


**Series T7250-T7258, T9250-T9258,  
T7001-T7013, T9301-T9313**  
**Extended Temperature/COTS**  
**XO, 3.3V**

**Features**

- 20kHz to 100MHz frequency range
- 5X7 SMD form factor
- Hermetically sealed for rugged environmental conditions
- Extremely wide operating temperature range accommodates harsh environments
- Crystals are processed with tight angle control to assure best frequency-temperature characteristics
- Units are vacuum baked before sealing at 175°C for 16 hours to eliminate moisture traces and pre-age units for superior stability
- Tristate feature optional
- Equivalent 5V parts are available in [T1250 series](#)
- Solder coating of outer pads upon request.



**RoHS Status**



RoHS  
6/6

**Tinned pad parts are  
5/6 RoHS compliant**

**Description**

Owing to their small size, light weight, and rugged characteristics, these 3.3V HCMOS extended temperature/COTS oscillators fulfill tasks not previously feasible. They are used in applications that take advantage of their extended temperature range and high performance. Twenty four different models (with and without tristate) cover -55°C to +200°C operation and provide frequency selection from 20kHz to 100MHz. They combine excellent long-term reliability, loading characteristics, and superior startup performance.

**Applications**

- Applications that require an HCMOS 3.3V clock and might be exposed to extremely harsh environmental conditions.

**Electrical Specifications**

Parameter	Symbol	Condition	Min	Typ	Max	Unit	Note	
Frequency Range	F		0.02		100	MHz		
Frequency Stability	$\Delta F/F$	Overall condition including calibration, temperature voltage and load variation	$\pm 25$		$\pm 500$	ppm	See Chart	
Operating Temperature	T		-55°		+200°	°C	See Chart	
Aging		First Year After First Year		3 1		ppm ppm/yr	85C	
Supply Voltage	V <sub>CC</sub>		3.0	3.3	3.6	V		
Supply Current					20	mA		
Output		All units, full range Loads 3 TTL loads, or 10 LSTTL loads, or 15pF CMOS						
Symmetry		TTL and LSTTL @ 1.4V CMOS, @ 50% V <sub>DD</sub>		40/60 40/60		%		
Rise and Fall Times		TTL and LSTTL from 0.4 to 2.4V CMOS, 15 pF, from 0.4 to (V <sub>DD</sub> -0.4) V CMOS, 30 pF, from 0.4 to (V <sub>DD</sub> -0.4) V			8 8 10	ns		
Input requirement for pin.1		Output enable - Output disable (Tristate)	pin 1 may float or 2.8V min pin 1 requires 0.4V max					

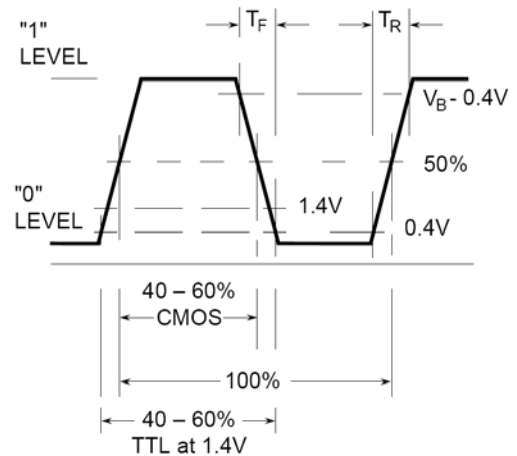
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**Environmental and Mechanical Conditions**

Parameter	Condition
Shock	1000 Gs, 0.35 ms, ½ sine wave, 3 shocks in each plane
Vibration	10-2000 Hz of 0.06" d.a. or 20 Gs, whichever is less
Humidity	Resistant to 85° R.H. at 85°C
Gross Leak	Each unit checked in 125°C fluorocarbon
Fine Leak	Mass spectrometer leak rate less than $2 \times 10^{-8}$ atm, cc/sec of helium
Case	Hermetically sealed ceramic LCC
Pads*	40 microinch of gold over nickel or tinned (solder coated)
Marking	Epoxy ink or laser engraved
Resistance to Solvents	MIL STD 202, Method 215

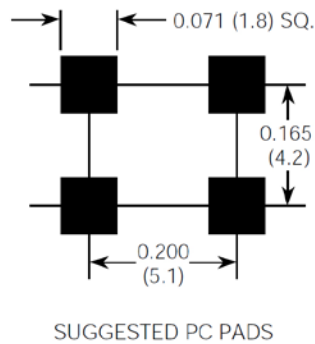
\*Tinned by hot dip solder in accordance with MIL-M38510 (63/37 Sn/Pb).

FIXED OUTPUT	TRISTATE	Frequency Stability	Operating Temperature	
Model	Model			
T7250	T9250	±75ppm	-40° to +85°C	
T7254	T9254	±100 ppm	0° to +175°C	
T7256	T9256	±75 ppm	-55° to +85°C	
T7258	T9258	±100 ppm	-40° to +85°C	
T7001	T9301	±500 ppm	-55° to +200°C	
T7002	T9302	±500 ppm	0° to 200°C	
T7003	T9303	±250 ppm	-55° to +200°C	
T7004	T9304	±250 ppm	0° to +200°C	
T7005	T9305	±250 ppm	-55° to +175°C	
T7006	T9306	±250 ppm	0° to +175°C	
T7007	T9307	±150 ppm	-55° to +175°C	
T7008	T9308	±150 ppm	0° to +175°C	
T7009	T9309	±100 ppm	-55° to +125°C	
T7010	T9310	±50 ppm	-55° to +85°C	
T7011	T9311	±25 ppm	-55° to +85°C	
T7012	T9312	±75 ppm	-55° to +125°C	
T7013	T9313	±50 ppm	-55° to +125°C	

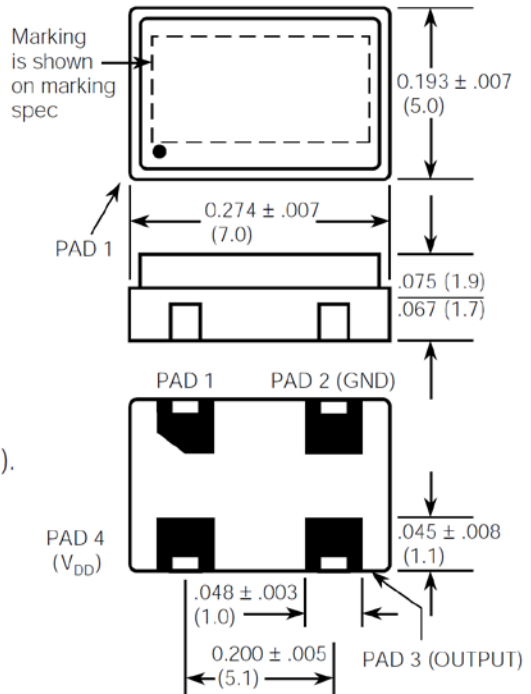


**Waveforms**

### Package Outline



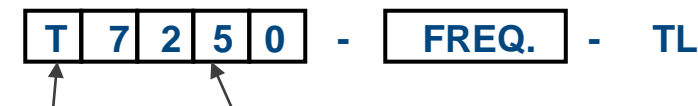
Millimeters are shown in ( ).



### Pin Assignments

Pin	Non-Tristate Models	Tristate Models
1	NOT USED	Floating or 1 : Oscillator runs Ground or 0 : Disable or Tristate
2	Ground and Case	
3	Output	
4	+3.3V, V <sub>DD</sub>	

### How to Order

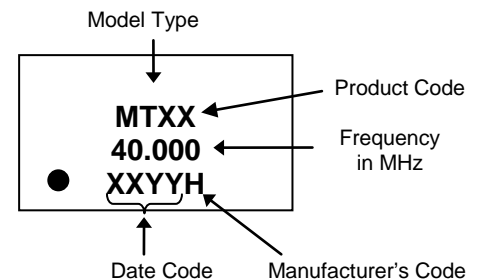


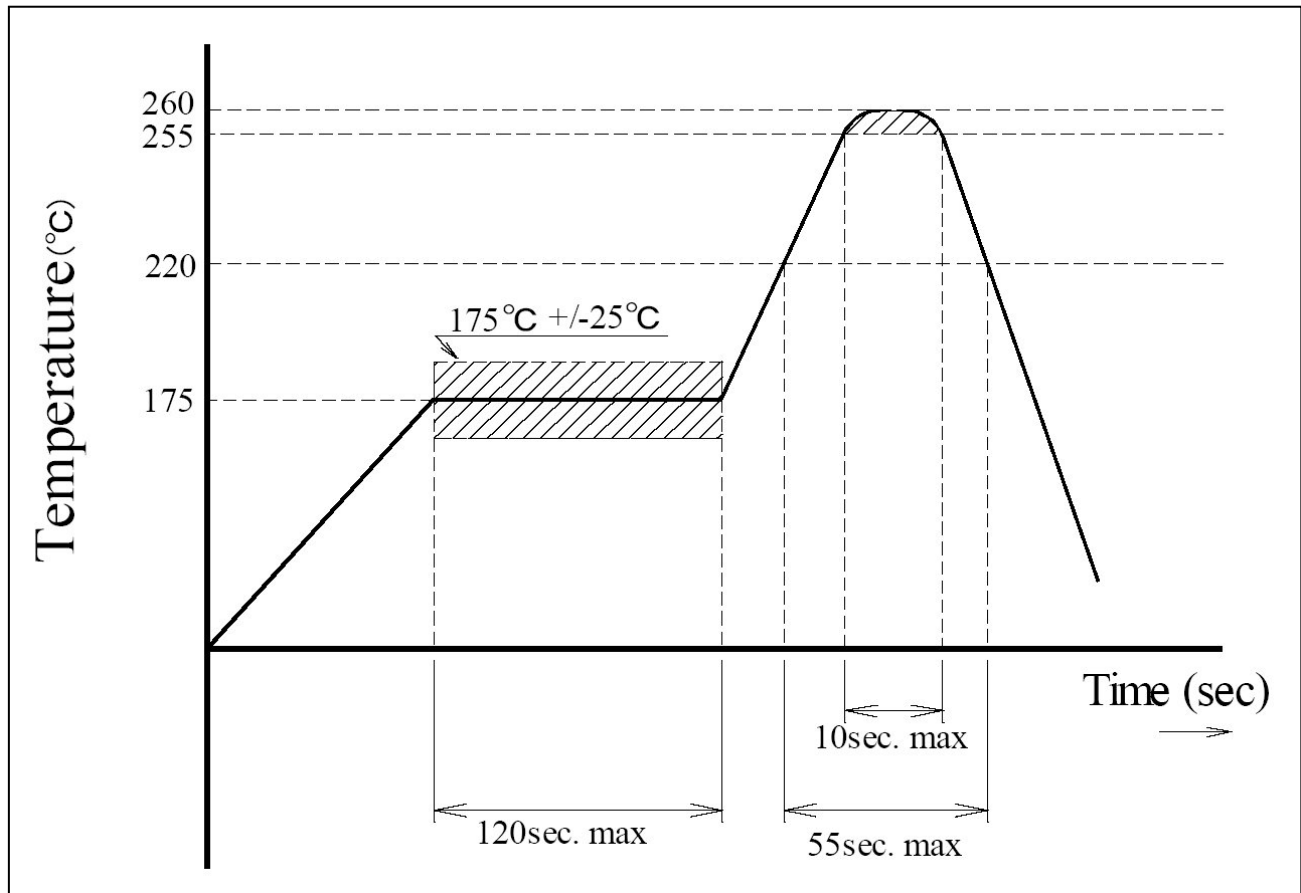
"T" is SMD (gold pads) T package

"7250" is model type

" " is none  
"TL" is tinned pads\*  
\*5/6 RoHs compliant

### Marking Specification





**Recommended Reflow Soldering Profile**

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**TABLE 2  
Reliability Test Procedures and Conditions for Quartz Crystal Oscillators**

**1. Group A**

Electrical Characteristics at 25°C

- Frequency at nominal supply voltage and endpoints
- Input current
- Symmetry (Duty Cycle)
- Zero/One levels
- Rise/Fall times
- Frequency (verify frequency at the temperature extremes)

Physical Dimensions

- Length/width
- Height
- Package finish (Corrosion, discoloration, etc.)
- Marking placement/legibility

**2. Group B**

1000 hrs at or above 125°C, nominal voltage, proper load  
(sample size by MIL -PRF-55310 table 6, max. aging within 15  
years requirement without catastrophic failures)

**3. Group C- All units have passed Group A testing**

**A. Subgroup 1: 8 pcs.**

<u>Standard</u>	<u>Condition</u>	<u>Description</u>	<u>End Point Measurement</u>
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)**

<u>Standard</u>	<u>Condition</u>	<u>Description</u>	<u>End point Measurement</u>
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 supply voltage 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 @350°C 3.5 sec	Frequency Output waveform

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

<u>Standard</u>	<u>Condition</u>	<u>Description</u>	<u>End point Measurement</u>
	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. A	Fine Leak	Qs <5 X10 <sup>-8</sup>
MIL-STD-883	Method 1014 COND. C	Gross Leak	Visual in 125°C Detector fluid

Test data is available for additional cost.