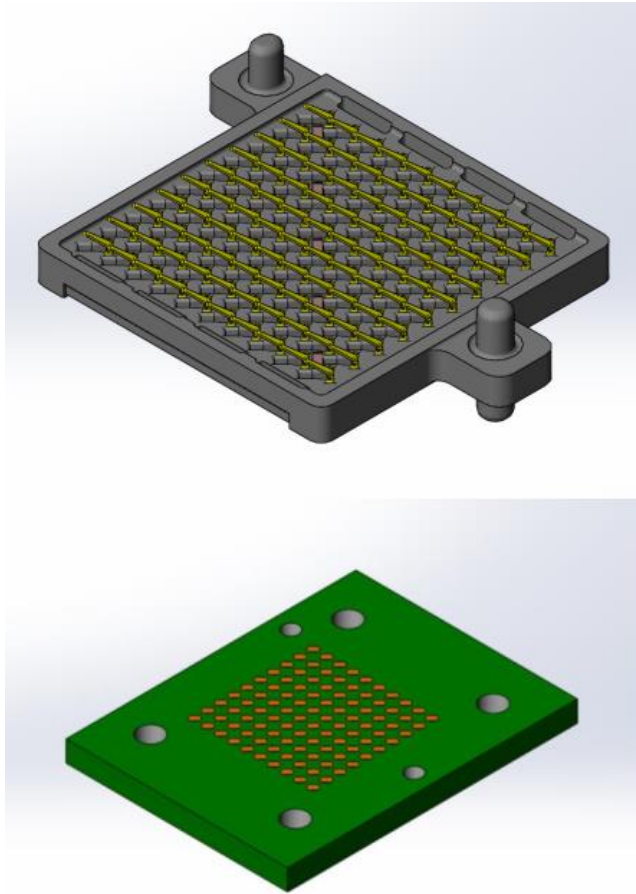




Project Number: Design Qualification Test Report	Tracking Code: 1466469_Report_Rev_1
Requested by: Neal Patterson	Date: 4/4/2018
Part #: GMI-30-2-1.27-G-10/PCB	Tech: Tony Wagoner
Part description: GMI/PCB	Qty to test: 20
Test Start: 03/14/2018	Test Completed: 04/3/2018



## DESIGN QUALIFICATION TEST REPORT

GMI/PCB  
GMI-30-2-1.27-G-10/PCB

Tracking Code: 1466469_Report_Rev_1	Part #: GMI-30-2-1.27-G-10/PCB
Part description: GMI/PCB	

**REVISION HISTORY**

<b>DATA</b>	<b>REV.NUM.</b>	<b>DESCRIPTION</b>	<b>ENG</b>
03/04/2018	1	Initial Issue	PC

## CERTIFICATION

All instruments and measuring equipment were calibrated to National Institute for Standards and Technology (NIST) traceable standards according to ISO 10012-1 and ANSI/NCSL 2540-1, as applicable.

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### SCOPE

To perform the following tests: Design Qualification test. Please see test plan.

### 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) Samtec Test PCBs used: PCB-108997-TST.

**FLOWCHARTS****Mating/Unmating/Durability**Group 1

GMI-30-2-1.27-G-10

8 Assemblies

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<b>Step</b>	<b>Description</b>
1.	Contact Gaps
2.	Mating/Unmating Force <sup>(1)</sup>
3.	Cycles Quantity = 25 Cycles
4.	Mating/Unmating Force <sup>(1)</sup>
5.	Cycles Quantity = 25 Cycles
6.	Mating/Unmating Force <sup>(1)</sup>
7.	Cycles Quantity = 25 Cycles
8.	Mating/Unmating Force <sup>(1)</sup>
9.	Cycles Quantity = 25 Cycles
10.	Mating/Unmating Force <sup>(1)</sup>

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(1) Mating/Unmating Force = EIA-364-13

**FLOWCHARTS Continued****Current Carrying Capacity**

Group 1  
GMI-30-2-1.27-G-10

10 Pins Powered  
Signal

**Step Description**

1. CCC <sup>(1)</sup>  
Rows = 10  
Number of Positions = 1

Group 2  
GMI-30-2-1.27-G-10

20 Pins Powered  
Signal

**Step Description**

1. CCC <sup>(1)</sup>  
Rows = 10  
Number of Positions = 2

Group 3  
GMI-30-2-1.27-G-10

30 Pins Powered  
Signal

**Step Description**

1. CCC <sup>(1)</sup>  
Rows = 10  
Number of Positions = 3

Group 4  
GMI-30-2-1.27-G-10

40 Pins Powered  
Signal

**Step Description**

1. CCC <sup>(1)</sup>  
Rows = 10  
Number of Positions = 4

Group 5  
GMI-30-2-1.27-G-10

300 Pins Powered  
Signal

**Step Description**

1. CCC <sup>(1)</sup>  
Rows = 10  
Number of Positions = 30

(1) CCC = EIA-364-70

Method 2, Temperature Rise Versus Current Curve

(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

**ATTRIBUTE DEFINITIONS Continued**

The following is a brief, simplified description of attributes.

**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.

**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 four temperature points are reported:
  - a. Ambient
  - b. 85° C
  - c. 95° C
  - d. 115° 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.

## RESULTS

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

- CCC for a 30°C Temperature Rise-----0.8 A per contact with 10 contacts (10x1) powered
- CCC for a 30°C Temperature Rise-----0.6 A per contact with 20 contacts (10x2) powered
- CCC for a 30°C Temperature Rise-----0.5 A per contact with 30 contacts (10x3) powered
- CCC for a 30°C Temperature Rise-----0.4 A per contact with 40 contacts (10x4) powered
- CCC for a 30°C Temperature Rise-----0.2 A per contact with 300 contacts (10x30) powered

### Mating – Unmating Force

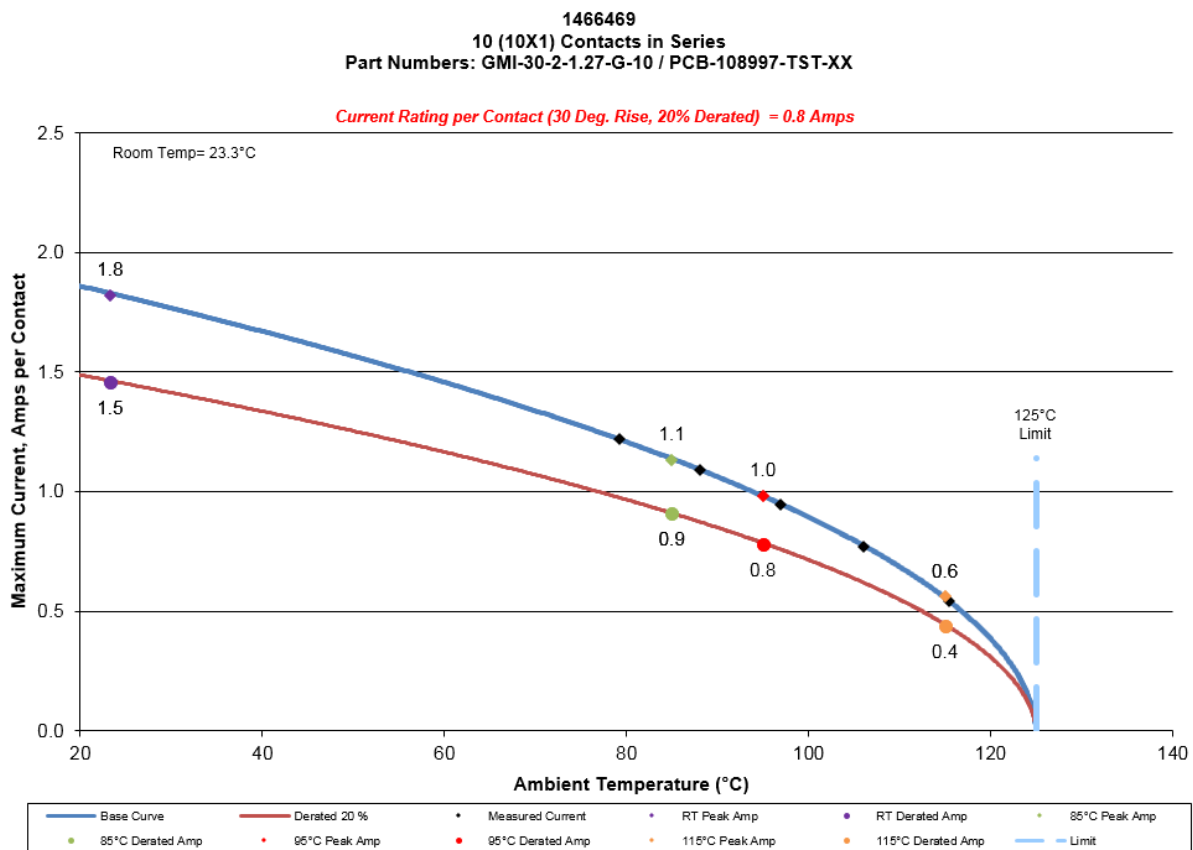
- **Initial**
  - **Mating**
    - **Min** -----32.99 Lbs
    - **Max**-----35.22 Lbs
- **After 25 Cycles**
  - **Mating**
    - **Min** -----28.69 Lbs
    - **Max**-----32.91 Lbs
- **After 50 Cycles**
  - **Mating**
    - **Min** -----29.02 Lbs
    - **Max**-----32.84 Lbs
- **After 75 Cycles**
  - **Mating**
    - **Min** -----29.05 Lbs
    - **Max**-----33.14 Lbs
- **After 100 Cycles**
  - **Mating**
    - **Min** -----28.88 Lbs
    - **Max**-----30.83 Lbs

## DATA SUMMARIES

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

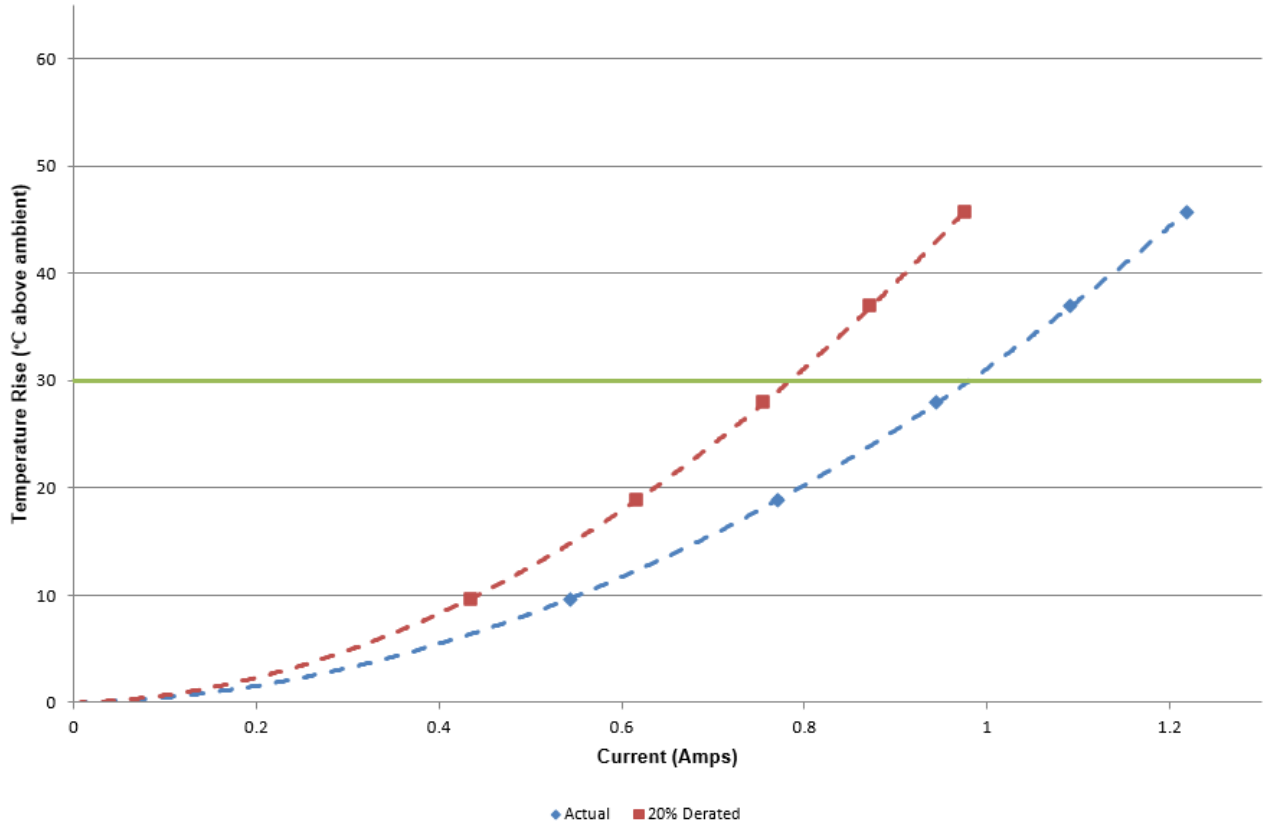
- 1) High quality thermocouples whose temperature slopes track one another were used for temperature monitoring.
- 2) The thermocouples were placed at a location to sense the maximum temperature generated during testing.
- 3) Temperature readings recorded are those for which three successive readings,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

- a. Linear configuration with 10 adjacent conductors/contacts powered



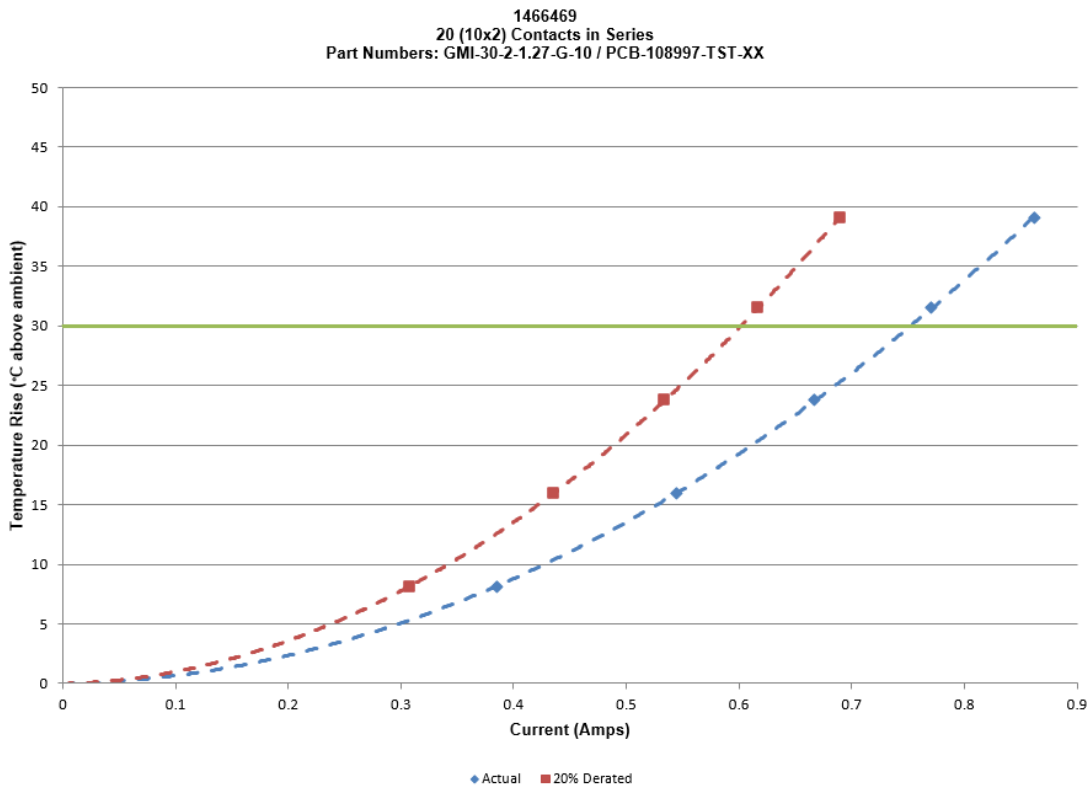
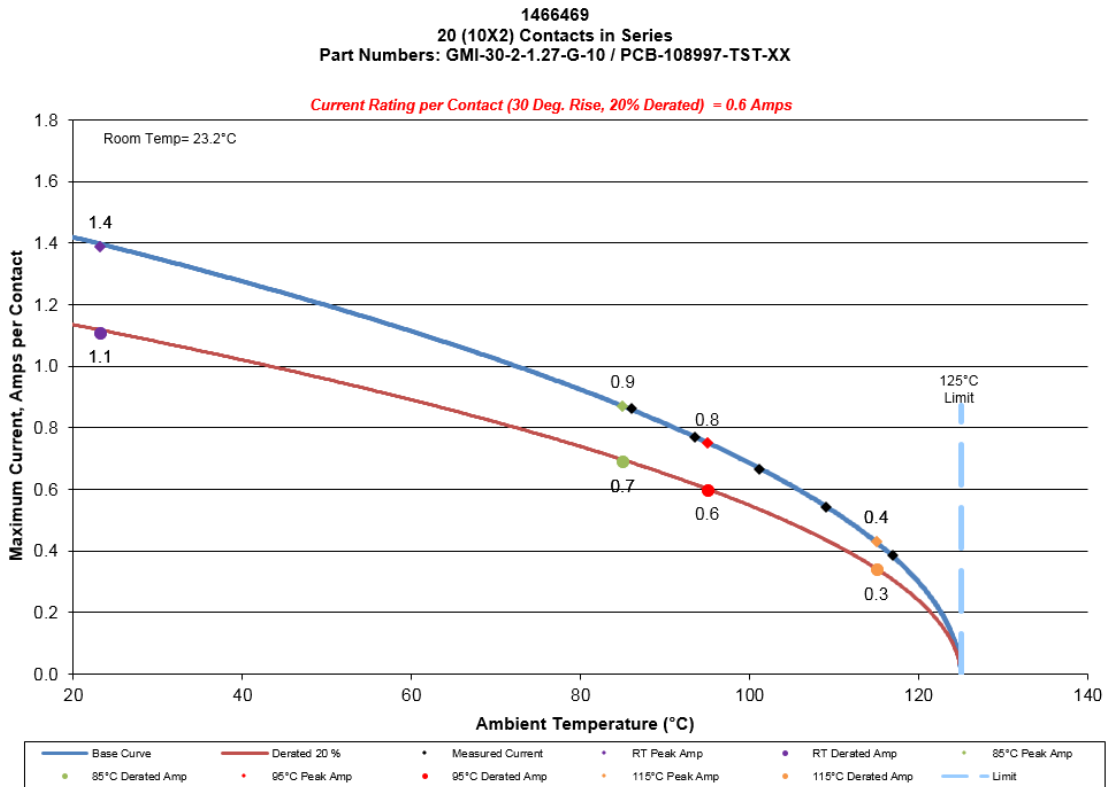
### DATA SUMMARIES Continued

1466469  
10 (10x1) Contacts in Series  
Part Numbers: GMI-30-2-1.27-G-10 / PCB-108997-TST-XX



### DATA SUMMARIES Continued

b. Linear configuration with 20 adjacent conductors/contacts powered

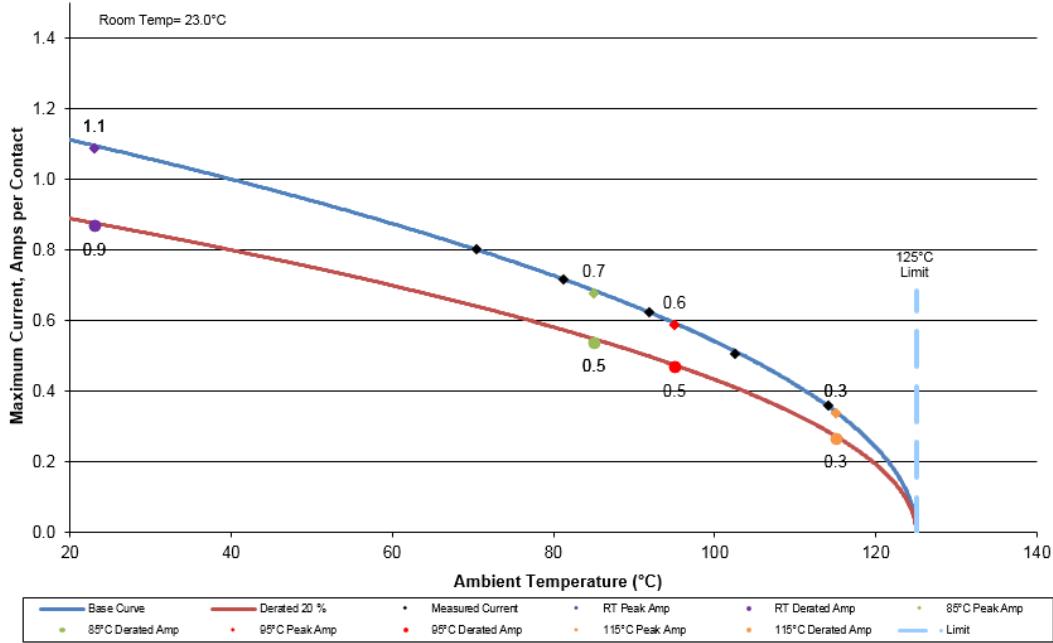


### DATA SUMMARIES Continued

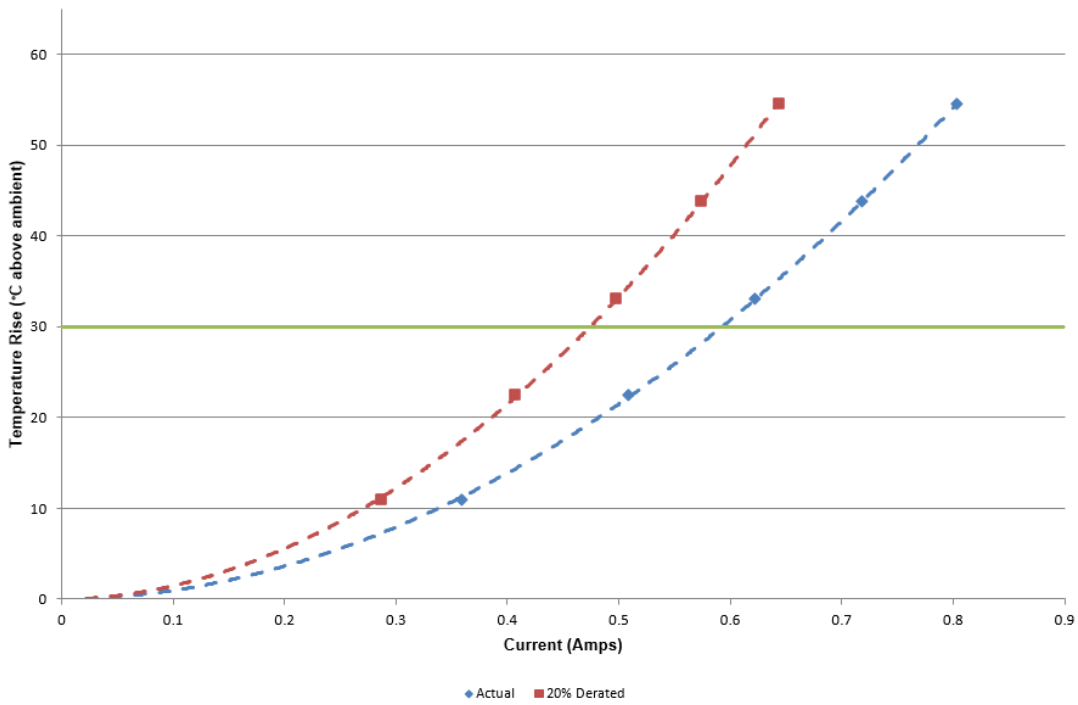
c. Linear configuration with 30 adjacent conductors/contacts powered

1466469  
30 (10x3) Contacts in Series  
Part Numbers: GMI-30-2-1.27-G-10 / PCB-108997-TST-XX

*Current Rating per Contact (30 Deg. Rise, 20% Derated) = 0.5 Amps*



1466469  
30 (10x3) Contacts in Series  
Part Numbers: GMI-30-2-1.27-G-10 / PCB-108997-TST-XX

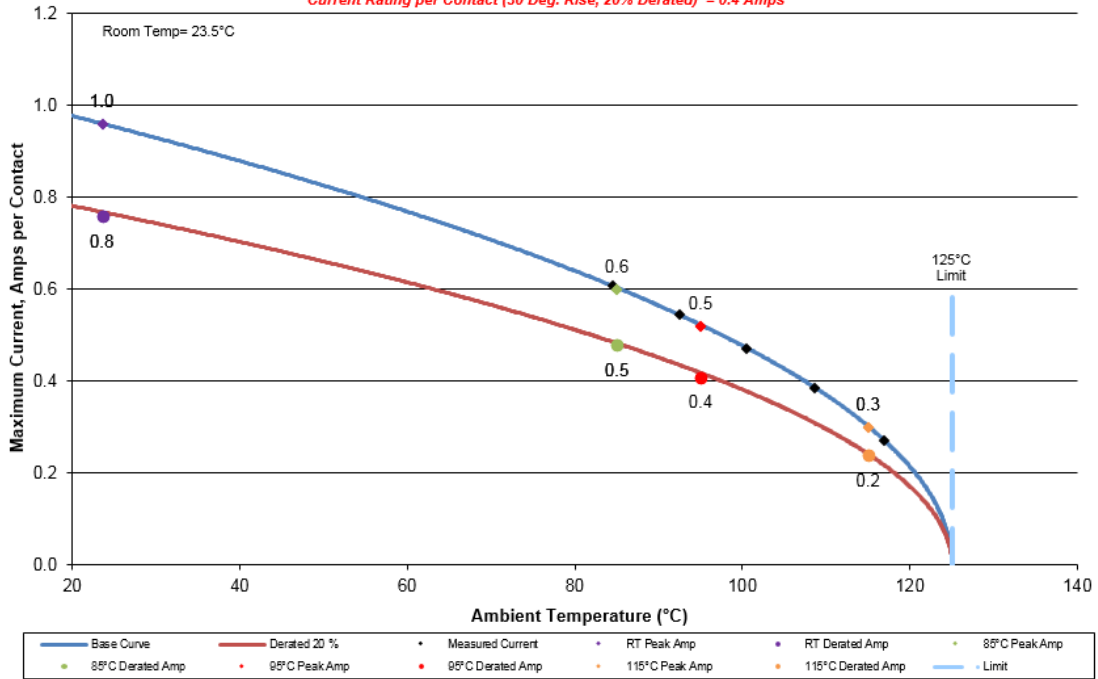


### DATA SUMMARIES Continued

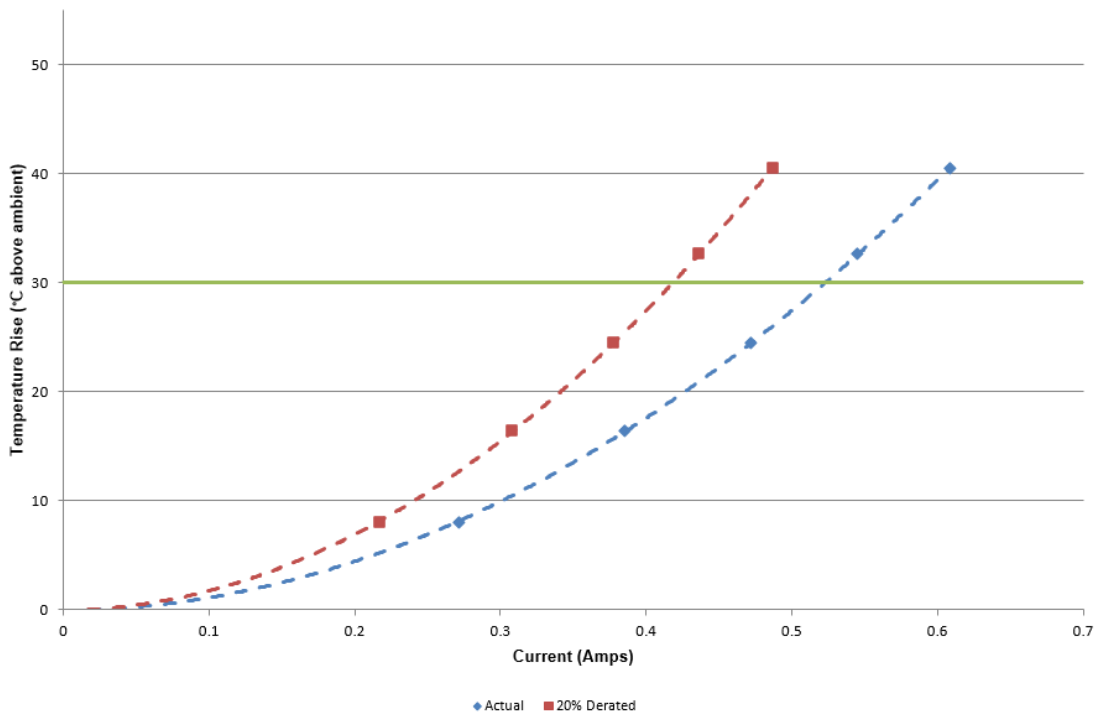
d. Linear configuration with 40 adjacent conductors/contacts powered

1466469  
40 (10x4) Contacts in Series  
Part Numbers: GMI-30-2-1.27-G-10 / PCB-108997-TST-XX

*Current Rating per Contact (30 Deg. Rise, 20% Derated) = 0.4 Amps*



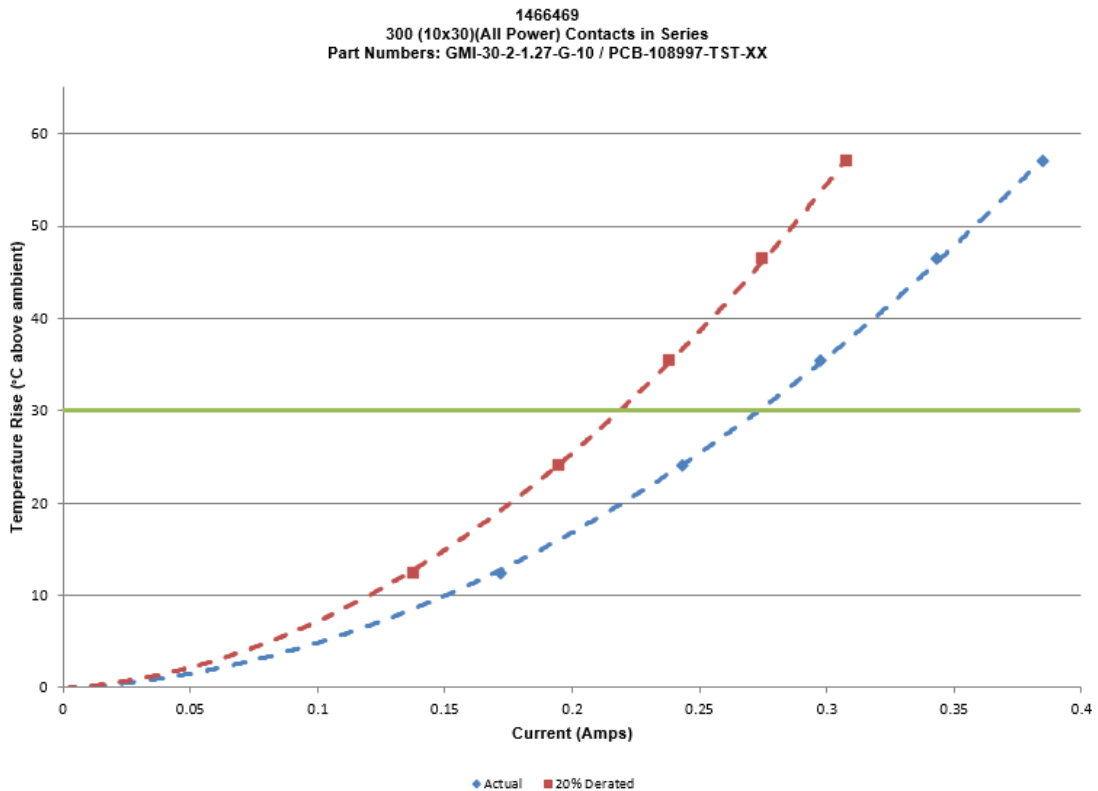
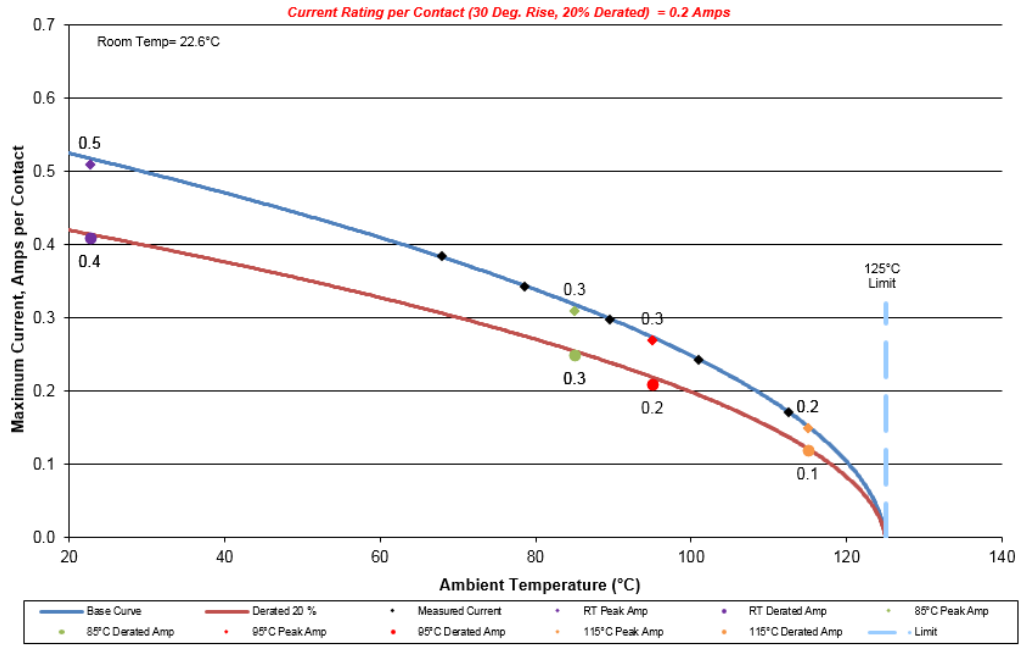
1466469  
40 (10x4) Contacts in Series  
Part Numbers: GMI-30-2-1.27-G-10 / PCB-108997-TST-XX



### DATA SUMMARIES Continued

e. Linear configuration with all adjacent conductors/contacts powered

1466469  
300 (10X30)(All Power) Contacts in Series  
Part Numbers: GMI-30-2-1.27-G-10 / PCB-108997-TST-XX



**DATA SUMMARIES Continued****MATING-UNMATING FORCE:**

	Initial				After 25 Cycles			
	Mating		Unmating		Mating		Unmating	
	New tons	Force (Lbs)	New tons	Force (Lbs)	New tons	Force (Lbs)	New tons	Force (Lbs)
Minimum	146.74	32.99	0.00	0.00	127.63	28.69	0.00	0.00
Maximum	156.65	35.22	0.00	0.00	146.39	32.91	0.00	0.00
<b>Average</b>	152.80	<b>34.35</b>	0.00	<b>0.00</b>	134.73	<b>30.29</b>	0.00	<b>0.00</b>
St Dev	3.29	0.74	0.00	0.00	7.37	1.66	0.00	0.00
Count	8	8	8	8	8	8	8	8
	After 50 Cycles				After 75 Cycles			
	Mating		Unmating		Mating		Unmating	
	New tons	Force (Lbs)	New tons	Force (Lbs)	New tons	Force (Lbs)	New tons	Force (Lbs)
Minimum	129.07	29.02	0.00	0.00	129.23	29.05	0.00	0.00
Maximum	146.08	32.84	0.00	0.00	147.41	33.14	0.00	0.00
<b>Average</b>	135.29	<b>30.42</b>	0.00	<b>0.00</b>	135.14	<b>30.38</b>	0.00	<b>0.00</b>
St Dev	6.46	1.45	0.00	0.00	5.66	1.27	0.00	0.00
Count	8	8	8	8	8	8	8	8
	After 100 Cycles							
	Mating		Unmating					
	New tons	Force (Lbs)	New tons	Force (Lbs)				
Minimum	128.48	28.88	0.00	0.00				
Maximum	137.14	30.83	0.00	0.00				
<b>Average</b>	133.91	<b>30.11</b>	0.00	<b>0.00</b>				
St Dev	2.88	0.65	0.00	0.00				
Count	8	8	8	8				

**EQUIPMENT AND CALIBRATION SCHEDULES****Equipment #:** TCT-06**Description:** Test Resources test stand**Manufacturer:** Test Resources**Model:** 100R250-12**Serial #:** 0710016-01**Accuracy:** Speed Accuracy: +/- 5% of indicated speed; Displacement: +/- 5 micrometers.

... Last Cal: 05/03/2017, Next Cal: 05/03/2018

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

... Last Cal: 06/16/2017, Next Cal: 06/16/2018

**Equipment #:** PS-01**Description:** Power Supply**Manufacturer:** Hewlett Packard**Model:** 6033A**Serial #:** 3329A-07330**Accuracy:** Not calibrated