MHF®-SW23 PLUG ASS'Y

Part No. Plug:20851-001R RF switch:20549-001E-**

Product Specification

Qualification Test Report No. TR-18076

Rev.	ECN	Date	Prepared by	Checked by	Approved by
3	S24246	June 17, 2024	H. Takao	-	K. Yufu
2	S23070	March 3, 2023	H. Takao	K. Tanaka	Y. Hashimoto
1	S19172	March 6, 2019	H. Takahashi	T. Yamauchi	T. Hirakawa
0	S18644	October 11, 2018	Y. Nakagawa	T. Yamauchi	K. Yotsutani

1. Scope

This product specification defines the test conditions and the performances of the MHF-SW23 PLUG ASS'Y

2. Product Name and Parts No.

2.1 Product Name

MHF-SW23 PLUG ASS'Y

2.2 Parts No.

Plug: 20851-001R
RF switch: 20549-001E-**

3. Rating

3.1 Applicable Cable

(1) Description

Inner conductor : AWG#32(7/0.08) , Silver plating annealed copper wire
Dielectric core : Fluoro-plastics
Outer conductor : Silver plating annealed copper wire or tin plating annealed copper wire
Jacket : Fluoro-plastics , diameter φ1.13mm

(2) Requirements

Characteristic impedance : 50(+2, -2)ohm by TDR method
Nominal capacitance (Reference value) : 97 pF/m
Dielectric withstand voltage : no breakdown at AC1000V for 1 minutes.

3.2 Operating Conditions

Rated power: 2W
Nominal characteristic impedance: 50Ω
Frequency: DC ~ 9GHz
VSWR: 1.4 Max at 0.3~3GHz, 1.6 Max at 3~6GHz, 2.0 Max at 6~9GHz.
Operating temperature: 233~358K(-40℃~+85℃)
(Containing temperature rise by current)
Operating humidity: 90% max

3.3 Storage Conditions

Storage temperature: 248 to 333K(-25℃ to 60℃)
Storage humidity: 85% max. (Non-condensing)

4. Test and Performance

Test Condition

Unless otherwise specified, all tests and measurements shall be performed under the following conditions in accordance with MIL-STD-202.

Temperature: 288K to 308K(15℃ to 35℃)
Pressure: 866hPa to 1066hPa(650mmHg to 800mmHg)
Relative humidity: 45 to75% R.H.

4.1. Electrical Performance

1. Contact resistance	
Reference standard:	MIL-STD-202-307
Test conditions:	Solder the MHF-SW23 to the test board and mate the plug connector together, then apply 20mV MAX. DC open circuit voltage and 10mA MAX. DC closed circuit current. Measure the contact resistance at the section shown in Fig.1 by the four terminal methods.

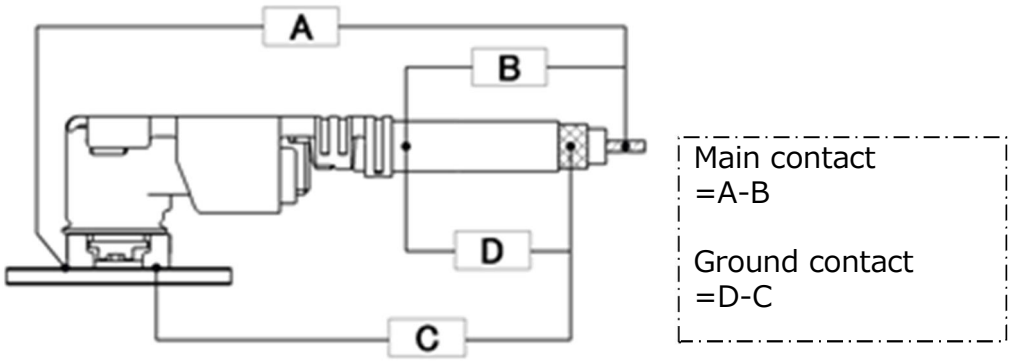


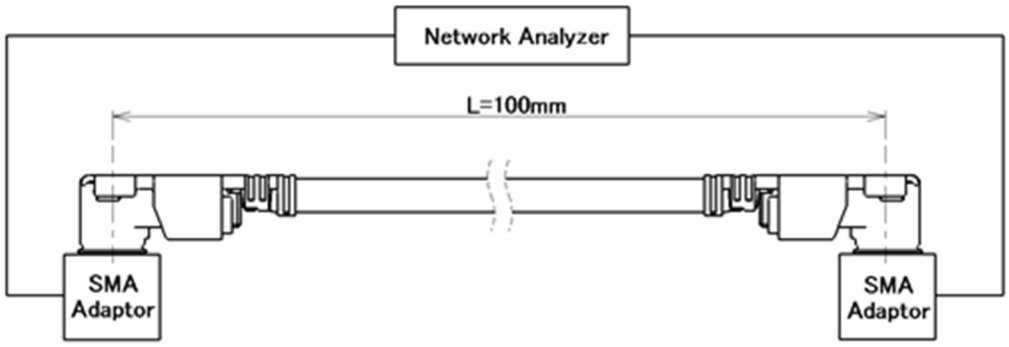
Fig. 1 Contact Resistance

Pass criteria:	Main contact Initial : 100mΩ MAX. After testing : 100mΩ MAX. Ground contact Initial : 100mΩ MAX. After testing : 100mΩ MAX.

2. Insulation resistance	
Reference standard:	MIL-STD-202-302, Test condition A
Test conditions:	Mate the plug and MHF-SW23 together, and then apply DC 100 V between the main contact and the ground contact.
Pass criteria:	Initial: 1000 MΩ MIN. After testing: 10 MΩ MIN.

3. Dielectric withstanding voltage	
Reference standard:	MIL-STD-202-301
Test conditions:	Mate the plug and MHF-SW23 together, then apply AC 200V(rms) between the main contact and the ground contact for a minute.
Pass criteria:	No abnormalities such as creeping discharge, flashover, insulator breakdown occur.

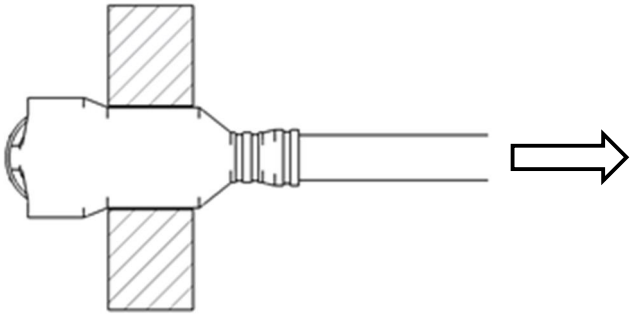
4.1. Electrical Performance

4. VSWR	
Reference standard:	-
Test conditions:	Measure the VSWR as shown in Fig. 2 by the network analyzer. Frequency : 300KHz ～ 9.0GHz  Fig. 2 VSWR
Pass criteria:	1.4 MAX. (0.3～3.0GHz) 1.6 MAX. (3.0～6.0GHz) 2.0 MAX. (6.0～9.0GHz)

4.2. Mechanical Performance

1. Un-mating force	
Reference standard:	-
Test conditions:	Solder the MHF-SW23 to the test board, then place the board and plug on push-on/pull-off machine. Repeat mating/unmating 30 cycles at a speed 25±3mm/min. along the mating axis. Measure the unmating force at the initial and after 30cycles.
Pass criteria:	Initial: 5 N MIN. 30cycles: 3 N MIN.

2. Durability	
Reference standard:	-
Test conditions:	Solder the MHF-SW23 to the test board, then place the board and plug on the push-on/pull-off machine, and repeat mating and unmating 30cycles at a speed 25±3mm/min. along the mating axis.
Pass criteria:	Contact resistance: Shall meet4.1.1

3. Cable retention force	
Reference standard:	-
Test conditions:	Pull the cable as shown in Fig. 3 at speed of 25±3mm/minutes by the tensile strength machine and measure the retention force.
	 Fig. 3 Cable Retention Force
Pass criteria:	10 N MIN.

4. Vibration	
Reference standard:	-
Test conditions:	Solder the MHF-SW23 to the test board, then mate plug connector, and place them on the vibrator. Then apply the following vibration. During the testing, run 100mA DC to check electrical discontinuity. Frequency: 10Hz→55Hz→10Hz/approx. 1min. Directions: 3 mutually perpendicular directions. Half amplitude, Peak value of acceleration: 0.75mm or 98m/s^2 (10G) Cycles: 10 cycles for each direction, a total of 30 cycles.
Pass criteria:	Contact resistance: Shall meet 4.1.1. Electrical discontinuity: No electrical discontinuity greater than 1μs shall occur. Appearance: No abnormality adversely affecting the performance shall occur.

5. Shock	
Reference standard:	-
Test conditions:	Solder the MHF-SW23 to the test board, then mate plug connector, and place them on the shock machine. Then apply the following shock. MAX.G: 50G Duration: 11msec Wave Form: Half Sinusoidal Directions: 3 mutually perpendicular direction Cycle: 3 cycles each direction
Pass criteria:	Contact resistance: Shall meet 4.1.1. Electrical discontinuity: No electrical discontinuity greater than 1μs shall occur. Appearance: No abnormality adversely affecting the performance shall occur.

4.3. Environmental Performance

1. Thermal shock	
Reference standard:	MIL-STD-202-107, Test condition A.
Test conditions:	Solder the MHF-SW23 to the test board, then mate plug connector, and expose them to the following environment. Temperature: 218K(-55℃),30min.→358K(85℃),30min. Transition time: 5min. MAX. Cycle: 100 cycles
Pass criteria:	Contact resistance: Shall meet 4.1.1. Insulation resistance: Shall meet 4.1.2. Appearance: No abnormality adversely affecting the performance shall occur.

2. Dry Heat	
Reference standard:	MIL-STD-202-108, Test condition A.
Test conditions:	Solder the MHF-SW23 to the test board, then mate plug connector, and expose them to the following environment. Temperature: 358±2K (85±2℃) Duration: 96 hours
Pass criteria:	Contact resistance: Shall meet 4.1.1. Insulation resistance: Shall meet 4.1.2. Appearance: No abnormality adversely affecting the performance shall occur.

3. Cold	
Reference standard:	-
Test conditions:	Solder the MHF-SW23 to the test board, then mate plug connector, and expose them to the following environment. Temperature: 218±2K (-55±2℃) Duration: 96 hours
Pass criteria:	Contact resistance: Shall meet 4.1.1. Insulation resistance: Shall meet 4.1.2. Appearance: No abnormality adversely affecting the performance shall occur.

4. Humidity (Steady state)	
Reference standard:	-
Test conditions:	Solder the MHF-SW23 to the test board, then mate plug connector, and expose them to the following environment. Temperature: 333±2K (60±2℃) Humidity: 90～95%RH Duration: 96 hours
Pass criteria:	Contact resistance: Shall meet 4.1.1. Insulation resistance: Shall meet 4.1.2. Appearance: No abnormality adversely affecting the performance shall occur.

5. Saltwater spray	
Reference standard:	-
Test conditions:	Solder the MHF-SW23 to the test board, then mate plug connector, and expose them to the following environment. Temperature: 308±2K (35±2°C) Saltwater density: 5±1% [by weight] Duration: 72 hours
Pass criteria:	Appearance: No abnormality adversely affecting the performance shall occur.

4.4 Test Sequence and Specimen Quantity

Table.1 Test Sequence and Sample Quantity

Test Item	Group										
	A	B	C	D	E	F	G	H	J	K	L
Contact resistance				1,3		1,3,5	1,3	1,3	1,3	1,3	
Insulation resistance	1						4	4	4	4	
Dielectric withstanding Voltage	2										
VSWR		1									
Unmating force			1								
Durability				2							
Cable retention force					1						
Vibration						2					
Shock						4					
Thermal shock							2				
Dry Heat								2			
Cold									2		
Humidity (Steady State)										2	
Saltwater spray											1
Specimen quantity.	5	5	5	5	5	5	5	5	5	5	5

※Numbers indicate test sequences.