

Project Number: Design Qualification Test Report	Tracking Code: 794601_Report_Rev_2
Requested by: Chad Humphres	Date: 9/18/2020
Part #: EPTS-2-P-D-VT-01/EBTM-4-10-2.0-S-VT-1/EPTT-2-P-11.5-D-RA/EBTF-4-10-2.0-S-RA-1	
Part description: EBTS/EPTM/EBTT/EBTF	Tech: Tony Wagoner
Test Start: 3/9/2016	Test Completed: 5/5/2016



(Actual part not depicted)

DESIGN QUALIFICATION TEST REPORT

EPTS/EPTM/EBTT/EBTF

EPTS-2-P-D-VT-01/EBTM-4-10-2.0-S-VT-1/EPTT-2-P-11.5-D-RA/EBTF-4-10-2.0-S-RA-1

Tracking Code: 794601_Report_Rev_2	Part #: EPTS-2-P-D-VT-01/EBTM-4-10-2.0-S-VT-1 EPTT-2-P-11.5-D-RA/EBTF-4-10-2.0-S-RA-1
Part description: EPTS/EPTM/EBTT/EBTF	

REVISION HISTORY

DATE	REV.NUM.	DESCRIPTION	ENG
11/7/2016	1	Initial Issue	KH
4/9/2020	1	Updated the CCC charts	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

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) Samtec Test PCBs used: PCB-107379-TST/PCB-107380-TST/PCB-107381-TST.

FLOWCHARTS**Gas Tight**Group 1

EPTS-2-P-D-VT-01/EBTM-4-10-2.0-S-VT-1

EPTT-2-P-11.5-D-RA/EBTF-4-10-2.0-S-RA-

1

8 Assemblies

Tin (Immersion) .0315" PTH

Step Description

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

Compliant Pin ONLYGroup 2

EPTS-2-P-D-VT-01

EPTT-2-P-11.5-D-RA

30 Contacts Minimum

EPTS TERMINAL Tin (Immersion) .0315"
PTH**Step Description**

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

Group 3

EPTS-2-P-D-VT-01

EPTT-2-P-11.5-D-RA

30 Contacts Minimum

EPTT CONTACT Tin (Immersion) .0315"
PTH**Step Description**

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

(1) Gas Tight = EIA-364-36

(2) LLCR = EIA-364-23

Open Circuit Voltage = 20 mV Max

Test Current = 100 mA Max

FLOWCHARTS Continued**Normal Force**

<u>Group 1</u>		<u>Group 2</u>		<u>Group 3</u>		<u>Group 4</u>	
EPTS-2-P-D-VT-01 EPTT-2-P-11.5-D-RA 8 Contacts Minimum 8 Power Beams (Wide) W/o Thermals-Tin (Immersion) .0315" PTH <i>Note: Test 8 Power Beams-Wide minimum</i>		EPTS-2-P-D-VT-01 EPTT-2-P-11.5-D-RA 8 Contacts Minimum 8 Power Beams (Narrow) W/o Thermals-Tin (Immersion) .0315" PTH <i>Note: Test 8 Power Beams-Narrow minimum</i>		EPTS-2-P-D-VT-01 EPTT-2-P-11.5-D-RA 8 Contacts Minimum 8 Power Beams (Wide) With Thermals-Tin (Immersion) .0315" PTH <i>Note: Test 8 Power Beams-Wide minimum</i>		EPTS-2-P-D-VT-01 EPTT-2-P-11.5-D-RA 8 Contacts Minimum 8 Power Beams (Narrow) With Thermals-Tin (Immersion) .0315" PTH <i>Note: Test 8 Power Beams-Narrow minimum</i>	
Step	Description	Step	Description	Step	Description	Step	Description
1.	Contact Gaps	1.	Contact Gaps	1.	Contact Gaps	1.	Contact Gaps
2.	Normal Force ⁽¹⁾ Deflection = 0.0081 " Expected Force at Max Deflection = 0 g <i>Note: Deflection number given (.0081) is Nominal Deflection</i>	2.	Normal Force ⁽¹⁾ Deflection = 0.0081 " Expected Force at Max Deflection = 0 g <i>Note: Deflection number given (.0081) is Nominal Deflection</i>	2.	Thermal Age ⁽²⁾	2.	Thermal Age ⁽²⁾
				3.	Contact Gaps	3.	Contact Gaps
				4.	Normal Force ⁽¹⁾ Expected Force at Max Deflection = 0 g Deflection = 0.0081 " <i>Note: Deflection number given (.0081) is Nominal Deflection</i>	4.	Normal Force ⁽¹⁾ Expected Force at Max Deflection = 0 g Deflection = 0.0081 " <i>Note: Deflection number given (.0081) is Nominal Deflection</i>

(1) Normal Force = EIA-364-04

(2) Thermal Age = EIA-364-17

Test Condition = 4 (105°C)

Time Condition = B (250 Hours)

FLOWCHARTS Continued

Thermal Aging

Group 1

EPTS-2-P-D-VT-01/EBTM-4-10-2.0-S-VT-1

EPTT-2-P-11.5-D-RA/EBTF-4-10-2.0-S-RA-

1

8 Assemblies

Tin (Immersion) .0315" PTH

Step	Description
1.	Contact Gaps
2.	Mating/Unmating Force ⁽²⁾
3.	LLCR ⁽¹⁾
4.	Thermal Age ⁽³⁾
5.	LLCR ⁽¹⁾ Max Delta = 15 mOhm
6.	Mating/Unmating Force ⁽²⁾
7.	Contact Gaps

Compliant Pin ONLY

Group 2

EPTS-2-P-D-VT-01

EPTT-2-P-11.5-D-RA

30 Contacts Minimum

EPTS TERMINAL Tin (Immersion) .0315"
PTH

Step	Description
1.	LLCR ⁽¹⁾
2.	Thermal Age ⁽³⁾
3.	LLCR ⁽¹⁾ Max Delta = 1 mOhm

Group 3

EPTS-2-P-D-VT-01

EPTT-2-P-11.5-D-RA

30 Contacts Minimum

EPTT CONTACT Tin (Immersion) .0315"
PTH

Step	Description
1.	LLCR ⁽¹⁾
2.	Thermal Age ⁽³⁾
3.	LLCR ⁽¹⁾ Max Delta = 1 mOhm

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

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

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

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

EPTS-2-P-D-VT-01/EBTM-4-10-2.0-S-VT-1

EPTT-2-P-11.5-D-RA/EBTF-4-10-2.0-S-RA-

1

8 Assemblies

Tin (Immersion) .0315" PTH

Step	Description
1.	Contact Gaps
2.	LLCR (2)
3.	Mating/Unmating Force (3)
4.	Cycles Quantity = 25 Cycles
5.	Mating/Unmating Force (3)
6.	Cycles Quantity = 25 Cycles
7.	Mating/Unmating Force (3)
8.	Cycles Quantity = 25 Cycles
9.	Mating/Unmating Force (3)
10.	Cycles Quantity = 25 Cycles
11.	Mating/Unmating Force (3)
12.	Contact Gaps
13.	LLCR (2) Max Delta = 15 mOhm
14.	Thermal Shock (4)
15.	LLCR (2) Max Delta = 15 mOhm
16.	Humidity (1)
17.	LLCR (2) Max Delta = 15 mOhm
18.	Mating/Unmating Force (3)

Compliant Pin ONLY

<u>Group 2</u>	<u>Group 3</u>																								
EPTS-2-P-D-VT-01 EPTT-2-P-11.5-D-RA 30 Contacts Minimum EPTS TERMINAL Tin (Immersion) .0315" PTH	EPTS-2-P-D-VT-01 EPTT-2-P-11.5-D-RA 30 Contacts Minimum EPTT CONTACT Tin (Immersion) .0315" PTH																								
<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 10%; text-align: left;">Step</th> <th style="text-align: left;">Description</th> </tr> </thead> <tbody> <tr><td>1.</td><td>LLCR (2)</td></tr> <tr><td>2.</td><td>Thermal Shock (4)</td></tr> <tr><td>3.</td><td>LLCR (2) Max Delta = 1 mOhm</td></tr> <tr><td>4.</td><td>Humidity (1)</td></tr> <tr><td>5.</td><td>LLCR (2) Max Delta = 1 mOhm</td></tr> </tbody> </table>	Step	Description	1.	LLCR (2)	2.	Thermal Shock (4)	3.	LLCR (2) Max Delta = 1 mOhm	4.	Humidity (1)	5.	LLCR (2) Max Delta = 1 mOhm	<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 10%; text-align: left;">Step</th> <th style="text-align: left;">Description</th> </tr> </thead> <tbody> <tr><td>1.</td><td>LLCR (2)</td></tr> <tr><td>2.</td><td>Thermal Shock (4)</td></tr> <tr><td>3.</td><td>LLCR (2) Max Delta = 1 mOhm</td></tr> <tr><td>4.</td><td>Humidity (1)</td></tr> <tr><td>5.</td><td>LLCR (2) Max Delta = 1 mOhm</td></tr> </tbody> </table>	Step	Description	1.	LLCR (2)	2.	Thermal Shock (4)	3.	LLCR (2) Max Delta = 1 mOhm	4.	Humidity (1)	5.	LLCR (2) Max Delta = 1 mOhm
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5.	LLCR (2) Max Delta = 1 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) Mating/Unmating Force = EIA-364-13
 - (4) 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)

Tracking Code: 794601_Report_Rev_2	Part #: EPTS-2-P-D-VT-01/EBTM-4-10-2.0-S-VT-1 EPTT-2-P-11.5-D-RA/EBTF-4-10-2.0-S-RA-1
Part description: EPTS/EPTM/EBTT/EBTF	

FLOWCHARTS Continued

IR/DWV

Pin-to-Pin

<u>Group 1</u>		<u>Group 2</u>		<u>Group 3</u>		<u>Group 4</u>	
EPTS-2-P-D-VT-01 EPTT-2-P-11.5-D-RA 2 Assemblies		EPTS-2-P-D-VT-01 2 Assemblies		EPTT-2-P-11.5-D-RA 2 Assemblies		EPTS-2-P-D-VT-01 EPTT-2-P-11.5-D-RA 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)

Row-to-Row

<u>Group 5</u>		<u>Group 6</u>		<u>Group 7</u>		<u>Group 8</u>	
EPTS-2-P-D-VT-01 EPTT-2-P-11.5-D-RA 2 Assemblies		EPTS-2-P-D-VT-01 2 Assemblies		EPTT-2-P-11.5-D-RA 2 Assemblies		EPTS-2-P-D-VT-01 EPTT-2-P-11.5-D-RA 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)

Tracking Code: 794601_Report_Rev_2	Part #: EPTS-2-P-D-VT-01/EBTM-4-10-2.0-S-VT-1 EPTT-2-P-11.5-D-RA/EBTF-4-10-2.0-S-RA-1
Part description: EPTS/EPTM/EBTT/EBTF	

FLOWCHARTS Continued

Current Carrying Capacity

<u>Group 1</u>		<u>Group 2</u>		<u>Group 3</u>	
EPTS-2-P-D-VT-01		EPTS-2-P-D-VT-01		EPTS-2-P-D-VT-01	
EPTT-2-P-11.5-D-RA		EPTT-2-P-11.5-D-RA		EPTT-2-P-11.5-D-RA	
4 Pins Powered		2 Pins Powered		2 Pins Powered	
Power Pins Tin (Immersion) .0315" PTH		Power Pins Tin (Immersion) .0315" PTH Side-Side		Power Pins Tin (Immersion) .0315" PTH Top-Bottom	
Step	Description	Step	Description	Step	Description
1.	CCC ⁽¹⁾ Rows=2 Number of Positions=2	1.	CCC ⁽¹⁾ Rows=1 Number of Positions=2	1.	CCC ⁽¹⁾ Rows=2 Number of Positions=1

(1) CCC = EIA-364-70

Method 2, Temperature Rise Versus Current Curve

(TIN PLATING) - Tabulate calculated current at RT, 65°C, 75°C and 95°C after derating 20% and based on 105°C

(GOLD PLATING) - Tabulate calculated current at RT, 85°C, 95°C and 115°C after derating 20% and based on 125°C

FLOWCHARTS Continued

Mechanical Shock/Random Vibration/LLCR

Group 1

EPTS-2-P-D-VT-01/EBTM-4-10-2.0-S-VT-1
 EPTT-2-P-11.5-D-RA/EBTF-4-10-2.0-S-RA-1
 1
 8 Assemblies
 Tin (Immersion) .0315" PTH

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

Compliant Pin ONLY

Group 2

EPTS-2-P-D-VT-01
 EPTT-2-P-11.5-D-RA
 30 Contacts Minimum
 EPTS TERMINAL Tin (Immersion) .0315"
 PTH

Step	Description
1.	LLCR (1)
2.	Random Vibration (3)
3.	LLCR (1) Max Delta = 1 mOhm

Group 3

EPTS-2-P-D-VT-01
 EPTT-2-P-11.5-D-RA
 30 Contacts Minimum
 EPTT CONTACT Tin (Immersion) .0315"
 PTH

Step	Description
1.	LLCR (1)
2.	Random Vibration (3)
3.	LLCR (1) Max Delta = 1 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

EPTS-2-P-D-VT-01/EBTM-4-10-2.0-S-VT-1

EPTT-2-P-11.5-D-RA/EBTF-4-10-2.0-S-RA-

1

8 Assemblies

Tin (Immersion) .0315" PTH

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)

FLOWCHARTS Continued**Pressfit Hole Evaluation**

Group 1 EPTS-2-P-D-VT-01		Group 2 EPTT-2-P-11.5-D-RA		Group 3 EPTS-2-P-D-VT-01		Group 4 EPTT-2-P-11.5-D-RA	
30 Contacts Minimum EPTS TERMINAL Tin (Immersion) .0275" PTH		30 Contacts Minimum EPTT CONTACT Tin (Immersion) .0275" PTH		30 Contacts Minimum EPTS TERMINAL Tin (Immersion) .0315" PTH		30 Contacts Minimum EPTT CONTACT Tin (Immersion) .0315" PTH	
Step	Description	Step	Description	Step	Description	Step	Description
1.	Insertion Force Rate=2.54 mm/min <i>Note: Pin 1</i>	1.	Insertion Force Rate=2.54 mm/min <i>Note: Pin 1</i>	1.	Insertion Force Rate=2.54 mm/min <i>Note: Pin 1</i>	1.	Insertion Force Rate=2.54 mm/min <i>Note: Pin 1</i>
2.	Retention Force Rate=2.54 mm/min <i>Note: Pin 1</i>	2.	Retention Force Rate=2.54 mm/min <i>Note: Pin 1</i>	2.	Retention Force Rate=2.54 mm/min <i>Note: Pin 1</i>	2.	Retention Force Rate=2.54 mm/min <i>Note: Pin 1</i>
3.	Cycles Quantity = 1 <i>Note: Pin 2</i>	3.	Cycles Quantity = 1 <i>Note: Pin 2</i>	3.	Cycles Quantity = 1 <i>Note: Pin 2</i>	3.	Cycles Quantity = 1 <i>Note: Pin 2</i>
4.	Insertion Force Rate=2.54 mm/min <i>Note: Pin 3</i>	4.	Insertion Force Rate=2.54 mm/min <i>Note: Pin 3</i>	4.	Insertion Force Rate=2.54 mm/min <i>Note: Pin 3</i>	4.	Insertion Force Rate=2.54 mm/min <i>Note: Pin 3</i>
5.	Retention Force Rate=2.54 mm/min <i>Note: Pin 3</i>	5.	Retention Force Rate=2.54 mm/min <i>Note: Pin 3</i>	5.	Retention Force Rate=2.54 mm/min <i>Note: Pin 3</i>	5.	Retention Force Rate=2.54 mm/min <i>Note: Pin 3</i>
6.	Hole Integrity <i>Note: Check for Distortion of the PTH according to EIA-364-96</i>	6.	Hole Integrity <i>Note: Check for Distortion of the PTH according to EIA-364-96</i>	6.	Hole Integrity <i>Note: Check for Distortion of the PTH according to EIA-364-96</i>	6.	Hole Integrity <i>Note: Check for Distortion of the PTH according to EIA-364-96</i>
Group 5 EPTS-2-P-D-VT-01		Group 6 EPTT-2-P-11.5-D-RA		Group 7 EPTS-2-P-D-VT-01		Group 8 EPTT-2-P-11.5-D-RA	
30 Contacts Minimum EPTS TERMINAL Tin (Immersion) .0275" PTH		30 Contacts Minimum EPTT CONTACT Tin (Immersion) .0275" PTH		30 Contacts Minimum EPTS TERMINAL Tin (Immersion) .0315" PTH		30 Contacts Minimum EPTT CONTACT Tin (Immersion) .0315" PTH	
Step	Description	Step	Description	Step	Description	Step	Description
1.	LLCR (1) <i>Note: Part 1</i>	1.	LLCR (1) <i>Note: Part 1</i>	1.	LLCR (1) <i>Note: Part 1</i>	1.	LLCR (1) <i>Note: Part 1</i>
2.	Cycles Quantity = 1 <i>Note: Part 2</i>	2.	Cycles Quantity = 1 <i>Note: Part 2</i>	2.	Cycles Quantity = 1 <i>Note: Part 2</i>	2.	Cycles Quantity = 1 <i>Note: Part 2</i>
3.	LLCR (1) Max Delta = 1 mOhm <i>Note: Part 3</i>	3.	LLCR (1) Max Delta = 1 mOhm <i>Note: Part 3</i>	3.	LLCR (1) Max Delta = 1 mOhm <i>Note: Part 3</i>	3.	LLCR (1) Max Delta = 1 mOhm <i>Note: Part 3</i>
4.	Hole Integrity <i>Note: Check for Distortion of the PTH according to EIA-364-96</i>	4.	Hole Integrity <i>Note: Check for Distortion of the PTH according to EIA-364-96</i>	4.	Hole Integrity <i>Note: Check for Distortion of the PTH according to EIA-364-96</i>	4.	Hole Integrity <i>Note: Check for Distortion of the PTH according to EIA-364-96</i>

(1) LLCR = EIA-364-23

Open Circuit Voltage = 20 mV Max

Test Current = 100 mA Max

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 1: -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 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.

MECHANICAL SHOCK (Specified Pulse):

- 1) Reference document: EIA-364-27, *Mechanical Shock Test Procedure for Electrical Connectors*
- 2) Test Condition C
- 3) Peak Value: 100 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 G² / 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

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.

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 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

TEMPERATURE RISE (Current Carrying Capacity, CCC):

- 1) EIA-364-70, *Temperature Rise versus Current Test Procedure for Electrical Connectors and Sockets*.
- 2) When current passes through a contact, the temperature of the contact increases as a result of I^2R (resistive) heating.
- 3) The number of contacts being investigated plays a significant part in power dissipation and therefore temperature rise.
- 4) The size of the temperature probe can affect the measured temperature.
- 5) Copper traces on PC boards will contribute to temperature rise:
 - a. Self heating (resistive)
 - b. Reduction in heat sink capacity affecting the heated contacts
- 6) A de-rating curve, usually 20%, is calculated.
- 7) Calculated de-rated currents at four temperature points are reported:
 - a. Ambient
 - b. 65° C
 - c. 75° C
 - d. 95° C
- 8) Typically, neighboring contacts (in close proximity to maximize heat build up) are energized.
- 9) The thermocouple (or temperature measuring probe) will be positioned at a location to sense the maximum temperature in the vicinity of the heat generation area.
- 10) A computer program, *TR 803.exe*, ensures accurate stability for data acquisition.
- 11) Hook-up wire cross section is larger than the cross section of any connector leads/PC board traces, jumpers, etc.
- 12) Hook-up wire length is longer than the minimum specified in the referencing standard.

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
- 4) The following guidelines are used to categorize the changes in LLCR for compliant pin only
 - a. $\leq +0.33$ mOhms:----- Stable
 - b. $> +0.33$ to $+0.66$ mOhms:----- Minor
 - c. $+0.67$ to $+1$ mOhms:----- Acceptable
 - d. $>+1$ mOhms:----- Unstable

ATTRIBUTE DEFINITIONS Continued

The following is a brief, simplified description of attributes

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
 - 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:
 - 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.
- 5) The following guidelines are used to categorize the changes in LLCR for compliant pin only
 - a. $\leq +0.33$ mOhms:----- Stable
 - b. $> +0.33$ to $+0.66$ mOhms:----- Minor
 - c. $+0.67$ to $+1$ mOhms:----- Acceptable
 - d. $>+1$ mOhms:----- Unstable

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: 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).

RESULTS

Temperature Rise, CCC at a 20% de-rating

- CCC for a 30°C Temperature Rise-----14.1 A per contact with 2 contacts (1 Row/2 Pins, Side to Side) powered
- CCC for a 30°C Temperature Rise-----14.8 A per contact with 2 contacts (2 Rows/1 Pin, Top to Bottom) powered
- CCC for a 30°C Temperature Rise-----14.0 A per contact with 4 contacts (2 Rows/2 Positions) powered

Mating/Unmating Forces:

Thermal Aging Group

- **Initial**
 - **Mating**
 - **Min**----- 11.81 Lbs
 - **Max** ----- 13.29 Lbs
 - **Unmating**
 - **Min**-----8.17 Lbs
 - **Max** -----9.36 Lbs
- **After Thermal**
 - **Mating**
 - **Min**-----7.22 Lbs
 - **Max** -----8.43 Lbs
 - **Unmating**
 - **Min**-----5.28 Lbs
 - **Max** -----6.25 Lbs

RESULTS Continued

Mating/Unmating Durability Group

- **Initial**
 - **Mating**
 - **Min**----- 11.26 Lbs
 - **Max**----- 14.82 Lbs
 - **Unmating**
 - **Min**-----8.33 Lbs
 - **Max**-----9.47 Lbs
- **After 25 Cycles**
 - **Mating**
 - **Min**----- 11.67 Lbs
 - **Max**----- 15.11 Lbs
 - **Unmating**
 - **Min**-----9.20 Lbs
 - **Max**----- 10.48 Lbs
- **After 50 Cycles**
 - **Mating**
 - **Min**----- 11.88 Lbs
 - **Max**----- 15.46 Lbs
 - **Unmating**
 - **Min**-----9.68 Lbs
 - **Max**----- 11.21 Lbs
- **After 75 Cycles**
 - **Mating**
 - **Min**----- 11.98 Lbs
 - **Max**----- 15.94 Lbs
 - **Unmating**
 - **Min**-----9.82 Lbs
 - **Max**----- 11.69 Lbs
- **After 100 Cycles**
 - **Mating**
 - **Min**----- 12.34 Lbs
 - **Max**----- 16.44 Lbs
 - **Unmating**
 - **Min**----- 10.27 Lbs
 - **Max**----- 12.27 Lbs
- **After Humidity**
 - **Mating**
 - **Min**-----8.24 Lbs
 - **Max**----- 10.59 Lbs
 - **Unmating**
 - **Min**-----6.07 Lbs
 - **Max**-----8.06 Lbs

RESULTS Continued

Normal Force at 0.0157 inch deflection

EBTT-2-P-11.5-D-RA (Wide)

- **Initial**
 - Min -----739.10 gf Set -----0.0002 in
 - Max -----773.30 gf Set -----0.0007 in
- **After Thermal**
 - Min -----674.00 gf Set -----0.0022 in
 - Max -----755.90 gf Set -----0.0032 in

EBTT-2-P-11.5-D-RA (Narrow)

- **Initial**
 - Min -----717.00 gf Set -----0.0002 in
 - Max -----797.20 gf Set -----0.0007 in
- **After Thermal**
 - Min -----495.00 gf Set -----0.0020 in
 - Max -----737.50 gf Set -----0.0059 in

Insulation Resistance minimums, IR

Pin to Pin

- **Initial**
 - Mated ----- 45000 Meg Ω -----Passed
- **Thermal**
 - Mated ----- 45000 Meg Ω -----Passed
- **Humidity**
 - Mated ----- 45000 Meg Ω -----Passed

Row to Row

- **Initial**
 - Mated ----- 45000 Meg Ω -----Passed
- **Thermal**
 - Mated ----- 45000 Meg Ω -----Passed
- **Humidity**
 - Mated ----- 45000 Meg Ω -----Passed

Dielectric Withstanding Voltage minimums, DWV

- **Minimums**
 - Breakdown Voltage -----2396 VAC
 - Test Voltage -----1795 VAC
 - Working Voltage ----- 595 VAC

Pin to Pin

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

Row to Row

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

RESULTS Continued**LLCR Gas Tight (64 LLCR test points)**

- **Initial** ----- 0.59 mOhms Max
- **Gas-Tight**
 - **<= +5.0 mOhms** ----- **64 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 Compliant pin (32 LLCR test points)**EPTS-2-P-DV-T-01 TERMINAL Tin (immersion) 0.0315" PTH**

- **Initial** ----- 0.04 mOhms Max
- **Gas-Tight**
 - **<= +0.33 mOhms** ----- **32 Points**----- **Stable**
 - **+0.34 to +0.66 mOhms** ----- **0 Points**----- **Minor**
 - **+0.67 to +1 mOhms** ----- **0 Points**----- **Acceptable**
 - **>+1 mOhms** ----- **0 Points**----- **Unstable**

EPTT-2-P-11.5-D-RA CONTACT Tin (immersion) 0.0315" PTH

- **Initial** ----- 0.02 mOhms Max
- **Gas-Tight**
 - **<= +0.33 mOhms** ----- **32 Points**----- **Stable**
 - **+0.34 to +0.66 mOhms** ----- **0 Points**----- **Minor**
 - **+0.67 to +1 mOhms** ----- **0 Points**----- **Acceptable**
 - **>+1 mOhms** ----- **0 Points**----- **Unstable**

RESULTS Continued

LLCR Thermal Aging (64 LLCR test points)

- **Initial** ----- 0.54 mOhms Max
- **Thermal Aging**
 - <= +5.0 mOhms ----- 64 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 Thermal Aging Compliant pin (32 LLCR test points)

EPTS-2-P-DV-T-01 TERMINAL Tin (immersion) 0.0315” PTH

- **Initial** ----- 0.07 mOhms Max
- **Thermal Aging**
 - <= +0.33 mOhms ----- 32 Points-----Stable
 - +0.34 to +0.66 mOhms ----- 0 Points-----Minor
 - +0.67 to +1 mOhms ----- 0 Points-----Acceptable
 - >+1 mOhms ----- 0 Points-----Unstable

EPTT-2-P-11.5-D-RA CONTACT Tin (immersion) 0.0315” PTH

- **Initial** ----- 0.05 mOhms Max
- **Thermal Aging**
 - <= +0.33 mOhms ----- 32 Points-----Stable
 - +0.34 to +0.66 mOhms ----- 0 Points-----Minor
 - +0.67 to +1 mOhms ----- 0 Points-----Acceptable
 - >+1 mOhms ----- 0 Points-----Unstable

RESULTS Continued**LLCR Durability (64 LLCR test points)**

- **Initial** ----- 0.59 mOhms Max
- **Durability, 100 Cycles**
 - **<= +5.0 mOhms** ----- 64 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
- **Thermal**
 - **<= +5.0 mOhms** ----- 64 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
- **Humidity**
 - **<= +5.0 mOhms** ----- 64 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 Durability Compliant pin (32 LLCR test points)****EPTS-2-P-DV-T-01 TERMINAL Tin (immersion) 0.0315" PTH**

- **Initial** ----- 0.06 mOhms Max
- **100 cycles**
 - **<= +0.33 mOhms** ----- 32 Points ----- Stable
 - **+0.34 to +0.66 mOhms** ----- 0 Points ----- Minor
 - **+0.67 to +1 mOhms** ----- 0 Points ----- Acceptable
 - **>+1 mOhms** ----- 0 Points ----- Unstable
- **Thermal**
 - **<= +0.33 mOhms** ----- 32 Points ----- Stable
 - **+0.34 to +0.66 mOhms** ----- 0 Points ----- Minor
 - **+0.67 to +1 mOhms** ----- 0 Points ----- Acceptable
 - **>+1 mOhms** ----- 0 Points ----- Unstable
- **Humidity**
 - **<= +0.33 mOhms** ----- 31 Points ----- Stable
 - **+0.34 to +0.66 mOhms** ----- 1 Points ----- Minor
 - **+0.67 to +1 mOhms** ----- 0 Points ----- Acceptable
 - **>+1 mOhms** ----- 0 Points ----- Unstable

EPTT-2-P-11.5-D-RA CONTACT Tin (immersion) 0.0315" PTH

- **Initial** ----- 0.04 mOhms Max
- **100 cycles**
 - **<= +0.33 mOhms** ----- 32 Points ----- Stable
 - **+0.34 to +0.66 mOhms** ----- 0 Points ----- Minor
 - **+0.67 to +1 mOhms** ----- 0 Points ----- Acceptable
 - **>+1 mOhms** ----- 0 Points ----- Unstable
- **Thermal**
 - **<= +0.33 mOhms** ----- 32 Points ----- Stable
 - **+0.34 to +0.66 mOhms** ----- 0 Points ----- Minor
 - **+0.67 to +1 mOhms** ----- 0 Points ----- Acceptable
 - **>+1 mOhms** ----- 0 Points ----- Unstable
- **Humidity**
 - **<= +0.33 mOhms** ----- 32 Points ----- Stable
 - **+0.34 to +0.66 mOhms** ----- 0 Points ----- Minor
 - **+0.67 to +1 mOhms** ----- 0 Points ----- Acceptable
 - **>+1 mOhms** ----- 0 Points ----- Unstable

RESULTS Continued

LLCR Shock & Vibration (64 LLCR test points)

- **Initial** ----- 0.55 mOhms Max
- **Shock &Vibration**
 - **<= +5.0 mOhms** ----- 64 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

Mechanical Shock & Random Vibration:

- **Shock**
 - **No Damage**----- Pass
 - **50 Nanoseconds**----- Pass
- **Vibration**
 - **No Damage**----- Pass
 - **50 Nanoseconds**----- Pass

LLCR Shock & Vibration Compliant pin (32 LLCR test points)

EPTS-2-P-DV-T-01 TERMINAL Tin (immersion) 0.0315” PTH

- **Initial** ----- 0.06 mOhms Max
- **Shock &Vibration**
 - **<= +0.33 mOhms** ----- 32 Points-----Stable
 - **+0.34 to +0.66 mOhms** ----- 0 Points-----Minor
 - **+0.67 to +1 mOhms**----- 0 Points-----Acceptable
 - **>+1 mOhms**----- 0 Points-----Unstable

EPTT-2-P-11.5-D-RA CONTACT Tin (immersion) 0.0315” PTH

- **Initial** ----- 0.03 mOhms Max
- **Shock &Vibration**
 - **<= +0.33 mOhms** ----- 32 Points-----Stable
 - **+0.34 to +0.66 mOhms** ----- 0 Points-----Minor
 - **+0.67 to +1 mOhms**----- 0 Points-----Acceptable
 - **>+1 mOhms**----- 0 Points-----Unstable

RESULTS Continued**Pressfit Hole Evaluation: Insertion/Withdrawal force****EPTS-2-P-DV-T-01 TERMINAL Tin (immersion) 0.0275" PTH**

- **Initial**
 - **Mating**
 - **Min**-----4.34 Lbs
 - **Max** -----6.05 Lbs
 - **Unmating**
 - **Min**-----3.71 Lbs
 - **Max** -----5.89 Lbs
- **After 3 Cycles**
 - **Mating**
 - **Min**-----4.13 Lbs
 - **Max** -----7.09 Lbs
 - **Unmating**
 - **Min**-----4.10 Lbs
 - **Max** -----6.74 Lbs

EPTT-2-P-11.5-D-RA CONTACT Tin (immersion) 0.0275" PTH

- **Initial**
 - **Mating**
 - **Min**-----4.87 Lbs
 - **Max** -----8.28 Lbs
 - **Unmating**
 - **Min**-----3.06 Lbs
 - **Max** -----6.42 Lbs
- **After 3 Cycles**
 - **Mating**
 - **Min**-----4.92 Lbs
 - **Max** -----7.70 Lbs
 - **Unmating**
 - **Min**-----2.90 Lbs
 - **Max** -----6.00 Lbs

RESULTS Continued

EPTS-2-P-DV-T-01 TERMINAL Tin (immersion) 0.0315" PTH

- **Initial**
 - **Mating**
 - **Min**-----0.86 Lbs
 - **Max** -----2.98 Lbs
 - **Unmating**
 - **Min**-----1.26 Lbs
 - **Max** -----3.42 Lbs
- **After 3 Cycles**
 - **Mating**
 - **Min**-----1.00 Lbs
 - **Max** -----3.51 Lbs
 - **Unmating**
 - **Min**-----1.25 Lbs
 - **Max** -----3.87 Lbs

EPTT-2-P-11.5-D-RA CONTACT Tin (immersion) 0.0315" PTH

- **Initial**
 - **Mating**
 - **Min**-----0.58 Lbs
 - **Max** -----4.08 Lbs
 - **Unmating**
 - **Min**-----1.02 Lbs
 - **Max** -----3.75 Lbs
- **After 3 Cycles**
 - **Mating**
 - **Min**-----0.68 Lbs
 - **Max** -----4.11 Lbs
 - **Unmating**
 - **Min**-----1.13 Lbs
 - **Max** -----3.17 Lbs

RESULTS Continued**Pressfit Hole Evaluation: LLCR (32 LLCR test points)****EPTS-2-P-DV-T-01 TERMINAL Tin (immersion) 0.0275" PTH**

- **Initial** ----- 0.06 mOhms Max
- **After 1 cycle**
 - **<= +0.33 mOhms** ----- 32 Points ----- Stable
 - **+0.34 to +0.66 mOhms** ----- 0 Points ----- Minor
 - **+0.67 to +1 mOhms** ----- 0 Points ----- Acceptable
 - **>+1 mOhms** ----- 0 Points ----- Unstable

EPTT-2-P-11.5-D-RA CONTACT Tin (immersion) 0.0275" PTH

- **Initial** ----- 0.44 mOhms Max
- **After 1 cycle**
 - **<= +0.33 mOhms** ----- 28 Points ----- Stable
 - **+0.34 to +0.66 mOhms** ----- 3 Points ----- Minor
 - **+0.67 to +1 mOhms** ----- 1 Points ----- Acceptable
 - **>+1 mOhms** ----- 0 Points ----- Unstable

EPTS-2-P-DV-T-01 TERMINAL Tin (immersion) 0.0315" PTH

- **Initial** ----- 0.17 mOhms Max
- **After 1 cycle**
 - **<= +0.33 mOhms** ----- 32 Points ----- Stable
 - **+0.34 to +0.66 mOhms** ----- 0 Points ----- Minor
 - **+0.67 to +1 mOhms** ----- 0 Points ----- Acceptable
 - **>+1 mOhms** ----- 0 Points ----- Unstable

EPTT-2-P-11.5-D-RA CONTACT Tin (immersion) 0.0315" PTH

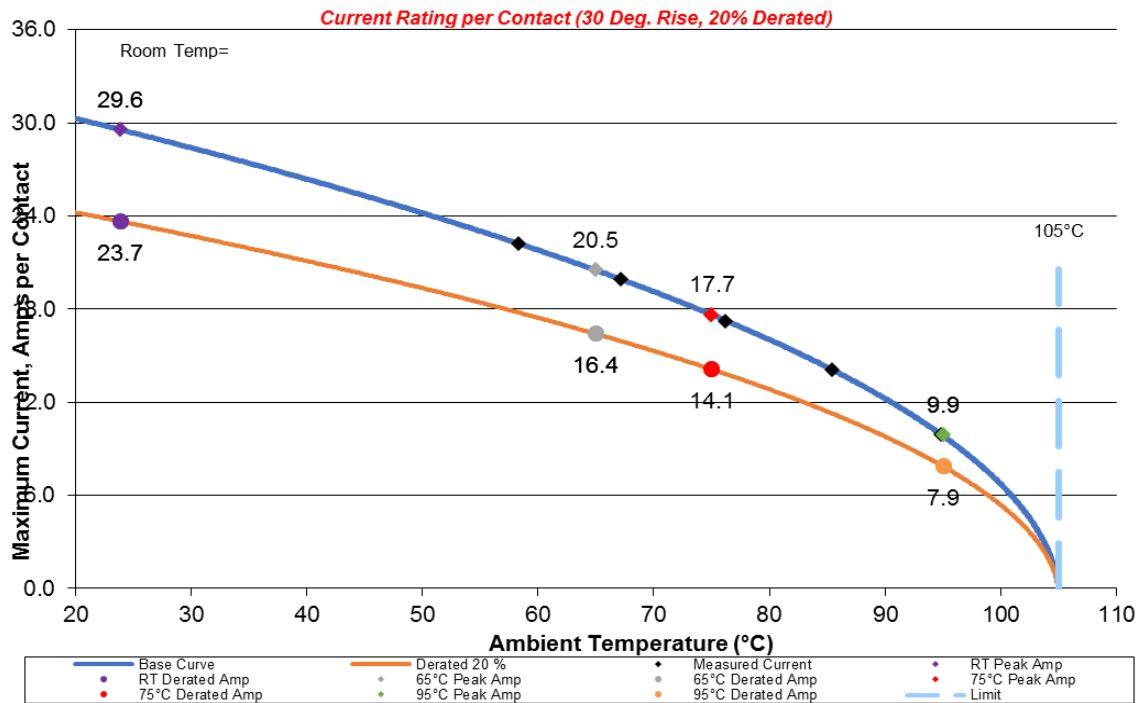
- **Initial** ----- 1.23 mOhms Max
- **After 1 cycle**
 - **<= +0.33 mOhms** ----- 32 Points ----- Stable
 - **+0.34 to +0.66 mOhms** ----- 0 Points ----- Minor
 - **+0.67 to +1 mOhms** ----- 0 Points ----- Acceptable
 - **>+1 mOhms** ----- 0 Points ----- Unstable

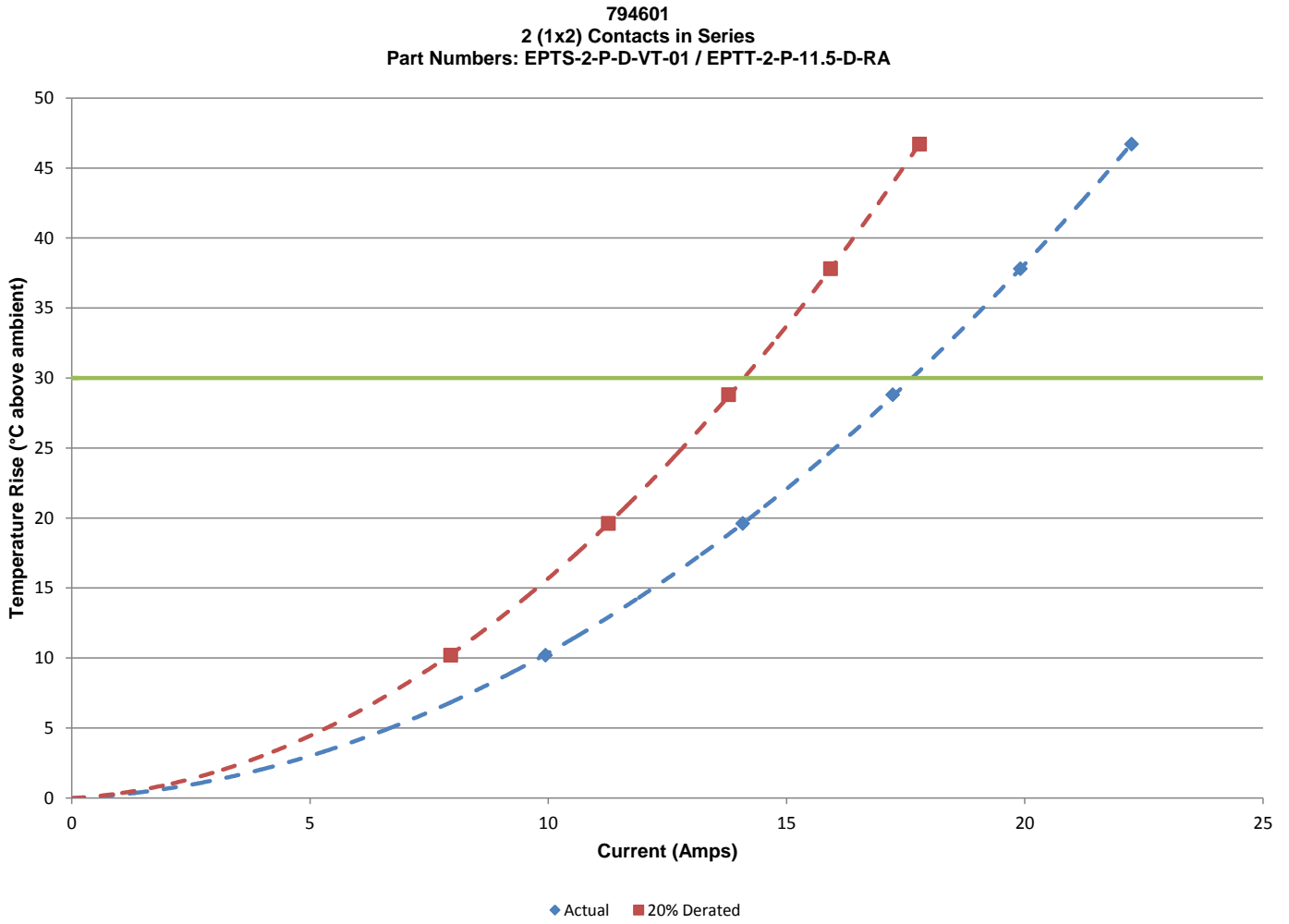
DATA SUMMARIES

TEMPERATURE RISE (Current Carrying Capacity, CCC):

- 1) High quality thermocouples whose temperature slopes track one another were used for temperature monitoring.
- 2) The thermocouples were placed at a location to sense the maximum temperature generated during testing.
- 3) Temperature readings recorded are those for which three successive readings, 15 minutes apart, differ less than 1° C (computer controlled data acquisition).
- 4) Adjacent contacts were powered:
 - a. 2 Contacts powered (1 Row/2 Pins, Signal to Side)

794601
2 (1X2) Contacts in Series (1 Row/2 Pins)(Side to Side)
Part Numbers: EPTS-2-P-D-VT-01 / EPTT-2-P-11.5-D-RA



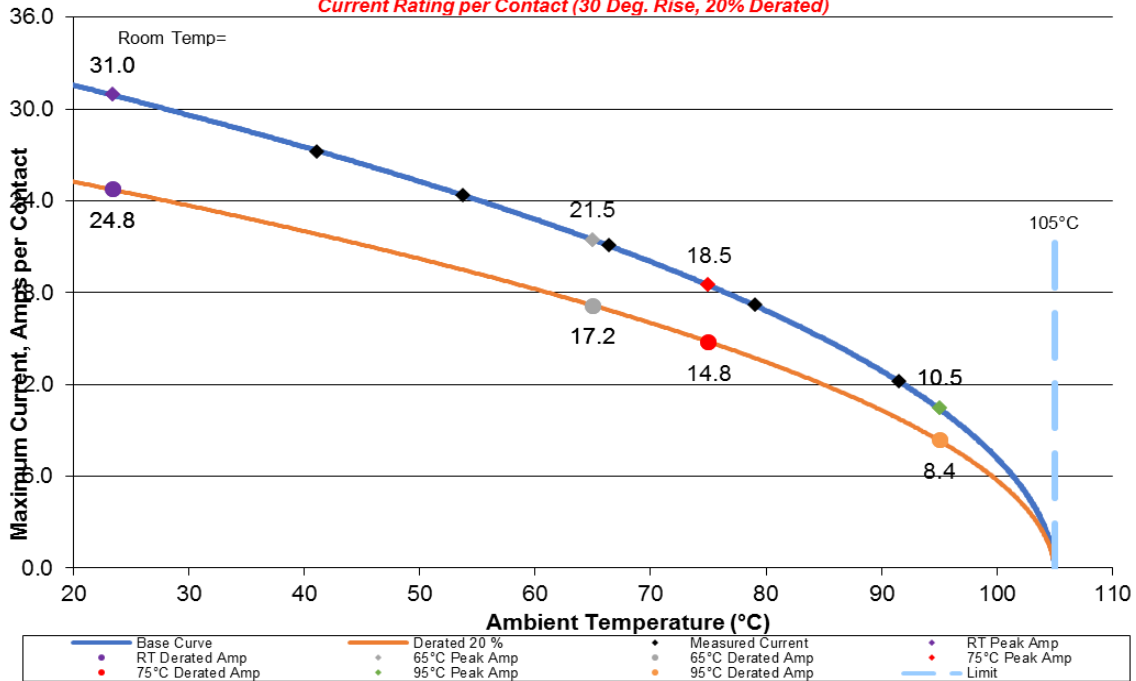


DATA SUMMARIES Continued

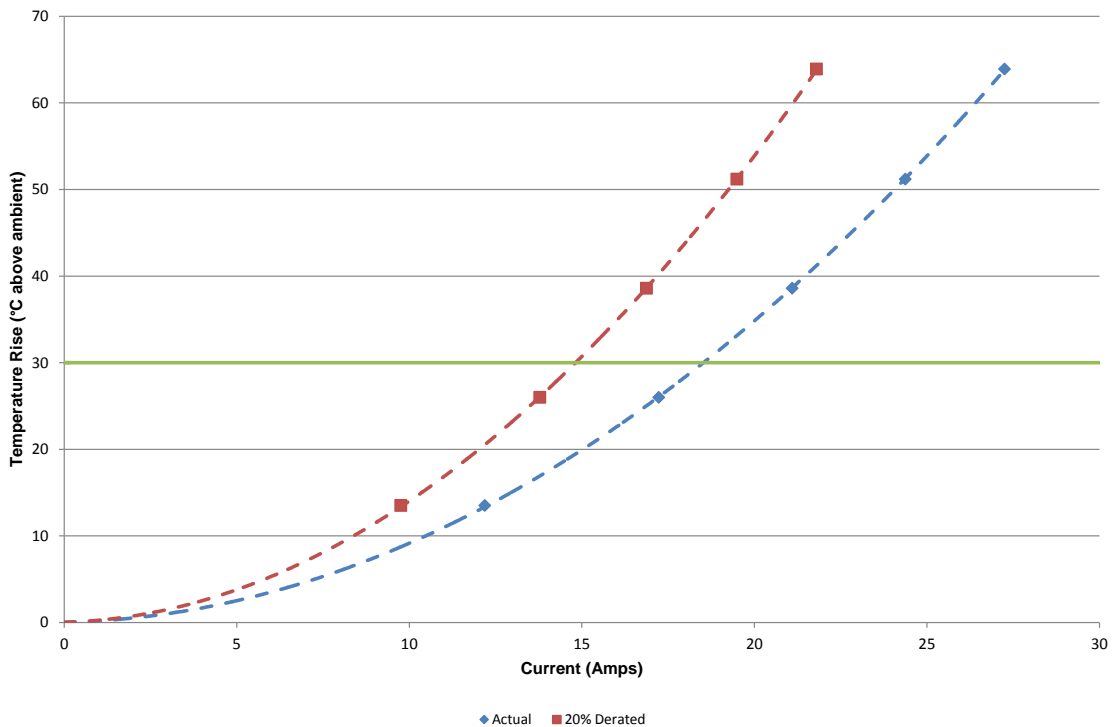
b. 2 Contacts powered (2 Rows/1Pin, Top to Bottom)

794601
2 (2X1) Contacts in Series(2 Rows/1 Pin)(Top to Bottom)
Part Numbers: EPTS-2-P-D-VT-01 / EPTT-2-P-11.5-D-RA

Current Rating per Contact (30 Deg. Rise, 20% Derated)

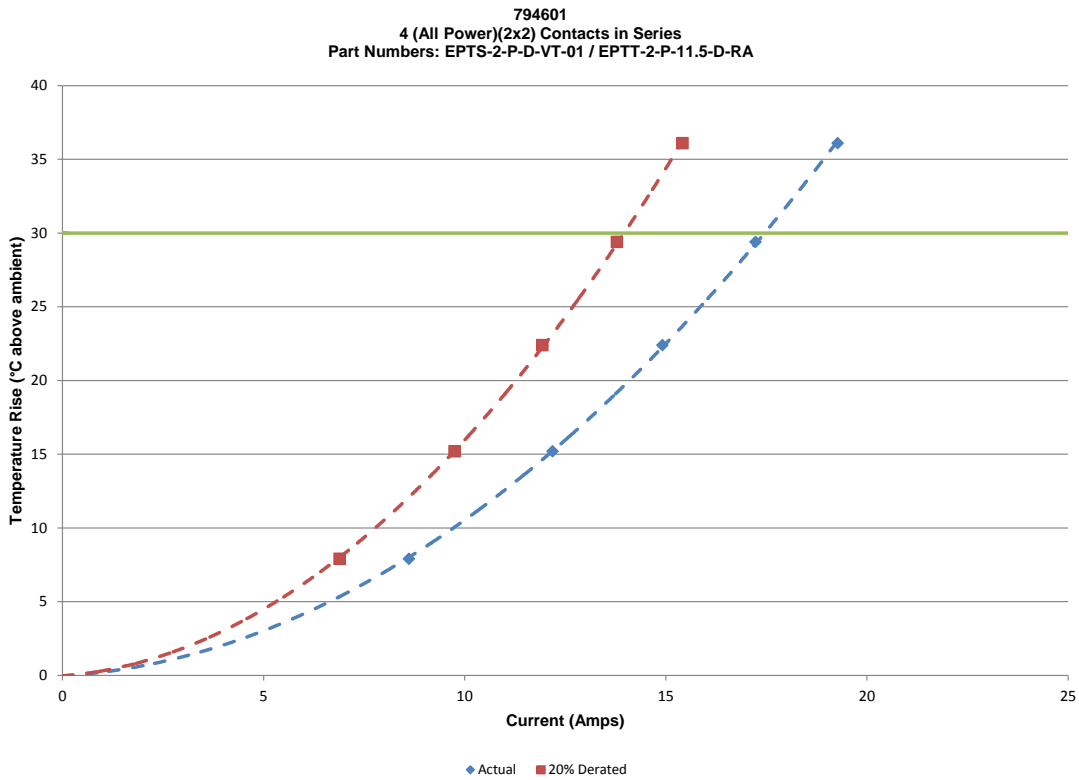
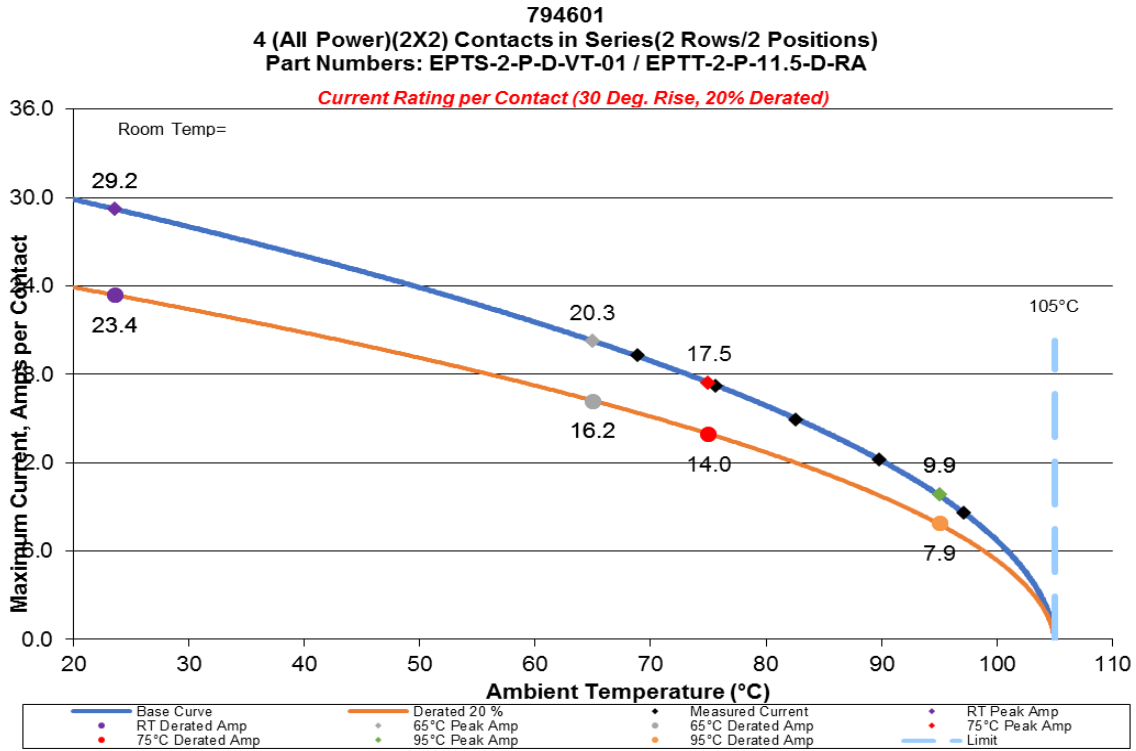


794601
2 (2x1) Contacts in Series
Part Numbers: EPTS-2-P-D-VT-01 / EPTT-2-P-11.5-D-RA



DATA SUMMARIES Continued

c. All Contacts powered (2 Rows/2 Positions)



DATA SUMMARIES Continued**Mating\Unmating Force:
Thermal Aging Group**

	Initial				After Thermals			
	Mating		Unmating		Mating		Unmating	
	Newton's	Force (Lbs)	Newton's	Force (Lbs)	Newton's	Force (Lbs)	Newton's	Force (Lbs)
Minimum	52.53	11.81	36.33	8.17	32.11	7.22	23.49	5.28
Maximum	59.13	13.29	41.65	9.36	37.48	8.43	27.81	6.25
Average	56.03	12.60	38.82	8.73	34.21	7.69	25.40	5.71
St Dev	1.95	0.44	1.96	0.44	1.68	0.38	1.69	0.38
Count	8	8	8	8	8	8	8	8

Mating\Unmating Durability Group

	Initial				25 Cycles			
	Mating		Unmating		Mating		Unmating	
	Newton's	Force (Lbs)	Newton's	Force (Lbs)	Newton's	Force (Lbs)	Newton's	Force (Lbs)
Minimum	50.08	11.26	37.03	8.33	51.91	11.67	40.91	9.20
Maximum	65.93	14.82	42.13	9.47	67.22	15.11	46.63	10.48
Average	55.43	12.46	38.74	8.71	58.03	13.05	43.39	9.76
St Dev	6.40	1.44	2.02	0.46	5.43	1.22	2.08	0.47
Count	8	8	8	8	8	8	8	8

	50 Cycles				75 Cycles			
	Mating		Unmating		Mating		Unmating	
	Newton's	Force (Lbs)	Newton's	Force (Lbs)	Newton's	Force (Lbs)	Newton's	Force (Lbs)
Minimum	52.85	11.88	43.06	9.68	53.30	11.98	43.70	9.82
Maximum	68.78	15.46	49.84	11.21	70.88	15.94	51.97	11.69
Average	59.93	13.47	46.11	10.37	62.27	14.00	47.94	10.78
St Dev	5.80	1.30	2.49	0.56	6.64	1.49	2.95	0.66
Count	8	8	8	8	8	8	8	8

	100 Cycles				After Humidity			
	Mating		Unmating		Mating		Unmating	
	Newton's	Force (Lbs)	Newton's	Force (Lbs)	Newton's	Force (Lbs)	Newton's	Force (Lbs)
Minimum	54.88	12.34	45.66	10.27	36.67	8.24	26.98	6.07
Maximum	73.14	16.44	54.55	12.27	47.11	10.59	35.85	8.06
Average	64.31	14.46	50.36	11.32	40.65	9.14	31.80	7.15
St Dev	6.31	1.42	3.26	0.73	3.94	0.89	3.16	0.71
Count	8	8	8	8	8	8	8	8

DATA SUMMARIES Continued

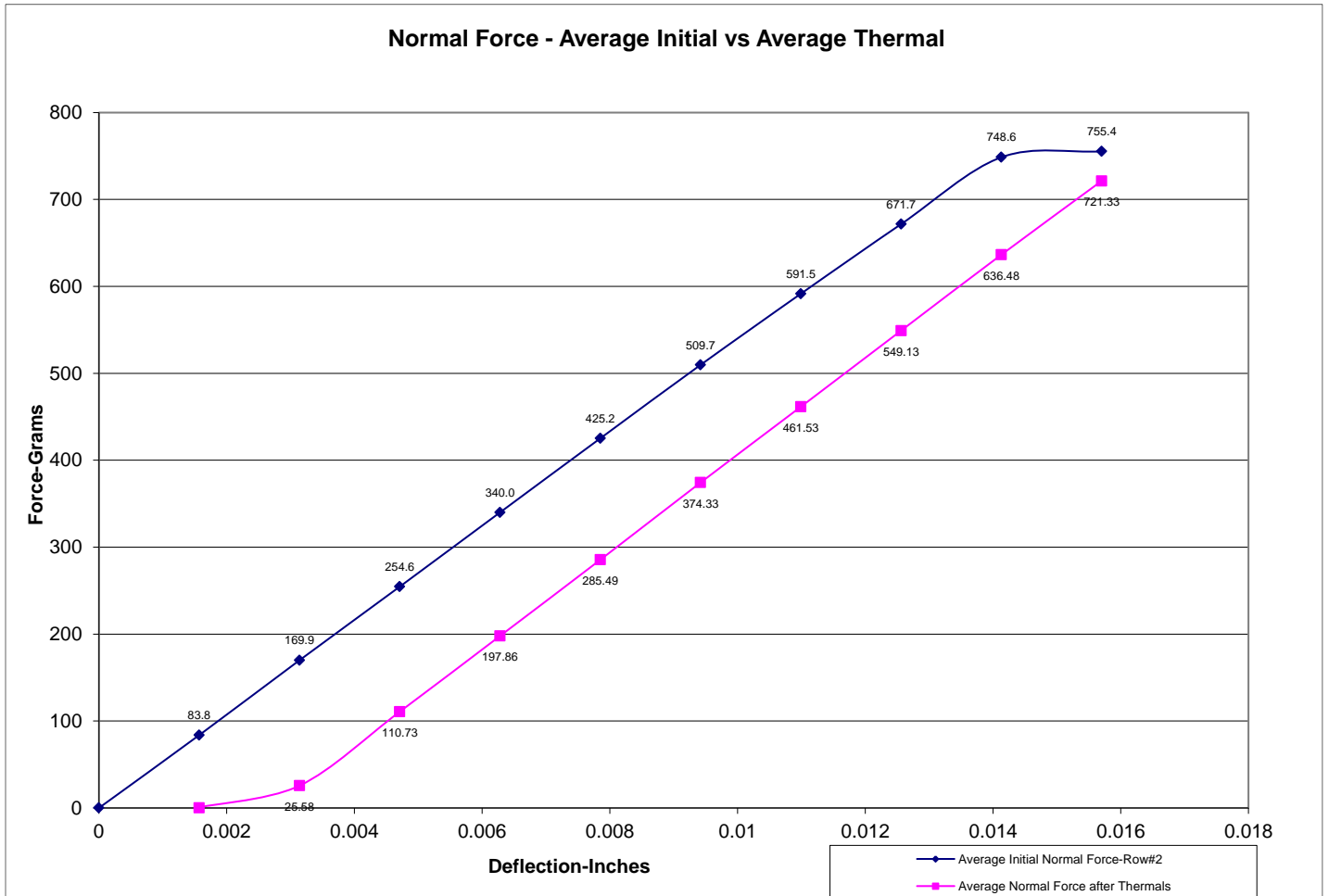
NORMAL FORCE (FOR CONTACTS TESTED OUTSIDE THE HOUSING):

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

EBTT-2-P-11.5-D-RA (Wide)

Initial	Deflections in inches Forces in Grams										
	0.0016	0.0031	0.0047	0.0063	0.0079	0.0094	0.0110	0.0126	0.0141	0.0157	SET
Averages	83.78	169.89	254.60	339.99	425.19	509.70	591.54	671.67	748.58	755.40	0.0006
Min	72.80	156.30	235.80	320.70	406.30	490.50	568.00	647.60	725.20	739.10	0.0002
Max	109.20	196.30	282.10	367.70	453.30	538.00	620.30	699.90	774.10	773.30	0.0007
St. Dev	8.881	10.105	12.031	12.729	13.254	14.865	16.015	16.240	15.611	11.702	0.0001
Count	12	12	12	12	12	12	12	12	12	12	12

After Thermals	Deflections in inches Forces in Grams										
	0.0016	0.0031	0.0047	0.0063	0.0079	0.0094	0.0110	0.0126	0.0141	0.0157	SET
Averages	0.00	25.58	110.73	197.86	285.49	374.33	461.53	549.13	636.48	721.33	0.0027
Min	0.00	3.90	82.80	164.40	246.90	336.60	420.40	507.50	589.70	674.00	0.0022
Max	0.00	49.70	136.80	225.30	312.80	403.50	492.60	580.00	670.10	755.90	0.0032
St. Dev	0.000	16.471	18.076	19.897	21.268	21.309	22.343	22.762	24.058	24.159	0.0003
Count	12	12	12	12	12	12	12	12	12	12	12

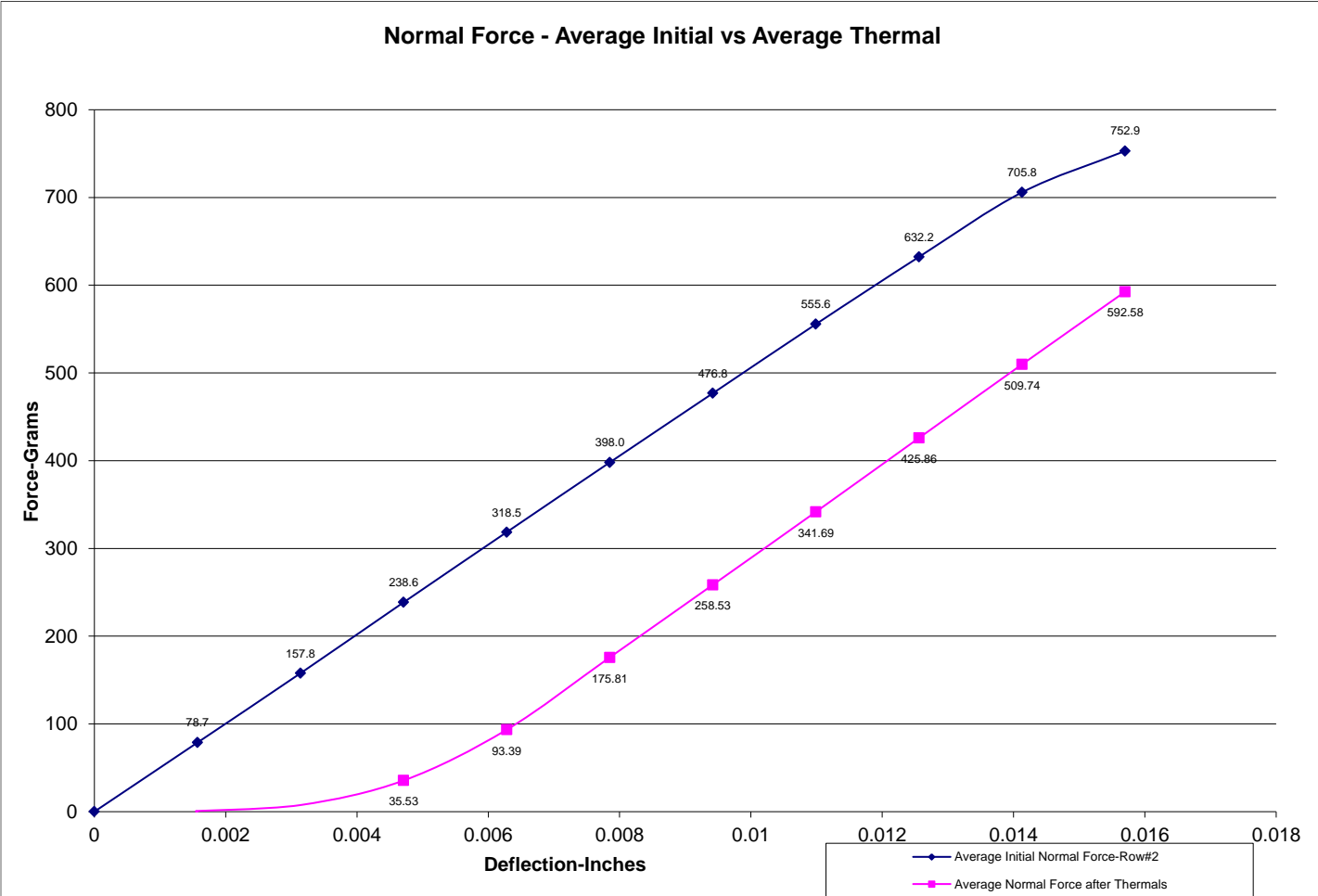


DATA SUMMARIES Continued

EBTT-2-P-11.5-D-RA (Narrow)

Initial	Deflections in inches Forces in Grams										
	<u>0.0016</u>	<u>0.0031</u>	<u>0.0047</u>	<u>0.0063</u>	<u>0.0079</u>	<u>0.0094</u>	<u>0.0110</u>	<u>0.0126</u>	<u>0.0141</u>	<u>0.0157</u>	<i>SET</i>
Averages	78.73	157.78	238.58	318.53	398.01	476.83	555.60	632.21	705.79	752.92	0.0005
Min	71.30	140.40	217.40	288.50	353.10	416.20	494.90	574.90	649.10	717.00	0.0002
Max	81.70	169.80	254.60	338.70	423.00	504.30	586.70	670.90	752.20	797.20	0.0007
St. Dev	3.331	8.900	11.181	15.592	21.330	27.416	30.659	33.632	38.016	22.791	0.0001
Count	12	12	12	12	12	12	12	12	12	12	12

After Thermals	Deflections in inches Forces in Grams										
	<u>0.0016</u>	<u>0.0031</u>	<u>0.0047</u>	<u>0.0063</u>	<u>0.0079</u>	<u>0.0094</u>	<u>0.0110</u>	<u>0.0126</u>	<u>0.0141</u>	<u>0.0157</u>	<i>SET</i>
Averages	0.19	7.53	35.53	93.39	175.81	258.53	341.69	425.86	509.74	592.58	0.0044
Min	0.00	0.00	0.00	26.20	108.90	185.40	263.70	344.30	422.90	495.00	0.0020
Max	0.80	57.00	140.60	224.40	313.50	399.80	484.00	569.50	654.00	737.50	0.0059
St. Dev	0.297	16.634	50.685	71.915	75.505	78.607	82.064	85.370	88.193	90.810	0.0013
Count	12	12	12	12	12	12	12	12	12	12	12



DATA SUMMARIES Continued

INSULATION RESISTANCE (IR):

Pin to Pin			
	Mated	Unmated	Unmated
Minimum	EPTS/EPTT	EPTS	EPTT
Initial	45000	45000	45000
Thermal	45000	45000	45000
Humidity	45000	45000	45000

Row to Row			
	Mated	Unmated	Unmated
Minimum	EPTS/EPTT	EPTS	EPTT
Initial	45000	45000	45000
Thermal	45000	45000	45000
Humidity	45000	45000	45000

DIELECTRIC WITHSTANDING VOLTAGE (DWV):

Voltage Rating Summary	
Minimum	EPTS/EPTT
Break Down Voltage	2396
Test Voltage	1795
Working Voltage	595

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

Row to Row	
Initial Test Voltage	Passed
After Thermal Test Voltage	Passed
After Humidity Test Voltage	Passed

DATA SUMMARIES Continued

Pressfit Hole Evaluation: Insertion/Retention force

EPTS-2-P-DV-T-01 TERMINAL Tin (immersion) 0.0275" PTH

	0.0275" PTH (Group 1-EPTS)			
	1st CYCLE		3rd CYCLE	
	Insertion Force (lbs.)	Withdrawal Force (lbs.)	Insertion Force (lbs.)	Withdrawal Force (lbs.)
Min. (lbs.)	4.34	3.71	4.13	4.10
Max. (lbs.)	6.05	5.89	7.09	6.74
Ave. (lbs.)	5.30	5.11	5.96	5.50

Group 2 EPTT-2-P-11.5-D-RA CONTACT Tin (immersion) 0.0275" PTH

	0.0275" PTH (Group 2-EPTT)			
	1st CYCLE		3rd CYCLE	
	Insertion Force (lbs.)	Withdrawal Force (lbs.)	Insertion Force (lbs.)	Withdrawal Force (lbs.)
Min. (lbs.)	4.87	3.06	4.92	2.90
Max. (lbs.)	8.28	6.42	7.70	6.00
Ave. (lbs.)	6.22	5.08	6.34	4.86

Group 3 EPTS-2-P-DV-T-01 TERMINAL Tin (immersion) 0.0315" PTH

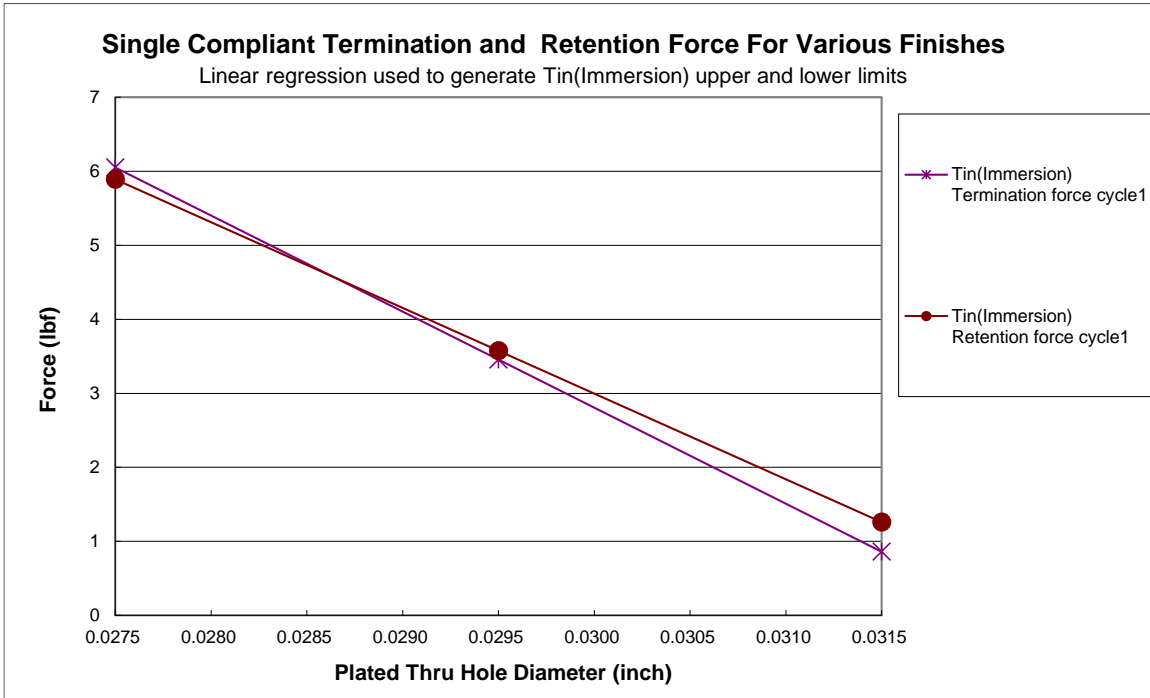
	0.0315" PTH (Group 3-EPTS)			
	1st CYCLE		3rd CYCLE	
	Insertion Force (lbs.)	Withdrawal Force (lbs.)	Insertion Force (lbs.)	Withdrawal Force (lbs.)
Min. (lbs.)	0.86	1.26	1.00	1.25
Max. (lbs.)	2.98	3.42	3.51	3.87
Ave. (lbs.)	1.97	2.41	2.06	2.50

Group 4 EPTT-2-P-11.5-D-RA CONTACT Tin (immersion) 0.0315" PTH

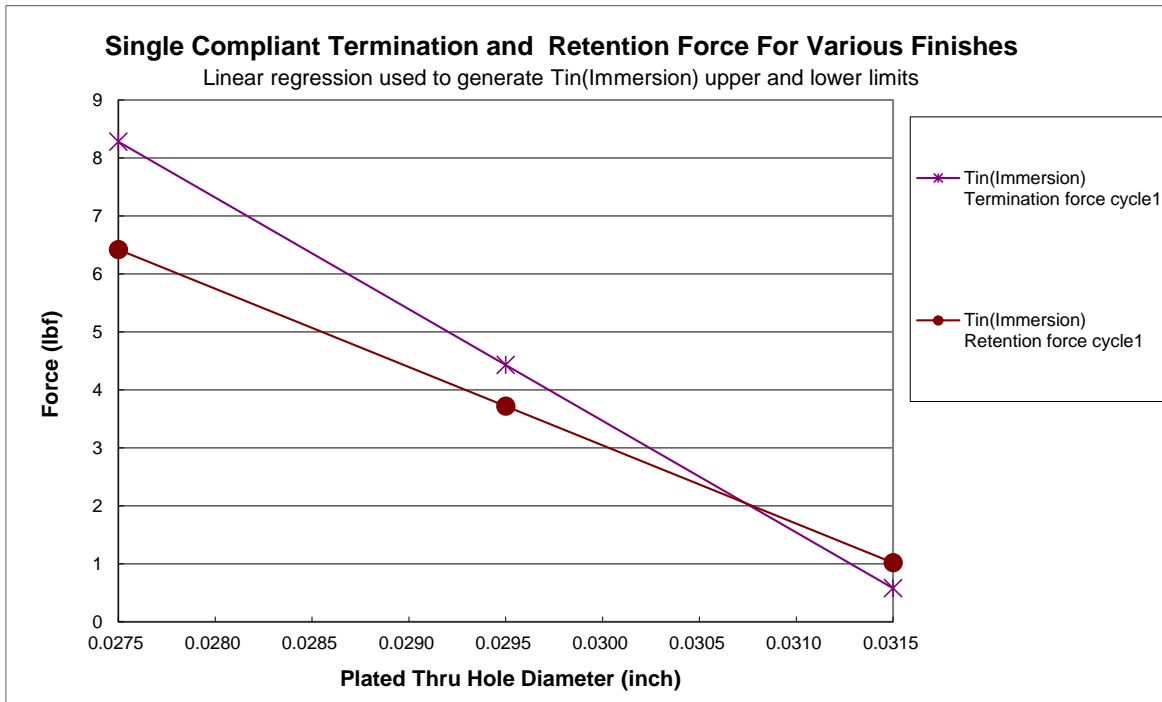
	0.0315" PTH (Group 4-EPTT)			
	1st CYCLE		3rd CYCLE	
	Insertion Force (lbs.)	Withdrawal Force (lbs.)	Insertion Force (lbs.)	Withdrawal Force (lbs.)
Min. (lbs.)	0.58	1.02	0.68	1.13
Max. (lbs.)	4.08	3.75	4.11	3.17
Ave. (lbs.)	2.29	2.40	1.99	2.09

DATA SUMMARIES Continued

Compliant pin summary graph-EBTS Terminal



Compliant pin summary graph-EBTT Contact



DATA SUMMARIES Continued

Pressfit Hole Evaluation: LLCR

EBTS-2-P-D-VT-S-01 Terminal Tin(immersion) 0.0275" PTH

- 1) A total of 32 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 for compliant pin only
 - a. $\leq +0.33$ mOhms: ----- Stable
 - b. $> +0.33$ to $+0.66$ mOhms: ----- Minor
 - c. $+0.67$ to $+1$ mOhms: ----- Acceptable
 - d. $>+1$ mOhms:----- Unstable

LLCR Measurement Summaries by Pin Type				
Date	5/4/2016	5/5/2016		
Room Temp (Deg C)	23	23		
Rel Humidity (%)	40	40		
Technician	Tony Wagoner	Tony Wagoner		
mOhm values	Actual	Delta	Delta	Delta
	Initial	after 1 Cycle		
Pin Type 1: Signal				
Average	0.03	0.02		
St. Dev.	0.01	0.03		
Min	0.01	0.00		
Max	0.06	0.16		
Summary Count	32	32		
Total Count	32	32		

LLCR Delta Count by Category				
	Stable	Minor	Acceptable	Unstable
mOhms	$\leq .33$	$>.33$ & $\leq .66$	$>.67$ & ≤ 1	>1
after 1 Cycle	32	0	0	0

DATA SUMMARIES Continued

Pressfit Hole Evaluation: LLCR

EBTT-2-P-11.5-D-RA Contact Tin (immersion) 0.0275" PTH

- 1) A total of 32 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 for compliant pin only
 - a. $\leq +0.33$ mOhms: ----- Stable
 - b. $> +0.33$ to $+0.66$ mOhms: ----- Minor
 - c. $+0.67$ to $+1$ mOhms: ----- Acceptable
 - d. $>+1$ mOhms:----- Unstable

LLCR Measurement Summaries by Pin Type				
Date	5/4/2016	5/5/2016		
Room Temp (Deg C)	23	23		
Rel Humidity (%)	40	40		
Technician	Tony Wagoner	Tony Wagoner		
mOhm values	Actual	Delta	Delta	Delta
	Initial	after 1 Cycle		
Pin Type 1: Signal				
Average	0.06	0.12		
St. Dev.	0.09	0.21		
Min	0.01	0.00		
Max	0.44	0.91		
Summary Count	32	32		
Total Count	32	32		

LLCR Delta Count by Category				
	Stable	Minor	Acceptable	Unstable
mOhms	$\leq .33$	$>.33$ & $\leq .66$	$>.67$ & ≤ 1	>1
after 1 Cycle	28	3	1	0

DATA SUMMARIES Continued

Pressfit Hole Evaluation: LLCR

EBTS-2-P-D-VT-S-01 Terminal Tin(immersion) 0.0315" PTH

- 1) A total of 32 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 for compliant pin only
 - a. $\leq +0.33$ mOhms: ----- Stable
 - b. $> +0.33$ to $+0.66$ mOhms: ----- Minor
 - c. $+0.67$ to $+1$ mOhms: ----- Acceptable
 - d. $>+1$ mOhms:----- Unstable

LLCR Measurement Summaries by Pin Type				
Date	5/4/2016	5/5/2016		
Room Temp (Deg C)	23	23		
Rel Humidity (%)	40	40		
Technician	Tony Wagoner	Tony Wagoner		
mOhm values	Actual	Delta	Delta	Delta
	Initial	after 1 Cycle		
Pin Type 1: Signal				
Average	0.05	0.03		
St. Dev.	0.03	0.02		
Min	0.02	0.00		
Max	0.17	0.09		
Summary Count	32	32		
Total Count	32	32		

LLCR Delta Count by Category				
	Stable	Minor	Acceptable	Unstable
mOhms	$\leq .33$	$>.33$ & $\leq .66$	$>.67$ & ≤ 1	>1
after 1 Cycle	32	0	0	0

DATA SUMMARIES Continued

Pressfit Hole Evaluation: LLCR

EBTT-2-P-11.5-D-RA Contact Tin (immersion) 0.0315" PTH

- 1) A total of 32 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 for compliant pin only
 - a. $\leq +0.33$ mOhms: ----- Stable
 - b. $> +0.33$ to $+0.66$ mOhms: ----- Minor
 - c. $+0.67$ to $+1$ mOhms: ----- Acceptable
 - d. $>+1$ mOhms:----- Unstable

LLCR Measurement Summaries by Pin Type				
Date	5/4/2016	5/5/2016		
Room Temp (Deg C)	23	23		
Rel Humidity (%)	40	40		
Technician	Tony Wagoner	Tony Wagoner		
mOhm values	Actual	Delta	Delta	Delta
	Initial	after 1 Cycle		
0.0315" PTH	Pin Type 1: Signal			
Average	0.21	0.08		
St. Dev.	0.26	0.07		
Min	0.01	0.00		
Max	1.23	0.26		
Summary Count	32	32		
Total Count	32	32		

LLCR Delta Count by Category				
	Stable	Minor	Acceptable	Unstable
mOhms	$\leq .33$	$>.33$ & $\leq .66$	$>.67$ & ≤ 1	>1
after 1 Cycle	32	0	0	0

DATA SUMMARIES Continued

LLCR Durability:

- 1) A total of 64 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
- 5) The following guidelines are used to categorize the changes in LLCR for compliant pin only
 - a. $\leq +0.33$ mOhms: ----- Stable
 - b. $> +0.33$ to $+0.66$ mOhms: ----- Minor
 - c. $+0.67$ to $+1$ mOhms: ----- Acceptable
 - d. $>+1$ mOhms: ----- Unstable

LLCR Measurement Summaries by Pin Type				
Date	3/15/2016	3/17/2016	3/22/2016	4/4/2016
Room Temp (Deg C)	23	23	23	23
Rel Humidity (%)	43	43	40	38
Technician	Tony Wagoner	Tony Wagoner	Tony Wagoner	Tony Wagoner
mOhm values	Actual	Delta	Delta	Delta
	Initial	100 Cycles	Therm Shck	Humidity
Pin Type 1: Signal				
Average	0.50	0.02	0.02	0.03
St. Dev.	0.03	0.01	0.02	0.02
Min	0.45	0.00	0.00	0.00
Max	0.59	0.06	0.11	0.14
Summary Count	64	64	64	64
Total Count	64	64	64	64

LLCR Delta Count by Category						
mOhms	Stable	Minor	Acceptable	Marginal	Unstable	Open
	≤ 5	$>5 \ \& \ \leq 10$	$>10 \ \& \ \leq 15$	$>15 \ \& \ \leq 50$	$>50 \ \& \ \leq 1000$	>1000
100 Cycles	64	0	0	0	0	0
Therm Shck	64	0	0	0	0	0
Humidity	64	0	0	0	0	0

DATA SUMMARIES Continued

EPTS-2-P-D-VT-01 Compliant Pin LLCR:

<i>LLCR Measurement Summaries by Pin Type</i>				
Date	3/15/2016	3/17/2016	3/22/2016	4/4/2016
Room Temp (Deg C)	23	23	23	23
Rel Humidity (%)	42	43	40	38
Technician	Tony Wagoner	Tony Wagoner	Tony Wagoner	Tony Wagoner
mOhm values	Actual Initial	Delta 100 Cycles	Delta Therm Shck	Delta Humidity
<i>Pin Type 1: Signal</i>				
Average	0.03	0.03	0.01	0.03
St. Dev.	0.01	0.01	0.01	0.06
Min	0.01	0.00	0.00	0.00
Max	0.06	0.05	0.05	0.34
Summary Count	32	32	32	32
Total Count	32	32	32	32

<i>LLCR Delta Count by Category</i>				
	Stable	Minor	Acceptable	Unstable
mOhms	<=.33	>.33 & <=.66	>.67 & <=1	>1
100 Cycles	32	0	0	0
Therm Shck	32	0	0	0
Humidity	31	1	0	0

DATA SUMMARIES Continued

EPTT-2-P-11.5-D-RA Compliant Pin LLCR:

LLCR Measurement Summaries by Pin Type				
Date	3/15/2016	3/17/2016	3/22/2016	4/4/2016
Room Temp (Deg C)	23	23	23	23
Rel Humidity (%)	42	43	40	38
Technician	Tony Wagoner	Tony Wagoner	Tony Wagoner	Tony Wagoner
mOhm values	Actual	Delta	Delta Therm Shck	Delta Humidity
	Initial	100 Cycles		
Pin Type 1: Signal				
Average	0.01	0.02	0.01	0.01
St. Dev.	0.01	0.01	0.01	0.01
Min	0.01	0.00	0.00	0.00
Max	0.04	0.05	0.04	0.03
Summary Count	32	32	32	32
Total Count	32	32	32	32

LLCR Delta Count by Category				
	Stable	Minor	Acceptable	Unstable
mOhms	<=.33	>.33 & <=.66	>.67 & <=1	>1
100 Cycles	32	0	0	0
Therm Shck	32	0	0	0
Humidity	32	0	0	0

DATA SUMMARIES Continued

LLCR Thermal Aging:

- 1) A total of 64 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
- 5) The following guidelines are used to categorize the changes in LLCR for compliant pin only
 - a. $\leq +0.33$ mOhms: ----- Stable
 - b. $> +0.33$ to $+0.66$ mOhms: ----- Minor
 - c. $+0.67$ to $+1$ mOhms: ----- Acceptable
 - d. $>+1$ mOhms: ----- Unstable

LLCR Measurement Summaries by Pin Type				
Date	3/16/2016	3/28/2016		
Room Temp (Deg C)	23	23		
Rel Humidity (%)	32	39		
Technician	Tony Wagoner	Aaron McKim		
Pin Type 1: Signal				
mOhm values	Actual Initial	Delta Thermal	Delta	Delta
Average	0.48	0.03		
St. Dev.	0.03	0.03		
Min	0.41	0.00		
Max	0.54	0.10		
Summary Count	64	64		
Total Count	64	64		

LLCR Delta Count by Category						
	Stable	Minor	Acceptable	Marginal	Unstable	Open
mOhms	≤ 5	>5 & ≤ 10	>10 & ≤ 15	>15 & ≤ 50	>50 & ≤ 1000	>1000
Thermal	64	0	0	0	0	0

DATA SUMMARIES Continued**EPTS-2-P-D-VT-01 Compliant Pin LLCR:**

LLCR Measurement Summaries by Pin Type				
Date	3/16/2016	3/28/2016		
Room Temp (Deg C)	23	23		
Rel Humidity (%)	32	39		
Technician	Tony Wagoner	Aaron McKim		
mOhm values	Actual Initial	Delta Thermal	Delta	Delta
Pin Type 1: Signal				
Average	0.04	0.03		
St. Dev.	0.01	0.02		
Min	0.02	0.00		
Max	0.07	0.09		
Summary Count	32	32		
Total Count	32	32		

LLCR Delta Count by Category				
	Stable	Minor	Acceptable	Unstable
mOhms	<=.33	>.33 & <=.66	>.67 & <=1	>1
Thermal	32	0	0	0

EPTT-2-P-11.5-D-RA Compliant Pin LLCR:

LLCR Measurement Summaries by Pin Type				
Date	3/17/2016	3/28/2016		
Room Temp (Deg C)	23	23		
Rel Humidity (%)	32	38		
Technician	Tony Wagoner	Aaron McKim		
mOhm values	Actual Initial	Delta Thermal	Delta	Delta
Pin Type 1: Signal				
Average	0.02	0.02		
St. Dev.	0.01	0.01		
Min	0.01	0.00		
Max	0.05	0.05		
Summary Count	32	32		
Total Count	32	32		

LLCR Delta Count by Category				
	Stable	Minor	Acceptable	Unstable
mOhms	<=.33	>.33 & <=.66	>.67 & <=1	>1
Thermal	32	0	0	0

DATA SUMMARIES Continued

LLCR Gas Tight:

- 1) A total of 64 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
- 5) The following guidelines are used to categorize the changes in LLCR for compliant pin only
 - a. $\leq +0.33$ mOhms: ----- Stable
 - b. $> +0.33$ to $+0.66$ mOhms: ----- Minor
 - c. $+0.67$ to $+1$ mOhms: ----- Acceptable
 - d. $>+1$ mOhms: ----- Unstable

LLCR Measurement Summaries by Pin Type				
Date	3/9/2016	3/11/2016		
Room Temp (Deg C)	23	23		
Rel Humidity (%)	38	38		
Technician	Tony Wagoner	Tony Wagoner		
mOhm values	Actual	Delta	Delta	Delta
	Initial	Acid Vapor		
Pin Type 1: Signal				
Average	0.48	0.01		
St. Dev.	0.03	0.01		
Min	0.43	0.00		
Max	0.59	0.05		
Summary Count	64	64		
Total Count	64	64		

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
Acid Vapor	64	0	0	0	0	0

DATA SUMMARIES Continued

EPTS-2-P-D-VT-01 Compliant Pin LLCR:

<i>LLCR Measurement Summaries by Pin Type</i>				
Date	3/10/2016	3/11/2016		
Room Temp (Deg C)	23	23		
Rel Humidity (%)	38	38		
Technician	Tony Wagoner	Tony Wagoner		
mOhm values	Actual Initial	Delta Acid Vapor	Delta	Delta
<i>Pin Type 1: Signal</i>				
Average	0.02	0.01		
St. Dev.	0.01	0.01		
Min	0.01	0.00		
Max	0.04	0.04		
Summary Count	32	32		
Total Count	32	32		

<i>LLCR Delta Count by Category</i>				
	Stable	Minor	Acceptable	Unstable
mOhms	<=.33	>.33 & <=.66	>.67 & <=1	>1
Acid Vapor	32	0	0	0

EPTT-2-P-11.5-D-RA Compliant Pin LLCR:

<i>LLCR Measurement Summaries by Pin Type</i>				
Date	3/10/2016	3/11/2016		
Room Temp (Deg C)	23	23		
Rel Humidity (%)	38	38		
Technician	Tony Wagoner	Tony Wagoner		
mOhm values	Actual Initial	Delta Acid Vapor	Delta	Delta
<i>Pin Type 1: Signal</i>				
Average	0.01	0.00		
St. Dev.	0.00	0.00		
Min	0.01	0.00		
Max	0.02	0.01		
Summary Count	32	32		
Total Count	32	32		

<i>LLCR Delta Count by Category</i>				
	Stable	Minor	Acceptable	Unstable
mOhms	<=.33	>.33 & <=.66	>.67 & <=1	>1
Acid Vapor	32	0	0	0

DATA SUMMARIES Continued

LLCR Shock & Vibration:

- 1). A total of 64 points were measured.
- 2). EIA-364-23, *Low Level Contact Resistance Test Procedure for Electrical Connectors and Sockets*.
- 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
- 4). The following guidelines are used to categorize the changes in LLCR for compliant pin only
 - e. $\leq +0.33$ mOhms: ----- Stable
 - f. $> +0.33$ to $+0.66$ mOhms: ----- Minor
 - g. $+0.67$ to $+1$ mOhms: ----- Acceptable
 - h. $>+1$ mOhms: ----- Unstable

LLCR Measurement Summaries by Pin Type				
Date	3/15/2016	3/17/2016		
Room Temp (Deg C)	23	23		
Rel Humidity (%)	43	32		
Technician	Tony Wagoner	Tony Wagoner		
mOhm values				
	Actual	Delta	Delta	Delta
	Initial	Shock-Vib		
Pin Type 1: Signal				
Average	0.50	0.03		
St. Dev.	0.03	0.02		
Min	0.42	0.00		
Max	0.55	0.11		
Summary Count	64	64		
Total Count	64	64		

LLCR Delta Count by Category						
mOhms	Stable	Minor	Acceptable	Marginal	Unstable	Open
	≤ 5	$>5 \ \& \ \leq 10$	$>10 \ \& \ \leq 15$	$>15 \ \& \ \leq 50$	$>50 \ \& \ \leq 1000$	>1000
Shock-Vib	64	0	0	0	0	0

Nanosecond Event Detection:

Shock and Vibration Event Detection Summary	
Contacts tested	60
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

DATA SUMMARIES Continued

EPTS-2-P-D-VT-01 Compliant Pin LLCR:

<i>LLCR Measurement Summaries by Pin Type</i>				
Date	3/15/2016	3/17/2016		
Room Temp (Deg C)	23	23		
Rel Humidity (%)	43	32		
Technician	Tony Wagoner	Tony Wagoner		
mOhm values	Actual Initial	Delta Shock-Vib	Delta	Delta
<i>Pin Type 1: Signal</i>				
Average	0.04	0.01		
St. Dev.	0.01	0.01		
Min	0.03	0.00		
Max	0.06	0.03		
Summary Count	32	32		
Total Count	32	32		

<i>LLCR Delta Count by Category</i>				
	Stable	Minor	Acceptable	Unstable
mOhms	<=.33	>.33 & <=.66	>.67 & <=1	>1
Shock-Vib	32	0	0	0

EPTT-2-P-11.5-D-RA Compliant Pin LLCR:

<i>LLCR Measurement Summaries by Pin Type</i>				
Date	3/15/2016	3/17/2016		
Room Temp (Deg C)	23	23		
Rel Humidity (%)	43	32		
Technician	Tony Wagoner	Tony Wagoner		
mOhm values	Actual Initial	Delta Shock-Vib	Delta	Delta
<i>Pin Type 1: Signal</i>				
Average	0.01	0.01		
St. Dev.	0.01	0.01		
Min	0.01	0.00		
Max	0.03	0.02		
Summary Count	32	32		
Total Count	32	32		

<i>LLCR Delta Count by Category</i>				
	Stable	Minor	Acceptable	Unstable
mOhms	<=.33	>.33 & <=.66	>.67 & <=1	>1
Shock-Vib	32	0	0	0

Tracking Code: 794601_Report_Rev_2	Part #: EPTS-2-P-D-VT-01/EBTM-4-10-2.0-S-VT-1 EPTT-2-P-11.5-D-RA/EBTF-4-10-2.0-S-RA-1
Part description: EPTS/EPTM/EBTT/EBTF	

EQUIPMENT AND CALIBRATION SCHEDULES

Equipment #: TCT-07

Description: Automated Test Stand

Manufacturer: Chatillon/Lloyd

Model: LF Plus

Serial #: LF1310

Accuracy: See Manual

... Last Cal: 11/14/2015, Next Cal: 11/14/2016

Equipment #: HPT-01

Description: Hipot Safety Tester

Manufacturer: Vitrek

Model: V73

Serial #: 019808

Accuracy:

... Last Cal: 05/15/2015, Next Cal: 05/15/2016

Equipment #: MO-04

Description: Multimeter /Data Acquisition System

Manufacturer: Keithley

Model: 2700

Serial #: 0798688

Accuracy: See Manual

... Last Cal: 09/11/2015, Next Cal: 09/11/2016

Equipment #: PS-02

Description: Power Supply

Manufacturer: Hewlett-Packard

Model: 6033A

Serial #: N/A

Accuracy: See Manual

... Last Cal: NOT CALIBRATED

Equipment #: MO-10

Description: Model 2750 Multimeter/Switch System (Integra Series)

Manufacturer: Keithley

Model: 2750

Serial #: 1215161

Accuracy: See Manual

... Last Cal: 09/11/2015, Next Cal: 09/11/2016

Equipment #: THC-05

Description: Temperature/Humidity Chamber (Chamber Room)

Manufacturer: Thermotron

Model: SM-8-3800

Serial #: 05 23 00 02

Accuracy: See Manual

... Last Cal: 11/14/2015, Next Cal: 11/14/2016

EQUIPMENT AND CALIBRATION SCHEDULES**Equipment #:** TSC-01**Description:** Vertical Thermal Shock Chamber**Manufacturer:** Cincinnati Sub Zero**Model:** VTS-3-6-6-SC/AC**Serial #:** 10-VT14993**Accuracy:** See Manual

... Last Cal: 06/30/2015, Next Cal: 06/30/2016

Equipment #: OV-05**Description:** Forced Air Oven, 5 Cu. Ft., 120 V (Chamber Room)**Manufacturer:** Sheldon Mfg.**Model:** CE5F**Serial #:** 02008008**Accuracy:** +/- 5 deg. C

... Last Cal: 02/18/2016, Next Cal: 02/18/2015

Equipment #: SVC-01**Description:** Shock & Vibration Table**Manufacturer:** Data Physics**Model:** LE-DSA-10-20K**Serial #:** 10037**Accuracy:** See Manual

... Last Cal: 04/22/2015, Next Cal: 04/22/2016

Equipment #: ACLM-01**Description:** Accelerometer**Manufacturer:** PCB Piezotronics**Model:** 352C03**Serial #:** 115819**Accuracy:** See Manual

... Last Cal: 07/18/2015, Next Cal: 07/18/2016

Equipment #: ED-03**Description:** Event Detector**Manufacturer:** Analysis Tech**Model:** 32EHD**Serial #:** 1100604**Accuracy:** See Manual

... Last Cal: 10/31/2015, Next Cal: 10/31/2016