REV LTR	DESCRIPTION	DATE	APPVD.
-	Orig.	8/15/12	MLG

XSIS XE642S - A00, SERIES

HC/ACMOS OSCILLATORS

FOR SPACE APPLICATIONS

450 KHz to 90 MHz

(7 x 9 mm, Formed-Leads, SMD, 5.0V)

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	
PREP. S. Gupta	8/15/12	**XSIS ELECTRONICS, INC.** 12620 W. 63rd Street, Shawnee, KS 66216 USA
ENG. M. Gupta	8/15/12	**XE642S - A00 SERIES HC/ACMOS** **"S" LEVEL OSCILLATORS**
Q. A. M. Gupta	8/15/12	FSC NO. 57051 — DWG. NO. XE642S-A00
CUST. ENG.		
CUST Q A.		SCALE N/A — SHEET 1 OF 6

1. SCOPE: XE642S-A00, HC/ACMOS series, high reliability hybrid microcircuit crystal oscillators are specifically designed, produced and tested by Xsis Electronics, Inc. for use in space applications. These devices are of hybrid microcircuit technology conforming to MIL-PRF-55310, Type 1, Class 2 oscillators

2. APPLICABLE DOCUMENTS:

MIL-PRF-55310E	Oscillator, Crystal Controlled, General Specifications for
MIL-PRF-38534H	Hybrid Microcircuits, General Specifications for
MIL-STD-883H	Test Methods and Procedures for Microelectronics

3. REQUIREMENTS:

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

3.2 Package: Ceramic, 90% Min. AL_2O_3. Thermal Resistance, θ_{JC}: 50 °C / Watt.

3.2.1 Lead finish: 50 to 70 micro-inches gold over 100 to 250 micro-inches nickel. Hot Solder tinning with Sn60/Pb40 solder per MIL-PRF-55310 is optional at an additional cost.

3.2.2 Weight: 0.5 Gms typical, 0.6 Gms Max.

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 1x (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:

Supply Voltage	-0.5 to +7 VDC
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: Hybrid Microcircuit Crystal Oscillators 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 crystals shall be used. As an option, Xsis will use premium Q swept quartz crystals at an additional charge. Crystal element evaluation shall be in accordance with MIL-PRF-55310.

3.7.2 Passive Elements: Established Reliability (ER) QPL components, failure level R minimum shall be used or element lot evaluation shall be in accordance with MIL-PRF-55310, class S.

3.7.3 Microcircuit die shall be from lots that have passed the element evaluation per MIL-PRF-55310, Appendix B, Level S, except testing per Subgroup 5 is omitted. Subgroup 5 testing is circuit configuration dependent, therefore, it is more effectively performed at the oscillator level as explained in Paragraph 3.7.4 herein.

3.7.4 Microcircuit die used in the oscillator shall be from NSC/FC 54ACT family and must be from wafer lot that has been successfully tested in the oscillator proposed herein for ionizing radiation of up to 100 krads.

3.7.5 Lot Traceability: Production lot for these oscillators 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.

4. Quality Assurance Provisions: The quality assurance provisions shall be per MIL-PRF-55310, except as specified herein.

4.1 100% Screening: The 100% screening shall be performed as per Table II. PDA requirements for nondestructive bond pull and burn-in shall be as specified below.

4.2 PDA for Nondestruct Bond Pull: Unless otherwise specified, PDA shall be 2% of total number of wires or 1 wire whichever is greater.

4.3 PDA for Burn-in: Unless otherwise specified, PDA for burn-in shall be 2% or 1 oscillator whichever is greater and shall be applicable to +23 °C and/or +25 °C static tests only. In addition Delta Calculation shall be performed after Burn-in and shall count for PDA. All measured values for Delta Calculation shall be recorded. Parts that exceed the specified delta limits shall be rejected and be counted for PDA. Delta Calculation shall be performed at 5.0 VDC for the following parameters:

Input Current	10% change Maximum
Output High Level	10% change Maximum
Output Low Level	0.1V change Maximum

4.4 Group A inspection shall be in accordance with MIL-PRF-55310 for product level S.

4.5 Group B inspection shall be in accordance with MIL-PRF-55310 for product level S.

4.6 Parts shall be capable of meeting group C inspection per MIL-PRF-55310. Generic group C inspection data on similar parts may be used to satisfy this requirement.

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.

Certificate of Conformance
Summary of Class “S” screening Test Results
PDA Calculations for Non-Destruct Bond Pull and Burn-in
Summary of Elements Lot Traceability
Electrical Tests before and after Burn-in
Group A Inspection Summary
Group B (30 day Aging) Data
Radiographic Inspection Certificate

5.0 Preservation, Packaging and Packing: The oscillators shall be clean, dry and packaged in a manner to provide adequate protection against electrostatic discharge, corrosion, deterioration and physical damage during shipment.

6.0 Part Numbering Example:

XE642S - A ☐ ☐ ☐ - FREQUENCY

Flight Model #
(See Note Below)

Add Suffix “ G ” if Enable/Disable is Required

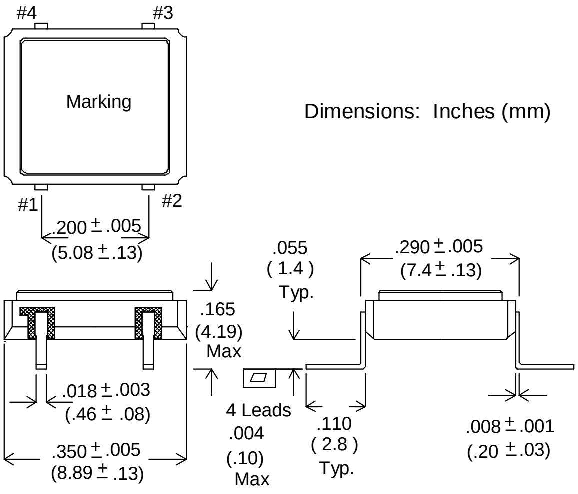
Select Frequency Stability	Select Operating Temperature Range
1 = ± 0.1%	1 = 0 °C to +70 °C
2 = ± 0.05%	2 = -30 °C to +85 °C
3 = ± 100 PPM	3 = -55 °C to +125 °C
4 = ± 50 PPM	4 = -55 °C to +105 °C
5 = ± 20 PPM	5 = -40 °C to +95 °C
6 = ± 10 PPM	6 = -20 °C to +70 °C

(Options 5 & 6 are not available for all Temperature Range Options)

Example: XE642S - A43 - 24.000 MHz = 24.000 MHz, Class “S” Oscillator, ± 50 PPM Frequency Stability over an operating temperature range of -55 °C to +125 °C,

NOTES: For **Engineering Model**, replace letter “S” in the part number with letter “E”. Engineering Models use the same design and elements as Flight Models except are subjected to MIL-PRF-55310 class B screening.

For **Prototype Model**, replace letter “S” in the part number with letter “P”. Prototypes are form, fit and function equivalent of Flight Models. Prototypes may use class B elements.



Dimensions: Inches (mm)

Pad #	Function
1	E/D (Optional)
2	GND/CASE
3	OUTPUT
4	V_{DD}

Enable/Disable Input is on Pin 1. A “Low” level at the input disables the Output into a high impedance state.

Figure 1 - Package Configuration & Pin Connections

XSIS ELECTRONICS, INC.
12620 W. 63rd St., Shawnee, KS 66216 USA

FSC NO. 57051
DWG. NO. XE642S-A00
REV
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TABLE I – Electrical Characteristics

Parameter	Spec. Limits
Frequency Range	450 KHz to 90 MHz
Frequency Accuracy at 23^{O}C	± 0.0015% (15 PPM)
Frequency Stability Vs Temperature	See Options in Paragraph 6.0
Operating Temperature Range	See Options in Paragraph 6.0
Input Voltage	+ 5 VDC ± 10%
Input Current at 5.0V (no load)	
450.00 KHz to 5.00 MHz	5 mA Max.
5.01 MHz to 10.00 MHz	10 mA Max.
10.01 MHz to 20.00 MHz	20 mA Max.
20.01 MHz to 30.00 MHz	25 mA Max.
30.01 MHz to 40.00 MHz	30 mA Max.
40.01 MHz to 50.00 MHz	35 mA Max.
50.01 MHz to 90.00 MHz	50 mA Max.
Output Waveform	Square Wave, HC/ACMOS
Output Duty Cycle	55/45% Max.
Output Load	10K || 15 pF
High Output Level	0.9 V_{DD} Min.
Low Output Level	0.1 V_{DD} Max.
Rise & Fall Times	
100.00 KHz to 25.00 MHz	5 nS Max
25.01 MHz to 45.00 MHz	4 nS Max.
45.01 MHz to 90.00 MHz	3 nS Max.
Start-up Time	10 mS Max.
Phase Jitter	0.3 pS rms typ. (10 KHz to 20 MHz Integrated)
Frequency Stability Vs Supply Voltage	± 4 PPM Max. for 10% change in Voltage
Frequency Aging @ 70^{O}C	3 PPM / Year Max.

Contact Xsis Engineering for any other special requirements.

Table II - Class “S” screening (100%)

Test - Inspection	Test Method – Condition
Nondestructive Bond Pull	MIL-STD-883, Method 2023
Internal Visual	MIL-STD-883, Method 2017, Level S
Stabilization Bake (Prior to Seal) 1/	MIL-STD-883, Method 1008, Condition C
Thermal Shock	MIL-STD-883, Method 1011, Condition A
Temperature Cycling	MIL-STD-883, Method 1010, Condition B
Constant Acceleration	MIL-STD-883, Method 2001, Condition A Y_1 only (5000 G)
Seal (Fine and Gross Leak)	MIL-PRF-55310, Para. 4.8.2.2.2
Particle Impact Noise Detection (PIND)	MIL-STD-883, Method 2020, Condition A
Radiographic Inspection	MIL-STD-883, Method 2012
Electrical Tests:	Nominal Supply Voltage, Specified load +23 °C Record all measurements
Input Current	MIL-PRF-55310, Para. 4.8.5
Output Frequency	MIL-PRF-55310, Para. 4.8.6
Output Voltage Levels	MIL-PRF-55310, Para. 4.8.21.3
Output Rise & Fall Times	MIL-PRF-55310, Para. 4.8.22
Output Duty Cycle	MIL-PRF-55310, Para. 4.8.23
Burn-in (load)	+125°C, Nominal Supply Voltage and Burn-in load, 320 Hours Minimum
Electrical Tests:	Nominal and Extreme Supply Voltages, Specified load, +23°C and operating temperature extremes, Record all measurements.
Input Current	MIL-PRF-55310, Para. 4.8.5
Output Frequency	MIL-PRF-55310, Para. 4.8.6
Output Voltage Levels	MIL-PRF-55310, Para. 4.8.21.3
Output Rise & Fall Times	MIL-PRF-55310, Para. 4.8.22
Output Duty Cycle	MIL-PRF-55310, Para. 4.8.23

1/ Vacuum bake and maintain oscillators in dry nitrogen per MIL-PRF-55310.