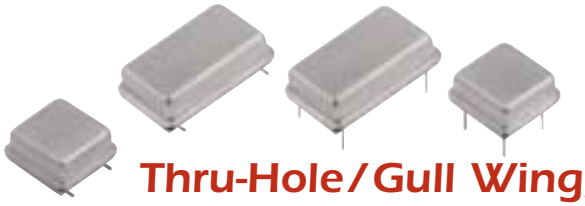
VOLTAGE CONTROLLED OSCILLATORS
HCMOS, 0° TO 70°C

FULL SIZE D.I.L.
M2001 thru M2007
L2001 thru L2007
M2021 thru M2023
L2021 thru L2023
M2031 thru M2033
L2031 thru L2033

M2008

HALF SIZE D.I.L.
H2001 thru H2007
H2021 thru H2023
H2031 thru H2033



Thru-Hole/Gull Wing, 5V
1 MHz to 175 MHz

Thru-Hole VCXOs, 5V

Thru-hole VCXOs are available for 5V operation from 1 MHz to175 MHz. Users have a choice of many off-the-shelf models. Diverse combinations of pull, control voltage and center frequency deviation are available, accommodating a wide variety of filtering and driving circuitry. Standard VCXOs are hermetically sealed in full size (M) or half size (H), DIL packages. All VCXOs are tested and guaranteed over 0 to 70°C. For operation from -40 to +85°C see our extended temperature models.

These 5V VCXOs generate an HCMOS frequency output which is controlled by an input voltage. The end-point frequency/voltage parameters are defined, as is the center frequency.

CONNECTIONS

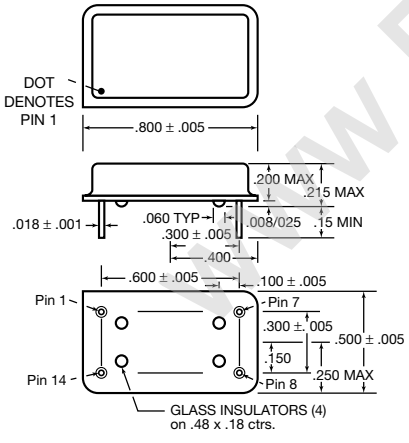
Full Size	Half Size	
Pin 1.	Pin 1.	Control Voltage, V_C
Pin 7.	Pin 4.	Ground & Case
Pin 8.	Pin 5.	Output
Pin 14.	Pin 8.	+5V, V_{DD}

CAPTURE RANGE

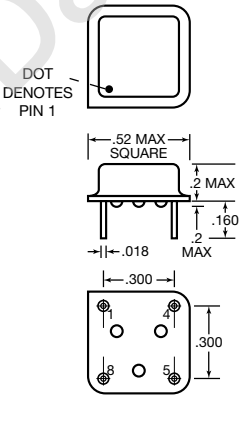
The Frequency-Capture range is equal to the (Center-Frequency ± the Frequency Deviation), because every MF VCXO is ATE-tested to meet the Frequency-Deviation over the temperature range. ***Frequency Capture specification includes all effects of temperature and supply voltage. It is not necessary to make additional capture allowances.***

FEATURES

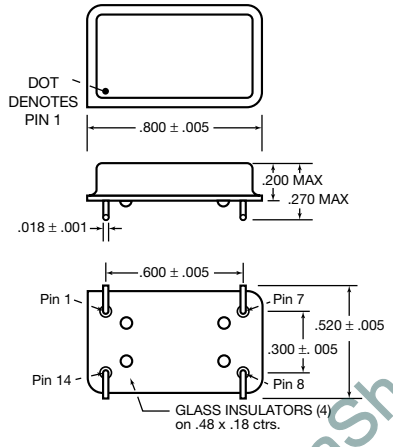
- Frequency from 1 MHz to 175 MHz
- Capture-range is fully defined, under all conditions
- Start-up time less than 5 ms.
- Low profile package available above 60 MHz
- Choice of thru-hole or gull wing



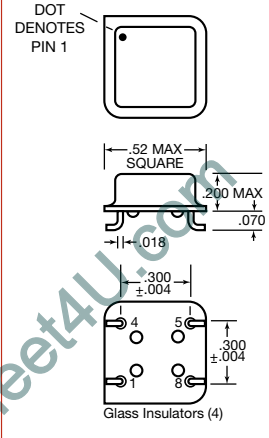
"M" Package – "L" Package is same as "M" but seated height is 0.190



"H" Package



"M" Package with Gull Wing



"H" Package with Gull Wing

MF ELECTRONICS
10 Commerce Drive, New Rochelle, NY10801 • 914-576-6570 • Fax: 914-576-6204 • http://www.mfelectronics.com • email:mfsales@mfelec.com

VOLTAGE CONTROLLED OSCILLATORS
HCMOS, 0° TO 70°C
Thru-Hole / Gull Wing, 5V
1 MHz to 175 MHz

FULL SIZE D.I.L.
M2001 thru M2007
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HALF SIZE D.I.L.
H2001 thru H2007
H2021 thru H2023
H2031 thru H2033

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)
2001	0.3 to 10.0	± 175 min	± 175	2.5 to 5.0	± 30, typ ± 50, max
2002	0.3 to 4.0	± 75 min	± 75	1.3 to 2.3	
2003	0.3 to 10.0	± 175 to 300	± 175	2.5 to 5.0	
2004	0.3 to 4.0	± 125 min	± 125	1.3 to 2.3	
2005	1.0 to 4.0	± 75 to 300	± 75	1.8 to 3.0	
2006	0 to 5.0	± 150 min	± 150	—	
2007	0.5 to 4.5	± 125 to 250	± 125	1.8 to 3	

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)
2021	0.5 to 4.5	± 75 to 150	± 75	2.5	± 30, typ ± 50, max
2022	0.5 to 4.5	± 100 to 200	± 100	2.5	
2023	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)
2031	0.5 to 4.5	± 75 to 150	± 75	2.5	± 20, typ ± 25, max
2032	0.5 to 4.5	± 100 to 200	± 100	2.5	
2033	0.5 to 4.5	± 150 to 300	± 150	2.5	

M2008 SPECIFICATIONS

Temperature of Operation	0 to 70°C (25 ppm) –40 to +85°C (50 ppm)		
Supply Voltage	5V ± 5%		
Supply Current	(CL = 15 pf)		
≤10 MHz	13 ma.		
≤20 MHz	17 ma.		
≤25 MHz	19 ma.		
Phase Jitter	<100 ps.		
Output Symmetry	45/55 @ CMOS/TTL levels (<16 MHz) 40/60 @ CMOS/TTL levels (16-25 MHz)		
TR & TF (max.)	**TR**	**TF**	(CL = 15 pf)
Cmos (20 to 80%)	5ns	4ns	
TTL (.5 to 2.5V)	4ns	4ns	
Load	10 TTL gates, CMOS compatible		
Start-up time	<10 ms.		
Frequency Control			
Control Voltage	0.5 – 2.5 – 4.5 Vdc		
Deviation	±100 ppm min., ±150 ppm max.		
Sensitivity	+50 to +75 ppm/V		
Linearity	<±5%		
Input Impedance	≥50 K ohms at ≤10 KHz		
Modulation BW	≥20 KHz (-3db, Vc=2.5V)		

DESCRIPTIONS

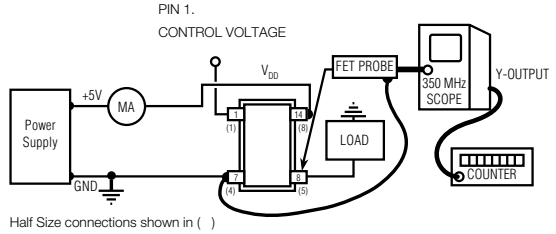
M2001, H2001, L2001	±175 ppm, min. deviation when using 0.3 to 10V control-voltage
M2002, H2002, L2002	±75 ppm, min. deviation when using 0.3 to 4.0V control-voltage
M2003, H2003, L2003	±175 ppm to ±300 ppm deviation when using 0.3 to 10V control-voltage
M2004, H2004, L2004	±125 ppm min. deviation when using 0.3 to 4.0V control-voltage
M2005, H2005, L2005	±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
M2006, H2006, L2006	±150 ppm, min. deviation when using 0 to 5.0V rail-to-rail control-voltage
M2007, H2007, L2007	±125 ppm to ±250 ppm deviation when using 0.5 to 4.5V control-voltage
M2021, H2021, L2021	±75 ppm capture when using using 0.5 to 4.5V control-voltage and 2.5V center with ±50 ppm stability
M2022, H2022, L2022	±100 ppm capture when using using 0.5 to 4.5V control-voltage and 2.5V center with ±50 ppm stability
M2023, H2023, L2023	±150 ppm capture when using using 0.5 to 4.5V control-voltage and 2.5V center with ±50 ppm stability
M2031, H2031, L2031	±75 ppm capture when using using 0.5 to 4.5V control-voltage and 2.5V center with ±25 ppm stability
M2032, H2032, L2032	±100 ppm capture when using using 0.5 to 4.5V control-voltage and 2.5V center with ±25 ppm stability
M2033, H2033, L2033	±150 ppm capture when using using 0.5 to 4.5V control-voltage and 2.5V center with ±25 ppm stability

FREQUENCY STABILITY

Frequency stability vs. Temperature (0 to 70°C) is typically less 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 allowance. 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.



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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HALF SIZE D.I.L.
H2001 thru H2007
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H2031 thru H2033

SPECIFICATIONS

Temperature

Operating	0 to 70°C
Storage	–55 to +125°C

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
Input Impedance,				
Pin 5., Control Voltage	15	1000		Kohms
Control Voltage Bandwidth	15	150		KHz

ENVIRONMENTAL SPECIFICATIONS

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 G's, 0.35 ms, 1/2 sine wave, 3 shocks in each plane

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

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

MECHANICAL SPECIFICATIONS

Gross Leak – Each unit checked in 125°C flurocarbon

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

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

Header – Steel, with nickel plate

Case – Stainless steel, type 304

Marking – Printing is black epoxy ink

Resistance to Solvents – MIL STD 202, Method 215

AGING

3 to 5 ppm, first year, typ.
1 ppm per year thereafter, typ.

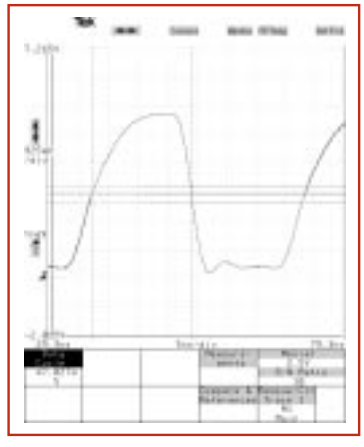

Fig. 1 M2001-27M with 33 pf load

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FREQUENCY VS. CONTROL VOLTAGE FOR TYPICAL DEVICES

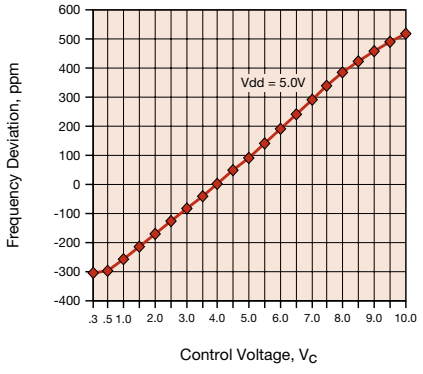

Fig. 2 M2001-40M

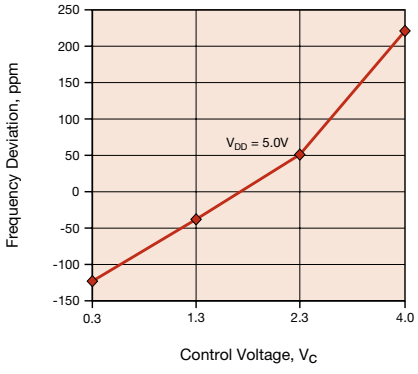

Fig. 3 M2002-12.352

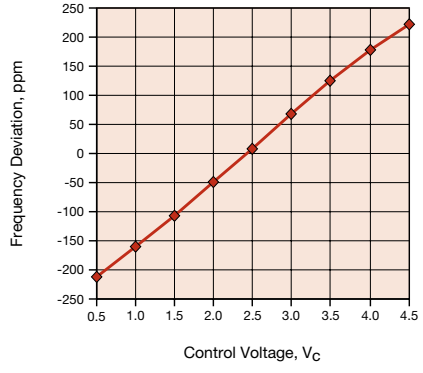

Fig. 4 M2007-16.777216M

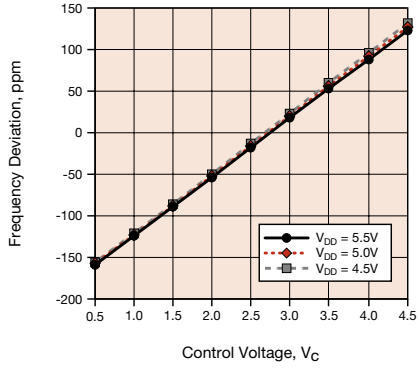

Fig. 5 M2008-16.384

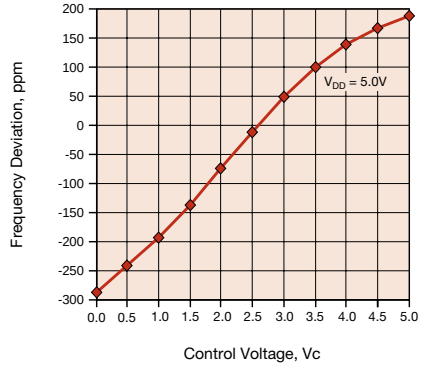

Fig. 6 M2023-19.44

HOW TO ORDER

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

M 2033-14.372M G

- "M" is full size DIL "H" is half size DIL "L" is low height, full size DIL
- "2033" is model type
- "14.372 M" frequency in MHz
- Add "G" for gullwing