Project Number: Design Qualification Test Report	Tracking Code: 2493872_Report_Rev_2
Requested by: Ross Pritchett	Date: 12/22/2020
Part #: RF047-A-MOBJ-MOBJ-0152/RF047-A-MOSP-MOSP-0152	
Part description: RF047/RF047	Tech: Scott Rollefstad
Test Start: 8/28/2020	Test Completed: 9/9/2020

DESIGN QUALIFICATION TEST REPORT

RF047/RF047

RF047-A-MOBJ-MOBJ-0152/RF047-A-MOSP-MOSP-0152

REVISION HISTORY

DATA	REV.NUM.	DESCRIPTION	ENG
10/20/2020	**1**	**Initial Issue**	**KH**
12/22/2020	**2**	**Add the Mating-Unmating force data**	**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, 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

Mating/Unmating/Durability

Group 1
RF047-A-M0BJ-505050-0152
RF047-A-M0SP-505050-0152
4 Assemblies

Step	Description
1.	Length & Mass
2.	Interface Gaging
3.	DWV at Test Voltage(1) - Non Standard DWV = 500 VAC
4.	LLCR (2) - Non Standard *Note: Signal and ground.*
5.	Mating/Unmating Force (3)
6.	Cycles Quantity = 500 Cycles
7.	LLCR (2) - Non Standard Max Delta = 15 mOhm *Note: Signal and ground.*
8.	Interface Gaging

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

(2) 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.

(3) Mating/Unmating Force = EIA-364-13

Mating/Unmating/Durability

Group 1
PRFM0-J-C-EE-047A-BD
450035
10 Assemblies
BULKHEAD MUD
Note: MATING PART 450035 IS A GAGE PROVIDED BY ENGINEERING.

Step	Description
1.	Mating/Unmating Force (1)
2.	Cycles Quantity = 50 Cycles
3.	Mating/Unmating Force (1)
4.	Cycles Quantity = 50 Cycles
5.	Mating/Unmating Force (1)

(1) Mating/Unmating Force = EIA-364-13

FLOWCHARTS Continued

IR/DWV

Pin-to-Ground

Group 1

RF047-A-M0BJ-505050-1000

RF047-A-M0SP-505050-0152

4 Assemblies

Note: For Step 6, please put the following cable assemblies in the thermal shock chamber (as ride along parts.):
RF047-A-M0BJ-M0BJ-1000 (4 PCS)

Step	Description
1.	Length & Mass
2.	Interface Gaging
3.	IR (2) - Non Standard
4.	DWV at Test Voltage(1) - Non Standard Test Voltage = 500 VAC
5.	LLCR (3) - Non Standard *Note: Signal and ground.*
6.	Thermal Shock (4) - Non Standard
7.	IR (2) - Non Standard
8.	DWV at Test Voltage(1) - Non Standard Test Voltage = 500 VAC
9.	LLCR (3) - Non Standard Max Delta = 15 mOhm *Note: Signal and ground.*
10.	Interface Gaging

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

Cable Pull

Group 1 RF047-A-M0BJ-505050-0152 2 Assemblies 0 Degrees		Group 2 RF047-A-M0BJ-505050-0152 RF047-A-M0SP-505050-0152 4 Assemblies 0 Degrees	
Step	**Description**	**Step**	**Description**
1.	Cable Retention (2) - Non Standard *Note: Pull-to-destruct. Record data.*	1.	Length & Mass
		2.	Interface Gaging
		3.	LLCR (3) - Non Standard *Note: Signal and ground.*
		4.	Cable Retention (1) - Non Standard *Note: Apply 5 pounds (2.3 kg) for Cable Retention test.*
		5.	LLCR (3) - Non Standard *Note: Signal and ground.*
		6.	Interface Gaging

(1) Cable Retention = Other
Apply 10 pounds (4.6 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: -65℃ to +125℃
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.

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) 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. <= +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 10 pounds (4.6 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

Mating – Unmating Forces

RF047-A-MOBJ-MOBJ-0152/RF047-A-MOSP-MOSP-0152

- **Initial**
  - **Mating**
    - **Min ---------- 5.37 lbs**
    - **Max---------- 7.87 lbs**
  - **Unmating**
    - **Min ---------- 3.26 lbs**
    - **Max---------- 5.89 lbs**
- **After 250 Cycles**
  - **Mating**
    - **Min ---------- 7.91 lbs**
    - **Max---------- 9.64 lbs**
  - **Unmating**
    - **Min ---------- 3.35 lbs**
    - **Max---------- 5.02 lbs**
- **After 500 Cycles**
  - **Mating**
    - **Min ---------- 6.96 lbs**
    - **Max---------- 9.74 lbs**
  - **Unmating**
    - **Min ---------- 2.44 lbs**
    - **Max---------- 4.25 lbs**

PRFM0-J-C-EE-047A-BD/450035

- **Initial**
  - **Mating**
    - **Min ---------- 3.45 lbs**
    - **Max---------- 5.43 lbs**
  - **Unmating**
    - **Min ---------- 5.66 lbs**
    - **Max---------- 9.03 lbs**
- **After 50 Cycles**
  - **Mating**
    - **Min ---------- 3.22 lbs**
    - **Max---------- 7.45 lbs**
  - **Unmating**
    - **Min ---------- 5.20 lbs**
    - **Max---------- 8.65 lbs**
- **After 100 Cycles**
  - **Mating**
    - **Min ---------- 4.05 lbs**
    - **Max---------- 7.43 lbs**
  - **Unmating**
    - **Min ---------- 5.49 lbs**
    - **Max---------- 9.55 lbs**

Cable Pull force

- **0° Pull**
  - **Min----------15.47 lbs**
  - **Max ----------15.75 lbs**

RESULTS Continued

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**
  - **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

Mating/Unmating Durability Group

Length

MOBJ

- **Min ---------- 154.575 mm**
- **Max ---------- 155.194 mm**

MOSP

- **Min ---------- 153.781 mm**
- **Max ---------- 158.987 mm**

Mass

MOBJ

- **Min ---------- 1.363 g**
- **Max ---------- 1.368 g**

MOSP

- **Min ---------- 1.118 g**
- **Max ---------- 1.148 g**

IR/DWV Group

Length

MOBJ

- **Min ----------1002.51 mm**
- **Max ----------1004.89 mm**

MOSP

- **Min ---------- 153.987 mm**
- **Max ---------- 154.781 mm**

Mass

MOBJ

- **Min ---------- 6.161 g**
- **Max ---------- 6.188 g**

MOSP

- **Min ---------- 1.125 g**
- **Max ---------- 1.137 g**

Cable Pull Group

Length

MOBJ

- **Min ---------- 154.0 mm**
- **Max ---------- 154.8 mm**

MOSP

- **Min ---------- 154.8 mm**
- **Max ---------- 155.6 mm**

Mass

MOBJ

- **Min ---------- 1.419 g**
- **Max ---------- 1.430 g**

MOSP

- **Min ---------- 1.130 g**
- **Max ---------- 1.137 g**

RESULTS Continued

Interface Gaging

Mating/Unmating Durability Group

MOBJ

Initial

- **Min ---------- 0.0444 inch**
- **Max ---------- 0.0635 inch**

After 500 cycles

- **Min ---------- 0.0547 inch**
- **Max ---------- 0.0763 inch**

MOSP

Initial

- **Min ---------- 0.0597 inch**
- **Max ---------- 0.0738 inch**

After 500 cycles

- **Min ---------- 0.0576 inch**
- **Max ---------- 0.0764 inch**

IR/DWV Group

MOBJ

Initial

- **Min ---------- 0.0307 inch**
- **Max ---------- 0.0556 inch**

After Thermal Shock

- **Min ---------- 0.0526 inch**
- **Max ---------- 0.0717 inch**

MOSP

Initial

- **Min ---------- 0.0544 inch**
- **Max ---------- 0.0650 inch**

After Thermal Shock

- **Min ---------- 0.0486 inch**
- **Max ---------- 0.0589 inch**

Cable Pull Group

MOBJ

Initial

- **Min ---------- 0.0418 inch**
- **Max ---------- 0.0801 inch**

After Retention

- **Min ---------- 0.0542 inch**
- **Max ---------- 0.0683 inch**

MOSP

Initial

- **Min ---------- 0.0597 inch**
- **Max ---------- 0.0652 inch**

After Retention

- **Min ---------- 0.0557 inch**
- **Max ---------- 0.0723 inch**

RESULTS Continued

LLCR Mating/Unmating Durability (4 ground and 4 signal LLCR test points)

Ground pin

- **Initial ---------- 29.37 mOhms Max**
- **After 500 cycles**
  - **<= +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 ---------- 82.7 mOhms Max**
- **After 500 cycles**
  - **<= +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 IR/DWV (4 ground and 4 signal LLCR test points)

Ground pin

- **Initial ----------127.43 mOhms Max**
- **Thermal Shock**
  - **<= +5.0 mOhms----------0 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 ----------4 Points ---------- Marginal**
  - **+50.1 to +1000 mOhms----------0 Points ---------- Unstable**
  - **>+1000 mOhms----------0 Points ---------- Open Failure**

Signal pin

- **Initial ----------309.3 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**

RESULTS Continued

LLCR Cable Pull (4 ground and 4 signal LLCR test points)

Ground pin

- **Initial ---------- 29.1 mOhms Max**
- **After 5lb Retention**
  - **<= +5.0 mOhms----------3 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 ---------- 82.73 mOhms Max**
- **After 5lb Retention**
  - **<= +5.0 mOhms----------3 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**

Note: Sample 3 is solder joint failed on pull.

DATA SUMMARIES

MATING/UNMATING:

Mating/Unmating Durability Group

RF047-A-MOBJ-MOBJ-0152/RF047-A-MOSP-MOSP-0152

	Initial				After 250 Cycles			
	Mating		**Unmating**		**Mating**		**Unmating**	
	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)
Minimum	23.89	5.37	14.50	3.26	35.18	7.91	14.90	3.35
Maximum	35.01	7.87	26.20	5.89	42.88	9.64	22.33	5.02
Average	28.11	**6.32**	21.80	**4.90**	38.61	**8.68**	18.84	**4.24**
St Dev	4.79	1.08	5.18	1.16	3.18	0.72	3.12	0.70
Count	4	4	4	4	4	4	4	4

	After 500 Cycles			
	Mating		**Unmating**	
	Newtons	Force (Lbs)	Newtons	Force (Lbs)
Minimum	30.96	6.96	10.85	2.44
Maximum	43.32	9.74	18.90	4.25
Average	37.56	**8.45**	14.87	**3.34**
St Dev	5.10	1.15	3.45	0.78
Count	4	4	4	4

PRFM0-J-C-EE-047A-BD/450035

	Initial				After 50 Cycles			
	Mating		**Unmating**		**Mating**		**Unmating**	
	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)
Minimum	15.35	3.45	25.18	5.66	14.32	3.22	23.13	5.20
Maximum	24.15	5.43	40.17	9.03	33.14	7.45	38.48	8.65
Average	18.92	**4.25**	33.22	**7.47**	22.90	**5.15**	30.31	**6.82**
St Dev	3.05	0.69	4.47	1.00	7.11	1.60	4.48	1.01
Count	10	10	10	10	10	10	10	10

	After 100 Cycles			
	Mating		**Unmating**	
	Newtons	Force (Lbs)	Newtons	Force (Lbs)
Minimum	18.01	4.05	24.42	5.49
Maximum	33.05	7.43	42.48	9.55
Average	25.18	**5.66**	29.67	**6.67**
St Dev	6.54	1.47	5.14	1.15
Count	10	10	10	10

DATA SUMMARIES Continued

INSULATION RESISTANCE (IR):

	Pin to Ground
	Mated
Minimum	RF047A/RF047A
Initial	45000
Thermal Shock	45000

DIELECTRIC WITHSTANDING VOLTAGE (DWV):

Voltage Rating Summary	
Minimum	RF047A/RF047A
Test Voltage	500

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

Mating/Unmating Durability Group

Pin to Ground	
Initial Test Voltage	Pass

Cable Pull Force:

0° Pull

	Force (lbs)
Minimum	**15.47**
Maximum	15.75
Average	15.58

DATA SUMMARIES Continued

LENGTH & MASS

Mating/Unmating Durability Group

M0BJ	Length (mm)	Mass (g)
1	154.575	1.366
2	154.575	1.367
3	154.575	1.368
4	155.194	1.363

MOSP	Length (mm)	Mass (g)
1	158.987	1.148
2	154.781	1.124
3	153.781	1.118
4	153.781	1.119

IR/DWV Group

MOBJ	Length (mm)	Mass (g)
1	1002.51	6.166
2	1004.89	6.188
3	1002.51	6.161
4	1004.89	6.165

M0SP	Length (mm)	Mass (g)
1	153.987	1.137
2	153.987	1.125
3	153.987	1.130
4	154.781	1.128

Cable Pull Group

Group 2		
MOBJ	Length (mm)	Mass (g)
1	154.8	1.430
2	154.0	1.419
3	154.8	1.421
4	154.8	1.430

Group 2		
MOSP	Length (mm)	Mass (g)
1	155.6	1.133
2	154.8	1.130
3	155.6	1.137
4	154.8	1.133

DATA SUMMARIES Continued

INTERFACE GAGING

Mating/Unmating Durability Group

Gaging (.003 / .000)(in)			
M0BJ	**Initial**	**Post 500 Cycles**	**Delta**
1	0.0635	0.07630	0.01280
2	0.0618	0.07220	0.01040
3	0.0592	0.06130	0.00210
4	0.0444	0.05470	0.01030

Gaging (.002 (+.001/-.002)(in)			
MOSP	**Initial**	**Post 500 Cycles**	**Delta**
1	0.0738	0.0764	0.0026
2	0.0655	0.0576	0.0079
3	0.0655	0.0653	0.0002
4	0.0597	0.0593	0.0004

IR/DWV Group

Gaging (.003 / .000)(in)			
M0BJ	**Initial**	**Therm Shock**	**Delta**
1	0.0441	0.0661	0.022
2	0.0307	0.0526	0.0219
3	0.0556	0.0609	0.0053
4	0.0379	0.0717	0.0338

Gaging (.002 (+.001/-.002)(in)			
M0SP	**Initial**	**Therm Shock**	**Delta**
1	0.0544	0.0486	0.0058
2	0.0609	0.05	0.0109
3	0.0650	0.0541	0.0109
4	0.0565	0.0589	0.0024

Cable Pull Group

Gaging (.003 / .000)(in)			
MOBJ	**Initial**	**Post Retention**	**Delta**
1	0.0585	0.054200	0.0043
2	0.0524	0.067000	0.0146
3	0.0801	NA*	#VALUE!
4	0.0418	0.0683	0.0265

Gaging (.002 (+.001/-.002)(in)			
MOSP	**Initial**	**Post Retention**	**Delta**
1	0.0652	0.072300	0.0071
2	0.0597	0.055700	0.0040
3	0.0611	NA*	#VALUE!
4	0.0608	0.0629	0.0021

Note: NA* = Solder joint failed on pull

DATA SUMMARIES Continued

LLCR Durability:

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. <= +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	9/28/2020	9/28/2020		
Room Temp (Deg C)	23	23		
Rel Humidity (%)	54	48		
Technician	Scott Rollefstad	Scott Rollefstad		
mOhm values	Actual **Initial**	**Delta 500 Cycles**		
Pin Type: Signal 1				
Average	81.74	0.61		
St. Dev.	0.66	0.44		
Min	81.29	0.09		
Max	82.7	1.02		
Summary Count	4	4		
Total Count	4	4		
Pin Type: GND 1				
Average	28.58	0.69		
St. Dev.	0.78	0.46		
Min	27.51	0.27		
Max	29.37	1.15		
Summary Count	4	4		
Total Count	4	4		

LLCR Delta Count by Category						
	Stable	**Minor**	**Acceptable**	**Marginal**	**Unstable**	**Open**
mOhms	**<=5**	**>5 & <=10**	**>10 & <=15**	**>15 & <=50**	**>50 & <=1000**	**>1000**
After 500 Cycles	**8**	**0**	**0**	**0**	**0**	**0**

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. <= +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	9/3/2020	9/4/2020		
Room Temp (Deg C)	23	23		
Rel Humidity (%)	53	45		
Technician	Scott Rollefstad	Scott Rollefstad		
mOhm values	Actual **Initial**	**Delta** **Thermal Shock**		
Pin Type: Signal 1				
Average	308.575	0.6		
St. Dev.	0.5852	0.4899		
Min	307.9	0		
Max	309.3	1.2		
Summary Count	4	4		
Total Count	4	4		
Pin Type: GND 1				
Average	124.8025	23.6775		
St. Dev.	3.7921	7.0758		
Min	119.2	15.7		
Max	127.43	30.55		
Summary Count	4	4		
Total Count	4	4		

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	**4**	**0**	**0**	**4**	**0**	**0**

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. <= +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	9/3/2020	9/9/2020		
Room Temp (Deg C)	23	23		
Rel Humidity (%)	54	50		
Technician	Scott Rollefstad	Scott Rollefstad		
mOhm values	Actual **Initial**	**Delta 5lb Retention**		
Pin Type: Signal 1				
Average	82.32	0.43		
St. Dev.	0.30	0.29		
Min	82	0.23		
Max	82.73	0.77		
Summary Count	4	3		
Total Count	4	3		
Pin Type: GND 1				
Average	28.70	0.52		
St. Dev.	0.37	0.18		
Min	28.34	0.34		
Max	29.1	0.7		
Summary Count	4	3		
Total Count	4	3		

LLCR Delta Count by Category						
	Stable	**Minor**	**Acceptable**	**Marginal**	**Unstable**	**Open**
mOhms	**<=5**	**>5 & <=10**	**>10 & <=15**	**>15 & <=50**	**>50 & <=1000**	**>1000**
After 5lb Retention	**6**	**0**	**0**	**0**	**0**	**0**

Note: Sample 3 is solder joint failed on pull.

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: 05/29/2020, Next Cal: 05/29/2021

Equipment #: MO-11
Description: Switch/Multimeter
Manufacturer: Keithley
Model: 3706
Serial #: 120169
Accuracy: See Manual
… Last Cal: 09/11/2020, Next Cal: 09/11/2021

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: 06/30/2020, Next Cal: 06/30/2021

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