

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.

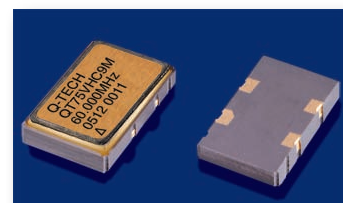
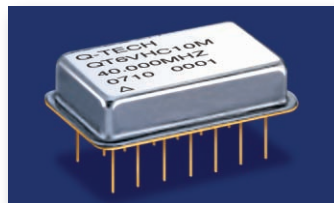
Features

- Made in the USA
- ECCN: EAR99
- DFARS 252-225-7014 Compliant:
Electronic Component Exemption
- USML Registration # M17677
- 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 (±Vc)
- Fundamental designs
- Q-Tech does not use pure lead or pure tin in its products
- RoHS compliant



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.

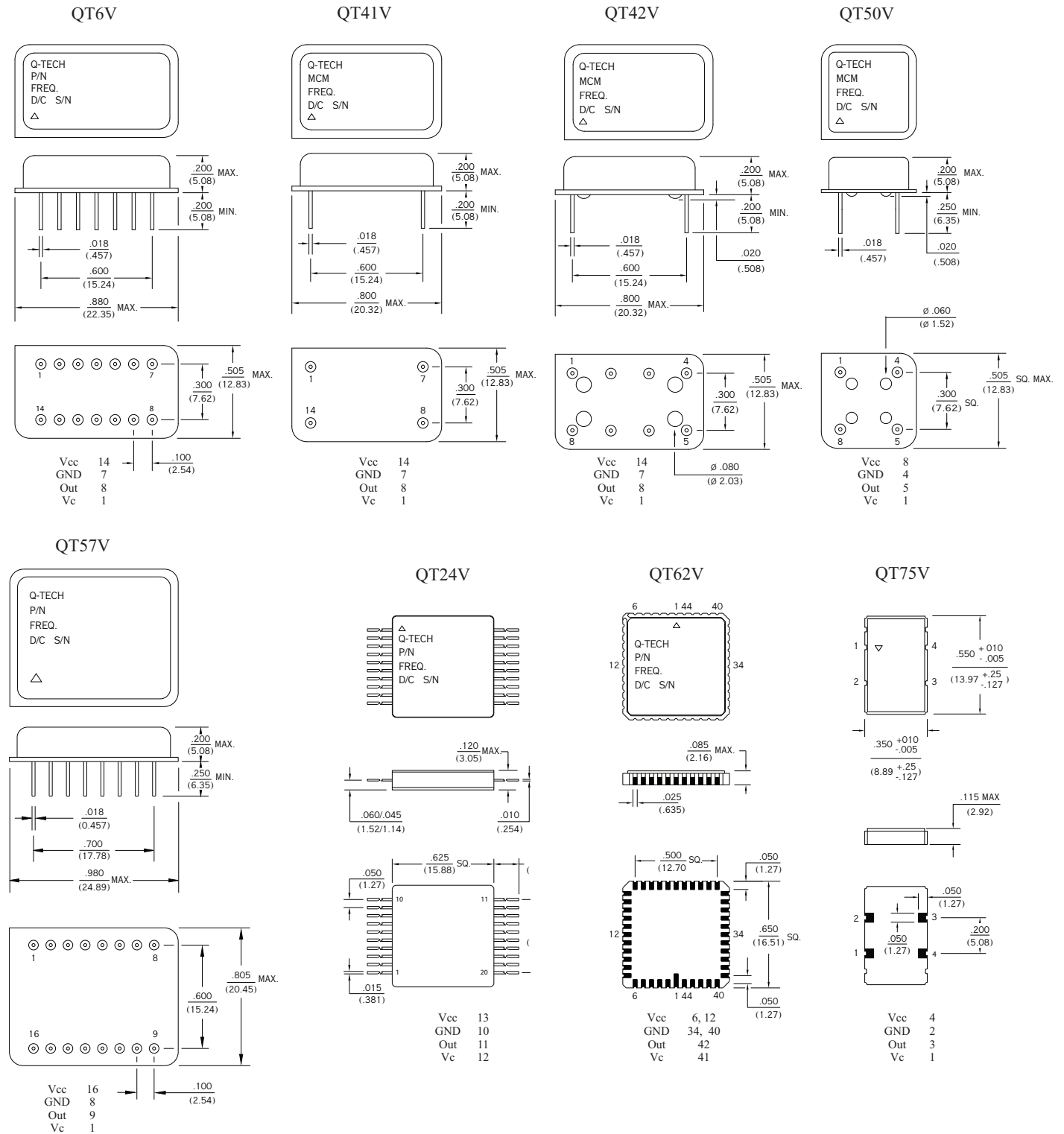
Electrical Characteristics

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)
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	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.

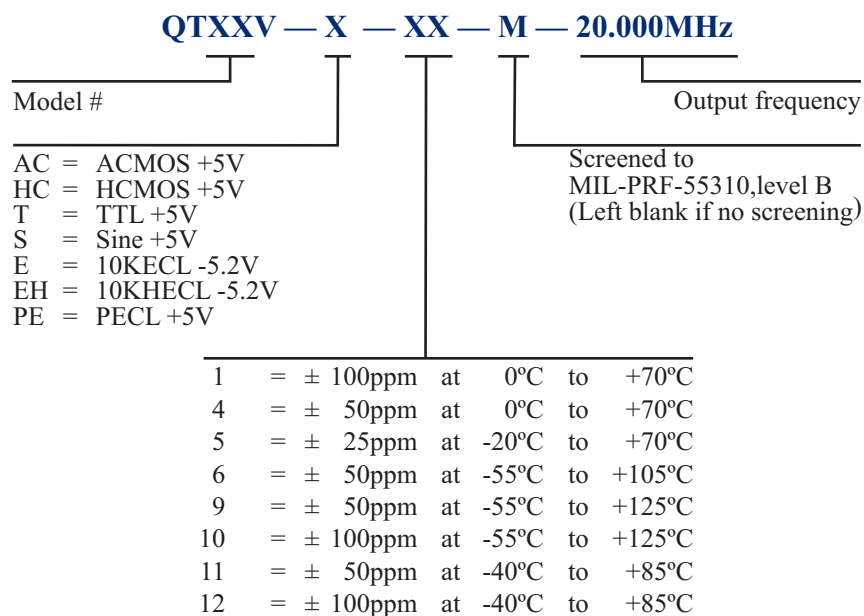
- Other frequencies and packages are available. Please contact for details.
- Other supply voltages are available. Please contact for details.
- Tighter symmetry is available other than 40/60% max.
- Other Vc and bipolar control voltages are available. Please contact for details.
- Wide frequency pulling is available up to ±500ppm min. APR is also available.
- Negative transfer function is available.
- Better linearity than ±10% is available.
- Harmonics better than -20dBc and subharmonics better than -30dBc are available.
- 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

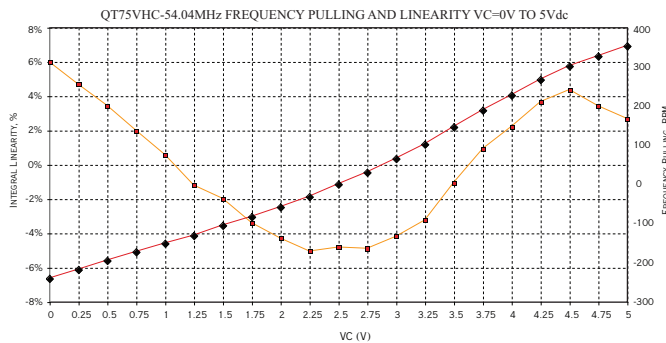
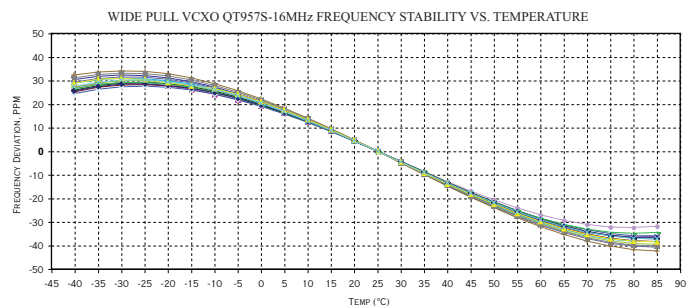
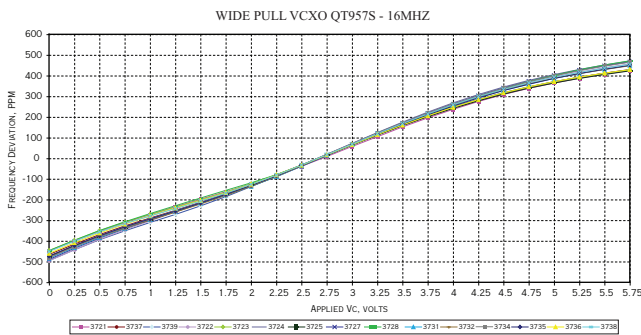
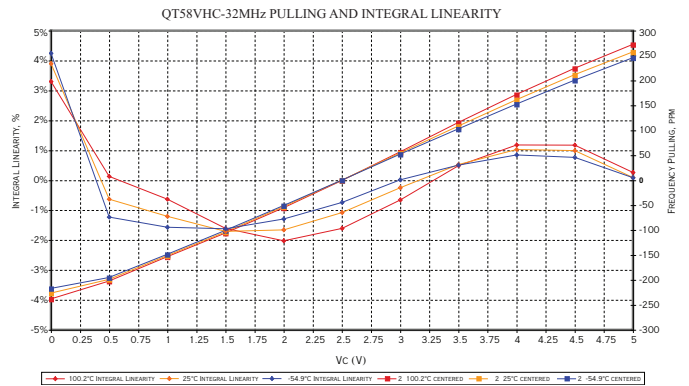
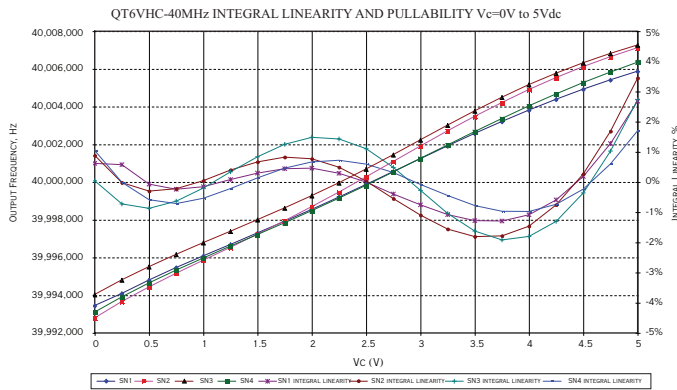
- Lead forming available on all packages. Please contact for details.
- Solder Dip Sn/Pb 60/40%
- P. I. N. D. test
- Lead trimming
- J-leads attached (QT75)

Specifications subject to change without prior notice.

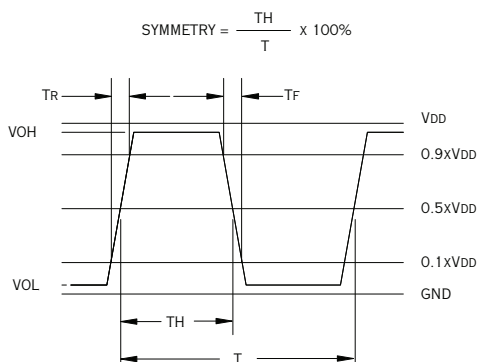
Key parameters of a VCXO:

- **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

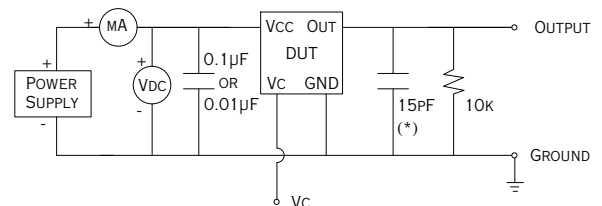


Output Waveform (Typical)



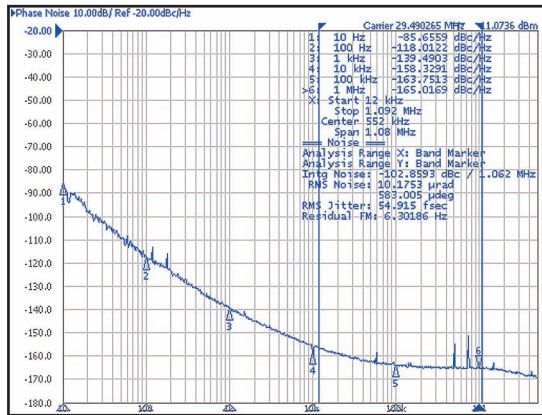
Test Circuit

TYPICAL TEST CIRCUIT FOR VCXO CMOS LOGIC

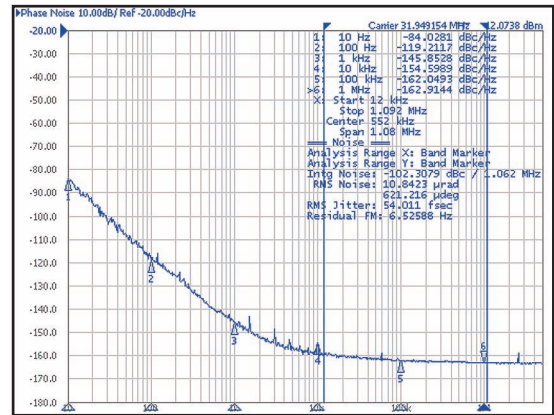


(* CL INCLUDES PROBE AND JIG CAPACITANCE

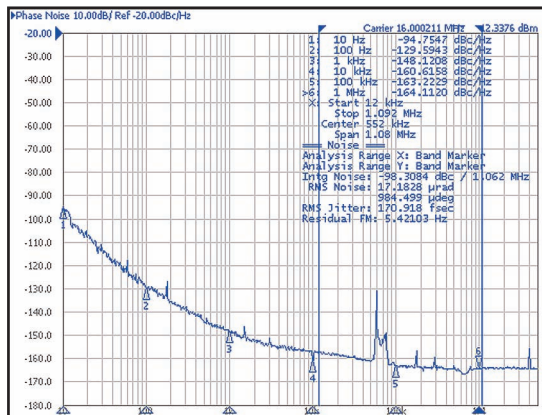
Phase Noise and Phase Jitter Integration



QT25VT, 29.5MHz

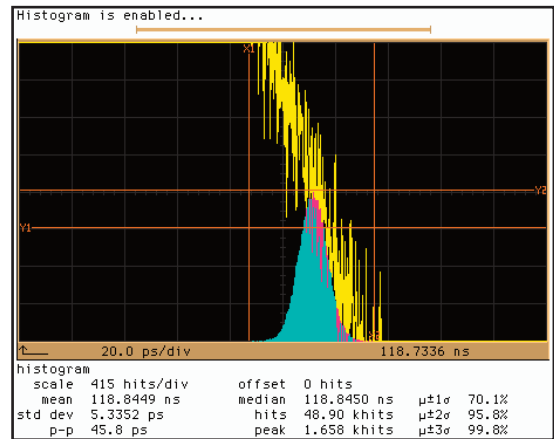


QT50VAC, 31.9488MHz



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 Leak	MIL-STD-883, Method 1014, Cond. A
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

Please contact Q-Tech for higher shock requirements