

2.5V VOLTAGE REFERENCES

DESCRIPTION

The LM236 and LM336 are precision 2.5V regulator diodes. These voltage reference monolithic ICs operate like 2.5V zener diodes with a low temperature coefficient and a dynamic impedance of 0.2Ω . A third pin enables adjusting the reference voltage and the temperature coefficient.

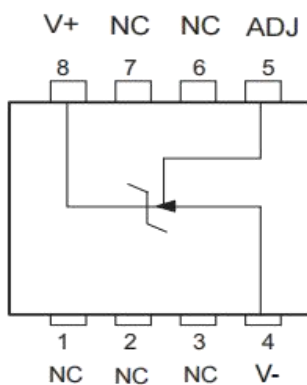
Features

- Adjustable 4V to 6V
- Low temperature coefficient
- Wide operating current of 600 μ A to 10 mA
- 0.6 Δ dynamic impedance
- $\pm 1\%$ initial tolerance available
- Guaranteed temperature stability
- Easily trimmed for minimum temperature drift
- Fast turn-on
- Three lead transistor package

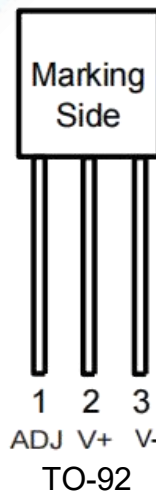
ORDERING INFORMATION

DEVICE	Package Type	MARKING	Packing	Packing Qty
LM236D-2.5RG	SOP8	236-2.5	Reel	2500pcs/reel
LM336D-2.5RG	SOP8	336-2.5	Reel	2500pcs/reel
LM236LP-2.5G	TO-92	LM236-2.5	Tape	1000pcs/box
LM336LP-2.5G	TO-92	LM336-2.5	Tape	1000pcs/box
LM236DQ-2.5RG	DFN-8	236-2.5	Reel	2500pcs/reel
LM336DQ-2.5RG	DFN-8	336-2.5	Reel	2500pcs/reel

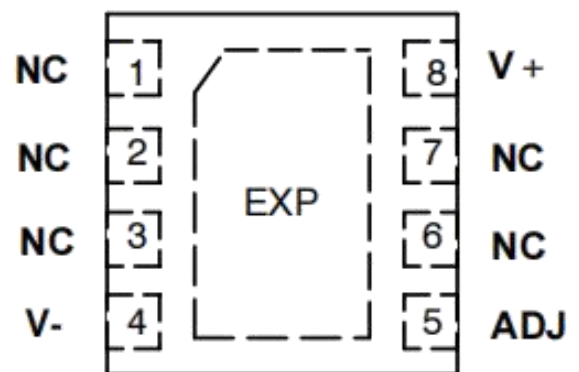
PIN CONNECTIONS



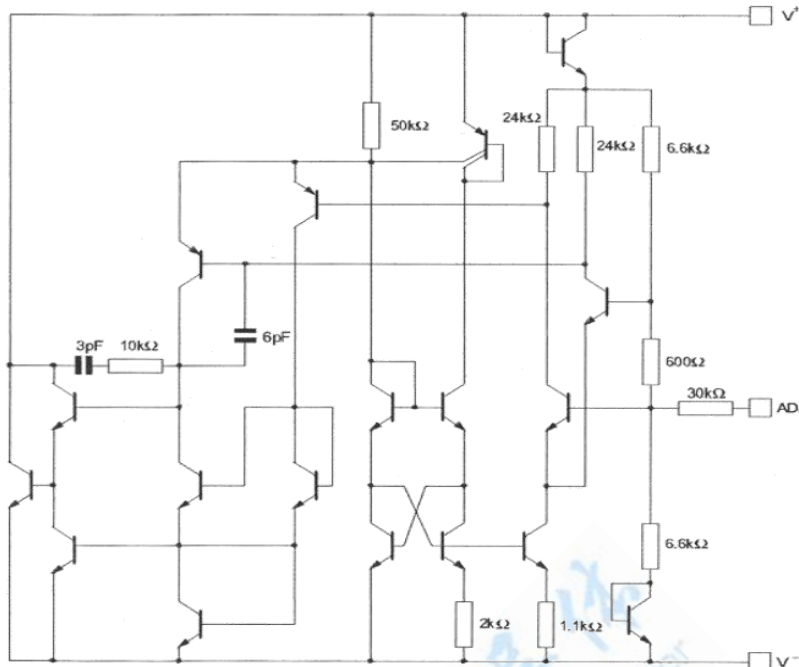
SOP8



TO-92



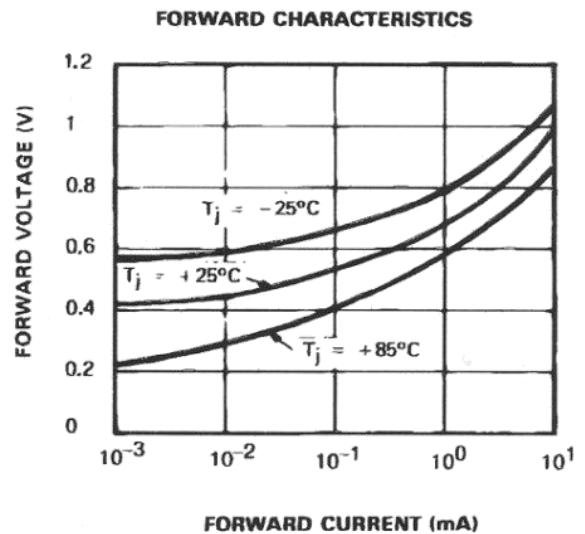
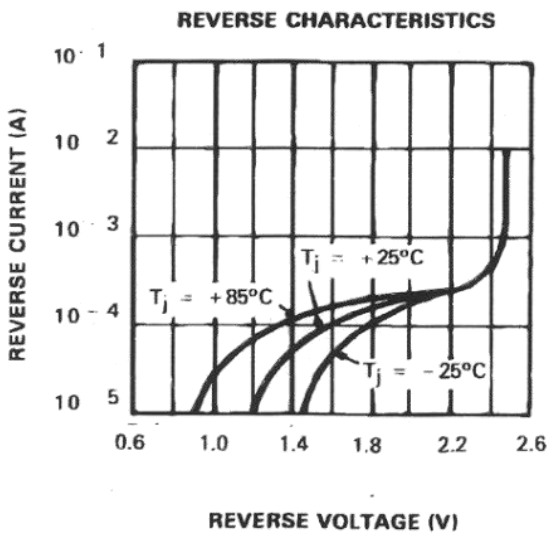
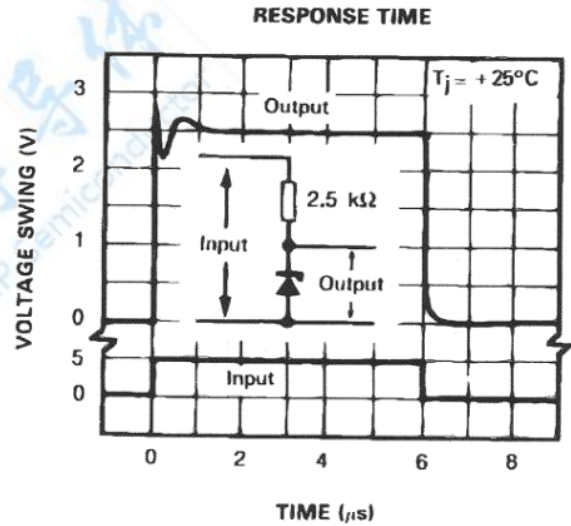
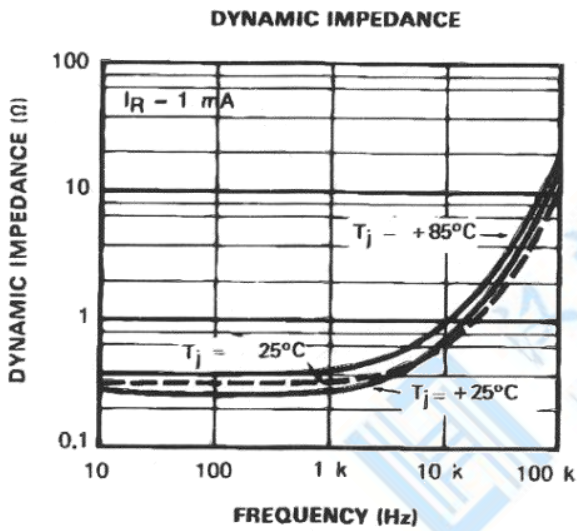
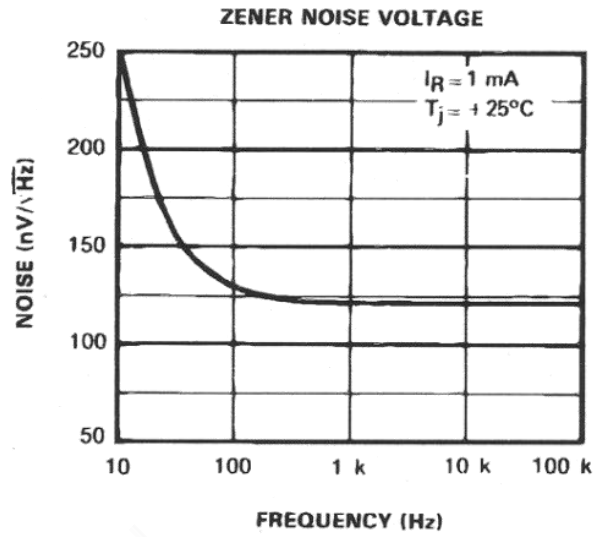
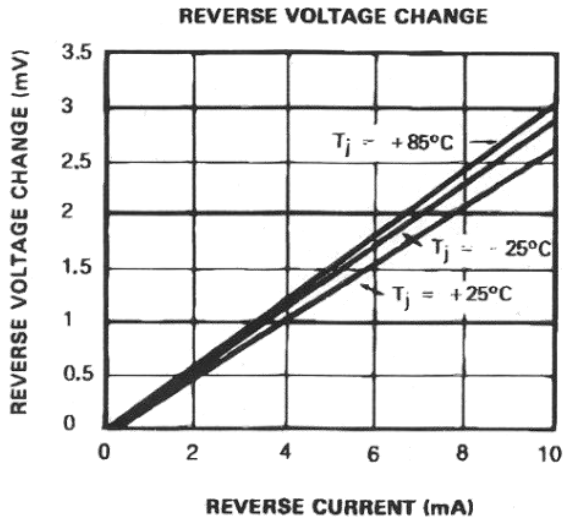
DFN-8 3*3

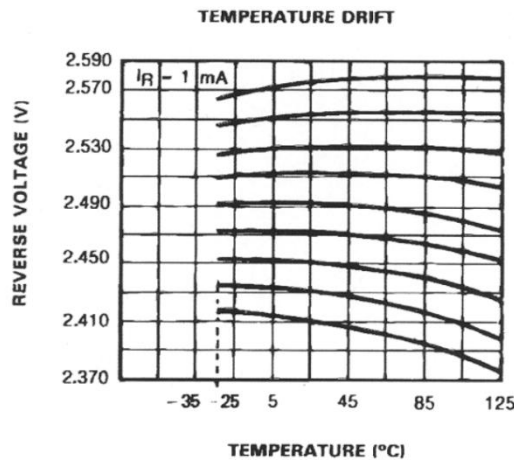
SCHEMATIC DIAGRAM

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	LM336	Unit
I_R	Current Reverse	15	mA
I_F	Current Forward	10	mA
T_{oper}	Operating Free-air Temperature Range	LM336-5.0: 0 to +70	°C
		LM236-5.0: -40 to +85	°C
T_{Stg}	Storage Temperature Range	-65 to +150	°C

ELECTRICAL CHARACTERISTICS

Symbol	Parameter	LM236/LM336			Unit
		Min.	Typ.	Max.	
V_R	Reference Breakdown Voltage $T_{amb} = +25^\circ\text{C}$, $I_R = 1\text{mA}$ LM336	2.44	2.49	2.54	V
ΔV_R	Reverse Breakdown Voltage Change with Current $600\mu\text{A} \leq I_R \leq 10\text{mA}$ $T_{amb} = +25^\circ\text{C}$ $T_{min.} \leq T_{amb} \leq T_{max.}$	-	2.6 3	10 12	mV
Z_D	Reverse Dynamic Impedance ($I_R = 1\text{mA}$) $T_{amb} = +25^\circ\text{C}$ $f=100\text{Hz}$ $T_{min.} \leq T_{amb} \leq T_{max.}$	-	2.6 3	1 1.4	
KVT	Temperature Stability ($V_R = 2.49\text{V}$, $I_R = 1\text{mA}$)	-	1.8	6	mV
KVH	Long Term Stability ($T_{amb} = +25^\circ\text{C} \pm 0.1^\circ\text{C}$, $I_R = 1\text{mA}$)	-	20	-	ppm

Typical Performance Characteristics


Typical Performance Characteristics (Continued)

Application Hints

The LM336 voltage references are easier to use than zener diodes. Their low impedance and wide current range facilitate biasing in any circuits. Besides, the breakdown voltage or the temperature coefficient can be adjusted so as to optimize the performance of the circuit.

Figure 1 represents a LM336 with a 10kΩ potentiometer to adjust the reverse breakdown voltage which can be adjusted without altering the temperature coefficient of the circuit. The adjustment range is generally sufficient to adjust the initial tolerance of the circuit and the inaccuracy of the amplifier circuit.

To obtain a lower temperature coefficient two diodes can be connected in series as indicated in Figure 2. When the circuit is adjusted to 2.49V the temperature coefficient is minimized.

For a correct temperature coefficient, the diodes should be at the same ambient temperature as the LM336.

The value of R1 is not critical (2-20kΩ).

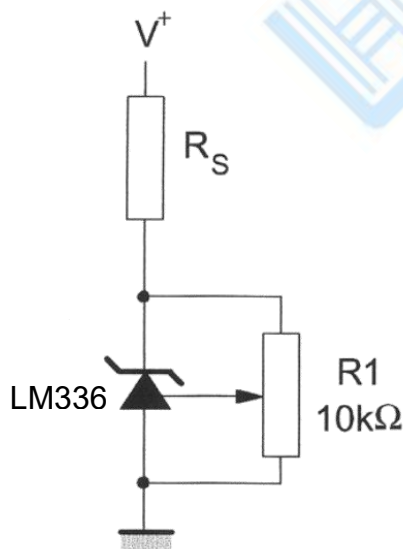


Figure 1: The LM336 with Pot for Adjustment of Breakdown Voltage

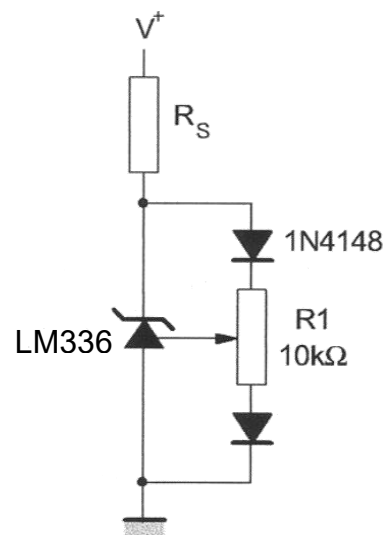


Figure 2: Temperature Coefficient Adjustment

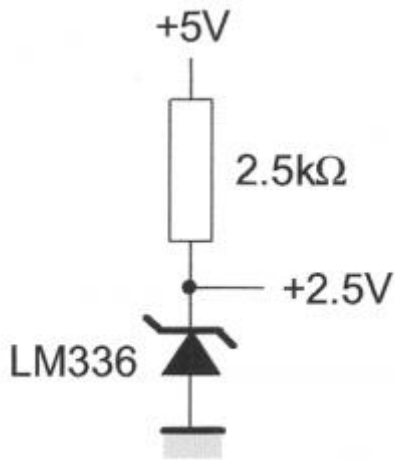
Typical Applications


Figure 3: 2.5V Reference

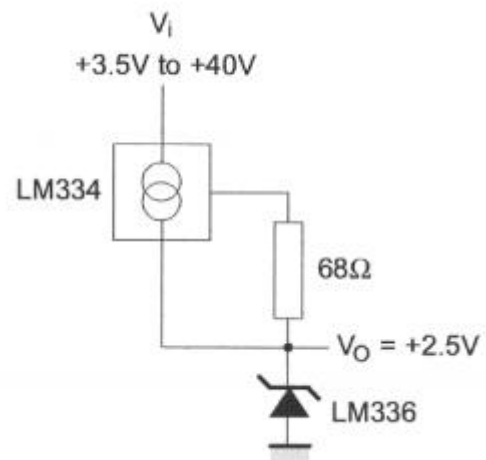


Figure 4: Wide Input Range Reference

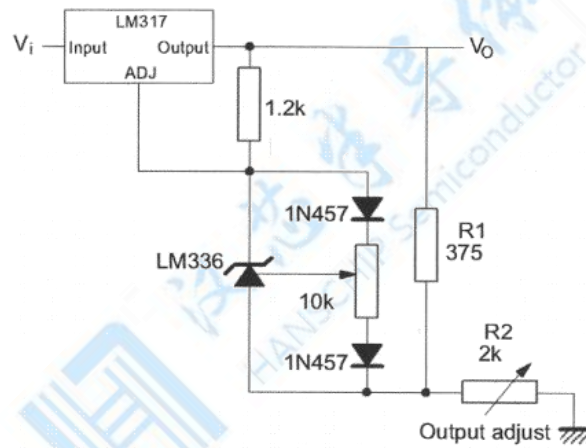


Figure 5: Precision Power Regulator with Low Temperature Coefficient

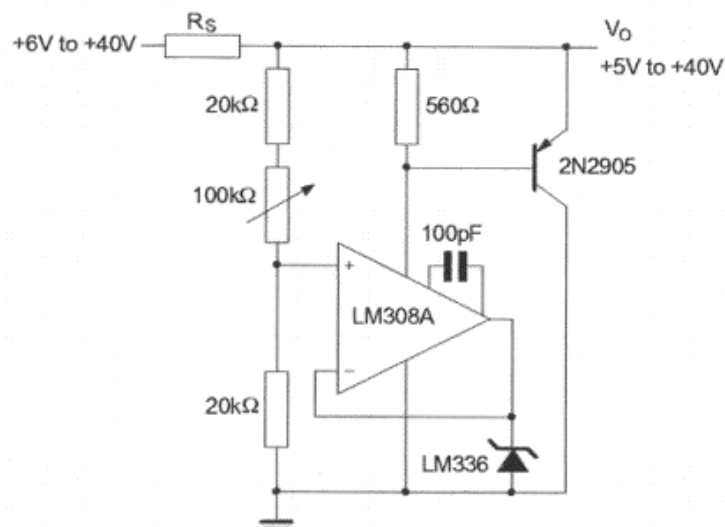
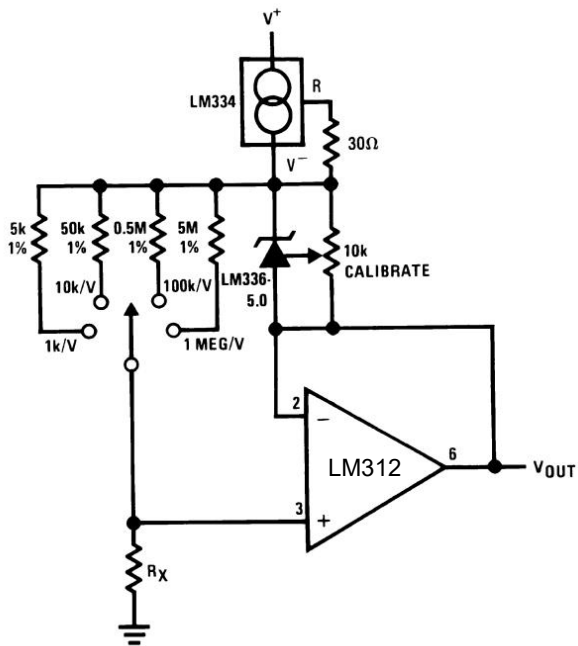
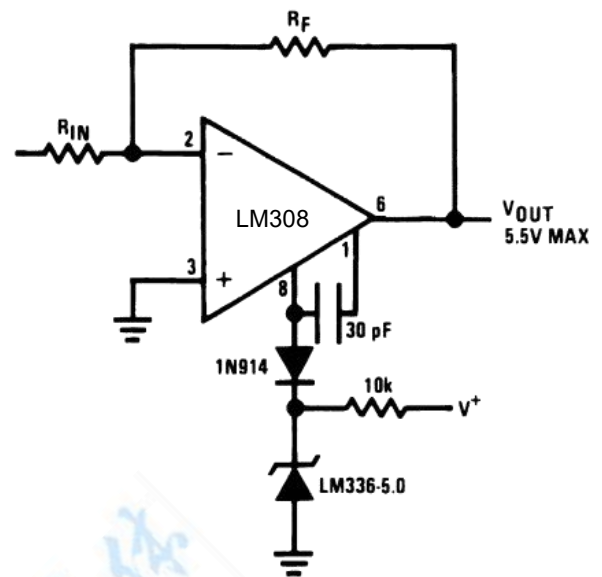
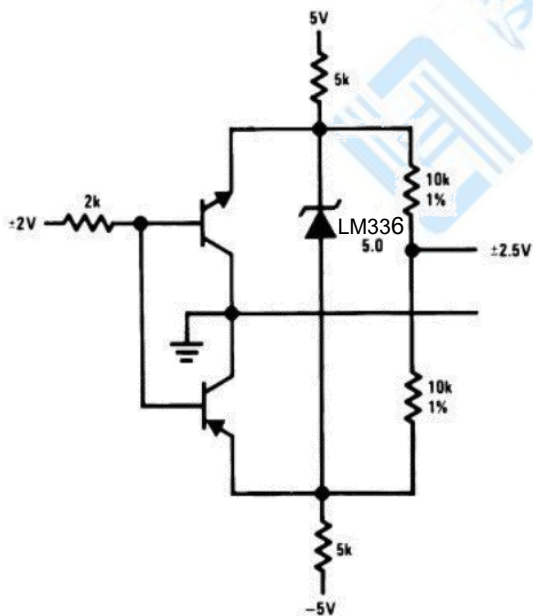
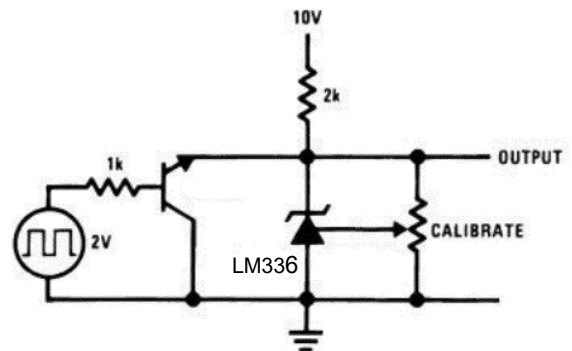
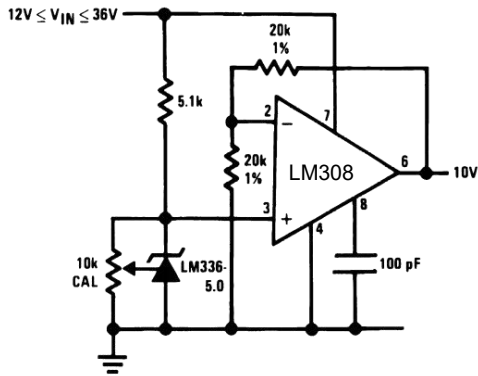
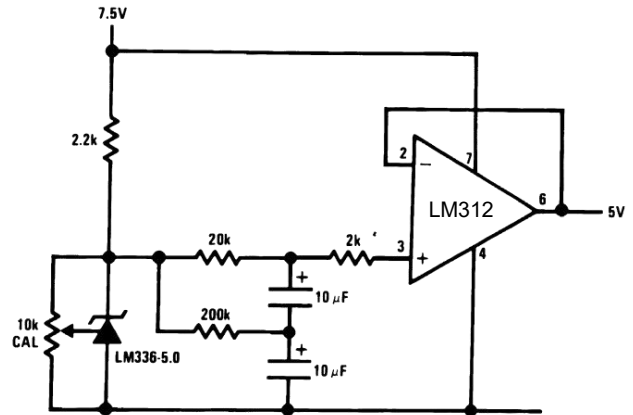
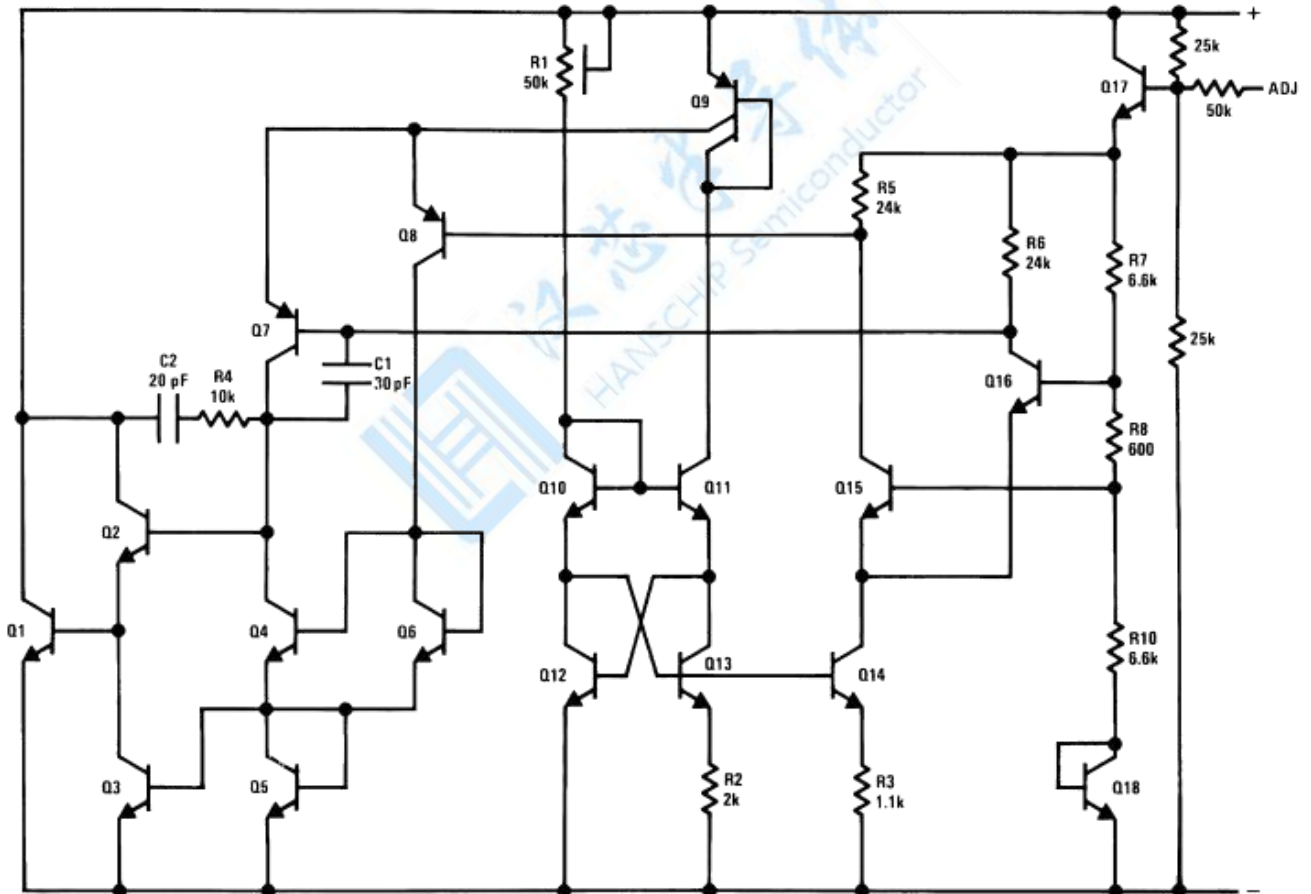


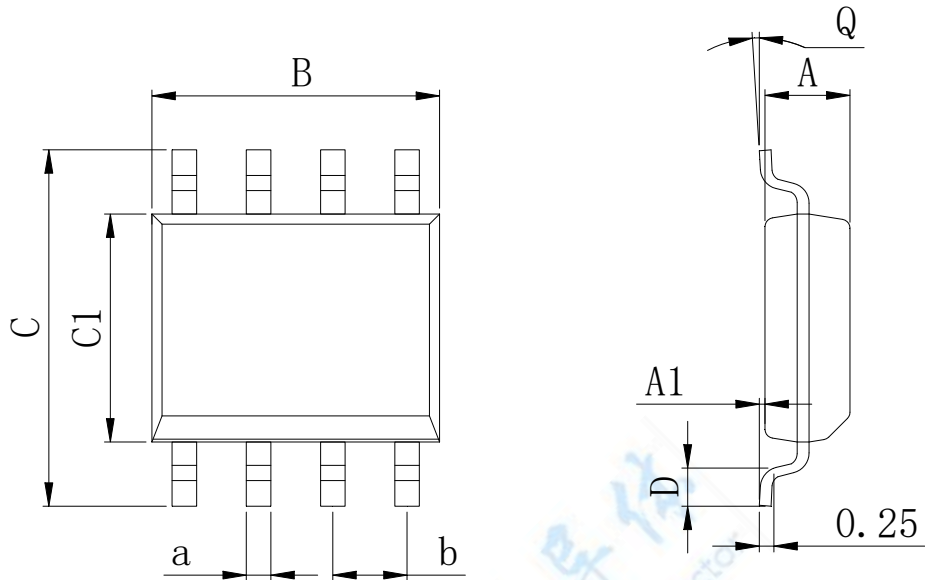
Figure 6: Adjustable Shunt Regulator

Typical Applications (Continued)
Linear Ohmmeter

Op Amp with Output Clamped

Bipolar Output Reference

5.0V Square Wave Calibrator


Typical Applications (Continued)
10V Buffered Reference

Low Noise Buffered Reference

Schematic Diagram


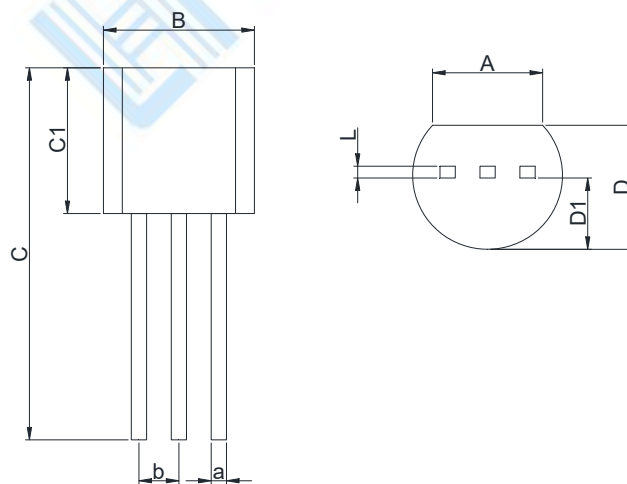
Physical Dimensions

SOP8 (150mil)


Dimensions In Millimeters(SOP8)

Symbol:	A	A1	B	C	C1	D	Q	a	b
Min:	1.35	0.05	4.90	5.80	3.80	0.40	0°	0.35	1.27 BSC
Max:	1.55	0.20	5.10	6.20	4.00	0.80	8°	0.45	

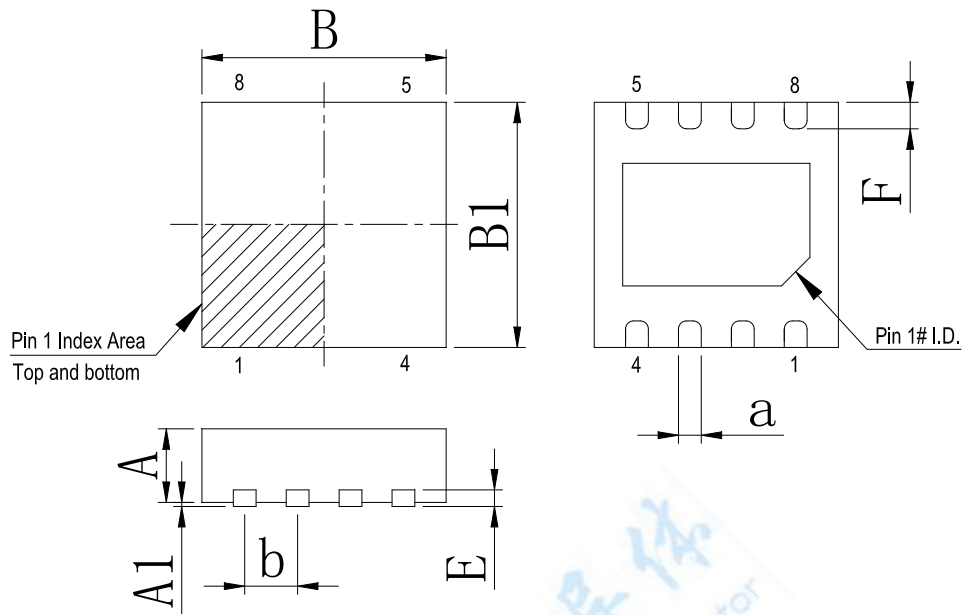
TO-92


Dimensions In Millimeters(TO-92)

Symbol:	A	B	C	C1	D	D1	L	a	b
Min:	3.43	4.44	11.2	4.32	3.17	2.03	0.33	0.40	1.27BSC
Max:	3.83	5.21	12.7	5.34	4.19	2.67	0.42	0.52	

Physical Dimensions

DFN-8 3*3



Dimensions In Millimeters(DFN-8 3*3)								
Symbol:	A	A1	B	B1	E	F	a	b
Min:	0.85	0.00	2.90	2.90	0.20	0.30	0.20	0.65 BSC
Max:	0.95	0.05	3.10	3.10	0.25	0.50	0.34	

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