

REV LTR	DESCRIPTION	DATE	APPVD.

XSIS XD8S SERIES
LVDS OSCILLATORS
FOR SPACE & HI-REL APPLICATIONS
100 MHz to 200 MHz
(5 x 7 mm, SMD, 2.5V & 3.3V)

(Refer to Page 5 for Models with Reduced Screening & QCI)

REV STATUS OF SHEETS	REV	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	SHEET NO.																
APPROVALS	DATE	XSIS ELECTRONICS, INC.															
PREP. S. Gupta	11/15/20	12620 W. 63 rd Street, Shawnee, KS 66216 USA															
ENG. M. Gupta	11/15/20	XD8S SERIES LVDS OSCILLATORS															
Q. A. M. Gupta	11/15/20	FSC NO.								DWG. NO.							
CUST. ENG.		57051								XD8S							
CUST Q A.		SCALE								SHEET							
		N/A								1 OF 3							

1. SCOPE: XD8S, LVDS series, high reliability hybrid microcircuit crystal oscillators are designed, produced and tested by Xsis Electronics, Inc. as MIL-PRF-55310, Class "S" equivalent devices for use in advanced 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: Alternate models, XD8H, XD8E, XD8B and XD8P with reduced QCI and/or reduced screening 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. AL₂O₃. Thermal Resistance, θ_{JC} : 40 °C / Watt.

3.2.1 Termination Finish: 1.27 μ m minimum gold plate over nickel. Hot Solder tinning with Sn60/Pb40 solder per MIL-PRF-55310 is optional at an additional cost.

3.2.2 Weight: 0.4 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 $1(10)^{-8}$ atm-cc/s Max.

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

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

Supply Voltage	-0.5 to +4.5 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 krad 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 crystal. Crystal element evaluation shall be in accordance with MIL-PRF-55310.

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.

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- 3.7.3 Passive Elements: Established Reliability (ER) QPL components, failure level R minimum shall be used or element lot evaluation shall be as per MIL-PRF-55310, class S, or MIL-PRF-38534, Appendix C, Class K as applicable.
- 3.7.4 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 3.7.5 herein.
- 3.7.5 Microcircuit die used in the oscillator shall be from wafer lot that has been successfully tested in the oscillator for ionizing radiation of up to 100 krad and is known to be Single Event Latch-up immune for LET of up to 95 Mev-cm²/mg
- 3.7.6 Workmanship, Rework and Process controls shall be in accordance with the requirements of MIL-PRF-55310.
- 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.
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 2.5 VDC or 3.3 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 Group A inspection shall be in accordance with MIL-PRF-55310 for product level S.
- 4.5 Group B inspection (30 day aging) shall be in accordance with MIL-PRF-55310 for product level S. In order to expedite delivery, by customer request, the aging test can be ended after 15 days if the amount of frequency aging is less than 50% of the 30 day specification limit.
- 4.6 Oscillators 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. When specified by the Customer, Xsis Electronics will perform Group C testing at an additional charge.

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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. (See Page 5 for the description of the Model Numbers other than XD8S)

Model XD8S:

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 (30 day Aging) Data
 Radiographic Inspection Certificate

Model XD8H:

Same as for **Model XD8S** except Group B (30 day Aging) Data

Model XD8E:

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

Model XD8B:

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

Model XD8P:

Certificate of Conformance

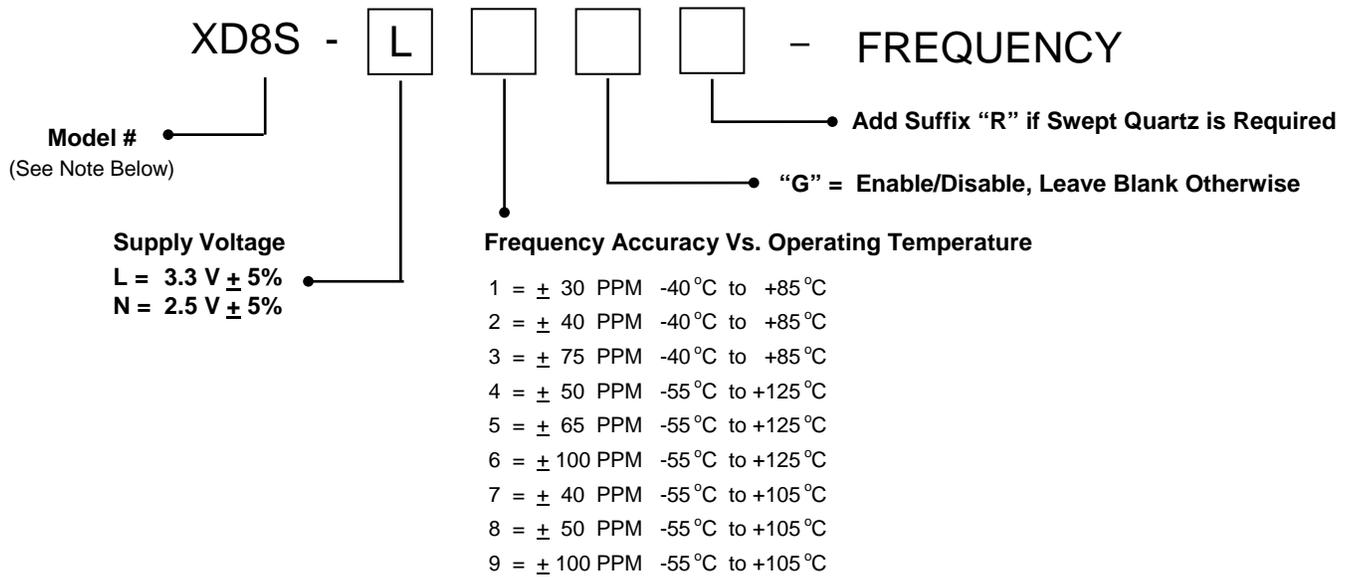
4.8 The following test and inspection options are available at customer request.

Customer Source Inspection for Pre-Cap and Final
 Group C Inspection per MIL-PRF-55310 on 4 or 8 units
 DPA (Destructive Physical Analysis)
 MIL-PRF-38534, Group B Inspection
 MIL-PRF-38534, Group C Inspection

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.

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6.0 Part Numbering Example:



P/N Example: XD8S – L4 - 100.000 MHz = 100.000 MHz, Class "S" Oscillator, ± 50 PPM Frequency Accuracy over an operating temperature range of -55 °C to +125 °C.

NOTE: Besides model XD8S above, the following additional models are available for applications that can accommodate reduced level of Elements, Screening and Quality Conformance inspection:

XD8H: Model XD8H is same as Model XD8S except as follows:

Group B inspection (30 day aging) per MIL-PRF-55310 is not applicable

XD8E: Model XD8E uses the same design and elements as Model XD8S 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

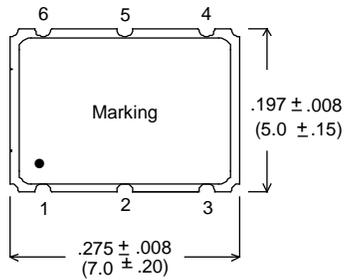
XD8B: Model XD8B is same as Model XD8E except as follows:

Active and Passive Elements are as per MIL-PRF-55310, Class B. Microcircuit die is similar to the one used in Model XD81S but is not from radiation tested wafer lot.

XD8P: Model XD8P is a form, fit and function equivalent prototype of Model XD8S.

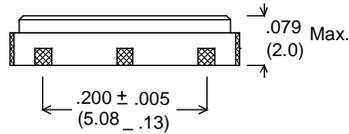
Prototypes may use commercial grade elements and are not screened. Quality Conformance inspection is not applicable.

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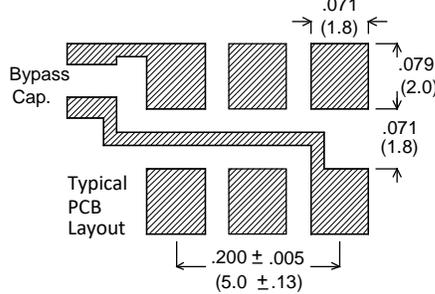
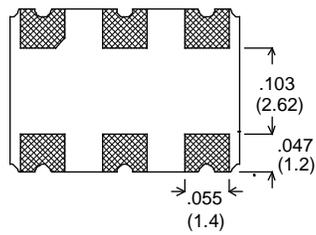


PAD#	FUNCTION
1	E/D (Optional)
2	N/C
3	GND/CASE
4	OUTPUT
5	COMP. OUTPUT
6	V _{DD}

Enable/Disable Input: A “Low” level at the input disables the Output into a high impedance state. Enable/Disable Input has internal pull-up.



Dimensions are in inches (mm)



An External 0.01uF Bypass Capacitor is required between VDD and GND.

Figure 1 - Package Configuration & Pin Connections

TABLE I – Electrical Characteristics for 2.5 V & 3.3V

Parameter	Spec. Limits
Frequency Range	100 MHz to 200 MHz
Frequency Accuracy	See Options in Paragraph 6.0
Operating Temperature Range	See Options in Paragraph 6.0
Supply Voltage	See Options in Paragraph 6.0
Input Current (no load)	65 mA Max.
Output Waveform	Square Wave
Output Duty Cycle	55/45% Max
Output Load	100 ohm across outputs
High Output Level	1.45V typical, 1.60 V Max.
Low Output Level	1.10V typical, 0.90 V Min.
Differential Output Voltage (Peak to Peak)	340 mV typical, 247 mV Min., 454 mV Max.
Offset Voltage	1.25 V typical, 1.125 V Min., 1.375 V Max.
Offset Error	50 mV Max.
Rise & Fall Times (20% to 80% Levels)	600 pS Max. over -55°C to +105°C 700 pS Max. over +105°C to +125°C
Enable/Disable (E/D) Input	$\geq 0.7 V_{dd}$ or Open: Normal Output $\leq 0.3 V_{dd}$: High Impedance
Start-up Time	10 mS Max.
Phase Jitter	0.3 pS rms typ, (10 KHz to 20 MHz Integrated)
Frequency Aging @ 70 °C ≤ 150 MHz > 150 MHz	± 1.5 PPM Max./30 days ± 2.0 PPM Max./30 days

Contact Xsis Engineering for any other special requirements.

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Table II - Models XD8S & XD8H, 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
Random Vibration	MIL-STD-883, Method 2026, Condition I-B
Thermal Shock	MIL-STD-883, Method 1011, Condition A
Temperature Cycling	MIL-STD-883, Method 1010, Condition C
Constant Acceleration	MIL-STD-883, Method 2001, Condition A Y ₁ axis only (5000 G)
Seal (Fine and Gross Leak)	MIL-PRF-55310, Para. 4.8.2.2.3
Particle Impact Noise Detection (PIND)	MIL-STD-883, Method 2020, Condition A
Radiographic Inspection	MIL-STD-883, Method 2012, Class S
Electrical Tests: Record all measurements. Input Current Output Frequency Output Voltage Levels Output Rise & Fall Times Output Duty Cycle Start-up Time	Nominal Supply Voltage, Specified load, +23 °C MIL-PRF-55310, Para. 4.8.5 MIL-PRF-55310, Para. 4.8.6 MIL-PRF-55310, Para. 4.8.21.3 MIL-PRF-55310, Para. 4.8.22 MIL-PRF-55310, Para. 4.8.23 MIL-PRF-55310, Para. 4.8.29
Burn-in (load)	+125 °C, Nominal Supply Voltage and Burn-in load, 320 Hours Minimum
Electrical Tests: Record all measurements. Input Current Output Frequency Output Voltage Levels Output Rise & Fall Times Output Duty Cycle Start-up Time	Nominal and Extreme Supply Voltages, Specified load, +23 °C and operating temperature extremes MIL-PRF-55310, Para. 4.8.5 MIL-PRF-55310, Para. 4.8.6 MIL-PRF-55310, Para. 4.8.21.3 MIL-PRF-55310, Para. 4.8.22 MIL-PRF-55310, Para. 4.8.23 MIL-PRF-55310, Para. 4.8.29
External Visual	MIL-STD-883, Method 2009

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

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Table III - Models XD8E & XD8B, 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 Y ₁ 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
Electrical Tests: Input Current Output Frequency Output Voltage Levels Output Rise & Fall Times Output Duty Cycle Start-up Test	Nominal Supply Voltage, Specified load, +23 °C Verify all parameters MIL-PRF-55310, Para. 4.8.5 MIL-PRF-55310, Para. 4.8.6 MIL-PRF-55310, Para. 4.8.21.3 MIL-PRF-55310, Para. 4.8.22 MIL-PRF-55310, Para. 4.8.23 MIL-PRF-55310, Para. 4.8.29
Burn-in (load)	+125 °C, Nominal Supply Voltage and Burn-in load, 160 Hours Minimum
Electrical Tests: Input Current Output Frequency Output Voltage Levels Output Rise & Fall Times Output Duty Cycle Start-up Test	Nominal Supply Voltage, Specified load, +23 °C and verify frequency at temperature extremes. MIL-PRF-55310, Para. 4.8.5 MIL-PRF-55310, Para. 4.8.6 MIL-PRF-55310, Para. 4.8.21.3 MIL-PRF-55310, Para. 4.8.22 MIL-PRF-55310, Para. 4.8.23 MIL-PRF-55310, Para. 4.8.29

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

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