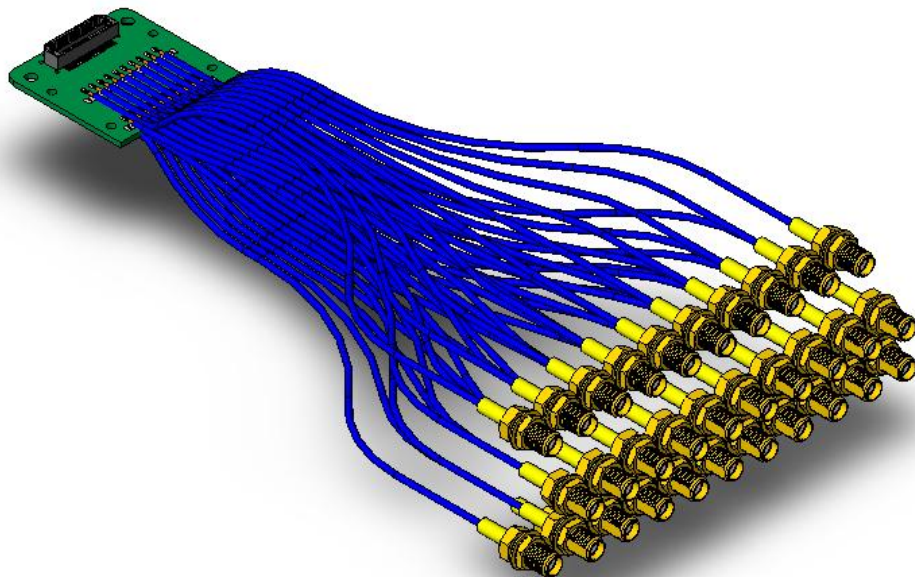




Project Number:		Tracking Code: TC0612--0978	
Requested by: Gary Lewis		Date: 3/24/2006	Product Rev: N/A
Part #: N-EQRF-020-06.0-T-L-SMA-J-2		Lot #: N/A	Tech: Troy Cook/Tony Wagoner
Eng: Dave Scopelliti			Qty to test: 40
Part description: EQRF			
Test Start: 05/12/2006		Test Completed: 8/1/2006	



DVT REPORT
for
N-EQRF-020-06.0-T-L-SMA-J-2
Mated with SMA-J-P-H-ST-TH1

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

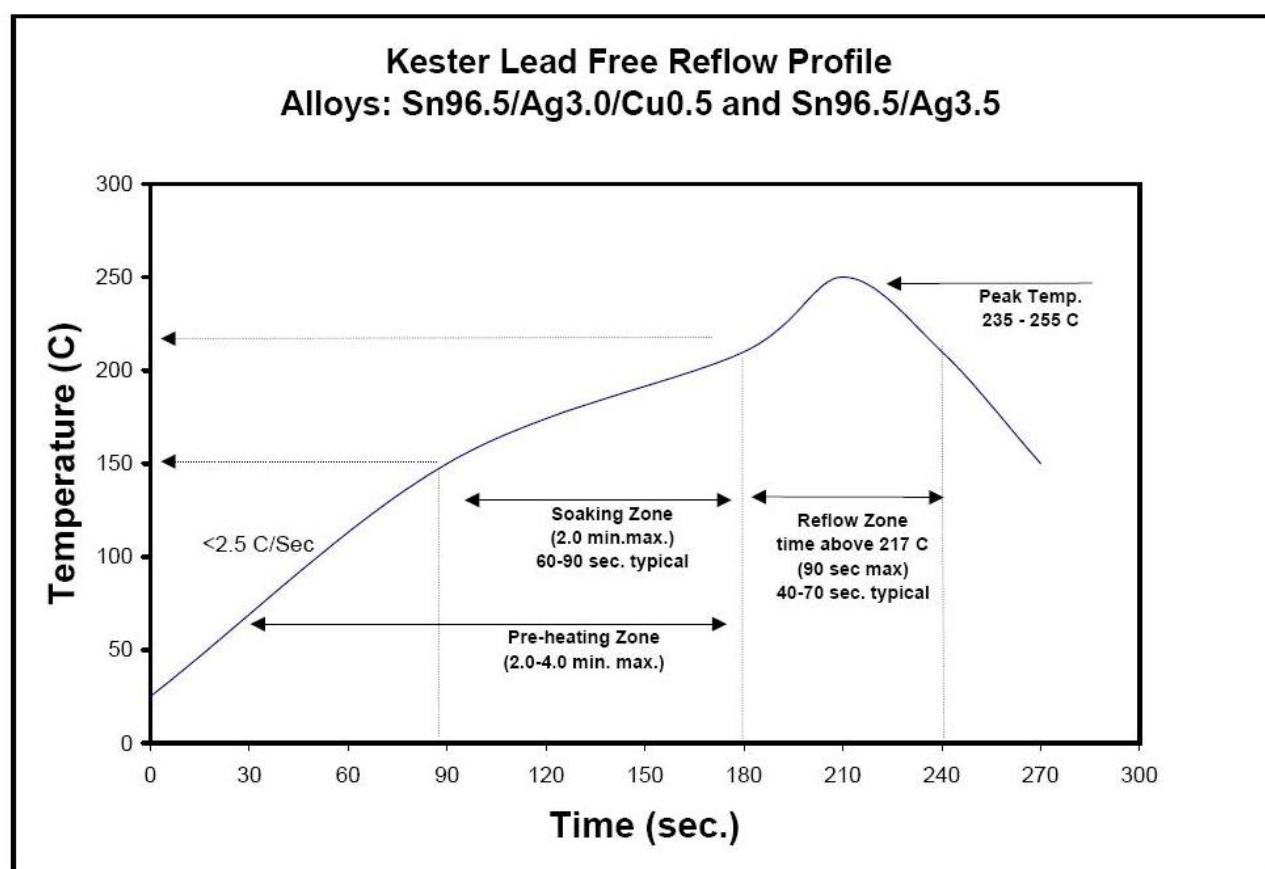
To perform the following tests: TESTPLAN ALLREADY SETUP....IR/DWV, CCC, PULL, FLEX

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) Internal Test PCBs used: PCB-100492-TST-XX

OVEN PROFILE (Soldering Parts to Test Boards)

Tracking Code: TC0612--0978	Part #: N-EQRF-020-06.0-T-L-SMA-J-2
Part description: EQRF	

FLOWCHARTS

Current Carrying Capacity

TEST STEP	GROUP 1 Cable Center 6 Adjacent Signal Lines
01	CCC

Tabulate calculated current at RT, 55° C, 65° C and 70° C
after derating 20% and based on 80° C
CCC, Temp rise = EIA-364-70

IR

TEST STEP	GROUP 1A DV Pin-Pin	GROUP 1A DV Row-Row
01	IR	IR
02	Data Review	Data Review
03	Thermal Aging	Thermal Aging
04	IR	IR
05	Data Review	Data Review
06	Humidity	Humidity
07	IR	IR

Thermal Aging = EIA-364-17, Test Condition 4, 105 deg C;
Time Condition 'B' (250 hours)
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

DWV

TEST STEP	GROUP 1a Pin-Pin Ambient	GROUP 2a Row-Row Ambient	GROUP 1b Pin-Pin Thermals	GROUP 2b Row-Row Thermals	GROUP 1c Pin-Pin Humidity	GROUP 2c Row-Row Humidity
01	DWV/Working Voltage	DWV/Working Voltage	Thermal Aging	Thermal Aging	Humidity	Humidity
02			DWV/Working Voltage	DWV/Working Voltage	DWV/Working Voltage	DWV/Working Voltage

Thermal Aging = EIA-364-17, Test Condition 4, 105 deg C;
Time Condition 'B' (250 hours)
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

FLOWCHARTS Continued**Connector Pull**

TEST STEP	GROUP 1A	GROUP 1B
	DV	DV
	SIG 0°	SIG 90°
01	Pull test, Continuity	Pull test, Continuity

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

Resistance, Snaked for 2-Wire Resistance

TEST STEP	<u>Flex Mode</u>	<u>Pendulum Mode</u>
	GROUP 1	GROUP 2
	DV	DV
	SIG, ±90° Bend Shroud	SIG, ±35° Bend Shroud
01	Resistance	Resistance
02	5000 Cycles	5000 Cycles
03	Data Review	Data Review
04	Resistance	Resistance
05	10000 Cycles	10000 Cycles
06	Data Review	Data Review
07	Resistance	Resistance
08	15000 Cycles	15000 Cycles
09	Data Review	Data Review
10	Resistance	Resistance
11	20000 Cycles	20000 Cycles
12	Data Review	Data Review
13	Resistance	Resistance
14	25000 Cycles	25000 Cycles
15	Resistance	Resistance

Cycling with No Load on cable loading at 1500 to 3000 /Hour
25 to 50 per minute

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) Connectors are sometimes mated and all samples are pre-conditioned at ambient.

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) Connectors are sometimes mated and all samples are pre-conditioned at ambient.

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. 55° C
 - c. 65° C
 - d. 70° 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
 - 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
 - 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).

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

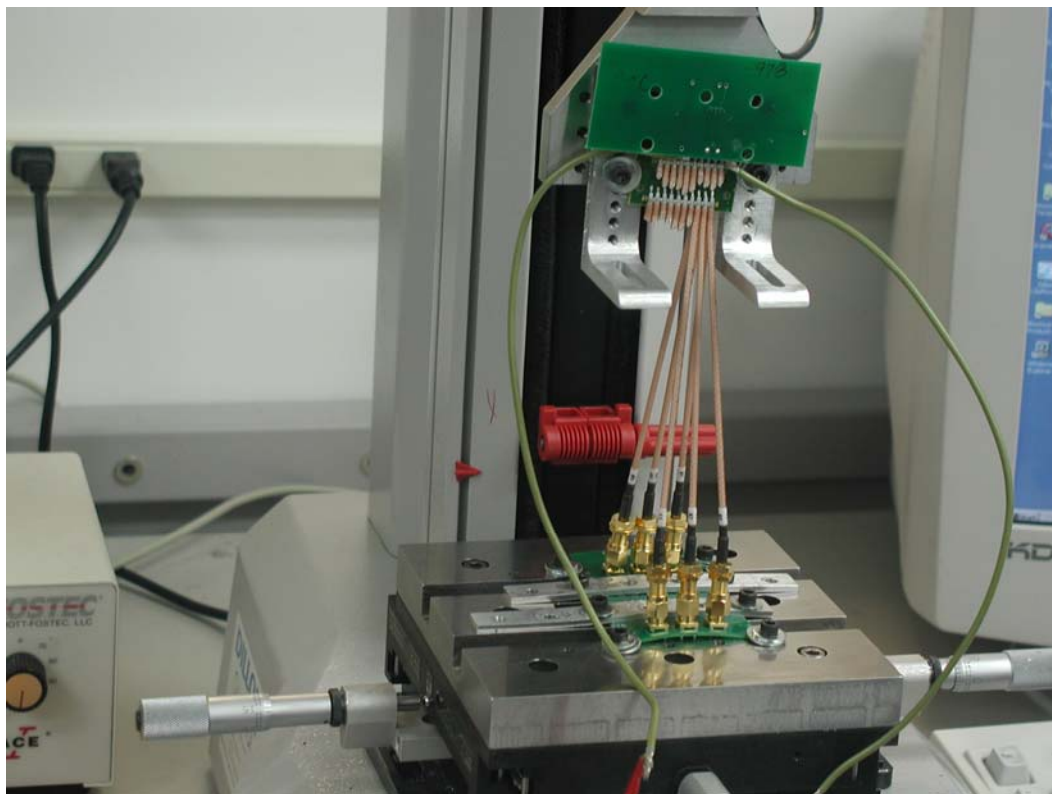


Fig. 1
(Typical set-up, actual part depicted.)
0° Connector pull, notice the electrical continuity hook-up wires.

CABLE DURABILITY:

- 1) Oscillate and monitor electrical continuity for open circuit indication.
 - a. $\pm 35^\circ$ Pendulum Mode, bend up to 15,000 cycles with no weight or load on the cable end.

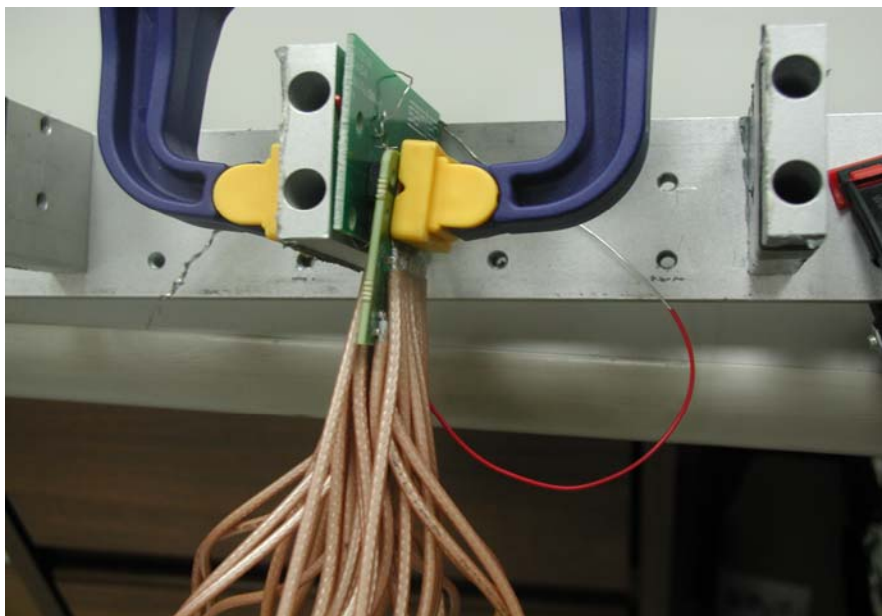


Fig. 2
(Typical set-up, actual part depicted.)

- b. $\pm 90^\circ$ Flex Mode, bend up to 5,000 cycles with no weight or load on cable end.

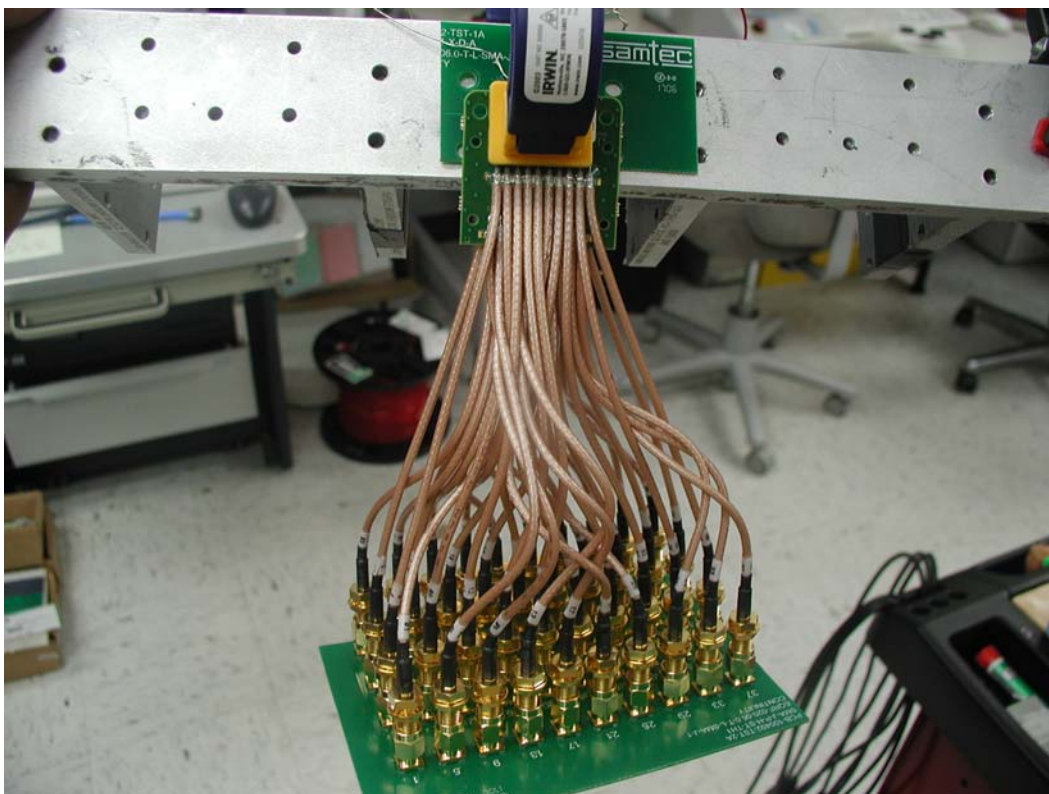


Fig. 3
(Typical set-up, actual part depicted.)

RESULTS

Temperature Rise, CCC at a 20% de-rating

- CCC for a 30°C Temperature Rise (Cable Center) ---1.3 A per contact with 6 adjacent contacts powered

Insulation Resistance minimums, IR

- Initial
 - Row to Row-----100,000 Meg Ω ----- Pass
 - Pin to Pin----- 15,000 Meg Ω
- Thermal
 - Row to Row-----100,000 Meg Ω
 - Pin to Pin----- 15,000 Meg Ω
- Humidity
 - Row to Row-----100,000 Meg Ω
 - Pin to Pin----- 10,000 Meg Ω

Dielectric Withstanding Voltage minimums, DWV

- Initial
 - Breakdown
 - Row to Row-----1,400VAC
 - Pin to Pin-----1,200 VAC
 - DWV
 - Row to Row-----1,050 VAC
 - Pin to Pin-----900 VAC
 - Working voltage
 - Row to Row-----350 VAC
 - Pin to Pin-----300 VAC
- Thermal
 - Breakdown
 - Row to Row-----900 VAC
 - Pin to Pin-----1,100 VAC
 - DWV
 - Row to Row-----675 VAC
 - Pin to Pin-----825 VAC
 - Working voltage
 - Row to Row-----225 VAC
 - Pin to Pin-----275 VAC
- Humidity
 - Breakdown
 - Row to Row-----1,100 VAC
 - Pin to Pin-----1,000 VAC
 - DWV
 - Row to Row-----825 VAC
 - Pin to Pin-----750 VAC
 - Working voltage
 - Row to Row-----275 VAC
 - Pin to Pin-----250 VAC

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Part description: EQRF	

SUPPLEMENTAL TESTING

Supplemental – Connector/Cable Pull

- 0° ----- 40.81 lbs min
- 90° ----- 33.79 lbs min

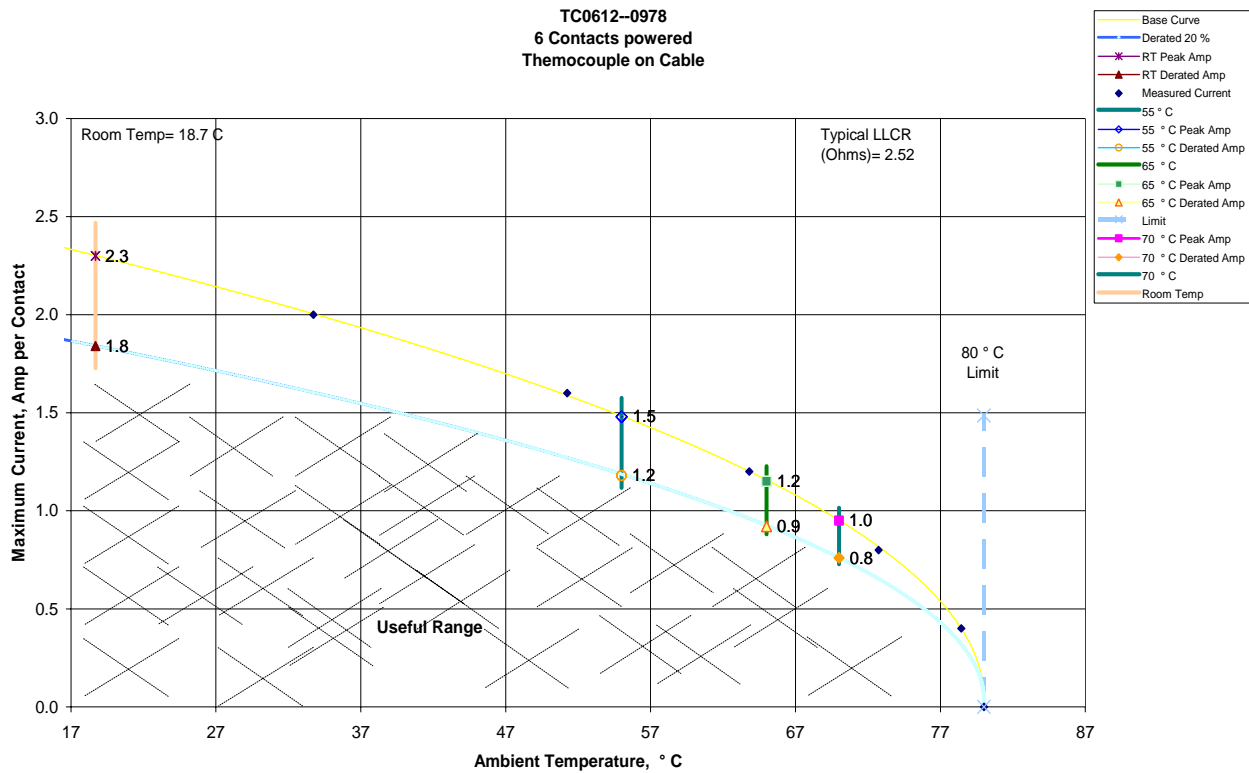
Supplemental – Cable Bend 25,000 Cycles

- ±35° Pendulum Mode ----- Earliest failure at 505 Cycles
- ±90° Flex Mode ----- Earliest failure at 251 Cycles

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 conductors/contacts powered
- 5) CCC was tested with the thermocouples in the following locations
 - a. Bundled in the cable, 6 adjacent lines powered



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

	Initial, Meg Ohms		Thermal, Meg Ohms		Humidity, Meg Ohms	
	P-P	R-R	P-P	R-R	P-P	R-R
	<u>Insulation Resistance</u>	<u>Insulation Resistance</u>	<u>Insulation Resistance</u>	<u>Insulation Resistance</u>	<u>Insulation Resistance</u>	<u>Insulation Resistance</u>
Average	57500	100000	20000	100000	55000	100000
Min	15000	100000	15000	100000	10000	100000
Max	100000	100000	25000	100000	100000	100000

DIELECTRIC WITHSTANDING VOLTAGE (DWV):

	Initial, VAC P-P			Initial, VAC R-R		
	<u>Breakdown Voltage</u>	<u>DWV</u>	<u>Working Voltage</u>	<u>Breakdown Voltage</u>	<u>DWV</u>	<u>Working Voltage</u>
Average	1225	919	306	1600	1200	400
Min	1200	900	300	1400	1050	350
Max	1250	938	313	1800	1350	450

	Thermal, VAC P-P			Thermal, VAC R-R		
	<u>Breakdown Voltage</u>	<u>DWV</u>	<u>Working Voltage</u>	<u>Breakdown Voltage</u>	<u>DWV</u>	<u>Working Voltage</u>
Average	1150	863	288	950	713	238
Min	1100	825	275	900	675	225
Max	1200	900	300	1000	750	250

	Humidity, VAC P-P			Humidity, VAC R-R		
	<u>Breakdown Voltage</u>	<u>DWV</u>	<u>Working Voltage</u>	<u>Breakdown Voltage</u>	<u>DWV</u>	<u>Working Voltage</u>
Average	1050	788	263	1400	1050	350
Min	1000	750	250	1100	825	275
Max	1100	825	275	1700	1275	425

DATA SUMMARIES Continued**SUPPLEMENTAL – CONNECTOR/CABLE PULL**

	0 Deg. Pull	90 Deg. Pull
	<u>Force (Lbs)</u>	<u>Force (Lbs)</u>
Minimum	40.81	33.79
Maximum	56.10	46.30
Average	47.9	38.9

SUPPLEMENTAL – CABLE BEND 15,000 CYCLES**a. 35 Deg. Pendulum**

	Resistance, Ohms					
	Initial	5000	10000	15000	20000	25000
Avg	14.4950	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Min	14.4800	0.0000	0.0000	0.0000	0.0000	0.0000
Max	14.5100	0.0000	0.0000	0.0000	0.0000	0.0000
St. Dev.	0.0212	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Count	2	0	0	0	0	0

b. 90 Deg. Flex

	Resistance, Ohms					
	Initial	5000	10000	15000	20000	25000
Avg	14.5138	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Min	14.3970	0.0000	0.0000	0.0000	0.0000	0.0000
Max	14.6000	0.0000	0.0000	0.0000	0.0000	0.0000
St. Dev.	0.0880	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Count	2	0	0	0	0	0

DATA**INSULATION RESISTANCE (IR):**

Sample #	Initial, Meg Ohms		Thermal, Meg Ohms		Humidity, Meg Ohms	
	P-P	R-R	P-P	R-R	P-P	R-R
	<u>Insulation Resistance</u>	<u>Insulation Resistance</u>	<u>Insulation Resistance</u>	<u>Insulation Resistance</u>	<u>Insulation Resistance</u>	<u>Insulation Resistance</u>
1	100000	100000	25000	100000	100000	100000
2	15000	100000	15000	100000	10000	100000

DIELECTRIC WITHSTANDING VOLTAGE (DWV):

	Initial, VAC P-P			Initial, VAC R-R		
	<u>Breakdown Voltage</u>	<u>DWV</u>	<u>Working Voltage</u>	<u>Breakdown Voltage</u>	<u>DWV</u>	<u>Working Voltage</u>
Average	1225	919	306	1600	1200	400
Min	1200	900	300	1400	1050	350
Max	1250	938	313	1800	1350	450

	Thermal, VAC P-P			Thermal, VAC R-R		
	<u>Breakdown Voltage</u>	<u>DWV</u>	<u>Working Voltage</u>	<u>Breakdown Voltage</u>	<u>DWV</u>	<u>Working Voltage</u>
Average	1150	863	288	950	713	238
Min	1100	825	275	900	675	225
Max	1200	900	300	1000	750	250

	Humidity, VAC P-P			Humidity, VAC R-R		
	<u>Breakdown Voltage</u>	<u>DWV</u>	<u>Working Voltage</u>	<u>Breakdown Voltage</u>	<u>DWV</u>	<u>Working Voltage</u>
Average	1050	788	263	1400	1050	350
Min	1000	750	250	1100	825	275
Max	1100	825	275	1700	1275	425

DATA Continued**SUPPLEMENTAL – CONNECTOR/CABLE PULL**

	0 Deg. Pull	90 Deg. Pull
Sample#	Maximum Force (Lbs)	Maximum Force (Lbs)
1	46.81	36.58
2	56.10	33.79
3	40.81	46.30

NOTE: Tested 6 wires bundled together for pull testing.

SUPPLEMENTAL – CABLE BEND 15,000 CYCLES**c. 35 Deg. Pendulum**

	No Load Used					
Cable	Resistance, Ohms					
	Initial	5000	10000	15000	20000	25000
1	14.51	Failed at 505 Cycles	N/A	N/A	N/A	N/A
2	14.48	Failed at 794 Cycles	N/A	N/A	N/A	N/A

d. 90 Deg. Flex

	No Load Used					
Cable	Resistance, Ohms					
	Initial	5000	10000	15000	20000	25000
1	14.6000	Failed at 1716 Cycles	N/A	N/A	N/A	N/A
2	14.5000	Failed at 251 Cycles	N/A	N/A	N/A	N/A

EQUIPMENT AND CALIBRATION SCHEDULES**Equipment #:** MO-02**Description:** Multimeter /Data Acquisition System**Manufacturer:** Keithley**Model:** 2700**Serial #:** 0780546**Accuracy:** See Manual

... Last Cal: 05/12/06, Next Cal: 05/12/07

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

... Last Cal: 01/31/06, Next Cal: 01/31/07

Equipment #: PS-01**Description:** System Power Supply**Manufacturer:** Hewlett Packard**Model:** HP 6033A**Serial #:** (HP) 3329A-07330**Accuracy:** See Manual

... Last Cal: 05/12/06, Next Cal: 05/12/07

Equipment #: TC090601-103/105**Description:** IC Thermocouple-103/105**Manufacturer:** Samtec**Model:****Serial #:** TC090601-103/105**Accuracy:** +/- 1 degree C

... Last Cal: , Next Cal:

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

... Last Cal: 5/12/06, Next Cal: 05/12/07

Tracking Code: TC0612--0978	Part #: N-EQRF-020-06.0-T-L-SMA-J-2
Part description: EQRF	

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

... Last Cal: 05/12/06, Next Cal: 05/12/07

Equipment #: THC-01

Description: Temperature/Humidity Chamber

Manufacturer: Thermotron

Model: SM-8-7800

Serial #: 30676

Accuracy: See Manual See Manual

... Last Cal: 8/18/2006, Next Cal: 8/18/2007

Equipment #: TCT-03

Description: Dillon Quantrol TC2 Test Stand

Manufacturer: Dillon Quantrol

Model: TC2

Serial #: 02-1033-03

Accuracy: Speed Accuracy: +/- 5% of indicated speed; Displacement: +/- 5 micrometers.

... Last Cal: 5/12/06, Next Cal: 5/12/07

Equipment #: LC-2500N(icell)

Description: 2500 N Load Cell for Dillon Quantrol

Manufacturer: Dillon Quantrol

Model: icell

Serial #: 01-0132-01

Accuracy: .10% of capacity

... Last Cal: 6/13/06, Next Cal: 6/13/07

Equipment #: MO-01

Description: Micro-Ohmmeter

Manufacturer: Keithley

Model: 580

Serial #: 0772740

Accuracy: See Manual

... Last Cal: 05/12/06, Next Cal: 05/12/07

Equipment #: HDR - 01

Description: HDR Flex Tester

Manufacturer: Samtec Inc.

Model: AT-1440-000

Serial #: 0780546

Accuracy: N/A

... Last Cal: No Calibration Required...