

Description

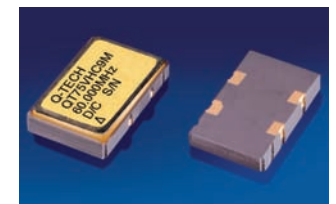
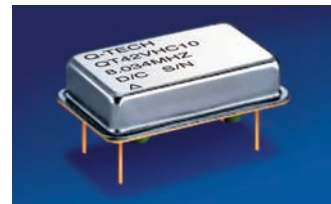
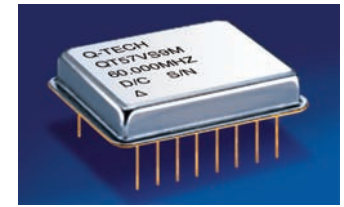
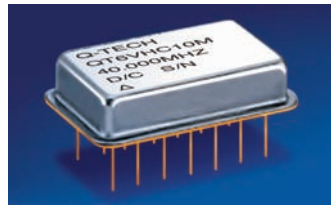
Q-Tech's voltage-controlled crystal oscillators (VCXO) consist of a varactor diode and associated circuitry such as a bipolar transistor or logic IC amplifier, logic output buffers and/or logic divider stages, and a round AT high-precision quartz crystal built in a wide selection of Dual-In-Line (DIP) or Surface -Mount (SMT) hermetically sealed packages.

Features

- Made in the USA
- ECCN: EAR99
- DFARS 252-225-7014 Compliant:
Electronic Component Exemption
- Wide frequency range from 1kHz to 155.52MHz
- Wide operating temperature range -55°C to +125°C
- Choice of output logic options (ACMOS, HCMOS, LVHCMOS, TTL, Sine, and ECL outputs)
- Supply voltage -5.2Vdc & 5Vdc ±10%
- Hermetically sealed package
- Tight or custom symmetry available
- Wide pull range up to ±500ppm (optional)
- Special linearity (<5%, <10% optional)
- Positive or Negative Transfer function
- Bipolar control ($\pm V_c$)
- Fundamental designs
- Q-Tech does not use pure lead or pure tin in its products

Applications

- Frequency synthesis
- Clock recovery
- Phase-lock loop (PLL) applications
- Telecommunication
- Applications requiring frequency modulation or electronic control of the oscillator frequency



Q-Tech offers custom design VCXOs in SMT packages (QT78, QT88) at 3.3 Vdc and 5.0Vdc up to 72MHz. Please contact Q-Tech for details.



VOLTAGE CONTROLLED (VCXO)
CRYSTAL CLOCK OSCILLATORS
-5.2Vdc & 5.0Vdc - 1kHz to 155.52MHz

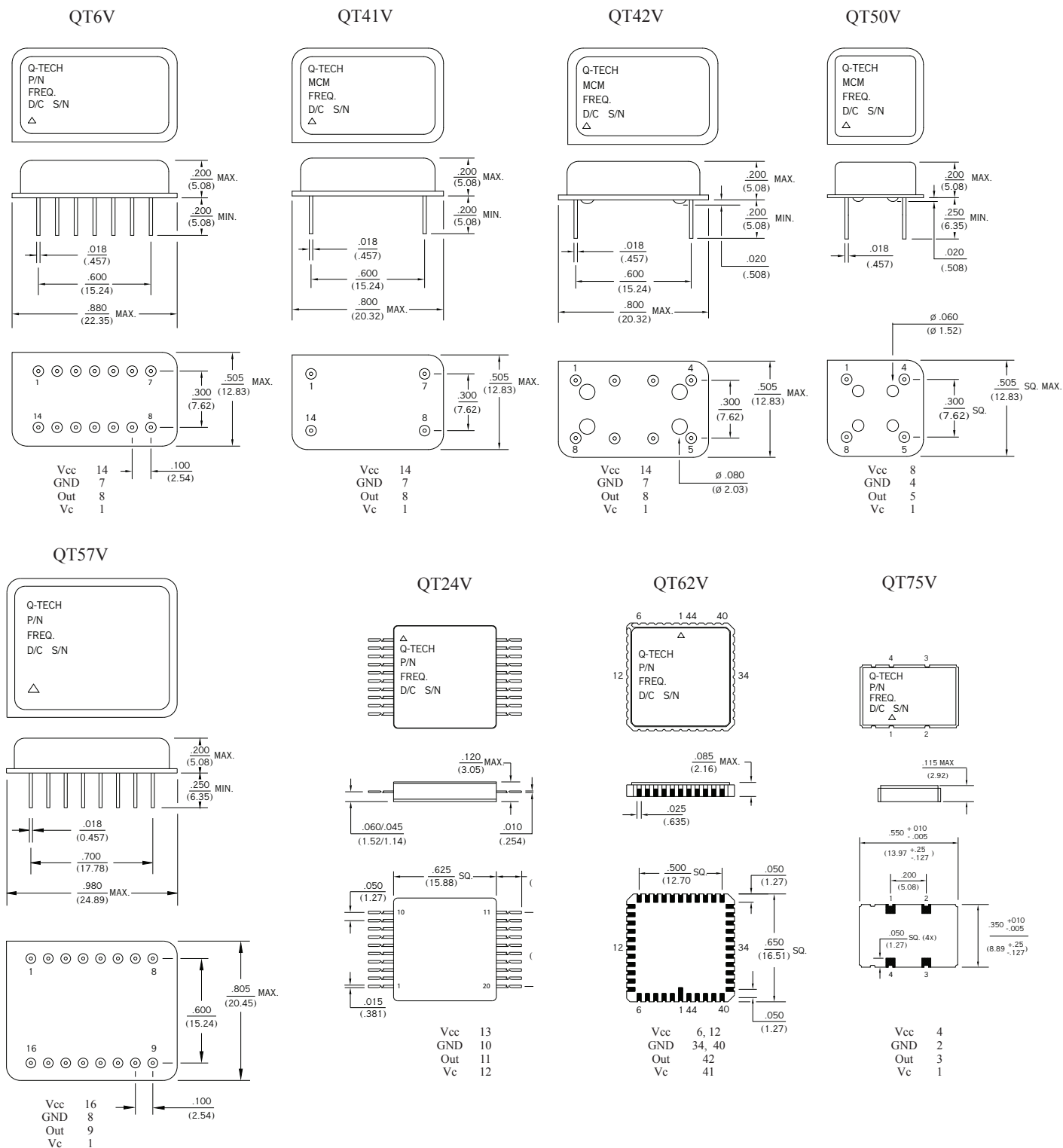
Electrical Characteristics

| Parameters | | ACMOS | HCMOS | TTL | SINE | ECL | PECL |
|--|-----------------|---|--------------|--------------------------------------|-----------------|---|--------------------|
| Output freq. range (Fo) (See note 1) | QT6, 18, 41, 42 | 375kHz — 70MHz | 1kHz — 70MHz | | 1MHz — 27MHz | 12MHz — 27MHz | |
| | QT50 | 375kHz — 27MHz | | N/A | | N/A | |
| | QT57 | 1kHz — 155.52MHz | | 1MHz — 155.52MHz | | 12MHz — 155.52MHz | |
| | QT24 | 375kHz — 70MHz | 1kHz — 70MHz | | N/A | Please call | |
| | QT62 | 1MHz — 27MHz | | N/A | | N/A | |
| | QT75 | 15MHz — 70MHz | | N/A | | N/A | |
| Supply voltage (Vcc) (See note 2) | | 5.0Vdc ± 10% | | | -5.2Vdc ± 5% | | 5.0Vdc ± 5% (PECL) |
| Maximum Applied Voltage (Vdd max.) | | -0.5 to +7.0Vdc | | | 0 to -8.0Vdc | | -0.5 to +7.0Vdc |
| Freq. stability (ΔF/ΔT) | | See Option codes | | | | | |
| Operating temp. (Topr) | | See Option codes | | | | | |
| Storage temp. (Tsto) | | -62°C to +125°C | | | | | |
| Operating supply current (No Load) | | 25 mA max. Fo < 20MHz 35 mA max. Fo ~ 20MHz to < 30MHz 45 mA max. Fo ~ 30MHz to < 70MHz 65 mA max. Fo ~ 70MHz to 155.52MHz | | 65mA max. | | 65 mA max. Fo < 50MHz 85 mA max. Fo ~ 50MHz to 155.52MHz | |
| Symmetry (See note 3) | | 45/55% max. Fo < 12MHz 40/60% max. Fo ~ 12MHz to 155.52MHz | | N/A | | 40 / 60% max. | |
| Rise and Fall times (Tr/Tf) (with typical load) | | 6ns max. Fo < 30MHz 3ns max. Fo ~ 30MHz to 155.52MHz | | N/A | | 3.5ns max. Fo < 125MHz 3.0ns max. Fo ~ 125MHz to 155.52MHz | |
| Output Load | | 15pF // 10kΩ | | 10TTL Fo < 20MHz 6TTL Fo ≥ 20 MHz | | 50Ω into Vcc -2V | |
| Control Voltage Vc (See note 4) | | 0V to 5Vdc | | | 0V to -5.2Vdc | | 0V to 5Vdc |
| Frequency pulling (See note 5) | | ± 100ppm min. | | | | | |
| Transfer function (See note 6) | | Positive | | | | | |
| Linearity (See note 7) | | ± 10% max. | | | | | |
| Modulation bandwidth | | up to 10kHz | | | | | |
| Input impedance | | > 10kΩ | | | | | |
| Output logic | | ACMOS | HCMOS | TTL | Sine, 0dBm min. | 10K / 10KHECL | PECL |
| Harmonics (See note 8) | | | | | -20dBc max. | | |
| Subharmonics (See note 8) | | N/A | | | -30dBc max. | | N/A |
| Phase noise (typ.) (See note 9) | | | | 10Hz | -70dBc / Hz | | |
| | | | | 100Hz | -95dBc / Hz | | |
| | | | | 1kHz | -120dBc / Hz | | |
| | | | | 10kHz | -135dBc / Hz | | |
| | | | | 100kHz | -145dBc / Hz | | |
| Start-up time | | 10ms max. | | | | | |

Notes: Custom designs are available with Q-Tech custom MCM part numbers.

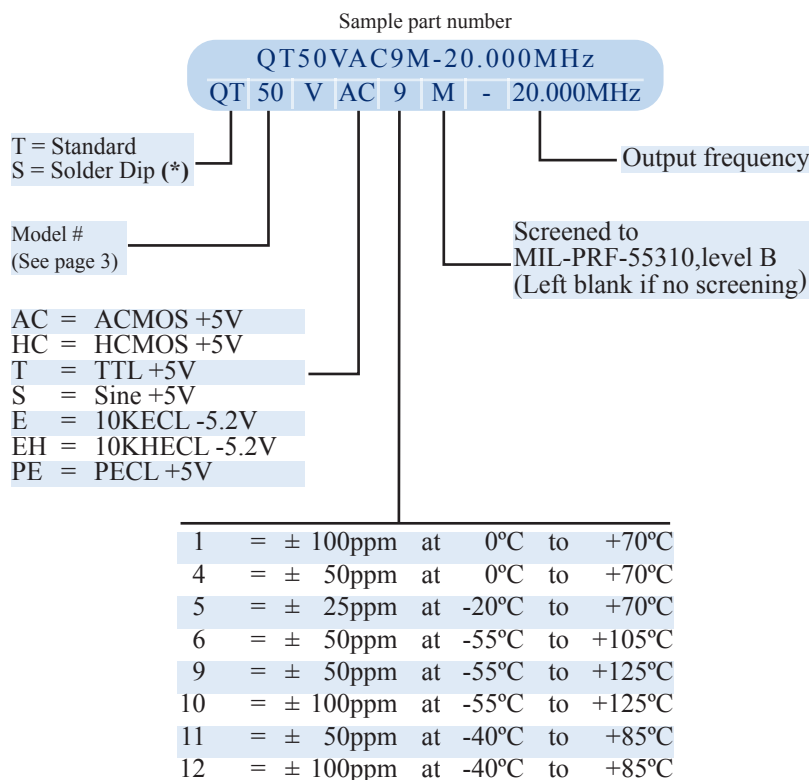
- | | |
|---|---|
| <ol style="list-style-type: none"> 1. Other frequencies and packages are available. Please contact for details. 2. Other supply voltages are available. Please contact for details. 3. Tighter symmetry is available other than 40/60% max. 4. Other Vc and bipolar control voltages are available. Please contact for details. 5. Wide frequency pulling is available up to ±500ppm min. APR is also available. | <ol style="list-style-type: none"> 6. Negative transfer function is available. 7. Better linearity than ±10% is available. 8. Harmonics better than -20dBc and subharmonics better than -30dBc are available. 9. Phase noise screening test is available. |
|---|---|

Package Configuration Versus Pin Connections



Dimensions are in inches (mm)

Ordering Information



Packaging Options

- Standard packaging in black foam (DIP)
- Standard packaging in a locked anti-static cardboard (QT24)
- Standard packaging anti-static plastic tube (QT75)
- Optional Tape and Reel

Other Options Available For An Additional Charge

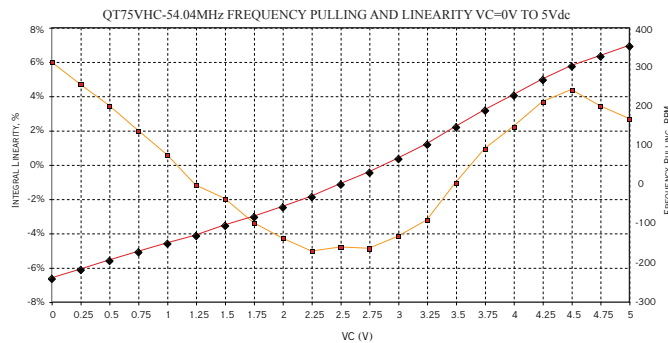
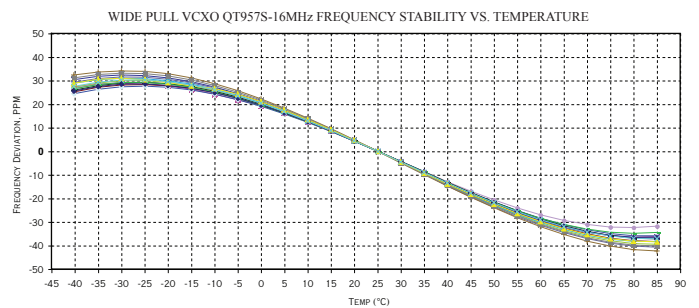
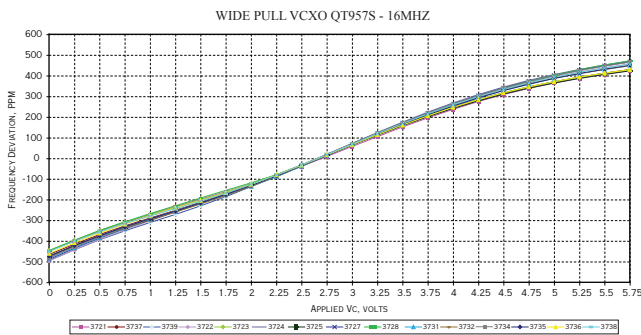
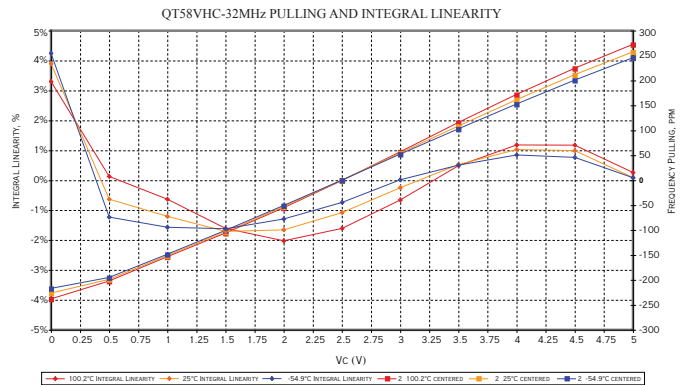
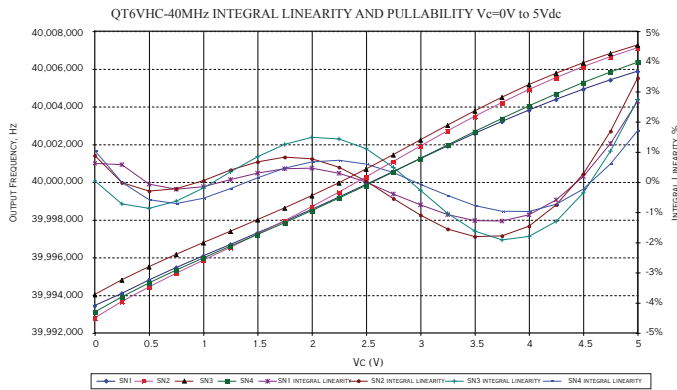
- Lead forming available on all packages. Please contact for details.
- (*) Hot Solder Dip Sn60 per MIL-PRF 55310
- P. I. N. D. test (MIL-STD 883, Method 2020)
- Lead trimming
- J-leads attached (QT75)

Specifications subject to change without prior notice.

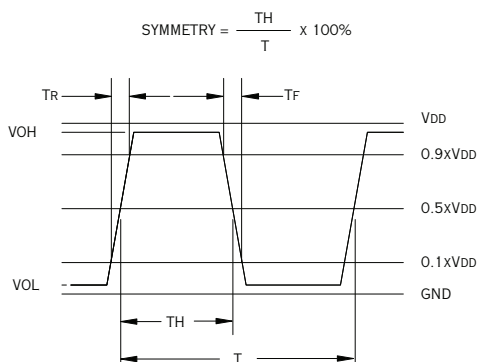
Key parameters of a VCXO:

- **Nominal Frequency (Fo):** Output frequency at center control voltage Vc.
- **Control Voltage:** The available voltage range at the input of the VCXO to vary the frequency (i.e., 0 - 5V, ±4V, etc.).
- **Deviation (pull range):** The change in the output frequency as a function of control voltage.
- **Transfer Function (sense):** Direction of change in frequency as a function of control voltage.
- **Temperature Range:** Operating temperature range.
- **Stability vs. Temperature:** Percentage, or ppm, change of output frequency with respect to the temperature range at a constant control voltage.
- **Input Impedance:** A measure of isolation between the VCXO internal frequency control network and the control voltage source.
- **Linearity:** The deviation from the best straight line slope of the frequency vs. control voltage plot.
- **Modulation Bandwidth (rate):** The maximum allowable rate of change of the control voltage.

Frequency vs. Temperature Curve

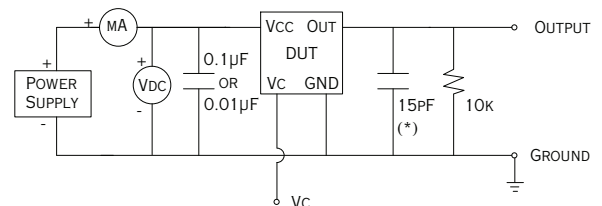


Output Waveform (Typical)



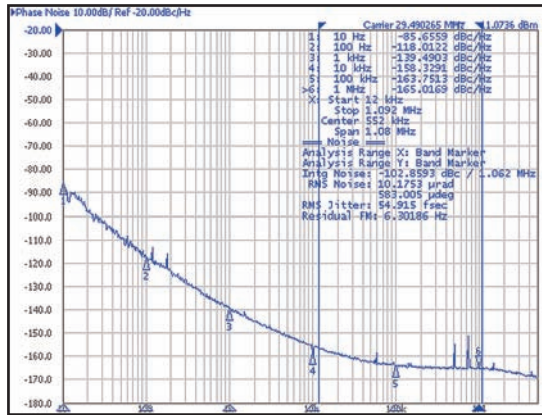
Test Circuit

TYPICAL TEST CIRCUIT FOR VCXO CMOS LOGIC

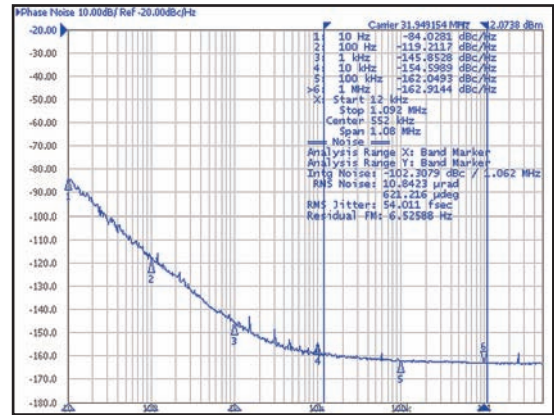


(*) CL INCLUDES PROBE AND JIG CAPACITANCE

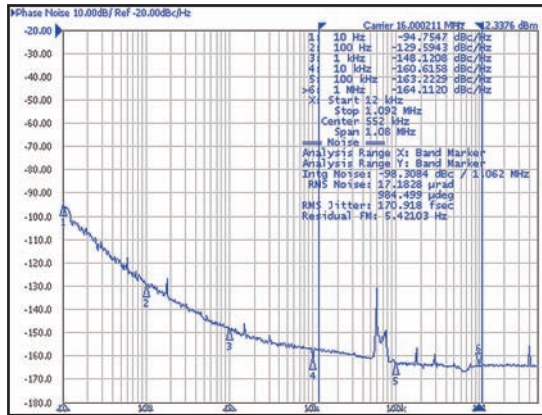
Phase Noise and Phase Jitter Integration



QT25VT, 29.5MHz

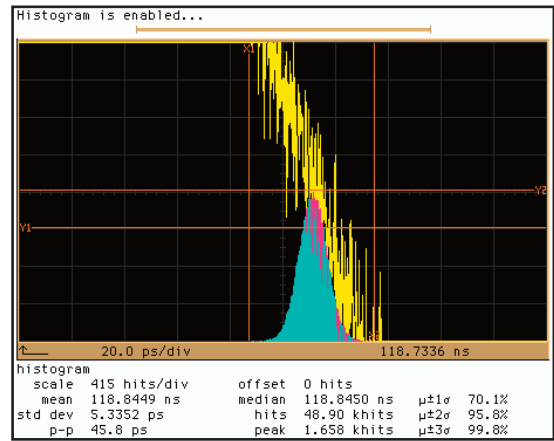


QT50VAC, 31.9488MHz



QT6VHC10M, 16MHz

Period Jitter



QT25VT, 29.5MHz

Environmental Specifications

Q-Tech Standard Screening/QCI (MIL-PRF55310) is available for all of our VCXO packages. Q-Tech can also customize screening and test procedures to meet your specific requirements. The units are designed and processed to exceed the following test conditions:

| Environmental Test | Test Conditions |
|---------------------------------|---|
| Temperature cycling | MIL-STD-883, Method 1010, Cond. B |
| Constant acceleration | MIL-STD-883, Method 2001, Cond. A, Y1 |
| Seal: Fine and Gross Leak | MIL-STD-883, Method 1014, Cond. A and C |
| Burn-in | 160 hours, 125°C with load |
| Aging | 30 days, 70°C, ± 1.5ppm max |
| Vibration sinusoidal | MIL-STD-202, Method 204, Cond. D |
| Shock, non operating | MIL-STD-202, Method 213, Cond. I |
| Thermal shock, non operating | MIL-STD-202, Method 107, Cond. B |
| Ambient pressure, non operating | MIL-STD-202, 105, Cond. C, 5 minutes dwell time minimum |
| Resistance to solder heat | MIL-STD-202, Method 210, Cond. B or C |
| Moisture resistance | MIL-STD-202, Method 106 |
| Terminal strength | MIL-STD-202, Method 211, Cond. C |
| Resistance to solvents | MIL-STD-202, Method 215 |
| Solderability | MIL-STD-202, Method 208 |
| ESD Classification | MIL-STD-883, Method 3015, Class 1 HBM 0 to 1,999V |
| Moisture Sensitivity Level | J-STD-020, MSL=1 |

Please contact Q-Tech for higher shock requirements