

Qualification Test of Universal Power Housing Using Alternative Resin

1. INTRODUCTION

1.1. Purpose

Testing was performed on the TE Connectivity (TE) Universal Power CAP and PLUG housing with an alternative resin, to determine whether the part with alternative resin can meet product specification, and compare with current resin performance. Testing was performed on representative part, 176295-1 and 176274-1, this report also applies to other Universal Power CAP and PLUG housing using the new resin.

1.2. Scope

This report covers the electrical, mechanical, and environmental performance of Universal Power CAP and PLUG housing with a new resin and current resin. Testing was performed at the Shanghai Electrical Components Test Laboratory on Jun. 2019. The test file number is TP-19-01659-RECORD. This documentation is on file and available from Shanghai Electrical Components Test Laboratory.

1.3. Conclusion

- a. Based on test results, the alternative resin has no adverse impact on product performance.
- b. Alternative resin has equivalent performances with current resin.

1.4. Product Description

This connector has been designed for wire-to-wire type interconnection connector, consisting of tab and receptacle contact lock type device for contact locking. It also features semi-inner locking device that allows positive locking of contact in a cavity position without fear of accidental releasing of locking due to jerk pulling of lead caused by wire entanglement, etc.

1.5. Test Specimens

Following part numbers were used for testing (See Figure 1).

| Test Group | Quantity | Part Number | Description |
|------------|----------|-------------|--|
| 1,2,3,4 | 14 pcs | 176295-1 | Universal Power 3.96mm pitch cap housing 6Pos. with current resin |
| 1,2,3,4 | 14 pcs | 176274-1 | Universal Power 3.96mm pitch plug housing 6Pos. with current resin |
| 1,2,3,4 | 14 pcs | 176295-1 | Universal Power 3.96mm pitch cap housing 6Pos. with new resin |
| 1,2,3,4 | 14 pcs | 176274-1 | Universal Power 3.96mm pitch plug housing 6Pos. with new resin |
| 1,4 | 64 pcs | 175152-1 | Universal Power connector receptacle contact |
| 1,4 | 64 pcs | 175150-1 | Universal Power connector tab contact |

Figure 1

1.6. Test Sequence (See Figure 2).

| Test or Examination | Test Groups | | | |
|------------------------------------|-------------------|-----|-----|-----|
| | 1 | 2 | 3 | 4 |
| | Test Sequence (a) | | | |
| Examination of Product | 1,4 | 1,3 | 1,3 | 1,7 |
| Insulation Resistance | | | | 2,5 |
| Dielectric Withstanding Voltage | | | | 3,6 |
| Contact Insertion Force | 2 | | | |
| Contact Retention Force | 3 | | | |
| Humidity and Temperature Cycling | | | | 4 |
| Housing Locking Mechanism Strength | | 2 | | |
| Housing Panel Retention Force | | | 2 | |



NOTE

a) Numbers indicate sequence in which tests shall be performed.

Figure 2

1.7. Environmental Conditions

Unless otherwise stated, the following environmental conditions prevailed during testing:

Temperature: 15°C to 35°C

Relative Humidity: 45% to 75%

2. SUMMARY OF TESTING

2.1. Examination of Product – Test Groups 1, 2, 3,4

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

2.2. Insulation Resistance – Test Group 4

All insulation resistance measurements met 1000 MΩ Min.(Initial) & 100 MΩ Min.(Final)

2.3. Dielectric Withstanding Voltage – Test Group 4

No creeping discharge nor flashover occur.

2.4. Contact Insertion & Retention Force – Test Group 1 (See Figure 3).

All contact insertion and retention force measurements met below spec

Insertion force : 6.86 N max. per contact.

Retention force: 39.2 N min. per contact.

| Test Group | Number of Data Points | Condition | Insertion force | | |
|------------|-----------------------|-----------------------------|-----------------|-------|-------|
| | | | Min | Max | Mean |
| 1 | 8 | 176295-1 with Current Resin | 2.75 | 4.57 | 3.76 |
| | 8 | 176295-1 with New Resin | 2.90 | 5.08 | 3.91 |
| | 8 | 176274-1 with Current Resin | 5.36 | 6.57 | 6.05 |
| | 8 | 176274-1 with New Resin | 5.07 | 6.50 | 6.03 |
| Test Group | Number of Data Points | Condition | Retention force | | |
| | | | Min | Max | Mean |
| 1 | 8 | 176295-1 with Current Resin | 51.47 | 72.45 | 60.58 |
| | 8 | 176295-1 with New Resin | 48.73 | 59.31 | 52.88 |
| | 8 | 176274-1 with Current Resin | 45.30 | 55.52 | 54.83 |
| | 8 | 176274-1 with New Resin | 41.05 | 48.80 | 44.41 |

Figure 3

2.5. Humidity-Temperature Cycling – Test Group 4

No evidence of physical damage detrimental to product performance occurred

2.6. Housing Locking Mechanism Strength – Test Group 2 (See Figure 4).

All housing lock strength measurements met 44.1N min.

| Test Group | Number of Data Points | Part Number | Housing Locking Force | | |
|------------|-----------------------|-------------------------------------|-----------------------|-------|-------|
| | | | Min | Max | Mean |
| 2 | 4 | 176295-1 & 176274-1 - Current Resin | 79.91 | 107.3 | 94.11 |
| | 4 | 176295-1 & 176274-1 - New Resin | 56.72 | 81.41 | 67.80 |

Figure 4

2.7. Housing Panel Retention Force – Test Group 3 (See Figure 5).

All housing panel retention force met 98N min.

| Test Group | Number of Data Points | Part Number | Housing Panel Retention Force | | |
|------------|-----------------------|--------------------------|-------------------------------|--------|--------|
| | | | Min | Max | Mean |
| 3 | 4 | 176295-1 - Current Resin | 160.30 | 179.70 | 168.53 |
| | 4 | 176295-1 - New Resin | 168.90 | 189.50 | 183.53 |

Figure 5

3. TEST METHODS

3.1. Examination of Product

Specimens were visually examined for evidence of physical damage detrimental to product performance. Testing was performed in accordance with EIA-364-18.

3.2. Insulation Resistance

Apply 500 VDC and hold for 1 minutes. Test between adjacent circuits of mated connectors accordance with EIA-364-21E.

3.3. Dielectric Withstanding Voltage

Hold at 2.2 kV AC at sea level for 1 minute. Test between adjacent circuits of mated connectors accordance with EIA-364-20E.

3.4. Contact Insertion Force

Measure the force required to insert contact into housing accordance with EIA-364-5.

3.5. Contact Retention Force

Operation Speed: 100 mm/min. Apply axial pull-off load to crimped wire accordance with EIA-364-29.

3.6. Humidity-Temperature Cycling

Subject mated specimens to 10 cycles between 25°C and 65°C at 90-95% RH. Measurements to be recorded after specimens are held for 3 hours at ambient temperature and humidity accordance with EIA-364-31E.

3.7. Housing Locking Mechanism Strength

Operation Speed: 100 mm/min. Measure housing locking strength accordance with EIA-364-98.