



T-58-07

ZNREF040

4V LOW POWER PRECISION REFERENCE SOURCE

The ZNREF040 is a monolithic integrated circuit providing a precise stable reference voltage of 4.01V at 500µA.

The circuit features a knee current of 150µA and operation over a wide range of temperatures and currents.

The ZNREF040 is available in a 3-pin metal can package with pin 2 offering a trim facility whereby the output voltage can be adjusted as shown in Fig.1. This facility is used when compensating for system errors or setting the reference output to a particular value. When the trim facility is not used, pin 2 should be left open circuit.

FEATURES

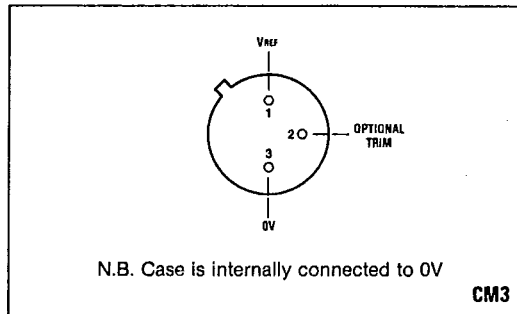
- Trimmable Output
- Excellent Temperature Stability
- Low Output Noise Figure
- Available in Two Temperature Ranges
- 1 and 2% Initial Voltage Tolerance Versions Available
- No External Stabilising Capacitor required in most cases
- Low Slope Resistance

ABSOLUTE MAXIMUM RATINGS

Reference current	75mA*
Power dissipation	300mW
Operating temperature range	See ordering information
Storage temperature range	-55°C to +175°C

Soldering temperature for a maximum time of 10s	
Within 1/16 in of the seating plane	300°C
Within 1/32 in of the seating plane	265°C

* Above 25°C this figure should be linearly derated to 20mA at +125°C.



Pin connections (bottom view)

ORDERING INFORMATION

Device	Tol. %	TC (ppm/°C)	Temperature range
ZNREF040 A1	1	50	-55°C to +125°C
ZNREF040 C1	1	50	0°C to +70°C
ZNREF040 C2	2		

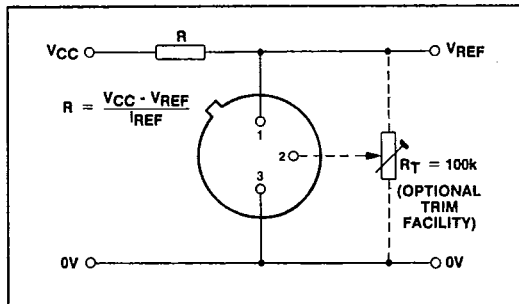


Fig.1 ZNREF040 application circuit

TEMPERATURE DEPENDENT ELECTRICAL CHARACTERISTICS

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Parameter	Symbol	Initial voltage tolerance %	Grade A - 55 to 125°C		Grade C 0 to 70°C		Units
			Typ.	Max.	Typ.	Max.	
Output voltage change over relevant temperature range (See note (a))	ΔV_{REF}	1 & 2	25.6	36	4.2	14	mV
Output voltage temperature coefficient (See note (b))	TCV_{REF}	1 & 2	35	50	15	50	ppm/°C

ELECTRICAL CHARACTERISTICS (at $T_{amb} = 25^\circ C$ and Pin 2 o/c unless otherwise specified).

Parameter	Symbol	Min.	Typ.	Max.	Units	Comments
Output voltage 1% tolerance (A1 C1) 2% tolerance (C2)	V_{REF}	3.97 3.93	4.01 4.01	4.05 4.09	V	$I_{REF} = 500\mu A$
Output voltage adjustment range	ΔV_{TRIM}	-	± 5	-	%	$R_T = 100k\Omega$
Change in TCV_{REF} with output adjustment	$TC\Delta V_{TRIM}$	-	0.8	-	ppm/°C/%	
Operating current range	I_{REF}	0.15	-	75	mA	See note (c)
Turn-on time Turn-off time	t_{on} t_{off}	-	40 0.3	-	μs	$R_L = 1k\Omega$
Output voltage noise (over the range 0.1 to 10Hz)	e_{np-p}	-	50	-	μV	Peak to peak measurement
Slope resistance	R_{REF}	-	2	3	Ω	$I_{REF} 0.5mA$ to 5mA, See note (d)

NOTES

(a) **Output change with temperature (ΔV_{REF})**
The absolute maximum difference between the maximum output voltage and the minimum output voltage over the specified temperature range

$$\Delta V_{REF} = V_{max} - V_{min}$$

(b) **Output temperature coefficient (TCV_{REF})**
The ratio of the output change with temperature to the specified temperature range expressed in ppm/°C.

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

ΔT = Full temperature change.

(c) **Operating current (I_{REF})**
Maximum operating current must be derated as indicated in maximum ratings.

(d) **Slope resistance (R_{REF})**
The slope resistance is defined as $R_{REF} =$ change in V_{REF} overspecified current range
 $\Delta I_{REF} = 5 - 0.5 = 4.5mA$ (typically)

(e) **Line regulation**
The ratio of change in output voltage to the change in input voltage producing it.

$$\frac{R_{REF} \times 100}{V_{REF} \times R_s} \% / V \quad R_s = \text{Source resistance}$$

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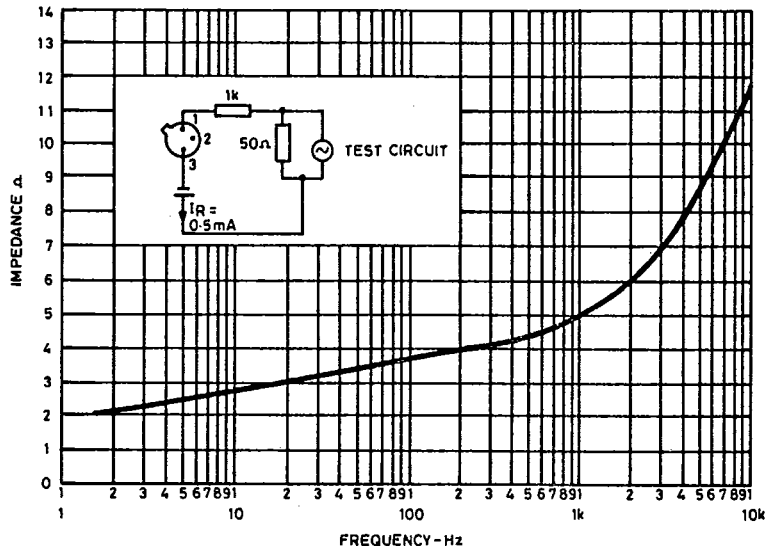


Fig.2 Dynamic impedance (typical)

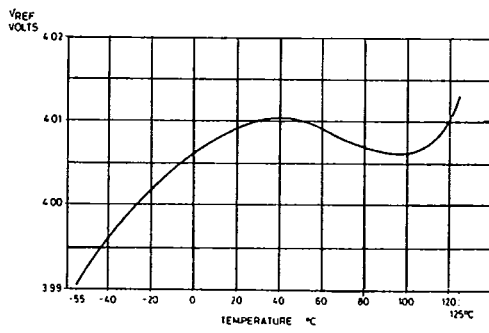


Fig.3 Typical temperature characteristics

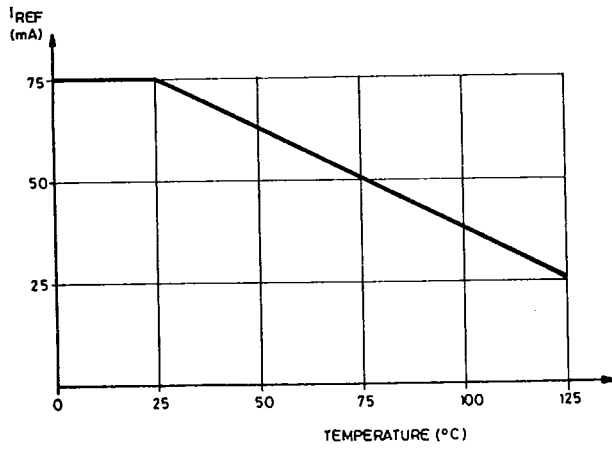


Fig.4 I_{REF} derating for ZNREF040