



Remote Control Decoder IC

PT2294

DESCRIPTION

PT2294 is a remote control decoder paired with PT2264 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. PT2294 is available in several options to suit every application needs: variable number of data output pins, latch or momentary output type.

When paired with PT2264, this encoder/decoder (PT2264 / PT2294) pair can operate at very wide temperature range ($-40^{\circ}\text{C} \sim +85^{\circ}\text{C}$). See also PT2264 Product Specification Features. Thus, this very important feature enables your Encoder/Decoder to operate under the worst environmental condition.

FEATURES

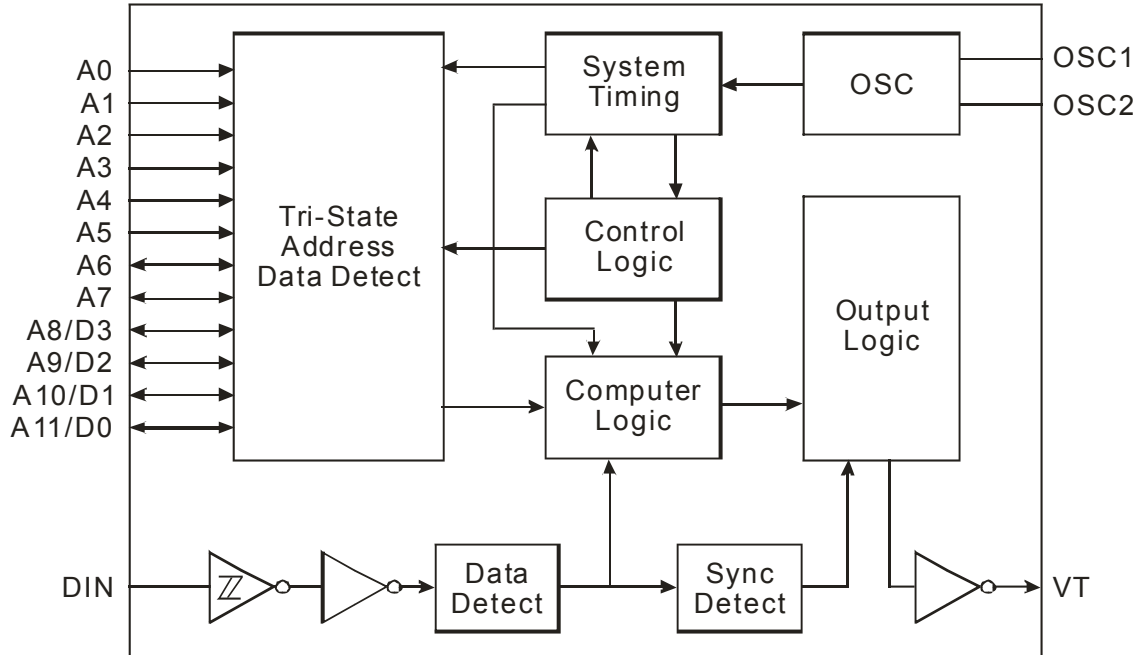
- CMOS technology
- Low power consumption
- Very high noise immunity
- Up to 12 Tri-State code address pins
- Up to 4 data pins
- Operating voltage: $V_{CC}=2.2 \sim 7\text{V}$
- Single resistor oscillator
- Latch or momentary output type

APPLICATIONS

- Remote control fan
- Home security/Automation system
- Remote control toys
- Remote control for industrial use
- Remote control for door bell

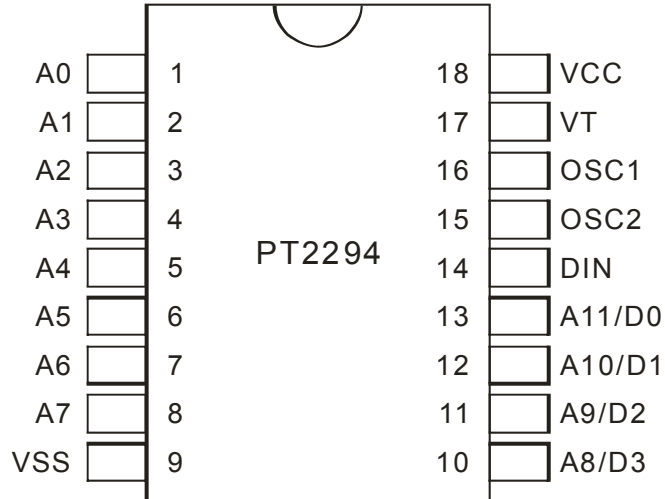


BLOCK DIAGRAM





PIN CONFIGURATION





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PIN DESCRIPTION

Pin Name	I/O	Description	Pin No.
A0 ~ A7	I	Code Address Pin Nos. 0 ~ 7. These eight tri-state pins are detected by PT2294 to determine the encoded waveform bit 0 ~ bit 9. Each pin can be set to "0", "1", or "f" (floating).	1 ~ 8
A8/D3 ~ A11/D0	I/O	Code Address Pin Nos. 8 ~ 11/Data Pin Nos. 0 ~ 3. These four pins are used as higher address input bits or data output pins depending on the version (type) of PT2294 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.	10 ~ 13
DIN	I	Data Input Pin. The encoded waveform received is serially fed to PT2294 at this pin.	14
OSC1	I	Oscillator Pin No. 1 A resistor connected between these two pins determines the fundamental frequency of PT2294.	16
OSC2	O		15
VT	O	Valid Transmission. Active High Signal. VT in high state signifies that PT2294 receives valid transmission waveform.	17
VCC	-	Positive Power Supply	18
VSS	-	Negative Power Supply	9



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FUNCTION DESCRIPTION

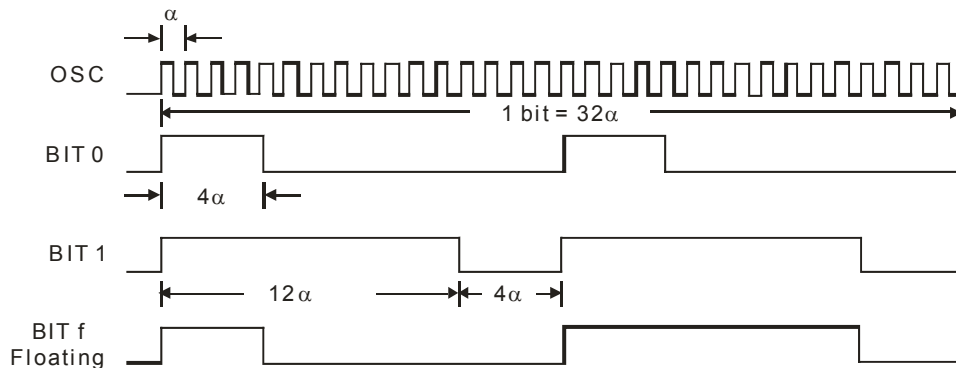
PT2294 decodes the waveform received and fed into the DIN pin. The waveform is decoded into code word that contains the address, data and sync bits. The decoded address bits are compared with the address set at the address input pins. If both addresses match for 2 consecutive code words, PT2294 drives -- (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:



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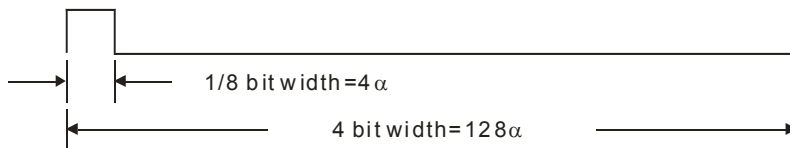
where:

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:



Note: 1 bit = 32α



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CODE WORD

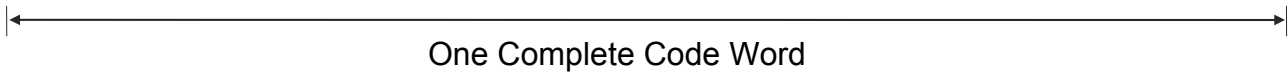
A group of Code Bits is called a Code Word. A Code Word consists of 12 AD bits followed by one Sync Bit. The 12 AD bits are interpreted as either address or data bits depending on the PT2294 version used. Please refer to the diagrams below:

PT2294:

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

PT2294-M4/L4:

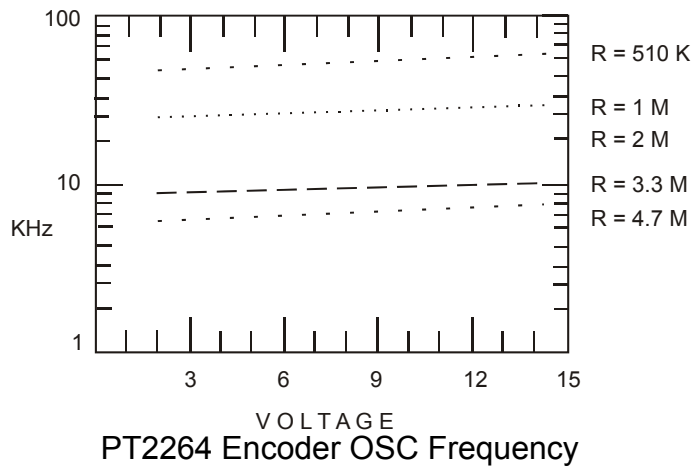
A0	A1	A2	A3	A4	A5	A6	A7	D3	D2	D1	D0	SYNC
----	----	----	----	----	----	----	----	----	----	----	----	------



SINGLE RESISTOR OSCILLATOR

The built-in oscillator circuitry of PT2294 allows a precision oscillator to be constructed with only an external resistor. For the PT2294 to decode correctly the waveform that was received, the oscillator frequency of PT2294 must be 1/16 ~ 4 (or 2 to 30) times that of the transmitting PT2264. It is a good practice to center the PT2294 oscillator frequency in this window to gain best window margin at both sides. The typical oscillator with various resistor values are shown below for PT2264 and PT2294.

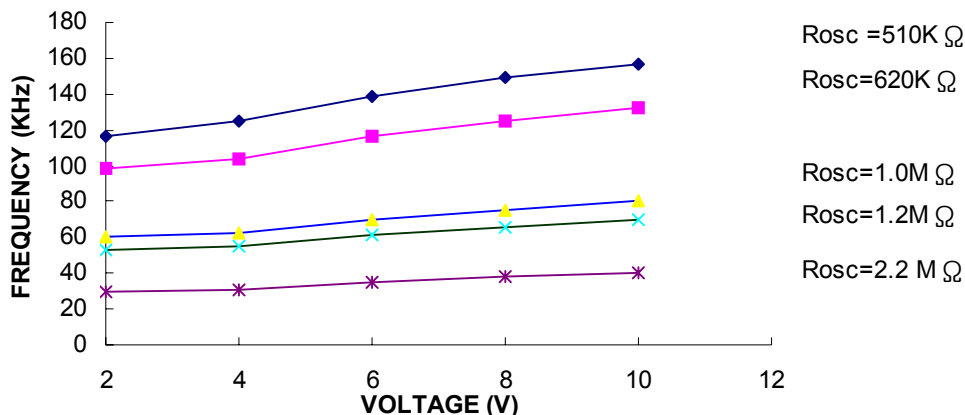
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PT2294 DECODER OSC FREQUENCY



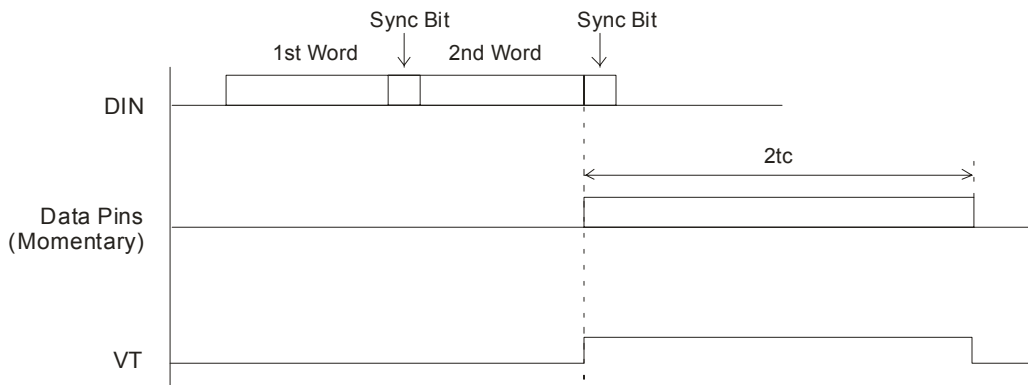
Suggested oscillator resistor values are shown below.

PT2264	PT2294
1.2MΩ	120KΩ
1.5MΩ	160KΩ
3.3MΩ	390KΩ

VAILD TRANSMISSION

When PT2294 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, PT2294 (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.

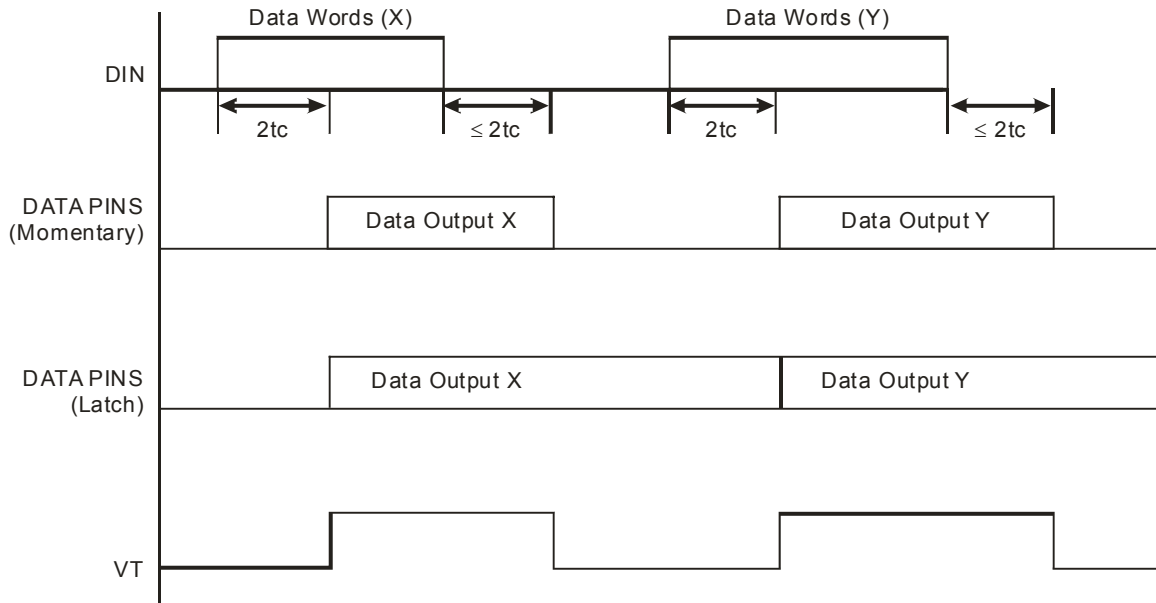


Note: tc=Width of 1 code word



LATCH OR MOMENTARY DATA OUTPUT TYPE

PT2294 uses either the latch or the momentary data output type depending on the PT2294 version used. The latch type (PT2294-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 (PT2294-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:



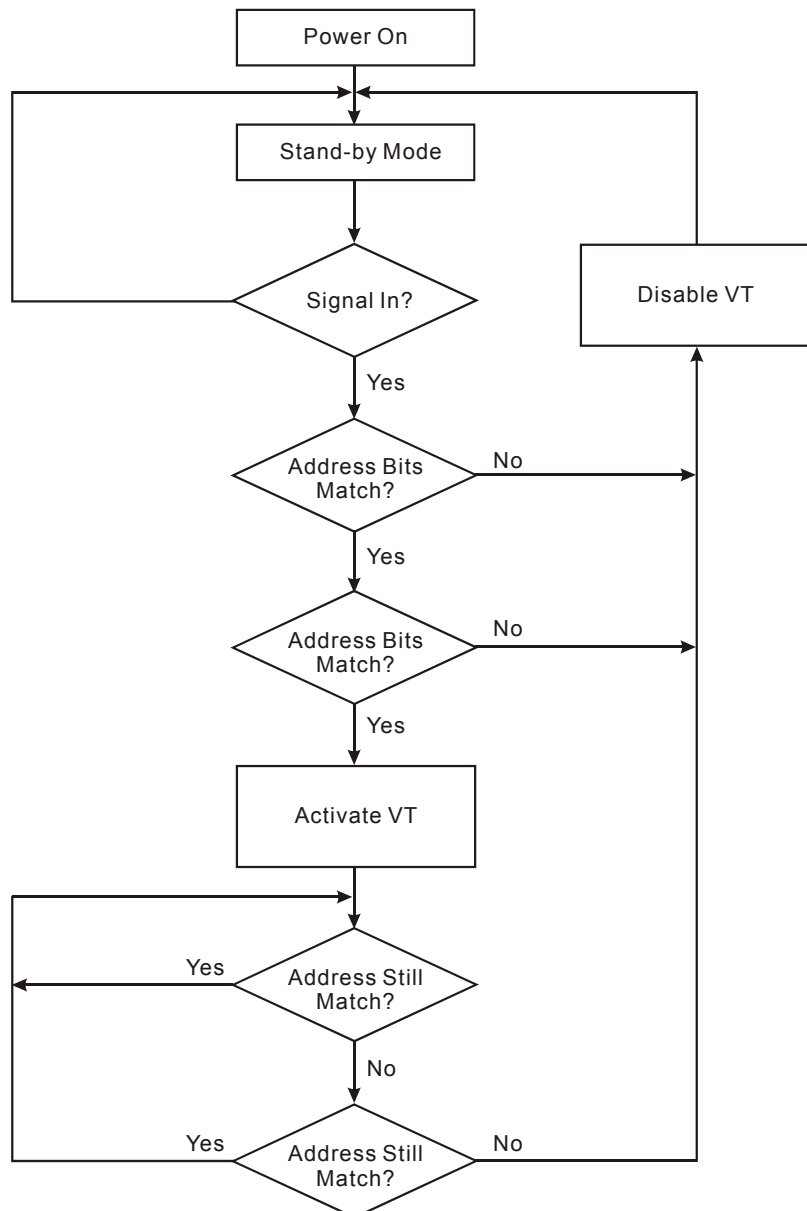
Note: tc =Width of 1 code word



OPERATION FLOWCHART

DECODER WOTHOUT DATA OUTPUT PIN

1. When Power is turned on, PT2294 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.
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.



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DECODER WITH DATA OUTPUT PINS

1. When Power is turned ON, PT2294 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.

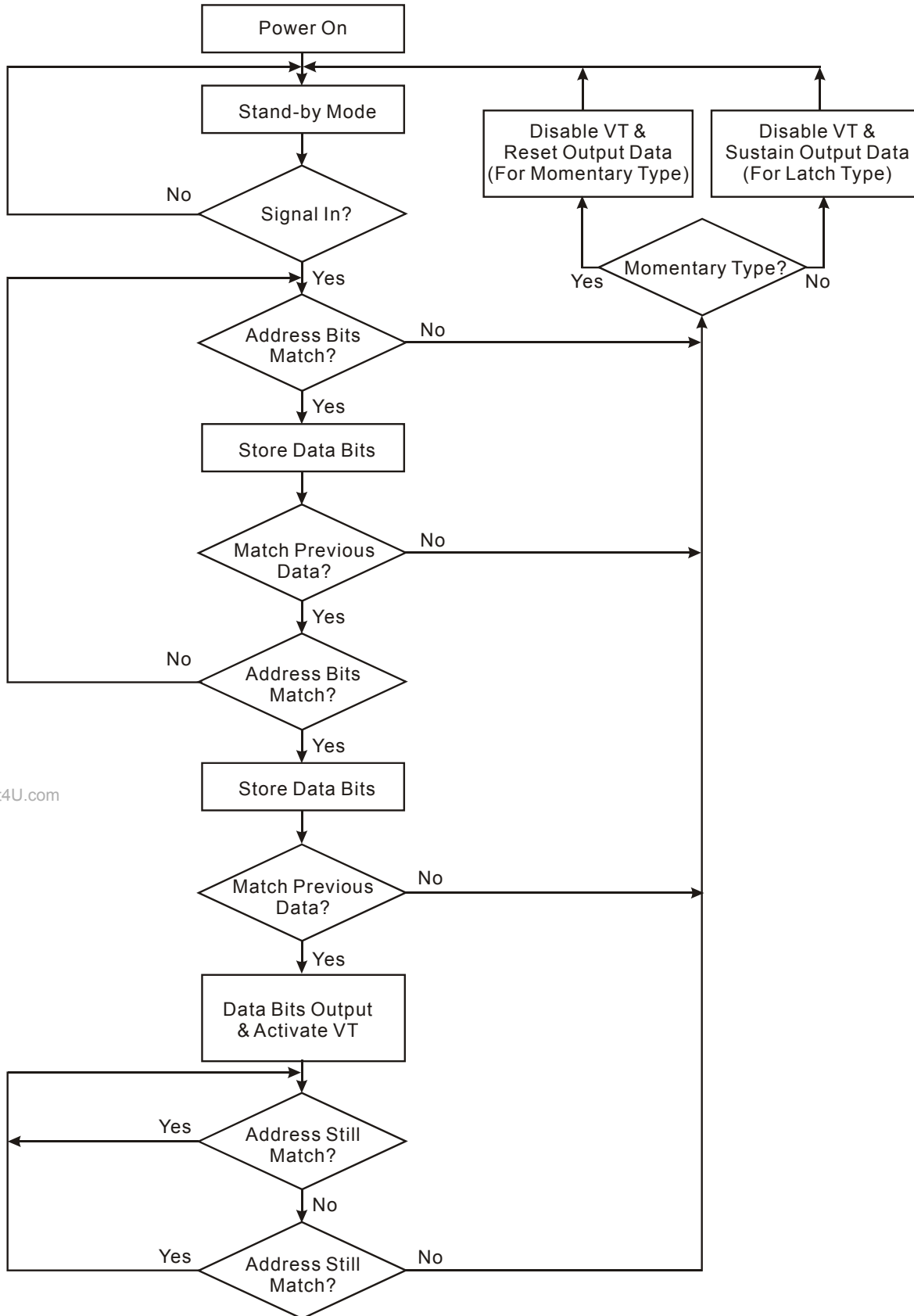
Whenever the Address Bits in a Frame match with that of the Address Configuration of the Pin, the data bits are stored into the memory. When the result is a match, it then undergoes another matching (Address Bits in the Frame vs. Address Configuration of the Pin) and storing (data bits stored in the 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.



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ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Conditions	Ratings	Unit
Operating temperature	Topr		-40 ~ +85	°C
Storage temperature	Tstg		-65 ~ +150	°C

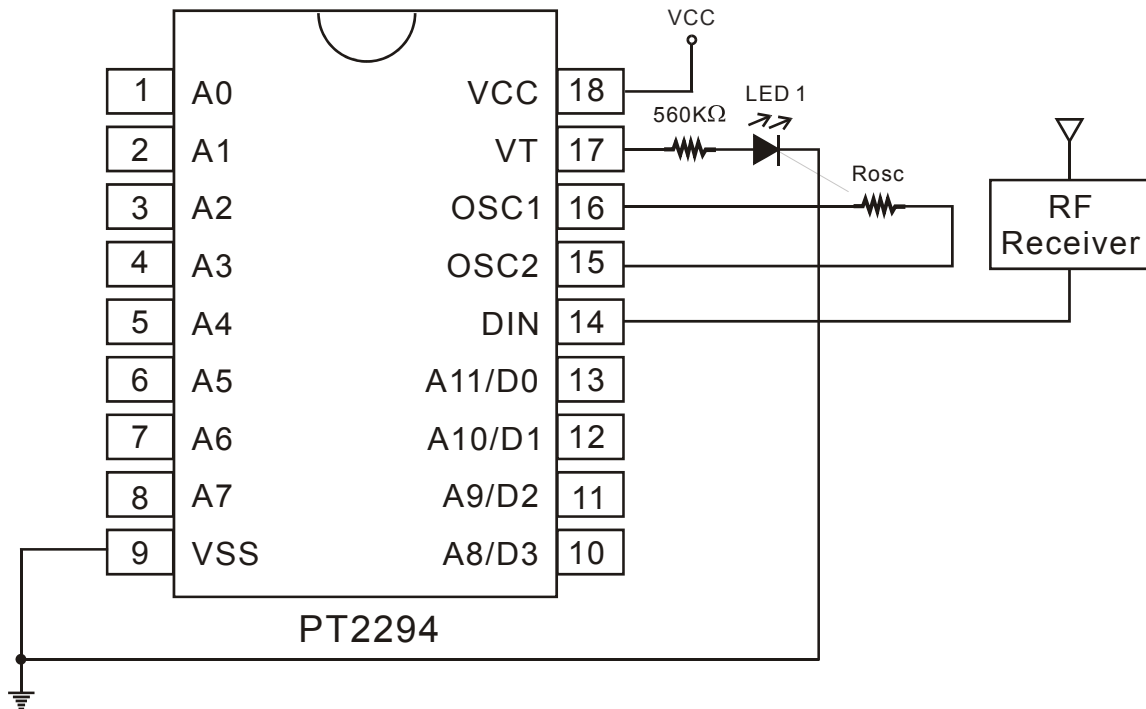
DC ELECTRICAL CHARACTERISTICS

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Supply voltage	VCC		2.2	5	7	V
Standby current	ISB	VCC=5V, DIN="L" OSC stops A0 ~ A11 Open		0.1	1	μA
D0, D1, D2, D3 output driving current	IOH	VCC=5V VOH=3.5V	3	5		mA
D0, D1, D2, D3 output sinking current	IOL	VCC=5V VOL=1.5V	-2	-4		mA
DIN high level input voltage	VIH	VCC	0.7VCC		VCC	V
DIN low level input voltage	VIL	VCC	0		0.3VCC	V
VT output driving current	IOH	VCC=5V VOH=3.5V	3	6		mA

APPLICATION CIRCUIT

NO DATA RF APPLICATION

Pin1~8, Pin 10~13 Address Datas must be paired with PT2264.



Notes:

1. Suggested oscillator resistor values (Rosc), please refer to page 7.
2. The LED is indicated when PT2294 receives valid transmission waveform.

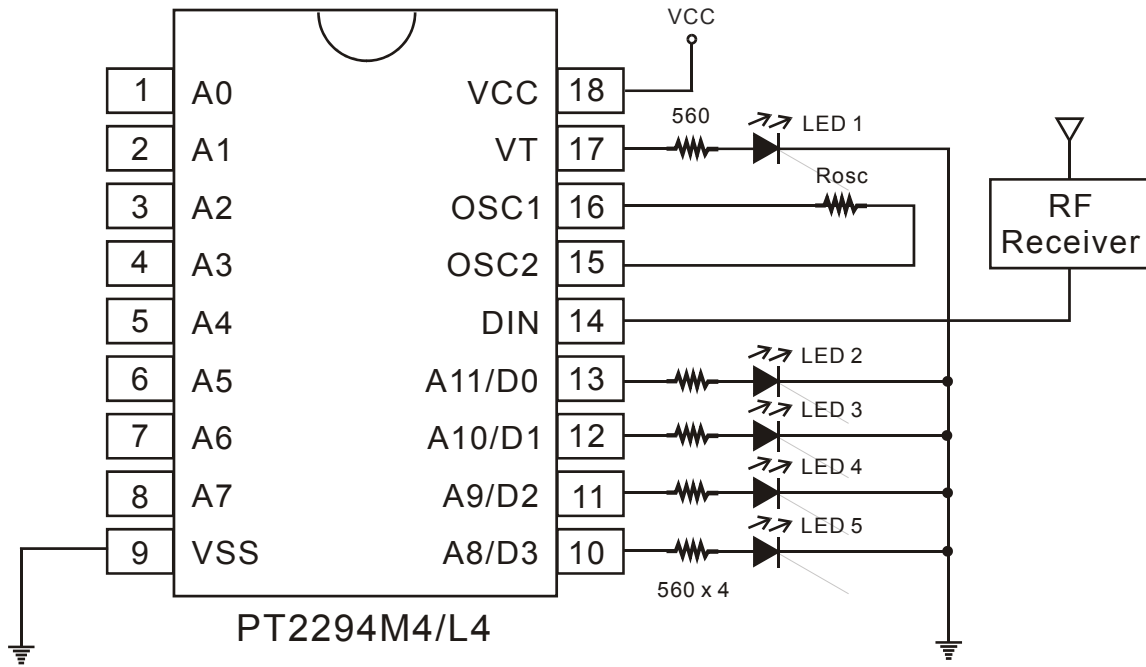


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2 DATA RF APPLICATION

Pin1~8, Pin 10, 11 Address Datas must be paired with PT2264.



Notes:

1. Suggested oscillator resistor values (Rosc), please refer to page 7.
2. The LED1~5 are indicated when PT2294 receives valid transmission waveform.



ORDER INFORMATION

Valid Part Number	Package	Top Code
PT2294	18 Pins, DIP, 300mil	PT2294
PT2294L4	18 Pins, DIP, 300mil	PT2294L4
PT2294M4	18 Pins, DIP, 300mil	PT2294M4
PT2294-S	18 Pins, SOP, 300mil	PT2294-S
PT2294L4-S	18 Pins, SOP, 300mil	PT2294L4-S
PT2294M4-S	18 Pins, SOP, 300mil	PT2294M4-S
PT2294 (L)	18 Pins, DIP, 300mil	PT2294
PT2294L4 (L)	18 Pins, DIP, 300mil	PT2294L4
PT2294M4 (L)	18 Pins, DIP, 300mil	PT2294M4
PT2294-S (L)	18 Pins, SOP, 300mil	PT2294-S
PT2294L4-S (L)	18 Pins, SOP, 300mil	PT2294L4-S
PT2294M4-S (L)	18 Pins, SOP, 300mil	PT2294M4-S

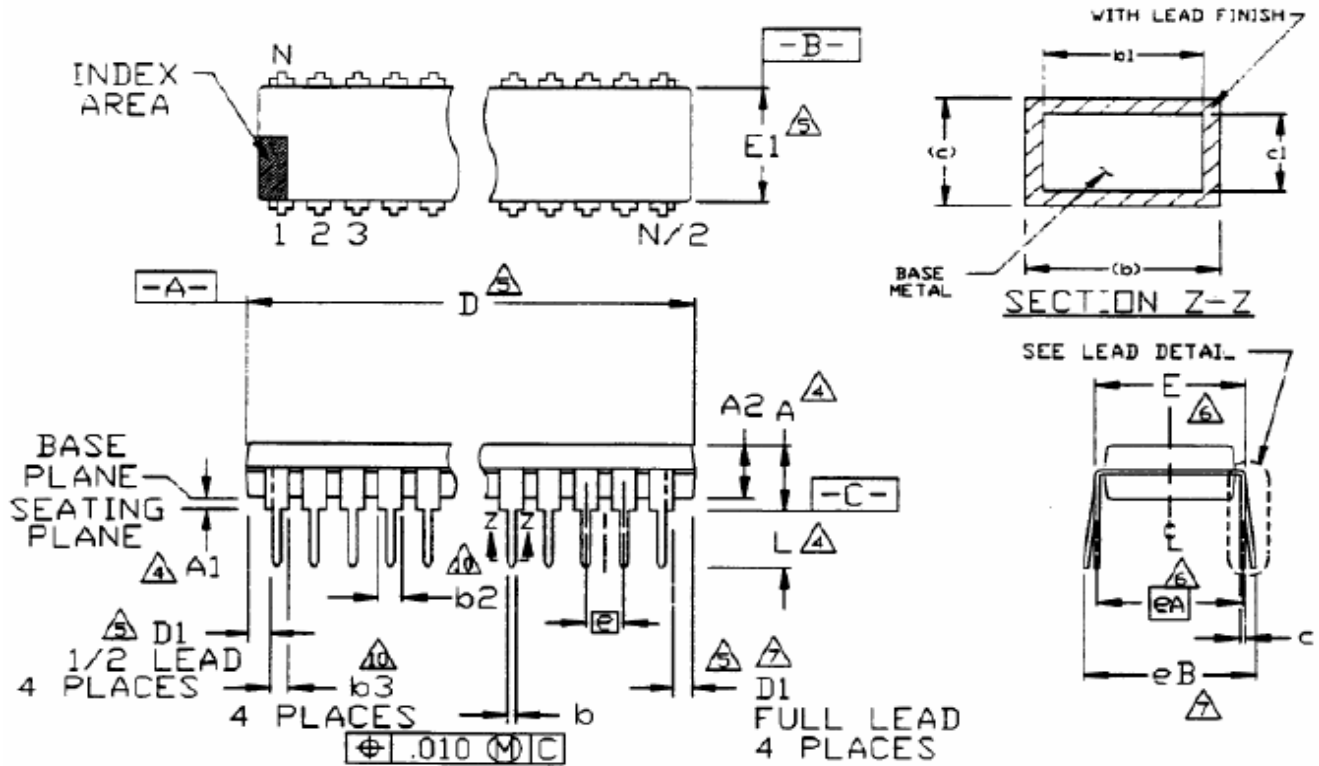
Notes:

1. (L), (C) or (S) = Lead Free.
2. The Lead Free mark is put in front of the date code.

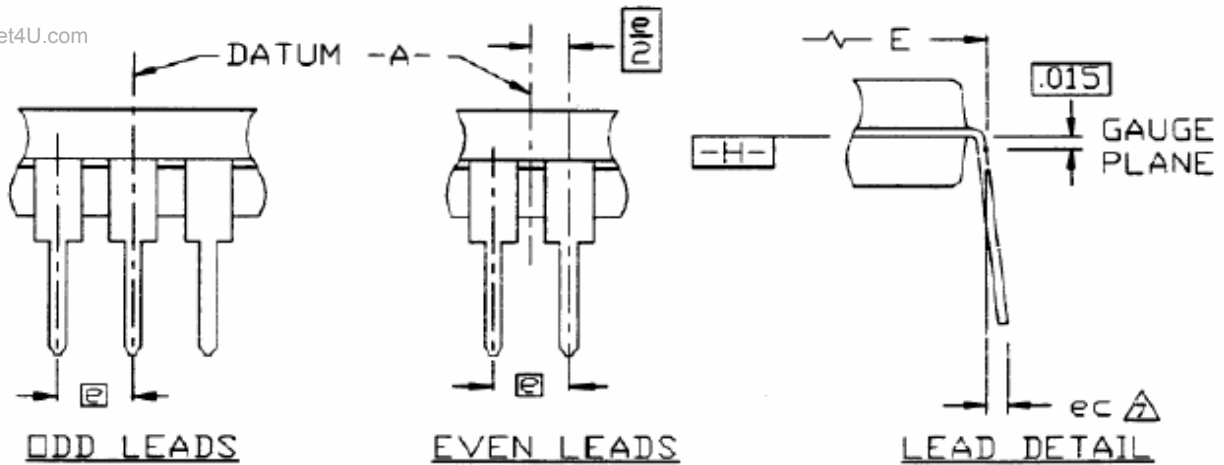


PACKAGE INFORMATION

18 PINS, DIP, 300MIL



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Symbol	Min.	Nom.	Max.
A	-	-	0.210
A1	0.150	-	-
A2	0.115	0.130	0.195
b	0.014	0.018	0.022
b1	0.014	0.018	0.020
b2	0.045	0.060	0.070
b3	0.030	0.039	0.045
c	0.008	0.010	0.014
D	0.880	0.900	0.920
D1	0.005	-	-
E	0.300	0.310	0.325
E1	0.240	0.250	0.280
e	0.100 BASIC		
eA	0.300 BASIC		
eB	-	-	0.430
eC	0.000	-	0.600
L	0.115	0.130	0.150

Notes:

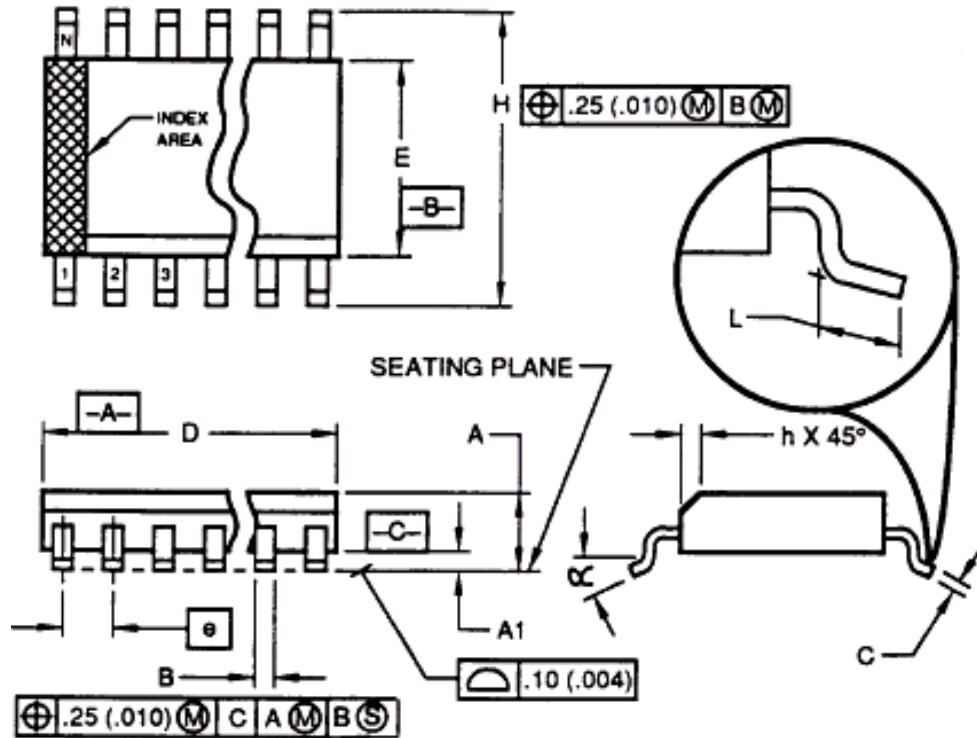
- All dimensioning are in INCHES.
 - Dimensioning and tolerancing per ANSI Y14.5M-1982.
 - Dimension "A", "A1" and "L" are measured with package seated in JEDEC Seating Plane Gauge GS-3.
 - "D", "D1" and "E1" dimensions do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 0.010 inch.
 - "E" and "eA" measured with the leads constrained to be perpendicular to datum \square -C.
 - "eB" and "eC" are measured at the lead tips with the leads unconstrained.
 - "N" is the number of terminal position (N=18).
 - Pointed or rounded lead tips are preferred to ease insertion.
 - "b2" and "b3" maximum dimensions are not include dambar protrusions. Dambar protrusions shall not exceed 0.010 inch (0.25mm)
 - Distance between leads including Dambar protrusions to be 0.005 inch minimum.
 - Datum plane \square -H coincident with the bottom of lead, where lead exits body.
 - Refer to JEDEC MS-001, Variation AC
- JEDEC is the trademark of JEDEC SOLID STATE TECHNOLOGY ASSOCIATION.



Remote Control Decoder IC

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18PINS SOP, 300MIL



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Symbol	Min.	Nom.	Max.
A	2.35	-	2.65
A1	0.10	-	0.30
B	0.33	-	0.51
C	0.23	-	0.32
D	11.35	-	11.75
E	7.40	-	7.60
e	1.27 BASIC		
H	10.00	-	10.65
h	0.25	-	0.75
L	0.40	-	1.27
∞	0°	-	8°



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Notes:

1. Dimensioning and tolerancing per ANSI Y14.5-1982.
 2. Dimension "D" does not include mold flash, protrusions or gate burrs. Mold Flash, protrusion or gate burrs shall not exceed 0.15mm (0.006 in) per side.
 3. Dimension "E" does not include interlead flash or protrusions. Interlead flash or protrusions shall not exceed 0.25mm (0.010 in) per side.
 4. The chamfer on the body is optional. If it is not present, a visual index feature must be located within the crosshatched area.
 5. "L" is the length of the terminal for soldering to substrate.
 6. "N" is the number of terminal positions. (N=18)
 7. The lead width "B" as measured 0.36mm (0.014 in) or greater above the seating plane, shall not exceed a maximum value of 0.61mm (0.24 in)
 8. Controlling dimension: MILLIMETER.
 9. Refer to JEDEC MS-013 Variation AB.
- JEDEC is the trademark of JEDEC SOLID STATE TECHNOLOGY ASSOCIATION.