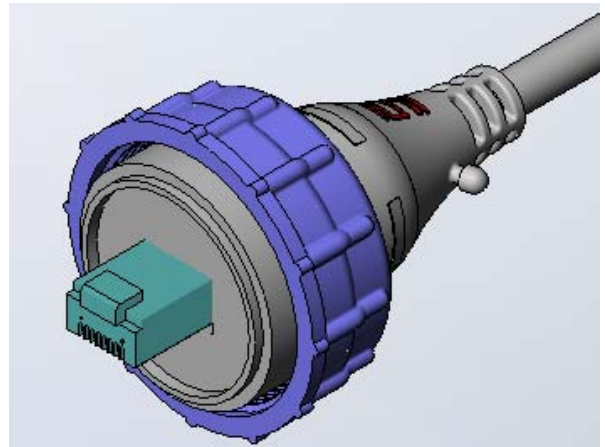
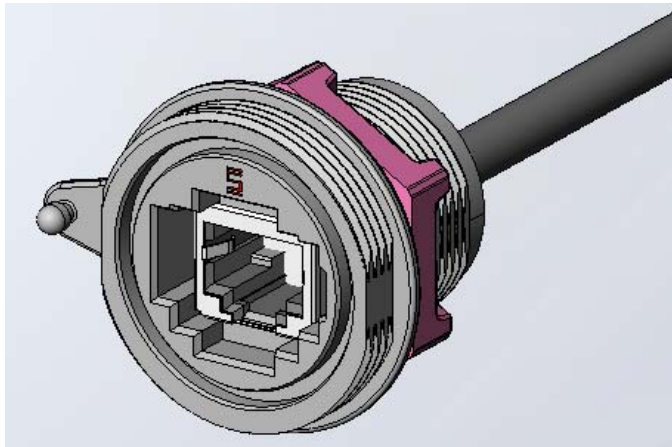




Project Number: Design Verification Test		Tracking Code: TC0929—2616_Report_Rev_1	
Requested by: Brandon Harpenau		Date: 12/18/2009	Product Rev: A
Part #: SCRES-G-XX.XX-D-C5E / SCPE-G-XX.XX-D-NP		Lot #: 1	Tech: Troy Cook Gary Lomax Rodney Riley
Eng: Eric Mings Mark Shireman			
Part description: Sealed Circular Receptacle / Plug, Cat 5e			Qty to test: 80
Test Start: 07/16/2009		Test Completed: 9/30/2009	



Design Verification Test Report

PART DESCRIPTION

SCRES-G-XX.XX-D-C5E
SCPE-G-XX.XX-D-NP

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.

All contents contained herein are the property of Samtec. No portion of this report, in part or in full shall be reproduced without prior written approval of Samtec.

SCOPE

To perform the following tests: Design verification test. 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.

FLOWCHARTS

Mating/Unmating/Gaps/Normal Force/Deflection Force

TEST STEP	GROUP A 10 Boards (each position submitted)	GROUP B1 Individual Contacts (8-10 min)	GROUP B2 Individual Contacts (8-10 min)
01	Mating / Unmating	Setup Approve	Setup Approve
02	25 Cycles	Normal Force (in the body unless otherwise specified)	Thermal Aging (Mated)
03	Clean w/Compressed Air		Normal Force
04	Mating / Unmating		
05	25 Cycles (50 Total)		
06	Clean w/Compressed Air		
07	Mating / Unmating		
08	25 Cycles (75 Total)		
09	Clean w/Compressed Air		
10	Mating / Unmating		
11	25 Cycles (100 Total)		
12	Clean w/Compressed Air		
13	Mating / Unmating		
14	Thermal Aging (Mated)		
15	Mating / Unmating		
16	Cyclic Humidity (Mated)		
17	Mating / Unmating		

Thermal Aging = EIA-364-17, Test Condition 11 (65 °C)

Time Condition 'A' (96 hours)

Humidity = EIA-364-31, Test Condition A (96 Hours)

Method II, with the following test conditions: +65 °C, 90% to 95% RH
ambient pre-condition

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

Gasket to be removed prior to taking forces.

IR & DWV

TEST STEP	GROUP A1 2 Mated Sets Break Down - Pin to Pin	GROUP A2 2 Unmated of Part # Being Tested Break Down - Pin to Pin	GROUP A3 2 Unmated of Mating Part # Break Down - Pin to Pin	GROUP B 2 Mated Sets Pin to Pin
01	DWV/Break Down Voltage	DWV/Break Down Voltage	DWV/Break Down Voltage	IR & DWV at test voltage (on both mated sets and on each connector unmated)
02				Thermal Aging (both sets unmated)
03				IR & DWV at test voltage (on both mated sets and on each connector unmated)

Thermal Aging = EIA-364-17, Test Condition 11 (65 °C)

Time Condition 'A' (96 hours)

IR = EIA-364-21

DWV = EIA-364-20, Test Condition 1

IP67 Mated Connector

TEST STEP	GROUP A SCRES-G-XX.XX-D-C5E 6 Connectors	GROUP A1 SCRES-G-XX.XX-D-NP 6 Connectors
01	Dust Test	Water Test
02	Check for Dust	Check for Water

Dust/Water Testing = Per CEI/IEC 60529 Code IP67

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 11 at 65° C.
- 3) Test Time Condition A for 96 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 A, 96 Hours.
- 3) Method II, with the following test conditions: + 65° C, 90% to 98% Relative Humidity.
- 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 IN THE HOUSING):

- 1) Reference document: EIA-364-04, *Normal Force Test Procedure for Electrical Connectors*.
- 2) The contacts shall be tested in the connector housing.
- 3) If necessary, a "window" shall be made in the connector body to allow a probe to engage and deflect the contact at the same attitude and distance (plus 0.05 mm [0.002"]) as would occur in actual use.
- 4) The connector housing shall be placed in a holding fixture that does not interfere with or otherwise influence the contact force or deflection.
- 5) 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 5.0 µm (0.0002").
- 6) The nominal deflection rate shall be 5 mm (0.2")/minute.
- 7) Unless otherwise noted a minimum of five contacts shall be tested.
- 8) The force/deflection characteristic to load and unload each contact shall be repeated five times.
- 9) The system shall utilize the TC² software in order to acquire and record the test data.
- 10) The permanent set of each contact shall be measured within the TC² software.
- 11) 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 5000 megohms.

DIELECTRIC WITHSTANDING VOLTAGE (DWV):

To determine if the sockets can operate at its rated voltage and withstand momentary over potentials due to switching, surges, and other similar phenomenon. Separate samples are used to evaluate the effect of environmental stresses so not to influence the readings from arcing that occurs during the measurement process.

- 1) **PROCEDURE:**
 - a. Reference document: EIA-364-20, *Withstanding Voltage Test Procedure for Electrical Connectors*.
 - b. Test Conditions:
 - i. Between Adjacent Contacts or Signal-to-Ground
 - ii. Barometric Test Condition 1
 - iii. Rate of Application 500 V/Sec
 - iv. Test Voltage (VAC) until breakdown occurs
- 2) **MEASUREMENTS/CALCULATIONS**
 - a. The breakdown voltage shall be measured and recorded.
 - b. The dielectric withstanding voltage shall be recorded as 75% of the minimum breakdown voltage.
 - c. The working voltage shall be recorded as one-third (1/3) of the dielectric withstanding voltage (one-fourth of the breakdown voltage).

SUPPLEMENTAL TESTS**WATER TESTING:**

- 1) Reference document: CEI/IEC 60529 Code IP67
- 2) SCRES torque specification for SPN-17-01 is 12 IN-LB
- 3) SCPE torque specification for SCN-17-01 is 12 IN-LB

DUST TESTING:

- 1) Reference document: CEI/IEC 60529 Code IP67
- 2) SCRES torque specification for SPN-17-01 is 12 IN-LB
- 3) SCPE torque specification for SCN-17-01 is 12 IN-LB

RESULTS

Mating – Unmating Forces

- **Initial**
 - **Mating**
 - **Min**-----0.44 Lbs
 - **Max**-----1.52 Lbs
 - **Unmating**
 - **Min**-----0.23 Lbs
 - **Max**-----0.69 Lbs
- **After 25 Cycles**
 - **Mating**
 - **Min**-----0.48 Lbs
 - **Max**-----0.99 Lbs
 - **Unmating**
 - **Min**-----0.60 Lbs
 - **Max**-----1.17 Lbs
- **After 50 Cycles**
 - **Mating**
 - **Min**-----0.48 Lbs
 - **Max**-----0.90 Lbs
 - **Unmating**
 - **Min**-----0.74 Lbs
 - **Max**-----1.42 Lbs
- **After 75 Cycles**
 - **Mating**
 - **Min**-----0.48 Lbs
 - **Max**-----0.98 Lbs
 - **Unmating**
 - **Min**-----0.74 Lbs
 - **Max**-----1.41 Lbs
- **After 100 Cycles**
 - **Mating**
 - **Min**-----0.47 Lbs
 - **Max**-----1.00 Lbs
 - **Unmating**
 - **Min**-----0.71 Lbs
 - **Max**-----1.41 Lbs
- **Thermal**
 - **Mating**
 - **Min**-----0.94 Lbs
 - **Max**-----1.14 Lbs
 - **Unmating**
 - **Min**-----0.32 Lbs
 - **Max**-----0.84 Lbs
- **Humidity**
 - **Mating**
 - **Min**-----0.85 Lbs
 - **Max**-----1.23 Lbs
 - **Unmating**
 - **Min**-----0.19 Lbs
 - **Max**-----0.56 Lbs

Normal Force at 0.075" deflection

- **Initial**
 - **Min**-----82.80 g **Set** ---- 0.0000"
 - **Max** -----123.50 g **Set** ---- 0.0012"
- **Thermal**
 - **Min**-----77.80 g
 - **Max** -----105.60 g

Insulation Resistance minimums, IR

- **Initial**
 - **Mated**----->100,000 Meg Ω ----- Pass
 - **Unmated** ----->100,000 Meg Ω ----- Pass
- **Thermal**
 - **Mated**----->100,000 Meg Ω ----- Pass
 - **Unmated** ----- 50,000 Meg Ω ----- Pass

Dielectric Withstanding Voltage minimums, DWV

- **Minimums**
 - **Breakdown Voltage**-----860 VAC
 - **Test Voltage** -----645 VAC
 - **Working Voltage** -----215 VAC
- **Initial DWV** -----Passed
- **Thermal DWV** -----Passed

SUPPLEMENTAL TESTING**IP67 Testing (Water & Dust)**

	<u>Initial (Before Exposure)</u>	<u>After Exposure</u>
Water	No Water Present	No Water Present
Dust	No Dust Present	No Dust Present

DATA SUMMARIES

MATING/UNMATING:

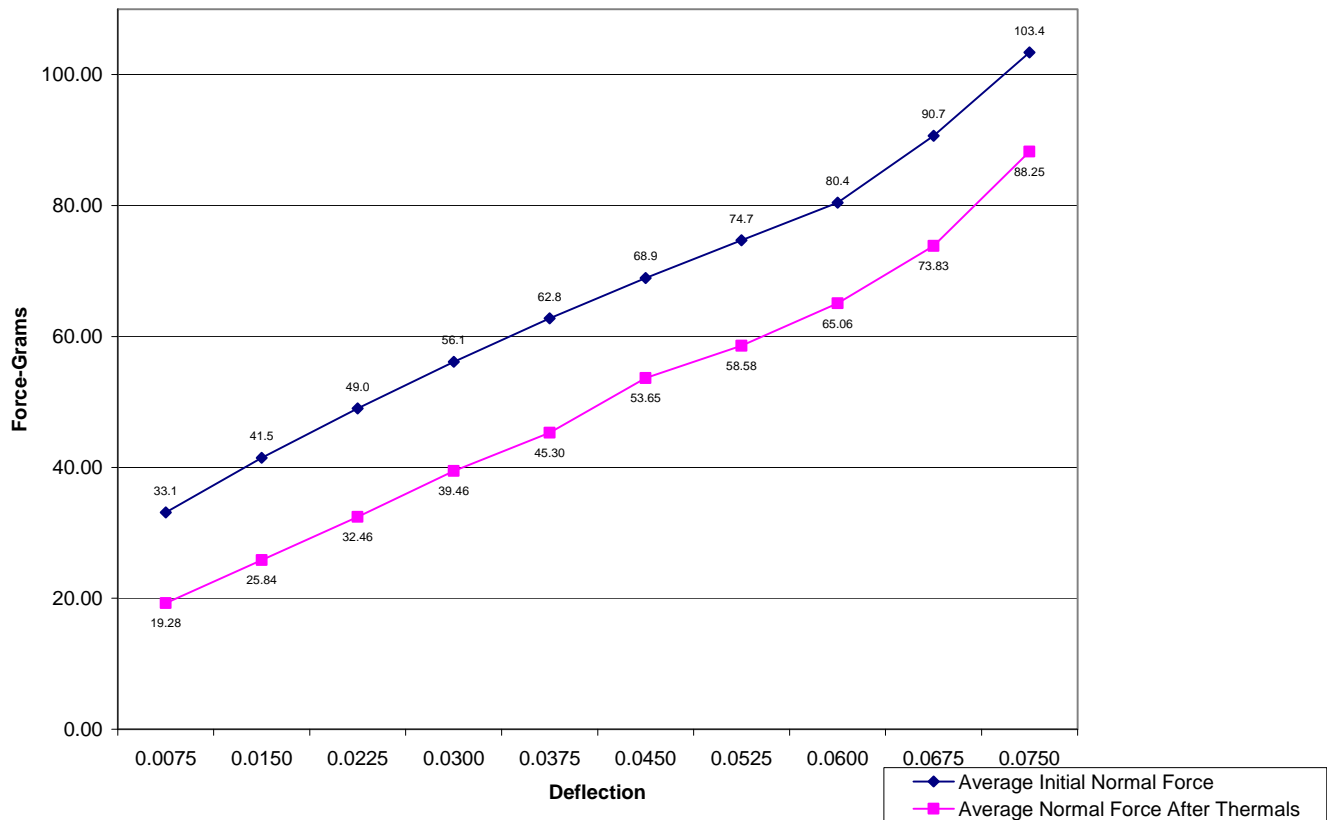
	Initial				After 25 Cycles			
	Mating		Unmating		Mating		Unmating	
	Force (Oz)	Force (Lbs)	Force (Oz)	Force (Lbs)	Force (Oz)	Force (Lbs)	Force (Oz)	Force (Lbs)
Minimum	7.04	0.44	3.68	0.23	7.68	0.48	9.60	0.60
Maximum	24.32	1.52	11.04	0.69	15.84	0.99	18.72	1.17
Average	12.29	0.77	8.96	0.56	11.01	0.69	12.56	0.79
	After 50 Cycles				After 75 Cycles			
	Mating		Unmating		Mating		Unmating	
	Force (Oz)	Force (Lbs)	Force (Oz)	Force (Lbs)	Force (Oz)	Force (Lbs)	Force (Oz)	Force (Lbs)
Minimum	7.68	0.48	11.84	0.74	7.68	0.48	11.84	0.74
Maximum	14.40	0.90	22.72	1.42	15.68	0.98	22.56	1.41
Average	11.01	0.69	14.61	0.91	11.34	0.71	15.62	0.98
	After 100 Cycles				After Thermals			
	Mating		Unmating		Mating		Unmating	
	Force (Oz)	Force (Lbs)	Force (Oz)	Force (Lbs)	Force (Oz)	Force (Lbs)	Force (Oz)	Force (Lbs)
Minimum	7.52	0.47	11.36	0.71	15.04	0.94	5.12	0.32
Maximum	16.00	1.00	22.56	1.41	18.24	1.14	13.44	0.84
Average	11.55	0.72	16.64	1.04	17.26	1.08	7.89	0.49
	After Humidity							
	Mating		Unmating					
	Force (Oz)	Force (Lbs)	Force (Oz)	Force (Lbs)				
Minimum	13.60	0.85	3.04	0.19				
Maximum	19.68	1.23	8.96	0.56				
Average	16.62	1.04	6.53	0.41				

NORMAL FORCE (FOR CONTACTS TESTED IN 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										
Averages Min Max St. Dev Count	<u>0.0075</u>	<u>0.0150</u>	<u>0.0225</u>	<u>0.0300</u>	<u>0.0375</u>	<u>0.0450</u>	<u>0.0525</u>	<u>0.0600</u>	<u>0.0675</u>	<u>0.0750</u>	<i>SET</i>
	33.11	41.46	49.01	56.14	62.78	68.93	74.71	80.44	90.65	103.39	0.0006
	24.30	32.10	39.60	46.80	53.10	59.10	65.10	69.60	78.10	82.80	0.0000
	43.80	52.70	60.30	67.20	74.20	81.60	87.60	94.30	107.80	123.50	0.0012
	7.676	8.038	8.130	8.112	8.485	9.139	9.525	10.051	12.191	15.470	0.0005
	8	8	8	8	8	8	8	8	8	8	8

After Thermals	Deflections in inches Forces in Grams										
	<u>0.0075</u>	<u>0.0150</u>	<u>0.0225</u>	<u>0.0300</u>	<u>0.0375</u>	<u>0.0450</u>	<u>0.0525</u>	<u>0.0600</u>	<u>0.0675</u>	<u>0.0750</u>	<i>SET</i>
Averages	19.28	25.84	32.46	39.46	45.30	53.65	58.58	65.06	73.83	88.25	0.0001
Min	7.60	14.60	21.50	28.20	34.70	41.60	47.60	53.50	62.00	77.80	0.0000
Max	31.40	40.10	48.70	56.30	63.90	75.20	78.60	85.80	93.00	105.60	0.0004
St. Dev	7.236	8.269	9.053	9.700	10.139	12.878	11.323	11.122	11.469	11.286	0.0001
Count	8	8	8	8	8	8	8	8	8	8	8

Normal Force - Average Initial vs Average Thermal

INSULATION RESISTANCE (IR):

	Pin to Pin		
	Mated	Unmated	Unmated
Minimum	SCRES/SCPE	SCRES	SCPE
Initial	100000	100000	100000
Thermal	100000	100000	50000

DIELECTRIC WITHSTANDING VOLTAGE (DWV):

Voltage Rating Summary	
Minimum	SCRES/SCPE
Break Down Voltage	860
Test Voltage	645
Working Voltage	215

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

SUPPLEMENTAL TESTS**IP67 Testing (Water & Dust)****IP67 Water Submersion Test**

Sample #	Visual Inspection
1	Passed (NO WATER INGRESS verified by black light)
2	Passed (NO WATER INGRESS verified by black light)
3	Passed (NO WATER INGRESS verified by black light)
4	Passed (NO WATER INGRESS verified by black light)
5	Passed (NO WATER INGRESS verified by black light)
6	Passed (NO WATER INGRESS verified by black light)

IP67 Dust Pressure Test

Sample #	Visual Inspection
1	No dust ingress through connector or into enclosure
2	No dust ingress through connector or into enclosure
3	No dust ingress through connector or into enclosure
4	No dust ingress through connector or into enclosure
5	No dust ingress through connector or into enclosure
6	No dust ingress through connector or into enclosure

DATA**MATING/UNMATING:**

Sample#	Initial		After 25 Cycles		After 50 Cycles		After 75 Cycles		After 100 Cycles		After Thermals		After Humidity	
	Mating	Unmating	Mating	Unmating	Mating	Unmating	Mating	Unmating	Mating	Unmating	Mating	Unmating	Mating	Unmating
1	0.67	0.23	0.71	0.61	0.74	0.74	0.79	0.74	0.81	0.71	0.94	0.32	1.21	0.55
2	0.74	0.60	0.67	0.67	0.73	0.81	0.76	0.87	0.80	0.90	1.01	0.49	1.09	0.56
3	0.94	0.56	0.87	0.81	0.82	0.81	0.82	1.02	0.84	1.18	1.12	0.84	1.10	0.53
4	1.52	0.68	0.99	1.17	0.90	1.42	0.98	1.41	1.00	1.40	1.13	0.54	1.07	0.51
5	0.71	0.50	0.69	0.78	0.71	0.96	0.72	0.98	0.72	1.03	1.11	0.60	1.10	0.40
6	0.63	0.67	0.66	0.85	0.73	1.08	0.72	1.19	0.68	1.41	1.14	0.47	1.23	0.42
7	0.44	0.69	0.48	0.90	0.48	0.85	0.48	0.96	0.47	0.99	1.09	0.42	0.87	0.26
8	0.87	0.55	0.79	0.70	0.77	0.83	0.78	0.88	0.79	0.95	1.11	0.41	0.85	0.19
9	0.63	0.65	0.53	0.76	0.52	0.87	0.53	0.88	0.54	0.91	1.02	0.42	0.92	0.35
10	0.53	0.47	0.49	0.60	0.48	0.76	0.51	0.83	0.57	0.92	1.12	0.42	0.95	0.31

NORMAL FORCE (FOR CONTACTS TESTED IN THE HOUSING):

Initial	Deflections in inches, Forces in Grams										
Sample #	0.0075	0.0150	0.0225	0.0300	0.0375	0.0450	0.0525	0.0600	0.0675	0.0750	SET
1	43.3	51.9	59.7	67.0	74.1	81.1	87.5	94.3	107.8	123.5	0.0002
2	34.8	44.1	53.0	61.0	68.6	75.6	82.1	88.1	99.9	106.6	0.0008
3	25.5	33.4	40.9	48.0	54.5	60.5	65.5	71.9	79.1	82.8	0.0005
4	24.3	32.1	39.6	46.8	53.1	59.1	65.1	69.6	78.1	87.7	0.0006
5	26.9	35.3	43.2	50.8	57.9	64.8	71.3	77.4	90.1	112.4	0.0000
6	43.8	52.7	60.3	67.2	74.2	81.6	87.6	93.7	105.4	122.0	0.0012
7	36.1	44.2	50.3	56.0	62.0	65.9	70.6	75.7	85.2	101.3	0.0012
8	30.2	38.0	45.1	52.3	57.8	62.8	68.0	72.8	79.6	90.8	0.0001

After Thermals	Deflections in inches, Forces in Grams										
Sample #	0.0075	0.0150	0.0225	0.0300	0.0375	0.0450	0.0525	0.0600	0.0675	0.0750	SET
1	31.4	40.1	48.7	56.3	63.9	71.6	78.6	85.8	93.0	105.6	0.0001
2	15.0	24.5	31.7	40.8	45.7	53.9	60.3	68.9	81.7	101.1	0.0000
3	15.9	18.7	24.3	30.1	34.7	41.6	47.6	54.5	62.0	77.8	0.0000
4	7.6	14.6	21.5	28.2	35.6	42.3	47.9	53.5	62.8	78.4	0.0004
5	21.2	28.3	31.9	39.0	44.2	50.6	57.0	65.2	73.4	87.0	0.0001
6	25.6	34.1	42.4	50.4	56.5	75.2	72.1	74.9	84.7	96.7	0.0001
7	16.6	21.2	27.7	33.6	40.0	45.9	51.8	57.9	65.1	79.8	0.0001
8	20.9	25.2	31.5	37.3	41.8	48.1	53.3	59.8	67.9	79.6	0.0001

INSULATION RESISTANCE (IR):

Initial Insulation Resistance			
Measured In Meg Ohms			
Pin to Pin			
Mated		Unmated	
X		X	X
Sample#	SCRES/SCPE	SCRES	SCPE
1	100,000	100,000	100,000
2	100,000	100,000	100,000

Thermal Insulation Resistance			
Measured In Meg Ohms			
Pin to Pin			
Mated		Unmated	
X		X	X
Sample#	SCRES/SCPE	SCRES	SCPE
1	100,000	100,000	50,000
2	100,000	100,000	50,000

DIELECTRIC WITHSTANDING VOLTAGE (DWV):

Initial DWV			
Test Voltage= 645			
Pin to Pin			
Mated		Unmated	
X		X	X
Sample#	SCRES/SCPE	SCRES	SCPE
1	645	645	645
2	645	645	645

Thermal Test Voltage			
Test Voltage= 645			
Pin to Pin			
Mated		Unmated	
X		X	X
Sample#	SCRES/SCPE	SCRES	SCPE
1	645	645	645
2	645	645	645

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: 5/12/2009, Next Cal: 5/12/2010

Equipment #: THC-02

Description: Temperature/Humidity Chamber

Manufacturer: Thermotron

Model: SE-1000-6-6

Serial #: 31808

Accuracy: See Manual (SJR Unit #1)

... Last Cal: 9/21/2009, Next Cal: 9/21/2010

Equipment #: THC-03

Description: Temperature/Humidity Chamber (SJR Room - Unit #2)

Manufacturer: Thermotron

Model: SE-1000-10-10

Serial #: 37551

Accuracy: See Manual (For SJR Testing) See Manual (For SJR Testing)

... Last Cal: 08/19/2008, Next Cal: 08/19/2009

Equipment #: THC-04

Description: Temperature/Humidity Chamber

Manufacturer: Thermotron

Model: SM-8-3800

Serial #: 37782

Accuracy: See Manual

... Last Cal: 04/07/2009, Next Cal: 04/07/2010

Equipment #: HPM-01

Description: Hipot Megommeter

Manufacturer: Hipotronics

Model: H306B-A

Serial #: M9905004

Accuracy: 2 % Full Scale Accuracy

... Last Cal: 11/24/08, Next Cal: 11/24/09