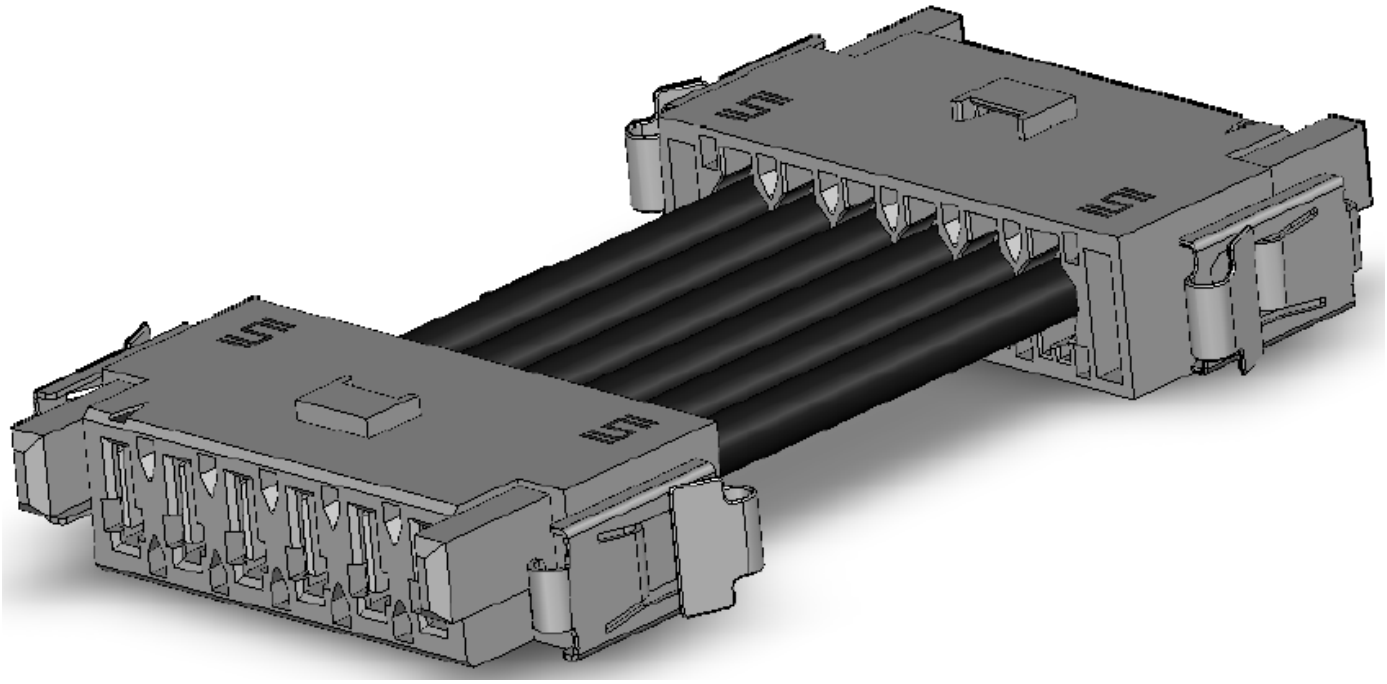
Project Number:	Tracking Code: TC0852—2145_ReportRev2		
Requested by: John Reid	Date: 3/30/2009	Product Rev: 1	
Part #: MPSS-08-14-L-3.25-DR-NUS/MPT-08-6.30-01-L-V-LC	Lot #: 12/23/2008	Tech: Rodney Riley, Gary Lomax, & Troy Cook	Eng: Troy Cook
Part description: MPSS/MPT			Qty to test: 50
Test Start: 12/23/2008	Test Completed: 3/5/2009		



DESIGN VERIFICATION TEST REPORT

PART DESCRIPTION

MPSS-08-14-L-3.25-DR-NUS

Mated with

MPT-08-6.30-01-L-V-LC

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: DVT per flow chart

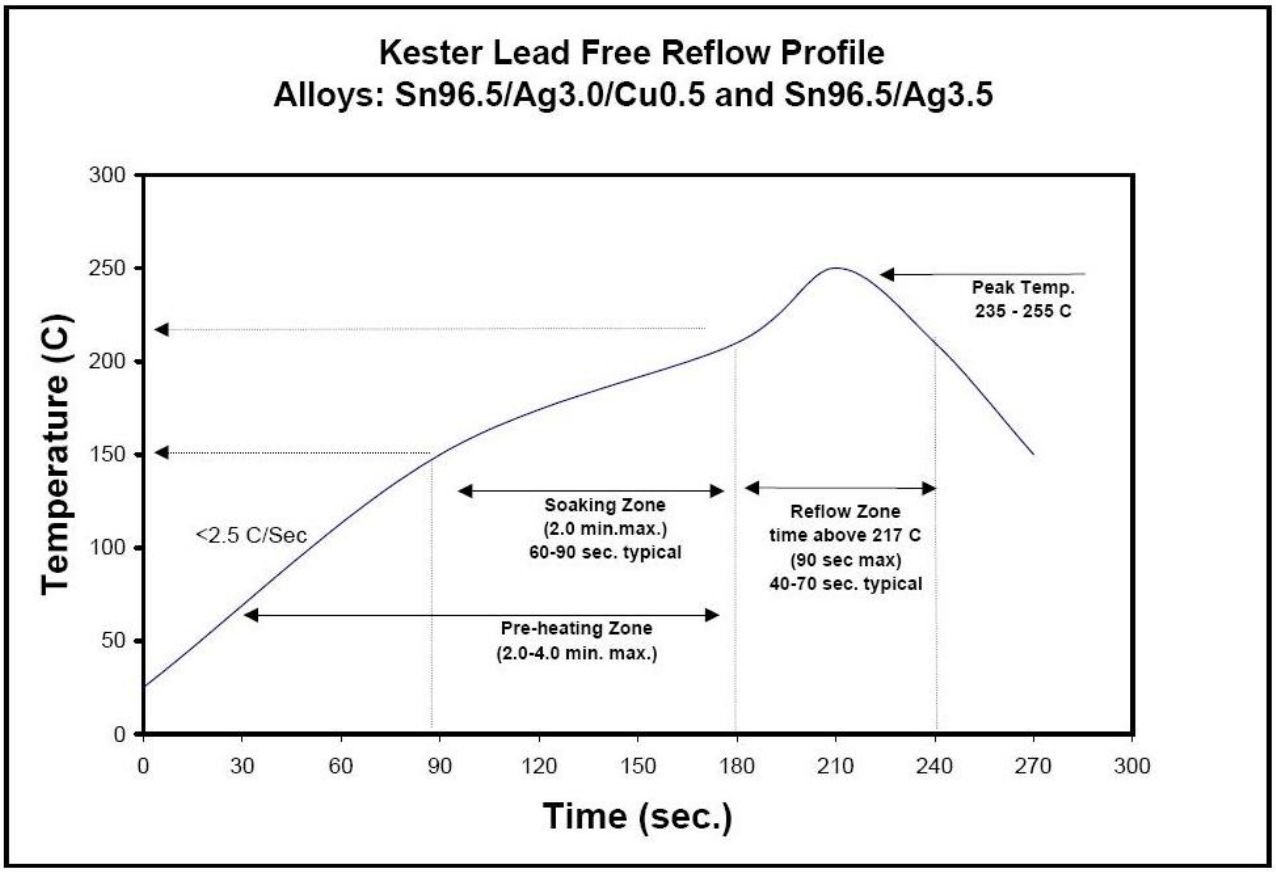
APPLICABLE DOCUMENTS

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: PCB-101625-TST-XX

TYPICAL OVEN PROFILE (Soldering Parts to Test Boards)



FLOWCHARTS

Current Carrying Capacity

14 & 16 GAGE WIRE

TEST STEP	GROUP A 3 Mated Assemblies 1 CONTACT POWERED (1x2 for a double row)	GROUP B 3 Mated Assemblies 2 CONTACTS POWERED (2x2 for a double row)	GROUP C 3 Mated Assemblies 3 CONTACTS POWERED (2x3 for a double row)	GROUP D 3 Mated Assemblies 4 CONTACTS POWERED (2x4 for a double row)	GROUP E 3 Mated Assemblies ALL CONTACTS POWERED
01	CCC	CCC	CCC	CCC	CCC

(TIN PLATING) - Tabulate calculated current at RT, 65° C, 75° C and 95° C
after derating 20% and based on 105° C
(GOLD PLATING) - Tabulate calculated current at RT, 85° C, 95° C and 115° C
after derating 20% and based on 125° C
CCC, Temp rise = EIA-364-70

Mating/Unmating/Normal Force

	10 Mated Assemblies
TEST STEP	GROUP A 10 Boards 100 Cycles
01	Contact Gaps
02	Mating / Unmating
03	Data Review
04	100 Cycles
05	Mating / Unmating
06	Contact Gaps
07	Data Review
08	Thermal Aging (Mated)
09	Mating / Unmating
10	Contact Gaps
11	Data Review
12	Humidity (Mated)
13	Mating / Unmating
14	Contact Gaps

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)
ambient pre-condition and delete steps 7a and 7b
Mating/Un-Mating Forces = EIA-364-13
Normal Force = EIA-364-04
Contact Gaps/Height - No standard method. Usually measured optically

FLOWCHARTS Continued

IR / DWV

	2 Mated Assemblies	2 Mated Assemblies	2 Mated Assemblies	2 Mated Assemblies
TEST STEP	**GROUP A** **2 Boards** **Ambient**	**GROUP B1** **2 Boards** **Ambient**	**GROUP B2** **2 Boards** **Thermal**	**GROUP B3** **2 Boards** **Humidity**
01	IR	DWV/Working Voltage	Thermal Aging	Humidity
02	Data Review		DWV/Working Voltage	DWV/Working Voltage
03	Thermal Aging			
04	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)
ambient pre-condition and delete steps 7a and 7b
IR = EIA-364-21
DWV = EIA-364-20

Durability/Thermal Age/Cyclic Humidity

	10 Boards
TEST STEP	**GROUP A** **80 Points** **100 Cycles**
01	LLCR-1
02	Data Review
03	100 Cycles
04	LLCR-2
05	Data Review
06	Thermal Age
07	LLCR-3
08	Data Review
09	Cyclic Humidity
10	LLCR-4

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/98% RH)
ambient pre-condition and delete steps 7a and 7b
LLCR = EIA-364-23, LLCR
use Keithley 580 in the dry circuit mode, 10 mA Max

FLOWCHARTS Continued

Current Cycling

	2 Mated Assemblies	2 Mated Assemblies
TEST STEP	GROUP A MPSS-08-14-L-3.25-DR-NUS	GROUP B MPSS-08-16-L-3.25-DR-NUS
01	Current Cycle, 500 cycles at Operating current	Current Cycle, 500 cycles at Operating current

Current Cycle = EIA 364-55, Condition "B", Method #4

Test at Current Listed

Measure at 30 minutes into 45 minute cycle

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.

CONTACT GAPS:

1) Gaps above the surrounding plastic surface were measured before and after stressing the contacts (e.g. thermal aging, mechanical cycling, etc.).
2) Typically, all contacts on the connector are measured.

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.

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

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. 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).

SUPPLEMENTAL TESTS

CURRENT CYCLING:

1) Reference document: EIA-364-55, *Current Cycling Test Procedure for Electrical Connectors*.
2) Reference document: EIA-364-06, *Contact Resistance Test Procedure for Electrical Connectors*.
    a. This is a four-wire measurement.
3) An uninterruptible Power Supply maintained power to appropriate equipment.
    a. A microprocessor controlled cycling fixture maintained accurate duty-cycle timing for test duration.
    b. A calibrated constant current source provided consistent DC power during ON cycles

RESULTS

Temperature Rise, CCC at a 20% de-rating

14 Gage Wire

- **Thermocouple Placement**
  - **Cable**
    - **CCC for a 30°C Temperature Rise-------16.8A per contact with 8 contacts powered**
  - **Contact**
    - **CCC for a 30°C Temperature Rise-------14.5A per contact with 8 contacts powered**
  - **Crimp**
    - **CCC for a 30°C Temperature Rise-------14.4A per contact with 8 contacts powered**

16 Gage Wire

- **Thermocouple Placement**
  - **Cable**
    - **CCC for a 30°C Temperature Rise-------12.3A per contact with 8 contacts powered**
  - **Contact**
    - **CCC for a 30°C Temperature Rise-------12.0A per contact with 8 contacts powered**
  - **Crimp**
    - **CCC for a 30°C Temperature Rise-------11.7A per contact with 8 contacts powered**

Current Cycling

- **14 Gage Wire**
  - **Operated at 125% of recommended level ----------Passed**
- **16 Gage Wire**
  - **Operated at 125% of recommended level ----------Passed**

Contact Gaps, MPSS

- **Initial**
  - **Min---------- 1.341 mm**
  - **Max ---------- 1.514 mm**
- **After 100 Cycles**
  - **Min---------- 1.362 mm**
  - **Max ---------- 1.522 mm**
- **Thermal**
  - **Min---------- 1.366 mm**
  - **Max ---------- 1.556 mm**
- **Humidity**
  - **Min---------- 1.367 mm**
  - **Max ---------- 1.527 mm**

Contact Gaps, MPT

- **Initial**
  - **Min---------- 1.848 mm**
  - **Max ---------- 1.974 mm**
- **After 100 Cycles**
  - **Min---------- 1.832 mm**
  - **Max ---------- 1.944 mm**
- **Thermal**
  - **Min---------- 1.780 mm**
  - **Max ---------- 1.884 mm**
- **Humidity**
  - **Min---------- 1.728 mm**
  - **Max ---------- 1.842 mm**

Mating – Unmating Forces

- **Initial**
  - **Mating**
    - **Min ---------- 4.1 lbs**
    - **Max---------- 4.9 lbs**
- **After 100 Cycles**
  - **Mating**
    - **Min ---------- 3.7 lbs**
    - **Max---------- 5.4 lbs**
- **Thermal**
  - **Mating**
    - **Min ---------- 3.4 lbs**
    - **Max---------- 4.5 lbs**
- **Humidity**
  - **Mating**
    - **Min ---------- 3.6 lbs**
    - **Max---------- 4.4 lbs**

Normal Force at .013" deflection

- **Initial**
  - **Min---------- 388.8 gm Set -------.0007**
  - **Max ---------- 600.0 gm Set -------.0017**
- **Thermal**
  - **Min---------- 511.6 gm**
  - **Max ---------- 956.3 gm**

Insulation Resistance minimums, IR

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

Dielectric Withstanding Voltage minimums, DWV

- **Initial**
  - **Breakdown**
    - **Mated ----------3,000 VAC**
    - **Unmated----------3,800VAC**
  - **DWV**
    - **Mated ----------2,250 VAC**
    - **Unmated----------2,850 VAC**
  - **Working voltage**
    - **Mated ----------750 VAC**
    - **Unmated----------950 VAC**
- **Thermal**
  - **Breakdown**
    - **Mated ----------2,800 VAC**
    - **Unmated----------3,700 VAC**
  - **DWV**
    - **Mated ----------2,100 VAC**
    - **Unmated----------2,775 VAC**
  - **Working voltage**
    - **Mated ----------700 VAC**
    - **Unmated----------925 VAC**
- **Humidity**
  - **Breakdown**
    - **Mated ----------2,400 VAC**
    - **Unmated----------3,800 VAC**
  - **DWV**
    - **Mated ----------1,800 VAC**
    - **Unmated----------2,850 VAC**
  - **Working voltage**
    - **Mated ----------600 VAC**
    - **Unmated----------950 VAC**

LLCR Durability (80 LLCR test points)

- **Initial ----------1.5 mOhms Max**
- **Durability, 100 Cycles**
  - **<= +5.0 mOhms ---------- 80 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**
- **Thermal**
  - **<= +5.0 mOhms ---------- 80 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**
- **Humidity**
  - **<= +5.0 mOhms ---------- 79 Points ---------- Stable**
  - **+5.1 to +10.0 mOhms ----------1 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**

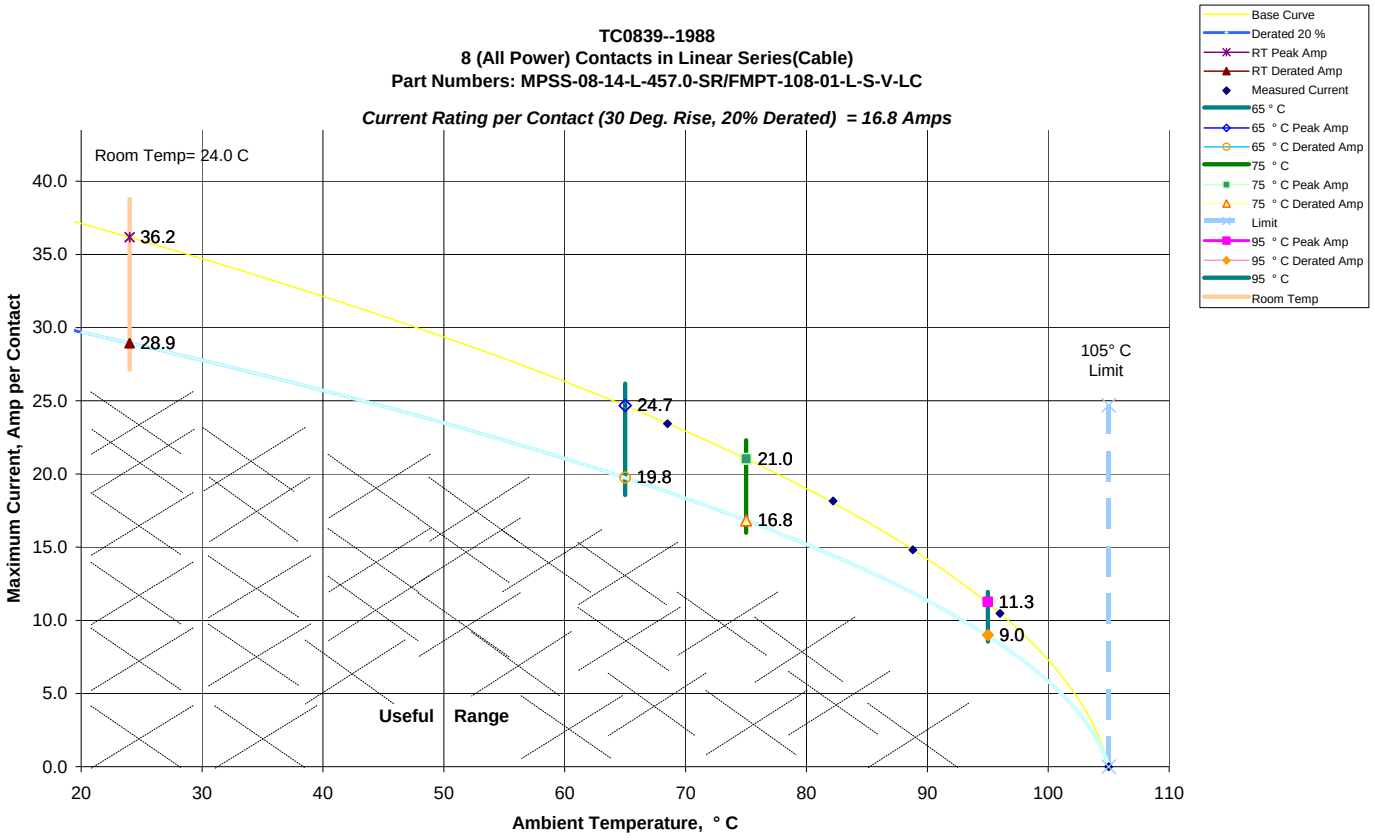
DATA SUMMARIES

TEMPERATURE RISE (Current Carrying Capacity, CCC):

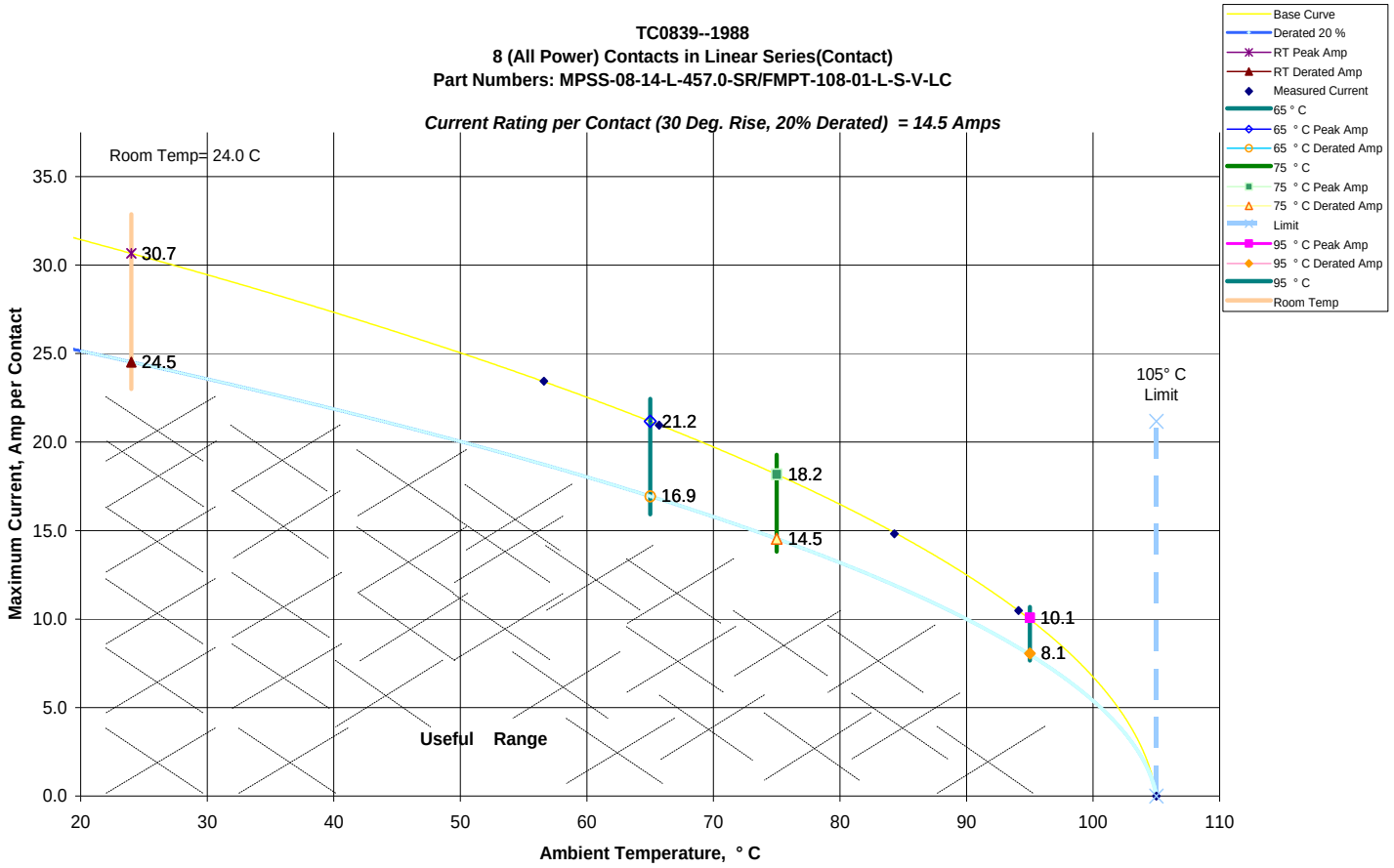
1) High quality thermocouples whose temperature slopes track one another were used for temperature monitoring.
2) The thermocouples were placed at a location to sense the maximum temperature generated during testing.
3) Temperature readings recorded are those for which three successive readings, 15 minutes apart, differ less than 1° C (computer controlled data acquisition).
4) Adjacent contacts were powered:

14 Gage Wire

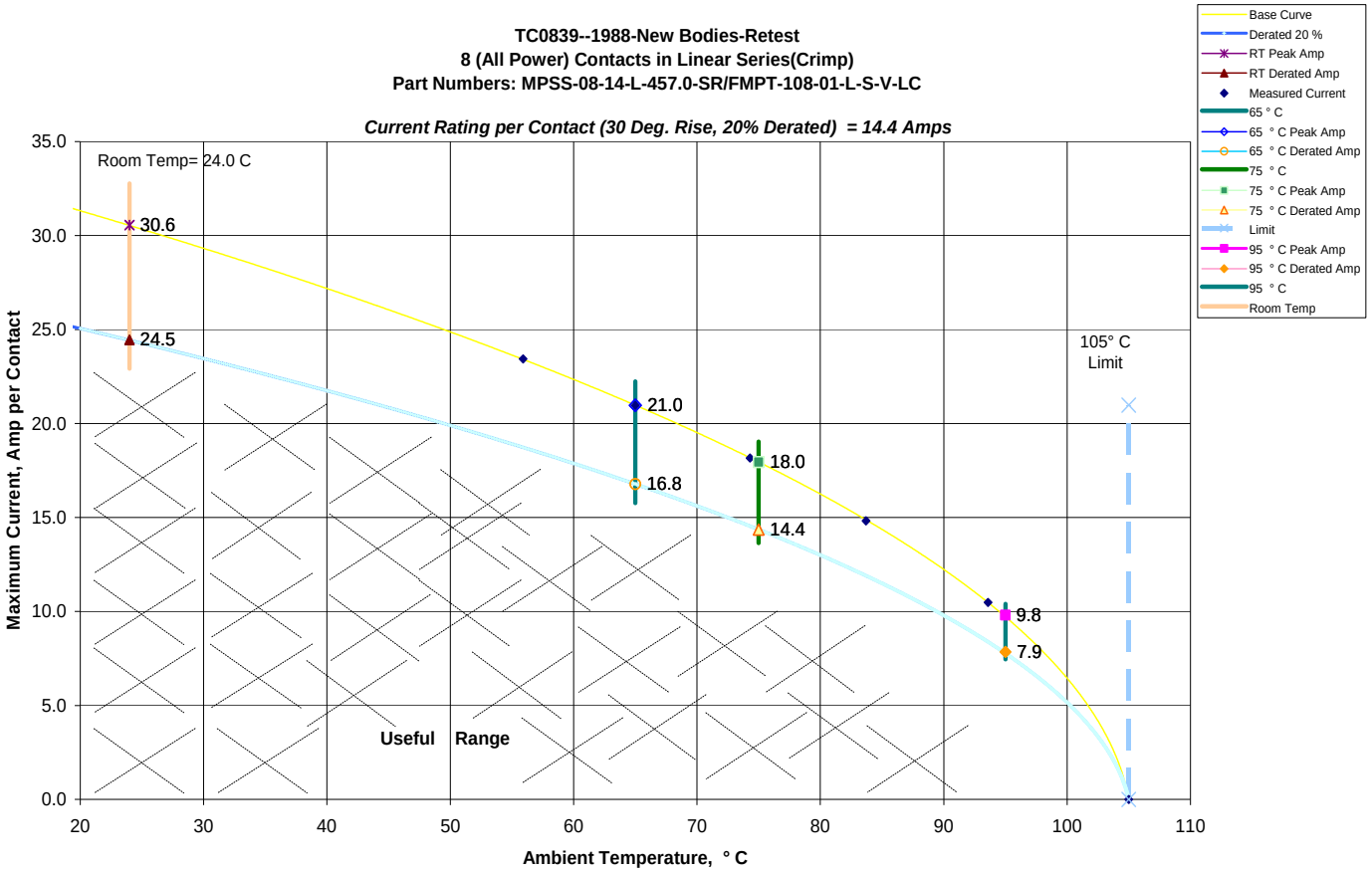
a. Linear configuration with all contacts powered (Thermocouple placed in the cable)



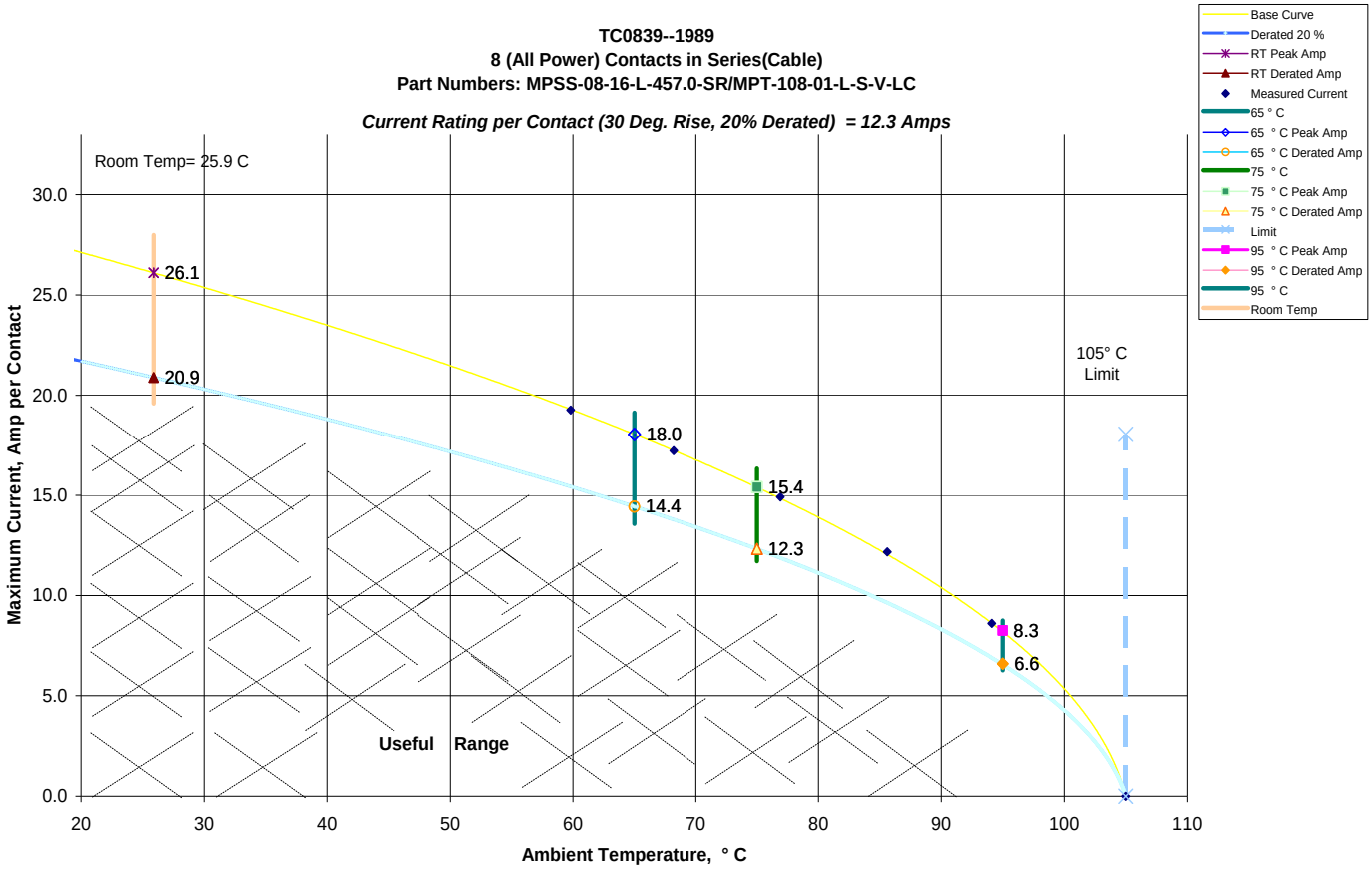
b. Linear configuration with all contacts powered (Thermocouple placed in the contact)



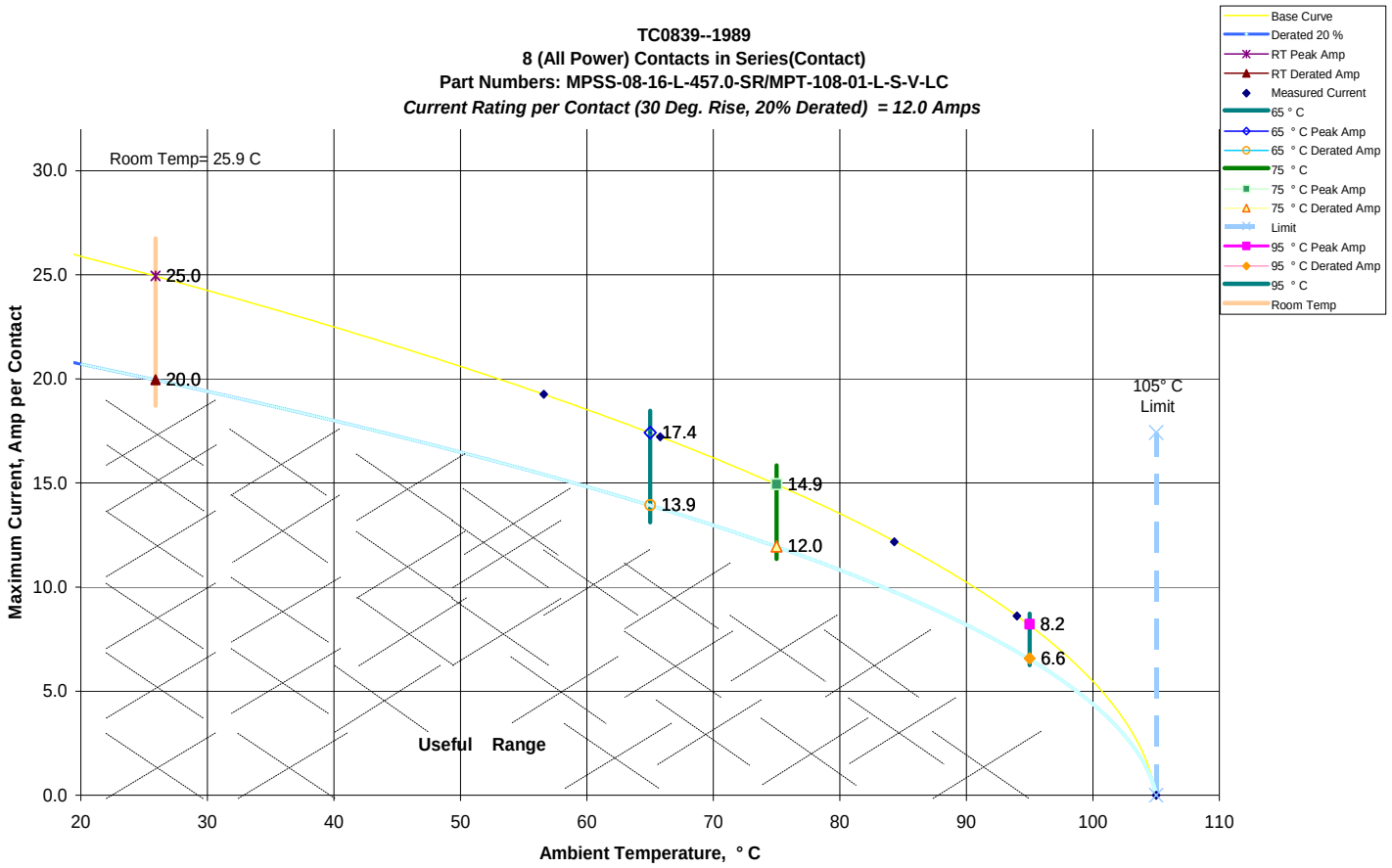
c. Linear configuration with all contacts powered (Thermocouple placed in the crimp)



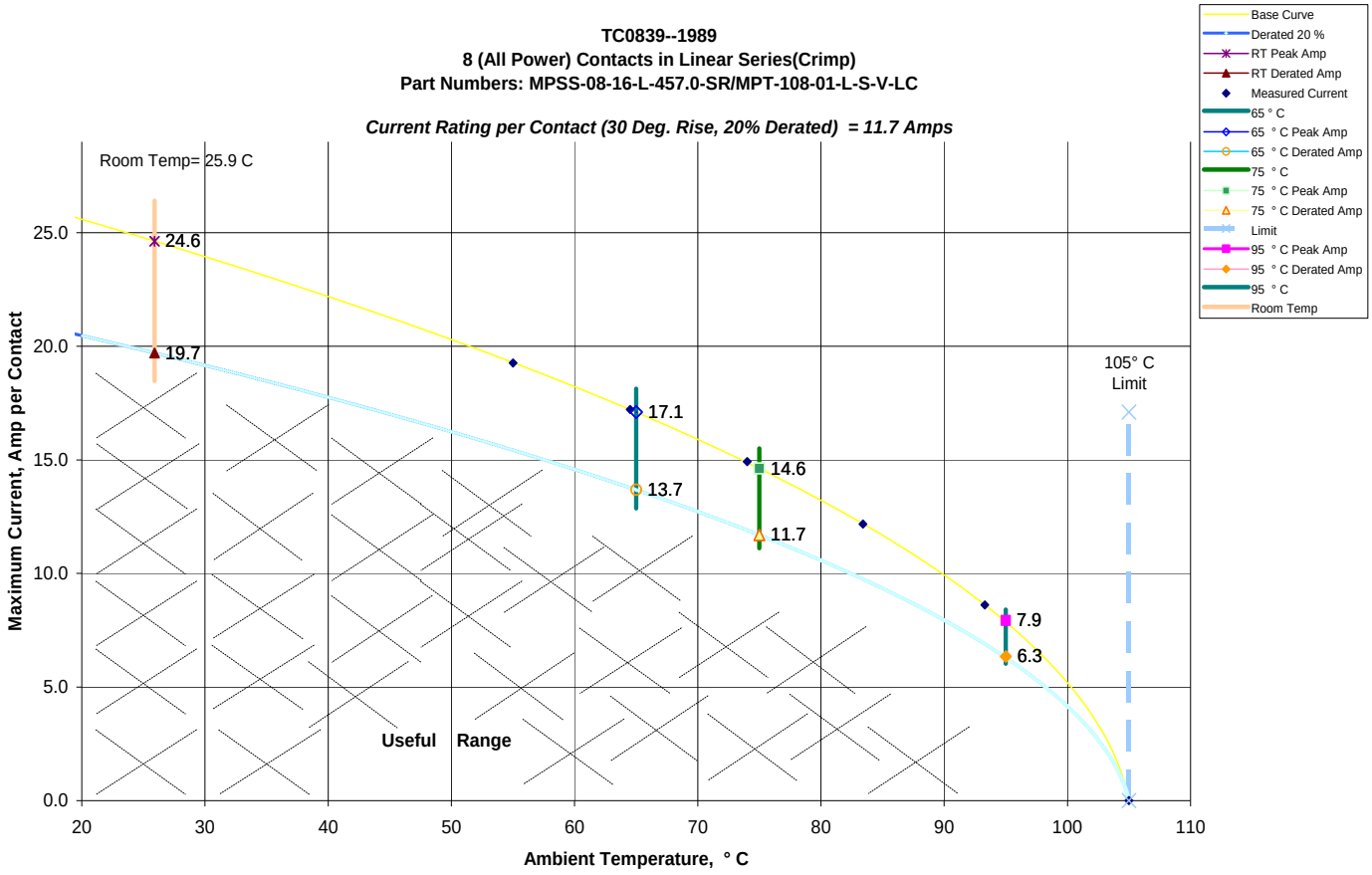
d. Linear configuration with all contacts powered (Thermocouple placed in the cable)



e. Linear configuration with all contacts powered (Thermocouple placed in the contact)



f. Linear configuration with all contacts powered (Thermocouple placed in the crimp)



DATA SUMMARIES Continued

CONTACT GAPS:

MPSS

Initial		After 100 Cycles		After Thermal		After Humidity	
Measured in mm		Measured in mm		Measured in mm		Measured in mm	
Minimum	1.341	***Minimum***	1.362	***Minimum***	1.366	***Minimum***	1.367
Maximum	1.514	***Maximum***	1.522	***Maximum***	1.556	***Maximum***	1.527
Average	1.452	***Average***	1.454	***Average***	1.471	***Average***	1.468
St. Dev.	0.038	***St. Dev.***	0.033	***St. Dev.***	0.030	***St. Dev.***	0.029
Count	80	***Count***	80	***Count***	80	***Count***	80

MPT

Initial		After 100 Cycles		After Thermal		After Humidity	
Measured in mm		Measured in mm		Measured in mm		Measured in mm	
Minimum	1.848	***Minimum***	1.832	***Minimum***	1.780	***Minimum***	1.728
Maximum	1.974	***Maximum***	1.944	***Maximum***	1.884	***Maximum***	1.842
Average	1.932	***Average***	1.901	***Average***	1.838	***Average***	1.796
St. Dev.	0.024	***St. Dev.***	0.023	***St. Dev.***	0.022	***St. Dev.***	0.024
Count	80	***Count***	80	***Count***	80	***Count***	80

MATING/UNMATING:

	Initial		After 100 Cycles	
	Mating		**Mating**	
	Force (Oz)	Force (Lbs)	Force (Oz)	Force (Lbs)
Minimum	65.8	4.1	59.9	3.7
Maximum	78.6	4.9	87.0	5.4
Average	72.9	**4.6**	76.7	**4.8**
	After Thermal		After Humidity	
	Mating		**Mating**	
	Force (Oz)	Force (Lbs)	Force (Oz)	Force (Lbs)
Minimum	54.7	3.4	56.8	3.6
Maximum	71.4	4.5	70.7	4.4
Average	65.4	**4.1**	64.4	**4.0**

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										
Sample #	**0.0013**	**0.0026**	**0.0039**	**0.0052**	**0.0065**	**0.0078**	**0.0091**	**0.0104**	**0.0117**	**0.0130**	***SET***
1	45.9	88.8	130.9	172.4	213.3	253.8	293.6	333.4	371.9	388.8	0.0007
2	65.6	116.7	168.7	221.8	272.0	321.8	370.7	418.1	468.5	465.4	0.0011
3	60.3	108.8	155.5	202.8	248.9	294.9	342.0	389.4	438.7	440.6	0.0008
4	83.8	164.0	232.6	294.6	355.3	417.3	482.7	545.6	608.9	600.0	0.0017
5	66.9	134.2	197.8	260.1	317.4	376.0	440.7	508.0	576.0	568.3	0.0009
6	51.9	100.6	149.7	198.4	243.8	285.7	327.0	367.2	405.3	417.7	0.0008

After Thermal	Deflections in inches, Forces in Grams										
Sample #	**0.0013**	**0.0026**	**0.0039**	**0.0052**	**0.0065**	**0.0078**	**0.0091**	**0.0104**	**0.0117**	**0.0130**	***SET***
1	31.0	44.8	74.9	119.8	166.5	216.4	276.9	350.4	431.7	541.9	0.0033
2	68.1	127.3	177.8	221.8	267.8	315.5	361.2	408.3	458.3	511.6	0.0019
3	86.8	174.5	262.9	348.1	436.4	526.7	625.3	727.3	848.5	956.3	0.0009
4	65.9	132.0	198.1	262.5	331.3	408.0	493.1	575.9	657.0	737.2	0.0017
5	67.5	117.5	155.8	181.2	198.9	242.8	345.7	461.1	577.3	696.8	0.0052

DATA SUMMARIES Continued

INSULATION RESISTANCE (IR):

	Pin-Pin	
	Mated	Unmated
Minimum	**MPSS/MPT**	**MPSS**
Initial	100000	100000
Thermal	100000	100000
Humidity	100000	100000

DIELECTRIC WITHSTANDING VOLTAGE (DWV):

		Pin-Pin	
		Mated	Unmated
Minimum		**MPSS/MPT**	**MPSS**
Breakdown Voltage	**Initial**	3000	3800
	Thermal	2800	3700
	Humidity	2400	3800
DWV	**Initial**	2250	2850
	Thermal	2100	2775
	Humidity	1800	2850
Working Voltage	**Initial**	750	950
	Thermal	700	925
	Humidity	600	950

DATA SUMMARIES Continued

LLCR:

1) A total of 80 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

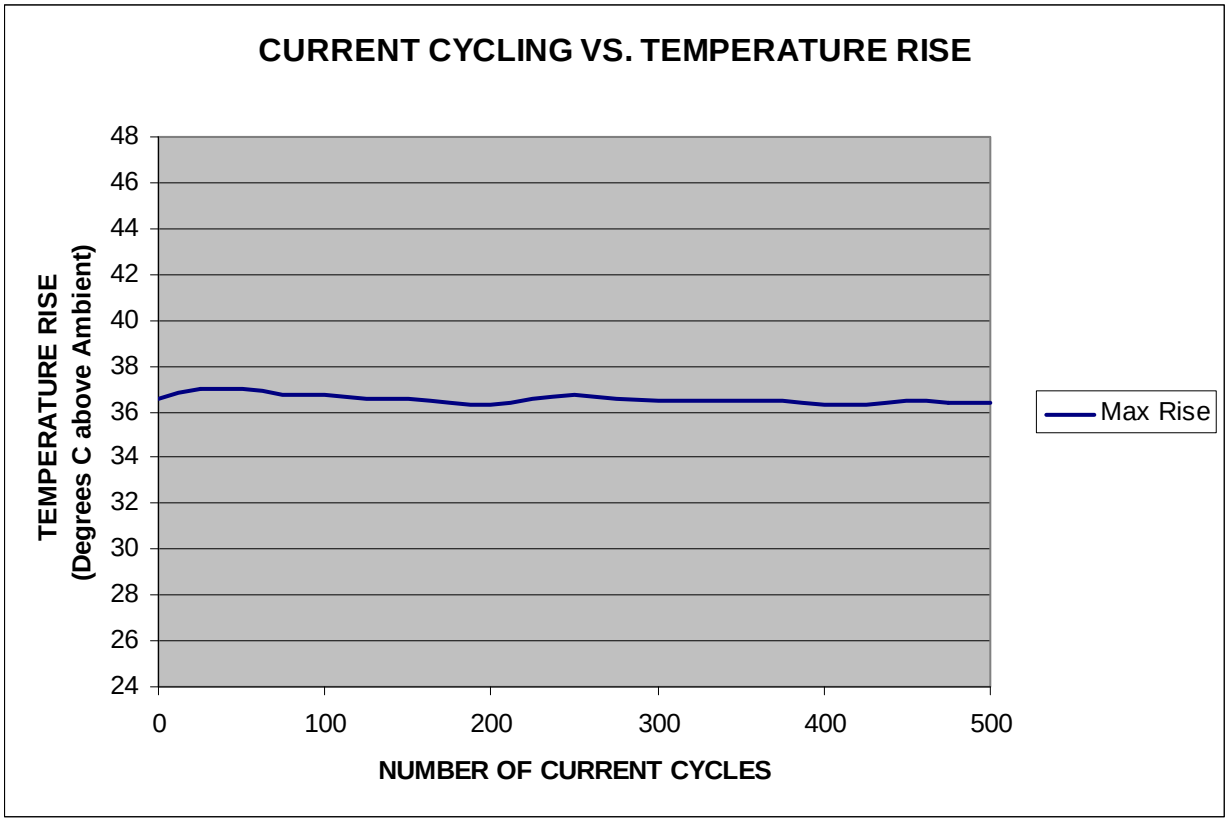
Date	Jan. 15 2009	Jan. 15 2009	Jan. 26 2009	Feb. 06 2009
Room Temp C	23	24	23	25
RH	22%	20%	25%	27%
Name	Marshall	Marshall	RILEY	Marshall
mOhm values	**Actual Initial**	**Delta 100 Cycles**	**Delta Thermal**	**Delta Humidity**
Average	0.9	0.1	0.2	0.3
St. Dev.	0.1	0.2	0.2	0.7
Min	0.8	-0.2	-0.1	-0.6
Max	1.5	0.7	1.1	5.2
Count	80	80	80	80

DATA SUMMARIES Continued

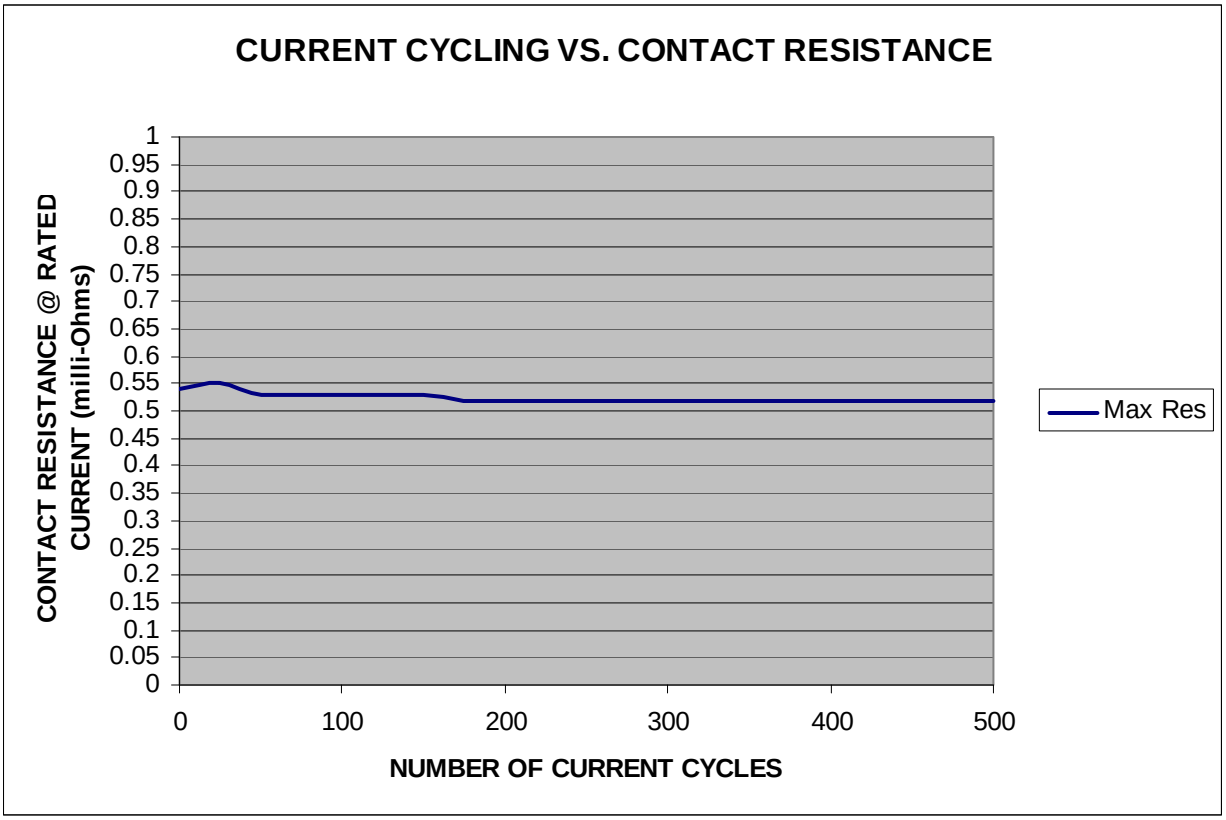
SUPPLEMENTAL TESTS

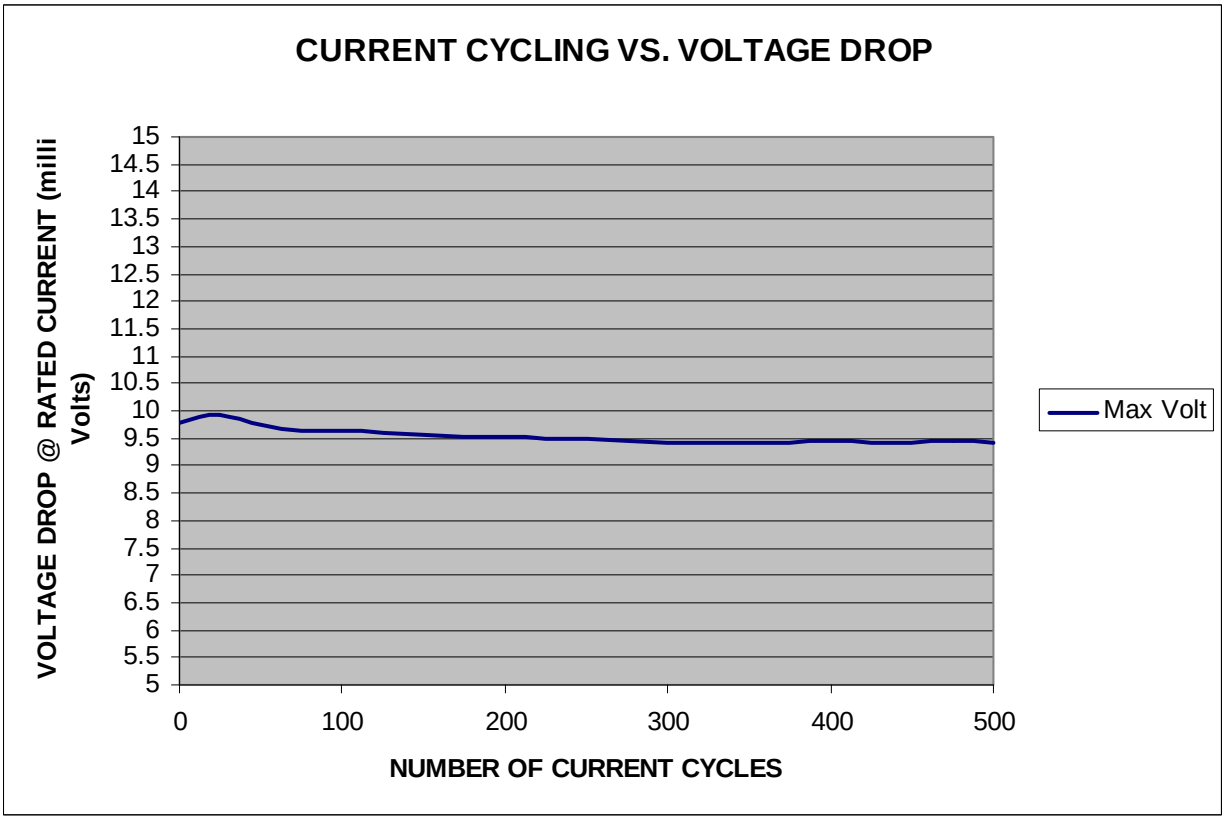
CURRENT CYCLING:
Product was operated at 125% of recommended level

14 Gage Wire



DATA SUMMARIES Continued

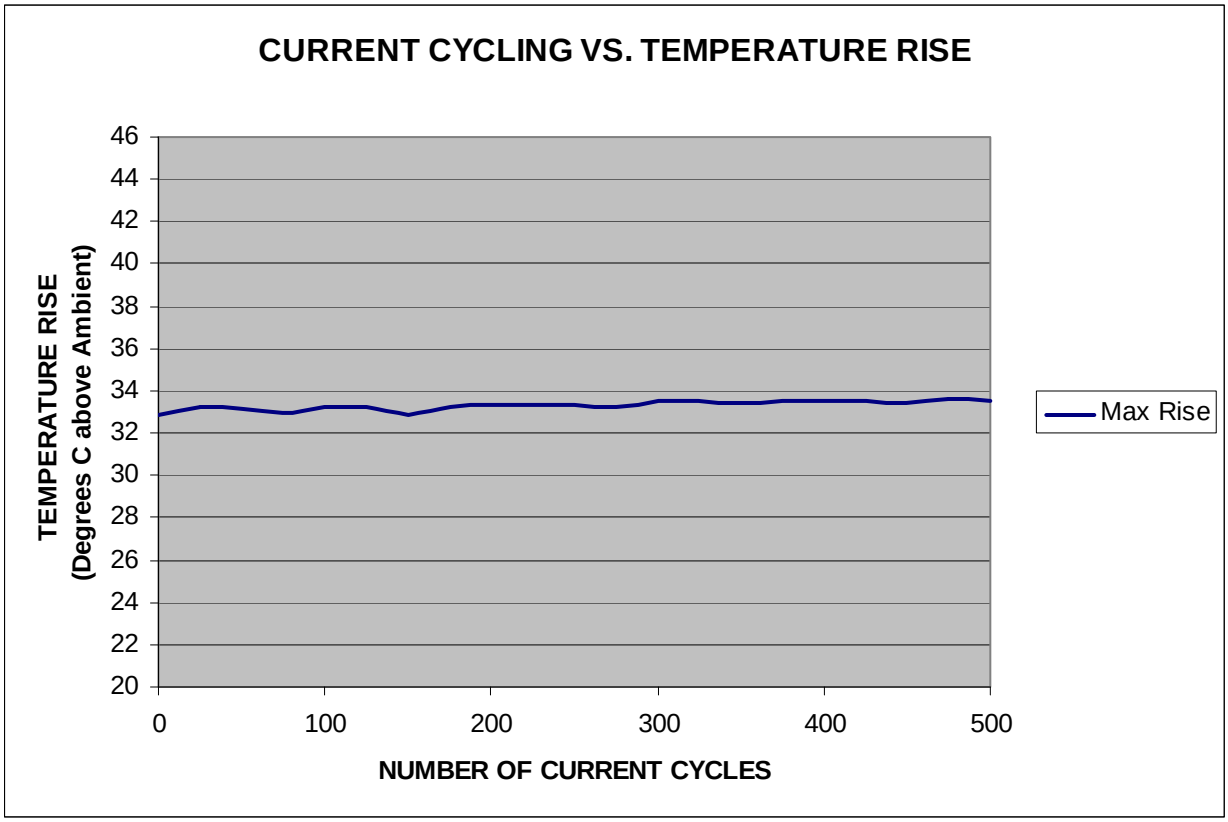




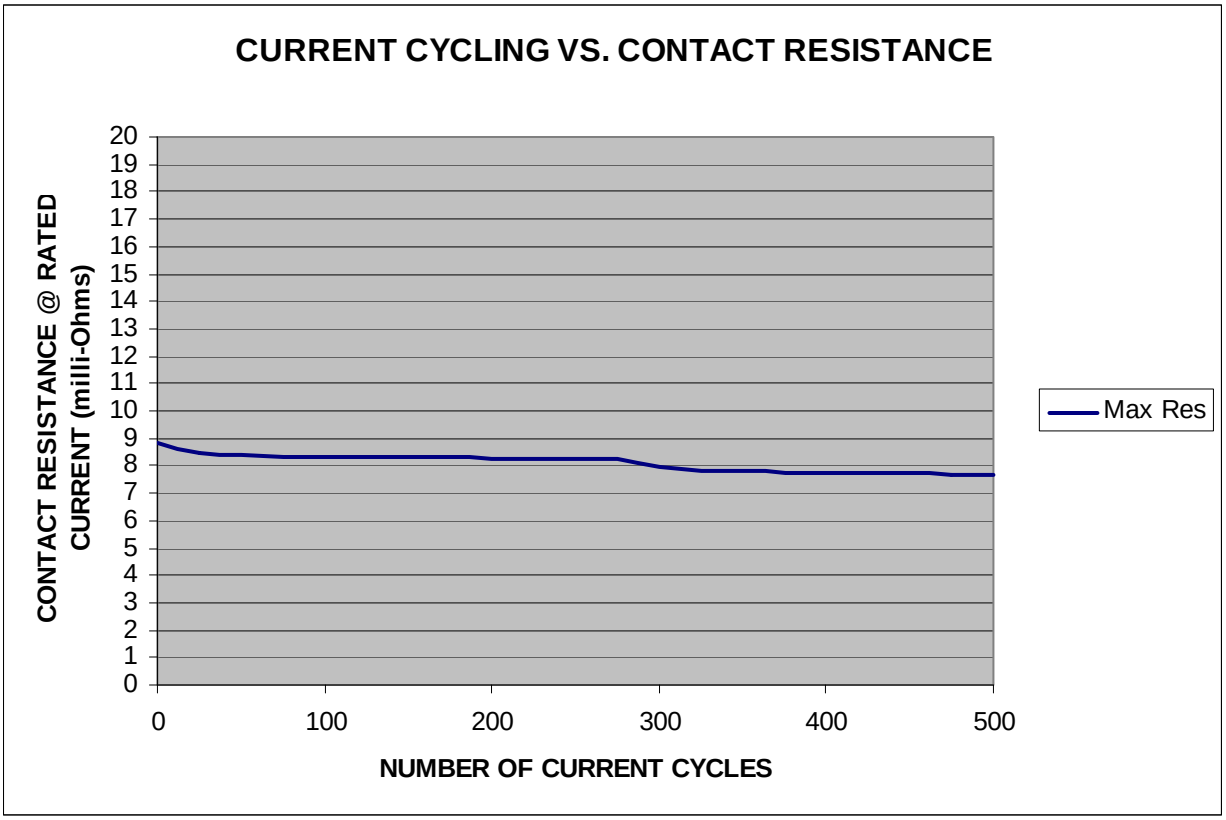
DATA SUMMARIES Continued

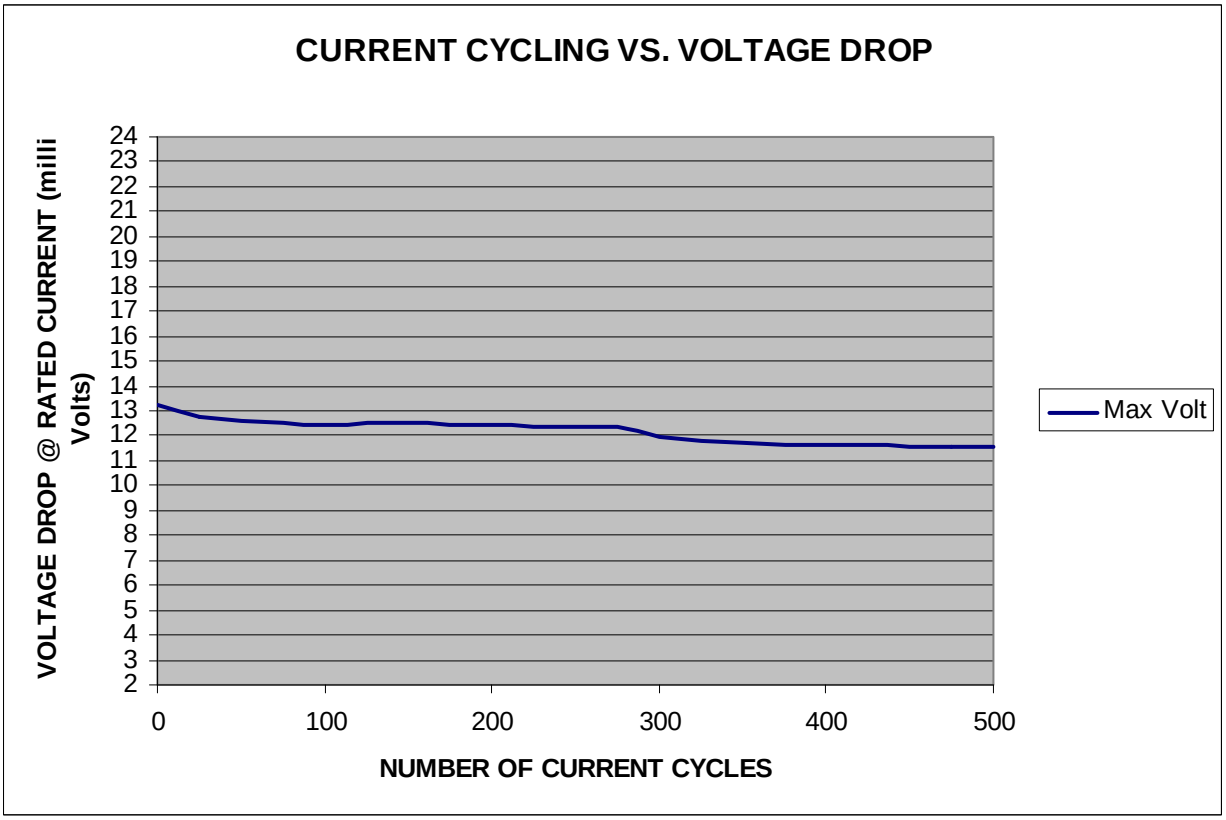
CURRENT CYCLING:
Product was operated at 125% of recommended level

16 Gage Wire



DATA SUMMARIES Continued





DATA

CONTACT GAPS:

MPSS

Initial										
Measured in mm										
Pos.#	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**B8**	**B9**	**B10**
1	1.454	1.428	1.424	1.472	1.496	1.452	1.462	1.468	1.458	1.46
2	1.452	1.484	1.484	1.484	1.482	1.478	1.454	1.494	1.47	1.486
3	1.476	1.484	1.452	1.414	1.448	1.342	1.406	1.452	1.512	1.47
4	1.484	1.446	1.452	1.38	1.468	1.498	1.474	1.468	1.46	1.468
5	1.388	1.372	1.49	1.476	1.341	1.341	1.434	1.382	1.466	1.452
6	1.428	1.452	1.454	1.47	1.448	1.414	1.416	1.48	1.482	1.434
7	1.43	1.476	1.46	1.464	1.468	1.432	1.342	1.514	1.47	1.462
8	1.422	1.47	1.494	1.454	1.468	1.48	1.46	1.468	1.45	1.47

After 100 Cycles										
Measured in mm										
Pos.#	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**B8**	**B9**	**B10**
1	1.4281	1.4661	1.4901	1.4621	1.4601	1.4961	1.4441	1.4681	1.4481	1.4841
2	1.4221	1.4701	1.4541	1.4401	1.4281	1.4361	1.3981	1.4861	1.4601	1.4741
3	1.3761	1.4381	1.4501	1.4781	1.3621	1.4321	1.4121	1.4781	1.4861	1.4261
4	1.4801	1.4061	1.4801	1.4761	1.4301	1.3781	1.4821	1.3781	1.4681	1.4561
5	1.4501	1.4681	1.4761	1.4001	1.4341	1.4861	1.4601	1.4881	1.4541	1.4721
6	1.4501	1.4761	1.4401	1.4241	1.4861	1.3661	1.4061	1.4321	1.5221	1.4641
7	1.4541	1.4841	1.4921	1.4781	1.4901	1.4861	1.4501	1.4841	1.4921	1.4701
8	1.4561	1.4241	1.4421	1.4741	1.4881	1.4501	1.4261	1.4541	1.4641	1.4801

After Thermal										
Measured in mm										
Pos.#	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**B8**	**B9**	**B10**
1	1.454	1.472	1.43	1.484	1.492	1.456	1.47	1.482	1.458	1.432
2	1.47	1.486	1.5	1.502	1.472	1.502	1.462	1.508	1.488	1.486
3	1.422	1.458	1.458	1.444	1.504	1.442	1.454	1.484	1.532	1.442
4	1.49	1.436	1.476	1.412	1.438	1.508	1.486	1.432	1.468	1.556
5	1.494	1.47	1.5	1.492	1.488	1.41	1.48	1.474	1.484	1.476
6	1.466	1.488	1.472	1.484	1.388	1.482	1.434	1.444	1.498	1.484
7	1.48	1.49	1.47	1.458	1.47	1.476	1.366	1.492	1.462	1.502
8	1.486	1.44	1.512	1.478	1.488	1.506	1.464	1.466	1.454	1.46

After Humidity										
Measured in mm										
Pos.#	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**B8**	**B9**	**B10**
1	1.46558	1.48082	1.52654	1.46812	1.4859	1.4986	1.45288	1.47828	1.46304	1.4859
2	1.45034	1.49352	1.4732	1.46304	1.45288	1.44526	1.36652	1.5113	1.46812	1.48082
3	1.42748	1.4732	1.46304	1.50114	1.3843	1.45288	1.44272	1.48844	1.49098	1.43764
4	1.49098	1.42494	1.49606	1.49352	1.4732	1.40716	1.50114	1.41986	1.47066	1.46812
5	1.49098	1.4732	1.4732	1.42494	1.45288	1.49352	1.46812	1.4986	1.47066	1.48082
6	1.4732	1.48844	1.45542	1.43764	1.50876	1.43002	1.42494	1.4351	1.5113	1.4732
7	1.4732	1.49352	1.49352	1.49098	1.4732	1.4859	1.47574	1.49352	1.48844	1.4732
8	1.4859	1.43256	1.4351	1.49098	1.49352	1.44526	1.45288	1.47574	1.47828	1.44526

DATA Continued

MPT

Initial										
Measured in mm										
Pos.#	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**B8**	**B9**	**B10**
1	1.96	1.926	1.934	1.928	1.966	1.972	1.922	1.96	1.902	1.944
2	1.924	1.9	1.898	1.912	1.934	1.96	1.946	1.938	1.908	1.906
3	1.926	1.912	1.936	1.954	1.948	1.966	1.934	1.91	1.876	1.948
4	1.928	1.92	1.974	1.954	1.948	1.918	1.938	1.964	1.848	1.932
5	1.948	1.928	1.926	1.954	1.952	1.928	1.96	1.938	1.866	1.93
6	1.94	1.934	1.932	1.946	1.904	1.952	1.924	1.908	1.928	1.928
7	1.942	1.9	1.96	1.942	1.93	1.92	1.912	1.914	1.95	1.936
8	1.93	1.892	1.934	1.968	1.946	1.886	1.944	1.956	1.944	1.928
After 100 Cycles										
Measured in mm										
Pos.#	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**B8**	**B9**	**B10**
1	1.8941	1.9021	1.8981	1.8901	1.9161	1.9221	1.8721	1.9141	1.8941	1.9221
2	1.8321	1.8961	1.8721	1.8521	1.8981	1.9261	1.9081	1.9101	1.8901	1.8701
3	1.8681	1.8961	1.9021	1.9221	1.9301	1.9441	1.8961	1.8881	1.8781	1.9261
4	1.8841	1.9061	1.9421	1.9241	1.9281	1.8941	1.9141	1.9261	1.8561	1.9041
5	1.9241	1.9161	1.8961	1.9421	1.9401	1.9061	1.9281	1.8801	1.8781	1.9061
6	1.9041	1.9221	1.8961	1.9241	1.8801	1.9101	1.8941	1.8721	1.9081	1.8801
7	1.8941	1.8821	1.9261	1.9101	1.8981	1.8821	1.8661	1.8781	1.9181	1.9161
8	1.8701	1.8701	1.8941	1.9381	1.9081	1.8521	1.9001	1.9161	1.9301	1.8841
After Thermal										
Measured in mm										
Pos.#	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**B8**	**B9**	**B10**
1	1.854	1.876	1.822	1.84	1.872	1.84	1.82	1.83	1.828	1.85
2	1.822	1.858	1.824	1.824	1.832	1.824	1.85	1.832	1.814	1.83
3	1.844	1.874	1.828	1.864	1.848	1.836	1.83	1.804	1.864	1.826
4	1.844	1.884	1.874	1.836	1.836	1.832	1.86	1.834	1.824	1.798
5	1.854	1.844	1.838	1.858	1.872	1.822	1.852	1.798	1.848	1.784
6	1.866	1.874	1.828	1.858	1.828	1.82	1.814	1.784	1.822	1.86
7	1.854	1.852	1.866	1.844	1.838	1.84	1.78	1.84	1.858	1.842
8	1.822	1.83	1.836	1.852	1.842	1.812	1.81	1.852	1.832	1.842
After Humidity										
Measured in mm										
Pos.#	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**B8**	**B9**	**B10**
1	1.792	1.788	1.776	1.84	1.828	1.814	1.786	1.826	1.794	1.818
2	1.802	1.78	1.7541	1.782	1.78	1.822	1.802	1.81	1.792	1.792
3	1.808	1.792	1.78	1.784	1.806	1.808	1.79	1.786	1.778	1.82
4	1.824	1.814	1.826	1.816	1.81	1.784	1.802	1.818	1.73	1.798
5	1.802	1.806	1.798	1.778	1.842	1.776	1.808	1.8	1.762	1.798
6	1.804	1.83	1.78	1.802	1.748	1.794	1.774	1.786	1.8	1.808
7	1.784	1.8	1.826	1.738	1.788	1.77	1.728	1.8	1.818	1.81
8	1.826	1.766	1.794	1.786	1.808	1.748	1.764	1.822	1.824	1.82

DATA Continued

MATING/UNMATING:

	Initial	After 100 Cycles	After Thermal	After Humidity
Sample#	Mating	Mating	Mating	Mating
1	4.11	4.56	4.13	4.07
2	4.64	4.70	4.12	4.42
3	4.79	4.64	4.20	4.23
4	4.92	5.08	4.25	3.68
5	4.62	4.76	4.15	3.90
6	4.71	4.93	4.21	4.18
7	4.23	3.74	3.42	3.80
8	4.48	5.44	4.26	4.18
9	4.41	5.33	4.46	4.23
10	4.63	4.77	3.66	3.55

DATA Continued

NORMAL FORCE (FOR CONTACTS TESTED IN THE HOUSING):

Initial	Deflections in inches Forces in Grams										
	0.0013	**0.0026**	**0.0039**	**0.0052**	**0.0065**	**0.0078**	**0.0091**	**0.0104**	**0.0117**	**0.0130**	***SET***
Averages	62.40	118.85	172.53	225.02	275.12	324.92	376.12	426.95	478.22	480.13	0.0010
Min	45.90	88.80	130.90	172.40	213.30	253.80	293.60	333.40	371.90	388.80	0.0007
Max	83.80	164.00	232.60	294.60	355.30	417.30	482.70	545.60	608.90	600.00	0.0017
St. Dev	13.231	26.892	36.894	44.841	52.376	61.074	72.036	83.014	94.780	85.042	0.0004
Count	6	6	6	6	6	6	6	6	6	6	6

Initial	Deflections in inches Forces in Grams										
	0.0013	**0.0026**	**0.0039**	**0.0052**	**0.0065**	**0.0078**	**0.0091**	**0.0104**	**0.0117**	**0.0130**	***SET***
Averages	63.86	119.22	173.90	226.68	280.18	341.88	420.44	504.60	594.56	688.76	0.0026
Min	31.00	44.80	74.90	119.80	166.50	216.40	276.90	350.40	431.70	511.60	0.0009
Max	86.80	174.50	262.90	348.10	436.40	526.70	625.30	727.30	848.50	956.30	0.0052
St. Dev	20.257	46.973	68.283	85.938	108.052	127.268	138.696	149.685	168.651	178.145	0.0017
Count	5	5	5	5	5	5	5	5	5	5	5

DATA Continued

INSULATION RESISTANCE (IR):

	Pin-Pin	
	Mated	Unmated
	Sample 1	**Sample 2**
Minimum	**MPSS/MPT**	**MPSS**
Initial	100000	100000
Thermal	100000	100000
Humidity	100000	100000

DIELECTRIC WITHSTANDING VOLTAGE (DWV):

	Pin-Pin	
	Mated	Unmated
	Sample 1	**Sample 2**
	MPSS/MPT	**MPSS**
Initial	3000	3800
Thermal	2800	3700
Humidity	2400	3800

DATA Continued

LLCR:

	mOhm values	Actual	Delta	Delta	Delta
Board	Position	Initial	100 Cycles	Thermal	Humidity
1	P1	0.9	0.2	0.2	0.2
1	P2	0.9	0.0	0.1	0.2
1	P3	1.0	0.0	0.1	0.0
1	P4	0.9	0.0	0.2	0.2
1	P5	0.9	-0.1	0.2	0.1
1	P6	0.9	-0.1	0.0	0.1
1	P7	1.0	-0.1	0.0	0.3
1	P8	0.9	0.0	0.4	0.1
2	P1	1.0	0.4	0.3	0.7
2	P2	0.9	0.0	0.1	0.3
2	P3	0.9	0.3	0.4	0.3
2	P4	0.8	0.0	0.0	0.1
2	P5	0.9	0.0	0.2	0.0
2	P6	0.9	0.3	0.5	0.4
2	P7	1.0	0.2	0.2	0.2
2	P8	0.9	0.7	0.9	1.2
3	P1	0.9	0.5	0.5	0.2
3	P2	0.9	0.2	0.2	0.0
3	P3	0.9	0.0	0.1	0.0
3	P4	1.0	0.2	0.1	0.1
3	P5	0.9	0.2	0.2	0.2
3	P6	0.8	0.1	0.0	0.0
3	P7	1.1	0.0	0.0	-0.2
3	P8	0.8	0.1	0.2	0.2
4	P1	0.8	0.2	0.2	0.9
4	P2	1.0	0.1	0.1	0.1
4	P3	0.9	0.1	0.0	0.1
4	P4	1.0	-0.2	-0.1	0.0
4	P5	0.9	0.1	0.1	1.0
4	P6	1.0	-0.1	0.0	0.7
4	P7	0.9	0.0	0.0	0.0
4	P8	1.5	0.2	0.5	-0.6
5	P1	0.9	-0.1	0.1	0.0
5	P2	0.9	0.0	0.1	0.0
5	P3	1.0	0.1	0.3	0.0
5	P4	0.9	0.0	0.1	0.0
5	P5	0.9	0.3	0.3	0.2
5	P6	1.0	-0.1	0.0	-0.1
5	P7	1.0	0.0	0.1	-0.1
5	P8	0.9	0.0	0.1	0.0
6	P1	0.8	0.2	0.3	0.3

6	P2	0.9	0.0	0.1	0.0
6	P3	0.9	0.0	0.0	0.0
6	P4	0.9	-0.1	0.0	0.0
6	P5	0.9	0.0	0.0	0.0
6	P6	0.9	0.0	0.2	0.1
6	P7	0.9	-0.1	0.1	0.0
6	P8	0.9	0.1	0.2	0.2
7	P1	0.8	0.1	1.1	5.2
7	P2	0.8	0.0	1.1	2.2
7	P3	0.8	0.0	0.2	1.1
7	P4	0.8	0.0	0.4	2.8
7	P5	0.9	0.0	0.0	0.0
7	P6	0.9	-0.1	0.0	0.0
7	P7	0.9	0.0	0.1	0.1
7	P8	0.9	0.0	0.2	0.7
8	P1	0.9	0.4	0.3	0.3
8	P2	0.8	0.0	0.0	0.0
8	P3	0.9	0.2	0.2	0.3
8	P4	1.1	-0.1	-0.1	0.0
8	P5	1.0	0.0	0.0	0.0
8	P6	0.9	0.1	0.1	0.3
8	P7	1.0	-0.1	0.0	0.2
8	P8	0.9	0.1	0.6	0.5
9	P1	0.9	0.2	0.2	0.1
9	P2	1.0	0.2	0.3	0.4
9	P3	0.9	0.0	0.0	0.0
9	P4	0.9	0.2	0.1	0.2
9	P5	1.0	-0.1	-0.1	-0.1
9	P6	1.0	-0.2	-0.1	-0.1
9	P7	0.9	0.3	0.1	0.5
9	P8	0.9	0.1	0.3	0.2
10	P1	0.9	0.1	0.4	0.1
10	P2	0.9	-0.1	0.1	0.4
10	P3	0.9	0.3	0.4	0.2
10	P4	0.8	-0.1	0.0	0.0
10	P5	0.8	0.0	0.0	0.0
10	P6	0.8	0.6	1.0	0.5
10	P7	0.8	0.0	0.1	0.1
10	P8	0.9	-0.1	0.3	0.5

EQUIPMENT AND CALIBRATION SCHEDULES

Equipment #: MV-05
Description: 6" x 6" Video Measuring Machine
Manufacturer: Micro-Vu
Model: M3010838
Serial #: V9344
Accuracy: See Manual
… Last Cal: 02/10/2009, Next Cal: 02/10/2010

Equipment #: TCT-04
Description: Dillon Quantrol TC21 25-1000 mm/min series test stand
Manufacturer: Dillon Quantrol
Model: TC2 I series test stand
Serial #: 04-1041-04
Accuracy: Speed Accuracy: +/- 5% of indicated speed; Speed Accuracy: +/- 5% of indicated speed;
… Last Cal: 05/18/2008, Next Cal: 05/18/2009

Equipment #: LC-100N-2
Description: 100 N icell load cell for Dillon Test Stand
Manufacturer: Mecmesin (Dillon/Quantrol)
Model: ILC
Serial #: 07-0217-10
Accuracy: .10% of Capacity
… Last Cal: 02/15/2009, Next Cal: 02/15/2010

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: 06/26/08, Next Cal: 06/26/09

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: 5/06/08, Next Cal: 05/06/09

Equipment #: MO-03
Description: Multimeter /Data Acquisition System
Manufacturer: Keithley
Model: 2700
Serial #: 0791975
Accuracy: See Manual
… Last Cal: 06/17/08, Next Cal: 06/17/09

Equipment #: HPM-01
Description: Hipot Megommeter
Manufacturer: Hipotronics
Model: H306B-A
Serial #: M9905004
Accuracy: 2 % Full Scale Accuracy 2 % Full Scale Accuracy
… Last Cal: 06/22/08, Next Cal: 06/22/09

Equipment #: STG-01
Description: Hipot Megomter Safety Test Cage
Manufacturer: Hipotronics
Model: TC-25
Serial #: M9910141
Accuracy: N/A
… Last Cal: No Calibration Required

Equipment #: MO-06
Description: Micro-Ohmeter
Manufacturer: Keithley
Model: 580
Serial #: 1110525
Accuracy: See Manual
… Last Cal: 06/17/2008, Next Cal: 06/17/2009

Equipment #: MO-07
Description: Multimeter / Data Acquistion System
Manufacturer: Keithley
Model: 2700
Serial #: 1116559
Accuracy: See Manual
… Last Cal: 6/17/2008, Next Cal: 6/17/2009

Equipment #: MO-01
Description: Micro-Ohmeter
Manufacturer: Keithley
Model: 580
Serial #: V9344
Accuracy: See Manual
… Last Cal: 06/17/08, Next Cal: 06/17/09

Equipment #: MO-03
Description: Multimeter /Data Acquisition System
Manufacturer: Keithley
Model: 2700
Serial #: 0791975
Accuracy: See Manual
… Last Cal: 06/17/08, Next Cal: 06/17/09