



# Low-Power Precision Voltage Detector

## FEATURES

- Ultra Low Current Consumption 2.4μA
- Accurate Voltage Detection Threshold
- Fine Voltage Detection Threshold Resolution
- Open Drain Output (Active Low)
- Industrial temperature range -40°C to +85°C
- 5-pin TSOT-23 and 3-pin SOT-89 RoHS compliant packages

## APPLICATIONS

- Battery-Powered Systems
- Power Supply Monitoring
- Handheld and Portable Equipment
- Processor Supervisor Reset

## DESCRIPTION

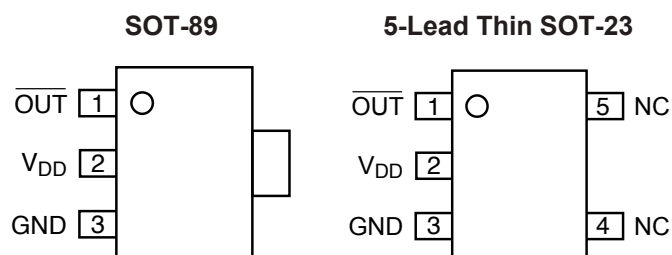
The CAT808 is a high-precision voltage detector designed for monitoring single cell and multi-cell batteries. Voltage detection thresholds between 2.0V and 3.5V are provided with 0.1V resolution and ±3.0% accuracy.

The CAT808 open-drain output is active low until the  $V_{DD}$  voltage exceeds the detection threshold. A low hysteresis is built into the device to minimize output “chatter”, while  $V_{DD}$  passes through the detection threshold, and the output transitions high.

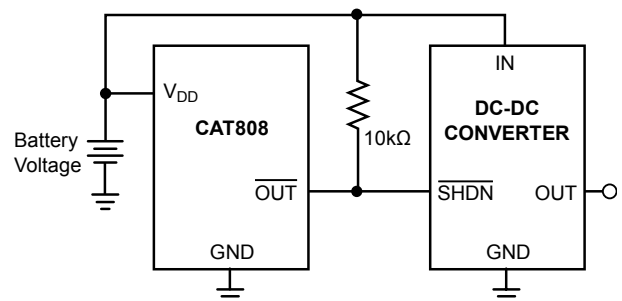
After the CAT808 asserts the output high condition, it continues to monitor  $V_{DD}$  until it drops below the detection threshold, when the output goes low until  $V_{DD}$  once again exceeds the detection threshold.

For Ordering Information details, see page 7.

## PIN CONFIGURATION



## TYPICAL APPLICATION



**Note:** The value of the pull-up resistor is not critical

## CAT808

### ABSOLUTE MAXIMUM RATINGS<sup>(1)</sup>

Parameters		Ratings	Units
Temperature under Bias		-55 to +125	°C
Storage Temperature		-65 to +150	°C
Voltage on any Pin with Respect to GND <sup>(2)(3)</sup>		-2.0 to V <sub>DD</sub> + 2.0	V
V <sub>DD</sub> with Respect to GND		-2.0 to 7.0	V
Lead Soldering temperature (10 seconds)		+300	°C
Power Dissipation	TSOT-23-5	250	mW
	SOT-89	500	mW

### RECOMMENDED OPERATING CONDITIONS

Parameters		Ratings	Units
V <sub>DD</sub>		+1.2 to +6.0	V
Operating Temperature Range		-40 to +85	°C

### DC ELECTRICAL CHARACTERISTICS

T<sub>A</sub> = -40°C to +85°C, V<sub>DD</sub> = 1.2V to 6.0V

Symbol	Parameter	Conditions	Min	Typ.	Max	Units	
V <sub>DET</sub>	Detection Voltage	CAT808Nxxx-27	2.62	2.7	2.78	V	
		CAT808Nxxx-32	3.12	3.2	3.28		
		CAT808Nxxx-35	3.42	3.5	3.58		
I <sub>DD</sub>	Current Consumption	V <sub>DD</sub> = 4.0V	-	2.4	5	μA	
		V <sub>DD</sub> = 5.0V	-	3.5	7		
		V <sub>DD</sub> = 6.0V	-	5	10		
I <sub>OUT</sub>	Output Sink Current	V <sub>DS</sub> = 0.5V	V <sub>DD</sub> =1.2V	0.6	1.4	-	mA
			V <sub>DD</sub> =2.4V	2.9	5	-	
I <sub>LEAK</sub>	Output Leakage Current	V <sub>DS</sub> = 5.0V, V <sub>DD</sub> = 5.0V	-	-	1	μA	
T <sub>PHL/LH</sub>	Response Time	-	-	-	60	μs	
$\frac{\Delta - V_{DET}}{\Delta T_A \bullet -V_{DET}}$	Detection Voltage Temperature Coefficient <sup>(4)</sup>		-	±10	±100	ppm/°C	

#### Notes:

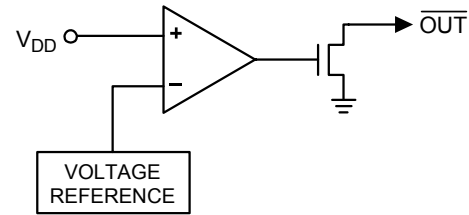
- Stresses above those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only and functional operation of the devices at these or any other conditions outside of those listed in the operational sections of this specification is not implied. Exposure to any absolute maximum rating for extended periods may affect device performance and reliability.
- The Minimum DC input voltage is -0.5V. During transitions, inputs may undershoot to -2.0V for periods of less than 20ns. Maximum DC voltage on output pins is V<sub>CC</sub> +0.5V, which may overshoot to V<sub>CC</sub> +2.0V for periods of less than 20ns.
- Latch-up protection is provided for stresses up to 100mA on all pins from -1V to V<sub>CC</sub> +1V.
- The temperature change ratio in the detection voltage [ppm/°C] is calculated by using the following equation:

$$\frac{\Delta - V_{DET}}{\Delta T_A \bullet -V_{DET}} \times 1,000,000 [\text{ppm}/^\circ\text{C}]$$

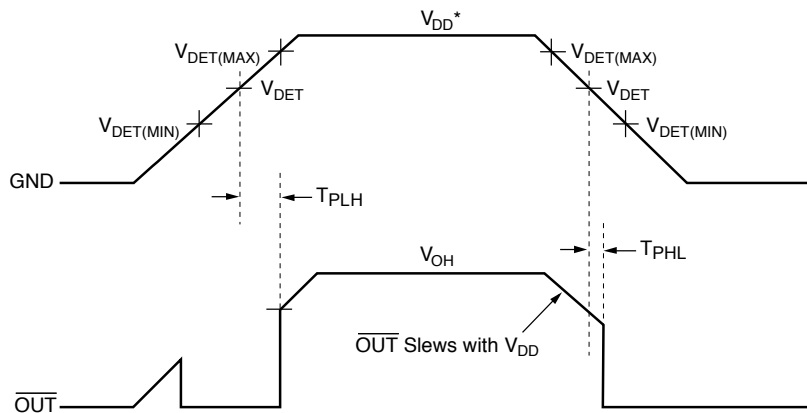
## OPERATION – VOLTAGE DETECTOR

The CAT808 has an active low output that asserts (pulls low) when the supply voltage drops below the detection threshold voltage ( $V_{DET}$ ). The open-drain output requires an external pull-up resistor between the output pin and the supply voltage (as shown in the typical application diagram). On power-up,  $\overline{OUT}$  is held active low until the supply voltage ( $V_{DD}$ ) rises above  $V_{DET}$ . While  $V_{DD}$  is above  $V_{DET}$ ,  $\overline{OUT}$  stays high until  $V_{DD}$  drops below  $V_{DET}$ , then  $\overline{OUT}$  once again goes low.

## BLOCK DIAGRAM



## TIMING DIAGRAM



\* Voltage of  $V_{DD}$  below 1 volt will not be able to maintain low output.

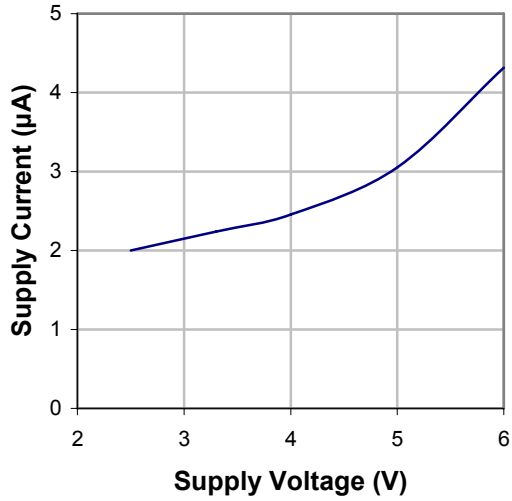
## PIN FUNCTIONS

Pin	Function
$V_{DD}$	Voltage Input and Power Supply
GND	Ground Pin
$\overline{OUT}$	Active Low Open Drain output
NC	No Connect, the pin is electrically open

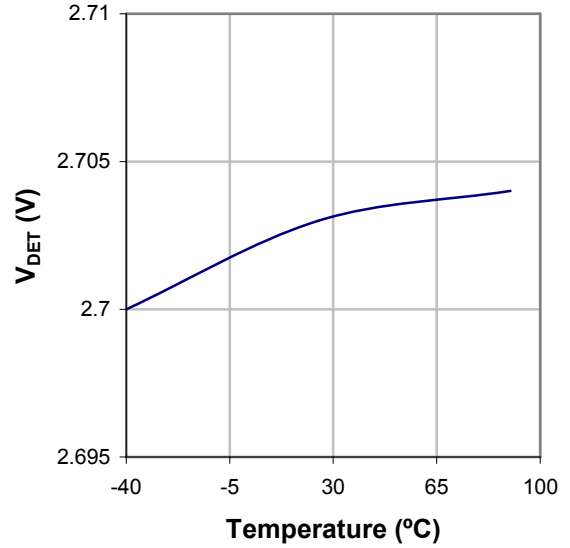
## TYPICAL ELECTRICAL OPERATING CHARACTERISTICS

Typical values at  $T_A = 25^\circ\text{C}$ .

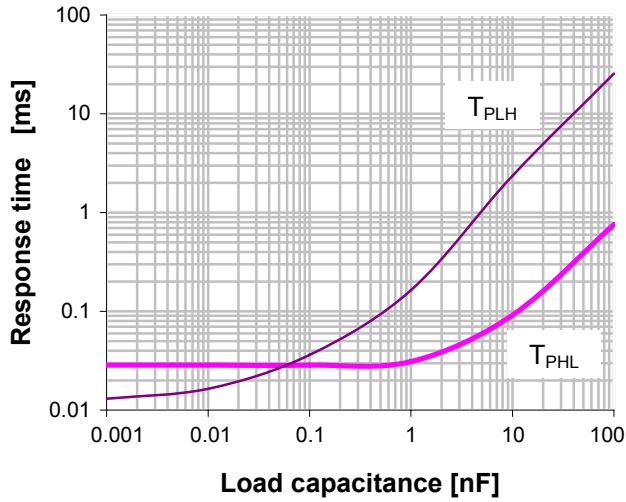
$V_{DD}$  Supply Current vs.  $V_{DD}$  Supply Voltage



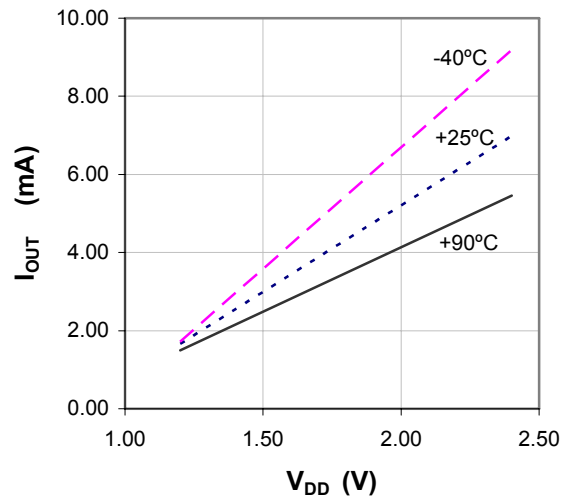
$V_{DET}$  Detection Voltage vs. Temperature



Response time vs. Load Capacitance

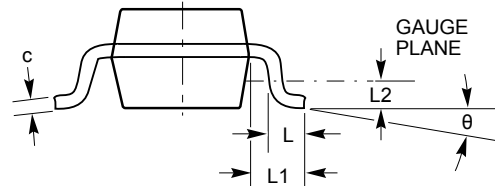
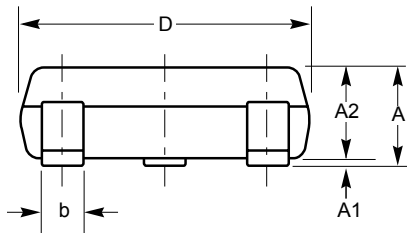
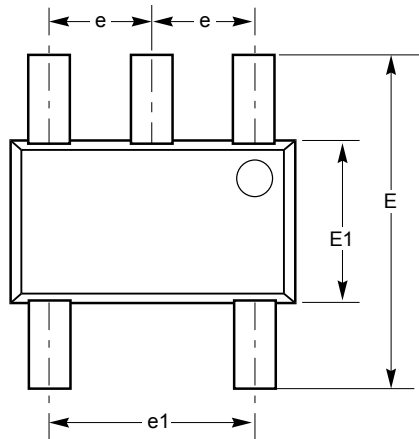


$I_{OUT}$  Transistor Output Current vs.  $V_{DD}$  Supply Voltage



**PACKAGE INFORMATION**

**5-LEAD TSOT-23 PACKAGE**

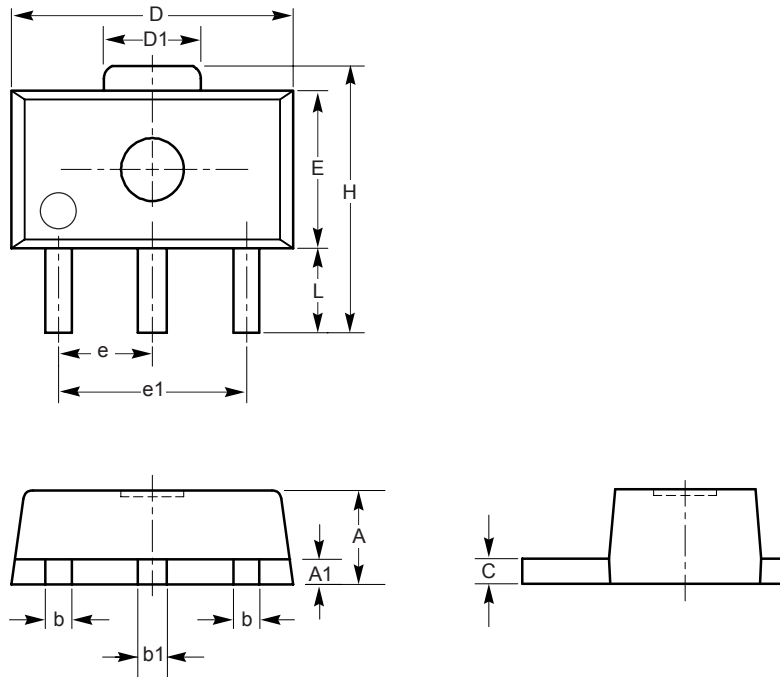


SYMBOL	MIN	NOM	MAX
A	—	—	1.00
A1	0.01	0.05	0.10
A2	0.80	0.87	0.90
b	0.30	—	0.45
c	0.12	0.15	0.20
D	2.90BSC		
E	2.80BSC		
E1	1.60BSC		
e	0.95BSC		
e1	1.90BSC		
L	0.30	0.40	0.50
L1	0.60REF		
L2	0.25BSC		
q	0°		8°

**Notes:**

- (1) All dimensions are in millimeters.
- (2) Complies with JEDEC specification MO-193.

**3-LEAD SOT-89 PACKAGE**

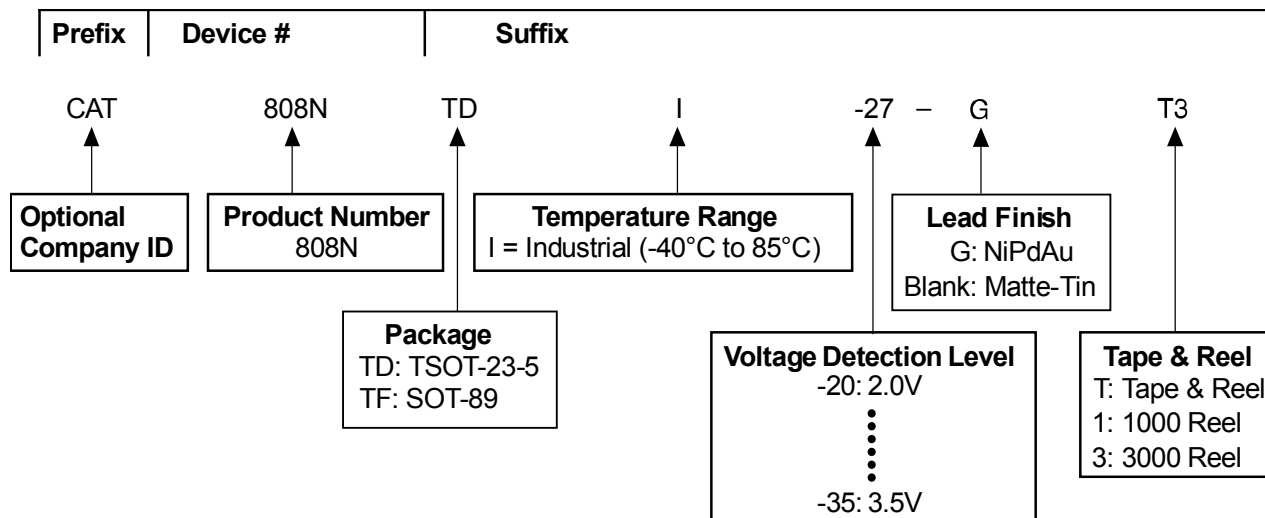


SYMBOL	MIN	NOM	MAX
A	1.40	1.50	1.60
A1	0.30	0.40	0.50
L	0.80	—	1.20
b	0.36	0.42	0.48
b1	0.41	0.47	0.53
C	0.38	0.40	0.43
D	4.40	4.50	4.60
D1	1.40	1.60	1.75
H	3.94	—	4.25
E	2.40	2.50	2.60
e1	2.90	3.00	3.10
e	1.45	1.50	1.55

**Notes:**

- (1) All dimensions are in millimeters.
- (2) Lead frame material: copper.

**EXAMPLE OF ORDERING INFORMATION**



**Notes:**

- (1) All packages are RoHS-compliant (Lead-free, Halogen-free).
- (2) The standard finish is NiPdAu.
- (3) The device used in the above example is a CAT808NTDI-27-GT3 (TSOT-23-5, Industrial Temperature, 2.7V Detection Level, NiPdAu, Tape & Reel).
- (4) For additional detection voltage, package and temperature options, please contact your nearest Catalyst Semiconductor Sales office.

**TOP MARKING**

Part Number	Package	Detection Voltage	Top Marking
CAT808NTDI-27-G	TSOT-23-5	2.70	MVym
CAT808NTDI-32-G	TSOT-23-5	3.20	MVym
CAT808NTDI-35-G	TSOT-23-5	3.50	MVym
CAT808NTFI-27	SOT-89	2.70	AAxxx
CAT808NTFI-32	SOT-89	3.20	AAxxx
CAT808NTFI-35	SOT-89	3.50	AAxxx

**Notes:**

- (1) ym – Year and Month Code.
- (2) xxx – Assembly location code and last 2 digits of assembly lot code.
- (3) SOT-89 is offered in Matte-Tin only.

## REVISION HISTORY

Date	Rev.	Reason
11/07/06	A	Initial Issue
05/10/07	B	Update Features Update Description Update DC Electrical Characteristics Update Example of Ordering Information Update Top Marking

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Catalyst Semiconductor, Inc.  
Corporate Headquarters  
2975 Stender Way  
Santa Clara, CA 95054  
Phone: 408.542.1000  
Fax: 408.542.1200  
www.catsemi.com

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