

MONOPLUG 2.5 Connector

1. SCOPE

1.1. Content

This specification covers performance, tests, and quality requirements for the Monoplug 2.5 connector system. Base numbers covered by this specification are listed in Figure 1. Compatible mating parts include tab headers (P/N 1971817, 1971818, 1971921, 1971922) and PCB frames (P/N 964575, 964576) for either single or double sided PC boards. These are shown in Figure 2.

Connector Type	Single Sided Keying	Double Sided Keying
Fully Loaded	2232892	2232884
	2232893	2232885
Selectively Loaded	2232890	2232894
	2232891	2232895

Figure 1

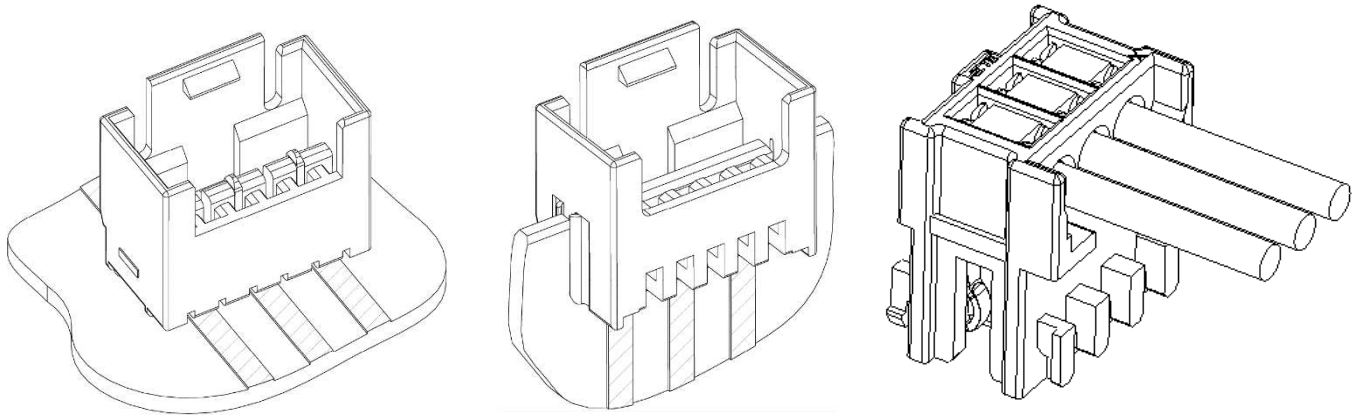


Figure 2

1.2. Qualification

When tests are performed on the subject product line, procedures specified in Figure 3 shall be used. All inspections shall be performed using the applicable inspection plan and product drawing.

1.3. Qualification Test Results

Successful qualification testing on the subject product line has been completed for this product line. The Qualification Test Report number is 501-106198.

2. APPLICABLE DOCUMENTS AND FORMS

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 Connectivity Specifications

114-106198	Application Specification – Monoplug 2.5 Connector System
501-106198	Qualification Test Report – Monoplug 2.5 Connector System
2232884	Customer Drawing – Monoplug 2.5 Connector System

2.2. Commercial Standards and Specifications

IEC 61984	International Standard – Safety Requirements and Tests
IEC 60335	International Standard – Safety of Household and Similar Appliance
IEC 60512	International Standard – Connectors for Electronic Equipment – Tests and Measurements
IEC 60695	International Standard – Fire Hazard Testing
UL 1977	Safety Standards – Component Connectors for Use in Data, Signal, Control, and Power Applications
EIA-364	Electrical Connector/Socket Test Procedures Including Environmental Classifications

2.3. Reference Documents

109-1	General Requirements for Testing
102-950	Qualification of Separable Interface Connectors

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 TE drawing.

3.3. Ratings

- A. Voltage Rating: 50 VAC (250 VAC for selectively loaded versions only)
- B. Current Rating: 2 A
- C. Temperature Rating: -40°C to +110°C
- D. Ingress Protection (IP) Rating: IP00

3.4. Performance Requirements and Test Description

The product should meet the electrical, mechanical and environmental performance requirements specified in Figure 3. All tests shall be performed at ambient environmental conditions otherwise specified per IEC 60512-1.

Preparation for all tests groups includes 24 hours of preconditioning at ambient environmental test conditions.

3.5. Test Requirements and Procedure Summary

Test Description	Requirement	Procedure
Examination of Product	Meets requirements of product drawing and TE specification (114-106198). After testing, there shall be no corrosive influence on the performance and no physical damage.	IEC 60512-1-1
Electrical		
Contact Resistance – Specified Test Current Method	Initial: 10 mΩ (milliohms) maximum (Ri) Final: 5+Ri or 1.5*Ri mΩ (milliohms) maximum	IEC 60512-2-2 See Figure 4. Subtract the bulk resistance of the wire from the measurement. Protect wire from corrosion during testing. Test on mated connectors. Test Current = 1A
Current-Temperature Derating Curve	110°C (Per IEC 60512-5-2, must specify an upper temperature limit)	IEC 60512-5-2
Temperature Rise of IDC	45°C maximum temperature rise	IEC 60512-5-1 Measure the temperature rise above ambient created by the energizing current. Measurement must be taken at a place where there is no influence from air convection. Measure in the area on the IDC area. Stabilize at a single current level until 3 readings at 5 minute intervals are within 1°.
Temperature Rise	$T \leq 110^{\circ}\text{C}$	IEC 60512-5-1 Measure the temperature rise above ambient created by the energizing current. Measurement must be taken at a place where there is no influence from air convection. Measure in the contact area between the mated connectors. Stabilize at a single current level until 3 readings at 5 minute intervals are within 1°.
Dielectric Withstanding Voltage	No breakdown or flashover. Leakage Current: 2.0 mA (maximum)	IEC 60512-4-1, Method C Apply 1390 VAC for 1 minute for both fully loaded and selectively loaded specimens. Test on unmated connectors.
Insulation Resistance	5 MΩ (megaohms) minimum	IEC 60512-3-1, Method C Apply 500 VDC for 1 minute between adjacent contacts. Test on unmated connectors.
Contact Resistance – Voltage Drop Method	U _{IDC} ≤ 22.5 mV or U _{overall} ≤ 50.0 mV	Acc. To IEC 60998 Part 2-3, Test 15.101, measuring the U _{IDC} (voltage drop on IDC only) considering the requirement on the left. (see Figure 5) As alternative, to measure at the same current the U _{overall} (voltage drop on the overall circuit = IDC+bulk+mating) considering the requirement on the left.
Mechanical		

Figure 3 (continued)

Engaging and Separating Forces (Terminal of Tab Header)	Engaging: 6N (maximum) Separating: 1N (maximum)	IEC 60512-13-1 Operating Speed: 25.4 mm/min Number of Cycles: 1
Contact Retention in Insert	20 N (minimum)	IEC 60512-15-1 Operating Speed: 25.4 mm/min
Termination Tensile Strength	30 N (minimum)	IEC 60998-2-3 Operating Speed: 25.4 mm/min Test 90° to the mating direction in the IDC area.
Polarization Test	No damage which could impair normal usage.	IEC 60512-13-5 Mating Force: 20 N (maximum) Operating Speed: 25.4 mm/min
Engaging and Separating Forces of a Connector	No damage which could impair normal usage.	IEC 60512-9-1 Mate and unmate connector 10 times. Operation Speed: 25.4 mm/min
Impact Test	No damage which could impair normal usage.	IEC 60512-7-2 Subject connectors to a single fall from a height of 1 m onto an uncoated concrete floor in each axis.
Wire Movement Test	No damage which could impair normal usage.	EN 60998 Part 2-3 Apply 3N for 15 minutes on end of 260 mm length wire around a circuit with a 6.5 mm diameter.

Environmental

Thermal Cycling	No damage which could impair normal usage.	IEC 60998-2-3 Lower Temperature Limit: 30°C Upper Temperature Limit: 85°C Number of Cycles: 192
Saturated Atmosphere in the Presence of Sulfur Dioxide	No damage which could impair normal usage.	IEC 60512-11-7 Subject connector to 0.2 dm ³ SO ₂ and 2 dm ³ H ₂ O at 40°C for 8 hours.
Dry Heat	No damage which could impair normal usage.	IEC 60512-11-9 Subject connector to 110°C for 7 days.
Cold	No damage which could impair normal usage.	IEC 60512-11-10 Subject connector to -40°C for 2 hours.
Ball Pressure Test	2 mm diameter (maximum)	IEC 60695-10-2 Test connector at 125°C for 1 hour.
Glow Wire Test	Flame duration ≤ 30 seconds (Test at 850°C). Flame duration ≤ 2 seconds (Test at 750°C).	IEC 60695-2-11 according to IEC 60335-1 To be tested on Un-Mated Connectors Test temperatures = 850°C, 750°C, and 550°C
Proof Tracking Index	250 V	IEC 60112 Test Liquid A

Figure 3 (end)


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 6.

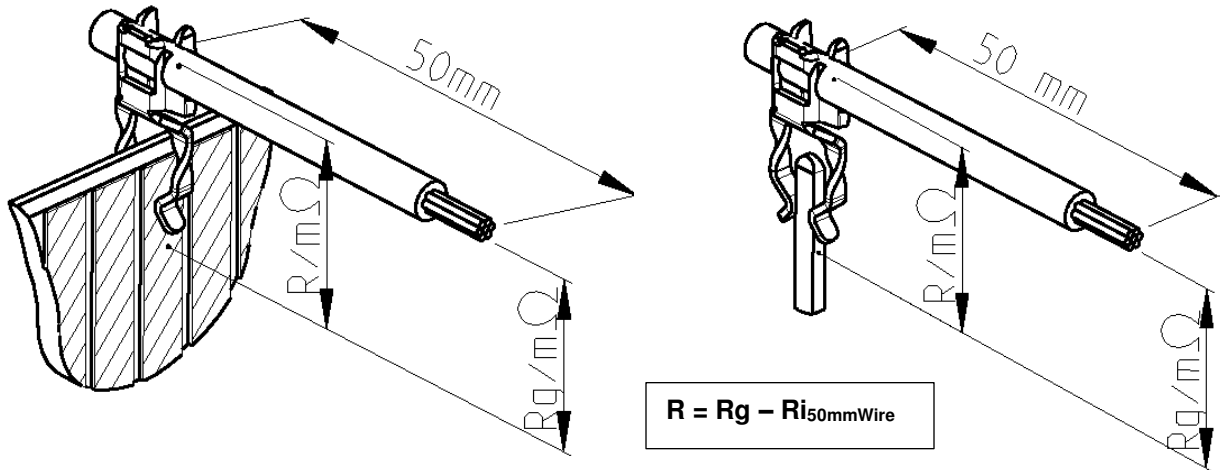


Figure 4

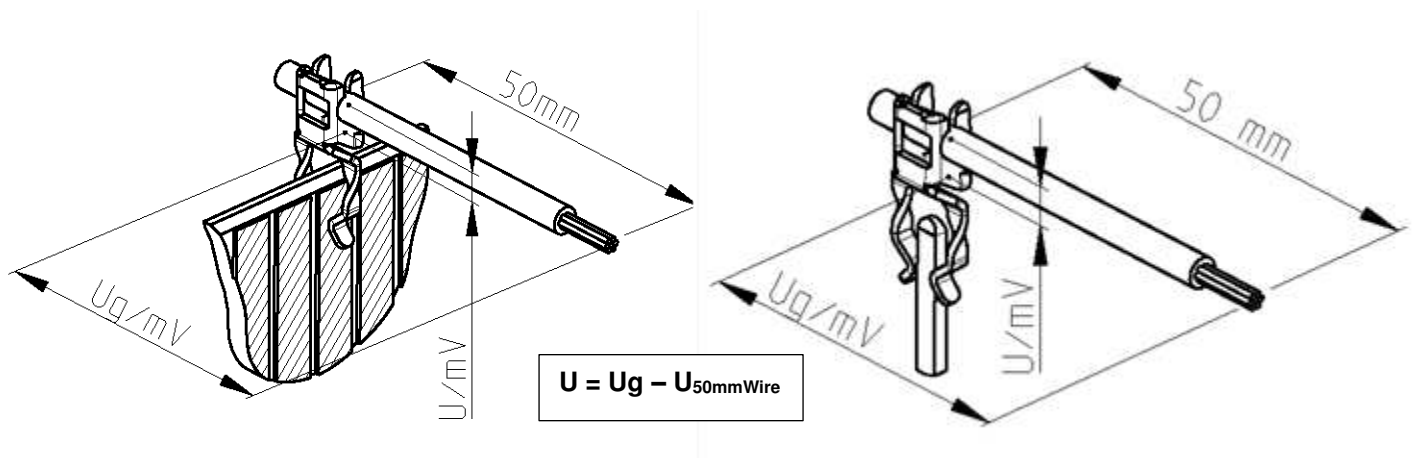


Figure 5

3.6. Product Qualification and Requalification Test Sequence

TEST OR EXAMINATION	TEST GROUP (a)												
	1	2	3	4	5	6	7	8	9	10	11	12	13
	TEST SEQUENCE (b)												
Examination of Product	1, 4	1, 5	1, 7	1, 8	1, 3	1, 3	1, 3	1, 3	1, 3	1, 5	1, 3	1, 3	1, 3
Contact Resistance – Specified Test Current Method		2, 4	2, 5	2, 6									
Current-Temperature Derating Curve			3										
Temperature Rise of IDC									2				
Temperature Rise			4										
Dielectric Withstanding Voltage			6	7									
Insulation Resistance													
Contact Resistance – Voltage Drop Method										2, 4			
Engaging and Separating Forces (Tab Header)	2												
Contact Retention in Insert	3												
Termination Tensile Strength							2						
Polarization Test					2								
Durability (Mechanical Operation Endurance)		3											
Impact Test								2					
Wire Movement Test						2							
Thermal Cycling										3			
Saturated Atmosphere in the Presence of Sulfur Dioxide				5									
Dry Heat				4									
Cold				3									
Ball Pressure Test											2		
Glow Wire Test												2	
Proof Tracking Index													2

Figure 6



NOTE

(a) See paragraph 4.2.

(b) Numbers indicate sequence in which tests are performed.

4. QUALITY ASSURANCE PROVISIONS

4.1. Test Conditions

Unless otherwise specified, all the tests shall be performed in any combination of the following test conditions shown in Figure 7.

Temperature	15°C – 35°C
Relative Humidity	45% – 75%
Atmospheric Pressure	86.6 – 106.6 KPa

Figure 7

4.2. Qualification Testing

A. Specimen Selection

Specimens shall be prepared in accordance with applicable instruction sheets and shall be selected at random from current production. See Figure 8 for minimum number of connectors per test group

WIRE SIZE	TEST GROUP												
	1	2	3	4	5	6	7	8	9	10	11	12	13
0.22 mm ²		3	3	3		3	3			3			
0.35 mm ²		3	3	3		3	3			3			
Any Size	3				3			3	3		3	3	3

Figure 8

B. Test Sequence

Qualification inspection shall be verified by testing specimens as specified in Figure 6.

4.3. 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.

4.4. Acceptance

Acceptance is based on verification that the product meets the requirements in Figure 3. 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.

4.5. 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.