EVAFLEX® 5-SE-VT

Part No. :20539-0**E-01

Product Specification

Qualification Test Report No. TR-12047

6	S22057	February 7, 2022	K.Hashimoto	M.Muro	H.Ikari
5	S15228	May 29, 2015	M.Ishimaru	H.Ikari	E.Kawabe
4	S15021	January 22, 2015	H.Kaneko	Y.Shimada	E.Kawabe
Rev.	ECN	Date	Prepared by	Checked by	Approved by

1. Scope

This specification provides the requirements of product performance and test methods of EVAFLEX 5-SE-VT Connector.

2. Product Name and Parts No.

2.1 Product Name

EVAFLEX 5-SE-VT

2.2 Parts No.

P/N : 20539-0**E-01

3. Ratings

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 ・・・・・・・ 233～358K (-40℃～+85℃)
85%R.H. MAX.
※Containing Temperature rise

Preservation Temperature ・・・・・ 248～333K (-25℃～+60℃) /1 year
85%R.H. MAX.
※Non-condensing,Non-freezing

Applicable Lead Thickness ・・・・・ t=0.30±0.05mm

Applicable Lead Plating ・・・・・・・ Au over Ni

4 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%

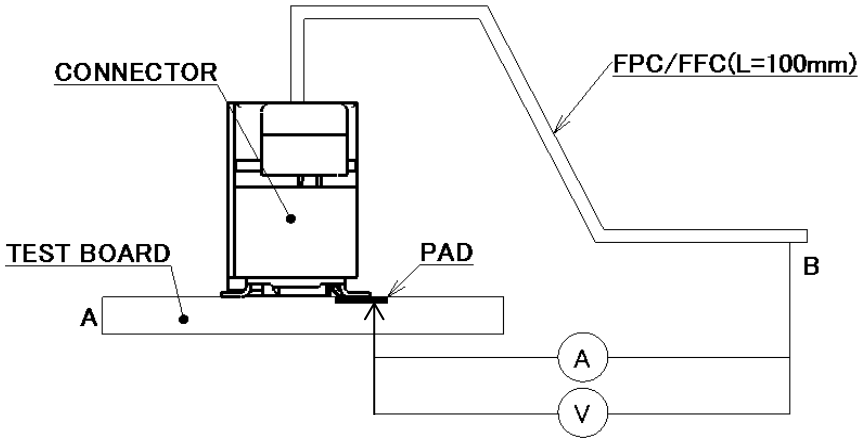
Atmospheric Pressure ・・・・ 866～1066hPa (650～800 mmHg)

5 Test Method and Performance

5.1 Electrical Performance

(1) Contact Resistance

(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

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

Table 1 Contact Resistance

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

(2) Dielectric Withstanding Voltage

(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.

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

(3) Insulation Resistance

(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.

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

(4) Temperature rise

(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.

(Requirement) Temperature rise ΔT: 30K(℃) MAX.

5.2 Mechanical Performance

(1) Mating/Un-mating Force

(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.

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

Table 2 Mating/Un-mating Force

	Mating Force	Un-mating Force
16P	9.6N MAX.	1.44N MIN.
22P	13.2N MAX.	1.98N MIN.
24P	14.4N MAX.	2.16N MIN.
26P	15.6N MAX.	2.34N 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.
60P	36.0N MAX.	5.40N MIN.
80P	48.0N MAX.	7.20N MIN.

(2) Durability

(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.

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

(3) FPC/FFC Retention Force

(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.

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

(4) Contact Retention Force

(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.

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

(5) Hold Down Retention Force

(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.

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

(6) Vibration

(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.

(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

(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.

(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

(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.)

(Requirement) 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

(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

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

(2) High Temperature Operation

(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

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

(3) Cold Temperature Life

(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

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

(4) Cold Temperature High Temperature Operation

(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

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

(5) High Humidity Life

(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

(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

(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

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

(7) Thermal Shock

(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

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

(8) Gas： SO_2

(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

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

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

(9) Salt Water Spray

(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

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

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

5.4 Others

(1) Soldering Heat Resistance

(1-1) Reflow

(Test Method) ①Reflow part

Peak 533K (260℃)

503K (230℃)MIN.： 40sec MIN.

②Pre-heating part

423～453K(150～180℃) ： 120sec. MIN.

Reflow shall be within twice.

Refer to Reflow temperature profile

(Requirements) There shall be no abnormality in appearance that would adversely affect the performance.

(1-2) Soldering iron

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

Heating duration ：3sec.

Heating times ： 2 times

(Requirements) There shall be no abnormality in appearance that would adversely affect the performance.

(2) Solderability

(Preprocessing) Expose them to the following environment.

Temperature ···· 358±2K (85±2℃)

Humidity ····· 65%RH

Duration ····· 168 hours

(Test Method) ①Reflow part

Peak 503±2K (230±2℃)

498K (225℃)MIN. : 20～30sec.

②Pre-heating part

403～443K(130～170℃) : 45～90sec.

Refer to Reflow temperature profile

(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.

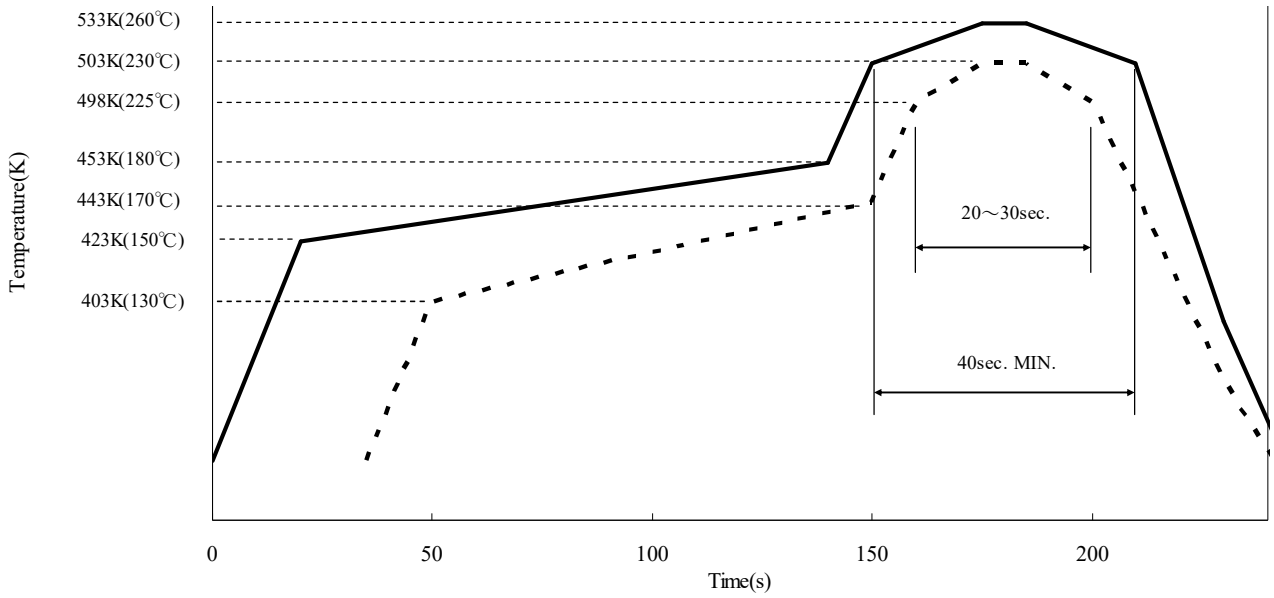


Fig.2 Reflow Temperature Profile

5.5 Test Sequence and Sample Quantity

Table.3 Test Sequence and Sample Quantity

Test Item	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 (SO_2)														2				
Salt Water Spray															2			
Soldering Heat Resistance																1		
Solderability																	1	
Sample QTY.	5 pcs.	5 pcs.	20 pos.	10 pos.	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-11002 for the handling of EVAFLEX 5-SE-VT