MAY 28, 2015

TEST REPORT #215134C

MFG TESTING

PART NUMBER

PCIE-064-02-S-D-RA

MATED WITH EDGE CARD

SAMTEC

APPROVED BY: DOMINIC ARPINO
PROJECT ENGINEERING MANAGER
CONTECH RESEARCH, INC.
RUMFORD, RI

1478 - 01
ACCREDITED
Test Laboratory
1478 - 02

Contech Research
An Independent Test and Research Laboratory

REVISION HISTORY

DATE	REV. NO.	DESCRIPTION	ENG.
5/28/2015	1.0	Initial Issue	DA

CERTIFICATION

This is to certify that the evaluation described herein was designed and executed by personnel of Contech Research, Inc. It was performed with the concurrence of Samtec, of New Albany, IN who was the test sponsor.

All equipment and measuring instruments used during testing were calibrated and traceable to NIST according to ISO 10012-1 and ANSI/NCSL Z540-1 and MIL-STD-45662 as applicable.

All data, raw and summarized, analysis and conclusions presented herein are the property of the test sponsor. No copy of this report, except in full, shall be forwarded to any agency, customer, etc., without the written approval of the test sponsor and Contech Research.

APPROVED BY: DOMINIC ARPINO
PROJECT ENGINEERING MANAGER
CONTECH RESEARCH, INC.
RUMFORD, RI

DA:cf

SCOPE

To perform Mixed Flowing Gas testing on PCIE connectors as manufactured and submitted by the test sponsor Samtec.

APPLICABLE DOCUMENTS

1. Unless otherwise specified, the following documents of issue in effect at the time of testing performed form a part of this report to the extent as specified herein. The requirements of sub-tier specifications and/or standards apply only when specifically referenced in this report.

2. Standard: EIA Publication 364

3. Samtec Test Plan 801, Rev. 1

TEST SAMPLES AND PREPARATION

1. The following test samples were submitted by the test sponsor, Samtec, for the evaluation to be performed by Contech Research, Inc.

   Quantity:

   8 Connector Pairs

   Part Number being tested:

   PCIE-064-02-S-D-RA

   Mating Part:

   EDGE CARD

2. The test samples as submitted were supplied by the manufacturer as being fabricated and assembled utilizing normal production techniques common for this type of product and inspected in accordance with the quality criteria as established for the product involved.

3. Test samples were supplied assembled and terminated to test boards by the test sponsor.

4. Test boards for mounting test samples were supplied by the test sponsor.

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TEST SAMPLES AND PREPARATION -continued

5. Applicable qualified mating connectors were supplied by the test sponsor.

6. All test samples were coded and identified by the test sponsor to maintain continuity throughout the test sequences. Upon initiating testing, mated test samples remained with each other throughout the test sequences for which they were designated.

7. All equipment and measuring instruments used during testing were calibrated and traceable to NIST according to ISO 10012-1 and ANSI/NCSL Z540-1, as applicable.

8. Unless otherwise specified in the test procedures used, no further preparation was used.

TEST SELECTION

1. See Test Plan Flow Diagram, Figure #1 for test sequences used.

2. Test set ups and/or procedures which are standard or common are not detailed or documented herein provided they are certified as being performed in accordance with the applicable (industry or military) test methods, standards and/or drawings as specified in the detail specification.

SAMPLE CODING

1. All samples were coded. Mated test samples remained with each other throughout the test group/sequences for which they were designated. Coding was performed in a manner which remained legible for the test duration.

2. The test samples were coded in the following manner:

GROUP 1

ID #17- File #215134B17
ID #18- File #215134B18
ID #19- File #215134B19
ID #20- File #215134B20
ID #21- File #215134B21
ID #22- File #215134B22
ID #23- File #215134B23
ID #24- File #215134B24

FIGURE #1

GROUP 3

SAMPLE PREPARATION

LLCR with edge card #1)

DURABILITY (20X)

Replace with new edge card #2
LLCR

MFG, 7 DAYS
Unmated expose connector only

LLCR

Replace & perform with new edge card #3
CYCLE 1X

LLCR

MFG, 7 DAYS
MATED

LLCR

Replace & perform with new edge card #4
CYCLE 1X

LLCR

DATA SUMMARY

TEST	**REQUIREMENT**	**RESULTS**
SIGNAL DATA		
LLCR		
Group #3	RECORD	26.4 mΩ MAX.
DURABILITY		
Group #1 (20X)	NO DAMAGE	PASSED
LLCR		
* Group #3	+10.0 mΩ MAX.CHG.	+2.6 mΩ MAX.CHG.
MFG (DAY 1 TO 7, UNMATED)		
Group #3	NO CORROSION	NO CORROSION
LLCR		
* Group #3	+10.0 mΩ MAX.CHG.	+1.7 mΩ MAX.CHG.
RESEAT 1X		
Group #3	NO DAMAGE	PASSED
LLCR		
* Group #3	+10.0 mΩ MAX.CHG.	+2.5 mΩ MAX.CHG.
MFG (MATED)		
Group #3	NO CORROSION	NO CORROSION
LLCR		
* Group #3	+10.0 mΩ MAX.CHG.	+2.5 mΩ MAX.CHG.
RESEAT 1X		
Group #3	NO DAMAGE	PASSED
LLCR		
* Group #3	+10.0 mΩ MAX.CHG.	+1.7 mΩ MAX.CHG.

* LLCR performed with a new Edge Card

EQUIPMENT LIST

ID#	Next Cal	Last Cal	Equipment Name	Manufacturer	Model #	Serial #	Accuracy	Freq. Cal
436	N/A	N/A	Gas Regulator	Liquid Carboinc Co.	702-S-3	392838	N/A	N/A
443	N/A	N/A	Gas Regulator Valve	Liquid Carbonic Co.	DRK-2-48	40197	See Manual	N/A
510	N/A	N/A	Regulator	Liquid Carbonic	SGS 160C	M2 42366	N/A	N/A
525	N/A	N/A	Gas Regulator	Superior Co.	5113A	350218	See Owners Manual	N/A
543	12/31/2015	12/31/2014	Analytical Balance	Ohaus Co.	AP250D	MO9198	± .4mg	12 mon
563	N/A	N/A	MFG Control Panel	Contech Research	N/A	N/A	N/A	Ea Test
650	3/23/2016	3/3/2015	Digital Multimeter	Hewlett Packard	34401A	US36032126	See Cal Cert	12 mon
1105	N/A	N/A	Elect.Liquid Level Control	Cole Parmer	7187	15239	N/A	N/A
1278	11/19/2015	11/19/2014	Micro-Ohm Meter	Keithley Instr.	580	0803947	See Manual	12 mon
1380	N/A	N/A	Scanner Main Frame	Keithley	7011	0672970	See Manual	Ea Test
1381	N/A	N/A	Air Dryer	Balston	75-20	A03391	See Manual	N/A
1540	N/A	N/A	MFG Chamber	Contech Research	5 CU. FT	N/A	N/A	
1571	N/A	N/A	Chlorine Analyzer	IMS CO.	Air Sentury	1265AN	See Cal Cert	EA Test
1589	N/A	N/A	Computer	IBM	MFG Lab	MFG-01	N/A	N/A
1595	N/A	N/A	H2S Analyzer	Teledyne Analyzer	101-E	1231	N/A	N/A
1599	N/A	N/A	NO2 Analyzer	Teledyne Analyzer	200E	289	N/A	N/A
1649	7/25/2015	7/25/2014	Temp/Humidity Transmitter	Vaisala	HMT333	F1250114	See Cal Cert	12 mon
1670	N/A	N/A	Computer	Dell	Vostro 410	9J63GH1	N/A	N/A

TEST RESULTS

PROJECT NO.: 215134C SPECIFICATION: EIA-364 TP 23

PART NO.: See page 4 PART DESCRIPTION: See page 4

SAMPLE SIZE: 8 samples TECHNICIAN: DWR

START DATE: 4/30/15 COMPLETE DATE: 4/30/15

ROOM AMBIENT: 22°C RELATIVE HUMIDITY: 37%

EQUIPMENT ID#: 1278, 1670

LOW LEVEL CIRCUIT RESISTANCE (LLCR)

PURPOSE:

1. To evaluate contact resistance characteristics of the contact systems under conditions where applied voltages and currents do not alter the physical contact interface and will detect oxides and films which degrade electrical stability. It is also sensitive to and may detect the presence of fretting corrosion induced by mechanical or thermal environments as well as any significant loss of contact pressure.
2. This attribute was monitored after each preconditioning and/or test exposure in order to determine said stability of the contact systems as they progress through the applicable test sequences.
3. The electrical stability of the system is determined by comparing the initial resistance value to that observed after a given test exposure. The difference is the change in resistance occurring whose magnitude establishes the stability of the interface being evaluated.

PROCEDURE:

1. The test was performed in accordance with EIA 364, Test Procedure 23 with the following conditions.

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PROCEDURE: -continued

2. Test Conditions:

a) Test Current : 100 milliamps maximum
b) Open Circuit Voltage : 20 millivolts
c) No. of Positions Tested : 24 signal per sample

3. Per the test sponsors request the edge card was replaced with a new edge card during the test sequence, see flow chart, Figure #1, where edge card replacements is indicated with an asterisk.

REQUIREMENTS:

Low level circuit resistance shall be measured and recorded.

RESULTS:

1. The following is a summary of the data observed:

LOW LEVEL CIRCUIT RESISTANCE
(milliohms)

Sample ID#	Avg.	Max.	Min.
17	21.5	25.3	18.3
18	21.7	24.8	18.8
19	21.7	25.9	18.9
20	21.9	25.7	18.5
21	22.1	25.9	19.0
22	22.2	26.4	18.5
23	21.8	25.9	19.0
24	21.7	26.0	17.7

2. See data files 215134B17 through 215134B24 for the individual data points.

PROJECT NO.: 215134C SPECIFICATION: EIA-364 TP 09

PART NO.: See page 4 PART DESCRIPTION: See page 4

SAMPLE SIZE: 8 samples TECHNICIAN: DWR

START DATE: 4/30/15 COMPLETE DATE: 5/1/15

ROOM AMBIENT: 22°C RELATIVE HUMIDITY: 35%

EQUIPMENT ID#: Manual

DURABILITY

PURPOSE:

1. This is a conditioning sequence which is used to induce the type of wear on the contacting surfaces which may occur under normal service conditions. The connectors are mated and unmated a predetermined number of cycles. Upon completion, the units being evaluated are exposed to the environments as specified to assess any impact on electrical stability resulting from wear or other wear dependent phenomenon.

2. This type of conditioning sequence is also used to mechanically stress the connector system as would normally occur in actual service. This sequence in conjunction with other tests is used to determine if a significant loss of contact pressure occurs from said stresses which in turn, may result in an unstable electrical condition to exist.

PROCEDURE:

1. The test was performed in accordance with EIA 364, Test Procedure 09.

2. Test Conditions:

   a) No. of Cycles : 20

3. The durability cycling was performed manually.

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PROCEDURE: -continued

4. All subsequent variable testing was performed in accordance with the procedures previously indicated.

REQUIREMENTS:

1. There shall be no evidence of physical damage to the test samples so tested.

2. The change in low level circuit resistance shall not exceed +10.0 milliohms.

RESULTS:

1. There was no evidence of visual or physical damage to the test samples as tested.

2. The following is a summary of the observed data:

CHANGE IN
LOW LEVEL CIRCUIT RESISTANCE
(milliohms)

Sample ID #	Avg. Change	Max. Change
17	-0.4	+0.6
18	-0.2	+0.7
19	+0.1	+2.6
20	-0.1	+1.4
21	-0.3	+0.4
22	-0.5	+0.2
23	-0.3	+2.1
24	+0.0	+1.6

3. See data files 215134B17 through 215134B24 for the individual data points.

PROJECT NO.: 215134C SPECIFICATION: EIA-364-65B

PART NO.: See page 4 PART DESCRIPTION: See page 4

SAMPLE SIZE: 8 samples TECHNICIAN: AJP

START DATE: 5/05/15 COMPLETE DATE: 5/20/15

ROOM AMBIENT: 21°C RELATIVE HUMIDITY: 45%

EQUIPMENT ID#: 436, 443, 510, 525, 543, 563, 650, 1105, 1380, 1381, 1540, 1571, 1589, 1595, 1599, 1649

MIXED FLOWING GAS

PURPOSE:

1. To determine the impact on electrical stability of contact interfaces when the test samples are exposed to a mixed flowing gas environment. Said environment is based on field data simulating typical, severe, non-benign environments. Said exposure is indicative of expected behavior in the field.

2. Mixed flowing gas tests (MFG) are environmental test procedures whose primary purpose is to evaluate product performance under simulated storage or operating (field) conditions. For parts involving plated contact surfaces, such tests are also used to measure the effect of plating degradation (due to the environment) on the electrical and durability properties of a contact or connector system. The specific test conditions are usually chosen so as to simulate, in the test laboratory, the effects of certain representative field environments or environmental severity levels on standard metallic surfaces.

PROCEDURE:

1. The test environment was performed in accordance with EIA 364, Test Procedure 65B with the following conditions.

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PROCEDURE: -continued

2. Environmental Conditions:

   a) Temperature : 30°C ± 1°C
   b) Relative Humidity : 70% ± 2%
   c) $C1_2$: 10 ± 3 ppb
   d) NO_2 : 200 ± 50 ppb
   e) H_2S : 10 ± 5 ppb
   f) SO_2 : 100 ± 20 ppb
   g) Exposure Time : 14 days
   h) Mating Conditions : Day 1 to 7, Unmated
   Day 8 to 14, Mated
   i) Mounting Conditions : Mounted
   j) Expose connector only Day 1 to 7

3. The test chamber was allowed to stabilize at the specified conditions indicated.

4. After stabilization, the test samples and control coupons were placed in the chamber such that they were no closer than 2.0" from each other and/or the chamber walls.

5. The test samples were handled in a manner so as not to disturb the contact interface.

6. After placement of the test samples in the chamber, it was allowed to re-stabilize and adjusted as required to maintain the specified concentrations and conditions.

7. The test chamber was monitored periodically during the exposure period to assure the environmental conditions as specified were maintained.

8. During the exposure, resistance measurements were taken at specific intervals and in the following sequence.

   a) Place the test samples in the test chamber.

   b) At each designated measurement period, remove the test units from the test chamber. The test samples were exposed to room ambient for two hours prior to making measurements.

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PROCEDURE: -continued

c) Measure and record low level circuit resistance measurements, Reseat one time and perform LLCR once again.

d) Upon completion of all of the measurements, place the test units back into the test chamber until the next measurement interval or until completion of the test duration.

9. Following completion of each 7 day MFG test exposure, the samples were subjected to the tests indicated below:

   a) LLCR
   b) Cycle 1X
   c) LLCR

10. All subsequent variable testing was performed in accordance with the procedures previously indicated.

REQUIREMENTS:

1. There shall be no evidence of damage or corrosion to the test samples as exposed which will cause mechanical or electrical malfunction of the said samples.

2. The change in low level circuit resistance shall not exceed +10.0 milliohms.

RESULTS:

1. There was no evidence of physical damage or corrosion

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RESULTS -continued

2. The following is a summary of the observed data:

CHANGE IN
LOW LEVEL CIRCUIT RESISTANCE
(milliohms)

Sample	@ 7 Days MFG Avg. Change	@ 7 Days MFG Max. Change	Cycle 1X Avg. Change	Cycle 1X Max. Change
17	-0.4	+1.1	+0.0	+1.3
18	-0.4	+0.7	-0.1	+1.4
19	+0.0	+1.7	-0.1	+1.4
20	+0.0	+1.6	-0.1	+1.7
21	-0.5	+0.5	-0.6	+0.4
22	-0.2	+1.7	-0.3	+1.2
23	-0.3	+1.5	-0.5	+0.4
24	+0.1	+1.7	+0.5	+2.0

3. The following is a summary of the observed data after 14 days of MFG exposure:

CHANGE IN
LOW LEVEL CIRCUIT RESISTANCE
(milliohms)

Sample	@ 14 Days MFG Avg. Change	@ 14 Days MFG Max. Change	Cycle 1X Avg. Change	Cycle 1X Max. Change
17	+0.7	+2.0	+0.1	+1.3
18	+0.5	+2.1	+0.1	+1.7
19	+0.3	+1.8	+0.1	+1.7
20	+0.1	+1.8	-0.4	+0.9
21	+0.2	+1.7	-0.1	+0.6
22	+0.2	+1.3	-0.3	+1.2
23	+0.3	+1.9	-0.3	+0.8
24	+0.4	+2.5	-0.1	+1.7

4. See data files 215134B17 through 215134B24 for the individual data points.

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RESULTS -continued

8. Five copper coupons were placed in the chamber for each of the seven days of exposure. Upon removal said coupons were evaluated via weight gain technique with the following results:

Coupon No.	WEIGHT GAIN (μgm/cm^2/Day) Set 1	Set 2
1	14+	15
2	16	14+
3	14+	15
4	16	14+
5	13+	13+

Requirement: 12 to 16 μgm/cm^2/Day

LLCR DATA FILES

GROUP 3

215134B17
215134B18
215134B19
215134B20
215134B21
215134B22
215134B23
215134B24

Low Level Contact Resistance - Delta Values

Project:	215134C				Spec: EIA 364 TP 23	
Customer:	Samtec				Subgroup: Group 3 No Lube	
Product:	PCIE-064-02-S-D-RA				File No.:	215134B17
Description:					Tech:	DWR
Open Circuit Voltage:		20mV			Current:	100mA
Units:	milliohms					
Temp ºC	22°C	22°C	21°C	21°C	21°C	21°C
R.H. %	37%	35%	51%	43%	45%	45%
Date:	30-Apr-15	01-May-15	12-May-15	13-May-15	20-May-15	20-May-15
Pos. ID	Initial	20X	MFG 7D	1X	MFG 7D	1X
			Unmated		Mated	
17-1	19.4	-0.6	-1.0	0.3	2.0	0.3
17-2	18.8	0.1	1.1	0.7	1.4	0.0
17-3	19.2	-0.4	0.2	0.6	1.8	0.1
17-4	20.6	-1.9	-1.5	-0.9	1.0	-1.8
17-5	19.9	-0.8	-0.3	0.1	1.0	-0.2
17-6	18.6	0.2	0.4	0.3	1.9	0.2
17-7	19.3	0.5	-0.2	1.3	1.5	0.7
17-8	24.6	-0.7	-0.5	-0.4	0.4	0.0
17-9	23.8	0.0	0.1	0.2	0.6	0.9
17-10	24.6	-0.4	-1.6	-0.4	0.4	-0.9
17-11	24.1	-0.1	-0.1	0.0	0.7	0.5
17-12	24.8	-0.9	-0.6	-0.9	-0.5	0.1
17-13	24.9	-0.3	0.2	-0.2	0.5	-0.2
17-14	24.8	-0.6	0.3	-1.0	-0.2	1.3
17-15	24.3	-0.1	-0.1	-0.2	1.7	0.5
17-16	25.3	-0.5	-0.7	-0.5	0.6	-0.2
17-17	24.9	-0.4	-1.4	0.7	-0.5	0.4
17-18	19.4	-0.4	-0.2	0.1	-0.1	0.1
17-19	19.3	0.1	0.0	0.5	1.2	0.1
17-20	18.3	0.6	0.2	0.6	1.1	0.7
17-21	19.5	-0.5	-1.2	-0.4	-0.4	0.0
17-22	19.3	-0.5	-1.2	-0.3	0.1	-0.1
17-23	19.5	-0.3	-0.8	-0.3	-0.9	-0.3
17-24	19.3	-0.5	-0.1	0.8	1.2	0.4
MAX	25.3	0.6	1.1	1.3	2.0	1.3
MIN	18.3	-1.9	-1.6	-1.0	-0.9	-1.8
AVG	21.5	-0.4	-0.4	0.0	0.7	0.1
STD	2.7	0.5	0.7	0.6	0.8	0.6
Open	0	0	0	0	0	0
Tech:	DWR	DWR	DWR	DWR	DWR	DWR
EQUIP. ID	1278	1278	1278	1278	1278	1278
	1670	1670	1670	1670	1670	1670

Low Level Contact Resistance - Delta Values						
Project:	215134C				Spec:	EIA 364 TP 23
Customer:	Samtec				Subgroup:	Group 3 No Lube
Product:	PCIE-064-02-S-D-RA				File No.:	215134B18
Description:					Tech:	DWR
Open Circuit Voltage:		20mV			Current:	100mA
Units:	milliohms					
Temp ºC	22°C	22°C	21°C	21°C	21°C	21°C
R.H. %	37%	35%	51%	43%	45%	45%
Date:	30-Apr-15	01-May-15	12-May-15	13-May-15	20-May-15	20-May-15
Pos. ID	Initial	20X	MFG 7D	1X	MFG 7D	1X
			Unmated		Mated	
18-1	19.4	-0.3	-0.2	-0.1	1.0	0.5
18-2	19.1	-0.2	-0.6	0.0	0.5	0.0
18-3	19.3	-0.2	0.1	-0.2	0.3	0.0
18-4	18.8	0.0	0.4	0.4	1.2	0.8
18-5	19.9	-0.4	-0.6	0.9	-0.2	0.5
18-6	19.2	0.5	-0.2	-0.1	-0.1	-0.6
18-7	19.5	-0.2	-0.2	-0.1	0.2	0.0
18-8	24.4	-0.2	-0.4	-0.4	-0.4	-0.9
18-9	24.0	0.4	0.1	-0.1	1.1	0.9
18-10	24.6	0.7	-0.1	-0.1	0.5	0.0
18-11	24.1	-0.1	-0.7	1.4	1.4	1.0
18-12	24.1	0.3	0.7	0.5	2.1	0.8
18-13	24.8	0.2	-0.3	-0.9	0.3	0.3
18-14	24.3	0.2	-1.2	0.3	0.0	0.1
18-15	24.2	0.1	-0.1	0.0	0.7	1.7
18-16	24.7	0.1	0.0	-0.1	0.7	0.1
18-17	24.7	0.1	-0.2	0.1	0.3	0.2
18-18	19.9	-0.6	-0.8	-0.2	1.0	-0.6
18-19	21.6	-2.9	-1.8	-1.6	-1.6	-1.4
18-20	21.0	0.3	-0.5	-0.2	-0.2	0.4
18-21	20.2	-0.7	-0.2	-1.1	-0.2	-0.2
18-22	20.1	-0.9	-1.2	-0.5	1.0	-0.9
18-23	19.8	-0.4	-0.2	0.0	1.9	0.0
18-24	19.7	-0.3	-0.3	-0.1	1.7	-0.3
MAX	24.8	0.7	0.7	1.4	2.1	1.7
MIN	18.8	-2.9	-1.8	-1.6	-1.6	-1.4
AVG	21.7	-0.2	-0.4	-0.1	0.5	0.1
STD	2.4	0.7	0.5	0.6	0.8	0.7
Open	0	0	0	0	0	0
Tech:	DWR	DWR	DWR	DWR	DWR	DWR
EQUIP. ID	1278	1278	1278	1278	1278	1278
	1670	1670	1670	1670	1670	1670

Low Level Contact Resistance - Delta Values

Project:	215134C				Spec: EIA 364 TP 23	
Customer:	Samtec				Subgroup: Group 3 No Lube	
Product:	PCIE-064-02-S-D-RA				File No.:	215134B19
Description:					Tech:	DWR
Open Circuit Voltage:		20mV			Current:	100mA
Units:	milliohms					
Temp ºC	22°C	22°C	21°C	21°C	21°C	21°C
R.H. %	37%	35%	51%	43%	45%	45%
Date:	30-Apr-15	01-May-15	12-May-15	13-May-15	20-May-15	20-May-15
Pos. ID	Initial	20X	MFG 7D	1X	MFG 7D	1X
			Unmated		Mated	
19-1	18.9	2.6	-0.2	0.5	0.8	-0.1
19-2	21.3	-0.2	-0.2	-0.3	0.3	0.1
19-3	19.3	0.5	0.2	0.3	0.1	0.3
19-4	19.4	0.3	0.2	-0.3	0.0	-0.4
19-5	19.5	0.1	-0.2	-0.3	0.1	0.2
19-6	19.0	1.3	-0.1	-0.7	0.7	-0.3
19-7	20.3	-0.1	0.6	0.3	0.8	0.5
19-8	25.2	-1.1	-0.9	-1.4	-1.0	-1.5
19-9	24.4	-1.5	0.6	0.6	0.8	0.6
19-10	24.2	-0.2	0.3	0.3	0.2	0.9
19-11	25.9	-0.4	0.1	0.4	0.7	0.0
19-12	25.5	-0.3	0.0	1.0	0.2	0.3
19-13	24.5	0.1	0.4	0.3	0.8	0.6
19-14	24.5	-0.1	0.2	0.0	1.8	-0.4
19-15	24.2	0.3	-0.7	-0.6	-1.0	0.4
19-16	23.2	1.4	1.7	1.4	1.7	1.7
19-17	24.7	0.1	-1.0	-0.4	-0.5	1.0
19-18	19.3	-0.1	0.2	-0.2	-0.3	0.1
19-19	21.1	-1.1	-1.2	-1.8	-0.9	-0.3
19-20	20.0	1.0	-0.1	-0.2	0.3	0.2
19-21	19.1	0.0	0.2	0.4	0.5	0.2
19-22	19.4	-0.6	-0.1	0.1	0.2	-0.8
19-23	19.1	-0.1	0.0	-0.4	1.7	-0.5
19-24	19.1	-0.3	-0.4	-0.3	-0.6	-0.3
MAX	25.9	2.6	1.7	1.4	1.8	1.7
MIN	18.9	-1.5	-1.2	-1.8	-1.0	-1.5
AVG	21.7	0.1	0.0	-0.1	0.3	0.1
STD	2.6	0.9	0.6	0.7	0.8	0.7
Open	0	0	0	0	0	0
Tech:	DWR	DWR	DWR	DWR	DWR	DWR
EQUIP. ID	1278	1278	1278	1278	1278	1278
	1670	1670	1670	1670	1670	1670

Low Level Contact Resistance - Delta Values

Project:	215134C				Spec: EIA 364 TP 23	
Customer:	Samtec				Subgroup: Group 3 No Lube	
Product:	PCIE-064-02-S-D-RA				File No.:	215134B20
Description:					Tech:	DWR
Open Circuit Voltage:		20mV			Current:	100mA
Units:	milliohms					
Temp ºC	22°C	22°C	21°C	21°C	21°C	21°C
R.H. %	37%	35%	51%	43%	45%	45%
Date:	30-Apr-15	01-May-15	12-May-15	13-May-15	20-May-15	20-May-15
Pos. ID	Initial	20X	MFG 7D	1X	MFG 7D	1X
			Unmated		Mated	
20-1	19.6	0.4	-0.4	0.1	-0.1	-0.3
20-2	19.6	-0.4	-0.8	-0.1	0.9	-0.7
20-3	18.5	0.8	0.0	1.7	0.9	0.9
20-4	19.6	0.1	-0.5	-0.1	-0.2	0.3
20-5	20.9	-0.3	-0.5	0.5	0.1	0.2
20-6	18.5	0.4	1.2	0.6	-0.3	-1.0
20-7	19.9	0.2	-0.1	-0.4	0.6	-0.2
20-8	24.4	-0.2	-0.3	-0.5	-1.1	-0.4
20-9	24.4	-0.4	1.6	0.0	0.1	-0.7
20-10	24.9	-0.2	0.0	-0.7	1.8	-0.2
20-11	25.7	-0.9	-0.9	-1.2	-0.4	-1.0
20-12	23.5	1.4	1.5	1.3	-0.7	0.5
20-13	25.4	-0.1	-0.4	-1.0	0.3	0.2
20-14	25.2	-0.9	0.2	-0.4	0.0	-0.3
20-15	25.1	-0.6	0.1	-0.3	0.2	-1.3
20-16	24.9	0.4	0.3	0.1	0.2	-0.1
20-17	25.7	-0.4	-0.4	-0.1	-0.7	-1.1
20-18	20.1	-0.5	-0.9	-0.2	-0.9	-0.7
20-19	19.6	0.0	0.8	0.0	0.4	0.7
20-20	19.3	-0.3	-0.2	0.1	0.8	0.0
20-21	20.1	-0.4	-0.5	-0.6	-0.6	-0.5
20-22	19.7	-0.3	-0.4	-0.3	0.0	-0.7
20-23	19.5	-0.1	0.4	0.2	0.7	-1.4
20-24	20.5	-0.7	-1.0	-0.4	0.4	-1.3
MAX	25.7	1.4	1.6	1.7	1.8	0.9
MIN	18.5	-0.9	-1.0	-1.2	-1.1	-1.4
AVG	21.9	-0.1	0.0	-0.1	0.1	-0.4
STD	2.7	0.5	0.7	0.6	0.7	0.6
Open	0	0	0	0	0	0
Tech:	DWR	DWR	DWR	DWR	DWR	DWR
EQUIP. ID	1278	1278	1278	1278	1278	1278
	1670	1670	1670	1670	1670	1670

Low Level Contact Resistance - Delta Values						
Project:	215134C				Spec: EIA 364 TP 23	
Customer:	Samtec				Subgroup: Group 3 No lube	
Product:	PCIE-064-02-S-D-RA				File No.:	215134B21
Description:					Tech:	DWR
Open Circuit Voltage:		20mV			Current:	100mA
Units:	milliohms					
Temp ºC	22°C	22°C	21°C	21°C	21°C	21°C
R.H. %	37%	35%	51%	43%	45%	45%
Date:	30-Apr-15	01-May-15	12-May-15	13-May-15	20-May-15	20-May-15
Pos. ID	Initial	20X	MFG 7D	1X	MFG 7D	1X
			Unmated		Mated	
21-1	21.6	-0.4	0.1	-1.1	1.5	0.1
21-2	19.9	-0.6	-1.1	-1.1	0.0	-0.3
21-3	19.3	-0.5	-1.1	-0.4	0.8	-0.2
21-4	19.3	-0.1	-0.5	-0.1	-0.8	0.6
21-5	20.6	-0.8	-1.2	-0.6	1.2	0.0
21-6	19.2	0.1	-0.5	-0.6	1.7	0.3
21-7	19.0	-0.1	0.3	-0.1	0.2	0.2
21-8	24.6	-0.4	-0.4	-0.7	-0.3	-0.4
21-9	24.3	0.0	0.3	-0.6	0.4	0.6
21-10	24.7	-0.1	-0.6	0.0	-0.5	0.5
21-11	24.3	-0.2	-0.5	-0.2	0.8	0.3
21-12	25.9	-0.3	-0.7	-0.2	0.1	-0.1
21-13	24.8	-0.1	0.1	0.4	0.7	-0.2
21-14	24.4	-0.4	0.0	0.0	-0.6	0.0
21-15	25.4	-1.3	-1.4	-1.5	-1.0	-1.3
21-16	25.1	-0.4	-0.4	-1.1	0.7	-1.0
21-17	24.6	0.2	0.3	-0.1	1.3	-0.1
21-18	20.5	-0.3	-0.3	-0.4	0.4	-0.1
21-19	21.6	-1.8	-1.5	-1.6	-0.8	-0.5
21-20	20.3	0.0	-1.5	-0.6	-0.4	0.0
21-21	20.2	-0.4	-1.9	-1.6	0.1	0.1
21-22	21.2	-0.6	-0.8	-0.6	-0.5	-0.2
21-23	19.0	0.4	0.5	-0.5	0.5	0.4
21-24	21.6	0.2	0.0	-0.4	-0.9	0.0
MAX	25.9	0.4	0.5	0.4	1.7	0.6
MIN	19.0	-1.8	-1.9	-1.6	-1.0	-1.3
AVG	22.1	-0.3	-0.5	-0.6	0.2	-0.1
STD	2.5	0.5	0.7	0.5	0.8	0.5
Open	0	0	0	0	0	0
Tech:	DWR	DWR	DWR	DWR	DWR	DWR
EQUIP. ID	1278	1278	1278	1278	1278	1278
	1670	1670	1670	1670	1670	1670

1478 - 01

ACCREDITED

Test Laboratory

1478 - 02

Low Level Contact Resistance - Delta Values

Project:	215134C				Spec: EIA 364 TP 23	
Customer:	Samtec				Subgroup: Group 3 No Lube	
Product:	PCIE-064-02-S-D-RA				File No.:	215134B22
Description:					Tech:	DWR
Open Circuit Voltage:		20mV			Current:	100mA
Units:	milliohms					
Temp ºC	22°C	22°C	21°C	21°C	21°C	21°C
R.H. %	37%	35%	51%	43%	45%	45%
Date:	30-Apr-15	01-May-15	12-May-15	13-May-15	20-May-15	20-May-15
Pos. ID	Initial	20X	MFG 7D	1X	MFG 7D	1X
			Unmated		Mated	
22-1	21.6	-1.2	0.1	1.2	-1.0	-0.4
22-2	20.0	-0.2	0.1	-1.4	-0.2	0.0
22-3	21.1	-0.1	-0.6	-0.8	0.5	0.2
22-4	21.0	-1.9	-1.7	-1.7	-1.8	-1.7
22-5	20.2	-0.3	0.2	0.0	1.1	0.1
22-6	20.0	-0.7	0.1	-1.0	0.2	-1.0
22-7	20.7	-0.2	1.7	0.2	0.2	0.4
22-8	25.0	-0.2	-1.6	0.3	0.6	-0.2
22-9	24.7	0.1	1.1	0.0	0.7	0.4
22-10	26.2	-0.8	-0.6	-0.2	-0.1	-0.7
22-11	25.8	-0.8	-0.9	-0.8	0.3	-1.7
22-12	25.4	-0.5	-0.3	0.0	1.1	0.0
22-13	26.4	-0.3	-0.3	0.6	0.4	-0.1
22-14	24.7	-0.2	-0.4	-0.1	1.0	0.1
22-15	24.5	-0.4	-0.4	0.2	-0.4	-0.1
22-16	25.0	-0.6	-0.2	-0.1	1.3	1.2
22-17	24.9	-0.1	-1.7	-0.1	0.5	1.1
22-18	19.5	-0.8	-0.4	-0.4	-0.1	-0.6
22-19	20.0	-0.5	0.0	-0.7	1.2	-1.6
22-20	18.5	0.2	-0.1	-0.5	-1.1	0.2
22-21	20.2	-1.5	-1.2	-1.5	-0.8	-1.1
22-22	18.7	-0.2	-0.2	0.0	0.8	-1.1
22-23	19.4	0.0	0.1	-0.1	0.3	-0.5
22-24	18.9	-0.3	1.4	-0.3	0.7	-0.6
MAX	26.4	0.2	1.7	1.2	1.3	1.2
MIN	18.5	-1.9	-1.7	-1.7	-1.8	-1.7
AVG	22.2	-0.5	-0.2	-0.3	0.2	-0.3
STD	2.8	0.5	0.9	0.7	0.8	0.8
Open	0	0	0	0	0	0
Tech:	DWR	DWR	DWR	DWR	DWR	DWR
EQUIP. ID	1278	1278	1278	1278	1278	1278
	1670	1670	1670	1670	1670	1670

Low Level Contact Resistance - Delta Values

Project:	215134C				Spec: EIA 364 TP 23	
Customer:	Samtec				Subgroup: Group 3 No Lube	
Product:	PCIE-064-02-S-D-RA				File No.:	215134B23
Description:					Tech:	DWR
Open Circuit Voltage:		20mV			Current:	100mA
Units:	milliohms					
Temp ºC	22°C	22°C	21°C	21°C	21°C	21°C
R.H. %	37%	35%	51%	43%	45%	45%
Date:	30-Apr-15	01-May-15	12-May-15	13-May-15	20-May-15	20-May-15
Pos. ID	Initial	20X	MFG 7D	1X	MFG 7D	1X
			Unmated		Mated	
23-1	19.0	-0.3	-0.4	-0.6	0.8	-0.1
23-2	19.1	-0.3	1.5	-0.4	0.7	-0.2
23-3	19.5	-0.5	-0.2	-0.3	-1.2	0.8
23-4	19.5	-0.2	-0.4	-0.1	0.3	-0.4
23-5	20.8	-1.6	-1.0	-0.8	1.2	-1.2
23-6	19.2	-0.3	-0.6	-1.0	1.1	-0.4
23-7	19.8	-1.2	0.2	-0.8	-0.4	0.2
23-8	24.8	-0.1	-1.0	-0.8	-0.1	-1.3
23-9	25.9	-2.4	-1.7	-1.5	-1.4	-1.6
23-10	25.4	0.0	-0.3	0.3	1.1	-0.1
23-11	24.1	0.4	0.5	0.1	1.8	0.5
23-12	24.4	0.9	-1.6	0.1	1.6	-0.2
23-13	25.0	-0.4	1.0	-0.5	0.6	-0.1
23-14	25.8	-1.9	-1.6	-1.8	-1.2	-2.1
23-15	24.4	-0.3	0.1	-0.3	1.0	0.2
23-16	24.9	1.9	-0.6	0.1	0.9	-0.3
23-17	24.1	0.0	0.9	0.4	1.9	0.7
23-18	19.8	-0.3	-0.5	-0.8	-1.2	-0.5
23-19	20.9	-1.7	-0.9	-1.4	-1.0	-0.7
23-20	19.2	-0.2	-0.1	-0.8	0.6	-0.2
23-21	19.6	-0.3	-0.5	-0.2	0.8	0.3
23-22	19.3	-0.1	0.1	-0.2	-1.6	-0.1
23-23	19.2	2.1	0.2	0.0	1.5	-0.2
23-24	20.0	-0.5	-0.3	-1.3	-0.5	-0.7
MAX	25.9	2.1	1.5	0.4	1.9	0.8
MIN	19.0	-2.4	-1.7	-1.8	-1.6	-2.1
AVG	21.8	-0.3	-0.3	-0.5	0.3	-0.3
STD	2.7	1.0	0.8	0.6	1.1	0.7
Open	0	0	0	0	0	0
Tech:	DWR	DWR	DWR	DWR	DWR	DWR
EQUIP. ID	1278	1278	1278	1278	1278	1278
	1670	1670	1670	1670	1670	1670

Low Level Contact Resistance - Delta Values						
Project:	215134C				Spec: EIA 364 TP 23	
Customer:	Samtec				Subgroup: Group 3 No Lube	
Product:	PCIE-064-02-S-D-RA				File No.:	215134B24
Description:					Tech:	DWR
Open Circuit Voltage:		20mV			Current:	100mA
Units:	milliohms					
Temp ºC	22°C	22°C	21°C	21°C	21°C	21°C
R.H. %	37%	35%	51%	43%	45%	45%
Date:	30-Apr-15	01-May-15	12-May-15	13-May-15	20-May-15	20-May-15
Pos. ID	Initial	20X	MFG 7D	1X	MFG 7D	1X
			Unmated		Mated	
24-1	19.1	1.2	1.7	1.6	1.6	-0.3
24-2	19.5	-0.7	0.4	0.2	0.2	0.0
24-3	17.7	1.6	1.0	1.0	2.4	1.4
24-4	18.4	0.3	0.5	0.5	1.5	1.7
24-5	20.2	-0.2	0.6	1.9	1.1	-0.1
24-6	19.7	-0.1	-0.5	-0.2	2.5	0.1
24-7	19.1	-0.1	0.3	0.7	2.1	0.0
24-8	24.0	0.0	0.3	0.4	0.2	-1.3
24-9	24.2	0.0	-0.4	-0.1	0.1	-0.2
24-10	26.0	-0.9	-1.3	-1.5	-1.6	-1.6
24-11	24.3	-0.1	-0.3	0.1	-0.7	-0.1
24-12	24.4	0.5	0.3	0.3	0.0	1.4
24-13	25.0	-0.4	-0.5	0.0	-0.3	0.2
24-14	24.4	-0.1	-0.1	0.2	-0.9	-0.6
24-15	24.2	0.0	0.5	0.2	0.1	-0.1
24-16	24.5	0.0	0.3	0.6	0.4	0.1
24-17	24.9	-0.3	-0.7	-0.1	-0.1	0.0
24-18	19.9	0.0	0.4	0.9	0.4	0.0
24-19	20.3	-0.3	-0.3	0.4	-1.0	0.0
24-20	20.5	-0.5	-0.7	2.0	0.6	-0.6
24-21	20.0	-0.1	-0.4	0.7	0.1	-0.2
24-22	19.9	-0.3	0.1	0.5	-0.7	-1.3
24-23	19.6	-0.3	0.0	0.5	0.8	-0.4
24-24	20.0	-0.1	0.3	0.4	0.3	-0.1
MAX	26.0	1.6	1.7	2.0	2.5	1.7
MIN	17.7	-0.9	-1.3	-1.5	-1.6	-1.6
AVG	21.7	0.0	0.1	0.5	0.4	-0.1
STD	2.6	0.5	0.6	0.7	1.0	0.8
Open	0	0	0	0	0	0
Tech:	DWR	DWR	DWR	DWR	DWR	DWR
EQUIP. ID	1278	1278	1278	1278	1278	1278
	1670	1670	1670	1670	1670	1670