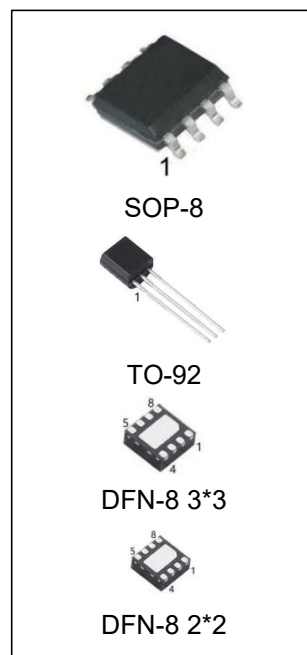


Description

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

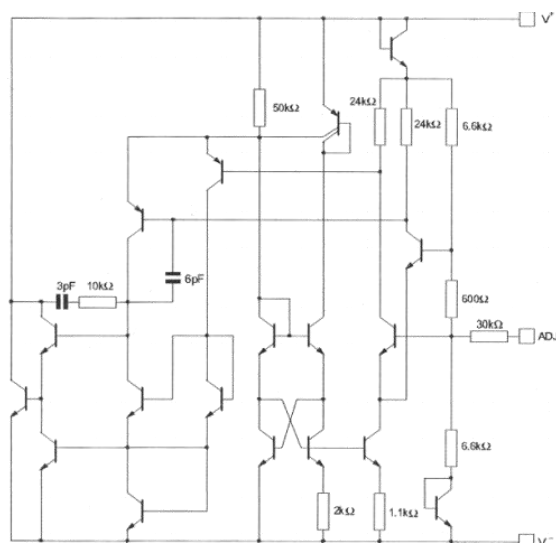
- Low temperature coefficient
- Wide operating current of $400\mu\text{A}$ to 10 mA
- 0.2Ω dynamic impedance
- $\pm 1\%$ initial tolerance available
- Guaranteed temperature stability
- Fast turn-on



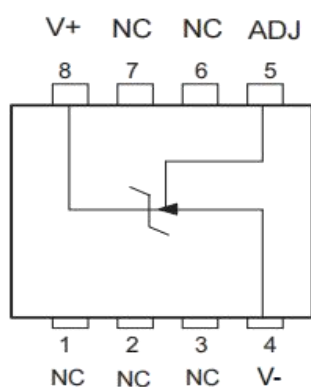
Ordering Information

DEVICE	Package Type	MARKING	Packing	Packing Qty
LM236AM-2.5/TR	SOP-8	236A-2.5	Reel	2500pcs/reel
LM236M-2.5/TR	SOP-8	236-2.5	Reel	2500pcs/reel
LM336BM-2.5/TR	SOP-8	336B-2.5	Reel	2500pcs/reel
LM336M-2.5/TR	SOP-8	336-2.5	Reel	2500pcs/reel
LM236AZ-2.5	TO-92	LM236A-2.5	BAG	1000pcs/box
LM236Z-2.5	TO-92	LM236-2.5	BAG	1000pcs/box
LM336BZ-2.5	TO-92	LM336B-2.5	BAG	1000pcs/box
LM336Z-2.5	TO-92	LM336-2.5	BAG	1000pcs/box
LM236ADQ3-2.5/TR	DFN-8 3*3	236A-2.5	Reel	5000pcs/reel
LM236DQ3-2.5/TR	DFN-8 3*3	236-2.5	Reel	5000pcs/reel
LM336BDQ3-2.5/TR	DFN-8 3*3	336B-2.5	Reel	5000pcs/reel
LM336DQ3-2.5/TR	DFN-8 3*3	336-2.5	Reel	5000pcs/reel
LM236ADQ2-2.5/TR	DFN-8 2*2	236A-2.5	Reel	4000pcs/reel
LM236DQ2-2.5/TR	DFN-8 2*2	236-2.5	Reel	4000pcs/reel
LM336BDQ2-2.5/TR	DFN-8 2*2	336B-2.5	Reel	4000pcs/reel
LM336DQ2-2.5/TR	DFN-8 2*2	336-2.5	Reel	4000pcs/reel

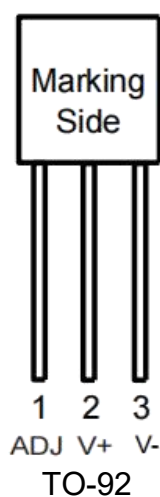
Schematic Diagram



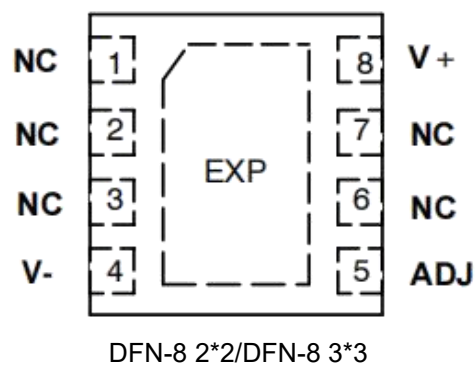
Pin Connections



SOP-8



TO-92



DFN-8 2*2/DFN-8 3*3

Absolute Maximum Ratings

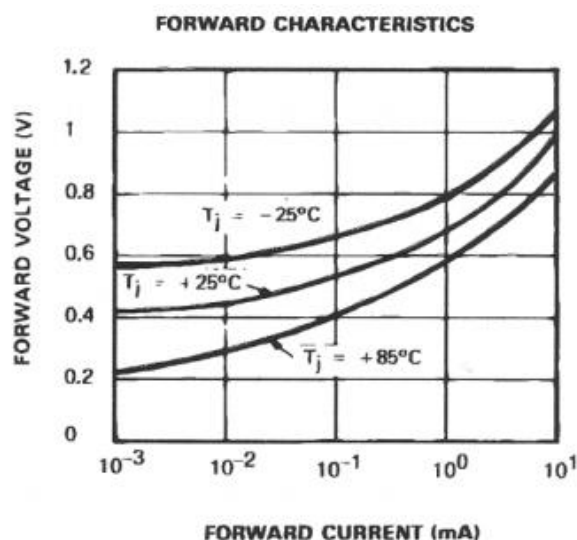
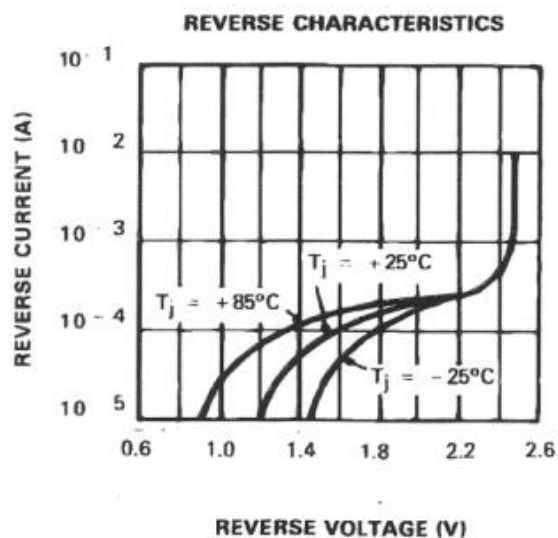
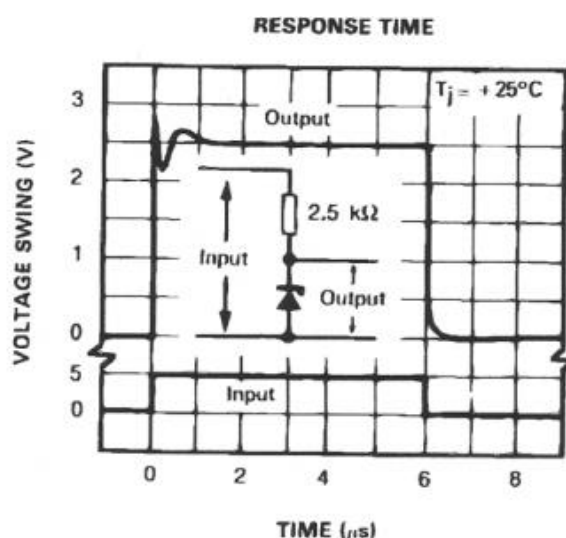
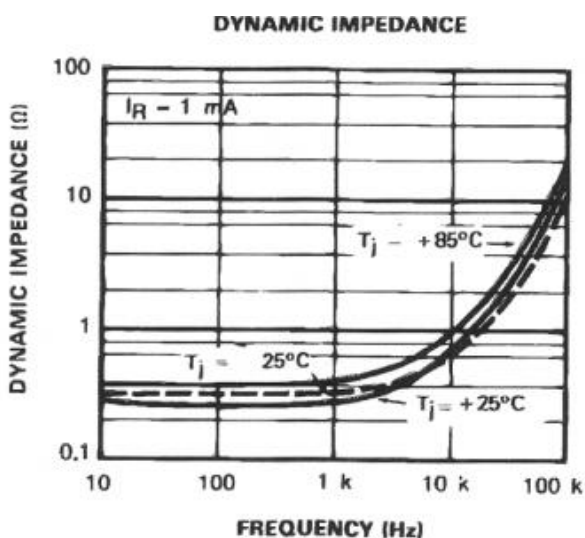
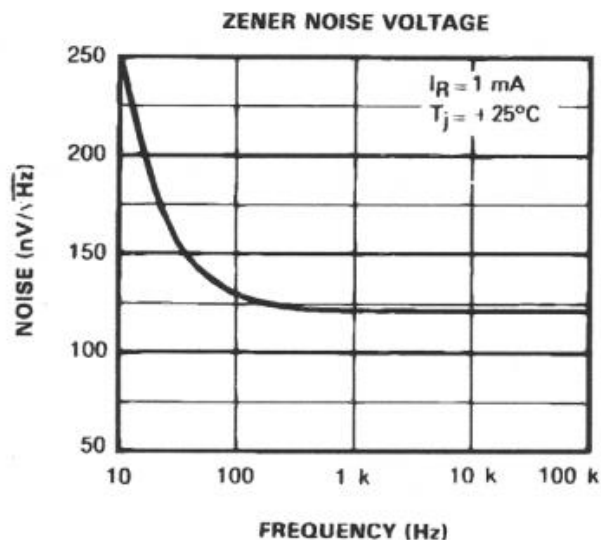
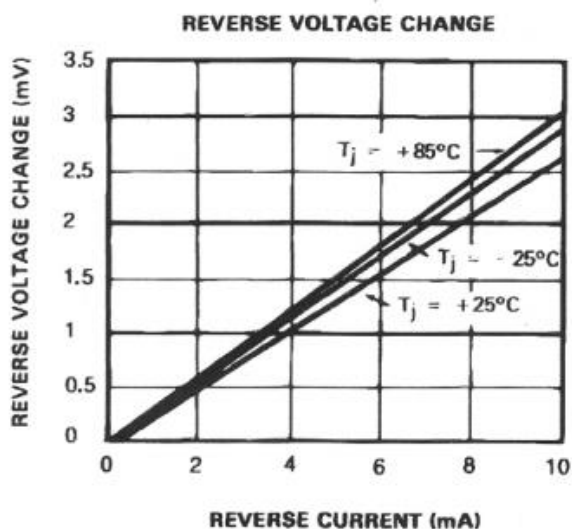
Symbol	Parameter	LM336	Unit
I_{RF}	Current Reverse Forward	15 10	mA
T_{oper}	Operating Free-air Temperature Range	LM336-2.5: 0 to +70 LM236-2.5: -40 to +85	°C °C
T_{Stg}	Storage Temperature Range	-65 to +150	°C
T_L	Lead Temperature (Soldering, 10 seconds)	260	°C

Note: Absolute Maximum Ratings indicate limits beyond which damage to the device may occur. Operating Ratings indicate conditions for which the device is intended to be functional, but specific performance is not ensured.

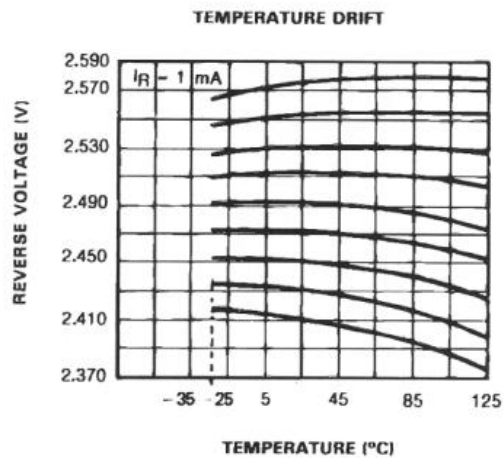
Electrical Characteristics

Symbol	Parameter		LM236/LM336			Unit
			Min.	Typ.	Max.	
V_R	Reference Breakdown Voltage $T_{amb} = +25^{\circ}\text{C}$, $I_R = 1\text{mA}$	LM236A-2.5	2.465	2.49	2.515	V
		LM236-2.5/LM336B-2.5	2.440	2.49	2.540	
		LM336-2.5	2.390	2.49	2.540	
ΔV_R	Reverse Breakdown Voltage Change with Current $400\mu\text{A} \leq I_R \leq 10\text{mA}$ $T_{amb} = +25^{\circ}\text{C}$ $T_{min.} \leq T_{amb} \leq T_{max.}$		-	2.6 3	10 12	mV
Z_D	Reverse Dynamic Impedance ($I_R = 1\text{mA}$) $T_{amb} = +25^{\circ}\text{C}$ $T_{min.} \leq T_{amb} \leq T_{max.}$		-	0.2 0.4	1 1.4	Ω
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).

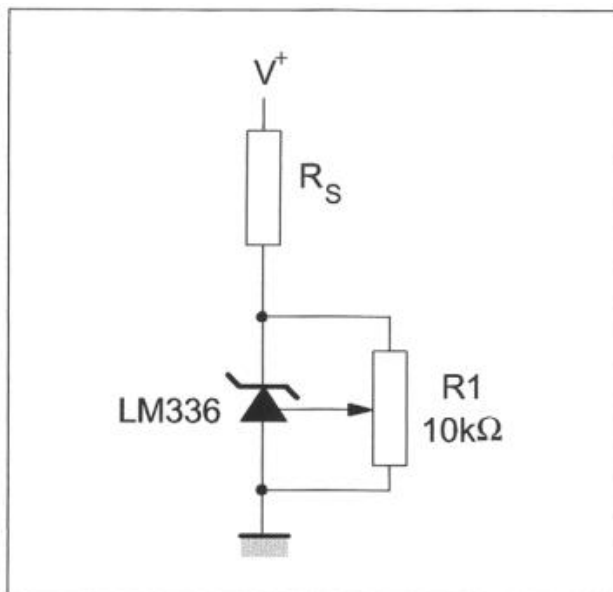


FIGURE1.LM336 with Pot for Adjustment of Breakdown Voltage

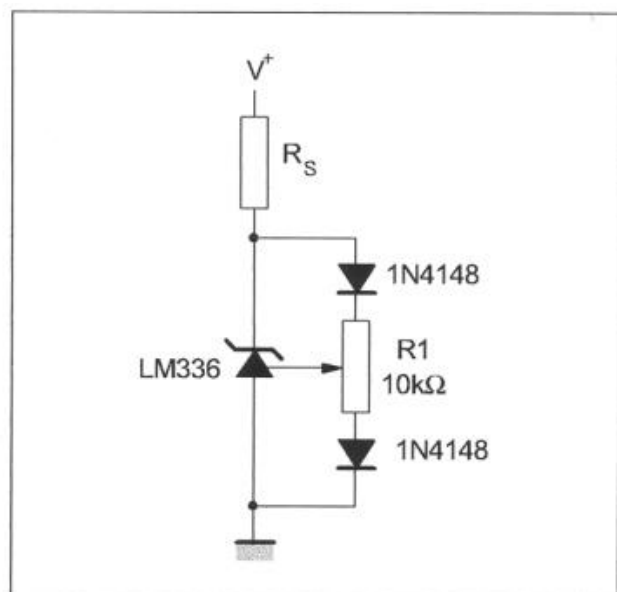


FIGURE 2. Temperature Coefficient Adjustment

Typical Applications

Figure 3 :2.5V Reference

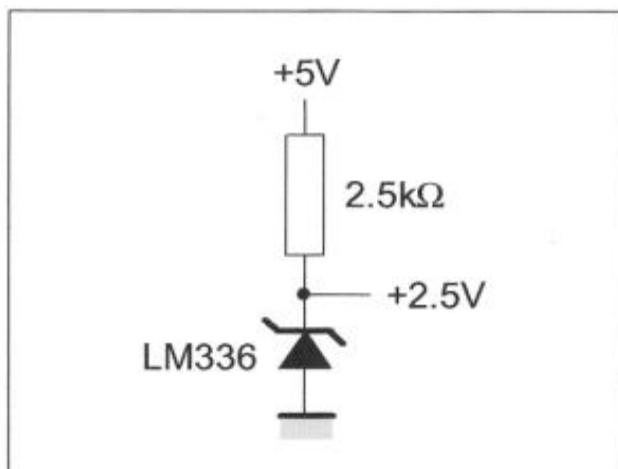


Figure 4 :Wide Input Range Reference

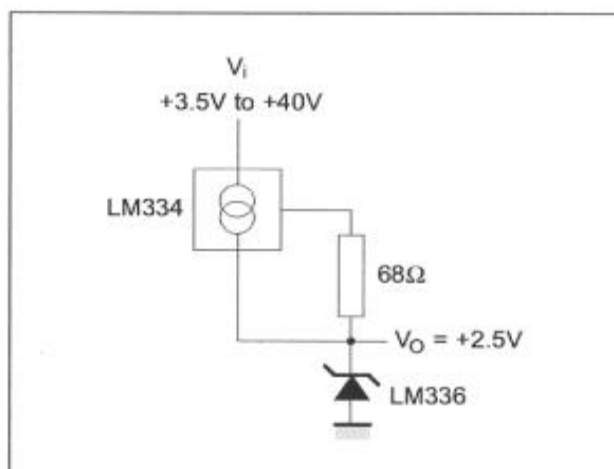


Figure 5 :Precision Power Regulator with Low Temperature Coefficient

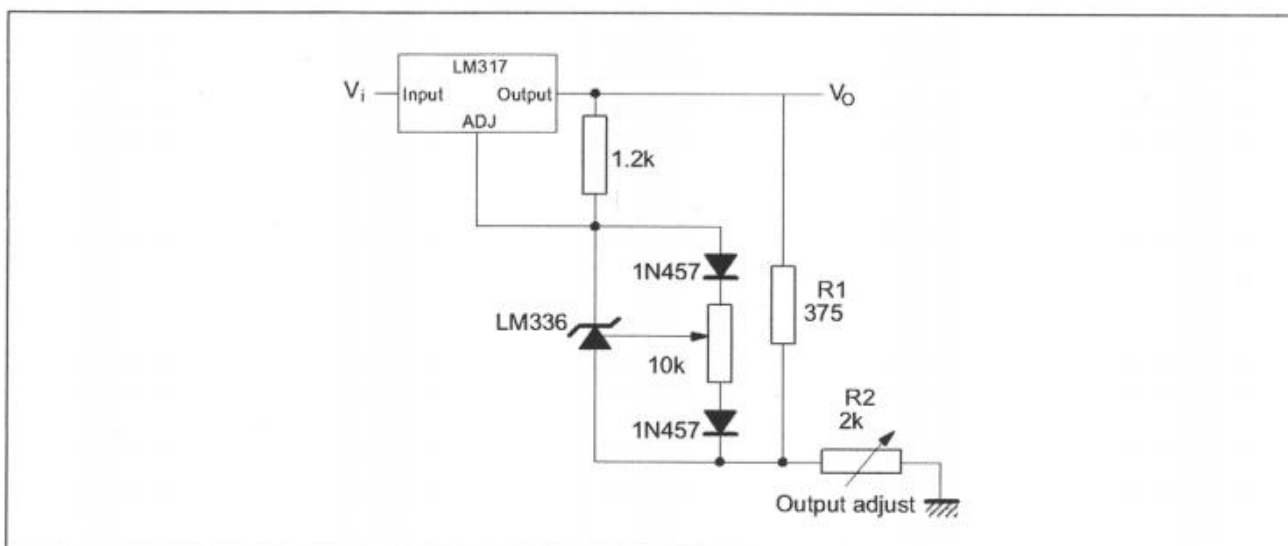


Figure 5 :Adjustable Shunt Regulator

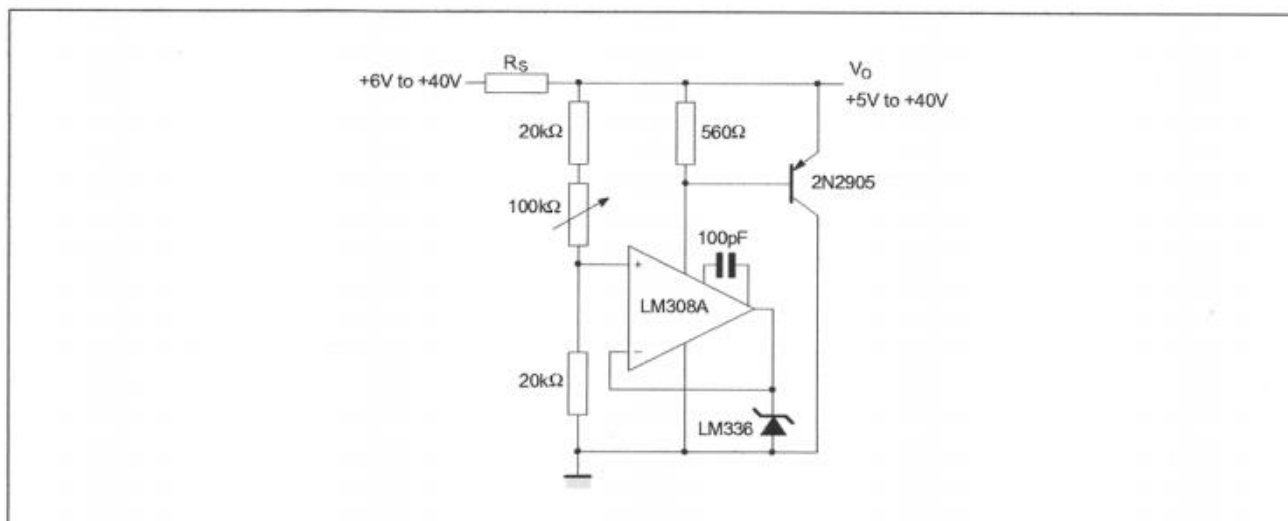


Figure 7 :Linear Ohmmeter

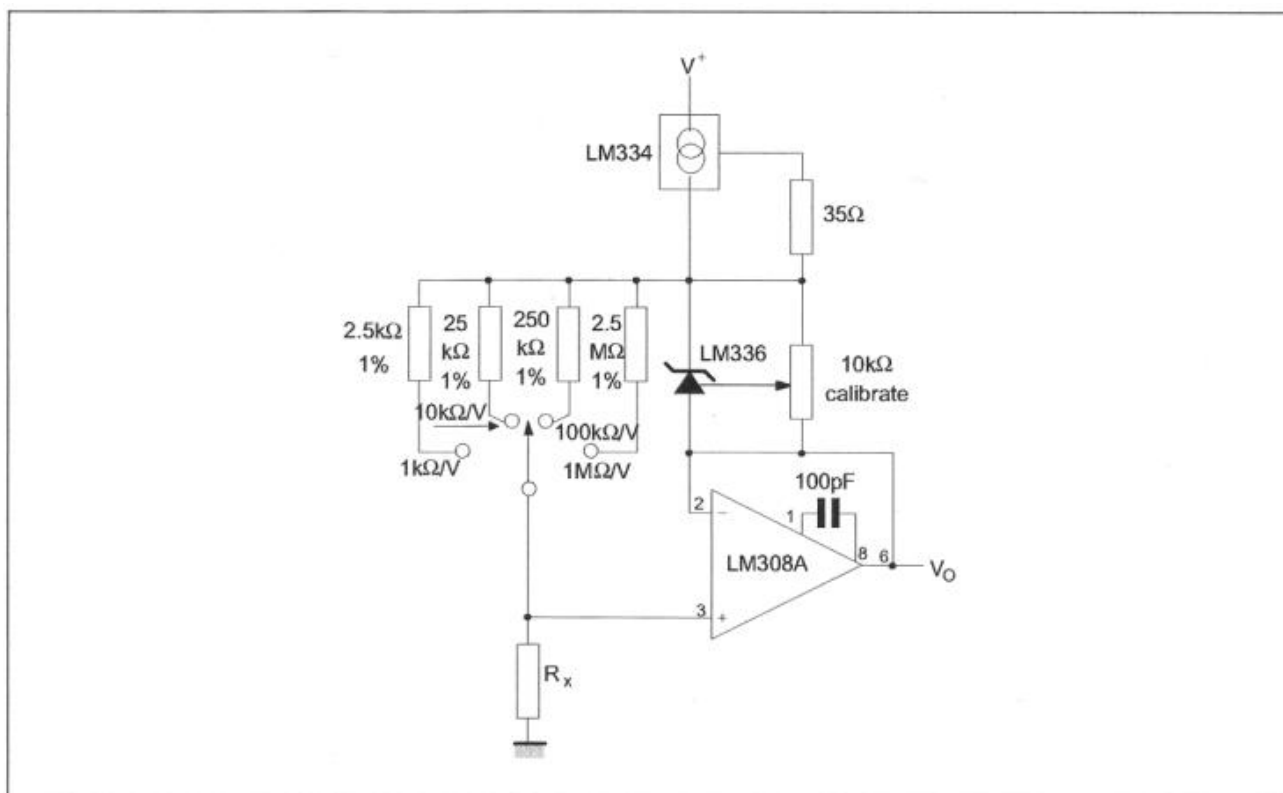


Figure 8 :Bipolar Output Reference

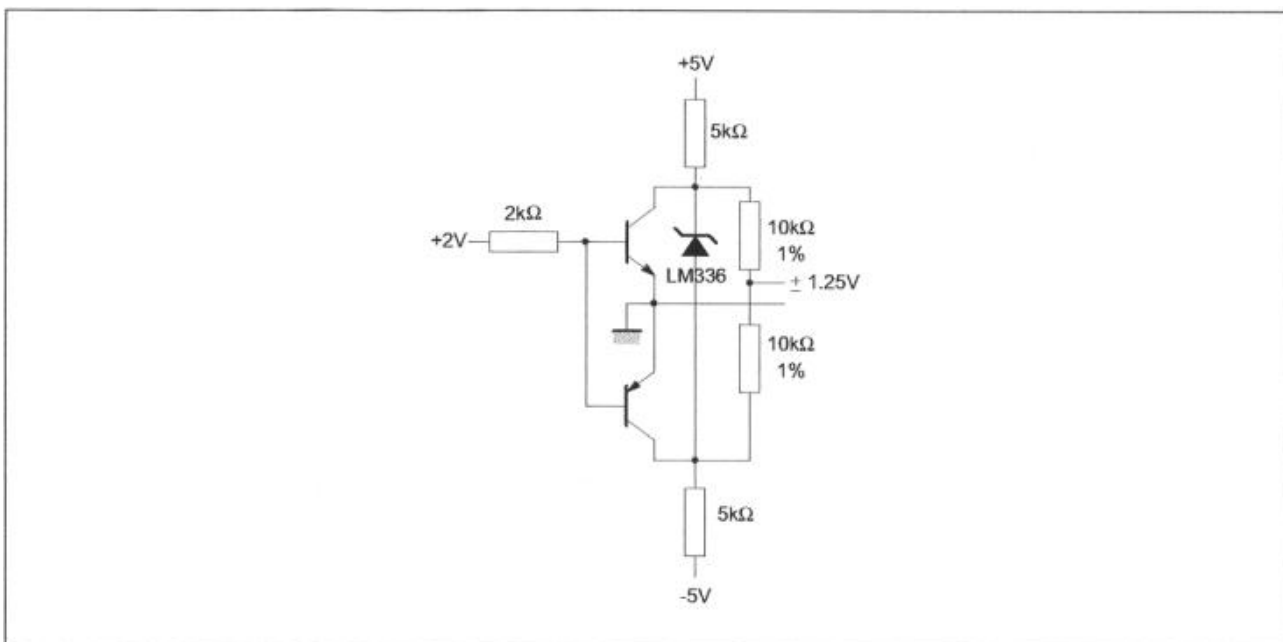


Figure 9 : 5V Buffered Reference

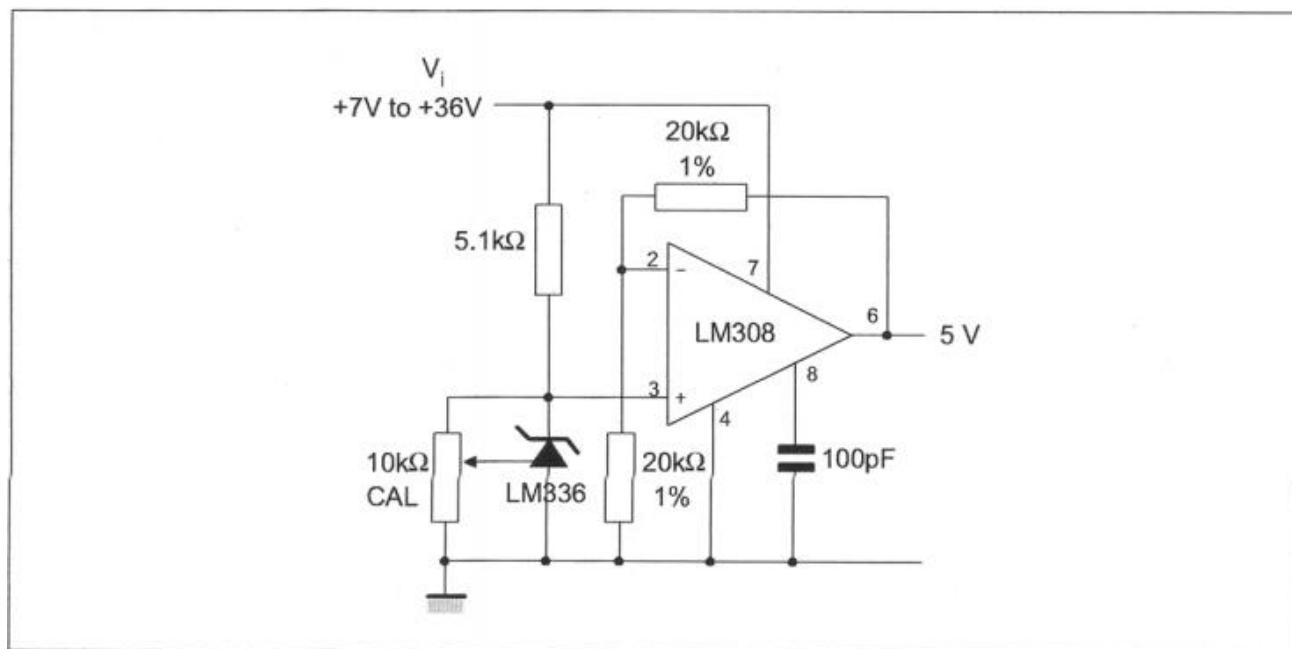
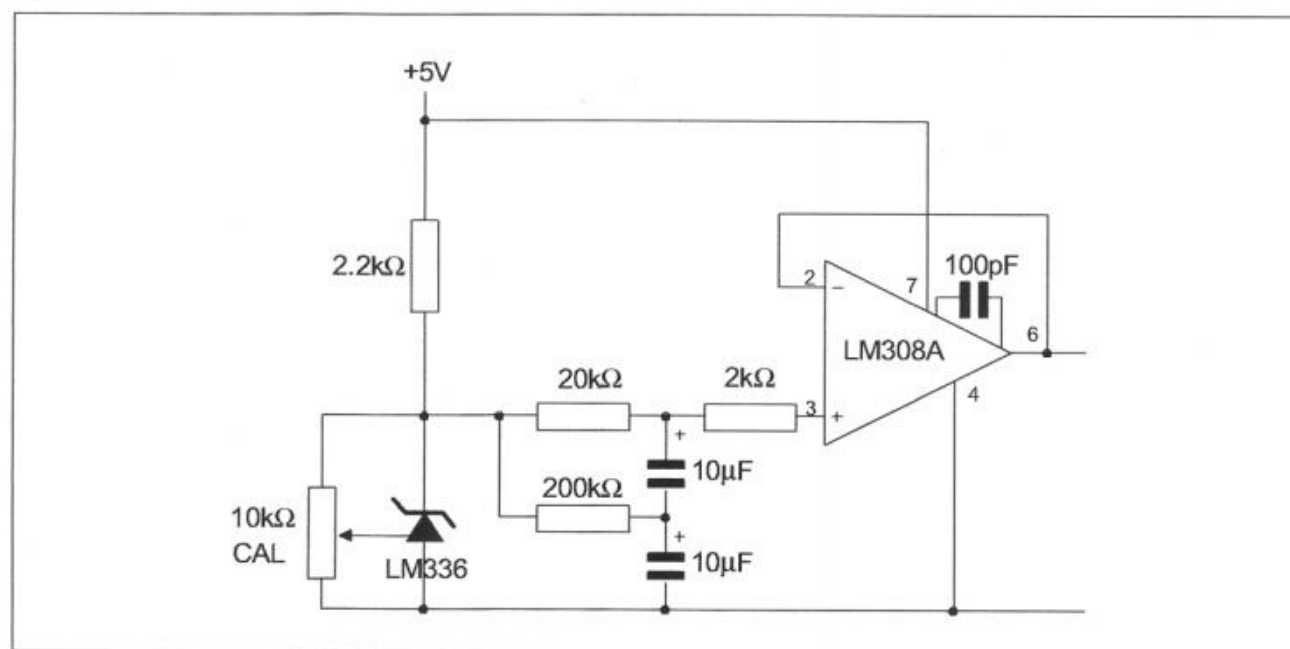
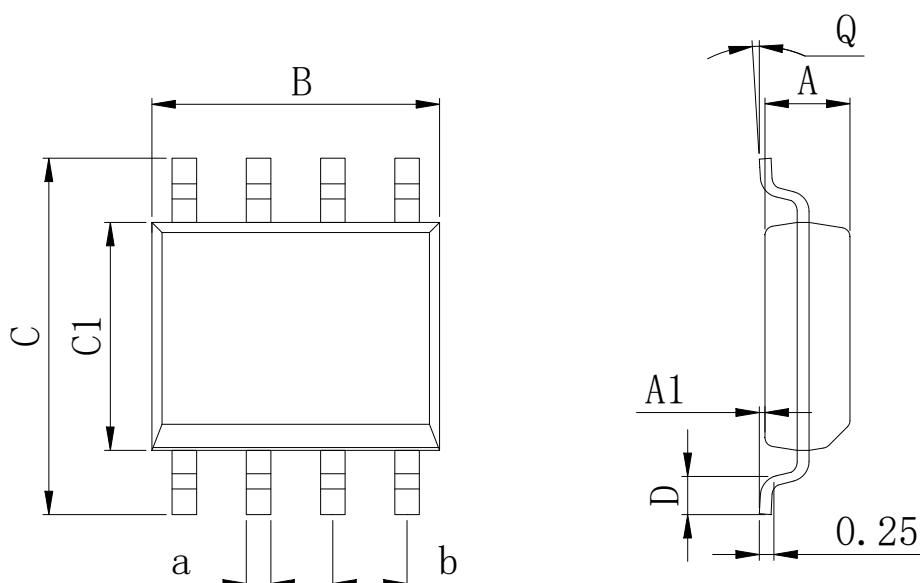


Figure 10 : Low Noise Buffered Reference



Physical Dimensions

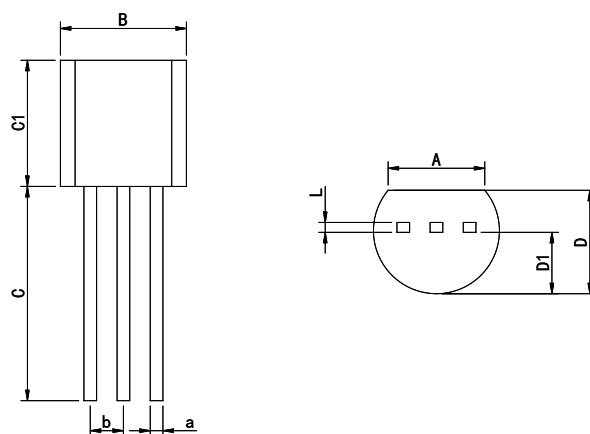
SOP-8



Dimensions In Millimeters(SOP-8)

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

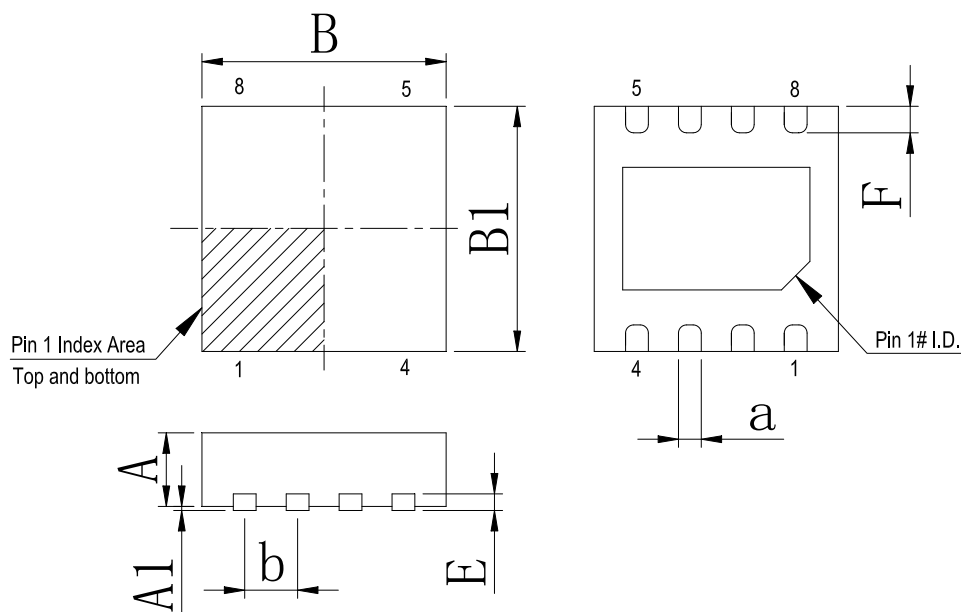


Dimensions In Millimeters(TO-92)

Symbol:	A	B	C	C1	D	D1	L	a	b
Min:	3.43	4.44	13.5	4.32	3.17	2.03	0.33	0.40	1.27BSC
Max:	4.13	5.21	15.3	5.34	4.19	2.67	0.42	0.52	

Physical Dimensions

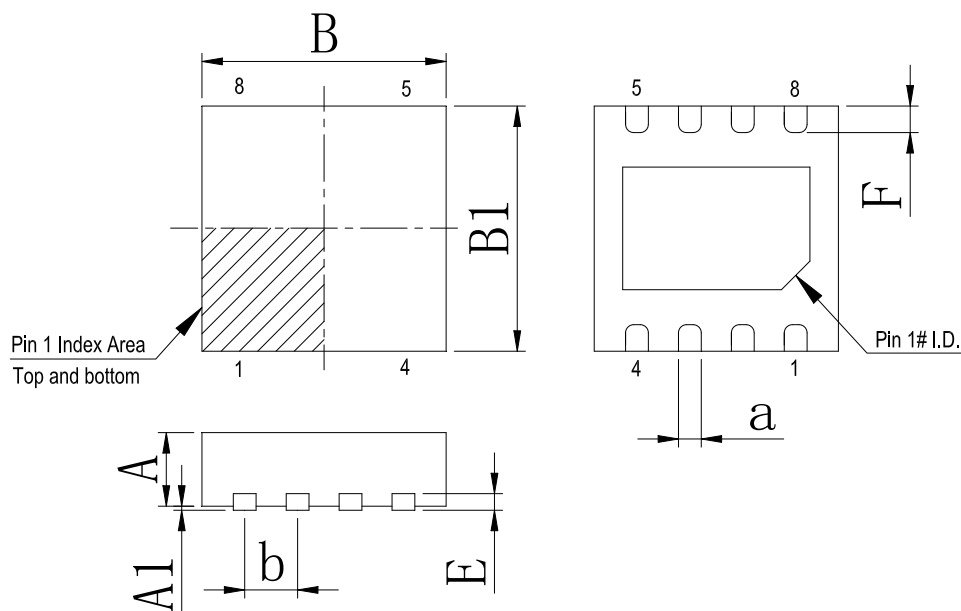
DFN-8 3*3



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	

DFN-8 2*2



Dimensions In Millimeters(DFN-8 2*2)

Symbol:	A	A1	B	B1	E	F	a	b
Min:	0.85	0	1.90	1.90	0.15	0.25	0.18	0.50TYP
Max:	0.95	0.05	2.10	2.10	0.25	0.45	0.30	

Revision History

REVISION NUMBER	DATE	REVISION	PAGE
V1.0	2015-9	New	1-11
V1.1	2021-9	Add annotation for Maximum Ratings.	2
V1.2	2024-11	Update TO-92 Physical Dimensions、Update Lead Temperature	2、 8
V1.3	2025-3	Add DFN-8 package model	1
V1.4	2025-4	Add tiered models	1

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