
Power Distribution Module Assembly

1. SCOPE

1.1. Content

This specification covers performance, tests and quality requirements for the TE Connectivity (TE) Power Distribution Module Assembly (PDM), produced for use in Arctic Cat Off Road vehicles. The PDM consists of a 4X10 contact pattern base, part number 109853-1, and cover with seal, part number 109854-1. The PDM contact pattern, 8.13 mm contact spacing, is that of Tyco Electronics VJ28-95F24 relay, and automotive MINI fuse system, intended for use in this application. The purpose of this document is to determine the capability of Tyco supplied components.

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

The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, 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

- 108-18513: Product Specification
- 109-197: TE Test Specifications vs EIA and IEC Test Methods
- 501-543: Qualification Test Report

2.2. Industry Standards

- EIA-364: Electrical Connector/Socket Test Procedures Including Environmental Classifications
- IEC 60512: Electromechanical Components For Electronic Equipment; Basic Testing Procedures and Measuring Methods Part 1: General
- IEC 60529: Degrees of Protection Provided by Enclosures (IP Code)
- SAE J1455: Joint SAE/TMC Recommended Environmental Practices for Electronic Equipment Design (Heavy-duty Trucks)

3. REQUIREMENTS

3.1. Design and Construction

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

3.2. Materials

- Base: PBT GF30, Valox 420SE0, flammability rating V-0
- Cover: Valox 310SE0, non reinforced PBT, flammability rating V-0
- Seal: Silicone rubber
- Terminals: TE MCP 2.8 mm system, sealed, 14-18 AWG Product Specification 108-18513-0
- Wire seal: Silicone rubber

3.3. Ratings

- Current: Refer to TE MCP 2.8 mm terminal system, part number 1-968857-1 sealed terminal 14-16 AWG, part number 1-968855-1 sealed terminal 18 AWG for electrical rating and heat rise characteristics
- Temperature: -40 to 65°C
- Seal: Dust proof, SAEJ1455, 4.7.3, splash proof, IP X4

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 per EIA-364.

3.5. Test Requirements and Procedures Summary

Test Description	Requirement	Procedure
Examination of product.	Meets requirements of product drawing.	Visual, dimensional and functional per applicable quality inspection plan.
ELECTRICAL		
Termination resistance, dry circuit.	10 milliohms maximum.	EIA-364-23A. Subject specimens to 100 milliamperes maximum and 20 millivolts maximum open circuit voltage.
Dielectric withstanding voltage.	Two minute hold with no cross over.	EIA 364-21C Apply 500 volts DC between adjacent terminals.
Temperature rise vs current.	Shall not exceed MCP 2.8 mm contact specification for 9 position housing, Product Specification 108-18513-0.	EIA 364-70A and IEC 60512-5-1. 30 ampere terminals must be separated by 10 ampere maximum terminals. Loading configuration per Figure 3. For intermittent use of 30 ampere current, the heat rise curve shown in Figure 4 applies.
Fuse blow.	No plastic or terminal interface degradation.	Subject each fuse under load to full 12 volts DC battery voltage and current until the fuse "opens" for a total of 5 times per fused circuit under load.

Figure 1 (continued)

Test Description	Requirement	Procedure
MECHANICAL		
Free fall, cover.	Ensured functionality, some chips and dents permitted but not over seal area. Meets water tightness test.	Drop from a height of 1 m [3.28 ft] onto a concrete floor on 3 corners and flat on latches. Two corners at bottom of cover (closed corners), 1 corner at seal area.
Free fall, device.	Ensured functionality, PDM mounts securely on vertical and horizontal brackets. Some chips and dents permitted but not over seal area. Meets water tightness test.	Affixed to 750 mm [29.53 in] cable length, 40 wires maximum, routed symmetrically, dropped 8 times from 750 mm [29.53 in], rotated 45 degrees each time. Loading configuration per Figure 3.
Resistance to vibrations.	No discontinuities greater than 1 millisecond. See Note.	Two PDM units populated per Figure 3 for vertical and horizontal bracket mount each, vibrated for 4 hours in each of 3 mutually perpendicular planes per spectrum specified in Figure 5 (GM-911P). Wires to be strapped tight with nylon tie wrap to respected base end brackets, with the maximum of 15 wires strapped to 1 end bracket. Wires to be firmly supported within 200 mm [7.87 in] from base wire support brackets.
Mechanical shock.	No discontinuities greater than 1 millisecond. See Note.	EIA 364-27B, Method H. 30 G's, total of 18 shocks, loading configuration per Figure 3. Rubber inserts to be inserted to restrain components in case mechanical shock forces exceed contact removal force.
Durability.	Cover shall withstand a total of 25 mounting-dismounting cycles. See Note.	No visible hinge cracking.
Housing locking mechanism strength.	Housing shall withstand disengagement force of 88.96 N [20 lbf] for 1 minute without depressing latches. See Note.	EIA-364-98. Cover latches in Test Group 2 shall be tested by pulling axially on a string passed through a hole drilled in the center of the cover and anchored inside the cover by a metal bar until a force of 88.96 N [20 lbf] is attained and then held for 1 minute. Cover latches in Test Group 8 shall be tested to destruction and forces recorded.

Figure 1 (continued)

Test Description	Requirement	Procedure
Contact retention strength.	Inserted contact must withstand a minimum force of 80 N [17.98 lbf] before disengagement from cavity, when pulled by the wire. All contact cavities to be tested.	IEC-512-16-20, Test Method A (destructive).
ENVIRONMENTAL		
Temperature life.	See Note.	EIA 364-17B, Method B, Test Condition 1. Subject specimens to 96 hours at 55° C. Loading configuration per Figure 3.
Resistance to thermal shocks.	See Note.	EIA 364-32C, Test Condition 1. Subject specimens to 50 cycles between -55 and 85°C.
Humidity.	See Note.	EIA 364-31B, Method 4. Subject specimens to 10 cycles (10 days) between 25 and 65°C at 80 to 100% RH with -10°C cold shock during cycle 7.
Dust bombardment.	See Note.	SAE J1455, 4.7.3. Omit gravel bombardment.
Water tightness.	See Note.	IEC 60529, IP X4 Test. 10 minute duration.

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.

Figure 1 (end)

3.6. Product Qualification and Requalification Test Sequence

Test or Examination	Test Group (a)								
	1	2	3	4	5	6	7	8	9
	Test Sequence (b)								
Examination of product	1,7	1,5	1,7	1,4	1,4	1,5	1,6	1,3	1,5
Termination resistance, dry circuit	2,6		2,6				2,5		2,4
Dielectric withstanding voltage						2,4			
Temperature rise vs current							3		
Fuse blow									3
Free fall, cover				2					
Free fall, device					2				
Resistance to vibrations	3								
Mechanical shock	4								
Durability	5	4							
Housing locking mechanism strength		3						2	
Contact retention strength		2							
Temperature life							4		
Resistance to thermal shocks.			3						
Humidity						3			
Dust bombardment			4						
Water tightness			5	3	3				

NOTE

- (a) See paragraph 4.1.A.
- (b) Numbers indicate sequence in which tests are performed.

Figure 2

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 2 specimens.

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.

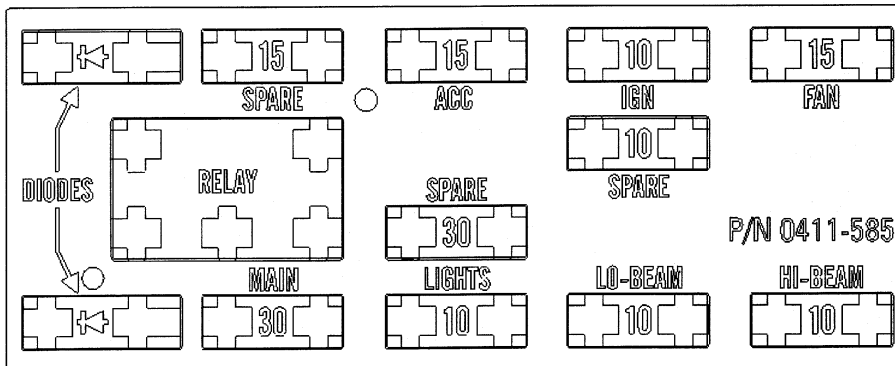
4.3. Acceptance

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

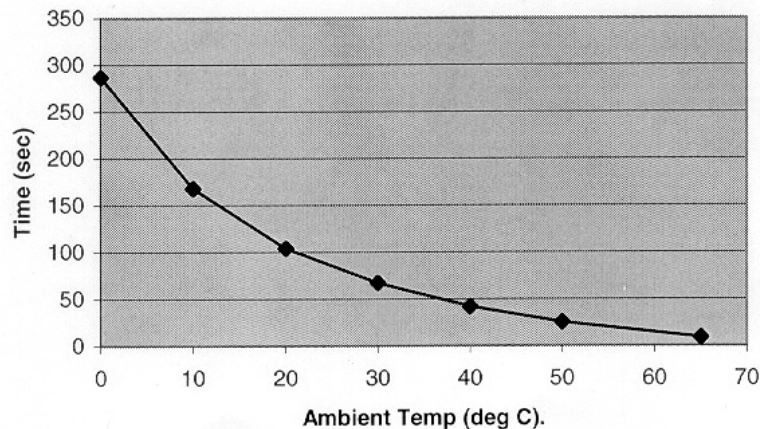
The applicable quality inspection plan shall specify the sampling acceptable quality level to be used. Dimensional and functional requirements shall be in accordance with the applicable product drawing and this specification.

Relay, 10A Neutral: 86@C2, 87@B2, 30@C4, 85@B4 and 87a@B3
 C2 and B4 coil, no load, 18 AWG
 C4 and B2 ignition, no load, 18 AWG
 Fuse, 30A Main: A3 and A4 1.42 amperes, wired separately, 14 AWG
 Fuse, 15A Accessory: D5 and D6 No load
 Fuse, 15A Fan: D9 and D10 5.2 amperes
 Fuse, 10A Ignition: D7 and D8 2.07 amperes
 Fuse, 10A Lights: A5 and A6 4.52 amperes (with brake lights on)
 Fuse, 10A Hi-Beam: A9 and A10 3.67 amperes
 Fuse, 10A Lo-Beam: A7 and A8 3.84 amperes
 Diode, 1A Neutral: D1 and D2 1.0 ampere
 Diode, 1A Reverse: A1 and A2 1.0 ampere
 All fuse and diodes 10 amperes and less - 18 AWG wire, 15 amperes - 16 AWG wire, 30 amperes - 14 AWG wire



NOTE Decal picture provided for illustration only. Spare fuses are not to be used in testing and unused contact cavities to be plugged with TE plugs part number 828922-1.

Figure 3
Current Load Configuration



NOTE Data shows time the main fuse contact reaches 80°C (maximum for GPT wires), under load of 30 amperes at various ambient temperatures, 0, 10, 20, 30, 40, 50 and 65°C. Saturation time 1 hour. Based on average of 2 specimens. Current load pattern per Figure 3 except main fuse load 30 amperes.

Figure 4
Heat Rise Curve for Intermittent Use of 30 Ampere Current

Breakpoint Frequency (Hz)	Magnitude (G ² /Hz)	Slope Between Breakpoints (dB/Octave) see Note (a)
10 see Note (a)	.070	0.0
20 see Note (a)	.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	

- NOTE**
- (a) *Linear slopes on log-log plots only.*
 - (b) *RMS G Level - 3.2 G's.*
 - (c) *Maximum G level limited to 3 X the RMS level.*
 - (d) *Tolerance: ± 4 db from 10 to 2000 Hz.*

Figure 5
Vibration Profile