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# LM336Z5

## Programmable Shunt Regulator

### Features

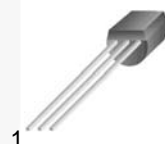
- Low Temperature Coefficient
- Adjustable 4 V to 6 V
- Wide Operating Range Current: 10 mA to 400 mA
- Three Lead Transistor Package (TO-92)
- 0.6  $\Omega$  Dynamic Impedance
- $\pm 1.0\%$  Initial Tolerance Available
- Guaranteed Temperature Stability
- Easily Trimmed for Minimum Temperature Drift
- Fast Turn On

### Description

The LM336Z5 integrated circuit is precision 5.0 V shunt regulator. The monolithic  $I_C$  voltage reference operates as a low temperature coefficient 5.0 V Zener with 0.6  $\Omega$  dynamic impedance. A third terminal on the LM336Z5 allows the reference voltage and temperature coefficient to be trimmed.

The LM336Z5 is useful as a precision 5.0 V low-voltage reference, which makes it convenient to obtain a stable reference from low-voltage supplies. Further, since the LM336Z5 operates as shunt regulator, it can be used as either a positive or negative voltage reference.

TO-92



1. Adj 2.+ 3. -

### Ordering Information

Part Number	Operating Temperature Range	Top Mark	Package	Packing Method
LM336Z5	0 ~ +70°C	LM336Z5	TO-92	Bulk
LM336Z5X		LM336Z5	TO-92	Tape and Reel



**Electrical Characteristics**

$0^{\circ}\text{C} \leq T_A \leq +70^{\circ}\text{C}$  unless otherwise specified.

Symbol	Parameter	Conditions	LM336Z5			Unit
			Min.	Typ.	Max.	
$V_R$	Reverse Breakdown Voltage	$T_A = 25^{\circ}\text{C}$ , $I_R = 1\text{ mA}$	4.8	5.0	5.2	V
$\Delta V_R / \Delta I_R$	Reverse Breakdown Change with Current	$T_A = 25^{\circ}\text{C}$ , $600\text{ }\mu\text{A} \leq I_R \leq 10\text{ mA}$		6	20	mV
$Z_D$	Reverse Dynamic Impedance	$T_A = 25^{\circ}\text{C}$ , $I_R = 1\text{ mA}$		0.6	2.0	$\Omega$
$ST_T$	Temperature Stability	$I_R = 1\text{ mA}$		4	12	mV
$\Delta V_R / \Delta I_R$	Reverse Breakdown Change with Current	$600\text{ }\mu\text{A} \leq I_R \leq 10\text{ mA}$		6	24	mV
$Z_D$	Reverse Dynamic Impedance	$I_R = 1\text{ mA}$		0.8	2.5	$\Omega$
ST	Long Term Stability In Reference Voltage	$I_R = 1\text{ mA}$		20		ppm/Khr

## Typical Performance Characteristics

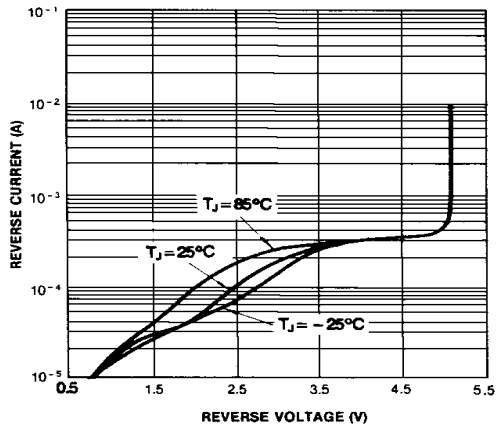


Figure 3. Reverse Characteristics

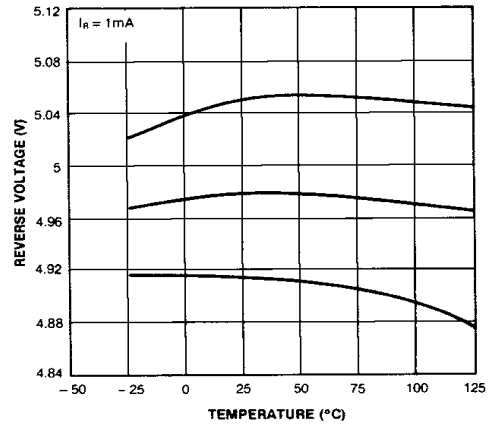


Figure 4. Temperature Drift

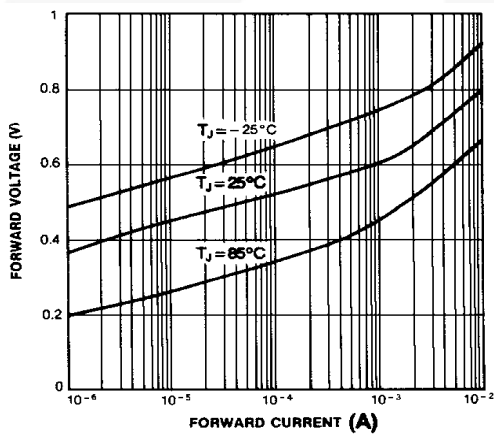


Figure 5. Forward Characteristics

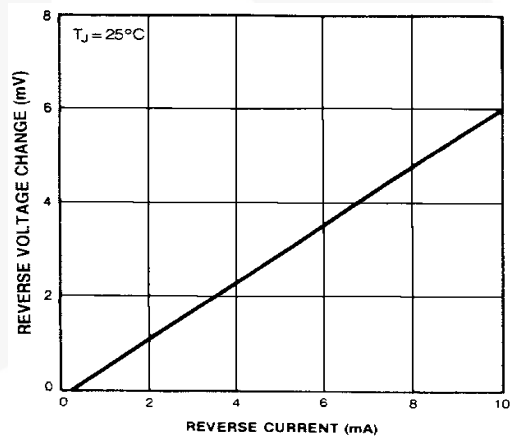
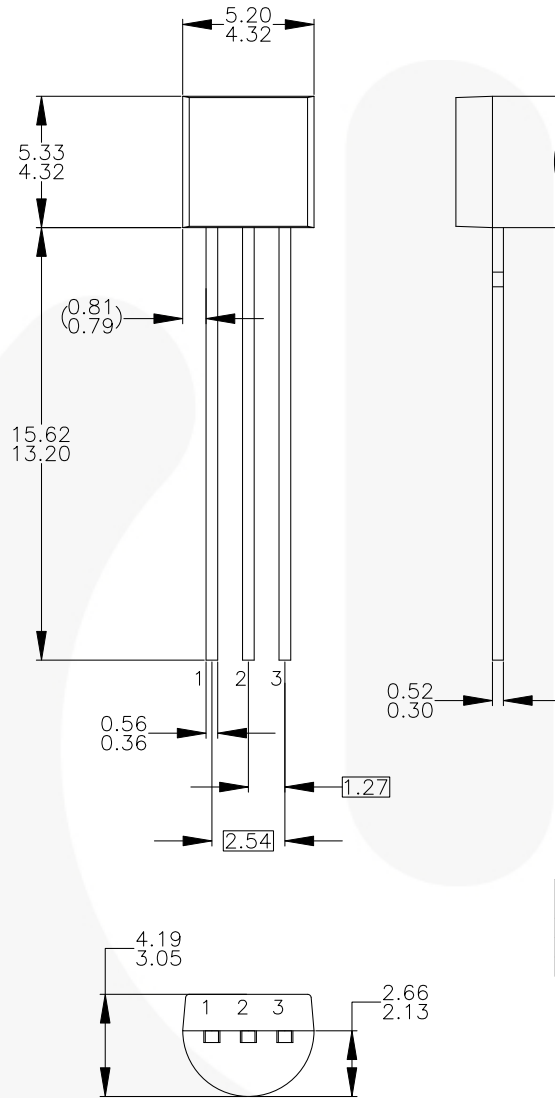


Figure 6. Reverse Voltage Change

## Physical Dimensions

## TO-92 Bulk Type



NOTES: UNLESS OTHERWISE SPECIFIED

- A) DRAWING WITH REFERENCE TO JEDEC TO-92 RECOMMENDATIONS.  
 B) ALL DIMENSIONS ARE IN MILLIMETERS.  
 C) DRAWING CONFORMS TO ASME Y14.5M-1994.  
 D) TO-92 (92,94,96,97,98) PIN CONFIGURATION:

PIN	92			94			96			97			98		
	P	F	M	P	F	M	B	F	M	P	F	M	P	F	M
1	E	S	S	E	S	S	B	D	G	C	G	D	C	G	D
2	B	D	G	C	G	D	E	S	S	B	D	G	E	S	S
3	C	G	D	B	D	G	C	G	D	E	S	S	B	D	G

LEGEND:

P - BIPOLAR      E - EMITTER      D - DRAIN  
 F - JFET          B - BASE          S - SOURCE  
 M - DMOS        C - COLLECTOR      G - GATE

- E) FOR PACKAGE 92, 94, 96, 97 AND 98:  
 PIN CONFIGURATION DRAIN "D" AND SOURCE "S"  
 ARE INTERCHANGEABLE AT JFET "F" OPTION.  
 F) DRAWING FILENAME: MKT-ZA03DREV3.

Figure 17. 3-Lead, TO-92, Molded, Standard Straight Lead

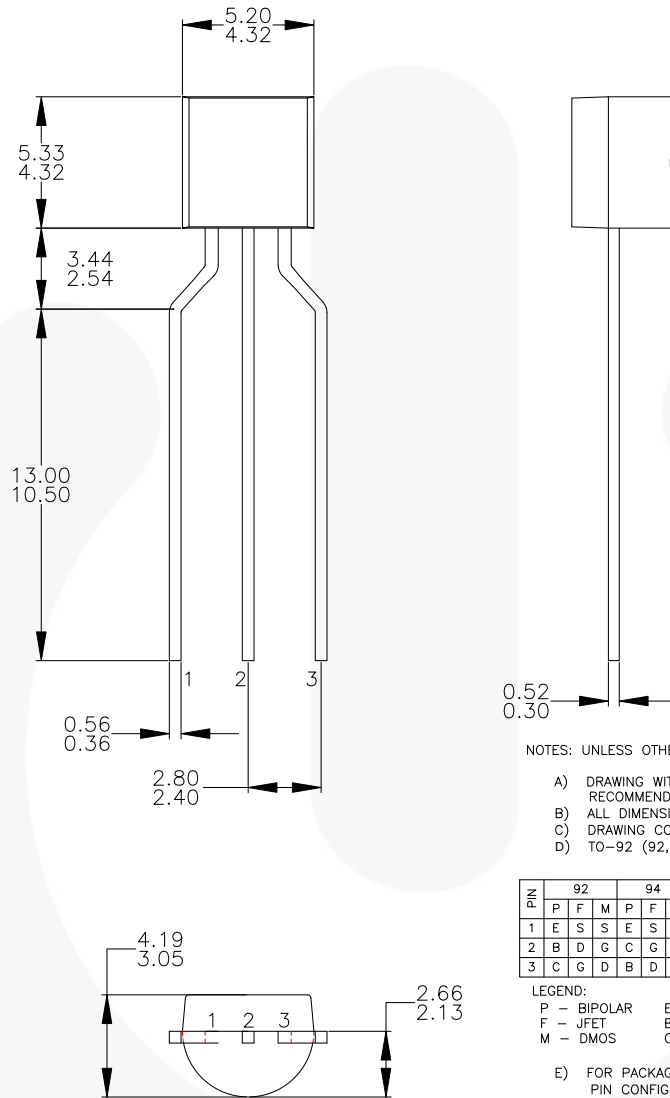
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## Physical Dimensions (Continued)

## TO-92 Tape and Reel Type



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 B) ALL DIMENSIONS ARE IN MILLIMETERS.  
 C) DRAWING CONFORMS TO ASME Y14.5M-1994.  
 D) TO-92 (92,94,96,97,98) PIN CONFIGURATION:

PIN	92			94			96			97			98		
	P	F	M	P	F	M	B	F	M	P	F	M	P	F	M
1	E	S	S	E	S	S	B	D	G	C	G	D	C	G	D
2	B	D	G	C	G	D	E	S	S	B	D	G	E	S	S
3	C	G	D	B	D	G	C	G	D	E	S	S	B	D	G

## LEGEND:

P - BIPOLAR      E - EMITTER      D - DRAIN  
 F - JFET          B - BASE          S - SOURCE  
 M - DMOS        C - COLLECTOR      G - GATE

- E) FOR PACKAGE 92, 94, 96, 97 AND 98:  
 PIN CONFIGURATION DRAIN "D" AND SOURCE "S"  
 ARE INTERCHANGEABLE AT JFET "F" OPTION.  
 F) DRAWING FILENAME: MKT-ZA03FREV2.

Figure 18. 3-Lead, TO-92, Molded, 0.200 in Line Spacing Lead Form

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