

CABLINE®-CAL

Part No. Plug: 20728-0**T-#1 Receptacle: 20729-0**E-##

Product Specification

Qualification Test Report No. TR-17036

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1. Scope

This Product Specification defines the test conditions and the performances of the CABLINE-CAL Connector, a wire-to-board connector of 0.40mm contact pitch.

2. Product Name and Parts No.

2.1 Product Name

CABLINE-CAL

2.2 Parts No.

Plug: 20728-0**T-#1

Receptacle: 20729-0**E-##

3. Rating

3.1 Applicable Cable

Micro Coax ...AWG#[44, 42, 40]

Discrete ...AWG#[38, 36, 34]

3.2 Operating Conditions

Amperage: 0.1A AC/DC [AWG#44] (per contact)

0.24A AC/DC [AWG#42] (per contact)

0.3A AC/DC [AWG#40] (per contact)

0.5A AC/DC [AWG#38] (per contact/for POWER)

0.8A AC/DC [AWG#36] (per contact/for POWER)

1.0A AC/DC [AWG#34] (per contact/for POWER)

※Testing by a real machine is recommended because temperature rise may be affected by actual situation.

Voltage: 100V AC (per a contact)

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)

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 apply 20mV MAX. DC open circuit voltage and 10mA MAX. DC closed circuit current. Measure the contact resistance of signal and GROUND at the section shown in Fig.1 by the four terminal methods.

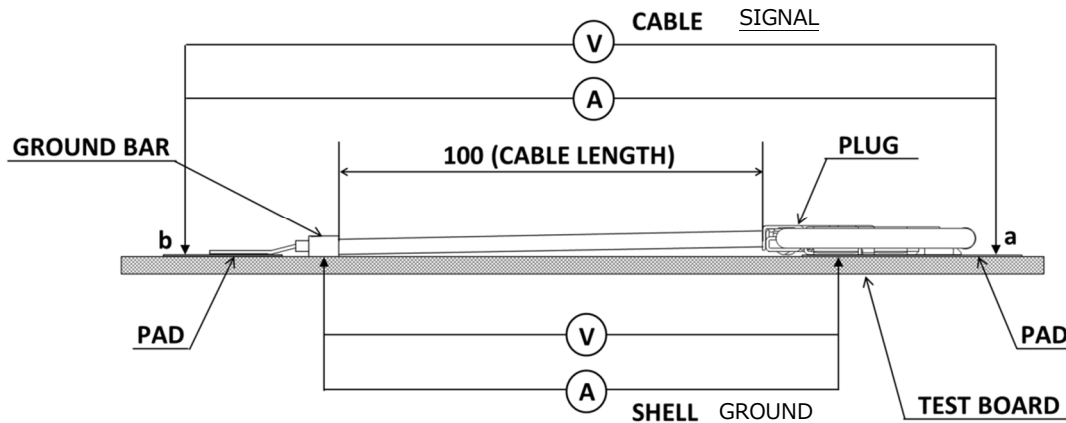


Fig.1 Contact Resistance

Pass criteria:	Signal Contact	Initial value contains the following conductor resistance of a cable 100mm.
	Initial : 180 mΩMAX.(AWG#34)	100mΩMAX.(AWG#34)
	275 mΩMAX.(AWG#36)	195mΩMAX. (AWG#36)
	360 mΩMAX.(AWG#38)	280mΩMAX. (AWG#38)
	600 mΩMAX.(AWG#40)	520mΩMAX. (AWG#40)
	700 mΩMAX.(AWG#42)	620mΩMAX. (AWG#42)
	1080 mΩMAX.(AWG#44)	1000mΩMAX.(AWG#44)
	After testing : ΔR 40mΩ MAX.	
	GROUND	
	Initial : 50 mΩ MAX.	
	After testing : ΔR40mΩ 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 inner contact and the ground contact.

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 for a minute.

Pass criteria: No abnormalities such as creeping discharge, flashover, insulator breakdown occur.

4.1. Electrical Performance

4. Temperature rising	
Reference standard:	-
Test conditions:	Mate the plug and receptacle connector together, and apply rating current per contact. Measure delta T over ambient.
Pass criteria:	Over ambient ΔT_{30} °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. Repeat mating/unmating 30 cycles at a speed 25 ± 3 mm/min. along the mating axis. Measure the mating and unmating force at the initial and after 30cycles.
Pass criteria:	<p>Mating force</p> <p>30 P Initial: 12.0 N MAX. 30cycles: 12.0 N MAX.</p> <p>40 P Initial: 16.0 N MAX. 30cycles: 16.0 N MAX.</p> <p>Unmating force</p> <p>30 P Initial: 1.8 N MIN. 30cycles: 1.8 N MIN.</p> <p>40 P Initial: 2.4 N MIN. 30cycles: 2.4 N MIN.</p>

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 unmating 30cycles 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 to the contact from opposite direction of the contact insertion at a speed of 25 ± 3 mm/min. Measure the force when the contact dislodges from 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 pull the cable along the cable axis at a speed 25 ± 3 mm/min. Measure the force when the discontinuity occurs.
Pass criteria:	<p>30P: 11.8 N MIN.</p> <p>40P: 12.4 N MIN.</p>

4.2. Mechanical Performance

5. Vibration	
Reference standard:	MIL-STD-202 G, Method 201
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 directions. 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

6. Shock	
Reference standard:	MIL-STD-202 G, Method 213, 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

4.3. Environmental Performance

1. Thermal shock	
Reference standard:	MIL-STD-202 G, Method 107, 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. Cycle: 5 cycles
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

2. High temperature life	
Reference standard:	MIL-STD-202 G, Method 108, 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

4.3. Environmental Performance

3. Humidity(Steady state)	
Reference standard:	MIL-STD-202 G, Method 103, 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

4. Humidity(Cycling)	
Reference standard:	MIL-STD-202 G, Method 106.
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[80]~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. Appearance: No abnormality

5. Salt water spray	
Reference standard:	-
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) Salt water density: 5±1% [by weight] Duration: 48 hours
Pass criteria:	Contact resistance: Shall meet 4.1.1. No abnormality adversely affecting the performance shall occur.

4.3. Environmental Performance

6. H ₂ 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 ₂ 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:	Immerse the contact soldering part to flux of RMA or R type for 5 to 10 seconds, then dip the part into the solder bath of 518±5K (245±5°C) for 5±0.5seconds.
Pass criteria:	More than 95% of the dipped surface shall be evenly wet.

2. Resistance to soldering heat	
Reference standard:	-
Test conditions:	Reflow temperature: See Fig.2. Cycle: 2
<p>IRリフロー条件 (IR Reflow Condition) ・リフロー部 (Reflow Part) 255°C: 30s 217°C: 60~150s ・予熱部 (Pre-heat part) 150~200°C: 60~120s</p> <p>3°C/s MAX</p> <p>260°C MAX. 255°C (30s) 217°C (60~150s) 200°C 150°C 25°C</p> <p>60~120s</p> <p>6°C/s MAX</p> <p>Time 25°C to Peak 8minutes. MAX. Time</p>	
Pass criteria:	No deformation nor defect adversely affecting the performance 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	1,5	1,3	1,5	1,5,7	1,3	1,3			
Insulation Resistance				2,6		2,6	2,8					
D. W. Voltage				3,7		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				4								
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 thickness of METAL MASK : $t=0.10$

Recommended Opening ratio of METAL MASK : 100%

※The pattern dimensions refer to a drawing