VOLTAGE CONTROLLED CRYSTAL OSCILLATORS
HCMOS/TTL 5V

FULL SIZE D.I.L. M package	HALF SIZE D.I.L. H package
M3201 thru M3207	H3201 thru H3207
M3221 thru M3223	H3221 thru H3223
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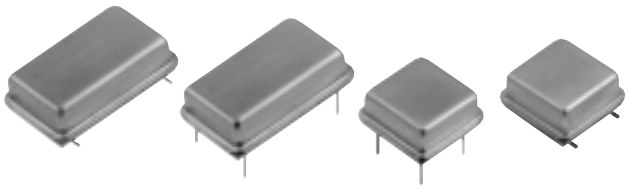


Thru-Hole / Gull Wing
Commercial: 0º to 70ºC
TRISTATE, 3 MHz to 125 MHz

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

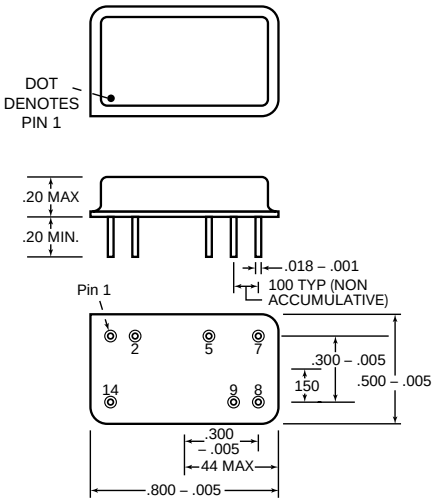
- Phase locked loops and data acquisition projects, including:
  - xDSL customer premise equipment
  - Cable modems
  - ATM/SONET/SDH

Description

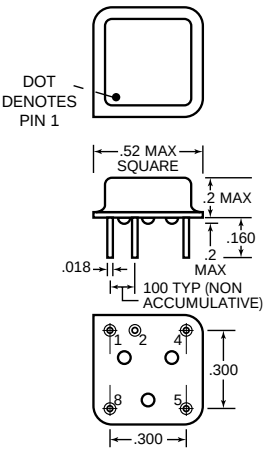
These thru-hole VCXOs generate a 5 volt HCMOS/TTL frequency output which is controlled ("pulled") by an input voltage. MF Electronics' VCXO specification defines not only the end-point frequency/ voltage parameters, but also the center voltage at which the nominal frequency is acheived.

CONNECTIONS

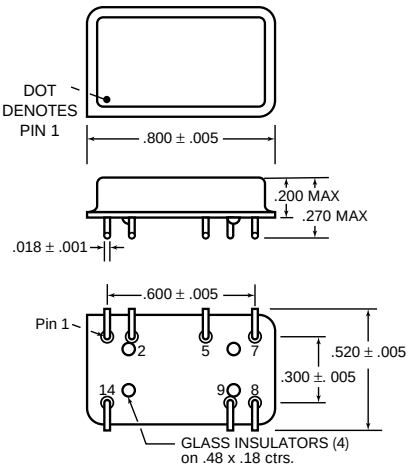
	Full Size	Half Size
Pin 1.	Not used	Control Voltage, V_C
Pin 2.	Control Voltage, V_C	Tristate
Pin 4.		Ground & Case
Pin 5.	Tristate	Output
Pin 7.	Ground & Case	
Pin 8.	Output	+5V, V_{DD}
Pin 9.	Not used	
Pin14.	+5V, V_{DD}	



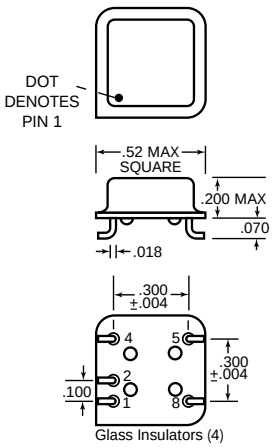
"M-1" Package



"H-1" Package



"M-1" Package with Gull Wing



"H-1" Package with Gull Wing

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

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Center Frequency is Between Two Voltages

MODEL	Control Voltage (Volts)	Frequency Deviation (ppm)	Guaranteed Capture Range (ppm)	Control Voltage at Center Frequency	Center Frequency Stability (ppm)
3201	0.3 to 10	± 175 min	± 175	2.5 to 5.0	± 30, typ ± 50, max
3202	0.3 to 4.0	± 75 min	± 75	1.3 to 2.3	
3203	0.3 to 10	± 175 to 300	± 175	2.5 to 5.0	
3204	0.3 to 4.0	± 125 min	± 125	1.3 to 2.3	
3205	1.0 to 4.0	± 75 to 300	± 75	1.8 to 3.0	
3206	0 to 5.0	± 150 min	± 150	—	
3207	0.5 to 4.5	± 125 to 250	± 125	1.8 to 3.0	

Center Frequency is at 2.5V with ±50 ppm stability

MODEL	Control Voltage (Volts)	Frequency Deviation (ppm)	Guaranteed Capture Range (ppm)	Control Voltage at Center Frequency	Center Frequency Stability (ppm)
3221	0.5 to 4.5	± 75 to 150	± 75	2.5	± 30, typ ± 50, max
3222	0.5 to 4.5	± 100 to 200	± 100	2.5	
3223	0.5 to 4.5	± 150 to 300	± 150	2.5	

Center Frequency is at 2.5V with ±25 ppm stability

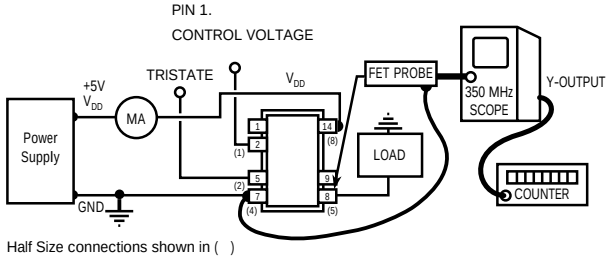
MODEL	Control Voltage (Volts)	Frequency Deviation (ppm)	Guaranteed Capture Range (ppm)	Control Voltage at Center Frequency	Center Frequency Stability (ppm)
3231	0.5 to 4.5	± 75 to 150	± 75	2.5	± 20, typ ± 25, max
3232	0.5 to 4.5	± 100 to 200	± 100	2.5	
3233	0.5 to 4.5	± 150 to 300	± 150	2.5	

Center Frequency is at 2.5V with ±20 ppm stability

MODEL	Control Voltage (Volts)	Frequency Deviation (ppm)	Guaranteed Capture Range (ppm)	Control Voltage at Center Frequency	Center Frequency Stability (ppm)
3241	0.5 to 4.5	± 75 to 150	± 75	2.5	± 15, typ ± 20, max
3242	0.5 to 4.5	± 100 to 200	± 100	2.5	
3243	0.5 to 4.5	± 150 to 300	± 150	2.5	

DESCRIPTIONS

M3201, H3201	±175 ppm, min. deviation when using 0.3 to 10V control-voltage
M3202, H3202	±75 ppm, min. deviation when using 0.3 to 4.0V control-voltage
M3203, H3203	±175 ppm to ±300 ppm deviation when using 0.3 to 10V control-voltage
M3204, H3204	±125 ppm min. deviation when using 0.3 to 4.0V control-voltage
M3205, H3205	±75 ppm to ±300 ppm deviation when using 1.0 to 4.0V control-voltage, for use where the control voltage is 1 volt off both rails
M3206, H3206	±150 ppm, min. deviation when using 0 to 5.0V rail-to-rail control-voltage
M3207, H3207	±125 ppm to ±250 ppm deviation when using 0.5 to 4.5V control-voltage
M3221, H3221	±75 ppm capture when using using 0.5 to 4.5V control-voltage and 2.5V center with ±50 ppm stability
M3222, H3222	±100 ppm capture when using using 0.5 to 4.5V control-voltage and 2.5V center with ±50 ppm stability
M3223, H3223	±150 ppm capture when using using 0.5 to 4.5V control-voltage and 2.5V center with ±50 ppm stability
M3231, H3231	±75 ppm capture when using using 0.5 to 4.5V control-voltage and 2.5V center with ±25 ppm stability
M3232, H3232	±100 ppm capture when using using 0.5 to 4.5V control-voltage and 2.5V center with ±25 ppm stability
M3233, H3233	±150 ppm capture when using using 0.5 to 4.5V control-voltage and 2.5V center with ±25 ppm stability
M3241, H3241	±75 ppm capture when using using 0.5 to 4.5V control-voltage and 2.5V center with ±20 ppm stability
M3242, H3242	±100 ppm capture when using using 0.5 to 4.5V control-voltage and 2.5V center with ±20 ppm stability
M3243, H3243	±150 ppm capture when using using 0.5 to 4.5V control-voltage and 2.5V center with ±20 ppm stability



Half Size connections shown in ( )

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)

ALL OSCILLATORS HAVE INTERNAL BYPASS CAPACITORS

TEST CIRCUIT

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ELECTRICAL SPECIFICATIONS

Frequency Range 3 MHz to 125 MHz

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

Center Frequency Range

V_C = 2.5V 3 MHz to 125 MHz

Frequency Stability

V_C = 2.5V ±20, ±25 or ±50 ppm, max. as shown in model specification

	MIN	TYP	MAX	UNITS
Input Voltage	4.5	5.0	5.5	volts
Input Current		30	45	mA
Output Levels (HCMOS)				
"0" Level, sinking 16 mA.			0.4	volts
"1" Level, sourcing 10 mA.	V_{DD} -.4			volts
Rise and Fall Times, HCMOS				
From 0.4 to (V_{DD}-.4) V		2.5	4	ns
(Above 35 MHz)			2	ns
Symmetry				
At V_{DD}/2	.		45/55	percent
Aging				
First year		3		ppm
After first year		1		ppm/yr
Input Impedance,				
Pin 2., Control Voltage	15	1000		Kohms
Control Voltage Bandwidth	15	20		KHz

Control Voltage

Maximum and minimum as specified for each model.

Jitter

Jitter is less than 80 ps peak-peak, when measured by Tektronix 11801B Digital Storage Oscilloscope with SD-22 Sampling head in Color Statistics mode.

Tristate

"1" Output is On - Pin 5 may float or 2.4V min, sourcing 400µa
"0" Output is disabled, high impedance – Pin 5 requires 0.4V, sinking 400µa

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 2 X 10^{-8} atmos, cc/sec of helium

Pins – Kovar, nickel plated with 60/40 solder coat, or 7 microinch gold over nickel

Bend Test – Will withstand two bends of 90° from reference

Header – Steel, with nickel plate, or 7 microinch gold over nickel

Case – Stainless steel, type 304

Marking – Permanent black epoxy ink or laser marked

Resistance to Solvents – MIL STD 202, Method 215

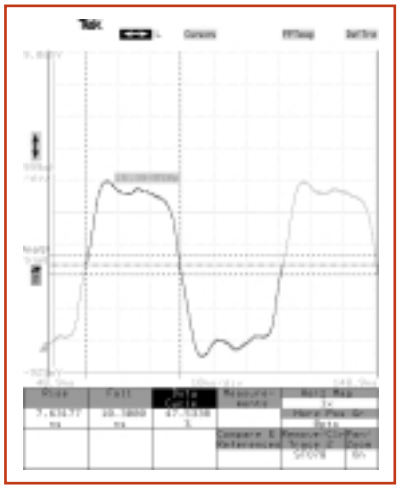

Fig. 1 H3223-16.384M with 50pf load

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FREQUENCY VS. CONTROL VOLTAGE FOR TYPICAL DEVICES

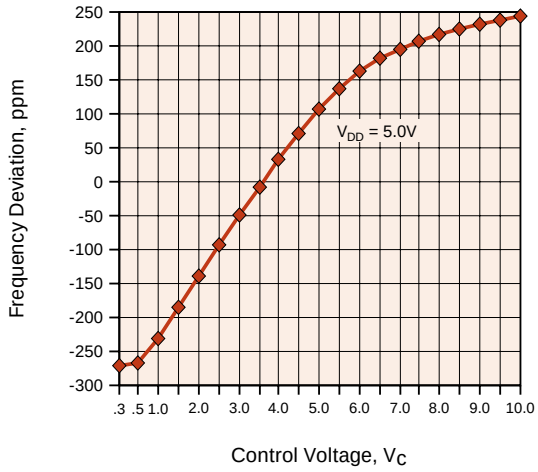

Fig. 2 M3203-10.24M

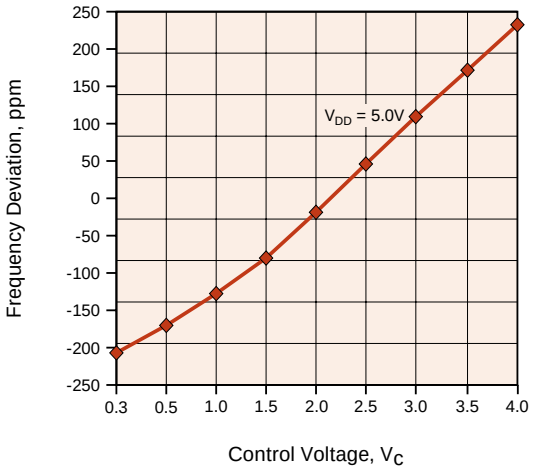

Fig. 3 M3204-8.192M

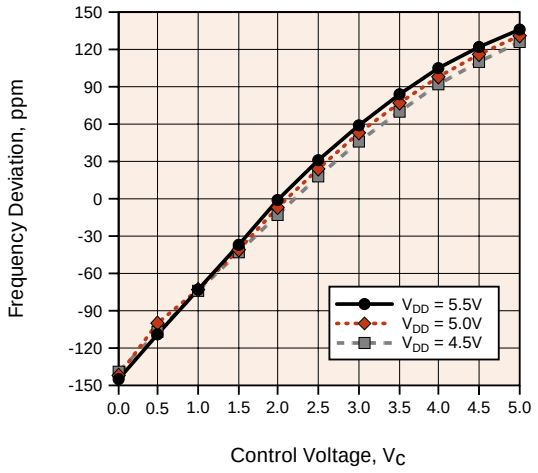

Fig. 4 M3221-1.024M

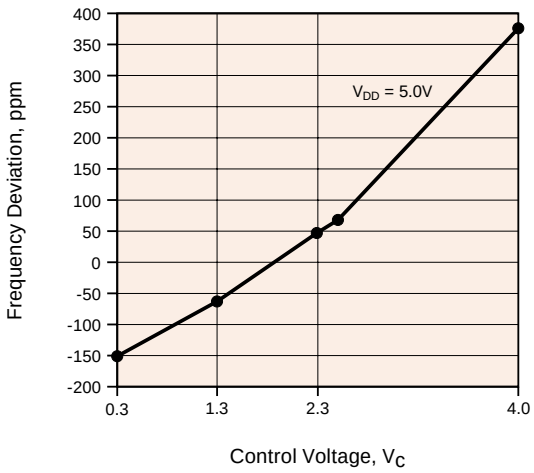

Fig. 5 H3302-148.26M

HOW TO ORDER

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

H 3223- 19.44M

- "M" is full size DIL "H" is half size DIL
- "3223" is model type
- "19.44 M" frequency in MHz
- Leave blank for straight leads Add "G" for gullwing

SS#	Rev.
M3201	A

Unless customer-specific terms and conditions are signed by an officer of MF Electronics, the sale of this and all MF Electronics products are subject to terms and conditions set forth at www.mfelectronics.com/terms

MF ELECTRONICS

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