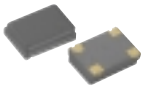
VOLTAGE CONTROLLED CRYSTAL OSCILLATORS
HCMOS/TTL 3.3V

SURFACE MOUNT
T package
T2306,
T2320, T2330



5 x 7 mm Surface Mount
Commercial: 0º to 70ºC
3 MHz to 32.768 MHz

GUARANTEED CAPTURE RANGE/ABSOLUTE PULL RANGE

Guaranteed Capture Range (GCR) and Absolute Pull Range (APR) are terms often used interchangeably. MF's Guaranteed Capture Range (GCR) is defined as the minimum guaranteed frequency deviation or "pull" (in ppm) around the nominal frequency, with all effects of temperature, variations in V_{DD} and load taken into account. This amount of absolute frequency deviation is available under all operating conditions for modulation or capturing other signals. No additional frequency capture allowances are necessary.

FEATURES

- Guaranteed Capture Range of ±50 ppm
- Excellent incrememtal and best-straight-line linearity
- Start-up time is less than 5ms
- Each unit is ATE-tested to guarantee full compliance with all electrical specifications

TYPICAL APPLICATIONS

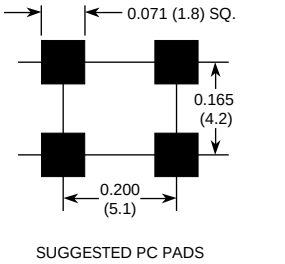
- Phase locked loops and data acquisition projects, including:
  - xDSL customer premise equipment
  - Cable modems
  - ATM/SONET/SDH

Description

These SMD VCXOs generate a 3.3 volt HCMOS/TTL frequency output which is controlled ("pulled") by an input voltage. MF Electronics' VCXO specification defines not only the end-point frequency/ voltage parameters, but also the center voltage at which the nominal frequency is acheived.

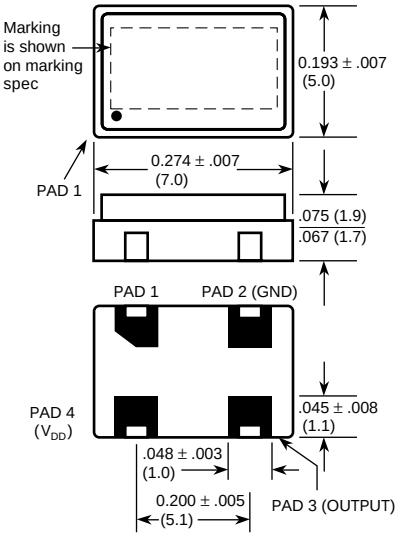
CONNECTIONS

	T Package
Pad 1.	Control Voltage
Pad 2.	Ground
Pad 3.	Output
Pad 4.	+3.3V, V_{DD}

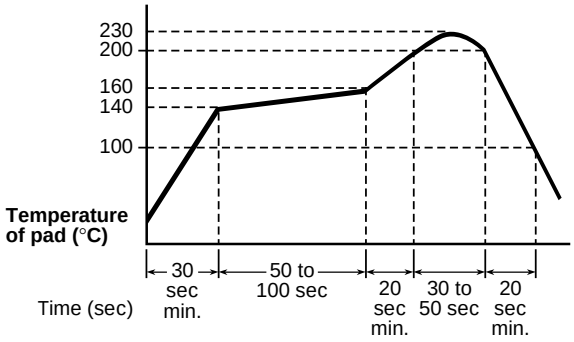


SUGGESTED PC PADS

Millimeters are shown in ( ).



"T" Package



Recommended Reflow Soldering Profile

MF ELECTRONICS

International Sales: +1.914-712-2200 • USA Sales: +1.800.331.1236 • Fax: 914.712.2290 • www.mfelectronics.com • email:sales@mfelectronics.com

VOLTAGE CONTROLLED CRYSTAL OSCILLATORS HCMOS/TTL 3.3V

Surface Mount

Commercial: 0° to 70°C

3 MHz to 32.768 MHz

SURFACE MOUNT
T package
T2306,
T2320, T2330

Center Frequency is Between Two Voltages with ±50 ppm stability

MODEL	Marking Letter ID	Control Voltage (Volts)	Guaranteed Frequency Deviation (ppm)	Control Capture Range (ppm)	Center Voltage at Center Frequency	Frequency Stability (ppm)
T2306	VQ	0 to 3.0	± 50 min	± 50	–	50, max

Center Frequency is at 1.5V with ±50 ppm stability

MODEL	Marking Letter ID	Control Voltage (Volts)	Frequency Deviation (ppm)	Guaranteed Capture Range (ppm)	Control Voltage at Center Frequency	Center Frequency Stability (ppm)
T2320	VR	0.5 to 2.5	± 50 to 150	± 50	1.5	± 30, typ

Center Frequency is at 1.5V with ±25 ppm stability

MODEL	Marking Letter ID	Control Voltage (Volts)	Frequency Deviation (ppm)	Guaranteed Capture Range (ppm)	Control Voltage at Center Frequency	Center Frequency Stability (ppm)
T2330	VS	0.5 to 2.5	± 50 to 150	± 50	1.5	± 15, typ

DESCRIPTIONS

T2306	±50 ppm, min. deviation when using 0 to 3.0V rail-to-rail control-voltage
T2320	±50 ppm capture when using using 0.5 to 2.5V control-voltage and 1.5V center with ±50 ppm stability
T2330	±50 ppm capture when using using 0.5 to 2.5V control-voltage and 1.5V center with ±25 ppm stability

FREQUENCY STABILITY

Frequency stability vs. Temperature (0 to 70°C) is typically better than ±20 ppm. Since the deviation of each oscillator is tested and guaranteed over the whole operating temperature range, it is not necessary to make additional capture allowances. All oscillators will capture frequencies with the full minimum values of the deviation under all conditions.

QUALITY

Each VCXO is computer-tested at three temperatures to guarantee full compliance to the specification.

ELECTRICAL SPECIFICATIONS

Frequency Range 3 MHz to 32.768 MHz

Frequency Stability Includes calibration at 25°C, operating temperature, change of input voltage, change of load, shock and vibration.

	MIN	TYP	MAX	UNITS
Input Voltage, V_{DD}	3.0	3.3	3.6	volts
Input Current				
3 M to 10 MHz		2.0	3.5	mA
10.1 to 20 MHz		3.0	4.0	mA
20.1 to 30 MHz		5.0	6.0	mA
30.1 MHz and above		7.0	8.0	mA
Output Levels				
"0" Level, sinking 16 mA			0.4	volts
"1" Level				
CMOS, sourcing 8 mA	V_{DD}-.4			volts
Rise and Fall Times				
CMOS, 15 pf, 20 to 80%		3.0	4	ns
CMOS, 30 pf, 20 to 80%)		4.0	5	ns
CMOS, 50 pf, 20 to 80%)		6.0	8	ns
Symmetry				
CMOS, @ 50% V_{DD}		48/52	45/55	percent
Aging				
First year		3		ppm
After first year		1		ppm/yr
Input Impedance,				
Pad 1, Control Voltage	100	1000		Kohms
Control Voltage Bandwidth	15	75		KHz

SURFACE MOUNT "T"

T packages are glass-ceramic packages, hermetically sealed at 420°C. For hand-soldering, the temperature of the iron should not exceed 400°C for three seconds.

ENVIRONMENTAL SPECIFICATIONS

Temperature

Operating 0º to 70°C
Storage -55º to +125°C

Temperature Cycle – Not to exceed ±5 ppm change when exposed to 2 hours maximum at each temperature from 0 to 120°C, with 25°C reference

Shock – 1000 Gs, 0.35 ms, 1/2 sine wave, 3 shocks in each plane

Vibration – 10-2000 Hz of .06" d.a. or 20 Gs, whichever is less

Humidity – Resistant to 85° R.H. at 85°C

MECHANICAL, SPECIFICATIONS

Gross Leak – Each unit checked in 125°C fluorocarbon

Fine Leak – Mass spectrometer leak rate less than 5 X 10 (-8) atoms, cc/sec of helium

Case – Hermetically sealed package

Pads – 60 microinch of gold over nickel

Marking – Print is permanent white ink.

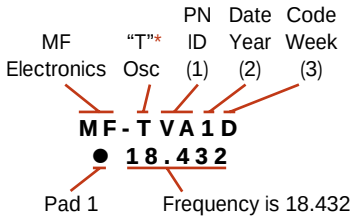
Resistance to Solvents – MIL STD 202, Method 215

TABLE 1

MODEL	Marking Letter ID
T2306	VQ
T2320	VR
T2330	VS

MARKING SPECIFICATION

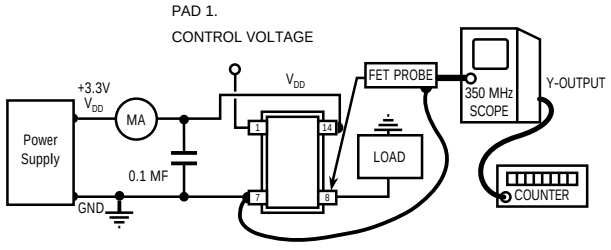
The format for the marking is:



NOTES

(1) One or two letters are used to identify the model. See Table 1.
(2) Number in date code is year. In example, "1" is 2001.
(3) Letter in date code is one two-week period. Year is divided into 26 two-week intervals. Each two-week interval is represented by one letter of the alphabet, in sequence.

* When Marking Letter ID is two letters, the "T" is deleted.



To adapt Fet probe to receptacle use Tektronix Part #103-0164-00

To connect output to scope use use Tektronix Part #131-0258-00 (receptacle)

TEST CIRCUIT

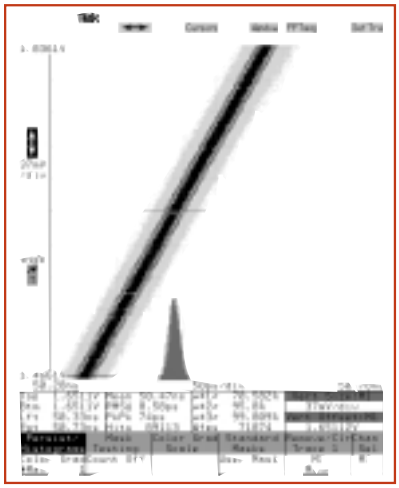


Fig. 1 T2320–20M

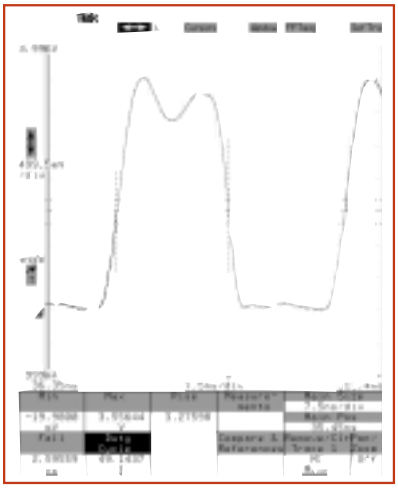


Fig. 2 T2320–19.44M with 25 pf load

DEVIATION vs CONTROL VOLTAGE FOR T2330-27M, TYPICAL

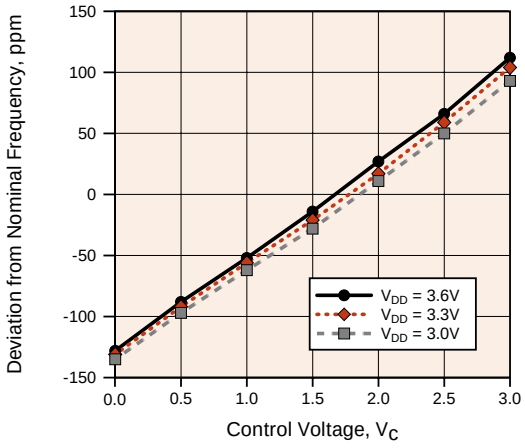


Fig. 3 Deviation vs. Control Voltage at 0°C

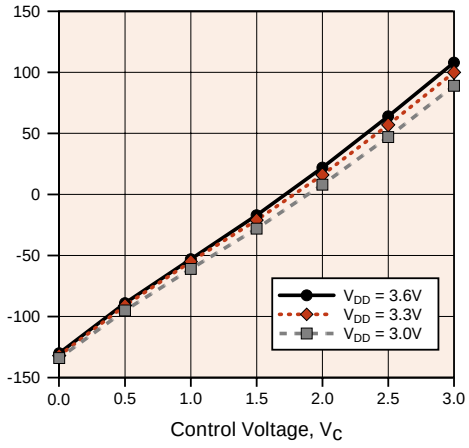


Fig. 4 Deviation vs. Control Voltage at 25°C

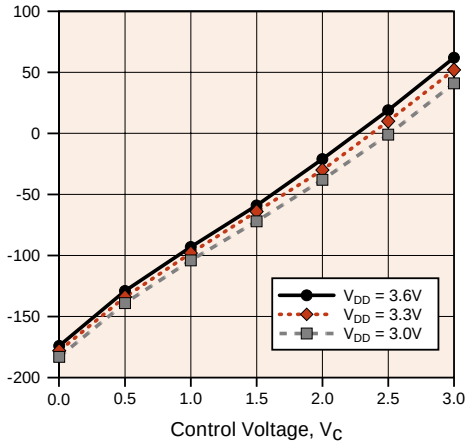


Fig. 5 Deviation vs. Control Voltage at 70°C

HOW TO ORDER

For Part Number, put package type before model number, and add frequency in MHz, for example:

T 2320 - 20M

- "T" is SMD "T" package
- "2320" is model type
- "20 M" frequency in MHz

SS#	Rev.
T2306	A