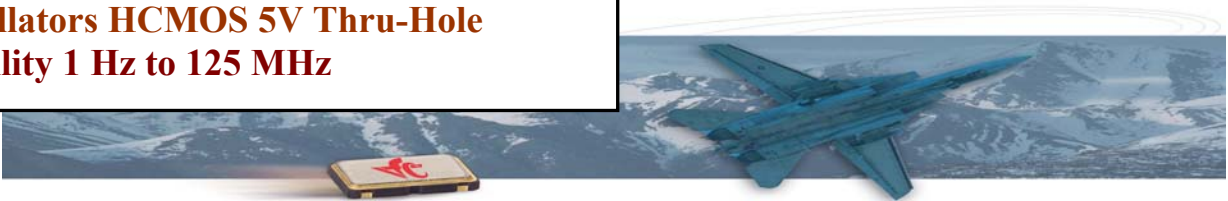




**M5500 Series**  
**Crystal Oscillators HCMOS 5V Thru-Hole**  
**High Reliability 1 Hz to 125 MHz**



**Extended Temperature Hi-Rel Product Specification** **XO**

**Features**

- Hermetically sealed half size or full size DIL package
- Crystal angle controlled to +/- 1 minute for excellent temperature stability
- 168 hour Class B burn-in and extensive environmental testing for best performance in rugged field environments
- Start-up time less than 10 ms, typical
- Serialized test data available

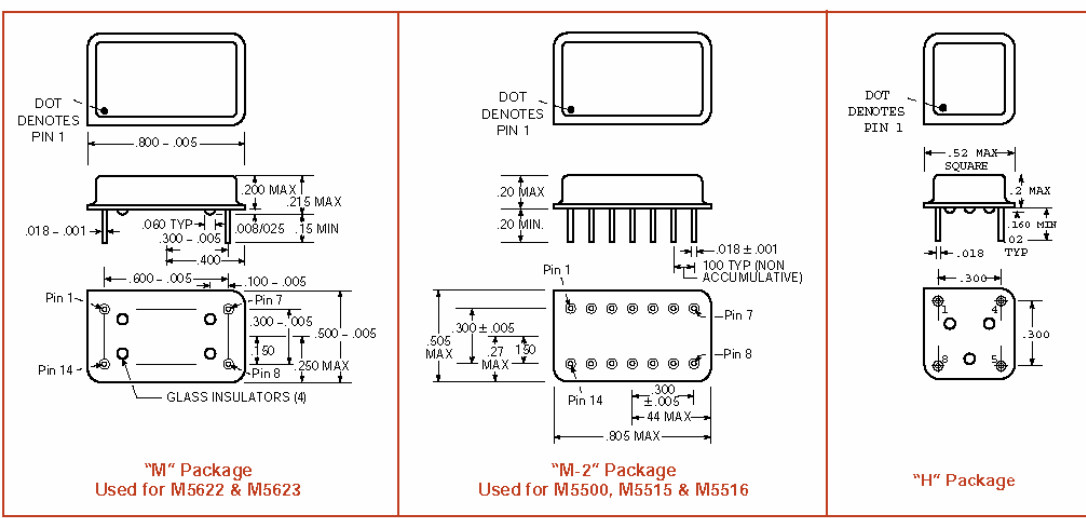
**Typical Applications**

Thru-hole PCB projects requiring high reliability HCMOS clock waveforms

**Description**

These high reliability oscillators provide HCMOS clock waveforms for applications subjected to the most stringent environmental conditions. They are through-hole mechanically robust oscillators. The "M-2" package has 14 pins which provides greater holdability onto the pc board. Each oscillator is burned-in at 125°C for 168 hours, temperature cycled and centrifuged and fully tested in accordance with Table 1. Reliability tests are performed per Table 2. The calculated MTBF is 1.4 X 10<sup>6</sup> hours at 125°C.

Full Size		Half Size		Operating Temperature	Frequency Stability
Model	Package	Model	Package		
M5500, M5516	M-2			-55 to +125°C	+/-75 ppm
M5515	M-2			0 to 70°C	+/-50 ppm
M5622	M	H5622	H	-55 to +85°C	+/-50 ppm
M5623	M	H5623	H	-55 to +125°C	+/-75 ppm





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**ELECTRICAL SPECIFICATIONS**

**Frequency Range**

M5500, M5515, M5516, M5622, M5623- 1 Hz to 125 MHz  
 H5622, H5623-1KHz to 125 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	5.5	volts
<b>Input Current</b>				
Frequency at 1 KHz or above		30	55	mA
Frequency below 1 KHz		35	60	mA
<b>Frequency Accuracy</b>	See Preceding Table			
<b>Waveform Symmetry</b>				
Measured at 1.5V	40/60		60/40	percent
<b>Rise and Fall Times</b>				
Below 10 MHz				
0.8 to 2.4volts		5	15	ns
10 MHz and above,				
0.8 to 2.4 volts		2	5	ns
<b>“Zero” Level,</b>				
Sinking 16 mA			0.5	volts
<b>“One” Level</b>				
Sourcing 400 microAmps	4.5			volts
Sourcing to 10 TTL loads	2.5			volts
<b>Frequency Change</b>				
From +5.5 to +5.0V		+/-5	+/-10	ppm
From +4.5 to +5.0V		+/-5	+/-10	ppm
<b>Aging</b>				
First year		3		ppm
After first year		1		ppm/yr

Pin	M5500	M5515, M5516	M5622, M5623
1.	Case	N.C	Case & Electrical Ground
2.	N.C.	N.C.	Pins 2 thru 6 are not present
3.	N.C.	N.C.	
4.	N.C.	N.C.	
5.	N.C.	N.C.	
6.	N.C.	N.C.	
7.	Electrical Ground	Case & Electrical Ground	Case & Electrical Ground
8.	Output	Output	Output
9.	N.C.	N.C.	Pins 9 thru 13 are not present
10.	N.C.	N.C.	
11.	N.C.	N.C.	
12.	N.C.	N.C.	
13.	N.C.	N.C.	
14.	+5V, V <sub>DD</sub>	+5V, V <sub>DD</sub>	+5V, V <sub>DD</sub>

**ENVIRONMENTAL SPECIFICATIONS**

**Shock-** MIL-STD 883, Method 2002, Test Condition B (1500 peak g, 0.5 ms duration, ½ sine wave, 5 shocks in 6 planes)

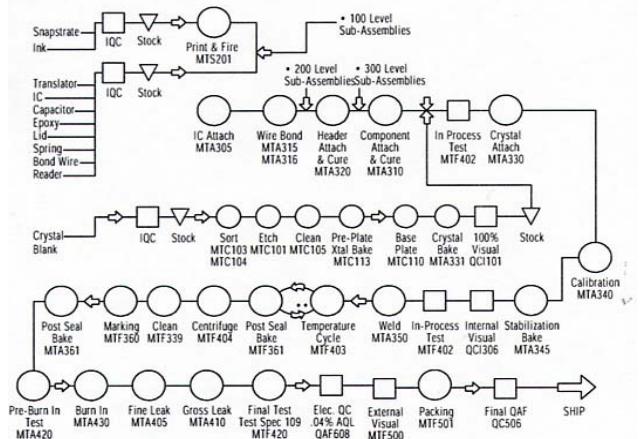
**Vibration-** MIL-STD 883, Method 2007, Test Condition A (20-2000 Hz of .06” d.a. or 20 Gs, whichever is less)

**Humidity-** Resistant to 85° R.H. at 85°C

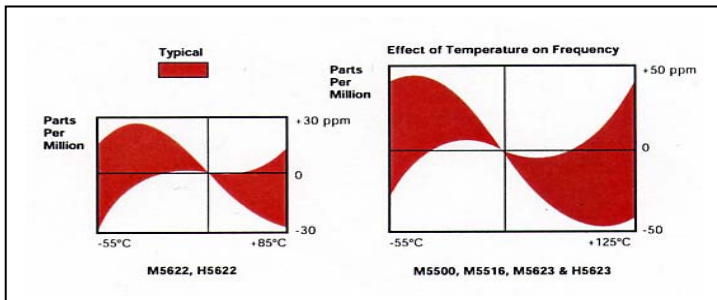
**CONNECTIONS**

	Half Size
<b>Pin 1.</b>	Not Used
<b>Pin 4.</b>	Ground and Case
<b>Pin 5.</b>	Output
<b>Pin 8.</b>	+5V, V <sub>DD</sub>

**PROCESSING FLOW CHART**

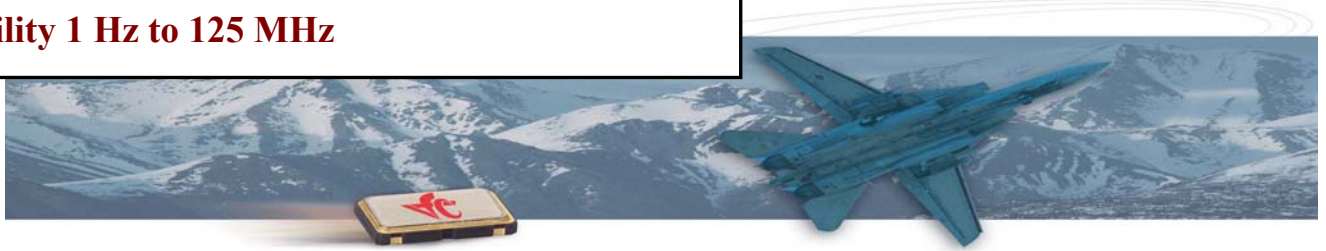


**NOTE:** • Indicates where Sub-Contracted Assemblies and Sub-Assemblies enter the Manufacturing Line.  
 All Sub-Contracted Assemblies and Sub-Assemblies are inspected to QC1307 and stored in stock until needed.  
 •• Indicates Post Seal Bake and Temperature Cycle Processes may be performed in reverse order.





**M5500 Series**  
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**High Reliability 1 Hz to 125 MHz**



**MECHANICAL DESCRIPTION**

- Case-** Stainless Steel  
**Marking-** Valpey part number, date code, serial number and description. Markings will withstand MIL-STD 202, Method 215.  
**Optional Marking-** Customer part number if required  
**Leads-** Kovar, nickel plated, gold flash  
**Shock-** MIL-STD 883, Method 2002, Test Condition B  
**Vibration-** MIL-STD 883, Method 2007, Test Condition A

**TABLE 1**

Each unit undergoes the following:

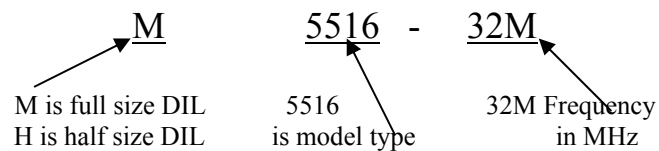
1. Stabilization Bake MIL-STD-883 Method 1008, Cond. B
2. Temperature Cycling MIL-STD-883 Method 1010, Cond. B
3. Centrifuge MIL-STD-883 Method 2001, Cond. A
4. Burn-in MIL-STD-1015 1015, Cond. B  
(125°C for 168 hours with bias)
5. Fine Leak MIL-STD-883 Method 1014, Cond. A1
6. Gross Leak MIL-STD-883, Method 1014, Cond. C
7. Electrical Test at 25°C and temperature extremes, as follows:

- |                    |                       |
|--------------------|-----------------------|
| A. Frequency*      | F. Duty Cycle (FL)    |
| B. Current         | G. Frequency at 5.5V  |
| C. Rise Time (FL)  | H. Frequency at 4.5V  |
| D. Fall Time (FL)  | I. "Zero" logic level |
| E. Duty Cycle (NL) | J. "One" logic level  |

\*Within 75 ppm from -55 to +125°C (M5500, M5516 and M5623)  
 Within 50 ppm from 0 to +70°C (M5515)  
 Within 50 ppm from -55 to +85°C (M5622)

**HOW TO ORDER**

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



**TABLE 2- RELIABILITY TEST PROCEDURE AND CONDITIONS FOR QUARTZ CRYSTAL OSCILLATORS**

I. Group A			
Electrical Characteristics at -55°, (0° for '5515), 25° and 125° (70° for M5515 and 85° for M5622)			
Frequency @ 4.5, 5.0 and 5.5 volts (for 5 volts units)			
Symmetry (Duty Cycle)			
Input current			
Zero/One levels			
Rise/Fall times			
Physical Dimensions			
Length/width			
Height			
Package finish (Corrosion, discoloration, etc.)			
Marking placement/legibility			
II. Group B- Life Test			
1000 hrs at 125°C with bias and load			
III. Group C- All units have passed Group A testing			
A. Subgroup 1-8 pcs.			
Standard	Condition	Description	End point measurement
MIL-STD-883	Method 2002 COND.B	Mechanical Shock 1500 g's, 5ms 5 drops, 6 axis	Frequency Output Waveform
MIL-STD-883	Method 2007 COND. A.	Vibration, var. freq. 20 g's, .06" disp., 20- 20, 000-20 Hz	Frequency Output waveform
MIL-STD-883	Method 2003	Solderability	Visual 95% coverage
B. Subgroup 2-4 pcs (One-half of Subgroup 1)			
MIL-STD-883	Method 1011 COND. B	Thermal Shock Liq. To liq. 15 cycles	Frequency Output waveform
MIL-STD-202	Method 105 COND. B	Altitude, 3.44 inch Hg. 12 hrs	Frequency Output waveform
MIL-STD-883	Method 1004	Moisture resist. With 5V applied 25-65°C, 90 to 100% RH, 10 cycles	Frequency Output waveform
MIL-STD-202	Method 210 COND.A	Resistance to Solder Heat Immersion @350°C 3.5 sec	Frequency Output waveform
C.Subgroups 3-4 pcs. (One half of Subgroup 1)			
Standard	Condition	Description	End point measurement
MIL-STD-883	Method 1009 COND. A	24 hrs. @ -55°C 24 hrs. @ 125°C Salt Atmosphere 24 hrs. @ 35°C .5-3.0% Solution Fine Leak	Frequency Output waveform Frequency Output waveform Visual Qs <5 X10 <sup>8</sup>
MIL-STD-883	Method 1014 COND. B	Gross Leak	Visual in 125°C Detector fluid