



# VOLTAGE CONTROLLED CRYSTAL OSCILLATORS HCMOS5V

FULL SIZE D.I.L.  
M package  
M2010, M2011  
M2015, M2016



## Phase-Locked Oscillator

Commercial: 0° to 70°C  
10 MHz to 44.736 MHz

### FEATURES

- Cost-effective PLL solution which includes a VCXO, filter and phase detector in a single component
- Simplicity of design – requires only dividers to complete the loop
- Output frequency may be chosen at convenient frequency to create edges for desired timing waveforms
- Start up time less than 10 ms
- Guaranteed start-up with ramping DC Supply
- Inputs are TTL/HCMOS compatible

### APPLICATIONS

- Regenerating and cleaning up noisy signals
- Low-jitter frequency multiplication

### SPECIAL APPLICATION NOTE

Both the reference frequency and the output frequency, or submultiple, are input to the device. The two similar frequencies are compared, and an error signal is obtained which is applied to the VCXO. The VCXO frequency is then corrected and "locked" to the average value of the reference frequency.

The output frequency, usually chosen at a convenient frequency higher than the reference frequency, may then be used to generate desired timing waveforms.

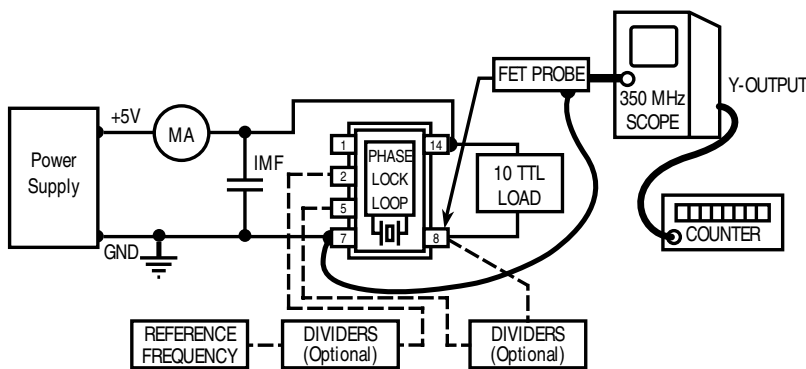
### Description

These PLL sub-systems incorporate all the components required for phase locked loop functionality except the external frequency divider. The phase locked loop unit includes VCXO, phase comparator, and control voltage filter. It will lock the locally generated VCXO output to an incoming reference signal of the same or digitally-related frequency. An external divider between VCXO output and phase-detector input establishes the output/reference frequency ratio. Offered in a 5V DIL (M) package, the PLL modules are built around a VCXO with customer's choice of reference and output frequencies.

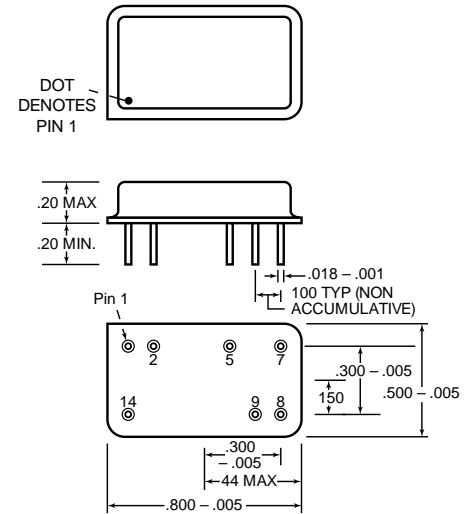
### CONNECTIONS

	M2010 & M2015	M2011 & M2016
Pin 1.	Not used	Not used
Pin 2.	Frequency Input #1	Frequency Input #1
Pin 5.	Frequency Input #2	Frequency Input #2
Pin 7.	Ground	Ground and case
Pin 8.	Output Frequency	Output Frequency
Pin 9.	+5V	+5V
Pin 14.	+5V	+5V

All other pins are not present



TEST CIRCUIT



"M-1" Package





VOLTAGE CONTROLLED  
CRYSTAL OSCILLATORS  
HCMOS5V

**Phase-Locked Oscillator**  
**Commercial: 0° to 70°C**  
**10 MHz to 44.736 MHz**

FULL SIZE D.I.L.  
M package  
M2010, M2011  
M2015, M2016

**ELECTRICAL SPECIFICATIONS**

**Frequency Range** 10 MHz to 44.736 MHz

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

	MIN	TYP	MAX	UNITS
<b>Input Voltage</b>	4.5	5.0	5.50	volts
<b>Input Current</b> (max. @ 5.5 VDC)		42	50	mA
<b>Output Levels</b> "0" Level, sinking 16 mA "1" Level, sourcing 8 mA	$V_{DD} - .4$	0.4	0.5	volts volts
<b>Rise and Fall Times</b> from 0.8 to 2.4V, 10 TTL		2.5	4	ns
<b>Symmetry</b> 10 TTL, @ 1.4V		45/55	40/60	percent
<b>Aging</b> First year After first year		3 1		ppm ppm/yr
<b>Input Requirements for Pins 2 and 5</b> Input Frequency, square wave Sinking at 0.4V Sourcing at 2.4V		0.6 100	1.6 400	mA mA

**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  $2 \times 10^{-8}$  atmos, cc/sec of helium

**Pins** – Kovar, 7 microinch gold over nickel

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

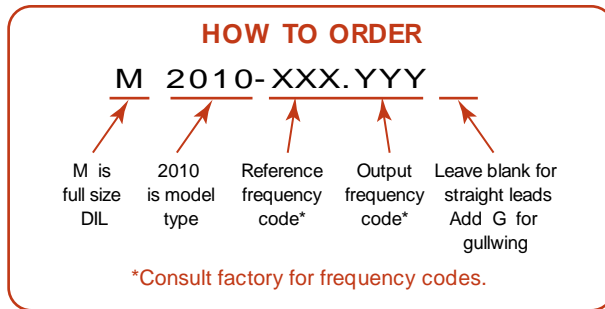
**Header** – Steel, 7 microinch gold over nickel

**Case** – Stainless steel, type 304

**Marking** – Permanent black epoxy ink or laser marked

**Resistance to Solvents** – MIL STD 202, Method 215

Reference Frequency Stability Requirements	
M2010, M2011	±125 ppm
M2015, M2016	±150 ppm



SS#	Rev.
M2010	B



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](http://www.mfelectronics.com/terms)