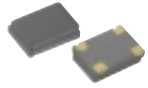




VOLTAGE CONTROLLED CRYSTAL OSCILLATORS HCMOS/TTL 3.3V

SURFACE MOUNT
T package
T2306,
T2320, T2330



5 x 7 mm Surface Mount Commercial: 0° to 70°C 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 incremental 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

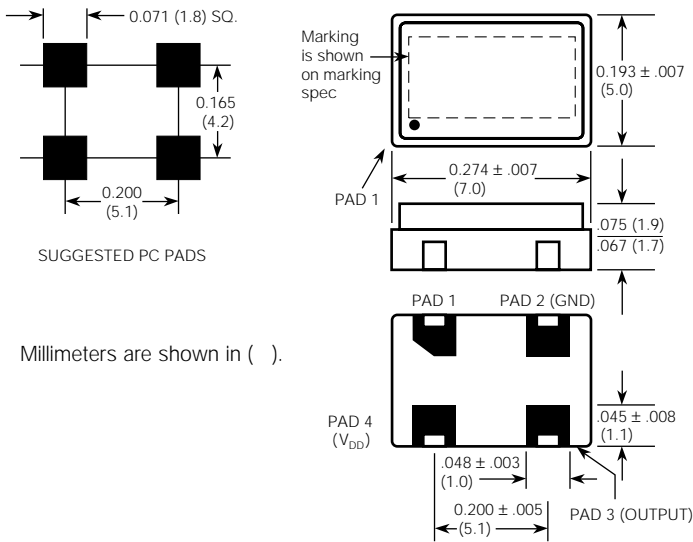
- Phase locked loops and data acquisition projects, including:
 - xDSL customer premise equipment
 - Cable modems
 - ATM/SONET/SDH

Description

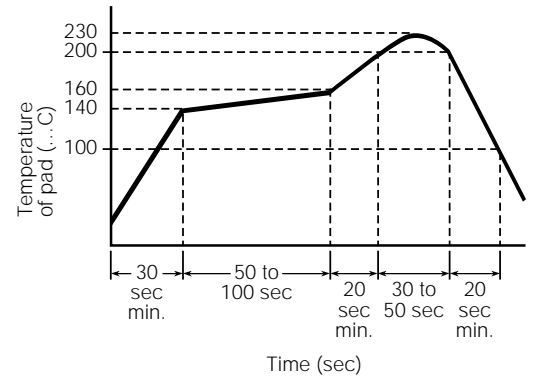
These SMD VCXOs generate a 3.3 volt HCMOS/TTL frequency output which is controlled ("pulled") by an input voltage. MF Electronics' VCXO specification defines not only the end-point frequency/voltage parameters, but also the center voltage at which the nominal frequency is achieved.

CONNECTIONS

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



"T" Package



Recommended Reflow Soldering Profile





VOLTAGE CONTROLLED
CRYSTAL OSCILLATORS
HC MOS/TTL 3.3V
Surface Mount
Commercial: 0° to 70°C
3 MHz to 32.768 MHz

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
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Aging

First year	3		ppm
After first year	1		ppm/yr

Input Impedance,

Pad 1, Control Voltage	100	1000	Kohms
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Control Voltage Bandwidth

15	75	KHz
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TEMPERATURE CONTROLLED
CRYSTAL OSCILLATORS
HCMOS/TTL 3.3V
Surface Mount
Commercial: 0° to 70°C
3 MHz to 32.768 MHz

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 0° to 70°C
Storage -55° 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

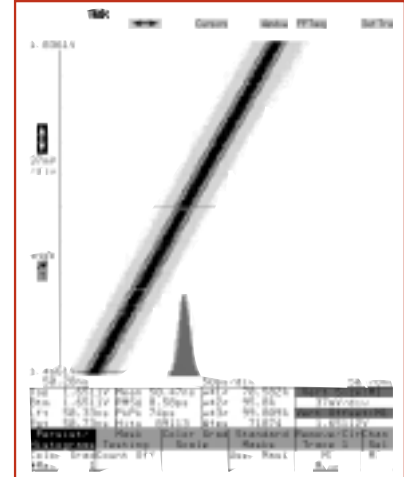


Fig. 1 T2320-20M

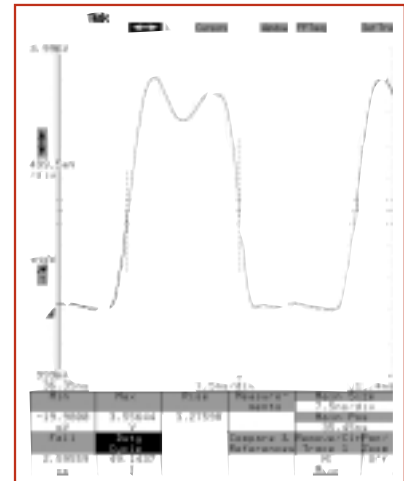
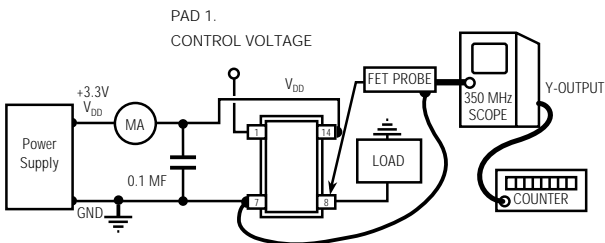


Fig. 2 T2320-19.44M with 25 pf load



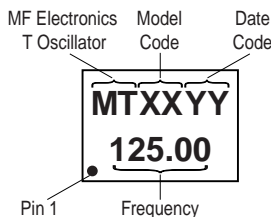
To adapt Fet probe to receptacle use Tektronix Part #103-0164-00

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

TEST CIRCUIT

MARKING SPECIFICATION

The format for the marking is:





DEVIATION vs CONTROL VOLTAGE
FOR T2330-27M, TYPICAL

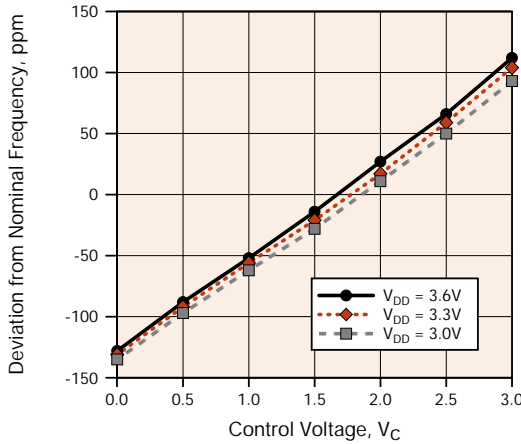


Fig. 3 Deviation vs. Control Voltage at 0°C

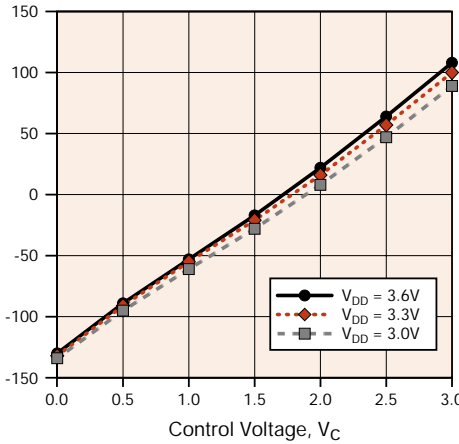


Fig. 4 Deviation vs. Control Voltage at 25°C

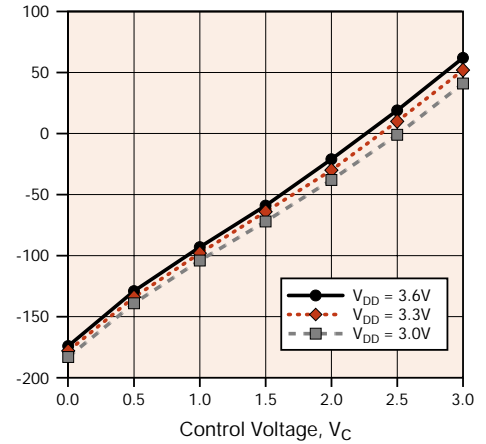
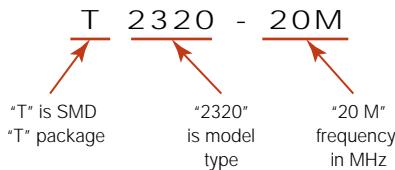


Fig. 5 Deviation vs. Control Voltage at 70°C

HOW TO ORDER

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



SS#	Rev.
T2306	A



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