

CABLINE®-CA II

Part No. Plug: 20679-0**T-01, Receptacle: 20682-0**E-#2#
Part No. Plug: 21066-0**T-01, Receptacle: 21095-0**E-02

Product Specification

Qualification Test Report No.

TR-15103 (Part No. Plug: 20679-0**T-01, Receptacle: 20682-0**E-#2#)
TR-23033 (Part No. Plug: 20679-0**T-01, Receptacle: 20682-0**E-22)
TR-24068 (Part No. Plug: 21066-0**T-01, Receptacle: 21095-0**E-02)

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|------|--------|--------------------|-------------|-------------|-------------|
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| 13 | S24518 | December 20, 2024 | K. Hara | T. Tanigawa | H. Ikari |
| 12 | S24431 | October 25, 2024 | K. Hara | | H. Ikari |
| 11 | S24397 | September 20, 2024 | K. Hara | T. Tanigawa | H. Ikari |
| Rev. | ECN | Date | Prepared by | Checked by | Approved by |

1. Scope

This Product Specification defines the test conditions and the performances of the CABLINE-CA II Connector, a wire-to-board connector of 0.4 mm contact pitch.

2. Product Name and Parts No.

2.1 Product Name

CABLINE-CA II

2.2 Parts No.

Plug: 20679-0**T-01, 21066-0**T-01

Receptacle: 20682-0**E-#2#, 21095-0**E-02

3. Rating

3.1 Applicable Cable

Micro-coaxial cable . . . AWG# [44, 42, 40, 38, 36]

Discrete wire . . . AWG# [36, 34]

Twinaxial cable . . . AWG# [40, 42]

3.2 Operating Conditions

Amperage : 0.1A AC/DC [AWG#44] (Per contact pin / Up to 50 contacts)

0.24A AC/DC [AWG#42] (Per contact pin / Up to 50 contacts)

0.3A AC/DC [AWG#40] (Per contact pin / Up to 50 contacts)

0.5A AC/DC [AWG#38] (Per contact pin / Up to 18 contacts)

0.8A AC/DC [AWG#36] (Per contact pin / Up to 6 contacts)

1.0A AC/DC [AWG#34] (Per contact pin / Up to 6 contacts)

※ Testing by a real machine is recommended because temperature rise may be affected by actual situation

Voltage: 100V AC (per contact pin)

Operating temperature: 233 to 378K (-40°C to +105°C) (Containing temperature rise by current)

Operating humidity: 85% max

3.3 Storage Conditions

Storage temperature: 248 to 333K (-25°C to +60°C)

Storage humidity: 85% max. / 1 year (Non-condensing)

4. Test and Performance

Test Condition

Unless otherwise specified, all tests and measurements shall be performed under the following conditions in accordance with MIL-STD-202.

Temperature: 288K to 308K (15°C to +35°C)

Pressure: 866hPa to 1066hPa (650mmHg to 800mmHg)

Relative humidity: 45 to 75% R.H.

4.1. Electrical Performance

| | | |
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| 1. Contact Resistance | | |
| Reference Standard: | MIL-STD-202G, Method 307 | |
| Test Conditions: | Solder the receptacle connector to the test board and mate the plug connector together, then apply 20mV MAX. DC open circuit voltage and 10mA MAX. DC closed circuit current. Measure the contact resistance of signal and ground at the section shown in Fig.1 by the four terminal methods. | |
| <div></div> <p>Fig.1</p> | | |
| Pass Criteria: | <div>Signal Contact</div> <div>Initial : 180 mΩ MAX. (AWG#34)</div> <div>275 mΩ MAX. (AWG#36)</div> <div>360 mΩ MAX. (AWG#38)</div> <div>600 mΩ MAX. (AWG#40)</div> <div>700 mΩ MAX. (AWG#42)</div> <div>1080 mΩ MAX. (AWG#44)</div> <div>After Testing : ΔR 40 mΩ MAX.</div> <div>Ground</div> <div>Initial : 50 mΩ MAX.</div> <div>After Testing : ΔR40 mΩ MAX.</div> | <div>Initial contains the following conductor resistance of a cable 100 mm.</div> <div>100 mΩ MAX. (AWG#34)</div> <div>195 mΩ MAX. (AWG#36)</div> <div>280 mΩ MAX. (AWG#38)</div> <div>520 mΩ MAX. (AWG#40)</div> <div>620 mΩ MAX. (AWG#42)</div> <div>1000 mΩ MAX. (AWG#44)</div> |

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| 2. Insulation Resistance | |
| Reference Standard: | MIL-STD-202 G, Method 302 |
| Test Conditions: | Mate the plug and receptacle connector together, and then apply DC 250V between the neighboring contacts and between contacts and shell. |
| Pass Criteria: | Initial: 1000 MΩ MIN. After Testing: 500 MΩ MIN. |

4.1. Electrical Performance

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| 3. Dielectric Withstanding Voltage | |
| Reference Standard: | MIL-STD-202 G, Method 301 |
| Test Conditions: | Mate the receptacle and plug connector together, then apply AC 250V(rms) between the neighboring contacts and between contacts and shell for a minute. |
| Pass Criteria: | No abnormalities such as creeping discharge, flashover, insulator breakdown occur. |

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| 4. Temperature Rising | |
| Reference Standard: | - |
| Test Conditions: | Mate the plug and receptacle connector together, and apply rating current per contact pin. Measure delta T over ambient. |
| Pass Criteria: | Over Ambient: $\Delta T 30^{\circ}\text{C}$ MAX. |

4.2. Mechanical Performance

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| 1. Mating Force and Un-Mating Force | |
| Reference Standard: | - |
| Test Conditions: | Solder the receptacle connector to the test board, then place the board and plug on push-on/pull-off machine, measure of initial and mating/unmating 30 cycles at a speed 25 ± 3 mm/min. along the mating axis. |
| Pass Criteria: | Mating Force 20P Initial: 9.70N MAX. 30 cycles: 9.70N MAX. 30P Initial: 14.55N MAX. 30 cycles: 14.55N MAX. 40P Initial: 19.40N MAX. 30 cycles: 19.40N MAX. 50P Initial: 24.25N MAX. 30 cycles: 24.25N MAX. Unmating Force 20P Initial: 2.0N MIN. 30 cycles: 2.0N MIN. 30P Initial: 3.0N MIN. 30 cycles: 3.0N MIN. 40P Initial: 4.0N MIN. 30 cycles: 4.0N MIN. 50P Initial: 5.0N MIN. 30 cycles: 5.0N MIN. |

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| 2. Durability | |
| Reference Standard: | - |
| Test Conditions: | Solder the receptacle connector to the test board, then place the board and plug on the push-on/pull-off machine, and repeat mating and unmating 30 cycles at a speed 25 ± 3 mm/min. along the mating axis. |
| Pass Criteria: | Contact Resistance: Shall meet 4.1.1. |

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| 3. Contact Retention Force | |
| Reference Standard: | - |
| Test Conditions: | Place the connector on the push-on/pull-off machine, then apply force on the contact head and push the contact along the direction opposite to the contact insertion at a speed of 25 ± 3 mm/min. Measure the force when the contact dislodges the connector. |
| Pass Criteria: | Receptacle Contact Retention Force: 0.2N MIN. |

4.2. Mechanical Performance

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| 4. Conn. Lock (Applicable Plug Part No.: 20877-#**T-#1) | |
| Reference Standard: | - |
| Test Conditions: | Mate, and place them on the push-on/pull-off machine, then apply 10N (1.02kgf) force on the connector along the mating axis. |
| Pass Criteria: | The lock does not damage and cancel. |

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| 5. Cable Retention Force | |
| Reference Standard: | - |
| Test Conditions: | Place the plug connector on the push-on/pull-off machine and then apply force on the cable along the direction at a speed 25±3 mm/min. Measure the force when the cable dislodges the plug connector. |
| Pass Criteria: | 20P: 9.80N MIN. 30P: 14.70N MIN. 40P: 19.60N MIN. 50P: 24.50N MIN. |

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| 6. Vibration | |
| Reference Standard: | MIL-STD-202 G, Method 201 |
| Test Conditions: | Solder the receptacle connector to the test board, then mate plug connector, and place them on the vibrator. Then apply the following vibration. During the testing, run 100mA DC to check electrical discontinuity. Frequency: 10 Hz→55 Hz→10 Hz/approx. 1min. Directions: 3 mutually perpendicular directions. Total Amplitude: 1.52 mm Sweep Duration: 2 hours for each direction, a total of 6 hours. |
| Pass Criteria: | Contact Resistance: Shall meet 4.1.1. Electrical discontinuity: No electrical discontinuity greater than 1μs shall occur. Appearance: No abnormality adversely affecting the performance shall occur. |

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| 7. Shock | |
| Reference Standard: | MIL-STD-202-213, Test Condition A. |
| Test Conditions: | Solder the receptacle connector to the test board, then mate plug connector, and place them on the shock machine. Then apply the following shock. MAX.G: 50 G Duration: 11msec Wave Form: Half Sinusoidal Directions: 6 Mutually Perpendicular Direction Cycle: 3 cycles Each Direction |
| Pass Criteria: | Contact Resistance: Shall meet 4.1.1. Electrical Discontinuity: No electrical discontinuity greater than 1μs shall occur. Appearance: No abnormality adversely affecting the performance shall occur. |

4.3. Environmental Performance

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| 1. Thermal Shock | |
| Reference Standard : | - |
| Test Conditions: | Solder the receptacle connector to the test board, then mate plug connector, and expose them to the following environment. Temperature: 218K(-55 °C),30min.→378K(105 °C),30min. Transition Time: 5min. MAX. Cycle: 5 cycles |
| Pass Criteria: | Contact Resistance: Shall meet 4.1.1. Insulation Resistance: Shall meet 4.1.2. Dielectric Withstanding Voltage: Shall meet 4.1.3. Appearance: No abnormality adversely affecting the performance shall occur. |

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| 2. High Temperature Life | |
| Reference Standard: | - |
| Test Conditions: | Solder the receptacle connector to the test board, then mate plug connector, and expose them to the following environment. Temperature: 378±2K (105±2 °C) Duration: 250 hours |
| Pass Criteria: | Contact Resistance: Shall meet 4.1.1. Contact Retention Force: Shall meet 4.2.3. Appearance: No abnormality adversely affecting the performance shall occur. |

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| 3. Humidity (Steady State) | |
| Reference Standard: | MIL-STD-202 G, Method 103, Condition A. |
| Test Conditions: | Solder the receptacle connector to the test board, then mate plug connector, and expose them to the following environment. Temperature: 313±2K (40±2 °C) Humidity: 90~95%RH Duration: 240 hours |
| Pass Criteria: | Contact Resistance: Shall meet 4.1.1. Insulation Resistance: Shall meet 4.1.2. Dielectric Withstanding Voltage: Shall meet 4.1.3. Appearance: No abnormality adversely affecting the performance shall occur. |

4.3. Environmental Performance**4. Humidity (Cycling)**

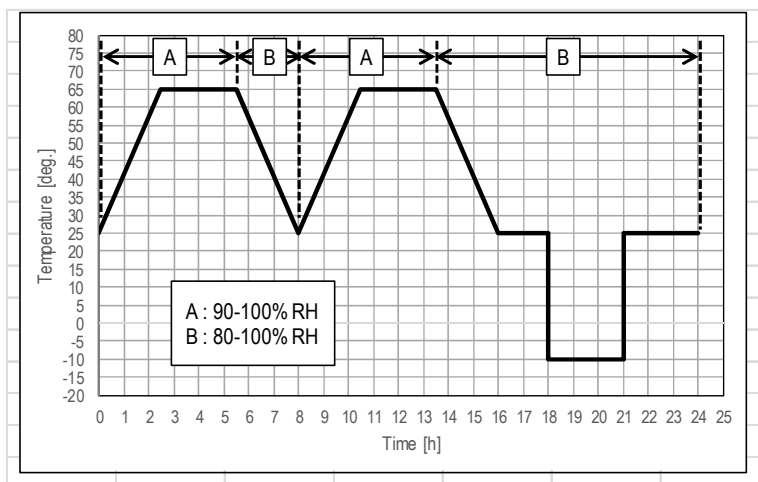
Reference Standard: MIL-STD-202 G, Method 106.

Test Conditions: Solder the receptacle connector to the test board, then mate plug connector, and expose them to the following environment.

Temperature: 298[263]~338K (25[-10]~65 °C)

Humidity: 90[80]~100%RH

Duration: 10 cycles (240 hours)



Pass Criteria: Contact Resistance: Shall meet 4.1.1.
 Insulation Resistance: Shall meet 4.1.2.
 Dielectric Withstanding Voltage: Shall meet 4.1.3.
 Appearance: No abnormality adversely affecting the performance shall occur.

5. Saltwater spray

Reference Standard: MIL-STD-202-101, Test Condition B.

Test Conditions: Solder the receptacle connector to the test board, then mate plug connector, and expose them to the following environment.

Temperature: 308±2K (35±2 °C)

Saltwater Density: 5±1% [by weight]

Duration: 48 hours

Pass Criteria: Contact Resistance: Shall meet 4.1.1.
 Appearance: No abnormality adversely affecting the performance shall occur.

6. H₂S Gas

Reference Standard: -

Test Conditions: Solder the receptacle connector to the test board, then mate plug connector, and expose them to the following environment.

Temperature: 313±2K (40±2 °C)

Relative Humidity: 80±5%RH

Gas: H₂S 3±1 ppm

Duration: 96 hours

Pass Criteria: Contact Resistance: Shall meet 4.1.1.
 Appearance: No abnormality adversely affecting the performance shall occur.

4.4. Others

1. Solderability

Reference Standard: -

Test Conditions: Immerse the contact soldering part to flux of RMA or R type for 5 to 10 seconds, then dip the part into the solder bath of $518 \pm 5K$ (245 ± 5 °C) for 5 ± 0.5 seconds.

Pass Criteria: More than 95% of the dipped surface shall be evenly wet.

2. Resistance to Soldering Heat

Reference Standard: -

Test Conditions: Reflow Temperature: See Fig.2.
Cycle: 2

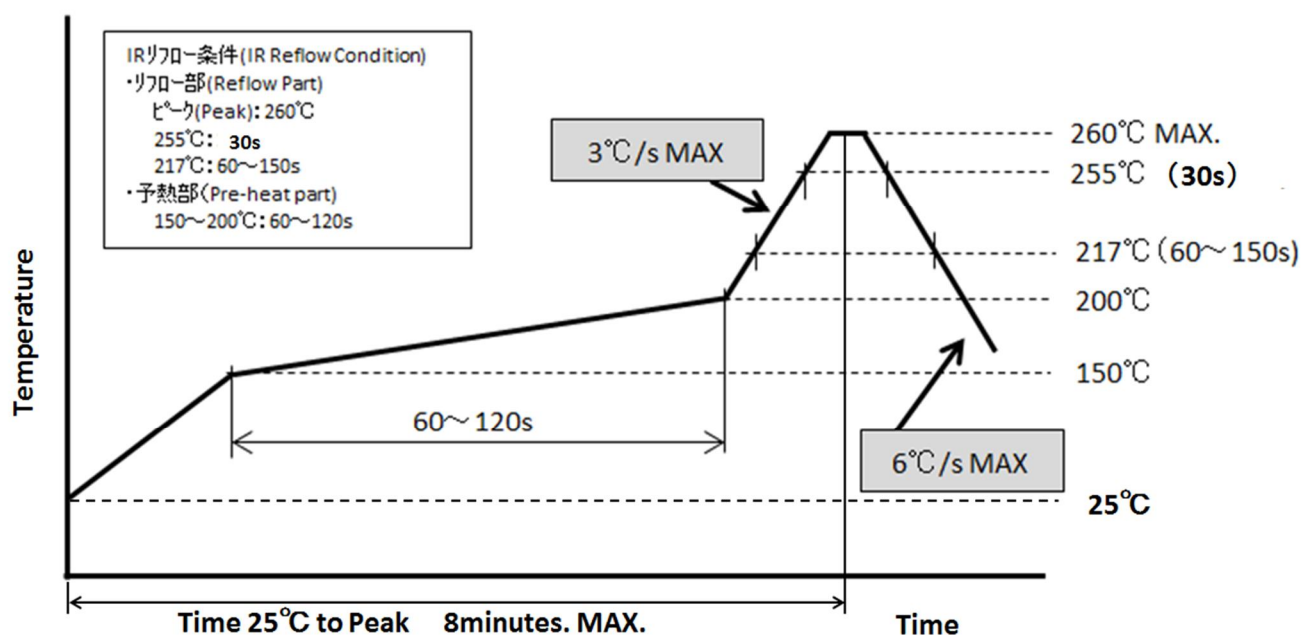


Fig.2

Pass Criteria: No deformation nor defect adversely affecting the performance occur.

4.5 Test Sequence and Specimen Quantity

Details of the Testing Groups A to M are indicated in test report.

Table.1 Test Sequence and Sample Quantity

| No. | Test Item | Testing Groups | | | | | | | | | | | | |
|-------------------------------|-----------|---------------------------------|---------|--------|--------|--------|--------|--------|----------------|--------|--------|---------|---------|--------|
| | | A | B | C | D | E | F | G | H | J | K | L | M | N |
| 4.1 Electrical Performance | 1 | Contact resistance | 2,6 | | | 1,3,5 | 1,5 | 1,3 | 1,5 | 1,5,7 | 1,3 | 1,3 | | |
| | 2 | Insulation resistance | | | | 2,6 | | 2,6 | 2,8 | | | | | |
| | 3 | Dielectric withstanding voltage | | | | 3,7 | | 3,7 | 3,9 | | | | | |
| | 4 | Temperature rising | | | | | | | | | | | | 1 |
| 4.2 Mechanical Performance | 1 | Mating force | 1,5 | | | | | | | | | | | |
| | | Unmating force | 3,7 | | | | | | | | | | | |
| | 2 | Durability | 4 | | | | | | 4 (10cycle) | | | | | |
| | 3 | Contact retention force | | 1,3 | | | | | | | | | | |
| | 4 | Conn.Lock | | | 1 | | | | | | | | | |
| | 5 | Cable retention force | 8 | | | | | | | | | | | |
| | 6 | Vibration | | | | 2 | | | | | | | | |
| | 7 | Shock | | | | 4 | | | | | | | | |
| 4.3 Environmental Performance | 1 | Thermal shock | | | | 4 | | | | | | | | |
| | 2 | High temperature life | | 2 | | | 2 | | | | | | | |
| | 3 | Humidity (Steady State) | | | | | | 4 | | | | | | |
| | 4 | Humidity (Cycling) | | | | | | | 6 | | | | | |
| | 5 | Saltwater spray | | | | | | | | 2 | | | | |
| | 6 | H ₂ S gas | | | | | | | | | 2 | | | |
| 4.4 Others | 1 | Solder ability | | | | | | | | | | 1 | | |
| | 2 | Soldering heat resistance | | | | | | | | | | | 1 | |
| Specimen quantity | | 5 pcs. | 20 pos. | 5 pcs. | 5 pcs. | 5 pcs. | 5 pcs. | 5 pcs. | 5 pcs. | 5 pcs. | 5 pcs. | 10 pcs. | 10 pcs. | 5 pcs. |

※Numbers indicate test sequences.

5. Recommended Metal Mask

Recommended thickness of Metal Mask: $t=0.12$

※The pattern dimensions refer to a drawing

6. Precautions for Handling Cable Connectors

Refer to instruction manual: HIM-15033 for the handling of CABLINE-CA II.