



Fuse and Relay Box Assembly

1. SCOPE

1.1. Content

This specification covers performance, tests and quality requirements for the TE Connectivity Fuse and Relay Box.

1.2. Qualification

When tests are performed on the subject product line, procedures specified in Figure 1 shall be used. All inspections shall be performed using the applicable inspection plan and product drawing.

2. APPLICABLE DOCUMENTS AND FORMS

The following documents and forms constitute a part of this specification to the extent specified herein. Unless otherwise indicated, the latest edition of the document applies. In the event of conflict between the requirements of this specification and the product drawing, the product drawing shall take precedence. In the event of conflict between the requirements of this specification and the referenced documents, this specification shall take precedence.

2.1. TE Documents

114-151059: Application Specification Fuse and Relay Box Assembly

501-151059: Qualification Test Report Fuse and Relay Box Assembly

502-151059: Engineering Test Report, High Vibration, Flanged Fuse and Relay Box Assembly

2.2. Industry Documents

EIA-364: Electrical Connector/Socket Test Procedures Including Environmental Classifications

ISO 20653: Road vehicles — Degrees of protection (IP code) – Protection of electrical equipment against foreign objects, water and access

3. REQUIREMENTS

3.1. Design and Construction

Product shall be of the design, construction, materials and physical dimensions specified on the applicable product drawing.

3.2. Materials

Materials used in the construction of this product shall be as specified on the applicable product drawing.

3.3. Ratings

- Temperature: -40° to 85°C
- Current: Refer to TE Connectivity AMP MCP 2.8 terminal system, Product Specification 108-18513
- Current: Refer to TE Connectivity AMP MCP 6.3 terminal system, Product Specification 108-18718
- Sealing: IP6K6, IP6K7

3.4. Performance and Test Description

Product is designed to meet the electrical, mechanical and environmental performance requirements specified in Figure 1. Unless otherwise specified, all tests shall be performed at ambient environmental conditions.

3.5. Test Requirements and Procedures Summary

TEST DESCRIPTION	REQUIREMENT	PROCEDURE						
Visual examination	Meets requirements of product drawing.	EIA 364-18B Examine visually under fluorescent lighting for form, fit and function. Verify print dimensions.						
ELECTRICAL								
Insulation resistance	100 megohms minimum.	EIA 364-21E 500 VDC, Test between adjacent contacts.						
Withstanding voltage	Two minute hold with no breakdown or flashover.	EIA 364-20 Condition I. 500 VDC. Test between adjacent contacts. Instantaneous rate of rise.						
Connection Resistance	100 Millivolts Max Voltage Drop	EIA 364-6 Measurements taken across each interface after thermal equilibrium is reached at current levels shown. Subtract bulk resistance of Equal Wire Length. <table style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Wire Size (AWG)</th> <th>Test Current (Amperes)</th> </tr> </thead> <tbody> <tr> <td>12</td> <td>15</td> </tr> <tr> <td>10</td> <td>40</td> </tr> </tbody> </table>	Wire Size (AWG)	Test Current (Amperes)	12	15	10	40
Wire Size (AWG)	Test Current (Amperes)							
12	15							
10	40							
MECHANICAL								
Mechanical shock.	No discontinuities greater than 10 microseconds.	EIA 364-27C Method H. 30 G's, total of 18 shocks.						
Random vibration.	No discontinuities greater than 10 microseconds.	Subject specimens to 3.2 Grms between 10 to 2000 Hz. Eight hours in each of 3 mutually perpendicular planes. See Figure 4 for vibration profile.						
Contact retention.	AMP MCP 2.8 – 60N minimum, AMP MCP 6.3 – 80N minimum	EIA 364-29C Method C, Push on terminals at rate of 25.4 mm per minute.						
Housing locking mechanism strength.	Shall withstand disengagement force of 100 N without depressing latches.	EIA-364-98 Subject specimens to a force of 100 N for 1 minute in the unmating direction with latches engaged.						
Housing locking mechanism retention force to failure.	Shall withstand disengagement force of 250 N minimum before latches are damaged (pull to failure).	EIA-364-98 Subject specimens to force in the unmating direction until latches are damaged.						
Durability, misaligned hinges.	Shall meet visual requirements and show no breakage after misaligned mounting/dismounting forces. Stress mark surface cracking permissible. Final cover removal force with latches engaged shall be greater than 100 N.	Subject specimens to 3 misaligned mounting/dismounting cycles at room ambient temperature applying a force of 100 N for 1 minute.						

Connector cover durability at ambient room temperature	No visible hinge cracking. See Note.	Mount and unmount cover 50 times at room ambient temperature.
Connector cover durability at -40°C.	No visible hinge cracking. See Note.	Mount and unmount cover 5 times at -40°C.
ENVIRONMENTAL		
Resistance to thermal shocks.	See Note.	EIA 364-32F Test Condition 1. Method A. Subject specimens to 50 cycles between -55°C and 85°C for 1 hour at each extreme, with maximum transition time of 5 minutes.
Degrees of protection.	No water ingress. See Note.	ISO 20653 IP6K6: 100KPa @ambient with 100L/min from 2.5-3m with a nozzle of 12.5mm diameter. Dust-50% Portland Cement-50%Fly Ash with 6 sec agitation every 15 min for 5 hours IP6K7: Room ambient parts placed into room ambient container of water of 1m depth for 30 min.
Salt fog.	No water ingress. See Note.	EIA-364-26 Condition D. Subject specimens to 5% salt concentration at 35°C for 1000 hours.
Humidity-temperature cycling.	See Note.	EIA-364-31 Method IV. Subject specimens to 10 cycles (10 days) between 25 and 65°C at 80 to 100% RH with -10°C cold shock.

Figure 1



NOTE

Shall meet visual requirements, show no physical damage, and meet requirements of additional tests as specified in the Product Qualification and Requalification Test Sequence shown in Figure 2.

3.5. Product Qualification and Requalification Test Sequence

The following tests were performed on the Fuse and Relay Box Assembly.

Test or Examination	Test Group (a)						
	1	2	3	4	5	6	7
	Test Sequence (b)						
Visual examination	1,8	1,5	1,4	1,7	1,7	1,5	1,5
Connection Resistance	2,4,6						
Insulation Resistance				2,4,6	2,4,6		
Withstanding voltage						2,4	2,4
Random vibration	3						
Mechanical shock	5						
Housing locking mechanism strength		4					
Housing locking mechanism retention force to failure			3				
Connector cover durability at room ambient		3					
Connector cover durability at -40°C	7						
Durability, misaligned hinges		2					
Contact retention			2				
Degree of protection, IP6K6				5			
Degree of protection, IP6K7					5		
Salt fog							3
Thermal shock				3(c)	3(c)		
Humidity-temperature cycling						3	

Figure 2



NOTE

- (a) See paragraph 4.1.A.
- (b) Numbers indicate sequence in which tests are performed
- (c) Samples allowed to vent to atmosphere during exposure via an unpopulated circuit cavity or through wire ends.

4. QUALITY ASSURANCE PROVISIONS

4.1. Qualification Testing

A. Specimen Selection

Specimens shall be prepared in accordance with applicable Instruction Sheets and shall be selected at random from current production. Each test group shall consist of a minimum of 3 samples.

Sample Quantities for Test Sequences

Test Group	Fuse and Relay Box Assembly	Cover	Wire Size (6.3 AMP MCP)	Wire Size (2.8 AMP MCP)	Sample Quantity	Comments
1	2304643-2 2304643-3 2304643-4	2098164-3	10 AWG TXL	12 AWG TXL	3	Max Wire
2	2304643-2 2304643-4	2098164-3	N/A	N/A	3	
3	2304643-1 2304643-2 2304643-3 2304643-4	2098164-3	10 AWG TXL	12 AWG TXL	3	Max Wire
4	2304643-1 2304643-2 2304643-3 2304643-4	2098164-3	18 AWG TXL	20 AWG TXL	3	Min Wire
5	2304643-1 2304643-2 2304643-3 2304643-4	2098164-3	18 AWG TXL	20 AWG TXL	3	Min Wire
6	2304643-1 2304643-2 2304643-3 2304643-4	2098164-3	18 AWG TXL	20 AWG TXL	3	Min Wire
7	2304643-1 2304643-2 2304643-3 2304643-4	2098164-3	18 AWG TXL	20 AWG TXL	3	Min Wire

Figure 3

B. Test Sequence

Qualification inspection shall be verified by testing specimens as specified in Figure 2.

4.2. Requalification Testing

If changes significantly affecting form, fit or function are made to the product or manufacturing process, product assurance shall coordinate requalification testing, consisting of all or part of the original testing sequence as determined by development/product, quality and reliability engineering.

4.3. Acceptance

Acceptance is based on verification that the product meets the requirements of Figure 1. Failures attributed to equipment, test setup or operator deficiencies shall not disqualify the product. If product failure occurs, corrective action shall be taken, and specimens resubmitted for qualification. Testing to confirm corrective action is required before resubmittal.

4.4. Quality Conformance Inspection

The applicable quality inspection plan shall specify the sampling acceptable quality level to be used. Dimensional and functional requirements shall be in accordance with the applicable product drawing and this specification.

5. VIBRATION PROFILE

Breakpoint Frequency (Hz)	Magnitude (G ² /Hz)	Slope Between Breakpoint (dB/Octave)
10	.070	0.0
20	.070	-5.42
40	.020	0.0
350	.020	-9.20
550	.005	-20.02
700	.001	-100.12
750	.0001	0.0
2000	.0001	0.0

Figure 4

NOTE

1. Tolerance: ± 4 db from 10 to 2000 Hz.
2. Wires to be firmly supported within 100 mm from PDM base wire exits.

6. SETUP FIGURES

IPX6 PRESSURE SPRAY

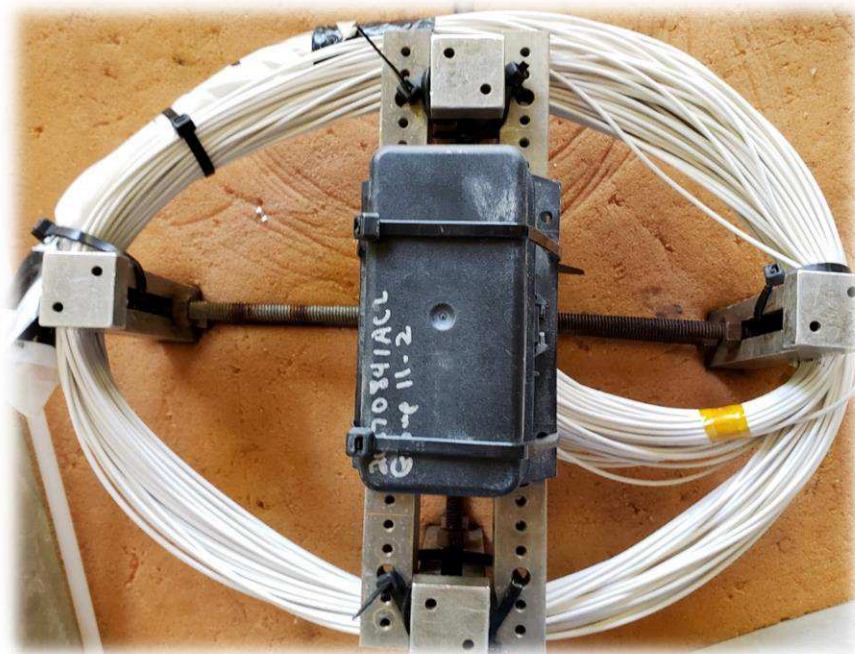


Figure 5

IPX7 IMMERSION FRAME SETUP

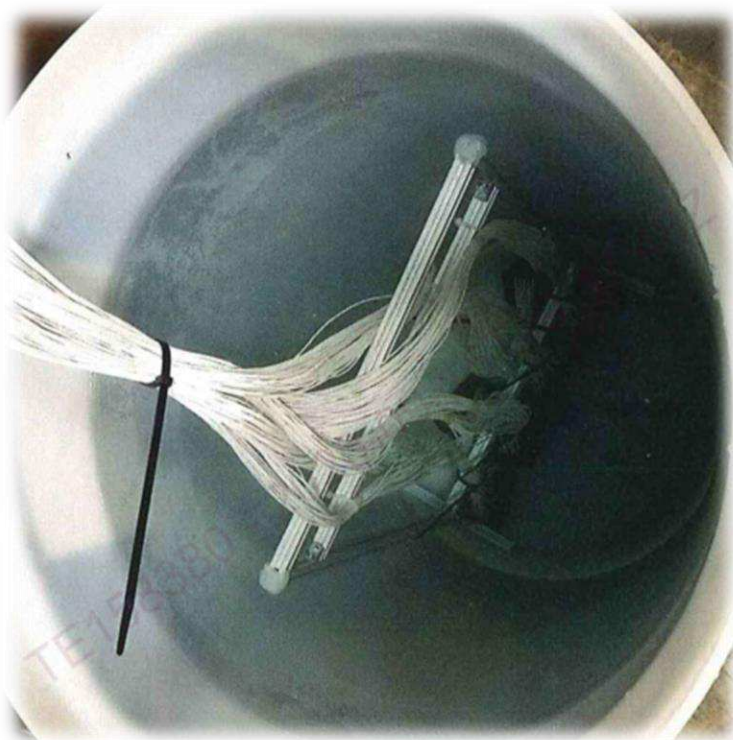


Figure 6

VIBRATION FIXTURE SETUP SHOWN FOR Z-AXIS

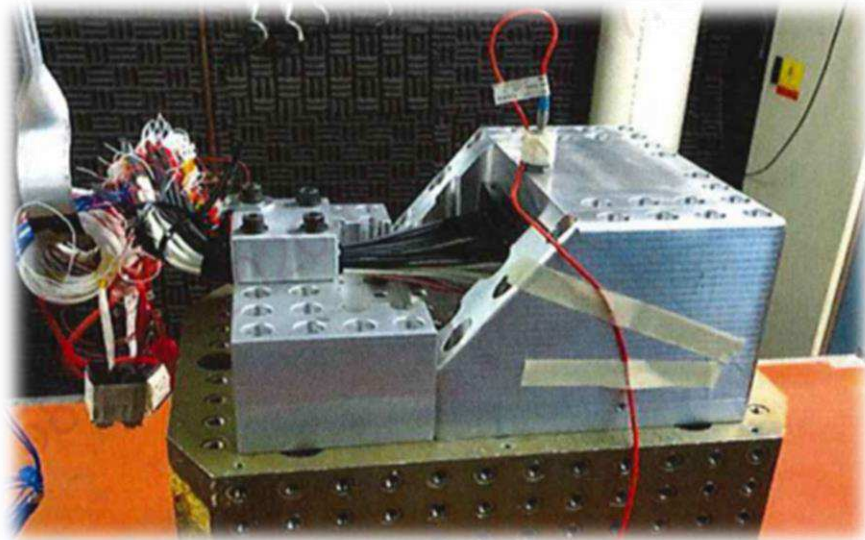


Figure 7

HOUSING LOCKING MECHANISM STRENGTH PULL SETUP

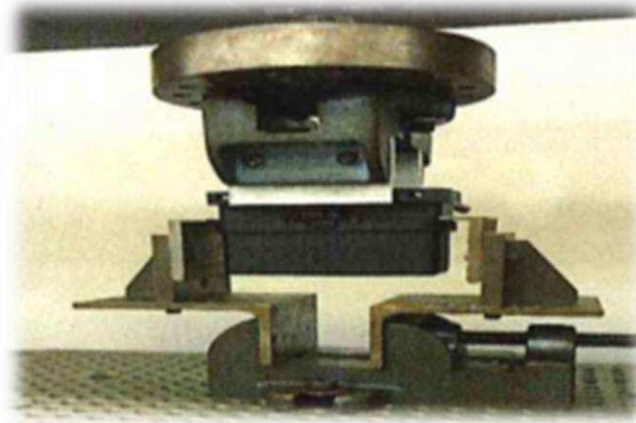


Figure 8

CONTACT RETENTION SETUP



Figure 9

7. REVISION HISTORY

Revision	Date	Revision Description
A	October 29, 2020	Initial Release
B	January 7, 2021	2304643-1 and 2304643-3 added