

***THIS DOCUMENT IS FOR MAINTENANCE
PURPOSES ONLY AND IS NOT
RECOMMENDED FOR NEW DESIGNS***

REF50Z/REF50D

5V MICROPOWER PRECISION REFERENCE

The REF50Z and REF50D are integrated circuits using the bandgap principle to provide a precise stable reference voltage of 5V. There are two package options available: REF50Z in a plastic 3-pin TO-92 and REF50D in a miniature surface mount package (MP8).

These references feature a recommended operating current of 60µA to 5mA which make them ideal for all low power and battery applications.

FEATURES

- Low Knee Current - typically 40 microamps
- Ideal for Battery Operation - 300 microwatts
- Internally Shaped
- REF50Z - 3 lead TO-92 Plastic Package
- REF50D - Miniature Plastic Surface Mount Package (MP8)
- Tight Initial V_{REF} Tolerance $\pm 1.5\%$
- Low Temperature Coefficient
- Low Slope Resistance
- Operation over Industrial Temperature Range

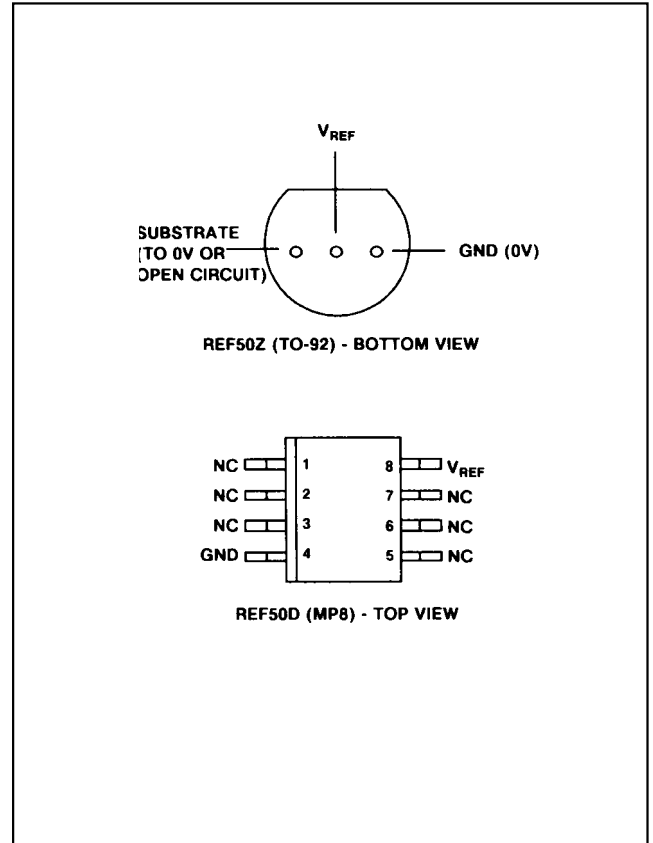


Fig.1 Pin connection

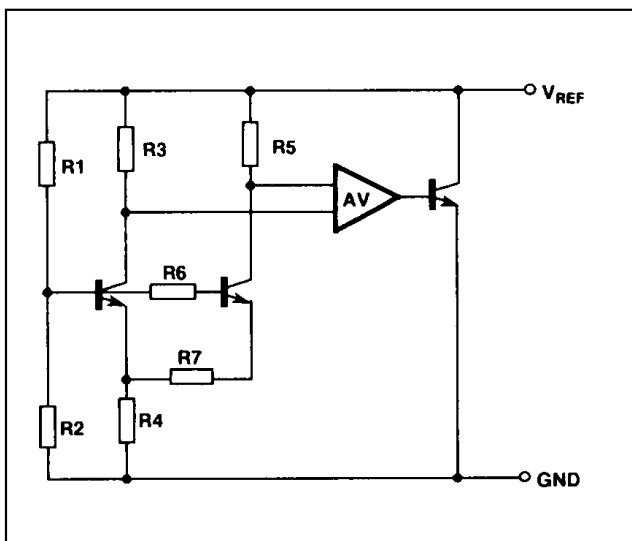


Fig.2 Internal connections

ORDERING INFORMATION

Device Type	Operating Temperature	Package
REF50Z	-40°C to +85°C	TO-92
REF50D	-40°C to +85°C	MP8

ABSOLUTE MAXIMUM RATINGS

Reference current	5mA
Operating temperature range:	
REF50Z	-40 to +85°C
REF50D	-40 to +85°C
Storage temperature	-55 to +125°C
Storage temperature for a max. time of 10ns:	
within 1.59mm of seating plane	300°C
within 0.80mm of seating plane	265°C

REF50Z/50D

ELECTRICAL CHARACTERISTICS

Test conditions (unless otherwise stated)

$$T_{amb} = 25^{\circ}\text{C}, I_{REF} = 150\mu\text{A}$$

Characteristics	Symbol	Value			Units	Conditions
		Min.	Typ.	Max.		
Output voltage	V_{REF}	4.925	5.00	5.075	V	
Slope resistance (Note 1)	R_{REF}		3.0	3.5	Ω	REF 50Z } REF50D } $I_{REF} = 150\mu\text{A}$ to 5mA
			3.0	3.5	Ω	
Turn-on (knee) current	I_{ON}		40		μA	
Recommended operating current range	I_{REF}	0.06		5.0	μA	
Temperature coefficient (Note 2)	TC V_{REF}		35	110	ppm/ $^{\circ}\text{C}$	REF25Z } REF25D } Note 2
			35	80	ppm/ $^{\circ}\text{C}$	
RMS noise voltage	E_N		13		μV	1kHz tp 10kHz
Turn-on time	T_{ON}		80		μs	
Turn-off time	T_{OFF}		7		μs	
Turn-on time	T_{ON}		65		μs	} $I_{REF} = 500\mu\text{A}$
Turn-off time	T_{OFF}		2		μs	

NOTES

1. Slope resistance (R_{REF})

Slope resistance is defined as

$$R_{REF} = \frac{\text{Change in } V_{REF} \text{ over a specified current range}}{\text{The change in reference current}}$$

2. Reference voltage temperature coefficient (TC VREF)

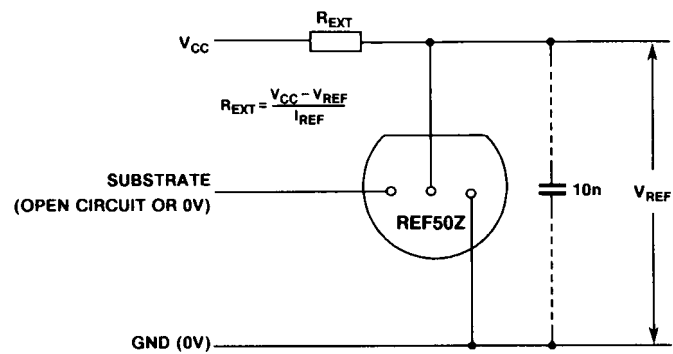
This is the normalised reference voltage change over temperature, divided by the change in temperature.

It is expressed in ppm/ $^{\circ}\text{C}$

$$TC V_{REF} = \frac{\Delta V_{REF} \times 10^6}{V_{REF} \times \Delta T} \text{ ppm}/^{\circ}\text{C}$$

ΔT = temperature change in $^{\circ}\text{C}$

ΔV_{REF} = change in reference voltage over temperature change ΔT



NOTE: In some instances, in order to achieve optimum operation, a 10nF capacitor should be connected between V_{REF} and $0V$ as shown.

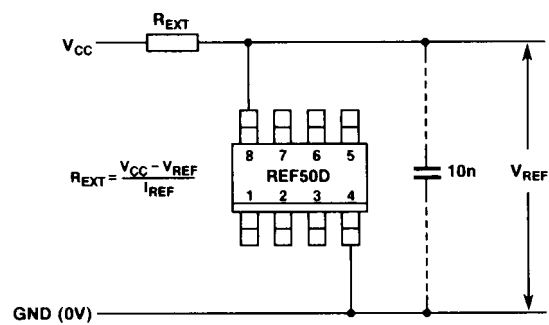


Fig.3 Connections diagram

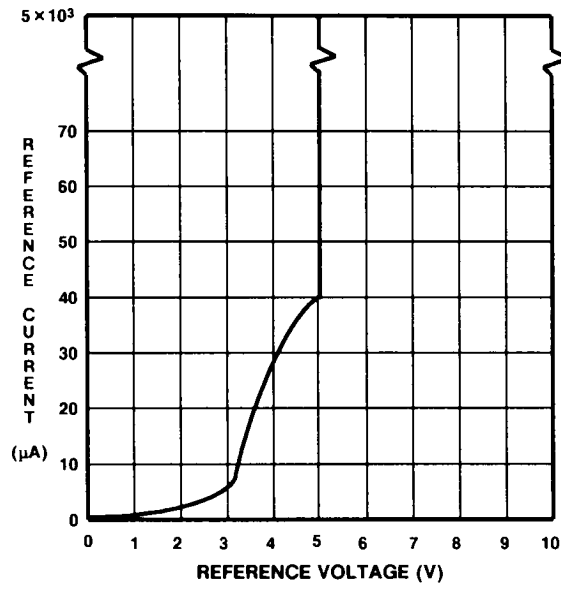


Fig.4 Typical reference characteristics

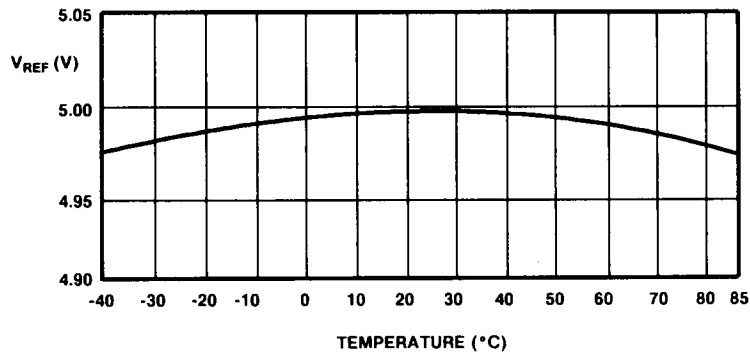


Fig.5 Typical temperature at $I_{REF} = 150\mu A$

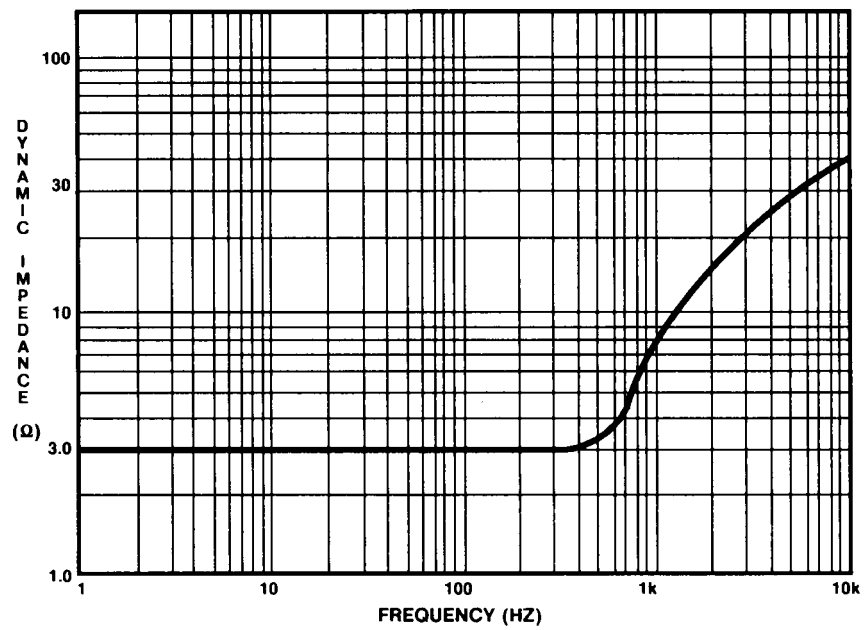


Fig.6 Typical dynamic impedance at $I_{REF} = 5mA$

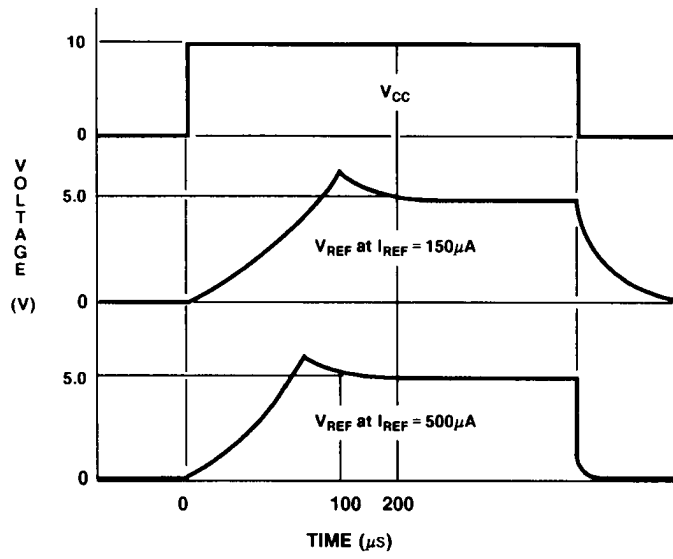


Fig.7 Typical response time (not to scale)

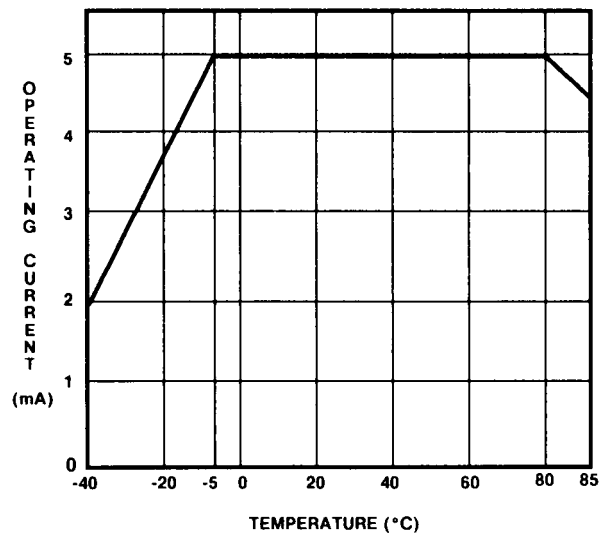
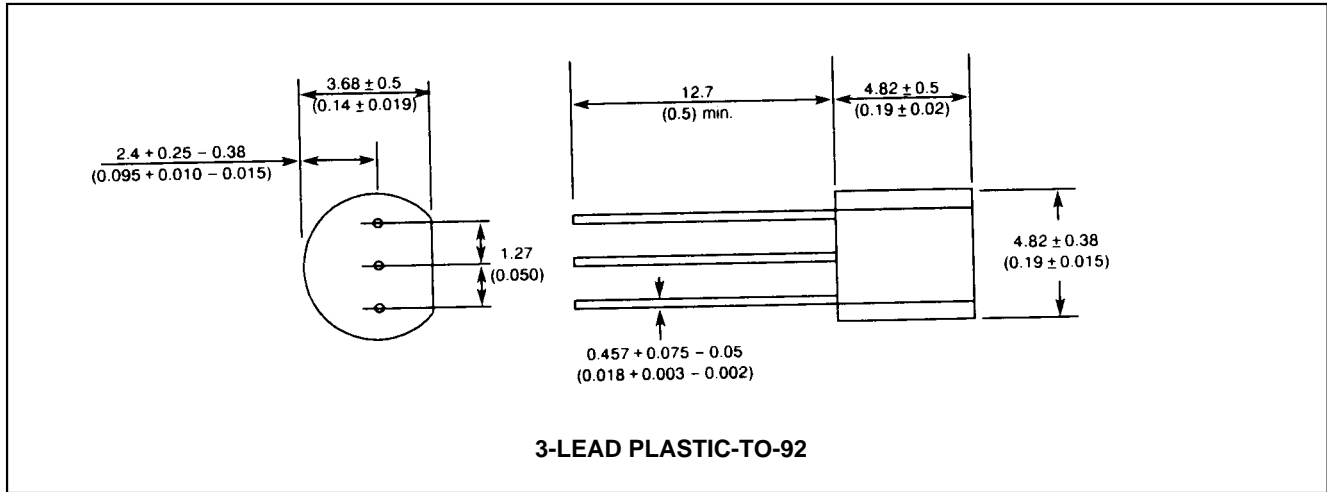
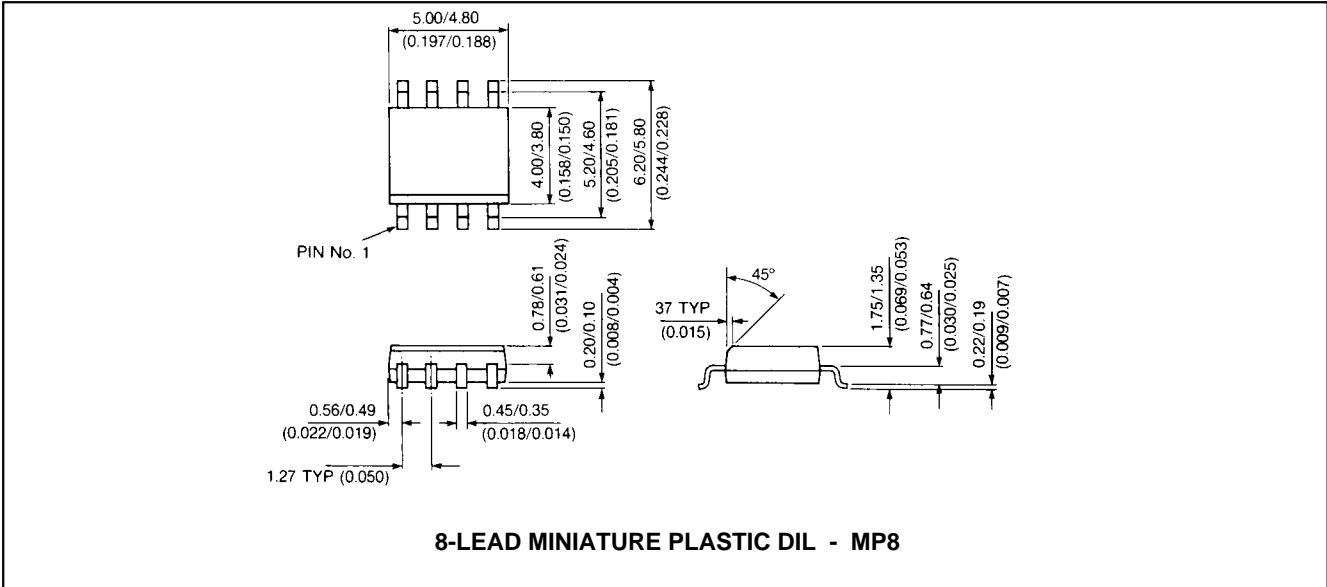


Fig.7 Typical response time (not to scale)

REF50Z/50D



HEADQUARTERS OPERATIONS
GEC PLESSEY SEMICONDUCTORS
 Cheney Manor, Swindon,
 Wiltshire SN2 2QW, United Kingdom.
 Tel: (0793) 518000
 Fax: (0793) 518411

GEC PLESSEY SEMICONDUCTORS
 Sequoia Research Park, 1500 Green Hills Road,
 Scotts Valley, California 95066,
 United States of America. Tel: (408) 438 2900
 Fax: (408) 438 5576

CUSTOMER SERVICE CENTRES

- **FRANCE & BENELUX** Les Ulis Cedex Tel: (1) 64 46 23 45 Tx: 602858F
 Fax : (1) 64 46 06 07
- **GERMANY** Munich Tel: (089) 3609 06-0 Tx: 523980 Fax : (089) 3609 06-55
- **ITALY** Milan Tel: (02) 66040867 Fax: (02) 66040993
- **JAPAN** Tokyo Tel: (03) 3296-0281 Fax: (03) 3296-0228
- **NORTH AMERICA Integrated Circuits and Microwave Products** Scotts Valley, USA
 Tel (408) 438 2900 Fax: (408) 438 7023.
Hybrid Products, Farmingdale, USA Tel (516) 293 8686
 Fax: (516) 293 0061.
- **SOUTH EAST ASIA** Singapore Tel: (65) 3827708 Fax: (65) 3828872
- **SWEDEN** Stockholm, Tel: 46 8 702 97 70 Fax: 46 8 640 47 36
- **UNITED KINGDOM & SCANDINAVIA**
 Swindon Tel: (0793) 518510 Tx: 444410 Fax : (0793) 518582

These are supported by Agents and Distributors in major countries world-wide.

© GEC Plessey Semiconductors 1993 Publication No. DS2427 Issue No. 1.0 June 1993

This publication is issued to provide information only which (unless agreed by the Company in writing) may not be used, applied or reproduced for any purpose nor form part of any order or contract nor to be regarded as a representation relating to the products or services concerned. No warranty or guarantee express or implied is made regarding the capability, performance or suitability of any product or service. The Company reserves the right to alter without prior knowledge the specification, design or price of any product or service. Information concerning possible methods of use is provided as a guide only and does not constitute any guarantee that such methods of use will be satisfactory in a specific piece of equipment. It is the user's responsibility to fully determine the performance and suitability of any equipment using such information and to ensure that any publication or data used is up to date and has not been superseded. These products are not suitable for use in any medical products whose failure to perform may result in significant injury or death to the user. All products and materials are sold and services provided subject to the Company's conditions of sale, which are available on request.