FORCE TECHNOLOGIES LTD

FT1004

Micropower Voltage Reference

DRAFT

Features

- **Guaranteed** ±4mV Initial Accuracy FT1004-1.2
- **Guaranteed** ±20mV Accuracy FT1004-2.5
- **Guaranteed** 10µA 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

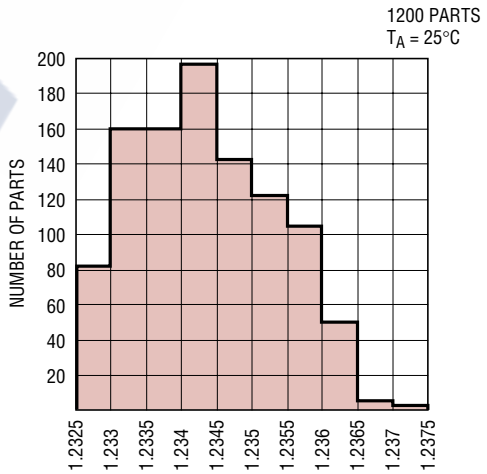
Description

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 ±4mV.

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)

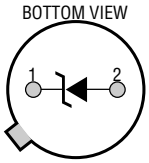


Absolute Maximum Ratings

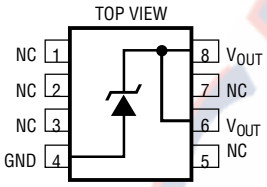
Reverse Breakdown Current 30mA
Forward Current 10mA
Storage Temperature Range ..... –65°C to 150°C
Lead Temperature (Soldering, 10 sec)..... 300°C

Operating Temperature Range
FT1004M..... –55°C to 125°C
FT1004I ..... –40°C to 85°C
FT1004C ..... 0°C to 70°C

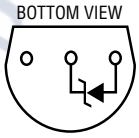
Package/Order Information



H PACKAGE
2-LEAD TO-46 METAL CAN
T_{JMAX} = 150°C, θ_{JA} = 440°C/W, θ_{JC} = 80°C/W



S8 PACKAGE
8-LEAD PLASTIC SO
T_{JMAX} = 100°C, θ_{JA} = 150°C/W



Z PACKAGE
3-LEAD PLASTIC TO-92
T_{JMAX} = 100°C, θ_{JA} = 160°C/W

ORDER PART NUMBER	ORDER PART NUMBER	S8 PART MARKING	ORDER PART NUMBER
FT1004MH-1.2 FT1004CH-1.2	FT1004CS8-1.2	0412	FT1004CZ-1.2
FT1004MH-2.5 FT1004CH-2.5	FT1004CS8-2.5	0425	FT1004CZ-2.5
	FT1004IS8-1.2	0412I	FT1004IZ-1.2
	FT1004IS8-2.5	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°C. (Note 2)

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