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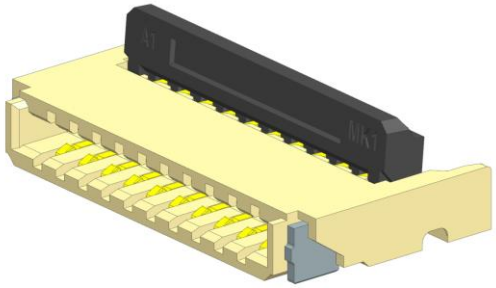
PRODUCT SPECIFICATION

FBH1
0.5mm PITCH FPC
CONNECTOR

0.5mm Pitch Backflip H=1.0

Series: 503480

REVISION DESCRIPTION	REVISED			0.5 FPC CONN. E/O BACKFLIP H=1.0MM			
CHANGE NO.	799517						
REVISED BY	RAJMOK	DATE	2023/04/10	DOC TYPE	DOC TYPE DESCRIPTION	DOC PART	SERIES
REV APPR BY	YNAITO	DATE	2024/10/21	PS	ENGINEERING SPECIFICATION WORD	001	503480
INITIAL RELEASE				CUSTOMER	DOCUMENT NUMBER	REVISION	SHEET
INITIAL DRWN	THIRAYAMA	DATE	2009/12/11	GENERAL MARKET	PS-503480-001	G	1 OF 16
INITIAL APPR	KMORIKAWA	DATE	2009/12/14				

1. SUBJECT:

This specification covers the 0.5mm PITCH FPC CONNECTOR series.

2. PRODUCTS:

2.1 PRODUCTS:

Material Number	Product Name
503480**09	Housing Assembly R/A (Upper or Lower Contact)
503480**00	Embossed Tape Package (ORDER No.)

2.2 DIMENSIONS, MATERIALS, PLATINGS

See SD-503480-001 drawing for details on dimensions, materials, and platings.

2.3 ENVIRONMENTAL CONFORMANCE: To fine product compliance information:

Go to molex.com and enter the part number in the search field.

At the bottom of the page go to “Environmental” to see compliance status.

3. REFERENCE DOCUMENTS:

DOCUMENT NUMBER	DESCRIPTION
SD-503480-001	Sales Drawing (Connector)
SD-503480-002	Sales Drawing (Package)
SPK-503480-001	Packaging Specification

4. ELECTRICAL RATINGS

4.1 VOLTAGE : 50 Volts Maximum. [AC (RMS) / DC]

4.2 CURRENT : 0.5 Amperes Maximum. [AC (RMS) / DC]

4.3 OPERATING TEMPERATURE RANGE : -40℃ ~ +105℃*1*2*3

4.4 STORAGE CONDITION :
Temperature : +5℃ ~ +35℃
Humidity : 60% R.H. Maximum (No Condensation)
Terms : For 12 months after shipping (unopened package)

*1 : Non-operating connectors after reflow must follow the operating temperature range condition.
*2 : This includes the terminal temperature rise generated by conducting electricity.
*3 : Applicable FPC (wires and cables) must also meet the specified temperature range.

5. PROCEDURE:

5.1 ELECTRICAL PERFORMANCE

Item		Test Condition	Requirement
5-1-1	Contact Resistance	Mate applicable FPC, measure by dry circuit, 20mV MAXIMUM, 10mA MAXIMUM. (JIS C5402-2-1)	100 milliohms MAXIMUM / pin
5-1-2	Insulation Resistance	Mate applicable FPC and apply 500V DC between adjacent terminals or terminal and ground. (JIS C5402-3-1/MIL-STD-202 Method 302)	50 Megaohms MINIMUM
5-1-3	Dielectric Strength	Mate applicable FPC and apply 200V AC for 1 minute between adjacent terminals and ground. (JIS C5402-4-1/MIL-STD-202 Method 301)	No Breakdown

5.2 MECHANICAL PERFORMANCE

Item		Test Condition	Requirement
5-2-1	FPC Retention Force	Insert the FPC, close the actuator, pull the FPC at the speed rate of 25±3mm per minute.	Refer to paragraph 7
5-2-2	Terminal/Housing Retention Force	Apply axial pull out force on the terminal assembled in the housing.	0.2 N MINIMUM {20 gf MINIMUM}

5.3 ENVIRONMENTAL PERFORMANCE

Item		Test Condition	Requirement	
5-3-1	Repeated Actuator Open/Close	Insert FPC, close and open actuator, withdraw FPC to 10 cycles, at the speed rate of less than 10 cycles / minute.	Contact Resistance	120 milliohms MAXIMUM
5-3-2	Temperature Rise	Mate applicable FPC and measure the temperature rise of contact when the maximum AC rated current is passed. (UL 498)	Temperature Rise	30 degree C MAXIMUM
5-3-3	Vibration	Mate applicable FPC and subject to the following vibration conditions, passing DC 1mA current during the test. Amplitude : 1.5 mm P-P Frequency : 10-55-10 Hz / minute. Duration : 2 hours in each 3 mutually perpendicular axes (JIS C60068-2-6/MIL-STD-202, Method 201)	Appearance	No Damage
			Contact Resistance	120 milliohms MAXIMUM
			Discontinuity	1.0 microsecond MAXIMUM
5-3-4	Mechanical Shock	Mate applicable FPC and subject to the following shock conditions. 3 times of shocks shall be applied for each 6 directions along 3 mutually perpendicular axes, passing DC 1mA current during the test. (Total of 18 shocks) Test pulse : Half Sine Peak value : 490m/s^2 {50G} Duration : 11 milliseconds (JIS C60068-2-27/MIL-STD-202 Method 213)	Appearance	No Damage
			Contact Resistance	120 milliohms MAXIMUM
			Discontinuity	1.0 microsecond MAXIMUM

5.3 ENVIRONMENTAL PERFORMANCE continued

Item		Test Condition	Requirement	
5-3-5	Heat Resistance	Mate applicable FPC and expose to 105±2 degree C for 96 hours. Upon completion of the exposure period, the test specimens shall be conditioned at ambient room conditions for 1 to 2 hours, after which the specified measurements shall be performed. (JIS C60068-2-2/MIL-STD-202 Method 108)	Appearance	No Damage
			Contact Resistance	120 milliohms MAXIMUM
5-3-6	Cold Resistance	Mate applicable FPC and expose to -40±3 degree C for 96 hours. Upon completion of the exposure period, the test specimens shall be conditioned at ambient room conditions for 1 to 2 hours, after which the specified measurements shall be performed. (JIS C60068-2-1)	Appearance	No Damage
			Contact Resistance	120 milliohms MAXIMUM
5-3-7	Humidity	Mate applicable FPC and expose to 40±2 degree C, relative humidity 90 to 95% for 96 hours. Upon completion of the exposure period, the test specimens shall be conditioned at ambient room conditions for 1 to 2 hours, after which the specified measurements shall be performed. (JIS C60068-2-78/MIL-STD-202 Method 103)	Appearance	No Damage
			Contact Resistance	120 milliohms MAXIMUM
			Dielectric Strength	Must meet 5-1-3
			Insulation Resistance	20 Megaohms MINIMUM

5.3 ENVIRONMENTAL PERFORMANCE continued

Item		Test Condition	Requirement	
5-3-8	Temperature Cycling	Mate applicable FPC and subject to the following conditions for 5 cycles. Upon completion of the exposure period, the test specimens shall be conditions at ambient room conditions for 1 to 2 hours, after which the specified measurements shall be performed. 1cycle a) -55±3 degree C 30 min. b) +105±2 degree C 30 min. Transit time shall be within 5 min. (JIS C60068-2-14)	Appearance	No Damage
			Contact Resistance	120 milliohms MAXIMUM
5-3-9	Salt Spray	Mate applicable FPC and exposed to the following salt mist conditions. Upon completion of the exposure period, salt deposits shall be removed by a gentle wash or dip in running water, after which the specified measurements shall be performed. NaCl solution Concentration: 5±1% Spray time: 48 hours Ambient temperature: 35±2 degree C (JIS C60068-2-11/MIL-STD-202, Method 101)	Appearance	No Damage
			Contact Resistance	120 milliohms MAXIMUM
5-3-10	SO_2 Gas	Mate applicable FPC and expose to 50±5ppm SO_2 gas at 40±2 degree C for 24 hours.	Contact Resistance	120 milliohms MAXIMUM
5-3-11	NH_3 Gas	Mate applicable FPC and expose to NH_3 gas evaporating from 28 % for 40 minutes.	Contact Resistance	120 milliohms MAXIMUM

5.3 ENVIRONMENTAL PERFORMANCE continued

Item		Test Condition	Requirement	
5-3-12	Solderability	Dip solder tails and nails into the molten solder (held at 245±3 degree C) up to 0.2mm from the tip of tails and nails for 3±0.5 sec.	Solder Wetting	95% of immersed area must show no voids, pinholes
5-3-13	Resistance to soldering Heat	Using the reflow profile condition below paragraph 8, reflow test specimens twice.	Appearance	No Damage
		Using a soldering iron (350±10 degrees C for 5 seconds) heat up the area 0.2mm from the tip of the solder tails and fitting nails. However, do not apply excessive pressure to either the terminals or fitting nails.		

( ) : Reference Standard

The evaluation samples of each specification test are reflowed according to the recommended Print Circuit Board layout and the recommended metal mask thickness specified in the sales drawing. The reflow conditions followed are specified in the reflow profile in section 5-3-13. Lead free solder (Sn-3Ag-0.5Cu) was used as the soldering paste

6. PRODUCT SHAPE, DIMENSIONS AND MATERIALS

Refer to the drawing.

7. FPC RETENTION FORCE

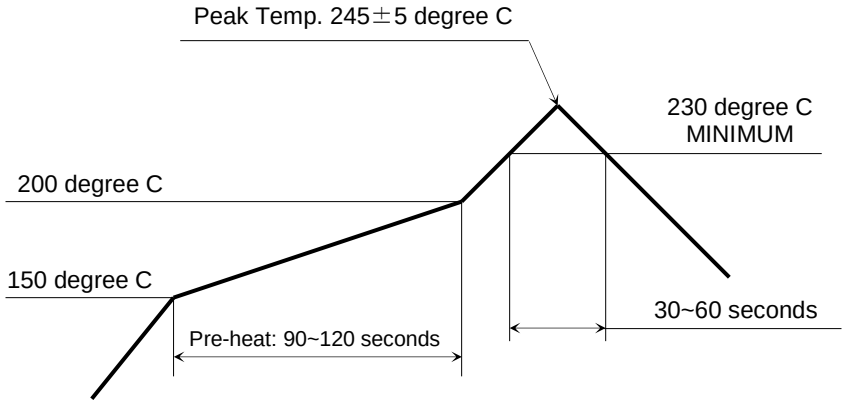
This test data in case of used the FPC(30p or less t=0.3±0.05mm, 31p over t=0.3±0.03mm)

CIRCUIT	UNIT	DATA (MINIMUM)	
		1st	10th
4	N [gf]	1.08 [110]	0.69 [70]
6	N [gf]	1.62 [165]	1.04 [106]
8	N [gf]	2.16 [220]	1.38 [141]
10	N [gf]	2.70 [275]	1.72 [176]
12	N [gf]	3.24 [330]	2.07 [211]
14	N [gf]	3.77 [385]	2.41 [246]
16	N [gf]	4.31 [440]	2.76 [282]
17	N [gf]	4.58 [468]	2.93 [299]
18	N [gf]	4.85 [495]	3.10 [317]
20	N [gf]	5.39 [550]	3.45 [352]
22	N [gf]	5.81 [593]	3.79 [387]
24	N [gf]	6.30 [642]	4.0 [407]
26	N [gf]	6.64 [678]	4.46 [455]
28	N [gf]	6.86 [700]	4.94 [504]

CIRCUIT	UNIT	DATA (MINIMUM)	
		1st	10th
30	N [gf]	7.35 [750]	5.30 [540]
32	N [gf]	7.88 [804]	5.49 [560]
34	N [gf]	8.34 [850]	6.00 [612]
36	N [gf]	8.47 [864]	6.35 [648]
38	N [gf]	8.94 [912]	6.71 [684]
40	N [gf]	9.41 [960]	7.06 [720]

There may be the case which the connector performance does not meet the above specification, because the different FPC manufacturers have their own unique specification.

8. REFLOW CONDITION



TEMPERATURE CONDITION GRAPH

NOTES

1. Please investigate the mounting condition (reflow soldering condition) on your own devices beforehand. The mounting conditions may change due to the soldering temperature, soldering paste, air reflow machine, Nitrogen reflow machine, and the type of printed circuit board. The different mounting conditions may have an influence on the product's performance.

2. Let temperature conditions be the solder joint of connector.

9. INSTRUCTION UPON MOUNTING

1. The mounting specification for coplanarity does not include the influence of warpage of the printed circuit board. The warpage of the printed circuit board should be a maximum of 0.02mm if measuring from one connector edge to the other.

2. The product performance was tested using rigid printed circuit board. In case the product needs to be reflowed onto flexible circuit board, please conduct a reflow test on the flexible circuit board in advance.

3. Please add a stiffener on the flexible printed circuit (FPC) when you mount the connector onto FPC in order to prevent deformation of the FPC.

4. Although there might be some discoloration seen on the soldering tail after reflow, this will not influence the product's performance.

5. If you leave any soldering area on this product open, there may be the possibility of a missing terminal short circuiting between pins, terminal buckling or the potential for the connector to come off of the printed circuit board. Therefore, please solder all of the terminals and fitting nails on the printed circuit board.

6. It may cause to come off FPC, and/or occur contact defect by cabling the FPC in your application. Please make sure to avoid placing the connector where the connector is affected from the excessive force by your printed circuit board Layout reason.

10. INSTRUCTION UPON USAGE

1. Please do not conduct any “washing process” on the connector because it may damage the product’s function.

2. Please make sure to use the appropriate FPC which has Gold plating (Nickel under plating) on the contact area.

3. Please check the compatibility between the connector and the FPC before mass production.

4. Please pay special attention not to add the excessive force on the FPC under the FPC inserted condition. It may cause to unlock the connector, break the FPC, and/or damage the FPC. Especially, in case the consecutive force on the FPC is added in your application, fix the FPC. Please avoid the vertical pulling force to direction of the PCB(rigid epoxy-glass printed circuit board). Also avoid twisting the FPC to the direction of contact pitch.

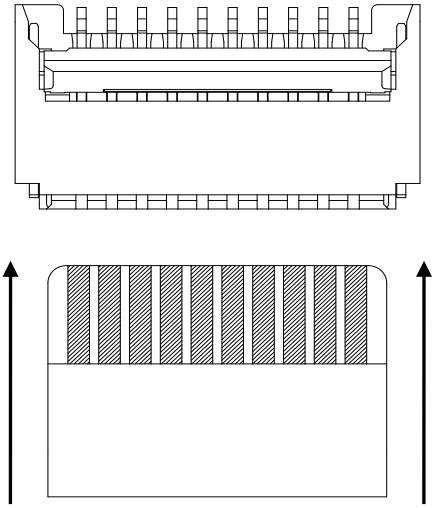
5. Please do not use the connector in a condition where the wire, the printed circuit board, or the contact area is experiencing a sympathetic vibration of wires and printed circuit board, and constant movement of devices. This may cause a defect in the contact due to the contact area being worn down. Therefore, please fix wires and printed circuit board on the chassis, and reduces sympathetic vibration.

6. Please do not touch the terminals and fitting nails before and after reflowing the connector onto the printed circuit board.

7. Please open and close the actuator with the connector is mounted on the PCB, and the FPC inserted. The actuator might not come off from the opening and shutting of the actuator in the state that FPC is not inserted and do not do, please. And there is possibility of damaging terminals.

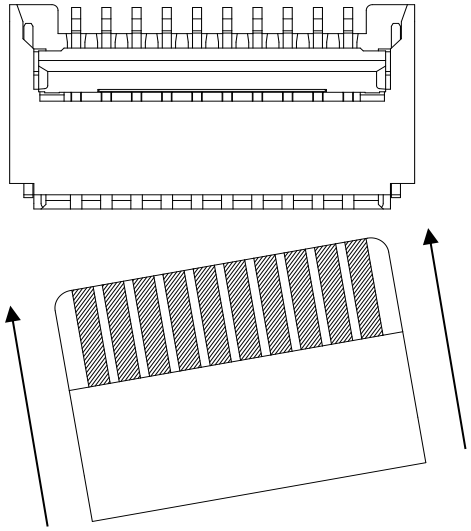
8. When inserting the FPC into the connector, please ensure that the actuator is completely open during insertion. Please also ensure that the FPC is completely inserted until the end of the FPC touches the housing (See Figure 1). Diagonal insertion of the FPC into the connector can cause a short circuit due to the misaligned pitch. Diagonal insertion can also deform the terminal and/or damage the FPC contact area because the FPC edge may contact the terminal (See Figure 2).

Horizontal insertion ○



(Figure 1)

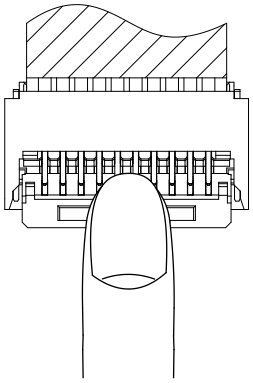
Diagonal insertion ×



(Figure 2)

9. When opening and closing the actuator, please do not use a sharp edged tool such as tweezers. This may cause to damage the connector or to the soldering area.

10. When opening and closing the actuator, please gently pull the center of the actuator by applying an even force across the actuator and rotating carefully. (See Figure 3) Please do not apply a force only to one side of actuator because it may cause to damage the connector. (See Figure 4)



(Figure 3)

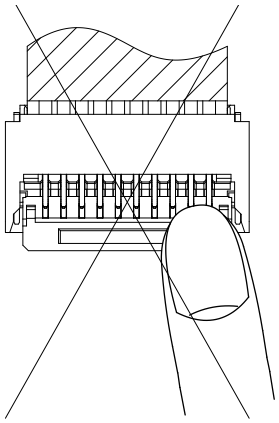
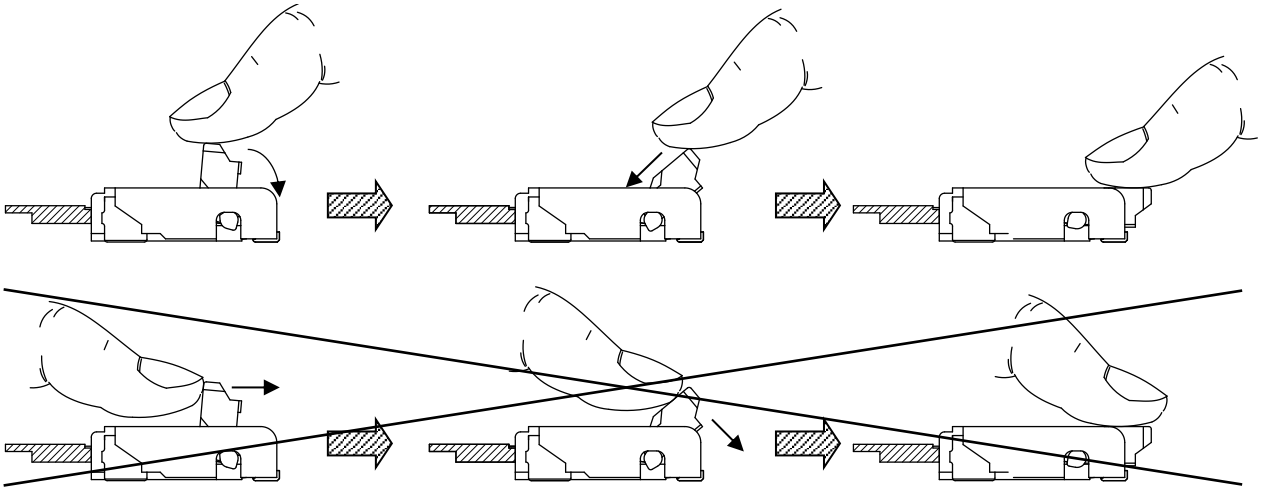
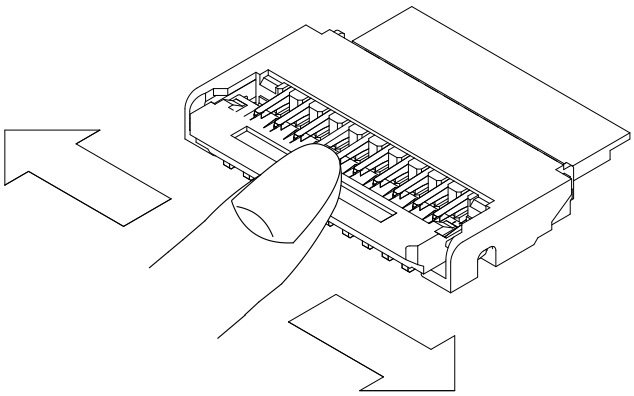


図-4(Figure 4)

11. When closing the actuator, please press down on the actuator with soft pressure in the direction of the rotary axis as shown in the figure below. Please do not push the actuator closed from the direction that the FPC is inserted. This may cause damage or disengagement of the actuator.



12. After the actuator is closed, please press down the surface of actuator with soft pressure in order to lock as shown in the following figure.



13. When unlocking the actuator, please pull up on the center of actuator in the direction of actuator rotation, which delivers even force to both edges of actuator. Please do not apply any force in any other direction as this may deform or damage the actuator.

14. When withdrawing the FPC, please make sure that the actuator is completely open. If the FPC is withdrawn without the actuator being fully open, please check to make sure that there is no debris on the contact area before inserting the FPC again.

11. EXTERNALS

1. This product may have a small black mark, a weld line or a scratch on the housing, these will not have any influence on the product's performance.

2. May be slight differences in the housing coloring, but there will be no influence on the product's performance.

3. You may find the white dot on the actuator when the lubricant becomes dry, this will not affect the product's performance.

4. There is no influence electrically though a few warps will be generated in the FPC insertion width of the housing. (warp of hood)

5. Because we plate the fitting nails with Tin, there may be scratch marks on the surface. However, these scratches will have no influence on the product's performance.

12. REPAIR

1. When conducting manual repairs using a soldering iron, please follow the soldering conditions shown in the product specification. If the conditions in the product spec are not followed, it may cause the terminals to fall off, a change in the contact gap, a deformation of the housing, melting of the housing, and damage the connector.

2. When conducting manual repairs using a soldering iron, please do not use more solder and flux than needed. This may cause solder wicking and flux wicking issues, and it will eventually cause a contact defect and functional issues.