

# 3-Pin Microprocessor Power Supply Supervisors

## CAT803, CAT809, CAT810

### Description

The CAT803, CAT809, and CAT810 are supervisory circuits that monitor power supplies in digital systems. The CAT803, CAT809, and CAT810 are direct replacements for the MAX803, MAX809 and MAX810 in applications operating over the industrial temperature range.

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 CAT803 has an open-drain  $\overline{\text{RESET}}$  output (active LOW). The CAT803 requires a pull-up resistor on the reset output.

The CAT809 features a push-pull  $\overline{\text{RESET}}$  output (active LOW) and the CAT810 features a push-pull RESET output (active HIGH).

Fast transients on the power supply are ignored and the output is guaranteed to be in the correct state at  $V_{CC}$  levels as low as 1.0 V.

The CAT803, CAT809, and CAT810 are available in both the compact 3-pin SOT-23 and SC-70 packages.

### Features

- Precision Monitoring of
  - +5.0 V (–5%, –10%, –20%),
  - +3.3 V (–5%, –10%),
  - +3.0 V (–10%) and
  - +2.5 V (–5%) Power Supplies
- Offered in Three Output Configurations:
  - CAT803: Open-Drain Active LOW Reset
  - CAT809: Push-Pull Active LOW Reset
  - CAT810: Push-Pull Active HIGH Reset
- Direct Replacements for the MAX803, MAX809 and MAX810 in Applications Operating over the Industrial Temperature Range
- Reset Valid down to  $V_{CC} = 1.0$  V
- 6  $\mu\text{A}$  Power Supply Current
- Power Supply Transient Immunity
- Industrial Temperature Range:  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
- Available in SOT-23 and SC-70 Packages
- These Devices are Pb-Free and are RoHS Compliant

### Applications

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

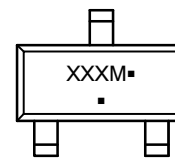


SOT-23  
TB SUFFIX  
CASE 527AG

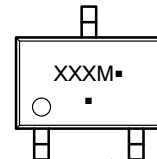


SC-70  
SD SUFFIX  
CASE 419AB

### MARKING DIAGRAMS



SOT-23

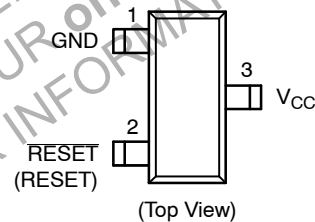


SC-70

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

(Note: Microdot may be in either location)

### PIN CONFIGURATION



3-Lead SOT23  
3-Lead SC70

CAT803  
CAT809  
(CAT810)

### ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 8 of this data sheet.

# CAT803, CAT809, CAT810

**Table 1. THRESHOLD SUFFIX SELECTOR**

| Nominal Threshold Voltage | Threshold Suffix Designation |
|---------------------------|------------------------------|
| 4.63 V                    | L                            |
| 4.38 V                    | M                            |
| 4.00 V                    | J                            |
| 3.08 V                    | T                            |
| 2.93 V                    | S                            |
| 2.63 V                    | R                            |
| 2.32 V                    | Z                            |

**Table 2. PIN DESCRIPTIONS**

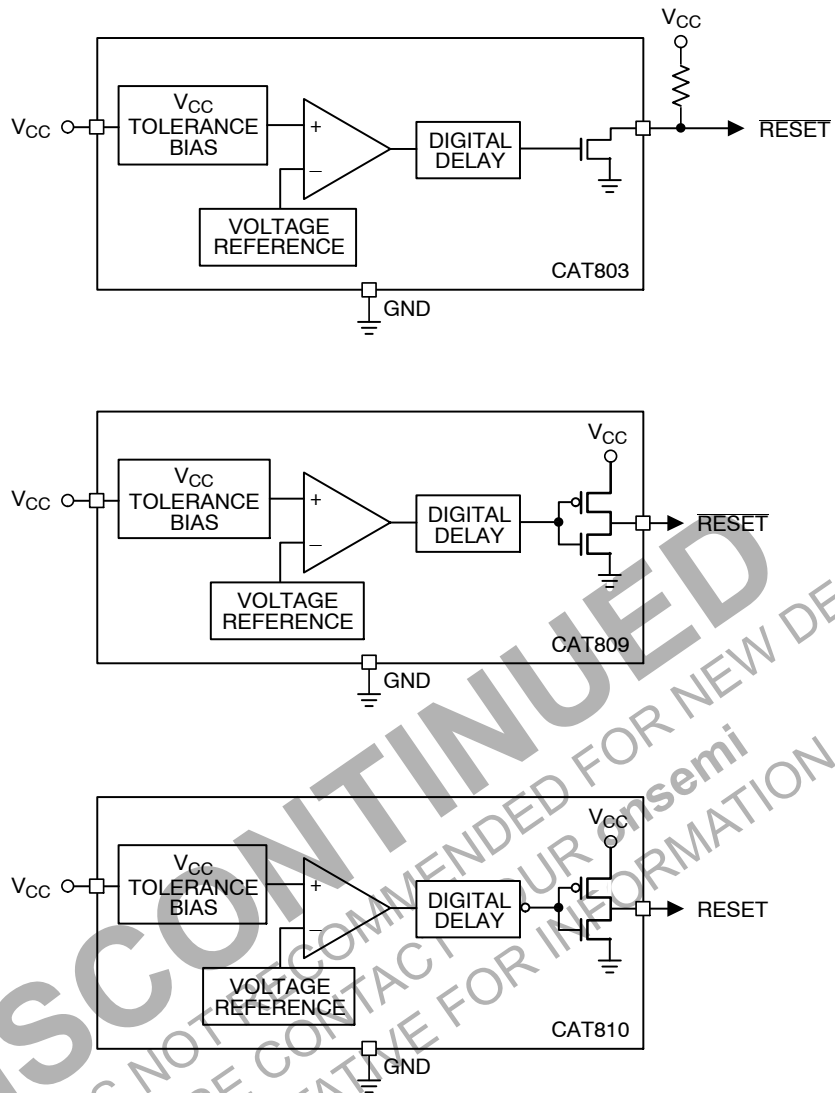
| Pin Number |        |        | Name     | Description                                                                                                                                                           |
|------------|--------|--------|----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CAT803     | CAT809 | CAT810 |          |                                                                                                                                                                       |
| 1          | 1      | 1      | GND      | Ground                                                                                                                                                                |
| 2          | 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.   |
| –          | –      | 2      | RESET    | Active HIGH reset. RESET is asserted if $V_{CC}$ falls below the reset threshold and remains high for at least 140 ms after $V_{CC}$ rises above the reset threshold. |
| 3          | 3      | 3      | $V_{CC}$ | Power supply voltage that is monitored.                                                                                                                               |

**Table 3. ABSOLUTE MAXIMUM RATINGS**

| Parameter                                                                                                                                             | Rating       | Units        |
|-------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|--------------|
| Any pin with respect to ground                                                                                                                        | –0.3 to +6.0 | V            |
| Input Current, $V_{CC}$                                                                                                                               | 20           | mA           |
| Output Current, RESET, $\overline{\text{RESET}}$                                                                                                      | 20           | mA           |
| Rate of Rise, $V_{CC}$                                                                                                                                | 100          | V/ $\mu$ s   |
| Continuous Power Dissipation<br>Derate 2.2 mW/ $^{\circ}$ C above 70 $^{\circ}$ C (SC–70)<br>Derate 4 mW/ $^{\circ}$ C above 70 $^{\circ}$ C (SOT–23) | 175<br>320   | mW           |
| Operating Temperature Range                                                                                                                           | –40 to +85   | $^{\circ}$ C |
| Storage Temperature Range                                                                                                                             | –65 to +105  | $^{\circ}$ C |
| Lead Soldering Temperature (10 sec)                                                                                                                   | 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.

# CAT803, CAT809, CAT810



**Figure 1. Block Diagrams**

# CAT803, CAT809, CAT810

**Table 4. ELECTRICAL CHARACTERISTICS**

( $V_{CC}$  = Full range,  $T_A$  =  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$ , unless otherwise specified. Typical values at  $T_A$  =  $+25^{\circ}\text{C}$  and  $V_{CC}$  = 5 V for the L/M/J versions,  $V_{CC}$  = 3.3 V for the T/S versions,  $V_{CC}$  = 3 V for the R version and  $V_{CC}$  = 2.5 V for the Z versions.)

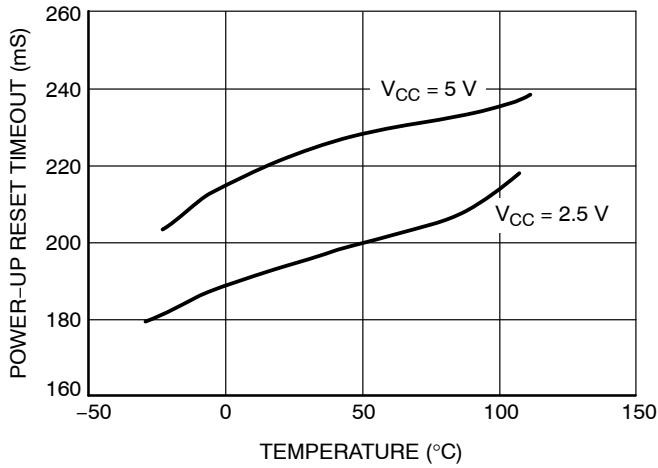
| Symbol   | Parameter                                                                                           | Conditions                                                                               | Min                                                    | Typ<br>(Note 1) | Max  | Units                   |
|----------|-----------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|--------------------------------------------------------|-----------------|------|-------------------------|
|          | $V_{CC}$ 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                                                                                      | $T_A$ = $-40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$                                   |                                                        | 8               | 20   | $\mu\text{A}$           |
|          |                                                                                                     | $V_{CC} < 5.5\text{ V}$ , J/L/M/H<br>$V_{CC} < 3.6\text{ V}$ , R/S/T/Z/V                 |                                                        | 6               | 15   |                         |
| $V_{TH}$ | Reset Threshold Voltage                                                                             | L Threshold                                                                              | $T_A$ = $+25^{\circ}\text{C}$                          | 4.56            | 4.63 | V                       |
|          |                                                                                                     |                                                                                          | $T_A$ = $-40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ | 4.50            | 4.75 |                         |
|          |                                                                                                     | M Threshold                                                                              | $T_A$ = $+25^{\circ}\text{C}$                          | 4.31            | 4.38 |                         |
|          |                                                                                                     |                                                                                          | $T_A$ = $-40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ | 4.25            | 4.50 |                         |
|          |                                                                                                     | J Threshold                                                                              | $T_A$ = $+25^{\circ}\text{C}$                          | 3.93            | 4.00 |                         |
|          |                                                                                                     |                                                                                          | $T_A$ = $-40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ | 3.89            | 4.10 |                         |
|          |                                                                                                     | T Threshold                                                                              | $T_A$ = $+25^{\circ}\text{C}$                          | 3.04            | 3.08 |                         |
|          |                                                                                                     |                                                                                          | $T_A$ = $-40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ | 3.00            | 3.15 |                         |
|          |                                                                                                     | S Threshold                                                                              | $T_A$ = $+25^{\circ}\text{C}$                          | 2.89            | 2.93 |                         |
|          |                                                                                                     |                                                                                          | $T_A$ = $-40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ | 2.85            | 3.00 |                         |
|          |                                                                                                     | R Threshold                                                                              | $T_A$ = $+25^{\circ}\text{C}$                          | 2.59            | 2.63 |                         |
|          |                                                                                                     |                                                                                          | $T_A$ = $-40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ | 2.55            | 2.70 |                         |
|          |                                                                                                     | Z Threshold                                                                              | $T_A$ = $+25^{\circ}\text{C}$                          | 2.28            | 2.32 |                         |
|          |                                                                                                     |                                                                                          | $T_A$ = $-40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ | 2.25            | 2.38 |                         |
|          | Reset Threshold Tempco                                                                              |                                                                                          |                                                        | 30              |      | ppm/ $^{\circ}\text{C}$ |
| $T_D$    | $V_{CC}$ to Reset Delay (Note 2)                                                                    | $V_{CC} = V_{TH}$ to $(V_{TH} - 100\text{ mV})$                                          |                                                        | 20              |      | $\mu\text{s}$           |
| $T_R$    | Reset Active Timeout Period                                                                         | $T_A$ = $-40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$                                   | 140                                                    | 240             | 460  | ms                      |
| $V_{OL}$ | RESET Output Voltage Low<br>(Open-drain active LOW,<br>CAT803 and push-pull,<br>active LOW, CAT809) | $V_{CC} = V_{TH}\text{ min}$ , $I_{SINK} = 1.2\text{ mA}$<br>CAT803S, CAT809R/S/T/Z      |                                                        |                 | 0.3  | V                       |
|          |                                                                                                     | $V_{CC} = V_{TH}\text{ min}$ , $I_{SINK} = 3.2\text{ mA}$<br>CAT809J/L/M                 |                                                        |                 | 0.4  |                         |
|          |                                                                                                     | $V_{CC} > 1.0\text{ V}$ , $I_{SINK} = 50\text{ }\mu\text{A}$                             |                                                        |                 | 0.3  |                         |
| $V_{OH}$ | RESET Output Voltage High<br>(Push-pull, active LOW,<br>CAT809)                                     | $V_{CC} = V_{TH}\text{ max}$ , $I_{SOURCE} = 500\text{ }\mu\text{A}$<br>CAT809R/S/T/Z    | $0.8 V_{CC}$                                           |                 |      | V                       |
|          |                                                                                                     | $V_{CC} = V_{TH}\text{ max}$ , $I_{SOURCE} = 800\text{ }\mu\text{A}$<br>CAT809J/L/M      | $V_{CC} - 1.5$                                         |                 |      |                         |
| $V_{OL}$ | RESET Output Voltage Low<br>(Push-pull, active HIGH,<br>CAT810)                                     | $V_{CC} > V_{TH}\text{ max}$ , $I_{SINK} = 1.2\text{ mA}$<br>CAT810T                     |                                                        |                 | 0.3  | V                       |
| $V_{OH}$ | RESET Output Voltage High<br>(Push-pull, active HIGH,<br>CAT810)                                    | $1.8\text{ V} < V_{CC}$ , $V_{TH}\text{ min}$ ,<br>$I_{SOURCE} = 150\text{ }\mu\text{A}$ | $0.8 V_{CC}$                                           |                 |      | V                       |

1. Production testing done at  $T_A$  =  $+25^{\circ}\text{C}$ ; limits over temperature guaranteed by design only.
2. RESET output for the CAT809; RESET output for the CAT810.

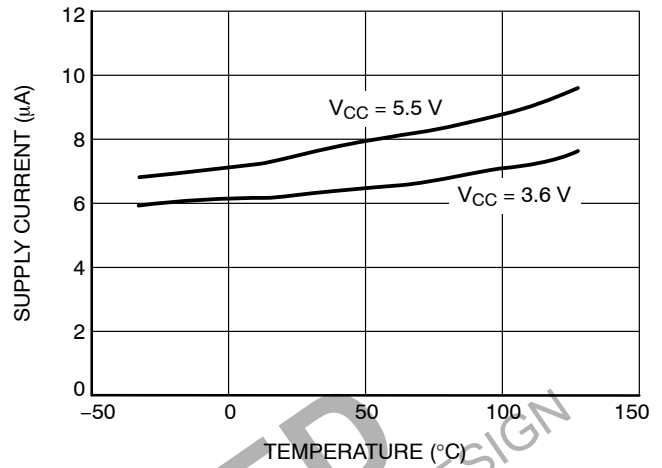
# CAT803, CAT809, CAT810

## TYPICAL OPERATING CHARACTERISTICS

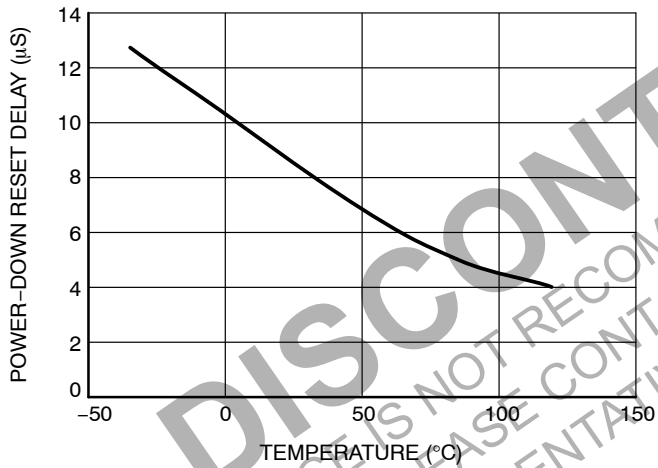
( $V_{CC}$  = Full range,  $T_A$  =  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$ , unless otherwise specified. Typical values at  $T_A$  =  $+25^{\circ}\text{C}$  and  $V_{CC}$  = 5 V for the L/M/J versions,  $V_{CC}$  = 3.3 V for the T/S versions,  $V_{CC}$  = 3 V for the R version and  $V_{CC}$  = 2.5 V for the Z version.)



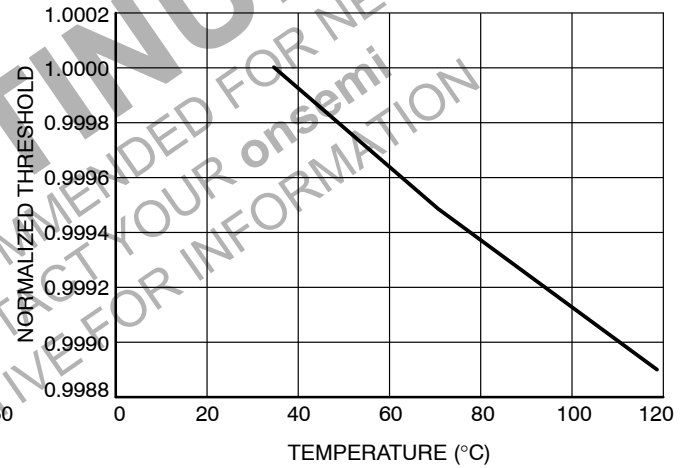
**Figure 2. Power-up Reset Timeout vs. Temperature**



**Figure 3. Supply Current vs. Temperature (No Load, CAT8xxR/S/T/Z)**



**Figure 4. Power-down Reset Delay vs. Temperature (CAT8xxR/S/T/Z)**



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

## Detailed Descriptions

### Reset Timing

The reset signal is asserted LOW for the CAT803/CAT809 and HIGH for the CAT810 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.

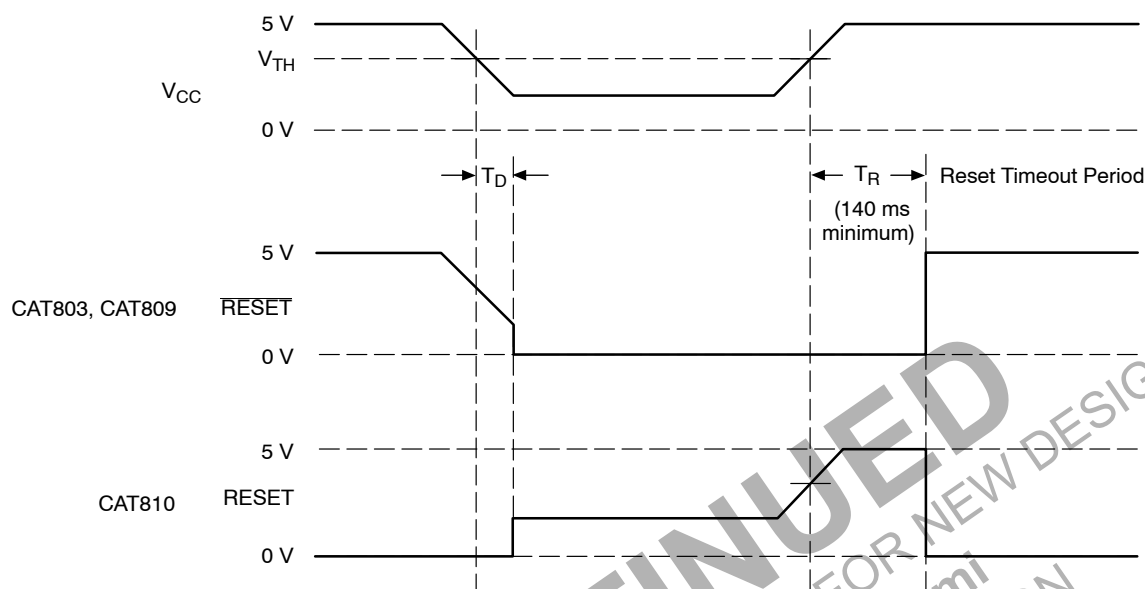


Figure 6. Reset Timing Diagram

### VCC Transient Response

The CAT803/CAT809/CAT810 protect  $\mu$ Ps against brownout failure. Short duration transients of 4  $\mu$ sec 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 ( $V_{TH} - V_{CC}$ ).

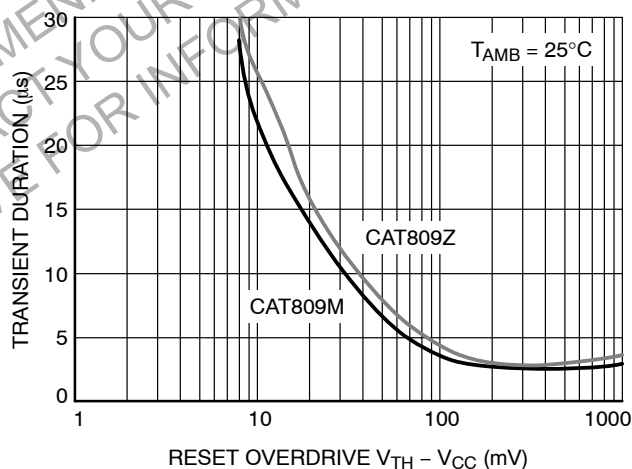


Figure 7. Maximum Transient Duration without Causing a Reset Pulse vs. Reset Comparator Overdrive

## CAT803, CAT809, CAT810

### Valid RESET with $V_{CC}$ Under 1.0 V

To ensure that the CAT809 RESET pin is in a known state when  $V_{CC}$  is under 1.0 V, a  $>10\text{ k}\Omega$  pull-down resistor between RESET pin and GND is recommended. For the CAT810, a pull-up resistor from RESET pin to  $V_{CC}$  is needed.

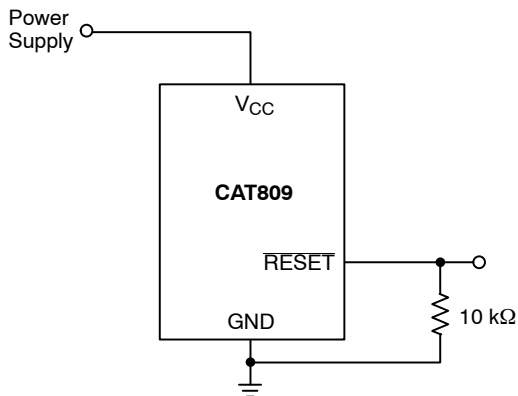


Figure 8. RESET Valid with  $V_{CC}$  Under 1.0 V

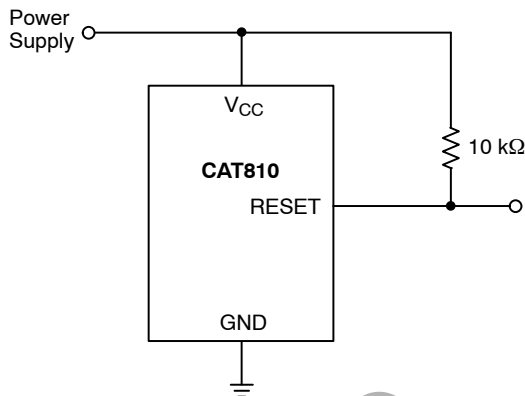


Figure 9. RESET Valid with  $V_{CC}$  Under 1.1 V

### Bi-directional Reset Pin Interfacing

The CAT809/810 can interface with  $\mu\text{P}/\mu\text{C}$  bi-directional reset pins by connecting a  $4.7\text{ k}\Omega$  resistor in series with the CAT809/810 reset output and the  $\mu\text{P}/\mu\text{C}$  bi-directional reset pin.

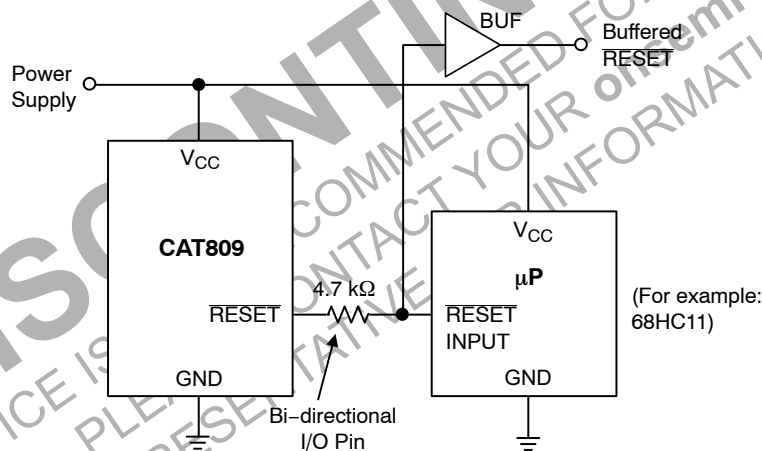


Figure 10. Bi-directional Reset Pin Interfacing

### CAT803 Open-Drain RESET Application

The CAT803 features an open-drain RESET output and therefore needs a pull-up resistor on the output for proper operation, as shown on Figure 11. An advantage of the open-drain output includes the ability to “wire AND” several outputs together to form an inexpensive logic circuit. It is also possible to have the pull-up resistor connected to a different supply which can be higher than the CAT803  $V_{CC}$  pin. The value of the pull-up resistor is not critical in most applications, typical values being between  $5\text{ k}\Omega$  and  $10\text{ k}\Omega$ .

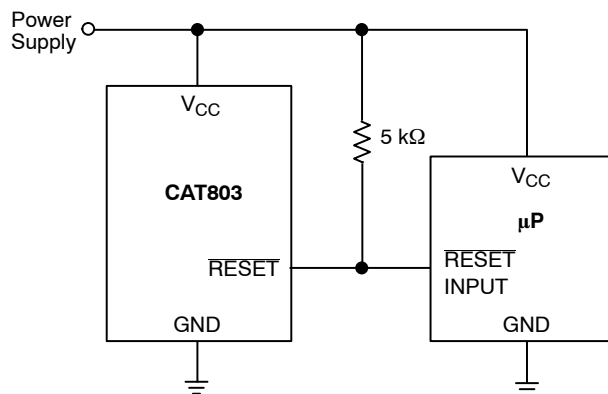


Figure 11. Typical CAT803 Open-Drain Circuit Configuration

# CAT803, CAT809, CAT810

**Table 5. ORDERING PART NUMBER**

| Order Number   |         | Top Mark<br>(Note 3) |            |       |                                |                       |
|----------------|---------|----------------------|------------|-------|--------------------------------|-----------------------|
| NiPdAu         | Voltage | NiPdAu               | Output     | Reset | Package                        | Shipping <sup>†</sup> |
| CAT803SSDI-GT3 | 2.93 V  | VKA                  | Open Drain | LOW   | SC-70<br>(Pb-Free/Halide Free) | 3000 / Tape & Reel    |

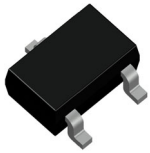
|                |        |     |                     |     |                                 |                    |
|----------------|--------|-----|---------------------|-----|---------------------------------|--------------------|
| CAT809LTBI-GT3 | 4.63 V | VLA | CMOS /<br>Push-Pull | LOW | SOT-23<br>(Pb-Free/Halide Free) | 3000 / Tape & Reel |
| CAT809MTBI-GT3 | 4.38 V | VLA |                     |     |                                 |                    |
| CAT809JTBI-GT3 | 4.00 V | VLA |                     |     |                                 |                    |
| CAT809TTBI-GT3 | 3.08 V | VLA |                     |     |                                 |                    |
| CAT809STBI-GT3 | 2.93 V | VLA |                     |     |                                 |                    |
| CAT809RTBI-GT3 | 2.63 V | VLA |                     |     |                                 |                    |
| CAT809ZTBI-GT3 | 2.32 V | VLA |                     |     |                                 |                    |

|                |        |     |                     |      |                                 |                    |
|----------------|--------|-----|---------------------|------|---------------------------------|--------------------|
| CAT810TTBI-GT3 | 3.08 V | VHA | CMOS /<br>Push-Pull | HIGH | SOT-23<br>(Pb-Free/Halide Free) | 3000 / Tape & Reel |
|----------------|--------|-----|---------------------|------|---------------------------------|--------------------|

†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](#).

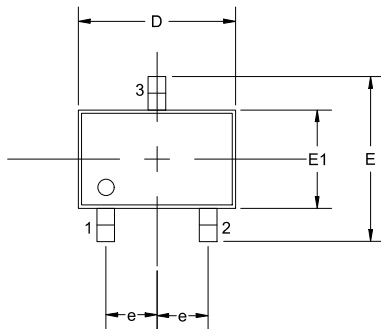
3. Threshold and full part numbers will be provided on box and reel labels as well as all Shipping documents.

4. For detailed information and a breakdown of device nomenclature and numbering systems, please see the **onsemi** Device Nomenclature document, [TND310/D](#).

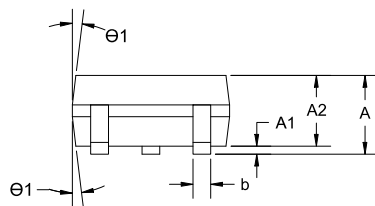


SC-70, 3 Lead, 1.25x2  
CASE 419AB  
ISSUE A

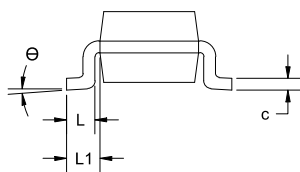
DATE 13 FEB 2023



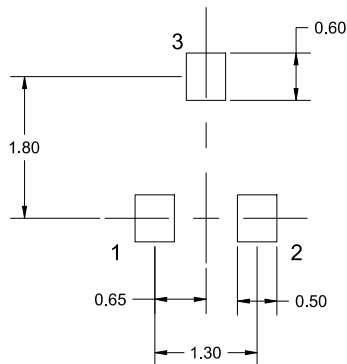
TOP VIEW



SIDE VIEW



END VIEW



SOLDERING FOOTPRINT

NOTES:

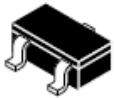
1. ALL DIMENSIONS ARE IN MILLIMETERS. ANGLES IN DEGREES.
2. COMPLIES WITH JEDEC MO-203

| DIM | MILLIMETERS |      |      |
|-----|-------------|------|------|
|     | 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    |      |      |
| Θ   | 0°          |      | 8°   |
| Θ1  | 4°          |      | 10°  |

\* For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

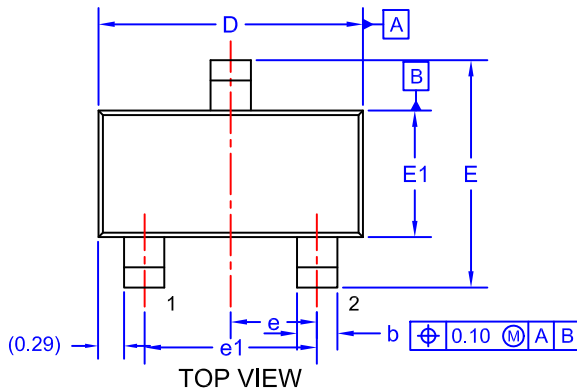
|                  |                       |                                                                                                                                                                                     |
|------------------|-----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DOCUMENT NUMBER: | 98AON34256E           | Electronic versions are uncontrolled except when accessed directly from the Document Repository.<br>Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red. |
| DESCRIPTION:     | SC-70, 3 LEAD, 1.25X2 | PAGE 1 OF 1                                                                                                                                                                         |

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**SOT-23/SUPERSOT™ –23, 3 LEAD, 1.4x2.9**  
**CASE 527AG**  
**ISSUE A**

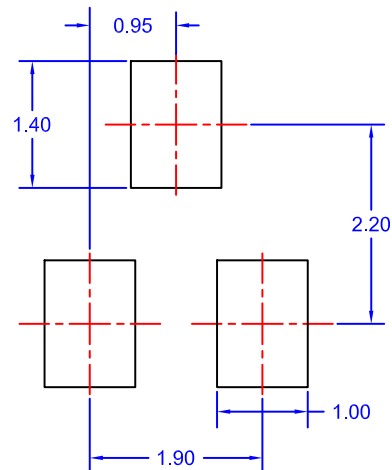
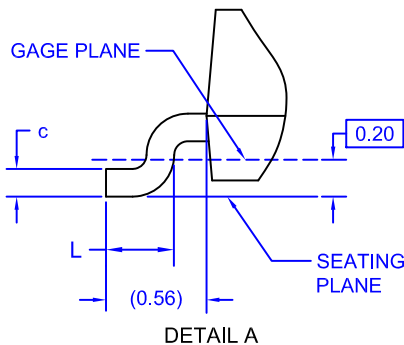
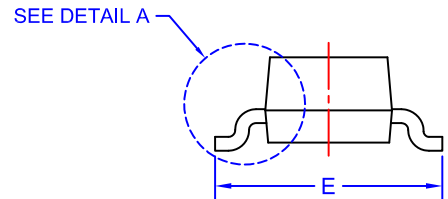
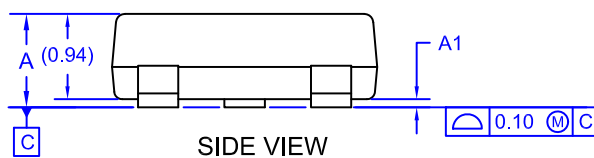
DATE 09 DEC 2019



NOTES: UNLESS OTHERWISE SPECIFIED

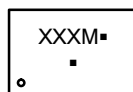
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2009.
2. ALL DIMENSIONS ARE IN MILLIMETERS.
3. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH AND TIE BAR EXTRUSIONS.

| DIM | MIN.     | NOM.  | MAX.  |
|-----|----------|-------|-------|
| A   | 0.85     | 0.95  | 1.12  |
| A1  | 0.00     | 0.05  | 0.10  |
| b   | 0.370    | 0.435 | 0.508 |
| c   | 0.085    | 0.150 | 0.180 |
| D   | 2.80     | 2.92  | 3.04  |
| E   | 2.31     | 2.51  | 2.71  |
| E1  | 1.20     | 1.40  | 1.52  |
| e   | 0.95 BSC |       |       |
| e1  | 1.90 BSC |       |       |
| L   | 0.33     | 0.38  | 0.43  |



\*FOR ADDITIONAL INFORMATION ON OUR Pb-FREE STRATEGY AND SOLDERING DETAILS, PLEASE DOWNLOAD THE ON SEMICONDUCTOR SOLDERING AND MOUNTING TECHNIQUES REFERENCE MANUAL, SOLDERM/D.

**GENERIC MARKING DIAGRAM\***



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

(Note: Microdot may be in either location)

\*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "▪", may or may not be present. Some products may not follow the Generic Marking.

|                         |                                            |                                                                                                                                                                                  |
|-------------------------|--------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
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| <b>DESCRIPTION:</b>     | <b>SOT-23/SUPERSOT-23, 3 LEAD, 1.4X2.9</b> | <b>PAGE 1 OF 1</b>                                                                                                                                                               |

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