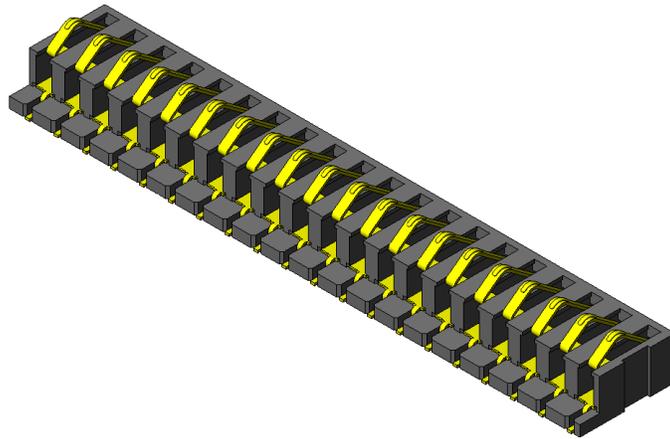




Project Number: Design Qualification Test Report	Tracking Code: 233517_Report_Rev_3
Requested by: Catie Eichhorn	Date: 2/28/2015
Part #: SIB-130-02-F-S-LC/PCB	Tech: Craig Ryan
Part description: SIB/PCB	Qty to test: 65
Test Start: 12/17/2012	Test Completed: 2/08/2012



## **DESIGN QUALIFICATION TEST REPORT**

**SIB/PCB**  
**SIB-130-02-F-S-LC/PCB**

Tracking Code: 233517_Report_Rev_3	Part #: SIB-130-02-F-S-LC/PCB
Part description: SIB/PCB	

**REVISION HISTORY**

<b>DATA</b>	<b>REV.NUM.</b>	<b>DESCRIPTION</b>	<b>ENG</b>
1/4/2013	1	Initial Issue	CR
7/4/2013	2	Update the test data	PC
2/19/2014	3	Update the test data	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

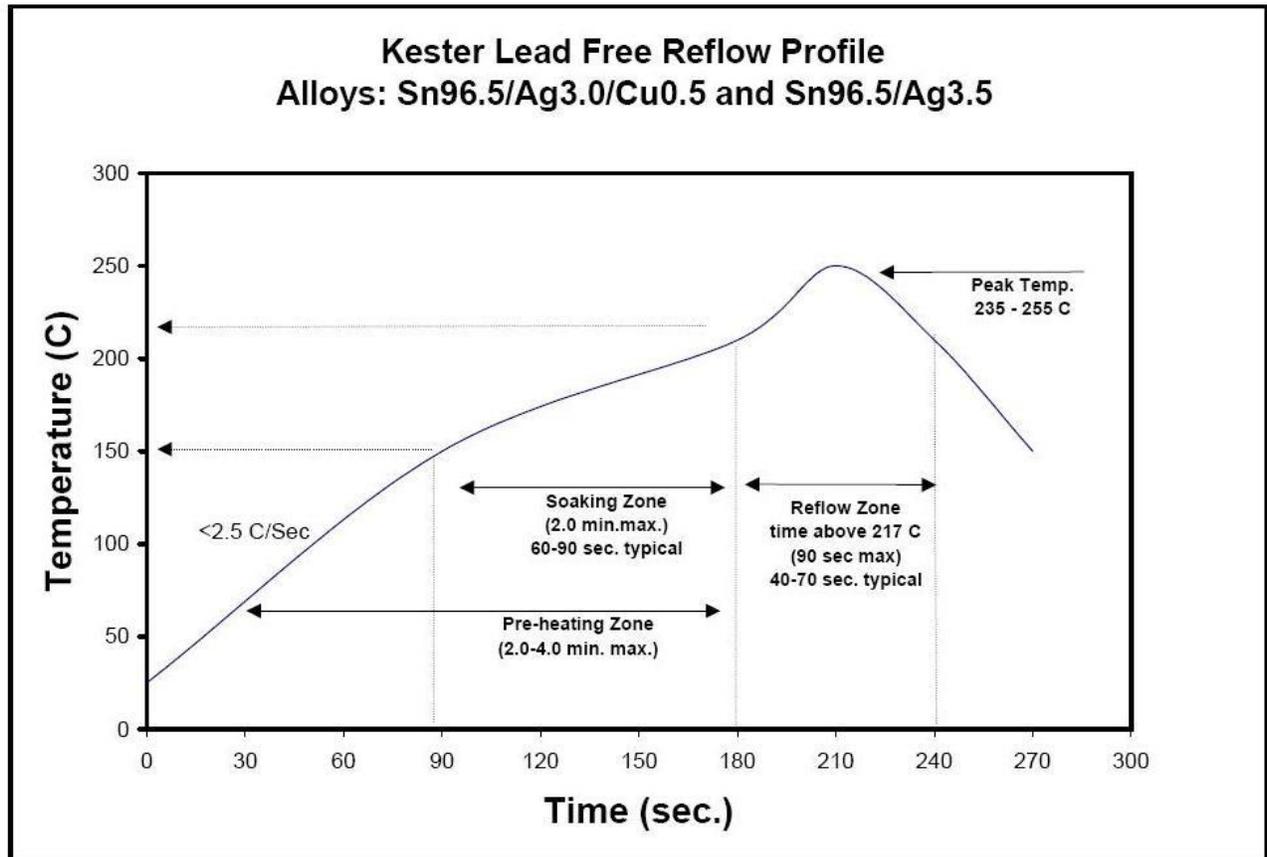
To perform the following tests: Design Qualification Test, Please see test plan.

### 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) Re-Flow Time/Temp: See accompanying profile.
- 10) Samtec Test PCBs used: PCB-104168-TST-XX

**TYPICAL OVEN PROFILE (Soldering Parts to Test Boards)**

**FLOWCHARTS****Gas Tight**

TEST STEP	GROUP A1 192 Points
01	LLCR-1
02	Gas Tight
03	LLCR-2

Gas Tight = EIA-364-36A

LLCR = EIA-364-23, LLCR

20 mV Max, 100 mA Max

Use Keithley 580 or 3706 in 4 wire dry circuit mode

**Thermal Aging**

TEST STEP	GROUP A1 8 Boards Thermal Aging (Mated)
01	Contact Gaps
02	Forces - Mating / Unmating
03	LLCR-1
04	Thermal Aging (Mated and Undisturbed)
05	LLCR-2
06	Forces - Mating / Unmating
07	Contact Gaps

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

Time Condition 'B' (250 Hours)

Mating / Unmating Forces = EIA-364-13

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

Gaps to be taken on a minimum of 20% of each part tested

LLCR = EIA-364-23, LLCR

20 mV Max, 100 mA Max

Use Keithley 580 or 3706 in 4 wire dry circuit mode

**FLOWCHARTS Continued****Durability/Mating/Unmating/Gaps**

<b>TEST STEP</b>	<b>GROUP A1 8 Boards (largest position submitted)</b>	<b>GROUP A2 8 Boards (middle position submitted)</b>	<b>GROUP A3 8 Boards (smallest position submitted)</b>
01	Contact Gaps	Contact Gaps	Contact Gaps
02	LLCR-1	Force - Mating	Force - Mating
03	Force - Mating	25 Cycles	25 Cycles
04	25 Cycles	Force - Mating	Force - Mating
05	Force - Mating	25 Cycles (50 Total)	25 Cycles (50 Total)
06	25 Cycles (50 Total)	Force - Mating	Force - Mating
07	Force - Mating	25 Cycles (75 Total)	25 Cycles (75 Total)
08	25 Cycles (75 Total)	Force - Mating	Force - Mating
09	Force - Mating	25 Cycles (100 Total)	25 Cycles (100 Total)
10	25 Cycles (100 Total)	Force - Mating	Force - Mating
11	Force - Mating		
12	Clean w/Compressed Air		
13	Contact Gaps		
14	LLCR-2		
15	Thermal Shock (Mated and Undisturbed)		
16	LLCR-3		
17	Cyclic Humidity (Mated and Undisturbed)		
18	LLCR-4		
19	Forces - Mating / Unmating		

Thermal Shock = EIA-364-32, Table II, Test Condition I:

-55°C to +85°C 1/2 hour dwell, 100 cycles

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

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

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

Mating / Unmating Forces = EIA-364-13

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

Gaps to be taken on a minimum of 20% of each part tested

LLCR = EIA-364-23, LLCR

20 mV Max, 100 mA Max

Use Keithley 580 or 3706 in 4 wire dry circuit mode

**FLOWCHARTS Continued****IR & DWV**

<b>TEST STEP</b>	<b>GROUP A1  2 Mated Sets  Break Down Pin-to-Pin</b>	<b>GROUP A2 2 Unmated of Part # Being Tested  Break Down Pin-to-Pin</b>	<b>GROUP B1  2 Mated Sets  Pin-to-Pin</b>
<b>01</b>	DWV/Break Down Voltage	DWV/Break Down Voltage	IR & DWV at test voltage (on both mated sets and on each connector unmated)
<b>02</b>			Thermal Shock (Mated and Undisturbed)
<b>03</b>			IR & DWV at test voltage (on both mated sets and on each connector unmated)
<b>04</b>			Cyclic Humidity (Mated and Undisturbed)
<b>05</b>			IR & DWV at test voltage (on both mated sets and on each connector unmated)

DWV on Group B1 to be performed at Test Voltage

DWV test voltage is equal to 75% of the lowest break down voltage from Groups A1, A2 or A3

Thermal Shock = EIA-364-32, Table II, Test Condition I:

-55°C to +85°C 1/2 hour dwell, 100 cycles

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

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

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

IR = EIA-364-21

DWV = EIA-364-20, Test Condition 1

### FLOWCHARTS Continued

**Normal Force**

TEST STEP	GROUP A1 Individual Contacts (8-10 min)	GROUP A2 Individual Contacts (8-10 min)
01	Contact Gaps	Contact Gaps
02	Setup Approved	Thermal Aging (Mated and Undisturbed)
03	Normal Force (in the body and soldered on PCB unless otherwise specified)	Contact Gaps
04		Setup Approved
05		Normal Force (in the body and soldered on PCB unless otherwise specified)

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

Time Condition 'B' (250 Hours)

Normal Force = EIA-364-04

(Perpendicular) Displacement Force = 12.7 mm/min ± 6 mm/min

Spec is 50 N @ 1 mm displacement

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

Gaps to be taken on a minimum of 20% of each part tested

**Current Carrying Capacity - Single Row**

TEST STEP	GROUP A1 3 Mated Assemblies 1 Contact Powered	GROUP A2 3 Mated Assemblies 2 Contacts Powered	GROUP A3 3 Mated Assemblies 3 Contacts Powered	GROUP A4 3 Mated Assemblies 4 Contacts Powered	GROUP A5 3 Mated Assemblies All Contacts Powered
01	CCC	CCC	CCC	CCC	CCC

(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

CCC, Temp rise = EIA-364-70

**FLOWCHARTS Continued****Extended Life**

<b>TEST STEP</b>	<b>GROUP A1 192 Points 1000 Cycles</b>	<b>GROUP B1 192 Points 2500 Cycles</b>	<b>GROUP C1 192 Points 5000 Cycles</b>
<b>01</b>	* Plating Thickness Verification	* Plating Thickness Verification	* Plating Thickness Verification
<b>02</b>	LLCR-1	LLCR-1	LLCR-1
<b>03</b>	1000 Cycles	2500 Cycles	5000 Cycles
<b>04</b>	Clean Mating Interface	Clean Mating Interface	Clean Mating Interface
<b>05</b>	LLCR-2	LLCR-2	LLCR-2
<b>06</b>	Thermal Shock (Mated and undisturbed)		
<b>07</b>	LLCR-3		
<b>08</b>	Cyclic Humidity (Mated and undisturbed)		
<b>09</b>	LLCR-4		
<b>10</b>	*** Photos of Contact Area		

Thermal Shock = EIA-364-32, Table II, Test Condition I:

-55°C to +85°C 1/2 hour dwell, 100 cycles

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

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

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

LLCR = EIA-364-23, LLCR

20 mV Max, 100 mA Max

Use Keithley 580 or 3706 in 4 wire dry circuit mode

\* Measure, verify, and document plating thickness on both male and female (one group only)

\*\* Plating thickness to be measured on loose pins used during assembly. Pins to be provided by requestor.

\*\*\* Save 2-3 photos of contact area in project folder for each group

**FLOWCHARTS Continued****Mechanical Shock / Vibration / LLCR**

<b>TEST STEP</b>	<b>GROUP A1 192 Points</b>
<b>01</b>	LLCR-1
<b>02</b>	Shock
<b>03</b>	Vibration
<b>04</b>	LLCR-2

**Mechanical Shock = EIA 364-27 Half Sine,**

**100 g's, 6 milliSeconds (Condition "C") each axis**

**Vibration = EIA 364-28, Random Vibration**

**7.56 g RMS, Condition VB --- 2 hours/axis**

**LLCR = EIA-364-23, LLCR**

**20 mV Max, 100 mA Max**

**Use Keithley 580 or 3706 in 4 wire dry circuit mode**

**Shock / Vibration / nanoSecond Event Detection**

<b>TEST STEP</b>	<b>GROUP A1 60 Points</b>
<b>01</b>	Event Detection, Shock
<b>02</b>	Event Detection, Vibration

**Mechanical Shock = EIA 364-27 Half Sine,**

**100 g's, 6 milliSeconds (Condition "C") each axis**

**Vibration = EIA 364-28, Random Vibration**

**7.56 g RMS, Condition VB --- 2 hours/axis**

**Event detection requirement during Shock / Vibration is 50 nanoseconds minimum**

## 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 G<sup>2</sup> / Hz
- 4) G 'RMS': 7.56
- 5) Frequency: 50 to 2000 Hz
- 6) Duration: 2.0 Hours per axis (3 axis total)

### NANOSECOND-EVENT DETECTION:

- 1) Reference document: EIA-364-87, *Nanosecond-Event Detection for Electrical Connectors*
- 2) Prior to test, the samples were characterized to assure the low nanosecond event being monitored will trigger the detector.
- 3) After characterization it was determined the test samples could be monitored for 50 nanosecond events

## ATTRIBUTE DEFINITIONS

The following is a brief, simplified description of attributes.

### MATING/UNMATING:

- 1) Reference document: EIA-364-13, *Mating and Unmating Forces Test Procedure for Electrical Connectors*.
- 2) The full insertion position was to within 0.003" to 0.004" of the plug bottoming out in the receptacle to prevent damage to the system under test.
- 3) One of the mating parts is secured to a floating X-Y table to prevent damage during cycling.

### NORMAL FORCE (FOR CONTACTS TESTED IN THE HOUSING):

- 1) Reference document: EIA-364-04, *Normal Force Test Procedure for Electrical Connectors*.
- 2) The contacts shall be tested in the connector housing.
- 3) If necessary, a "window" shall be made in the connector body to allow a probe to engage and deflect the contact at the same attitude and distance (plus 0.05 mm [0.002"]) as would occur in actual use.
- 4) The connector housing shall be placed in a holding fixture that does not interfere with or otherwise influence the contact force or deflection.
- 5) Said holding fixture shall be mounted on a floating, adjustable, X-Y table on the base of the Dillon TC<sup>2</sup>, computer controlled test stand with a deflection measurement system accuracy of 5.0  $\mu$ m (0.0002").
- 6) The nominal deflection rate shall be 5 mm (0.2")/minute.
- 7) Unless otherwise noted a minimum of five contacts shall be tested.
- 8) The force/deflection characteristic to load and unload each contact shall be repeated five times.
- 9) The system shall utilize the TC<sup>2</sup> software in order to acquire and record the test data.
- 10) The permanent set of each contact shall be measured within the TC<sup>2</sup> software.
- 11) The acquired data shall be graphed with the deflection data on the X-axis and the force data on the Y-axis and a print out will be stored with the Tracking Code paperwork.

### INSULATION RESISTANCE (IR):

To determine the resistance of insulation materials to leakage of current through or on the surface of these materials when a DC potential is applied.

- 1) PROCEDURE:
  - a. Reference document: EIA-364-21, *Insulation Resistance Test Procedure for Electrical Connectors*.
  - b. Test Conditions:
    - i. Between Adjacent Contacts or Signal-to-Ground
    - ii. Electrification Time 2.0 minutes
    - iii. Test Voltage (500 VDC) corresponds to calibration settings for measuring resistances.
- 2) MEASUREMENTS:
- 3) When the specified test voltage is applied (VDC), the insulation resistance shall not be less than 5000 megohms.

## ATTRIBUTE DEFINITIONS

The following is a brief, simplified description of attributes.

### DIELECTRIC WITHSTANDING VOLTAGE (DWV):

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

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

### 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 three temperature points are reported:
  - a. Ambient
  - b. 85° C
  - c. 95° C
  - d. 115° 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.

**ATTRIBUTE DEFINITIONS**

The following is a brief, simplified description of attributes.

**LLCR:**

- 1) EIA-364-23, *Low Level Contact Resistance Test Procedure for Electrical Connectors and Sockets*.
- 2) A computer program, *LLCR 221.exe*, ensures repeatability for data acquisition.
- 3) The following guidelines are used to categorize the changes in LLCR as a result from stressing
  - a.  $\leq +5.0$  mOhms:----- Stable
  - b.  $+5.1$  to  $+10.0$  mOhms:----- Minor
  - c.  $+10.1$  to  $+15.0$  mOhms:----- Acceptable
  - d.  $+15.1$  to  $+50.0$  mOhms:----- Marginal
  - e.  $+50.1$  to  $+2000$  mOhms:----- Unstable
  - f.  $>+2000$  mOhms:----- Open Failure

**GAS TIGHT:**

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

- 1) EIA-364-23, *Low Level Contact Resistance Test Procedure for Electrical Connectors and Sockets*.
- 2) A computer program, *LLCR 221.exe*, ensures repeatability for data acquisition.
- 3) The following guidelines are used to categorize the changes in LLCR as a result from stressing
  - a.  $\leq +5.0$  mOhms:----- Stable
  - 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  $50^{\circ}$  C
    - ix. The final LLCR shall be conducted within 1 hour after drying.

**RESULTS****Temperature Rise, CCC at a 20% de-rating**

- CCC for a 30°C Temperature Rise -----2.6 A per contact with 1 adjacent signal contacts powered
- CCC for a 30°C Temperature Rise -----2.2 A per contact with 2 adjacent signal contacts powered
- CCC for a 30°C Temperature Rise -----1.9 A per contact with 3 adjacent signal contacts powered
- CCC for a 30°C Temperature Rise -----1.8 A per contact with 4 adjacent signal contacts powered
- CCC for a 30°C Temperature Rise -----1.3 A per contact with all adjacent signal contacts powered

**Mating /unmating force****Mating&Unmating durability (SIB-130-02-F-S-LC/PCB):**

- **Initial**
  - **Mating**
    - **Min** ----- 7.76 Lbs
    - **Max**----- 8.36 Lbs
- **After 25 Cycles**
  - **Mating**
    - **Min** ----- 8.04 Lbs
    - **Max**----- 8.71 Lbs
- **After 50 Cycles**
  - **Mating**
    - **Min** ----- 8.34 Lbs
    - **Max**----- 8.96 Lbs
- **After 75 Cycles**
  - **Mating**
    - **Min** ----- 8.43 Lbs
    - **Max**----- 9.42 Lbs
- **After 100 Cycles**
  - **Mating**
    - **Min** ----- 8.43 Lbs
    - **Max**----- 9.54 Lbs
- **After Humidity**
  - **Mating**
    - **Min** ----- 7.94 Lbs
    - **Max**----- 8.82 Lbs

**Mating/Unmating basic (SIB-120-02-F-S-LC/PCB):**

- **Initial**
  - **Mating**
    - **Min** ----- 5.01 Lbs
    - **Max**----- 5.38 Lbs
- **After 25 Cycles**
  - **Mating**
    - **Min** ----- 5.16 Lbs
    - **Max**----- 5.53 Lbs
- **After 50 Cycles**
  - **Mating**
    - **Min** ----- 5.10 Lbs
    - **Max**----- 5.91 Lbs
- **After 75 Cycles**
  - **Mating**
    - **Min** ----- 5.15 Lbs
    - **Max**----- 5.92 Lbs
- **After 100 Cycles**
  - **Mating**
    - **Min** ----- 5.09 Lbs
    - **Max**----- 6.19 Lbs

**RESULTS Continued**

**Mating/Unmating basic (SIB-105-02-F-S-LC/PCB):**

- **Initial**
  - **Mating**
    - **Min ----- 1.31 Lbs**
    - **Max----- 1.42 Lbs**
- **After 25 Cycles**
  - **Mating**
    - **Min ----- 1.32 Lbs**
    - **Max----- 1.45 Lbs**
- **After 50 Cycles**
  - **Mating**
    - **Min ----- 1.34 Lbs**
    - **Max----- 1.47 Lbs**
- **After 75 Cycles**
  - **Mating**
    - **Min ----- 1.35 Lbs**
    - **Max----- 1.50 Lbs**
- **After 100 Cycles**
  - **Mating**
    - **Min ----- 1.38 Lbs**
    - **Max----- 1.56 Lbs**

**Thermal aging (SIB-130-02-F-S-LC/PCB):**

- **Initial**
  - **Mating**
    - **Min ----- 8.41 Lbs**
    - **Max----- 9.56 Lbs**
- **After thermal aging**
  - **Mating**
    - **Min ----- 8.04 Lbs**
    - **Max----- 8.75 Lbs**

**Normal Force at 0.057 inch deflections**

- **Initial**
  - **Min----- 113.00 gf                      Set ----- 0.0009 Inch**
  - **Max ----- 115.40 gf                      Set ----- 0.0017 Inch**
- **Thermal**
  - **Min----- 110.80 gf                      Set ----- 0.0029 Inch**
  - **Max ----- 119.40 gf                      Set ----- 0.0044 Inch**

**RESULTS Continued****Insulation Resistance minimums, IR****Pin-Pin**

- **Initial**
  - Mated----- 100000Meg  $\Omega$  ----- Pass
  - Unmated ----- 100000Meg  $\Omega$  ----- Pass
- **Thermal**
  - Mated----- 100000Meg  $\Omega$  ----- Pass
  - Unmated ----- 100000Meg  $\Omega$  ----- Pass
- **Humidity**
  - Mated----- 100000Meg  $\Omega$  ----- Pass
  - Unmated ----- 100000Meg  $\Omega$  ----- Pass

**Dielectric Withstanding Voltage minimums, DWV**

- **Minimums**
  - Breakdown Voltage----- 1700 VAC
  - Test Voltage ----- 1275 VAC
  - Working Voltage -----425 VAC

**Pin - pin**

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

**LLCR Durability (191 pin LLCR test points)**

- **Initial** ----- 16.51 mOhms Max
- **After 100 Cycles**
  - $\leq +5.0$  mOhms ----- 191 Points ----- Stable
  - $+5.1$  to  $+10.0$  mOhms -----0 Points ----- Minor
  - $+10.1$  to  $+15.0$  mOhms -----0 Points ----- Acceptable
  - $+15.1$  to  $+50.0$  mOhms -----0 Points ----- Marginal
  - $+50.1$  to  $+2000$  mOhms -----0 Points ----- Unstable
  - $>+2000$  mOhms -----0 Points ----- Open Failure
- **After thermal shock**
  - $\leq +5.0$  mOhms ----- 191 Points ----- Stable
  - $+5.1$  to  $+10.0$  mOhms -----0 Points ----- Minor
  - $+10.1$  to  $+15.0$  mOhms -----0 Points ----- Acceptable
  - $+15.1$  to  $+50.0$  mOhms -----0 Points ----- Marginal
  - $+50.1$  to  $+2000$  mOhms -----0 Points ----- Unstable
  - $>+2000$  mOhms -----0 Points ----- Open Failure
- **After humidity**
  - $\leq +5.0$  mOhms ----- 191 Points ----- Stable
  - $+5.1$  to  $+10.0$  mOhms -----0 Points ----- Minor
  - $+10.1$  to  $+15.0$  mOhms -----0 Points ----- Acceptable
  - $+15.1$  to  $+50.0$  mOhms -----0 Points ----- Marginal
  - $+50.1$  to  $+2000$  mOhms -----0 Points ----- Unstable
  - $>+2000$  mOhms -----0 Points ----- Open Failure

**RESULTS Continued**

**LLCR Thermal aging (192 pin LLCR test points)**

- **Initial** ----- 16.17 mOhms Max
- **Thermal**
  - <= +5.0 mOhms ----- 192 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 (192 pin LLCR test points)**

- **Initial** ----- 16.06 mOhms Max
- **Gas-Tight**
  - <= +5.0 mOhms ----- 192 Points ----- Stable
  - +5.1 to +10.0 mOhms ----- 0 Points ----- Minor
  - +10.1 to +15.0 mOhms ----- 0 Points ----- Acceptable
  - +15.1 to +50.0 mOhms ----- 0 Points ----- Marginal
  - +50.1 to +2000 mOhms ----- 0 Points ----- Unstable
  - >+2000 mOhms ----- 0 Points ----- Open Failure

**LLCR Shock &Vibration (192 pin LLCR test points)**

- **Initial** ----- 16.23 mOhms Max
- **Shock &Vibration**
  - <= +5.0 mOhms ----- 192 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**----- Passed
  - **50 Nanoseconds**----- Passed
- **Vibration**
  - **No Damage**----- Passed
  - **50 Nanoseconds**----- Passed

**RESULTS Continued****LLCR ELP (192 pin LLCR test points)****1000 cycles**

- **Initial** ----- 15.59 mOhms Max
- **After 1000 Cycles**
  - **<= +5.0 mOhms** ----- 192 Points ----- Stable
  - **+5.1 to +10.0 mOhms** ----- 0 Points ----- Minor
  - **+10.1 to +15.0 mOhms** ----- 0 Points ----- Acceptable
  - **+15.1 to +50.0 mOhms** ----- 0 Points ----- Marginal
  - **+50.1 to +2000 mOhms** ----- 0 Points ----- Unstable
  - **>+2000 mOhms** ----- 0 Points ----- Open Failure
- **After thermal shock**
  - **<= +5.0 mOhms** ----- 192 Points ----- Stable
  - **+5.1 to +10.0 mOhms** ----- 0 Points ----- Minor
  - **+10.1 to +15.0 mOhms** ----- 0 Points ----- Acceptable
  - **+15.1 to +50.0 mOhms** ----- 0 Points ----- Marginal
  - **+50.1 to +2000 mOhms** ----- 0 Points ----- Unstable
  - **>+2000 mOhms** ----- 0 Points ----- Open Failure
- **After humidity**
  - **<= +5.0 mOhms** ----- 192 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

**2500 cycles**

- **Initial** ----- 17.81 mOhms Max
- **After 2500 Cycles**
  - **<= +5.0 mOhms** ----- 192 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

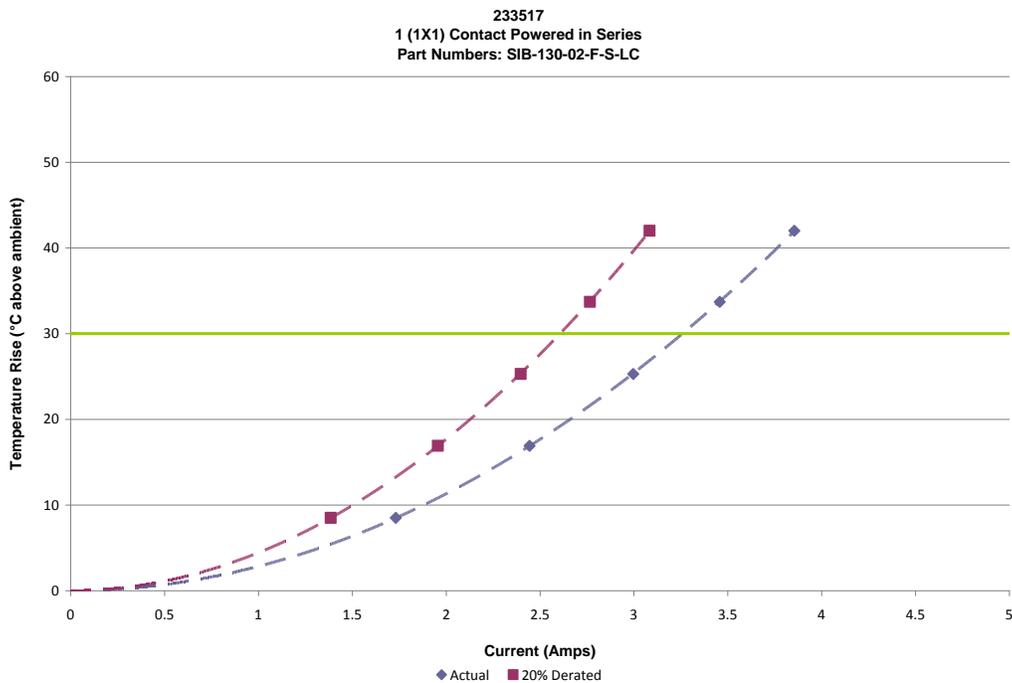
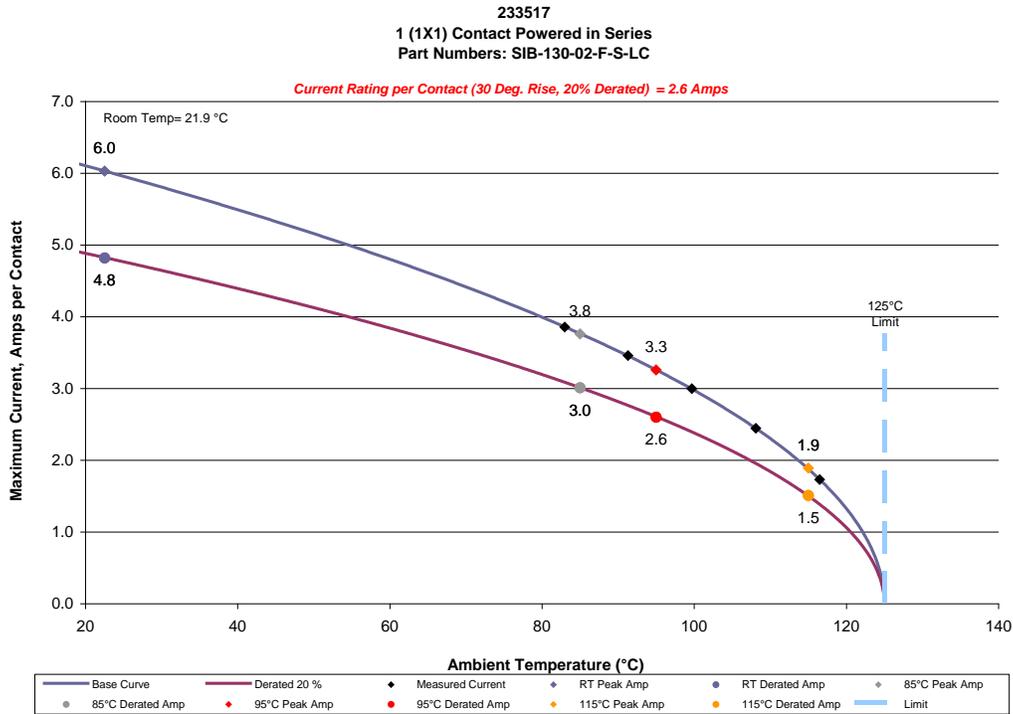
**5000 cycles**

- **Initial** ----- 18.80 mOhms Max
- **After 5000 Cycles**
  - **<= +5.0 mOhms** ----- 192 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

### DATA SUMMARIES

#### TEMPERATURE RISE (Current Carrying Capacity, CCC):

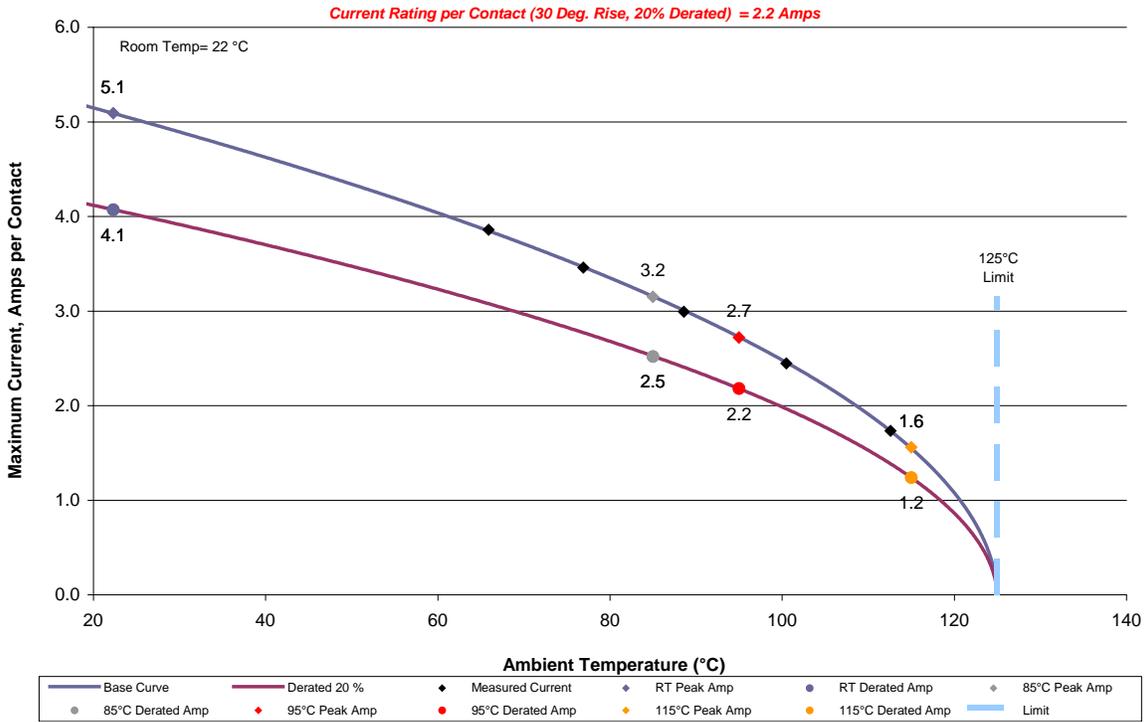
- 1) High quality thermocouples whose temperature slopes track one another were used for temperature monitoring.
- 2) The thermocouples were placed at a location to sense the maximum temperature generated during testing.
- 3) Temperature readings recorded are those for which three successive readings,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



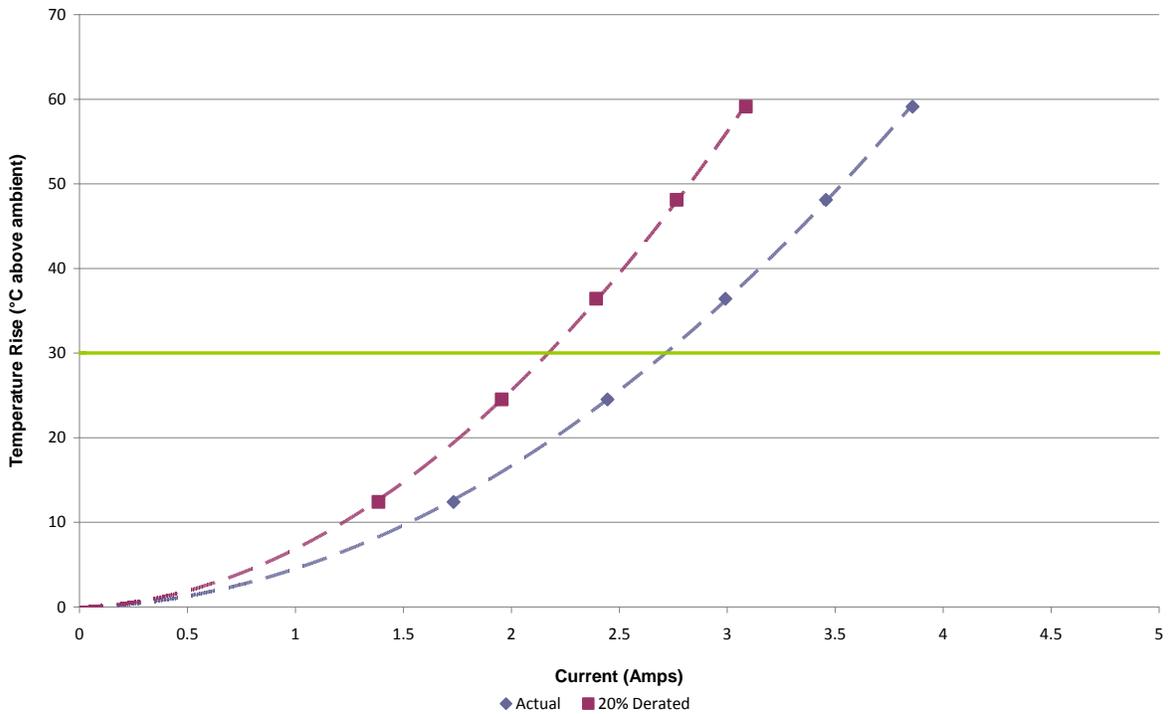
### DATA SUMMARIES Continued

b. Linear configuration with 2 adjacent signal conductors/contacts powered

233517  
 2 (1X2) Contacts Powered in Series  
 Part Numbers: SIB-130-02-F-S-LC



233517  
 2 (1X2) Contacts Powered in Series  
 Part Numbers: SIB-130-02-F-S-LC

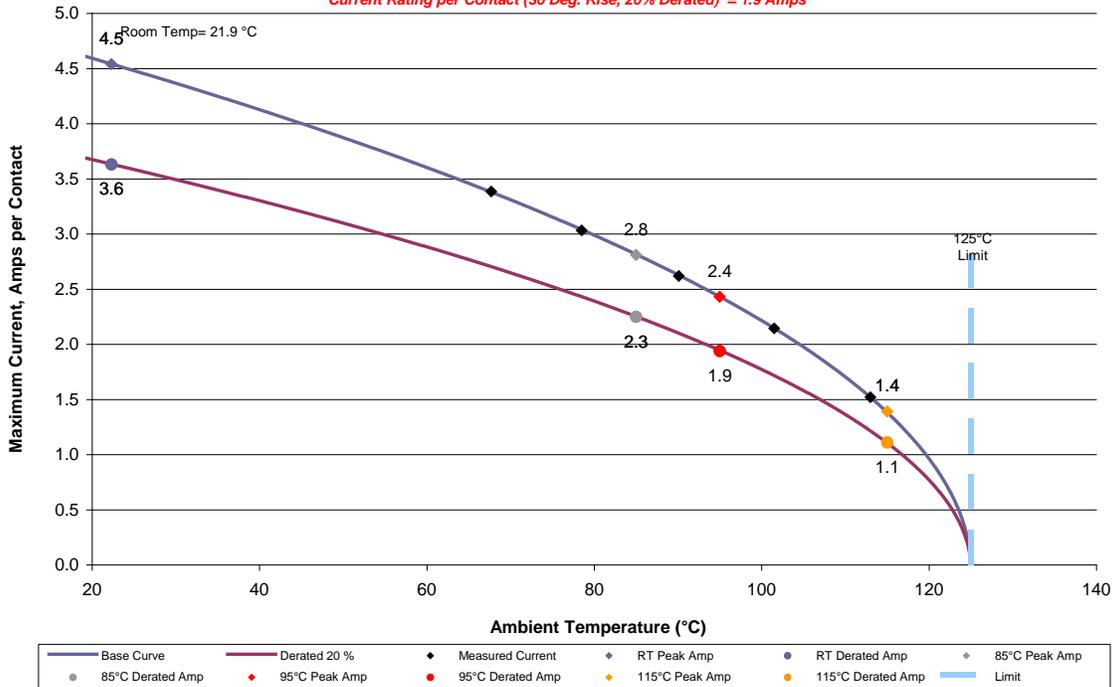


### DATA SUMMARIES Continued

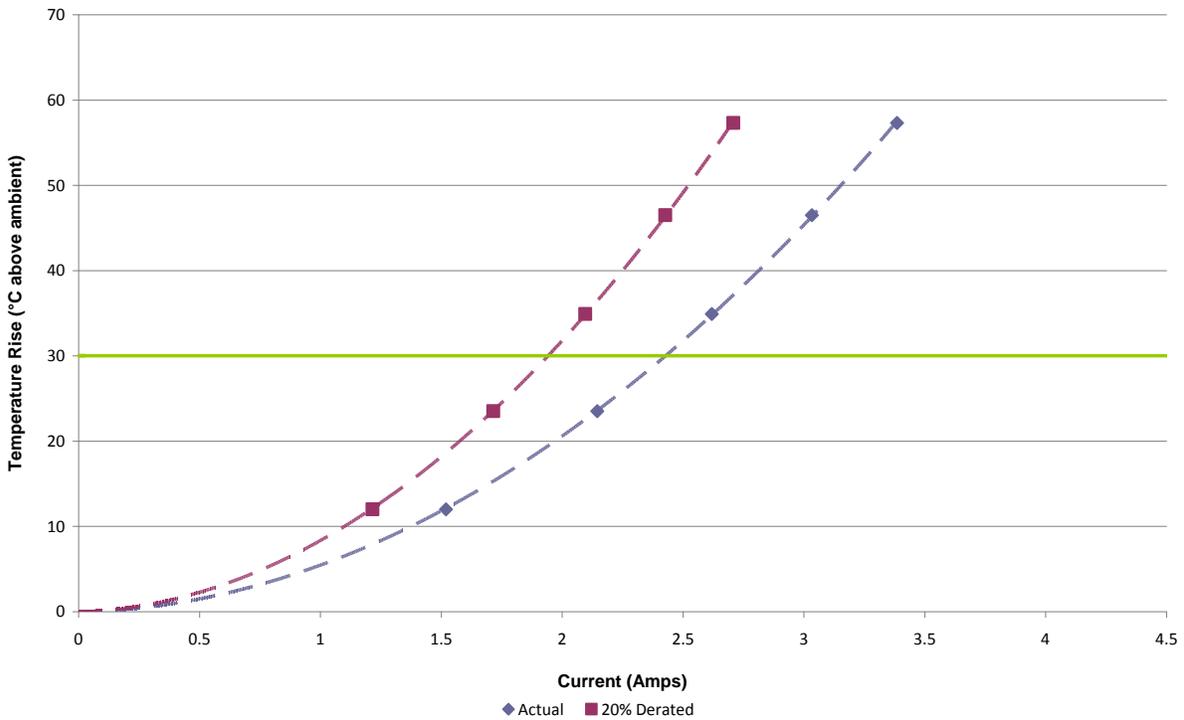
c. Linear configuration with 3 adjacent signal conductors/contacts powered

233517  
3 (1X3) Contacts Powered in Series  
Part Numbers: SIB-130-02-F-S-LC

Current Rating per Contact (30 Deg. Rise, 20% Derated) = 1.9 Amps



233517  
3 (1X3) Contacts Powered in Series  
Part Numbers: SIB-130-02-F-S-LC

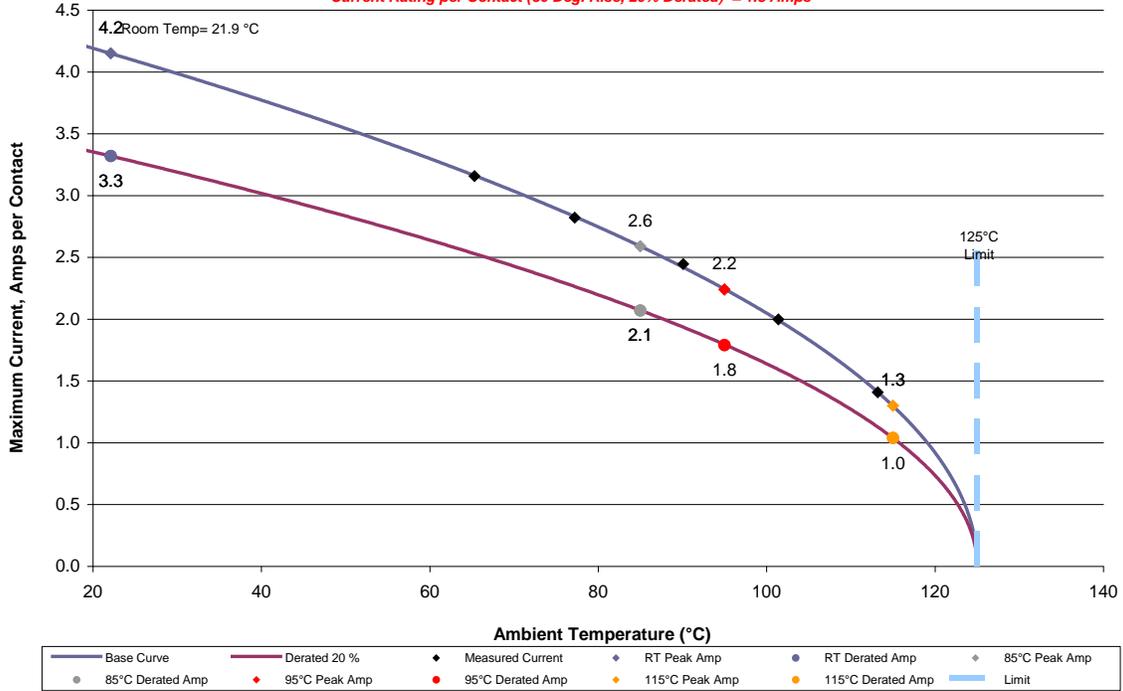


**DATA SUMMARIES Continued**

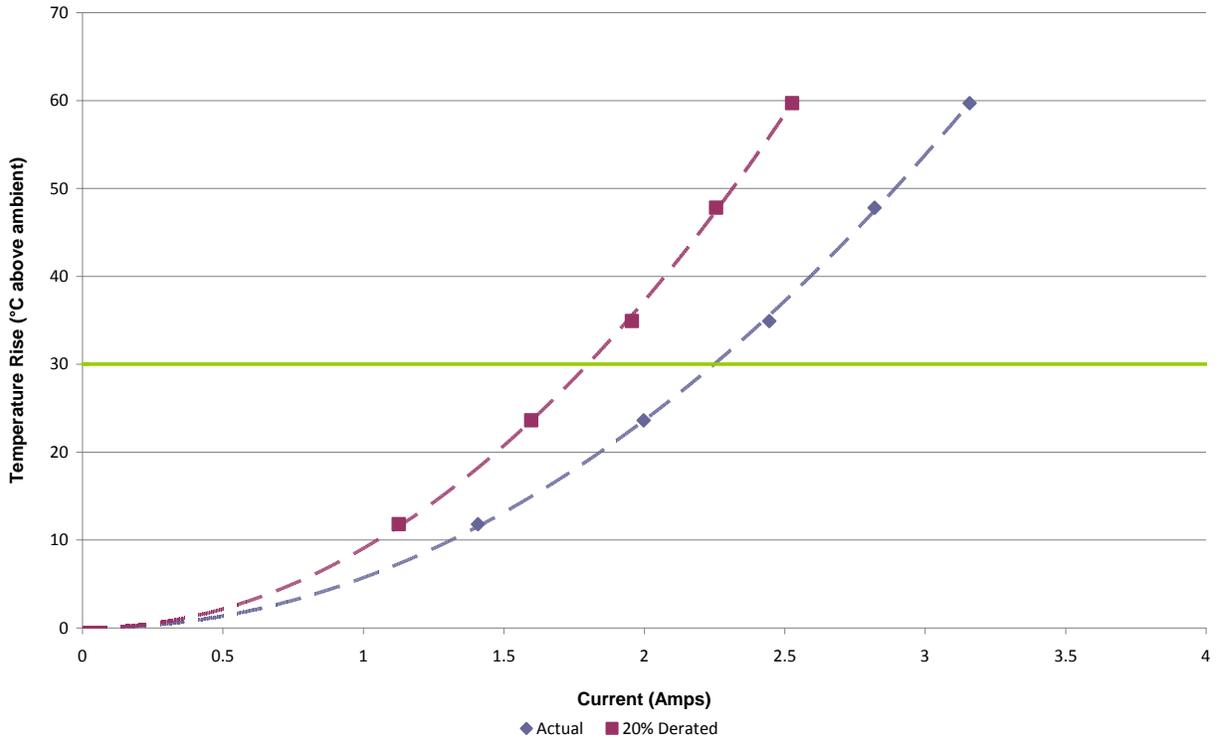
d. Linear configuration with 4 adjacent signal conductors/contacts powered

233517  
4 (1X4) Contacts Powered in Series  
Part Numbers: SIB-130-02-F-S-LC

Current Rating per Contact (30 Deg. Rise, 20% Derated) = 1.8 Amps



233517  
4 (1X4) Contacts Powered in Series  
Part Numbers: SIB-130-02-F-S-LC

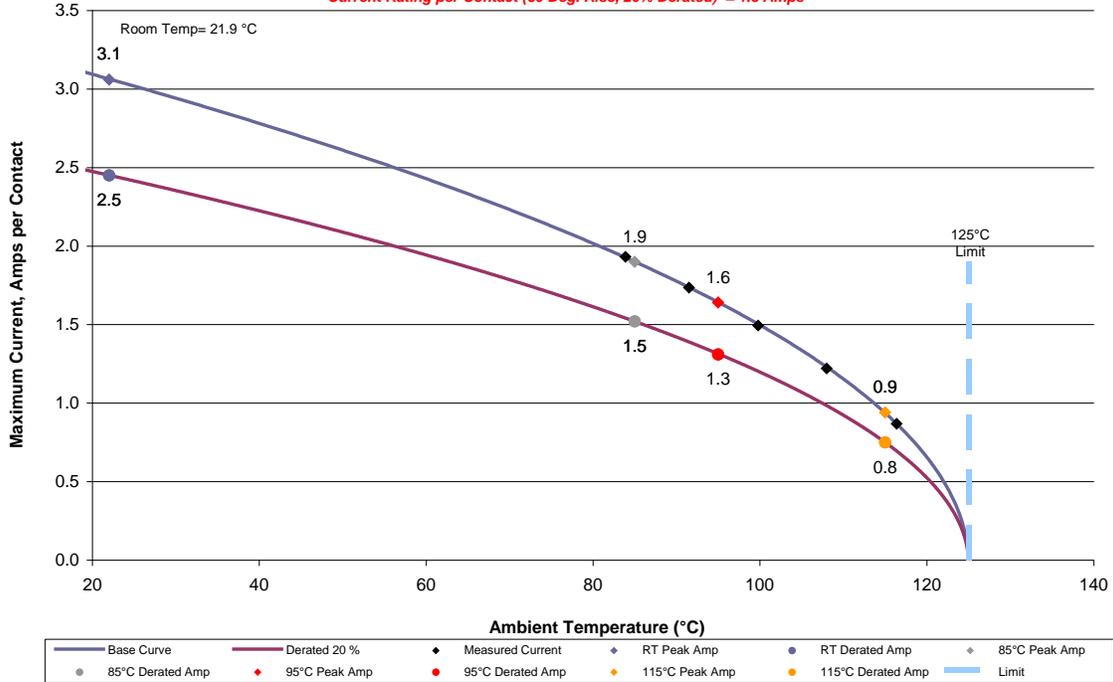


### DATA SUMMARIES Continued

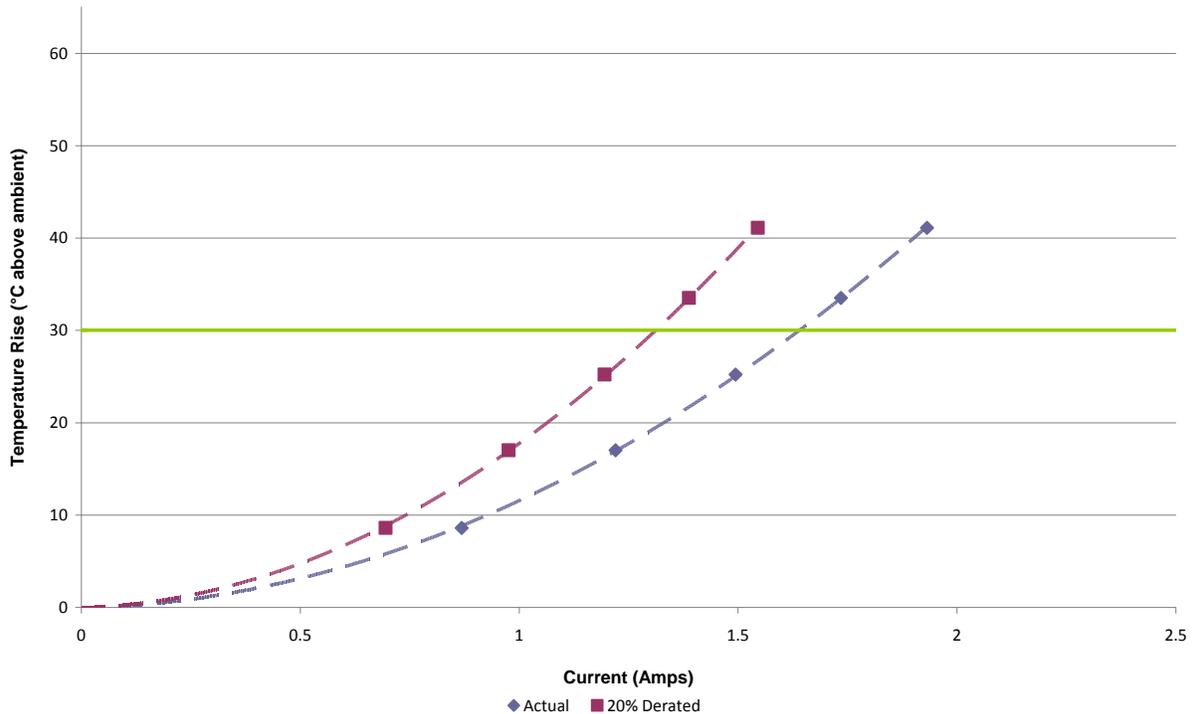
e. Linear configuration with all adjacent signal conductors/contacts powered

233517  
30 (All Power) Contacts Powered in Series  
Part Numbers: SIB-130-02-F-S-LC

Current Rating per Contact (30 Deg. Rise, 20% Derated) = 1.3 Amps



233517  
30 (All Power) Contacts Powered in Series  
Part Numbers: SIB-130-02-F-S-LC



**DATA SUMMARIES Continued****MATING/UNMATING FORCE:****Thermal aging (SIB-130-02-F-S-LC/PCB)**

	Initial				After Thermals			
	Mating		Unmating		Mating		Unmating	
	Newton's	Force (Lbs)	Newton's	Force (Lbs)	Newton's	Force (Lbs)	Newton's	Force (Lbs)
Minimum	37.41	8.41	0.00	0.00	35.76	8.04	0.00	0.00
Maximum	42.52	9.56	0.00	0.00	38.92	8.75	0.00	0.00
<b>Average</b>	39.55	<b>8.89</b>	0.00	<b>0.00</b>	37.71	<b>8.48</b>	0.00	<b>0.00</b>
St Dev	1.53	0.34	0.00	0.00	1.05	0.24	0.00	0.00
Count	8	8	8	8	8	8	8	8

**Mating/Unmating durability (SIB-130-02-F-S-LC/PCB):**

	Initial				After 25 Cycles			
	Mating		Unmating		Mating		Unmating	
	Newton's	Force (Lbs)	Newton's	Force (Lbs)	Newton's	Force (Lbs)	Newton's	Force (Lbs)
Minimum	34.52	7.76	0.00	0.00	35.76	8.04	0.00	0.00
Maximum	37.19	8.36	0.00	0.00	38.74	8.71	0.00	0.00
<b>Average</b>	36.28	<b>8.16</b>	0.00	<b>0.00</b>	36.94	<b>8.31</b>	0.00	<b>0.00</b>
St Dev	0.88	0.20	0.00	0.00	0.96	0.21	0.00	0.00
Count	8	8	8	8	8	8	8	8
	After 50 Cycles				After 75 Cycles			
	Mating		Unmating		Mating		Unmating	
	Newton's	Force (Lbs)	Newton's	Force (Lbs)	Newton's	Force (Lbs)	Newton's	Force (Lbs)
Minimum	37.10	8.34	0.00	0.00	37.50	8.43	0.00	0.00
Maximum	39.85	8.96	0.00	0.00	41.90	9.42	0.00	0.00
<b>Average</b>	38.30	<b>8.61</b>	0.00	<b>0.00</b>	39.53	<b>8.89</b>	0.00	<b>0.00</b>
St Dev	0.86	0.19	0.00	0.00	1.23	0.28	0.00	0.00
Count	8	8	8	8	8	8	8	8
	After 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	37.50	8.43	0.00	0.00	35.32	7.94	0.00	0.00
Maximum	42.43	9.54	0.00	0.00	39.23	8.82	0.00	0.00
<b>Average</b>	40.10	<b>9.02</b>	0.00	<b>0.00</b>	37.65	<b>8.46</b>	0.00	<b>0.00</b>
St Dev	1.48	0.33	0.00	0.00	1.28	0.29	0.00	0.00
Count	8	8	8	8	8	8	8	8

**DATA SUMMARIES Continued****Mating/Unmating basic (SIB-120-02-F-S-LC/PCB):**

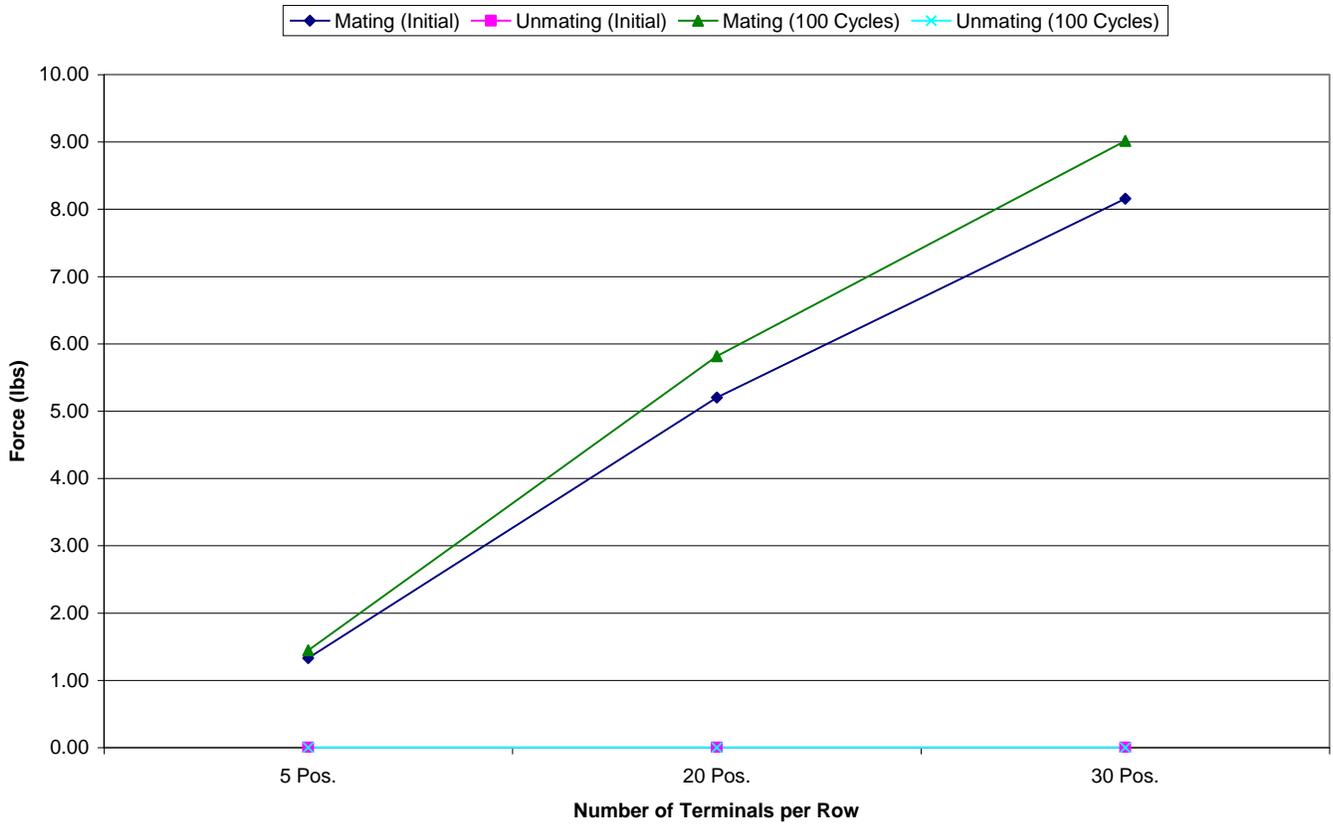
	Initial				After 25 Cycles			
	Mating		Unmating		Mating		Unmating	
	Newton's	Force (Lbs)	Newton's	Force (Lbs)	Newton's	Force (Lbs)	Newton's	Force (Lbs)
Minimum	22.27	5.01	0.00	0.00	22.96	5.16	0.00	0.00
Maximum	23.91	5.38	0.00	0.00	24.59	5.53	0.00	0.00
<b>Average</b>	23.13	<b>5.20</b>	0.00	<b>0.00</b>	23.84	<b>5.36</b>	0.00	<b>0.00</b>
St Dev	0.69	0.16	0.00	0.00	0.64	0.14	0.00	0.00
Count	8	8	8	8	8	8	8	8
	After 50 Cycles				After 75 Cycles			
	Mating		Unmating		Mating		Unmating	
	Newton's	Force (Lbs)	Newton's	Force (Lbs)	Newton's	Force (Lbs)	Newton's	Force (Lbs)
Minimum	22.68	5.10	0.00	0.00	22.92	5.15	0.00	0.00
Maximum	26.27	5.91	0.00	0.00	26.34	5.92	0.00	0.00
<b>Average</b>	24.81	<b>5.58</b>	0.00	<b>0.00</b>	25.32	<b>5.69</b>	0.00	<b>0.00</b>
St Dev	1.10	0.25	0.00	0.00	1.27	0.28	0.00	0.00
Count	8	8	8	8	8	8	8	8
	After 100 Cycles							
	Mating		Unmating					
	Newton's	Force (Lbs)	Newton's	Force (Lbs)				
Minimum	22.62	5.09	0.00	0.00				
Maximum	27.53	6.19	0.00	0.00				
<b>Average</b>	25.88	<b>5.82</b>	0.00	<b>0.00</b>				
St Dev	1.75	0.39	0.00	0.00				
Count	8	8	8	8				

**DATA SUMMARIES Continued****Mating/Unmating basic (SIB-105-02-F-S-LC/PCB):**

	Initial				After 25 Cycles			
	Mating		Unmating		Mating		Unmating	
	Newton	Force (Lbs)	Newton	Force (Lbs)	Newton	Force (Lbs)	Newton	Force (Lbs)
Minimum	5.77	1.30	0.00	0.00	5.88	1.32	0.00	0.00
Maximum	6.32	1.42	0.00	0.00	6.46	1.45	0.00	0.00
<b>Average</b>	5.92	<b>1.33</b>	0.00	<b>0.00</b>	6.05	<b>1.36</b>	0.00	<b>0.00</b>
St Dev	0.18	0.04	0.00	0.00	0.19	0.04	0.00	0.00
Count	8	8	8	8	8	8	8	8
	After 50 Cycles				After 75 Cycles			
	Mating		Unmating		Mating		Unmating	
	Newton	Force (Lbs)	Newton	Force (Lbs)	Newton	Force (Lbs)	Newton	Force (Lbs)
Minimum	5.94	1.34	0.00	0.00	6.02	1.35	0.00	0.00
Maximum	6.56	1.47	0.00	0.00	6.69	1.50	0.00	0.00
<b>Average</b>	6.19	<b>1.39</b>	0.00	<b>0.00</b>	6.33	<b>1.42</b>	0.00	<b>0.00</b>
St Dev	0.21	0.05	0.00	0.00	0.23	0.05	0.00	0.00
Count	8	8	8	8	8	8	8	8
	After 100 Cycles							
	Mating		Unmating					
	Newton	Force (Lbs)	Newton	Force (Lbs)				
Minimum	6.12	1.38	0.00	0.00				
Maximum	6.92	1.56	0.00	0.00				
<b>Average</b>	6.43	<b>1.45</b>	0.00	<b>0.00</b>				
St Dev	0.30	0.07	0.00	0.00				
Count	8	8	8	8				

### DATA SUMMARIES Continued

#### Mating/Unmating Data for 5, 20 and 30 Position SIB/PCB

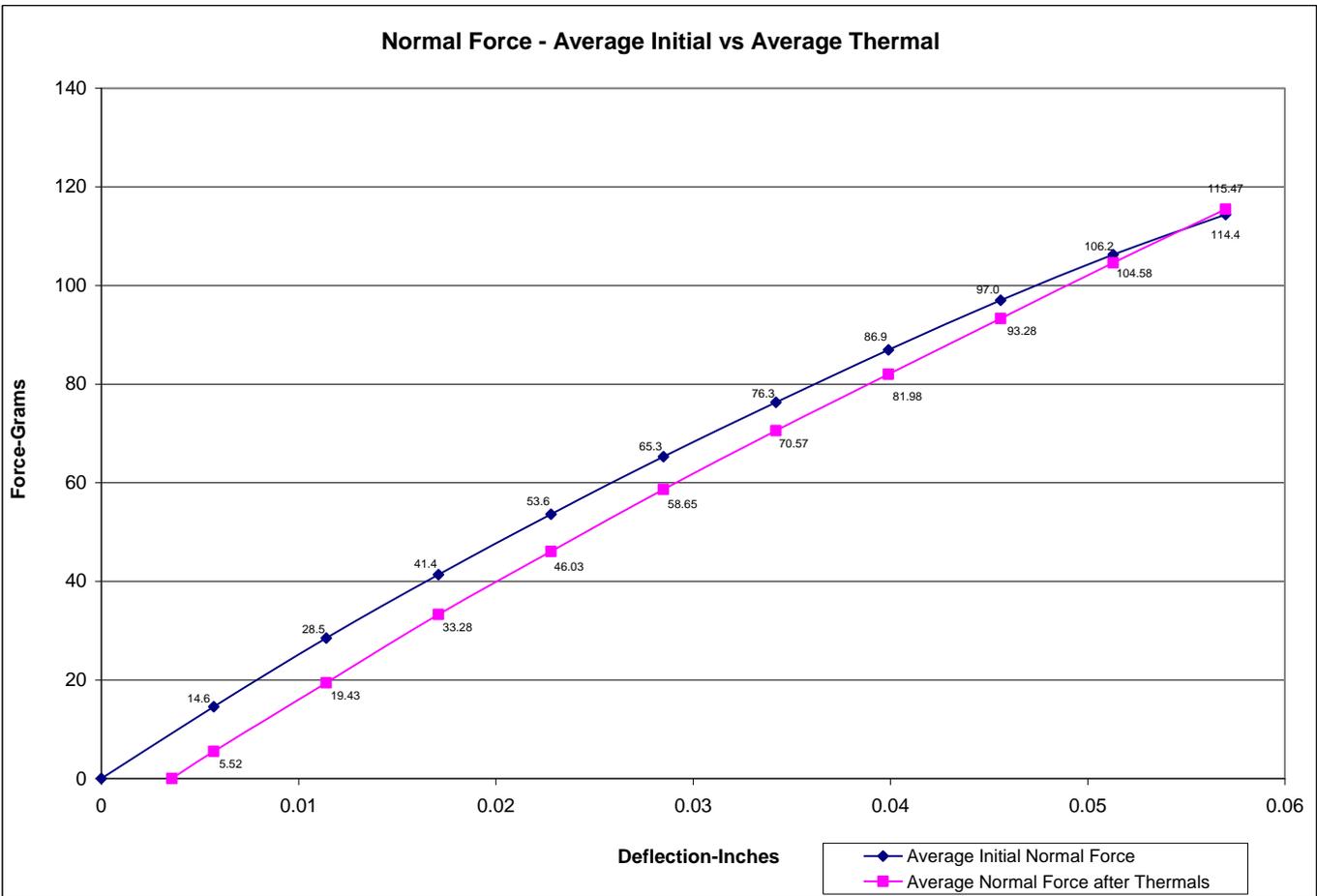


**DATA SUMMARIES Continued**

**Normal force:**

Initial	Deflections in inches Forces in Grams										
	<u>0.0057</u>	<u>0.0114</u>	<u>0.0171</u>	<u>0.0228</u>	<u>0.0285</u>	<u>0.0342</u>	<u>0.0399</u>	<u>0.0456</u>	<u>0.0513</u>	<u>0.0570</u>	<i>SET</i>
<b>Averages</b>	14.58	28.47	41.35	53.62	65.30	76.31	86.92	96.98	106.24	114.38	0.0012
<b>Min</b>	14.30	28.00	41.00	52.80	64.70	75.70	85.40	95.70	105.10	113.00	0.0009
<b>Max</b>	15.20	29.30	41.80	55.00	66.00	77.50	88.30	98.30	107.40	115.40	0.0017
<b>St. Dev</b>	0.266	0.442	0.235	0.612	0.437	0.535	0.816	0.746	0.680	0.774	0.0003
<b>Count</b>	12	12	12	12	12	12	12	12	12	12	12

After Thermals	Deflections in inches Forces in Grams										
	<u>0.0057</u>	<u>0.0114</u>	<u>0.0171</u>	<u>0.0228</u>	<u>0.0285</u>	<u>0.0342</u>	<u>0.0399</u>	<u>0.0456</u>	<u>0.0513</u>	<u>0.0570</u>	<i>SET</i>
<b>Averages</b>	5.52	19.43	33.28	46.03	58.65	70.57	81.98	93.28	104.58	115.47	0.0037
<b>Min</b>	3.50	17.00	30.90	43.60	55.90	67.70	79.50	90.50	100.40	110.80	0.0029
<b>Max</b>	8.20	23.20	37.50	49.70	62.80	75.00	86.10	97.70	109.30	119.40	0.0044
<b>St. Dev</b>	1.348	1.863	2.103	1.903	2.136	2.105	2.109	2.387	2.566	2.685	0.0005
<b>Count</b>	12	12	12	12	12	12	12	12	12	12	12



**DATA SUMMARIES Continued****INSULATION RESISTANCE (IR):**

Minimum	Pin to Pin		
	Mated	Unmated	Unmated
	<b>SIB/PCB</b>	<b>SIB</b>	<b>PCB</b>
<b>Initial</b>	100000	100000	Not Tested
<b>Thermal</b>	100000	100000	Not Tested
<b>Humidity</b>	100000	100000	Not Tested

**DIELECTRIC WITHSTANDING VOLTAGE (DWV):**

Voltage Rating Summary	
Minimum	<b>SIB/PCB</b>
<b>Break Down Voltage</b>	1700
<b>Test Voltage</b>	1275
<b>Working Voltage</b>	425

Pin to Pin	
<b>Initial Test Voltage</b>	Passed
<b>After Thermal Test Voltage</b>	Passed
<b>After Humidity Test Voltage</b>	Passed

**DATA SUMMARIES Continued**

**LLCR Durability:**

- 1) A total of 191 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

LLCR Measurement Summaries by Pin Type				
Date	1/8/2013	1/17/2013	1/21/2013	2/1/2013
Room Temp (Deg C)	22	22	22	22
Rel Humidity (%)	33	32	32	32
Technician	Craig Ryan	Craig Ryan	Craig Ryan	Craig Ryan
mOhm values				
<b>Actual Initial</b>	<b>Delta 100 Cycles</b>	<b>Delta Therm Shck</b>	<b>Delta Humidity</b>	
Pin Type 1: Signal				
Average	15.41	0.42	0.38	0.41
St. Dev.	0.39	0.40	0.29	0.32
Min	14.24	0.00	0.00	0.00
Max	16.51	2.69	1.55	1.83
Summary Count	191	191	191	191
Total Count	191	191	191	191

LLCR Delta Count by Category						
	Stable	Minor	Acceptable	Marginal	Unstable	Open
mOhms	$\leq 5$	$>5 \ \& \ \leq 10$	$>10 \ \& \ \leq 15$	$>15 \ \& \ \leq 50$	$>50 \ \& \ \leq 1000$	$>1000$
<b>100 Cycles</b>	<b>191</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Therm Shck</b>	<b>191</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Humidity</b>	<b>191</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**DATA SUMMARIES Continued**

**LLCR Thermal aging:**

- 1) A total of 192 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

LLCR Measurement Summaries by Pin Type				
Date	1/8/2013	1/21/2013		
Room Temp (Deg C)	22	22		
Rel Humidity (%)	32	32		
Technician	Craig Ryan	Craig Ryan		
<b>mOhm values</b>	<b>Actual</b>	<b>Delta</b>	<b>Delta</b>	<b>Delta</b>
	<b>Initial</b>	<b>Thermal</b>		
<b>Pin Type 1: Signal</b>				
Average	15.35	0.42		
St. Dev.	0.33	0.22		
Min	14.38	0.00		
Max	16.17	1.01		
Summary Count	192	192		
Total Count	192	192		

LLCR Delta Count by Category						
	Stable	Minor	Acceptable	Marginal	Unstable	Open
mOhms	$\leq 5$	$>5 \ \& \ \leq 10$	$>10 \ \& \ \leq 15$	$>15 \ \& \ \leq 50$	$>50 \ \& \ \leq 1000$	$>1000$
<b>Thermal</b>	<b>192</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**DATA SUMMARIES Continued**

**LLCR Gas Tight:**

- 1) A total of 192 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

LLCR Measurement Summaries by Pin Type				
Date	12/20/2012	12/20/2012		
Room Temp (Deg C)	21	21		
Rel Humidity (%)	36	36		
Technician	Craig Ryan	Craig Ryan		
<b>mOhm values</b>	<b>Actual Initial</b>	<b>Delta Acid Vapor</b>	<b>Delta</b>	<b>Delta</b>
Pin Type 1: Signal				
Average	15.07	0.08		
St. Dev.	0.42	0.11		
Min	13.80	0.00		
Max	16.06	1.09		
Summary Count	192	192		
Total Count	192	192		

LLCR Delta Count by Category						
mOhms	Stable	Minor	Acceptable	Marginal	Unstable	Open
	$\leq 5$	$>5$ & $\leq 10$	$>10$ & $\leq 15$	$>15$ & $\leq 50$	$>50$ & $\leq 1000$	$>1000$
<b>Acid Vapor</b>	<b>192</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**DATA SUMMARIES Continued**

**LLCR S&V:**

- 1) A total of 192 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

LLCR Results for Test: Shock Vib LLCR				
		Series:	SIB	
LLCR Measurement Summaries by Pin Type				
Date	12/13/2012	12/17/2012		
Room Temp (Deg C)	22	22		
Rel Humidity (%)	32	43		
Technician	Craig Ryan	Craig Ryan		
<b>mOhm values</b>	<b>Actual</b>	<b>Delta</b>	<b>Delta</b>	<b>Delta</b>
	<b>Initial</b>	<b>Shock-Vib</b>		
Pin Type 1: Signal				
Average	15.23	0.19		
St. Dev.	0.47	0.13		
Min	13.99	0.00		
Max	16.23	0.70		
Summary Count	192	192		
Total Count	192	192		

LLCR Delta Count by Category						
mOhms	Stable	Minor	Acceptable	Marginal	Unstable	Open
	$\leq 5$	$>5$ & $\leq 10$	$>10$ & $\leq 15$	$>15$ & $\leq 50$	$>50$ & $\leq 1000$	$>1000$
<b>Shock-Vib</b>	<b>192</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Shock and Vibration 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
<b>Total Events</b>	<b>0</b>

**DATA SUMMARIES Continued**

**LLCR ELP:**

- 1) A total of 192 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

**1000 cycles**

<b>LLCR Measurement Summaries by Pin Type</b>					
	Date	4/12/2013	4/16/2013	4/22/2013	5/6/2013
Room Temp (Deg C)		24	24	23	24
Rel Humidity (%)		34	38	31	35
Technician		Craig Ryan	Craig Ryan	Craig Ryan	Craig Ryan
mOhm values		<b>Actual</b>	<b>Delta</b>	<b>Delta</b>	<b>Delta</b>
		<b>Initial</b>	<b>1000 Cycles</b>	<b>Therm Shck</b>	<b>Humidity</b>
<b>Pin Type 1: Signal</b>					
Average		14.64	0.43	0.53	0.55
St. Dev.		0.35	0.35	0.36	0.36
Min		13.76	0.00	0.00	0.01
Max		15.59	2.47	3.36	2.65
Summary Count		192	192	192	192
Total Count		192	192	192	192

<b>LLCR Delta Count by Category</b>						
	Stable	Minor	Acceptable	Marginal	Unstable	Open
mOhms	$\leq 5$	$>5$ & $\leq 10$	$>10$ & $\leq 15$	$>15$ & $\leq 50$	$>50$ & $\leq 1000$	$>1000$
<b>1000 Cycles</b>	<b>192</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Therm Shck</b>	<b>192</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Humidity</b>	<b>192</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**DATA SUMMARIES Continued****2500 cycles**

<b>LLCR Measurement Summaries by Pin Type</b>		
Date	4/17/2013	4/24/2013
Room Temp (Deg C)	24	24
Rel Humidity (%)	40	36
Technician	Craig Ryan	Craig Ryan
<b>mOhm values</b>	<b>Actual Initial</b>	<b>Delta 2500 Cycles</b>
<b>Pin Type 1: Signal</b>		
Average	14.86	0.65
St. Dev.	0.66	0.56
Min	13.31	0.01
Max	17.81	3.47
Summary Count	192	192
Total Count	192	192

<b>LLCR Delta Count by Category</b>						
mOhms	Stable	Minor	Acceptable	Marginal	Unstable	Open
	<=5	>5 & <=10	>10 & <=15	>15 & <=50	>50 & <=1000	>1000
<b>2500 Cycles</b>	192	0	0	0	0	0

**5000 cycles**

<b>LLCR Measurement Summaries by Pin Type</b>		
Date	4/25/2013	5/7/2013
Room Temp (Deg C)	24	24
Rel Humidity (%)	31	32
Technician	Craig Ryan	Craig Ryan
<b>mOhm values</b>	<b>Actual Initial</b>	<b>Delta 5000 Cycles</b>
<b>Pin Type 1: Signal</b>		
Average	15.05	0.87
St. Dev.	0.73	0.69
Min	13.90	0.00
Max	18.80	4.22
Summary Count	192	192
Total Count	192	192

<b>LLCR Delta Count by Category</b>						
mOhms	Stable	Minor	Acceptable	Marginal	Unstable	Open
	<=5	>5 & <=10	>10 & <=15	>15 & <=50	>50 & <=1000	>1000
<b>5000 Cycles</b>	192	0	0	0	0	0

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

... Last Cal: 03/27/2013, Next Cal: 03/27/2014

**Equipment #:** RS-09**Description:** Current Shunt**Manufacturer:** Empro**Model:** HA10050**Serial #:** HA10050-1**Accuracy:** +/- 0.25% of RDG

... Last Cal: 05/30/2013, Next Cal: 05/30/2014

**Equipment #:** TCT-04**Description:** Dillon Quantrol TC21 25-1000 mm/min series test stand**Manufacturer:** Dillon Quantrol**Model:** TC2 I series test stand**Serial #:** 04-1041-04**Accuracy:** Speed Accuracy: +/- 5% of indicated speed; Speed Accuracy: +/- 5% of indicated speed;

... Last Cal: 05/03/2013, Next Cal: 05/03/2014

**Equipment #:** THC-02**Description:** Temperature/Humidity Chamber (SJR Room – Unit #1)**Manufacturer:** Thermotron**Model:** SE-1000-6-6**Serial #:** 31808**Accuracy:** See Manual

... Last Cal: 11/04/2013, Next Cal: 11/04/2014

**Equipment #:** HPM-01**Description:** Hipot Megommeter**Manufacturer:** Hipotronics**Model:** H306B-A**Serial #:** M9905004**Accuracy:** 2 % Full Scale Accuracy

... Last Cal: 05/24/2013, Next Cal: 08/24/2014

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

... Last Cal: 05/18/2013, Next Cal: 05/18/2014

**EQUIPMENT AND CALIBRATION SCHEDULES****Equipment #:** OV-03**Description:** Cascade Tek Forced Air Oven (Chamber Room)**Manufacturer:** Cascade Tek**Model:** CE5F**Serial #:** 02008008**Accuracy:** See Manual

... Last Cal: 06/16/2013, Next Cal: 06/16/2014

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

... Last Cal: 11/31/2013, Next Cal: 11/31/2014

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

... Last Cal: 07/09/2013, Next Cal: 07/09/2014

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

... Last Cal: 06/04/2013, Next Cal: 206/04/2013