HGSEMI

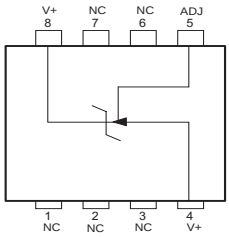
LM336

2.5V VOLTAGE REFERENCES

- LOW TEMPERATURE COEFFICIENT
- WIDE OPERATING CURRENT OF 400µA TO 10mA
- 0.2Ω DYNAMIC IMPEDANCE
- GUARANTEED TEMPERATURE STABILITY
- FAST TURN-ON

D SO8
(Plastic Micropackage)

SO8
(Top view)



1- NC
2- NC
3- NC
4- V-
5- ADJ
6- NC
7- NC
8- V+

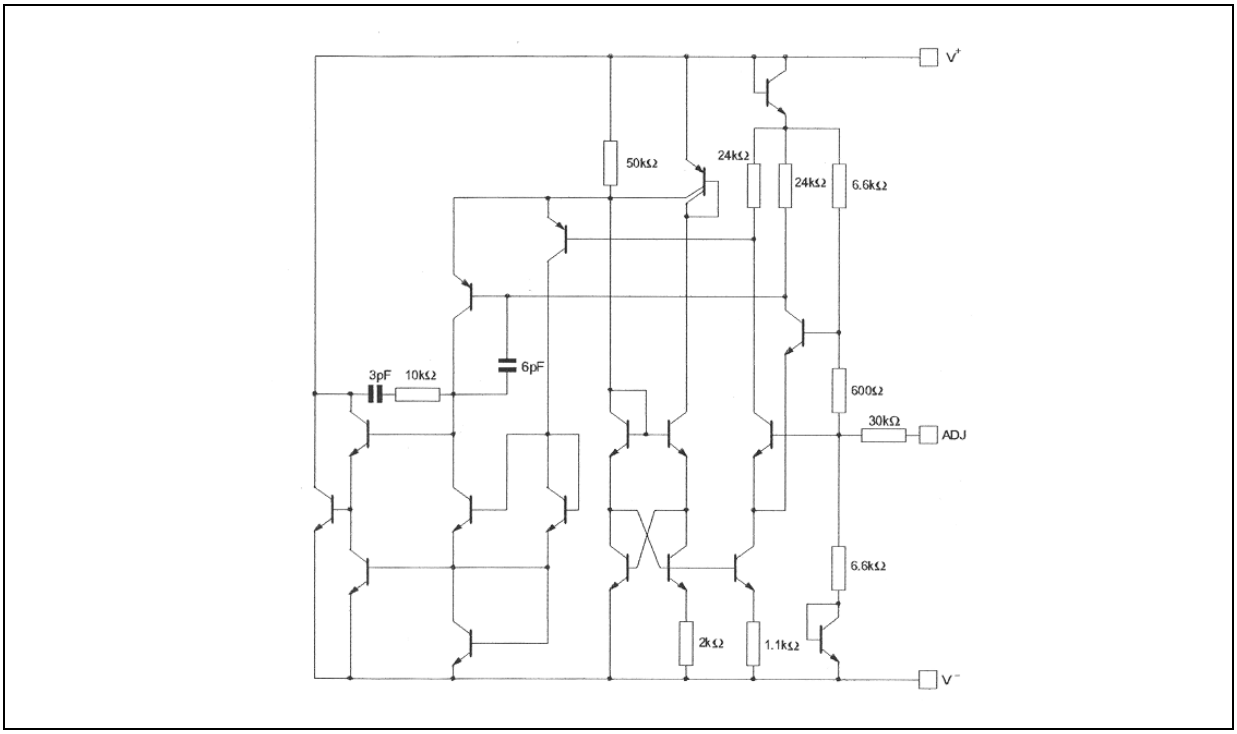
DESCRIPTION

The 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.

HGSEMI

LM336

SCHEMATIC DIAGRAM



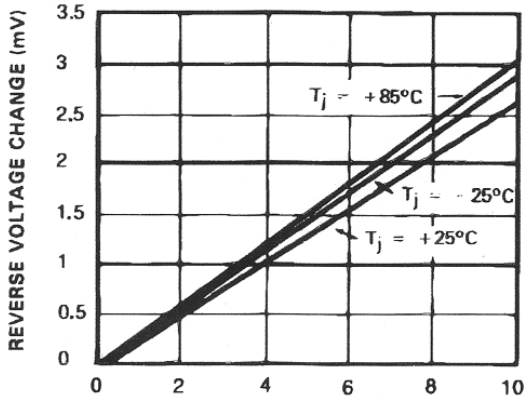
ABSOLUTE MAXIMUM RATINGS

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

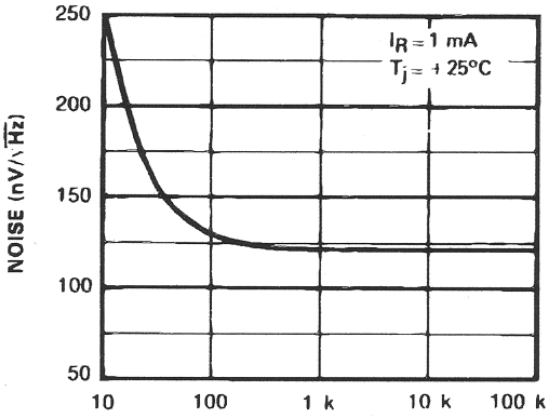
ELECTRICAL CHARACTERISTICS

Symbol	Parameter	LM336			Unit
		Min.	Typ.	Max.	
V_R	Reference Breakdown Voltage T_{amb} = +25°C, I_R = 1mA LM336	 2.44	 2.49	 2.54	V
ΔV_R	Reverse Breakdown Voltage Change with Current 400µA ≤ I_R ≤ 10mA T_{amb} = +25°C $T_{min.} \le T_{amb} \le T_{max.}$		 2.6 3	 10 12	mV
Z_D	Reverse Dynamic Impedance (I_R = 1mA) T_{amb} = +25°C $T_{min.} \le T_{amb} \le T_{max.}$		 0.2 0.4	 1 1.4	Ω
K_{VT}	Temperature Stability (V_R = 2.49V, I_R = 1mA)		1.8	6	mV
K_{VH}	Long Term Stability (T_{amb} = +25°C ±0.1°C, I_R= 1mA)		20		ppm

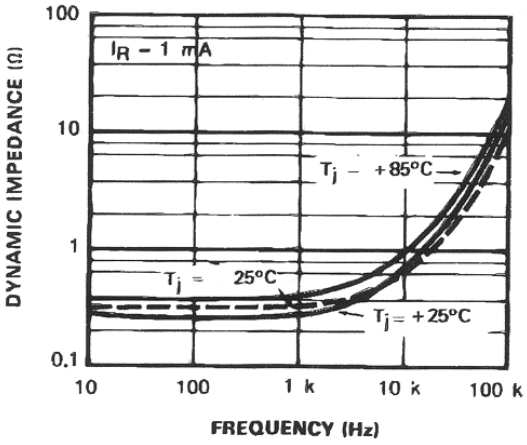
REVERSE VOLTAGE CHANGE



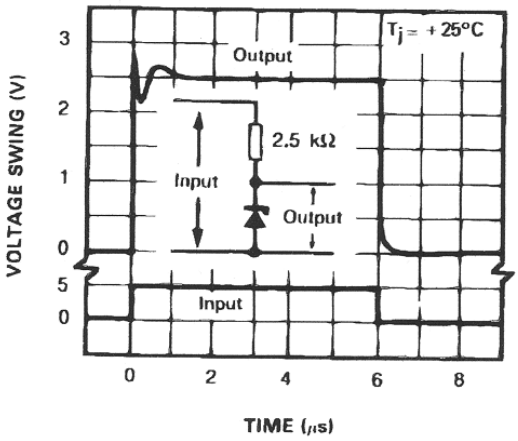
ZENER NOISE VOLTAGE



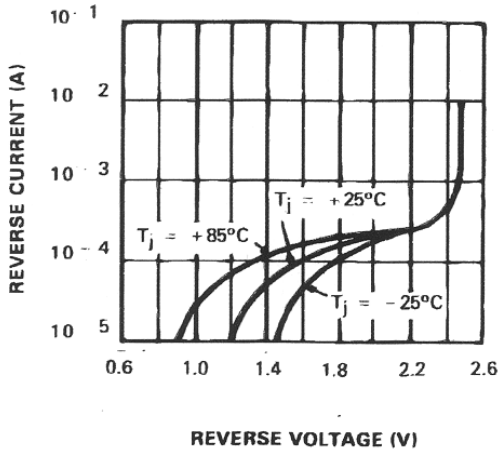
DYNAMIC IMPEDANCE



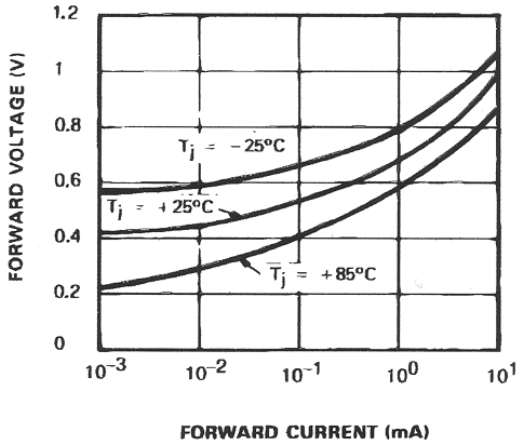
RESPONSE TIME



REVERSE CHARACTERISTICS



FORWARD CHARACTERISTICS



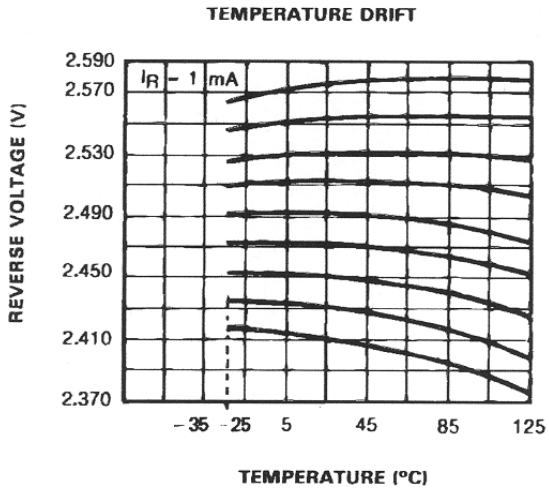
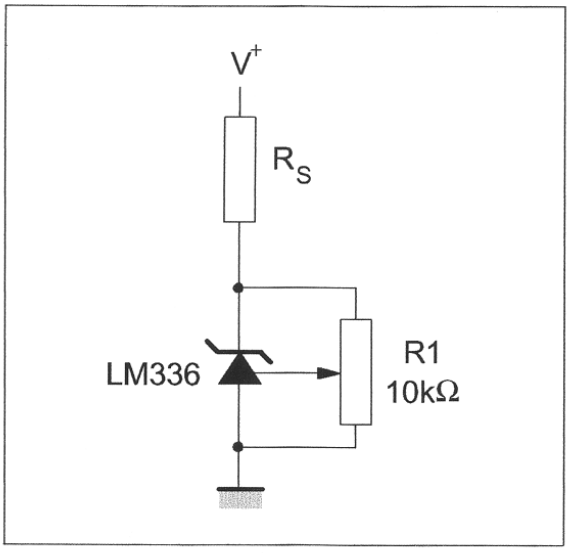


Figure 1 : The LM336 with Pot for Adjustment of Breakdown Voltage



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.

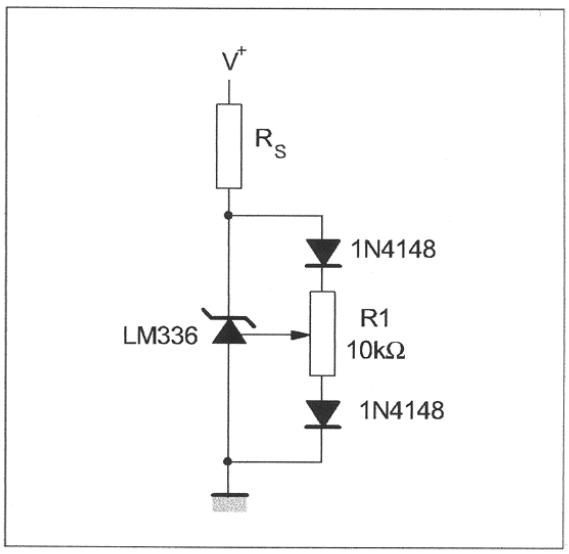
Figure 1 represents a LM336 with a 10kΩ potentiometer to adjust the reverse breakdown voltage which can be adjusted without altering the temperature coefficient of the circuit. The adjustment range is generally sufficient to adjust the initial tolerance of the circuit and the inaccuracy of the amplifier 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 2 : Temperature Coefficient Adjustment



TYPICAL APPLICATIONS

Figure 3 : 2.5V Reference

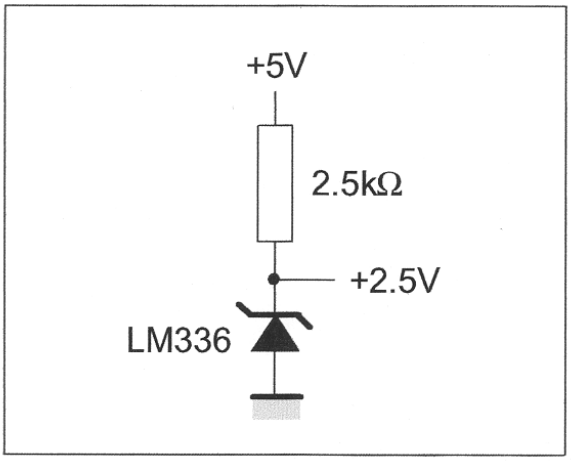


Figure 4 : Wide Input Range Reference

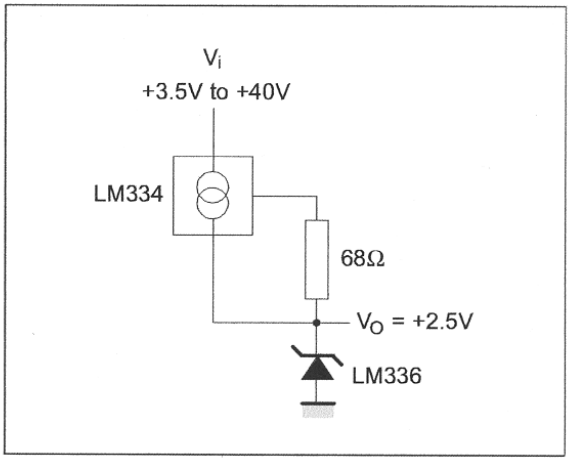


Figure 5 : Precision Power Regulator with Low Temperature Coefficient

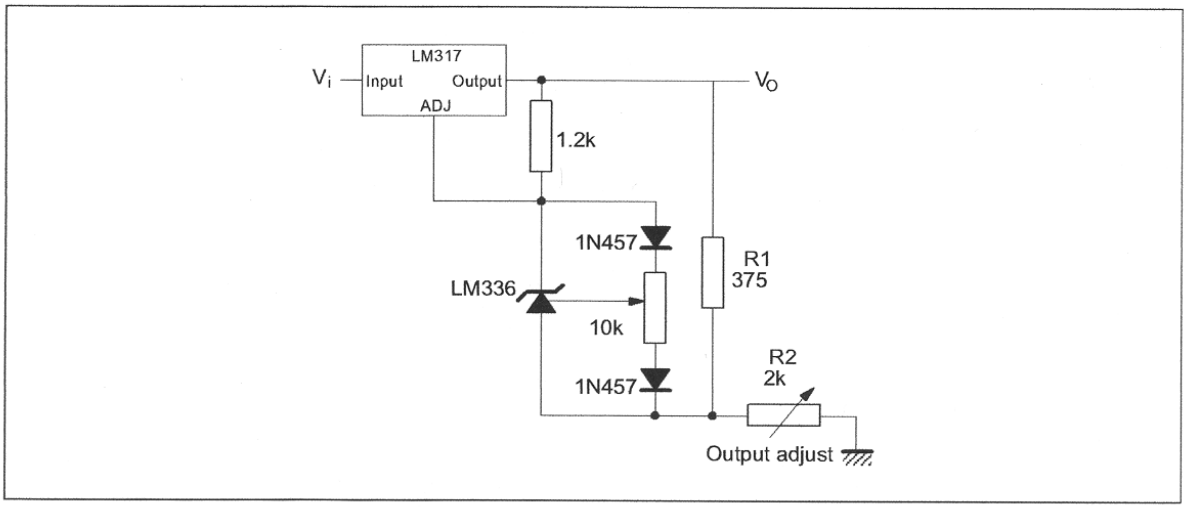


Figure 6 : Adjustable Shunt Regulator

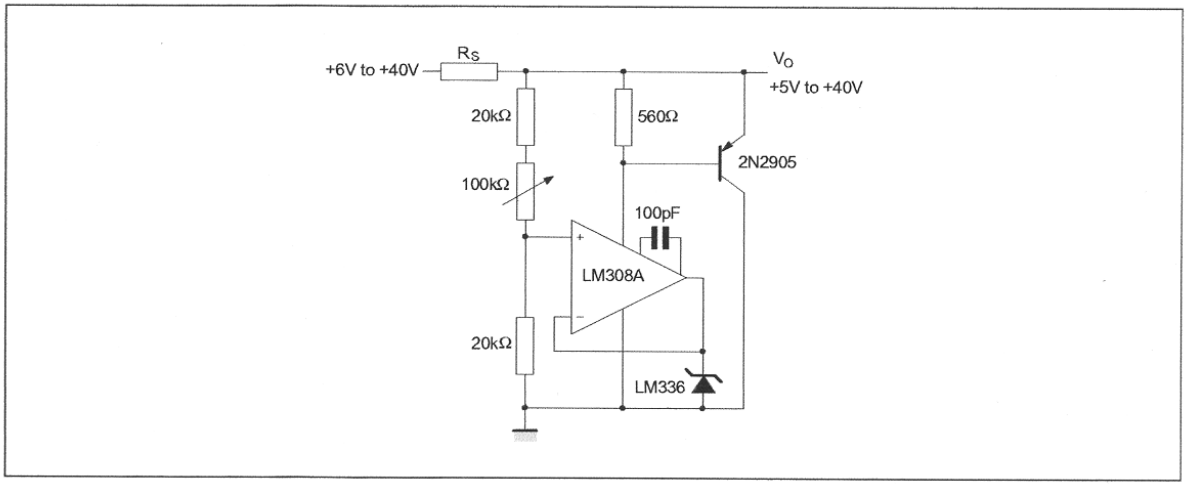


Figure 7 : Linear Ohmmeter

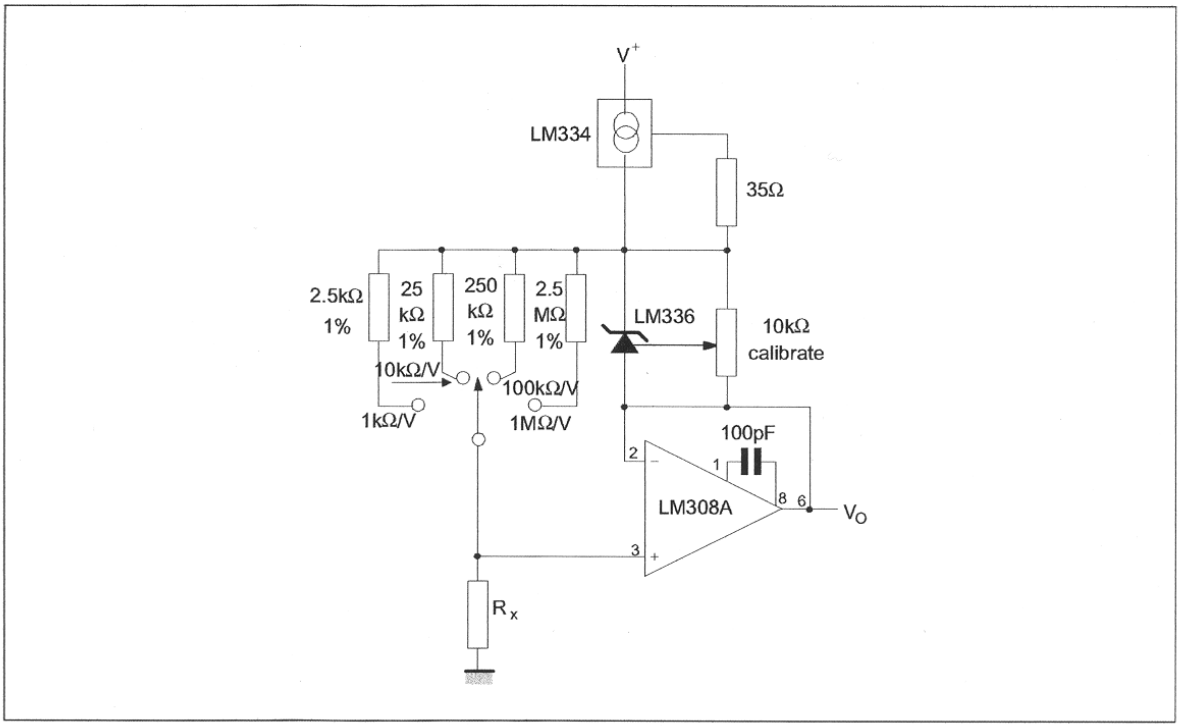


Figure 8 : Bipolar Output Reference

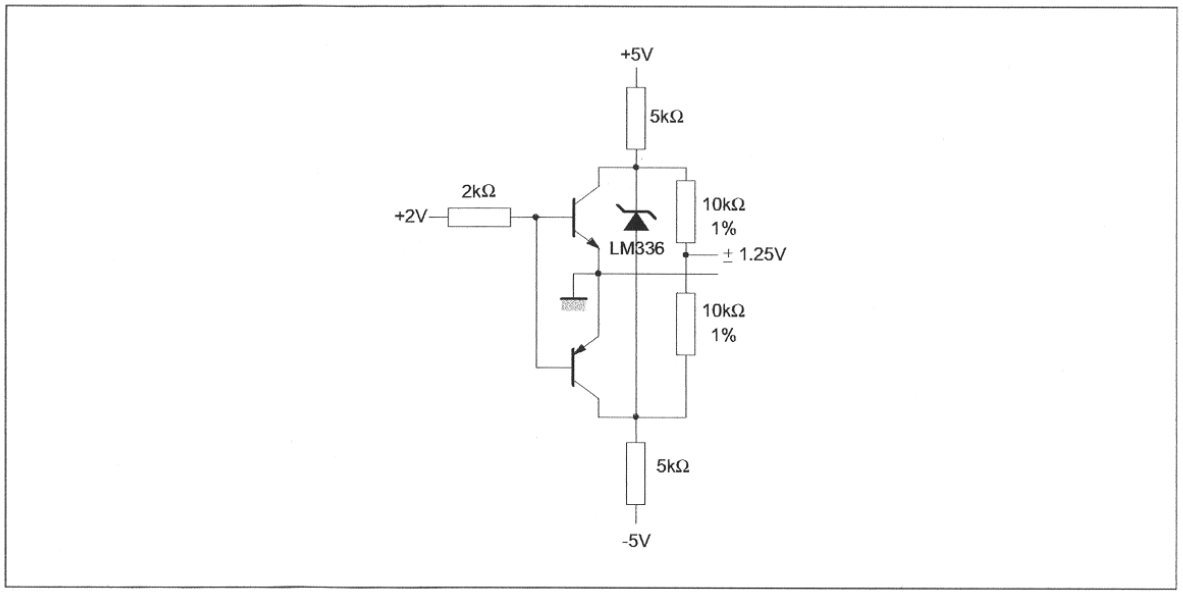


Figure 9 : 5V Buffered Reference

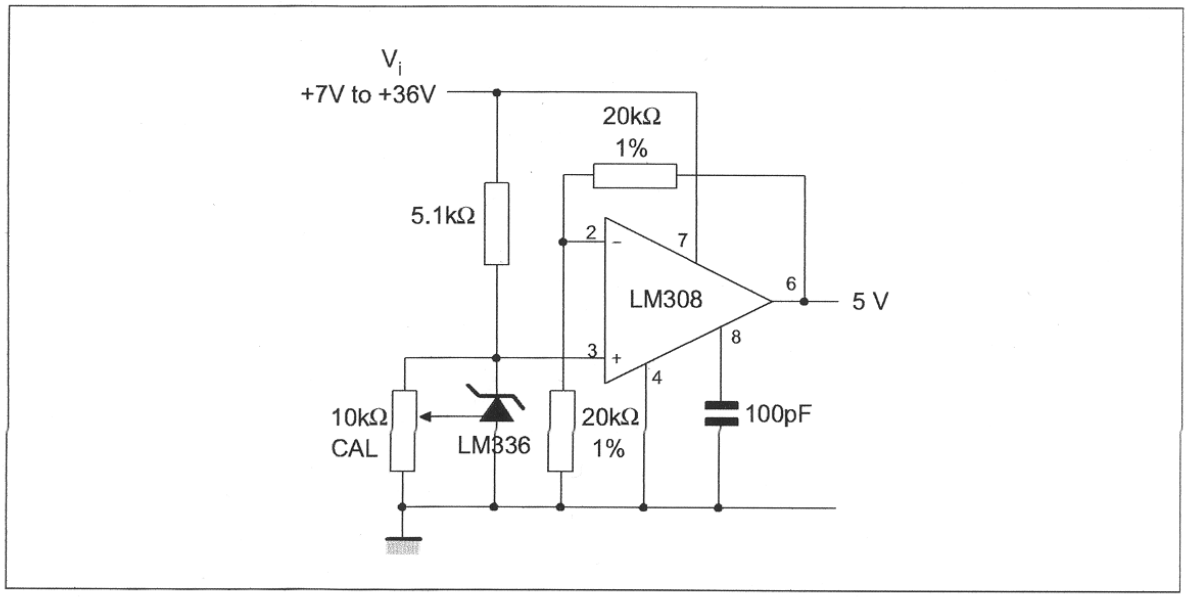
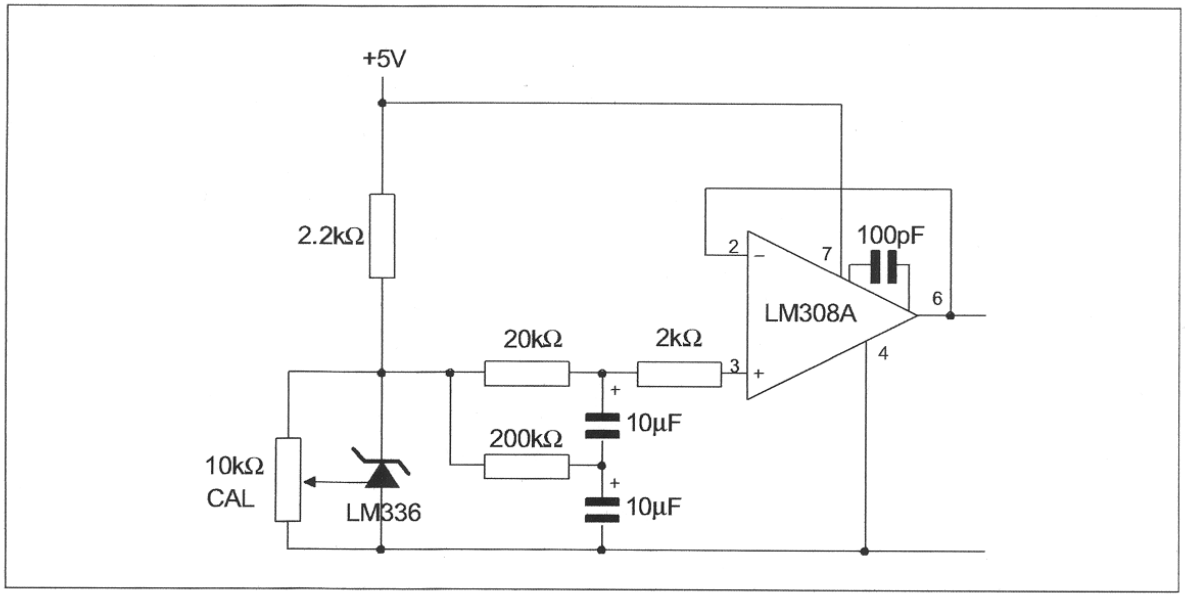


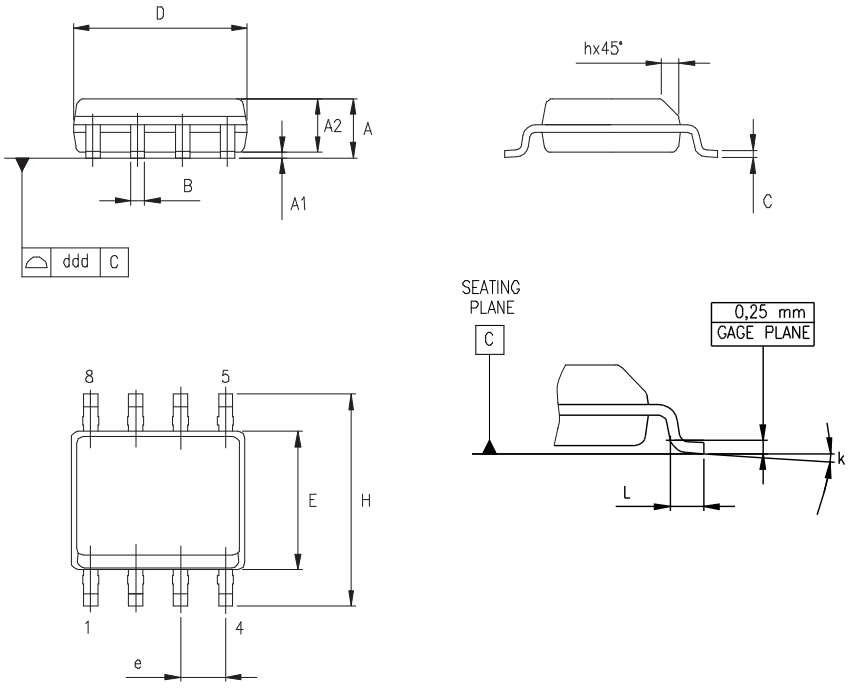
Figure 10 : Low Noise Buffered Reference



PACKAGE MECHANICAL DATA

SO-8 MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	1.35		1.75	0.053		0.069
A1	0.10		0.25	0.04		0.010
A2	1.10		1.65	0.043		0.065
B	0.33		0.51	0.013		0.020
C	0.19		0.25	0.007		0.010
D	4.80		5.00	0.189		0.197
E	3.80		4.00	0.150		0.157
e		1.27			0.050	
H	5.80		6.20	0.228		0.244
h	0.25		0.50	0.010		0.020
L	0.40		1.27	0.016		0.050
k	8° (max.)					
ddd			0.1			0.04



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