



**PRECISION
DEVICES
INC.**



MIL-STD-790 Certified Facility (QPL)
MIL-STD-38534 Certified to QML
Certified to (MIL) Laboratory Suitability

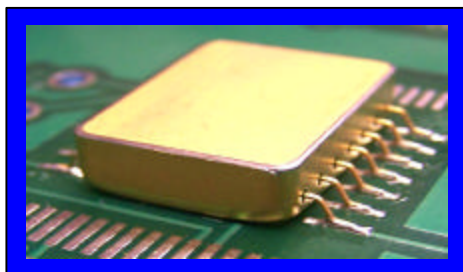
MANUFACTURER OF QUARTZ CRYSTAL PRODUCTS // 800-274-XTAL
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PDI takes pride in effectively promoting quality through continuous improvement techniques geared to meet and exceed our customer's requirements. Employee involvement and Continuous Improvement teams are utilized to institute both product and process improvements throughout the entire company. This constant commitment to quality is evident by some of the following highlighted activities:

- ISO 9001:2000* Registered
- ISO 14001:1996* Registered
- MIL-PRF-790* Quality Parts Listing (QPL) Certified
- MIL-PRF-38534* Quality Manufacturers List (QML) Certified
- MIL-Laboratory Suitability* Testing Capability Approved by US Government
- Electro Static Discharge (ESD)* Program, Employee Training & Certification
- IPC 610* Electronic Acceptance Criteria, Employee Training & Certification
- IPC/EIA – J*, Class 2 Solder Joint Industry Standard, Employee Training & Certification
- State-of-the-Art Cleanroom, ISO 14644-1 & 2, Class 7* (FED-STD 209E, Class 10,000)

Unlike standard commercial products, space and military products are classified by PDI as “High Reliability” (HI-REL). HI-REL products must be submitted to various levels of quality conformance testing to ensure that the products are capable of performing to specifications in the often harsh environments of military and space applications. Figure 1 outlines two of the many HI-REL packages PDI has designed and manufactured for HI-REL applications.

Figure 1. 14-Pin Gold and 14-Pin Dip Oscillator Package Types.



Both the United States and the European community have each developed specifications that detail the sequence of quality conformance testing. In the United States, the Defense Supply Center Columbus (DSCC) is the controlling agency and has issued specifications that govern the quality conformance testing sequence performed on HI-REL devices. Table 1 on the following page, summarizes some of the environmental testing PDI has successfully performed on various products used in both military and space flight applications.

Table 1. Typical HI-REL Device Construction & Testing Plan.

OPERATION	Requirements	Control Item
Assemble Oscillators	7.5 ML 0001 Oscillator Assembly Process	MIL-PRF-38534, Class S (Space)
Internal Visual	ML-005, ML-006, ML-007 Internal Visual Examination	MIL-STD-883, Method 2017
Visual & Mechanical Inspection	Verify material, interface, physical dimensions, marking and workmanship at PDI	MIL-STD-1285, method 1 (Marking) IAW 55310/16 H
Stabilization Bake	8.2 ML 0001 Stabilization Bake Oven Operation at PDI	MIL-STD-883, Method 1008
Electricals Band-Run	Measure frequency output, ppm/duty cycle, current draw, rise and fall time at PDI	IAW MIL-PRF-55310 & PDI Design Drawing
Seal	8.2 ML 0006 Hermeticity Test Military Product ML-004 Gross Leak Test at PDI	MIL-STD-883, Method 1014 (Fine & Gross)
100% Screening		
Thermal Shock	ML-003 Thermal Shock Oven Guide 7.5 ML 0003 Thermal Shock Operation.	MIL-STD-202, Method 107, Test Condition B
Resistance to Soldering Heat	Per QA solder test methods.	MIL-STD-202, Method 210, Test Condition C
Solderability	8.2 QA 0003 Solder Testing Procedure.	MIL-STD-202, Method 208, Test Condition C
Powered Burn-In	8.2 ML 0004 Powered Burn-In Operation.	MIL-STD-883, Method 1015, Test Condition B. Nominal supply voltage and load, 320 Hours Minimum.
Constant Acceleration	8.2 ML 0003 Constant Acceleration Operation.	MIL-STD-883, Method 2001, Test Condition A. Y1 Axis only.
Electricals	Measure frequency output, ppm/duty cycle, current draw, rise and fall time at PDI.	IAW MIL-PRF-38534 & PDI Design Drawing
Seal	8.2 ML 0006 Hermeticity Test Military Products. ML-004 Gross Leak Test at PDI.	MIL-STD-883, Method 1014 (Fine & Gross)
External Visual Inspection	Verify material, interface, physical dimensions, marking and workmanship at PDI.	IAW MIL-PRF-38534 & PDI Design Drawing
Group A Testing	Precision Devices, Inc., Middleton, WI 53562	Static, Dynamic, Functional, and Switching per MIL-PRF-38534 & MIL-STD-883, Method 3015
Group B Testing	Precision Devices, Inc., Middleton, WI 53562	Conducted In-Line During Manufacturing
Group C Testing		
Temperature Cycling	200 Cycles. 7.5 ML 0003 Thermal Shock Operation.	MIL-STD-883, Method 1010, Test Condition B

Constant Acceleration	8.2 ML 0003 Constant Acceleration Operation.	MIL-STD-883, Method 2001, Test Condition A Y1 Axis only.
Seal	8.2 ML 0006 Hermeticity Test Military Product ML-004 Gross Leak Test at PDI.	MIL-STD-883, Method 1014 (Fine & Gross)
Visual Examination	Verify material, interface, physical dimensions, marking and workmanship at PDI.	MIL-STD-883, Method 1010
Steady State Life Test	1000 Hours, Under Power at PDI.	MIL-STD-883, Method 1005
Group D Testing		
Thermal Shock	ML-003 Thermal Shock Oven Guide 7.5 ML 0003 Thermal Shock Operation.	MIL-STD-883, Method 1011
Stabilization Bake	8.2 ML 0001 Stabilization Bake Oven Operation.	MIL-STD-883, Method 1008
Lead Integrity	DSCC-VQ Approved Laboratory Downers Grove, IL 60515	MIL-STD-202, Method 211, Test Condition C See 55310 Spec (Applied force: 2 pounds each terminal for 10 seconds, Bends: 5 at 45 degrees each)
Vibration Testing	DSCC-VQ Approved Laboratory Downers Grove, IL 60515	MIL-STD-202, Method 204, Test Condition D
Mechanical Shock	DSCC-VQ Approved Laboratory Downer Grove, IL 60515	MIL-STD-202, Method 213, Test Condition I
Constant Acceleration	8.2 ML 0003 Constant Acceleration Operation.	MIL-STD-883, Method 2001, Test Condition A Y1 Axis only.
Ambient Pressure	DSCC-VQ Approved Laboratory Downer Grove, IL 60515	Operating- MIL-STD-202, Method 105, Test Condition C. Non Operating- Chamber internal absolute pressure to 1.16 x .0001 Pascal max. for 12 hours @ -60C • 2C (IAW 55310/16 H)
Resistance to Soldering Heat	DSCC-VQ Approved Laboratory Downer Grove, IL 60515	MIL-STD-202, Method 210, Test Condition C
Moisture Resistance	DSCC-VQ Approved Laboratory Downer Grove, IL 60515	MIL-STD-202, Method 106
Salt Atmosphere Test	DSCC-VQ Approved Laboratory Downer Grove, IL 60515	MIL-STD-883, Method 109, Test Condition A
Solderability	DSCC-VQ Approved Laboratory Downer Grove, IL 60515	MIL-STD-202, Method 208
Internal Water Vapor	Seal Laboratories, El Segundo, CA	MIL-STD-883, Method 1018 (@100 ^o C)
Metal Package Isolation	DSCC-VQ Approved Laboratory Downers Grove, IL 60515	MIL-STD-883, Method 1003
Seal	8.2 ML 0006 Hermeticity Test Military Product ML-004 Gross Leak Test at PDI	MIL-STD-883, Method 1014 (Fine & Gross)
<i>Radiation Tolerance</i>	Titan Laboratories, El Segundo, CA	MIL-STD-883, Method 1019 & 1017


Pre-Ship		
Particle Impact Noise Detection (PIND) Test	Seal Laboratories, El Segundo, CA	MIL-STD-883, Method 2020
Radiographic	X-Ray performed by Artesyn Technologies, Madison, Wisconsin 53717	MIL-STD-883, Method 2012
External Visual Inspection	Verify material, interface, physical dimensions, marking and workmanship at PDI.	IAW MIL-PRF-38534 & PDI Design Drawing
Source Inspection	Inspection by customer at PDI facility of origin.	Per Customer Purchase Order

PDI also maintains a design and manufacturing control program for the output of “Lead-Free” (Pb-Free) products. The program is in accordance with European Union (EU) Legislation: Restrictions on Hazardous Substances (RoHS) banning the use of lead (Pb) after July 1, 2006.

For both custom and standard parts our engineering and design team is available to help you meet your needs. Our toll free number 1-800-274-XTAL (9825) allows immediate contact with our engineering, manufacturing and sales staff.

Your Home for High Reliability (HI-REL) Quartz Crystal Products


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A global leader in the industry, PDI has a wide variety of products for all your design requirements.

- ◆ A designer & supplier of HI-REL Products
- ◆ MIL-STD-790 Approved
- ◆ MIL-PRF-38534 Space Level Product Designs

QPL listed for MIL-3098 Quartz Crystal and MIL-55310 Crystal Oscillator design and manufacture.



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