

CABLINE®-CA II PLUS

Part No. Plug: 20788-0\*\*T-01, Receptacle: 20790-0\*\*E-##

Product Specification

Qualification Test Report No.

TR-16075 (Plug P/N: 20788-0\*\*T-01, Receptacle P/N: 20790-0\*\*E-0#)

TR-23031 (Plug P/N: 20788-0\*\*T-01, Receptacle P/N: 20790-0\*\*E-1#)

6	S23465	December 25, 2023	K. Hara	T. Tanigawa	H. Ikari
5	S22053	February 7, 2022	K. Hara	T. Tanigawa	H. Ikari
4	S21626	November 24, 2021	R. Hatano	T. Tanigawa	H. Ikari
3	S19485	August 22, 2019	A. Koyanagi	T. Kurachi	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 PLUS Connector, a wire-to-board connector of 0.4mm contact pitch.

## 2. Product Name and Parts No.

### 2.1 Product Name

CABLINE-CA II PLUS

### 2.2 Parts No.

Plug for cable assembly: 20788-0\*\*T-01

Receptacle assembly: 20790-0\*\*E-##

## 3. Rating

### 3.1 Applicable Cable

Micro-coaxial cable ...AWG#【44、42、40、38、36】

Discrete wire ...AWG#【36、34】

Twinax cable...AWG#【40、42】

### 3.2 Operating Conditions

Amperage : 0.1A AC/DC [AWG#44] (Per contact pin/Up to 60 contacts)

0.24A AC/DC [AWG#42] (Per contact pin /Up to 60 contacts)

0.3A AC/DC [AWG#40] (Per contact pin /Up to 60 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./1year (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-202G.

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

No	Items	Test Conditions	Specifications
1	Contact Resistance	Solder the receptacle connector to the test board and mate the plug connector together, then measure the contact resistance as shown in Fig.1 by the four terminal methods. Apply the low level condition of 20mV MAX. DC for the open circuit voltage and 1mA MAX. DC for the closed circuit current in accordance with MIL-STD-202G, Method 307.	<u>Contact</u> Initial : 180mΩMAX.(AWG#34) 275 mΩMAX.(AWG#36) 360 mΩMAX.(AWG#38) 600 mΩMAX.(AWG#40) 700 mΩMAX.(AWG#42) 1080 mΩMAX.(AWG#44) After testing : $\triangle R$ 40mΩ MAX. Initial contains the following conductor resistance of a cable 100mm. 100mΩMAX.(AWG#34) 195mΩMAX. (AWG#36) 280mΩMAX. (AWG#38) 520mΩMAX. (AWG#40) 620mΩMAX. (AWG#42) 1000mΩMAX.(AWG#44) <u>Ground Shell</u> Initial : 50 mΩ MAX. After testing : $\triangle R$ 40mΩ MAX.
2	Insulation Resistance	Mate the plug and receptacle connector together, then apply DC 250 V between the neighboring contacts in accordance with MIL-STD-202G, Method 302.	Initial : 1000 MΩ MIN. After testing : 500 MΩ MIN.
3	Dielectric Withstanding Voltage	Mate the receptacle and plug connector together, then apply AC 250V(rms) between the neighboring contacts for a minute in accordance with MIL-STD-202G, Method 301.	No creeping discharge, flashover, no insulator breakdown shall occur.
4	Temperature rising	Mate the plug and receptacle connector together, then apply rating current per contact pin.	Over ambient.: $\Delta T=30^{\circ}\text{C}$ MAX.

## 4.2. Mechanical Performance

No	Items	Test Conditions	Specifications
1	Mating Force and Un-mating Force	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/un-mating 30 cycles at a speed $25\pm 3\text{mm/min}$ . along the mating axis.	<u>Mating</u> 60P Initial : 29.10 N MAX. 30cycles : 29.10 N MAX.  <u>Un-mating</u> 60P Initial : 6.0 N MIN. 30cycles : 6.0 N MIN.
2	Durability	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 un-mating 30cycles at a speed $25\pm 3\text{mm/min}$ . along the mating axis.	[Contact Resistance] Shall meet 4.1.1.
3	Contact Retention Force	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 $25\pm 3\text{mm/min}$ . Measure the force when the contact dislodges the connector.	Plug contact retention force shall not be less than 0.6N(61.2gf). Receptacle contact retention force shall not be less than 0.2N(20.4gf).
4	Conn. Lock	Mate, and place them on the push-on/pull-off machine, then apply 10N (1.02gf) force on the cable along the mating axis.	The lock does not damage and cancel.
5	Cable Retention Force	Place the plug connector on the push-on/pull-off machine, then apply force on the cable along the direction at a speed $25\pm 3\text{mm/min}$ . Measure the force when the cable dislodges the plug connector.	60P : 29.40 N MIN.
6	Vibration	Solder the receptacle connector to the test board, then mate plug connector, and place them on the vibrator. Then apply the following vibration in accordance with MIL-STD-202G, Method 201A. During the testing, run 100mA DC to check electrical discontinuity. Frequency : 10Hz→55Hz→10Hz/approx 1min. Directions : Three mutually perpendicular direction. Total Amplitude : 1.52mm Sweep duration : 2 hours for each direction, a total of 6 hours.	[Contact Resistance] Shall meet 4.1.1. [Electrical discontinuity] No electrical discontinuity grater than $1\mu\text{s}$ shall occur. [Appearance] No abnormality adversely affecting the performance shall occur.
7	Shock	Solder the receptacle connector to the test board, then mate plug connector, and place them on the shock machine. Then apply the following shock in accordance with MIL-STD-202G, Method 213B, Condition A. MAX.G : 50G Duration : 11msec Wave Form : Half Sinusoidal	[Contact Resistance] Shall meet 4.1.1. [Electrical discontinuity] No electrical discontinuity grater than $1\mu\text{s}$ shall occur. [Appearance] No abnormality adversely affecting the performance shall occur.

## 4.3. Environmental Performance

No	Items	Test Conditions	Specifications
1	Thermal Shock	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. No. of cycles : 5 cycles	[Contact Resistance] Shall meet 4.1.1.
2	High Temperature Life	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	[Contact Resistance] Shall meet 4.1.1 [Contact Retention Force] Shall meet 4.2.3.
3	Humidity (Steady State)	Solder the receptacle connector to the test board, then mate plug connector, and expose them to the following environment in accordance with MIL-STD-202G, Method 103B, Condition A. Temperature : 313±2K (40±2°C) Humidity : 90~95%RH Duration : 240 hours	[Contact Resistance] Shall meet 4.1.1. [Insulation Resistance] Shall meet 4.1.2. [Dielectric Withstanding Voltage] Shall meet 4.1.3.
4	Humidity (Cycling)	Solder the receptacle connector to the test board, then mate plug connector, and expose them to the following environment in accordance with MIL-STD-202G, Method 106G. Temperature : 298[263]~338K (25[-10]~65°C) Humidity : 90~98%RH Duration : 10cycles (240hours)	[Contact Resistance] Shall meet 4.1.1. [Insulation Resistance] Shall meet 4.1.2. [Dielectric Withstanding Voltage] Shall meet 4.1.3.
5	Salt Water Spray	Solder the receptacle connector to the test board, then mate plug connector, and expose them to the following environment in accordance with MIL-STD-202G, Method 101E, Condition B. Temperature : 308±2K (35±2°C) Salt water density : 5±1% [by weight] Duration : 48 hours	[Contact Resistance] Shall meet 4.1.1.
6	H <sub>2</sub> S Gas	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 <sub>2</sub> S 3pm Duration : 96hours	[Contact Resistance] Shall meet 4.1.1. [Appearance] No abnormality adversely affecting the performance shall occur.

## 4.4. Others

No	Items		Test Conditions	Specifications
1	Solder ability		Dip the solder tine of the contact in the solder bath at $518 \pm 5K$ ( $245 \pm 5^{\circ}C$ ) for $5 \pm 0.5$ seconds after immersing the tine in the flux of RMA or R type for 5 to 10 seconds in accordance.	More than 95% of the dipped surface shall be evenly wet.
2	Soldering Heat Resistance	Reflow	Reflow temperature profile 5 The number of times of Reflow is within 2.	No abnormality adversely affecting the performance shall not occur.
		Soldering iron	Operating temperature : $613 \sim 633K$ ( $350^{\circ}C \pm 10$ ) Application time of soldering iron : $5 \pm 1$ sec. The number of times of application : 3times	No abnormality adversely affecting the performance shall occur.

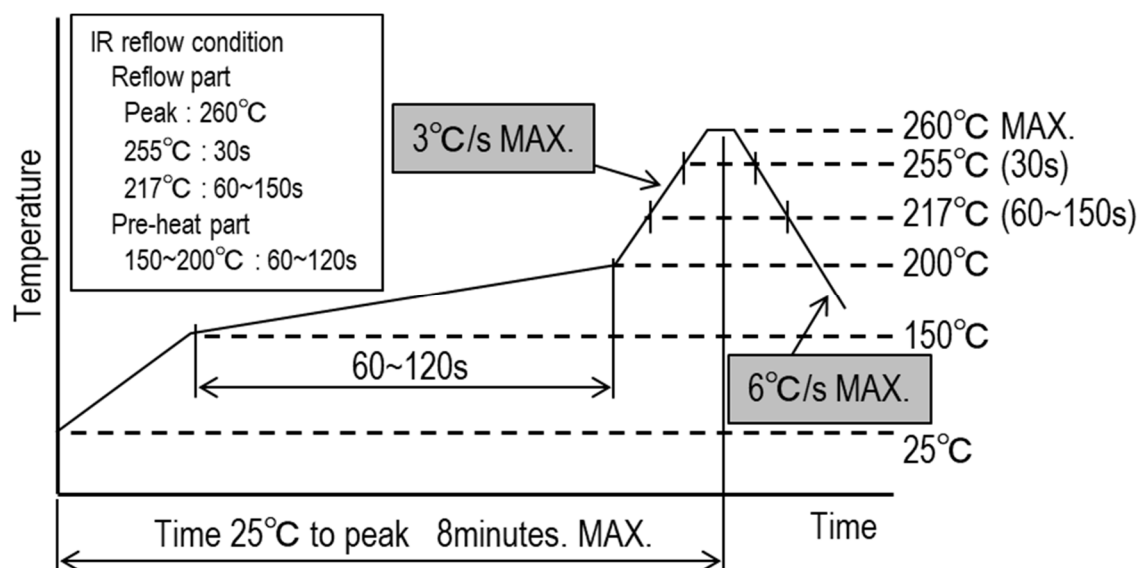
## 4.5 Test Sequence and Sample Quantity

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					
Temp. Life													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					2								
High Temperature Life		2				2							
Humidity (Steady State)							4						
Humidity (Cycling)								6					
Salt Water Spray									2				
H <sub>2</sub> S 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.

※The number of group is test sequence.

## 5. Reflow Temperature Profile



### 5.1 Recommended METAL MASK

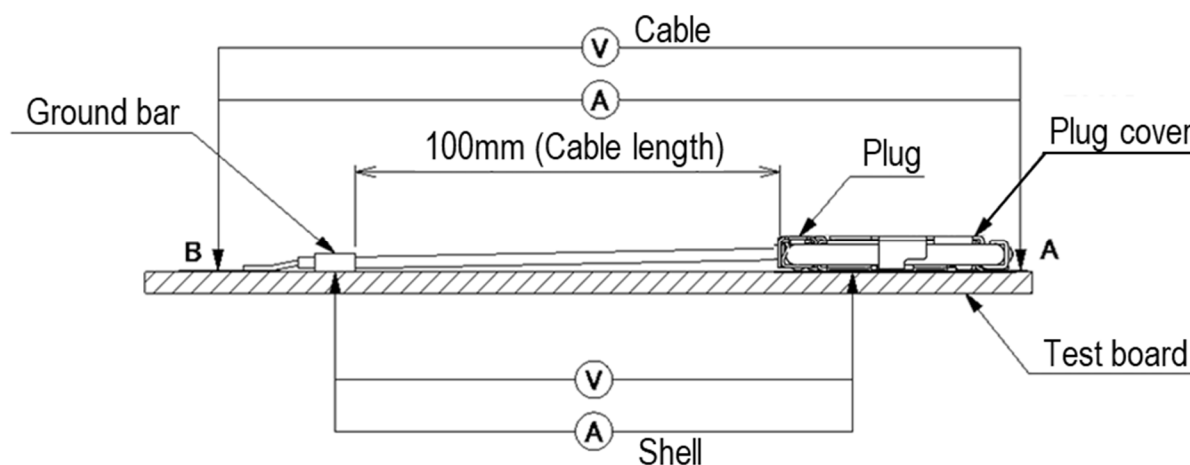
Recommended thickness of metal mask :  $t=0.12$

Recommended opening ratio of metal mask : 100%

※The pattern dimensions refer to a drawing

## 6. Measuring method

### 6.1 Measuring method of Contact Resistance



$$\text{Contact Resistance} = R_{AB}$$

Figure 1. Contact Resistance

## 7. Precautions for Handling Cable Connectors

Refer to instruction manual: HIM-16028 for the handling of CABLINE-CA II PLUS.