CAT803, CAT809, CAT810

3-Pin Microprocessor Power Supply Supervisors

ON Semiconductor®

http://onsemi.com

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, AE^2™ 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.

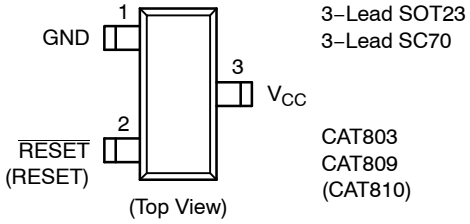
Features

- 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
- PDAs and Handheld Equipment

PIN CONFIGURATION



MARKING INFORMATION

Device (Note 1)	**SOT−23 RoHS NiPdAu Finish** (Notes 2, 3)	**SC70 RoHS NiPdAu Finish** (Notes 2, 3)
CAT803x	RNYM	RN_
CAT809x (Note 4)	NRYM	NR_
CAT810x	NSYM	NS_

1. All threshold trip level options have the same marking.
2. The “YM” in the SOT−23 package marking indicates the Year and Month of production and the “_” in the SC70 package marking indicates the assembly location.
3. All NiPdAu devices will be marked to indicate product type and package. Threshold and full part numbers will be provided on box and reel labels as well as all Shipping documents.
4. CAT809V is available only in the SOT−23 package and the Top Markings for this package is SKYM.

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 11 of this data sheet.

Table 1. THRESHOLD SUFFIX SELECTOR

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

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 (SC70) Derate 4 mW/°C above 70°C (SOT23)	 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 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.

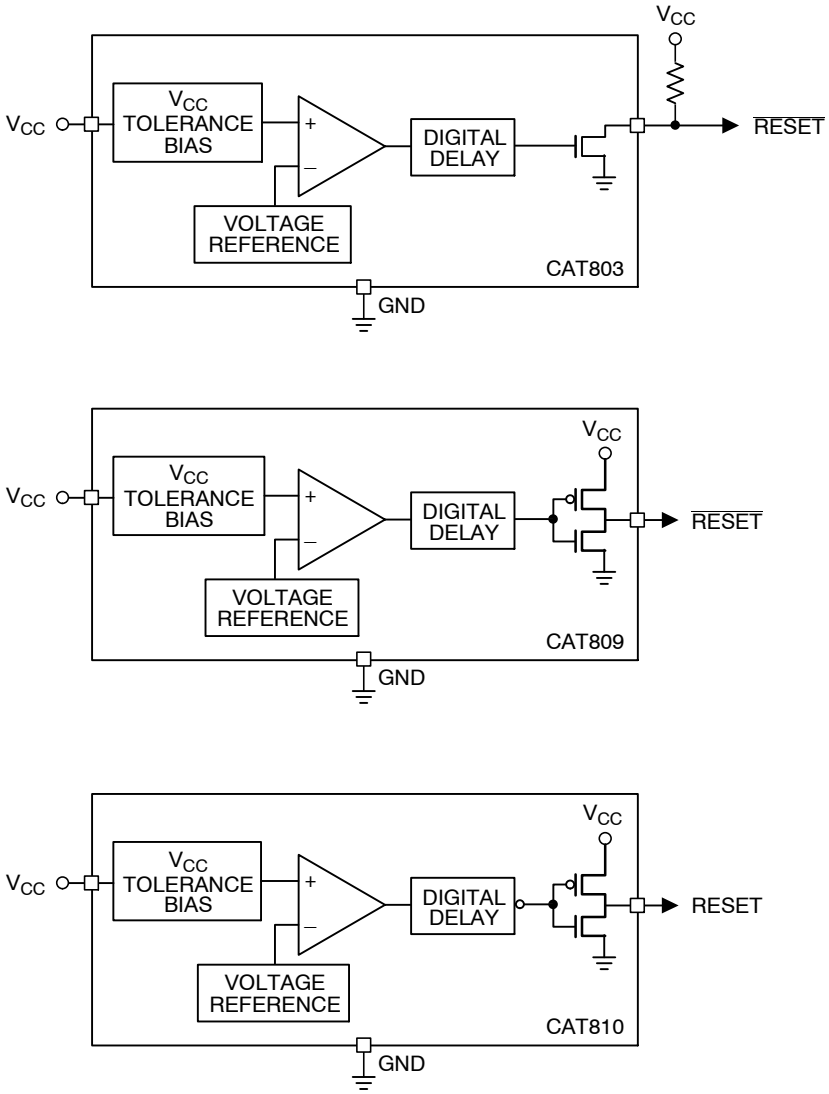


Figure 1. Block Diagrams

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/H/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/V versions.)

Symbol	Parameter	Conditions		Min	Typ (Note 5)	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	
		H Threshold	T_A = +25°C	4.48	4.55	4.62	
			T_A = −40°C to +85°C	4.43		4.67	
		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	
		V Threshold	T_A = +25°C	1.58	1.60	1.62	
			T_A = −40°C to +85°C	1.56		1.64	
	Reset Threshold Tempco				30		ppm/°C
T_D	V_{CC} to Reset Delay (Note 6)	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 CAT803R/S/T/Z, CAT809R/S/T/Z/V				0.3	V
		V_{CC} = V_{TH} min, I_{SINK} = 3.2 mA CAT803J/L/M, CAT809J/L/M/H				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/V		0.8 V_{CC}			V
		V_{CC} = V_{TH} max, I_{SOURCE} = 800 μA CAT809J/L/M/H		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 CAT810R/S/T/Z				0.3	V
		V_{CC} > V_{TH} max, I_{SINK} = 3.2 mA CAT810J/L/M				0.4	
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

5. Production testing done at T_A = +25°C; limits over temperature guaranteed by design only.
6. $\overline{\text{RESET}}$ 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.)

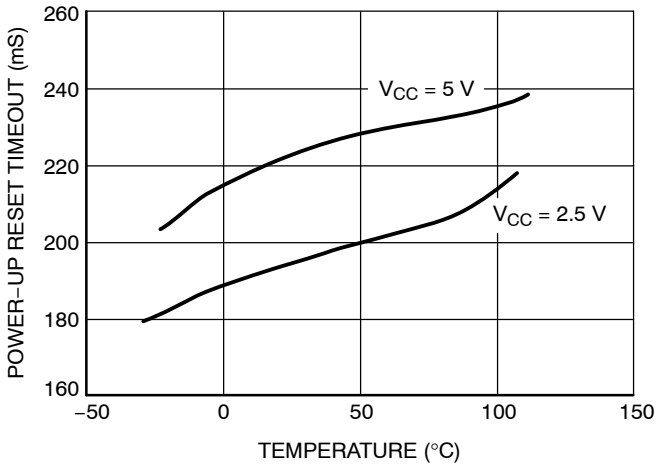


Figure 2. Power−up Reset Timeout vs. Temperature

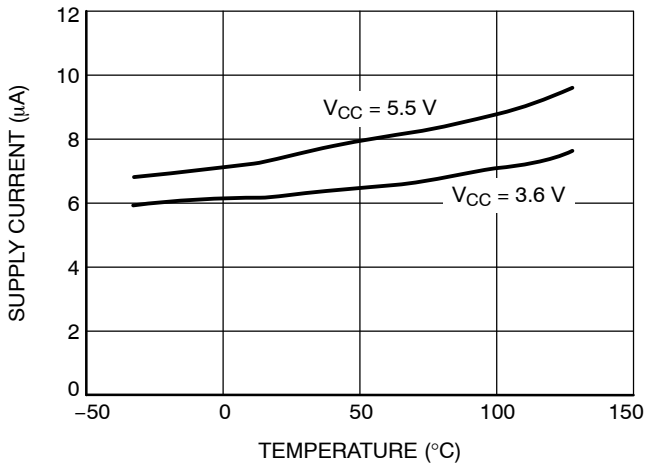


Figure 3. Supply Current vs. Temperature (No Load, CAT8xxR/S/T/Z)

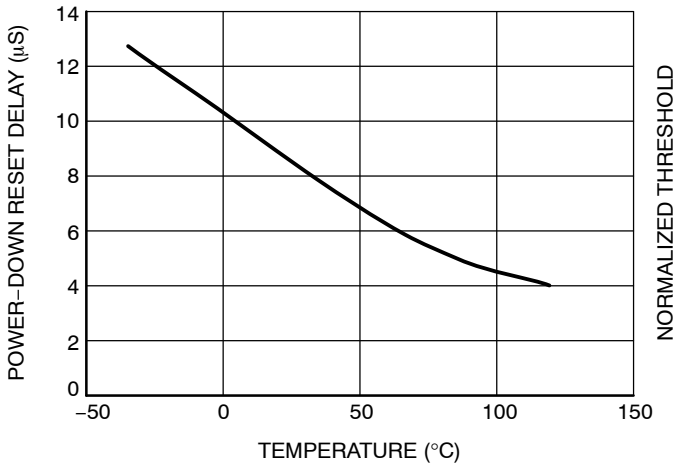


Figure 4. Power−down Reset Delay vs. Temperature (CAT8xxR/S/T/Z)

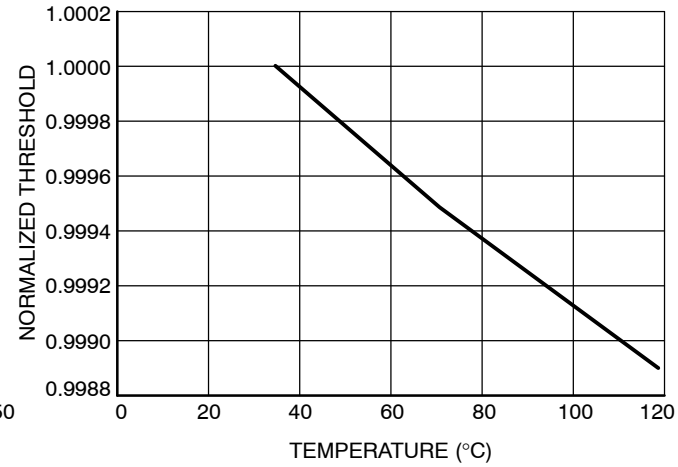


Figure 5. Normalized Reset Threshold vs. Temperature

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.

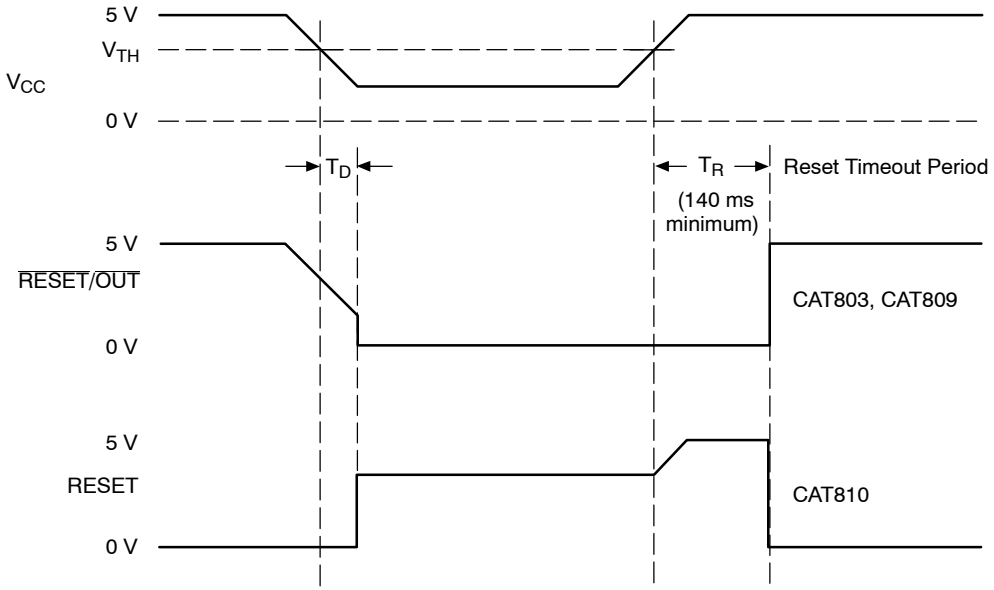


Figure 6. Reset Timing Diagram

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 ($V_{TH} - V_{CC}$).

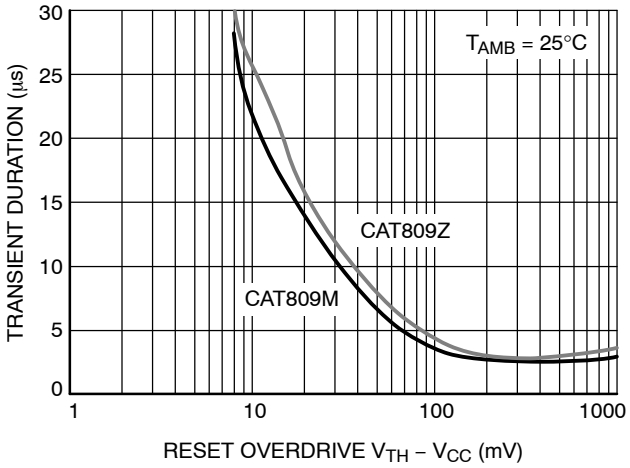


Figure 7. Maximum Transient Duration without Causing a Reset Pulse vs. Reset Comparator Overdrive

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.

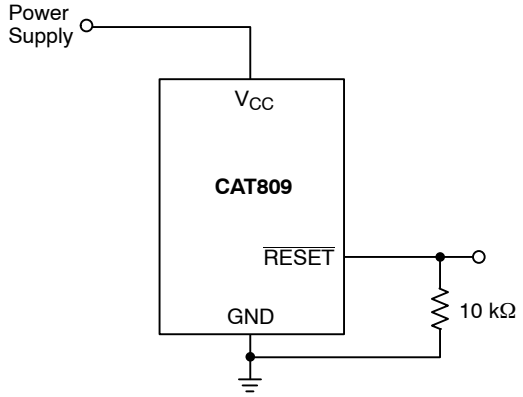


Figure 8. $\overline{\text{RESET}}$ Valid with V_{CC} Under 1.0 V

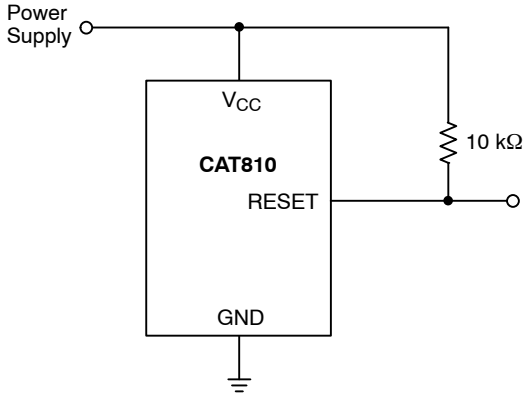


Figure 9. RESET Valid with V_{CC} Under 1.1 V

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.

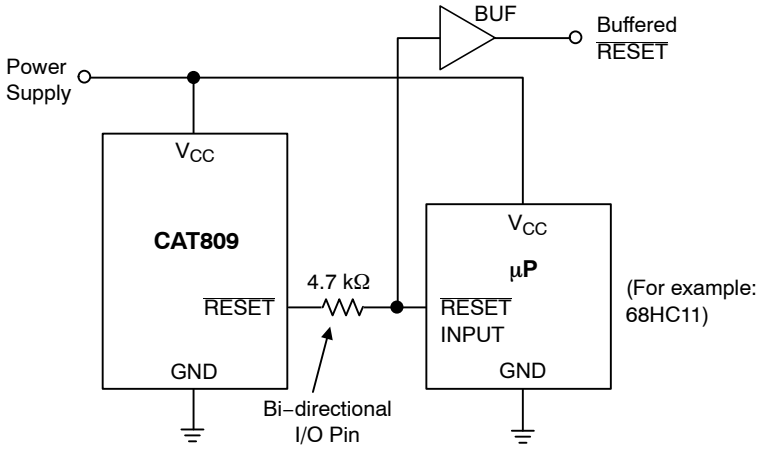


Figure 10. Bi−directional Reset Pin Interfacing

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.

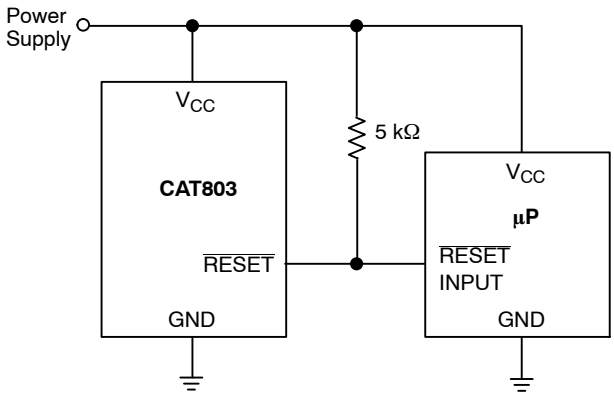
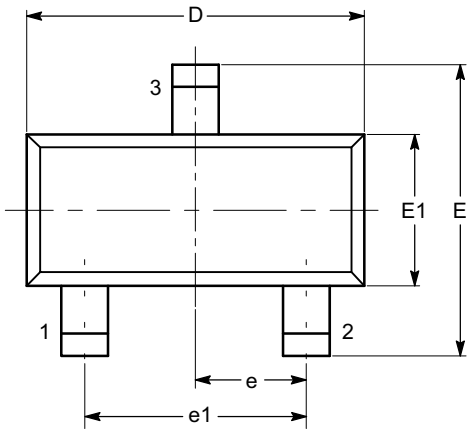


Figure 11. Typical CAT803 Open−Drain Circuit Configuration

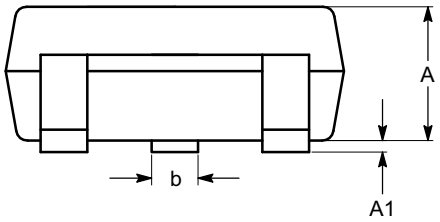
PACKAGE DIMENSIONS

SOT−23, 3 Lead
CASE 527AG−01
ISSUE O

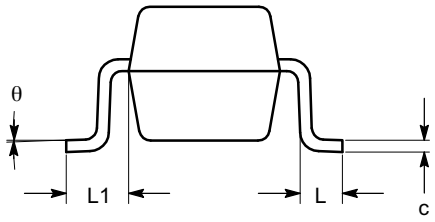


TOP VIEW

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		
θ	0º		8º



SIDE VIEW

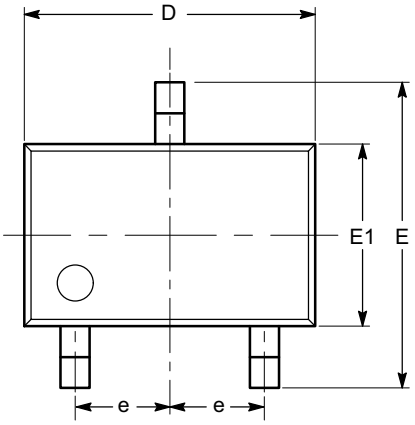


END VIEW

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

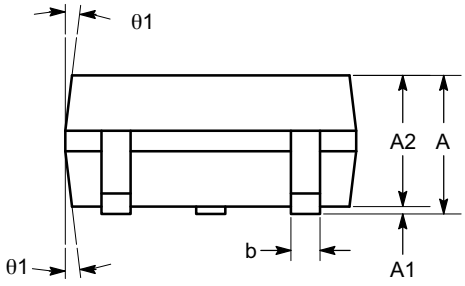
PACKAGE DIMENSIONS

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

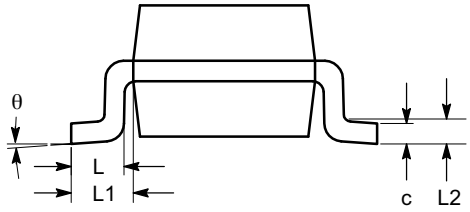


TOP VIEW

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	
θ	0°		8°
θ1	4°		10°



SIDE VIEW



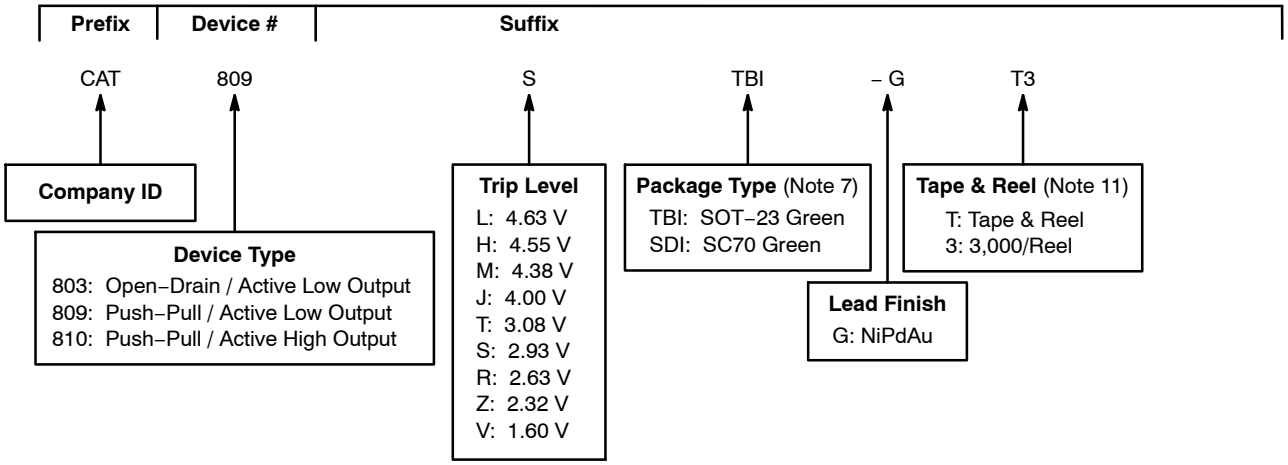
END VIEW

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

Table 5. ORDERING PART NUMBER

Order Number	Voltage	Output	Reset	Package	Quantity per Reel
CAT803LSDI−GT3	4.63 V	Open Drain	LOW	SC70−3	3,000
CAT803MSDI−GT3	4.38 V				
CAT803JSDI−GT3	4.00 V				
CAT803TSDI−GT3	3.08 V				
CAT803SSDI−GT3	2.93 V				
CAT803RSDI−GT3	2.63 V				
CAT803ZSDI−GT3	2.32 V				
CAT809LSDI−GT3	4.63 V	CMOS / Push−Pull	LOW		
CAT809MSDI−GT3	4.38 V				
CAT809JSDI−GT3	4.00 V				
CAT809TSDI−GT3	3.08 V				
CAT809SSDI−GT3	2.93 V				
CAT809RSDI−GT3	2.63 V				
CAT809ZSDI−GT3	2.32 V				
CAT810LSDI−GT3	4.63 V	CMOS / Push−Pull	HIGH		
CAT810MSDI−GT3	4.38 V				
CAT810JSDI−GT3	4.00 V				
CAT810TSDI−GT3	3.08 V				
CAT810SSDI−GT3	2.93 V				
CAT810RSDI−GT3	2.63 V				
CAT810ZSDI−GT3	2.32 V				
CAT803LTBI−GT3	4.63 V	Open Drain	LOW	SOT−23−3	3,000
CAT803MTBI−GT3	4.38 V				
CAT803JTBI−GT3	4.00 V				
CAT803TTBI−GT3	3.08 V				
CAT803STBI−GT3	2.93 V				
CAT803RTBI−GT3	2.63 V				
CAT803ZTBI−GT3	2.32 V				
CAT809LTBI−GT3	4.62 V	CMOS / Push−Pull	LOW		
CAT809HTBI−GT3	4.55 V				
CAT809MTBI−GT3	4.38 V				
CAT809JTBI−GT3	4.00 V				
CAT809TTBI−GT3	3.08 V				
CAT809STBI−GT3	2.93 V				
CAT809RTBI−GT3	2.63 V				
CAT809ZTBI−GT3	2.32 V				
CAT809VTBI−GT3	1.60 V				
CAT810LTBI−GT3	4.63 V	CMOS / Push−Pull	HIGH		
CAT810MTBI−GT3	4.38 V				
CAT810JTBI−GT3	4.00 V				
CAT810TTBI−GT3	3.08 V				
CAT810STBI−GT3	2.93 V				
CAT810RTBI−GT3	2.63 V				
CAT810ZTBI−GT3	2.32 V				

Example of Ordering Information (Notes 8, 9, 10)



7. All packages are RoHS–compliant (Lead–free, Halogen–free)
8. The standard lead finish is NiPdAu. Contact factory for other lead finishes.
9. The device used in the above example is a CAT809STBI–GT3 (Push–Pull / Active Low Output, trip level of 2.85 V to 3.00 V, SOT–23 Green, NiPdAu, Tape & Reel, 3,000/Reel).
10. For additional package and temperature options, please contact your nearest ON Semiconductor Sales office.
11. 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.

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
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P.O. Box 5163, Denver, Colorado 80217 USA
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Email: orderlit@onsemi.com

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Phone: 421 33 790 2910
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Phone: 81–3–5773–3850

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