

# MHF® 7S Connector

Part No. Plug: 20980-001R-13 Receptacle: 20981-001E-02

# **Product Specification**

Qualification Test Report No. TR-20043

4	S21500	October 26, 2021	Y. Imaji	H. Nakamura	Hiro Takahashi
3	S21114	March 11, 2021	Y. Imaji	H. Nakamura	Hiro Takahashi
2	S20673	December 25, 2020	Y. Imaji	H. Nakamura	Hiro Takahashi
1	S20645	December 9, 2020	Y. Imaji	H. Nakamura	Hiro Takahashi
Rev.	ECN	Date	Prepared by	Checked by	Approved by

Confidential C I-PEX Inc. QKE-DFFDE06-08 REV.12

#### 1. Scope

This product specification defines the test conditions and the performances of the MHF 7S Connector

#### 2. Product Name and Parts No.

#### 2.1 Product Name

MHF 7S Connector

#### 2.2 Parts No.

Plug: 20980-001R-13 Receptacle: 20981-001E-02

#### 3. Rating

#### 3.1 Applicable Cable

#### (1) Description

Inner conductor: AWG#32(7/0.08)
Silver plating annealed copper wire

Dielectric core: Fluoro-plastics, diameter 0.70(+/-0.03)mm, nominal thickness 0.23mm

Outer conductor: 16/5/0.04, diameter 0.90(+/-0.09)mm, tin-copper alloy

Jacket: Fluoro-plastics, diameter 1.13(+0.08,-0.05)mm, nominal thickness 0.12mm

#### (2) Requirements

Characteristic impedance:  $50\pm2\Omega$  by TDR method Nominal capacitance(Reference value): 97 pF/m

Conductor resistance of inner conductor at 293K (20°C)(Reference value): 520Ω/km

Insulation resistance: 1,500M $\Omega$  • km MIN.

Dielectric withstand voltage: no breakdown at AC 500V for 1 minutes.

#### 3.2 Operating Conditions

Voltage: 60 Vrms AC

Operating temperature: 233 to 363K(-40°C to +90°C) (Containing temperature rise by current)

Nominal characteristic impedance:  $50\Omega$ 

Frequency: DC~15 GHz

VSWR: [Mating condition] 1.30 MAX at 0.1~3 GHz

1.35 MAX at 3~6 GHz 1.40 MAX at 6~9 GHz 1.45 MAX at 9~12 GHz 1.50 MAX at 12~15 GHz

Operating humidity: 90% max

#### 3.3 Storage Conditions

Storage temperature: 248 to 333K(-25°C to 60°C) 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.

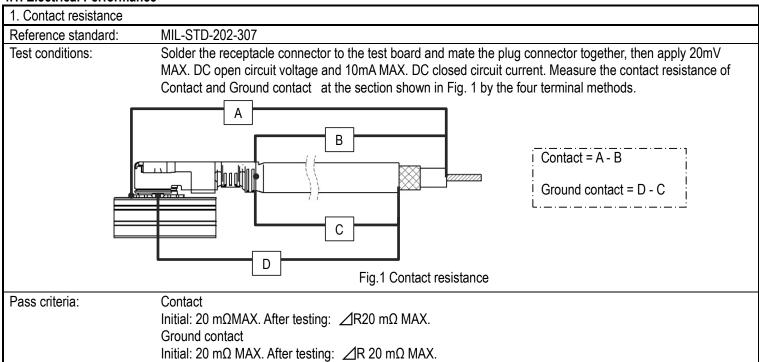
Temperature: 288K to 308K(15°C to 35°C)

Pressure: 866hPa to 1066hPa (650 mmHg to 800 mmHg)

Relative humidity: 45 to 75% R.H.

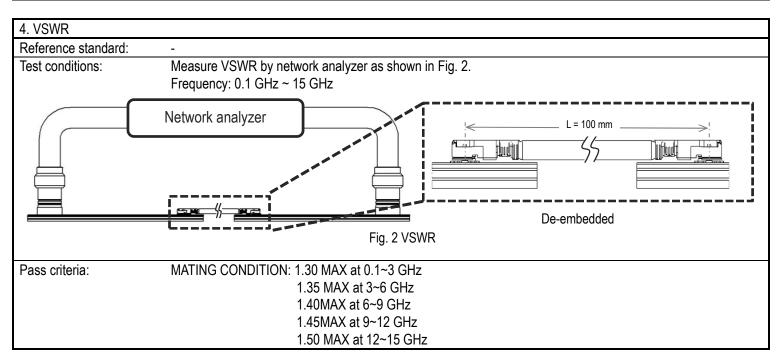


#### 4.1. Electrical Performance



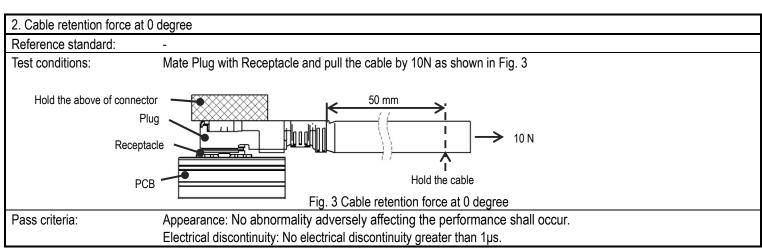
2. Insulation resistance	
Reference standard:	MIL-STD-202-302, Condition A
Test conditions:	Mate the plug and receptacle connector together, and then apply DC 100 V between Contact and Ground contact.
Pass criteria:	Initial: 500 MΩ MIN. After testing: 100 MΩ MIN.

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

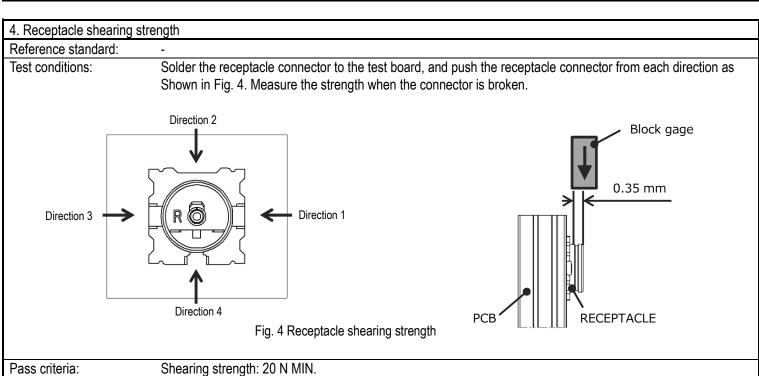


#### 4.2. Mechanical Performance

1. Mating force and Un-mating force		
Reference standard:	•	
Test conditions:	Solder the receptacle connector 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 mating and unmating force at the initial and after 30 cycles.	
Pass criteria:	Mating force Initial: 30 N MAX. 30cycles: 30 N MAX. Unmating force Initial: 20 N MAX., 5 N MIN. 30cycles: 20 N MAX., 3 N MIN.	



3. Durability	
Reference standard:	-
Test conditions:	Solder the receptacle connector 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:	Appearance: No abnormality adversely affecting the performance shall occur.  Contact resistance: Shall meet4.1.1



## 4.2. Mechanical Performance

5. 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 →100Hz → 10Hz ✓ approx. 15minutes.  Half amplitude, Peak value of acceleration: 1.5mm or 59m/s2 (6G)  Directions, cycle: 3 mutually perpendicular directions, 5 cycles (approx. 75minutes.) for 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.

Reference standard:	-
Test conditions:	Apply the following shock to the mating connector. During the testing, run 100mA DC to check electrical discontinuity.  MAX.G: 735m/s2(75G)  Duration: 11msec  Wave Form: Half Sinusoidal  Directions: 6 directions along 3 mutually perpendicular directions  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, 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°C),30min.→358K(85°C),30min.  Transition time: 5min. MAX.  Cycles: 5 cycles
Pass criteria:	Contact resistance: Shall meet 4.1.1. Insulation resistance: Shall meet 4.1.2. Dielectric withstanding voltage: Shall meet 4.1.3. Appearance: No abnormality adversely affecting the performance shall occur.

2. High temperature life	
Reference standard:	-
Test conditions:	Solder the receptacle connector to the test board, then mate plug connector, and expose them to the following environment.  Temperature: 363±2K (90±2°C)  Duration: 96 hours
Pass criteria:	Contact resistance: Shall meet 4.1.1. Appearance: No abnormality adversely affecting the performance shall occur.

## PRS-2676-04EN

## 4.3. Environmental Performance

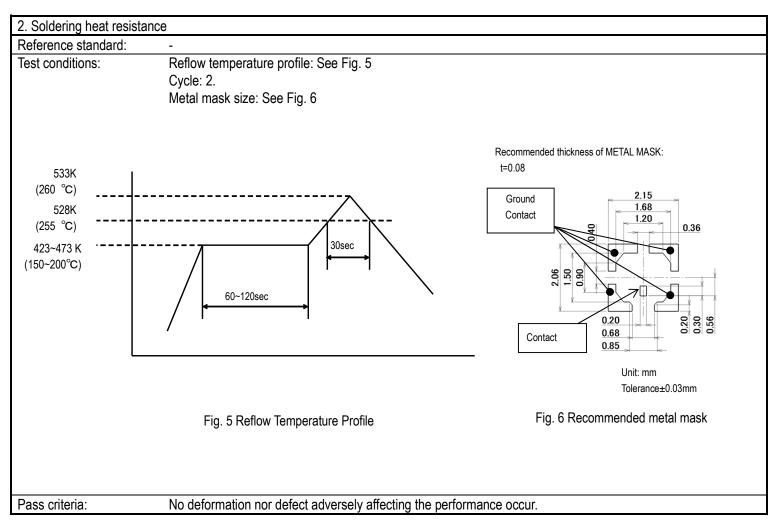
3. Humidity (Steady state	
Reference standard:	MIL-STD-202-103, Condition B.
Test conditions:	Solder the receptacle connector to the test board, then mate plug connector, and expose them to the following environment.  Temperature: 313±2K (40±2°C)  Humidity: 90~95%RH  Duration: 96 hours
Pass criteria:	Contact resistance: Shall meet 4.1.1. Insulation resistance: Shall meet 4.1.2. Dielectric withstanding voltage: Shall meet 4.1.3. Appearance: No abnormality adversely affecting the performance shall occur.

4. Saltwater spray Reference standard:	
Reference Standard.	-
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°C)
	Saltwater density: 5±1% [by weight]
	Duration: 48 hours
Pass criteria:	Contact resistance: Shall meet 4.1.1.
	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°C)  Relative humidity: 80±5%RH  Gas: H <sub>2</sub> S 3±1ppm  Duration: 48 hours
Pass criteria:	Contact resistance: Shall meet 4.1.1. Appearance: No abnormality adversely affecting the performance shall occur.

#### 4.4. Others

1. Solder ability	
Reference standard:	-
Test conditions:	Immerse the contact soldering part to flux of RMA or R type for 5 to 10 seconds, then dip the part into the solder bath of $518\pm5K$ ( $245\pm5$ °C) for $5\pm0.5$ seconds.
Pass criteria:	More than 95% of the dipped surface shall be evenly wet.



## 4.5 Test Sequence and Specimen Quantity

**Table.1 Test Sequence and Sample Quantity** 

Test Item		Group														
1650	. item	Α	В	С	D	Е	F	G	Н	J	K	L	M	N	Р	Q
Contact Resistance						1,3		1,3	1,3	1,5	1,3	1,5	1,3	1,3		
Insulation resistance										2,6		2,6				
Dielectric withstanding voltage		1								3,7		3,7				
VSWR			1													
Mating force/Unmating force				1												
Cabel retention force at 0 degree					1											
Durability						2										
Receptacle shearing strength							1									
Vibration								2								
Shock									2							
Thermal shock										4						
High temperature life											2					
Humidity steady state												4				
Salt Water Spray													2			
H₂S Gas														2		
Solder ability															1	
Soldering Heat Resistance																1
Sample Quantity (pcs.)	Plug	10	10	10	10	10	_	10	10	10	10	10	10	10	_	_
	Receptacle	10	10	10	10	10	20	10	10	10	10	10	10	10	10	10
Test board (pcs.)		10	10	10	10	10	20	10	10	10	10	10	10	10	10	10

※Numbers indicate test sequences.