



Project Number: Design Qualification Test Report		Tracking Code: TC1005--3144_Report_Rev_1	
Requested by: Dipesh Parmar		Date: 8/25/2011	Product Rev: N/A
Part #: BNC7T-J-P-HN-ST-TH2D\RFA6T-74SPX-999999-0203		Lot #: N/A	Eng: Eric Mings
Part description: BNC7T\RFA6T			Qty to test: 30
Test Start: 05/11/2010	Test Completed: 06/17/2010		



DESIGN QUALIFICATION TEST REPORT

BNC7T\RFA6T

BNC7T-J-P-HN-ST-TH2D\RFA6T-74SPX-999999-0203

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

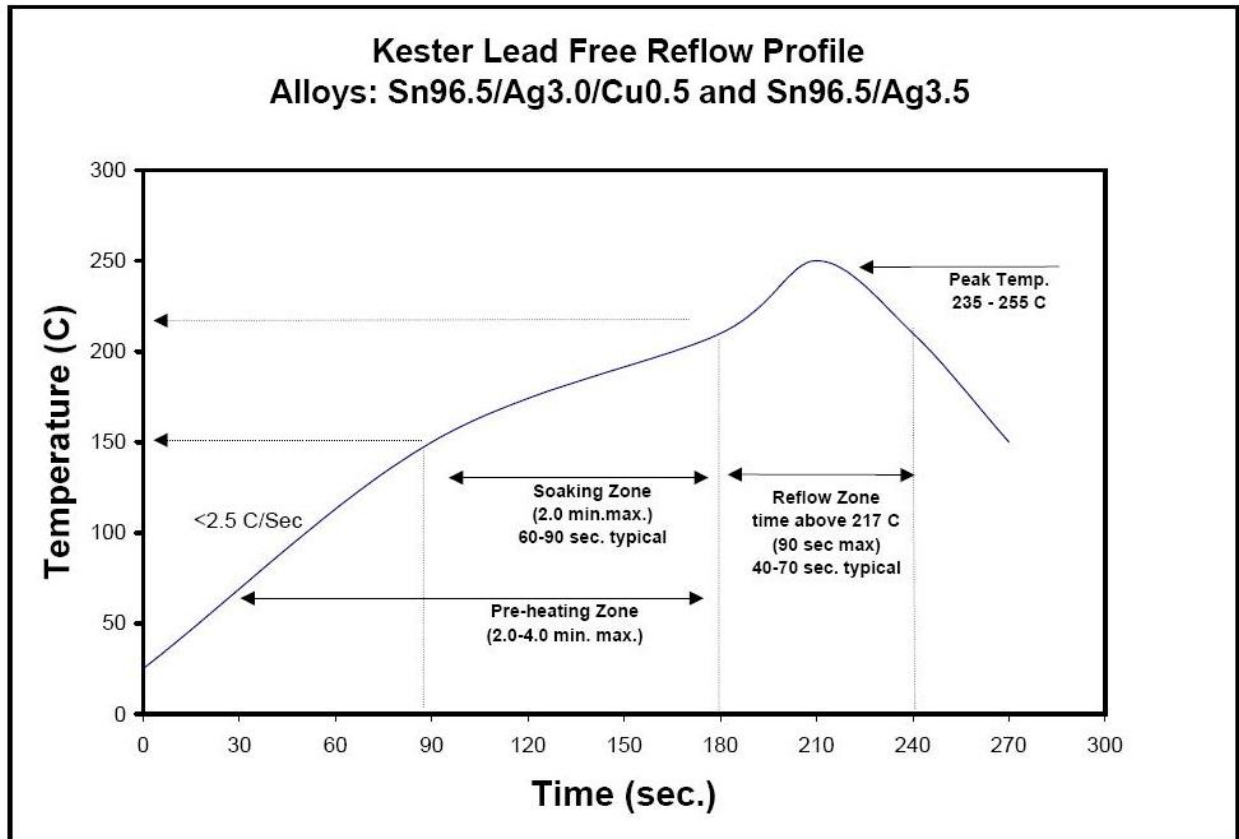
To perform the following tests: Design Qualification test. Please see test plan.

APPLICABLE DOCUMENTS

Standards: EIA Publication 364

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) Solder Information: Lead Free
- 9) Re-Flow Time/Temp: See accompanying profile.
- 10) Samtec Test PCBs used: PCB-102353-TST-XX / PCB-101942-TST-XX

TYPICAL OVEN PROFILE (Soldering Parts to Test Boards)

FLOWCHARTS**Gas Tight**

TEST STEP	GROUP A1 10 Points
01	LLCR-1
02	Gas Tight
03	LLCR-2

Gas Tight = EIA-364-36A

LLCR = EIA-364-23, LLCR

use Keithley 580 in the dry circuit mode, 10 mA Max

Durability/Thermal Age/Cyclic Humidity

TEST STEP	GROUP A1 10 Points 100 Cycles	GROUP B1 10 Points 500 Cycles
01	LLCR-1	LLCR-1
02	100 Cycles	500 Cycles
03	Clean Mating Interface	Clean Mating Interface
04	LLCR-2	LLCR-2
05	Thermal Age (Mated and undisturbed)	Thermal Age (Mated and undisturbed)
06	LLCR-3	LLCR-3
07	Cyclic Humidity (Mated and undisturbed)	Cyclic Humidity (Mated and undisturbed)
08	LLCR-4	LLCR-4

Thermal Aging = EIA-364-17, Test Condition 4 (105°C)

Time Condition 'B' (250 Hours)

Humidity = EIA-364-31, Test Condition 'B' (240 Hours)

and Method III (+25°C to +65°C @ 90% RH to 98% RH)

ambient pre-condition and delete steps 7a and 7b

LLCR = EIA-364-23, LLCR

use Keithley 580 in the dry circuit mode, 10 mA Max

FLOWCHARTS Continued**Mating/Unmating/Gaps/Normal Force/Deflection Force**

TEST STEP	GROUP A 10 Pcs	GROUP B1	GROUP B2
	No Coupling Nut on Cable	7 contacts	6 contacts mated
01	Contact Gaps (Center Contact Only)	Contact Gaps (Center Contact Only)	Contact Gaps (Center Contact Only)
02	Mating / Unmating	Setup Approved	Setup Approved
03	100 Cycles	Normal Force	Thermal Aging (Mated)
04	Clean w/Compressed Air		Contact Gaps (Center Contact Only)
05	Mating / Unmating		
06	100 Cycles (200 Total)		Normal Force
07	Clean w/Compressed Air		
08	Mating / Unmating		
09	100 Cycles (300 Total)		
10	Clean w/Compressed Air		
11	Mating / Unmating		
12	100 Cycles (400 Total)		
13	Clean w/Compressed Air		
14	Mating / Unmating		
15	100 Cycles (500 Total)		
16	Clean w/Compressed Air		
17	Mating / Unmating		
18	Contact Gaps (Center Contact Only)		
19	Thermal Aging (Mated)		
20	Mating / Unmating		
21	Contact Gaps		
22	Cyclic Humidity (Mated)		
23	Mating / Unmating		

Thermal Aging = EIA-364-17, Test Condition 4 (105°C)

Time Condition 'B' (250 Hours)

Humidity = EIA-364-31, Test Condition B (240 Hours)

and Method III (+25°C to +65°C @ 90% RH to 98% RH)

ambient pre-condition and delete steps 7a and 7b

Mating/Un-Mating Forces = EIA-364-13

Normal Force = EIA-364-04

(Perpendicular) displacement Force = 12.7 mm/min +/- 6 mm/min

Spec is 50 N @ 1 mm displacement

Contact Gaps/Height - No standard method. Usually measured optically

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FLOWCHARTS Continued

Connector Pull

TEST	GROUP A1 BNC7T-J-P-HN-ST-TH2D	GROUP A2 BNC7T-J-P-HN-ST-TH2D	GROUP A3 BNC7T-J-P-HN-ST-TH2D	GROUP A4 2 Piece Contact
STEP	5 Pieces SIG 0°	5 Pieces SIG 90°, Direction 1	5 Pieces SIG 90°, Direction 2	10 Pieces SIG 0°
01	Pull test, Continuity(signal only)	Pull test, Continuity(signal only)	Pull test, Continuity(signal only)	Pull test, Record Max Force to Break

TEST	GROUP B1 BNC7T-J-P-HN-ST-TH1	GROUP B2 BNC7T-J-P-HN-ST-TH1	GROUP B3 BNC7T-J-P-HN-ST-TH1
STEP	5 Pieces SIG 0°	5 Pieces SIG 90°, Direction 1	5 Pieces SIG 90°, Direction 2
01	Pull test, Continuity(signal only)	Pull test, Continuity(signal only)	Pull test, Continuity(signal only)

Monitor continuity and pull
Record forces when continuity fails or solder joints/connector legs break.

ATTRIBUTE DEFINITIONS

The following is a brief, simplified description of attributes.

THERMAL:

- 1) EIA-364-17, *Temperature Life with or without Electrical Load Test Procedure for Electrical Connectors*.
- 2) Test Condition 4 at 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.

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.

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 ± 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.

CONTACT GAPS:

- 1) Gaps above the surrounding plastic surface were measured before and after stressing the contacts (e.g. thermal aging, mechanical cycling, etc.).
- 2) Typically, all contacts on the connector are measured.

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. $\leq +5.0$ 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 $+2000$ 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. $\leq +5.0$ mOhms: ----- Stable
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 - 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:
 - a. Reference document: EIA-364-36, *Test Procedure for Determination of Gas-Tight Characteristics for Electrical Connectors, Sockets and/or Contact Systems*.
 - b. 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° C
 - ix. The final LLCR shall be conducted within 1 hour after drying.

ATTRIBUTE DEFINITIONS Continued

The following is a brief, simplified description of attributes

CONNECTOR PULL:

- 1) Secure cable near center and pull on connector
 - a. At 90°, right angle to cable
 - b. At 0°, in-line with cable

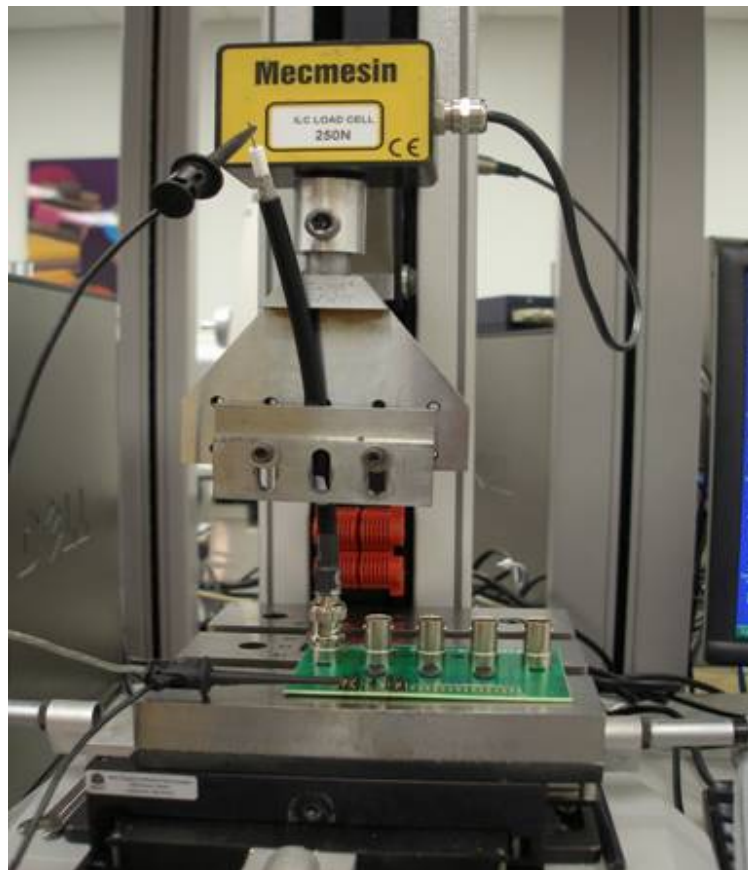


Fig. 1

(Typical set-up, actual part not depicted.)

0° Connector pull, notice the electrical continuity hook-up wires.

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Part description: BNC7T\RFA6T	

RESULTS

Contact Gaps

- **Initial**
 - o **Min**----- **1.0119 mm**
 - o **Max**----- **1.2479 mm**
- **After 500 Cycles**
 - o **Min**----- **1.1198 mm**
 - o **Max**----- **1.2501 mm**
- **Thermal**
 - o **Min**----- **1.2101 mm**
 - o **Max**----- **1.2858 mm**

Normal Force at 0.0020 in deflection

- **Initial**
 - o **Min**----- **58.50 gf** **Set ---- 0.0000 in**
 - o **Max**----- **85.20 gf** **Set ---- 0.0002 in**
- **Thermal**
 - o **Min**----- **46.60 gf** **Set ---- 0.0000 in**
 - o **Max**----- **77.90 gf** **Set ---- 0.0005 in**

RESULTS Continued**Mating – Unmating Forces**

- **Initial**
 - **Mating**
 - Min ----- 1.50 Lbs
 - Max ----- 1.97 Lbs
 - **Unmating**
 - Min ----- 1.25 Lbs
 - Max ----- 1.72 Lbs
- **After 100 Cycles**
 - **Mating**
 - Min ----- 1.98 Lbs
 - Max ----- 2.66 Lbs
 - **Unmating**
 - Min ----- 1.23 Lbs
 - Max ----- 1.89 Lbs
- **After 200 Cycles**
 - **Mating**
 - Min ----- 2.19 Lbs
 - Max ----- 3.00 Lbs
 - **Unmating**
 - Min ----- 1.25 Lbs
 - Max ----- 1.94 Lbs
- **After 300 Cycles**
 - **Mating**
 - Min ----- 2.07 Lbs
 - Max ----- 2.85 Lbs
 - **Unmating**
 - Min ----- 1.14 Lbs
 - Max ----- 1.98 Lbs
- **After 400 Cycles**
 - **Mating**
 - Min ----- 1.95 Lbs
 - Max ----- 2.71 Lbs
 - **Unmating**
 - Min ----- 1.27 Lbs
 - Max ----- 1.83 Lbs
- **After 500 Cycles**
 - **Mating**
 - Min ----- 2.00 Lbs
 - Max ----- 2.93 Lbs
 - **Unmating**
 - Min ----- 1.39 Lbs
 - Max ----- 1.85 Lbs
- **Thermal**
 - **Mating**
 - Min ----- 0.37 Lbs
 - Max ----- 0.73 Lbs
 - **Unmating**
 - Min ----- 0.32 Lbs
 - Max ----- 0.73 Lbs
- **Humidity**
 - **Mating**
 - Min ----- 0.61 Lbs
 - Max ----- 0.93 Lbs
 - **Unmating**
 - Min ----- 0.22 Lbs
 - Max ----- 0.66 Lbs

RESULTS Continued**LLCR Durability (10 signal and 10 ground LLCR test points)
100 cycles****Signals**

- **Initial**-----5.8mOhms Max
- **Durability, 100 Cycles**
 - o <= +5.0 mOhms ----- 10 Points ----- Stable
 - o +5.1 to +10.0 mOhms ----- 0 Points ----- Minor
 - o +10.1 to +15.0 mOhms ----- 0 Points ----- Acceptable
 - o +15.1 to +50.0 mOhms ----- 0 Points ----- Marginal
 - o +50.1 to +2000 mOhms ----- 0 Points ----- Unstable
 - o >+2000 mOhms ----- 0 Points ----- Open Failure
- **Thermal**
 - o <= +5.0 mOhms ----- 10 Points ----- Stable
 - o +5.1 to +10.0 mOhms ----- 0 Points ----- Minor
 - o +10.1 to +15.0 mOhms ----- 0 Points ----- Acceptable
 - o +15.1 to +50.0 mOhms ----- 0 Points ----- Marginal
 - o +50.1 to +2000 mOhms ----- 0 Points ----- Unstable
 - o >+2000 mOhms ----- 0 Points ----- Open Failure
- **Humidity**
 - o <= +5.0 mOhms ----- 10 Points ----- Stable
 - o +5.1 to +10.0 mOhms ----- 0 Points ----- Minor
 - o +10.1 to +15.0 mOhms ----- 0 Points ----- Acceptable
 - o +15.1 to +50.0 mOhms ----- 0 Points ----- Marginal
 - o +50.1 to +2000 mOhms ----- 0 Points ----- Unstable
 - o >+2000 mOhms ----- 0 Points ----- Open Failure

Grounds

- **Initial**-----6.4mOhms Max
- **Durability, 100 Cycles**
 - o <= +5.0 mOhms ----- 10 Points ----- Stable
 - o +5.1 to +10.0 mOhms ----- 0 Points ----- Minor
 - o +10.1 to +15.0 mOhms ----- 0 Points ----- Acceptable
 - o +15.1 to +50.0 mOhms ----- 0 Points ----- Marginal
 - o +50.1 to +2000 mOhms ----- 0 Points ----- Unstable
 - o >+2000 mOhms ----- 0 Points ----- Open Failure
- **Thermal**
 - o <= +5.0 mOhms ----- 10 Points ----- Stable
 - o +5.1 to +10.0 mOhms ----- 0 Points ----- Minor
 - o +10.1 to +15.0 mOhms ----- 0 Points ----- Acceptable
 - o +15.1 to +50.0 mOhms ----- 0 Points ----- Marginal
 - o +50.1 to +2000 mOhms ----- 0 Points ----- Unstable
 - o >+2000 mOhms ----- 0 Points ----- Open Failure
- **Humidity**
 - o <= +5.0 mOhms ----- 10 Points ----- Stable
 - o +5.1 to +10.0 mOhms ----- 0 Points ----- Minor
 - o +10.1 to +15.0 mOhms ----- 0 Points ----- Acceptable
 - o +15.1 to +50.0 mOhms ----- 0 Points ----- Marginal
 - o +50.1 to +2000 mOhms ----- 0 Points ----- Unstable
 - o >+2000 mOhms ----- 0 Points ----- Open Failure

RESULTS Continued**LLCR Durability (10 signal and 10 ground LLCR test points)
500 cycles****Signals**

- **Initial**-----5.8mOhms Max
- **Durability, 500 Cycles**
 - o <= +5.0 mOhms ----- 10 Points ----- Stable
 - o +5.1 to +10.0 mOhms ----- 0 Points ----- Minor
 - o +10.1 to +15.0 mOhms ----- 0 Points ----- Acceptable
 - o +15.1 to +50.0 mOhms ----- 0 Points ----- Marginal
 - o +50.1 to +2000 mOhms ----- 0 Points ----- Unstable
 - o >+2000 mOhms ----- 0 Points ----- Open Failure
- **Thermal**
 - o <= +5.0 mOhms ----- 10 Points ----- Stable
 - o +5.1 to +10.0 mOhms ----- 0 Points ----- Minor
 - o +10.1 to +15.0 mOhms ----- 0 Points ----- Acceptable
 - o +15.1 to +50.0 mOhms ----- 0 Points ----- Marginal
 - o +50.1 to +2000 mOhms ----- 0 Points ----- Unstable
 - o >+2000 mOhms ----- 0 Points ----- Open Failure
- **Humidity**
 - o <= +5.0 mOhms ----- 10 Points ----- Stable
 - o +5.1 to +10.0 mOhms ----- 0 Points ----- Minor
 - o +10.1 to +15.0 mOhms ----- 0 Points ----- Acceptable
 - o +15.1 to +50.0 mOhms ----- 0 Points ----- Marginal
 - o +50.1 to +2000 mOhms ----- 0 Points ----- Unstable
 - o >+2000 mOhms ----- 0 Points ----- Open Failure

Grounds

- **Initial**-----8.1mOhms Max
- **Durability, 500 Cycles**
 - o <= +5.0 mOhms ----- 10 Points ----- Stable
 - o +5.1 to +10.0 mOhms ----- 0 Points ----- Minor
 - o +10.1 to +15.0 mOhms ----- 0 Points ----- Acceptable
 - o +15.1 to +50.0 mOhms ----- 0 Points ----- Marginal
 - o +50.1 to +2000 mOhms ----- 0 Points ----- Unstable
 - o >+2000 mOhms ----- 0 Points ----- Open Failure
- **Thermal**
 - o <= +5.0 mOhms ----- 5 Points ----- Stable
 - o +5.1 to +10.0 mOhms ----- 5 Points ----- Minor
 - o +10.1 to +15.0 mOhms ----- 0 Points ----- Acceptable
 - o +15.1 to +50.0 mOhms ----- 0 Points ----- Marginal
 - o +50.1 to +2000 mOhms ----- 0 Points ----- Unstable
 - o >+2000 mOhms ----- 0 Points ----- Open Failure
- **Humidity**
 - o <= +5.0 mOhms ----- 5 Points ----- Stable
 - o +5.1 to +10.0 mOhms ----- 3 Points ----- Minor
 - o +10.1 to +15.0 mOhms ----- 2 Points ----- Acceptable
 - o +15.1 to +50.0 mOhms ----- 0 Points ----- Marginal
 - o +50.1 to +2000 mOhms ----- 0 Points ----- Unstable
 - o >+2000 mOhms ----- 0 Points ----- Open Failure

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RESULTS Continued

LLCR Gas Tight (10 signal and 10 ground LLCR test points)

Signals

- **Initial**-----5.8mOhms Max
- **Gas-Tight**
 - o <= +5.0 mOhms ----- 10 Points ----- Stable
 - o +5.1 to +10.0 mOhms -----0 Points ----- Minor
 - o +10.1 to +15.0 mOhms -----0 Points ----- Acceptable
 - o +15.1 to +50.0 mOhms -----0 Points ----- Marginal
 - o +50.1 to +2000 mOhms-----0 Points ----- Unstable
 - o >+2000 mOhms-----0 Points ----- Open Failure

Grounds

- **Initial**-----6.9mOhms Max
- **Gas-Tight**
 - o <= +5.0 mOhms ----- 10 Points ----- Stable
 - o +5.1 to +10.0 mOhms -----0 Points ----- Minor
 - o +10.1 to +15.0 mOhms -----0 Points ----- Acceptable
 - o +15.1 to +50.0 mOhms -----0 Points ----- Marginal
 - o +50.1 to +2000 mOhms-----0 Points ----- Unstable
 - o >+2000 mOhms-----0 Points ----- Open Failure

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Part description: BNC7T\RFA6T	

RESULTS Continued

Connector Pull

Group A1 SIG 0° (BNC7T-J-P-HN-ST-TH2D)

- 0° ----- 29.94 lbs min

Group A2 SIG 90°, Direction 1 (BNC7T-J-P-HN-ST-TH2D)

- 90° ----- 13.96 lbs min

Group A3 SIG 90°, Direction 2 (BNC7T-J-P-HN-ST-TH2D)

- 90° ----- 8.26 lbs min

Group A4 Contact 0° (2 Piece Contact)

- 0° ----- 25.38 lbs min

Group B1 SIG 0° (BNC7T-J-P-HN-ST-TH1)

- 0° ----- 32.39 lbs min

Group B2 SIG 90°, Direction 1 (BNC7T-J-P-HN-ST-TH1)

- 90° ----- 13.47 lbs min

Group B3 SIG 90°, Direction 2 (BNC7T-J-P-HN-ST-TH1)

- 90° ----- 10.71 lbs min

DATA SUMMARIES**CONTACT GAPS:**

Initial		After 500 Cycles		After Thermal	
Units: mm		Units: mm		Units: mm	
<i>Minimum</i>	1.0119	<i>Minimum</i>	1.1198	<i>Minimum</i>	1.2101
<i>Maximum</i>	1.2479	<i>Maximum</i>	1.2501	<i>Maximum</i>	1.2858
<i>Average</i>	1.1733	<i>Average</i>	1.1955	<i>Average</i>	1.2357
<i>St. Dev.</i>	0.0528	<i>St. Dev.</i>	0.0287	<i>St. Dev.</i>	0.0188
<i>Count</i>	20	<i>Count</i>	20	<i>Count</i>	20

NORMAL FORCE (FOR CONTACTS TESTED OUTSIDE THE HOUSING):

- 1) Calibrated force gauges are used along with computer controlled positioning equipment.
- 2) Typically, 8-10 readings are taken and the averages reported.

Initial	Deflections in inches Forces in Grams										
	<u>0.0002</u>	<u>0.0004</u>	<u>0.0006</u>	<u>0.0008</u>	<u>0.0010</u>	<u>0.0012</u>	<u>0.0014</u>	<u>0.0016</u>	<u>0.0018</u>	<u>0.0020</u>	<i>SET</i>
Averages	6.14	12.86	19.60	26.67	33.27	40.89	48.31	55.93	63.66	71.41	0.0001
Min	4.90	11.10	15.20	20.00	23.60	32.60	40.50	46.40	52.60	58.50	0.0000
Max	7.20	15.40	24.30	32.70	41.50	50.00	57.90	67.30	77.10	85.20	0.0002
St. Dev	0.846	1.605	3.357	4.418	6.050	6.217	6.274	7.088	8.022	8.620	0.0001
Count	7	7	7	7	7	7	7	7	7	7	7

After Thermals	Deflections in inches Forces in Grams										
	<u>0.0002</u>	<u>0.0004</u>	<u>0.0006</u>	<u>0.0008</u>	<u>0.0010</u>	<u>0.0012</u>	<u>0.0014</u>	<u>0.0016</u>	<u>0.0018</u>	<u>0.0020</u>	<i>SET</i>
Averages	5.87	12.50	19.06	24.85	31.36	37.66	43.99	50.67	57.43	64.16	0.0002
Min	3.30	9.20	15.40	20.20	24.30	28.50	32.10	36.80	41.50	46.60	0.0000
Max	8.70	16.00	23.60	31.80	39.50	47.30	54.50	62.60	70.40	77.90	0.0005
St. Dev	1.633	2.012	2.661	3.681	4.653	5.671	6.755	7.795	8.795	9.488	0.0002
Count	11	11	11	11	11	11	11	11	11	11	11

DATA SUMMARIES Continued**MATING/UNMATING FORCE:**

	Initial				After 100 Cycles			
	Mating		Unmating		Mating		Unmating	
	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)
Minimum	6.67	1.50	5.56	1.25	8.81	1.98	5.47	1.23
Maximum	8.76	1.97	7.65	1.72	11.83	2.66	8.41	1.89
Average	7.45	1.68	6.62	1.49	10.27	2.31	7.21	1.62
St Dev	0.73	0.16	0.73	0.16	0.91	0.20	1.02	0.23
Count	10	10	10	10	10	10	10	10
	After 200 Cycles				After 300 Cycles			
	Mating		Unmating		Mating		Unmating	
	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)
Minimum	9.74	2.19	5.56	1.25	9.21	2.07	5.07	1.14
Maximum	13.34	3.00	8.63	1.94	12.68	2.85	8.81	1.98
Average	11.55	2.60	7.04	1.58	11.24	2.53	6.78	1.52
St Dev	1.24	0.28	1.08	0.24	1.36	0.30	1.20	0.27
Count	10	10	10	10	10	10	10	10
	After 400 Cycles				After 500 Cycles			
	Mating		Unmating		Mating		Unmating	
	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)
Minimum	8.67	1.95	5.65	1.27	8.90	2.00	6.18	1.39
Maximum	12.05	2.71	8.14	1.83	13.03	2.93	8.23	1.85
Average	10.31	2.32	6.74	1.52	11.21	2.52	7.37	1.66
St Dev	1.28	0.29	0.76	0.17	1.40	0.32	0.73	0.16
Count	10	10	10	10	10	10	10	10
	After Thermals				After Humidity			
	Mating		Unmating		Mating		Unmating	
	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)
Minimum	1.62	0.37	1.40	0.32	2.71	0.61	1.00	0.22
Maximum	3.25	0.73	3.25	0.73	4.14	0.93	2.95	0.66
Average	2.44	0.55	2.41	0.54	3.65	0.82	2.37	0.53
St Dev	0.53	0.12	0.58	0.13	0.47	0.11	0.54	0.12
Count	10	10	10	10	10	10	10	10

DATA SUMMARIES Continued**LLCR:**

- 1) A total of 10 signal and 10 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 $+2000$ mOhms----- Unstable
 - f. $>+2000$ mOhms:----- Open Failure

100 cycles**Signals**

Date	2010-4-21	2010-4-22	2010-5-10	2010-5-21
Room Temp C	25	25	24	24
RH	28%	29%	45%	48%
Name	A McKim	Lomax	Lomax	Lomax
mOhm values	Actual Initial	Delta 100 Cycles	Delta Thermal	Delta Humidity
Average	5.6	0.0	0.0	-0.1
St. Dev.	0.1	0.1	0.1	0.0
Min	5.4	-0.1	-0.1	-0.1
Max	5.8	0.1	0.1	0.0
Count	10	10	10	10

How many samples are being tested?**10****How many contacts are on each board?****1**

	Stable	Minor	Acceptable	Marginal	Unstable	Open
100 Cycles	10	0	0	0	0	0
Thermal	10	0	0	0	0	0
Humidity	10	0	0	0	0	0

DATA SUMMARIES Continued**100 cycles
Grounds**

Date	2010-4-21	2010-4-22	2010-5-10	2010-5-21
Room Temp C	25	25	24	24
RH	28%	29%	45%	48%
Name	A McKim	Lomax	Lomax	Lomax
mOhm values	Actual Initial	Delta 100 Cycles	Delta Thermal	Delta Humidity
Average	5.5	0.1	1.8	2.9
St. Dev.	0.7	1.0	1.1	1.3
Min	4.6	-1.3	-0.3	1.1
Max	6.4	2.1	3.7	4.4
Count	10	10	10	10

How many samples are being tested? 10

How many contacts are on each board? 1

	Stable	Minor	Acceptable	Marginal	Unstable	Open
100 Cycles	10	0	0	0	0	0
Thermal	10	0	0	0	0	0
Humidity	10	0	0	0	0	0

DATA SUMMARIES Continued**500 cycles
Signals**

Date	2010-4-21	2010-4-26	2010-5-25	2010-6-6
Room Temp C	25	25	24	25
RH	32%	39%	51%	48%
Name	A McKim	Lomax	Lomax	Lomax
mOhm values	Actual Initial	Delta 100 Cycles	Delta Thermal	Delta Humidity
Average	5.7	0.1	0.7	0.4
St. Dev.	0.1	0.2	1.5	0.4
Min	5.5	-0.1	0.0	0.1
Max	5.8	0.5	4.8	1.4
Count	10	10	10	10

How many samples are being tested? 10How many contacts are on each board? 1

	Stable	Minor	Acceptable	Marginal	Unstable	Open
500 Cycles	10	0	0	0	0	0
Thermal	10	0	0	0	0	0
Humidity	10	0	0	0	0	0

Grounds

Date	2010-4-21	2010-4-26	2010-5-25	2010-6-6
Room Temp C	25	25	24	25
RH	32%	39%	51%	48%
Name	A McKim	Lomax	Lomax	Lomax
mOhm values	Actual Initial	Delta 100 Cycles	Delta Thermal	Delta Humidity
Average	6.5	-2.4	5.4	6.4
St. Dev.	1.0	1.0	2.4	3.2
Min	4.9	-3.8	2.0	2.7
Max	8.1	-0.7	8.2	12.0
Count	10	10	10	10

How many samples are being tested? 10How many contacts are on each board? 1

	Stable	Minor	Acceptable	Marginal	Unstable	Open
500 Cycles	10	0	0	0	0	0
Thermal	5	5	0	0	0	0
Humidity	5	3	2	0	0	0

DATA SUMMARIES Continued**GAS TIGHT:**

- 1) A total of 10 signal and 10 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 $+2000$ mOhms: ----- Unstable
 - f. $>+2000$ mOhms: ----- Open Failure

Signals

Date	2010-4-26	2010-4-26
Room Temp C	25	25
RH	39%	38%
Name	Lomax	Lomax
mOhm values	Actual Initial	Delta Gas Tight
Average	5.7	0.0
St. Dev.	0.1	0.1
Min	5.6	-0.1
Max	5.8	0.2
Count	10	10

How many samples are being tested?

10

How many contacts are on each board?

1

	Stable	Minor	Acceptable	Marginal	Unstable	Open
Gas Tight	10	0	0	0	0	0

DATA SUMMARIES Continued**Grounds**

Date	2010-4-26	2010-4-26
Room Temp C	25	25
RH	39%	38%
Name	Lomax	Lomax
mOhm values	Actual Initial	Delta Gas Tight
Average	6.0	0.3
St. Dev.	0.7	0.7
Min	4.9	-0.9
Max	6.9	1.2
Count	10	10

How many samples are being tested?**10****How many contacts are on each board?****1**

	Stable	Minor	Acceptable	Marginal	Unstable	Open
Gas Tight	10	0	0	0	0	0

DATA SUMMARIES Continued**Connector Pull****Group A1 SIG 0° (BNC7T-J-P-HN-ST-TH2D)**

	Force (lbs)
Minimum	29.94
Maximum	36.62
Average	32.77

Group A2 SIG 90°, Direction 1 (BNC7T-J-P-HN-ST-TH2D)

	Force (lbs)
Minimum	13.96
Maximum	16.80
Average	15.67

Group A3 SIG 90°, Direction 2 (BNC7T-J-P-HN-ST-TH2D)

	Force (lbs)
Minimum	8.26
Maximum	10.96
Average	9.80

Group A4 Contact 0° (2 Piece Contact)

	Force (lbs)
Minimum	25.38
Maximum	34.49
Average	31.14

Group B1 SIG 0° (BNC7T-J-P-HN-ST-TH1)

	Force (lbs)
Minimum	32.39
Maximum	39.55
Average	35.37

Group B1 SIG 90°, Direction 1 (BNC7T-J-P-HN-ST-TH1)

	Force (lbs)
Minimum	13.47
Maximum	16.96
Average	15.36

Group B1 SIG 90°, Direction 2 (BNC7T-J-P-HN-ST-TH1)

	Force (lbs)
Minimum	10.71
Maximum	16.23
Average	13.37

DATA**CONTACT GAPS:**

Initial										
Units:mm										
Pos.#	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10
1	1.1760	1.1820	1.1580	1.1960	1.0620	1.1840	1.1820	1.2380	1.1800	1.2260
2	1.1779	1.1679	1.2479	1.1719	1.1999	1.1859	1.1739	1.1779	1.1659	1.0119
After 500 Cycles										
Units:mm										
Pos.#	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10
1	1.1961	1.1898	1.1841	1.1938	1.2501	1.1858	1.2041	1.2118	1.2021	1.1378
2	1.2041	1.2058	1.1901	1.1898	1.2421	1.1978	1.2001	1.1878	1.2161	1.1198
After Thermal										
Units:mm										
Pos.#	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10
1	1.2401	1.2361	1.2101	1.2461	1.2121	1.2421	1.2281	1.2721	1.2361	1.2421
2	1.2278	1.2318	1.2858	1.2318	1.2438	1.2458	1.2258	1.2278	1.2158	1.2118

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

Initial	Deflections in inches, Forces in Grams										
Sample #	0.0002	0.0004	0.0006	0.0008	0.0010	0.0012	0.0014	0.0016	0.0018	0.0020	SET
1	6.6	12.3	19.6	25.9	32.3	38.4	45.4	51.5	58.0	64.9	0.0000
2	7.2	15.4	24.3	32.7	41.5	50.0	57.9	67.3	77.1	85.2	0.0000
3	6.7	14.0	22.3	30.4	38.3	45.8	52.9	61.2	69.3	77.2	0.0000
4	6.3	12.3	15.2	20.0	23.6	32.6	41.5	50.5	59.5	68.5	0.0001
5	4.9	11.1	16.5	22.6	28.2	34.5	40.5	46.4	52.6	58.5	0.0002
6	6.2	13.8	21.8	28.9	35.8	43.9	50.9	57.9	65.0	73.4	0.0000
7	5.1	11.1	17.5	26.2	33.2	41.0	49.1	56.7	64.1	72.2	0.0001

After Thermals	Deflections in inches, Forces in Grams										
Sample #	0.0002	0.0004	0.0006	0.0008	0.0010	0.0012	0.0014	0.0016	0.0018	0.0020	SET
1	3.3	9.6	16.1	22.3	28.0	34.0	40.5	47.9	54.7	62.0	0.0004
2	6.3	12.7	20.0	26.4	34.7	41.4	49.2	56.4	64.4	71.3	0.0001
3	6.4	13.3	19.8	21.1	28.9	36.9	44.4	51.5	59.7	66.9	0.0001
4	5.8	11.8	17.5	24.2	30.6	37.0	43.7	49.9	56.1	62.8	0.0001
5	5.7	13.3	20.0	27.3	33.8	40.6	48.1	56.2	63.5	71.2	0.0001
6	8.7	16.0	23.6	31.8	39.5	47.3	54.5	62.6	70.4	77.9	0.0000
7	8.1	14.5	22.8	29.6	37.7	45.4	52.5	60.2	67.8	75.2	0.0000
8	5.2	11.7	17.3	23.9	30.7	37.0	42.8	49.0	55.5	61.4	0.0000
9	5.3	11.6	16.9	21.3	26.5	31.4	36.7	42.3	49.1	54.9	0.0004
10	3.5	9.2	15.4	20.2	24.3	28.5	32.1	36.8	41.5	46.6	0.0003
11	6.3	13.8	20.3	25.2	30.3	34.8	39.4	44.6	49.0	55.6	0.0005

DATA Continued**MATING/UNMATING:**

<u>Sample#</u>	<u>Initial</u>		<u>After 100 Cycles</u>		<u>After 200 Cycles</u>		<u>After 300 Cycles</u>		<u>After 400 Cycles</u>	
	Mating	Unmating	Mating	Unmating	Mating	Unmating	Mating	Unmating	Mating	Unmating
1	1.52	1.48	2.32	1.62	2.55	1.29	2.33	1.19	2.02	1.41
2	1.61	1.34	2.12	1.23	2.19	1.25	2.07	1.14	1.95	1.27
3	1.50	1.25	2.20	1.50	2.44	1.48	2.23	1.41	1.98	1.48
4	1.60	1.31	2.35	1.42	2.73	1.85	2.28	1.60	2.05	1.48
5	1.68	1.53	2.66	1.75	3.00	1.66	2.76	1.38	2.35	1.56
6	1.64	1.27	1.98	1.89	2.38	1.34	2.83	1.44	2.55	1.38
7	1.55	1.28	2.25	1.41	2.29	1.51	2.77	1.64	2.53	1.55
8	1.94	1.72	2.52	1.88	2.91	1.75	2.85	1.88	2.71	1.76
9	1.74	1.51	2.49	1.63	2.89	1.75	2.83	1.98	2.55	1.83
10	1.97	1.62	2.19	1.87	2.58	1.94	2.33	1.58	2.50	1.44
<u>Sample#</u>	<u>After 500 Cycles</u>		<u>After Thermals</u>		<u>After Humidity</u>					
	Mating	Unmating	Mating	Unmating	Mating	Unmating				
1	2.22	1.56	0.41	0.43	0.72	0.22				
2	2.18	1.39	0.62	0.58	0.85	0.54				
3	2.00	1.73	0.45	0.45	0.89	0.55				
4	2.34	1.42	0.73	0.64	0.93	0.47				
5	2.58	1.85	0.37	0.32	0.61	0.66				
6	2.73	1.71	0.68	0.73	0.93	0.53				
7	2.68	1.58	0.54	0.58	0.77	0.58				
8	2.93	1.80	0.52	0.49	0.85	0.64				
9	2.67	1.70	0.65	0.71	0.91	0.53				
10	2.87	1.84	0.51	0.50	0.74	0.60				

DATA Continued**LLCR:**100 cycles
Signals

	mOhm values	Actual	Delta	Delta	Delta
Board	Position	Initial	100 Cycles	Thermal	Humidity
1	P2	5.7	-0.1	0.0	-0.1
2	P2	5.7	0.1	0.0	-0.1
3	P2	5.7	-0.1	0.0	-0.1
4	P2	5.8	0.1	0.1	-0.1
5	P2	5.7	0.0	0.0	0.0
6	P2	5.4	-0.1	0.0	0.0
7	P2	5.4	0.0	0.1	-0.1
8	P2	5.6	0.1	0.1	0.0
9	P2	5.8	-0.1	-0.1	-0.1
10	P2	5.6	0.0	0.0	0.0

Grounds

	mOhm values	Actual	Delta	Delta	Delta
Board	Position	Initial	100 Cycles	Thermal	Humidity
1	P1	5.0	0.1	1.9	1.2
2	P1	4.6	-0.1	1.3	1.1
3	P1	4.8	0.1	1.0	2.1
4	P1	5.4	0.1	1.9	3.1
5	P1	6.4	-1.3	1.3	1.8
6	P1	6.4	-0.4	-0.3	3.8
7	P1	4.9	-0.3	2.3	4.4
8	P1	6.2	-0.7	2.2	4.2
9	P1	5.3	1.8	3.7	3.1
10	P1	5.7	2.1	2.8	4.3

DATA Continued**500 cycles
Signals**

	mOhm values	Actual	Delta	Delta	Delta
Board	Position	Initial	100 Cycles	Thermal	Humidity
1	P2	5.6	0.5	1.5	1.4
2	P2	5.7	0.1	0.4	0.2
3	P2	5.7	0.1	0.0	0.1
4	P2	5.7	-0.1	0.0	0.1
5	P2	5.8	0.0	0.0	0.3
6	P2	5.6	0.1	0.2	0.2
7	P2	5.6	0.1	0.2	0.2
8	P2	5.5	0.0	0.1	0.2
9	P2	5.7	0.1	0.0	0.1
10	P2	5.7	0.1	4.8	0.9

Grounds

	mOhm values	Actual	Delta	Delta	Delta
Board	Position	Initial	500 Cycles	Thermal	Humidity
1	P1	5.3	-1.1	4.3	3.6
2	P1	6.1	-1.8	3.4	3.2
3	P1	7.4	-3.6	4.1	4.7
4	P1	7.1	-3.3	2.0	2.7
5	P1	5.9	-2.1	8.1	8.1
6	P1	4.9	-0.7	8.2	6.9
7	P1	6.4	-2.3	6.3	11.0
8	P1	6.6	-2.1	7.0	7.0
9	P1	7.1	-3.0	2.5	12.0
10	P1	8.1	-3.8	8.0	4.6

DATA Continued**Gas Tight Group
Signals**

	mOhm values	Actual	Delta
Board	Position	Initial	Gas Tight
1	P2	5.6	0.1
2	P2	5.7	0.0
3	P2	5.6	0.2
4	P2	5.8	-0.1
5	P2	5.6	0.0
6	P2	5.6	0.0
7	P2	5.8	0.0
8	P2	5.8	0.0
9	P2	5.6	0.1
10	P2	5.6	0.0

Grounds

	mOhm values	Actual	Delta
Board	Position	Initial	Gas Tight
1	P1	6.3	-0.9
2	P1	5.0	0.2
3	P1	6.8	0.9
4	P1	6.6	-0.1
5	P1	4.9	1.1
6	P1	6.9	-0.2
7	P1	5.4	0.8
8	P1	5.9	0.7
9	P1	6.3	1.2
10	P1	6.3	-0.2

DATA Continued**Connector Pull****Group A1 SIG 0° (BNC7T-J-P-HN-ST-TH2D)**

Sample #	Force (lbs)
1	36.616
2	29.943
3	35.923
4	30.106
5	31.275

Group A2 SIG 90°, Direction 1 (BNC7T-J-P-HN-ST-TH2D)

Sample #	Force (lbs)
1	16.8
2	15.753
3	15.468
4	16.358
5	13.959

Group A3 SIG 90°, Direction 2 (BNC7T-J-P-HN-ST-TH2D)

Sample #	Force (lbs)
1	9.8113
2	8.264
3	9.297
4	10.683
5	10.955

Group A4 Contact 0° (2 Piece Contact)

Sample #	Force (lbs)
1	32.538
2	32.269
3	30.227
4	25.375
5	26.313
6	29.588
7	33.476
8	33.475
9	33.598
10	34.493

DATA Continued**Connector Pull****Group B1 SIG 0°(BNC7T-J-P-HN-ST-TH1)**

Sample #	Force (lbs)
1	34.442
2	39.552
3	34.034
4	32.389
5	36.453

Group B1 SIG 90°, Direction 1 (BNC7T-J-P-HN-ST-TH1)

Sample #	Force (lbs)
1	13.47
2	15.087
3	15.101
4	16.963
5	16.188

Group B1 SIG 90°, Direction 2 (BNC7T-J-P-HN-ST-TH1)

Sample #	Force (lbs)
1	10.71
2	12.45
3	13.796
4	13.66
5	16.229

EQUIPMENT AND CALIBRATION SCHEDULES**Equipment #:** MO-04**Description:** Multimeter /Data Acquisition System**Manufacturer:** Keithley**Model:** 2700**Serial #:** 0798688**Accuracy:** See Manual

... Last Cal: 04/30/2011, Next Cal: 04/30/2012

Equipment #: OV-5**Description:** Forced Air Oven, 5 Cu. Ft., 120 V**Manufacturer:** Sheldon Mfg.**Model:** CE5F**Serial #:** 02008008**Accuracy:** +/- 5 deg. C

... Last Cal: 02/16/2011, Next Cal: 02/16/2012

Equipment #: TCT-04**Description:** Dillon Quantrol TC2 Test Stand**Manufacturer:** Dillon Quantrol**Model:** TC2**Serial #:** 04-1041-04**Accuracy:** Speed Accuracy: +/- 5% of indicated speed; Displacement: +/- 5 micrometers.

... Last Cal: 05/21/2011, Next Cal: 05/21/2012

Equipment #: THC-02**Description:** Temperature/Humidity Chamber**Manufacturer:** Thermotron**Model:** SE-1000-6-6**Serial #:** 31808**Accuracy:** See Manual

... Last Cal: 02/16/2011, Next Cal: 02/16/2012