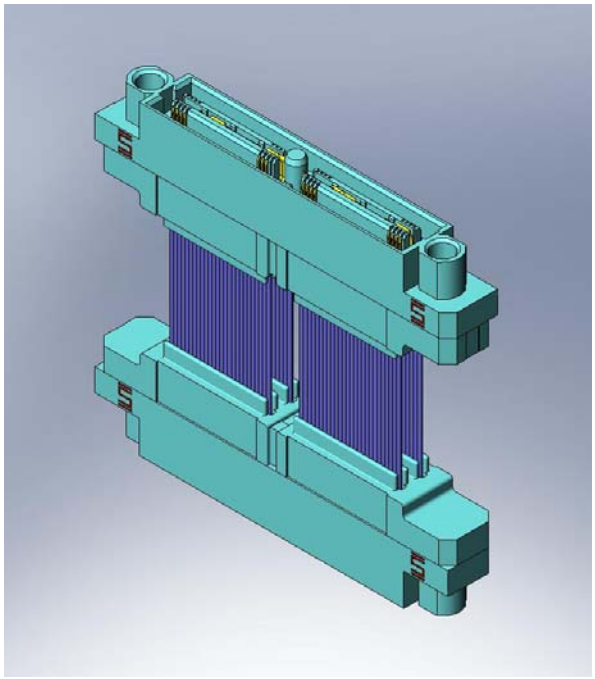
Project Number:	Tracking Code: TC0819--1730		
Requested by: Bryon Saylor	Date: 9/3/2008	Product Rev: 0	
Part #: Q2DA-052-12.00-QFS-QFS	Lot #: N/A	Tech: Eric Fox, Gary Lomax & Rodney Riley	Eng: Greg Brown
Part description: Q2DA			Qty to test: 70
Test Start: 5/8/2008	Test Completed: 8/25/2008		



PART DESCRIPTION

Q2DA-052-12.00-QFS-QFS

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: Emailing test sheet. Disregard groundplane testing as described.

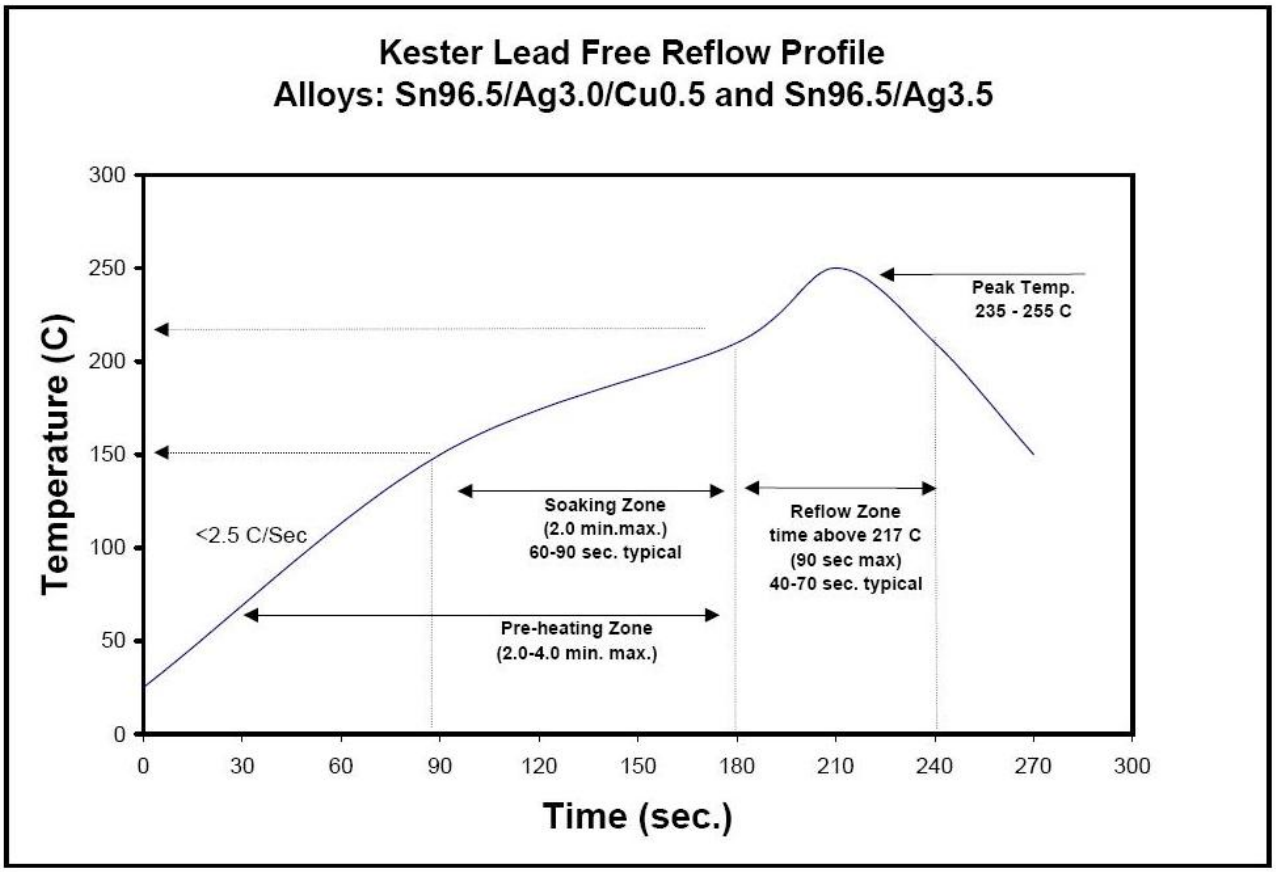
APPLICABLE DOCUMENTS

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 Board

TYPICAL OVEN PROFILE (Soldering Parts to Test Boards)



FLOWCHARTS

Current Carrying Capacity

1 Piece

TEST STEP	GROUP 1 Both Cables Powered 6 Adjacent Contacts in each row of each bank
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

IR

	2 Pieces	2 Pieces
TEST STEP	GROUP 1A TOP Cable, Conductor - to - Conductor	GROUP 1B BOTTOM Cable, Conductor - to - Conductor
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

FLOWCHARTS Continued

	2 Pieces		2 Pieces		2 Pieces	
TEST STEP	GROUP 1 TOP Cable, Conductor - to - Conductor Ambient	GROUP 2 BOTTOM Cable, Conductor - to - Conductor Ambient	GROUP 3 TOP Cable, Conductor - to - Conductor Thermal	GROUP 4 BOTTOM Cable, Conductor - to - Conductor Thermal	GROUP 5 TOP Cable, Conductor - to - Conductor Humidity	GROUP 6 BOTTOM Cable, Conductor - to - Conductor 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

Connector Pull

	5 Pieces
TEST STEP	GROUP 1A-STD 025 position
01	Pull test, Continuity

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

FLOWCHARTS Continued

Resistance, SIG Continuity

	10 Pieces	10 Pieces
TEST	GROUP 1	GROUP 1A
STEP	D 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

4 oz load on a twin-ax product
8 oz load on a Co-ax cable.

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^{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.

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).

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

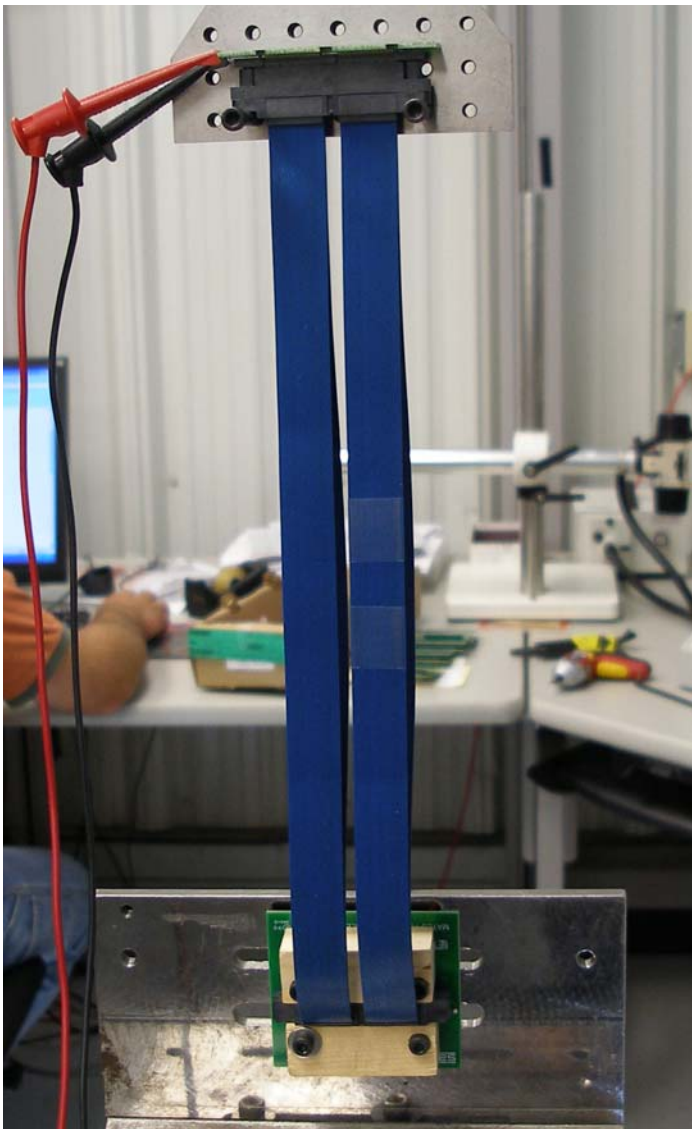


Fig. 1
(Typical set-up, actual part depicted.)
90° Connector pull, notice the electrical continuity hook-up wires.

DURABILITY:

1) Oscillate and monitor electrical continuity for open circuit indication.
   a. ± 35° Pendulum Mode, bend up to 20,000 cycles with 4 oz. load on cable end.

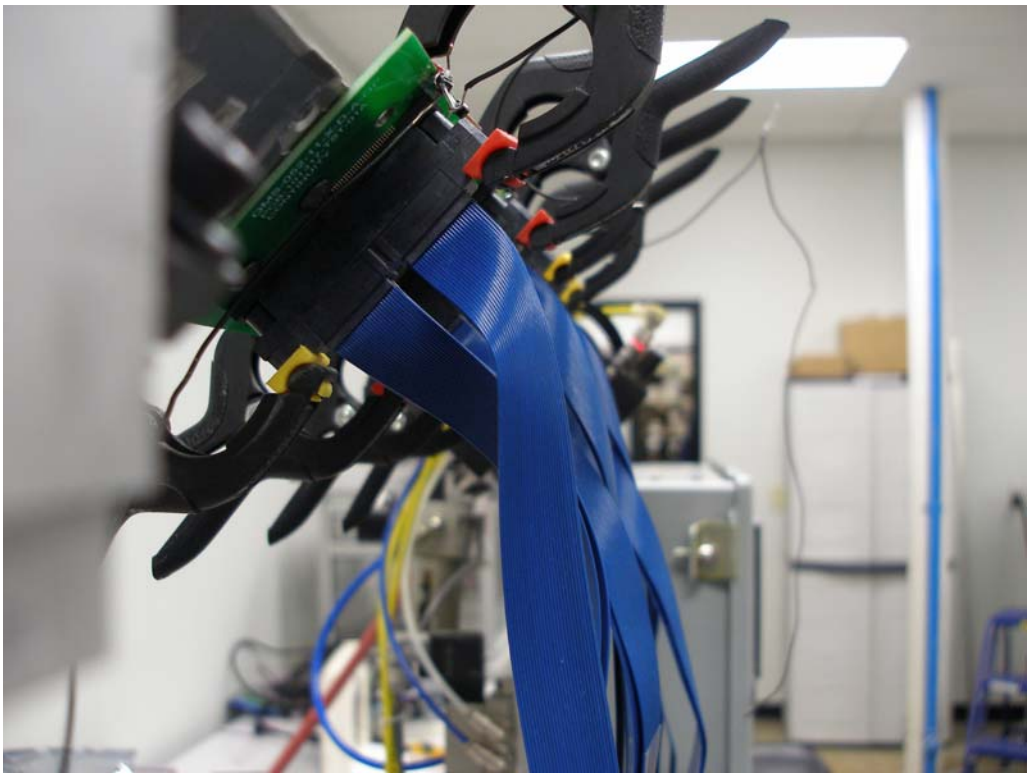


Fig. 2
(Typical set-up, actual part depicted.)

b. ± 90° Flex Mode, bend up to 5,000 cycles with 4 oz. load on cable end.

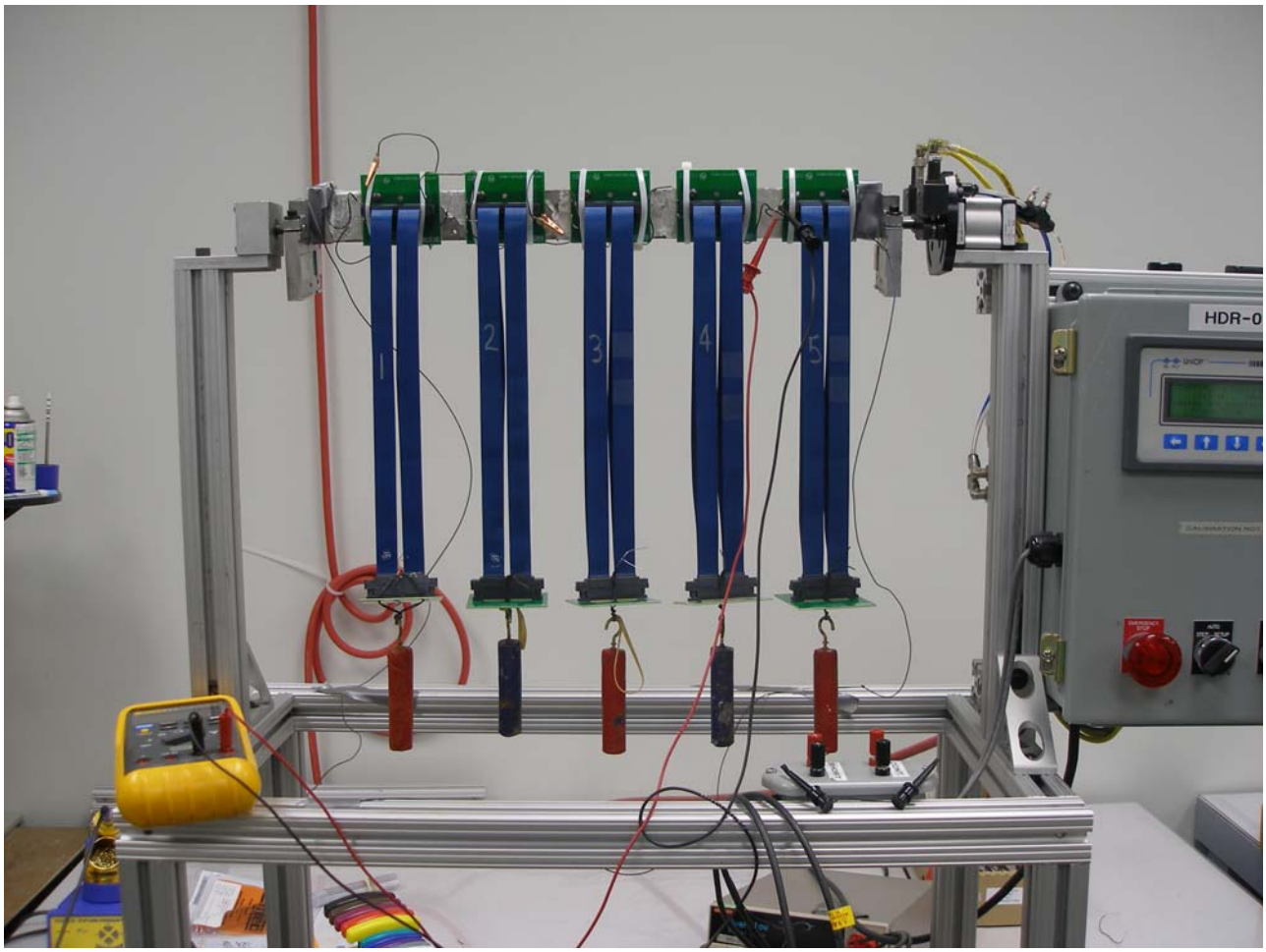


Fig. 3
(Typical set-up, actual part depicted.)

RESULTS

Temperature Rise, CCC at a 20% de-rating

- **CCC for a 30°C Temperature Rise----------0.4A per contact with 104 adjacent contacts powered**

Insulation Resistance minimums, IR

- **Initial**
  - **Mated----------100,000 Meg Ω ---------- Pass**
  - **Unmated ----------100,000 Meg Ω**
- **Thermal**
  - **Mated---------- 25,000 Meg Ω**
  - **Unmated ---------- 50,000 Meg Ω**
- **Humidity**
  - **Mated---------- 24,000 Meg Ω**
  - **Unmated ---------- 40,000 Meg Ω**

Dielectric Withstanding Voltage minimums, DWV

- **Initial**
  - **Breakdown**
    - **Mated ----------920 VAC**
    - **Q2DA ---------- 1040 VAC**
  - **DWV**
    - **Mated ----------690 VAC**
    - **Q2DA ----------780 VAC**
  - **Working voltage**
    - **Mated ----------230 VAC**
    - **Q2DA ----------260 VAC**
- **Thermal**
  - **Breakdown**
    - **QMS---------- 1000 VAC**
    - **Q2DA ----------980 VAC**
  - **DWV**
    - **QMS----------750 VAC**
    - **Q2DA ----------735 VAC**
  - **Working voltage**
    - **QMS----------250 VAC**
    - **Q2DA ----------245 VAC**
- **Humidity**
  - **Breakdown**
    - **QMS----------860 VAC**
    - **Q2DA ---------- 1020 VAC**
  - **DWV**
    - **QMS----------645 VAC**
    - **Q2DA ----------765 VAC**
  - **Working voltage**
    - **QMS----------215 VAC**
    - **Q2DA ----------255 VAC**

SUPPLEMENTAL TESTING

Supplemental – Connector/Cable Pull

- **0°---------- 71.0 lbs min**
- **90° ---------- 54.5 lbs min**

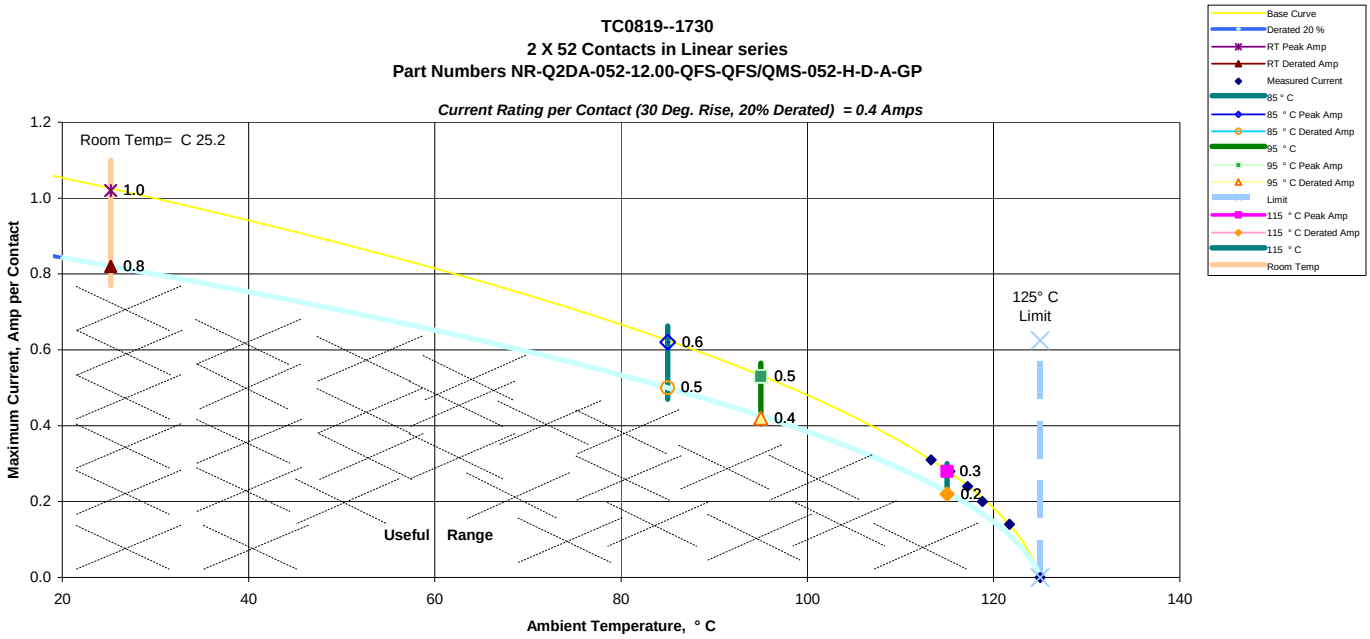
Supplemental – Cable Bend

- **±35° Pendulum Mode**
  - **Min---------- 11,485 cycles**
  - **Max ---------- 19,245 cycles**
- **±90°Flex Mode**
  - **Min---------- 4,326 cycles**
  - **Max ---------- 6,670 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 all adjacent conductors/contacts powered



DATA SUMMARIES Continued

INSULATION RESISTANCE (IR):

	Insulation Resistance	
	Mated	Unmated
Minimum	QMS/Q2DA	QMS
Initial	100000	100000
Thermal	25000	50000
Humidity	24000	40000

DIELECTRIC WITHSTANDING VOLTAGE (DWV):

		Dielectric Withstanding Voltage		
		Mated	Unmated	Unmated
Minimum		QMS/Q2DA	QMS	Q2DA
Breakdown Voltage	**Initial**	920	Not Tested	1040
	Thermal	Not Tested	1000	980
	Humidity	Not Tested	860	1020
DWV	**Initial**	690	Not Tested	780
	Thermal	Not Tested	750	735
	Humidity	Not Tested	645	765
Working Voltage	**Initial**	230	Not Tested	260
	Thermal	Not Tested	250	245
	Humidity	Not Tested	215	255

DATA SUMMARIES Continued

SUPPLEMENTAL TESTS

Pull Testing

	0 Deg.	*90 Deg.*
Pull DV	Force (Lbs)	Force (Lbs)
Minimum	71.00	54.50
Maximum	*136.00*	*89.50*
Average	***97.8***	***73.6***

35 Deg Flex	Resistance, Ohms					
	Initial	**After 1000**	**After 2000**	**After 3000**	**After 4000**	**After 5000**
Avg	53.4000	52.6000	52.7000	52.2250	52.5750	52.4500
Min	52.7000	52.3000	52.3000	52.0000	52.0000	52.2000
Max	53.9000	53.1000	53.1000	52.6000	52.9000	52.6000
St. Dev.	0.5033	0.3559	0.4082	0.2630	0.4031	0.1915
	After 6000	**After 7000**	**After 8000**	**After 9000**	**After 10000**	**After 11000**
Avg	52.2500	53.0750	52.1000	52.8500	52.9750	52.7250
Min	52.2000	52.2000	52.0000	52.2000	52.3000	52.5000
Max	52.3000	54.0000	52.2000	53.4000	54.2000	53.0000
St. Dev.	0.0577	0.7890	0.0816	0.6403	0.8421	0.2062
	After 12000	**After 13000**	**After 14000**	**After 15000**	**After 16000**	**After 17000**
Avg	52.3900	52.3000	52.9000	52.5000	51.9500	55.8000
Min	52.3800	52.3000	52.6000	52.3000	51.9000	54.8000
Max	52.4000	52.3000	53.2000	52.7000	52.0000	56.8000
St. Dev.	0.0141	0.0000	0.4243	0.2828	0.0707	1.4142
	After 18000	**After 19000**				
Avg	52.8500	55.1000				
Min	52.8000	55.1000				
Max	52.9000	55.1000				
St. Dev.	0.0707	0.0000				

90 Deg Flex	Resistance, Ohms						
	Initial	**After 1000**	**After 2000**	**After 3000**	**After 4000**	**After 5000**	**After 6000**
Avg	51.8500	53.8250	51.4750	51.6250	52.4750	53.3667	52.7000
Min	50.9000	51.4000	50.8000	50.8000	51.9000	52.8000	52.7000
Max	52.4000	57.7000	51.9000	52.1000	53.1000	53.8000	52.7000
St. Dev.	0.6658	2.9691	0.4787	0.5679	0.5058	0.5132	0.0000
Count	4	4	4	4	4	3	1

DATA

INSULATION RESISTANCE (IR):

	Initial IR		
	Mated	*Unmated*	
	QMS/Q2DA	QMS	Q2DA
Minimum	100000	100000	Not Tested
Maximum	100000	100000	Not Tested
Average	100000	100000	Not Tested

	Thermal IR		
	Mated	*Unmated*	
	QMS/Q2DA	QMS	Q2DA
Minimum	25000	50000	Not Tested
Maximum	50000	50000	Not Tested
Average	37500	50000	Not Tested

	Mated	*Unmated*	
	QMS/Q2DA	QMS	Q2DA
Minimum	24000	40000	Not Tested
Maximum	100000	100000	Not Tested
Average	62000	70000	Not Tested

DIELECTRIC WITHSTANDING VOLTAGE (DWV):

	Initial DWV		
	Mated	*Unmated*	
Minimum:	QMS/Q2DA	QMS	Q2DA
Breakdown Voltage	920	Not Tested	1040
DWV	690	Not Tested	780
Working Voltage	230	Not Tested	260

	Mated	*Unmated*	
Minimum:	QMS/Q2DA	QMS	Q2DA
Breakdown Voltage	Not Tested	1000	980
DWV	Not Tested	750	735
Working Voltage	Not Tested	250	245

	Mated	*Unmated*	
Minimum:	QMS/Q2DA	QMS	Q2DA
Breakdown Voltage	Not Tested	860	1020
DWV	Not Tested	645	765
Working Voltage	Not Tested	215	255

DATA Continued

SUPPLEMENTAL

Pull Testing

	0 Deg.	*90 Deg.*
Sample#	Maximum Force (Lbs)	Maximum Force (Lbs)
1	136.0	84.5
2	119.5	57.5
3	79.0	54.5
4	83.4	89.5
5	71.0	82.0

35 Deg. Flex Continuity Testing						
Cable	**Initial**	**After 1000 Cycles**	**After 2000 Cycles**	**After 3000 Cycles**	**After 4000 Cycles**	**After 5000 Cycles**
1	53.5	52.6	53.0	52.6	52.9	52.6
2	52.7	52.3	52.3	52.1	52.0	52.2
3	53.9	52.4	52.4	52.2	52.6	52.6
4	53.5	53.1	53.1	52.0	52.8	52.4
5						
Cable	**After 6000 Cycles**	**After 7000 Cycles**	**After 8000 Cycles**	**After 9000 Cycles**	**After 10000 Cycles**	**After 11000 Cycles**
1	52.3	52.7	52.2	53.4	54.2	52.7
2	52.2	54.0	52.1	53.4	52.3	53.0
3	52.3	53.4	52.1	52.4	52.8	52.7
4	52.2	52.2	52.0	52.2	52.6	52.5
5						
Cable	**After 12000 Cycles**	**After 13000 Cycles**	**After 14000 Cycles**	**After 15000 Cycles**	**After 16000 Cycles**	**After 17000 Cycles**
1	52.4	52.3	53.2	52.7	52.0	56.8
2	Failed 11485	--	--	--	--	--
3	52.4	52.3	52.6	52.3	51.9	54.8
4	Failed 11790	--	--	--	--	--
5						
Cable	**After 18000 Cycles**	**After 19000 Cycles**	**After 20000 Cycles**			
1	52.9	55.1	Failed 19245			
2	--	--	--			
3	52.8	Failed 18040	--			
4	--	--	--			
5						

DATA Continued

90 Deg. Flex Continuity Testing						
Cable	**Initial**	**After 1000 Cycles**	**After 2000 Cycles**	**After 3000 Cycles**	**After 4000 Cycles**	**After 5000 Cycles**
1	50.9	54.6	51.9	50.8	51.9	**Failed 4326**
2	51.9	51.4	51.5	51.8	53.1	53.8
3	52.2	57.7	51.7	52.1	52.3	52.8
4	52.4	51.6	50.8	51.8	52.6	53.5
5						
Cable	**After 6000 Cycles**	**After 7000 Cycles**	**After 8000 Cycles**	**After 9000 Cycles**	**After 10,000 Cycles**	
1	--	--				
2	**Failed 5590**	--				
3	52.7	**Failed 6670**				
4	**Failed 5585**	--				
5						

EQUIPMENT AND CALIBRATION SCHEDULES

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 #: 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 #: 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 #: 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 #: 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)-1
Description: 1000 N icell load cell for Dillon Test stand
Manufacturer: Mecmesin (Dillon/Quantrol)
Model: icell
Serial #: 06-0052-12
Accuracy: .10 % of capacity
… Last Cal: 08/06/2008, Next Cal: 08/06/2009

Equipment #: TC111307-(001 - 017)
Description: CCC Chamber Thermocouples
Manufacturer: Samtec
Model:
Serial #: TC111307-(001 - 017)
Accuracy: +/- 1 Deg. +/- 1 Deg.
… Last Cal: 11/30/2007, Next Cal: 11/30/2008

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:

Equipment #: THC-04
Description: Temperature/Humidity Chamber
Manufacturer: Thermotron
Model: SM-8-3800
Serial #: 37782
Accuracy: See Manual
… Last Cal: 09/21/2007, Next Cal: 09/21/2008

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
… Last Cal: 06/62/07, Next Cal: 06/22/08

Equipment #: MO-01
Description: Micro-Ohmeter
Manufacturer: Keithley
Model: 580
Serial #: 2721A00648
Accuracy: See Manual
… Last Cal: 06/22/07, Next Cal: 06/22/08

Equipment #: HDR - 01
Description: HDR Flex Tester
Manufacturer: Samtec Inc.
Model: AT-1440-000
Serial #: AT-1440-000
Accuracy: N/A
… Last Cal: No Calibration Required, Next Cal: