

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

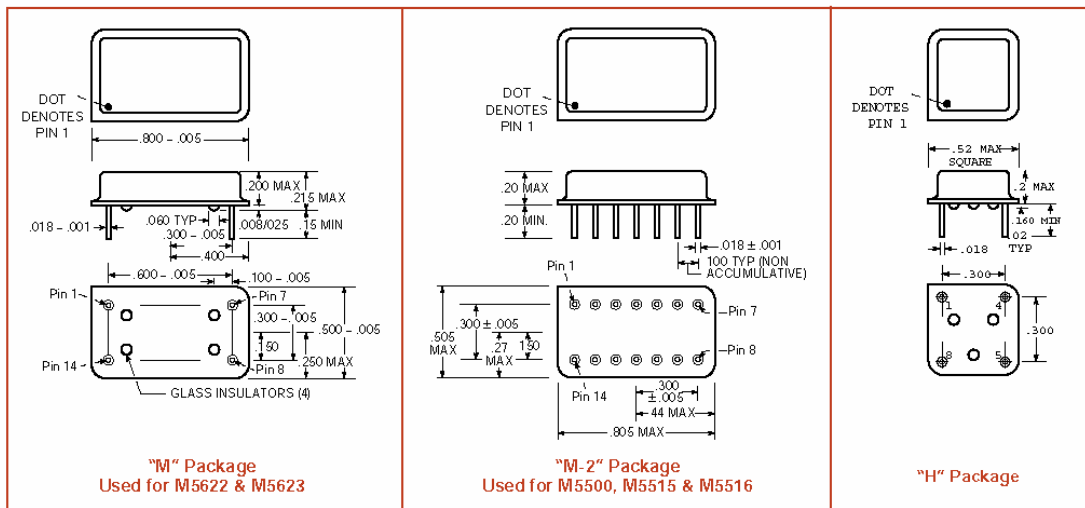
Typical Applications

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 1.4×10^6 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
Input Voltage,	4.5	5.0	5.5	volts
Input Current				
Frequency at 1 KHz or above		30	55	mA
Frequency below 1 KHz		35	60	mA
Frequency Accuracy	See Preceding Table			
Waveform Symmetry				
Measured at 1.5V	40/60		60/40	percent
Rise and Fall Times				
Below 10 MHz				
0.8 to 2.4volts		5	15	ns
10 MHz and above,				
0.8 to 2.4 volts		2	5	ns
“Zero” Level,				
Sinking 16 mA			0.5	volts
“One” Level				
Sourcing 400 microAmps	4.5			volts
Sourcing to 10 TTL loads	2.5			volts
Frequency Change				
From +5.5 to +5.0V		+/-5	+/-10	ppm
From +4.5 to +5.0V		+/-5	+/-10	ppm
Aging				
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 _{DD}	+5V, V _{DD}	+5V, V _{DD}

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)

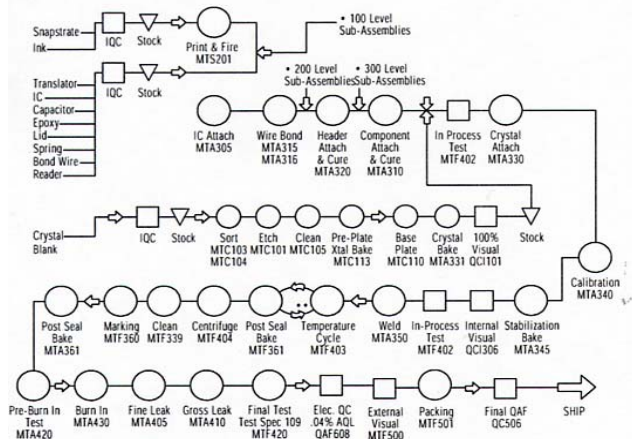
Vibration- MIL-STD 883, Method 2007, Test Condition A (20-2000 Hz of .06” d.a. or 20 Gs, whichever is less)

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

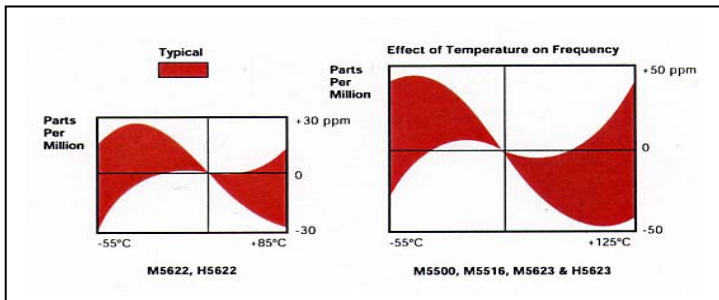
CONNECTIONS

	Half Size
Pin 1.	Not Used
Pin 4.	Ground and Case
Pin 5.	Output
Pin 8.	+5V, V _{DD}

PROCESSING FLOW CHART

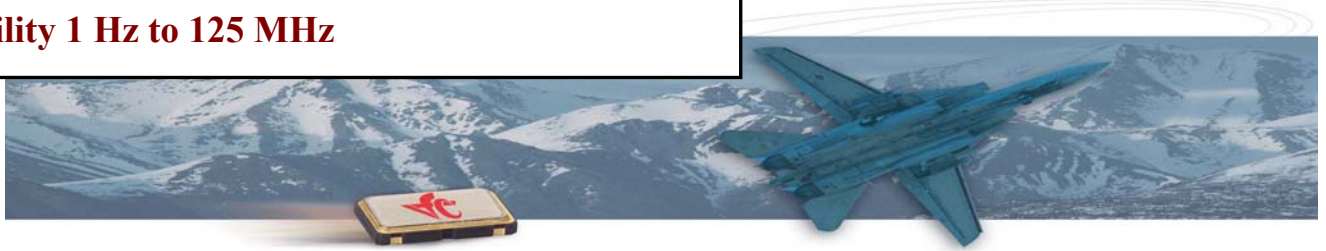


NOTE: • Indicates where Sub-Contracted Assemblies and Sub-Assemblies enter the Manufacturing Line.
 All Sub-Contracted Assemblies and Sub-Assemblies are inspected to QC1307 and stored in stock until needed.
 •• Indicates Post Seal Bake and Temperature Cycle Processes may be performed in reverse order.





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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:

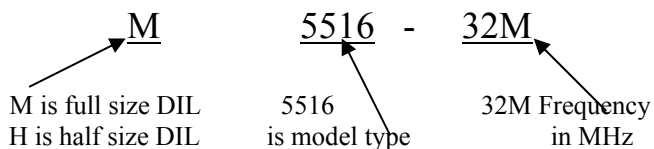


TABLE 2- RELIABILITY TEST PROCEDURE AND CONDITIONS FOR QUARTZ CRYSTAL OSCILLATORS

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	Storage Temp. 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 ⁸
MIL-STD-883	Method 1014 COND. B	Gross Leak	Visual in 125°C Detector fluid

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