CABLINE®-VS

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

Product Specification

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

Rev.	ECN	Date	Prepared by	Checked by	Approved by
17	S24204	May 29, 2024	T. Ono	M. Nakamura	T. Masunaga
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

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 ℃～85 ℃) (Containing temperature rise by current.)
Operating Humidity: 85% max.

3.3 Storage Conditions

Storage Temperature: 248 to 333K(-25℃ to 60℃)
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 to 308K(15℃ to 35℃)
Pressure: 866hPa to 1066hPa (650mmHg to 800mmHg)
Relative Humidity: 45 to75% 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.

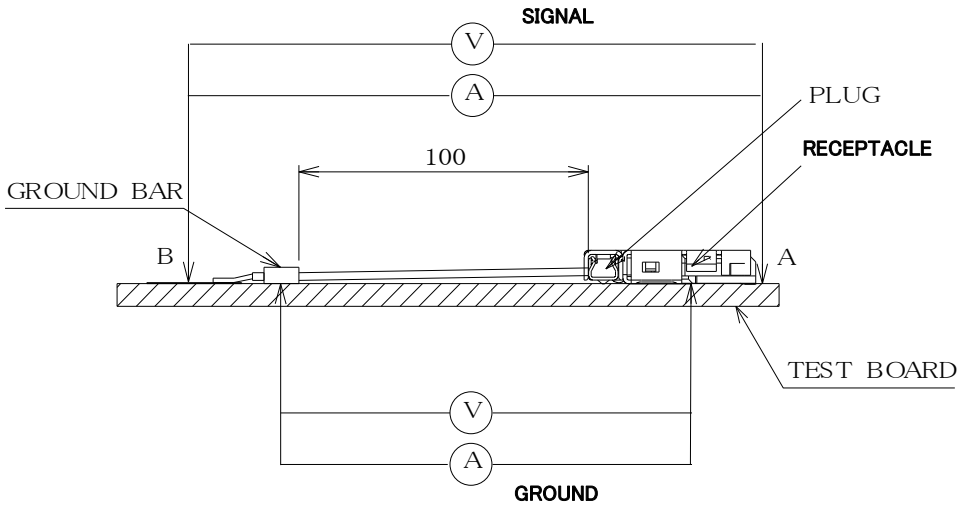


Fig.1

Pass Criteria:	Signal Contact Initial: 140 mΩ MAX.(AWG#32) 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: ⊿R40 mΩ MAX. Ground Shell Initial: 50 mΩ MAX. After Testing: ⊿R 40 mΩ MAX.	Initial contains the following conductor resistance of a cable 100 mm. 60 mΩ MAX.(AWG#32) 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)

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 abnormalities such as creeping discharge, flashover, insulator breakdown 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 ⊿T 30 ℃ 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 20 P Initial: 9.45 N MAX. 30cycles: 9.45 N MAX. 30 P Initial: 12.15 N MAX. 30cycles: 12.15 N MAX. 40 P Initial: 16.20 N MAX. 30cycles: 16.20 N MAX. 50 P Initial: 20.25 N MAX. 30cycles: 20.25 N MAX. Un-mating Force 20 P Initial: 2.00 N MIN. 30cycles: 2.00 N MIN. 30 P Initial: 3.00 N MIN. 30cycles: 3.00 N MIN. 40 P Initial: 4.00 N MIN. 30cycles: 4.00 N MIN. 50 P Initial: 5.00 N MIN. 30cycles: 5.00 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 30 cycles at a speed 25±3 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 on the contact head and push the contact along the direction opposite to the contact insertion at a speed of 25±3 mm/min. Measure the force when the contact dislodges the connector.
Pass Criteria:	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±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.

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: 1.52 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

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

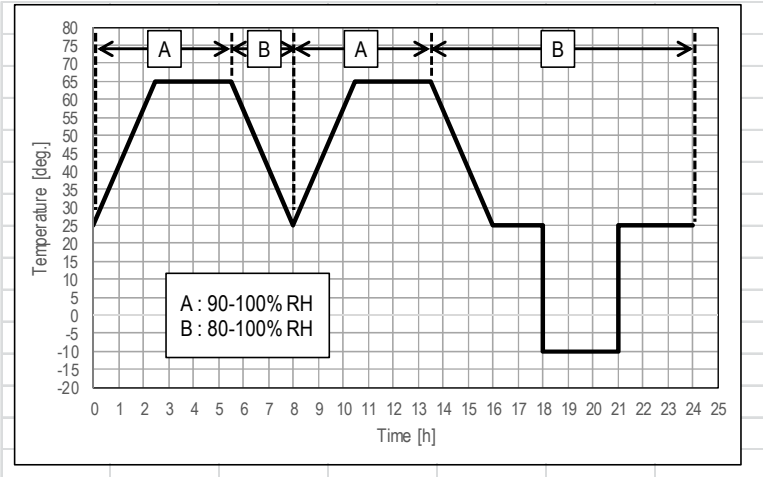
4.3. Environmental Performance

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 ℃),30min.→358K(85 ℃),30min. Transition Time: 5min. MAX. Cycle: 5 cycles
Pass Criteria:	Contact Resistance: Shall meet 4.1.1. Appearance: No abnormality adversely affecting the performance shall occur.

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±2K (85±2 ℃) 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 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±2K (40±2 ℃) 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.

4.3. Environmental Performance

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 ℃) 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.

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 ℃) 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_2S 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 ℃) Relative Humidity: 80±5%RH Gas: H_2S 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. Solder Ability	
Reference Standard:	-
Test Conditions:	Dip the solder tine of the contact in the solder bath at 518±5K（245±5 ℃） 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.

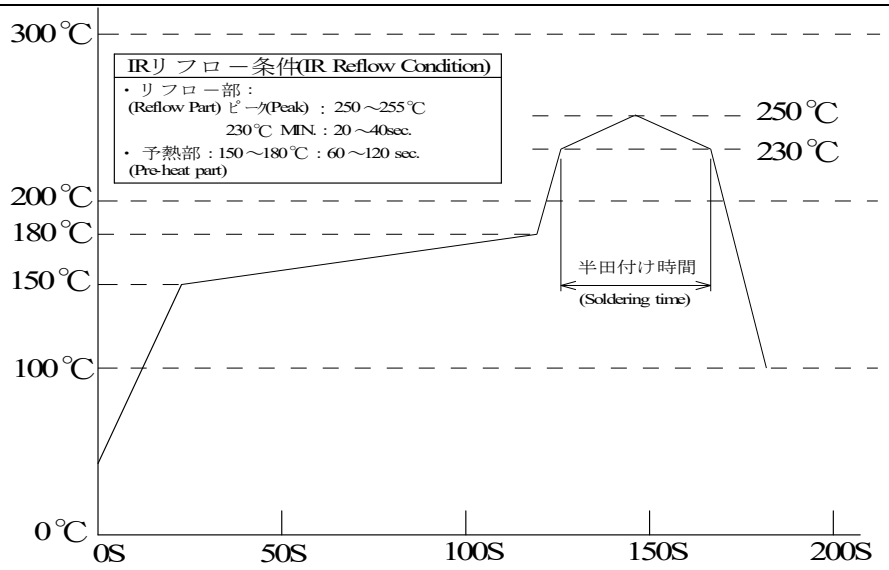


Fig.2

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

3. Soldering Heat Resistance (Soldering Iron)	
Reference Standard:	-
Test Conditions:	Operating Temperature: 613~633K (350 ℃±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

Details of the Testing Groups A to M 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											
		Un-mating Force	3,7											
	2	Durability	4						4 (10 cycles)					
	3	Contact Retention Force		1,3										
	4	Cable Retention Force	8											
	5	Vibration			2									
	6	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_2S 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.	10 pcs.	10 pcs.	5 pcs.

※Numbers indicate test sequences.

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.