TelCom Semiconductor, Inc.

LM285/285B-1.2V
LM285/285B-2.5V
LM385/385B-1.2V
LM385/385B-2.5V

LOW POWER, BANDGAP VOLTAGE REFERENCES

FEATURES

- **Output Tolerance ..... 1% or 2%**
- **Output Voltage Option**
  - **LM285/385-1.2V 1.235V**
  - **LM285/385-2.5V 2.5V**
- **Wide Operating Current Range**
  - **LM285/385-1.2V ..... 15µA to 20mA**
  - **LM285/385-2.5V ..... 20µA to 20mA**
- **Temperature Coefficient ..... 30ppm/°C**
- **Dynamic Impedance 0.6Ω**
- **TO-92-3 Plastic Package**
- **8-Pin Plastic Narrow Body (SOIC) Package**

APPLICATIONS

- **ADC and DAC Reference**
- **Current Source Generation**
- **Threshold Detectors**
- **Power Supplies**
- **Multi-meters**

GENERAL DESCRIPTION

The LM285/385-1.2V (1.235V output) and LM285/385-2.5V (2.5V output) are bipolar, two-terminal, bandgap voltage references that offer precision performance without premium price. These devices do not require thin-film resistors, greatly lowering manufacturing complexity and cost.

A 30ppm/°C output temperature coefficient and a 15µA to 20mA operating current range make these voltage references especially attractive for multimeter, data acquisition and telecommunications applications.

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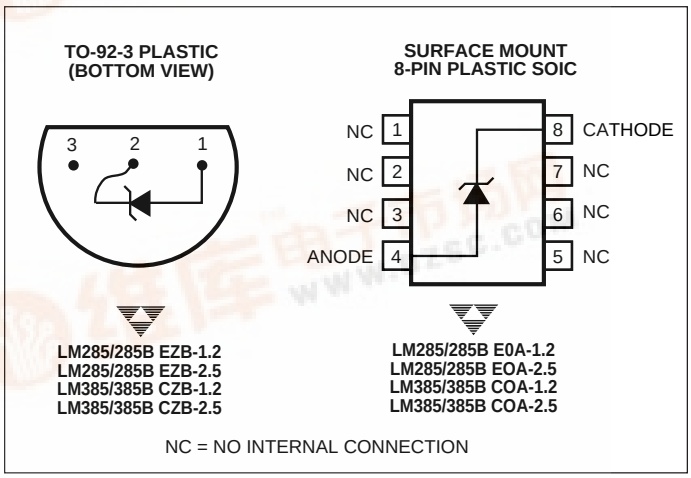
PIN CONFIGURATIONS



ORDERING INFORMATION

Part No.	Package	Temperature Range	Voltage	Tolerance
LM285BEOA-1.2	8-Pin SOIC	– 40°C to +85°C	1.2	1%
LM285BEOA-2.5	8-Pin SOIC	– 40°C to +85°C	2.5	1.5%
LM285BEZB-1.2	TO-92-3	– 40°C to +85°C	1.2	1%
LM285BEZB-2.5	TO-92-3	– 40°C to +85°C	2.5	1.5%
LM285EOA-1.2	8-Pin SOIC	– 40°C to +85°C	1.2	2%
LM285EOA-2.5	8-Pin SOIC	– 40°C to +85°C	2.5	3%
LM285EZB-1.2	TO-92-3	– 40°C to +85°C	1.2	2%
LM285EZB-2.5	TO-92-3	– 40°C to +85°C	2.5	3%
LM385BCOA-1.2	8-Pin SOIC	0°C to +70°C	1.2	1%
LM385BCOA-2.5	8-Pin SOIC	0°C to +70°C	2.5	1.5%
LM385BCZB-1.2	TO-92-3	0°C to +70°C	1.2	1%
LM385BCZB-2.5	TO-92-3	0°C to +70°C	2.5	1.5%
LM385COA-1.2	8-Pin SOIC	0°C to +70°C	1.2	2%
LM385COA-2.5	8-Pin SOIC	0°C to +70°C	2.5	3%
LM385CZB-1.2	TO-92-3	0°C to +70°C	1.2	2%
LM385CZB-2.5	TO-92-3	0°C to +70°C	2.5	3%

LM285/285B-1.2V
LM285/285B-2.5V
LM385/385B-1.2V
LM385/385B-2.5V

LOW POWER, BANDGAP VOLTAGE REFERENCES

ABSOLUTE MAXIMUM RATINGS*

Forward Current ..... +10mA
Reverse Current ..... +30mA
Storage Temperature Range ..... – 65°C to +150°C
Operating Temperature Range
TO-92 Package ..... – 40°C to +85°C
Surface Mount Package ..... – 40°C to +85°C
Lead Temperature (Soldering, 10 sec)
TO-92 Package ..... +300°C
Surface Mount Package ..... +300°C
Power Dissipation
Limited by Forward/Reverse Current

*Functional operation above the absolute maximum stress ratings is not implied.

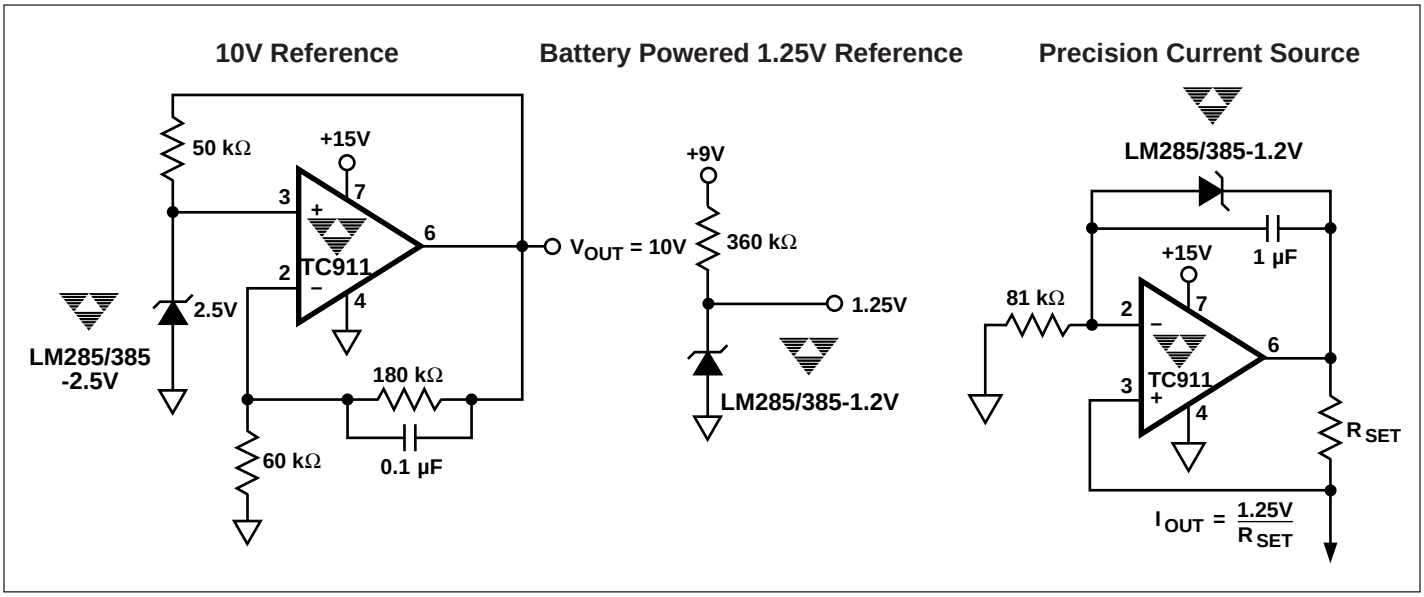
ELECTRICAL CHARACTERISTICS: T_A = +25°C, unless otherwise specified.

Symbol	Parameter	Test Conditions	LM285 / LM285B–1.2 Min	LM285 / LM285B–1.2 Typ	LM285 / LM285B–1.2 Max	LM385 / LM385B–1.2 Min	LM385 / LM385B–1.2 Typ	LM385 / LM385B–1.2 Max	Unit
$V_{(BR)R}$	Reverse Breakdown Voltage	$I_R \le 20mA$							V
	LM285B-1.2/LM385B-1.2		1.223	1.235	1.247	1.223	1.235	1.247	
	$T_A = T_{low}$ to T_{high} (Note 1)		1.200	—	1.270	1.210	—	1.260	
	LM285-1.2V/LM385-1.2V		1.205	1.235	1.260	1.205	1.235	1.260	
	$T_A = T_{low}$ to T_{high} (Note 1)		1.192	—	1.273	1.192	—	1.273	
I_{RMIN}	Minimum Operating Current								µA
	T_A = +25°C		—	8.0	15	—	8.0	15	
	$T_A = T_{low}$ to T_{high} (Note 1)		—	—	20	—	—	20	
$\Delta V_{(BR)R}$	Reverse Breakdown Voltage Change with Current								mV
	$I_{Rmin} = I_R$ = 1.0mA, T_A = +25°C		—	—	1.0	—	—	1.0	
	$T_A = T_{low}$ to T_{high} (Note 1)		—	—	1.5	—	—	1.5	
	1.0mA = I_R = 20mA, T_A = +25°C		—	—	10	—	—	20	
	$T_A = T_{low}$ to T_{high} (Note 1)		—	—	20	—	—	25	
Z	Reverse Dynamic Impedance	I_R = 100µA	—	0.6	—	—	0.6	—	Ω
$\Delta V_{(BR)}/\Delta T$	Average Temperature Coefficient	10µA ≤ I_R ≤ 20mA	—	30	100	—	30	100	ppm/°C
S	Long Term Stability	I_R = 100µA, T_A = +25°C ±0.1°C	—	20	—	—	20	—	ppm/kHR

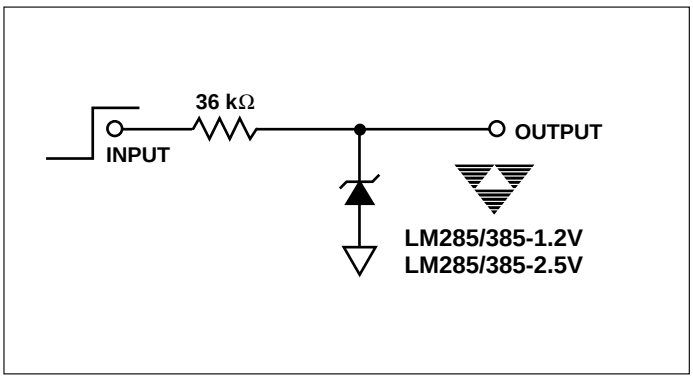
Symbol	Parameter	Test Conditions	LM285 / LM285B–2.5 Min	LM285 / LM285B–2.5 Typ	LM285 / LM285B–2.5 Max	LM385 / LM385B–2.5 Min	LM385 / LM385B–2.5 Typ	LM385 / LM385B–2.5 Max	Unit
$V_{(BR)R}$	Reverse Breakdown Voltage	I_R = 20mA							V
	LM285B-2.5/LM385B-2.5		2.462	2.5	2.538	2.462	2.5	2.538	
	$T_A = T_{low}$ to T_{high} (Note 1)		2.415	—	2.585	2.436	—	2.564	
	LM285-2.5V/LM385-2.5V		2.425	2.5	2.575	2.425	2.5	2.575	
	$T_A = T_{low}$ to T_{high} (Note 1)		2.400	—	2.600	2.400	—	2.600	
I_{RMIN}	Minimum Operating Current								µA
	T_A = +25°C		—	13	20	—	13	20	
	$T_A = T_{low}$ to T_{high} (Note 1)		—	—	30	—	—	30	
$\Delta V_{(BR)R}$	Reverse Breakdown Voltage Change with Current								mV
	$I_{Rmin} = I_R$ = 1.0mA, T_A = +25°C		—	—	1.0	—	—	2.0	
	$T_A = T_{low}$ to T_{high} (Note 1)		—	—	1.5	—	—	2.5	
	1.0mA = I_R = 20mA, T_A = +25°C		—	—	10	—	—	20	
	$T_A = T_{low}$ to T_{high} (Note 1)		—	—	20	—	—	25	
Z	Reverse Dynamic Impedance	I_R = 100µA	—	0.6	—	—	0.6	—	Ω
$\Delta V_{(BR)}/\Delta T$	Average Temperature Coefficient	20µA ≤ I_R ≤ 20mA	—	30	100	—	30	100	ppm/°C
S	Long Term Stability	I_R = 100µA, T_A = +25°C ±0.1°C	—	20	—	—	20	—	ppm/kHR

Note: 1. T_{low} = – 40°C for LM285-1.2, LM285-2.5, LM285B-1.2, LM285B-2.5
0°C for LM385-1.2, LM385B-1.2, LM385-2.5, LM385B-2.5

TYPICAL APPLICATIONS

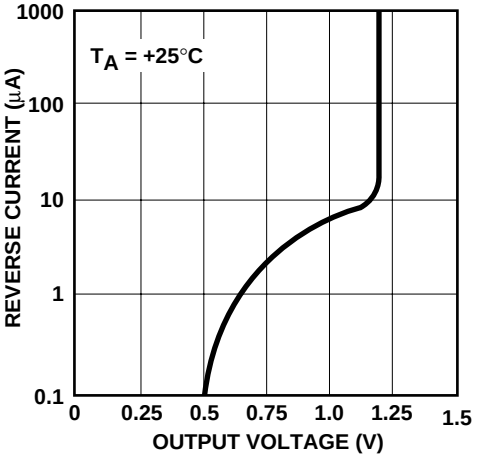


RESPONSE TIME TEST CIRCUIT

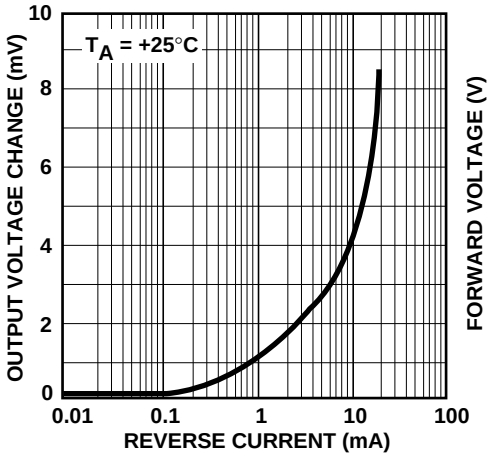


TYPICAL CHARACTERISTICS

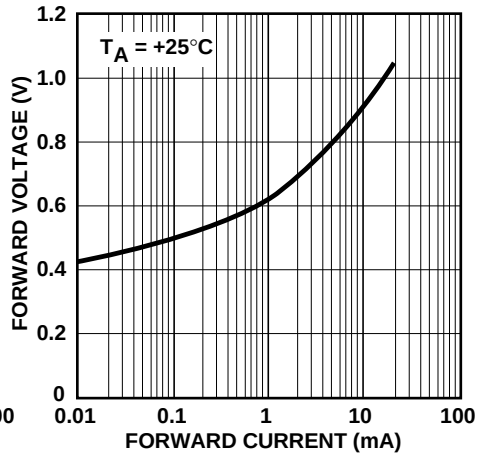
LM285/385-1.2V: Output Voltage vs Reverse Current



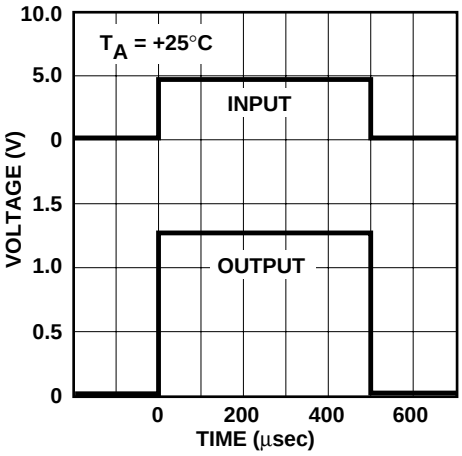
LM285/385-1.2V: Output Voltage Change vs Reverse Current



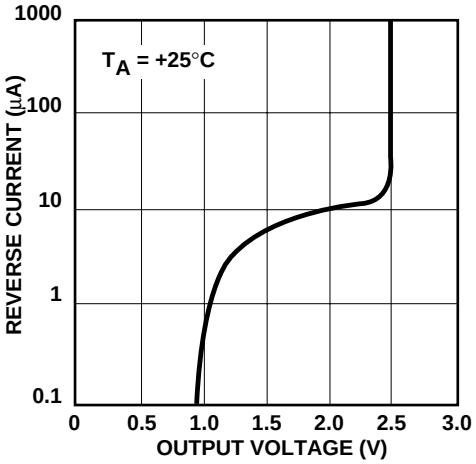
LM285/385-1.2V: Forward Voltage vs Forward Current



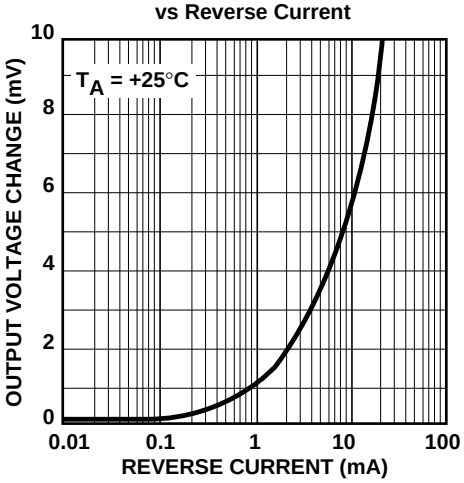
LM285/385-1.2V Response Time



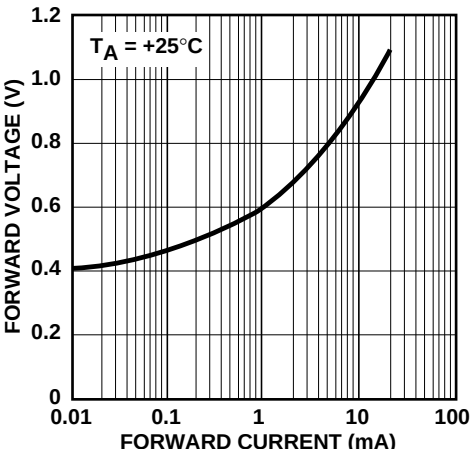
LM285/385-2.5V: Output Voltage vs Reverse Current



LM285/385-2.5V: Output Voltage Change vs Reverse Current



LM285/385-2.5V: Forward Voltage vs Forward Current



LM285/385-2.5V Response Time