
Military Program Overview

Corporate Philosophy

Lattice Semiconductor Corporation (LSC) is committed to leadership in device performance and quality. Our family of military ispLSI, pLSI and GAL devices is a reflection of this philosophy. LSC manufactures all devices under strict Quality Assurance guidelines. All grades, Commercial through Military 883, are monitored under a quality program conformant to MIL-I-38535 Appendix C with inspections conformant to MIL-I-45208.

Quality and Testability

Lattice Semiconductor processes its devices to strict conformance with MIL-STD-883 Class B. In conjunction with the military flow, the inherent testability of E²CMOS technology allows LSC to achieve a quality level superior to other PLD technologies.

All devices are patterned and tested dozens of times throughout the manufacturing flow. Every device is tested under worst case configurations to assure customers achieve 100% yields. Tests are performed using the same E² cell array that will be used for the final patterning of the devices. This 100% "actual test" philosophy does away with the correlated and simulated testing that is necessary with bipolar and UV (EPROM) based PLD devices.

Reliability

Lattice Semiconductor performs extensive reliability testing prior to product release. This testing continues in the form of Reliability Monitors that are run on an ongoing basis to assure continued process integrity.

The reliability testing performed includes extensive analysis of fundamental design and process integrity. The reprogrammable nature of LSC devices allows an inherently more thorough reliability evaluation than with other programmable alternatives.

MIL-STD-883 Compliance

MIL-STD-883 defines a uniform and precise method for environmental, mechanical and electrical testing which ensures the suitability of microelectronic devices for use in military and aerospace systems. Table I summarizes the MIL-STD-883, Method 5004 Class B flow. Table II summarizes the conformance testing required by MIL-STD-883, Method 5005, for quality conformance testing of LSC military microcircuits.

MIL-I-38535

MIL-I-38535 Appendix A and C, when used in conjunction with MIL-STD-883, define design, packaging, material, marking, sampling, qualification and quality system requirements for LSC military devices.

Group Data

Group A and B data is taken on every inspection lot per MIL-STD-883, Class B requirements. This data, along with Generic Group C and D data can be supplied, upon written request, with your device shipment. Your LSC sales representative can advise you of charges and leadtime necessary for providing this data.

Standard Military Drawings

LSC actively supports the DESC Standard Military Drawing (SMD) Program. The SMD Program offers a cost effective alternative to source control drawings and provides standardized MIL-STD-883 product specifications to simplify military procurement.

A list of currently available SMD qualified devices is provided (see Military Ordering Information).

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**MILITARY SCREENING FLOW
(TABLE I)**

Screen	Method	Requirement
Internal Visual	2010 Cond. B	100%
Temp. Cycling	1010 Cond. C	100%
Constant Acceleration	2001 Cond. E	100%
Hermeticity	1014	100%
Fine	Cond. A or B	
Gross	Cond. C	
Endurance Test	1033	100%
Retention Test	Unbiased Bake 24 HRS. T _A = 180°C	100%
Pre Burn-In Electrical	Applicable Device Specification T _c = 25°C	100%
Dynamic Burn-In	1015 Cond. D	100%
Post Burn-In Electrical	Applicable Device Specification T _c = 25°C PDA = 5%	100%
Final Electrical Test	Applicable Device Specification T _c = 125°C	100%
Final Electrical Test	Applicable Device Specification T _c = - 55°C	100%
Final Electrical Test	Applicable Device Specification T _c = 25°C	100%
External Visual	2009	100%
QCI Sample Selection	MIL-M-38535, Appendix A Sec. 4.5 and MIL-STD-883 Sec. 1.2	Sample

**MILITARY QUALITY CONFORMANCE
INSPECTIONS (TABLE II)**

Subgroup	Method	Sample
GROUP A: Electrical Tests		
<i>Subgroups 1, 7, 9</i> Electrical Test	Applicable Device Spec. 25°C	LTPD = 2
<i>Subgroups 2, 8A, 10</i> Electrical Test	Applicable Device Spec. Max. Operating Temp.	LTPD = 2
<i>Subgroups 3, 8B, 11</i> Electrical Test	Applicable Device Spec. Min. Operating Temp.	LTPD = 2
GROUP B: Mechanical Tests		
<i>Subgroup 2</i> Solvent Resistance	2015	4(0) LTPD = 10
<i>Subgroup 3</i> Solderability	2003	
<i>Subgroup 5</i> Bond Strength	2011	LTPD = 15
GROUP C: Chip Integrity Tests		
<i>Subgroup 1</i> Dynamic Life Test End Point Electrical	1005, 1,000 HRS. 125°C Applicable Device Spec.	LTPD = 5
<i>Subgroup 2</i> Unbiased Retention End Point Electrical	Applicable Device Spec. Applicable Device Spec.	LTPD = 5
GROUP D: Environmental Integrity		
<i>Subgroup 1</i> Physical Dimensions	2016	LTPD = 15
<i>Subgroup 2</i> Lead Integrity Hermeticity	2004, Cond. B 1014	LTPD = 5
<i>Subgroup 3</i> Thermal Shock Temp. Cycle Moisture Resistance Endpoint Electrical Hermeticity Visual Examination	1011, Cond. B, 15 Cycles 1010, Cond. C, 100 Cycles 1004 Applicable Device Spec. 1014 1004, 1010	LTPD = 15
<i>Subgroup 4</i> Mechanical Shock Vibration Constant Acceleration Hermeticity Visual Examination Endpoint Electrical	2002, Cond. B 2007, Cond. A 2001, Cond. E 1014 1010, 1011 Applicable Device Spec.	LTPD = 15
<i>Subgroup 5</i> Salt Atmosphere Hermeticity Visual Examination	1009, Cond. A 1014 1009	LTPD = 15
<i>Subgroup 6</i> Internal Water Vapor	1018 < 5,000 PPM, 100°C	3(0)
<i>Subgroup 7</i> Lead Finish Adhesion	2025	LTPD = 15
<i>Subgroup 8</i> Lid Torque	2024	5(0)



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