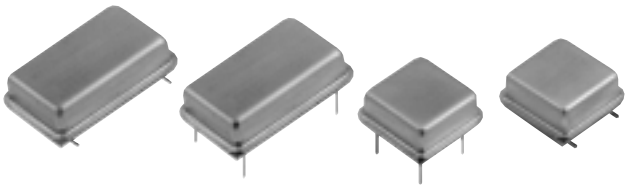
VOLTAGE CONTROLLED CRYSTAL OSCILLATORS
HCMOS/TTL 3.3V

FULL SIZE D.I.L. M package	HALF SIZE D.I.L. H package
M3306	H3306
M3321, M3322	H3321, H3322
M3331, M3332	H3331, H3332
M3341, M3342	H3341, H3342



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

- Wide voltage control capture range
- 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

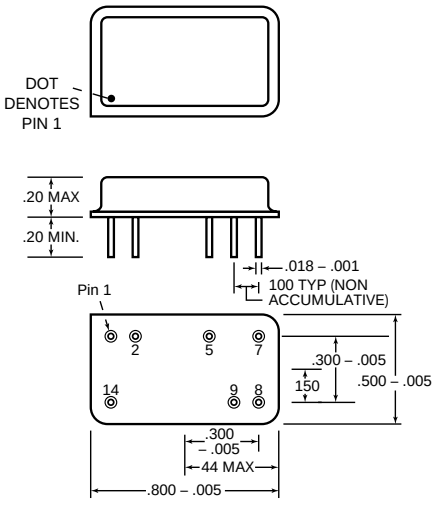
- Phase locked loops and data acquisition projects, including:
  - xDSL customer premise equipment
  - Cable modems
  - ATM/SONET/SDH

Description

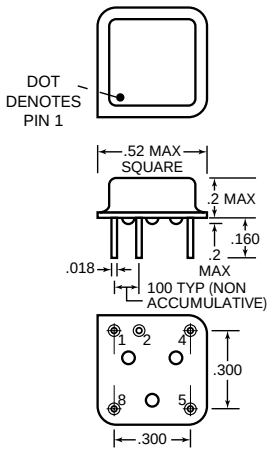
These thru-hole VCXOs generate a 3.3 volt HCMOS/TTL frequency output which is controlled ("pulled") by an input voltage. MF Electronics' VCXO specification defines not only the end-point frequency/ voltage parameters, but also the center voltage at which the nominal frequency is acheived.

CONNECTIONS

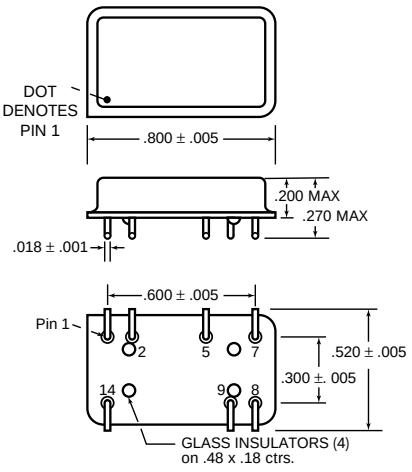
	Full Size	Half Size
Pin 1.	Not used	Control Voltage, V_C
Pin 2.	Control Voltage, V_C	Tristate
Pin 4.		Ground & Case
Pin 5.	Tristate	Output
Pin 7.	Ground & Case	
Pin 8.	Output	+3.3V, V_{DD}
Pin 9.	Not used	
Pin14.	+3.3V, V_{DD}	



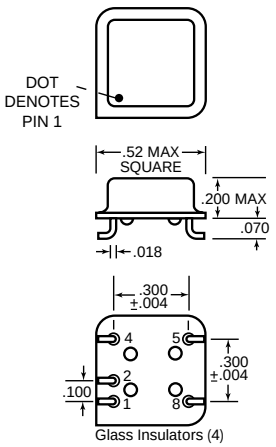
"M-1" Package



"H-1" Package



"M-1" Package with Gull Wing



"H-1" Package with Gull Wing

MF ELECTRONICS

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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)
3306	0 to 3.0	± 150 min	± 150	—	± 30, typ ± 50, max

Center Frequency is at 1.5V with ±50 ppm stability

MODEL	Control Voltage (Volts)	Frequency Deviation (ppm)	Guaranteed Capture Range (ppm)	Control Voltage at Center Frequency	Center Frequency Stability (ppm)
3321	0.5 to 2.5	± 75 to 150	± 75	1.5	± 30, typ
3322	0.5 to 2.5	± 100 to 200	± 100	1.5	± 50, max

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)
3331	0.5 to 2.5	± 75 to 150	± 75	2.5	± 20, typ
3332	0.5 to 2.5	± 100 to 200	± 100	2.5	± 25, max

Center Frequency is at 1.5V with ±20 ppm stability

MODEL	Control Voltage (Volts)	Frequency Deviation (ppm)	Guaranteed Capture Range (ppm)	Control Voltage at Center Frequency	Center Frequency Stability (ppm)
3341	0.5 to 2.5	± 75 to 150	± 75	1.5	± 15, typ
3342	0.5 to 2.5	± 100 to 200	± 100	1.5	± 20, max

DESCRIPTIONS

M3306, H3306	±150 ppm, min. deviation when using 0 to 3 control-voltage
M3321, H3321	±75 ppm capture when using using 0.5 to 2.5V control-voltage and 1.5V center with ±50 ppm stability
M3322, H3322	±100 ppm capture when using using 0.5 to 2.5V control-voltage and 1.5V center with ±50 ppm stability
M3331, H3331	±75 ppm capture when using using 0.5 to 2.5V control-voltage and 1.5V center with ±25 ppm stability
M3332, H3332	±100 ppm capture when using using 0.5 to 2.5V control-voltage and 1.5V center with ±25 ppm stability
M3341, H3341	±75 ppm capture when using using 0.5 to 2.5V control-voltage and 1.5V center with ±20 ppm stability
M3342, H3342	±100 ppm capture when using using 0.5 to 2.5V control-voltage and 1.5V center with ±20 ppm stability

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 = 1.5V 3 MHz to 125 MHz

Frequency Stability

V_C = 1.5V ±25 or ±50 ppm, max. as shown in model specification

	MIN	TYP	MAX	UNITS
Input Voltage, V_{DD}	3.0	3.3	3.6	volts
Input Current				
1 KHz to 10 MHz		8	14	mA
10.1 to 25 MHz		15	20	mA
25.1 to 50 MHz		20	30	mA
50.1 to 75 MHz		25	35	mA
75.1 to 125 MHz		30	40	mA
Output Levels				
"0" Level, sinking 16 mA			0.4	volts
"1" Level, sourcing 8 mA	V_{DD}-.4		0.5	volts
Rise and Fall Times				
CMOS, 15 pf, 20 to 80% (<60 MHz)		3.0	4	ns
CMOS, 30 pf, 20 to 80% (<60 MHz)		4.0	5	ns
CMOS, 50 pf, 20 to 80% (<60 MHz)		6.0	8	ns
CMOS, 15 pf, 20 to 80% (>60 MHz)		2.0	2.5	ns
CMOS, 30 pf, 20 to 80% (>60 MHz)		3.0	4.5	ns
Symmetry				
CMOS, @ 50% V_{DD}		48/52	45/55	percent
Aging				
First year		3		ppm
After first year		1		ppm/yr

Input Requirements for Pin 1.:

"1": On – Pin 1 may float or 2.4V min., sourcing 400 microAmp

"0": Tristate – Pin 1 requires 0.4V, sinking 400 microAmp

Control Voltage Bandwidth	15	150		KHz

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, tristate, 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

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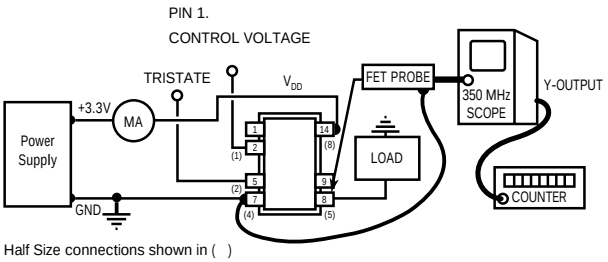
MECHANICAL SPECIFICATIONS

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 – Ceramic with glass hermetic seal, sealed in 420°C furnace
Pads – 60 microinch of gold over nickel
Marking – Print is permanent white ink
Resistance to Solvents – MIL STD 202, Method 215



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

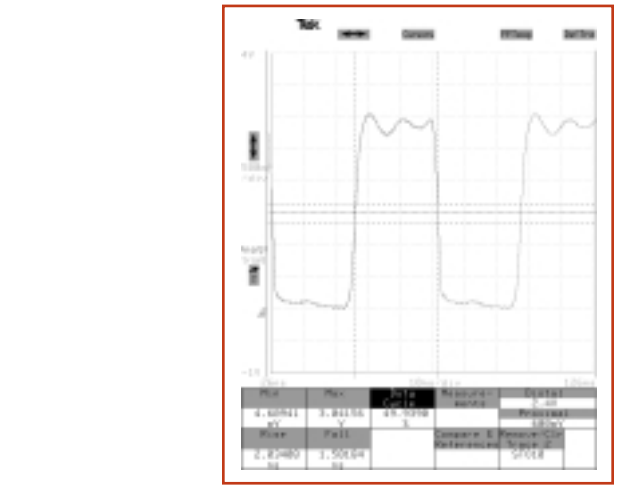


Fig. 3 H3223-19.44M, without load

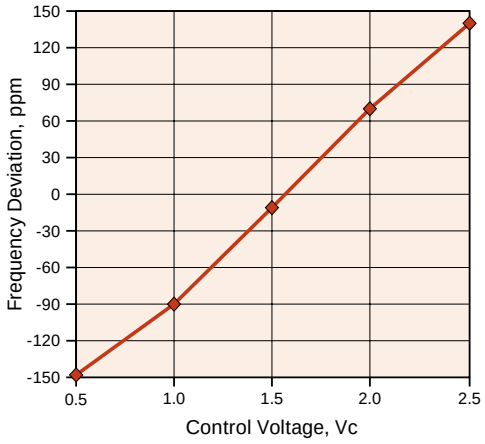


Fig. 1 Deviation vs. Control Voltage for M3322-14.912M

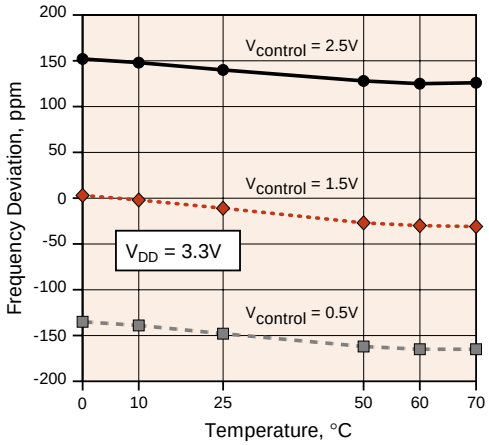


Fig. 2 Frequency Stability vs, Temperature for M3322-14.912M

HOW TO ORDER

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

M 3342- 19.44M

- "M" is full size DIL "H" is half size DIL
- "3342" is model type
- "19.44 M" frequency in MHz
- Leave blank for straight leads Add "G" for gullwing

SS#	Rev.
M3306	A

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