T5321 Series
T5421 Series

5 x 7 mm Surface Mount High Reliability

Tristate/Non-Tristate, 1MHz to 100MHz

Valpey Fisher Corporation
Uncompromised Precision

Features

- Leadless chip carrier package is hermetically sealed for superior aging and field performance
- 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 <10 ms, typical
- Tristate option available
- Calculated MTBF is 3.8×10^6 hours at 125°C

RoHS Status

RoHS 6/6

Application

- Surface Mounted PCB projects requiring high reliability CMOS clock waveforms

Description

These high reliability oscillators provide HCMOS clock waveforms for applications subjected to the most stringent environmental conditions. They are mechanically robust and weigh less than 0.2 grams. This 5x7mm SMD package has a hermetic seal, thus ensuring the integrity of each oscillator. Each oscillator is burned-in at 125°C for 168 hours, temperature cycled and centrifuged then fully tested in accordance with Table 1. Reliability tests are performed per Table 2. The calculated MTBF is 3.8×10^6 at 125°C.

Electrical Specifications

Parameter	Symbol	Condition	Min	Typ	Max	Unit	Note
Frequency Range	F		1		100	MHz	
Frequency Stability	ΔF/F	Vs. Operating Temperature	±25		±75	ppm	See Chart
		Aging 1st Year After 1st Year			±3 ±1		
Operating Temperature Range	T		-55°		+125°	°C	See Chart
Input Voltage	Vcc		3.00	3.30	3.6	V	
Input Current	Icc				16	mA	
Waveform Symmetry		Measured at 50% V_{DD}	40/60	45/55	60/40	%	
Rise / Fall Time	Tr/Tf	CMOS, 15pF, 20% to 80% (<60MHz) 20% to 80% (≥60MHz) CMOS, 30pF, 20% to 80% (<60MHz) 20% to 80% (≥60MHz)		 3.0 2.0 4.0 3.0	 4.0 2.5 5.0 4.5	ns	
Output Level	"Zero" Level "One" Level	Sinking 16mA Sourcing 8mA	 V_{DD}-0.4		0.4	V	
Input requirement for pin.1		Output enable - Output disable (Tristate)	pin 1 may float or 2.8V min (sourcing 400 uA) pin 1 requires 0.4V max (sinking 400 uA)				

Environmental and Mechanical Conditions

Parameter	Condition
Shock	1000 Gs, 0.35 ms, ½ sine wave, 3 shocks in each plane
Vibration	10-2000 Hz of .06" d.a. or 20Gs, whichever is less
Humidity	Resistant to 85° R.H. at 85°C
Leak	Per MIL-STD-883, Method 1014, Cond. A1 and C1
Case	Hermetically sealed ceramic LCC
Pads	40 microinch of gold over nickel
Resistance to Solvents	Per MIL-STD-202, Method 215
Marking	Epoxy ink or laser engraved

FIXED OUTPUT	TRISTATE	Operating Temperature	Frequency Stability
Model	Model		
T5321	T5421	-55°C to +85°C	±25 ppm
T5322	T5422	-55°C to +85°C	±50 ppm
T5323	T5423	-55°C to +125°C	±75 ppm
T5324	T5424	-55°C to +125°C	±50 ppm

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. Constant Acceleration	MIL-STD-883 Method 2001, Cond, A
4. Burn-in	MIL-STD-883 Method 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
B. Current	G. Frequency at 3.65V
C. Rise Time	H. Frequency at 3.0V
D. Fall Time	I. "Zero" logic level
E. Duty Cycle	J. "One" logic level
K. Tristate	

Test Data on each unit is available for additional cost

Thermal Characteristics
Thermal Resistance

From Junction to Case, RØjc 16 °C/Watt

Surface Mount Application
These packages are designed for reflow soldering in accordance with recommended profiles. For hand-soldering, the temperature of the iron should not exceed 400°C for three seconds.

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How to Order

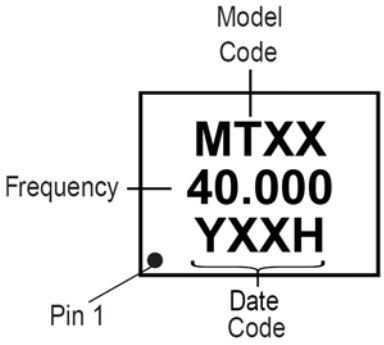
T **5322** – **40M**

5322 is model type

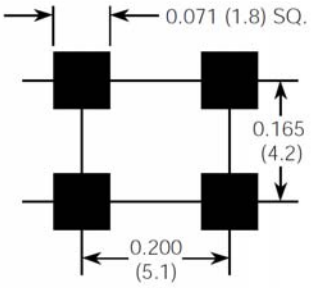
40M Frequency in MHz

Marking Specification

The format for the marking is:

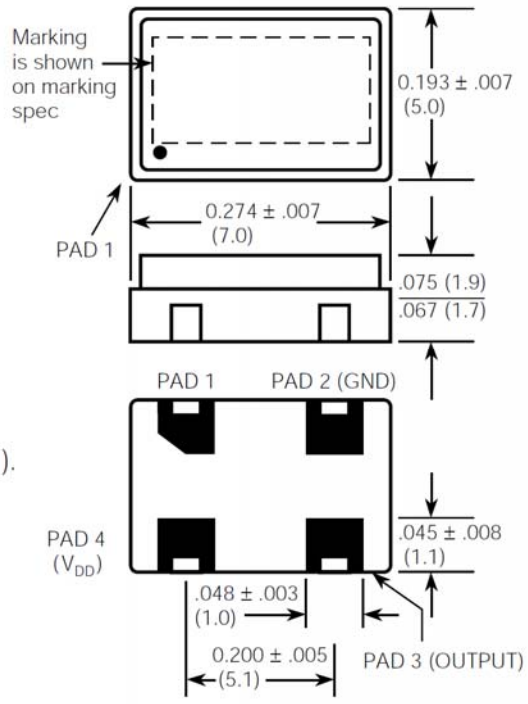


Package



SUGGESTED PC PADS

Millimeters are shown in ( ).



Pin #	T5321-5324	T5421-T5424
Pin 1	Not Connected	Tristate
Pin 2	Ground	Ground
Pin 3	Output	Output
Pin 4	+3.3V, V_{DD}	+3.3V, V_{DD}

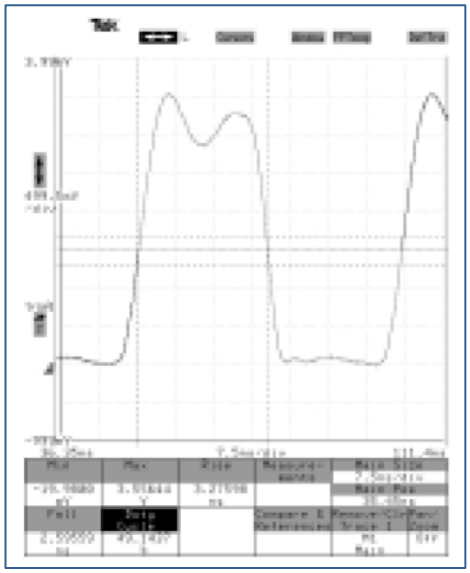


Fig.1 T5322-20M with 25pf load

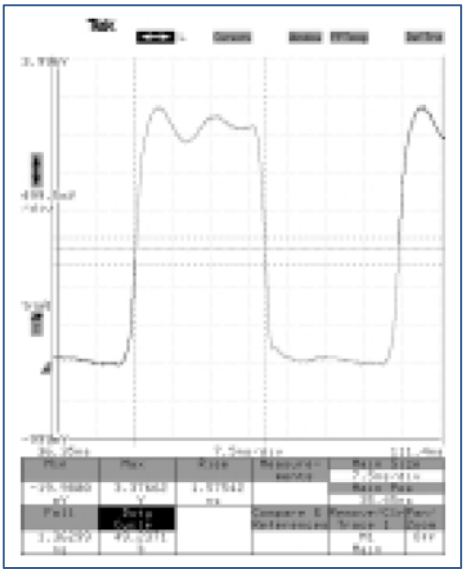
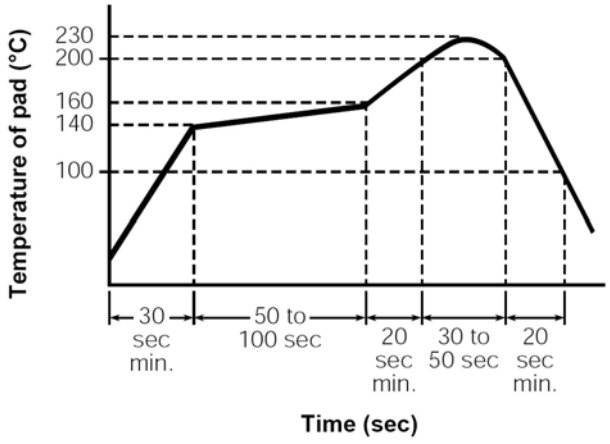
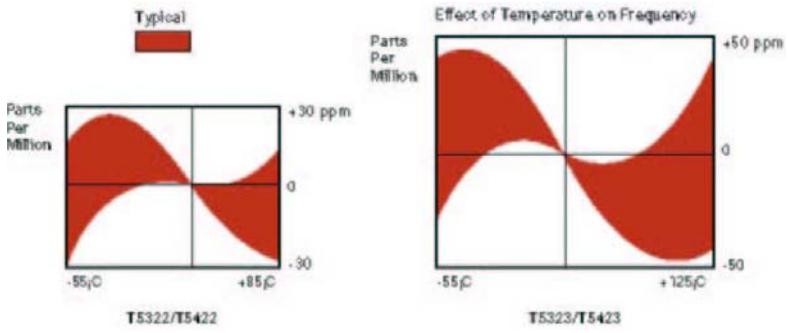


Fig.2 T5322-20M without load



Recommended Reflow Soldering Profile



PROCESSING FLOW CHART

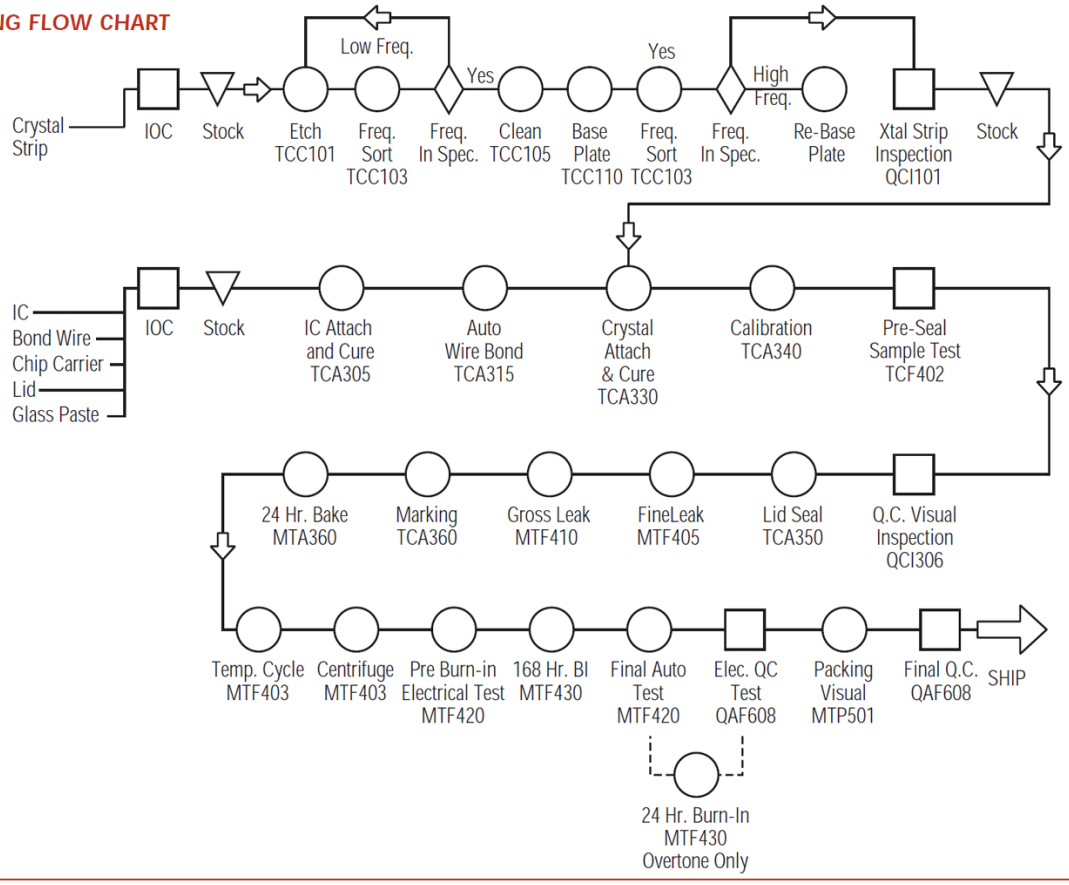


TABLE 2
Reliability Test Procedures and Conditions for Quartz Crystal Oscillators

1. Group A

Electrical Characteristics at -55°C, 25°C and 125°C
(85°C for T5322 and T5422)
Frequency @ 3.0, 3.3 and 3.6 volts
Symmetry (Duty Cycle)
Input current
Zero/One levels
Rise/Fall times
Physical Dimensions
Length/width
Height
Package finish (Corrosion, discoloration, etc.)
Marking placement/legibility

2. Group B- Life Test

1000 hrs at or above 125°C, 3.3V VDC, with proper load

3. 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, 0.5ms 5 drops, 6 axis	Frequency Output waveform
MIL-STD-883	Method 2007 COND. A.	Vibration, var. freq. 20 g's, 0.06" 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)

Standard	Condition	Description	End point Measurement
MIL-STD-883	Method 1011 COND. B	Thermal Shock Liq. To liq. -55°C to 125°C, 15cycles	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 3.3V applied 25°C to 65°C, 90 to 100% RH, 10 cycles	Frequency Output waveform
MIL-STD-202	Method 210 COND.A	Resistance to Solder Heat Immersion @350ºC 3.5 sec	Frequency Output waveform

C. Subgroups 3-4 pcs. (One half of Subgroup 1)

Standard	Condition	Description	End point Measurement
	Storage Temp. No. Oper	24 hrs. @ -55°C 24 hrs. @ 125°C	Frequency Output waveform
MIL-STD-883	Method 1009 COND. A	Salt Atmosphere 24 hrs. @ 35°C 0.5-3.0% Solution	Frequency Output waveform Visual
MIL-STD-883	Method 1014 COND. A1	Fine Leak	Qs <5 X10^{-8}
MIL-STD-883	Method 1014 COND. C1	Gross Leak	Visual in 125°C Detector fluid