

CABLINE®-CA

Part No. Plug: 20633-\*\*\*T-0#S Receptacle: 20525-\*\*\*E-0##

Product Specification

Qualification Test Report No. TR-14122(P/N : 20525-0\*\*E-0##)  
TR-16023(P/N : 20525-2\*\*E-0##)

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8	S23274	September 27, 2023	H.Uchida	M.Nakamura	T.Masunaga
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## 1. Scope

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

## 2. Product Name and Parts No.

### 2.1 Product Name

CABLINE-CA

### 2.2 Parts No.

Plug: 20633-#\*\*T-0#S

Receptacle: 20525-#\*\*E-0##

## 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 60 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 40 Contacts)

0.5A AC/DC [AWG#38] (Per Contact Pin / Up to 14 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 4 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 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

This initial test is equal to it's at shipping condition and unless otherwise specified, all tests and measurements shall be performed under the following conditions in accordance with MIL-STD-202 G.

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-202G, Method 307

Test Conditions: 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 10mA MAX. DC for the closed circuit current.

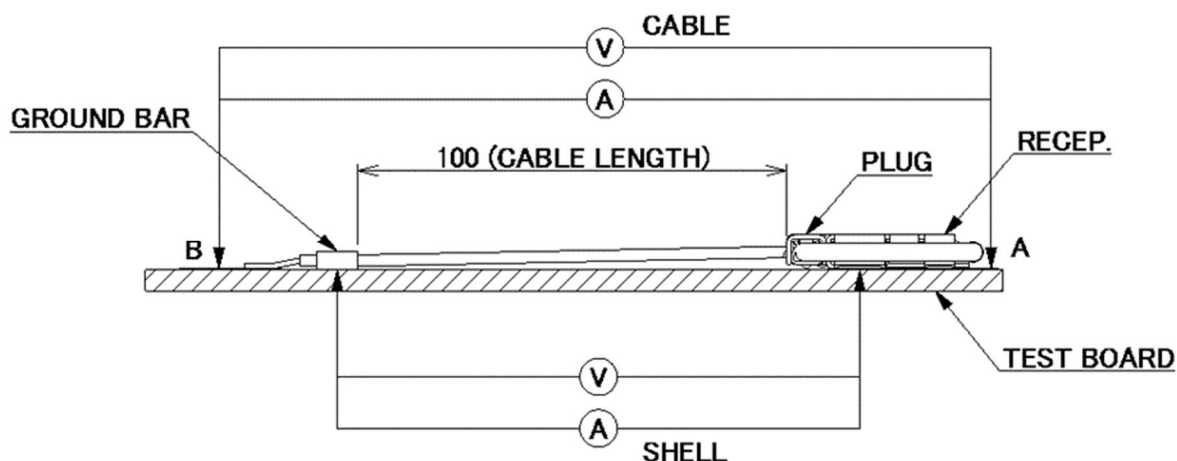


Fig.1

**Pass Criteria:****Contact**

Initial: 180 mΩ MAX.(AWG#34), 275 mΩ MAX.(AWG#36), 360 mΩ MAX.(AWG#38),  
600 mΩ MAX.(AWG#40), 700 mΩ MAX.(AWG#42), 1080 mΩ MAX.(AWG#44)

After Testing:  $\Delta R$  40 mΩ MAX.

Initial contains the following conductor resistance of a cable 100 mm.

100 mΩ MAX. (AWG#34), 195 mΩ MAX. (AWG#36), 280 mΩ MAX. (AWG#38),  
520 mΩ MAX. (AWG#40), 620 mΩ MAX. (AWG#42), 1000 mΩ MAX.(AWG#44)

**Ground Contact**

Initial: 50 mΩ MAX. After Testing:  $\Delta R$  40 mΩ MAX.

**2. Insulation Resistance**

Reference Standard: MIL-STD-202 G, Method 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 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 creeping discharge, flashover, no insulator breakdown shall occur.

**4. Temperature Rising**

Reference Standard: -

Test Conditions: Mate the plug and receptacle connector together and then apply rating current per contact.

Pass Criteria: Over Ambient:  $\Delta T$  30 °C MAX.

**4.2. Mechanical Performance**

<b>1. Mating Force and Un-Mating Force</b>	
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/un-mating 30 cycles at a speed $25\pm 3$ mm/min. along the mating axis.
Pass Criteria:	<p><b>Mating Force</b></p> <p>10 P Initial: 7.80N MAX.    30 cycles: 7.80N MAX.    12 P Initial: 8.20N MAX.    30 cycles: 8.20N MAX.</p> <p>20 P Initial: 9.70N MAX.    30 cycles: 9.70N MAX.    30 P Initial: 14.55N MAX.    30 cycles: 14.55N MAX.</p> <p>40 P Initial: 19.40N MAX.    30 cycles: 19.40N MAX.    50 P Initial: 24.25N MAX.    30 cycles: 24.25N MAX.</p> <p>60 P Initial: 29.10N MAX.    30 cycles: 29.10N MAX.</p> <p><b>Un-Mating Force</b></p> <p>10 P Initial: 1.00N MIN.    30 cycles: 1.00N MIN.    12 P Initial: 1.20N MIN.    30 cycles: 1.20N MIN.</p> <p>20 P Initial: 2.00N MIN.    30 cycles: 2.00N MIN.    30 P Initial: 3.00N MIN.    30 cycles: 3.00N MIN.</p> <p>40 P Initial: 4.00N MIN.    30 cycles: 4.00N MIN.    50 P Initial: 5.00N MIN.    30 cycles: 5.00N MIN.</p> <p>60 P Initial: 6.00N MIN.    30 cycles: 6.00N MIN.</p>

<b>2. Durability</b>	
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 un-mating 30 cycles at a speed $25\pm 3$ mm/min. along the mating axis.
Pass Criteria:	Contact Resistance: Shall meet 4.1.1

<b>3. Contact Retention Force</b>	
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 $25\pm 3$ mm/min. Measure the force when the contact dislodges the connector.
Pass Criteria:	<p>Plug Contact Retention Force: 0.60N MIN.</p> <p>Receptacle Contact Retention Force: 0.20N MIN.</p>

<b>4. Conn. Lock</b>	
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.

**4.2. Mechanical Performance**

<b>5. Cable Retention Force</b>	
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:	10P: 4.90N MIN.    12P: 5.88N MIN.    20P: 9.80N MIN.    30P: 14.70N MIN. 40P: 19.60N MIN.    50P: 24.50N MIN.    60P: 29.40N MIN.

<b>6. Vibration</b>	
Reference Standard:	MIL-STD-202 G, Method 201A
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 direction. 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.

<b>7. Shock</b>	
Reference Standard:	MIL-STD-202 G, Method 213B, 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 about 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**

<b>1. Thermal Shock</b>	
Reference Standard:	MIL-STD-202 G, Method 107G, 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. No. of Cycles: 5 cycles
Pass Criteria:	Contact Resistance: Shall meet 4.1.1. Appearance: No abnormality adversely affecting the performance shall occur.

<b>2. High Temperature Life</b>	
Reference Standard:	MIL-STD-202 G, Method 108A, 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.

<b>3. Humidity (Steady State)</b>	
Reference Standard:	MIL-STD-202 G, Method 103B, 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.

<b>4. Humidity (Cycling)</b>	
Reference Standard:	MIL-STD-202 G, Method 106G.
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: 90~98%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.

**4.3. Environmental Performance****5. Saltwater Spray**

Reference Standard: MIL-STD-202 G, Method 101E, Condition B.

Test Conditions: Solder the receptacle connector to the test board, then mate plug connector, and expose them to the following environment.  
Temperature:  $308 \pm 2$  K ( $35 \pm 2$  °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<sub>2</sub>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:  $313 \pm 2$  K ( $40 \pm 2$  °C)  
Relative Humidity:  $80 \pm 5\%$  RH  
Gas: H<sub>2</sub>S  $3 \pm 1$  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: Dip the solder tine of the contact in the solder bath at  $518 \pm 5\text{K}$  ( $245 \pm 5\text{ }^{\circ}\text{C}$ ) for  $5 \pm 0.5$  seconds after immersing the tine in the flux of RMA or R type for 5 to 10 seconds.

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

## 2. Soldering Heat Resistance

Reference Standard: -

Test Conditions: Reflow: Reflow temperature as shown in Fig.2. The number of times of Reflow is within 2.

Soldering Iron: Operating Temperature :  $613 \sim 633\text{K}$  ( $350\text{ }^{\circ}\text{C} \pm 10$ )

Application Time of Soldering Iron :  $5 \pm 1\text{sec}$ .

The Number of Times of Application : 3 times

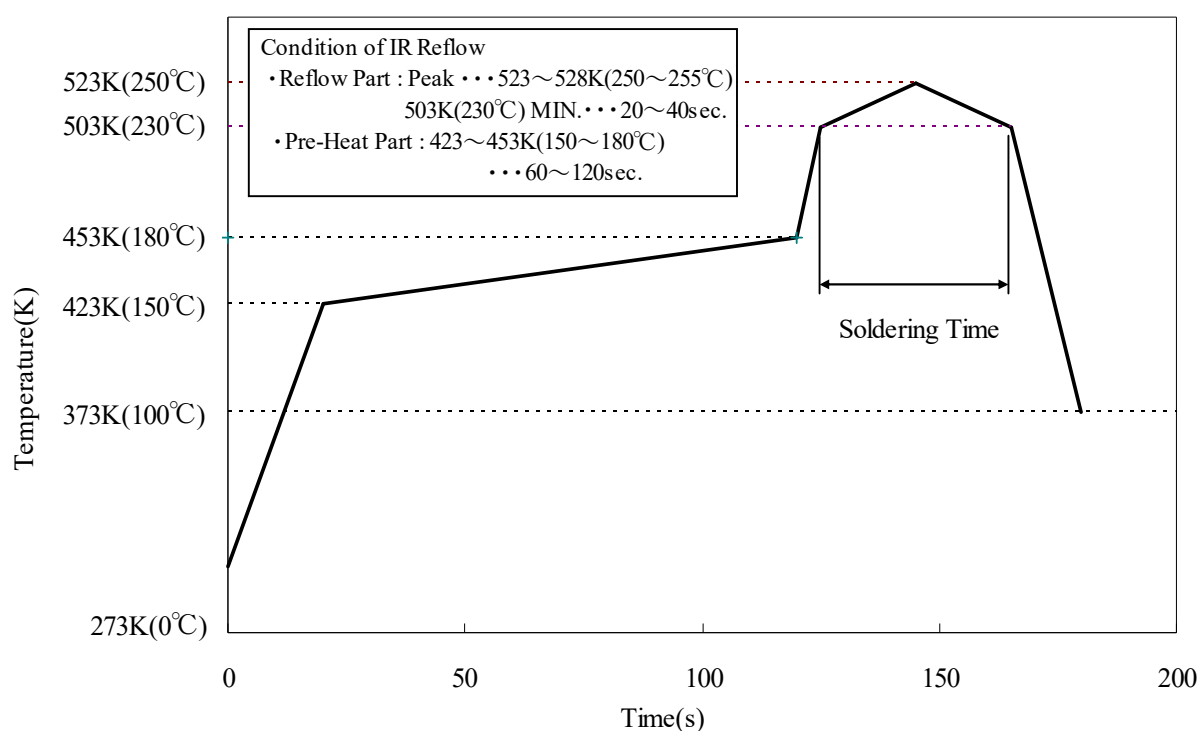


Fig.2

Pass Criteria: No abnormality adversely affecting the performance shall not occur.



**4.5 Test Sequence and Specimen Quantity**

Details of the Testing Groups A to N 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
4.1 Electrical Performance	1	Contact resistance	2,6			1,3,5	1,3	1,3	1,5	1,5,7	1,3	1,3			
	2	Insulation resistance							2,6	2,8					
	3	Dielectric withstanding voltage							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					2								
	2	High temperature life		2				2							
	3	Humidity (Steady State)							4						
	4	Humidity (Cycling)								6					
	5	Saltwater spray									2				
	6	H <sub>2</sub> 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 :  $t = 0.12$

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-09008 for the Handling of CABLINE-CA