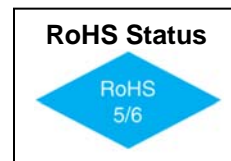


**M6000 series**  
**H6000 series**  
**VCXO 5.0V**  
**Full/Half size, Thru-hole, HCMOS/TTL**



**Features**

- Frequency range of 1KHz to 150MHz
- Industrial temperature range of -40 to +85°C
- Excellent incremental and best-straight-line linearity
- Start-up time is less than 5ms



**Applications**

- Phase locked loops
- xDSL customer premise equipment
- Cable modems
- ATM/SONET/SDH

**Electrical Specifications**

Parameter	Symbol	Condition	Min	Typ	Max	Unit	Note
Frequency Range	F		0.001		150	MHz	
Frequency Stability	$\Delta F/F$	Operating Temperature at 25°C		$\pm 40$	$\pm 50$	ppm	
Aging		First Year After First Year		3 1		ppm ppm/yr	
Operating Temperature	T		-40°		+85°	°C	
Supply Voltage	Vcc		4.5	5.0	5.5	V	
Supply Current	Icc			30	45	mA	
Output Levels		"0" Level, sinking 16mA "1" Level, sourcing 10mA	$V_{DD}-0.4$		0.4	V	
Rise & Fall Times		From 0.4 to ( $V_{DD}-0.4$ ) V (Above 35 MHz)		2.5	4 2	ns	
Input Impedance		Pin 5., Vc	15	1000		KOhm	
Symmetry		At $V_{DD}/2$			45/55	%	
Control Voltage Bandwidth			15	150		KHz	

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**Environmental and Mechanical Conditions**

Parameter	Specification
<b>Shock</b>	1000 Gs, 0.35 ms, 1/2 sine wave, 3 shocks in each plane
<b>Vibration</b>	10-2000 Hz of .06" d.a. or 20 Gs, whichever is less
<b>Humidity</b>	Resistant to 85° R.H. at 85°C
<b>Gross Leak</b>	Each unit checked in 125°C fluorocarbon
<b>Fine Leak</b>	Mass spectrometer leak rate less than $2 \times 10^{-8}$ atm, cc/sec of helium
<b>Pins</b>	Kovar, nickel plated with 60/40 solder coat
<b>Bend Test</b>	Will withstand two bends of 90° from reference
<b>Header</b>	Steel, with nickel plated
<b>Case</b>	Stainless steel, type 304
<b>Marking</b>	Permanent black epoxy ink or laser marked
<b>Resistance to Solvents</b>	MIL STD 202, Method 215

**Center Frequency is between Two Voltages with ±50 ppm stability**

MODEL	Control Voltage (Volts)	Frequency Deviation (ppm)	Guaranteed Capture Range (ppm)	Control Voltage at Center Frequency	Center Frequency Stability (ppm)
6001	0.3 to 10.0	± 175 min	± 175	2.5 to 5.0	± 40, typ ± 50, max
6002	0.3 to 4.0	± 75 min	± 75	1.3 to 2.3	
6003	0.3 to 10.0	± 175 to 300	± 175	2.5 to 5.0	
6004	0.3 to 4.0	± 125 min	± 125	1.3 to 2.3	
6005	1.0 to 4.0	± 75 to 300	± 75	1.8 to 3.0	
6006	0 to 5.0	± 150 min	± 150	—	
6007	0.5 to 4.5	± 125 to 250	± 125	1.8 to 3.0	

**DESCRIPTIONS**

M6001, H6001	±175 ppm, min. deviation when using 0.3 to 10V control-voltage
M6002, H6002	±75 ppm, min. deviation when using 0.3 to 4.0V control-voltage
M6003, H6003	±175 ppm to ±300 ppm deviation when using 0.3 to 10V control-voltage
M6004, H6004	±125 ppm deviation when using 0.3 to 4.0V control-voltage
M6005, H6005	±75 ppm to ±300 ppm deviation when using 1.0 to 4.0 control-voltage, for use where the control voltage is 1 volt off both rails
M6006, H6006	±150 ppm, min. deviation when using 0 to 5.0 control-voltage
M6007, H6007	±125 ppm to ±250 ppm deviation when using 0.5 to 4.5 control-voltage
M6021, H6021	±75 ppm capture when using 0.5 to 4.5V control-voltage and 2.5V center with 50 ppm stability
M6022, H6022	±100 ppm capture when using 0.5 to 4.5V control-voltage and 2.5V center with 50 ppm stability
M6023, H6023	±150 ppm capture when using 0.5 to 4.5V control-voltage and 2.5V center with 50 ppm stability

**Center Frequency is at 2.5V with ±20 ppm stability**

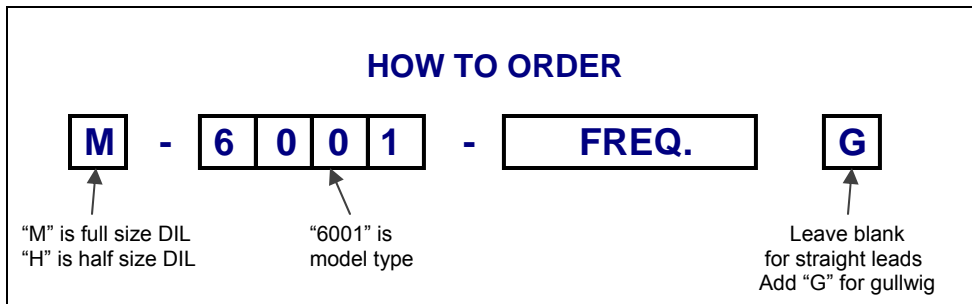
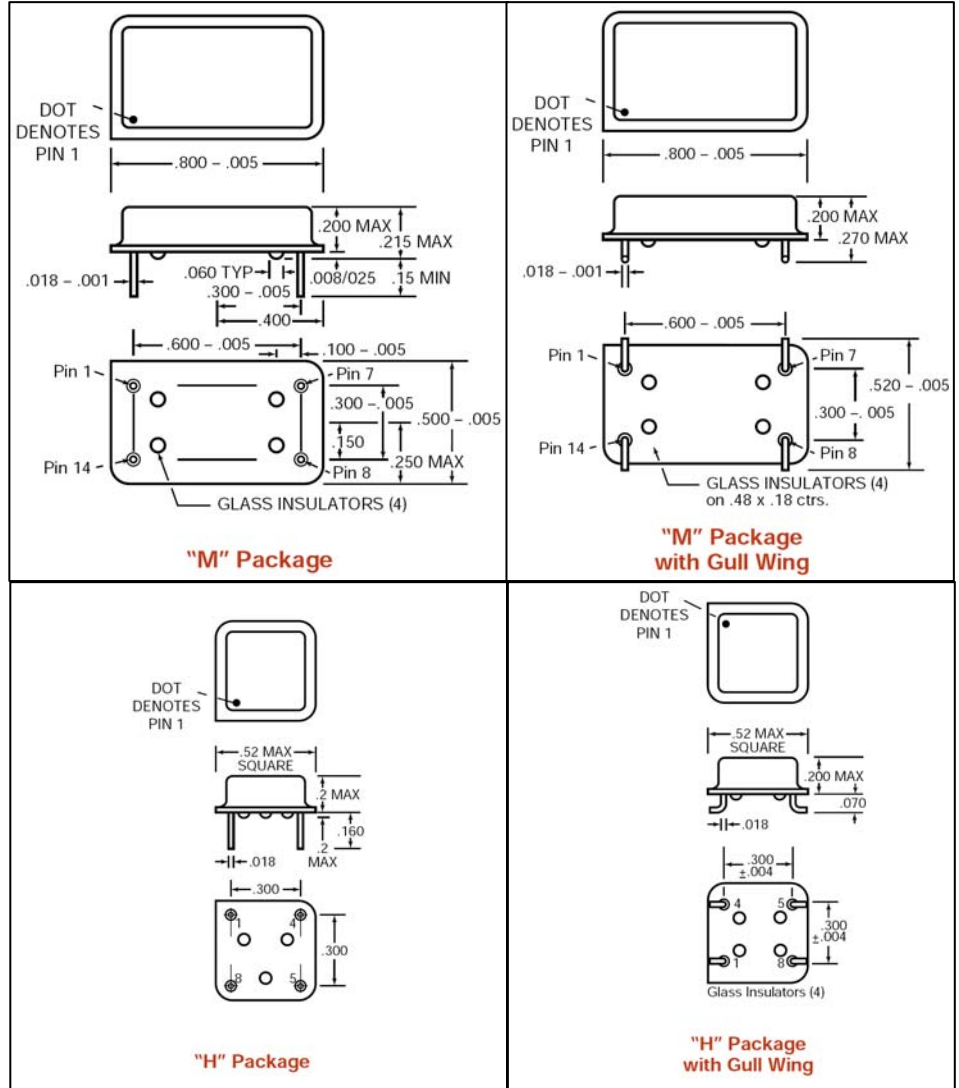
MODEL	Control Voltage (Volts)	Frequency Deviation (ppm)	Guaranteed Capture Range (ppm)	Control Voltage at Center Frequency	Center Frequency Stability (ppm)
6021	0.5 to 4.5	± 75 to 150	± 75	2.5	± 30, typ ± 50, max
6022	0.5 to 4.5	± 100 to 200	± 100	2.5	
6023	0.5 to 4.5	± 150 to 300	± 150	2.5	



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**Full/Half size, Thru-hole, HCMOS/TTL**

Pin #	Full size (M)	Half size (H)
1	Control Voltage	Control Voltage
4	N/C	Ground & Case
5	N/C	Output
7	Ground & Case	N/C
8	Output	+5.0V, VDD
14	+5.0V, VDD	N/C



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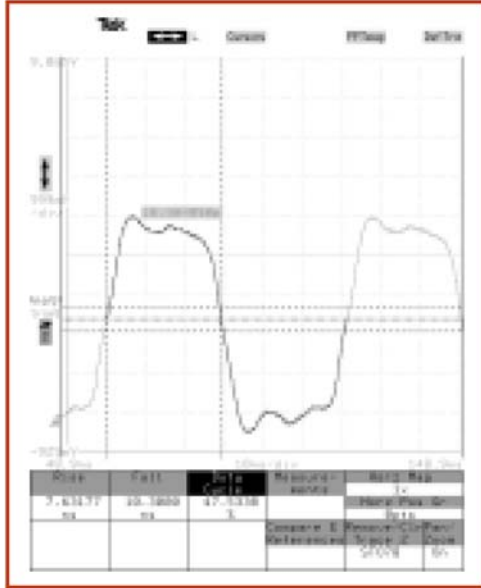
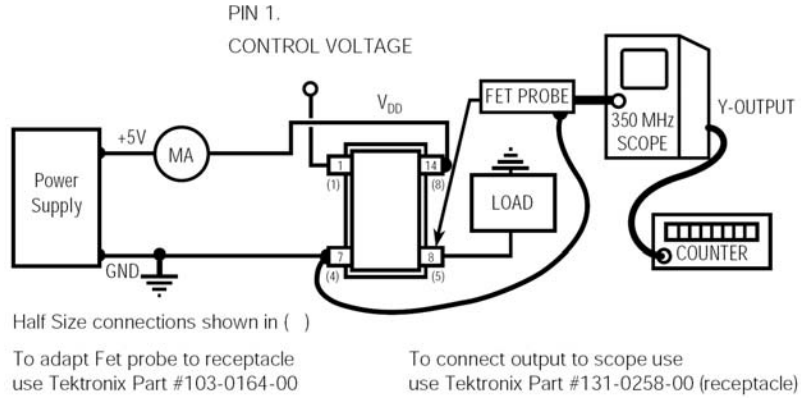


Fig. 1 M6022-16.384M,  
with 50 pf load



**ALL OSCILLATORS HAVE INTERNAL BYPASS CAPACITORS**

**TEST CIRCUIT**

**FREQUENCY VS. CONTROL VOLTAGE FOR TYPICAL DEVICE**

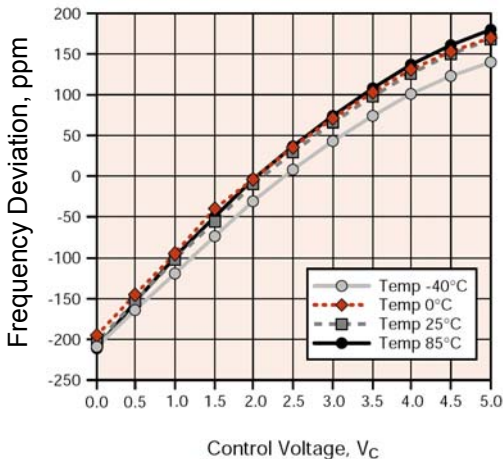


Fig. 2 Frequency vs. Control Voltage

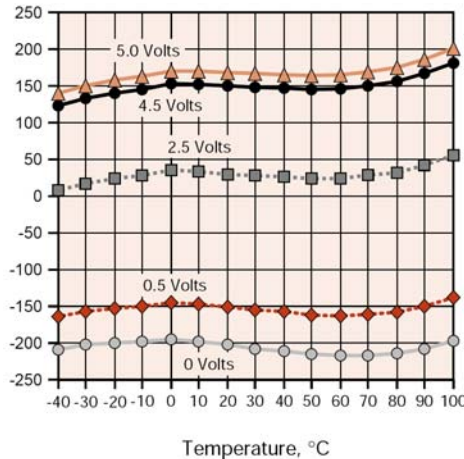


Fig. 3 Frequency vs. Temperature

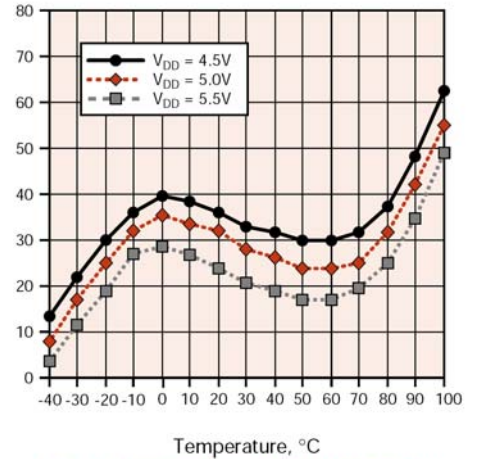


Fig. 4 Frequency vs. Temperature @ 2.5V  
Control Voltage