Revision Record							
Revision	**DCO**	**Description**	**Engineering Approval**	**Date**	**QA Approval**	**Date**	**Release Date**
-	6884	Initial Release. Document number changed from QT725C Rev A to QPDS-0134 and migrated to new document format. Add EAR Destination Control Statement.	R. Duong C. Hooper	06/21/2017 07/18/2017	D. Moline	06/27/2017	07/18/2017

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UNLESS OTHERWISE SPECIFIED
Dimensions are in Inches
Tolerances

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

DETAIL PRODUCT SPECIFICATION CONTROL DRAWING

Initial Release	
Prepared	**Date**
Joshua Navarrete	06/16/2017
Checked	**Date**
Richard Duong	06/21/2017
Engineering Approval	**Date**
Curtis Hooper	07/18/2017
Quality Assurance Approval	**Date**
Daniel Moline	06/27/2017
Released	**Date**
Steve Nguyen	07/18/2017

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TITLE

QT725C Hybrid Voltage Controlled Crystal Oscillator, +5V, Class S, Detail Specification For

DRAWING NO.			REVISION
QPDS-0134			**-**
SCALE	SIZE	CAGE CODE	PAGE
NONE	**A**	**51774**	**1** of **5**

1 SCOPE

1.1 Scope. This specification establishes the detail requirements for hybrid, hermetically sealed, crystal oscillators for use in space flight missions.

1.2 Part number. The part number shall be as specified in Table I herein.

2 APPLICABLE DOCUMENTS

2.1 Specifications and standards. Unless otherwise specified, the following documents shall be applicable to this specification to the extent specified herein.

SPECIFICATIONS

401-0298-018 Hybrid Crystal Oscillators, Class S, General Specification For

3 REQUIREMENTS

3.1 General requirements. The individual item requirements shall be as specified in the General Specification with the exceptions, modifications, and additions specified herein.

3.2 Approved manufacturer. Hybrid crystal oscillators shall be supplied from the manufacturer specified in paragraph 7.1 herein.

3.3 Design and construction.

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

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

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

3.3.3.1 CMOS microcircuit usage. For frequencies below 12 MHZ the 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 DSSC SMD 5962-87549. These microcircuits are specified to be *single event latchup free* for LET up to 93 MeV-cm^2/mg. The manufacturer shall be ST Microelectronics Corporation.

3.4 Performance requirements.

3.4.1. Maximum ratings. The maximum ratings shall be as specified in Table II herein.

3.4.2. Electrical performance characteristics and limits. The electrical performance requirements and limits shall be in accordance with Table III herein.

3.4.3. Delta limits. Except for frequency aging (refer to Table III), delta limits shall be in accordance with the General Specification.

3.4.4. Total dose radiation limits. Hybrid crystal oscillators supplied in accordance with this specification shall be capable of meeting the performance requirements after being exposed to 100 krad total dose radiation levels.

4 QUALITY ASSURANCE PROVISIONS

4.1 General. The quality assurance provisions shall be in accordance with the General Specification with the exceptions, modifications, and additions specified herein.

4.2 Screening tests. The screening tests shall be in accordance with the General Specification.

4.3 Quality Conformance Inspection. Quality Conformance Inspection shall be in accordance with the General Specification and shall be required only when specified by the purchase order.

5 PACKAGING

5.1 Preservation, packaging and packing. Hybrid crystal oscillators shall be prepared for delivery in accordance with the General specification.

6 NOTES

6.1 Notes. The notes of the General Specification are applicable to this drawing.

6.2 Ordering information. The procuring activity shall advise Q-Tech Corporation at the time of Request for Quotation if quality conformance inspection is to be required.

6.3 Part number.

QT725 C B M - 16.000000 MHZ

- Model #
- Supply voltage: C: + 5.0 volts Temp
- Stability - see Table I
- Screening: E: engineering model; M: flight model Frequency
- (8 digits)

TABLE I. STABILITY / TEMPERATURE OPTIONS	
OPTION	**TEMP STABILITY**
B	± 50 PPM, - 55 °C TO + 125 °C
D	± 40 PPM, - 55 °C TO + 105 °C
E	± 30 PPM, - 40 °C TO + 85 °C

7 SOURCE OF SUPPLY

7.1 Approved manufacturer.

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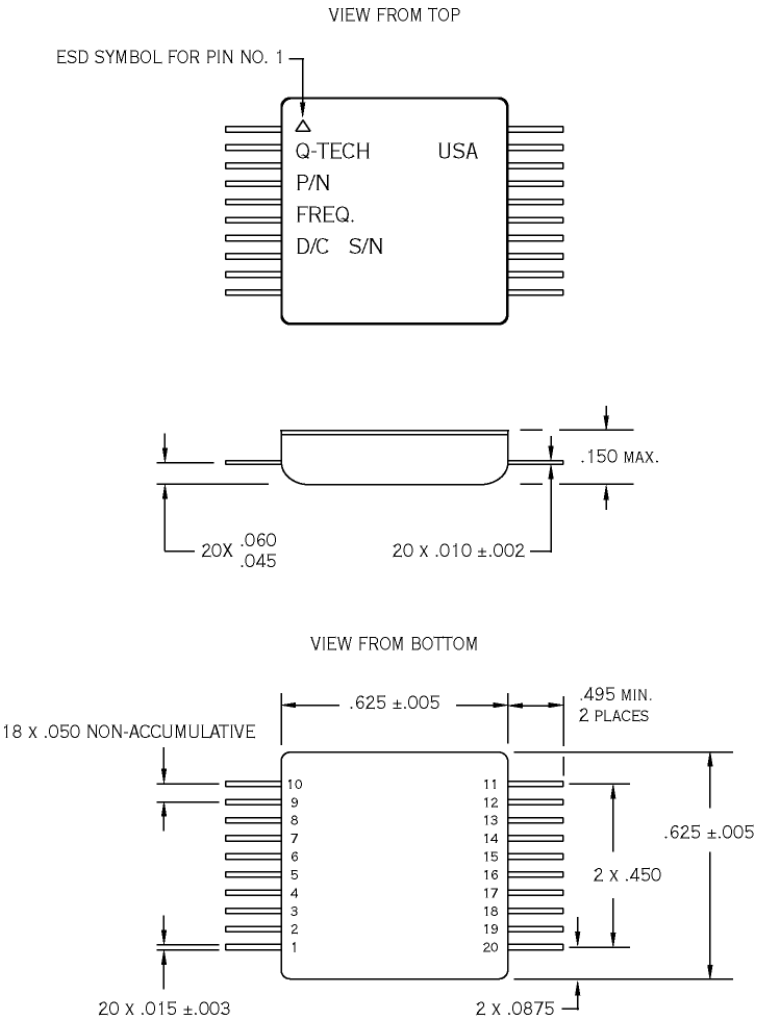
TABLE II. MAXIMUM RATINGS				
Parameter	**Symbol**	**Min**	**Max**	**Units**
Supply voltage	V_{CC}	0	7	Volts
Control voltage	V_C	0	7	Volts
Operating temperature	T_C	-55	125	ºC
Storage temperature	Tstg	-65	150	ºC
Lead solder temperature/time			250/10	ºC/seconds
Package thermal resistance	θjc		50	ºC/W

TABLE III. ELECTRICAL PERFORMANCE CHARACTERISTICS

ELECTRICAL PARAMETER	TEST CONDITIONS 2/,3/	LIMITS				NOTES
		MIN.	NOM.	MAX.	UNITS	
FREQUENCY RANGE AVAILABLE		3		100	MHz	
FREQUENCY/TEMPERATURE STABILITY		See Table I				1/
INITIAL FREQUENCY ACCURACY	Vc = 2.5 volts (center) T = +25°C ± 2 °C			± 25	PPM	4/
FREQUENCY DEVIATION	0 < Vc < 5 -55°C < T < +125°C	± 110			PPM	4/
CONTROL VOLTAGE (Vc) RANGE		0		5	Vdc	
TUNING SCALE FACTOR, AVERAGE		80		120	PPM/VOLT	5/
TRANSFER FUNCTION		Positive			-	
LINEARITY				±10	%	
MODULATION BANDWIDTH		DC		10	kHz	8/
CONTROL VOLTAGE INPUT IMPEDANCE		50			kΩ	8/
SUPPLY VOLTAGE		4.5	5	5.5	Vdc	
INPUT CURRENT Measured without load at 5.5 Vdc	**Output frequency:**					
	Less than 12 MHZ			25	mA	
	12 MHZ - 59.99 MHZ			30	mA	
	60 MHZ - 100 MHZ			50	mA	
LOAD			CMOS		-	7/
OUTPUT VOLTAGE - LOGIC "0"				V_{CC} x 0.1	Vdc	6/
OUTPUT VOLTAGE - LOGIC "1"		V_{CC} x 0.9			Vdc	6/
OUTPUT WAVEFORM		Squarewave			N/A	
RISE / FALL TIME	**Output frequency:**					
	Below 12 MHZ			5	nS	7/
	12 MHZ - 80 MHZ			3.5	nS	7/
	80 MHZ - 100 MHZ			2.5	nS	7/
DUTY CYCLE		60/40			%	
FREQUENCY AGING (AFTER 30 DAYS)	70 °C ± 3°C			±1.5	ppm	
FREQUENCY AGING (AFTER 1 YEAR)	70 °C ± 3°C			±10	ppm	
STARTUP TIME				10	ms	

NOTES

1. The limit for frequency/temperature stability shall be referenced to the output frequency at 25 °Cwith Vc = any constant value within the control voltage range.
2. Unless otherwise specified, the limits are over the full operating temperature range and under specified load conditions.
3. Unless otherwise specified, all measurements are in accordance with MIL-PRF-55310.
4. Referenced to nominal output frequency. Up to 30 days after shipment (does not include Aging). Center tuning voltage is defined as Vc = 2.5 volts.
5. Slope of linear estimate (least squares) for 0 < Vc < 5V.
6. Voltage values are with respect to network ground terminal.
7. A standard CMOS load of 10 kOhm || 15 pF shall be used. See MIL-PRF-55310/26 for CMOS waveform measurement definitions.
8. Tested at room temperature only.



NOTES:

1. Dimensions are in inches.
2. Lead numbers are for reference only and are not marked on the unit.
3. All pins with function NC may not be connected as external tie or connections, except they may be tied to Ground.

TERMINAL CONNECTIONS			
TERMINAL NO.	**CONNECTION**	**TERMINAL NO.**	**CONNECTION**
1	Vc	11	OUTPUT
2	N/C	12	GND/CASE *
3	N/C	13	V_{CC}
4	N/C	14	N/C
5	N/C	15	GND/CASE *
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	GND/CASE	20	N/C

* Additional optional Ground connections are included only when microcircuit used is 54AC00 (see paragraph 3.3.3.1), and may be connected to circuit ground plane for minimum overshoot/ringing when driving capacitive loads.

FIGURE 1. PACKAGE DIMENSIONS AND TERMINAL CONNECTIONS