Remote Control Decoder   PT2270

Description

PT2270 is a remote control decoder paired with PT2260 or PT2262 utilizing CMOS Technology. It has 12 bits of tri-state address pins providing a maximum of 531,441 (or 3^{12}) address codes; thereby drastically reducing any code collision and unauthorized code scanning possibilities. PT2270 is available in several options to suit every application needs : variable number of data output pins, latch or momentary output type.

When paired with PT2260, this encoder/decoder (PT2260 / PT2270) pair can operate at very wide temperature range (-30°C ~ +70 ^{o}C). *See also* PT2260 Product Specification Features. Thus, this very important feature enables your Encoder/Decoder to operate under the worst environmental condition.
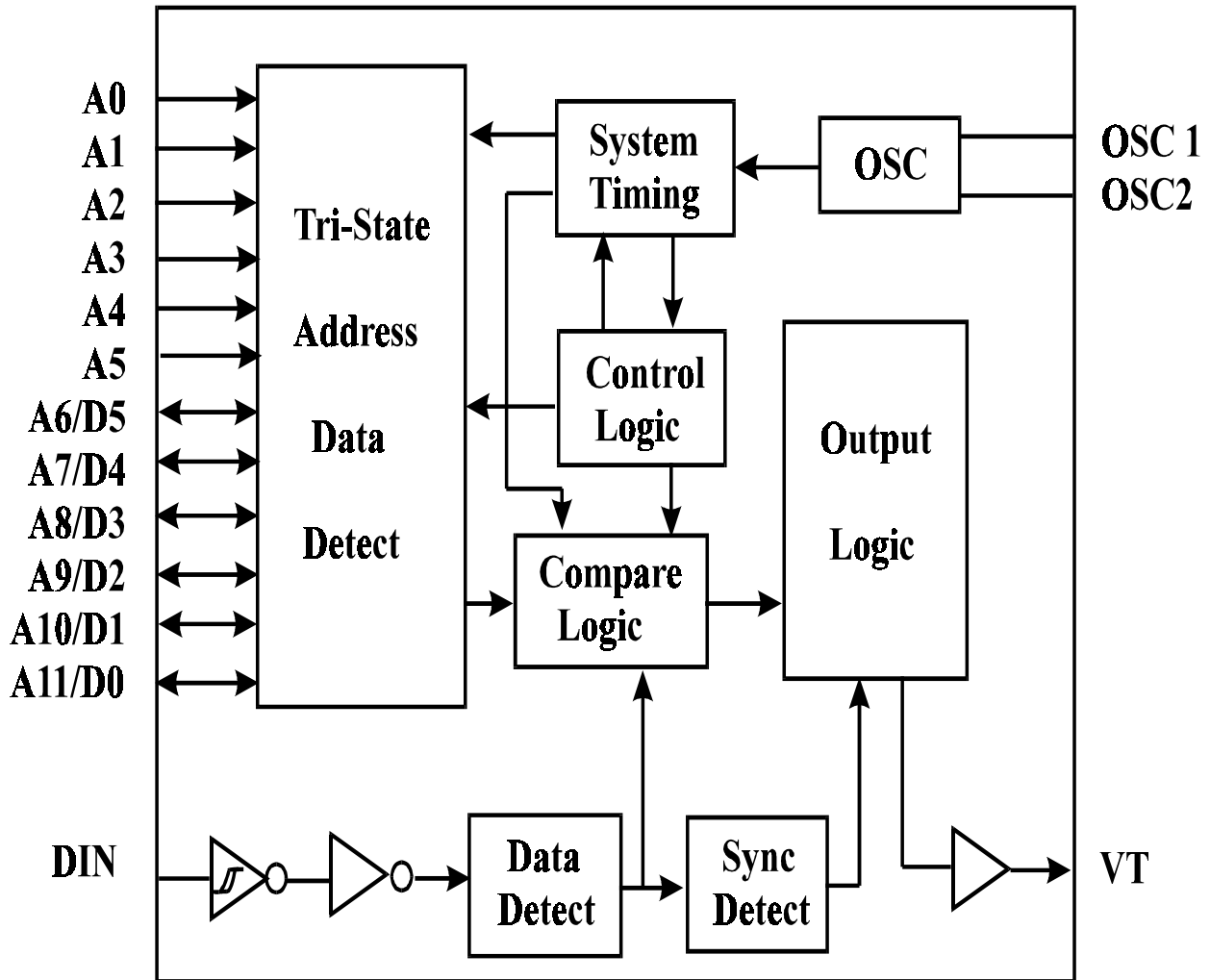
Features

❒   CMOS Technology
❒   Low Power Consumption
❒   Very High Noise Immunity
❒   Up to 12 Tri-State Code Address Pins
❒   Up to 6 Data Pins
❒   Operating Voltage : Vcc = 2 ~ 10 Volts
❒   Single Resistor Oscillator
❒   Latch or Momentary Output Type

Applications

❒   Car Security System
❒   Garage Door Controller
❒   Remote Control Fan
❒   Home Security/Automation System
❒   Remote Control Toys
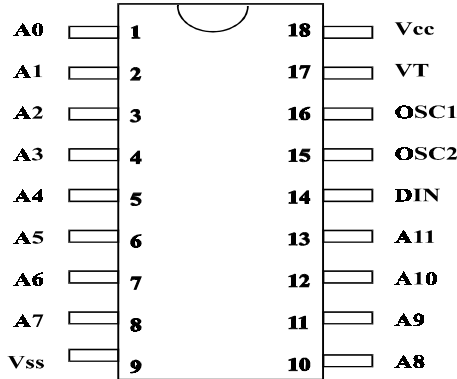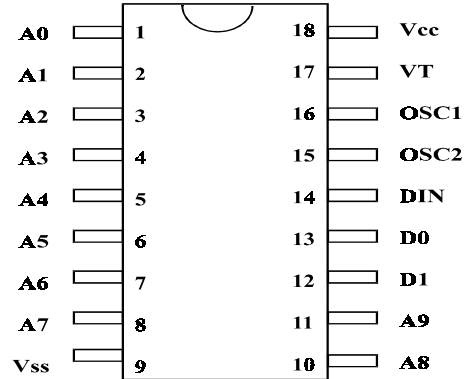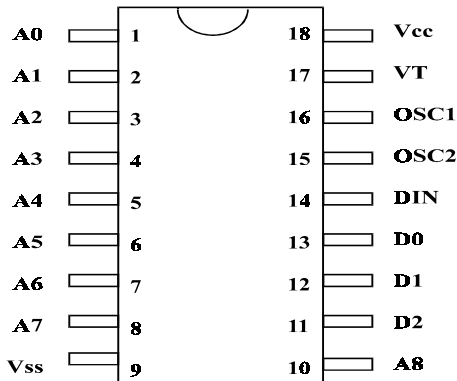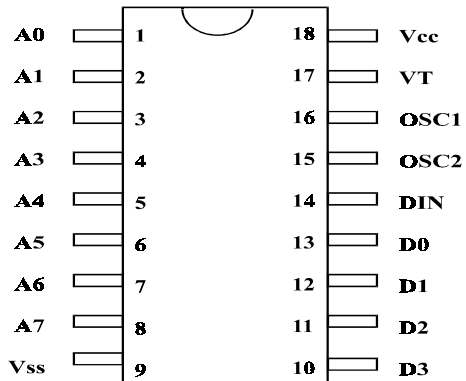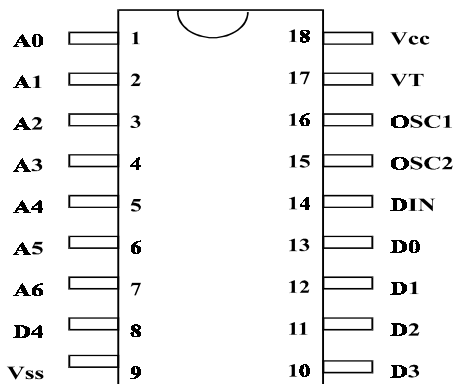❒   Remote Control for Industrial Use

Block Diagram

Pin Configuration

PT 2270

A0	1	18	Vcc
A1	2	17	VT
A2	3	16	OSC1
A3	4	15	OSC2
A4	5	14	DIN
A5	6	13	A11
A6	7	12	A10
A7	8	11	A9
Vss	9	10	A8

PT 2270 – M2/L2

A0	1	18	Vcc
A1	2	17	VT
A2	3	16	OSC1
A3	4	15	OSC2
A4	5	14	DIN
A5	6	13	D0
A6	7	12	D1
A7	8	11	A9
Vss	9	10	A8

PT 2270 – M3/L3

A0	1	18	Vcc
A1	2	17	VT
A2	3	16	OSC1
A3	4	15	OSC2
A4	5	14	DIN
A5	6	13	D0
A6	7	12	D1
A7	8	11	D2
Vss	9	10	A8

PT 2270 – M4/L4

A0	1	18	Vcc
A1	2	17	VT
A2	3	16	OSC1
A3	4	15	OSC2
A4	5	14	DIN
A5	6	13	D0
A6	7	12	D1
A7	8	11	D2
Vss	9	10	D3

PT 2270 – M5/L5

A0	1	18	Vcc
A1	2	17	VT
A2	3	16	OSC1
A3	4	15	OSC2
A4	5	14	DIN
A5	6	13	D0
A6	7	12	D1
D4	8	11	D2
Vss	9	10	D3

PT 2270 – M6/L6

A0	1	18	Vcc
A1	2	17	VT
A2	3	16	OSC1
A3	4	15	OSC2
A4	5	14	DIN
A5	6	13	D0
D5	7	12	D1
D4	8	11	D2
Vss	9	10	D3

Remote Control Decoder   PT2270

Pin Description

| Pin Name	I/O	Description		Pin No.
A0 ~ A5	I	Code Address Pin Nos. 0 ~ 5. These six tri-state pins are detected by PT2270 to determine the encoded waveform bit 0 ~ bit 5. Each pin can be set to "0", "1", or "f" (floating).		1 ~ 6
A6/D5 ~ A11/D0	I/O	Code Address Pin Nos. 6 ~ 11/Data Pin Nos. 5 ~ 0 . These six pins are used as higher address input bits or data output pins depending on the version (type) of PT2270 used. When used as address inputs, these pins are tri-state input pins and each pin can be set to "0", "1", or "f" (floating). When used as output pins, these pins are driven to Vcc if (1) the address decoded from the waveform that was received matches the address setting at the address input pins, and (2) the corresponding data bits received is a "1" bit. Otherwise, they are driven to Vss.		7 ~ 8 10 ~ 13
DIN	I	Data Input Pin. The encoded waveform received is serially fed to PT2270 at this pin.		14
OSC 1	I	Oscillator Pin No.1	A resistor connected between these two pins determine the fundamental frequency of PT2270.	16
OSC 2	O	Oscillator Pin No. 2		15
VT	O	Valid Transmission. Active High Signal. VT in high state signifies that PT2270 receives valid transmission waveform.		17
Vcc	-	Positive Power Supply		18
Vss	-	Negative Power Supply		9

Functional Description

PT2270 decodes the waveform received and fed into the DIN pin. The Waveform is decoded into code word that contains the address, data and sync bits. The decoded address bits are compared with the address set at the address input pins. If both addresses match for 2 consecutive code words, PT2270 drives -- (1) the data output pin(s) whose corresponding data bit(s) is then decoded to be a "1" bit, and (2) the VT output -- to high voltage (high state).

Code Bits

A Code Bit is the basic component of the encoded waveform, and can be classified as either an *AD (Address/Data) Bit* or a *SYNC (Synchronous) Bit*.

Address/Data (AD) Bit Waveform

An AD Bit can be designated as Bit "0", "1" or "f" if it is in low, high or floating state respectively. One bit waveform consists of 2 pulse cycles. Each pulse cycle has 16 oscillating time periods. For further details, please refer to the diagram below:
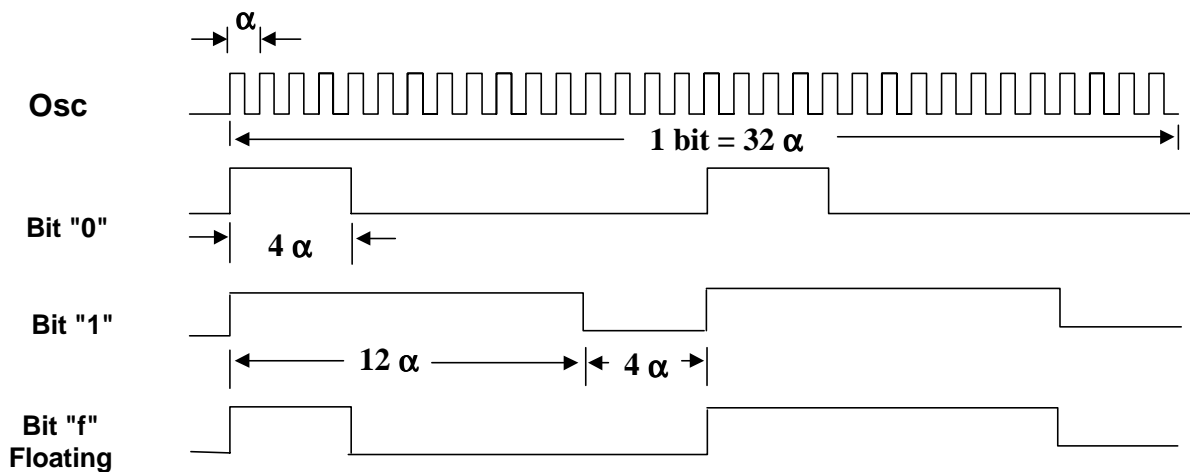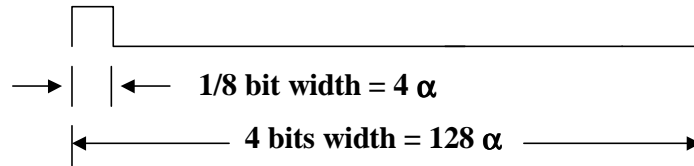

where : α = Oscillating Clock Period
                Bit "f" is only available for Address Bits

Synchronous (Sync.) Bit Waveform

The Synchronous Bit Waveform is 4 bits long with 1/8 bit width
pulse. Please refer to the diagram below:

1/8 bit width = 4 α

4 bits width = 128 α

Note : 1 bit = 32 α

Code Word

A group of Code Bits is called a Code Word. A Code Word consists of 12 AD bits
followed by one Sync Bit. The 12 AD bits are interpreted as either address or data
bits depending on the PT2270 version used. Please refer to the diagrams below:

PT2270:

A0	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	SYNC

PT2270–M2/L2:

A0	A1	A2	A3	A4	A5	A6	A7	A8	A9	D1	D0	SYNC

PT2270–M3/L3:

A0	A1	A2	A3	A4	A5	A6	A7	A8	D2	D1	D0	SYNC

PT2270–M4/L4:

A0	A1	A2	A3	A4	A5	A6	A7	D3	D2	D1	D0	SYNC

PT2270–M5/L5:

A0	A1	A2	A3	A4	A5	A6	D4	D3	D2	D1	D0	SYNC

PT2270–M6/L6:

A0	A1	A2	A3	A4	A5	D5	D4	D3	D2	D1	D0	SYNC

One Complete Code Word

Remote Control Decoder   PT2270
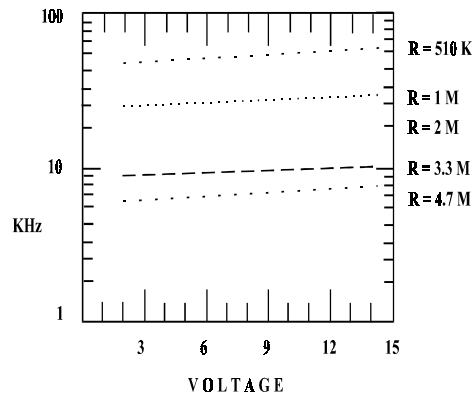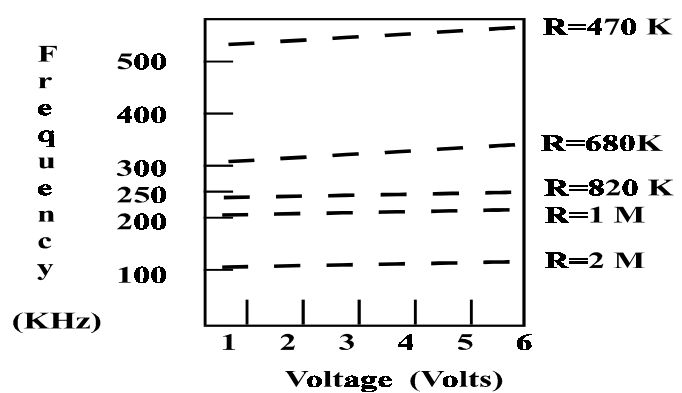
Single Resistor Oscillator

The built-in oscillator circuitry of PT2270 allows a precision oscillator to be constructed with only an external resistor. For the PT2270 to decode correctly the waveform that was received, the oscillator frequency of PT2270 must be 1/16 ~ 4 (or 2 to 30) times that of the transmitting PT2260 (or PT2262). It is a good practice to center the PT2270 oscillator frequency in this window to gain best window margin at both sides. The typical oscillator with various resistor values are shown below for PT2260, PT2262 and PT2270.
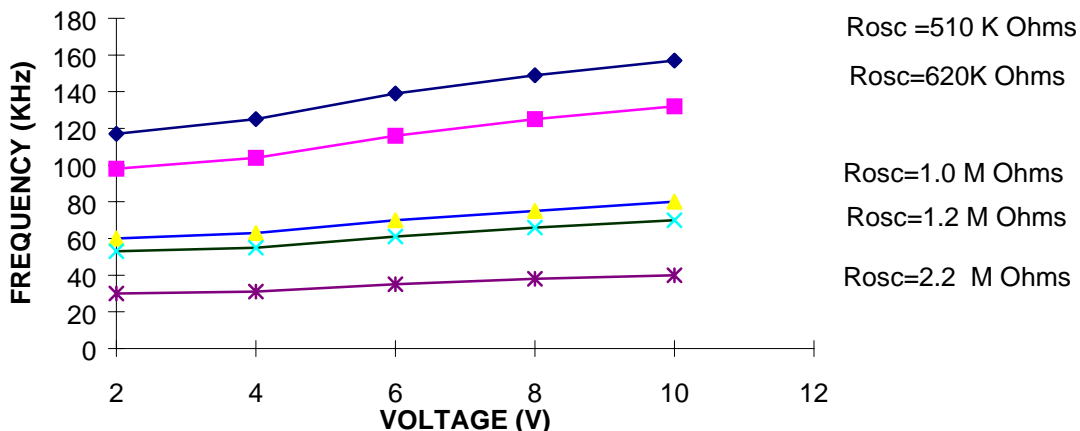
PT2262 Encoder OSC Frequency

PT2260 Encoder OSC Frequency

PT2270 Decoder OSC Frequency

Suggested oscillator resistor values are shown below.

PT2260	PT2270
820 KΩ	1.0 MΩ
1.0 MΩ	1.2 MΩ
2.0 MΩ	2.2 MΩ

PT2262	PT2270
1.2 MΩ	120KΩ
1.5MΩ	160KΩ
3.3MΩ	390KΩ

Valid Transmission

When PT2270 receives a transmission code word, it initially checks whether this is a valid transmission. For a transmission to be valid, (1) it must be a Complete Code Word, and (2) the Address Bits must match the Address Setting at the Address Pins. After two consecutive valid transmissions, PT2270 (1) drives the data pins according to the data bits received, and (2) raises VT to high voltage (high state).
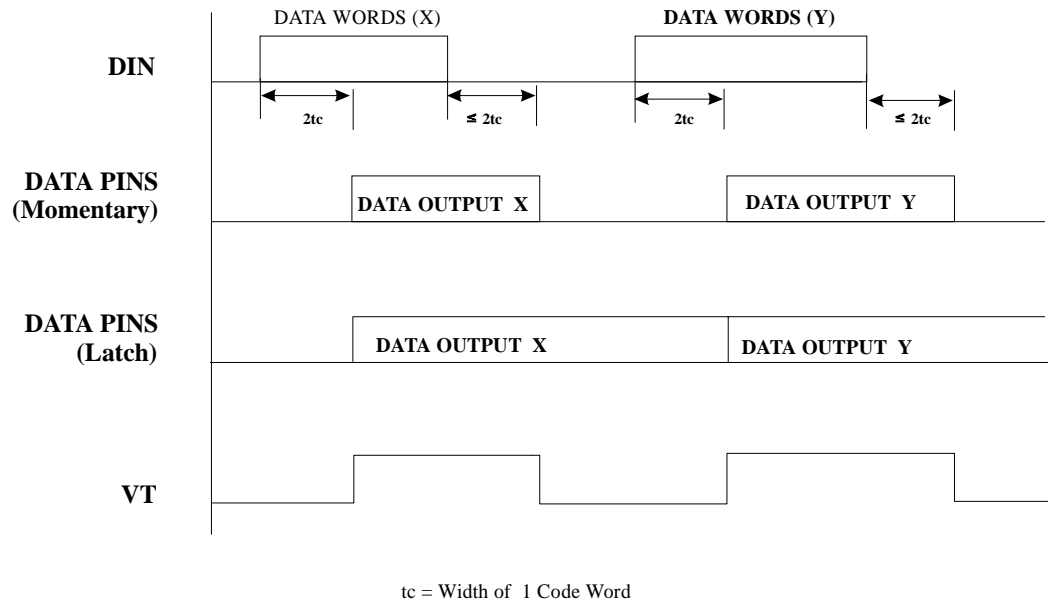
The timings are shown in the following diagram.
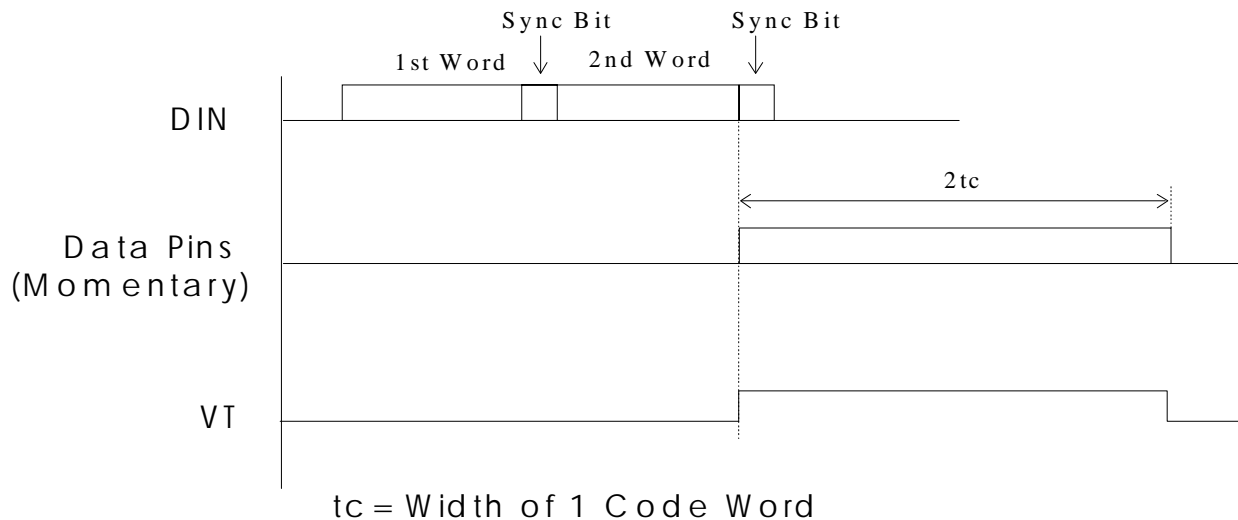
Latch or Momentary Data Output Type

PT2270 uses either the latch or the momentary data output type depending on the PT2270 version used. The latch type (PT2270-Lx) activates the data out during transmission and this data is sustained in the memory until another data is inputted or entered. A momentary type (PT2270-Mx), on the other hand, activates the data out only during transmission. In the momentary type, the data does not remain in the memory after the transmission is completed. Please refer to the diagram below:


DATA WORDS (X)   DATA WORDS (Y)

DIN

$2t_c$ $\leq 2t_c$ $2t_c$ $\leq 2t_c$

DATA PINS
(Momentary)   DATA OUTPUT X   DATA OUTPUT Y

DATA PINS
(Latch)   DATA OUTPUT X   DATA OUTPUT Y

VT

t_c = Width of 1 Code Word

Operation Flowchart

Decoder Without Data Output Pin

1. When Power is turned on, PT2270 activates the Stand-By Mode.
2. It then searches for signals. If there is no signal received, it remains in the Stand-By Mode; otherwise, the address bits received are compared with the address configuration of the pins.

Remote Control Decoder   PT2270

3. The VT goes high signifying the validation of transmission only when there are two (2) continuous frames that contain matched address bits; otherwise, VT will not be activated and the Stand-By Mode remains active.
4. Then, the Address Bits are again checked. Two continuous mismatches of the address bits would disable the VT and make the Stand-By Mode active; otherwise, the address bits are continuously checked.
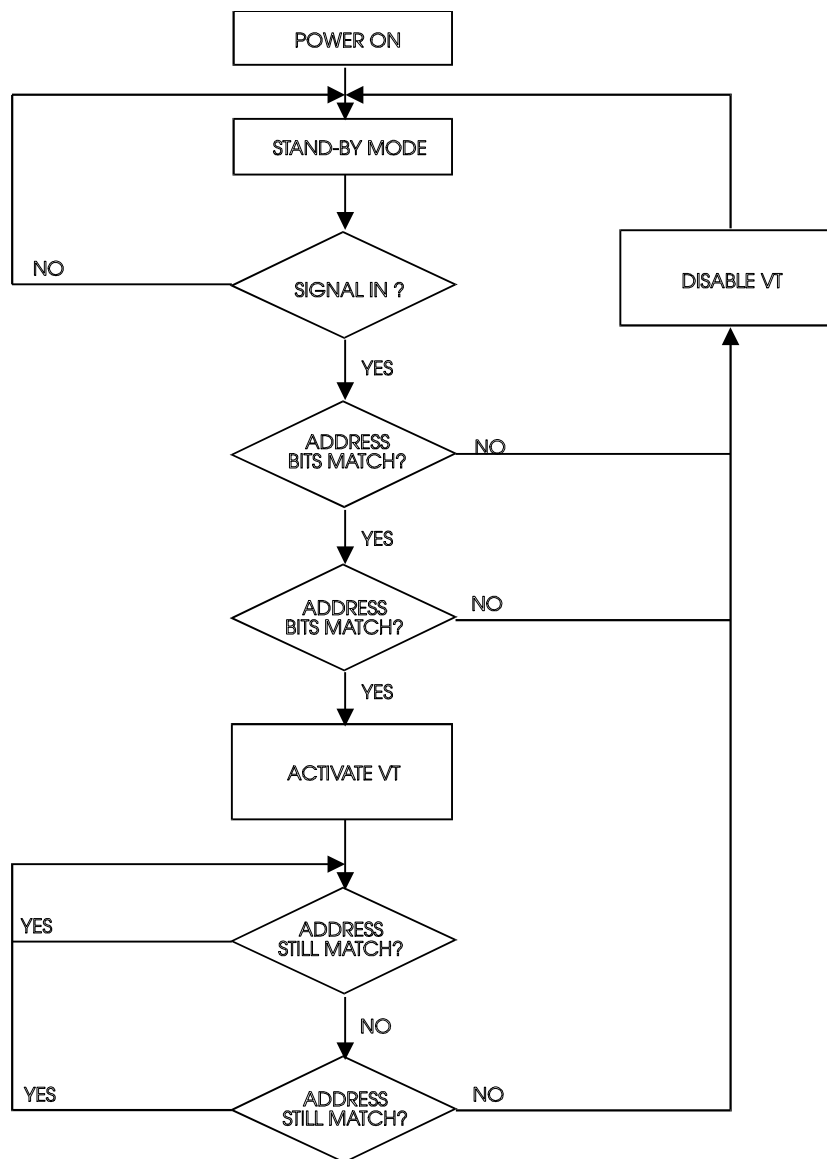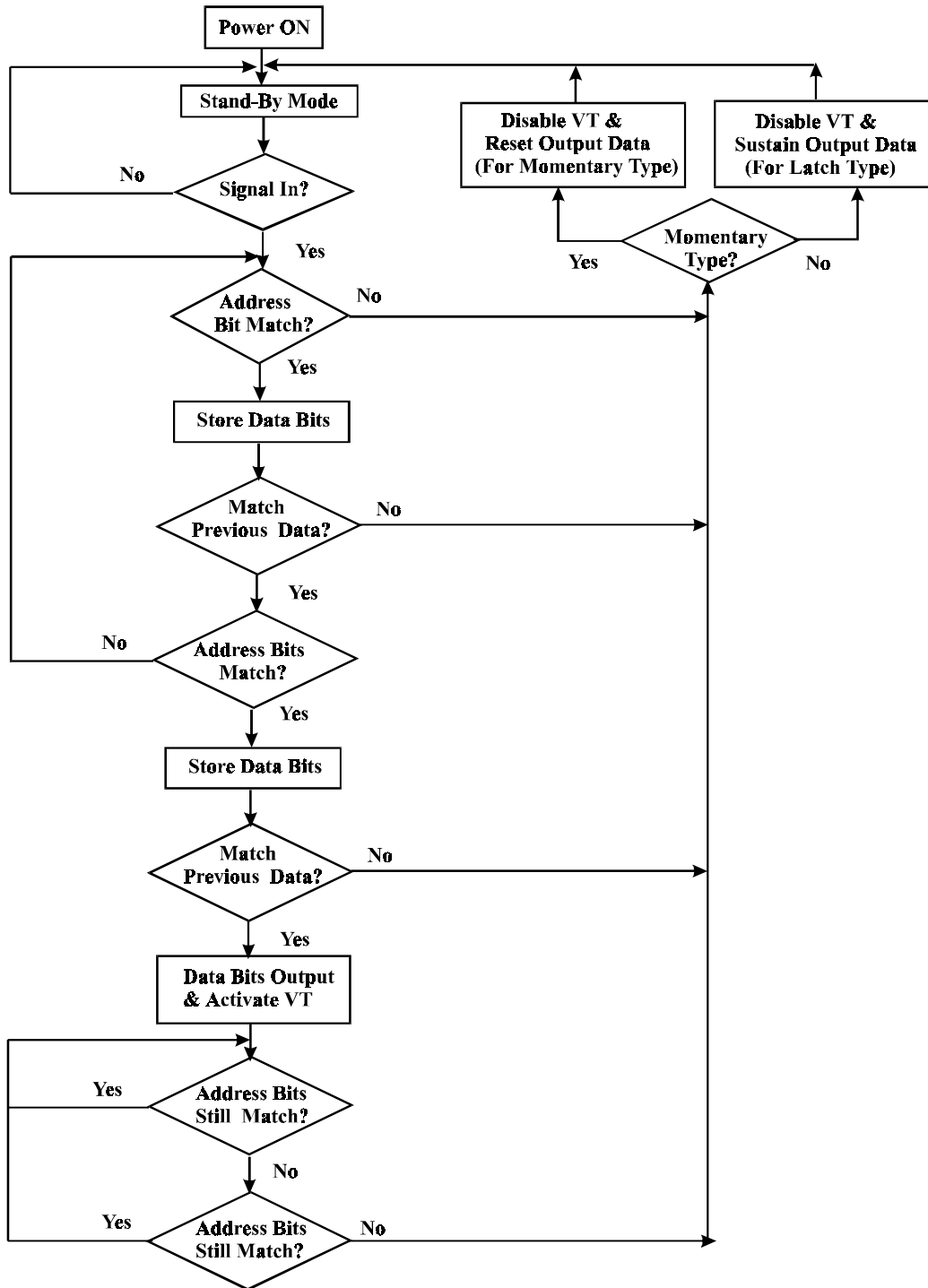
DECODER WITHOUT DATA OUTPUT PIN

Decoder with Data Output Pins

1. When Power is turned ON, PT2270 activates the Stand-By Mode.
2. It then searches for signals. If there is no signal received, it remains in the Stand-By Mode; otherwise, the address bits are compared with the address configuration of the pins.

   Whenever the Address Bits in a Frame match with that of the Address Configuration of the Pin, the data bits are stored into the memory. When the result is a match, it then undergoes another matching (Address Bits in the Frame vs. Address Configuration of the Pin) and storing (data bits stored in the memory) process.
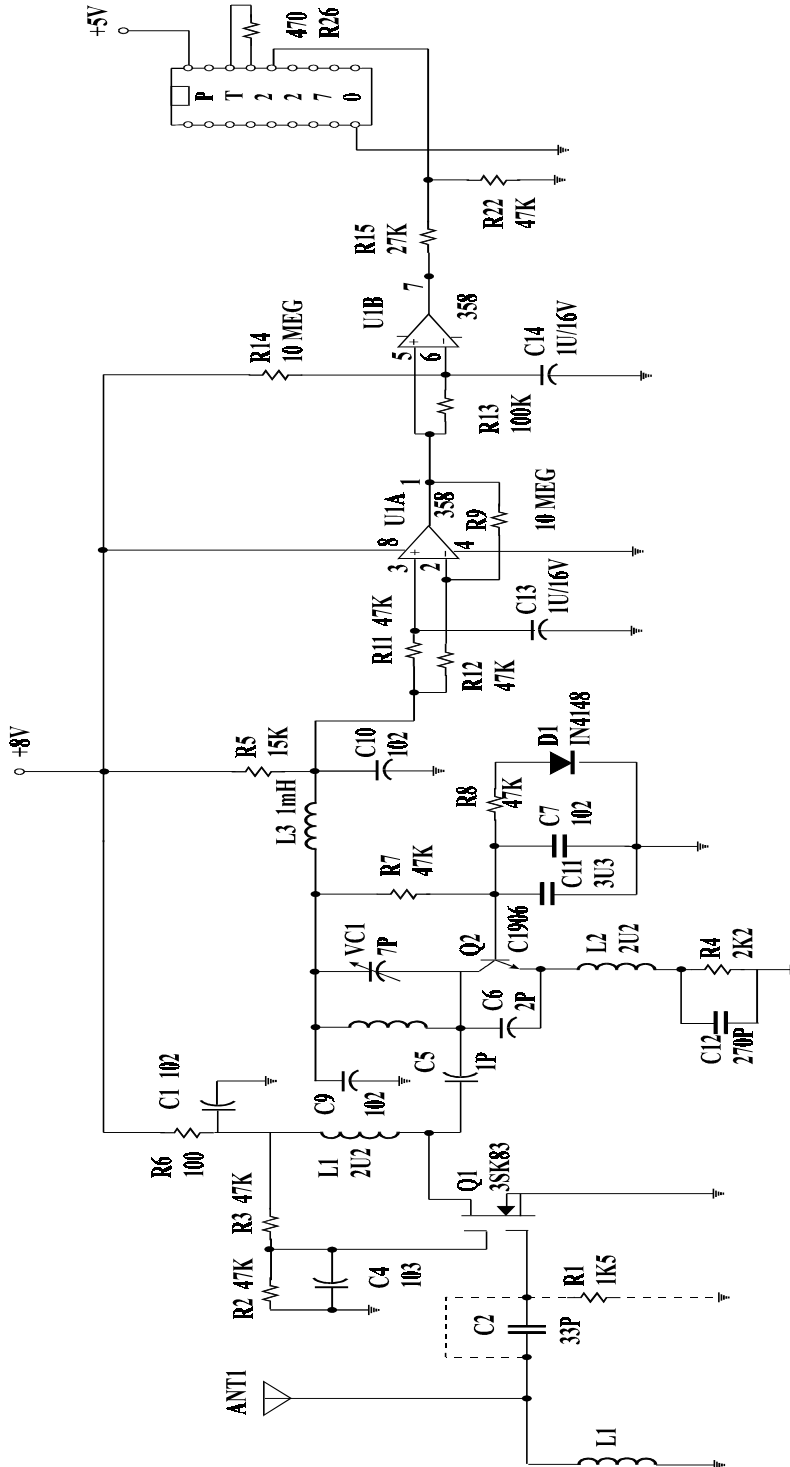
   When this IC finds two (2) continuous and identical data having the same address bits, the data output(s) is activated and the VT is enabled. The VT is disabled when there are 2 continuous mismatched addresses. For the momentary type, the data output is reset; while for the latch type, the data output is sustained.

Decoder with Data Output Pins
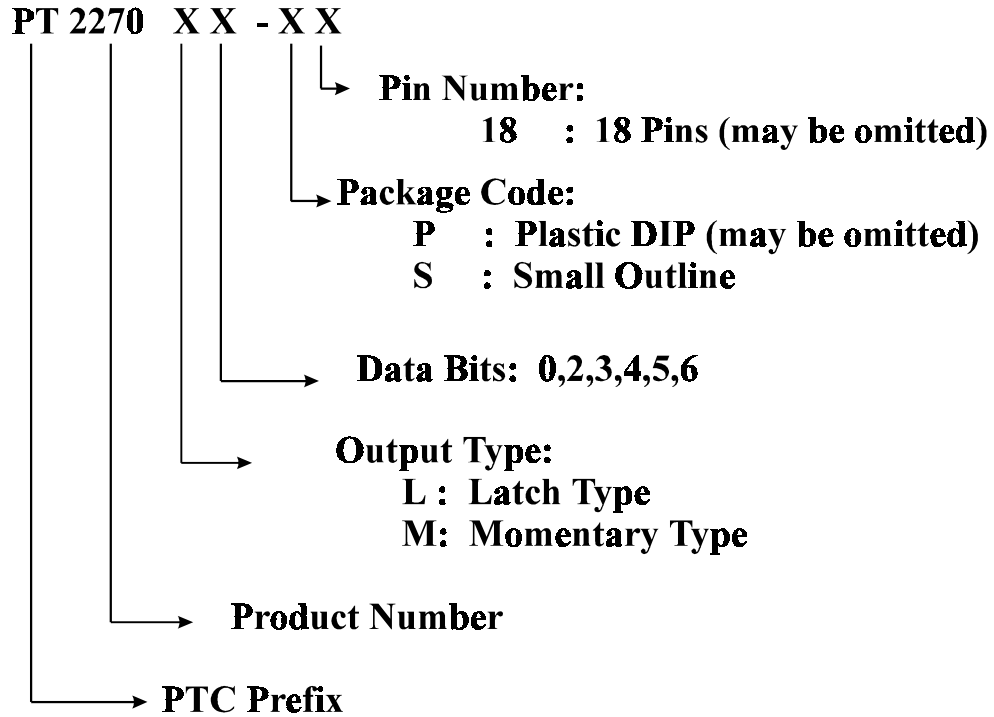
Application Circuit

DC Electrical Characteristics

PARAMETER	SYMBOL	CONDITION	LIMIT			UNIT
			MIN.	TYP.	MAX.	
Supply Voltage	Vcc		2.0	5.0	10.0	Volt
Standby Current	I_{SB}	Vcc=5 V, DIN = "L" OSC stops A0 ~ A11 Open		0.1	1	μA
D0~D5 Output Driving Current	I_{OH}	Vcc = 5 V V_{OH} = 3.5 V	3	5		mA
D0~D5 Output Sinking Current	I_{OL}	Vcc = 5 V V_{OL}= 1.5	-2	-4		mA
DIN High Level Input Voltage	V_{IH}	Vcc	0.7Vcc		Vcc	Volt
DIN Low Level Input Voltage	V_{IL}	Vcc	0		0.3Vcc	Volt
VT Output Driving Current	I_{OH}	Vcc=5V V_{OH}=3.5V	3	6		mA

Ordering Information

Valid Part Number	Package
PT2270 (-S)	18 Pins, DIP (SO)
PT2270-L2 (-S)	18 Pins, DIP (SO)
PT2270-M2 (-S)	18 Pins, DIP (SO)
PT2270-L3 (-S)	18 Pins, DIP (SO)
PT2270-M3 (-S)	18 Pins, DIP (SO)
PT2270-L4 (-S)	18 Pins, DIP (SO)
PT2270-M4 (-S)	18 Pins, DIP (SO)
PT2270-L5 (-S)	18 Pins, DIP (SO)
PT2270-M5 (-S)	18 Pins, DIP (SO)
PT2270-L6 (-S)	18 Pins, DIP (SO)
PT2270-M6 (-S)	18 Pins, DIP (SO)

PT 2270   X X   - X X

⌐→ **Pin Number:**
      18   : 18 Pins (may be omitted)

→ **Package Code:**
      P   : Plastic DIP (may be omitted)
      S   : Small Outline

→ **Data Bits: 0,2,3,4,5,6**

→ **Output Type:**
      L : Latch Type
      M: Momentary Type

→ **Product Number**

→ **PTC Prefix**

Remote Control Decoder   PT2270

Package Dimension

DIP Package
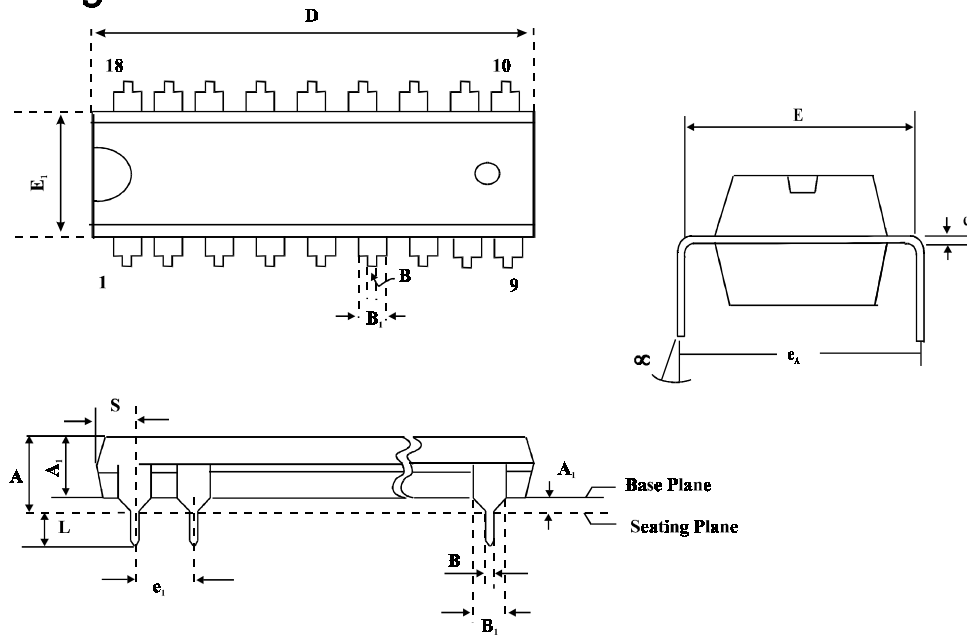
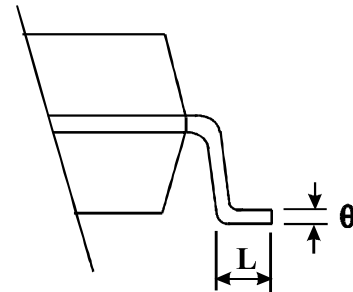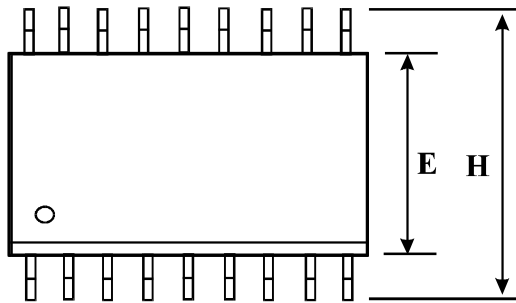| Symbol	Dimensions in Inch	Dimensions in mm
A	0.175 Max	4.45 Max
A_1	0.010 Min	0.25 Min
A_2	0.130 + 0.005	3.30 + 0.13
B	0.018 + 0.004	0.46 + 0.10
	0.018 - 0.002	0.46 - 0.05
B_1	0.060 + 0.004	1.52 + 0.10
	0.060 - 0.002	1.52 - 0.03
c	0.010 + 0.004	0.25 + 0.10
	0.010 - 0.002	0.25 - 0.05
D	0.900 TYP (0.910 Max)	22.86 TYP (23.11 Max)
E	0.300 + 0.010	7.62 + 0.25
E_1	0.250 + 0.005	6.35 + 0.13
e_1	0.100 + 0.010	2.54 + 0.25
L	0.130 + 0.010	3.30 + 0.25
α	$0° \sim 15°$	$0° \sim 15°$
e_A	0.355 + 0.020	9.02 + 0.51
S	0.055 Max	1.40 Max

Note:
1. The max. value of dimension D includes end flash.
2. The dimension E_1 doesn't include resin fins
3. The dimension S includes end flash.
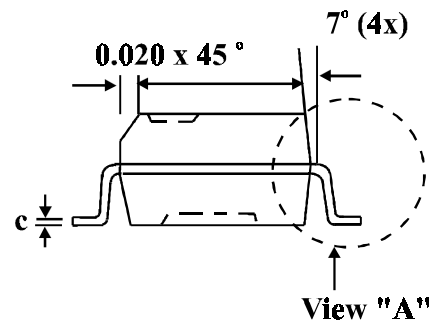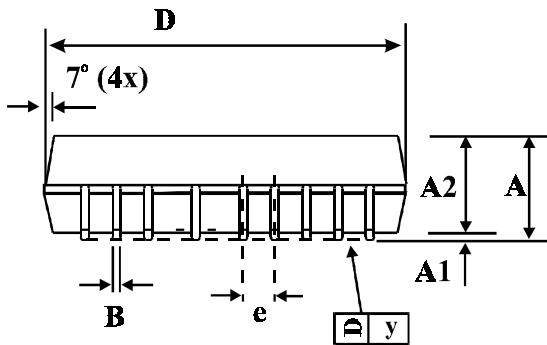4. All dimensions are based on British system

Remote Control Decoder   PT2270

SO Package

VIEW "A"

Symbols	Dimensions in Millimeters			Dimensions in Inches		
	Min.	Nom.	Max.	Min.	Nom.	Max
A	2.36	2.49	2.64	0.093	0.098	0.104
A1	0.10	-	0.30	0.004	-	0.012
A2	-	2.31	-	-	0.091	-
B	0.33	0.41	0.51	0.013	0.016	0.020
C	0.18	0.23	0.28	0.007	0.009	0.011
D	11.5	11.6	11.63	0.452	0.455	0.458
E	7.39	7.49	7.59	0.291	0.295	0.299
e	-	1.27	-	-	0.050	-
H	10.01	10.31	10.64	0.394	0.406	0.419
L	0.38	0.81	1.27	0.015	0.032	0.050
y	-	-	0.10	-	-	0.004
θ	0°	-	8°	0°	-	8°

Note: 1. Controlling Dimension : Inch
         2. Lead Frame Material : Copper 194
         3. After solder plating lead thickness will be 0.015" max.
         4. Dimension "D" does not include mold flash, protrusions or gate burrs.
         5. Dimension "E" does not include interlead flash or protrusions.
         6. Tolerance : ± 0.010" unless otherwise specified.
         7. Otherwise dimensions follow acceptable spec.