

# Micropower Voltage Reference Diode



## CLM285-1.2 / CLM385-1.2

### FEATURES

- Tight Tolerance ..... 1% - 2%
- Operating Current ..... 10 $\mu$ A - 20mA
- Dynamic Impedance ..... 1 $\Omega$
- Low Temperature Coefficient

### PRODUCT DESCRIPTION

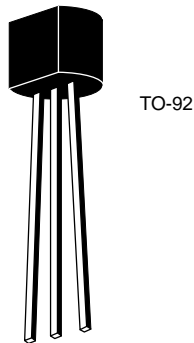
The CLM285 / 385 - 1.2 are micropower 2 terminal band-gap voltage regulator diodes. Operating over a wide current range of 10 $\mu$ A to 20mA with low dynamic impedance and stable temperature characteristics. Calogic utilizes on-chip trimming to provide tight voltage tolerances.

The devices are excellent in portable meters, regulators or general purpose analog circuitry with battery life approaching shelf life.

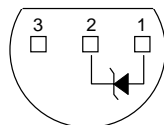
### ORDERING INFORMATION

Part	Package	Max Tempco (ppm)	Temp Range
CLM285Y1	SOIC	100	-40 $^{\circ}$ C to +85 $^{\circ}$ C
CLM385T1	TO-46	100	0 $^{\circ}$ C to +70 $^{\circ}$ C
CLM385N1	TO-92	100	0 $^{\circ}$ C to +70 $^{\circ}$ C
CLM385Y1	SOIC	100	0 $^{\circ}$ C to +70 $^{\circ}$ C

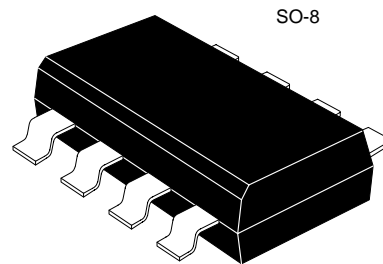
### PIN CONFIGURATIONS



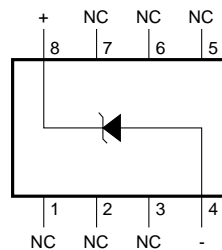
TO-92



TO-92 (N-SUFFIX)  
BOTTOM VIEW



SO-8



SO PACKAGE  
(Y-SUFFIX)  
BOTTOM VIEW



**ABSOLUTE MAXIMUM RATINGS**

Reverse Current .....	30mA	Storage Temperature .....	-55°C to +150°C
Forward Current .....	10mA	Soldering Information	
Operating Temperature Range		TO-92 Package (10 sec.) .....	260°C
CLM285-1.2 .....	-40°C to +85°C	SO Package: Vapor Phase (60 sec.) .....	215°C
CLM385-1.2 .....	0°C to +70°C	Infrared (15 sec.) .....	220°C

**ELECTRICAL CHARACTERISTICS (Note 1)**

PARAMETER	CLM285-1.2			CLM385-1.2			UNITS (LIMITS)	CONDITIONS
	TYP	TESTED LIMIT (NOTE 2)	DESIGN LIMIT (NOTE 3)	TYP	TESTED LIMIT (NOTE 2)	DESIGN LIMIT (NOTE 3)		
Reverse Breakdown Voltage	1.235	1.220 1.245		1.235 1.235	1.223 1.247 1.225 1.245		V <sub>MIN</sub> V <sub>MAX</sub> V <sub>MIN</sub> V <sub>MAX</sub>	T <sub>A</sub> = 25°C, 1 <sub>MIN</sub> ≤ I <sub>R</sub> ≤ 1 <sub>MAX</sub> CLM285-1.2/CLM385B-1.2  CLM385-1.2
Minimum Operating Current	8	8	<b>10</b>	8	15	<b>10</b>	μA	
Reverse Breakdown		1	<b>1.5</b>		1	<b>1.5</b>	mV	I <sub>MIN</sub> ≤ I <sub>R</sub> ≤ 1mA
Voltage Change with Current		10	<b>20</b>		10	<b>20</b>	mV	1mA ≤ I <sub>R</sub> ≤ 20mA
Reverse Dynamic Impedance	1		<b>1.5</b>	1		<b>1.5</b>	Ω	I <sub>R</sub> = 100μA, f = 20Hz
Wideband Noise (rms)	60			60			μV	I <sub>R</sub> = 100μA 10Hz ≤ f ≤ 10kHz
Long Term Stability	20			20			ppm	I <sub>R</sub> = 100μA, T = 1000Hr T <sub>A</sub> = 25°C ± 0.1°C
Average Temperature Coefficient (Note 4)		<b>50</b>	<b>100</b>		<b>50</b>	<b>100</b>	ppm/°C	I <sub>R</sub> = 100μA

**Note 1:** Parameters identified with **boldface type** apply at temperature extremes and for I<sub>MIN</sub> < I<sub>R</sub> < 20mA, unless otherwise specified. All other numbers apply at T<sub>A</sub> = T<sub>J</sub> = 25°C.

**Note 2:** Guaranteed and 100% production tested.

**Note 3:** Guaranteed (but not 100% production tested) over the operating temperature and input current ranges. These limits are not to be used to calculate outgoing quality levels.

**Note 4:** The average temperature coefficient is defined as the maximum deviation of reference voltage at all measured temperatures between the operating T<sub>MAX</sub> and T<sub>MIN</sub>, divided by T<sub>MAX</sub>-T<sub>MIN</sub>. The measured temperatures are -55°C, -40°C, 0°C, 25°C, 70°C, 85°C, 125°C.

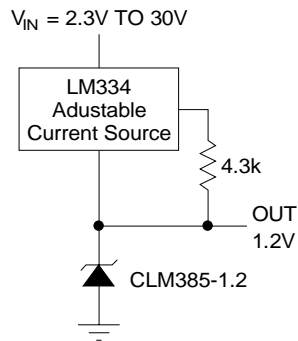
**Note 5:** For elevated temperature operation, T<sub>J</sub> max is:

CLM285	125°C
CLM385	100°C

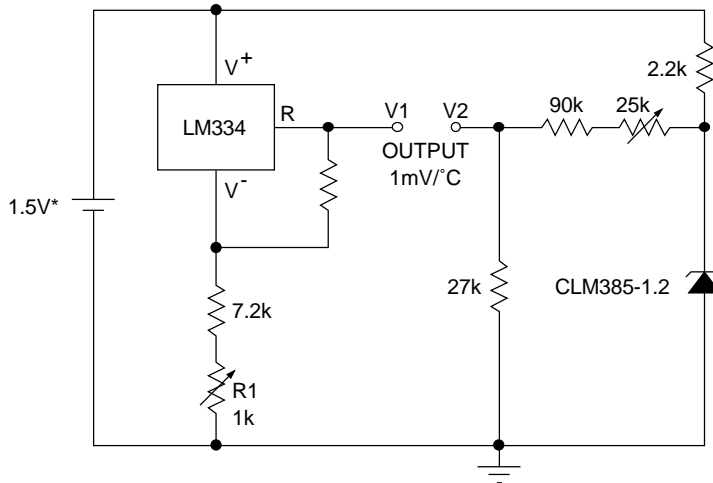
Thermal Resistance	TO-92	SO-8
θ <sub>JA</sub> (Junction to Ambient)	180°C/W (0.4" leads) 170°C/W (0.125" leads)	165°C/W
θ <sub>JC</sub> (Junction to Case)	N/A	N/A

APPLICATIONS

WIDE INPUT RANGE REFERENCE



CENTIGRADE THERMOMETER



CALIBRATION

1. ADJUST R1 SO THAT V1 = TEMP AT 1mV/°K
2. ADJUST V2 TO 273.2mV

\*  $I_Q$  FOR 1.3V TO 1.6V BATTERY VOLTAGE = 50 $\mu$ A TO 150 $\mu$ A