

MINIFLEX® 3-BFN LK TYPE

Part No. 20599-0**E-01#

Product Specification

Qualification Test Report No. TR-13085

4	S21548	November 8, 2021	S.Shigekoshi	M.Muro	H.Ikari
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1	S13464	December 2, 2013	Y.S		E.K
Rev.	ECN	Date	Prepared by	Checked by	Approved by

1. Scope

This Product Specification defines the test conditions and the performances of the MINIFLEX 3-BFN LK TYPE Connector , a FPC-to-board connector of 0.3mm contact pitch.

2. Product Name and Parts No

2.1 Product Name

MINIFLEX 3-BFN LK TYPE

2.2 Parts No.

20599-0**E-01#

3. Ratings

3.1 Operating Conditions

Amperage 0.3A DC (per contact)
Voltage 50V AC (per contact)
Operating Temperature 233~358K (-40°C~+85°C)
(Containing temperature rise by current)
Operating Humidity 20~80%RH

3.2 Storage Conditions

Storage Temperature Connector : 233~358K (-40°C~+85°C)
Emboss Packing : 233~328K (-40°C~+55°C)
Storage Humidity Connector & Emboss Packing : 20~85%RH
Storage period Maximum storage period: Within one year from delivery date, under sealed condition.

3.3 Applicable Lead Thickness

$t=0.20\pm 0.03$ (FPC)
Thermosetting adhesive

4. Test Methods and Performance :

4.1 Test Condition

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.

4.2 Test and Performance

4.2.1 Electrical Performance

(1) Contact Resistance

(Test Method) 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 10mA MAX. DC in accordance with MIL-STD-202G 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.

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

Table1 Contact Resistance

Initial	60mΩ MAX.
After Test	ΔR= 40mΩ MAX.

(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 creeping discharge, flashover, nor insulator breakdown shall 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 not be less than 100MΩ.

(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 (30°C) MAX.

4.2.2 Mechanical Performance

(1) Actuator operating force

(Test Method) Solder the connector to the test board and insert FPC to the connector, then, lock & unlock the actuator.

(Requirements) Actuator operating force before and after test shall meet the values in Table 2.

Table2 Operating Force

n : Pos.	Locking Force	Unlocking Force
Initial	0.3 N (31gf) ×(n+2) MAX.	0.02N (2.0gf) ×(n+2) MIN.
20 th cycles	0.3 N (31gf) ×(n+2) MAX.	0.02N (2.0gf) ×(n+2) MIN.

※ "n" is the number of pin

(2) FPC Retention Force

(Test Method) 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 25±3mm/min. along the mating axis.

(Requirements) FPC Retention force before and after test shall meet the values in Table 3.

Table3 FPC Retention Force

n : Pos.	FPC Retention Force
Initial	0.13 N (13gf) ×n +1.0N MIN.
After Test	0.10 N (10gf) ×n +1.0N MIN.

※ "n" is the number of pin

(3) Durability

(Test Method) Solder the connector to the test board, insert FPC to the connector, then, operate the actuator 20cycles repeatedly.

(Requirements) Contact resistance before and after test shall meet the values in Table.1.
Actuator operating force before and after test shall meet the values in Table.2.
FPC retention force before and after test shall meet the values in Table.3.

(4) Contact and Lock Retention Force

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

(Requirements) Contact and lock retention force shall not be less than 0.3N (30.6gf).

(5) Vibration

(Test Method) Solder the connector to the test board and connect the applicable Lead, then, put them on the vibrator and apply the following vibration in accordance with MIL-STD-202G Method 201A.

During the test, apply the current of 1mA DC to check electrical discontinuity.

Frequency 10Hz→55Hz→10Hz/ approx 1 min.

Directions Three mutually perpendicular direction.

Total Amplitude 1.52mm

Sweep duration 2 hours for each direction, a total of 6 hours.

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

During test, no electrical discontinuity greater than 1μsec. shall occur.

After test, No abnormality adversely affecting the performance shall occur. between parts, no chipping, no breakage or other abnormality.

(6) Shock

(Test Method) Solder the connector to the test board, connect the applicable Lead, and place them on the shock machine. Then, apply the following shock in accordance with MIL-STD-202G, Method 213B, Condition A.

During test, apply the current of 1mA DC to check electrical discontinuity.

MAX. G 50 G

Duration 11msec.

Wave Form Half Sinusoidal

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

During test, no electrical discontinuity greater than 1μsec. shall occur.

After test, No abnormality adversely affecting the performance shall occur. between parts, no chipping, no breakage or other abnormality.

(7) Fretting corrosion

(Test Method) Solder the connector to the test board, connect the applicable Lead, place them on the fretting corrosion machine and apply the following shock.

During test, apply the current of 1mA DC to check electrical discontinuity.

MAX. G 100 G

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

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

During test, no electrical discontinuity greater than 1μsec. shall occur.

After test, No abnormality adversely affecting the performance shall occur. between parts, no chipping, no breakage or other abnormality.

4.2.3 Environmental Performance

(1) Thermal Shock

(Test Method) 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. → 358K (+85°C):30 min.

No. of cycles 200 cycles

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

(2) 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±2 K (85±2°C)

Duration 1000 hours

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

(3) High Temperature & High humidity energizing

(Test Method) Solder the connector to the test board and connect the applicable Lead, then, apply the rated voltage in the following environment.

Temperature 333 K (60°C)

Humidity 90%RH

Duration 1000 hours

(Requirements) Contact resistance before and after test shall meet the values in Table 1,
Dielectric withstanding voltage shall meet 5.2.1. (2) and insulation resistance shall meet 5.2.1.(3).
No abnormality adversely affecting the performance shall occur.

(4) High Temperature & 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 K (60°C)

Humidity 90%RH

Duration 1000 hours

(Requirements) Contact resistance before and after test shall meet the values in Table 1,
Dielectric withstanding voltage shall meet 5.2.1. (2) and insulation resistance shall meet 5.2.1.(3).
No abnormality adversely affecting the performance shall occur.

(5) 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 K (-40°C)

Duration 1000 hours

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

(6) Gas : H₂S

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

Chamber temperature ... 317 K (40°C)

Gas H₂S 3ppm

Humidity 80%RH

Duration 96 hours

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

(7) Gas : SO₂

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

Chamber temperature ... 317 K (40°C)

Gas SO₂ 25ppm

Humidity 80%RH

Duration 96 hours

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

(8) Salt Water Spray

(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 101E, Condition B.

Temperature 308±2 K (35±2°C)

Salt water density 5±1% by weight

Duration 48 hours

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

4.2.4 Others

(1) Solderability

(Test Method) Expose the connector to the following environment for preparation and dip the soldering area of the contact into the solder bath at 523 ± 2 K ($255 \pm 2^\circ\text{C}$) in accordance with EIAJ-ET7404 (Quick heating method).

Condition of Preparation : PCT

Temperature 378K (105°C)

Humidity 100%RH

Duration 4 hours

(Requirements) Zero cross time is 3 second MAX. More than 95% of the dipped surface shall be evenly wet.

(2) Soldering Heat Resistance

A. Test Method

<Reflow>

① Reflow part

533K (260°C) Peak

503K (230°C)MIN. 30~40 sec.

② Pre-heat part

423~453K ($150 \sim 180^\circ\text{C}$) 60~120 sec.

The number of times of Reflow is within Twice.

Condition of Preparation : PCT

Temperature 358K (85°C)

Humidity 85%RH

Duration 24 hours

< Soldering iron>

Temperature of soldering iron .. 663 ± 10 K ($390 \pm 10^\circ\text{C}$)

heating time 3.0 ± 0.5 sec.

heating times 2 times

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

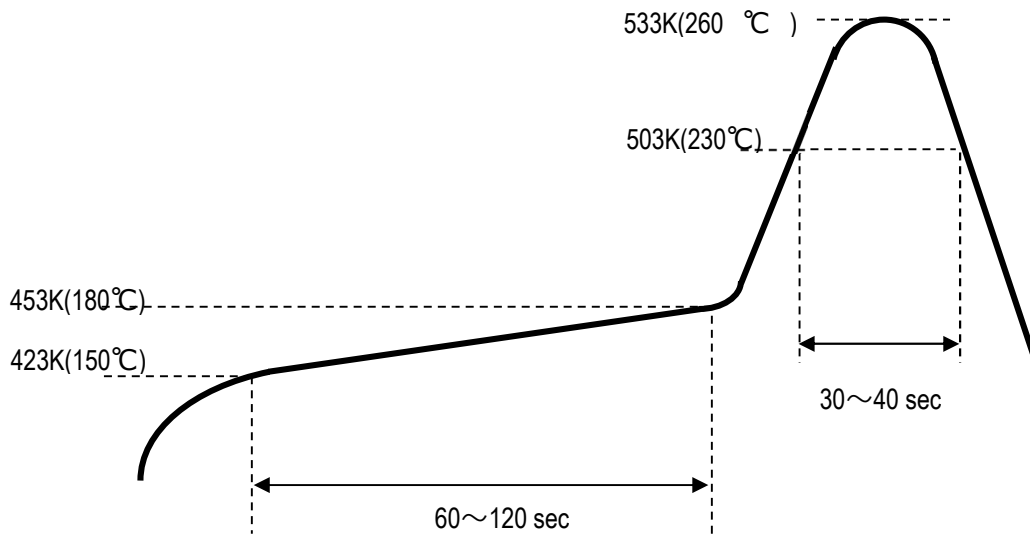


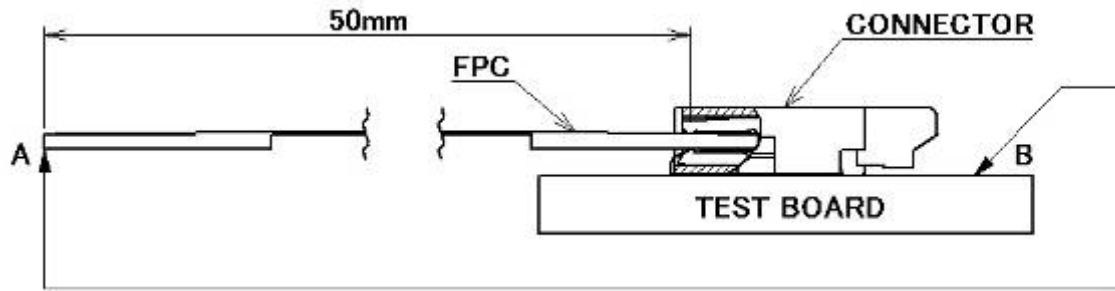
Fig.1 Reflow Temperature Profile

4.2.5 Test Sequence and Sample Quantity

Table 4 Test Sequence and Sample Quantity

Test Items	Group															
	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R
C/T Resistance	2,7			1,3,5	1,3	1,3	1,3	1,5	1,5	1,3	1,3	1,3	1,3			
D.W.Voltage								2,6	2,6							
Insulation Resistance								3,7	3,7							
Temp. rise																1
Act Locking Force	1,5															
Act Un-locking Force	3,6															
FPC Retention Force		1,3														
Durability	4	2														
C/T and Lock Retention Force			1													
Vibration				2												
Shock				4												
Fretting corrosion					2											
Thermal Shock						2										
High Temp. Life							2									
High Temp & High Hum energizing								2								
High Temp & High Hum Life									2							
Cold Temp. Life										2						
Gas (H ₂ S)											2					
Gas (SO ₂)												2				
Salt Water Spray													2			
Solderability														1		
Soldering Heat Resist.															1	
Sample QTY.	5 pcs	5 pcs	5 pcs	5 pcs	5 pcs	5 pcs	5 pcs	5 pcs	5 pcs	5 pcs	5 pcs	5 pcs	5 pcs	5 pcs	5 pcs	5 pcs

The number in group means the test sequence.



Contact Resistance = R_{AB} - Resistance of a 50mm length of FPC cable - Resistance of Test Board .

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-12007 for the handling of MINIFLEX 3-BFN.