

MINIFLEX® 5-BF III

Part No. 20593-0**E-01#

Product Specification

Qualification Test Report No. TR-14023

6	S22035	January 27, 2022	M.Muro	-	H.Ikari
5	S19589	September 26, 2019	K.Hashimoto	M.Muro	H.Ikari
4	S17735	October 6, 2017	H.Aoki	M.Ishimaru	H.Ikari
3	S15027	June 19, 2015	H. Mashima	J. Tateishi	E. Kawabe
Rev.	ECN	Date	Prepared by	Checked by	Approved by

1. Preamble

This Product Specification defines the test conditions and the performances of the MINIFLEX 5-BFN III Connector , a FPC-to-board connector of 0.5mm contact pitch.

2. Product Name and Parts No.

2.1 Product Name

MINIFLEX 5-BFN III

2.2 Parts No.

20593-0**E-01#

3. Ratings

3.1 Operating Conditions

Amperage 0.5A AC/DC (per contact)
The total current flow of the whole connector shall be 13.0A or lower.
Voltage 50V AC/DC (per contact)
Operating Temperature ... 233~358K (-40°C~+85°C)
(Containing temperature rise by current)
Operating Humidity 20~85%RH

3.2 Storage Conditions

Storage Temperature Connector : 233~358K (-40°C~+85°C)
Emboss Packing: 233~323K (-40°C~+50°C)
Storage Humidity 20~85%RH (Non-condensing)
Storage period ... Before opening : 1 year after product is delivered.
After opening, use it as soon as possible.

3.3 Applicable Lead Thickness

t=0.3±0.05
Thermosetting adhesive

4. Test Methods and Performances

4.1 Test Condition

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

Temperature 288~308K (15~35°C)
Humidity 45~75%
Atmospheric Pressure ... 650~800 mmHg

4.2 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-202 Method 307 and measure the contact resistance as shown in Fig.2 by the four terminals method. The conductor resistance of test board and FPC is excluded.	Initial : 50mΩMAX. After testing : 70mΩ MAX.
2.	Insulation Resistance	Solder the connector to the test board and connect the applicable Lead, then, apply DC250V between the neighboring contacts in accordance with MIL-STD-202, Method 302.	100 MΩ MIN.
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 one minute in accordance with MIL-STD-202, Method 301.	No abnormalities such as creeping discharge, flashover, insulator breakdown occur. Leak current shall be less than 1mA.
4.	Temperature rising	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 connector. (0.5A MAX per a contact / 13.0A MAX per a connector.)	Temperature rise ΔT : 30K (°C) MAX.

4.3 Mechanical Performance

No	Items	Test Conditions	Specifications
1.	Actuator operating force	Solder the connector to the test board and insert the applicable Lead to the connector, then, lock & unlock the actuator.	<u>Locking Force</u> Initial : 0.5 N (51gf) × n N MAX. 20cycles : 0.5 N (51gf) × n N MAX. <u>Unlocking Force</u> Initial : 0.10 N (10gf) × n MIN. 20cycles : 0.10 N (10gf) × n MIN. ("n" is the number of pin)
2.	FPC/FFC Retention Force	Insert the applicable Lead into the connector, place them on the push-on/pull-off machine, then, un-mate applicable Lead at the speed of 20±3 mm/min. in parallel with the mating axis.	Initial : 0.18 N (18gf)×n MIN. 20cycles : 0.18 N (18gf)×n MIN. ("n" is the number of pin)
3.	Durability	Solder the connector to the test board, insert the applicable Lead to the connector, then, operate actuator 20 cycles repeatedly.	[Contact Resistance] Shall meet 4.2.1. [Actuator operating force] Shall meet 4.3.1. [FPC/FFC retention force] Shall meet 4.3.2.
4.	Contact Retention Force	Place the connector on the push-on/pull-off machine and apply force to the contact in the direction opposite to insertion at the speed of 25±3 mm/min. Measure the force when the contact came off from the connector.	0.5N (51gf).MIN.
5.	Hold Down Retention Force	Place the connector on the push-on/pull-off machine and apply force to the hold down in the direction opposite to the insertion at a speed of 25±3 mm/min. Measure the force when the hold down came off from the connector.	1.0N (102gf) MIN.
6.	Vibration	Solder the connector to the test board and connect the applicable Lead, then, put them on the vibrator. Apply the following vibration in accordance with MIL-STD-202, Method 201A. During the test, apply the current of 100mA DC to check electrical discontinuity. Frequency : 10Hz→500Hz→10Hz/approx 20 min. 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 4.2.1. [Electrical discontinuity] No electrical discontinuity grater than 1μs shall occur. [Appearance] No abnormality adversely affecting the performance shall occur.
7.	Shock	Solder the connector to the test board and connect the applicable Lead, then, put them on the shock machine. Apply the following shock in accordance with MIL-STD-202, Method 213B, Condition A. During the test, apply the current of 100mA DC to check electrical discontinuity. MAX.G : 50G Duration : 11msec Wave Form : Half Sinusoidal Number of times : 3 times for each direction, a total of 18 times.	[Contact Resistance] Shall meet 4.2.1. [Electrical discontinuity] No electrical discontinuity grater than 1μs shall occur. [Appearance] No abnormality adversely affecting the performance shall occur.

4.4 Environmental Performance

No	Items	Test Conditions	Specifications
1.	High Temperature Life	Solder the connector to the test board and connect the applicable Lead, then, expose them to the following environment in accordance with MIL-STD-202, Method 108A, Condition D. Temperature : $358\pm 2\text{K}$ ($85\pm 2^\circ\text{C}$) Duration : 1000 hours	[Contact Resistance] Shall meet 4.2.1. [Contact Retention Force] Shall meet 4.3.4. [Hold Down Retention Force] Shall meet 4.3.5. [Appearance] No abnormality adversely affecting the performance shall occur.
2.	Low Temperature Life	Solder the connector to the test board and connect the applicable Lead, then, expose them to the following environment in accordance with JIS-C-0020. Temperature : $233\pm 2\text{K}$ ($-40\pm 2^\circ\text{C}$) Duration : 500 hours	[Contact Resistance] Shall meet 4.2.1. [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-202, Method 103B, Temperature : $333\pm 2\text{K}$ ($60\pm 2^\circ\text{C}$) Humidity : 90~95%RH Duration : 500 hours	[Contact Resistance] Shall meet 4.2.1. [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-202, Method 106G. Temperature : 298~338K ($25\sim 65^\circ\text{C}$) Humidity : 90~98%RH Duration : 10 cycles (240hours)	[Contact Resistance] Shall meet 4.2.1. [Insulation Resistance] Shall meet 4.2.2. [Dielectric Withstanding Voltage] Shall meet 4.2.3. [Appearance] No abnormality adversely affecting the performance shall occur.
5.	Thermal Shock	Solder the connector to the test board and connect the applicable Lead, then, expose them to the following environment in accordance with MIL-STD-202, Method 107G, Condition A-3. Temperature : 218K (-55°C):30 min. → 358K ($+85^\circ\text{C}$):30 min. Transition Time : 5min. MAX. No. of cycles : 100 cycles	[Contact Resistance] Shall meet 4.2.1. [Appearance] No abnormality adversely affecting the performance shall occur.

4.4 Environmental Performance

No	Items	Test Conditions	Specifications
6.	Gas : H ₂ S+ SO ₂	Solder the connector to the test board and connect the applicable Lead, then, expose them to the following environment. Chamber temperature : 313±2K (40±2°C) Gas : H ₂ S (3ppm)+SO ₂ (10ppm) Humidity : 75±3%RH Duration : 96 hours	[Contact Resistance] Shall meet 4.2.1. [Appearance] No abnormality adversely affecting the performance shall occur.
7.	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-202, Method 101E, Condition B. Temperature:308±2 K (35±2°C) Salt water density : 5±1% [by weight] Duration : 48 hours	[Contact Resistance] Shall meet 4.2.1. [Appearance] No abnormality adversely affecting the performance shall occur.

4.5 Others

No	Items	Test Conditions	Specifications
1.	Solderability	Expose the connector to the following environment for preparation and dip the soldering area of the contact into the solder bath at 528 ± 2 K ($255 \pm 2^\circ\text{C}$) in accordance with EIAJ-ET7404 (Quick heating method). The solder paste of M705-221MB (SENJU METAL INDUSTRY Co.,Ltd.) shall be used. <Condition of Pretreatment> Temperature : 378K (105°C) Humidity : 100%RH Duration : 4 hours	Zero cross time is 3 second MAX. More than 95% of the dipped surface shall be evenly wet.
2.	Soldering Heat Resistance	<Reflow> ① Pre-heat part $423 \sim 453\text{K}$ ($150 \sim 180^\circ\text{C}$) : 60~120sec. ② Reflow part 503K (230°C) MIN. : 30~60sec. 533K (260°C) peak The reflow shall be within 2 times.	[Contact Resistance] Shall meet 4.2.1. [Appearance] No abnormality adversely affecting the performance shall occur.

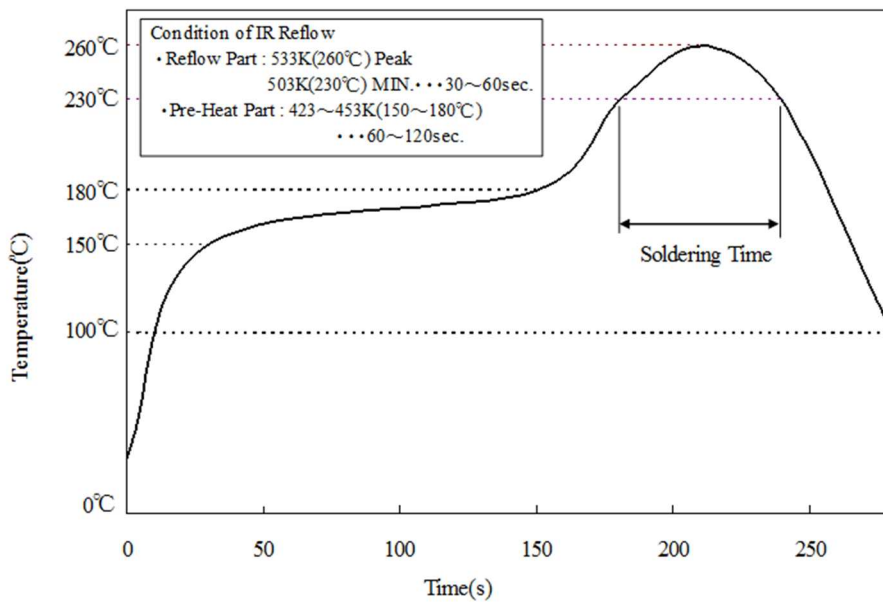


Fig.1 Reflow Temperature Profile-1

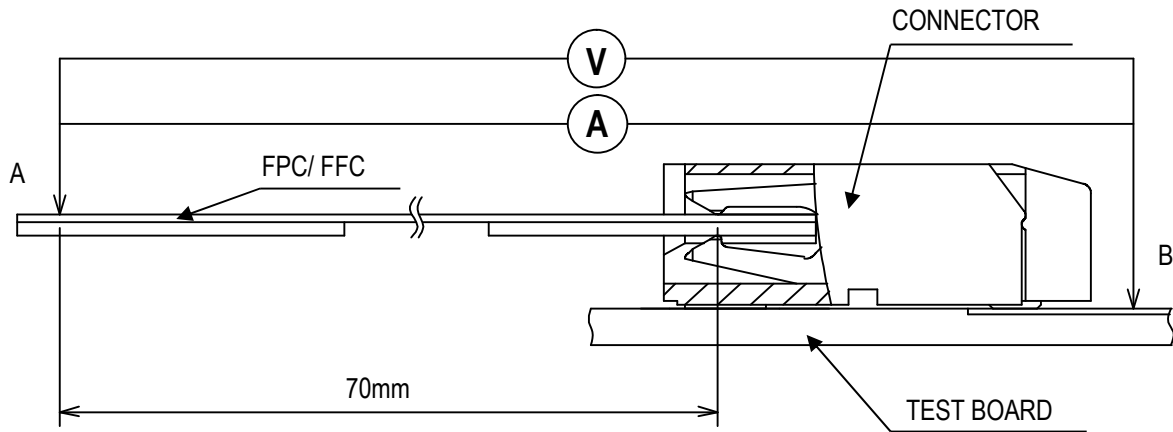
4.6 Test Sequence and Sample Quantity

Table1 Test Sequence and Sample Quantity

Test Items	Group												
	A	B	C	D	E	F	G	H	I	J	K	L	M
Contact Resistance		2,6		1,3,5	1,5	1,3	1,3	1,5	1,3	1,3	1,3		2
Insulation Resistance								2,6					
D.W.Voltage								3,7					
Temp. rise	1												
Act Locking Force		1,5											
Act Un-locking Force		3,7											
FPC/FFC Retention Force			1,3										
Durability		4	2										
Contact Retention Force					2,6								
Hold Down Retention Force					3,7								
Vibration				2									
Shock				4									
High Temperature Life					4								
Low Temperature Life						2							
Humidity (Steady State)							2						
Humidity (Cycling)								4					
Thermal Shock									2				
Gas : H ₂ S+ SO ₂										2			
Salt Water Spray											2		
Solderability												1	
Soldering Heat Resist.													1
Sample QTY.	5 pcs	5 pcs	10 pcs	5 pcs	15 pcs	5 pcs	5 pcs	10 pcs	5 pcs	5 pcs	5 pcs	10 pcs	5 pcs

Numbers in group means test sequence.

【Measurement method of contact resistance】



Contact Resistance = R_{AB} - Resistance of a 70mm length of FPC/FFC.
Fig. 2 Contact Resistance

5. Recommended Metal Mask

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

6. Precautions for Handling Cable Connectors

Refer to instruction manual HIM-06004 for the handling of MINIFLEX 5-BFN III