

### Revision Record

Revision	DCO	Description	Engineering Approval	Date	QA Approval	Date	Release Date
-		Initial Release					
A	6391	Renamed QT625NC to QPDS-0125, Table 1 update frequency range Table 3 update current and tr/ta, Update 6.4.4 for microcircuit usage	C. Hooper J. Navarrete R. Duong	02/01/17 02/01/17 02/02/17	D. Moline	02/01/17	01/22/19



**UNLESS OTHERWISE SPECIFIED**


Dimensions are in Inches

Tolerances

Decimal	Fraction	Angular
.xxx ± .005		
.xx ± .02	$x/x \pm 1/16$	$x^\circ \pm 2^\circ$
.x ± .1		

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### DETAIL PRODUCT SPECIFICATION CONTROL DRAWING

Initial Release		 <b>Q-Tech Corporation</b> 10150 West Jefferson Boulevard Culver City, CA 90232-3510 USA			
<b>Prepared</b>	<b>Date</b>	TITLE			
Joshua Navarrete	01/31/2017				
<b>Checked</b>	<b>Date</b>	<b>HYBRID CRYSTAL OSCILLATOR +5V, CLASS S, QT625NC,                      NASA EEE-INST-002, LEVEL 1, DETAIL SPECIFICATION FOR</b>			
Ricgard Duong	02/02/2017				
<b>Engineering Approval</b>	<b>Date</b>				
Curtis Hooper	02/01/2017	DRAWING NO.		REVISION	
<b>Quality Assurance Approval</b>	<b>Date</b>	<b>QPDS-0125</b>		<b>A</b>	
Daniel Moline	02/01/2017	SCALE	SIZE	CAGE CODE	PAGE
<b>Released</b>	<b>Date</b>	<b>NONE</b>	<b>A</b>	<b>51774</b>	<b>1 of 7</b>
Steven Nguyen	01/22/2019				

**1 PURPOSE**

1.1 The purpose of this Detail Specification Control Drawing (SCD) is to describe the specific quality and reliability requirements for a family of hermetically sealed, Space Level, Hybrid Crystal Oscillators conforming to product Level 1 as described in EEE-INST-002, with exceptions herein, for use in space flight missions.

**2 SCOPE**

2.1 This specification establishes the minimum detail requirements for QT625NC intended for use in conjunction with the applicable general SCD.

**3 PART PROTECTION AND SAFETY**

3.1 These items are susceptible to breakdown damage resulting from electrostatic discharge. Every precaution shall be taken while handling, installing, and testing the parts to prevent static charge. Care should be exercised to not apply more than rated voltage or current to any terminal/pad during testing.

**4 PART NUMBER**

4.1 The Q-Tech Part Number shall be as specified in Table 1 herein.

**5 APPLICABLE DOCUMENTATION & REFERENCES**

5.1 The following documents form a part of this drawing to the extent specified or modified herein.

**5.2 Military & Industry**

5.2.1 MIL-PRF-55310, Oscillator, Crystal Controlled, General Specification for

5.2.2 MIL-PRF-38534, Microcircuit Manufacturing, General Specification for

5.2.3 MIL-STD-202, Test Methods for Electronic and Electrical Component Parts

5.2.4 MIL-STD-883, Test Methods and Procedures for Microelectronics

5.2.5 EEE-INST-002, Instructions for EEE Parts Selection, Screening, Qualification, and Derating

**5.3 Q-Tech**

5.3.1 0401-00298-0021, Hybrid Crystal Oscillator, Class S, NASA EEE-INST-002, Level 1, General Specification for

**5.4 Application of Documents**

**5.4.1 Issue of Documents**

Document revisions in effect on the date of the customer purchase order form a part of this drawing except as modified herein.

**5.4.2 Order of Precedence**

In the event of conflict between this document and the references cited herein or other requirements, the precedence in which requirements shall govern, in descending order, is as follows:

- a) Applicable Customer Purchase Order
- b) Applicable Customer Detail SCD and/or Detail Drawing
- c) Applicable Q-Tech Corporation Detail SCD/Drawing
- d) Applicable Q-Tech Corporation General SCD
- e) Other Specifications, Standards, and Documentation Referenced Above



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**5.4.3 Customer Purchase Order Special Requirements**

Additional special requirements shall be specified in the applicable customer purchase order when additional requirements or modifications are needed for compliance to special programs or product line compliance. Unique identification of the items produced may be required.

**5.4.4 General Specification Control Drawing**

Any reference to the “general specification” or “general SCD” refers to the Q-Tech Corporation General Specification Control Drawing cited in the Applicable Documentation and References section, unless otherwise specified.

**6 GENERAL REQUIREMENTS**

**6.1 Definition of Requirements**

Items supplied to this detail SCD shall meet the detail requirements specified herein.

**6.2 Individual Item Requirements**

The individual item requirements shall be in accordance with Q-Tech Corporation General SCD 401-0298-021 with the exceptions, modifications, and additions herein.

**6.3 Approved Source of Supply**

Hybrid crystal oscillators shall be supplied from the manufacturer specified in “Source of Supply” below.

**6.4 Design and Construction**

**6.4.1 Outline Dimensions and Terminal Connections**

The outline dimensions and terminal connections shall be as shown in Figure 1 herein.

**6.4.2 Package Body and Lead Finish**

The package body and lead finish shall be gold in accordance with MIL-PRF-38534.

**6.4.3 Active Devices**

The microcircuit used in this part shall use CMOS technology and shall be from a wafer proven to be radiation tolerate to 100 kRad(Si) total ionizing dose.

**6.4.4 CMOS Microcircuit Usage**

For frequencies below 3 MHz, the CMOS output microcircuit shall be 54AC191, see DSCC SMD 5962-89749. For frequencies from 3 MHz but below 12MHz, the CMOS output microcircuit shall be 54AC74, see DSCC SMD 5962-88520. For frequencies greater than or equal to 12 MHz, the CMOS microcircuit shall be 54AC00, see DSCC SMD 5962-87549. These microcircuits are specified to be single event latchup free for LET up to 93 MeV-cm<sup>2</sup>/mg. For output frequencies up to 100 MHz, the manufacturer shall be ST Microelectronics Corporation. For output frequencies greater than 100 MHz, the manufacturer shall be National Semiconductor Corporation.

**6.5 Performance Requirements**

**6.5.1 Maximum Ratings**

The maximum ratings shall be as specified in Table 2 herein.

**6.5.2 Electrical Performance Characteristics and Limits**

The electrical performance requirements and limits shall be in accordance with Table 3 herein.

**6.5.3 Delta Limits**

Except for frequency aging (refer to Table 3 herein), delta limits shall be in accordance with the general SCD.



**6.5.4 Total Dose Radiation Limits**

Hybrid crystal oscillators supplied in accordance with this detail SCD shall be capable of meeting the performance requirements after being exposed to 100 kRad total dose radiation levels.

**7 QUALITY ASSURANCE PROVISIONS**

**7.1 General**

The quality assurance provisions shall be in accordance with the general SCD with the exceptions, modifications, and additions specified herein.

**7.2 Screening**

The screening tests shall be in accordance with the general SCD.

**7.3 Quality Conformance Inspection (QCI)**

Quality Conformance Inspection shall be in accordance with the general SCD and shall be required only when specified by the purchase order.

**8 PREPARATION FOR DELIVERY**

**8.1 Preservation, Packaging, and Packing**

Hybrid crystal oscillators shall be prepared for delivery in accordance with the general SCD.

**8.2 Electrostatic Discharge Sensitivity**

The devices supplied to this detail SCD shall be considered to be electrostatic discharge sensitive and require further protection and shall use one of the packaging requirements in accordance with MIL-PRF-38534, Category A, Section 5.

**9 SOURCE OF SUPPLY**

**9.1 Approved Manufacturer**

Q-Tech Corporation  
10150 West Jefferson  
Boulevard Culver City, CA  
90232-3510 USA

**10 NOTES**

10.1 The notes of the general SCD are applicable to this drawing.



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**Table 1 – Part Number**

Model Number		
QT625N		
Supply Voltage Code	Supply Voltage	
C	+ 5.0 V <sub>DC</sub>	
Stability / Temperature	Frequency Stability	Stability
A	± 65 PPM	-55 <sup>°C</sup> to +125 <sup>°C</sup>
B	± 50 PPM	-55 <sup>°C</sup> to +125 <sup>°C</sup>
C	± 50 PPM	-55 <sup>°C</sup> to +105 <sup>°C</sup>
D	± 40 PPM	-55 <sup>°C</sup> to +105 <sup>°C</sup>
E	± 30 PPM	-40 <sup>°C</sup> to +85 <sup>°C</sup>
F	± 50 PPM	-20 <sup>°C</sup> to +70 <sup>°C</sup>
G	± 25 PPM	-20 <sup>°C</sup> to +70 <sup>°C</sup>
H*	± 5 PPM	0 <sup>°C</sup> to +55 <sup>°C</sup>
Duty Cycle Code	Duty Cycle	Availability
1	60 / 40	All Frequencies
2	45 / 55	Up to 100 MHz
Screening Code	Screening Option	
E	Engineering Model	
M	Flight Model	
Frequency Code	Minimum Frequency	Maximum
8 digits	0.7500000 MHz	150.00000 MHz
<p>*Frequency stability shall be referenced to the specified nominal output frequency, except for temperature code H where it is with reference to room temperature (T = 25 ± 2<sup>°C</sup>). For temperature code H, room temperature tolerance shall be ± 10 PPM.</p> <p>Example Part Number: "QT625NCB1M-16.000000MHz" specifies a 16 MHz QT625NC oscillator with a frequency stability of ± 50 PPM over -55<sup>°C</sup> to +125<sup>°C</sup> with 60/40 Duty Cycle and Flight Model screening.</p>		

**Table 2 – Maximum Ratings**

Parameter	Symbol	Minimum	Maximum	Units
Supply Voltage	V <sub>CC</sub>	0	7	Volts
Operating Temperature	T <sub>C</sub>	-55	+125	°C
Storage Temperature	T <sub>STG</sub>	-65	+150	°C
Lead Solder Temperature/Time			+250/10	°C/Seco
Package Thermal Resistance	Θ <sub>JC</sub>		50	°C/W

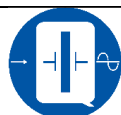


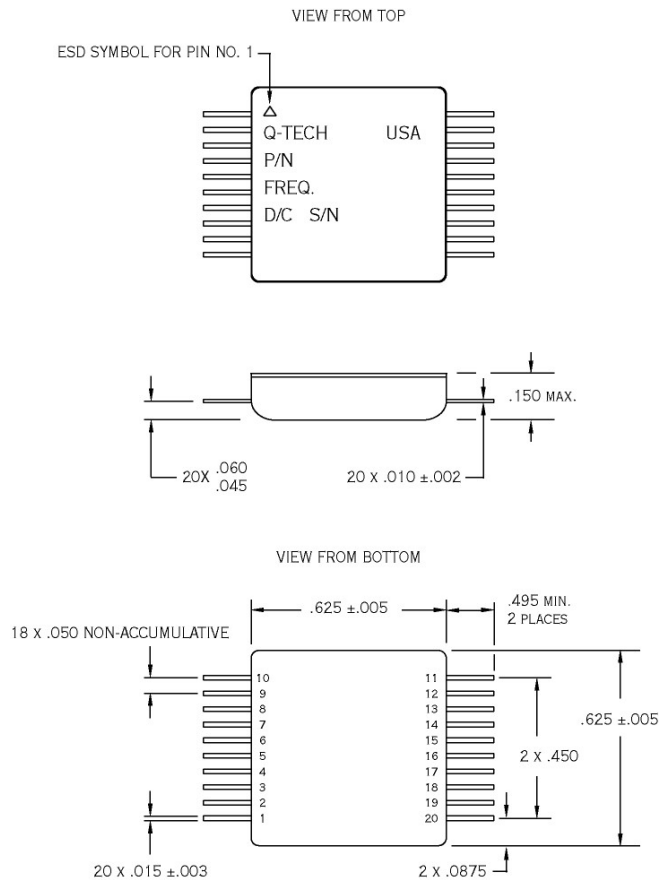
**Table 3 – Electrical Performance Characteristics**

Electrical Parameter	Test Conditions (Note 2 and 3)	Limits				Notes
		Min.	Nom.	Max.	Units	
Frequency Stability	See Table 1	See Table 1			ppm	Note 1 and 4
Supply Voltage		4.5	5	5.5	Vdc	
Input Current Measured Without Load at 5.5 V <sub>DC</sub>	Output Frequency:					
	Up to 59.99 MHz			25	mA	
	60 to 99.99 MHz			45	mA	
	100 to 150 MHz			60	mA	
Load					Note 6	
Output Voltage – Logic “0”				V <sub>CC</sub> x 0.1	Vdc	
Output Voltage – Logic “1”		V <sub>CC</sub> x 0.9			Vdc	
Output Waveform		Squarewave			N/A	
Rise/Fall Time	Output Frequency:					
	Less than 12 MHz			5	nsec	Note 7
	12 to 80 MHz			4	nsec	Note 7
	Above 80 MHz			3	nsec	Note 7
Duty Cycle	Option 1:	60/40 or better			%	
	Option 2:	45/55 or better			%	
Frequency Aging (After 30 Days)	70°C ± 3°C			±1.5	ppm	
Frequency Aging (After 1 Year)	70°C ± 3°C			±10	ppm	
Start Up Time				10	msec	

**NOTES**

1. The limit for Frequency Stability (tolerance) is referenced to the specified nominal frequency and shall include the effects of temperature, load and supply voltage variations.
2. Unless otherwise specified, the limits are over the full operating temperature range, and under specified load conditions and nominal Supply Voltage.
3. Unless otherwise specified, all measurements are in accordance with MIL-PRF-55310.
4. Up to 30 days after shipment.
5. Voltage values are with respect to network ground terminal.
6. A standard CMOS load of 10 KOhm || 15 pF shall be used, except for frequencies greater than 125 MHz, where the load shall be 5 pF. Refer to MIL-PRF-55310/26 for CMOS waveform measurement definitions.
7. Measured between 10% and 90% for Rise time or between 90% and 10 % for Fall time.





**Figure 1 – Package Dimensions and Terminal Connections**

**Table 4 – Terminal Connections**

Terminal No.	Connection	Terminal No.	Connection
1	N/C	11	OUTPUT
2	N/C	12	GROUND/CASE (Note 4)
3	N/C	13	V <sub>CC</sub>
4	N/C	14	N/C
5	N/C	15	GROUND/CASE (Note 4)
6	N/C	16	N/C
7	N/C	17	N/C
8	N/C	18	N/C
9	N/C	19	N/C
10	GROUND/CASE	20	N/C

**NOTES**

1. Dimensions are in inches.
2. Lead numbers are for reference only and are not marked on the unit.
3. A triangle symbol is marked on the corner of the package to indicate Pin 1.
4. Additional optional ground connections may be connected to circuit ground plane for minimum overshoot/ringing when driving capacitive loads.



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