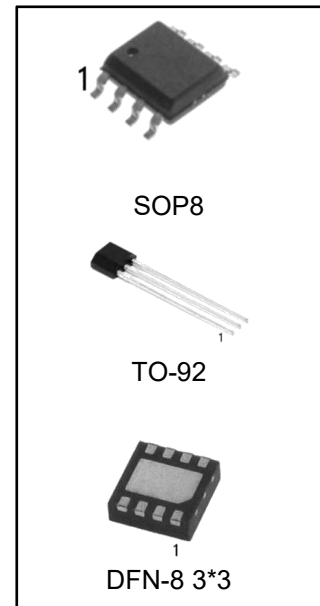


Description

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

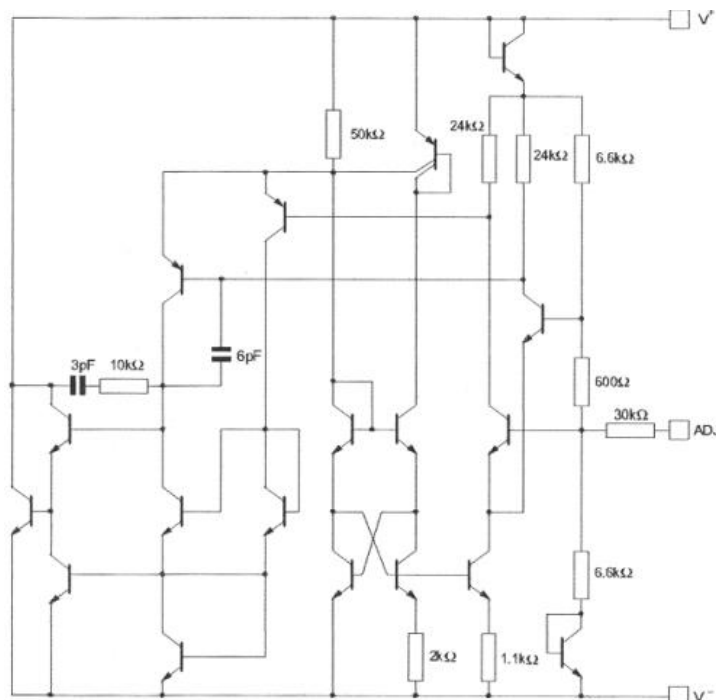
- Low temperature coefficient
- Wide operating current of $400\mu\text{A}$ to 10 mA
- 0.2Ω dynamic impedance
- $\pm 1\%$ initial tolerance available
- Guaranteed temperature stability
- Fast turn-on



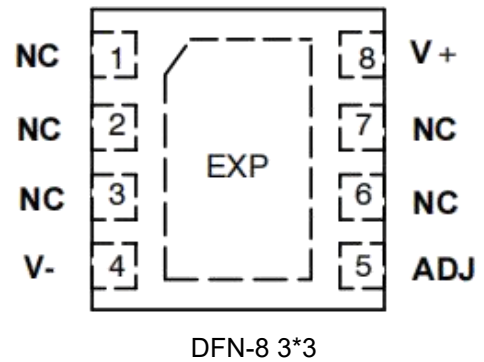
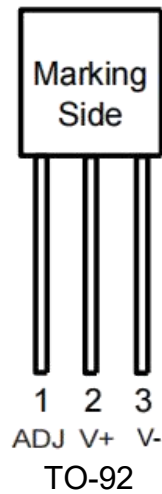
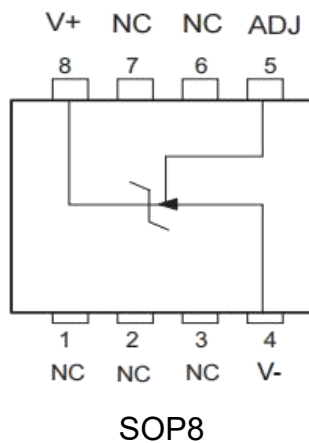
Ordering Information

| DEVICE | Package Type | MARKING | Packing | Packing Qty |
|----------------|--------------|-----------|---------|--------------|
| LM236M-2.5/TR | SOP8 | 236-2.5 | Reel | 2500pcs/reel |
| LM336M-2.5/TR | SOP8 | 336-2.5 | Reel | 2500pcs/reel |
| LM236Z-2.5 | TO-92 | LM236-2.5 | Tape | 1000pcs/box |
| LM336Z-2.5 | TO-92 | LM336-2.5 | Tape | 1000pcs/box |
| LM236DQ-2.5/TR | DFN-8 3*3 | 236-2.5 | Reel | 2500pcs/reel |
| LM336DQ-2.5/TR | DFN-8 3*3 | 336-2.5 | Reel | 2500pcs/reel |

Schematic Diagram



Pin Connections



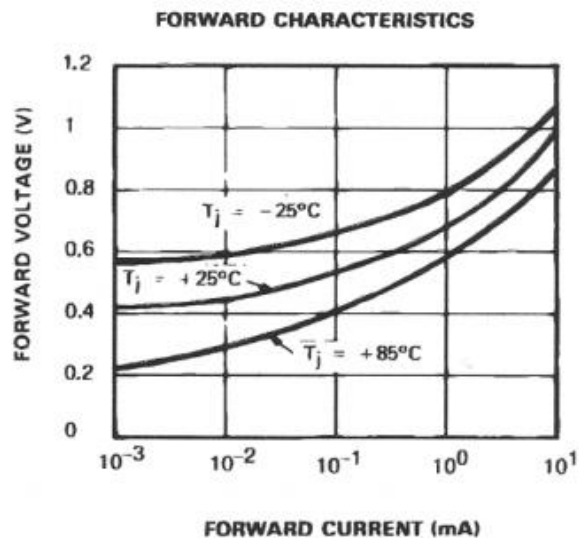
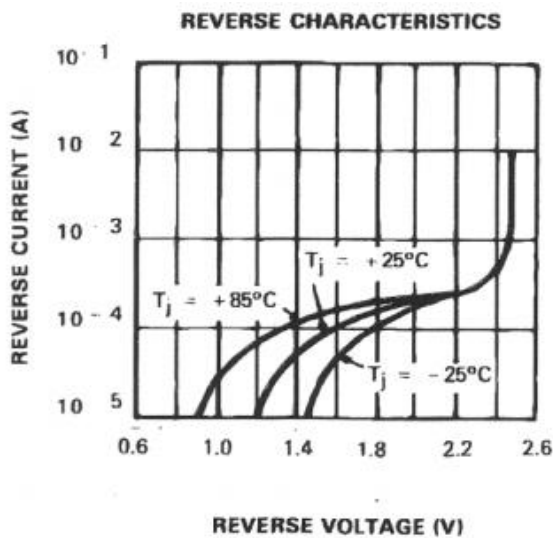
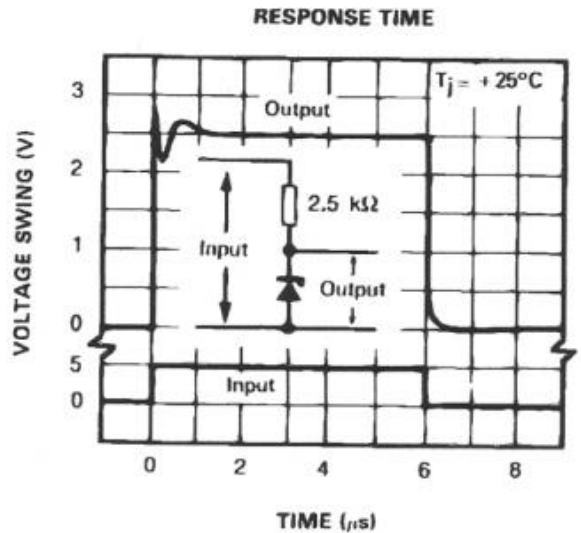
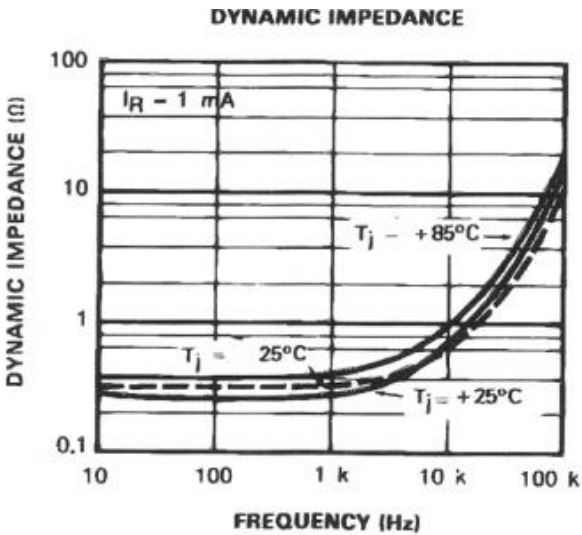
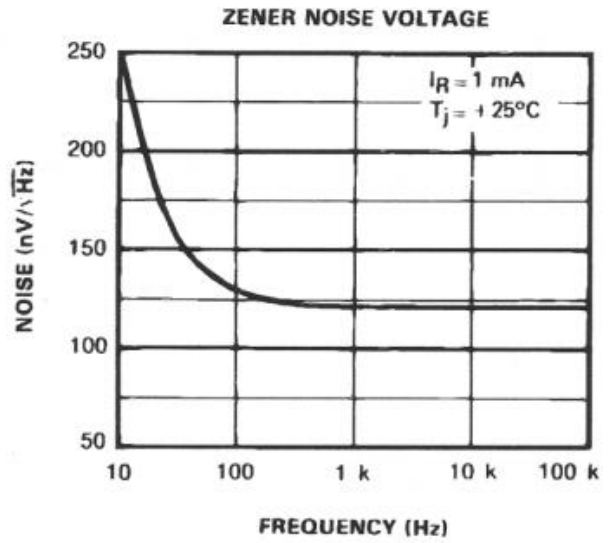
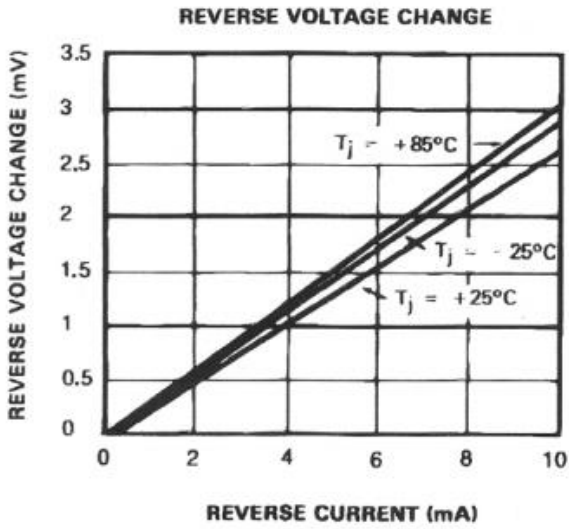
Absolute Maximum Ratings

| Symbol | Parameter | LM336 | Unit |
|-------------------|--------------------------------------|-----------------------|------|
| I _{RF} | Current Reverse Forward | 15 | mA |
| | | 10 | |
| T _{oper} | Operating Free-air Temperature Range | LM336-2.5: 0 to +70 | °C |
| | | LM236-2.5: -40 to +85 | °C |
| T _{Stg} | Storage Temperature Range | -65 to +150 | °C |

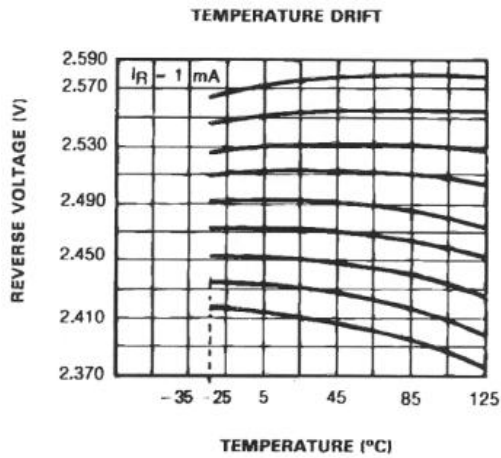
Electrical Characteristics

| Symbol | Parameter | LM236/LM336 | | | Unit |
|-----------------|--|-------------|------------|----------|------|
| | | Min. | Typ. | Max. | |
| V _R | Reference Breakdown Voltage T _{amb} = +25°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.} ≤ T _{amb} ≤ T _{max.} | - | 2.6 3 | 10 12 | mV |
| Z _D | Reverse Dynamic Impedance (I _R = 1mA) T _{amb} = +25°C T _{min.} ≤ T _{amb} ≤ T _{max.} | - | 0.2 0.4 | 1 1.4 | Ω |
| KVT | Temperature Stability (V _R = 2.49V, I _R = 1mA) | - | 1.8 | 6 | mV |
| KVH | Long Term Stability (T _{amb} = +25°C ±0.1°C, I _R = 1mA) | - | 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).

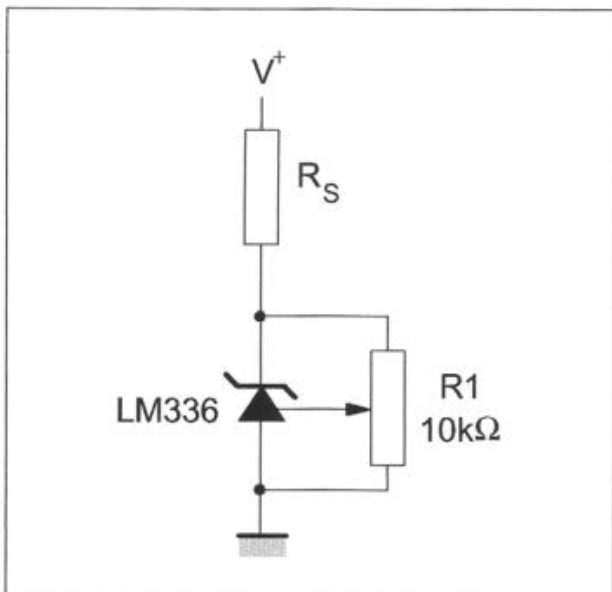


FIGURE1.LM336 with Pot for Adjustment of Breakdown Voltage

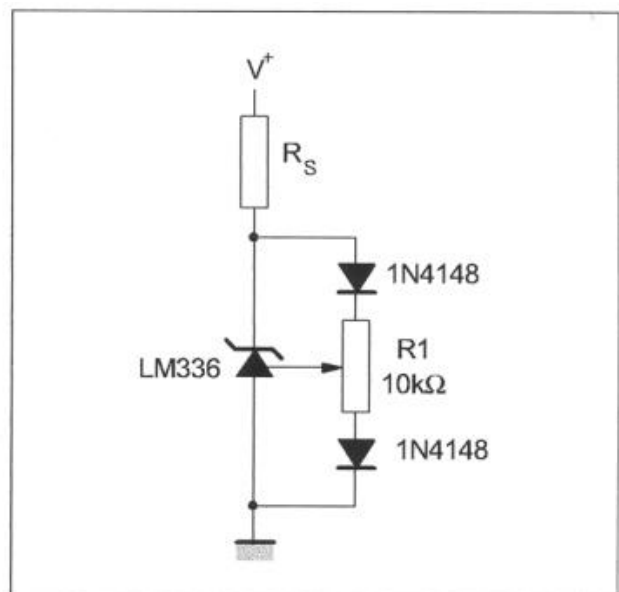


FIGURE 2. Temperature Coefficient Adjustment

Typical Applications

Figure 3 :2.5V Reference

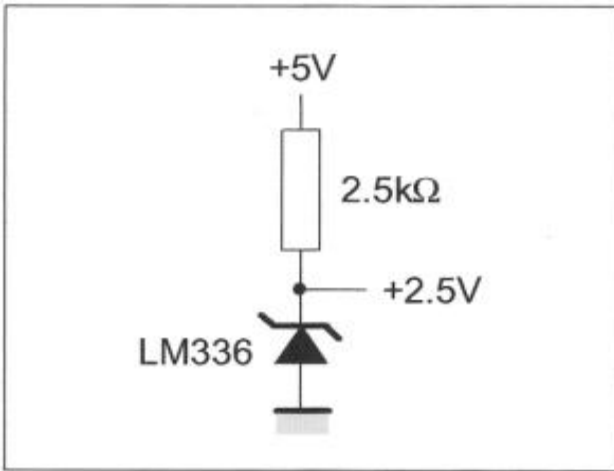


Figure 4 :Wide Input Range Reference

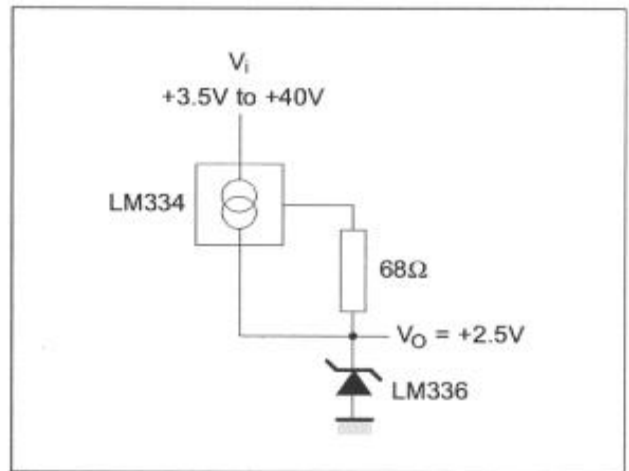


Figure 5 :Precision Power Regulator with Low Temperature Coefficient

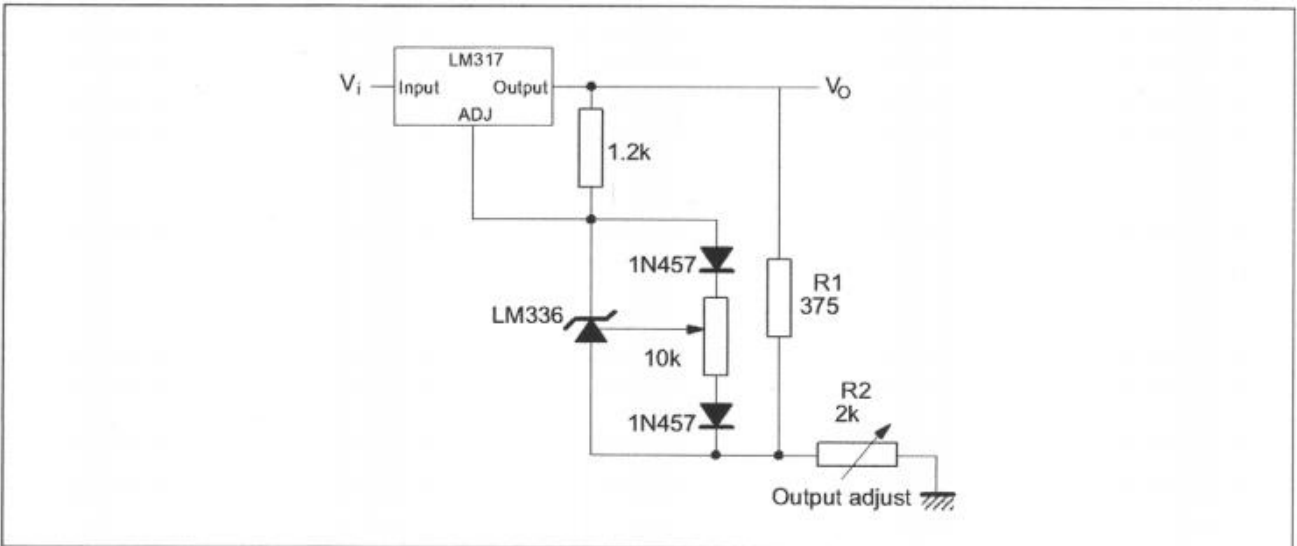


Figure 5 :Adjustable Shunt Regulator

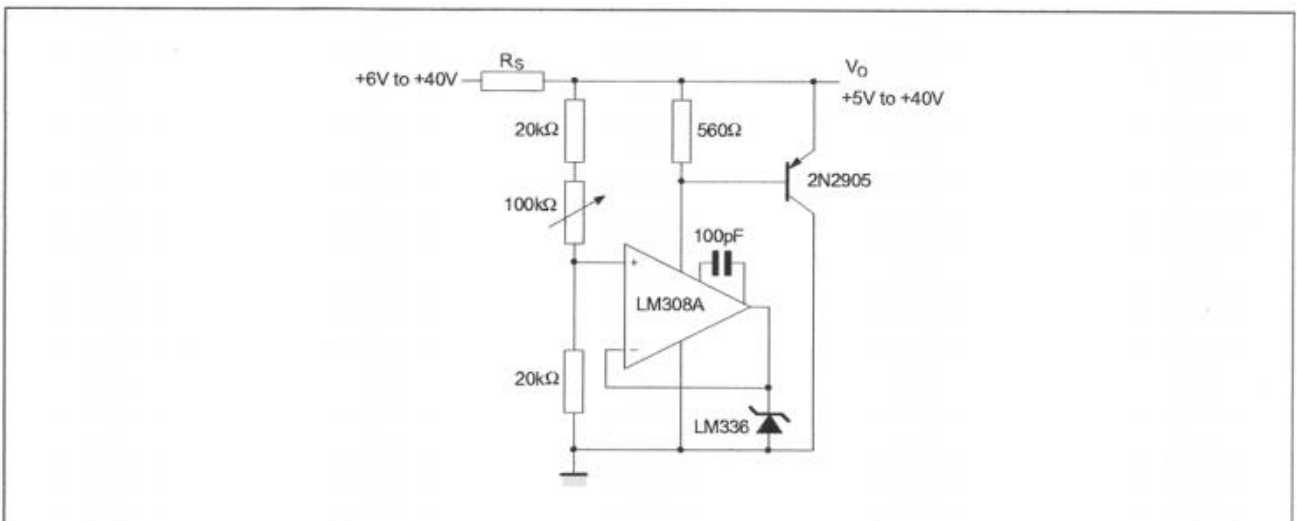


Figure 7 :Linear Ohmmeter

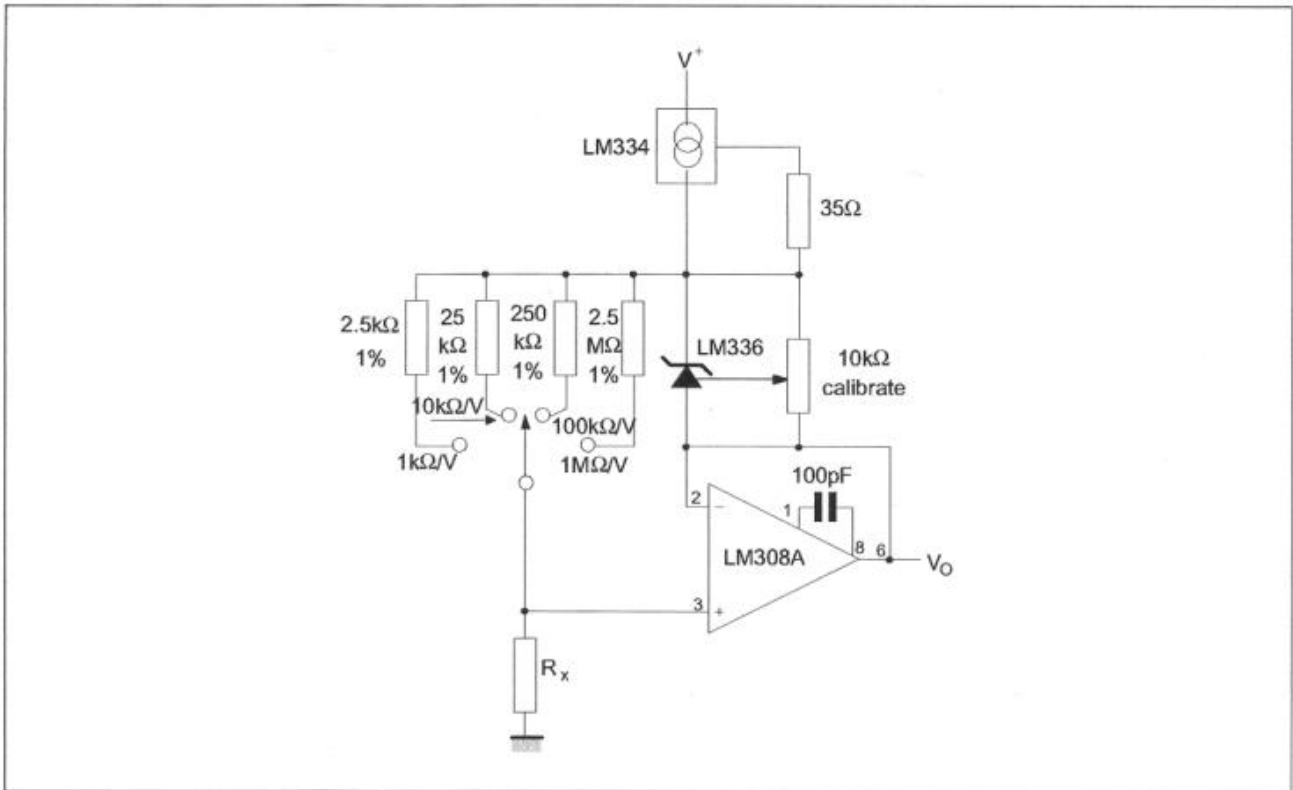


Figure 8 :Bipolar Output Reference

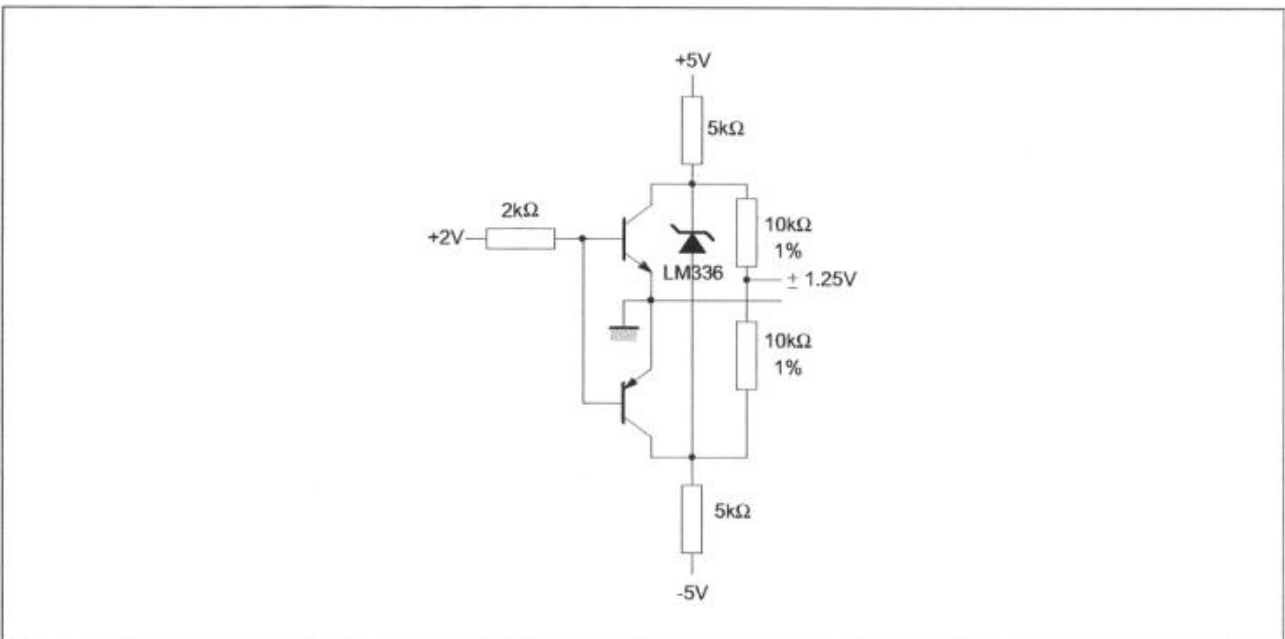


Figure 9 : 5V Buffered Reference

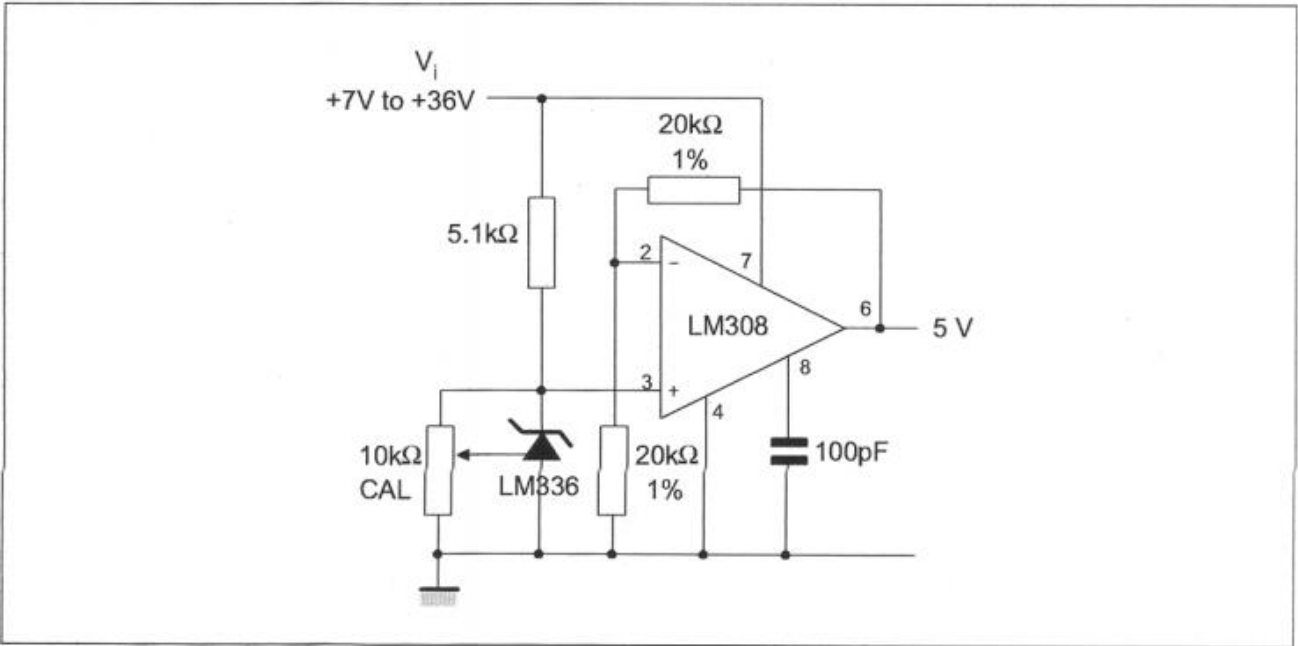
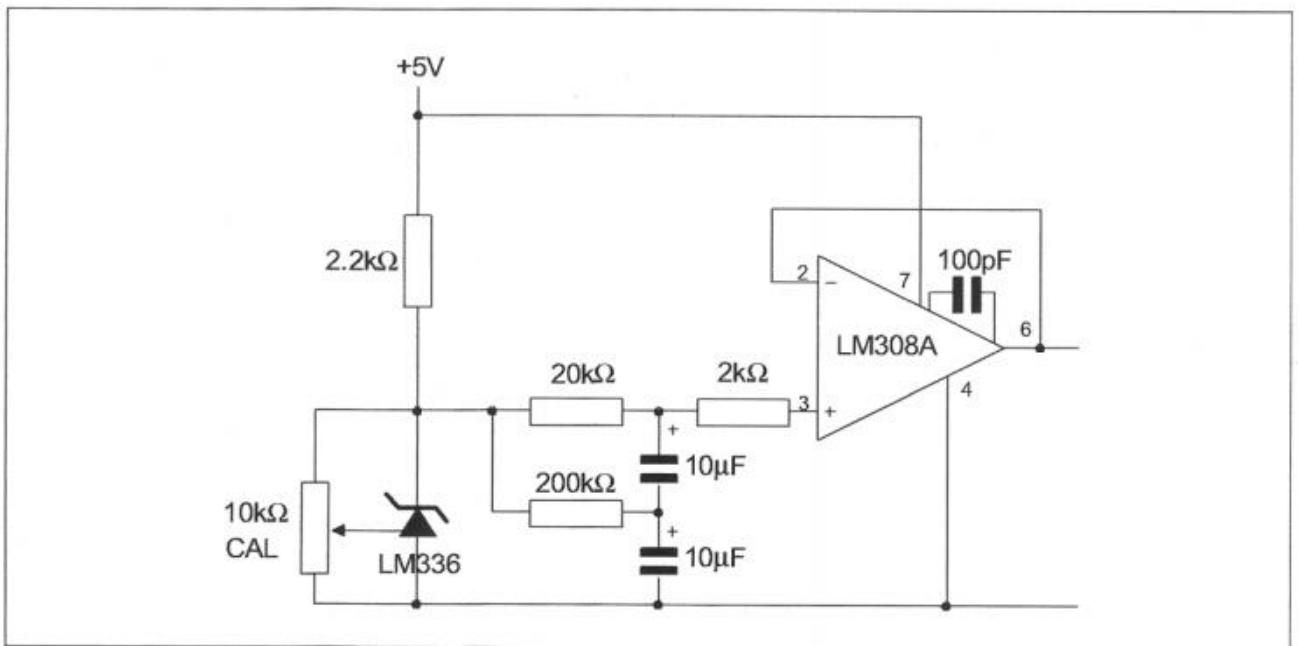
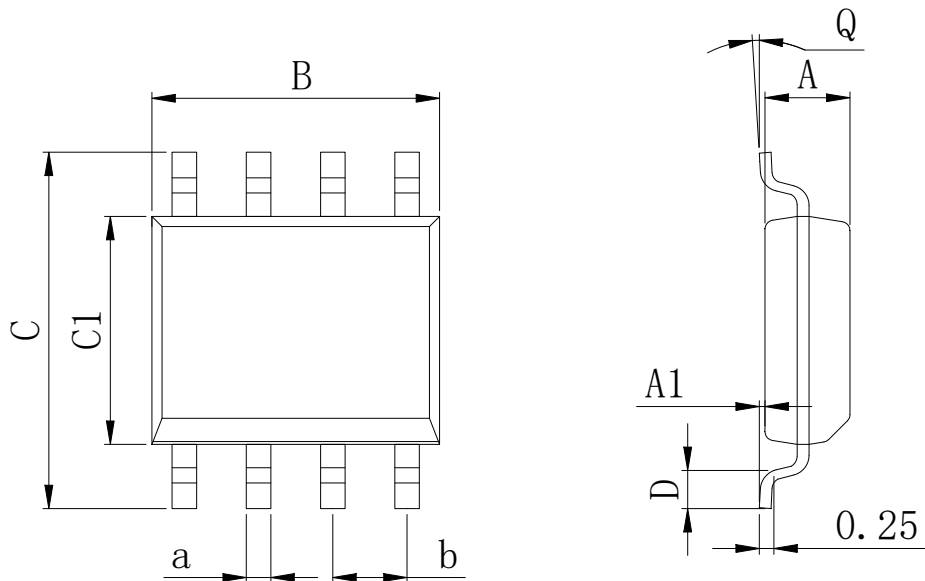


Figure 10 : Low Noise Buffered Reference



Physical Dimensions

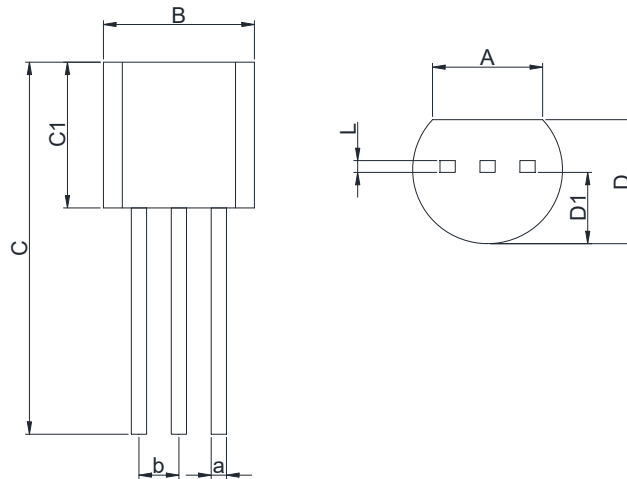
SOP8



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

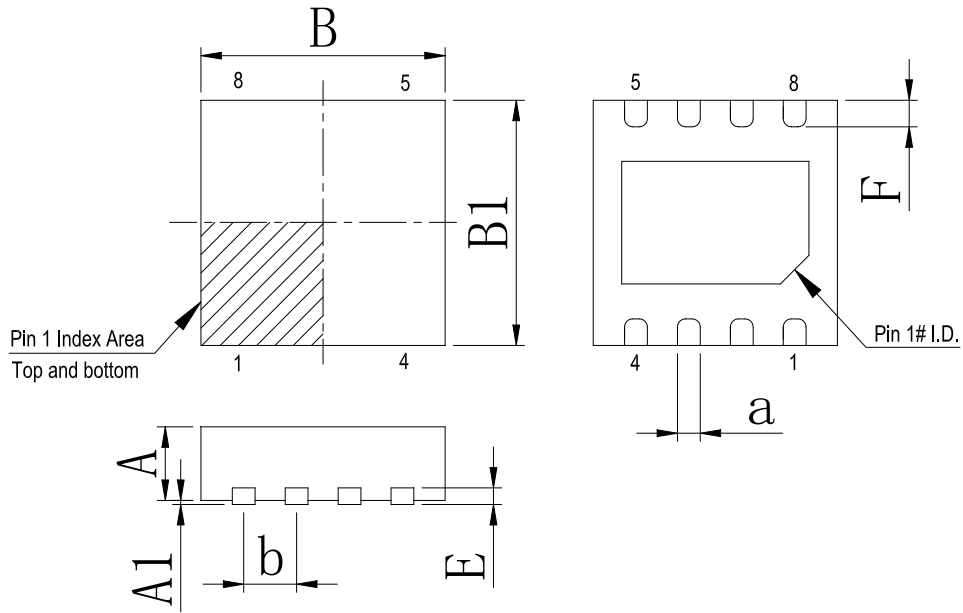


Dimensions In Millimeters(TO-92)

| 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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