

LM285, LM385B

Micropower Voltage Reference Diodes

The LM285/LM385 series are micropower two-terminal bandgap voltage regulator diodes. Designed to operate over a wide current range of 10 μ A to 20 mA, these devices feature exceptionally low dynamic impedance, low noise and stable operation over time and temperature. Tight voltage tolerances are achieved by on-chip trimming. The large dynamic operating range enables these devices to be used in applications with widely varying supplies with excellent regulation. Extremely low operating current make these devices ideal for micropower circuitry like portable instrumentation, regulators and other analog circuitry where extended battery life is required.

The LM285/LM385 series are packaged in a low cost TO-226 plastic case and are available in two voltage versions of 1.235 V and 2.500 V as denoted by the device suffix (see Ordering Information table). The LM285 is specified over a -40°C to $+85^{\circ}\text{C}$ temperature range while the LM385 is rated from 0°C to $+70^{\circ}\text{C}$.

The LM385 is also available in a surface mount plastic package in voltages of 1.235 V and 2.500 V.

Features

- Pb-Free Packages are Available
- Operating Current from 10 μ A to 20 mA
- 1.0%, 1.5%, 2.0% and 3.0% Initial Tolerance Grades
- Low Temperature Coefficient
- 1.0 Ω Dynamic Impedance
- Surface Mount Package Available

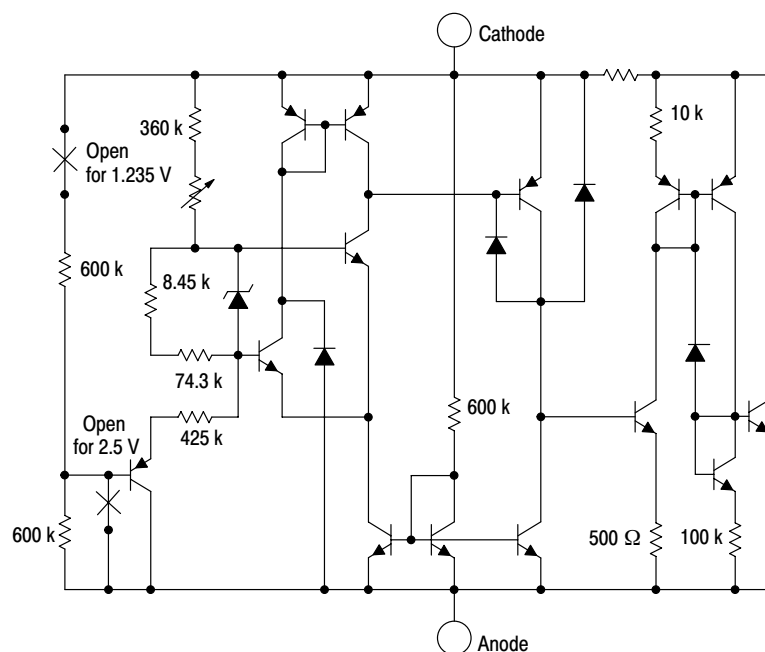


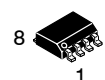
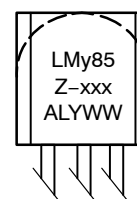
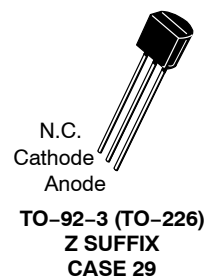
Figure 1. Representative Schematic Diagram



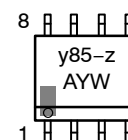
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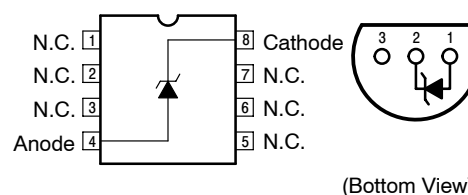
MARKING DIAGRAMS



SOIC-8
D SUFFIX
CASE 751

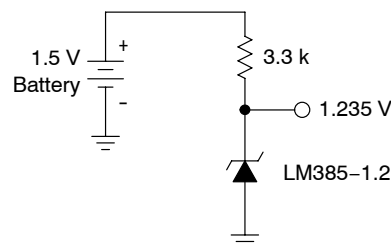


xxx = 1.2 or 2.5
y = 2 or 3
z = 1 or 2
A = Assembly Location
L = Wafer Lot
Y = Year
W, WW = Work Week



(Bottom View)

Standard Application



ORDERING INFORMATION

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

LM285, LM385B

MAXIMUM RATINGS (T_A = 25°C, unless otherwise noted)

Rating	Symbol	Value	Unit
Reverse Current	I _R	30	mA
Forward Current	I _F	10	mA
Operating Ambient Temperature Range LM285 LM385	T _A	-40 to +85 0 to +70	°C
Operating Junction Temperature	T _J	+150	°C
Storage Temperature Range	T _{stg}	-65 to + 150	°C
Electrostatic Discharge Sensitivity (ESD) Human Body Model (HBM) Machine Model (MM) Charged Device Model (CDM)	ESD	4000 400 2000	V

Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

ELECTRICAL CHARACTERISTICS (T_A = 25°C, unless otherwise noted)

Characteristic	Symbol	LM285-1.2			LM385-1.2/LM385B-1.2			Unit
		Min	Typ	Max	Min	Typ	Max	
Reverse Breakdown Voltage (I _{Rmin} ≤ I _R ≤ 20 mA) LM285-1.2/LM385B-1.2 T _A = T _{low} to T _{high} (Note 1) LM385-1.2 T _A = T _{low} to T _{high} (Note 1)	V _{(BR)R}	1.223 1.200 – –	1.235 – – –	1.247 1.270 – –	1.223 1.210 1.205 1.192	1.235 – 1.235 –	1.247 1.260 1.260 1.273	V
Minimum Operating Current T _A = 25°C T _A = T _{low} to T _{high} (Note 1)	I _{Rmin}	– –	8.0 –	10 20	– –	8.0 –	15 20	μA
Reverse Breakdown Voltage Change with Current I _{Rmin} ≤ I _R ≤ 1.0 mA, T _A = +25°C T _A = T _{low} to T _{high} (Note 1) 1.0 mA ≤ I _R ≤ 20 mA, T _A = +25°C T _A = T _{low} to T _{high} (Note 1)	ΔV _{(BR)R}	– – – –	– – – –	1.0 1.5 10 20	– – – –	– – – –	1.0 1.5 20 25	mV
Reverse Dynamic Impedance I _R = 100 μA, T _A = +25°C	Z	–	0.6	–	–	0.6	–	Ω
Average Temperature Coefficient 10 μA ≤ I _R ≤ 20 mA, T _A = T _{low} to T _{high} (Note 1)	ΔV _{(BR)R} /ΔT	–	80	–	–	80	–	ppm/°C
Wideband Noise (RMS) I _R = 100 μA, 10 Hz ≤ f ≤ 10 kHz	n	–	60	–	–	60	–	μV
Long Term Stability I _R = 100 μA, T _A = +25°C ± 0.1°C	S	–	20	–	–	20	–	ppm/kHR
Reverse Breakdown Voltage (I _{Rmin} ≤ I _R ≤ 20 mA) LM285-2.5/LM385B-2.5 T _A = T _{low} to T _{high} (Note 1) LM385-2.5 T _A = T _{low} to T _{high} (Note 1)	V _{(BR)R}	2.462 2.415 – –	2.5 – – –	2.538 2.585 – –	2.462 2.436 2.425 2.400	2.5 – 2.5 –	2.538 2.564 2.575 2.600	V
Minimum Operating Current T _A = 25°C T _A = T _{low} to T _{high} (Note 1)	I _{Rmin}	– –	13 –	20 30	– –	13 –	20 30	μA

1. T_{low} = -40°C for LM285-1.2, LM285-2.5
T_{high} = +85°C for LM285-1.2, LM285-2.5
T_{low} = 0°C for LM385-1.2, LM385B-1.2, LM385-2.5, LM385B-2.5
T_{high} = +70°C for LM385-1.2, LM385B-1.2, LM385-2.5, LM385B-2.5