

3 mm Micro MATE-N-LOK* Connector

1. INTRODUCTION

1.1 Purpose

Testing was performed on 3 mm Micro MATE-N-LOK* Connectors to determine its conformance related to the requirements of product specification 108-1836 Rev. E.

1.2 Scope

This report covers the electrical, mechanical, and environmental performance of 3 mm Micro MATE-N-LOK* Connectors. Testing was performed at the Shanghai Electrical Components Test Laboratory between May 29, 2018 and Aug.24, 2018. The associated test number is TP-18-01416.

1.3 Conclusion

Based on the test results, all meet the requirement.

1.4 Test Specimens

Specimens with the following part numbers as Table 1 were used for test, all wired specimens used 22AWG and 20AWG wire.

Table 1

| Type | Part No | Description | Qty. | Comments |
|------|------------|---|---------------|---|
| 1 | 2315752-4 | RECEPTACLE HOUSING, SINGLE ROW, MICRO MATE-N-LOK | 5 pairs/group | Only 2315752-4, 2315785-4, 3-794617-0 and 3-794615-0 are required to do group 5 test (glow wire test), and 2pcs/part no. for this test. |
| | 2315785-4 | PLUG HOUSING, SINGLE ROW, FREE HANGING MICRO MATE-N-LOK | | |
| 2 | 2315752-4 | RECEPTACLE HOUSING, SINGLE ROW, MICRO MATE-N-LOK | 5 pairs/group | |
| | 2315786-4 | PLUG HOUSING, SINGLE ROW, PANEL MOUNT, MICRO MATE-N-LOK | | |
| 3 | 3-794617-0 | RECEPTACLE HOUSING, 2 TO 24 POSITION, DUAL ROW, MICRO MATE-N-LOK | 5 pairs/group | |
| | 3-794615-0 | PLUG HOUSING, 2 TO 24 POSITION DUAL ROW, PANEL MOUNT, MICRO MATE-N-LOK | | |
| 4 | 3-794617-0 | RECEPTACLE HOUSING, 2 TO 24 POSITION, DUAL ROW, MICRO MATE-N-LOK | 5 pairs/group | |
| | 3-794616-0 | PLUG HOUSING, 2 TO 24 POSITION DUAL ROW, FREE HANGING, MICRO MATE-N-LOK | | |

Besides list above, the following list below also must be considered as approved although not tested. Part numbers have variation of polarization (poka-yoke) and number of ways, but they use the same raw material and are contained in the same product line.

| PN | Description |
|-------------|---|
| 3-794615-6 | PLUG HOUSING, 2 TO 24 POSITION DUAL ROW, PANEL MOUNT, MICRO MATE-N-LOK |
| 3-794615-8 | PLUG HOUSING, 2 TO 24 POSITION DUAL ROW, PANEL MOUNT, MICRO MATE-N-LOK |
| 3-794616-6 | PLUG HOUSING, 2 TO 24 POSITION DUAL ROW, FREE HANGING, MICRO MATE-N-LOK |
| 3-794616-8 | PLUG HOUSING, 2 TO 24 POSITION DUAL ROW, FREE HANGING, MICRO MATE-N-LOK |
| 3-794617-2 | RECEPTACLE HOUSING, 2 TO 24 POSITION, DUAL ROW, MICRO MATE-N-LOK |
| 3-794617-4 | RECEPTACLE HOUSING, 2 TO 24 POSITION, DUAL ROW, MICRO MATE-N-LOK |
| 3-794617-6 | RECEPTACLE HOUSING, 2 TO 24 POSITION, DUAL ROW, MICRO MATE-N-LOK |
| 3-794617-8 | RECEPTACLE HOUSING, 2 TO 24 POSITION, DUAL ROW, MICRO MATE-N-LOK |
| 4-794617-2 | RECEPTACLE HOUSING, 2 TO 24 POSITION, DUAL ROW, MICRO MATE-N-LOK |
| 2-1445022-3 | RECEPTACLE HOUSING, 2 TO 12 POSITION, SINGLE ROW, MICRO MATE-N-LOK |
| 2-1445022-6 | RECEPTACLE HOUSING, 2 TO 12 POSITION, SINGLE ROW, MICRO MATE-N-LOK |
| 2315744-2 | RECEPTACLE HOUSING, DUAL ROW, MICRO MATE-N-LOK |
| 2315744-4 | RECEPTACLE HOUSING, DUAL ROW, MICRO MATE-N-LOK |
| 2315752-2 | RECEPTACLE HOUSING, SINGLE ROW, MICRO MATE-N-LOK |
| 2315752-3 | RECEPTACLE HOUSING, SINGLE ROW, MICRO MATE-N-LOK |
| 2315758-2 | PLUG HOUSING, DUAL ROW, PANEL MOUNT, MICRO MATE-N-LOK |
| 2315758-4 | PLUG HOUSING, DUAL ROW, PANEL MOUNT, MICRO MATE-N-LOK |
| 2315759-2 | PLUG HOUSING, DUAL ROW, FREE HANGING, MICRO MATE-N-LOK |
| 2315759-4 | PLUG HOUSING, DUAL ROW, FREE HANGING, MICRO MATE-N-LOK |
| 2315785-2 | PLUG HOUSING, SINGLE ROW, FREE HANGING MICRO MATE-N-LOK |
| 2315785-3 | PLUG HOUSING, SINGLE ROW, FREE HANGING MICRO MATE-N-LOK |
| 2315786-2 | PLUG HOUSING, SINGLE ROW, PANEL MOUNT, MICRO MATE-N-LOK |
| 2315786-3 | PLUG HOUSING, SINGLE ROW, PANEL MOUNT, MICRO MATE-N-LOK |

1.5 Test Sequence

Table 2

| Test | Test Group | | | | |
|-------------------------------|---------------|-----|-----|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| | Test Sequence | | | | |
| Examination of Product | 1,9 | 1,8 | 1,8 | 1 | 1 |
| Termination resistance | 3,7 | 2,6 | | | |
| Insulation resistance | | | 2,6 | | |
| Dielectric withstanding | | | 3,7 | | |
| Temperature rise vs current | | 3,7 | | | |
| Temperature rise | | | | | |
| Vibration, random | 5 | | | | |
| Mechanical shock | 6 | | | | |
| Durability | 4 | 2 | | | |
| Mating force | 2 | | 2 | | |
| Unmating force | 8 | | | | |
| Housing lock strength | | | | 5 | |
| Thermal shock | | | 4 | 3 | |
| Humidity/temperature cycling | | | 5 | 4 | |
| Temperature life | | 5 | | | |
| Mixed flowing gas | | 4 | | | |
| Crimp contact retention | | | 9 | | |
| Glow wire end-products test | | | | | 2 |
| Crimp contact insertion force | | | | 2 | |



Note:

- a). Test group defined per customer requirement
- b). Numbers indicate sequence in which tests are performed.

1.6 Environmental Conditions

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

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

2. TEST PROCEDUES

2.1. Examination of Product

Visual Inspection: appearance, and function of specimens pursuant to the applicable inspection plan.

Requirements: Meets requirements of product drawing and no physical damage.

Test Method: EIA-364-18 B

2.2. Termination resistance

Subject specimens to 100 milliamperes maximum and 20 millivolts maximum open circuit voltage.

Requirements: 20 mΩ Max.

Test Method: IEC 60512-2-1-2002

2.3. Insulation Resistance

Test between adjacent contacts of mated specimens with 500 V DC for 2 minutes.

Requirements: 1000MΩ. Min (initial); 500MΩ. Min (final)

Test Method: EIA-364-21E

2.4. Dielectric withstanding

1500 volts AC at sea level. Test between adjacent contacts of mated specimens. 1 minute hold with no breakdown, flashover, or 0.5 milliampere maximum leakage.

Requirements: No breakdown or flashover.

Test Method: EIA-364 20D

2.5. Temperature rise

Stabilize at a single current level until 3 readings at 5 minutes intervals are within 1°C. Test current: 5A DC for 4 Pos. 4.25A DC for 10 Pos. All wired specimens used 20 AWG wire for this group.

Requirements: 30 °C Max.

Test Method: EIA-364-70C, Method 1.

2.6. Vibration, random

Subject mated specimens to 3.10 G's rms between 20-500 Hz. 15 minutes in each of 3 mutually perpendicular planes.

Requirements: No discontinuities of 1 microsecond or longer duration.

Test Method: EIA-364-28F, Test Condition VII, Condition D

2.7. Mechanical shock

Subject mated specimens to 50 G's half-sine shock pulses of 11 milliseconds duration. 3 shocks in each direction applied along 3 mutually perpendicular planes, 18total shocks.

Requirements: No discontinuities of 1 microsecond or longer duration.

Test Method: EIA-364-27C, Method A

2.8. Durability

Mate and unmated specimens for 30 cycles for tin plated specimens, 75 cycles for 15 µin gold plated specimens, and 150 cycles for 30 µin gold plated specimens at a maximum rate of 500 cycles per hour.

Requirements: no physical damage.

Test Method: EIA-364-9C

2.9. Mating force&unmating

Measure the force necessary to mate and unmated samples with a rate of 5.08 mm /min.

Requirements: Mating force 4 Pos. 27.44 N Max. (0.7kgf*4*9.8=27.44N, 0.7kgf Max. per contact);
10 Pos. 68.60 N Max. (0.7kgf*10*9.8=68.60, 0.7kgf Max. per contact);
Unmating force 4 Pos. 2.74 N Min. (0.07kgf*4*9.8=2.74N, 0.07kgf Min. per contact);
10 Pos. 6.86 N Min. (0.07kgf*10*9.8=6.86N, 0.07kgf Min. per contact).

Test Method: EIA-364-13E-2011

2.10. Housing Locking Strength

Determine housing lock strength at a maximum rate of 12.7 mm per minute.

Requirements: 26.46 N Min.

Test Method: EIA-364-98-1997

2.11. Thermal shock

Mated connector -40°C/30 min., 105°C/30 min. Making this a cycle, repeat 5 cycles.

Requirements: No physical damage.

Test Method: EIA-364-32G

2.12. Humidity/temperature cycling

Subject specimens to 10 cycles (10 days) between 25 and 65°C at 80 to 100% RH.

Requirements: No visible defects or deviations, no cracks on the isolating parts.

Test Method: EIA-364-31E-2017, Method III.

2.13. Temperature life

Subject mated specimens to 105°C for 500 hours.

Requirements: No visible defects or deviations, no cracks on the isolating parts.

Test Method: EIA-364-17C, Method A.

2.14. Mixed flowing gas

Subject mated specimens to environmental Class IIA for 20 days (30°C and 70%R.H., Cl2 10ppb, NO2 200ppb, H2S 10ppb, SO2 100ppb).

Requirements: No physical damage and meet requirement of subsequent test.

Test Method: EIA-364-65, Class IIA.

2.15. Crimp contact retention

Apply an axial load of 1.81 kgf to contacts at a rate of 0.45 kgf per second and hold for 6 seconds.

Requirements: Contact shall not dislodge.

Test Method: EIA-364-29C.

2.16. Glow wire end-products test

The extremity of the wire is positioned horizontally and brought into contact with the sample with a force between 0.85 and 1.2N for a period of 30s. Test temperature: 750°C Time of Glow tip application Ta: 30s

Requirements: Te-Ti ≤2s or no flame

Test Method: IEC 60335-1 edition 5.2 2016-05.

2.17. Crimp contact insertion force

Measure force necessary to insert crimped contacts into housing.

Requirements: 6.86 N Max.

Test Method: 108-1836 Rev.E.

3. SUMMARY OF TESTING

| Group | Test Item | QTY | Condition | Test | | | | Requirement | Conclusion |
|------------------------|------------------------|-------|-----------------------------|---|-------|-------|------------------|------------------|------------|
| | | | | Max | Min | Ave | Unit | | |
| 1 | Examination of Product | 20 | initial | No physical damage occurred | | | / | No abnormalities | Meet spec |
| | Mating force | 5 | Initial-type1 | 17.88 | 13.19 | 14.46 | N | 27.44 N Max. | Meet spec |
| | | 5 | Initial-type2 | 25.26 | 11.91 | 18.89 | | | |
| | | 5 | Initial-type3 | 46.16 | 32.84 | 37.33 | N | 68.60 N Max. | |
| | | 5 | Initial-type4 | 39.04 | 26.01 | 32.97 | | | |
| | Termination resistance | 5 | Initial-type1 | 5.37 | 3.66 | 4.24 | mΩ | 20 mΩ Max. | Meet spec |
| | | 5 | Initial-type2 | 9.23 | 5.18 | 7.21 | | | |
| | | 5 | Initial-type3 | 6.85 | 3.85 | 4.53 | | | |
| | | 5 | Initial-type4 | 5.28 | 3.79 | 4.56 | | | |
| | Durability | 20 | final | No physical damage occurred | | | / | No abnormalities | Meet spec |
| | Vibration, random | 20 | final | No physical damage, no electrical discontinuity greater than 1 μs | | | / | No abnormalities | Meet spec |
| | Mechanical shock | 20 | final | No physical damage, no electrical discontinuity greater than 1 μs | | | / | No abnormalities | Meet spec |
| | Termination resistance | 5 | final-type1 | 14.10 | 4.22 | 7.82 | mΩ | 20 mΩ Max. | Meet spec |
| | | 5 | final-type2 | 16.58 | 4.74 | 10.09 | | | |
| | | 5 | final-type3 | 11.73 | 4.09 | 5.99 | | | |
| | | 5 | final-type4 | 13.93 | 4.19 | 6.95 | | | |
| | Unmating force | 5 | final-type1 | 8.88 | 7.91 | 7.34 | N | 2.74 N Min. | Meet spec |
| | | 5 | final-type2 | 3.63 | 3.01 | 3.20 | | | |
| | | 5 | final-type3 | 13.06 | 10.06 | 12.08 | N | 6.86 N Min. | |
| | | 5 | final-type4 | 14.97 | 10.28 | 12.52 | | | |
| Examination of Product | 20 | final | No physical damage occurred | | | / | No abnormalities | Meet spec | |

| Group | Test Item | QTY | Condition | Test Result | | | Unit | Requirement | Conclusion |
|-----------------------------|-------------------------------|-------------|-----------------------------|------------------------------|-------|-------|----------------------------|------------------|------------|
| | | | | Max | Min | Ave | | | |
| 2 | Examination of Product | 20 | initial | No physical damage occurred. | | | / | No abnormalities | Meet spec |
| | Termination resistance | 5 | Initial-type1 | 4.89 | 3.63 | 4.14 | mΩ | 20 mΩ Max. | Meet spec |
| | | 5 | Initial-type2 | 4.75 | 4.75 | 3.89 | | | |
| | | 5 | Initial-type3 | 5.30 | 2.54 | 4.23 | | | |
| | | 5 | Initial-type4 | 5.50 | 3.41 | 4.25 | | | |
| | Temperature rise vs current | 5 | Initial-type1 | 20.22 | 15.55 | 18.00 | °C | 30 °C Max. | Meet spec |
| | | 5 | Initial-type2 | 19.55 | 13.84 | 16.40 | | | |
| | | 5 | Initial-type3 | 23.18 | 19.39 | 21.09 | | | |
| | | 5 | Initial-type4 | 23.99 | 19.13 | 21.47 | | | |
| | Mixed flowing gas | 20 | final | No physical damage occurred | | | / | No abnormalities | Meet spec |
| | Temperature life | 20 | final | No physical damage occurred | | | / | No abnormalities | Meet spec |
| | Termination resistance | 5 | final-type1 | 7.67 | 3.86 | 5.20 | mΩ | 20 mΩ Max. | Meet spec |
| | | 5 | final-type2 | 8.05 | 4.21 | 5.53 | | | |
| | | 5 | final-type3 | 7.59 | 4.16 | 5.14 | | | |
| 5 | | final-type4 | 8.30 | 4.26 | 5.24 | | | | |
| Temperature rise vs current | 5 | final-type1 | 22.31 | 16.60 | 18.98 | °C | 30 °C Max. | Meet spec | |
| | 5 | final-type2 | 23.77 | 18.14 | 20.23 | | | | |
| | 5 | final-type3 | 25.11 | 20.20 | 22.54 | | | | |
| | 5 | final-type4 | 23.97 | 20.49 | 22.04 | | | | |
| Examination of Product | 20 | final | No physical damage occurred | | | / | No abnormalities | Meet spec | |
| 3 | Examination of Product | 20 | initial | No physical damage occurred | | | / | No abnormalities | Meet spec |
| | Crimp contact insertion force | 5 | Initial-type1 | 5.33 | 1.27 | 3.32 | N | 6.86 N Max. | Meet spec |
| | | 5 | Initial-type2 | 5.73 | 1.07 | 3.49 | | | |
| | | 5 | Initial-type3 | 5.54 | 1.39 | 3.52 | | | |
| | | 5 | Initial-type4 | 5.42 | 1.60 | 3.58 | | | |
| | Insulation resistance | 5 | Initial-type1 | 3.73 | 0.55 | 1.45 | 10 ¹¹ Ω | 1000 MΩ Min. | Meet spec |
| | | 5 | Initial-type2 | 1.66 | 0.54 | 1.12 | | | |
| | | 5 | Initial-type3 | 1.57 | 0.60 | 0.97 | | | |
| | | 5 | Initial-type4 | 4.19 | 0.73 | 0.97 | | | |
| | Dielectric withstanding | 20 | initial | No breakdown, no flashover | | | / | No abnormalities | Meet spec |
| | Thermal shock | 20 | final | No physical damage occurred | | | / | No abnormalities | Meet spec |
| | Humidity/temperature cycling | 20 | final | No physical damage occurred | | | / | No abnormalities | Meet spec |
| | Insulation resistance | 5 | final-type1 | 4.40 | 1.85 | 3.04 | 10 ¹⁰ Ω | 500 MΩ Min. | Meet spec |
| | | 5 | final-type2 | 5.26 | 2.37 | 3.32 | | | |
| 5 | | final-type3 | 4.40 | 1.17 | 1.91 | | | | |
| 5 | | final-type4 | 3.00 | 1.24 | 1.93 | | | | |
| Dielectric withstanding | 20 | final | No breakdown, no flashover | | | / | No abnormalities | Meet spec | |
| Examination of Product | 20 | final | No physical damage occurred | | | / | No abnormalities | Meet spec | |
| Crimp contact retention | 20 | final | Contact were not dislodged. | | | / | Contact shall not dislodge | Meet spec | |

| Group | Test Item | QTY | Condition | Test Result | | | | Requirement | Conclusion | |
|-------|------------------------------|-------------|-------------|-----------------------------|-------|-------|------|-------------|-----------------------|-----------|
| | | | | Max | Min | Ave | Unit | | | |
| 4 | Examination of Product | 20 | initial | No physical damage occurred | | | | / | No abnormalities | Meet spec |
| | Thermal shock | 20 | initial | No physical damage occurred | | | | / | No abnormalities | Meet spec |
| | Humidity/temperature cycling | 20 | final | No physical damage occurred | | | | / | No abnormalities | Meet spec |
| | Housing lock strength | 5 | final-type1 | 34.02 | 32.58 | 33.28 | N | 26.46 N Min | Meet spec | |
| | | 5 | final-type2 | 34.14 | 33.67 | 33.99 | | | | |
| 5 | | final-type3 | 32.81 | 30.86 | 32.23 | | | | | |
| 5 | | final-type4 | 38.92 | 34.09 | 35.50 | | | | | |
| 5 | Examination of Product | 8 | initial | No physical damage occurred | | | | / | No abnormalities | Meet spec |
| | Glow wire end-products test | 8 | final | No flame | | | | / | Te-Ti ≤2s or no flame | Meet spec |

Note: 1 kgf=9.8 N; 100 MΩ=108 Ω.

4. CALIBRATION

4.1 Calibration Statement

All equipment containing a calibration number is calibrated and traceable through TE Connectivity (TE).

5. VALIDATION

Requested by:

Jyotirmaya 2018 05 18

_____ / ____ / ____

Product Engineer
TE Connectivity India Pvt Ltd.

Prepared by:

Xuewei Liao 2018 09 14

_____ / ____ / ____

Test Engineer
Shanghai Electrical Components Test Lab.

Approved by:

Robin Lu 2018 09 14

_____ / ____ / ____

Manager
Shanghai Electrical Components Test Lab.