Project Number:	Tracking Code: TC0313--0164		
Requested by: Mark Shireman	Date: 3/25/2003	Product Rev: N/A	
Part #: BTS-050-(01,02)-L-D-A	Lot #: N/A	Tech: Troy Cook	Eng: John Tozier
Part description: BTS/BSS-050			Qty to test: 20
Test Start: 4/10/2003	Test Completed: 5/15/2003		

IR/DWV and CCC summary report on two stack heights

PART DESCRIPTION

BTS-050-(01,02)-L-D-A
MATED WITH BSS-050-01-L-D-A

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: IR/DWV and CCC.

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:
   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
      iv) Sample test boards are removed and placed into the Branson 3510 cleaner containing deionized water with the following conditions:
      v) Temperature: ----------55° C +/- 5° C
      vi) Frequency:----------40 KHz
      vii) Immersion Time: ----------5 to 10 Minutes
      viii) 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
   c) Upon removal, the sample test boards are rinsed for 1/2 to 1 minute in room temperature free flowing deionized water.
   d) 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
   e) Sample test boards are then allowed to set and recover to room ambient condition prior to testing.
4) Parts not intended for testing LLCR and DWV/IR are visually inspected and cleaned if necessary.
5) Any additional preparation will be noted in the individual test procedures.

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Part description: BTS/BSS-050	

FLOWCHARTS

TEST STEP	GROUP A 2 Boards Ambient	GROUP B1 2 Boards Ambient	GROUP B2 2 Boards Thermal	GROUP B3 2 Boards Humidity	GROUP C 1 board min 6 Contacts in series
01	IR	DWV/Working Voltage	Thermal Aging	Humidity	CCC
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)
delete steps 7a and 7b

CCC, Temp rise = EIA-364-70

Tabulate calculated current at RT, 60° C, 75° C and 80° C
after derating 20% and based on 105 ° C

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Part description: BTS/BSS-050	

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.

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) $60\ ^{o}$ C
   c) $75\ ^{o}$ C
   d) $80\ ^{o}$ 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.

ATTRIBUTE DEFINITION Continued

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 and/or Unmated
      iii) Mounted
      iv) Electrification Time 2.0 minutes
      v) Test Voltage (VDC) corresponding 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 5000 megohms.

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Part description: BTS/BSS-050	

RESULTS

Temperature Rise, CCC

- **At 75°C, relative to 105°C at 20% de-rated with 6 adjacent conductors powered**
  - **-01 Stack Height----------1.3 A**
  - **-02 Stack Height----------1.4 A**

Dielectric Withstanding Voltage minimums, DWV

- **Initial**
  - **Breakdown - Mated**
    - **-01 Stack Height ---------- 1250 VAC**
    - **-02 Stack Height ---------- 1250 VAC**
  - **DWV - Mated**
    - **-01 Stack Height ----------938 VAC**
    - **-02 Stack Height ----------938 VAC**
  - **Working voltage - Mated**
    - **-01 Stack Height ----------313 VAC**
    - **-02Stack Height ----------313 VAC**
- **Thermal**
  - **Breakdown - Mated**
    - **-01 Stack Height ---------- 1200 VAC**
    - **-02 Stack Height ---------- 1200 VAC**
  - **DWV - Mated**
    - **-01 Stack Height ----------900 VAC**
    - **-02 Stack Height ----------900 VAC**
  - **Working voltage - Mated**
    - **-01 Stack Height ----------300 VAC**
    - **-02 Stack Height ----------300 VAC**
- **Humidity**
  - **Breakdown - Mated**
    - **-01 Stack Height ---------- 1000 VAC**
    - **-02 Stack Height ---------- 1050 VAC**
  - **DWV - Mated**
    - **-01 Stack Height ----------750 VAC**
    - **-02 Stack Height ----------788 VAC**
  - **Working voltage - Mated**
    - **-01 Stack Height ----------250 VAC**
    - **-02 Stack Height ----------263 VAC**

Insulation Resistance minimums, IR

- **Initial - Mated**
  - **01 Stack Height---------- 25,000 Meg Ω ---------- Pass**
  - **02 Stack Height---------- 10,000 Meg Ω ---------- Pass**
- **Initial – Un-Mated, BSS only**
  - **01 Stack Height---------- 50,000 Meg Ω ---------- Pass**
  - **02 Stack Height---------- 15,000 Meg Ω ---------- Pass**
- **Thermal - Mated**
  - **01 Stack Height----------100,000 Meg Ω**
  - **02 Stack Height----------100,000 Meg Ω**
- **Thermal – Un-Mated, BSS only**
  - **01 Stack Height----------100,000 Meg Ω**
  - **02 Stack Height----------100,000 Meg Ω**
- **Humidity - Mated**
  - **01 Stack Height----------100,000 Meg Ω**
  - **02 Stack Height----------100,000 Meg Ω**

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Part description: BTS/BSS-050	

RESULTS Continued

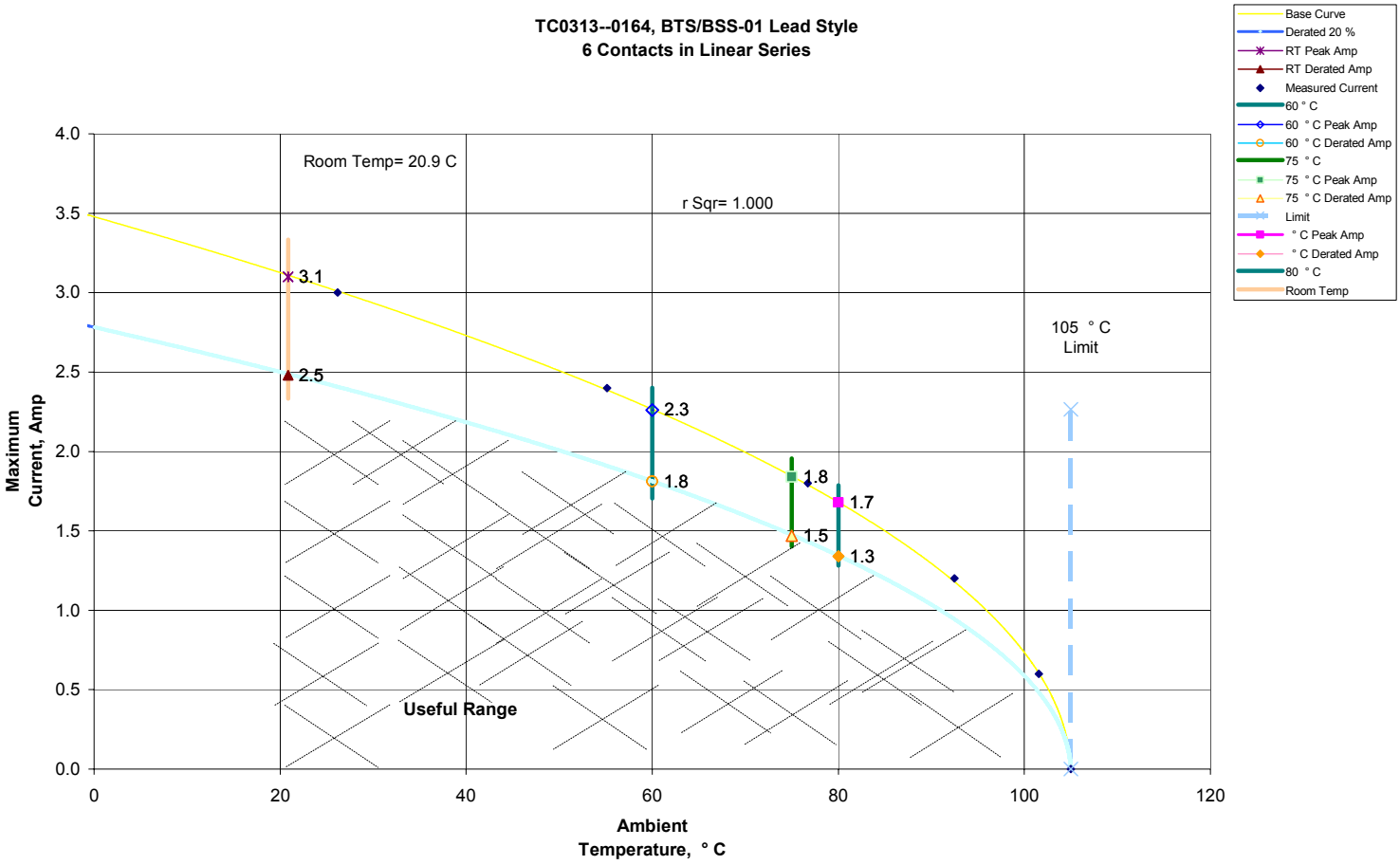
- **Humidity – Un-Mated, BSS only**
  - **01 Stack Height----------100,000 Meg Ω**
  - **02 Stack Height----------100,000 Meg Ω**

Tracking Code: TC0313--0164	Part #: BTS-050-(01,02)-L-D-A
Part description: BTS/BSS-050	

DATA SUMMARIES

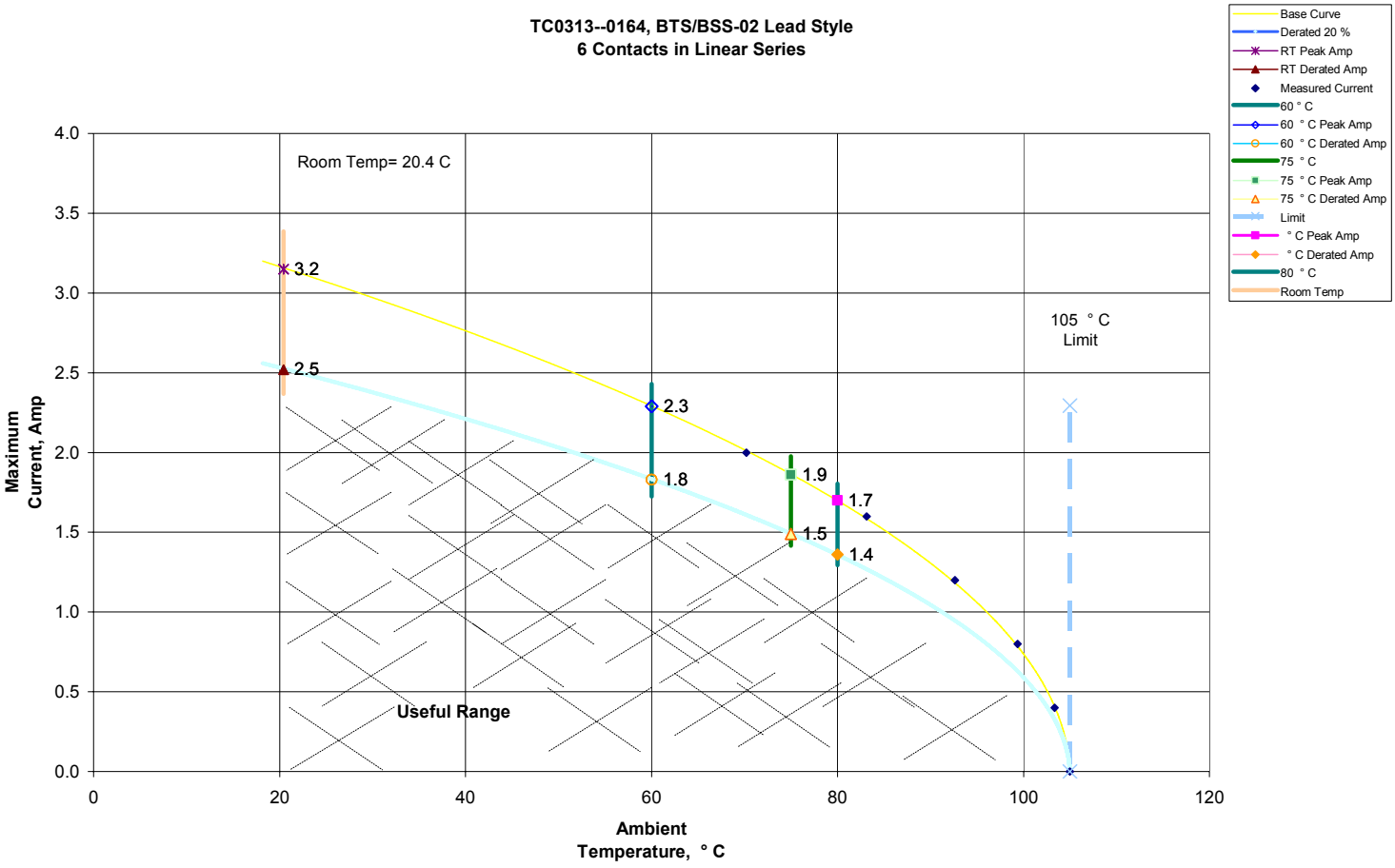
TEMPERATURE RISE (Current Carrying Capacity, CCC):

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) SIX adjacent contacts were powered:
   a) Linear configuration



Tracking Code: TC0313--0164	Part #: BTS-050-(01,02)-L-D-A
Part description: BTS/BSS-050	

DATA SUMMARIES Continued



DATA SUMMARIES Continued

DIELECTRIC WITHSTANDING VOLTAGE (DWV) -01 Stack Height:

Initial

VAC	Breakdown Voltage	DWV	Working Voltage
Average	1275	956	319
Min	1250	938	313
Max	1300	975	325

Thermal

VAC	Breakdown Voltage	DWV	Working Voltage
Average	1225	919	306
Min	1200	900	300
Max	1250	938	313

Humidity

VAC	Breakdown Voltage	DWV	Working Voltage
Average	1000	750	250
Min	1000	750	250
Max	1000	750	250

DIELECTRIC WITHSTANDING VOLTAGE (DWV) -02 Stack Height:

Initial

VAC	Breakdown Voltage	DWV	Working Voltage
Average	1300	975	325
Min	1250	938	313
Max	1350	1013	338

Thermal

VAC	Breakdown Voltage	DWV	Working Voltage
Average	1250	938	313
Min	1200	900	300
Max	1300	975	325

Humidity

VAC	Breakdown Voltage	DWV	Working Voltage
Average	1075	806	269
Min	1050	788	263
Max	1100	825	275

Tracking Code: TC0313--0164	Part #: BTS-050-(01,02)-L-D-A
Part description: BTS/BSS-050	

DATA SUMMARIES Continued

INSULATION RESISTANCE (IR) -01 Stack Height:

MegOhms

	Mated	Unmated
	Initial	
Average	25000	50000
Min	25000	50000
Max	25000	50000
	Thermal	
Average	100000	100000
Min	100000	100000
Max	100000	100000
	Humidity	
Average	100000	100000
Min	100000	100000
Max	100000	100000

INSULATION RESISTANCE (IR) -02 Stack Height:

MegOhms

	Mated	Unmated
	Initial	
Average	10000	20000
Min	10000	15000
Max	10000	25000
	Thermal	
Average	100000	100000
Min	100000	100000
Max	100000	100000
	Humidity	
Average	100000	100000
Min	100000	100000
Max	100000	100000

Tracking Code: TC0313--0164	Part #: BTS-050-(01,02)-L-D-A
Part description: BTS/BSS-050	

DATA

DIELECTRIC WITHSTANDING VOLTAGE (DWV) -01 Stack Height:

Test Date:	4/11/2003
Operator:	Troy Cook
Temperature (C):	20
Humidity (RH):	33%
Pressure (In. Hg):	29.23
Equipment ID:	HPM-01
Used In:	BSS/BTS - 01

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

Initial

Sample #	Breakdown Voltage	DWV	Working Voltage
1	1250	938	313
2	1300	975	325

Test Date:	4/22/2003
Operator:	Troy Cook
Temperature (C):	22
Humidity (RH):	40%
Pressure (In. Hg):	29.35
Equipment ID	HPM-01
Used In:	BSS/BTS - 01

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

Thermal

Sample #	Breakdown Voltage	DWV	Working Voltage
1	1200	900	300
2	1250	938	313

Tracking Code: TC0313--0164	Part #: BTS-050-(01,02)-L-D-A
Part description: BTS/BSS-050	

DATA Continued

DIELECTRIC WITHSTANDING VOLTAGE (DWV):

Test Date:	5/15/2003
Operator:	Troy Cook
Temperature (C):	22
Humidity (RH):	44%
Pressure (In. Hg):	29.21
Equipment ID	HPM-01
Used In:	BSS/BTS - 01

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

Sample #	Breakdown Voltage	DWV	Working Voltage
1	1000	750	250
2	1000	750	250

DIELECTRIC WITHSTANDING VOLTAGE (DWV) -02 Stack Height:

Test Date:	4/11/2003
Operator:	Troy Cook
Temperature (C):	20
Humidity (RH):	33%
Pressure (In. Hg):	29.23
Equipment ID:	HPM-01
Used In:	BSS/BTS - 02

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

Sample #	Breakdown Voltage	DWV	Working Voltage
1	1350	1013	338
2	1250	938	313

Tracking Code: TC0313--0164	Part #: BTS-050-(01,02)-L-D-A
Part description: BTS/BSS-050	

DATA Continued

DIELECTRIC WITHSTANDING VOLTAGE (DWV) -02 Stack Height:

Test Date:	4/22/2003
Operator:	Troy Cook
Temperature (C):	22
Humidity (RH):	42%
Pressure (In. Hg):	29.35
Equipment ID	HPM-01
Used In:	BSS/BTS - 02

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

Sample #	Breakdown Voltage	DWV	Working Voltage
1	1300	975	325
2	1200	900	300

Test Date:	5/15/2003
Operator:	Troy Cook
Temperature (C):	22
Humidity (RH):	48%
Pressure (In. Hg):	29.21
Equipment ID	HPM-01
Used In:	BSS/BTS - 02

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

Sample #	Breakdown Voltage	DWV	Working Voltage
1	1100	825	275
2	1050	788	263

Tracking Code: TC0313--0164	Part #: BTS-050-(01,02)-L-D-A
Part description: BTS/BSS-050	

DATA Continued

INSULATION RESISTANCE (IR) -01 Stack Height:

Test Date:	4/10/2003
Operator:	Troy Cook
Temperature (C):	23
Humidity (RH):	32%
Pressure (In. Hg):	29.35
Equipment ID:	HPM-01
Used In:	BSS/BTS-01

Electrification Time ***Two (2) minutes***

MegOhms

	Initial	
	Mated	***Unmated***
Sample #	**Insulation Resistance**	**Insulation Resistance**
1	25000	50000
2	25000	50000

Test Date:	4/22/2003
Operator:	Troy Cook
Temperature (C):	22
Humidity (RH):	39%
Pressure (In. Hg):	29.35
Equipment ID:	HPM-01
Used In:	BSS/BTS-01

Electrification Time ***Two (2) minutes***

	Thermal	
	Mated	***Unmated***
Sample #	**Insulation Resistance**	**Insulation Resistance**
1	100000	100000
2	100000	100000

DATA Continued

INSULATION RESISTANCE (IR) -01 Stack Height:

Test Date:	5/15/2003
Operator:	Troy Cook
Temperature (C):	22
Humidity (RH):	42%
Pressure (In. Hg):	29.21
Equipment ID:	HPM-01
Used In:	BSS/BTS-01

Electrification Time ***Two (2) minutes***

Humidity

	Mated	***Unmated***
Sample #	**Insulation Resistance**	**Insulation Resistance**
1	100000	100000
2	100000	100000

INSULATION RESISTANCE (IR) -02 Stack Height:

Test Date:	4/10/2003
Operator:	Troy Cook
Temperature (C):	23
Humidity (RH):	32%
Pressure (In. Hg):	29.35
Equipment ID:	HPM-01
Used In:	BSS/BTS - 02

Electrification Time ***Two (2) minutes***

Initial

	Mated	***Unmated***
Sample #	**Insulation Resistance**	**Insulation Resistance**
1	10000	25000
2	10000	15000

Tracking Code: TC0313--0164	Part #: BTS-050-(01,02)-L-D-A
Part description: BTS/BSS-050	

DATA Continued

INSULATION RESISTANCE (IR) -02 Stack Height:

Test Date:	4/22/2003
Operator:	Troy Cook
Temperature (C):	22
Humidity (RH):	41%
Pressure (In. Hg):	29.35
Equipment ID:	HPM-01
Used In:	BSS/BTS - 02

Electrification Time ***Two (2) minutes***

Thermal

	Mated	***Unmated***
Sample #	**Insulation Resistance**	**Insulation Resistance**
1	100000	100000
2	100000	100000

Test Date:	5/15/2003
Operator:	Troy Cook
Temperature (C):	22
Humidity (RH):	44%
Pressure (In. Hg):	29.21
Equipment ID:	HPM-01
Used In:	BSS/BTS - 02

Electrification Time ***Two (2) minutes***

Humidity

	Mated	***Unmated***
Sample #	**Insulation Resistance**	**Insulation Resistance**
1	100000	100000
2	100000	100000

Tracking Code: TC0313--0164	Part #: BTS-050-(01,02)-L-D-A
Part description: BTS/BSS-050	

EQUIPMENT AND CALIBRATION SCHEDULES

Equipment #: THL-01
Description: Temperature/Humidity Chart Recorder
Manufacturer: Dickson
Model: THDX
Serial #: 9316255
Accuracy: Temp: +/- 1C; Humidity: +/-2% RH (0 - 60%) +/- 3% RH (61 - 95%).
… Last Cal: 7/15/02, Next Cal: 7/15/03

Equipment #: MO-02
Description: Multimeter /Data Acquisition System
Manufacturer: Keithley
Model: 2700
Serial #: 0780546
Accuracy: See Manual
… Last Cal6/25/02, Next Cal: 6/25/03

Equipment #: MO-04
Description: Multimeter /Data Acquisition System
Manufacturer: Keithley
Model: 2700
Serial #: 0798688
Accuracy: See Manual
… Last Cal: 6/25/02, Next Cal: 6/25/03

Equipment #: TC090601-103/105
Description: IC Thermocouple-103/105
Manufacturer: Samtec
Model:
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: 6/25/02, Next Cal: 6/25/03

Equipment #: PS-01
Description: System Power Supply
Manufacturer: Hewlett Packard
Model: HP 6033A
Serial #: (HP) 3329A-07330
Accuracy: See Manual 10/16/02- Had a fuse replaced and equipment was re-calibrated.
… Last Cal: 10/16/02, Next Cal: 10/31/03

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: 6/25/02, Next Cal: 6/25/03

Equipment #: THC-01
Description: Temperature/Humidity Chamber
Manufacturer: Thermotron
Model: SM-8-7800
Serial #: 30676
Accuracy: See Manual
… Last Cal: 5/13/02, Next Cal: 5/13/03