

# CAT8900

## Precision Analog Voltage References

The CAT8900 is a high precision voltage reference providing very accurate voltage regulation with low supply current consumption.

CAT8900 is ideal for use in battery powered systems where operating current needs to be minimized and there can be a great variation in supply voltages. It will source or sink up to 10 mA of load current, and can for most applications, forgo the use of an output bypass capacitor. The device is supplied in a space saving three terminal SOT-23 package.

### Features

- Reference Voltages:  
1.024 V, 1.200 V, 1.250 V, 1.800 V,  
2.048 V, 2.500 V, 2.600 V,  
3.000 V, 3.300 V
- Low Supply Current: 450 nA (Typical)
- Initial Accuracy:  
Class B:  $\pm 1.0$  mV  
Class C:  $\pm 2.5$  mV  
Class D:  $\pm 5.0$  mV
- Drift Performance: 50 ppm/ $^{\circ}$ C
- SOT-23 3-Lead Package
- This Device is Pb-Free, Halogen Free/BFR Free, and RoHS Compliant

### Typical Applications

- Battery Powered Systems
- A/D and D/A Converters
- Precision Regulator Systems
- Power Supplies
- Portable Medical Equipment

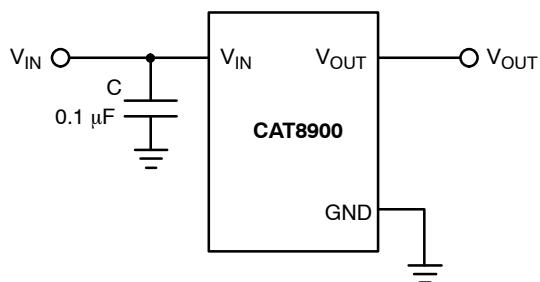
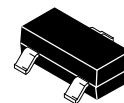


Figure 1. Application Circuit



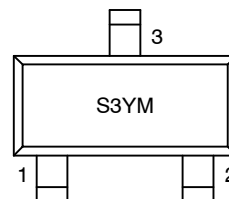
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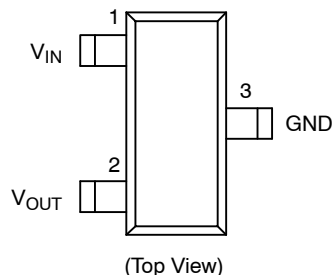
**SOT23-3  
TP, TB SUFFIX  
CASE 527AG**

### MARKING DIAGRAM



S3 = Specific Device Code  
Y = Production Year  
(Last Digit)  
M = Production Month  
(1 - 9, A, B, C)

### PIN CONNECTIONS



### PIN FUNCTIONS

Pin No.	Pin Name	Function
1	V <sub>IN</sub>	Supply Voltage Input
2	V <sub>OUT</sub>	Output Voltage
3	GND	Ground

### ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 2 of this data sheet.

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**Table 1. ORDERING INFORMATION**

Orderable Part Number	Initial Accuracy (±mV)	Initial Accuracy (%)	V <sub>OUT</sub> Voltage (V) (Note 1)	Package	Shipping <sup>†</sup>
CAT8900B102TBGT3	1.0	0.10%	1.024	SOT-23	3,000
CAT8900C102TBGT3	2.5	0.24%			
CAT8900D102TBGT3	5.0	0.49%			
CAT8900B120TBGT3	1.0	0.08%	1.200		
CAT8900C120TBGT3	2.5	0.21%			
CAT8900D120TBGT3	5.0	0.42%			
CAT8900B125TBGT3	1.0	0.08%	1.250		
CAT8900C125TBGT3	2.5	0.20%			
CAT8900D125TBGT3	5.0	0.40%			
CAT8900B180TBGT3	1.0	0.06%	1.800		
CAT8900C180TBGT3	2.5	0.14%			
CAT8900D180TBGT3	5.0	0.28%			
CAT8900B204TBGT3	1.0	0.05%	2.048		
CAT8900C204TBGT3	2.5	0.12%			
CAT8900D204TBGT3	5.0	0.24%			
CAT8900B250TBGT3	1.0	0.04%	2.500		
CAT8900C250TBGT3	2.5	0.10%			
CAT8900D250TBGT3	5.0	0.20%			
CAT8900B260TBGT3	1.0	0.04%	2.600		
CAT8900C260TBGT3	2.5	0.10%			
CAT8900D260TBGT3	5.0	0.19%			
CAT8900B300TBGT3	1.0	0.03%	3.000		
CAT8900C300TBGT3	2.5	0.08%			
CAT8900D300TBGT3	5.0	0.17%			
CAT8900B330TBGT3	1.0	0.03%	3.300		
CAT8900C330TBGT3	2.5	0.08%			
CAT8900D330TBGT3	5.0	0.15%			

1. Contact factory for availability of these and other custom voltages.

†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.

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**Table 2. ABSOLUTE MAXIMUM RATINGS** (Note 2)

Rating	Value	Unit
$V_{IN}$	6.5	V
Storage Temperature Range	-55 to +125	°C
Junction Temperature Range	+150	°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.

2. Maximum terminal current is bounded by the maximum current handling of the switches, maximum power dissipation of the package.

**Table 3. RECOMMENDED OPERATING CONDITIONS**

Rating	Value	Unit
Temperature Range	-40 to +85	°C

**Table 4. ELECTRICAL CHARACTERISTICS**

$V_{IN} = 3.0$  V,  $I_{OUT} = 0$  mA,  $C_{OUT} = 0.001$   $\mu$ F, -40°C to +85°C unless specified otherwise.

Parameter	Test Conditions	Symbol	Min	Typ	Max	Unit
Output Voltage	CAT8900x102 CAT8900x120 CAT8900x125 CAT8900x180 CAT8900x204 CAT8900x250 CAT8900x260 CAT8900x300 ( $V_{IN} = 5.0$ V) CAT8900x330 ( $V_{IN} = 5.0$ V)	$V_{OUT}$		1.024 1.200 1.250 1.800 2.048 2.500 2.600 3.000 3.300		V
Initial Accuracy	Grade B ( $T_A = 25^\circ\text{C}$ ) Grade C ( $T_A = 25^\circ\text{C}$ ) Grade D ( $T_A = 25^\circ\text{C}$ )		-1.0 -2.5 -5.0		+1.0 +2.5 +5.0	mV
Output Voltage Noise (Note 3)	$f = 0.1$ Hz to 10 Hz			50		$\mu\text{Vp-p}$
Output Voltage Temperature Drift	-40°C to 85°C	$\Delta V_{OUT} \div \Delta T$		20	50	ppm/°C
Thermal Hysteresis (Note 3)	$\Delta T_A = 125^\circ\text{C}$	$\Delta V_{OUT} \div \Delta T_A$		100		ppm
Line Regulation	$2.7\text{ V} < V_{IN} < 5.5\text{ V}$	$\Delta V_{OUT} \div \Delta V_{IN}$		30	100	$\mu\text{V/V}$
Dropout Voltage	$V_{IN} = 3.0$ V, CAT8900x250	$V_{DO}$		1.0	2.5	mV
Load Regulation Sourcing	$0\text{ mA} < I_{LOAD} < 10\text{ mA}$ ; $V_{IN} = 3\text{ V}$	$\Delta V_{OUT} \div \Delta I_{LOAD}$		100	250	$\mu\text{V/mA}$
Sinking	$-10\text{ mA} < I_{LOAD} < 0\text{ mA}$ ; $V_{IN} = 3\text{ V}$			150	350	$\mu\text{V/mA}$
Long Term Stability (Note 3)	$T_A = 25^\circ\text{C}$ ; first 1000 hours	$\Delta V_{OUT} \div \Delta t$		50		ppm
Output Current		$I_{LOAD}$	-10		+10	mA
Short Circuit Current (Note 3)	$T_A = 25^\circ\text{C}$ $V_{OUT}$ pin shorted to GND $V_{OUT}$ pin shorted to $V_{IN}$	$I_{SC}$		40 20	60 40	mA
Turn-on Settling Time	0.1% @ $V_{IN} = 3\text{ V}$ ; $C_L = 0\text{ pF}$			2		ms

## POWER SUPPLY

Input Voltage	$I_L = 0\text{ mA}$	$V_{IN}$	2.7		5.5	V
Supply current		$I_{IN}$		450	800	nA

3. Guaranteed by design.

# TYPICAL CHARACTERISTICS

( $V_{IN} = 3.0\text{ V}$ ,  $I_{OUT} = 0\text{ mA}$ , ambient temperature of  $25^{\circ}\text{C}$ , unless specified otherwise.)

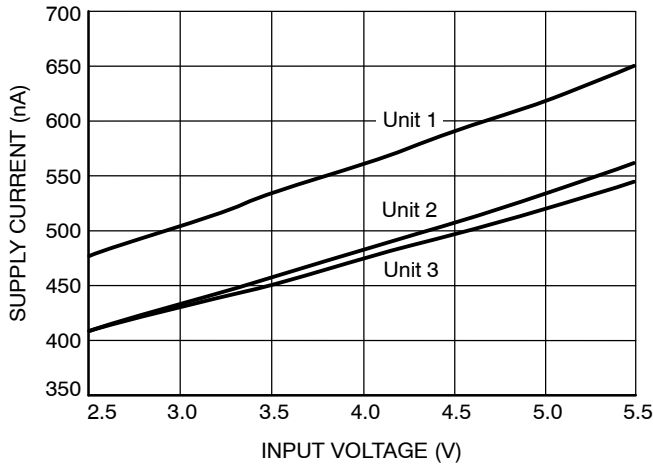


Figure 2. Supply Current vs. Input Voltage

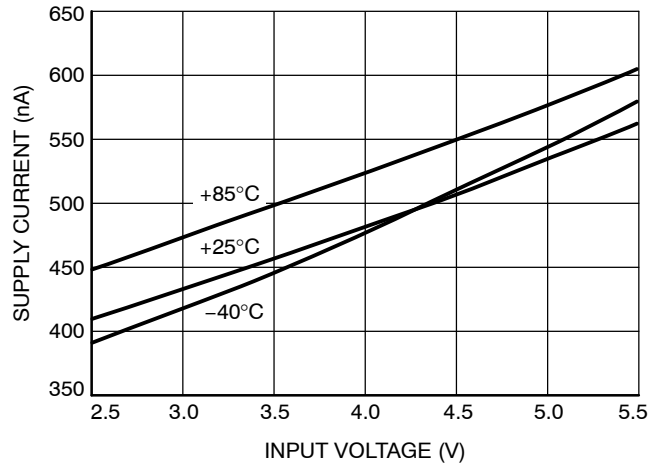


Figure 3. Supply Current vs. Input Voltage Over Temperature

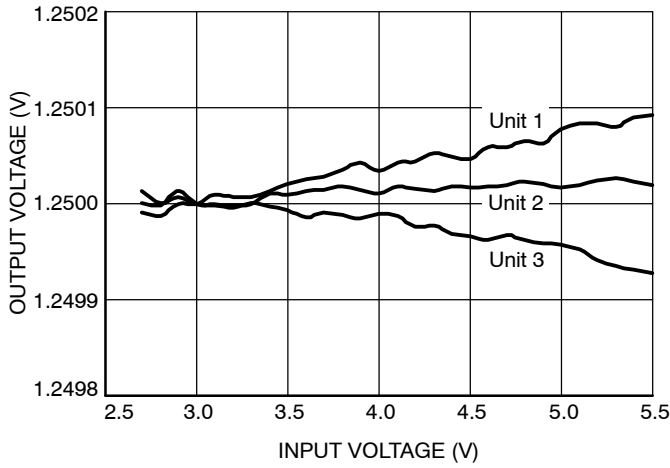


Figure 4. Line Regulation

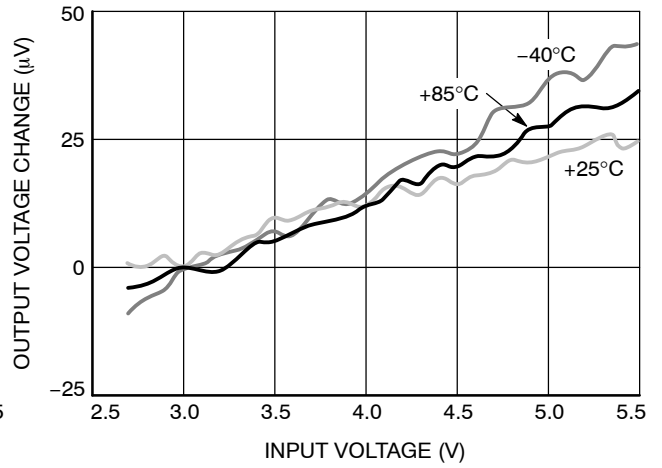


Figure 5. Line Regulation Over Temperature Normalized

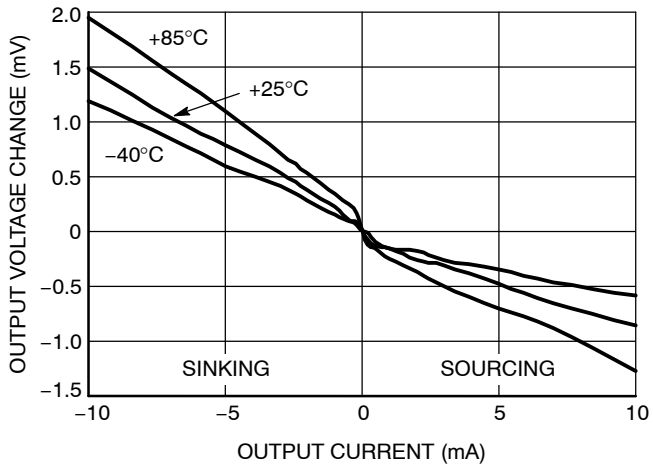


Figure 6. Load Regulation Over Temperature

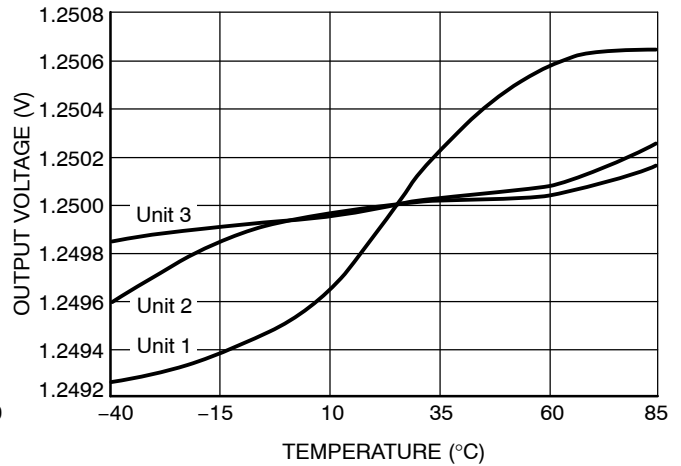


Figure 7. Output Voltage vs. Temperature Normalized

# TYPICAL CHARACTERISTICS

( $V_{IN} = 3.0\text{ V}$ ,  $I_{OUT} = 0\text{ mA}$ , ambient temperature of  $25^{\circ}\text{C}$ , unless specified otherwise.)

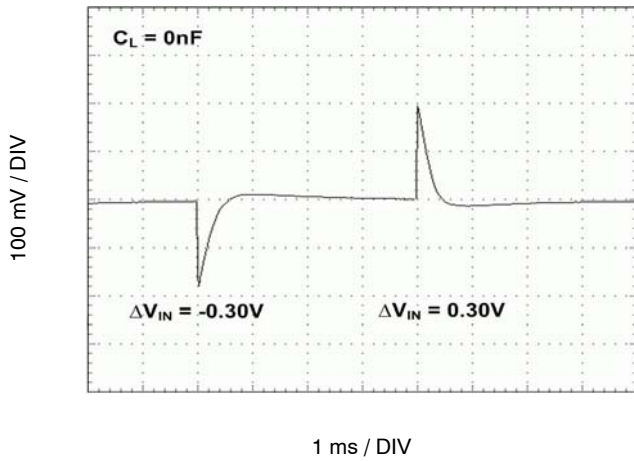


Figure 8. Line Transient Response

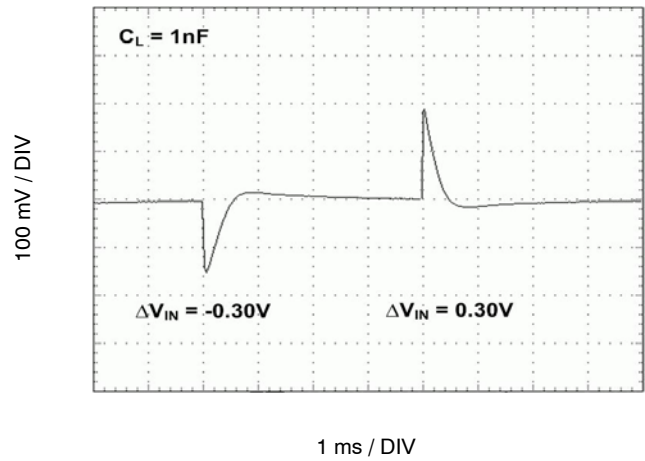


Figure 9. Line Transient Response with Capacitive Load

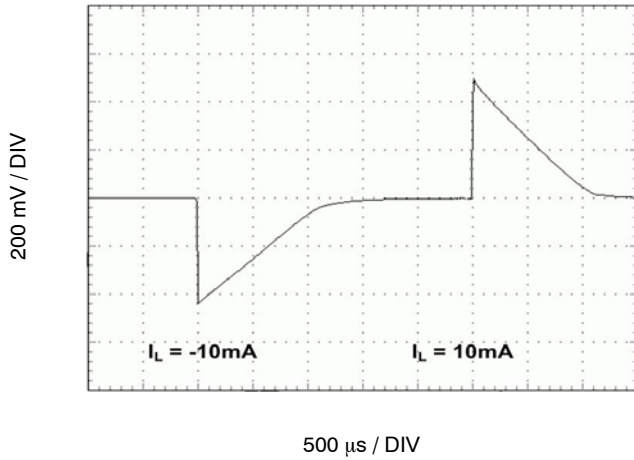


Figure 10. Load Transient Response

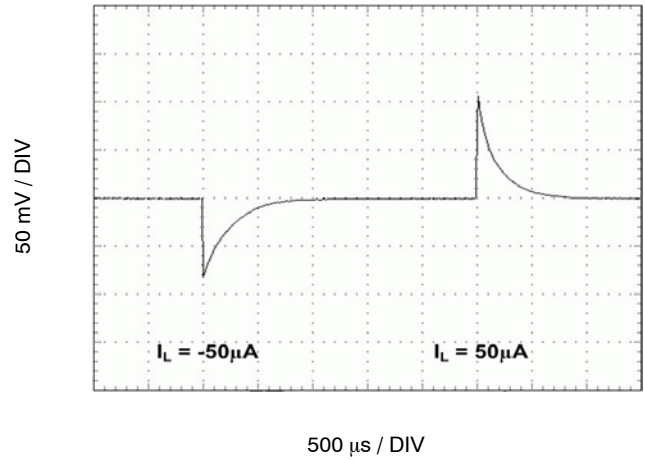


Figure 11. Load Transient Response

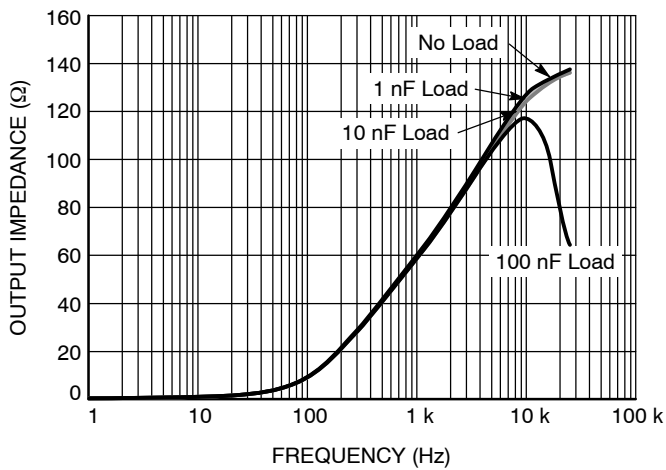


Figure 12. Output Impedance vs. Frequency

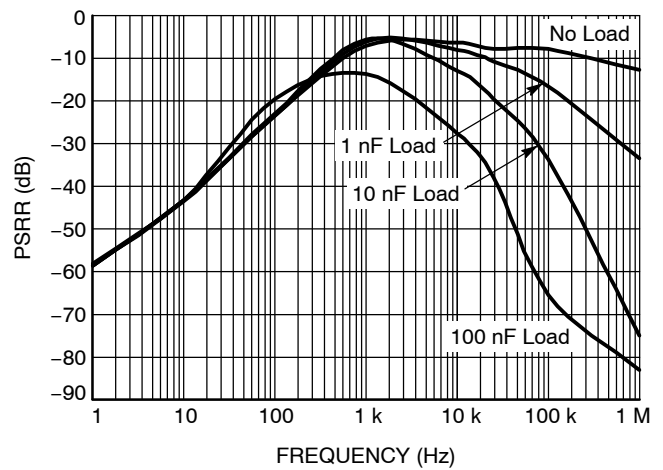
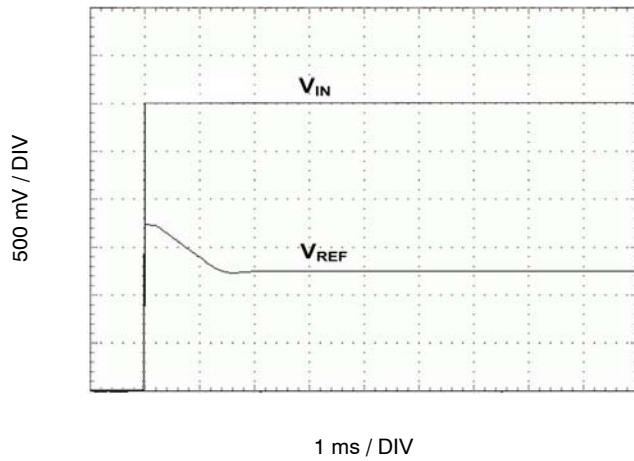


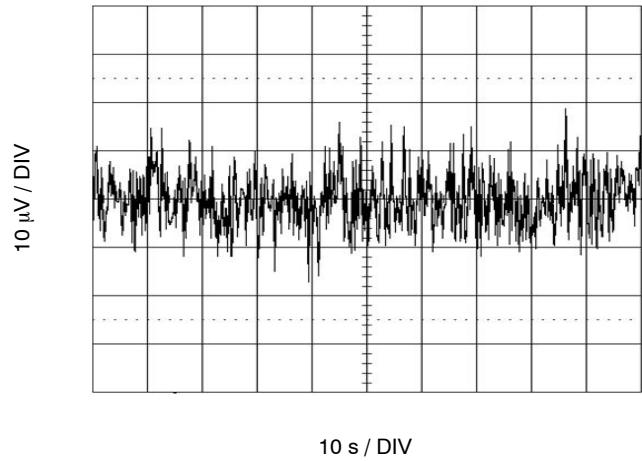
Figure 13. Power Supply Rejection Ratio vs. Frequency

**TYPICAL CHARACTERISTICS**

( $V_{IN} = 3.0\text{ V}$ ,  $I_{OUT} = 0\text{ mA}$ , ambient temperature of  $25^{\circ}\text{C}$ , unless specified otherwise.)



**Figure 14. Turn-On Time**

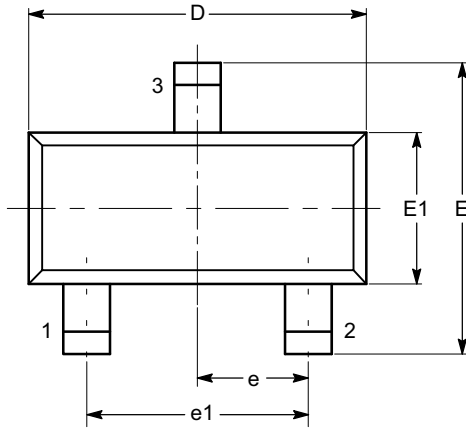


**Figure 15. Output Noise**

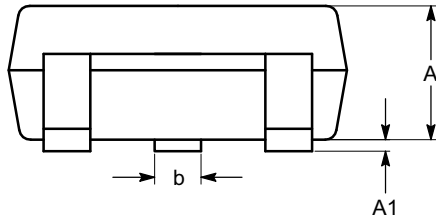
# CAT8900

## PACKAGE DIMENSIONS

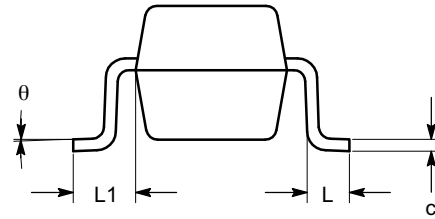
SOT-23, 3 Lead  
CASE 527AG-01  
ISSUE O



TOP VIEW



SIDE VIEW




END 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	0°		8°

### Notes:

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

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