

# CAT8801

## 200 nA Microprocessor Power Supply Supervisors

### Description

The CAT8801 is a supervisory circuit that monitors power supplies in digital systems and provides a reset signal whenever the system's input voltage is below a prescribed minimum level. The CAT8801 replaces popular voltage supervisors such as MAX809 in applications where operating current is a primary consideration.

CAT8801 generates a reset signal, which is asserted while the power supply voltage is below a preset threshold level and remains asserted for at least 140 ms after the power supply level has risen above that level. Nine industry standard threshold levels are offered to support +5.0 V, +3.3 V, +3.0 V, +2.5 V and +1.8 V systems. ON Semiconductor's floating gate technology, used in programming the trigger thresholds, makes it possible to quickly offer any custom reset threshold value should the 9 standard voltage thresholds not meet a system's needs.

The CAT8801 features a Push-Pull CMOS  $\overline{\text{RESET}}$  output (active LOW) and is fully specified over the industrial temperature range of  $-40^{\circ}\text{C}$  to  $85^{\circ}\text{C}$ .

CAT8801 is available in compact 3-pin SOT23 and SC-70 packages.

### Features

- Precision Voltage Monitoring of +1.8 V, +2.5 V, +3.0 V, +3.3 V and +5.0 V Power Supplies
- Ultra Low 200 nA Supply Current
- $\pm 1.2\%$  Voltage Threshold Accuracy
- 270 ms Power-On Reset Timeout
- Reset Signal Valid Down to  $V_{CC} = 1\text{ V}$
- No External Components Necessary
- High Immunity to Power-Supply Transients
- Industrial Temperature Range:  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
- Available in RoHS-compliant SOT-23 and SC-70 Packages

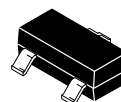
### Applications

- Computers
- Servers
- Laptops
- Cable Modems
- Wireless Communications
- Embedded Control Systems
- Power Meters
- PDAs and Handheld Equipment

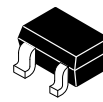


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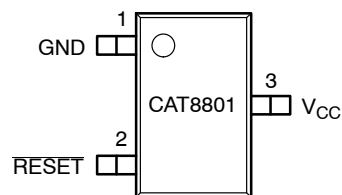


**SOT-23  
TB SUFFIX  
CASE 527AG**



**SC-70  
SD SUFFIX  
CASE 419AB**

### PIN CONNECTIONS



3-Lead SOT-23  
3-Lead SC-70  
(Top View)

### THRESHOLD SUFFIX SELECTOR

| Threshold Suffix | Nominal Threshold |
|------------------|-------------------|
| L                | 4.625             |
| M                | 4.380             |
| T                | 3.075             |
| S                | 2.925             |
| R                | 2.630             |
| Z                | 2.320             |
| Y                | 2.190             |
| W                | 1.670             |
| V                | 1.580             |

### ORDERING INFORMATION

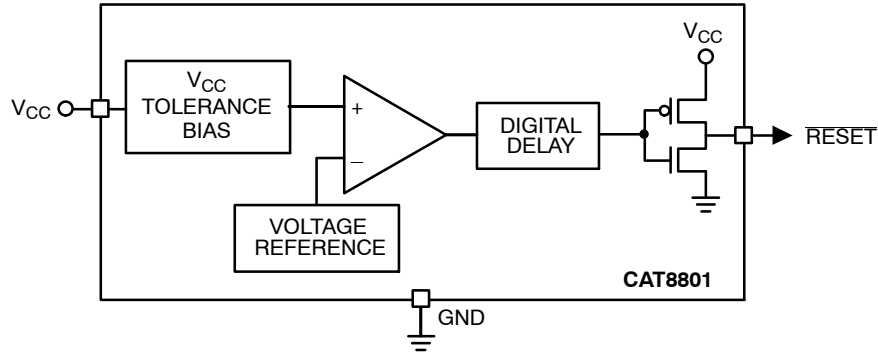
See detailed ordering and shipping information in the package dimensions section on page 7 of this data sheet.

# CAT8801

**Table 1. PIN DESCRIPTION**

| Pin # | Name     | Description                                                                                                                                                         |
|-------|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1     | GND      | Ground                                                                                                                                                              |
| 2     | RESET    | Active LOW reset. RESET is asserted if $V_{CC}$ falls below the reset threshold and remains low for at least 140 ms after $V_{CC}$ rises above the reset threshold. |
| 3     | $V_{CC}$ | Power supply voltage that is monitored.                                                                                                                             |

**Block Diagram**



**Table 2. ABSOLUTE MAXIMUM RATINGS**

| Parameters                                                | Ratings      | Units        |
|-----------------------------------------------------------|--------------|--------------|
| Any pin with respect to ground                            | -0.3 to +6.0 | V            |
| Input Current, $V_{CC}$                                   | 20           | mA           |
| Output Current, RESET                                     | 20           | mA           |
| Rate of Rise, $V_{CC}$                                    | 100          | V/ $\mu$ s   |
| Continuous Power Dissipation                              |              | mW           |
| Derate 2.2 mW/ $^{\circ}$ C above 70 $^{\circ}$ C (SC-70) | 175          |              |
| Derate 4 mW/ $^{\circ}$ C above 70 $^{\circ}$ C (SOT-23)  | 320          |              |
| Operating Temperature Range                               | -40 to +85   | $^{\circ}$ C |
| Storage Temperature Range                                 | -65 to +150  | $^{\circ}$ C |
| Lead Soldering Temperature (10 seconds)                   | 300          | $^{\circ}$ C |

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

# CAT8801

**Table 3. ELECTRICAL CHARACTERISTICS** (Note 1)

( $V_{CC}$  = Full range,  $T_A$  =  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$  unless otherwise noted. Typical values at  $T_A$  =  $+25^{\circ}\text{C}$ .)

| Symbol        | Parameter                               | Test Conditions                                      | Min                                                  | Typ   | Max   | Units                  |
|---------------|-----------------------------------------|------------------------------------------------------|------------------------------------------------------|-------|-------|------------------------|
|               | $V_{CC}$ Range                          | $T_A = 0^{\circ}\text{C}$ to $+70^{\circ}\text{C}$   | 1.0                                                  |       | 5.5   | V                      |
|               |                                         | $T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ | 1.2                                                  |       | 5.5   |                        |
| $I_{CC}$      | Supply Current                          | $V_{TH} < V_{CC} < 5.5\text{ V}$                     |                                                      | 200   | 400   | nA                     |
|               |                                         | $V_{TH} < V_{CC} < 3.6\text{ V}$                     |                                                      | 175   | 350   |                        |
| $V_{TH}$      | Reset Threshold Voltage (Note 2)        | L                                                    | $T_A = +25^{\circ}\text{C}$                          | 4.570 | 4.625 | V                      |
|               |                                         |                                                      | $T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ | 4.500 | 4.750 |                        |
|               |                                         | M                                                    | $T_A = +25^{\circ}\text{C}$                          | 4.327 | 4.380 |                        |
|               |                                         |                                                      | $T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ | 4.262 | 4.498 |                        |
|               |                                         | T                                                    | $T_A = +25^{\circ}\text{C}$                          | 3.038 | 3.075 |                        |
|               |                                         |                                                      | $T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ | 3.000 | 3.150 |                        |
|               |                                         | S                                                    | $T_A = +25^{\circ}\text{C}$                          | 2.890 | 2.925 |                        |
|               |                                         |                                                      | $T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ | 2.850 | 3.000 |                        |
|               |                                         | R                                                    | $T_A = +25^{\circ}\text{C}$                          | 2.598 | 2.630 |                        |
|               |                                         |                                                      | $T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ | 2.559 | 2.701 |                        |
|               |                                         | Z                                                    | $T_A = +25^{\circ}\text{C}$                          | 2.292 | 2.320 |                        |
|               |                                         |                                                      | $T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ | 2.257 | 2.383 |                        |
|               |                                         | Y                                                    | $T_A = +25^{\circ}\text{C}$                          | 2.164 | 2.190 |                        |
|               |                                         |                                                      | $T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ | 2.131 | 2.249 |                        |
|               |                                         | W                                                    | $T_A = +25^{\circ}\text{C}$                          | 1.650 | 1.670 |                        |
|               |                                         |                                                      | $T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ | 1.625 | 1.715 |                        |
|               |                                         | V                                                    | $T_A = +25^{\circ}\text{C}$                          | 1.561 | 1.580 |                        |
|               |                                         |                                                      | $T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ | 1.537 | 1.623 |                        |
| $V_{TH\_HYS}$ | Threshold Hysteresis                    |                                                      |                                                      | 2     |       | %                      |
|               | Reset Threshold Temperature Coefficient |                                                      |                                                      |       | 0.1   | mV/ $^{\circ}\text{C}$ |
|               | $V_{CC}$ to Reset Delay                 | $V_{CC} = V_{TH}$ to $(V_{TH} - 100\text{ mV})$      |                                                      | 20    | 50    | $\mu\text{s}$          |
|               | Reset Active Timeout Period             | $T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ | 140                                                  | 270   | 460   | ms                     |
| $V_{OL}$      | RESET Output Voltage Low                | $I_{SINK} = 2\text{ mA}$                             |                                                      |       | 0.4   | V                      |
| $V_{OH}$      | RESET Output Voltage High               | $I_{SOURCE} = 0.5\text{ mA}$                         | $0.8 \times V_{CC}$                                  |       |       | V                      |

1. Production testing done at  $T_A = +25^{\circ}\text{C}$ ; limits over temperature guaranteed by design.

2. Measured on falling edge of  $V_{CC}$ .

# TYPICAL OPERATING CHARACTERISTICS

( $V_{CC}$  = Full range,  $T_A$  =  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$  unless otherwise noted. Typical values at  $T_A$  =  $+25^{\circ}\text{C}$ .)

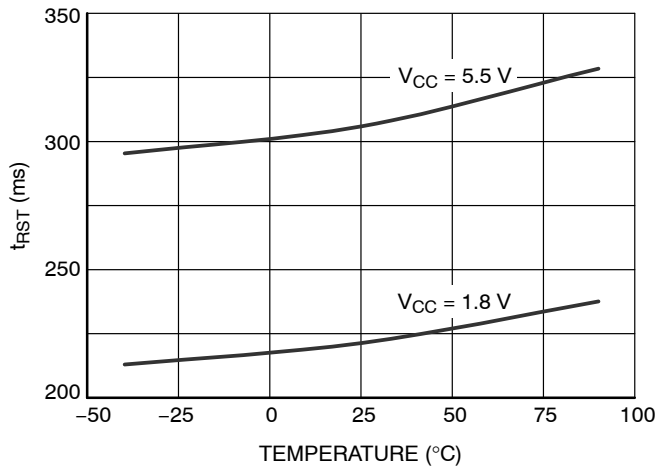


Figure 1. Power-Up Reset Timeout

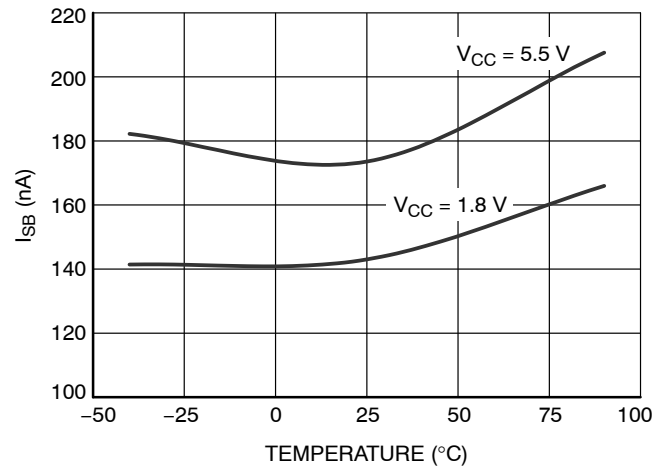


Figure 2. Supply Current vs. Temperature

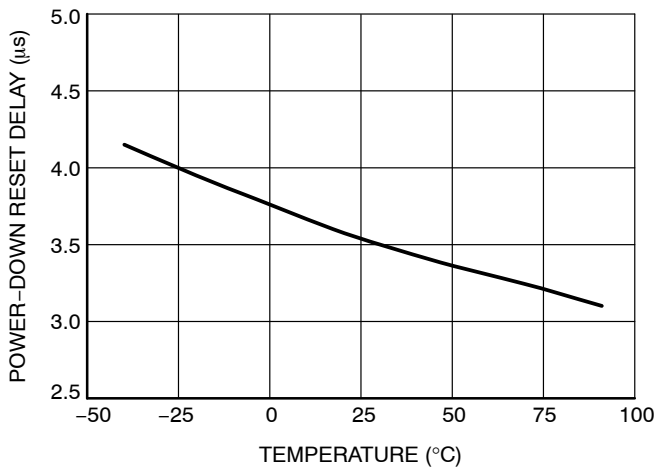


Figure 3. Power-Down Reset Delay vs. Temperature

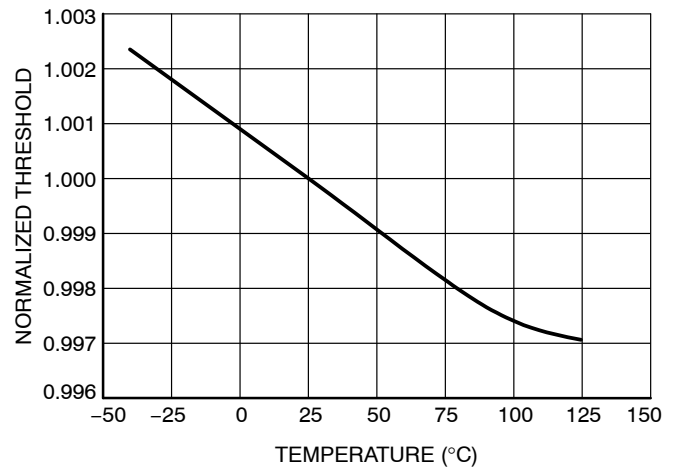


Figure 4. Normalized Reset Threshold vs. Temperature

## Description

### Reset Timing

The reset signal is asserted LOW for the CAT8801 when the power supply voltage falls below the threshold trip voltage and remains asserted for at least 140 ms after the power supply voltage has risen above the threshold.

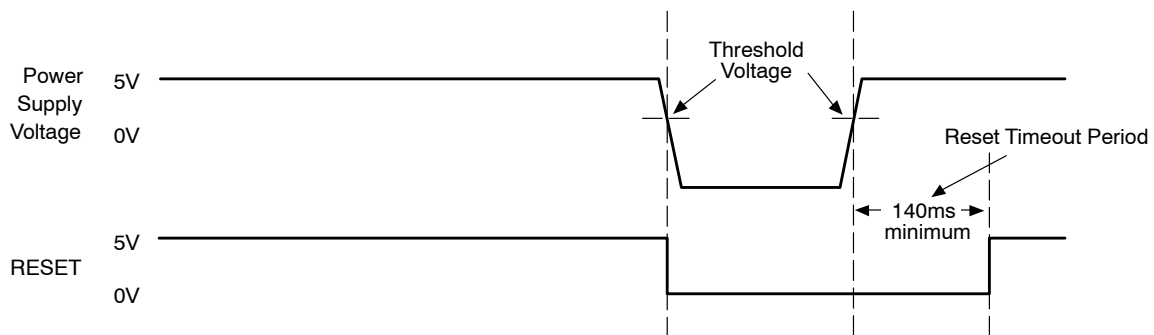
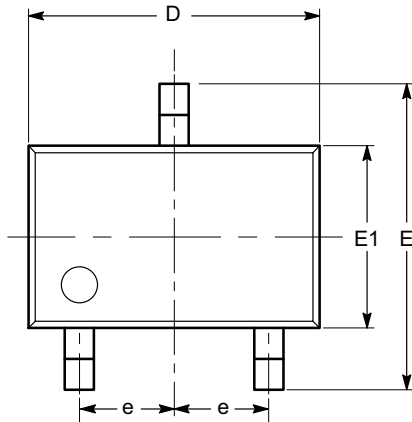


Figure 5. Reset Timing Diagram

# CAT8801

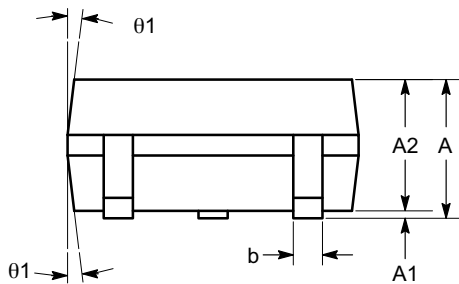
## PACKAGE DIMENSIONS

SC-70, 3 Lead, 1.25x2  
CASE 419AB-01  
ISSUE O

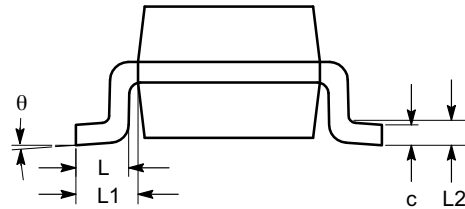


TOP VIEW

| SYMBOL     | MIN      | NOM  | MAX  |
|------------|----------|------|------|
| A          | 0.80     |      | 1.10 |
| A1         | 0.00     |      | 0.10 |
| A2         | 0.80     | 0.90 | 1.00 |
| b          | 0.15     |      | 0.30 |
| c          | 0.08     |      | 0.22 |
| D          | 1.80     | 2.00 | 2.20 |
| E          | 1.80     | 2.10 | 2.40 |
| E1         | 1.15     | 1.25 | 1.35 |
| e          | 0.65 BSC |      |      |
| L          | 0.26     | 0.36 | 0.46 |
| L1         | 0.42 REF |      |      |
| L2         | 0.15 BSC |      |      |
| $\theta$   | 0°       |      | 8°   |
| $\theta 1$ | 4°       |      | 10°  |



SIDE VIEW



END VIEW

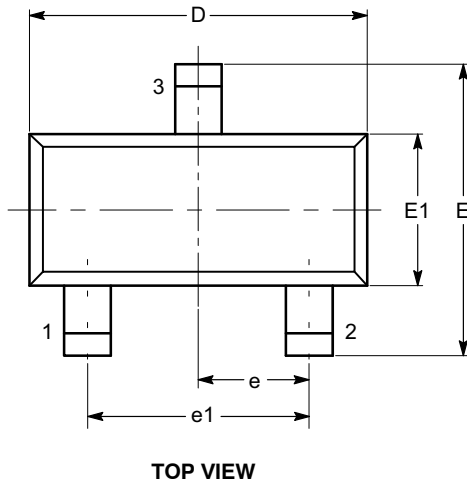
### Notes:

- (1) All dimensions are in millimeters. Angles in degrees.
- (2) Complies with JEDEC MO-203.

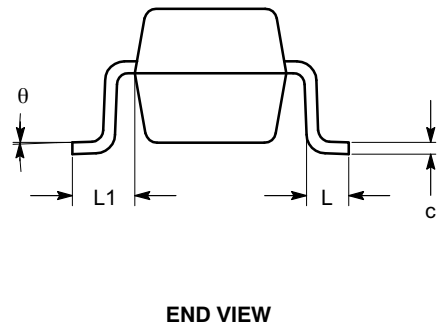
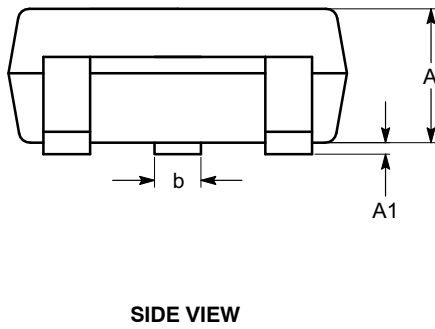
# CAT8801

## PACKAGE DIMENSIONS

SOT-23, 3 Lead  
CASE 527AG-01  
ISSUE O



| SYMBOL   | MIN      | NOM | MAX  |
|----------|----------|-----|------|
| A        | 0.89     |     | 1.12 |
| A1       | 0.013    |     | 0.10 |
| b        | 0.37     |     | 0.50 |
| c        | 0.085    |     | 0.18 |
| D        | 2.80     |     | 3.04 |
| E        | 2.10     |     | 2.64 |
| E1       | 1.20     |     | 1.40 |
| e        | 0.95 BSC |     |      |
| e1       | 1.90 BSC |     |      |
| L        | 0.40 REF |     |      |
| L1       | 0.54 REF |     |      |
| $\theta$ | 0°       |     | 8°   |

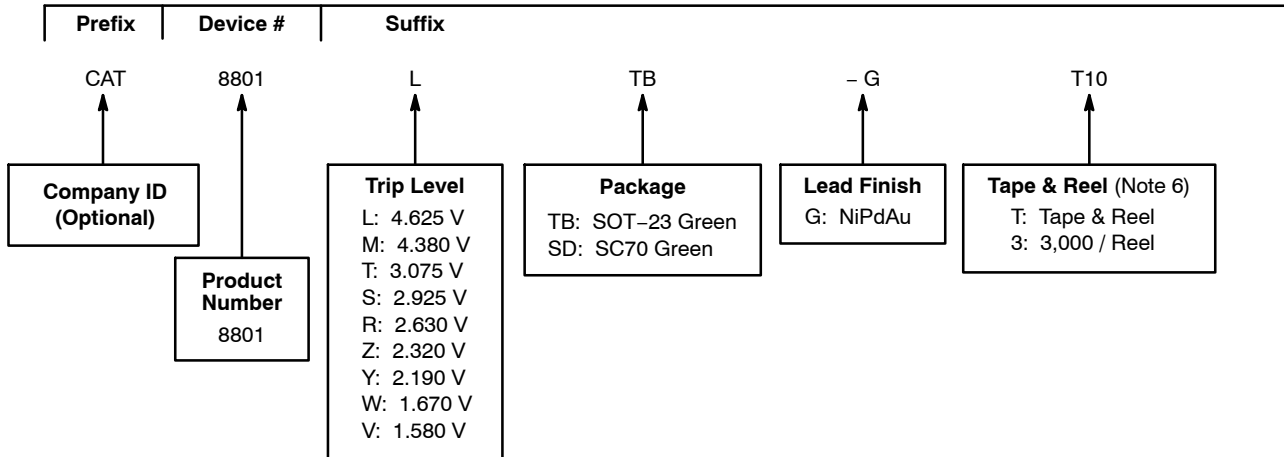


### Notes:

- (1) All dimensions are in millimeters. Angles in degrees.
- (2) Complies with JEDEC TO-236.

# CAT8801

## Example of Ordering Information (Note 3)



## ORDERING INFORMATION

| Parts and Threshold | Voltage | SOT-23<br>Green NiPdAu Lead Finish (Note 5) | SC-70<br>Green NiPdAu Lead Finish |
|---------------------|---------|---------------------------------------------|-----------------------------------|
| CAT8801L            | 4.625   | CAT8801LTB-GT3                              | CAT8801LSD-GT3                    |
| CAT8801M            | 4.380   | CAT8801MTB-GT3                              | CAT8801MSD-GT3                    |
| CAT8801T            | 3.075   | CAT8801TTB-GT3                              | CAT8801TSD-GT3                    |
| CAT8801S            | 2.925   | CAT8801STB-GT3                              | CAT8801SSD-GT3                    |
| CAT8801R            | 2.630   | CAT8801RTB-GT3                              | CAT8801RSD-GT3                    |
| CAT8801Z            | 2.320   | CAT8801ZTB-GT3                              | CAT8801ZSD-GT3                    |
| CAT8801Y            | 2.190   | CAT8801YTB-GT3                              | CAT8801YSD-GT3                    |
| CAT8801W            | 1.670   | CAT8801WTB-GT3                              | CAT8801WSD-GT3                    |
| CAT8801V            | 1.580   | CAT8801VTB-GT3                              | CAT8801VSD-GT3                    |

- All packages are RoHS-compliant (Lead-free, Halogen-free).
- The device used in the above example is a CAT8801LTB-GT3 (4.625 V, SOT-23, NiPdAu, Tape & Reel, 3,000/Reel).
- For availability of the various voltage, package and temperature options, please contact your nearest ON Semiconductor sales office.
- For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

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