

## 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

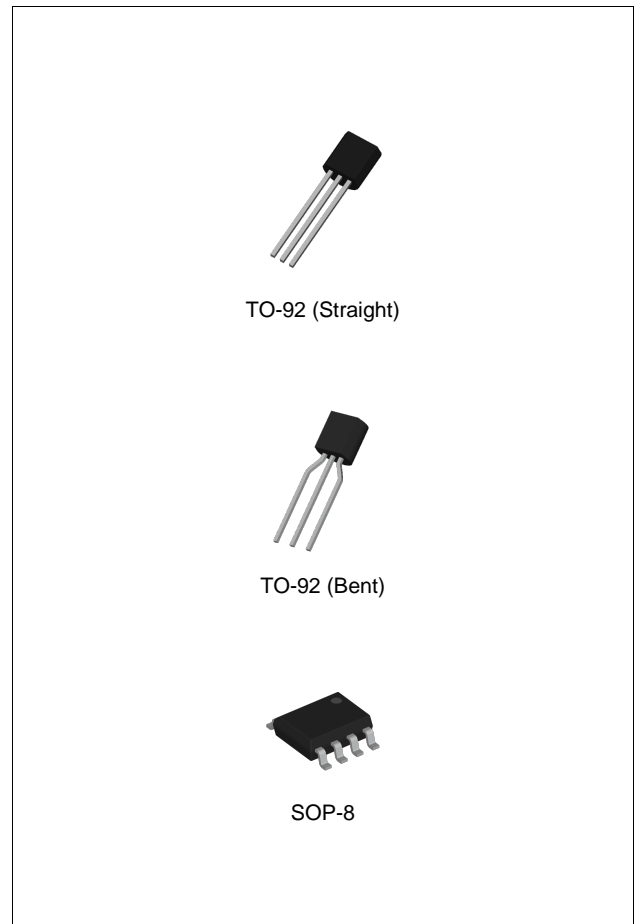
- Reference for 2.5V/ 5.0V Systems
- A/D and D/A Reference
- Digital Voltmeters
- Power Supply Monitor
- Precision Current Sources

## 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 0°C to 70°C temperature range. See the connection diagrams for available packages.



## ORDERING INFORMATION

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

**ABSOLUTE MAXIMUM RATINGS** (Note 1)

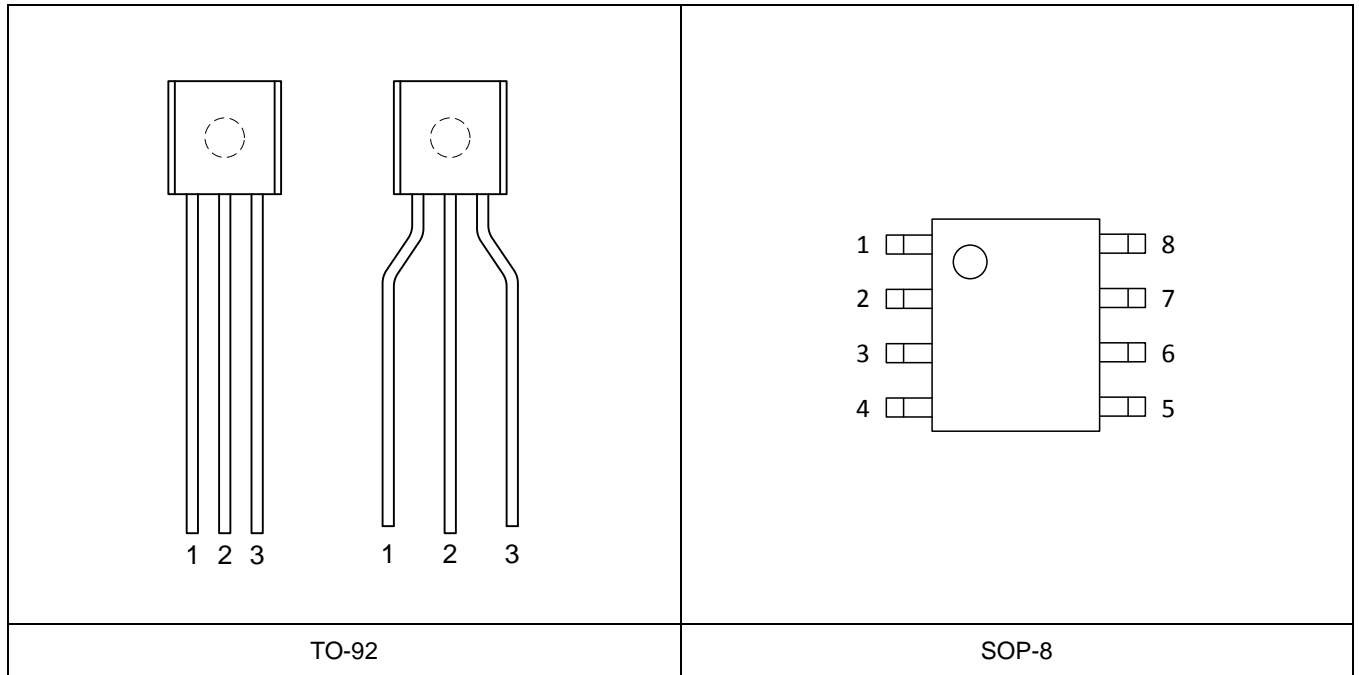
CHARACTERISTIC	SYMBOL	MIN	MAX	UNIT
Reverse Current	$I_R$	-	15	mA
Forward Current	$I_F$	-	10	mA
Operating Ambient Temperature Range	$T_{OPR}$	0	70	°C
Junction Temperature	$T_J$	-	100	°C
Storage Temperature Range	$T_{STG}$	-65	150	°C

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**

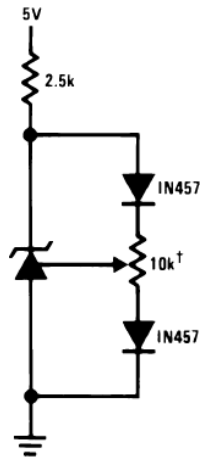


**PIN DESCRIPTION**

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

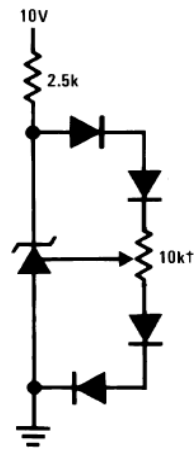
### 2.5V REFERENCE



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.

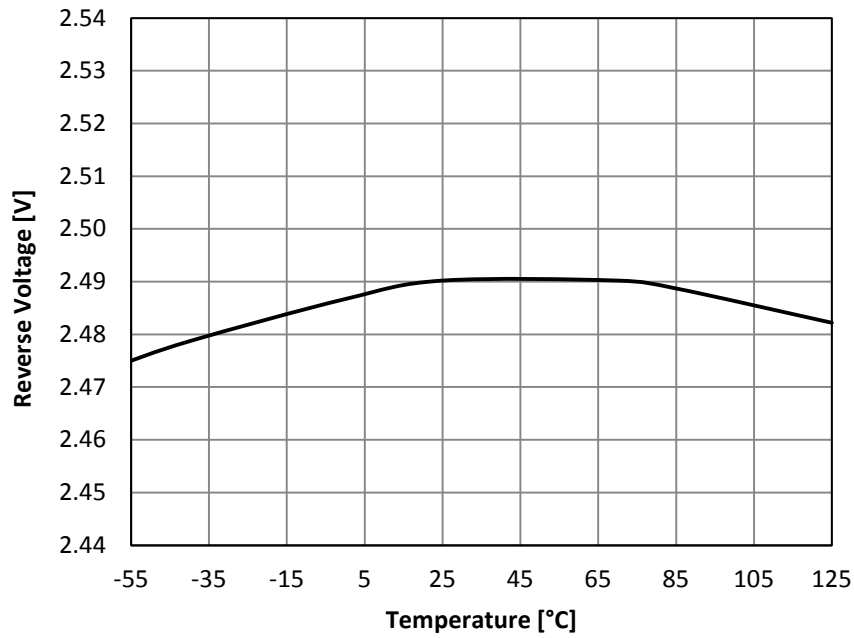
## ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
<b>2.5 V REFERENCE</b>							
Reverse Breakdown Voltage	$V_Z$	$T_A = 25^\circ\text{C}, I_R = 1.0 \text{ mA}$	LM336	2.390	2.490	2.590	V
			LM336B	2.440	2.490	2.540	V
Reverse Breakdown Change with Current	$\Delta V_Z/\Delta I_R$	$T_A = 25^\circ\text{C}, 400 \mu\text{A} \leq I_R \leq 10 \text{ mA}$	-	2.6	10	mV	
Temperature Stability <sup>(Note 2)</sup>	$\Delta V_Z/\Delta T$	$V_R$ Adjusted to 2.490V, $I_R = 1.0\text{mA}$ , $0^\circ\text{C} \leq T_A \leq 70^\circ\text{C}$	-	3.0	-	mV	
<b>5.0 V REFERENCE</b>							
Reverse Breakdown Voltage	$V_Z$	$T_A = 25^\circ\text{C}, I_R = 1.0 \text{ mA}$	LM336	4.80	5.00	5.20	V
			LM336B	4.90	5.00	5.10	V
Reverse Breakdown Change with Current	$\Delta V_Z/\Delta I_R$	$T_A = 25^\circ\text{C}, 600 \mu\text{A} \leq I_R \leq 10 \text{ mA}$	-	6.0	20	mV	
Temperature Stability <sup>(Note 2)</sup>	$\Delta V_Z/\Delta T$	$V_R$ Adjusted to 5.00V, $I_R = 1.0\text{mA}$ , $0^\circ\text{C} \leq T_A \leq 70^\circ\text{C}$	-	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  $25^\circ\text{C}$  to  $T_A$  (min) or  $T_A$  (max).

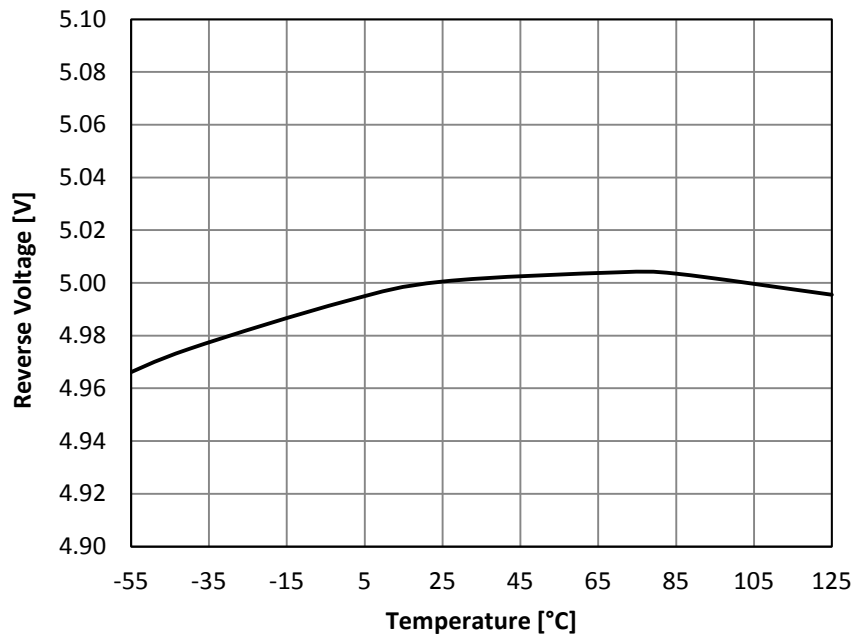
TYPICAL OPERATING CHARACTERISTICS

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.