Q-TECH CORPORATION

ONE INCH SQUARE LOW PHASE NOISE OCXO

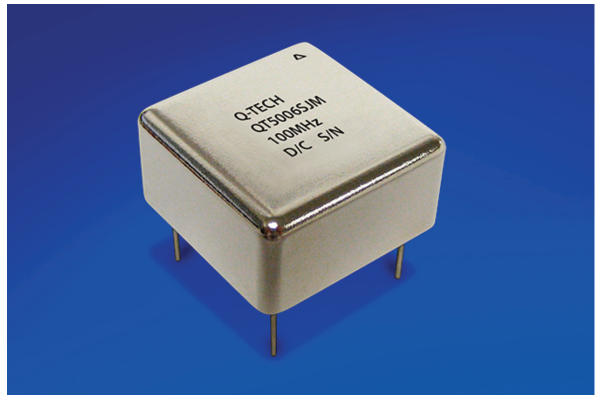
3.3 to 12Vdc - 1MHz to 125MHz

Description

Q-Tech's High Stability OCXO is a high reliability signal generator that provides an HCMOS or Sine Wave output. The OCXO is available in a Through hole package.

A flexible design allows Q-Tech Corporation to offer a variety of choices of output standard, power and load. Based on this flexibility, Q-Tech welcomes specifications with parameters other than standard.

Low G-Sensitivity SC-Cut Crystal utilized in the design guarantees 1PPB/G or better. The reliable construction of this design qualifies it for stringent environmental applications.



Ordering Information

(Sample part number)

QT5006SJM-100.000MHz

Q	T	5	0	0	6	S	J	M	-	100.000MHz

Package Type:

0	Through Hole

Supply Voltage:

3	+3.3V
5	+5.0V
6	+12.0V

Logic:

C	HCMOS
S	Sine Wave

Frequency vs. Temperature Code

G	±	100PPB	at	-20ºC	to	+70ºC
H	±	10PPB	at	-20ºC	to	+70ºC
J	±	200PPB	at	-40ºC	to	+85ºC
D	±	20PPB	at	-40ºC	to	+85ºC

Screening Option:

Blank	No Screening
M	Per MIL-PRF-55310, Level B

Output Frequency

For Non-Standard requirements, contact Q-Tech Corporation at Sales@Q-Tech.com

Features

- Made in the USA
- ECCN: EAR99
- DFARS 252-225-7014 Compliant: Electronic Component Exemption

- Supply voltages 3.3Vdc, 5Vdc and 12Vdc
- Wide temperature range (-40ºC to +85ºC)
- SC-Cut crystal
- Low phase noise and jitter
- Choice of output power and load
- Hermetically sealed packages
- Custom design available tailored to meet customer's needs
- Q-Tech does not use pure lead or pure tin in its products

Applications

- Designed to meet today's requirements for communication systems.
- Wide military clock applications
- Control and measurement
- Signal processing

Packaging Options

- Standard packaging in black foam

Other Options Available For An Additional Charge

- P. I. N. D. test (MIL-STD 883, Method 2020)
- Phase Noise test (Static and under vibration)
- Jitter test

Specifications subject to change without prior notice.

Electrical Characteristics

Parameters	Conditions	Requirements	
Output Frequency Range		**1MHz — 125MHz**	
Supply Voltage	±5.0%	3.3V, 5V and 12V	
Initial Tolerance	@+25°C	±50 PPB	
Temperature Range		See Option Codes	
Frequency Stability vs. Temperature		See Option Codes	
Frequency Stability vs. Voltage Variation	Over temperature range	±20 PPB	
Frequency Stability vs. Load Variation	±5.0% Load Variation	±20 PPB	
Warm-up Power	@-40°C	4.5W (for codes D and J)	
Steady State Power	@+25°C	1.5W (for codes D and J)	
Warm-up Time	@+25°C to ±100PPB (shours ref.)	5min	
Output Waveform		Sine Wave	HCMOS
Output Power		+3.0±1.0 dBm	
Output Power Stability	Over temperature range	±1.0 dBm	
Duty Cycle	Over temperature range		50%±5.0%
Output Load		50Ω	10kΩ//15pF
Harmonics	Over temperature range	-35dBc	
Spurious	Over temperature range	-90dBc	
Aging	Per day	1PPB	
	15 years	1.5PPM	
Phase Noise for 100MHz OCXO (typ.)	10Hz	-90dBc/Hz	
	100Hz	-120dBc/Hz	
	1kHz	-150dBc/Hz	
	10kHz	-160dBc/Hz	
	100kHz	-162dBc/Hz	

Other Design and Test Options

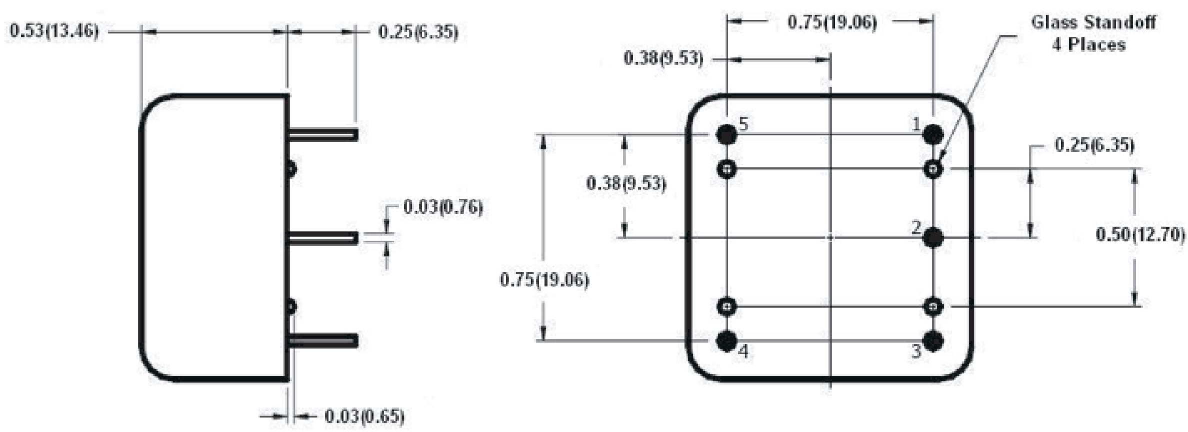
- Supply voltage +3.3Vdc to +12Vdc
- Phase Noise and Jitter built to specification including static and vibration.
- QCI tests
- Tight frequency stability versus temperature, supply voltage, and load variations
- Low g-sensitivity and low phase noise
- Low spurious (see note 3)
- Low frequency aging, Allan Variance
- High-shock resistant

Notes:

1. The output level is determined by the supply voltage, load, and package size.
2. Typical amplitude stability over temperature is ±10% or less.
3. Typical spurious level is better than -100dBc over the spectrum of 100kHz to 1GHz.
4. Guaranteed by design, can be tested by customer request.

Package Outline and Pin Connections

Dimensions are in inches (mm)



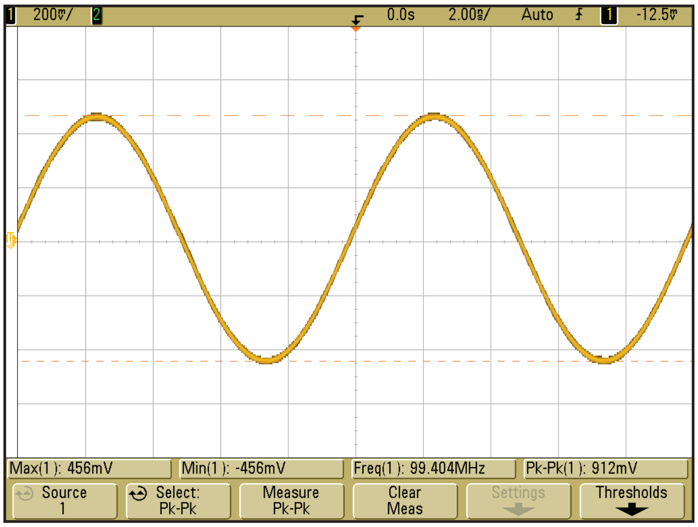
Pin No.	Designation
1	OUTPUT
2	GND/CASE
3	VOLTAGE CONTROL
4	NC
5	SUPPLY VOLTAGE

NC (No Connection)

Package Information

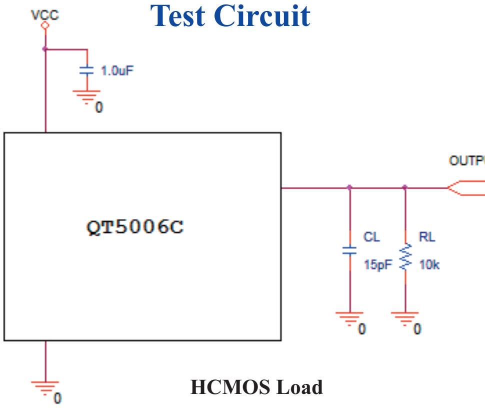
Package Material: COLD ROLLED Steel
Bright Nickel Plated 500µ inches

Sine Wave Output Waveform into 50Ω load

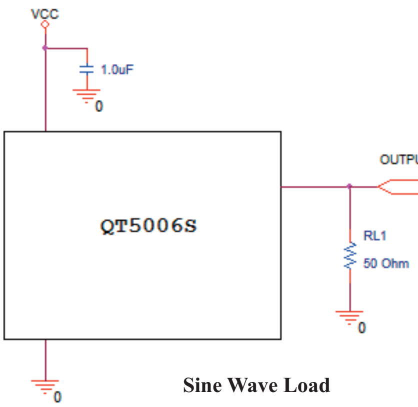


Typical output of QT5006SJ-100.000MHz

Test Circuit

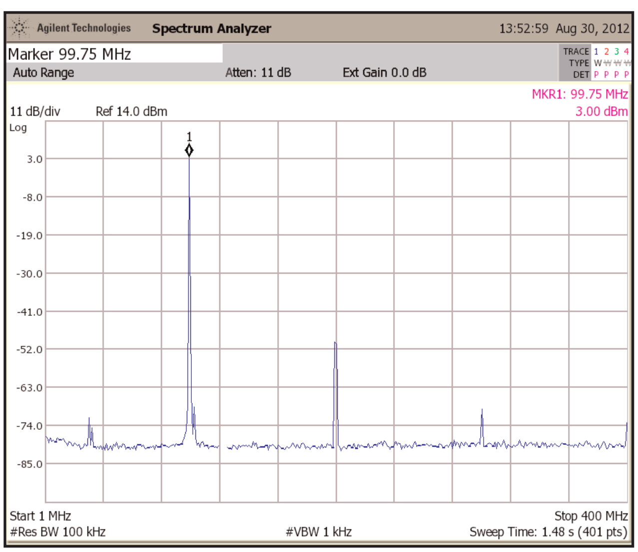


HCMOS Load

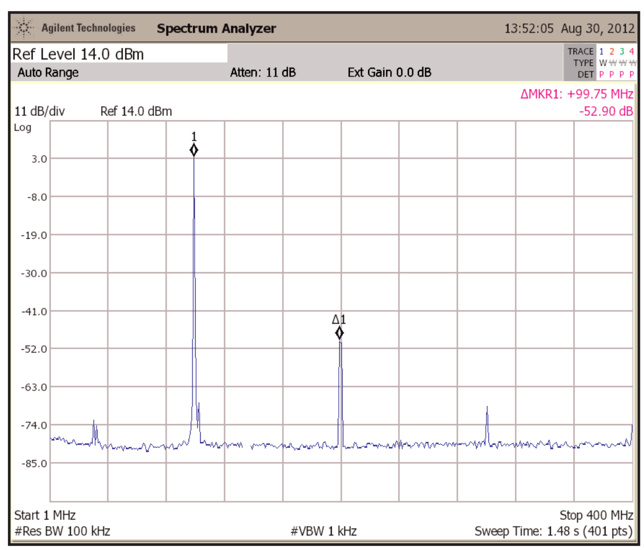


Sine Wave Load

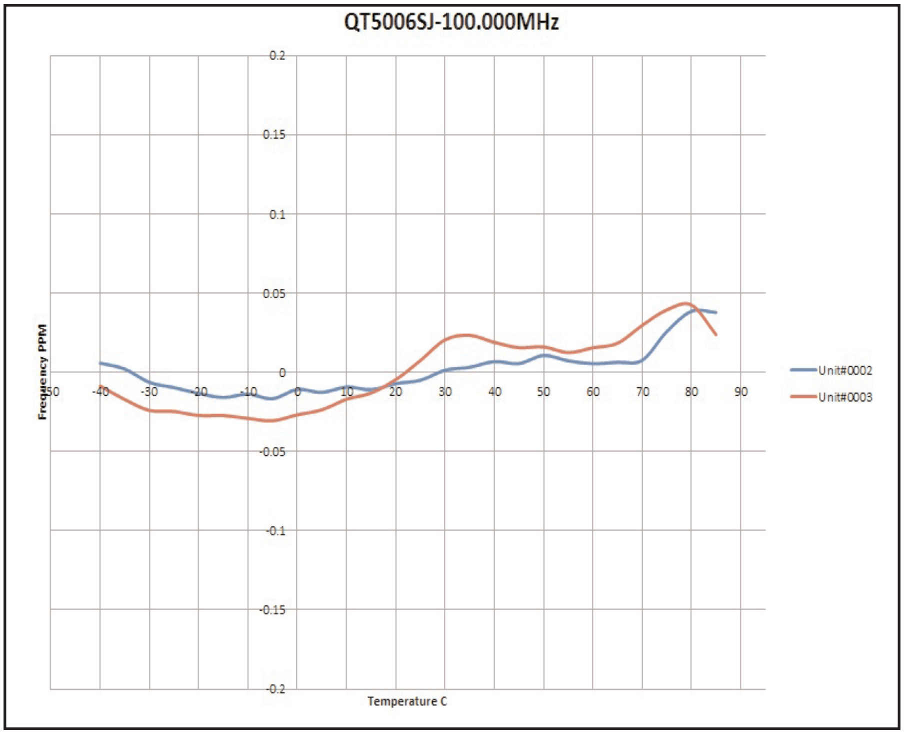
Typical Amplitude for Sine Wave Output



Sine Wave Output Harmonic Distortion



Frequency vs. Temperature Curve



Typical Stability of QT5006SJ-100.000MHz

Environmental Specifications

Q-Tech Standard Screening similar to (MIL-PRF-55310) is available. Q-Tech can also customize screening and test procedures to meet your specific requirements. The packages 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
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. 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 1HBM 0 to 1,999V
Moisture Sensitivity Level	J STD 020, MSL 1

Please contact Q-Tech for higher shock requirements

Phase Noise and Phase Jitter Integration

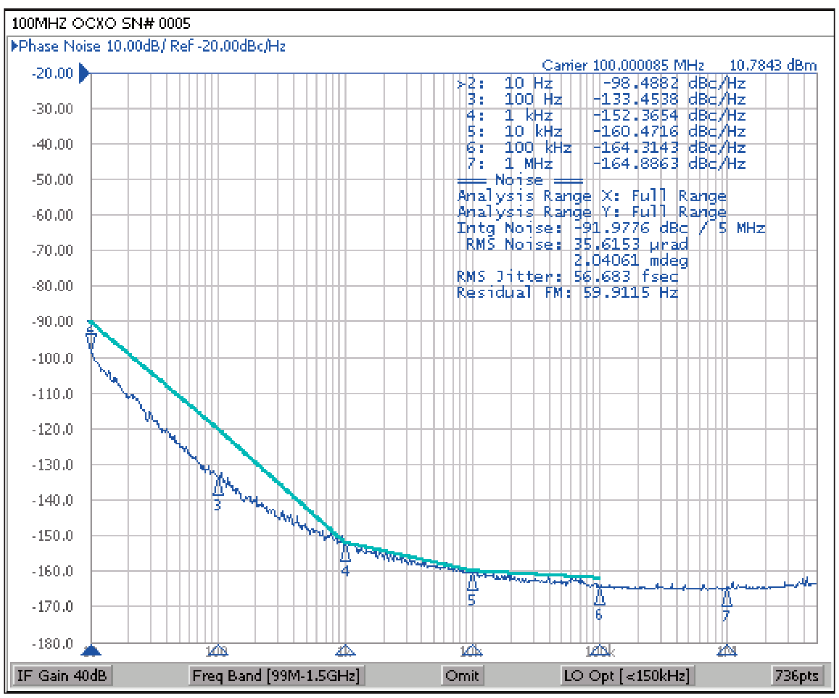
Phase noise is measured in the frequency domain, and is expressed as a ratio of signal power to noise power measured in a 1Hz bandwidth at an offset frequency from the carrier, e.g. 10Hz, 100Hz, 1kHz, 10kHz, 100kHz, etc. Phase noise measurement is made with an Agilent E5052A Signal Source Analyzer (SSA) with built-in outstanding low-noise DC power supply source. The DC source is floated from the ground and isolated from external noise to ensure accuracy and repeatability.

In order to determine the total noise power over a certain frequency range (bandwidth), the time domain must be analyzed in the frequency domain, and then reconstructed in the time domain into an RMS value with the unwanted frequencies excluded. This may be done by converting L(f) back to Sφ(f) over the bandwidth of interest, integrating and performing some calculations.

Symbol	Definition
$\int\mathcal{L}(f)$	Integrated single side band phase noise (dBc)
Sφ (f) (180/Π)x$\sqrt{2\int\mathcal{L}(f)df}$	Spectral density of phase modulation, also known as RMS phase error (in degrees)
RMS jitter Sφ (f)/(fosc.360°)	Jitter(in seconds) due to phase noise. Note Sφ (f) in degrees.

The value of RMS jitter over the bandwidth of interest, e.g. 10kHz to 20MHz, 10Hz to 20MHz, represents 1 standard deviation of phase jitter contributed by the noise in that defined bandwidth.

Figure below shows a typical phase noise/phase jitter of a QT5006S, 12V, 100.000MHz OCXO at offset frequencies 10Hz to 5MHz.



QT5006SJ-100.000MHz

ECO	REV	REVISION SUMMARY	Page
10836	A	Fixed typo under "Other Design and Test Options" (from see note 5 to 3)	2