

# CABLINE®-VS

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

## Product Specification

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

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
12	S19680	October 31, 2019	Y. Sasa	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 0.5mm 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

AWG#[44,42,40,38,36,34,32]

### 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.

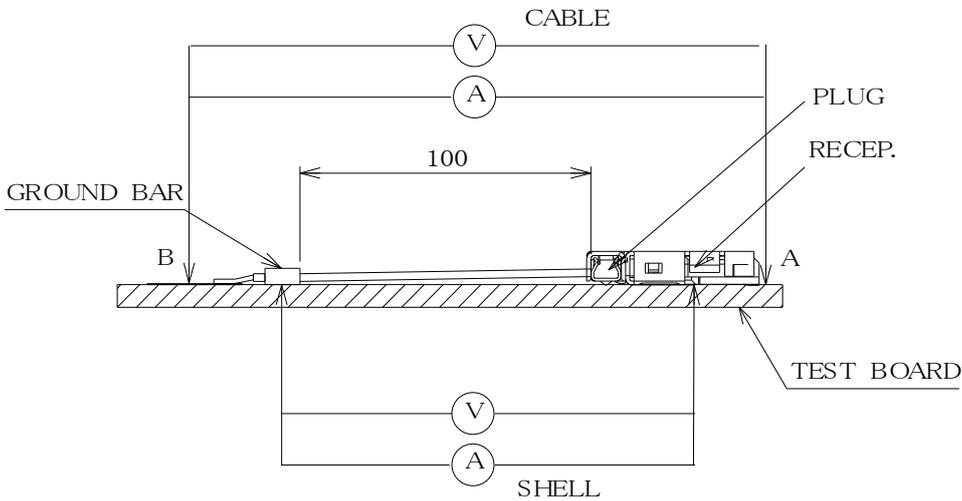


Fig.1

Pass criteria:	<p>Contact</p> <p>Initial: 140 mΩMAX.(AWG#32) 180 mΩMAX.(AWG#34) 275 mΩMAX.(AWG#36) 360 mΩMAX.(AWG#38) 600 mΩMAX.(AWG#40) 700 mΩMAX.(AWG#42) 1080 mΩMAX.(AWG#44)</p> <p>After testing: <math>\Delta</math>R40 mΩ MAX.</p> <p>Ground Shell</p> <p>Initial: 50 mΩ MAX.</p> <p>After testing: <math>\Delta</math>R 40 mΩ MAX.</p>	<p>Initial contains the following conductor resistance of a cable 100 mm.</p> <p>60 mΩMAX.(AWG#32) 100 mΩMAX.(AWG#34) 195 mΩMAX.(AWG#36) 280 mΩMAX.(AWG#38) 520 mΩMAX.(AWG#40) 620 mΩMAX.(AWG#42) 1000 mΩMAX.(AWG#44)</p>
----------------	--	---

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 pin.

Pass criteria: Over ambient  $\Delta$ T30 °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, measure of initial and mating/unmating 30 cycles at a speed 25±3mm/min. along the mating axis.	
Pass criteria:	Mating force	Unmating force
	20 P: 9.45 N MAX.	20 P: 2.0 N MIN.
	30 P: 12.15 N MAX.	30 P: 3.0 N MIN.
	40 P: 16.2 N MAX.	40 P: 4.0 N MIN.
	50 P: 20.25 N MAX.	50 P: 5.0 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 un-mating 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 on the contact head and push the contact along the direction opposite to the contact insertion at a speed of 25±3mm/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.

### 4. Cable retention force

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±3mm/min. Measure the force when the cable dislodges the plug connector.
Pass criteria:	20 P: 9.80 N MIN. 30 P: 14.70 N MIN. 40 P: 19.60 N MIN. 50 P: 24.50 N MIN.

### 5. Vibration

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: 1.52mm 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 1µs shall occur. Appearance: No abnormality adversely affecting the performance shall occur.

## 4.2. Mechanical Performance

6. Shock							
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.						
	<table border="0"> <tr> <td>MAX.G: 50G</td> <td>Directions: 6 mutually perpendicular direction</td> </tr> <tr> <td>Duration: 11msec</td> <td>Cycle: 3 cycles about each direction</td> </tr> <tr> <td>Wave Form: Half Sinusoidal</td> <td></td> </tr> </table>	MAX.G: 50G	Directions: 6 mutually perpendicular direction	Duration: 11msec	Cycle: 3 cycles about each direction	Wave Form: Half Sinusoidal	
MAX.G: 50G	Directions: 6 mutually perpendicular direction						
Duration: 11msec	Cycle: 3 cycles about each direction						
Wave Form: Half Sinusoidal							
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

1. Thermal shock	
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 $^{\circ}$ C),30min. $\rightarrow$ 358K(85 $^{\circ}$ C),30min. Transition time: 5min. MAX. No. of cycles: 5 cycles
Pass criteria:	Contact resistance: Shall meet 4.1.1.

2. High temperature life	
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 $^{\circ}$ C) Duration: 250 hours
Pass criteria:	Contact resistance: Shall meet 4.1.1. Contact retention force: Shall meet 4.2.3.

3. Humidity(Steady state)	
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 $^{\circ}$ 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.

4. Humidity(Cycling)	
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 $^{\circ}$ C) Humidity: 90~98%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.

4.3. Environmental Performance

5. Salt water 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: $308 \pm 2K$ ( $35 \pm 2^\circ C$ ) Salt water 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: $313 \pm 2K$ ( $40 \pm 2^\circ C$ ) Relative humidity: $80 \pm 5\%RH$ Gas: H <sub>2</sub> S $3 \pm 1ppm$ 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. Solder ability	
Reference standard:	-
Test conditions:	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.
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.

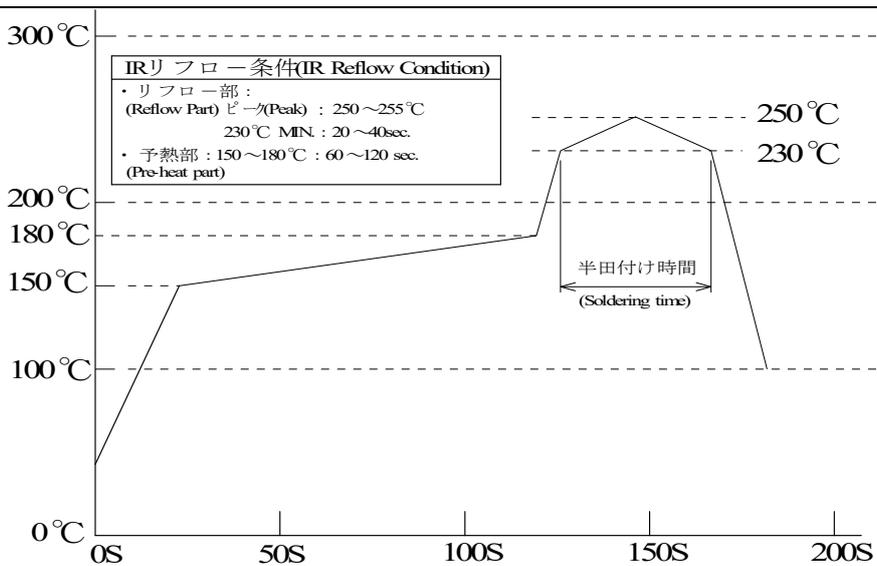


Fig.2

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:  $350^{\circ}\text{C} \pm 10$   
Application time of soldering iron:  $5 \pm 1$  sec.  
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					
Salt Water Spray								2				
H2S Gas									2			
Solder ability										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 = 0.12mm

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

6. Precautions for Handling Cable Connectors

Refer to instruction manual : HIM-08004 for the handling of CABLINE-VS.