

MINIFLEX® 5-FF

Part No. 20647-0**E-01

Product Specification

Qualification Test Report No. TR-14129

4	S22033	January 25, 2022	M.Muro	-	H.Ikari
3	S19600	September 27, 2019	S.Shigekoshi	M.Muro	H.Ikari
2	S16317	May 26, 2016	H.Kaneko	-	J.Tateishi
1	S15051	January 30, 2015	T.Ogino	-	E.Kawabe
Rev.	ECN	Date	Prepared by	Checked by	Approved by

1. Scope

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

2. Product Name and Parts No.

2.1 Product Name

MINIFLEX 5-FF

2.2 Parts No.

20647-0**E-01

3. Rating

3.1 Applicable cable

Applicable Lead Thickness : $t=0.30\pm 0.05$

Thermosetting adhesive

3.2 Operating Condition

Amperage : 0.5A DC (per contact)

0.35A DC (Available for all pin)

Voltage : 50V AC (per contact)

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

(Containing temperature rise by current)

※Using 150°C heat resistant FPC : 233~398K (-40°C~125°C)

Operating Humidity : 90% max.

3.3 Storage Conditions

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

Storage Humidity : 90% max. (Non-condensing)

Storage period : Maximum storage period: Within one year from delivery date, under sealed condition.

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

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 : 40mΩ MAX. After testing : \triangle R20mΩ MAX.
2	Insulation Resistance	Solder the connector to the test board and connect the applicable Lead, then, apply DC500V between the neighboring contacts in accordance with MIL-STD-202, Method 302.	500 MΩ MIN.
3	Dielectric Withstanding Voltage	Solder the connector to the test board and connect the applicable Lead, then, apply AC 200V (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.
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.	Over ambient. ΔT : 30°C MAX.

4.2. Mechanical Performance

No	Items	Test Conditions	Specifications
1	Cable Retention Force	Insert the applicable Lead into the connector, place them on the push-on/pull-off machine, then, un-mate the Lead at the speed of $25\pm 3\text{mm/min}$. along the mating axis. ($t=0.3\text{mm}$ when using)	Initial : $0.4\text{ N (40.8gf)}\times n$ MIN. ("n" is the number of pin)
2	Durability	Solder the connector to the test board, insert FPC to the connector, then, operate actuator 20cycles repeatedly.	[Contact Resistance] Shall meet 4.1.1.
3	Contact Retention Force	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.	Contact Retention Force shall not be less than 0.2 N.
4	Hold down Retention Force	Place the connector on the push-on/pull-off machine, then apply force on the H/D head and push the H/D along the direction opposite to the H/D insertion at a speed of $25\pm 3\text{mm/min}$. Measure the force when the contact dislodges the connector.	Hold down Retention Force shall not be less than 0.5 N.
5	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 1mA DC to check electrical discontinuity. Frequency : $10\text{Hz}\rightarrow 55\text{Hz}\rightarrow 10\text{Hz}$ / approx 1 min. Directions : Three mutually perpendicular direction. Total Amplitude : 1.50mm Cycle : 10cycles	[Contact Resistance] Shall meet 4.1.1. [Electrical discontinuity] No electrical discontinuity grater than $1\mu\text{s}$ shall occur. [Appearance] No abnormality adversely affecting the performance shall occur.
6	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 213, Condition C. During the test, apply the current of 1mA DC to check electrical discontinuity. MAX.G : 100G Duration : 6msec Wave Form : Half Sinusoidal Number of times : 3 times for each direction, a total of 18 times.	[Contact Resistance] Shall meet 4.1.1. [Electrical discontinuity] No electrical discontinuity grater than $1\mu\text{s}$ shall occur. [Appearance] No abnormality adversely affecting the performance shall occur.

4.3. Environmental Performance

No	Items	Test Conditions	Specifications
1	Thermal Shock	<p>① Solder the connector to the test board and connect the applicable Lead, then, expose them to the following environment. Temperature : 233K (-40°C) : 30 min. → 378K (+105°C) : 30 min. No. of cycles : 100 cycles</p> <p>② Solder the connector to the test board and connect the applicable Lead, then, expose them to the following environment. Temperature : 233K (-40°C) : 30 min. → 398K (+125°C) : 30 min. No. of cycles : 100 cycles ※Using 150°C heat resistant FPC</p>	<p>[Contact Resistance] Shall meet 4.1.1.</p> <p>[Insulation Resistance] Shall meet 4.1.2.</p> <p>[Dielectric Withstanding Voltage] Shall meet 4.1.3.</p> <p>[Appearance] No abnormality adversely affecting the performance shall occur.</p>
2	High Temperature Life	<p>① 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 : 500 hours</p> <p>② Solder the connector to the test board and connect the applicable Lead, then, expose them to the following environment. Temperature : 398±2K (125±2°C) Duration : 1000 hours ※Using 150°C heat resistant FPC</p>	<p>[Contact Resistance] Shall meet 4.1.1.</p> <p>[Contact Retention Force] Shall meet 4.2.3.</p> <p>[Appearance] No abnormality adversely affecting the performance shall occur.</p>
3	Humidity (Steady State)	<p>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, Condition B. Temperature : 313±2K (40±2°C) Humidity : 90~95%RH Duration : 96 hours</p>	<p>[Contact Resistance] Shall meet 4.1.1.</p> <p>[Insulation Resistance] Shall meet 4.1.2.</p> <p>[Dielectric Withstanding Voltage] Shall meet 4.1.3.</p> <p>[Appearance] No abnormality adversely affecting the performance shall occur.</p>
4	Humidity (Cycling)	<p>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 [263]~338K (25 [-10]~65°C) Humidity : 90~98%RH Duration : 10cycles (240hours)</p>	<p>[Contact Resistance] Shall meet 4.1.1.</p> <p>[Insulation Resistance] Shall meet 4.1.2.</p> <p>[Dielectric Withstanding Voltage] Shall meet 4.1.3.</p> <p>[Appearance] No abnormality adversely affecting the performance shall occur.</p>
5	Cold Temperature Life	<p>Solder the connector to the test board and connect the applicable Lead, then, expose them to the following environment. Temperature : 233 K (-40°C) Duration : 96 hours</p>	<p>[Contact Resistance] Shall meet 4.1.1.</p> <p>[Appearance] No abnormality adversely affecting the performance shall occur.</p>

4.3. Environmental Performance

No	Items	Test Conditions	Specifications
6	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 A. Temperature : $308\pm 2K$ ($35\pm 2^{\circ}C$) Salt water density : $5\pm 1\%$ [by weight] Duration : 96 hours	[Contact Resistance] Shall meet 4.1.1. [Appearance] No abnormality adversely affecting the performance shall occur.
7	SO ₂ Gas	Solder the connector to the test board and connect the applicable Lead, then, expose them to the following environment. Chamber temperature : $313\pm 2K$ ($40\pm 2^{\circ}C$) Gas : SO ₂ 25±5ppm Humidity : 80±5%RH Duration : 96 hours	[Contact Resistance] Shall meet 4.1.1. [Appearance] No abnormality adversely affecting the performance shall occur.
8	H ₂ S Gas	Solder the connector to the test board and connect the applicable Lead, then, expose them to the following environment Temperature : $313\pm 2K$ ($40\pm 2^{\circ}C$) Relative Humidity : 80±5%RH Gas : H ₂ S 10~15 ppm 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	Solder ability	Dip the solder tine of the contact in the solder bath at $508\pm 5K$ ($235\pm 5^{\circ}C$) for 2 ± 0.5 seconds after immersing the tine in the flux of RMA or R type for 5 to 10 seconds in accordance.	More than 95% of the dipped surface shall be evenly wet.
2	Soldering Heat Resistance	Reflow temperature profile 5. The number of times of Reflow is within 2.	No abnormality adversely affecting the performance shall occur.

4.5 Test Sequence and Sample Quantity

Table1 Test Sequence and Sample Quantity

Test Item	Group															
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	
Contact Resistance	1,3			1,3,5	1,5	1,3	1,5	1,5	1,3	1,3	1,3	1,3				
Insulation Resistance					2,6		2,6	2,6								
D. W. Voltage					3,7		3,7	3,7								
Temp. Life															1	
Cable Retention Force		1														
Contact Retention Force			1,3													
Hold down Retention Force			1,3													
Durability	2															
Vibration				2												
Shock				4												
Thermal Shock					4											
High Temperature Life			2			2										
Humidity (Steady State)							4									
Humidity (Cycling)																
Cold Temp. Life									2							
Salt Water Spray										2						
SO ₂ Gas											2					
H ₂ S Gas												2				
Solder ability													1			
Soldering Heat Resistance														1		
Sample QTY.	5 pcs.	5 pcs	20 pos.	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.

5. Reflow Temperature Profile

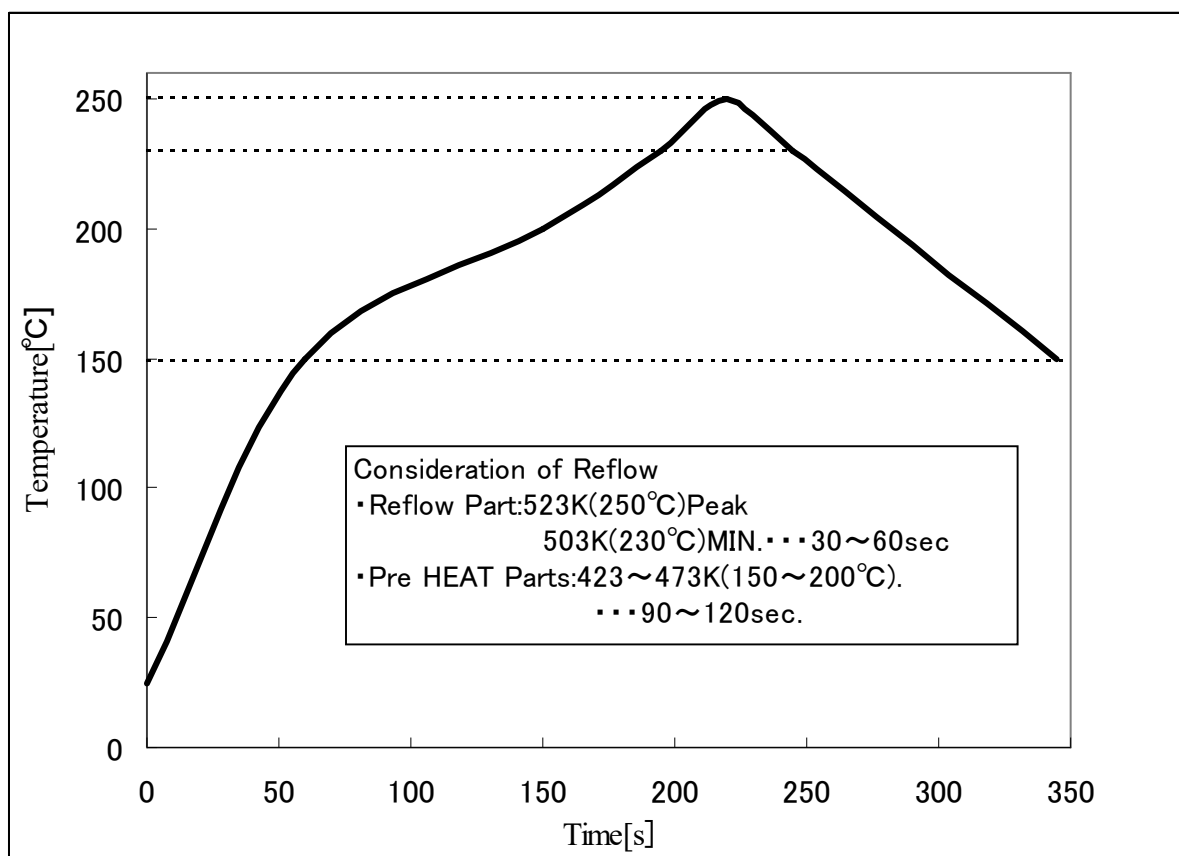
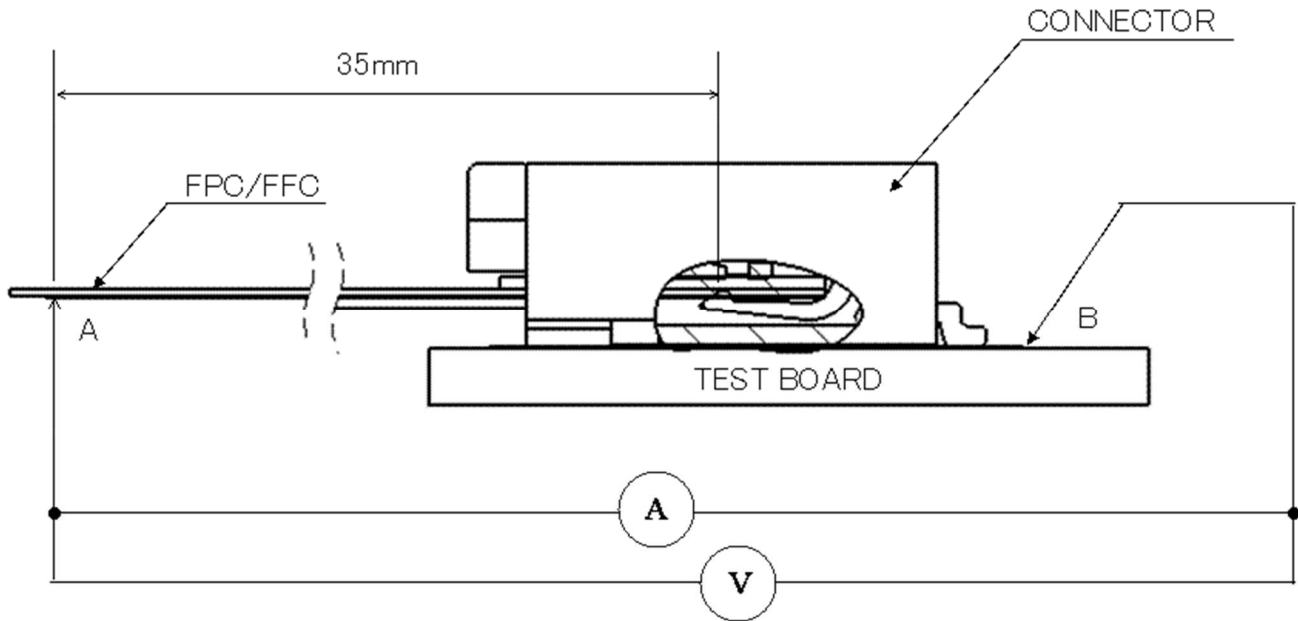


Fig. 1 Reflow Temperature Profile

6. Measuring method

Measuring method of Contact Resistance



Contact Resistance = R_{AB} - Resistance of a 35 mm length of FPC cable.

Fig. 2 Contact Resistance

7. Recommended metal mask

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

8. Precautions for Handling Cable Connectors

Refer to instruction manual HIM-15007 for the handling of MINIFLEX 5-FF