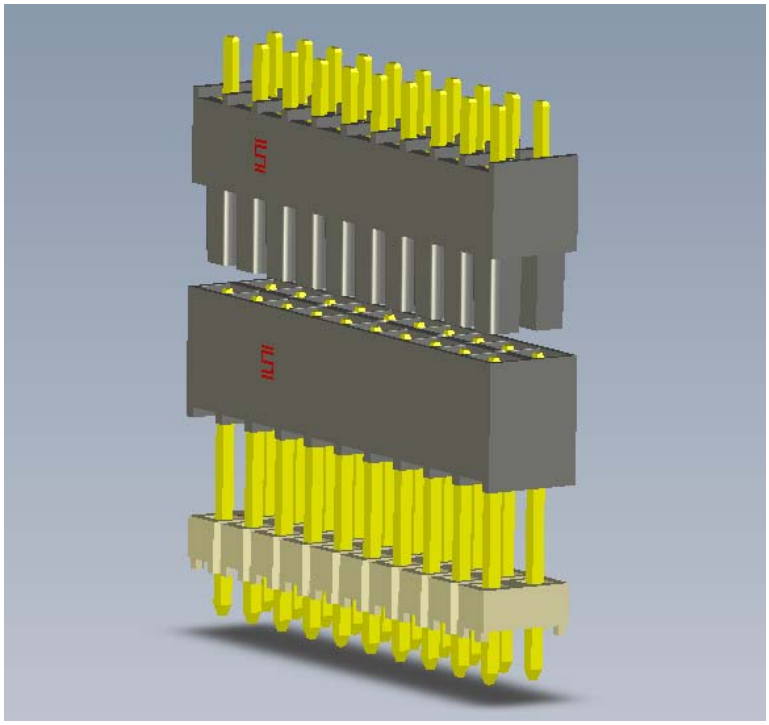
| | | | |
|---|---|---|---|
| Project Number: TC0820-1744 | Tracking Code: TC0820—1744 Report Rev 4 | | |
| Requested by: Bryon Saylor | Date: 10/6/2008 | Product Rev: M | |
| Part #: IPS1-125-01-S-D/IPT1-125-01-S-D | Lot #: 0 | Tech: Eric Fox | Eng: Troy Cook |
| Part description: IPX1 | | Qty to test: 20 | |
| Test Start: 5/14/2008 | Test Completed: 9/30/2008 | | |

# SAMTEC POWER CHARACTERIZATION



**PART DESCRIPTION**

**IPS1-125-01-S-D/IPT1-125-01-S-D**

## 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

1. Temperature Rise/Current Carrying Capacity
   - 1.1. To determine the amount of current the device under test (DUT) can safely carry over the operating temperature range of the DUT.
   - 1.2. Contact loading will also be addressed in this document which will determine how much current can be carried as the number of energized contacts is varied.

2. Current Cycling
   - 2.1. To determine the performance of the device under test (DUT) when subjected to the power-on/power-off cycling that heats and cools the DUT in normal everyday use.
   - 2.2. Contact loading will set to 100% throughout the test.

## APPLICABLE DOCUMENTS

Standards: EIA Publication 364-70 Temperature Rise
EIA Publication 364-06 Contact Resistance
EIA Publication 364-55 Current Cycling
TLPM-032 Current Carrying Capacity
TLPM-084 Current Cycling
IEC 512-3 Electromechanical Components for Electronic Equipment: Basic Testing Procedures and Measuring Methods, Part 3: Current Carrying Capacity Tests

## TEST SAMPLES AND PREPARATION

1) All materials shall be manufactured in accordance with the applicable product specification.
2) All test samples shall be identified and encoded to maintain traceability throughout the test sequences.
3) After soldering, the parts to be used shall be cleaned according to TLWI-0001.
4) All samples shall be visually inspected and cleaned as necessary.
5) Any additional preparation shall be noted in the individual test sequences.
6) Solder Information: Lead Free
7) Re-Flow Time/Temp: See accompanying profile.
8) All products designed to operate mounted on a printed circuits board shall be tested mounted to test boards in accordance with EIA-364-70.

PREPARED TEST SAMPLE

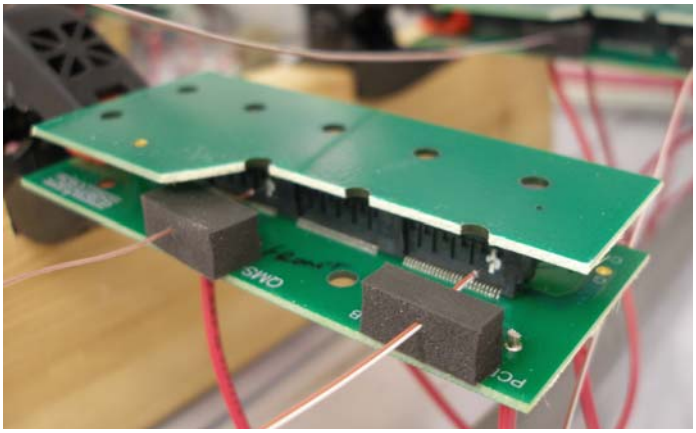


Figure 1: Example of Thermocouple placement, actual part not depicted.

9) The following loading configurations shall be tested for Temperature Rise/Current Carrying Capacity testing of two row connector systems:
   a. Two by One contact energized
   b. Two by Two contacts energized adjacent to each other
   c. Two by Three contacts energized adjacent to each other
   d. Two by Four contacts energized adjacent to each other
   e. All contacts energized

Test Condition as in 9-a above

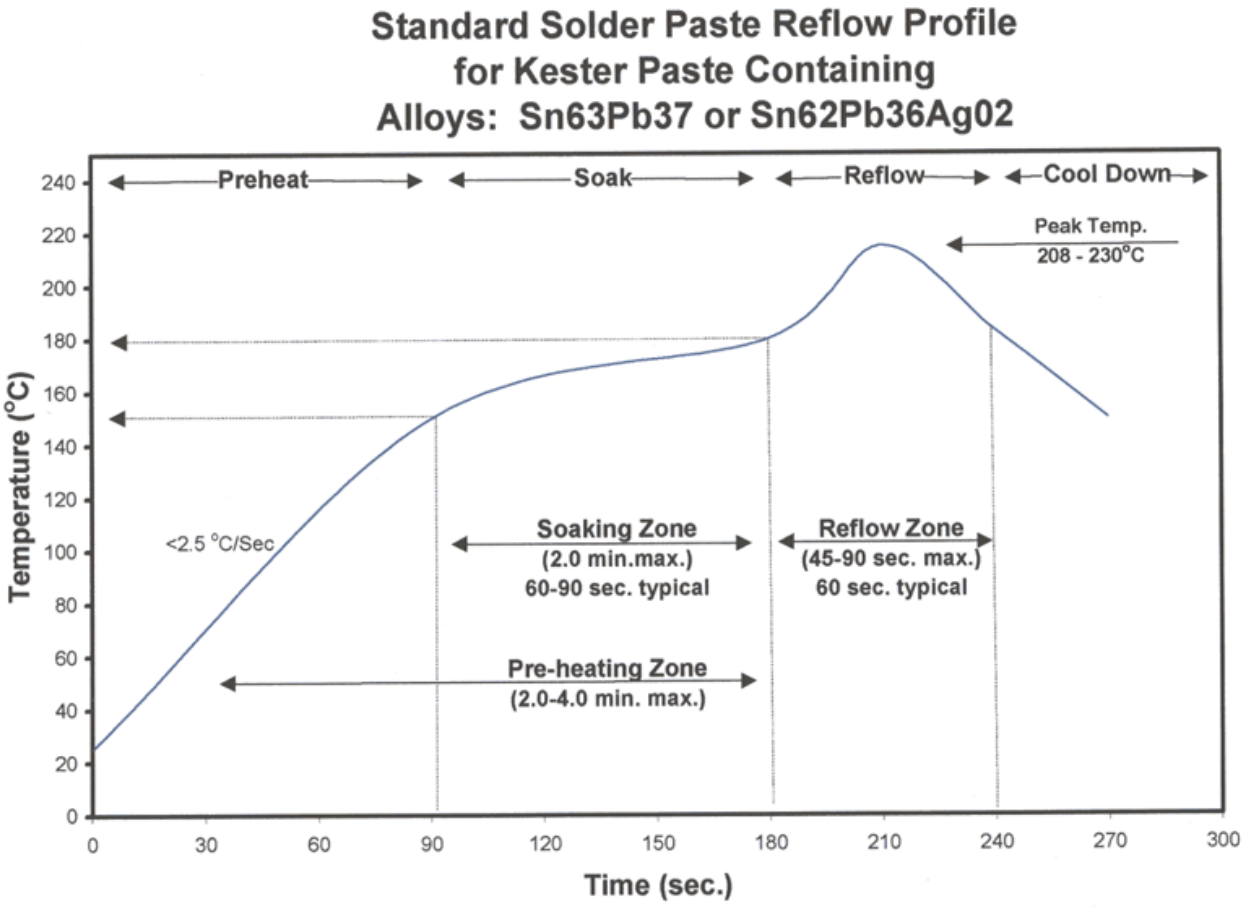
✧ Indicates energized contacts

✦ Indicates thermocouple monitored, energized contacts

| | | | |
|---|---|---|---|
| ✧ | | | |
| ✦ | | | |

10) For Current Cycling, only 100 % loading will be tested.

**OVEN PROFILE (Soldering Parts to Test Boards)**



## FLOWCHARTS

### Current Carrying Capacity

**3 Mated Assemblies Each**

| TEST STEP | GROUP A<br>3 Mated Assembies<br>2 CONTACTS POWERED | GROUP B<br>3 Mated Assembies<br>4 CONTACTS POWERED | GROUP C<br>3 Mated Assembies<br>6 CONTACTS POWERED | GROUP D<br>3 Mated Assembies<br>8 CONTACTS POWERED | GROUP E<br>3 Mated Assembies<br>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**

### Current Cycling

| TEST STEP | GROUP A<br>8 Mated Assembies<br>ALL CONTACTS POWERED |
|---|---|
| 01 | Current Cycle, 500 cycles at 125% of Rated current |

**Current Cycle = EIA 364-55, Condition "B", Method #4**
**Test at Current 125% of Rated Current**
**Measure at 30 minutes into 45 minute cycle**
**Measure Voltage Drop on 5 random contacts**

## TEST PROCEDURES

| | | | |
|---|---|---|---|
| **Part No.** | **IPS1-125-01-S-D** | **Mating Part No.** | **IPT1-125-01-S-D** |
| **Sample Size** | **15** | **Technician** | **Eric Fox** |
| **Start Date** | **7/14/2008** | **Complete Date** | **7/15/2008** |
| **Room Ambient** | **26.5°C** | **Relative Humidity** | **32%** |
| **Equipment ID#: MO-04, PS-07, TC111307-(001 - 017)** | | | |

### TEMPERATURE RISE (Current Carrying Capacity, CCC):

1) Thermocouples shall be calibrated in accordance with Samtec documents; TLWI 0003, Thermocouple Welding Procedure and TLWI 0005, Thermocouple Calibration
2) The thermocouples shall be placed at a location to sense the maximum temperature generated during testing.
3) Temperature stability shall be defined as the temperature at which three successive readings, 5 minutes apart, differ not more than 1° C (computer controlled data acquisition). This is the Temperature Rise that the Current Carrying Capacity and De-rating curves are based on.
4) The following loading configurations shall be tested (double for two row systems):
   a. One contact energized only
   b. Two contacts energized adjacent to each other
   c. Three contacts energized adjacent to each other
   d. Four contacts energized adjacent to each other
   e. All contacts energized
5) The following loading configurations shall be tested for Temperature Rise/Current Carrying Capacity testing of two row connector systems:
   a. Two by One contact energized
   b. Two by Two contacts energized adjacent to each other
   c. Two by Three contacts energized adjacent to each other
   d. Two by Four contacts energized adjacent to each other
   e. All contacts energized
6) Three samples shall be tested for each of the above configurations for a total of eighteen assemblies.
7) Temperature Rise measurements shall be made at 5 different current levels yielding temperature rises in the 10 to 70°C range.
8) The base curve for the Current Rating chart will be derived from the average (maximum) value of three test specimens in accordance with IEC 512-3, Test 5b.

| Part No. | IPS1-125-01-S-D | Mating Part No. | IPT1-125-01-S-D |
|---|---|---|---|
| Sample Size | 8 | Technician | Eric Fox |
| Start Date | 9/9/2008 | Complete Date | 9/30/2008 |
| Room Ambient | 25.5°C | Relative Humidity | 36% |
| Equipment ID#: PS-01, MO-08, TC111307-(041 - 059) | | | |

## CURRENT CYCLING

1. Samples shall be prepared and tested as above (paragraph 14.5).
2. Current Cycling shall be performed in accordance with EIA-364-55, Test Condition
3. Testing shall be as follows:
    - 3.1. Test Current: 2.9(125% of 30°C Rating)
    - 3.2. "ON" Time: 45 Minutes
    - 3.3. "OFF" Time: 15 Minutes
    - 3.4. Number of Cycles: 500
    - 3.5. Measurements: 40 minutes into ON cycle
        - 3.5.1. Temperature
        - 3.5.2. Voltage Drop/Contact Resistance
4. Temperature vs. Number of Cycles and Voltage Drop vs. Number of Cycles shall be measured and recorded.

## TEST RESULTS

### CURRENT CARRYING CAPACITY (CCC) RESULTS

- **There was no evidence of physical damage to the test samples as tested.**
- **The following is a summary of the observed data:**

**Temperature Rise, CCC at a 20% de-rating**

- **CCC for a 30°C Temperature Rise ----------5.9A per contact with 2 contacts (2 x 1) powered**
- **CCC for a 30°C Temperature Rise ----------4.8A per contact with 4 contacts (2 x 2) powered**
- **CCC for a 30°C Temperature Rise ----------4.1A per contact with 6 contacts (2 x 3) powered**
- **CCC for a 30°C Temperature Rise ----------3.6A per contact with 8 contacts (2 x 4) powered**
- **CCC for a 30°C Temperature Rise ----------2.3A per contact with 50 contacts (2 x 25) powered**

### CURRENT CYCLING RESULTS

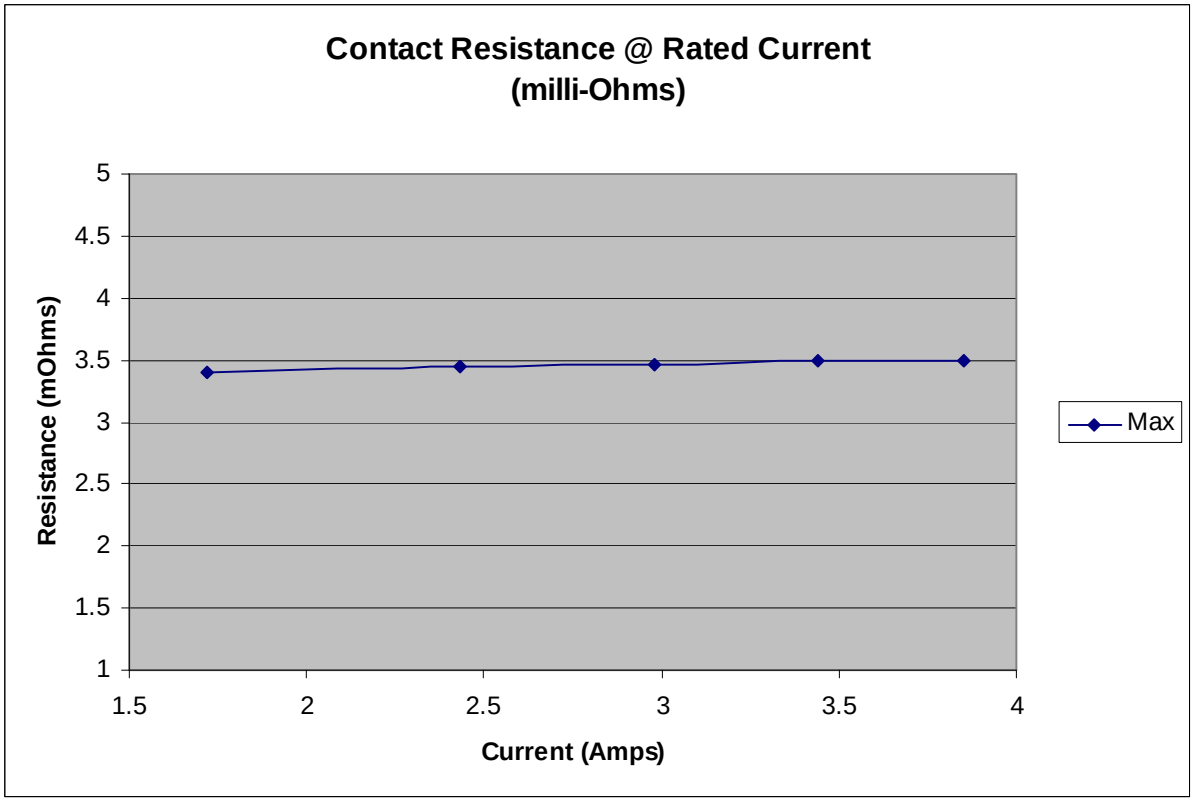
**Test Condition: 500 Cycles, 45 minutes ON and 15 minutes OFF**

- **Test Current ---------- 2.9Amps**
- **Contact Resistances, Measured 40 minutes into the FIRST and LAST ON cycle**
  - **Initial**
    - **Min ---------- 3.0 mOhms**
    - **Max---------- 3.4 mOhms**
  - **Final**
    - **Min ---------- 3.1 mOhms**
    - **Max---------- 3.5 mOhms**
- **Temperature Change, Measured 40 minutes into the FIRST and LAST ON cycle**
  - **Initial Temperature Change ----------30.3°C**
  - **Final Temperature Change ----------30.0°C**

## TEST DATA

### CONTACT RESISTANCE @ RATED CURRENT

The following data represents the Voltage drop and Contact Resistance at Rated Current for the 100% energized samples:

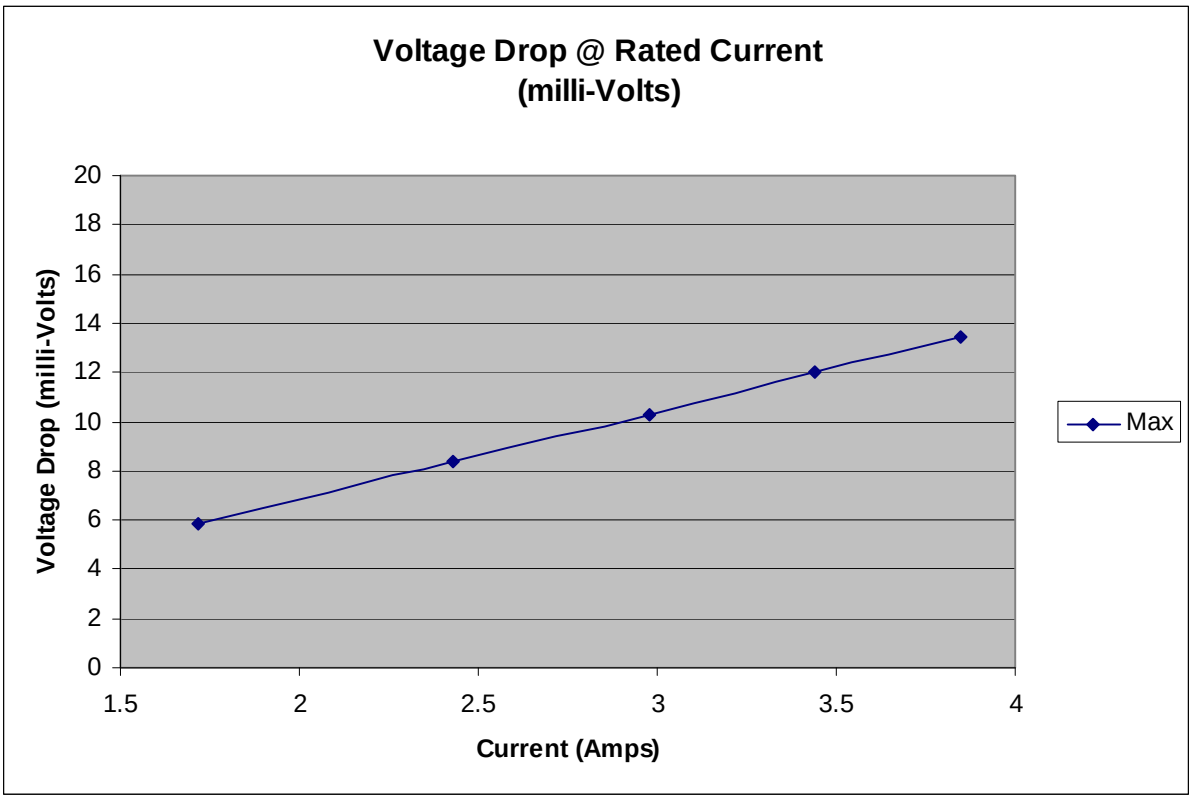



| CONTACT RESISTANCE DATA<br>ALL CONTACTS ENERGIZED<br>(mΩ) | | | | | |
|---|---|---|---|---|---|
| TEST CURRENT AMPS | 1.72 | 2.43 | 2.98 | 3.44 | 3.85 |
| Min | 3 | 3.04 | 3.05 | 3.09 | 3.09 |
| Max | 3.4 | 3.45 | 3.46 | 3.5 | 3.49 |
| Avg | 3.23 | 3.27 | 3.28 | 3.32 | 3.32 |

## TEST DATA

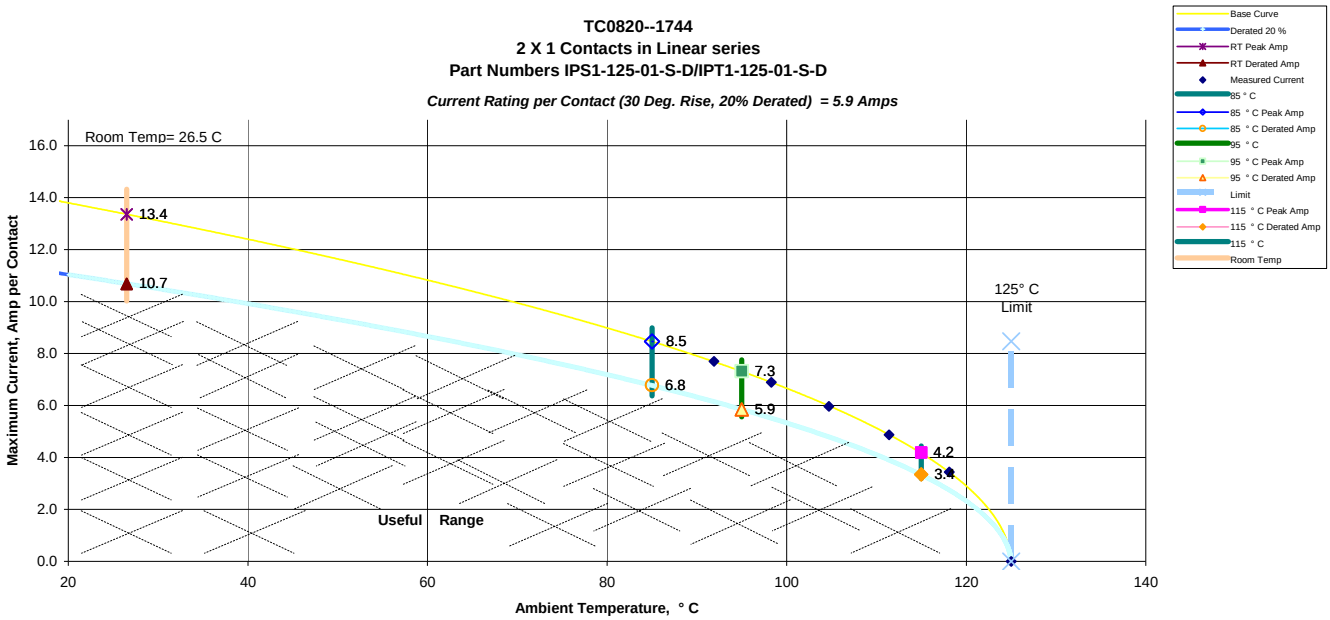
### VOLTAGE DROP @ RATED CURRENT

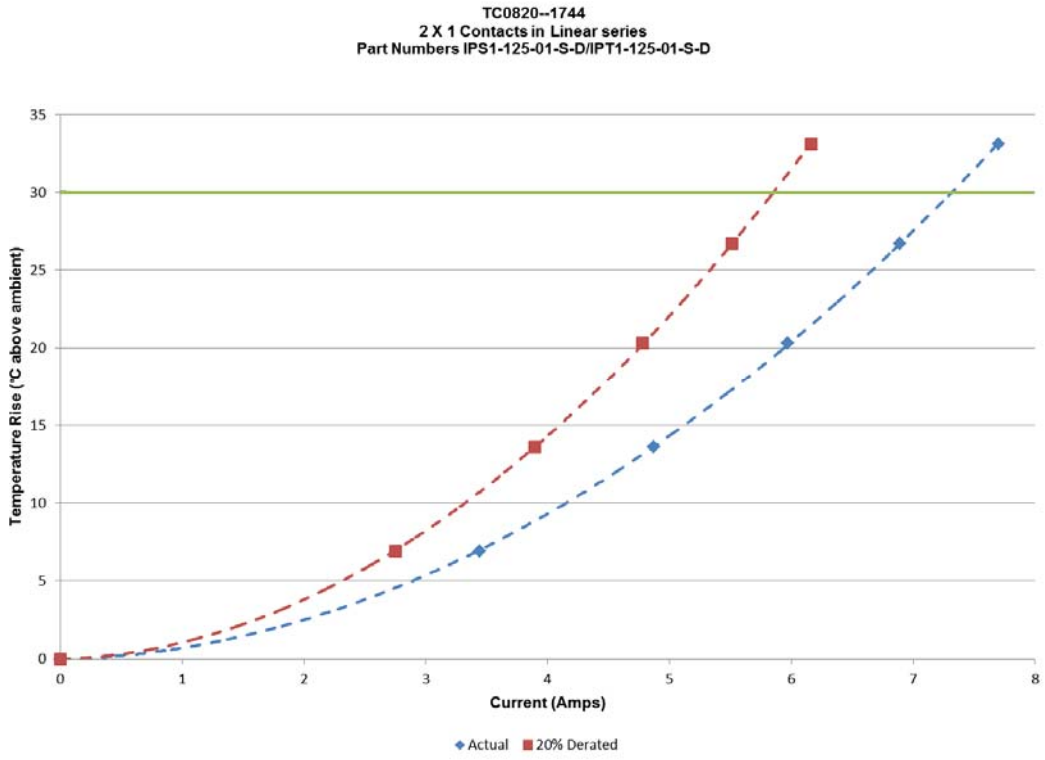
The following data represents the Voltage drop at Rated Current for the 100% energized samples:




| VOLTAGE DROP DATA<br>ALL CONTACTS ENERGIZED<br>(mV) | | | | | |
|---|---|---|---|---|---|
| TEST CURRENT AMPS | 1.72 | 2.43 | 2.98 | 3.44 | 3.85 |
| Min | 5.16 | 7.38 | 9.08 | 10.62 | 11.89 |
| Max | 5.85 | 8.38 | 10.31 | 12.03 | 13.45 |
| Avg | 5.55 | 7.93 | 9.76 | 11.39 | 12.75 |

## CURRENT CARRYING CAPACITY DATA

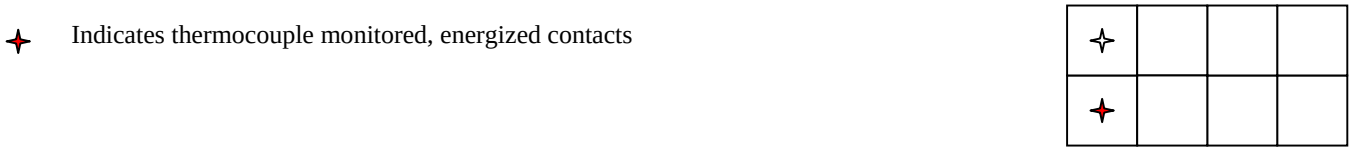


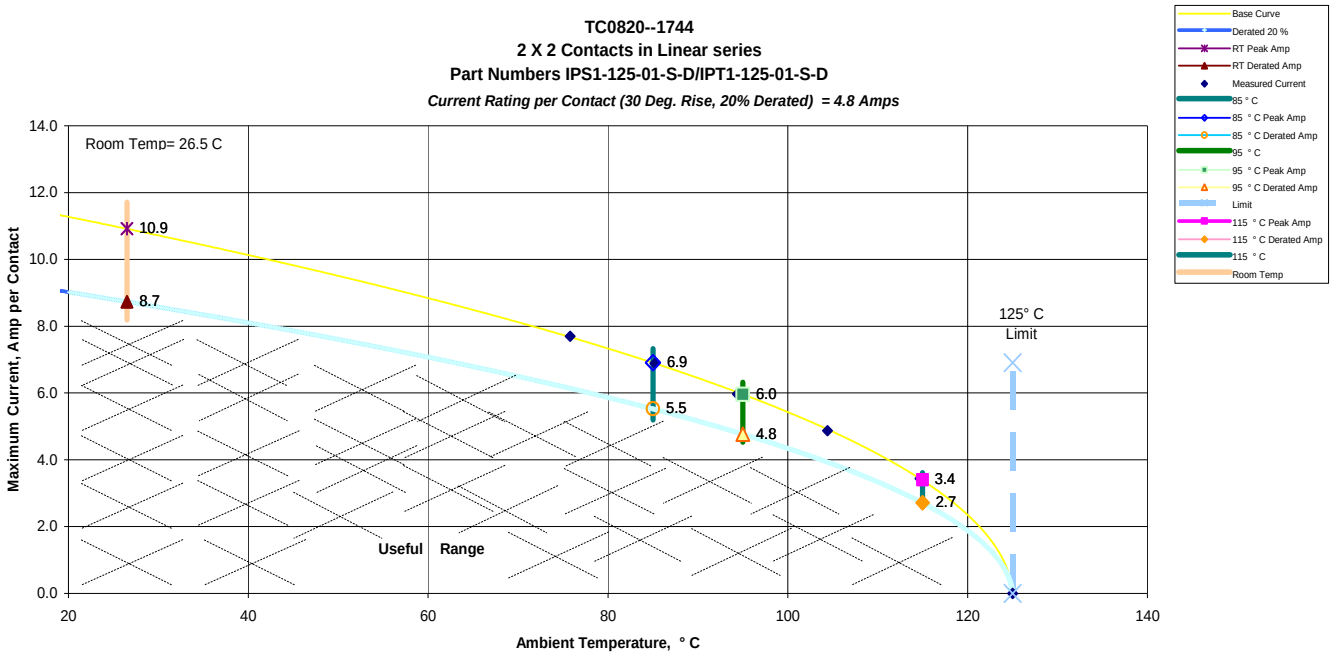



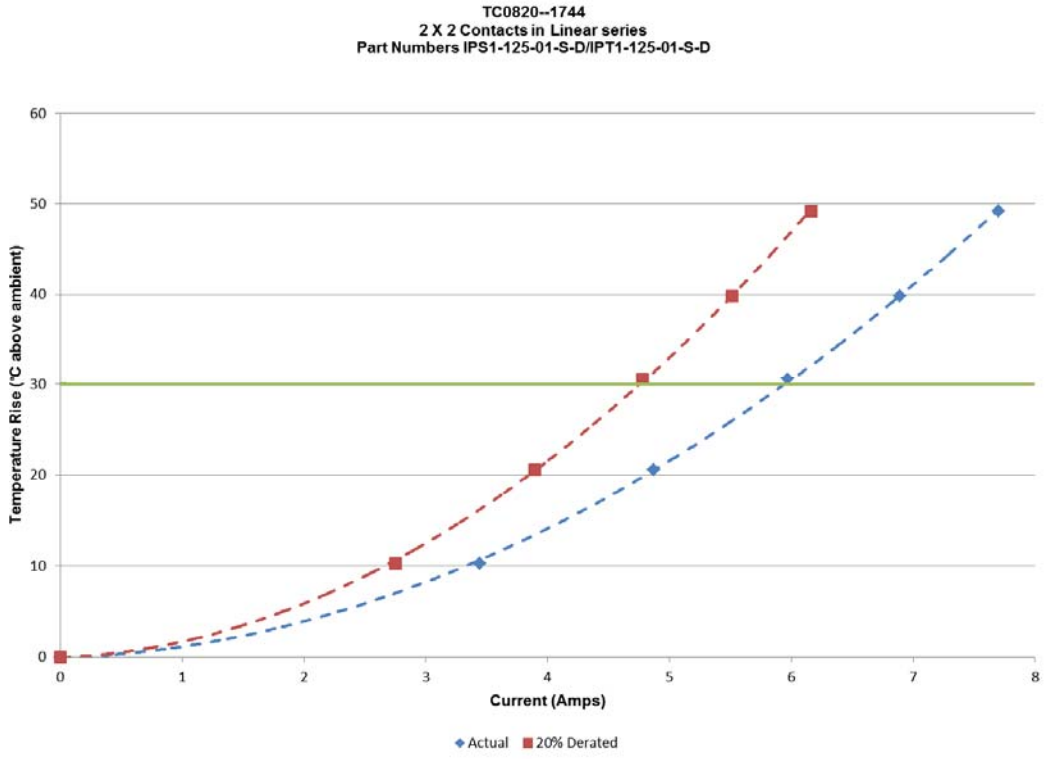
## TEMPERATURE RISE DATA
### TWO CONTACT ENERGIZED
### (Degrees Celsius above ambient)

| TEST CURRENT AMPS | 3.44 | 4.87 | 5.97 | 6.89 | 7.7 |
|---|---|---|---|---|---|
| **Sample 1** | 6.6 | 12.7 | 19.1 | 24.8 | 30.5 |
| **Sample 2** | 7.2 | 14.4 | 21.7 | 28.5 | 34.9 |
| **Sample 3** | 6.8 | 13.7 | 20.2 | 26.7 | 33.8 |
| | | | | | |
| **Min** | 6.6 | 12.7 | 19.1 | 24.8 | 30.5 |
| **Max** | 7.2 | 14.4 | 21.7 | 28.5 | 34.9 |
| **Avg** | 6.87 | 13.6 | 20.33 | 26.67 | 33.07 |

Double Row Configuration



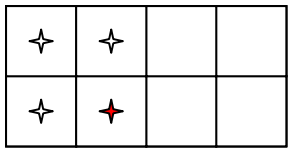

TC0820--1744
2 X 2 Contacts in Linear series
Part Numbers IPS1-125-01-S-D/IPT1-125-01-S-D
Current Rating per Contact (30 Deg. Rise, 20% Derated) = 4.8 Amps
Room Temp= 26.5 C
10.9
8.7
6.9
5.5
6.0
4.8
3.4
2.7
125° C
Limit
Useful Range
Maximum Current, Amp per Contact
Ambient Temperature, ° C
Base Curve
Derated 20 %
RT Peak Amp
RT Derated Amp
Measured Current
85 ° C
85 ° C Peak Amp
85 ° C Derated Amp
95 ° C
95 ° C Peak Amp
95 ° C Derated Amp
Limit
115 ° C Peak Amp
115 ° C Derated Amp
115 ° C
Room Temp

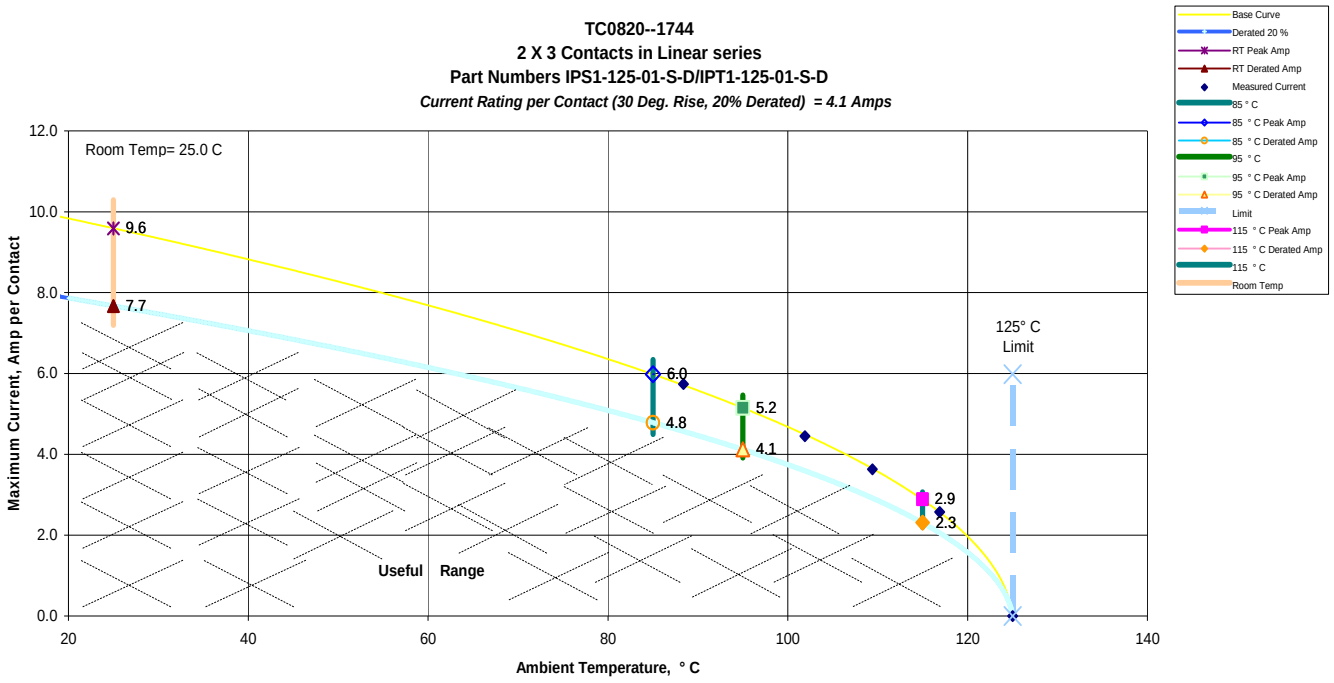

TC0820--1744
2 X 2 Contacts in Linear series
Part Numbers IPS1-125-01-S-D/IPT1-125-01-S-D
Temperature Rise (°C above ambient)
Current (Amps)
Actual
20% Derated

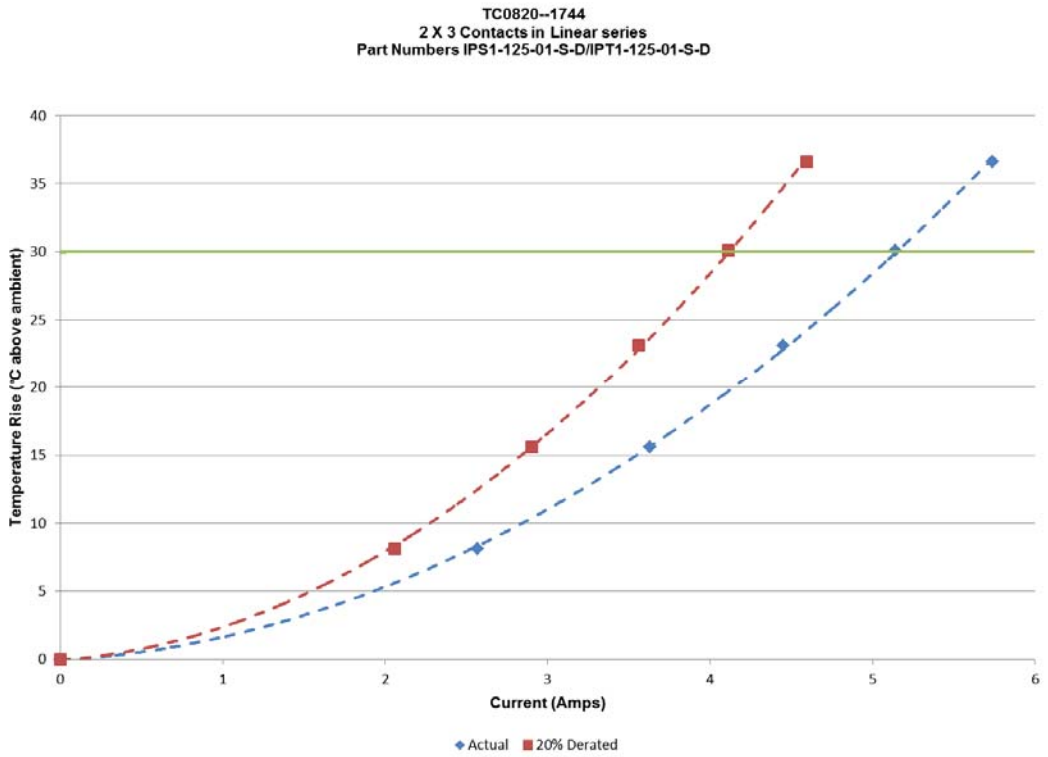
| TEMPERATURE RISE DATA<br>FOUR CONTACTS ENERGIZED<br>(Degrees Celsius above ambient) | | | | | |
|---|---|---|---|---|---|
| TEST CURRENT AMPS | **3.44** | **4.87** | **5.97** | **6.89** | **7.7** |
| **Sample 4** | 10.2 | 20.2 | 30.2 | 39.1 | 48.9 |
| **Sample 5** | 10.5 | 20.8 | 30.8 | 40 | 49.2 |
| **Sample 6** | 10.3 | 20.9 | 30.9 | 40.3 | 49.4 |
| | | | | | |
| **Min** | 10.2 | 20.2 | 30.2 | 39.1 | 48.9 |
| **Max** | 10.5 | 20.9 | 30.9 | 40.3 | 49.4 |
| **Avg** | 10.33 | 20.63 | 30.63 | 39.8 | 49.17 |

✧ Indicates energized contacts

✦ Indicates thermocouple monitored, energized contacts




TC0820--1744
2 X 3 Contacts in Linear series
Part Numbers IPS1-125-01-S-D/IPT1-125-01-S-D
Current Rating per Contact (30 Deg. Rise, 20% Derated) = 4.1 Amps
Room Temp= 25.0 C
9.6
7.7
6.0
4.8
5.2
4.1
2.9
2.3
125° C Limit
Useful Range
Maximum Current, Amp per Contact
Ambient Temperature, ° C
Base Curve
Derated 20 %
RT Peak Amp
RT Derated Amp
Measured Current
85 ° C
85 ° C Peak Amp
85 ° C Derated Amp
95 ° C
95 ° C Peak Amp
95 ° C Derated Amp
Limit
115 ° C Peak Amp
115 ° C Derated Amp
115 ° C
Room Temp

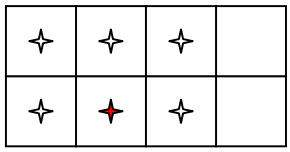

TC0820--1744
2 X 3 Contacts in Linear series
Part Numbers IPS1-125-01-S-D/IPT1-125-01-S-D
Temperature Rise (°C above ambient)
Current (Amps)
Actual
20% Derated

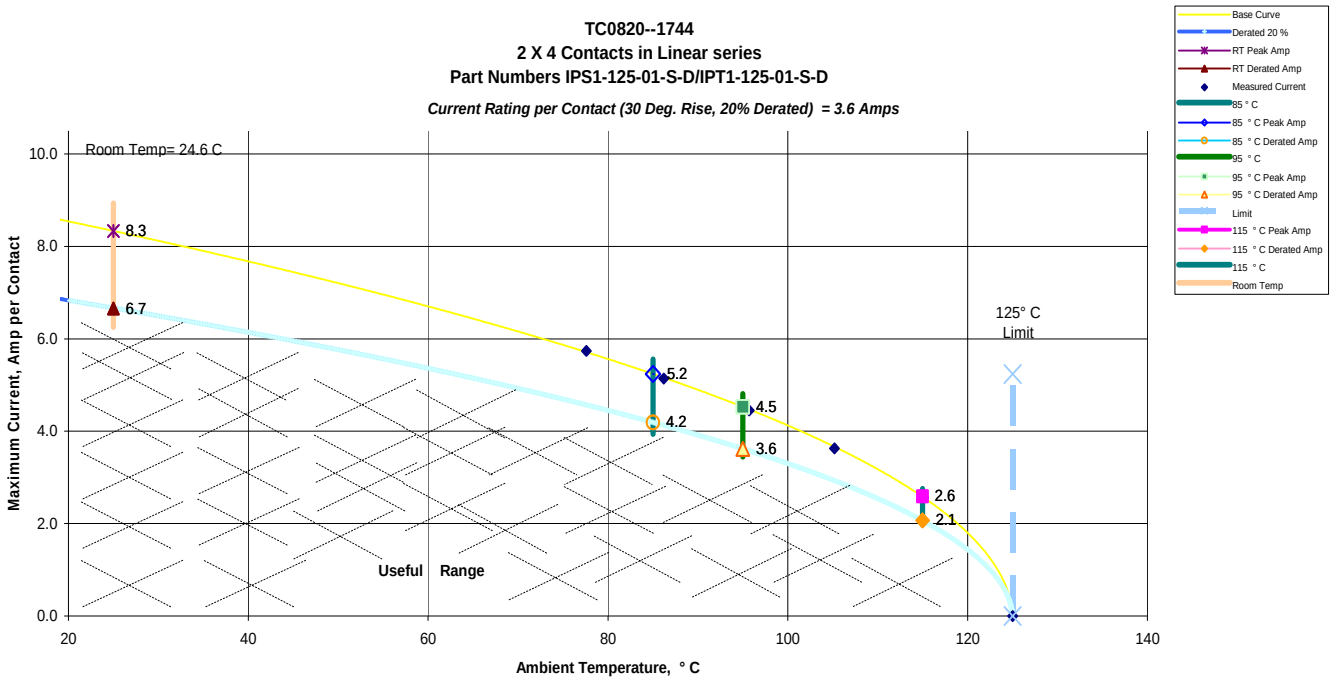
## TEMPERATURE RISE DATA
### SIX CONTACTS ENERGIZED
### (Degrees Celsius above ambient)

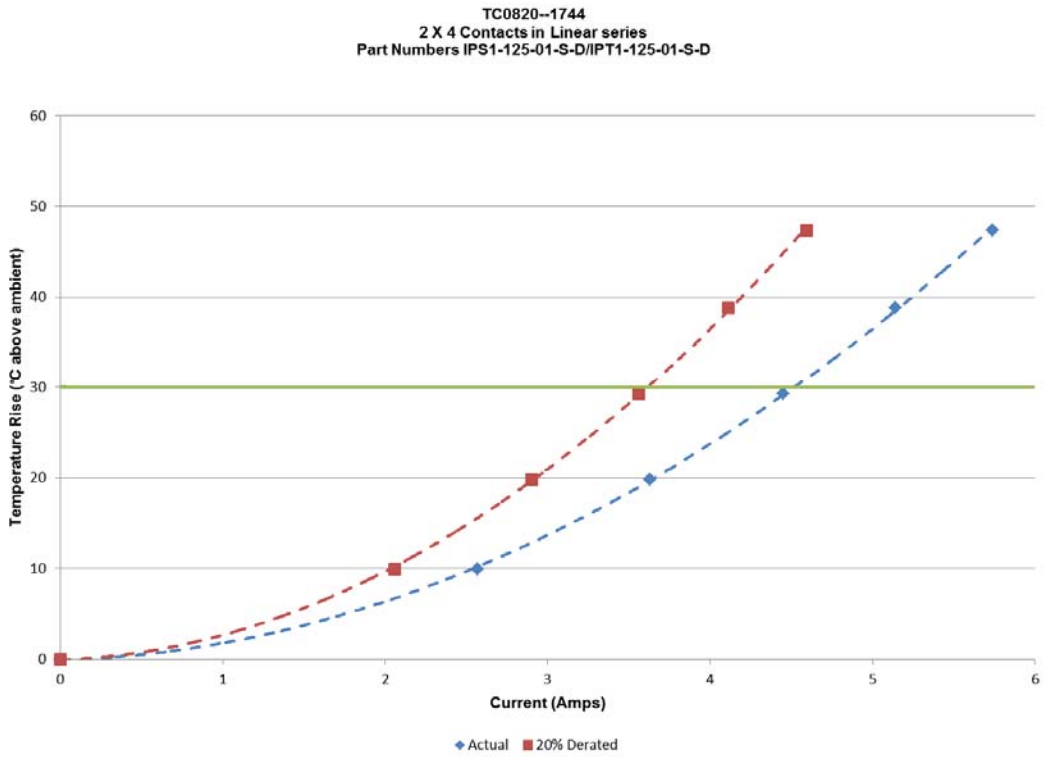
| TEST CURRENT AMPS | 2.57 | 3.63 | 4.45 | 5.14 | 5.74 |
|---|---|---|---|---|---|
| **Sample 7** | 8.3 | 16.1 | 23.4 | 30.7 | 37.4 |
| **Sample 8** | 8.1 | 15.2 | 22.4 | 28.6 | 34.6 |
| **Sample 9** | 8 | 15.6 | 23.6 | 31 | 37.9 |
| | | | | | |
| **Min** | 8 | 15.2 | 22.4 | 28.6 | 34.6 |
| **Max** | 8.3 | 16.1 | 23.6 | 31 | 37.9 |
| **Avg** | 8.13 | 15.63 | 23.13 | 30.1 | 36.63 |

✧ Indicates energized contacts

✦ Indicates thermocouple monitored, energized contacts




TC0820--1744
2 X 4 Contacts in Linear series
Part Numbers IPS1-125-01-S-D/IPT1-125-01-S-D
Current Rating per Contact (30 Deg. Rise, 20% Derated) = 3.6 Amps
Room Temp= 24.6 C
8.3
6.7
5.2
4.2
4.5
3.6
2.6
2.1
125° C
Limit
Useful Range
Maximum Current, Amp per Contact
Ambient Temperature, ° C
Base Curve
Derated 20 %
RT Peak Amp
RT Derated Amp
Measured Current
85 ° C
85 ° C Peak Amp
85 ° C Derated Amp
95 ° C
95 ° C Peak Amp
95 ° C Derated Amp
Limit
115 ° C Peak Amp
115 ° C Derated Amp
115 ° C
Room Temp

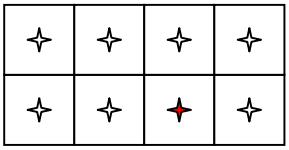

TC0820--1744
2 X 4 Contacts in Linear series
Part Numbers IPS1-125-01-S-D/IPT1-125-01-S-D
Temperature Rise (°C above ambient)
Current (Amps)
Actual
20% Derated

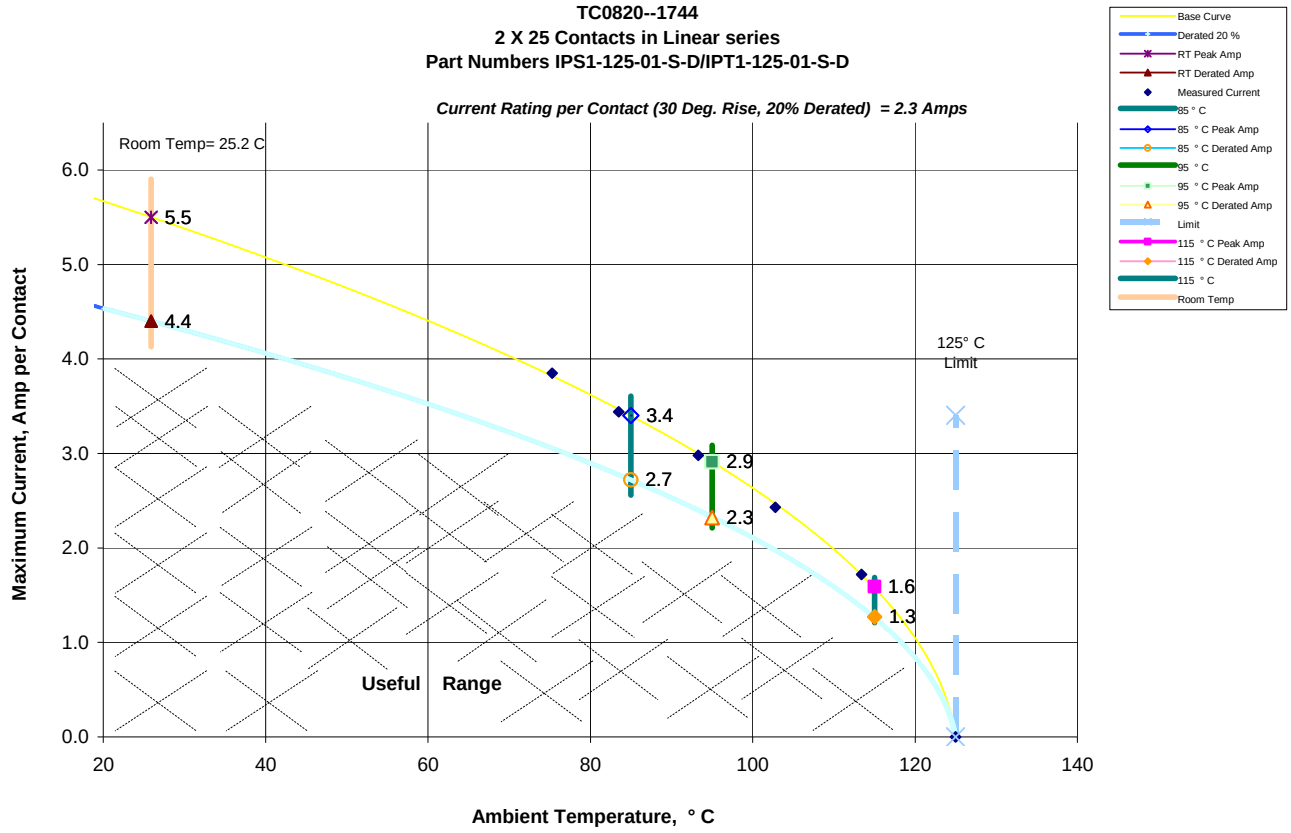
## TEMPERATURE RISE DATA
### EIGHT CONTACTS ENERGIZED
### (Degrees Celsius above ambient)

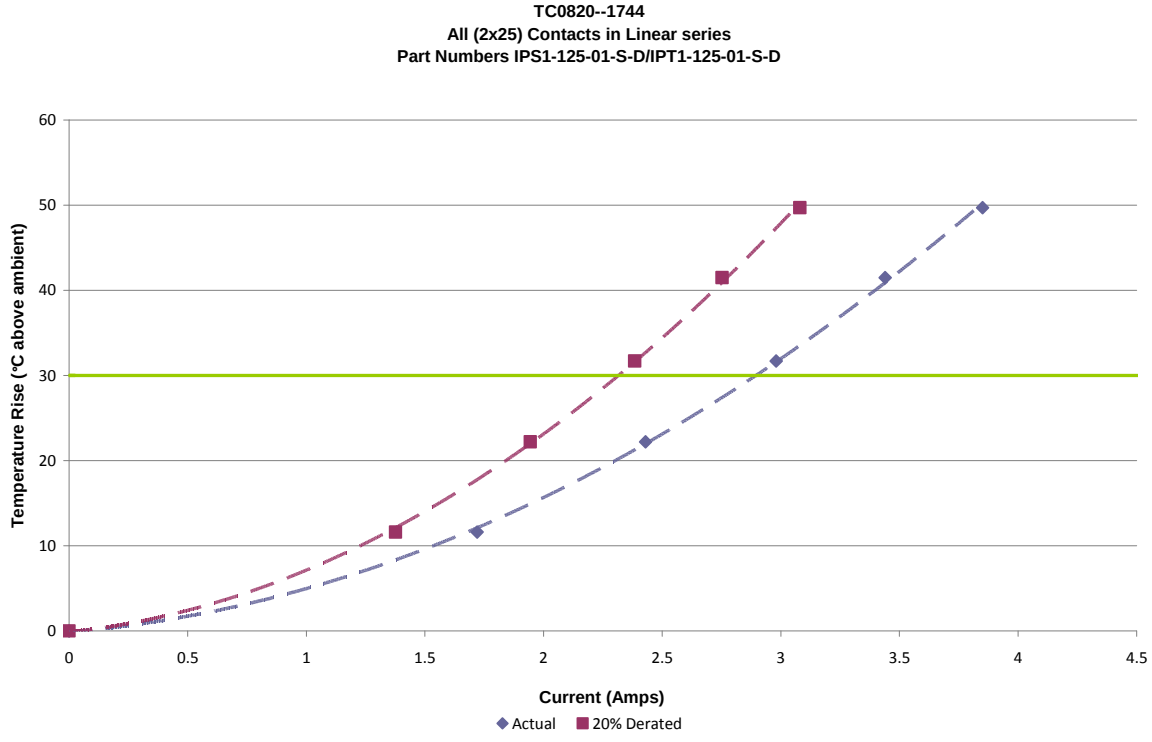
| TEST CURRENT AMPS | 2.57 | 3.63 | 4.45 | 5.14 | 5.74 |
|---|---|---|---|---|---|
| **Sample 10** | 9.9 | 19.8 | 29.4 | 38.7 | 47.7 |
| **Sample 11** | 9.6 | 19.1 | 28.1 | 37.4 | 45.7 |
| **Sample 12** | 10.2 | 20.5 | 30.5 | 40.2 | 48.9 |
| | | | | | |
| **Min** | 9.6 | 19.1 | 28.1 | 37.4 | 45.7 |
| **Max** | 10.2 | 20.5 | 30.5 | 40.2 | 48.9 |
| **Avg** | 9.9 | 19.8 | 29.33 | 38.77 | 47.43 |

✧ Indicates energized contacts

✦ Indicates thermocouple monitored, energized contacts



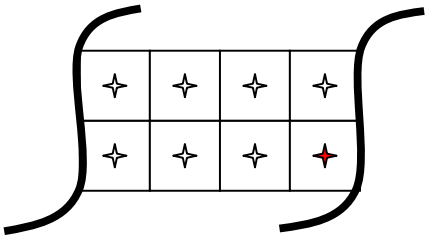

TC0820--1744
2 X 25 Contacts in Linear series
Part Numbers IPS1-125-01-S-D/IPT1-125-01-S-D
Current Rating per Contact (30 Deg. Rise, 20% Derated) = 2.3 Amps
Room Temp= 25.2 C
5.5
4.4
3.4
2.7
2.9
2.3
1.6
1.3
125° C Limit
Useful Range
Maximum Current, Amp per Contact
Ambient Temperature, ° C
Base Curve
Derated 20 %
RT Peak Amp
RT Derated Amp
Measured Current
85 ° C
85 ° C Peak Amp
85 ° C Derated Amp
95 ° C
95 ° C Peak Amp
95 ° C Derated Amp
Limit
115 ° C Peak Amp
115 ° C Derated Amp
115 ° C
Room Temp

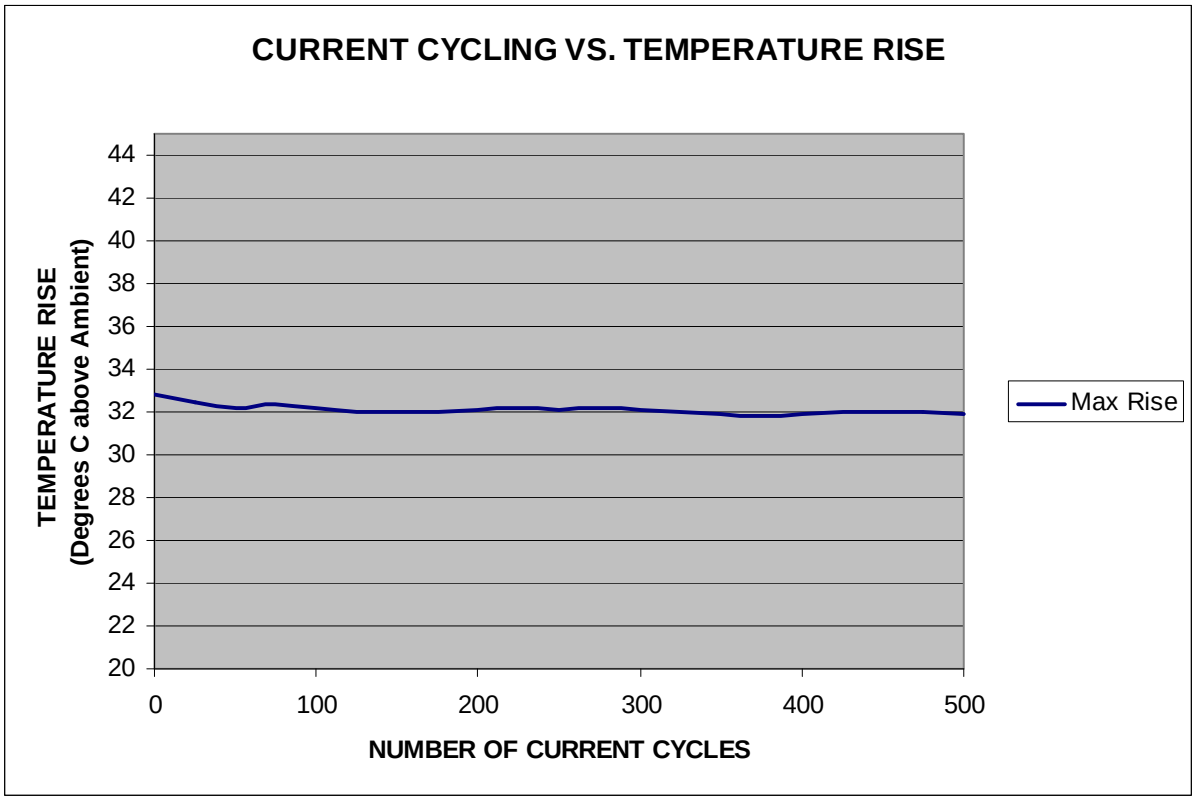

TC0820--1744
All (2x25) Contacts in Linear series
Part Numbers IPS1-125-01-S-D/IPT1-125-01-S-D
Temperature Rise (°C above ambient)
Current (Amps)
Actual
20% Derated

| TEMPERATURE RISE DATA<br>ALL CONTACTS ENERGIZED<br>(Degrees Celsius above ambient) | | | | | |
|---|---|---|---|---|---|
| TEST CURRENT AMPS | 1.72 | 2.43 | 2.98 | 3.44 | 3.85 |
| Sample 13 | 11.3 | 22.1 | 31.7 | 41.6 | 49.4 |
| Sample 14 | 11.7 | 22.3 | 31.8 | 41.7 | 49.9 |
| Sample 15 | 11.9 | 22.3 | 31.7 | 41.3 | 49.7 |
| | | | | | |
| Min | 11.3 | 22.1 | 31.7 | 41.3 | 49.4 |
| Max | 11.9 | 22.3 | 31.8 | 41.7 | 49.9 |
| Avg | 11.63 | 22.23 | 31.73 | 41.53 | 49.67 |

Indicates energized contacts

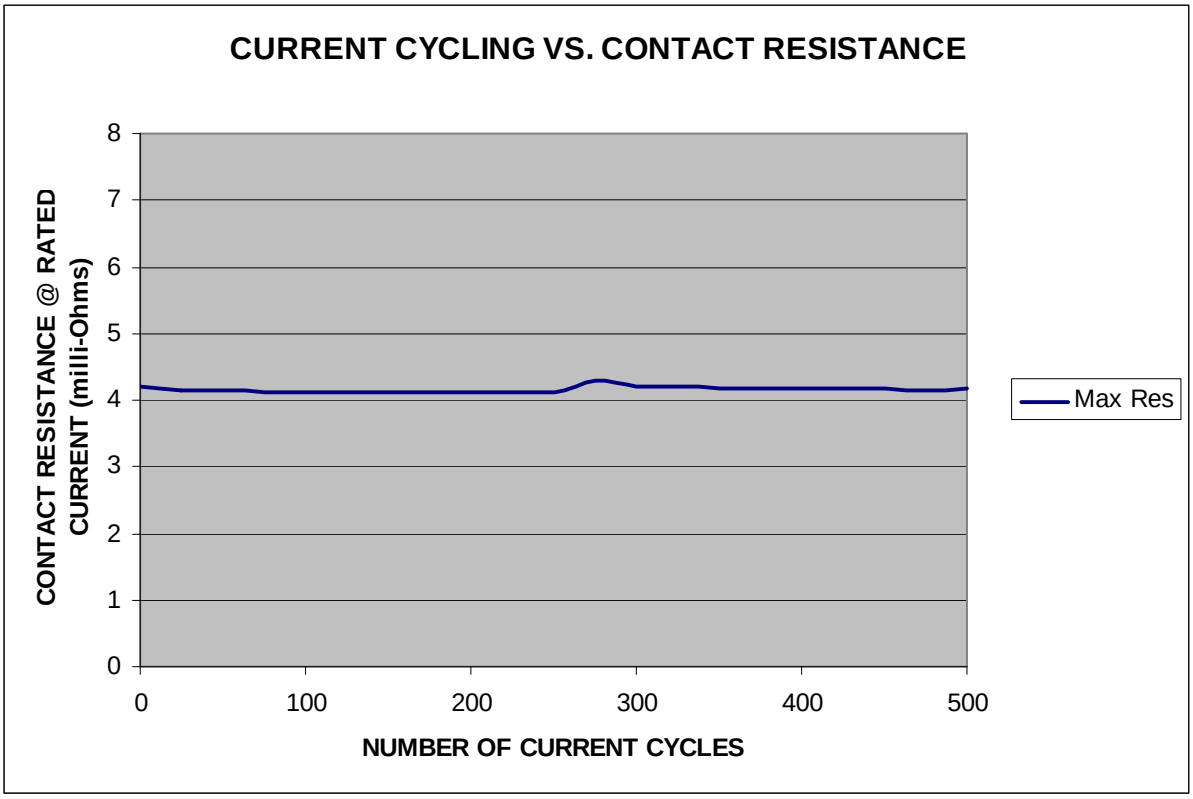
Indicates thermocouple monitored, energized contacts



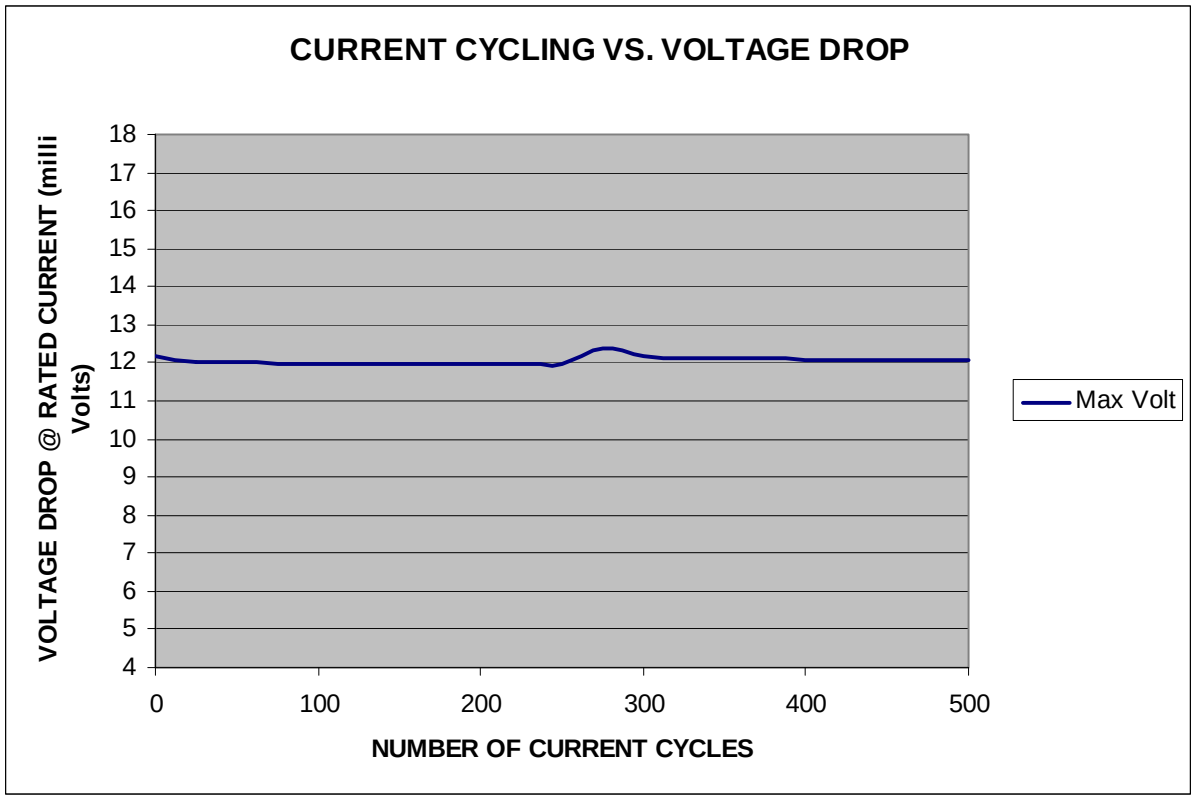



**TEMPERATURE RISE DATA**
**ALL CONTACTS ENERGIZED**
**(Degrees Celsius above ambient)**

| | INITIAL | 50 CYCLES | 100 CYCLES | 200 CYCLES | 500 CYCLES |
|---|---|---|---|---|---|
| **Min** | 27 | 29.1 | 28.9 | 28.5 | 28.6 |
| **Max** | 32.8 | 32.2 | 32.2 | 32.1 | 31.9 |
| **Avg** | 30.3 | 30.3 | 30.2 | 30 | 30 |




| CONTACT RESISTANCE DATA<br>ALL CONTACTS ENERGIZED<br>(mΩ) | | | | | |
|---|---|---|---|---|---|
| | INITIAL | 50 CYCLES | 100 CYCLES | 200 CYCLES | 500 CYCLES |
| **Min** | 2.96 | 2.91 | 2.9 | 2.89 | 2.88 |
| **Max** | 4.19 | 4.14 | 4.13 | 4.13 | 4.17 |
| **Avg** | 3.52 | 3.45 | 3.44 | 3.42 | 3.42 |




**VOLTAGE DROP DATA**
**ALL CONTACTS ENERGIZED**
**(MV)**

| | INITIAL | 50 CYCLES | 100 CYCLES | 200 CYCLES | 500 CYCLES |
|---|---|---|---|---|---|
| **Min** | 8.58 | 8.44 | 8.41 | 8.38 | 8.35 |
| **Max** | 12.15 | 12.02 | 11.99 | 11.97 | 12.08 |
| **Avg** | 10.2 | 10 | 9.97 | 9.93 | 9.91 |

## EQUIPMENT AND CALIBRATION SCHEDULES

**Equipment #:** PS-01
**Description:** System Power Supply
**Manufacturer:** Hewlett Packard
**Model:** HP 6033A
**Serial #:** (HP) 3329A-07330
**Accuracy:** See Manual
… Last Cal: 06/22/07, Next Cal: 06/22/08

**Equipment #:** PS-02
**Description:** System Power Supply, 0 - 20V/ 0 - 30 amp, 200 Watts
**Manufacturer:** Hewlett Packard
**Model:** 6033A
**Serial #:** (HP) 2847A-04167
**Accuracy:** See Manual
… Last Cal: 03/08/2007, Next Cal: 03/08/2008

**Equipment #:** PS-03
**Description:** Power Supply, 50 amp
**Manufacturer:** HP/Agilent
**Model:** 0-60V / 0 - 50 amps / 1000 Watts
**Serial #:** 2723A-02144
**Accuracy:** See Manual
… Last Cal: 06/22/2007, Next Cal: 06/22/08

**Equipment #:** PS-04
**Description:** 60 V, 50 A DC Power Supply - AutoRanging SO
**Manufacturer:** Hewlett Packard / Agilent
**Model:** AT-6032A
**Serial #:** MY41001186
**Accuracy:** See Manual Current Cycle Chamber 2 - Lower Shelf
… Last Cal: 12/04/2007, Next Cal: 12/04/2008

**Equipment #:** PS-05
**Description:** 60 V, 50 A DC Power Supply - AutoRanging SO
**Manufacturer:** Hewlett Packard / Agilent
**Model:** AT-6032A
**Serial #:** MY41001158
**Accuracy:** See Manual Current Cycle Chamber 2 - Lower Shelf
… Last Cal: 12/04/2007, Next Cal: 12/04/2008

**Equipment #:** PS-06
**Description:** 60 V, 50 A DC Power Supply - AutoRanging SO
**Manufacturer:** Hewlett Packard / Agilent
**Model:** AT-6032A
**Serial #:** US35420827
**Accuracy:** See Manual Current Cycle Chamber 3 (This chamber only has 1 shelf)
… Last Cal: 10/25/2007, Next Cal: 10/25/2008

**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 See Manual
… Last Cal: 10/25/2007, Next Cal: 10/25/2008

**Equipment #:** MO-02
**Description:** Multimeter /Data Acquisition System
**Manufacturer:** Keithley
**Model:** 2700
**Serial #:** 0780546
**Accuracy:** See Manual
… Last Cal: 06/22/07, Next Cal: 06/22/08

**Equipment #:** PS-04
**Description:** 60 V, 50 A DC Power Supply - AutoRanging SO
**Manufacturer:** Hewlett Packard / Agilent
**Model:** AT-6032A
**Serial #:** MY41001186
**Accuracy:** See Manual Current Cycle Chamber 2 - Lower Shelf
… Last Cal: 12/04/2007, Next Cal: 12/04/2008

**Equipment #:** MO-08
**Description:** Model 2750 Multimeter/Switch System (Integra Series)
**Manufacturer:** Keithley
**Model:** 2750
**Serial #:** WDC-875194
**Accuracy:** See Manual
… Last Cal: 10/25/2007, Next Cal: 10/27/2008

**Equipment #:** MO-09
**Description:** Model 2750 Multimeter/Switch System (Integra Series)
**Manufacturer:** Keithley
**Model:** 2750
**Serial #:** WDC-874817
**Accuracy:** See Manual
… Last Cal: 10/22/2007, Next Cal: 10/22/2008

**Equipment #:** TC111307-(001 - 017)

**Description:** CCC Chamber Thermocouples
**Manufacturer:** Samtec
**Model:**
**Serial #:** TC111307-(001 - 017)
**Accuracy:** +/- 1 Deg.
… Last Cal: 11/03/2007, Next Cal: 11/03/2008

**Equipment #:** TC111307-(041 - 059)
**Description:** Current Cycling Chamber #1 Thermcouples
**Manufacturer:** Samtec
**Model:**
**Serial #:** TC111307-(041 - 059)
**Accuracy:** +/- 1 Deg.
… Last Cal: 11/03/2007, Next Cal: 11/03/2008

**Equipment #:** TC111307-(118 - 136)
**Description:** Current Cycling Chamber # 2 Thermcouples
**Manufacturer:** Samtec
**Model:**
**Serial #:** TC111307-(118 - 136)
**Accuracy:** +/- 1 Deg.
… Last Cal: 11/03/2007, Next Cal: 11/03/2008

**Equipment #:** TC120607-(101C - 109C), 110807-140
**Description:** Current Cycling Chamber # 3 Thermcouples
**Manufacturer:** Samtec
**Model:**
**Serial #:** TC120607-(101C - 109C), 110807-140
**Accuracy:** +/- 1 Deg.
… Last Cal: 12/06/2007 & 11/08/2007, Next Cal: 12/06/2008 & 11/08/2008