

REV LTR	DESCRIPTION	DATE	APPVD.
-	Orig.	1/15/24	MLG

**XRS4x CRYSTAL UNITS
FOR SPACE & HI-REL APPLICATIONS**

8 MHz to 200 MHz

(7 x 9 mm, SMD)

(Refer to Page 4 for Reduced QCI Model)

REV STATUS OF SHEETS	REV																
	SHEET NO.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
APPROVALS	DATE	XSIS ELECTRONICS, INC.															
PREP. S. Gupta	1/15/24	12620 W. 63 rd Street, Shawnee, KS 66216 USA															
ENG. M. Gupta	1/15/24	CRYSTAL UNITS FOR SPACE & HI-REL APPLICATIONS															
Q. A. M. Gupta	1/15/24	FSC NO.								DWG. NO.							
CUST. ENG.		57051								XRS4x							
CUST Q A.		SCALE								SHEET							
		N/A								1 OF 7							

1. SCOPE: XRS4x series, high reliability crystal units are designed, produced and tested by Xsis Electronics, Inc. as per the requirements of MIL-PRF-3098 for use in advanced industrial, military, avionics and space applications.

1.1 ALTERNATE MODELS: Alternate model, XRE4x with reduced QCI and/or reduced screening and shorter lead time is also offered as explained on page 4.

2. APPLICABLE DOCUMENTS:

MIL-PRF-3098L	Crystal Units, Quartz, General Specifications for
MIL-PRF-202H	Test Methods Standard, Electronic and Electrical Component Parts
MIL-STD-883L	Test Methods and Procedures for Microelectronics
MIL-PRF-55310F	Oscillator, Crystal Controlled, General Specifications for

3. REQUIREMENTS:

3.1 General: The individual item requirements shall be as specified herein.

3.2 Package: Ceramic, 90% Min. AL₂O₃, Weight: 0.6g Max.

3.2.1 Lid Material & Finish: Kovar, 100 to 200 microinches Electroless Nickel

3.2.1 Lead Material & Finish: Kovar, 50 to 70 micro-inches gold over 100 to 250 micro-inches nickel. Hot Solder tinning with Sn63/Pb37 solder per MIL-PRF-55310 is optional at an additional cost.

3.2.3 Reflow Soldering: Reflow soldering at 260 °C for 10 seconds shall not degrade the performance.

3.3 Hermeticity: Resistance welded, hermetically sealed, leak rate of 1(10)⁻⁸ atm-cc/s Max.

3.4 Marking: As a minimum, the parts shall be marked with Xsis P/N, Xsis cage code, ESD symbol, date code and serial number.

3.5 Absolute Maximum Ratings: Unless otherwise specified, absolute maximum ratings shall be as follows:

Operating Free-Air Temperature Range	-55°C to +125°C
Storage Temperature	-55°C to +125°C

3.6 Electrical Characteristics: See Table I

3.6.1 Total Dose Radiation: Crystal Units shall be capable of meeting the electrical characteristics of Para. 3.6 after being exposed to total ionizing dose radiation of 100 krads as per MIL-STD-883, method 1019.

3.7 Hybrid Elements:

3.7.1 Quartz Crystals: High grade cultured quartz crystal shall be used. As an option, Xsis will use premium Q swept quartz crystal at an additional charge, refer to part numbering example in paragraph 6 to specify swept quartz.

3.7.2 Crystal Mounting: Crystal element shall be mounted at 4 points in such a manner as to provide adequate ruggedness and performance under extreme environments specified herein.

3.7.3 Workmanship: Assembly, Rework and Process controls shall be in accordance with the requirements of MIL-PRF-3098 as applicable.

3.7.4 Lot Traceability: Production lot for these Crystal Units shall be homogenous. Each element used in the production lot shall be traceable to a single lot. Swept quartz shall be traceable to the quartz bar, and its applicable processing details.

XSIS ELECTRONICS, INC.

12620 W. 63rd St., Shawnee, KS 66216 USA

Tel: 913-631-0448 e-mail: xsis@xis.com website: www.xsis.com

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- 3.7.5 Prohibited Materials: The following items shall not be used in these Crystal Units:
Pure Tin (Sn >97%), Cadmium, Zinc, Mercury, Selenium, Silver as under plate, and Gold Plating without a nickel barrier.
- 3.7.6 Material Outgassing: All materials shall meet a TML of 1% Max. and a CVCM of 0.1% Max., when tested in accordance with ASTM E595.
4. QUALITY ASSURANCE PROVISIONS: The quality assurance provisions shall be as specified herein.
- 4.1 100% Screening: The 100% screening shall be performed as per Table III. PDA for screening shall be 5% or 1 unit whichever is greater. Lot may be resubmitted for screening one time only and may be submitted only when the observed percentage of defectives does not exceed 10%. For acceptance, resubmitted lot shall be subjected to and pass the complete screening sequence with PDA of 3% or 1 unit whichever is greater. Any rejects due to frequency out of tolerance over the operating temperature shall not be counted towards PDA calculation.
- 4.2 Group A inspection shall be in accordance with MIL-PRF-3098 for product level S. Any test performed during 100% screening need not be repeated for Group A inspection.
- 4.6 Crystal Units shall be capable of meeting group B inspection per MIL-PRF-3098 product Level B. When specified by the Customer, Xsis Electronics will perform Group B testing at an additional charge.
- 4.7 Inspection and Test Data: Unless otherwise specified in the purchase order, the following Inspection and test data documentation shall be supplied with the parts.

Model XRS4x

Certificate of Conformance
Summary of Screening Test Results per Table III
Group A Inspection Summary
Radiographic Inspection Certificate

Model XRE4x: (See Page 4 for the description of the Model Number XRE4x)

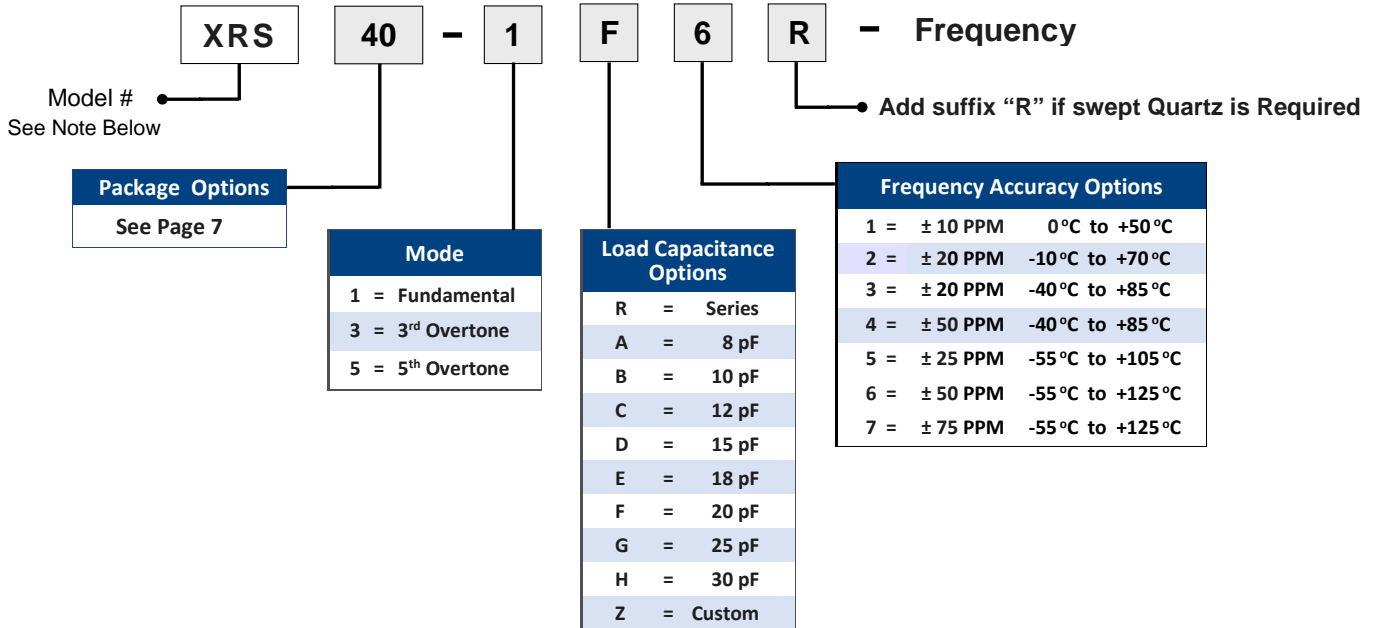
Certificate of Conformance
Summary of Screening Test Results per Table IV
Group A Inspection Summary

- 4.8 The following test and inspection options are available at customer request, at additional cost.
Customer Source Inspection for Pre-Cap and Final
Group B Inspection per MIL-PRF-3098 for product level "B" on number of units specified by the customer
DPA (Destructive Physical Analysis)
5. PRESERVATION, PACKAGING AND PACKING: Crystal Units shall be clean, dry and packaged in a manner to provide adequate protection against electrostatic discharge, corrosion, deterioration and physical damage during shipment.

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6. PART NUMBERING EXAMPLE:

P/N EXAMPLE: XRS40 -1F6R - 24M00000 = 24.000 MHz, Fundamental Mode, C_L= 20 PF, Swept Quartz Frequency Accuracy of ± 50 PPM over -55°C to +125°C



NOTE: Besides model **XRS4x**, the following additional model is available for applications that can accommodate reduced level of Elements, Screening and Quality Conformance inspection:

XRE4x: Model **XRE4x** uses the same design & elements as **Model XRS4x** except,

100% screening is as per Table IV herein

PDA for Screening is 10% or 1 unit whichever is greater

Group A inspection is as per MIL-PRF-3098, Class B

Table I - Electrical Specifications, Fundamental, 3rd and 5th Overtone Oscillation modes

Parameter	Fundamental	3 rd	5 th
Nominal Frequency Range	8.0 MHz to 40.0 MHz	40.0 MHz to 150.0 MHz	75.0 MHz to 200.0 MHz
Mode	Fundamental	3 rd	5 th
Resonance Type	See Ordering Information		
Load Capacitance	See Ordering Information		
Frequency Accuracy Vs. Temperature	See Ordering Information		
Resistance (ESR) 8.0 to 20 MHz 20.1 to 40 MHz 40.0 to 90 MHz 90.1 to 150 MHz 75.0 to 125 MHz 125.1 to 200 MHz	40 Ohms Max. 30 Ohms Max.	50 Ohms Max 60 Ohms Max.	70 Ohms Max. 80 Ohms Max.
Shunt Capacitance	7 pF Max.		
Unwanted Modes Resistance	> 2 times the Main Mode Resistance		
Storage Temperature	-55 °C to +125 °C		
Drive Level	50 µW Typical, 1 mW Max.		
Aging at 25°C per year	± 3 PPM Max		

For special requirements, please contact Xsis Electronics at xisis@xisis.com or call us at 913-631-0448

Table II - Environmental Specifications :

Crystal Units shall be able to withstand any of the following environmental stresses with change in Frequency of less than 5 PPM and change in resistance of less than 10%.

Test - Inspection	Test Method - Condition
Shock	MIL-STD-202, Method 213, Cond. C
Vibration	MIL-STD-202, Method 204, Cond. A, 3 hours minimum.
Thermal Shock	MIL-STD-202, Method 107, Cond. B
Moisture Resistance	MIL-STD-202, Method 106, except Step 7b, Vibration, is not applicable.

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Table III - Model XRS4x, Screening (100%)

Test - Inspection	Test Method – Condition
Pre-seal Visual Examination	MIL-PRF-3098, Method 4.10.2.2
Stabilization Bake (Prior to Seal) <u>1/</u>	MIL-STD-883, Method 1008, Condition C (+150 °C), 48 hours minimum
Seal (Fine and Gross Leak)	MIL-PRF-3098, Para. 4.10.26
Temperature Cycling	MIL-STD-883, Method 1010, Condition B
Shock	MIL-STD-202, Method 213, Condition F
Particle Impact Noise Detection (PIND)	MIL-STD-883, Method 2020, Condition A
Frequency and Resistance over Operating Temperature	MIL-PRF-3098, Para. 4.10.18
Low Temperature Storage	MIL-PRF-3098, Para. 4.10.18.4
Unwanted Modes	MIL-PRF-3098, Para. 4.10.9
Capacitance Shunt	MIL-PRF-3098, Para. 4.10.7.1
Accelerated Aging	MIL-PRF-3098, Para. 4.10.27.2
Radiographic Inspection	MIL-STD-202, Method 209, view 1 in Y1 direction, second view 90° relative to first view.
External Visual & Mechanical	MIL-PRF-3098, Para. 4.10.2.1

1/ Vacuum bake and maintain Crystal Units in dry nitrogen until sealed.

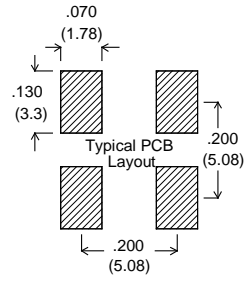
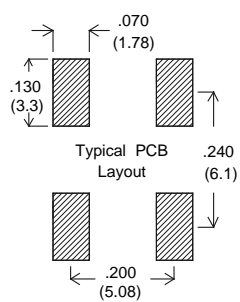
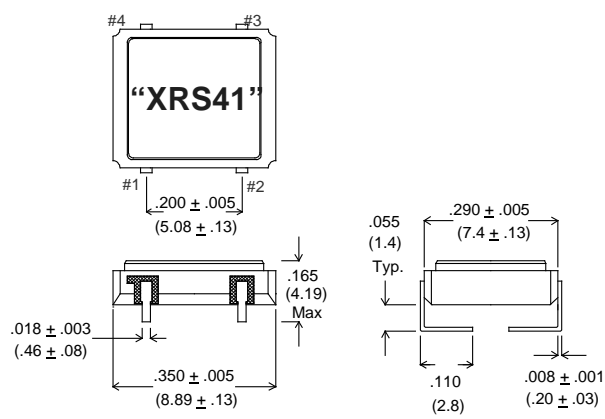
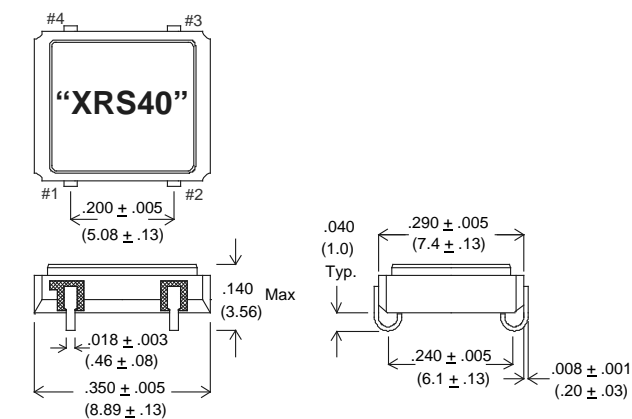
Table IV - Model XRE4x, Screening (100%)

Test - Inspection	Test Method – Condition
Pre-seal Visual Examination	MIL-PRF-3098, Method 4.10.2.2
Stabilization Bake (Prior to Seal) <u>1/</u>	MIL-STD-883, Method 1008, Condition C (+150 °C), 24 hours minimum
Seal (Fine and Gross Leak)	MIL-PRF-3098, Para. 4.10.26
Frequency and Resistance over Operating Temperature	MIL-PRF-3098, Para. 4.10.18
External Visual & Mechanical	MIL-PRF-3098, Para. 4.10.2.1

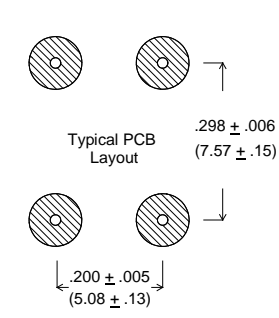
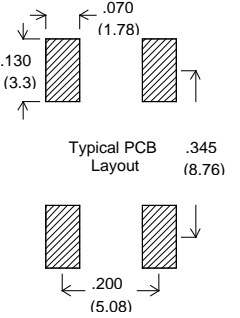
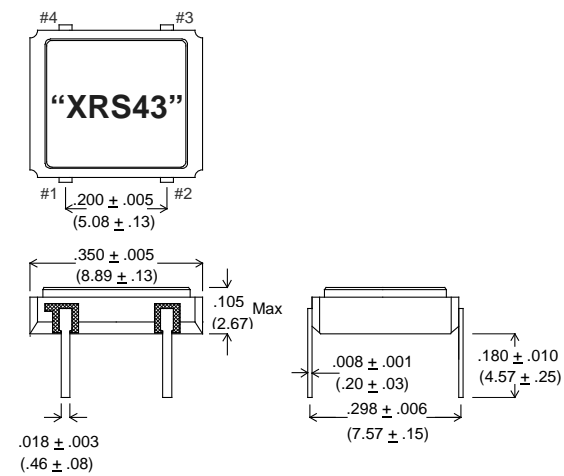
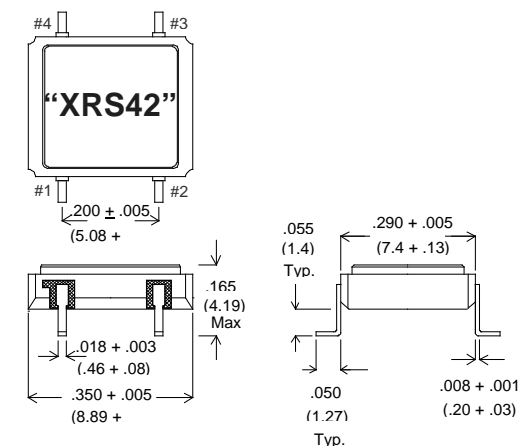
1/ Vacuum bake and maintain Crystal Units in dry nitrogen per MIL-PRF-55310

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Package Type, Outline and Pin Connections – Dimensions are in inches (mm)



LEAD/PAD#	FUNCTION
1	CRYSTAL
2	N/C
3	CRYSTAL
4	N/C



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