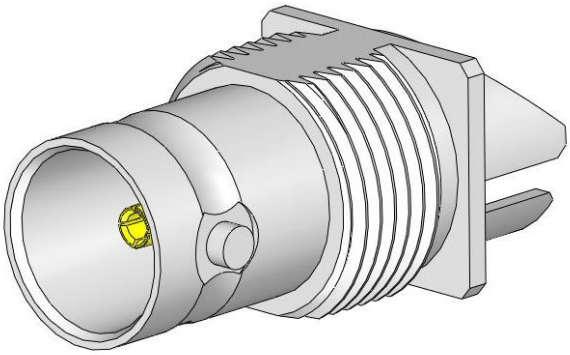
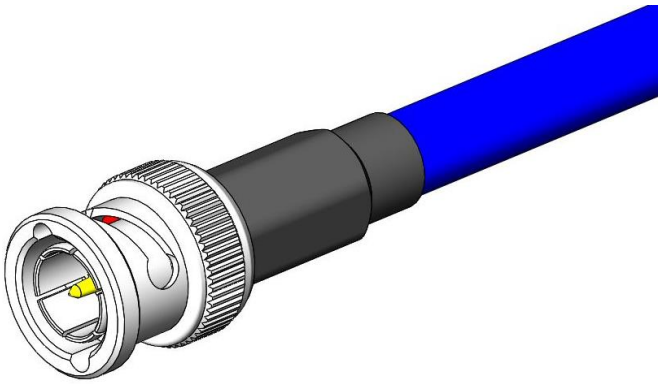
Project Number: Design Qualification Test Report	Tracking Code: 1790788_Report_Rev_1
Requested by: Alvin Wang	Date: 3/19/2019
Part #: BNC7T-J-P-GN-ST-EM1/RFB6T-74SP3-303030-0156	Tech: Melanie Babin
Part description: BNC7T/RFB6T	Qty to test: 50
Test Start: 12/10/2018	Test Completed: 01/24/2019





Design Qualification Test Report

BNC7T/RFB6T

BNC7T-J-P-GN-ST-EM1/RFB6T-74SP3-303030-0156

REVISION HISTORY

DATA	REV.NUM.	DESCRIPTION	ENG
3/19/2019	**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) After soldering, the parts to be used for LLCR and DWV/IR 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 and DWV/IR are visually inspected and cleaned if necessary.
7) Any additional preparation will be noted in the individual test sequences.
8) Samtec Test PCBs used: PCB-109167-TST, PCB-103219-TST.

FLOWCHARTS

Gas Tight

Group 1
BNC7T-J-P-GN-ST-EM1
RFB6T-74SP3-303030-0156
8 Assemblies

Step	Description
1.	LLCR (2)
2.	Gas Tight (1)
3.	LLCR (2) Max Delta = 15 mOhm

(1) Gas Tight = EIA-364-36
(2) LLCR = EIA-364-23
Open Circuit Voltage = 20 mV Max
Test Current = 100 mA Max

Thermal Aging

Group 1
BNC7T-J-P-GN-ST-EM1
RFB6T-74SP3-303030-0156
8 Assemblies

Step	Description
1.	Contact Gaps
2.	LLCR (1)
3.	Thermal Age (2)
4.	LLCR (1) Max Delta = 15 mOhm
5.	Contact Gaps

(1) LLCR = EIA-364-23
Open Circuit Voltage = 20 mV Max
Test Current = 100 mA Max
(2) Thermal Age = EIA-364-17
Test Condition = 4 (105°C)
Time Condition = B (250 Hours)

FLOWCHARTS Continuted

Normal Force

Group 1
BNC7T-SKT-001-G
BNC7T-P-C-G-ST-CA6-PIN
8 Contacts Minimum
Signal Without Thermals

Step	Description
1.	Contact Gaps
2.	Normal Force (1) Expected Force at Max Deflection = 120 g Deflection = 0.0035 "

Group 2
BNC7T-SHL-001-N
BNC7T-P-C-N-ST-CA6-CBDY
8 Contacts Minimum
Gound Without Thermals

Step	Description
1.	Contact Gaps
2.	Normal Force (1) Deflection = 0.0034 " Expected Force at Max Deflection = 565 g

Group 3
BNC7T-SKT-001-G
BNC7T-P-C-G-ST-CA6-PIN
8 Contacts Minimum
Signal With Thermals

Step	Description
1.	Contact Gaps
2.	Thermal Age (2)
3.	Contact Gaps
4.	Normal Force (1) Deflection = 0.0035 " Expected Force at Max Deflection = 120 g

Group 4
BNC7T-SHL-001-N
BNC7T-P-C-N-ST-CA6-CBDY
8 Contacts Minimum
Ground With Thermals

Step	Description
1.	Contact Gaps
2.	Thermal Age (2)
3.	Contact Gaps
4.	Normal Force (1) Deflection = 0.0034 " Expected Force at Max Deflection = 565 g

(1) Normal Force = EIA-364-04

(2) Thermal Age = EIA-364-17
Test Condition = 4 (105°C)
Time Condition = B (250 Hours)

Mating/Unmating/Durability

Group 1
BNC7T-J-P-GN-ST-EM1
RFB6T-74SP3-303030-0156
8 Assemblies

Step	Description
1.	Contact Gaps
2.	LLCR (2)
3.	Cycles Quantity = 100 Cycles
4.	Contact Gaps
5.	LLCR (2) Max Delta = 15 mOhm
6.	Thermal Shock (3)
7.	LLCR (2) Max Delta = 15 mOhm
8.	Humidity (1)
9.	LLCR (2) Max Delta = 15 mOhm

(1) Humidity = EIA-364-31
Test Condition = B (240 Hours)
Test Method = III (+25°C to +65°C @ 90% RH to 98% RH)
Test Exceptions: ambient pre-condition and delete steps 7a and 7b

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

(3) 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)

FLOWCHARTS Continued

IR/DWV

Pin-to-Ground

Group 1 BNC7T-J-P-GN-ST-EM1 RFB6T-74SP3-303030-0156 2 Assemblies		Group 2 BNC7T-J-P-GN-ST-EM1 2 Assemblies		Group 3 RFB6T-74SP3-303030-0156 2 Assemblies		Group 4 BNC7T-J-P-GN-ST-EM1 RFB6T-74SP3-303030-0156 2 Assemblies	
Step	**Description**	**Step**	**Description**	**Step**	**Description**	**Step**	**Description**
1.	DWV Breakdown (2)	1.	DWV Breakdown (2)	1.	DWV Breakdown (2)	1.	IR (4)
						2.	DWV at Test Voltage (1)
						3.	Thermal Shock (5)
						4.	IR (4)
						5.	DWV at Test Voltage (1)
						6.	Humidity (3)
						7.	IR (4)
						8.	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) Humidity = EIA-364-31
Test Condition = B (240 Hours)
Test Method = III (+25°C to +65°C @ 90% RH to 98% RH)
Test Exceptions: ambient pre-condition and delete steps 7a and 7b

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

(5) 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)

Mechanical Shock/Random Vibration/LLCR

Group 1
BNC7T-J-P-GN-ST-EM1
RFB6T-74SP3-303030-0312
8 Assemblies

Step	Description
1.	LLCR (1)
2.	Mechanical Shock (2)
3.	Random Vibration (3)
4.	LLCR (1) Max Delta ▪ 15 mOhm

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

(2) Mechanical Shock = EIA-364-27
Test Condition = C (100 G Peak, 6 milliseconds, Half Sine)
Number of Shocks = 3 Per Direction, Per Axis, 18 Total

(3) Random Vibration = EIA-364-28
Condition = VB (7.56 gRMS Average, 2 Hours/Axis)

FLOWCHARTS Continued

Mechanical Shock/Random Vibration/Event Detection

Group 1
BNC7T-J-P-GN-ST-EM1
RFB6T-74SP3-303030-0312
60 Points

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)

Pull/Shear

Group 1
BNC7T-J-P-GN-ST-EM1
RFB6T-74SP3-303030-0156
5 Assemblies

Step	Description
1.	Connector Pull

Group 2
BNC7T-J-P-GN-ST-EM1
RFB6T-74SP3-303030-0156
5 Assemblies

Step	Description
1.	Connector Shear

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:

1) EIA-364-17, *Temperature Life with or without Electrical Load Test Procedure for Electrical Connectors.*
2) Test Condition :105° C.
3) Test Time Condition B for 250 hours.
4) All test samples are pre-conditioned at ambient.
5) All test samples are exposed to environmental stressing in the mated condition.

HUMIDITY:

1) Reference document: EIA-364-31, *Humidity Test Procedure for Electrical Connectors.*
2) Test Condition B, 240 Hours.
3) Method III, +25° C to + 65° C, 90% to 98% Relative Humidity excluding sub-cycles 7a and 7b.
4) All samples are pre-conditioned at ambient.
5) All test samples are exposed to environmental stressing in the mated condition.

MECHANICAL SHOCK (Specified Pulse):

1) Reference document: EIA-364-27, *Mechanical Shock Test Procedure for Electrical Connectors*
2) Test Condition C
3) Peak Value: 30 G
4) Duration: 6 Milliseconds
5) Wave Form: Half Sine
6) Velocity: 12.3 ft/s
7) Number of Shocks: 3 Shocks / Direction, 3 Axis (18 Total)

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

ATTRIBUTE DEFINITIONS Continued

The following is a brief, simplified description of attributes.

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 TC^2, 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 ± 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 TC^2 software in order to acquire and record the test data.
14) The permanent set of each contact shall be measured within the TC^2 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.

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. Rate of Application 500 V/Sec
        iii. 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).

ATTRIBUTE DEFINITIONS Continued

The following is a brief, simplified description of attributes.

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 +2000 mOhms: ---------- Unstable
    f. >+2000 mOhms:---------- Open Failure

GAS TIGHT:

To provide method for evaluating the ability of the contacting surfaces in preventing penetration of harsh vapors which might lead to oxide formation that may degrade the electrical performance of the contact system.

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 +2000 mOhms: ---------- Unstable
    f. >+2000 mOhms:---------- Open Failure
4) Procedure:
    g. Reference document: EIA-364-36, *Test Procedure for Determination of Gas-Tight Characteristics for Electrical Connectors, Sockets and/or Contact Systems*.
    h. Test Conditions:
        i. Class II--- Mated pairs of contacts assembled to their plastic housings.
        ii. Reagent grade Nitric Acid shall be used of sufficient volume to saturate the test chamber
        iii. The ratio of the volume of the test chamber to the surface area of the acid shall be 10:1.
        iv. The chamber shall be saturated with the vapor for at least 15 minutes before samples are added.
        v. Exposure time, 55 to 65 minutes.
        vi. The samples shall be no closer to the chamber walls than 1 inches and no closer to the surface of the acid than 3 inches.
        vii. The samples shall be dried after exposure for a minimum of 1 hour.
        viii. Drying temperature 50^{o} C
        ix. The final LLCR shall be conducted within 1 hour after drying.

RESULTS

Normal Force deflection

Signal pin at 0.0035 inch

- **Initial**
  - **Min ---------- 99.40 gf Set ----- 0.0000 inch**
  - **Max ---------- 126.30 gf Set ----- 0.0001 inch**
- **Thermal**
  - **Min ---------- 87.10 gf Set ----- 0.0000 inch**
  - **Max ---------- 118.10 gf Set ----- 0.0014 inch**

Ground pin at 0.0034 inch

- **Initial**
  - **Min ---------- 523.90 gf Set ----- 0.0000 inch**
  - **Max ---------- 650.00 gf Set ----- 0.0004 inch**
- **Thermal**
  - **Min ---------- 253.30 gf Set ----- 0.0008 inch**
  - **Max ---------- 428.80 gf Set ----- 0.0020 inch**

LLCR Durability (16 signal LLCR test points)

Signal pin

- **Initial ---------- 6.03 mOhms Max**

Ground pin

- **Initial ---------- 2.73 mOhms Max**
- **After 100 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 +2000 mOhms ---------- 0 Points ---------- Unstable**
  - **>+2000 mOhms ---------- 0 Points ---------- Open Failure**
- **After thermal shock**
  - **<= +5.0 mOhms ---------- 16Points ---------- 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 +2000 mOhms ---------- 0 Points ---------- Unstable**
  - **>+2000 mOhms ---------- 0 Points ---------- Open Failure**
- **After humidity**
  - **<= +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 +2000 mOhms ---------- 0 Points ---------- Unstable**
  - **>+2000 mOhms ---------- 0 Points ---------- Open Failure**

RESULTS Continued

LLCR Thermal Aging (16 signal LLCR test points)

Signal pin

- **Initial ---------- 6.29 mOhms Max**

Ground pin

- **Initial ---------- 2.61 mOhms Max**
- **Thermal Aging**
  - **<= +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 +2000 mOhms ---------- 0 Points ---------- Unstable**
  - **>+2000 mOhms ---------- 0 Points ---------- Open Failure**

LLCR Gas Tight (16 signal LLCR test points)

Signal pin

- **Initial ---------- 6.10 mOhms Max**

Ground pin

- **Initial ---------- 2.94 mOhms Max**
- **Gas-Tight**
  - **<= +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 +2000 mOhms ---------- 0 Points ---------- Unstable**
  - **>+2000 mOhms ---------- 0 Points ---------- Open Failure**

LLCR Shock Vib (16 signal LLCR test points)

Signal pin

- **Initial ---------- 3.29 mOhms Max**

Ground pin

- **Initial ---------- 9.75 mOhms Max**
- **S&V**
  - **<= +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 +2000 mOhms ---------- 0 Points ---------- Unstable**
  - **>+2000 mOhms ---------- 0 Points ---------- Open Failure**

RESULTS Continued

Insulation Resistance minimums, IR

Signal Pin to Ground Pin

- **Initial**
  - **Mated ---------- 1550 Meg Ω ---------- Passed**
  - **Unmated ---------- 1685 Meg Ω ---------- Passed**
- **Thermal Shock**
  - **Mated ---------- 1250 Meg Ω ---------- Passed**
  - **Unmated ---------- 1540 Meg Ω ---------- Passed**
- **Humidity**
  - **Mated ----------45000 Meg Ω ---------- Passed**
  - **Unmated ----------45000 Meg Ω ---------- Passed**

Dielectric Withstanding Voltage minimums, DWV

- **Minimums**
  - **Breakdown Voltage ---------- 2772 VAC**
  - **Test Voltage ---------- 2080 VAC**
  - **Working Voltage ----------690 VAC**

Signal Pin to Ground Pin

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

Row to Row

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

DATA SUMMARIES

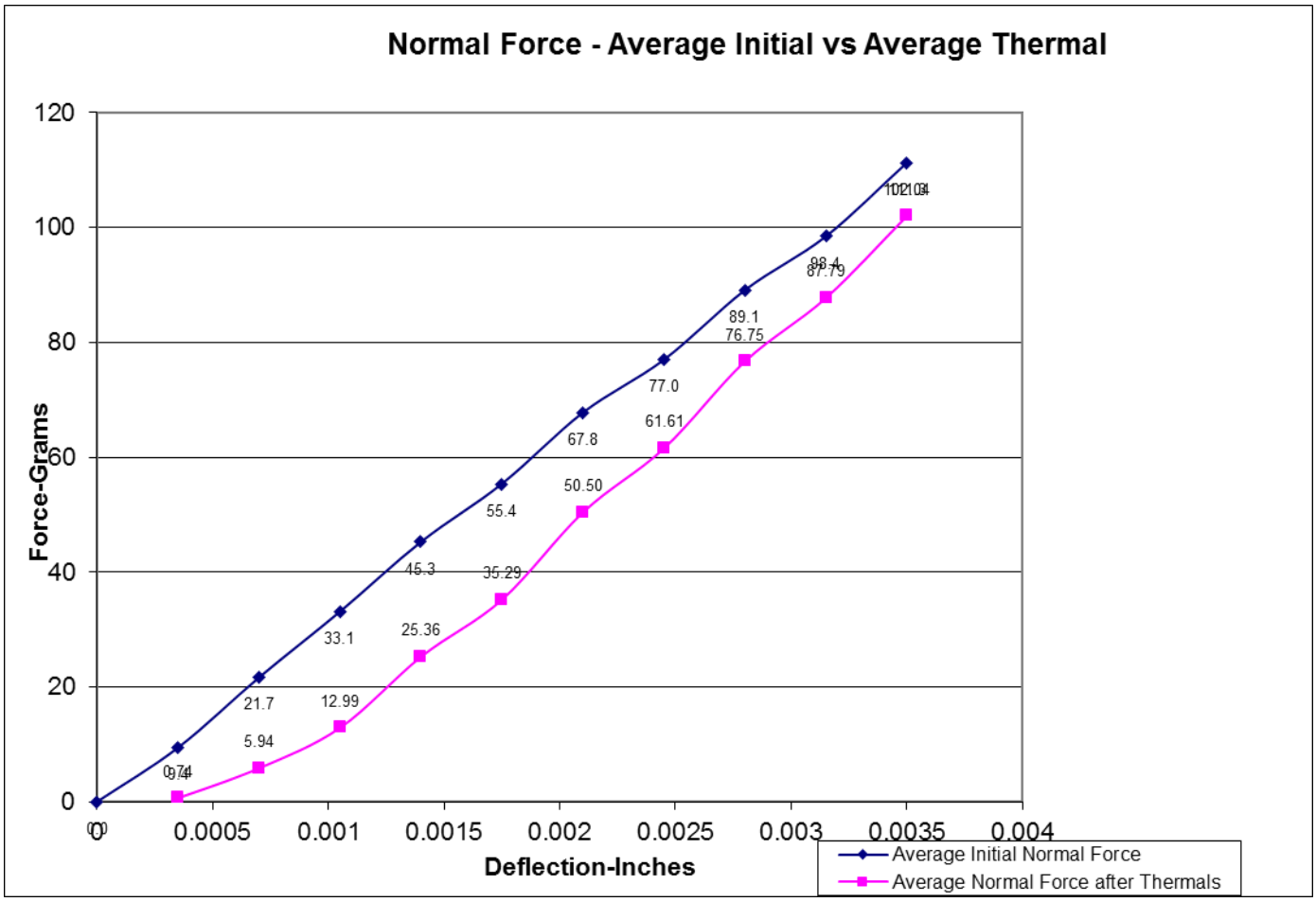
NORMAL FORCE (FOR CONTACTS TESTED OUT THE HOUSING):

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.

Signal pin

Initial	Deflections in inches Forces in Grams										
	0.0004	0.0007	0.0011	0.0014	0.0018	0.0021	0.0025	0.0028	0.0032	0.0035	*SET*
Averages	9.43	21.65	33.11	45.25	55.36	67.76	76.95	89.08	98.44	111.25	0.0000
Min	5.60	17.10	29.40	39.90	49.60	59.20	67.80	79.40	88.40	99.40	0.0000
Max	12.90	26.10	37.00	53.10	61.10	74.50	86.50	98.10	111.30	126.30	0.0001
St. Dev	3.006	2.901	2.479	4.748	3.999	5.996	5.662	7.272	8.544	9.372	0.0000
Count	8	8	8	8	8	8	8	8	8	8	8

fter Therma	Deflections in inches Forces in Grams										
	0.0004	0.0007	0.0011	0.0014	0.0018	0.0021	0.0025	0.0028	0.0032	0.0035	*SET*
Averages	0.74	5.94	12.99	25.36	35.29	50.50	61.61	76.75	87.79	102.04	0.0006
Min	-0.20	-0.20	-0.20	0.20	8.20	27.00	39.30	55.90	70.70	87.10	0.0000
Max	5.30	16.00	23.00	38.10	52.50	62.50	76.50	91.60	105.40	118.10	0.0014
St. Dev	1.850	6.533	9.140	13.101	14.277	12.129	12.204	12.490	12.207	12.056	0.0004
Count	8	8	8	8	8	8	8	8	8	8	8



DATA SUMMARIES

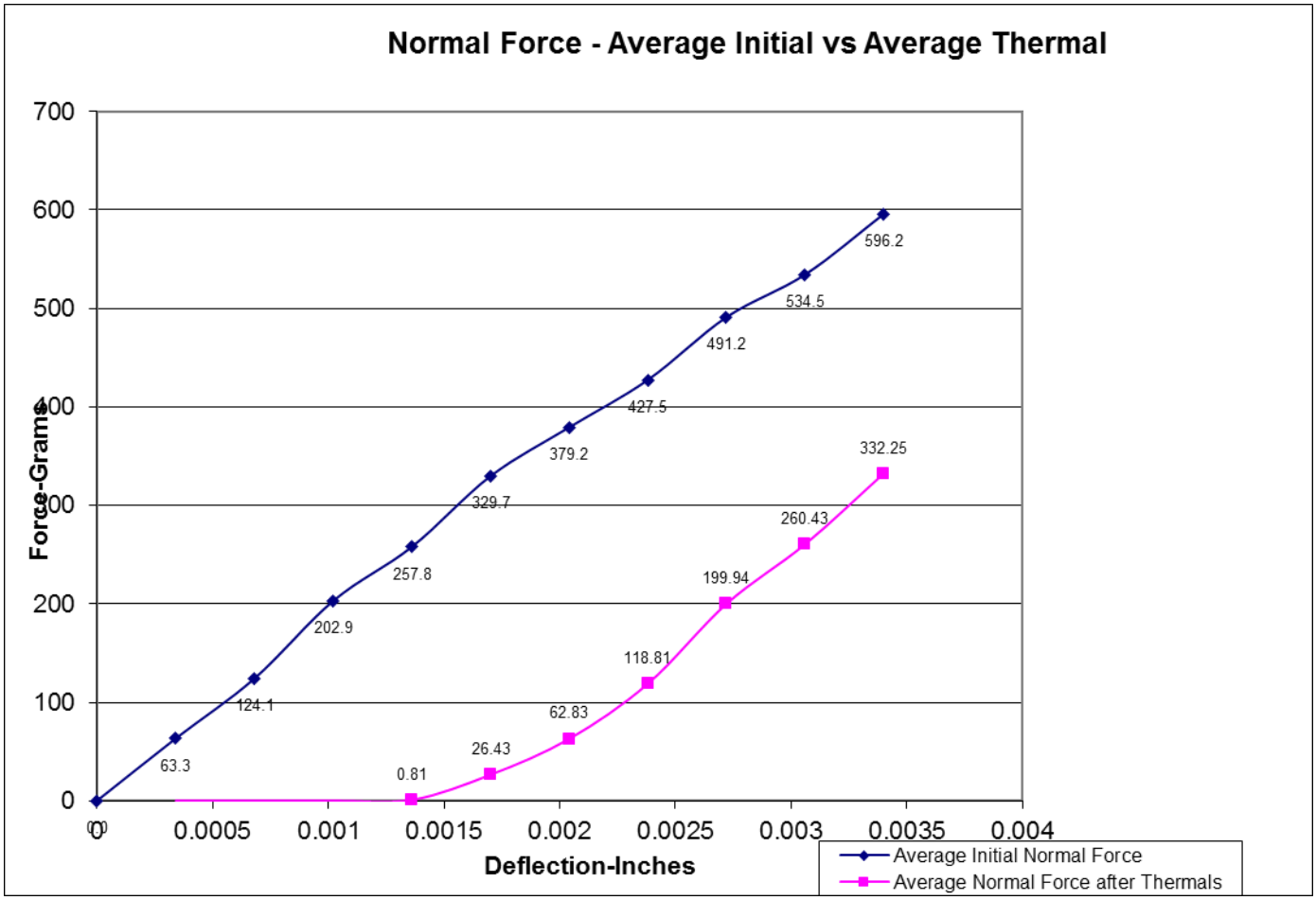
NORMAL FORCE (FOR CONTACTS TESTED OUT THE HOUSING):

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.

Ground pin

Initial	Deflections in inches Forces in Grams										
	0.0003	**0.0007**	**0.0010**	**0.0014**	**0.0017**	**0.0020**	**0.0024**	**0.0027**	**0.0031**	**0.0034**	***SET***
Averages	63.33	124.10	202.93	257.84	329.66	379.21	427.48	491.23	534.54	596.15	0.0001
Min	40.30	104.00	175.90	221.40	287.00	330.30	382.10	442.10	462.30	523.90	0.0000
Max	96.80	148.50	224.40	280.90	363.50	410.80	454.00	533.40	576.40	650.00	0.0004
St. Dev	17.462	15.950	20.724	21.341	29.097	32.636	28.019	33.846	41.778	43.557	0.0002
Count	8	8	8	8	8	8	8	8	8	8	8

fter Therma	Deflections in inches Forces in Grams										
	0.0003	**0.0007**	**0.0010**	**0.0014**	**0.0017**	**0.0020**	**0.0024**	**0.0027**	**0.0031**	**0.0034**	***SET***
Averages	-0.05	-0.05	-0.05	0.81	26.43	62.83	118.81	199.94	260.43	332.25	0.0014
Min	-0.10	-0.10	-0.10	-0.10	-0.10	-0.10	21.50	116.70	189.10	253.30	0.0008
Max	0.30	0.30	0.30	6.80	102.90	161.00	232.80	304.20	356.10	428.80	0.0020
St. Dev	0.141	0.141	0.141	2.423	40.399	61.623	76.917	67.580	59.122	62.979	0.0004
Count	8	8	8	8	8	8	8	8	8	8	8



DATA SUMMARIES Continued

INSULATION RESISTANCE (IR):

	Pin to Ground		
	Mated	Unmated	Unmated
Minimum	**BNC7T/RFB6T**	**BNC7T**	**RFB6T**
Initial	1550	1685	45000
Thermal	1250	1540	45000
Humidity	45000	45000	45000

DIELECTRIC WITHSTANDING VOLTAGE (DWV):

Voltage Rating Summary	
Minimum	**BNC7T/RFB6T**
Break Down Voltage	2772
Test Voltage	2080
Working Voltage	690

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

DATA SUMMARIES Continued

LLCR Durabiltiy:

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 +2000 mOhms ---------- Unstable
   f. >+2000 mOhms:---------- Open Failure

		LLCR Measurement Summaries by Pin Type			
	Date	12/18/2018	12/25/2018	1/3/2019	1/24/2019
Room Temp (Deg C)		23	23	23	23
Rel Humidity (%)		56	56	57	56
	Technician	Peter Chen	Peter Chen	Peter Chen	Peter Chen
mOhm values		**Actual**	**Delta**	**Delta**	**Delta**
		Initial	**100 Cycles**	**Therm Shck**	**Humidity**
		Pin Type 1: Signal			
	Average	5.96	0.03	0.13	0.06
	St. Dev.	0.07	0.02	0.06	0.05
	Min	5.82	0.00	0.06	0.00
	Max	6.03	0.07	0.27	0.17
	Summary Count	8	8	8	8
	Total Count	8	8	8	8
		Pin Type 2: Ground			
	Average	2.23	0.43	1.43	2.11
	St. Dev.	0.23	0.26	0.66	0.66
	Min	1.99	0.15	0.67	1.37
	Max	2.73	0.93	2.67	3.48
	Summary Count	8	8	8	8
	Total Count	8	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**
100 Cycles	**16**	**0**	**0**	**0**	**0**	**0**
Therm Shck	**16**	**0**	**0**	**0**	**0**	**0**
Humidity	**16**	**0**	**0**	**0**	**0**	**0**

DATA SUMMARIES Continued

LLCR Thermal aging

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 +2000 mOhms ---------- Unstable
   f. >+2000 mOhms:---------- Open Failure

		LLCR Measurement Summaries by Pin Type			
	Date	12/18/2018	1/3/2019		
Room Temp (Deg C)		23	23		
Rel Humidity (%)		56	57		
Technician		Peter Chen	Peter Chen		
mOhm values		**Actual**	**Delta**	**Delta**	**Delta**
		Initial	**Thermal**		
		Pin Type 1: Signal			
	Average	5.96	0.11		
	St. Dev.	0.19	0.06		
	Min	5.67	0.02		
	Max	6.29	0.22		
Summary Count		8	8		
Total Count		8	8		
		Pin Type 2: Ground			
	Average	2.41	0.23		
	St. Dev.	0.13	0.13		
	Min	2.25	0.01		
	Max	2.61	0.37		
Summary Count		8	8		
Total Count		8	8		

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

DATA SUMMARIES Continued

LLCR GAS TIGHT:

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 +2000 mOhms: ---------- Unstable
   f. >+2000 mOhms:---------- Open Failure

		LLCR Measurement Summaries by Pin Type			
	Date	1/9/2019	1/10/2019		
Room Temp (Deg C)		23	23		
Rel Humidity (%)		65	54		
Technician		Peter Chen	Peter Chen		
mOhm values		**Actual**	**Delta**	**Delta**	**Delta**
		Initial	**Acid Vapor**		
		Pin Type 1: Signal			
	Average	5.87	0.10		
	St. Dev.	0.17	0.09		
	Min	5.59	0.01		
	Max	6.10	0.29		
Summary Count		8	8		
Total Count		8	8		
		Pin Type 2: Ground			
	Average	2.27	0.68		
	St. Dev.	0.28	0.59		
	Min	2.01	0.12		
	Max	2.94	1.98		
Summary Count		8	8		
Total Count		8	8		

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

DATA SUMMARIES Continued

LLCR Shock Vib:

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 +2000 mOhms: ---------- Unstable
   f. >+2000 mOhms:---------- Open Failure

		LLCR Measurement Summaries by Pin Type			
	Date	12/18/2018	12/20/2018		
	Room Temp (Deg C)	22	22		
	Rel Humidity (%)	36	38		
	Technician	Tony Wagoner	Tony Wagoner		
	mOhm values	**Actual**	**Delta**	**Delta**	**Delta**
		Initial	**Shock-Vib**		
		Pin Type 1: Ground			
	Average	3.22	0.19		
	St. Dev.	0.03	0.07		
	Min	3.18	0.09		
	Max	3.29	0.31		
	Summary Count	8	8		
	Total Count	8	8		
		Pin Type 2: Signal			
	Average	9.62	0.08		
	St. Dev.	0.09	0.10		
	Min	9.47	0.00		
	Max	9.75	0.33		
	Summary Count	8	8		
	Total Count	8	8		

LLCR Delta Count by Category						
	Stable	**Minor**	**Acceptable**	**Marginal**	**Unstable**	**Open**
mOhms	**<=5**	**>5 & <=10**	**>10 & <=15**	**>15 & <=50**	**>50 & <=1000**	**>1000**
Shock-Vib	**16**	**0**	**0**	**0**	**0**	**0**

Shock Vibration Event Detection:

Shock and Vibration Event Detection Summary	
Contacts tested	16
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-HPM-01
Description: Hipot Megommeter
Manufacturer: Hipotronics
Model: H306B-A
Serial #: M9905004
Accuracy: 2 % Full Scale Accuracy
… Last Cal: 2018-4-27, Next Cal: 2019-4-26

Equipment #: HZ-MO-03
Description: Micro-ohmmeter
Manufacturer: Keithley
Model: 580
Serial #: 297288
Accuracy: Last Cal: 2018-8-06, Next Cal: 2019-8-05

Equipment #: HZ-OV-01
Description: Oven
Manufacturer: Huida
Model: CS101-1E
Serial #: CS101-1E-B
Accuracy: Last Cal: 2018-12-14, Next Cal: 2019-12-13

Equipment #: HZ-THC-01
Description: Humidity transmitter
Manufacturer: Thermtron
Model: HMM30C
Serial #: D0240037
Accuracy: Last Cal: 2019-3-3, Next Cal: 2020-3-2

Equipment #: HZ-MO-01
Description: Micro-ohmmeter
Manufacturer: Keithley
Model: 2700
Serial #: 1199807
Accuracy: Last Cal: 2018-4-28, Next Cal: 2019-4-27

Equipment #: HZ-PS-01
Description: Power Supply
Manufacturer: Agilent
Model: 6031A
Serial #: MY41000982
Accuracy: Last Cal: 2018-4-28, Next Cal: 2019-4-27

EQUIPMENT AND CALIBRATION SCHEDULES

Equipment #: HZ-TSC-01
Description: Thermal Shock transmitter
Manufacturer: Keithley
Model: 10-VT14994
Serial #: VTS-3-6-6-SC/AC
Accuracy: Last Cal: 2018-11-1, Next Cal: 2019-11-1

Equipment #: SVC-01
Description: Shock & Vibration Table
Manufacturer: Data Physics
Model: LE-DSA-10-20K
Serial #: 10037
Accuracy: Last Cal: 2018-11-31, Next Cal: 2019-11-31

Equipment #: ACLM-01
Description: Accelerometer
Manufacturer: PCB Piezotronics
Model: 352C03
Serial #: 115819
Accuracy: Last Cal: 2018-07-09, Next Cal: 2019-07-09

Equipment #: ED-03
Description: Event Detector
Manufacturer: Analysis Tech
Model: 32EHD
Serial #: 1100604
Accuracy: Last Cal: 2018-06-04, Next Cal: 2019-06-04