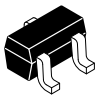
3-Pin Microprocessor Power Supply Supervisors

CAT803, CAT809, CAT810



SOT−23
TB SUFFIX
CASE 527AG

SC−70
SD SUFFIX
CASE 419AB

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.

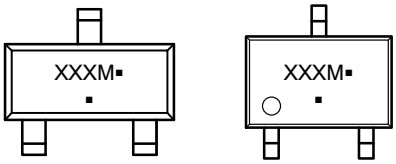
Features

- 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 μA Power Supply Current
- Power Supply Transient Immunity
- Industrial Temperature Range: −40°C to +85°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

MARKING DIAGRAMS

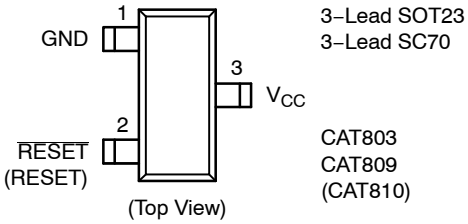


SOT−23 SC−70

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

(Note: Microdot may be in either location)

PIN CONFIGURATION



ORDERING INFORMATION

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

- PDAs and Handheld Equipment

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	–	$\overline{\text{RESET}}$	Active LOW reset. $\overline{\text{RESET}}$ 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/μs
Continuous Power Dissipation Derate 2.2 mW/°C above 70°C (SC−70) Derate 4 mW/°C above 70°C (SOT−23)	 175 320	mW
Operating Temperature Range	−40 to +85	°C
Storage Temperature Range	−65 to +105	°C
Lead Soldering Temperature (10 sec)	300	°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.

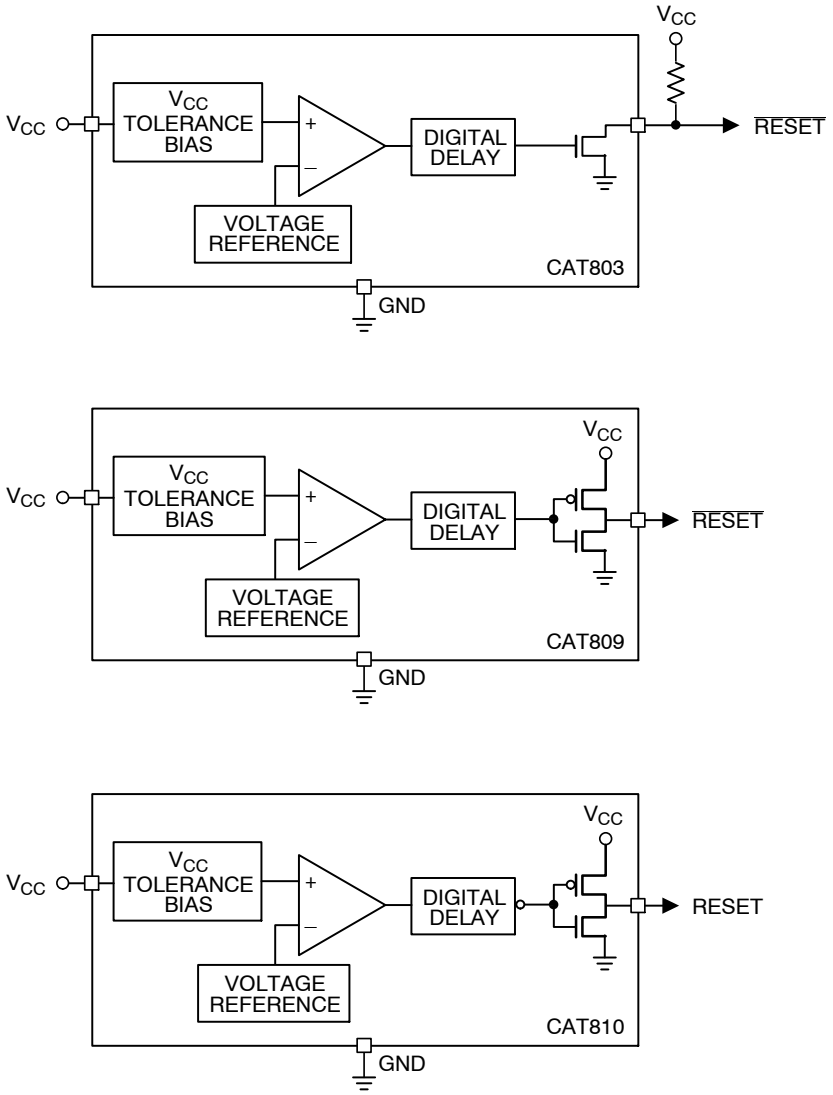


Figure 1. Block Diagrams

Table 4. ELECTRICAL CHARACTERISTICS
(V_{CC} = Full range, T_A = −40°C to +85°C, unless otherwise specified. Typical values at T_A = +25°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 (Note 1)	Max	Units
	V_{CC} Range	T_A = 0°C to +70°C		1.0		5.5	V
		T_A = −40°C to +85°C		1.2		5.5	
I_{CC}	Supply Current	T_A = −40°C to +85°C	V_{CC} < 5.5 V, J/L/M/H		8	20	μA
			V_{CC} < 3.6 V, R/S/T/Z/V		6	15	
V_{TH}	Reset Threshold Voltage	L Threshold	T_A = +25°C	4.56	4.63	4.70	V
			T_A = −40°C to +85°C	4.50		4.75	
		M Threshold	T_A = +25°C	4.31	4.38	4.45	
			T_A = −40°C to +85°C	4.25		4.50	
		J Threshold	T_A = +25°C	3.93	4.00	4.06	
			T_A = −40°C to +85°C	3.89		4.10	
		T Threshold	T_A = +25°C	3.04	3.08	3.11	
			T_A = −40°C to +85°C	3.00		3.15	
		S Threshold	T_A = +25°C	2.89	2.93	2.96	
			T_A = −40°C to +85°C	2.85		3.00	
		R Threshold	T_A = +25°C	2.59	2.63	2.66	
			T_A = −40°C to +85°C	2.55		2.70	
		Z Threshold	T_A = +25°C	2.28	2.32	2.35	
			T_A = −40°C to +85°C	2.25		2.38	
	Reset Threshold Tempco				30		ppm/°C
T_D	V_{CC} to Reset Delay (Note 2)	V_{CC} = V_{TH} to (V_{TH} − 100 mV)			20		μs
T_R	Reset Active Timeout Period	T_A = −40°C to +85°C		140	240	460	ms
V_{OL}	$\overline{\text{RESET}}$ Output Voltage Low (Open−drain active LOW, CAT803 and push−pull, active LOW, CAT809)	V_{CC} = V_{TH} min, I_{SINK} = 1.2 mA CAT803S, CAT809R/S/T/Z				0.3	V
		V_{CC} = V_{TH} min, I_{SINK} = 3.2 mA CAT809J/L/M				0.4	
		V_{CC} > 1.0 V, I_{SINK} = 50 μA				0.3	
V_{OH}	$\overline{\text{RESET}}$ Output Voltage High (Push−pull, active LOW, CAT809)	V_{CC} = V_{TH} max, I_{SOURCE} = 500 μA CAT809R/S/T/Z		0.8 V_{CC}			V
		V_{CC} = V_{TH} max, I_{SOURCE} = 800 μA CAT809J/L/M		V_{CC} − 1.5			
V_{OL}	RESET Output Voltage Low (Push−pull, active HIGH, CAT810)	V_{CC} > V_{TH} max, I_{SINK} = 1.2 mA CAT810T				0.3	V
V_{OH}	RESET Output Voltage High (Push−pull, active HIGH, CAT810)	1.8 V < V_{CC} V_{TH} min, I_{SOURCE} = 150 μA		0.8 V_{CC}			V

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

TYPICAL OPERATING CHARACTERISTICS

(V_{CC} = Full range, T_A = −40°C to +85°C, unless otherwise specified. Typical values at T_A = +25°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.)

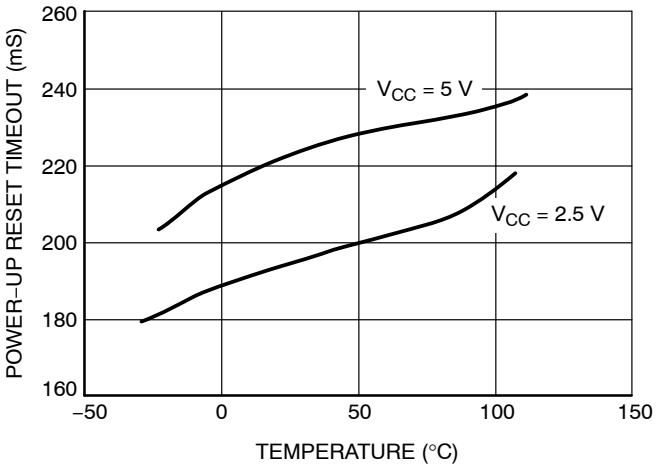


Figure 2. Power−up Reset Timeout vs. Temperature

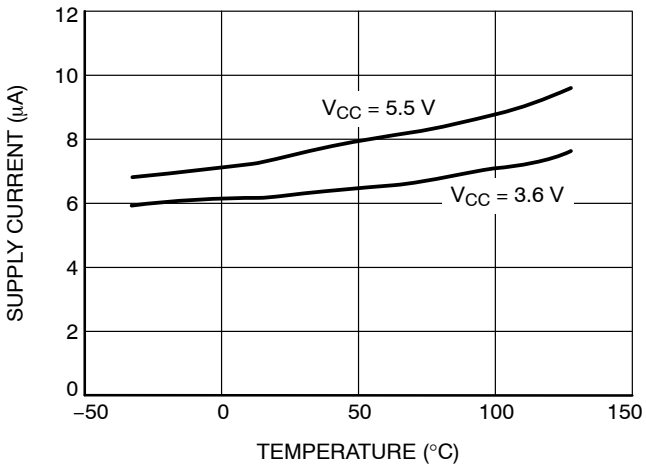


Figure 3. Supply Current vs. Temperature (No Load, CAT8xxR/S/T/Z)

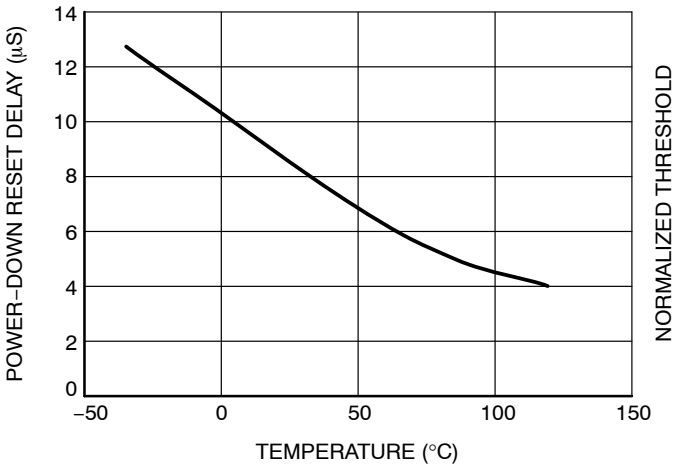


Figure 4. Power−down Reset Delay vs. Temperature (CAT8xxR/S/T/Z)

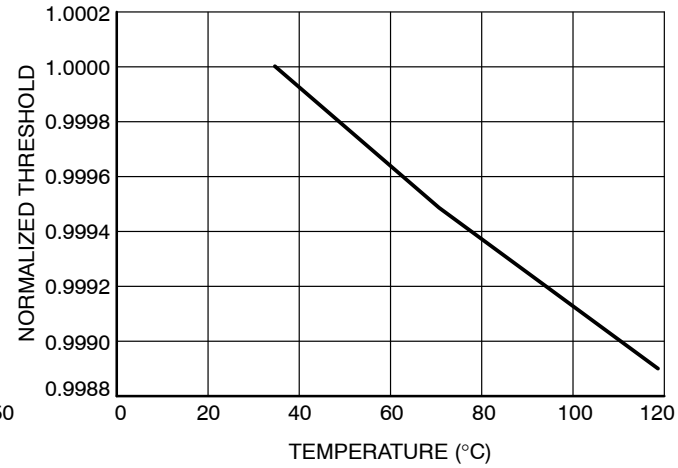


Figure 5. Normalized Reset Threshold vs. Temperature

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.

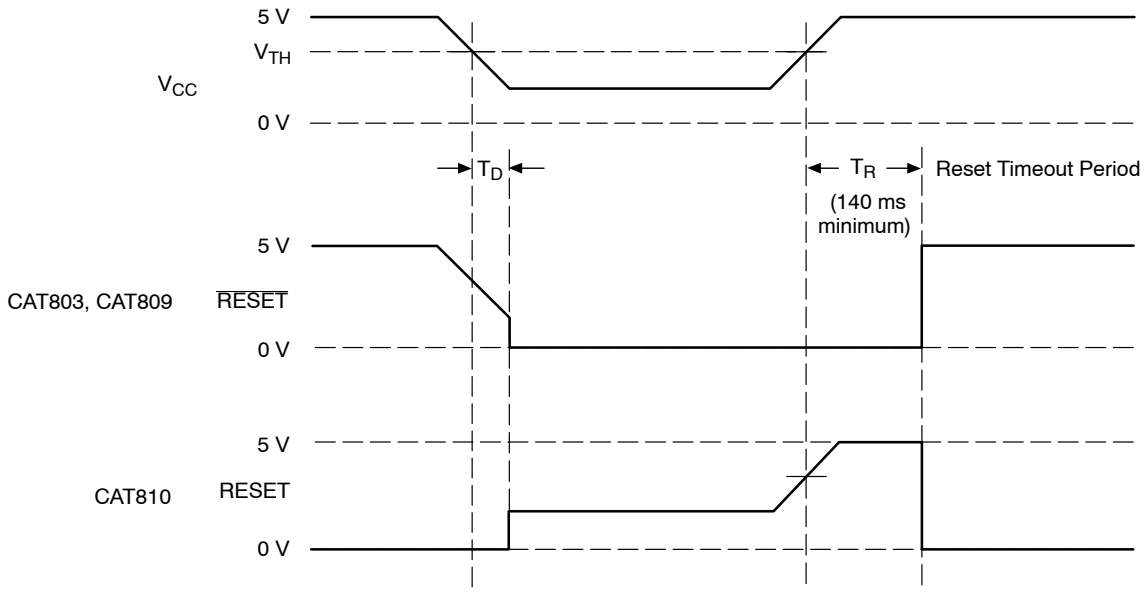


Figure 6. Reset Timing Diagram

V_{CC} Transient Response

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

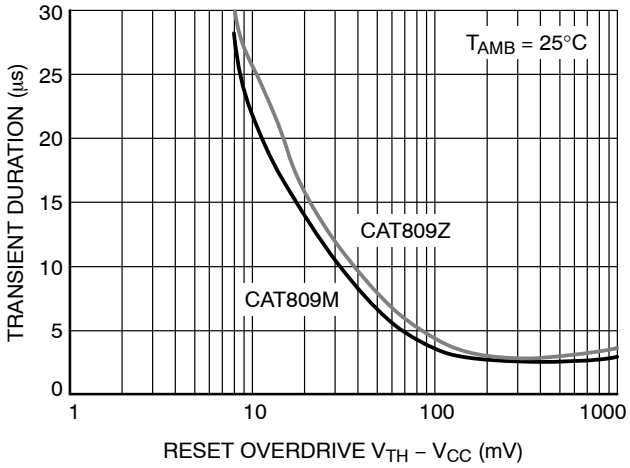


Figure 7. Maximum Transient Duration without Causing a Reset Pulse vs. Reset Comparator Overdrive

Valid RESET with V_{CC} Under 1.0 V

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

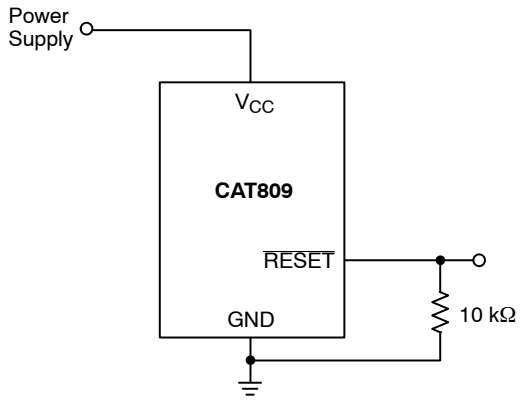


Figure 8. $\overline{\text{RESET}}$ Valid with V_{CC} Under 1.0 V

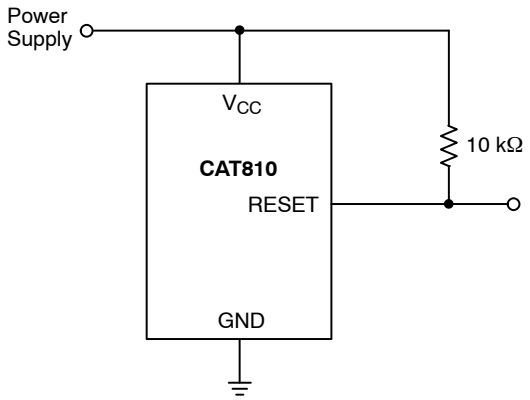


Figure 9. RESET Valid with V_{CC} Under 1.1 V

Bi−directional Reset Pin Interfacing

The CAT809/810 can interface with μP/μC bi−directional reset pins by connecting a 4.7 kΩ resistor in series with the CAT809/810 reset output and the μP/μC bi−directional reset pin.

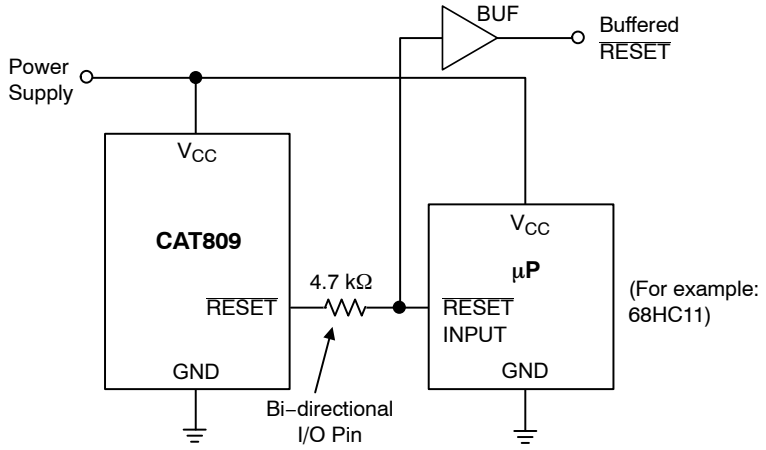


Figure 10. Bi−directional Reset Pin Interfacing

CAT803 Open−Drain $\overline{\text{RESET}}$ 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 kΩ and 10 kΩ.

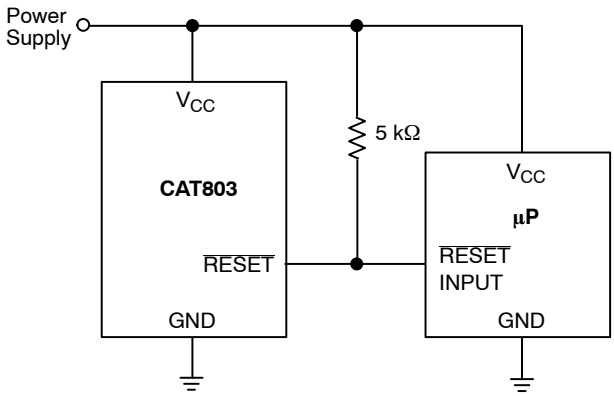


Figure 11. Typical CAT803 Open−Drain Circuit Configuration

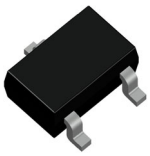
Table 5. ORDERING PART NUMBER

Order Number NiPdAu	Voltage	Top Mark (Note 3) NiPdAu	Output	Reset	Package	Shipping†
CAT803SSDI−GT3	2.93 V	VKA	Open Drain	LOW	SC−70 (Pb−Free/Halide Free)	3000 / Tape & Reel
CAT809LTBI−GT3	4.63 V	VLA	CMOS / Push−Pull	LOW	SOT−23 (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 / Push−Pull	HIGH	SOT−23 (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.

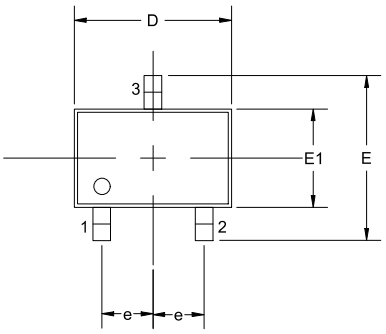
3. Threshold and full part numbers will be provided on box and reel labels as well as all Shipping documents.
4. For detailed information and a breakdown of device nomenclature and numbering systems, please see the **onsemi** Device Nomenclature document, TND310/D,

MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS

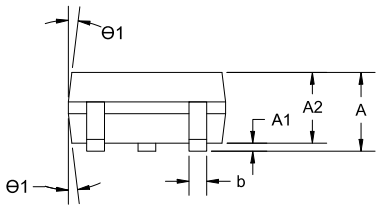


SC−70, 3 Lead, 1.25x2
CASE 419AB
ISSUE A

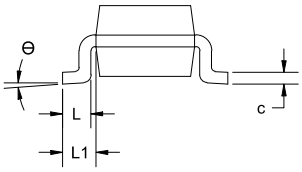
DATE 13 FEB 2023



TOP VIEW



SIDE VIEW

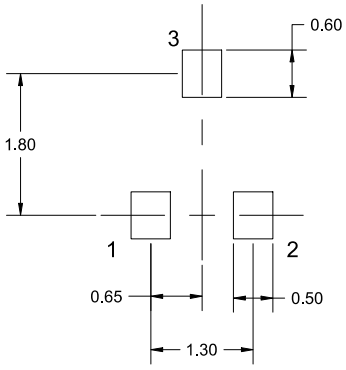


END VIEW

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°



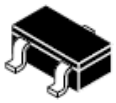
SOLDERING FOOTPRINT

* 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. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.
DESCRIPTION:	SC−70, 3 LEAD, 1.25X2	PAGE 1 OF 1

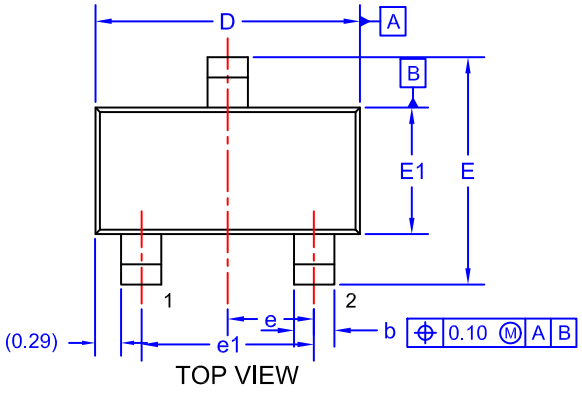
MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS

ON Semiconductor®



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

DATE 09 DEC 2019

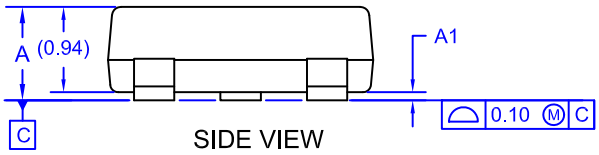


TOP VIEW

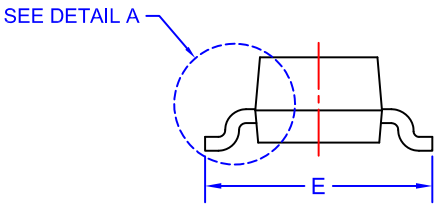
NOTES: UNLESS OTHERWISE SPECIFIED

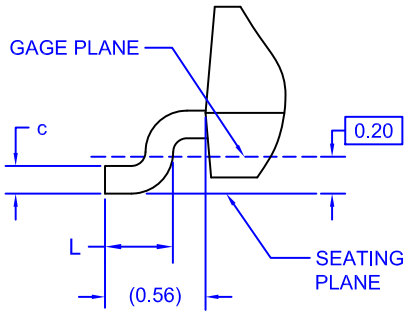
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2009.
2. ALL DIMENSIONS ARE IN MILLIMETERS.
3. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH AND TIE BAR EXTRUSIONS.

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

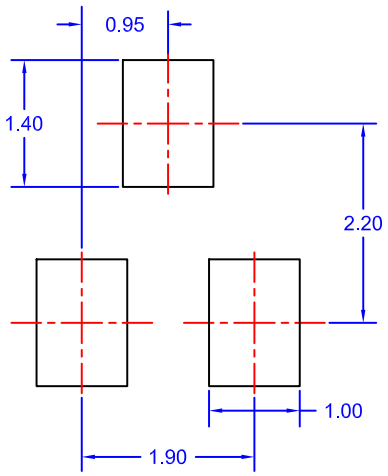


SIDE VIEW





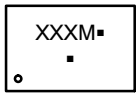
DETAIL A



LAND PATTERN RECOMMENDATION*

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

DOCUMENT NUMBER:	**98AON34319E**	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped “CONTROLLED COPY” in red.
DESCRIPTION:	**SOT−23/SUPERSOT−23, 3 LEAD, 1.4X2.9**	**PAGE 1 OF 1**

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Email Requests to: orderlit@onsemi.com

onsemi Website: www.onsemi.com

TECHNICAL SUPPORT
North American Technical Support:
Voice Mail: 1 800−282−9855 Toll Free USA/Canada
Phone: 011 421 33 790 2910

Europe, Middle East and Africa Technical Support:
Phone: 00421 33 790 2910
For additional information, please contact your local Sales Representative

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