

## Low Power Voltage Detector

### Features

- High accuracy:  $\pm 2\%$  (25 °C)
- Low power consumption: 0.6 $\mu$ A @ 3V V<sub>CC</sub>
- Detecting voltage range: 1.8 to 5V in 100mV increments
- Operating voltage range: 1.2V ~ 5.5V
- Operating temperature range: -40 °C to + 85 °C
- Detecting voltage accuracy over temperature:  $\pm 2.5\% \times \text{TYP}$
- Output configuration: N-channel open drain or CMOS
- Reset timeout period at least 120ms

### Description

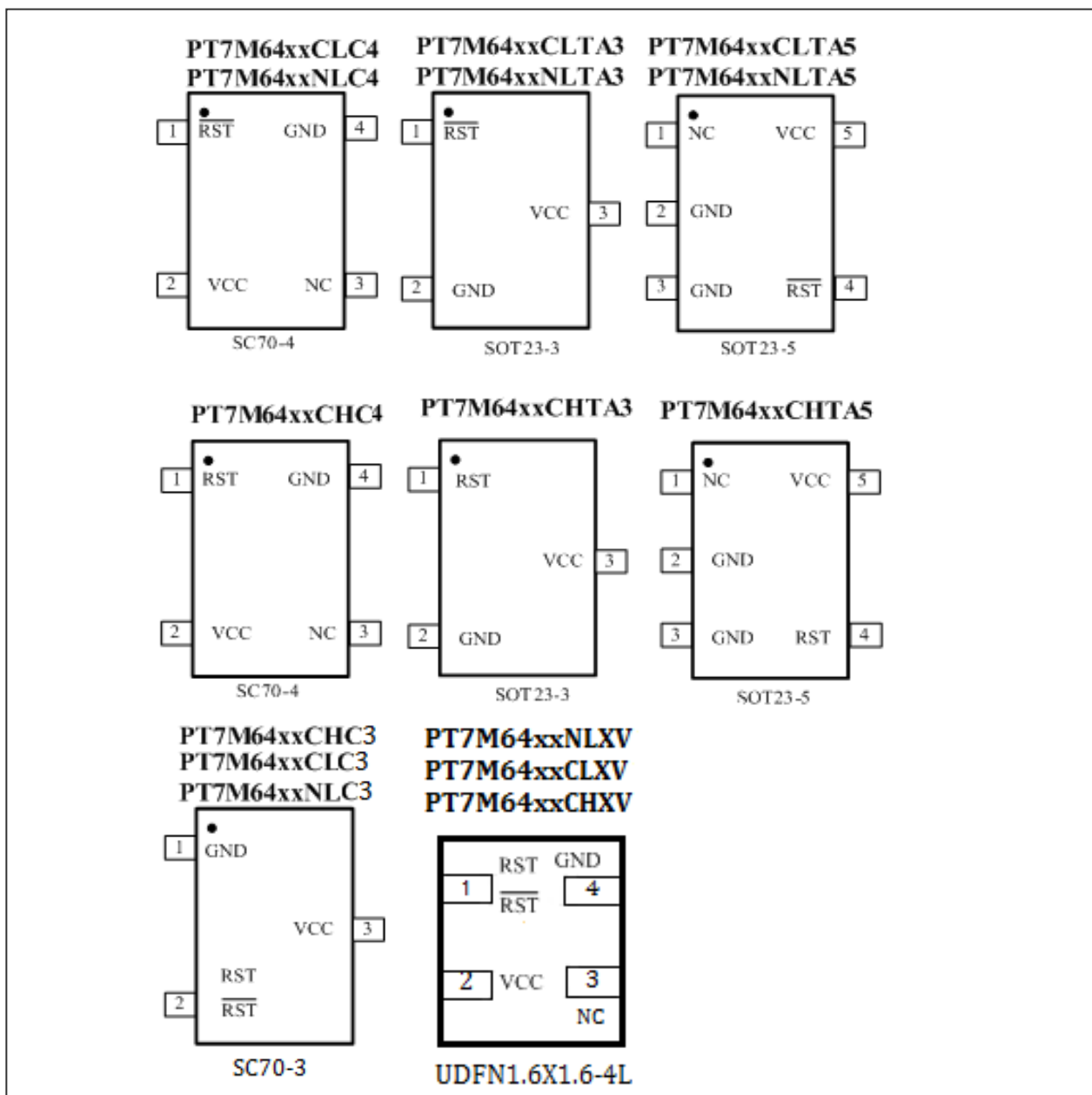
The PT7M64xx series are  $\mu$ P supervisory circuits with a minimum reset timeout period of 120ms. Each circuit includes a precise bandgap reference; a comparator, a reset timeout circuit, internally trimmed resistor networks that set specified trip thresholds, and an internal 5% threshold hysteresis circuit (see the *Block Diagram*). Output is asserted when V<sub>CC</sub> falls below the internal V<sub>TH-</sub> and remains asserted until V<sub>CC</sub> rises above V<sub>TH+</sub> (V<sub>TH+</sub> = V<sub>TH-</sub>  $\times$  1.05) after a reset timeout period. These devices provide excellent circuit reliability and low cost by eliminating external components and adjustments when monitoring normal systems voltage from +1.8V to +5V in 100mV increments. The series are voltage detectors with a propagation delay of 35 $\mu$ s.

The family is available with four output stage options: push-pull with active-low output, push-pull with active-high output, open drain with active-low output and bidirection port with active-low output and pushbutton reset input. These devices specified over the -40 °C to +85 °C temperature range.

**Table 1. Function comparison**

| Item | Part No.   | Reset Output |            |             |            | Reset<br>bi-direction | Threshold                              |
|------|------------|--------------|------------|-------------|------------|-----------------------|----------------------------------------|
|      |            | Open-Drain   |            | Push-Pull   |            |                       |                                        |
|      |            | Active high  | Active low | Active high | Active low |                       |                                        |
| 1    | PT7M64xxCL | -            | -          | -           | √          | -                     | 1.8V to 5.0V<br>in 100mV<br>increments |
| 2    | PT7M64xxCH | -            | -          | √           | -          | -                     |                                        |
| 3    | PT7M64xxNL | -            | √          | -           | -          | -                     |                                        |

## Pin Configuration

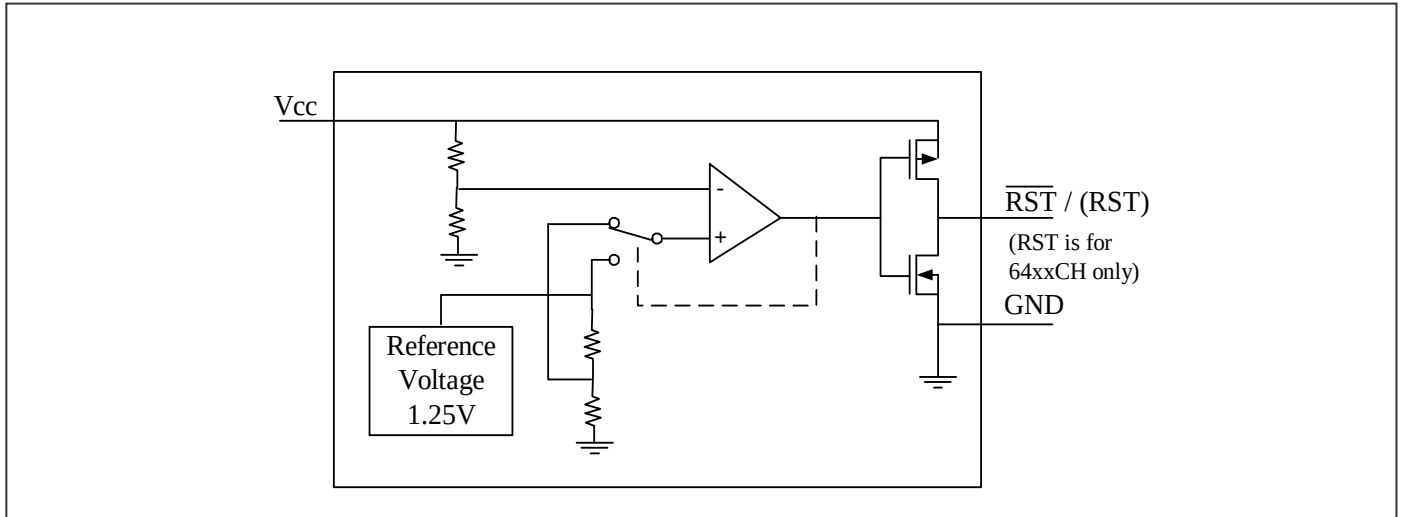


## Pin Description

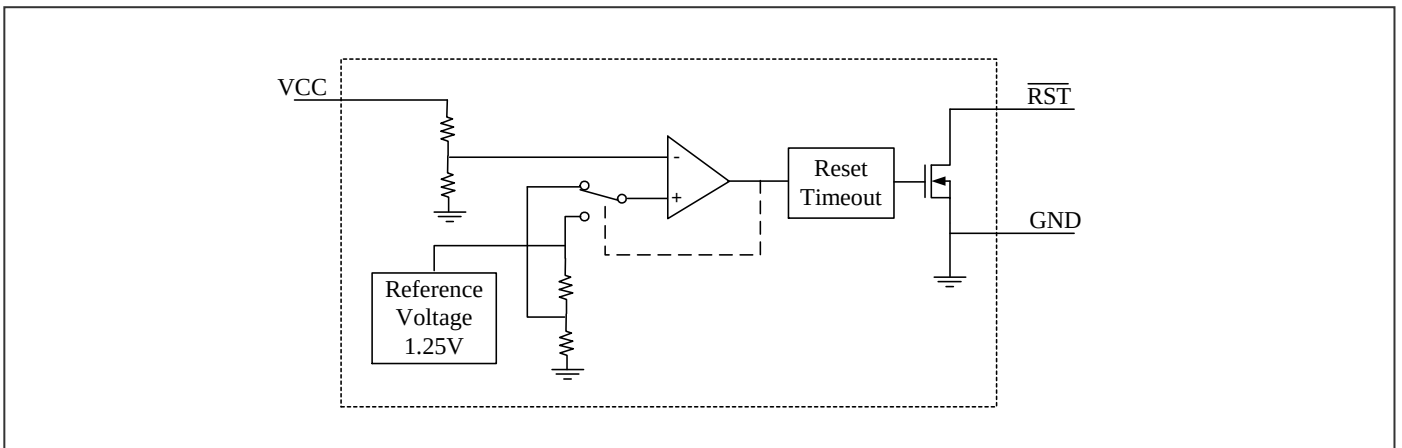
| Name                    | Type | Description                                                                                                                                                                                                               |
|-------------------------|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| $\overline{\text{RST}}$ | O    | <b>Reset Output (PT7M64xxCL/NL/BL/NLL):</b> $\overline{\text{RST}}$ is asserted when $V_{CC}$ drops below voltage threshold $V_{TH}$ : Active low. For PT7M64xxBL, $\overline{\text{RST}}$ is also pushbutton reset input |
| RST                     | O    | <b>Reset Output (PT7M64xxCH):</b> RST is asserted when $V_{CC}$ drops below voltage threshold $V_{TH}$ : Active high.                                                                                                     |
| GND                     | P    | <b>Ground</b>                                                                                                                                                                                                             |
| $V_{CC}$                | P    | <b>Supply Voltage</b>                                                                                                                                                                                                     |

## Block Diagram

Block Diagram of PT7M64xxCL/CH



Block Diagram of PT7M64xxNL



## Maximum Ratings

|                                                                   |                                |
|-------------------------------------------------------------------|--------------------------------|
| Storage Temperature .....                                         | -65 °C to +150 °C              |
| Ambient Temperature with Power Applied .....                      | -40 °C to +85 °C               |
| Supply Voltage to Ground Potential (V <sub>CC</sub> to GND) ..... | -0.3V to +6.0V                 |
| DC Input Voltage (All inputs except V <sub>CC</sub> and GND)..... | -0.3V to V <sub>CC</sub> +0.3V |
| DC Output Current (All outputs) .....                             | 20mA                           |
| ESD(HBM) for 64xxNL/NLL.....                                      | 1KV                            |
| ESD(HBM) for 64xxCL/CH/BL.....                                    | 2KV                            |
| Power Dissipation .....                                           | 320mW                          |
| (Depend on package)                                               |                                |

### Note:

Stresses greater than those listed under MAXIMUM RATINGS may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability.

## DC Electrical Characteristics

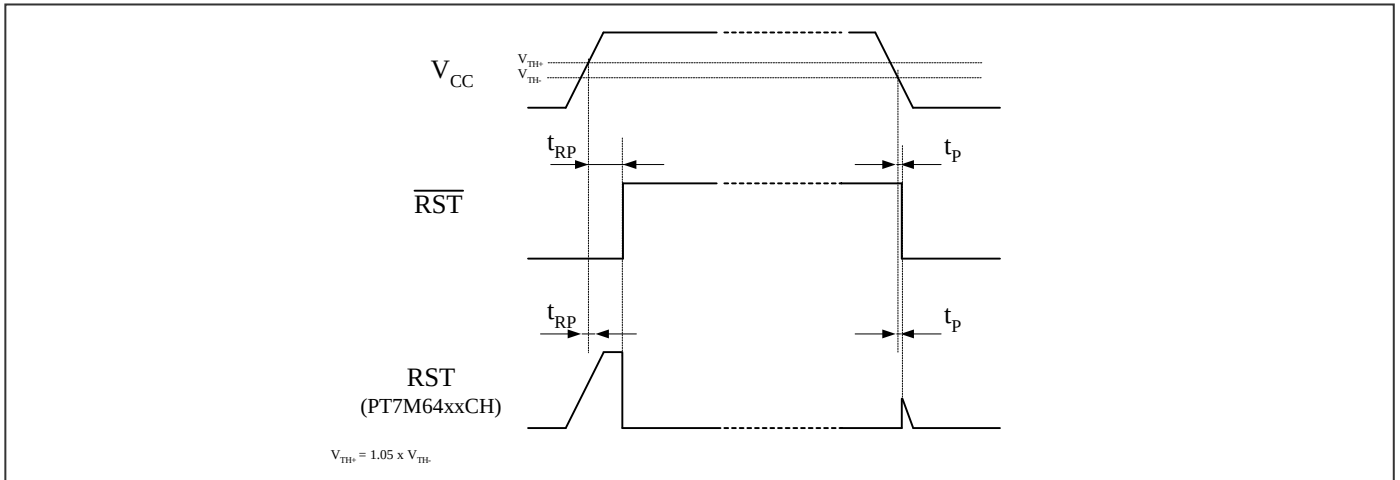
(V<sub>CC</sub> = 1.2V to 5.5V, T<sub>A</sub> = -40~85 °C, unless otherwise noted. Typical values are at T<sub>A</sub> = +25 °C)

| Description                       |                                 | Sym               | Test Conditions                                                                            | Min                           | Typ              | Max                           | Unit |
|-----------------------------------|---------------------------------|-------------------|--------------------------------------------------------------------------------------------|-------------------------------|------------------|-------------------------------|------|
| Supply Voltage                    |                                 | V <sub>CC</sub>   | T <sub>A</sub> = 0~70 ℃                                                                    | 1.0                           | -                | 5.5                           | V    |
|                                   |                                 |                   | T <sub>A</sub> = -40~85 ℃                                                                  | 1.2                           | -                | 5.5                           |      |
| Supply Current                    |                                 | I <sub>CC</sub>   | V <sub>CC</sub> = 3V. No load.                                                             | -                             | 0.6              | 1.2                           | μA   |
|                                   |                                 |                   | V <sub>CC</sub> = 5V. No load.                                                             | -                             | 0.9              | 2.0                           | μA   |
| Output Driving                    | Output high<br>(Push-Pull only) | V <sub>OH</sub>   | V <sub>CC</sub> ≥ 1.8V, I <sub>source</sub> = 1mA                                          | 0.8×V <sub>CC</sub>           | -                | -                             | V    |
|                                   |                                 |                   | V <sub>CC</sub> ≥ 2.5V, I <sub>source</sub> = 3mA                                          | 0.8×V <sub>CC</sub>           | -                | -                             |      |
|                                   |                                 |                   | V <sub>CC</sub> ≥ 4.5V, I <sub>source</sub> = 8mA                                          | 0.8×V <sub>CC</sub>           | -                | -                             |      |
|                                   | Output low                      | V <sub>OL</sub>   | V <sub>CC</sub> ≥ 1.2V, I <sub>sink</sub> = 1mA                                            | -                             | -                | 0.3                           | V    |
|                                   |                                 |                   | V <sub>CC</sub> ≥ 2.5V, I <sub>sink</sub> = 4mA                                            | -                             | -                | 0.3                           |      |
|                                   |                                 |                   | V <sub>CC</sub> ≥ 4.5V, I <sub>sink</sub> = 9mA                                            | -                             | -                | 0.4                           |      |
| Open-Drain Output Leakage Current |                                 | I <sub>LKG</sub>  | -                                                                                          | -                             | -                | 1                             | μA   |
| Voltage Threshold*                |                                 | V <sub>TH-</sub>  | +25℃                                                                                       | (V <sub>TH-</sub> )<br>×0.985 | V <sub>TH-</sub> | (V <sub>TH-</sub> )<br>×1.015 | V    |
|                                   |                                 |                   | -40℃~85℃                                                                                   | (V <sub>TH-</sub> )<br>×0.975 | V <sub>TH-</sub> | (V <sub>TH-</sub> )<br>×1.025 |      |
|                                   |                                 | V <sub>TH+</sub>  | +25℃                                                                                       | (V <sub>TH+</sub> )<br>×0.985 | V <sub>TH+</sub> | (V <sub>TH+</sub> )<br>×1.015 |      |
|                                   |                                 |                   | -40℃~85℃                                                                                   | (V <sub>TH+</sub> )<br>×0.975 | V <sub>TH+</sub> | (V <sub>TH+</sub> )<br>×1.025 |      |
| Voltage threshold Hysteresis      |                                 | V <sub>HYST</sub> | V <sub>HYST</sub> = [(V <sub>TH+</sub> )-(V <sub>TH-</sub> )]/(V <sub>TH-</sub> )<br>×100% | 3                             | 4.5              | 6                             | %    |
| Pushbutton Detect                 |                                 | P <sub>BDV</sub>  | -40℃~85℃, V <sub>CC</sub> = 5V                                                             | 0.7                           | -                | 1.2                           | V    |
| Internal Pull-Up Resistor         |                                 | R <sub>p</sub>    | -                                                                                          | 3.75                          | 5                | 6.25                          | kΩ   |

\* V<sub>TH+</sub> = 1.05 × V<sub>TH-</sub>. V<sub>TH-</sub> is V<sub>CC</sub> dropping from high to low voltage. V<sub>TH+</sub> is V<sub>CC</sub> rising from low to high voltage.

## AC Electrical Characteristics

### Timing Diagram

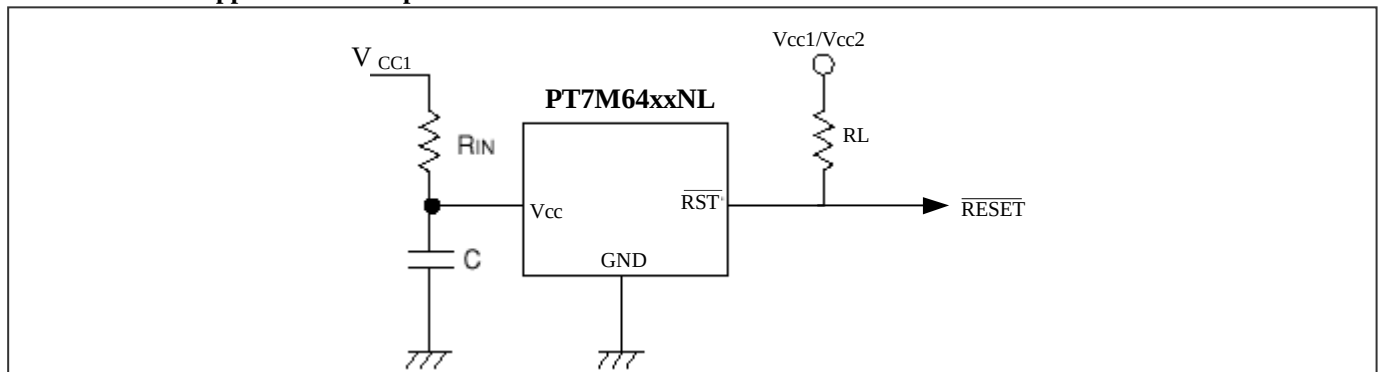


( $V_{CC} = 1.2V$  to  $5.5V$ ,  $T_A = -40 \sim 85^\circ C$ , unless otherwise noted. Typical values are at  $T_A = +25^\circ C$ )

| Sym      | Description    | Test Conditions     | Min | Typ | Max | Unit    |
|----------|----------------|---------------------|-----|-----|-----|---------|
| $t_{RP}$ | Timeout Period | $T_A = +25^\circ C$ | 120 | 260 | 430 | ms      |
| $t_P$    | Delay          | -                   | -   | 35  | -   | $\mu s$ |

## Typical Operation Circuit

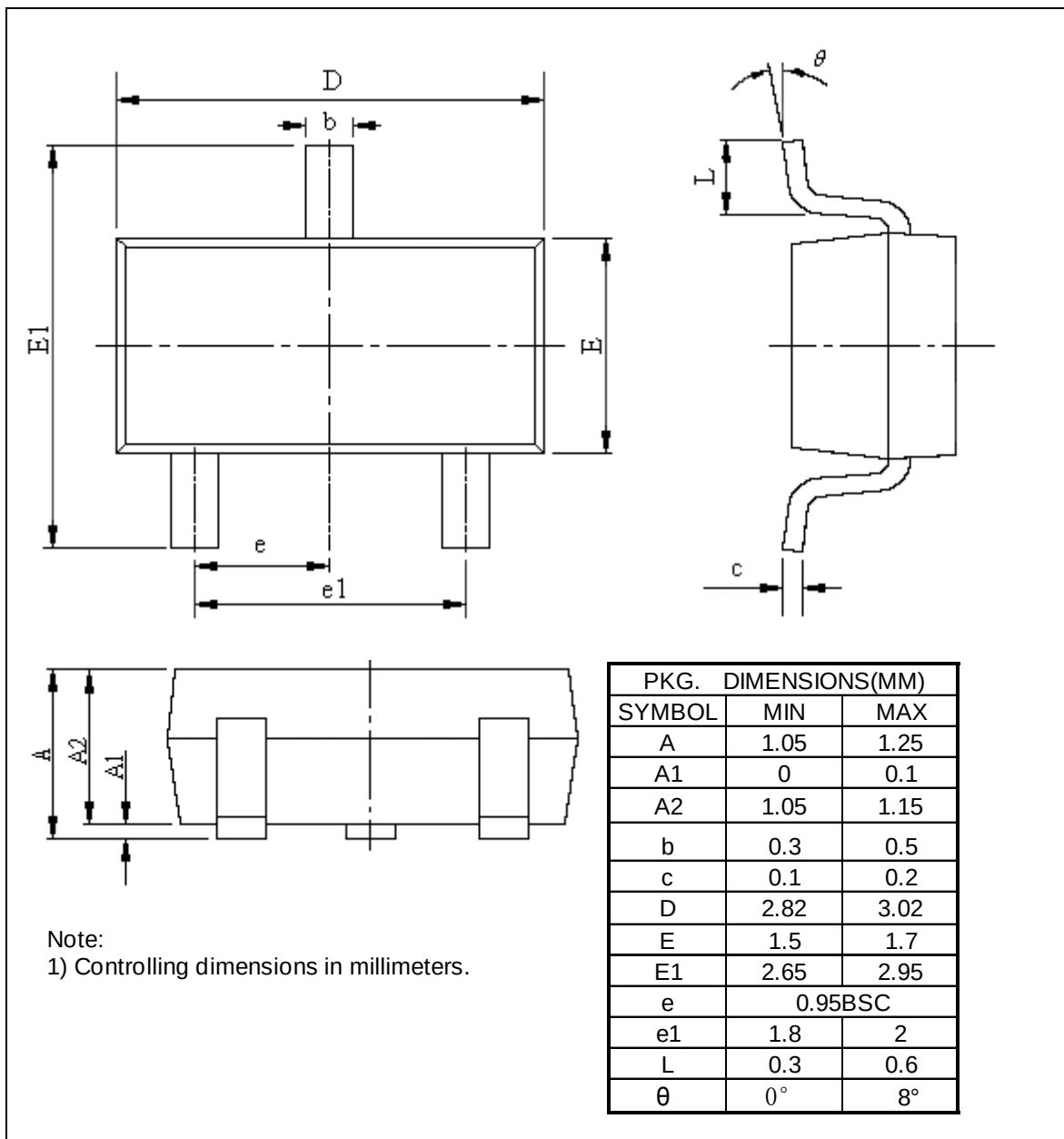
### PT7M64xxNL Application Example



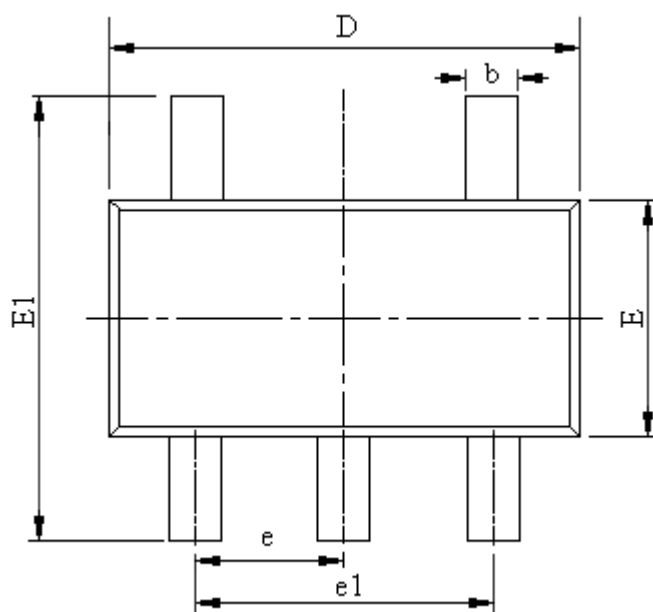
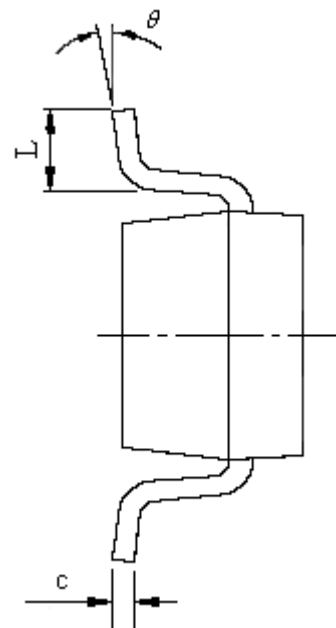
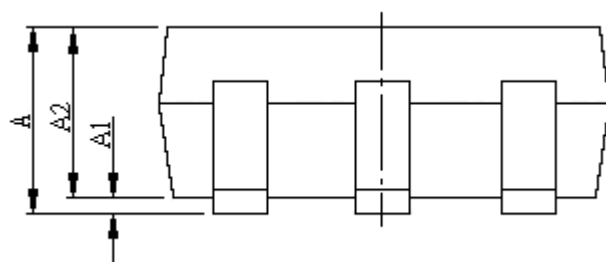
For typical application,  $R_L$  could be  $100k\Omega$ ,  $R_{IN}$  less than  $10k\Omega$  and that  $C$  more than  $0.1\mu F$ .

## Mechanical Information

TA3 (SOT23-3)



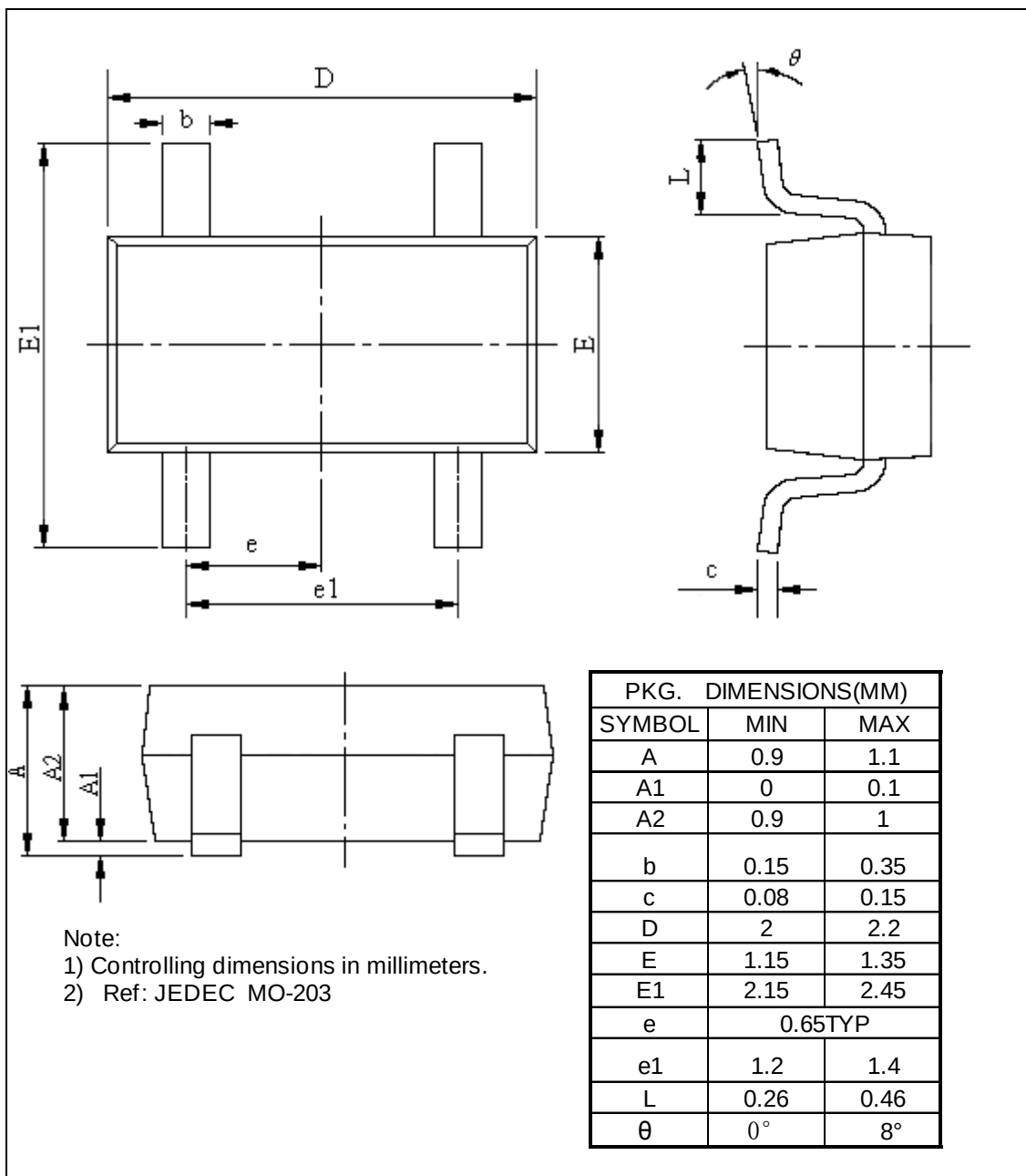
TA5 (SOT23-5)

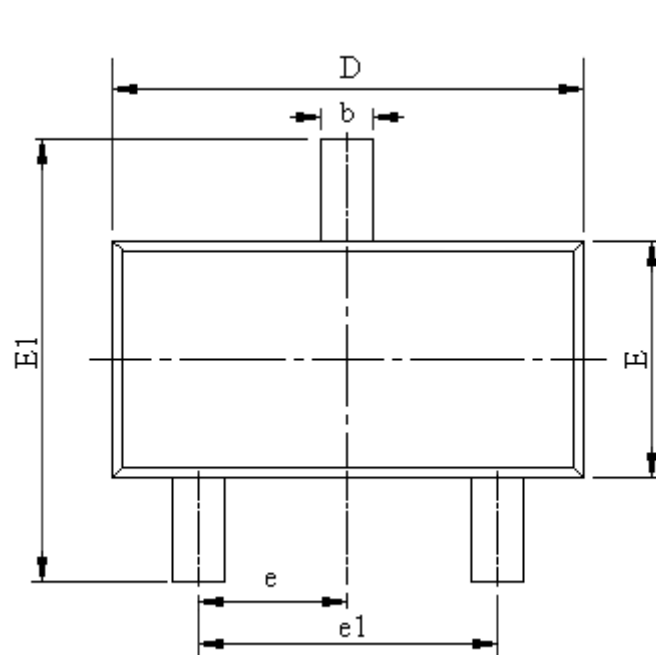
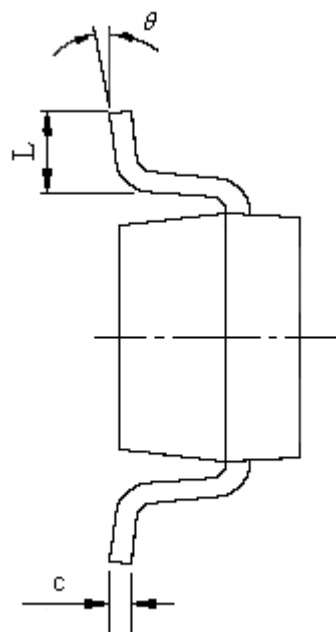
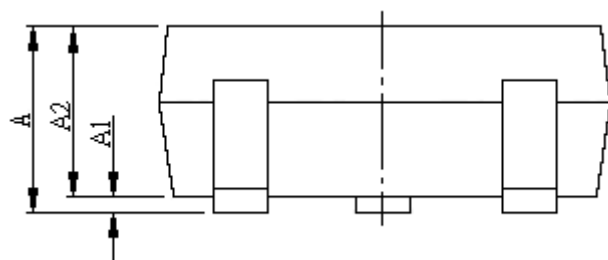


Note:

- 1) Controlling dimensions in millimeters.
- 2) Ref: JEDEC MO-178C/AA

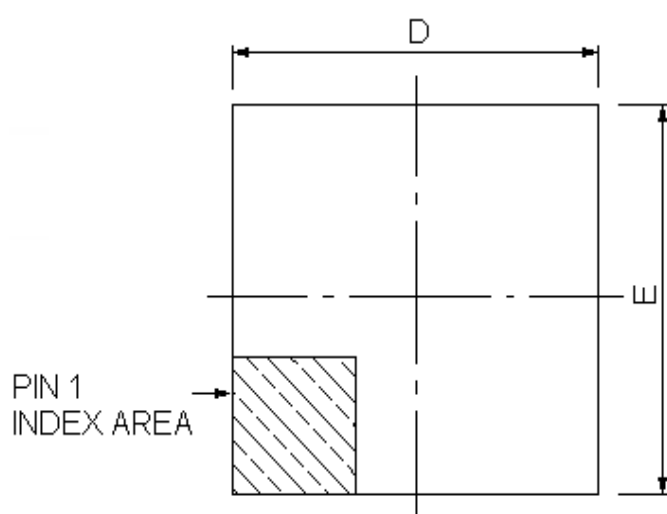
| PKG. DIMENSIONS(MM) |         |      |
|---------------------|---------|------|
| SYMBOL              | MIN     | MAX  |
| A                   | 1.05    | 1.25 |
| A1                  | 0.00    | 0.10 |
| A2                  | 1.05    | 1.15 |
| b                   | 0.30    | 0.50 |
| c                   | 0.10    | 0.20 |
| D                   | 2.82    | 3.02 |
| E                   | 1.50    | 1.70 |
| E1                  | 2.65    | 2.95 |
| e                   | 0.95BSC |      |
| e1                  | 1.80    | 2.00 |
| L                   | 0.30    | 0.60 |
| $\theta$            | 0°      | 8°   |

**C4 (SC70-4)**


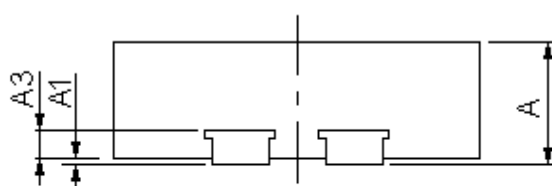
**C3 (SC70-3)**

**Note:**

1) Controlling dimensions in millimeters.

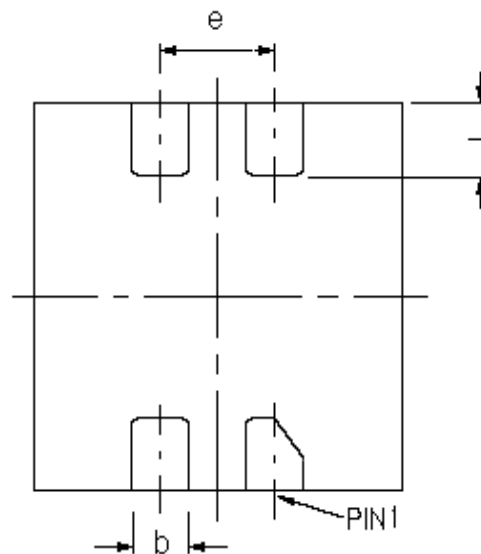
| PKG. DIMENSIONS(MM) |         |      |
|---------------------|---------|------|
| SYMBOL              | MIN     | MAX  |
| A                   | 0.90    | 1.10 |
| A1                  | 0.00    | 0.10 |
| A2                  | 0.90    | 1.00 |
| b                   | 0.20    | 0.40 |
| c                   | 0.08    | 0.15 |
| D                   | 2.00    | 2.20 |
| E                   | 1.15    | 1.35 |
| E1                  | 2.15    | 2.45 |
| e                   | 0.65TYP |      |
| e1                  | 1.20    | 1.40 |
| L                   | 0.26    | 0.46 |
| $\theta$            | 0°      | 8°   |

**XV (UDFN1.6x1.6-4L)**


TOP VIEW



SIDE VIEW



BOTTOM VIEW

| PKG. DIMENSIONS(MM) |          |      |
|---------------------|----------|------|
| SYMBOL              | MIN      | MAX  |
| A                   | 0.45     | 0.55 |
| A1                  | 0.00     | 0.05 |
| A3                  | 0.11 REF |      |
| D                   | 1.55     | 1.65 |
| E                   | 1.55     | 1.65 |
| b                   | 0.20     | 0.30 |
| e                   | 0.50 TYP |      |
| L                   | 0.25     | 0.35 |

**Note:**

1) Ref: JEDEC MO-236

## Ordering Information

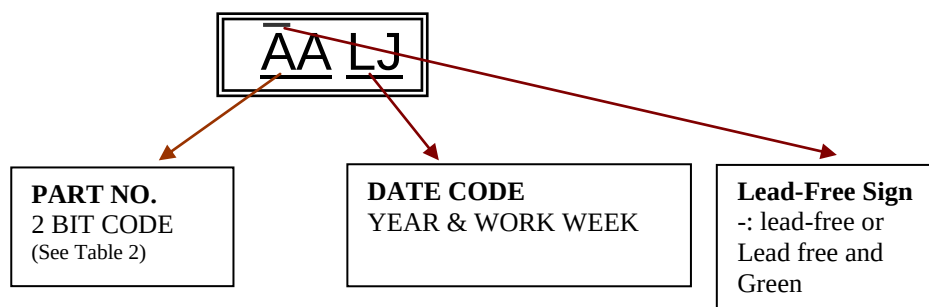
| Part Number    | Package Code | Package                           |
|----------------|--------------|-----------------------------------|
| PT7M64xxCLTA3E | TA3          | Lead free and Green SOT23-3       |
| PT7M64xxCLTA5E | TA5          | Lead free and Green SOT23-5       |
| PT7M64xxCLC3E  | C3           | Lead free and Green SC70-3        |
| PT7M64xxCLC4E  | C4           | Lead free and Green SC70-4        |
| PT7M64xxCHTA3E | TA3          | Lead free and Green SOT23-3       |
| PT7M64xxCHTA5E | TA5          | Lead free and Green SOT23-5       |
| PT7M64xxCHC3E  | C3           | Lead free and Green SC70-3        |
| PT7M64xxCHC4E  | C4           | Lead free and Green SC70-4        |
| PT7M64xxNLTA3E | TA3          | Lead free and Green SOT23-3       |
| PT7M64xxNLTA5E | TA5          | Lead free and Green SOT23-5       |
| PT7M64xxNLC3E  | C3           | Lead free and Green SC70-3        |
| PT7M64xxNLC4E  | C4           | Lead free and Green SC70-4        |
| PT7M64xxNLXV4E | XV           | Lead Free and Green DFN1.6X1.6-4L |
| PT7M64xxCLXV4E | XV           | Lead Free and Green DFN1.6X1.6-4L |
| PT7M64xxCHXV4E | XV           | Lead Free and Green DFN1.6X1.6-4L |

### Note:

- “xx” refer to voltage range, see below table 1.
- E = Pb-free or Pb-free and Green
- Adding X Suffix= Tape/Reel
- Contact Pericom for availability.

**Table.2 Suffix “xx” definition of PT7M64xx**

| Suffix xx | V <sub>TH</sub> (V) | Suffix xx | V <sub>TH</sub> (V) | Suffix xx | V <sub>TH</sub> (V) | Suffix xx | V <sub>TH</sub> (V) | Suffix xx | V <sub>TH</sub> (V) |
|-----------|---------------------|-----------|---------------------|-----------|---------------------|-----------|---------------------|-----------|---------------------|
| 18        | 1.8                 | 25        | 2.5                 | 32        | 3.2                 | 39        | 3.9                 | 46        | 4.6                 |
| 19        | 1.9                 | 26        | 2.6                 | 33        | 3.3                 | 40        | 4.0                 | 47        | 4.7                 |
| 20        | 2.0                 | 27        | 2.7                 | 34        | 3.4                 | 41        | 4.1                 | 48        | 4.8                 |
| 21        | 2.1                 | 28        | 2.8                 | 35        | 3.5                 | 42        | 4.2                 | 49        | 4.9                 |
| 22        | 2.2                 | 29        | 2.9                 | 36        | 3.6                 | 43        | 4.3                 | 50        | 5.0                 |
| 23        | 2.3                 | 30        | 3.0                 | 37        | 3.7                 | 44        | 4.4                 |           |                     |
| 24        | 2.4                 | 31        | 3.1                 | 38        | 3.8                 | 45        | 4.5                 |           |                     |

**SOT-23/SC-70 Package Top Marking Instruction**


Example: AALJ → PART NO.: PT7M64XXCL  
 DATE CODE: YEAR 2003 WW10  
 Example:  $\bar{A}$ ALJ → PART NO.: PT7M64XXCLE  
 DATE CODE: YEAR 2003 WW10  
 Lead free package or Lead free and Green package

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