

**Series T7250-T7258, T9250-T9258,
T4001-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](#)



RoHS Status



Applications

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

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.

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 | ± 25 | | ± 500 | ppm | See Chart | |
| Operating Temperature | T | | -55° | | +200° | °C | See Chart | |
| Aging | | First Year After First Year | | 3 1 | | ppm ppm/yr | | |
| Supply Voltage | V _{CC} | | 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 _{DD} | | 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 _{DD} - 0.4) V CMOS, 30 pF, from 0.4 to (V _{DD} - 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 | | | | | |



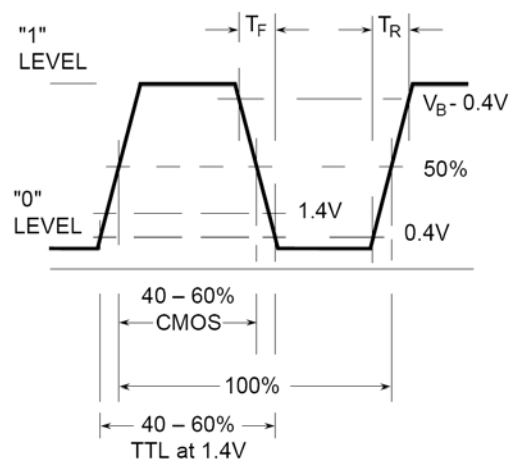
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Environmental and Mechanical Conditions

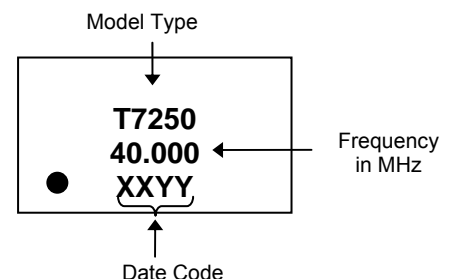
| Parameter | Specification |
|------------------------|--|
| Shock | 1000 Gs, 0.35 ms, ½ sine wave, 3 shocks in each plane |
| Vibration | 10-2000 Hz of 0.06" d.a. or 20 Gs, whichever is less |
| Humidity | Resistant to 85° R.H. at 85°C |
| Gross Leak | Each unit checked in 125°C fluorocarbon |
| Fine Leak | Mass spectrometer leak rate less than 2×10^{-8} atm, cc/sec of helium |
| Case | Ceramic with glass hermetic seal |
| 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 |

| FIXED OUTPUT | TRISTATE | | |
|--------------|----------|---------------------|-----------------------|
| Model | Model | Frequency Stability | Operating Temperature |
| 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

Marking Specification



How to Order

T 7 2 5 0 - FREQ. - TL

"T" is SMD (gold pads) T package

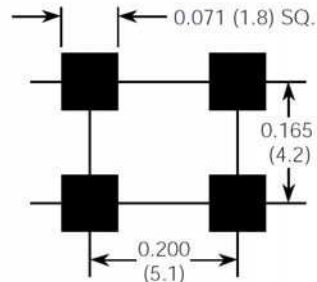
"7250" is model type

" " is none "TL" is tinned pads



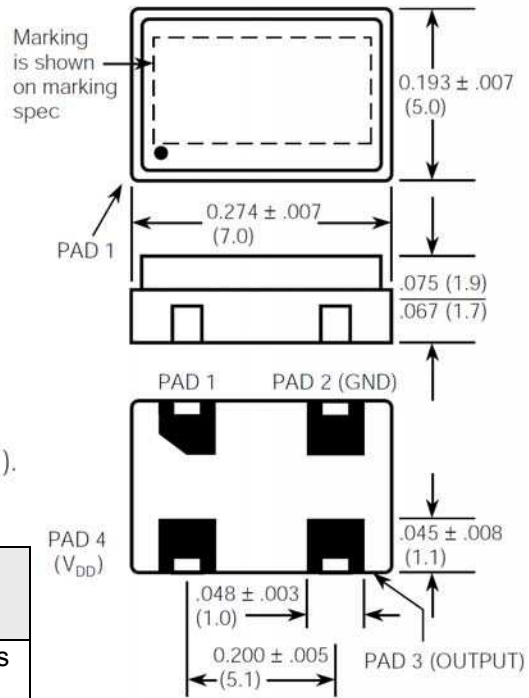
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Package Outline



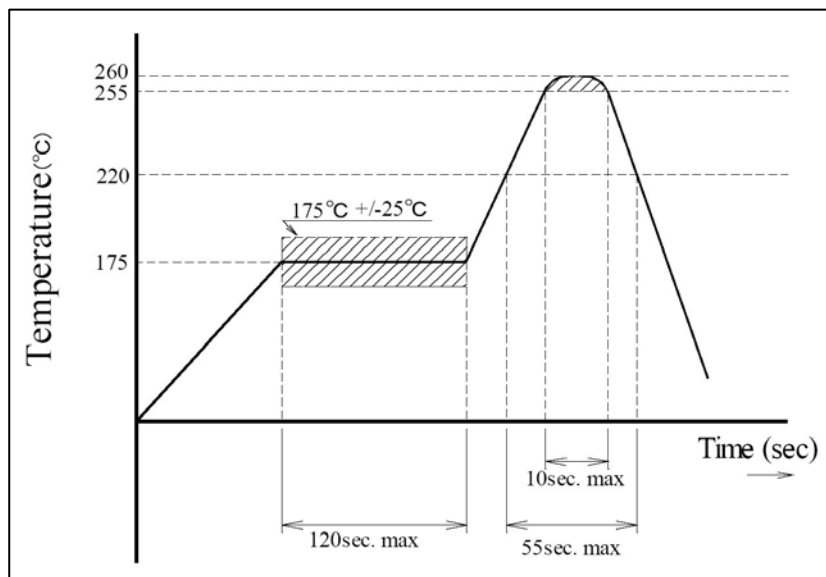
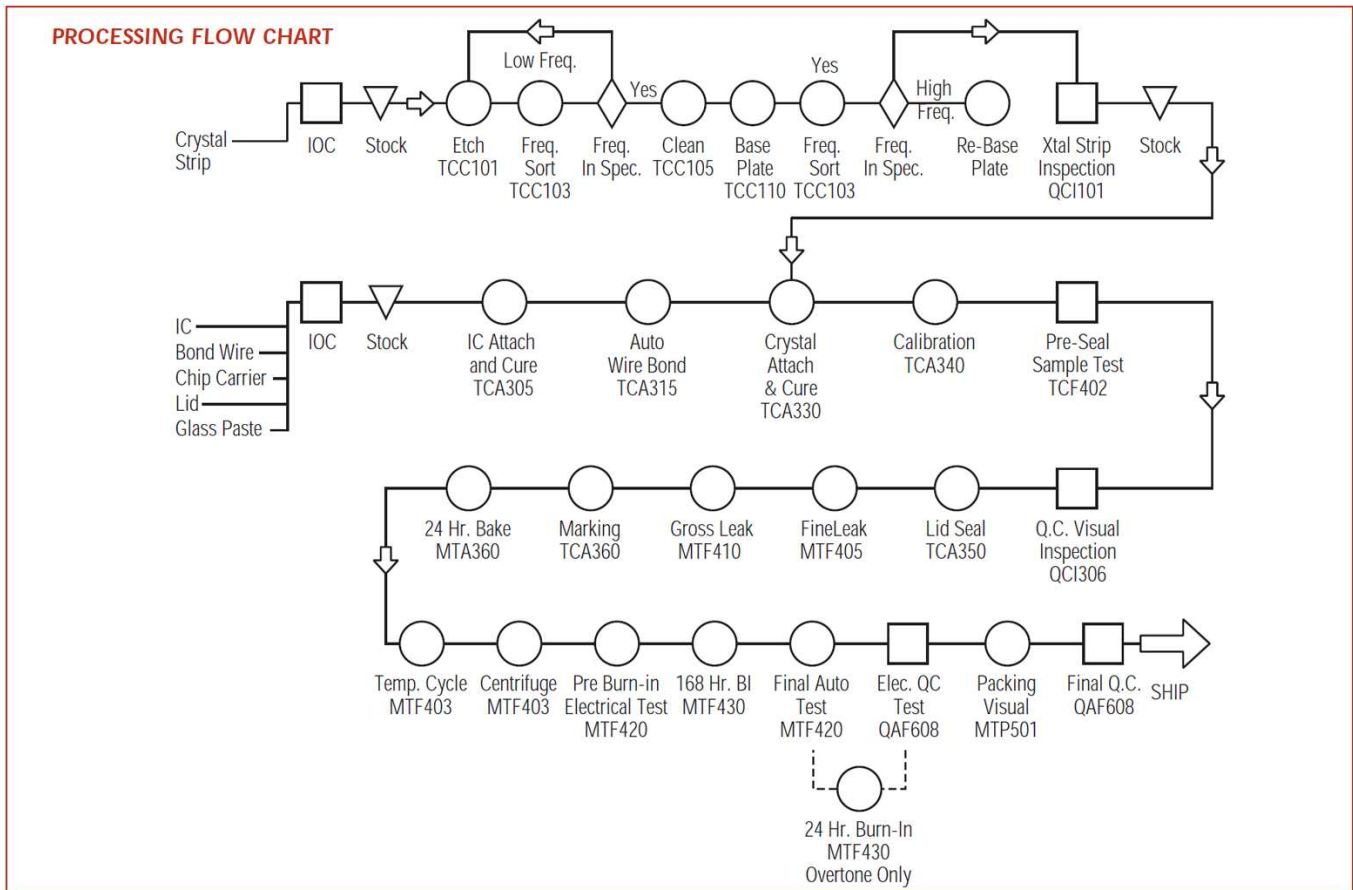
SUGGESTED PC PADS

Millimeters are shown in ().



| 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 _{DD} | |

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Recommended Reflow Soldering Profile

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

| 1. Group A | | | | B. Subgroup 2-4 pcs (One-half of Subgroup 1) | | | |
|--|------------------|--------------------|------------------------------|--|------------------|--------------------|------------------------------|
| Electrical Characteristics at temperature endpoints and 25°C | | | | <u>Standard</u> | <u>Condition</u> | <u>Description</u> | <u>End point Measurement</u> |
| Frequency @ 3.0, 3.3, and 3.6 volts | | | | MIL-STD-883 | Method 1011 | Thermal Shock | Frequency |
| Symmetry (Duty Cycle) | | | | | COND. B | Liq. To liq. | Output waveform |
| Input current | | | | | | -55°C to 125°C, | |
| Zero/One levels | | | | | | 15 cycles | |
| Rise/Fall times | | | | | | | |
| Physical Dimensions | | | | MIL-STD-202 | Method 105 | Altitude, 3.44 | Frequency |
| Length/width | | | | | COND. B | inch Hg. 12 hrs | Output waveform |
| Height | | | | | | | |
| Seal (Visual) | | | | MIL-STD-883 | Method 1004 | Moisture resist. | Frequency |
| Package finish (Corrosion, discoloration, etc.) | | | | | | with 3.3V applied | Output waveform |
| Marking placement/legibility | | | | | | 25°C to 65°C, | |
| | | | | | | 90 to 100% RH, | |
| | | | | | | 10 cycles | |
| 2. Group B- Life Test | | | | MIL-STD-202 | Method 210 | Resistance to | Frequency |
| 1000 hrs at or above 125°C, 3.3V VDC, with proper load | | | | | COND.A | Solder Heat | Output waveform |
| | | | | | | Immersion @350°C | |
| | | | | | | 3.5 sec | |
| 3. Group C- All units have passed Group A testing | | | | C. Subgroups 3-4 pcs. (One half of Subgroup 1) | | | |
| A. Subgroup 1-8 pcs. | | | | <u>Standard</u> | <u>Condition</u> | <u>Description</u> | <u>End point Measurement</u> |
| <u>Standard</u> | <u>Condition</u> | <u>Description</u> | <u>End Point Measurement</u> | | | | |
| MIL-STD-883 | Method 2002 | Mechanical Shock | Frequency | | | 24 hrs. @ -55°C | Frequency |
| | COND.B | 1500 g's, 0.5ms | Output waveform | | | 24 hrs. @ 125°C | Output waveform |
| | | 5 drops, 6 axis | | | | | |
| MIL-STD-883 | Method 2007 | Vibration, var. | Frequency | | | | |
| | COND. A. | freq. 20 g's, | Output waveform | | | | |
| | | 0.06" disp., 20- | | | | | |
| | | 20, 000-20 Hz | | MIL-STD-883 | Method 1009 | Salt Atmosphere | Frequency |
| | | | | | COND. A | 24 hrs. @ 35°C | Output waveform |
| | | | | | | 0.5-3.0% Solution | Visual |
| MIL-STD-883 | Method 2003 | Solderability | Visual 95% | MIL-STD-883 | Method 1014 | Fine Leak | Qs <5 X10 ⁻⁸ |
| | | | Coverage | | COND. A1 | | |
| | | | | MIL-STD-883 | Method 1014 | Gross Leak | Visual in 125°C |
| | | | | | COND. C1 | | Detector fluid |
| Test data is available for additional cost | | | | | | | |