

# CAT811

## 4-Pin Microprocessor Power Supply Supervisor with Manual Reset

### Description

The CAT811 is a microprocessor supervisory circuit that monitors power supplies. The CAT811 is a direct replacement for the MAX811 in applications operating over the industrial temperature range and has a manual reset input.

These devices generate a reset signal, which is asserted while the power supply voltage is below a preset threshold level and for at least 140 ms after the power supply level has risen above that level. The underlying floating gate technology, Analog EEPROM used by ON Semiconductor, makes it possible to offer any custom reset threshold value. Seven industry standard threshold levels are offered to support +5.0 V, +3.3 V, +3.0 V and +2.5 V systems. The CAT811 features a RESET push-pull output (active LOW).

Fast transients on the power supply are ignored and the output is guaranteed to be in the correct state at V<sub>CC</sub> levels as low as 1.0 V.

The CAT811 is fully specified over the industrial temperature range (–40°C to 85°C) and is available in a compact 4-pin SOT-143 package.

### Features

- Precision Monitoring of
  - +5.0 V ( $\pm 5\%$ ,  $\pm 10\%$ ,  $\pm 20\%$ ),
  - +3.3 V ( $\pm 5\%$ ,  $\pm 10\%$ )
- Manual Reset Input
- Output Configuration: Active LOW Reset
- Direct Replacements for the MAX811 in Applications Operating over the Industrial Temperature Range
- Reset Valid down to V<sub>CC</sub> = 1.0 V
- 6  $\mu$ A Power Supply Current
- Power Supply Transient Immunity
- Available in SOT-143 Packages with Sn or NiPdAu Green Lead Finishes
- Industrial Temperature Range: –40°C to +85°C
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

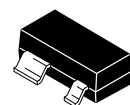
### Applications

- Computers, Servers, Laptops and Cable Modems
- Wireless Communications
- Embedded Control Systems
- White Goods, Power Meters
- Intelligent Instruments
- PDAs and Handheld Equipment



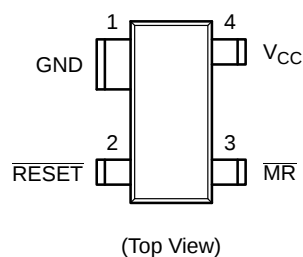
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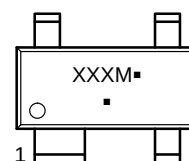


**SOT-143  
BI SUFFIX  
CASE 527AF**

### PIN CONFIGURATION



### MARKING DIAGRAM



XXX = Specific Device Code  
M = Month Code  
■ = Pb-Free Package

(Note: Microdot may be in either location)

### ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 9 of this data sheet.

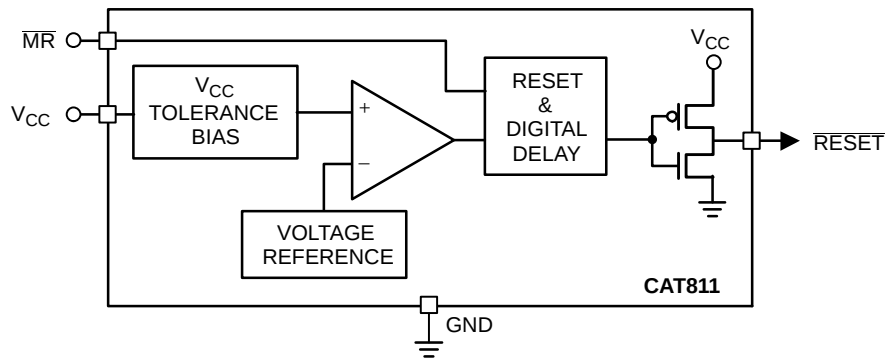
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**Table 1. THRESHOLD SUFFIX SELECTOR DESCRIPTION**

| Nominal Threshold Voltage | Threshold Suffix Designation |
|---------------------------|------------------------------|
| 4.63 V                    | L                            |
| 3.08 V                    | T                            |
| 2.93 V                    | S                            |

**Table 2. PIN DESCRIPTION**

| Pin Number | 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          | MR       | Manual Reset Input. A logic LOW on MR asserts RESET. RESET remains active as long as MR is LOW and for 140 ms after MR returns HIGH. The active low input has an internal 20 k $\Omega$ pull-up resistor. The input should be left open if not used. |
| 4          | $V_{CC}$ | Power supply voltage that is monitored.                                                                                                                                                                                                              |



**Figure 1. Block Diagrams**

**Table 3. 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 $\overline{RESET}$                                                           | 20           | mA           |
| Rate of Raise, $V_{CC}$                                                                     | 100          | V/ $\mu$ s   |
| Continuous Power Dissipations<br>Derate 4 mW/ $^{\circ}$ C above +70 $^{\circ}$ C (SOT-143) | 320          | mW           |
| Storage Temperature Range                                                                   | -65 to +105  | $^{\circ}$ C |
| Operating Ambient Temperature Range                                                         | -40 to +85   | $^{\circ}$ C |
| Lead Soldering Temperature (10 seconds)                                                     | +300         | $^{\circ}$ C |

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

**Table 4. ELECTRICAL OPERATING CHARACTERISTICS**

( $V_{CC}$  = Full range,  $T_A$  = -40 $^{\circ}$ C to +85 $^{\circ}$ C unless otherwise noted. Typical values at  $T_A$  = +25 $^{\circ}$ C and  $V_{CC}$  = 5 V for the L version,  $V_{CC}$  = 3.3 V for the T/S versions.)

| Parameter                        | Symbol   | Conditions                                   | Min                                          | Typ  | Max  | Units             |
|----------------------------------|----------|----------------------------------------------|----------------------------------------------|------|------|-------------------|
| $V_{CC}$ Range                   |          | $T_A$ = 0 $^{\circ}$ C to +70 $^{\circ}$ C   | 1.0                                          |      | 5.5  | V                 |
|                                  |          | $T_A$ = -40 $^{\circ}$ C to +85 $^{\circ}$ C | 1.2                                          |      | 5.5  |                   |
| Supply Current                   | $I_{CC}$ | $T_A$ = -40 $^{\circ}$ C to +85 $^{\circ}$ C | $V_{CC} < 5.5$ V, L                          | 8    | 20   | $\mu$ A           |
|                                  |          |                                              | $V_{CC} < 3.6$ V, S/T                        | 6    | 15   |                   |
| Reset Threshold Voltage          | $V_{TH}$ | L Threshold                                  | $T_A$ = +25 $^{\circ}$ C                     | 4.56 | 4.63 | V                 |
|                                  |          |                                              | $T_A$ = -40 $^{\circ}$ C to +85 $^{\circ}$ C | 4.50 |      |                   |
|                                  |          | T Threshold                                  | $T_A$ = +25 $^{\circ}$ C                     | 3.04 | 3.08 |                   |
|                                  |          |                                              | $T_A$ = -40 $^{\circ}$ C to +85 $^{\circ}$ C | 3.00 |      |                   |
|                                  |          | S Threshold                                  | $T_A$ = +25 $^{\circ}$ C                     | 2.89 | 2.93 |                   |
|                                  |          |                                              | $T_A$ = -40 $^{\circ}$ C to +85 $^{\circ}$ C | 2.85 |      |                   |
| Reset Threshold Tempco           |          |                                              |                                              | 30   |      | ppm/ $^{\circ}$ C |
| $V_{CC}$ to Reset Delay (Note 3) |          | $V_{CC} = V_{TH}$ to ( $V_{TH} - 100$ mV)    |                                              | 20   |      | $\mu$ s           |
| Reset Active Timeout Period      |          | $T_A$ = -40 $^{\circ}$ C to +85 $^{\circ}$ C | 140                                          | 240  | 400  | ms                |

1. Production testing done at  $T_A$  = +25 $^{\circ}$ C; limits over temperature guaranteed by design only.
2. Glitches of 100 ns or less typically will not generate a reset pulse.
3.  $\overline{RESET}$  output for the CAT811.

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**Table 4. ELECTRICAL OPERATING CHARACTERISTICS**

( $V_{CC}$  = Full range,  $T_A$  =  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$  unless otherwise noted. Typical values at  $T_A$  =  $+25^{\circ}\text{C}$  and  $V_{CC}$  = 5 V for the L version,  $V_{CC}$  = 3.3 V for the T/S versions.)

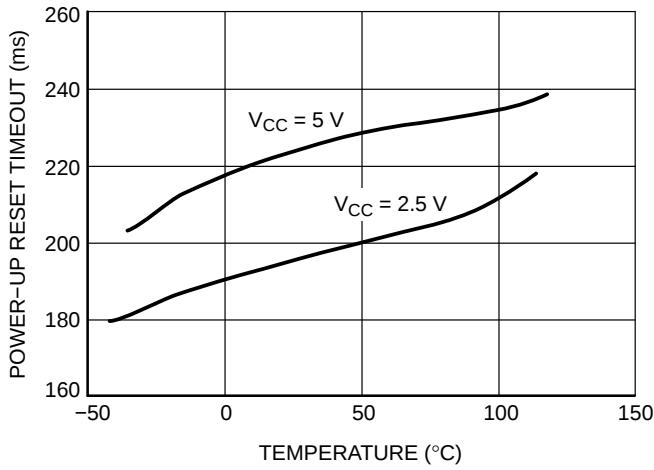
| Parameter                                                 | Symbol   | Conditions                                                        | Min            | Typ | Max          | Units         |
|-----------------------------------------------------------|----------|-------------------------------------------------------------------|----------------|-----|--------------|---------------|
| RESET Output Voltage Low (Push-pull, active LOW, CAT811)  | $V_{OL}$ | $V_{CC} = V_{TH \min}$ , $I_{SINK} = 1.2 \text{ mA}$ CAT811S/T    |                |     | 0.3          | V             |
|                                                           |          | $V_{CC} = V_{TH \min}$ , $I_{SINK} = 3.2 \text{ mA}$ CAT811L      |                |     | 0.4          |               |
|                                                           |          | $V_{CC} > 1.0 \text{ V}$ , $I_{SINK} = 50 \mu\text{A}$            |                |     | 0.3          |               |
| RESET Output Voltage High (Push-pull, active LOW, CAT811) | $V_{OH}$ | $V_{CC} = V_{TH \max}$ , $I_{SOURCE} = 500 \mu\text{A}$ CAT811S/T | $0.8V_{CC}$    |     |              | V             |
|                                                           |          | $V_{CC} = V_{TH \max}$ , $I_{SOURCE} = 800 \mu\text{A}$ CAT811L   | $V_{CC} - 1.5$ |     |              | V             |
| MR Minimum Pulse Width                                    | $t_{MR}$ |                                                                   | 10             |     |              | $\mu\text{s}$ |
| MR Glitch Immunity                                        |          | (Note 2)                                                          |                | 100 |              | ns            |
| MR to RESET Propagation Delay                             | $t_{MD}$ | (Note 3)                                                          |                | 0.5 |              | $\mu\text{s}$ |
| MR Input Threshold                                        | $V_{IH}$ | $V_{CC} > V_{TH \max}$ , CAT811L                                  | 2.3V           |     |              | V             |
|                                                           | $V_{IL}$ |                                                                   |                |     | 0.8          |               |
|                                                           | $V_{IH}$ | $V_{CC} > V_{IH \max}$ , CAT811S/T                                | $0.7V_{CC}$    |     |              |               |
|                                                           | $V_{IL}$ |                                                                   |                |     | $0.25V_{CC}$ |               |
| MR Pull-up Resistance                                     |          |                                                                   | 10             | 20  | 75           | $k\Omega$     |

1. Production testing done at  $T_A$  =  $+25^{\circ}\text{C}$ ; limits over temperature guaranteed by design only.
2. Glitches of 100 ns or less typically will not generate a reset pulse.
3. RESET output for the CAT811.

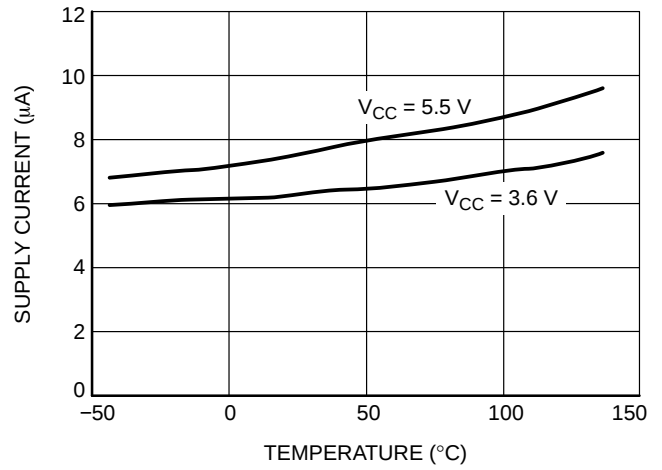
# CAT811

## TYPICAL OPERATING CHARACTERISTICS

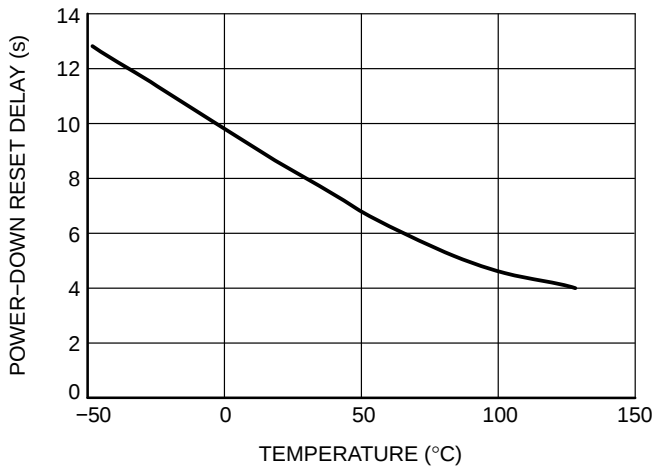
( $V_{CC}$  = Full range,  $T_A$  =  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$  unless otherwise noted. Typical values at  $T_A$  =  $+25^{\circ}\text{C}$  and  $V_{CC}$  = 5 V for the L version,  $V_{CC}$  = 3.3 V for the T/S versions.)



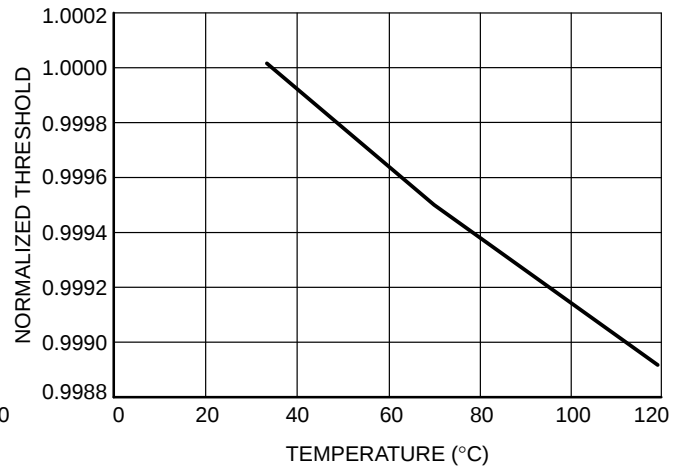
**Figure 2. Power-Up Reset Timeout vs. Temperature**



**Figure 3. Supply Current vs. Temperature (No Load, CAT811S/T)**



**Figure 4. Power-Down Reset Delay vs. Temperature (CAT811S/T)**



**Figure 5. Normalized Reset Threshold vs. Temperature**

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## DETAILED DESCRIPTION

### Reset Timing

The reset signal is asserted LOW for the CAT811 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.

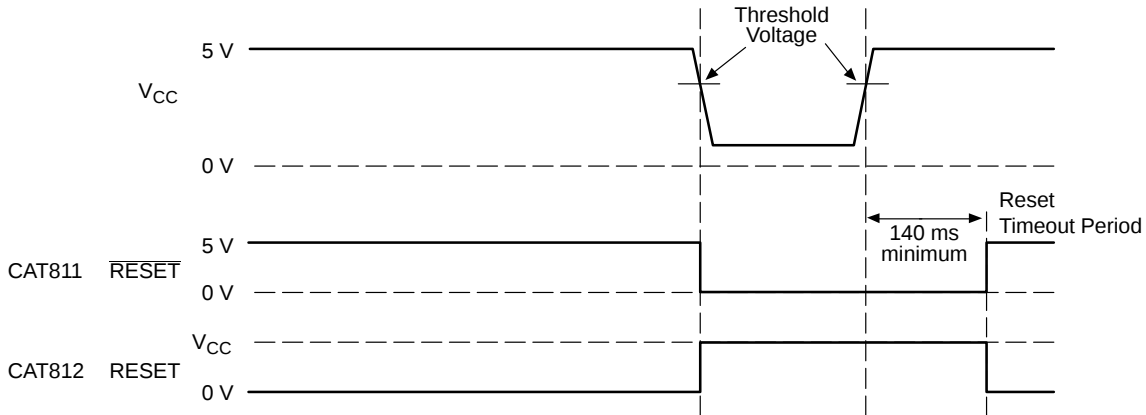


Figure 6. Reset Timing Diagram

### V<sub>CC</sub> Transient Response

The CAT811 protect  $\mu$ Ps against brownout failure. Short duration transients of 4  $\mu$ s or less and 100 mV amplitude typically do not cause a false RESET.

Figure 7 shows the maximum pulse duration of negative-going  $V_{CC}$  transients that do not cause a reset condition. As the amplitude of the transient goes further below the threshold (increasing  $V_{TH} - V_{CC}$ ), the maximum pulse duration decreases. In this test, the  $V_{CC}$  starts from an initial voltage of 0.5 V above the threshold and drops below it by the amplitude of the overdrive voltage ( $V_{TH} - V_{CC}$ ).

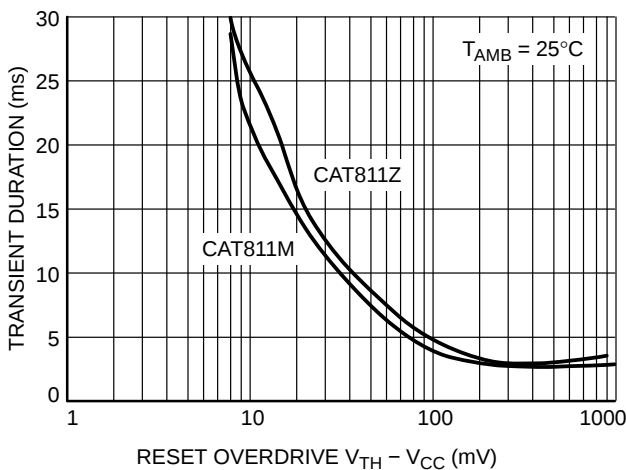


Figure 7. Maximum Transient Duration without Causing a Reset Pulse vs. Reset Comparator Overdrive

### Valid Reset with $V_{CC}$ under 1.0 V

To ensure that the CAT811  $\overline{\text{RESET}}$  pin is in a known state when  $V_{CC}$  is under 1.0 V, a 100 k $\Omega$  pull-down resistor between  $\overline{\text{RESET}}$  pin and GND is recommended; the value is not critical.

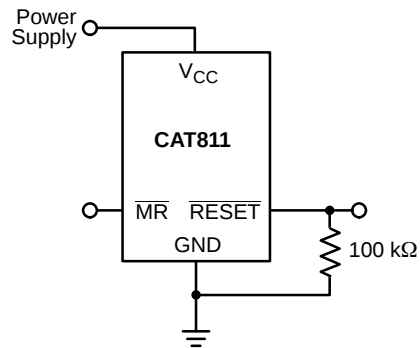


Figure 8.  $\overline{\text{RESET}}$  Valid with  $V_{CC}$  Under 1.0 V

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## Bi-directional Reset Pin Interfacing

The CAT811 can interface with  $\mu\text{P}/\mu\text{C}$  bi-directional reset pins by connecting a 4.7 k $\Omega$  resistor in series with the CAT811 reset output and the  $\mu\text{P}/\mu\text{C}$  bi-directional reset pin.

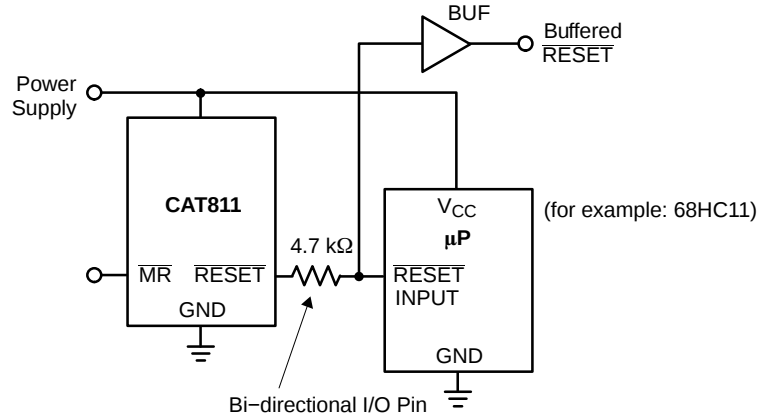


Figure 9. Bi-directional Reset Pin Interfacing

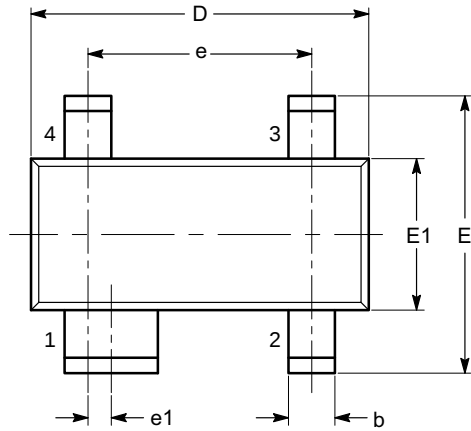
Table 5. OTHER SUPERVISORY PRODUCTS

| Function                          | CAT1161/3          | CAT1162            | CAT809                | CAT810                | CAT811        |
|-----------------------------------|--------------------|--------------------|-----------------------|-----------------------|---------------|
| With 16k Bit Serial EEPROM Memory | ✓                  | ✓                  |                       |                       |               |
| Watchdog Timer                    | ✓                  |                    |                       |                       |               |
| Manual Reset Input                | ✓                  | ✓                  |                       |                       | ✓             |
| Active Low Reset                  |                    |                    | ✓                     |                       | ✓             |
| Active High Reset                 |                    |                    |                       | ✓                     |               |
| Dual Polarity Reset Outputs       | ✓                  | ✓                  |                       |                       |               |
| Package                           | 8-pin DIP and SOIC | 8-pin DIP and SOIC | 3-pin SOT-23 and SC70 | 3-pin SOT-23 and SC70 | 4-pin SOT-143 |

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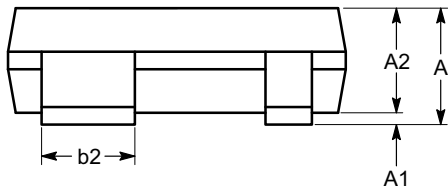
## PACKAGE DIMENSIONS

SOT-143, 4 Lead  
CASE 527AF-01  
ISSUE A

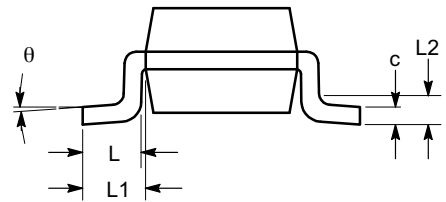


TOP VIEW

| SYMBOL   | MIN      | NOM  | MAX  |
|----------|----------|------|------|
| A        | 0.80     |      | 1.22 |
| A1       | 0.05     |      | 0.15 |
| A2       | 0.75     | 0.90 | 1.07 |
| b        | 0.30     |      | 0.50 |
| b2       | 0.76     |      | 0.89 |
| c        | 0.08     |      | 0.20 |
| D        | 2.80     | 2.90 | 3.04 |
| E        | 2.10     |      | 2.64 |
| E1       | 1.20     | 1.30 | 1.40 |
| e        | 1.92 BSC |      |      |
| e1       | 0.20 BSC |      |      |
| L        | 0.40     | 0.50 | 0.60 |
| L1       | 0.54 REF |      |      |
| L2       |          | 0.25 |      |
| $\theta$ | 0°       |      | 8°   |



SIDE VIEW



END VIEW

### Notes:

- (1) All dimensions are in millimeters. Angles in degrees.
- (2) Complies with JEDEC TO-253.

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## ORDERING INFORMATION

| Order Number   | Voltage | Top Mark (Note 4) | Output       | Reset | Package   | Quantity per Reel (Note 5) |
|----------------|---------|-------------------|--------------|-------|-----------|----------------------------|
| NiPdAu         |         | NiPdAu            |              |       |           |                            |
| CAT811LTBI-GT3 | 4.63 V  | VEA               | Manual Reset | LOW   | SOT-143-4 | 3,000                      |
| CAT811MTBI-GT3 | 4.38 V  | VEA               |              |       |           |                            |
| CAT811JTBI-GT3 | 4.00 V  | VEA               |              |       |           |                            |
| CAT811TTBI-GT3 | 3.08 V  | VEA               |              |       |           |                            |
| CAT811STBI-GT3 | 2.93 V  | VEA               |              |       |           |                            |
| CAT811RTBI-GT3 | 2.63 V  | VEA               |              |       |           |                            |
| CAT811ZTBI-GT3 | 2.32 V  | VEA               |              |       |           |                            |

- Threshold and full part numbers will be provided on box and reel labels as well as all Shipping documents.
- 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.
- For detailed information and a breakdown of device nomenclature and numbering systems, please see the ON Semiconductor Device Nomenclature document, TND310/D, available at [www.onsemi.com](http://www.onsemi.com)

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