

# CABLINE® V Connector (Red Phosphorus Free)

Part No. Plug: 20345-##\*T-##R Receptacle: 20347-##\*E-##R

## Product Specification

Qualification Test Report No. TR-08068

5	S22049	March 9, 2022	R.Hatano	T.Tanigawa	H.Ikari
4	S18670	October 19, 2018	K.Hashimoto		H.Ikari
3	S18168	March 7, 2018	K.Ikeshita		T.Matsumoto
2	S15560	November 19, 2015	H.Mashima		J.Tateishi
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## 1. Scope

CABLINE V Connector is wire to board connector for SGC Cable and Discrete cable on pitch of 0.4mm.

## 2. Objectives

This specification covers the requirements for product performance and test methods of CABLINE V Connector.

## 3. Ratings

Amperage	.....	0.1A AC/DC [AWG#44] (Per contact pin / Up to 40 contacts) 0.24A AC/DC [AWG#42] (Per contact pin/ Up to 40 contacts) 0.3A AC/DC [AWG#40] (Per contact pin / Up to 40 contacts) 0.8A AC/DC [AWG#36] (Per contact pin / Up to 12 contacts) *Testing by a real machine is recommended because temperature rise may affected by actual situation
Voltage	.....	100V AC (Per contact pin)
Storage Condition	: 248~333K (-25°C~+60°C) / 85%RH MAX. / for 1 year	*Non condensing
Operating Temperature	: 233~358K (-40°C~+85°C) / 85%RH MAX.	*Containing temperature rise by energizing

## 4. Construction, Material and Finish

### 4.1 Plastic Components

- (1) Plug Housing ..... Heat Resisting Plastics, UL94V-0, Black  
Red Phosphorus Free
- (2) Receptacle Housing ... Heat Resisting Plastics, UL94V-0, Black  
Red Phosphorus Free

### 4.2 Metallic Components

#### (1) Plug

- (a) Contact .....Copper Alloy  
Plating .....Au Plating
- (b) Shell A .....Stainless steel or Copper Alloy  
Plating ..... ①Sn-Cu Plating  
②Sn Plating
- (c) Shell B .....Copper Alloy  
Plating ..... ①Sn-Cu Plating  
②Sn Plating

#### (2) Receptacle

- (a) Contact ..... Copper Alloy  
Plating ..... Au Plating
- (b) Shell ..... Copper Alloy  
Plating ..... ①Sn-Cu Plating  
②Sn Plating

## 5. Test Methods and Performance

### 5.1 Test Condition

Unless otherwise specified, all tests and measurements shall be performed under the following conditions in accordance with MIL-STD-202G.

Temperature	.....	288~308K (15~35°C)
Humidity	.....	45~75%
Atmospheric Pressure	....	866~1066hPa (650~800 mmHg)

## 5.2 Test and Performance

### 5.2.1 Electrical

#### (1) Contact Resistance

A. Testing : 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 method. 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.

B. Requirements : Contact resistance shall meet the values in Table 1.

Table1 Contact Resistance

Initial	Contact	AWG#36 ... 235mΩMAX. AWG#40 ... 560mΩMAX. AWG#42 ... 650mΩMAX. AWG#44 ... 1040mΩMAX.
	Ground Shell	50mΩ MAX.(Stainless steel) 40mΩ MAX.(Phosphor Bronze)
After Testing	Contact	40mΩ MAX. (ΔR)
	Ground Shell	40mΩ MAX. (ΔR)

Initial contains the conductor resistance 160mΩ~195mΩ(AWG#36),  
485mΩ~520mΩ(AWG#40),  
585mΩ~620mΩ(AWG#42),  
1000mΩMAX.(AWG#44) of a cable 100mm.

#### (2) Dielectric Withstanding Voltage

A. Testing : 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.

B. Requirements : No abnormalities such as creeping discharge, flashover, insulator breakdown occur.

#### (3) Insulation Resistance

A. Testing : Mate the plug and receptacle connector together, then apply DC500V between the neighboring contacts in accordance with MIL-STD-202G, Method 302.

B. Requirements : Insulation resistance shall not be less than 1000MΩ in the initial and 500 MΩ after testing.

## 5.2.1 Electrical

### (4) Temperature rising

A. Testing : Mate the plug and receptacle connector together, then apply rating current per contact pin.

B. Requirement :  $\Delta T$ : 30°C MAX. over ambient.

## 5.2.2 Mechanical

### (1) Mating/Un-mating Force

A. Testing : 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 30th cycles at a speed  $25 \pm 3$ mm/min. along the mating axis.

B. Requirements : Mating and un-mating force before and after the testing shall meet the values in Table 2.

Table2 Mating/Unmating Force

		Mating Force	Unmating Force
Without Lock	10P	20.0N (2.04kgf) MAX.	2.5N (0.26kgf) MIN.
	15P	22.5N (2.30kgf) MAX.	3.0N (0.31kgf) MIN.
	20P	25.0N (2.55kgf) MAX.	3.5N (0.36kgf) MIN.
	25P	27.5N (2.81kgf) MAX.	4.0N (0.41kgf) MIN.
	30P	30.0N (3.06kgf) MAX.	4.5N (0.46kgf) MIN.
	35P	32.5N (3.32kgf) MAX.	5.0N (0.51kgf) MIN.
	40P	35.0N (3.57kgf) MAX.	5.5N (0.56kgf) MIN.
With Lock	10P	20.0N (2.04kgf) MAX.	4.0N (0.41kgf) MIN.
	15P	22.5N (2.30kgf) MAX.	5.0N (0.51kgf) MIN.
	20P	25.0N (2.55kgf) MAX.	5.5N (0.51kgf) MIN.
	25P	27.5N (2.81kgf) MAX.	6.0N (0.61kgf) MIN.
	30P	30.0N (3.06kgf) MAX.	7.0N (0.61kgf) MIN.
	35P	32.5N (3.32kgf) MAX.	8.0N (0.82kgf) MIN.
	40P	35.0N (3.57kgf) MAX.	8.5N (0.82kgf) MIN.

### (2) Durability

A. Testing : 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.

B. Requirements : Contact resistance before and after the testing shall meet the values in Table 1.

## 5.2.2 Mechanical

### (3) Contact Retention Force

A. Testing : 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.

B. Requirements : Plug contact retention force shall not be less than 0.6N (61.2gf).

Receptacle contact retention force shall not be less than 0.6N(61.2gf).

### (4) Cable Retention Force

A. Testing : Place the plug connector on the push-on/pull-off machine, then apply force on the cable along the direction at a speed of 25±3mm/min.

Measure the force when the cable dislodges the plug connector.

B. Requirements : Cable retention force shall not be less than the values in Table 3.

Table3 Cable Retention Force

10P	4.90N (0.50kgf) MIN.
15P	7.35N (0.75kgf) MIN.
20P	9.80N (1.00kgf) MIN.
25P	12.25N (1.25kgf) MIN.
30P	14.70N (1.50kgf) MIN.
35P	17.15N (1.75kgf) MIN.
40P	19.60N (2.00kgf) MIN.

### (5) Vibration

A. Testing : 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 1 min.

Directions ······ Three mutually perpendicular direction.

Total Amplitude ····· 1.52mm

Sweep duration ···· 2 hours for each direction, a total of 6 hours.

B. Requirements : Contact resistance: Shall meet the values in Table 1.

Electrical discontinuity: No electrical discontinuity greater than 1μs shall occur.

Appearance: No abnormality adversely affecting the performance shall occur.

## 5.2.2 Mechanical

### (6) Shock

A. Testing : Solder the receptacle connector to the test board, then mate plug connector, and place them on the shock machine. The apply the following shock in accordance with MIL-STD-202G, Method 213B, Condition A.

During the testing run 100mA DC check electrical discontinuity.

MAX. G . . . . . 50G

Duration . . . . . 11msec.

Wave Form . . . . . Half Sinusoidal

B. Requirements : Contact resistance: Shall meet the values in Table 1.

Electrical discontinuity: No electrical discontinuity greater than 1 $\mu$ s shall occur.

Appearance: No abnormality adversely affecting the performance shall occur.

## 5.2.3 Environmental

### (1) Thermal Shock

A. Testing : 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 107G, Condition B.

Temperature . . . . . 218K [30 min.]  $\rightarrow$  358K [30 min.]

(-55 $^{\circ}$ C [30 min.]  $\rightarrow$  +85 $^{\circ}$ C[30 min.]

Transition time . . . . . 5 min. MAX.

No. of cycles . . . . . 5cycles

B. Requirements : Contact resistance before and after the testing shall meet the values in Table 1.

### (2) High Temperature Life

A. Testing : 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 108A, Condition B.

Temperature . . . . . 358 $\pm$ 2K (85 $\pm$ 2 $^{\circ}$ C)

Duration . . . . . 250 hours

B. Requirements : Contact resistance before and after the testing shall meet the values in Table 1.

Contact retention force before and after the testing shall meet 5.2.2.(3).

## 5.2.3 Environmental

### (3) Humidity (Steady State)

A. Testing : 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

B. Requirements : Contact resistance before and after the testing shall meet the values in Table 1, dielectric withstanding voltage shall meet 5.2.1.(2), insulation resistance shall meet 5.2.1.(3).

### (4) Humidity (Cycling)

A. Testing : 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  
No. of cycles ···· 10cycles [=240 hours]

B. Requirements : Contact resistance before and after the testing shall meet the values in Table, dielectric withstanding voltage shall meet 5.2.1.(2), insulation resistance shall meet 5.2.1.(3).

### (5) Salt Water (Spray)

A. Testing : 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

B. Requirements : Contact resistance before and after the testing shall meet the values in Table 1.

## 5.2.3 Environmental

### (6) Gas : H<sub>2</sub>S

A. Testing : Solder the receptacle connector to the test board, then mate plug connector, and expose them to the following environment.

Chamber temperature . . . . . 313±2K (40±2°C)  
Gas . . . . . H<sub>2</sub>S     3ppm  
Humidity . . . . . 80±5%  
Duration . . . . . 96 hours

B. Requirements : Contact resistance : Shall meet the values in Table 1.  
Appearance : No abnormality adversely affecting the performance shall occur.

## 5.2.4 Others

### (1) Solderability

A. Testing : Dip the solder tine of the contact in the solder bath at 518±5K(245±5°C) for 5±0.5sec. After immersing the tine in the flux of RMA or R type for 5 to 10 seconds.

B. Requirements : More than 95% of the dipped surface shall be evenly wet.

### (2) Soldering Heat Resistance

#### Reflow

A. Testing :     ①Reflow part  
                    Peak 523~527K (250~255°C)  
                    503K (230°C)MIN.             20~40sec.  
                    ②Pre-heat part  
                    423~453K(150~180°C)     60~120sec.  
                    \*The number of times of Reflow is within 2.  
                    \*\*Refer to Reflow temperature profile

B. Requirements : No deformation nor defect adversely affecting the performance occur.

#### Soldering iron

A. Testing :     Operating temperature : 613~633K (340~360°C)  
                    Application time of soldering iron : 4~6sec.  
                    The number of times of Application : 3 □

B. Requirements : No deformation nor defect adversely affecting the performance occur.



## 5.2.5. Test Sequence and Sample Quantity

Table4 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												
Unmating 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					
Gas (H <sub>2</sub> S)									2				
Solderability										1			
Soldering Heat Resistance											1		
Sample QTY.	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.

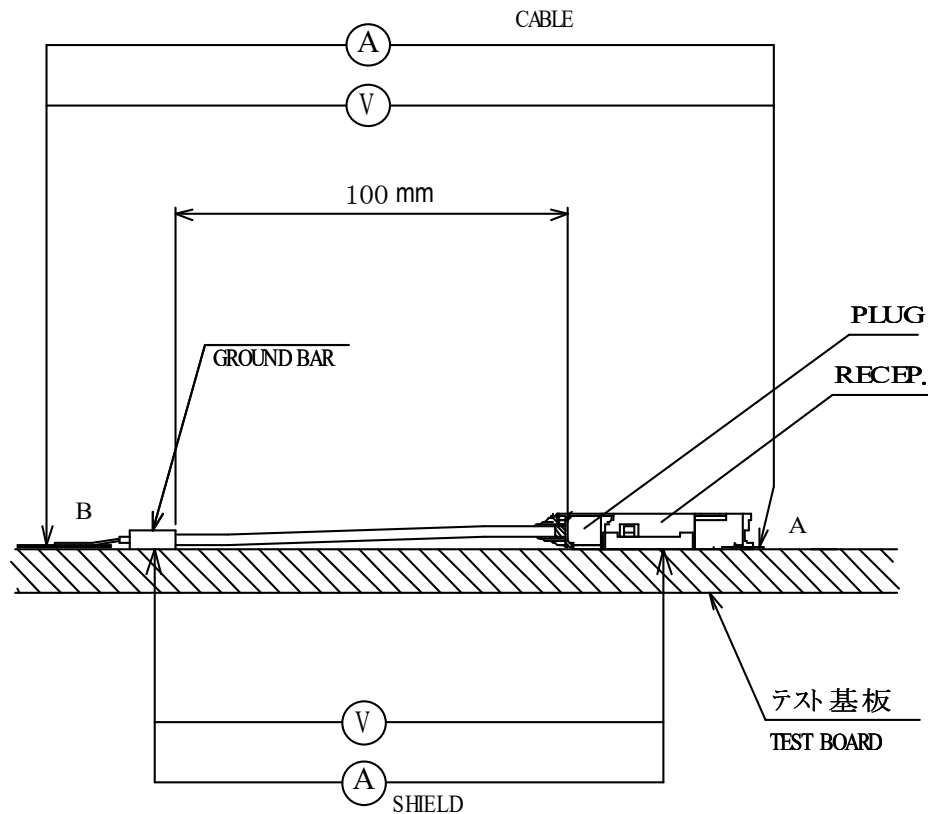
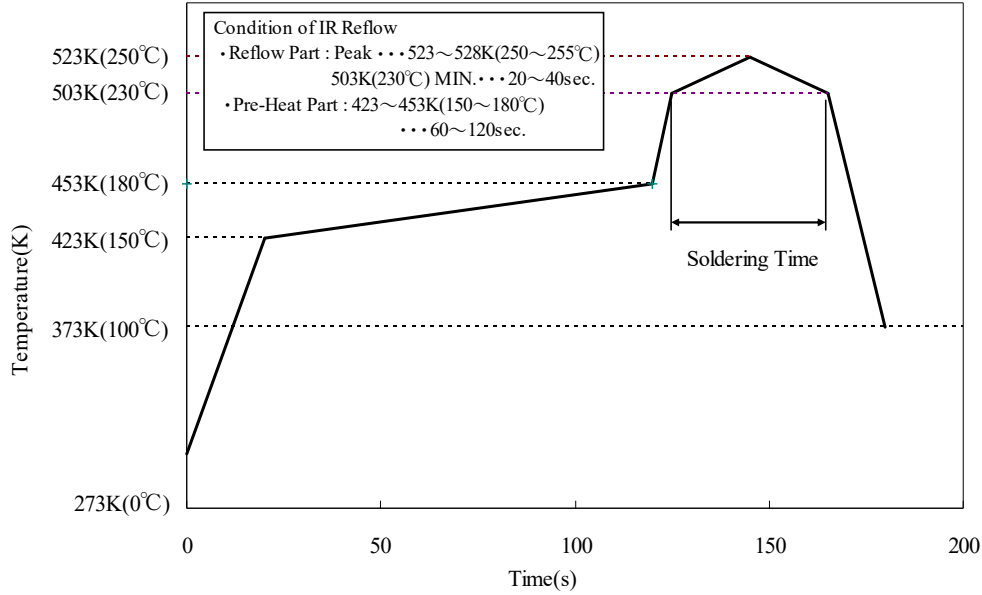
※The number of group is test sequence.

## 6. Reflow Temperature Profile

Recommended thickness of METAL MASK :  $t=0.12\text{mm}$

Recommended Aperture Rate : 100 %

※The pattern dimensions refer to a drawing.



Contact Resistance =  $R_{AB}$

Fig.1 Contact Resistance