

EVAFLEX® 5-HD

Part No. 20952-0**E-02

Product Specification

Qualification Test Report No. TR-20006

3	S22028	January 20, 2022	M.Muro	-	H.Ikari
2	S20326	July 2, 2020	H.Kaneko	M.Muro	Y.Shimada
1	S20297	June 18, 2020	H.Kaneko	M.Muro	Y.Shimada
0	S20053	January 23, 2020	H.Kaneko	M.Muro	H.Ikari
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1. Scope

This Product Specification defines the test conditions and the performances of the EVAFLEX 5-HD Connector, a board-to-FFC/FPC connector of 0.5mm contact pitch.

2. Product Name and Parts No.

2.1 Product Name

EVAFLEX 5-HD

2.2 Parts No.

20952-0**E-02

3. Rating

3.1 Operating Conditions

Amperage : 0.30A AC/DC (Per contact / Up to all contacts)

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

Voltage : 50V AC/DC (per contact)

Operating temperature : 218~358K (-55°C~+85°C)

(Containing temperature rise by current)

Operating humidity : 85% max.

3.2 Storage Conditions

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

Storage humidity : 85% max. (Non-condensing)

Storage period : Maximum storage period

(Within one year from delivery date, under sealed condition.)

3.3 Applicable Lead Thickness

t=0.33±0.03 mm (Contact point)

t=0.50±0.03 mm (GND point)

3.4 Applicable Lead Plating

Au over Ni

4. Test and Performance

Test Condition

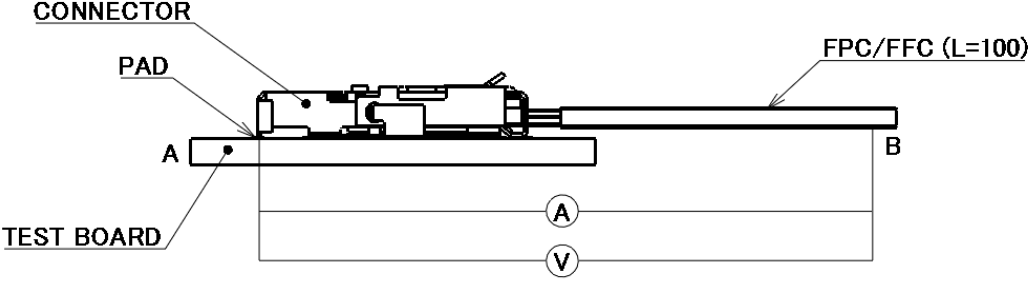
This initial test is equal to it's at shipping condition and unless otherwise specified, all tests and measurements shall be performed under the following conditions in accordance with MIL-STD-202.

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-202, Method 307
Test conditions:	Solder the connector to the test board and connect the applicable Lead, then, measure the contact resistance as shown in Fig.1 by the four terminals method. Apply the open circuit voltage of 20mV MAX. DC and the closed circuit current of 1mA MAX. DC Not containing the conductor resistance of test board and FPC/FFC.
	
$\text{Contact Resistance} = R_{AB} - (\text{FPC/FFC } 100\text{mm Conductor Resistance})$	
Fig.1	
Pass criteria:	Initial: 60 mΩMAX. After testing: ΔR40 mΩ MAX

2. Insulation resistance	
Reference standard:	MIL-STD-202, Method 302
Test conditions:	Solder the connector to the test board and connect the applicable Lead, then apply DC 250 V between the neighboring contacts.
Pass criteria:	Initial: 100 MΩ MIN.

3. Dielectric withstanding voltage	
Reference standard:	MIL-STD-202, Method 301
Test conditions:	Solder the connector to the test board and connect the applicable Lead, 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. Temperature rising	
Reference standard:	-
Test conditions:	Solder the connector to the test board and connect the applicable Lead, then, apply the rating current to each contact and measure temperature rise around the connector.
Pass criteria:	Over ambient ΔT30 °C MAX.

4.2. Mechanical Performance

1. Mating force and Un-mating force

Reference standard: -

Test conditions: Solder the 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 $25\pm 3\text{mm/min}$. along the mating axis.
LOCK shall be released before measuring un-mating force.

Pass criteria: Mating force
24 P Initial: 14.00 N MAX.
Unmating force
24 P Initial: 2.30 N MIN.

2. Durability

Reference standard: -

Test conditions: Solder the 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 $25\pm 3\text{mm/min}$. along the mating axis.

Pass criteria: Contact resistance: Shall meet 4.1.1

3. FFC/FPC Retention Force

Reference standard: -

Test conditions: Set the connector in which the applicable lead is inserted to the push-on/pull-off machine, then un-mate the lead forcedly at the speed of $25\pm 3\text{mm/min}$. along the mating axis.

Pass criteria: FFC/FPC retention force
24 P Initial: 8.5 N MIN.

4. 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 $25\pm 3\text{mm/min}$. Measure the force when the contact dislodges the connector.

Pass criteria: Contact retention force: 0.30N MIN.

5. SHELL retention force

Reference standard: -

Test conditions: Place the connector on the push-on/pull-off machine, then apply force on the shell head and push the shell along the direction opposite to the contact insertion at a speed of $25\pm 3\text{mm/min}$. Measure the force when the shell dislodges the connector.

Pass criteria: SHELL retention force: 1.50N MIN.

6. Vibration

Reference standard: MIL-STD-202, Method 201

Test conditions: Solder the connector to the test board and connect the applicable Lead, then, set 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 $1\mu\text{s}$ shall occur.
Appearance: No abnormality adversely affecting the performance shall occur.

4.3. Environmental Performance

1. Thermal shock	
Reference standard:	MIL-STD-202, Method 107G, Condition A
Test conditions:	Solder the connector to the test board and connect the applicable Lead, then, 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. Appearance: No abnormality adversely affecting the performance shall occur.

2. High temperature life	
Reference standard:	MIL-STD-202, Method 108A, Condition B
Test conditions:	Solder the connector to the test board and connect the applicable Lead, then, expose them to the following environment. Temperature: 358±2K (85±2°C) Duration: 250 hours
Pass criteria:	Contact resistance: Shall meet 4.1.1. Appearance: No abnormality adversely affecting the performance shall occur.

3. Humidity (Steady State)	
Reference standard:	MIL-STD-202, Method 103, Condition A.
Test conditions:	Solder the connector to the test board and connect the applicable Lead, then, 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 adversely affecting the performance shall occur.

4. Humidity (Cycling)	
Reference standard:	MIL-STD-202, Method 106.
Test conditions:	Solder the connector to the test board and connect the applicable Lead, then, expose them to the following environment. Temperature: 263~338K (-10~65°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. Appearance: No abnormality adversely affecting the performance shall occur.

5. Salt water spray	
Reference standard:	MIL-STD-202, Method 101, Condition B.
Test conditions:	Solder the connector to the test board and connect the applicable Lead, then, 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. Appearance: No abnormality adversely affecting the performance shall occur.

4.3. Environmental Performance

6. H₂S gas

Reference standard: -

Test conditions: Solder the connector to the test board and connect the applicable Lead, then, expose them to the following environment.
 Temperature: 313±2K (40±2°C)
 Relative humidity: 80±5%RH
 Gas: H₂S 3±1ppm
 Duration: 96 hours

Pass criteria: Contact resistance: Shall meet 4.1.1.
 Appearance: No abnormality adversely affecting the performance shall occur.

4.4. Others

1. Soldering heat resistance (Reflow)

Reference standard: -

Test conditions: Reflow temperature as shown in Fig.2.
The number of times of Reflow is within 2.

Reflow Condition

•Reflow part

Peak : 533K(260°C)

528K(255°C) : 30sec.

490K(217°C) : 60~150sec.

•Pre-heat part

423K(150°C)~473K(200°C) : 60~120sec.

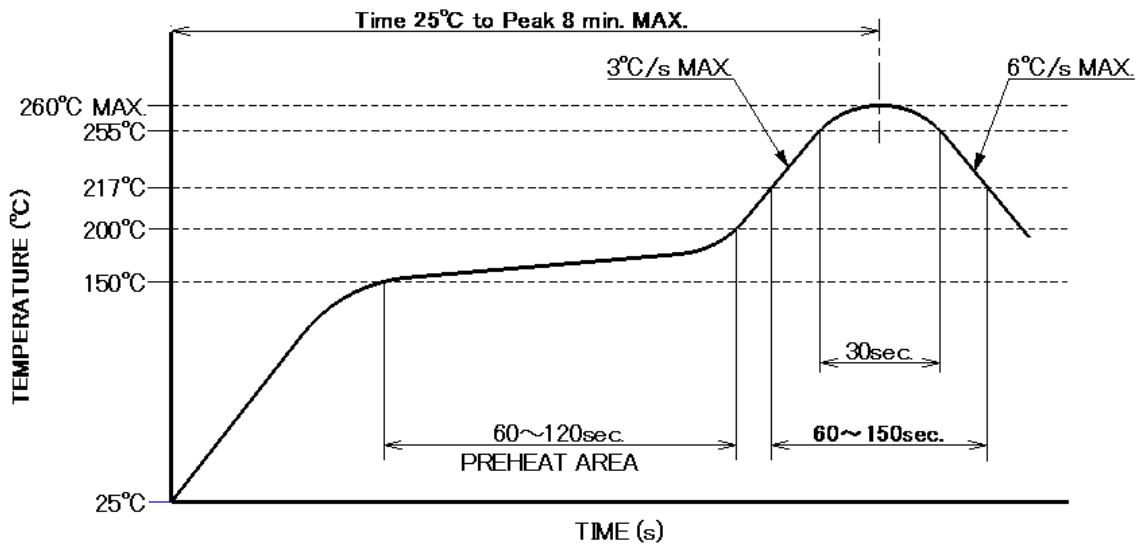


Fig.2

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

2. Soldering heat resistance (Soldering iron)

Reference standard: -

Test conditions: Operating temperature: 663K(390°C)
Heating duration: 3 sec.
Heating times: 2 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	N	P
Contact Resistance	2,6				1,3,5	1,3	1,3	1,5	1,5	1,3	1,3			
Insulation Resistance								2,6	2,6					
D. W. Voltage								3,7	3,7					
Temperature rising														1
Mating Force	1,5													
Un-mating Force	3,7													
Durability	4													
FFC/FPC Retention Force		1												
Contact Retention Force			1											
SHELL Retention Force				1										
Vibration					2									
Shock					4									
Thermal Shock						2								
High Temperature Life							2							
Humidity (Steady State)								4						
Humidity (Cycling)									4					
Salt Water Spray										2				
H ₂ S Gas											2			
Solder ability												1		
Soldering Heat Resistance													1	
Specimen Quantity.	5 pcs.	5 pcs.	20 pcs.	5 pcs.	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

Refer to drawing for the recommended metal mask thickness and opening dimension.

6. Precautions for Handling Connectors

Refer to instruction manual HIM-19004 for the handling of EVAFLEX 5-HD.