EVAFLEX® 5-SE

(0.5mm pitch FPC/FFC Conn.)

Part No. 20526-0**E-01

Product Specification

Qualification Test Report No. TR-10048

Rev.	ECN	Date	Prepared by	Checked by	Approved by
9	S22041	January 28, 2022	K.Hashimoto	M.Muro	H.Ikari
8	S18700	October 30, 2018	H.Kaneko		Y.Shimada
7	S18609	September 24, 2018	H.Kaneko		Y.Shimada
6	S18591	September 18, 2018	H.Kaneko		Y.Shimada

1. Scope

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

2. Product Name and Parts No.

2.1 Product Name

EVAFLEX 5-SE

2.2 Parts No.

20526-0**E-01

3. Rating

3.1 Operating Conditions

Amperage : 0.50A AC/DC (per contact)
※Available up to 15Pin
0.35A AC/DC (per contact)
※Available for all Pin
Voltage : 50V AC/DC (per contact)
Operating temperature:
①Using FFC 233～358K(-40℃～+85℃)
※Containing Temperature rise
②Using FPC 233～398K(-40℃～+125℃)
※Containing Temperature rise

Operating humidity: 85% max

3.2 Storage Conditions

Storage temperature: 248～333K(-25℃～60℃)
85%R.H. MAX.
※Non-condensing,Non-freezing
Storage humidity: 85% max. (Non-condensing)
Storage period: Within 1 year after delivery (Our packing state)

3.3 Applicable Lead Thickness

①Using FFC : t=0.3±0.05 mm
②Using FPC : t=0.3±0.03 mm

3.4 Applicable Lead Plating

Au over Ni

4. Test and Performance

Test Condition

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

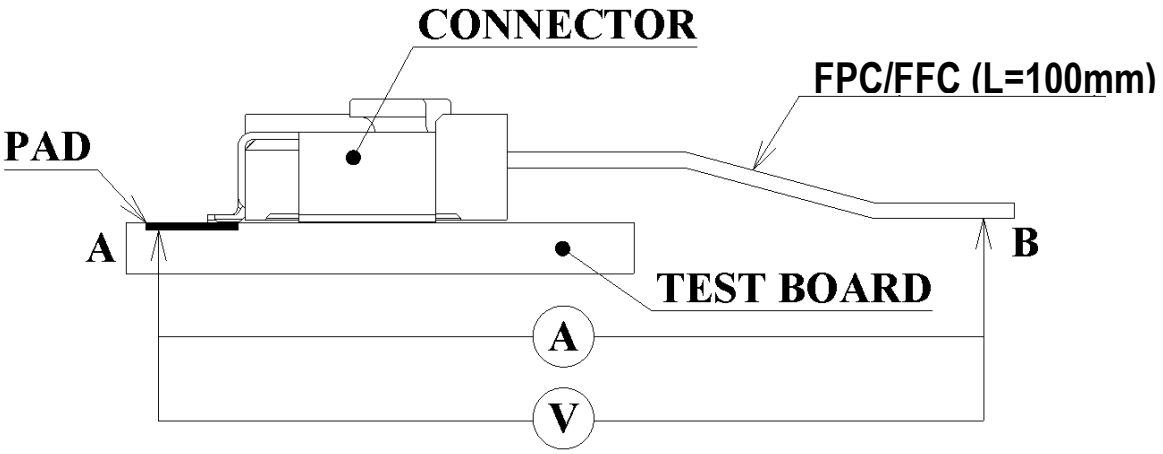
Temperature	・・・・・・・・・・・	288～308K (15～35℃)
Humidity	・・・・・・・・・・・・・	45～75%
Atmospheric Pressure	・・・・	866～1066hPa (650～800 mmHg)

5 Test Method and Performance)

5.1 Electrical Performance

(1) Contact Resistance

A. (Test Method) 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 10mA MAX. DC in accordance with MIL-STD-202G, Method 307. (Not containing the conductor resistance of test board and FPC/FFC.)



Contact Resistance = R_{AB} − (FPC/FFC 100mm Conductor Resistance)

Fig.1 Contact Resistance

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

Table1 Contact Resistance

Initial	70mΩMAX.
After Test	40mΩ MAX. (ΔR)

(2) Dielectric Withstanding Voltage

A. (Test Method) 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.

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

(3) Insulation Resistance

A. (Test Method) Solder the connector to the test board and connect the applicable Lead, then apply DC250V between the neighboring contacts in accordance with MIL-STD-202G, Method 302.

B. (Requirements) Insulation resistance shall be 500MΩ or more.

(4) Temperature rise

A. (Test Method) 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.

B. (Requirements) Temperature rise ΔT: 30K(℃) MAX.

5.2 Mechanical Performance

(1) Mating/Un-mating Force

A. (Test Method) Solder the receptacle connector to the test board, set the specimen to the push-on/pull-off machine, then, mate/unmate them at the speed of 25±3mm/min. along the mating axis and Measure mating/un-mating force at initial and after 30th cycle. LOCK shall be released before measuring un-mating force.

B. (Requirements) Mating/un-mating force before and after test shall meet the values in Table 2.

Table2 Mating/Un-mating Force

	Mating Force	Un-mating Force
10P	6.0N MAX.	0.90N MIN.
15P	9.0N MAX.	1.35N MIN.
22P	13.2N MAX.	1.98N MIN.
30P	18.0N MAX.	2.70N MIN.
40P	24.0N MAX.	3.60N MIN.
45P	27.0N MAX.	4.05N MIN.
50P	30.0N MAX.	4.50N MIN.
55P	33.0N MAX.	4.95N MIN.
60P	36.0N MAX.	5.40N MIN.

(2) Durability

A. (Test Method) Solder the receptacle connector to the test board, set the specimen to the push-on/pull-off machine, then, mate/unmate them at the speed of 25±3mm/min. along the mating axis 30 cycles repeatedly.

B. (Requirements) Contact resistance before and after test shall meet the values in Table 1.

(3) FPC/FFC Retention Force

A. (Test Method) Set the connector in which the applicable lead is inserted to the push-on/pull-off machine, then um-mate the lead forcedly at the speed of 25±3mm/min. along the mating axis.

B. (Requirements) FPC/FFC Retention force shall be 25.0N (2.55kgf) or more.
LOCK shall not be deformed.

(4) Contact Retention Force

A. (Test Method) Set the connector to the push-on/pull-off machine and apply force to the contact in the direction opposite to insertion at the speed of 25±3mm/min.
Measure the force when the contact came off from the connector.

B. (Requirements) Contact retention force shall be 0.60N (61gf) or more.

(5) Hold Down Retention Force

A. (Test Method) Set the connector to the push-on/pull-off machine and apply force to the hold down in the direction opposite to insertion at the speed of 25±3mm/min.
Measure the force when the hold down came off from the connector.

B. (Requirements) Hold down retention force shall be 1.47N (150gf) or more.

(6) Vibration

A. (Test Method) Solder the connector to the test board and connect the applied Lead, and place them on the vibrator. During the testing, run 100mA DC to check electrical discontinuity.

Frequency ・・・・・・・・ 10Hz→500Hz→10Hz / approx 15 min.
Directions ・・・・・・・・ Three mutually perpendicular direction
Total Amplitude ・・・・ 1.5mm (10Hz～20Hz)
Accelerative ・・・・・・ 49m/s^2 (5 G) (20Hz～500Hz)
Sweep duration ・・・・ 75 min for each direction, a total of 225 min.)

B. (Requirements) Contact resistance before and after the testing shall meet the values in Table 1.
During the testing, no electrical discontinuity grater than 1μsec. shall occur.
After the testing, There shall be no abnormality in appearance that would adversely affect the performance.

(7) Shock

A. (Test Method) Solder the connector to the test board and connect the applicable Lead, then, set them on the shock machine and apply the following shock in accordance with MIL-STD-202G, Method 213B, Condition C. During the testing, run 100mA DC to check electrical discontinuity.

MAX. G ・・・・・・・・・・ 980m/s^2 (100 G)
Duration ・・・・・・・・・・ 6msec.
Wave Form ・・・・・・・・ Half Sinusoidal
Number of times ・・・・・10 times for each direction, a total of 60 times.

B. (Requirements) Contact resistance before and after test shall meet the values in Table 1.
During the testing, no electrical discontinuity grater than 1μsec. shall occur.
After the testing, There shall be no abnormality in appearance that would adversely affect the performance.

(8) Fretting corrosion

A. (Test Method) Solder the connector to the test board and connect the applied Lead, and place them on fretting corrosion machine. Then apply the following shock, during the testing run 1mA DC check electrical discontinuity.

MAX. G ・・・ 980m/s^2 (100 G)

Cycles ・・・・ 20,000 cycles (50～60Cycles/min.)

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

During the testing, no electrical discontinuity grater than 1μsec. shall occur.

After the testing, There shall be no abnormality in appearance that would adversely affect the performance.

5.3 Environmental Performance

(1) High Temperature Life

①Using FFC

A-1. (Test Method) 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 108A, Condition D.

Temperature ・・・・ 358±2K (85±2℃)

Duration ・・・・・・ 1,000 hours

② Using FPC

A-2. (Test Method) older the connector to the test board and connect the applicable Lead, then, expose them to the following environment.

Temperature ・・・・ 398±2K (125±2℃)

Duration ・・・・・・ 1,000 hours

B. (Requirements) Contact resistance before and after test shall meet the values in Table 1.

(2) High Temperature Operation

A. (Test Method) Solder the connector to the test board and connect the applicable Lead, then, expose them to the following environment.

Temperature ・・・・ 358±2K (85±2℃)

Duration ・・・・・・ 1,000 hours

B. (Requirements) Contact resistance before and after test shall meet the values in Table 1.

(3) Cold Temperature Life

A. (Test Method) Solder the connector to the test board and connect the applicable Lead, then, expose them to the following environment.

Temperature ・・・・ 233±3K (-40±3℃)

Duration ・・・・・・・ 1,000 hours

B. (Requirements) Contact resistance before and after test shall meet the values in Table 1.

(4) Cold Temperature High Temperature Operation

A. (Test Method) Solder the connector to the test board and connect the applicable Lead, then, expose them to the following environment.

Temperature ···· 233±3K (-40±3℃)

Duration ····· 1,000 hours

B. (Requirements) Contact resistance before and after test shall meet the values in Table 1.

(5) High Humidity Life

A.(Test Method) Solder the connector to the test board and connect the applicable Lead, then, expose them to the following environment.

Temperature ···· 333±2K (60±2℃)

Humidity ····· 90～95%RH

Duration ····· 1,000 hours

B. (Requirements) Contact resistance before and after test shall meet the values in Table 1, dielectric withstanding voltage shall meet 5.1.(2), insulation resistance shall meet 5.1.(3).

(6) High Temperature and High Humidity

A. (Test Method) Solder the connector to the test board and connect the applicable Lead, then, expose them to the following environment.

Temperature ···· 333±2K (60±2℃)

Humidity ····· 90～95%RH

Duration ····· 2～4 hours

B. (Requirements) Contact resistance before and during test shall meet the initial value in Table 1.

(7) Thermal Shock

①Using FFC

A-1. (Test Method) Solder the connector to the test board and connect the applicable Lead, then, expose them to the following environment.

Temperature ・・・・・・ 233±2K [30 min.] → 358±2K [30 min.]
(-40±2℃ [30 min.] → +85±2℃ [30 min.])
Transition time ・・・・ 5 min. MAX.
No. of cycles ・・・・・ 1,000 cycles

②Using FPC

A-2. (Test Method) Solder the connector to the test board and connect the applicable Lead, then, expose them to the following environment.

Temperature ・・・・・・ 233±2K [30 min.] → 398±2K [30 min.]
(-40±2℃ [30 min.] → +125±2℃ [30 min.])
Transition time ・・・・ 5 min. MAX.
No. of cycles ・・・・・・100 cycles

B. (Requirements) Contact resistance before and after test shall meet the values in Table 1.

(8) Gas： SO_2

A. (Test Method) Solder the connector to the test board and connect the applicable Lead, then, expose them to the following environment.

Chamber temperature ・・・・ 313 K (40℃)
Gas ・・・・・・・・・・・・・・・・ SO_2 25ppm
Humidity ・・・・・・・・・・・・・ 80%RH
Duration ・・・・・・・・・・・・・ 500 hours

B. (Requirements) Contact resistance before and after the testing shall meet the values in Table 1.
No abnormality adversely affecting the performance shall occur.

(9) Salt Water Spray

A. (Test Method) Solder the connector to the test board and connect the applied Lead, and expose them to the following environment in accordance with MIL-STD-202G, Method 101E, Condition B.

Temperature ・・・・・・・・・308±2 K (35±2℃)
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.
By visual inspection, without noticeable rust.

5.4 Others

(1) Soldering Heat Resistance

(1-1) Reflow

A. (Test Method) ① Reflow part

Peak 533K (260℃)

503K (230℃)MIN. : 40sec MIN.

② Pre-heating part

423～453K(150～180℃) : 120sec. MIN.

Reflow shall be within twice.

Refer to Reflow temperature profile

B. (Requirements) No abnormality adversely affecting the performance shall occur.

(1-2) Soldering iron

A. (Test Method) Operating temperature : 663K (390℃)

Heating duration : 3sec.

Heating times : 2 times

B. (Requirements) No abnormality adversely affecting the performance shall occur.

(2) Solderability

A. (Preprocessing) Expose them to the following environment.

Temperature ···· 358±2K (85±2℃)

Humidity ····· 65%RH

Duration ····· 168 hours

B. (Test Method) ① Reflow part

Peak 503±2K (230±2℃)

498K (225℃)MIN. : 20～30sec.

② Pre-heating part

403～443K(130～170℃) : 45～90sec.

Refer to Reflow temperature profile

C. (Requirements) Fillet is made.(Fillet angle ≦ 90°)

Soldering Heat Resistance	Solderbility
Condition of Reflow ・Reflow Part Peak : 533K (260°C) 503K (230°C) MIN. : 40sec. MIN. ・Pre Heat Part 403~453K (150~180°C) : 120sec. MIN.	Condition of Reflow ・Reflow Part Peak : 503K (230°C±2°C) 498K (225°C) MIN. : 20~30sec. ・Pre Heat Part 403~443K (150~170°C) : 45~90sec.

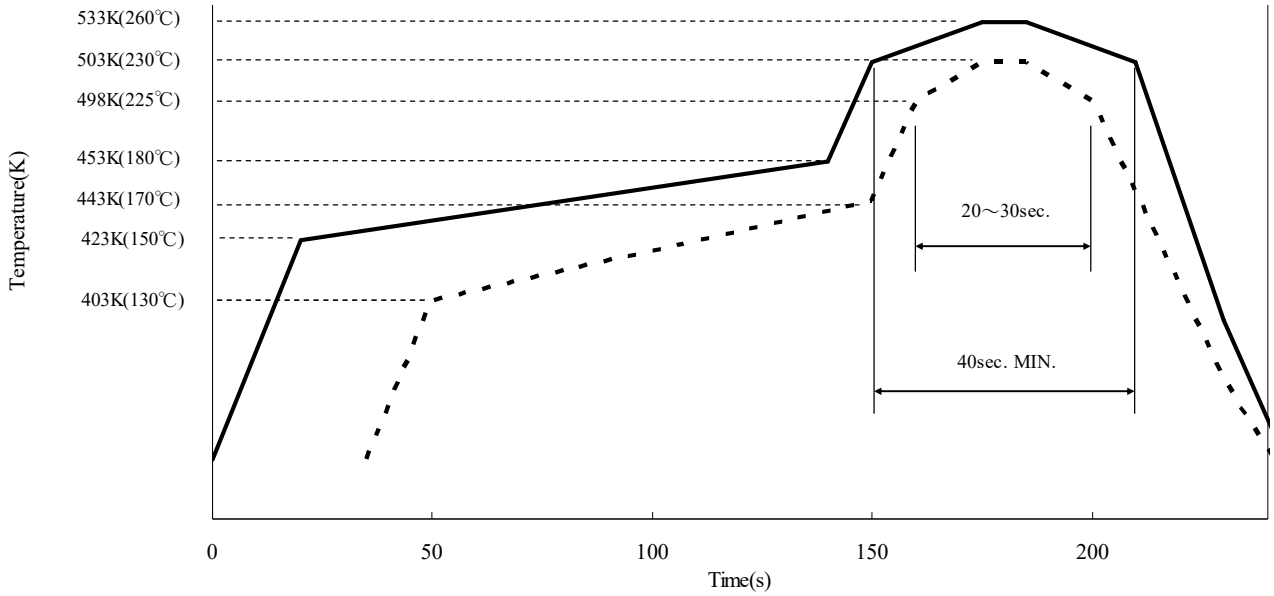


Fig.2 Reflow Temperature Profile

5.5 Test Sequence and Specimen Quantity

Table.3 Test Sequence and Sample Quantity

Test Items	Group																	
	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T
C/T Resistance	2,6				1,3, 5	1,3	1,3	1,3	1,3	1,3	1,5	1,3	1,3	1,3	1,3			
Insulation Resistance											2,6							
D. W. Voltage											3,7							
Temp. rise																		1
Mating Force	1,5																	
Unmating Force	3,7																	
Durability	4																	
FPC/FFC Retention Force		1																
Contact Retention Force			1															
Hold Down Retention Force				1														
Vibration					2													
Shock					4													
Fretting corrosion						2												
High Temp. Life							2											
High Temp. Operation								2										
Cold Temp. Life									2									
Cold Temp. Operation										2								
High Humidity Life											4							
High Humidity												2						
Thermal Shock													2					
GAS (SO2)														2				
Salt Water Spray															2			
Soldering Heat Resist.																1		
Solderability																	1	
Sample QTY.	5 pcs	5 pcs	20 pcs	10 pcs	5 pcs	5 pcs	5 pcs	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. 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-10008 for the handling of EVAFLEX 5-SE