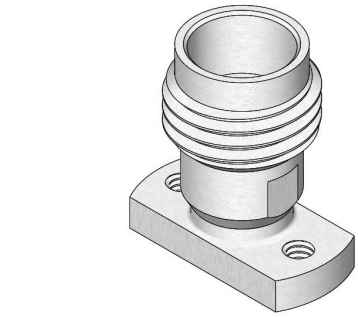
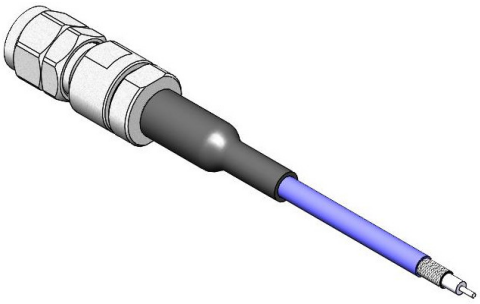
Project Number: Design Qualification Test Report	Tracking Code: 2213507_Report_Rev_1
Requested by: Tim Clare	Date: 2/19/2020
Part #: 240-J-P-EP-ST-CM-X/RF086-24SP-505050-0304	
Part description: 240/RF086	Tech: Tony Wagoner
Test Start: 12/17/2019	Test Completed: 1/24/2020





DESIGN QUALIFICATION TEST REPORT

240/RF086
240-J-P-EP-ST-CM-X/RF086-24SP-505050-0304

REVISION HISTORY

DATA	REV.NUM.	DESCRIPTION	ENG
2/19/2020	**1**	**Initial Issue**	**KH**

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) After soldering, the parts to be used for LLCR testing were cleaned according to TLWI-0001.
4) Either an automated cleaning procedure or an ultrasonic cleaning procedure may be used.
5) The automated procedure is used with aqueous compatible soldering materials.
6) Parts not intended for testing LLCR are visually inspected and cleaned if necessary.
7) Any additional preparation will be noted in the individual test sequences.
8) Solder Information: Lead Free
9) Samtec Test PCBs used: PCB-103219-TST

FLOWCHARTS

Mating/Unmating/Durability

Group 1
240-J-P-EP-ST-CM-X
RF086-24SP-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
4.	Visual Inspection *Note: Inspect for any damage, shake out or blow out any debris. Do not use any chemicals.*
5.	Cycles Quanity = 100
6.	Visual Inspection *Note: Inspect for any damage, shake out or blow out any debris. Do not use any chemicals.*
7.	Cycles Quanty = 100
8.	Visual Inspection *Note: Inspect for any damage, shake out or blow out any debris. Do not use any chemicals.*
9.	Cycles Quanty = 100
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	Group 2	Group 3	Group 4
240-J-P-EP-ST-CM-X RF086-24SP-505050-0304 2 Assemblies	240-J-P-EP-ST-CM-X 2 Assemblies	RF086-24SP-505050-0304 2 Assemblies	240-J-P-EP-ST-CM-X RF086-24SP-505050-0304 2 Assemblies
Step Description 1. DWV Breakdown (2)	**Step Description** 1. DWV Breakdown (2)	**Step Description** 1. DWV Breakdown (2)	**Step Description** 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)

ATTRIBUTE DEFINITIONS

The following is a brief, simplified description of attributes.

THERMAL SHOCK:

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

THERMAL SHOCK:

1) EIA-364-32, *Thermal Shock (Temperature Cycling) Test Procedure for Electrical Connectors.*
2) Test Condition: -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.

MATING/UNMATING:

1) Reference document: EIA-364-13, *Mating and Unmating Forces Test Procedure for Electrical Connectors*.
2) The full insertion position was to within 0.003" to 0.004" of the plug bottoming out in the receptacle to prevent damage to the system under test.
3) One of the mating parts is secured to a floating X-Y table to prevent damage during cycling.

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

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: 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 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: 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 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

Insulation Resistance minimums, IR

Pin to Ground

- **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---------- 1122 VAC**
  - **Test Voltage ----------842 VAC**
  - **Working Voltage ----------280 VAC**

Pin to Ground

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

RESULTS Continued

LLCR Durability (8 signal and 8 ground LLCR test points)

Signal

- **Initial ---------- 23.61 mOhms Max**

Ground

- **Initial ---------- 12.53 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

INSULATION RESISTANCE (IR):

	Pin to Ground		
	Mated	Unmated	Unmated
Minimum	**240/RF086**	**240**	**RF086**
Initial	45000	45000	45000
Thermal	45000	45000	45000

DIELECTRIC WITHSTANDING VOLTAGE (DWV):

Voltage Rating Summary	
Minimum	**240/RF086**
Break Down Voltage	1122
Test Voltage	842
Working Voltage	280

Pin to Ground	
Initial Test Voltage	Passed
After Thermal Test Voltage	Passed

DATA SUMMARIES Continued

LLCR Durability:

1) A total of 8 signal and 8 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. <= +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	12/31/2019	1/23/2020	1/24/2020	
Room Temp (Deg C)	22	23	23	
Rel Humidity (%)	37	39	39	
Technician	Tony Wagoner	Tony Wagoner	Tony Wagoner	
mOhm values	**Actual Initial**	**Delta 500 Cycles**	**Delta Therm Shck**	**Delta**
	Pin Type 1: Signal			
Average	23.35	1.64	0.49	
St. Dev.	0.25	1.26	0.27	
Min	22.97	0.22	0.14	
Max	23.61	4.65	1.06	
Summary Count	8	8	8	
Total Count	8	8	8	
	Pin Type 2: Ground			
Average	11.98	1.34	1.41	
St. Dev.	0.45	1.05	0.61	
Min	11.18	0.10	0.34	
Max	12.53	3.66	2.46	
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 #: TCT-04
Description: Dillon Quantrol TC21 25-1000 mm/min series test stand
Manufacturer: Dillon Quantrol
Model: TC2 I series test stand
Serial #: 04-1041-04
Accuracy: Speed Accuracy: +/- 5% of indicated speed; Speed Accuracy: +/- 5% of indicated speed;
… Last Cal: 05/29/2019, Next Cal: 05/29/2020

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: 05/15/2019, Next Cal: 05/15/2020