

| REV LTR | DESCRIPTION                                                                                                | DATE    | APPVD. |
|---------|------------------------------------------------------------------------------------------------------------|---------|--------|
| -       | Orig. Release                                                                                              | 4/12/22 | MLG    |
| A       | Corrected Model numbers in Titles of Table V and VI                                                        | 8/18/22 | MLG    |
| B       | Corrected Rise & Fall times for 5.0 V parts in Table I<br>Added Frequency Stability Vs. Voltage in Table I | 8/25/22 | MLG    |

**XE641K SERIES**  
**HC/ACMOS OSCILLATORS**  
**FOR SPACE & HI-REL APPLICATIONS**  
**450 KHz to 125 MHz**

( 7 x 9 mm, Formed Leads, SMD, 2.5V, 3.3V & 5.0V )

( Refer to Page 5 for Reduced QCI Models XE641E, XE641B & XE641P )

| REV STATUS OF SHEETS | REV         |                                                         |   |   |   |   |   |   |          |   |       |    |         |    |    |    |    |  |
|----------------------|-------------|---------------------------------------------------------|---|---|---|---|---|---|----------|---|-------|----|---------|----|----|----|----|--|
|                      | SHEET NO.   | 1                                                       | 2 | 3 | 4 | 5 | 6 | 7 | 8        | 9 | 10    | 11 | 12      | 13 | 14 | 15 | 16 |  |
| <b>APPROVALS</b>     | <b>DATE</b> | <b>XSIS ELECTRONICS, INC.</b>                           |   |   |   |   |   |   |          |   |       |    |         |    |    |    |    |  |
| PREP.<br>S. Gupta    | 4/12/22     | 12620 W. 63 <sup>rd</sup> Street, Shawnee, KS 66216 USA |   |   |   |   |   |   |          |   |       |    |         |    |    |    |    |  |
| ENG.<br>M. Gupta     | 4/12/22     | <b>XE641K SERIES HC/ACMOS OSCILLATORS</b>               |   |   |   |   |   |   |          |   |       |    |         |    |    |    |    |  |
| Q. A.<br>M. Gupta    | 4/12/22     | FSC NO.                                                 |   |   |   |   |   |   | DWG. NO. |   |       |    |         |    |    |    |    |  |
| CUST. ENG.           |             | 57051                                                   |   |   |   |   |   |   | XE641K   |   |       |    |         |    |    |    |    |  |
| CUST Q A.            |             | SCALE                                                   |   |   |   |   |   |   | N/A      |   | SHEET |    | 1 OF 11 |    |    |    |    |  |

1. SCOPE:

XE641K Series, HC/ACMOS, high reliability hybrid microcircuit crystal oscillators are designed, produced and tested by Xsis Electronics, Inc. as MIL-PRF-38534 (modified), Class K equivalent devices, as described herein, for use in high reliability industrial, military, avionics and space applications. These devices are of hybrid microcircuit technology conforming to MIL-PRF-55310, Type 1, Class 2 oscillators.

1.1 ALTERNATE MODELS: Models XE641E, XE641B and XE641P with reduced QCI and/or reduced screening and shorter lead times are also offered as explained on page 5.

2. APPLICABLE DOCUMENTS:

|                |                                                            |
|----------------|------------------------------------------------------------|
| MIL-PRF-55310F | Oscillator, Crystal Controlled, General Specifications for |
| MIL-PRF-38534K | Hybrid Microcircuits, General Specifications for           |
| MIL-STD-883L   | 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<sub>2</sub>O<sub>3</sub>, Weight: 0.6 Gms Max., Thermal Resistance,  $\theta_{JC}$ : 28 °C / Watt.

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.

3.2.2 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 x (10)<sup>-8</sup> atm-cc/s Max.

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

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

|                                      |                 |
|--------------------------------------|-----------------|
| Supply Voltage                       | See Table I     |
| 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: A high grade cultured quartz crystal shall be used. As an option, Xsis will use a premium Q swept quartz crystal at an additional charge, refer to part numbering example in paragraph 6 to specify swept quartz crystal. Crystal element evaluation shall be in accordance with MIL-PRF-55310.

3.7.2 Crystal Mounting: The 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 Passive Elements: Established Reliability (ER) QPL components, failure level R minimum shall be used or element evaluation shall be as per MIL-PRF-38534, Level K.

**XSIS ELECTRONICS, INC.**

**12620 W. 63<sup>rd</sup> St., Shawnee, KS 66216 USA**

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

**FSC NO.**

**57051**

**DWG. NO.**

**XE641K**

**REV**

**B**

**SCALE**

**N/A**

**SHEET**

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- 3.7.4 The Microcircuit die shall be from lots that have passed the element evaluation per MIL-PRF-38534, Level K. In addition, ionizing radiation testing shall be performed at the oscillator level as explained in paragraph 3.7.5 herein.
- 3.7.5 For Output Frequencies up to 70 MHz for 2.5V parts, and up to 90 MHz for 3.3V & 5.0V parts, the microcircuit die shall be from NSC/FC 54ACT family. For higher output frequencies, the microcircuit die shall be from 0.8 μm BiCMOS Si family. The Microcircuit die shall be from wafer lots that have been successfully tested in the oscillator for ionizing radiation up to 100 krads. Xsis Electronics has also performed SET & SEL testing on both types of microcircuit die stated above. Both die are SEL immune for LET of up to 95 Mev-cm<sup>2</sup>/mg. Test reports are available on request.
- 3.7.6 Workmanship, Rework and Process controls shall be in accordance with the requirements of MIL-PRF-55310 and MIL-PRF-38534 as applicable.
- 3.7.7 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.
- 3.7.8 Prohibited Materials: The following items shall not be used in these oscillators: Pure Tin (Sn >97%), Cadmium, Zinc, Mercury, Selenium, Silver as under plate. Gold Plating without a nickel barrier.
- 3.7.9 Element Derating: All active and passive elements shall be derated in accordance with the applicable Hybrid microcircuit requirements of MIL-STD-975. Elements shall not operate in excess of derated values.
- 3.7.10 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 II. PDA requirements for nondestructive bond pull, burn-in and frequency aging 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 one wire whichever is greater.
- 4.3 PDA for Burn-in: Unless otherwise specified, PDA for burn-in #2 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 2.5 VDC, 3.3 VDC or 5.0 VDC as applicable for the following parameters:

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

- 4.4 PDA for Frequency Aging: 5% or 1 oscillator whichever is greater. Delta limit for frequency aging shall be as specified in Table I.
- 4.5 Group A inspection shall be performed as per Table III.
- 4.6 Group B inspection shall be performed as per Table IV.
- 4.7 If required by the purchase order, Group C inspection shall be performed as per Table V.

**NOTE: Frequency accuracy limit after life test shall be increased by 10 PPM to allow for Accelerated frequency aging at +125°C.**

|                                                                                                                                                       |                         |                           |                 |
|-------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|---------------------------|-----------------|
| <b>XSIS ELECTRONICS, INC.</b><br>12620 W. 63 <sup>rd</sup> St., Shawnee, KS 66216 USA<br>Tel: 913-631-0448 e-mail: xsis@xis.com website: www.xsis.com | FSC NO.<br><b>57051</b> | DWG. NO.<br><b>XE641K</b> | REV<br><b>B</b> |
|                                                                                                                                                       | SCALE<br><b>N/A</b>     | SHEET<br><b>3 OF 11</b>   |                 |

- 4.8 Group D inspection per Table VI is omitted because it is performed as a part of receiving inspection of packages.
- 4.9 Inspection and Test Data: Unless otherwise specified in the purchase order, the following Inspection and test data documentation shall be supplied with the parts.

**( See Page 5 for the description of the Model Numbers XE641E, XE641B & XE641P )**

**Model XE641K:**

Certificate of Conformance  
 Summary of Screening Test Results per Table II  
 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 Inspection Data  
 Group C Inspection Data, if required by the purchase order  
 Group D Inspection Data  
 Radiographic Inspection Certificate

**Model XE641E:**

Certificate of Conformance  
 Summary of Screening Test Results per Table VII  
 Summary of Elements Lot Traceability  
 Group A Inspection Summary  
 Radiographic Inspection Certificate

**Model XE641B:**

Certificate of Conformance  
 Summary of Screening Test Results per Table VII  
 Group A Inspection Summary  
 Radiographic Inspection Certificate, if required by the Purchase Order

**Model XE641P:**

Certificate of Conformance

- 4.10 The following test and inspection options are available at customer request.

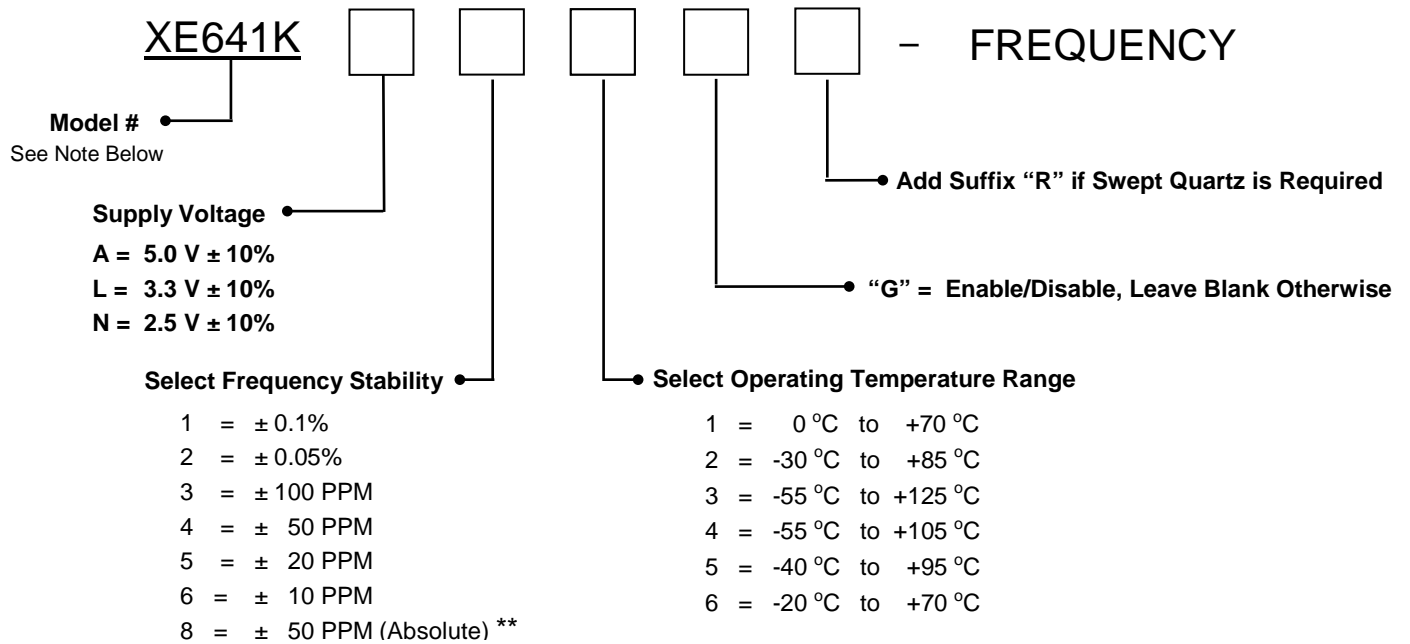
Customer Source Inspection for Pre-Cap and Final  
 DPA (Destructive Physical Analysis)  
 Group C testing per Table V

5. 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.

|                                                                                                                                                       |                         |                           |                 |
|-------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|---------------------------|-----------------|
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|                                                                                                                                                       | <b>SCALE</b> N/A        | <b>SHEET</b> 4 OF 11      |                 |

6. PART NUMBERING EXAMPLE:



\*\* Option 8 provides ± 50 PPM frequency-temperature stability referenced to the specified nominal frequency including load & supply voltage variations of ± 10%.

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

**P/N Example: XE641K - L43 - 24.000 MHz = 24.000 MHz, 3.3V Oscillator, ± 50 PPM Frequency Stability over an operating temperature range of -55 °C to +125 °C.**

**NOTE:** Besides model **XE641K**, the following additional models are available for applications that can accommodate reduced level of screening and quality conformance inspection:

**XE641E:** Model **XE641E** uses the same design and elements as **Model XE641K** except as follows:

- 100% screening is as per Table III herein
- PDA for Burn-in is 10% or 1 unit whichever is greater
- Delta measurements of paragraph 4.3 are not applicable
- Group A inspection is as per MIL-PRF-55310, Class B
- Group B inspection (30 day aging ) per MIL-PRF-55310 is not applicable

**XE641B:** Model **XE641B** is same as **Model XE641E** except as follows:

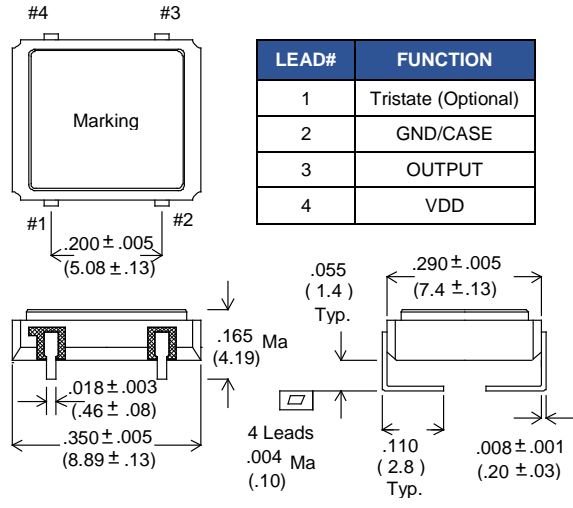
- Active and Passive Elements are as per MIL-PRF-55310, Class B. The Microcircuit die is the same as in Model XE641K but is not from a radiation tested wafer lot.
- Radiographic Inspection is not applicable, unless required by the Purchase Order at additional cost.

**XE641P:** Model **XE641P** is a form, fit and function equivalent prototype of **Model XE641K**.

- Prototypes may use commercial grade elements and are not screened.
- Quality Conformance inspection is not applicable

|                                                                                                                                                       |                         |                           |                 |
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|                                                                                                                                                       | <b>SCALE</b> N/A        | <b>SHEET</b> 5 OF 11      |                 |

7. PACKAGE OUTLINE:



Dimensions: Inches (mm)

**Tristate Input:** A "Low" level at the input disables the Output into a high impedance state.

Tristate Input has internal pull-up, it can be left floating or connected to Vdd.

Figure 1 - Package Configuration & Pin Connections

|                                                                                                                                                       |         |          |         |
|-------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------|---------|
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|                                                                                                                                                       | 57051   | XE641K   | B       |
| SCALE                                                                                                                                                 | N/A     | SHEET    | 6 OF 11 |

**Table I - Electrical Characteristics**

| Parameter                                        | Spec. Limits                                                                                                                                                                                                               |                                                                                                                                                                                               |                                                                                                                                                                                                |
|--------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                  | "N"                                                                                                                                                                                                                        | "L"                                                                                                                                                                                           | "A"                                                                                                                                                                                            |
| Frequency Range                                  | 450 KHz to 120 MHz                                                                                                                                                                                                         | 450 KHz to 125 MHz                                                                                                                                                                            | 450 KHz to 90 MHz                                                                                                                                                                              |
| Input Voltage                                    | + 2.5 VDC ± 10%                                                                                                                                                                                                            | + 3.3 VDC ± 10%                                                                                                                                                                               | + 5 VDC ± 10%                                                                                                                                                                                  |
| Absolute Max. Applied Voltage                    | + 5.0 VDC                                                                                                                                                                                                                  | + 5.0 VDC                                                                                                                                                                                     | + 7.0 VDC                                                                                                                                                                                      |
| Frequency Accuracy at 23°C                       | ± 15 PPM Max.                                                                                                                                                                                                              |                                                                                                                                                                                               |                                                                                                                                                                                                |
| Frequency Stability vs. Temperature              | See Options in Paragraph 6.0                                                                                                                                                                                               |                                                                                                                                                                                               |                                                                                                                                                                                                |
| Operating Temperature Range                      | See Options in Paragraph 6.0                                                                                                                                                                                               |                                                                                                                                                                                               |                                                                                                                                                                                                |
| Input Current ( no load )                        | 2.5 mA Max. 450KHz - 5MHz<br>4 mA Max. 5MHz - 10MHz<br>6 mA Max. 10MHz - 20MHz<br>8 mA Max. 20MHz - 30MHz<br>12 mA Max. 30MHz - 40MHz<br>16 mA Max. 40MHz - 50MHz<br>25 mA Max. 50MHz - 70MHz<br>35 mA Max. 70MHz - 120MHz | 3 mA Max. 450KHz - 5MHz<br>5 mA Max. 5MHz - 10MHz<br>8 mA Max. 10MHz - 20MHz<br>10 mA Max. 20MHz - 30MHz<br>15 mA Max. 30MHz - 40MHz<br>20 mA Max. 40MHz - 50MHz<br>35 mA Max. 50MHz - 125MHz | 5 mA Max. 450KHz - 5MHz<br>10 mA Max. 5MHz - 10MHz<br>20 mA Max. 10MHz - 20MHz<br>25 mA Max. 20MHz - 30MHz<br>30 mA Max. 30MHz - 40MHz<br>35 mA Max. 40MHz - 50MHz<br>50 mA Max. 50MHz - 90MHz |
| Output Waveform                                  | Square Wave, HC/ACMOS                                                                                                                                                                                                      |                                                                                                                                                                                               |                                                                                                                                                                                                |
| Output Duty Cycle ( at 50% Output Levels )       | 55/45% Max                                                                                                                                                                                                                 |                                                                                                                                                                                               |                                                                                                                                                                                                |
| Output Load                                      | 10K    15 pF                                                                                                                                                                                                               |                                                                                                                                                                                               |                                                                                                                                                                                                |
| High Output Level                                | 0.9 VDD Min.                                                                                                                                                                                                               |                                                                                                                                                                                               |                                                                                                                                                                                                |
| Low Output Level                                 | 0.1 VDD Max.                                                                                                                                                                                                               |                                                                                                                                                                                               |                                                                                                                                                                                                |
| Tristate ( Option G )                            | ≥ 0.7 Vdd or Open:Normal Output,<br>≤ 0.3 Vdd:High Impedance                                                                                                                                                               | ≥ 2.2 Vdd or Open:Normal Output,<br>≤ 0.8 Vdd High Impedance                                                                                                                                  |                                                                                                                                                                                                |
| Rise & Fall Times ( at 10 to 90% Output Levels ) | 5 nS Max for Frequency ≤ 25.00 MHz<br>4 nS Max for Frequency 25.01 MHz to 45.00 MHz<br>3 nS Max. for Frequency > 45MHz                                                                                                     |                                                                                                                                                                                               |                                                                                                                                                                                                |
| Start-up Time                                    | 10 mS Max.                                                                                                                                                                                                                 |                                                                                                                                                                                               |                                                                                                                                                                                                |
| Phase Jitter                                     | 0.3 pS rms typ, (10 KHz to 20 MHz Integrated)                                                                                                                                                                              |                                                                                                                                                                                               |                                                                                                                                                                                                |
| Frequency Stability Vs. Voltage                  | ± 4 PPM Max for ± 10% change in Supply Voltage                                                                                                                                                                             |                                                                                                                                                                                               |                                                                                                                                                                                                |
| Frequency Aging @ 70°C                           | ± 1.5 PPM Max. / 30 days, ± 5 PPM Max. First Year, ± 2.5 PPM Max. / Year thereafter                                                                                                                                        |                                                                                                                                                                                               |                                                                                                                                                                                                |

*Contact Xsis Engineering for any other special requirements.*

|                                                                                                                                                             |              |               |          |
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|                                                                                                                                                             | <b>57051</b> | <b>XE641K</b> | <b>B</b> |
|                                                                                                                                                             | SCALE        | SHEET         |          |
|                                                                                                                                                             | N/A          | 7 OF 11       |          |

**Table II - Model XE641K, Modified MIL-PRF-38534, Class K 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 ) <u>1/</u>      | MIL-STD-883, Method 1008, Condition C ( +150 °C ), 48 hours minimum          |
| Temperature Cycling                                 | MIL-STD-883, Method 1010, Condition C                                        |
| Constant Acceleration                               | MIL-STD-883, Method 2001, Condition A<br>Y <sub>1</sub> axis 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, Class S                                            |
| Pre Burn-in Electrical Tests: Record as applicable  | Refer to Table II-a below                                                    |
| Burn-in #1                                          | +125 °C, Nominal Supply Voltage and Burn-in load, 160 Hours Minimum          |
| Interim Electrical Tests: Record as applicable      | Refer to Table II-a below                                                    |
| Burn-in #2                                          | +125 °C, Nominal Supply Voltage and Burn-in load, 160 Hours Minimum          |
| Post Burn-in Electrical Tests: Record as applicable | Refer to Table II-a below                                                    |
| Frequency Aging 30 days                             | Per MIL-PRF-55310                                                            |
| Seal ( Fine and Gross Leak )                        | MIL-PRF-55310, Para. 4.8.2.2.3                                               |
| External Visual                                     | MIL-STD-883, Method 2009                                                     |

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

**Table II-a – Pre, Interim & Post Burn-in Electrical Tests**

| Test Parameter                      | MIL-PRF-55310 Method | Pre BI<br>24 ± 1 °C | Interim BI<br>24 ± 1 °C | Post BI<br>24 ± 1 °C | Post BI<br>Low Temp | Post BI<br>High Temp |
|-------------------------------------|----------------------|---------------------|-------------------------|----------------------|---------------------|----------------------|
| Input Current                       | 4.8.5                | ✓                   | ✓                       | ✓                    | ✓                   | ✓                    |
| Output Frequency                    | 4.8.6                | ✓                   | ✓                       | ✓                    | ✓                   | ✓                    |
| Frequency Vs. Temperature Stability | 4.8.10.1             | ✓                   | ✓                       | ✓                    | ✓                   | ✓                    |
| Frequency Vs. Supply Voltage        | 4.8.14               | ✓                   | ✓                       | ✓                    | ✓                   | ✓                    |
| Output Voltage Levels               | 4.8.21.3             | ✓                   | ✓                       | ✓                    | ✓                   | ✓                    |
| Output Rise & Fall Times            | 4.8.22               | ✓                   | ✓                       | ✓                    | ✓                   | ✓                    |
| Output Duty Cycle                   | 4.8.23               | ✓                   | ✓                       | ✓                    | ✓                   | ✓                    |
| Start-up time                       | 4.8.29               | ✓                   | ✓                       | ✓                    | ✓                   | ✓                    |
| Enable/Disable, if applicable       | 4.8.28               | ✓                   | ✓                       | ✓                    | ✓                   | ✓                    |

|                                                                                                                                                       |                         |                           |                 |
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|                                                                                                                                                       | <b>SCALE</b><br>N/A     | <b>SHEET</b><br>8 OF 11   |                 |



**Table III - Model XE641K, Group A Inspection 1/**

| Test - Inspection                                                                                                                                                                                                                           | Test Method – Condition                                                               |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| Input Current<br>Frequency Accuracy<br>Frequency Vs. Supply Voltage Tolerance<br>Output Waveform<br>Output Voltage Levels<br>Output Rise & Fall Times<br>Output Duty Cycle<br>Start-up time<br>Output Enable/Disable Function if Applicable | 24 ± 1 °C, Applicable Method of MIL-PRF-55310                                         |
| Frequency Vs. Temperature Stability                                                                                                                                                                                                         | Measure output frequency at ten equispaced points of the operating temperature range. |

1/ Any electrical tests performed as part of final electrical tests in 100% screening need not be repeated.

**Table IV - Model XE641K, Group B Inspection 1/**

| Subgroup | Test - Inspection                      | MIL-STD-883 |                         | Quantity<br>( Accept No.) |
|----------|----------------------------------------|-------------|-------------------------|---------------------------|
|          |                                        | Method      | Condition               |                           |
| 1        | Physical Dimensions                    | 2016        | -                       | 2(0)                      |
| 2        | PIND <u>2/</u>                         | 2020        | A                       | 15(0)                     |
| 3        | Resistance to Solvents <u>3/</u>       | 2015        | -                       | 3(0)                      |
| 4        | Internal Visual & Mechanical <u>4/</u> | 2014        | -                       | 1(0)                      |
| 5        | Bond Strength <u>5/</u>                | 2011        | C or D                  | 2(0)                      |
| 6        | Die Shear Strength <u>6/</u>           | 2019        | -                       | 2(0)                      |
| 7        | Solderability                          | 2003        | Solder Temp. 245 ± 5 °C | 1(0)                      |
| 8        | Seal ( Fine & Gross ) <u>7/</u>        | 1014        | A1 or B1 & B3           | 15(0)                     |

1/ Non-catastrophic screening rejects may be used for Group B testing.

2/ This test is performed during 100% screening

3/ This test is performed on each lot of marking ink

4/ Internal Visual inspection is performed at pre-seal on each unit.

5/ This test is performed prior to seal in accordance with Group B bond strength requirements of MIL-PRF-38534.

6/ This test is performed prior to seal in accordance with Group B die shear strength requirements of MIL-PRF-38534.

7/ Fine and Gross tests are being performed during 100% screening.

|                                                                                                                                                       |         |          |         |
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|                                                                                                                                                       | 57051   | XE641K   | B       |
| SCALE                                                                                                                                                 | N/A     | SHEET    | 9 OF 11 |

**Table V - Model XE641K, Group C Inspection**

| Subgroup | Test - Inspection                                                             | MIL-STD-883 |                            | Quantity<br>( Accept No.) |
|----------|-------------------------------------------------------------------------------|-------------|----------------------------|---------------------------|
|          |                                                                               | Method      | Condition                  |                           |
| 1        | External Visual                                                               | 2009        | -                          | 5(0) <u>1/</u>            |
|          | PIND                                                                          | 2020        | A                          |                           |
|          | Temperature Cycling                                                           | 1010        | C, 20 cycles               |                           |
|          | Constant Acceleration                                                         | 2001        | 5000G, Y <sub>1</sub> Axis |                           |
|          | Seal ( Fine Leak )                                                            | 1014        | A1 or B1                   |                           |
|          | Seal ( Gross Leak )                                                           | 1014        | B3                         |                           |
|          | Visual Examination                                                            | 1010        | -                          |                           |
|          | End Point Electricals                                                         | -           | -                          |                           |
| 2        | End Point Electricals<br>Steady State Life<br>End Point Electricals <u>4/</u> | 1005        | 1000 Hours at 125°C        | 5(0) <u>2/</u>            |
| 3        | Internal Gas Analysis                                                         | 1018        | -                          | 3(0) <u>3/</u>            |

1/ Five units are used for Group C inspection in accordance with limited usage requirements of MIL-PRF-38534

2/ Subgroup 1 test samples are not recommended to be used for Subgroup 2 testing

3/ Subgroup 1 test samples shall be used for Subgroup 3 testing.

4/ Frequency accuracy limit shall be increased by 10 PPM to allow for accelerated frequency aging during life test.

**Table VI - Model XE641K, Group D Inspection**

| Subgroup | Test - Inspection     | MIL-STD-883 |                     | Quantity<br>( Accept No.) |
|----------|-----------------------|-------------|---------------------|---------------------------|
|          |                       | Method      | Condition           |                           |
| 1        | Thermal Shock         | 1011        | C                   | 5(0)                      |
|          | Stabilization Bake    | 1008        | 1 hour at 150 °C    | 5(0)                      |
|          | Lead Integrity        | 2004        | B2 ( lead fatigue ) | 1(0)                      |
|          | Seal ( Fine & Gross ) | 1014        | A1 or B1 & C        | 5(0)                      |

Group D inspection is not required when package evaluation has been performed as a part of receiving inspection.

**Table VII - Models XE641E & XE641B, Screening (100%)**

| Test - Inspection                                                 | Test Method – Condition                                                      |
|-------------------------------------------------------------------|------------------------------------------------------------------------------|
| Nondestructive Bond Pull                                          | MIL-STD-883, Method 2023                                                     |
| Internal Visual                                                   | MIL-STD-883, Method 2017, Level B                                            |
| Stabilization Bake ( Prior to Seal ) <u>1/</u>                    | MIL-STD-883, Method 1008, Condition C ( +150 °C ), 24 hours minimum          |
| Temperature Cycling                                               | MIL-STD-883, Method 1010, Condition B                                        |
| Constant Acceleration                                             | MIL-STD-883, Method 2001, Condition A<br>Y <sub>1</sub> axis only ( 5000 G ) |
| Seal ( Fine & Gross )                                             | MIL-PRF-55310, Para. 4.8.2.2.2                                               |
| Particle Impact Noise Detection ( PIND )                          | MIL-STD-883, Method 2020, Condition A                                        |
| Radiographic Inspection ( <b>Model XE641E only</b> )<br><u>2/</u> | MIL-STD-883, Method 2012, Class S                                            |
| Pre Burn-in Electrical Tests: Verify Measurements                 | Refer to Table VII-a below                                                   |
| Burn-in                                                           | +125 °C, Nominal Supply Voltage and Burn-in load, 160 Hours Minimum          |
| Post Burn-in Electrical Tests: Verify Measurements                | Refer to Table VII-a below                                                   |
| External Visual                                                   | MIL-STD-883, Method 2009                                                     |

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

2/ Radiographic Inspection is applicable to **Model XE641E** only.

**Table VII-a - Pre & Post Burn-in Electrical Tests**

| Test Parameter                      | MIL-PRF-55310 Method | Pre BI<br>24 ± 1 °C | Post BI<br>24 ± 1 °C | Post BI<br>Low Temp | Post BI<br>High Temp |
|-------------------------------------|----------------------|---------------------|----------------------|---------------------|----------------------|
| Input Current                       | 4.8.5                | ✓                   | ✓                    | ✓                   | ✓                    |
| Output Frequency at 23 to 25 °C     | 4.8.6                | ✓                   | ✓                    | ✓                   | ✓                    |
| Frequency Vs. Temperature Stability | 4.8.10.1             | ✓                   | ✓                    | ✓                   | ✓                    |
| Frequency Vs. Supply Voltage        | 4.8.14               | ✓                   | ✓                    | ✓                   | ✓                    |
| Output Voltage Levels               | 4.8.21.3             | ✓                   | ✓                    | ✓                   | ✓                    |
| Output Rise & Fall Times            | 4.8.22               | ✓                   | ✓                    | ✓                   | ✓                    |
| Output Duty Cycle                   | 4.8.23               | ✓                   | ✓                    | ✓                   | ✓                    |
| Start-up time                       | 4.8.29               | ✓                   | ✓                    | ✓                   | ✓                    |
| Enable/Disable, if applicable       | 4.8.28               | ✓                   | ✓                    | ✓                   | ✓                    |

**XSIS ELECTRONICS, INC.**  
 12620 W. 63<sup>rd</sup> St., Shawnee, KS 66216 USA  
 Tel: 913-631-0448 e-mail: xsis@xis.com website: www.xsis.com

**FSC NO.**

**57051**

**DWG. NO.**

**XE641K**

**REV**

**B**

**SCALE**

**N/A**

**SHEET**

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