

Product Overview

In addition to meeting the “basic” requirements of the NASA & ESA specifications the TR-HIREL-1 has been configured to provide the user with additional environment test and inspections to satisfy application specific requirements associated with space flight missions. Additional tests contained within the TR-HIREL-1 are Vibration Miss Test (aka Miss Test Under Vibration & Asynchronous Miss Test)

Specifications

NASAS3IIP754

NASA INST-EE

ESASCS360I

ESASCC3602

TR-HIREL -1

Certifications

MILPRF39016

ISO 9001: 2008

NASA SOLDER

BOEING D1-9000

MIL-STD-790

The purpose in developing the TR-HIREL-1 Specification was to provide our customers with a generic specification meeting the basic requirements of the ESA/SCC 3001 & 3602 and the NASA/GSFC S-311-P-754 specifications. The “basic” test protocol is as follows:

Required Tests

100% Pre-Cap

Small Particle

Sinusoidal Vibration

Random Vibration (when specified)

Resonant Beam Test (High Vibration “V” Relays Only)

P.I.N.D. Test

Internal Moisture

Temperature Condition, High and Low Temperature Miss Test

Electrical Measurements

Leak Test

Radiographic Inspection (X-Ray)

Green Dot Marking

Visual Inspection

The purpose of the TR-HIREL-1 is to provide the user with an established, pre-formatted specification meeting the requirements of the NASA/GSFC S311-P-754, European Space Agency (ESA) Specification SCC/3601 & 3601 and the latest NASA Document EEE-INST-002, Instructions for EEE Parts Selection, Screening, Qualification and Derating. The default requirements of the TR-HIREL meet all three referenced specifications with the following “Final Production Tests” and “Screening and Electrical Measurements”:

100% Pre-cap inspection - Criteria establishing the standard methods for inspection prior to hermetic sealing (Teledyne Relays’ Procedure of Internal Inspection, Document 0-40-115)

Small Particle Inspection/Millipore Clean - in-process inspection to further evaluate relay cleanliness Through an automated small particle inspection process prior to sealing (Teledyne Relays’ Pre-cap Small Particle Inspection, Document 0-40-265)

Sinusoidal Vibration - Standard Vibration test, sinusoidal and random, as specified by MIL-PRF-39016 & MIL-PRF-28776 (MIL-STD-202, Method 204; Test Method: Vibration, High Frequency)

Particle Impact Noise Detection (P.I.N.D.) -This test is designed to detect the presence of loose particles in sealed relays. This test method meets the criteria of MIL-R-39016E, Appendix B* (Teledyne Relays’ Particle Impact Noise Detection, Document 0-40-824)

Temperature Conditioning & High and Low Temperature Miss Test - Internal Moisture and High and Low Temperature Run-In tests per the requirement of MIL-PRF-39016 & MIL-PRF-28776 (MIL-STD-202, Method 107 Test Method: Thermal Shock)

Room Temperature Miss Test - Relays shall be subjected to a 2,500 cycle run-in test at applicable ambient temperatures. (MIL-PRF-39016)

Electrical Measurements - used to prove that the component part can operate safely at its rated voltage (MIL-PRF-39016 & MIL-STD-202)

Leak/Seal Test The purpose of this test method is to determine the effectiveness of the seal of a component part which has an internal cavity which is either evacuated or contains air or gas there shall be no leakage in excess of 1×10^{-8} atm-cm³/s of air.

(MIL-STD-202, Method 112 Test Method: Seal)

Radiographic Inspection (X-ray) Each relay shall be examined to determine proper internal construction and workmanship. Teledyne Relays' Radiographic Inspection of Relays, Document No. 0-40-193

External Visual and Mechanical Inspection Relays shall be examined to verify that the marking, header glass, external design and construction, physical dimensions and workmanship are in accordance with Teledyne Relays' acceptance criteria. Teledyne Relays' Inspection Criteria, External Visual and Mechanical, Document 0-40-913.

The TR-HIREL-1 specification is a guideline to aid in the procurement of electromechanical relays furnished to meet the requirements of all applicable electro-mechanical specifications:

- MIL-PRF-39016
- MIL-PRF-28776
- NASA/GSFC S-311-P-754
- NASA EEE-INST-002
- ESA/SCC 3601
- ESA/SCC 3602

The TR-HIREL-1 provides an efficient cost effective alternative to the requirements for Source Control Drawings (SCD) and the cycle of specification reviews associated with them. The TR-HIREL-1 has the heritage and credibility of worldwide recognition and use in every facet of the space community. Relays screened in accordance with the TR-HIREL-1 are currently in use on communications satellites, deep space probes and launch vehicles. The specification has been embraced on an international level because of its ability to satisfy NASA and ESA requirements with its default requirements. In addition to being used as a stand-alone procurement specification the TR-HIREL-1 has been used as the baseline for customer SCD's.

Product Capabilities



Teledyne Relays' TR-HIREL-1 High Reliability Specification

For over Fifty years Teledyne Relays has been supplying High Reliability relays to the aerospace community for use in space flight applications. Drawing on this experience we have developed the TR-HIREL-1 Specification Program. This Program provides our customers with the means to order high reliability switching solutions to established specification which define the performance requirements in addition to the governing quality assurance provisions. The TR-HIREL-1 Program consists of a series of documents which define the performance and quality assurance provisions comparable to those defined in:

- NASA/GSFC S-311-P-754
- NASA EE-INST-002
- ESA/SCC 3601
- ESA/SCC 3602

Design control and configuration control activities are conducted as prescribed by recognized industry standards such as ISO 9001, Boeing AS9000 and MIL-STD-709.

The TR-HIREL -1 Specification provides for the customization of test plans to assist the user in verifying the functionality of the product procured before installation into higher level assemblies. Verification can be achieved by any combination of the following:

- Custom qualification plans jointly developed by Teledyne Relays and the customer.
- Review of existing historical data compiled from similar designs.
- Custom selection of test and inspection variants during Production Lot manufacture.
- Menu driven Lot Acceptance Tests based on MIL-PRF-39016 & ESA/SCC requirements.

For more information, or assistance in the application of the TR-HIREL-1 Program, please contact your regional Sales Manager:

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