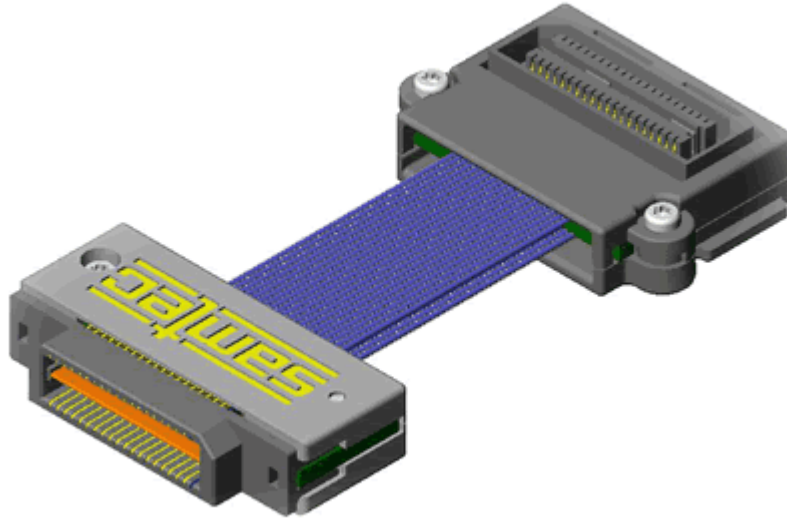




Project Number: NA		Tracking Code: TC0345--0309	
Requested by: John Reid		Date: 11/4/2003	Product Rev: 5
Part #: EQCD DV-EM Phase B DVT testing		Lot #: 11/4/2003	Tech: TC & TR
Part description: Micro Co-ax High Speed Cable Assy, 0.8 mm Pitch			Eng: John Tozier
Qty to test: 50		Test Start: 01/21/2004	
Test Completed: 3/2/2004			



PART DESCRIPTION

EQCD DV-EM

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: Phase B DVT testing

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) The ultrasonic procedure can be used with either aqueous or non-aqueous soldering components and follows:
 - a) Sample test boards are to be ultrasonically cleaned after test lead attachment, preparation and/or soldering using the following process.
 - b) Sample test boards are immersed into Branson 3510 cleaner containing Kyzen Ionox HC1 (or equivalent) with the following conditions:
 - i) Temperature: -----55° C +/- 5° C
 - ii) Frequency:-----40 KHz
 - iii) Immersion Time: -----5 to 10 Minutes
 - c) Sample test boards are removed and placed into the Branson 3510 cleaner containing deionized water with the following conditions:
 - i) Temperature: -----55° C +/- 5° C
 - ii) Frequency:-----40 KHz
 - iii) Immersion Time: -----5 to 10 Minutes
 - d) Sample test boards are removed and placed in a beaker positioned on a hot plate with a magnetic stirrer containing deionized water warmed to 55° C +/- 5° C for 1/2 to 1 minute
 - e) Upon removal, the sample test boards are rinsed for 1/2 to 1 minute in room temperature free flowing deionized water.
 - f) After the final rinse, the sample test boards are dried in an air-circulating oven for 10 to 15 minutes at 50° C +/- 5° C
 - g) Sample test boards are then allowed to set and recover to room ambient condition prior to testing.
- 7) Parts not intended for testing LLCR and DWV/IR are visually inspected and cleaned if necessary.
- 8) Any additional preparation will be noted in the individual test sequences
- 9) Solder Information:
- 10) Re-Flow Time/Temp: See accompanying profile
- 11) Internal Test PCBs used:

FLOWCHARTS

TEST	GROUP 1-X-Over	GROUP 2	GROUP 3	GROUP 4
STEP	TOP Cable 6 Contacts	Cable Center Both Cables Powered, at 95° C 6 Contacts	GND, On X-Over Board	GND, Cable Center Both Cables Powered, at 95° C
01	CCC	CCC	CCC	CCC

Tabulate calculated current at RT, 75° C, 80° C and 95° C
after derating 20% and based on 105° C Cable Limit

CCC, Temp rise = EIA-364-70

TEST	GROUP 1A- X-Over	GROUP 1B- X-Over		
STEP	TOP- BOTTOM Cable EQCD	TOP- BOTTOM Cable EQCD		
01	IR	IR		
02	Data Review	Data Review		
03	Thermal Aging	Gas Tight		
04	IR	IR		
05	Data Review			
06	Humidity			
07	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

Gas Tight = EIA-364-36A

FLOWCHARTS Continued

TEST	GROUP 1A-X-Over	GROUP 1B-X-Over	GROUP 1C-X-Over	GROUP 1D-STD
STEP	TOP Cable Ambient	TOP Cable Thermal	TOP Cable Humidity	TOP Cable Gas Tight
01	DWV/Working Voltage	Thermal Aging	Humidity	Gas Tight
02		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

Gas Tight = EIA-364-36A

TEST STEP	GROUP 1A-X-Over	GROUP 1B-X-Over
	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.

TEST STEP	GROUP 1-X-Over
01	Pull test, Mechanical

Record MAX force

FLOWCHARTS Continued

TEST STEP	GROUP 1A-X-Over	GROUP 1B-X-Over
	Sig ±90° Bend	Sig ±35° Bend
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

ATTRIBUTE DEFINITION

Following is a brief, simplified description of attributes.

THERMAL AGING:

- 1) EIA-364-17, *Temperature Life with or without Electrical Load Test Procedure for Electrical Connectors*.
 - a) Test Condition 4 at 105° C.
 - b) Test Time Condition B for 250 hours.
- 2) Connectors are mated.

CYCLIC HUMIDITY:

- 1) Reference document: EIA-364-31, *Humidity Test Procedure for Electrical Connectors*.
 - a) Test Condition B, 240 Hours.
 - b) Method III, +25° C to + 65° C, 90% to 98% Relative Humidity excluding sub-cycles 7a and 7b.
- 2) Connectors are mated and 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) 75° C
 - c) 80° C
 - d) 95° 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.

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) Mated
 - iii) Mounted
 - iv) Rate of Application 500 V/Sec

- v) 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).

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) Mated
 - iii) Mounted
 - iv) Electrification Time 2.0 minutes
 - v) Test Voltage (500 VDC) corresponds to calibration settings for measuring resistances.
- 2) MEASUREMENTS:
 - a) When the specified test voltage is applied (VDC), the insulation resistance shall not be less than 1000 megohms.

GAS TIGHT:

To provide method for evaluating the ability of the electrical system to withstand harsh vapors which might lead to oxide formation that may degrade the electrical performance of the electrical system.

- 1) 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) Reagent grade Nitric Acid shall be used of sufficient volume to saturate the test chamber
 - ii) The ratio of the volume of the test chamber to the surface area of the acid shall be less than 10.
 - iii) The chamber shall be saturated with the vapor for at least 15 minutes before samples are added.
 - iv) Exposure time – 55 to 65 minutes.
 - v) 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.
 - vi) The samples shall be dried after exposure for a minimum of 1 hour.
 - vii) Drying temperature 50 °C
 - viii) The final measurements shall be conducted within 1 hour after drying.

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

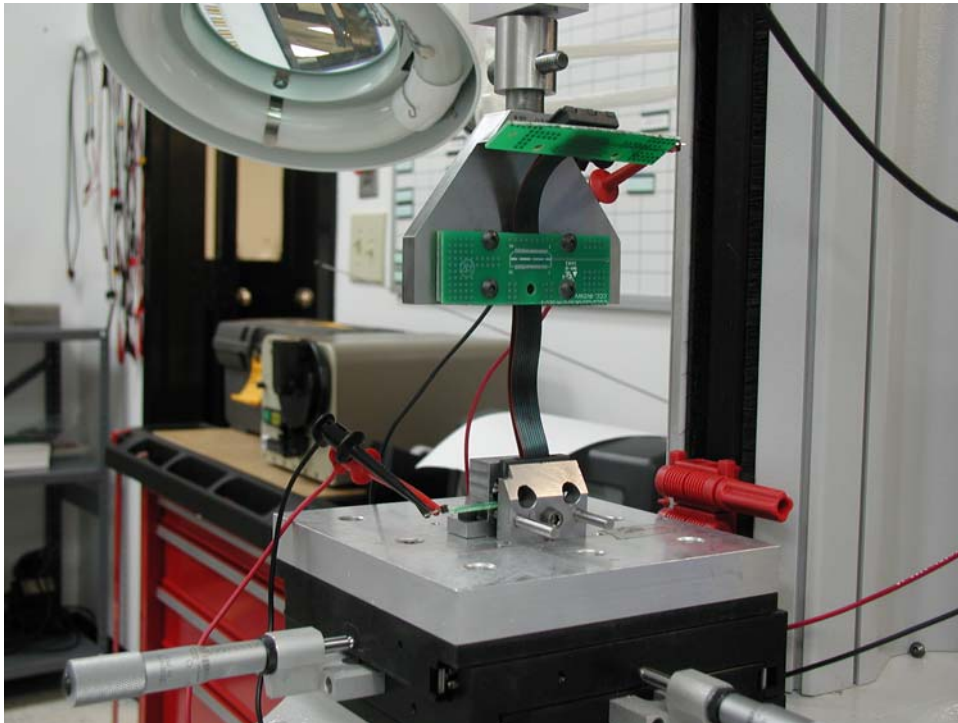
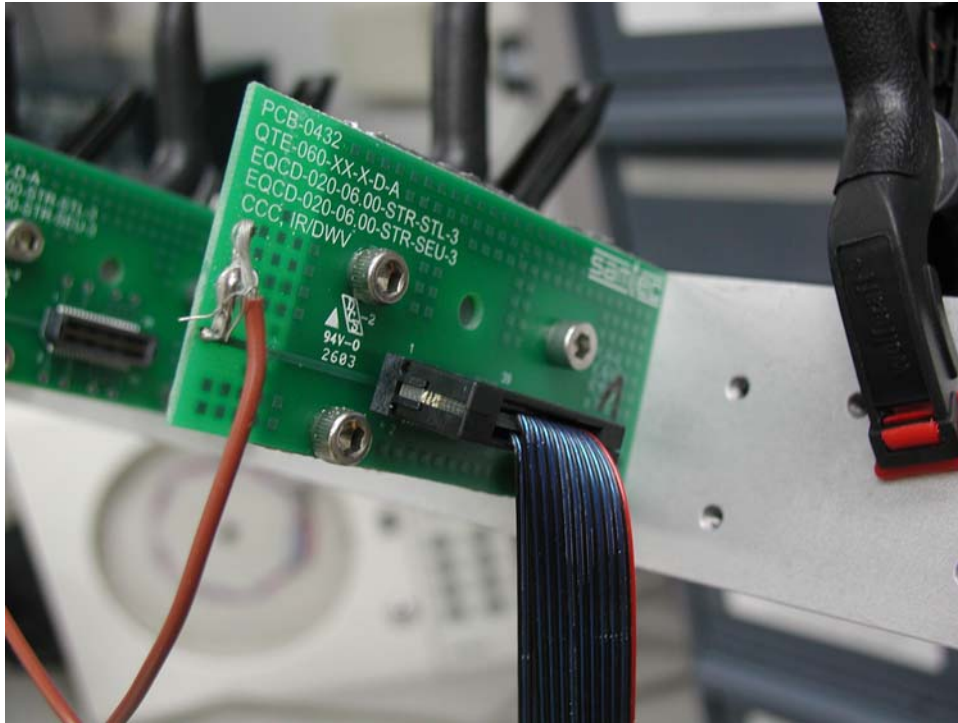


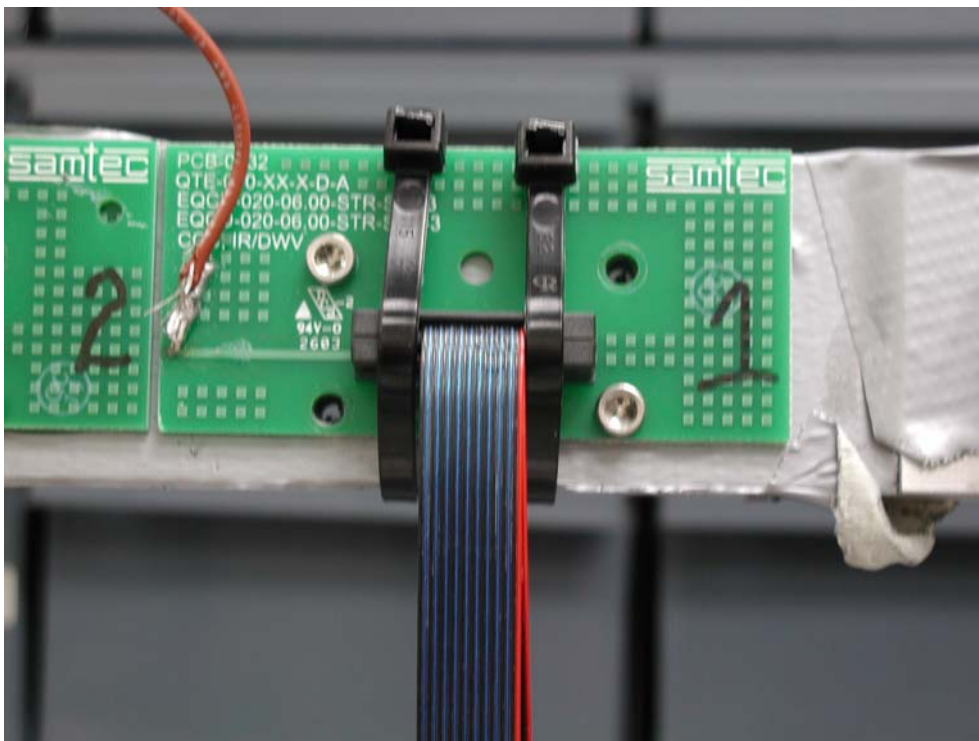
Fig. 1
 0° Connector pull. Notice the electrical continuity hook-up wires.

SUPPLEMENTAL TESTS Continued**CONNECTOR DURABILITY:**

- 1) Bend up to 25,000 cycles with 8 oz. load on cable end
 - a) $\pm 35^\circ$, Pendulum Mode



- b) $\pm 90^\circ$, Flex Mode



RESULTS**Temperature Rise, CCC at 20% de-rated**

- At 95°C, relative to 105°C
 - With 6 adjacent Signal Lines powered
 - Measured at PC board ----- 0.53A
 - Measured in center of cable ----- 0.23A
 - With Ground Plane Powered
 - Measured at PC board ----- 8.5A
 - Measured in center of cable ----- 6.5A

Dielectric Withstanding Voltage minimums, DWV

- Initial
 - Breakdown
 - Mated
 - Top----- 1100 VAC
 - Bottom -----900 VAC
 - Unmated
 - Top----- 1000 VAC
 - Bottom ----- 1000 VAC
 - DWV
 - Mated
 - Top-----825 VAC
 - Bottom -----675 VAC
 - Unmated
 - Top-----750 VAC
 - Bottom -----750 VAC
 - Working voltage
 - Mated
 - Top-----275 VAC
 - Bottom -----225 VAC
 - Unmated
 - Top-----250 VAC
 - Bottom -----250 VAC
- Thermal
 - Breakdown
 - Mated
 - Top----- 1200 VAC
 - Bottom ----- 1200 VAC
 - Unmated
 - Top----- 1200 VAC
 - Bottom ----- 1200 VAC
 - DWV
 - Mated
 - Top-----900 VAC
 - Bottom -----900 VAC
 - Unmated
 - Top-----900 VAC
 - Bottom -----900 VAC
 - Working voltage
 - Mated
 - Top-----300 VAC
 - Bottom -----300 VAC
 - Unmated
 - Top-----300 VAC
 - Bottom -----300 VAC

- **Humidity**
 - **Breakdown**
 - **Mated**
 - Top----- 1100 VAC
 - Bottom -----800 VAC
 - **Unmated**
 - Top----- 1100 VAC
 - Bottom -----900 VAC
 - **DWV**
 - **Mated**
 - Top-----825 VAC
 - Bottom -----600 VAC
 - **Unmated**
 - Top-----825 VAC
 - Bottom -----625 VAC
 - **Working voltage**
 - **Mated**
 - Top-----275 VAC
 - Bottom -----200 VAC
 - **Unmated**
 - Top-----275 VAC
 - Bottom -----225 VAC

Insulation Resistance minimums, IR

- **Initial**
 - **Mated**
 - Top -----2,500 Meg Ω ----- Pass
 - Bottom ----- 25,000 Meg Ω ----- Pass
 - **Unmated**
 - Top -----2,500 Meg Ω ----- Pass
 - Bottom ----- 25,000 Meg Ω ----- Pass
- **Thermal**
 - **Mated**
 - Top ----- 75,000 Meg Ω
 - Bottom -----100,000 Meg Ω
 - **Unmated**
 - Top ----- 75,000 Meg Ω
 - Bottom ----- 75,000 Meg Ω
- **Humidity**
 - **Mated**
 - Top ----- 50,000 Meg Ω
 - Bottom ----- 50,000 Meg Ω
 - **Unmated**
 - Top ----- 50,000 Meg Ω
 - Bottom ----- 50,000 Meg Ω

Supplementary Testing**DWV Gas Tight, Mated**

- **Initial**
 - **Breakdown,**
 - Top ----- 1700 VAC
 - Bottom ----- 1700 VAC
 - **DWV**
 - Top ----- 1275 VAC
 - Bottom ----- 1275 VAC
 - **Working Voltage**
 - Top ----- 425 VAC
 - Bottom ----- 425 VAC
- **Gas Tight**
 - **Breakdown**
 - Top ----- 1060 VAC
 - Bottom ----- Not Tested
 - **DWV**
 - Top ----- 795 VAC
 - Bottom ----- Not Tested
 - **Working Voltage**
 - Top ----- 265 VAC
 - Bottom ----- Not Tested

IR Gas Tight, Mated

- **Initial**
 - **Mated**
 - Top ----- 50,000 Meg Ω ----- Pass
 - Bottom ----- 100,000 Meg Ω ----- Pass
 - **Unmated**
 - Top ----- 100,000 Meg Ω ----- Pass
 - Bottom ----- 100,000 Meg Ω ----- Pass
- **Gas Tight**
 - **Mated**
 - Top ----- 400 Meg Ω
 - Bottom ----- 100 Meg Ω
 - **Unmated**
 - Top ----- 450 Meg Ω
 - Bottom ----- 100 Meg Ω

Connector/Cable Pull, Monitored for Signal Continuity

- 0° ----- 65.49 lbs min
- 90° ----- 41.43 lbs min

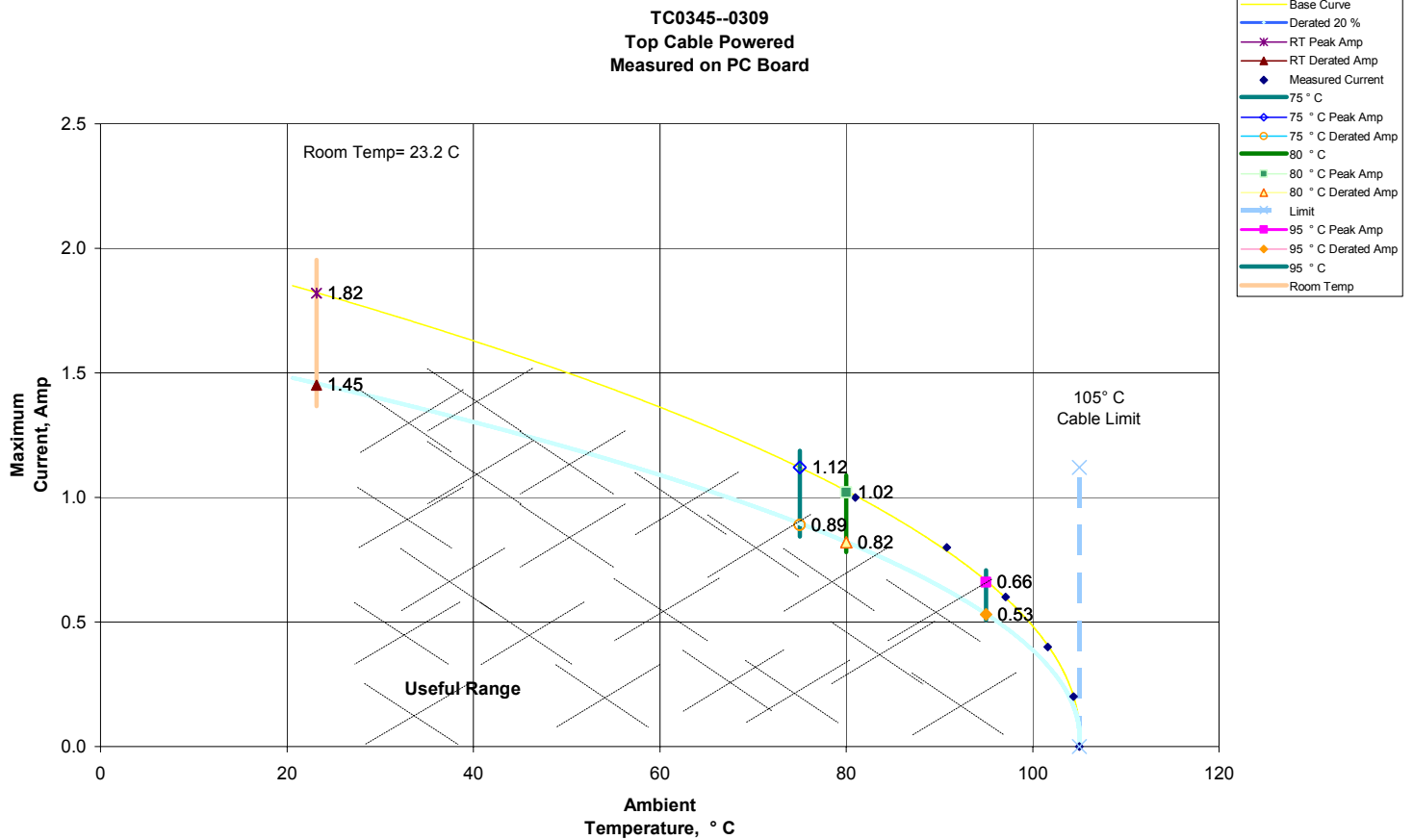
Cable Flex 25,000 Cycles, Monitored for Signal Continuity

- $\pm 35^\circ$ Pendulum Mode ----- Electrical Failure at 7,500 Cycles
- $\pm 90^\circ$ Flex Mode ----- Electrical Failure at 1,373 Cycles

DATA SUMMARIES

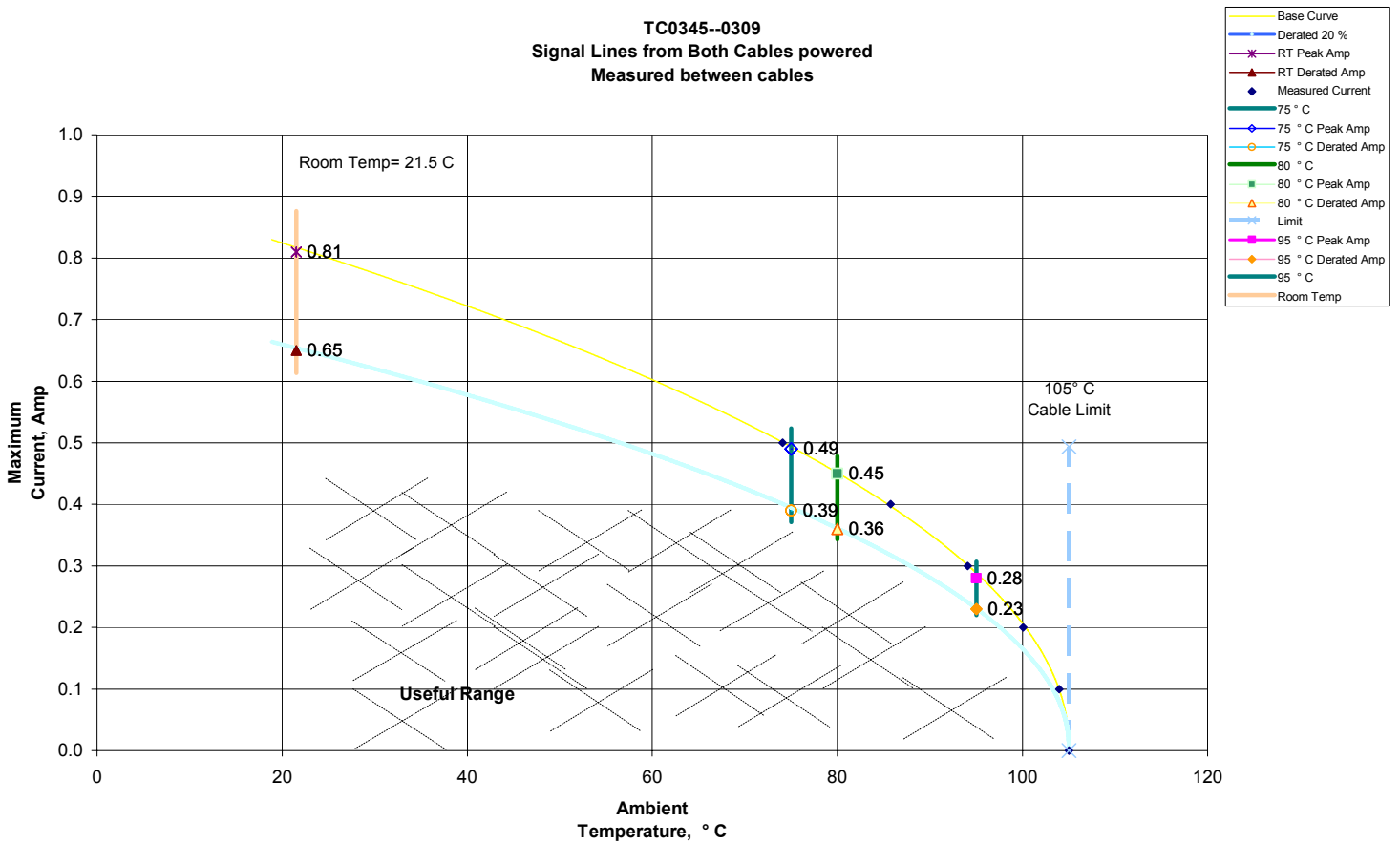
TEMPERATURE RISE (Current Carrying Capacity, CCC):

- 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).



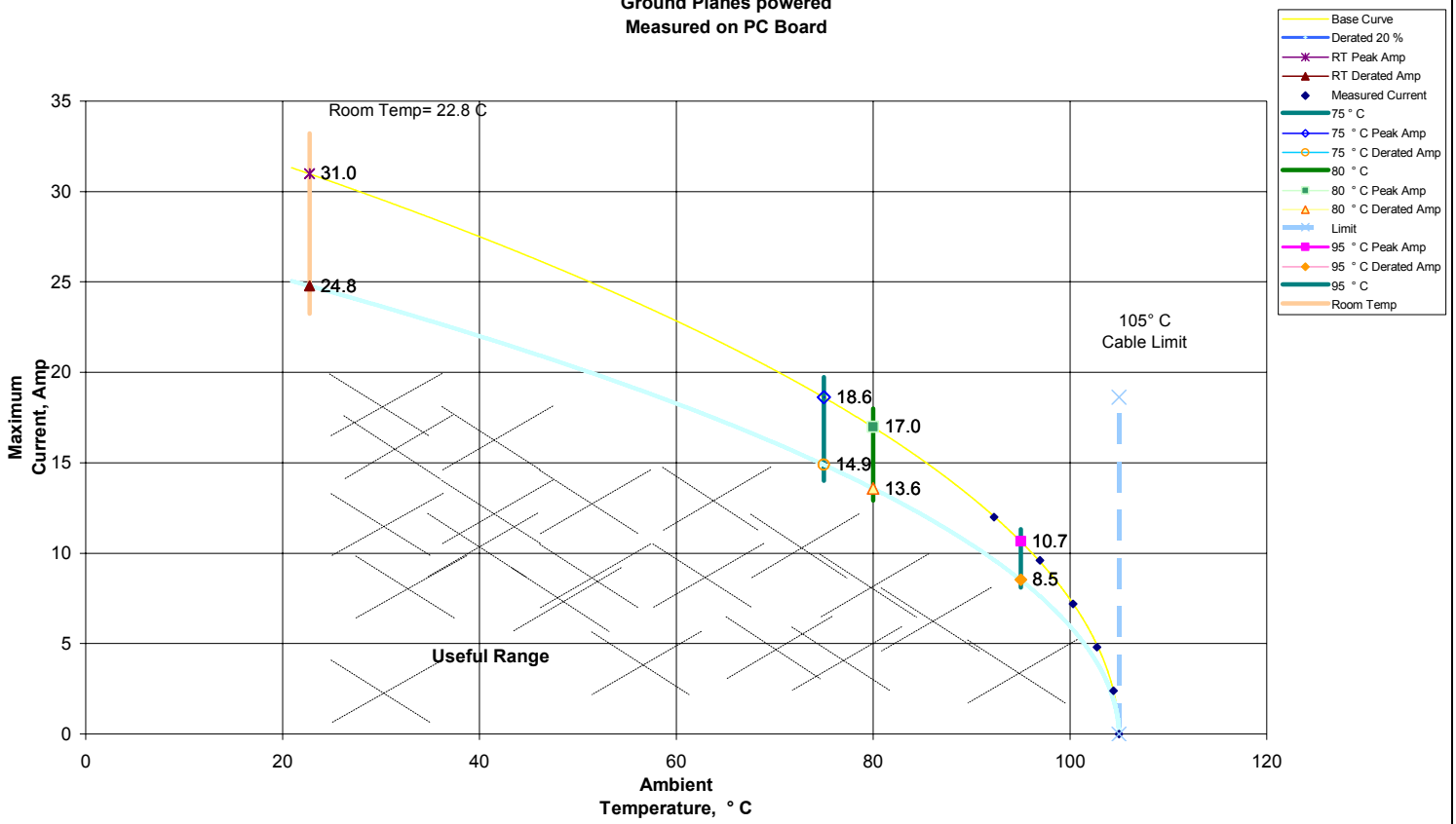
DATA SUMMARIES Continued

TC0345--0309
Signal Lines from Both Cables powered
Measured between cables



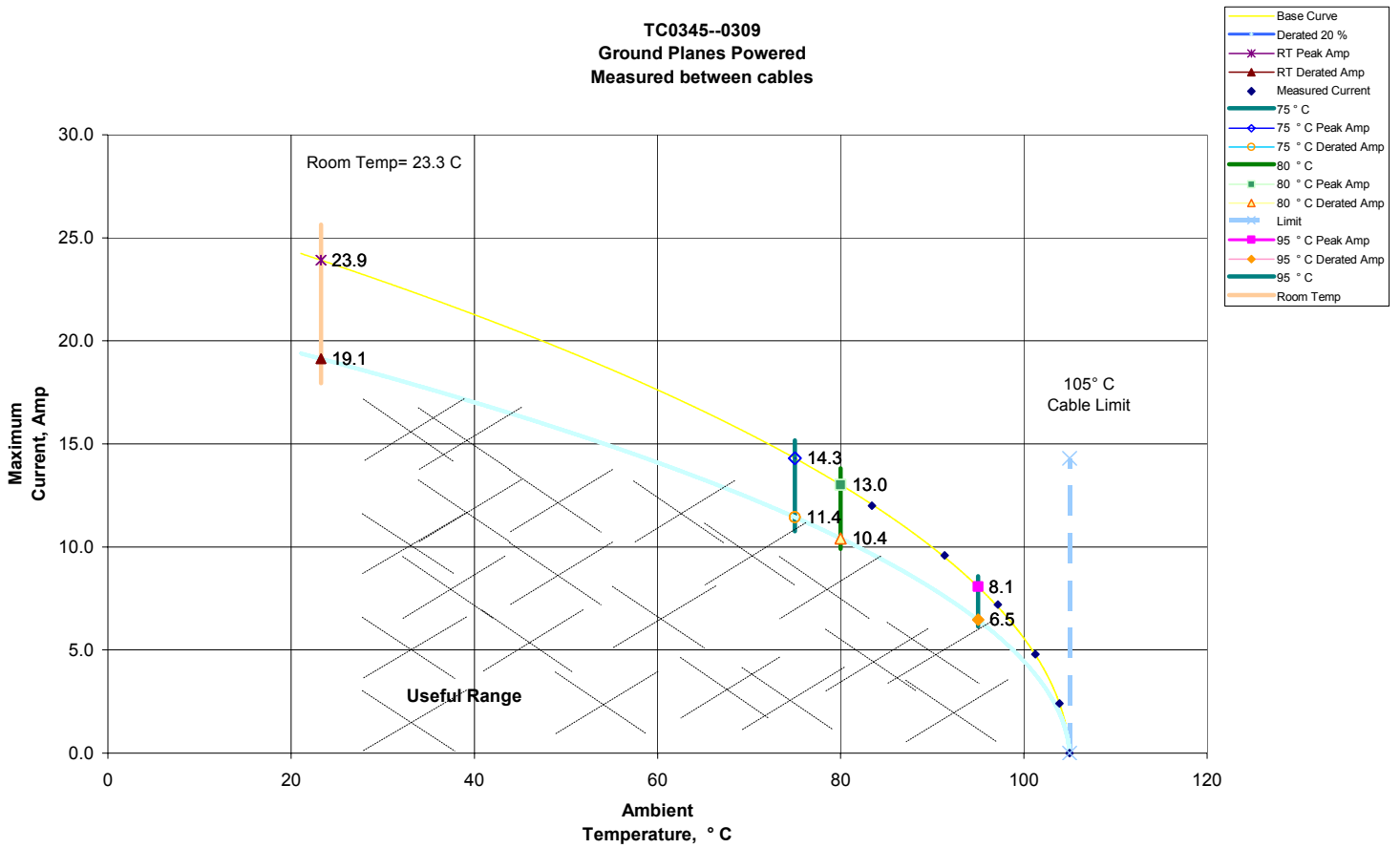
DATA SUMMARIES Continued

TC0345--0309
Ground Planes powered
Measured on PC Board



DATA SUMMARIES Continued

**TC0345--0309
Ground Planes Powered
Measured between cables**



DATA SUMMARIES Continued
DIELECTRIC WITHSTANDING VOLTAGE (DWV):

Voltage Rate 500 VAC Per Sec.

Test Voltage Until Breakdown Occurs

TOP						
Initial mated top, VAC			Initial unmated top, VAC			
	<u>Breakdown Voltage</u>	<u>DWV</u>	<u>Working Voltage</u>	<u>Breakdown Voltage</u>	<u>DWV</u>	<u>Working Voltage</u>
Average	1100	825	275	1000	750	250
Min	1100	825	275	1000	750	250
Max	1100	825	275	1000	750	250
BOTTOM						
Initial mated bottom, VAC			Initial unmated bottom, VAC			
	<u>Breakdown Voltage</u>	<u>DWV</u>	<u>Working Voltage</u>	<u>Breakdown Voltage</u>	<u>DWV</u>	<u>Working Voltage</u>
Average	900	675	225	1000	750	250
Min	900	675	225	1000	750	250
Max	900	675	225	1000	750	250

Voltage Rate 500 VAC Per Sec.

Test Voltage Until Breakdown Occurs

TOP						
initial mated top, VAC			initial unmated top, VAC			
	<u>Breakdown Voltage</u>	<u>DWV</u>	<u>Working Voltage</u>	<u>Breakdown Voltage</u>	<u>DWV</u>	<u>Working Voltage</u>
Average	1200	900	300	1200	900	300
Min	1200	900	300	1200	900	300
Max	1200	900	300	1200	900	300
BOTTOM						
initial mated bottom, VAC			initial unmated bottom, VAC			
	<u>Breakdown Voltage</u>	<u>DWV</u>	<u>Working Voltage</u>	<u>Breakdown Voltage</u>	<u>DWV</u>	<u>Working Voltage</u>
Average	1200	900	300	1200	900	300
Min	1200	900	300	1200	900	300
Max	1200	900	300	1200	900	300

DATA SUMMARIES Continued**DIELECTRIC WITHSTANDING VOLTAGE (DWV):**

Voltage Rate 500 VAC Per Sec.

Test Voltage Until Breakdown Occurs

TOP						
initial mated top, VAC			initial unmated top, VAC			
	<u>Breakdown Voltage</u>	<u>DWV</u>	<u>Working Voltage</u>	<u>Breakdown Voltage</u>	<u>DWV</u>	<u>Working Voltage</u>
Average	1100	825	275	1100	825	275
Min	1100	825	275	1100	825	275
Max	1100	825	275	1100	825	275
BOTTOM						
initial mated bottom, VAC			initial unmated bottom, VAC			
	<u>Breakdown Voltage</u>	<u>DWV</u>	<u>Working Voltage</u>	<u>Breakdown Voltage</u>	<u>DWV</u>	<u>Working Voltage</u>
Average	800	600	200	900	675	225
Min	800	600	200	900	675	225
Max	800	600	200	900	675	225

DATA SUMMARIES Continued**INSULATION RESISTANCE (IR):**Electrification Time *Two (2) minutes***Initial, Meg Ohms**

		TOP	
		Mated	Unmated
		<u>Insulation Resistance</u>	<u>Insulation Resistance</u>
Average		8750	8750
Min		2500	2500
Max		15000	15000
		BOTTOM	
		Mated	Unmated
		<u>Insulation Resistance</u>	<u>Insulation Resistance</u>
Average		62500	62500
Min		25000	25000
Max		100000	100000

Electrification Time *Two (2) minutes***Thermal, Meg Ohms**

		TOP	
		Mated	Unmated
		<u>Insulation Resistance</u>	<u>Insulation Resistance</u>
Average		96429	87500
Min		75000	75000
Max		100000	100000
		BOTTOM	
		Mated	Unmated
		<u>Insulation Resistance</u>	<u>Insulation Resistance</u>
Average		100000	87500
Min		100000	75000
Max		100000	100000

DATA SUMMARIES Continued**INSULATION RESISTANCE (IR):**Electrification Time *Two (2) minutes***Humidity, Meg Ohms**

		TOP	
		Mated	Unmated
		Insulation Resistance	Insulation Resistance
Average		75000	75000
Min		50000	50000
Max		100000	100000
		BOTTOM	
		Mated	Unmated
		Insulation Resistance	Insulation Resistance
Average		75000	75000
Min		50000	50000
Max		100000	100000

DATA SUMMARIES Continued**SUPPLEMENTAL TESTING****DWV GAS TIGHT:**

Voltage Rate 500 VAC Per Sec.			
Test Voltage Until Breakdown Occurs			
Top			
Initial, VAC			
	<u>Breakdown Voltage</u>	<u>DWV</u>	<u>Working Voltage</u>
Average	1750	1313	438
Min	1700	1275	425
Max	1800	1350	450
Bottom			
	<u>Breakdown Voltage</u>	<u>DWV</u>	<u>Working Voltage</u>
Average	1750	1313	438
Min	1700	1275	425
Max	1800	1350	450

Top			
Voltage Rate 500 VAC Per Sec.			
Test Voltage Until Breakdown Occurs			
Gas Tight, Meg Ohms			
	<u>Breakdown Voltage</u>	<u>DWV</u>	<u>Working Voltage</u>
Average	1130	848	283
Min	1060	795	265
Max	1200	900	300

DATA SUMMARIES Continued**IR GAS TIGHT:**Electrification Time *Two (2) minutes***Initial, Meg Ohms**

		Top	
		Mated	Unmated
		<u>Insulation Resistance</u>	<u>Insulation Resistance</u>
Average		75000	100000
Min		50000	100000
Max		100000	100000
		Bottom	
		<u>Insulation Resistance</u>	<u>Insulation Resistance</u>
Average		100000	100000
Min		100000	100000
Max		100000	100000

Electrification Time *Two (2) minutes***Gas Tight, Meg Ohms**

		Top	
		Mated	Unmated
		<u>Insulation Resistance</u>	<u>Insulation Resistance</u>
Average		2200	1275
Min		400	450
Max		4000	2100
		Bottom	
		Mated	Unmated
		<u>Insulation Resistance</u>	<u>Insulation Resistance</u>
Average		135	150
Min		100	100
Max		170	200

DATA SUMMARIES Continued**Connector/Cable Pull, Monitored for Signal Continuity**

	0 Degrees	90 Degrees
	Force (Lbs)	Force (Lbs)
Minimum	65.49	41.43
Maximum	129.23	57.61
Average	97.23	51.84

Cable Flex 25,000 Cycles, Monitored for Signal Continuity

Resistance, Ohms/Cable, \pm 35 Degree Pendulum Mode						
	Initial	5000 Cycles	10000 Cycles	15000 Cycles	20000 Cycles	25000 Cycles
Avg	0.406	0.406	0.406	0.405	0.407	0.407
Min	0.402	0.401	0.402	0.400	0.402	0.401
Max	0.413	0.412	0.413	0.413	0.412	0.417
St. Dev.	0.0030	0.0035	0.0033	0.0036	0.0035	0.0053
Count	10	10	8	8	8	8

Resistance, Ohms/Cable, \pm 90 Degree Flex Mode						
	Initial	5000 Cycles	10000 Cycles	15000 Cycles	20000 Cycles	25000 Cycles
Avg	0.404	0.406	0.411			
Min	0.397	0.402	0.411			
Max	0.410	0.411	0.411			
St. Dev.	0.0039	0.0036				
Count	10	6	1			

DATA**DIELECTRIC WITHSTANDING VOLTAGE (DWV):**

Test Date:	2/11/2004
Operator:	TR
Temperature (C):	23
Humidity (RH):	23%
Equipment ID:	HPM-01

Voltage Rate 500 VAC Per Sec.

Test Voltage Until Breakdown Occurs

TOP						
Initial mated, VAC			Initial unmated, VAC			
Sample #	<u>Breakdown Voltage</u>	<u>DWV</u>	<u>Working Voltage</u>	<u>Breakdown Voltage</u>	<u>DWV</u>	<u>Working Voltage</u>
1	1100	825	275	1000	750	250
BOTTOM						
Initial mated, VAC			initial unmated, VAC			
Sample #	<u>Breakdown Voltage</u>	<u>DWV</u>	<u>Working Voltage</u>	<u>Breakdown Voltage</u>	<u>DWV</u>	<u>Working Voltage</u>
1	900	675	225	1000	750	250

Test Date:	1/4/2004
Operator:	TR
Temperature (C):	20
Humidity (RH):	25%
Equipment ID:	HPM-01

Voltage Rate 500 VAC Per Sec.

Test Voltage Until Breakdown Occurs

TOP						
initial mated, VAC			initial unmated, VAC			
Sample #	<u>Breakdown Voltage</u>	<u>DWV</u>	<u>Working Voltage</u>	<u>Breakdown Voltage</u>	<u>DWV</u>	<u>Working Voltage</u>
1	1200	900	300	1200	900	300
BOTTOM						
initial mated, VAC			initial unmated, VAC			
Sample #	<u>Breakdown Voltage</u>	<u>DWV</u>	<u>Working Voltage</u>	<u>Breakdown Voltage</u>	<u>DWV</u>	<u>Working Voltage</u>
1	1200	900	300	1200	900	300

DATA Continued**DIELECTRIC WITHSTANDING VOLTAGE (DWV):**

Test Date:	2/11/2004
Operator:	TR
Temperature (C):	23
Humidity (RH):	23%
Equipment ID:	HPM-01

Voltage Rate *500 VAC Per Sec.*Test Voltage *Until Breakdown Occurs*

TOP						
initial mated, VAC				initial unmated, VAC		
<u>Sample #</u>	<u>Breakdown Voltage</u>	<u>DWV</u>	<u>Working Voltage</u>	<u>Breakdown Voltage</u>	<u>DWV</u>	<u>Working Voltage</u>
1	1100	825	275	1100	825	275
BOTTOM						
initial mated, VAC				initial unmated, VAC		
<u>Sample #</u>	<u>Breakdown Voltage</u>	<u>DWV</u>	<u>Working Voltage</u>	<u>Breakdown Voltage</u>	<u>DWV</u>	<u>Working Voltage</u>
1	800	600	200	900	675	225

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

Test Date:	1/21/2004
Operator:	TR
Temperature (C):	23
Humidity (RH):	24%
Equipment ID:	HPM-01

Electrification Time *Two (2) minutes***Initial, Meg Ohms**

TOP		
	Mated	Unmated
Sample #	<u>Insulation Resistance</u>	<u>Insulation Resistance</u>
1	15000	15000
2	2500	2500
BOTTOM		
	Mated	Unmated
Sample #	<u>Insulation Resistance</u>	<u>Insulation Resistance</u>
1	100000	100000
2	25000	25000

Test Date:	2/6/2004
Operator:	TR
Temperature (C):	21
Humidity (RH):	33%
Equipment ID:	HPM-01

Electrification Time *Two (2) minutes***Thermal, Meg Ohms**

TOP		
	Mated	Unmated
Sample #	<u>Insulation Resistance</u>	<u>Insulation Resistance</u>
1	100000	100000
2	75000	75000
BOTTOM		
	Mated	Unmated
Sample #	<u>Insulation Resistance</u>	<u>Insulation Resistance</u>
1	100000	100000
2	100000	75000

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

Test Date:	3/2/2004
Operator:	Troy Cook
Temperature (C):	23
Humidity (RH):	41%
Equipment ID:	HPM-01

Electrification Time *Two (2) minutes***Humidity, Meg Ohms**

TOP		
	<u>Mated</u>	<u>Unmated</u>
<u>Sample #</u>	<u>Insulation Resistance</u>	<u>Insulation Resistance</u>
1	100000	100000
2	50000	50000
BOTTOM		
	<u>Mated</u>	<u>Unmated</u>
<u>Sample #</u>	<u>Insulation Resistance</u>	<u>Insulation Resistance</u>
1	50000	100000
2	100000	50000

DATA Continued**SUPPLEMENTAL****DWV GAS TIGHT:**

Test Date:	1/13/2004		
Operator:	TR		
Temperature (C):	21		
Humidity (RH):	21%		
Equipment ID:	STG-01		
Voltage Rate 500 VAC Per Sec.			
Test Voltage Until Breakdown Occurs			
Top			
	Initial, VAC		
Sample #	Breakdown Voltage	DWV	Working Voltage
1	1700	1275	425
2	1800	1350	450
Bottom			
Sample #	Breakdown Voltage	DWV	Working Voltage
1	1700	1275	425
2	1800	1350	450

Test Date:	2/17/2004		
Operator:	Troy Cook		
Temperature (C):	22		
Humidity (RH):	28%		
Equipment ID:	HPM-01		
Voltage Rate 500 VAC Per Sec.			
Test Voltage Until Breakdown Occurs			
Top			
	Gas Tight, Meg Ohms		
Sample #	Breakdown Voltage	DWV	Working Voltage
1	1200	900	300
2	1060	795	265

DATA Continued**SUPPLEMENTAL****IR GAS TIGHT:**

Test Date:	3/4/2004	
Operator:	Troy Cook	
Temperature (C):	22	
Humidity (RH):	41%	
Equipment ID:	STG-01	
Electrification Time <i>Two (2) minutes</i>		
Initial, Meg Ohms		
Top		
	Mated	Unmated
Sample #	Insulation Resistance	Insulation Resistance
1	100000	100000
2	50000	100000
Bottom		
	Mated	Unmated
Sample #	Insulation Resistance	Insulation Resistance
1	100000	100000
2	100000	100000
Test Date:	3/5/2004	
Operator:	Troy Cook	
Temperature (C):	23	
Humidity (RH):	51%	
Equipment ID:	HPM-01	
Electrification Time <i>Two (2) minutes</i>		
Gas Tight, Meg Ohms		
Top		
	Mated	Unmated
Sample #	Insulation Resistance	Insulation Resistance
1	4000	2100
2	400	450
Bottom		
	Mated	Unmated
Sample #	Insulation Resistance	Insulation Resistance
1	170	200
2	100	100

DATA Continued**SUPPLEMENTAL****Connector/Cable Pull, Monitored for Signal Continuity, 35 Degree Pendulum Mode**

Test Date:	2/10/2004
Operator:	Troy Cook
Temperature (C):	21
Humidity (RH):	25%
Equipment ID:	TCT-03
Load Cell:	LC-2500N(icell)
Readout ID:	#N/A

0 Degrees

Sample#	Force (Lbs)
1	116.90
2	107.17
3	129.23
4	67.34
5	65.49

Test Date:	2/10/2004
Operator:	Troy Cook
Temperature (C):	21
Humidity (RH):	25%
Equipment ID:	TCT-03
Load Cell:	LC-2500N(icell)
Readout ID:	#N/A

90 Degrees

Sample#	Force (Lbs)
1	49.64
2	57.61
3	54.59
4	41.43
5	55.93

DATA Continued**SUPPLEMENTAL****Cable Flex 25,000 Cycles, Monitored for Signal Continuity, \pm 35 Degree Pendulum Mode**

	Initial	5000 Cycles	10000 Cycles	15000 Cycles	20000 Cycles	25000 Cycles
Test Date:	1/26/2004	1/26/2004	1/27/2004	1/27/2004	1/28/2004	1/28/2004
Operator:	Troy Cook	Troy Cook	Troy Cook	Troy Cook	Troy Cook	Troy Cook
Temperature (C):	21	21	22	22	21	21
Humidity (RH):	19%	30%	31%	22%	28%	27%
Equipment ID:	MO-01	MO-01	MO-01	MO-01	MO-01	MO-01
Equipment ID:	HDR - 01	HDR - 01	HDR - 01	HDR - 01	HDR - 01	HDR - 01
Cycle Rate/Hour (+/- 100):	2700	2700	2700	2700	2700	2700

Cable	Resistance, Ohms/Cable, \pm 35 Degree Pendulum Mode					
	Initial	5000 Cycles	10000 Cycles	15000 Cycles	20000 Cycles	25000 Cycles
1	0.405	0.408	0.406	0.405	0.409	0.407
2	0.406	0.409	0.406	0.406	0.409	0.407
3	0.406	0.409	0.406	0.405	0.409	0.417
4	0.402	0.404	0.402	0.400	0.404	0.402
5	0.406	0.407	0.406	0.405	0.408	0.407
6	0.405	0.404	0.405	0.405	0.404	0.403
7	0.403	0.401	Failed @ 7500			
8	0.407	0.406	Failed @ 7581			
9	0.403	0.401	0.403	0.403	0.402	0.401
10	0.413	0.412	0.413	0.413	0.412	0.411

DATA Continued**SUPPLEMENTAL****Cable Flex 25,000 Cycles, Monitored for Signal Continuity, ± 90 Degree Flex Mode**

	Initial	5000 Cycles	10000 Cycles	15000 Cycles	20000 Cycles	25000 Cycles
Test Date:	1/19/2004	1/19/2004	1/20/2004	1/20/2004	9/18/2003	9/18/2003
Operator:	Troy Cook	Troy Cook	Troy Cook	Troy Cook	Troy Cook	Troy Cook
Temperature (C):	21	23	23	23	23	23
Humidity (RH):	48%	48%	48%	48%	44%	44%
Equipment ID:	MO-01	MO-01	MO-01	MO-01	MO-01	MO-01
Equipment ID:	HDR - 01	HDR - 01	HDR - 01	HDR - 01	HDR - 01	HDR - 01
Cycle Rate/Hour (+/- 100):	2700	2700	2700	2700	2700	2700
Cable	Resistance, Ohms/Cable, ± 90 Degree Flex Mode					
	Initial	5000 Cycles	10000 Cycles	15000 Cycles	20000 Cycles	25000 Cycles
1	0.402	0.405	Failed @6084			
2	0.404	0.411	Failed @6084			
3	0.399	Failed @4975				
4	0.397	Failed @3176				
5	0.402	Failed @1373				
6	0.404	0.402	Failed @5587			
7	0.403	Failed @3435				
8	0.410	0.410	Failed @5587			
9	0.406	0.403	Failed @6503			
10	0.408	0.406	0.411	Failed @10,000+		

EQUIPMENT AND CALIBRATION SCHEDULES**Equipment #:** THL-02**Description:** Temperature/Humidity Chart Recorder**Manufacturer:** Dickson**Model:** THDX**Serial #:** 00120351**Accuracy:** Temp: +/- 1C; Humidity: +/-2% RH (0 - 60%) +/- 3% RH (61 - 95%).

... Last Cal: 6/17/03, Next Cal: 6/31/04

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

... Last Cal: 6/12/03, Next Cal: 6/12/04

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

... Last Cal: 6/12/03, Next Cal: 6/12/04

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

... Last Cal: 6/12/03, Next Cal: 6/12/04

Equipment #: TC090601-103/105**Description:** IC Thermocouple-103/105**Manufacturer:** Samtec**Serial #:** TC090601-103/105**Accuracy:** +/- 1 degree C**Equipment #:** HPM-01**Description:** Hipot Megommeter**Manufacturer:** Hipotronics**Model:** H306B-A**Serial #:** M9905004**Accuracy:** 2 % Full Scale Accuracy

... Last Cal: 6/12/03, Next Cal: 6/12/04

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: 6/20/03, Next Cal: 6/30/04**Equipment #:** THC-01**Description:** Temperature/Humidity Chamber**Manufacturer:** Thermotron**Model:** SM-8-7800**Serial #:** 30676**Accuracy:** See Manual

... Last Cal: 5/28/2003, Next Cal: 5/28/2004

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: 6/12/03, Next Cal: 6/12/04**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: 3/27/03, Next Cal: 3/27/04

Equipment #: MO-01**Description:** Micro-Ohmmeter**Manufacturer:** Keithley**Model:** 580**Serial #:** 00120351**Accuracy:** See Manual

... Last Cal: 6/12/03, Next Cal: 6/12/04