

NUMBER GS-12-449	TYPE PRODUCT SPECIFICATION	Amphenol FCI	
TITLE 59453series FPC connector (0.5mm pitch, SMT type)		PAGE 1 of 7	REVISION D
		AUTHORIZED BY Sei Watanabe	DATE Aug./07/2023
		CLASSIFICATION UNRESTRICTED	

1. SCOPE

This product specification covers the requirements for the 59453 series FPC connector.
(0.5mm pitch, SMT type)

2. APPLICABLE STANDARDS

- JIS C 5402 : Method for Test of Connectors for Electronic Equipment
- JIS C 0806 : Packaging of Electronic Components on Continuous Tapes
(Surface Mount Components)
- UL – 94 : TESTS FOR FLAMMABILITY OF PLASTIC MATERIALS FOR PARTS
IN DEVICES AND APPLIANCES

3. CONNECTOR SHAPE AND DIMENSIONS AND MATERIALS

Refer to product drawing : Drawing number 59453

4. RECOMMENDED PCB LAYOUT AND CONDUCTOR (FPC)

Refer to product drawing : Drawing number 59453

5. RATING

Rating voltage : AC/DC 50V

Rating current : AC/DC 0.4A

Operating temperature range : -55 °C ~ +105 °C
(Including temperature rise caused by application of current.)

Performance of various

Unless otherwise specified, when tested the ambient conditions in accordance with IEC Publication 60068-1 as described below and evaluated with the sequence listed in Table 1, the connector shall meet the requirements.

- Temperature : 15 ~ 35 °C
- Relative humidity : 25 ~ 85 %Rh.
- Atmospheric pressure : 86 ~ 106 kPa

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Table 1. Performance of various

	Para.	Requirements	Condition
Electrical Requirements	LLCR	Initial:30mΩ Max.	6.1
	Insulation Resistance	Initial:100MΩ Min. Final:100MΩMin.	6.2
	Dielectric Withstanding Voltage	No evidence of arc-over or insulation breakdown. (Current leakage: 2mA Max.)	6.3
Mechanical Requirements	Durability	No evidence of cracking, swelling or other damage. LLCR Final: Δ20mΩMax.	6.4
	Vibration	No evidence of physical or mechanical damage, or disassociation of parts, and no electrical discontinuity greater than 1μsec, shall occur. LLCR Final: Δ20mΩMax.	6.5
Environmental Requirements	Humidity (Steady State)	LLCR Final: Δ20mΩMax. Insulation Resistance Final: 100MΩMin. Dielectric Withstanding Voltage: No evidence of arc-over or insulation breakdown.	6.6
	Thermal Shock	LLCR Final: Δ20mΩMax.	6.7
	High Temperature	LLCR Final: Δ20mΩMax.	6.8
	Salt Spray	LLCR Final: Δ20mΩMax.	6.9
Others	Solder Heat Resistance	There shall be no defect which spoils a function.	6.10
	Solderability	Actual soldered area must be more than 95% of the dipped area intended to be soldered.	6.11
	Conductor Retention Force (Reference)	2+(n x 0.1) N min. (n: number of contacts)	6.12

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6. Test method

6.1. Low level Contact resistance (LLCR)

Measuring under the following conditions in accordance with IEC 60512-2 or JIS C 5402.

The measuring data is included the conductor resistance of terminal and FPC.

- (a) Method of connection : See Fig 1.
- (b) Test current : 20 mA DC Max
- (c) Open circuit voltage : 20 mV DC Max

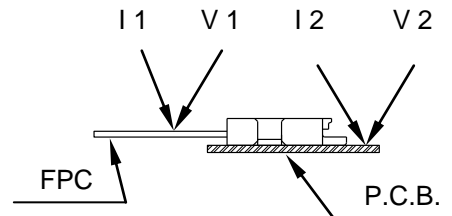


Fig.1 LLCR measuring method

6.2. Insulation Resistance

Measured in accordance with IEC 60512-2 or JIS C 5402.

The following details shall apply.

- (a) Test Voltage : 500 V DC for 1 minute
- (b) Special Preparation : Unmated condition of the FPC
- (c) Points of Measurement : Between adjacent terminals

6.3. Dielectric Withstanding Voltage

Unmated connector is tested in accordance with IEC 60512-2 or JIS C 5402.

The following details shall apply.

- (a) Test Voltage : 200V AC for 1 minute
- (b) Special Preparation : Unmated condition of the FPC
- (c) Points of Measurement : Between adjacent terminals

6.4. Durability

When the connector and the application conductor are mated, it repeats 10 cycles of a regulated operation method.

6.5. Vibration

The test shall be in accordance with IEC 60068-2-6 or JIS C 60068-2-6.

The following details shall apply.

- (a) Frequency : 10 to 500Hz, sweep vibration
- (b) Amplitude or acceleration amplitude : 0.75mm or 100m/s² (10G)
- (c) Sweep rate : 1octave/minute
- (d) Duration : 10cycles for each axis X, Y, Z (total 30cycles)

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6.6. Humidity

After the mated connector is exposed to a high humidity ambience in accordance with IEC 60068-2-78 or JIS C 60068-2-78.

The test samples should be measured after regulation time, after takes it out in normal condition (25Deg±10Deg, 50%RH±25%RH) and leaving you unattended for 2 ± 1 hours.

The following details shall apply.

- (a) Ambient Temperature : 40 ± 2 °C
- (b) Relative Humidity : 90 ~ 95 %
- (c) Duration : 48 hours

6.7. Thermal Shock

After the mated connector is exposed to alternate cycles of extreme high and low temperature in accordance with IEC 60068-2-14 or JIS C 60068-2-14.

The test samples should be measured after regulation time, after takes it out in normal condition (25Deg±10Deg, 50%RH±25%RH) and leaving you unattended for 2 ± 1 hours.

The following details shall apply.

- (a) Temperature range : -55 °C for 30 minutes followed by +105 °C for 30 minutes.
- (b) Number of cycles : 5cycles

6.8. High Temperature

After the mated connector is exposed to a high humidity ambience in accordance with IEC 60068-2-2 or JIS C 60068-2-2. The following details shall apply.

- (a) Ambient Temperature : 105 ± 2 °C
- (b) Duration : 96 hours

6.9. Salt Splay

After the mated connector is exposed to a salt fog ambience in accordance with IEC 60068-2-11 or JIS C 60068-2-11.

The following details shall apply.

- (a) Salt Solution : 5±1% by weight
- (b) Ambient Temperature : 35±2deg.
- (c) Duration : 48 hours
- (d) Special Treatment : The measurement shall be conducted after mated connector is mildly rinsed in running water to remove deposition of salt, followed by natural drying by placed it for 24 hours at room temperature.

6.10. Solder Heat Resistance

Solder by setting reflow bath on the following condition.

Reflow soldering is carried out twice.

- (a) Pre-Heat Temperature : 150 ~ 180 °C
- (b) Pre-Heat Duration : 60 ~ 120 sec.
- (c) Soldering Temperature : 240 °C min.
- (d) Soldering Duration : 20 ~ 40sec.
- (e) Peak temperature : 260 °C
- (f) Solder paste : SAC305 (Sn-3.0Ag-0.5Cu) or Equivalent

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6.11. Solderability

The connector is soldered by the following condition

- (a) Soldering bath temp. : 245 ±5 °C
- (b) Dipping time : 2 ±0.5 sec.

6.12. Conductor Retention Force (Reference Test)

Measure initial retention force after inserted and locked by using accommodated conductor specified item 4.

7. Test sequence

Test sequence is shown in Table 2.

Table 2. Test sequence

Test item		Test group										Test Method
		A	B	C	D	E	F	G	H	I	J	
1	Low Level Contact Resistance (LLCR)	1 3	1 3	1 3		1 3	1 3	1 3				6.1
2	Insulation resistance				1 4							6.2
3	Dielectric with standing voltage				2 5							6.3
4	Durability	2										6.4
5	Vibration		2									6.5
6	Humidity			2	3							6.6
7	Thermal shock					2						6.7
8	High Temperature						2					6.8
9	Salt spray							2				6.9
10	Solder Heat Resistance								1			6.10
11	Solderability									1		6.11
12	Conductor Retention Force										1	6.12

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8. Notice

- 8.1. Please refer to the "Handling procedures and remarks" before use.
- 8.2. Conductor retention force specified in item 6.12 differs due to its kind, structure, and surface treatment of conductor. Therefore, the value of retention force specified in item 6.12 would be reference value.
- 8.3. The 59453 series both the top side and bottom side contact type have passed the SAE/USCAR-2 Vibration / Mechanical Shock (Test sequence M) of class V1. Please contact us for more information.

9. Recommended Reflow Conditions

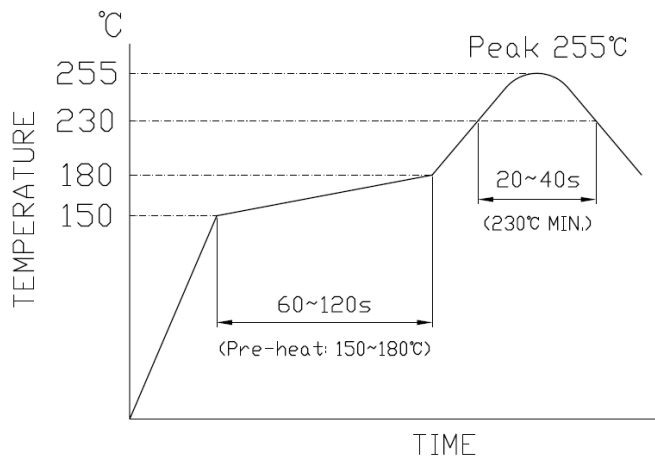


Fig. 2 Recommended reflow temperature profile

Note: Please check the reflow soldering condition for your own application beforehand due to different conditions with soldering devices, PCB, etc.
 No moisture treatment before reflow process.
 Recommended number of cycles of reflow process: 2 times max.

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REVISION RECORD

Rev	Page	Description	EC#	Date
A	ALL	RELEASED	J07-0159	Aug./30/2007
B	ALL	REVISED	J09-0094	Mar./09/2009
C	ALL	Format change.	ELX-J-35030	Oct./07/2019
	1	Emboss tape material revised; A-PET or PS Cover tape material revised; Polyester, Polyethylene		
D	All	Removed Japanese Change operation temperature from -55~85°C to -55~105°C Change test condition of item 6.7 Thermal shock from 85 °C to 105 °C Add test items, 6.8 High Temperature and 6.12 Cable retention force. Add note 8-2 and 8-3 Add recommended reflow conditions for item 9.	ELX-J-48944	Aug./07/2023