

CABLINE®-CX II Connector

Part No.20977-040T-01, 20978-040T-01, 20976-040E-01

Product Specification

Qualification Test Report No. TR-17063

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3	S19497	September 2, 2019	S.Yamaguchi	T.Kurachi	H.Ikari
2	S17887	December 6, 2017	R.Hoshino	T.Yayoshi	M.Takemoto
1	S17749	October 6, 2017	R.Hoshino	T.Yayoshi	M.Takemoto
Rev.	ECN	Date	Prepared by	Checked by	Approved by

1. Scope

This product specification defines the test conditions and the performances of the CABLINE-CX II Connector , a wire-to-board connector of 0.25mm contact pitch.

2. Product Name and Parts No.

2.1 Product Name

CABLINE-CX II

2.2 Parts No.

Plug: 20977-040T-01 (WITH COVER)

20978-040T-01 (WITHOUT COVER)

Receptacle: 20976-040E-01

3. Rating

3.1 Applicable Cable

Micro Coax ...AWG#【46、44、39】

Discrete ...AWG#【39】

3.2 Operating Conditions

Amperage: 0.10 AAC/DC [AWG#46] (per contact)

0.15 AAC/DC [AWG#44] (per contact)

0.30 AAC/DC [AWG#39] (per contact/for POWER/up to 8P ※20977-040T-01
per contact/for POWER/up to 7P ※20978-040T-01)

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 to 75% 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.

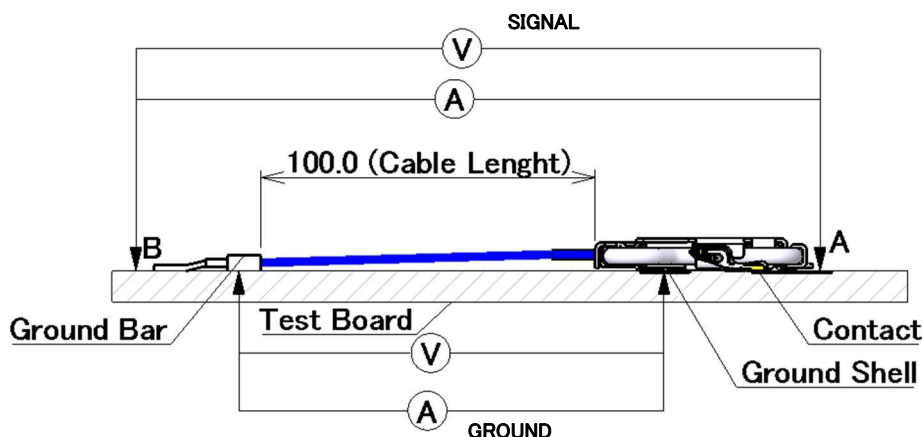


Fig.1

Pass criteria: Signal Contact
 Initial: 388 mΩ MAX. (AWG#39)
 1,080 mΩ MAX. (AWG#44)
 1,830 mΩ MAX. (AWG#46)
 After testing: Δ R 40 mΩ MAX.
 Initial value contains the following conductor resistance of a cable 100 mm.
 377 mΩ (AWG#39)
 1,000 mΩ (AWG#44)
 1,750 mΩ (AWG#46)
 GROUND
 Initial: 50 mΩ MAX. After testing: Δ R 40 mΩ MAX.

2. Insulation resistance

Reference standard: MIL-STD-202-302, Test condition

Test conditions: Mate the plug and receptacle connector together, and then apply DC 250 V between the inner contact and the ground contact.

Pass criteria: Initial: 1,000 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 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 Δ T 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 20 cycles at a speed $25\pm 3\text{mm/min}$. along the mating axis. Measure the mating and unmating force at the initial and after 20cycles.
Pass criteria:	Mating force 40 P Initial: 30.0 N MAX. 20cycles: 30.0 N MAX. Unmating force 40 P Initial: 4.0 N MIN. 20cycles: 4.0 N MIN.

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 20cycles at a speed $25\pm 3\text{mm/min}$. 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 $25\pm 3\text{mm/min}$. Measure the force when the contact dislodges from the connector.
Pass criteria:	Plug contact retention force: 0.5N MIN. Receptacle contact retention force: 0.2N MIN.

4. Conn. Lock	
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.

5. 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 $25\pm 3\text{mm/min}$. Measure the force when the discontinuity occurs.
Pass criteria:	40P: 19.60 N MIN.

6. Vibration	
Reference standard:	MIL-STD-202-201
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: 10Hz→55Hz→10Hz/approx. 1min. Directions: 3 mutually perpendicular directions. Total Amplitude: 1.52mm 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 $1\mu\text{s}$ shall occur. Appearance: No abnormality adversely affecting the performance shall occur.

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: 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 1 μ s shall occur. Appearance: No abnormality adversely affecting the performance shall occur.

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 A.
Test conditions:	Solder the receptacle connector to the test board, then mate plug connector, and expose them to the following environment. Temperature: 358 \pm 2K (85 \pm 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 B.
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°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)

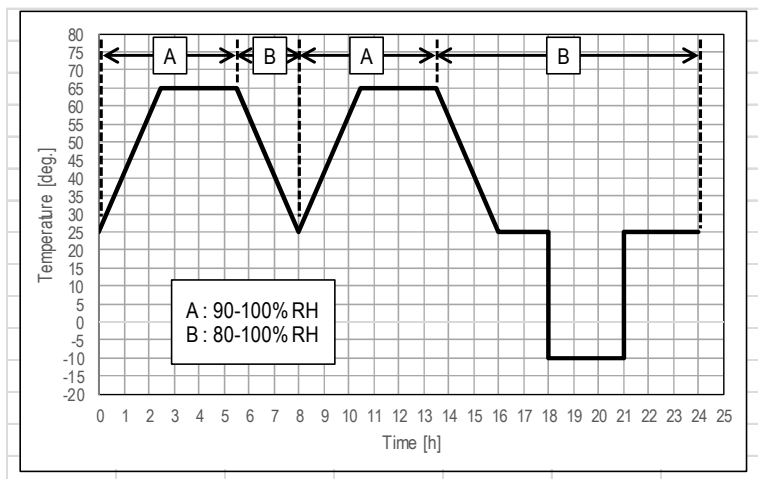
Reference standard: MIL-STD-202-106.

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

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

Humidity: 90[80]~100%RH

Duration: 10cycles (240hours)



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±1ppm

Duration: 96 hours

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

1. Solderability

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 $518\pm 5K$ ($245\pm 5^{\circ}C$) for 5 ± 0.5 seconds.

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

Reference standard: -

Fig.2

Test conditions	Operating temperature : 613~633K (350±10 °C)
(Soldering iron):	Application time of soldering iron : 5±1 seconds
	The number of times of application : 3 times

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	1,5	1,3	1,5	1,5,7	1,3	1,3			
Insulation Resistance					2,6		2,6	2,8					
D. W. Voltage					3,7		3,7	3,9					
Temperature Rising													1
Mating Force	1,5												
Un-mating Force	3,7												
Durability	4							4 (10cycles)					
Contact Retention Force		1,3											
Connector Lock			1										
Cable Retention Force	8												
Vibration				2									
Shock				4									
Thermal Shock					4								
High Temperature Life		2				2							
Humidity (Steady State)							4						
Humidity (Cycling)								6					
Salt Water Spray									2				
H2S Gas										2			
Solder ability											1		
Soldering Heat Resistance												1	
Sample Quantity	5 pcs.	20 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 : $t=0.12$ 100%

Refer to drawing for the recommended metal mask thickness and opening dimension.

6. Caution for handling the cable connector

Handle the cable connector carefully in cable harnessing work so that pulling force is NOT applied to specific cables.
Be careful so that pulling force and/or repeated bending force is NOT applied to the cable attachment part of a cable connector.

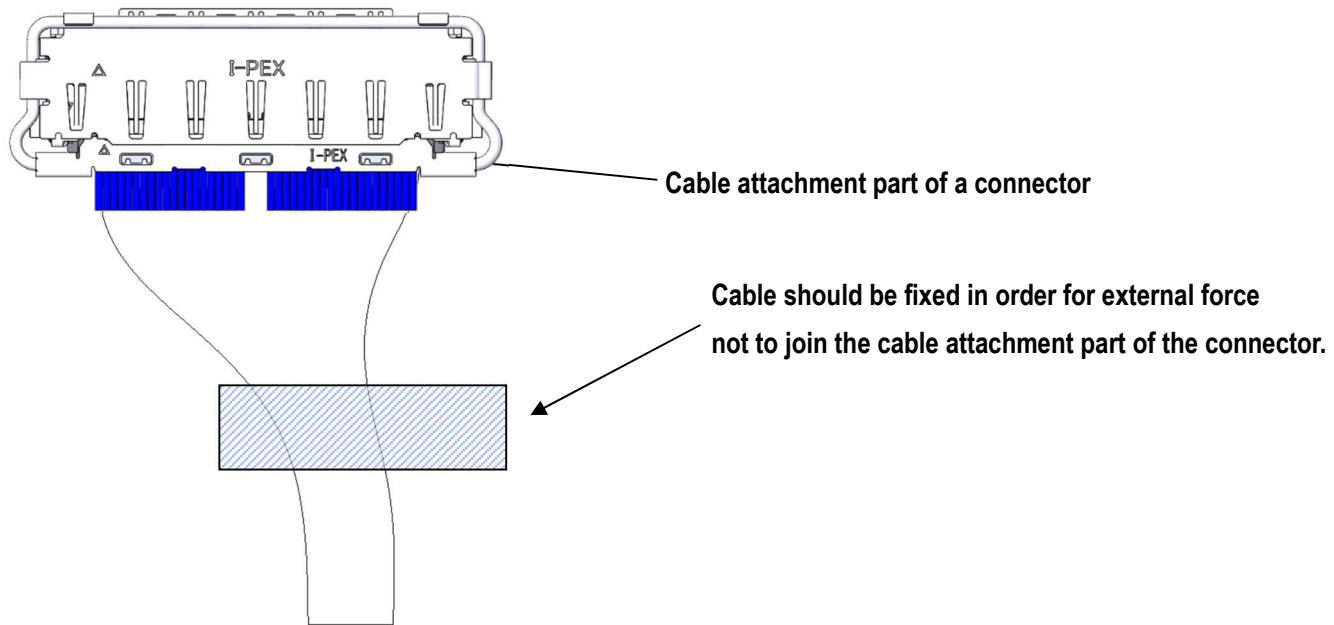


Fig.3

CAUTION

- Do not pull up the cable to withdraw the plug connector.