2.5V/ 5.0V Reference Diode LM336

FEATURES

- Wide Operating Current of 400μA to 10mA for 2.5V
- Wide Operating Current of 600μA to 10mA for 5.0V
- Guaranteed Temperature Stability
- Fast Turn-on
- Easily Trimmed for Minimum Temperature Drift
- Available in TO-92 and SOP-8 Packages

APPLICATIONS

- Reference for 2.5V/ 5.0V Systems
- A/D and D/A Reference
- Digital Voltmeters
- Power Supply Monitor
- Precision Current Sources

DESCRIPTION

The LM336-2.5/5.0 integrated circuits are precision 2.5V and 5.0V shunt regulator diodes. Monolithic IC LM336-2.5 voltage references operate as a low temperature coefficient 2.5V Zener with 0.2Ω dynamic impedance. Monolithic IC LM336-5.0 voltage references operate as a low temperature coefficient 5V Zener with 0.6Ω dynamic impedance. A third terminal on the LM336 allows the reference voltage and temperature coefficient to be trimmed easily.

The LM336 series is useful as a precision low voltage reference for digital voltmeters, power supplies or op amp circuitry. The 2.5V and 5.0V make it convenient to obtain a stable reference from low voltage supplies. Further, since the LM336-2.5/5.0 operates as a shunt regulator, it can be used as either a positive or negative voltage reference.

The LM336 is rated for operation over a 0ºC to 70ºC temperature range. See the connection diagrams for available packages.

TO-92 (Straight)

TO-92 (Bent)

SOP-8

ORDERING INFORMATION

Device	Package
LM336x-2.5	TO-92 (Bulk, Straight)
LM336xTA-2.5	TO-92 (Tape, Bent)
LM336xD-2.5	SOP-8
LM336x-5.0	TO-92 (Bulk, Straight)
LM336xTA-5.0	TO-92 (Tape, Bent)
LM336xD-5.0	SOP-8

ABSOLUTE MAXIMUM RATINGS (Note 1)

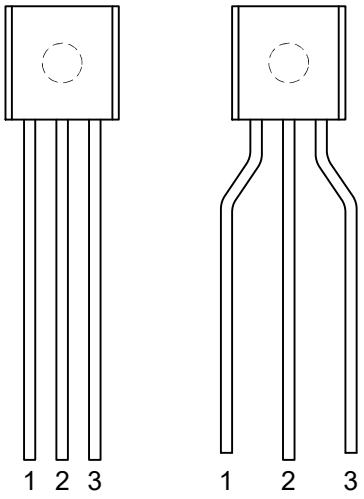
CHARACTERISTIC	SYMBOL	MIN	MAX	UNIT
Reverse Current	I_R	-	15	mA
Forward Current	I_F	-	10	mA
Operating Ambient Temperature Range	T_{OPR}	0	70	°C
Junction Temperature	T_J	-	100	°C
Storage Temperature Range	T_{STG}	−65	150	°C

Note 1. Stresses listed as the absolute maximum ratings may cause permanent damage to the device.

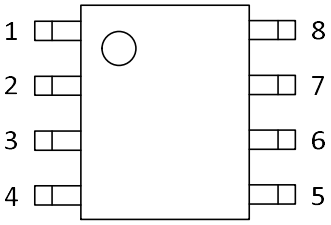
ORDERING INFORMATION

VOUT	Package	Order No.	Description	Supplied As	Status
2.5V	TO-92	LM336-2.5	4.0%, Straight Lead	Bulk	Contact Us
	TO-92	LM336B-2.5	2.0%, Straight Lead	Bulk	Active
	TO-92	LM336TA-2.5	4.0%, Bent Lead	Tape & Ammo Pack	Contact Us
	TO-92	LM336BTA-2.5	2.0%, Bent Lead	Tape & Ammo Pack	Active
	SOP-8	LM336D-2.5	4.0%	Tape & Reel	Contact Us
	SOP-8	LM336BD-2.5	2.0%	Tape & Reel	Contact Us
5.0V	TO-92	LM336-5.0	4.0%, Straight Lead	Bulk	Contact Us
	TO-92	LM336B-5.0	2.0%, Straight Lead	Bulk	Active
	TO-92	LM336TA-5.0	4.0%, Bent Lead	Tape & Ammo Pack	Contact Us
	TO-92	LM336BTA-5.0	2.0%, Bent Lead	Tape & Ammo Pack	Active
	SOP-8	LM336D-5.0	4.0%	Tape & Reel	Contact Us
	SOP-8	LM336BD-5.0	2.0%	Tape & Reel	Contact Us

PIN CONFIGURATION



TO-92



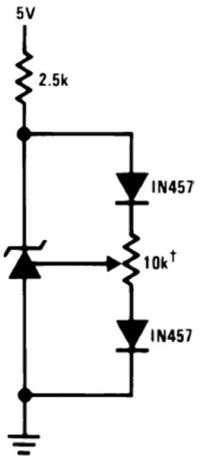
SOP-8

PIN DESCRIPTION

Pin No.		Pin Name	Pin Function
TO-92	SOP-8		
1	5	ADJ	Adjustable
2	8	+	Positive
3	4	–	Negative
-	1, 2, 3, 6, 7	NC	No Connection

TYPICAL APPLICATIONS

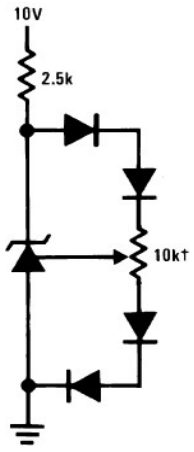
2.5V REFERENCE



2.5V Reference with Minimum Temperature Coefficient

† Adjust to 2.490V
Any Silicon signal diode can be used.

5.0V REFERENCE



5.0V Reference with Minimum Temperature Coefficient

† Adjust to 5.00V
Any Silicon signal diode can be used.

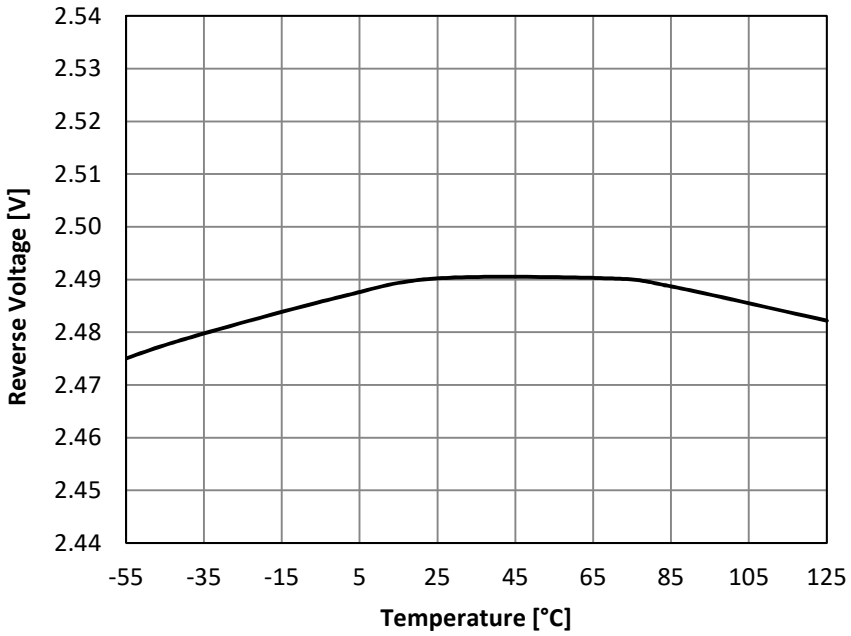
ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITIONS		MIN	TYP	MAX	UNIT
2.5 V REFERENCE							
Reverse Breakdown Voltage	V_Z	T_A = 25ºC, I_R = 1.0 mA	LM336	2.390	2.490	2.590	V
			LM336B	2.440	2.490	2.540	V
Reverse Breakdown Change with Current	$\Delta V_Z/\Delta I_R$	T_A = 25ºC, 400 μA ≤ I_R ≤ 10 mA		-	2.6	10	mV
Temperature Stability (Note 2)	$\Delta V_Z/\Delta T$	V_R Adjusted to 2.490V, I_R = 1.0mA, 0ºC ≤ T_A ≤ 70ºC		-	3.0	-	mV
5.0 V REFERENCE							
Reverse Breakdown Voltage	V_Z	T_A = 25ºC, I_R = 1.0 mA	LM336	4.80	5.00	5.20	V
			LM336B	4.90	5.00	5.10	V
Reverse Breakdown Change with Current	$\Delta V_Z/\Delta I_R$	T_A = 25ºC, 600 μA ≤ I_R ≤ 10 mA		-	6.0	20	mV
Temperature Stability (Note 2)	$\Delta V_Z/\Delta T$	V_R Adjusted to 5.00V, I_R = 1.0mA, 0ºC ≤ T_A ≤ 70ºC		-	8.0	-	mV

Note 2.Temperature stability for LM336 family is specified by design. Design limits are ensured (but not 100% production tested) over the indicated temperature and supply voltage ranges. Stability is defined as the maximum change in V_{REF} from 25ºC to T_A (min) or T_A (max).

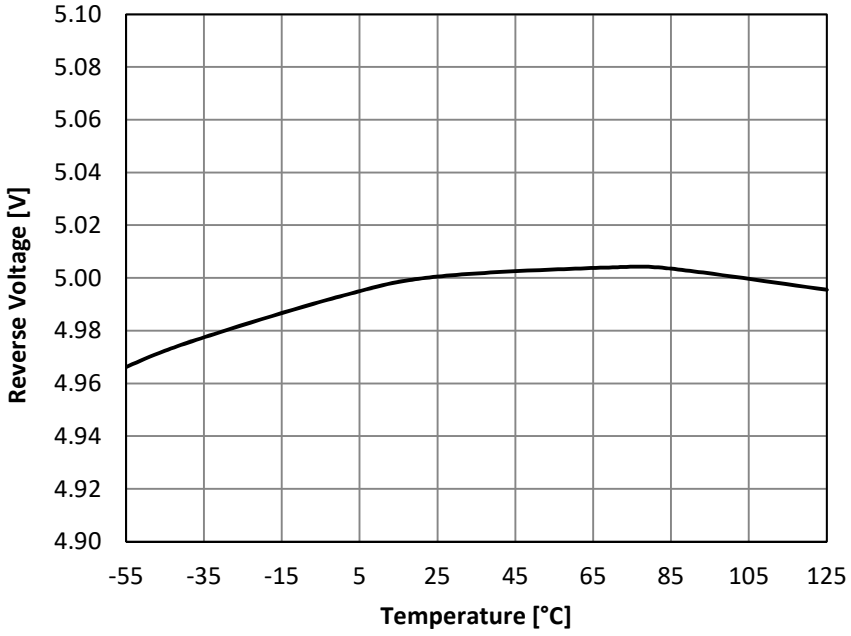
TYPICAL OPERATING CHARACTERISTICS

2.5V REFERENCE



Temperature Drift

5.0V REFERENCE



Temperature Drift

REVISION NOTICE

The description in this datasheet is subject to change without any notice to describe its electrical characteristics properly.