Description

The LM236 and LM336 are precision 5.0V regula- tor diodes. These voltage reference monolithic ICs operate like 5.0V zener diodes with a low temper- ature coefficient and a dynamic impedance of 0.6Ω. A third pin enables adjusting the reference voltage and the temperature coefficient.

SOP-8

TO-92


DFN-8 3*3


DFN-8 2*2

Features

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

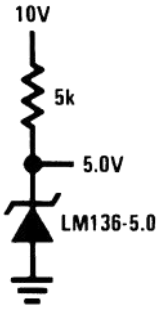
Ordering Information

DEVICE	Package Type	MARKING	Packing	Packing Qty
LM236AM-5.0/TR	SOP-8	236A-5.0	REEL	2500pcs/reel
LM236M-5.0/TR	SOP-8	236-5.0	REEL	2500pcs/reel
LM336BM-5.0/TR	SOP-8	336B-5.0	REEL	2500pcs/reel
LM336M-5.0/TR	SOP-8	336-5.0	REEL	2500pcs/reel
LM236AZ-5.0	TO-92	LM236A-5.0	BAG	1000pcs/box
LM236Z-5.0	TO-92	LM236-5.0	BAG	1000pcs/box
LM336BZ-5.0	TO-92	LM336B-5.0	BAG	1000pcs/box
LM336Z-5.0	TO-92	LM336-5.0	BAG	1000pcs/box
LM236ADQ3-5.0/TR	DFN-8 3*3	236A-5.0	REEL	5000pcs/reel
LM236DQ3-5.0/TR	DFN-8 3*3	236-5.0	REEL	5000pcs/reel
LM336BDQ3-5.0/TR	DFN-8 3*3	336B-5.0	REEL	5000pcs/reel
LM336DQ3-5.0/TR	DFN-8 3*3	336-5.0	REEL	5000pcs/reel
LM236ADQ2-5.0/TR	DFN-8 2*2	236A-5.0	REEL	5000pcs/reel*
LM236DQ2-5.0/TR	DFN-8 2*2	236-5.0	REEL	5000pcs/reel*
LM336BDQ2-5.0/TR	DFN-8 2*2	336B-5.0	REEL	5000pcs/reel*
LM336DQ2-5.0/TR	DFN-8 2*2	336-5.0	REEL	5000pcs/reel*

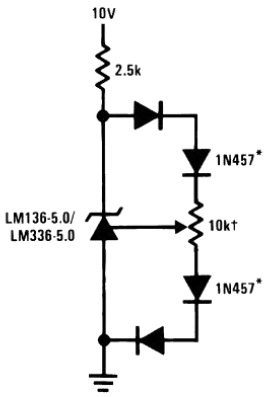
* old:4000pcs/reel,New packaging quantity of 5000 pcs/reel after December 2025.

Typical Applications

5.0V Reference



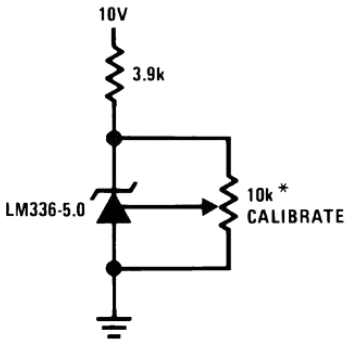
5.0V Reference with Minimum Temperature Coefficient



† Adjust to 5.00V

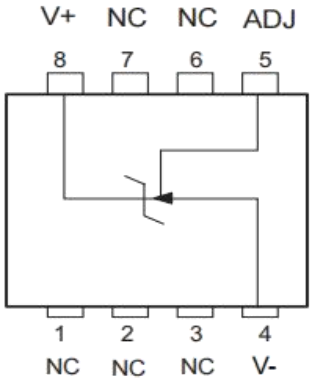
* Any silicon signal diode

Trimmed 4V to 6V Reference with Temperature Coefficient Independent of Breakdown Voltage

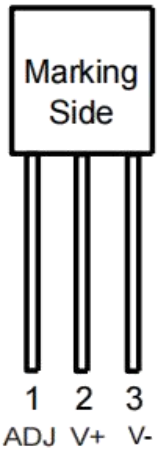


* Does not affect temperature coefficient

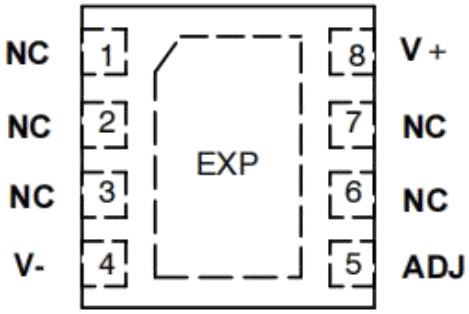
Pin Connections



SOP-8



TO-92



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

Absolute Maximum Ratings

Symbol	Parameter	LM336	Unit
I_R I_F	Current Reverse Forward	15 10	mA
Toper	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
T_L	Lead Temperature (Soldering, 10 seconds)	260	°C

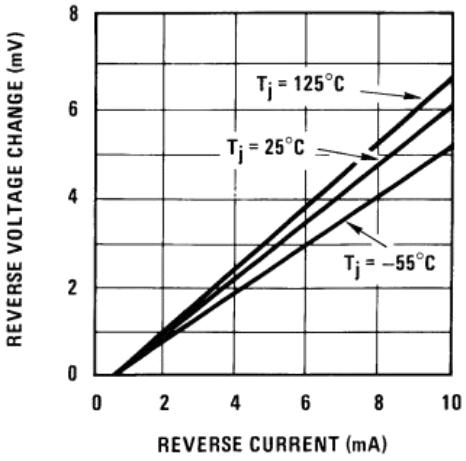
Note:Absolute Maximum Ratings indicate limits beyond which damage to the device may occur. Operating Ratings indicate conditions for which the device is intended to be functional, but specific performance is not ensured.

Electrical Characteristics

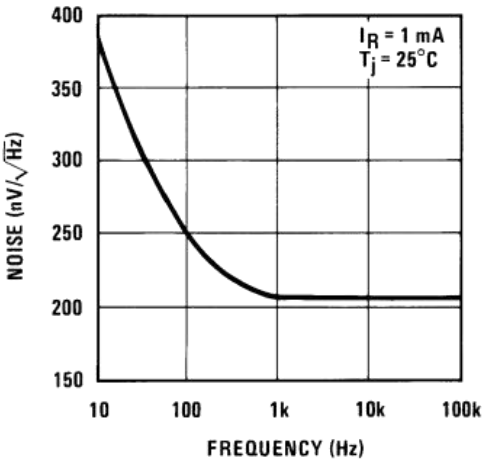
Symbol	Parameter		LM236/LM336			Unit
			Min.	Typ.	Max.	
V_R	Reference Breakdown Voltage T_{amb} = +25°C, I_R = 1mA	LM236A-5.0	4.95	5.0	5.05	V
		LM236-5.0/LM336B-5.0	4.90	5.0	5.10	
		LM336-5.0	4.98	5.0	5.20	
ΔV_R	Reverse Breakdown Voltage Change with Current 600μA ≤ I_R ≤ 10mA T_{amb} = +25°C $T_{min.} \le T_{amb} \le T_{max.}$		-	6	20	mV
Z_D	Reverse Dynamic Impedance (I_R = 1mA) T_{amb} = +25°C f=100Hz $T_{min.} \le T_{amb} \le T_{max.}$		-	0.6	2.0	
K_{VT}	Temperature Stability (V_R = 5.0V, I_R = 1mA)		-	4	12	mV
K_{VH}	Long Term Stability (T_{amb} = +25°C ±0.1°C, I_R= 1mA)		-	20	-	ppm

Typical Performance Characteristics

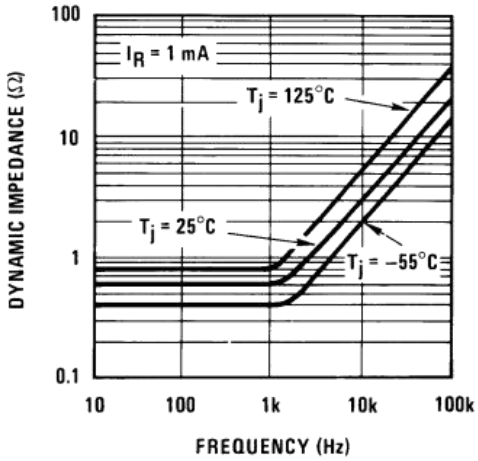
Reverse Voltage Change



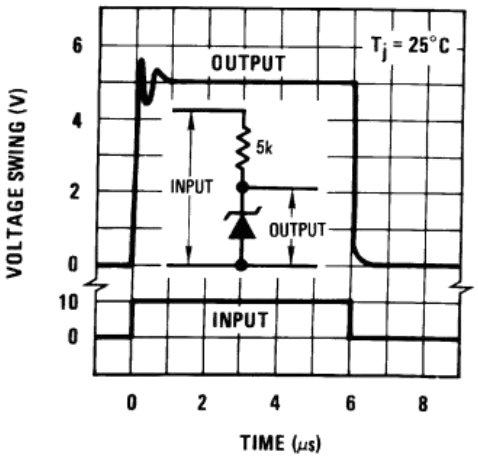
Zener Noise Voltage



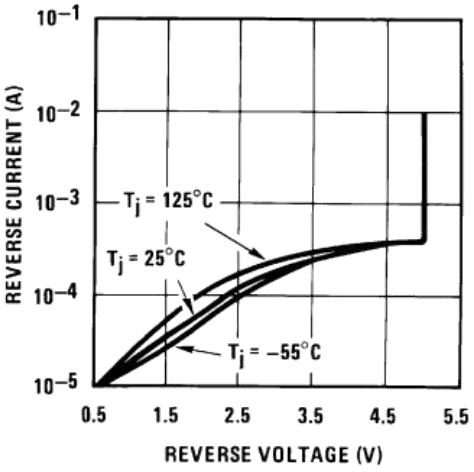
Dynamic Impedance



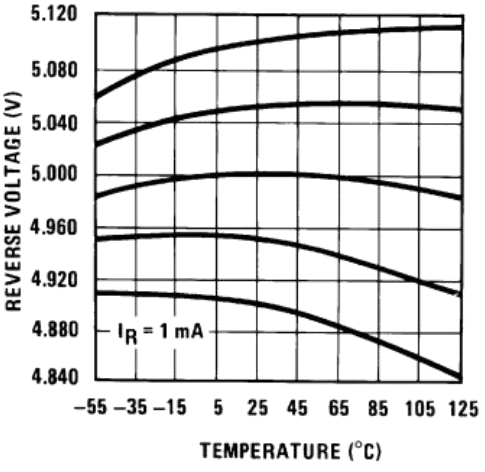
Response Time



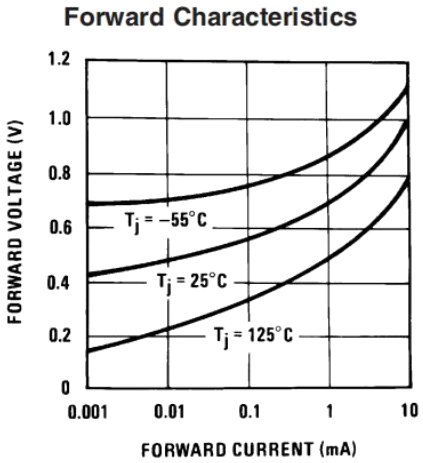
Reverse Characteristics



Temperature Drift



Typical Performance Characteristics (Continued)



Application Hints

The LMx36-5.0 series voltage references are much easier to use than ordinary zener diodes. Their low impedance and wide operating current range simplify biasing in almost any circuit. Further, either the breakdown voltage or the temperature coefficient can be adjusted to optimize circuit performance.

Figure 1 showsanLM336-5.0witha10kpotentiometerfor adjusting the reverse breakdown voltage. With the addition of R1 the breakdown voltage can be adjusted without affecting the temperature coefficient of the device. The adjustment range is usually sufficient to adjust for both the initial device tolerance and inaccuracies in buffer circuitry.

If minimum temperature coefficient is desired, four diodes can be added in series with the adjustment potentiometer as shown in Figure 2. When the device is adjusted to 5.00V the temperature coefficient is minimized. Almost any silicon signal diode can be used for this purpose such as a 1N914, 1N4148 or a 1N457. For proper temperature compensation the diodes should be in the same thermal environment as theLM336-5.0.Itisusuallysufficienttomountthediodesnear the LM336-5.0ontheprintedcircuitboard.Theabsolute resistance of the network is not critical and any value from 2k to 20k will work. Because of the wide adjustment range, fixed resistors should be connected in series with the pot to make pot setting less critical.

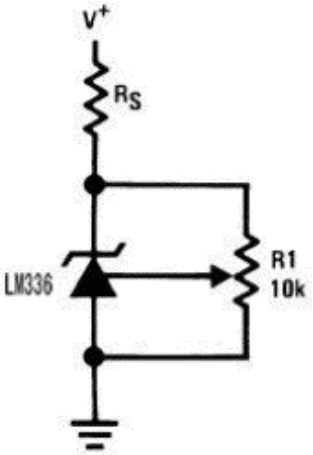


FIGURE1.LM336-5.0withPotforAdjustmentof Breakdown Voltage (Trim Range = ±1.0V Typical)

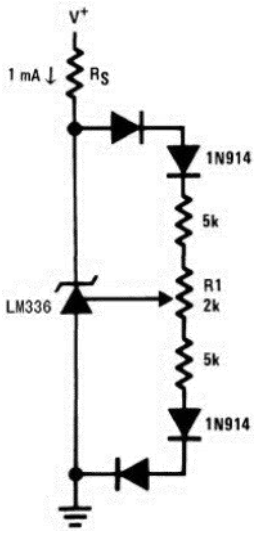
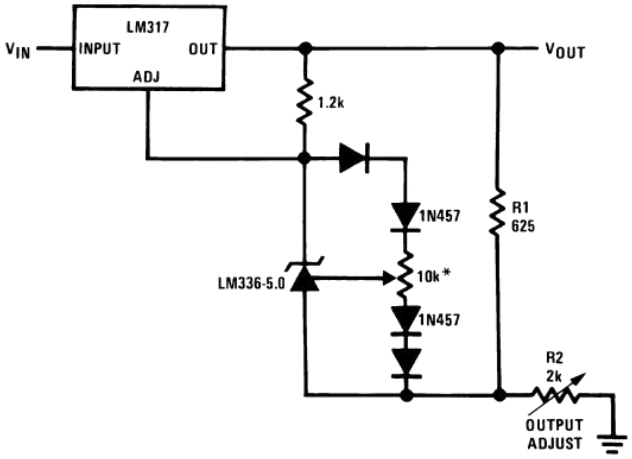
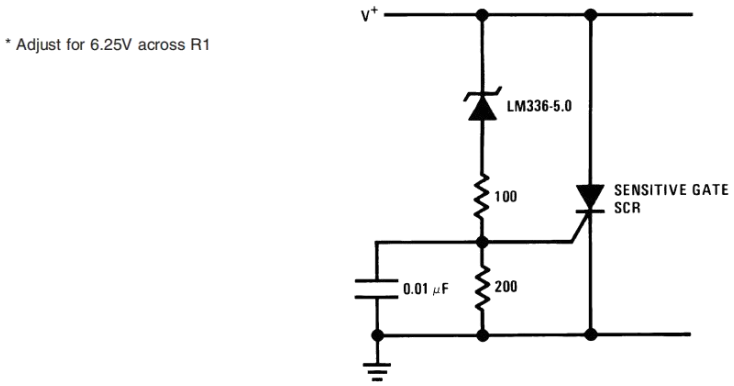


FIGURE 2. Temperature Coefficient Adjustment (Trim Range = ±0.5V Typical)

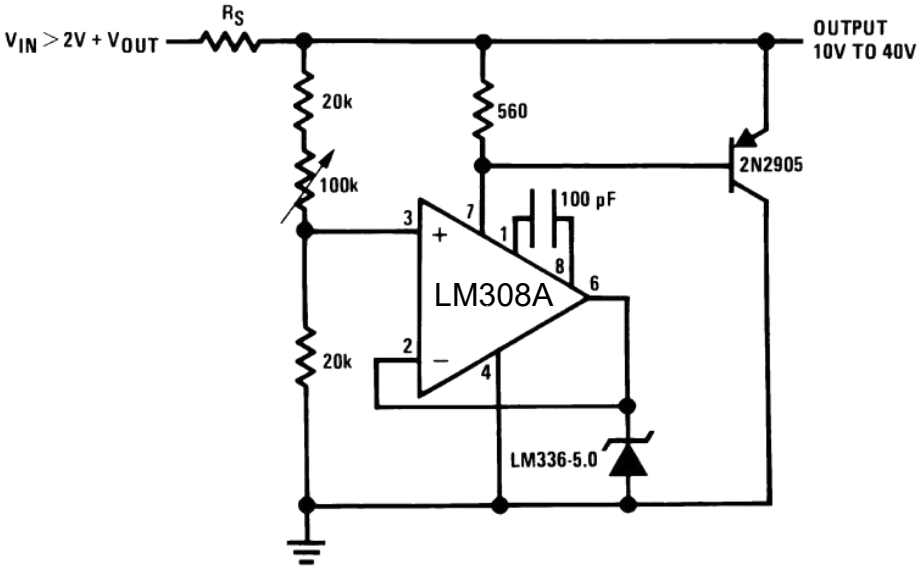
Typical Applications



Precision Power Regulator with Low Temperature Coefficient



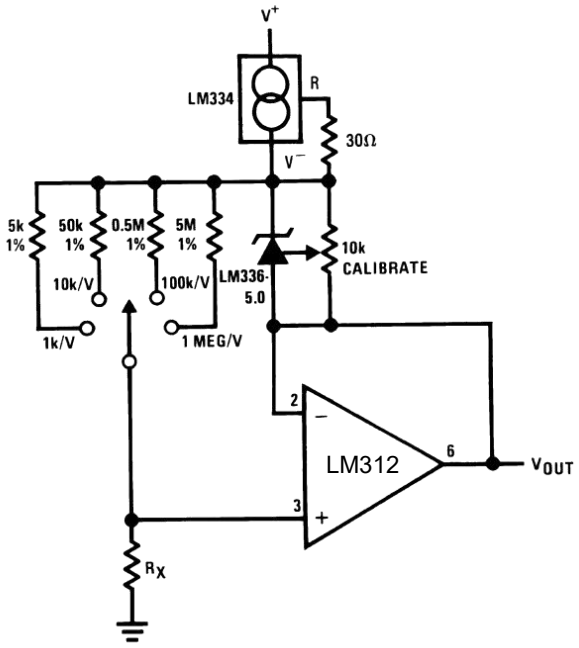
5V Crowbar



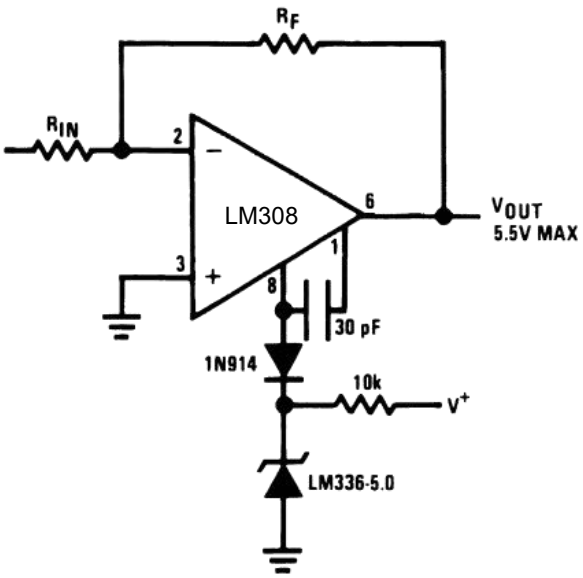
Adjustable Shunt Regulator

Typical Applications (Continued)

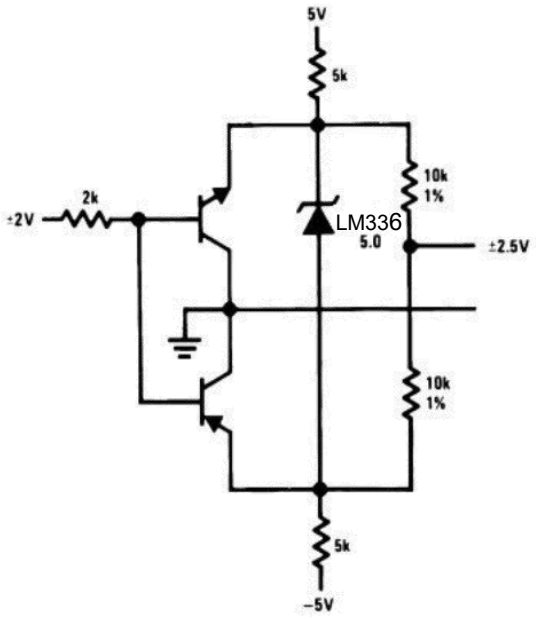
Linear Ohmmeter



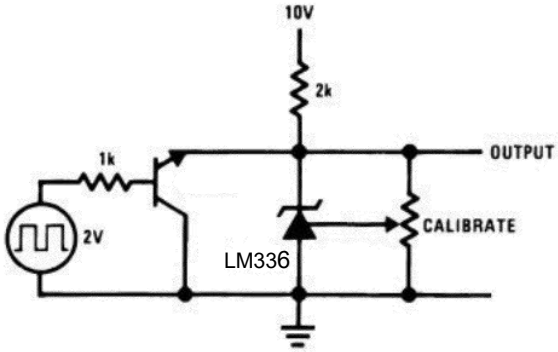
Op Amp with Output Clamped



Bipolar Output Reference

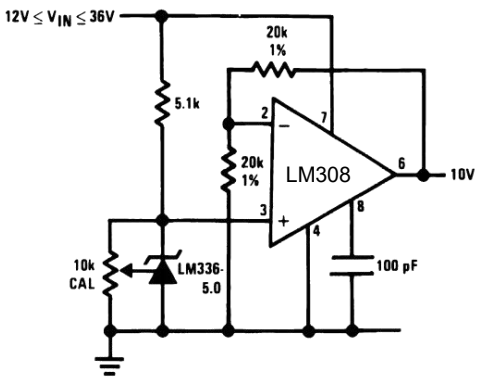


5.0V Square Wave Calibrator

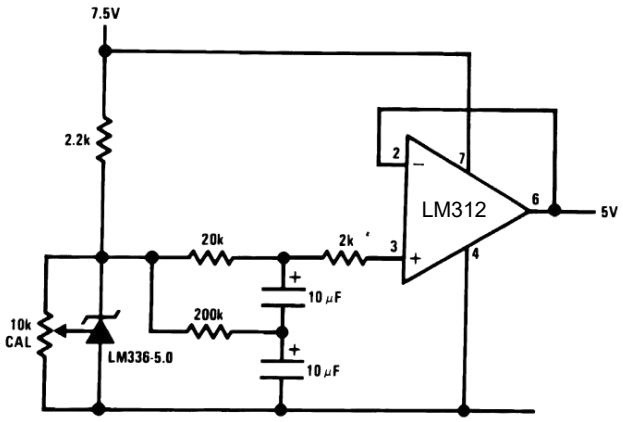


Typical Applications (Continued)

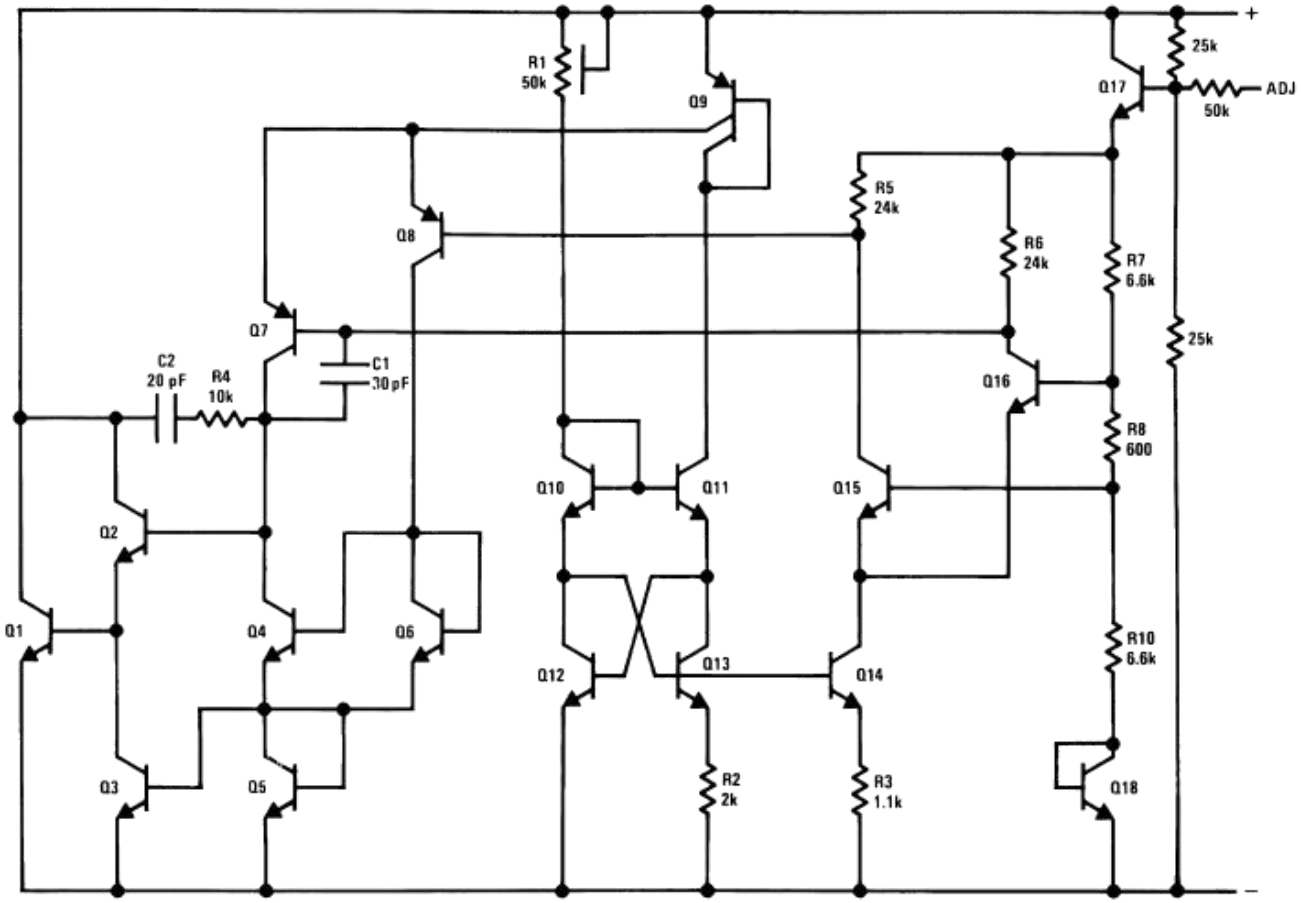
10V Buffered Reference



Low Noise Buffered Reference

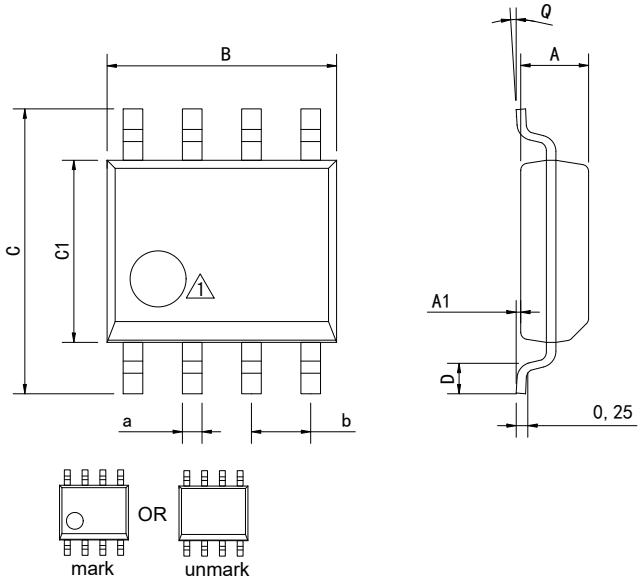


Schematic Diagram



Physical Dimensions

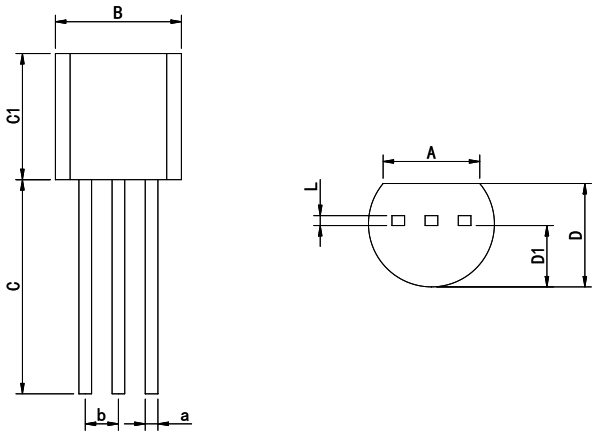
SOP-8



1 Package top mark may be in lower left corner or unmark

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	

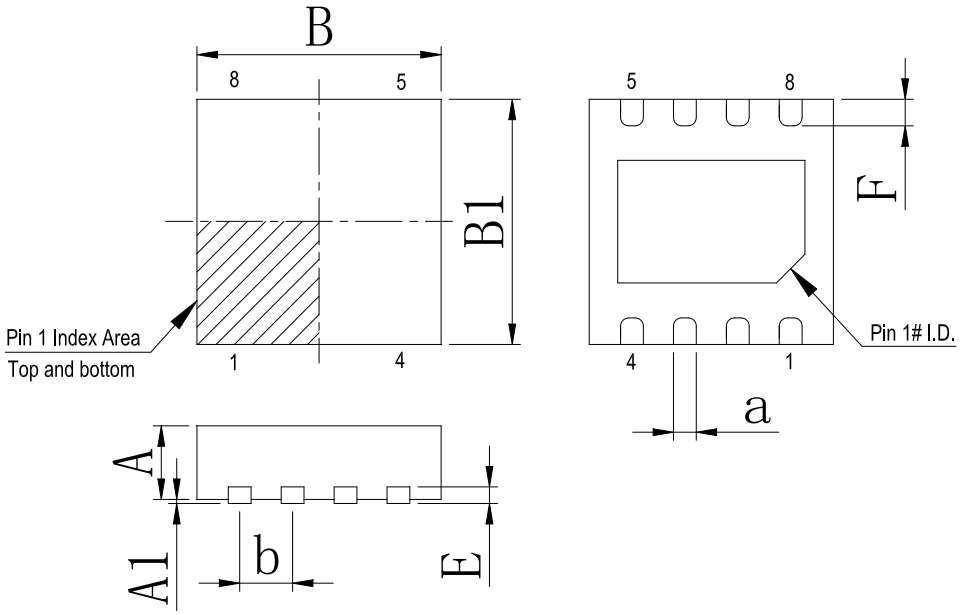
TO-92



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	

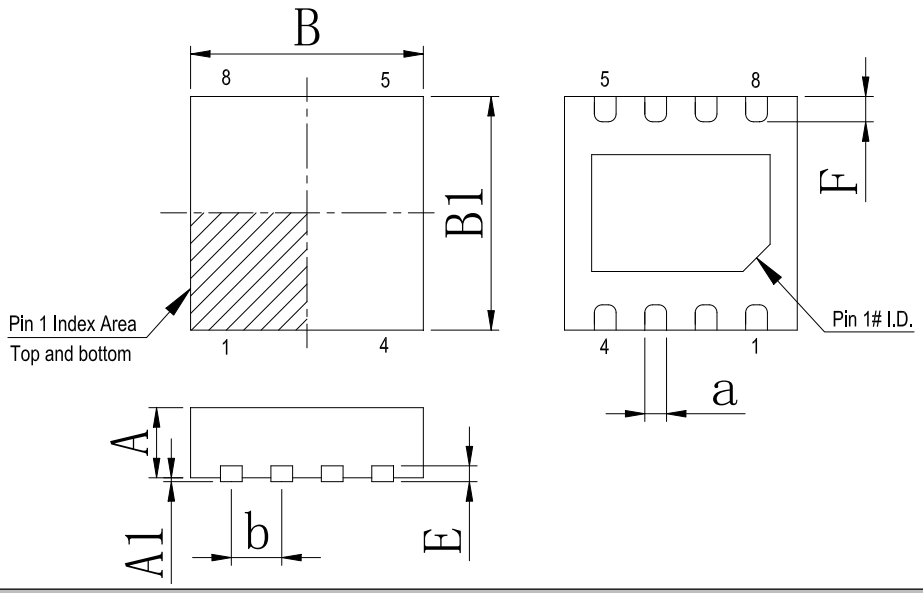
Physical Dimensions

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	1-12
V1.1	2017-9	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
V1.5	2025-12	Update important statements、Update SOP-14 Dimension drawing	9、12

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