

CABLINE®-CBL

Part No. Plug:20472-#**T-10# Receptacle:20474-0**E-12#

Product Specification

Qualification Test Report No. TR-08030,23006

9	S23063	February 27, 2023	R. Morita	M. Nakamura	T. Masunaga
8	S21550	October 29, 2021	R. Morita	T. Masunaga	H. Ikari
7	S16789	December 16, 2016	R. Hoshino	-	K. Narita
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Rev.	ECN	Date	Prepared by	Checked by	Approved by

1. Scope

This product specification defines the test conditions and the performances of the CABLINE-CBL Connector , a wire-to-board connector of 0.4mm contact pitch.

2. Product Name and Parts No.

2.1 Product Name

CABLINE-CBL

2.2 Parts No.

Plug: 20472-#**T-10#

Receptacle:20474-0**E-12#

3. Rating

3.1 Applicable Cable

AWG#[36,40,42,44]

3.2 Operating Conditions

Amperage: 0.1A AC/DC [AWG#44] (per contact)

0.24A AC/DC [AWG#42] (per contact)

0.3A AC/DC [AWG#40] (per contact)

0.8A AC/DC [AWG#36] (per contact)

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

Voltage: 100V AC (per contact)

Operating temperature: 233 to 358K(-40°C to 85°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. (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 to75% R.H.

4.1. Electrical Performance

1. Contact resistance	
Reference standard:	MIL-STD-202-307
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.
<p>The diagram shows a cross-section of the test setup. A cable of length 100 mm is connected to a plug and receptacle on a test board. A ground bar is connected to the shell. Two voltmeters (V) and two ammeters (A) are used to measure resistance between the cable and shell. The top circuit measures the signal contact resistance, and the bottom circuit measures the shell resistance.</p>	
Fig.1	
Pass criteria:	<p>Signal Contact</p> <p>Initial: 275 mΩ MAX.(AWG# 36) 600 mΩ MAX.(AWG#40) 700 mΩ MAX.(AWG#42) 1080 mΩ MAX.(AWG#44)</p> <p>After testing: ΔR 40 mΩ MAX.</p> <p>Initial value contains the following conductor resistance of a cable 100 mm.</p> <p>160~195 mΩ(AWG#36) 485~520 mΩ(AWG#40) 585~620 mΩ(AWG#42) 1000 mΩ(AWG#44)</p> <p>GROUND</p> <p>Initial: 50 mΩ MAX. After testing: ΔR 40 mΩ MAX.</p>
2. Insulation resistance	
Reference standard:	MIL-STD-202-302
Test conditions:	Mate the plug and receptacle connector together, and then apply DC 250 V between the neighboring contacts and between contacts and SHELL.
Pass criteria:	Initial: 1000 MΩ MIN. After testing: 500 MΩ MIN.
3. Dielectric withstanding voltage	
Reference standard:	MIL-STD-202-301
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.
4. Temperature rising	
Reference standard:	-
Test conditions:	Mate the plug and receptacle connector together, and apply rating current per contact. Measure delta T over ambient.
Pass criteria:	Over ambient ΔT 30 °C MAX.

4.2. Mechanical Performance

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. Repeat mating/unmating 30 cycles at a speed 25±3mm/min. along the mating axis. Measure the mating and unmating force at the initial and after 30cycles.
Pass criteria:	<p>Mating force</p> <p>30 P Initial: 10.0 N MAX. 30cycles: 10.0 N MAX.</p> <p>40 P Initial: 12.0 N MAX. 30cycles: 12.0 N MAX.</p> <p>Unmating force</p> <p>30 P Initial: 3.0 N MIN. 30cycles: 3.0 N MIN.</p> <p>40 P Initial: 4.0 N MIN. 30cycles: 4.0 N MIN.</p>

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 30cycles at a speed 25±3mm/min. along the mating axis.
Pass criteria:	Contact resistance: Shall meet 4.1.1

3. Contact retention force	
Reference standard:	-
Test conditions:	Place the connector on the push-on/pull-off machine, then apply force to the contact from opposite direction of the contact insertion at a speed of 25±3mm/min. Measure the force when the contact dislodges from the connector.
Pass criteria:	Receptacle contact retention force: 0.2N MIN.

4. Cable retention force	
Reference standard:	-
Test conditions:	Place the plug connector on the push-on/pull-off machine and pull the cable along the cable axis at a speed 25±3mm/min. Measure the force when the discontinuity occurs.
Pass criteria:	30P: 14.70 N MIN. 40P: 19.60 N MIN.

5. Vibration	
Reference standard:	MIL-STD-202-201
Test conditions:	<p>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.</p> <p>Frequency: 10Hz→55Hz→10Hz/approx. 1min.</p> <p>Directions: 3 mutually perpendicular directions.</p> <p>Total Amplitude: 1.52mm</p> <p>Sweep duration: 2 hours for each direction, a total of 6 hours.</p>
Pass criteria:	<p>Contact resistance: Shall meet 4.1.1.</p> <p>Electrical discontinuity: No electrical discontinuity greater than 1µs shall occur.</p> <p>Appearance: No abnormality adversely affecting the performance shall occur.</p>

6. 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: 50G 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.

7. Conn. Lock	
Reference standard:	-
Test conditions:	Mate, and place them on the push-on/pull-off machine, then apply 10N force on the cable along the mating axis.
Pass criteria:	The lock does not damage and cancel.

4.3. Environmental Performance

1. Thermal shock	
Reference standard:	MIL-STD-202-107, Test condition A.
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.→358K(85°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.

2. High temperature life	
Reference standard:	MIL-STD-202-108, 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: 358±2K (85±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.

3. Humidity (Steady state)	
Reference standard:	MIL-STD-202-103, Test condition A.
Test conditions:	Solder the receptacle connector to the test board, then mate plug connector, and expose them to the following environment. Temperature: $313 \pm 2K$ ($40 \pm 2^\circ C$) 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. Humidity (Cycling)	
Reference standard:	MIL-STD-202-106.
Test conditions:	Solder the receptacle connector to the test board, then mate plug connector, and expose them to the following environment. Temperature: $298[263] \sim 338K$ ($25[-10] \sim 65^\circ C$) Humidity: 90[80]~100%RH Duration: 10cycles (240hours)
	<p>The graph plots Temperature [deg.] on the y-axis (ranging from -20 to 80) against Time [h] on the x-axis (ranging from 0 to 25). The temperature profile consists of two cycles, A and B. Cycle A (0-10h) starts at 25°C, ramps up to 65°C at 2h, holds at 65°C until 6h, ramps down to 25°C at 8h, and holds at 25°C until 10h. Cycle B (10-20h) starts at 25°C, ramps up to 30°C at 12h, holds at 30°C until 16h, ramps down to -10°C at 18h, and holds at -10°C until 20h. A legend box indicates: A: 90-100% RH, B: 80-100% RH.</p>
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: $308 \pm 2K$ ($35 \pm 2^\circ C$) Saltwater density: $5 \pm 1\%$ [by weight] Duration: 48 hours
Pass criteria:	Contact resistance: Shall meet 4.1.1. Appearance: No abnormality adversely affecting the performance shall occur.

6. H ₂ S 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: H ₂ S 3±1ppm 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:	MIL-STD-202, Method 208
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±5K (245±5°C) for 5±0.5seconds.
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. The number of times of Reflow is within 2.

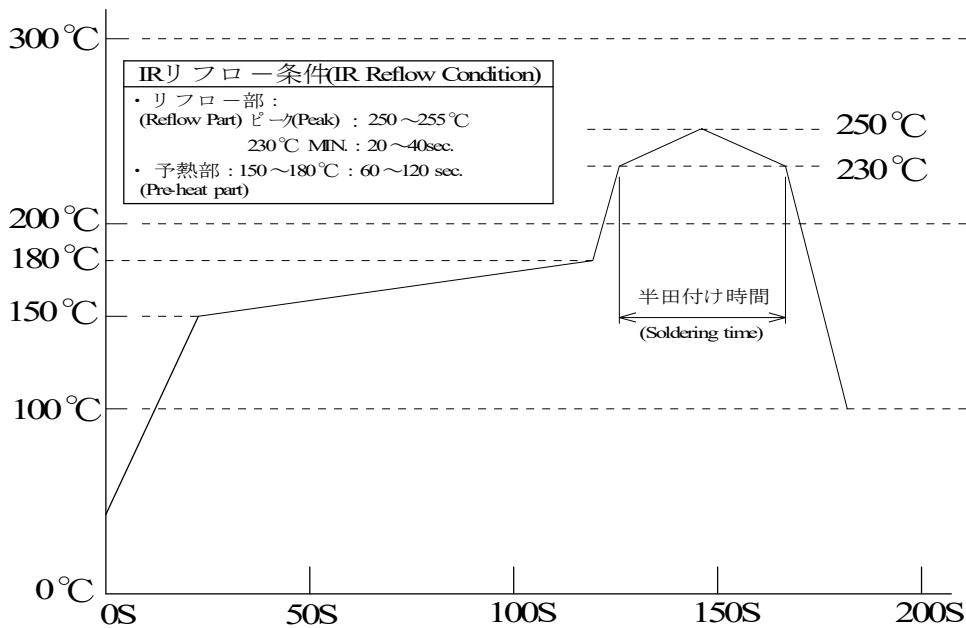


Fig.2

Pass criteria:	No deformation nor defect adversely affecting the performance occur.
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3. Soldering iron	
Reference standard:	-
Test conditions:	Operating temperature : 613~633K (350°C±10) Application time of soldering iron : 5±1sec. The number of times of Application : 3
Pass criteria:	No deformation nor defect adversely affecting the performance occur.

4.5 Test Sequence and Specimen Quantity

Table.1 Test Sequence and Sample Quantity

Test Item	Group													
	A	B	C	D	E	F	G	H	J	K	L	M	N	
Contact resistance	2,6			1,3,5	1,3	1,3	1,5	1,5,7	1,3	1,3				
Insulation resistance							2,6	2,8						
D.W. Voltage							3,7	3,9						
Temperature rising													1	
Mating force	1,5													
Unmating force	3,7													
Durability	4							4 (10cycles)						
Contact retention force		1,3												
Conn. Lock			1											
Cable retention force	8													
Vibration				2										
Shock				4										
Thermal shock					2									
High temperature life		2				2								
Humidity (Steady State)							4							
Humidity (Cycling)								6						
Saltwater spray									2					
H ₂ S gas										2				
Solder ability											1			
Soldering heat resistance												1		
Specimen quantity.	5 pcs.	20 pcs.	5 pcs.	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=0.1 mm

Recommended Opening ratio of METAL MASK : 100%

*The pattern dimensions refer to a drawing

6. Precautions for Handling Cable Connectors

Refer to instruction manual : HIM-09002 for the handling of CABLINE-CBL.