



Network  
Components  
Business Unit

# CMOS IC

## Product Catalogue

### 2005-2006

- CMOS IC
- Quartz Crystals
- Custom LCD Module
- Micro Batteries
- Materials



# Voltage Detectors

Next-generation flagship model voltage detector

Ultra-low current consumption

## 350nA typ. S-1000 Series

From SII with recognized No. 1 global share<sup>Note</sup>

Note SII's share in the CMOS voltage detector market; data taken from SII market research.

**350nA**

**Incredible low current consumption of 350 nA**

The S-1000 achieves an **ultra-low current consumption of 350 nA (typ.)** due to a new fine process technology and optimized circuit design, while maintaining a **response speed equivalent to that of the S-808xxC.**

**±1.0%**

**Ultra-high detection voltage accuracy of ±1.0%**

The ±1.0% ultra-high detection voltage accuracy achieved by the S-1000 enables highly accurate detection of the battery (power supply) voltage.



# Voltage Regulators

Richlineup of highly innovative voltage regulators



**±1.0%**

High output voltage accuracy

S-1111/21	S-1112/22	S-1167	S-1323	S-T111
S-L2985	S-1200	S-1165	S-1131	S-1132
S-1170	S-1701	S-1711		



**9 μA (70 dB)/50 μA (80 dB)**

High ripple rejection ratio and low current consumption

9 μA typ. (70 dB, C <sub>OUT</sub> =1 μF)	S-1167
18 μA typ. (70 dB, C <sub>OUT</sub> =0.1 μF)	S-1200
20 μA typ. (70 dB, C <sub>OUT</sub> =0.1 μF)	S-1132
50 μA typ. (80 dB)	S-1112/22, S-T111, S-L2985



**0.1 μF/0.47 μF Ceramic capacitors**

Small external input/output ceramic capacitors with high level of safety

0.1 μF Input/output	S-T111	S-1200	S-1132
0.47 μF Output	S-1112/22	S-L2985	



**SNT/HSON/WLP**

Wide range of small packages available  
Ultra-small SNT package used in many products

SNT-4A	S-817	S-1323
SNT-6A	S-1711	
SNT-6A(H)	S-812C	S-1112, S-1167, S-1200
	S-1132	



**80/70 dB**

High ripple rejection ratio

80 dB	S-1112/22	S-T111	S-L2985
70 dB	S-1111/21	S-1167	S-1323, S-1200
	S-L2980	S-1165	S-1131, S-1132
	S-1170	S-1701	S-1711



**~ 800 mA**

CMOS voltage regulator with 800 mA high output current

~800 mA	S-1170
~300 mA	S-1131, S-1132



**500 mW (SNT-6A (H))**

Small package and high power dissipation

SNT-4A (1.2x1.6 mm)	300 mW (when mounted on PCB)
SNT-6A (1.6x1.8 mm)	400 mW (when mounted on PCB)
SNT-6A(H) (1.6x1.8 mm)	500 mW (when mounted on PCB)



**0.4 Ω/0.7 Ω**

Low on-resistance (low dropout voltage)

Battery can be used up completely, extending the battery life

0.4 Ω	S-1170
0.7 Ω	S-1165



Notebook PC



Mobile phone



PDA



Electric shaver



Game



Digital still camera, Compact camera



Car navigation



DVD-R/RW, CD-R/RW  
DVD player/recorder



Cordless phone, FAX



Video camera



LCD TV, Plasma TV

**www.sii-ic.com**

## SII IC Product Web site



**All the support you need for selecting the best products! Full of hints!**

⊙ **Extensive range of data sheets and support information**

Data sheets and technical details of new products and products listed in this catalog are downloadable.

⊙ **Easy search of product information from various design support pages**

Set search conditions to make it even easier to find what you are looking for.

⊙ **Environment information**

Provides latest response status to environmental measures, such as lead-free products or the RoHS Directive that will be even more important.

⊙ **Wealth of up-to-the-minute information on the latest products and more**

Get the latest information in a timely manner.

⊙ **GTSCAT Switching regulator simulator**

This is a tool for supporting the design of circuits to be used with switching regulators.

This software quickly analyses the performance of switching regulators made or sold by SII in the standard circuits.

<Types of analysis>

- Analysis of steady state waveforms
- Analysis of how efficiency and output voltage depend on output current
- Analysis of transient response during power on
- Analysis of transient response during input voltage fluctuation
- Analysis of transient response during load current fluctuation

Simulation results are clearly shown in a graph.

⊙ **Delivers information covering a wide variety of information and events**

Carries important announcements

⊙ **Web pages fully written in Chinese (simplified) are also provided.**

### Voltage Detectors

ULTRA-SMALL PACKAGE HIGH-PRECISION VOLTAGE DETECTOR .....	S-1000 series .....	7
SUPER-SMALL PACKAGE HIGH-PRECISION VOLTAGE DETECTOR .....	S-808xxC series .....	8
SUPER-SMALL PACKAGE HIGH-PRECISION VOLTAGE DETECTOR WITH DELAY CIRCUIT (INTERNAL DELAY TIME SETTING) .....	S-801 series .....	11
SUPER-SMALL PACKAGE HIGH-PRECISION VOLTAGE DETECTOR WITH DELAY CIRCUIT (EXTERNAL DELAY TIME SETTING) .....	S-809xxC series .....	13

### Voltage Regulators

TO 150 mA OUTPUT CURRENT HIGH RIPPLE REJECTION AND LOW DROPOUT CMOS VOLTAGE REGULATOR .....	S-1112/1122 series .....	14
TO 150 mA OUTPUT CURRENT HIGH RIPPLE REJECTION AND LOW DROPOUT CMOS VOLTAGE REGULATOR .....	S-T111 series .....	16
TO 150 mA OUTPUT CURRENT HIGH RIPPLE REJECTION, WLP PACKAGE AND LOW DROPOUT CMOS VOLTAGE REGULATOR .....	S-L2985 series .....	17
TO 150 mA OUTPUT CURRENT HIGH RIPPLE REJECTION AND LOW DROPOUT CMOS VOLTAGE REGULATOR .....	S-1111/1121 series .....	18
TO 150 mA OUTPUT CURRENT ULTRA LOW CURRENT CONSUMPTION, HIGH RIPPLE REJECTION AND LOW DROPOUT CMOS VOLTAGE REGULATOR .....	S-1167 series .....	19
TO 150 mA OUTPUT CURRENT HIGH RIPPLE REJECTION AND SMALL PACKAGE CMOS VOLTAGE REGULATOR .....	S-1323 series .....	20
TO 150 mA OUTPUT CURRENT, 10 V INPUT VOLTAGE		
HIGH RIPPLE REJECTION LOW DROPOUT LOW INPUT AND OUTPUT CAPACITANCE CMOS VOLTAGE REGULATOR .....	S-1200 series .....	21
TO 150 mA OUTPUT CURRENT, 10 V INPUT VOLTAGE HIGH RIPPLE REJECTION AND LOW DROPOUT CMOS VOLTAGE REGULATOR .....	S-L2980 series .....	22
TO 200 mA OUTPUT CURRENT HIGH RIPPLE REJECTION AND LOW DROPOUT CMOS VOLTAGE REGULATOR .....	S-1165 series .....	23
TO 300 mA OUTPUT CURRENT HIGH RIPPLE REJECTION AND LOW DROPOUT MIDDLE-OUTPUT CURRENT CMOS VOLTAGE REGULATOR .....	S-1131 series .....	24
TO 300 mA OUTPUT CURRENT HIGH RIPPLE REJECTION LOW DROPOUT MIDDLE OUTPUT CURRENT CMOS VOLTAGE REGULATOR .....	S-1132 series .....	25
TO 800 mA OUTPUT CURRENT HIGH RIPPLE REJECTION AND LOW DROPOUT HIGH-OUTPUT CURRENT CMOS VOLTAGE REGULATOR .....	S-1170 series .....	26
HIGH OPERATING VOLTAGE CMOS VOLTAGE REGULATOR .....	S-812C series .....	27
SUPER-SMALL PACKAGE VOLTAGE REGULATOR .....	S-817 series .....	29
EXTERNAL TRANSISTOR TYPE VOLTAGE REGULATOR .....	S-816 series .....	31
LOW DROPOUT VOLTAGE REGULATOR .....	S-814 series .....	32
LOW DROPOUT CMOS VOLTAGE REGULATOR .....	S-818 series .....	33
HIGH RIPPLE REJECTION LOW DROPOUT CMOS VOLTAGE REGULATOR WITH RESET FUNCTION .....	S-1701 series .....	34
SUPER-SMALL PACKAGE 2-CIRCUIT HIGH RIPPLE REJECTION LOW DROPOUT CMOS VOLTAGE REGULATOR .....	S-1711 series .....	36

### Switching Regulators (DC-DC Converters)

STEP-UP, SUPER-SMALL PACKAGE, 600 kHz, PWM CONTROL OR PWM/PFM SWITCHABLE SWITCHING REGULATOR CONTROLLER .....	S-8355/56/57/58 series .....	37
STEP-UP, PWM CONTROL OR PWM/PFM SWITCHABLE BUILT-IN TRANSISTOR SWITCHING REGULATOR .....	S-8353/8354 series .....	40
STEP-UP, 600 kHz, PWM CONTROL OR PWM/PFM SWITCHABLE BUILT-IN TRANSISTOR SWITCHING REGULATOR (MULTICHIP PACKAGE) .....	S-83M355/83M356 series .....	42
STEP-UP, SUPER-SMALL PACKAGE, PFM CONTROL SWITCHING REGULATOR/SWITCHING REGULATOR CONTROLLER .....	S-8351/8352 series .....	43
STEP-UP, 1.2 MHz HIGH-FREQUENCY, PWM CONTROL SWITCHING REGULATOR CONTROLLER .....	S-8337/8338 series .....	45
STEP-UP, 600 kHz, PWM CONTROL OR PWM/PFM SWITCHABLE SWITCHING REGULATOR CONTROLLER .....	S-8340/8341 series .....	46
STEP-UP, FOR LCD BIAS SUPPLY, 1-CHANNEL, PWM CONTROL SWITCHING REGULATOR CONTROLLER .....	S-8333 series .....	47
STEP-UP, FOR LCD BIAS SUPPLY, 3-CHANNEL SWITCHING REGULATOR .....	S-8335 series .....	48
STEP-UP, FOR LCD BIAS SUPPLY, 1-CHANNEL SWITCHING REGULATOR .....	S-8330/8331 series .....	49
STEP-DOWN, PWM CONTROL OR PWM/PFM SWITCHABLE SWITCHING REGULATOR CONTROLLER .....	S-8520/8521 series .....	50
STEP-DOWN, 600 kHz, PWM CONTROL OR PWM/PFM SWITCHABLE SWITCHING REGULATOR CONTROLLER .....	S-8540/8541 series .....	52
STEP-DOWN, SYNCHRONOUS PWM CONTROL SWITCHING REGULATOR CONTROLLER .....	S-8533 series .....	53
STEP-UP OR DOWN, SINGLE-COIL, PWM CONTROL SWITCHING REGULATOR CONTROLLER .....	S-8460 .....	54

### Charge Pumps

3-CHANNEL WHITE LED DRIVER IC (CHARGE PUMP IC WITH BUILT-IN CONSTANT CURRENT CIRCUIT) .....	S-8813 series .....	55
STEP-UP CHARGE PUMP DC-DC CONVERTER .....	S-8821 series .....	56
ULTRA-LOW VOLTAGE OPERATION CHARGE PUMP IC FOR STEP-UP DC-DC CONVERTER STARTUP .....	S-882Z series .....	57

### Composite ICs

HIGH WITHSTANDING-VOLTAGE VOLTAGE REGULATOR WITH RESET FUNCTION .....	S-87x series .....	58
BATTERY BACKUP IC .....	S-8424A series .....	60
BATTERY BACKUP IC .....	S-8425 series .....	61



# Contents

## Lithium-ion Rechargeable Battery Protection ICs

BATTERY PROTECTION IC FOR 1-CELL PACK	S-8211A/C series	62
BATTERY PROTECTION IC FOR 1-CELL PACK	S-8261 series	64
BATTERY PROTECTION IC FOR 1-CELL PACK	S-8241 series	66
BATTERY PROTECTION IC FOR 2-SERIAL-CELL PACK	S-8242 series	68
BATTERY PROTECTION IC FOR 2-SERIAL-CELL PACK	S-8232 series	69
BATTERY PROTECTION IC FOR 3-SERIAL-CELL PACK	S-8233A/B/C series	70
BATTERY PROTECTION IC FOR 2-SERIAL OR 3-SERIAL CELL PACK	S-8253A/B series	71
BATTERY PROTECTION IC FOR 3-SERIAL OR 4-SERIAL CELL PACK	S-8243A/B series	72
BATTERY PROTECTION IC FOR 3-SERIAL OR 4-SERIAL CELL PACK	S-8254 series	73
BATTERY PROTECTION IC FOR 1 TO 4-SERIAL CELL PACK (SECONDARY PROTECTION)	S-8244 series	74

## MEMORIES

75

### E<sup>2</sup>PROM

HIGH-RELIABILITY, SUPER-SMALL PACKAGE 2-WIRE SERIAL E <sup>2</sup> PROM	S-24CS01A/02A/04A/08A/16A/64A/128A	76
HIGH-RELIABILITY, SUPER-SMALL PACKAGE 3-WIRE SERIAL E <sup>2</sup> PROM	S-93C46B/56B/66B/76A/86B	78
HIGH-RELIABILITY, 3-WIRE SERIAL E <sup>2</sup> PROM WITH 125°C OPERATION GUARANTEED	S-93A46A/56A/66A/86A	79
LOW VOLTAGE OPERATION, SUPER-SMALL PACKAGE 2-WIRE SERIAL E <sup>2</sup> PROM	S-24C02BP/04BP	80
LOW VOLTAGE OPERATION, SUPER-SMALL PACKAGE 3-WIRE SERIAL E <sup>2</sup> PROM	S-93L46A/56A/66A/76A	81
OTHERS E <sup>2</sup> PROM		82

## ANALOG ICs

83

### Mini Analog

0.5 $\mu$ A RAIL-TO-RAIL CMOS OPERATIONAL AMPLIFIER	1 Circuit	S-89430A/89431A	84
CMOS OPERATIONAL AMPLIFIER	1 Circuit	S-89110A/89120A	85
CMOS OPERATIONAL AMPLIFIER	2 Circuits	S-89110B/89120B	85
0.7 $\mu$ A RAIL-TO-RAIL CMOS COMPARATOR	1 Circuit	S-89530A/89531A	86
CMOS COMPARATOR	1 Circuit	S-89210A/89220A	87
CMOS COMPARATOR	2 Circuits	S-89210B/89220B	87

### Temperature switch

TEMPERATURE SWITCH IC	S-8130 series	88
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### Sensor

TEMPERATURE SENSOR IC	S-8110C/8120C series	89
LINEAR IMAGE SENSOR IC FOR CONTACT IMAGE SENSOR	S-86xx	90

## REALTIME CLOCK, PROGRAMMABLE PORT CONTROLLER, MINI LOGIC

91

REALTIME CLOCK	S-35190A/35390A	92
PROGRAMMABLE PORT CONTROLLER (PORT EXPANDER WITH BUILT-IN E <sup>2</sup> PROM CIRCUIT)	S-7750B	94
MINI LOGIC SERIES	S-75V/75L series	95

## DESIGNATED CLIENT PRODUCTS

96

## PHASE-OUT AND OBSOLETE PRODUCTS

97

## CMOS IC PACKAGES

99

## CMOS IC PACKAGES (DIMENSIONAL DRAWINGS)

100

For thermal head drivers and paging decoders, see our Web site at [SII-IC.COM](http://SII-IC.COM).  
For LCD drivers, contact our sales office.

## Power Supply IC Lineup

				Package			
						Page	
<b>Voltage Detectors</b>							
350nA Ultra low current consumption		S-1000 series				7	
Built-in delay circuit		S-808xxC series				8	
Internal delay time setting		S-801 series				11	
External delay time setting		S-809xxC series				13	
<b>Voltage Regulators (Positive Output Voltage)</b>							
Output current up to 75mA Linear regulators		SNT-6A(H)(Super-small) available		With ON/OFF function		S-812C series	27
		SNT-4A(Super-small) available		Without ON/OFF function		S-817 series	29
Output current up to 150mA LDO regulators		80dB Super high ripple rejection		Equivalent to TK111		S-1112/1122 series	14
		70dB High ripple rejection		WLP package (super-small)		S-L2985 series	17
				S-1111/1121 series		18	
				9mA Ultra-low current consumption		S-1167 series	19
				SNT-4A and SC-82AB packages		S-1323 series	20
				10V input voltage, low current consumption		S-1200 series	21
				10V input voltage, Equivalent to LP2980		S-L2980 series	22
Output current up to 200mA LDO regulators		70dB High ripple rejection		Low I/O voltage differential		S-1165 series	23
Output current up to 300mA LDO regulators		70dB High ripple rejection		Tantalum capacitors		S-1131 series	24
Output current up to 800mA LDO regulators		70dB High ripple rejection		Ceramic capacitors		S-1132 series	25
Output current up to 1A Linear regulators		External transistor		Low I/O voltage differential		S-1170 series	26
		Output current up to 180mA		Short circuit protection		S-816 series	31
		Output current up to 300mA				S-814 series	32
						S-818 series	33
Composite ICs		70dB High ripple rejection		Voltage detector + voltage regulator		S-1701 series	34
				Voltage regulators (2 circuits)		S-1711 series	36
<b>Switching Regulators (DC-DC Converters)</b>							
Step-up		Super-small		PWM control, PWM/PFM switchover		S-8355/56/57/58 series	37
				Built-in Tr		S-8353/8354 series	40
				High frequency (600kHz)		S-83M355/83M356 series	42
				PFM control		S-8351/8352 series	43
				1.2MHz		S-8337/8338 series	45
				600/300kHz		S-8340/8341 series	46
				For LCD		S-8335 series	48
				3 channels		S-8333 series	47
				1 channel		S-8330/8331 series	49
				High frequency (1.2MHz)		S-8520/8521 series	50
Step-down		Super-small				S-8540/8541 series	52
				High frequency (600/300 kHz)		S-8533 series	53
				Synchronous rectifying		S-8460	54
Step-up & step-down							
<b>Charge Pumps</b>							
Step-up 3-channel white LED driver						S-8813 series	55
Step-up						S-8821 series	56
Set-up DC-DC converter startup IC (Ultra-Low voltage operation)						S-882Z series	57
<b>Composite ICs</b>							
Voltage detector + voltage regulator (high-withstanding voltage)						S-87x series	58
Battery backup						S-8424A series	60
						S-8425 series	61
<b>Lithium-ion Rechargeable Battery Protection ICs</b>							
1-Cell		Small				S-8211A/C series	62
						S-8261 series	64
						S-8241 series	66
2-Cell						S-8232 series	69
		External capacitance not required				S-8242 series	68
						S-8253A series	71
3-Cell						S-8233A/B/C series	70
		Battery voltage monitor				S-8243A series	72
		External capacitance not required				S-8253B series	71
4-Cell				Battery voltage monitor		S-8243B series	72
3-/4-Cell switching						S-8254 series	73
Secondary protection						S-8244 series	74

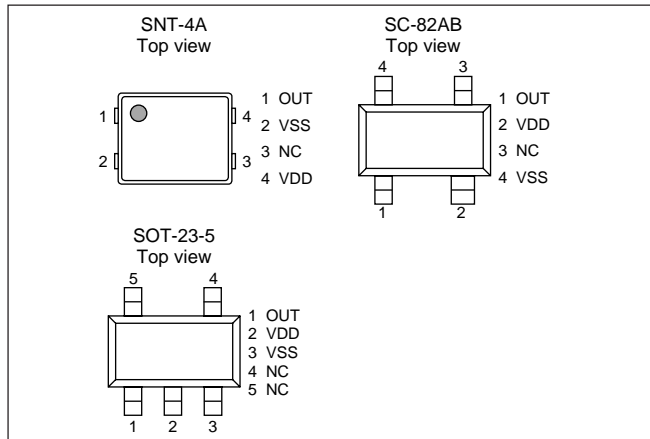
**New** : New product \*1. S-1112 series only

## ULTRA-SMALL PACKAGE HIGH-PRECISION VOLTAGE DETECTOR

S-1000 series

The S-1000 series is a series of high-precision voltage detectors developed using CMOS process. The detection voltage is fixed internally with an accuracy of  $\pm 1.0\%$ . It operates with low current consumption of 350 nA typ. Two output forms, Nch open-drain and CMOS output, are available. CMOS voltage detector, S-1000 Series is the most suitable for the portable equipments with ultra low current consumption, high precision and corresponding to the small package.

### PIN CONFIGURATIONS



### FEATURES

- low current consumption: 350 nA (0.35  $\mu$ A) typ. ( $V_{DD}$  = detection voltage + 1.5 V)
- Detection voltage accuracy:  $\pm 1.0\%$
- Operating voltage range: 0.95 to 5.5 V
- Hysteresis: 5% typ.
- Detection voltage: 1.5 to 4.6 V (0.1 V steps)
- Output type: Active low Open-drain (Nch open-drain) output  
Active low Push-pull (CMOS output)

### APPLICATIONS

- Power monitor for microcomputers and reset for CPUs.
- Power monitor for portable equipments such as cellular phones, digital still cameras and PDAs.
- Constant voltage power monitor for cameras, video equipments and communication devices.

### SELECTION GUIDE

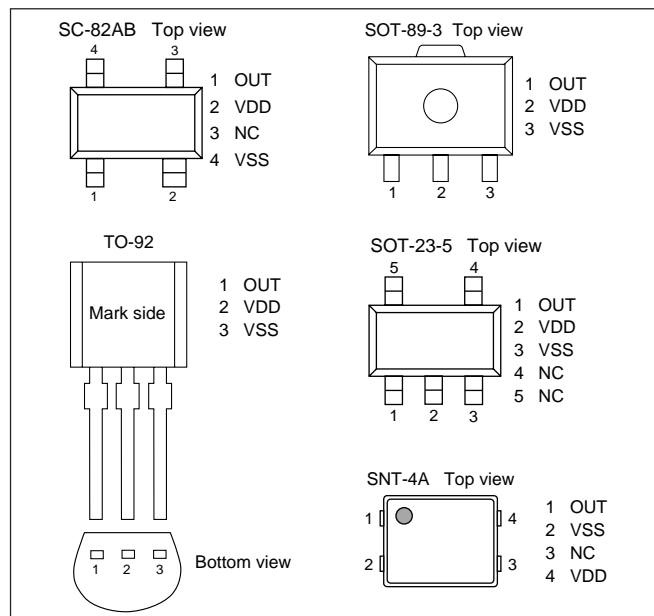
Detection voltage	Open-drain (Nch open-drain) [low]			Push-pull (CMOS output) [low]		
	SC-82AB (3000/reel)	SOT-23-5 (3000/reel)	SNT-4A (5000/reel)	SC-82AB (3000/reel)	SOT-23-5 (3000/reel)	SNT-4A (5000/reel)
1.5 $\pm$ 1.0%	S-1000N15-N4T1G	S-1000N15-M5T1G	S-1000N15-I4T1G	S-1000C15-N4T1G	S-1000C15-M5T1G	S-1000C15-I4T1G
1.6 $\pm$ 1.0%	S-1000N16-N4T1G	S-1000N16-M5T1G	S-1000N16-I4T1G	S-1000C16-N4T1G	S-1000C16-M5T1G	S-1000C16-I4T1G
1.7 $\pm$ 1.0%	S-1000N17-N4T1G	S-1000N17-M5T1G	S-1000N17-I4T1G	S-1000C17-N4T1G	S-1000C17-M5T1G	S-1000C17-I4T1G
1.8 $\pm$ 1.0%	S-1000N18-N4T1G	S-1000N18-M5T1G	S-1000N18-I4T1G	S-1000C18-N4T1G	S-1000C18-M5T1G	S-1000C18-I4T1G
1.9 $\pm$ 1.0%	S-1000N19-N4T1G	S-1000N19-M5T1G	S-1000N19-I4T1G	S-1000C19-N4T1G	S-1000C19-M5T1G	S-1000C19-I4T1G
2.0 $\pm$ 1.0%	S-1000N20-N4T1G	S-1000N20-M5T1G	S-1000N20-I4T1G	S-1000C20-N4T1G	S-1000C20-M5T1G	S-1000C20-I4T1G
2.1 $\pm$ 1.0%	S-1000N21-N4T1G	S-1000N21-M5T1G	S-1000N21-I4T1G	S-1000C21-N4T1G	S-1000C21-M5T1G	S-1000C21-I4T1G
2.2 $\pm$ 1.0%	S-1000N22-N4T1G	S-1000N22-M5T1G	S-1000N22-I4T1G	S-1000C22-N4T1G	S-1000C22-M5T1G	S-1000C22-I4T1G
2.3 $\pm$ 1.0%	S-1000N23-N4T1G	S-1000N23-M5T1G	S-1000N23-I4T1G	S-1000C23-N4T1G	S-1000C23-M5T1G	S-1000C23-I4T1G
2.4 $\pm$ 1.0%	S-1000N24-N4T1G	S-1000N24-M5T1G	S-1000N24-I4T1G	S-1000C24-N4T1G	S-1000C24-M5T1G	S-1000C24-I4T1G
2.5 $\pm$ 1.0%	S-1000N25-N4T1G	S-1000N25-M5T1G	S-1000N25-I4T1G	S-1000C25-N4T1G	S-1000C25-M5T1G	S-1000C25-I4T1G
2.6 $\pm$ 1.0%	S-1000N26-N4T1G	S-1000N26-M5T1G	S-1000N26-I4T1G	S-1000C26-N4T1G	S-1000C26-M5T1G	S-1000C26-I4T1G
2.7 $\pm$ 1.0%	S-1000N27-N4T1G	S-1000N27-M5T1G	S-1000N27-I4T1G	S-1000C27-N4T1G	S-1000C27-M5T1G	S-1000C27-I4T1G
2.8 $\pm$ 1.0%	S-1000N28-N4T1G	S-1000N28-M5T1G	S-1000N28-I4T1G	S-1000C28-N4T1G	S-1000C28-M5T1G	S-1000C28-I4T1G
2.9 $\pm$ 1.0%	S-1000N29-N4T1G	S-1000N29-M5T1G	S-1000N29-I4T1G	S-1000C29-N4T1G	S-1000C29-M5T1G	S-1000C29-I4T1G
3.0 $\pm$ 1.0%	S-1000N30-N4T1G	S-1000N30-M5T1G	S-1000N30-I4T1G	S-1000C30-N4T1G	S-1000C30-M5T1G	S-1000C30-I4T1G
3.1 $\pm$ 1.0%	S-1000N31-N4T1G	S-1000N31-M5T1G	S-1000N31-I4T1G	S-1000C31-N4T1G	S-1000C31-M5T1G	S-1000C31-I4T1G
3.2 $\pm$ 1.0%	S-1000N32-N4T1G	S-1000N32-M5T1G	S-1000N32-I4T1G	S-1000C32-N4T1G	S-1000C32-M5T1G	S-1000C32-I4T1G
3.3 $\pm$ 1.0%	S-1000N33-N4T1G	S-1000N33-M5T1G	S-1000N33-I4T1G	S-1000C33-N4T1G	S-1000C33-M5T1G	S-1000C33-I4T1G
3.4 $\pm$ 1.0%	S-1000N34-N4T1G	S-1000N34-M5T1G	S-1000N34-I4T1G	S-1000C34-N4T1G	S-1000C34-M5T1G	S-1000C34-I4T1G
3.5 $\pm$ 1.0%	S-1000N35-N4T1G	S-1000N35-M5T1G	S-1000N35-I4T1G	S-1000C35-N4T1G	S-1000C35-M5T1G	S-1000C35-I4T1G
3.6 $\pm$ 1.0%	S-1000N36-N4T1G	S-1000N36-M5T1G	S-1000N36-I4T1G	S-1000C36-N4T1G	S-1000C36-M5T1G	S-1000C36-I4T1G
3.7 $\pm$ 1.0%	S-1000N37-N4T1G	S-1000N37-M5T1G	S-1000N37-I4T1G	S-1000C37-N4T1G	S-1000C37-M5T1G	S-1000C37-I4T1G
3.8 $\pm$ 1.0%	S-1000N38-N4T1G	S-1000N38-M5T1G	S-1000N38-I4T1G	S-1000C38-N4T1G	S-1000C38-M5T1G	S-1000C38-I4T1G
3.9 $\pm$ 1.0%	S-1000N39-N4T1G	S-1000N39-M5T1G	S-1000N39-I4T1G	S-1000C39-N4T1G	S-1000C39-M5T1G	S-1000C39-I4T1G
4.0 $\pm$ 1.0%	S-1000N40-N4T1G	S-1000N40-M5T1G	S-1000N40-I4T1G	S-1000C40-N4T1G	S-1000C40-M5T1G	S-1000C40-I4T1G
4.1 $\pm$ 1.0%	S-1000N41-N4T1G	S-1000N41-M5T1G	S-1000N41-I4T1G	S-1000C41-N4T1G	S-1000C41-M5T1G	S-1000C41-I4T1G
4.2 $\pm$ 1.0%	S-1000N42-N4T1G	S-1000N42-M5T1G	S-1000N42-I4T1G	S-1000C42-N4T1G	S-1000C42-M5T1G	S-1000C42-I4T1G
4.3 $\pm$ 1.0%	S-1000N43-N4T1G	S-1000N43-M5T1G	S-1000N43-I4T1G	S-1000C43-N4T1G	S-1000C43-M5T1G	S-1000C43-I4T1G
4.4 $\pm$ 1.0%	S-1000N44-N4T1G	S-1000N44-M5T1G	S-1000N44-I4T1G	S-1000C44-N4T1G	S-1000C44-M5T1G	S-1000C44-I4T1G
4.5 $\pm$ 1.0%	S-1000N45-N4T1G	S-1000N45-M5T1G	S-1000N45-I4T1G	S-1000C45-N4T1G	S-1000C45-M5T1G	S-1000C45-I4T1G
4.6 $\pm$ 1.0%	S-1000N46-N4T1G	S-1000N46-M5T1G	S-1000N46-I4T1G	S-1000C46-N4T1G	S-1000C46-M5T1G	S-1000C46-I4T1G

## SUPER-SMALL PACKAGE HIGH-PRECISION VOLTAGE DETECTOR

S-808xxC series

The S-808xxC series is a family of high-precision voltage detectors, developed using CMOS technology. The detection voltage is fixed and its accuracy is  $\pm 2.0\%$ . Five package types are available for various uses. Open-drain (Nch open-drain) output and Push-pull (CMOS output) are available.

### PIN CONFIGURATIONS



### FEATURES

- Ultra-low current consumption:
  - 1.3  $\mu\text{A}$  typ. (Detection voltage 1.4 V typ. or below models,  $V_{DD} = 1.5$  V)
  - 0.8  $\mu\text{A}$  typ. (Detection voltage 1.5 V typ. or above models,  $V_{DD} = 3.5$  V)
- Detection voltage accuracy:  $\pm 2.0\%$
- Operating voltage range:
  - 0.65 to 5.0 V (Detection voltage 1.4 V typ. or below models)
  - 0.95 to 10.0 V (Detection voltage 1.5 V typ. or above models)
- Hysteresis: 5% typ.
- Detection voltage: 0.8 to 6.0 V (0.1 V steps)
- Output type: Active low Open-drain (Nch open-drain) output  
Active low Push-pull (CMOS output)

### APPLICATIONS

- Battery checker
- Power failure detector
- Power supply monitor for portable equipment such as pagers, pocket calculators, electronic organizers, remote controllers
- Constant voltage power supply monitor for cameras, video equipment, communication devices
- Power supply monitor for microcomputers and reset for CPUs



SELECTION GUIDE (1) Open-drain (Nch open-drain) output

(1/2)

Detection voltage	Hysteresis width (typ.)	Open-drain (Nch open-drain) [active low]				
		SC-82AB (3000/reel)	TO-92*1	SOT-89-3 (1000/reel)	SOT-23-5 (3000/reel)	SNT-4A (5000/reel)
0.8V ± 2.0%	0.034V	S-80808CNNB-B9MT2G	-	-	-	S-80808CNPF-B9MTFG
0.9V ± 2.0%	0.044V	S-80809CNNB-B9NT2G	-	-	-	S-80809CNPF-B9NTFG
1.0V ± 2.0%	0.054V	S-80810CNNB-B9OT2G	-	-	-	S-80810CNPF-B9OTFG
1.1V ± 2.0%	0.064V	S-80811CNNB-B9PT2G	-	-	-	S-80811CNPF-B9PTFG
1.2V ± 2.0%	0.073V	S-80812CNNB-B9QT2G	-	-	-	S-80812CNPF-B9QTFG
1.3V ± 2.0%	0.083V	S-80813CNNB-B9RT2G	-	-	-	S-80813CNPF-B9RTFG
1.4V ± 2.0%	0.093V	S-80814CNNB-B9ST2G	-	-	-	S-80814CNPF-B9STFG
1.5V ± 2.0%	0.075V	S-80815CNNB-B8AT2G	S-80815CNY-X-G	S-80815CNUA-B8AT2G	S-80815CNMC-B8AT2G	S-80815CNPF-B8ATFG
1.6V ± 2.0%	0.080V	S-80816CNNB-B8BT2G	S-80816CNY-X-G	S-80816CNUA-B8BT2G	S-80816CNMC-B8BT2G	S-80816CNPF-B8BTFG
1.7V ± 2.0%	0.085V	S-80817CNNB-B8CT2G	S-80817CNY-X-G	S-80817CNUA-B8CT2G	S-80817CNMC-B8CT2G	S-80817CNPF-B8CTFG
1.8V ± 2.0%	0.090V	S-80818CNNB-B8DT2G	S-80818CNY-X-G	S-80818CNUA-B8DT2G	S-80818CNMC-B8DT2G	S-80818CNPF-B8DTFG
1.9V ± 2.0%	0.095V	S-80819CNNB-B8ET2G	S-80819CNY-X-G	S-80819CNUA-B8ET2G	S-80819CNMC-B8ET2G	S-80819CNPF-B8ETFG
2.0V ± 2.0%	0.100V	S-80820CNNB-B8FT2G	S-80820CNY-X-G	S-80820CNUA-B8FT2G	S-80820CNMC-B8FT2G	S-80820CNPF-B8FTFG
2.1V ± 2.0%	0.105V	S-80821CNNB-B8GT2G	S-80821CNY-X-G	S-80821CNUA-B8GT2G	S-80821CNMC-B8GT2G	S-80821CNPF-B8GTFG
2.2V ± 2.0%	0.110V	S-80822CNNB-B8HT2G	S-80822CNY-X-G	S-80822CNUA-B8HT2G	S-80822CNMC-B8HT2G	S-80822CNPF-B8HTFG
2.3V ± 2.0%	0.115V	S-80823CNNB-B8IT2G	S-80823CNY-X-G	S-80823CNUA-B8IT2G	S-80823CNMC-B8IT2G	S-80823CNPF-B8ITFG
2.4V ± 2.0%	0.120V	S-80824CNNB-B8JT2G	S-80824CNY-X-G	S-80824CNUA-B8JT2G	S-80824CNMC-B8JT2G	S-80824CNPF-B8JTFG
2.4V typ.	4.4 ± 0.1V <sup>2</sup>	-	S-80824KNY-X-G	S-80824KNUA-D2BT2G	-	-
2.5V ± 2.0%	0.125V	S-80825CNNB-B8KT2G	S-80825CNY-X-G	S-80825CNUA-B8KT2G	S-80825CNMC-B8KT2G	S-80825CNPF-B8KTFG
2.6V ± 2.0%	0.130V	S-80826CNNB-B8LT2G	S-80826CNY-X-G	S-80826CNUA-B8LT2G	S-80826CNMC-B8LT2G	S-80826CNPF-B8LTFG
2.7V ± 2.0%	0.135V	S-80827CNNB-B8MT2G	S-80827CNY-X-G	S-80827CNUA-B8MT2G	S-80827CNMC-B8MT2G	S-80827CNPF-B8MTFG
2.8V ± 2.0%	0.140V	S-80828CNNB-B8NT2G	S-80828CNY-X-G	S-80828CNUA-B8NT2G	S-80828CNMC-B8NT2G	S-80828CNPF-B8NTFG
2.9V ± 2.0%	0.145V	S-80829CNNB-B8OT2G	S-80829CNY-X-G	S-80829CNUA-B8OT2G	S-80829CNMC-B8OT2G	S-80829CNPF-B8OTFG
3.0V ± 2.0%	0.150V	S-80830CNNB-B8PT2G	S-80830CNY-X-G	S-80830CNUA-B8PT2G	S-80830CNMC-B8PT2G	S-80830CNPF-B8PTFG
3.1V ± 2.0%	0.155V	S-80831CNNB-B8QT2G	S-80831CNY-X-G	S-80831CNUA-B8QT2G	S-80831CNMC-B8QT2G	S-80831CNPF-B8QTFG
3.2V ± 2.0%	0.160V	S-80832CNNB-B8RT2G	S-80832CNY-X-G	S-80832CNUA-B8RT2G	S-80832CNMC-B8RT2G	S-80832CNPF-B8RTFG
3.3V ± 2.0%	0.165V	S-80833CNNB-B8ST2G	S-80833CNY-X-G	S-80833CNUA-B8ST2G	S-80833CNMC-B8ST2G	S-80833CNPF-B8STFG
3.4V ± 2.0%	0.170V	S-80834CNNB-B8TT2G	S-80834CNY-X-G	S-80834CNUA-B8TT2G	S-80834CNMC-B8TT2G	S-80834CNPF-B8TTFG
3.5V ± 2.0%	0.175V	S-80835CNNB-B8UT2G	S-80835CNY-X-G	S-80835CNUA-B8UT2G	S-80835CNMC-B8UT2G	S-80835CNPF-B8UTFG
3.6V ± 2.0%	0.180V	S-80836CNNB-B8VT2G	S-80836CNY-X-G	S-80836CNUA-B8VT2G	S-80836CNMC-B8VT2G	S-80836CNPF-B8VTFG
3.7V ± 2.0%	0.185V	S-80837CNNB-B8WT2G	S-80837CNY-X-G	S-80837CNUA-B8WT2G	S-80837CNMC-B8WT2G	S-80837CNPF-B8WTFG
3.8V ± 2.0%	0.190V	S-80838CNNB-B8XT2G	S-80838CNY-X-G	S-80838CNUA-B8XT2G	S-80838CNMC-B8XT2G	S-80838CNPF-B8XTFG
3.9V ± 2.0%	0.195V	S-80839CNNB-B8YT2G	S-80839CNY-X-G	S-80839CNUA-B8YT2G	S-80839CNMC-B8YT2G	S-80839CNPF-B8YTFG
4.0V ± 2.0%	0.200V	S-80840CNNB-B8ZT2G	S-80840CNY-X-G	S-80840CNUA-B8ZT2G	S-80840CNMC-B8ZT2G	S-80840CNPF-B8ZTFG
4.1V ± 2.0%	0.205V	S-80841CNNB-B82T2G	S-80841CNY-X-G	S-80841CNUA-B82T2G	S-80841CNMC-B82T2G	S-80841CNPF-B82TFG
4.2V ± 2.0%	0.210V	S-80842CNNB-B83T2G	S-80842CNY-X-G	S-80842CNUA-B83T2G	S-80842CNMC-B83T2G	S-80842CNPF-B83TFG
4.3V ± 2.0%	0.215V	S-80843CNNB-B84T2G	S-80843CNY-X-G	S-80843CNUA-B84T2G	S-80843CNMC-B84T2G	S-80843CNPF-B84TFG
4.4V ± 2.0%	0.220V	S-80844CNNB-B85T2G	S-80844CNY-X-G	S-80844CNUA-B85T2G	S-80844CNMC-B85T2G	S-80844CNPF-B85TFG
4.5V ± 2.0%	0.225V	S-80845CNNB-B86T2G	S-80845CNY-X-G	S-80845CNUA-B86T2G	S-80845CNMC-B86T2G	S-80845CNPF-B86TFG
4.6V ± 2.0%	0.230V	S-80846CNNB-B87T2G	S-80846CNY-X-G	S-80846CNUA-B87T2G	S-80846CNMC-B87T2G	S-80846CNPF-B87TFG
4.6V ± 0.10V	0.10V max.	-	S-80846KNY-X-G	S-80846KNUA-D2CT2G	-	-
4.7V ± 2.0%	0.235V	S-80847CNNB-B88T2G	S-80847CNY-X-G	S-80847CNUA-B88T2G	S-80847CNMC-B88T2G	S-80847CNPF-B88TFG
4.8V ± 2.0%	0.240V	S-80848CNNB-B89T2G	S-80848CNY-X-G	S-80848CNUA-B89T2G	S-80848CNMC-B89T2G	S-80848CNPF-B89TFG
4.9V ± 2.0%	0.245V	S-80849CNNB-B9AT2G	S-80849CNY-X-G	S-80849CNUA-B9AT2G	S-80849CNMC-B9AT2G	S-80849CNPF-B9ATFG
5.0V ± 2.0%	0.250V	S-80850CNNB-B9BT2G	S-80850CNY-X-G	S-80850CNUA-B9BT2G	S-80850CNMC-B9BT2G	S-80850CNPF-B9BTFG
5.1V ± 2.0%	0.255V	S-80851CNNB-B9CT2G	S-80851CNY-X-G	S-80851CNUA-B9CT2G	S-80851CNMC-B9CT2G	S-80851CNPF-B9CTFG
5.2V ± 2.0%	0.260V	S-80852CNNB-B9DT2G	S-80852CNY-X-G	S-80852CNUA-B9DT2G	S-80852CNMC-B9DT2G	S-80852CNPF-B9DTFG
5.3V ± 2.0%	0.265V	S-80853CNNB-B9ET2G	S-80853CNY-X-G	S-80853CNUA-B9ET2G	S-80853CNMC-B9ET2G	S-80853CNPF-B9ETFG
5.4V ± 2.0%	0.270V	S-80854CNNB-B9FT2G	S-80854CNY-X-G	S-80854CNUA-B9FT2G	S-80854CNMC-B9FT2G	S-80854CNPF-B9FTFG
5.5V ± 2.0%	0.275V	S-80855CNNB-B9GT2G	S-80855CNY-X-G	S-80855CNUA-B9GT2G	S-80855CNMC-B9GT2G	S-80855CNPF-B9GTFG
5.6V ± 2.0%	0.280V	S-80856CNNB-B9HT2G	S-80856CNY-X-G	S-80856CNUA-B9HT2G	S-80856CNMC-B9HT2G	S-80856CNPF-B9HTFG
5.7V ± 2.0%	0.285V	S-80857CNNB-B9IT2G	S-80857CNY-X-G	S-80857CNUA-B9IT2G	S-80857CNMC-B9IT2G	S-80857CNPF-B9ITFG
5.8V ± 2.0%	0.290V	S-80858CNNB-B9JT2G	S-80858CNY-X-G	S-80858CNUA-B9JT2G	S-80858CNMC-B9JT2G	S-80858CNPF-B9JTFG
5.9V ± 2.0%	0.295V	S-80859CNNB-B9KT2G	S-80859CNY-X-G	S-80859CNUA-B9KT2G	S-80859CNMC-B9KT2G	S-80859CNPF-B9KTFG
6.0V ± 2.0%	0.300V	S-80860CNNB-B9LT2G	S-80860CNY-X-G	S-80860CNUA-B9LT2G	S-80860CNMC-B9LT2G	S-80860CNPF-B9LTFG

\*1. "X" in the model number of TO-92 differs as follows:  
 B: Bulk, T: Tape and reel (2000/reel), Z: Tape and ammo (2500/reel)  
 \*2. Describes the release voltage.

## SELECTION GUIDE (2) Push-pull (CMOS output)

(2/2)

Detection voltage	Hysteresis width (typ.)	Push-pull (CMOS output) [active low]				
		SC-82AB (3000/reel)	TO-92 <sup>1</sup>	SOT-89-3 (1000/reel)	SOT-23-5 (3000/reel)	SNT-4A (5000/reel)
0.8V ± 2.0%	0.034V	S-80808CLNB-B7MT2G	-	-	-	S-80808CLPF-B7MTFG
0.9V ± 2.0%	0.044V	S-80809CLNB-B7NT2G	-	-	-	S-80809CLPF-B7NTFG
1.0V ± 2.0%	0.054V	S-80810CLNB-B7OT2G	-	-	-	S-80810CLPF-B7OTFG
1.1V ± 2.0%	0.064V	S-80811CLNB-B7PT2G	-	-	-	S-80811CLPF-B7PTFG
1.2V ± 2.0%	0.073V	S-80812CLNB-B7QT2G	-	-	-	S-80812CLPF-B7QTFG
1.3V ± 2.0%	0.083V	S-80813CLNB-B7RT2G	-	-	-	S-80813CLPF-B7RTFG
1.4V ± 2.0%	0.093V	S-80814CLNB-B7ST2G	-	-	-	S-80814CLPF-B7STFG
1.5V ± 2.0%	0.075V	S-80815CLNB-B6AT2G	S-80815CLY-X-G	S-80815CLUA-B6AT2G	S-80815CLMC-B6AT2G	S-80815CLPF-B6ATFG
1.6V ± 2.0%	0.080V	S-80816CLNB-B6BT2G	S-80816CLY-X-G	S-80816CLUA-B6BT2G	S-80816CLMC-B6BT2G	S-80816CLPF-B6BTFG
1.7V ± 2.0%	0.085V	S-80817CLNB-B6CT2G	S-80817CLY-X-G	S-80817CLUA-B6CT2G	S-80817CLMC-B6CT2G	S-80817CLPF-B6CTFG
1.8V ± 2.0%	0.090V	S-80818CLNB-B6DT2G	S-80818CLY-X-G	S-80818CLUA-B6DT2G	S-80818CLMC-B6DT2G	S-80818CLPF-B6DTFG
1.9V ± 2.0%	0.095V	S-80819CLNB-B6ET2G	S-80819CLY-X-G	S-80819CLUA-B6ET2G	S-80819CLMC-B6ET2G	S-80819CLPF-B6ETFG
2.0V ± 2.0%	0.100V	S-80820CLNB-B6FT2G	S-80820CLY-X-G	S-80820CLUA-B6FT2G	S-80820CLMC-B6FT2G	S-80820CLPF-B6FTFG
2.1V ± 2.0%	0.105V	S-80821CLNB-B6GT2G	S-80821CLY-X-G	S-80821CLUA-B6GT2G	S-80821CLMC-B6GT2G	S-80821CLPF-B6GTFG
2.2V ± 2.0%	0.110V	S-80822CLNB-B6HT2G	S-80822CLY-X-G	S-80822CLUA-B6HT2G	S-80822CLMC-B6HT2G	S-80822CLPF-B6HTFG
2.3V ± 2.0%	0.115V	S-80823CLNB-B6IT2G	S-80823CLY-X-G	S-80823CLUA-B6IT2G	S-80823CLMC-B6IT2G	S-80823CLPF-B6ITFG
2.4V ± 2.0%	0.120V	S-80824CLNB-B6JT2G	S-80824CLY-X-G	S-80824CLUA-B6JT2G	S-80824CLMC-B6JT2G	S-80824CLPF-B6JTFG
2.5V ± 2.0%	0.125V	S-80825CLNB-B6KT2G	S-80825CLY-X-G	S-80825CLUA-B6KT2G	S-80825CLMC-B6KT2G	S-80825CLPF-B6KTFG
2.6V ± 2.0%	0.130V	S-80826CLNB-B6LT2G	S-80826CLY-X-G	S-80826CLUA-B6LT2G	S-80826CLMC-B6LT2G	S-80826CLPF-B6LTFG
2.7V ± 2.0%	0.135V	S-80827CLNB-B6MT2G	S-80827CLY-X-G	S-80827CLUA-B6MT2G	S-80827CLMC-B6MT2G	S-80827CLPF-B6MTFG
2.8V ± 2.0%	0.140V	S-80828CLNB-B6NT2G	S-80828CLY-X-G	S-80828CLUA-B6NT2G	S-80828CLMC-B6NT2G	S-80828CLPF-B6NTFG
2.9V ± 2.0%	0.145V	S-80829CLNB-B6OT2G	S-80829CLY-X-G	S-80829CLUA-B6OT2G	S-80829CLMC-B6OT2G	S-80829CLPF-B6OTFG
3.0V ± 2.0%	0.150V	S-80830CLNB-B6PT2G	S-80830CLY-X-G	S-80830CLUA-B6PT2G	S-80830CLMC-B6PT2G	S-80830CLPF-B6PTFG
3.1V ± 2.0%	0.155V	S-80831CLNB-B6QT2G	S-80831CLY-X-G	S-80831CLUA-B6QT2G	S-80831CLMC-B6QT2G	S-80831CLPF-B6QTFG
3.2V ± 2.0%	0.160V	S-80832CLNB-B6RT2G	S-80832CLY-X-G	S-80832CLUA-B6RT2G	S-80832CLMC-B6RT2G	S-80832CLPF-B6RTFG
3.3V ± 2.0%	0.165V	S-80833CLNB-B6ST2G	S-80833CLY-X-G	S-80833CLUA-B6ST2G	S-80833CLMC-B6ST2G	S-80833CLPF-B6STFG
3.4V ± 2.0%	0.170V	S-80834CLNB-B6TT2G	S-80834CLY-X-G	S-80834CLUA-B6TT2G	S-80834CLMC-B6TT2G	S-80834CLPF-B6TTFG
3.5V ± 2.0%	0.175V	S-80835CLNB-B6UT2G	S-80835CLY-X-G	S-80835CLUA-B6UT2G	S-80835CLMC-B6UT2G	S-80835CLPF-B6UTFG
3.6V ± 2.0%	0.180V	S-80836CLNB-B6VT2G	S-80836CLY-X-G	S-80836CLUA-B6VT2G	S-80836CLMC-B6VT2G	S-80836CLPF-B6VTFG
3.7V ± 2.0%	0.185V	S-80837CLNB-B6WT2G	S-80837CLY-X-G	S-80837CLUA-B6WT2G	S-80837CLMC-B6WT2G	S-80837CLPF-B6WTFG
3.8V ± 2.0%	0.190V	S-80838CLNB-B6XT2G	S-80838CLY-X-G	S-80838CLUA-B6XT2G	S-80838CLMC-B6XT2G	S-80838CLPF-B6XTFG
3.9V ± 2.0%	0.195V	S-80839CLNB-B6YT2G	S-80839CLY-X-G	S-80839CLUA-B6YT2G	S-80839CLMC-B6YT2G	S-80839CLPF-B6YTFG
4.0V ± 2.0%	0.200V	S-80840CLNB-B6ZT2G	S-80840CLY-X-G	S-80840CLUA-B6ZT2G	S-80840CLMC-B6ZT2G	S-80840CLPF-B6ZTFG
4.1V ± 2.0%	0.205V	S-80841CLNB-B62T2G	S-80841CLY-X-G	S-80841CLUA-B62T2G	S-80841CLMC-B62T2G	S-80841CLPF-B62TFG
4.2V ± 2.0%	0.210V	S-80842CLNB-B63T2G	S-80842CLY-X-G	S-80842CLUA-B63T2G	S-80842CLMC-B63T2G	S-80842CLPF-B63TFG
4.3V ± 2.0%	0.215V	S-80843CLNB-B64T2G	S-80843CLY-X-G	S-80843CLUA-B64T2G	S-80843CLMC-B64T2G	S-80843CLPF-B64TFG
4.4V ± 2.0%	0.220V	S-80844CLNB-B65T2G	S-80844CLY-X-G	S-80844CLUA-B65T2G	S-80844CLMC-B65T2G	S-80844CLPF-B65TFG
4.45V typ.	4.70V max. <sup>2</sup>	-	S-80844KLY-X-G	S-80844KLU-D2AT2G	-	-
4.5V ± 2.0%	0.225V	S-80845CLNB-B66T2G	S-80845CLY-X-G	S-80845CLUA-B66T2G	S-80845CLMC-B66T2G	S-80845CLPF-B66TFG
4.6V ± 2.0%	0.230V	S-80846CLNB-B67T2G	S-80846CLY-X-G	S-80846CLUA-B67T2G	S-80846CLMC-B67T2G	S-80846CLPF-B67TFG
4.7V ± 2.0%	0.235V	S-80847CLNB-B68T2G	S-80847CLY-X-G	S-80847CLUA-B68T2G	S-80847CLMC-B68T2G	S-80847CLPF-B68TFG
4.8V ± 2.0%	0.240V	S-80848CLNB-B69T2G	S-80848CLY-X-G	S-80848CLUA-B69T2G	S-80848CLMC-B69T2G	S-80848CLPF-B69TFG
4.9V ± 2.0%	0.245V	S-80849CLNB-B7AT2G	S-80849CLY-X-G	S-80849CLUA-B7AT2G	S-80849CLMC-B7AT2G	S-80849CLPF-B7ATFG
5.0V ± 2.0%	0.250V	S-80850CLNB-B7BT2G	S-80850CLY-X-G	S-80850CLUA-B7BT2G	S-80850CLMC-B7BT2G	S-80850CLPF-B7BTFG
5.1V ± 2.0%	0.255V	S-80851CLNB-B7CT2G	S-80851CLY-X-G	S-80851CLUA-B7CT2G	S-80851CLMC-B7CT2G	S-80851CLPF-B7CTFG
5.2V ± 2.0%	0.260V	S-80852CLNB-B7DT2G	S-80852CLY-X-G	S-80852CLUA-B7DT2G	S-80852CLMC-B7DT2G	S-80852CLPF-B7DTFG
5.3V ± 2.0%	0.265V	S-80853CLNB-B7ET2G	S-80853CLY-X-G	S-80853CLUA-B7ET2G	S-80853CLMC-B7ET2G	S-80853CLPF-B7ETFG
5.4V ± 2.0%	0.270V	S-80854CLNB-B7FT2G	S-80854CLY-X-G	S-80854CLUA-B7FT2G	S-80854CLMC-B7FT2G	S-80854CLPF-B7FTFG
5.5V ± 2.0%	0.275V	S-80855CLNB-B7GT2G	S-80855CLY-X-G	S-80855CLUA-B7GT2G	S-80855CLMC-B7GT2G	S-80855CLPF-B7GTFG
5.6V ± 2.0%	0.280V	S-80856CLNB-B7HT2G	S-80856CLY-X-G	S-80856CLUA-B7HT2G	S-80856CLMC-B7HT2G	S-80856CLPF-B7HTFG
5.7V ± 2.0%	0.285V	S-80857CLNB-B7IT2G	S-80857CLY-X-G	S-80857CLUA-B7IT2G	S-80857CLMC-B7IT2G	S-80857CLPF-B7ITFG
5.8V ± 2.0%	0.290V	S-80858CLNB-B7JT2G	S-80858CLY-X-G	S-80858CLUA-B7JT2G	S-80858CLMC-B7JT2G	S-80858CLPF-B7JTFG
5.9V ± 2.0%	0.295V	S-80859CLNB-B7KT2G	S-80859CLY-X-G	S-80859CLUA-B7KT2G	S-80859CLMC-B7KT2G	S-80859CLPF-B7KTFG
6.0V ± 2.0%	0.300V	S-80860CLNB-B7LT2G	S-80860CLY-X-G	S-80860CLUA-B7LT2G	S-80860CLMC-B7LT2G	S-80860CLPF-B7LTFG

\*1. "X" in the model number of TO-92 differs as follows:

B: Bulk, T: Tape and reel (2000/reel), Z: Tape and ammo (2500/reel)

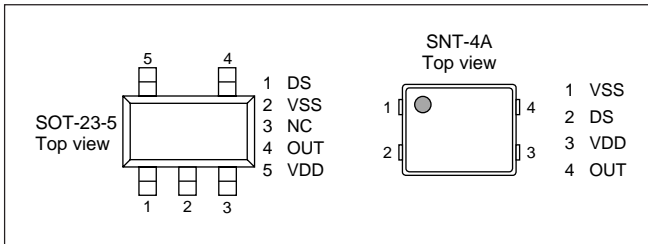
\*2. Describes the release voltage.

**SUPER-SMALL PACKAGE HIGH-PRECISION VOLTAGE DETECTOR WITH DELAY CIRCUIT (INTERNAL DELAY TIME SETTING)**

**S-801 series**

The S-801 series is a high-precision voltage detector with a fixed delay time generator, developed using CMOS technology. The detection voltage is fixed internally with a precision of  $\pm 2.0\%$ . An integrated oscillator and counter timer make it possible to delay the release signal without using external components. One of three delay times can be selected. Open-drain (Nch open-drain) output and Push-pull (CMOS output) are available.

**■ PIN CONFIGURATIONS**



**■ FEATURES**

- Ultra-low current consumption: 1.3  $\mu\text{A}$  typ. ( $V_{\text{DD}} = 3.5 \text{ V}$ )
- Detection voltage accuracy:  $\pm 2.0\%$
- Hysteresis: 60 mV typ.
- Three delay times: 50 ms typ. (A series), 100 ms typ. (B series), 200 ms typ. (C series)
- Delay time ON/OFF switch available (DS pin).
- Operating voltage range: 0.95 to 10.0 V
- Detection voltage: 2.2 to 6.0 V (0.1 V steps)
- Output type: Active-low Open-drain (Nch open-drain) output, Active-low Push-pull (CMOS output)

**■ APPLICATIONS**

- Power supply monitor for portable equipment such as notebook PCs, digital still cameras, PDAs, and cellular phones
- Constant voltage power supply monitor for cameras, video equipment and communication devices
- Power supply monitor for microcomputers and reset for CPUs

**■ SELECTION GUIDE (1) SOT-23-5 (3000/reel)**

Detection voltage	Delay time (typ.)	Open-drain (Nch open-drain) [low]	Push-pull (CMOS output) [low]	Detection voltage	Delay time (typ.)	Open-drain (Nch open-drain) [low]	Push-pull (CMOS output) [low]
2.2 V $\pm$ 2.0%	50 ms	S-80122ANMC-JCHT2G	S-80122ALMC-JAHT2G	4.2 V $\pm$ 2.0%	50 ms	S-80142ANMC-JC3T2G	S-80142ALMC-JA3T2G
	100 ms	S-80122BNMC-JGHT2G	S-80122BLMC-JEHT2G		100 ms	S-80142BNMC-JG3T2G	S-80142BLMC-JE3T2G
	200 ms	S-80122CNMC-JKHT2G	S-80122CLMC-JIHT2G		200 ms	S-80142CNMC-JK3T2G	S-80142CLMC-JI3T2G
2.3 V $\pm$ 2.0%	50 ms	S-80123ANMC-JCIT2G	S-80123ALMC-JAIT2G	4.3 V $\pm$ 2.0%	50 ms	S-80143ANMC-JC4T2G	S-80143ALMC-JA4T2G
	100 ms	S-80123BNMC-JGIT2G	S-80123BLMC-JEIT2G		100 ms	S-80143BNMC-JG4T2G	S-80143BLMC-JE4T2G
	200 ms	S-80123CNMC-JKIT2G	S-80123CLMC-JIIT2G		200 ms	S-80143CNMC-JK4T2G	S-80143CLMC-JI4T2G
2.4 V $\pm$ 2.0%	50 ms	S-80124ANMC-JCJT2G	S-80124ALMC-JAJT2G	4.4 V $\pm$ 2.0%	50 ms	S-80144ANMC-JC5T2G	S-80144ALMC-JA5T2G
	100 ms	S-80124BNMC-JGJT2G	S-80124BLMC-JEJT2G		100 ms	S-80144BNMC-JG5T2G	S-80144BLMC-JE5T2G
	200 ms	S-80124CNMC-JKJT2G	S-80124CLMC-JIJT2G		200 ms	S-80144CNMC-JK5T2G	S-80144CLMC-JI5T2G
2.5 V $\pm$ 2.0%	50 ms	S-80125ANMC-JCKT2G	S-80125ALMC-JAKT2G	4.5 V $\pm$ 2.0%	50 ms	S-80145ANMC-JC6T2G	S-80145ALMC-JA6T2G
	100 ms	S-80125BNMC-JGKT2G	S-80125BLMC-JEKT2G		100 ms	S-80145BNMC-JG6T2G	S-80145BLMC-JE6T2G
	200 ms	S-80125CNMC-JKKT2G	S-80125CLMC-JIKT2G		200 ms	S-80145CNMC-JK6T2G	S-80145CLMC-JI6T2G
2.6 V $\pm$ 2.0%	50 ms	S-80126ANMC-JCLT2G	S-80126ALMC-JALT2G	4.6 V $\pm$ 2.0%	50 ms	S-80146ANMC-JC7T2G	S-80146ALMC-JA7T2G
	100 ms	S-80126BNMC-JGLT2G	S-80126BLMC-JELT2G		100 ms	S-80146BNMC-JG7T2G	S-80146BLMC-JE7T2G
	200 ms	S-80126CNMC-JKLT2G	S-80126CLMC-JILT2G		200 ms	S-80146CNMC-JK7T2G	S-80146CLMC-JI7T2G
2.7 V $\pm$ 2.0%	50 ms	S-80127ANMC-JCMT2G	S-80127ALMC-JAMT2G	4.7 V $\pm$ 2.0%	50 ms	S-80147ANMC-JC8T2G	S-80147ALMC-JA8T2G
	100 ms	S-80127BNMC-JGMT2G	S-80127BLMC-JEMT2G		100 ms	S-80147BNMC-JG8T2G	S-80147BLMC-JE8T2G
	200 ms	S-80127CNMC-JKMT2G	S-80127CLMC-JIMT2G		200 ms	S-80147CNMC-JK8T2G	S-80147CLMC-JI8T2G
2.8 V $\pm$ 2.0%	50 ms	S-80128ANMC-JCNT2G	S-80128ALMC-JANT2G	4.8 V $\pm$ 2.0%	50 ms	S-80148ANMC-JC9T2G	S-80148ALMC-JA9T2G
	100 ms	S-80128BNMC-JGNT2G	S-80128BLMC-JENT2G		100 ms	S-80148BNMC-JG9T2G	S-80148BLMC-JE9T2G
	200 ms	S-80128CNMC-JKNT2G	S-80128CLMC-JINT2G		200 ms	S-80148CNMC-JK9T2G	S-80148CLMC-JI9T2G
2.9 V $\pm$ 2.0%	50 ms	S-80129ANMC-JCOT2G	S-80129ALMC-JAOT2G	4.9 V $\pm$ 2.0%	50 ms	S-80149ANMC-JDAT2G	S-80149ALMC-JBAT2G
	100 ms	S-80129BNMC-JGOT2G	S-80129BLMC-JEOT2G		100 ms	S-80149BNMC-JDAT2G	S-80149BLMC-JEAT2G
	200 ms	S-80129CNMC-JKOT2G	S-80129CLMC-JIOT2G		200 ms	S-80149CNMC-JKAT2G	S-80149CLMC-JIAT2G
3.0 V $\pm$ 2.0%	50 ms	S-80130ANMC-JCPT2G	S-80130ALMC-JAPT2G	5.0 V $\pm$ 2.0%	50 ms	S-80150ANMC-JDBT2G	S-80150ALMC-JBBT2G
	100 ms	S-80130BNMC-JGPT2G	S-80130BLMC-JEPT2G		100 ms	S-80150BNMC-JGBT2G	S-80150BLMC-JEBT2G
	200 ms	S-80130CNMC-JKPT2G	S-80130CLMC-JIPT2G		200 ms	S-80150CNMC-JKBT2G	S-80150CLMC-JIBT2G
3.1 V $\pm$ 2.0%	50 ms	S-80131ANMC-JCQT2G	S-80131ALMC-JAQT2G	5.1 V $\pm$ 2.0%	50 ms	S-80151ANMC-JDCT2G	S-80151ALMC-JBCT2G
	100 ms	S-80131BNMC-JGQT2G	S-80131BLMC-JEQT2G		100 ms	S-80151BNMC-JGCT2G	S-80151BLMC-JECT2G
	200 ms	S-80131CNMC-JKQT2G	S-80131CLMC-JIQT2G		200 ms	S-80151CNMC-JKCT2G	S-80151CLMC-JICT2G
3.2 V $\pm$ 2.0%	50 ms	S-80132ANMC-JCRT2G	S-80132ALMC-JART2G	5.2 V $\pm$ 2.0%	50 ms	S-80152ANMC-JDDT2G	S-80152ALMC-JBDT2G
	100 ms	S-80132BNMC-JGRT2G	S-80132BLMC-JERT2G		100 ms	S-80152BNMC-JDGT2G	S-80152BLMC-JEBT2G
	200 ms	S-80132CNMC-JKRT2G	S-80132CLMC-JIRT2G		200 ms	S-80152CNMC-JDCT2G	S-80152CLMC-JIBT2G
3.3 V $\pm$ 2.0%	50 ms	S-80133ANMC-JCST2G	S-80133ALMC-JAST2G	5.3 V $\pm$ 2.0%	50 ms	S-80153ANMC-JDET2G	S-80153ALMC-JBET2G
	100 ms	S-80133BNMC-JGST2G	S-80133BLMC-JEST2G		100 ms	S-80153BNMC-JHET2G	S-80153BLMC-JFET2G
	200 ms	S-80133CNMC-JKST2G	S-80133CLMC-JIST2G		200 ms	S-80153CNMC-JJET2G	S-80153CLMC-JJET2G
3.4 V $\pm$ 2.0%	50 ms	S-80134ANMC-JCJT2G	S-80134ALMC-JAJT2G	5.4 V $\pm$ 2.0%	50 ms	S-80154ANMC-JDFT2G	S-80154ALMC-JBFT2G
	100 ms	S-80134BNMC-JGJT2G	S-80134BLMC-JEJT2G		100 ms	S-80154BNMC-JHFT2G	S-80154BLMC-JJFT2G
	200 ms	S-80134CNMC-JKJT2G	S-80134CLMC-JIJT2G		200 ms	S-80154CNMC-JJFT2G	S-80154CLMC-JJFT2G
3.5 V $\pm$ 2.0%	50 ms	S-80135ANMC-JCUT2G	S-80135ALMC-JAUT2G	5.5 V $\pm$ 2.0%	50 ms	S-80155ANMC-JDGT2G	S-80155ALMC-JBGT2G
	100 ms	S-80135BNMC-JGUT2G	S-80135BLMC-JEUT2G		100 ms	S-80155BNMC-JHGT2G	S-80155BLMC-JJGT2G
	200 ms	S-80135CNMC-JKUT2G	S-80135CLMC-JIUT2G		200 ms	S-80155CNMC-JJGT2G	S-80155CLMC-JJGT2G
3.6 V $\pm$ 2.0%	50 ms	S-80136ANMC-JCVT2G	S-80136ALMC-JAVT2G	5.6 V $\pm$ 2.0%	50 ms	S-80156ANMC-JDHT2G	S-80156ALMC-JBHT2G
	100 ms	S-80136BNMC-JGVT2G	S-80136BLMC-JEVT2G		100 ms	S-80156BNMC-JHHT2G	S-80156BLMC-JJHT2G
	200 ms	S-80136CNMC-JKVT2G	S-80136CLMC-JIVT2G		200 ms	S-80156CNMC-JJHT2G	S-80156CLMC-JJHT2G
3.7 V $\pm$ 2.0%	50 ms	S-80137ANMC-JCWT2G	S-80137ALMC-JAWT2G	5.7 V $\pm$ 2.0%	50 ms	S-80157ANMC-JDIT2G	S-80157ALMC-JBIT2G
	100 ms	S-80137BNMC-JGWT2G	S-80137BLMC-JEWT2G		100 ms	S-80157BNMC-JHIT2G	S-80157BLMC-JJIT2G
	200 ms	S-80137CNMC-JKWT2G	S-80137CLMC-JIWT2G		200 ms	S-80157CNMC-JJIT2G	S-80157CLMC-JJIT2G
3.8 V $\pm$ 2.0%	50 ms	S-80138ANMC-JCXT2G	S-80138ALMC-JAXT2G	5.8 V $\pm$ 2.0%	50 ms	S-80158ANMC-JDJT2G	S-80158ALMC-JBJT2G
	100 ms	S-80138BNMC-JGXT2G	S-80138BLMC-JEXT2G		100 ms	S-80158BNMC-JJHT2G	S-80158BLMC-JJHT2G
	200 ms	S-80138CNMC-JKXT2G	S-80138CLMC-JIXT2G		200 ms	S-80158CNMC-JJHT2G	S-80158CLMC-JJHT2G
3.9 V $\pm$ 2.0%	50 ms	S-80139ANMC-JCYT2G	S-80139ALMC-JAYT2G	5.9 V $\pm$ 2.0%	50 ms	S-80159ANMC-JDKT2G	S-80159ALMC-JBKT2G
	100 ms	S-80139BNMC-JGYT2G	S-80139BLMC-JEYT2G		100 ms	S-80159BNMC-JJKT2G	S-80159BLMC-JJKT2G
	200 ms	S-80139CNMC-JKYT2G	S-80139CLMC-JIYT2G		200 ms	S-80159CNMC-JJKT2G	S-80159CLMC-JJKT2G
4.0 V $\pm$ 2.0%	50 ms	S-80140ANMC-JCZT2G	S-80140ALMC-JAZT2G	6.0 V $\pm$ 2.0%	50 ms	S-80160ANMC-JDLT2G	S-80160ALMC-JBLT2G
	100 ms	S-80140BNMC-JGZT2G	S-80140BLMC-JEZT2G		100 ms	S-80160BNMC-JJLT2G	S-80160BLMC-JJLT2G
	200 ms	S-80140CNMC-JKZT2G	S-80140CLMC-JJZT2G		200 ms	S-80160CNMC-JJLT2G	S-80160CLMC-JJLT2G
4.1 V $\pm$ 2.0%	50 ms	S-80141ANMC-JCT2G	S-80141ALMC-JA2T2G				
	100 ms	S-80141BNMC-JGT2G	S-80141BLMC-JE2T2G				
	200 ms	S-80141CNMC-JKT2G	S-80141CLMC-JI2T2G				

## SELECTION GUIDE (2) SNT-4A (5000/reel)

Detection voltage	Delay time (typ.)	Open-drain (Nch open-drain) [low]	Push-pull (CMOS output) [low]	Detection voltage	Delay time (typ.)	Open-drain (Nch open-drain) [low]	Push-pull (CMOS output) [low]
2.2 V ± 2.0%	50 ms	S-80122ANPF-JCHTFG	S-80122ALPF-JAHTFG	4.2 V ± 2.0%	50 ms	S-80142ANPF-JC3TFG	S-80142ALPF-JA3TFG
	100 ms	S-80122BNPF-JGHTFG	S-80122BLPF-JEHTFG		100 ms	S-80142BNPF-JG3TFG	S-80142BLPF-JE3TFG
	200 ms	S-80122CNPF-JKHTFG	S-80122CLPF-JIHTFG		200 ms	S-80142CNPF-JK3TFG	S-80142CLPF-JI3TFG
2.3 V ± 2.0%	50 ms	S-80123ANPF-JCITFG	S-80123ALPF-JAITFG	4.3 V ± 2.0%	50 ms	S-80143ANPF-JC4TFG	S-80143ALPF-JA4TFG
	100 ms	S-80123BNPF-JGITFG	S-80123BLPF-JEITFG		100 ms	S-80143BNPF-JG4TFG	S-80143BLPF-JE4TFG
	200 ms	S-80123CNPF-JKITFG	S-80123CLPF-JIITFG		200 ms	S-80143CNPF-JK4TFG	S-80143CLPF-JI4TFG
2.4 V ± 2.0%	50 ms	S-80124ANPF-JCJTFG	S-80124ALPF-JAJTFG	4.4 V ± 2.0%	50 ms	S-80144ANPF-JC5TFG	S-80144ALPF-JA5TFG
	100 ms	S-80124BNPF-JGJTFG	S-80124BLPF-JEJTFG		100 ms	S-80144BNPF-JG5TFG	S-80144BLPF-JE5TFG
	200 ms	S-80124CNPF-JKJTFG	S-80124CLPF-JIJTFG		200 ms	S-80144CNPF-JK5TFG	S-80144CLPF-JI5TFG
2.5 V ± 2.0%	50 ms	S-80125ANPF-JCKTFG	S-80125ALPF-JAKTFG	4.5 V ± 2.0%	50 ms	S-80145ANPF-JC6TFG	S-80145ALPF-JA6TFG
	100 ms	S-80125BNPF-JGKTFG	S-80125BLPF-JEKTFG		100 ms	S-80145BNPF-JG6TFG	S-80145BLPF-JE6TFG
	200 ms	S-80125CNPF-JKJTFG	S-80125CLPF-JIKTFG		200 ms	S-80145CNPF-JK6TFG	S-80145CLPF-JI6TFG
2.6 V ± 2.0%	50 ms	S-80126ANPF-JCLTFG	S-80126ALPF-JALTFG	4.6 V ± 2.0%	50 ms	S-80146ANPF-JC7TFG	S-80146ALPF-JA7TFG
	100 ms	S-80126BNPF-JGLTFG	S-80126BLPF-JELTFG		100 ms	S-80146BNPF-JG7TFG	S-80146BLPF-JE7TFG
	200 ms	S-80126CNPF-JKJTFG	S-80126CLPF-JIJTFG		200 ms	S-80146CNPF-JK7TFG	S-80146CLPF-JI7TFG
2.7 V ± 2.0%	50 ms	S-80127ANPF-JCMTFG	S-80127ALPF-JAMTFG	4.7 V ± 2.0%	50 ms	S-80147ANPF-JC8TFG	S-80147ALPF-JA8TFG
	100 ms	S-80127BNPF-JGJTFG	S-80127BLPF-JEMTFG		100 ms	S-80147BNPF-JG8TFG	S-80147BLPF-JE8TFG
	200 ms	S-80127CNPF-JKMTFG	S-80127CLPF-JIMTFG		200 ms	S-80147CNPF-JK8TFG	S-80147CLPF-JI8TFG
2.8 V ± 2.0%	50 ms	S-80128ANPF-JCNTFG	S-80128ALPF-JANTFG	4.8 V ± 2.0%	50 ms	S-80148ANPF-JC9TFG	S-80148ALPF-JA9TFG
	100 ms	S-80128BNPF-JGNTFG	S-80128BLPF-JENTFG		100 ms	S-80148BNPF-JG9TFG	S-80148BLPF-JE9TFG
	200 ms	S-80128CNPF-JKNTFG	S-80128CLPF-JINTFG		200 ms	S-80148CNPF-JK9TFG	S-80148CLPF-JI9TFG
2.9 V ± 2.0%	50 ms	S-80129ANPF-JCOTFG	S-80129ALPF-JAOTFG	4.9 V ± 2.0%	50 ms	S-80149ANPF-JDATFG	S-80149ALPF-JBATFG
	100 ms	S-80129BNPF-JGOTFG	S-80129BLPF-JEOTFG		100 ms	S-80149BNPF-JHATFG	S-80149BLPF-JFATFG
	200 ms	S-80129CNPF-JKOTFG	S-80129CLPF-JIOTFG		200 ms	S-80149CNPF-JLATFG	S-80149CLPF-JIATFG
3.0 V ± 2.0%	50 ms	S-80130ANPF-JCPTFG	S-80130ALPF-JAPTFG	5.0 V ± 2.0%	50 ms	S-80150ANPF-JDBTFG	S-80150ALPF-JBDBTFG
	100 ms	S-80130BNPF-JGPTFG	S-80130BLPF-JEPTFG		100 ms	S-80150BNPF-JHBTFG	S-80150BLPF-JFBTFG
	200 ms	S-80130CNPF-JKPTFG	S-80130CLPF-JIPTFG		200 ms	S-80150CNPF-JLBTFG	S-80150CLPF-JIBTFG
3.1 V ± 2.0%	50 ms	S-80131ANPF-JCQTFG	S-80131ALPF-JAQTFG	5.1 V ± 2.0%	50 ms	S-80151ANPF-JDCTFG	S-80151ALPF-JBCTFG
	100 ms	S-80131BNPF-JGQTFG	S-80131BLPF-JEQTFG		100 ms	S-80151BNPF-JHCTFG	S-80151BLPF-JFCTFG
	200 ms	S-80131CNPF-JKQTFG	S-80131CLPF-JIQTFG		200 ms	S-80151CNPF-JLCTFG	S-80151CLPF-JIBCTFG
3.2 V ± 2.0%	50 ms	S-80132ANPF-JCRTFG	S-80132ALPF-JARTFG	5.2 V ± 2.0%	50 ms	S-80152ANPF-JDDTFG	S-80152ALPF-JBDBTFG
	100 ms	S-80132BNPF-JGRTFG	S-80132BLPF-JERTFG		100 ms	S-80152BNPF-JHDTFG	S-80152BLPF-JFDTFG
	200 ms	S-80132CNPF-JKRTFG	S-80132CLPF-JIRTFG		200 ms	S-80152CNPF-JLDTFG	S-80152CLPF-JIBDTFG
3.3 V ± 2.0%	50 ms	S-80133ANPF-JCSTFG	S-80133ALPF-JASTFG	5.3 V ± 2.0%	50 ms	S-80153ANPF-JDETFG	S-80153ALPF-JBETFG
	100 ms	S-80133BNPF-JGSTFG	S-80133BLPF-JESTFG		100 ms	S-80153BNPF-JHETFG	S-80153BLPF-JFETFG
	200 ms	S-80133CNPF-JKSTFG	S-80133CLPF-JISTFG		200 ms	S-80153CNPF-JLETFG	S-80153CLPF-JIETFG
3.4 V ± 2.0%	50 ms	S-80134ANPF-JCTTFG	S-80134ALPF-JATTFG	5.4 V ± 2.0%	50 ms	S-80154ANPF-JDFTFG	S-80154ALPF-JBFTFG
	100 ms	S-80134BNPF-JGTFG	S-80134BLPF-JETTFG		100 ms	S-80154BNPF-JHFTFG	S-80154BLPF-JJFTFG
	200 ms	S-80134CNPF-JKTFG	S-80134CLPF-JITTFG		200 ms	S-80154CNPF-JLFTFG	S-80154CLPF-JIBFTFG
3.5 V ± 2.0%	50 ms	S-80135ANPF-JCUTFG	S-80135ALPF-JAUTFG	5.5 V ± 2.0%	50 ms	S-80155ANPF-JDGTFG	S-80155ALPF-JBGTFG
	100 ms	S-80135BNPF-JGUTFG	S-80135BLPF-JEUTFG		100 ms	S-80155BNPF-JHGTFG	S-80155BLPF-JJGTFG
	200 ms	S-80135CNPF-JKUTFG	S-80135CLPF-JIUTFG		200 ms	S-80155CNPF-JLGTFG	S-80155CLPF-JIBGTFG
3.6 V ± 2.0%	50 ms	S-80136ANPF-JCVTFG	S-80136ALPF-JAVTFG	5.6 V ± 2.0%	50 ms	S-80156ANPF-JDHTFG	S-80156ALPF-JBHTFG
	100 ms	S-80136BNPF-JGVTFG	S-80136BLPF-JEVTFG		100 ms	S-80156BNPF-JHHTFG	S-80156BLPF-JJHTFG
	200 ms	S-80136CNPF-JKVTFG	S-80136CLPF-JIVTFG		200 ms	S-80156CNPF-JLHTFG	S-80156CLPF-JIBHTFG
3.7 V ± 2.0%	50 ms	S-80137ANPF-JCWTFG	S-80137ALPF-JAWTFG	5.7 V ± 2.0%	50 ms	S-80157ANPF-JDITFG	S-80157ALPF-JBITFG
	100 ms	S-80137BNPF-JGWTFG	S-80137BLPF-JEWTFG		100 ms	S-80157BNPF-JHITFG	S-80157BLPF-JJITFG
	200 ms	S-80137CNPF-JKWTFG	S-80137CLPF-JIWTFG		200 ms	S-80157CNPF-JLITFG	S-80157CLPF-JIBITFG
3.8 V ± 2.0%	50 ms	S-80138ANPF-JCXTFG	S-80138ALPF-JAXTFG	5.8 V ± 2.0%	50 ms	S-80158ANPF-JDJTFG	S-80158ALPF-JBJTFG
	100 ms	S-80138BNPF-JGXTFG	S-80138BLPF-JEXTFG		100 ms	S-80158BNPF-JHJTFG	S-80158BLPF-JJBTFG
	200 ms	S-80138CNPF-JKXTFG	S-80138CLPF-JIXTFG		200 ms	S-80158CNPF-JLJTFG	S-80158CLPF-JIBJTFG
3.9 V ± 2.0%	50 ms	S-80139ANPF-JCYTFG	S-80139ALPF-JAYTFG	5.9 V ± 2.0%	50 ms	S-80159ANPF-JDKTFG	S-80159ALPF-JBKTFG
	100 ms	S-80139BNPF-JGYTFG	S-80139BLPF-JEYTFG		100 ms	S-80159BNPF-JHJTFG	S-80159BLPF-JJKTFG
	200 ms	S-80139CNPF-JKYTFG	S-80139CLPF-JIYTFG		200 ms	S-80159CNPF-JLJTFG	S-80159CLPF-JIBKTFG
4.0 V ± 2.0%	50 ms	S-80140ANPF-JCZTFG	S-80140ALPF-JAZTFG	6.0 V ± 2.0%	50 ms	S-80160ANPF-JDLTFG	S-80160ALPF-JBLTFG
	100 ms	S-80140BNPF-JGZTFG	S-80140BLPF-JEZTFG		100 ms	S-80160BNPF-JHLTFG	S-80160BLPF-JJLTFG
	200 ms	S-80140CNPF-JKZTFG	S-80140CLPF-JIZTFG		200 ms	S-80160CNPF-JLLTFG	S-80160CLPF-JIBLTFG
4.1 V ± 2.0%	50 ms	S-80141ANPF-JC2TFG	S-80141ALPF-JA2TFG				
	100 ms	S-80141BNPF-JG2TFG	S-80141BLPF-JE2TFG				
	200 ms	S-80141CNPF-JK2TFG	S-80141CLPF-JI2TFG				

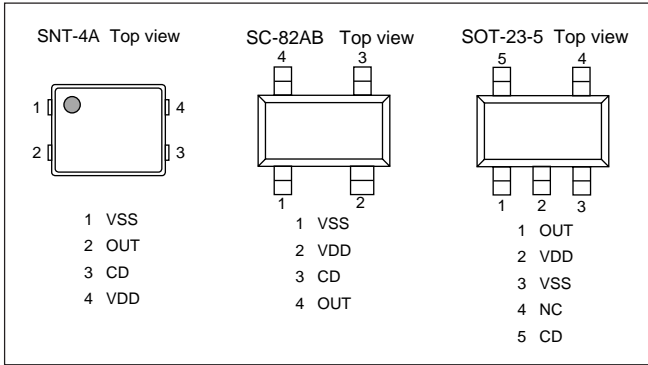


**SUPER-SMALL PACKAGE HIGH-PRECISION VOLTAGE DETECTOR WITH DELAY CIRCUIT (EXTERNAL DELAY TIME SETTING)**

**S-809xxC series**

The S-809xxC series is a family of high-precision voltage detectors, developed using CMOS technology. The detection voltage is fixed and its accuracy is  $\pm 2.0\%$ . The release signal can be delayed by an external capacitor. Open-drain (Nch open-drain) output and Push-pull (CMOS output) are available.

**■ PIN CONFIGURATIONS**



**■ FEATURES**

- Ultra-low current consumption:
  - 1.0  $\mu\text{A}$  typ. (Detection voltage 1.4 V typ. or below models,  $V_{\text{DD}} = 2.0 \text{ V}$ )
  - 1.1  $\mu\text{A}$  typ. (Detection voltage 1.5 V typ. or above models,  $V_{\text{DD}} = 3.5 \text{ V}$ )
- Detection voltage accuracy:  $\pm 2.0\%$
- Operating voltage range: 0.7 to 10.0 V
- Hysteresis: 5% typ.
- Detection voltage: 1.3 to 6.0 V (0.1 V steps)
- Output type: Active-low Open-drain (Nch open-drain) output  
Active-low Push-pull (CMOS output)

**■ APPLICATIONS**

- Power supply monitor for portable applications such as notebook PCs, digital still cameras, PDAs, and cellular phones
- Constant voltage power supply monitor for cameras, video equipment, communication devices
- Power supply monitor for microcomputers and reset for CPUs

**■ SELECTION GUIDE**

Detection voltage	Hysteresis width (typ.)	Open-drain (Nch open-drain) [low]			Push-pull (CMOS output) [low]		
		SC-82AB (3000/reel)	SOT-23-5 (3000/reel)	SNT-4A (5000/reel)	SC-82AB (3000/reel)	SOT-23-5 (3000/reel)	SNT-4A (5000/reel)
1.3V $\pm$ 2.0%	0.065V	S-80913CNNB-G8HT2G	S-80913CNMC-G8HT2G	S-80913CNPF-G8HTFG	S-80913CLNB-G6HT2G	S-80913CLMC-G6HT2G	S-80913CLPF-G6HTFG
1.4V $\pm$ 2.0%	0.070V	S-80914CNNB-G8JT2G	S-80914CNMC-G8JT2G	S-80914CNPF-G8JTFG	S-80914CLNB-G6JT2G	S-80914CLMC-G6JT2G	S-80914CLPF-G6JTFG
1.5V $\pm$ 2.0%	0.075V	S-80915CNNB-G8KT2G	S-80915CNMC-G8KT2G	S-80915CNPF-G8KTFG	S-80915CLNB-G6KT2G	S-80915CLMC-G6KT2G	S-80915CLPF-G6KTFG
1.6V $\pm$ 2.0%	0.080V	S-80916CNNB-G8LT2G	S-80916CNMC-G8LT2G	S-80916CNPF-G8LTFG	S-80916CLNB-G6LT2G	S-80916CLMC-G6LT2G	S-80916CLPF-G6LTFG
1.7V $\pm$ 2.0%	0.085V	S-80917CNNB-G8MT2G	S-80917CNMC-G8MT2G	S-80917CNPF-G8MTFG	S-80917CLNB-G6MT2G	S-80917CLMC-G6MT2G	S-80917CLPF-G6MTFG
1.8V $\pm$ 2.0%	0.090V	S-80918CNNB-G8NT2G	S-80918CNMC-G8NT2G	S-80918CNPF-G8NTFG	S-80918CLNB-G6NT2G	S-80918CLMC-G6NT2G	S-80918CLPF-G6NTFG
1.9V $\pm$ 2.0%	0.095V	S-80919CNNB-G8PT2G	S-80919CNMC-G8PT2G	S-80919CNPF-G8PTFG	S-80919CLNB-G6PT2G	S-80919CLMC-G6PT2G	S-80919CLPF-G6PTFG
2.0V $\pm$ 2.0%	0.100V	S-80920CNNB-G8QT2G	S-80920CNMC-G8QT2G	S-80920CNPF-G8QTFG	S-80920CLNB-G6QT2G	S-80920CLMC-G6QT2G	S-80920CLPF-G6QTFG
2.1V $\pm$ 2.0%	0.105V	S-80921CNNB-G8RT2G	S-80921CNMC-G8RT2G	S-80921CNPF-G8RTFG	S-80921CLNB-G6RT2G	S-80921CLMC-G6RT2G	S-80921CLPF-G6RTFG
2.2V $\pm$ 2.0%	0.110V	S-80922CNNB-G8ST2G	S-80922CNMC-G8ST2G	S-80922CNPF-G8STFG	S-80922CLNB-G6ST2G	S-80922CLMC-G6ST2G	S-80922CLPF-G6STFG
2.3V $\pm$ 2.0%	0.115V	S-80923CNNB-G8TT2G	S-80923CNMC-G8TT2G	S-80923CNPF-G8TTFG	S-80923CLNB-G6TT2G	S-80923CLMC-G6TT2G	S-80923CLPF-G6TTFG
2.4V $\pm$ 2.0%	0.120V	S-80924CNNB-G8UT2G	S-80924CNMC-G8UT2G	S-80924CNPF-G8UTFG	S-80924CLNB-G6UT2G	S-80924CLMC-G6UT2G	S-80924CLPF-G6UTFG
2.5V $\pm$ 2.0%	0.125V	S-80925CNNB-G8VT2G	S-80925CNMC-G8VT2G	S-80925CNPF-G8VTFG	S-80925CLNB-G6VT2G	S-80925CLMC-G6VT2G	S-80925CLPF-G6VTFG
2.6V $\pm$ 2.0%	0.130V	S-80926CNNB-G8WT2G	S-80926CNMC-G8WT2G	S-80926CNPF-G8WTFG	S-80926CLNB-G6WT2G	S-80926CLMC-G6WT2G	S-80926CLPF-G6WTFG
2.7V $\pm$ 2.0%	0.135V	S-80927CNNB-G8XT2G	S-80927CNMC-G8XT2G	S-80927CNPF-G8XTFG	S-80927CLNB-G6XT2G	S-80927CLMC-G6XT2G	S-80927CLPF-G6XTFG
2.8V $\pm$ 2.0%	0.140V	S-80928CNNB-G8YT2G	S-80928CNMC-G8YT2G	S-80928CNPF-G8YTFG	S-80928CLNB-G6YT2G	S-80928CLMC-G6YT2G	S-80928CLPF-G6YTFG
2.9V $\pm$ 2.0%	0.145V	S-80929CNNB-G8ZT2G	S-80929CNMC-G8ZT2G	S-80929CNPF-G8ZTFG	S-80929CLNB-G6ZT2G	S-80929CLMC-G6ZT2G	S-80929CLPF-G6ZTFG
3.0V $\pm$ 2.0%	0.150V	S-80930CNNB-G80T2G	S-80930CNMC-G80T2G	S-80930CNPF-G80TFG	S-80930CLNB-G60T2G	S-80930CLMC-G60T2G	S-80930CLPF-G60TFG
3.1V $\pm$ 2.0%	0.155V	S-80931CNNB-G81T2G	S-80931CNMC-G81T2G	S-80931CNPF-G81TFG	S-80931CLNB-G61T2G	S-80931CLMC-G61T2G	S-80931CLPF-G61TFG
3.2V $\pm$ 2.0%	0.160V	S-80932CNNB-G82T2G	S-80932CNMC-G82T2G	S-80932CNPF-G82TFG	S-80932CLNB-G62T2G	S-80932CLMC-G62T2G	S-80932CLPF-G62TFG
3.3V $\pm$ 2.0%	0.165V	S-80933CNNB-G83T2G	S-80933CNMC-G83T2G	S-80933CNPF-G83TFG	S-80933CLNB-G63T2G	S-80933CLMC-G63T2G	S-80933CLPF-G63TFG
3.4V $\pm$ 2.0%	0.170V	S-80934CNNB-G84T2G	S-80934CNMC-G84T2G	S-80934CNPF-G84TFG	S-80934CLNB-G64T2G	S-80934CLMC-G64T2G	S-80934CLPF-G64TFG
3.5V $\pm$ 2.0%	0.175V	S-80935CNNB-G85T2G	S-80935CNMC-G85T2G	S-80935CNPF-G85TFG	S-80935CLNB-G65T2G	S-80935CLMC-G65T2G	S-80935CLPF-G65TFG
3.6V $\pm$ 2.0%	0.180V	S-80936CNNB-G86T2G	S-80936CNMC-G86T2G	S-80936CNPF-G86TFG	S-80936CLNB-G66T2G	S-80936CLMC-G66T2G	S-80936CLPF-G66TFG
3.7V $\pm$ 2.0%	0.185V	S-80937CNNB-G87T2G	S-80937CNMC-G87T2G	S-80937CNPF-G87TFG	S-80937CLNB-G67T2G	S-80937CLMC-G67T2G	S-80937CLPF-G67TFG
3.8V $\pm$ 2.0%	0.190V	S-80938CNNB-G88T2G	S-80938CNMC-G88T2G	S-80938CNPF-G88TFG	S-80938CLNB-G68T2G	S-80938CLMC-G68T2G	S-80938CLPF-G68TFG
3.9V $\pm$ 2.0%	0.195V	S-80939CNNB-G89T2G	S-80939CNMC-G89T2G	S-80939CNPF-G89TFG	S-80939CLNB-G69T2G	S-80939CLMC-G69T2G	S-80939CLPF-G69TFG
4.0V $\pm$ 2.0%	0.200V	S-80940CNNB-G9AT2G	S-80940CNMC-G9AT2G	S-80940CNPF-G9ATFG	S-80940CLNB-G7AT2G	S-80940CLMC-G7AT2G	S-80940CLPF-G7ATFG
4.1V $\pm$ 2.0%	0.205V	S-80941CNNB-G9BT2G	S-80941CNMC-G9BT2G	S-80941CNPF-G9BTFG	S-80941CLNB-G7BT2G	S-80941CLMC-G7BT2G	S-80941CLPF-G7BTFG
4.2V $\pm$ 2.0%	0.210V	S-80942CNNB-G9CT2G	S-80942CNMC-G9CT2G	S-80942CNPF-G9CTFG	S-80942CLNB-G7CT2G	S-80942CLMC-G7CT2G	S-80942CLPF-G7CTFG
4.3V $\pm$ 2.0%	0.215V	S-80943CNNB-G9DT2G	S-80943CNMC-G9DT2G	S-80943CNPF-G9DTFG	S-80943CLNB-G7DT2G	S-80943CLMC-G7DT2G	S-80943CLPF-G7DTFG
4.4V $\pm$ 2.0%	0.220V	S-80944CNNB-G9ET2G	S-80944CNMC-G9ET2G	S-80944CNPF-G9ETFG	S-80944CLNB-G7ET2G	S-80944CLMC-G7ET2G	S-80944CLPF-G7ETFG
4.5V $\pm$ 2.0%	0.225V	S-80945CNNB-G9FT2G	S-80945CNMC-G9FT2G	S-80945CNPF-G9FTFG	S-80945CLNB-G7FT2G	S-80945CLMC-G7FT2G	S-80945CLPF-G7FTFG
4.6V $\pm$ 2.0%	0.230V	S-80946CNNB-G9GT2G	S-80946CNMC-G9GT2G	S-80946CNPF-G9GTFG	S-80946CLNB-G7GT2G	S-80946CLMC-G7GT2G	S-80946CLPF-G7GTFG
4.7V $\pm$ 2.0%	0.235V	S-80947CNNB-G9HT2G	S-80947CNMC-G9HT2G	S-80947CNPF-G9HTFG	S-80947CLNB-G7HT2G	S-80947CLMC-G7HT2G	S-80947CLPF-G7HTFG
4.8V $\pm$ 2.0%	0.240V	S-80948CNNB-G9JT2G	S-80948CNMC-G9JT2G	S-80948CNPF-G9JTFG	S-80948CLNB-G7JT2G	S-80948CLMC-G7JT2G	S-80948CLPF-G7JTFG
4.9V $\pm$ 2.0%	0.245V	S-80949CNNB-G9KT2G	S-80949CNMC-G9KT2G	S-80949CNPF-G9KTFG	S-80949CLNB-G7KT2G	S-80949CLMC-G7KT2G	S-80949CLPF-G7KTFG
5.0V $\pm$ 2.0%	0.250V	S-80950CNNB-G9LT2G	S-80950CNMC-G9LT2G	S-80950CNPF-G9LTFG	S-80950CLNB-G7LT2G	S-80950CLMC-G7LT2G	S-80950CLPF-G7LTFG
5.1V $\pm$ 2.0%	0.255V	S-80951CNNB-G9MT2G	S-80951CNMC-G9MT2G	S-80951CNPF-G9MTFG	S-80951CLNB-G7MT2G	S-80951CLMC-G7MT2G	S-80951CLPF-G7MTFG
5.2V $\pm$ 2.0%	0.260V	S-80952CNNB-G9NT2G	S-80952CNMC-G9NT2G	S-80952CNPF-G9NTFG	S-80952CLNB-G7NT2G	S-80952CLMC-G7NT2G	S-80952CLPF-G7NTFG
5.3V $\pm$ 2.0%	0.265V	S-80953CNNB-G9PT2G	S-80953CNMC-G9PT2G	S-80953CNPF-G9PTFG	S-80953CLNB-G7PT2G	S-80953CLMC-G7PT2G	S-80953CLPF-G7PTFG
5.4V $\pm$ 2.0%	0.270V	S-80954CNNB-G9QT2G	S-80954CNMC-G9QT2G	S-80954CNPF-G9QTFG	S-80954CLNB-G7QT2G	S-80954CLMC-G7QT2G	S-80954CLPF-G7QTFG
5.5V $\pm$ 2.0%	0.275V	S-80955CNNB-G9RT2G	S-80955CNMC-G9RT2G	S-80955CNPF-G9RTFG	S-80955CLNB-G7RT2G	S-80955CLMC-G7RT2G	S-80955CLPF-G7RTFG
5.6V $\pm$ 2.0%	0.280V	S-80956CNNB-G9ST2G	S-80956CNMC-G9ST2G	S-80956CNPF-G9STFG	S-80956CLNB-G7ST2G	S-80956CLMC-G7ST2G	S-80956CLPF-G7STFG
5.7V $\pm$ 2.0%	0.285V	S-80957CNNB-G9TT2G	S-80957CNMC-G9TT2G	S-80957CNPF-G9TTFG	S-80957CLNB-G7TT2G	S-80957CLMC-G7TT2G	S-80957CLPF-G7TTFG
5.8V $\pm$ 2.0%	0.290V	S-80958CNNB-G9UT2G	S-80958CNMC-G9UT2G	S-80958CNPF-G9UTFG	S-80958CLNB-G7UT2G	S-80958CLMC-G7UT2G	S-80958CLPF-G7UTFG
5.9V $\pm$ 2.0%	0.295V	S-80959CNNB-G9VT2G	S-80959CNMC-G9VT2G	S-80959CNPF-G9VTFG	S-80959CLNB-G7VT2G	S-80959CLMC-G7VT2G	S-80959CLPF-G7VTFG
6.0V $\pm$ 2.0%	0.300V	S-80960CNNB-G9WT2G	S-80960CNMC-G9WT2G	S-80960CNPF-G9WTFG	S-80960CLNB-G7WT2G	S-80960CLMC-G7WT2G	S-80960CLPF-G7WTFG

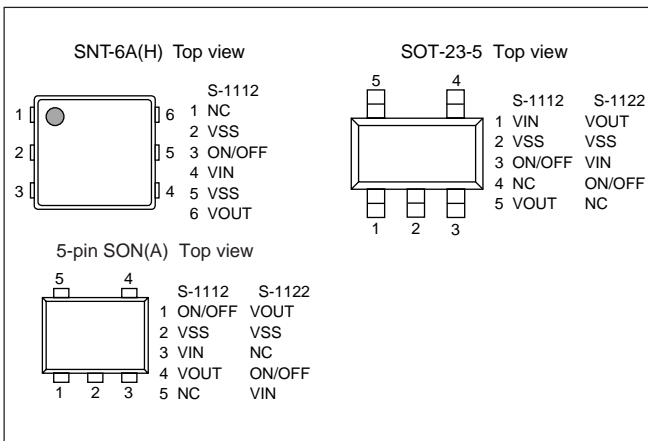


## TO 150 mA OUTPUT CURRENT HIGH RIPPLE REJECTION AND LOW DROPOUT CMOS VOLTAGE REGULATOR

### S-1112/1122 series

The S-1112/1122 series is a positive voltage regulator that features low dropout voltage, high output voltage accuracy, and low current consumption, and has been developed using CMOS technology. Since a low on-resistance transistor is incorporated, the dropout voltage is small, and a large output current can be obtained. A built-in overcurrent protection circuit prevents the load current from exceeding the current capacitance of the output transistor. Moreover, the battery life can be extended by using the power-on/off circuit. A greater variety of capacitors can be used with this series compared with existing voltage regulators developed using CMOS technology, including a small ceramic capacitor. Small SOT-23-5, SNT-6A(H) and 5-pin SON(A) packages realize high-density mounting.

### ■ PIN CONFIGURATIONS



### ■ FEATURES

- Low current consumption
    - 50  $\mu$ A typ., 90  $\mu$ A max. (during operation)
    - 0.1  $\mu$ A typ., 1  $\mu$ A max. (during power-off)
  - Output voltage: 1.5 to 5.5 V (selectable in 0.1 V steps)
  - High output voltage accuracy:  $\pm 1.0\%$
  - Output current
    - 150 mA capable (product with 3.0 V output, when  $V_{IN} = 4$  V)\*1
  - Dropout voltage
    - 190 mV typ. (product with 3.0 V output, when  $I_{OUT} = 100$  mA)
  - Ripple rejection rate: 80 dB typ. ( $f = 1$  kHz,  $V_{OUT} = 3$  V)
  - Built-in power-off circuit: Selection of positive/negative logic is possible.
  - Built-in overcurrent protection circuit
  - Use of a low ESR capacitor is possible.
  - Output capacitor: Use of a ceramic capacitor of 0.47  $\mu$ F or more is possible.
- \*1. Attention should be paid to the power dissipation of the package when the load is large.

### ■ APPLICATIONS

- Constant voltage power supply for battery-powered devices
- Constant voltage power supply for communication devices
- Constant voltage power supply for household electrical appliances
- Constant voltage power supply for cellular phones

SELECTION GUIDE

Output voltage	S-1112 series			S-1122 series			Dropout voltage (typ.) (I <sub>OUT</sub> = 100mA)	Output current (min.) (V <sub>IN</sub> = V <sub>OUT</sub> + 1.0V)	Current consumption during operation (typ.) (V <sub>IN</sub> = V <sub>OUT</sub> + 1.0V, no load)
	SOT-23-5 (3000/reef)	5-pin SON(A) (3000/reef)	SNT-6A(H) (5000/reef)	SOT-23-5 (3000/reef)	5-pin SON(A) (3000/reef)				
1.5V ± 1.0%	S-1112B15MC-L6ATFG	S-1112B15PN-L6ATFG	S-1112B15PL-L6ATFG	S-1122B15MC-L8ATFG	S-1122B15PN-L8ATFG		0.32V	150mA	50µA
1.6V ± 1.0%	S-1112B16MC-L6BTFG	S-1112B16PN-L6BTFG	S-1112B16PL-L6BTFG	S-1122B16MC-L8BTFG	S-1122B16PN-L8BTFG		0.32V	150mA	50µA
1.7V ± 1.0%	S-1112B17MC-L6CTFG	S-1112B17PN-L6CTFG	S-1112B17PL-L6CTFG	S-1122B17MC-L8CTFG	S-1122B17PN-L8CTFG		0.28V	150mA	50µA
1.8V ± 1.0%	S-1112B18MC-L6DTFG	S-1112B18PN-L6DTFG	S-1112B18PL-L6DTFG	S-1122B18MC-L8DTFG	S-1122B18PN-L8DTFG		0.28V	150mA	50µA
1.9V ± 1.0%	S-1112B19MC-L6ETFG	S-1112B19PN-L6ETFG	S-1112B19PL-L6ETFG	S-1122B19MC-L8ETFG	S-1122B19PN-L8ETFG		0.25V	150mA	50µA
2.0V ± 1.0%	S-1112B20MC-L6FTFG	S-1112B20PN-L6FTFG	S-1112B20PL-L6FTFG	S-1122B20MC-L8FTFG	S-1122B20PN-L8FTFG		0.25V	150mA	50µA
2.1V ± 1.0%	S-1112B21MC-L6GTFG	S-1112B21PN-L6GTFG	S-1112B21PL-L6GTFG	S-1122B21MC-L8GTFG	S-1122B21PN-L8GTFG		0.25V	150mA	50µA
2.2V ± 1.0%	S-1112B22MC-L6HTFG	S-1112B22PN-L6HTFG	S-1112B22PL-L6HTFG	S-1122B22MC-L8HTFG	S-1122B22PN-L8HTFG		0.25V	150mA	50µA
2.3V ± 1.0%	S-1112B23MC-L6ITFG	S-1112B23PN-L6ITFG	S-1112B23PL-L6ITFG	S-1122B23MC-L8ITFG	S-1122B23PN-L8ITFG		0.25V	150mA	50µA
2.4V ± 1.0%	S-1112B24MC-L6JTFG	S-1112B24PN-L6JTFG	S-1112B24PL-L6JTFG	S-1122B24MC-L8JTFG	S-1122B24PN-L8JTFG		0.20V	150mA	50µA
2.5V ± 1.0%	S-1112B25MC-L6KTFG	S-1112B25PN-L6KTFG	S-1112B25PL-L6KTFG	S-1122B25MC-L8KTFG	S-1122B25PN-L8KTFG		0.20V	150mA	50µA
2.6V ± 1.0%	S-1112B26MC-L6LTFG	S-1112B26PN-L6LTFG	S-1112B26PL-L6LTFG	S-1122B26MC-L8LTFG	S-1122B26PN-L8LTFG		0.20V	150mA	50µA
2.7V ± 1.0%	S-1112B27MC-L6MTFG	S-1112B27PN-L6MTFG	S-1112B27PL-L6MTFG	S-1122B27MC-L8MTFG	S-1122B27PN-L8MTFG		0.20V	150mA	50µA
2.8V ± 1.0%	S-1112B28MC-L6NTFG	S-1112B28PN-L6NTFG	S-1112B28PL-L6NTFG	S-1122B28MC-L8NTFG	S-1122B28PN-L8NTFG		0.19V	150mA	50µA
2.85V ± 1.0%	S-1112B28JMC-L7PTFG	S-1112B28JPN-L7PTFG					0.19V	150mA	50µA
2.9V ± 1.0%	S-1112B29MC-L6OTFG	S-1112B29PN-L6OTFG	S-1112B29PL-L6OTFG	S-1122B29MC-L8OTFG	S-1122B29PN-L8OTFG		0.19V	150mA	50µA
3.0V ± 1.0%	S-1112B30MC-L6PTFG	S-1112B30PN-L6PTFG	S-1112B30PL-L6PTFG	S-1122B30MC-L8PTFG	S-1122B30PN-L8PTFG		0.19V	150mA	50µA
3.1V ± 1.0%	S-1112B31MC-L6QTFG	S-1112B31PN-L6QTFG	S-1112B31PL-L6QTFG	S-1122B31MC-L8QTFG	S-1122B31PN-L8QTFG		0.19V	150mA	50µA
3.2V ± 1.0%	S-1112B32MC-L6RTFG	S-1112B32PN-L6RTFG	S-1112B32PL-L6RTFG	S-1122B32MC-L8RTFG	S-1122B32PN-L8RTFG		0.19V	150mA	50µA
3.3V ± 1.0%	S-1112B33MC-L6STFG	S-1112B33PN-L6STFG	S-1112B33PL-L6STFG	S-1122B33MC-L8STFG	S-1122B33PN-L8STFG		0.19V	150mA	50µA
3.4V ± 1.0%	S-1112B34MC-L6TTFG	S-1112B34PN-L6TTFG	S-1112B34PL-L6TTFG	S-1122B34MC-L8TTFG	S-1122B34PN-L8TTFG		0.19V	150mA	50µA
3.5V ± 1.0%	S-1112B35MC-L6UJTFG	S-1112B35PN-L6UJTFG	S-1112B35PL-L6UJTFG	S-1122B35MC-L8UJTFG	S-1122B35PN-L8UJTFG		0.19V	150mA	50µA
3.6V ± 1.0%	S-1112B36MC-L6VTFG	S-1112B36PN-L6VTFG	S-1112B36PL-L6VTFG	S-1122B36MC-L8VTFG	S-1122B36PN-L8VTFG		0.19V	150mA	50µA
3.7V ± 1.0%	S-1112B37MC-L6WTFG	S-1112B37PN-L6WTFG	S-1112B37PL-L6WTFG	S-1122B37MC-L8WTFG	S-1122B37PN-L8WTFG		0.19V	150mA	50µA
3.8V ± 1.0%	S-1112B38MC-L6XTFG	S-1112B38PN-L6XTFG	S-1112B38PL-L6XTFG	S-1122B38MC-L8XTFG	S-1122B38PN-L8XTFG		0.19V	150mA	50µA
3.9V ± 1.0%	S-1112B39MC-L6YTFG	S-1112B39PN-L6YTFG	S-1112B39PL-L6YTFG	S-1122B39MC-L8YTFG	S-1122B39PN-L8YTFG		0.19V	150mA	50µA
4.0V ± 1.0%	S-1112B40MC-L6ZTFG	S-1112B40PN-L6ZTFG	S-1112B40PL-L6ZTFG	S-1122B40MC-L8ZTFG	S-1122B40PN-L8ZTFG		0.19V	150mA	50µA
4.1V ± 1.0%	S-1112B41MC-L7ATFG	S-1112B41PN-L7ATFG	S-1112B41PL-L7ATFG	S-1122B41MC-L9ATFG	S-1122B41PN-L9ATFG		0.19V	150mA	50µA
4.3V ± 1.0%	S-1112B43MC-L7CTFG	S-1112B43PN-L7CTFG	S-1112B43PL-L7CTFG	S-1122B43MC-L9CTFG	S-1122B43PN-L9CTFG		0.19V	150mA	50µA
4.4V ± 1.0%	S-1112B44MC-L7DTFG	S-1112B44PN-L7DTFG	S-1112B44PL-L7DTFG	S-1122B44MC-L9DTFG	S-1122B44PN-L9DTFG		0.19V	150mA	50µA
4.5V ± 1.0%	S-1112B45MC-L7ETFG	S-1112B45PN-L7ETFG	S-1112B45PL-L7ETFG	S-1122B45MC-L9ETFG	S-1122B45PN-L9ETFG		0.19V	150mA	50µA
4.6V ± 1.0%	S-1112B46MC-L7FTFG	S-1112B46PN-L7FTFG	S-1112B46PL-L7FTFG	S-1122B46MC-L9FTFG	S-1122B46PN-L9FTFG		0.19V	150mA	50µA
4.7V ± 1.0%	S-1112B47MC-L7GTFG	S-1112B47PN-L7GTFG	S-1112B47PL-L7GTFG	S-1122B47MC-L9GTFG	S-1122B47PN-L9GTFG		0.19V	150mA	50µA
4.8V ± 1.0%	S-1112B48MC-L7HTFG	S-1112B48PN-L7HTFG	S-1112B48PL-L7HTFG	S-1122B48MC-L9HTFG	S-1122B48PN-L9HTFG		0.19V	150mA	50µA
4.9V ± 1.0%	S-1112B49MC-L7ITFG	S-1112B49PN-L7ITFG	S-1112B49PL-L7ITFG	S-1122B49MC-L9ITFG	S-1122B49PN-L9ITFG		0.19V	150mA	50µA
5.0V ± 1.0%	S-1112B50MC-L7JTFG	S-1112B50PN-L7JTFG	S-1112B50PL-L7JTFG	S-1122B50MC-L9JTFG	S-1122B50PN-L9JTFG		0.19V	150mA	50µA
5.1V ± 1.0%	S-1112B51MC-L7KTFG	S-1112B51PN-L7KTFG	S-1112B51PL-L7KTFG	S-1122B51MC-L9KTFG	S-1122B51PN-L9KTFG		0.19V	150mA	50µA
5.2V ± 1.0%	S-1112B52MC-L7LJTFG	S-1112B52PN-L7LJTFG	S-1112B52PL-L7LJTFG	S-1122B52MC-L9LJTFG	S-1122B52PN-L9LJTFG		0.19V	150mA	50µA
5.3V ± 1.0%	S-1112B53MC-L7MTFG	S-1112B53PN-L7MTFG	S-1112B53PL-L7MTFG	S-1122B53MC-L9MTFG	S-1122B53PN-L9MTFG		0.19V	150mA	50µA
5.4V ± 1.0%	S-1112B54MC-L7NTFG	S-1112B54PN-L7NTFG	S-1112B54PL-L7NTFG	S-1122B54MC-L9NTFG	S-1122B54PN-L9NTFG		0.19V	150mA	50µA
5.5V ± 1.0%	S-1112B55MC-L7OTFG	S-1112B55PN-L7OTFG	S-1112B55PL-L7OTFG	S-1122B55MC-L9OTFG	S-1122B55PN-L9OTFG		0.19V	150mA	50µA

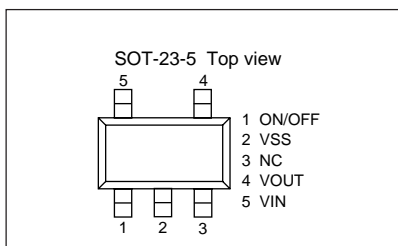
Remark Please contact our sales office if you desire a product with an inverted ON/OFF pin logic.

## TO 150 mA OUTPUT CURRENT HIGH RIPPLE REJECTION AND LOW DROPOUT CMOS VOLTAGE REGULATOR

### S-T111 series

The S-T111 series is a positive voltage regulator that features low dropout voltage, high output voltage accuracy, and low current consumption, and has been developed using CMOS technology. Since a low on-resistance transistor is incorporated, the dropout voltage is small, and a large output current can be obtained. A built-in overcurrent protection circuit prevents the load current from exceeding the current capacitance of the output transistor. Moreover, the battery life can be extended by using the power-on/off circuit. A greater variety of capacitors can be used with this series compared with existing voltage regulators developed using CMOS technology, including a small ceramic capacitor. The small SOT-23-5 package realizes high-density mounting.

### ■ PIN CONFIGURATIONS



### ■ FEATURES

- Low current consumption
  - 50  $\mu$ A typ., 90  $\mu$ A max. (during operation)
  - 0.1  $\mu$ A typ., 1  $\mu$ A max. (during power-off)
- Output voltage: 1.5 to 5.5 V (selectable in 0.1 V steps)
- High output voltage accuracy:  $\pm 1.0\%$
- Output current
  - 150 mA capable (product with 3.0 V output, when  $V_{IN} = 4$  V)\*1
- Dropout voltage
  - 190 mV typ. (product with 3.0 V output, when  $I_{OUT} = 100$  mA)
- Ripple rejection rate: 80 dB typ. ( $f = 1$  kHz,  $V_{OUT} = 3$  V)
- Built-in power-off circuit: Selection of positive/negative logic is possible.
- Built-in overcurrent protection circuit
- Use of a low ESR capacitor is possible.
- Input/output capacitor: Use of a ceramic capacitor of 0.1  $\mu$ F or more is possible.

\*1. Attention should be paid to the power dissipation of the package when the load is large.

### ■ APPLICATIONS

- Constant voltage power supply for battery-powered devices
- Constant voltage power supply for communication devices
- Constant voltage power supply for household electrical appliances
- Constant voltage power supply for cellular phones

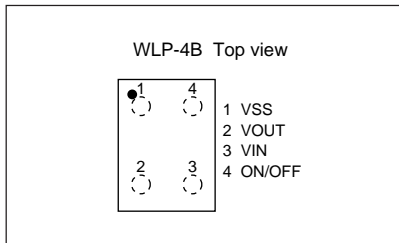
### ■ SELECTION GUIDE

Output voltage	SOT-23-5 (3000/reel)	Dropout voltage (typ.)		Output current (min.) ( $V_{IN} = V_{OUT(S)} + 1.0V$ )	Current consumption during operation (typ.) ( $V_{IN} = V_{OUT(S)} + 1.0V$ , no load)
		( $I_{OUT} = 50mA$ )	( $I_{OUT} = 100mA$ )		
1.5V $\pm$ 1.0%	S-T111B15MC-OGATFG	Not prescribed	0.32V	150mA	50 $\mu$ A
1.6V $\pm$ 1.0%	S-T111B16MC-OGBTFG	Not prescribed	0.32V	150mA	50 $\mu$ A
1.7V $\pm$ 1.0%	S-T111B17MC-OGCTFG	Not prescribed	0.28V	150mA	50 $\mu$ A
1.8V $\pm$ 1.0%	S-T111B18MC-OGDTFG	Not prescribed	0.28V	150mA	50 $\mu$ A
1.9V $\pm$ 1.0%	S-T111B19MC-OGETFG	Not prescribed	0.25V	150mA	50 $\mu$ A
2.0V $\pm$ 1.0%	S-T111B20MC-OGFTFG	Not prescribed	0.25V	150mA	50 $\mu$ A
2.1V $\pm$ 1.0%	S-T111B21MC-OGGTFG	Not prescribed	0.25V	150mA	50 $\mu$ A
2.2V $\pm$ 1.0%	S-T111B22MC-OGHTFG	Not prescribed	0.25V	150mA	50 $\mu$ A
2.3V $\pm$ 1.0%	S-T111B23MC-OGITFG	Not prescribed	0.25V	150mA	50 $\mu$ A
2.4V $\pm$ 1.0%	S-T111B24MC-OGJTFG	Not prescribed	0.20V	150mA	50 $\mu$ A
2.5V $\pm$ 1.0%	S-T111B25MC-OGKTFG	Not prescribed	0.20V	150mA	50 $\mu$ A
2.6V $\pm$ 1.0%	S-T111B26MC-OGLTFG	Not prescribed	0.20V	150mA	50 $\mu$ A
2.7V $\pm$ 1.0%	S-T111B27MC-OGMTFG	Not prescribed	0.20V	150mA	50 $\mu$ A
2.8V $\pm$ 1.0%	S-T111B28MC-OGNTFG	0.08V	0.19V	150mA	50 $\mu$ A
2.9V $\pm$ 1.0%	S-T111B29MC-OGOTFG	0.08V	0.19V	150mA	50 $\mu$ A
3.0V $\pm$ 1.0%	S-T111B30MC-OGPTFG	0.08V	0.19V	150mA	50 $\mu$ A
3.1V $\pm$ 1.0%	S-T111B31MC-OGQTFG	0.08V	0.19V	150mA	50 $\mu$ A
3.2V $\pm$ 1.0%	S-T111B32MC-OGRTFG	0.08V	0.19V	150mA	50 $\mu$ A
3.3V $\pm$ 1.0%	S-T111B33MC-OGSTFG	0.08V	0.19V	150mA	50 $\mu$ A
3.4V $\pm$ 1.0%	S-T111B34MC-OGTTFG	0.08V	0.19V	150mA	50 $\mu$ A
3.5V $\pm$ 1.0%	S-T111B35MC-OGUTFG	0.08V	0.19V	150mA	50 $\mu$ A
3.6V $\pm$ 1.0%	S-T111B36MC-OGVTFG	0.08V	0.19V	150mA	50 $\mu$ A
3.7V $\pm$ 1.0%	S-T111B37MC-OGWTFG	0.08V	0.19V	150mA	50 $\mu$ A
3.8V $\pm$ 1.0%	S-T111B38MC-OGXTFG	0.08V	0.19V	150mA	50 $\mu$ A
3.9V $\pm$ 1.0%	S-T111B39MC-OGYTFG	0.08V	0.19V	150mA	50 $\mu$ A
4.0V $\pm$ 1.0%	S-T111B40MC-OGZTFG	0.08V	0.19V	150mA	50 $\mu$ A
4.1V $\pm$ 1.0%	S-T111B41MC-OHATFG	0.08V	0.19V	150mA	50 $\mu$ A
4.2V $\pm$ 1.0%	S-T111B42MC-OHBTFG	0.08V	0.19V	150mA	50 $\mu$ A
4.3V $\pm$ 1.0%	S-T111B43MC-OHCTFG	0.08V	0.19V	150mA	50 $\mu$ A
4.4V $\pm$ 1.0%	S-T111B44MC-OHDTFG	0.08V	0.19V	150mA	50 $\mu$ A
4.5V $\pm$ 1.0%	S-T111B45MC-OHETFG	0.08V	0.19V	150mA	50 $\mu$ A
4.6V $\pm$ 1.0%	S-T111B46MC-OHFTFG	0.08V	0.19V	150mA	50 $\mu$ A
4.7V $\pm$ 1.0%	S-T111B47MC-OHGTFG	0.08V	0.19V	150mA	50 $\mu$ A
4.8V $\pm$ 1.0%	S-T111B48MC-OHHTFG	0.08V	0.19V	150mA	50 $\mu$ A
4.9V $\pm$ 1.0%	S-T111B49MC-OHITFG	0.08V	0.19V	150mA	50 $\mu$ A
5.0V $\pm$ 1.0%	S-T111B50MC-OHJTFG	0.08V	0.19V	150mA	50 $\mu$ A
5.1V $\pm$ 1.0%	S-T111B51MC-OHKTFG	0.08V	0.19V	150mA	50 $\mu$ A
5.2V $\pm$ 1.0%	S-T111B52MC-OHLTFG	0.08V	0.19V	150mA	50 $\mu$ A
5.3V $\pm$ 1.0%	S-T111B53MC-OHMTFG	0.08V	0.19V	150mA	50 $\mu$ A
5.4V $\pm$ 1.0%	S-T111B54MC-OHNTFG	0.08V	0.19V	150mA	50 $\mu$ A
5.5V $\pm$ 1.0%	S-T111B55MC-OHOTFG	0.08V	0.19V	150mA	50 $\mu$ A

**Remark** Please contact our sales office if you desire a product with an inverted ON/OFF pin logic.

**TO 150 mA OUTPUT CURRENT  
HIGH RIPPLE REJECTION, WLP PACKAGE AND LOW DROPOUT CMOS VOLTAGE REGULATOR**
**S-L2985 series**

The S-L2985 series is a positive voltage regulator that features low dropout voltage, high output voltage accuracy, and low current consumption, and has been developed using CMOS technology. Since a low on-resistance transistor is incorporated, the dropout voltage is small, and a large output current can be obtained. A built-in overcurrent protection circuit prevents the load current from exceeding the current capacitance of the output transistor. Moreover, the battery life can be extended by using the power-on/off circuit. A greater variety of capacitors can be used with this series compared with existing voltage regulators developed using CMOS technology, including a small ceramic capacitor. The super-small WLP-4B package realizes high-density mounting.

**■ PIN CONFIGURATIONS**

**■ SELECTION GUIDE**

Output voltage	WLP4B (3000/reel)	Dropout voltage (typ.) ( $I_{OUT}=100\text{mA}$ )	Output current (min.) ( $V_{IN}\geq V_{OUT(S)}+1.0\text{V}$ )	Current consumption during operation (typ.) ( $V_{IN}=V_{OUT(S)}+1.0\text{V}$ , no load)
1.5V $\pm$ 1.0%	S-L2985B15-H4T1	0.32V	150mA	50 $\mu$ A
1.8V $\pm$ 1.0%	S-L2985B18-H4T1	0.28V	150mA	50 $\mu$ A
2.5V $\pm$ 1.0%	S-L2985B25-H4T1	0.20V	150mA	50 $\mu$ A
2.6V $\pm$ 1.0%	S-L2985B26-H4T1	0.20V	150mA	50 $\mu$ A
2.7V $\pm$ 1.0%	S-L2985B27-H4T1	0.20V	150mA	50 $\mu$ A
2.8V $\pm$ 1.0%	S-L2985B28-H4T1	0.19V	150mA	50 $\mu$ A
2.9V $\pm$ 1.0%	S-L2985B29-H4T1	0.19V	150mA	50 $\mu$ A
3.0V $\pm$ 1.0%	S-L2985B30-H4T1	0.19V	150mA	50 $\mu$ A
3.1V $\pm$ 1.0%	S-L2985B31-H4T1	0.19V	150mA	50 $\mu$ A
3.2V $\pm$ 1.0%	S-L2985B32-H4T1	0.19V	150mA	50 $\mu$ A
3.3V $\pm$ 1.0%	S-L2985B33-H4T1	0.19V	150mA	50 $\mu$ A
3.4V $\pm$ 1.0%	S-L2985B34-H4T1	0.19V	150mA	50 $\mu$ A
3.5V $\pm$ 1.0%	S-L2985B35-H4T1	0.19V	150mA	50 $\mu$ A
5.0V $\pm$ 1.0%	S-L2985B50-H4T1	0.19V	150mA	50 $\mu$ A

**Remark** Please contact our sales office if you desire a product with an inverted ON/OFF pin logic.

**■ FEATURES**

- Low current consumption  
50  $\mu$ A typ., 90  $\mu$ A max. (during operation)  
0.1  $\mu$ A typ., 1  $\mu$ A max. (during power-off)
  - Output voltage: 1.5 to 5.5 V (selectable in 0.1 V steps)
  - High output voltage accuracy:  $\pm 1.0\%$
  - Output current  
150 mA capable (product with 3.0 V output, when  $V_{IN} = 4\text{V}$ )\*1
  - Dropout voltage  
190 mV typ. (product with 3.0 V output, when  $I_{OUT} = 100\text{mA}$ )
  - Ripple rejection rate: 80 dB typ. ( $f = 1\text{kHz}$ ,  $V_{OUT} = 3\text{V}$ )
  - Built-in power-off circuit: Selection of positive/negative logic is possible.
  - Built-in overcurrent protection circuit
  - Use of a low ESR capacitor is possible.
  - Output capacitor: Use of a ceramic capacitor of 0.47  $\mu$ F or more is possible.
- \*1. Attention should be paid to the power dissipation of the package when the load is large.

**■ APPLICATIONS**

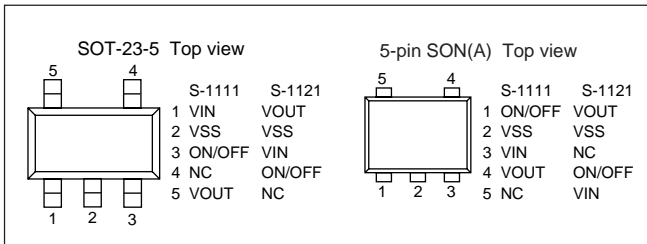
- Constant voltage power supply for battery-powered devices
- Constant voltage power supply for communication devices
- Constant voltage power supply for household electrical appliances
- Constant voltage power supply for cellular phones

## TO 150 mA OUTPUT CURRENT HIGH RIPPLE REJECTION AND LOW DROPOUT CMOS VOLTAGE REGULATOR

### S-1111/1121 series

The S-1111/1121 series is a positive voltage regulator that features low dropout voltage, high output voltage accuracy, and low current consumption, and has been developed using CMOS technology. Since a low on-resistance transistor is incorporated, the dropout voltage is small, and a large output current can be obtained. A built-in overcurrent protection circuit prevents the load current from exceeding the current capacitance of the output transistor. Moreover, the battery life can be extended by using the power-on/off circuit. Small SOT-23-5 and 5-pin SON(A) packages realize high-density mounting. The lineup includes the S-1111 and S-1121 series, which differ in pin configuration.

### PIN CONFIGURATIONS



### FEATURES

- Low current consumption
  - 35  $\mu$ A typ., 65  $\mu$ A max. (during operation)
  - 0.1  $\mu$ A typ., 1  $\mu$ A max. (during power-off)
- Output voltage: 1.5 to 5.5 V (selectable in 0.1 V steps)
- High output voltage accuracy:  $\pm 1.0\%$
- Output current
  - 150 mA capable (product with 3.0 V output, when  $V_{IN} = 4$  V)\*1
- Dropout voltage
  - 200 mV typ. (product with 3.0 V output, when  $I_{OUT} = 100$  mA)
- Ripple rejection rate: 70 dB typ. ( $f = 1$  kHz,  $V_{OUT} = 3$  V)
- Built-in power-off circuit: Selection of positive/negative logic is possible.
- Built-in overcurrent protection circuit

\*1. Attention should be paid to the power dissipation of the package when the load is large.

### APPLICATIONS

- Constant voltage power supply for battery-powered devices
- Constant voltage power supply for communication devices
- Constant voltage power supply for household electrical appliances
- Constant voltage power supply for cellular phones

### SELECTION GUIDE

Output voltage	S-1111 series		S-1121 series		Dropout voltage (typ.) ( $I_{OUT}=100$ mA)	Output current (min.) ( $V_{IN}=V_{OUT}+1.0$ V)	Current consumption during operation (typ.) ( $V_{IN}=V_{OUT}+1.0$ V, no load)
	SOT-23-5 (3000/reel)	5-pin SON(A) (3000/reel)	SOT-23-5 (3000/reel)	5-pin SON(A) (3000/reel)			
1.5V $\pm 1.0\%$	S-1111B15MC-NYATFG	S-1111B15PN-NYATFG	S-1121B15MC-N2ATFG	S-1121B15PN-N2ATFG	0.60V	150mA	35 $\mu$ A
1.6V $\pm 1.0\%$	S-1111B16MC-NYBTFG	S-1111B16PN-NYBTFG	S-1121B16MC-N2BTFG	S-1121B16PN-N2BTFG	0.60V	150mA	35 $\mu$ A
1.7V $\pm 1.0\%$	S-1111B17MC-NYCTFG	S-1111B17PN-NYCTFG	S-1121B17MC-N2CTFG	S-1121B17PN-N2CTFG	0.60V	150mA	35 $\mu$ A
1.8V $\pm 1.0\%$	S-1111B18MC-NYDTFG	S-1111B18PN-NYDTFG	S-1121B18MC-N2DTFG	S-1121B18PN-N2DTFG	0.60V	150mA	35 $\mu$ A
1.9V $\pm 1.0\%$	S-1111B19MC-NYETFG	S-1111B19PN-NYETFG	S-1121B19MC-N2ETFG	S-1121B19PN-N2ETFG	0.60V	150mA	35 $\mu$ A
2.0V $\pm 1.0\%$	S-1111B20MC-NYFTFG	S-1111B20PN-NYFTFG	S-1121B20MC-N2FTFG	S-1121B20PN-N2FTFG	0.35V	150mA	35 $\mu$ A
2.1V $\pm 1.0\%$	S-1111B21MC-NYGTFG	S-1111B21PN-NYGTFG	S-1121B21MC-N2GTFG	S-1121B21PN-N2GTFG	0.35V	150mA	35 $\mu$ A
2.2V $\pm 1.0\%$	S-1111B22MC-NYHTFG	S-1111B22PN-NYHTFG	S-1121B22MC-N2HTFG	S-1121B22PN-N2HTFG	0.35V	150mA	35 $\mu$ A
2.3V $\pm 1.0\%$	S-1111B23MC-NYITFG	S-1111B23PN-NYITFG	S-1121B23MC-N2ITFG	S-1121B23PN-N2ITFG	0.35V	150mA	35 $\mu$ A
2.4V $\pm 1.0\%$	S-1111B24MC-NYJTFG	S-1111B24PN-NYJTFG	S-1121B24MC-N2JTFG	S-1121B24PN-N2JTFG	0.35V	150mA	35 $\mu$ A
2.5V $\pm 1.0\%$	S-1111B25MC-NYKTFG	S-1111B25PN-NYKTFG	S-1121B25MC-N2KTFG	S-1121B25PN-N2KTFG	0.24V	150mA	35 $\mu$ A
2.6V $\pm 1.0\%$	S-1111B26MC-NYLTFG	S-1111B26PN-NYLTFG	S-1121B26MC-N2LTFG	S-1121B26PN-N2LTFG	0.24V	150mA	35 $\mu$ A
2.7V $\pm 1.0\%$	S-1111B27MC-NYMTFG	S-1111B27PN-NYMTFG	S-1121B27MC-N2MTFG	S-1121B27PN-N2MTFG	0.24V	150mA	35 $\mu$ A
2.8V $\pm 1.0\%$	S-1111B28MC-NYNTFG	S-1111B28PN-NYNTFG	S-1121B28MC-N2NTFG	S-1121B28PN-N2NTFG	0.20V	150mA	35 $\mu$ A
2.9V $\pm 1.0\%$	S-1111B29MC-NYOTFG	S-1111B29PN-NYOTFG	S-1121B29MC-N2OTFG	S-1121B29PN-N2OTFG	0.20V	150mA	35 $\mu$ A
3.0V $\pm 1.0\%$	S-1111B30MC-NYPTFG	S-1111B30PN-NYPTFG	S-1121B30MC-N2PTFG	S-1121B30PN-N2PTFG	0.20V	150mA	35 $\mu$ A
3.1V $\pm 1.0\%$	S-1111B31MC-NYQTFG	S-1111B31PN-NYQTFG	S-1121B31MC-N2QTFG	S-1121B31PN-N2QTFG	0.20V	150mA	35 $\mu$ A
3.2V $\pm 1.0\%$	S-1111B32MC-NYRTFG	S-1111B32PN-NYRTFG	S-1121B32MC-N2RTFG	S-1121B32PN-N2RTFG	0.20V	150mA	35 $\mu$ A
3.3V $\pm 1.0\%$	S-1111B33MC-NYSTFG	S-1111B33PN-NYSTFG	S-1121B33MC-N2STFG	S-1121B33PN-N2STFG	0.20V	150mA	35 $\mu$ A
3.4V $\pm 1.0\%$	S-1111B34MC-NYTFG	S-1111B34PN-NYTFG	S-1121B34MC-N2TFG	S-1121B34PN-N2TFG	0.17V	150mA	35 $\mu$ A
3.5V $\pm 1.0\%$	S-1111B35MC-NYUFG	S-1111B35PN-NYUFG	S-1121B35MC-N2UFG	S-1121B35PN-N2UFG	0.17V	150mA	35 $\mu$ A
3.6V $\pm 1.0\%$	S-1111B36MC-NYVTFG	S-1111B36PN-NYVTFG	S-1121B36MC-N2VTFG	S-1121B36PN-N2VTFG	0.17V	150mA	35 $\mu$ A
3.7V $\pm 1.0\%$	S-1111B37MC-NYWTFG	S-1111B37PN-NYWTFG	S-1121B37MC-N2WTFG	S-1121B37PN-N2WTFG	0.17V	150mA	35 $\mu$ A
3.8V $\pm 1.0\%$	S-1111B38MC-NYXTFG	S-1111B38PN-NYXTFG	S-1121B38MC-N2XTFG	S-1121B38PN-N2XTFG	0.17V	150mA	35 $\mu$ A
3.9V $\pm 1.0\%$	S-1111B39MC-NYYTFG	S-1111B39PN-NYYTFG	S-1121B39MC-N2YTFG	S-1121B39PN-N2YTFG	0.17V	150mA	35 $\mu$ A
4.0V $\pm 1.0\%$	S-1111B40MC-NYZTFG	S-1111B40PN-NYZTFG	S-1121B40MC-N2ZTFG	S-1121B40PN-N2ZTFG	0.17V	150mA	35 $\mu$ A
4.1V $\pm 1.0\%$	S-1111B41MC-NZATFG	S-1111B41PN-NZATFG	S-1121B41MC-N3ATFG	S-1121B41PN-N3ATFG	0.17V	150mA	35 $\mu$ A
4.2V $\pm 1.0\%$	S-1111B42MC-NZBTFG	S-1111B42PN-NZBTFG	S-1121B42MC-N3BTFG	S-1121B42PN-N3BTFG	0.17V	150mA	35 $\mu$ A
4.3V $\pm 1.0\%$	S-1111B43MC-NZCTFG	S-1111B43PN-NZCTFG	S-1121B43MC-N3CTFG	S-1121B43PN-N3CTFG	0.17V	150mA	35 $\mu$ A
4.4V $\pm 1.0\%$	S-1111B44MC-NZDTFG	S-1111B44PN-NZDTFG	S-1121B44MC-N3DTFG	S-1121B44PN-N3DTFG	0.17V	150mA	35 $\mu$ A
4.5V $\pm 1.0\%$	S-1111B45MC-NZETFG	S-1111B45PN-NZETFG	S-1121B45MC-N3ETFG	S-1121B45PN-N3ETFG	0.17V	150mA	35 $\mu$ A
4.6V $\pm 1.0\%$	S-1111B46MC-NZFTFG	S-1111B46PN-NZFTFG	S-1121B46MC-N3FTFG	S-1121B46PN-N3FTFG	0.17V	150mA	35 $\mu$ A
4.7V $\pm 1.0\%$	S-1111B47MC-NZGTFG	S-1111B47PN-NZGTFG	S-1121B47MC-N3GTFG	S-1121B47PN-N3GTFG	0.17V	150mA	35 $\mu$ A
4.75V $\pm 1.0\%$	-	-	S-1121B47MC-N3GTFG	S-1121B47PN-N3GTFG	0.17V	150mA	35 $\mu$ A
4.75V $\pm 1.0\%$	-	-	S-1121B4HMC-N3PTFG	-	0.17V	150mA	35 $\mu$ A
4.8V $\pm 1.0\%$	S-1111B48MC-NZHFTG	S-1111B48PN-NZHFTG	S-1121B48MC-N3HTFG	S-1121B48PN-N3HTFG	0.17V	150mA	35 $\mu$ A
4.9V $\pm 1.0\%$	S-1111B49MC-NZITFG	S-1111B49PN-NZITFG	S-1121B49MC-N3ITFG	S-1121B49PN-N3ITFG	0.17V	150mA	35 $\mu$ A
5.0V $\pm 1.0\%$	S-1111B50MC-NZJTFG	S-1111B50PN-NZJTFG	S-1121B50MC-N3JTFG	S-1121B50PN-N3JTFG	0.17V	150mA	35 $\mu$ A
5.1V $\pm 1.0\%$	S-1111B51MC-NZKTFG	S-1111B51PN-NZKTFG	S-1121B51MC-N3KTFG	S-1121B51PN-N3KTFG	0.17V	150mA	35 $\mu$ A
5.2V $\pm 1.0\%$	S-1111B52MC-NZLTFG	S-1111B52PN-NZLTFG	S-1121B52MC-N3LTFG	S-1121B52PN-N3LTFG	0.17V	150mA	35 $\mu$ A
5.3V $\pm 1.0\%$	S-1111B53MC-NZMTFG	S-1111B53PN-NZMTFG	S-1121B53MC-N3MTFG	S-1121B53PN-N3MTFG	0.17V	150mA	35 $\mu$ A
5.4V $\pm 1.0\%$	S-1111B54MC-NZNFTG	S-1111B54PN-NZNFTG	S-1121B54MC-N3NFTG	S-1121B54PN-N3NFTG	0.17V	150mA	35 $\mu$ A
5.5V $\pm 1.0\%$	S-1111B55MC-NZOTFG	S-1111B55PN-NZOTFG	S-1121B55MC-N3OTFG	S-1121B55PN-N3OTFG	0.17V	150mA	35 $\mu$ A

Remark Please contact our sales office if you desire a product with an inverted ON/OFF pin logic.



**TO 150 mA OUTPUT CURRENT**

ULTRA LOW CURRENT CONSUMPTION, HIGH RIPPLE REJECTION AND LOW DROPOUT CMOS VOLTAGE REGULATOR

**S-1167 series**

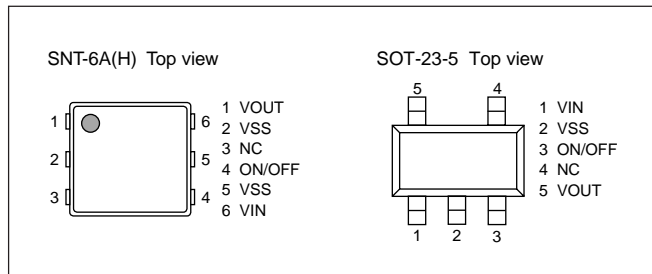
The S-1167 series is a positive voltage regulator with ultra low current consumption, high ripple rejection, low drop voltage and high output voltage accuracy developed based on CMOS technology.

Although current consumption is very small with 9  $\mu$ A typ., S-1167 series realized the 70 dB of high ripple rejection rate. Besides a 1.0  $\mu$ F ceramic capacitor is available as an input-and-output capacitor.

Moreover, dropout voltage is also small since output voltage accuracy realizes  $\pm 1.0\%$  of high accuracy, and the low-on-resistance transistor is built-in. A built-in Output current protector prevents the load current from exceeding the current capacitance of the output transistor. A shutdown circuit ensures long battery life.

Two packages, SOT-23-5 and SNT-6A(H), are available. Compared with the voltage regulators using the conventional CMOS process, S-1167 Series is the most suitable for the portable equipments with ultra low current consumption and corresponding to the small package.

**■ PIN CONFIGURATIONS**



**■ SELECTION GUIDE**

Output voltage	SOT-23-5 (3000/reel)	SNT-6A(H) (5000/reel)	Dropout voltage (typ.) (I <sub>OUT</sub> =100mA)	Output current (min.) (V <sub>IN</sub> ≥V <sub>OUT(S)</sub> +1.0V)	Current consumption during operation (typ.) (V <sub>IN</sub> =V <sub>OUT(S)</sub> +1.0V, no load)
1.5 V ± 1.0%	S-1167B15-M5T1G	S-1167B15-I6T2G	0.54V	150mA	9 $\mu$ A
1.6 V ± 1.0%	S-1167B16-M5T1G	S-1167B16-I6T2G	0.54V	150mA	9 $\mu$ A
1.7 V ± 1.0%	S-1167B17-M5T1G	S-1167B17-I6T2G	0.54V	150mA	9 $\mu$ A
1.8 V ± 1.0%	S-1167B18-M5T1G	S-1167B18-I6T2G	0.54V	150mA	9 $\mu$ A
1.9 V ± 1.0%	S-1167B19-M5T1G	S-1167B19-I6T2G	0.54V	150mA	9 $\mu$ A
2.0 V ± 1.0%	S-1167B20-M5T1G	S-1167B20-I6T2G	0.23V	150mA	9 $\mu$ A
2.1 V ± 1.0%	S-1167B21-M5T1G	S-1167B21-I6T2G	0.23V	150mA	9 $\mu$ A
2.2 V ± 1.0%	S-1167B22-M5T1G	S-1167B22-I6T2G	0.23V	150mA	9 $\mu$ A
2.3 V ± 1.0%	S-1167B23-M5T1G	S-1167B23-I6T2G	0.23V	150mA	9 $\mu$ A
2.4 V ± 1.0%	S-1167B24-M5T1G	S-1167B24-I6T2G	0.23V	150mA	9 $\mu$ A
2.5 V ± 1.0%	S-1167B25-M5T1G	S-1167B25-I6T2G	0.20V	150mA	9 $\mu$ A
2.6 V ± 1.0%	S-1167B26-M5T1G	S-1167B26-I6T2G	0.20V	150mA	9 $\mu$ A
2.7 V ± 1.0%	S-1167B27-M5T1G	S-1167B27-I6T2G	0.20V	150mA	9 $\mu$ A
2.8 V ± 1.0%	S-1167B28-M5T1G	S-1167B28-I6T2G	0.20V	150mA	9 $\mu$ A
2.9 V ± 1.0%	S-1167B29-M5T1G	S-1167B29-I6T2G	0.20V	150mA	9 $\mu$ A
3.0 V ± 1.0%	S-1167B30-M5T1G	S-1167B30-I6T2G	0.15V	150mA	9 $\mu$ A
3.1 V ± 1.0%	S-1167B31-M5T1G	S-1167B31-I6T2G	0.15V	150mA	9 $\mu$ A
3.2 V ± 1.0%	S-1167B32-M5T1G	S-1167B32-I6T2G	0.15V	150mA	9 $\mu$ A
3.3 V ± 1.0%	S-1167B33-M5T1G	S-1167B33-I6T2G	0.14V	150mA	9 $\mu$ A
3.4 V ± 1.0%	S-1167B34-M5T1G	S-1167B34-I6T2G	0.14V	150mA	9 $\mu$ A
3.5 V ± 1.0%	S-1167B35-M5T1G	S-1167B35-I6T2G	0.14V	150mA	9 $\mu$ A
3.6 V ± 1.0%	S-1167B36-M5T1G	S-1167B36-I6T2G	0.14V	150mA	9 $\mu$ A
3.7 V ± 1.0%	S-1167B37-M5T1G	S-1167B37-I6T2G	0.14V	150mA	9 $\mu$ A
3.8 V ± 1.0%	S-1167B38-M5T1G	S-1167B38-I6T2G	0.14V	150mA	9 $\mu$ A
3.9 V ± 1.0%	S-1167B39-M5T1G	S-1167B39-I6T2G	0.14V	150mA	9 $\mu$ A
4.0 V ± 1.0%	S-1167B40-M5T1G	S-1167B40-I6T2G	0.14V	150mA	9 $\mu$ A
4.1 V ± 1.0%	S-1167B41-M5T1G	S-1167B41-I6T2G	0.14V	150mA	9 $\mu$ A
4.2 V ± 1.0%	S-1167B42-M5T1G	S-1167B42-I6T2G	0.14V	150mA	9 $\mu$ A
4.3 V ± 1.0%	S-1167B43-M5T1G	S-1167B43-I6T2G	0.14V	150mA	9 $\mu$ A
4.4 V ± 1.0%	S-1167B44-M5T1G	S-1167B44-I6T2G	0.14V	150mA	9 $\mu$ A
4.5 V ± 1.0%	S-1167B45-M5T1G	S-1167B45-I6T2G	0.14V	150mA	9 $\mu$ A
4.6 V ± 1.0%	S-1167B46-M5T1G	S-1167B46-I6T2G	0.14V	150mA	9 $\mu$ A
4.7 V ± 1.0%	S-1167B47-M5T1G	S-1167B47-I6T2G	0.14V	150mA	9 $\mu$ A
4.8 V ± 1.0%	S-1167B48-M5T1G	S-1167B48-I6T2G	0.14V	150mA	9 $\mu$ A
4.9 V ± 1.0%	S-1167B49-M5T1G	S-1167B49-I6T2G	0.14V	150mA	9 $\mu$ A
5.0 V ± 1.0%	S-1167B50-M5T1G	S-1167B50-I6T2G	0.14V	150mA	9 $\mu$ A
5.1 V ± 1.0%	S-1167B51-M5T1G	S-1167B51-I6T2G	0.14V	150mA	9 $\mu$ A
5.2 V ± 1.0%	S-1167B52-M5T1G	S-1167B52-I6T2G	0.14V	150mA	9 $\mu$ A
5.3 V ± 1.0%	S-1167B53-M5T1G	S-1167B53-I6T2G	0.14V	150mA	9 $\mu$ A
5.4 V ± 1.0%	S-1167B54-M5T1G	S-1167B54-I6T2G	0.14V	150mA	9 $\mu$ A
5.5 V ± 1.0%	S-1167B55-M5T1G	S-1167B55-I6T2G	0.14V	150mA	9 $\mu$ A

**Remark** Please contact our sales office if you desire a product with an inverted ON/OFF pin logic.

**■ FEATURES**

- Low current consumption  
 9  $\mu$ A typ., 16  $\mu$ A max. (during operation)  
 0.1  $\mu$ A typ., 0.9  $\mu$ A max. (during power-off)
- Output voltage: 1.5 to 5.5 V (selectable in 0.1 V steps)
- High output voltage accuracy:  $\pm 1.0\%$
- Output current  
 150 mA capable (product with 3.0 V output, when V<sub>IN</sub> = 4 V)\*1
- Dropout voltage  
 150 mV (product with 3.0 V output, when I<sub>OUT</sub> = 100 mA)
- Ripple rejection rate: 70 dB typ. (f = 1 kHz, V<sub>OUT</sub> = 3 V)
- Built-in power-off circuit: Selection of positive/negative logic is possible.
- Built-in overcurrent protection circuit
- Use of a low ESR capacitor is possible.
- Input/output capacitor: Use of a ceramic capacitor of 1.0  $\mu$ F or more is possible.

\*1. Attention should be paid to the power dissipation of the package when the load is large.

**■ APPLICATIONS**

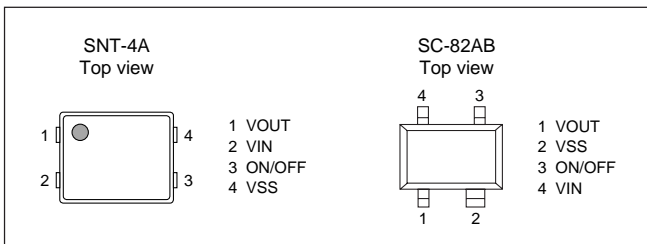
- Power supply for battery-powered devices
- Power supply for cellular phones
- Power supply for portable equipments

## TO 150 mA OUTPUT CURRENT HIGH RIPPLE REJECTION AND SMALL PACKAGE CMOS VOLTAGE REGULATOR

### S-1323 series

The S-1323 series is a positive voltage regulator that features low dropout voltage, high output voltage accuracy, and low current consumption, and has been developed using CMOS technology. Since a low on-resistance transistor is incorporated, the dropout voltage is small, and a large output current can be obtained. A built-in overcurrent protection circuit prevents the load current from exceeding the current capacitance of the output transistor. Moreover, the battery life can be extended by using the power-on/off circuit. A small SNT-4A and SC-82AB package realizes high-density mounting.

### PIN CONFIGURATIONS



### FEATURES

- Low current consumption  
70  $\mu$ A typ., 90  $\mu$ A max. (during operation)  
0.1  $\mu$ A typ., 1  $\mu$ A max. (during power-off)
- Output voltage: 1.5 to 5.5 V (selectable in 0.1 V steps)
- High output voltage accuracy:  $\pm 1.0\%$
- Output current  
150 mA capable (product with 3.0 V output, when  $V_{IN} = 4$  V)\*1
- Dropout voltage  
500 mV typ. (product with 3.0 V output, when  $I_{OUT} = 150$  mA)
- Ripple rejection rate: 70 dB typ. ( $f = 1$  kHz,  $V_{OUT} = 3$  V)
- Built-in power-off circuit: Selection of positive/negative logic is possible.
- Built-in overcurrent protection circuit
- Use of a low ESR capacitor is possible.
- Input/output capacitor: Use of a ceramic capacitor of 1.0  $\mu$ F or more is possible.

\*1. Attention should be paid to the power dissipation of the package when the load is large.

### APPLICATIONS

- Constant voltage power supply for battery-powered devices
- Constant voltage power supply for communication devices
- Constant voltage power supply for household electrical appliances
- Constant voltage power supply for cellular phones

### SELECTION GUIDE

Output voltage	SNT-4A (5000/reel)	SC-82AB (3000/reel)	Dropout voltage (typ.) ( $I_{OUT}=150$ mA)	Output current (min.) ( $V_{IN}\geq V_{OUT(S)}+1.0$ V)	Current consumption during operation (typ.) ( $V_{IN}=V_{OUT(S)}+1.0$ V, no load)
1.5V $\pm$ 1.0%	S-1323B15PF-N8ATFG	S-1323B15NB-N8ATFG	0.50V	150mA	70 $\mu$ A
1.6V $\pm$ 1.0%	S-1323B16PF-N8BTFG	S-1323B16NB-N8BTFG	0.50V	150mA	70 $\mu$ A
1.7V $\pm$ 1.0%	S-1323B17PF-N8CTFG	S-1323B17NB-N8CTFG	0.50V	150mA	70 $\mu$ A
1.8V $\pm$ 1.0%	S-1323B18PF-N8DTFG	S-1323B18NB-N8DTFG	0.50V	150mA	70 $\mu$ A
1.85V $\pm$ 1.0%	S-1323B1JPF-N9PTFG	-	0.50V	150mA	70 $\mu$ A
1.9V $\pm$ 1.0%	S-1323B19PF-N8ETFG	S-1323B19NB-N8ETFG	0.50V	150mA	70 $\mu$ A
2.0V $\pm$ 1.0%	S-1323B20PF-N8FTFG	S-1323B20NB-N8FTFG	0.50V	150mA	70 $\mu$ A
2.1V $\pm$ 1.0%	S-1323B21PF-N8GTFG	S-1323B21NB-N8GTFG	0.50V	150mA	70 $\mu$ A
2.2V $\pm$ 1.0%	S-1323B22PF-N8HTFG	S-1323B22NB-N8HTFG	0.50V	150mA	70 $\mu$ A
2.3V $\pm$ 1.0%	S-1323B23PF-N8ITFG	S-1323B23NB-N8ITFG	0.50V	150mA	70 $\mu$ A
2.4V $\pm$ 1.0%	S-1323B24PF-N8JTFG	S-1323B24NB-N8JTFG	0.50V	150mA	70 $\mu$ A
2.5V $\pm$ 1.0%	S-1323B25PF-N8KTFG	S-1323B25NB-N8KTFG	0.50V	150mA	70 $\mu$ A
2.6V $\pm$ 1.0%	S-1323B26PF-N8LTFG	S-1323B26NB-N8LTFG	0.50V	150mA	70 $\mu$ A
2.7V $\pm$ 1.0%	S-1323B27PF-N8MTFG	S-1323B27NB-N8MTFG	0.50V	150mA	70 $\mu$ A
2.8V $\pm$ 1.0%	S-1323B28PF-N8NTFG	S-1323B28NB-N8NTFG	0.50V	150mA	70 $\mu$ A
2.85V $\pm$ 1.0%	S-1323B2JPF-N9QTFG	-	0.50V	150mA	70 $\mu$ A
2.9V $\pm$ 1.0%	S-1323B29PF-N8OTFG	S-1323B29NB-N8OTFG	0.50V	150mA	70 $\mu$ A
3.0V $\pm$ 1.0%	S-1323B30PF-N8PTFG	S-1323B30NB-N8PTFG	0.50V	150mA	70 $\mu$ A
3.1V $\pm$ 1.0%	S-1323B31PF-N8QTFG	S-1323B31NB-N8QTFG	0.50V	150mA	70 $\mu$ A
3.2V $\pm$ 1.0%	S-1323B32PF-N8RTFG	S-1323B32NB-N8RTFG	0.50V	150mA	70 $\mu$ A
3.3V $\pm$ 1.0%	S-1323B33PF-N8STFG	S-1323B33NB-N8STFG	0.50V	150mA	70 $\mu$ A
3.4V $\pm$ 1.0%	S-1323B34PF-N8TTFG	S-1323B34NB-N8TTFG	0.50V	150mA	70 $\mu$ A
3.5V $\pm$ 1.0%	S-1323B35PF-N8UTFG	S-1323B35NB-N8UTFG	0.50V	150mA	70 $\mu$ A
3.6V $\pm$ 1.0%	S-1323B36PF-N8VTFG	S-1323B36NB-N8VTFG	0.50V	150mA	70 $\mu$ A
3.7V $\pm$ 1.0%	S-1323B37PF-N8WTFG	S-1323B37NB-N8WTFG	0.50V	150mA	70 $\mu$ A
3.8V $\pm$ 1.0%	S-1323B38PF-N8XTFG	S-1323B38NB-N8XTFG	0.50V	150mA	70 $\mu$ A
3.9V $\pm$ 1.0%	S-1323B39PF-N8YTFG	S-1323B39NB-N8YTFG	0.50V	150mA	70 $\mu$ A
4.0V $\pm$ 1.0%	S-1323B40PF-N8ZTFG	S-1323B40NB-N8ZTFG	0.50V	150mA	70 $\mu$ A
4.1V $\pm$ 1.0%	S-1323B41PF-N9ATFG	S-1323B41NB-N9ATFG	0.50V	150mA	70 $\mu$ A
4.2V $\pm$ 1.0%	S-1323B42PF-N9BTFG	S-1323B42NB-N9BTFG	0.50V	150mA	70 $\mu$ A
4.3V $\pm$ 1.0%	S-1323B43PF-N9CTFG	S-1323B43NB-N9CTFG	0.50V	150mA	70 $\mu$ A
4.4V $\pm$ 1.0%	S-1323B44PF-N9DTFG	S-1323B44NB-N9DTFG	0.50V	150mA	70 $\mu$ A
4.5V $\pm$ 1.0%	S-1323B45PF-N9ETFG	S-1323B45NB-N9ETFG	0.50V	150mA	70 $\mu$ A
4.6V $\pm$ 1.0%	S-1323B46PF-N9FTFG	S-1323B46NB-N9FTFG	0.50V	150mA	70 $\mu$ A
4.7V $\pm$ 1.0%	S-1323B47PF-N9GTFG	S-1323B47NB-N9GTFG	0.50V	150mA	70 $\mu$ A
4.8V $\pm$ 1.0%	S-1323B48PF-N9HTFG	S-1323B48NB-N9HTFG	0.50V	150mA	70 $\mu$ A
4.9V $\pm$ 1.0%	S-1323B49PF-N9ITFG	S-1323B49NB-N9ITFG	0.50V	150mA	70 $\mu$ A
5.0V $\pm$ 1.0%	S-1323B50PF-N9JTFG	S-1323B50NB-N9JTFG	0.50V	150mA	70 $\mu$ A
5.1V $\pm$ 1.0%	S-1323B51PF-N9KTFG	S-1323B51NB-N9KTFG	0.50V	150mA	70 $\mu$ A
5.2V $\pm$ 1.0%	S-1323B52PF-N9LTFG	S-1323B52NB-N9LTFG	0.50V	150mA	70 $\mu$ A
5.3V $\pm$ 1.0%	S-1323B53PF-N9MTFG	S-1323B53NB-N9MTFG	0.50V	150mA	70 $\mu$ A
5.4V $\pm$ 1.0%	S-1323B54PF-N9NTFG	S-1323B54NB-N9NTFG	0.50V	150mA	70 $\mu$ A
5.5V $\pm$ 1.0%	S-1323B55PF-N9OTFG	S-1323B55NB-N9OTFG	0.50V	150mA	70 $\mu$ A

**Remark** Please contact our sales office if you desire a product with an inverted ON/OFF pin logic.

**TO 150 mA OUTPUT CURRENT, 10 V INPUT VOLTAGE**  
**HIGH RIPPLE REJECTION LOW DROPOUT LOW INPUT AND OUTPUT CAPACITANCE CMOS VOLTAGE REGULATOR**

**S-1200 series**

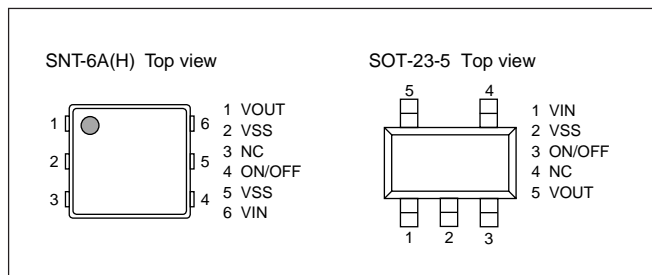
The S-1200 series is a positive voltage regulator with a low dropout voltage, high output voltage accuracy developed based on CMOS technology.

A 0.1  $\mu\text{F}$  small ceramic capacitor can be used. It operates with low current consumption of 18  $\mu\text{A}$  typ.

A built-in Output current protector prevents the load current from exceeding the current capacitance of the output transistor.

Compared with the voltage regulators using the conventional CMOS process, small ceramic capacitors are also available. Furthermore a small SNT-6A(H) and SOT-23-5 packages realize high-density mounting.

**■ PIN CONFIGURATIONS**



**■ FEATURES**

- Input voltage: 2 to 10 V
- Low current consumption  
 18  $\mu\text{A}$  typ., 40  $\mu\text{A}$  max. (during operation)  
 0.01  $\mu\text{A}$  typ., 1  $\mu\text{A}$  max. (during power-off)
- Output voltage: 1.5 to 5.5 V (selectable in 0.1 V steps)
- High output voltage accuracy:  $\pm 1.0\%$
- Output current  
 150 mA capable (product with 3.0 V output, when  $V_{\text{IN}} = 4 \text{ V}$ )<sup>\*1</sup>
- Dropout voltage  
 140 mV typ. (product with 3.0 V output, when  $I_{\text{OUT}} = 100 \text{ mA}$ )
- Ripple rejection rate: 70 dB typ. ( $f = 1 \text{ kHz}$ ,  $V_{\text{OUT}} = 3 \text{ V}$ )
- Built-in power-off circuit: Selection of positive/negative logic is possible.
- Built-in overcurrent protection circuit
- Use of a low ESR capacitor is possible.
- Input/output capacitor: Use of a ceramic capacitor of 0.1  $\mu\text{F}$  or more is possible.

\*1. Attention should be paid to the power dissipation of the package when the load is large.

**■ APPLICATIONS**

- Power supply for battery-powered devices
- Power supply for personal communication devices
- Power supply for home electric/electronic appliances
- Power supply for cellular phones

**■ SELECTION GUIDE**

Output voltage	SNT-6A(H) (5000/reel)	SOT-23-5 (3000/reel)	Dropout voltage (typ.) ( $I_{\text{OUT}}=300\text{mA}$ )	Output current (min.) ( $V_{\text{IN}}=V_{\text{OUT(S)}}+1.0\text{V}$ )	Current consumption during operation (typ.) ( $V_{\text{IN}}=V_{\text{OUT(S)}}+1.0\text{V}$ , no load)
1.5 V $\pm$ 1.0%	S-1200B15-I6T2G	S-1200B15-M5T1G	0.55V	150mA	18 $\mu\text{A}$
1.6 V $\pm$ 1.0%	S-1200B16-I6T2G	S-1200B16-M5T1G	0.55V	150mA	18 $\mu\text{A}$
1.7 V $\pm$ 1.0%	S-1200B17-I6T2G	S-1200B17-M5T1G	0.55V	150mA	18 $\mu\text{A}$
1.8 V $\pm$ 1.0%	S-1200B18-I6T2G	S-1200B18-M5T1G	0.55V	150mA	18 $\mu\text{A}$
1.9 V $\pm$ 1.0%	S-1200B19-I6T2G	S-1200B19-M5T1G	0.55V	150mA	18 $\mu\text{A}$
2.0 V $\pm$ 1.0%	S-1200B20-I6T2G	S-1200B20-M5T1G	0.24V	150mA	18 $\mu\text{A}$
2.1 V $\pm$ 1.0%	S-1200B21-I6T2G	S-1200B21-M5T1G	0.24V	150mA	18 $\mu\text{A}$
2.2 V $\pm$ 1.0%	S-1200B22-I6T2G	S-1200B22-M5T1G	0.24V	150mA	18 $\mu\text{A}$
2.3 V $\pm$ 1.0%	S-1200B23-I6T2G	S-1200B23-M5T1G	0.24V	150mA	18 $\mu\text{A}$
2.4 V $\pm$ 1.0%	S-1200B24-I6T2G	S-1200B24-M5T1G	0.24V	150mA	18 $\mu\text{A}$
2.5 V $\pm$ 1.0%	S-1200B25-I6T2G	S-1200B25-M5T1G	0.16V	150mA	18 $\mu\text{A}$
2.6 V $\pm$ 1.0%	S-1200B26-I6T2G	S-1200B26-M5T1G	0.16V	150mA	18 $\mu\text{A}$
2.7 V $\pm$ 1.0%	S-1200B27-I6T2G	S-1200B27-M5T1G	0.16V	150mA	18 $\mu\text{A}$
2.8 V $\pm$ 1.0%	S-1200B28-I6T2G	S-1200B28-M5T1G	0.16V	150mA	18 $\mu\text{A}$
2.9 V $\pm$ 1.0%	S-1200B29-I6T2G	S-1200B29-M5T1G	0.16V	150mA	18 $\mu\text{A}$
3.0 V $\pm$ 1.0%	S-1200B30-I6T2G	S-1200B30-M5T1G	0.14V	150mA	18 $\mu\text{A}$
3.1 V $\pm$ 1.0%	S-1200B31-I6T2G	S-1200B31-M5T1G	0.14V	150mA	18 $\mu\text{A}$
3.2 V $\pm$ 1.0%	S-1200B32-I6T2G	S-1200B32-M5T1G	0.14V	150mA	18 $\mu\text{A}$
3.3 V $\pm$ 1.0%	S-1200B33-I6T2G	S-1200B33-M5T1G	0.13V	150mA	18 $\mu\text{A}$
3.4 V $\pm$ 1.0%	S-1200B34-I6T2G	S-1200B34-M5T1G	0.13V	150mA	18 $\mu\text{A}$
3.5 V $\pm$ 1.0%	S-1200B35-I6T2G	S-1200B35-M5T1G	0.13V	150mA	18 $\mu\text{A}$
3.6 V $\pm$ 1.0%	S-1200B36-I6T2G	S-1200B36-M5T1G	0.13V	150mA	18 $\mu\text{A}$
3.7 V $\pm$ 1.0%	S-1200B37-I6T2G	S-1200B37-M5T1G	0.13V	150mA	18 $\mu\text{A}$
3.8 V $\pm$ 1.0%	S-1200B38-I6T2G	S-1200B38-M5T1G	0.13V	150mA	18 $\mu\text{A}$
3.9 V $\pm$ 1.0%	S-1200B39-I6T2G	S-1200B39-M5T1G	0.13V	150mA	18 $\mu\text{A}$
4.0 V $\pm$ 1.0%	S-1200B40-I6T2G	S-1200B40-M5T1G	0.13V	150mA	18 $\mu\text{A}$
4.1 V $\pm$ 1.0%	S-1200B41-I6T2G	S-1200B41-M5T1G	0.13V	150mA	18 $\mu\text{A}$
4.2 V $\pm$ 1.0%	S-1200B42-I6T2G	S-1200B42-M5T1G	0.13V	150mA	18 $\mu\text{A}$
4.3 V $\pm$ 1.0%	S-1200B43-I6T2G	S-1200B43-M5T1G	0.13V	150mA	18 $\mu\text{A}$
4.4 V $\pm$ 1.0%	S-1200B44-I6T2G	S-1200B44-M5T1G	0.13V	150mA	18 $\mu\text{A}$
4.5 V $\pm$ 1.0%	S-1200B45-I6T2G	S-1200B45-M5T1G	0.13V	150mA	18 $\mu\text{A}$
4.6 V $\pm$ 1.0%	S-1200B46-I6T2G	S-1200B46-M5T1G	0.13V	150mA	18 $\mu\text{A}$
4.7 V $\pm$ 1.0%	S-1200B47-I6T2G	S-1200B47-M5T1G	0.13V	150mA	18 $\mu\text{A}$
4.8 V $\pm$ 1.0%	S-1200B48-I6T2G	S-1200B48-M5T1G	0.13V	150mA	18 $\mu\text{A}$
4.9 V $\pm$ 1.0%	S-1200B49-I6T2G	S-1200B49-M5T1G	0.13V	150mA	18 $\mu\text{A}$
5.0 V $\pm$ 1.0%	S-1200B50-I6T2G	S-1200B50-M5T1G	0.13V	150mA	18 $\mu\text{A}$
5.1 V $\pm$ 1.0%	S-1200B51-I6T2G	S-1200B51-M5T1G	0.13V	150mA	18 $\mu\text{A}$
5.2 V $\pm$ 1.0%	S-1200B52-I6T2G	S-1200B52-M5T1G	0.13V	150mA	18 $\mu\text{A}$
5.3 V $\pm$ 1.0%	S-1200B53-I6T2G	S-1200B53-M5T1G	0.13V	150mA	18 $\mu\text{A}$
5.4 V $\pm$ 1.0%	S-1200B54-I6T2G	S-1200B54-M5T1G	0.13V	150mA	18 $\mu\text{A}$
5.5 V $\pm$ 1.0%	S-1200B55-I6T2G	S-1200B55-M5T1G	0.13V	150mA	18 $\mu\text{A}$

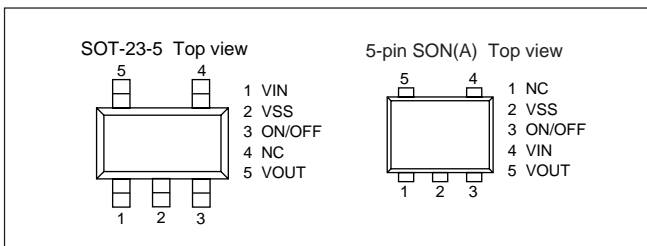
**Remark** Please contact our sales office if you desire a product with an inverted ON/OFF pin logic.

## TO 150 mA OUTPUT CURRENT, 10 V INPUT VOLTAGE HIGH RIPPLE REJECTION AND LOW DROPOUT CMOS VOLTAGE REGULATOR

### S-L2980 series

The S-L2980 series is a positive voltage regulator that features low dropout voltage, high output voltage accuracy, and low current consumption, and has been developed using CMOS technology. Since a low on-resistance transistor is incorporated, the dropout voltage is small, and a large output current can be obtained. Moreover, the battery life can be extended by using the power-on/off circuit. A greater variety of capacitors can be used with this series compared with existing voltage regulators developed using CMOS technology, including a small ceramic capacitor.

### PIN CONFIGURATIONS



### SELECTION GUIDE

Output voltage	SOT-23-5 (3000/reel)	5-pin SON(A) (3000/reel)	Dropout voltage (typ.) (I <sub>out</sub> =50mA)	Output current (min.) (V <sub>IN</sub> ≥V <sub>OUT(S)</sub> +1.0V)	Current consumption during operation (typ.) (V <sub>IN</sub> =V <sub>OUT(S)</sub> +1.0V, no load)
1.5V ± 2.0%	S-L2980A15MC-TF-G	S-L2980A15PN-TF-G	0.17V	150mA	90μA
1.6V ± 2.0%	S-L2980A16MC-TF-G	S-L2980A16PN-TF-G	0.17V	150mA	90μA
1.7V ± 2.0%	S-L2980A17MC-TF-G	S-L2980A17PN-TF-G	0.17V	150mA	90μA
1.8V ± 2.0%	S-L2980A18MC-TF-G	S-L2980A18PN-TF-G	0.16V	150mA	90μA
1.9V ± 2.0%	S-L2980A19MC-TF-G	S-L2980A19PN-TF-G	0.16V	150mA	90μA
2.0V ± 2.0%	S-L2980A20MC-TF-G	S-L2980A20PN-TF-G	0.15V	150mA	90μA
2.1V ± 2.0%	S-L2980A21MC-TF-G	S-L2980A21PN-TF-G	0.15V	150mA	90μA
2.2V ± 2.0%	S-L2980A22MC-TF-G	S-L2980A22PN-TF-G	0.15V	150mA	90μA
2.3V ± 2.0%	S-L2980A23MC-TF-G	S-L2980A23PN-TF-G	0.15V	150mA	90μA
2.4V ± 2.0%	S-L2980A24MC-TF-G	S-L2980A24PN-TF-G	0.15V	150mA	90μA
2.5V ± 2.0%	S-L2980A25MC-TF-G	S-L2980A25PN-TF-G	0.13V	150mA	90μA
2.6V ± 2.0%	S-L2980A26MC-TF-G	S-L2980A26PN-TF-G	0.13V	150mA	90μA
2.7V ± 2.0%	S-L2980A27MC-TF-G	S-L2980A27PN-TF-G	0.13V	150mA	90μA
2.8V ± 2.0%	S-L2980A28MC-TF-G	S-L2980A28PN-TF-G	0.13V	150mA	90μA
2.9V ± 2.0%	S-L2980A29MC-TF-G	S-L2980A29PN-TF-G	0.13V	150mA	90μA
3.0V ± 2.0%	S-L2980A30MC-TF-G	S-L2980A30PN-TF-G	0.12V	150mA	90μA
3.1V ± 2.0%	S-L2980A31MC-TF-G	S-L2980A31PN-TF-G	0.12V	150mA	90μA
3.2V ± 2.0%	S-L2980A32MC-TF-G	S-L2980A32PN-TF-G	0.12V	150mA	90μA
3.3V ± 2.0%	S-L2980A33MC-TF-G	S-L2980A33PN-TF-G	0.11V	150mA	90μA
3.4V ± 2.0%	S-L2980A34MC-TF-G	S-L2980A34PN-TF-G	0.11V	150mA	90μA
3.5V ± 2.0%	S-L2980A35MC-TF-G	S-L2980A35PN-TF-G	0.11V	150mA	90μA
3.6V ± 2.0%	S-L2980A36MC-TF-G	S-L2980A36PN-TF-G	0.11V	150mA	90μA
3.7V ± 2.0%	S-L2980A37MC-TF-G	S-L2980A37PN-TF-G	0.11V	150mA	90μA
3.8V ± 2.0%	S-L2980A38MC-TF-G	S-L2980A38PN-TF-G	0.11V	150mA	90μA
3.9V ± 2.0%	S-L2980A39MC-TF-G	S-L2980A39PN-TF-G	0.11V	150mA	90μA
4.0V ± 2.0%	S-L2980A40MC-TF-G	S-L2980A40PN-TF-G	0.11V	150mA	90μA
4.1V ± 2.0%	S-L2980A41MC-TF-G	S-L2980A41PN-TF-G	0.11V	150mA	90μA
4.2V ± 2.0%	S-L2980A42MC-TF-G	S-L2980A42PN-TF-G	0.11V	150mA	90μA
4.3V ± 2.0%	S-L2980A43MC-TF-G	S-L2980A43PN-TF-G	0.11V	150mA	90μA
4.4V ± 2.0%	S-L2980A44MC-TF-G	S-L2980A44PN-TF-G	0.11V	150mA	90μA
4.5V ± 2.0%	S-L2980A45MC-TF-G	S-L2980A45PN-TF-G	0.11V	150mA	90μA
4.6V ± 2.0%	S-L2980A46MC-TF-G	S-L2980A46PN-TF-G	0.11V	150mA	90μA
4.7V ± 2.0%	S-L2980A47MC-TF-G	S-L2980A47PN-TF-G	0.11V	150mA	90μA
4.8V ± 2.0%	S-L2980A48MC-TF-G	S-L2980A48PN-TF-G	0.11V	150mA	90μA
4.9V ± 2.0%	S-L2980A49MC-TF-G	S-L2980A49PN-TF-G	0.11V	150mA	90μA
5.0V ± 2.0%	S-L2980A50MC-TF-G	S-L2980A50PN-TF-G	0.11V	150mA	90μA
5.1V ± 2.0%	S-L2980A51MC-TF-G	S-L2980A51PN-TF-G	0.11V	150mA	90μA
5.2V ± 2.0%	S-L2980A52MC-TF-G	S-L2980A52PN-TF-G	0.11V	150mA	90μA
5.3V ± 2.0%	S-L2980A53MC-TF-G	S-L2980A53PN-TF-G	0.11V	150mA	90μA
5.4V ± 2.0%	S-L2980A54MC-TF-G	S-L2980A54PN-TF-G	0.11V	150mA	90μA
5.5V ± 2.0%	S-L2980A55MC-TF-G	S-L2980A55PN-TF-G	0.11V	150mA	90μA
5.6V ± 2.0%	S-L2980A56MC-TF-G	S-L2980A56PN-TF-G	0.11V	150mA	90μA
5.7V ± 2.0%	S-L2980A57MC-TF-G	S-L2980A57PN-TF-G	0.11V	150mA	90μA
5.8V ± 2.0%	S-L2980A58MC-TF-G	S-L2980A58PN-TF-G	0.11V	150mA	90μA
5.9V ± 2.0%	S-L2980A59MC-TF-G	S-L2980A59PN-TF-G	0.11V	150mA	90μA
6.0V ± 2.0%	S-L2980A60MC-TF-G	S-L2980A60PN-TF-G	0.11V	150mA	90μA

**Remark** Please contact our sales office if you desire a product with an inverted ON/OFF pin logic.

### FEATURES

- Input voltage: 2 to 10 V
  - Low current consumption  
90 μA typ., 140 μA max. (during operation)  
0.1 μA typ., 1 μA max. (during power-off)
  - Output voltage: 1.5 to 6.0 V (selectable in 0.1 V steps)
  - Output voltage accuracy: ±2.0%
  - Output current  
150 mA capable (product with 3.0 V output, when V<sub>IN</sub> = 4 V)\*1
  - Dropout voltage  
120 mV typ. (product with 3.0 V output, when I<sub>OUT</sub> = 50 mA)
  - Ripple rejection rate: 70 dB typ. (f = 1 kHz, V<sub>OUT</sub> = 3 V)
  - Built-in power-off circuit: Selection of positive/negative logic is possible.
  - Built-in short-circuit protection circuit
  - Use of a low ESR capacitor is possible.
  - Output capacitor: Use of a ceramic capacitor of 1.0 μF or more is possible.
- \*1. Attention should be paid to the power dissipation of the package when the load is large.

### APPLICATIONS

- Constant voltage power supply for battery-powered devices
- Constant voltage power supply for communication devices
- Constant voltage power supply for household electrical appliances
- Constant voltage power supply for cellular phones

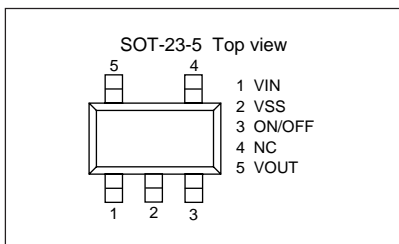


## TO 200 mA OUTPUT CURRENT HIGH RIPPLE REJECTION AND LOW DROPOUT CMOS VOLTAGE REGULATOR

S-1165 series

The S-1165 series is a positive voltage regulator that features low dropout voltage, high output voltage accuracy, and low current consumption, and has been developed using CMOS technology. Since a low on-resistance transistor is incorporated, the dropout voltage is small, and a large output current can be obtained. A built-in overcurrent protection circuit prevents the load current from exceeding the current capacitance of the output transistor. Moreover, the battery life can be extended by using the power-on/off circuit. A small SOT-23-5 package realizes high-density mounting.

### PIN CONFIGURATIONS



### FEATURES

- Low current consumption
  - 35  $\mu$ A typ., 65  $\mu$ A max. (during operation)
  - 0.1  $\mu$ A typ., 1  $\mu$ A max. (during power-off)
- Output voltage: 1.5 to 5.5 V (selectable in 0.1 V steps)
- High output voltage accuracy:  $\pm 1.0\%$
- Output current
  - 200 mA capable (product with 3.0 V output, when  $V_{IN} = 4$  V)<sup>\*1</sup>
- Dropout voltage
  - 140 mV typ. (product with 3.0 V output, when  $I_{OUT} = 200$  mA)
- Ripple rejection rate: 70 dB typ. ( $f = 1$  kHz,  $V_{OUT} = 3$  V)
- Built-in power-off circuit: Selection of positive/negative logic is possible.
- Built-in overcurrent protection circuit
  - \*1. Attention should be paid to the power dissipation of the package when the load is large.

### APPLICATIONS

- Constant voltage power supply for battery-powered devices
- Constant voltage power supply for communication devices
- Constant voltage power supply for household electrical appliances
- Constant voltage power supply for cellular phones

### SELECTION GUIDE

Output voltage	SOT-23-5 (3000/reel)	Dropout voltage (typ.) ( $I_{OUT}=200$ mA)	Output current (min.) ( $V_{IN}\geq V_{OUT(S)}+1.0$ V)	Current consumption during operation (typ.) ( $V_{IN}=V_{OUT(S)}+1.0$ V, no load)
1.5V $\pm$ 1.0%	S-1165B15MC-N6ATFG	0.20V	200mA	35 $\mu$ A
1.6V $\pm$ 1.0%	S-1165B16MC-N6BTFG	0.20V	200mA	35 $\mu$ A
1.7V $\pm$ 1.0%	S-1165B17MC-N6CTFG	0.20V	200mA	35 $\mu$ A
1.8V $\pm$ 1.0%	S-1165B18MC-N6DTFG	0.20V	200mA	35 $\mu$ A
1.9V $\pm$ 1.0%	S-1165B19MC-N6ETFG	0.20V	200mA	35 $\mu$ A
2.0V $\pm$ 1.0%	S-1165B20MC-N6FTFG	0.20V	200mA	35 $\mu$ A
2.1V $\pm$ 1.0%	S-1165B21MC-N6GTFG	0.20V	200mA	35 $\mu$ A
2.2V $\pm$ 1.0%	S-1165B22MC-N6HTFG	0.20V	200mA	35 $\mu$ A
2.3V $\pm$ 1.0%	S-1165B23MC-N6ITFG	0.20V	200mA	35 $\mu$ A
2.4V $\pm$ 1.0%	S-1165B24MC-N6JTFG	0.20V	200mA	35 $\mu$ A
2.5V $\pm$ 1.0%	S-1165B25MC-N6KTFG	0.20V	200mA	35 $\mu$ A
2.6V $\pm$ 1.0%	S-1165B26MC-N6LTFG	0.14V	200mA	35 $\mu$ A
2.7V $\pm$ 1.0%	S-1165B27MC-N6MTFG	0.14V	200mA	35 $\mu$ A
2.8V $\pm$ 1.0%	S-1165B28MC-N6NTFG	0.14V	200mA	35 $\mu$ A
2.9V $\pm$ 1.0%	S-1165B29MC-N6OTFG	0.14V	200mA	35 $\mu$ A
3.0V $\pm$ 1.0%	S-1165B30MC-N6PTFG	0.14V	200mA	35 $\mu$ A
3.1V $\pm$ 1.0%	S-1165B31MC-N6QTFG	0.14V	200mA	35 $\mu$ A
3.2V $\pm$ 1.0%	S-1165B32MC-N6RTFG	0.14V	200mA	35 $\mu$ A
3.3V $\pm$ 1.0%	S-1165B33MC-N6STFG	0.14V	200mA	35 $\mu$ A
3.4V $\pm$ 1.0%	S-1165B34MC-N6TTFG	0.14V	200mA	35 $\mu$ A
3.5V $\pm$ 1.0%	S-1165B35MC-N6UTFG	0.14V	200mA	35 $\mu$ A
3.6V $\pm$ 1.0%	S-1165B36MC-N6VTFG	0.14V	200mA	35 $\mu$ A
3.7V $\pm$ 1.0%	S-1165B37MC-N6WTFG	0.14V	200mA	35 $\mu$ A
3.8V $\pm$ 1.0%	S-1165B38MC-N6XTFG	0.14V	200mA	35 $\mu$ A
3.9V $\pm$ 1.0%	S-1165B39MC-N6YTFG	0.14V	200mA	35 $\mu$ A
4.0V $\pm$ 1.0%	S-1165B40MC-N6ZTFG	0.14V	200mA	35 $\mu$ A
4.1V $\pm$ 1.0%	S-1165B41MC-N7ATFG	0.14V	200mA	35 $\mu$ A
4.2V $\pm$ 1.0%	S-1165B42MC-N7BTFG	0.14V	200mA	35 $\mu$ A
4.3V $\pm$ 1.0%	S-1165B43MC-N7CTFG	0.14V	200mA	35 $\mu$ A
4.4V $\pm$ 1.0%	S-1165B44MC-N7DTFG	0.14V	200mA	35 $\mu$ A
4.5V $\pm$ 1.0%	S-1165B45MC-N7ETFG	0.14V	200mA	35 $\mu$ A
4.6V $\pm$ 1.0%	S-1165B46MC-N7FTFG	0.14V	200mA	35 $\mu$ A
4.7V $\pm$ 1.0%	S-1165B47MC-N7GTFG	0.14V	200mA	35 $\mu$ A
4.8V $\pm$ 1.0%	S-1165B48MC-N7HTFG	0.14V	200mA	35 $\mu$ A
4.9V $\pm$ 1.0%	S-1165B49MC-N7ITFG	0.14V	200mA	35 $\mu$ A
5.0V $\pm$ 1.0%	S-1165B50MC-N7JTFG	0.14V	200mA	35 $\mu$ A
5.1V $\pm$ 1.0%	S-1165B51MC-N7KTFG	0.14V	200mA	35 $\mu$ A
5.2V $\pm$ 1.0%	S-1165B52MC-N7LTFG	0.14V	200mA	35 $\mu$ A
5.3V $\pm$ 1.0%	S-1165B53MC-N7MTFG	0.14V	200mA	35 $\mu$ A
5.4V $\pm$ 1.0%	S-1165B54MC-N7NTFG	0.14V	200mA	35 $\mu$ A
5.5V $\pm$ 1.0%	S-1165B55MC-N7OTFG	0.14V	200mA	35 $\mu$ A

**Remark** Please contact our sales office if you desire a product with an inverted ON/OFF pin logic.

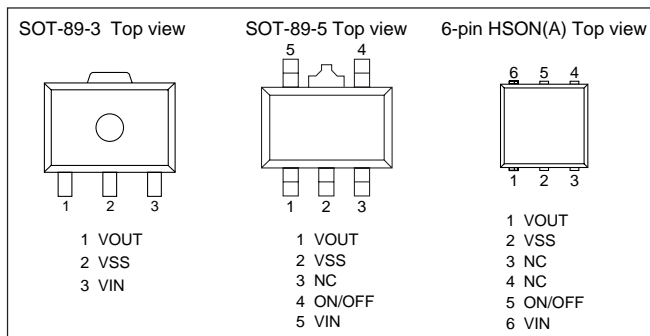


## TO 300 mA OUTPUT CURRENT HIGH RIPPLE REJECTION AND LOW DROPOUT MIDDLE-OUTPUT CURRENT CMOS VOLTAGE REGULATOR

### S-1131 series

The S-1131 series is a positive voltage regulator that features low dropout voltage, high output voltage accuracy, and low current consumption, and has been developed using CMOS technology. Since a low on-resistance transistor is incorporated, the dropout voltage is small, and a large output current can be obtained. A built-in overcurrent protection circuit prevents the load current from exceeding the current capacitance of the output transistor. Small SOT-89-3, SOT-89-5, and 6-pin HSON(A) packages realize high-density mounting.

### ■ PIN CONFIGURATIONS



### ■ FEATURES

- Low current consumption  
35  $\mu$ A typ., 65  $\mu$ A max. (during operation)  
0.1  $\mu$ A typ., 1  $\mu$ A max. (during power-off)
- Output voltage: 1.5 to 5.5 V (selectable in 0.1 V steps)
- High output voltage accuracy:  $\pm$ 1.0%
- Output current  
300 mA capable (product with 3.0 V output, when  $V_{IN} = 4$  V)\*1
- Dropout voltage  
250 mV typ. (product with 3.0 V output, when  $I_{OUT} = 100$  mA)
- Ripple rejection rate: 70 dB typ. ( $f = 1$  kHz,  $V_{OUT} = 3$  V)
- Built-in power-off circuit: Selection of positive/negative logic is possible.
- Built-in overcurrent protection circuit

\*1. Attention should be paid to the power dissipation of the package when the load is large.

### ■ APPLICATIONS

- Constant voltage power supply for DVD drives and CD-ROM drives
- Constant voltage power supply for battery-powered devices
- Constant voltage power supply for communication devices
- Constant voltage power supply for notebook PCs

### ■ SELECTION GUIDE

Output voltage	SOT-89-3 (1000/reel)	SOT-89-5 (1000/reel)	6-pin HSON(A) (3000/reel)	Dropout voltage (typ.) ( $I_{OUT}=100$ mA)	Output current (min.) ( $V_{IN}\geq V_{OUT}(S)+1.0$ V)	Current consumption during operation (typ.) ( $V_{IN}=V_{OUT}(S)+1.0$ V, no load)
1.5V $\pm$ 1.0%	S-1131B15UA-N4ATFG	S-1131B15UC-N4ATFG	S-1131B15PD-N4ATFG	1.00V	300mA	35 $\mu$ A
1.6V $\pm$ 1.0%	S-1131B16UA-N4BTFG	S-1131B16UC-N4BTFG	S-1131B16PD-N4BTFG	0.90V	300mA	35 $\mu$ A
1.7V $\pm$ 1.0%	S-1131B17UA-N4CTFG	S-1131B17UC-N4CTFG	S-1131B17PD-N4CTFG	0.80V	300mA	35 $\mu$ A
1.8V $\pm$ 1.0%	S-1131B18UA-N4DTFG	S-1131B18UC-N4DTFG	S-1131B18PD-N4DTFG	0.70V	300mA	35 $\mu$ A
1.9V $\pm$ 1.0%	S-1131B19UA-N4ETFG	S-1131B19UC-N4ETFG	S-1131B19PD-N4ETFG	0.60V	300mA	35 $\mu$ A
2.0V $\pm$ 1.0%	S-1131B20UA-N4FTFG	S-1131B20UC-N4FTFG	S-1131B20PD-N4FTFG	0.50V	300mA	35 $\mu$ A
2.1V $\pm$ 1.0%	S-1131B21UA-N4GTFG	S-1131B21UC-N4GTFG	S-1131B21PD-N4GTFG	0.40V	300mA	35 $\mu$ A
2.2V $\pm$ 1.0%	S-1131B22UA-N4HTFG	S-1131B22UC-N4HTFG	S-1131B22PD-N4HTFG	0.30V	300mA	35 $\mu$ A
2.3V $\pm$ 1.0%	S-1131B23UA-N4ITFG	S-1131B23UC-N4ITFG	S-1131B23PD-N4ITFG	0.30V	300mA	35 $\mu$ A
2.4V $\pm$ 1.0%	S-1131B24UA-N4JTFG	S-1131B24UC-N4JTFG	S-1131B24PD-N4JTFG	0.30V	300mA	35 $\mu$ A
2.5V $\pm$ 1.0%	S-1131B25UA-N4KTFG	S-1131B25UC-N4KTFG	S-1131B25PD-N4KTFG	0.30V	300mA	35 $\mu$ A
2.6V $\pm$ 1.0%	S-1131B26UA-N4LTFG	S-1131B26UC-N4LTFG	S-1131B26PD-N4LTFG	0.25V	300mA	35 $\mu$ A
2.7V $\pm$ 1.0%	S-1131B27UA-N4MTFG	S-1131B27UC-N4MTFG	S-1131B27PD-N4MTFG	0.25V	300mA	35 $\mu$ A
2.8V $\pm$ 1.0%	S-1131B28UA-N4NTFG	S-1131B28UC-N4NTFG	S-1131B28PD-N4NTFG	0.25V	300mA	35 $\mu$ A
2.9V $\pm$ 1.0%	S-1131B29UA-N4OTFG	S-1131B29UC-N4OTFG	S-1131B29PD-N4OTFG	0.25V	300mA	35 $\mu$ A
3.0V $\pm$ 1.0%	S-1131B30UA-N4PTFG	S-1131B30UC-N4PTFG	S-1131B30PD-N4PTFG	0.25V	300mA	35 $\mu$ A
3.1V $\pm$ 1.0%	S-1131B31UA-N4QTFG	S-1131B31UC-N4QTFG	S-1131B31PD-N4QTFG	0.25V	300mA	35 $\mu$ A
3.2V $\pm$ 1.0%	S-1131B32UA-N4RTFG	S-1131B32UC-N4RTFG	S-1131B32PD-N4RTFG	0.25V	300mA	35 $\mu$ A
3.3V $\pm$ 1.0%	S-1131B33UA-N4STFG	S-1131B33UC-N4STFG	S-1131B33PD-N4STFG	0.25V	300mA	35 $\mu$ A
3.4V $\pm$ 1.0%	S-1131B34UA-N4TTFG	S-1131B34UC-N4TTFG	S-1131B34PD-N4TTFG	0.20V	300mA	35 $\mu$ A
3.5V $\pm$ 1.0%	S-1131B35UA-N4UTFG	S-1131B35UC-N4UTFG	S-1131B35PD-N4UTFG	0.20V	300mA	35 $\mu$ A
3.6V $\pm$ 1.0%	S-1131B36UA-N4VTFG	S-1131B36UC-N4VTFG	S-1131B36PD-N4VTFG	0.20V	300mA	35 $\mu$ A
3.7V $\pm$ 1.0%	S-1131B37UA-N4WTFG	S-1131B37UC-N4WTFG	S-1131B37PD-N4WTFG	0.20V	300mA	35 $\mu$ A
3.8V $\pm$ 1.0%	S-1131B38UA-N4XTFG	S-1131B38UC-N4XTFG	S-1131B38PD-N4XTFG	0.20V	300mA	35 $\mu$ A
3.9V $\pm$ 1.0%	S-1131B39UA-N4YTFG	S-1131B39UC-N4YTFG	S-1131B39PD-N4YTFG	0.20V	300mA	35 $\mu$ A
4.0V $\pm$ 1.0%	S-1131B40UA-N4ZTFG	S-1131B40UC-N4ZTFG	S-1131B40PD-N4ZTFG	0.20V	300mA	35 $\mu$ A
4.1V $\pm$ 1.0%	S-1131B41UA-N5ATFG	S-1131B41UC-N5ATFG	S-1131B41PD-N5ATFG	0.20V	300mA	35 $\mu$ A
4.2V $\pm$ 1.0%	S-1131B42UA-N5BTFG	S-1131B42UC-N5BTFG	S-1131B42PD-N5BTFG	0.20V	300mA	35 $\mu$ A
4.3V $\pm$ 1.0%	S-1131B43UA-N5CTFG	S-1131B43UC-N5CTFG	S-1131B43PD-N5CTFG	0.20V	300mA	35 $\mu$ A
4.4V $\pm$ 1.0%	S-1131B44UA-N5DTFG	S-1131B44UC-N5DTFG	S-1131B44PD-N5DTFG	0.20V	300mA	35 $\mu$ A
4.5V $\pm$ 1.0%	S-1131B45UA-N5ETFG	S-1131B45UC-N5ETFG	S-1131B45PD-N5ETFG	0.20V	300mA	35 $\mu$ A
4.6V $\pm$ 1.0%	S-1131B46UA-N5FTFG	S-1131B46UC-N5FTFG	S-1131B46PD-N5FTFG	0.20V	300mA	35 $\mu$ A
4.7V $\pm$ 1.0%	S-1131B47UA-N5GTFG	S-1131B47UC-N5GTFG	S-1131B47PD-N5GTFG	0.20V	300mA	35 $\mu$ A
4.8V $\pm$ 1.0%	S-1131B48UA-N5HTFG	S-1131B48UC-N5HTFG	S-1131B48PD-N5HTFG	0.20V	300mA	35 $\mu$ A
4.9V $\pm$ 1.0%	S-1131B49UA-N5ITFG	S-1131B49UC-N5ITFG	S-1131B49PD-N5ITFG	0.20V	300mA	35 $\mu$ A
5.0V $\pm$ 1.0%	S-1131B50UA-N5JTFG	S-1131B50UC-N5JTFG	S-1131B50PD-N5JTFG	0.20V	300mA	35 $\mu$ A
5.1V $\pm$ 1.0%	S-1131B51UA-N5KTFG	S-1131B51UC-N5KTFG	S-1131B51PD-N5KTFG	0.20V	300mA	35 $\mu$ A
5.2V $\pm$ 1.0%	S-1131B52UA-N5LTFG	S-1131B52UC-N5LTFG	S-1131B52PD-N5LTFG	0.20V	300mA	35 $\mu$ A
5.3V $\pm$ 1.0%	S-1131B53UA-N5MTFG	S-1131B53UC-N5MTFG	S-1131B53PD-N5MTFG	0.20V	300mA	35 $\mu$ A
5.4V $\pm$ 1.0%	S-1131B54UA-N5NTFG	S-1131B54UC-N5NTFG	S-1131B54PD-N5NTFG	0.20V	300mA	35 $\mu$ A
5.5V $\pm$ 1.0%	S-1131B55UA-N5OTFG	S-1131B55UC-N5OTFG	S-1131B55PD-N5OTFG	0.20V	300mA	35 $\mu$ A

**Remark** Please contact our sales office if you desire a product with an inverted ON/OFF pin logic.

**TO 300 mA OUTPUT CURRENT**  
**HIGH RIPPLE REJECTION LOW DROPOUT MIDDLE OUTPUT CURRENT CMOS VOLTAGE REGULATOR**

**S-1132 series**

The S-1132 series is a positive voltage regulator with a low dropout voltage, high output voltage accuracy, and low current consumption (300 mA output current) developed based on CMOS technology.

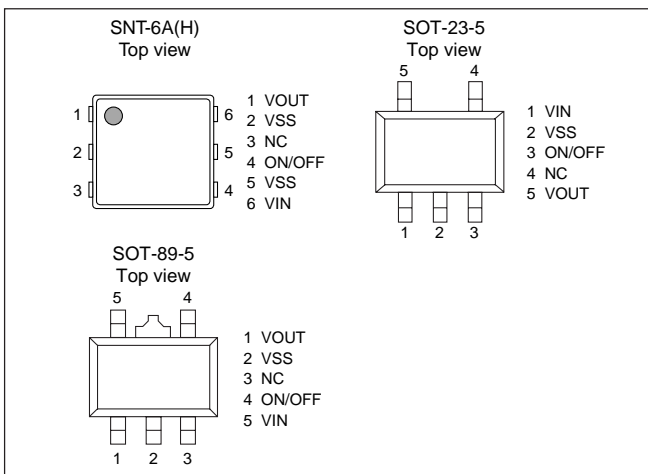
A 0.1  $\mu$ F small ceramic capacitor can be used. It operates with low current consumption of 20  $\mu$ A typ.

A built-in Output current protector prevents the load current from exceeding the current capacitance of the output transistor.

Compared with the conventional 300 mA output current CMOS voltage regulators, high-density mounting is realized by using the super-small SNT-6A(H) package and a 0.1 $\mu$ F small ceramic capacitor.

Also, the low current consumption makes the S-1132 series ideal for mobile devices.

**■ PIN CONFIGURATIONS**



**■ FEATURES**

- Low current consumption  
 20  $\mu$ A typ., 40  $\mu$ A max. (during operation)  
 0.01  $\mu$ A typ., 1  $\mu$ A max. (during power-off)
- Output voltage: 1.5 to 5.5 V (selectable in 0.1 V steps)
- High output voltage accuracy:  $\pm$ 1.0%
- Output current  
 300 mA capable (product with 3.0 V output, when  $V_{IN} = 4$  V)\*1
- Dropout voltage  
 130 mV typ. (product with 3.0 V output, when  $I_{OUT} = 100$  mA)
- Ripple rejection rate: 70 dB typ. (f = 1 kHz,  $V_{OUT} = 3$  V)
- Built-in power-off circuit: Selection of positive/negative logic is possible.
- Built-in overcurrent protection circuit
- Use of a low ESR capacitor is possible.
- Input/output capacitor: Use of a ceramic capacitor of 0.1  $\mu$ F or more is possible.

\*1. Attention should be paid to the power dissipation of the package when the load is large.

**■ APPLICATIONS**

- Power supply for battery-powered devices
- Power supply for personal communication devices
- Power supply for home electric/electronic appliances
- Power supply for cellular phones

**■ SELECTION GUIDE**

Output voltage	SOT-23-5 (3000/reel)	SOT-89-5 (1000/reel)	SNT-6A(H) (5000/reel)	Dropout voltage (typ.) ( $I_{OUT}=100$ mA)	Output current (min.) ( $V_{IN}=V_{OUT(S)}+1.0$ V)	Current consumption during operation (typ.) ( $V_{IN}=V_{OUT(S)}+1.0$ V, no load)
1.5 V $\pm$ 1.0%	S-1132B15-M5T1G	S-1132B15-U5T1G	S-1132B15-I6T2G	0.54V	300mA	20 $\mu$ A
1.6 V $\pm$ 1.0%	S-1132B16-M5T1G	S-1132B16-U5T1G	S-1132B16-I6T2G	0.54V	300mA	20 $\mu$ A
1.7 V $\pm$ 1.0%	S-1132B17-M5T1G	S-1132B17-U5T1G	S-1132B17-I6T2G	0.54V	300mA	20 $\mu$ A
1.8 V $\pm$ 1.0%	S-1132B18-M5T1G	S-1132B18-U5T1G	S-1132B18-I6T2G	0.54V	300mA	20 $\mu$ A
1.9 V $\pm$ 1.0%	S-1132B19-M5T1G	S-1132B19-U5T1G	S-1132B19-I6T2G	0.54V	300mA	20 $\mu$ A
2.0 V $\pm$ 1.0%	S-1132B20-M5T1G	S-1132B20-U5T1G	S-1132B20-I6T2G	0.15V	300mA	20 $\mu$ A
2.1 V $\pm$ 1.0%	S-1132B21-M5T1G	S-1132B21-U5T1G	S-1132B21-I6T2G	0.15V	300mA	20 $\mu$ A
2.2 V $\pm$ 1.0%	S-1132B22-M5T1G	S-1132B22-U5T1G	S-1132B22-I6T2G	0.15V	300mA	20 $\mu$ A
2.3 V $\pm$ 1.0%	S-1132B23-M5T1G	S-1132B23-U5T1G	S-1132B23-I6T2G	0.15V	300mA	20 $\mu$ A
2.4 V $\pm$ 1.0%	S-1132B24-M5T1G	S-1132B24-U5T1G	S-1132B24-I6T2G	0.15V	300mA	20 $\mu$ A
2.5 V $\pm$ 1.0%	S-1132B25-M5T1G	S-1132B25-U5T1G	S-1132B25-I6T2G	0.14V	300mA	20 $\mu$ A
2.6 V $\pm$ 1.0%	S-1132B26-M5T1G	S-1132B26-U5T1G	S-1132B26-I6T2G	0.14V	300mA	20 $\mu$ A
2.7 V $\pm$ 1.0%	S-1132B27-M5T1G	S-1132B27-U5T1G	S-1132B27-I6T2G	0.14V	300mA	20 $\mu$ A
2.8 V $\pm$ 1.0%	S-1132B28-M5T1G	S-1132B28-U5T1G	S-1132B28-I6T2G	0.14V	300mA	20 $\mu$ A
2.9 V $\pm$ 1.0%	S-1132B29-M5T1G	S-1132B29-U5T1G	S-1132B29-I6T2G	0.14V	300mA	20 $\mu$ A
3.0 V $\pm$ 1.0%	S-1132B30-M5T1G	S-1132B30-U5T1G	S-1132B30-I6T2G	0.13V	300mA	20 $\mu$ A
3.1 V $\pm$ 1.0%	S-1132B31-M5T1G	S-1132B31-U5T1G	S-1132B31-I6T2G	0.13V	300mA	20 $\mu$ A
3.2 V $\pm$ 1.0%	S-1132B32-M5T1G	S-1132B32-U5T1G	S-1132B32-I6T2G	0.13V	300mA	20 $\mu$ A
3.3 V $\pm$ 1.0%	S-1132B33-M5T1G	S-1132B33-U5T1G	S-1132B33-I6T2G	0.10V	300mA	20 $\mu$ A
3.4 V $\pm$ 1.0%	S-1132B34-M5T1G	S-1132B34-U5T1G	S-1132B34-I6T2G	0.10V	300mA	20 $\mu$ A
3.5 V $\pm$ 1.0%	S-1132B35-M5T1G	S-1132B35-U5T1G	S-1132B35-I6T2G	0.10V	300mA	20 $\mu$ A
3.6 V $\pm$ 1.0%	S-1132B36-M5T1G	S-1132B36-U5T1G	S-1132B36-I6T2G	0.10V	300mA	20 $\mu$ A
3.7 V $\pm$ 1.0%	S-1132B37-M5T1G	S-1132B37-U5T1G	S-1132B37-I6T2G	0.10V	300mA	20 $\mu$ A
3.8 V $\pm$ 1.0%	S-1132B38-M5T1G	S-1132B38-U5T1G	S-1132B38-I6T2G	0.10V	300mA	20 $\mu$ A
3.9 V $\pm$ 1.0%	S-1132B39-M5T1G	S-1132B39-U5T1G	S-1132B39-I6T2G	0.10V	300mA	20 $\mu$ A
4.0 V $\pm$ 1.0%	S-1132B40-M5T1G	S-1132B40-U5T1G	S-1132B40-I6T2G	0.10V	300mA	20 $\mu$ A
4.1 V $\pm$ 1.0%	S-1132B41-M5T1G	S-1132B41-U5T1G	S-1132B41-I6T2G	0.10V	300mA	20 $\mu$ A
4.2 V $\pm$ 1.0%	S-1132B42-M5T1G	S-1132B42-U5T1G	S-1132B42-I6T2G	0.10V	300mA	20 $\mu$ A
4.3 V $\pm$ 1.0%	S-1132B43-M5T1G	S-1132B43-U5T1G	S-1132B43-I6T2G	0.10V	300mA	20 $\mu$ A
4.4 V $\pm$ 1.0%	S-1132B44-M5T1G	S-1132B44-U5T1G	S-1132B44-I6T2G	0.10V	300mA	20 $\mu$ A
4.5 V $\pm$ 1.0%	S-1132B45-M5T1G	S-1132B45-U5T1G	S-1132B45-I6T2G	0.10V	300mA	20 $\mu$ A
4.6 V $\pm$ 1.0%	S-1132B46-M5T1G	S-1132B46-U5T1G	S-1132B46-I6T2G	0.10V	300mA	20 $\mu$ A
4.7 V $\pm$ 1.0%	S-1132B47-M5T1G	S-1132B47-U5T1G	S-1132B47-I6T2G	0.10V	300mA	20 $\mu$ A
4.8 V $\pm$ 1.0%	S-1132B48-M5T1G	S-1132B48-U5T1G	S-1132B48-I6T2G	0.10V	300mA	20 $\mu$ A
4.9 V $\pm$ 1.0%	S-1132B49-M5T1G	S-1132B49-U5T1G	S-1132B49-I6T2G	0.10V	300mA	20 $\mu$ A
5.0 V $\pm$ 1.0%	S-1132B50-M5T1G	S-1132B50-U5T1G	S-1132B50-I6T2G	0.10V	300mA	20 $\mu$ A
5.1 V $\pm$ 1.0%	S-1132B51-M5T1G	S-1132B51-U5T1G	S-1132B51-I6T2G	0.10V	300mA	20 $\mu$ A
5.2 V $\pm$ 1.0%	S-1132B52-M5T1G	S-1132B52-U5T1G	S-1132B52-I6T2G	0.10V	300mA	20 $\mu$ A
5.3 V $\pm$ 1.0%	S-1132B53-M5T1G	S-1132B53-U5T1G	S-1132B53-I6T2G	0.10V	300mA	20 $\mu$ A
5.4 V $\pm$ 1.0%	S-1132B54-M5T1G	S-1132B54-U5T1G	S-1132B54-I6T2G	0.10V	300mA	20 $\mu$ A
5.5 V $\pm$ 1.0%	S-1132B55-M5T1G	S-1132B55-U5T1G	S-1132B55-I6T2G	0.10V	300mA	20 $\mu$ A

**Remark** Please contact our sales office if you desire a product with an inverted ON/OFF pin logic.

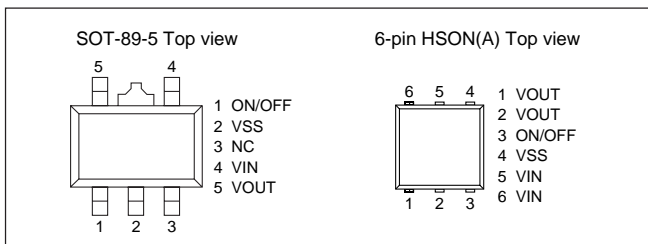
## TO 800 mA OUTPUT CURRENT

## HIGH RIPPLE REJECTION AND LOW DROPOUT HIGH-OUTPUT CURRENT CMOS VOLTAGE REGULATOR

## S-1170 series

The S-1170 series is a positive voltage regulator that features low dropout voltage, high output voltage accuracy, and low current consumption, and has been developed using CMOS technology. Since a low on-resistance transistor is incorporated, the dropout voltage is small, and a large output current can be obtained. A built-in overcurrent protection circuit prevents the load current from exceeding the current capacitance of the output transistor, and a built-in thermal shunt circuit prevents damage due to heat generation. Small SOT-89-5 and 6-pin HSON(A) packages realize high-density mounting.

### PIN CONFIGURATIONS



### FEATURES

- Low current consumption
  - 80  $\mu$ A typ., 160  $\mu$ A max. (during operation)
  - 0.1  $\mu$ A typ., 1  $\mu$ A max. (during power-off)
- Output voltage: 1.5 to 5.5 V (selectable in 0.1 V steps)
- High output voltage accuracy:  $\pm 1.0\%$
- Output current
  - 800 mA capable (product with 3.0 V output, when  $V_{IN} = 4$  V)\*1
- Dropout voltage
  - 120 mV typ. (product with 3.0 V output, when  $I_{OUT} = 300$  mA)
- Ripple rejection rate: 70 dB typ. ( $f = 1$  kHz,  $V_{OUT} = 3.0$  V)
- Built-in power-off circuit: Selection of positive/negative logic is possible.
- Built-in overcurrent protection circuit
- Built-in thermal shunt circuit
- Input/output capacitor: Use of a ceramic capacitor of 4.7  $\mu$ F or more is possible.

\*1. Attention should be paid to the power dissipation of the package when the load is large.

### APPLICATIONS

- Constant voltage power supply for DVD drives and CD-ROM drives
- Constant voltage power supply for battery-powered devices
- Constant voltage power supply for communication devices
- Constant voltage power supply for notebook PCs

### SELECTION GUIDE

Output voltage	SOT-89-5 (1000/reel)	6-pin HSON(A) (3000/reel)	Dropout voltage (typ.) ( $I_{OUT}=300$ mA)	Output current (min.) ( $V_{IN} \geq V_{OUT(S)} + 1.0$ V)	Current consumption during operation (typ.) ( $V_{IN} = V_{OUT(S)} + 1.0$ V, no load)
1.5V $\pm$ 1.0%	S-1170B15UC-OTATFG	S-1170B15PD-OTATFG	0.35	800mA	80 $\mu$ A
1.6V $\pm$ 1.0%	S-1170B16UC-OTBTFG	S-1170B16PD-OTBTFG	0.30	800mA	80 $\mu$ A
1.7V $\pm$ 1.0%	S-1170B17UC-OTCTFG	S-1170B17PD-OTCTFG	0.25	800mA	80 $\mu$ A
1.8V $\pm$ 1.0%	S-1170B18UC-OTDTFG	S-1170B18PD-OTDTFG	0.20	800mA	80 $\mu$ A
1.9V $\pm$ 1.0%	S-1170B19UC-OTETFG	S-1170B19PD-OTETFG	0.20	800mA	80 $\mu$ A
2.0V $\pm$ 1.0%	S-1170B20UC-OTFTFG	S-1170B20PD-OTFTFG	0.20	800mA	80 $\mu$ A
2.1V $\pm$ 1.0%	S-1170B21UC-OTGTFG	S-1170B21PD-OTGTFG	0.15	800mA	80 $\mu$ A
2.2V $\pm$ 1.0%	S-1170B22UC-OTHTFG	S-1170B22PD-OTHTFG	0.15	800mA	80 $\mu$ A
2.3V $\pm$ 1.0%	S-1170B23UC-OTITFG	S-1170B23PD-OTITFG	0.15	800mA	80 $\mu$ A
2.4V $\pm$ 1.0%	S-1170B24UC-OTJTFG	S-1170B24PD-OTJTFG	0.15	800mA	80 $\mu$ A
2.5V $\pm$ 1.0%	S-1170B25UC-OTKTFG	S-1170B25PD-OTKTFG	0.15	800mA	80 $\mu$ A
2.6V $\pm$ 1.0%	S-1170B26UC-OTLTFG	S-1170B26PD-OTLTFG	0.15	800mA	80 $\mu$ A
2.7V $\pm$ 1.0%	S-1170B27UC-OTMTFG	S-1170B27PD-OTMTFG	0.15	800mA	80 $\mu$ A
2.8V $\pm$ 1.0%	S-1170B28UC-OTNTFG	S-1170B28PD-OTNTFG	0.15	800mA	80 $\mu$ A
2.9V $\pm$ 1.0%	S-1170B29UC-OTOTFG	S-1170B29PD-OTOTFG	0.15	800mA	80 $\mu$ A
3.0V $\pm$ 1.0%	S-1170B30UC-OTPTFG	S-1170B30PD-OTPTFG	0.12	800mA	80 $\mu$ A
3.1V $\pm$ 1.0%	S-1170B31UC-OTQTFG	S-1170B31PD-OTQTFG	0.12	800mA	80 $\mu$ A
3.2V $\pm$ 1.0%	S-1170B32UC-OTRTFG	S-1170B32PD-OTRTFG	0.12	800mA	80 $\mu$ A
3.3V $\pm$ 1.0%	S-1170B33UC-OTSTFG	S-1170B33PD-OTSTFG	0.12	800mA	80 $\mu$ A
3.4V $\pm$ 1.0%	S-1170B34UC-OTTFG	S-1170B34PD-OTTFG	0.12	800mA	80 $\mu$ A
3.5V $\pm$ 1.0%	S-1170B35UC-OTUTFG	S-1170B35PD-OTUTFG	0.12	800mA	80 $\mu$ A
3.6V $\pm$ 1.0%	S-1170B36UC-OTVTFG	S-1170B36PD-OTVTFG	0.12	800mA	80 $\mu$ A
3.7V $\pm$ 1.0%	S-1170B37UC-OTWTFG	S-1170B37PD-OTWTFG	0.12	800mA	80 $\mu$ A
3.8V $\pm$ 1.0%	S-1170B38UC-OTXTFG	S-1170B38PD-OTXTFG	0.12	800mA	80 $\mu$ A
3.9V $\pm$ 1.0%	S-1170B39UC-OTYTFG	S-1170B39PD-OTYTFG	0.12	800mA	80 $\mu$ A
4.0V $\pm$ 1.0%	S-1170B40UC-OTZTFG	S-1170B40PD-OTZTFG	0.12	800mA	80 $\mu$ A
4.1V $\pm$ 1.0%	S-1170B41UC-OUATFG	S-1170B41PD-OUATFG	0.12	800mA	80 $\mu$ A
4.2V $\pm$ 1.0%	S-1170B42UC-OUBTFG	S-1170B42PD-OUBTFG	0.12	800mA	80 $\mu$ A
4.3V $\pm$ 1.0%	S-1170B43UC-OUCTFG	S-1170B43PD-OUCTFG	0.12	800mA	80 $\mu$ A
4.4V $\pm$ 1.0%	S-1170B44UC-OUDTFG	S-1170B44PD-OUDTFG	0.12	800mA	80 $\mu$ A
4.5V $\pm$ 1.0%	S-1170B45UC-OUETFG	S-1170B45PD-OUETFG	0.12	800mA	80 $\mu$ A
4.6V $\pm$ 1.0%	S-1170B46UC-OUFTFG	S-1170B46PD-OUFTFG	0.12	800mA	80 $\mu$ A
4.7V $\pm$ 1.0%	S-1170B47UC-OUGTFG	S-1170B47PD-OUGTFG	0.12	800mA	80 $\mu$ A
4.8V $\pm$ 1.0%	S-1170B48UC-OUHTFG	S-1170B48PD-OUHTFG	0.12	800mA	80 $\mu$ A
4.9V $\pm$ 1.0%	S-1170B49UC-OUITFG	S-1170B49PD-OUITFG	0.12	800mA	80 $\mu$ A
5.0V $\pm$ 1.0%	S-1170B50UC-OUJTFG	S-1170B50PD-OUJTFG	0.12	800mA	80 $\mu$ A
5.1V $\pm$ 1.0%	S-1170B51UC-OUKTFG	S-1170B51PD-OUKTFG	0.12	800mA	80 $\mu$ A
5.2V $\pm$ 1.0%	S-1170B52UC-OUJTFG	S-1170B52PD-OUJTFG	0.12	800mA	80 $\mu$ A
5.3V $\pm$ 1.0%	S-1170B53UC-OUJTFG	S-1170B53PD-OUJTFG	0.12	800mA	80 $\mu$ A
5.4V $\pm$ 1.0%	S-1170B54UC-OUJTFG	S-1170B54PD-OUJTFG	0.12	800mA	80 $\mu$ A
5.5V $\pm$ 1.0%	S-1170B55UC-OUJTFG	S-1170B55PD-OUJTFG	0.12	800mA	80 $\mu$ A

**Remark** Please contact our sales office if you desire a product with an inverted ON/OFF pin logic.

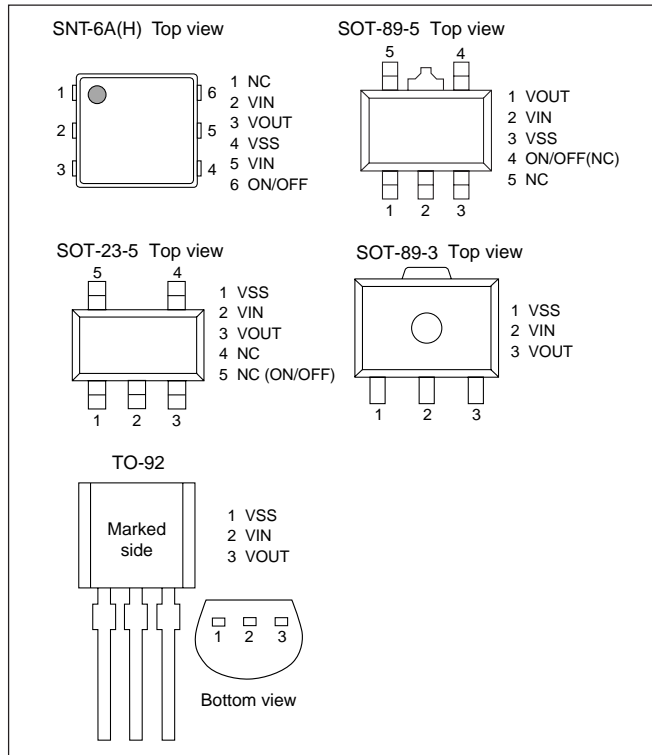
## HIGH OPERATING VOLTAGE CMOS VOLTAGE REGULATOR

## S-812C series

The S-812C series is a high operating voltage LDO voltage regulator developed using CMOS technology. The maximum operating voltage of the S-812C series is 16 V, making it ideal for high voltage applications. The low current consumption and power-off function of the S-812C series also make it suitable for portable devices that require low current consumption.

The S-812C series can be used with ceramic capacitors.

### ■ PIN CONFIGURATIONS



### ■ FEATURES

- Low current consumption: 1.0  $\mu$ A typ., 1.8  $\mu$ A max. (3.0 V output product, during operation)
- Output voltage range: 2.0 V to 6.0 V (Selectable in 0.1 V steps)
- Output voltage accuracy:  $\pm 2.0\%$
- Input voltage: 16 V max.
- Output current
  - 50 mA capable (3.0 V output product, when  $V_{IN} = 5$  V)<sup>\*1</sup>
  - 75 mA capable (5.0 V output product, when  $V_{IN} = 7$  V)<sup>\*1</sup>
- Dropout voltage: 120 mV typ. ( $V_{OUT} = 5.0$  V,  $I_{OUT} = 10$  mA)
- Output capacitor: A ceramic capacitor can be used.
- Built-in shutdown circuit: Shutdown on/off function and output signal polarity (positive/negative) are selectable.
- Short-circuit protection: Function selectable  
Short-circuit current: 40 mA typ. (With protection function)

\*1. Attention should be paid to the power dissipation of the package when the load is large.

## SELECTION GUIDE

Output voltage	With short-circuit protection and power-off functions			Without short-circuit protection and power-off functions			Dropout voltage (typ.) (I <sub>OUT</sub> =10mA)	Output current (min.) (V <sub>OUTS</sub> =2V, I <sub>OUT</sub> =16V)	Current consumption during operation (typ.) (V <sub>IN</sub> =1.8V, I <sub>OUT</sub> =2V, no load)
	SNT8A(H) (5000/reel)	SOT-23-5 (3000/reel)	SOT-89-5 (1000/reel)	TO-92 <sup>1</sup>	SOT-23-5 (3000/reel)	SOT-89-3 (1000/reel)			
2.0V ± 2.0%	S-812C20BP1-C4ATFG	S-812C20BMC-C4AT2G	-	S-812C20AY-XG	S-812C20AMC-C2AT2G	S-812C20AUA-C2AT2G	0.46V	30mA	0.9µA
2.1V ± 2.0%	S-812C21BP1-C4BTFG	S-812C21BMC-C4BT2G	-	S-812C21AY-XG	S-812C21AMC-C2BT2G	S-812C21AUA-C2BT2G	0.46V	30mA	0.9µA
2.2V ± 2.0%	S-812C22BP1-C4CTFG	S-812C22BMC-C4CT2G	-	S-812C22AY-XG	S-812C22AMC-C2CT2G	S-812C22AUA-C2CT2G	0.46V	30mA	0.9µA
2.3V ± 2.0%	S-812C23BP1-C4DTFG	S-812C23BMC-C4DT2G	-	S-812C23AY-XG	S-812C23AMC-C2DT2G	S-812C23AUA-C2DT2G	0.46V	30mA	0.9µA
2.4V ± 2.0%	S-812C24BP1-C4ETFG	S-812C24BMC-C4ET2G	-	S-812C24AY-XG	S-812C24AMC-C2ET2G	S-812C24AUA-C2ET2G	0.46V	30mA	0.9µA
2.5V ± 2.0%	S-812C25BP1-C4FTFG	S-812C25BMC-C4FT2G	-	S-812C25AY-XG	S-812C25AMC-C2FT2G	S-812C25AUA-C2FT2G	0.32V	30mA	0.9µA
2.6V ± 2.0%	S-812C26BP1-C4GTFG	S-812C26BMC-C4GT2G	-	S-812C26AY-XG	S-812C26AMC-C2GT2G	S-812C26AUA-C2GT2G	0.32V	30mA	0.9µA
2.7V ± 2.0%	S-812C27BP1-C4HTFG	S-812C27BMC-C4HT2G	-	S-812C27AY-XG	S-812C27AMC-C2HT2G	S-812C27AUA-C2HT2G	0.32V	30mA	0.9µA
2.8V ± 2.0%	S-812C28BP1-C4JTFG	S-812C28BMC-C4JT2G	-	S-812C28AY-XG	S-812C28AMC-C2JT2G	S-812C28AUA-C2JT2G	0.32V	30mA	1.0µA
2.9V ± 2.0%	S-812C29BP1-C4KTFG	S-812C29BMC-C4KT2G	-	S-812C29AY-XG	S-812C29AMC-C2KT2G	S-812C29AUA-C2KT2G	0.23V	50mA	1.0µA
3.0V ± 2.0%	S-812C30BP1-C4LTFG	S-812C30BMC-C4LT2G	-	S-812C30AY-XG	S-812C30AMC-C2LT2G	S-812C30AUA-C2LT2G	0.23V	50mA	1.0µA
3.1V ± 2.0%	S-812C31BP1-C4MTFG	S-812C31BMC-C4MT2G	-	S-812C31AY-XG	S-812C31AMC-C2MT2G	S-812C31AUA-C2MT2G	0.23V	50mA	1.0µA
3.2V ± 2.0%	S-812C32BP1-C4NTFG	S-812C32BMC-C4NT2G	-	S-812C32AY-XG	S-812C32AMC-C2NT2G	S-812C32AUA-C2NT2G	0.23V	50mA	1.0µA
3.3V ± 2.0%	S-812C33BP1-C4OTFG	S-812C33BMC-C4OT2G	S-812C33BUC-C4NT2G	S-812C33AY-XG	S-812C33AMC-C2NT2G	S-812C33AUA-C2NT2G	0.23V	50mA	1.0µA
3.4V ± 2.0%	S-812C34BP1-C4PTFG	S-812C34BMC-C4PT2G	-	S-812C34AY-XG	S-812C34AMC-C2PT2G	S-812C34AUA-C2PT2G	0.23V	50mA	1.0µA
3.5V ± 2.0%	S-812C35BP1-C4QTFG	S-812C35BMC-C4QT2G	-	S-812C35AY-XG	S-812C35AMC-C2PT2G	S-812C35AUA-C2PT2G	0.19V	50mA	1.0µA
3.6V ± 2.0%	S-812C36BP1-C4RTFG	S-812C36BMC-C4RT2G	-	S-812C36AY-XG	S-812C36AMC-C2QT2G	S-812C36AUA-C2QT2G	0.19V	50mA	1.0µA
3.7V ± 2.0%	S-812C37BP1-C4STFG	S-812C37BMC-C4ST2G	-	S-812C37AY-XG	S-812C37AMC-C2RT2G	S-812C37AUA-C2RT2G	0.19V	50mA	1.0µA
3.8V ± 2.0%	S-812C38BP1-C4TTFG	S-812C38BMC-C4ST2G	-	S-812C38AY-XG	S-812C38AMC-C2ST2G	S-812C38AUA-C2ST2G	0.19V	50mA	1.2µA
3.9V ± 2.0%	S-812C39BP1-C4UFG	S-812C39BMC-C4TT2G	-	S-812C39AY-XG	S-812C39AMC-C2TT2G	S-812C39AUA-C2TT2G	0.19V	50mA	1.2µA
4.0V ± 2.0%	S-812C40BP1-C4VTFG	S-812C40BMC-C4UT2G	-	S-812C40AY-XG	S-812C40AMC-C2UT2G	S-812C40AUA-C2UT2G	0.16V	65mA	1.2µA
4.1V ± 2.0%	S-812C41BP1-C4WTFG	S-812C41BMC-C4VT2G	-	S-812C41AY-XG	S-812C41AMC-C2VT2G	S-812C41AUA-C2VT2G	0.16V	65mA	1.2µA
4.2V ± 2.0%	S-812C42BP1-C4XTFG	S-812C42BMC-C4XT2G	-	S-812C42AY-XG	S-812C42AMC-C2WT2G	S-812C42AUA-C2WT2G	0.16V	65mA	1.2µA
4.3V ± 2.0%	S-812C43BP1-C4YTFG	S-812C43BMC-C4YT2G	-	S-812C43AY-XG	S-812C43AMC-C2XT2G	S-812C43AUA-C2XT2G	0.16V	65mA	1.2µA
4.4V ± 2.0%	S-812C44BP1-C4ZTFG	S-812C44BMC-C4YT2G	-	S-812C44AY-XG	S-812C44AMC-C2YT2G	S-812C44AUA-C2YT2G	0.16V	65mA	1.2µA
4.5V ± 2.0%	S-812C45BP1-C5ATFG	S-812C45BMC-C4ZT2G	-	S-812C45AY-XG	S-812C45AMC-C2ZT2G	S-812C45AUA-C2ZT2G	0.14V	65mA	1.2µA
4.6V ± 2.0%	S-812C46BP1-C5BTFG	S-812C46BMC-C5AT2G	-	S-812C46AY-XG	S-812C46AMC-C3AT2G	S-812C46AUA-C3AT2G	0.14V	65mA	1.2µA
4.7V ± 2.0%	S-812C47BP1-C5CTFG	S-812C47BMC-C5BT2G	-	S-812C47AY-XG	S-812C47AMC-C3BT2G	S-812C47AUA-C3BT2G	0.14V	65mA	1.2µA
4.8V ± 2.0%	S-812C48BP1-C5DTFG	S-812C48BMC-C5CT2G	-	S-812C48AY-XG	S-812C48AMC-C3CT2G	S-812C48AUA-C3CT2G	0.14V	65mA	1.2µA
4.9V ± 2.0%	S-812C49BP1-C5ETFG	S-812C49BMC-C5DT2G	-	S-812C49AY-XG	S-812C49AMC-C3DT2G	S-812C49AUA-C3DT2G	0.14V	65mA	1.2µA
5.0V ± 2.0%	S-812C50BP1-C5FTFG	S-812C50BMC-C5ET2G	S-812C50BUC-C5ET2G	S-812C50AY-XG	S-812C50AMC-C3ET2G	S-812C50AUA-C3ET2G	0.12V	75mA	1.2µA
5.1V ± 2.0%	S-812C51BP1-C5GTFG	S-812C51BMC-C5FT2G	-	S-812C51AY-XG	S-812C51AMC-C3FT2G	S-812C51AUA-C3FT2G	0.12V	75mA	1.2µA
5.2V ± 2.0%	S-812C52BP1-C5HTFG	S-812C52BMC-C5GT2G	-	S-812C52AY-XG	S-812C52AMC-C3GT2G	S-812C52AUA-C3GT2G	0.12V	75mA	1.5µA
5.3V ± 2.0%	S-812C53BP1-C5ITFG	S-812C53BMC-C5HT2G	-	S-812C53AY-XG	S-812C53AMC-C3HT2G	S-812C53AUA-C3HT2G	0.12V	75mA	1.5µA
5.4V ± 2.0%	S-812C54BP1-C5JTFG	S-812C54BMC-C5IT2G	-	S-812C54AY-XG	S-812C54AMC-C3IT2G	S-812C54AUA-C3IT2G	0.12V	75mA	1.5µA
5.5V ± 2.0%	S-812C55BP1-C5KTFG	S-812C55BMC-C5JT2G	-	S-812C55AY-XG	S-812C55AMC-C3JT2G	S-812C55AUA-C3JT2G	0.11V	75mA	1.5µA
5.6V ± 2.0%	S-812C56BP1-C5LTFG	S-812C56BMC-C5KT2G	-	S-812C56AY-XG	S-812C56AMC-C3KT2G	S-812C56AUA-C3KT2G	0.11V	75mA	1.5µA
5.7V ± 2.0%	S-812C57BP1-C5MTFG	S-812C57BMC-C5LT2G	-	S-812C57AY-XG	S-812C57AMC-C3LT2G	S-812C57AUA-C3LT2G	0.11V	75mA	1.5µA
5.8V ± 2.0%	S-812C58BP1-C5NTFG	S-812C58BMC-C5MT2G	-	S-812C58AY-XG	S-812C58AMC-C3MT2G	S-812C58AUA-C3MT2G	0.11V	75mA	1.5µA
5.9V ± 2.0%	S-812C59BP1-C5OTFG	S-812C59BMC-C5NT2G	-	S-812C59AY-XG	S-812C59AMC-C3NT2G	S-812C59AUA-C3NT2G	0.11V	75mA	1.5µA
6.0V ± 2.0%	S-812C60BP1-C5PTFG	S-812C60BMC-C5OT2G	-	S-812C60AY-XG	S-812C60AMC-C3OT2G	S-812C60AUA-C3OT2G	0.11V	75mA	1.5µA

\*1. "X" in the model number of TO-92 differs as follows:  
 B: Bulk, T: Tape and reel (2000/reel), Z: Tape and ammo (2500/reel)



## SUPER-SMALL PACKAGE VOLTAGE REGULATOR

## S-817 series

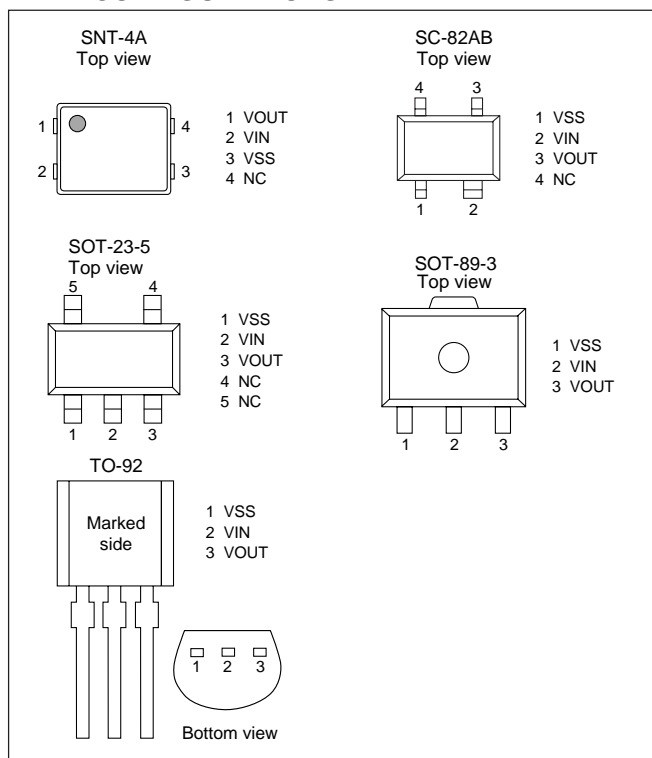
The S-817 series is a 3-terminal positive voltage regulator, developed using CMOS technology.

The small SNT-4A package (1.6 x 1.2 mm) and SC-82AB package (2.0 x 2.1 mm) of the S-817A series is ideal for designing small portable devices. Small ceramic capacitors can be used as the output capacitor, and the S-817 series provides stable operation with low loads down to 1  $\mu$ A.

The S-817B series does not include a short-circuit protection circuit.

The S-817B series is available in four packages: SNT-4A, SC-82AB, SOT-23-5, TO-92 and SOT-89-3.

### PIN CONFIGURATIONS



### FEATURES

- Low current consumption: 1.2  $\mu$ A typ., 2.5  $\mu$ A max. (during operation)
- Output voltage: 1.1 to 6.0 V (selectable in 0.1 V steps)
- Output voltage accuracy:  $\pm 2.0\%$
- Input voltage: 10 V max.
- Output current: 50 mA capable  
(Product with 3.0 V output, when  $V_{IN} = 5$  V)\*\*  
75 mA capable  
(Product with 5.0 V output, when  $V_{IN} = 7$  V)\*\*
- Dropout voltage: 160 mV typ.  
( $V_{OUT} = 5.0$  V,  $I_{OUT} = 10$  mA)
- Low ESR capacitor: A ceramic capacitor of 0.1  $\mu$ F or higher.
- Short-circuit protection: Only for A series
- Excellent line regulation: Stable even with low load (1  $\mu$ A)
- Super-small package: SNT-4A (A series)  
SC-82AB (A series)  
SOT-23-5 (B series)  
TO-92 (B series)  
SOT-89-3 (B series)

\*1. Attention should be paid to the power dissipation of the package when the load is large.

### APPLICATIONS

- Constant voltage power supply for battery-powered devices
- Constant voltage power supply for communication devices
- Constant voltage power supply for household electrical appliances

## SELECTION GUIDE

Output voltage	With short-circuit protection			Without short-circuit protection			Dropout voltage (I <sub>OUT</sub> =10mA) (V <sub>OUT</sub> ±2V±1ms/10V)	Output Current (min.) (V <sub>OUT</sub> ±2V±1ms/10V)	Current consumption during operation (I <sub>TP</sub> ) (V <sub>IN</sub> =V <sub>OUT</sub> +2V, no load)
	SNT-4A (5000/reel)	SC-82AB (3000/reel)	SOT-23-5 (3000/reel)	SOT-89-3 (1000/reel)	TO-92 <sup>1</sup>				
1.1 V ± 2.0%	S-817A11APF-CUATFG	S-817A11ANB-CUAT2G	S-817B11AMC-CWAT2G	S-817B11AUA-CWAT2G	S-817B11AY-X-G	S-817B11AY-X-G	0.92V	20mA	1.2µA
1.2 V ± 2.0%	S-817A12APF-CUATFG	S-817A12ANB-CUAT2G	S-817B12AMC-CWAT2G	S-817B12AUA-CWAT2G	S-817B12AY-X-G	S-817B12AY-X-G	0.92V	20mA	1.2µA
1.3 V ± 2.0%	S-817A13APF-CUATFG	S-817A13ANB-CUAT2G	S-817B13AMC-CWAT2G	S-817B13AUA-CWAT2G	S-817B13AY-X-G	S-817B13AY-X-G	0.92V	20mA	1.2µA
1.4 V ± 2.0%	S-817A14APF-CUATFG	S-817A14ANB-CUAT2G	S-817B14AMC-CWAT2G	S-817B14AUA-CWAT2G	S-817B14AY-X-G	S-817B14AY-X-G	0.92V	20mA	1.2µA
1.5 V ± 2.0%	S-817A15APF-CUATFG	S-817A15ANB-CUAT2G	S-817B15AMC-CWAT2G	S-817B15AUA-CWAT2G	S-817B15AY-X-G	S-817B15AY-X-G	0.58V	20mA	1.2µA
1.6 V ± 2.0%	S-817A16APF-CUATFG	S-817A16ANB-CUAT2G	S-817B16AMC-CWAT2G	S-817B16AUA-CWAT2G	S-817B16AY-X-G	S-817B16AY-X-G	0.58V	20mA	1.2µA
1.7 V ± 2.0%	S-817A17APF-CUATFG	S-817A17ANB-CUAT2G	S-817B17AMC-CWAT2G	S-817B17AUA-CWAT2G	S-817B17AY-X-G	S-817B17AY-X-G	0.58V	20mA	1.2µA
1.8 V ± 2.0%	S-817A18APF-CUATFG	S-817A18ANB-CUAT2G	S-817B18AMC-CWAT2G	S-817B18AUA-CWAT2G	S-817B18AY-X-G	S-817B18AY-X-G	0.58V	20mA	1.2µA
1.9 V ± 2.0%	S-817A19APF-CUATFG	S-817A19ANB-CUAT2G	S-817B19AMC-CWAT2G	S-817B19AUA-CWAT2G	S-817B19AY-X-G	S-817B19AY-X-G	0.58V	20mA	1.2µA
2.0 V ± 2.0%	S-817A20APF-CUATFG	S-817A20ANB-CUAT2G	S-817B20AMC-CWAT2G	S-817B20AUA-CWAT2G	S-817B20AY-X-G	S-817B20AY-X-G	0.40V	35mA	1.2µA
2.1 V ± 2.0%	S-817A21APF-CUATFG	S-817A21ANB-CUAT2G	S-817B21AMC-CWAT2G	S-817B21AUA-CWAT2G	S-817B21AY-X-G	S-817B21AY-X-G	0.40V	35mA	1.2µA
2.2 V ± 2.0%	S-817A22APF-CUATFG	S-817A22ANB-CUAT2G	S-817B22AMC-CWAT2G	S-817B22AUA-CWAT2G	S-817B22AY-X-G	S-817B22AY-X-G	0.40V	35mA	1.2µA
2.3 V ± 2.0%	S-817A23APF-CUATFG	S-817A23ANB-CUAT2G	S-817B23AMC-CWAT2G	S-817B23AUA-CWAT2G	S-817B23AY-X-G	S-817B23AY-X-G	0.40V	35mA	1.2µA
2.4 V ± 2.0%	S-817A24APF-CUATFG	S-817A24ANB-CUAT2G	S-817B24AMC-CWAT2G	S-817B24AUA-CWAT2G	S-817B24AY-X-G	S-817B24AY-X-G	0.40V	35mA	1.2µA
2.5 V ± 2.0%	S-817A25APF-CUATFG	S-817A25ANB-CUAT2G	S-817B25AMC-CWAT2G	S-817B25AUA-CWAT2G	S-817B25AY-X-G	S-817B25AY-X-G	0.31V	35mA	1.2µA
2.6 V ± 2.0%	S-817A26APF-CUATFG	S-817A26ANB-CUAT2G	S-817B26AMC-CWAT2G	S-817B26AUA-CWAT2G	S-817B26AY-X-G	S-817B26AY-X-G	0.31V	35mA	1.2µA
2.7 V ± 2.0%	S-817A27APF-CUATFG	S-817A27ANB-CUAT2G	S-817B27AMC-CWAT2G	S-817B27AUA-CWAT2G	S-817B27AY-X-G	S-817B27AY-X-G	0.31V	35mA	1.2µA
2.8 V ± 2.0%	S-817A28APF-CUATFG	S-817A28ANB-CUAT2G	S-817B28AMC-CWAT2G	S-817B28AUA-CWAT2G	S-817B28AY-X-G	S-817B28AY-X-G	0.31V	35mA	1.2µA
2.9 V ± 2.0%	S-817A29APF-CUATFG	S-817A29ANB-CUAT2G	S-817B29AMC-CWAT2G	S-817B29AUA-CWAT2G	S-817B29AY-X-G	S-817B29AY-X-G	0.31V	35mA	1.2µA
3.0 V ± 2.0%	S-817A30APF-CUATFG	S-817A30ANB-CUAT2G	S-817B30AMC-CWAT2G	S-817B30AUA-CWAT2G	S-817B30AY-X-G	S-817B30AY-X-G	0.25V	50mA	1.2µA
3.1 V ± 2.0%	S-817A31APF-CUATFG	S-817A31ANB-CUAT2G	S-817B31AMC-CWAT2G	S-817B31AUA-CWAT2G	S-817B31AY-X-G	S-817B31AY-X-G	0.25V	50mA	1.2µA
3.2 V ± 2.0%	S-817A32APF-CUATFG	S-817A32ANB-CUAT2G	S-817B32AMC-CWAT2G	S-817B32AUA-CWAT2G	S-817B32AY-X-G	S-817B32AY-X-G	0.25V	50mA	1.2µA
3.3 V ± 2.0%	S-817A33APF-CUATFG	S-817A33ANB-CUAT2G	S-817B33AMC-CWAT2G	S-817B33AUA-CWAT2G	S-817B33AY-X-G	S-817B33AY-X-G	0.25V	50mA	1.2µA
3.4 V ± 2.0%	S-817A34APF-CUATFG	S-817A34ANB-CUAT2G	S-817B34AMC-CWAT2G	S-817B34AUA-CWAT2G	S-817B34AY-X-G	S-817B34AY-X-G	0.25V	50mA	1.2µA
3.5 V ± 2.0%	S-817A35APF-CUATFG	S-817A35ANB-CUAT2G	S-817B35AMC-CWAT2G	S-817B35AUA-CWAT2G	S-817B35AY-X-G	S-817B35AY-X-G	0.22V	50mA	1.2µA
3.6 V ± 2.0%	S-817A36APF-CUATFG	S-817A36ANB-CUAT2G	S-817B36AMC-CWAT2G	S-817B36AUA-CWAT2G	S-817B36AY-X-G	S-817B36AY-X-G	0.22V	50mA	1.2µA
3.7 V ± 2.0%	S-817A37APF-CUATFG	S-817A37ANB-CUAT2G	S-817B37AMC-CWAT2G	S-817B37AUA-CWAT2G	S-817B37AY-X-G	S-817B37AY-X-G	0.22V	50mA	1.2µA
3.8 V ± 2.0%	S-817A38APF-CUATFG	S-817A38ANB-CUAT2G	S-817B38AMC-CWAT2G	S-817B38AUA-CWAT2G	S-817B38AY-X-G	S-817B38AY-X-G	0.22V	50mA	1.2µA
3.9 V ± 2.0%	S-817A39APF-CUATFG	S-817A39ANB-CUAT2G	S-817B39AMC-CWAT2G	S-817B39AUA-CWAT2G	S-817B39AY-X-G	S-817B39AY-X-G	0.22V	50mA	1.2µA
4.0 V ± 2.0%	S-817A40APF-CUATFG	S-817A40ANB-CUAT2G	S-817B40AMC-CWAT2G	S-817B40AUA-CWAT2G	S-817B40AY-X-G	S-817B40AY-X-G	0.19V	65mA	1.2µA
4.1 V ± 2.0%	S-817A41APF-CUATFG	S-817A41ANB-CUAT2G	S-817B41AMC-CWAT2G	S-817B41AUA-CWAT2G	S-817B41AY-X-G	S-817B41AY-X-G	0.19V	65mA	1.2µA
4.2 V ± 2.0%	S-817A42APF-CUATFG	S-817A42ANB-CUAT2G	S-817B42AMC-CWAT2G	S-817B42AUA-CWAT2G	S-817B42AY-X-G	S-817B42AY-X-G	0.19V	65mA	1.2µA
4.3 V ± 2.0%	S-817A43APF-CUATFG	S-817A43ANB-CUAT2G	S-817B43AMC-CWAT2G	S-817B43AUA-CWAT2G	S-817B43AY-X-G	S-817B43AY-X-G	0.19V	65mA	1.2µA
4.4 V ± 2.0%	S-817A44APF-CUATFG	S-817A44ANB-CUAT2G	S-817B44AMC-CWAT2G	S-817B44AUA-CWAT2G	S-817B44AY-X-G	S-817B44AY-X-G	0.18V	65mA	1.2µA
4.5 V ± 2.0%	S-817A45APF-CUATFG	S-817A45ANB-CUAT2G	S-817B45AMC-CWAT2G	S-817B45AUA-CWAT2G	S-817B45AY-X-G	S-817B45AY-X-G	0.18V	65mA	1.2µA
4.6 V ± 2.0%	S-817A46APF-CUATFG	S-817A46ANB-CUAT2G	S-817B46AMC-CWAT2G	S-817B46AUA-CWAT2G	S-817B46AY-X-G	S-817B46AY-X-G	0.18V	65mA	1.2µA
4.7 V ± 2.0%	S-817A47APF-CUATFG	S-817A47ANB-CUAT2G	S-817B47AMC-CWAT2G	S-817B47AUA-CWAT2G	S-817B47AY-X-G	S-817B47AY-X-G	0.18V	65mA	1.2µA
4.8 V ± 2.0%	S-817A48APF-CUATFG	S-817A48ANB-CUAT2G	S-817B48AMC-CWAT2G	S-817B48AUA-CWAT2G	S-817B48AY-X-G	S-817B48AY-X-G	0.18V	65mA	1.2µA
4.9 V ± 2.0%	S-817A49APF-CUATFG	S-817A49ANB-CUAT2G	S-817B49AMC-CWAT2G	S-817B49AUA-CWAT2G	S-817B49AY-X-G	S-817B49AY-X-G	0.18V	65mA	1.2µA
5.0 V ± 2.0%	S-817A50APF-CUATFG	S-817A50ANB-CUAT2G	S-817B50AMC-CWAT2G	S-817B50AUA-CWAT2G	S-817B50AY-X-G	S-817B50AY-X-G	0.16V	75mA	1.2µA
5.1 V ± 2.0%	S-817A51APF-CUATFG	S-817A51ANB-CUAT2G	S-817B51AMC-CWAT2G	S-817B51AUA-CWAT2G	S-817B51AY-X-G	S-817B51AY-X-G	0.16V	75mA	1.2µA
5.2 V ± 2.0%	S-817A52APF-CUATFG	S-817A52ANB-CUAT2G	S-817B52AMC-CWAT2G	S-817B52AUA-CWAT2G	S-817B52AY-X-G	S-817B52AY-X-G	0.16V	75mA	1.2µA
5.3 V ± 2.0%	S-817A53APF-CUATFG	S-817A53ANB-CUAT2G	S-817B53AMC-CWAT2G	S-817B53AUA-CWAT2G	S-817B53AY-X-G	S-817B53AY-X-G	0.16V	75mA	1.2µA
5.4 V ± 2.0%	S-817A54APF-CUATFG	S-817A54ANB-CUAT2G	S-817B54AMC-CWAT2G	S-817B54AUA-CWAT2G	S-817B54AY-X-G	S-817B54AY-X-G	0.16V	75mA	1.2µA
5.5 V ± 2.0%	S-817A55APF-CUATFG	S-817A55ANB-CUAT2G	S-817B55AMC-CWAT2G	S-817B55AUA-CWAT2G	S-817B55AY-X-G	S-817B55AY-X-G	0.15V	75mA	1.2µA
5.6 V ± 2.0%	S-817A56APF-CUATFG	S-817A56ANB-CUAT2G	S-817B56AMC-CWAT2G	S-817B56AUA-CWAT2G	S-817B56AY-X-G	S-817B56AY-X-G	0.15V	75mA	1.2µA
5.7 V ± 2.0%	S-817A57APF-CUATFG	S-817A57ANB-CUAT2G	S-817B57AMC-CWAT2G	S-817B57AUA-CWAT2G	S-817B57AY-X-G	S-817B57AY-X-G	0.15V	75mA	1.2µA
5.8 V ± 2.0%	S-817A58APF-CUATFG	S-817A58ANB-CUAT2G	S-817B58AMC-CWAT2G	S-817B58AUA-CWAT2G	S-817B58AY-X-G	S-817B58AY-X-G	0.15V	75mA	1.2µA
5.9 V ± 2.0%	S-817A59APF-CUATFG	S-817A59ANB-CUAT2G	S-817B59AMC-CWAT2G	S-817B59AUA-CWAT2G	S-817B59AY-X-G	S-817B59AY-X-G	0.15V	75mA	1.2µA
6.0 V ± 2.0%	S-817A60APF-CUATFG	S-817A60ANB-CUAT2G	S-817B60AMC-CWAT2G	S-817B60AUA-CWAT2G	S-817B60AY-X-G	S-817B60AY-X-G	0.15V	75mA	1.2µA

<sup>1</sup> "X" in the model number of TO-92 differs as follows:  
B: Bulk, T: Tape and reel (2000/reel), Z: Tape and ammo (2500/reel)

## EXTERNAL TRANSISTOR TYPE VOLTAGE REGULATOR

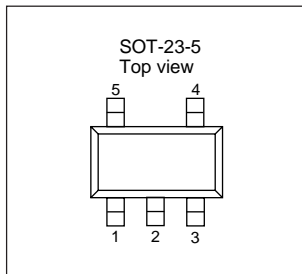
S-816 series

The S-816 series is an external transistor type positive voltage regulator with overcurrent protection and shutdown function, and has been developed using CMOS technology. Using an external PNP transistor, the S-816 series can configure a low dropout regulator with an output current in the range of several hundred mA to 1A.

An improved phase compensation circuit enables an excellent transient response with low current consumption, making the S-816 suitable for circuits with large input and/or load variations.

The SOT-23-5 small package combined with the low current consumption make the S-816 series ideal for battery-powered portable equipment. An input voltage of up to 16 V also enables direct input from an AC adapter.

## PIN CONFIGURATIONS



Pin No.	Symbol	Description
1	EXT	Output pin for base-current control
2	VSS	GND pin
3	ON/OFF	Power-off pin
4	VIN	IC power supply pin
5	VOUT	Output voltage monitoring pin

## SELECTION GUIDE

Output voltage	SOT-23-5 (3000/reel)	Dropout voltage (typ.) (I <sub>OUT</sub> =100mA)	Output current (min.) (V <sub>OUT(S)</sub> +2V≤V <sub>IN(S)</sub> ≤10V)	Current consumption during operation (typ.) (V <sub>IN</sub> =V <sub>OUT(S)</sub> +1V, no load)
2.5V ± 2.0%	S-816A25AMC-BAAT2G	100mV	1A	30μA
2.6V ± 2.0%	S-816A26AMC-BABT2G	100mV	1A	30μA
2.7V ± 2.0%	S-816A27AMC-BACT2G	100mV	1A	30μA
2.8V ± 2.0%	S-816A28AMC-BADT2G	100mV	1A	30μA
2.9V ± 2.0%	S-816A29AMC-BAET2G	100mV	1A	30μA
3.0V ± 2.0%	S-816A30AMC-BAFT2G	100mV	1A	30μA
3.1V ± 2.0%	S-816A31AMC-BAGT2G	100mV	1A	30μA
3.2V ± 2.0%	S-816A32AMC-BAHT2G	100mV	1A	30μA
3.3V ± 2.0%	S-816A33AMC-BAIT2G	100mV	1A	30μA
3.4V ± 2.0%	S-816A34AMC-BAJT2G	100mV	1A	30μA
3.5V ± 2.0%	S-816A35AMC-BAKT2G	100mV	1A	30μA
3.6V ± 2.0%	S-816A36AMC-BALT2G	100mV	1A	30μA
3.7V ± 2.0%	S-816A37AMC-BAMT2G	100mV	1A	30μA
3.8V ± 2.0%	S-816A38AMC-BANT2G	100mV	1A	30μA
3.9V ± 2.0%	S-816A39AMC-BAOT2G	100mV	1A	30μA
4.0V ± 2.0%	S-816A40AMC-BAPT2G	100mV	1A	30μA
4.1V ± 2.0%	S-816A41AMC-BAQT2G	100mV	1A	30μA
4.2V ± 2.0%	S-816A42AMC-BART2G	100mV	1A	30μA
4.3V ± 2.0%	S-816A43AMC-BAST2G	100mV	1A	30μA
4.4V ± 2.0%	S-816A44AMC-BATT2G	100mV	1A	30μA
4.5V ± 2.0%	S-816A45AMC-BAUT2G	100mV	1A	30μA
4.6V ± 2.0%	S-816A46AMC-BAVT2G	100mV	1A	30μA
4.7V ± 2.0%	S-816A47AMC-BAWT2G	100mV	1A	30μA
4.8V ± 2.0%	S-816A48AMC-BAXT2G	100mV	1A	30μA
4.9V ± 2.0%	S-816A49AMC-BAYT2G	100mV	1A	30μA
5.0V ± 2.0%	S-816A50AMC-BAZT2G	100mV	1A	30μA
5.1V ± 2.0%	S-816A51AMC-BBAT2G	100mV	1A	30μA
5.2V ± 2.0%	S-816A52AMC-BBBT2G	100mV	1A	30μA
5.3V ± 2.0%	S-816A53AMC-BBCT2G	100mV	1A	30μA
5.4V ± 2.0%	S-816A54AMC-BBDT2G	100mV	1A	30μA
5.5V ± 2.0%	S-816A55AMC-BBET2G	100mV	1A	30μA
5.6V ± 2.0%	S-816A56AMC-BBFT2G	100mV	1A	30μA
5.7V ± 2.0%	S-816A57AMC-BBGT2G	100mV	1A	30μA
5.8V ± 2.0%	S-816A58AMC-BBHT2G	100mV	1A	30μA
5.9V ± 2.0%	S-816A59AMC-BBIT2G	100mV	1A	30μA
6.0V ± 2.0%	S-816A60AMC-BBJT2G	100mV	1A	30μA

## FEATURES

- Low current consumption  
30 μA typ., 40 μA max. (during operation)  
1 μA max. (during power-off)
- Input voltage: 16 V max.
- Output voltage accuracy: ±2.0%
- Output voltage range: 2.5 V to 6.0 V  
(Selectable in 0.1 V steps)
- Shutdown function
- Built-in current source (10 μA) eliminates the need for resistance between the base-emitters.
- Overcurrent (base current) protection

## APPLICATIONS

- On-board power supply of battery devices for cellular phones, electronic organizers, and PDAs
- Constant voltage power supply for portable communication equipment, cameras, and video equipment
- Power supply for CPUs
- Switching regulator's next-stage regulator
- Main regulator for multi power supply system

## LOW DROPOUT VOLTAGE REGULATOR

## S-814 series

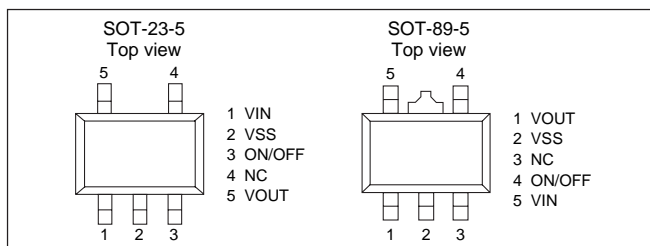
The S-814 series is a positive voltage regulator that features low dropout voltage, high output voltage accuracy and low current consumption, and has been developed using CMOS technology.

A built-in low on-resistance transistor enables a low dropout voltage and large output current, and the shutdown function can help extend battery life.

A greater variety of output capacitors can be used in the S-814 series compared with existing CMOS voltage regulators, including a small ceramic capacitor.

The small SOT-23-5 package is recommended for configuring portable devices and the SOT-89-5 for large output current applications.

### PIN CONFIGURATIONS



### FEATURES

- Low current consumption  
30  $\mu$ A typ., 40  $\mu$ A max. (During operation)  
100 nA typ., 500 nA max. (During power-off)
  - Output voltage: 2.0 V to 6.0 V (Selectable in 0.1 V steps)
  - Output voltage accuracy:  $\pm 2.0\%$
  - Input voltage: 10 V max.
  - Output current:  
110 mA capable (product with 3.0 V output, when  $V_{IN} = 4$  V)<sup>\*1</sup>  
180 mA capable (product with 5.0 V output, when  $V_{IN} = 6$  V)<sup>\*1</sup>
  - Low dropout voltage:  
170 mV typ. (product with 5.0 V output, when  $I_{OUT} = 60$  mA)
  - Built-in shutdown circuit
  - Built-in short-circuit protection circuit
  - Low ESR capacitor: A ceramic capacitor of 0.47  $\mu$ F or more can be used as the output capacitor
  - Small package: SOT-23-5, SOT-89-5
- \*1. Attention should be paid to the power dissipation of the package when the load is large.

### APPLICATIONS

- Constant voltage power supply for battery-powered devices
- Constant voltage power supply for communication electrical devices
- Constant voltage power supply for household electrical appliances

### SELECTION GUIDE

Output voltage	SOT-23-5 (3000/reel)	SOT-89-5 (1000/reel)	Dropout voltage (typ.) ( $I_{OUT}=60$ mA)	Output current (min.) ( $V_{OUT(S)+1V \leq V_{IN} \leq 10V$ )	Current consumption during operation (typ.) ( $V_{IN}=V_{OUT(S)+1V$ , no load)
2.0V $\pm$ 2.0%	S-814A20AMC-BCKT2G	S-814A20AUC-BCKT2G	0.51V	100mA	30 $\mu$ A
2.1V $\pm$ 2.0%	S-814A21AMC-BCLT2G	S-814A21AUC-BCLT2G	0.51V	100mA	30 $\mu$ A
2.2V $\pm$ 2.0%	S-814A22AMC-BCMT2G	S-814A22AUC-BCMT2G	0.51V	100mA	30 $\mu$ A
2.3V $\pm$ 2.0%	S-814A23AMC-BCNT2G	S-814A23AUC-BCNT2G	0.51V	100mA	30 $\mu$ A
2.4V $\pm$ 2.0%	S-814A24AMC-BCOT2G	S-814A24AUC-BCOT2G	0.51V	100mA	30 $\mu$ A
2.5V $\pm$ 2.0%	S-814A25AMC-BCPT2G	S-814A25AUC-BCPT2G	0.38V	100mA	30 $\mu$ A
2.6V $\pm$ 2.0%	S-814A26AMC-BCQT2G	S-814A26AUC-BCQT2G	0.38V	100mA	30 $\mu$ A
2.7V $\pm$ 2.0%	S-814A27AMC-BCRT2G	S-814A27AUC-BCRT2G	0.38V	100mA	30 $\mu$ A
2.8V $\pm$ 2.0%	S-814A28AMC-BCST2G	S-814A28AUC-BCST2G	0.38V	100mA	30 $\mu$ A
2.9V $\pm$ 2.0%	S-814A29AMC-BCTT2G	S-814A29AUC-BCTT2G	0.38V	100mA	30 $\mu$ A
3.0V $\pm$ 2.0%	S-814A30AMC-BCUT2G	S-814A30AUC-BCUT2G	0.30V	110mA	30 $\mu$ A
3.1V $\pm$ 2.0%	S-814A31AMC-BCVT2G	S-814A31AUC-BCVT2G	0.30V	110mA	30 $\mu$ A
3.2V $\pm$ 2.0%	S-814A32AMC-BCWT2G	S-814A32AUC-BCWT2G	0.30V	110mA	30 $\mu$ A
3.3V $\pm$ 2.0%	S-814A33AMC-BCXT2G	S-814A33AUC-BCXT2G	0.30V	110mA	30 $\mu$ A
3.4V $\pm$ 2.0%	S-814A34AMC-BCYT2G	S-814A34AUC-BCYT2G	0.30V	110mA	30 $\mu$ A
3.5V $\pm$ 2.0%	S-814A35AMC-BCZT2G	S-814A35AUC-BCZT2G	0.24V	110mA	30 $\mu$ A
3.6V $\pm$ 2.0%	S-814A36AMC-BDAT2G	S-814A36AUC-BDAT2G	0.24V	110mA	30 $\mu$ A
3.7V $\pm$ 2.0%	S-814A37AMC-BDBT2G	S-814A37AUC-BDBT2G	0.24V	110mA	30 $\mu$ A
3.8V $\pm$ 2.0%	S-814A38AMC-BDCT2G	S-814A38AUC-BDCT2G	0.24V	110mA	30 $\mu$ A
3.9V $\pm$ 2.0%	S-814A39AMC-BDDT2G	S-814A39AUC-BDDT2G	0.24V	110mA	30 $\mu$ A
4.0V $\pm$ 2.0%	S-814A40AMC-BDET2G	S-814A40AUC-BDET2G	0.20V	135mA	30 $\mu$ A
4.1V $\pm$ 2.0%	S-814A41AMC-BDFT2G	S-814A41AUC-BDFT2G	0.20V	135mA	30 $\mu$ A
4.2V $\pm$ 2.0%	S-814A42AMC-BDGT2G	S-814A42AUC-BDGT2G	0.20V	135mA	30 $\mu$ A
4.3V $\pm$ 2.0%	S-814A43AMC-BDHT2G	S-814A43AUC-BDHT2G	0.20V	135mA	30 $\mu$ A
4.4V $\pm$ 2.0%	S-814A44AMC-BDIT2G	S-814A44AUC-BDIT2G	0.20V	135mA	30 $\mu$ A
4.5V $\pm$ 2.0%	S-814A45AMC-BDJT2G	S-814A45AUC-BDJT2G	0.18V	135mA	30 $\mu$ A
4.6V $\pm$ 2.0%	S-814A46AMC-BDKT2G	S-814A46AUC-BDKT2G	0.18V	135mA	30 $\mu$ A
4.7V $\pm$ 2.0%	S-814A47AMC-BDLT2G	S-814A47AUC-BDLT2G	0.18V	135mA	30 $\mu$ A
4.8V $\pm$ 2.0%	S-814A48AMC-BDMT2G	S-814A48AUC-BDMT2G	0.18V	135mA	30 $\mu$ A
4.9V $\pm$ 2.0%	S-814A49AMC-BDNT2G	S-814A49AUC-BDNT2G	0.18V	135mA	30 $\mu$ A
5.0V $\pm$ 2.0%	S-814A50AMC-BDOT2G	S-814A50AUC-BDOT2G	0.17V	180mA	30 $\mu$ A
5.1V $\pm$ 2.0%	S-814A51AMC-BDPT2G	S-814A51AUC-BDPT2G	0.17V	180mA	30 $\mu$ A
5.2V $\pm$ 2.0%	S-814A52AMC-BDQT2G	S-814A52AUC-BDQT2G	0.17V	180mA	30 $\mu$ A
5.3V $\pm$ 2.0%	S-814A53AMC-BDRT2G	S-814A53AUC-BDRT2G	0.17V	180mA	30 $\mu$ A
5.4V $\pm$ 2.0%	S-814A54AMC-BDST2G	S-814A54AUC-BDST2G	0.17V	180mA	30 $\mu$ A
5.5V $\pm$ 2.0%	S-814A55AMC-BDTT2G	S-814A55AUC-BDTT2G	0.17V	180mA	30 $\mu$ A
5.6V $\pm$ 2.0%	S-814A56AMC-BDUT2G	S-814A56AUC-BDUT2G	0.17V	180mA	30 $\mu$ A
5.7V $\pm$ 2.0%	S-814A57AMC-BDVT2G	S-814A57AUC-BDVT2G	0.17V	180mA	30 $\mu$ A
5.8V $\pm$ 2.0%	S-814A58AMC-BDWT2G	S-814A58AUC-BDWT2G	0.17V	180mA	30 $\mu$ A
5.9V $\pm$ 2.0%	S-814A59AMC-BDXT2G	S-814A59AUC-BDXT2G	0.17V	180mA	30 $\mu$ A
6.0V $\pm$ 2.0%	S-814A60AMC-BDYT2G	S-814A60AUC-BDYT2G	0.17V	180mA	30 $\mu$ A

**Remark** Please contact our sales office if you desire a product with an inverted ON/OFF pin logic.

LOW DROPOUT CMOS VOLTAGE REGULATOR

S-818 series

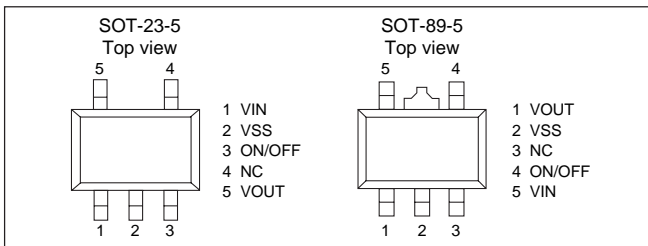
The S-818 series is a positive voltage regulator that features low dropout voltage, high output voltage accuracy, and low current consumption, and has been developed using CMOS technology.

A built-in low on-resistance transistor enables a low dropout voltage and large output current, and the shutdown function can help extend battery life.

A greater variety of output capacitors can be used in the S-818 series compared with existing CMOS voltage regulators, including a small ceramic capacitor.

The small SOT-23-5 package is recommended for configuring portable devices and the SOT-89-5 for large output current applications.

■ PIN CONFIGURATIONS



■ FEATURES

- Low current consumption  
 30  $\mu$ A typ., 40  $\mu$ A max. (during operation)  
 100 nA typ., 500 nA max. (during power-off)
  - Output voltage: 2.0 V to 6.0 V (selectable in 0.1 V steps)
  - Output voltage accuracy:  $\pm$ 2.0%
  - Input voltage: 10 V max.
  - Output current  
 200 mA capable (product with 3.0 V output, when  $V_{IN} = 4$  V)<sup>\*1</sup>  
 300 mA capable (product with 5.0 V output, when  $V_{IN} = 6$  V)<sup>\*1</sup>
  - Low dropout voltage  
 170 mV typ. (product with 5.0 V output, when  $I_{OUT} = 60$  mA)
  - Built-in shutdown circuit
  - Low ESR capacitor: A ceramic capacitor of 2  $\mu$ F or more can be used as the output capacitor
  - Small package: SOT-23-5, SOT-89-5
- \*1. Attention should be paid to the power dissipation of the package when the load is large.

■ APPLICATIONS

- Constant voltage power supply for battery-powered devices
- Constant voltage power supply for communication devices
- Constant voltage power supply for household electrical appliances

■ SELECTION GUIDE

Output voltage	SOT-23-5 (3000/reel)	SOT-89-5 (1000/reel)	Dropout voltage (typ.) ( $I_{OUT}=60$ mA)	Output current (min.) ( $V_{OUT(S)+1V \leq V_{IN} \leq 10V$ )	Current consumption during operation (typ.) ( $V_{IN}=V_{OUT(S)+1V$ , no load)
2.0V $\pm$ 2.0%	S-818A20AMC-BGAT2G	S-818A20AUC-BGAT2G	0.51V	100mA	30 $\mu$ A
2.1V $\pm$ 2.0%	S-818A21AMC-BGBT2G	S-818A21AUC-BGBT2G	0.51V	100mA	30 $\mu$ A
2.2V $\pm$ 2.0%	S-818A22AMC-BGCT2G	S-818A22AUC-BGCT2G	0.51V	100mA	30 $\mu$ A
2.3V $\pm$ 2.0%	S-818A23AMC-BGDT2G	S-818A23AUC-BGDT2G	0.51V	100mA	30 $\mu$ A
2.4V $\pm$ 2.0%	S-818A24AMC-BGET2G	S-818A24AUC-BGET2G	0.51V	100mA	30 $\mu$ A
2.5V $\pm$ 2.0%	S-818A25AMC-BGFT2G	S-818A25AUC-BGFT2G	0.38V	150mA	30 $\mu$ A
2.6V $\pm$ 2.0%	S-818A26AMC-BGGT2G	S-818A26AUC-BGGT2G	0.38V	150mA	30 $\mu$ A
2.7V $\pm$ 2.0%	S-818A27AMC-BGHT2G	S-818A27AUC-BGHT2G	0.38V	150mA	30 $\mu$ A
2.8V $\pm$ 2.0%	S-818A28AMC-BGIT2G	S-818A28AUC-BGIT2G	0.38V	150mA	30 $\mu$ A
2.9V $\pm$ 2.0%	S-818A29AMC-BGJT2G	S-818A29AUC-BGJT2G	0.38V	150mA	30 $\mu$ A
3.0V $\pm$ 2.0%	S-818A30AMC-BGKT2G	S-818A30AUC-BGKT2G	0.30V	200mA	30 $\mu$ A
3.1V $\pm$ 2.0%	S-818A31AMC-BGLT2G	S-818A31AUC-BGLT2G	0.30V	200mA	30 $\mu$ A
3.2V $\pm$ 2.0%	S-818A32AMC-BGMT2G	S-818A32AUC-BGMT2G	0.30V	200mA	30 $\mu$ A
3.3V $\pm$ 2.0%	S-818A33AMC-BGNT2G	S-818A33AUC-BGNT2G	0.30V	200mA	30 $\mu$ A
3.4V $\pm$ 2.0%	S-818A34AMC-BGOT2G	S-818A34AUC-BGOT2G	0.30V	200mA	30 $\mu$ A
3.5V $\pm$ 2.0%	S-818A35AMC-BGPT2G	S-818A35AUC-BGPT2G	0.24V	200mA	30 $\mu$ A
3.6V $\pm$ 2.0%	S-818A36AMC-BGQT2G	S-818A36AUC-BGQT2G	0.24V	200mA	30 $\mu$ A
3.7V $\pm$ 2.0%	S-818A37AMC-BGRT2G	S-818A37AUC-BGRT2G	0.24V	200mA	30 $\mu$ A
3.8V $\pm$ 2.0%	S-818A38AMC-BGST2G	S-818A38AUC-BGST2G	0.24V	200mA	30 $\mu$ A
3.9V $\pm$ 2.0%	S-818A39AMC-BGTT2G	S-818A39AUC-BGTT2G	0.24V	200mA	30 $\mu$ A
4.0V $\pm$ 2.0%	S-818A40AMC-BGUT2G	S-818A40AUC-BGUT2G	0.20V	250mA	30 $\mu$ A
4.1V $\pm$ 2.0%	S-818A41AMC-BGVT2G	S-818A41AUC-BGVT2G	0.20V	250mA	30 $\mu$ A
4.2V $\pm$ 2.0%	S-818A42AMC-BGWT2G	S-818A42AUC-BGWT2G	0.20V	250mA	30 $\mu$ A
4.3V $\pm$ 2.0%	S-818A43AMC-BGXT2G	S-818A43AUC-BGXT2G	0.20V	250mA	30 $\mu$ A
4.4V $\pm$ 2.0%	S-818A44AMC-BGYT2G	S-818A44AUC-BGYT2G	0.20V	250mA	30 $\mu$ A
4.5V $\pm$ 2.0%	S-818A45AMC-BGZT2G	S-818A45AUC-BGZT2G	0.18V	250mA	30 $\mu$ A
4.6V $\pm$ 2.0%	S-818A46AMC-BHAT2G	S-818A46AUC-BHAT2G	0.18V	250mA	30 $\mu$ A
4.7V $\pm$ 2.0%	S-818A47AMC-BHBT2G	S-818A47AUC-BHBT2G	0.18V	250mA	30 $\mu$ A
4.8V $\pm$ 2.0%	S-818A48AMC-BHCT2G	S-818A48AUC-BHCT2G	0.18V	250mA	30 $\mu$ A
4.9V $\pm$ 2.0%	S-818A49AMC-BHDT2G	S-818A49AUC-BHDT2G	0.18V	250mA	30 $\mu$ A
5.0V $\pm$ 2.0%	S-818A50AMC-BHET2G	S-818A50AUC-BHET2G	0.17V	300mA	30 $\mu$ A
5.1V $\pm$ 2.0%	S-818A51AMC-BHFT2G	S-818A51AUC-BHFT2G	0.17V	300mA	30 $\mu$ A
5.2V $\pm$ 2.0%	S-818A52AMC-BHGT2G	S-818A52AUC-BHGT2G	0.17V	300mA	30 $\mu$ A
5.3V $\pm$ 2.0%	S-818A53AMC-BHHT2G	S-818A53AUC-BHHT2G	0.17V	300mA	30 $\mu$ A
5.4V $\pm$ 2.0%	S-818A54AMC-BHIT2G	S-818A54AUC-BHIT2G	0.17V	300mA	30 $\mu$ A
5.5V $\pm$ 2.0%	S-818A55AMC-BHJT2G	S-818A55AUC-BHJT2G	0.17V	300mA	30 $\mu$ A
5.6V $\pm$ 2.0%	S-818A56AMC-BHKT2G	S-818A56AUC-BHKT2G	0.17V	300mA	30 $\mu$ A
5.7V $\pm$ 2.0%	S-818A57AMC-BHLT2G	S-818A57AUC-BHLT2G	0.17V	300mA	30 $\mu$ A
5.8V $\pm$ 2.0%	S-818A58AMC-BHMT2G	S-818A58AUC-BHMT2G	0.17V	300mA	30 $\mu$ A
5.9V $\pm$ 2.0%	S-818A59AMC-BHNT2G	S-818A59AUC-BHNT2G	0.17V	300mA	30 $\mu$ A
6.0V $\pm$ 2.0%	S-818A60AMC-BHOT2G	S-818A60AUC-BHOT2G	0.17V	300mA	30 $\mu$ A

Remark Please contact our sales office if you desire a product with an inverted ON/OFF pin logic.



## HIGH RIPPLE REJECTION LOW DROPOUT CMOS VOLTAGE REGULATOR WITH RESET FUNCTION

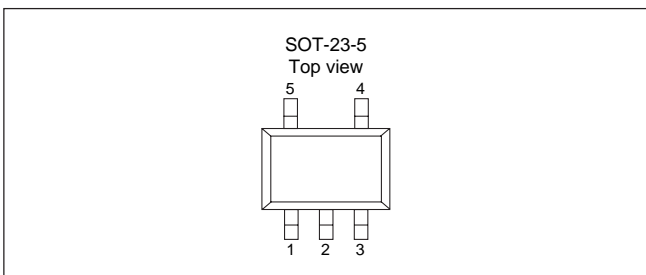
S-1701 series

The S-1701 series, developed based on CMOS technology, is a voltage regulator with a reset function and integrates a high-accuracy voltage detector with on-chip delay circuit and a positive voltage regulator with a low dropout voltage and high output voltage on one chip.

The S-1701 series is available in many types according to the selection of the voltage detector block of the voltage detector, including a SENSE pin input product. A built-in low on-resistance transistor provides a low dropout voltage and large output current.

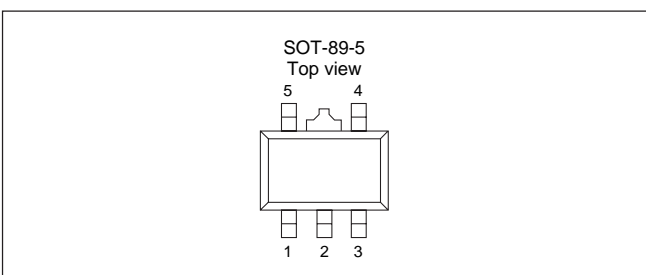
Small ceramic capacitors are available and an external capacitor for delay is needless. Small SOT-23-5 and SOT-89-5 packages realize high-density mounting.

### PIN CONFIGURATIONS



Pin No.	Symbol	Description
1	VIN	Input voltage pin
2	VSS	GND pin
3	ON/OFF	Shutdown pin (A, B, C, D, E, F, G, H, J, K, L, M types)
3	SENSE	Detector SENSE pin (N, P, Q, R, S, T types)
3	NC <sup>*1</sup>	No connection (U, V, W, X, Y, Z types)
4	VDOOUT	Detector output voltage pin
5	VOOUT	Regulator output voltage pin

\*1. The NC pin is electrically open.  
The NC pin can be connected to VIN and VSS.



Pin No.	Symbol	Description
1	VIN	Input voltage pin
2	VSS	GND pin
3	VOOUT	Regulator output voltage pin
4	VDOOUT	Detector output voltage pin
5	ON/OFF	Shutdown pin (A, B, C, D, E, F, G, H, J, K, L, M types)
5	SENSE	Detector SENSE pin (N, P, Q, R, S, T types)
5	NC <sup>*1</sup>	No connection (U, V, W, X, Y, Z types)

\*1. The NC pin is electrically open.  
The NC pin can be connected to VIN and VSS.

### FEATURES

#### Whole regulator

- Low current consumption  
85  $\mu$ A typ., 110  $\mu$ A max. (during operation)

#### Regulator block

- Output voltage: 1.5 to 5.0 V (selectable in 0.1 V steps)
- High output voltage accuracy:  $\pm 1.0\%$
- Operating voltage range: 2.0 to 6.5 V
- Output current  
400 mA capable (product with 3.0 V output, when  $V_{IN} = 5$  V)<sup>\*1</sup>
- Dropout voltage  
140 mV typ. (product with 3.0 V output, when  $I_{OUT} = 100$  mA)
- Ripple rejection rate: 70 dB typ. ( $f = 1$  kHz,  $V_{OUT} = 3$  V)
- Built-in power-off circuit: Selection of positive/negative logic is possible.
- Built-in overcurrent protection circuit
- Use of a low ESR capacitor is possible.
- Input/output capacitor: Use of a ceramic capacitor of 1.0  $\mu$ F or more is possible.

#### Detector block

- Detection voltage: 1.5 to 5.5 V (selectable in 0.1 V steps)
  - Detection voltage accuracy:  $\pm 1.0\%$
  - Operating voltage range: 0.8 to 6.5 V
  - Output mode: Nch open-drain active low output
  - No need of an external capacitor for delay
  - Three delay time settings: No delay (60  $\mu$ s), 50 ms, 100 ms
- \*1. Attention should be paid to the power dissipation of the package when the load large.

### APPLICATIONS

- Power supply and reset circuit for battery-powered devices
- Power supply for personal communication devices
- Power supply for home appliances

■ FUNCTION LIST

Product Type	Regulator Block		Detector Block	
	ON/OFF Pin	ON/OFF Logic	SENSE Pin	Release Delay
S-1701 Series A Type	Provided	Active high	VIN connection (pin not provided)	No delay (60μs)
S-1701 Series B Type	Provided	Active high	VIN connection (pin not provided)	50ms
S-1701 Series C Type	Provided	Active high	VIN connection (pin not provided)	100ms
S-1701 Series D Type	Provided	Active high	VOOUT connection (pin not provided)	No delay (60μs)
S-1701 Series E Type	Provided	Active high	VOOUT connection (pin not provided)	50ms
S-1701 Series F Type	Provided	Active high	VOOUT connection (pin not provided)	100ms
S-1701 Series G Type	Provided	Active low	VIN connection (pin not provided)	No delay (60μs)
S-1701 Series H Type	Provided	Active low	VIN connection (pin not provided)	50ms
S-1701 Series J Type	Provided	Active low	VIN connection (pin not provided)	100ms
S-1701 Series K Type	Provided	Active low	VOOUT connection (pin not provided)	No delay (60μs)
S-1701 Series L Type	Provided	Active low	VOOUT connection (pin not provided)	50ms
S-1701 Series M Type	Provided	Active low	VOOUT connection (pin not provided)	100ms
S-1701 Series N Type	VIN connection (pin not provided)	None	Provided	No delay (60μs)
S-1701 Series P Type	VIN connection (pin not provided)	None	Provided	50ms
S-1701 Series Q Type	VIN connection (pin not provided)	None	Provided	100ms
S-1701 Series R Type	VDOOUT connection (pin not provided)	None	Provided	No delay (60μs)
S-1701 Series S Type	VDOOUT connection (pin not provided)	None	Provided	50ms
S-1701 Series T Type	VDOOUT connection (pin not provided)	None	Provided	100ms
S-1701 Series U Type	VIN connection (pin not provided)	None	VOOUT connection (pin not provided)	No delay (60μs)
S-1701 Series V Type	VIN connection (pin not provided)	None	VOOUT connection (pin not provided)	50ms
S-1701 Series W Type	VIN connection (pin not provided)	None	VOOUT connection (pin not provided)	100ms
S-1701 Series X Type	VIN connection (pin not provided)	None	VIN connection (pin not provided)	No delay (60μs)
S-1701 Series Y Type	VIN connection (pin not provided)	None	VIN connection (pin not provided)	50ms
S-1701 Series Z Type	VIN connection (pin not provided)	None	VIN connection (pin not provided)	100ms

**Remark** For more details, refer to Data Sheet.

## SUPER-SMALL PACKAGE 2-CIRCUIT HIGH RIPPLE REJECTION LOW DROPOUT CMOS VOLTAGE REGULATOR

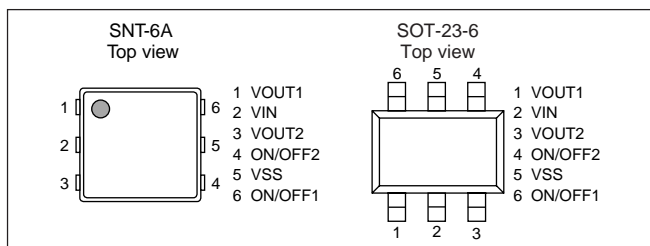
▶ NEW S-1711 series

The S-1711 series is a 2-channel positive voltage regulator with a low dropout voltage, high output voltage accuracy, and low current consumption (150 mA output current) developed based on CMOS technology.

A 1.0  $\mu\text{F}$  small ceramic capacitor can be used, and a 2-circuit voltage regulator with  $\pm 1.0\%$  high-accuracy output voltage is incorporated in an SOT-23-6 or super-small SNT-6A package. A built-in output current protector prevents the load current from exceeding the current capacitance of the output transistor.

Compared with the conventional 150 mA output current 2-channel CMOS voltage regulators, high-density mounting is realized by using the super-small SNT-6A package and a small ceramic capacitor. Also, the low current consumption makes the S-1711 series ideal for mobile devices.

### PIN CONFIGURATIONS



### FUNCTION LIST

Product Type	ON/OFF Logic	Discharge Shunt Function	Pull-up/pull-down Resistance
S-1711 Series A Type	Active high	Available	Built-in pull-down resistance
S-1711 Series B Type	Active high	Available	None
S-1711 Series C Type	Active high	None	Built-in pull-down resistance
S-1711 Series D Type	Active high	None	None
S-1711 Series E Type	Active low	Available	Built-in pull-up resistance
S-1711 Series F Type	Active low	Available	None
S-1711 Series G Type	Active low	None	Built-in pull-up resistance
S-1711 Series H Type	Active low	None	None

**Remark** For more details, refer to Data Sheet.

### FEATURES

- Low current consumption (Per circuit)
  - 70  $\mu\text{A}$  typ., 90  $\mu\text{A}$  max. (during operation)
  - 0.1  $\mu\text{A}$  typ., 1  $\mu\text{A}$  max. (during power-off)
- Output voltage: 1.5 to 5.5 V (selectable in 0.1 V steps)
- High output voltage accuracy:  $\pm 1.0\%$
- Output current
  - 150 mA capable (product with 3.0 V output, when  $V_{\text{IN}} = 4 \text{ V}$ )\*1
- Dropout voltage
  - 200 mV typ. (product with 3.0 V output, when  $I_{\text{OUT}} = 150 \text{ mA}$ )
- Ripple rejection rate: 70 dB typ. ( $f = 1 \text{ kHz}$ ,  $V_{\text{OUT}} = 3 \text{ V}$ )
- Built-in power-off circuit: Selection of positive/negative logic is possible.
- Built-in overcurrent protection circuit
- Use of a low ESR capacitor is possible.
- Input/output capacitor: Use of a ceramic capacitor of 1.0  $\mu\text{F}$  or more is possible.

\*1. Attention should be paid to the power dissipation of the package when the load is large.

### APPLICATIONS

- Power supply for battery-powered devices
- Power supply for personal communication devices
- Power supply for home electric/electronic appliances
- Power supply for cellular phones

## STEP-UP, SUPER-SMALL PACKAGE, 600 kHz, PWM CONTROL OR PWM/PFM SWITCHABLE SWITCHING REGULATOR CONTROLLER

### S-8355/56/57/58 series

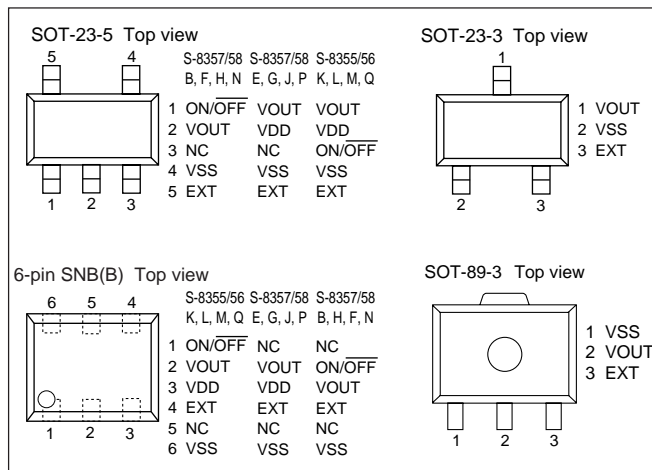
The S-8355/56/57/58 series is a CMOS step-up switching regulator which consists of a reference voltage source, an oscillation circuit, an error amplifier, a phase compensation circuit, a PWM controller (S-8355/57) and a PWM/PFM switching controller (S-8356/58).

A bipolar (NPN) transistor or an enhancement (N-ch) MOS FET transistor can be used as external transistor.

The S-8355/57 series realizes low ripple, high efficiency, and excellent transient characteristics due to its PWM controller, which can vary the duty ratio linearly from 0% to 83% (from 0 to 78% for 250 kHz, 300 kHz, and 600 kHz models), optimally-designed error amplifier, and phase compensation circuits.

The S-8356/58 series features a PWM/PFM switching controller that can switch the operation to a PFM controller under light loads to prevent a decrease in efficiency.

### ■ PIN CONFIGURATIONS



### ■ FEATURES

- Low voltage operation: Start-up is guaranteed from 0.9 V (I<sub>OUT</sub> = 1 mA)
- Low current consumption: 25.9  $\mu$ A typ. (100 kHz product, 3.3 V, during operation) 0.5  $\mu$ A max. (during power-off)
- Duty ratio: Built-in PWM/PFM switching control circuit (S-8356/58) 15 to 83% (100 kHz models), 15 to 78% (250 kHz, 300 kHz, and 600 kHz models)
- External parts: Coil, diode, capacitor, and transistor
- Output voltage: 1.5 to 6.5 V (for V<sub>DD</sub>/V<sub>OUT</sub> separate types) or 2.0 to 6.5 V (for other than V<sub>DD</sub>/V<sub>OUT</sub> separate types) (Selectable in 0.1 V steps).
- Output voltage accuracy:  $\pm$ 2.4%
- Oscillation frequency: 100, 250, 300, 600 kHz
- Soft start function: 6 ms typ. (100 kHz models)
- Shutdown function
- Package: 6-pin SNB(B), SOT-23-5, SOT-23-3, and SOT-89-3

### ■ APPLICATIONS

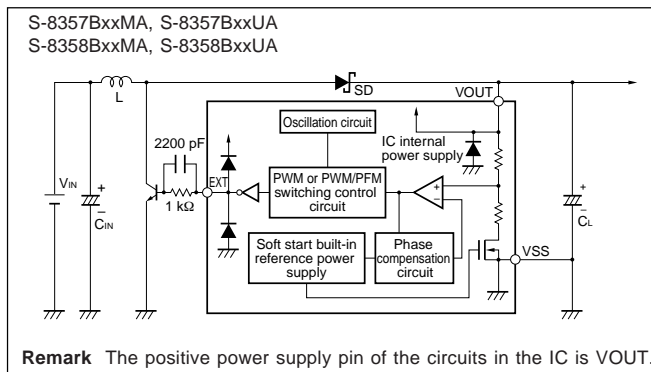
- Power supplies for portable devices, such as digital cameras, electronic organizers, and PDAs,
- Power supplies for audio equipment, such as portable CD/MD players
- Constant voltage power supply of cameras, video equipment, and communication devices
- Power supply for microcomputers

### ■ FUNCTION LIST

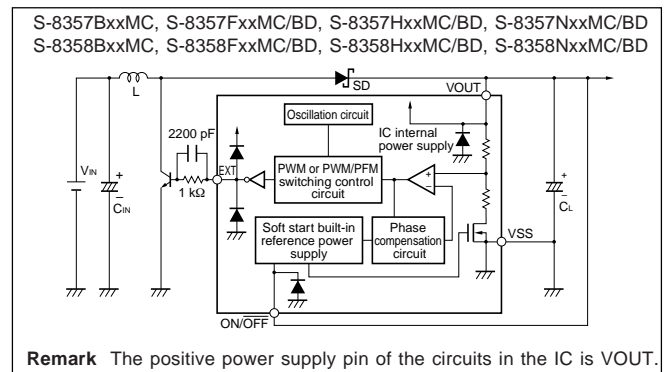
Product name	Control system	Switching frequency (kHz)	Shutdown function	V <sub>DD</sub> /V <sub>OUT</sub> separation type	Package	Applications
S-8355KxxMC	PWM	100	Yes	Yes	SOT-23-5	Application requiring a variable output voltage and a shutdown function
S-8355LxxMC/BD	PWM	250	Yes	Yes	SOT-23-5/6-pin SNB(B)	Application requiring a variable output voltage, a shutdown function and a thin coil
S-8355MxxMC/BD	PWM	300	Yes	Yes	SOT-23-5/6-pin SNB(B)	Application requiring a variable output voltage, a shutdown function and a thin coil
S-8355QxxMC/BD	PWM	600	Yes	Yes	SOT-23-5/6-Pin SNB(B)	Application requiring a variable output voltage, a shutdown function and a thin coil
S-8357BxxMC	PWM	100	Yes	-	SOT-23-5	Application requiring a shutdown function
S-8357BxxMA	PWM	100	-	-	SOT-23-3	Application not requiring a shutdown function
S-8357BxxUA	PWM	100	-	-	SOT-89-3	Application not requiring a shutdown function
S-8357ExxMC	PWM	100	-	Yes	SOT-23-5	Application in which the output voltage is adjusted by external resistor
S-8357FxxMC/BD	PWM	300	Yes	-	SOT-23-5/6-pin SNB(B)	Application requiring a shutdown function and a thin coil
S-8357GxxMC/BD	PWM	300	-	Yes	SOT-23-5/6-pin SNB(B)	Application requiring a variable output voltage and a thin coil
S-8357HxxMC/BD	PWM	250	Yes	-	SOT-23-5/6-pin SNB(B)	Application requiring a shutdown function and a thin coil
S-8357JxxMC/BD	PWM	250	-	Yes	SOT-23-5/6-pin SNB(B)	Application in which the output voltage is adjusted by external resistor and requiring a thin coil
S-8357NxxMC/BD	PWM	600	Yes	-	SOT-23-5/6-pin SNB(B)	Application requiring a shutdown function and a thin coil
S-8357PxxMC/BD	PWM	600	-	Yes	SOT-23-5/6-pin SNB(B)	Application in which the output voltage is adjusted by external resistor and requiring a thin coil
S-8356KxxMC	PWM/PFM switched	100	Yes	Yes	SOT-23-5	Application requiring a variable output voltage and a shutdown function
S-8356LxxMC/BD	PWM/PFM switched	250	Yes	Yes	SOT-23-5/6-pin SNB(B)	Application requiring an output voltage variable, a shutdown function and a thin coil
S-8356MxxMC/BD	PWM/PFM switched	300	Yes	Yes	SOT-23-5/6-pin SNB(B)	Application requiring an output voltage variable, a shutdown function and a thin coil
S-8356QxxMC/BD	PWM/PFM switched	600	Yes	Yes	SOT-23-5/6-pin SNB(B)	Application requiring an output voltage variable, a shutdown function and a thin coil
S-8358BxxMC	PWM/PFM switched	100	Yes	-	SOT-23-5	Application requiring a shutdown function
S-8358BxxMA	PWM/PFM switched	100	-	-	SOT-23-3	Application not requiring a shutdown function
S-8358BxxUA	PWM/PFM switched	100	-	-	SOT-89-3	Application not requiring a shutdown function
S-8358ExxMC	PWM/PFM switched	100	-	Yes	SOT-23-5	Application in which the output voltage is adjusted by external resistor
S-8358FxxMC/BD	PWM/PFM switched	300	Yes	-	SOT-23-5/6-pin SNB(B)	Application requiring a shutdown function and a thin coil
S-8358GxxMC/BD	PWM/PFM switched	300	-	Yes	SOT-23-5/6-pin SNB(B)	Application requiring a variable output voltage and a thin coil
S-8358HxxMC/BD	PWM/PFM switched	250	Yes	-	SOT-23-5/6-pin SNB(B)	Application requiring a shutdown function and a thin coil
S-8358JxxMC/BD	PWM/PFM switched	250	-	Yes	SOT-23-5/6-pin SNB(B)	Application in which the output voltage is adjusted by external resistor and requiring a thin coil
S-8358NxxMC/BD	PWM/PFM switched	600	Yes	-	SOT-23-5/6-pin SNB(B)	Application requiring a shutdown function and a thin coil
S-8358PxxMC/BD	PWM/PFM switched	600	-	Yes	SOT-23-5/6-pin SNB(B)	Application in which the output voltage is adjusted by external resistor and requiring a thin coil

## ■ BLOCK DIAGRAM AND CIRCUIT CONNECTION EXAMPLE

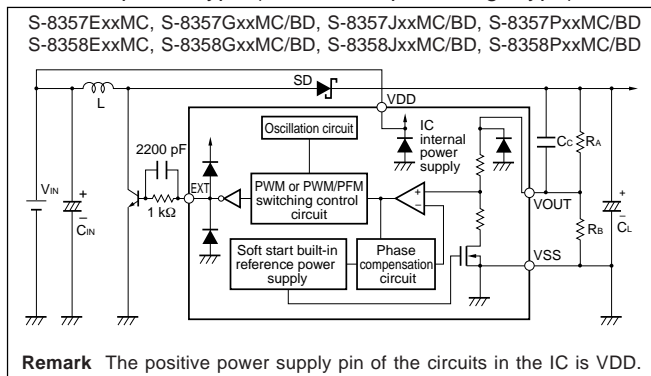
### 1. Without shutdown function



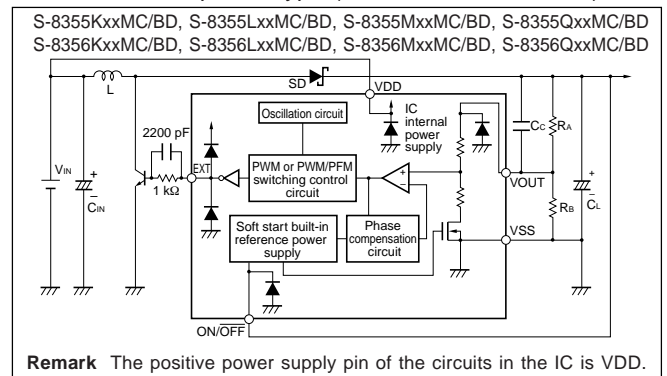
### 2. With shutdown function



### 3. VDD separate type (variable output voltage type)



### 4. VDD/VOUT separate type (with shutdown function)



## ■ SELECTION GUIDE

### • S-8355 series

Item Output voltage	S-8355KxxMC series	S-8355LxxMC series	S-8355MxxMC series	S-8355MxxBD series	S-8355QxxBD series	S-8355QxxMC series
1.5V	-	S-8355L15MC-NCAT2G	-	-	S-8355Q15BD-OWA-TF	S-8355Q15MC-OWAT2G
1.8V	S-8355K18MC-NADT2G	-	S-8355M18MC-MCDT2G	S-8355M18BD-MCD-TF	-	-
2.0V	S-8355K20MC-NAFT2G	S-8355L20MC-NCFT2G	S-8355M20MC-MCFT2G	-	-	-
2.4V	S-8355K24MC-NAJT2G	-	-	-	-	S-8355Q24MC-OWJT2G
2.8V	-	-	-	-	-	S-8355Q28BD-OWN-TF
3.0V	-	-	-	-	-	-
3.1V	S-8355K31MC-NAQT2G	-	S-8355M31MC-MCQT2G	-	S-8355Q31BD-OWQ-TF	S-8355Q31MC-OWQT2G
3.2V	-	-	S-8355M32MC-MCRT2G	-	-	-
3.3V	S-8355K33MC-NAST2G	-	-	-	-	-
3.4V	-	-	S-8355M34MC-MCTT2G	S-8355M34BD-MCT-TF	S-8355Q34BD-OWT-TF	-
5.0V	S-8355K50MC-NBJT2G	-	S-8355M50MC-MDJT2G	-	S-8355Q50BD-OXJ-TF	S-8355Q50MC-OXJT2G
5.5V	-	-	S-8355M55MC-MDOT2G	-	-	-

### • S-8356 series

Item Output voltage	S-8356KxxMC series	S-8356MxxMC series	S-8356MxxBD series	S-8356QxxMC series	S-8356QxxBD series
1.5V	-	S-8356M15MC-MEAT2G	-	-	-
1.8V	S-8356K18MC-NEDT2G	S-8356M18MC-MEDT2G	S-8356M18BD-MED-TF	S-8356Q18MC-OYDT2G	-
3.0V	-	S-8356M30MC-MEPT2G	-	S-8356Q30MC-OYPT2G	-
3.1V	-	S-8356M31MC-MEQT2G	-	S-8356Q31MC-OYQT2G	-
3.3V	S-8356K33MC-NEST2G	S-8356M33MC-MEST2G	-	S-8356Q33MC-OYST2G	S-8356Q33BD-OYS-TF
3.7V	-	-	-	-	S-8356Q37BD-OYW-TF
5.0V	S-8356K50MC-NFJT2G	S-8356M50MC-MFJT2G	S-8356M50BD-MFJ-TF	S-8356Q50MC-OVJT2G	S-8356Q50BD-OVJ-TF

### • S-8357 series (1/2)

Item Output voltage	S-8357BxxMC series	S-8357BxxMA series	S-8357BxxUA series	S-8357ExxMC series	S-8357FxxMC series	S-8357GxxMC series
1.5V	-	-	-	S-8357E15MC-NKAT2G	-	-
2.0V	-	-	-	S-8357E20MC-NKFT2G	-	-
2.5V	S-8357B25MC-NIKT2G	-	-	-	-	-
2.6V	S-8357B26MC-NILT2G	-	-	-	-	-
2.7V	S-8357B27MC-NIMT2G	-	-	-	-	-
2.8V	S-8357B28MC-NINT2G	-	-	-	-	-
3.0V	S-8357B30MC-NIPT2G	S-8357B30MA-NIPT2G	-	S-8357E30MC-NKPT2G	-	-
3.1V	-	-	-	-	-	-
3.2V	-	-	-	-	S-8357F32MC-MGR2G	-
3.3V	S-8357B33MC-NIST2G	S-8357B33MA-NIST2G	S-8357B33UA-NIST2G	-	S-8357F33MC-MGST2G	-
3.5V	-	-	-	-	-	-
3.6V	S-8357B36MC-NIVT2G	-	-	-	-	-
4.8V	S-8357B48MC-NJHT2G	-	S-8357B48UA-NJHT2G	-	-	-
5.0V	S-8357B50MC-NJTT2G	S-8357B50MA-NJTT2G	S-8357B50UA-NJTT2G	S-8357E50MC-NLJT2G	S-8357F50MC-MHJT2G	S-8357G50MC-MJTT2G
5.2V	S-8357B52MC-NJLT2G	-	-	-	S-8357F52MC-MHLT2G	-
5.4V	S-8357B54MC-NJNT2G	-	-	-	-	-
6.0V	S-8357B60MC-NJTT2G	-	-	-	-	-

**Remark** Please contact our sales office if you desire a product with an output voltage other than those shown above.



■ SELECTION GUIDE

• S-8357 series (2/2)

Item Output voltage	S-8357HxxMC series	S-8357JxxMC series	S-8357JxxBD series	S-8357NxxMC series
1.5V	-	-	-	-
2.0V	-	S-8357J20MC-NOFT2G	-	-
2.5V	-	S-8357J25MC-NOKT2G	-	-
2.6V	-	-	-	-
2.7V	-	-	-	-
2.8V	-	-	-	-
3.0V	S-8357H30MC-NMPT2G	-	-	S-8357N30MC-O2PT2G
3.1V	S-8357H31MC-NMQT2G	-	-	-
3.2V	-	-	-	-
3.3V	-	-	-	S-8357N33MC-O2ST2G
3.5V	S-8357H35MC-NMUT2G	-	-	-
3.6V	S-8357H36MC-NMVT2G	-	-	-
4.8V	-	-	-	-
5.0V	S-8357H50MC-NNJT2G	S-8357J50MC-NPJT2G	S-8357J50BD-NPJ-TF	S-8357N50MC-O3JT2G
5.2V	-	-	-	-
5.3V	-	-	-	S-8357N53MC-O3MT2G
5.4V	-	-	-	-
6.0V	-	-	-	-

• S-8358 series (1/2)

Item Output voltage	S-8358BxxMC series	S-8358BxxMA series	S-8358BxxUA series	S-8358ExxMC series	S-8358FxxMC series	S-8358GxxMC series
2.0V	-	-	-	S-8358E20MC-NSFT2G	-	-
2.3V	S-8358B23MC-NQIT2G	-	-	-	-	-
2.5V	S-8358B25MC-NQKT2G	-	-	-	-	-
2.6V	S-8358B26MC-NQLT2G	-	-	-	S-8358F26MC-MKLT2G	-
2.7V	S-8358B27MC-NQMT2G	-	-	-	S-8358F27MC-MKMT2G	-
3.0V	S-8358B30MC-NQPT2G	S-8358B30MA-NQPT2G	-	-	S-8358F30MC-MKPT2G	-
3.1V	S-8358B31MC-NQQT2G	-	-	-	-	-
3.2V	S-8358B32MC-NQRT2G	-	-	-	-	-
3.3V	S-8358B33MC-NQST2G	-	S-8358B33UA-NQST2G	-	S-8358F33MC-MKST2G	-
3.5V	S-8358B35MC-NQUT2G	-	-	-	-	-
3.6V	S-8358B36MC-NQVT2G	-	-	-	-	-
3.8V	S-8358B38MC-NQXT2G	-	-	-	-	-
4.0V	S-8358B40MC-NQZT2G	-	-	-	-	-
5.0V	S-8358B50MC-NRJT2G	S-8358B50MA-NRJT2G	S-8358B50UA-NRJT2G	S-8358E50MC-NTJT2G	S-8358F50MC-MLJT2G	S-8358G50MC-MNJT2G
5.3V	-	-	-	-	S-8358F53MC-MLMT2G	-
6.0V	S-8358B60MC-NRRT2G	-	-	-	-	-

• S-8358 series (2/2)

Item Output voltage	S-8358HxxMC series	S-8358JxxMC series	S-8358NxxMC series
2.0V	-	-	-
2.3V	S-8358H23MC-NUIT2G	-	-
2.5V	-	-	-
2.6V	-	-	-
2.7V	-	-	-
3.0V	S-8358H30MC-NUPT2G	-	S-8358N30MC-O6PT2G
3.1V	-	-	-
3.2V	-	-	-
3.3V	S-8358H33MC-NUST2G	S-8358J33MC-NWST2G	S-8358N33MC-O6ST2G
3.5V	-	-	-
3.6V	-	-	-
3.8V	-	-	-
4.0V	S-8358H40MC-NUZT2G	-	-
5.0V	S-8358H50MC-NVJT2G	S-8358J50MC-NXJT2G	S-8358N50MC-O7JT2G
5.3V	-	-	S-8358N53MC-O7MT2G
6.0V	-	-	-

**Remark** Please contact our sales office if you desire a product with an output voltage other than those shown above.

## STEP-UP, PWM CONTROL OR PWM/PFM SWITCHABLE BUILT-IN TRANSISTOR SWITCHING REGULATOR

### S-8353/8354 series

The S-8353/8354 series is a CMOS step-up switching regulator which consists of a reference voltage source, an oscillation circuit, a power MOS FET, an error amplifier, a phase compensation circuit, a PWM controller (S-8353 series) and a PWM/PFM switching controller (S-8354 series).

The step-up switching regulator can be configured simply by attaching a coil, capacitor, and diode externally. In addition to the above features, the small package and low power consumption of this series make it ideal for portable device applications requiring high efficiency. The S-8353 series realizes low ripple, high efficiency, and excellent transient characteristics due to its PWM controller, which can vary the duty ratio linearly from 0% to 83% (from 0% to 78% for 250 kHz models), optimally-designed error amplifier, and phase compensation circuits.

The S-8354 series features a PWM/PFM switching controller that can switch the operation to a PFM controller under a light load to prevent a decrease in efficiency.

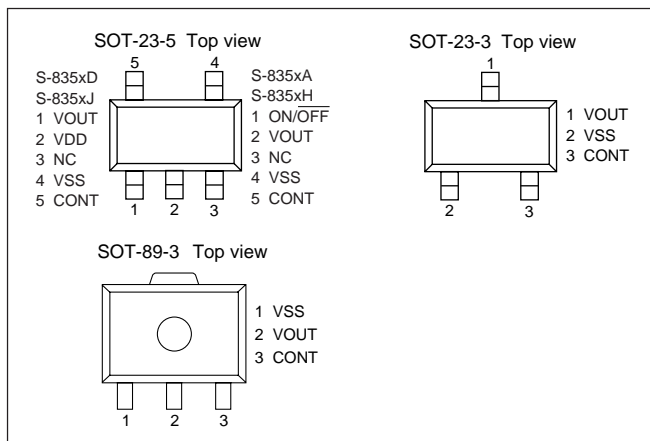
### FEATURES

- Low voltage operation:  
Start-up is guaranteed from 0.9 V ( $I_{OUT} = 1$  mA)
- Low current consumption:  
18.7  $\mu$ A typ. (50 kHz product, 3.3 V, during operation)  
0.5  $\mu$ A max. (during power-off)
- Duty ratio:  
Built-in PWM/PFM switching control circuit (S-8354 series)  
15 to 83% (30 kHz and 50 kHz models),  
15 to 78% (250 kHz models)
- External parts: Coil, capacitor, and diode
- Output voltage:  
1.5 to 6.5 V (for  $V_{DD}/V_{OUT}$  separate types) or  
2.0 to 6.5 V (for other than  $V_{DD}/V_{OUT}$  separate types)  
(Selectable in 0.1 V steps)
- Output voltage accuracy:  $\pm 2.4\%$
- Oscillation frequency: 30, 50, and 250 kHz
- Soft start function: 6 ms typ. (50 kHz models)
- Package: SOT-23-5, SOT-23-3, and SOT-89-3

### APPLICATIONS

- Power supplies for portable equipment such as digital cameras, electronic organizers, and PDAs
- Power supplies for audio equipment such as portable CD/MD players
- Constant voltage power supplies for cameras, video equipment, and communications equipment
- Power supplies for microcomputers

### PIN CONFIGURATIONS

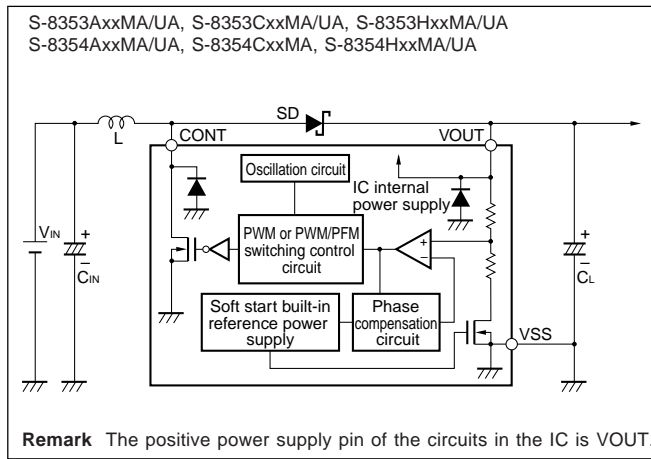


### FUNCTION LIST

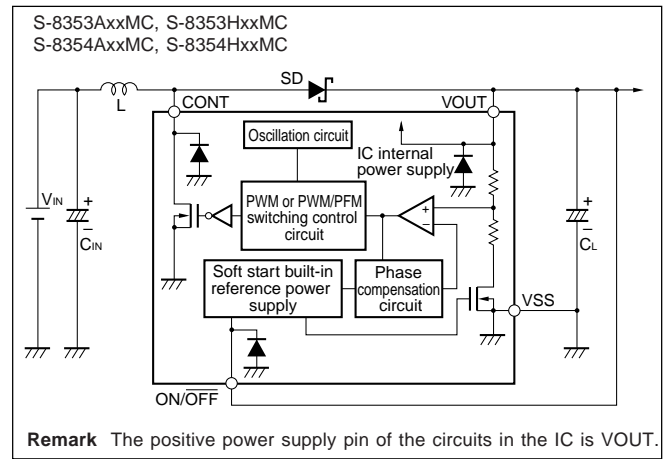
Product name	Control system	Switching frequency (kHz)	Shutdown function	$V_{DD}/V_{OUT}$ separation type	Package	Applications
S-8353AxxMC	PWM	50	Yes	-	SOT-23-5	Application requiring a shutdown function
S-8353AxxMA/UA	PWM	50	-	-	SOT-23-3/SOT-89-3	Application not requiring a shutdown function
S-8353CxxMA/UA	PWM	30	-	-	SOT-23-3/SOT-89-3	For pagers
S-8353DxxMC	PWM	50	-	Yes	SOT-23-5	Application in which the output voltage is adjusted by external resistor
S-8353HxxMC	PWM	250	Yes	-	SOT-23-5	Application requiring a shutdown function and a thin coil
S-8353HxxMA/UA	PWM	250	-	-	SOT-23-3/SOT-89-3	Application not requiring a shutdown function but requiring a thin coil.
S-8353JxxMC	PWM	250	-	Yes	SOT-23-5	Application in which the output voltage is adjusted by external resistor and requiring a thin coil
S-8354AxxMC	PWM/PFM switched	50	Yes	-	SOT-23-5	Application requiring a shutdown function
S-8354AxxMA/UA	PWM/PFM switched	50	-	-	SOT-23-3/SOT-89-3	Application not requiring a shutdown function
S-8354CxxMA	PWM/PFM switched	30	-	-	SOT-23-3	For pagers
S-8354DxxMC	PWM/PFM switched	50	-	Yes	SOT-23-5	Application in which the output voltage is adjusted by external resistor
S-8354HxxMC	PWM/PFM switched	250	Yes	-	SOT-23-5	Application requiring a shutdown function and a thin coil
S-8354HxxMA/UA	PWM/PFM switched	250	-	-	SOT-23-3/SOT-89-3	Application not requiring a shutdown function but requiring a thin coil.
S-8354JxxMC	PWM/PFM switched	250	-	Yes	SOT-23-5	Application in which the output voltage is adjusted by external resistor and requiring a thin coil

**■ BLOCK DIAGRAM AND CIRCUIT CONNECTION EXAMPLE**

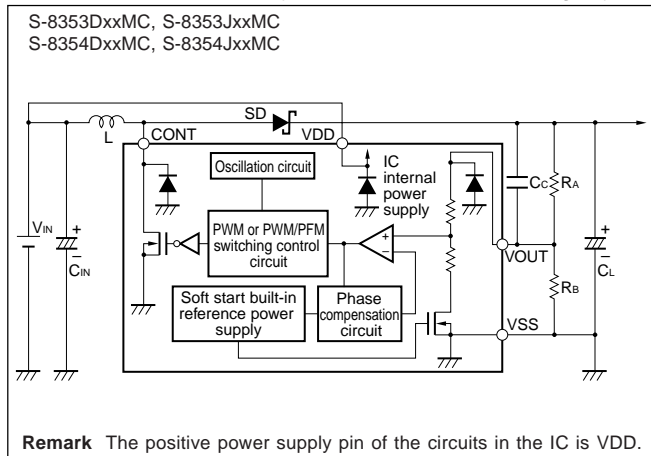
1. Without shutdown function



2. With shutdown function



3. VDD/VOUT separate type (variable output voltage type)



**■ SELECTION GUIDE**

• S-8353 series (1/2)

Item	S-8353AxxMC series	S-8353AxxMA series	S-8353AxxUA series
Output voltage			
2.0V	S-8353A20MC-IQFT2G	-	-
2.5V	S-8353A25MC-IQKT2G	-	-
2.7V	S-8353A27MC-IQMT2G	-	-
2.8V	S-8353A28MC-IQNT2G	-	-
3.0V	S-8353A30MC-IQPT2G	S-8353A30MA-IQPT2G	S-8353A30UA-IQPT2G
3.1V	-	-	-
3.2V	-	-	-
3.3V	S-8353A33MC-IQST2G	S-8353A33MA-IQST2G	S-8353A33UA-IQST2G
3.5V	-	-	-
3.6V	-	-	S-8353A36UA-IQVT2G
3.8V	S-8353A38MC-IQXT2G	-	S-8353A38UA-IQXT2G
4.0V	-	-	S-8353A40UA-IQZT2G
4.5V	S-8353A45MC-IRET2G	-	-
5.0V	S-8353A50MC-IRJT2G	S-8353A50MA-IRJT2G	S-8353A50UA-IRJT2G
5.5V	S-8353A55MC-IROT2G	-	S-8353A55UA-IROT2G

• S-8353 series (2/2)

Item	S-8353CxxMA series	S-8353CxxUA series	S-8353DxxMC series	S-8353HxxMC series	S-8353HxxMA series	S-8353HxxUA series	S-8353JxxMC series
Output voltage							
2.0V	-	-	S-8353D20MC-IUFT2G	S-8353H20MC-IWFT2G	-	-	S-8353J20MC-IYFT2G
2.5V	-	-	-	-	-	-	S-8353J25MC-IYKT2G
2.7V	-	-	-	-	-	-	-
2.8V	-	-	-	-	-	-	-
3.0V	S-8353C30MA-ISPT2G	S-8353C30UA-ISPT2G	S-8353D30MC-IUPT2G	S-8353H30MC-IWPT2G	S-8353H30MA-IWPT2G	-	S-8353J30MC-IYPT2G
3.1V	-	-	-	S-8353H31MC-IWQT2G	-	-	-
3.2V	-	-	-	S-8353H32MC-IWRT2G	-	-	-
3.3V	-	-	-	S-8353H33MC-IWST2G	S-8353H33MA-IWST2G	S-8353H33UA-IWST2G	-
3.5V	-	-	-	S-8353H35MC-IWUT2G	-	-	-
3.6V	-	-	-	-	-	-	-
3.7V	-	-	S-8353H37MC-IWWT2G	-	-	-	-
3.8V	-	-	-	S-8353H38MC-IWXT2G	-	-	-
4.0V	-	-	-	S-8353H40MC-IWZT2G	-	-	-
4.5V	-	-	-	S-8353H45MC-IXET2G	-	-	-
5.0V	-	-	S-8353D50MC-IVJT2G	S-8353H50MC-IXJT2G	-	S-8353H50UA-IXJT2G	S-8353J50MC-IZJT2G
5.5V	-	-	-	-	-	-	-

• S-8354 series

Item	S-8354AxxMC series	S-8354AxxMA series	S-8354AxxUA series	S-8354DxxMC series	S-8354HxxMC series	S-8354JxxMC series
Output voltage						
1.5V	-	-	-	-	-	S-8354J15MC-JYAT2G
2.0V	-	-	-	S-8354D20MC-JUFT2G	-	S-8354J20MC-JYFT2G
2.5V	-	-	-	-	S-8354H25MC-JWKT2G	-
2.7V	S-8354A27MC-JQMT2G	S-8354A27MA-JQMT2G	-	-	-	-
3.0V	S-8354A30MC-JQPT2G	S-8354A30MA-JQPT2G	S-8354A30UA-JQPT2G	-	S-8354H30MC-JWPT2G	S-8354J30MC-JYPT2G
3.1V	-	-	-	-	S-8354H31MC-JWQT2G	-
3.3V	S-8354A33MC-JQST2G	S-8354A33MA-JQST2G	S-8354A33UA-JQST2G	-	S-8354H33MC-JWST2G	-
3.5V	-	-	S-8354A35UA-JQVT2G	-	-	-
4.0V	S-8354A40MC-JQZT2G	-	S-8354A40UA-JQZT2G	-	-	-
5.0V	S-8354A50MC-JRJT2G	S-8354A50MA-JRJT2G	S-8354A50UA-JRJT2G	-	S-8354H50MC-JXJT2G	S-8354J50MC-JZJT2G

**Remark** Please contact our sales office if you desire a product with an output voltage other than those shown above.

## STEP-UP, 600 kHz, PWM CONTROL OR PWM/PFM SWITCHABLE BUILT-IN TRANSISTOR SWITCHING REGULATOR (MULTICHIP PACKAGE)

## ▶ NEW S-83M355/83M356 series

The S-83M355/83M356 series is a CMOS step-up switching regulator with power MOS FET (multichip package) which mainly consists of a reference voltage source, an oscillation circuit, an error amplifier, a phase compensation circuit, a PWM control circuit (S-83M355 series) and a PWM/PFM switching control circuit (S-83M356 series). With a built-in low on-state resistance power MOS FET, this product can adapt to applications requiring high efficiency and a high output current with few external parts.

The S-83M355 series employs a PWM control circuit whose duty ratio can be varied linearly, is ideal for applications requiring a low ripple voltage.

The S-83M356 series features a PWM/PFM switching control circuit that can prevent a decline in the efficiency during a light load.

S-83M355/83M356 series is ideal for applications requiring high efficiency and a high output current due to its built-in 20 V withstanding voltage power MOS FET.

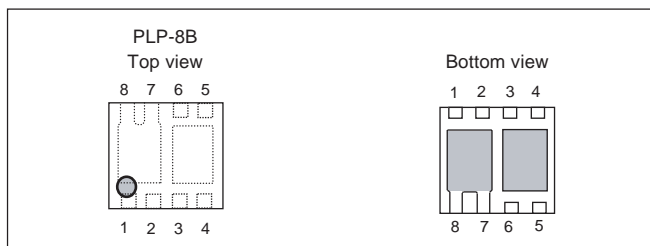
### ■ FEATURES

- Built-in power MOS FET: 75 mΩ (typ.)  
: 20 V withstanding voltage
- Input voltage: 1.5 V to 6.5 V
- Output voltage: 2.0 V to 15 V  
: can be changed by an external resistor
- Oscillation frequency: 600 kHz
- Efficiency: 85% (typ.)
- Soft start function
- Shutdown function

### ■ APPLICATIONS

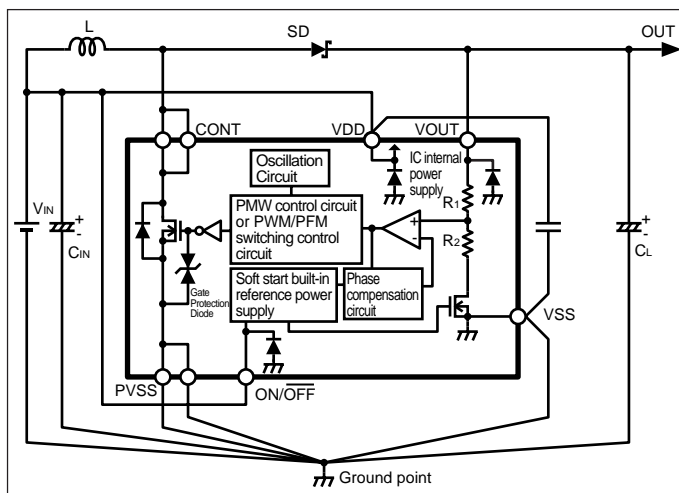
- Power supplies for portable equipment such as digital cameras, electronic notebooks, and PDAs
- Power supplies for audio equipment such as portable CD/MD players

### ■ PIN CONFIGURATION



Pin No.	Symbol	Description
1, 2	PVSS	Power GND pin
3	VSS	GND pin
4	ON/OFF	Shutdown pin "H": Normal operation (Step-up operation) "L": Stop step-up (Whole circuit stop)
5	VOUT	Output voltage pin
6	VDD	IC power supply pin
7, 8	CONT	External inductor connection pin

### ■ BLOCK DIAGRAM AND CIRCUIT CONNECTION EXAMPLE



### ■ SELECTION GUIDE

Product name	Output voltage (V)	The corresponding voltage value by an output voltage setting resistor*1 (V)	Control system	
			PWM control	PWM/PFM switching control
S-83M355Q20-X8T1	2.0	$2.0 \leq V_{OUT(S)} \leq 15.0$	Yes	-
S-83M355Q50-X8T1	5.0	$5.0 \leq V_{OUT(S)} \leq 15.0$	Yes	-
S-83M356Q20-X8T1	2.0	$2.0 \leq V_{OUT(S)} \leq 15.0$	-	Yes
S-83M356Q50-X8T1	5.0	$5.0 \leq V_{OUT(S)} \leq 15.0$	-	Yes

\*1. The output voltage value can optionally be set by an external divider resistor in the S-83M355/83M356 series

**STEP-UP, SUPER-SMALL PACKAGE, PFM CONTROL SWITCHING REGULATOR/  
SWITCHING REGULATOR CONTROLLER**

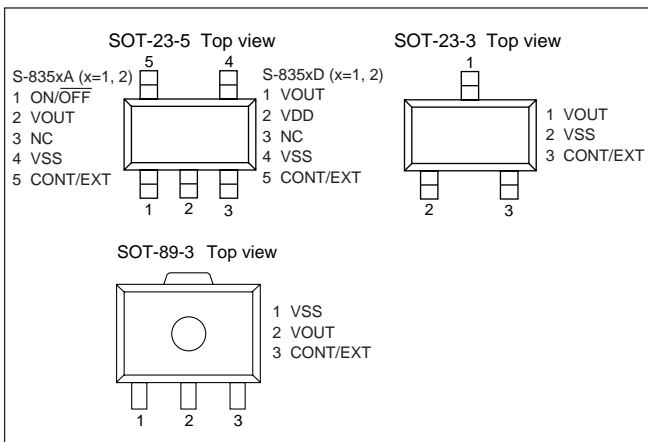
**S-8351/8352 series**

The S-8351/8352 series is a CMOS PFM-control step-up switching regulator that consists of a reference voltage source, an oscillator, and a comparator. The PFM controller allows the duty ratio to be automatically switched according to the load (light load: 50%, high output current: 75%), enabling products with a low ripple over a wide range, high efficiency, and high output current (product types A, B, and D). Products with a fixed duty ratio of 75% are also available (product type C).

With the S-8351 series, a step-up switching regulator can be configured by using an external coil, capacitor, and diode. The built-in MOS FET is turned off by a protection circuit when the voltage at the CONT pin exceeds the limit to prevent it from being damaged. This feature, along with the mini package and low current consumption, makes the S-8351 series ideal for portable equipment.

The S-8352 series, which features an external transistor, is suitable for applications requiring high output current.

**■ PIN CONFIGURATIONS**



**■ FUNCTION LIST**

Product name	Control system (Duty ratio (%))	Switching frequency (kHz)	Shutdown function	V <sub>DD</sub> /V <sub>OUT</sub> separation type	Power transistor	Package	Applications
S-8351AxxMC	PFM(50/75)	100	Yes	-	Built-in	SOT-23-5	Application requiring a shutdown function
S-8351BxxMA	PFM(50/75)	100	-	-	Built-in	SOT-23-3	Application not requiring a shutdown function
S-8351CxxMA/UA	PFM(75)	100	-	-	Built-in	SOT-23-3/SOT-89-3	Application not requiring a shutdown function
S-8351DxxMC	PFM(50/75)	100	-	Yes	Built-in	SOT-23-5	Application in which the output voltage is adjusted by external resistor
S-8352AxxMC	PFM(50/75)	100	Yes	-	External	SOT-23-5	Application requiring a shutdown function
S-8352BxxMA	PFM(50/75)	100	-	-	External	SOT-23-3	Application not requiring a shutdown function
S-8352CxxMA/UA	PFM(75)	100	-	-	External	SOT-23-3/SOT-89-3	Application not requiring a shutdown function
S-8352DxxMC	PFM(50/75)	100	-	Yes	External	SOT-23-5	Application in which the output voltage is adjusted by external resistor

**■ FEATURES**

- Low voltage operation: Startup at 0.9 V min. (I<sub>OUT</sub> = 1 mA) guaranteed
- Low current consumption: 23.2 μA typ. (V<sub>OUT</sub> = 3.3 V, during maximum operation) 0.5 μA max. (during power-off)
- Duty ratio: 50/75%, built-in auto-switching-type PFM controller (product types A, B, D) 75%, built-in fixed-type PFM controller (product type C)
- External parts: Coil, capacitor, diode
- Output voltage: 2.0 to 6.5 V (product types A, B, C) or 1.5 to 6.5 V (product type D) (selectable in 0.1 V steps)
- Output voltage accuracy: ±2.4%
- Shutdown function (product type A)
- V<sub>DD</sub>/V<sub>OUT</sub> separate type (product type D)
- External transistor type available (S-8352 series)
- Package: SOT-23-5, SOT-23-3, and SOT-89-3

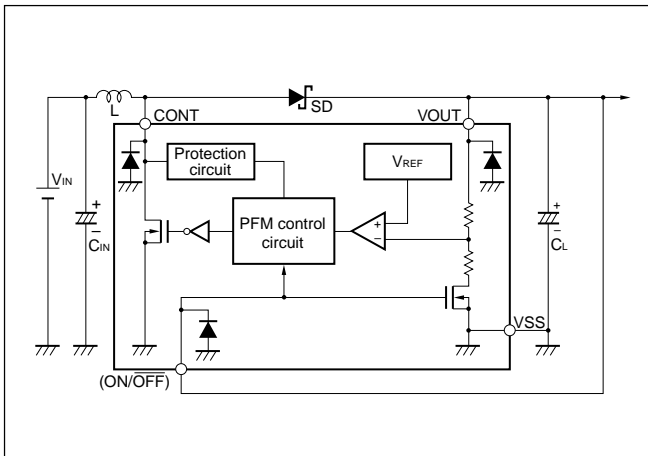
**■ APPLICATIONS**

- Power supply for portable equipment such as digital cameras, electronic organizers, and PDAs
- Power supply for audio equipment such as portable CD/MD players
- Constant voltage power supply for cameras, video equipment, and communications equipment
- Power supply for microcomputers

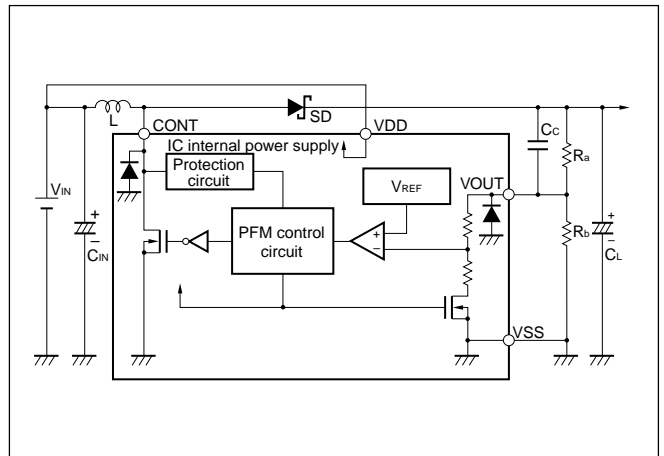


## ■ BLOCK DIAGRAM AND CIRCUIT CONNECTION EXAMPLE

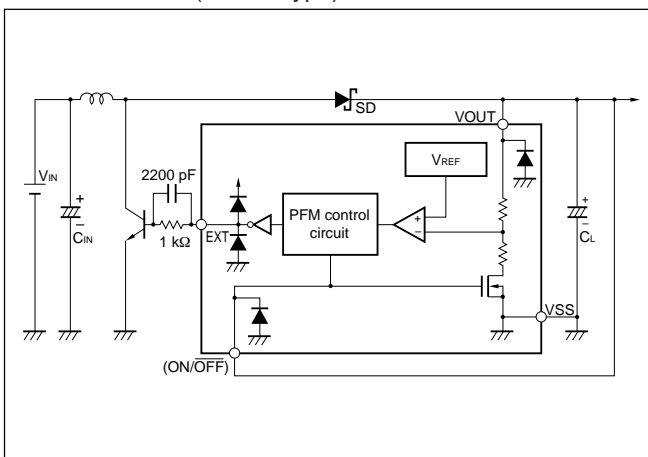
1. S-8351 series (normal type)



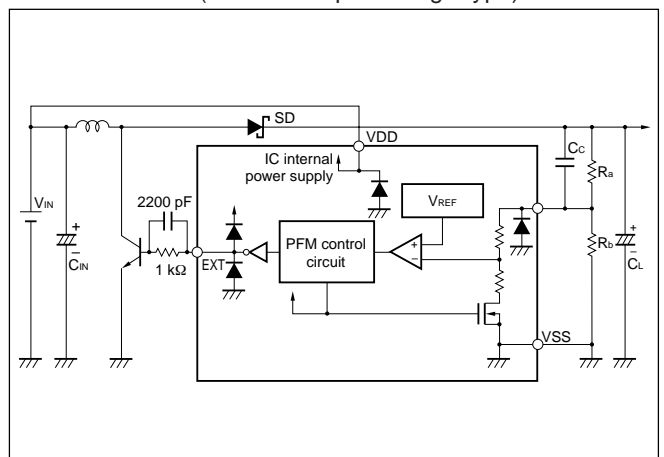
2. S-8351 series (variable output voltage type)



3. S-8352 series (normal type)



4. S-8352 series (variable output voltage type)



## ■ SELECTION GUIDE

### • S-8351 series

Item	S-8351AxxMC series	S-8351BxxMA series	S-8351CxxUA series	S-8351DxxMC series
Output voltage				
1.5V	-	-	-	S-8351D15MC-J8AT2G
2.0V	-	S-8351B20MA-J4FT2G	-	S-8351D20MC-J8FT2G
2.2V	S-8351A22MC-J2HT2G	-	-	-
2.5V	S-8351A25MC-J2KT2G	S-8351B25MA-J4KT2G	-	-
2.7V	S-8351A27MC-J2MT2G	S-8351B27MA-J4MT2G	-	-
3.0V	S-8351A30MC-J2PT2G	S-8351B30MA-J4PT2G	S-8351C30UA-J6PT2G	S-8351D30MC-J8PT2G
3.2V	-	-	S-8351C32UA-J6RT2G	-
3.3V	S-8351A33MC-J2ST2G	S-8351B33MA-J4ST2G	S-8351C33UA-J6ST2G	-
3.5V	S-8351A35MC-J2UT2G	-	S-8351C35UA-J6UT2G	-
4.0V	S-8351A40MC-J2ZT2G	-	-	S-8351D40MC-J8ZT2G
4.5V	S-8351A45MC-J3ET2G	S-8351B45MA-J5ET2G	-	-
4.6V	-	S-8351B46MA-J5FT2G	-	-
4.7V	S-8351A47MC-J3GT2G	-	-	-
5.0V	S-8351A50MC-J3JT2G	S-8351B50MA-J5JT2G	S-8351C50UA-J7JT2G	S-8351D50MC-J9JT2G
5.5V	S-8351A55MC-J3OT2G	S-8351B55MA-J5OT2G	-	-

### • S-8352 series

Item	S-8352AxxMC series	S-8352BxxMA series	S-8352CxxUA series	S-8352DxxMC series
Output voltage				
2.0V	-	-	-	S-8352D20MC-K8FT2G
2.5V	S-8352A25MC-K2KT2G	-	-	-
3.0V	S-8352A30MC-K2PT2G	S-8352B30MA-K4PT2G	S-8352C30UA-K6PT2G	S-8352D30MC-K8PT2G
3.1V	-	-	S-8352C31UA-K6QT2G	-
3.2V	S-8352A32MC-K2RT2G	-	S-8352C32UA-K6RT2G	-
3.3V	S-8352A33MC-K2ST2G	-	-	S-8352D33MC-K8ST2G
3.5V	S-8352A35MC-K2UT2G	-	-	-
3.7V	S-8352A37MC-K2WT2G	-	-	-
4.0V	S-8352A40MC-K2ZT2G	-	-	-
4.6V	S-8352A46MC-K3FT2G	-	-	-
4.7V	S-8352A47MC-K3GT2G	-	-	-
5.0V	S-8352A50MC-K3JT2G	S-8352B50MA-K5JT2G	S-8352C50UA-K7JT2G	-
5.4V	S-8352A54MC-K3NT2G	-	-	-

**Remark** Please contact our sales office if you desire a product with an output voltage other than those shown above.

**STEP-UP, 1.2 MHz HIGH-FREQUENCY, PWM CONTROL SWITCHING REGULATOR CONTROLLER**

**S-8337/8338 series**

The S-8337/8338 series is a family of CMOS step-up switching regulators that include a reference voltage source, an oscillator, an error amplifier, a PWM controller, an under voltage lockout circuit (UVLO), and a timer-latch-type short-circuit protection circuit. The minimum operating voltage is a low 1.8 V, making this series ideal for LCD power supplies and mobile devices that operate on a low voltage.

The resistor connected to the ROSC pin allows an internal oscillation frequency of up to 1.133 MHz to be set.

In the S-8337, the resistor connected to the RDuty pin allows the PWM maximum duty to be controlled. In the S-8338, the maximum duty is fixed to 88%. Changing the values of the resistor and capacitor connected to the CC pin allows control of the phase compensation and gain value and enables the operating stability and transient response to be set appropriately for each application.

The reference voltage is a high-accuracy 1.0 V  $\pm$ 1.5%, enabling the desired output voltage to be obtained via an external output voltage setting resistor. The capacitor connected to the CSP pin can be used to set the short-circuit protection delay time. If the status of the maximum duty continues due to short-circuiting, the capacitor is charged and the operation is stopped after a specified time. This status is cancelled when power is turned on again or the controller enters the power off status (S-8338). Either a ceramic or tantalum capacitor can be used as the output capacitor. The S-8337/8338 series are very user-friendly controller ICs due to the variety of possible settings and selections and the small package.

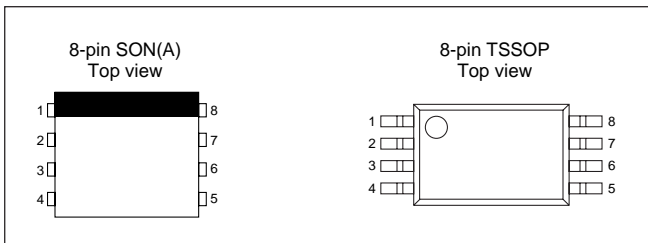
**FEATURES**

- Low voltage operation: 1.8 V to 6.0 V
- Oscillation frequency: Settable in range of 286 kHz to 1.133 MHz via external resistor
- Maximum duty: Settable in range of 47 to 88.5% via external resistor (S-8337 series)  
Fixed to 88% typ. (S-8338 series)
- Reference voltage: 1.0 V  $\pm$ 1.5%
- U.V.L.O. function:  
Detection voltage selectable from 1.5 V to 2.3 V in 0.1 V steps  
Hysteresis width selectable from 0.1 V to 0.3 V in 0.1 V steps
- Timer-latch-type short-circuit protection circuit:  
Delay time settable via external capacitor
- Soft start function: Soft-start time adjustable in three steps: 10 ms, 15 ms, and 20 ms
- Phase compensation external setting: Adjustable by connecting resistor and capacitor to GND in series
- Power-off function: Current consumption during power-off  
1.0  $\mu$ A max. (S-8338 series)
- Small package: 8-pin SON(A), 8-pin TSSOP

**APPLICATIONS**

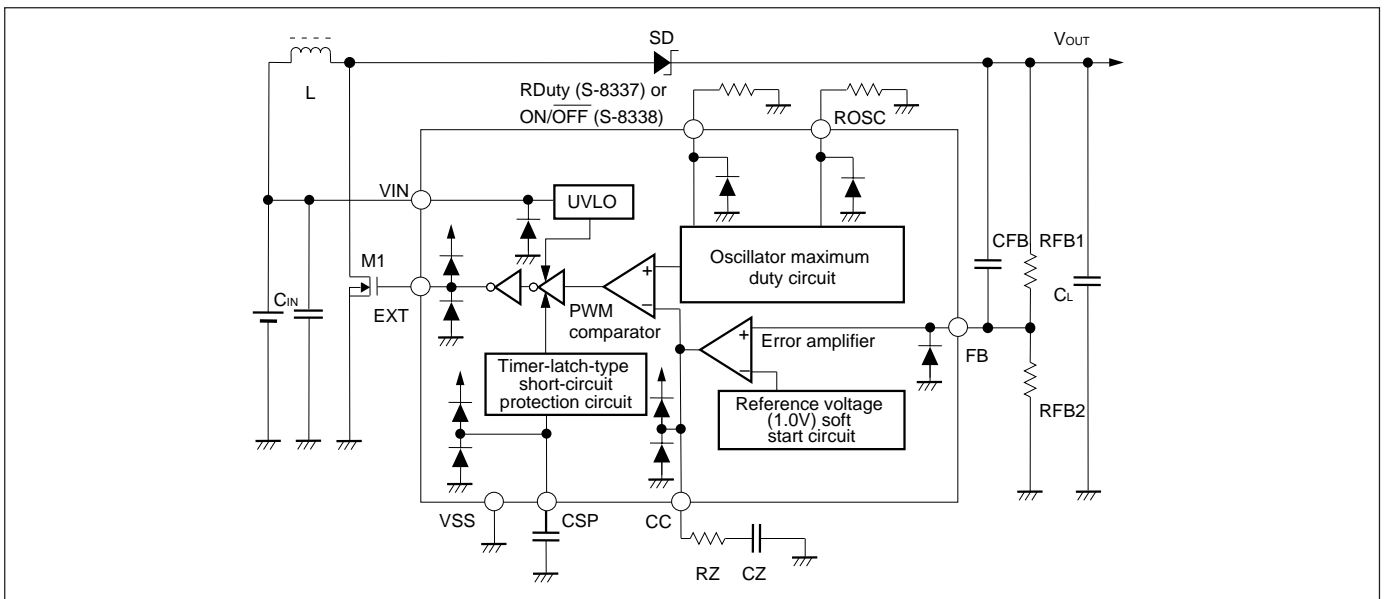
- Power supply for LCD bias
- Power supply for portable devices

**PIN CONFIGURATION**



Pin No.	Symbol	Description
1	CC	Error amplifier output phase compensation pin
2	FB	Output voltage return pin
3	CSP	Short-circuit protection delay time setting pin
4	VIN	Power supply input pin
5	EXT	External transistor connector pin
6	VSS	GND pin
7	ROSC	Oscillation frequency setting resistor connection pin
8	RDuty	Maximum duty setting resistor connection pin (S-8337)
	ON/OFF	Power-off pin (S-8338)

**BLOCK DIAGRAM AND CIRCUIT CONNECTION EXAMPLE**



## STEP-UP, 600 kHz, PWM CONTROL OR PWM/PFM SWITCHABLE SWITCHING REGULATOR CONTROLLER

### S-8340/8341 series

The S-8340/8341 series is a family of PWM control (S-8340) and PWM/PFM switchover control (S-8341) CMOS step-up switching regulator controllers that consist of a reference voltage source, an oscillator, an error amplifier, a phase compensation circuit, a PWM controller, etc. A high oscillation frequency of 300 kHz or 600 kHz enables the realization of a high efficiency switching regulator capable of driving large output current using small external components. In addition, the output stage can be speed up due to the high speed switching of the low on-resistance N-ch power MOS. The S-8340 provides high efficiency, excellent transient characteristics and low ripple output from an optimally designed error amplifier, phase compensation circuit and PWM controller that varies the duty ratio linearly from 0% to 82%. The S-8341 achieves high efficiency over the entire load range due to the PWM/PFM switchover circuit, which enters PWM mode when the duty ratio is higher than 27% and PFM mode when lower. The small 8-pin TSSOP package and high oscillation frequency make this series suitable for use as a power supply for portable devices.

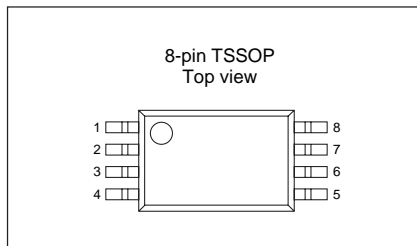
### FEATURES

- Oscillation frequency: 600 kHz (A, B type), 300 kHz (C, D type)
- Output voltage range: 2.5 V to 6.0 V (selectable in 0.1 V steps, output voltage fixed type)
- Output voltage accuracy:  $\pm 2.0\%$
- An output voltage external setting (FB) type is also available. ( $V_{FB} = 1.0\text{ V}$ )
- External components: Transistor, coil, diode, 6 capacitor (x 3), and resistor
- Duty ratio: 0% to 82% PWM control (S-8340 series)  
27% to 82% PWM/PFM switchover control (S-8341 series A/B type)  
21% to 82% PWM/PFM switchover control (S-8341 series C/D type)
- Oscillation is guaranteed at a low 0.9 V operation
- Current limit circuit: Set by an external resistor RSENSE
- Soft start function: Set by an external capacitor CSS
- Shutdown function
- Package: 8-pin TSSOP

### APPLICATIONS

- Power supply for portable devices such as PDAs, electronic organizers and mobile phones
- Power supply for audio devices such as portable CD players and headphone stereos
- Main and sub power supply for notebook computers and peripheral equipment
- Constant voltage power supply for cameras, video equipment and communication devices

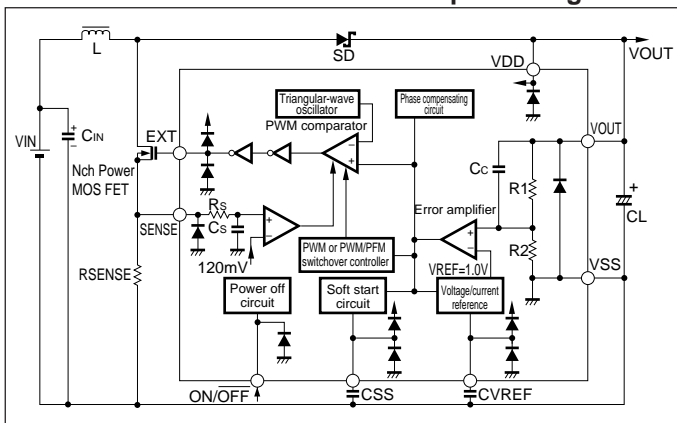
### PIN CONFIGURATION



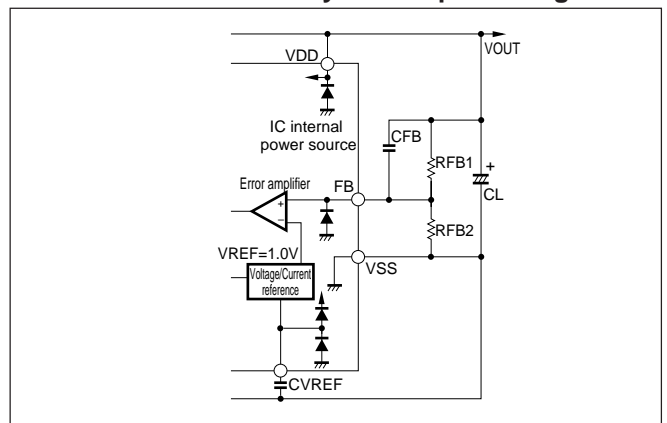
Pin No.	Symbol	Description
1	VSS	GND pin
2	CVREF	Bypass capacitor connection pin for reference voltage source
3	CSS	Soft start capacitor connection pin
4	ON/OFF	Power off pin "H": Normal operation (step-up operations) "L": Step-up stopped (all circuits stopped)
5	VDD	IC power supply pin
6	VOUT (FB)	Output voltage pin (FB for externally set types)
7	EXT	External transistor connector pin
8	SENSE	Current limiting detection pin

### BLOCK DIAGRAM AND CIRCUIT CONNECTION EXAMPLE

#### <Product with fixed internal output voltage>



#### <Product with externally set output voltage>



### SELECTION GUIDE

#### <Product with fixed output voltage>

(3000/reel)

Output voltage (V)	S-8340 series A type fosc = 600 kHz, PWM control	S-8341 series A type fosc = 600 kHz, PWM/PFM switchover control	S-8340 series C type fosc = 300 kHz, PWM control	S-8341 series C type fosc = 300 kHz, PWM/PFM switchover control
2.5	S-8340A25AFT-T2-G	S-8341A25AFT-T2-G	S-8340C25AFT-T2-G	S-8341C25AFT-T2-G
3.0	S-8340A30AFT-T2-G	S-8341A30AFT-T2-G	S-8340C30AFT-T2-G	S-8341C30AFT-T2-G
3.3	S-8340A33AFT-T2-G	S-8341A33AFT-T2-G	S-8340C33AFT-T2-G	S-8341C33AFT-T2-G
3.4	S-8340A34AFT-T2-G	-	-	-
3.5	S-8340A35AFT-T2-G	-	-	-
5.0	S-8340A50AFT-T2-G	S-8341A50AFT-T2-G	S-8340C50AFT-T2-G	S-8341C50AFT-T2-G
5.1	S-8340A51AFT-T2-G	-	-	S-8341C51AFT-T2-G
5.6	S-8340A56AFT-T2-G	-	-	-
6.0	S-8340A60AFT-T2-G	-	S-8340C60AFT-T2-G	-

#### <Product with externally set output voltage>

Output voltage (V)	S-8340 series B type fosc = 600 kHz, PWM control	S-8341 series B type fosc = 600 kHz, PWM/PFM switchover control	S-8340 series D type fosc = 300 kHz, PWM control	S-8341 series D type fosc = 300 kHz, PWM/PFM switchover control
Variable	S-8340B00AFT-T2-G	S-8341B00AFT-T2-G	S-8340D00AFT-T2-G	S-8341D00AFT-T2-G

**Remark** Please contact our sales office if a product with an output voltage other than the above is required.

**STEP-UP, FOR LCD BIAS SUPPLY,  
1-CHANNEL, PWM CONTROL SWITCHING REGULATOR CONTROLLER**

**NEW S-8333 series**

The S-8333 series is a family of CMOS step-up switching regulators that include a reference voltage source, an oscillator, an error amplifier, a PWM controller, an under voltage lockout circuit (UVLO), and a timer-latch-type short-circuit protection circuit. The minimum operating voltage is a low 1.8 V, making this series ideal for LCD power supplies and mobile devices that operate on a low voltage.

The resistor connected to the ROSC pin allows an internal oscillation frequency of up to 1.133 MHz to be set. The resistor connected to the RDuty pin allows the PWM maximum duty to be controlled. The soft-start function at power application is accomplished by combining the reference voltage control and maximum duty control methods. Even if the voltage of the FB pin is retained lower than the reference voltage due to factor outside of the IC, the output voltage is raised by controlling the maximum duty. Changing the values of the resistor and capacitor connected to the CC pin allows control of the phase compensation and gain value and enables the operating stability and transient response to be set appropriately for each application.

The reference voltage is a high-accuracy 1.0 V  $\pm$ 1.5%, enabling the desired output voltage to be obtained via an external output voltage setting resistor. The capacitor connected to the CSP pin can be used to set the short-circuit protection delay time. If the status of the maximum duty continues due to short-circuiting, the capacitor is charged and the operation is stopped after a specified time. The short-circuit protection function is cancelled when the power supply is raised to the UVLO release voltage after it has been lowered to the UVLO detection voltage. Either a ceramic or tantalum capacitor can be used as the output capacitor. The S-8333 series are very user-friendly controller ICs due to the variety of possible settings and selections and the small package.

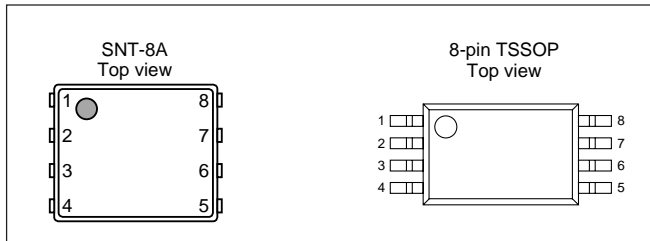
**FEATURES**

- Low voltage operation: 1.8 V to 6.0 V
- Oscillation frequency: Settable in range of 286 kHz to 1.133 MHz via external resistor
- Maximum duty: Settable in range of 47 to 88.5% via external resistor
- Reference voltage: 1.0 V  $\pm$ 1.5%
- U.V.L.O. function:
  - Detection voltage selectable from 1.5 V to 2.3 V in 0.1 V steps
  - Hysteresis width selectable from 0.1 V to 0.3 V in 0.1 V steps
- Timer-latch-type short-circuit protection circuit:
  - Delay time settable via external capacitor
- Soft start function: Soft-start time adjustable in three steps: 10 ms, 15 ms, and 20 ms
  - Both reference voltage control and maximum duty control methods are applied.
- Phase compensation external setting: Adjustable by connecting resistor and capacitor to GND in series
- Small package: SNT-8A, 8-pin TSSOP

**APPLICATIONS**

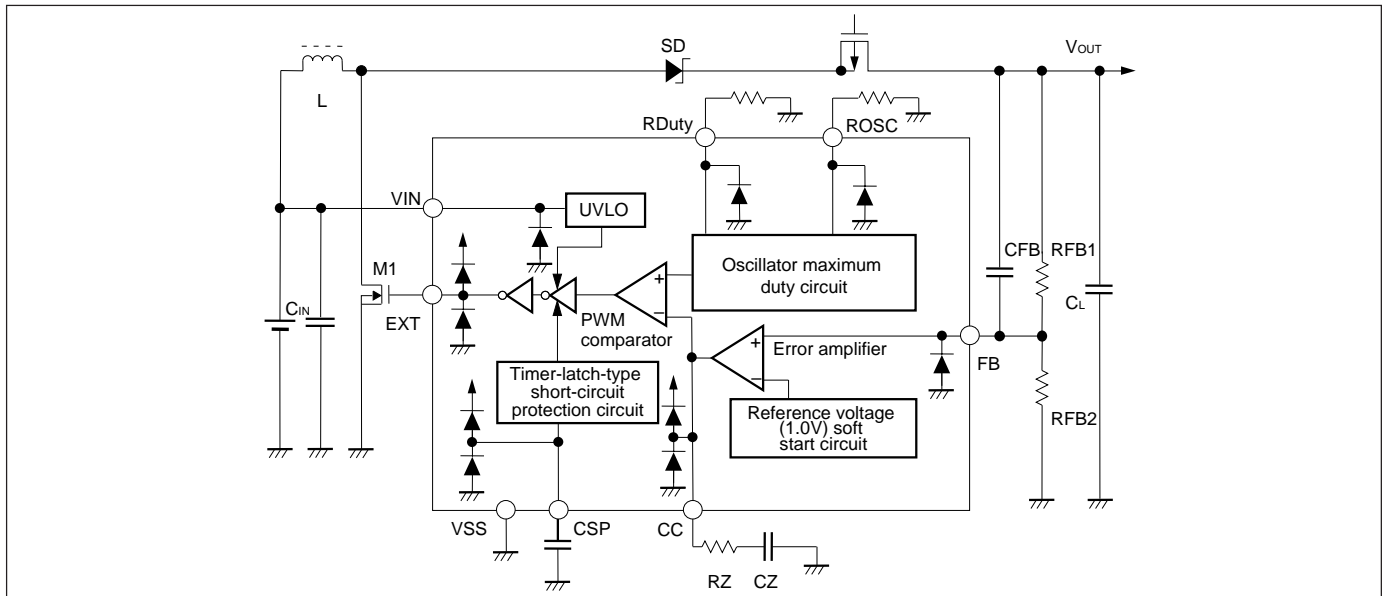
- Power supply for LCD bias
- Power supply for portable devices

**PIN CONFIGURATION**



Pin No.	Symbol	Description
1	CC	Error amplifier output phase compensation pin
2	FB	Output voltage return pin
3	CSP	Short-circuit protection delay time setting pin
4	VIN	Power supply input pin
5	EXT	External transistor connector pin
6	VSS	GND pin
7	ROSC	Oscillation frequency setting resistor connection pin
8	RDuty	Maximum duty setting resistor connection pin

**BLOCK DIAGRAM AND CIRCUIT CONNECTION EXAMPLE**



## STEP-UP, FOR LCD BIAS SUPPLY, 3-CHANNEL SWITCHING REGULATOR

S-8335 series

The S-8335 series is an IC for the bias power supply of a Multi Line Addressing (MLA) drive LCD with a two-line simultaneous selection system. It can be used for a medium-sized LCD panel. The positive and negative power supplies required for the LCD common driver of 2MLA drive systems and each segment driver is supplied by two step-up types and one inversion type PFM control CMOS switching regulators. Since the current consumption is very small due to the CMOS structure, this series is ideal for the LCD power supply of portable devices requiring low power consumption. Moreover, it is possible to form a very low power consumption LCD module using an LCD common driver (HD66523R<sup>1</sup>: product of Hitachi, Ltd.), a segment driver (HD66522<sup>1</sup>: product of Hitachi, Ltd.), and the S-8335 series.

\*1. These drivers can support 1/240 and 1/200 duty.

### APPLICATIONS

- Power supply of medium-sized LCD panel

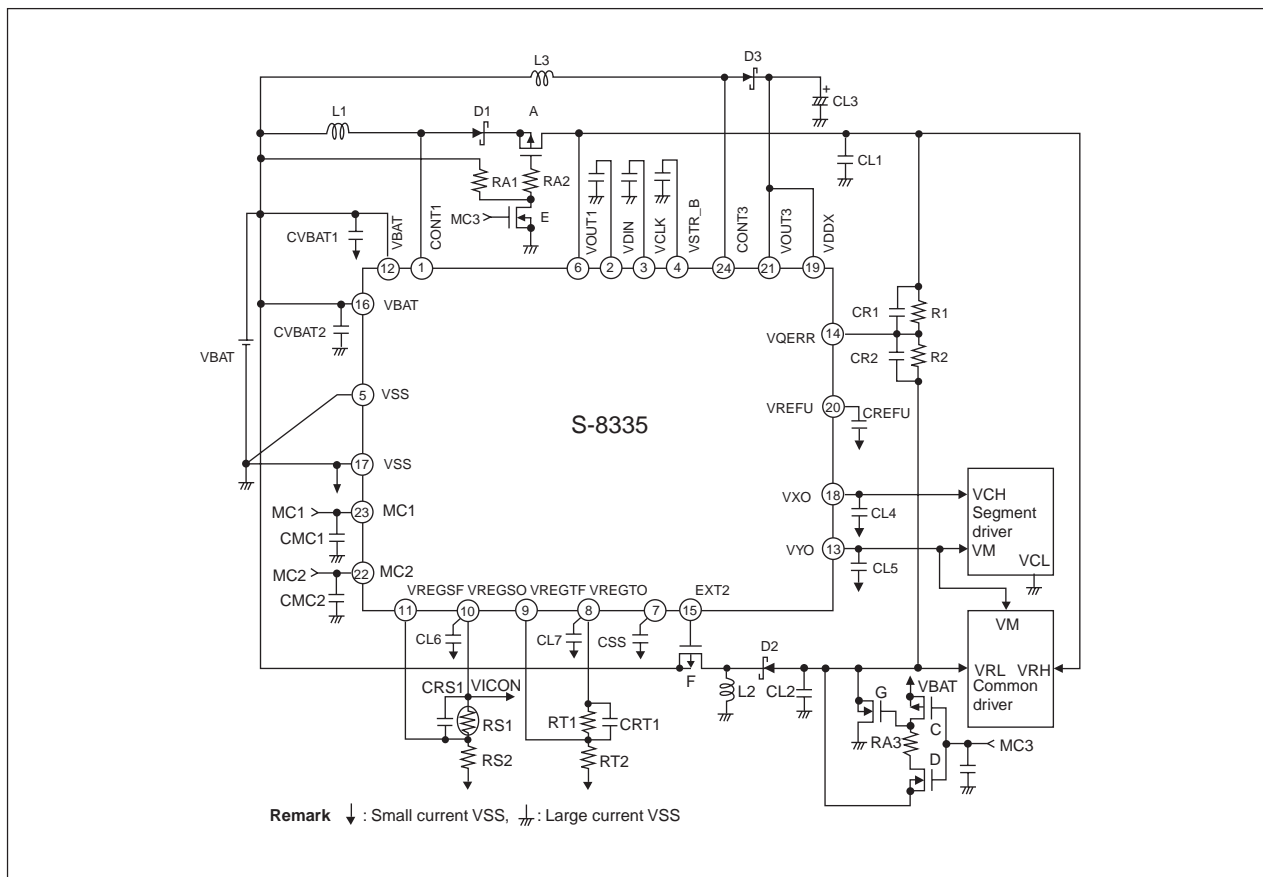
### SELECTION GUIDE

Product name	Bias ratio	Common driver positive power supply VRH output voltage range [V]		Common driver negative power supply VRL output voltage range [V]	
		VRH_min	VRH_max	VRL_min	VRL_max
S-8335A240FT-TB-G	8.75	8.91	16.59	-6.87	-12.80
S-8335A200FT-TB-G	8.04	8.22	15.30	-6.18	-11.49
S-8335A160FT-TB-G	7.33	7.48	13.93	-5.44	-10.13
S-8335A120FT-TB-G	6.50	6.66	12.41	-4.61	-8.59

### FEATURES

- Can be used in four kinds of LCD panels.  
1/240 duty, 1/200 duty, 1/160 duty, 1/120 duty
- Input voltage range:  
2.4 to 5.0 V (driving directly with one lithium battery is possible)
- Output voltage range
  - Common driver positive power supply (VRH) output voltage range (typ. value)
    - 8.91 to 16.59 V (S-8335A240FT-TB-G)
    - 8.22 to 15.30 V (S-8335A200FT-TB-G)
    - 7.48 to 13.93 V (S-8335A160FT-TB-G)
    - 6.66 to 12.41 V (S-8335A120FT-TB-G)
  - (Variable using built-in 6-bit electronic volume, also includes built-in power MOS FET)
  - Common driver negative power supply (VRL) output voltage range (typ. value)
    - 6.87 to -12.80 V (S-8335A240FT-TB-G)
    - 6.18 to -11.49 V (S-8335A200FT-TB-G)
    - 5.44 to -10.13 V (S-8335A160FT-TB-G)
    - 4.61 to -8.59 V (S-8335A120FT-TB-G)
- Segment driver positive power supply output voltage range 2.0 to 3.8 V
- Segment driver middle output voltage range 1.0 to 1.9 V
- Positive power supply (VICON) output voltage range for icons 1.0 to 2.2 V (a voltage can be set by external resistor)
- Low current consumption: 100  $\mu$ A typ. (Mode 1, VBAT = 3 V)  
10  $\mu$ A typ. (Mode 2, VBAT = 3 V)  
1  $\mu$ A max. (Mode 3, VBAT = 3 V)
- Triple operation mode function: Mode 1: Normal operation  
Mode 2: Icon mode  
Mode 3: Standby mode
- Shutdown function: Stepping up operation is stopped, and the VRH and VRL pins are shorted to VSS using an on-chip or external Nch transistor.
- Soft start function: Can be set by external capacitor (CSS).
- Oscillation frequency: 100 kHz  $\pm$  20 kHz, duty = 50%
- Package: 24-pin TSSOP

### EXAMPLE OF APPLICATION CIRCUIT





**STEP-UP, FOR LCD BIAS SUPPLY,  
1-CHANNEL SWITCHING REGULATOR**

**S-8330/8331 series**

The S-8330/8331 series is a CMOS PWM-control step-up switching regulator that consists of a reference voltage source, an oscillation circuit, a power MOS FET (for the S-8330 series), and an error amplifier. The output voltage can be adjusted by electronic volume. A shutdown function is also available. The S-8330 series features low current consumption due to the CMOS structure, and a step-up switching regulator can be constructed simply by externally connecting a coil, capacitors and a diode. The compact 8-pin SSOP package and small number of external components make the S-8330 series ideal for LCD bias generators in portable equipment. For applications requiring a high output current, the external transistor controller type S-8331 series is also available.

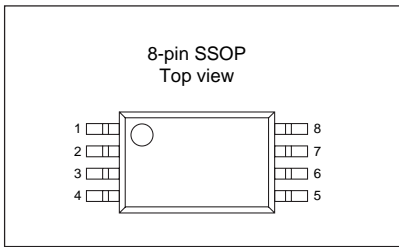
**FEATURES**

- Maximum output voltage: 20 V to 30 V (2 V steps)  
12 V range can be adjusted by electronic volume
- Output current: 5 mA ( $V_{IN} = 5\text{ V}$ ,  $V_{OUT} = 30\text{ V}$ )
- Low current consumption:  
100  $\mu\text{A}$  typ. (180 kHz product,  $V_{IN} = 5\text{ V}$ , during operation)  
1.0  $\mu\text{A}$  max. (during power-off)
- Shutdown function: Stepping up operation is stopped, and  $V_{OUT}$  pin is shorted to GND at shutdown.
- Input voltage range: 2.0 to 9.0 V
- Soft start function
- Built-in CR oscillation circuit: 180 kHz typ. (A series)  
50 kHz typ. (B series)
- Package: 8-pin SSOP
- Built-in 8-bit electronic volume
- External transistor type is available (S-8331 series)

**APPLICATIONS**

- Power supply for medium-sized or large-sized LCD panels.
- Power supply for portable equipment such as pagers, pocket calculators, electronic organizers, and remote controllers.
- Constant voltage power supply for cameras, video equipment, and communications equipment.

**PIN CONFIGURATION**



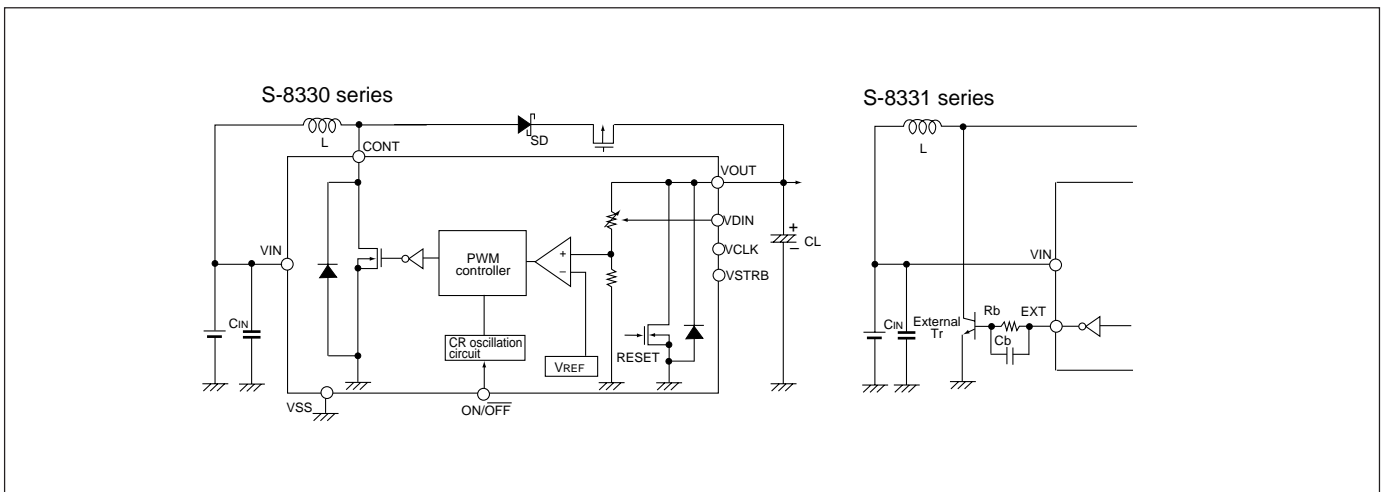
Pin No.	Symbol	Description
1	VDIN	Electric volume data input pin
2	VCLK	Electric volume clock input pin
3	VSTRB	Electric volume strobe signal input pin
4	VOUT	Output voltage monitor pin
5	VIN	Power supply pin
6	CONT	External inductor connection pin (S-8330 series: Open drain output)
	EXT	External transistor connection pin (S-8331 series: Push-pull (CMOS output))
7	ON / OFF	Shutdown pin
		"H": Normal operation (stepping up operation) "L": Stepping up stopped
8	VSS	GND pin

**SELECTION GUIDE**

(2000/reel)

Output voltage range (V)	S-8330AxxFS series	S-8330BxxFS series	S-8331AxxFS series	S-8331BxxFS series
8 to 20V	S-8330A20FS-T2-G	S-8330B20FS-T2-G	S-8331A20FS-T2-G	S-8331B20FS-T2-G
10 to 22V	S-8330A22FS-T2-G	S-8330B22FS-T2-G	S-8331A22FS-T2-G	S-8331B22FS-T2-G
12 to 24V	S-8330A24FS-T2-G	S-8330B24FS-T2-G	S-8331A24FS-T2-G	S-8331B24FS-T2-G
14 to 26V	S-8330A26FS-T2-G	S-8330B26FS-T2-G	S-8331A26FS-T2-G	S-8331B26FS-T2-G
16 to 28V	S-8330A28FS-T2-G	S-8330B28FS-T2-G	S-8331A28FS-T2-G	S-8331B28FS-T2-G
18 to 30V	S-8330A30FS-T2-G	S-8330B30FS-T2-G	S-8331A30FS-T2-G	S-8331B30FS-T2-G

**BLOCK DIAGRAM AND CIRCUIT CONNECTION EXAMPLE**



## STEP-DOWN, PWM CONTROL OR PWM/PFM SWITCHABLE SWITCHING REGULATOR CONTROLLER

S-8520/8521 series

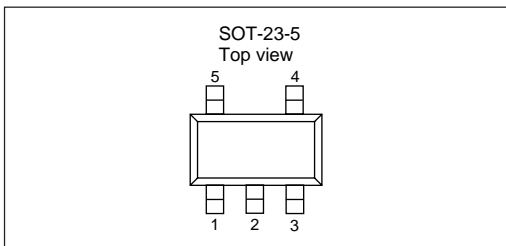
The S-8520/8521 series is a family of CMOS step-down switching regulator controllers with PWM-control (S-8520) and PWM/PFM switchover control (S-8521).

The S-8520 series provides low-ripple output, high-efficiency, and excellent transient characteristics due to a PWM controller capable of varying the duty ratio linearly from 0% up to 100%. The series also contains a soft-start circuit that prevents overshoot at startup.

The S-8521 series works with either PWM control or PFM control, and can switch from one to the other. It normally operates using PWM control with a duty ratio of 25% to 100%, and under a light load, it automatically switches to PFM control with a duty ratio of 25%. This series ensures high efficiency over a wide range of conditions, from standby mode to full operation.

The combination of the SOT-23-5 small package and the low current consumption make the S-8520/8521 series an ideal power supply for portable devices.

### PIN CONFIGURATION



Pin No.	Symbol	Description
1	ON/OFF	Power-off terminal "H": Normal operation (step-down operation) "L": Step-down operation stopped (All circuits deactivated)
2	VSS	GND pin
3	VOUT	Output voltage monitoring terminal
4	EXT	Connection terminal for external transistor
5	VIN	IC power supply terminal

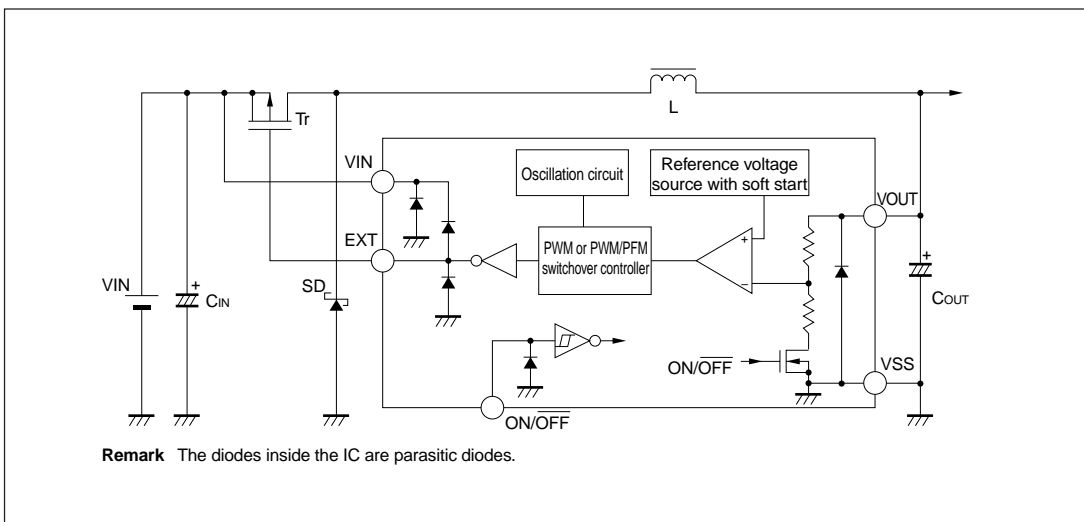
### FEATURES

- Low current consumption:
  - 60  $\mu$ A max. (A, B series, during operation)
  - 21  $\mu$ A max. (C, D series, during operation)
  - 100  $\mu$ A max. (E, F series, during operation)
  - 0.5  $\mu$ A max. (during power-off)
- Input voltage: 2.5 V to 16 V (B, D, F series)  
2.5 V to 10 V (A, C, E series)
- Output voltage: 1.5 V to 6.0 V (selectable in 0.1 V steps)
- Duty ratio: 0% to 100% PWM control (S-8520)  
25% to 100% PWM/PFM switchover control (S-8521)
- External components: P-ch power MOS FET or PNP transistor, coil, diode and capacitors. (If a PNP transistor is used, a base resistor and a capacitor are required.)
- Oscillation frequency: 180 kHz typ. (A, B series),  
60 kHz typ. (C, D series),  
or 300 kHz typ. (E, F series)
- Soft-start function: 8 ms typ. (A, B series),  
12 ms typ. (C, D series),  
or 4.5 ms typ. (E, F series)
- Shutdown function
- Overload protection circuit: Overload detection time  
4 ms typ. (A series),  
14 ms typ. (C series),  
2.6 ms typ. (E series)
- Package: SOT-23-5

### APPLICATIONS

- On-board power supply of battery devices for portable telephones, electronic organizers, PDAs
- Power supply for audio devices such as portable CD players and headphone stereos
- Constant voltage power supply for cameras, video equipment and communications equipment
- Power supply for microcomputers
- Voltage conversion from 4-NiH or NiCd, or 2-Lithium ion batteries to 3.3 V/3 V
- Voltage conversion from AC adapter to 5 V/3 V

### BLOCK DIAGRAM AND CIRCUIT CONNECTION EXAMPLE



■ SELECTION GUIDE

A, B series (Oscillation frequency: 180 kHz) C series (Oscillation frequency: 60 kHz)

(3000/reel)

Output Voltage (V)	S-8520AxxMC series	S-8521AxxMC series	S-8520BxxMC series	S-8521BxxMC series	S-8520CxxMC series	S-8521CxxMC series
1.5	-	-	-	S-8521B15MC-ATAT2G	-	-
1.6	-	-	-	-	-	S-8521C16MC-BTBT2G
1.8	-	-	S-8520B18MC-ARDT2G	S-8521B18MC-ATDT2G	-	-
1.9	-	-	-	S-8521B19MC-ATET2G	-	-
2.0	-	-	-	S-8521B20MC-ATFT2G	-	-
2.1	S-8520A21MC-AVGT2G	-	-	S-8521B21MC-ATGT2G	-	-
2.3	-	-	-	S-8521B23MC-ATIT2G	-	-
2.4	-	-	S-8520B24MC-ARJT2G	-	-	-
2.5	S-8520A25MC-AVKT2G	S-8521A25MC-AXKT2G	S-8520B25MC-ARKT2G	S-8521B25MC-ATKT2G	S-8520C25MC-BRKT2G	S-8521C25MC-BTKT2G
2.6	S-8520A26MC-AVLT2G	-	-	S-8521B26MC-ATLT2G	-	-
2.7	S-8520A27MC-AVMT2G	S-8521A27MC-AXMT2G	S-8520B27MC-ARMT2G	S-8521B27MC-ATMT2G	S-8520C27MC-BRMT2G	S-8521C27MC-BTMT2G
2.8	S-8520A28MC-AVNT2G	S-8521A28MC-AXNT2G	S-8520B28MC-ARNT2G	S-8521B28MC-ATNT2G	S-8520C28MC-BRNT2G	S-8521C28MC-BTNT2G
2.9	S-8520A29MC-AVOT2G	S-8521A29MC-AXOT2G	S-8520B29MC-AROT2G	S-8521B29MC-ATOT2G	S-8520C29MC-BROT2G	S-8521C29MC-BTOT2G
3.0	S-8520A30MC-AVPT2G	S-8521A30MC-AXPT2G	S-8520B30MC-ARPT2G	S-8521B30MC-ATPT2G	S-8520C30MC-BRPT2G	S-8521C30MC-BTPT2G
3.1	S-8520A31MC-AVQT2G	S-8521A31MC-AXQT2G	S-8520B31MC-ARQT2G	S-8521B31MC-ATQT2G	S-8520C31MC-BRQT2G	S-8521C31MC-BTQT2G
3.2	S-8520A32MC-AVRT2G	S-8521A32MC-AXRT2G	S-8520B32MC-ARRT2G	S-8521B32MC-ATRT2G	S-8520C32MC-BRRT2G	S-8521C32MC-BTRT2G
3.3	S-8520A33MC-AVST2G	S-8521A33MC-AXST2G	S-8520B33MC-ARST2G	S-8521B33MC-ATST2G	S-8520C33MC-BRST2G	S-8521C33MC-BTST2G
3.4	S-8520A34MC-AVTT2G	S-8521A34MC-AXTT2G	S-8520B34MC-ARTT2G	S-8521B34MC-ATTT2G	S-8520C34MC-BRTT2G	S-8521C34MC-BTTT2G
3.5	S-8520A35MC-AVUT2G	S-8521A35MC-AXUT2G	S-8520B35MC-ARUT2G	S-8521B35MC-ATUT2G	S-8520C35MC-BRUT2G	S-8521C35MC-BTUT2G
3.6	S-8520A36MC-AVVT2G	S-8521A36MC-AXVT2G	S-8520B36MC-ARVT2G	S-8521B36MC-ATVT2G	S-8520C36MC-BRVT2G	S-8521C36MC-BTVT2G
4.0	-	-	-	S-8521B40MC-ATZT2G	-	-
4.3	-	-	S-8520B43MC-ASCT2G	-	-	-
4.4	-	-	-	S-8521B44MC-AUDT2G	-	-
5.0	S-8520A50MC-AWJT2G	S-8521A50MC-AYJT2G	S-8520B50MC-ASJT2G	S-8521B50MC-AUJT2G	S-8520C50MC-BSJT2G	S-8521C50MC-BUJT2G
5.3	-	-	S-8520B53MC-ASMT2G	-	-	-

D series (Oscillation frequency: 60 kHz) E, F series (Oscillation frequency: 300 kHz)

Output Voltage (V)	S-8520DxxMC series	S-8521DxxMC series	S-8520ExxMC series	S-8521ExxMC series	S-8520FxxMC series	S-8521FxxMC series
1.5	-	-	-	S-8521E15MC-BLAT2G	S-8520F15MC-BNAT2G	S-8521F15MC-BPAT2G
1.6	-	S-8521D16MC-BXBT2G	S-8520E16MC-BJBT2G	S-8521E16MC-BLBT2G	-	-
1.7	-	-	-	S-8521E17MC-BLCT2G	-	-
1.8	-	-	S-8520E18MC-BJDT2G	S-8521E18MC-BLDT2G	S-8520F18MC-BNDT2G	S-8521F18MC-BPDT2G
1.9	-	-	-	S-8521E19MC-BLET2G	-	S-8521F19MC-BPET2G
2.0	-	S-8521D20MC-BXFT2G	-	S-8521E20MC-BLFT2G	S-8520F20MC-BNFT2G	-
2.5	S-8520D25MC-BVKT2G	S-8521D25MC-BXKT2G	S-8520E25MC-BJKT2G	S-8521E25MC-BLKT2G	S-8520F25MC-BNKT2G	S-8521F25MC-BPKT2G
2.6	-	-	-	-	S-8520F26MC-BNLT2G	-
2.7	S-8520D27MC-BVMT2G	S-8521D27MC-BXMT2G	-	-	S-8520F27MC-BNMT2G	-
2.8	S-8520D28MC-BVNT2G	S-8521D28MC-BXNT2G	-	-	-	-
2.9	S-8520D29MC-BVOT2G	S-8521D29MC-BXOT2G	-	-	-	-
3.0	S-8520D30MC-BVPT2G	S-8521D30MC-BXPT2G	S-8520E30MC-BJPT2G	S-8521E30MC-BLPT2G	S-8520F30MC-BNPT2G	S-8521F30MC-BPPT2G
3.1	S-8520D31MC-BVQT2G	S-8521D31MC-BXQT2G	-	-	S-8520F31MC-BNQT2G	-
3.2	S-8520D32MC-BVRT2G	S-8521D32MC-BXRT2G	-	-	-	-
3.3	S-8520D33MC-BVST2G	S-8521D33MC-BXST2G	S-8520E33MC-BJST2G	S-8521E33MC-BLST2G	S-8520F33MC-BNST2G	S-8521F33MC-BPST2G
3.4	S-8520D34MC-BVTT2G	S-8521D34MC-BXTT2G	-	-	S-8520F34MC-BNNT2G	S-8521F34MC-BPNT2G
3.5	S-8520D35MC-BVUT2G	S-8521D35MC-BXUT2G	-	S-8521E35MC-BLUT2G	-	-
3.6	S-8520D36MC-BVVT2G	S-8521D36MC-BXVT2G	-	-	S-8520F36MC-BNVT2G	S-8521F36MC-BPVT2G
4.0	-	S-8521D40MC-BXZT2G	-	-	-	S-8521F40MC-BPZT2G
5.0	S-8520D50MC-BWJT2G	S-8521D50MC-BYJT2G	S-8520E50MC-BKJT2G	S-8521E50MC-BMJT2G	S-8520F50MC-BOJT2G	S-8521F50MC-BQJT2G
5.2	-	-	S-8520E52MC-BKLT2G	-	-	-
5.5	-	-	-	-	S-8520F55MC-BOOT2G	S-8521F55MC-BQOT2G

Remark Please contact our sales office if you desire a product with an output voltage other than those shown above.

## STEP-DOWN, 600 kHz, PWM CONTROL OR PWM/PFM SWITCHABLE SWITCHING REGULATOR CONTROLLER

## S-8540/8541 series

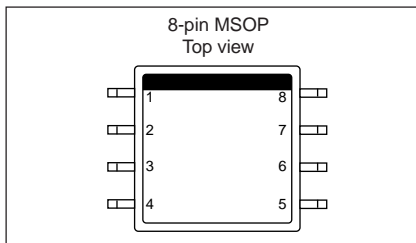
The S-8540/8541 series is a PWM control (S-8540) and PWM/PFM switchover control (S-8541) CMOS step-down switching regulator controller that includes a reference voltage source, an oscillation circuit, an error amplifier, a phase compensation circuit, a PWM controller, and a current limiter. Since the oscillation frequency is high (600 kHz and 300 kHz), a step-down switching regulator with an efficient and large output current can be constructed using only small external parts.

The S-8540 realizes low ripple and high efficiency due to a PWM controller that can change the duty ratio linearly from 0% to 100%, and an optimized error amplifier and phase compensation circuit.

The S-8541 operates in the PWM mode when the duty ratio is 29% and higher, and in the PFM mode when it is below 29% to realize high efficiency in the total load range.

The combination of an 8-pin MSOP package and a high-oscillation frequency make the S-8540/8541 series controllers ideal as the main power supply of portable devices.

### PIN CONFIGURATION



Pin No.	Symbol	Description
1	VSS	GND pin
2	EXT	External transistor connection pin
3	VIN	IC power supply pin
4	CVREF	Bypass capacitor connection pin for reference voltage source
5	ON/OFF	Shutdown connection pin, soft start capacitor connection pin Normal operation (step-down operation) All circuits stopped (step-down operation stopped)
6	NC (FB)	Output voltage fixed output type is NC. (Output voltage external setting type is FB)
7	VOUT	Output voltage pin
8	SENSE	Current limiting detection pin

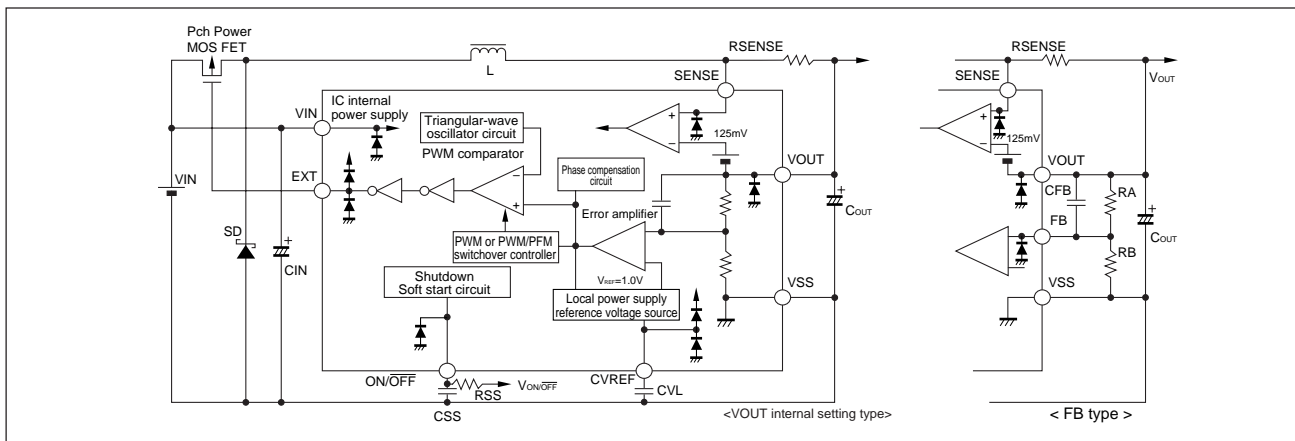
### FEATURES

- Oscillation frequency: 600 kHz (A, B type)  
300 kHz (C, D type)
- Output voltage: 1.5 V and 6.0 V (Selectable in 0.1 V steps)
- Output voltage accuracy:  $\pm 2.0\%$
- An output voltage external setting (FB) type is also provided:  
 $V_{FB} = 1.0\text{ V}$
- Duty ratio: 0 to 100% PWM control (S-8540)  
29 to 100% PWM/PFM switchover control (S-8541)
- External parts are a transistor, a coil, a diode, and capacitors.
- Built-in current limiter can be set by external resistor RSENSE.
- Soft start function can be set by external resistor RSS and external capacitor CSS.
- Shutdown function
- Small package: 8-pin MSOP

### APPLICATIONS

- Power supplies for portable devices such as PDAs, electronic organizers, and cellular phones.
- Power supplies for audio equipment such as portable CD players and headphone stereos.
- Main or sub power supplies for notebook computers and peripheral equipment.

### BLOCK DIAGRAM AND CIRCUIT CONNECTION EXAMPLE



### SELECTION GUIDE

#### 1. A, B type (Oscillation frequency: 600 kHz) (3000/reel)

Output voltage (V)	S-8540xxxFN series	S-8541xxxFN series
1.5	S-8540A15FN-IAAT2G	-
1.6	-	S-8541A16FN-IGBT2G
1.8	S-8540A18FN-IADT2G	S-8541A18FN-IGDT2G
2.5	S-8540A25FN-IAKT2G	S-8541A25FN-IGKT2G
3.3	S-8540A33FN-IAST2G	S-8541A33FN-IGST2G
5.0	S-8540A50FN-IBBT2G	-
External setting (1.5 to 6.0)	S-8540B00FN-IMAT2G	S-8541B00FN-IMDT2G

#### 2. C, D type (Oscillation frequency: 300 kHz) (3000/reel)

Output voltage (V)	S-8540xxxFN series	S-8541xxxFN series
1.8	S-8540C18FN-ICDT2G	S-8541C18FN-IIDT2G
2.5	S-8540C25FN-ICKT2G	S-8541C25FN-IKKT2G
3.3	S-8540C33FN-ICST2G	S-8541C33FN-IIST2G
External setting (1.5 to 6.0)	S-8540D00FN-IMBT2G	S-8541D00FN-IMET2G

**Remark** Please contact our sales office if a product with an output voltage other than the above is required.

**STEP-DOWN, SYNCHRONOUS PWM CONTROL SWITCHING REGULATOR CONTROLLER**

**S-8533 series**

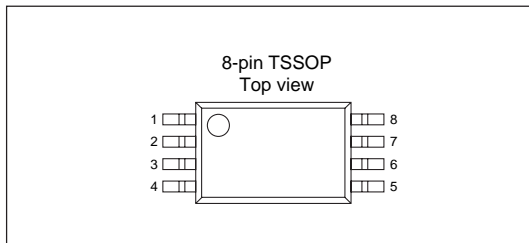
The S-8533 series is a synchronous PWM control CMOS step-down switching regulator controller that includes a reference voltage source, a synchronous rectification circuit, an oscillation circuit, an error amplifier, a phase compensation circuit, and a PWM controller.

An efficient step-down switching regulator can be realized simply by adding external Pch and Nch power MOS FETs, one coil, and three capacitors.

Since the oscillation frequency is a high 300 kHz, the S-8533 can be used to configure a high efficiency step-down switching regulator capable of driving high output current using small external components. Because of the synchronous rectification operation of the S-8533 series, a 3 to 10% increase in efficiency is obtained compared to conventional step-down switching regulators.

The 8-pin TSSOP and high oscillation frequency make the S-8533 ideal as the main power supply for portable devices.

**■ PIN CONFIGURATIONS**



Pin No.	Symbol	Description
1	NC	No connection
2	VOUT	Output voltage pin
3	ON / OFF	Shutdown pin "H": Usual operation (step-down operation) "L": Step-down stopped (all circuits stopped)
4	CSS	Soft start capacitor connection pin
5	VSS	GND pin
6	NDRV	External Nch connection pin
7	PDRV	External Pch connection pin
8	VIN	IC power supply pin

**■ FEATURES**

- Synchronous rectification system realizing high efficiency (typ. 94%)
- Use at maximum duty = 100% and use of a battery up to maximum life is possible by using Pch and Nch MOS transistors on the MOS.
- Oscillation frequency: 300 kHz
- Input voltage: 2.7 to 16.0 V
- Output voltage: 1.25, 1.3 to 6.0 V (Selectable in 0.1 V steps)
- Output voltage accuracy: ±2.0%
- Soft start function: Can be set by external capacitor CSS.
- Shutdown function
- Small package: 8-pin TSSOP

**■ APPLICATIONS**

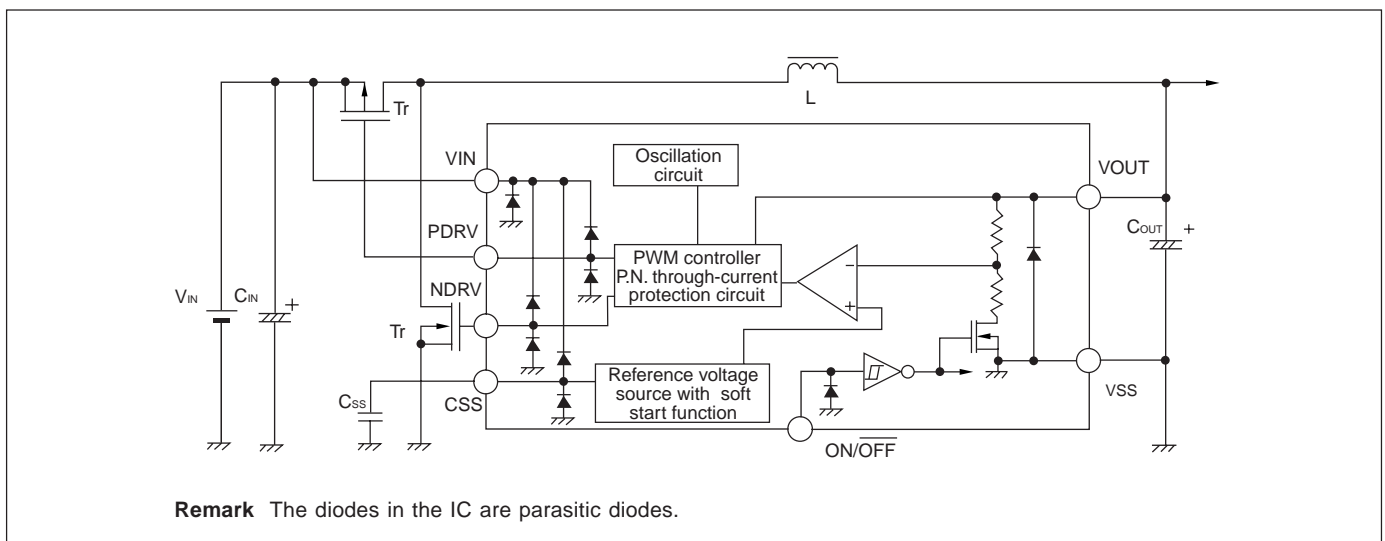
- Constant voltage power supply for hard disk and DVD drives
- Power supply for portable devices, such as digital cameras, PDAs, electronic organizers, and cellular phones
- Main or sub power supply of notebook computers and peripheral equipment
- Constant voltage power supply of cameras, video equipment, and communications devices

**■ SELECTION GUIDE**

Output voltage	8-pin TSSOP (3000/reel)
1.25V	S-8533A125FT-TB-G
1.5V	S-8533A15AFT-TB-G
1.8V	S-8533A18AFT-TB-G
2.5V	S-8533A25AFT-TB-G
2.7V	S-8533A27AFT-TB-G
3.3V	S-8533A33AFT-TB-G
5.0V	S-8533A50AFT-TB-G

**Remark** Please contact our sales office if a product with an output voltage other than the above is required.

**■ BLOCK DIAGRAM AND CIRCUIT CONNECTION EXAMPLE**





## STEP-UP OR DOWN, SINGLE-COIL, PWM CONTROL SWITCHING REGULATOR CONTROLLER

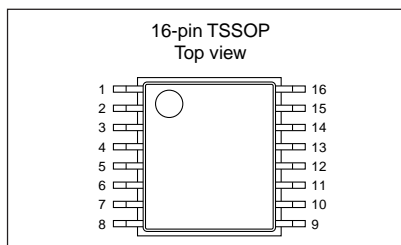
S-8460

The S-8460 is a PWM control CMOS step-down switching regulator controller that includes a PWM step-up/down automatic switching circuit, a reference voltage circuit, an oscillation circuit, an error amplifier, a phase compensation circuit, and a PWM controller. The PWM step-up/down automatic switching control circuit realizes a highly efficient step-up/down switching regulator using one coil. Furthermore, efficient and large output current is enabled by externally attaching an N channel power MOS FET. Moreover, the PWM controller, which can vary the duty ratio linearly from 0%, and the optimally designed error amplification circuit and phase compensation circuit realize low ripple and good transient response characteristics.

### APPLICATIONS

- Power supply for portable devices, such as PDAs, electronic organizers, and cellular phones
- Main or the sub power supply of notebook computers and peripheral equipment
- Constant voltage power supply of cameras, video equipment, and communications.
- Available from 2 dry battery cells and 1 lithium cell to AC adapter

### PIN CONFIGURATION

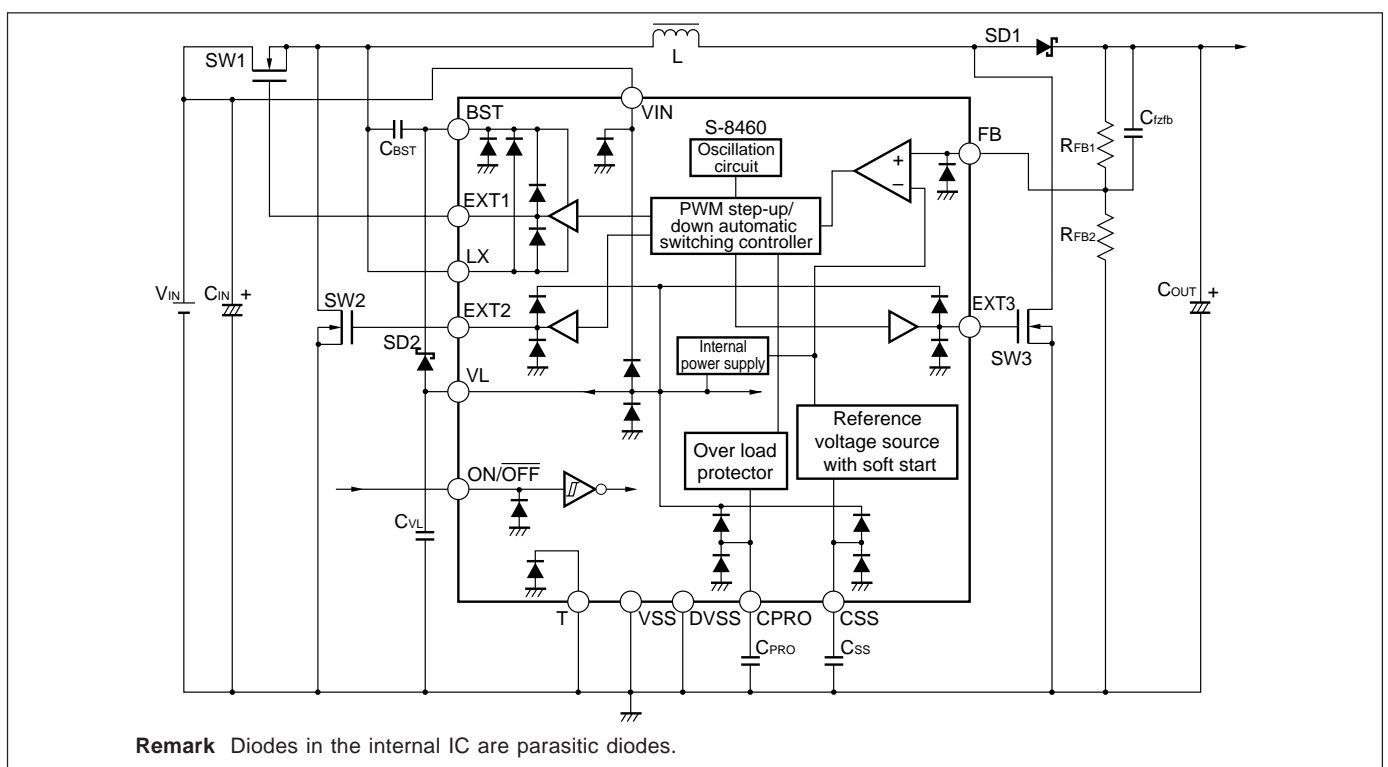


Pin No.	Symbol	Description
1	VIN	IC power supply pin
2	VL	Boost power supply pin
3	ON/OFF	Shutdown pin "H": Usual operation (step-up/down). "L": All circuits stopped (step-up/step-down stopped)
4	VSS	GND pin
5	CSS	Soft start capacity connection pin
6	CPRO	Protection time setting capacity connection pin
7	T	Test pin, usually connected to GND
8	N.C.	Non connection
9	FB	FB pin
10	N.C.	Non connection
11	EXT3	External transistor drive pin 3
12	DVSS	Digital GND pin
13	EXT2	External transistor drive pin 2
14	LX	Coil connection pin
15	EXT1	External transistor drive pin 1
16	BST	Boost capacitor pin for SW1 drive

### PRODUCT

- S-8460B00AFT-TB-G

### BLOCK DIAGRAM AND CIRCUIT CONNECTION EXAMPLE



### FEATURES

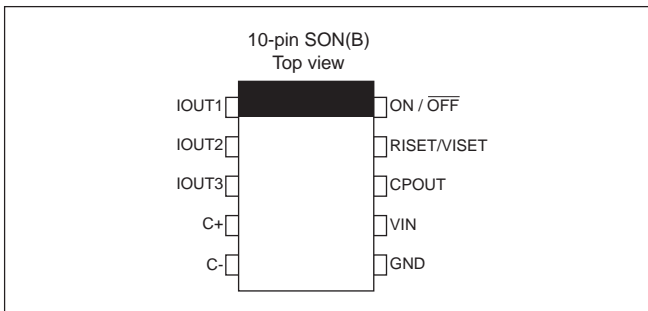
- Single-coil step-up/down automatic switchover method realizing high efficiency
- High efficiency is realized by using only N-ch power MOS for external power MOS
- Automatic recoverable overload protection circuit built-in
- FB pin voltage:  $V_{FB} = 1.0\text{ V}$
- FB pin voltage accuracy:  $\pm 2.0\%$
- Oscillation frequency: 300 kHz
- Package: 16-pin TSSOP
- Output voltage: 2.5 to 6.0 V
- Input voltage: 2.2 to 18.0 V, input from 2 dry cells and one lithium cell to an AC adapter supported.
- Soft start function: Can be set by external capacitor  $C_{SS}$ .
- Shutdown function

## 3-CHANNEL WHITE LED DRIVER IC (CHARGE PUMP IC WITH BUILT-IN CONSTANT CURRENT CIRCUIT)

S-8813 series

The S-8813 series is a CMOS charge pump DC-DC converter with a built-in constant current circuit. The constant current output feature is ideal for the power supply of LEDs. There are three output channels so three LEDs can be driven. Variable voltage and variable current setting resistor types are available. Since small ceramic capacitors can be used for the external capacitors such as the pump capacitor, input capacitor, and output capacitor, the mounting area can be minimized.

### PIN CONFIGURATION



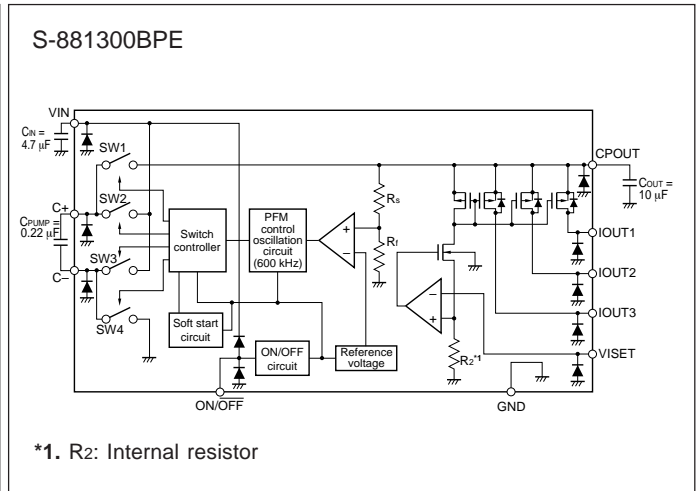
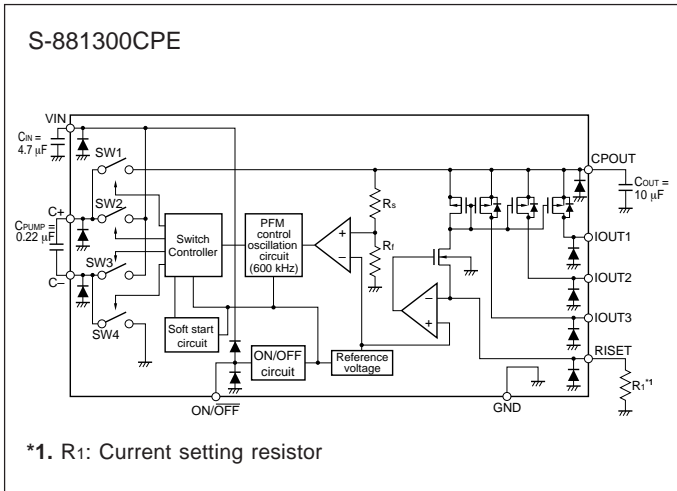
### FEATURES

- PFM control CMOS charge pump
- Built-in constant current circuit
- Power supply voltage: 2.7 to 4.5 V
- Output current value:
  - The two types, a current variable enable variable voltage type and a current setting variable resistor type, are available between 5.0 mA and 18.0 mA (When  $V_{IOUT1,2,3} \leq 4.0$  V,  $V_{IN} = 3.0$  V)
- Output current dispersion among pins:  $\pm 1\%$  max.
- Built-in soft start circuit: 1.5 ms typ.
- Constant current output pin: 3 ch  $\pm 5\%$  precision
- Oscillation frequency: 600 kHz typ.
- ON/OFF function available (during standby: 1  $\mu$ A max.)
- Light control function: Variable via external resistor (S-881300CPE)  
Variable via external input voltage (S-881300BPE)  
Variable via PWM signal (S-881300CPE)
- Ultra-small package: 10-pin SON(B)

### APPLICATIONS

- Power supply for white LED display backlight
- Constant current circuit
- Cellular phone and PDA with 1 cell lithium battery
- Power supply for flat panel display

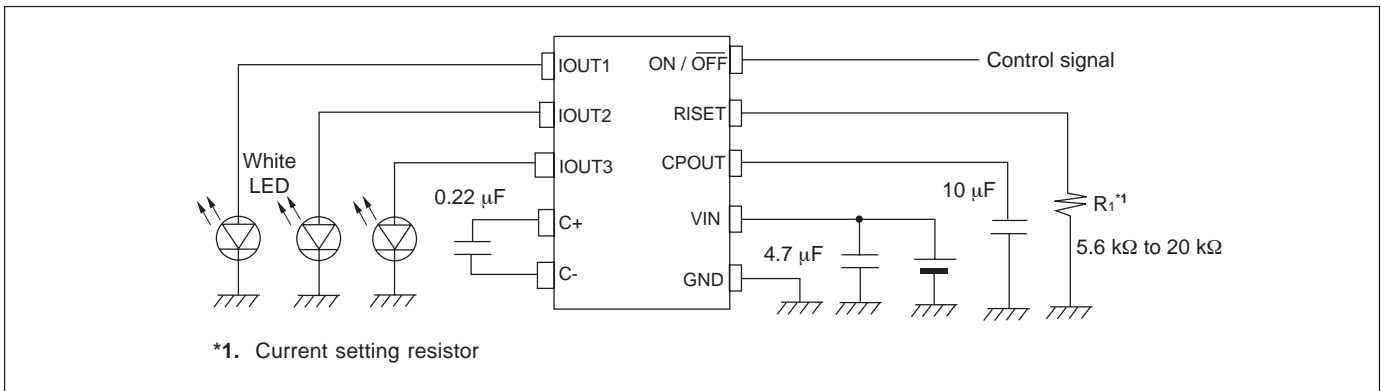
### BLOCK DIAGRAM



### PRODUCTS

- S-881300CPE-IPATFG (Current setting variable resistor type)
- S-881300BPE-IOQTFG (Variable voltage type)

### APPLICATION CIRCUIT EXAMPLE (Current setting variable resistor type: S-881300CPE-IPATFG)



## STEP-UP CHARGE PUMP DC-DC CONVERTER

S-8821 series

The S-8821 series is a CMOS step-up charge pump DC-DC converter with a voltage regulation function. The S-8821 series consists of an oscillation circuit, a controller, a reference voltage circuit, an error amplifier circuit, and an output switching transistor, and can regulate the output voltage by PFM control. Since small ceramic capacitors can be used for the pump capacitor, input capacitor, and output capacitor, the mounting area can be minimized.

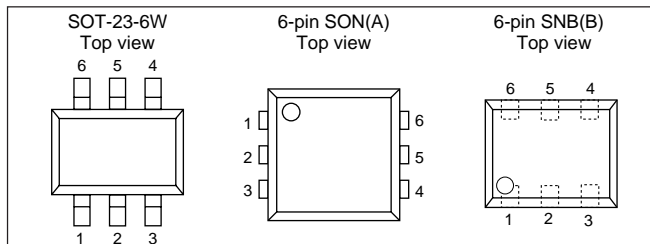
### FEATURES

- Step-up CMOS charge pump
- Power supply voltage: 1.6 to 5.0 V
- Output voltage: 2.5 to 5.5 V (selectable in 0.1 V steps)
- Output voltage accuracy:  $\pm 2\%$
- Output current: 25 mA ( $V_{IN} = (V_{OUT(S)} \times 0.8)$  V)
- Oscillation frequency: 1.0 MHz
- ON/OFF function
- Ultra-small package: 6-pin SON(A), SOT-23-6W, and 6-pin SNB(B)

### APPLICATIONS

- Lithium ion battery driven applications
- Local power supply

### PIN CONFIGURATIONS

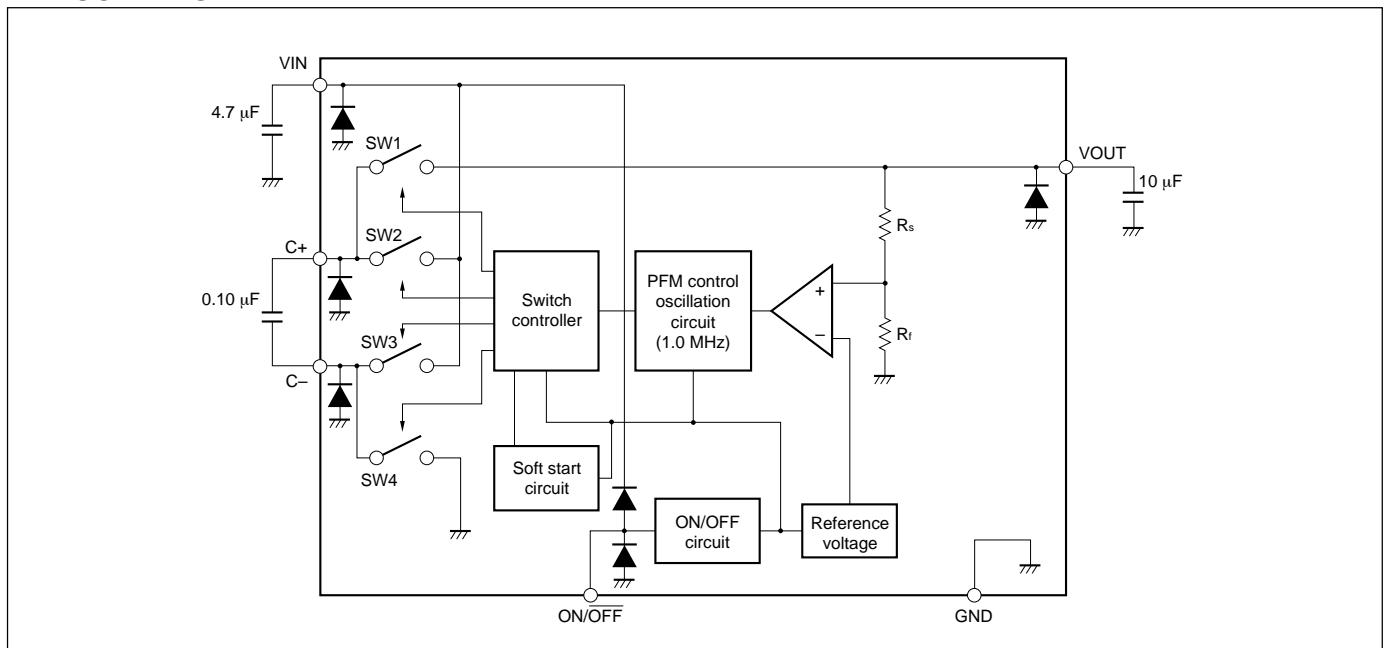


SOT-23-6W	Pin No.		Symbol	Description
	6-pin SON(A)	6-pin SNB(B)		
1	5	6	VIN	Voltage input pin
2	4	5	C+	Charge-pump pump capacitor connection pin (positive pin)
3	3	4	C-	Charge-pump pump capacitor connection pin (negative pin)
4	1	3	ON/OFF	Shutdown pin High level (H): normal operation (step-up) Low level (L): step-up halt (all circuits halt)
5	2	2	GND	GND pin
6	6	1	VOUT	Voltage output pin

### SELECTION GUIDE

Output voltage	SOT-23-6W	6-pin SON(A)	6-pin SNB(B)
2.5V	S-882125AMH-M2ATFG	-	-
3.0V	S-882130AMH-M2FTFG	S-882130APB-M2FTFG	S-882130ABD-M2F-TF
3.3V	S-882133AMH-M2ITFG	S-882133APB-M2ITFG	S-882133ABD-M2I-TF
3.6V	S-882136AMH-M2LTFG	-	-
4.5V	S-882145AMH-M2UTFG	-	-
5.0V	S-882150AMH-M2ZTFG	S-882150APB-M2ZTFG	S-882150ABD-M2Z-TF
5.2V	S-882152AMH-M3BTFG	-	-
5.5V	S-882155AMH-M3ETFG	-	-

### BLOCK DIAGRAM



## ULTRA-LOW VOLTAGE OPERATION CHARGE PUMP IC FOR STEP-UP DC-DC CONVERTER STARTUP

► NEW S-882Z series

The S-882Z series is a charge pump IC for step-up DC-DC converter startup, which differs from conventional charge pump ICs, in that it uses fully depleted SOI (Silicon on Insulator) technology to enable ultra-low voltage operation. Being capable of stepping up an extremely low input voltage of 0.3 to 0.35 V, this series enables the efficient use of very low energy levels. The stepped up electric power is stored in a startup capacitor, and it is discharged as the startup power of the step-up DC-DC converter when the startup capacitor reaches the discharge start voltage level.

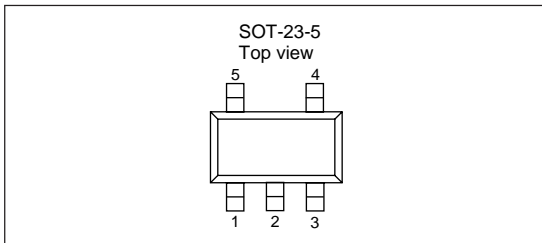
### FEATURES

- Operating input voltage: 0.3 to 3.0 V
- Current consumption:
  - During operation : 0.5 mA max. (at  $V_{IN} = 0.3$  V)
  - During shutdown : 0.6  $\mu$ A max. (at  $V_{IN} = 0.3$  V)
- Discharge start voltage: 1.8 to 2.4 V (selectable in 0.2 V steps)
- Shutdown voltage: Discharge start voltage +0.1 V (fixed)
- Oscillation frequency: 350 kHz typ. (at  $V_{IN} = 0.3$  V)
- Small package: SOT-23-5 package
- External component: Startup capacitor ( $C_{CPOUT}$ ), 1 unit

### APPLICATIONS

- Stepping up from low-voltage power supply such as solar cell and fuel cell
- Stepping up internal power supply voltage of RF tag
- Intermittent power supply to intermittently operating system

### PIN CONFIGURATIONS



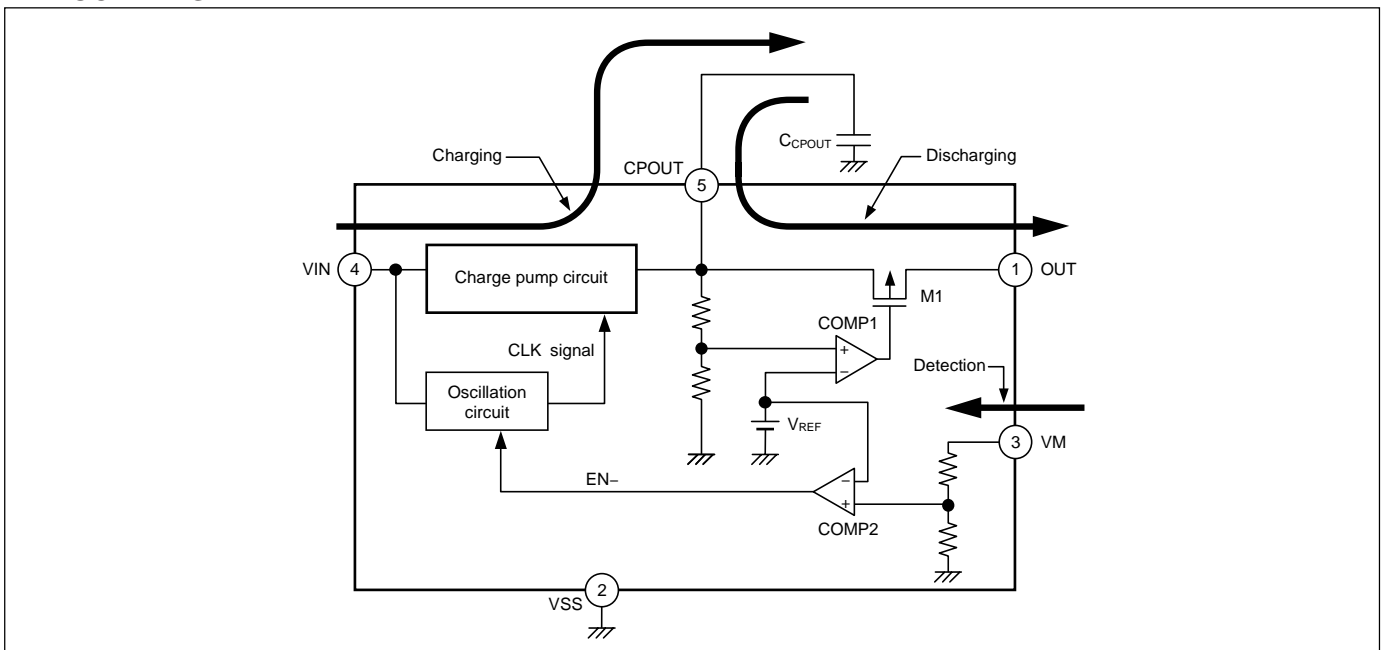
Pin No.	Symbol	Description
1	OUT	Output pin (step-up DC-DC converter connection pin)
2	VSS	GND pin
3	VM	Step-up DC-DC converter output voltage monitor pin
4	VIN	Power supply input pin
5	CPOUT	Startup capacitor connection pin

### SELECTION GUIDE

Discharge start voltage	Shutdown voltage	SOT-23-5
$1.8V \pm 0.1V$	$1.9V \pm 0.1V$	S-882Z18-M5T1G
$2.0V \pm 0.1V$	$2.1V \pm 0.1V$	S-882Z20-M5T1G
$2.2V \pm 0.1V$	$2.3V \pm 0.1V$	S-882Z22-M5T1G
$2.4V \pm 0.1V$	$2.5V \pm 0.1V$	S-882Z24-M5T1G

**Remark** Contact our sales office for products with discharge start voltage other than those specified above.

### BLOCK DIAGRAM

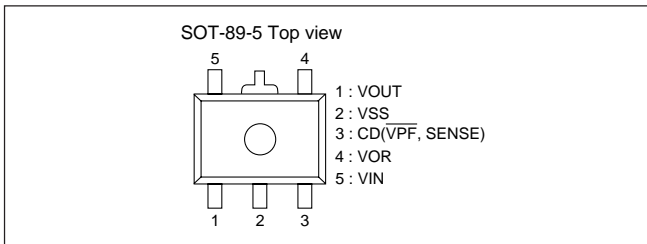


## HIGH WITHSTANDING-VOLTAGE VOLTAGE REGULATOR WITH RESET FUNCTION

S-87x series

The S-87x series is a low-current-consuming, high-operation-voltage regulator with a reset function that integrates a highly precise voltage detection circuit and a voltage regulator on a single chip. The output voltage and detection voltage are fixed internally and have a  $\pm 2.4\%$  accuracy. The S-87x series basically consists of a voltage detector, a voltage regulator, and a short-circuit protection circuit with selection of a delay circuit or a shutdown function also possible. The package is the SOT-89-5.

### PIN CONFIGURATION



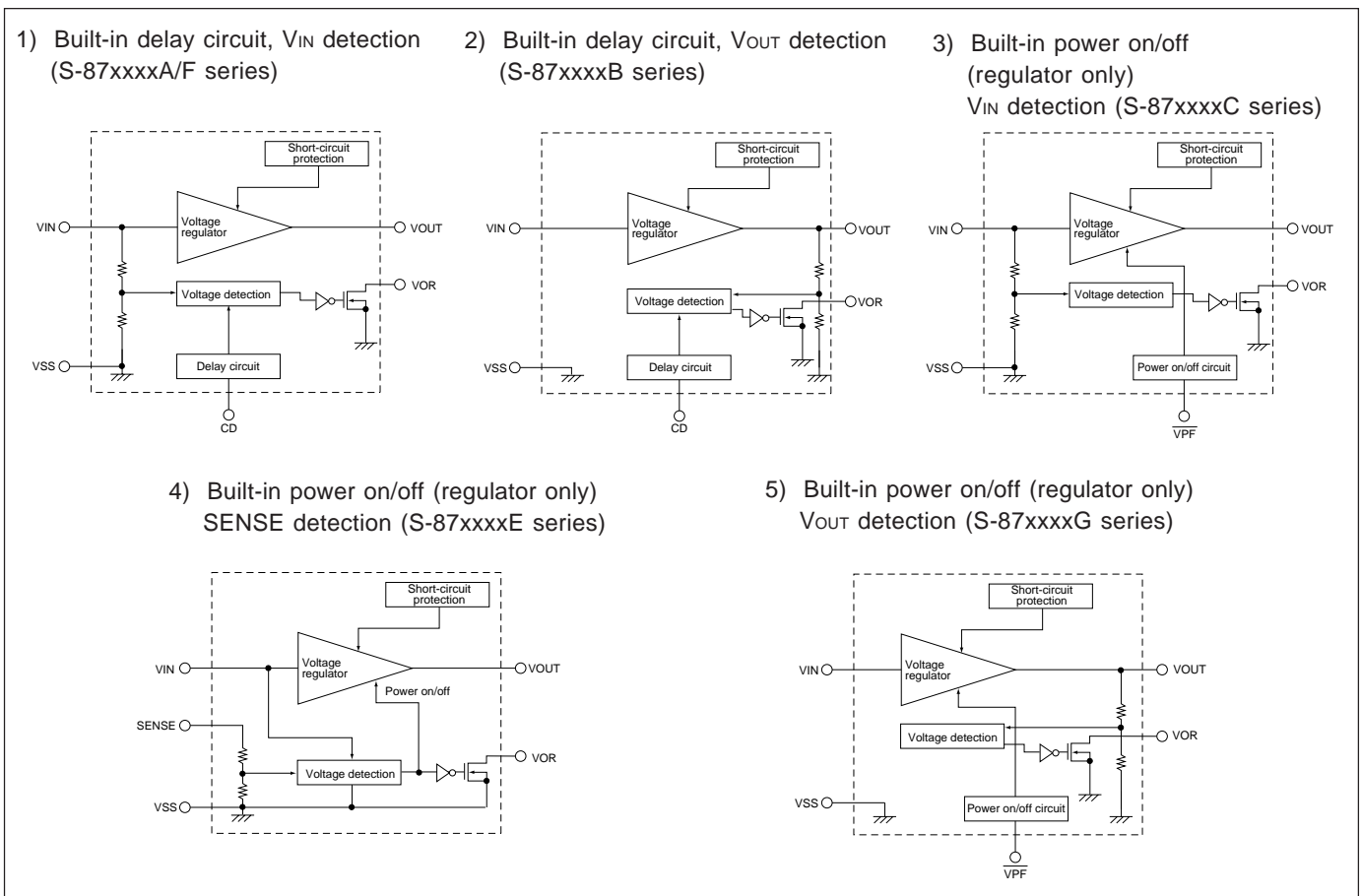
### FEATURES

- Output voltage range: 2.6 V to 5.8 V (0.1 V steps)
- Output voltage accuracy:  $\pm 2.4\%$
- Detection voltage range: 2.1 V to 11.3 V (0.1 V steps)
- Detection voltage accuracy:  $\pm 2.4\%$  (for S-87xxxxF series, release voltage  $\pm 1.1\%$ )
- Low I/O voltage difference: 0.15 V typ. ( $I_{OUT} = 30$  mA,  $V_{OUT} = 5.0$  V)
- Low current consumption: 0.45 V typ. ( $I_{OUT} = 30$  mA,  $V_{OUT} = 3.0$  V)
- Low current consumption: 8  $\mu$ A max. (during operation)
- Low current consumption: 3.5  $\mu$ A max. (during power-off)
- Wide operating voltage range: 24 V max.
- Wide operating temperature range:  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
- Built-in delay circuit or shutdown circuit: 27 ms typ. (S-87xxxxA/B/F series,  $C_D = 4.7$  nF)
- Small package: SOT-89-5
- Built-in short-circuit protection

### APPLICATIONS

- Constant voltage power supply or reset circuit of battery-powered equipment
- VTRs, cameras, communications equipment, or others
- Lithium-ion rechargeable battery packs

### BLOCK DIAGRAM



### FUNCTION TABLE

Series name	Voltage detector (VD)	Detection voltage accuracy (%)	Release voltage accuracy (%)	Built-in delay circuit	Power-off function for regulator
S-87xxxxA	$V_{IN}$ detection	$\pm 2.4\%$	-	Yes	No
S-87xxxxB	$V_{OUT}$ detection	$\pm 2.4\%$	-	Yes	No
S-87xxxxC	$V_{IN}$ detection	$\pm 2.4\%$	-	No	Yes
S-87xxxxE	SENSE detection	$\pm 2.4\%$	-	No	Yes
S-87xxxxF	$V_{IN}$ detection	-	$\pm 1.1\%$	Yes	No
S-87xxxxG	$V_{OUT}$ detection	$\pm 2.4\%$	-	No	Yes



## SELECTION GUIDE

(1000/reel)

VR output voltage	VD detection voltage	S-87xxxxA series	S-87xxxxB series	S-87xxxxC series	S-87xxxxG series
5.6V	3.5V	-	S-875635BUP-AGAT2G	-	-
5.2V	9.4V	-	-	S-875294CUP-AHCT2G	-
5.2V	7.1V	-	-	S-875271CUP-AHAT2G	-
5.2V	5.5V	-	-	S-875255CUP-AHBT2G	-
5.0V	11.0V	-	-	S-8750B0CUP-ACGT2G	-
5.0V	7.7V	S-875077AUP-AAFT2G	-	S-875077CUP-ACFT2G	-
5.0V	6.1V	-	-	S-875061CUP-ACHT2G	-
5.0V	4.5V	S-875045AUP-AAAT2G	S-875045BUP-ABAT2G	S-875045CUP-ACAT2G	-
5.0V	4.3V	S-875043AUP-AABT2G	S-875043BUP-ABBT2G	S-875043CUP-ACBT2G	-
5.0V	4.2V	-	-	-	S-875042GUP-ANCT2G
5.0V	4.1V	S-875041AUP-AACT2G	S-875041BUP-ABCT2G	S-875041CUP-ACCT2G	-
5.0V	3.9V	S-875039AUP-AADT2G	S-875039BUP-ABDT2G	S-875039CUP-ACDT2G	-
5.0V	3.7V	S-875037AUP-AAET2G	S-875037BUP-ABET2G	S-875037CUP-ACET2G	S-875037GUP-ANET2G
5.0V	3.4V	-	S-875034BUP-ABFT2G	-	-
5.0V	2.9V	-	S-875029BUP-ABHT2G	-	-
5.0V	2.1V	-	S-875021BUP-ABGT2G	-	-
3.3V	7.7V	S-873377AUP-OAAT2G	-	-	-
3.3V	6.1V	-	-	S-873361CUP-AOHT2G	-
3.3V	4.1V	-	-	S-873341CUP-AOCT2G	-
3.3V	2.8V	S-873328AUP-OABT2G	-	-	-
3.3V	2.5V	-	S-873325BUP-ALAT2G	-	-
3.0V	6.9V	-	-	S-873069CUP-AFFT2G	-
3.0V	5.9V	-	-	S-873059CUP-AFGT2G	-
3.0V	2.5V	S-873025AUP-ADAT2G	S-873025BUP-AEAT2G	S-873025CUP-AFAT2G	-
3.0V	2.4V	S-873024AUP-ADBT2G	S-873024BUP-AEBT2G	S-873024CUP-AFBT2G	-
3.0V	2.3V	S-873023AUP-ADCT2G	S-873023BUP-AECT2G	S-873023CUP-AFCT2G	-
3.0V	2.2V	S-873022AUP-ADDT2G	S-873022BUP-AEDT2G	S-873022CUP-AFDT2G	-
3.0V	2.1V	S-873021AUP-ADET2G	S-873021BUP-AEET2G	S-873021CUP-AFET2G	-
2.6V	2.2V	-	S-872622BUP-OLAT2G	-	-

VR output voltage	VD detection voltage	S-87xxxxE series
5.0V	11.0V	S-8750B0EUP-AJIT2G
5.0V	8.7V	S-875087EUP-AJGT2G
5.0V	7.7V	S-875077EUP-AJFT2G
5.0V	6.1V	S-875061EUP-AJHT2G
5.0V	3.3V	S-875033EUP-AJAT2G
5.0V	3.0V	S-875030EUP-AJBT2G
3.3V	11.0V	S-8733B0EUP-APCT2G
3.3V	10.0V	S-8733A0EUP-APFT2G
3.3V	8.2V	S-873382EUP-APHT2G
3.3V	7.2V	S-873372EUP-APET2G
3.3V	6.4V	S-873364EUP-APGT2G
3.3V	4.8V	S-873348EUP-APDT2G
3.3V	3.0V	S-873330EUP-APBT2G
3.0V	11.3V	S-8730B3EUP-AMFT2G
3.0V	8.2V	S-873082EUP-AMCT2G
3.0V	6.2V	S-873062EUP-AMBT2G
3.0V	5.0V	S-873050EUP-AMET2G
3.0V	4.2V	S-873042EUP-AMDT2G

VR output voltage	VD release voltage	S-87xxxxF series
5.0V	8.7V	S-875087FUP-AKAT2G

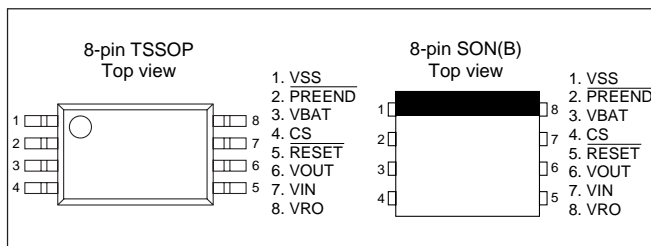
**Remark** Be sure to design all applications of the S-87x series with emphasis on safety.

The S-8424A series is a CMOS IC designed for use in the switching circuits of primary and backup power supplies. It consists of two voltage regulators, three voltage detectors, a power supply switch and its controller, as well as other functions on a single chip.

In addition to the switching function between the primary and backup power supply, the S-8424A series can provide the microcontrollers with three types of voltage detection output signals corresponding to the power supply voltage.

Moreover adopting a special sequence for switch control enables the effective use of the backup power supply, making this IC ideal for configuring a backup system.

### PIN CONFIGURATION



### FEATURES

- Low current consumption
  - 15  $\mu$ A max. ( $V_{IN} = 6$  V, during normal operation)
  - 2.1  $\mu$ A max. (during backup)
- Voltage regulator
  - Output voltage accuracy:  $\pm 2\%$
  - Output voltage: 2.3 V to 5.4 V (selectable in 0.1 V steps)
- Three built-in voltage detectors (CS, PREEND, RESET)
  - Detection voltage accuracy:  $\pm 2\%$
  - Detection voltage: 2.4 V to 5.3 V (selectable in 0.1 V steps) (CS voltage detector)
  - 1.7 V to 3.4 V (selectable in 0.1 V steps) (PREEND, RESET voltage detector)
- Switching circuit for primary power supply and backup power supply configurable on one chip
- Efficient use of backup power supply possible
- Special sequence

Backup voltage is not output when the primary power supply voltage does not reach the initial voltage at which the switch unit operates.

- Package: 8-pin TSSOP  
8-pin SON(B)

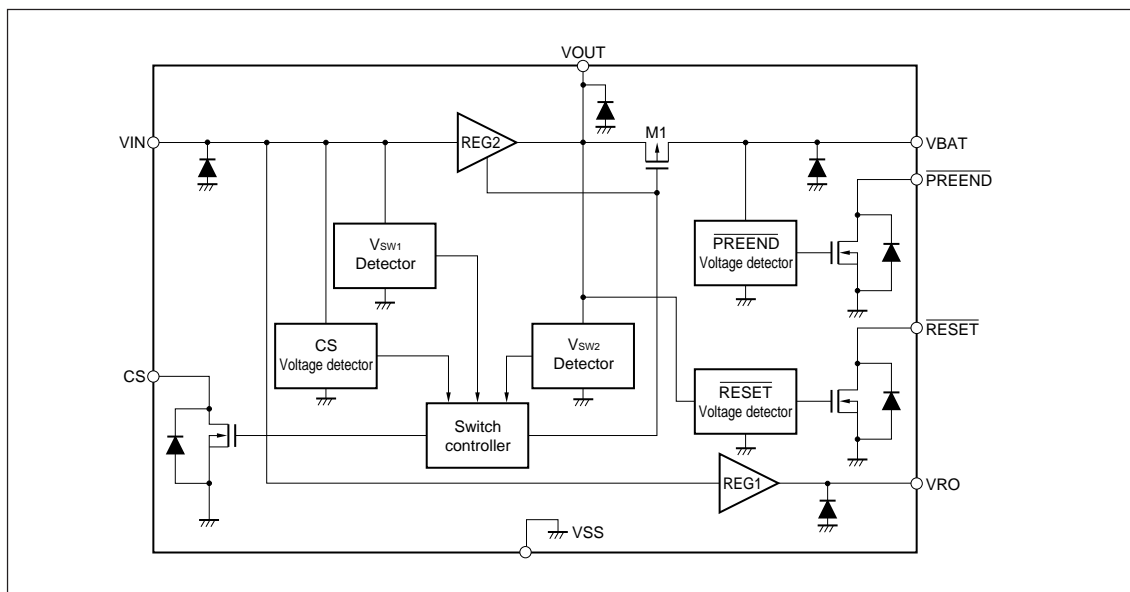
### APPLICATIONS

- Camcorders
- Digital still cameras
- Memory cards
- SRAM backup equipment

### SELECTION GUIDE

Item	Package	Output voltage (V)		CS voltage (V)		RESET voltage (V)		PREEND voltage (V)		Switch voltage (V)
		V <sub>RO</sub>	V <sub>OUT</sub>	-V <sub>DET1</sub>	+V <sub>DET1</sub>	-V <sub>DET2</sub>	+V <sub>DET2</sub>	-V <sub>DET3</sub>	+V <sub>DET3</sub>	V <sub>SW1</sub>
S-8424AAAF-TB-G	8-pin TSSOP	3.000	3.000	3.300	3.401	2.200	2.312	2.600	2.748	+V <sub>DET1</sub> × 0.85
S-8424AAAP-TF-G	8-pin SON(B)	3.000	3.000	4.000	4.129	2.300	2.420	2.500	2.640	+V <sub>DET1</sub> × 0.77
S-8424AABF-TB-G	8-pin TSSOP	3.300	3.300	4.000	4.129	2.300	2.420	2.500	2.640	+V <sub>DET1</sub> × 0.77
S-8424AACF-TB-G	8-pin TSSOP	3.200	3.200	3.300	3.401	2.400	2.528	2.600	2.748	+V <sub>DET1</sub> × 0.85
S-8424AADF-TB-G	8-pin TSSOP	5.000	5.000	4.600	4.753	2.300	2.420	2.500	2.640	+V <sub>DET1</sub> × 0.77
S-8424AAEF-TB-G	8-pin TSSOP	3.150	3.150	4.200	4.337	2.300	2.420	2.500	2.640	+V <sub>DET1</sub> × 0.77
S-8424AAFF-TB-G	8-pin TSSOP	3.200	3.200	4.400	4.545	2.400	2.528	2.600	2.748	+V <sub>DET1</sub> × 0.77
S-8424AAGF-TB-G	8-pin TSSOP	2.800	2.800	4.400	4.545	2.400	2.528	2.600	2.748	+V <sub>DET1</sub> × 0.77
S-8424AAHF-TB-G	8-pin TSSOP	5.000	5.000	4.600	4.753	2.550	2.690	2.700	2.856	+V <sub>DET1</sub> × 0.77
S-8424AAJF-TB-G	8-pin TSSOP	3.100	3.100	4.400	4.545	2.200	2.312	2.600	2.748	+V <sub>DET1</sub> × 0.77
S-8424AAKF-TB-G	8-pin TSSOP	3.200	3.200	4.600	4.753	2.400	2.528	2.600	2.748	+V <sub>DET1</sub> × 0.77

### BLOCK DIAGRAM



**BATTERY BACKUP IC**

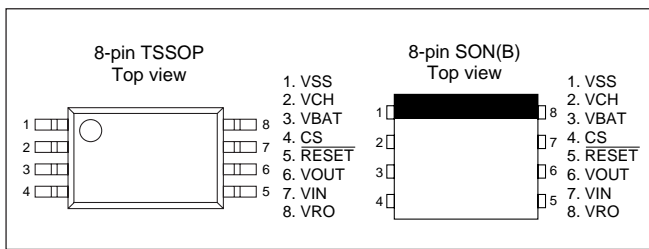
**S-8425 series**

The S-8425 series is a CMOS IC designed for use in the switching circuits of primary and backup power supplies. It consists of three voltage regulators, two voltage detectors, a power supply switch and its controller, as well as other functions on a single chip.

In addition to the function for switching between the primary and backup power supply, the S-8425 series can provide microcontrollers with two types of voltage detection output signals corresponding to the power supply voltage.

Moreover, adopting a special sequence for switch control enables the effective use of the backup power supply, making this IC ideal for configuring a backup system.

**■ PIN CONFIGURATION**



**■ FEATURES**

- Low current consumption
  - 15  $\mu$ A max. ( $V_{IN} = 6$  V, during normal operation)
  - 2.1  $\mu$ A max. (during backup)
- Voltage regulator
  - Output voltage accuracy:  $\pm 2\%$
  - Output voltage: Independently selectable in 0.1 V steps in the range of 2.3 V to 5.4 V
- Two built-in voltage detectors (CS, RESET)
  - Detection voltage accuracy:  $\pm 2\%$
  - Detection voltage: Selectable in 0.1 V steps in the range of 2.4 V to 5.3 V (CS voltage detector)  
Selectable in 0.1 V steps in the range of 1.7 V to 3.4 V (RESET voltage detector)
- RESET release delay: 300  $\mu$ s min.
- Switching circuit for primary power supply and backup power supply configurable on one chip
- Efficient use of backup power supply possible
- Special sequence
  - Backup voltage is not output when the primary power supply voltage does not reach the initial voltage at which the switch unit operates.
- Package: 8-pin TSSOP  
8-pin SON(B)

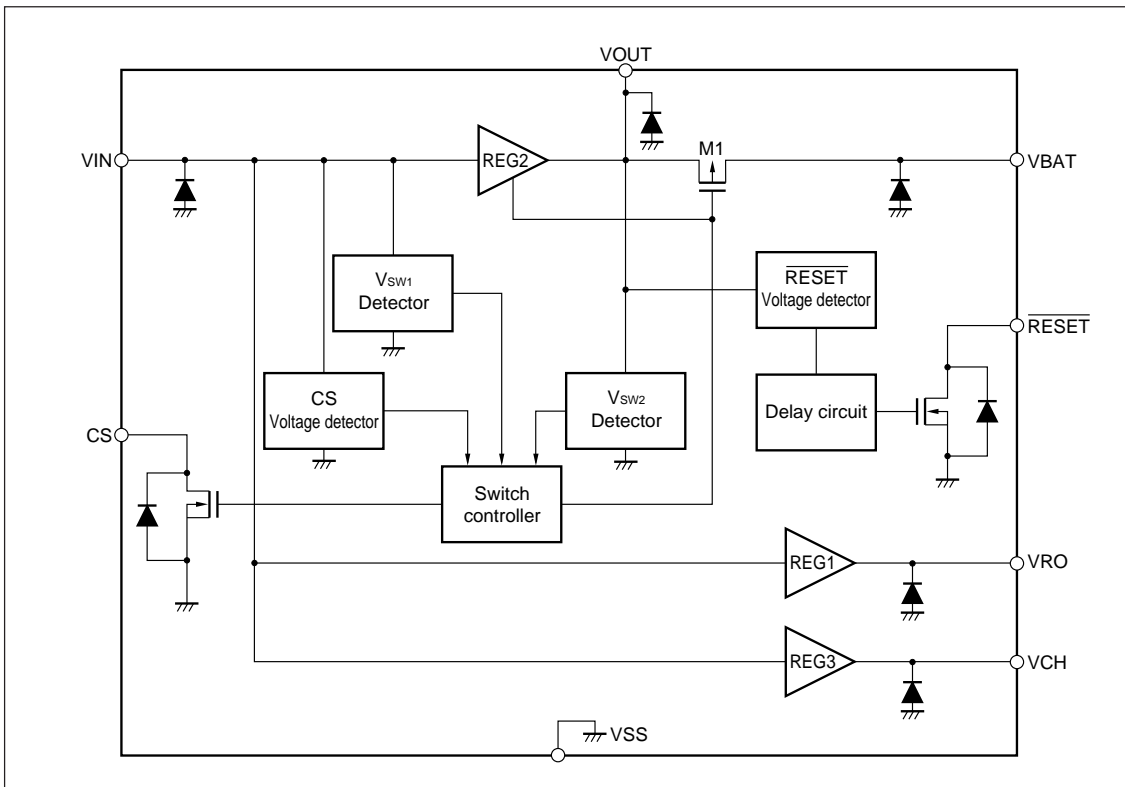
**■ APPLICATIONS**

- Camcorders
- Digital still cameras
- Memory cards
- SRAM backup equipment

**■ SELECTION GUIDE**

Item	Package	Output voltage (V)			CS voltage (V)		RESET voltage (V)		Switch voltage (V)
		VRO	VOUT	VCH	-VDET1	+VDET1	-VDET2	+VDET2	V <sub>SW1</sub>
S-8425AAAF-TB-G	8-pin TSSOP	3.000	3.000	3.300	3.300	3.401	2.200	2.312	+V <sub>DET1</sub> × 0.85
S-8425AAAP-TF-G	8-pin SON(B)	3.000	3.000	3.300	3.300	3.401	2.200	2.312	+V <sub>DET1</sub> × 0.85

**■ BLOCK DIAGRAM**



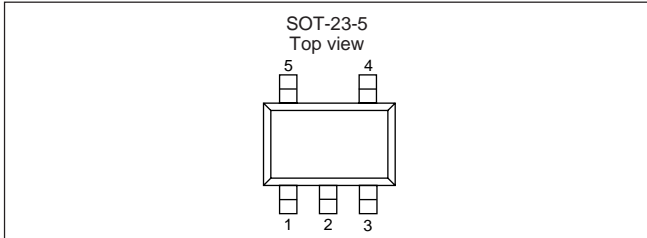
## BATTERY PROTECTION IC FOR 1-CELL PACK

▶ NEW

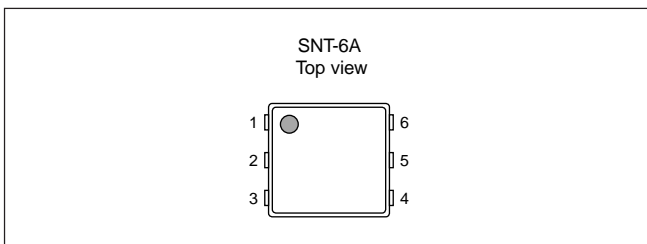
S-8211A/C series

The S-8211A/C series are protection ICs for single-cell lithium-ion/lithium-polymer rechargeable batteries and include high-accuracy voltage detectors and delay circuits. These ICs are suitable for protecting single-cell rechargeable lithium-ion/lithium-polymer battery packs from overcharge, overdischarge, and overcurrent.

### ■ PIN CONFIGURATION



Pin No.	Symbol	Description
1	VM	Voltage detection between VM pin and VSS pin (Overcurrent/charger detection pin)
2	VDD	Connection for positive power supply input
3	VSS	Connection for negative power supply input
4	DO	Connection of discharge control FET gate (CMOS output)
5	CO	Connection of charge control FET gate (CMOS output)



Pin No.	Symbol	Description
1	NC	No connection
2	CO	Connection of charge control FET gate (CMOS output)
3	DO	Connection of discharge control FET gate (CMOS output)
4	VSS	Connection for negative power supply input
5	VDD	Connection for positive power supply input
6	VM	Voltage detection between VM pin and VSS pin (Overcurrent/charger detection pin)

### ■ FEATURES

- High-accuracy voltage detection circuit
- Overcharge detection voltage:
  - 3.9 to 4.4 V (5 mV steps) Accuracy ±25 mV (+25 °C)
  - Accuracy ±30 mV (-5 to +55°C)
- Overcharge release voltage:
  - 3.8 to 4.4 V<sup>\*1</sup> Accuracy ±50 mV
- Overdischarge detection voltage:
  - 2.0 to 3.0 V (10 mV steps) Accuracy ±50 mV
- Overdischarge release voltage:
  - 2.0 to 3.4 V<sup>\*2</sup> Accuracy ±100 mV
- Discharge overcurrent detection voltage:
  - 0.05 to 0.30 V (10 mV steps) Accuracy ±15 mV
- Load short-circuiting detection voltage:
  - S-8211A series: 1.2 V (fixed) Accuracy ±300 mV
  - S-8211C series: 0.5 V (fixed) Accuracy ±200 mV
- Charge overcurrent detection voltage:
  - 0.1 V (fixed) Accuracy ±30 mV
- Detection delay times are generated by an internal circuit (external capacitors are unnecessary). Accuracy ±20%
- High-withstanding-voltage device is used for charger connection pins (VM pin and CO pin : Absolute maximum rating = 28 V)
- 0 V battery charge function available/unavailable are selectable.
- Shutdown function Yes/No are selectable.
- Wide operating temperature range -40 to +85°C
- Low current consumption
- Operation mode 3.0 μA typ., 5.5 μA max. (+25°C)
- Power-down mode 0.2 μA max. (+25°C)
- Small package: SOT-23-5, SNT-6A

- \*1. Overcharge release voltage = Overcharge detection voltage – Overcharge hysteresis voltage (Overcharge hysteresis voltage can be selected as 0 V or from a range of 0.1 to 0.4 V in 50 mV steps.)
- \*2. Overdischarge release voltage = Overdischarge detection voltage + Overdischarge hysteresis voltage (Overdischarge hysteresis voltage can be selected as 0 V or from a range of 0.1 to 0.7 V in 100 mV steps.)

### ■ APPLICATIONS

- Lithium ion rechargeable battery packs
- Lithium polymer rechargeable battery packs

SELECTION GUIDE

S-8211A series

(1) SOT-23-5

(3000/reel)

Item	Overcharge detection voltage	Overcharge release voltage	Overdischarge detection voltage	Overdischarge release voltage	Discharge overcurrent detection voltage	Load short circuit detection Voltage	Charge overcurrent detection voltage	0 V battery charge function	Delay time combination <sup>*1</sup>	Shutdown function
Product name	V <sub>CU</sub>	V <sub>CL</sub>	V <sub>DL</sub>	V <sub>DU</sub>	V <sub>DIOV</sub>	V <sub>SHORT</sub>	V <sub>CIOV</sub>			
S-8211AAA-M5T1G	4.325V	4.075V	2.50V	2.90V	0.15V	1.2V	-0.1V	Available	(1)	Yes
S-8211AAB-M5T1G	4.325V	4.075V	2.50V	2.90V	0.15V	1.2V	-0.1V	Unavailable	(1)	Yes
S-8211AAC-M5T1G	4.325V	4.075V	2.50V	2.90V	0.15V	1.2V	-0.1V	Unavailable	(2)	No
S-8211AAD-M5T1G	4.350V	4.150V	2.30V	3.00V	0.20V	1.2V	-0.1V	Available	(3)	Yes
S-8211AAE-M5T1G	4.280V	4.180V	2.30V	2.30V	0.12V	1.2V	-0.1V	Available	(4)	Yes
S-8211AAF-M5T1G	4.275V	4.275V	2.30V	2.30V	0.10V	1.2V	-0.1V	Available	(5)	Yes
S-8211AAG-M5T1G	4.275V	4.075V	2.60V	2.90V	0.10V	1.2V	-0.1V	Unavailable	(2)	No
S-8211AAH-M5T1G	4.280V	4.080V	2.30V	2.30V	0.08V	1.2V	-0.1V	Available	(2)	Yes
S-8211AAI-M5T1G	4.280V	4.080V	2.30V	2.30V	0.10V	1.2V	-0.1V	Available	(2)	Yes
S-8211AAK-M5T1G	4.280V	4.080V	2.30V	2.30V	0.13V	1.2V	-0.1V	Unavailable	(2)	Yes
S-8211AAL-M5T1G	4.280V	4.130V	2.60V	3.10V	0.15V	1.2V	-0.1V	Unavailable	(2)	Yes
S-8211AAM-M5T1G	4.280V	4.130V	2.80V	3.10V	0.15V	1.2V	-0.1V	Unavailable	(2)	Yes
S-8211AAO-M5T1G	4.275V	4.075V	2.30V	2.30V	0.12V	1.2V	-0.1V	Available	(5)	Yes
S-8211AAP-M5T1G	4.275V	4.075V	2.30V	2.30V	0.13V	1.2V	-0.1V	Available	(5)	Yes
S-8211AAQ-M5T1G	4.275V	4.075V	2.30V	2.30V	0.15V	1.2V	-0.1V	Available	(5)	Yes
S-8211AAR-M5T1G	4.275V	4.075V	2.30V	2.30V	0.15V	1.2V	-0.1V	Available	(2)	Yes
S-8211AAS-M5T1G	4.280V	4.130V	2.80V	3.10V	0.10V	1.2V	-0.1V	Unavailable	(2)	Yes

\*1. Refer to the delay time combination

Remark Please contact the SII marketing department for the products with detection voltage value other than those specified above.

(2) SNT-6A

(5000/reel)

Item	Overcharge detection voltage	Overcharge release voltage	Overdischarge detection voltage	Overdischarge release voltage	Discharge overcurrent detection voltage	Load short circuit detection Voltage	Charge overcurrent detection voltage	0 V battery charge function	Delay time combination <sup>*1</sup>	Shutdown function
Product name	V <sub>CU</sub>	V <sub>CL</sub>	V <sub>DL</sub>	V <sub>DU</sub>	V <sub>DIOV</sub>	V <sub>SHORT</sub>	V <sub>CIOV</sub>			
S-8211AAA-I6T1G	4.325V	4.075V	2.50V	2.90V	0.15V	1.2V	-0.1V	Available	(1)	Yes
S-8211AAB-I6T1G	4.325V	4.075V	2.50V	2.90V	0.15V	1.2V	-0.1V	Unavailable	(1)	Yes
S-8211AAC-I6T1G	4.325V	4.075V	2.50V	2.90V	0.15V	1.2V	-0.1V	Unavailable	(2)	No
S-8211AAD-I6T1G	4.350V	4.150V	2.30V	3.00V	0.20V	1.2V	-0.1V	Available	(3)	Yes
S-8211AAE-I6T1G	4.280V	4.180V	2.30V	2.30V	0.12V	1.2V	-0.1V	Available	(4)	Yes
S-8211AAF-I6T1G	4.275V	4.275V	2.30V	2.30V	0.10V	1.2V	-0.1V	Available	(5)	Yes
S-8211AAG-I6T1G	4.275V	4.075V	2.60V	2.90V	0.10V	1.2V	-0.1V	Unavailable	(2)	No
S-8211AAH-I6T1G	4.280V	4.080V	2.30V	2.30V	0.08V	1.2V	-0.1V	Available	(2)	Yes
S-8211AAI-I6T1G	4.280V	4.080V	2.30V	2.30V	0.10V	1.2V	-0.1V	Available	(2)	Yes
S-8211AAJ-I6T1G	4.280V	4.080V	2.30V	2.30V	0.10V	1.2V	-0.1V	Unavailable	(2)	Yes
S-8211AAK-I6T1G	4.280V	4.080V	2.30V	2.30V	0.13V	1.2V	-0.1V	Unavailable	(2)	Yes
S-8211AAL-I6T1G	4.280V	4.130V	2.60V	3.10V	0.15V	1.2V	-0.1V	Unavailable	(2)	Yes
S-8211AAM-I6T1G	4.280V	4.130V	2.80V	3.10V	0.15V	1.2V	-0.1V	Unavailable	(2)	Yes
S-8211AAN-I6T1G	4.200V	4.100V	2.80V	2.90V	0.15V	1.2V	-0.1V	Unavailable	(2)	Yes
S-8211AAO-I6T1G	4.275V	4.075V	2.30V	2.30V	0.12V	1.2V	-0.1V	Available	(5)	Yes

\*1. Refer to the delay time combination

Remark Please contact the SII marketing department for the products with detection voltage value other than those specified above.

S-8211C series

(1) SOT-23-5

(3000/reel)

Item	Overcharge detection voltage	Overcharge release voltage	Overdischarge detection voltage	Overdischarge release voltage	Discharge overcurrent detection voltage	Load short circuit detection Voltage	Charge overcurrent detection voltage	0 V battery charge function	Delay time combination <sup>*1</sup>	Shutdown function
Product name	V <sub>CU</sub>	V <sub>CL</sub>	V <sub>DL</sub>	V <sub>DU</sub>	V <sub>DIOV</sub>	V <sub>SHORT</sub>	V <sub>CIOV</sub>			
S-8211CAA-M5T1G	4.275V	4.175V	2.30V	2.40V	0.10V	0.5V	-0.1V	Available	(2)	Yes

\*1. Refer to the delay time combination

Remark Please contact the SII marketing department for the products with detection voltage value other than those specified above.

(2) SNT-6A

(5000/reel)

Item	Overcharge detection voltage	Overcharge release voltage	Overdischarge detection voltage	Overdischarge release voltage	Discharge overcurrent detection voltage	Load short circuit detection Voltage	Charge overcurrent detection voltage	0 V battery charge function	Delay time combination <sup>*1</sup>	Shutdown function
Product name	V <sub>CU</sub>	V <sub>CL</sub>	V <sub>DL</sub>	V <sub>DU</sub>	V <sub>DIOV</sub>	V <sub>SHORT</sub>	V <sub>CIOV</sub>			

\*1. Refer to the delay time combination

Remark Please contact the SII marketing department for the products with detection voltage value other than those specified above.

Delay time combination

Delay time combination	Overcharge detection delay time t <sub>CU</sub>	Overdischarge detection delay time t <sub>DL</sub>	Discharge overcurrent detection delay time t <sub>DIOV</sub>	Load short-circuiting detection delay time t <sub>SHORT</sub>	Charge overcurrent detection delay time t <sub>CIOV</sub>
(1)	1.2s	150ms	9ms	560μs	9 ms
(2)	1.2s	150ms	9ms	300μs	9 ms
(3)	143ms	38ms	18ms	300μs	9 ms
(4)	1.2s	150ms	18ms	300μs	9 ms
(5)	1.2s	38ms	9ms	300μs	9 ms

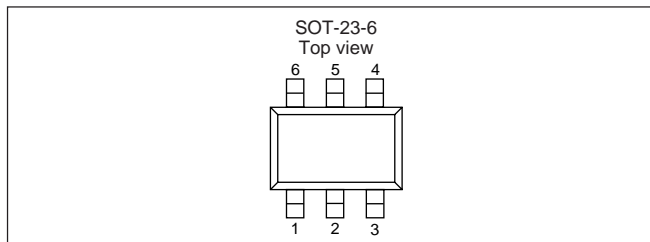


## BATTERY PROTECTION IC FOR 1-CELL PACK

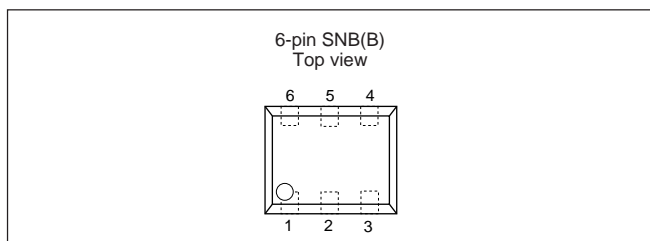
S-8261 series

The S-8261 series is a protection IC for lithium ion/lithium polymer rechargeable batteries and includes a high-precision voltage detection circuit and a delay circuit. This series is the optimal IC for protection against overcharge, overdischarge, and overcurrent in 1-cell lithium ion/lithium-polymer rechargeable battery packs. The withstanding voltage of the charger connection pin is improved compared with the S-8241 series.

### PIN CONFIGURATION



Pin No.	Symbol	Description
1	DO	FET gate connection pin for discharge control (Push-pull (CMOS output))
2	VM	Detection pin of voltage between VM and VSS (Overcurrent detection pin)
3	CO	FET gate connection pin for charge control (Push-pull (CMOS output))
4	DP	Test pin for delay time measurement
5	VDD	Positive power supply input pin
6	VSS	Negative power supply input pin



Pin No.	Symbol	Description
1	CO	FET gate connection pin for charge control (Push-pull (CMOS output))
2	VM	Detection pin of voltage between VM and VSS (Overcurrent detection pin)
3	DO	FET gate connection pin for discharge control (Push-pull (CMOS output))
4	VSS	Negative power supply input pin
5	DP	Test pin for delay time measurement
6	VDD	Positive power supply input pin

### FEATURES

- Built-in high precision voltage detection circuit
  - Overcharge detection voltage: 3.9 V to 4.4 V, accuracy of  $\pm 25$  mV
  - Overcharge hysteresis voltage: 0 V to 0.4 V, accuracy of  $\pm 25$  mV
  - Overdischarge detection voltage: 2.0 V to 3.0 V, accuracy of  $\pm 50$  mV
  - Overdischarge hysteresis voltage: 0 V to 0.7 V, accuracy of  $\pm 50$  mV
  - Overcurrent 1 detection voltage: 0.05 V to 0.3 V, accuracy of  $\pm 15$  mV
  - Overcurrent 2 detection voltage: 0.5 V (fixed), accuracy of  $\pm 100$  mV
- A high withstanding voltage device is used for the charger connection pin. Absolute maximum rating: 28 V
- Various delay times are realized with a built-in circuit only.  $\pm 20\%$  accuracy
- Three-stage overcurrent detection circuit built-in
  - Overcurrent 1, overcurrent 2, load short circuit
- 0 V battery charge function available/unavailable are selectable
- Charger detection function and unusual charge current detection function available
- Low current consumption: 3.5  $\mu$ A typ., 7.0  $\mu$ A max. (during operation)
  - 0.1  $\mu$ A max. (during power-down)
- Wide operating temperature range:  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
- Small package: SOT-23-6  
6-pin SNB(B)

### APPLICATIONS

- Lithium ion rechargeable battery packs
- Lithium polymer rechargeable battery packs

SELECTION GUIDE

Item	Overcharge detection voltage	Overcharge hysteresis voltage	Overdischarge detection voltage	Overdischarge hysteresis voltage	Overcurrent 1 detection voltage	0 V battery charge function	Overcharge detection delay time	Over discharge detection delay time	Overcurrent 1 detection delay time
S-8261AAGMD-G2GT2G	4.28V	0.2V	2.3V	0V	0.16V	Available	1.2s	144ms	9ms
S-8261AAHMD-G2HT2G	4.28V	0.2V	2.3V	0V	0.08V	Available	1.2s	144ms	9ms
S-8261AAJBD-G2J-TF	4.325V	0.25V	2.5V	0.4V	0.15V	Unavailable	1.2s	144ms	9ms
S-8261AAJMD-G2JT2G	4.325V	0.25V	2.5V	0.4V	0.15V	Unavailable	1.2s	144ms	9ms
S-8261AALMD-G2LT2G	4.30V	0.1V	2.3V	0V	0.08V	Unavailable	1.2s	144ms	9ms
S-8261AAMMD-G2MT2G	4.30V	0.1V	2.3V	0V	0.2V	Unavailable	1.2s	144ms	9ms
S-8261AANMD-G2NT2G	4.275V	0.1V	2.3V	0.1V	0.1V	Available	1.2s	144ms	9ms
S-8261AAOMD-G2OT2G	4.28V	0.2V	2.3V	0V	0.13V	Unavailable	1.2s	144ms	9ms
S-8261AAPMD-G2PT2G	4.325V	0.25V	2.5V	0.4V	0.1V	Unavailable	1.2s	144ms	9ms
S-8261AARBD-G2R-TF	4.28V	0.2V	2.3V	0V	0.1V	Available	1.2s	144ms	9ms
S-8261AARMMD-G2RT2G	4.28V	0.2V	2.3V	0V	0.1V	Available	1.2s	144ms	9ms
S-8261AASMD-G2ST2G	4.28V	0.2V	2.3V	0V	0.15V	Unavailable	1.2s	144ms	4.5ms
S-8261AAUMD-G2UT2G	4.275V	0.1V	2.3V	0.1V	0.1V	Available	4.6s	144ms	9ms
S-8261AAVBD-G2V-TF	4.30V	0.2V	2.3V	0V	0.13V	Available	4.6s	144ms	9ms
S-8261AAAMD-G2XT2G	4.35V	0.1V	2.3V	0.1V	0.1V	Available	4.6s	144ms	9ms
S-8261AAZMD-G2ZT2G	4.28V	0.25V	2.5V	0.4V	0.1V	Unavailable	1.2s	144ms	9ms
S-8261ABAMD-G3AT2G	4.35V	0.2V	2.5V	0V	0.2V	Available	4.6s	144ms	9ms
S-8261ABBMD-G3BT2G	4.275V	0.2V	2.3V	0V	0.13V	Available	1.2s	144ms	9ms
S-8261ABCMD-G3CT2G	4.3V	0.2V	2.3V	0V	0.13V	Available	1.2s	144ms	9ms
S-8261ABDBD-G3D-TF	4.28V	0.2V	2.3V	0V	0.13V	Available	1.84s	115ms	7.2ms
S-8261ABEBD-G3E-TF	4.275V	0.2V	2.3V	0V	0.1V	Available	1.2s	144ms	9ms
S-8261ABGBD-G3G-TF	4.275V	0.2V	2.3V	0V	0.1V	Unavailable	1.2s	36ms	9ms
S-8261ABHBD-G3H-TF	4.20V	0V	2.3V	0V	0.1V	Available	0.3s	36ms	18ms
S-8261ABIBD-G3I-TF	4.275V	0.2V	2.3V	0V	0.2V	Unavailable	1.2s	36ms	9ms
S-8261ABJMD-G3JT2G	4.28V	0.2V	3.0V	0V	0.08V	Available	1.2s	144ms	9ms
S-8261ABKMD-G3KT2G	4.10V	0.25V	2.5V	0.4V	0.15V	Unavailable	1.2s	144ms	9ms
S-8261ABLBD-G3L-TF	4.275V	0.2V	2.3V	0V	0.05V	Unavailable	1.2s	36ms	9ms
S-8261ABMMD-G3MT2G	4.28V	0.2V	2.8V	0V	0.1V	Available	1.2s	144ms	9ms
S-8261ABNMD-G3NT2G	4.30V	0.2V	2.3V	0V	0.06V	Available	1.2s	144ms	9ms
S-8261ABOBD-G3O-TF	4.28V	0.2V	2.3V	0V	0.04V	Available	1.2s	144ms	9ms
S-8261ABPMD-G3PT2G	4.20V	0.1V	2.8V	0.1V	0.15V	Unavailable	1.2s	144ms	9ms
S-8261ABRMD-G3RT2G	4.275V	0.2V	2.5V	0.4V	0.15V	Unavailable	1.2s	144ms	9ms
S-8261ABSMD-G3ST2G	4.28V	0.1V	2.5V	0.5V	0.18V	Unavailable	1.2s	144ms	9ms

Remarks 1. Please contact the SII marketing department for the products with detection voltage value other than those specified above.  
 2. S-8261xxxMD: SOT-23-6 (3000/reel), S-8261xxxBD: 6-pin SNB(B) (3000/reel)

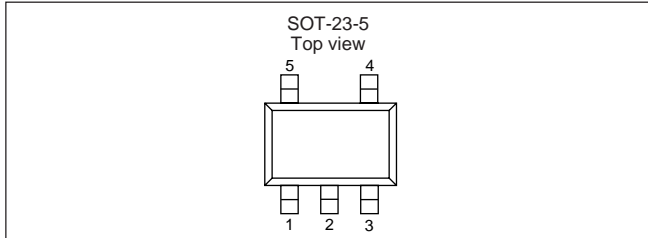
## BATTERY PROTECTION IC FOR 1-CELL PACK

S-8241 series

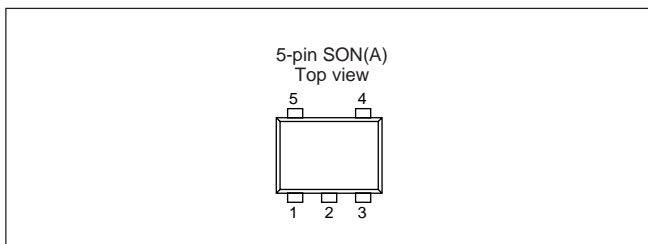
The S-8241 series is a protection IC for lithium ion/lithium polymer rechargeable batteries and includes a high-precision voltage detection circuit and a delay circuit.

It is the optimal IC for protection against overcharge, overdischarge, and overcurrent in 1-cell lithium-ion/lithium polymer rechargeable battery packs.

### ■ PIN CONFIGURATION



Pin No.	Symbol	Description
1	VM	Detection pin of voltage between VM and VSS (overcurrent detection pin)
2	VDD	Positive power supply input pin
3	VSS	Negative power supply input pin
4	DO	FET gate for discharge control connection pin (Push-pull (CMOS output))
5	CO	FET gate for charge control connection pin (Push-pull (CMOS output))



Pin No.	Symbol	Description
1	VM	Detection pin of voltage between VM and VSS (overcurrent detection pin)
2	VDD	Positive power supply input pin
3	CO	FET gate for charge control connection pin (Push-pull (CMOS output))
4	DO	FET gate for discharge control connection pin (Push-pull (CMOS output))
5	VSS	Negative power supply input pin

### ■ FEATURES

- Built-in high-precision voltage detection circuit
  - Overcharge detection voltage: 3.9 V to 4.4 V (in 5 mV steps), accuracy:  $\pm 25$  mV (25°C), and  $\pm 30$  mV (-5°C to +55°C)
  - Overcharge release voltage: 3.8 V to 4.4 V<sup>\*1</sup>, accuracy:  $\pm 50$  mV
  - Overdischarge detection voltage: 2.0 V to 3.0 V (in 100 mV steps), accuracy:  $\pm 80$  mV
  - Overdischarge release voltage: 2.0 V to 3.4 V<sup>\*2</sup>, accuracy:  $\pm 100$  mV
  - Overcurrent 1 detection voltage: 0.05 V to 0.3 V (in 5 mV steps), accuracy:  $\pm 20$  mV
  - Overcurrent 2 detection voltage: 0.5 V (fixed), accuracy:  $\pm 100$  mV
- \*1. Overcharge release voltage = Overcharge detection voltage - Overcharge hysteresis width  
Overcharge hysteresis width can be selected as 0.0 V or from between 0.1 V and 0.4 V in 50 mV steps.
- \*2. Overdischarge release voltage = Overdischarge detection voltage + Overdischarge hysteresis width  
Overdischarge hysteresis width can be selected from between 0.0 V and 0.7 V in 100 mV steps.
- A high withstanding voltage device is used for the charger connection pin (VM pin, CO pin: absolute maximum rating = 26 V)
- Various delay times: A built-in circuit can generate overcharge: t<sub>CU</sub>, overdischarge: t<sub>DL</sub>, overcurrent 1: t<sub>IOV1</sub>, and overcurrent 2: t<sub>IOV2</sub> with no external capacitor. Accuracy:  $\pm 30\%$
- Three-stage over-current detection circuit built-in (overcurrent 1, overcurrent 2, load short circuit)
- 0 V battery charge function available/unavailable are selectable
- Selection of shutdown function is possible. (Yes/No)
- Charger detection function and unusual charge current detection function available
- Small package: SOT-23-5 and 5-pin SON(A)
- Low current consumption:
  - 3.0  $\mu$ A typ. 5.0  $\mu$ A max. (during operation)
  - 0.1  $\mu$ A max. (during power-down)
- Wide operating temperature range: -40°C to +85°C

### ■ APPLICATIONS

- Lithium ion rechargeable battery packs
- Lithium polymer rechargeable battery packs

SELECTION GUIDE

Item	Overcharge detection voltage	Overcharge release voltage	Overdischarge detection voltage	Overdischarge release voltage	Overcurrent 1 detection voltage	0 V battery charge function	Delay time combination <sup>*1</sup>	Shutdown function
S-8241ABAMC-GBAT2G	4.275V	4.075V	2.3V	2.9V	0.100V	Unavailable	(1)	Yes
S-8241ABBMC-GBBT2G	4.280V	3.980V	2.3V	2.4V	0.125V	Available	(2)	Yes
S-8241ABCMC-GBCT2G	4.350V	4.100V	2.3V	2.8V	0.075V	Unavailable	(1)	Yes
S-8241ABDMC-GBDT2G	4.275V	4.175V	2.3V	2.4V	0.100V	Available	(1)	Yes
S-8241ABDPN-KBDTFG	4.295V	4.095V	2.3V	3.0V	0.200V	Unavailable	(1)	Yes
S-8241ABEMC-GBET2G	4.325V	4.075V	2.5V	2.9V	0.100V	Unavailable	(1)	Yes
S-8241ABFMC-GBFT2G	4.200V	4.100V	2.3V	3.0V	0.100V	Unavailable	(1)	Yes
S-8241ABGMC-GBGT2G	4.325V	4.125V	2.3V	2.3V	0.100V	Available	(1)	Yes
S-8241ABHMC-GBHT2G	4.280V	4.080V	2.3V	2.3V	0.160V	Unavailable	(1)	Yes
S-8241ABIMC-GBIT2G	4.325V	4.075V	2.5V	2.9V	0.150V	Unavailable	(1)	Yes
S-8241ABKMC-GBKT2G	4.320V	4.070V	2.5V	2.9V	0.100V	Unavailable	(1)	Yes
S-8241ABLMC-GBLT2G	4.350V	4.050V	2.35V	2.65V	0.150V	Available	(1)	Yes
S-8241ABNPN-KBNTFG	4.350V	4.15V	2.3V	3.0V	0.150V	Available	(2)	Yes
S-8241ABOMC-GBOT2G	4.350V	4.15V	2.3V	3.0V	0.200V	Available	(2)	Yes
S-8241ABPMC-GBPT2G	4.280V	4.080V	2.3V	2.3V	0.130V	Unavailable	(1)	Yes
S-8241ABQMC-GBQT2G	4.350V	4.150V	2.35V	2.65V	0.200V	Available	(2)	Yes
S-8241ABSPN-KBSTFG	4.300V	4.100V	2.3V	2.3V	0.100V	Available	(1)	Yes
S-8241ABTMC-GBT2G	4.200V	4.100V	2.3V	2.3V	0.150V	Unavailable	(1)	Yes
S-8241ABVMC-GBVT2G	4.295V	4.095V	2.3V	2.3V	0.130V	Available	(1)	Yes
S-8241ABWMC-GBWT2G	4.280V	4.080V	2.3V	2.3V	0.130V	Unavailable	(3)	Yes
S-8241ABXMC-GBXT2G	4.350V	4.000V	2.6V	3.3V	0.200V	Unavailable	(1)	Yes
S-8241ABXPN-KBXTFG	4.220V	4.220V	2.3V	2.3V	0.200V	Available	(3)	Yes
S-8241ABYMC-GBYT2G	4.275V	4.075V	2.3V	2.4V	0.140V	Available	(1)	Yes
S-8241ABZPN-KBZTFG	4.280V	4.080V	2.3V	2.3V	0.200V	Available	(1)	Yes
S-8241ACAMC-GCAT2G	4.300V	4.100V	2.3V	2.3V	0.150V	Available	(1)	Yes
S-8241ACBMC-GCBT2G	4.275V	4.075V	2.3V	2.3V	0.100V	Unavailable	(4)	Yes
S-8241ACDMC-GCDT2G	4.295V	4.095V	2.3V	2.3V	0.080V	Available	(1)	Yes
S-8241ACEMC-GCET2G	4.295V	4.095V	2.3V	2.3V	0.090V	Available	(1)	Yes
S-8241ACFMC-GCFT2G	4.295V	4.095V	2.3V	2.3V	0.060V	Available	(1)	Yes
S-8241ACGMC-GCGT2G	4.280V	4.080V	2.6V	2.6V	0.200V	Available	(1)	Yes
S-8241ACGPN-KCGTFG	4.350V	4.150V	2.05V	2.75V	0.200V	Available	(2)	Yes
S-8241ACHMC-GCHT2G	4.300V	4.100V	2.3V	2.3V	0.120V	Available	(1)	Yes
S-8241ACIMC-GCIT2G	4.350V	4.150V	2.0V	2.0V	0.200V	Available	(2)	Yes
S-8241ACJPN-KCJTFG	4.200V	4.200V	2.5V	3.0V	0.100V	Available	(1)	Yes
S-8241ACKMC-GCKT2G	4.350V	4.150V	2.1V	2.2V	0.200V	Available	(2)	Yes
S-8241ACLMC-GCLT2G	4.100V	3.850V	2.5V	2.9V	0.150V	Unavailable	(1)	No
S-8241ACNMC-GCNT2G	4.325V	4.075V	2.5V	2.9V	0.150V	Unavailable	(1)	No
S-8241ACNPN-KCNTFG	4.275V	4.175V	2.3V	2.4V	0.100V	Available	(1)	No
S-8241ACOMC-GCOT2G	4.350V	4.150V	2.3V	3.0V	0.100V	Available	(1)	No
S-8241ACPMC-GCPT2G	4.180V	3.930V	2.5V	2.9V	0.150V	Unavailable	(1)	No
S-8241ACQMC-GCQT2G	4.100V	4.000V	2.5V	2.9V	0.150V	Unavailable	(1)	No
S-8241ACRMC-GCRT2G	4.180V	4.080V	2.5V	2.9V	0.150V	Unavailable	(1)	No
S-8241ACSMC-GCST2G	4.275V	4.075V	2.5V	2.9V	0.150V	Unavailable	(1)	No
S-8241ACTMC-GCTT2G	4.275V	4.075V	2.6V	2.9V	0.100V	Unavailable	(1)	No
S-8241ACUMC-GCUT2G	4.350V	4.150V	2.7V	2.7V	0.200V	Unavailable	(2)	Yes
S-8241ACXMC-GCXT2G	4.350V	4.150V	2.3V	3.0V	0.100V	Available	(1)	Yes
S-8241ACYMC-GCYT2G	4.280V	4.080V	2.3V	2.3V	0.250V	Unavailable	(2)	Yes
S-8241ACZPN-KCZTFG	4.280V	4.080V	2.3V	2.3V	0.250V	Unavailable	(2)	Yes
S-8241ADAMC-GDAT2G	4.280V	4.080V	2.3V	2.3V	0.250V	Unavailable	(2)	Yes
S-8241ADBPN-KDBTFG	4.280V	4.080V	2.3V	2.3V	0.250V	Unavailable	(2)	Yes

\*1. Refer to the delay time combination

- Remarks 1. Please contact the SII marketing department for the products with detection voltage value other than those specified above.  
 2. S-8241xxxMC: SOT-23-5 (3000/reel), S-8241xxxPN: 5-pin SON(A) (3000/reel)

Delay time combination

Delay time combination	Overcharge detection delay time	Overdischarge detection delay time	Overcurrent 1 detection delay time
(1)	1.0 s	125 ms	8 ms
(2)	0.125 s	31 ms	16 ms
(3)	0.25 s	125 ms	8 ms
(4)	2.0 s	125 ms	8 ms

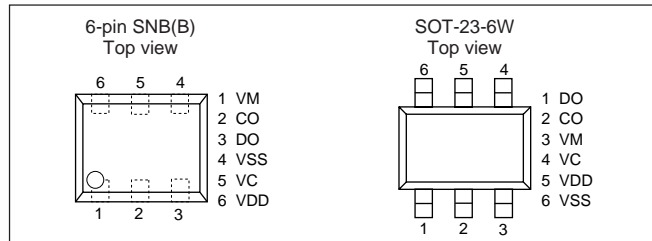
## BATTERY PROTECTION IC FOR 2-SERIAL-CELL PACK

S-8242 series

The S-8242 Series are protection ICs for 2-serial-cell lithium ion/lithium polymer rechargeable batteries and include high-accuracy voltage detectors and delay circuits.

These ICs are suitable for protecting 2-cell rechargeable lithium-ion/lithium-polymer battery packs from overcharge, overdischarge, and overcurrent.

### PIN CONFIGURATIONS



### FEATURES

- (1) High-accuracy voltage detection for each cell
  - Overcharge detection voltage n (n = 1, 2)  
3.9 to 4.4 V (50 mV steps) Accuracy  $\pm 25$  mV
  - Overcharge release voltage n (n = 1, 2)  
3.8 to 4.4 V\*1 Accuracy  $\pm 50$  mV
  - Overdischarge detection voltage n (n = 1, 2)  
2.0 to 3.0 V (100 mV steps) Accuracy  $\pm 50$  mV
  - Overdischarge release voltage n (n = 1, 2)  
2.0 to 3.4 V\*2 Accuracy  $\pm 100$  mV
- \*1. Overcharge release voltage = Overcharge detection voltage – Overcharge hysteresis voltage  
(Overcharge hysteresis voltage n (n = 1, 2) can be selected as 0 V or from a range of 0.1 to 0.4 V in 50 mV steps.)
- \*2. Overdischarge release voltage = Overdischarge detection voltage + Overdischarge hysteresis voltage  
(Overdischarge hysteresis voltage n (n = 1, 2) can be selected as 0 V or from a range of 0.1 to 0.7 V in 100 mV steps.)
- (2) Two-level overcurrent detection (overcurrent 1, overcurrent 2)
  - Overcurrent detection voltage 1  
0.05 V, 0.08 to 0.30 V (10 mV steps) Accuracy  $\pm 15$  mV
  - Overcurrent detection voltage 2  
1.2 V (fixed) Accuracy  $\pm 300$  mV
- (3) Delay times (overcharge, overdischarge, overcurrent) are generated by an internal circuit (external capacitors are unnecessary).
- (4) 0 V battery charge function available/unavailable are selectable.
- (5) Charger detection function
  - The overdischarge hysteresis is released by detecting negative voltage at the VM pin (–0.7 V typ.). (Charger detection function)
- (6) High-withstanding-voltage devices  
Absolute maximum rating: 28 V
- (7) Wide operating temperature range –40 to +85°C
- (8) Low current consumption  
Operation mode 10  $\mu$ A max. (+25°C)  
Power-down mode 0.1  $\mu$ A max. (+25°C)
- (9) Small package SOT-23-6W, 6-Pin SNB(B)

### APPLICATIONS

- Lithium ion rechargeable battery packs
- Lithium polymer rechargeable battery packs

### SELECTION GUIDE

Item	Overcharge detection voltage (V <sub>cu</sub> )	Overcharge release voltage (V <sub>cl</sub> )	Overdischarge detection voltage (V <sub>dl</sub> )	Overdischarge release voltage (V <sub>du</sub> )	Overcurrent detection voltage 1 (V <sub>iovt</sub> )	0 V battery charge
S-8242AAA-B6T10Z	4.325 V	4.075 V	2.2 V	2.9 V	0.21 V	Unavailable
S-8242AAA-M6T2GZ	4.325 V	4.075 V	2.2 V	2.9 V	0.21 V	Unavailable
S-8242AAD-M6T2GZ	4.350 V	4.150 V	2.3 V	3.0 V	0.30 V	Available
S-8242AAE-M6T2GZ	4.300 V	4.050 V	2.0 V	2.7 V	0.20 V	Available
S-8242AAF-M6T2GZ	4.300 V	4.100 V	2.4 V	3.0 V	0.20 V	Unavailable
S-8242AAG-M6T2GZ	4.350 V	4.150 V	2.4 V	3.0 V	0.30 V	Available
S-8242AAH-M6T2GZ	4.350 V	4.150 V	2.3 V	3.0 V	0.30 V	Unavailable
S-8242AAJ-B6T10Z	4.325 V	4.075 V	2.2 V	2.4 V	0.19 V	Unavailable
S-8242AAK-M6T2GZ	4.280 V	4.130 V	2.4 V	2.9 V	0.15 V	Unavailable
S-8242AAL-B6T10Z	4.280 V	4.080 V	2.2 V	2.9 V	0.10 V	Unavailable
S-8242AAM-B6T10Z	4.300 V	4.100 V	2.0 V	2.0 V	0.20 V	Available
S-8242AAM-M6T2GZ	4.300 V	4.100 V	2.0 V	2.0 V	0.20 V	Available
S-8242AAN-M6T2GZ	4.350 V	4.100 V	2.3 V	3.0 V	0.10 V	Available
S-8242AAO-M6T2GZ	4.350 V	4.100 V	2.4 V	3.0 V	0.15 V	Available
S-8242AAP-B6T10Z	4.325 V	4.075 V	2.2 V	2.4 V	0.17 V	Unavailable

**Remarks** 1. Please contact the SII marketing department for the products with detection voltage value other than those specified above.  
2. S-8242xxx-B6T10Z: 6-pin SNB(B) (3000/reel), S-8242xxx-M6T2GZ: SOT-23-6W (3000/reel)

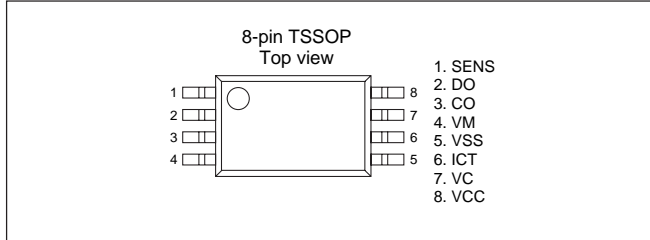
**BATTERY PROTECTION IC FOR 2-SERIAL-CELL PACK**

**S-8232 series**

The S-8232 series is a series of lithium ion rechargeable battery protection ICs incorporating high-accuracy voltage detection circuits and delay circuits.

This series is suitable for a 2-cell lithium-ion battery pack.

**■ PIN CONFIGURATION**



**■ FEATURES**

- Built-in high-accuracy voltage detection circuit
  - Overcharge detection voltage: 3.90 V ± 25 mV to 4.60 V ± 25 mV (5 mV steps)
  - Overcharge release voltage: 3.60 V ± 50 mV to 4.60 V ± 50 mV (5 mV steps)
 (The overcharge release voltage can be selected from within a range of a 0 to 0.3 V differential from the overcharge detection voltage)
- Overdischarge detection voltage: 1.70 V ± 80 mV to 2.60 V ± 80 mV (50 mV steps)
- Overdischarge release voltage: 1.70 V ± 100 mV to 3.80 V ± 100 mV (50 mV steps)
- (The overdischarge release voltage can be selected from within a range of a 0 to 1.2 V differential from the overdischarge detection voltage)
- Overcurrent detection voltage 1: 0.07 V ± 20 mV to 0.30 V ± 20 mV (5 mV steps)
- High input-voltage device: Absolute maximum rating: 18 V
- Wide operating voltage range: 2.0 V to 16 V
- The delay time for overcharge detection, overdischarge detection, and overcurrent detection can be set via an external capacitor. The respective time ratios are 100:10:1.
- Two overcurrent detection levels (protection for short-circuiting)
- Internal auxiliary overcharge detection circuit (fail-safe for overcharge detection)
- 0 V battery charging function (“Charge-prohibited” can be set by an option)
- Low current consumption
  - 7.5 μA typ., 14.2 μA max. (-40 to +85°C, during operation)
  - 0.2 nA typ., 0.1 μA max. (-40 to +85°C, during power-down)
- Small package: 8-pin TSSOP (Mounting area: 6.4 mm × 3.1 mm)

**■ APPLICATIONS**

- Lithium ion rechargeable battery packs
- Lithium polymer rechargeable battery packs

**■ SELECTION GUIDE**

(3000/reel)

Product name	Item	Overcharge detection voltage	Overcharge release voltage	Over discharge detection voltage	Overdischarge release voltage	Overcurrent detection voltage	Overcharge detection delay(C3 = 0.22 μF)	0 V battery charging function
S-8232AAFT-T2-G		4.25V±25mV	4.05V±50mV	2.40V±80mV	3.00V±100mV	0.150V±20mV	1.0s	Available
S-8232ABFT-T2-G		4.35V±25mV	4.15V±50mV	2.30V±80mV	3.00V±100mV	0.300V±20mV	1.0s	Available
S-8232ACFT-T2-G		4.35V±25mV	4.15V±50mV	2.30V±80mV	3.00V±100mV	0.300V±20mV	1.0s	Unavailable
S-8232AEFT-T2-G		4.35V±25mV	4.28V±50mV	2.15V±80mV	2.80V±100mV	0.100V±20mV	1.0s	Available
S-8232AFFT-T2-G		4.25V±25mV	4.05V±50mV	2.30V±80mV	2.70V±100mV	0.300V±20mV	1.0s	Available
S-8232AGFT-T2-G		4.25V±25mV	4.05V±50mV	2.20V±80mV	2.40V±100mV	0.200V±20mV	1.0s	Available
S-8232AHFT-T2-G		4.25V±25mV	4.05V±50mV	2.20V±80mV	2.40V±100mV	0.300V±20mV	1.0s	Available
S-8232AIFT-T2-G		4.325V±25mV	4.325V±25mV <sup>2,3</sup>	2.40V±80mV	3.00V±100mV	0.300V±20mV	1.0s	Unavailable
S-8232AJFT-T2-G		4.25V±25mV	4.05V±50mV	2.40V±80mV	3.00V±100mV	0.150V±20mV	1.0s	Unavailable
S-8232AKFT-T2-G		4.20V±25mV	4.00V±50mV	2.30V±80mV	2.90V±100mV	0.200V±20mV	1.0s	Available
S-8232ALFT-T2-G		4.30V±25mV	4.05V±50mV	2.00V±80mV	3.00V±100mV	0.200V±20mV	1.0s	Available
S-8232AMFT-T2-G		4.19V±25mV	4.19V±25mV <sup>2</sup>	2.00V±80mV	3.00V±100mV	0.190V±20mV	1.0s	Available
S-8232ANFT-T2-G		4.325V±25mV	4.325V±25mV <sup>2,4</sup>	2.40V±80mV	3.00V±100mV	0.300V±20mV	1.0s	Unavailable
S-8232AOFT-T2-G		4.30V±25mV	4.05V±50mV	2.00V±80mV	3.00V±100mV	0.230V±20mV	1.0s	Available
S-8232APFT-T2-G		4.28V±25mV	4.05V±50mV	2.30V±80mV	2.90V±100mV	0.100V±20mV	1.0s	Unavailable
S-8232ARFT-T2-G		4.325V±25mV	4.325V±25mV <sup>2,4</sup>	2.00V±80mV	2.50V±100mV	0.300V±20mV	1.0s	Unavailable
S-8232ASFT-T2-G <sup>*1</sup>		4.295V±25mV	4.20V±50mV <sup>4</sup>	2.30V±80mV	3.00V±100mV	0.300V±20mV	1.0s	Unavailable
S-8232ATFT-T2-G		4.125V±25mV	4.125V±25mV <sup>2</sup>	2.00V±80mV	3.00V±100mV	0.190V±20mV	1.0s	Available
S-8232AUFT-T2-G		4.30V±25mV	4.1V±50mV	2.40V±80mV	3.00V±100mV	0.200V±20mV	1.0s	Unavailable
S-8232AVFT-T2-G		4.30V±25mV	4.05V±50mV	2.00V±80mV	3.00V±100mV	0.300V±20mV	1.0s	Available
S-8232AWFT-T2-G		4.35V±25mV	4.15V±50mV	2.30V±80mV	3.00V±100mV	0.150V±20mV	1.0s	Unavailable
S-8232AXFT-T2-G		4.325V±25mV	4.20V±50mV	2.30V±80mV	3.00V±100mV	0.20V±20mV	1.0s	Unavailable
S-8232AYFT-T2-G		4.30V±25mV	4.05V±50mV	2.00V±80mV	2.00V±80mV	0.20V±20mV	1.0s	Available
S-8232AZFT-T2-G		4.30V±25mV	4.05V±50mV	2.30V±80mV	2.30V±80mV	0.20V±20mV	1.0s	Available
S-8232NAFT-T2-G		4.325V±25mV	4.325V±25mV <sup>2,4</sup>	2.40V±80mV	3.00V±100mV	0.15V±20mV	1.0s	Unavailable
S-8232NCFT-T2-G		4.275V±25mV	4.05V±50mV	2.20V±80mV	3.00V±100mV	0.20V±20mV	1.0s	Unavailable
S-8232NDFT-T2-G		4.35V±25mV	4.15V±50mV	2.30V±80mV	2.30V±80mV	0.15V±20mV	1.0s	Available
S-8232NEFT-T2-G		4.35V±25mV	4.15V±50mV	2.30V±80mV	3.00V±100mV	0.23V±20mV	1.0s	Available
S-8232NFFT-T2-G		4.325V±25mV	4.1V±50mV	2.30V±80mV	2.90V±100mV	0.21V±20mV	1.0s	Unavailable
S-8232NGFT-T2-G		4.35V±25mV	4.15V±50mV	2.60V±80mV	3.00V±100mV	0.30V±20mV	1.0s	Available
S-8232NHFT-T2-G		4.28V±25mV	4.05V±50mV	2.30V±80mV	2.90V±100mV	0.11V±20mV	1.0s	Unavailable
S-8232NIFF-T2-G		4.25V±25mV	4.05V±50mV	2.50V±80mV	3.00V±100mV	0.15V±20mV	1.0s	Unavailable
S-8232NJFT-T2-G		4.28V±25mV	4.05V±50mV	2.30V±80mV	2.90V±100mV	0.11V±20mV	1.0s	Available
S-8232NKFT-T2-G		4.35V±25mV	4.15V±50mV	2.30V±80mV	2.30V±80mV	0.12V±20mV	1.0s	Available
S-8232NLFT-T2-G		4.30V±25mV	4.05V±50mV	2.30V±80mV	3.00V±100mV	0.23V±20mV	1.0s	Available

\*1. Confirm the operation using the data sheet. With overdischarge detection/release hysteresis, without final overcharge function, without 0 V charging function.

\*2. No overcharge detection/release hysteresis.

\*3. Final overcharge magnification: × 1.11. Other: × 1.25.

\*4. Without final overcharge function.

**Remarks** 1. Please contact our sales office if a product with a detection voltage other than the above is required.  
 2. Be sure to design all applications of the S-8232 series with emphasis on safety.

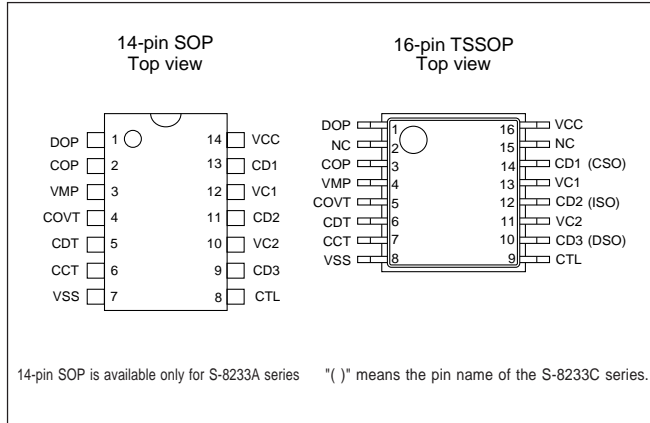


## BATTERY PROTECTION IC FOR 3-SERIAL-CELL PACK

## S-8233A/B/C series

The S-8233A/B/C series is a series of lithium ion rechargeable battery protection ICs incorporating high-accuracy voltage detectors and a delay circuit. This series is suitable for protecting a three-cell pack.

### PIN CONFIGURATIONS



### FEATURES

- Built-in high-accuracy voltage detection circuit
  - Overcharge detection voltage:  $4.10\text{ V} \pm 0.05\text{ V}$  to  $4.35\text{ V} \pm 0.05\text{ V}$  (0.05 V steps)
  - Accuracy of overcharge detection voltage:  $\pm 25\text{ mV}$  (B series)
  - Overcharge release voltage:  $3.85\text{ V} \pm 0.10\text{ V}$  to  $4.35\text{ V} \pm 0.10\text{ V}$  (0.05 V steps)
  - (The overcharge release voltage can be selected from within a range of a 0 to 0.3 V differential from the overcharge detection voltage)
  - Overdischarge detection voltage:  $2.00\text{ V} \pm 0.08\text{ V}$  to  $2.70\text{ V} \pm 0.08\text{ V}$  (0.10 V steps)
  - Overdischarge release voltage:  $2.00\text{ V} \pm 0.10\text{ V}$  to  $3.70\text{ V} \pm 0.10\text{ V}$  (0.10 V steps)
  - (The overdischarge release voltage can be selected from within a range of a 0 to 1.0 V differential from the overdischarge detection voltage)
  - Overcurrent detection voltage 1:  $0.15\text{ V} \pm 10\%$  to  $0.50\text{ V} \pm 10\%$  (0.05 V steps)
- Function for checking battery-pack status (C series)
- High input-voltage device: Absolute maximum rating: 26 V
- Wide operating voltage range: 2 V to 24 V
- The delay time for each type of detection can be set via an external capacitor.
- Three overcurrent detection levels (protection for short-circuiting)
- Internal charge/discharge prohibition circuit via the control pin
- A function for charging batteries from 0 V is available.
- Low current consumption
  - 50  $\mu\text{A}$  max. (+25°C, during operation)
  - 0.1  $\mu\text{A}$  max. (+25°C, during power-down)
- Package: 14-pin SOP (A series only)  
16-pin TSSOP

### APPLICATIONS

- Lithium ion rechargeable battery packs
- Lithium polymer rechargeable battery packs

### SELECTION GUIDE

#### S-8233A series

(2000/reel)

14-pin SOP	16-pin TSSOP	Overcharge detection voltage	Overcharge release voltage	Overdischarge detection voltage	Overdischarge release voltage	Overcurrent release voltage 1	0 V battery charging function
S-8233ACFE-TB-G	S-8233ACFT-TB-G	$4.25 \pm 0.05\text{V}$	$4.05 \pm 0.10\text{V}$	$2.00 \pm 0.08\text{V}$	$2.30 \pm 0.10\text{V}$	$0.20 \pm 0.02\text{V}$	-
S-8233ADFE-TB-G	S-8233ADFT-TB-G	$4.10 \pm 0.05\text{V}$	$4.10\text{V}^{*1}$	$2.00 \pm 0.08\text{V}$	$2.30 \pm 0.10\text{V}$	$0.20 \pm 0.02\text{V}$	-
S-8233AEFE-TB-G	S-8233AEFT-TB-G	$4.25 \pm 0.05\text{V}$	$4.10 \pm 0.10\text{V}$	$2.30 \pm 0.08\text{V}$	$2.70 \pm 0.10\text{V}$	$0.15 \pm 0.015\text{V}$	-
S-8233AFFE-TB-G	S-8233AFFT-TB-G	$4.35 \pm 0.05\text{V}$	$4.05 \pm 0.10\text{V}$	$2.40 \pm 0.08\text{V}$	$2.70 \pm 0.10\text{V}$	$0.50 \pm 0.05\text{V}$	Available
S-8233AGFE-TB-G	S-8233AGFT-TB-G	$4.25 \pm 0.05\text{V}$	$4.05 \pm 0.10\text{V}$	$2.40 \pm 0.08\text{V}$	$2.70 \pm 0.10\text{V}$	$0.40 \pm 0.04\text{V}$	Available
S-8233AIFE-TB-G	S-8233AIFT-TB-G	$4.25 \pm 0.05\text{V}$	$4.10 \pm 0.10\text{V}$	$2.30 \pm 0.08\text{V}$	$3.00 \pm 0.10\text{V}$	$0.15 \pm 0.015\text{V}$	-
S-8233AJFE-TB-G	S-8233AJFT-TB-G	$4.35 \pm 0.05\text{V}$	$4.05 \pm 0.10\text{V}$	$2.40 \pm 0.08\text{V}$	$2.70 \pm 0.10\text{V}$	$0.30 \pm 0.03\text{V}$	-
S-8233AKFE-TB-G	S-8233AKFT-TB-G	$4.35 \pm 0.05\text{V}$	$4.05 \pm 0.10\text{V}$	$2.40 \pm 0.08\text{V}$	$2.70 \pm 0.10\text{V}$	$0.15 \pm 0.015\text{V}$	-
S-8233ALFE-TB-G	S-8233ALFT-TB-G	$4.35 \pm 0.05\text{V}$	$4.05 \pm 0.10\text{V}$	$2.40 \pm 0.08\text{V}$	$2.70 \pm 0.10\text{V}$	$0.40 \pm 0.04\text{V}$	Available
S-8233AMFE-TB-G	S-8233AMFT-TB-G	$4.35 \pm 0.05\text{V}$	$4.05 \pm 0.10\text{V}$	$2.40 \pm 0.08\text{V}$	$2.70 \pm 0.10\text{V}$	$0.30 \pm 0.03\text{V}$	Available
S-8233ANFE-TB-G	S-8233ANFT-TB-G	$4.35 \pm 0.05\text{V}$	$4.05 \pm 0.10\text{V}$	$2.40 \pm 0.08\text{V}$	$2.40 \pm 0.08\text{V}$	$0.15 \pm 0.015\text{V}$	Available
S-8233AOFE-TB-G	S-8233AOFT-TB-G	$4.35 \pm 0.05\text{V}$	$4.05 \pm 0.10\text{V}$	$2.40 \pm 0.08\text{V}$	$2.70 \pm 0.10\text{V}$	$0.15 \pm 0.015\text{V}$	Available
S-8233APFE-TB-G	S-8233APFT-TB-G	$4.25 \pm 0.05\text{V}$	$4.05 \pm 0.10\text{V}$	$2.70 \pm 0.08\text{V}$	$3.00 \pm 0.10\text{V}$	$0.30 \pm 0.03\text{V}$	Available
S-8233AQFE-TB-G	-	$4.25 \pm 0.05\text{V}$	$4.25\text{V}^{*1}$	$2.70 \pm 0.08\text{V}$	$3.00 \pm 0.10\text{V}$	$0.30 \pm 0.03\text{V}$	Available
-	S-8233ARFT-TB-G	$4.35 \pm 0.05\text{V}$	$4.05 \pm 0.10\text{V}$	$2.00 \pm 0.08\text{V}$	$2.70 \pm 0.10\text{V}$	$0.30 \pm 0.03\text{V}$	Available

\*1. No overcharge detection hysteresis.

Remark Please contact our sales office if a product with a detection voltage other than the above is required.

#### S-8233B series

(2000/reel)

16-pin TSSOP	Overcharge detection voltage	Overcharge release voltage	Overdischarge detection voltage	Overdischarge release voltage	Overcurrent detection voltage 1	0 V battery charging function	Conditioning function	CTL logic <sup>*2</sup>
S-8233BAFT-TB-G	$4.225 \pm 0.025\text{V}$	$4.225\text{V}^{*1}$	$2.30 \pm 0.08\text{V}$	$2.70 \pm 0.10\text{V}$	$0.20 \pm 0.02\text{V}$	-	Yes	Normal
S-8233BBFT-TB-G	$4.325 \pm 0.025\text{V}$	$4.15 \pm 0.10\text{V}$	$2.30 \pm 0.08\text{V}$	$2.70 \pm 0.10\text{V}$	$0.20 \pm 0.02\text{V}$	-	No	Inverted
S-8233BCFT-TB-G	$4.200 \pm 0.025\text{V}$	$4.2\text{V}^{*2}$	$2.80 \pm 0.08\text{V}$	$3.30 \pm 0.10\text{V}$	$0.25 \pm 0.025\text{V}$	Available	Yes	Normal
S-8233BDFT-TB-G	$4.325 \pm 0.025\text{V}$	$4.15 \pm 0.10\text{V}$	$2.00 \pm 0.08\text{V}$	$2.70 \pm 0.10\text{V}$	$0.50 \pm 0.05\text{V}$	-	No	Inverted

\*1. No overcharge detection/release hysteresis.

\*2. Normal: Both charging and discharging are disabled by turning off the charging FET and the discharging FET when the control pin is floating.

Inverted: Both charging and discharging are disabled by turning off the charging FET and the discharging FET when the control pin is externally set to VSS level.

Remark Please contact our sales office if a product with a detection voltage other than the above is required.

#### S-8233C series

(2000/reel)

16-pin TSSOP	Overcharge detection voltage	Overcharge release voltage	Overdischarge detection voltage	Overdischarge release voltage	Overcurrent detection voltage 1	0 V battery charging function
S-8233CAFT-TB-G	$4.25 \pm 0.05\text{V}$	$4.05 \pm 0.10\text{V}$	$2.00 \pm 0.08\text{V}$	$2.30 \pm 0.10\text{V}$	$0.25 \pm 0.025\text{V}$	-

Remark Please contact our sales office if a product with a detection voltage other than the above is required.

Remark Be sure to design all applications of the S-8233A/B/C series with emphasis on safety.

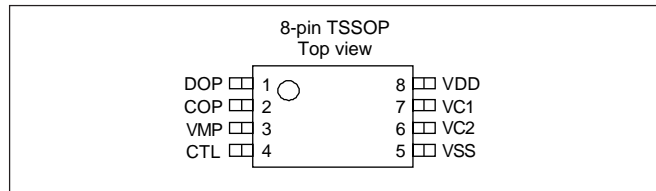
**BATTERY PROTECTION IC FOR 2-SERIAL OR 3-SERIAL CELL PACK**

**S-8253A/B series**

The S-8253A/B series are ICs for protecting 2-cell or 3-cell lithium ion rechargeable batteries and incorporate high-accuracy voltage detection and delay circuits.

The S-8243A/B series are suitable for protecting lithium-ion battery packs from overcharge, overdischarge and overcurrent.

**■ PIN CONFIGURATION**



Pin No.	Symbol	Description
1	DOP	Connection of discharge control FET gate (CMOS output)
2	COP	Connection of charge control FET gate (N-ch open-drain output)
3	VMP	Voltage detection between VDD and VMP (overcurrent detection pin)
4	CTL	Input of charge/discharge control signal, pin for shortening test time (L: Normal operation, H: Charge/discharge inhibited, M (V <sub>DD</sub> × 1/2): Test time reduced)
5	VSS	Connection for negative power supply input and negative voltage of battery 2
6	VC2	S-8253A series: No connection*1 S-8253B series: Connection for negative voltage of battery 2 and positive voltage of battery 3
7	VC1	Connection for negative voltage of battery 1 and positive voltage of battery 2
8	VDD	Connection for positive power supply input and positive voltage of battery 1

\*1. In the case of the S-8253A. "No connection" means electrically open. In this case, this pin can be connected to VDD or VSS.

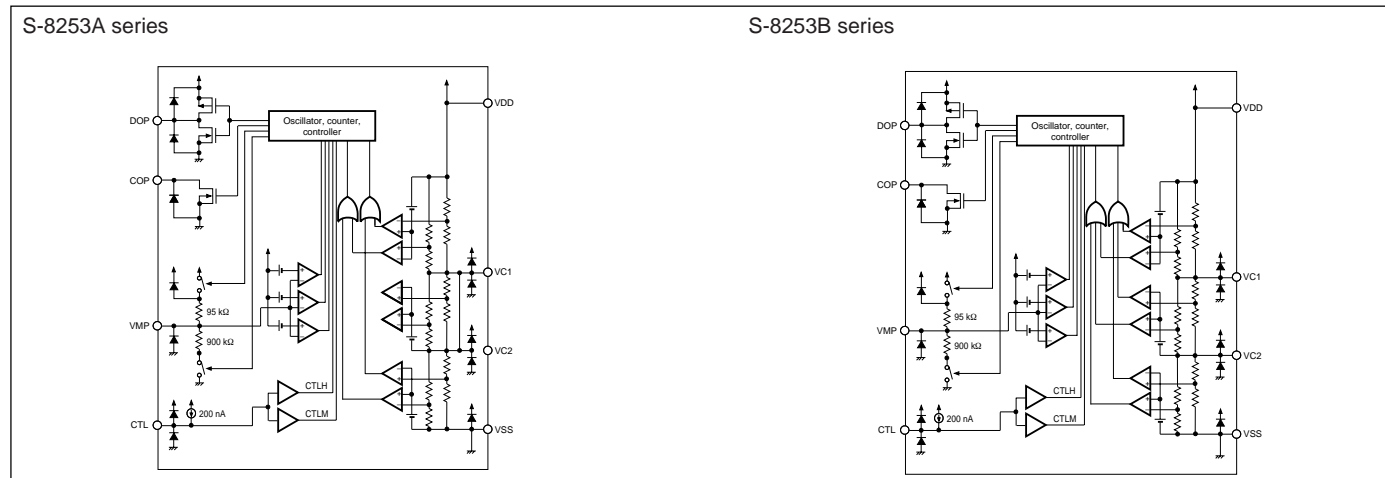
**■ FEATURES**

- High-accuracy voltage detection for each cell
  - Overcharge detection voltage n (n = 1 to 3) 3.9 V to 4.4 V (50 mV steps), accuracy ±25 mV
  - Overcharge release voltage n (n = 1 to 3) 3.8 V to 4.4 V<sup>\*1</sup>, accuracy ±50 mV
- \*1: Overcharge release voltage = Overcharge detection voltage - Overcharge hysteresis voltage (Overcharge hysteresis voltage n (n = 1 to 3) can be selected from 0 V or 0.1 V to 0.4 V in 50 mV steps)
- Overdischarge detection voltage n (n = 1 to 3) 2.0 V to 3.0 V (100 mV steps), accuracy ±80 mV
- Overdischarge release voltage n (n = 1 to 3) 2.0 V to 3.4 V<sup>\*2</sup>, accuracy ±100 mV
- \*2: Overdischarge release voltage = Overdischarge detection voltage + Overdischarge hysteresis voltage (Overdischarge hysteresis voltage n (n = 1 to 3) can be selected from 0 V or 0.2 V to 0.7 V in 100 mV steps)
- Three-level overcurrent protection (including protection from short-circuiting)
  - Overcurrent detection voltage 1 0.05 V to 0.30 V (50 mV steps), accuracy ±25 mV
  - Overcurrent detection voltage 2 0.5 V (fixed)
  - Overcurrent detection voltage 3 1.2 V (fixed)
- Delay times (for overcharge, overdischarge, and overcurrent) can be set by the built-in circuit (external capacitance is not required)
- Charge/discharge operation can be controlled via the control pins
- 0 V battery charge function available/unavailable are selectable
- High-withstanding-voltage device: Absolute maximum rating of 26 V
- Wide operating voltage range: 2 V to 24 V
- Wide operating temperature range: -40°C to +85°C
- Low current consumption
  - During operation: 28 µA max. (+25°C)
  - During power-down: 0.1 µA max. (+25°C)
- Small package: 8-pin TSSOP

**■ APPLICATIONS**

- Lithium ion rechargeable battery packs
- Lithium polymer rechargeable battery packs

**■ BLOCK DIAGRAM**



**■ SELECTION GUIDE**

• S-8253A series (for 2-cell battery)

(3000/reel)

Item	Overcharge detection voltage	Overcharge release voltage	Overdischarge detection voltage	Overdischarge release voltage	Overcurrent detection voltage 1	0 V battery charge
S-8253AAA-T8T1GZ	4.350 ± 0.025V	4.050 ± 0.050V	2.4 ± 0.080V	2.7 ± 0.100V	0.30 ± 0.025V	Available
S-8253AAB-T8T1GZ	4.350 ± 0.025V	4.050 ± 0.050V	2.7 ± 0.080V	2.7 ± 0.100V	0.30 ± 0.025V	Available
S-8253AAC-T8T1GZ	4.350 ± 0.025V	4.050 ± 0.050V	2.4 ± 0.080V	2.7 ± 0.100V	0.08 ± 0.025V	Available
S-8253AAD-T8T1GZ	4.250 ± 0.025V	4.050 ± 0.050V	2.4 ± 0.080V	2.7 ± 0.100V	0.12 ± 0.025V	Available
S-8253AAE-T8T1GZ	4.350 ± 0.025V	4.050 ± 0.050V	2.8 ± 0.080V	3.0 ± 0.100V	0.30 ± 0.025V	Available

Remark Please contact our sales office if a product with a detection voltage other than the above is required.

• S-8253B series (for 3-cell battery)

(3000/reel)

Item	Overcharge detection voltage	Overcharge release voltage	Overdischarge detection voltage	Overdischarge release voltage	Overcurrent detection voltage	0 V battery charge
S-8253BAA-T8T1GZ	4.350 ± 0.025V	4.050 ± 0.050V	2.4 ± 0.080V	2.7 ± 0.100V	0.30 ± 0.025V	Available
S-8253BAB-T8T1GZ	4.325 ± 0.025V	4.075 ± 0.050V	2.2 ± 0.080V	2.9 ± 0.100V	0.20 ± 0.025V	Unavailable
S-8253BAC-T8T1GZ	4.350 ± 0.025V	4.050 ± 0.050V	2.4 ± 0.080V	2.7 ± 0.100V	0.08 ± 0.025V	Available
S-8253BAD-T8T1GZ	4.250 ± 0.025V	4.050 ± 0.050V	2.4 ± 0.080V	2.7 ± 0.100V	0.12 ± 0.025V	Available

Remark Please contact our sales office if a product with a detection voltage other than the above is required.

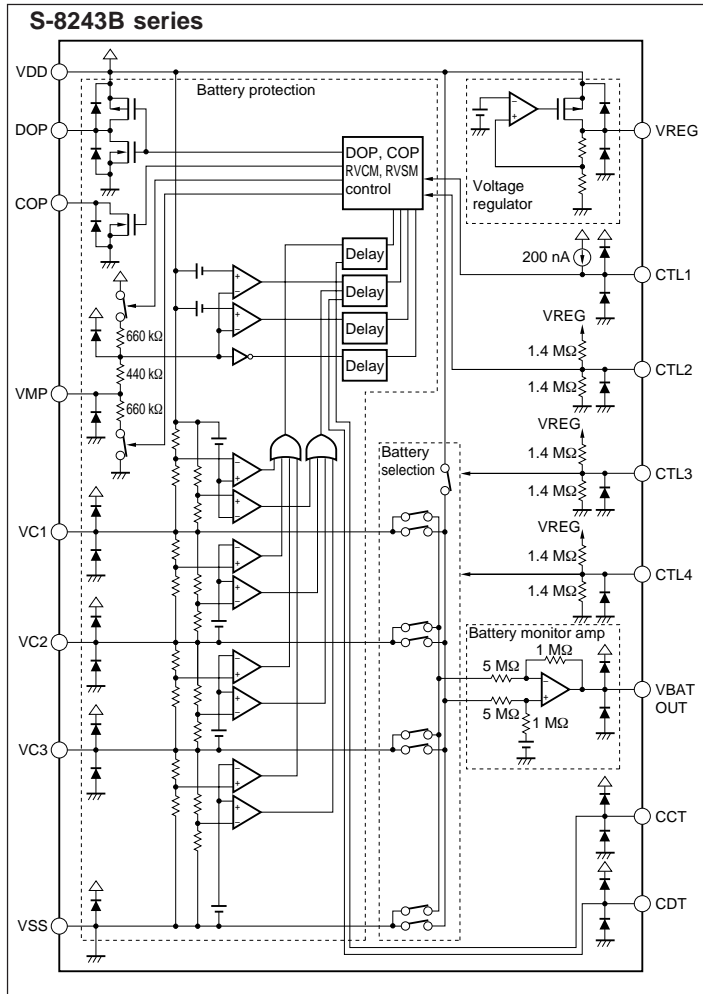
## BATTERY PROTECTION IC FOR 3-SERIAL OR 4-SERIAL CELL PACK

## S-8243A/B series

The S-8243A/B series is lithium ion rechargeable battery protection IC incorporating high-accuracy battery protection circuits, a battery monitor amp and a voltage regulator.

The S-8243A/B series is suitable for protection of 3-serial or 4-serial cell lithium-ion battery packs from overcharge, overdischarge and overcurrent. Combining this series with a microcomputer or gas gauge IC makes it possible to indicate the remaining battery.

### ■ BLOCK DIAGRAM



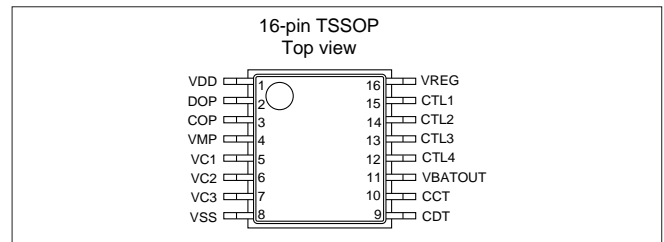
### ■ FEATURES

- High-accuracy voltage detection for each cell
  - Overcharge detection voltage n (n = 1 to 4)  
3.9 V to 4.4 V (50 mV step), accuracy ±25 mV
  - Hysteresis voltage n (n = 1 to 4) of overcharge detection  
-0.10 V to -0.40 V or 0 V (50 mV step), accuracy ±50 mV  
(Overcharge release voltage n (= Overcharge detection voltage n + Hysteresis voltage n) can be selected within the range 3.8 V to 4.4 V.)
  - Overdischarge detection voltage n (n = 1 to 4)  
2.0 V to 3.0 V (100 mV step), accuracy ±80 mV
  - Hysteresis voltage n (n = 1 to 4) of overdischarge detection  
0.20 V to 0.70 V or 0 V (100 mV step), accuracy ±100 mV  
(Overdischarge release voltage n (= Overdischarge detection voltage n + Hysteresis voltage n) can be selected within the range 2.0 V to 3.4 V.)
- Three-level overcurrent protection including protection for short-circuiting
  - Overcurrent detection voltage 1  
0.05 V to 0.3 V (50 mV step), accuracy ±25 mV
  - Overcurrent detection voltage 2  
0.5 V, accuracy ±100 mV
  - Overcurrent detection voltage 3  
 $V_{DD}/2$ , accuracy ±15%
- Delay times for overcharge detection, overdischarge detection and overcurrent detection 1 can be set by an external capacitor. (Delay times for overcurrent detection 2 and 3 are fixed internally.)
- Charge/discharge operation can be controlled through the control pins.
- High-accuracy battery monitor amp  
 $G_{AMP} = V_{BATTERY} \times 0.2 \pm 1.0\%$
- Voltage regulator  
 $V_{OUT} = 3.3 V \pm 2.4\%$  (3 mA max.)
- High input-voltage device  
Absolute maximum rating: 26 V
- Wide operating voltage range: 6 V to 18 V
- Wide operating temperature range: -40°C to +85°C
- Low current consumption  
120 μA max. (during operation)  
0.1 μA max. (during power-down)
- Small package: 16-pin TSSOP

### ■ APPLICATIONS

- Lithium ion rechargeable battery packs
- Lithium polymer rechargeable battery packs

### ■ PIN CONFIGURATION



### ■ SELECTION GUIDE

#### • S-8243A series (3-cell serial pack)

(2000/reel)

Items	Overcharge detection voltage	Overcharge hysteresis voltage	Overcharge detection voltage	Overcharge hysteresis voltage	Overcurrent detection voltage 1	0 V battery charging function
S-8243AACFT-TB-G	4.35 ± 0.025V	-0.15 ± 0.05V	2.40 ± 0.08V	0.20 ± 0.10V	0.20V ± 0.025V	Available
S-8243AADFT-TB-G	4.35 ± 0.025V	-0.35 ± 0.05V	2.40 ± 0.08V	0V	0.20V ± 0.025V	Available

**Remark** Please contact our sales office if a product with a detection voltage other than the above is required.

#### • S-8243B series (4-cell serial pack)

(2000/reel)

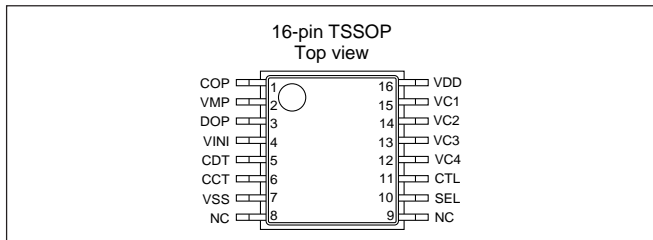
Items	Overcharge detection voltage	Overcharge hysteresis voltage	Overcharge detection voltage	Overcharge hysteresis voltage	Overcurrent detection voltage 1	0 V battery charging function
S-8243BADFT-TB-G	4.35 ± 0.025V	-0.25 ± 0.05V	2.40 ± 0.08V	0V	0.25V ± 0.025V	Available
S-8243BAEFT-TB-G	4.35 ± 0.025V	-0.15 ± 0.05V	2.40 ± 0.08V	0.20 ± 0.10V	0.20V ± 0.025V	Available
S-8243BAFFT-TB-G	4.25 ± 0.025V	-0.25 ± 0.05V	2.40 ± 0.08V	0V	0.20V ± 0.025V	Available

**Remark** Please contact our sales office if a product with a detection voltage other than the above is required.

**BATTERY PROTECTION IC FOR 3-SERIAL OR 4-SERIAL CELL PACK** **S-8254 series**

The S-8254 series are lithium ion rechargeable battery protection ICs for 3-cell or 4-cell batteries in series and incorporate high-accuracy voltage detectors and a delay circuit. Whether the IC is used for a 3-cell or 4-cell battery can be selected using the SEL pin.

**■ PIN CONFIGURATIONS**



**■ FEATURES**

- Built-in high-accuracy voltage detection circuit
  - Overcharge detection voltage: 3.90 V to 4.40 V (0.05 V steps)
  - Accuracy of overcharge detection voltage: ±25 mV
  - Overcharge release voltage: 3.80 V to 4.40 V (0.05 V steps)
  - Overdischarge detection voltage: 2.00 V to 3.00 V (0.10 V steps)
  - Overdischarge detection voltage accuracy: ±80 mV
  - Overdischarge release voltage: 2.00 V to 3.40 V (0.10 V steps)
- High input-voltage device: Absolute maximum rating: 26 V
- Wide operating voltage range: 2 V to 24 V
- Wide operating temperature range: -45 to +85°C
- Three overcurrent detection levels (protection for short-circuiting)
- Overcharge detection delay time, overdischarge detection delay time, and overcurrent detection delay time 1 settable via external capacitor
- 3-serial cell and 4-serial cell switchable via SEL pin
- Charge/discharge controllable via control pin
- Low current consumption: 30 µA max. (+25°C, during operation)  
0.1 µA max. (+25°C, during power-down)
- Package: 16-pin TSSOP

**■ APPLICATIONS**

- Lithium ion rechargeable battery packs
- Lithium polymer rechargeable battery packs

**■ SELECTION GUIDE**

(2000/reel)

Item	Overcharge detection voltage	Overcharge release voltage	Overdischarge detection voltage	Overdischarge release voltage	Overcurrent detection voltage 1	0 V battery charging function
S-8254AAAFT-TB-G	4.350 ± 0.025V	4.150 ± 0.050V	2.00 ± 0.080V	2.70 ± 0.100V	0.30 ± 0.025V	Available
S-8254AABFT-TB-G	4.250 ± 0.025V	4.250 ± 0.025V	2.00 ± 0.080V	2.70 ± 0.100V	0.30 ± 0.025V	Available
S-8254AAEFT-TB-G	4.350 ± 0.025V	4.150 ± 0.050V	2.00 ± 0.080V	2.70 ± 0.100V	0.20 ± 0.025V	Available
S-8254AAFFFT-TB-G	4.350 ± 0.025V	4.150 ± 0.050V	2.40 ± 0.080V	3.00 ± 0.100V	0.20 ± 0.025V	Available
S-8254AAGFT-TB-G	4.275 ± 0.025V	4.075 ± 0.050V	2.30 ± 0.080V	2.70 ± 0.100V	0.13 ± 0.025V	Available
S-8254AAHFT-TB-G	4.350 ± 0.025V	4.150 ± 0.050V	2.40 ± 0.080V	2.70 ± 0.100V	0.10 ± 0.025V	Available
S-8254AAIIFT-TB-G	4.350 ± 0.025V	4.150 ± 0.050V	2.40 ± 0.080V	3.00 ± 0.100V	0.30 ± 0.025V	Available
S-8254AAJFT-TB-G	4.350 ± 0.025V	4.150 ± 0.050V	2.40 ± 0.080V	3.00 ± 0.100V	0.15 ± 0.025V	Available
S-8254AAKFT-TB-G	4.350 ± 0.025V	4.150 ± 0.050V	2.70 ± 0.080V	3.00 ± 0.100V	0.20 ± 0.025V	Available
S-8254AALFT-TB-G	4.300 ± 0.025V	4.150 ± 0.050V	2.40 ± 0.080V	3.00 ± 0.100V	0.20 ± 0.025V	Available
S-8254AAMFT-TB-G	4.200 ± 0.025V	4.100 ± 0.050V	2.50 ± 0.080V	2.70 ± 0.100V	0.30 ± 0.025V	Available
S-8254AANFT-TB-G	4.250 ± 0.025V	4.150 ± 0.050V	2.50 ± 0.080V	3.00 ± 0.100V	0.10 ± 0.025V	Available

**Remarks 1.** Please contact our sales office if a product with a detection voltage other than the above is required.  
**2.** Be sure to design all applications of the S-8254 series with emphasis on safety.

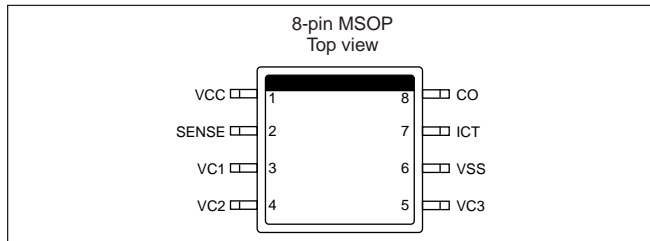
## BATTERY PROTECTION IC FOR 1 TO 4-SERIAL CELL PACK (SECONDARY PROTECTION)

S-8244 series

The S-8244 series is a rechargeable lithium ion battery secondary protection IC with a built-in high-precision voltage detection circuit and delay circuit.

By short-circuiting between each cell, this series can be used for 1 to 4 cells in a series connection.

### PIN CONFIGURATION



### FEATURES

- Built-in high-precision voltage detection circuit
  - Overcharge detection voltage: 3.7 V to 4.5 V (in 5 mV steps), accuracy:  $\pm 25$  mV (25°C), and  $\pm 50$  mV (-40°C to +85°C)
  - Hysteresis: Selection of one of the following five values is possible. 0.38 V  $\pm 0.1$  V, 0.25 V  $\pm 0.07$  V, 0.13 V  $\pm 0.04$  V, 0.045 V  $\pm 0.02$  V, none
- A high withstanding voltage device is used for the charger connection pin. (Absolute maximum rating = 26 V)
- Wide operation voltage range: 3.6 V to 24 V (Normal operation range of delay circuit in overvoltage detection)
- The delay time at detection can be set by an external capacitor.
- Low current consumption
  - 3.0  $\mu$ A max. (+25°C, 3.5 V for each cell)
  - 2.4  $\mu$ A max. (+25°C, 2.3 V for each cell)
- Small package: 8-pin MSOP
- Output signal type and logic: Selection of one of the following four types is possible.
  - Push-pull (CMOS output), active "H"
  - Push-pull (CMOS output), active "L"
  - P-ch open-drain output, active "L"
  - Open-drain (Nch open-drain) output, active "H"
 (The product with a 0.045 V hysteresis is only applicable for Push-pull (CMOS output).)

### APPLICATIONS

- Lithium ion rechargeable battery packs (for secondary protection)
- Lithium polymer rechargeable battery packs (for secondary protection)

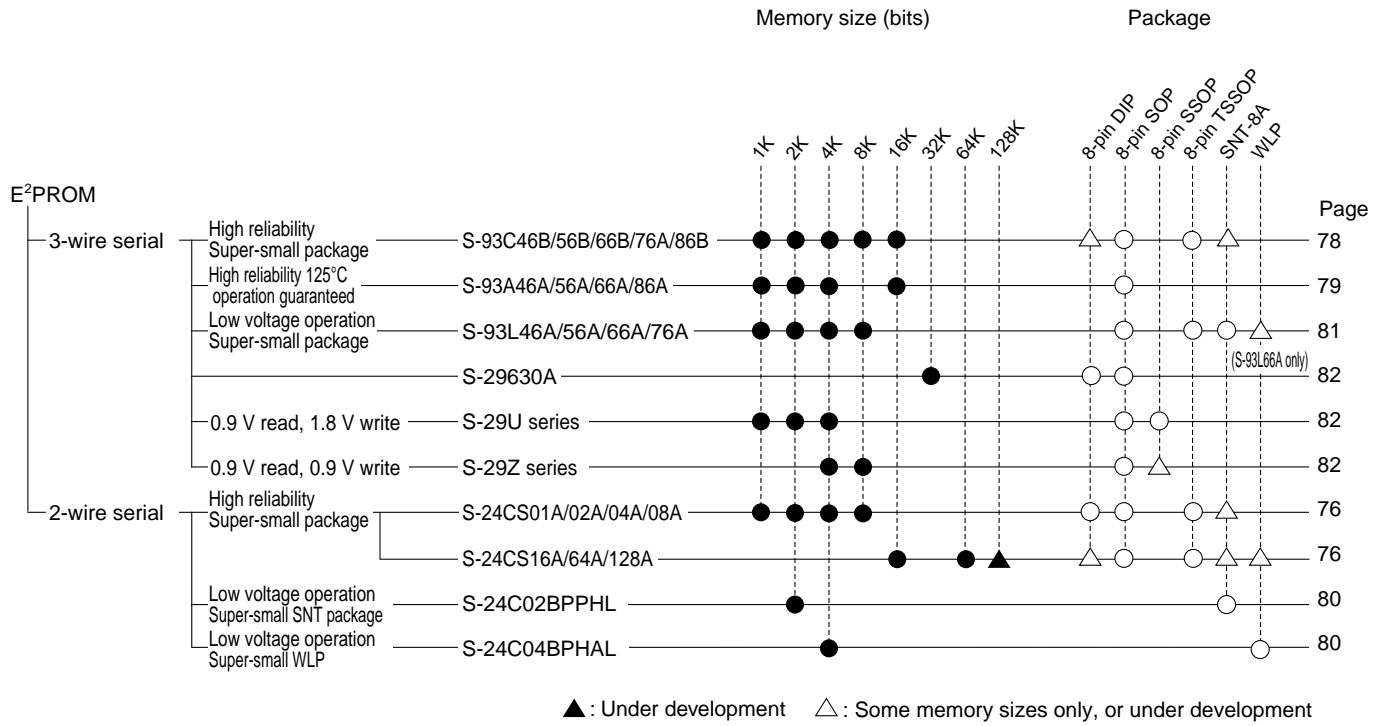
### SELECTION GUIDE

(3000/reel)

Product name	Item	Overcharge detection voltage	Overcharge hysteresis voltage	Output type
S-8244AAAFN-CEAT2G		4.450 $\pm$ 0.025 V	0.38 V $\pm$ 0.1 V	Push-pull (CMOS output), active "H"
S-8244AABFN-CEBT2G		4.200 $\pm$ 0.025 V	0 V	Open-drain (Nch open-drain), active "H"
S-8244AACFN-CECT2G		4.115 $\pm$ 0.025 V	0.13 V $\pm$ 0.04 V	Push-pull (CMOS output), active "H"
S-8244AADFN-CEDT2G		4.200 $\pm$ 0.025 V	0 V	Pch open-drain, active "L"
S-8244AAEFN-CEET2G		4.225 $\pm$ 0.025 V	0 V	Open-drain (Nch open-drain), active "H"
S-8244AAFFN-CEFT2G		4.350 $\pm$ 0.025 V	0.045 V $\pm$ 0.02 V	Push-pull (CMOS output), active "H"
S-8244AAGFN-CEGT2G		4.450 $\pm$ 0.025 V	0.045 V $\pm$ 0.02 V	Push-pull (CMOS output), active "H"
S-8244AAHFN-CEHT2G		4.300 $\pm$ 0.025 V	0.25 V $\pm$ 0.07 V	Push-pull (CMOS output), active "H"
S-8244AAIFN-CEIT2G		4.400 $\pm$ 0.025V	0.045 $\pm$ 0.02V	Push-pull (CMOS output), active "H"
S-8244AAJFN-CEJT2G		4.500 $\pm$ 0.025V	0.38 $\pm$ 0.1V	Push-pull (CMOS output), active "H"

**Remark** Please contact our sales office if a product with a detection voltage other than the above is required.

## Memory Lineup





## HIGH-RELIABILITY, SUPER-SMALL PACKAGE 2-WIRE SERIAL E<sup>2</sup>PROM

## S-24CS01A/02A/04A/08A/16A/64A/128A

The S-24CS01A/02A/04A/08A/16A/64A/128A are 2-wire, low-power-consumption serial E<sup>2</sup>PROMs with a wide operating voltage range. Depending on the product, the memory size is 1 Kb, 2 Kb, 4 Kb, 8 Kb, 16 Kb, 64 Kb or 128 Kb. An endurance of 1 million cycles (100,000 in some products) over a wide temperature range (-40 to +85°C) is guaranteed and data can be retained for even after 1 million rewrites (100,000 rewrites for some models), making these highly reliable memories.

These products feature a function to prohibit writing during low-voltage supply and enable page write and sequential read.

The use of a super-small SNT<sup>1</sup> package and WLP<sup>2</sup> means that these memories are excellent for small and thin applications such as mobile devices.

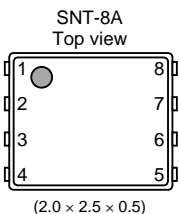
\*1. Small-outline Non-leaded Thin package

\*2. Wafer Level chip size Package

### FEATURES

- Low current consumption: 2.0  $\mu$ A (S-24CS01A/02A/04A/08A) ( $V_{CC} = 5.5$  V, during standby)  
5.0  $\mu$ A (S-24CS16A/64A) ( $V_{CC} = 5.5$  V, during standby)  
0.8 mA max. ( $V_{CC} = 5.5$  V, during reading)
- Operating voltage range: 1.8 to 5.5 V (during reading)  
2.7 to 5.5 V (during writing)
- Page write: 8 bytes/page (S-24CS01A/02A)  
16 bytes/page (S-24CS04A/08A/16A)  
32 bytes/page (S-24CS64A)
- Sequential read
- Operating frequency: 400 kHz ( $V_{CC} = 4.5$  to 5.5V)
- Endurance  
S-24CS01A/02A/04A/08A: Up to 10 million cycles (25°C)  
1 million cycles guaranteed (85°C)  
S-24CS16A/64A: Up to 1 million cycles (25°C)  
100,000 cycles guaranteed (85°C)
- Data retention: 10 years (after 1 million rewrites or 100,000 rewrites)
- Write protection: 100%
- Write protection under low power supply voltage
- Package:  
SNT-8A  
8-pin DIP  
8-pin SOP  
8-pin TSSOP  
WLP-6A  
WLP-8C

### PIN CONFIGURATIONS (1/2)

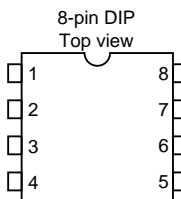


(2.0 x 2.5 x 0.5)

S-24CS01APH-TF-G  
S-24CS02APH-TF-G  
S-24CS04APH-TF-G  
S-24CS16A0I-I8T1G

Product name	S-24CS01A S-24CS02A	S-24CS04A	S-24CS16A
Pin No. 1	A0	NC	A2 <sup>*1</sup>
Pin No. 2	A1	A1	GND
Pin No. 3	A2	A2	SDA
Pin No. 4	GND	GND	SCL
Pin No. 5	SDA	SDA	WP
Pin No. 6	SCL	SCL	VCC
Pin No. 7	WP	WP	NC
Pin No. 8	VCC	VCC	NC

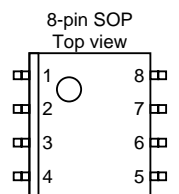
\*1. S-24CS16A is TEST pin.



S-24CS01ADP-G  
S-24CS02ADP-G  
S-24CS04ADP-G  
S-24CS08ADP-1G  
S-24CS16A0I-D8S1G

Product name	S-24CS01A S-24CS02A	S-24CS04A	S-24CS08A S-24CS16A
Pin No. 1	A0	NC	NC
Pin No. 2	A1	A1	NC
Pin No. 3	A2	A2	A2 <sup>*1</sup>
Pin No. 4	GND	GND	GND
Pin No. 5	SDA	SDA	SDA
Pin No. 6	SCL	SCL	SCL
Pin No. 7	WP	WP	WP
Pin No. 8	VCC	VCC	VCC

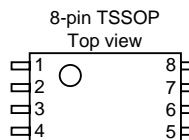
\*1. S-24CS16A is TEST pin.



S-24CS01AFJ-TB-G  
S-24CS02AFJ-TB-G  
S-24CS04AFJ-TB-G  
S-24CS08AFJ-TB-1G  
S-24CS16A0I-J8T1G  
S-24CS64A0I-J8T1G

Product name	S-24CS01A S-24CS02A S-24CS64A	S-24CS04A	S-24CS08A S-24CS16A
Pin No. 1	A0	NC	NC
Pin No. 2	A1	A1	NC
Pin No. 3	A2	A2	A2 <sup>*1</sup>
Pin No. 4	GND	GND	GND
Pin No. 5	SDA	SDA	SDA
Pin No. 6	SCL	SCL	SCL
Pin No. 7	WP	WP	WP
Pin No. 8	VCC	VCC	VCC

\*1. S-24CS16A is TEST pin.



S-24CS01AFT-TB-G  
S-24CS02AFT-TB-G  
S-24CS04AFT-TB-G  
S-24CS08AFT-TB-1G  
S-24CS16A0I-T8T1G  
S-24CS64A0I-T8T1G

Product name	S-24CS01A S-24CS02A S-24CS64A	S-24CS04A	S-24CS08A S-24CS16A
Pin No. 1	A0	NC	NC
Pin No. 2	A1	A1	NC
Pin No. 3	A2	A2	A2 <sup>*1</sup>
Pin No. 4	GND	GND	GND
Pin No. 5	SDA	SDA	SDA
Pin No. 6	SCL	SCL	SCL
Pin No. 7	WP	WP	WP
Pin No. 8	VCC	VCC	VCC

\*1. S-24CS16A is TEST pin.

S-24CS01AFT-TBH-G (Product supporting 105°C)  
S-24CS02AFT-TBH-G (Product supporting 105°C)  
S-24CS04AFT-TBH-G (Product supporting 105°C)  
S-24CS08AFT-TBH-1G (Product supporting 105°C)

S-24CS01AFJ-TBH-G (Product supporting 105°C)  
S-24CS02AFJ-TBH-G (Product supporting 105°C)  
S-24CS04AFJ-TBH-G (Product supporting 105°C)  
S-24CS08AFJ-TBH-1G (Product supporting 105°C)

■ PIN CONFIGURATIONS (2/2)

WLP-6A  
Bottom view

(1.66 × 1.15 × 0.6)  
S-24CS16A0I-H6T1

Pin No.	Product name
1	A2*
2	VCC
3	WP
4	SCL
5	SDA
6	GND

\*1. S-24CS16A is TEST pin.

WLP-8C  
Bottom view

(1.94 × 1.97 × 0.6)  
S-24CS64A0I-H8T1

Pin No.	Product name
1	A0
2	VCC
3	WP
4	SCL
5	SDA
6	GND
7	A2
8	A1

■ SPECIFICATIONS

Product name	Item	Memory size	Organization	Page write size	Operating voltage range		Current consumption		Clock frequency (max.)	Endurance*1	Data retention	Slave address	Protect area	Package
					Read	Write	Read	Standby						
S-24CS01A		1 Kb	128 × 8 bits	8 bytes	1.8 V to 5.5 V	2.7 V to 5.5 V	0.2 mA (2.7V) 0.8 mA (5.5V)	2.0μA	400 kHz (4.5 to 5.5V) 100 kHz (1.8 to 4.5V)	Up to 10 million cycles (25°C) 1 million cycles (85°C)	10 years (After 1 million cycles)	YES	100%	SNT-8A 8-pin DIP 8-pin SOP 8-pin TSSOP
S-24CS02A		2 Kb	256 × 8 bits	8 bytes	1.8 V to 5.5 V	2.7 V to 5.5 V	0.2 mA (2.7V) 0.8 mA (5.5V)	2.0μA	400 kHz (4.5 to 5.5V) 100 kHz (1.8 to 4.5V)	Up to 10 million cycles (25°C) 1 million cycles (85°C)	10 years (After 1 million cycles)	YES	100%	SNT-8A 8-pin DIP 8-pin SOP 8-pin TSSOP
S-24CS04A		4 Kb	512 × 8 bits	16 bytes	1.8 V to 5.5 V	2.7 V to 5.5 V	0.2 mA (2.7V) 0.8 mA (5.5V)	2.0μA	400 kHz (4.5 to 5.5V) 100 kHz (1.8 to 4.5V)	Up to 10 million cycles (25°C) 1 million cycles (85°C)	10 years (After 1 million cycles)	YES	100%	SNT-8A 8-pin DIP 8-pin SOP 8-pin TSSOP
S-24CS08A		8 Kb	1024 × 8 bits	16 bytes	1.8 V to 5.5 V	2.7 V to 5.5 V	0.2 mA (2.7V) 0.8 mA (5.5V)	2.0μA	400 kHz (4.5 to 5.5V) 100 kHz (1.8 to 4.5V)	Up to 10 million cycles (25°C) 1 million cycles (85°C)	10 years (After 1 million cycles)	YES	100%	8-pin DIP 8-pin SOP 8-pin TSSOP
S-24CS16A		16 Kb	2048 × 8 bits	16 bytes	1.8 V to 5.5 V	2.7 V to 5.5 V	0.3 mA (2.7V) 0.8 mA (5.5V)	3.0μA (1.8 to 4.5 V) 5.0μA (4.5 to 5.5 V)	400 kHz (4.5 to 5.5V) 100 kHz (1.8 to 4.5V)	Up to 1 million cycles (25°C) 100,000 cycles (85°C)	10 years (After 100,000 cycles)	-	100%	SNT-8A WLP-6A 8-pin DIP 8-pin SOP 8-pin TSSOP
S-24CS64A		64 Kb	8192 × 8 bits	32 bytes	1.8 V to 5.5 V	2.7 V to 5.5 V	0.3 mA (2.7V) 0.8 mA (5.5V)	3.0μA (1.8 to 4.5 V) 5.0μA (4.5 to 5.5 V)	400 kHz (4.5 to 5.5V) 100 kHz (1.8 to 4.5V)	Up to 1 million cycles (25°C) 100,000 cycles (85°C)	10 years (After 100,000 cycles)	YES	100%	WLP-8C 8-pin SOP 8-pin TSSOP
S-24CS128A		128 Kb	16384 × 8 bits	Under development										

\*1. Cycles/word (Word: 8 bits)

## HIGH-RELIABILITY, SUPER-SMALL PACKAGE 3-WIRE SERIAL E<sup>2</sup>PROM

## S-93C46B/56B/66B/76A/86B

The S-93C46B/56B/66B/76A/86B are high-speed, low-current-consumption 3-wire E<sup>2</sup>PROMs with a wide operating voltage range.

Depending on the product, the memory size is 1 Kb, 2 Kb, 4 Kb, 8 Kb, or 16 Kb. It is organized as 64-word × 16-bit, 128-word × 16-bit, 256-word × 16-bit, 512-word × 16-bit, and 1024 words × 16 bits respectively. Each is capable of sequential read, at which time addresses are automatically incremented in 16-bit blocks. The instruction code is compatible with the NM93CSxx.

These highly reliable E<sup>2</sup>PROM memories feature a guaranteed endurance of 1 million cycles over a wide operating temperature range (-40 to +85°C), data retention of 10 years after 1 million rewrites, and a maximum operating temperature of 105°C.

Built-in data protection functions such as prohibiting write operations during low-voltage supply and protecting against write due to erroneous instruction recognition make these products ideal for storing important data.

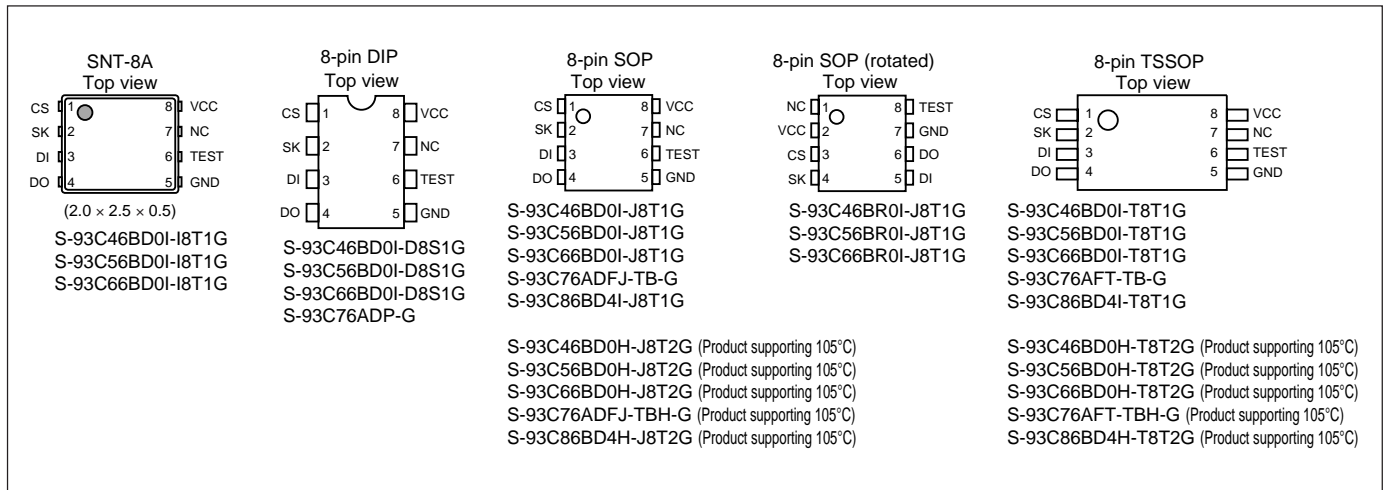
The availability of a super-small SNT<sup>1</sup> package makes these memories ideal for small and thin applications such as mobile devices.

\*1. Small-outline Non-leaded Thin package

### FEATURES

- Low current consumption:
  - 1.5 μA max. (V<sub>CC</sub> = 5.5 V, during standby)
  - 0.8 mA max. (V<sub>CC</sub> = 5.5 V, during reading)
  - 0.4 mA max. (V<sub>CC</sub> = 2.5 V, during reading)
- Wide operating voltage range:
  - 1.8 to 5.5 V (during reading)
  - 2.7 to 5.5 V (during writing)
- Sequential read capable
- Write protection under low power supply voltage
- Protect function against write due to erroneous instruction recognition (S-93C46B/56B/66B/86B)
- Endurance:
  - Up to 10 million cycles (25°C)
  - 1 million cycles guaranteed (85°C)
- Data retention: 10 years (after 1 million rewrites)
- High temperature operation: Supports 105°C max.

### PIN CONFIGURATIONS



### SPECIFICATIONS

Product name	Item	Memory size	Organization	Instruction code	Operating voltage range		Current consumption		Clock frequency (max.)	Endurance*1	Data retention	Package
					Read	Write	Read	Standby				
S-93C46B	1 Kb	64 × 16 bits	NM93CSxx compatible	1.8 V to 5.5 V	2.7 V to 5.5 V	0.8 mA (5.5 V)	1.5μA	0.25 MHz (1.8 V) to 2.0 MHz (5.5 V)	Up to 10 million cycles (25°C) 1 million cycles (85°C)	10 years (After 1 million cycles)	SNT-8A	
						0.4 mA (2.5 V)					8-pin DIP	
						8-pin SOP						
8-pin TSSOP												
S-93C56B	2 Kb	128 × 16 bits	NM93CSxx compatible	1.8 V to 5.5 V	2.7 V to 5.5 V	0.8 mA (5.5 V)	1.5μA	0.25 MHz (1.8 V) to 2.0 MHz (5.5 V)	Up to 10 million cycles (25°C) 1 million cycles (85°C)	10 years (After 1 million cycles)	SNT-8A	
						0.4 mA (2.5 V)					8-pin DIP	
						8-pin SOP						
8-pin TSSOP												
S-93C66B	4 Kb	256 × 16 bits	NM93CSxx compatible	1.8 V to 5.5 V	2.7 V to 5.5 V	0.8 mA (5.5 V)	1.5μA	0.25 MHz (1.8 V) to 2.0 MHz (5.5 V)	Up to 10 million cycles (25°C) 1 million cycles (85°C)	10 years (After 1 million cycles)	SNT-8A	
						0.4 mA (2.5 V)					8-pin DIP	
						8-pin SOP						
8-pin TSSOP												
S-93C76A	8 Kb	512 × 16 bits	NM93CSxx compatible	1.8 V to 5.5 V	2.7 V to 5.5 V	0.8 mA (5.5 V)	1.5μA	0.25 MHz (1.8 V) to 2.0 MHz (5.5 V)	Up to 10 million cycles (25°C) 1 million cycles (85°C)	10 years (After 1 million cycles)	8-pin DIP	
						0.4 mA (2.5 V)					8-pin SOP	
						8-pin TSSOP						
S-93C86B	16 Kb	1024 × 16 bits	NM93CSxx compatible	1.8 V to 5.5 V	2.7 V to 5.5 V	0.8 mA (5.5 V)	1.5μA	0.25 MHz (1.8 V) to 2.0 MHz (5.5 V)	Up to 10 million cycles (25°C) 1 million cycles (85°C)	10 years (After 1 million cycles)	8-pin SOP	
						0.4 mA (2.5 V)					8-pin TSSOP	
						8-pin TSSOP						

\*1. Cycles/word (Word: 16 bits)

## HIGH-RELIABILITY, 3-WIRE SERIAL E<sup>2</sup>PROM WITH 125°C OPERATION GUARANTEED

### S-93A46A/56A/66A/86A

The S-93A46A/56A/66A/86A are high-temperature operation, high-speed, low-current-consumption 3-wire E<sup>2</sup>PROMs with a wide operating voltage range.

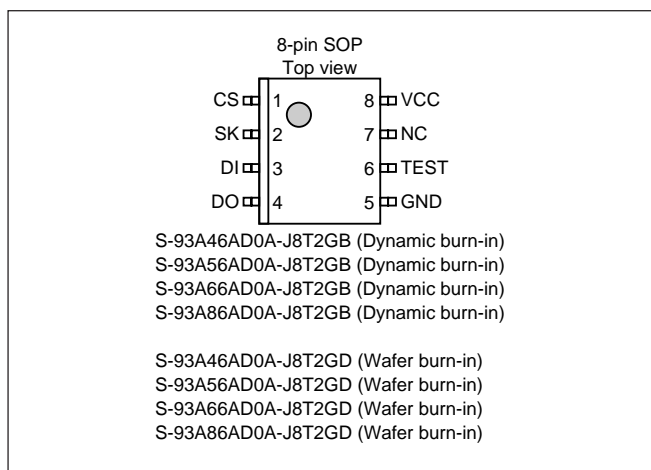
Depending on the product, the memory size is 1 Kb, 2 Kb, 4 Kb, or 16 Kb. The products are organized as 64 words × 16 bits, 128 words × 16 bits, 256 words × 16 bits, and 1024 words × 16 bits, respectively. Each is capable of sequential read, at which time addresses are automatically incremented in 16-bit blocks. The instruction code is compatible with the NM93CSxx. An endurance of 1 million cycles (85°C) is guaranteed and data can be retained for 15 years after 150,000 rewrites (at 125°C), making these highly reliable memories. A high tolerance under severe usage conditions also makes operation at high temperatures possible (operating temperature range: -40 to +125°C).

These products feature a function to prohibit writing during low-voltage supply and to protect against writing due to erroneous instruction recognition, making them ideal for storing important data.

### FEATURES

- Low current consumption:
  - 3.0  $\mu$ A max. ( $V_{CC} = 5.5$  V, during standby)
  - 1.0 mA max. ( $V_{CC} = 5.5$  V, during reading)
  - 0.6 mA max. ( $V_{CC} = 2.7$  V, during reading)
- Wide operating voltage range:
  - 2.7 to 5.5 V (during reading)
  - 2.7 to 5.5 V (during writing)
- Sequential read capable
- Write protection under low power supply voltage
- Protect function against write due to erroneous instruction recognition
- CMOS schmitt input (CS, SK)
- Endurance: 1 million cycles guaranteed (85°C)
- Data retention: 15 years (after 150,000 rewrites (at 125°C))
- High temperature operation:
  - Operating temperature -40 to 125°C

### PIN CONFIGURATIONS



### SPECIFICATIONS

Item Product name	Memory size	Organization	Instruction code	Operating voltage range		Current consumption		Clock frequency (max.)	Endurance*1	Data retention	Package
				Read	Write	Read	Standby				
S-93A46A	1 Kb	64 × 16 bits	NM93CSxx compatible	2.7 V to 5.5 V	2.7 V to 5.5 V	0.6 mA (2.7 V) 1.0 mA (5.5 V)	3.0 $\mu$ A	0.5 MHz (2.7 V) to 1.0 MHz (5.5 V)	1 million cycles (85°C) 150,000 cycles (125°C)	15 years*2	8-pin SOP
S-93A56A	2 Kb	128 × 16 bits	NM93CSxx compatible	2.7 V to 5.5 V	2.7 V to 5.5 V	0.6 mA (2.7 V) 1.0 mA (5.5 V)	3.0 $\mu$ A	0.5 MHz (2.7 V) to 1.0 MHz (5.5 V)	1 million cycles (85°C) 150,000 cycles (125°C)	15 years*2	8-pin SOP
S-93A66A	4 Kb	256 × 16 bits	NM93CSxx compatible	2.7 V to 5.5 V	2.7 V to 5.5 V	0.6 mA (2.7 V) 1.0 mA (5.5 V)	3.0 $\mu$ A	0.5 MHz (2.7 V) to 1.0 MHz (5.5 V)	1 million cycles (85°C) 150,000 cycles (125°C)	15 years*2	8-pin SOP
S-93A86A	16 Kb	1024 × 16 bits	NM93CSxx compatible	2.7 V to 5.5 V	2.7 V to 5.5 V	0.6 mA (2.7 V) 1.0 mA (5.5 V)	3.0 $\mu$ A	0.5 MHz (2.7 V) to 2.0 MHz (5.5 V)	1 million cycles (85°C) 150,000 cycles (125°C)	15 years*2	8-pin SOP

\*1. Cycles/word (Word: 16 bits)

\*2. After 150,000 rewrites (at 125°C)

## LOW VOLTAGE OPERATION, SUPER-SMALL PACKAGE 2-WIRE SERIAL E<sup>2</sup>PROM

## S-24C02BP/04BP

The S-24C02BP/04BP are 2-wire, low voltage operation, low-power-consumption serial E<sup>2</sup>PROMs with a wide operating voltage range. Depending on the product, the memory size is 2 Kb or 4 Kb.

An endurance of 1 million cycles over a wide temperature range (–40 to +85°C) is guaranteed and data can be retained for 10 years after 1 million rewrites, making these highly reliable memories.

These products enable page write and sequential read. The use of a super-small 8-pin SNT<sup>1</sup> package and WLP<sup>2</sup> means that these memories are excellent for small and thin applications such as mobile devices.

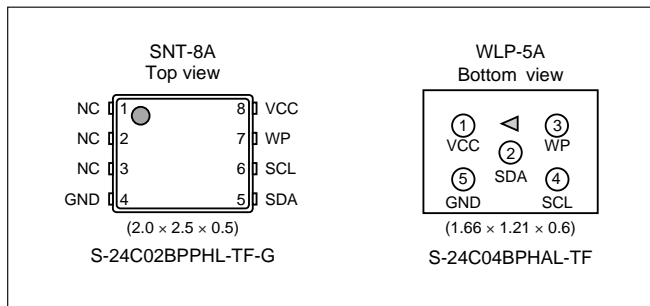
\*1. Small-outline Non-leaded Thin package

\*2. Wafer Level Chip Size Package

### ■ FEATURES

- Low current consumption: 1.0  $\mu$ A max.  
(V<sub>CC</sub> = 5.5 V, during standby)  
0.8 mA max.  
(V<sub>CC</sub> = 5.5 V, during reading)
- Operating voltage range: 1.6 to 5.5 V (during reading)  
1.8 to 5.5 V (during writing, S-24C02BP)  
1.7 to 5.5 V (during writing, S-24C04BP)
- Page write: 8 bytes/page (S-24C02BP)  
16 bytes/page (S-24C04BP)
- Sequential read
- Operating frequency: 400 kHz (V<sub>CC</sub> = 4.5 to 5.5V)
- Endurance: 1 million cycles guaranteed (85°C)
- Data retention: 10 years (after 1 million rewrites)
- Write protection: 100%
- Package: SNT-8A (S-24C02BP)  
WLP-5A (S-24C04BP)

### ■ PIN CONFIGURATIONS



### ■ SPECIFICATIONS

Item Product name	Memory size	Organization	Page write size	Operating voltage range		Current consumption		Clock frequency (max.)	Endurance <sup>1</sup>	Data retention	Slave address	Protect area	Package
				Read	Write	Read	Standby						
S-24C02BPPHL-TF-G	2 Kb	256 × 8 bits	8 bytes	1.6 V to 5.5 V	1.8 V to 5.5 V	0.3 mA (2.7V) 0.8 mA (5.5V)	1.0 $\mu$ A	400 kHz (4.5 to 5.5V) 100 kHz (1.6 to 4.5V)	1 million cycles (85°C)	10 years (After 1 million cycles)	-	100%	SNT-8A
S-24CS04BPHAL-TF	4 Kb	512 × 8 bits	16 bytes	1.6 V to 5.5 V	1.7 V to 5.5 V	0.3 mA (2.7V) 0.8 mA (5.5V)	1.0 $\mu$ A	400 kHz (4.5 to 5.5V) 100 kHz (1.6 to 4.5V)	1 million cycles (85°C)	10 years (After 1 million cycles)	-	100%	WLP-5A

\*1. Cycles/word (Word: 8 bits)

## LOW VOLTAGE OPERATION, SUPER-SMALL PACKAGE 3-WIRE SERIAL E<sup>2</sup>PROM

### S-93L46A/56A/66A/76A

The S-93L46A/56A/66A/76A are low-voltage-operation high-speed, low-current-consumption 3-wire E<sup>2</sup>PROMs with a wide operating voltage range.

Depending on the product, the memory size is 1 Kb, 2 Kb, 4 Kb, or 8 Kb. It is organized as 64-word × 16-bit, 128-word × 16-bit, 256-word × 16-bit, and 512-word × 16-bit respectively. Each is capable of sequential read, at which time addresses are automatically incremented in 16-bit blocks. The instruction code is compatible with the NM93CSxx.

These highly reliable E<sup>2</sup>PROM memories feature a guaranteed endurance of 1 million cycles over a wide operating temperature range (−40 to +85°C), data retention of 10 years after 1 million rewrites.

Built-in data protection functions such as prohibiting write operations during low-voltage supply and protecting against write due to erroneous instruction recognition make these products ideal for storing important data.

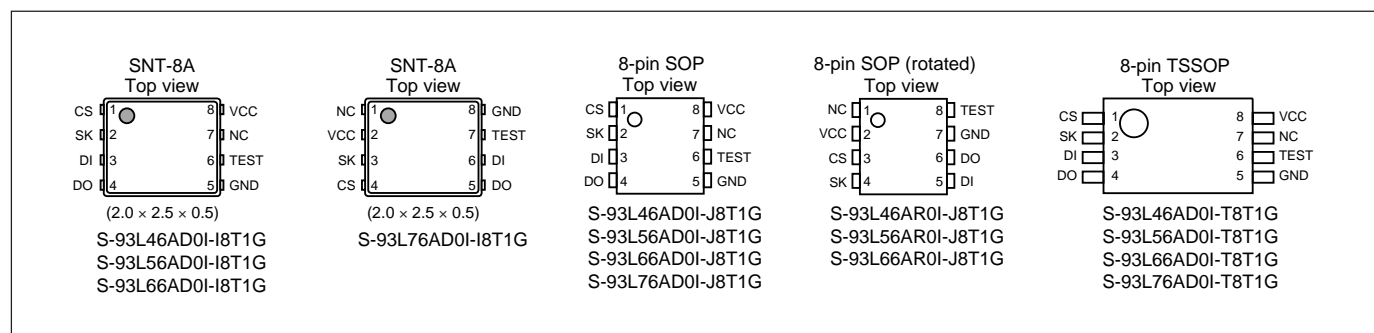
The use of a super-small SNT<sup>1</sup> package means that these memories are excellent for small and thin applications such as mobile devices.

\*1. Small-outline Non-leaded Thin package

## FEATURES

- Low current consumption:
  - 1.5 μA max. (V<sub>CC</sub> = 5.5 V, during standby, S-93L46A/56A/66A)
  - 2.0 μA max. (V<sub>CC</sub> = 5.5 V, during standby, S-93L76A)
  - 0.8 mA max. (V<sub>CC</sub> = 5.5 V, during reading)
  - 0.4 mA max. (V<sub>CC</sub> = 2.5 V, during reading)
- Wide operating voltage range:
  - 1.6 to 5.5 V (during reading)
  - 1.8 to 5.5 V (WRITE, ERASE)
  - 2.7 to 5.5 V (WRAL, ERAL)
- Sequential read capable
- Write protection under low power supply voltage
- Protect function against write due to erroneous instruction recognition (S-93L46A/56A/66A)
- Endurance:
  - Up to 10 million cycles (25°C)
  - 1 million cycles guaranteed (85°C)
- Data retention: 10 years (after 1 million rewrites)

## PIN CONFIGURATIONS



## SPECIFICATIONS

Product name	Item	Memory size	Organization	Instruction code	Operating voltage range		Current consumption		Clock frequency (max.)	Endurance*1	Data retention	Package
					Read	Write	Read	Standby				
S-93L46A	1 Kb	64 × 16 bits	NM93CSxx compatible	1.6V to 5.5V	1.8V to 5.5V	0.8 mA (5.5 V)	1.5μA	0.25 MHz (1.6 V) to 2.0 MHz (5.5 V)	Up to 10 million cycles (25°C) 1 million cycles (85°C)	10 years (After 1 million cycles)	SNT-8A 8-pin SOP 8-pin TSSOP	
					2.7V to 5.5V	0.4 mA (2.5 V)						
S-93L56A	2 Kb	128 × 16 bits	NM93CSxx compatible	1.6V to 5.5V	1.8V to 5.5V	0.8 mA (5.5 V)	1.5μA	0.25 MHz (1.6 V) to 2.0 MHz (5.5 V)	Up to 10 million cycles (25°C) 1 million cycles (85°C)	10 years (After 1 million cycles)	SNT-8A 8-pin SOP 8-pin TSSOP	
					2.7V to 5.5V	0.4 mA (2.5 V)						
S-93L66A	4 Kb	256 × 16 bits	NM93CSxx compatible	1.6V to 5.5V	1.8V to 5.5V	0.8 mA (5.5 V)	1.5μA	0.25 MHz (1.6 V) to 2.0 MHz (5.5 V)	Up to 10 million cycles (25°C) 1 million cycles (85°C)	10 years (After 1 million cycles)	SNT-8A 8-pin SOP 8-pin TSSOP	
					2.7V to 5.5V	0.4 mA (2.5 V)						
S-93L76A	8 Kb	512 × 16 bits	NM93CSxx compatible	1.6V to 5.5V	1.8V to 5.5V	0.8 mA (5.5 V)	2.0μA	0.25 MHz (1.6 V) to 2.0 MHz (5.5 V)	Up to 10 million cycles (25°C) 1 million cycles (85°C)	10 years (After 1 million cycles)	SNT-8A 8-pin SOP 8-pin TSSOP	
					2.7V to 5.5V	0.4 mA (2.5 V)						

\*1. Cycles/word (Word: 16 bits)



## OTHERS E²PROM

### (1) 2-WIRE

Product name	Item	Memory size	Organization	Page write size	Operating voltage range		Current consumption		Clock frequency (max.)	Endurance*1	Data retention	Slave address	Protect area	Package
					Read	Write	Read	Standby						
S-24C01B		1 Kb	128 × 8 bits	8 bytes	2.0V to 5.5V	2.0V to 5.5V	0.3mA (3.3V) 0.8mA (5.5V)	1.0µA	400kHz (4.5 to 5.5V) 100kHz (2.0 to 4.5V)	1 million cycles (85°C)	10 years (After 1 million cycles)	-	100%	8-pin DIP 8-pin SOP
S-24C02B		2 Kb	256 × 8 bits	8 bytes	2.0V to 5.5V	2.0V to 5.5V	0.3mA (3.3V) 0.8mA (5.5V)	1.0µA	400kHz (4.5 to 5.5V) 100kHz (2.0 to 4.5V)	1 million cycles (85°C)	10 years (After 1 million cycles)	-	50% (second half)	8-pin TSSOP 8-pin MSOP
S-24C04B		4 Kb	512 × 8 bits	16 bytes	2.0V to 5.5V	2.0V to 5.5V	0.3mA (3.3V) 0.8mA (5.5V)	1.0µA	400kHz (4.5 to 5.5V) 100kHz (2.0 to 4.5V)	1 million cycles (85°C)	10 years (After 1 million cycles)	-	50% (second half)	8-pin DIP 8-pin SOP 8-pin MSOP

\*1. Cycles/word (Word: 8 bits)

**Remark** The products listed in the above table standardly contain lead. To learn which products are lead-free, please contact our sales office.

### (2) 3-WIRE

Product name	Item	Memory size	Organization	Instruction code	Operating voltage range		Current consumption		Clock frequency (max.)	Endurance*1	Data retention	Package
					Read	Write	Read	Standby				
S-93C46A		1 Kb	64 × 16 bits	NM93CSxx compatible	1.8 V to 5.5 V	1.8 V to 5.5 V	0.4mA (2.5V) 0.8mA (5.5V)	1.0µA	0.25 MHz (1.8 V) to 2.0 MHz (5.5 V)	1 million cycles (85°C)	10 years (After 1 million cycles)	8-pin DIP 8-pin SOP 8-pin TSSOP 8-pin MSOP
S-93C56A		2 Kb	128 × 16 bits	NM93CSxx compatible	1.8 V to 5.5 V	1.8 V to 5.5 V	0.4mA (2.5V) 0.8mA (5.5V)	1.0µA	0.25 MHz (1.8 V) to 2.0 MHz (5.5 V)	1 million cycles (85°C)	10 years (After 1 million cycles)	8-pin DIP 8-pin SOP 8-pin TSSOP 8-pin MSOP
S-93C66A		4 Kb	256 × 16 bits	NM93CSxx compatible	1.8 V to 5.5 V	1.8 V to 5.5 V	0.4mA (2.5V) 0.8mA (5.5V)	1.0µA	0.25 MHz (1.8 V) to 2.0 MHz (5.5 V)	1 million cycles (85°C)	10 years (After 1 million cycles)	8-pin DIP 8-pin SOP 8-pin TSSOP 8-pin MSOP
S-29630A		32 Kb	2048 × 16 bits	NM93CSxx compatible	1.8 V to 5.5 V	1.8 V to 5.5 V	0.4mA (2.5V) 1.2mA (5.5V)	1.0µA	0.25 MHz (1.8 V) to 1.4 MHz (5.5 V)	1 million cycles (85°C)	10 years (After 1 million cycles)	8-pin DIP 8-pin SOP
S-29U130A		1 Kb	64 × 16 bits	NM93CSxx compatible	0.9 V to 3.6 V	1.8 V to 3.6 V	0.2mA (0.9V) 0.6mA (3.6V)	1.0 µA (-10 to 70°C) 2.0 µA (-40 to 85°C)	10 kHz (0.9 V) to 500 kHz (3.6 V) (-10 to 70°C)	100,000 cycles (85°C)	10 years (After 100,000 cycles)	8-pin SOP 8-pin SSOP
S-29U220A		2 Kb	128 × 16 bits	NM93CSxx compatible	0.9 V to 3.6 V	1.8 V to 3.6 V	0.2mA (0.9V) 0.6mA (3.6V)	1.0 µA (-10 to 70°C) 2.0 µA (-40 to 85°C)	10 kHz (0.9 V) to 500 kHz (3.6 V) (-10 to 70°C)	100,000 cycles (85°C)	10 years (After 100,000 cycles)	8-pin SOP 8-pin SSOP
S-29U330A		4 Kb	256 × 16 bits	NM93CSxx compatible	0.9 V to 3.6 V	1.8 V to 3.6 V	0.2mA (0.9V) 0.6mA (3.6V)	1.0 µA (-10 to 70°C) 2.0 µA (-40 to 85°C)	10 kHz (0.9 V) to 500 kHz (3.6 V) (-10 to 70°C)	100,000 cycles (85°C)	10 years (After 100,000 cycles)	8-pin SOP 8-pin SSOP
S-29Z330A		4 Kb	256 × 16 bits	NM93CSxx compatible	0.9 V to 3.6 V	0.9 V to 3.6 V	0.2mA (0.9V) 0.6mA (3.6V)	1.0 µA (-10 to 70°C) 2.0 µA (-40 to 85°C)	10 kHz (0.9 V) to 500 kHz (3.6 V) (-10 to 70°C)	100,000 cycles (85°C)	10 years (After 100,000 cycles)	8-pin SOP 8-pin SSOP
S-29Z430A		8 Kb	512 × 16 bits	NM93CSxx compatible	0.9 V to 3.6 V	0.9 V to 3.6 V	0.2mA (0.9V) 0.6mA (3.6V)	1.0 µA (-10 to 70°C) 2.0 µA (-40 to 85°C)	10 kHz (0.9 V) to 500 kHz (3.6 V) (-10 to 70°C)	100,000 cycles (85°C)	10 years (After 100,000 cycles)	8-pin SOP

\*1. Cycles/word (Word: 16 bits)

**Remark** The products listed in the above table standardly contain lead. To learn which products are lead-free, please contact our sales office.

## Analog IC lineup

				Package		
Mini Analog	CMOS operational amplifier	0.5 $\mu$ A Rail-to-Rail	1 circuit	S-89430A/89431A	SC-88A	84
			1 circuit	S-89110A/89120A	8-pin MSOP	85
		2 circuits	S-89110B/89120B	DEV	85	
	CMOS comparator	0.7 $\mu$ A Rail-to-Rail	1 circuit	S-89530A/89531A	8-pin MSOP	86
			1 circuit	S-89210A/89220A	8-pin MSOP	87
			2 circuits	S-89210B/89220B	DEV	87

**DEV** : Under development

				Package		
Temperature sensor	Temperature switch IC		S-8130 series	8-pin MSOP	88	
	Temperature sensor IC		S-8110C	SNT-4A	89	
		High-precision		S-8120C	SC-82AB	89
	Linear image sensor IC for contact image sensor		S-86xx	Die	90	

## 0.5 $\mu$ A RAIL-TO-RAIL CMOS OPERATIONAL AMPLIFIER 1 Circuit S-89430A/89431A

The mini-analog series is a group of ICs that incorporate a general-purpose analog circuit in an ultra-small package. The S-89430/89431 are CMOS type operational amplifiers that feature Rail-to-Rail\*1 I/O and an internal phase compensation circuit. These features enable driving at a lower voltage (from 0.9 V) and with lower current consumption (0.5  $\mu$ A typ.) than existing general-purpose operational amplifiers, making the S-8943xA/B series ideal for use in battery-powered compact portable devices. The S-89430A/89431A series is a single operational amplifier, with one circuit incorporated in the ultra-small SC-88A.

\*1. Rail-to-Rail is a registered trademark of Motorola, Inc.

### PRODUCT LIST

Package	SC-88A (1 circuit is mounted)
Offset voltage	
$V_{IO} = 10$ mV max.	S-89430ACNC-HBUTFG
$V_{IO} = 5$ mV max.	S-89431ACNC-HBVTFG

### SPECIFICATIONS

$T_a = 25^\circ\text{C}$  (typ.)

Product name	S-89431ACNC			
Absolute maximum rating	7 V			
Operating temperature range	-40 to +85°C			
Package	SC-88A			
Operating voltage	0.9 to 5.5 V			
Power supply voltage $V_{DD}$	At 0.9 V	At 1.8 V	At 3.0 V	
Current consumption *1	0.9 $\mu$ A max.	0.9 $\mu$ A max.	0.9 $\mu$ A max.	
Input offset voltage	5 mV max.	5 mV max.	5 mV max.	
Input offset current	1 pA	1 pA	1 pA	
Input bias current	1 pA	1 pA	1 pA	
Common-mode input voltage range	0 to 0.9 V	0 to 1.8 V	0 to 3.0 V	
Voltage gain (open loop)	75 dB	75 dB	80 dB	
Maximum output voltage swing *2	$V_{OH}$	0.85 V min.	1.75 V min.	2.95 V min.
	$V_{OL}$	0.05 V max.	0.05 V max.	0.05 V max.
Slew rate	4.0 V/ms	4.5 V/ms	5.0 V/ms	
Gain bandwidth product	5.0 kHz	5.0 kHz	4.8 kHz	
Source current ( $V_{OUT} = V_{SS}$ )	40 $\mu$ A min.	1.2 mA min.	4.8 mA min.	
Sink current ( $V_{OUT} = V_{DD}$ )	12 $\mu$ A min.	1.2 mA min.	4.8 mA min.	

\*1. Value with  $V_{IN} = V_{DD}/2$  in voltage follower configuration

\*2.  $R_L = 100$  k $\Omega$

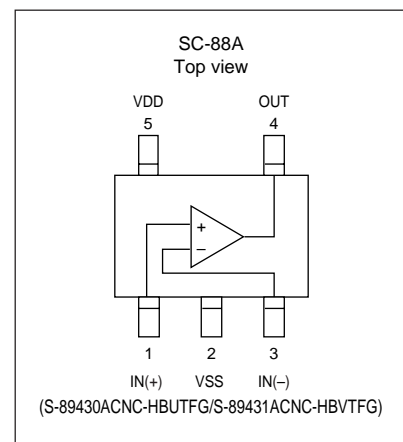
### FEATURES

- Can be driven at lower voltage than existing general-purpose operational amplifiers:  $V_{DD} = 0.9$  to 5.5 V
- Ultra-low current consumption:  $I_{DD} = 0.5$   $\mu$ A typ.
- Rail-to-rail wide I/O voltage range:  $V_{CMR} = V_{SS}$  to  $V_{DD}$
- Low input offset voltage: 5.0 mV max.
- No external devices required due to an internal phase compensation
- Small package SC-88A

### APPLICATIONS

- Cellular phones, digital still cameras, PDAs, notebook PCs, digital camcorders

### PIN CONFIGURATIONS



# CMOS OPERATIONAL AMPLIFIER

1 Circuit S-89110A/89120A  
2 Circuits S-89110B/89120B

► Under development

The mini analog series is a family of ICs that integrate general-purpose analog circuits in ultra-small packages.

The S-89110/89120 is a CMOS operational amplifier with a wide operating voltage range and ultra-low current consumption. The S-89110/89120 provides the best solution for battery-powered portable equipment.

## FEATURES

- Low operation voltage :  $V_{DD} = 1.8$  to  $5.5$  V
- Low current consumption:  $I_{DD} = 50 \mu A$  (S-89110)  
 $I_{DD} = 10 \mu A$  (S-89120)
- Low input offset voltage:  $4.0$  mV max.
- Small package: SC-88A  
8-pin MSOP (under development)

## PRODUCT LIST

Package Current consumption	SC-88A (1 circuit is mounted)	8-pin MSOP (2 circuits are mounted)
$I_{DD} = 50 \mu A$ typ.	S-89110ANC-1A1-TFG	S-89110BC-K8T1G (under development)
$I_{DD} = 10 \mu A$ typ.	S-89120ANC-1A2-TFG	S-89120BC-K8T1G (under development)

## APPLICATIONS

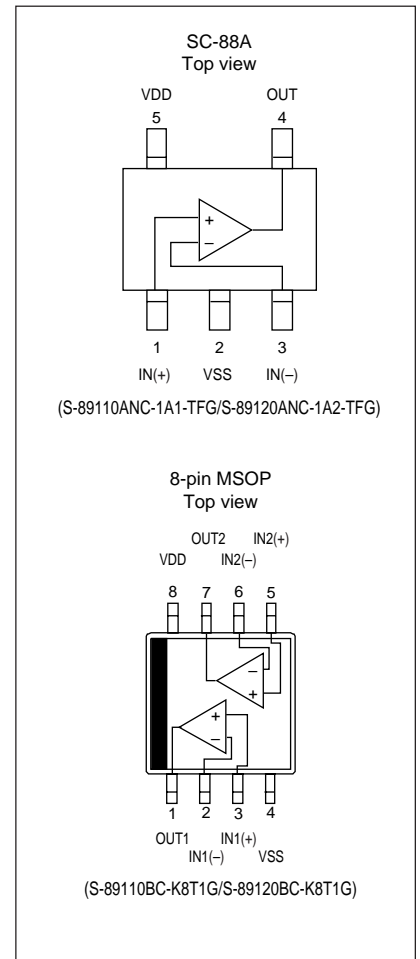
- Cellular phones, PDAs, cameras, digital cameras, camcorders, notebook PCs

## SPECIFICATIONS

$T_a = 25^\circ C$  (typ.)

Product name	S-89110ANC		S-89120ANC	
	At 1.8 V	At 3.0 V	At 1.8 V	At 3.0 V
Absolute maximum rating	10 V			
Operating temperature range	-40 to +85°C			
Package	SC-88A		SC-88A	
Operating voltage	1.8 to 5.5 V			
Power supply voltage VDD	At 1.8 V	At 3.0 V	At 1.8 V	At 3.0 V
Current consumption	50 $\mu A$ typ.	50 $\mu A$ typ.	10 $\mu A$ typ.	10 $\mu A$ typ.
Input offset voltage	4 mV max.	4 mV max.	4 mV max.	4 mV max.
Input offset current	1 pA	1 pA	1 pA	1 pA
Input bias current	1 pA	1 pA	1 pA	1 pA
Common-mode input voltage range	0 to 1.1 V	0 to 2.3 V	0 to 1.1 V	0 to 2.3 V
Voltage gain (open loop)	80 dB	80 dB	80 dB	80 dB
Maximum output voltage swing (VOH)	1.7 V min.	2.9 V min.	1.7 V min.	2.9 V min.
Slew rate	0.07 V/ $\mu s$	0.07 V/ $\mu s$	0.015 V/ $\mu s$	0.015 V/ $\mu s$
Gain bandwidth product	160 kHz	175 kHz	30 kHz	35 kHz
Source current ( $V_{OUT} = V_{SS}$ )	100 $\mu A$ min.	120 $\mu A$ min.	20 $\mu A$ min.	25 $\mu A$ min.
Sink current ( $V_{OUT} = V_{DD}$ )	5 mA min.	15 mA min.	5 mA min.	15 mA min.

## PIN CONFIGURATION



## 0.7 $\mu$ A RAIL-TO-RAIL CMOS COMPARATOR

## 1 Circuit S-89530A/89531A

The mini analog series is a family of ICs that integrate general-purpose analog circuits in ultra-small chip packages. The S-89530/89531 is a CMOS comparator with Rail-to-Rail\*1 I/O. Since this series features low voltage drive and low current consumption compared with the conventional comparator, it is ideal for small battery-powered portable applications.

\*1. Rail-to-Rail is a registered trademark of Motorola, Inc.

### PRODUCT LIST

Package	SC-88A (1 circuit is mounted)
Offset voltage	
$V_{IO} = 10\text{mV max.}$	S-89530ACNC-HCBTFG
$V_{IO} = 5\text{mV max.}$	S-89531ACNC-HCCTFG

### SPECIFICATIONS

$T_a = 25^\circ\text{C}$  (typ. value)

Product name	S-89531ANC			
Absolute maximum rating	7 V			
Operating temperature range	-40 to +85°C			
Package	SC-88A			
Operating voltage	0.9 to 5.5 V			
Power supply voltage $V_{DD}$	At 0.9 V	At 1.8 V	At 3.0 V	
Current consumption	1.3 $\mu$ A max.	1.4 $\mu$ A max.	1.4 $\mu$ A max.	
Input offset voltage	5 mV max.	5 mV max.	5 mV max.	
Input offset current	1 pA	1 pA	1 pA	
Input bias current	1 pA	1 pA	1 pA	
Common-mode input voltage range	0 to 0.9 V	0 to 1.8 V	0 to 3.0 V	
Voltage gain (open loop)	74 dB	80 dB	86 dB	
Maximum output voltage swing*1	$V_{OH}$	0.88 V min.	1.78 V min.	2.98 V min.
	$V_{OL}$	0.02 V max.	0.02 V max.	0.02 V max.
Source current ( $V_{OUT} = V_{SS}$ )	12 $\mu$ A min.	1.0 mA min.	4.0 mA min.	
Sink current ( $V_{OUT} = V_{DD}$ )	12 $\mu$ A min.	1.2 mA min.	4.8 mA min.	
Rise propagation delay time	65 $\mu$ s	90 $\mu$ s	110 $\mu$ s	
Fall propagation delay time	65 $\mu$ s	160 $\mu$ s	280 $\mu$ s	
Output rise time	5 $\mu$ s	8 $\mu$ s	10 $\mu$ s	
Output fall time	20 $\mu$ s	25 $\mu$ s	30 $\mu$ s	

\*1.  $R_L = 100\text{ k}\Omega$

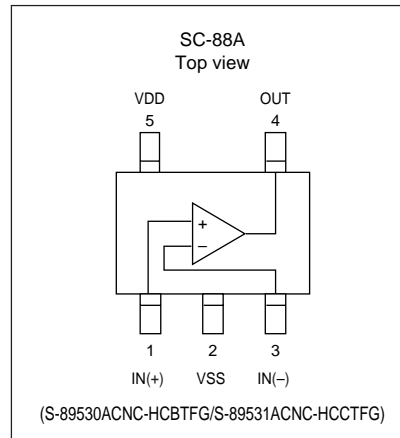
### FEATURES

- Compared with the conventional general-purpose comparator, low voltage operation is possible:  $V_{DD} = 0.9$  to  $5.5\text{ V}$
- Low current consumption:  $I_{DD} = 0.7\ \mu\text{A typ.}$
- Wide I/O voltage range:  $V_{CMR} = V_{SS}$  to  $V_{DD}$
- Small input offset voltage:  $5.0\text{ mV max.}$
- Small package: SC-88A

### APPLICATIONS

- Cellular phones, digital still cameras, PDAs, notebook PCs, digital camcorders

### PIN CONFIGURATION



# CMOS COMPARATOR

1 Circuit S-89210A/89220A  
 2 Circuits S-89210B/89220B

► Under development

The mini analog series is a family of ICs that integrate general-purpose analog circuits in ultra-small packages.

The S-89210/89220 is a CMOS type comparator with a wide operating voltage range and ultra-low current consumption.

The S-89210/89220 provides the best solution for battery-powered portable equipment.

## PRODUCT LIST

Package	SC-88A (1 circuit is mounted)	8-pin MSOP (2 circuits are mounted)
Current consumption		
I <sub>DD</sub> = 50µA typ.	S-89210ACNC-1C0TFG	S-89210BC-K8T1G (under development)
I <sub>DD</sub> = 10µA typ.	S-89220ACNC-1C1TFG	S-89220BC-K8T1G (under development)

## SPECIFICATIONS

T<sub>a</sub> = 25°C, typ.

Product name	S-89210ACNC		S-89220ACNC	
Absolute maximum rating	10 V		10 V	
Operation temperature range	-40 to +85°C		-40 to +85°C	
Package	SC-88A		SC-88A	
Operating voltage	1.8 to 5.5 V		1.8 to 5.5 V	
Power supply voltage VDD	At 1.8 V	At 3.0 V	At 1.8 V	At 3.0 V
Current consumption	50 µA typ.	50 µA typ.	10 µA typ.	10 µA typ.
Input offset voltage	4 mV max.	4 mV max.	4 mV max.	4 mV max.
Common-mode input voltage range	0 to 1.1 V	0 to 2.3 V	0 to 1.1 V	0 to 2.3 V
Maximum output voltage swing (V <sub>OH</sub> )	1.5 V min.	2.7 V min.	1.5 V min.	2.7 V min.
Source current (V <sub>OUT</sub> = 0 V)	100 µA min.	120 µA min.	20 µA min.	25 µA min.
Sink current (V <sub>OUT</sub> = 0.5 V)	5 mA min.	8 mA min.	5 mA min.	8 mA min.
Rise propagation delay time	20 µs	30 µs	100 µs	150 µs
Fall propagation delay time	5 µs	6 µs	25 µs	30 µs
Output rise time	1.2 µs	2 µs	6 µs	10 µs
Output fall time	1.2 µs	2 µs	6 µs	10 µs

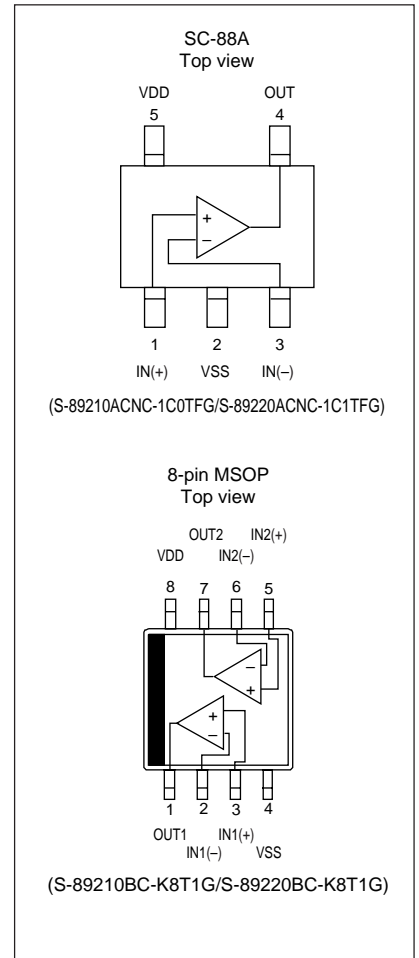
## FEATURES

- Low voltage operation: V<sub>DD</sub> = 1.8 to 5.5 V
- Low current consumption: I<sub>DD</sub> = 50 µA (S-89210ACNC)  
I<sub>DD</sub> = 10 µA (S-89220ACNC)
- Low input offset voltage: 4.0 mV max.
- Small package: SC-88A  
8-pin MSOP (under development)

## APPLICATIONS

- Cellular phones, PDAs, cameras, digital still cameras, camcorders, notebook PCs

## PIN CONFIGURATION

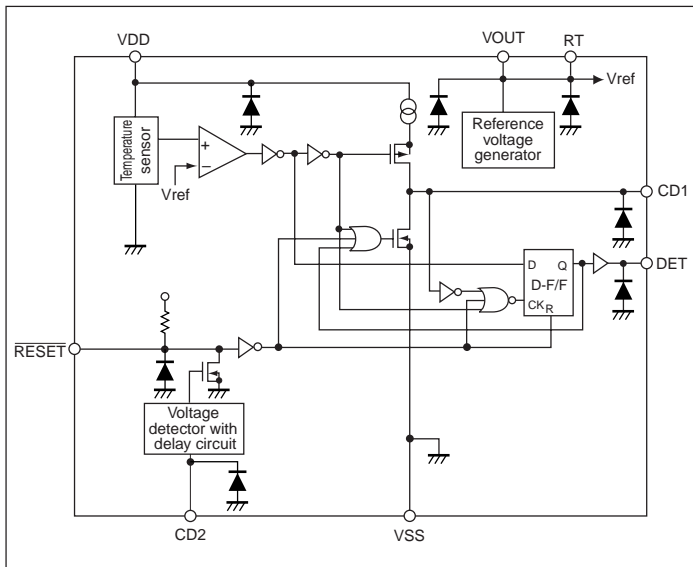




The S-8130AA series is a temperature switch IC that contains a semiconductor temperature sensor with  $\pm 2.5^\circ\text{C}$  temperature accuracy, and performs temperature detection. It operates from a power supply voltage of 2.2 V, and integrates a temperature sensor with a temperature coefficient of  $-13\text{ mV}/^\circ\text{C}$ , a reference voltage generator, a comparator, a voltage detector, and a noise protection circuit in a single small 8-pin MSOP package. With an operating temperature range of  $-40^\circ\text{C}$  to  $+100^\circ\text{C}$  and excellent linearity compared with temperature sensors such as the conventional thermistor, this series is ideal for a wide range of temperature control applications. The detection temperature is set internally.

In the S-8130AC series, the detection temperature can be set by an external resistor.

### ■ BLOCK DIAGRAM (S-8130AA series)

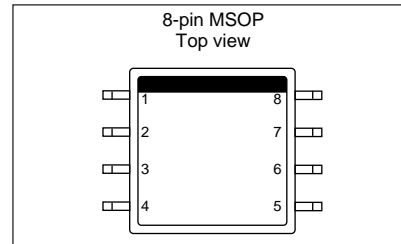


### ■ FEATURES

- Detection temperature accuracy:  $\pm 2.5^\circ\text{C}$  ( $+60$  to  $+95^\circ\text{C}$ , in  $5^\circ\text{C}$  steps)
- Temperature voltage output based on VSS
- Low voltage operation:  $V_{\text{DD}} = 2.2\text{ V min.}$
- Low current consumption:  $15\ \mu\text{A typ.}$  ( $+25^\circ\text{C}$ )
- Logical output is fixed by the latch after temperature detection.
- Small package: 8-pin MSOP
- Error prevention circuit for temperature detection built in

### ■ PIN CONFIGURATION

(common to S-8130AA/AC series)



Pin No.	Symbol	Description
1	VDD	Positive power supply pin
2	DET	Setting temperature detection output signal (active high)
3	CD2	Delay time setting capacitor connection pin for voltage detection circuits
4	CD1	Capacitor connection pin for error prevention time setting
5	VSS	Ground pin
6	RESET	Reset I/O pin (active low)
7	RT	Reference voltage input pin
8	VOUT	Reference voltage output pin for built-in comparator

### ■ SELECTION GUIDE

#### S-8130AA series

Product name	Detection temperature TDET	DET output	Release voltage VRET	RESET
S-8130AAAFN-MAAT2G	$80^\circ\text{C}$	Active high	2.4 V	Pull up
S-8130AACFN-MAET2G	$86^\circ\text{C}$	Active high	2.9 V	Pull up

#### S-8130AC series

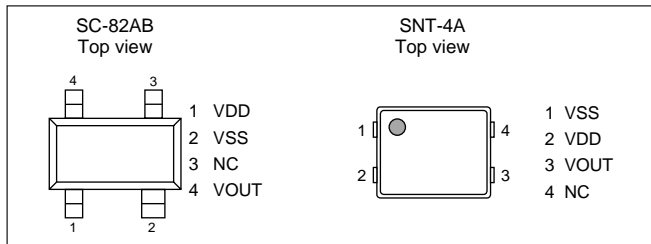
Product name	DET output	Release voltage VRET	RESET
S-8130ACAFN-MACT2G	Active high	2.4 V	Pull up

**Remark** For options other than those listed above, please contact our marketing department.

## TEMPERATURE SENSOR IC S-8110C/8120C series

The S-8110C/8120C series is a family of high-precision temperature sensor ICs on a single chip with a linear output voltage for temperature changes. Each chip is composed of a temperature sensor, a constant current circuit, and an operational amplifier. It can be used at temperatures ranging from  $-40^{\circ}\text{C}$  to  $+100^{\circ}\text{C}$ . These devices have much better linearity than other temperature sensors such as thermistors, and can be used for a wide range of temperature control applications.

### PIN CONFIGURATIONS



### FEATURES

- Linear output voltage for temperature change
- Low current consumption
- Built-in operational amplifier
- $V_{SS}$  based output
- Compact package:
  - SC-82AB
  - SNT-4A

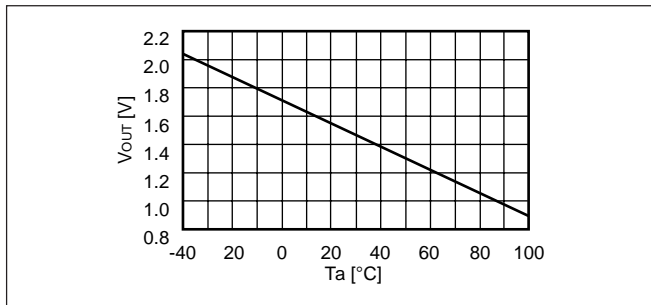
### APPLICATIONS

- High-frequency circuits such as cellular phones and radio equipment
- Compensation of oscillation frequency in crystal oscillator
- LCD contrast compensation
- Temperature detection in battery management
- Compensation of amplifier gain
- Heat prevention for charged batteries or halogen lights
- Compensation of auto focus circuits

### SPECIFICATIONS

Item	Operating voltage range	Temperature sensitivity (typ.)	Output accuracy	Linearity	Operating temperature range	Current consumption (typ. $T_a=+25^{\circ}\text{C}$ )	Package
S-8110CNB-DRA-TF-G	2.4 to 10.0 V	$-8.2 \text{ mV}/^{\circ}\text{C}$	$\pm 5.0^{\circ}\text{C}$	$\pm 0.5\%$ Typ.	$-40$ to $+100^{\circ}\text{C}$	4.5 $\mu\text{A}$	SC-82AB
S-8110CPF-DRA-TF-G							SNT-4A
S-8120CNB-DRB-TF-G	2.4 to 10.0 V	$-8.2 \text{ mV}/^{\circ}\text{C}$	$\pm 2.5^{\circ}\text{C}$	$\pm 0.5\%$ Typ.	$-40$ to $+100^{\circ}\text{C}$	4.5 $\mu\text{A}$	SC-82AB
S-8120CPF-DRB-TF-G							SNT-4A

### TEMPERATURE ( $T_a$ ) VS. OUTPUT VOLTAGE ( $V_{OUT}$ ) CHARACTERISTICS GRAPH (TYPICAL DATA)



The S-86xx series are linear image sensor ICs ideal for multi-chip contact image sensors. These devices synchronize analog image signals received from the light receiving element with the clock and output them sequentially. Three models are available: the S-8605B series, which uses phototransistors as the light receiving element, and the S-8665BWI, which use photodiodes as the light receiving element.

The S-8605B series and S-8665BWI also operate on a 3.3 V single power supply.

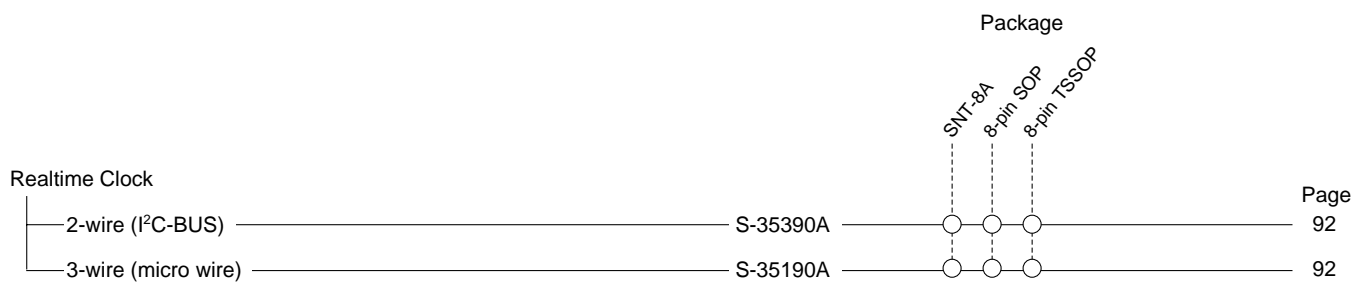
### ■ FEATURES

- Reading widths supporting various sizes.
  - Can be used to read various document sizes by changing the number of linearly arranged chips.
- Double-input drive (SI and CLK)
  - Easy to start using start and clock signals.
- Fast operation
- Low voltage operation: 3.3 to 5 V single power supply (S-8605B series/S-8665BWI)
- Photodiode light receiving element with good picture quality (S-8665BWI)

### ■ SPECIFICATIONS

Product name	Resolution	Reading width	Light receiving element	Clock frequency	Output amplifier	Densitivity	Format
S-8605BWI	8 dpm	12.00 mm	Photo-Tr	2.0MHz	Integrated	15V/lx*s	Wafer
S-8605BWI01	8 dpm	12.00 mm	Photo-Tr	2.0MHz	-	7V/lx*s	Wafer
S-8665BWI	600 dpi	19.79 mm	Photo-Di	5.0MHz	Integrated	95V/lx*s	Wafer

## Realtime Clock Lineup



## Programmable Port Controller Lineup



## Mini Logic Lineup



The S-35190A/35390A are low-current-consumption CMOS realtime clock ICs that feature a wide operating voltage range (1.3 V to 5.5 V) and can be driven on a variety of supply voltages, from a main supply to a backup supply. The time keeping current consumption of 0.25  $\mu$ A and minimum time keeping operation voltage of 1.1 V enable greatly increased battery duration.

In a system that operates on a backup battery, the free register incorporated in the realtime clock can be used for the user backup memory function. This user register can hold data on a supply voltage as low as 1.2 V (min.), so the data stored in the register before the main power supply was cut can be called any time after the voltage is restored.

These products also include a clock adjustment function that enables wide-ranging correction of deviation in the frequency of the crystal oscillator at a minimum resolution of 1 ppm. Also, by combining this function with a temperature sensor, the clock adjustment value can be set in accordance with changes in the temperature, which makes it possible to realize a clock function that retains a high degree of accuracy regardless of temperature variation.

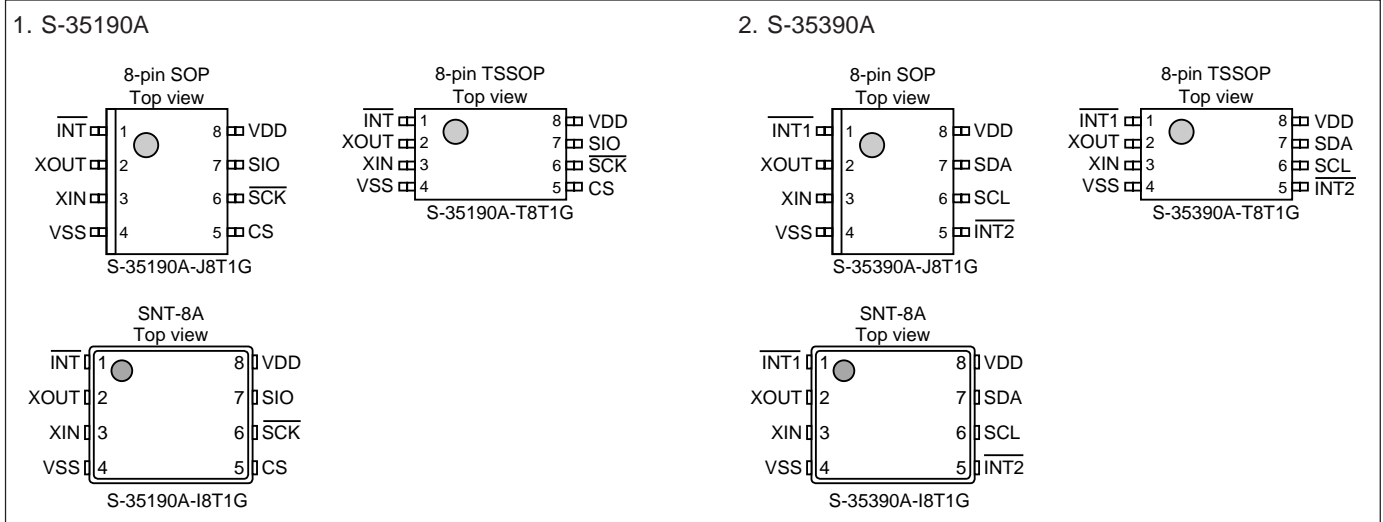
### FEATURES

- Low current consumption: 0.25  $\mu$ A typ. ( $V_{DD} = 3.0$  V,  $T_a = 25^\circ$ C)
- Wide operating voltage range: 1.3 to 5.5 V
- Minimum time keeping operation voltage: 1.1 V typ.
- Built-in clock adjustment function (minimum resolution: 1 ppm or 3 ppm)
- Built-in free user register
- 3-wire (micro wire) CPU interface (S-35190A)
- 2-wire (I<sup>2</sup>C BUS) CPU interface (S-35390A)
- Built-in alarm interrupter
- Built-in flag generator at power down or power on
- Auto calendar up to the year 2099, automatic leap year calculation function
- Built-in constant voltage circuit
- Built-in 32 kHz crystal oscillator (Cd built in, Cg external)
- Package: 8-pin SOP, 8-pin TSSOP, SNT-8A

### APPLICATIONS

- Digital still cameras
- Digital video cameras
- Electronic voltmeters
- DVD recorders
- TVs, radios
- PHS
- Mobile phones
- Car navigation

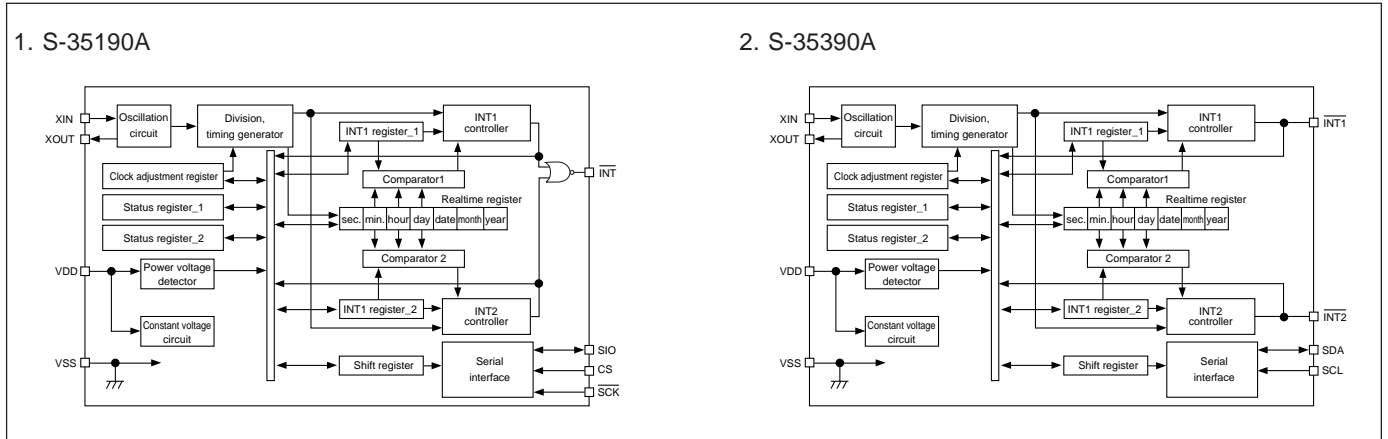
### PIN CONFIGURATIONS



■ SPECIFICATIONS

Item Product name	Communication mode	Operating voltage range	Time keeping operation voltage	Current consumption (typ.) (V <sub>DD</sub> =3.0 V, T <sub>a</sub> =25°C)		Oscillation frequency deviation (deviation between ICs)	Voltage deviation of oscillating frequency (V <sub>DD</sub> =1.3 to 5.5 V)	Package
				During clocking operation	During communication			
S-35190A	3-wire	1.3 to 5.5V	1.1 to 5.5V	0.25 μA	6 μA	±10 ppm	±3 ppm/V	8-pin SOP
S-35390A	2-wire							8-pin TSSOP SNT-8A

■ BLOCK DIAGRAM





## PROGRAMMABLE PORT CONTROLLER (PORT EXPANDER WITH BUILT-IN E<sup>2</sup>PROM CIRCUIT)

▶ NEW S-7750B

The S-7750B is a programmable port controller IC comprising E<sup>2</sup>PROM, a data output controller, a circuit to prevent malfunction during low supply voltage, etc.

It operates at 400 kHz and interfaces with external devices via the I<sup>2</sup>CBUS. High and low of the 8-channel digital output, and the delay time of each channel can be controlled by serial signals.

Initial value, and reverse delay time can be set for the 8-channel digital output pins, respectively for each port. This is effective for controlling turning on or off the voltage regulator in mobile phones. The built-in E<sup>2</sup>PROM allows the initial value of each control setting to be retained when power is off.

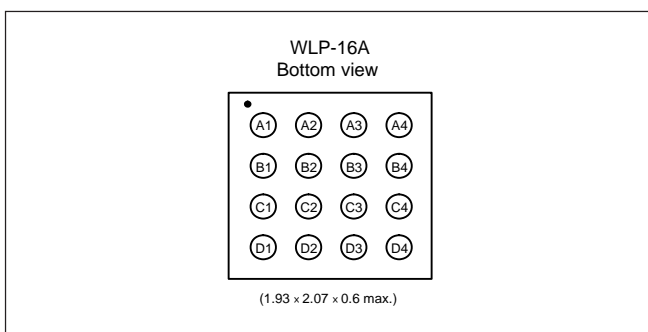
### ■ FEATURES

- Operating voltage range: 2.3 V to 4.5 V
- 8-channel digital output
- Operating frequency: 400 kHz
- Malfunction prevention function at low supply voltage
- Low current consumption During standby: 3.0 μA max. (V<sub>CC</sub> = 4.5 V)
- Built-in E<sup>2</sup>PROM circuit
- E<sup>2</sup>PROM endurance: 10<sup>5</sup> cycles (at -40 to +85°C)
- E<sup>2</sup>PROM write protect function

### ■ APPLICATIONS

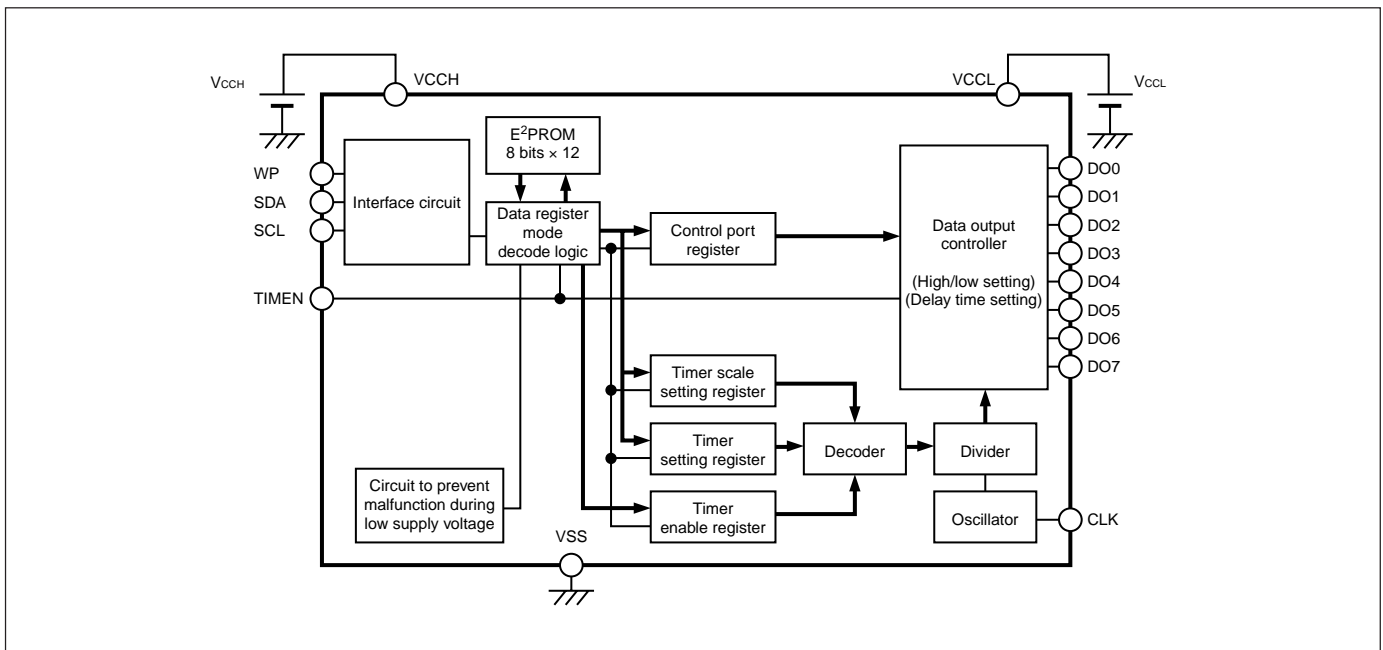
- The voltage regulator turns on or off control in mobile phones

### ■ PIN CONFIGURATIONS



Pin No.	Symbol	Description
A1	CLK	External clock input
A2	SCL	Serial clock input
A3	WP	Write protect input
A4	VCCH	Power supply
B1	DO7	Output port 7
B2	VSS	Ground
B3	SDA	Serial data I/O
B4	DO0	Output port 0
C1	DO6	Output port 6
C2	TIMEN	Timer enable input
C3	DO3	Output port 3
C4	DO1	Output port 1
D1	DO5	Output port 5
D2	DO4	Output port 4
D3	VCCL	Power supply for output port
D4	DO2	Output port 2

### ■ BLOCK DIAGRAM



**MINI LOGIC SERIES**

**S-75V/75L series**

The mini logic series features one standard logic gate in a super small package and plays a complimentary role for the input/output signals of microcomputers, gate arrays and so on. The S-75V series realizes high speed operation compatible with LSTTL. The S-75L series can operate between 1.0 V to 3.6 V, making it suitable for small battery-powered portable equipment.

**FEATURES**

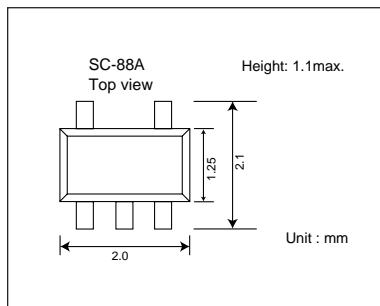
- Wide operating power supply range: 2.0 V to 5.5 V (S-75V series)  
1.0 V to 3.6 V (S-75L series)
- Low current consumption: 1.0  $\mu$ A max. (5.5 V, 25°C)  
(S-75V series)
- All inputs have power down protection function
- Super-small package: SC-88A

**APPLICATIONS**

- Cellular phones, PHS, PDAs, cameras, digital cameras
- Camcorders, pagers
- PCs, notebook PCs and peripheral equipment

**DIMENSIONS**

SC-88A (typ.)



**SPECIFICATIONS**

Series name	VHS series	LV series
Product name	S-75VxxANC	S-75LxxANC
Propagation delay time NAND GATE (CL=15pF)	3.7ns typ. (at Vcc=5V)	7.0ns typ. (at Vcc=3V)
Operating voltage	2 to 5.5V	1 to 3.6V
Operating temperature	-40 to +85°C	-40 to +85°C
Output current	I <sub>OH</sub>	-8mA min. (Vcc=4.5V)
	I <sub>OL</sub>	8mA min. (Vcc=4.5V)
Package	SC-88A	SC-88A

Function	Product name	Product name
2NAND	S-75V00ANC-5V1-TFG	S-75L00ANC-5L1-TFG
2NOR	S-75V02ANC-5V3-TFG	S-75L02ANC-5L3-TFG
INV1	S-75V04ANC-5V5-TFG	S-75L04ANC-5L5-TFG
INV2	S-75VU04ANC-5V6TFG	S-75LU04ANC-5L6TFG
2AND	S-75V08ANC-5V2-TFG	S-75L08ANC-5L2-TFG
Schmitt INV	S-75V14ANC-5VA-TFG	S-75L14ANC-5LA-TFG
2OR	S-75V32ANC-5V4-TFG	S-75L32ANC-5L4-TFG
EX-OR	S-75V86ANC-5V8-TFG	S-75L86ANC-5L8-TFG

**PIN CONFIGURATIONS AND FUNCTIONS**

<p>S-75V00ANC, S-75L00ANC 2-input NAND gate</p> <p><math>Y = \overline{A \cdot B}</math></p>	<p>S-75V02ANC, S-75L02ANC 2-input NOR gate</p> <p><math>Y = \overline{A + B}</math></p>	<p>S-75V04ANC, S-75L04ANC Inverter</p> <p><math>Y = \overline{A}</math></p>	<p>S-75VU04ANC, S-75LU04ANC Inverter(unbuffered)</p> <p><math>Y = \overline{A}</math></p>
<p>S-75V08ANC, S-75L08ANC 2-input AND gate</p> <p><math>Y = A \cdot B</math></p>	<p>S-75V14ANC, S-75L14ANC Schmitt trigger inverter</p> <p><math>Y = \overline{A}</math></p>	<p>S-75V32ANC, S-75L32ANC 2-input OR gate</p> <p><math>Y = A + B</math></p>	<p>S-75V86ANC, S-75L86ANC 2-input exclusive OR gate</p> <p><math>Y = \overline{A} \cdot B + A \cdot \overline{B}</math></p>

# // DESIGNATED CLIENT PRODUCTS

The products in the list below are provided for designated client-use only, and may be discontinued or no longer be available in the future. Please recommend new or existing products to the customer.

Product Group	Product Type	Part Number
Power-supply IC	Lithium ion rechargeable battery protection IC	S-8231 series
Realtime clock	2-wire	S-3530A
		S-3531A
		S-35L32A
	3-wire	S-3511A
		S-3513B
		S-35L12A
		S-3510A

This information is current as of October 2005.

# PHASE-OUT AND OBSOLETE PRODUCTS

The following products will be phased out (production discontinued) or have become obsolete. So these products can no longer be sold.

(1/2)

Product Group	Product Type	Part Number		
Power-supply IC	Voltage detector	S-805 series		
		S-806 series		
		S-807 series		
		S-808xxA series		
		S-809xxA series		
	Voltage regulator	S-802 series		
		S-812xxAG series		
		S-812xxHG series		
		S-812xxPG series		
		S-812xxSG series		
		S-813 series		
		Switching regulator	S-8311 series	
	S-8321/8322 series			
	S-8323/8327 series			
	S-8324/8328 series			
	S-8430 series			
	S-8435/8436 series			
	S-8437/8438 series			
	Composite	S-8532 series		
		S-8420 series		
S-8423 series				
S-8440 series				
S-8470 series				
Lithium ion rechargeable battery protection IC	S-87050 series			
MOS FET	N-channel	S-8850 series		
		S-8491 series		
		S-90N0113SMA		
		S-90N0133SUA		
		S-90N0212SMA		
		S-90N0232SUA		
		S-90N0312SMA		
		S-90N0332SUA		
		S-90N0442SUA		
		S-90N0513SPN		
	P-channel	S-90P0112SMA		
		S-90P0222SUA		
		S-90P0332SUA		
Analog IC	Mini analog	S-89400A		
		S-89401A		
		S-89402A		
		S-89403A		
		S-89410A		
		S-89411A		
		S-89430BCPN		
		S-89430BCFN		
		S-89431BCPN		
		S-89431BCFN		
		S-89440A		
		S-89440B		
		S-89441A		
		S-89441B		
		S-89510A		
		S-89511A		
		S-89530BCPN		
		S-89531BCPN		
		Memory	2-wire serial E <sup>2</sup> PROM	S-24C01A/02A/04A/08A/16A
			3-wire serial E <sup>2</sup> PROM	S-2900A
S-29130A/220A/230A/330A				
S-29131A/221A/231A/331A				
S-29190A/290A/390A				
S-29191A/291A/391A				
S-29194A/294A/394A				
S-29253A/29353A				
S-29255A/29355A				
S-29430A				
S-29453A				
S-29530A				
S-29590A/29690A				
S-29L130A/L220A/L330A				
S-29L131A/L221A/L331A				
S-29L194A/L294A/L394A				
S-29U131A/U221A/U331A				
S-29U194A/U294A/U394A				
S-2911I/2911R				
S-2914I/2914R				
S-2917I				
S-2918I				
S-2921R				
S-2922A				
S-2924R				
S-2927A				
S-2940I				
S-2961I				
S-2980I				
S-29x3A/29x3C				
S-29x4A				
S-29x9A/29x9C/29x9G				

# PHASE-OUT AND OBSOLETE PRODUCTS

(2/2)

Product Group	Product Type	Part Number
Memory	Parallel	S-2812 series
		S-2816 series
		S-2817 series
		S-2860 series
		S-2864 series
	NVRAM	S-22H10
		S-22S10
		S-22H12
		S-22S12
		S-2444
		S-2445
		S-24H30
		S-24S30
		S-24H45
		S-24S45
	SRAM	S-2510A
FUSE ROM	S-2100R	
Realtime clock	2-wire	S-35380A
	3-wire	S-35180A
ASSP	For communication	S-7038AF
		S-7040A/7040B
		S-7040C/7040D
		S-7041A/70L41A
		S-7041B/70L41B
		S-7116A
	For timer	S-3520CF
		S-8081B
	For camera	S-3560
	Microcomputer	4-bit
		S-14 series
8-bit		S-18 series
For communication		S-70L01AQS series
	S-7292AF series	
Driver	For temperature	S-4601A
		S-4620A
		S-4640A
Sensor	Temperature sensor	S-8100BF
		S-8101AMP
		S-8110A/8120A
		S-8110BNP/8120BNP
	Photo sensor	S-8270A

This information is current as of October 2005.

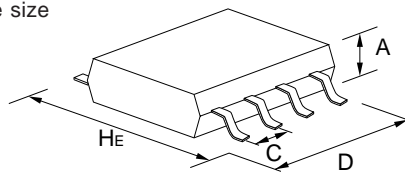
# CMOS IC PACKAGES

Package Type	Pin Count	Package Name	Package Size (mm)			Pitch (mm)	Dimensional Drawing Reference No.
			He	D	A (max.)	C	
Lead insertion type	3	TO-92	4.2	5.2	7.5	2.5/1.27	-
	8	8-Pin DIP	7.6	9.6	5.1	2.54	-
Flat-lead type	3	SOT-89-3	4.0	4.5	1.6	1.5	1
	5	SOT-89-5	4.5	4.5	1.6	1.5	2
Gull-wing type	4	SC-82AB	2.1	2.0	1.1	1.3	3
	5	SC-88A	2.1	2.0	1.1	0.65	4
	3	SOT-23-3	2.8	2.9	1.3	1.9	5
	5	SOT-23-5	2.8	2.9	1.3	0.95	6
	6	SOT-23-6	2.8	2.9	1.35	0.95	7
	8	8-Pin SOP (JEDEC)	6.0	5.0	1.75	1.27	8
	14	14-Pin SOP	7.8	10.1	2.2	1.27	9
	8	8-Pin SSOP	6.4	3.1	1.3	0.65	10
	10	10-Pin SSOP	6.4	3.1	1.3	0.5	11
	8	8-Pin TSSOP	6.4	3.0	1.1	0.65	12
	16	16-Pin TSSOP	6.4	5.1	1.1	0.65	13
	24	24-Pin TSSOP	6.4	7.9	1.1	0.65	-
	8	8-Pin MSOP	4.0	3.0	1.3	0.65	14
	Non-lead type	5	5-Pin SON(A)	2.1	2.0	0.85	0.65
6		6-Pin SON(A)	3.0	1.6	0.85	0.5	-
8		8-Pin SON(A)	3.0	2.9	0.9	0.65	16
8		8-Pin SON(B)	4.0	3.0	0.9	0.65	-
10		10-Pin SON(B)	3.0	2.9	0.9	0.5	-
6		6-Pin HSON(A)	3.0	2.9	0.9	0.95	17
6		6-Pin SNB(B)	2.0	1.8	0.85	0.5	18
8		PLP-8B	2.5	2.7	0.6	0.65	19
4		SNT-4A <sup>*1</sup>	1.6	1.2	0.5	0.65	20
6		SNT-6A <sup>*1</sup>	1.8	1.6	0.5	0.5	21
8		SNT-8A <sup>*1</sup>	2.5	2.0	0.5	0.5	22
WLP type		4	WLP-4B <sup>*2</sup>	0.79	1.16	0.58	0.5 (0.2) <sup>*3</sup>
	5	WLP-5A <sup>*2</sup>	1.21	1.66	0.6	0.5 (0.25) <sup>*3</sup>	24
	6	WLP-6A <sup>*2</sup>	1.15	1.66	0.6	0.5 (0.25) <sup>*3</sup>	25
	8	WLP-8C <sup>*2</sup>	1.97	1.94	0.6	0.5 (0.3) <sup>*3</sup>	26
	16	WLP-16A	2.07	1.93	0.6	0.5 (0.25) <sup>*3</sup>	27

\*1: Small Outline Non-leaded Thin Package.

\*2: Stands for Wafer Level Chip Size Package. The package size differs depending on the product.

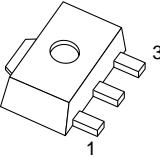
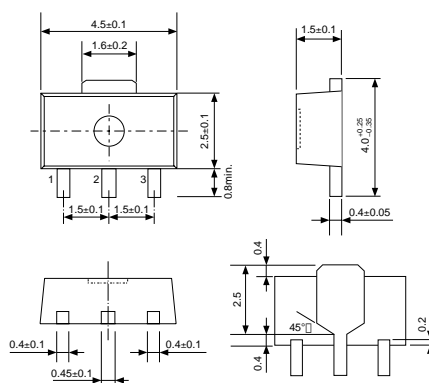
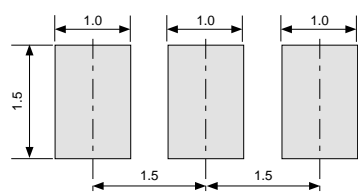
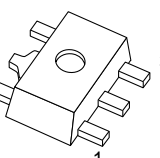
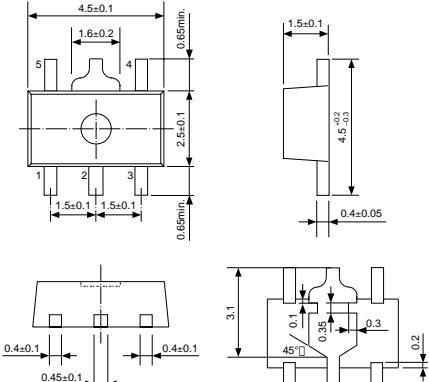
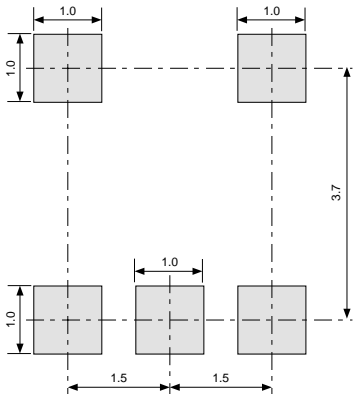
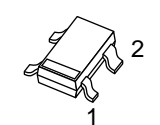
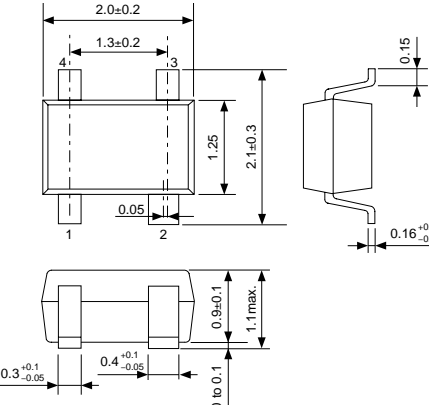
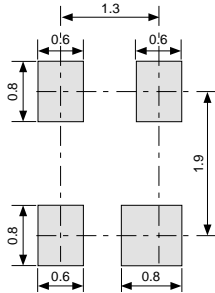
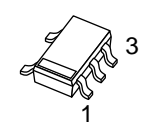
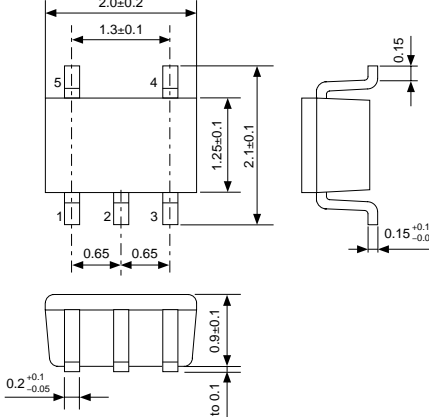
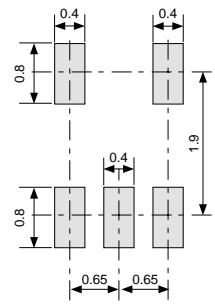
\*3: Figures in parentheses indicate the bump size.



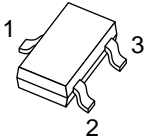
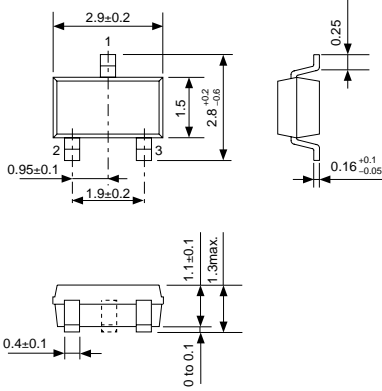
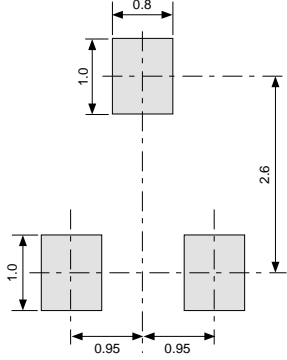
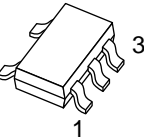
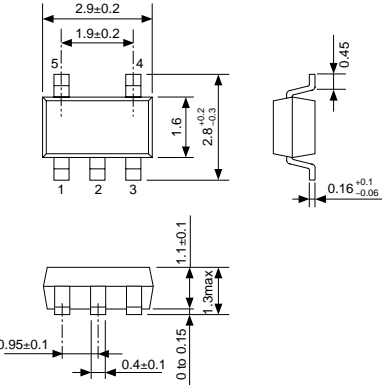
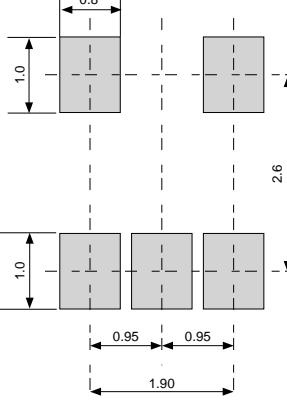
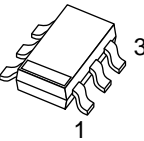
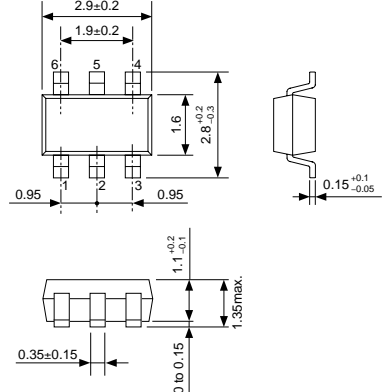
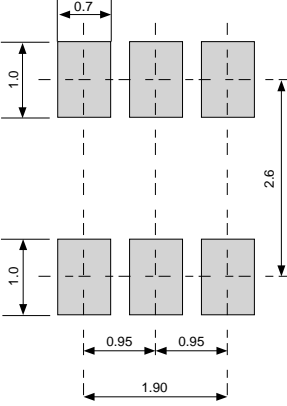
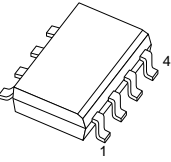
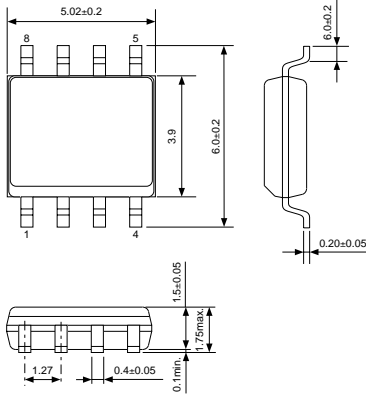
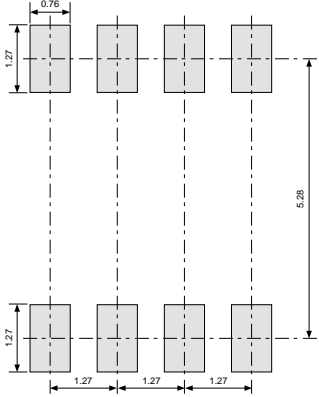


# CMOS IC PACKAGES (DIMENSIONAL DRAWINGS)

(Unit : mm)

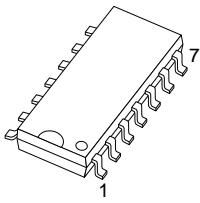
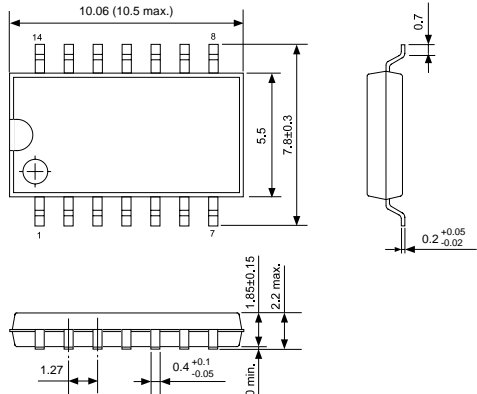
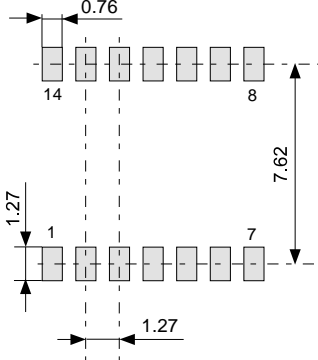
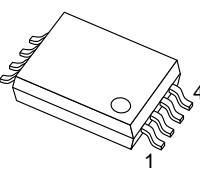
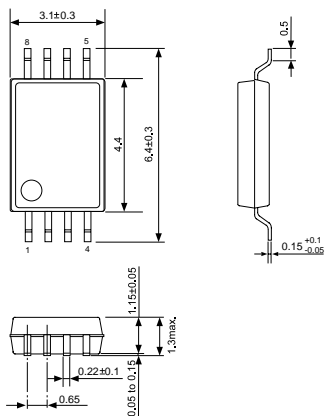
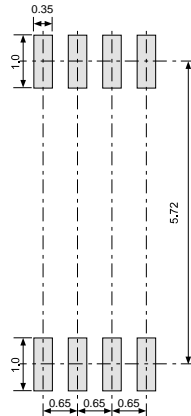
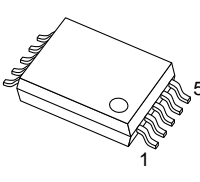
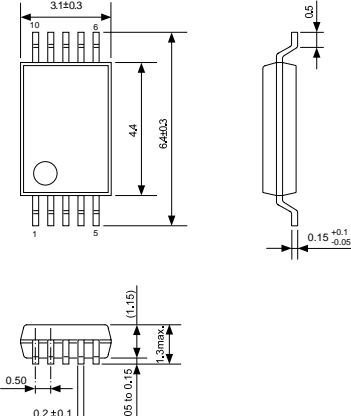
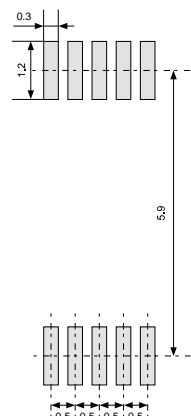
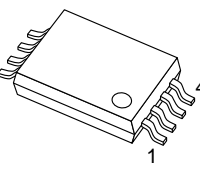
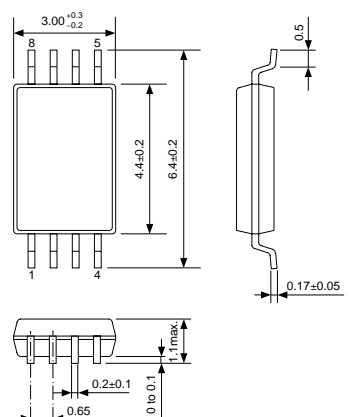
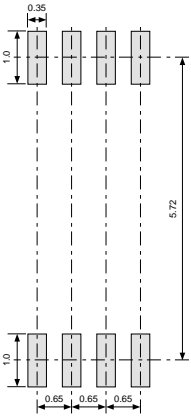
Package Name	Dimensional Drawing	Recommended Land Pattern
<b>1. SOT-89-3</b>  	 <p style="text-align: right;">UP003-A-P</p>	 <p style="text-align: right;">UP003-A-L</p>
<b>2. SOT-89-5</b>  	 <p style="text-align: right;">UP005-A-P</p>	 <p style="text-align: right;">UP005-A-L</p>
<b>3. SC-82AB</b>  	 <p style="text-align: right;">NP004-A-P</p>	 <p style="text-align: right;">NP004-A-L</p>
<b>4. SC-88A</b>  	 <p style="text-align: right;">NP005-B-P</p>	 <p style="text-align: right;">NP005-B-L</p>

(Unit : mm)

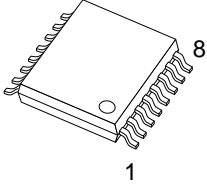
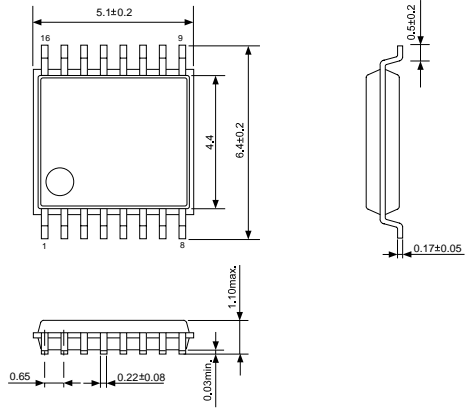
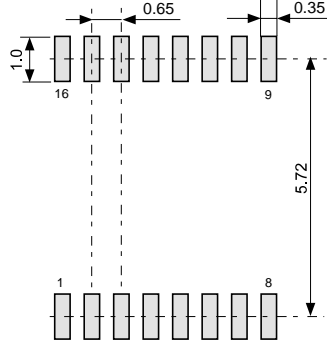
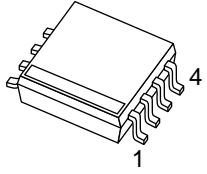
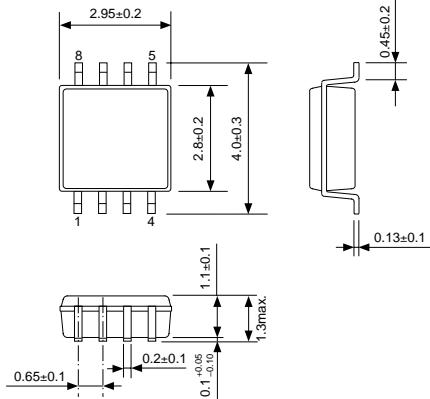
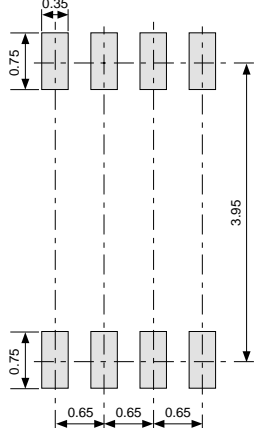
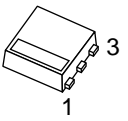
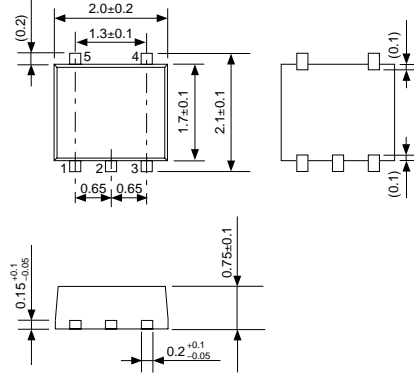
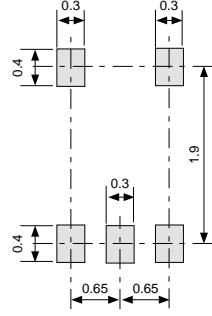
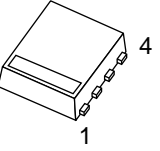
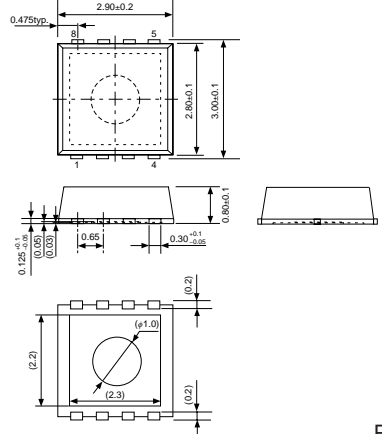
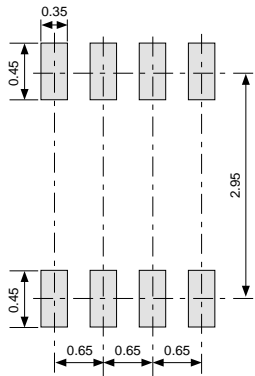
Package Name	Dimensional Drawing	Recommended Land Pattern
<p><b>5. SOT-23-3</b></p> 	 <p>MP003-A-P</p>	 <p>MP003-A-L</p>
<p><b>6. SOT-23-5</b></p> 	 <p>MP005-A-P</p>	 <p>MP005-A-L</p>
<p><b>7. SOT-23-6</b></p> 	 <p>MP006-A-P</p>	 <p>MP006-A-L</p>
<p><b>8. 8-Pin SOP (JEDEC)</b></p> 	 <p>FJ008-D-P</p>	 <p>FJ008-D-L</p>

# CMOS IC PACKAGES (DIMENSIONAL DRAWINGS)

(Unit : mm)

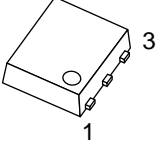
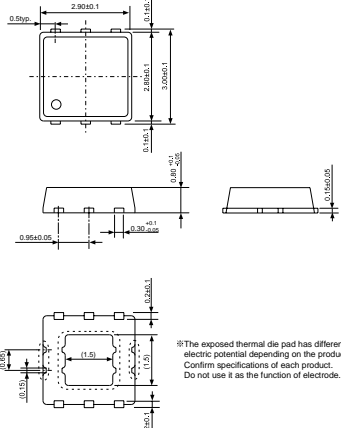
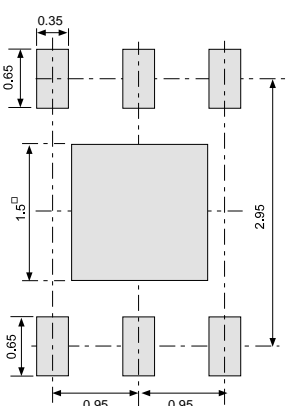
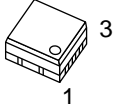
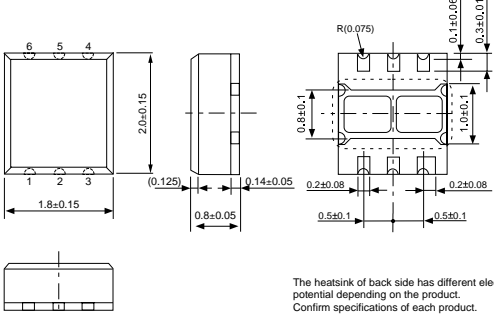
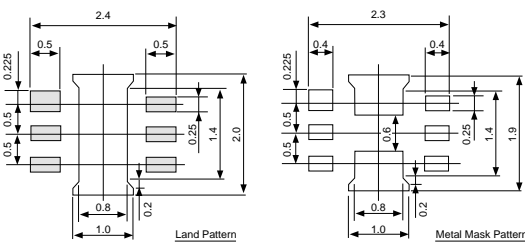
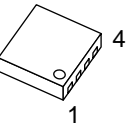
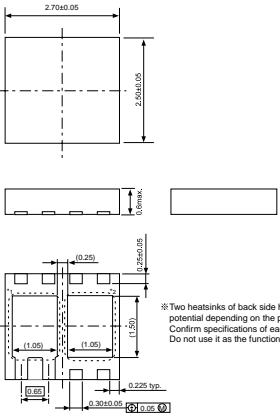
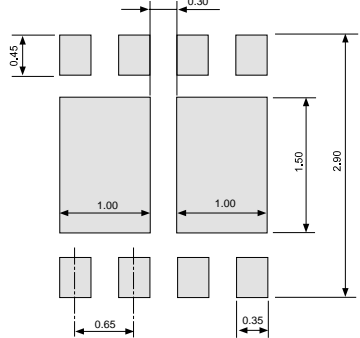

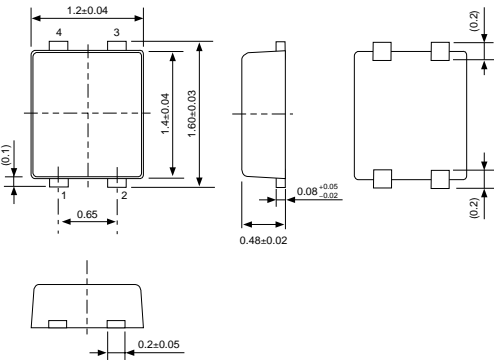
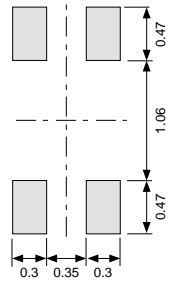
Package Name	Dimensional Drawing	Recommended Land Pattern
<b>9. 14-Pin SOP</b> 	 <p style="text-align: right;">FE014-A-P</p>	 <p style="text-align: right;">FE014-A-L</p>
<b>10. 8-Pin SSOP</b> 	 <p style="text-align: right;">FS008-A-P</p>	 <p style="text-align: right;">FS008-A-L</p>
<b>11. 10-Pin SSOP</b> 	 <p style="text-align: right;">FS010-A-P</p>	 <p style="text-align: right;">FS010-A-L</p>
<b>12. 8-Pin TSSOP</b> 	 <p style="text-align: right;">FT008-A-P</p>	 <p style="text-align: right;">FT008-A-L</p>

(Unit : mm)

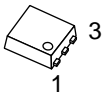
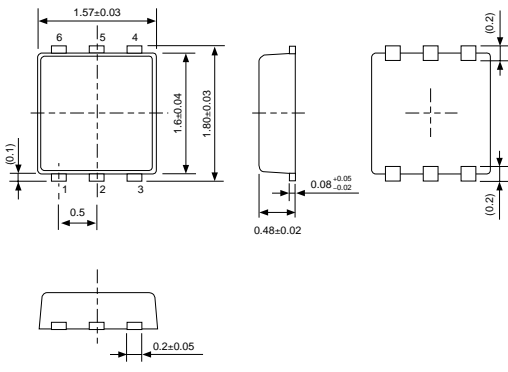
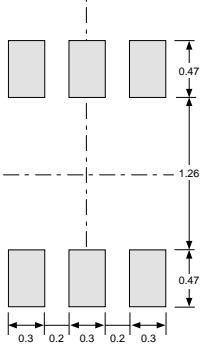
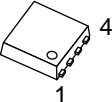
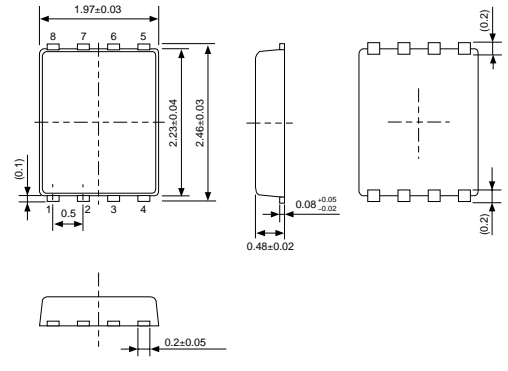
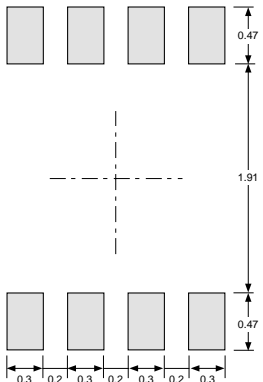
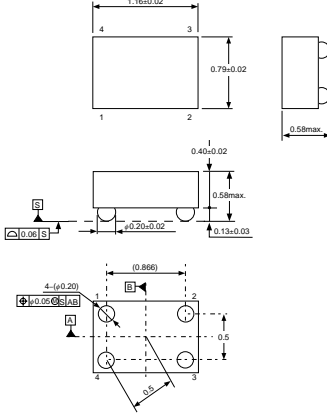
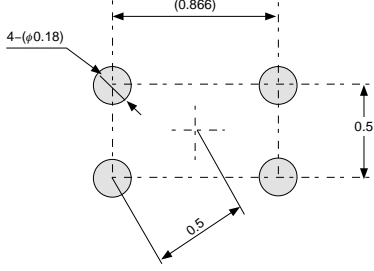
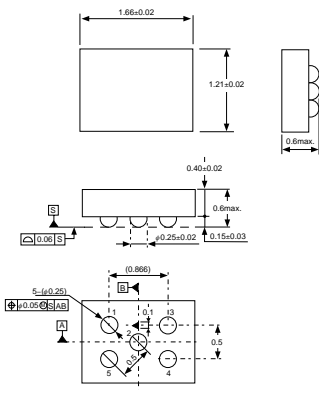
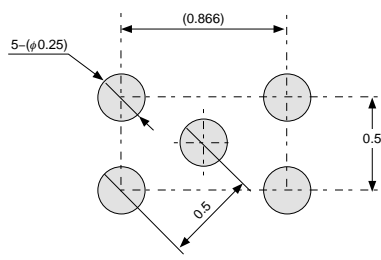
Package Name	Dimensional Drawing	Recommended Land Pattern
<p><b>13. 16-Pin TSSOP</b></p> 	 <p>FT016-A-P</p>	 <p>FT016-A-L</p>
<p><b>14. 8-Pin MSOP</b></p> 	 <p>FN008-A-P</p>	 <p>FN008-A-L</p>
<p><b>15. 5-Pin SON(A)</b></p> 	 <p>PN005-A-P</p>	 <p>PN005-A-L</p>
<p><b>16. 8-Pin SON(A)</b></p> 	 <p>PN008-A-P</p>	 <p>PN008-A-L</p>

# CMOS IC PACKAGES (DIMENSIONAL DRAWINGS)

(Unit : mm)

Package Name	Dimensional Drawing	Recommended Land Pattern
<b>17. 6-Pin HSON(A)</b>  	 <p>※The exposed thermal die pad has different electric potential depending on the product. Confirm specifications of each product. Do not use it as the function of electrode.</p>	
	PD006-A-P	PD006-A-L
<b>18. 6-Pin SNB(B)</b>  	 <p>The heatsink of back side has different electric potential depending on the product. Confirm specifications of each product. Do not use it as the function of electrode.</p>	
	BD006-A-P	BD006-A-L
<b>19. PLP-8B</b>  	 <p>※Two heatsinks of back side have different electric potential depending on the product. Confirm specifications of each product. Do not use it as the function of electrode.</p>	 <p><b>Cautions</b> Please use the above-mentioned land figure as a reference drawing. When you use it, please carry out sufficient evaluation by an actual substrate etc.</p>
	XB008-A-P	XB008-A-L
<b>20. SNT-4A</b>  		
	PF004-A-P	PF004-A-L

(Unit : mm)

Package Name	Dimensional Drawing	Recommended Land Pattern
<p><b>21. SNT-6A</b> <b>SNT-6A(H)</b></p> 	 <p>PG006-A-P PI006-A-P</p>	 <p>PG006-A-L PI006-A-L</p>
<p><b>22. SNT-8A</b></p> 	 <p>PH008-A-P</p>	 <p>PH008-A-L</p>
<p><b>23. WLP-4B</b></p>	 <p>HB004-A-P</p>	 <p>HB004-A-L</p>
<p><b>24. WLP-5A</b></p>	 <p>HA005-A-P</p>	 <p>HA005-A-L</p>



# CMOS IC PACKAGES (DIMENSIONAL DRAWINGS)

(Unit : mm)

Package Name	Dimensional Drawing	Recommended Land Pattern
<b>25. WLP-6A</b>	<p style="text-align: right;">HA006-A-P</p>	<p style="text-align: right;">HA006-A-L</p>
<b>26. WLP-8C</b>	<p style="text-align: right;">HC008-A-P</p>	<p style="text-align: right;">HC008-A-L</p>
<b>27. WLP-16A</b>	<p style="text-align: right;">HA016-A-P</p>	<p style="text-align: right;">HA016-A-L</p>

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## Environmental Activities at Seiko Instruments Inc. Semiconductor Division

### **SII Group Environmental Policy: Environmental Concept**

As a good corporate citizen, the SII Group will continue to harmonize its corporate activities with the global environment, protect and improve the environment, and contribute to the establishment of a sustainable society that can coexist with all living things.

In line with the environmental policies of the SII Group, the Semiconductor Division of SII not only develops environmentally conscious products, but also makes every effort to implement energy-saving measures, reduce the amount of waste, and effectively utilize paper resources.

### **– Specific Actions Taken by the Semiconductor Division of SII to Protect the Environment –**

#### **1. Energy Saving**

##### **♣Producing energy-saving products**

We promote the development of energy-efficient (low power consumption) products by utilizing the features of CMOS ICs.

##### **♣Creating more energy-efficient manufacturing processes**

We are creating more energy-efficient manufacturing processes at our semiconductor manufacturing sites.

#### **2. Zero Emissions (Elimination of Waste Sent to Disposal Site)**

We are achieving a reduction in waste by actively promoting recycling of materials used in the semiconductor manufacturing process, such as etching solution, washing water, and packing materials.

Waste reductions are also being achieved in our office, where staff are encouraged to not only sort garbage for recycling, but also to actively recycle the paper they use in daily operations.

#### **3. Chemical Materials Management**

##### **♣Activities to reduce the impact of chemical substances**

SII Semiconductor Division has been an industry leader to stop the use of ozone-layer depletion materials :

- SII discontinued specific fluorine in August 1992 ;
- SII discontinued Trichloroethane in November 1993 ;
- SII discontinued organic chloride solvents in March 1999 ;
- SII discontinued alternative fluorine HCFC-141b (a global warming factor gas) in March 2000.

We continuously review our processes to reduce chemical materials which are harmful to our global environment.

##### **♣Lead-Free Soldering**

The plating on the outer leads of our semiconductor devices has been lead-free since December 2003.

#### **4. Design of Environmentally Conscious Products**

##### **♣Implementation of environmental assessments**

Products to be newly developed undergo stringent environmental assessments. These assessments involve checking whether the product contains any banned or regulated substances. An MSDS (Material Safety Data Sheet) is also obtained so that we can evaluate the environmental impact and safety of the product, and thereby reduce the impact of that product on the environment.

#### **5. Green Purchasing**

We observe the "Green Purchasing Guidelines" set by the SII Group to promote green purchasing in cooperation with our suppliers.

## All Products Are Lead-Free and Compliant with the RoHS Directive

### The products in this catalog are all lead-free.

- The products in this catalog are all lead-free and the 6 banned materials regulated by the RoHS Directive<sup>Note</sup> (cadmium, hexavalent chromium, mercury, lead, polybrominated biphenyls (PBB), and polybrominated diphenyl ethers (PBDE)) are not used.
- The electrical characteristics, mechanical characteristics, and packages of the lead-free products in this catalog are the same as the leaded products. (The only change is that the pin leads are lead-free plated.)
- SII lead-free products have part numbers with a “G” suffix, except for the following products.
  - Some lead-free product part numbers have “GB”, “GD”, or “GZ” suffixes.
  - Although the products having WLP, SNB, or PLP packages do not have part numbers with the “G” suffix, they are all lead-free.

#### – For Customers Already Using SII Products –

The barcode labels attached on the inner boxes and reels can be used to distinguish lead-free products from leaded products.

Barcode label for leaded products

<b>TYPE:S-xxxxxxxxxxxxx</b>	
	Barcode
QTY:xxxx	
	Barcode
LOT:xxxxxxxxxxxxx	
	Barcode
CODE:xxxxxxxxxxxxx	
	Barcode

Barcode label for lead-free products

<b>TYPE:S-xxxxxxxxxxxxx</b>	
	Barcode
QTY:xxxx	
	Barcode
NoPb	
LOT:xxxxxxxxxxxxx	
	Barcode
CODE:xxxxxxxxxxxxx	
	Barcode

Lead-free product mark

**Note** RoHS Directive: The restriction of the use of certain hazardous substances in electrical and electronic equipment

The RoHS Directive, adopted by the European Parliament and the European Council, restricts the use of the following materials for electrical and electronic equipment put on the market in Europe from July 1, 2006.

Hg (mercury), Cd (cadmium), Pb (lead), Cr<sup>6+</sup> (hexavalent chromium), PBB (polybrominated biphenyls), PBDE (polybrominated diphenyl ethers)

# E<sup>2</sup>PROM

Rich lineup featuring high reliability, super-small packages, high performance and high quality

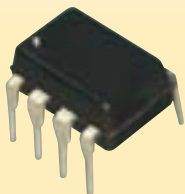
## 3-wire serial E<sup>2</sup>PROM

Product name	Outline / Memory size	Operating voltage range Read / Write (min.)	Endurance	8-pin DIP	8-pin SOP	8-pin TSSOP	WLP	SNT-8A	Product supporting 105°C	125°C operation guaranteed	Low voltage operation products
S-93C46B	Wide use 1 kb	1.8 V / 2.7 V	10 million cycles possible (25°C) 1 million cycles guaranteed (85°C)	●	●	●	●	●	●	●	●
S-93C56B	Wide use 2 kb	1.8 V / 2.7 V	10 million cycles possible (25°C) 1 million cycles guaranteed (85°C)	●	●	●	●	●	●	●	●
S-93C66B	Wide use 4 kb	1.8 V / 2.7 V	10 million cycles possible (25°C) 1 million cycles guaranteed (85°C)	●	●	●	●	●	●	●	●
S-93C76A	Wide use 8 kb	1.8 V / 2.7 V	10 million cycles possible (25°C) 1 million cycles guaranteed (85°C)	●	●	●	●	●	●	●	●
S-93C86B	Wide use 16 kb	1.8 V / 2.7 V	10 million cycles possible (25°C) 1 million cycles guaranteed (85°C)	●	●	●	●	●	●	●	●
S-93A46A	125°C operation 1 kb	2.7 V / 2.7 V	1 million cycles guaranteed (85°C) 150,000 cycles guaranteed (125°C)	●	●	●	●	●	●	●	●
S-93A56A	125°C operation 2 kb	2.7 V / 2.7 V	1 million cycles guaranteed (85°C) 150,000 cycles guaranteed (125°C)	●	●	●	●	●	●	●	●
S-93A66A	125°C operation 4 kb	2.7 V / 2.7 V	1 million cycles guaranteed (85°C) 150,000 cycles guaranteed (125°C)	●	●	●	●	●	●	●	●
S-93A86A	125°C operation 16 kb	2.7 V / 2.7 V	1 million cycles guaranteed (85°C) 150,000 cycles guaranteed (125°C)	●	●	●	●	●	●	●	●
S-93L46A	Low voltage operation 1 kb	1.6 V / 1.8 V	10 million cycles possible (25°C) 1 million cycles guaranteed (85°C)	●	●	●	●	●	●	●	●
S-93L56A	Low voltage operation 2 kb	1.6 V / 1.8 V	10 million cycles possible (25°C) 1 million cycles guaranteed (85°C)	●	●	●	●	●	●	●	●
S-93L66A	Low voltage operation 4 kb	1.6 V / 1.8 V	10 million cycles possible (25°C) 1 million cycles guaranteed (85°C)	●	●	●	●	●	●	●	●
S-93L76A	Low voltage operation 8 kb	1.6 V / 1.8 V	10 million cycles possible (25°C) 1 million cycles guaranteed (85°C)	●	●	●	●	●	●	●	●

## 2-wire serial E<sup>2</sup>PROM

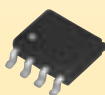
Product name	Outline / Memory size	Operating voltage range Read / Write (min.)	Endurance	8-pin DIP	8-pin SOP	8-pin TSSOP	WLP	SNT-8A	Product supporting 105°C	125°C operation guaranteed	Low voltage operation products
S-24CS01A	Wide use 1 kb	1.8 V / 2.7 V	10 million cycles possible (25°C) 1 million cycles guaranteed (85°C)	●	●	●	●	●	●	●	●
S-24CS02A	Wide use 2 kb	1.8 V / 2.7 V	10 million cycles possible (25°C) 1 million cycles guaranteed (85°C)	●	●	●	●	●	●	●	●
S-24CS04A	Wide use 4 kb	1.8 V / 2.7 V	10 million cycles possible (25°C) 1 million cycles guaranteed (85°C)	●	●	●	●	●	●	●	●
S-24CS08A	Wide use 8 kb	1.8 V / 2.7 V	10 million cycles possible (25°C) 1 million cycles guaranteed (85°C)	●	●	●	●	●	●	●	●
S-24CS16A	Wide use 16 kb	1.8 V / 2.7 V	1 million cycles possible (25°C) 100,000 cycles guaranteed (85°C)	●	●	●	●	●	●	●	●
S-24CS64A	Wide use 64 kb	1.8 V / 2.7 V	1 million cycles possible (25°C) 100,000 cycles guaranteed (85°C)	●	●	●	●	●	●	●	●
S-24CS128A	Wide use 128 kb	Under development	Under development	●	●	●	●	●	●	●	●
S-24C02BP	Low voltage operation 2 kb	1.6 V / 1.8 V	10 million cycles possible (25°C) 1 million cycles guaranteed (85°C)	●	●	●	●	●	●	●	●
S-24C04BP	Low voltage operation 4 kb	1.6 V / 1.7 V	10 million cycles possible (25°C) 1 million cycles guaranteed (85°C)	●	●	●	●	●	●	●	●

8-pin DIP



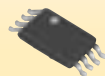
He7.6xD9.60xA5.1 max.

8-pin SOP



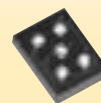
He6.0xD5.0xA1.75 max.

8-pin TSSOP



He6.4xD3.0xA1.1 max.

WLP

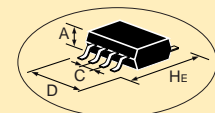


He1.21xD1.66xA0.6 max. (S-24C04BP)  
He1.15xD1.66xA0.6 max. (S-24CS16A)  
He1.97xD1.94xA0.6 max. (S-24CS64A)

SNT-8A



He2.5xD2.0xA0.5 max.





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The Semiconductor Division of Seiko Instruments Inc. who manufactures the products described in this catalog holds the QS-9000 quality management system certificates, and the ISO-14001 environmental management system certificate.

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