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

REF12Z/REF12D

1.26V MICROPOWER PRECISION REFERENCE

The REF12Z and REF12D are integrated circuits using the bandgap principle to provide a precise stable reference voltage of 1.26V. There are two package options available: REF12Z in a plastic 3-pin TO-92 and REF12D in a miniature surface mount package (MP8).

These references feature a recommended operating current of 90μA to 2.5mA which make them ideal for all low power and battery applications.

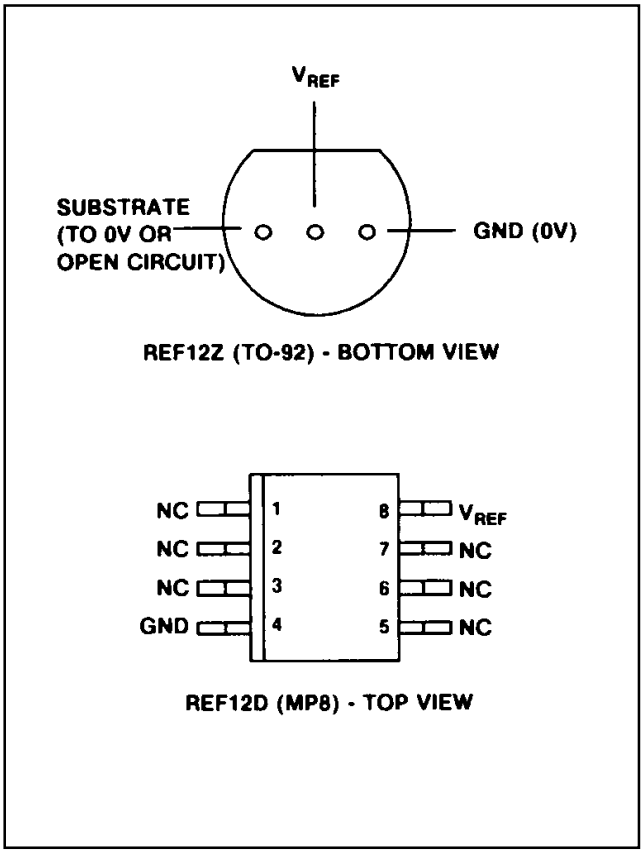


Fig.1 Pin connection

FEATURES

- Low Knee Current - typically 80 microamps
- Ideal for Battery Operation - 113 microwatts
- REF12Z - 3 lead TO-92 Plastic Package
- REF12D - Miniature Plastic Surface Mount Package (MP8)
- Tight Initial V_{REF} Tolerance ±1%
- Low Temperature Coefficient
- Low Slope Resistance
- Low Cost
- Operation over Industrial Temperature Range

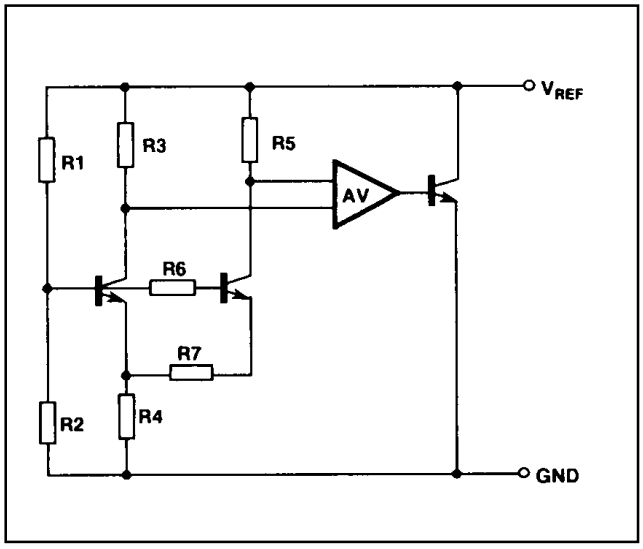


Fig.2 Internal connections

ORDERING INFORMATION

Device Type	Operating Temperature	Package
REF12Z	-40°C to +85°C	TO-92
REF12D	-40°C to +85°C	MP8

ABSOLUTE MAXIMUM RATINGS

Reference current	2.5mA
Operating temperature range:	
REF12Z	-40 to +85°C
REF12D	-40 to +85°C
Storage temperature	-55 to +125°C
Storage temperature for a max. time of 10ns:	
within 1.59mm of the seating plane	300°C
within 0.80mm of the seating plane	265°C

ELECTRICAL CHARACTERISTICS

These characteristics are guaranteed over the following conditions (unless otherwise stated)

T_{amb} = 25°C, C_S = 470nF (see Fig.3)

Characteristic	Symbol	Value			Units	Conditions
		Min.	Typ.	Max.		
Output voltage	V_{REF}	1.247	1.26	1.273	V	
Slope resistance (Note 1)	R_{REF}		2.5	4.0	Ω	I_{REF} = 150µA to 2.5mA Note 1
Turn-on (knee) current	I_{ON}		80	90	µA	
Recommended operating current range	I_{REF}	0.09		2.5	mA	
Temperature coefficient (Note 2)	TC V_{REF}		40	80	ppm/°C	REF12Z } Note 2
			30	80	ppm/°C	REF12D } Note 2
RMS noise voltage	E_N		1.0		µV/√Hz	0.1Hz to 25kHz
Turn-on time	T_{ON}		0.4		ms	} I_{REF} = 1.5mA
Turn-off time	T_{OFF}		15		ms	} I_{REF} = 1.5mA
Turn-on time	T_{ON}		5		ms	} I_{REF} = 1.5mA
Turn-off time	T_{OFF}		110		ms	} I_{REF} = 1.5mA

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 V_{REF})

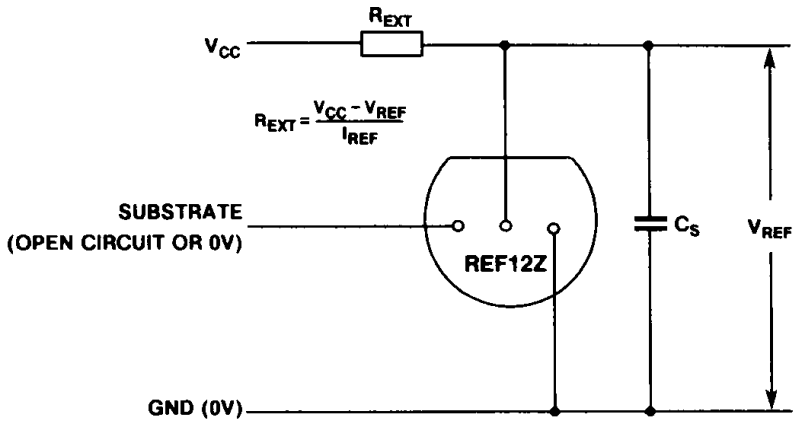
   This is the normalised reference voltage change over temperature, divided by the change in temperature.

   It is expressed in ppm/°C

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

   ΔT = temperature change in °C

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



NOTE: In order to achieve optimum operation, a stabilising capacitor ($C_S \geq 470nF$) should be connected between V_{REF} and 0V as shown.

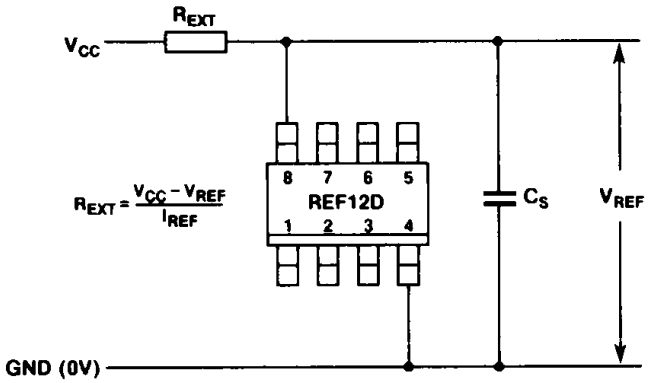


Fig.3 Connection diagram

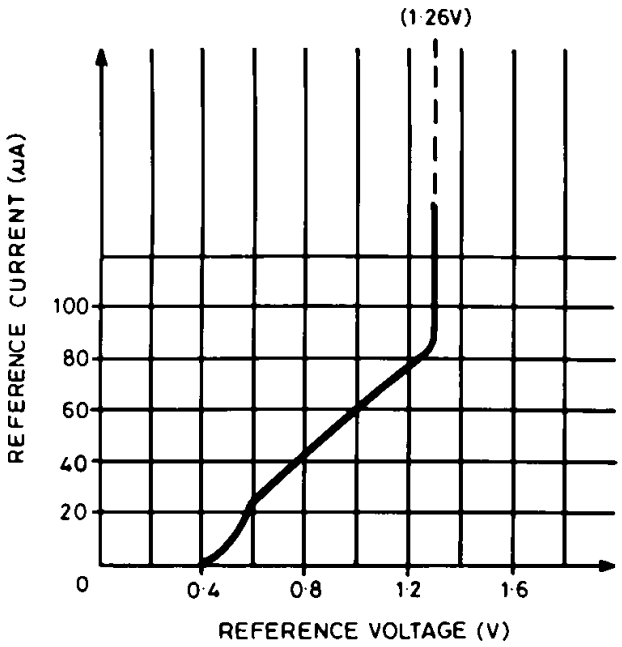


Fig.4 Typical reference characterics

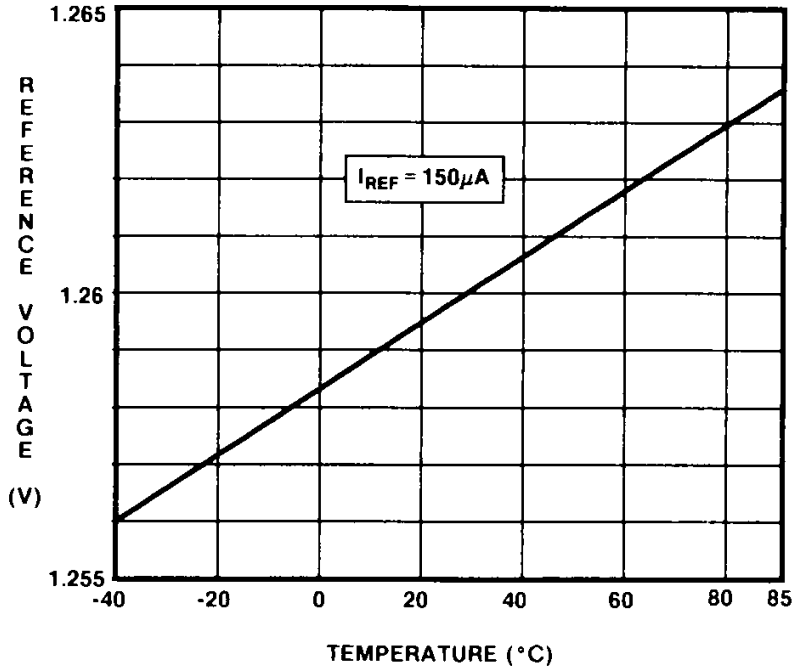


Fig.5 Typical temperature characteristic

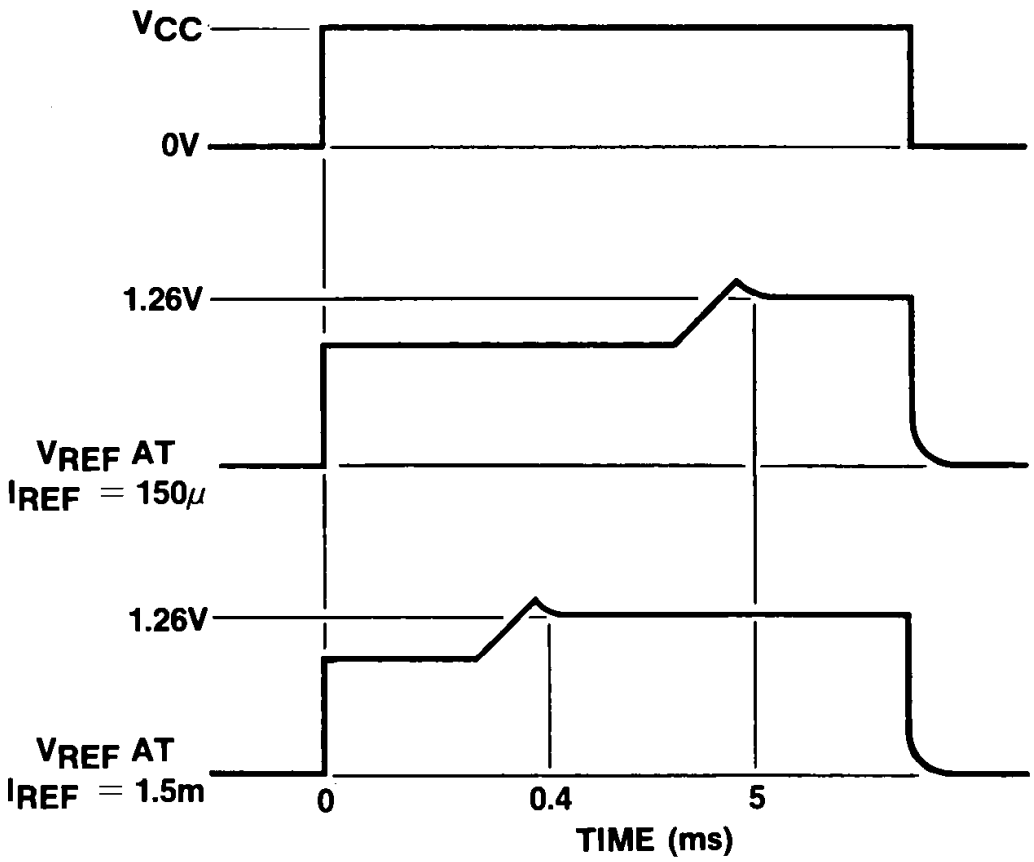


Fig.6 Typical response time

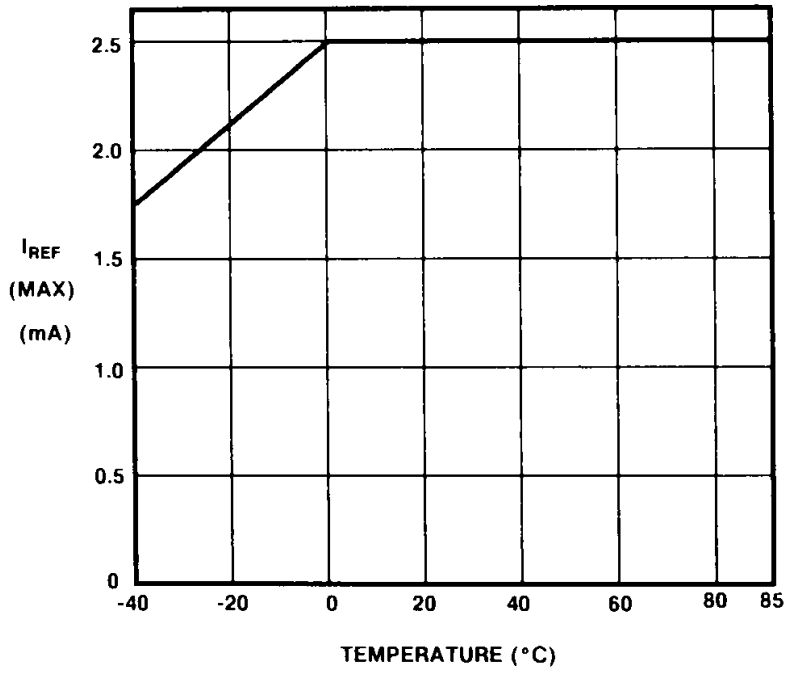


Fig.7 Typical derating curve

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