

EVAFLEX® 5-VS TYPE CH

Part No. 20720-0**E-02

Product Specification

Qualification Test Report No. TR-16039

3	S23186	June 20, 2023	M. Muro	-	H. Ikari
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Rev.	ECN	Date	Prepared by	Checked by	Approved by

1. Scope

This Product Specification defines the test conditions and the performances of the EVAFLEX 5-VS TYPE CH Connector , a shield FFC to board connector of 0.5mm contact pitch.

2. Product Name and Parts No.

2.1 Product Name

EVAFLEX 5-VS TYPE CH

2.2 Parts No.

20720-0**E-02

3. Rating

3.1 Operating Condition

Amperage : 0.3A AC/DC (per contact)

In case of applying 0.5A AC/DC (per contact), the total current of the whole connector shall be 15.0A or lower.

Voltage : 200V AC/DC (per contact)

Operating Temperature : 233~378K(-40°C~105°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

$t=0.33\pm 0.03$ mm

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-202G.

Temperature ... 288K~308K (15°C~35°C)

Pressure ... 866hPa~1066hPa (650mmHg~800mmHg)

Relative Humidity ... 45~75%R.H.

4.1 Electrical Performance

No	Items	Test Conditions	Specifications
1.	Contact Resistance	Solder the connector to the test board and connect the applicable Lead. Apply the open circuit voltage of 20mV MAX. DC and the closed circuit current of 1mA MAX. DC in accordance with MIL-STD-202G Method 307. Measure the contact resistance as shown in Fig.1 by the four terminals method.	Initial : 60mΩ or less Change Δ R : 40mΩ or less
2.	Insulation Resistance	Solder the connector to the test board and connect the applicable Lead, then, apply DC100V between the neighboring contacts in accordance with MIL-STD-202G, Method 302.	100MΩ or more
3.	Dielectric Withstanding Voltage	Solder the connector to the test board and connect the applicable Lead, then, apply AC 250V (rms) between the neighboring contacts for 1 minute in accordance with MIL-STD-202G, Method 301.	No abnormalities such as creeping discharge, flashover, insulator breakdown occur
4.	Temperature rise	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.	Temperature rise Δ T : 30K (30°C) MAX.
5.	Differential Impedance	Solder the connector to the test board and connect the applicable Lead, then, measure differential impedance with the rise time 250psec.	100±10Ω

4.2 Mechanical Performance

No	Items	Test Conditions	Specifications
1.	Mating and Un-mating Force	Solder the connector to the test board and connect the applicable Lead, then, set the specimen on push-on/pull-off machine. Measure the force at initial and mating/un-mating 30th cycles at a speed of 25±3mm/min. along the mating axis.	<u>Mating Force</u> 0.6N×n MAX. <u>Un-mating Force</u> 0.1N×n MIN. ※“n”is the number of pin
2.	Durability	Solder the connector to the test board and set the specimen on the push-on/pull-off machine. Mate and un-mate 30cycles repeatedly at a speed of 25±3mm/min. Along the mating axis.	[Contact Resistance] Shall meet 4.1.1.
3.	Contact Retention Force	Set the connector on the push-on/pull-off machine and apply force to the contact in the direction opposite to insertion at a speed of 25±3mm/min. Measure the force when the contact came off from the connector.	0.3N / Pin MIN.
4.	FFC Retention Force	Solder the connector to the test board and connect the applicable Lead, then, set the specimen on push-on/pull-off machine. Pull the Lead along the mating axis.	0.3N×n + 6.0N MIN. ※“n”is the number of pin No abnormality in the lock part appearance.
5.	Vibration (1)	Solder the connector to the test board and connect the applicable Lead, then, set them on the vibrator and apply the following vibration in accordance with MIL-STD-202G, Method 201A. During test, apply 100mA DC to check electrical discontinuity. Frequency : 10Hz→55Hz→10Hz/approx 1min. Directions : Three mutually perpendicular direction. Total Amplitude : 1.52mm Sweep duration : 2 hours for each direction, a total of 6 hours.	[Contact Resistance] Shall meet 4.1.1. [Electrical discontinuity] No electrical discontinuity greater than 1μs. [Appearance] No abnormality adversely affecting the performance shall occur
6.	Shock (1)	Solder the connector to the test board, connect the applicable Lead, and set them on the shock machine. Apply the following shock in accordance with MIL-STD-202G, Method 213B, Condition A. During test, apply 100mA DC to check electrical discontinuity. MAX.G : 50G Duration : 11msec Wave Form : Half Sinusoidal Test times : 3 times for each direction, (a total of 18 times.)	[Contact Resistance] Shall meet 4.1.1. [Electrical discontinuity] No electrical discontinuity greater than 1μs. [Appearance] No abnormality adversely affecting the performance shall occur

4.2 Mechanical Performance

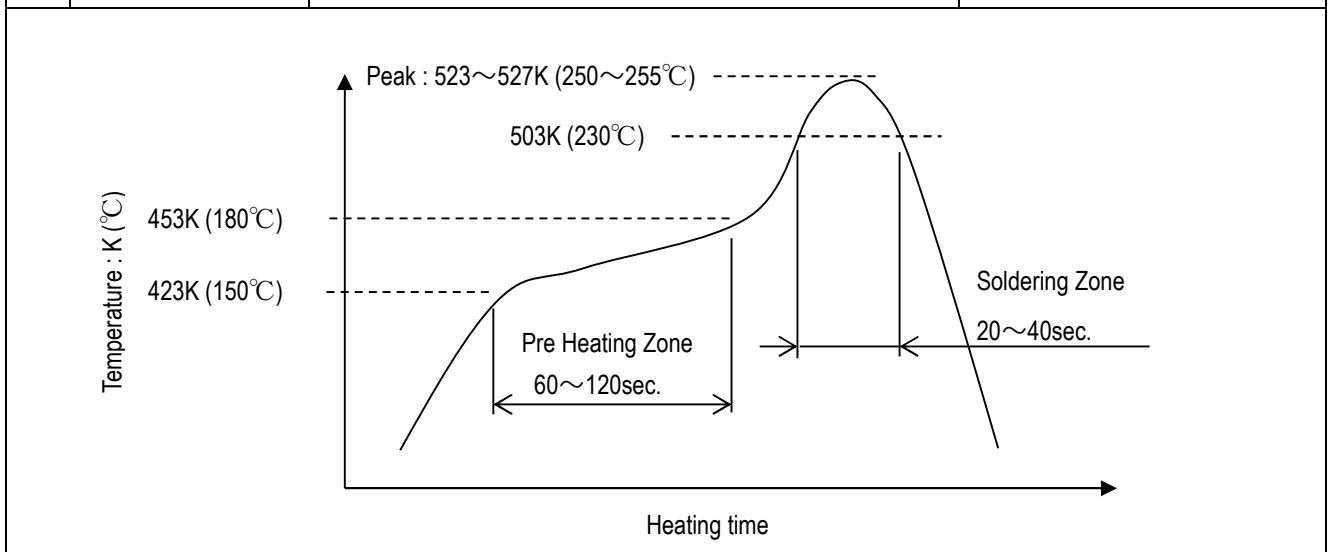
No	Items	Test Conditions	Specifications																											
7.	Vibration (2) & Shock (2)	<p>Solder the connector to the test board and connect the applicable Lead. Repeat mating and un-mating 10 cycles. Then set the specimen on the vibrator and apply the vibration. After that, set the specimen on the shock machine and apply the shock. During tests, apply 100mA DC to check electrical discontinuity. Test conditions comply with USCAR-2 5.4.6 Vibration/Mechanical Shock class V1.</p> <p>(Vibration)</p> <p>Frequency :</p> <p>V1 - Random</p> <table border="1"> <thead> <tr> <th>F (Hz)</th> <th>PSD¹</th> <th>PSD g²/Hz</th> </tr> </thead> <tbody> <tr> <td>5.0</td> <td>0.192</td> <td>0.00200</td> </tr> <tr> <td>12.5</td> <td>23.8</td> <td>0.24800</td> </tr> <tr> <td>77.5</td> <td>0.307</td> <td>0.00320</td> </tr> <tr> <td>145.0</td> <td>0.192</td> <td>0.00200</td> </tr> <tr> <td>200.0</td> <td>1.13</td> <td>0.01180</td> </tr> <tr> <td>230.0</td> <td>0.031</td> <td>0.00032</td> </tr> <tr> <td>1000.0</td> <td>0.002</td> <td>0.00002</td> </tr> <tr> <td>g_{rms}</td> <td>17.74</td> <td>1.81 g</td> </tr> </tbody> </table> <p>Directions : 3 mutually perpendicular direction. Sweep duration : 8 hours for each direction, a total of 24 hours.</p> <p>(Shock)</p> <p>MAX.G : 35G Duration : 5~10msec Wave Form : Half Sinusoidal Test times : 10 times for each direction. (Total of 60 times.)</p>	F (Hz)	PSD ¹	PSD g ² /Hz	5.0	0.192	0.00200	12.5	23.8	0.24800	77.5	0.307	0.00320	145.0	0.192	0.00200	200.0	1.13	0.01180	230.0	0.031	0.00032	1000.0	0.002	0.00002	g_{rms}	17.74	1.81 g	<p>[Contact Resistance] Shall meet 4.1.1. [Electrical discontinuity] No electrical discontinuity greater than 1μs. [Appearance] No abnormality adversely affecting the performance shall occur</p>
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4.3 Environmental Performance

No	Items	Test Conditions	Specifications
1.	Thermal Shock	Solder the connector to the test board and connect the applicable Lead, then, expose them to the following environment. Temperature : 233K(-40°C) : 30min.→378K(105°C) : 30min. Transition time : 5min. MAX. No. of cycles : 1000 cycles	[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
2.	High Temperature Life	Solder the connector to the test board and connect the applicable Lead, then, expose them to the following environment. Temperature : 378±2K (105±2°C) Duration : 1000 hours	[Contact Resistance] Shall meet 4.1.1. [Appearance] No abnormality adversely affecting the performance shall occur
3.	Humidity (Steady State)	Solder the connector to the test board and connect the applicable Lead, then, 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	[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)	Solder the connector to the test board and connect the applicable Lead, then, expose them to the following environment in accordance with MIL-STD-202G, Method 106G. Temperature : 263~338K (-10~65°C) Humidity : 90~98%RH Duration : 10cycles (240hours)	[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	Solder the connector to the test board and connect the applicable Lead, then, 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	[Contact Resistance] Shall meet 4.1.1. [Appearance] No abnormality adversely affecting the performance shall occur
6.	H ₂ S Gas	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 : H ₂ S 3±1ppm Duration : 96 hours	[Contact Resistance] Shall meet 4.1.1. [Appearance] No abnormality adversely affecting the performance shall occur

4.4.Others

No	Items	Test Conditions	Specifications
1.	Solderability	Dip the soldering tip of the contact in the solder bath at $518 \pm 5K$ ($245 \pm 5^{\circ}C$) for 5 ± 0.5 seconds. Use RMA or R type flux and immerse for 5 to 10 seconds.	More than 95% of the dipped surface shall be evenly wet.
2.	Soldering Heat Resistance	<p><Reflow></p> <p><u>Reflow part</u> Peak : $523 \sim 528K$ ($250 \sim 255^{\circ}C$) $503K$ ($230^{\circ}C$) MIN. : $20 \sim 40$ sec.</p> <p><u>Pre-heat part</u> $423 \sim 453K$ ($150 \sim 180^{\circ}C$) : $60 \sim 120$ sec. Reflow shall be within twice. Refer to Reflow temperature profile.</p>	No abnormality adversely affecting the performance shall occur

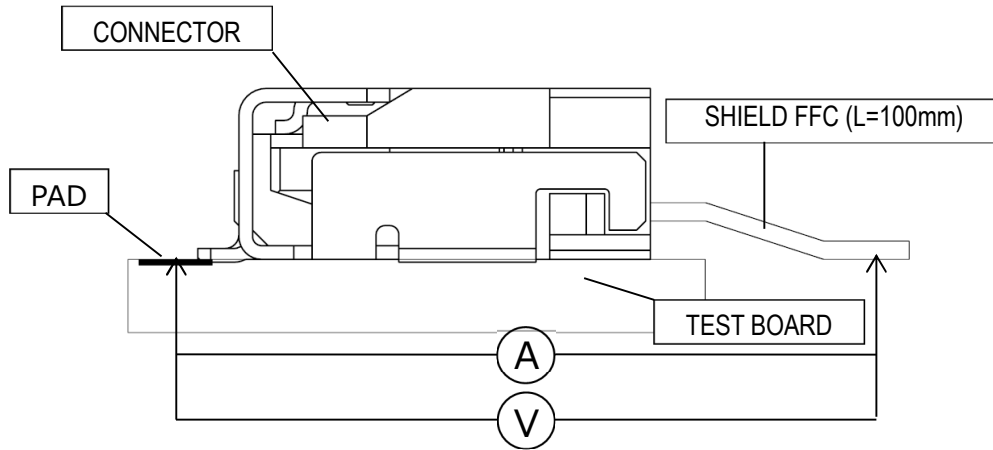


5. Test Sequence and Sample Quantity

Table1 Test Sequence and Sample Quantity

Test Item	Group														
	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q
Contact Resistance			2,6			1,3,5	1,3,5,7	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				
Temp. Rise	1														
Differential Impedance		1													
Mating Force			1,5												
Un-mating Force			3,7												
Durability			4				2 (10 cycles)								
Contact Retention Force				1											
FFC Retention Force					1										
Vibration (1)						2									
Shock (1)						4									
Vibration (2) & Shock (2)							4,6								
Thermal Shock								2							
High Temperature Life									2						
Humidity (Steady State)										4					
Humidity (Cycling)											4				
Salt Water Spray												2			
H ₂ S Gas													2		
Solderability														1	
Soldering Heat Resistance															1
Sample QTY.	5	5	5	20	5	5	5	5	5	5	5	5	5	10	10

※ The number of "group" means test sequence.



$$\text{Contact Resistance} = R_{AB} - (\text{FPC} / \text{FFC } 100\text{mm}(\text{Conductor Resistance}))$$

Fig.1 Contact Resistance

6. Recommended Metal Mask

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

7. Precautions for Handling Cable Connectors

Refer to instruction manual HIM-12003 for the handling of EVAFLEX 5-VS