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Electronic Components Sourcing Information

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## Product Reference Information

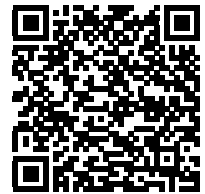
**Part Number:** TCD1473A201-020  
**Manufacturer:** TE Connectivity AMP Connectors  
**Package:** Bag  
**Availability:** Please confirm with sales

**Product Page:**

<https://antrexco.com/product/details/te-connectivity-amp-connectors/tcd1473a201-020.html>

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**Note:**

This PDF includes an ANTREX product reference cover page.

The original manufacturer datasheet follows from the next page.

**Industrial M12 D-code To RJ45 Plug cordsets****1. INTRODUCTION****1.1 Purpose**

Testing was performed on M12 D-code male straight 4P to RJ45 cordsets to determine if it meets the requirements of design objective 108-137541.

**1.2 Scope**

This report covers the electrical, mechanical, environmental performance and electrical transmission requirements of the M12 D-code male straight 4P connector and RJ45 plug connector.

**1.3 Product Description**

| P/N             | Name                                                                         |
|-----------------|------------------------------------------------------------------------------|
| TCD14745101-XXX | M12 D code, 4P, Male Straight to RJ45 plug cordset with shielded PUR cable   |
| TCD14741111-XXX | M12 D code, 4P, Male Straight to RJ45 plug cordset with shielded PVC cable   |
| TCD1473A201-XXX | M12 D code, 4P, Male Straight to RJ45 plug cordset with shielded TPE cable   |
| TCD2473A201-XXX | M12 D code, 4P, Male Straight to RJ45 plug cordset with unshielded TPE cable |

**1.3.1 Take minimum samples as below for testing to cover the whole family due to platform design**

| Item | PN              | Description                            |
|------|-----------------|----------------------------------------|
| 1    | TCD14745101-001 | M12D4-MS-RJ-PUR-22SH-TYPE C GREEN-0.5M |
| 2    | TCD14741111-001 | M12D4-MS-RJ-PVC-22SH-TYPE B GREEN-0.5M |
| 3    | TCD1473A201-001 | M12D4-MS-RJ-TPE-24SH-TEAL-0.5M         |
| 4    | TCD2473A201-001 | M12D4-MS-RJ-TPE-24UNSH-TEAL-0.5M       |

**1.3.2 RJ45 Plug test samples list**

| Item | PN        | Description          |
|------|-----------|----------------------|
| 1    | 2378164-1 | RJ45 PLUG,4PIN,8P4CS |
| 2    | 2378166-1 | RJ45 PLUG,4PIN,8P4CS |
| 3    | 2378167-1 | RJ45 PLUG,4PIN,8P4CS |

**1.4 Test condition**

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

Temperature: 15°C to 35°C  
Relative Humidity: 25% to 75%

## 2. Qualification Test Sequence for M12 D code side

| Test or Examination         | Test Group    |              |     |      |      |      |
|-----------------------------|---------------|--------------|-----|------|------|------|
|                             | A(a)          | B            | C   | D    | E(f) | F(g) |
|                             | Test Sequence |              |     |      |      |      |
| Examination of product      | 1             | 3,6,11,20,26 | 8   | 9    | 1    |      |
| Voltage proof               | 4             | 10,19,25     | 4,7 | 4,8  |      |      |
| Insulation resistance       | 3             | 9,13,18,24   | 3,6 | 3,7  |      |      |
| LLCR                        | 2             | 2,5,8,17,23  | 2   | 2    | 2,6  |      |
| Temperature Rising          |               |              |     | 5(e) |      |      |
| Impacting water             |               | 21           | 5   | 6    |      |      |
| Dust(IP6X)                  |               | 22(b)        |     |      |      |      |
| Durability                  |               |              |     |      | 4    |      |
| Mating and Un-mating Force  |               |              |     |      | 3,5  |      |
| Sinusoidal vibration        |               | 1            |     |      |      |      |
| Mechanical shock            |               | 4            |     |      |      |      |
| Rapid change in temperature |               | 7            |     | 1    |      |      |
| Dry heat                    |               | 12           |     |      |      |      |
| Damp heat, cyclic           |               | 14(c),16(d)  |     |      |      |      |
| Cold                        |               | 15           |     |      |      |      |
| Mixed flowing gas           |               |              | 1   |      |      |      |
| Transmission requirement    |               |              |     |      |      | 1    |

- (a) When the initial test group A has been completed, the specimens are divided in the 3 groups B, C, D. All connectors in each group shall undergo the tests specified for the relevant group numbers indicate sequence in which tests are performed.
- (b) It's allowed to perform with an additional specimen, extending the total number of specimen by 1.
- (c) First cycle
- (d) Remaining cycles
- (e) Test with additional specimen for over-molding type cable assembly
- (f) This test group should be tested without the screw nut

### \* Notes:

Numbers indicate the sequence in which the tests are performed.

## 3. TEST CONTENT for M12 D code connector side

3.1 Test Group  
3.1.1 Group A+B

| Group | Test Item                           | Sample    | Requirement                                                               | Test Condition and Result  | Conclusion |
|-------|-------------------------------------|-----------|---------------------------------------------------------------------------|----------------------------|------------|
| A     | LLCR                                | See 1.3.1 | 10 m $\Omega$ Max.                                                        | <15 m $\Omega$             | meet spec. |
|       | Insulation resistance               | See 1.3.1 | 100M $\Omega$ Min                                                         | >100M $\Omega$             | meet spec. |
|       | Voltage Proof                       | See 1.3.1 | No breakdown or flashover                                                 | No breakdown and flashover | meet spec. |
| B     | Sinusoidal vibration                | See 1.3.1 | No physical damage;<br>No electrical discontinuity greater than 1 $\mu$ s | No abnormalities           | meet spec. |
|       | LLCR                                | See 1.3.1 | $\Delta$ 15m $\Omega$ max.                                                | <15 m $\Omega$             | meet spec. |
|       | Examination of product              | See 1.3.1 | No defect would impair normal operation                                   | Normal                     | meet spec. |
|       | Mechanical shock                    | See 1.3.1 | No physical damage;<br>No electrical discontinuity greater than 1 $\mu$ s | No abnormalities           | meet spec. |
|       | LLCR                                | See 1.3.1 | $\Delta$ 15m $\Omega$ max.                                                | <15 m $\Omega$             | meet spec. |
|       | Examination of product              | See 1.3.1 | No defect would impair normal operation                                   | Normal                     | meet spec. |
|       | Rapid change in temperature         | See 1.3.1 | No physical damage                                                        | No abnormalities           | meet spec. |
|       | LLCR                                | See 1.3.1 | $\Delta$ 15m $\Omega$ max.                                                | <15 m $\Omega$             | meet spec. |
|       | Insulation resistance               | See 1.3.1 | 100M $\Omega$ Min                                                         | >100M $\Omega$             | meet spec. |
|       | Voltage proof(withstanding voltage) | See 1.3.1 | No breakdown or flashover                                                 | No breakdown and flashover | meet spec. |
|       | Examination of product              | See 1.3.1 | No defect would impair normal operation                                   | Normal                     | meet spec. |
|       | Dry heat                            | See 1.3.1 | No physical damage                                                        | Normal                     | meet spec. |
|       | Insulation resistance               | See 1.3.1 | 100M $\Omega$ Min                                                         | >100M $\Omega$             | meet spec. |
|       | Damp heat, cyclic                   | See 1.3.1 | No physical damage                                                        | No abnormalities           | meet spec. |
|       | Cold                                | See 1.3.1 | No physical damage                                                        | Normal                     | meet spec. |
|       | Damp heat, cyclic                   | See 1.3.1 | No physical damage                                                        | No abnormalities           | meet spec. |
|       | LLCR                                | See 1.3.1 | $\Delta$ 15m $\Omega$ max.                                                | <15 m $\Omega$             | meet spec. |
|       | Insulation resistance               | See 1.3.1 | 100M $\Omega$ Min                                                         | >100M $\Omega$             | meet spec. |
|       | Voltage proof(withstanding voltage) | See 1.3.1 | No breakdown or flashover                                                 | No breakdown or flashover  | meet spec. |
|       | Examination of product              | See 1.3.1 | No defect would impair normal operation                                   | Normal                     | meet spec. |
|       | Impacting water                     | See 1.3.1 | No water ingress                                                          | No water ingress           | meet spec. |
|       | LLCR                                | See 1.3.1 | $\Delta$ 15m $\Omega$ max.                                                | <15 m $\Omega$             | meet spec. |

|  |                                     |           |                           |                           |            |
|--|-------------------------------------|-----------|---------------------------|---------------------------|------------|
|  | Insulation resistance               | See 1.3.1 | 100MΩ Min                 | >100MΩ                    | meet spec. |
|  | Voltage proof(withstanding voltage) | See 1.3.1 | No breakdown or flashover | No breakdown or flashover | meet spec. |
|  | Examination of product              | See 1.3.1 | No physical damage        | Normal                    | meet spec. |

## 3.1.2 Group A+C

| Group | Test Item                           | Sample Number | Requirement                             | Test Condition and Result  | Conclusion |
|-------|-------------------------------------|---------------|-----------------------------------------|----------------------------|------------|
| A     | LLCR                                | See 1.3.1     | 10 m Ω Max.                             | <10 m Ω                    | meet spec. |
|       | Insulation resistance               | See 1.3.1     | 100MΩ Min                               | >100MΩ                     | meet spec. |
|       | Voltage Proof                       | See 1.3.1     | No breakdown or flashover               | No breakdown and flashover | meet spec. |
| C     | Mixed Flowing Gas                   | See 1.3.1     | No corrosion and defect                 | No abnormalities           | meet spec. |
|       | LLCR                                | See 1.3.1     | Δ15mΩ max.                              | <15 mΩ                     | meet spec. |
|       | Insulation resistance               | See 1.3.1     | 100MΩ Min                               | >100MΩ                     | meet spec. |
|       | Voltage proof(withstanding voltage) | See 1.3.1     | No breakdown or flashover               | No breakdown and flashover | meet spec. |
|       | Impacting water                     | See 1.3.1     | No water ingress                        | No water ingress           | meet spec. |
|       | Insulation resistance               | See 1.3.1     | 100MΩ Min                               | >100MΩ                     | meet spec. |
|       | Voltage proof(withstanding voltage) | See 1.3.1     | No breakdown or flashover               | No breakdown and flashover | meet spec. |
|       | Examination of product              | See 1.3.1     | No defect would impair normal operation | Normal                     | meet spec. |

## 3.1.3 Group A+D

| Group | Test Item                           | Sample Number | Requirement               | Test Condition and Result  | Conclusion |
|-------|-------------------------------------|---------------|---------------------------|----------------------------|------------|
| A     | LLCR                                | See 1.3.1     | 10 m Ω Max.               | <10 m Ω                    | meet spec. |
|       | Insulation resistance               | See 1.3.1     | 100MΩ Min                 | >100MΩ                     | meet spec. |
|       | Voltage Proof                       | See 1.3.1     | No breakdown or flashover | No breakdown and flashover | meet spec. |
| D     | Rapid change in temperature         | See 1.3.1     | No physical damage        | No abnormalities           | meet spec. |
|       | LLCR                                | See 1.3.1     | Δ15mΩ max.                | <15 mΩ                     | meet spec. |
|       | Insulation resistance               | See 1.3.1     | 100MΩ Min                 | >100MΩ                     | meet spec. |
|       | Voltage proof(withstanding voltage) | See 1.3.1     | No breakdown or flashover | No breakdown and flashover | meet spec. |
|       | Temperature Rising                  | See 1.3.1     | ΔT 30° C Max.             | No abnormalities           | meet spec. |
|       | Impacting water                     | See 1.3.1     | No water ingress          | No water ingress           | meet spec. |

|  |                                      |           |                                         |                            |            |
|--|--------------------------------------|-----------|-----------------------------------------|----------------------------|------------|
|  | Insulation resistance                | See 1.3.1 | 100MΩ Min                               | >100MΩ                     | meet spec. |
|  | Voltage proof (withstanding voltage) | See 1.3.1 | No breakdown or flashover               | No breakdown and flashover | meet spec. |
|  | Examination of product               | See 1.3.1 | No defect would impair normal operation | Normal                     | meet spec. |

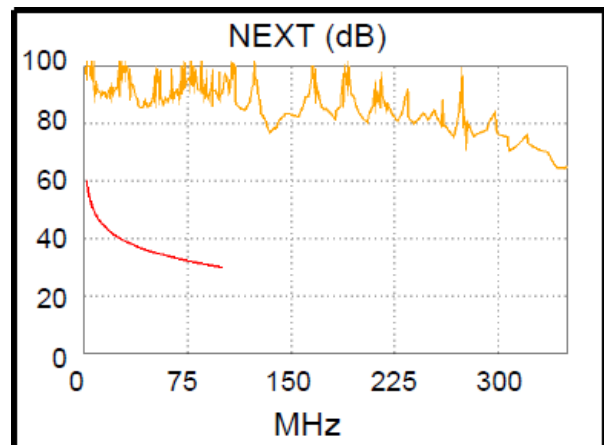
## 3.1.4 Group E

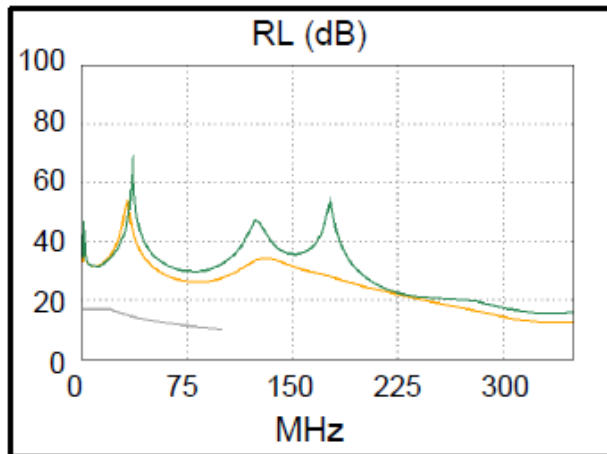
| Group | Test Item                  | Sample Number | Requirement                             | Test Condition and Result | Conclusion |
|-------|----------------------------|---------------|-----------------------------------------|---------------------------|------------|
| E     | Examination of product     | See 1.3.1     | No defect would impair normal operation | No abnormalities          | meet spec. |
|       | LLCR                       | See 1.3.1     | 10 m Ω Max.                             | <10 m Ω                   | meet spec. |
|       | Mating and Un-mating Force | See 1.3.1     | 15N Max.                                | <15N                      | meet spec. |
|       | Durability                 | See 1.3.1     | 100 cycles for gold plating             | No abnormalities          | meet spec. |
|       | Mating and Un-mating Force | See 1.3.1     | 15N Max.                                | <15N                      | meet spec. |
|       | LLCR                       | See 1.3.1     | Δ15mΩ max.                              | <15 m Ω                   | meet spec. |

## 3.1.5 Group F (Electrical transmission for M12 D code to RJ45 plug cordsets)

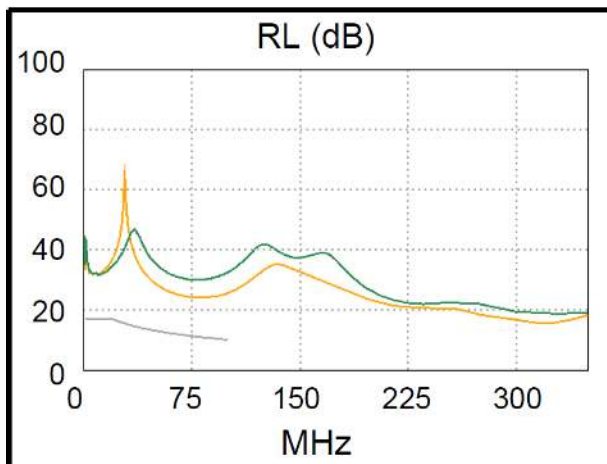
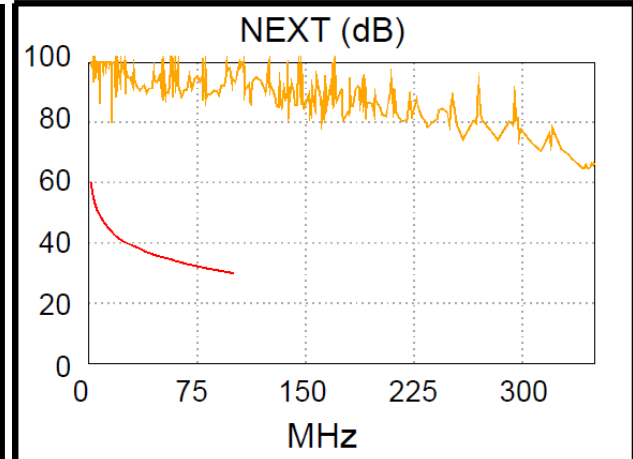
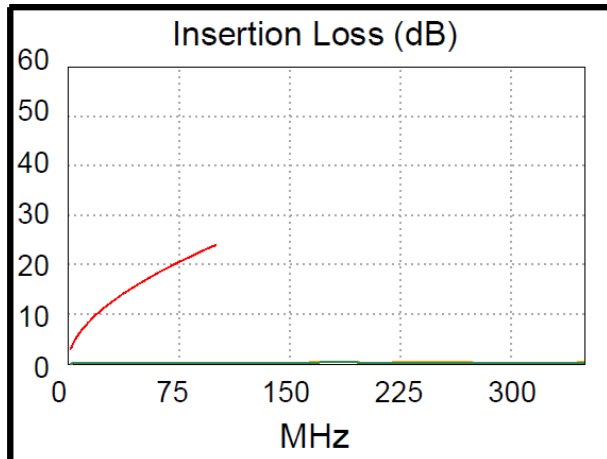
| Group | Test Item      | Sample Number | Requirement                              | Test Condition and Result | Conclusion |
|-------|----------------|---------------|------------------------------------------|---------------------------|------------|
| F     | Insertion loss | See 1.3.1     | ≥4dB at 1 MHz, ≥24dB at 100MHz           | See the curve             | Meet Spec  |
|       | Return loss    | See 1.3.1     | ≥17dB at 1 MHz, ≥10dB at 100MHz          | See the curve             | Meet Spec  |
|       | NEXT           | See 1.3.1     | ≥ 63.3 dB at 1 MHz, ≥ 30.1 dB at 100 MHz | See the curve             | Meet Spec  |

### 3.1.5.1 Electrical transmission curve for TCD14745101-001

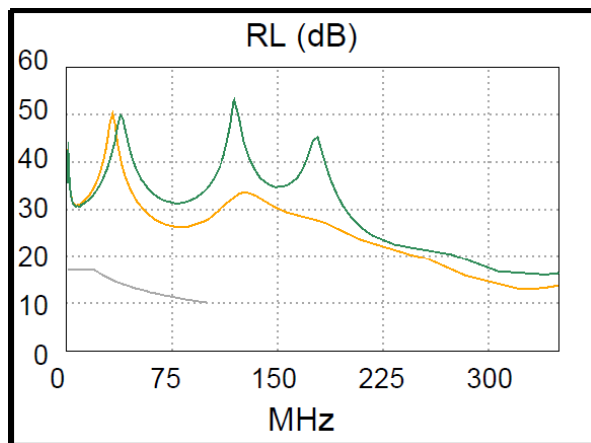
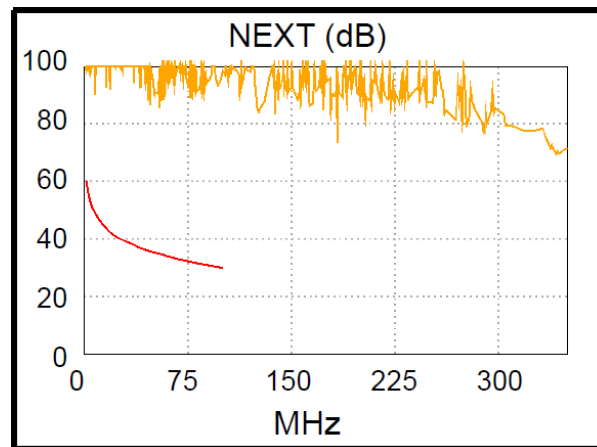




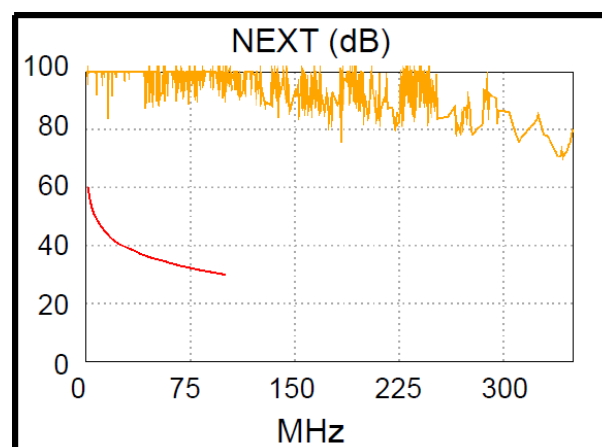
## 3.1.5.2 Electrical transmission curve for TCD14741111-001

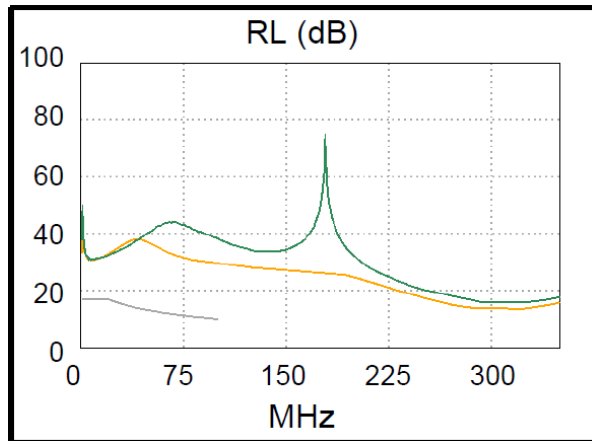


## 3.1.5.3 Electrical transmission curve for TCD1473A201-001



## 3.1.5.4 Electrical transmission curve for TCD2473A201-001





## 4.RJ45 Plug Test Sequence

| No. | Test or Examination                         | Test Group    |     |   |        |        |     |     |
|-----|---------------------------------------------|---------------|-----|---|--------|--------|-----|-----|
|     |                                             | A             | B   | C | D      | E      | F   | G   |
|     |                                             | Test Sequence |     |   |        |        |     |     |
| 1   | Examination of product                      | 1             | 1,5 | 1 | 1,5,10 | 1,5,10 | 1,9 | 1,5 |
| 2   | Contact resistance                          | 2             | 2,4 |   | 2,6    | 2,6    | 2,4 | 2,4 |
| 3   | Insulation resistance                       | 3             |     |   | 7      | 7      | 5   |     |
| 4   | Voltage proof                               | 4             |     |   | 8      | 8      | 6   |     |
| 5   | Durability, jack-plug interface             | 5             | 3   |   | 9      |        | 7   |     |
| 6   | Plug insertion force, jack-plug interface   |               |     | 2 |        |        |     |     |
| 7   | Plug withdrawal force, jack-plug interface  |               |     | 3 |        |        |     |     |
| 8   | Plug retention in jack, jack-plug interface |               |     | 4 |        | 9      | 8   |     |
| 9   | Thermal shock                               |               |     |   | 3      | 3      |     |     |
| 10  | Humidity/temperature cycling                |               |     |   |        | 4      |     |     |
| 11  | Humidity, steady state                      |               |     |   | 4      |        |     |     |
| 12  | Salt Spray Test                             |               |     |   |        |        |     | 3   |
| 13  | Stress relaxation                           |               |     |   |        |        | 3   |     |

## 5. TEST CONTENT (RJ45 PLUG)

| Group | Test Items                                   | Sample Number | status  | Requirement                                                         | Test Condition and Result  | Conclusion |
|-------|----------------------------------------------|---------------|---------|---------------------------------------------------------------------|----------------------------|------------|
| A     | Initial examination of product               | See 1.3.2     | Initial | Meets requirements of product drawing and Application Specification | No abnormalities           | Meet Spec  |
|       | LLCR                                         | See 1.3.2     | Initial | 20mΩ Max.                                                           | <20mΩ                      | Meet Spec  |
|       | Insulation resistance                        | See 1.3.2     | Initial | 1000MΩ Min.                                                         | >1000MΩ                    | Meet Spec  |
|       | Voltage proof (withstanding voltage)         | See 1.3.2     | Initial | No breakdown or flashover.                                          | No breakdown or flashover. | Meet Spec  |
|       | Durability, jack-plug interface.             | See 1.3.2     | Final   | No physical damage, function of buckle normal                       | Normal                     | Meet Spec  |
| B     | Initial examination of product               | See 1.3.2     | Initial | Meets requirements of product drawing and Application Specification | No abnormalities           | Meet Spec  |
|       | LLCR                                         | See 1.3.2     | Initial | 20mΩ Max.                                                           | <20mΩ                      | Meet Spec  |
|       | Durability, jack-plug interface.             | See 1.3.2     | Final   | No physical damage, function of buckle normal                       | Normal                     | Meet Spec  |
|       | LLCR                                         | See 1.3.2     | Final   | Δ10mΩ Max.                                                          | < 10mΩ                     | Meet Spec  |
|       | Final examination of product                 | See 1.3.2     | Final   | No physical damage                                                  | Normal                     | Meet Spec  |
| C     | Initial examination of product               | See 1.3.2     | Initial | Meets requirements of product drawing and Application Specification | No abnormalities           | Meet Spec  |
|       | Plug insertion force, jack-plug interface    | See 1.3.2     | Final   | 30N Max.                                                            | <30N                       | Meet Spec  |
|       | Plug withdrawal force, jack-plug interface   | See 1.3.2     | Final   | 30N Max.                                                            | <30N                       | Meet Spec  |
|       | Plug retention in jack, jack-plug interface. | See 1.3.2     | Final   | Plug shall not dislodge from jack                                   | Normal                     | Meet Spec  |
| D     | Initial examination of product               | See 1.3.2     | Initial | Meets requirements of product drawing and Application Specification | No abnormalities           | Meet Spec  |
|       | LLCR                                         | See 1.3.2     | Initial | 20mΩ Max.                                                           | <20mΩ                      | Meet Spec  |
|       | Thermal shock                                | See 1.3.2     | Final   | Δ10mΩ Max.<br>No physical damage                                    | < 10mΩ                     | Meet Spec  |
|       | Humidity, steady state                       | See 1.3.2     | Final   | No physical damage                                                  | Normal                     | Meet Spec  |
|       | Examination of product                       | See 1.3.2     | Final   | No physical damage                                                  | Normal                     | Meet Spec  |
|       | LLCR                                         | See 1.3.2     | Initial | Δ10mΩ Max.                                                          | <10mΩ                      | Meet Spec  |
|       | Insulation resistance                        | See 1.3.2     | Initial | 1000MΩ Min.                                                         | >1000MΩ                    | Meet Spec  |
|       | Voltage proof (withstanding voltage)         | See 1.3.2     | Initial | No breakdown or flashover.                                          | No breakdown or flashover. | Meet Spec  |
|       | Durability, jack-plug interface.             | See 1.3.2     | Final   | No physical damage, function of buckle normal                       | Normal                     | Meet Spec  |
|       | Final examination of product                 | See 1.3.2     | Final   | No physical damage                                                  | Normal                     | Meet Spec  |

|   |                                             |           |         |                                                                                              |                            |           |
|---|---------------------------------------------|-----------|---------|----------------------------------------------------------------------------------------------|----------------------------|-----------|
| E | Initial examination of product              | See 1.3.2 | Initial | Meets requirements of product drawing and Application Specification                          | No abnormalities           | Meet Spec |
|   | LLCR                                        | See 1.3.2 | Initial | 20mΩ Max.                                                                                    | <20mΩ                      | Meet Spec |
|   | Thermal shock                               | See 1.3.2 | Final   | Δ10mΩ Max.<br>No physical damage                                                             | < 10mΩ                     | Meet Spec |
|   | Humidity/temperature cycling                | See 1.3.2 | Final   | No physical damage                                                                           | Normal                     | Meet Spec |
|   | Final examination of product                | See 1.3.2 | Final   | No physical damage                                                                           | Normal                     | Meet Spec |
|   | LLCR                                        | See 1.3.2 | Initial | Δ10mΩ Max.                                                                                   | <10mΩ                      | Meet Spec |
|   | Insulation resistance                       | See 1.3.2 | Initial | 1000MΩ Min.                                                                                  | >1000MΩ                    | Meet Spec |
|   | Voltage proof (withstanding voltage)        | See 1.3.2 | Initial | No breakdown or flashover.                                                                   | No breakdown or flashover. | Meet Spec |
|   | Plug retention in jack, jack-plug interface | See 1.3.2 | Final   | Plug shall not dislodge from jack                                                            | Normal                     | Meet Spec |
|   | Final examination of product                | See 1.3.2 | Final   | No physical damage                                                                           | Normal                     | Meet Spec |
| F | Initial examination of product              | See 1.3.2 | Initial | Meets requirements of product drawing and Application Specification                          | No abnormalities           | Meet Spec |
|   | LLCR                                        | See 1.3.2 | Initial | 20mΩ Max.                                                                                    | <20mΩ                      | Meet Spec |
|   | Stress relaxation                           | See 1.3.2 | Final   | No physical damage.                                                                          | Normal                     | Meet Spec |
|   | LLCR                                        | See 1.3.2 | Final   | Δ10mΩ Max.                                                                                   | <10mΩ                      | Meet Spec |
|   | Insulation resistance                       | See 1.3.2 | Final   | 1000MΩ Min.                                                                                  | >1000MΩ                    | Meet Spec |
|   | Voltage proof (withstanding voltage)        | See 1.3.2 | Final   | No breakdown or flashover.                                                                   | No breakdown or flashover. | Meet Spec |
|   | Durability, jack-plug interface             | See 1.3.2 | Final   | No physical damage, function of buckle normal                                                | Normal                     | Meet Spec |
|   | Plug retention in jack, jack-plug interface | See 1.3.2 | Final   | Plug shall not dislodge from jack                                                            | Normal                     | Meet Spec |
|   | Final examination of product                | See 1.3.2 | Final   | No physical damage                                                                           | Normal                     | Meet Spec |
| G | Initial examination of product              | See 1.3.2 | Initial | Meets requirements of product drawing and Application Specification                          | No abnormalities           | Meet Spec |
|   | LLCR                                        | See 1.3.2 | Initial | 20mΩ Max.                                                                                    | <20mΩ                      | Meet Spec |
|   | Salt Spray Test                             | See 1.3.2 | Final   | No physical damage. Most one terminal is allowed A corrosion point, area of not more than 5% | Normal                     | Meet Spec |
|   | LLCR                                        | See 1.3.2 | Final   | Δ10mΩ Max.                                                                                   | <10mΩ                      | Meet Spec |
|   | Final examination of product                | See 1.3.2 | Final   | No physical damage                                                                           | Normal                     | Meet Spec |

## **6. Conclusion**

M12 D-code male straight to RJ45 plug cordsets meet all the electrical, mechanical, environmental performance and transmission requirements of product specification 108-137541.