

RJ45 Modular Jacks

1. SCOPE

1.1. Content

This specification covers the performance, tests and quality requirements for RJ45 Jacks for Ethernet applications.

1.2. Qualification

When tests are performed on the subject product line, procedures specified in Paragraph 3.4 shall be used. All inspections shall be performed using the applicable inspection plan and product drawing.

2. APPLICABLE DOCUMENTS AND FORMS

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

A. Application Specifications

114-97854 Application Specification

B. Test Reports

Provided under request.

2.2. Standards

Federal

QQ-B-626 Brass; bar, plate, rod, strip, flat wire and special shaped sections

QQ-B-750 Bronze, phosphor; bar, plate, rod, sheet, strip, flat, wire, and structural and special shaped sections

QQ-N-290 Plating, nickel (electrodeposited)

Military

MIL-STD-1344A Test methods for electrical connectors

MIL-C-39012C General specification for connectors, coaxial, radio frequency

MIL-G-45204 Gold plating (electrodeposited)

Underwriters' Laboratories, Inc.

UL-STD-94 Tests for flammability of plastic material for parts in devices and appliances.

Others

ISO 2859 Sampling procedures for inspection by attributes.

FCC Part 68 Connection of Terminal Equipment to the Telephone, Connector Specifications

EIA-364 Electrical Connector/Socket Test Procedures Incl. Environmental classifications

JESD22-B102D Solderability Test Method.

IEC 60603-7 All dimensions in the contact zone of all RJ45 Jacks are according to IEC 60603-7.

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.

- Contacts Phosphor bronze,
Contact area gold plating,
Solder tails gold (or tin) plating, nickel under plated all over.
- Housing Thermoplastic, UL94V-0, black.
- Shield Brass, overall Nickel plating.
- LED Epoxy encapsulated diode lens, iron lead frame with Nickel and Tin.

3.3. Ratings

Relative Humidity: 70% $\pm 10\%$ RH

Operating Temperature: -40°C to 85°C

Current Rating: 1.4 A max

Voltage Rating: 150 VAC max

3.4. Performance and Test Description

The product is designed to meet the electrical, mechanical, and environmental performance requirements specified in paragraph 3.5 below.

3.5. Test Requirements and Procedures Summary

Unless otherwise specified, all tests shall be performed at ambient environmental conditions.

TEST DESCRIPTION	REQUIREMENT	PROCEDURE
Visual and Mechanical examination	Meet requirements of mechanical structure, appearance, specifications and product drawing.	-
ELECTRICAL		
Low level Contact Resistance	20mΩ max initial 30mΩ max final	Open circuit at 20mV max, 10mA max. <i>See appendix for schematic and procedure.</i> Comply with EIA-364-23B.
Dielectric Withstanding Voltage	No creeping discharge or flashover shall occur. Current leakage: 0.5mA max.	Test between adjacent circuits of connector. 1 KV AC rms at 60Hz, 1 minute between adjacent contacts. 1.5 KV AC rms at 60Hz, 1 minute between shield and contacts.

		Comply with EIA-364-20C.
Insulation Resistance	500MΩ min	Test between adjacent contacts of connector for 1 minute. Impressed voltage 500VDC. Comply with EIA-364-21C.
LED Test	Meet LED requirements of product drawing.	If applicable: Test all LEDs in both directions

MECHANICAL

Contact Normal Force	Individually pin(s) of contact area 1 N min.	Comply with EIA-364-04A
Durability	Mate and unmate for 750 cycles. Operation speed: 25mm/min See Note below.	Comply with EIA-364-09C.
Mating Force	Measure the force required to mate the connector. Operation speed: 25mm/min. 2 contacts → 15.7 N max 4 contacts → 17.7 N max 6 contacts → 20.6 N max 8 contacts → 22.6 N max 10 contacts → 24.6 N max	Comply with EIA-364-13B.

ENVIRONMENTAL

Humidity Test	See note below.	At a temperature of 40°C ± 2°C, and relative humidity of 90% to 95% for 96 hours. Condition: Unmated connector. Comply with EIA-364-31B.
Temperature Life	See note below.	Exposing in a heat chamber at a temperature of 65°C ± 2°C for 96 hours. Condition: Unmated connector. Comply with EIA-364-17B.

SOLDERABILITY

Solderability Test (THR)	Appearance of the specimen shall be inspected with a magnifier of min 10x. The soldered surface shall be covered with a smooth solder coating with no more than small amounts of scattering imperfections such as pin-holes, un-wet or de-wet areas.	Test connector on PCB Profile acc. IPC/JEDEC J-STD-020D Preheat temperature: 150+-10°, Preheat time: 60~120sec Peak temperature: 235 +-5 °C Peak soldering time: 10+-1sec Number of reflow: 2 Comply with IEC 60068-2-58
Resistance to Soldering Heat (THR)	No physical or evidence of damage. If with LED: LED functionality shall be tested.	Test Connectors loose (not on PCB) Profile acc. IPC/JEDEC J-STD-020D Average ramp rate: 3°C/ sec max Preheat temperature:150~200°C Preheat time: 60~120sec Ramp to peak: 3°C/sec max

		Time over liquid's (217°C): 60~150sec Peak temperature: 250 +0/-5 °C Peak soldering time: 30sec Ramp - cool down: 6°C/ sec max Time 25°C to peak: 8 min max Number of reflow: 2 Comply with IEC 60068-2-58
Solderability (DIP)	Appearance of the specimen shall be inspected with a magnifier of min 10x. The soldered surface shall be covered with a smooth solder coating with no more than small amounts of scattering imperfections such as pin-holes, un-wet or de-wet areas.	Test connector on PCB Solder Temperature: 245+-5° Immersion Duration: 3+-0.5sec IEC 60068-2-20, Test Ta
Resistance to Soldering Heat (DIP)	No physical evidence of damage.	IEC 60068-2-20, Test Tb, method 1a 260 +0/-5 °C /10sec

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 Paragraph 3.6.

3.6. Test Sequence of product qualification

TEST OR EXAMINATION	TEST GROUP				
	A	B	C	D	E
Visual examination	1, 7 ^(a)	1, 5	1, 10	1, 5	1, 4
LED test			2, 9	2, 6	
Contact Resistance	2, 6	2, 4	3, 8	3, 7	
Dielectric Withstanding Voltage			4, 7		
Insulation Resistance				4	
Contact Normal Force					2
Durability	4				
Mating Force	3, 5				
Humidity Test		3			
Temperature Life			5		
Resistance to Soldering Heat (THR)			6 ^(b)		
Solderability test (THR)					3 ^(b)
Resistance to Soldering Heat (DIP)			6 ^(b)		
Solderability test (DIP)					3 ^(b)

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

(b) Half of the specimen each

3.7. Test Samples

The test samples consist of 20 pieces which were divided into 5 groups (A, B, C, D, E) with 4 pieces. In each group for each corresponding test group defined in the "Test Sequence of Product Qualification" table.

4. QUALITY ASSURANCE PROVISIONS

4.1. Qualification Testing

A. Sample Selection

Modular jack test samples shall be selected at random from current production lots. They shall be prepared for testing in accordance with current application specifications and instruction sheets.

B. Test Sequence

The tests realization must be in accordance with test groups as shown in section 3.6.

4.2. Acceptance

Acceptance is based on verification that the product meets the requirements of section 3.5. Failures attributed to equipment, test setup, or operator deficiencies shall not disqualify the product. When product failure occurs, corrective action shall be taken and samples resubmitted for qualification. Testing to confirm corrective action is required before resubmittal.

4.3. Quality Conformance Inspection

The applicable TE quality inspection plan will 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.

Appendix

5.1 Arrangement for Contact Resistance Test:

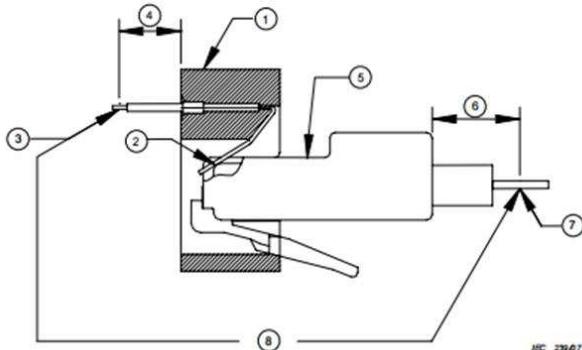


Image from IEC 60603-7-5 : 2007.

Key:

- 1 Fixed Connector
- 2 Point B
- 3 Point A
- 4 As short as practical
- 5 Free Connector
- 6 As short as practical
- 7 Point C
- 8 Contact resistance measurement points

The test procedure is as follows:

- a) Determine the bulk resistance of the fixed connector between points A and B of the figure above, by calculation or by measurement. This resistance is noted R_{AB} .
- b) Determine the bulk resistance of the free connector between points B and C of the figure above, by calculation or by measurement. This resistance is noted R_{BC} .
- c) Measure the local mated connector resistance between points A and C, following the requirements and procedures of IEC 60512, Test 2a. This resistance is noted R_{AC} .
- d) Calculate the contact resistance by subtracting the sum of the bulk resistance of the fixed and free connectors from the total mated connector resistance.

$$\text{Contact Resistance} = R_{AC} - (R_{AB} + R_{BC}), \text{ where I indicates initial value.}$$

Revision Record

Revision	Remarks	Name	Date
A	Document release	NM	22/02/2024
B	Mating Force & Contact N. F. value correction	NM	8/03/2024