

CABLINE®-VS

Part No. Plug: 20453-\*\*\*T-### Receptacle: 20455-\*\*\*E-###

Product Specification

Qualification Test Report No. TR-08047,13084,16002

16	S23322	September 20, 2023	T. Ono	M. Nakamura	T. Masunaga
15	S22126	March 24, 2022	T. Ono	T. Masunaga	H. Ikari
14	S21547	October 28, 2021	R. Morita	T. Masunaga	H. Ikari
13	S21272	June 16, 2021	T. Ono	T. Masunaga	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-VS Connector, a wire-to-board connector of 0.5 mm contact pitch.

## 2. Product Name and Parts No.

### 2.1 Product Name

CABLINE-VS

### 2.2 Parts No.

#### 2.2.1 Combination 1

Plug: 20453-0\*\*T-###

Receptacle: 20455-\*\*\*E-#2#

#### 2.2.2 Combination 2

Plug: 20453-2\*\*T-###

Receptacle: 20455-\*\*\*E-#6#

#### 2.2.3 Combination 3

Plug: 20453-3\*\*T-###

Receptacle: 20455-\*\*\*E-#9#

## 3. Rating

### 3.1 Applicable Cable

Micro-Coaxial Cable ...AWG# [44, 42, 40, 38, 36]

Discrete Wire ...AWG# [36, 34, 32]

Twinax Cable ...AWG# [40]

### 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 14 Contacts)

0.8A AC/DC [AWG#36] (Per Contact Pin / Up to 10 Contacts)

1.0A AC/DC [AWG#34] (Per Contact Pin / Up to 6 Contacts)

1.0A AC/DC [AWG#32] (Per Contact Pin / Up to 6 Contacts)

Voltage: 100V AC/DC (Per Contact Pin)

Operating Temperature: 233~358K (-40 °C~85 °C) (Containing temperature rise by current.)

Operating Humidity: 85% max.

### 3.3 Storage Conditions

Storage Temperature: 248~333K (-25 °C~60 °C)

Storage Humidity: 85% max. (Non-Condensing)

Storage Period: Within 1 Year After Delivery (Our Packing State)

## 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~308K (15 °C~35 °C)

Pressure... 866hPa~1066hPa (650mmHg~800mmHg)

Relative Humidity... 45~75%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.

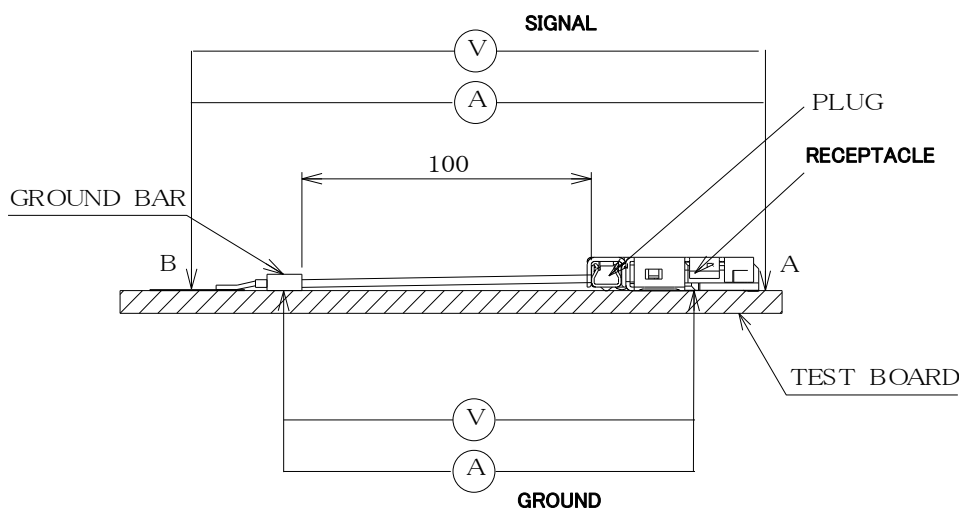


Fig.1

Pass Criteria:	Signal Contact	Initial contains the following conductor resistance of a cable 100 mm.
	Initial: 140 mΩ MAX.(AWG#32)	60 mΩ MAX.(AWG#32)
	180 mΩ MAX.(AWG#34)	100 mΩ MAX.(AWG#34)
	275 mΩ MAX.(AWG#36)	195 mΩ MAX.(AWG#36)
	360 mΩ MAX.(AWG#38)	280 mΩ MAX.(AWG#38)
	600 mΩ MAX.(AWG#40)	520 mΩ MAX.(AWG#40)
	700 mΩ MAX.(AWG#42)	620 mΩ MAX.(AWG#42)
	1080 mΩ MAX.(AWG#44)	1000 mΩ MAX.(AWG#44)
	After Testing: $\Delta$ R40 mΩ MAX.	
	Ground Shell	
	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 250V 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 pin.

Pass Criteria: Over Ambient :  $\Delta$ T30 °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/unmating 30 cycles at a speed $25\pm 3$ mm/min. along the mating axis.	
Pass Criteria:	Mating Force	Un-Mating Force
	20P: 9.45N MAX.	20P: 2.0N MIN.
	30P: 12.15N MAX.	30P: 3.0N MIN.
	40P: 16.20N MAX.	40P: 4.0N MIN.
	50P: 20.25N MAX.	50P: 5.0N MIN.

<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:	Plug Contact Retention Force: 0.6N MIN. Receptacle Contact Retention Force: 0.2N MIN.	

<b>4. 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 $25\pm 3$ 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.	

<b>5. Vibration</b>		
Reference Standard:	MIL-STD-202 G, Method 201 A	
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.	

**4.2. Mechanical Performance**

<b>6. Shock</b>	
Reference Standard:	MIL-STD-202 G, Method 213 B, 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.
	<div>MAX.G: 50G</div> <div>Duration: 11msec</div> <div>Wave Form: Half Sinusoidal</div> <div>Directions: 6 mutually perpendicular direction</div> <div>Cycle: 3 cycles about each direction</div>
Pass Criteria:	Contact Resistance: Shall meet 4.1.1. Electrical Discontinuity: No electrical discontinuity greater than 1 $\mu$ s 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 107 G, 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.

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

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

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

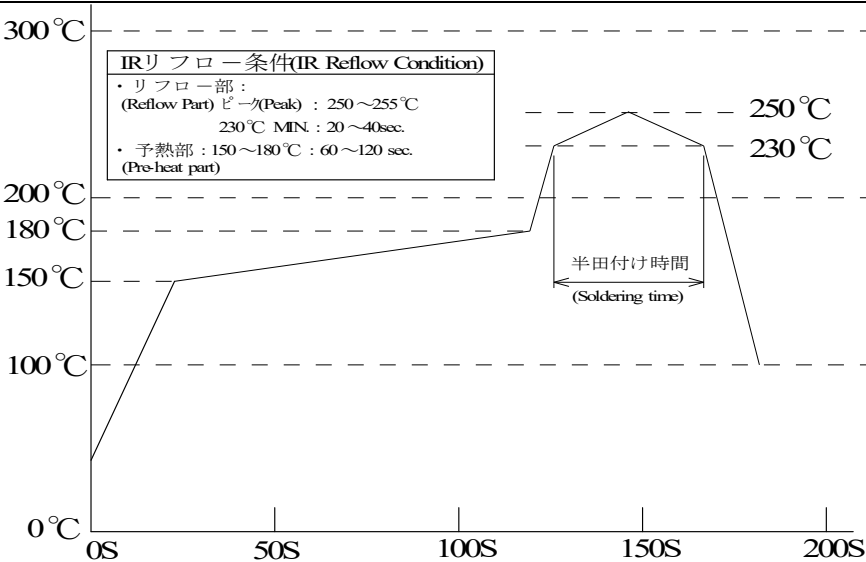
4.3. Environmental Performance

5. Saltwater Spray	
Reference Standard:	MIL-STD-202 G, Method 101 E, 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. 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±2K (40±2 °C) Relative Humidity: 80±5%RH Gas: H <sub>2</sub> S 3±1ppm Duration: 48 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±5K (245±5 °C) for 5±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 (Reflow)	
Reference Standard:	-
Test Conditions:	Reflow temperature as shown in Fig.2. The number of times of reflow is within 2.
<div><p>IRリフロー条件(IR Reflow Condition)</p><ul style="list-style-type: none"><li>リフロー部: (Reflow Part) ピーク(Peak) : 250~255°C 230°C MIN : 20~40sec.</li><li>予熱部 : 150~180°C : 60~120 sec. (Pre-heat part)</li></ul><p>半田付け時間 (Soldering time)</p></div>	
Pass Criteria:	No abnormality adversely affecting the performance shall not occur.

**4.4. Others****3. Soldering Heat Resistance (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 times

Pass Criteria:      No abnormality adversely affecting the performance shall not 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
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											
Un-mating Force	3,7											
Durability	4						4 (10cycles)					
Contact Retention Force		1,3										
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 <sub>2</sub> S Gas									2			
Solderability										1		
Soldering Heat Resistance											1	
Specimen Quantity.	5 pcs.	20 pos.	5 pcs.	5 pcs.	5 pcs.	5 pcs.	5 pcs.	5 pcs.	5 pcs.	10 pcs.	10 pcs.	5 pcs.

※Numbers indicate sequence in which tests are performed.

## 5. Recommended Metal Mask

Recommended Metal Mask Thickness ..... t = 0.12 mm

Recommended Metal Mask Opening Rate ..... 100%

## 6. Precautions for Handling Cable Connectors

Refer to Instruction Manual : HIM-08004 for the handling of CABLINE-VS.