

DRAFT

Features

- **Guaranteed** $\pm 4\text{mV}$ Initial Accuracy FT1004-1.2
- **Guaranteed** $\pm 20\text{mV}$ Accuracy FT1004-2.5
- **Guaranteed** $10\mu\text{A}$ Operating Current
- **Guaranteed** Temperature Performance
- Operates up to 20mA
- Very Low Dynamic Impedance

Applications

- Portable Meter References
- Portable Test Instruments
- Battery-Operated Systems
- Current Loop Instrumentation

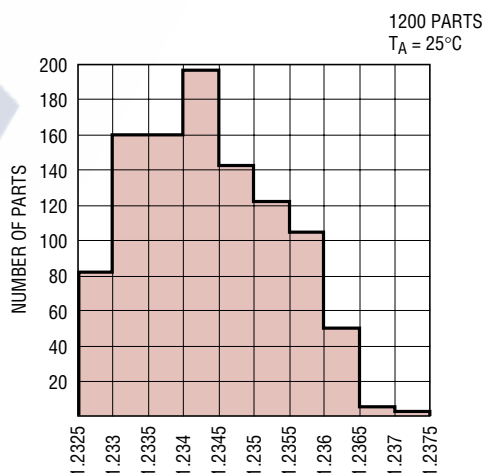
Description

The FT1004 micropower voltage reference is a 2-terminal bandgap reference diode designed to provide high accuracy and excellent temperature characteristics at very low operating currents. Optimisation of the key parameters in the design, processing and testing of the device results in accuracy specifications previously attainable only with selected units. Below is a distribution plot of reference voltage for a typical lot of FT1004-1.2. Virtually all of the units fall well within the prescribed limits of $\pm 4\text{mV}$.

The FT1004 is a pin-for-pin replacement for the FT185/385 series of references with improved accuracy specifications. More important, the FT1004 is an attractive device for use in systems where accuracy was previously obtained at the expense of power consumption and trimming.

For a low drift micropower reference with guaranteed temperature coefficient, see the FT1034 data sheet.

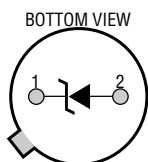
**Typical Distribution Of
Reference Voltage (FT1004-1.2)**



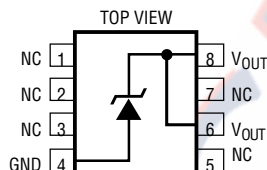
Absolute Maximum Ratings

Reverse Breakdown Current	30mA	Operating Temperature Range	
Forward Current	10mA	FT1004M.....	-55°C to 125°C
Storage Temperature Range	-65°C to 150°C	FT1004I	-40°C to 85°C
Lead Temperature (Soldering, 10 sec)	300°C	FT1004C	0°C to 70°C

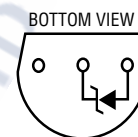
Package/Order Information



H PACKAGE
2-LEAD TO-46 METAL CAN
 $T_{JMAX} = 150^{\circ}\text{C}$, $\theta_{JA} = 440^{\circ}\text{C/W}$, $\theta_{JC} = 80^{\circ}\text{C/W}$



S8 PACKAGE
8-LEAD PLASTIC SO
 $T_{JMAX} = 100^{\circ}\text{C}$, $\theta_{JA} = 150^{\circ}\text{C/W}$



Z PACKAGE
3-LEAD PLASTIC TO-92
 $T_{JMAX} = 100^{\circ}\text{C}$, $\theta_{JA} = 160^{\circ}\text{C/W}$

ORDER PART NUMBER	ORDER PART NUMBER	S8 PART MARKING	ORDER PART NUMBER
FT1004MH-1.2	FT1004CH-1.2	0412	FT1004CZ-1.2
FT1004MH-2.5	FT1004CH-2.5	0425	FT1004CZ-2.5
		0412I	FT1004IZ-1.2
		0425I	FT1004IZ-2.5

Electrical Characteristics

The ● denotes the specifications which apply over the full operating temperature range, otherwise specifications are at $T_A = 25^{\circ}\text{C}$. (Note 2)

SYMBOL	PARAMETER	CONDITIONS	FT1004-1.2			FT1004-2.5			UNITS
			MIN	TYP	MAX	MIN	TYP	MAX	
V_Z	Reverse Breakdown Voltage	$I_R = 100\mu\text{A}$ ● FT1004M: $-55^{\circ}\text{C} \leq T_A \leq 125^{\circ}\text{C}$ ● FT1004C: $0^{\circ}\text{C} \leq T_A \leq 70^{\circ}\text{C}$ ● FT1004I: $-40^{\circ}\text{C} \leq T_A \leq 85^{\circ}\text{C}$	1.231	1.235	1.239	2.480	2.500	2.520	V
			● 1.220	1.230	1.245	● 2.460	2.500	2.53	V
			● 1.225	1.235	1.245	● 2.470	2.500	2.53	V
			● 1.220	1.230	1.245	● 2.460	2.500	2.53	V
$\frac{\Delta V_Z}{\Delta T_{\text{Temp}}}$	Average Temperature Coefficient	$I_{MIN} \leq I_R \leq 20\text{mA}$ (Note 3)	20			20			ppm/ $^{\circ}\text{C}$
I_{MIN}	Minimum Operating Current		● 8 10			12 20			μA
$\frac{\Delta V_Z}{\Delta I_R}$	Reverse Breakdown Voltage Change with Current	$I_{MIN} \leq I_R \leq 1\text{mA}$	● 1.0			1.0			mV
			● 1.5			1.5			mV
		$1\text{mA} \leq I_R \leq 20\text{mA}$	● 10			10			mV
			● 20			20			mV
r_Z	Reverse Dynamic Impedance	$I_R = 100\mu\text{A}$	● 0.2 0.6			0.2 0.6			Ω
			● 1.5			1.5			Ω
e_n	Wide Band Noise (RMS)	$I_R = 100\mu\text{A}$, $10\text{Hz} \leq f \leq 10\text{kHz}$	60			120			μV
$\frac{\Delta V_Z}{\Delta T_{\text{Time}}}$	Long Term Stability	$I_R = 100\mu\text{A}$, $T_A = 25^{\circ}\text{C} \pm 0.1^{\circ}\text{C}$	20			20			ppm/kHr

Note 1: Absolute Maximum Ratings are those values beyond which the life of a device may be impaired.

Note 2: All specifications are for $T_A = 25^{\circ}\text{C}$ unless otherwise noted.

Note 3: Selected devices with guaranteed maximum temperature coefficient are available upon request.

For MIL-STD 883 components, please refer to FT "B" data sheet for test listing and parameters.



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