PLESSEY Semiconductors

T-58-07

REF50/REF50Z

5V MICROPOWER PRECISION REFERENCES

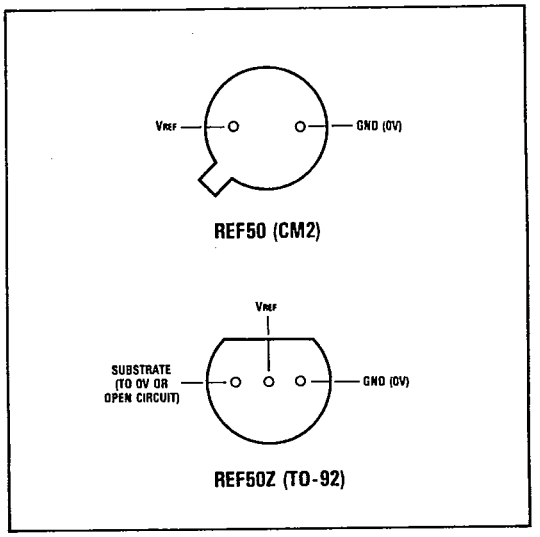
The REF50 and REF50Z are micropower integrated circuits using the bandgap principle to provide a precise reference voltage of 5V. There are two package options available: REF50 in 2-pin TO-18 metal can (CM2) and REF50Z in plastic 3-pin TO-92. These references feature a recommended operating current range of 60μA to 5mA which make them ideal for all low power and battery applications.

FEATURES

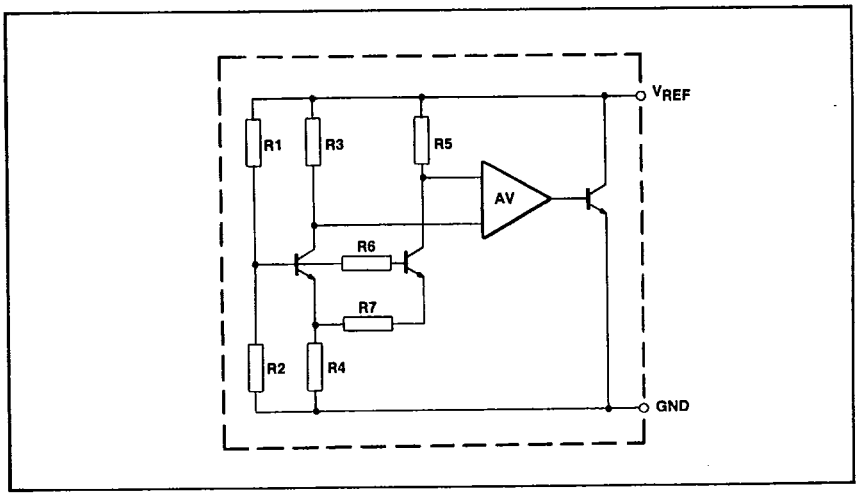
- Low Knee Current — Typically 50 microamps
- Ideal for Battery Operation
- REF50Z — 3 Lead TO-92 Plastic Package
- REF50 — 2 Lead TO-18 (CM2) Metal Can Package
- Tight Initial V_{REF} Tolerance ±1%
- Low Temperature Coefficient
- Low Cost
- Operation over Full Military (Metal Can) and Industrial (Plastic) Temperature Ranges

ORDERING INFORMATION

Device type	Operating temperature	Package
REF50	-55°C to +125°C	CM2
REF50Z	-40°C to +85°C	TO-92



Pin connections - bottom view



Internal connections REF50/50Z

12E D 7220513 0008513 3
PLESSEY SEMICONDUCTORS
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ABSOLUTE MAXIMUM RATINGS

Reference current 5mA
Operating temperature range
REF50 . . . . . −55 to +125°C
REF50Z . . . . . −40 to +85°C
Storage temperature . . . . . −55 to +125°C
Soldering temperature for a maximum time of 10s
within 1.59mm of the seating plane . . . . . 300°C
within 0.80mm of the seating plane . . . . . 265°C

ELECTRICAL CHARACTERISTICS (at T_{amb} = 25°C unless otherwise stated).

Parameter	Symbol	Min.	Typ.	Max.	Units	Comments
Output voltage	V_{REF}	4.95	5.00	5.05	V	I_{REF} = 150μA
Slope resistance	R_{REF}	–	3.0	3.5	Ω	I_{REF} = 150μA to 5mA note (a)
Turn-on (knee) current	I_{ON}	–	50	60	μA	
Recommended operating current range	I_{REF}	0.06	–	5.0	mA	−5 to +80°C
Temperature coefficient	TC V_{REF}	–	30	60	ppm/°C	REF50 } I_{REF} = 150μA
		–	40	70		REF50Z }
RMS noise voltage 1Hz to 10kHz	E_N	–	35	–	μV	Peak to peak
Turn-on time	T_{on}	–	200	–	μs	I_{REF} = 150μA
Turn-off time	T_{off}	–	10	–		
Turn-on time	T_{on}	–	100	–	μs	I_{REF} = 500μA
Turn-off time	T_{off}	–	2	–		

Note It should be noted that in some instances to achieve optimum operation a 10nF capacitor should be connected between V_{REF} and G_{ND}.

NOTES

(a) Slope resistance (R_{REF})

Slope resistance is defined as

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

(b) 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 as follows:

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

ΔT = temperature change in °C.

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

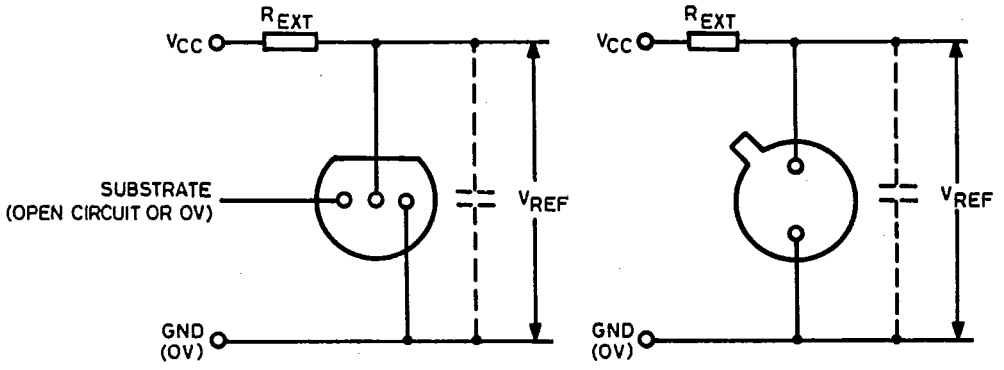
(c) Line regulation (ΔV_{REF} L)

The ratio of the change in reference voltage to the change in input voltage.

$$\Delta V_{REF}\ L = \left|\frac{R_{REF} \times 100}{V_{REF} \times R_s}\right| \quad \%/V$$

R_S = Source resistance.

Connection diagram



$R_{EXT} = (V_{CC} - V_{REF})/I_{REF}$

REF50Z **REF50**

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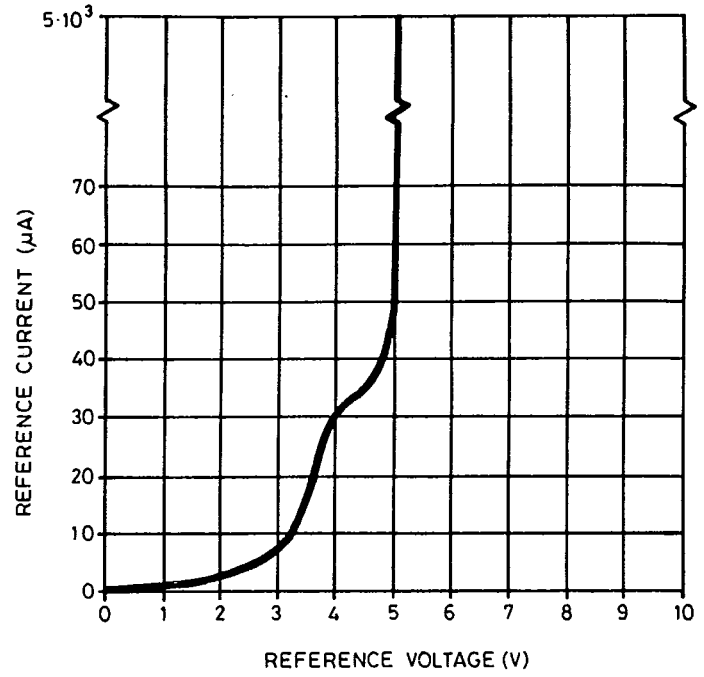
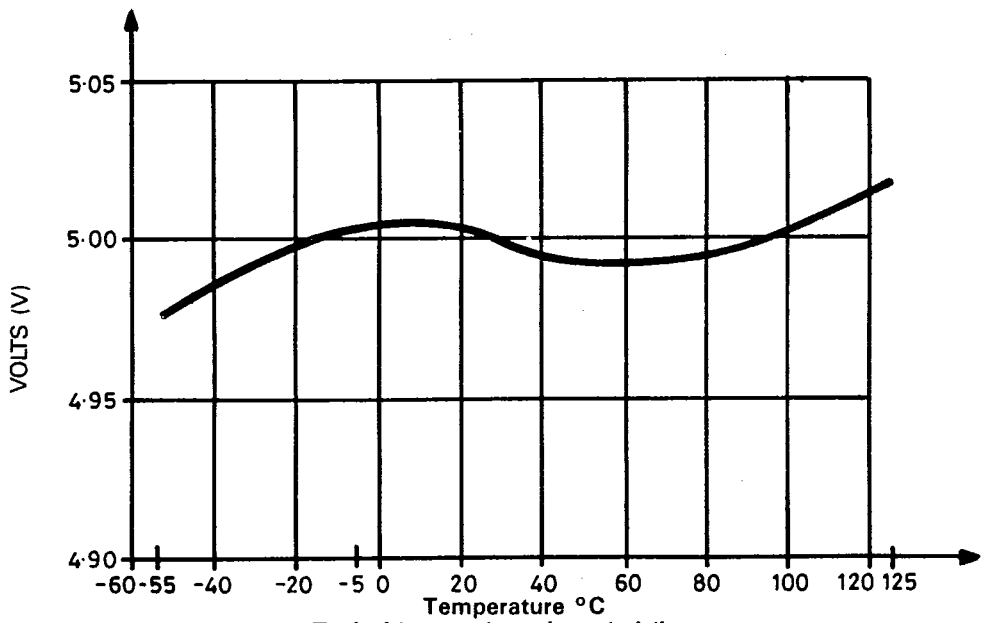
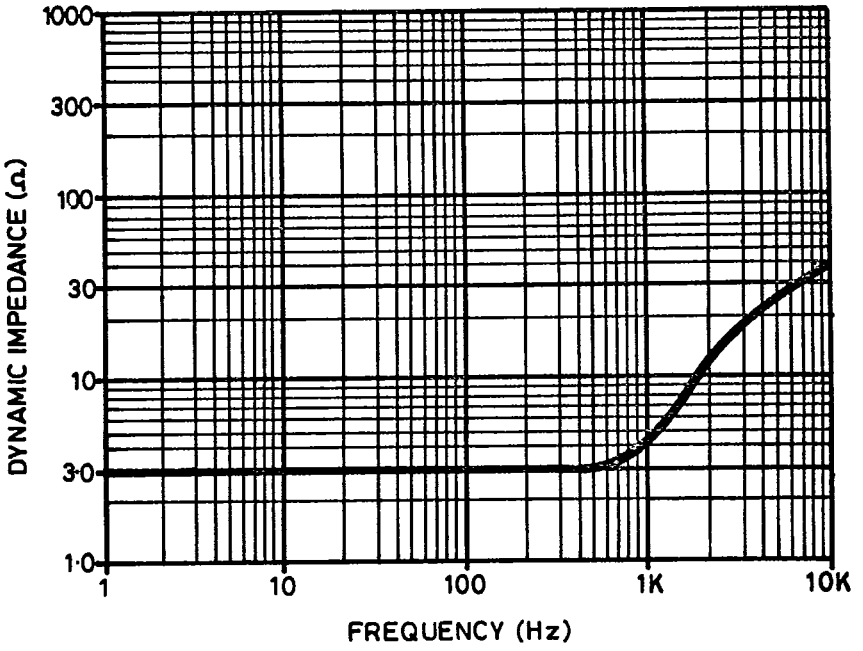


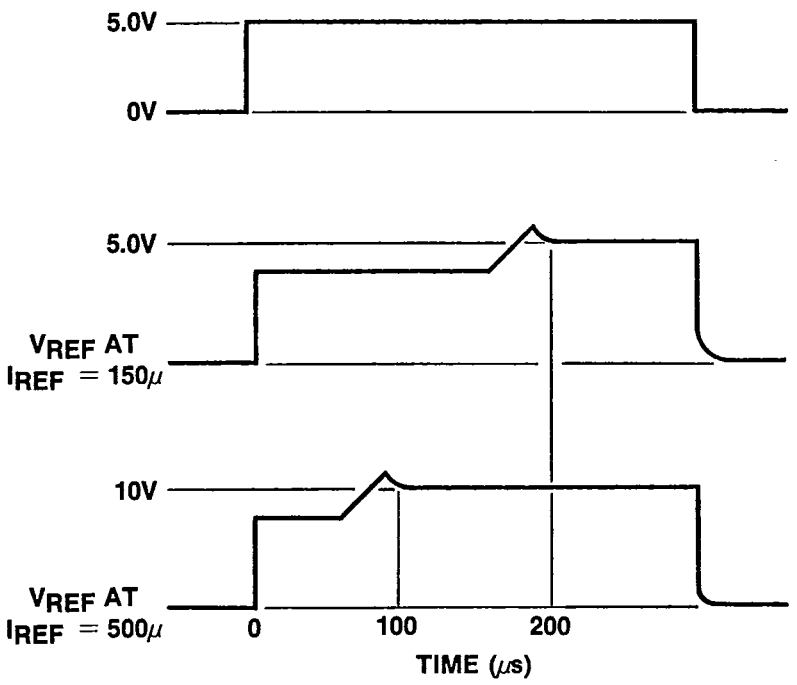
Typical reference characteristic



Typical temperature characteristic



Typical dynamic impedance



Typical response time

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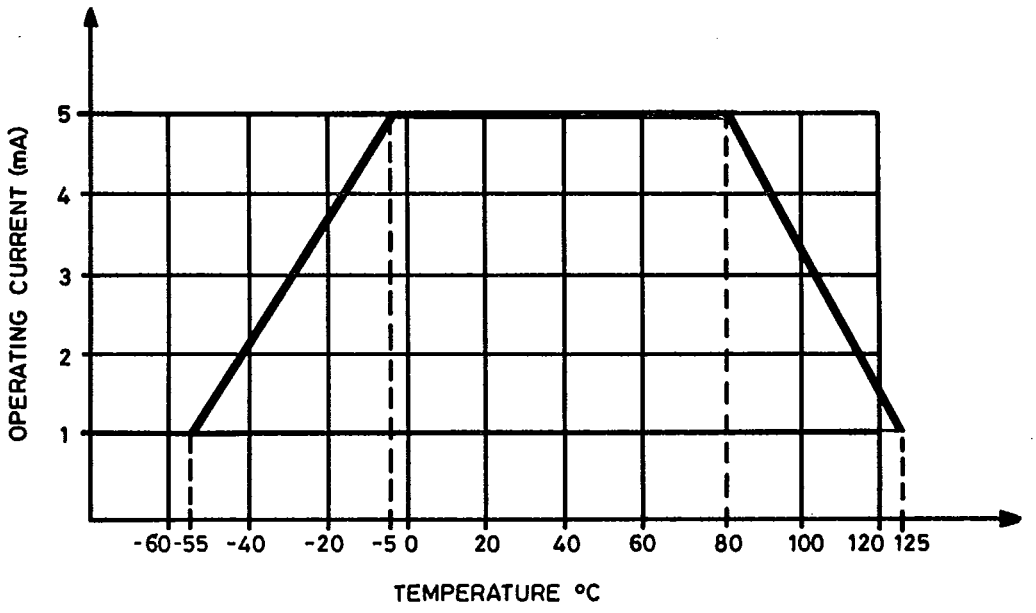

Typical derating curve