MHF®-SW23 ASS'Y

Part No. 20549-001E-**

Product Specification

Qualification Test Report No. TR-12041

Rev.	ECN	Date	Prepared by	Checked by	Approved by
6	S21532	October 26, 2021	K.Motomura	K.Yufu	M.Takemoto
5	S20232	April 23, 2020	K.Motomura	K.Yufu	Y.Hashimoto
4	S18270	April 30, 2018	M.Nomoto	K.Yufu	K.Yotsutani
3	S17055	January 31, 2017	Y.Imaji	Y.Hashimoto	K.Yotsutani

1. Scope

This Product Specification defines the test conditions and the performances of the MHF-SW23 ASS'Y.

2. Product Name and Parts No.

2.1 Product Name

MHF-SW23 ASS'Y

2.2 Parts No.

20549-001E-**

3. Product Shape, Dimensions and Material

Refer to the drawing. (Drawing No. 20549)

4. Rating

Table 1

	On state (Not mated with the plug)
Rated power	2W
Frequency	DC～11.0GHz
VSWR	1.2 MAX. (DC～2.5GHz) 1.3 MAX. (2.5GHz～6.0GHz) 1.5 MAX. (6.0GHz～11.0GHz)
Insertion Loss	0.15dB MAX. (DC～2.5GHz) 0.20dB MAX. (2.5GHz～6.0GHz) 0.40dB MAX. (6.0GHz～11.0GHz)
Isolation	20dB MIN. (DC～3.0GHz) 15dB MIN. (3.0GHz～6.0GHz) 12dB MIN. (6.0GHz～11.0GHz)
Service condition	Temperature : 233K～358K (-40℃～+85℃) Humidity : 90% MAX. Containing temperature rise by energizing
Storage condition	Temperature : 243K～343K (-30℃～+70℃) Humidity : 90% MAX. Non condensing

5. Test and Performance

5.1 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 G.

Temperature… 288K～308K（15℃～35℃）
Relative humidity… 45～75%R.H.

5.2 Electrical Performance

1. Contact resistance	
Reference standard:	MIL-STD-202, Method 307
Test conditions:	Measure the contact resistance as shown in Fig.1 & 2 by the four terminal method. Apply the low level condition of 20mV max. DC for the open circuit voltage and 10mA max. DC for the closed circuit current.

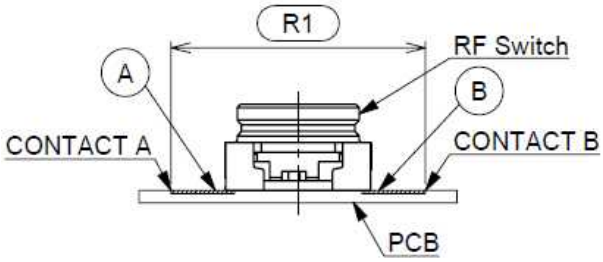


Fig. 1 On state : Contact Resistance

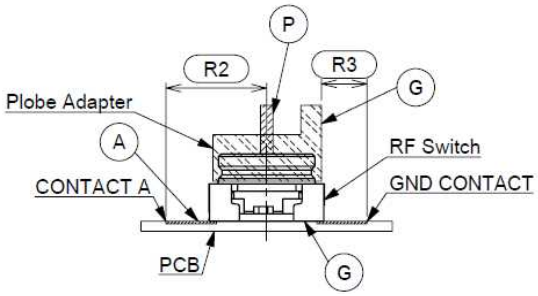


Fig. 2 Off state: Contact Resistance

Pass criteria:	[Inner contact(R1,R2)]: 100mΩ MAX. [GND contact(R3)]: 100mΩ MAX.

2. Insulation resistance	
Reference standard:	MIL-STD-202 , Method 302, Condition A
Test conditions:	DC100V is applied and measured between a center contact and ground contact.
Pass criteria:	Initial: 1000MΩ MIN. After test: 10MΩ MIN.

3. Dielectric withstanding voltage	
Reference standard:	MIL-STD-202 , Method 301
Test conditions:	Apply AC100V between the center contact and the ground contact for a minute.
Pass criteria:	Without damage such as arcing or breakdown etc.

5.2 Electrical Performance

4. VSWR (Voltage Standing Wave Ratio)	
Reference standard:	-
Test conditions:	Measure the VSWR by the network analyzer as shown in Fig. 3. Frequency: 300KHz ～ 11GHz

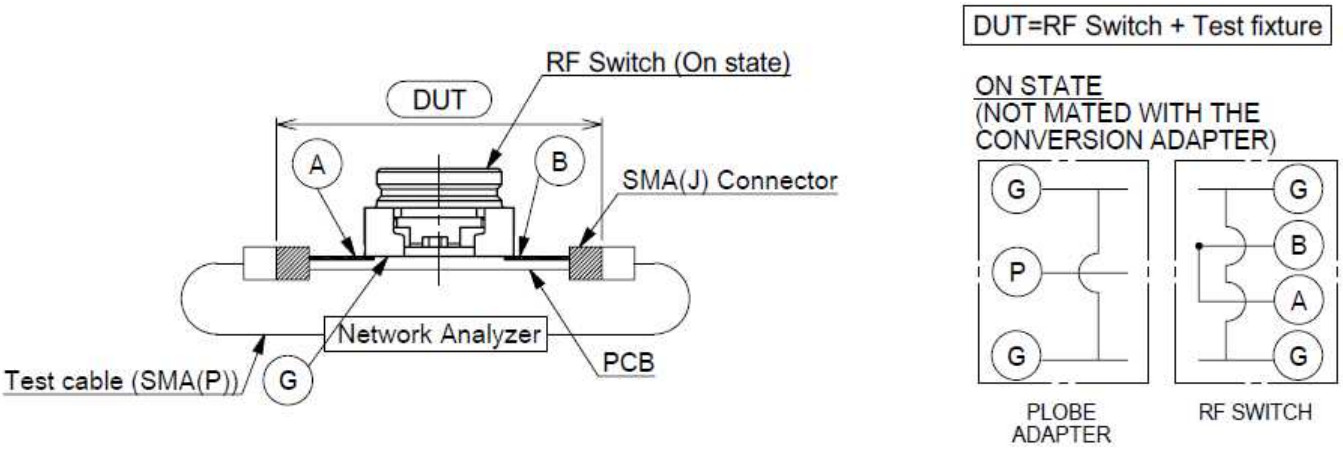


Fig. 3 On state VSWR, Insertion Loss

Pass criteria:	[On state] 1.2 MAX. (300 KHz～2.5 GHz) 1.3 MAX. (2.5 GHz～6.0 GHz) 1.5 MAX. (6.0 GHz～11.0 GHz)

5. Insertion Loss	
Reference standard:	-
Test conditions:	Measure the insertion loss as shown in Fig. 3 above by the network analyzer. Deduct the characteristic of the test fixture from result of a measurement. Frequency : 300KHz ～ 11GHz
Pass criteria:	[On state] 0.15dB MAX. (300 KHz～2.5 GHz) 0.20dB MAX. (2.5 GHz～6.0 GHz) 0.40dB MAX. (6.0 GHz～11.0 GHz)

5.2 Electrical Performance

6. Isolation	
Reference standard:	-
Test conditions:	Measure the isolation as shown in Fig. 4 by the network analyzer. Frequency : 300KHz ～ 11GHz

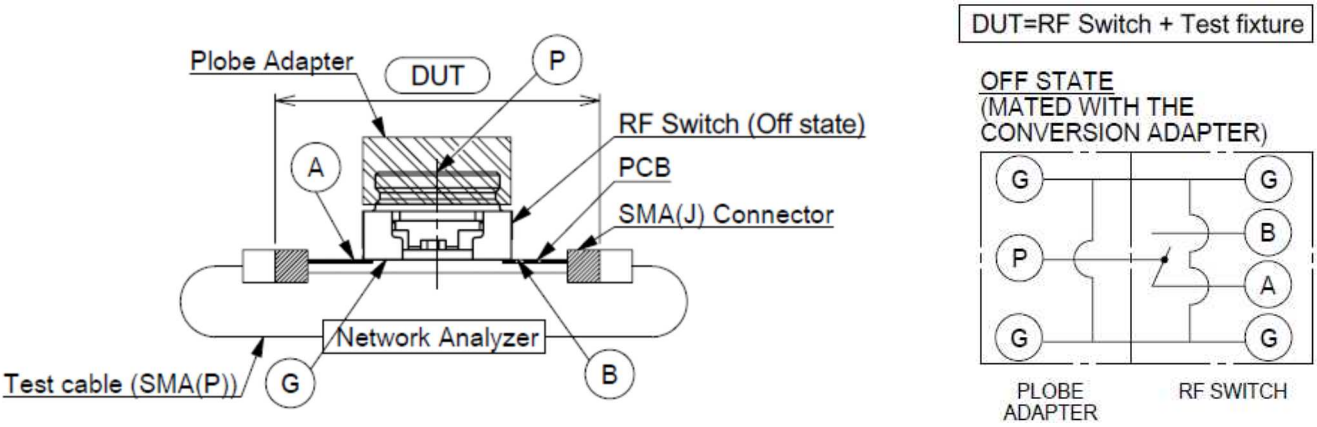


Fig. 4 Off state Isolation

Pass criteria:	[Off state] 20dB MIN. (300kHz～3.0GHz) 15dB MIN. (3.0GHz～6.0GHz) 12dB MIN. (6.0GHz～11.0GHz)

5.3 Mechanical Performance

1. Durability	
Reference standard:	-
Test conditions:	Repeat mating and un-mating 100 cycles at along the mating axis.
Pass criteria:	[Contact Resistance] Shall meet 5.2.1 [Appearance] No abnormality adversely affecting the performance shall occur.

2. Vibration	
Reference standard:	-
Test conditions:	Apply the following vibration to the mating connector. During the testing, run 100mA DC to check electrical discontinuity. Frequency: 10Hz → 55Hz → 10Hz / Approx. 1 minutes. Half amplitude, Peak value of acceleration: 0.75mm or 98m/s^2 (10G) Directions, Cycling: 3 mutually perpendicular direction, 10 cycles for each direction.
Pass criteria:	[Contact Resistance] Shall meet 5.2.1 [Electrical Discontinuity] 1μs MAX. [Appearance] No abnormality adversely affecting the performance shall occur.

3. Shock	
Reference standard:	MIL-STD-202, Method 213, Condition B
Test conditions:	Apply the following shock to the mating switch. During the testing, run 100mA DC to check electrical discontinuity. Peak value of acceleration: 490m/s^2 (50G) Duration: 11msec. Wave Form: Half sinusoidal Direction, Cycle: 3 mutually perpendicular direction, 3 cycles for each direction
Pass criteria:	[Contact Resistance] Shall meet 5.2.1 [Electrical Discontinuity] 1μs MAX. [Appearance] No abnormality adversely affecting the performance shall occur.

5.4 Environmental Performance

1. Humidity (Steady State)	
Reference standard:	MIL-STD-202, Method 103, Condition B
Test conditions:	Apply the following environment to the switch. Temperature: 333±2K (60±2℃) Humidity: 90～95%RH Duration: 96 hours
Pass criteria:	[Contact Resistance] Shall meet 5.2.1. [Insulation Resistance] Shall meet 5.2.2. [Appearance] No abnormality adversely affecting the performance shall occur.

2. Thermal shock	
Reference standard:	MIL-STD-202, Method 107, Condition A
Test conditions:	Apply the following environment to the switch. Temperature: 218K (-55℃) :30 minutes ⇔ 358K (85℃) :30 minutes Transition time: 5 minutes Number of cycles: 100 cycles
Pass criteria:	[Contact Resistance] Shall meet 5.2.1. [Insulation Resistance] Shall meet 5.2.2. [Appearance] No abnormality adversely affecting the performance shall occur.

3. Dry Heat	
Reference standard:	MIL-STD-202 G, Method 213, Condition A.
Test conditions:	Apply the following environment to the switch. Temperature: 358±2K (85±2℃) Duration: 96 hours
Pass criteria:	[Contact Resistance] Shall meet 5.2.1. [Insulation Resistance] Shall meet 5.2.2. [Appearance] No abnormality adversely affecting the performance shall occur.

5.4 Environmental Performance

4. Cold	
Reference standard:	MIL-STD-202 G, Method 107, Condition A.
Test conditions:	Apply the following environment to the switch. Temperature: 218±2K (-55±2℃) Duration: 96 hours
Pass criteria:	[Contact Resistance] Shall meet 5.2.1. [Insulation Resistance] Shall meet 5.2.2. [Appearance] No abnormality adversely affecting the performance shall occur.

5. Salt water spray	
Reference standard:	-
Test conditions:	Apply the following environment to the switch. Temperature: 308±2K (35±2℃) Salt water density: 5±1% [by weight] Duration: 72 hours
Pass criteria:	[Appearance] No abnormality adversely affecting the performance shall occur.

5.5 Others

1. Soldering heat resistance	
Reference standard:	-
Test conditions:	Apply the following environment to the switch. Reflow condition: Refer to Fig. 5.

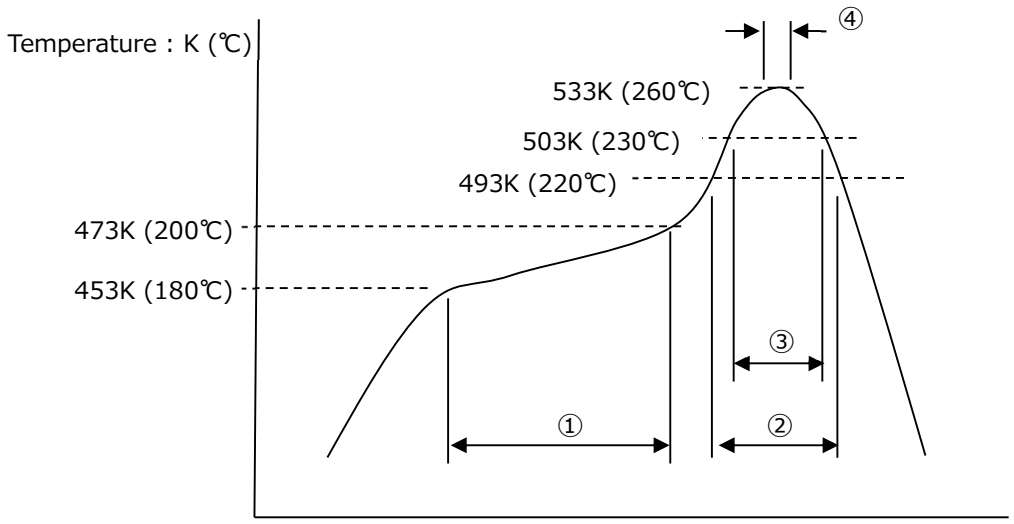
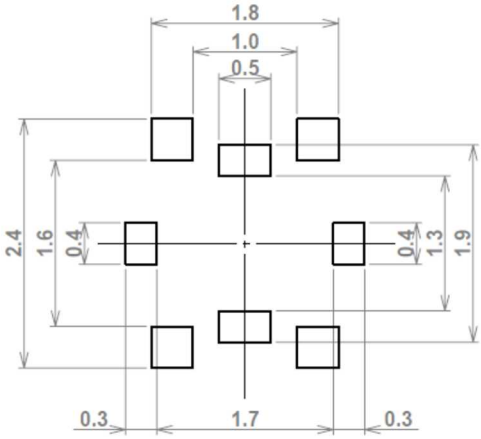


Fig. 5

Table 2

①Pre Heating Zone 453K(180℃) – 473K(200℃)	60 – 120 sec.
②Soldering Zone 493K(220℃) min.	60 – 150 sec.
③Soldering Zone 503K(230℃) min.	40 sec. max.
④Peak 533K(260℃)	10 sec. max.
Heating Method	Infrared
Reflow cycles	cycles max.



Tolerance	±0.05
Thickness	0.1
Unit	mm

Fig. 6Metal mask dimensions

Pass criteria:	No abnormality adversely affecting the performance shall not occur.

6. Test Sequence and Specimen Quantity

Table 3 Test Sequence and Sample Quantity

Test Item	Group									
	A	B	C	D	E	F	G	H	J	K
Contact Resistance			1,3	1,3,5	1,3	1,3	1,3	1,3		
Insulation Resistance	1				4	4	4	4		
D. W. Voltage	2									
VSWR		1								
Insertion Loss		2								
Isolation		3								
Durability			2							
Vibration				2						
Shock				4						
Humidity (Steady State)					2					
Thermal Shock						2				
Dry Heat							2			
Cold								2		
Salt Water Spray									1	
Resistance to Soldering Heat										1
Specimen Quantity. (pcs)	5	5	5	5	5	5	5	5	5	5

※Numbers indicate sequence in which tests are performed.