features

- **Qualification in Accordance With AEC-Q100†**
- **Qualified for Automotive Applications**
- **Customer-Specific Configuration Control Can Be Supported Along With Major-Change Approval**
- **Single Voltage Detector (TPS3803): Adjustable/1.5 V**
- **Dual Voltage Detector (TPS3805): Adjustable/3.3 V**
- **High ±1.5% Threshold Voltage Accuracy**
- **Supply Current: 3 μA Typical at V_{DD} = 3.3 V**
- **Push/Pull Reset Output (TPS3805) Open-Drain Reset Output (TPS3803)**
- **Temperature Range . . . −40°C to 125°C**
- **Five-Pin SC−70 Package**

† Contact factory for details. Q100 qualification data available on request.

typical applications

- **Applications Using DSPs, Microcontrollers, or Microprocessors**
- **Wireless Communication Systems**
- **Portable/Battery-Powered Equipment**
- **Programmable Controls**
- **Intelligent Instruments**
- **Industrial Equipment**
- **Notebook/Desktop Computers**
- **Automotive Systems**

description

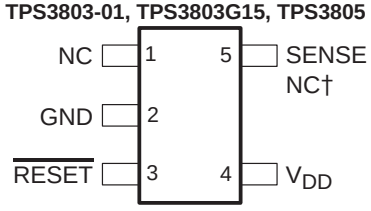
The TPS3803 and TPS3805 families of supervisory circuits provide circuit initialization and timing supervision, primarily for DSPs and processor-based systems.

The TPS3803G15 device has a fixed-sense threshold voltage V_{IT} set by an internal voltage divider, whereas the TPS3803−01 has an adjustable SENSE input that can be configured by two external resistors. In addition to the fixed sense threshold monitored at V_{DD}, the TPS3805 devices provide a second adjustable SENSE input. $\overline{\text{RESET}}$ is asserted in case any of the two voltages drops below V_{IT}.

During power on, $\overline{\text{RESET}}$ is asserted when supply voltage V_{DD} becomes higher than 0.8 V. Thereafter, the supervisory circuit monitors V_{DD} (and/or SENSE) and keeps $\overline{\text{RESET}}$ active as long as V_{DD} or SENSE remains below the threshold voltage V_{IT}. As soon as V_{DD} (SENSE) rises above the threshold voltage V_{IT}, $\overline{\text{RESET}}$ is deasserted again. The product spectrum is designed for 1.5 V, 3.3 V, and adjustable supply voltages. The devices are available in a five-pin SC-70 package. The TPS3803 and TPS3805 devices are characterized for operation over a temperature range of −40°C to 125°C.

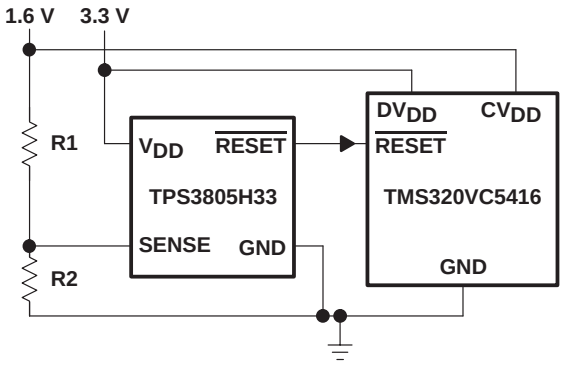
DCK PACKAGE
(TOP VIEW)

TPS3803-01, TPS3803G15, TPS3805



†TPS3803G15

typical operating circuit

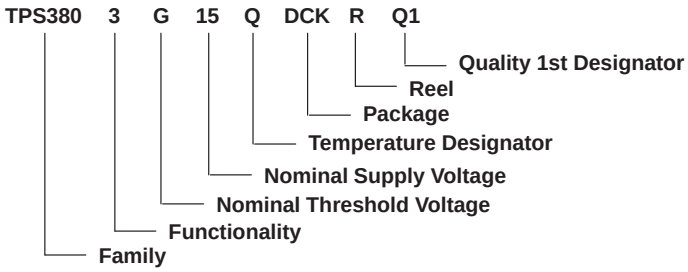


PACKAGE INFORMATION

T_A	DEVICE NAME	THRESHOLD VOLTAGE		MARKING
		V_{DD}	SENSE	
−40°C to 125°C	TPS3803−01QDCKRQ1†	NA	1.226 V	AWJ
	TPS3803G15QDCKRQ1†	1.40 V	NA	AXU
	TPS3805H33QDCKRQ1†	3.05 V	1.226 V	AWZ

† The DCKR passive indicates tape and reel containing 3000 parts.

ordering information

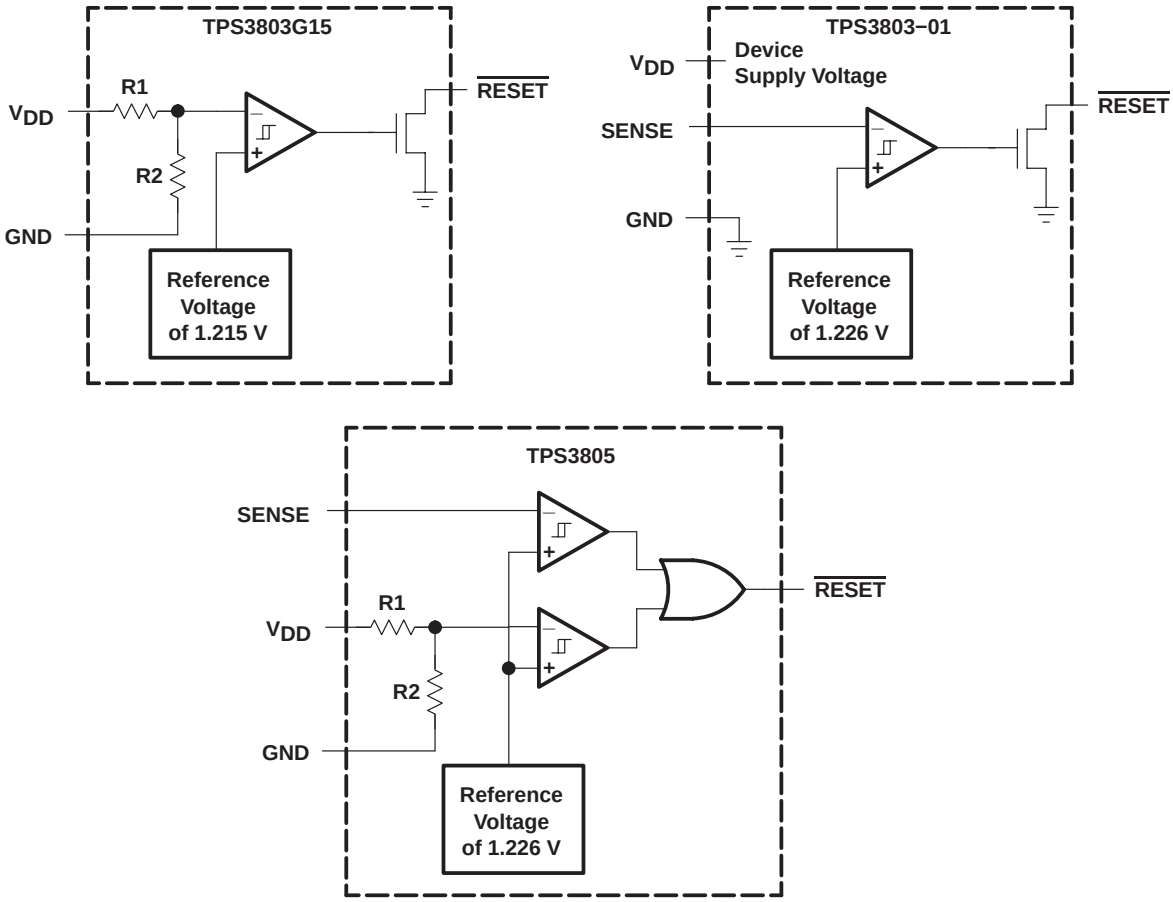


Function/Truth Tables

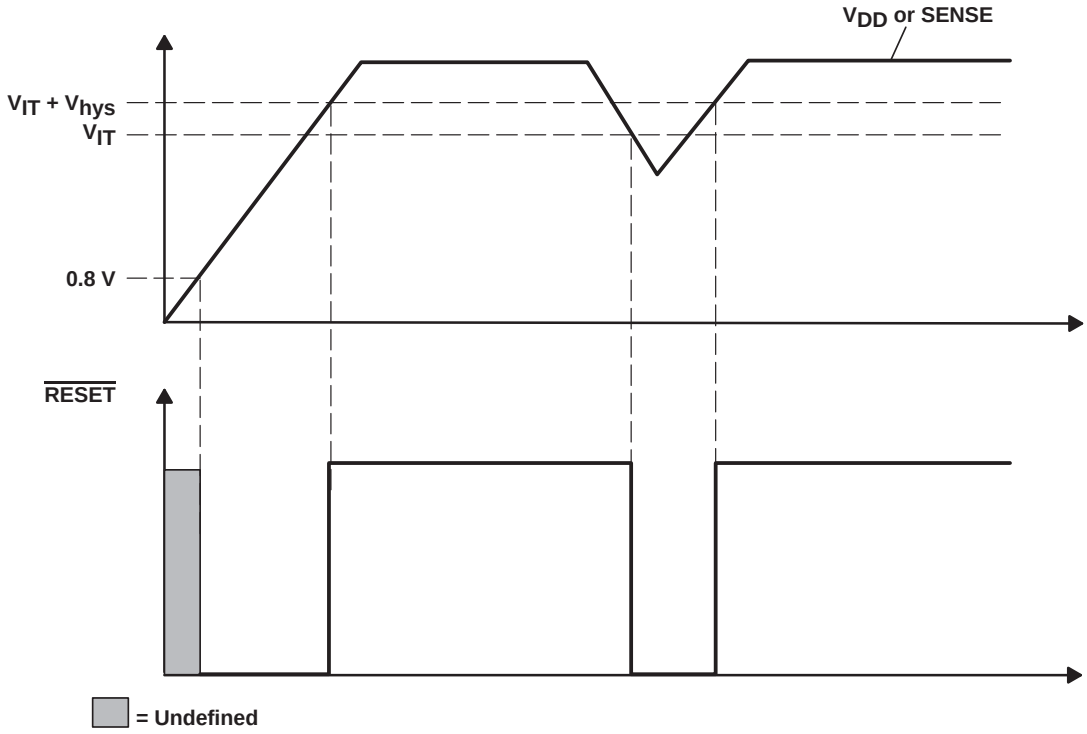
TPS3803-01		TPS3803G15	
SENSE > V_{IT}	$\overline{\text{RESET}}$	V_{DD} > V_{IT}	$\overline{\text{RESET}}$
0	L	0	L
1	H	1	H

TPS3805H33		
V_{DD} > V_{IT}	SENSE > V_{IT}	$\overline{\text{RESET}}$
0	0	L
0	1	L
1	0	L
1	1	H

functional block diagram



timing requirements



Terminal Functions

TERMINAL NAME	TERMINAL NO.	I/O	DESCRIPTION
GND	2	I	Ground
$\overline{\text{RESET}}$	3	O	Active-low reset output (TPS3803—open−drain, TPS3805—push/pull)
SENSE	5	I	Adjustable sense input
NC	1		No internal connection
NC (TPS3803G15)	5		No internal connection
V_{DD}	4	I	Input supply voltage, fixed sense input for TPS3803G15 and TPS3805

absolute maximum ratings over operating free-air temperature (unless otherwise noted)†

Supply voltage, V_{DD} (see Note1) . . . . . 7 V
All other pins (see Note 1) . . . . . −0.3 V to 7 V
Maximum low-output current, I_{OL} . . . . . 5 mA
Maximum high-output current, I_{OH} . . . . . −5 mA
Input clamp current, I_{IK} (V_I<0 or V_I>V_{DD}) . . . . . ±10 mA
Output clamp current, I_{OK} (V_O<0 or V_O>V_{DD}) . . . . . ±10 mA
Continuous total power dissipation . . . . . See Dissipation Rating Table
Operating free-air temperature range, T_A . . . . . −40°C to 125°C
Storage temperature range, T_{stg} . . . . . −65°C to 150°C
Soldering temperature . . . . . 260°C

† Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute−maximum−rated conditions for extended periods may affect device reliability.

NOTE 1: All voltage values are with respect to GND. For reliable operation the device should not be continuously operated at 7 V for more than t=1000 h.

DISSIPATION RATING TABLE

PACKAGE	T_A <25°C POWER RATING	DERATING FACTOR ABOVE T_A = 25°C	T_A = 70°C POWER RATING	T_A = 85°C POWER RATING
DCK	321 mW	2.6 mW/°C	206 mW	167 mW

recommended operating conditions

	MIN	MAX	UNIT
Supply voltage, V_{DD}	1.3	6	V
Input voltage, V_I	0	V_{DD}+0.3	V
Operating free-air temperature range, T_A	−40	125	°C

electrical characteristics over recommended operating free-air temperature range (unless otherwise noted)

PARAMETER			TEST CONDITIONS	MIN	TYP	MAX	UNIT
V_{OH}	High-level output voltage (TPS3805 only)		V_{DD} = 1.5 V, I_{OH} = −0.5 mA	0.8xV_{DD}			V
			V_{DD} = 3.3 V, I_{OH} = −1.0 mA				
			V_{DD} = 6 V, I_{OH} = −1.5 mA				
V_{OL}	Low-level output voltage		V_{DD} = 1.5 V, I_{OL} = 1.0 mA			0.3	V
			V_{DD} = 3.3 V, I_{OL} = 2 mA				
			V_{DD} = 6 V, I_{OL} = 3 mA				
	Power-up reset voltage (see Note 2)	V_{IT} > 1.5 V, T_A = 25°C		0.8			V
		V_{IT} ≤ 1.5 V, T_A = 25°C		1.0			V
V_{IT}	Negative-going input threshold voltage (see Note 3)	SENSE	T_A = −40°C to 125°C	1.200	1.226	1.244	V
		TPS3803G15		1.379	1.4	1.421	
		TPS3805H33		3.004	3.05	3.096	
V_{hys}	Hysteresis		1.2 V < V_{IT} < 2.5 V		15		mV
			2.5 V < V_{IT} < 3.5 V		30		
I_I	Input current	SENSE		−25		25	nA
I_{OH}	High-level output current at $\overline{\text{RESET}}$	Open drain only	V_{DD} = V_{IT} + 0.2V, V_{OH} = V_{DD}			300	nA
I_{DD}	Supply current	TPS3803−01	V_{DD} = 3.3 V, output unconnected		2	4	µA
		TPS3805, TPS3803G15			3	5	
		TPS3803−01	V_{DD} = 6 V, output unconnected		2	4	
		TPS3805, TPS3803G15			4	6	
C_I	Input capacitance		V_I = 0 V to V_{DD}		1		pF

NOTES: 2. The lowest supply voltage at which $\overline{\text{RESET}}$ (V_{OL}(max) = 0.2 V, I_{OL} = 50 µA) becomes active. $t_{r(VDD)}$ ≥ 15 µs/V
3. To ensure the best stability of the threshold voltage, place a bypass capacitor (ceramic, 0.1 µF) near the supply terminals.

timing requirements at R_L = 1 MΩ, C_L = 50 pF, T_A = −40°C to 125°C

PARAMETER			TEST CONDITIONS	MIN	TYP	MAX	UNIT
t_w	Pulse width	At V_{DD}	V_{IH} = 1.05 x V_{IT}, V_{IL} = 0.95 x V_{IT}	5.5			µs
		At SENSE					

switching characteristics at R_L = 1 MΩ, C_L = 50 pF, T_A = −40°C to 125°C

PARAMETER			TEST CONDITIONS	MIN	TYP	MAX	UNIT
t_{PHL}	Propagation (delay) time, high-to-low-level output	V_{DD} to $\overline{\text{RESET}}$ delay	V_{IH} = 1.05 x V_{IT}, V_{IL} = 0.95 x V_{IT}		5	100	µs
		SENSE to $\overline{\text{RESET}}$ delay					
t_{PLH}	Propagation (delay) time, low-to-high-level output	V_{DD} to $\overline{\text{RESET}}$ delay			5	100	
		SENSE to $\overline{\text{RESET}}$ delay					

TYPICAL CHARACTERISTICS

**TPS3805H33
SUPPLY CURRENT
vs
SUPPLY VOLTAGE**

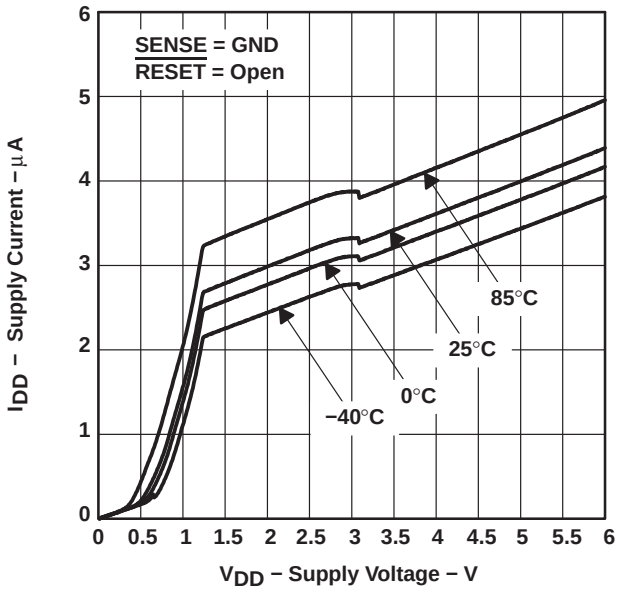


Figure 1

**TPS3803−01
SUPPLY CURRENT
vs
SUPPLY VOLTAGE**

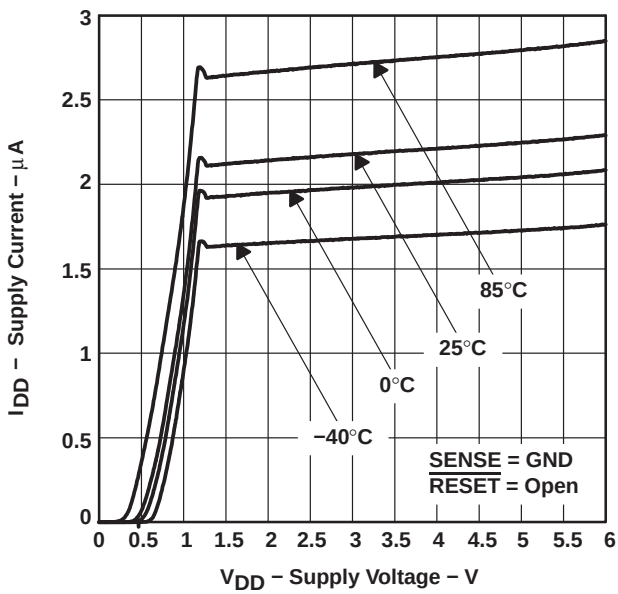


Figure 2

**LOW-LEVEL OUTPUT VOLTAGE
vs
LOW-LEVEL OUTPUT CURRENT**

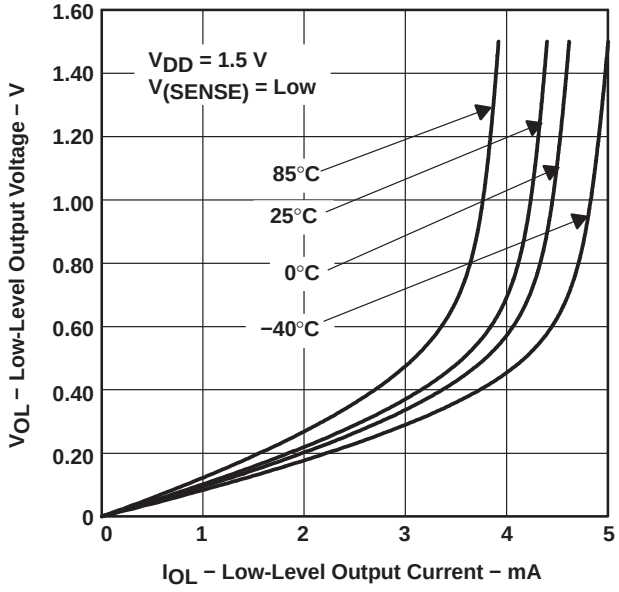


Figure 3

**LOW-LEVEL OUTPUT VOLTAGE
vs
LOW-LEVEL OUTPUT CURRENT**

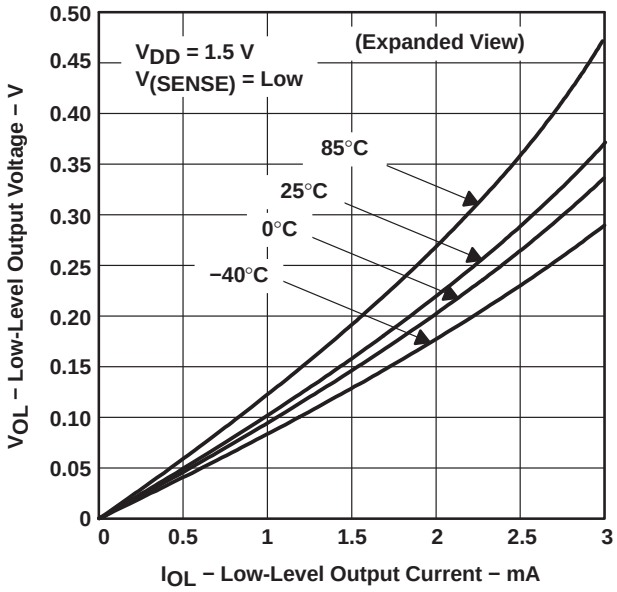


Figure 4

TYPICAL CHARACTERISTICS

LOW-LEVEL OUTPUT VOLTAGE
vs
LOW-LEVEL OUTPUT CURRENT

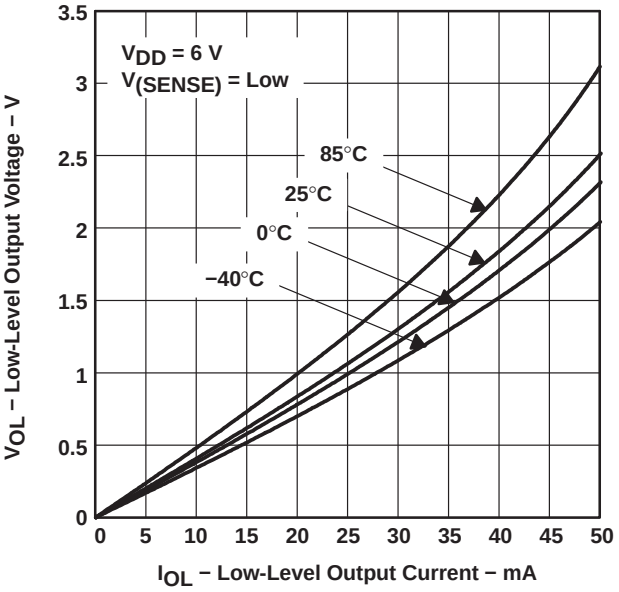


Figure 5

LOW-LEVEL OUTPUT VOLTAGE
vs
LOW-LEVEL OUTPUT CURRENT

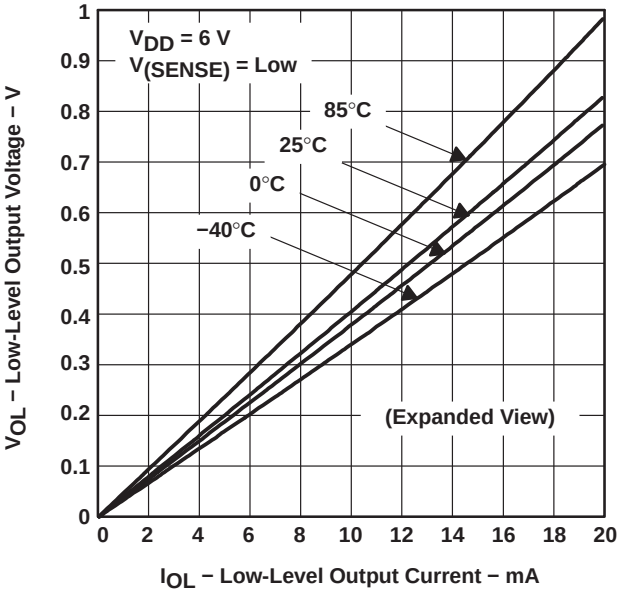


Figure 6

TPS3805H33
HIGH-LEVEL OUTPUT VOLTAGE
vs
HIGH-LEVEL OUTPUT CURRENT

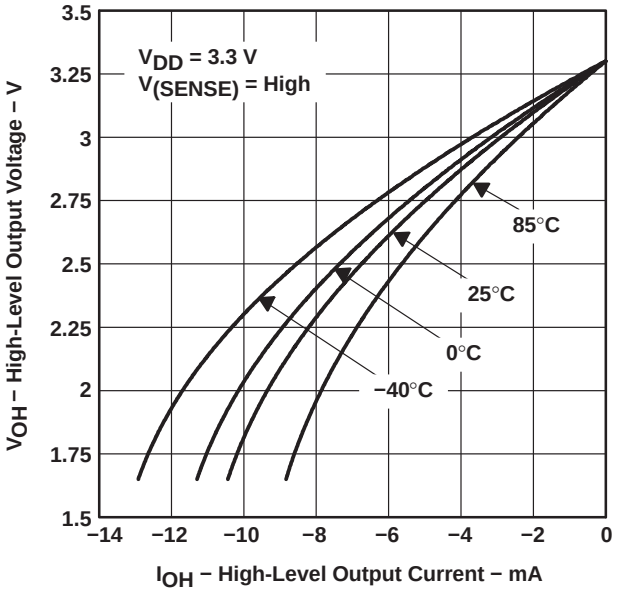


Figure 7

TPS3805H33
HIGH-LEVEL OUTPUT VOLTAGE
vs
HIGH-LEVEL OUTPUT CURRENT

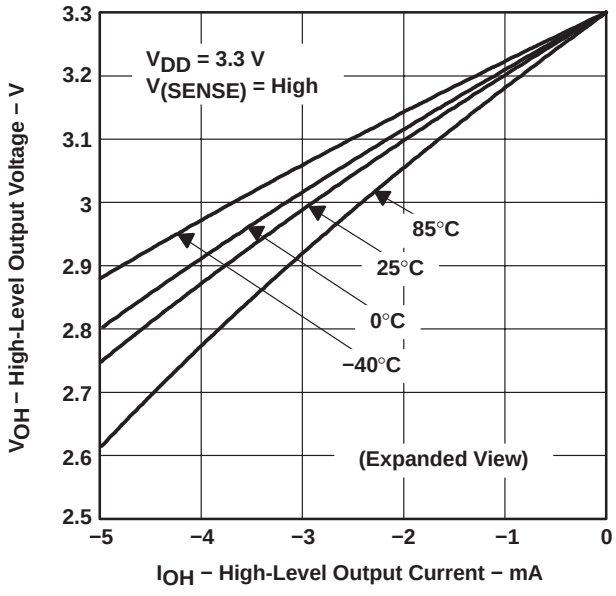


Figure 8

TYPICAL CHARACTERISTICS

**TPS3805H33
HIGH-LEVEL OUTPUT VOLTAGE
vs
HIGH-LEVEL OUTPUT CURRENT**

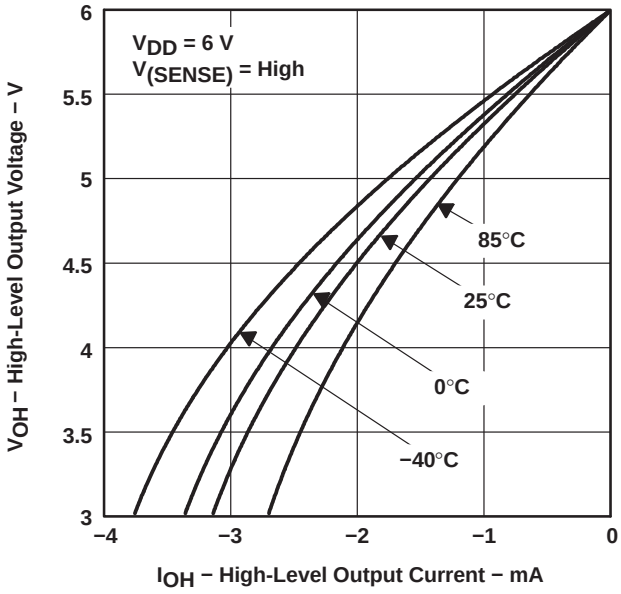


Figure 9

**TPS3805H33
HIGH-LEVEL OUTPUT VOLTAGE
vs
HIGH-LEVEL OUTPUT CURRENT**

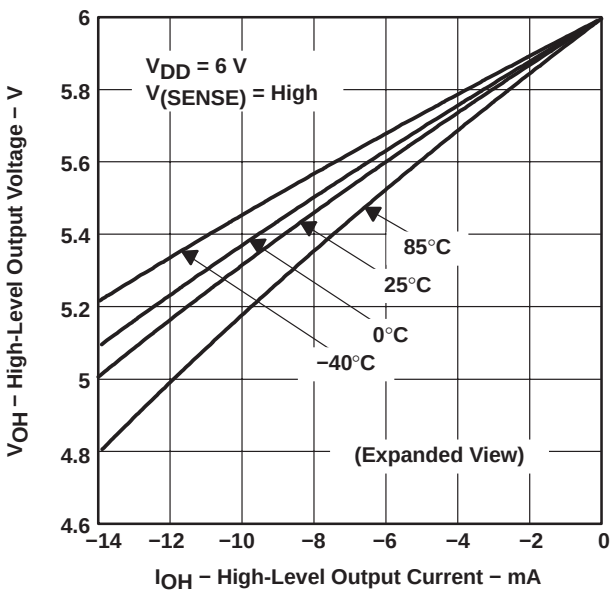


Figure 10

**TPS3803−01
NORMALIZED INPUT THRESHOLD VOLTAGE
vs
FREE-AIR TEMPERATURE AT SENSE**

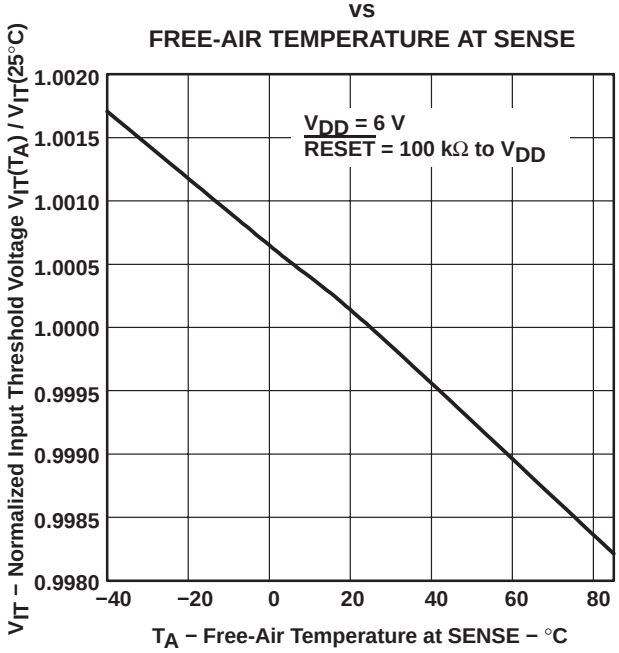


Figure 11

**MINIMUM PULSE DURATION AT V_{DD}
vs
V_{DD} THRESHOLD OVERDRIVE VOLTAGE**

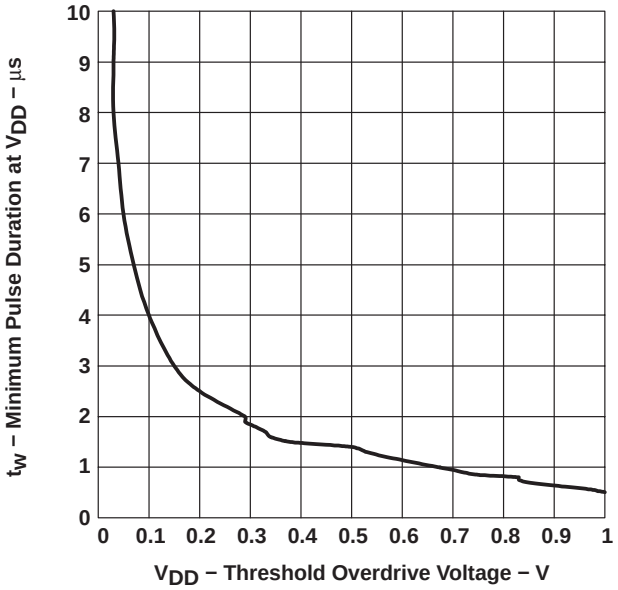


Figure 12

TYPICAL CHARACTERISTICS

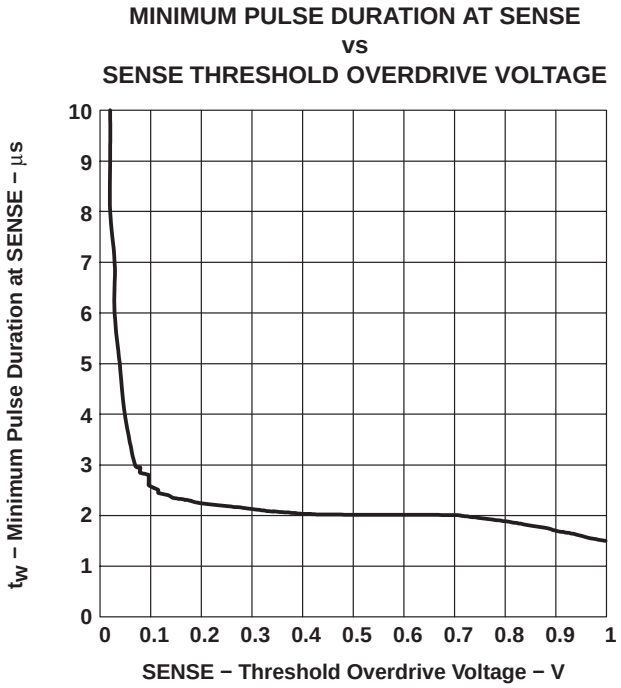


Figure 13

PACKAGING INFORMATION

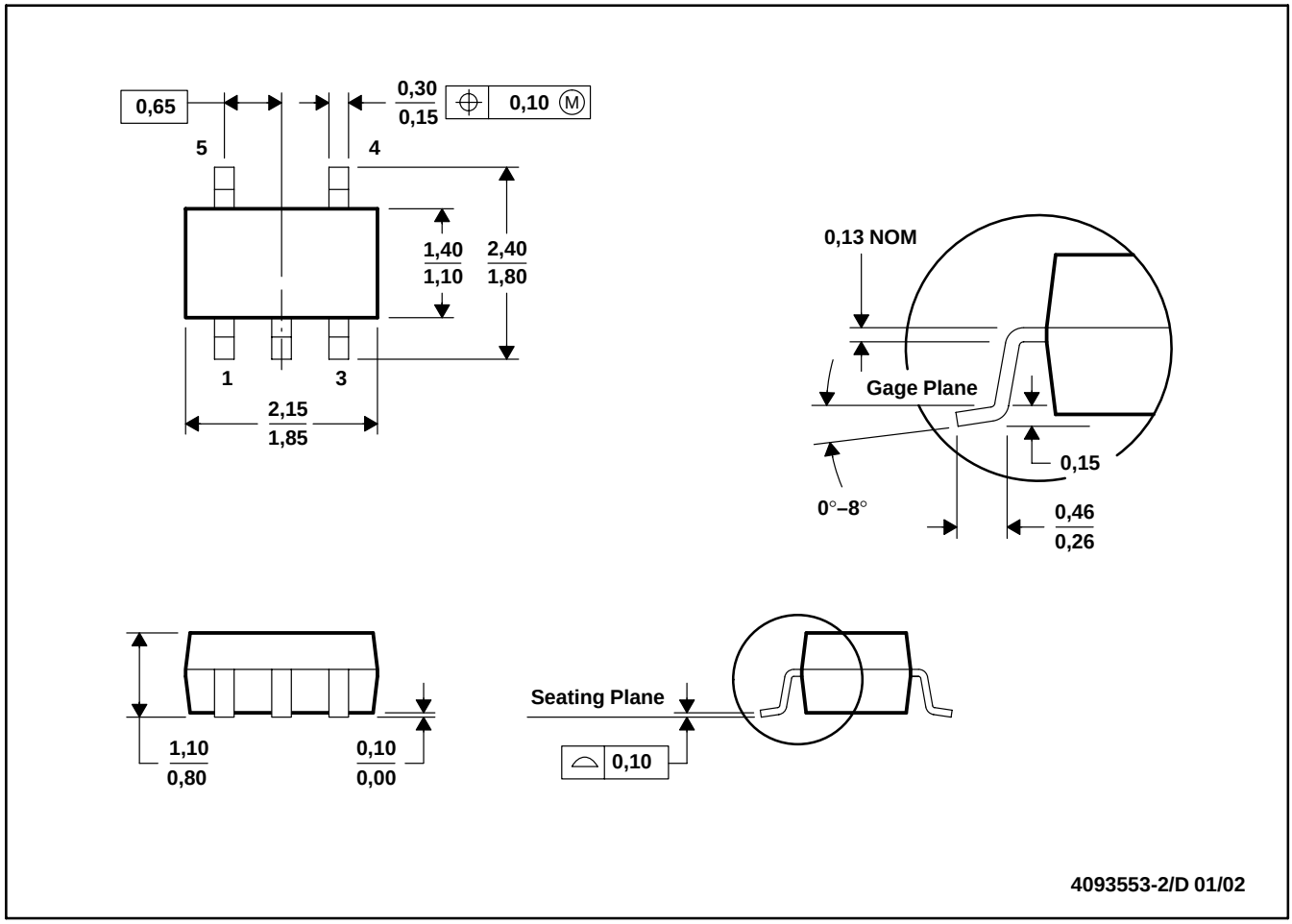
Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish	MSL Peak Temp (3)
TPS3803-01QDCKRQ1	ACTIVE	SC70	DCK	5	3000	None	CU	Level-1-260C-UNLIM
TPS3803G15QDCKRQ1	ACTIVE	SC70	DCK	5	3000	None	CU	Level-1-260C-UNLIM
TPS3805H33QDCKRQ1	ACTIVE	SC70	DCK	5	3000	None	CU	Level-1-260C-UNLIM

(1) The marketing status values are defined as follows:
ACTIVE: Product device recommended for new designs.
LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.
NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.
PREVIEW: Device has been announced but is not in production. Samples may or may not be available.
OBSOLETE: TI has discontinued the production of the device.

(2) Eco Plan - May not be currently available - please check http://www.ti.com/productcontent for the latest availability information and additional product content details.
None: Not yet available Lead (Pb-Free).
Pb-Free (RoHS): TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.
Green (RoHS & no Sb/Br): TI defines "Green" to mean "Pb-Free" and in addition, uses package materials that do not contain halogens, including bromine (Br) or antimony (Sb) above 0.1% of total product weight.

(3) MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDECindustry standard classifications, and peak solder temperature.

DCK (R-PDSO-G5) **PLASTIC SMALL-OUTLINE PACKAGE**



NOTES: A. All linear dimensions are in millimeters.
B. This drawing is subject to change without notice.
C. Body dimensions do not include mold flash or protrusion.
D. Falls within JEDEC MO-203

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