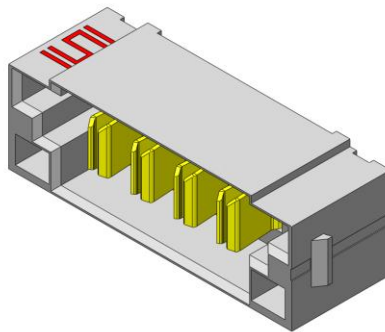
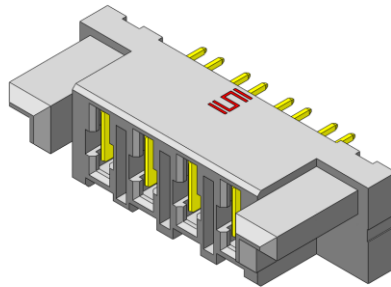




Project Number: TC0919—2456		Tracking Code: TC0919-PES/PET-2456 Power Report Rev 2		
Requested by: Mark Shireman		Date: 6/4/2013	Product Rev: N/A	
Part #: PES-08-01-T-VT/PET-08-01-V-T-LC		Lot #: 04/23/2009	Tech: Tony Wagoner	Eng: Mark Shireman
Part description: POWER STRIP				Qty to test: 60
Test Start: 05/16/2009	Test Completed: 6/16/2009			

SAMTEC POWER CHARACTERIZATION



PART DESCRIPTION

POWER TERMINAL & SOCKET

PES-08-01-T-VT/PET-08-01-T-VT-LC



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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

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.

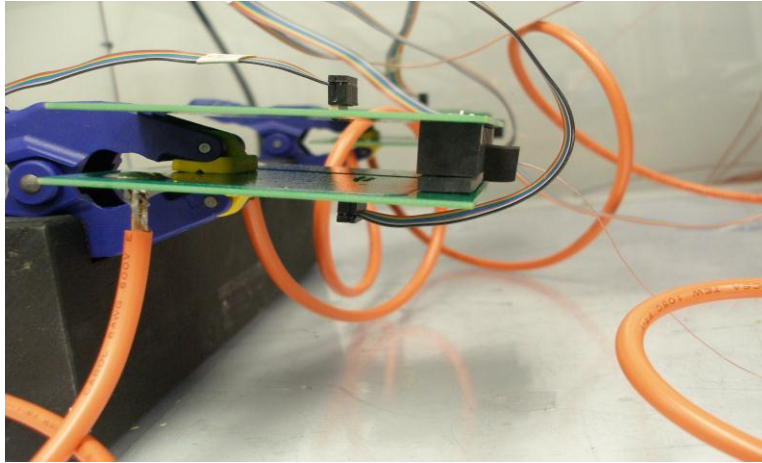
APPLICABLE DOCUMENTS

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



- 9) The following loading configurations shall be tested for Temperature Rise/Current Carrying Capacity testing of single row connector 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

✦ Indicates energized contacts

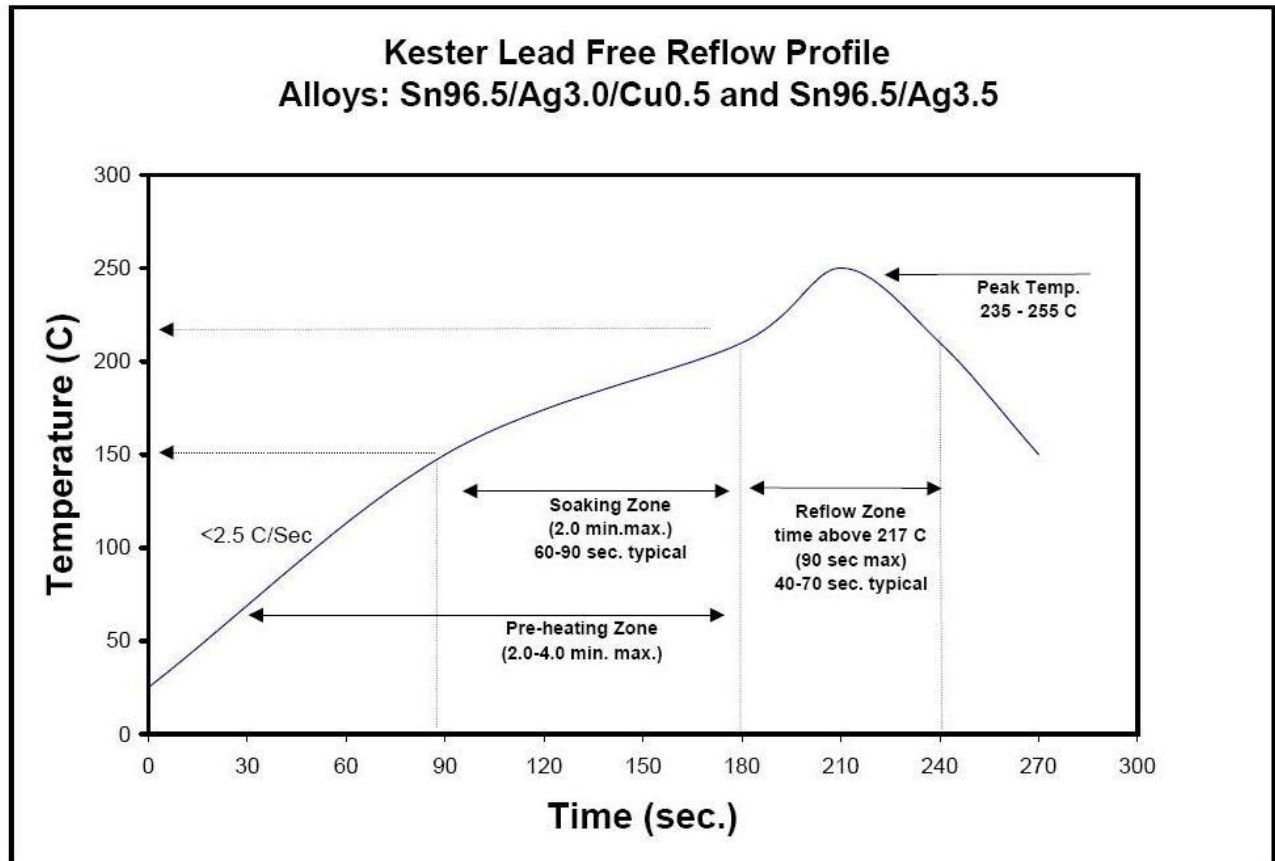
✦ Indicates thermocouple monitored, energized contacts

Test Condition as in 9.1 above



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

OVEN PROFILE (Soldering Parts to Test Boards)





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FLOWCHARTS

Current Carrying Capacity

3 Mated Assemblies Each

TEST STEP	GROUP A 3 Mated Assemblies 1 CONTACT POWERED	GROUP B 3 Mated Assemblies 2 CONTACTS POWERED	GROUP C 3 Mated Assemblies 3 CONTACTS POWERED	GROUP D 3 Mated Assemblies 4 CONTACTS POWERED	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 105° C

Current Cycling

TEST STEP	GROUP A 8 Mated Assemblies 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 40 minutes into 45 minute cycle

Measure Voltage Drop on 5 random contacts



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TEST PROCEDURES

Part No.	PES-08-01-T-VT	Mating Part No.	PET-08-01-T-VT-LC
Sample Size	15	Technician	Tony Wagoner
Start Date	05/16/2009	Complete Date	05/22/2009
Room Ambient	23°C	Relative Humidity	27%
Equipment ID#: MO-04, PS-07, RS-09, 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.



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Part No.	PES-08-01-T-VT	Mating Part No.	PET-08-01-T-VT-LC
Sample Size	8	Technician	Tony Wagoner
Start Date	05/26/2009	Complete Date	06/16/2009
Room Ambient	31°C	Relative Humidity	39%
Equipment ID#: MO-10, PS-04, RS-03, 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: 36.7 (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.



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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 -----58.7A per contact with 1 contacts (1 x 1) powered
- CCC for a 30°C Temperature Rise -----48.5A per contact with 2 contacts (1 x 2) powered
- CCC for a 30°C Temperature Rise -----41.1A per contact with 3 contacts (1 x 3) powered
- CCC for a 30°C Temperature Rise -----38.0A per contact with 4 contacts (1 x 4) powered
- CCC for a 30°C Temperature Rise -----29.4A per contact with All contacts (1 x 8) powered

CURRENT CYCLING RESULTS

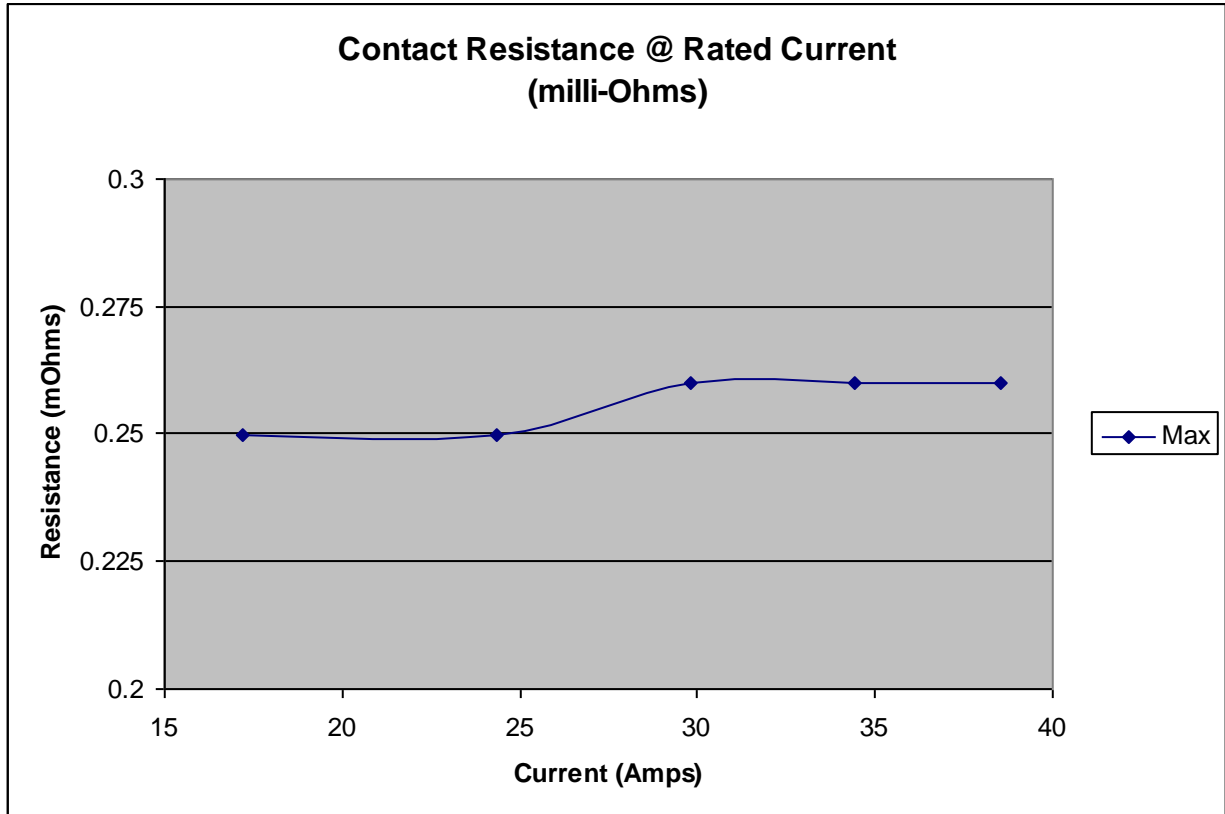
Test Condition: 500 Cycles, 45 minutes ON and 15 minutes OFF

- Test Current -----36.7 Amps
- Contact Resistances, Measured 40 minutes into the FIRST and LAST ON cycle
 - Initial
 - Min -----.17mOhms
 - Max-----.27mOhms
 - Final
 - Min -----.17mOhms
 - Max-----.27mOhms
- Temperature Change, Measured 40 minutes into the FIRST and LAST ON cycle
 - Initial Temperature Change -----28.3°C
 - Final Temperature Change -----28.4°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:



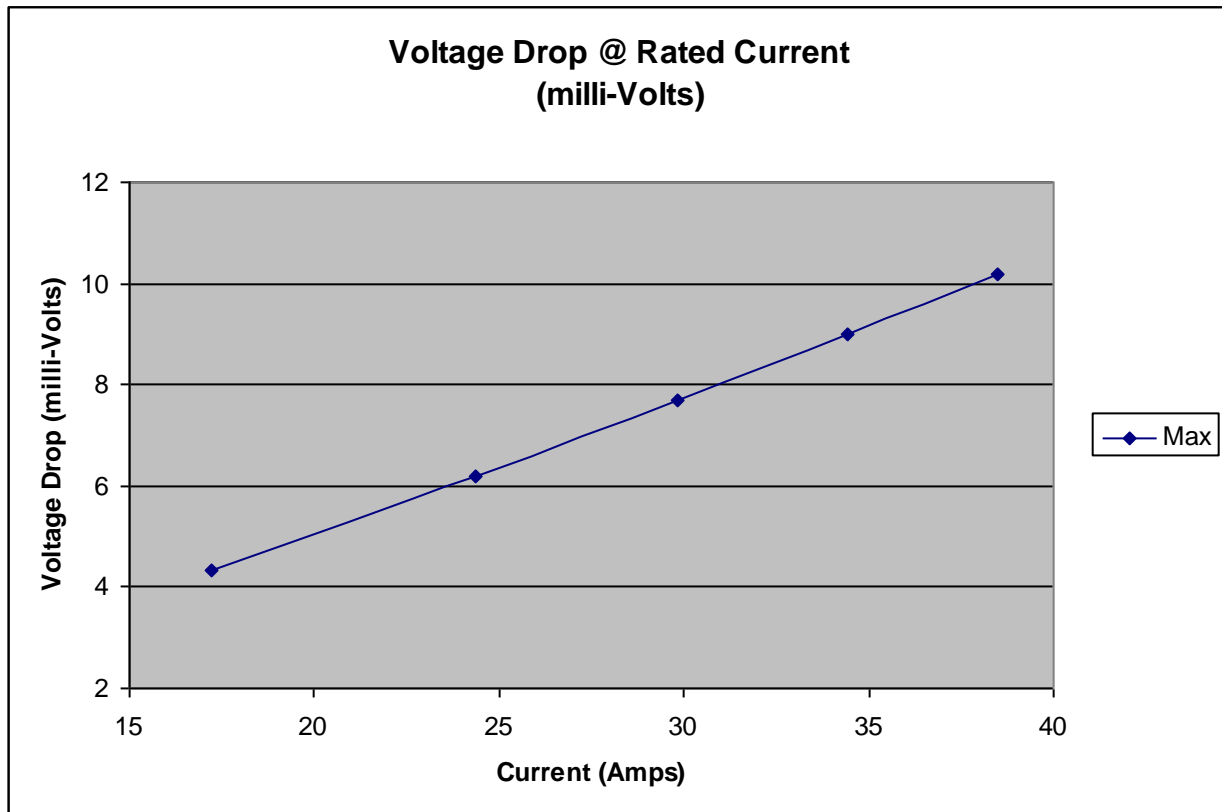
**CONTACT RESISTANCE DATA
ALL CONTACTS ENERGIZED
(mΩ)**

TEST CURRENT AMPS	17.21	24.34	29.83	34.45	38.51
Min	0.17	0.17	0.18	0.18	0.18
Max	0.25	0.25	0.26	0.26	0.26
Avg	0.2	0.2	0.21	0.21	0.21

TEST DATA

VOLTAGE DROP @ RATED CURRENT

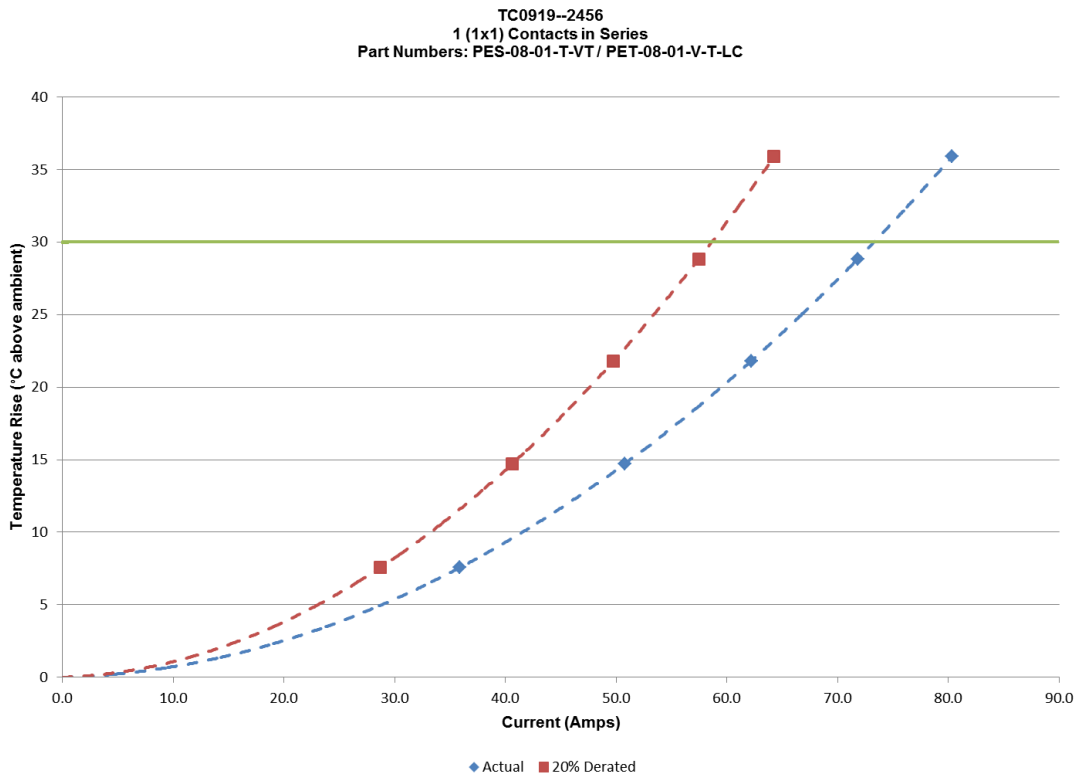
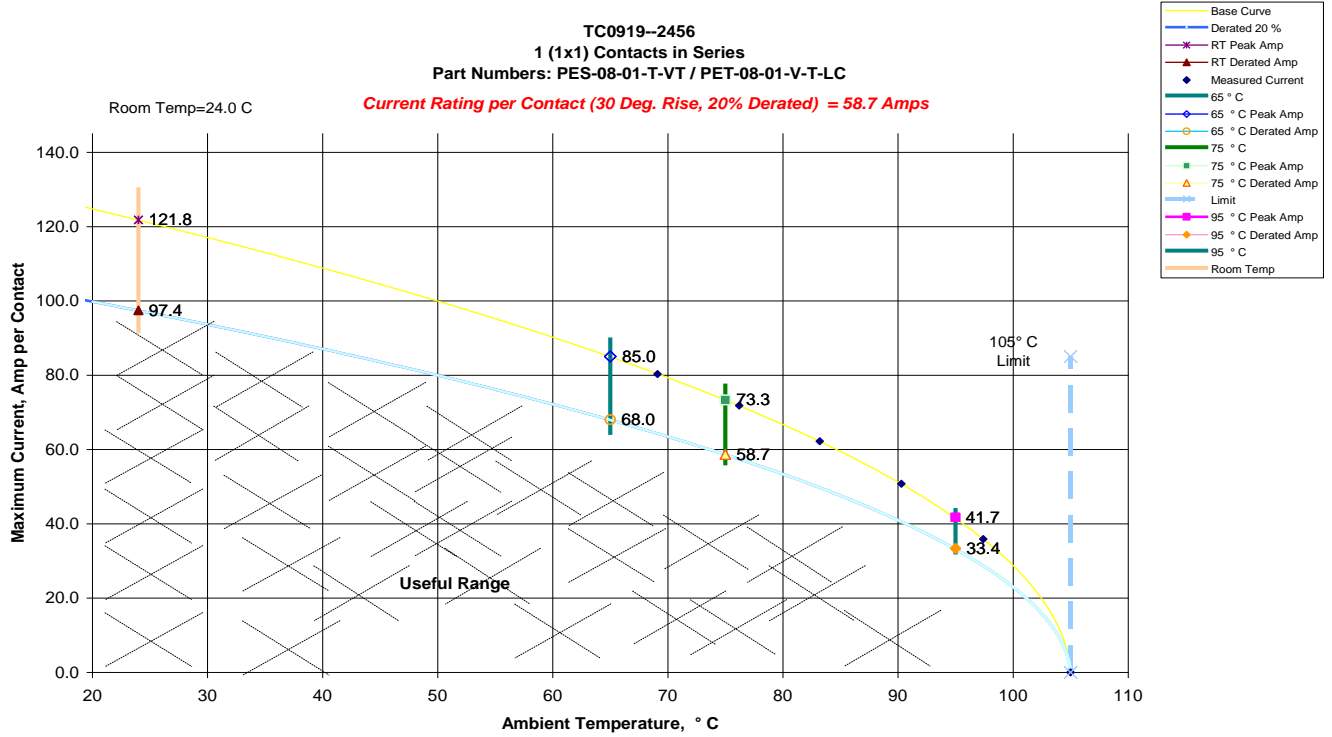
The following data represents the Voltage drop at Rated Current for the 100% energized samples:



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

TEST CURRENT AMPS	17.21	24.34	29.83	34.45	38.51
Min	2.95	4.23	5.25	6.15	6.97
Max	4.33	6.2	7.7	9.01	10.2
Avg	3.49	5	6.21	7.26	8.23

CURRENT CARRYING CAPACITY DATA





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TEMPERATURE RISE DATA ONE CONTACT ENERGIZED (Degrees Celsius above ambient)

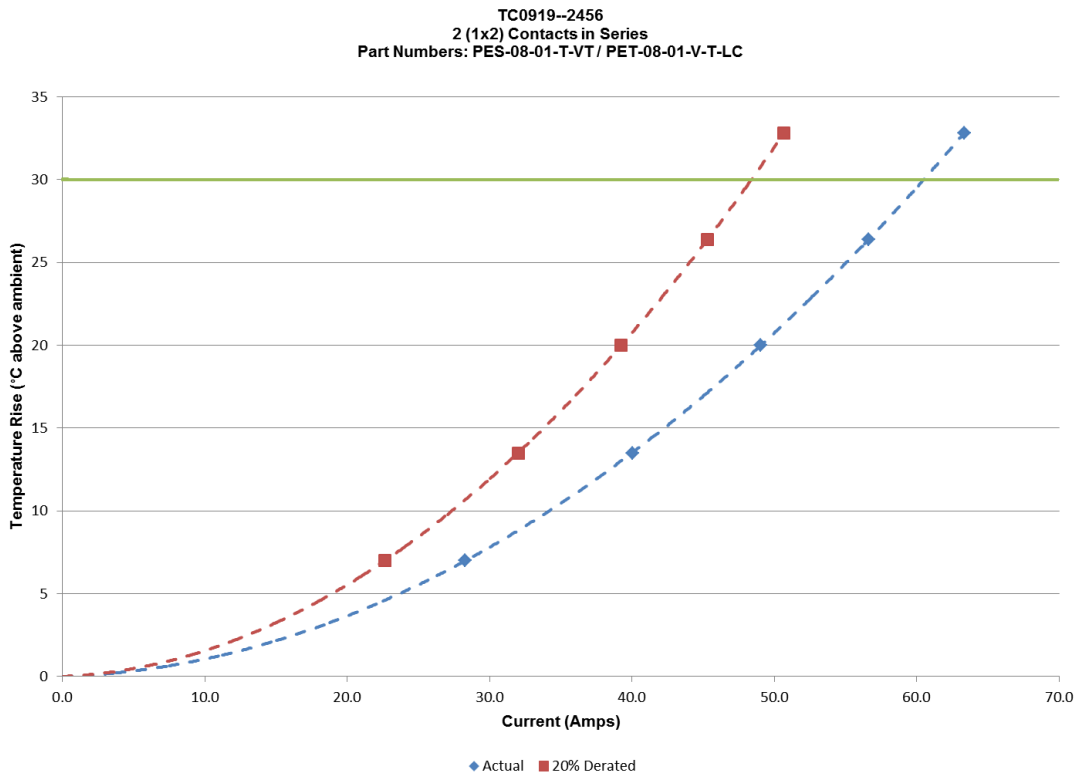
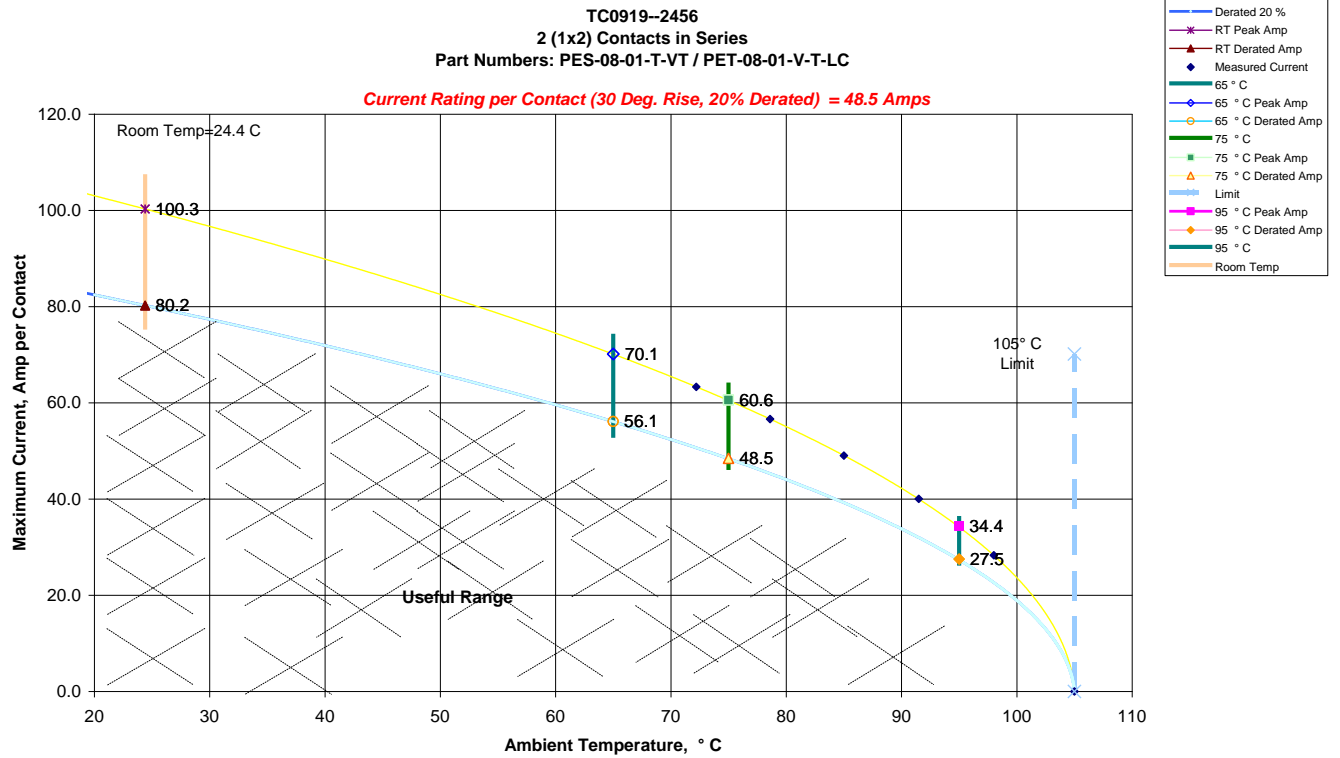
TEST CURRENT AMPS	35.89	50.76	62.21	71.83	80.31
Sample 1	7.7	14.9	22	29.1	36.1
Sample 2	7.8	15.2	22.8	29.9	37.5
Sample 3	7.2	13.9	20.6	27.3	34
Min	7.2	13.9	20.6	27.3	34
Max	7.8	15.2	22.8	29.9	37.5
Avg	7.57	14.67	21.8	28.77	35.87

✦ Indicates energized contacts

✦ Indicates thermocouple monitored, energized contacts

Single Row Configuration

✦			
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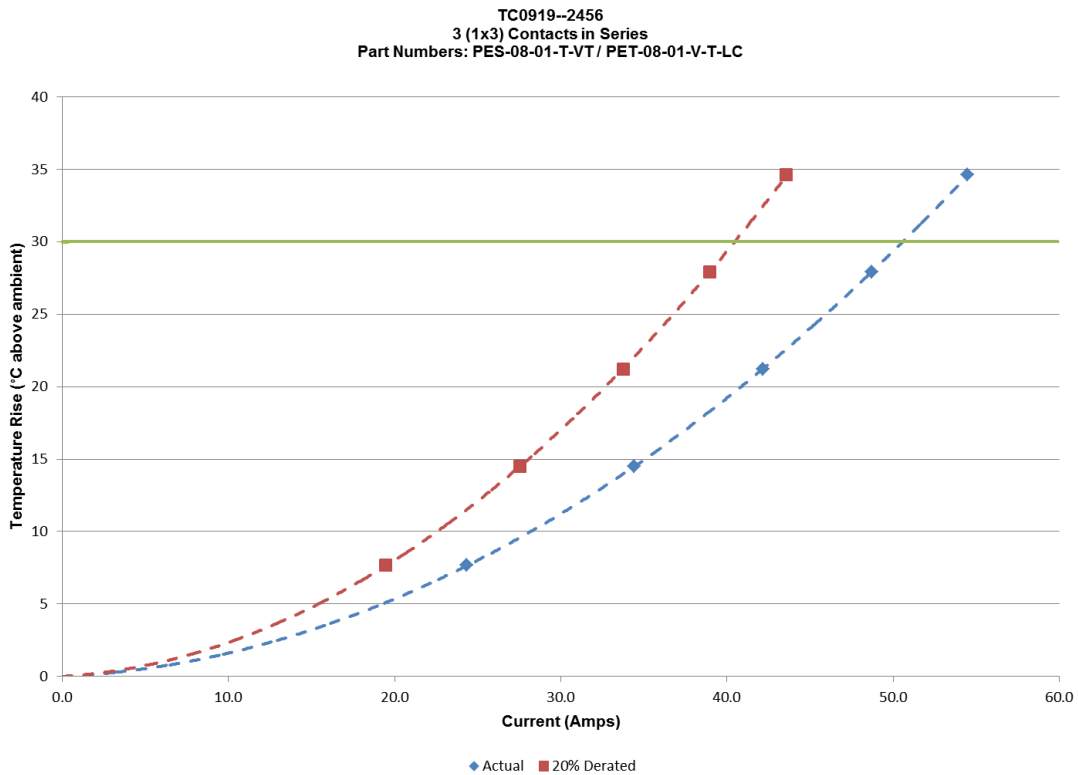
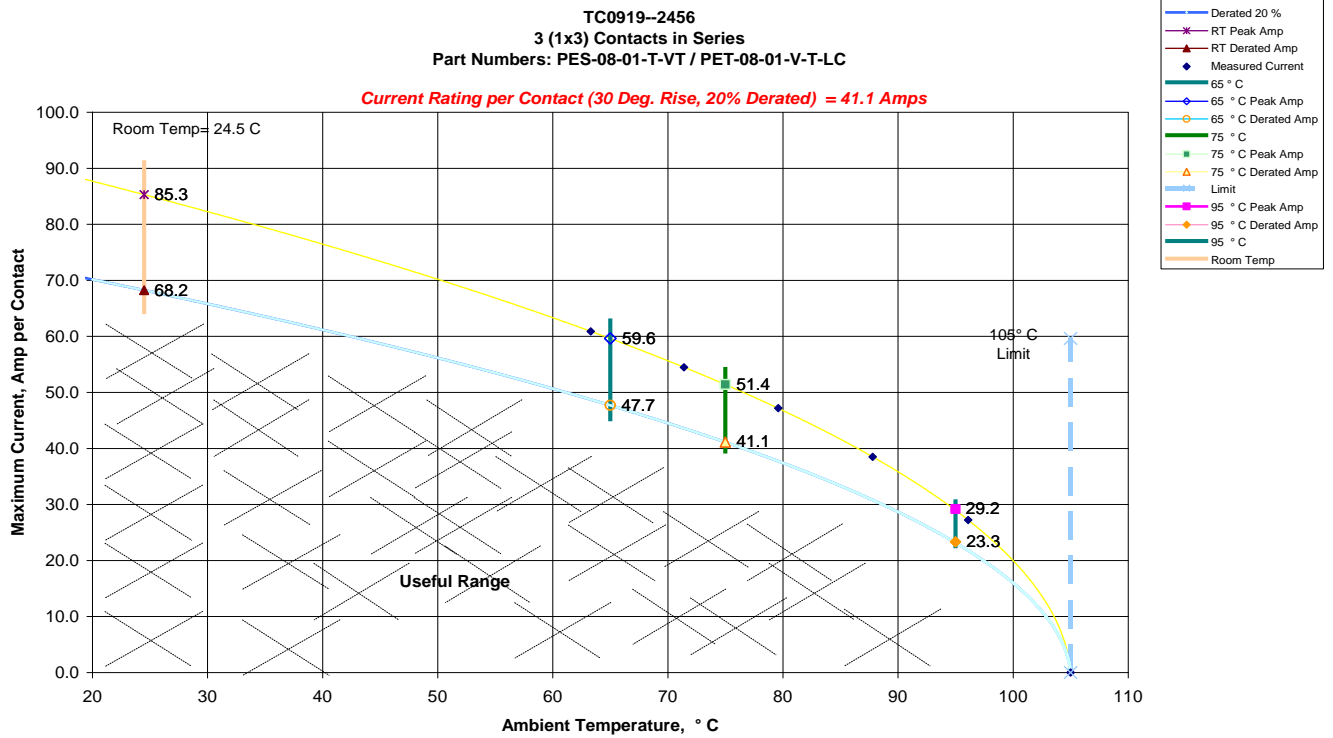
TEMPERATURE RISE DATA TWO CONTACTS ENERGIZED (Degrees Celsius above ambient)

TEST CURRENT AMPS	28.3	40.02	49.04	56.63	63.32
Sample 4	7.4	14.4	21.3	28.1	35
Sample 5	6.8	13.2	19.5	25.7	31.9
Sample 6	6.7	13	19.1	25.3	31.4
Min	6.7	13	19.1	25.3	31.4
Max	7.4	14.4	21.3	28.1	35
Avg	6.97	13.53	19.97	26.37	32.77

✦ Indicates energized contacts

✦ Indicates thermocouple monitored, energized contacts

✦	✦		
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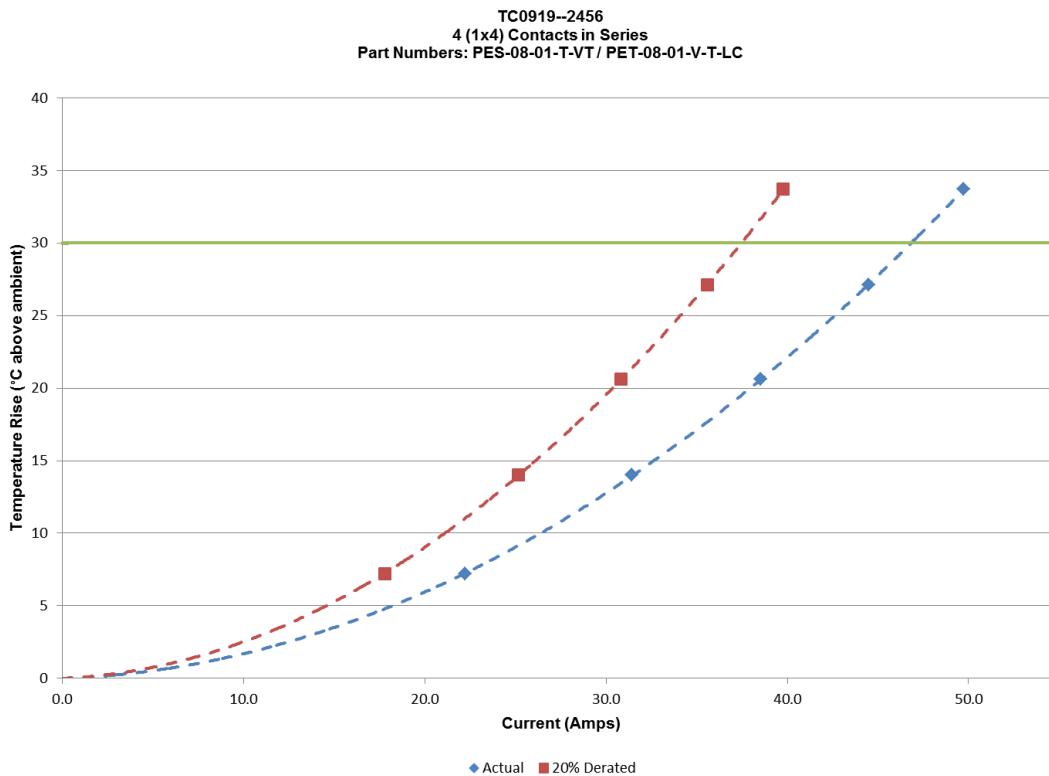
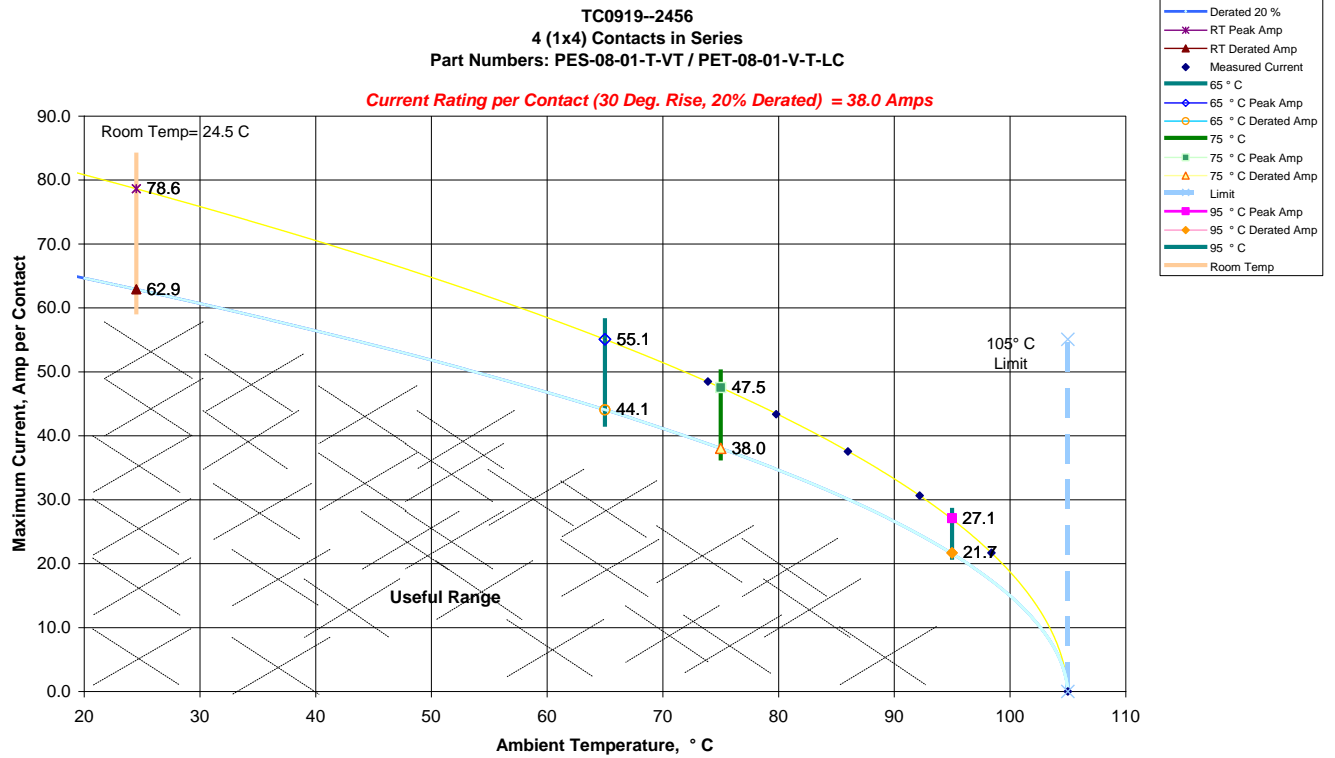
TEMPERATURE RISE DATA THREE CONTACTS ENERGIZED (Degrees Celsius above ambient)

TEST CURRENT AMPS	27.22	38.49	47.17	54.47	60.9
Sample 7	9.4	18.1	26.7	35.3	44
Sample 8	8.2	15.9	23.4	30.8	38.2
Sample 9	9.1	17.6	26	34.5	42.9
Min	8.2	15.9	23.4	30.8	38.2
Max	9.4	18.1	26.7	35.3	44
Avg	8.9	17.2	25.37	33.53	41.7

✦ Indicates energized contacts

✦ Indicates thermocouple monitored, energized contacts

✦	✦	✦	
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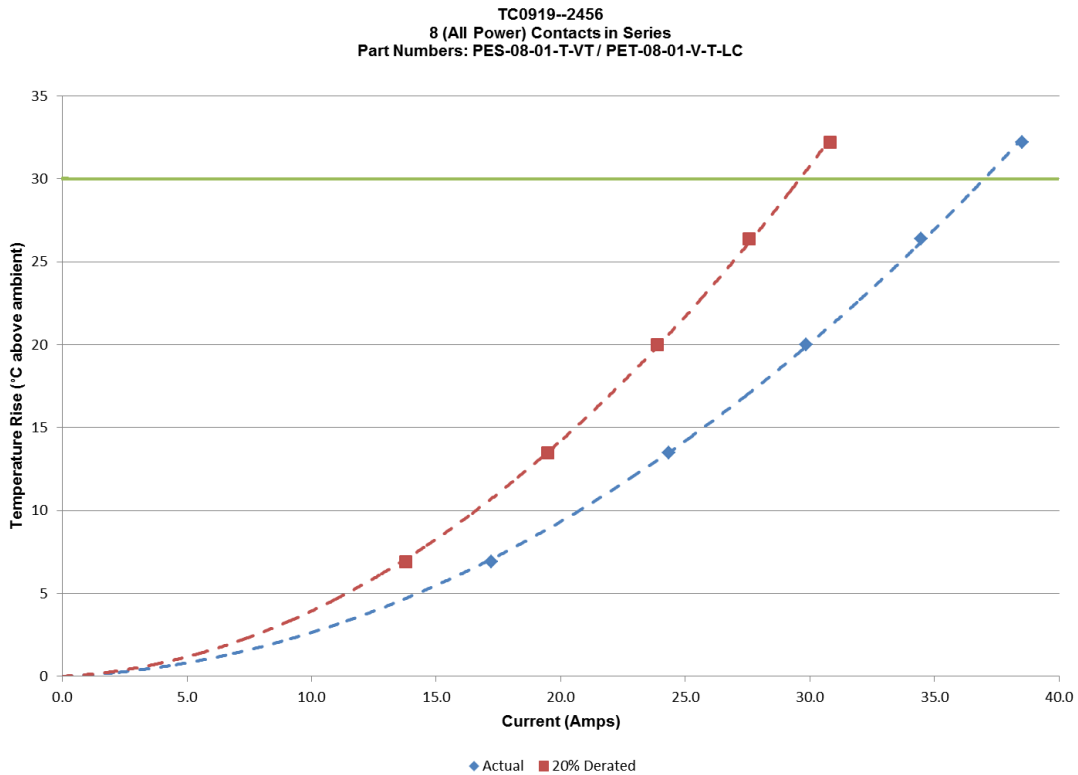
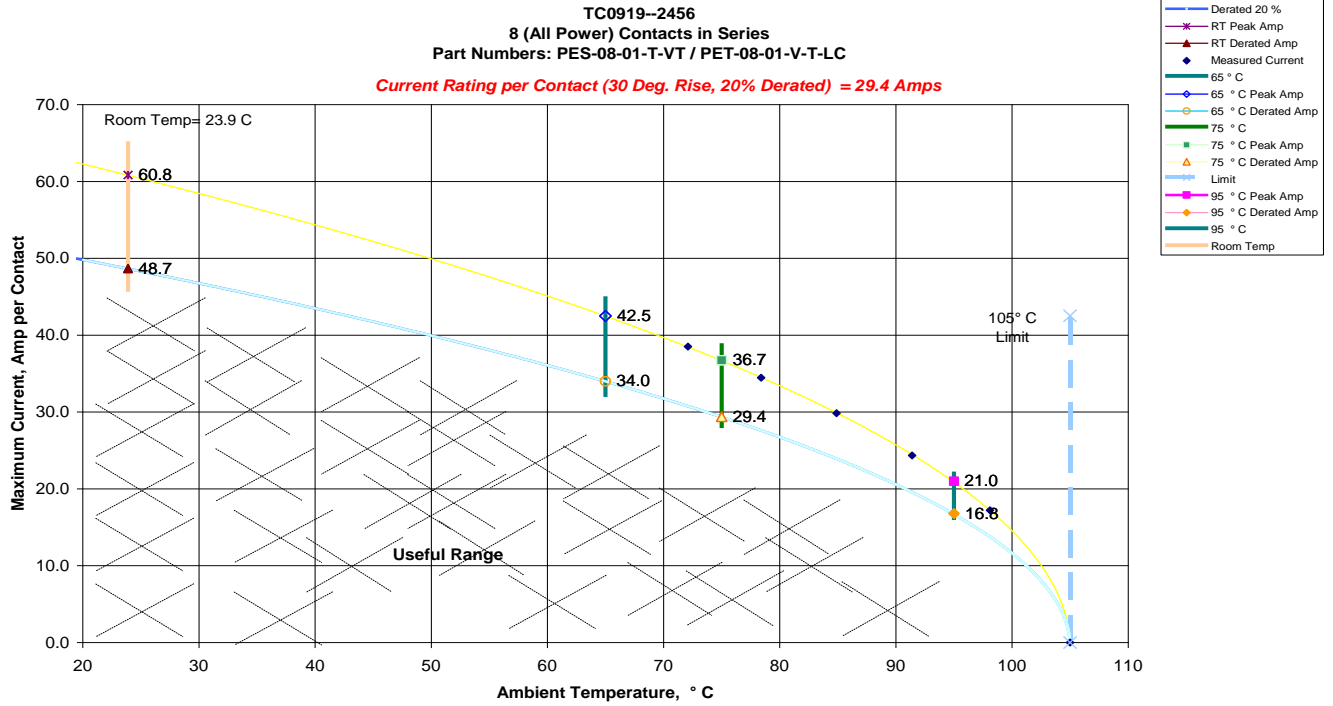
TEMPERATURE RISE DATA FOUR CONTACTS ENERGIZED (Degrees Celsius above ambient)

TEST CURRENT AMPS	21.67	30.65	37.56	43.37	48.49
Sample 10	6.3	12.1	17.8	23.4	28.8
Sample 11	7	13.6	20.3	26.9	33.3
Sample 12	6.5	12.8	19	25.2	31.2
Min	6.3	12.1	17.8	23.4	28.8
Max	7	13.6	20.3	26.9	33.3
Avg	6.6	12.83	19.03	25.17	31.1

✦ Indicates energized contacts

✦ Indicates thermocouple monitored, energized contacts

✦	✦	✦	✦
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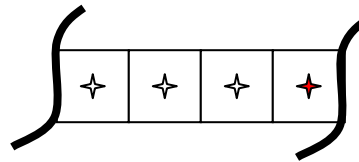


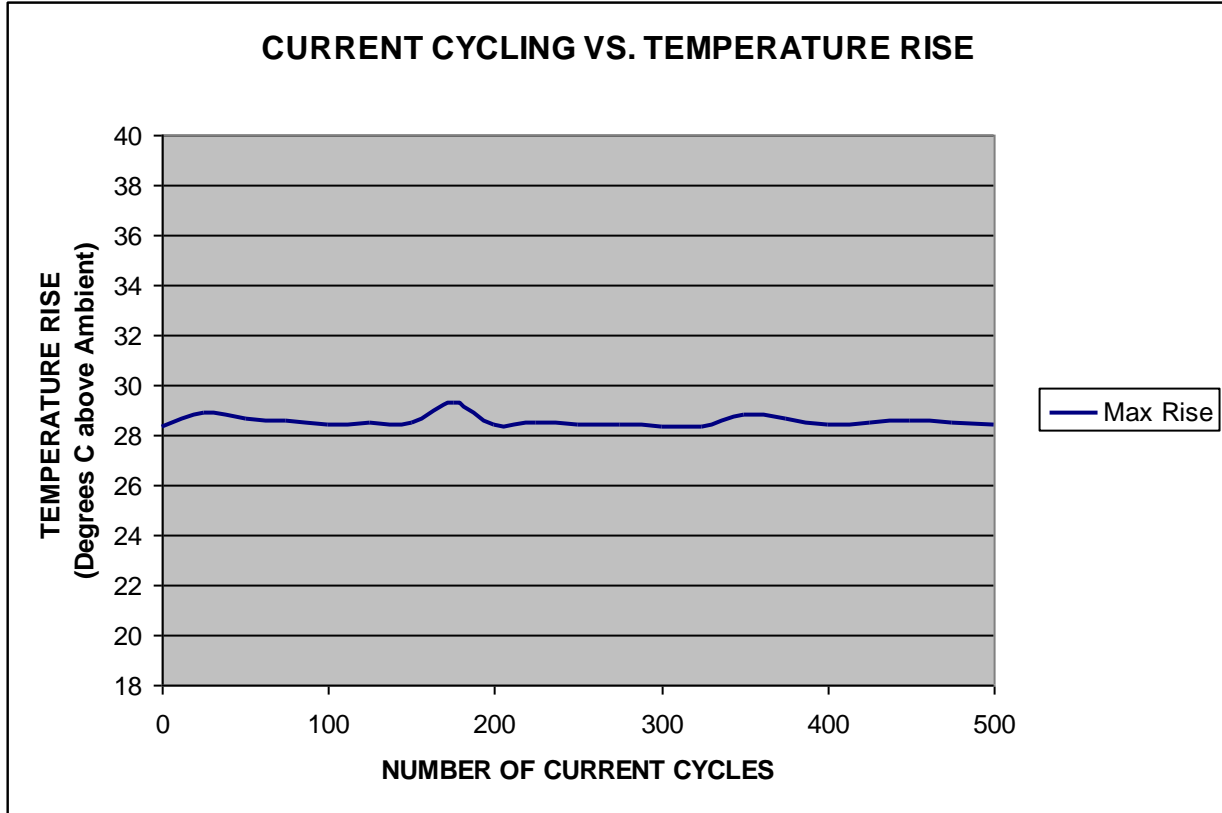
**TEMPERATURE RISE DATA
ALL CONTACTS ENERGIZED
(Degrees Celsius above ambient)**

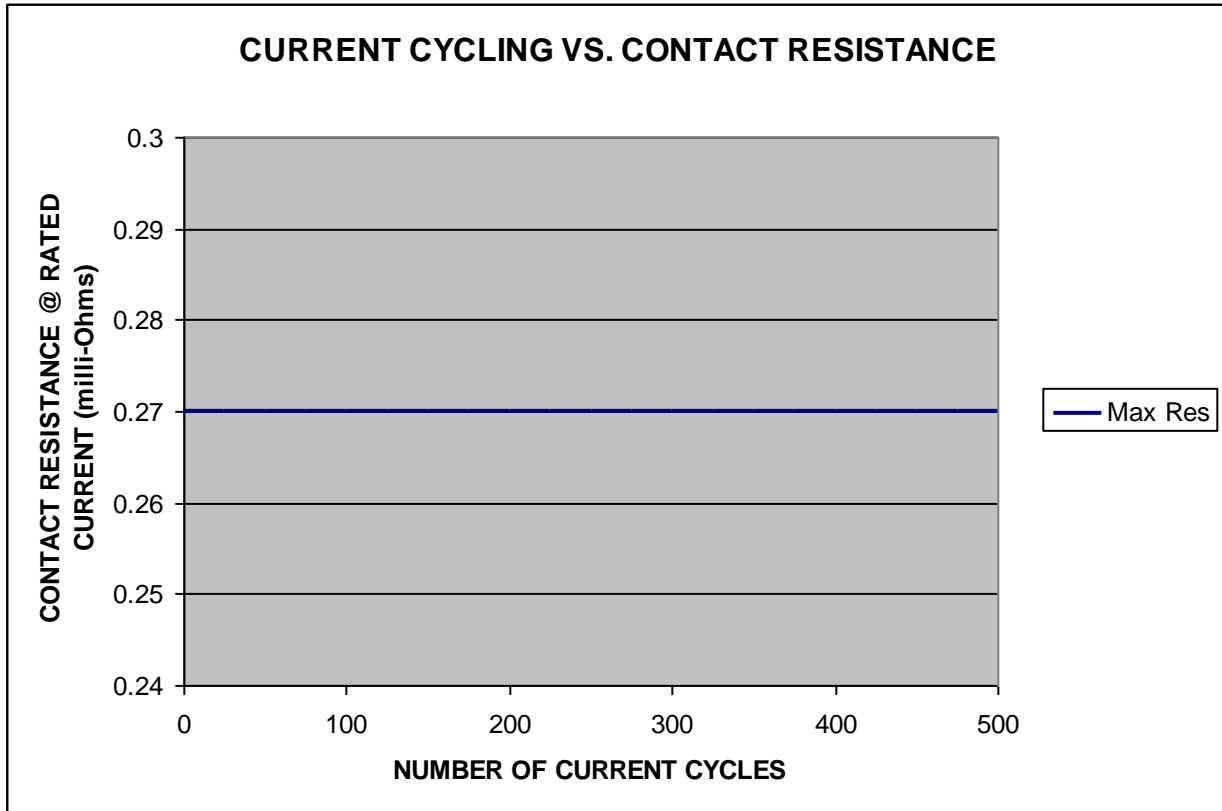
TEST CURRENT AMPS	17.21	24.34	29.83	34.45	38.51
Sample 13	7	14	20.8	27.5	34.1
Sample 14	6.9	13.6	20.1	26.6	33
Sample 15	6.8	13.2	19.5	25.7	31.6
Min	6.8	13.2	19.5	25.7	31.6
Max	7	14	20.8	27.5	34.1
Avg	6.9	13.6	20.13	26.6	32.9

✦ Indicates energized contacts

✦ Indicates thermocouple monitored, energized contacts

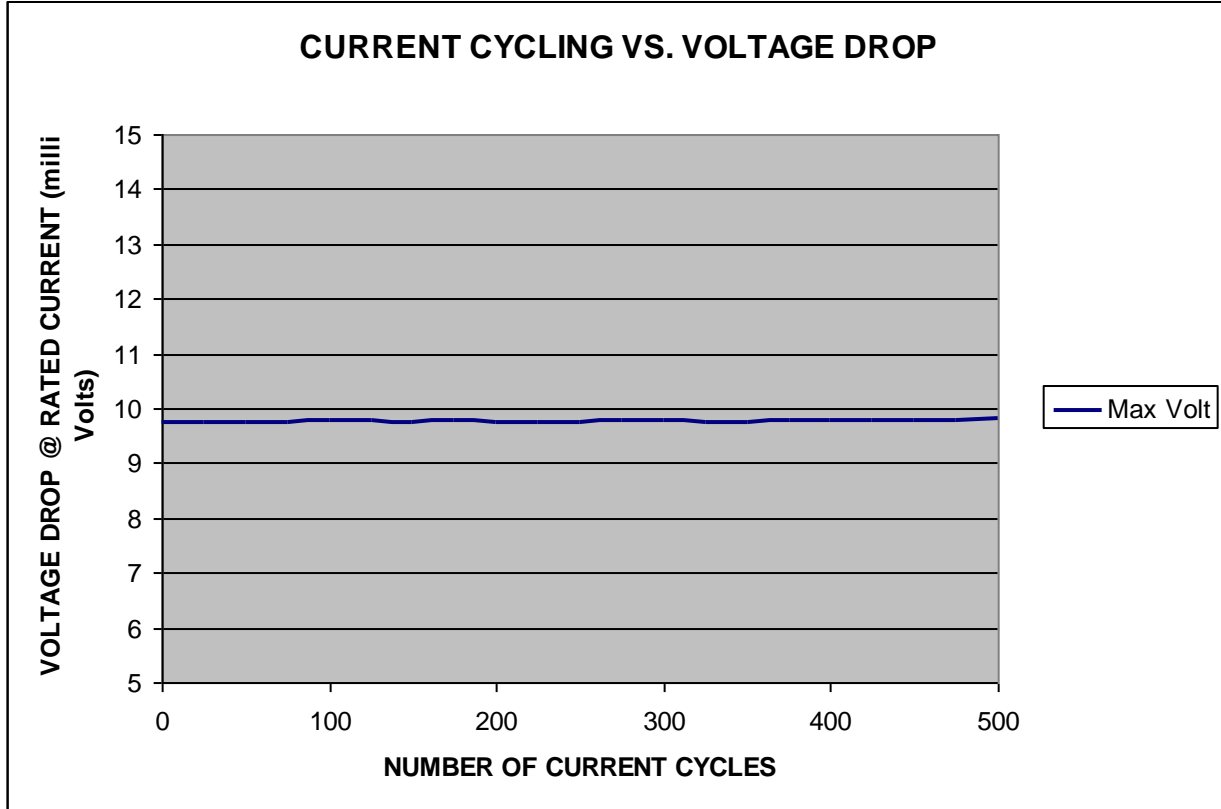






**CONTACT RESISTANCE DATA
ALL CONTACTS ENERGIZED
(mΩ)**

	INITIAL	50 CYCLES	100 CYCLES	200 CYCLES	500 CYCLES
Min	0.17	0.17	0.17	0.17	0.17
Max	0.27	0.27	0.27	0.27	0.27
Avg	0.21	0.21	0.21	0.21	0.21



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

	INITIAL	50 CYCLES	100 CYCLES	200 CYCLES	500 CYCLES
Min	6.22	6.25	6.26	6.25	6.27
Max	9.75	9.75	9.77	9.75	9.8
Avg	7.65	7.66	7.68	7.67	7.71



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EQUIPMENT AND CALIBRATION SCHEDULES

Equipment #: MO-04

Description: 2700 Multimeter/Data Acquisition System (Integra Series)

Manufacturer: Keithley

Model: 2700

Serial #: 0798688

Accuracy: See Manual

... Last Cal: 04/06/2009, Next Cal: 04/06/2010

Equipment #: RS-09

Description: Current Shunt

Manufacturer: Empro

Model: HA5050

Serial #: HA5050-7

Accuracy: +/- 0.25% of RDG

... Last Cal: 05/14/2009, Next Cal: 05/14/2010

Equipment #: M0-08

Description: Model 2750 Multimeter/Switch System (Integra Series)

Manufacturer: Keithley

Model: 2750

Serial #: 1215161

Accuracy: See Manual

... Last Cal: 10/07/2008, Next Cal: 10/07/2009

Equipment #: RS-03

Description: Current Shunt

Manufacturer: Empro

Model: HA5050

Serial #: HA5050-7

Accuracy: +/- 0.25% of RDG

... Last Cal: 05/13/2009, Next Cal: 05/13/2010

Equipment #: TC111307-(001 - 053)

Description: CCC Chamber Thermocouples

Manufacturer: Samtec

Model:

Serial #: TC111307-(001 - 017)

Accuracy: +/- 1 Deg.

... Last Cal: 11/30/2008, Next Cal: 11/30/2009

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