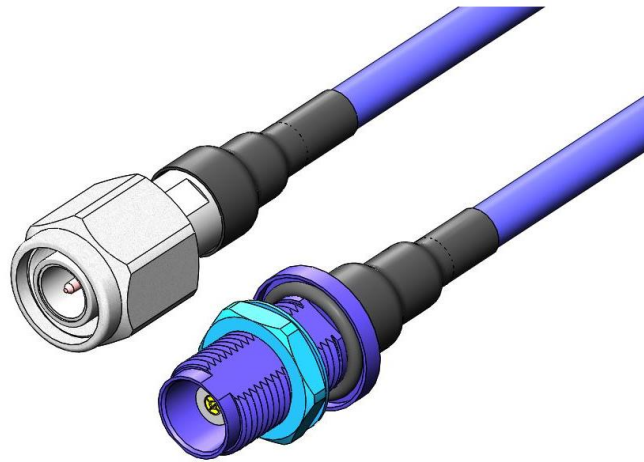




Project Number: Design Qualification Test Report	Tracking Code: 2777810_Report_Rev_2
Requested by: Alvin Wang	Date: 12/24/2021
Part #: RF180-04SP-505050-0152 /RF180-04BJ-505050-0152	
Part description: RF180-04SP / RF180-04BJ	Tech: Peter Chen
Test Start: 4/25/2021	Test Completed: 5/14/2021



DESIGN QUALIFICATION TEST REPORT

RF180-04SP / RF180-04BJ
RF180-04SP-505050-0152 /RF180-04BJ-505050-0152

REVISION HISTORY

DATA	REV.NUM.	DESCRIPTION	ENG
6/7/2021	1	Initial Issue	PC
11/30/2021	2	Add The normal force and Durability	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

RF180-04SP-505050-1000

RF180-04BJ-505050-1000

4 Assemblies

Step	Description
1.	Length & Mass
2.	Interface Gaging
3.	IR (2) - Non Standard
4.	DWV at Test Voltage (1) - Non Standard Test Voltage = 1500 V
5.	LLCR (3) - Non Standard <i>Note: Signal and ground.</i>
6.	Thermal Shock (4) - Non Standard <i>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.</i> <i>Plug version: RF180-04SP-04SP-1000 (4 PCS)</i> <i>Jack version: RF180-04BJ-04BJ-1000 (4PCS)</i>
7.	IR (2) - Non Standard
8.	DWV at Test Voltage (1) - Non Standard Test Voltage = 1500 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
RF180-04BJ-505050-0152

2 Assemblies
0 Degrees

Step	Description
1.	Cable Retention (2) - Non Standard <i>Note: Pull-to-destruct.</i>

Group 2
RF180-04SP-505050-0152

2 Assemblies
0 Degrees

Step	Description
1.	Cable Retention (2) - Non Standard <i>Note: Pull-to-destruct.</i>

Group 3
RF180-04BJ-505050-0152
RF180-04SP-505050-0152

4 Assemblies
0 Degrees

Step	Description
1.	Length & Mass
2.	Interface Gaging
3.	LLCR (3) - Non Standard <i>Note: Signal and ground.</i>
4.	Cable Retention (1) - Non Standard <i>Note: Apply 25 pounds (11.3kg) for Cable Retention test.</i>
5.	LLCR (3) - Non Standard <i>Note: Signal and ground.</i>
6.	Interface Gaging

(1) Cable Retention = Other

Apply 25 pounds (11.3 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.

FLOWCHARTS Continued**Mating/Unmating/Durability**Group 1

RF180-04SP-505050-0152

RF180-04BJ-505050-0152

4 Assemblies

Step	Description
1.	Length & Mass
2.	Interface Gaging
3.	DWV at Test Voltage ⁽¹⁾ - Non Standard Test Voltage = 500 V
4.	LLCR ⁽²⁾ - Non Standard <i>Note: Signal and ground.</i>
5.	Cycles Quantity = 500 Cycles <i>Note: By hand. Torque each time to 8 in-lbs. Rotate plug coupling nut only. Do not rotate entire assembly. MIL-PRF-39012, Paragraph. 4.6.12</i>
6.	LLCR ⁽²⁾ - Non Standard <i>Note: Signal and ground.</i>
7.	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.

FLOWCHARTS Continued**Normal Force****Group 1**

PRF04-J-SK-001-2E

8 Contacts Minimum
Signal Without Thermals

Step	Description
1.	Contact Gaps
2.	Normal Force ⁽¹⁾ Deflection = 0.005 " Expected Force at Max Deflection = 100 g

Group 2

PRF04-J-SK-001-2E

PRF04-P-PN-002-E

8 Contacts Minimum
Signal With Thermals

Step	Description
1.	Contact Gaps
2.	Thermal Age ⁽²⁾
3.	Contact Gaps
4.	Normal Force ⁽¹⁾ Deflection = 0.005 " Expected Force at Max Deflection = 100 g

(1) Normal Force = EIA-364-04

(2) Thermal Age = EIA-364-17

Test Condition = 4 (105°C)

Time Condition = B (250 Hours)

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 25 pounds (11.3 kg) for cable retention test.
- 2) Pull to destruct.
- 3) MIL-PRF-30192, paragraph. 4.6.21.

NORMAL FORCE (FOR CONTACTS TESTED OUTSIDE THE HOUSING):

- 1) Reference document: EIA-364-04, *Normal Force Test Procedure for Electrical Connectors*.
- 2) The contacts shall be tested in the loose state, *not* inserted in connector housing.
- 3) The contacts shall be prepared to allow access to the spring member at the same attitude and deflection level as would occur in actual use.
- 4) In the event that portions of the contact prevent insertion of the test probe and/or deflection of the spring member under evaluation, said material shall be removed leaving the appropriate contact surfaces exposed.
- 5) In the case of multi-tine contacts, each tine shall be tested independently on separate samples as required.
- 6) The connector housing shall be simulated, if required, in order to provide an accurate representation of the actual contact system performance.
- 7) A holding fixture shall be fashioned to allow the contact to be properly deflected.
- 8) Said holding fixture shall be mounted on a floating, adjustable, X-Y table on the base of the Dillon TC², computer controlled test stand with a deflection measurement system accuracy of 5 μm (0.0002”).
- 9) The probe shall be attached to a Dillon P/N 49761-0105, 5 N (1.1 Lb) load cell providing an accuracy of $\pm 0.2\%$.
- 10) The nominal deflection rate shall be 5 mm (0.2”)/minute.
- 11) Unless otherwise noted a minimum of five contacts shall be tested.
- 12) The force/deflection characteristic to load and unload each contact shall be repeated five times.
- 13) The system shall utilize the TC² software in order to acquire and record the test data.
- 14) The permanent set of each contact shall be measured within the TC² software.
- 15) The acquired data shall be graphed with the deflection data on the X-axis and the force data on the Y-axis and a print out will be stored with the Tracking Code paperwork.

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 RF180-04SP-505050-0152**
 - **Min** ----- 152.20 lbs
 - **Max** ----- 163.35 lbs
 - Group 2 RF180-04BJ-505050-0152**
 - **Min** ----- 121.47 lbs
 - **Max** ----- 135.87 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

- **Minimums**
 - **Test Voltage** ----- 1500 VAC

Pin to Ground

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

Mating/Unmating Durability Group**Pin to Ground**

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

Normal force -0.009 inch deflection

- **Initial**
 - **Min** ----- 472.30 g
 - **Max** ----- 610.50 g
- **After thermal**
 - **Min** ----- 456.10 g
 - **Max** ----- 631.60 g

RESULTS Continued**Length & Mass****IR/DWV Group****Length****04SP**

- **Min** -----1002.00 mm
- **Max** -----1002.00 mm

04BJ

- **Min** -----1007.00 mm
- **Max** -----1007.00 mm

Mass**04SP**

- **Min** -----70.79 g
- **Max** -----70.85 g

04BJ

- **Min** -----73.37 g
- **Max** -----73.55 g

Cable Pull Group**Length****04SP**

- **Min** ----- 156.00 mm
- **Max** ----- 156.00 mm

04BJ

- **Min** ----- 156.00 mm
- **Max** ----- 156.00 mm

Mass**04SP**

- **Min** -----26.05 g
- **Max** -----26.10 g

04BJ

- **Min** -----23.14 g
- **Max** -----23.29 g

Durability Group**Length****04SP**

- **Min** ----- 117.00 mm
- **Max** ----- 117.00 mm

04BJ

- **Min** ----- 117.00 mm
- **Max** ----- 117.00 mm

Mass**04SP**

- **Min** -----24.02 g
- **Max** -----24.25 g

04BJ

- **Min** -----23.01 g
- **Max** -----23.36 g

RESULTS Continued**Interface Gaging****IR/DWV Group****04SP****Initial**

- Min ----- 0.0137 mm (0.00054 inch)
- Max ----- 0.0255 mm (0.00100 inch)

After Thermal Shock

- Min ----- 0.0021 mm (0.00008 inch)
- Max ----- 0.0245 mm (0.00096 inch)

04BJ**Initial**

- Min ----- 0.0488 mm (0.00192 inch)
- Max ----- 0.0716 mm (0.00282 inch)

After Thermal Shock

- Min ----- 0.0273mm (0.00107 inch)
- Max ----- 0.0666 mm (0.00262 inch)

Cable Pull Group**04SP****Initial**

- Min ----- 0.0342 mm (0.00135 inch)
- Max ----- 0.0422 mm (0.00166 inch)

After Retention

- Min ----- 0.0339 mm (0.00133 inch)
- Max ----- 0.0425 mm (0.00167 inch)

04BJ**Initial**

- Min ----- 0.0031 mm (0.00012 inch)
- Max ----- 0.0269 mm (0.00106 inch)

After Retention

- Min ----- 0.0029 mm (0.00011 inch)
- Max ----- 0.0212 mm (0.00083 inch)

Durability Group**04SP****Initial**

- Min ----- 0.0108 mm (0.00043 inch)
- Max ----- 0.0131 mm (0.00052 inch)

After Thermal Shock

- Min ----- 0.0210 mm (0.00083 inch)
- Max ----- 0.0280 mm (0.00110 inch)

04BJ**Initial**

- Min ----- 5.1910 mm (0.20437 inch)
- Max ----- 5.2130 mm (0.20524 inch)

After Thermal Shock

- Min ----- 5.1860 mm (0.20417 inch)
- Max ----- 5.2280 mm (0.20583 inch)

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

- **Initial** ----- 26.71 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** ----- 31.55 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** -----4.43 mOhms Max
- **After 25lb 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** -----5.68 mOhms Max
- **After 25lb 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

RESULTS Continued**LLCR Durability (4 ground and 4 signal LLCR test points)****Ground pin**

- **Initial** -----5.58 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** -----4.07 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

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

Pin to Ground	
	Mated
Minimum	RF180-04SP/RF180-04BJ
Initial	45000
Thermal Shock	45000

DIELECTRIC WITHSTANDING VOLTAGE (DWV):

Voltage Rating Summary	
Minimum	RF180-04SP/RF180-04BJ
Test Voltage	500

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

Mating/Unmating Durability Group

Pin to Ground	
Initial Test Voltage	Pass

Cable Pull Force:**0° Pull****Group 1 RF180-04SP-505050-0152**

	Force (lbs)
Minimum	152.20
Maximum	163.35
Average	157.78

Group 2 RF180-04BJ-505050-0152

	Force (lbs)
Minimum	121.47
Maximum	135.87
Average	128.67

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

04SP	Length (mm)	Mass (g)
1	1002.00	70.80
2	1002.00	70.81
3	1002.00	70.85
4	1002.00	70.79

04BJ	Length (mm)	Mass (g)
1	1007.00	73.55
2	1007.00	73.37
3	1007.00	73.40
4	1007.00	73.43

Cable Pull Group

Group 3		
04SP	Length (mm)	Mass (g)
1	156.00	26.05
2	156.00	26.08
3	156.00	26.09
4	156.00	26.10

Group 3		
04BJ	Length (mm)	Mass (g)
1	156.00	23.29
2	156.00	23.26
3	156.00	23.14
4	156.00	23.28

Durability Group

04SP	Length (mm)	Mass (g)
1	117.00	24.25
2	117.00	24.02
3	117.00	24.05
4	117.00	24.25

04BJ	Length (mm)	Mass (g)
1	150.00	23.36
2	150.00	23.02
3	150.00	23.01
4	150.00	23.11

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

Gaging (0.023/0.00)(mm)						
04SP	Initial		After Thermal shock		Delta	
	mm	inch	mm	inch	mm	inch
1	0.0137	0.00054	0.00210	0.00008	0.00202	0.00008
2	0.0255	0.00100	0.01480	0.00058	0.01422	0.00056
3	0.0157	0.00062	0.02120	0.00083	0.02037	0.00080
4	0.0253	0.00100	0.02450	0.00096	0.02354	0.00093

Gaging (0.023/0.00)(mm)						
04BJ	Initial		After Thermal shock		Delta	
	mm	inch	mm	inch	mm	inch
1	0.0615	0.00242	0.0273	0.00107	0.03420	0.00135
2	0.0488	0.00192	0.0581	0.00229	0.00930	0.00037
3	0.0621	0.00244	0.0666	0.00262	0.00450	0.00018
4	0.0716	0.00282	0.0341	0.00134	0.03750	0.00148

Cable Pull Group

Gaging (0.023/0.00)(mm)						
04SP	Initial		Retention		Delta	
	mm	inch	mm	inch	mm	inch
1	0.0422	0.00166	0.042300	0.00167	0.00010	0.00000
2	0.0345	0.00136	0.040500	0.00159	0.00600	0.00024
3	0.0384	0.00151	0.042500	0.00167	0.00410	0.00016
4	0.0342	0.00135	0.0339	0.00133	0.00030	0.00001

Gaging (0.023/0.00)(mm)						
04BJ	Initial		Retention		Delta	
	mm	inch	mm	inch	mm	inch
1	0.0031	0.00012	0.012600	0.00050	0.00950	0.00037
2	0.0269	0.00106	0.008700	0.00034	0.01820	0.00072
3	0.0196	0.00077	0.002900	0.00011	0.01670	0.00066
4	0.0117	0.00046	0.0212	0.00083	0.00950	0.00037

Durability Group

Gaging (0.023/0.00)(mm)						
04SP	Initial		Retention		Delta	
	mm	inch	mm	inch	mm	inch
1	0.0122	0.00048	0.02400	0.00094	0.01180	0.00046
2	0.0119	0.00047	0.02800	0.00110	0.01610	0.00063
3	0.0131	0.00052	0.02700	0.00106	0.01390	0.00055
4	0.0108	0.00043	0.02100	0.00083	0.01020	0.00040

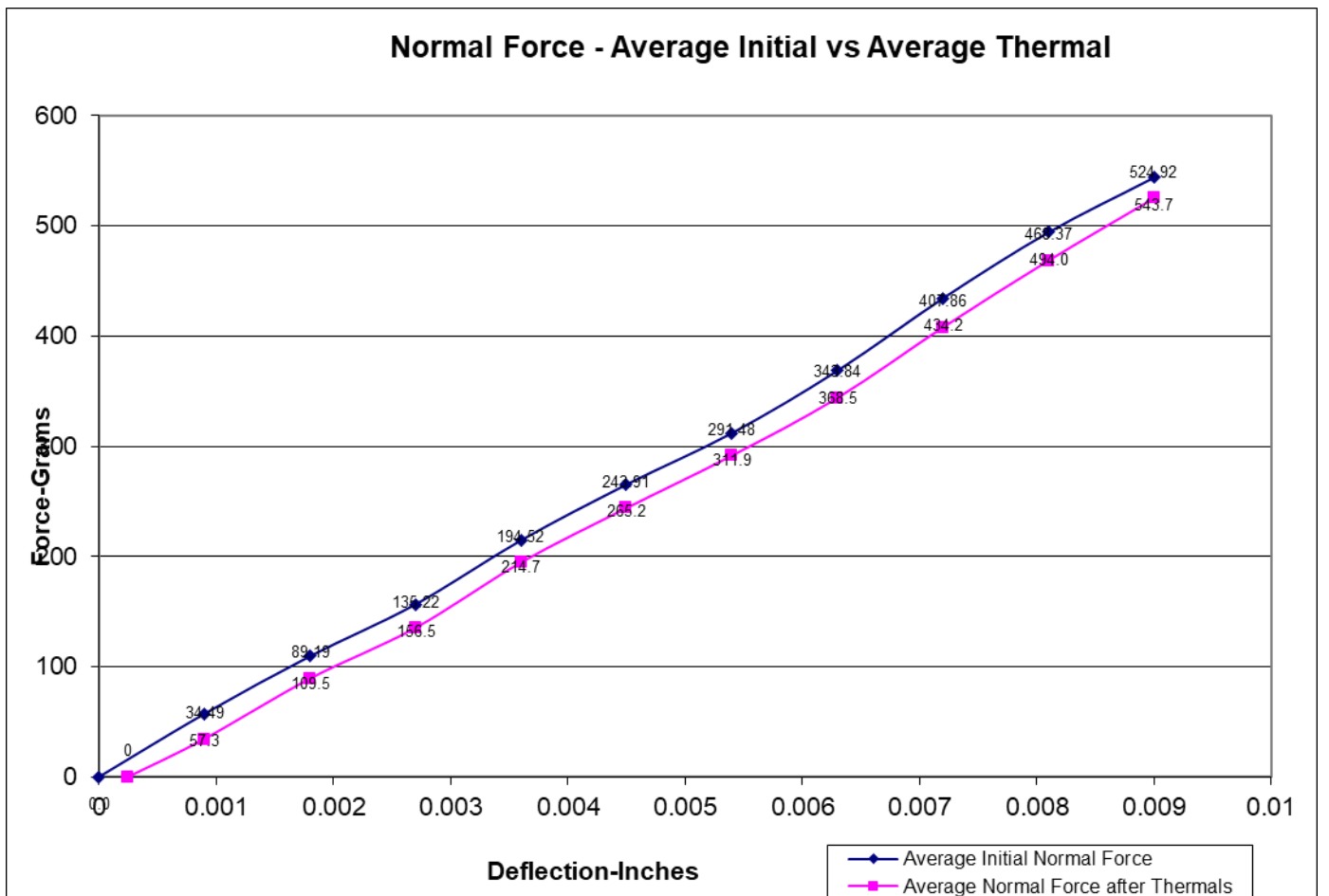
Gaging (0.023/0.00)(mm)						
04BJ	Initial		Retention		Delta	
	mm	inch	mm	inch	mm	inch
1	5.2040	0.20488	5.2180	0.20543	0.01400	0.00055
2	5.1910	0.20437	5.2280	0.20583	0.03700	0.00146
3	5.2130	0.20524	5.1860	0.20417	0.02700	0.00106
4	5.2080	0.20504	5.2110	0.20516	0.00300	0.00012

DATA SUMMARIES Continued**NORMAL FORCE (FOR CONTACTS TESTED OUT THE HOUSING):**

- 1) Calibrated force gauges are used along with computer controlled positioning equipment.
- 2) For Normal force 8-10 measurements are taken and the averages reported.

Initial	Deflections in inches Forces in Grams										
	<u>0.0009</u>	<u>0.0018</u>	<u>0.0027</u>	<u>0.0036</u>	<u>0.0045</u>	<u>0.0054</u>	<u>0.0063</u>	<u>0.0072</u>	<u>0.0081</u>	<u>0.0090</u>	<i>SET</i>
Averages	57.32	109.50	156.53	214.65	265.22	311.93	368.46	434.18	494.03	543.66	0.0002
Min	38.80	79.60	123.60	179.50	226.90	272.70	318.80	374.70	425.00	472.30	0.0000
Max	70.70	132.90	183.70	250.80	310.10	370.30	434.00	510.50	579.40	610.50	0.0006
St. Dev	8.916	14.694	18.215	24.449	28.022	33.539	41.484	52.054	59.303	51.218	0.0002
Count	10	10	10	10	10	10	10	10	10	10	10

After Thermals	Deflections in inches Forces in Grams										
	<u>0.0009</u>	<u>0.0018</u>	<u>0.0027</u>	<u>0.0036</u>	<u>0.0045</u>	<u>0.0054</u>	<u>0.0063</u>	<u>0.0072</u>	<u>0.0081</u>	<u>0.0090</u>	<i>SET</i>
Averages	34.49	89.19	135.22	194.52	243.91	291.48	343.84	407.86	468.37	524.92	0.0003
Min	1.00	53.30	98.70	152.10	193.70	236.30	290.80	349.90	402.40	456.10	0.0000
Max	63.20	130.30	179.10	240.80	296.20	351.30	416.20	492.60	568.80	631.60	0.0007
St. Dev	20.802	22.562	23.734	27.538	31.496	36.531	40.002	46.345	55.540	59.625	0.0003
Count	10	10	10	10	10	10	10	10	10	10	10



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	4/25/021	5/12/021		
Room Temp (Deg C)	22	22		
Rel Humidity (%)	50	50		
Technician	4/25/021	5/12/021		
mOhm values	Actual	Delta		
	Initial	Thermal Shock		
Pin Type: Signal 1				
Average	26.71	0.20		
St. Dev.	0.05	0.19		
Min	26.67	0.01		
Max	26.76	0.41		
Summary Count	4	4		
Total Count	4	4		
Pin Type: GND 1				
Average	31.55	0.27		
St. Dev.	0.58	0.19		
Min	30.88	0.09		
Max	32.24	0.45		
Summary Count	4	4		
Total Count	4	4		

LLCR Delta Count by Category						
	Stable	Minor	Acceptable	Marginal	Unstable	Open
mOhms	≤ 5	$>5 \ \& \ \leq 10$	$>10 \ \& \ \leq 15$	$>15 \ \& \ \leq 50$	$>50 \ \& \ \leq 1000$	>1000
After Thermal Shock	8	0	0	0	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. $\leq +5.0$ 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	5/14/2021	5/14/2021		
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	4.43	0.11		
St. Dev.	0.08	0.05		
Min	4.37	0.08		
Max	4.53	0.16		
Summary Count	4	4		
Total Count	4	4		
Pin Type: GND 1				
Average	5.68	0.93		
St. Dev.	0.48	1.03		
Min	5.26	0.26		
Max	6.31	2.11		
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 5lb Retention	8	0	0	0	0	0

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. $\leq +5.0$ 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

Date	9/20/2021	10/8/2021		
Room Temp (Deg C)	22	22		
Rel Humidity (%)	50	50		
Technician	Kason He	Kason He		
mOhm values	Actual Initial	Delta 500 CYCLES		
Pin Type: Signal 1				
Average	4.04	0.05		
St. Dev.	0.02	0.04		
Min	4.02	0.01		
Max	4.07	0.08		
Summary Count	4	4		
Total Count	4	4		
Pin Type: GND 1				
Average	5.43	1.68		
St. Dev.	0.20	0.11		
Min	5.17	1.54		
Max	5.58	1.79		
Summary Count	4	4		
Total Count	4	4		

LLCR Delta Count by Category						
	Stable	Minor	Acceptable	Marginal	Unstable	Open
mOhms	≤ 5	$>5 \ \& \ \leq 10$	$>10 \ \& \ \leq 15$	$>15 \ \& \ \leq 50$	$>50 \ \& \ \leq 1000$	>1000
After 500 Cycles	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