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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: ± 1.0 mV
  Class C: ± 2.5 mV
  Class D: ± 5.0 mV
- Drift Performance: 50 ppm/°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
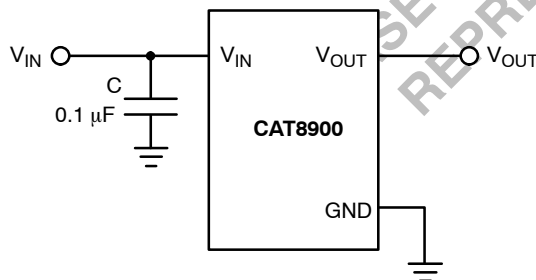
Figure 1. Application Circuit

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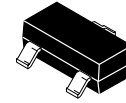
SOT23−3
TP, TB SUFFIX
CASE 527AG

MARKING DIAGRAM

S3YM
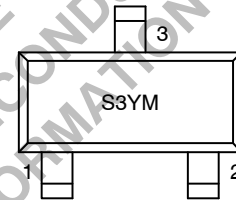
S3 = Specific Device Code
Y = Production Year
(Last Digit)
M = Production Month
(1 – 9, A, B, C)

PIN CONNECTIONS

(Top View)
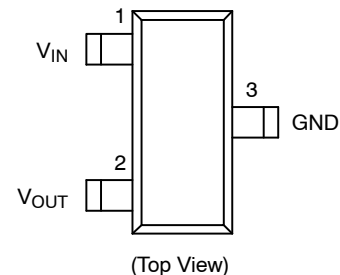
PIN FUNCTIONS

Pin No.	Pin Name	Function
1	V_{IN}	Supply Voltage Input
2	V_{OUT}	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.

Table 1. ORDERING INFORMATION

Orderable Part Number	Initial Accuracy (±mV)	Initial Accuracy (%)	V$_{OUT}$ Voltage (V) (Note 1)	Package	Shipping[†]
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.

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 μF, −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°C)		−1.0		+1.0	mV
	Grade C (T_A = 25°C)		−2.5		+2.5	
	Grade D (T_A = 25°C)		−5.0		+5.0	
Output Voltage Noise (Note 3)	f = 0.1 Hz to 10 Hz			50		μVp−p
Output Voltage Temperature Drift	−40°C to 85°C	$\Delta V_{OUT} \div \Delta T$		20	50	ppm/°C
Thermal Hysteresis (Note 3)	ΔT_A = 125°C	$\Delta V_{OUT} \div \Delta T_A$		100		ppm
Line Regulation	2.7 V < V_{IN} < 5.5 V	$\Delta V_{OUT} \div \Delta V_{IN}$		30	100	μV/V
Dropout Voltage	V_{IN} = 3.0 V, CAT8900x250	V_{DO}		1.0	2.5	mV
Load Regulation Sourcing	0 mA < I_{LOAD} < 10 mA; V_{IN} = 3 V	$\Delta V_{OUT} \div \Delta I_{LOAD}$		100	250	μV/mA
Sinking	−10 mA < I_{LOAD} < 0 mA; V_{IN} = 3 V			150	350	μV/mA
Long Term Stability (Note 3)	T_A = 25°C; first 1000 hours	$\Delta V_{OUT} \div \Delta t$		50		ppm
Output Current		I_{LOAD}	−10		+10	mA

Short Circuit Current (Note 3)
  Sourcing
  Sinking
	T_A = 25°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 V; C_L = 0 pF			2		ms

POWER SUPPLY

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

3. Guaranteed by design.

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TYPICAL CHARACTERISTICS

(V_{IN} = 3.0 V, I_{OUT} = 0 mA, ambient temperature of 25°C, unless specified otherwise.)
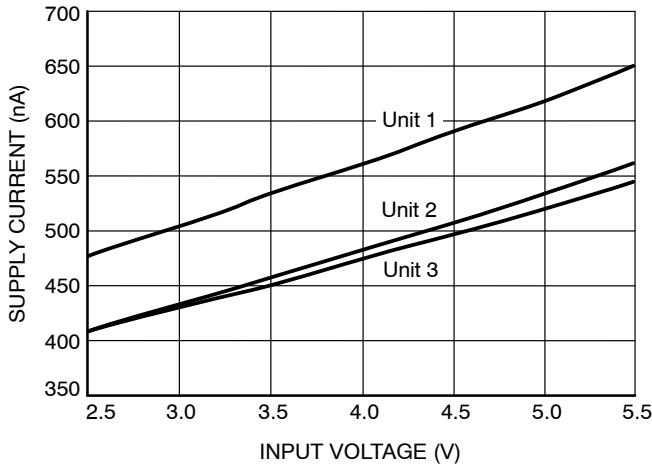

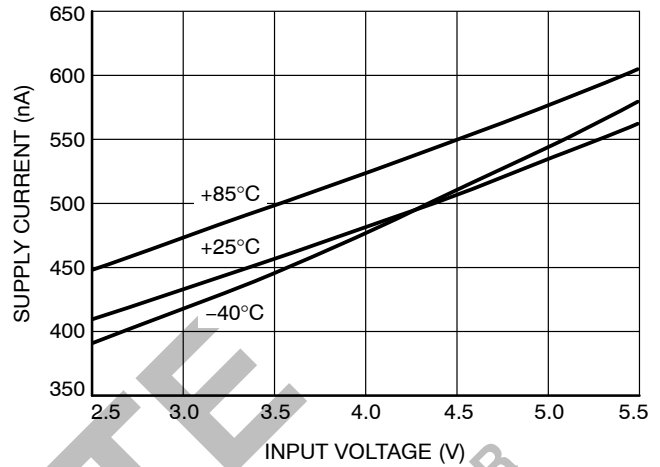Figure 2. Supply Current vs. Input Voltage

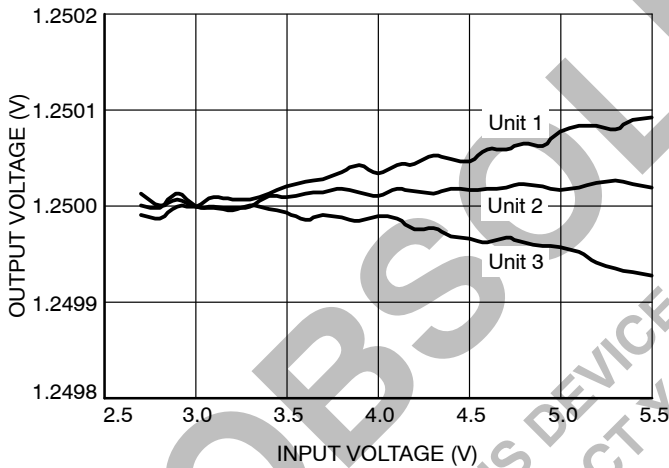Figure 3. Supply Current vs. Input Voltage Over Temperature
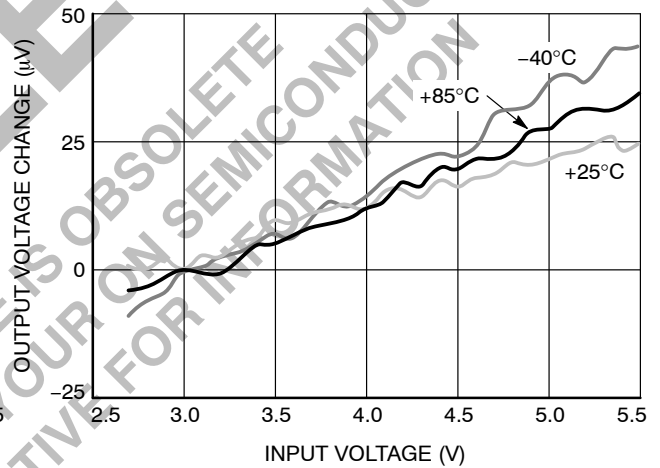

Figure 4. Line Regulation
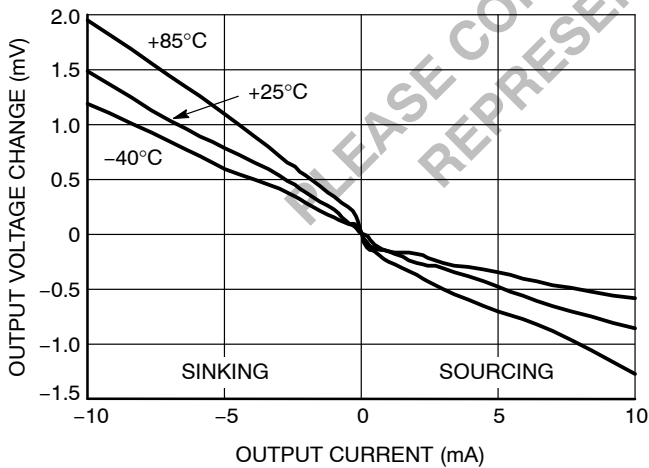

Figure 5. Line Regulation Over Temperature Normalized

Figure 6. Load Regulation Over Temperature

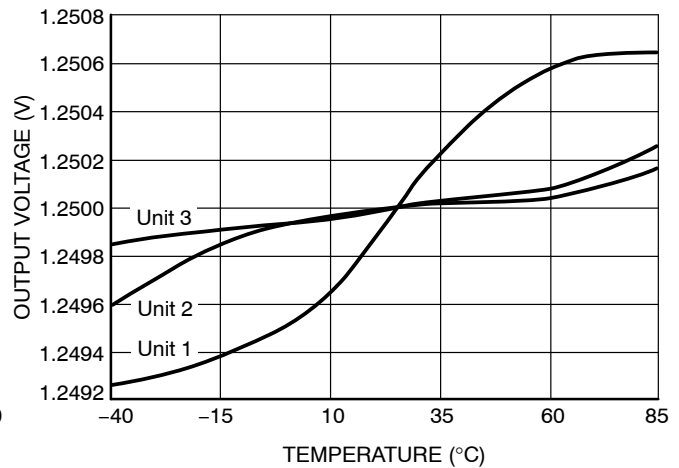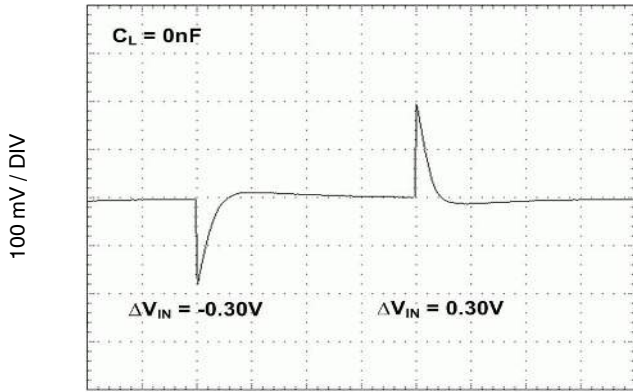Figure 7. Output Voltage vs. Temperature Normalized

TYPICAL CHARACTERISTICS

(V_{IN} = 3.0 V, I_{OUT} = 0 mA, ambient temperature of 25°C, unless specified otherwise.)

C_L = 0nF

ΔV_{IN} = -0.30V ΔV_{IN} = 0.30V

1 ms / DIV

Figure 8. Line Transient Response

C_L = 1nF

ΔV_{IN} = -0.30V ΔV_{IN} = 0.30V

1 ms / DIV
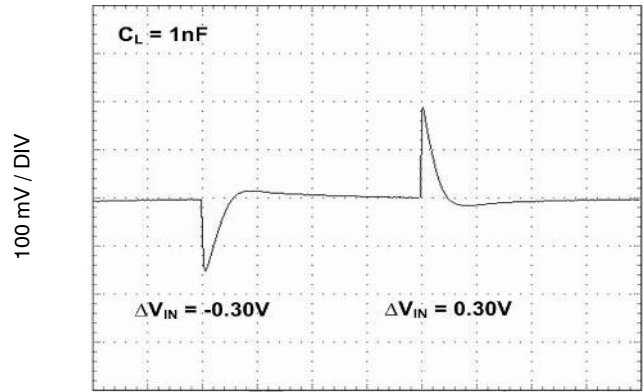
Figure 9. Line Transient Response with Capacitive Load

I_L = -10mA I_L = 10mA

500 μs / DIV
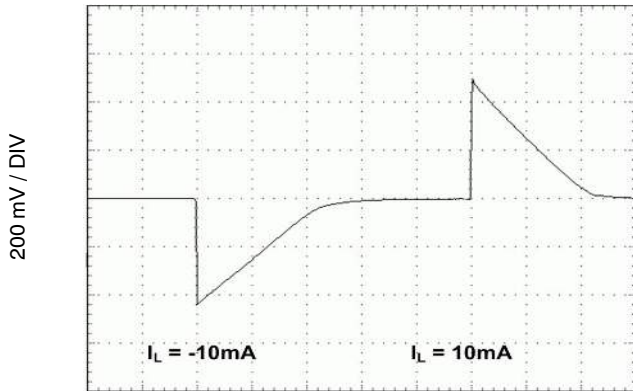
Figure 10. Load Transient Response

I_L = -50μA I_L = 50μA

500 μs / DIV
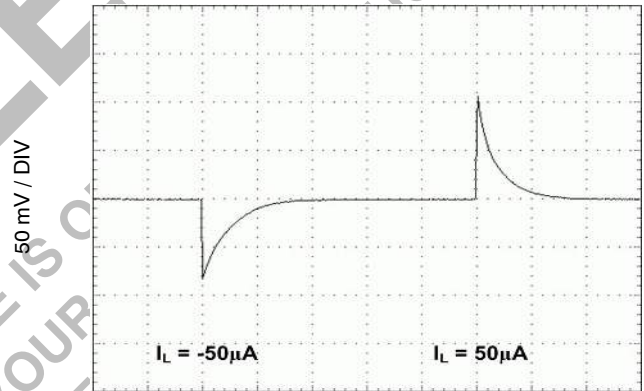
Figure 11. Load Transient Response

No Load
1 nF Load
10 nF Load
100 nF Load
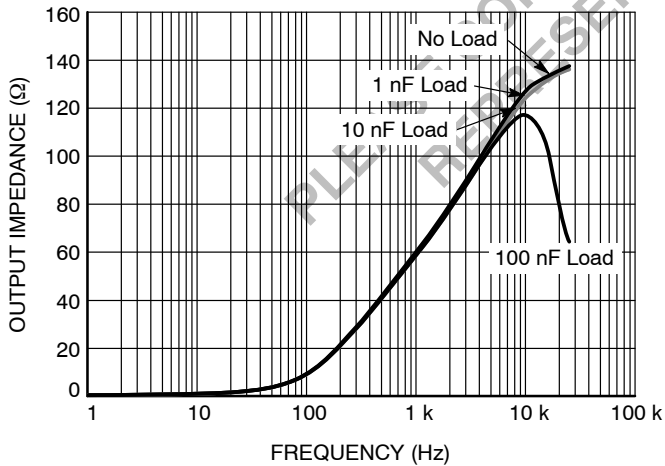
Figure 12. Output Impedance vs. Frequency

No Load
1 nF Load
10 nF Load
100 nF Load
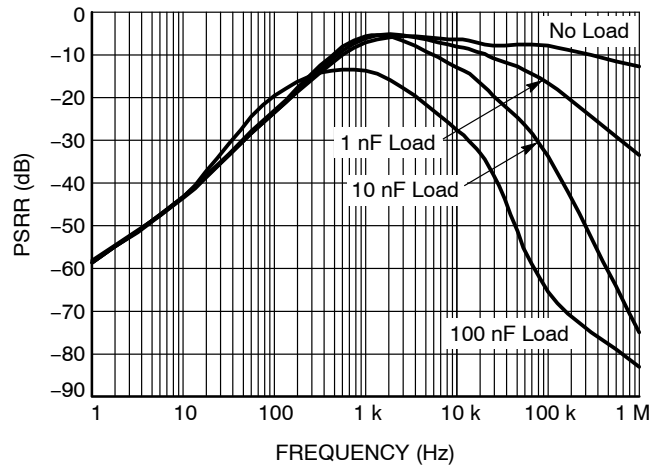
Figure 13. Power Supply Rejection Ratio vs. Frequency

TYPICAL CHARACTERISTICS

(V$_{IN}$ = 3.0 V, I$_{OUT}$ = 0 mA, ambient temperature of 25°C, unless specified otherwise.)

1 ms / DIV

Figure 14. Turn−On Time
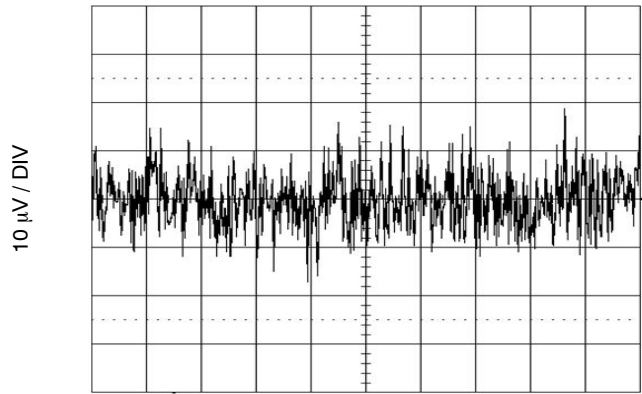
10 s / DIV

Figure 15. Output Noise

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PACKAGE DIMENSIONS

SOT−23, 3 Lead
CASE 527AG−01
ISSUE O
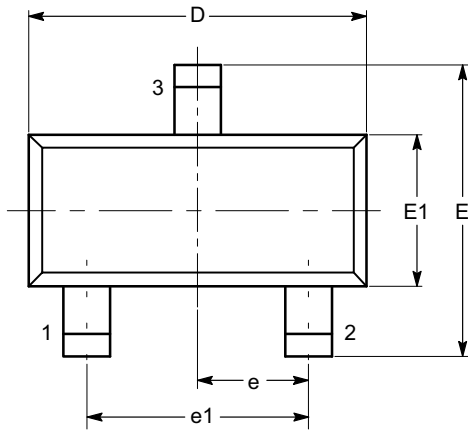
SYMBOL	MIN	NOM	MAX
A	0.89		1.12
A1	0.013		0.10
b	0.37		0.50
c	0.085		0.18
D	2.80		3.04
E	2.10		2.64
E1	1.20		1.40
e		0.95 BSC	
e1		1.90 BSC	
L		0.40 REF	
L1		0.54 REF	
θ	0°		8°

TOP VIEW
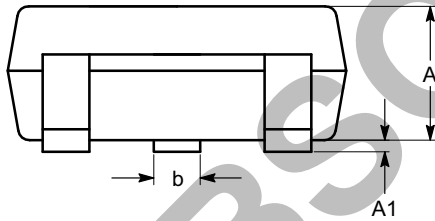
SIDE VIEW
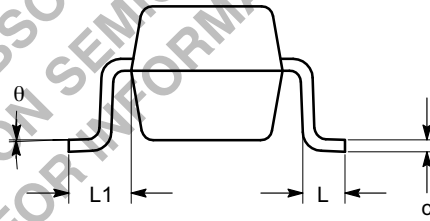
END VIEW

Notes:

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

PUBLICATION ORDERING INFORMATION

CAT8900/D