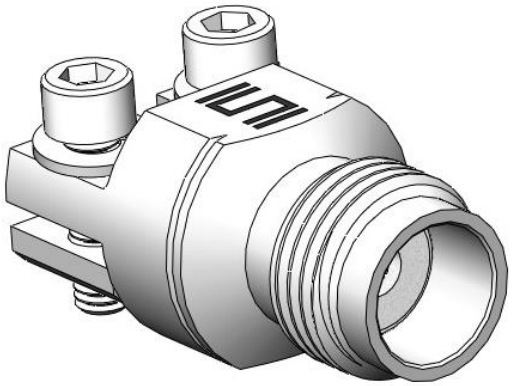
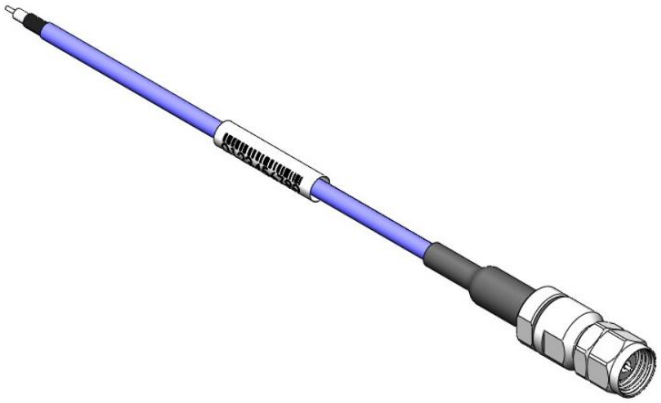
Project Number: Design Qualification Test Report	Tracking Code: 3399409_Report_Rev_1
Requested by: Iris Wang	Date: 7/12/2023
Part #: 185-J-P-EP-ST-EL-01/RF086-18SP-505050-0304	
Part description: 185-J-P / RF086	Tech: Keney Chen
Test Start: 8/1/2022	Test Completed: 9/15/2022





DESIGN QUALIFICATION TEST REPORT

185-J-P / RF086
185-J-P-EP-ST-EL-01 /RF086-18SP-505050-0304

REVISION HISTORY

DATA	REV.NUM.	DESCRIPTION	ENG
2/28/2023	**1**	**Initial Issue**	**KC**

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: MIL-PRF-39012, 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) 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

185-J-P-EP-ST-EL-01

RF086-18SP-505050-0304

10 Assemblies

Step	Description
1.	Interface Gaging *Note: Measure and record center contact recess from interface reference plane*
2.	IR (2) - Non Standard
3.	DWV at Test Voltage(1) - Non Standard Test Voltage = 500 VAC
4.	LLCR (3) - Non Standard *Note: Signal and ground.*
5.	Thermal Shock (4) - Non Standard
6.	IR (2) - Non Standard
7.	DWV at Test Voltage(1) - Non Standard Test Voltage = 500 VAC
8.	LLCR (3) - Non Standard Max Delta = 15 mOhm *Note: Signal and ground.*
9.	Interface Gaging *Note: Measure and record center contact recess from interface reference plane*

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(1) DWV at Test Voltage = Other
Test Condition = 1 (Sea Level) Test voltage applied for 60 seconds
MIL-PRF-39012, Paragraph. 4.6.14 per MIL-STD-202-301

(2) IR = Other
Test Condition = 500V DC, 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
Test Condition = I (-65°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

Mechanical Shock/Random Vibration/Event Detection

Group 1
185-J-P-EP-ST-EL-01
RF086-18SP-505050-0304
10 Assemblies

Step	Description
1.	Nanosecond Event Detection (Mechanical Shock) (1)
2.	Nanosecond Event Detection (Random Vibration) (2)

(1) Nanosecond Event Detection (Mechanical Shock)
Use EIA-364-87 for Nanosecond Event Detection:
Test Condition = F (50 nanoseconds at 10 ohms)
Use EIA-364-27 for Mechanical Shock:
Test Condition = C (100 G Peak, 6 milliseconds, Half Sine)
Number of Shocks = 3 Per Direction, Per Axis, 18 Total

(2) Nanosecond Event Detection (Random Vibration)
Use EIA-364-87 for Nanosecond Event Detection:
Test Condition = F (50 nanoseconds at 10 ohms)
Use EIA-364-28 for Random Vibration:
Condition = VB (7.56 gRMS Average, 2 Hours/Axis)

FLOWCHARTS Continued

Center Contact Retention

Minimum Force

Group 1

185-J-P-EP-ST-EL-01

5 Assemblies

Minimum Force

Note: Test I.A.W. MIL-PRF-39012 par. 4.6.9.

Step	Description
1.	Measure Contact Recess @ Interface
2.	Apply Minimum Force Onto Socket Face *Note: Applied Force = 4 lbf (17.8 N)*
3.	Apply Min Force Onto Contact In Opposite Direction *Note: Applied Force = 4 lbf (17.8 N)*
4.	Measure Contact Recess @ Interface

Center Contact Captivation

Group 1

185-J-P-EP-ST-EL-01

5 Assemblies

Maximum Force.

Note: This is a destructive test. Apply force to the center socket contact (push on contact from pin end of assembly) and record maximum force at captivation failure and note cause of failure. Examples of failure; Contact disengaged from internal dielectric capture bead. Interface bushing disengaged.

Step	Description
1.	Apply Force On The Socket Center Contact *Note: Crosshead speed range 0.5-5.0 mm/min will be sufficient. Maximum force is the load force measured at captivation failure.*

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: -65℃ to +125℃
3) Test Time: ½ hour dwell at each temperature extreme
4) Test Duration: test condition B except10 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 100mA 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. <= +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

Center Contact Retention:

1) Apply 4 pounds force Onto Socket Face and Onto Contact in Opposite Direction

Center Contact Captivation:

1) Apply force On The Socket Center Contact

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 5000 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).

VIBRATION:

1) Reference document: EIA-364-28, *Vibration Test Procedure for Electrical Connectors*
2) Test Condition V, Letter B
3) Power Spectral Density: 0.04 G^2 / Hz
4) G 'RMS': 7.56
5) Frequency: 50 to 2000 Hz
6) Duration: 2.0 Hours per axis (3 axis total)

NANOSECOND-EVENT DETECTION:

1) Reference document: EIA-364-87, *Nanosecond-Event Detection for Electrical Connectors*
2) Prior to test, the samples were characterized to assure the low nanosecond event being monitored will trigger the detector.
3) After characterization it was determined the test samples could be monitored for 50 nanosecond events

RESULTS

Center Contact Captivation

- **Min ----------13.60 lbs**
- **Max ----------15.08 lbs**

Insulation Resistance minimums, IR

Pin to Ground

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

Dielectric Withstanding Voltage minimums, DWV

- **Test Voltage ----------500 VAC**

Pin to Ground

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

Interface Gaging

IR/DWV Group

Initial

- **Min ---------- 0.0010 inch (0.025mm)**
- **Max ---------- 0.0020 inch (0.051mm)**

After Retention

- **Min ---------- 0.0015 inch (0.038mm)**
- **Max ---------- 0.0025 inch (0.064mm)**

Center Contact Retention Group

Initial

- **Min ---------- 0.0010 inch (0.025mm)**
- **Max ---------- 0.0020 inch (0.051mm)**

After Retention

- **Min ---------- 0.0015 inch (0.038mm)**
- **Max ---------- 0.0025 inch (0.064mm)**

RESULTS Continued

LLCR IR/DWV (10 ground and 10 signal LLCR test points)

Ground pin

- **Initial ---------- 12.63 mOhms Max**
- **Thermal Shock**
  - **<= +5.0 mOhms ---------- 10 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 ---------- 36.82 mOhms Max**
- **Thermal Shock**
  - **<= +5.0 mOhms ---------- 10 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):

	Pin to Ground
	Mated
Minimum	**185-J-P/RF086**
Initial	45000
Thermal Shock	45000

DIELECTRIC WITHSTANDING VOLTAGE (DWV):

Voltage Rating Summary	
Minimum	**185-JP-P/RF086**
Test Voltage	500

Pin to Ground	
Initial Test Voltage	Pass
After Thermal Shock Test Voltage	Pass

Center Contact Captivation Force:

	Force (lbs)	Force (N)
Minimum	**13.60**	**60.52**
Maximum	15.08	67.11
Average	14.19	63.15

DATA SUMMARIES Continued

LLCR IR/DWV:

1) A total of 10 signal and 10 ground points were measured.
2) *MIL-PRF-39012, Paragraph 4.6.13 except current to be 100mA nominal and voltage to be 20 mV maximum.*
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	12/1/2022	12/13/2022		
Room Temp (Deg C)	22	22		
Rel Humidity (%)	50	50		
Technician	Keney Chen	Keney Chen		
mOhm values	Actual **Initial**	**Delta Thermal Shock**		
	Pin Type: Signal 1			
Average	35.45	1.01		
St. Dev.	0.64	0.97		
Min	34.61	0.01		
Max	36.82	2.77		
Summary Count	10	10		
Total Count	10	10		
	Pin Type: GND 1			
Average	11.22	0.63		
St. Dev.	0.90	0.66		
Min	9.75	0.07		
Max	12.63	2.23		
Summary Count	10	10		
Total Count	10	10		

LLCR Delta Count by Category						
	Stable	**Minor**	**Acceptable**	**Marginal**	**Unstable**	**Open**
mOhms	**<=5**	**>5 & <=10**	**>10 & <=15**	**>15 & <=50**	**>50 & <=1000**	**>1000**
After Thermal Shock	**20**	**0**	**0**	**0**	**0**	**0**

DATA SUMMARIES Continued

Nanosecond Event Detection:

Shock and Vibration Event Detection Summary	
Contacts tested	20
Test Condition	C, 100g's, 6ms, Half-Sine
Shock Events	0
Test Condition	V-B, 7.56 rms g
Vibration Events	0
Total Events	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: 3/4/2022, Next Cal: 3/3/2023

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: 04/16/2022, Next Cal: 04/15/2023

Equipment #: DG-HPT-01
Description: Hipot Safety Tester
Manufacturer: Vitrek
Model: V73
Serial #: 025866
Accuracy:
… Last Cal: 04/16/2022, Next Cal: 04/15/2023

Equipment #: HZ-MO-05
Description: Micro-ohmmeter
Manufacturer: Keithley
Model: 3706
Serial #: 1285188
Accuracy: Last Cal: 12/17/2022, Next Cal: 12/16/2023

Equipment #: MO-11
Description: Switch/Multimeter
Manufacturer: Keithley
Model: 3706
Serial #: 120169
Accuracy: See Manual
… Last Cal: 08/21/2022, Next Cal: 08/21/2023

Equipment #: SVC-01
Description: Shock & Vibration Table
Manufacturer: Data Physics
Model: LE-DSA-10-20K
Serial #: 10037
Accuracy: See Manual
… Last Cal: 11/31/2022, Next Cal: 11/31/2023

EQUIPMENT AND CALIBRATION SCHEDULES Continued

Equipment #: ACLM-01
Description: Accelerometer
Manufacturer: PCB Piezotronics
Model: 352C03
Serial #: 115819
Accuracy: See Manual
… Last Cal: 07/09/2022, Next Cal: 07/09/2023

Equipment #: ED-03
Description: Event Detector
Manufacturer: Analysis Tech
Model: 32EHD
Serial #: 1100604
Accuracy: See Manual
… Last Cal: 06/04/2022, Next Cal: 06/04/2023