
Renesas Radiation Tolerant Hermetic Screening Flow

This document outlines the production flow and lot assurance testing for Renesas radiation tolerant hermetic products for space applications. Refer to the datasheet for each device for more information specific to that device.

Contents

1. Introduction	2
2. Production Flow	2
3. Production Screening Procedure	3
4. Up-Front Characterization and Qualification	4
4.1 Package Related Tests	4
4.2 Device Related Tests	5
4.3 Radiation Related Tests	6
5. Revision History	6

1. Introduction

The production and screening flow detailed in this document applies to all Renesas radiation tolerant hermetic products.

2. Production Flow

This section outlines the production flow that Renesas radiation tolerant hermetic parts receive after assembly. After parts have been assembled, all units go through the [Production Screening Procedure](#). After the ICs pass the production screening procedure, they move into inventory and become orderable.

The flowcharts in this document are used as a visual representation of the production screening flow. However, the order of the tests is subject to change based on manufacturing needs.

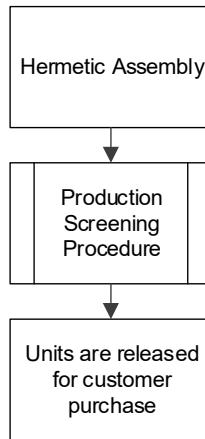


Figure 1. Radiation Tolerant Hermetic Production Flow Chart

3. Production Screening Procedure

This section outlines the production screening procedure that 100% of Renesas radiation tolerant hermetic units receive.

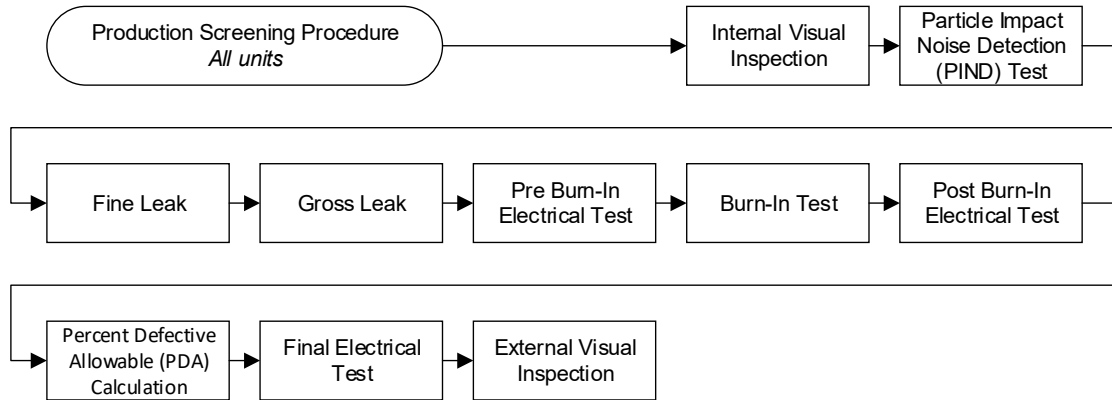


Figure 2. Production Screening Procedure Flow Chart

Table 1. Production Screening Procedure Test Method Descriptions

Test	Test Method	Notes
Internal Visual Inspection	MIL-STD-884 TM2010	Condition B
Particle Impact Noise Detection (PIND) Test	MIL-STD-883 TM2020	Condition A on each device
Fine Leak	MIL-STD-883 TM1014	-
Gross Leak	MIL-STD-883 TM1014	-
Pre Burn-In Electrical Test	Per device specification, read and record	-
Burn-In Test	MIL-STD-883 1015	160 hours at 125°C minimum or equivalent
Post Burn-In Electrical Test	Per device specification, read and record	-
Percent Defective Allowable (PDA) Calculation	10% PDA	-
Final Electrical Test	Per device specification	25°C, min., and max. operating temperatures
External Visual Inspection	MIL-STD-883	-

4. Up-Front Characterization and Qualification

This section outlines the one-time, up-front characterization and qualification that products receive. These tests are only performed during initial qualification or after any major design and/or process change. These tests are performed in addition to the standard production screening flow. Reliability summaries are available on request for individual products.

Table 2. Up-Front Characterization Samples

Test Group	Test	Minimum Number of Samples
Package Related Tests	All Tests	3(0)
Device Related Tests	Human Body Model (HBM) Electrostatic Discharge (ESD) Sensitivity Test	3(0)
Device Related Tests	Charge Device Model (CDM) Electrostatic Discharge (ESD) Sensitivity Test	3(0)
Device Related Tests	Latch-Up Test	3(0)
Radiation Related Tests	Biased Low Dose Rate (LDR) Test	10(0)
Radiation Related Tests	Unbiased Low Dose Rate (LDR) Test	10(0)
Radiation Related Tests	Destructive Single Event Effects (DSEE) Test	4(0)
Radiation Related Tests	Single Event Transient (SET) Test	4(0)

4.1 Package Related Tests

As a part of one-time, up-front characterization, certain package related tests are performed as shown in [Figure 3](#).

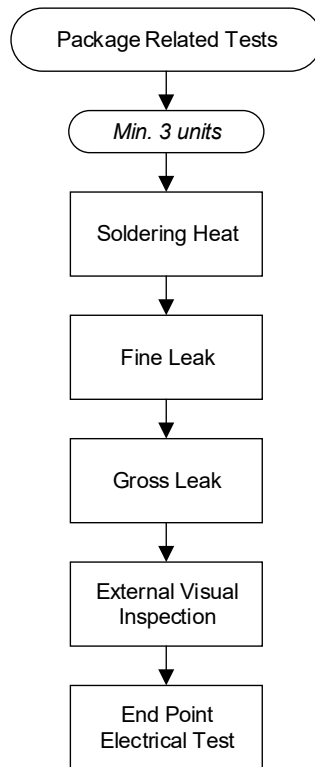


Figure 3. Up-Front Characterization Package Related Tests Flowchart

Table 3. Up-Front Characterization Package Related Test Descriptions

Test	Test Method	Notes
Soldering Heat	MIL-STD-883 TM2036	-
Fine Leak	MIL-STD-883 TM1014	-
Gross Leak	MIL-STD-883 TM1014	-
External Visual Inspection	MIL-STD-883 TM2009	-
End Point Electrical Test	Per device specification	-

4.2 Device Related Tests

As a part of one-time, up-front characterization, certain device related tests are performed as shown in [Figure 4](#).

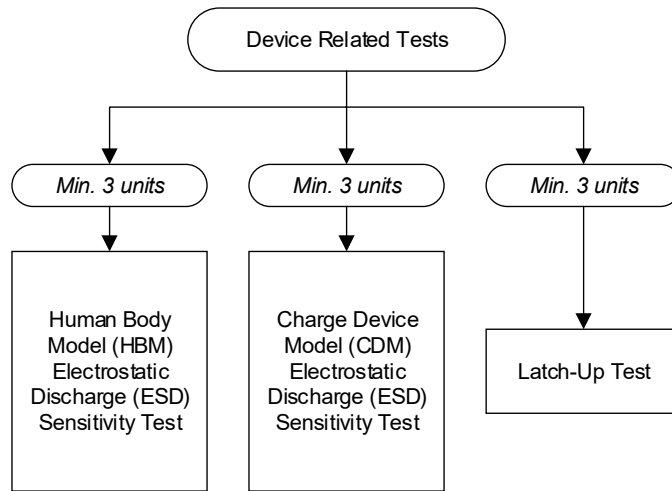


Figure 4. Up-Front Characterization Device Related Tests Flowchart

Table 4. Up-Front Characterization Device Related Test Descriptions

Test	Test Method	Notes
Human Body Model (HBM) Electrostatic Discharge (ESD) Sensitivity Test	MIL-STD-883 TM3015 or JEDEC Test Standard JS-001	Assembly and test areas use JESD625 specification controls
Charge Device Model (CDM) Electrostatic Discharge (ESD) Sensitivity Test	MIL-STD-883 TM3015 or JEDEC Test Standard JS-002	
Latch-Up Test	JESD-78	-

4.3 Radiation Related Tests

As a part of one-time, up-front characterization, certain radiation related tests are performed as shown in Figure 5. The radiation levels that a given device is qualified to can be found on its respective datasheets and radiation test reports.

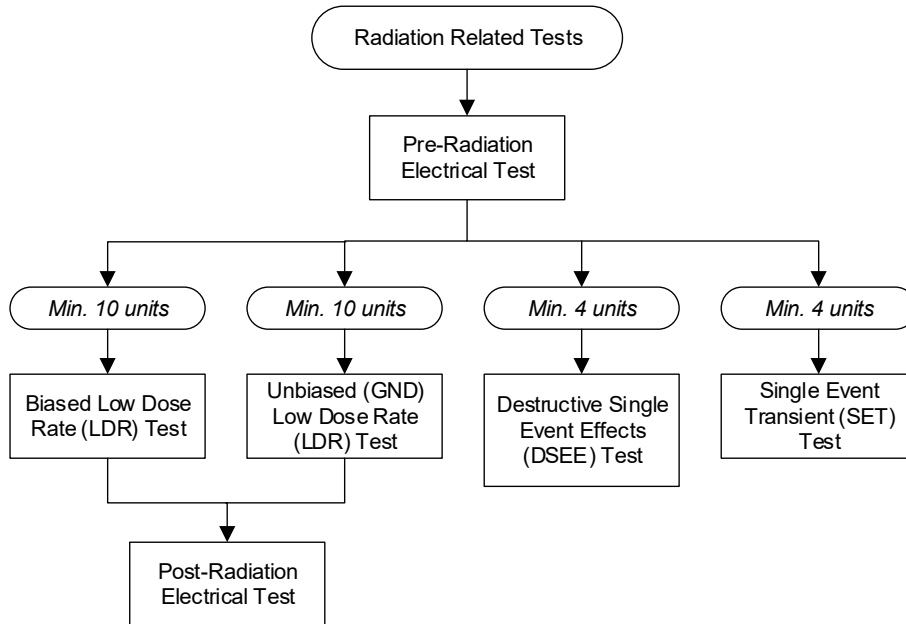


Figure 5. Up-Front Characterization Radiation Related Tests Flowchart

Table 5. Up-Front Characterization Radiation Related Test Descriptions

Test	Test Method	Notes
Pre-Radiation Electrical Test	Per device specification, read and record	25°C
Biased Low Dose Rate (LDR) Test	MIL-STD-883 TM1019	Radiation level as per device specification
Unbiased (GND) Low Dose Rate (LDR) Test	MIL-STD-883 TM1019	Radiation level as per device specification
Post-Radiation Electrical Test	Per device specification, read and record	25°C
Destructive Single Event Effects (DSEE) Test	JEDEC Test Standard JESD57A, per device specification	Radiation level as per device specification to assess burnout and latch-up in a heavy ion environment
Single Event Effects (SEE) Test	JEDEC Test Standard JESD57A, per device specification	Radiation level as per device specification

5. Revision History

Revision	Date	Description
1.00	Dec 19, 2024	Initial release.

IMPORTANT NOTICE AND DISCLAIMER

RENESAS ELECTRONICS CORPORATION AND ITS SUBSIDIARIES (“RENESAS”) PROVIDES TECHNICAL SPECIFICATIONS AND RELIABILITY DATA (INCLUDING DATASHEETS), DESIGN RESOURCES (INCLUDING REFERENCE DESIGNS), APPLICATION OR OTHER DESIGN ADVICE, WEB TOOLS, SAFETY INFORMATION, AND OTHER RESOURCES “AS IS” AND WITH ALL FAULTS, AND DISCLAIMS ALL WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, WITHOUT LIMITATION, ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR NON-INFRINGEMENT OF THIRD-PARTY INTELLECTUAL PROPERTY RIGHTS.

These resources are intended for developers who are designing with Renesas products. You are solely responsible for (1) selecting the appropriate products for your application, (2) designing, validating, and testing your application, and (3) ensuring your application meets applicable standards, and any other safety, security, or other requirements. These resources are subject to change without notice. Renesas grants you permission to use these resources only to develop an application that uses Renesas products. Other reproduction or use of these resources is strictly prohibited. No license is granted to any other Renesas intellectual property or to any third-party intellectual property. Renesas disclaims responsibility for, and you will fully indemnify Renesas and its representatives against, any claims, damages, costs, losses, or liabilities arising from your use of these resources. Renesas' products are provided only subject to Renesas' Terms and Conditions of Sale or other applicable terms agreed to in writing. No use of any Renesas resources expands or otherwise alters any applicable warranties or warranty disclaimers for these products.

(Disclaimer Rev.1.01)

Corporate Headquarters

TOYOSU FORESIA, 3-2-24 Toyosu,
Koto-ku, Tokyo 135-0061, Japan
www.renesas.com

Trademarks

Renesas and the Renesas logo are trademarks of Renesas Electronics Corporation. All trademarks and registered trademarks are the property of their respective owners.

Contact Information

For further information on a product, technology, the most up-to-date version of a document, or your nearest sales office, please visit www.renesas.com/contact-us/.