

Flanged Fuse and Relay Box Assembly, High Vibration Testing

1. INTRODUCTION

1.1. Purpose

Testing was performed on the Flanged Fuse and Relay Box to determine conformance to a 9.86 Grms vibration profile when pre-tin plated terminals are used with the fuse cavities and pre-silver plated terminals are used with the relay cavities.

1.2. Scope

This report covers the performance of the Fuse and Relay Box. Testing was performed at the Winston-Salem Electronic Components Test Laboratory. The test file number for this testing is WE-20230377. This documentation is on file at, and available from, the Global Automotive Division Product Reliability Center.

1.3. Conclusion

The Flanged Fuse and Relay Box conformed to the electrical performance requirements through exposure of the 9.86 Grms vibration profile shown in Figure 3 of this document. TE part no. 2304643-4 was fully populated with 30 fuses and TE part no. 2304643-3 was populated with 3 relays and 6 fuses.

1.4. Test Specimens

Test specimens were representative of normal production lots. Specimen part numbers listed in Figure 1 were used for the tests.

PART NUMBER	DESCRIPTION
2304643-3	27POS, HYBRID, REC HSG ASSY, SLD
2304643-4	60POS, AMP MCP 2.8, REC HSG ASSY, SLD
2098164-3	Cover, 60 Pos, No Top Side Fuse Graphic
0297030.WXNV	Littelfuse 30A MINI Blade Fuse
1-1414687-0	V23136A0004X059-EV-CBOX
1-1719506-1	AMP MCP 2.8 Receptacle Contact, 12 AWG TXL, Pre-tin Plated
1-1241418-3	AMP MCP 6.3 Receptacle Contact, 10 AWG TXL, Pre-silver Plated
828905-1	AMP MCP 2.8 Wire Seal, 12 AWG TXL
1719043-1	AMP MCP 6.3 Wire Seal, 10 AWG TXL

Figure 1. Test Specimen Part Numbers and Description

1.5. Environmental Conditions

Unless otherwise stated, the following environmental conditions prevailed during testing.
 Temperature: 15°C to 35°C
 Relative humidity (RH): 25 to 75%

1.6. Qualification Test Sequence

Test or Examination	Test Group (a) (c)
	1
Test Sequence (b)	
Visual Examination	1,7
Connection Resistance	2,4,6
Random vibration	3
Mechanical shock	5

Figure 2



NOTE

- (a) See paragraph 1.4
- (b) Numbers indicate sequence in which tests are performed.
- (c) Pre-Silver plated terminals used in circuit cavities for the relays.

2. SUMMARY OF TESTING

2.1. Visual Examination

Specimens were visually inspected and no evidence of physical damage detrimental to product performance was observed.

2.2. Connection Resistance

All voltage drop measurements were less than 150 mV after subtracting the bulk resistance of equal wire length.

2.3. Random Vibration

Following vibration testing, no cracks, breaks, or loose parts on the specimens were visible. No discontinuities detected.

2.4. Mechanical Shock

Following mechanical shock testing, no cracks, breaks, or loose parts on the specimens were visible.

3. TEST METHODS

3.1. Visual Examination of Product

All samples were visually examined for identification, torn seals, cracked plastic and any other defects.

3.2. Connection Resistance

The samples were placed on a non-conductive surface. Measurements were taken on the data acquisition systems using the voltage probe bundles (4-wire probe method). The current was set at 40 A for the 10 AWG TXL wire and 15 A for the 12 AWG TXL wire. The circuits were allowed to stabilize for 30 minutes before measurements were taken. The overall resistance included 12 inches of wire, terminal crimp resistance, bulk resistance of the terminal, and the terminal to fuse or relay interface. The resistance of the 12 inches of wire was subtracted out of the final measurements so that the reported data only included the crimp, bulk resistance of the terminal, and the interface.

3.3. Random Vibration

Specimens were subjected to 9.86 Grms, per the vibration profile in Figure 3 for eight hours in each of 3 mutually perpendicular planes. Specimens were monitored for discontinuities of 10 microseconds or greater using a current of 100 milliamperes at less than 20 millivolts DC.

Breakpoint Frequency (Hz)	Magnitude (G ² /Hz)
24	0.040
60	0.500
100	0.500
300	0.025
2000	0.025

Figure 3: Vibration Profile

i NOTE

- (a) Tolerance: ± 4 db from 10 to 2000 Hz
- (b) Wires to be firmly supported within 100 mm from wire exits.

VIBRATION FIXTURE SETUP SHOWN FOR Z-AXIS WITH WIRE BUNDLE CLAMPED

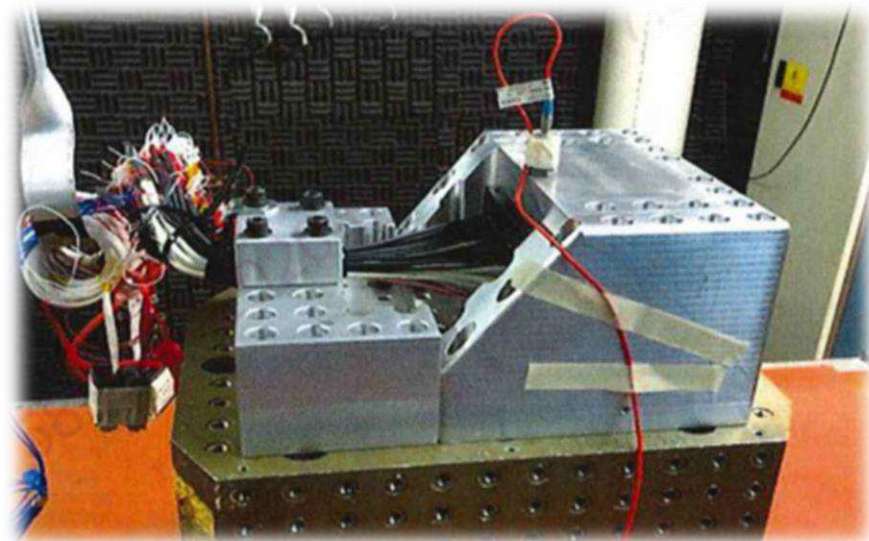


Figure 4

3.4. Mechanical Shock

Specimens were subjected to a mechanical shock test having a half-sine waveform of 30 gravity units (g peak) and a duration of 11 milliseconds. Three shocks in each direction were applied along the 3 mutually perpendicular planes for a total of 18 shocks. Specimens were monitored for discontinuities of 10 microseconds or greater using a current of 100 milliamperes DC.

4. QUALITY ASSURANCE PROVISIONS

4.1. 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.

Test Group	Fuse and Relay Box Assembly	Cover	Wire Size (6.3 AMP MCP)	Wire Size (2.8 AMP MCP)	Sample Quantity	Comments
1	2304643-3 2304643-4	2098164-3	10 AWG TXL	12 AWG TXL	3 each	Max Wire

Figure 5