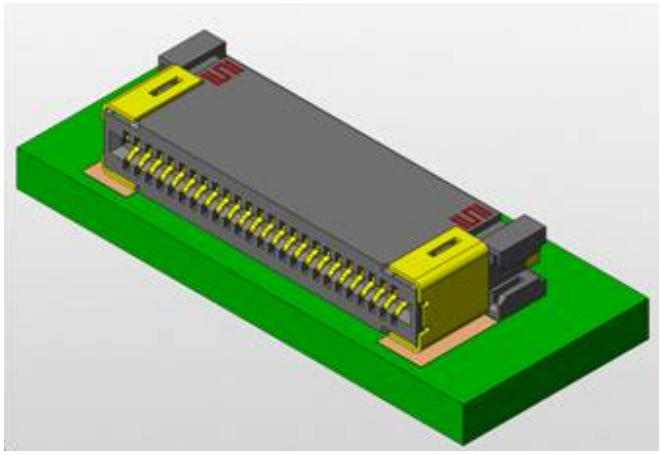
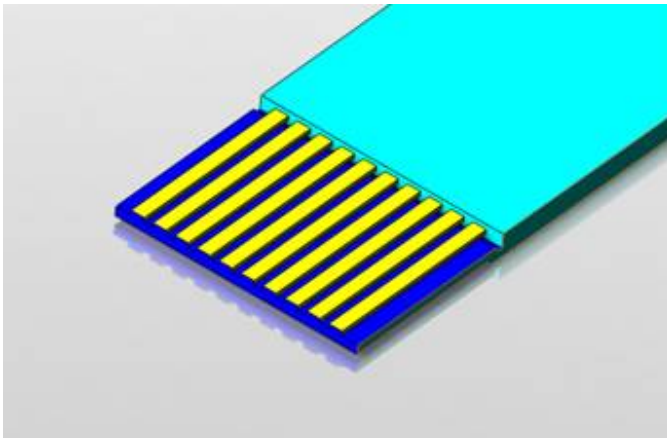
Project Number: Design Qualification Test Report	Tracking Code: 227742_Report_Rev_2			
Requested by: Hardy Tain	Date: 8/10/2013	Product Rev: 1		
Part #: FC5-30-02-T-WT/FJH-30-D-05.00-4	Lot #: N/A	Tech: Kason He	Eng: Vico Zhao	
Part description: FC5/FJH			Qty to test: 50	
Test Start: 11/09/2012	Test Completed: 12/21/2012			





DESIGN QUALIFICATION TEST REPORT

FC5/FJH
FC5-30-02-T-WT/FJH-30-D-05.00-4

REVISION HISTORY

DATA	REV.NUM.	DESCRIPTION	ENG
12/25/2012	**1**	**Initial Issue**	**KH**
8/10/2013	**2**	**Update CCC charts**	**VZ**

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

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

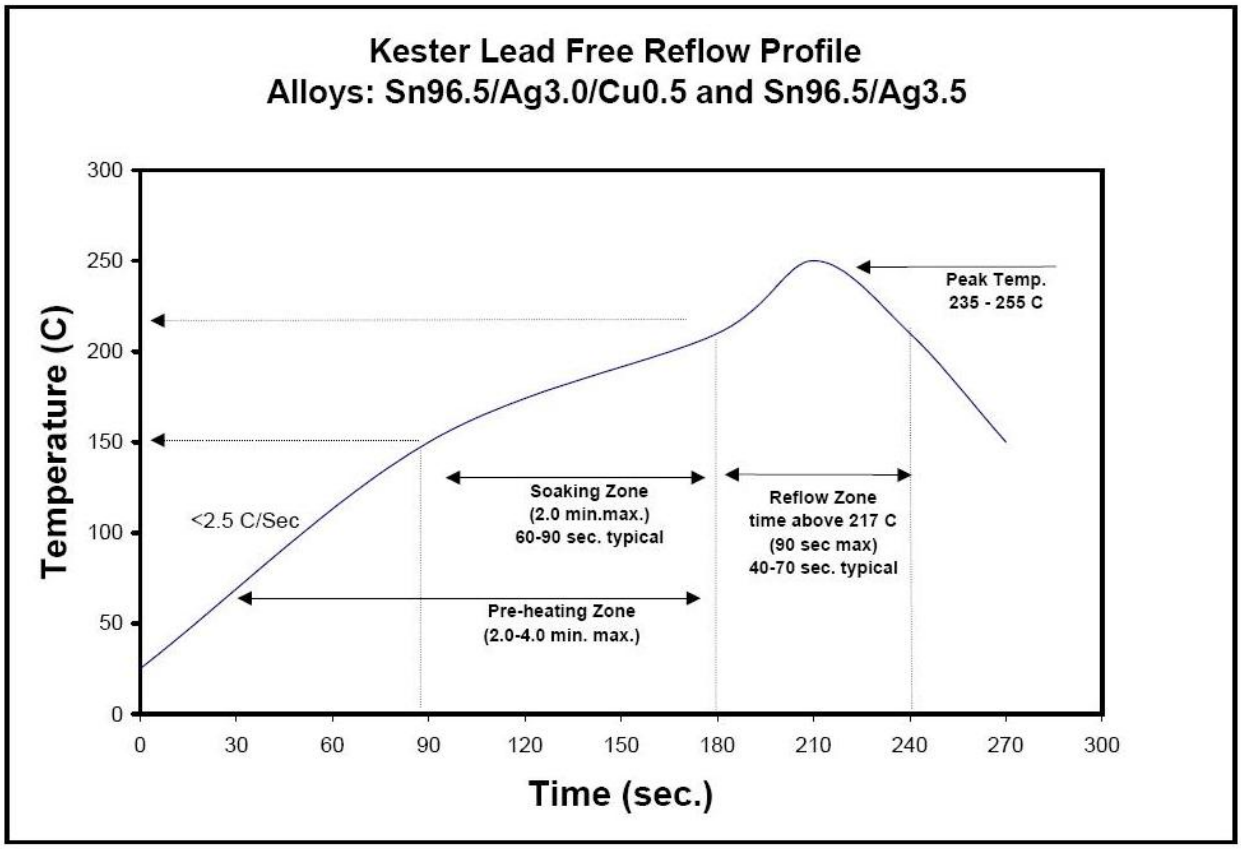
APPLICABLE DOCUMENTS

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 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) Re-Flow Time/Temp: See accompanying profile.
10) Samtec Test PCBs used: PCB-104085-TST/PCB-104086-TST

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

Max delta allowed is 20 mOhms

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

FLOWCHARTS Continued

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 3 (85°C)

Time Condition 'A' (96 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

Max delta allowed is 20 mOhms

FLOWCHARTS Continued

Durability/Mating/Unmating/Gaps

TEST STEP	GROUP B1 8 Boards (largest position submitted)
01	Contact Gaps
02	LLCR-1
03	Forces - Mating / Unmating
	30 Cycles
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

-30°C to +85°C 1/2 hour dwell, 5 cycles

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

and Method II (40°C @ 90% RH to 95% 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

Max delta allowed is 20 mOhms

FLOWCHARTS Continued

IR & DWV

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

-30°C to +85°C 1/2 hour dwell, 5 cycles

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

and Method II (40°C @ 90% RH to 95% RH)

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

IR = EIA-364-21

DWV = EIA-364-20, Test Condition 1

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

FLOWCHARTS Continued

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

Mechanical Shock / Vibration / LLCR

TEST STEP	GROUP A1 192 Points
01	LLCR-1
02	Shock
03	Vibration
04	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

Max delta allowed is 20 mOhms

Shock / Vibration / nanoSecond Event Detection

TEST STEP	GROUP A1 60 Points
01	Event Detection, Shock
02	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: -30°C to +85°C
3) Test Time: ½ hour dwell at each temperature extreme
4) Number of Cycles: 5
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.

THERMAL:

1) EIA-364-17, *Temperature Life with or without Electrical Load Test Procedure for Electrical Connectors.*
2) Test Condition 3 at 85° C.
3) Test Time Condition A for 96 hours.
4) All test samples are pre-conditioned at ambient.
5) All test samples are exposed to environmental stressing in the mated condition.

HUMIDITY:

1) Reference document: EIA-364-31, *Humidity Test Procedure for Electrical Connectors.*
2) Test Condition A, 96 Hours.
3) Method II, +40° C, 90% to 95% 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^2 / 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 Continued

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^2, computer controlled test stand with a deflection measurement system accuracy of 5.0 µm (0.0002").
6) The nominal deflection rate shall be 5 mm (0.2")/minute.
7) Unless otherwise noted a minimum of five contacts shall be tested.
8) The force/deflection characteristic to load and unload each contact shall be repeated five times.
9) The system shall utilize the TC^2 software in order to acquire and record the test data.
10) The permanent set of each contact shall be measured within the TC^2 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.

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. 80^{o} C
    c. 95^{o} C
    d. 115^{o} 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 Continued

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. <= +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. <= +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^{o} C
        ix. The final LLCR shall be conducted within 1 hour after drying.

ATTRIBUTE DEFINITIONS Continued

The following is a brief, simplified description of attributes

INSULATION RESISTANCE (IR):

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

1) PROCEDURE:
    a. Reference document: EIA-364-21, *Insulation Resistance Test Procedure for Electrical Connectors*.
    b. Test Conditions:
        i. Between Adjacent Contacts or Signal-to-Ground
        ii. Electrification Time 2.0 minutes
        iii. Test Voltage (500 VDC) corresponds to calibration settings for measuring resistances.
2) MEASUREMENTS:
3) When the specified test voltage is applied (VDC), the insulation resistance shall not be less than 1000 megohms.

DIELECTRIC WITHSTANDING VOLTAGE (DWV):

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

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

RESULTS

Temperature Rise, CCC at a 20% de-rating

- **CCC for a 30°C Temperature Rise----------2.5A per contact with 1 adjacent contacts powered**
- **CCC for a 30°C Temperature Rise----------2.0A per contact with 2 adjacent contacts powered**
- **CCC for a 30°C Temperature Rise----------1.5A per contact with 3 adjacent contacts powered**
- **CCC for a 30°C Temperature Rise----------1.4A per contact with 4 adjacent contacts powered**
- **CCC for a 30°C Temperature Rise----------0.7A per contact with all adjacent contacts powered**

Mating/Unmating Forces: Mating/Unmating Durability Group

- **Initial**
  - **Mating**
    - **Min ---------- 8.17 Lbs**
    - **Max----------10.54 Lbs**
  - **Unmating**
    - **Min ---------- 6.36 Lbs**
    - **Max---------- 8.67 Lbs**
- **After 30 Cycles**
  - **Mating**
    - **Min ---------- 6.00 Lbs**
    - **Max---------- 7.89 Lbs**
  - **Unmating**
    - **Min ---------- 4.24 Lbs**
    - **Max---------- 5.09 Lbs**
- **After Humidity**
  - **Mating**
    - **Min ---------- 6.21 Lbs**
    - **Max---------- 9.71 Lbs**
  - **Unmating**
    - **Min ---------- 5.21 Lbs**
    - **Max---------- 7.16 Lbs**

Mating/Unmating Forces: Thermal Aging Group

- **Initial**
  - **Mating**
    - **Min ---------- 7.37 Lbs**
    - **Max----------10.26 Lbs**
  - **Unmating**
    - **Min ---------- 6.44 Lbs**
    - **Max---------- 7.90 Lbs**
- **After Thermal**
  - **Mating**
    - **Min ---------- 5.53 Lbs**
    - **Max---------- 8.91 Lbs**
  - **Unmating**
    - **Min ---------- 5.13 Lbs**
    - **Max---------- 7.05 Lbs**

Normal Force at 0.005 inches deflection

- **Initial**
  - **Min---------- 223.60 gf Set ----- 0.0001 in**
  - **Max ---------- 252.90 gf Set ----- 0.0007 in**
- **Thermal**
  - **Min---------- 195.50 gf Set------ 0.0000 in**
  - **Max ---------- 233.90 gf Set------ 0.0008 in**

RESULTS Continued

Insulation Resistance minimums, IR

Pin to Pin

- **Initial**
  - **Mated ---------- 10000Meg Ω ---------- Passed**
  - **Unmated ---------- 10000Meg Ω ---------- Passed**
- **Thermal**
  - **Mated ---------- 6595Meg Ω ---------- Passed**
  - **Unmated ---------- 10000Meg Ω ---------- Passed**
- **Humidity**
  - **Mated ---------- 1597Meg Ω ---------- Passed**
  - **Unmated ---------- 6537Meg Ω ---------- Passed**

Pin to Closest Metallic Hardware

- **Initial**
  - **Mated ---------- 10000Meg Ω ---------- Passed**
  - **Unmated ---------- 10000Meg Ω ---------- Passed**
- **Thermal**
  - **Mated ---------- 10000Meg Ω ---------- Passed**
  - **Unmated ---------- 10000Meg Ω ---------- Passed**
- **Humidity**
  - **Mated ---------- 10000Meg Ω ---------- Passed**
  - **Unmated ---------- 10000Meg Ω ---------- Passed**

Dielectric Withstanding Voltage minimums, DWV

- **Minimums**
  - **Breakdown Voltage ---------- 625 VAC**
  - **Test Voltage ---------- 469 VAC**
  - **Working Voltage ---------- 156 VAC**

Pin to Pin

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

Pin to Closest Metallic Hardware

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

RESULTS Continued

LLCR Gas Tight (192 LLCR test points)

- **Initial ---------- 93.20mOhms 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 Thermal Aging (192 LLCR test points)

- **Initial ---------- 93.66mOhms Max**
- **Thermal Aging**
  - **<= +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 Durability: (192 LLCR test points)

- **Initial ---------- 93.82mOhms Max**
- **Durability, 30 Cycles**
  - **<= +5.0 mOhms ---------- 155 Points ---------- Stable**
  - **+5.1 to +10.0 mOhms ---------- 37 Points ---------- Minor**
  - **+10.1 to +15.0 mOhms ---------- 0 Points ---------- Acceptable**
  - **+15.1 to +50.0 mOhms ---------- 0 Points ---------- Marginal**
  - **+50.1 to +2000 mOhms ---------- 0 Points ---------- Unstable**
  - **>+2000 mOhms ---------- 0 Points ---------- Open Failure**
- **Thermal**
  - **<= +5.0 mOhms ---------- 160 Points ---------- Stable**
  - **+5.1 to +10.0 mOhms ---------- 32 Points ---------- Minor**
  - **+10.1 to +15.0 mOhms ---------- 0 Points ---------- Acceptable**
  - **+15.1 to +50.0 mOhms ---------- 0 Points ---------- Marginal**
  - **+50.1 to +2000 mOhms ---------- 0 Points ---------- Unstable**
  - **>+2000 mOhms ---------- 0 Points ---------- Open Failure**
- **Humidity**
  - **<= +5.0 mOhms ---------- 161 Points ---------- Stable**
  - **+5.1 to +10.0 mOhms ---------- 31 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 Shock & Vibration (192 LLCR test points)

- **Initial ---------- 197.93mOhms 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:

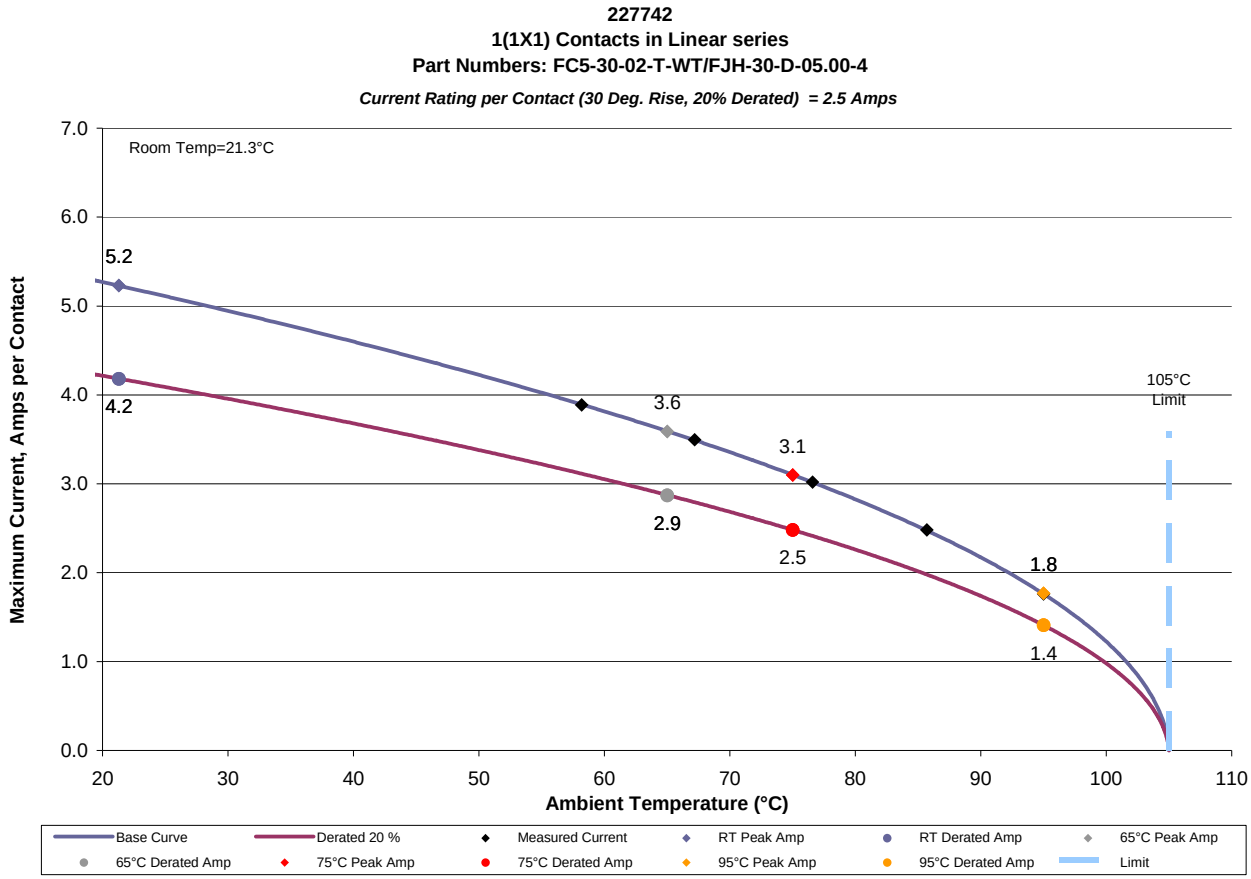
- **Shock**
  - **No Damage ---------- ---------- Pass**
  - **50 Nanoseconds ---------- ---------- Pass**
- **Vibration**
  - **No Damage ---------- ---------- Pass**
  - **50 Nanoseconds ---------- ---------- Pass**

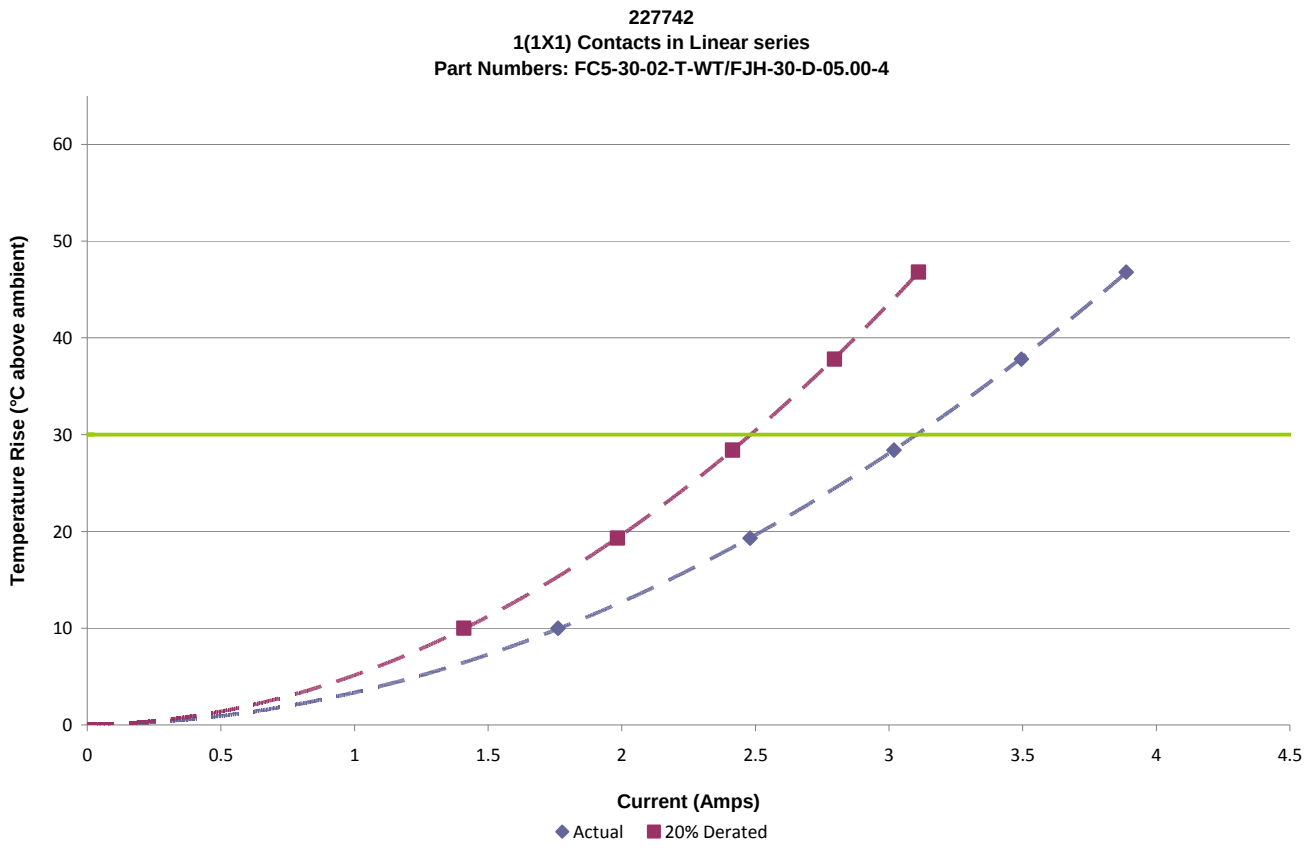
DATA SUMMARIES

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:

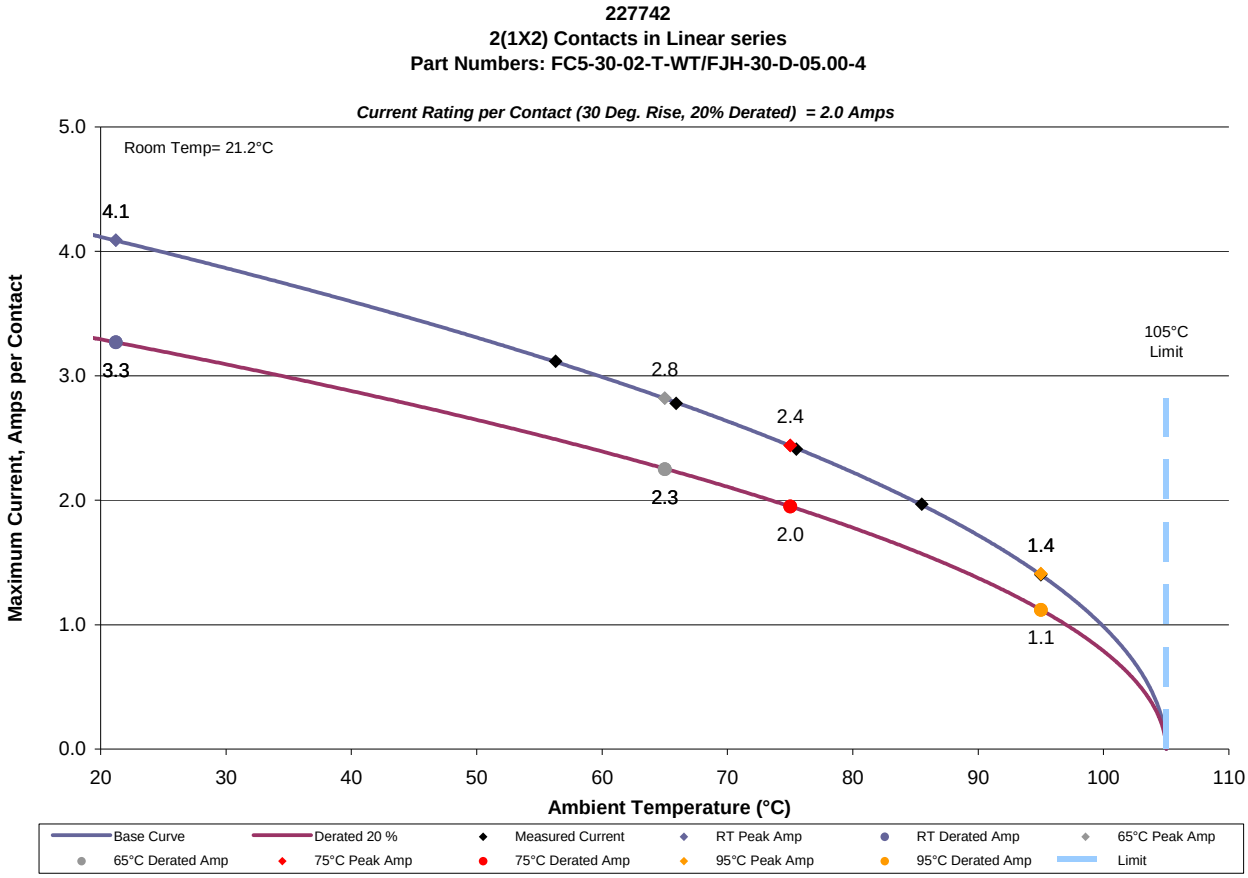
    a. Linear configuration with 1 adjacent conductors/contacts powered

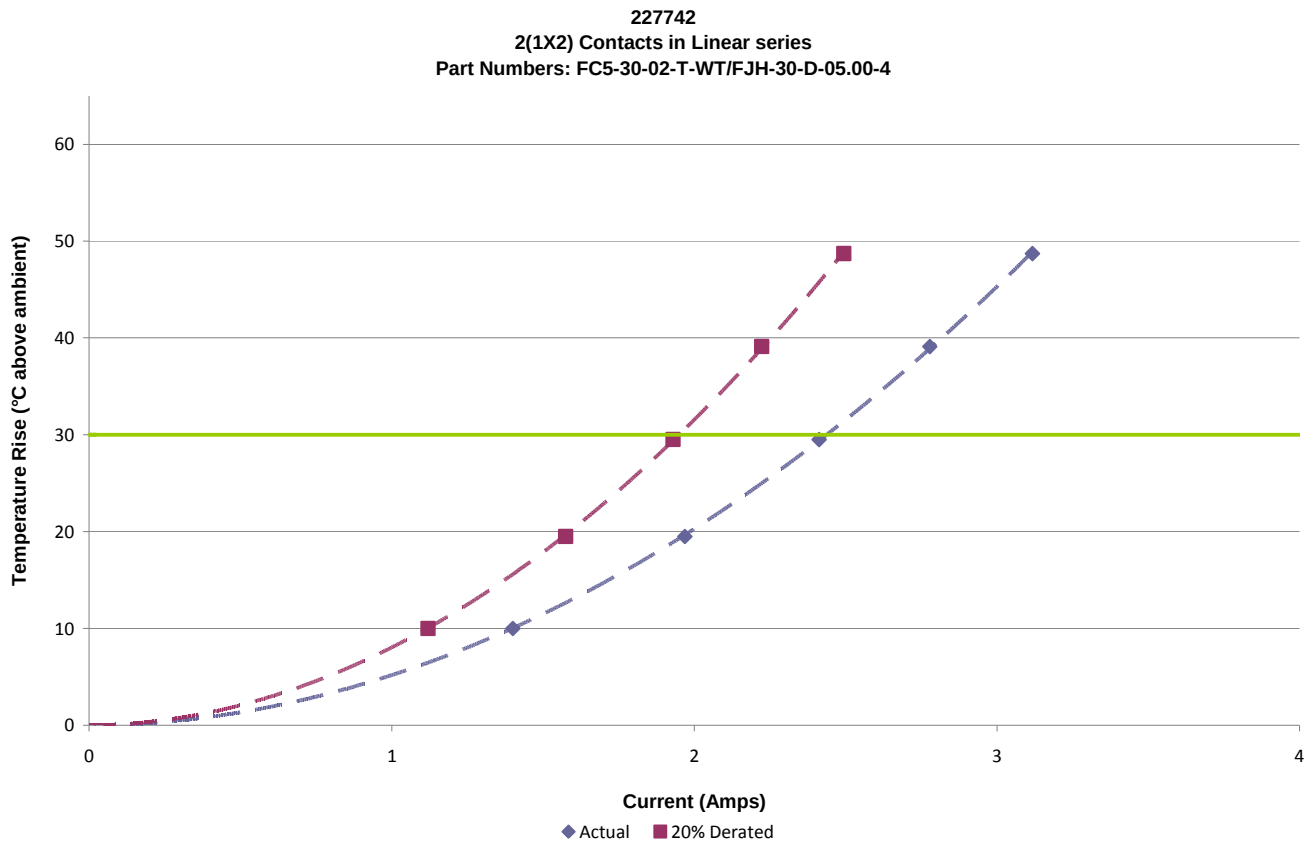



227742
1(1X1) Contacts in Linear series
Part Numbers: FC5-30-02-T-WT/FJH-30-D-05.00-4
Temperature Rise (°C above ambient)
60
50
40
30
20
10
0
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
Current (Amps)
Actual
20% Derated

DATA SUMMARIES Continued

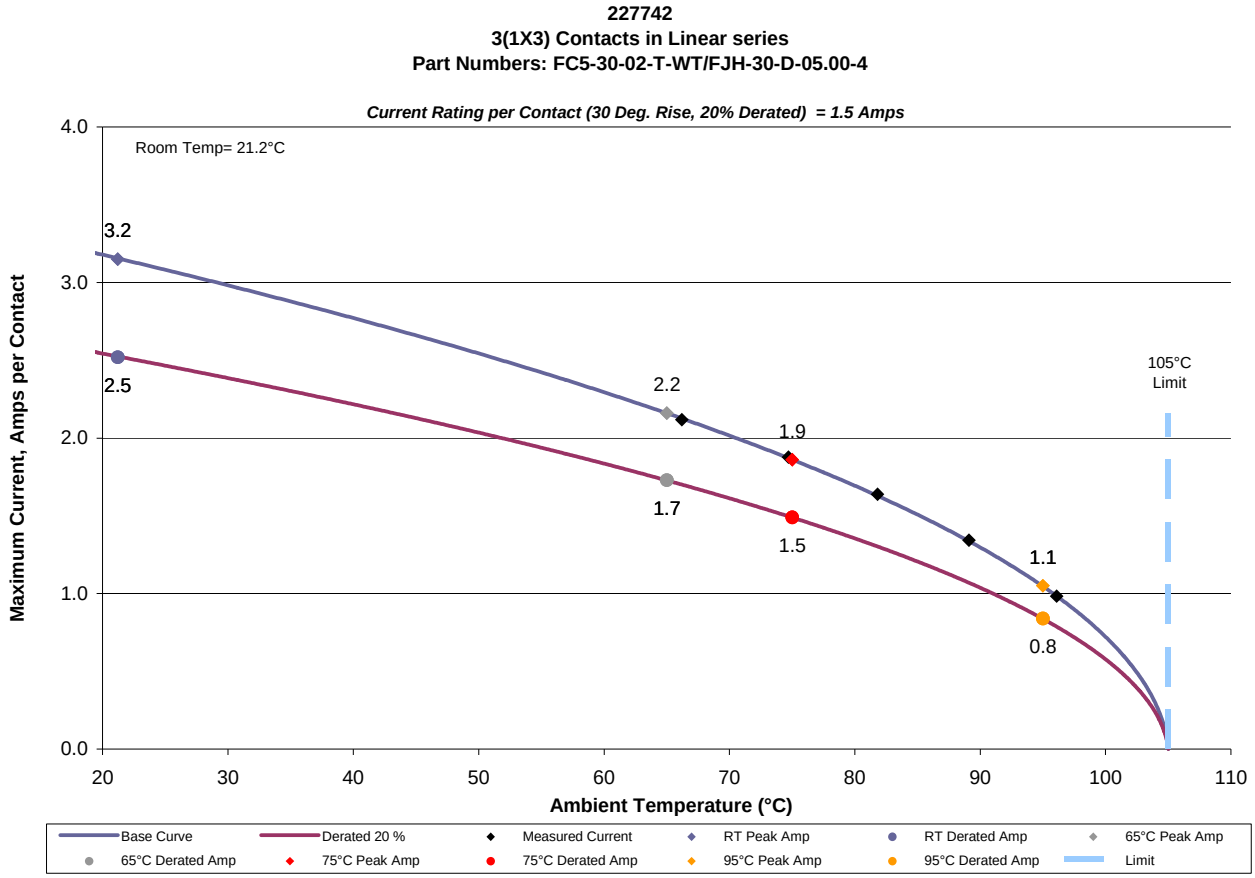
b. Linear configuration with 2 adjacent conductors/contacts powered

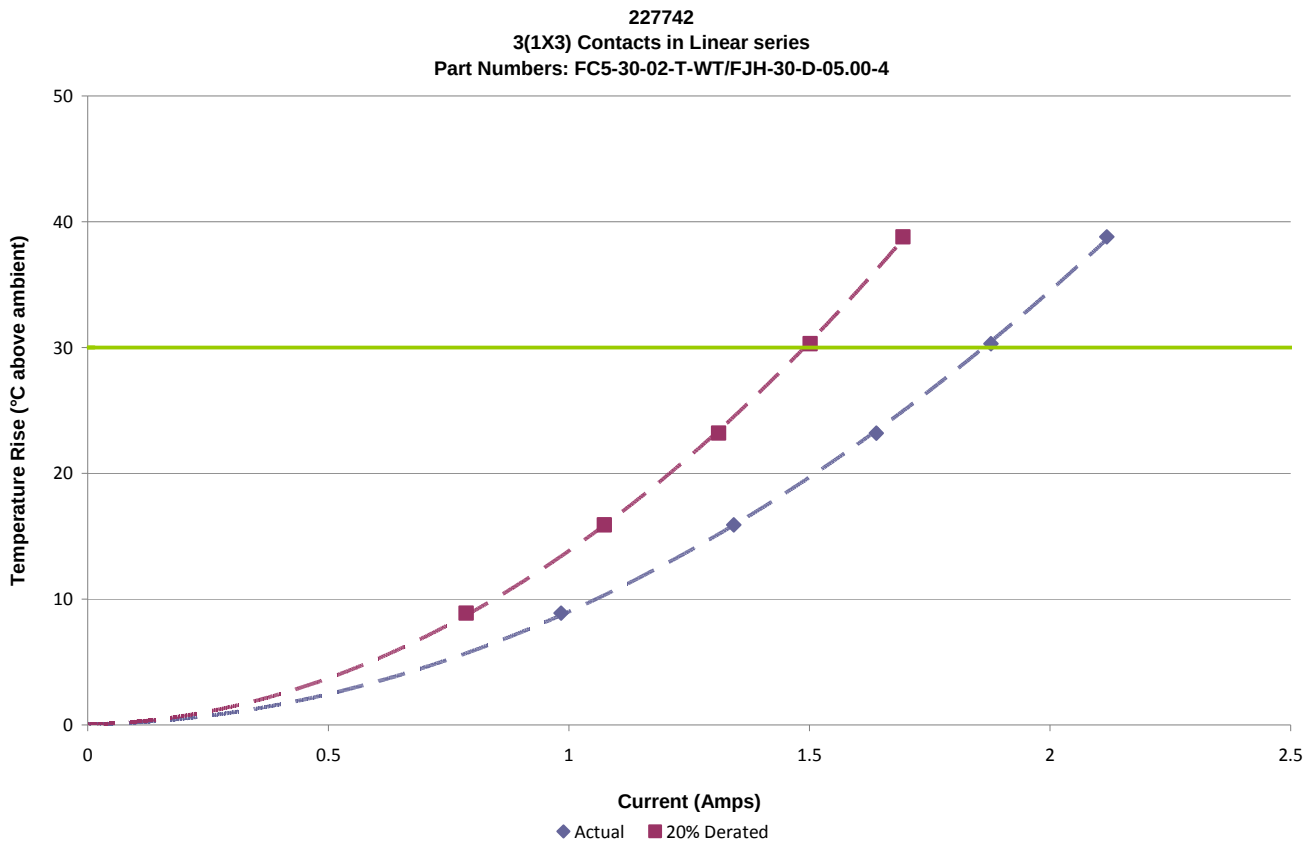



227742
2(1X2) Contacts in Linear series
Part Numbers: FC5-30-02-T-WT/FJH-30-D-05.00-4
Temperature Rise (°C above ambient)
60
50
40
30
20
10
0
0
1
2
3
4
Current (Amps)
Actual
20% Derated

DATA SUMMARIES Continued

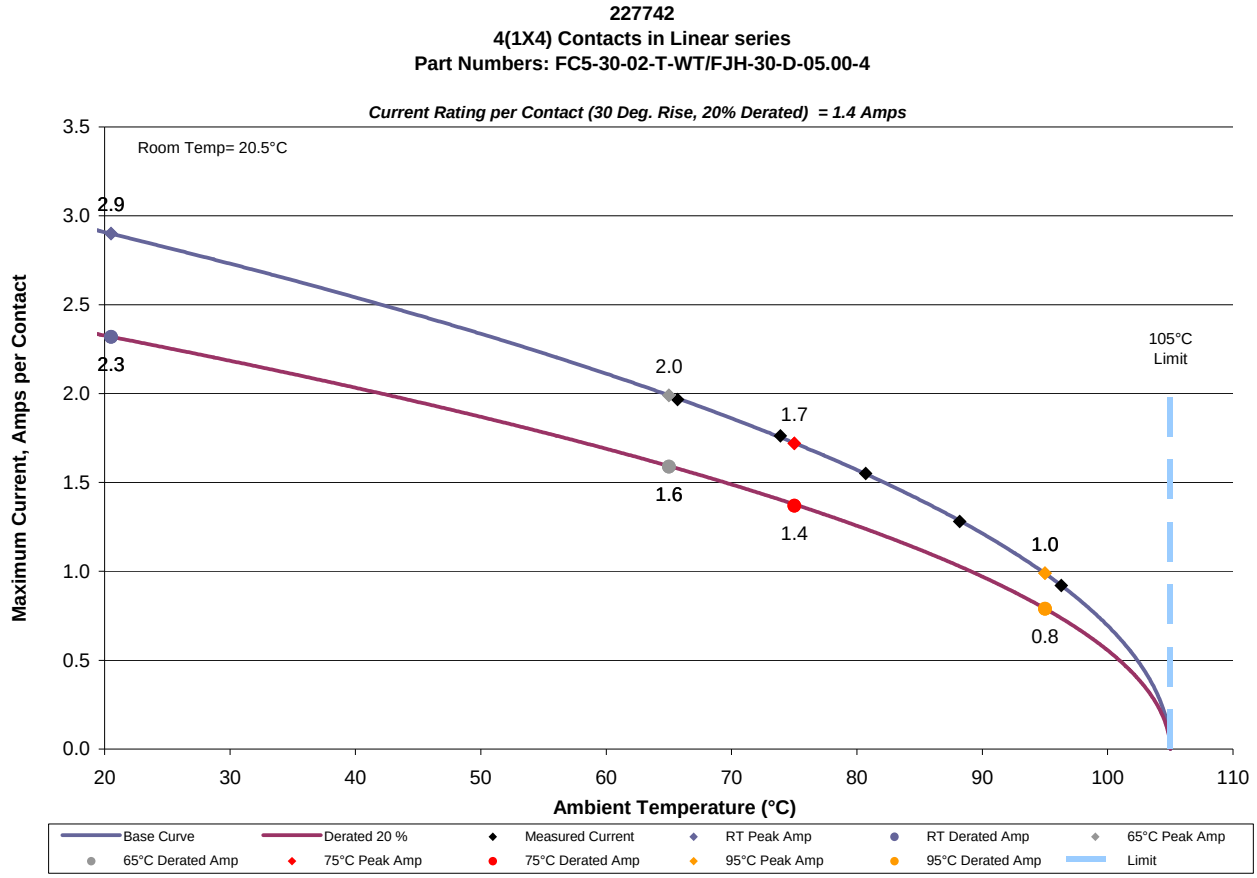
c. Linear configuration with 3 adjacent conductors/contacts powered

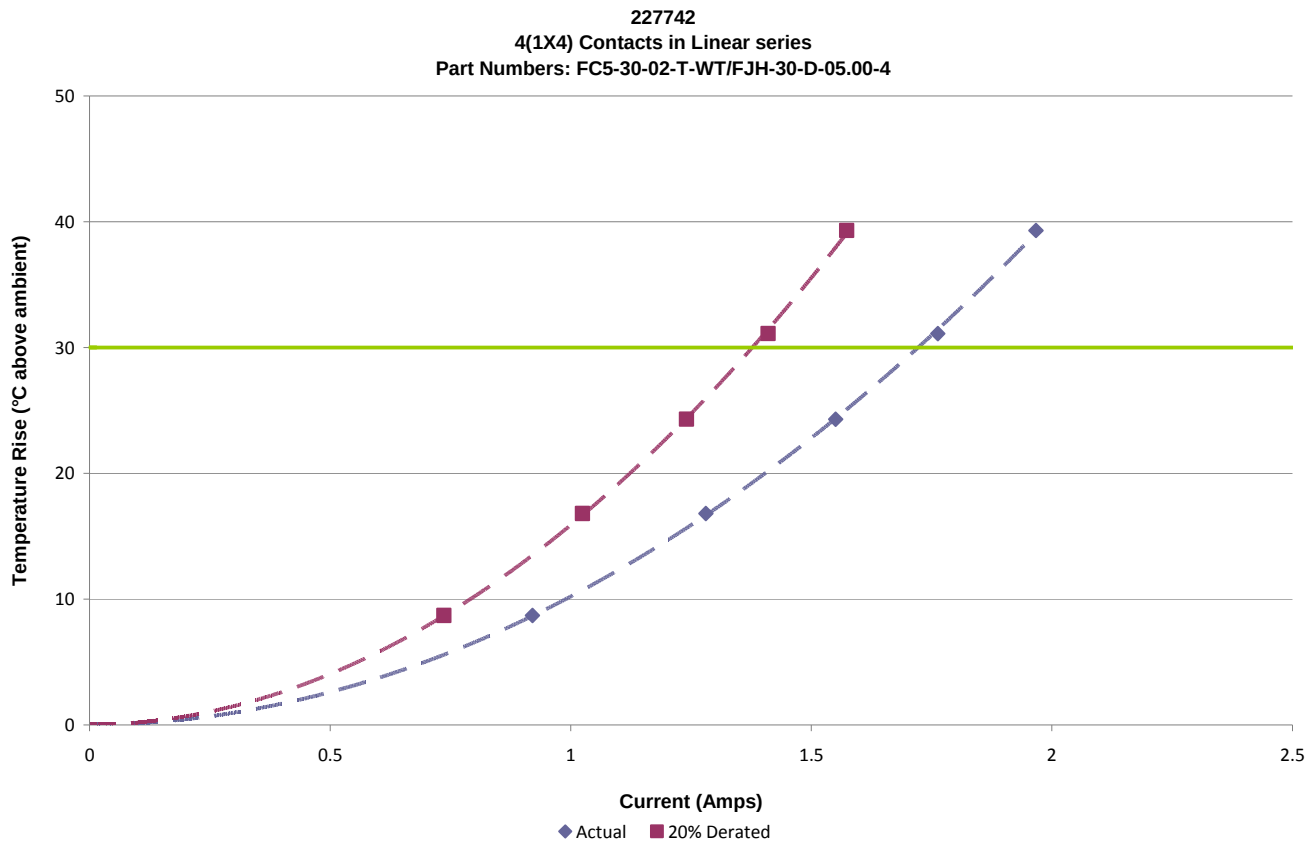



227742
3(1X3) Contacts in Linear series
Part Numbers: FC5-30-02-T-WT/FJH-30-D-05.00-4
Temperature Rise (°C above ambient)
50
40
30
20
10
0
0
0.5
1
1.5
2
2.5
Current (Amps)
Actual
20% Derated

DATA SUMMARIES Continued

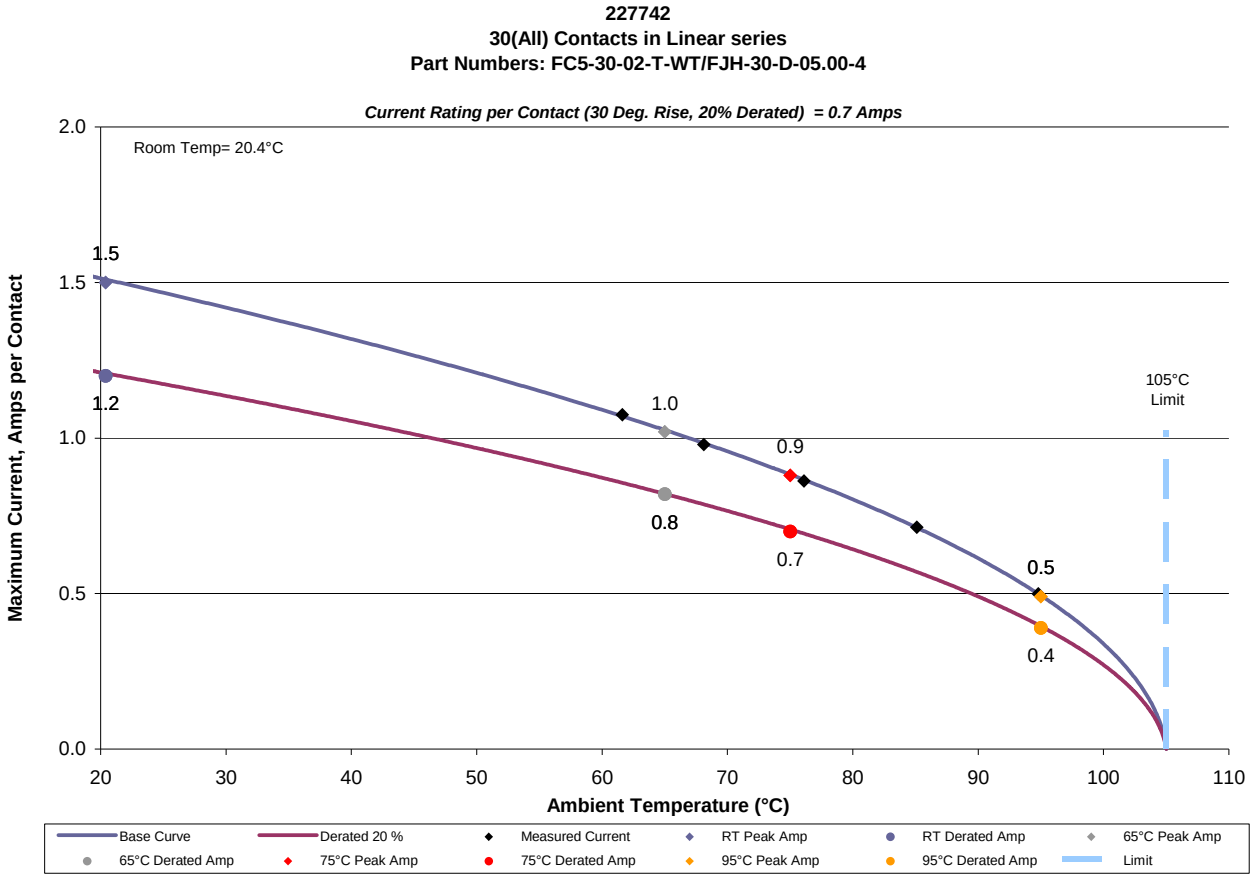
d. Linear configuration with 4 adjacent conductors/contacts powered

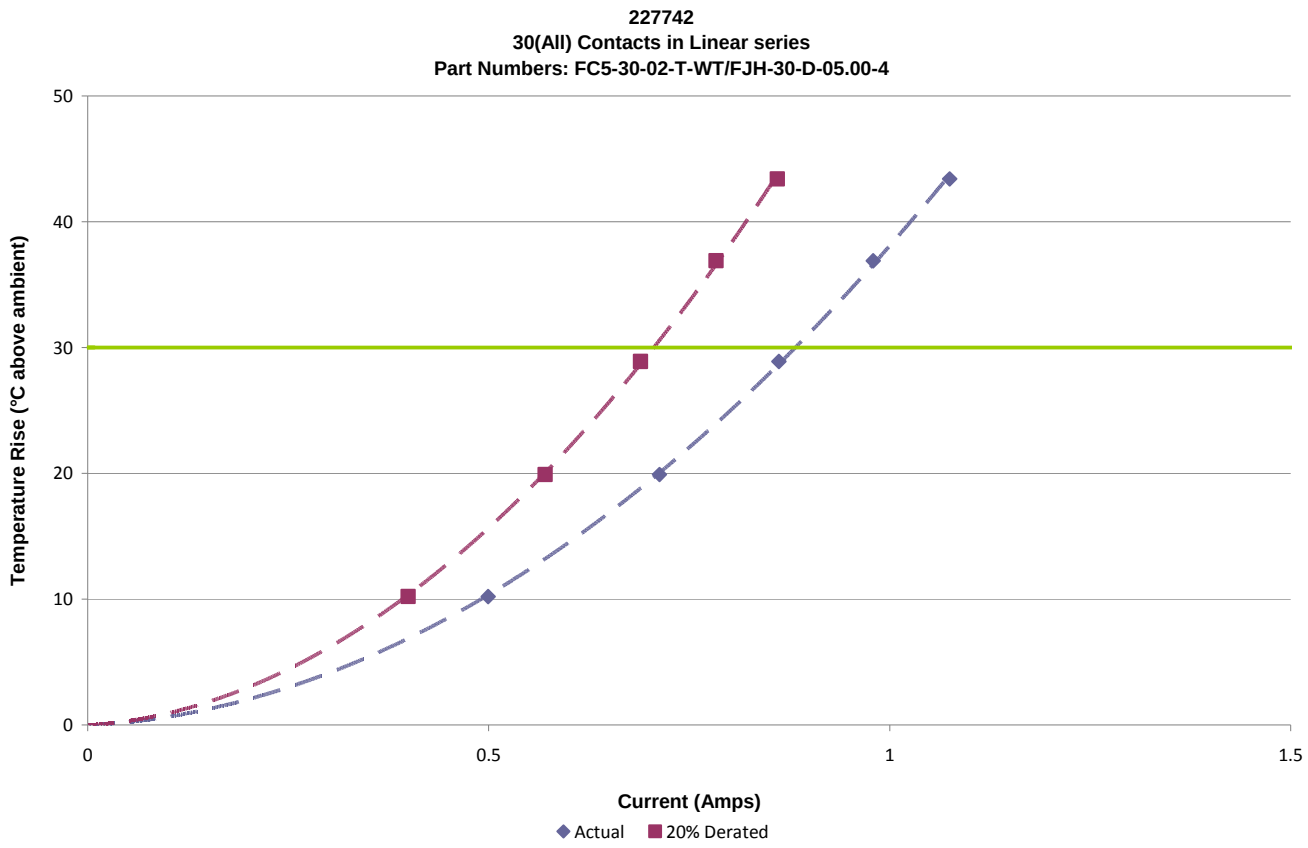



227742
4(1X4) Contacts in Linear series
Part Numbers: FC5-30-02-T-WT/FJH-30-D-05.00-4
Temperature Rise (°C above ambient)
50
40
30
20
10
0
0
0.5
1
1.5
2
2.5
Current (Amps)
Actual
20% Derated

DATA SUMMARIES Continued

e. Linear configuration with all adjacent conductors/contacts powered




227742
30(All) Contacts in Linear series
Part Numbers: FC5-30-02-T-WT/FJH-30-D-05.00-4
Temperature Rise (°C above ambient)
50
40
30
20
10
0
0
0.5
1
1.5
Current (Amps)
Actual
20% Derated

DATA SUMMARIES Continued

Mating\Unmating Force: Mating\Unmating Durability Group

	Initial				After 30 Cycles			
	Mating		**Unmating**		**Mating**		**Unmating**	
	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)
Minimum	36.34	8.17	28.29	6.36	26.69	6.00	18.86	4.24
Maximum	46.88	10.54	38.56	8.67	35.09	7.89	22.64	5.09
Average	40.93	**9.20**	32.98	**7.41**	32.41	**7.29**	21.00	**4.72**
St Dev	4.39	0.99	3.60	0.81	2.71	0.61	1.46	0.33
Count	8	8	8	8	8	8	8	8

	After Humidity			
	Mating		**Unmating**	
	Newtons	Force (Lbs)	Newtons	Force (Lbs)
Minimum	27.62	6.21	23.17	5.21
Maximum	43.19	9.71	31.85	7.16
Average	37.89	**8.52**	28.31	**6.37**
St Dev	4.70	1.06	2.77	0.62
Count	8	8	8	8

Mating\Unmating Force: Thermal Aging Group

	Initial				After Thermals			
	Mating		**Unmating**		**Mating**		**Unmating**	
	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)
Minimum	32.78	7.37	28.65	6.44	24.60	5.53	22.82	5.13
Maximum	45.64	10.26	35.14	7.90	39.63	8.91	31.36	7.05
Average	40.14	**9.03**	31.34	**7.05**	33.31	**7.49**	27.18	**6.11**
St Dev	4.02	0.90	2.31	0.52	5.31	1.19	2.86	0.64
Count	8	8	8	8	8	8	8	8

DATA SUMMARIES Continued

NORMAL FORCE (FOR CONTACTS TESTED IN THE HOUSING):

1) Calibrated force gauges are used along with computer controlled positioning equipment.
2) For Normal force 8-10 measurements are taken and the averages reported.

Initial	Deflections in inches Forces in Grams										
	0.0005	**0.0010**	**0.0015**	**0.0020**	**0.0025**	**0.0030**	**0.0035**	**0.0040**	**0.0045**	**0.0050**	***SET***
Averages	18.59	42.37	68.68	94.17	119.60	143.48	163.33	192.00	217.22	239.08	0.0003
Min	4.00	16.80	42.60	71.00	96.80	119.80	139.70	173.60	195.70	223.60	0.0001
Max	24.30	52.70	80.80	101.90	131.50	154.70	176.80	203.80	231.80	252.90	0.0007
St. Dev	5.363	9.379	10.465	8.643	9.784	10.293	10.385	9.573	10.448	9.095	0.0002
Count	12	12	12	12	12	12	12	12	12	12	12

After Thermals	Deflections in inches Forces in Grams										
	0.0005	**0.0010**	**0.0015**	**0.0020**	**0.0025**	**0.0030**	**0.0035**	**0.0040**	**0.0045**	**0.0050**	***SET***
Averages	14.94	31.58	53.75	75.84	99.13	121.82	141.83	170.16	192.97	214.23	0.0003
Min	4.40	20.40	37.90	58.80	80.80	102.70	121.00	148.60	172.90	195.50	0.0000
Max	21.20	39.00	73.80	96.20	117.60	141.00	160.80	190.80	210.50	233.90	0.0008
St. Dev	4.141	6.106	10.945	10.878	12.054	11.257	12.247	12.541	11.328	11.139	0.0002
Count	12	12	12	12	12	12	12	12	12	12	12

DATA SUMMARIES Continued

INSULATION RESISTANCE (IR):

	Pin to Pin		
	Mated	Unmated	Unmated
Minimum	**FC5/FJH**	**FC5**	**FJH**
Initial	10000	10000	Not Tested
Thermal	6595	10000	Not Tested
Humidity	1597	6537	Not Tested

	Pin to Closest Metallic Hardware		
	Mated	Unmated	Unmated
Minimum	**FC5/FJH**	**FC5**	**FJH**
Initial	10000	10000	Not Tested
Thermal	10000	10000	Not Tested
Humidity	10000	10000	Not Tested

DIELECTRIC WITHSTANDING VOLTAGE (DWV):

Voltage Rating Summary	
Minimum	**FC5/FJH**
Break Down Voltage	625
Test Voltage	469
Working Voltage	156

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

Ground to Closest Metallic Hardware	
Initial Test Voltage	Passed
After Thermal Test Voltage	Passed
After Humidity Test Voltage	Passed

DATA SUMMARIES Continued

LLCR Durability:

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. <= +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	11/11/2012	11/14/2012	11/16/2012	11/21/2012
Room Temp (Deg C)	21	22	22	22
Rel Humidity (%)	56	52	56	56
Technician	Kason He	Kason He	Kason He	Kason He
mOhm values	**Actual Initial**	**Delta 30 Cycles**	**Delta Therm Shck**	**Delta Humidity**
	Pin Type 1: Signal			
Average	90.36	2.78	2.66	2.45
St. Dev.	2.29	2.26	2.12	2.15
Min	82.53	0.00	0.07	0.00
Max	93.92	8.86	8.68	9.24
Summary Count	192	192	192	192
Total Count	192	192	192	192

LLCR Delta Count by Category						
	Stable	**Minor**	**Acceptable**	**Marginal**	**Unstable**	**Open**
mOhms	**<=5**	**>5 & <=10**	**>10 & <=15**	**>15 & <=50**	**>50 & <=1000**	**>1000**
30 Cycles	**155**	**37**	**0**	**0**	**0**	**0**
Therm Shck	**160**	**32**	**0**	**0**	**0**	**0**
Humidity	**161**	**31**	**0**	**0**	**0**	**0**

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. <= +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	11/11/2012	11/16/2012
Room Temp (Deg C)	21	22
Rel Humidity (%)	56	56
Technician	Kason He	Kason He
mOhm values	**Actual Initial**	**Delta Thermal**
	Pin Type 1: Signal	
Average	90.93	0.20
St. Dev.	1.56	0.26
Min	86.09	0.01
Max	93.66	2.03
Summary Count	192	192
Total Count	192	192

LLCR Delta Count by Category						
	Stable	**Minor**	**Acceptable**	**Marginal**	**Unstable**	**Open**
mOhms	**<=5**	**>5 & <=10**	**>10 & <=15**	**>15 & <=50**	**>50 & <=1000**	**>1000**
Thermal	**192**	**0**	**0**	**0**	**0**	**0**

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. <= +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	11/22/2012	11/23/2012
Room Temp (Deg C)	22	22
Rel Humidity (%)	56	58
Technician	Kason He	Kason He
mOhm values	**Actual Initial**	**Delta Acid Vapor**
	Pin Type 1: Signal	
Average	90.09	1.84
St. Dev.	1.36	0.55
Min	85.74	1.23
Max	93.20	4.71
Summary Count	192	192
Total Count	192	192

LLCR Delta Count by Category						
	Stable	**Minor**	**Acceptable**	**Marginal**	**Unstable**	**Open**
mOhms	**<=5**	**>5 & <=10**	**>10 & <=15**	**>15 & <=50**	**>50 & <=1000**	**>1000**
Acid Vapor	**192**	**0**	**0**	**0**	**0**	**0**

DATA SUMMARIES Continued

LLCR Shock &Vibration:

1). A total of 192 points were measured.
2). EIA-364-23, *Low Level Contact Resistance Test Procedure for Electrical Connectors and Sockets.*
3). The following guidelines are used to categorize the changes in LLCR as a result from stressing.
   a. <= +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	12/19/2012	12/21/2012
Room Temp (Deg C)	22	21
Rel Humidity (%)	32	33
Technician	Aaron McKim	Aaron McKim
mOhm values	**Actual Initial**	**Delta Shock-Vib**
	Pin Type 1: Signal	
Average	193.21	1.00
St. Dev.	1.35	0.88
Min	188.05	0.00
Max	197.93	4.65
Summary Count	192	192
Total Count	192	192

LLCR Delta Count by Category						
	Stable	**Minor**	**Acceptable**	**Marginal**	**Unstable**	**Open**
mOhms	**<=5**	**>5 & <=10**	**>10 & <=15**	**>15 & <=50**	**>50 & <=1000**	**>1000**
Shock-Vib	**192**	**0**	**0**	**0**	**0**	**0**

Nanosecond Event Detection:

Shock and Vibration Event Detection Summary	
Contacts tested	60
Test Condition	C, 100g's, 6ms, Half-Sine
Shock Events	0
Test Condition	V-B, 7.56 rms g
Vibration Events	0
Total Events	0

EQUIPMENT AND CALIBRATION SCHEDULES

Equipment #: HZ-TCT-01
Description: Normal force analyzer
Manufacturer: Mecmesin Multitester
Model: Mecmesin Multitester 2.5-i
Serial #: 08-1049-04
Accuracy: Last Cal: 4/27/2012, Next Cal: 4/26/2013

Equipment #: HZ-OV-01
Description: Oven
Manufacturer: Huida
Model: CS101-1E
Serial #: CS101-1E-B
Accuracy: Last Cal: 12/13/2011, Next Cal: 12/12/2012

Equipment #: HZ-THC-01
Description: Humidity transmitter
Manufacturer: Thermtron
Model: HMM30C
Serial #: D0240037
Accuracy: Last Cal: 3/1/2012, Next Cal: 2/28/2013

Equipment #: HZ-HPM-01
Description: NA9636H
Manufacturer: Ainuo
Model: 6031A
Serial #: 089601091
Accuracy: Last Cal: 3/8/2012, Next Cal: 3/7/2013

Equipment #: HZ-MO-01
Description: Micro-ohmmeter
Manufacturer: Keithley
Model: 2700
Serial #: 1199807
Accuracy: Last Cal: 4/27/2012, Next Cal: 4/26/2013

Equipment #: HZ-PS-01
Description: Power Supply
Manufacturer: Agilent
Model: 6031A
Serial #: MY41000982
Accuracy: Last Cal: 4/27/2012, Next Cal: 4/26/2013

Equipment #: HZ-MO-05
Description: Micro-ohmmeter
Manufacturer: Keithley
Model: 3706
Serial #: 1285188
Accuracy: Last Cal: 11/15/2012, Next Cal: 11/14/2013

EQUIPMENT AND CALIBRATION SCHEDULES

Equipment #: HZ-TSC-01
Description: Vertical Thermal Shock Chamber
Manufacturer: Cincinnatti Sub Zero
Model: VTS-3-6-6-SC/AC
Serial #: 10-VT14994
Accuracy: See Manual
… Last Cal: 06/28/2012, Next Cal: 06/27/2013

Equipment #: SVC-01
Description: Shock & Vibration Table
Manufacturer: Data Physics
Model: LE-DSA-10-20K
Serial #: 10037
Accuracy: See Manual
… Last Cal: 11/31/2011, Next Cal: 11/31/2012

Equipment #: ACLM-01
Description: Accelerometer
Manufacturer: PCB Piezotronics
Model: 352C03
Serial #: 115819
Accuracy: See Manual
… Last Cal: 07/09/2012, Next Cal: 07/09/2013

Equipment #: ED-03
Description: Event Detector
Manufacturer: Analysis Tech
Model: 32EHD
Serial #: 1100604
Accuracy: See Manual
… Last Cal: 06/04/2012, Next Cal: 06/04/2013