

Supervisory Circuit

Features

- Highly accurate: $\pm 1.5\%$ (25°C)
- Detect voltage range: 1.8 to 5V in 100mV increments
- Operating voltage range: 1.0V ~ 5.5V
- Operating temperature range: -40°C to + 85°C
- Detect voltage temperature characteristics: $\pm 2.5\% \times$ TYP
- Output configuration: Bi-dir
- Four reset timeout period available:
 - ◆ typical 1.6ms for PT7M6314USxxD1;
 - ◆ typical 26ms for PT7M6314USxxD2;
 - ◆ typical 200ms for PT7M6314USxxD3;
 - ◆ typical 1570ms for PT7M6314USxxD4;

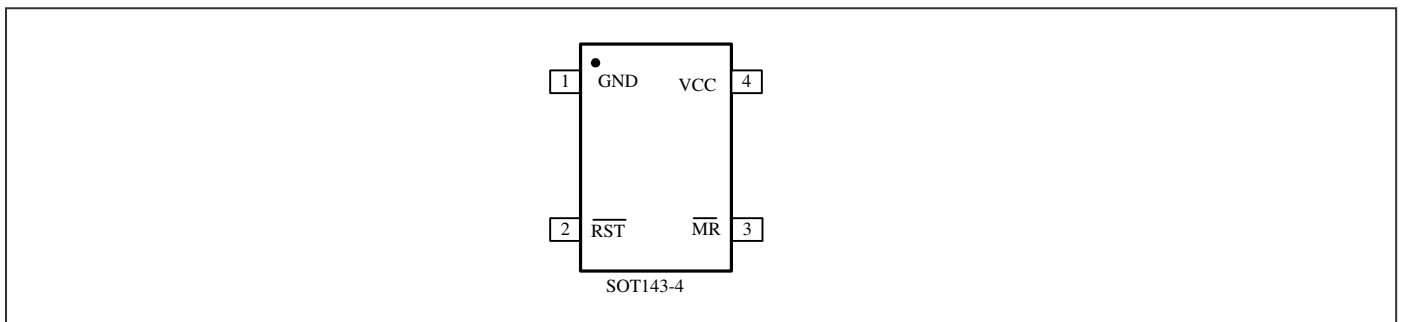
General Description

The series are designed to monitor power supplies in μ P and digital systems. It provides excellent circuit reliability and low cost by eliminating external components and adjustments, and a debounced manual reset input.

This device performs a single function: it asserts a reset signal whenever the V_{CC} supply voltage falls below a preset threshold or whenever manual reset is asserted. Reset remains asserted for an internally programmed interval (reset timeout period) after V_{CC} has risen above the reset threshold or manual reset is de-asserted.

PT7M6314USxx are bidirectional output, allowing it to be directly connected to μ P with bidirectional reset inputs. The serials come with factory-trimmed reset threshold voltages in 100mV increments from 2.5V to 5V. Preset timeout periods of 200ms and 1570ms (typ.) are available.

Pin Configuration



Pin Description

| Name | Type | Description |
|------------------|------|---|
| \overline{RST} | I/O | Reset Output and Pushbutton Input: \overline{RST} is asserted when V_{CC} drops below voltage threshold V_{TH} . Active low. When other devices pull \overline{RST} low, the device will speed its rising edge once the reset condition release. |
| \overline{MR} | I | Manual Reset: A logic low on \overline{MR} asserts reset. Reset remains asserted as long as \overline{MR} is low, and for the reset timeout period (t_{RS}) after the reset conditions are terminated. Connect to V_{CC} if not used. |
| GND | P | Ground |
| V_{CC} | P | Supply Voltage. |

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 _{CC} to GND) | -0.3V to +7.0V |
| DC Input Voltage (All inputs except V _{CC} and GND)..... | -0.3V to V _{CC} +0.3V |
| DC Output Current (All outputs) | 30mA |
| 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.

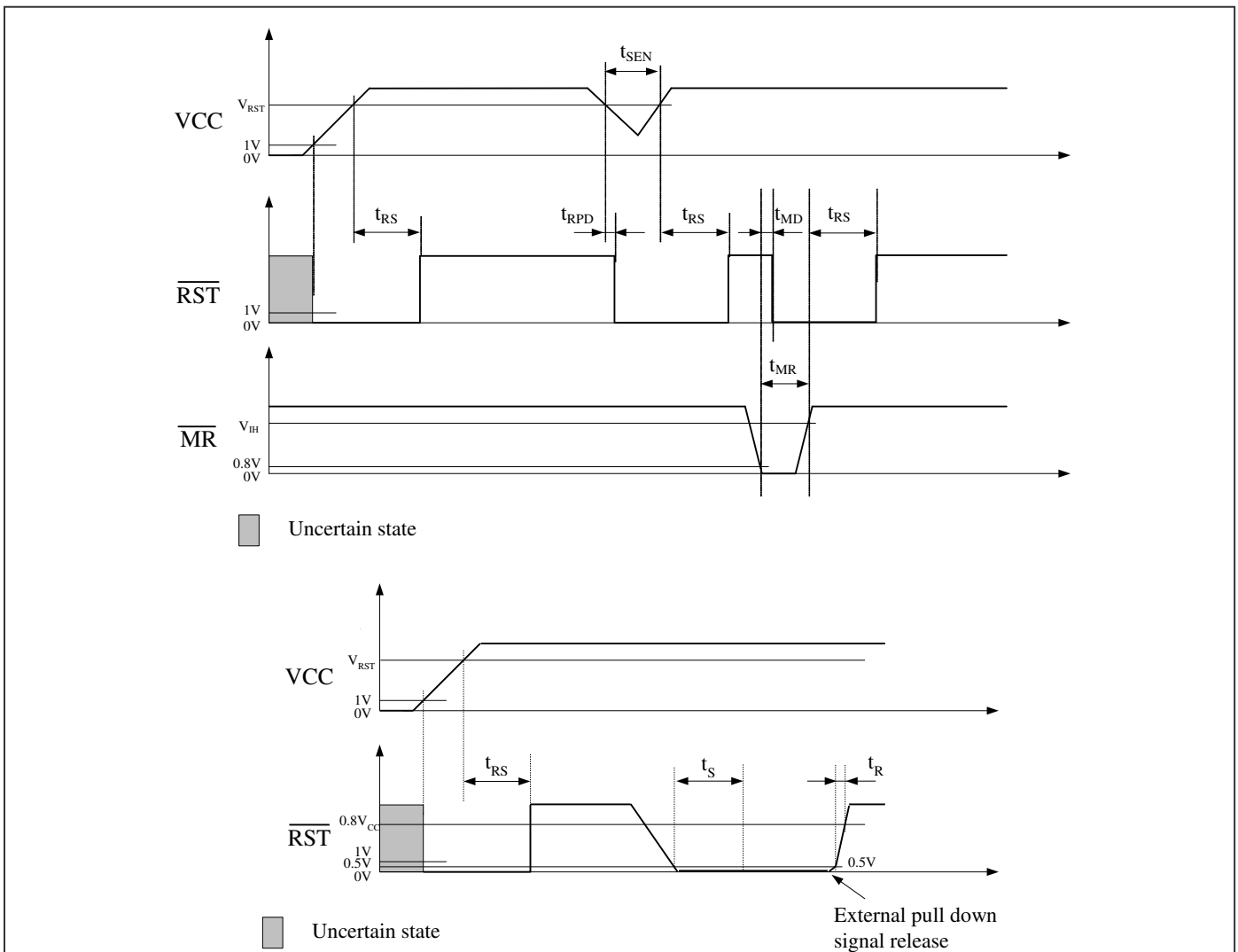
DC Electrical Characteristics

(T_A= -40~85°C, unless otherwise noted. Typical values are at T_A = +25°C)

| Description | | Sym. | Test Conditions | Min. | Typ. | Max. | Unit |
|-------------------------------------|------------|-------------------|--|-------------------------------|---------------------|-------------------------------|------|
| Supply Voltage | | V _{CC} | | 1.0 | | 5.5 | V |
| Supply Current | | I _{CC} | V _{CC} = 5.5V. No load. | | | 12 | μA |
| | | | V _{CC} = 3.6V. No load. | | | 10 | μA |
| Voltage Threshold | | V _{TH-} | +25°C | (V _{TH-}) ×0.985 | V _{TH-} | (V _{TH-}) ×1.015 | V |
| | | | -40°C~85°C | (V _{TH-}) ×0.975 | V _{TH-} | (V _{TH-}) ×1.025 | |
| Hysteresis | | V _{HYS} | V _{TH+} - V _{TH-} * | | 50 | | mV |
| Output Driving | Output low | V _{OL} | I _{OH} = 8mA, V _{CC} = 5V | | | 0.4 | V |
| | | | I _{OH} = 4mA, V _{CC} = 3V | | | 0.3 | |
| | | | I _{OH} = -50μA, V _{CC} = 1V | | | 0.09 | |
| Internal pull-up resistor | | R _P | $\overline{\text{MR}}$ | 32 | 63 | 100 | kΩ |
| | | | $\overline{\text{RST}}$ pin. V _{CC} = 3V. | - | 11 | 20 | kΩ |
| | | | $\overline{\text{RST}}$ pin. V _{CC} = 5V. | - | 5 | 10 | |
| Input High Voltage | | V _{IH} | $\overline{\text{MR}}$ | V _{CC} < 4V | 0.7×V _{CC} | | V |
| | | | V _{CC} > 4V | 2.4 | | | |
| Input Low Voltage | | V _{IL} | $\overline{\text{MR}}$ | V _{CC} < 4V | | 0.3×V _{CC} | V |
| | | | V _{CC} > 4V | | | 0.8 | |
| RST active pull-up enable threshold | | V _{THUP} | V _{CC} = 5V | 0.7 | 0.9 | 1.2 | V |
| RST active pull-up current | | | V _{CC} = 3.3V | | 20 | | mA |

Note: V_{TH-} is voltage threshold when V_{CC} falls from high to low. V_{TH+} is voltage threshold when V_{CC} rises from low to high.

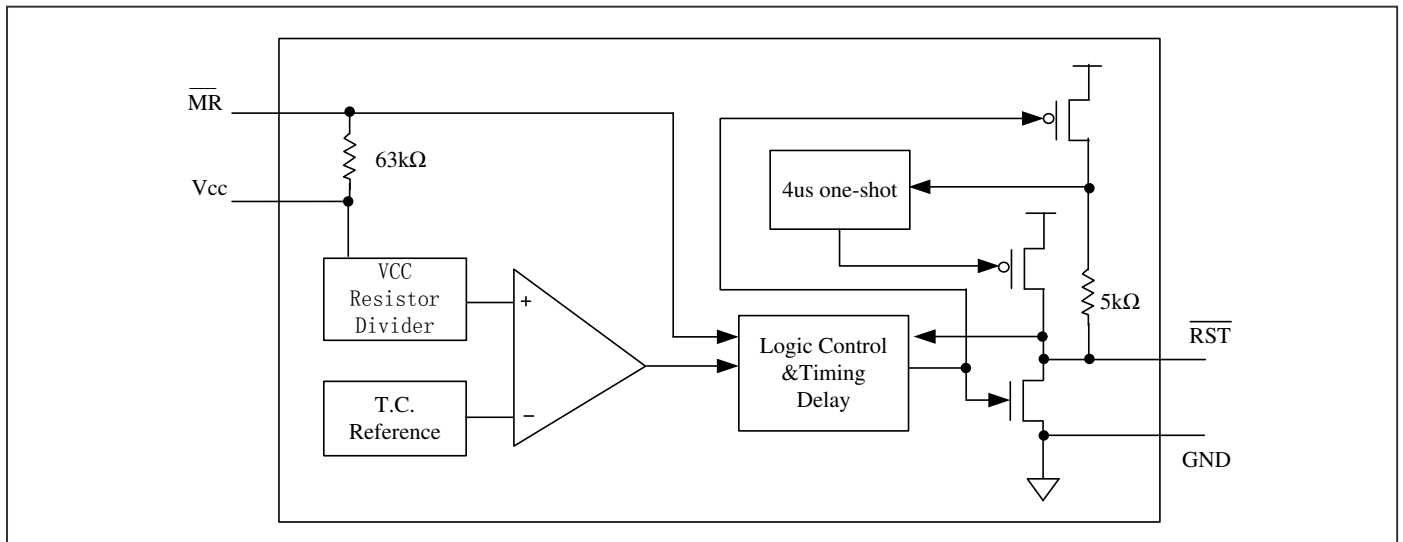
AC Electrical Characteristics
Timing diagram



(V_{CC} = 1.0V to 5.5V, T_A = -40~85°C, unless otherwise noted. Typical values are at T_A = +25°C)

| Sym. | Description | Test Conditions | Part No. | Min. | Typ. | Max. | Unit |
|------------------|---------------------------------|----------------------|---------------------------|------|------|------|------|
| t _{RS} | Reset Timeout Period | | 6314USxxD1 | 1 | 1.6 | 2.2 | ms |
| | | | 6314USxxD2 | 17 | 26 | 40 | ms |
| | | | 6314USxxD3 | 140 | 200 | 280 | ms |
| | | | 6314USxxD4 | 1120 | 1570 | 2240 | ms |
| t _{RPD} | Delay | | | 10 | | ns | |
| t _{SEN} | Sensitivity | | | 20 | | μs | |
| t _{MD} | MR to Reset Delay | | | | 500 | | ns |
| t _{MR} | MR Pulse Width | | | 1 | | | μs |
| t _S | External Pull Down Signal Pulse | RST pin | | 1 | | | μs |
| t _R | RST Output Rise Time | V _{CC} = 3V | C _{LOAD} = 120pF | | | 333 | ns |
| | | | C _{LOAD} = 250pF | | | 666 | |
| | | V _{CC} = 5V | C _{LOAD} = 200pF | | | 333 | |
| | | | C _{LOAD} = 400pF | | | 666 | |

Block Diagram



Function Description

Power Monitor

A microprocessor's (μP 's) reset input starts the μP in a known state. Whenever the μP is in an unknown state, it should be held in reset. The supervisory circuits assert reset during power-up and prevent code execution errors during power-down or brownout conditions.

On power-up, once V_{cc} reaches about 1.0V, $\overline{\text{RST}}$ is a guaranteed logic low of 0.4V or less. As V_{cc} rises, $\overline{\text{RST}}$ stays low. When V_{cc} rises above the reset threshold V_{RST} , an internal timer releases $\overline{\text{RST}}$ after about 1570ms (PT7M6314USxxD4). $\overline{\text{RST}}$ asserts whenever V_{cc} drops below the reset threshold, i.e. brownout condition. If brownout occurs in the middle of a previously initiated reset pulse, the pulse continues for at least another 1.6ms or 26ms or 200ms or 1570ms (PT7M6314USxxD4). On power-down, once V_{cc} falls below the reset threshold, $\overline{\text{RST}}$ stays low and is guaranteed to be 0.4V or less until V_{cc} drops below 1V.

Manual Reset

The manual-reset input ($\overline{\text{MR}}$) allows reset to be triggered by a pushbutton switch. The switch is effectively debounced by the 1.6ms (PT7M6314USxxD1) or 26ms (PT7M6314USxxD2) or 200ms (PT7M6314USxxD3) or 1570ms (PT7M6314USxxD4) reset pulse width.

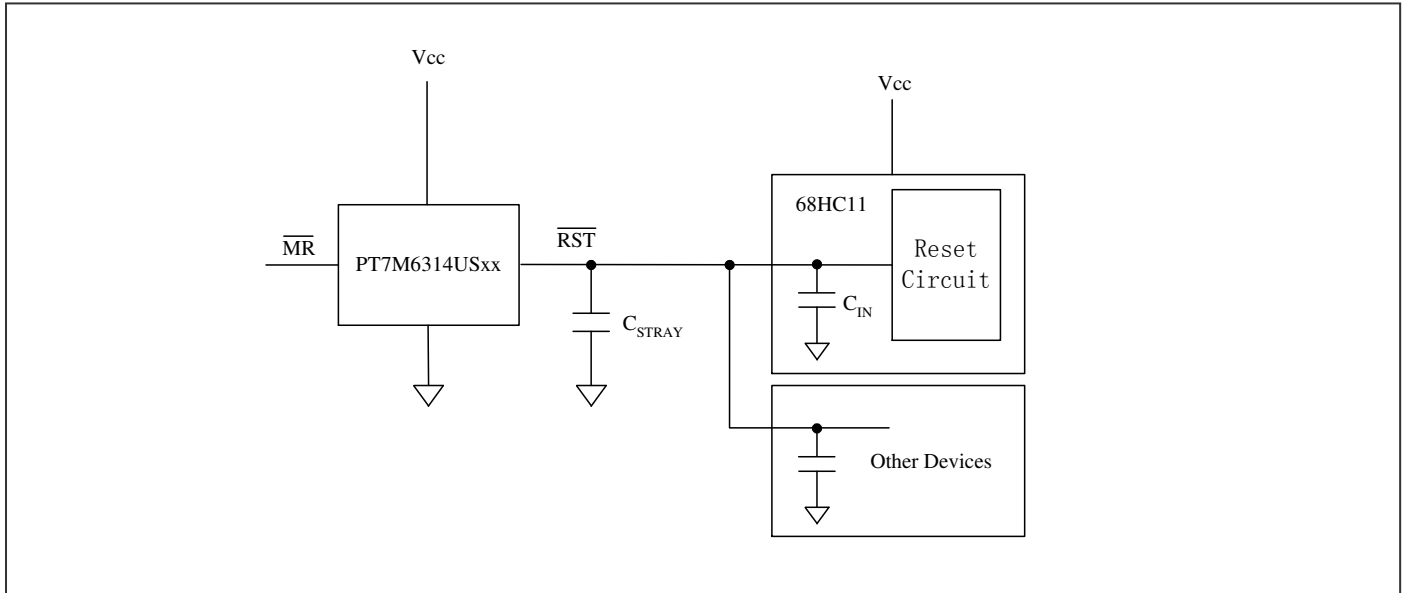
Reset Output: Bi-direction

The PT7M6314USxx's RESET output is designed to interface with μP s that have bidirectional reset pins, such as the Motorola 68HC11. Like an open-drain output, the PT7M6314USxx allows the μP or other devices to pull $\overline{\text{RST}}$ low and assert a reset condition. However, unlike a standard open-drain output, it includes the commonly specified 5k Ω pull-up resistor with a P-channel active pull-up in parallel. This structure can speed the rising edge when the reset condition releases. The reset condition will occur when V_{cc} drops below the reset threshold, or Manual Reset is set to ground, or $\overline{\text{RST}}$ is pulled down.

Application Information

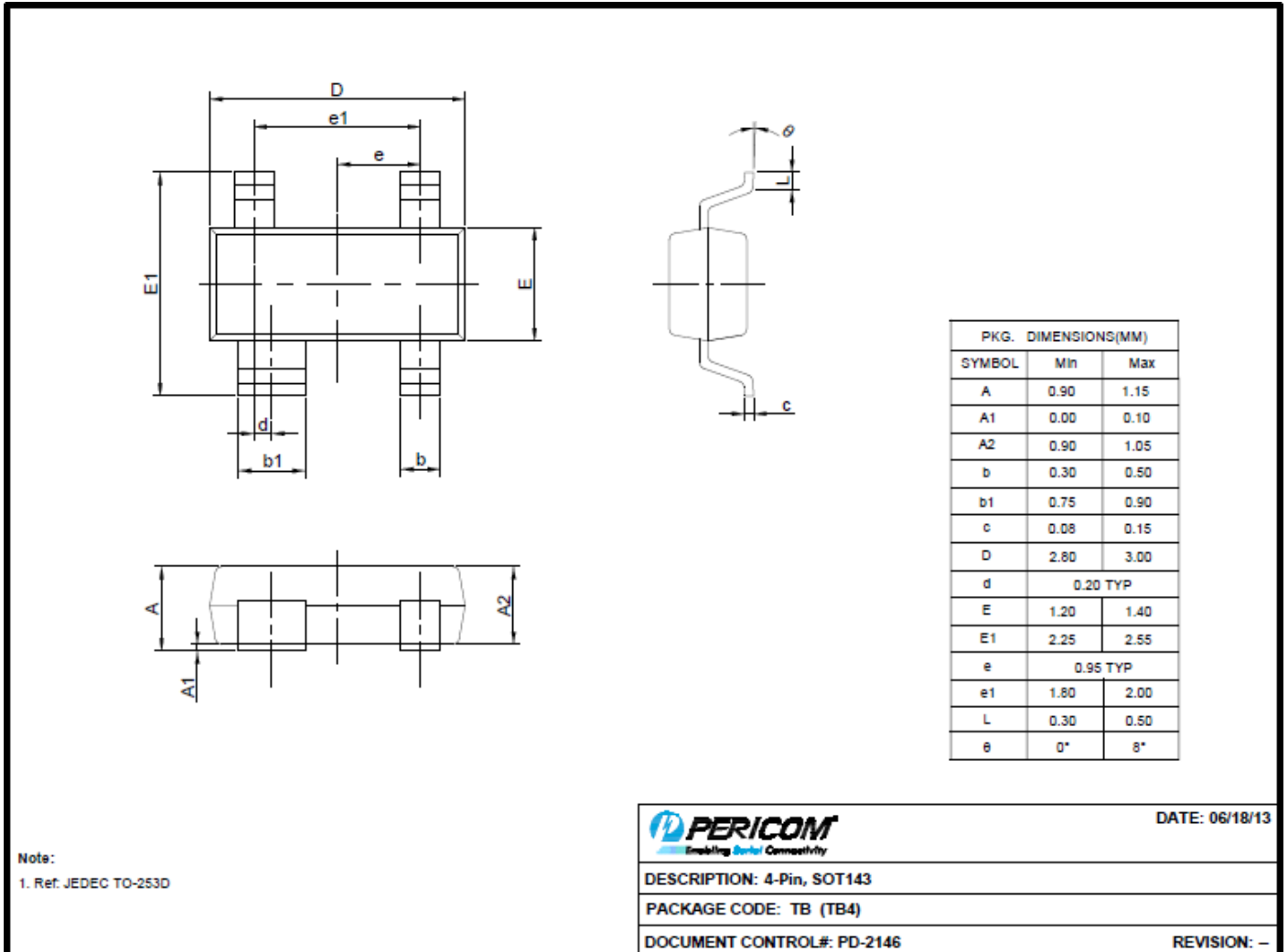
Typical Operation Circuit

Fig 6. PT7M6314USxx Application Example



Mechanical Information

SOT143-4



Ordering Information

| Part Number | Package Code | Package |
|--------------------|--------------|---|
| PT7M6314USxxD1TBEX | TB | Lead free and Green SOT143-4, Tape & Reel |
| PT7M6314USxxD2TBEX | TB | Lead free and Green SOT143-4, Tape & Reel |
| PT7M6314USxxD3TBEX | TB | Lead free and Green SOT143-4, Tape & Reel |
| PT7M6314USxxD4TBEX | TB | Lead free and Green SOT143-4, Tape & Reel |

Note:

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

Table 1 Suffix “xx” definition of PT7M6314USxx

| Suffix xx | V _{TH} (V) | Suffix xx | V _{TH} (V) | Suffix xx | V _{TH} (V) | Suffix xx | V _{TH} (V) |
|-----------|---------------------|-----------|---------------------|-----------|---------------------|-----------|---------------------|
| 25 | 2.5 | 32 | 3.2 | 39 | 3.9 | 46 | 4.6 |
| 26 | 2.6 | 33 | 3.3 | 40 | 4.0 | 47 | 4.7 |
| 27 | 2.7 | 34 | 3.4 | 41 | 4.1 | 48 | 4.8 |
| 28 | 2.8 | 35 | 3.5 | 42 | 4.2 | 49 | 4.9 |
| 29 | 2.9 | 36 | 3.6 | 43 | 4.3 | 50 | 5.0 |
| 30 | 3.0 | 37 | 3.7 | 44 | 4.4 | | |
| 31 | 3.1 | 38 | 3.8 | 45 | 4.5 | | |

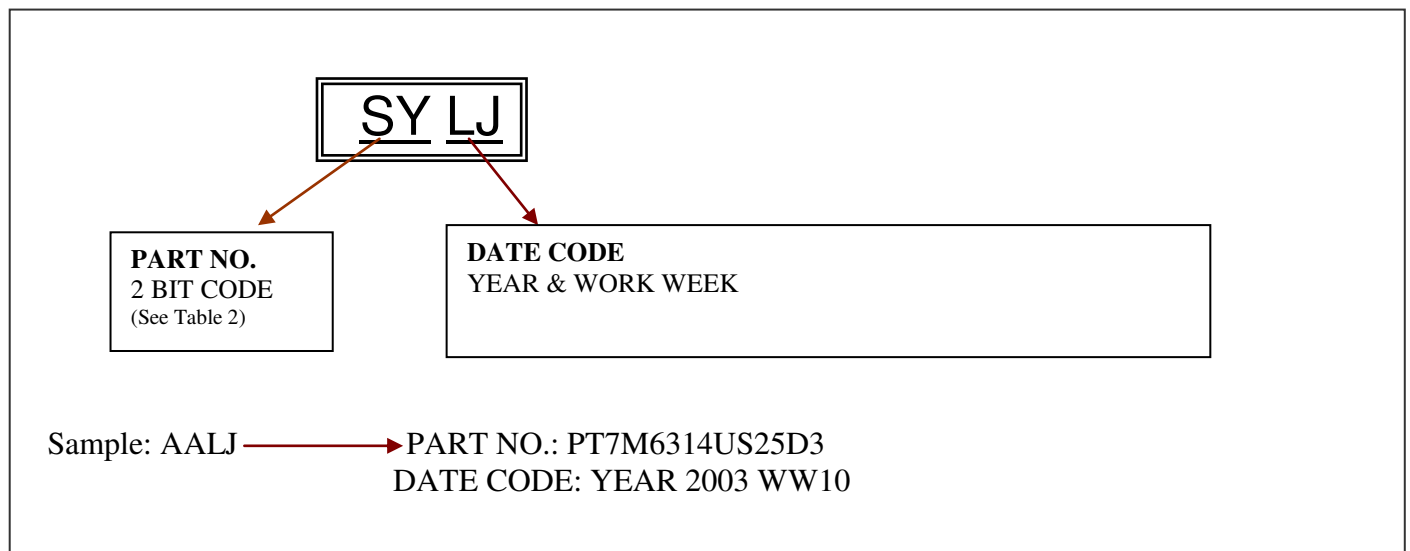
SOT-143 Package Top Marking Instruction


Table2

| Part No. | Code | Part No. | Code | Part No. | Code |
|-----------------|-------------|-----------------|-------------|-----------------|-------------|
| PT7M6314US25D3 | SY | PT7M6314US34D3 | UI | PT7M6314US43D3 | VS |
| PT7M6314US25D4 | SZ | PT7M6314US34D4 | UJ | PT7M6314US43D4 | VT |
| PT7M6314US26D3 | TC | PT7M6314US35D3 | UM | PT7M6314US44D3 | VW |
| PT7M6314US26D4 | TD | PT7M6314US35D4 | UN | PT7M6314US44D4 | VX |
| PT7M6314US27D3 | TG | PT7M6314US36D3 | UQ | PT7M6314US45D3 | WA |
| PT7M6314US27D4 | TH | PT7M6314US36D4 | UR | PT7M6314US45D4 | WB |
| PT7M6314US28D3 | TK | PT7M6314US37D3 | UU | PT7M6314US46D3 | WE |
| PT7M6314US28D4 | TL | PT7M6314US37D4 | UV | PT7M6314US46D4 | WF |
| PT7M6314US29D3 | TO | PT7M6314US38D3 | UY | PT7M6314US47D3 | WI |
| PT7M6314US29D4 | TP | PT7M6314US38D4 | UZ | PT7M6314US47D4 | WJ |
| PT7M6314US30D3 | TS | PT7M6314US39D3 | VC | PT7M6314US48D3 | WM |
| PT7M6314US30D4 | TT | PT7M6314US39D4 | VD | PT7M6314US48D4 | WN |
| PT7M6314US31D3 | TW | PT7M6314US40D3 | VG | PT7M6314US49D3 | WQ |
| PT7M6314US31D4 | TX | PT7M6314US40D4 | VH | PT7M6314US49D4 | WR |
| PT7M6314US32D3 | UA | PT7M6314US41D3 | VK | PT7M6314US50D3 | WU |
| PT7M6314US32D4 | UB | PT7M6314US41D4 | VL | PT7M6314US50D4 | WV |
| PT7M6314US33D3 | UE | PT7M6314US42D3 | VO | | |
| PT7M6314US33D4 | UF | PT7M6314US42D4 | VP | | |

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