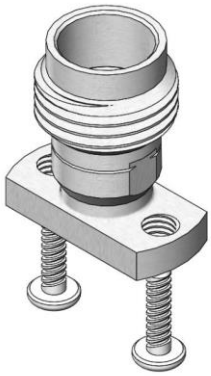
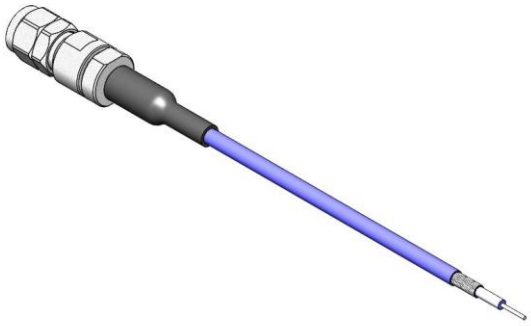
Project Number: Design Qualification Test Report	Tracking Code: 2350899_Report_Rev_1
Requested by: Tim Clare	Date: 6/22/2020
Part #: 185-J-P-EP-ST-CM-X /RF086-18SP-505050-0304	Tech: Tony Wagoner
Part description: 185 / RF086	Qty to test: 20
Test Start: 04/10/2020	Test Completed: 04/25/2020





DESIGN QUALIFICATION TEST REPORT

185/ RF086
185-J-P-EP-ST-CM-X /RF086-18SP-505050-0304

REVISION HISTORY

DATA	REV.NUM.	DESCRIPTION	ENG
6/22/2020	**1**	**Initial Issue**	**PC**

CERTIFICATION

All instruments and measuring equipment were calibrated to National Institute for Standards and Technology (NIST) traceable standards according to IS0 10012-l and ANSI/NCSL 2540-1, as applicable.

SCOPE

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

APPLICABLE DOCUMENTS

Standards: EIA Publication 364

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) Either an automated cleaning procedure or an ultrasonic cleaning procedure may be used.
4) The automated procedure is used with aqueous compatible soldering materials.
5) Parts not intended for testing LLCR and DWV/IR are visually inspected and cleaned if necessary.
6) Any additional preparation will be noted in the individual test sequences.
7) Solder Information: Lead free
8) Samtec Test PCBs used: PCB-110419-TST-XX.

FLOWCHARTS

Mating/Unmating/Durability

Group 1
185-J-P-EP-ST-CM-X
RF086-18SP-505050-0304
8 Assemblies

Step	Description
1.	Contact Gaps *Note: A. Measure and record Initial gap, (distance) of closure between the fingers of the socket contact.* *B. Measure and record the interface dimension from the referance plane to the socket contact. Should not exceed .000" to -.003".*
2.	LLCR (1)
3.	Cycles Quanty ▪ 100 *Note: Torque to 8 to 10 in/lbs.*
4.	Visual Inspection *Note: Inspect for any damage, shake out or blow out any debris. Do not use any chemicals.*
5.	Cycles Quanity ▪ 100 *Note: Torque to 8 to 10 in/lbs.*
6.	Visual Inspection *Note: Inspect for any damage, shake out or blow out any debris. Do not use any chemicals.*
7.	Cycles Quanty ▪ 100 *Note: Torque to 8 to 10 in/lbs.*
8.	Visual Inspection *Note: Inspect for any damage, shake out or blow out any debris. Do not use any chemicals.*
9.	Cycles Quanty ▪ 100 *Note: Torque to 8 to 10 in/lbs.*
10.	Visual Inspection *Note: Inspect for any damage, shake out or blow out any debris. Do not use any chemicals.*
11.	Cycles Quanty ▪ 100 *Note: Torque to 8 to 10 in/lbs.*
12.	Visual Inspection *Note: Inspect for any damage, shake out or blow out any debris. Do not use any chemicals.*
13.	Contact Gaps *Note: A. Measure and record Initial gap, (distance) of closure between the fingers of the socket contact.* *B. Measure and record the interface dimension from the referance plane to the socket contact, should not exceed .000" to -.003".*
14.	LLCR (1) Max Delta ▪ 15 mOhm
15.	Thermal Shock (2) - Non Standard
16.	LLCR (1) Max Delta ▪ 15 mOhm

1) LLCR = EIA-364-23
Open Circuit Voltage = 20 mV Max
Test Current = 100 mA Max

2) Thermal Shock = Other
Exposure Time at Temperature Extremes = 1/2 Hour
Method A, Test Condition = I (-55°C to +125°C)
Test Duration = A-3 (10 Cycles)

FLOWCHARTS Continued

IR/DWV

Pin-to-Closest Metallic Hardware

Group 1 185-J-P-EP-ST-CM-X RF086-18SP-505050-0304 2 Assemblies		Group 2 185-J-P-EP-ST-CM-X 2 Assemblies		Group 3 RF086-18SP-505050-0304 2 Assemblies		Group 4 185-J-P-EP-ST-CM-X RF086-18SP-505050-0304 2 Assemblies	
Step	**Description**	**Step**	**Description**	**Step**	**Description**	**Step**	**Description**
1.	DWV Breakdown (2)	1.	DWV Breakdown (2)	1.	DWV Breakdown (2)	1.	IR (3)
						2.	DWV at Test Voltage (1)
						3.	Thermal Shock (4)
						4.	IR (3)
						5.	DWV at Test Voltage (1)

(1) DWV at Test Voltage = EIA-364-20
Test Condition = 1 (Sea Level)
DWV test voltage is equal to 75% of the lowest breakdown voltage
Test voltage applied for 60 seconds

(2) DWV Breakdown = EIA-364-20
Test Condition = 1 (Sea Level)
DWV test voltage is equal to 75% of the lowest breakdown voltage
Test voltage applied for 60 seconds

(3) IR = EIA-364-21
Test Condition = 500 Vdc, 2 Minutes Max

(4) Thermal Shock = EIA-364-32
Exposure Time at Temperature Extremes = 1/2 Hour
Method A, Test Condition = I (-55°C to +85°C)
Test Duration = A-3 (100 Cycles)

Socket Contact Retention

Group 1
185-J-P-EP-ST-CM-X

10 Assemblies

Step	Description
1.	Socket Contact Retention *Note: This is a distructive test.* *Apply force to the center socket contact until captativation failure, (push contact from flange side), record force*

ATTRIBUTE DEFINITIONS

The following is a brief, simplified description of attributes.

THERMAL SHOCK Durability:

1) Other request, *Thermal Shock (Temperature Cycling) Test Procedure for Electrical Connectors.*
2) Test Condition 1: -55°C to +125°C
3) Test Time: ½ hour dwell at each temperature extreme
4) Number of Cycles: 10
5) All test samples are pre-conditioned at ambient.
6) All test samples are exposed to environmental stressing in the mated condition.

THERMAL SHOCK IR_DWV:

7) EIA-364-32, *Thermal Shock (Temperature Cycling) Test Procedure for Electrical Connectors.*
8) Test Condition 1: -55°C to +85°C
9) Test Time: ½ hour dwell at each temperature extreme
10) Number of Cycles: 100
11) All test samples are pre-conditioned at ambient.
12) All test samples are exposed to environmental stressing in the mated condition.

LLCR:

1) EIA-364-23, *Low Level Contact Resistance Test Procedure for Electrical Connectors and Sockets*.
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. <= +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

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: EIA-364-21, *Insulation Resistance Test Procedure for Electrical Connectors*.
    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.

ATTRIBUTE DEFINITIONS Continued

The following is a brief, simplified description of attributes.

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: EIA-364-20, *Withstanding Voltage Test Procedure for Electrical Connectors*.
    b. Test Conditions:
        i. Between Adjacent Contacts or Signal-to-Ground
        ii. Barometric Test Condition 1
        iii. Rate of Application 500 V/Sec
        iv. Test Voltage (VAC) until breakdown occurs
2) MEASUREMENTS/CALCULATIONS
    a. The dielectric withstanding voltage shall be recorded as 750VAC.

The working voltage shall be recorded as one-third (1/3) of the dielectric withstanding voltage (one-fourth of the breakdown voltage).

Socket Contact Retention

Apply force to the center socket contact until captativation failure,(push contact from flange side),record force.

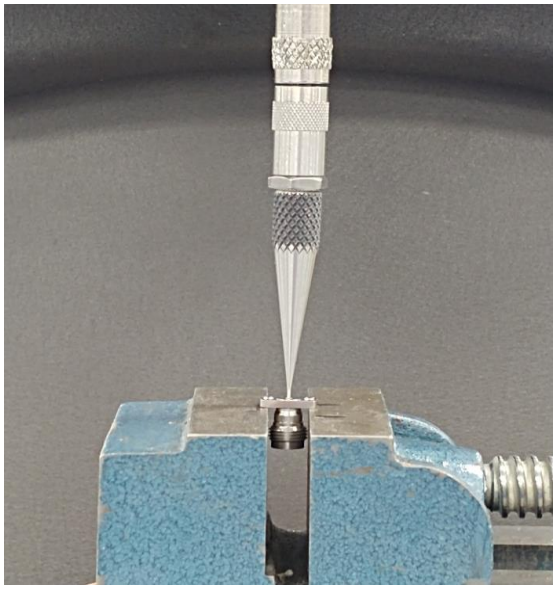


Fig 1

RESULTS

Socket Contact Retention

- **Initial**
  - **Min ---------- 23.68 Lbs**
  - **Max ---------- 27.04 Lbs**

Insulation Resistance minimums, IR

- **Initial**
  - **Mated ---------- 45000 Meg Ω ---------- Passed**
  - **Unmated ---------- 45000 Meg Ω ---------- Passed**
- **Thermal Shock**
  - **Mated ---------- 45000 Meg Ω ---------- Passed**
  - **Unmated ---------- 45000 Meg Ω ---------- Passed**

Dielectric Withstanding Voltage minimums, DWV

- **Minimums**
  - **Breakdown Voltage ---------- 880 VAC**
  - **Test Voltage ---------- 665 VAC**
  - **Working Voltage ---------- 220 VAC**
- **Initial DWV ---------- Passed**
- **Thermal DWV ---------- Passed**

LLCR Mating/Unmating Durability Group (16 LLCR test points)

Signal Pin:

- **Initial ---------- 26.49 mOhms Max**

Ground Pin:

- **Initial ---------- 10.30 mOhms Max**
- **Durability, 500 Cycles**
  - **<= +5.0 mOhms ---------- 16 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**
- **Thermal Shock**
  - **<= +5.0 mOhms ---------- 16 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

Socket Contact Retention

	Force (lbs)
Minimum	**23.68**
Maximum	27.04
Average	25.40

INSULATION RESISTANCE (IR):

	Pin to Closest Metallic Hardware		
	Mated	Unmated	Unmated
Minimum	**185/RF086**	**185**	**RF086**
Initial	45000	45000	45000
Thermal	45000	45000	45000

DIELECTRIC WITHSTANDING VOLTAGE (DWV):

Voltage Rating Summary	
Minimum	**185/RF086**
Break Down Voltage	880
Test Voltage	665
Working Voltage	220

Pin to Closest Metallic Hardware	
Initial Test Voltage	Passed
After Thermal Test Voltage	Passed

DATA SUMMARIES Continued

LLCR Mating/Unmating Durability Group

1). A total of 16 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. <= +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	4/16/2020	4/24/2020	4/25/2020	
Room Temp (Deg C)	22	23	22	
Rel Humidity (%)	25	39	40	
Technician	Tony Wagoner	Tony Wagoner	Tony Wagoner	
mOhm values	**Actual Initial**	**Delta 500 Cycles**	**Delta Therm Shck**	**Delta**
	Pin Type 1: Signal			
Average	25.39	0.57	2.16	
St. Dev.	0.46	0.43	1.18	
Min	25.04	0.02	0.38	
Max	26.49	1.35	3.71	
Summary Count	8	8	8	
Total Count	8	8	8	
	Pin Type 2: Ground			
Average	10.15	1.90	0.42	
St. Dev.	0.13	0.45	0.22	
Min	9.84	1.49	0.07	
Max	10.30	2.69	0.64	
Summary Count	8	8	8	
Total Count	8	8	8	

LLCR Delta Count by Category						
	Stable	**Minor**	**Acceptable**	**Marginal**	**Unstable**	**Open**
mOhms	**<=5**	**>5 & <=10**	**>10 & <=15**	**>15 & <=50**	**>50 & <=1000**	**>1000**
500 Cycles	**16**	**0**	**0**	**0**	**0**	**0**
Therm Shck	**16**	**0**	**0**	**0**	**0**	**0**

EQUIPMENT AND CALIBRATION SCHEDULES

Equipment #: MO-11
Description: Switch/Multimeter
Manufacturer: Keithley
Model: 3706
Serial #: 120169
Accuracy: See Manual
… Last Cal: 09/11/2019, Next Cal: 09/11/2020

Equipment #: TSC-01
Description: Vertical Thermal Shock Chamber
Manufacturer: Cincinnati Sub Zero
Model: VTS-3-6-6-SC/AC
Serial #: 10-VT14993
Accuracy: See Manual
… Last Cal: 06/30/2019, Next Cal: 06/30/2020

Equipment #: HPT-01
Description: Hipot Safety Tester
Manufacturer: Vitrek
Model: V73
Serial #: 019808
Accuracy:
… Last Cal: 05/15/2020, Next Cal: 05/15/2021