MHF®-A Connector

Part No. Plug: 20428-001R Receptacle: 20429-001E

Product Specification

Qualification Test Report No. TR-07031

Rev.	ECN	Date	Prepared by	Checked by	Approved by
3	S22278	June 24, 2022	Y. Imaji	K. Yufu	Y. Hashimoto
2	S12394	September 3, 2012	H.M		Tom
1	S07169	June 29, 2007	Y.S		E.K
0	S07055	February 27, 2007	Y.Hashimoto		E.Kawabe

1. Scope

This product specification defines the test conditions and the performances of the MHF-A PLUG、RECEPTACLE.

2. Product Name and Parts No.

2.1 Product Name

MHF-A Connector

2.2 Parts No.

20428-001R : (MHF-A PLUG)
20429-001E : (MHF-A RECEPTACLE)
Cable : AWG#32 coaxial cable /jacket diameter 1.13mm

3. Product Shape, Dimensions, Materials and RoHS compliant

Refer to the drawing.

4. Rating

4.1 Applicable Cable

(1) Components
Inner conductor : AWG#32(7/0.08) ,Silver plating annealed copper wire
Dielectric core : Fluoro-plastics ,diameter 0.7 (±0.03)mm , nominal thickness 0.23mm
Outer conductor : 16／4／0.05, nominal diameter 0.95mm , silver plating annealed copper wire or tin plating annealed copper wire
Jacket : Fluoro-plastics , diameter 1.13(+0.10, －0.06)mm , nominal thickness 0.09mm
(2) Requirements
Characteristic impedance : 50(±2)Ω by TDR method
Nominal capacitance (Reference value) : 98 pF/m
Conductor resistance of inner conductor at 293K (20℃) : 597Ω/km MAX.
Insulation resistance : 1500 mega-ohm‧km MIN.
Dielectric withstand voltage : no breakdown at AC500V for 1 minutes.

4.2 Operating Conditions

Voltage: 60Vrms AC
Operating temperature: 233～363K(-40℃～90℃) (Containing temperature rise by current)
Nominal characteristic impedance： 50Ω
Frequency: DC~9GHz
VSWR: PLUG: 1.30 MAX at 0.1~3GHz. 1.50 MAX at 3~6GHz. 1.90 MAX at 6~9GHz.
RECEPTACLE: 1.30 MAX at 0.1~3GHz. 1.40 MAX at 3~6GHz. 1.50 MAX at 6~9GHz.

4.3 Storage Conditions

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

5. Test and Performance

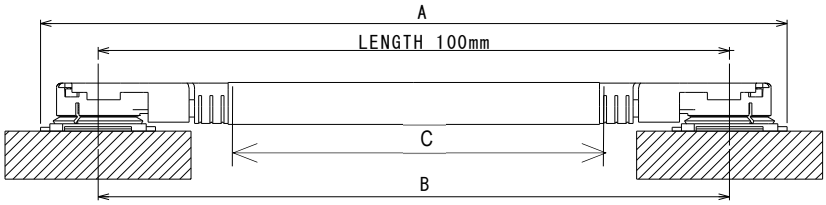
Test Condition

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.

5.1. Electrical Performance

1. Contact resistance	
Reference standard:	MIL-STD-202-307
Test conditions:	Solder the receptacle connector to the test board and mate the plug connector together, then, measure the contact resistance as shown in Fig.1 by the four terminal method. Open circuit voltage : 20mV MAX. Circuit current : 10mA MAX.



Inner contact
=(A-B) / 2

Ground contact
=(B-C) / 2

Fig.1

Pass criteria:	Inner contact Initial :20mΩMax. After testing :⊿R 20mΩMax. Ground contact Initial :20mΩMax. After testing :⊿R 20mΩMax.

2. Insulation Resistance	
Reference standard:	MIL-STD-202-302
Test conditions:	Mate the plug and receptacle connector together, then, apply DC 100 V between the inner contact and the ground contact.
Pass criteria:	Initial: 500 MΩ MIN. After testing: 100 MΩ MIN.

3. Dielectric Withstanding Voltage	
Reference standard:	MIL-STD-202-301
Test conditions:	Mate the receptacle and plug connector together, then, apply AC 200 V rms between the inner contact and the ground contact for a minute.
Pass criteria:	No creeping discharge, no flashover, and no insulator breakdown.

4. VSWR	
Reference standard:	-
Test conditions:	Measure the VSWR and insertion loss as shown in Fig.-2 by the network analyzer. Frequency : VSWR 100M ～ 9GHz ,

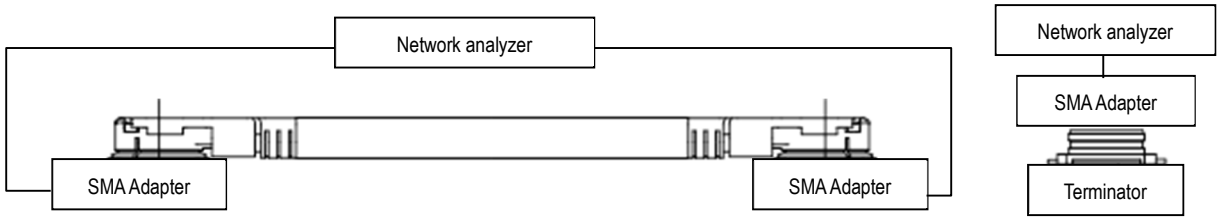
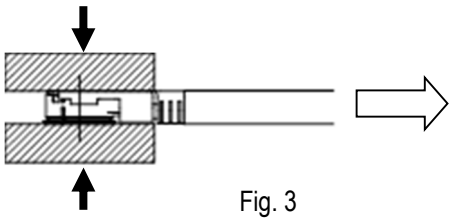


Fig. 2

Pass criteria:	[PLUG] 1.30 MAX at 0.1~3GHz. 1.50 MAX at 3~6GHz. 1.90 MAX at 6~9GHz. [RECEPTACLE] 1.30 MAX at 0.1~3GHz. 1.40 MAX at 3~6GHz. 1.50 MAX at 6~9GHz.

5.2. Mechanical Performance

1. Mating Force and Unmating Force	
Reference standard:	-
Test conditions:	Solder the receptacle connector to the test board and mate the plug connector, then, measure the mating and un-mating force at speed 25±3mm/minutes in parallel with the mating axis the push-pull machine.
Pass criteria:	[Total mating force] Initial: 15 N MAX. After 30 cycles: 15 N MAX. [Total unmating force] Initial: 4 N MIN. After 30 cycles: 2 N MIN.

2. Cable Retention Force	
Reference standard:	-
Test conditions:	Pull the cable as shown in Fig.-3 at speed 25±3mm/minutes by tensile strength machine and measure the retention force.
	 Fig. 3
Pass criteria:	8N MIN.

3. Durability	
Reference standard:	-
Test conditions:	Mate and un-mate the receptacle connector (soldered to the test board) and plug connector 30 cycles at speed 25±3mm/minutes in parallel with the mating axis by the push-pull machine.
Pass criteria:	[Contact Resistance] Shall meet 5.1.1. [Appearance] No abnormality adversely affecting the performance shall occur.

4. Vibration	
Reference standard:	-
Test conditions:	Apply the following vibration to the mating connector. During the testing, run 100mA DC to check electrical discontinuity. Frequency: 30Hz →100Hz → 30Hz / approx 20minutes. Half amplitude, Peak value of acceleration: 1.5mm or 59m/s2 (6G) Directions , cycle: 3 mutually perpendicular direction, 2 hours for each direction, a total of 6 hours.
Pass criteria:	[Contact Resistance] Shall meet 5.1.1. [Electrical discontinuity] No electrical discontinuity greater than 1μs shall occur. [Appearance] No abnormality adversely affecting the performance shall occur.

6.Shock	
Reference standard:	
Test conditions:	Apply the following shock to the mating connector. During the testing, run 100mA DC to check electrical discontinuity. Peak value of acceleration : 735m/s2 (75G) Duration : 11msec Wave Form : half sinusoidal Directions , cycle: 6 mutually perpendicular direction , 3 cycles about each direction
Pass criteria:	[Contact Resistance] Shall meet 5.1.1. [Electrical discontinuity] No electrical discontinuity greater than 1μs shall occur. [Appearance] No abnormality adversely affecting the performance shall occur.

5.3. Environmental Performance

1. Humidity (Steady State)	
Reference standard:	MIL-STD-202-103, Test condition B.
Test conditions:	Solder the receptacle connector to the test board, then mate plug connector, and expose them to the following environment. Temperature: 313±2K (40±2℃) Humidity: 90～95%RH Duration: 96 hours
Pass criteria:	[Contact Resistance] Shall meet 5.1.1. [Insulation Resistance]Shall meet 5.1.2. [Dielectric Withstanding Voltage] Shall meet 5.1.3. [Appearance] No abnormality adversely affecting the performance shall occur.

2. Humidity (Cycling)	
Reference standard:	MIL-STD-202-106.
Test conditions:	Solder the receptacle connector to the test board, then mate plug connector, and expose them to the following environment. Temperature: 298～338K (25～65℃) Humidity: 90～95%RH Duration: 10 cycles (240 hours)
Pass criteria:	[Contact Resistance] Shall meet 5.1.1. [Insulation Resistance]Shall meet 5.1.2. [Dielectric Withstanding Voltage] Shall meet 5.1.3. [Appearance] No abnormality adversely affecting the performance shall occur.

3. Thermal Shock	
Reference standard:	MIL-STD-202-107, Test condition A.
Test conditions:	Solder the receptacle connector 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: 5 cycles
Pass criteria:	[Contact Resistance] Shall meet 5.1.1. [Insulation Resistance]Shall meet 5.1.2. [Dielectric Withstanding Voltage] Shall meet 5.1.3. [Appearance] No abnormality adversely affecting the performance shall occur.

2. High temperature life	
Reference standard:	MIL-STD-202-108, Test condition A.
Test conditions:	Solder the receptacle connector 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 5.1.1. [Appearance] No abnormality adversely affecting the performance shall occur.

5. H2S Gas	
Reference standard:	-
Test conditions:	Solder the receptacle connector to the test board, then mate plug connector, and expose them to the following environment. Temperature : 313±2K (40±2℃) Relative Humidity : 80±5%RH Gas : H2S 3±1ppm Duration : 48 hours
Pass criteria:	[Contact Resistance] Shall meet 5.1.1. [Appearance] No abnormality adversely affecting the performance shall occur.

6. Salt Water Spray	
Reference standard:	MIL-STD-202-101, Test condition B.
Test conditions:	Solder the receptacle connector to the test board, then mate plug connector, and expose them to the following environment. Temperature : 308±2K (35±2℃) Relative Humidity : 95～98%RH Salt water density : 5±1% (by weight) Duration : 48 hours
Pass criteria:	[Contact Resistance] Shall meet 5.1.1. [Appearance] No abnormality adversely affecting the performance shall occur.

5.4.Others

1. Solder ability	
Reference standard:	-
試験条件:	Dip the soldering point of the contacts in the solder bath at 518±5K （245±5℃） for 5±0.5seconds after immersing the tine in the flux of RMA type for 5 to 10 seconds.
Pass criteria:	More than 95% of the dipped surface shall be evenly wet.

2. Soldering Heat Resistance (Reflow)	
Reference standard:	-
Test conditions:	Reflow temperature: See Fig.4. Cycle: 2

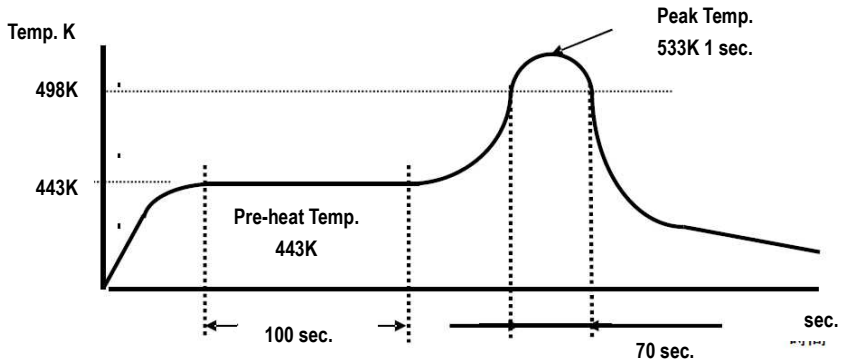


Fig. 4

Pass criteria:	Abnormality adversely affecting the performance should not occur.

3. Soldering Heat Resistance (Hand Soldering)	
Reference standard:	-
Test conditions:	Solder the soldering point of the contacts by the soldering iron at 623K （350℃） for 5 seconds.
Pass criteria:	Abnormality adversely affecting the performance should not occur.

5.5 Test Sequence and Sample Quantity

Table 1 Test Sequence and Sample Quantity

Test Item	Group													
	A	B	C	D	E	F	G	H	J	K	L	M	N	P
Contact Resistance				1,3	1,3	1,3	1,5	1,5	1,5	1,3	1,3	1,3		
Insulation Resistance							2,6	2,6	2,6					
Dielectric Withstanding Voltage							3,7	3,7	3,7					
VSWR	1													
Mating & Un-mating Force		1												
Cable Retention Force			1											
Durability				2										
Vibration					2									
Shock						2								
Humidity (Steady State)							4							
Humidity (Cycling)								4						
Thermal Shock									4					
High Temperature Life										2				
H2S Gas											2			
Salt Water Spray												2		
Solder Ability													1	
Soldering Heat Resistance (Reflow, Hand Soldering)														1
Sample Quantity	10	10	10	10	10	10	10	10	10	10	10	10	-	-
	5		-										10	10

Numbers in “Group” mean test sequence.

6. Recommended Metal Mask

Refer to drawing for the recommended metal mask thickness and opening dimension.

7. Precautions for Handling Cable Connectors

See HIM-11001.