2.5 V VOLTAGE REFERENCES

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

D
SO8
(Plastic Micropackage)

Z
TO92
(Plastic Package)

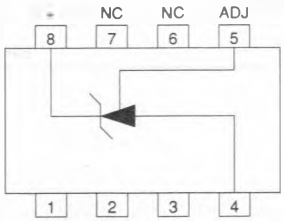
(order codes at the end of the datasheet)

DESCRIPTION

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

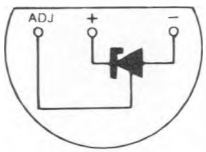
PIN CONNECTION

SO8
top view



E88LM236-01

TO92
bottom view

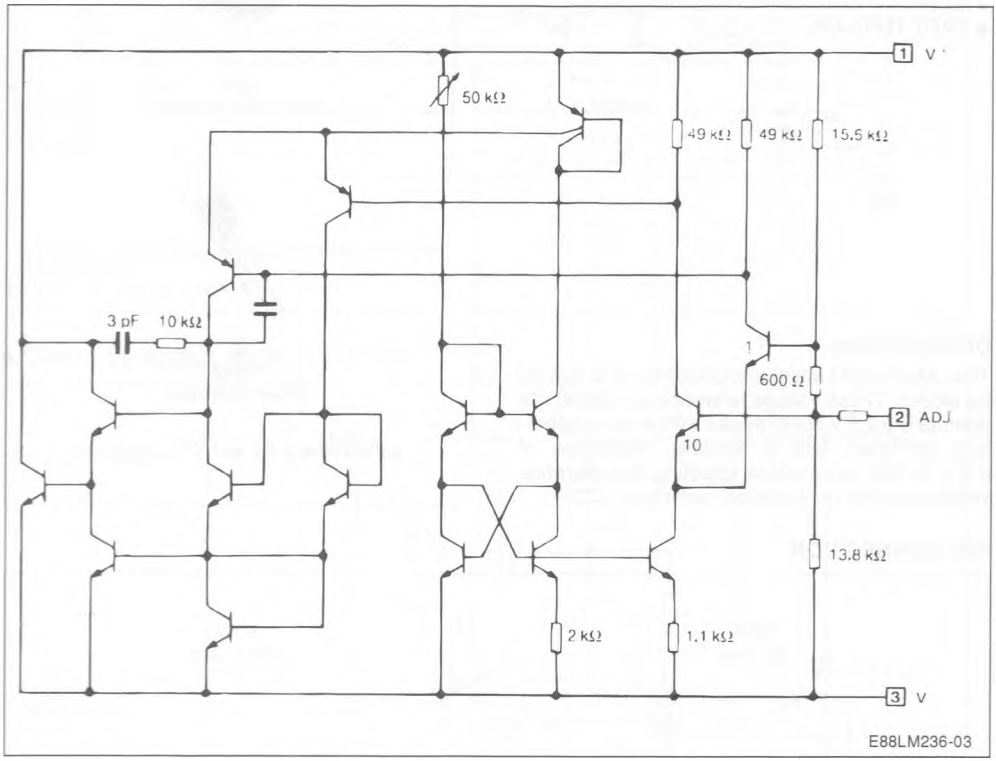


E88LM236-02

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value		Unit
		LM236, A	LM336, B	
	Current			mA
I_R	Reverse	15	15	
I_F	Foward	10	10	
T_{oper}	Operating Free-air Temperature Range	– 25 to + 85	0 to + 70	°C
T_{stg}	Storage Temperature Range	– 60 to + 150	– 60 to + 150	°C

SCHEMATIC DIAGRAM

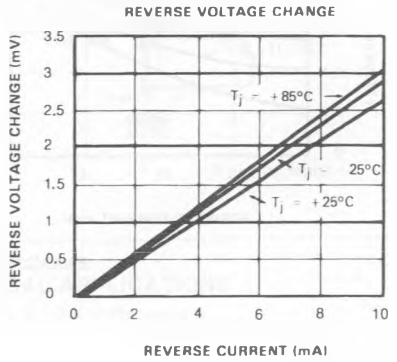


ELECTRICAL CHARACTERISTICS

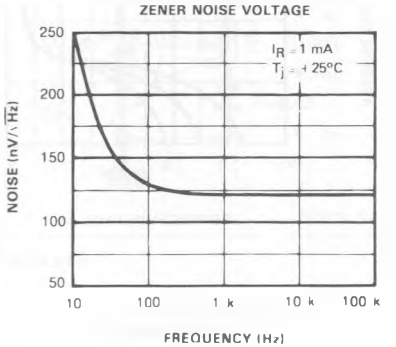
LM236, A : $-25\,°C \le T_{amb} \le +85\,°C$
LM336, B : $0\,°C \le T_{amb} \le +70\,°C$
(unless otherwise specified)

Symbol	Parameter	LM236, A			LM236, B			Unit
		Min.	Typ.	Max.	Min.	Typ.	Max.	
V_R	Reserve Breakdown Voltage							V
	$T_{amb} = +25\,°C$ LM236, LM336	2.44	2.49	2.54	2.39	2.49	2.59	
	$I_R = 1$ mA LM236A, LM336B	2.465	2.49	2.515	2.44	2.49	2.54	
ΔV_R	Reserve breakdown change with current							mV
	(400 µA ≤ I_R ≤ 10 mA)							
	$T_{amb} = +25\,°C$		2.6	6		2.6	10	
	$T_{min} \le T_{amb} \le T_{max}$		3	10		3	12	
Z_D	Reserve Dynamic Impedance ($I_R = 1$ mA)							Ω
	$T_{amb} = +25\,°C$		0.2	0.6		0.2	1	
	$T_{min} \le T_{amb} \le T_{max}$		0.4	1		0.4	1.4	
K_{VT}	Temperature Stability ($V_R = 2.49$ V, $I_R = 1$ mA)		3.5	9		1.8	6	mV
K_{VH}	Long Term Stability ($T_{amb} = +25\,°C \pm 0.1\,°C$, $I_R = 1$ mA)		20			20		ppm

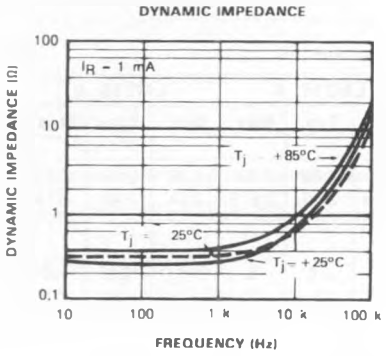
Note : 1. The maximum junction temperature of the LM236 is + 125 °C and the LM336 is + 100 °C. For elevated junction temperature, devices should be derated based on a thermal resistance of 180 °C/W junction to ambient with 10 mm leads from a PC board or 160 °C/W junction to ambient with 3 mm lead length to a PC board.



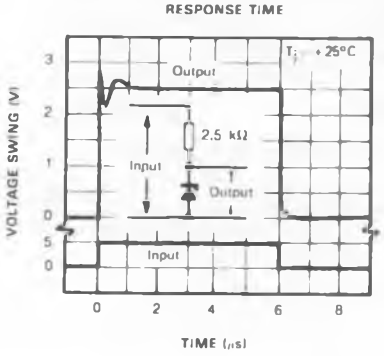
E88LM236-04



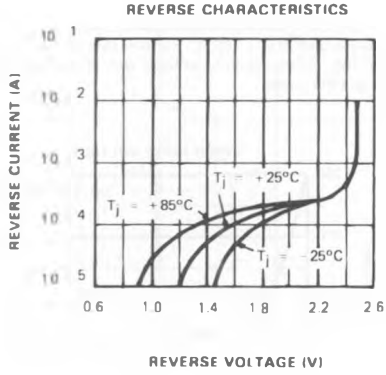
E88LM236-05



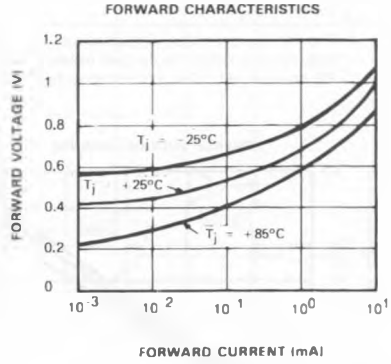
E88LM236-06



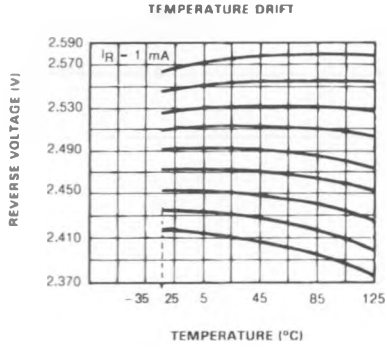
E88LM236-07



E88LM236-08



E88LM236-09



E88LM236-10

APPLICATIONS HINTS

The LM236, 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 ajusted so as to optimize the performance of the circuit.

Figure 1 represents a LM336 with a 10 kΩ potentiometer to adjust the reverse breakdown voltage. By adding resistor R1, the breakdown voltage 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 fig. 2. When the circuit is adjusted to 2.49 V 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 (2-20 kΩ).

Figure 1 : The LM236 with Pot for Adjustment of Breakdown Voltage.

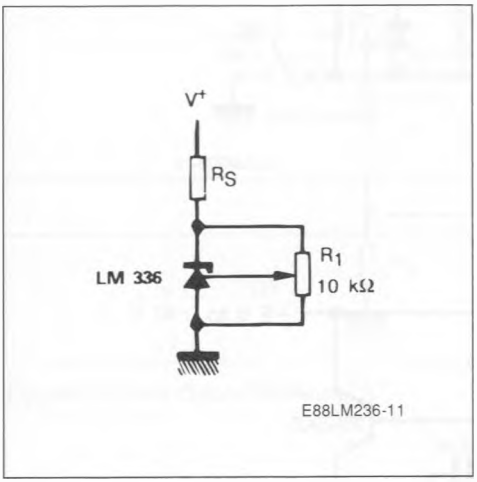
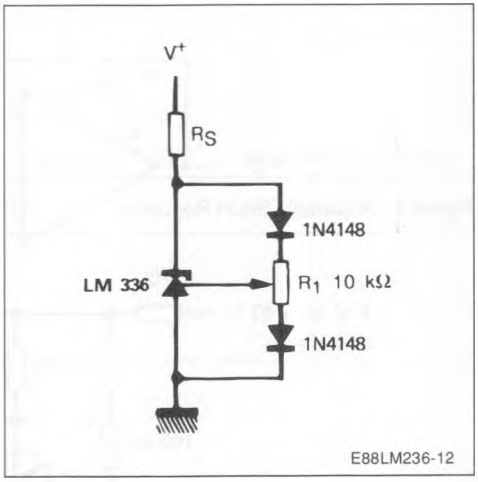


Figure 2 : Temperature Coefficient Adjustment.



TYPICAL APPLICATIONS

Figure 3 : 2.5 V Reference.

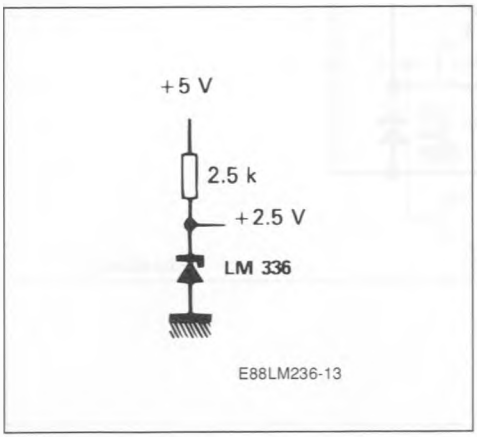


Figure 4 : Wide Input Range Reference.

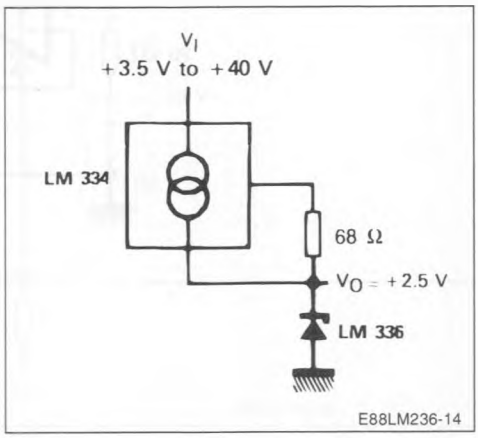


Figure 5 : Precision Power Regulator with Low Temperature Coefficient.

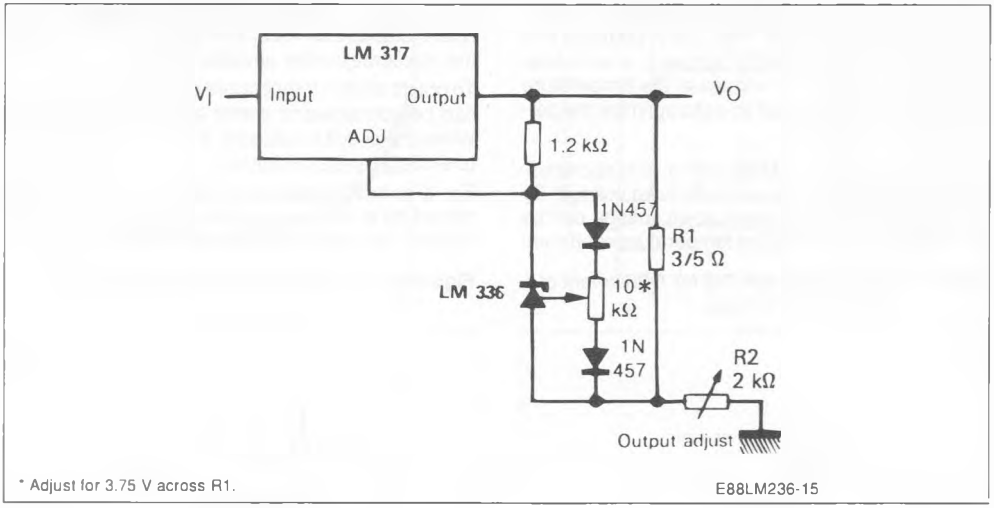


Figure 6 : Adjustable Shunt Regulator.

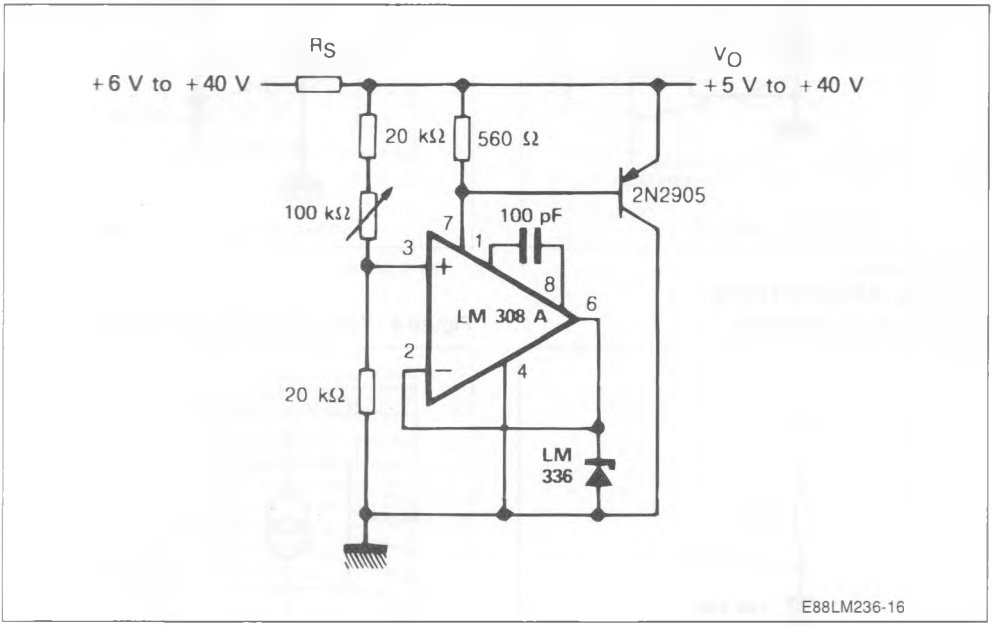


Figure 7 : Linear Ohmmeter.

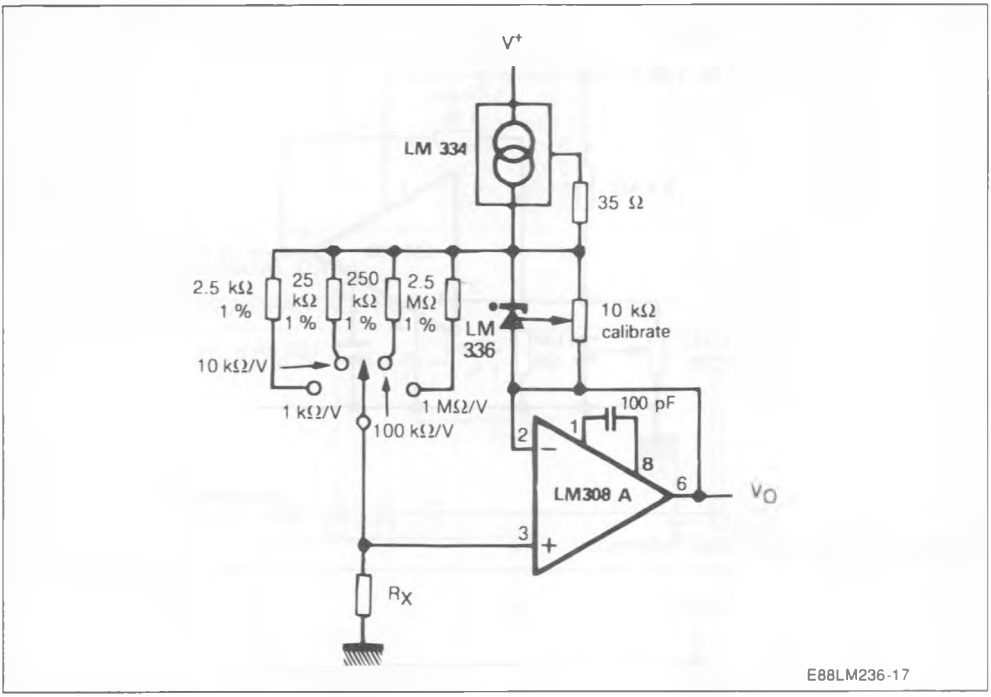


Figure 8 : Bipolar Output Reference.

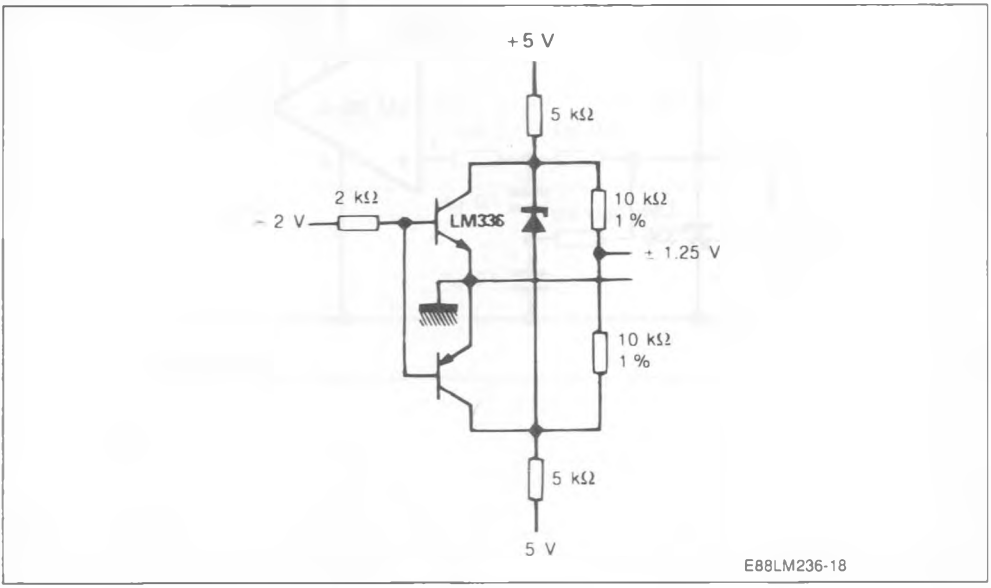


Figure 9 : 5 V Buffered Reference.

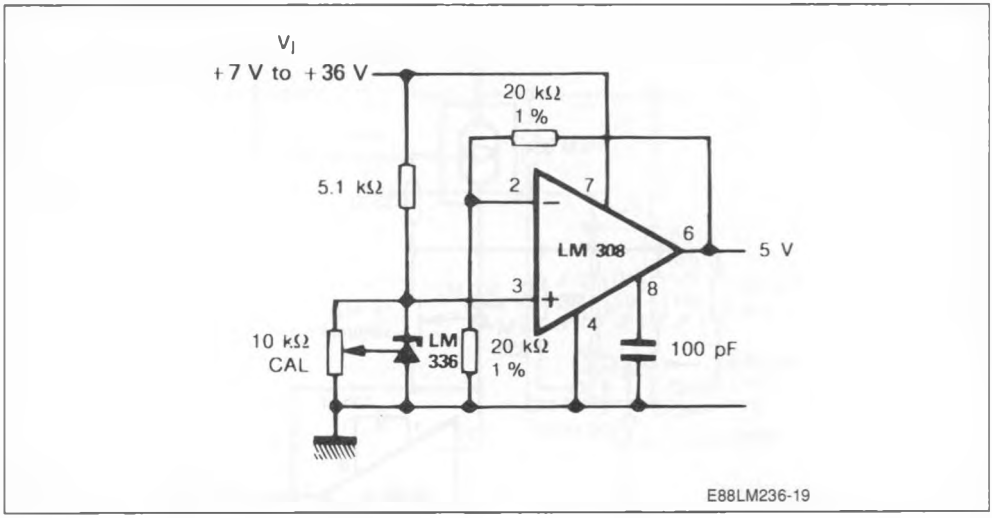
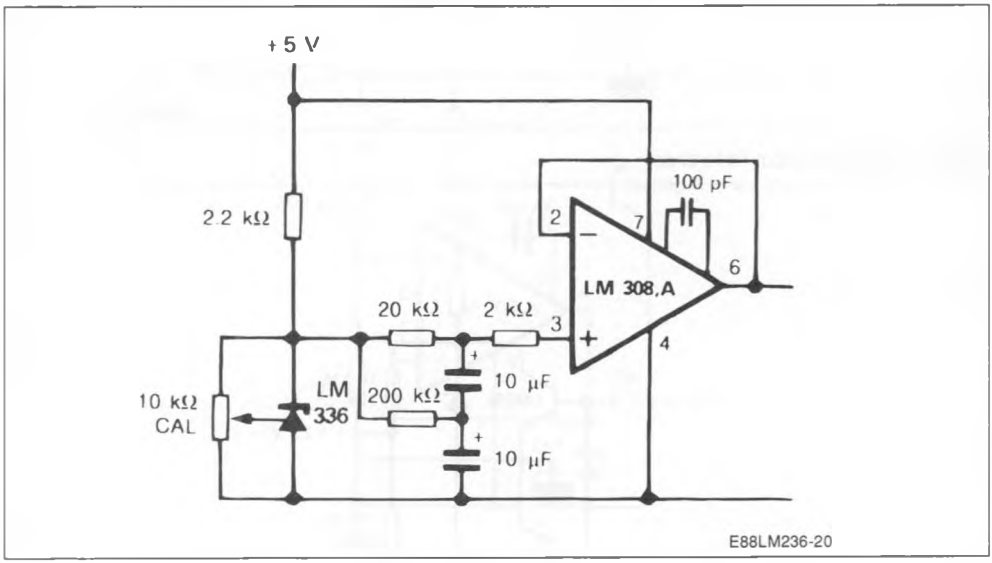


Figure 10 : Low Noise Buffered Reference.

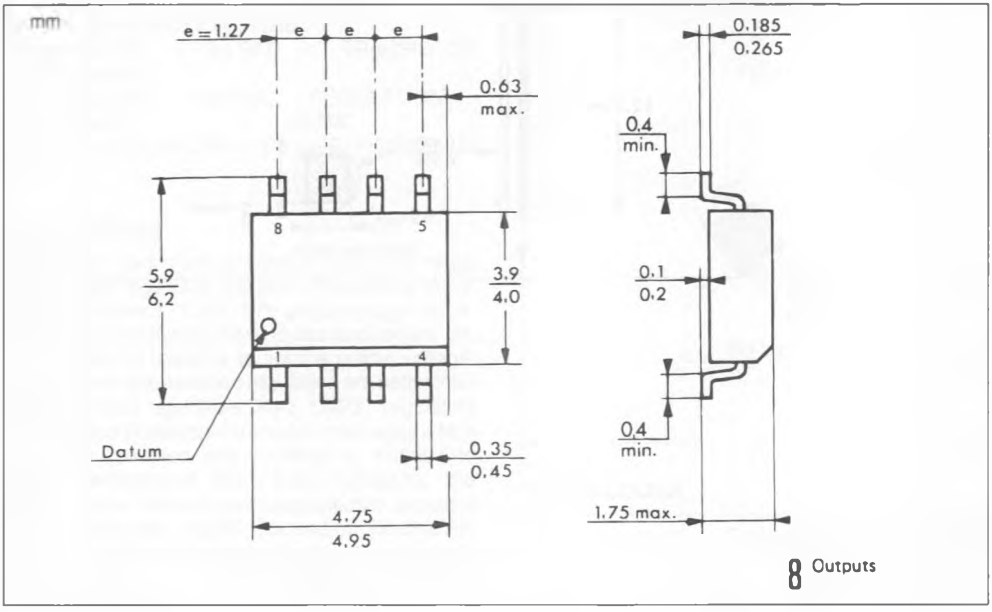


ORDER CODES

Part Number	Temperature Range	Package
LM236Z	– 25 °C to + 85 °C	To 92
LM236AZ	– 25 °C to + 85 °C	To 92
LM236D	– 25 °C to + 85 °C	So 8
LM236AD	– 25 °C to + 85 °C	So 8
LM336Z	0 °C to + 70 °C	To 92
LM336BZ	0 °C to + 70 °C	To 92
LM336D	0 °C to + 70 °C	So 8
LM336BD	0 °C to + 70 °C	So 8

PACKAGE MECHANICAL DATA

8 PINS – PLASTIC MICROPACKAGE SO



3 PINS – PLASTIC PACKAGE TO92