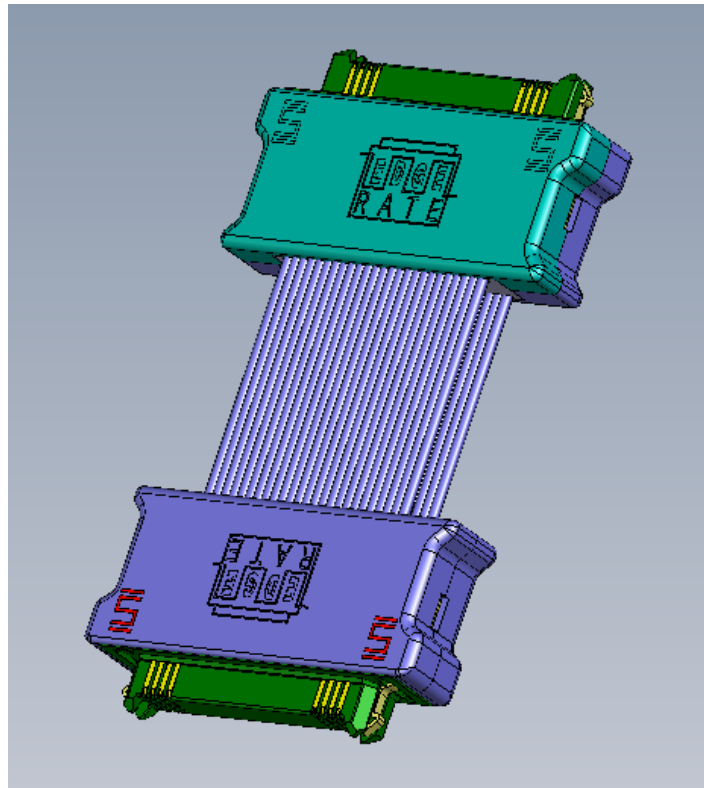




Project Number:	Tracking Code: TC0810--1621		
Requested by: John Riley	Date: 05/27/2008	Product Rev: 0	
Part #: ERCDA-25-09.00-1SS-TD-TU	Lot #: N/A	Tech: Eric Fox & Daniel Borgelt	Eng: Troy Cook
Part description: ERCDA			Qty to test: 35
Test Start: 03/06/2008	Test Completed: 6/21/2008		



DESIGN VERIFICATION TEST REPORT

ERCDA-25-09.00-1SS-TD-TU

Mated with

ERF8-025-05.0-L-DV-L

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

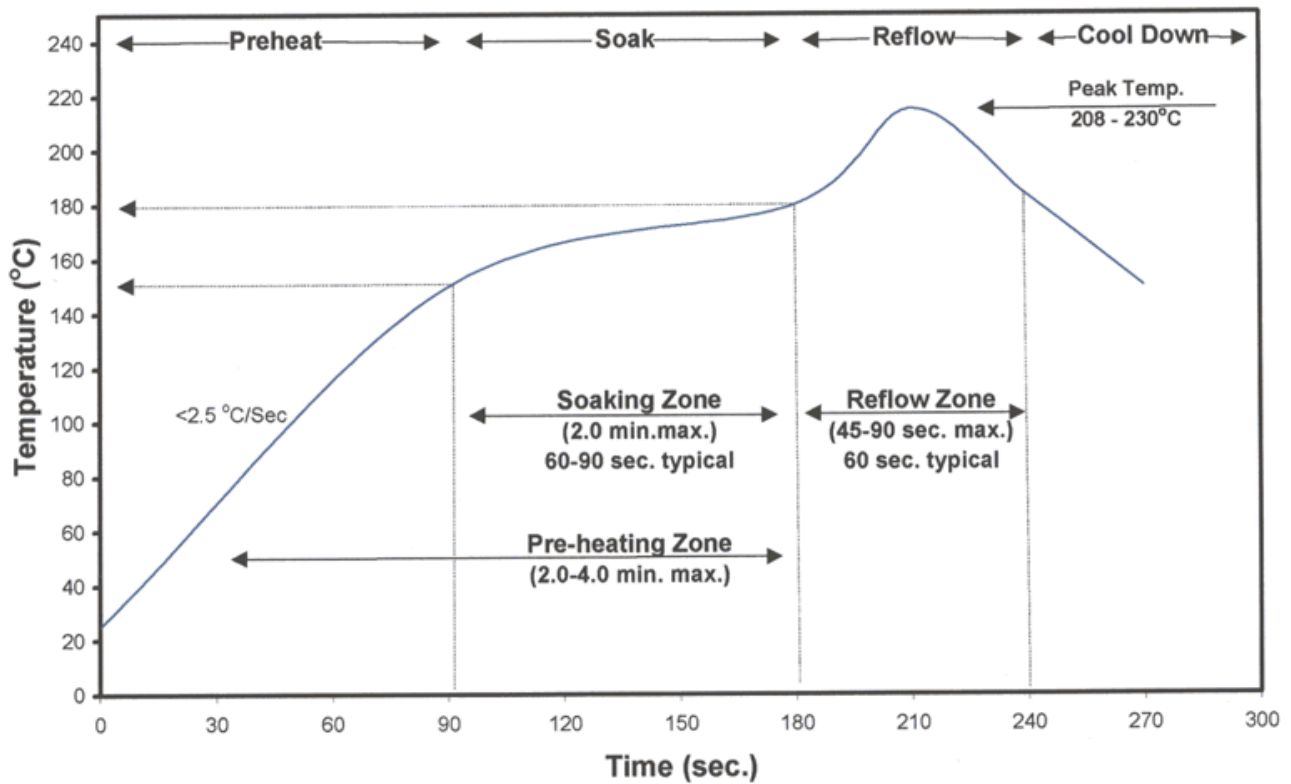
To perform the following tests: Design verification test.

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: Test PCB

TYPICAL OVEN PROFILE (Soldering Parts to Test Boards)**Standard Solder Paste Reflow Profile
for Kester Paste Containing
Alloys: Sn63Pb37 or Sn62Pb36Ag02**

FLOWCHARTS**Current Carrying Capacity**

Category Electrical 11 and 12

3 Piece

TEST	GROUP 1
STEP	One Cable Powered 6 Adjacent Contacts
01	CCC

Tabulate calculated current at RT, 60° C, 75° C and 80° C

after derating 20% and after derating 20% and based on 80° C

CCC, Temp rise = EIA-364-70

Initial IR/DWV

Category Electrical 13

2 Pieces

2 Pieces

1 Piece

TEST	GROUP 1A Cable#1 - Conductor - to - Conductor	GROUP 1B Cable#2 Conductor - to - Conductor	GROUP 1C Conductor - Latch (Ground)
STEP			
01	IR/DWV	IR/DWV	IR/DWV
02	Data Review	Data Review	Data Review

NOTES: When testing, take the first measurement(s) (End#1) and then unplug the cable and plug the opposite end of the cable in.
Repeat measurement(s) for End #2

Category Electrical 14

2 Pieces

TEST	GROUP 2A Cable#1 - Conductor - to - Conductor Thermal	GROUP 2B Cable#2 Conductor - to - Conductor Thermal	GROUP 2C Conductor - Latch (Ground) Thermal
STEP			
01	Thermal Aging	Thermal Aging	Thermal Aging
02	IR/DWV	IR/DWV	IR/DWV

Thermal Aging = EIA-364-17, Test Condition 4, 105 deg C;

Time Condition 'B' (250 hours)

NOTES: When testing, take the first measurement(s) (End#1) and then unplug the cable and plug the opposite end of the cable in.
Repeat measurement(s) for End #2

FLOWCHARTS Continued**Category Electrical 14**

2 Pieces

TEST STEP	GROUP 3A Cable#1 - Conductor - to - Conductor Thermal	GROUP 3B Cable#2 Conductor - to - Conductor Thermal	GROUP 3C Conductor - Latch (Ground) Thermal
01	Humidity	Humidity	Humidity
02	IR/DWV	IR/DWV	IR/DWV

Humidity =EIA-364-31, Test Condition B (240 Hours)
and Method III (+25 ° C to +65 ° C @ 90%RH to 98% RH)
delete steps 7a and 7b

NOTES: When testing, take the first measurement(s) (End#1) and then unplug the cable and plug the opposite end of the cable in.
Repeat measurement(s) for End #2

Connector Pull**Category Mechanical 1 and 2**

5 Pieces

5 Pieces

5 Pieces

5 Pieces

TEST STEP	GROUP 2A-STD	GROUP 2B-STD	GROUP 1A-STD	GROUP 1B-STD
	025 position	025 position	025 position	025 position
	SIG 0°	SIG 90°	LATCHES 0°	LATCHES 90°
01	Pull test, Continuity	Pull test, Continuity	Pull test, Continuity	Pull test, Continuity

Secure both cables in the center
Monitor continuity and pull
record forces when continuity fails.

FLOWCHARTS Continued**Resistance, SIG Continuity****Category Electrical 8 and Mechanical 3 and 4****5 Pieces****5 Pieces**

TEST	GROUP 1	GROUP 1A
STEP	DV End 90°	DV End 35°
	SIG	SIG
01	Resistance	Resistance
02	1000 Cycles	1000 Cycles
03	Resistance	Resistance
04	Data Review	Data Review
05	2000 Cycles	2000 Cycles
06	Resistance	Resistance
07	Data Review	Data Review
08	3000 Cycles	3000 Cycles
09	Resistance	Resistance
10	Data Review	Data Review
11	4000 Cycles	4000 Cycles
12	Resistance	Resistance
13	Data Review	Data Review
14	5000 Cycles	5000 Cycles
15	Resistance	Resistance

ATTRIBUTE DEFINITIONS

The following is a brief, simplified description of attributes.

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.

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° 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.

INSULATION RESISTANCE (IR):

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

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

DIELECTRIC WITHSTANDING VOLTAGE (DWV):

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

- 1) PROCEDURE:
 - a. Reference document: EIA-364-20, *Withstanding Voltage Test Procedure for Electrical Connectors*.
 - b. Test Conditions:
 - i. Between Adjacent Contacts or Signal-to-Ground
 - ii. 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).

LLCR:

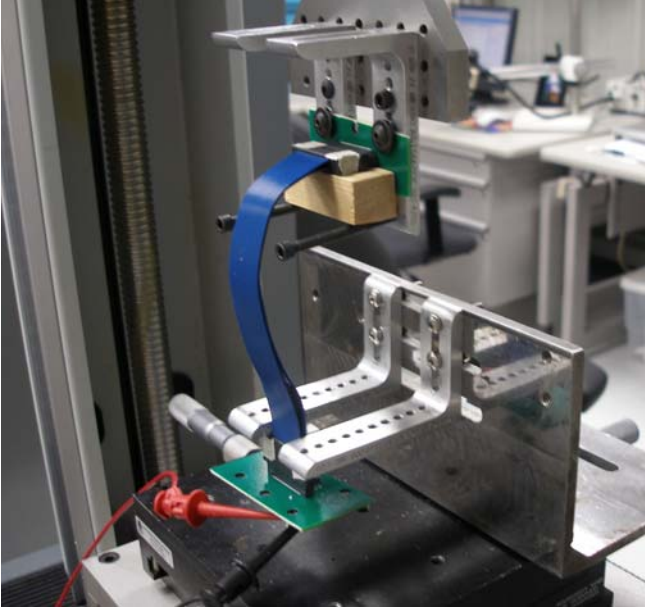
- 1) EIA-364-23, *Low Level Contact Resistance Test Procedure for Electrical Connectors and Sockets*.
- 2) A computer program, *LLCR 221.exe*, ensures repeatability for data acquisition.
- 3) The following guidelines are used to categorize the changes in LLCR as a result from stressing
 - a. $\leq +5.0$ 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

SUPPLEMENTAL TESTS

CONNECTOR PULL:

- 1) Secure cable near center and pull on connector

a. At 90° , right angle to cable



b. At 0° , in-line with cable



Fig. 1 & 2
(Typical set-up, actual part depicted.)
Notice the electrical continuity hook-up wires.

CABLE DURABILITY:

- 1) Oscillate and monitor electrical continuity for open circuit indication.
 - a. $\pm 35^\circ$ Pendulum Mode, bend up to 5,000 cycles with 8 oz. load on cable end.

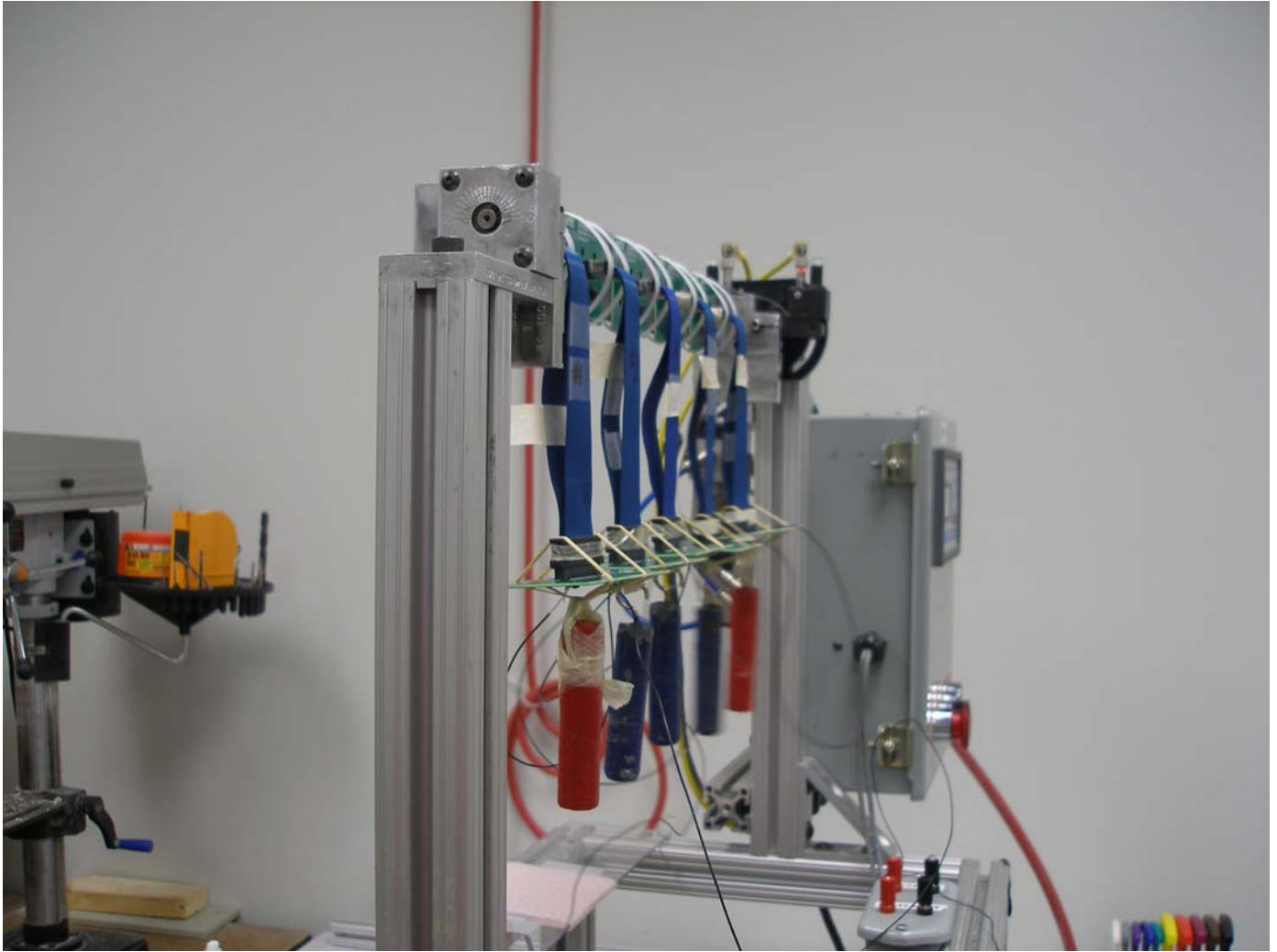


Fig. 3
(Typical set-up, actual part depicted.)

- b. $\pm 90^\circ$ Flex Mode, bend up to 5,000 cycles with 8 oz. load on cable end.

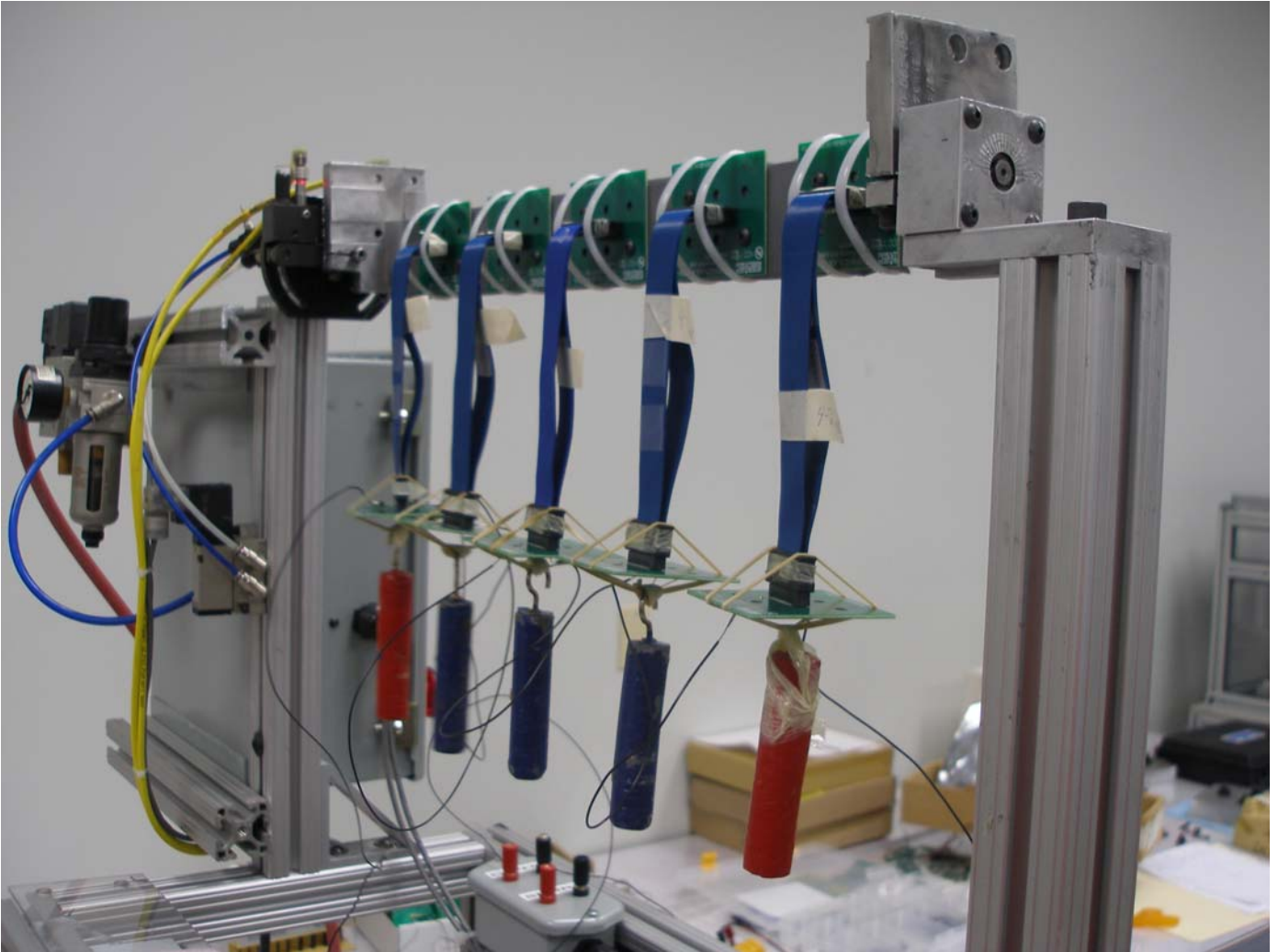


Fig. 4
(Typical set-up, actual part depicted.)

RESULTS

Temperature Rise, CCC at a 20% de-rating

- CCC for a 30°C Temperature Rise-----1.6A per contact with 6 linear contacts powered.

Temperature Rise, CCC at a 20% de-rating

- CCC for a 30°C Temperature Rise-----1.1A per contact with 6 linear contacts powered and thermocouple in cable.

Insulation Resistance minimums, Signal to Signal

- Initial
 - Mated-----100,000 Meg Ω ----- Pass
- Thermal
 - Mated-----100,000 Meg Ω ----- Pass
- Humidity
 - Mated-----100,000 Meg Ω ----- Pass

Insulation Resistance minimums, Signal to Ground

- Initial
 - Mated----- 25,000 Meg Ω ----- Pass
- Thermal
 - Mated----- 25,000 Meg Ω ----- Pass
- Humidity
 - Mated----- 50,000 Meg Ω ----- Pass

Dielectric Withstanding Voltage minimums, Signal to Signal

- Initial
 - Breakdown
 - Mated-----480 VAC
 - DWV
 - Mated-----360 VAC
 - Working voltage
 - Mated-----120 VAC
- Thermal
 - Breakdown
 - Mated-----640 VAC
 - DWV
 - Mated-----480 VAC
 - Working voltage
 - Mated-----160 VAC
- Humidity
 - Breakdown
 - Mated-----700 VAC
 - DWV
 - Mated-----525 VAC
 - Working voltage
 - Mated-----175 VAC

Dielectric Withstanding Voltage minimums, DWV

- **Initial**
 - **Breakdown**
 - Mated -----740 VAC
 - **DWV**
 - Mated -----555 VAC
 - **Working voltage**
 - Mated -----185 VAC
- **Thermal**
 - **Breakdown**
 - Mated -----740 VAC
 - **DWV**
 - Mated -----555 VAC
 - **Working voltage**
 - Mated -----185 VAC
- **Humidity**
 - **Breakdown**
 - Mated -----720 VAC
 - **DWV**
 - Mated -----540 VAC
 - **Working voltage**
 - Mated -----180 VAC

SUPPLEMENTAL TESTING**Supplemental – Connector/Cable Pull, (Latch)**

- 0° ----- 83.50 lbs min
- 90° ----- 8.50 lbs min

Supplemental – Connector/Cable Pull, (Signal)

- 0° ----- 34.50 lbs min
- 90° ----- 14.00 lbs min

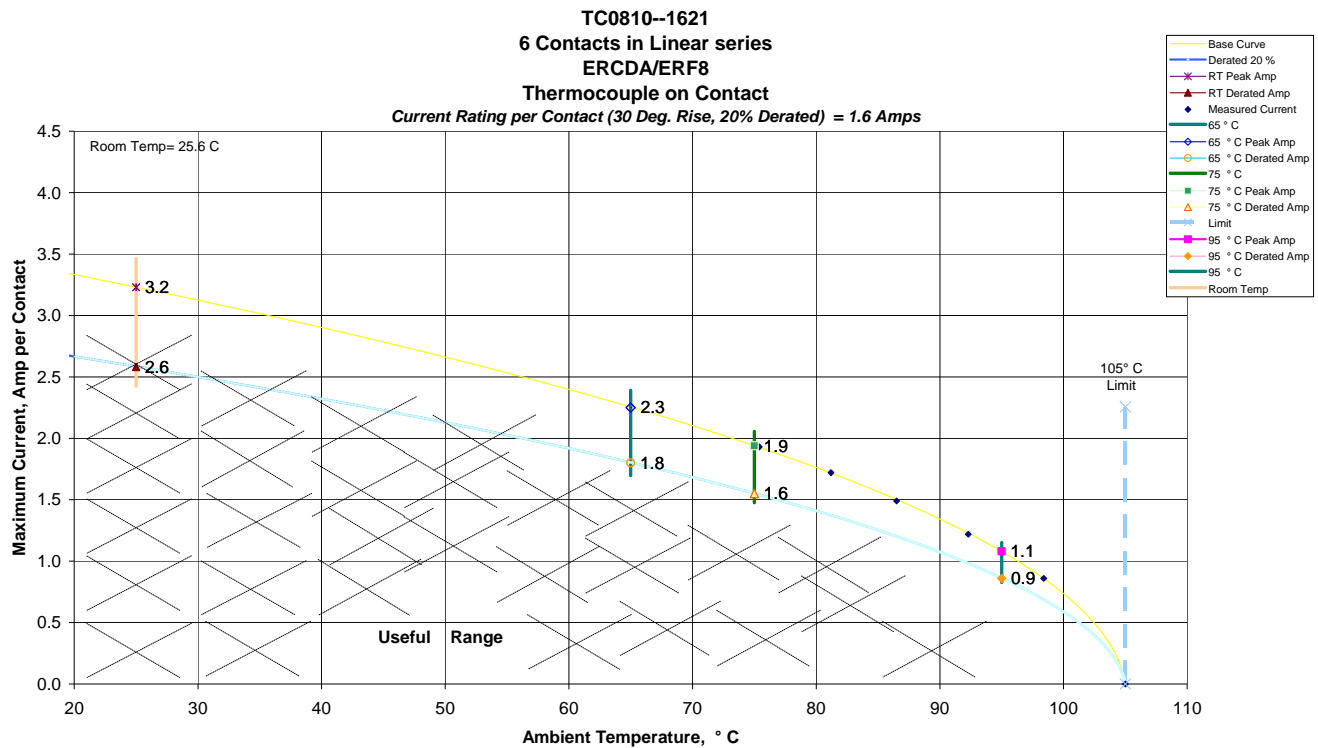
Supplemental – Cable Bend 5,000 Cycles

- ±35° Pendulum Mode ----- No Electrical Failures
- ±90° Flex Mode ----- No Electrical Failures

DATA SUMMARIES

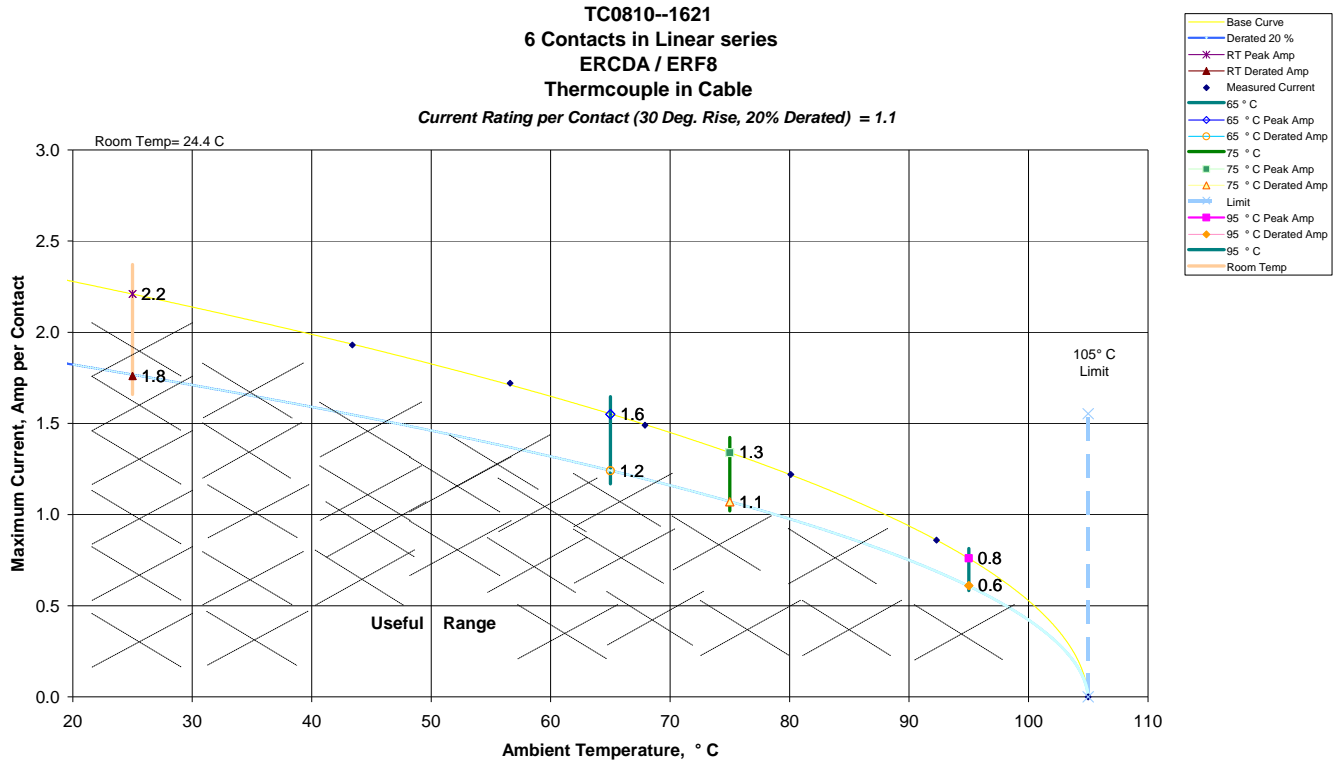
TEMPERATURE RISE (Current Carrying Capacity, CCC):

- 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 six adjacent contacts powered.



DATA SUMMARIES Continued

b. Linear configuration with six adjacent contacts powered with thermocouple in cable.



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

	Signal-Signal	Signal-Ground
	Mated	Mated
Minimum	ERCDA/ERF8	ERCDA/ERF8
Initial	100000	25000
Thermal	100000	25000
Humidity	100000	50000

DIELECTRIC WITHSTANDING VOLTAGE (DWV):

		Signal-Signal	Signal-Ground
		Mated	Mated
Minimum		ERCDA/ERF8	ERCDA/ERF8
Breakdown Voltage	Initial	480	740
	Thermal	640	740
	Humidity	700	720
DWV	Initial	360	555
	Thermal	480	555
	Humidity	525	540
Working Voltage	Initial	120	185
	Thermal	160	185
	Humidity	175	180

CABLE PULL:**SIGNAL**

	0 Deg.	90 Deg.	90 Deg. (Supported)**
Pull DV	Force (Lbs)	Force (Lbs)	Force (Lbs)
Minimum	34.50	14.00	43.50
Maximum	131.50	17.50	116.00
Average	102.8	15.5	71.40

LATCH

	0 Deg.	90 Deg.	90 Deg. (Supported)**
Pull DV	Force (Lbs)	Force (Lbs)	Force (Lbs)
Minimum	83.50	8.50	80.50
Maximum	141.50	20.50	126.50
Average	99.9	17.0	96.50

CABLE BEND:**35 DEGREE**

	Resistance, Ohms					
	Initial	After 1000	After 2000	After 3000	After 4000	After 5000
Avg	7.6750	7.6150	7.6275	7.6200	7.6875	7.7175
Min	7.6000	7.5900	7.5600	7.5700	7.6700	7.6700
Max	7.7000	7.6400	7.6900	7.6500	7.7300	7.8000
St. Dev.	0.0500	0.0289	0.0538	0.0346	0.0287	0.0591
Count	4	4	4	4	4	4

90 DEGREE

	Resistance, Ohms					
	Initial	After 1000	After 2000	After 3000	After 4000	After 5000
Avg	7.6060	7.5000	7.4980	7.5040	7.4700	7.4520
Min	7.3800	7.3800	7.3800	7.3900	7.3600	7.3500
Max	7.8900	7.7100	7.7400	7.7100	7.6900	7.6400
St. Dev.	0.1917	0.1245	0.1411	0.1220	0.1298	0.1134
Count	5	5	5	5	5	5

DATA**SUPPLEMENTAL TESTING****CABLE PULL:**

SIGNAL	0 Deg.	90 Deg.	90 Deg. (Supported)**
Sample#	Maximum Force (Lbs)	Maximum Force (Lbs)	Maximum Force (Lbs)
1	111.00	14.00	60.00
2	120.00	15.50	86.50
3*	34.50	14.50	116.00
4	131.50	16.00	43.50
5	117.00	17.50	51.00

LATCH	0 Deg.	90 Deg.	90 Deg. (Supported)**
Sample#	Maximum Force (Lbs)	Maximum Force (Lbs)	Maximum Force (Lbs)
1	83.50	17.50	126.50
2	141.50	20.50	81.50
3	93.00	18.50	97.00
4	89.00	8.50	80.50
5	92.50	20.00	97.00

CABLE BEND:**35 DEGREE**

Cable	Initial	After 1000 Cycles	After 2000 Cycles	After 3000 Cycles	After 4000 Cycles	After 5000 Cycles
1	7.6	7.6400	7.6	7.6	7.7	7.7
2	7.7	7.5900	7.6	7.6	7.7	7.7
3	7.7	7.6	7.7	7.7	7.7	7.8
4	7.7	7.5900	7.6	7.6	7.7	7.7

90 DEGREE

Cable	Initial	After 1000 Cycles	After 2000 Cycles	After 3000 Cycles	After 4000 Cycles	After 5000 Cycles
1	7.6	7.5	7.5	7.5	7.5	7.4
2	7.4	7.5	7.4	7.5	7.4	7.4
3	7.9	7.7	7.7	7.7	7.7	7.6
4	7.6	7.5	7.5	7.5	7.5	7.5
5	7.5	7.4	7.4	7.4	7.4	7.4

EQUIPMENT AND CALIBRATION SCHEDULES**Equipment #:** MO-04**Description:** Multimeter /Data Acquisition System**Manufacturer:** Keithley**Model:** 2700**Serial #:** 0798688**Accuracy:** See Manual - DO NOT USE UNTIL CALIBRATED.

... Last Cal: 03/10/08, Next Cal: 03/10/09

Equipment #: PS-07**Description:** 20 V, 120 A DC Power Supply - AutoRanging SO/HPIB**Manufacturer:** Hewlett Packard / Agilent**Model:** AT-6031A**Serial #:** 2721A00648**Accuracy:** See Manual Current Carrying Capacity (CCC) Chamber

... Last Cal: 10/25/2007, Next Cal: 10/25/2008

Equipment #: STG-01**Description:** Hipot Megomter Safety Test Cage**Manufacturer:** Hipotronics**Model:** TC-25**Serial #:** M9910141**Accuracy:** N/A

... Last Cal: No Calibration Required, Next Cal:

Equipment #: THC-01**Description:** Temperature/Humidity Chamber**Manufacturer:** Thermotron**Model:** SM-8-7800**Serial #:** 30676**Accuracy:** See Manual

... Last Cal: 9/21/2007, Next Cal: 9/21/2008

Equipment #: TCT-01**Description:** Test Stand**Manufacturer:** Chatillon**Model:** TCD-1000**Serial #:** 05 23 00 02**Accuracy:** Speed Accuracy: +/-5% of max speed; Displacement: +/- .5% or +/- .005, whichever is greater.

... Last Cal: 5/24/07, Next Cal: 5/31/08

Equipment #: LC-1000N (icell)-2**Description:** 1000 N icell load cell for Dillon Test Stand**Manufacturer:** Mecmesin (Dillon/Quantrol)**Model:** icell**Serial #:** 07-0117-06**Accuracy:** .10% of Capacity

... Last Cal: 12/05/2007, Next Cal: 12/05/2008

Equipment #: OV-03**Description:** Cascade Tek Forced Air Oven**Manufacturer:** Cascade Tek**Model:** TFO-5**Serial #:** 0500100**Accuracy:** Temp. Stability: +/- .1C/C change in ambient Temp. Stability: +/- .1C/C change in ambient
... Last Cal: 06/62/07, Next Cal: 06/22/08**Equipment #:** HPM-01**Description:** Hipot Megommeter**Manufacturer:** Hipotronics**Model:** H306B-A**Serial #:** M9905004**Accuracy:** 2 % Full Scale Accuracy

... Last Cal: 06/22/07, Next Cal: 06/22/08

Equipment #: CM-01**Description:** Continuity Monitor**Manufacturer:** Samtec**Model:****Serial #:** NA**Accuracy:** 1 mS to 10 mS window

... Last Cal: No Calibration Required, Next Cal: