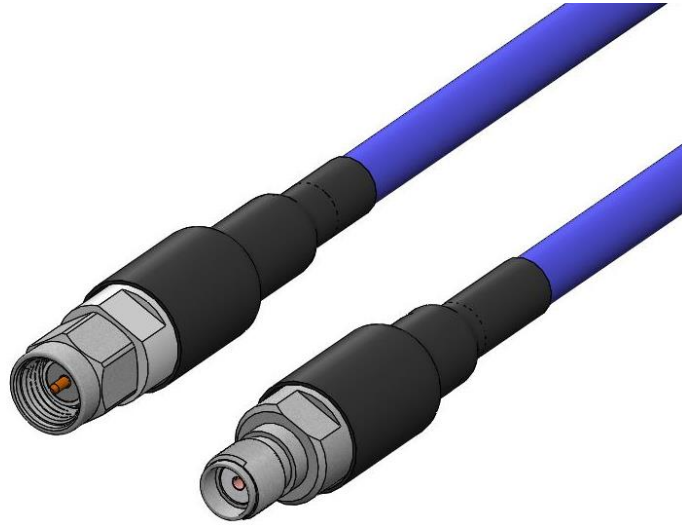




Project Number: Design Qualification Test Report	Tracking Code: 2697052_Report_Rev_1
Requested by: Alvin Wang	Date: 4/21/2021
Part #: RF180-01SP-505050-0152 /RF180-01SJ-505050-0152	
Part description: RF180-01SP / RF180-01SJ	Tech: Peter Chen
Test Start: 3/1/2021	Test Completed: 3/20/2021



**DESIGN QUALIFICATION TEST REPORT**  
**RF180-01SP / RF180-01SJ**  
**RF180-01SP-505050-0152 /RF180-01SJ-505050-0152**

Tracking Code: 2697052_Report_Rev_1	Part #: RF180-01SP-505050-0152 /RF180-01SJ-505050-0152
Part description: RF180-01SP / RF180-01SJ	

**REVISION HISTORY**

<b>DATA</b>	<b>REV.NUM.</b>	<b>DESCRIPTION</b>	<b>ENG</b>
4/20/2021	1	Initial Issue	PC

## CERTIFICATION

All instruments and measuring equipment were calibrated to National Institute for Standards and Technology (NIST) traceable standards according to ISO 10012-1 and ANSI/NCSL 2540-1, as applicable.

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### SCOPE

To perform the following tests: Design Qualification test. Please see test plan.

### APPLICABLE DOCUMENTS

Standards: EIA Publication 364, MIL-PRF-39012.

### TEST SAMPLES AND PREPARATION

- 1) All materials were manufactured in accordance with the applicable product specification.
- 2) All test samples were identified and encoded to maintain traceability throughout the test sequences.
- 3) Parts not intended for testing LLCR and DWV/IR are visually inspected and cleaned if necessary.
- 4) Any additional preparation will be noted in the individual test sequences.

**FLOWCHARTS****IR/DWV****Pin-to-Ground**Group 1

RF180-01SP-505050-0152

RF180-01SJ-505050-0152

4 Assemblies

*Note: For STEP 6, please put the following additional cable assemblies in the thermal shock chamber (ride along parts). Plug & jack versions are mated with dust caps (Brown) on open ends.*

*Plug version: RF180-01SP-01SP-1000 (4 PCS)*

*Jack version: RF180-01SJ-01SJ-1000 (4PCS)*

Step	Description
1.	Length & Mass
2.	Interface Gaging
3.	IR (2) - Non Standard
4.	DWV at Test Voltage (1) - Non Standard Test Voltage = 500 V
5.	LLCR (3) - Non Standard <i>Note: Signal and ground.</i>
6.	Thermal Shock (4) - Non Standard
7.	IR (2) - Non Standard
8.	DWV at Test Voltage (1) - Non Standard Test Voltage = 500 V
9.	LLCR (3) - Non Standard <i>Note: Signal and ground.</i>
10.	Interface Gaging

**(1) DWV at Test Voltage = Other**

Test Condition = 1 (Sea Level) Test voltage applied for 60 seconds  
MIL-PRF-39012, Paragraph 4.6.8 per MIL-STD-202-302

**(2) IR = Other**

Test Condition = 500 Vdc, 2 Minutes Max  
MIL-PRF-39012, Paragraph 4.6.8 per MIL-STD-202-302

**(3) LLCR = Other**

Open Circuit Voltage = 20 mV Max  
Test Current = 100 mA Max  
MIL-PRF-39012, Paragraph 4.6.13 except current to be 100mA nominal and voltage to be 20 mV maximum.

**(4) Thermal Shock = Other**

Exposure Time at Temperature Extremes = 1/2 Hour  
Method A, Test Condition = I (-55°C to +125°C)  
Test Duration = test condition B except 10 cycles instead of 5.  
MIL-PRF-39012, Paragraph. 4.6.17 per MIL-STD-202-107

**FLOWCHARTS Continued****Cable Pull**

Group 1  
RF180-01SJ-505050-0152

2 Assemblies  
0 Degrees

**Step Description**

1. Cable Retention (2) - Non Standard  
*Note: Pull-to-destruct.*

Group 2  
RF180-01SP-505050-0152

2 Assemblies  
0 Degrees

**Step Description**

1. Cable Retention (2) - Non Standard  
*Note: Pull-to-destruct.*

Group 3  
RF180-01SJ-505050-0152  
RF180-01SP-505050-0152

4 Assemblies  
0 Degrees

**Step Description**

1. Length & Mass
2. Interface Gaging
3. LLCR (3) - Non Standard  
*Note: Signal and ground.*
4. Cable Retention (1) - Non Standard  
*Note: Apply 20 pounds (9.2kg) for Cable Retention test.*
5. LLCR (3) - Non Standard  
*Note: Signal and ground.*
6. Interface Gaging

**(1) Cable Retention = Other**

Apply 20 pounds (9.2 kg) for Cable Retention test.  
MIL-PRF-30192, Paragraph 4.6.21

**(2) Cable Retention = Other**

Pull-to-destruct.  
MIL-PRF-30192, Paragraph 4.6.21

**(3) LLCR = Other**

Open Circuit Voltage = 20 mV Max  
Test Current = 100 mA Max  
MIL-PRF-39012, Paragraph 4.6.13 except current to be 100mA nominal and voltage to be 20 mV maximum.

## ATTRIBUTE DEFINITIONS

The following is a brief, simplified description of attributes.

### THERMAL SHOCK:

- 1) MIL-PRF-39012, paragraph. 4.6.17 per MIL-STD-202-107.
- 2) Test Condition I: -55°C to +125°C
- 3) Test Time: ½ hour dwell at each temperature extreme
- 4) Test Duration: test condition B except 10 cycles instead of 5.
- 5) All test samples are pre-conditioned at ambient.
- 6) All test samples are exposed to environmental stressing in the mated condition.

### LLCR:

- 1) MIL-PRF-39012, Paragraph 4.6.13 except current to be 100 mA nominal and voltage to be 20 mV maximum.
- 2) A computer program, *LLCR 221.exe*, ensures repeatability for data acquisition.
- 3) The following guidelines are used to categorize the changes in LLCR as a result from stressing
  - a.  $\leq +5.0$  mOhms:----- Stable
  - b.  $+5.1$  to  $+10.0$  mOhms:----- Minor
  - c.  $+10.1$  to  $+15.0$  mOhms:----- Acceptable
  - d.  $+15.1$  to  $+50.0$  mOhms:----- Marginal
  - e.  $+50.1$  to  $+1000$  mOhms:----- Unstable
  - f.  $>+1000$  mOhms:----- Open Failure

### CABLE RETENTION:

- 1) Apply 20 pounds (9.2 kg) for cable retention test.
- 2) Pull to destruct.
- 3) MIL-PRF-30192, paragraph. 4.6.21.

**ATTRIBUTE DEFINITIONS Continued**

The following is a brief, simplified description of attributes

**INSULATION RESISTANCE (IR):**

To determine the resistance of insulation materials to leakage of current through or on the surface of these materials when a DC potential is applied.

- 1) PROCEDURE:
  - a. Reference document: MIL-PRF-39012, paragraph. 4.6.8 per MIL-STD-202-302.
  - b. Test Conditions:
    - i. Between Adjacent Contacts or Signal-to-Ground
    - ii. Electrification Time 2.0 minutes
    - iii. Test Voltage (500 VDC) corresponds to calibration settings for measuring resistances.
- 2) MEASUREMENTS:
- 3) When the specified test voltage is applied (VDC), the insulation resistance shall not be less than 1000 megohms.

**DIELECTRIC WITHSTANDING VOLTAGE (DWV):**

To determine if the sockets can operate at its rated voltage and withstand momentary over potentials due to switching, surges, and other similar phenomenon. Separate samples are used to evaluate the effect of environmental stresses so not to influence the readings from arcing that occurs during the measurement process.

- 1) PROCEDURE:
  - a. Reference document: MIL-PRF-39012, paragraph. 4.6.14 per MIL-STD-202-301.
  - b. Test Conditions:
    - i. Between Adjacent Contacts or Signal-to-Ground
    - ii. Barometric Test Condition 1(Sea Level) Test voltage applied for 60 seconds.
    - iii. Rate of Application 500 V/Sec
    - iv. Test Voltage (VAC) until breakdown occurs
- 2) MEASUREMENTS/CALCULATIONS
  - a. The breakdown voltage shall be measured and recorded.
  - b. The dielectric withstanding voltage shall be recorded as 75% of the minimum breakdown voltage.
  - c. The working voltage shall be recorded as one-third (1/3) of the dielectric withstanding voltage (one-fourth of the breakdown voltage).

**RESULTS**

**Cable Pull force**

- 0° Pull
  - Group 1 RF180-01SJ-505050-0152
    - Min----- 121.23 lbs
    - Max ----- 137.04 lbs
  - Group 2 RF180-01SP-505050-0152
    - Min----- 122.69 lbs
    - Max ----- 129.32 lbs

**Insulation Resistance minimums, IR**

**Pin to Ground**

- Initial
  - Mated-----45000 Meg  $\Omega$  ----- Passed
- Thermal Shock
  - Mated-----45000 Meg  $\Omega$  ----- Passed

**Dielectric Withstanding Voltage minimums, DWV**

- Minimums
  - Test Voltage -----500 VAC

**Pin to Ground**

- Initial DWV -----Passed
- Thermal DWV-----Passed

**Mating/Unmating Durability Group**

**Pin to Ground**

- Initial DWV -----Passed

**RESULTS Continued**

**Length & Mass**

**IR/DWV Group**

**Length**

- 01SP**
- **Min**----- **156.00 mm**
- **Max**----- **156.00mm**
- 01SJ**
- **Min**----- **156.00 mm**
- **Max**----- **156.00 mm**

**Mass**

- 01SP**
- **Min**-----**18.03 g**
- **Max**-----**18.07 g**
- 01SJ**
- **Min**-----**16.75 g**
- **Max**-----**16.87 g**

**Cable Pull Group**

**Length**

- 01SP**
- **Min**----- **156.00 mm**
- **Max**----- **156.00 mm**
- 01SJ**
- **Min**----- **156.00 mm**
- **Max**----- **156.00 mm**

**Mass**

- 01SP**
- **Min**-----**18.03 g**
- **Max**-----**18.05 g**
- 01SJ**
- **Min**-----**16.56 g**
- **Max**-----**16.89 g**

**RESULTS Continued****Interface Gaging****IR/DWV Group****01SP****Initial**

- **Min**-----**0.0129 mm**
- **Max**-----**0.0288 mm**

**After Thermal Shock**

- **Min**-----**0.0136 mm**
- **Max**-----**0.0438 mm**

**01SJ****Initial**

- **Min**-----**0.0062 mm**
- **Max**-----**0.0251 mm**

**After Thermal Shock**

- **Min**-----**0.0069 mm**
- **Max**-----**0.0289 mm**

**Cable Pull Group****01SP****Initial**

- **Min**-----**0.0078 mm**
- **Max**-----**0.0479 mm**

**After Retention**

- **Min**-----**0.0323 mm**
- **Max**-----**0.0453 mm**

**01SJ****Initial**

- **Min**-----**0.0039 mm**
- **Max**-----**0.0117 mm**

**After Retention**

- **Min**-----**0.0048 mm**
- **Max**-----**0.0156 mm**

**RESULTS Continued****LLCR IR/DWV (4 ground and 4 signal LLCR test points)****Ground pin**

- **Initial** -----5.69 mOhms Max
- **Thermal Shock**
  - **<= +5.0 mOhms**-----4 Points ----- Stable
  - **+5.1 to +10.0 mOhms** -----0 Points ----- Minor
  - **+10.1 to +15.0 mOhms** -----0 Points ----- Acceptable
  - **+15.1 to +50.0 mOhms** -----0 Points ----- Marginal
  - **+50.1 to +1000 mOhms**-----0 Points ----- Unstable
  - **>+1000 mOhms** -----0 Points ----- Open Failure

**Signal pin**

- **Initial** -----5.65 mOhms Max
- **Thermal Shock**
  - **<= +5.0 mOhms**-----4 Points ----- Stable
  - **+5.1 to +10.0 mOhms** -----0 Points ----- Minor
  - **+10.1 to +15.0 mOhms** -----0 Points ----- Acceptable
  - **+15.1 to +50.0 mOhms** -----0 Points ----- Marginal
  - **+50.1 to +1000 mOhms**-----0 Points ----- Unstable
  - **>+1000 mOhms** -----0 Points ----- Open Failure

**LLCR Cable Pull (4 ground and 4 signal LLCR test points)****Ground pin**

- **Initial** -----5.38 mOhms Max
- **After 20lb Retention**
  - **<= +5.0 mOhms**-----4 Points ----- Stable
  - **+5.1 to +10.0 mOhms** -----0 Points ----- Minor
  - **+10.1 to +15.0 mOhms** -----0 Points ----- Acceptable
  - **+15.1 to +50.0 mOhms** -----0 Points ----- Marginal
  - **+50.1 to +1000 mOhms**-----0 Points ----- Unstable
  - **>+1000 mOhms** -----0 Points ----- Open Failure

**Signal pin**

- **Initial** -----5.67 mOhms Max
- **After 20lb Retention**
  - **<= +5.0 mOhms**-----4 Points ----- Stable
  - **+5.1 to +10.0 mOhms** -----0 Points ----- Minor
  - **+10.1 to +15.0 mOhms** -----0 Points ----- Acceptable
  - **+15.1 to +50.0 mOhms** -----0 Points ----- Marginal
  - **+50.1 to +1000 mOhms**-----0 Points ----- Unstable
  - **>+1000 mOhms** -----0 Points ----- Open Failure

**DATA SUMMARIES****INSULATION RESISTANCE (IR):**

<b>Pin to Ground</b>	
	Mated
Minimum	<b>RF180-01SP/RF180-01SJ</b>
<b>Initial</b>	45000
<b>Thermal Shock</b>	45000

**DIELECTRIC WITHSTANDING VOLTAGE (DWV):**

<b>Voltage Rating Summary</b>	
Minimum	<b>RF180-01SP/RF180-01SJ</b>
<b>Test Voltage</b>	500

<b>Pin to Ground</b>	
<b>Initial Test Voltage</b>	Pass
<b>After Thermal Shock Test Voltage</b>	Pass

**Mating/Unmating Durability Group**

<b>Pin to Ground</b>	
<b>Initial Test Voltage</b>	Pass

**Cable Pull Force:****0° Pull****Group 1 RF180-01SP-505050-0152**

	<b>Force (lbs)</b>
Minimum	121.23
Maximum	137.04
Average	129.14

**Group 2 RF180-01SJ-505050-0152**

	<b>Force (lbs)</b>
Minimum	122.69
Maximum	129.32
Average	126.00

**DATA SUMMARIES Continued****LENGTH & MASS****IR/DWV Group**

<b>01SP</b>	<b>Length (mm)</b>	<b>Mass (g)</b>
1	156.00	18.07
2	156.00	18.03
3	156.00	18.06
4	156.00	18.04

<b>01SJ</b>	<b>Length (mm)</b>	<b>Mass (g)</b>
1	156.00	16.75
2	156.00	16.75
3	156.00	16.81
4	156.00	16.87

**Cable Pull Group**

<b>Group 3</b>		
<b>01SP</b>	<b>Length (mm)</b>	<b>Mass (g)</b>
1	156.00	18.04
2	156.00	18.05
3	156.00	18.04
4	156.00	18.03

<b>Group 3</b>		
<b>01SJ</b>	<b>Length (mm)</b>	<b>Mass (g)</b>
1	156.00	16.56
2	156.00	16.68
3	156.00	16.89
4	156.00	16.86

**DATA SUMMARIES Continued****INTERFACE GAGING****IR/DWV Group**

<b>Gaging (0.08 /-0.00) (mm)</b>			
<b>01SP</b>	<b>Initial</b>	<b>Post Ther Shock</b>	<b>Delta</b>
1	0.0139	0.02380	0.00990
2	0.0171	0.04380	0.02670
3	0.0129	0.02420	0.01130
4	0.0288	0.01360	0.01520

<b>Gaging (0.08 /-0.00) (mm)</b>			
<b>01SJ</b>	<b>Initial</b>	<b>Post Ther Shock</b>	<b>Delta</b>
1	0.0151	0.0086	0.0065
2	0.0179	0.0069	0.0110
3	0.0251	0.0241	0.0010
4	0.0062	0.0289	0.0227

**Cable Pull Group**

<b>Gaging (0.08 /-0.00) (mm)</b>			
<b>01SP</b>	<b>Initial</b>	<b>Retention</b>	<b>Delta</b>
1	0.0078	0.032300	0.0245
2	0.0209	0.039600	0.0187
3	0.0456	0.045300	0.0003
4	0.0479	0.0356	0.0123

<b>Gaging (0.08 /-0.00) (mm)</b>			
<b>01SJ</b>	<b>Initial</b>	<b>Retention</b>	<b>Delta</b>
1	0.0045	0.004800	0.0003
2	0.0117	0.012500	0.0008
3	0.0039	0.015600	0.0117
4	0.0063	0.0102	0.0039

### DATA SUMMARIES Continued

**LLCR IR/DWV:**

- 1) A total of 4 signal and 4 ground points were measured.
- 2) EIA-364-23, *Low Level Contact Resistance Test Procedure for Electrical Connectors and Sockets.*
- 3) A computer program, *LLCR 221.exe*, ensures repeatability for data acquisition.
- 4) The following guidelines are used to categorize the changes in LLCR as a result from stressing.
  - a.  $\leq +5.0$  mOhms:----- Stable
  - b.  $+5.1$  to  $+10.0$  mOhms:----- Minor
  - c.  $+10.1$  to  $+15.0$  mOhms:----- Acceptable
  - d.  $+15.1$  to  $+50.0$  mOhms:----- Marginal
  - e.  $+50.1$  to  $+1000$  mOhms:----- Unstable
  - f.  $>+1000$  mOhms:----- Open Failure

LLCR Measurement Summaries by Pin Type				
Date	3/1/021	3/3/021		
Room Temp (Deg C)	22	22		
Rel Humidity (%)	50	50		
Technician	Peter Chen	Peter Chen		
<b>mOhm values</b>	<b>Actual</b>	<b>Delta</b>		
	<b>Initial</b>	<b>Thermal Shock</b>		
Pin Type: Signal 1				
Average	5.35	0.15		
St. Dev.	0.24	0.18		
Min	5.14	0.03		
Max	5.69	0.41		
Summary Count	4	4		
Total Count	4	4		
Pin Type: GND 1				
Average	5.36	0.83		
St. Dev.	0.20	0.52		
Min	5.22	0.55		
Max	5.65	1.61		
Summary Count	4	4		
Total Count	4	4		

LLCR Delta Count by Category						
	Stable	Minor	Acceptable	Marginal	Unstable	Open
mOhms	$\leq 5$	$>5$ & $\leq 10$	$>10$ & $\leq 15$	$>15$ & $\leq 50$	$>50$ & $\leq 1000$	$>1000$
<b>After Thermal Shock</b>	<b>8</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

### DATA SUMMARIES Continued

**LLCR Cable Pull:**

- 1) A total of 4 signal and 4 ground points were measured.
- 2) EIA-364-23, *Low Level Contact Resistance Test Procedure for Electrical Connectors and Sockets*.
- 3) A computer program, *LLCR 221.exe*, ensures repeatability for data acquisition.
- 4) The following guidelines are used to categorize the changes in LLCR as a result from stressing.
  - a.  $\leq +5.0$  mOhms: ----- Stable
  - b.  $+5.1$  to  $+10.0$  mOhms: ----- Minor
  - c.  $+10.1$  to  $+15.0$  mOhms: ----- Acceptable
  - d.  $+15.1$  to  $+50.0$  mOhms: ----- Marginal
  - e.  $+50.1$  to  $+1000$  mOhms: ----- Unstable
  - f.  $>+1000$  mOhms: ----- Open Failure

LLCR Measurement Summaries by Pin Type				
Date	3/19/2021	3/19/2021		
Room Temp (Deg C)	20	20		
Rel Humidity (%)	50	50		
Technician	Peter Chen	Peter Chen		
mOhm values	Actual	Delta		
	Initial	5lb Retention		
Pin Type: Signal 1				
Average	5.35	0.05		
St. Dev.	0.02	0.05		
Min	5.33	0		
Max	5.38	0.1		
Summary Count	4	4		
Total Count	4	4		
Pin Type: GND 1				
Average	5.36	0.35		
St. Dev.	0.32	0.22		
Min	4.93	0.1		
Max	5.67	0.5		
Summary Count	4	4		
Total Count	4	4		

LLCR Delta Count by Category						
	Stable	Minor	Acceptable	Marginal	Unstable	Open
mOhms	$\leq 5$	$>5$ & $\leq 10$	$>10$ & $\leq 15$	$>15$ & $\leq 50$	$>50$ & $\leq 1000$	$>1000$
After 5lb Retention	8	0	0	0	0	0

**EQUIPMENT AND CALIBRATION SCHEDULES****Equipment #:** HZ-TCT-01**Description:** Normal force analyzer**Manufacturer:** Mecmesin Multitester**Model:** Mecmesin Multitester 2.5-i**Serial #:** 08-1049-04**Accuracy:** Last Cal: 3/4/2021, Next Cal: 3/3/2022**Equipment #:** HZ-TSC-01**Description:** Vertical Thermal Shock Chamber**Manufacturer:** Cincinnatti Sub Zero**Model:** VTS-3-6-6-SC/AC**Serial #:** 10-VT14994**Accuracy:** See Manual

... Last Cal: 04/16/2021, Next Cal: 04/15/2022

**Equipment #:** DG-HPT-01**Description:** Hipot Safety Tester**Manufacturer:** Vitrek**Model:** V73**Serial #:** 025866**Accuracy:**

... Last Cal: 04/16/2021, Next Cal: 04/15/2022

**Equipment #:** HZ-MO-05**Description:** Micro-ohmmeter**Manufacturer:** Keithley**Model:** 3706**Serial #:** 1285188**Accuracy:** Last Cal: 12/17/2020, Next Cal: 12/16/2021