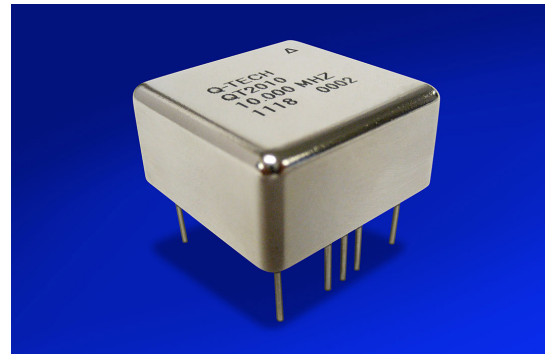**Q-TECH CORPORATION**

Description

Q-Tech's microcomputer compensated crystal oscillator, MCXO, uses a high stability overtone SC-cut crystal with microprocessor controlled compensation. The self-temperature sensing resonator, using a dual-mode oscillator, virtually eliminates thermometry related errors. As a result, all basic TCXO and OCXO limitations are overcome or significantly reduced in the MCXO.
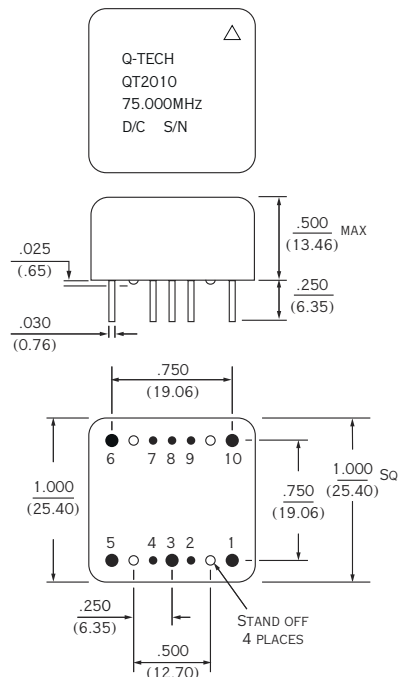
Features

- Made in the USA
- ITAR
- DFARS 252-225-7014 Compliant: Electronic Component Exemption
- USML Registration # M17677
- Frequency Stability-Temperature: $\pm 2 \times 10^{-8}$ from -40°C to +85°C
- Outputs: 5 to 100MHz, 32.768kHz and 1PPS. Other frequency options available
- DC Power Input: 3.3Vdc, 105milliwatts max
- Inputs: Mode Control
  Calibration Reference Signal
  Sync (optional)
- Initialization: <5 seconds from power on to full performance
- Dual-Mode Oscillator: Specially developed for the MCXO
- Aging Correction: Auto calibration in the field
- Environmental: Inherently rugged design capable of full military screening
- Low Phase Noise and Jitter
- Small Form Factor
- G-Sensitivity 1PPB/G max.

Applications

- Satellite terminals
- Underwater monitors
- GPS
- Mobile equipment

Package Outline and Pin Connections
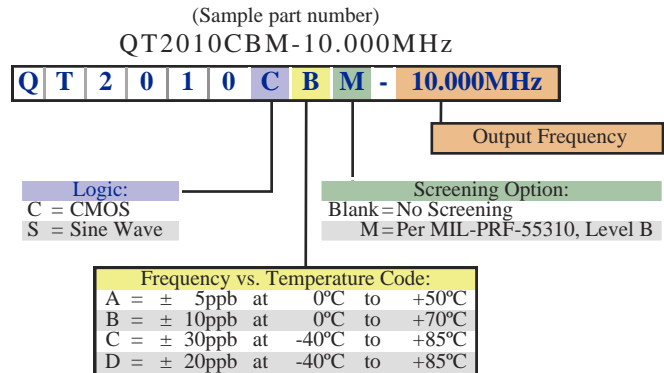**Dimensions are in inches (mm)**

Q-TECH
QT2010
75.000MHz
D/C   S/N

.025 (.65)
.030 (0.76)
.500 MAX (13.46)
.250 (6.35)

.750 (19.06)
1.000 (25.40)
.750 (19.06)
1.000 SQ. (25.40)
.250 (6.35)
.500 (12.70)
STAND OFF 4 PLACES

Pin No.	Function
1	Frequency Output
2, 4, 7	N/C
3	GND / CASE
5	Vc/Fref Input
6	1PPS Output
8	Mode Select
9	Status
10	Voltage Supply

Package Material:

- .025 + .002/-.003 Cold Rolled Steel
- Bright Nickel Plated 500μ Solderable

Ordering Information

(Sample part number)
QT2010CBM-10.000MHz

| Q | T | 2 | 0 | 1 | 0 | C | B | M | - | 10.000MHz |

Output Frequency

Logic:
C = CMOS
S = Sine Wave

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

Frequency vs. Temperature Code:				
A = ± 5ppb at	0°C	to	+50°C
B = ± 10ppb at	0°C	to	+70°C
C = ± 30ppb at	-40°C	to	+85°C
D = ± 20ppb at	-40°C	to	+85°C

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

Q-TECH
CORPORATION

Pinout Description

Pin #1   Frequency output. Depends on specification part number, Frequency output can be HCMOS or Sine Wave. HCMOS output has 10 kOhm in parallel with 15pF load. Sine Wave output has 50 Ohm load.
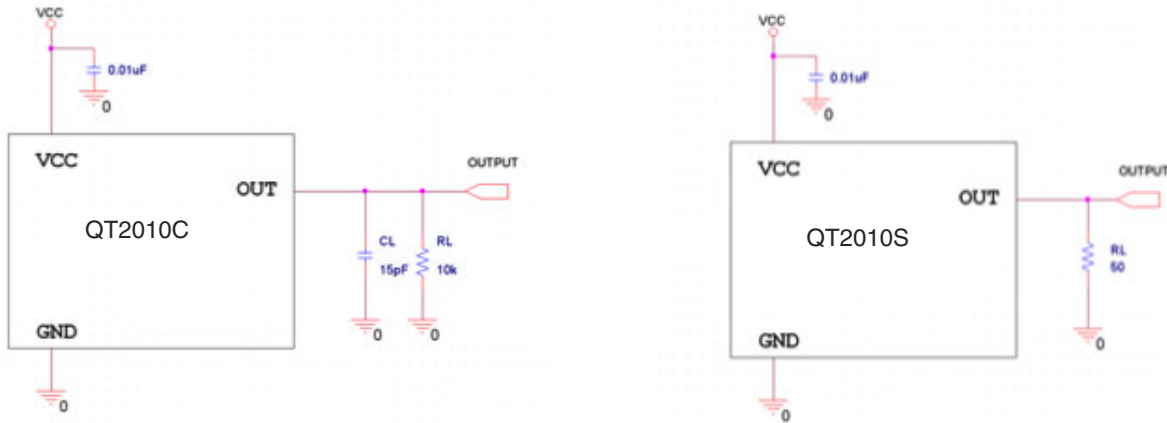
Frequency Output range is 5MHz to 100MHz.

Pin #3:   Case Ground. This pin provides negative voltage (0V) to the MCXO. It is connected to the oscillator case to reduce EMI.

Pin #5:   Vc/Reference Input. This input can be configured as Voltage Control or Reference. The configuration is one time programming at the factory according to customer request. In case of Voltage Control setup, by providing voltage within range of 0 to +3.3V output Frequency on the both Frequency and timing outputs will be changed within range of +/-2.5PPM. Vc slope is positive. To get nominal frequency 1.65V on this input has to be applied. This function is used to compensate MCXO aging. In case of Reference Input setup, 10MHz signal should be applied to the input. When 10MHz signal (1V p-p min) is provided to the pin, MCXO starts aging correction routine and synchronizes both frequency and timing mode outputs to the reference signal. The routine takes about 10-15 seconds. After frequency is synchronized MCXO continues to operate as normal. In order to perform synchronization again, the reference should be disconnected and connected one more time. Precision of synchronization is +/-5PPB.

Pin #6:   1PPS Output. This output provides 1PPS (1Hz) HCMOS signal. It also can be configured to provide 32.768 kHz HCMOS signal. The configuration is one time programming at the factory according to customer request.

Pin #8:   Mode Select. This pin is responsible for MCXO operating modes. If low level (<0.5v) signal is applied to the pin, MCXO will start to operate in Frequency Mode. It will output signal with specified frequency at the pin#1. Pin#6 will be disabled. Power consumption will be according to Frequency Mode specification. If high level (>2.8V) signal is applied to the pin, MCXO will start to operate in Timing Mode. It will output 1PPS or 32.768 kHz signal at Pin#6. Power consumption will be according to Timing Mode specification. Pin#1 will be disabled.

Pin #9:   Status. Status output has low level signal during normal operation. It provides low frequency signal (2-4Hz) for 5-10 seconds after power is applied to Pin#10. It goes high during aging correction routine. It also goes high in case of MCXO malfunction. It can be connected to LED to indicate MCXO status.

Pin #10:   Voltage Supply. This pin provides positive voltage (3.3V) to the MCXO. Minimum value of bypass capacitor is 2.2uF. It has to be installed close pin#10.

Pins #2,4,7: Not Connected. Leave these pins not connected. They have internal functions and grounding them may lead to MCXO malfunction.

Contact factory for deviations from the standard functions and operation.

Electrical Characteristics

Pararmeters	Symbol	Conditions		Value		Unit
Frequency Mode Parameters						
Frequency Range	fo	-		**5.000-100.000**		MHz
Supply voltage, Nom.	Vs	Vs±5%		**3.3**		V
Power Consumption, max.	Ps	Vs, nom. / Ta=+25°C (No load)		**105**		mW
Nominal Tolerance	Fnom	Vs, nom. / Ta=+25°C		**±10**		ppb
Freq. Stability vs. Temperature	Δf/fc (Ta)	Ta=-40°C...+85°C		**±20**		ppb
Freq. Stability vs. Load Variation	Δfl	HCMOS 10kΩ//15pF ±5% Load Change	SINE WAVE 50Ω±5%	**±20**		ppb
Freq. Stability vs. Voltage Supply Variation	Δfv	±5% Input Voltage Change		**±20**		ppb
Aging (Max)	Δf/fo	Per Day Over 10 Years Over 20 Years		**±1.0** **±1.0** **±1.5**		ppb ppm ppm
Output Waveform				HCMOS **3.3V**	SINE WAVE **3dBm±3dBm**	
Symmetry		Ta=-40°C...+85°C		**50±5**		%
Rise/Fall Time (Max)		Ta=-40°C...+85°C		**3**		nSec
Startup Time (Max)		Ta=-40°C...+85°C, to ±50.0 ppm		**20**		mSec
Stabilization Time (Max)		Ta=-40°C...+85°C, to ±0.03 ppm		**3**		Sec
Phase Noise (10MHz)		10Hz		**-110**		dBc/Hz
		100Hz		**-135**		dBc/Hz
		1kHz		**-145**		dBc/Hz
		10kHz		**-155**		dBc/Hz
		100kHz		**-160**		dBc/Hz
Phase Noise Jitter		1kHz to 20MHz		**1**		pSec
Spurious (Max)		Ta=-40°C...+85°C, >1kHz offset		**-100**		dBc
Aging Adjustment (10MHz ref)		Ta=+25°C, stable environment		**±0.02**		ppm
Timekeeping Mode Parameters						
Frequency Nom.	Ft	Ta=-40°C...+85°C		**1**		PPS
Power Consumption, max.	Ps	Vs, nom. / Ta=+25°C (No load)		**90**		mW
Freq. Stability vs. Temperature	Δf/Ft (Ta)	Ta=-40°C...+85°C		**±20**		ppb
Output Waveform				**HCMOS 3.3V**		
Symmetry		Ta=-40°C...+85°C		**50±5**		%
Rise/Fall Time (Max)		Ta=-40°C...+85°C		**100**		nSec
Startup Time (Max)		Ta=-40°C...+85°C ,to ±120.0 ppm		**500**		mSec
Stabilization Time (Max)		Ta=-40°C...+85°C, to ±0.03 ppm		**3**		Sec
Period Jitter				**5**		nSec

Phase Noise Plots
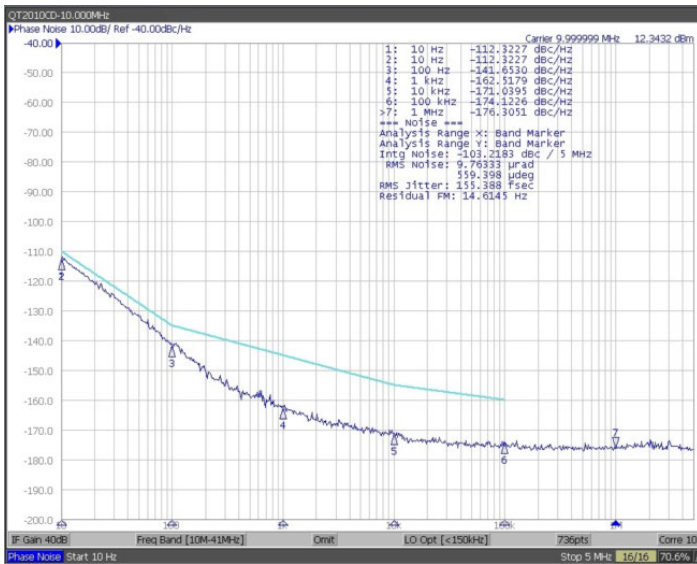
QT2010CD-10.000MHZ
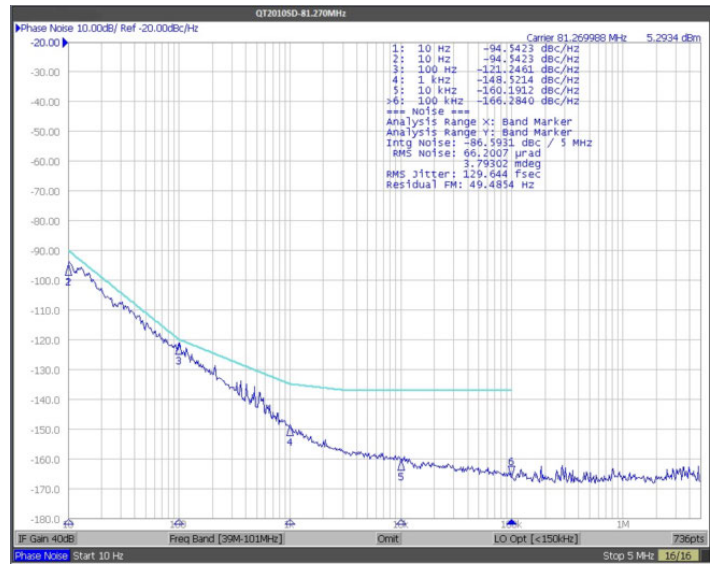
QT2010SD-81.270MHZ

Temperature Stability
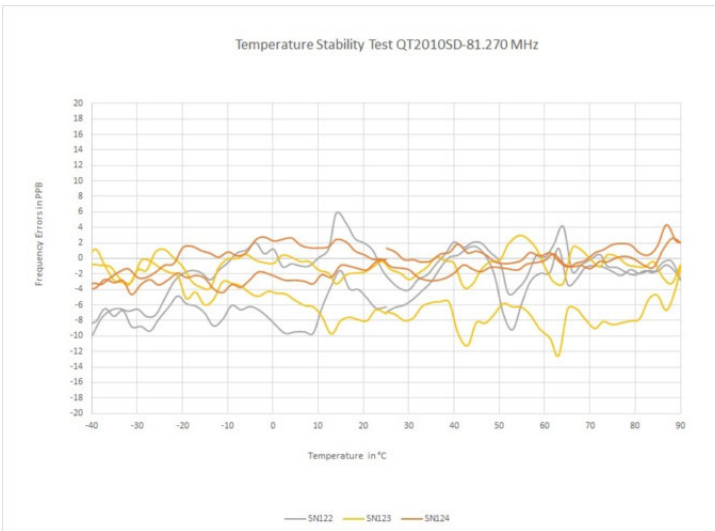
Revision History

ECO	REV	REVISION SUMMARY	Page
10690	B	Add Pin Out Description	2
		Add document number on footer of all pages	All
DCO 5453	C	Add Phase noise and temperature stability plots	4
	D	Remove temperature codes E and F	1