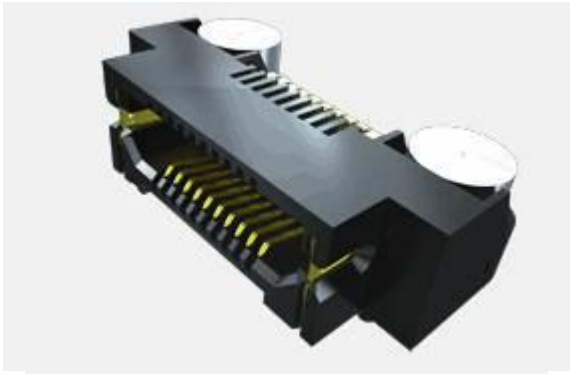
Project Number: Intermateability Test Report	Tracking Code: 679575_Report_Rev_1
Requested by: Neal Patterson	Date: 4/4/2016
Part #: ERF8-060-01-L-D-RA/ERM8-060-02.0-L-DV/ ER8-120S-0.8SH(10)/ER8-120P-0.8SV-2H(10)	
Part description: ERF8/ERM8/ER8/ER8	Tech: Peter Chen
Test Start:11/20/2015	Test Completed: 12/14/2015



(Actual part not depicted)

INTERMATEABILITY TEST REPORT (Samtec with Hirose)

ERF8/ERM8
ERF8-060-01-L-D-RA/ERM8-060-02.0-L-DV
ER8-120S-0.8SH(10)/ER8-120P-0.8SV-2H(10)

REVISION HISTORY

DATE	REV.NUM.	DESCRIPTION	ENG
4/2/2016	**1**	**Initial Issue**	**KH**

CERTIFICATION

All instruments and measuring equipment were calibrated to National Institute for Standards and Technology (NIST) traceable standards according to IS0 10012-l and ANSI/NCSL 2540-1, as applicable.

SCOPE

The report documents the testing performed to qualify the intermateability of Samtec's ERF8-RA/ERM8-DV with Hirose's ER8-S/ER8-P.

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 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 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-107096-TST

TEST LOCATIONS

1) Test locations are defined below.
    a. Samtec Inc. – New Albany, IN, USA
        i. Groups 1 and 2
    b. Hirose Electric Co. LTD – Japan
        i. Groups 3 and 4

FLOWCHARTS

Mating/Unmating/Durability

Group 1
ERF8-060-01-L-D-RA
ER8-120P-0.8SV-2H(10)
8 Assemblies
Samtec Socket To Hirose Header

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)

Group 2
ERF8-060-01-L-D-RA
ERM8-060-02.0-L-DV
8 Assemblies
Samtec To Samtec

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)

Group 3
ER8-120S-0.8SH(10)
ER8-120P-0.8SV-2H(10)
5 Assemblies
Hirose Socket To Hirose Header

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)

Group 3
ER8-120S-0.8SH(10)
ERM8-060-02.0-L-DV
5 Assemblies
Hirose Socket To Samtec Header

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)

(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)

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℃ to +85℃
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.

HUMIDITY:

1) Reference document: EIA-364-31, *Humidity Test Procedure for Electrical Connectors.*
2) Test Condition B, 240 Hours.
3) Method III, +25° C to + 65° C, 90% to 98% Relative Humidity excluding sub-cycles 7a and 7b.
4) All samples are pre-conditioned at ambient.
5) All test samples are exposed to environmental stressing in the mated condition.

MATING/UNMATING:

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

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. <= +5.0 mOhms:---------- Stable
    b. +5.1 to +10.0 mOhms:---------- Minor
    c. +10.1 to +15.0 mOhms: ---------- Acceptable
    d. >15.0 mOhms: ---------- Not Acceptable
4) Samtec monitored 24 positions per mated assembly and tested eight mated assemblies per group.
5) Hirose monitored 120 positions per mated assembly and tested five mated assemblies per group.

RESULTS

Mating/Unmating Forces

Mating-Unmating Durability Group 1 (Samtec Socket to Hirose Header)

- **Initial**
  - **Mating**
    - **Min ---------- 4.59 Lbs (20.42 N)**
    - **Max---------- 5.05 Lbs (22.46 N)**
  - **Unmating**
    - **Min ---------- 2.80 Lbs (12.45 N)**
    - **Max---------- 3.08 Lbs (13.70 N)**
- **After 25 Cycles**
  - **Mating**
    - **Min ---------- 5.87 Lbs (26.11 N)**
    - **Max---------- 6.77 Lbs (30.11 N)**
  - **Unmating**
    - **Min ---------- 3.56 Lbs (15.83 N)**
    - **Max---------- 3.95 Lbs (17.57 N)**
- **After 50 Cycles**
  - **Mating**
    - **Min ---------- 6.05 Lbs (26.91 N)**
    - **Max---------- 6.61 Lbs (29.40 N)**
  - **Unmating**
    - **Min ---------- 3.53 Lbs (15.70 N)**
    - **Max---------- 4.14 Lbs (18.41 N)**
- **After 75 Cycles**
  - **Mating**
    - **Min ---------- 6.18 Lbs (27.49 N)**
    - **Max---------- 6.65 Lbs (29.58 N)**
  - **Unmating**
    - **Min ---------- 3.74 Lbs (16.64 N)**
    - **Max---------- 4.27 Lbs (18.99 N)**
- **After 100 Cycles**
  - **Mating**
    - **Min ---------- 6.04 Lbs (26.87 N)**
    - **Max---------- 6.86 Lbs (30.38 N)**
  - **Unmating**
    - **Min ---------- 3.81 Lbs (16.95 N)**
    - **Max---------- 4.28 Lbs (19.04 N)**
- **Humidity**
  - **Mating**
    - **Min ---------- 3.24 Lbs (14.41 N)**
    - **Max---------- 3.91 Lbs (17.39 N)**
  - **Unmating**
    - **Min ---------- 2.01 Lbs (8.94 N)**
    - **Max---------- 2.57 Lbs (11.43 N)**

RESULTS Continued

Mating/Unmating Forces

Mating-Unmating Durability Group 2 (Samtec Socket to Samtec Header)

- **Initial**
  - **Mating**
    - **Min ---------- 4.49 Lbs (19.97 N)**
    - **Max---------- 5.53 Lbs (24.60 N)**
  - **Unmating**
    - **Min ---------- 2.39 Lbs (10.63 N)**
    - **Max---------- 2.89 Lbs (12.85 N)**
- **After 25 Cycles**
  - **Mating**
    - **Min ---------- 5.02 Lbs (22.33 N)**
    - **Max---------- 6.59 Lbs (29.31 N)**
  - **Unmating**
    - **Min ---------- 2.84 Lbs (12.63 N)**
    - **Max---------- 3.50 Lbs (15.57 N)**
- **After 50 Cycles**
  - **Mating**
    - **Min ---------- 5.02 Lbs (22.33 N)**
    - **Max---------- 6.54 Lbs (29.09 N)**
  - **Unmating**
    - **Min ---------- 2.95 Lbs (13.12 N)**
    - **Max---------- 3.72 Lbs (16.55 N)**
- **After 75 Cycles**
  - **Mating**
    - **Min ---------- 5.06 Lbs (22.51 N)**
    - **Max---------- 6.88 Lbs (30.60 N)**
  - **Unmating**
    - **Min ---------- 3.03 Lbs (13.48 N)**
    - **Max---------- 3.92 Lbs (17.44 N)**
- **After 100 Cycles**
  - **Mating**
    - **Min ---------- 5.17 Lbs (23.00 N)**
    - **Max---------- 7.14 Lbs (31.76 N)**
  - **Unmating**
    - **Min ---------- 3.07 Lbs (13.66 N)**
    - **Max---------- 4.15 Lbs (18.46 N)**
- **Humidity**
  - **Mating**
    - **Min ---------- 3.79 Lbs (16.86 N)**
    - **Max---------- 4.24 Lbs (18.86 N)**
  - **Unmating**
    - **Min ---------- 2.14 Lbs (9.52 N)**
    - **Max---------- 2.46 Lbs (10.94 N)**

RESULTS Continued

Mating/Unmating Forces

Mating-Unmating Durability Group 3 (Hirose Socket to Hirose Header)

- **Initial**
  - **Mating**
    - **Min ---------- 4.92 Lbs (21.90 N)**
    - **Max---------- 5.10 Lbs (22.70 N)**
  - **Unmating**
    - **Min ---------- 2.14 Lbs (9.50 N)**
    - **Max---------- 2.34 Lbs (10.40 N)**
- **After 25 Cycles**
  - **Mating**
    - **Min ---------- 5.17 Lbs (23.00 N)**
    - **Max---------- 5.60 Lbs (24.90 N)**
  - **Unmating**
    - **Min ---------- 2.11 Lbs (9.40 N)**
    - **Max---------- 2.61 Lbs (11.60 N)**
- **After 50 Cycles**
  - **Mating**
    - **Min ---------- 5.15 Lbs (22.90 N)**
    - **Max---------- 5.44 Lbs (24.20 N)**
  - **Unmating**
    - **Min ---------- 1.91 Lbs (8.50 N)**
    - **Max---------- 2.36 Lbs (10.50 N)**
- **After 75 Cycles**
  - **Mating**
    - **Min ---------- 5.04 Lbs (22.40 N)**
    - **Max---------- 5.28 Lbs (23.50 N)**
  - **Unmating**
    - **Min ---------- 2.09 Lbs (9.20 N)**
    - **Max---------- 2.47 Lbs (11.00 N)**
- **After 100 Cycles**
  - **Mating**
    - **Min ---------- 4.92 Lbs (21.90 N)**
    - **Max---------- 5.31 Lbs (23.60 N)**
  - **Unmating**
    - **Min ---------- 2.16 Lbs (9.60 N)**
    - **Max---------- 2.47 Lbs (11.00 N)**
- **Humidity**
  - **Mating**
    - **Min ---------- 3.69 Lbs (16.40 N)**
    - **Max---------- 3.98 Lbs (17.70 N)**
  - **Unmating**
    - **Min ---------- 1.91 Lbs (8.50 N)**
    - **Max---------- 2.27 Lbs (10.10 N)**

RESULTS Continued

Mating/Unmating Forces

Mating-Unmating Durability Group 4 (Hirose Socket to Samtec Header)

- **Initial**
  - **Mating**
    - **Min ---------- 5.08 Lbs (22.60 N)**
    - **Max---------- 5.51 Lbs (24.50 N)**
  - **Unmating**
    - **Min ---------- 2.07 Lbs (9.20 N)**
    - **Max---------- 2.54 Lbs (11.30 N)**
- **After 25 Cycles**
  - **Mating**
    - **Min ---------- 4.86 Lbs (21.60 N)**
    - **Max---------- 5.17 Lbs (23.00 N)**
  - **Unmating**
    - **Min ---------- 2.18 Lbs (9.70 N)**
    - **Max---------- 2.43 Lbs (10.80 N)**
- **After 50 Cycles**
  - **Mating**
    - **Min ---------- 4.95 Lbs (22.00 N)**
    - **Max---------- 5.40 Lbs (24.00 N)**
  - **Unmating**
    - **Min ---------- 2.25 Lbs (10.00 N)**
    - **Max---------- 2.43 Lbs (10.80 N)**
- **After 75 Cycles**
  - **Mating**
    - **Min ---------- 4.50 Lbs (20.00 N)**
    - **Max---------- 5.01 Lbs (22.30 N)**
  - **Unmating**
    - **Min ---------- 2.05 Lbs (9.10 N)**
    - **Max---------- 2.27 Lbs (10.10 N)**
- **After 100 Cycles**
  - **Mating**
    - **Min ---------- 4.38 Lbs (19.80 N)**
    - **Max---------- 4.92 Lbs (21.90 N)**
  - **Unmating**
    - **Min ---------- 1.93 Lbs (8.60 N)**
    - **Max---------- 2.34 Lbs (10.40 N)**
- **Humidity**
  - **Mating**
    - **Min ---------- 3.87 Lbs (17.20 N)**
    - **Max---------- 4.23 Lbs (18.80 N)**
  - **Unmating**
    - **Min ---------- 2.07 Lbs (9.20 N)**
    - **Max---------- 2.34 Lbs (10.40 N)**

RESULTS Continued

LLCR Mating/Unmating Durability Group 1 (112 row 1 and 80 row 2 LLCR test points)

Samtec Socket to Hirose Header

Row 1

- **Initial ---------- 16.55 mOhms Max**
- **Durability, 100 Cycles**
  - **<= +5.0 mOhms ---------- 112 Points ---------- Stable**
  - **+5.1 to +10.0 mOhms ----------0 Points ---------- Minor**
  - **+10.1 to +15.0 mOhms ----------0 Points ---------- Acceptable**
  - **>15.0 mOhms ----------0 Points ---------- Not Acceptable**
- **Thermal Shock**
  - **<= +5.0 mOhms ---------- 112 Points ---------- Stable**
  - **+5.1 to +10.0 mOhms ----------0 Points ---------- Minor**
  - **+10.1 to +15.0 mOhms ----------0 Points ---------- Acceptable**
  - **>15.0 mOhms ----------0 Points ---------- Not Acceptable**
- **Humidity**
  - **<= +5.0 mOhms ---------- 111 Points ---------- Stable**
  - **+5.1 to +10.0 mOhms ----------1 Points ---------- Minor**
  - **+10.1 to +15.0 mOhms ----------0 Points ---------- Acceptable**
  - **>15.0 mOhms ----------0 Points ---------- Not Acceptable**

Row 2

- **Initial ---------- 13.52 mOhms Max**
- **Durability, 100 Cycles**
  - **<= +5.0 mOhms ----------80 Points ---------- Stable**
  - **+5.1 to +10.0 mOhms ----------0 Points ---------- Minor**
  - **+10.1 to +15.0 mOhms ----------0 Points ---------- Acceptable**
  - **>15.0 mOhms ----------0 Points ---------- Not Acceptable**
- **Thermal Shock**
  - **<= +5.0 mOhms ----------80 Points ---------- Stable**
  - **+5.1 to +10.0 mOhms ----------0 Points ---------- Minor**
  - **+10.1 to +15.0 mOhms ----------0 Points ---------- Acceptable**
  - **>15.0 mOhms ----------0 Points ---------- Not Acceptable**
- **Humidity**
  - **<= +5.0 mOhms ----------80 Points ---------- Stable**
  - **+5.1 to +10.0 mOhms ----------0 Points ---------- Minor**
  - **+10.1 to +15.0 mOhms ----------0 Points ---------- Acceptable**
  - **>15.0 mOhms ----------0 Points ---------- Not Acceptable**

RESULTS Continued

LLCR Mating/Unmating Durability Group 2 (112 row 1 and 80 row 2 LLCR test points)

Samtec Socket to Samtec Header

Row 1

- **Initial ---------- 16.88 mOhms Max**
- **Durability, 100 Cycles**
  - **<= +5.0 mOhms ---------- 112 Points ---------- Stable**
  - **+5.1 to +10.0 mOhms ----------0 Points ---------- Minor**
  - **+10.1 to +15.0 mOhms ----------0 Points ---------- Acceptable**
  - **>15.0 mOhms ----------0 Points ---------- Not Acceptable**
- **Thermal Shock**
  - **<= +5.0 mOhms ---------- 112 Points ---------- Stable**
  - **+5.1 to +10.0 mOhms ----------0 Points ---------- Minor**
  - **+10.1 to +15.0 mOhms ----------0 Points ---------- Acceptable**
  - **>15.0 mOhms ----------0 Points ---------- Not Acceptable**
- **Humidity**
  - **<= +5.0 mOhms ---------- 108 Points ---------- Stable**
  - **+5.1 to +10.0 mOhms ----------4 Points ---------- Minor**
  - **+10.1 to +15.0 mOhms ----------0 Points ---------- Acceptable**
  - **>15.0 mOhms ----------0 Points ---------- Not Acceptable**

Row 2

- **Initial ---------- 13.38 mOhms Max**
- **Durability, 100 Cycles**
  - **<= +5.0 mOhms ----------80 Points ---------- Stable**
  - **+5.1 to +10.0 mOhms ----------0 Points ---------- Minor**
  - **+10.1 to +15.0 mOhms ----------0 Points ---------- Acceptable**
  - **>15.0 mOhms ----------0 Points ---------- Not Acceptable**
- **Thermal Shock**
  - **<= +5.0 mOhms ----------80 Points ---------- Stable**
  - **+5.1 to +10.0 mOhms ----------0 Points ---------- Minor**
  - **+10.1 to +15.0 mOhms ----------0 Points ---------- Acceptable**
  - **>15.0 mOhms ----------0 Points ---------- Not Acceptable**
- **Humidity**
  - **<= +5.0 mOhms ----------77 Points ---------- Stable**
  - **+5.1 to +10.0 mOhms ----------3 Points ---------- Minor**
  - **+10.1 to +15.0 mOhms ----------0 Points ---------- Acceptable**
  - **>15.0 mOhms ----------0 Points ---------- Not Acceptable**

RESULTS Continued

LLCR Mating/Unmating Durability Group 3 (300 row 1 and 300 row 2 LLCR test points)

Hirose Socket to Hirose Header

Row 1

- **Initial ---------- 15.60 mOhms Max**
- **Durability, 100 Cycles**
  - **<= +5.0 mOhms ---------- 300 Points ---------- Stable**
  - **+5.1 to +10.0 mOhms ----------0 Points ---------- Minor**
  - **+10.1 to +15.0 mOhms ----------0 Points ---------- Acceptable**
  - **>15.0 mOhms ----------0 Points ---------- Not Acceptable**
- **Thermal Shock**
  - **<= +5.0 mOhms ---------- 300 Points ---------- Stable**
  - **+5.1 to +10.0 mOhms ----------0 Points ---------- Minor**
  - **+10.1 to +15.0 mOhms ----------0 Points ---------- Acceptable**
  - **>15.0 mOhms ----------0 Points ---------- Not Acceptable**
- **Humidity**
  - **<= +5.0 mOhms ---------- 300 Points ---------- Stable**
  - **+5.1 to +10.0 mOhms ----------0 Points ---------- Minor**
  - **+10.1 to +15.0 mOhms ----------0 Points ---------- Acceptable**
  - **>15.0 mOhms ----------0 Points ---------- Not Acceptable**

Row 2

- **Initial ---------- 18.20 mOhms Max**
- **Durability, 100 Cycles**
  - **<= +5.0 mOhms ---------- 299 Points ---------- Stable**
  - **+5.1 to +10.0 mOhms ----------1 Points ---------- Minor**
  - **+10.1 to +15.0 mOhms ----------0 Points ---------- Acceptable**
  - **>15.0 mOhms ----------0 Points ---------- Not Acceptable**
- **Thermal Shock**
  - **<= +5.0 mOhms ---------- 300 Points ---------- Stable**
  - **+5.1 to +10.0 mOhms ----------0 Points ---------- Minor**
  - **+10.1 to +15.0 mOhms ----------0 Points ---------- Acceptable**
  - **>15.0 mOhms ----------0 Points ---------- Not Acceptable**
- **Humidity**
  - **<= +5.0 mOhms ---------- 298 Points ---------- Stable**
  - **+5.1 to +10.0 mOhms ----------2 Points ---------- Minor**
  - **+10.1 to +15.0 mOhms ----------0 Points ---------- Acceptable**
  - **>15.0 mOhms ----------0 Points ---------- Not Acceptable**

RESULTS Continued

LLCR Mating/Unmating Durability Group 4 (300 row 1 and 300 row 2 LLCR test points)

Hirose Socket to Samtec Header

Row 1

- **Initial ---------- 14.80 mOhms Max**
- **Durability, 100 Cycles**
  - **<= +5.0 mOhms ---------- 299 Points ---------- Stable**
  - **+5.1 to +10.0 mOhms ----------1 Points ---------- Minor**
  - **+10.1 to +15.0 mOhms ----------0 Points ---------- Acceptable**
  - **>15.0 mOhms ----------0 Points ---------- Not Acceptable**
- **Thermal Shock**
  - **<= +5.0 mOhms ---------- 300 Points ---------- Stable**
  - **+5.1 to +10.0 mOhms ----------1 Points ---------- Minor**
  - **+10.1 to +15.0 mOhms ----------0 Points ---------- Acceptable**
  - **>15.0 mOhms ----------0 Points ---------- Not Acceptable**
- **Humidity**
  - **<= +5.0 mOhms ---------- 296 Points ---------- Stable**
  - **+5.1 to +10.0 mOhms ----------4 Points ---------- Minor**
  - **+10.1 to +15.0 mOhms ----------0 Points ---------- Acceptable**
  - **>15.0 mOhms ----------0 Points ---------- Not Acceptable**

Row 2

- **Initial ---------- 19.40 mOhms Max**
- **Durability, 100 Cycles**
  - **<= +5.0 mOhms ---------- 298 Points ---------- Stable**
  - **+5.1 to +10.0 mOhms ----------2 Points ---------- Minor**
  - **+10.1 to +15.0 mOhms ----------0 Points ---------- Acceptable**
  - **>15.0 mOhms ----------0 Points ---------- Not Acceptable**
- **Thermal Shock**
  - **<= +5.0 mOhms ---------- 297 Points ---------- Stable**
  - **+5.1 to +10.0 mOhms ----------3 Points ---------- Minor**
  - **+10.1 to +15.0 mOhms ----------0 Points ---------- Acceptable**
  - **>15.0 mOhms ----------0 Points ---------- Not Acceptable**
- **Humidity**
  - **<= +5.0 mOhms ---------- 294 Points ---------- Stable**
  - **+5.1 to +10.0 mOhms ----------6 Points ---------- Minor**
  - **+10.1 to +15.0 mOhms ----------0 Points ---------- Acceptable**
  - **>15.0 mOhms ----------0 Points ---------- Not Acceptable**

DATA SUMMARIES

MATING-UNMATING FORCE:

Mating-Unmating Durability Group 1 (Samtec Socket to Hirose Header)

	Initial				After 25 Cycles			
	Mating		**Unmating**		**Mating**		**Unmating**	
	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)
Minimum	20.42	4.59	12.45	2.80	26.11	5.87	15.83	3.56
Maximum	22.46	5.05	13.70	3.08	30.11	6.77	17.57	3.95
Average	21.68	**4.87**	13.14	**2.96**	28.50	**6.41**	16.39	**3.68**
St Dev	0.74	0.17	0.42	0.09	1.29	0.29	0.63	0.14
Count	8	8	8	8	8	8	8	8

	After 50 Cycles				After 75 Cycles			
	Mating		**Unmating**		**Mating**		**Unmating**	
	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)
Minimum	26.91	6.05	15.70	3.53	27.49	6.18	16.64	3.74
Maximum	29.40	6.61	18.41	4.14	29.58	6.65	18.99	4.27
Average	28.09	**6.32**	16.94	**3.81**	28.27	**6.36**	17.60	**3.96**
St Dev	0.84	0.19	0.82	0.19	0.77	0.17	0.76	0.17
Count	8	8	8	8	8	8	8	8

	After 100 Cycles				After Humidity			
	Mating		**Unmating**		**Mating**		**Unmating**	
	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)
Minimum	26.87	6.04	16.95	3.81	14.41	3.24	8.94	2.01
Maximum	30.38	6.83	19.04	4.28	17.39	3.91	11.43	2.57
Average	28.72	**6.46**	17.93	**4.03**	16.27	**3.66**	10.71	**2.41**
St Dev	1.14	0.26	0.74	0.17	0.95	0.21	0.83	0.19
Count	8	8	8	8	8	8	8	8

SUMMARIES Continued

MATING-UNMATING FORCE:

Mating-Unmating Durability Group 2 (Samtec Socket to Samtec Header)

	Initial				After 25 Cycles			
	Mating		**Unmating**		**Mating**		**Unmating**	
	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)
Minimum	19.97	4.49	10.63	2.39	22.33	5.02	12.63	2.84
Maximum	24.60	5.53	12.85	2.89	29.31	6.59	15.57	3.50
Average	22.18	**4.99**	12.20	**2.74**	25.81	**5.80**	14.01	**3.15**
St Dev	1.52	0.34	0.75	0.17	2.35	0.53	1.12	0.25
Count	8	8	8	8	8	8	8	8

	After 50 Cycles				After 75 Cycles			
	Mating		**Unmating**		**Mating**		**Unmating**	
	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)
Minimum	22.33	5.02	13.12	2.95	22.51	5.06	13.48	3.03
Maximum	29.09	6.54	16.55	3.72	30.60	6.88	17.44	3.92
Average	25.98	**5.84**	14.71	**3.31**	27.04	**6.08**	15.31	**3.44**
St Dev	2.52	0.57	1.36	0.31	3.04	0.68	1.61	0.36
Count	8	8	8	8	8	8	8	8

	After 100 Cycles				After Humidity			
	Mating		**Unmating**		**Mating**		**Unmating**	
	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)
Minimum	23.00	5.17	13.66	3.07	16.86	3.79	9.52	2.14
Maximum	31.76	7.14	18.46	4.15	18.86	4.24	10.94	2.46
Average	28.06	**6.31**	15.96	**3.59**	17.96	**4.04**	10.33	**2.32**
St Dev	3.35	0.75	1.83	0.41	0.71	0.16	0.44	0.10
Count	8	8	8	8	8	8	8	8

SUMMARIES Continued

MATING-UNMATING FORCE:

Mating-Unmating Durability Group 3 (Hirose Socket to Hirose Header)

	Initial				After 25 Cycles			
	Mating		**Unmating**		**Mating**		**Unmating**	
	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)
Minimum	21.90	4.92	9.50	2.14	23.00	5.17	9.40	2.11
Maximum	22.70	5.10	10.40	2.34	24.90	5.60	11.60	2.61
Average	22.44	**5.04**	10.00	**2.25**	23.78	**5.35**	10.10	**2.27**
St Dev	0.32	0.07	0.35	0.08	0.78	0.18	0.89	0.20
Count	5	5	5	5	5	5	5	5

	After 50 Cycles				After 75 Cycles			
	Mating		**Unmating**		**Mating**		**Unmating**	
	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)
Minimum	22.90	5.15	8.50	1.91	22.40	5.04	9.30	2.09
Maximum	24.20	5.44	10.50	2.36	23.50	5.28	11.00	2.47
Average	23.54	**5.29**	9.70	**2.18**	23.02	**5.18**	10.06	**2.26**
St Dev	0.57	0.13	0.83	0.19	0.45	0.10	0.74	0.17
Count	5	5	5	5	5	5	5	5

	After 100 Cycles				After Humidity			
	Mating		**Unmating**		**Mating**		**Unmating**	
	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)
Minimum	21.90	4.92	9.60	2.16	16.40	3.69	8.50	1.91
Maximum	23.60	5.31	11.00	2.47	17.70	3.98	10.10	2.27
Average	22.86	**5.14**	10.42	**2.34**	17.02	**3.83**	8.98	**2.02**
St Dev	0.74	0.17	0.63	0.14	0.50	0.11	0.64	0.14
Count	5	5	5	5	5	5	5	5

SUMMARIES Continued

MATING-UNMATING FORCE:

Mating-Unmating Durability Group 4 (Hirose Socket to Samtec Header)

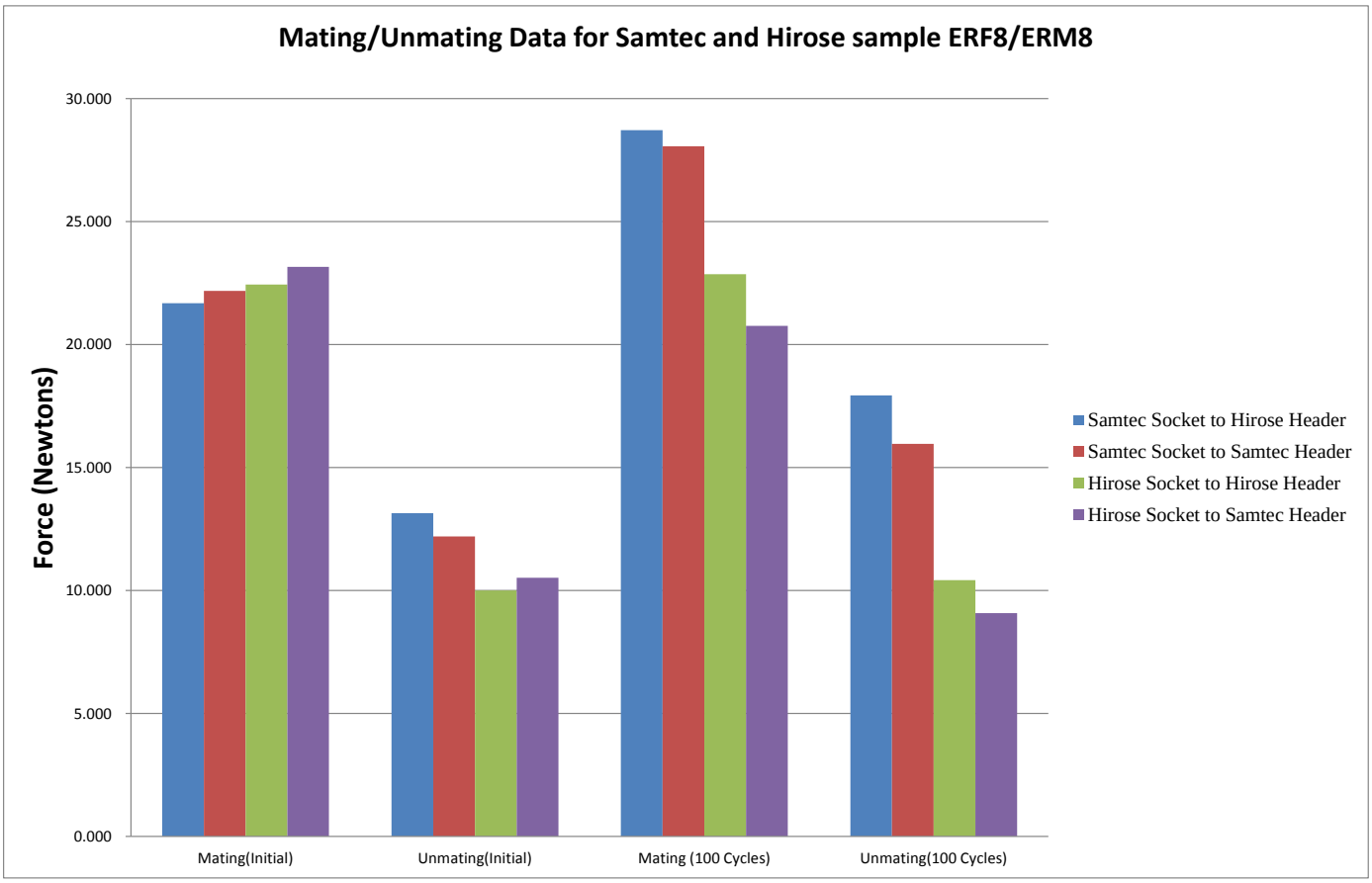
	Initial				After 25 Cycles			
	Mating		**Unmating**		**Mating**		**Unmating**	
	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)
Minimum	22.60	5.08	9.20	2.07	21.60	4.86	9.70	2.18
Maximum	24.50	5.51	11.30	2.54	23.00	5.17	10.80	2.43
Average	23.16	**5.21**	10.52	**2.37**	22.26	**5.00**	10.28	**2.31**
St Dev	0.76	0.17	0.81	0.18	0.55	0.12	0.47	0.10
Count	5	5	5	5	5	5	5	5

	After 50 Cycles				After 75 Cycles			
	Mating		**Unmating**		**Mating**		**Unmating**	
	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)
Minimum	22.00	4.95	10.00	2.25	20.00	4.50	9.10	2.05
Maximum	24.00	5.40	10.80	2.43	22.30	5.01	10.10	2.27
Average	23.04	**5.18**	10.32	**2.32**	21.56	**4.85**	9.58	**2.15**
St Dev	0.81	0.18	0.33	0.07	0.90	0.20	0.41	0.09
Count	5	5	5	5	5	5	5	5

	After 100 Cycles				After Humidity			
	Mating		**Unmating**		**Mating**		**Unmating**	
	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)
Minimum	19.50	4.38	8.60	1.93	17.20	3.87	9.20	2.07
Maximum	21.90	4.92	10.40	2.34	18.80	4.23	10.40	2.34
Average	20.76	**4.67**	9.08	**2.04**	18.04	**4.06**	9.82	**2.21**
St Dev	0.89	0.20	0.75	0.17	0.59	0.13	0.43	0.10
Count	5	5	5	5	5	5	5	5

DATA SUMMARIES Continued

Mating\Unmating Force Comparison



DATA SUMMARIES Continued

LLCR Mating/Unmating Durability Group 1 (Samtec Socket to Hirose Header)

1). A total of 112 row 1 and 80 row 2 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. <= +5.0 mOhms: ---------- Stable
   b. +5.1 to +10.0 mOhms: ---------- Minor
   c. +10.1 to +15.0 mOhms: ---------- Acceptable
   d. >15.0 mOhms: ---------- Not Acceptable

LLCR Measurement Summaries by Pin Type				
Date	9/24/2015	10/9/2015	10/15/2015	10/27/2015
Room Temp (Deg C)	23	23	23	23
Rel Humidity (%)	56	54	54	55
Technician	Peter Chen	Peter Chen	Peter Chen	peter Chen
mOhm values	**Actual Initial**	**Delta 100 Cycles**	**Delta Therm Shck**	**Delta Humidity**
	Pin Type 1: Row 1			
Average	14.91	0.62	0.53	0.59
St. Dev.	0.57	0.42	0.43	0.64
Min	13.75	0.02	0.04	0.01
Max	16.55	1.98	2.44	5.45
Summary Count	112	112	112	112
Total Count	112	112	112	112
	Pin Type 2: Row 2			
Average	12.04	0.56	0.56	0.61
St. Dev.	0.53	0.46	0.46	0.66
Min	10.76	0.01	0.01	0.01
Max	13.52	2.93	2.54	4.85
Summary Count	80	80	80	80
Total Count	80	80	80	80

LLCR Delta Count by Category				
	Stable	**Minor**	**Acceptable**	**Not Acceptable**
mOhms	**<=5**	**>5 & <=10**	**>10 & <=15**	**>15**
100 Cycles	**192**	**0**	**0**	**0**
Therm Shck	**192**	**0**	**0**	**0**
Humidity	**191**	**1**	**0**	**0**

DATA SUMMARIES Continued

LLCR Mating/Unmating Durability Group 2 (Samtec Socket to Samtec Header)

1). A total of 112 row 1 and 80 row 2 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. <= +5.0 mOhms: ---------- Stable
   b. +5.1 to +10.0 mOhms: ---------- Minor
   c. +10.1 to +15.0 mOhms: ---------- Acceptable
   d. >15.0 mOhms: ---------- Not Acceptable

LLCR Measurement Summaries by Pin Type				
Date	9/24/2015	10/9/2015	10/15/2015	10/27/2015
Room Temp (Deg C)	23	23	23	23
Rel Humidity (%)	56	54	54	55
Technician	Peter Chen	Peter Chen	Peter Chen	peter Chen
mOhm values	**Actual Initial**	**Delta 100 Cycles**	**Delta Therm Shck**	**Delta Humidity**
	Pin Type 1: Row 1			
Average	15.14	0.85	1.15	1.76
St. Dev.	0.60	0.75	1.06	1.51
Min	13.94	0.00	0.00	0.02
Max	16.88	4.41	4.89	7.76
Summary Count	112	112	112	112
Total Count	112	112	112	112
	Pin Type 2: Row 2			
Average	12.34	0.88	1.05	1.51
St. Dev.	0.54	0.78	0.71	1.47
Min	11.08	0.01	0.03	0.01
Max	13.38	3.95	3.37	7.80
Summary Count	80	80	80	80
Total Count	80	80	80	80

LLCR Delta Count by Category				
	Stable	**Minor**	**Acceptable**	**Not Acceptable**
mOhms	**<=5**	**>5 & <=10**	**>10 & <=15**	**>15**
100 Cycles	**192**	**0**	**0**	**0**
Therm Shck	**192**	**0**	**0**	**0**
Humidity	**185**	**7**	**0**	**0**

DATA SUMMARIES Continued

LLCR Mating/Unmating Durability Group 3 (Hirose Socket to Hirose Header)

1). A total of 300 row 1 and 300 row 2 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. <= +5.0 mOhms: ---------- Stable
   b. +5.1 to +10.0 mOhms: ---------- Minor
   c. +10.1 to +15.0 mOhms: ---------- Acceptable
   d. >15.0 mOhms: ---------- Not Acceptable

	LLCR Measurement Summaries by Pin Type			
Date	11/20/2015	11/22/2015	12/3/2015	12/14/2015
Room Temp (Deg C)	22	22	23	22
Rel Humidity (%)	55	56	55	55
Technician	KJ.SUGAWARA	KJ.SUGAWARA	KJ.SUGAWARA	KJ.SUGAWARA
mOhm values	**Actual Initial**	**Delta 100 Cycles**	**Delta Therm Shck**	**Delta Humidity**
	Pin Type 1: Row 1			
Average	13.63	-0.50	-0.12	0.20
St. Dev.	0.59	0.58	0.69	0.78
Min	12.10	-2.20	-2.10	-1.80
Max	15.60	2.30	2.10	3.20
Summary Count	300	300	300	300
Total Count	300	300	300	300
	Pin Type 2: Row 2			
Average	16.01	0.05	0.40	0.53
St. Dev.	0.61	0.77	0.67	0.96
Min	14.30	-2.30	-1.70	-1.70
Max	18.20	6.50	3.60	6.30
Summary Count	300	300	300	300
Total Count	300	300	300	300

LLCR Delta Count by Category				
	Stable	**Minor**	**Acceptable**	**Not Acceptable**
mOhms	**<=5**	**>5 & <=10**	**>10 & <=15**	**>15**
100 Cycles	**599**	**1**	**0**	**0**
Therm Shck	**600**	**0**	**0**	**0**
Humidity	**598**	**2**	**0**	**0**

DATA SUMMARIES Continued

LLCR Mating/Unmating Durability Group 4 (Hirose Socket to Samtec Header)

1). A total of 300 row 1 and 300 row 2 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. <= +5.0 mOhms: ---------- Stable
   b. +5.1 to +10.0 mOhms: ---------- Minor
   c. +10.1 to +15.0 mOhms: ---------- Acceptable
   d. >15.0 mOhms: ---------- Not Acceptable

LLCR Measurement Summaries by Pin Type				
Date	11/20/2015	11/22/2015	12/3/2015	12/14/2015
Room Temp (Deg C)	22	22	23	22
Rel Humidity (%)	55	56	55	55
Technician	KJ.SUGAWARA	KJ.SUGAWARA	KJ.SUGAWARA	KJ.SUGAWARA
mOhm values	**Actual Initial**	**Delta 100 Cycles**	**Delta Therm Shck**	**Delta Humidity**
	Pin Type 1: Row 1			
Average	13.13	0.20	0.31	0.85
St. Dev.	0.52	0.65	0.64	1.14
Min	12.00	-1.40	-1.10	-0.90
Max	14.80	5.30	2.50	8.00
Summary Count	300	300	300	300
Total Count	300	300	300	300
	Pin Type 2: Row 2			
Average	16.02	0.35	0.63	0.62
St. Dev.	0.59	1.01	1.05	1.33
Min	14.50	-3.50	-2.50	-3.10
Max	19.40	7.40	6.60	7.10
Summary Count	300	300	300	300
Total Count	300	300	300	300

LLCR Delta Count by Category				
	Stable	**Minor**	**Acceptable**	**Not Acceptable**
mOhms	**<=5**	**>5 & <=10**	**>10 & <=15**	**>15**
100 Cycles	**597**	**3**	**0**	**0**
Therm Shck	**597**	**3**	**0**	**0**
Humidity	**590**	**10**	**0**	**0**