CAT808

Low-Power Precision Voltage Detector

ON Semiconductor®

http://onsemi.com

TSOT−5
TD SUFFIX
CASE 419AE

Description

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

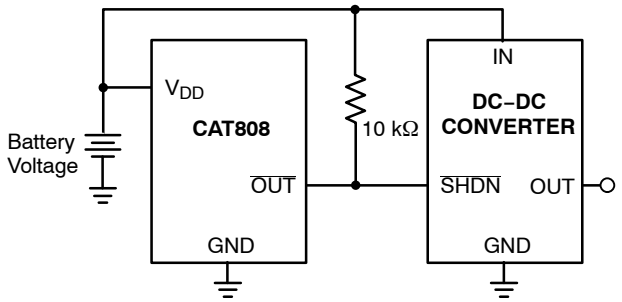
After the CAT808 asserts the output high condition, it continues to monitor V_{DD} until it drops below the detection threshold, when the output goes low until V_{DD} once again exceeds the detection threshold.

Features

- Ultra Low Current Consumption 2.4 μA
- 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
- These Devices are Pb−Free, Halogen Free/BFR Free and are RoHS Compliant

Applications

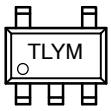
- Battery−Powered Systems
- Power Supply Monitoring
- Handheld and Portable Equipment
- Processor Supervisor Reset



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

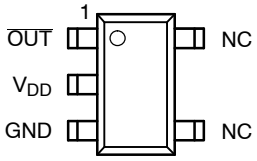
Figure 1. Typical Application

MARKING DIAGRAM



TL = Specific Device Code
Y = Production Year
M = Production Month

PIN CONNECTIONS



(Top View)

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 6 of this data sheet.

Table 1. ABSOLUTE MAXIMUM RATINGS

Parameters	Ratings	Units
Temperature under Bias	−55 to +125	°C
Storage Temperature	−65 to +150	°C
Voltage on any Pin with Respect to GND (Notes 1, 2)	−2.0 to V_{DD} + 2.0	V
V_{DD} with Respect to GND	−2.0 to 7.0	V
Lead Soldering temperature (10 seconds)	+300	°C
Power Dissipation	250	mW

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.

1. The Minimum DC input voltage is −0.5 V. During transitions, inputs may undershoot to −2.0 V for periods of less than 20 ns. Maximum DC voltage on output pins is V_{CC} +0.5 V, which may overshoot to V_{CC} +2.0 V for periods of less than 20 ns.
2. Latch−up protection is provided for stresses up to 100 mA on all pins from −1 V to V_{CC} +1 V.

Table 2. RECOMMENDED OPERATING CONDITIONS

Parameters	Ratings	Units
V_{DD}	+1.2 to +6.0	V
Operating Temperature Range	−40 to +85	°C

Table 3. DC ELECTRICAL CHARACTERISTICS (T_A = −40°C to +85°C, V_{DD} = 1.2 V to 6.0 V)

Symbol	Parameter	Conditions		Min	Typ	Max	Units
V_{DET}	Detection Voltage	CAT808Nxxx−25		2.43	2.5	2.57	V
		CAT808Nxxx−27		2.62	2.7	2.78	
		CAT808Nxxx−32		3.12	3.2	3.28	
		CAT808Nxxx−35		3.42	3.5	3.58	
I_{DD}	Current Consumption	V_{DD} = 4.0 V		–	2.4	5	μA
		V_{DD} = 5.0 V		–	3.5	7	
		V_{DD} = 6.0 V		–	5	10	
I_{OUT}	Output Sink Current	V_{DS} = 0.5 V	V_{DD} = 1.2 V	0.6	1.4	–	mA
			V_{DD} = 2.4 V	2.9	5	–	
I_{LEAK}	Output Leakage Current	V_{DS} = 5.0 V, V_{DD} = 5.0 V		–	–	1	μA
$T_{PHL/LH}$	Response Time	–		–	–	60	μs
$\frac{\Delta V_{DET}}{\Delta T_A \bullet V_{DET}(typ)}$	Detection Voltage Temperature Coefficient (Note 3)			–	±10	±100	ppm/°C

3. The temperature change ratio in the detection voltage [ppm/°C] is calculated by using the following equation:

$$\frac{\Delta V_{DET}}{\Delta T_A \cdot V_{DET}(typ)} \times 1,000,000[ppm/°C]$$

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.

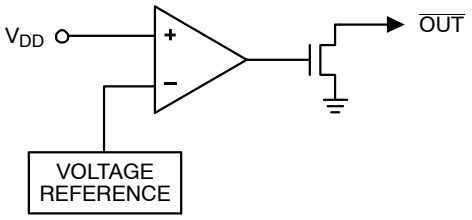
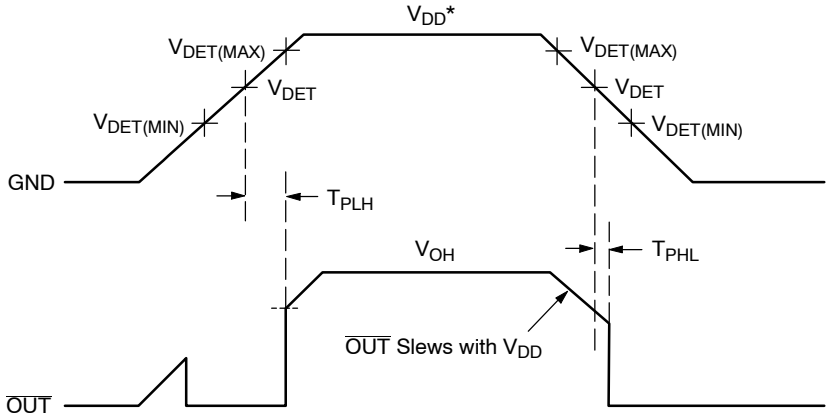


Figure 2. Block Diagram



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

Figure 3. Timing Diagram

Table 4. 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°C)

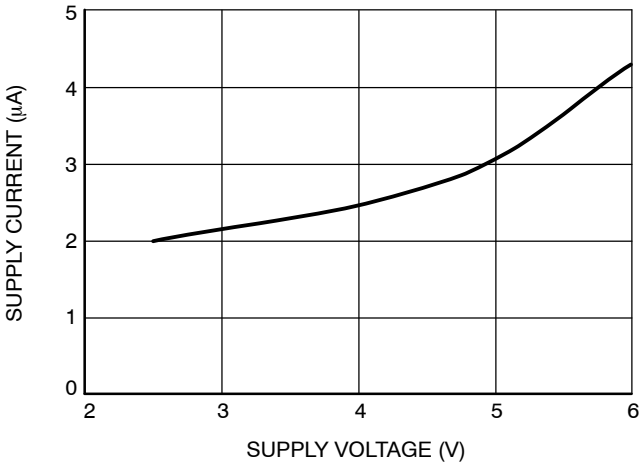


Figure 4. V_{DD} Supply Current vs. V_{DD} Supply Voltage

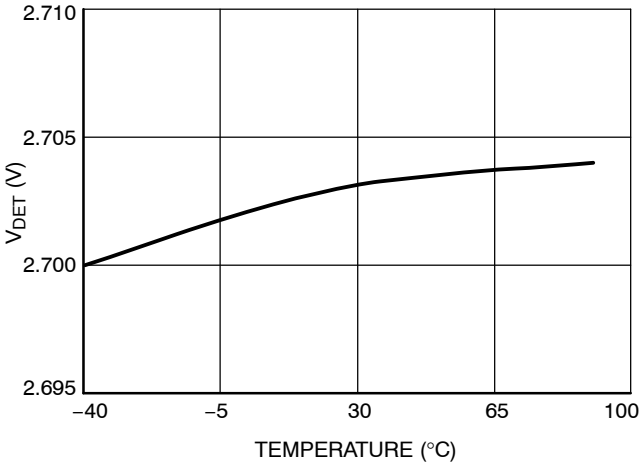


Figure 5. V_{DET} Detection Voltage vs. Temperature

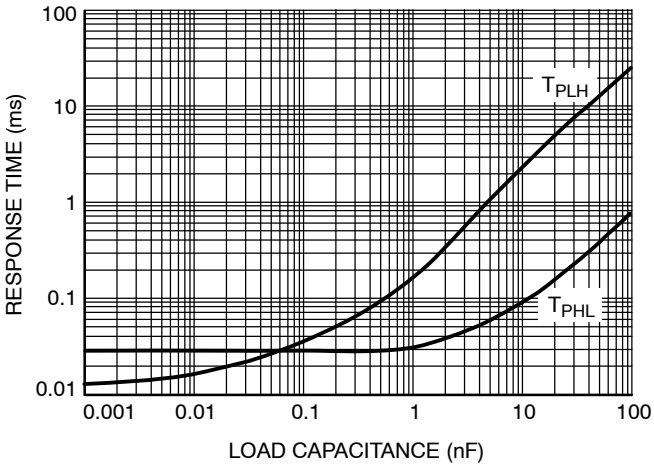


Figure 6. Response Time vs. Load Capacitance

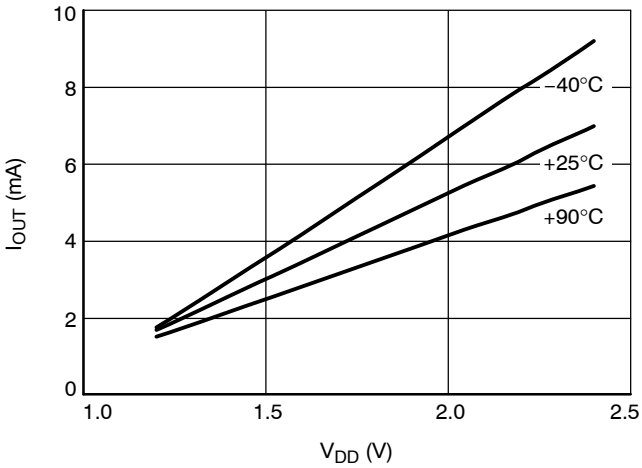
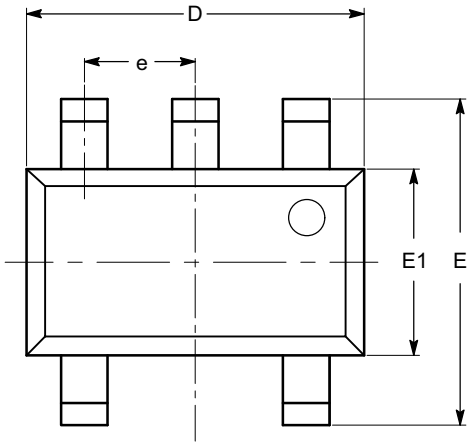


Figure 7. I_{OUT} Transistor Output Current vs. V_{DD} Supply Voltage

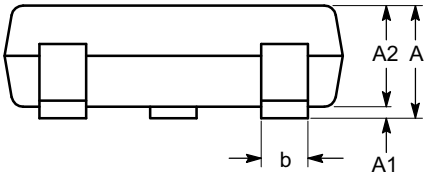
PACKAGE DIMENSIONS

TSOT−23, 5 LEAD
CASE 419AE−01
ISSUE O

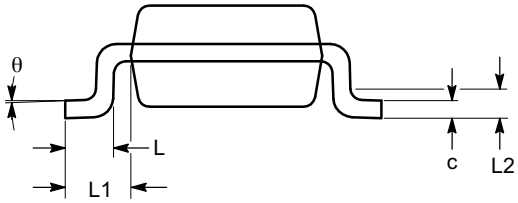


TOP VIEW

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	2.90 BSC		
E	2.80 BSC		
E1	1.60 BSC		
e	0.95 TYP		
L	0.30	0.40	0.50
L1	0.60 REF		
L2	0.25 BSC		
θ	0º		8º



SIDE VIEW



END VIEW

Notes:
(1) All dimensions are in millimeters. Angles in degrees.
(2) Complies with JEDEC MO-193.

Ordering Information

Table 5. ORDERING INFORMATION

Orderable Part Number	Specific Device Marking	Package	Temperature Range	Lead Finish	Shipping†
CAT808NTDI−25GT3	TL	TSOT−23−5	Industrial	NiPdAu	3000 Units / Tape & Reel
CAT808NTDI−27GT3	TL	TSOT−23−5	Industrial	NiPdAu	3000 Units / Tape & Reel
CAT808NTDI−32GT3	TL	TSOT−23−5	Industrial	NiPdAu	3000 Units / Tape & Reel
CAT808NTDI−35GT3	TL	TSOT−23−5	Industrial	NiPdAu	3000 Units / Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specification Brochure, BRD8011/D.

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Literature Distribution Center for ON Semiconductor
P.O. Box 5163, Denver, Colorado 80217 USA
Phone: 303−675−2175 or 800−344−3860 Toll Free USA/Canada
Fax: 303−675−2176 or 800−344−3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

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