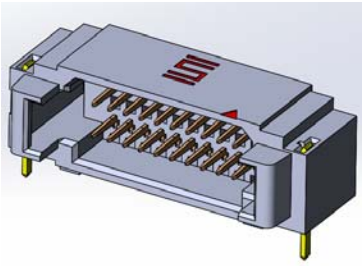
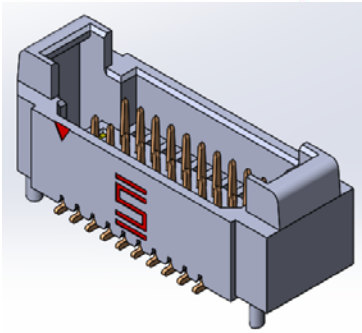
| | |
|---|---|
| Project Number: Design Qualification Test Report | Tracking Code: 1794071_Report_Rev_1 |
| Requested by: Roy Luo | Date: 1/10/2019 |
| Part #: S1SD-20-28-GF-12.00-L1/T1M-20-GF-DV-K/T1M-20-GF-DH-K | |
| Part description: S1SD/T1M | Tech: Kason He |
| Test Start: 10/24/2018 | Test Completed: 11/3/2018 |





**DESIGN QUALIFICATION TEST REPORT**

**S1SD/T1M**
**S1SD-20-28-GF-12.00-L1/T1M-20-GF-DV-K /T1M-20-GF-DH-K**

## REVISION HISTORY

| DATA | REV.NUM. | DESCRIPTION | ENG |
|---|---|---|---|
| **1/10/2019** | **1** | **Initial Issue** | **KH** |

## 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: 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 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 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-108489-TST/PCB-108777-TST/ PCB-108778-TST

# FLOWCHARTS

## Mating/Unmating/Durability

| Group 1<br>T1M-20-GF-DV-K<br>S1SD-20-28-GF-06.00-L<br>8 Assemblies | | Group 2<br>T1M-20-GF-DH-K<br>S1SD-20-28-GF-06.00-L<br>8 Assemblies | |
|---|---|---|---|
| **Step** | **Description** | **Step** | **Description** |
| 1. | Mating/Unmating Force (1) | 1. | Mating/Unmating Force (1) |
| 2. | Cycles<br>Quantity = 25 Cycles | 2. | Cycles<br>Quantity = 25 Cycles |
| 3. | Mating/Unmating Force (1) | 3. | Mating/Unmating Force (1) |
| 4. | Cycles<br>Quantity = 25 Cycles | 4. | Cycles<br>Quantity = 25 Cycles |
| 5. | Mating/Unmating Force (1) | 5. | Mating/Unmating Force (1) |
| 6. | Cycles<br>Quantity = 25 Cycles | 6. | Cycles<br>Quantity = 25 Cycles |
| 7. | Mating/Unmating Force (1) | 7. | Mating/Unmating Force (1) |
| 8. | Cycles<br>Quantity = 25 Cycles | 8. | Cycles<br>Quantity = 25 Cycles |
| 9. | Mating/Unmating Force (1) | 9. | Mating/Unmating Force (1) |

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

# FLOWCHARTS Continued

## Current Carrying Capacity

Group 1
T1M-20-GF-DV-K
S1SD-20-28-GF-12.00-L1
2 Pins Powered
Signal

| Step | Description |
|---|---|
| 1. | CCC (1)<br>Rows = 2<br>Number of Positions = 1 |

Group 2
T1M-20-GF-DV-K
S1SD-20-28-GF-12.00-L1
4 Pins Powered
Signal

| Step | Description |
|---|---|
| 1. | CCC (1)<br>Rows = 2<br>Number of Positions = 2 |

Group 3
T1M-20-GF-DV-K
S1SD-20-28-GF-12.00-L1
6 Pins Powered
Signal

| Step | Description |
|---|---|
| 1. | CCC (1)<br>Rows = 2<br>Number of Positions = 3 |

Group 4
T1M-20-GF-DV-K
S1SD-20-28-GF-12.00-L1
8 Pins Powered
Signal

| Step | Description |
|---|---|
| 1. | CCC (1)<br>Rows = 2<br>Number of Positions = 4 |

Group 5
T1M-20-GF-DV-K
S1SD-20-28-GF-12.00-L1
40 Pins Powered
Signal

| Step | Description |
|---|---|
| 1. | CCC (1)<br>Rows = 2<br>Number of Positions = 20 |

Group 6
T1M-20-GF-DH-K
S1SD-20-28-GF-12.00-L1
2 Pins Powered
Signal

| Step | Description |
|---|---|
| 1. | CCC (1)<br>Rows = 2<br>Number of Positions = 1 |

Group 7
T1M-20-GF-DH-K
S1SD-20-28-GF-12.00-L1
4 Pins Powered
Signal

| Step | Description |
|---|---|
| 1. | CCC (1)<br>Rows = 2<br>Number of Positions = 2 |

Group 8
T1M-20-GF-DH-K
S1SD-20-28-GF-12.00-L1
6 Pins Powered
Signal

| Step | Description |
|---|---|
| 1. | CCC (1)<br>Rows = 2<br>Number of Positions = 3 |

Group 9
T1M-20-GF-DH-K
S1SD-20-28-GF-12.00-L1
8 Pins Powered
Signal

| Step | Description |
|---|---|
| 1. | CCC (1)<br>Rows = 2<br>Number of Positions = 4 |

Group 10
T1M-20-GF-DH-K
S1SD-20-28-GF-12.00-L1
40 Pins Powered
Signal

| Step | Description |
|---|---|
| 1. | CCC (1)<br>Rows = 2<br>Number of Positions = 20 |

(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

## FLOWCHARTS Continued

### Mechanical Shock/Random Vibration/LLCR

| Group 1<br>T1M-20-GF-DV-K<br>S1SD-20-28-GF-06.00-L<br>8 Assemblies | | Group 2<br>T1M-20-GF-DH-K<br>S1SD-20-28-GF-06.00-L<br>8 Assemblies | |
|---|---|---|---|
| **Step** | **Description** | **Step** | **Description** |
| 1. | LLCR (1) | 1. | LLCR (1) |
| 2. | Mechanical Shock (2) | 2. | Mechanical Shock (2) |
| 3. | Random Vibration (3) | 3. | Random Vibration (3) |
| 4. | LLCR (1)<br>Max Delta = 15 mOhm | 4. | LLCR (1)<br>Max Delta = 15 mOhm |

(1) LLCR = EIA-364-23
Open Circuit Voltage = 20 mV Max
Test Current = 100 mA Max

(2) Mechanical Shock = EIA-364-27
Test Condition = C (100 G Peak, 6 milliseconds, Half Sine)
Number of Shocks = 3 Per Direction, Per Axis, 18 Total

(3) Random Vibration = EIA-364-28
Condition = VB (7.56 gRMS Average, 2 Hours/Axis)

## ATTRIBUTE DEFINITIONS

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.

### MECHANICAL SHOCK (Specified Pulse):

1) Reference document: EIA-364-27, *Mechanical Shock Test Procedure for Electrical Connectors*
2) Test Condition A
3) Peak Value: 50 G
4) Duration: 11 Milliseconds
5) Wave Form: Half Sine
6) Velocity: 12.3 ft/s
7) Number of Shocks: 3 Shocks / Direction, 3 Axis (18 Total)

### VIBRATION:

1) Reference document: EIA-364-28, *Vibration Test Procedure for Electrical Connectors*
2) Test Condition: VC
3) Power Spectral Density: 0.06 $G^2$ / Hz
4) G 'RMS': 9.26
5) Frequency: 50 to 2000 Hz
6) Duration: 2 Hours per axis (6 Hours total)

### NANOSECOND-EVENT DETECTION:

1) Reference document: EIA-364-87, *Nanosecond-Event Detection for Electrical Connectors*
2) Prior to test, the samples were characterized to assure the low nanosecond event being monitored will trigger the detector.
3) After characterization it was determined the test samples could be monitored for 50 nanosecond events

## ATTRIBUTE DEFINITIONS Continued

The following is a brief, simplified description of attributes.

### 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. $85^o$ 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.

### 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

## RESULTS

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

**S1SD-20-28-GF-12.00-L1/T1M-20-GF-DV-K**

- **CCC for a 30°C Temperature Rise----------2.3 A per contact with 2 contacts (2x1) powered**
- **CCC for a 30°C Temperature Rise----------1.8 A per contact with 4 contacts (2x2) powered**
- **CCC for a 30°C Temperature Rise----------1.5 A per contact with 6 contacts (2x3) powered**
- **CCC for a 30°C Temperature Rise----------1.4 A per contact with 8 contacts (2x4) powered**
- **CCC for a 30°C Temperature Rise----------0.9 A per contact with 40 contacts (2x20) powered**

**S1SD-20-28-GF-12.00-L1/T1M-20-GF-DH-K**

- **CCC for a 30°C Temperature Rise----------2.2 A per contact with 2 contacts (2x1) powered**
- **CCC for a 30°C Temperature Rise----------1.7 A per contact with 4 contacts (2x2) powered**
- **CCC for a 30°C Temperature Rise----------1.5 A per contact with 6 contacts (2x3) powered**
- **CCC for a 30°C Temperature Rise----------1.3 A per contact with 8 contacts (2x4) powered**
- **CCC for a 30°C Temperature Rise----------0.8 A per contact with 40 contacts (2x20) powered**

### Mating – Unmating Forces

**Mating/Unmating Basic**

**S1SD-20-28-GF-12.00-L1/T1M-20-GF-DV-K**

- **Initial**
  - **Mating**
    - **Min ---------- 5.47 lbs**
    - **Max---------- 7.18 lbs**
  - **Unmating**
    - **Min ---------- 3.27 lbs**
    - **Max---------- 4.72 lbs**
- **After 25 Cycles**
  - **Mating**
    - **Min ---------- 5.96 lbs**
    - **Max---------- 7.32 lbs**
  - **Unmating**
    - **Min ---------- 4.40 lbs**
    - **Max---------- 5.45 lbs**
- **After 50 Cycles**
  - **Mating**
    - **Min ---------- 6.37 lbs**
    - **Max---------- 7.75 lbs**
  - **Unmating**
    - **Min ---------- 4.86 lbs**
    - **Max---------- 5.95 lbs**
- **After 75 Cycles**
  - **Mating**
    - **Min ---------- 6.59 lbs**
    - **Max---------- 8.10 lbs**
  - **Unmating**
    - **Min ---------- 5.20 lbs**
    - **Max---------- 6.44 lbs**
- **After 100 Cycles**
  - **Mating**
    - **Min ---------- 6.77 lbs**
    - **Max---------- 8.44 lbs**
  - **Unmating**
    - **Min ---------- 5.50 lbs**
    - **Max---------- 6.67 lbs**

## RESULTS Continued

**S1SD-20-28-GF-12.00-L1/T1M-20-GF-DH-K**

- **Initial**
  - **Mating**
    - **Min ---------- 4.40 lbs**
    - **Max---------- 5.82 lbs**
  - **Unmating**
    - **Min ---------- 2.77 lbs**
    - **Max---------- 3.29 lbs**
- **After 25 Cycles**
  - **Mating**
    - **Min ---------- 4.46 lbs**
    - **Max---------- 5.77 lbs**
  - **Unmating**
    - **Min ---------- 3.02 lbs**
    - **Max---------- 4.53 lbs**
- **After 50 Cycles**
  - **Mating**
    - **Min ---------- 4.86 lbs**
    - **Max---------- 6.35 lbs**
  - **Unmating**
    - **Min ---------- 3.78 lbs**
    - **Max---------- 4.93 lbs**
- **After 75 Cycles**
  - **Mating**
    - **Min ---------- 5.45 lbs**
    - **Max---------- 6.63 lbs**
  - **Unmating**
    - **Min ---------- 4.11 lbs**
    - **Max---------- 5.12 lbs**
- **After 100 Cycles**
  - **Mating**
    - **Min ---------- 5.94 lbs**
    - **Max---------- 7.09 lbs**
  - **Unmating**
    - **Min ---------- 4.34 lbs**
    - **Max---------- 5.40 lbs**

## RESULTS Continued

### LLCR Shock & Vibration Group (192 LLCR test points)

**S1SD-20-28-GF-12.00-L1/T1M-20-GF-DV-K**

- **Initial ---------- 76.72 mOhms Max**
- **Shock &Vibration**
  - **<= +5.0 mOhms ---------- 192 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**

### Mechanical Shock & Random Vibration:

- **Shock**
  - **No Damage ---------- ---------- Pass**
  - **50 Nanoseconds ---------- ---------- Pass**
- **Vibration**
  - **No Damage ---------- ---------- Pass**
  - **50 Nanoseconds ---------- ---------- Pass**

**S1SD-20-28-GF-12.00-L1/T1M-20-GF-DH-K**

- **Initial ---------- 76.36 mOhms Max**
- **Shock &Vibration**
  - **<= +5.0 mOhms ---------- 192 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**

### Mechanical Shock & Random Vibration:

- **Shock**
  - **No Damage ---------- ---------- Pass**
  - **50 Nanoseconds ---------- ---------- Pass**
- **Vibration**
  - **No Damage ---------- ---------- Pass**
  - **50 Nanoseconds ---------- ---------- Pass**

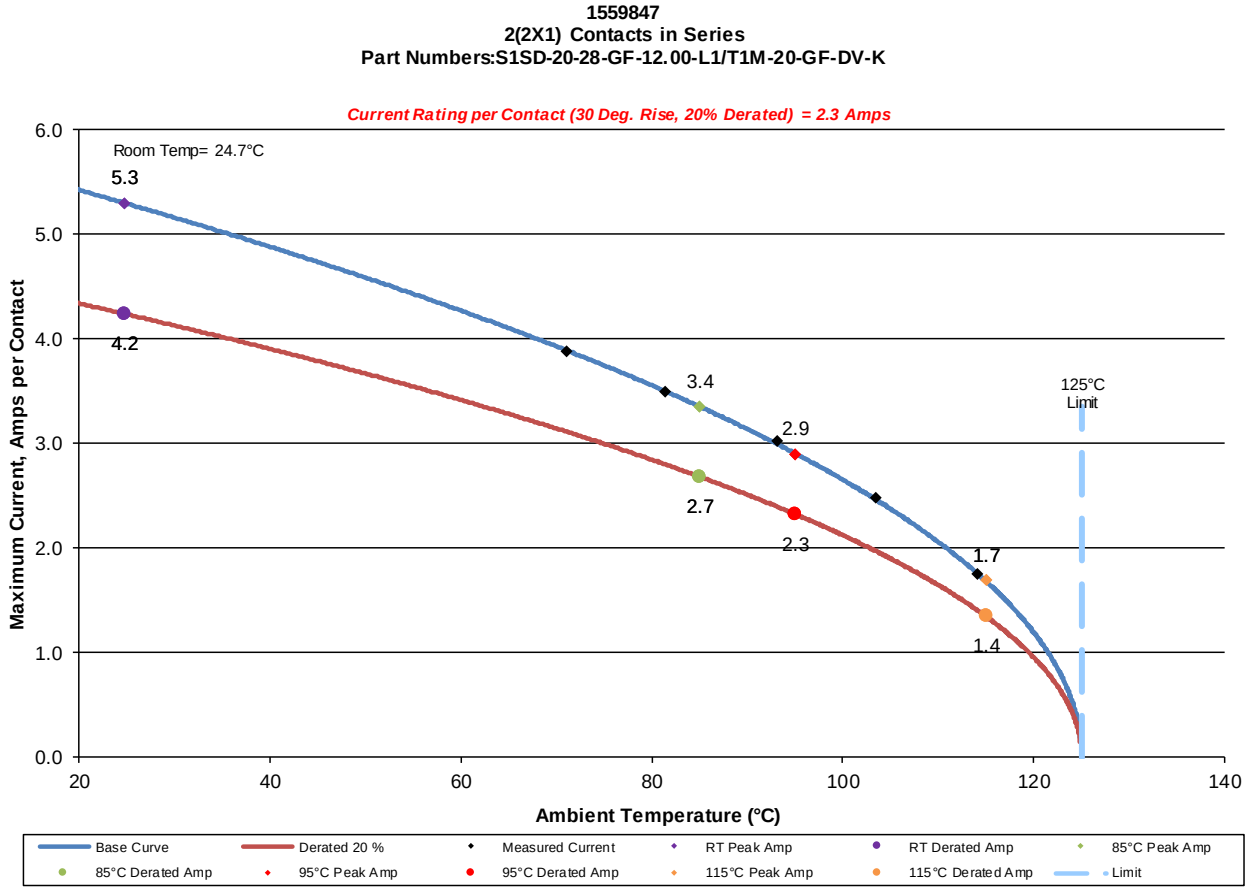
# DATA SUMMARIES

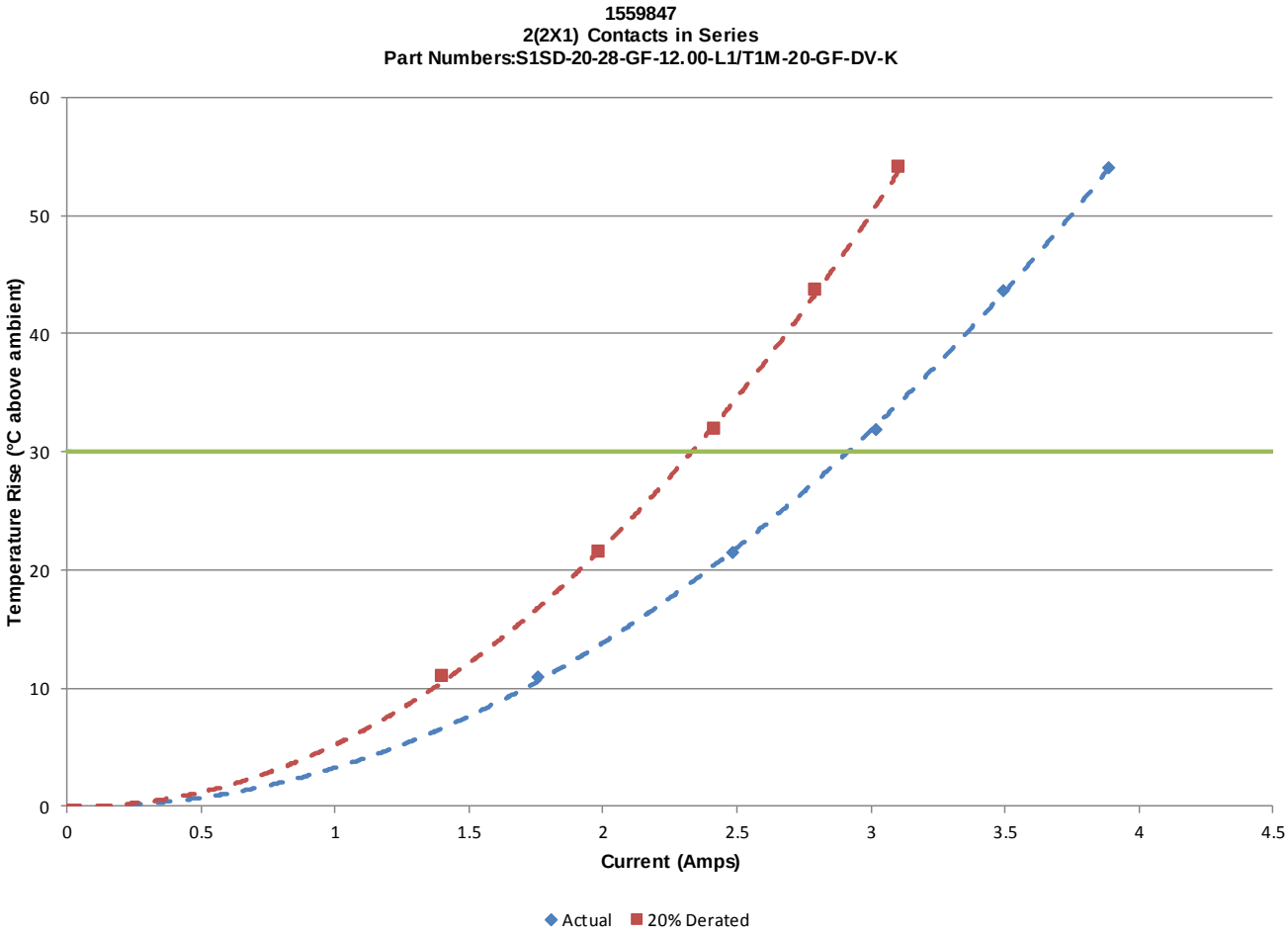
## TEMPERATURE RISE (Current Carrying Capacity, CCC):

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:

**S1SD-20-28-GF-12.00-L1/T1M-20-GF-DV-K**

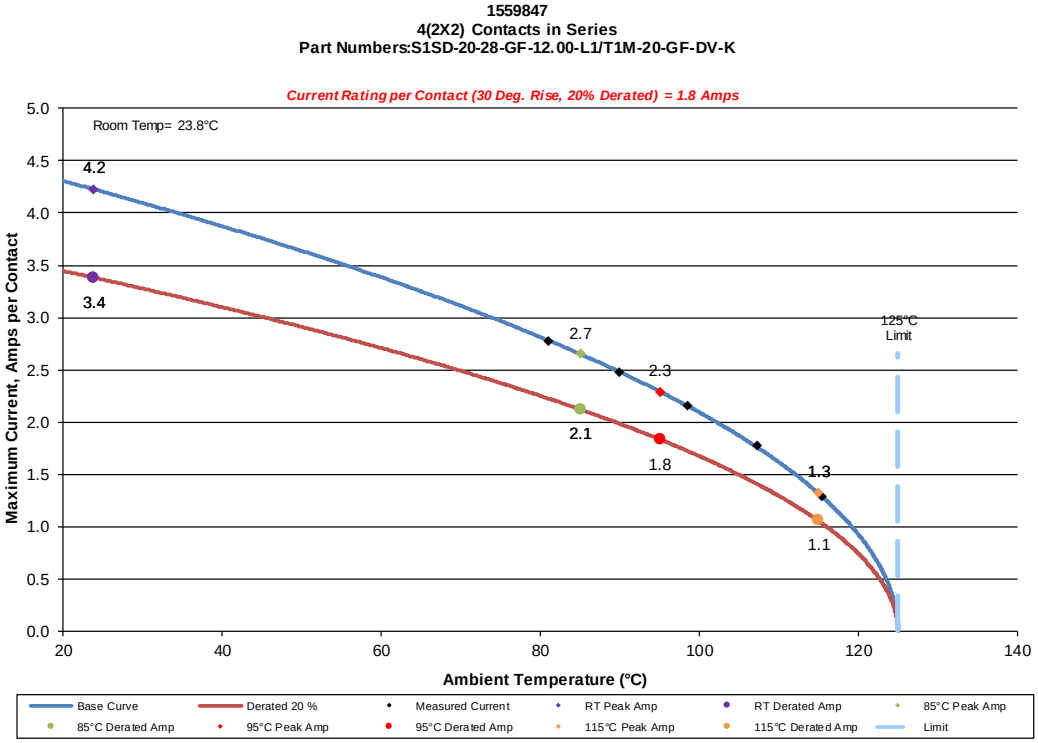
a. Linear configuration with 2 adjacent conductors/contacts powered

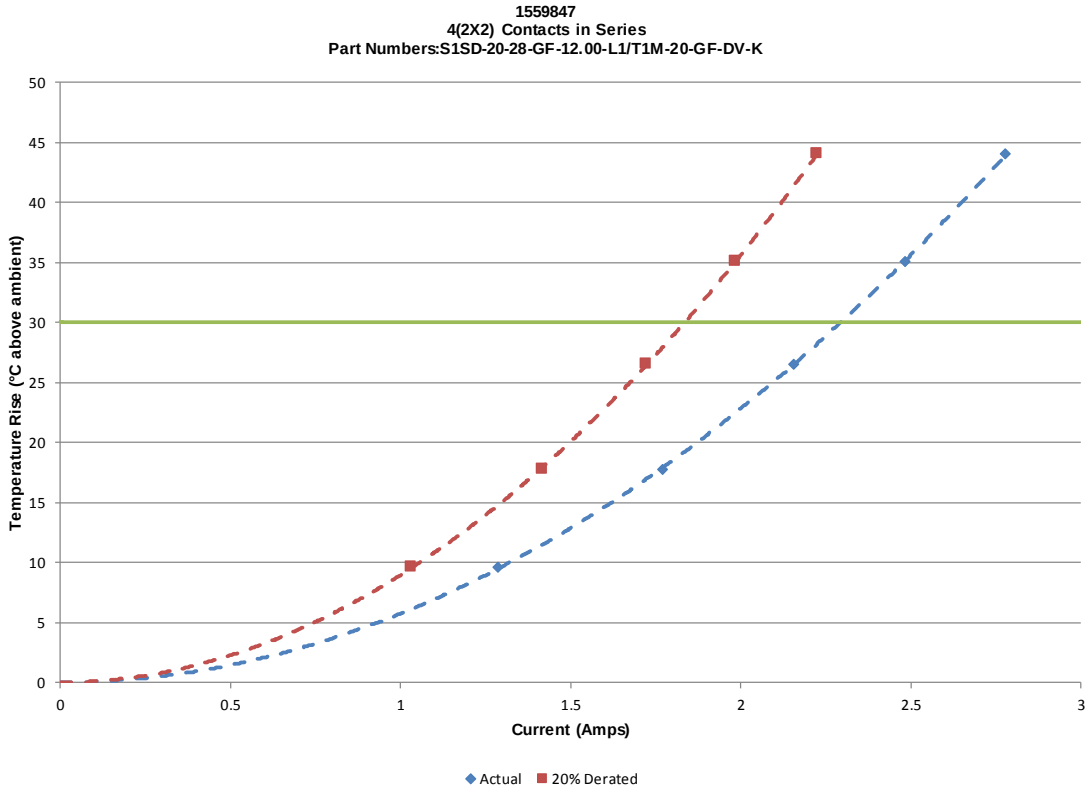



1559847
2(2X1) Contacts in Series
Part Numbers:S1SD-20-28-GF-12.00-L1/T1M-20-GF-DV-K
Temperature Rise (°C above ambient)
60
50
40
30
20
10
0
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
Current (Amps)
Actual
20% Derated

## DATA SUMMARIES Continued

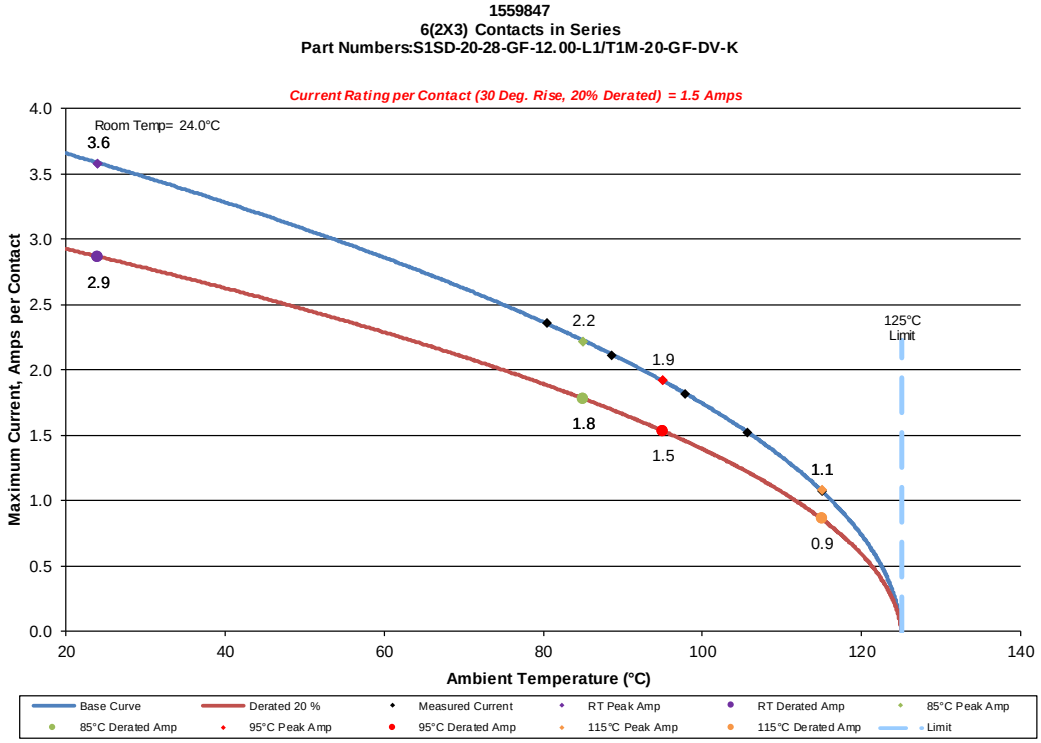
b. Linear configuration with 4 adjacent conductors/contacts powered

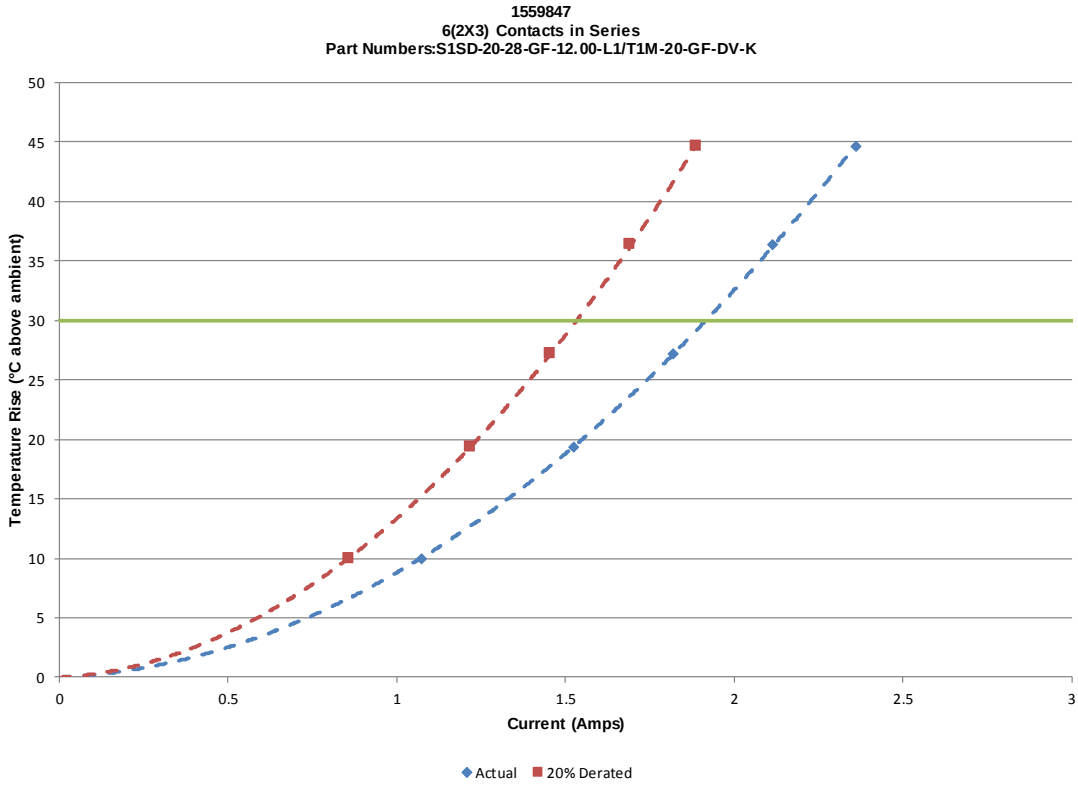


## DATA SUMMARIES Continued

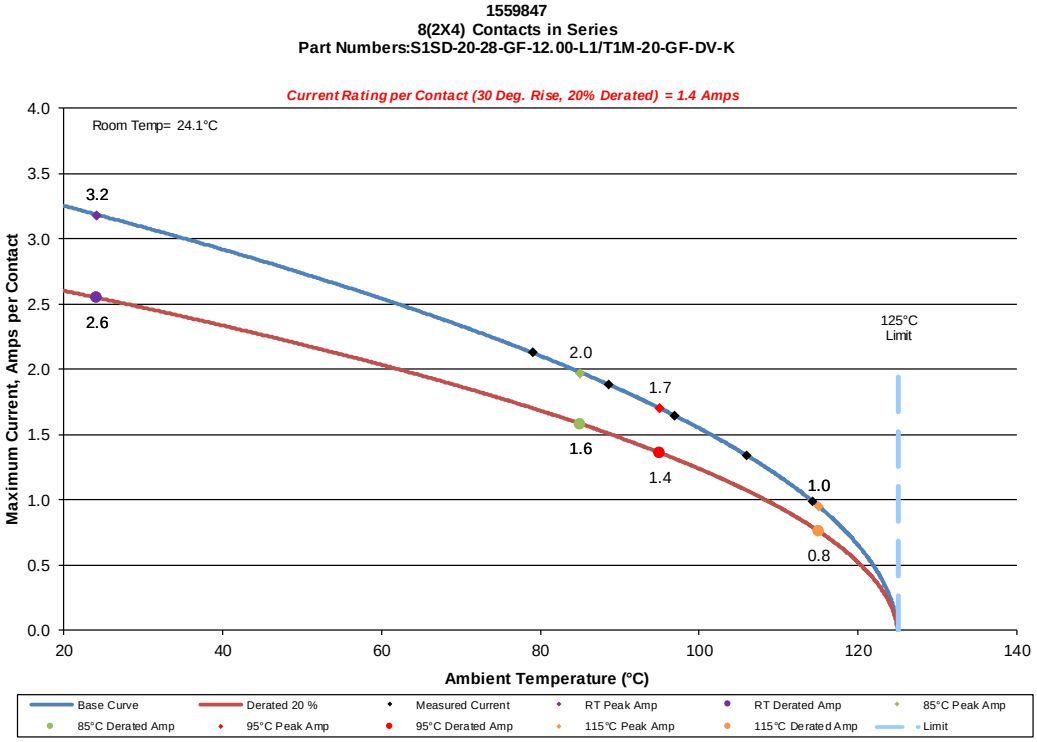
c. Linear configuration with 6 adjacent conductors/contacts powered.

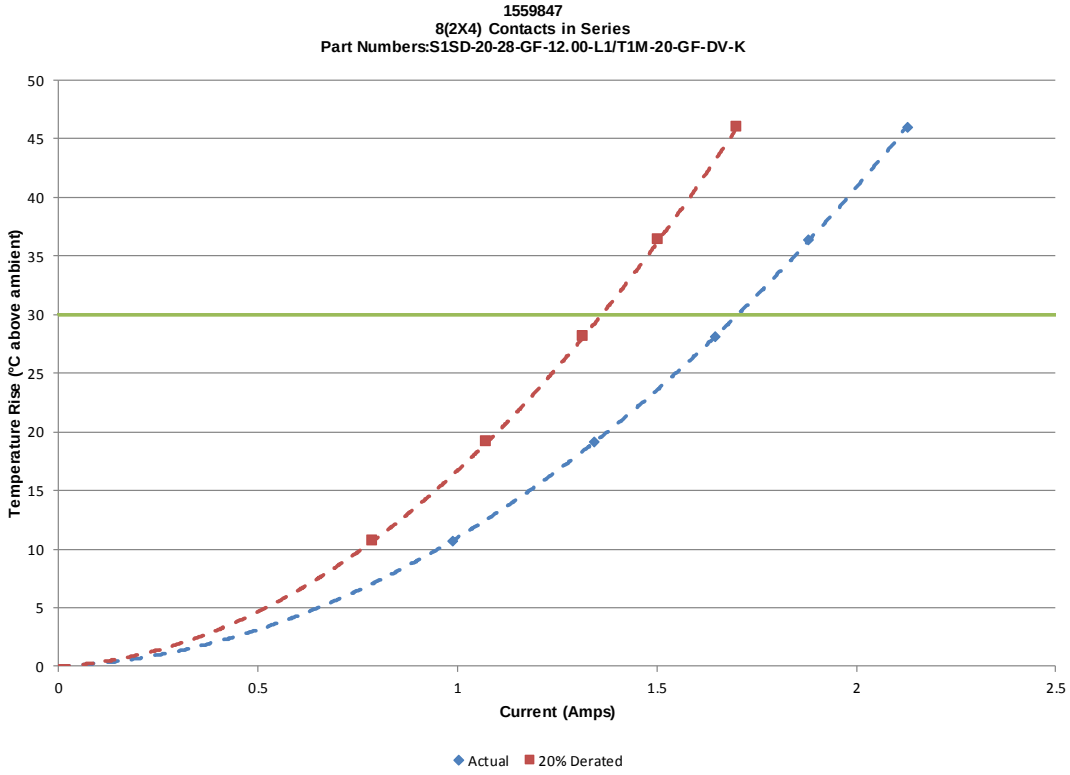


## DATA SUMMARIES Continued

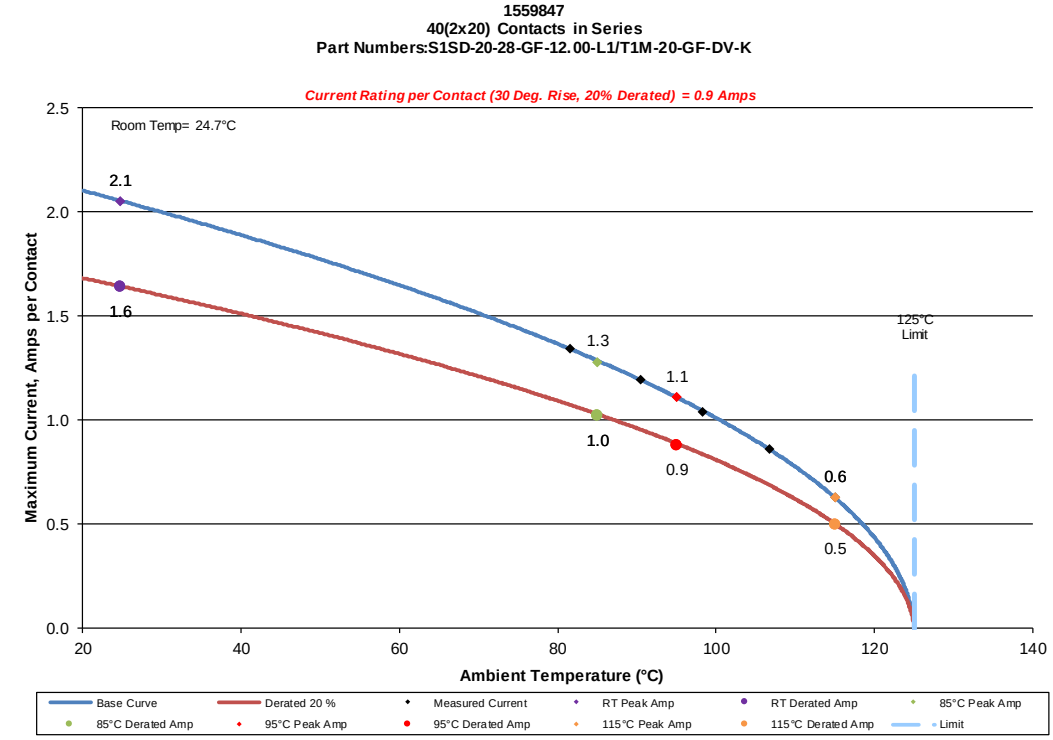
d. Linear configuration with 8 adjacent conductors/contacts powered.

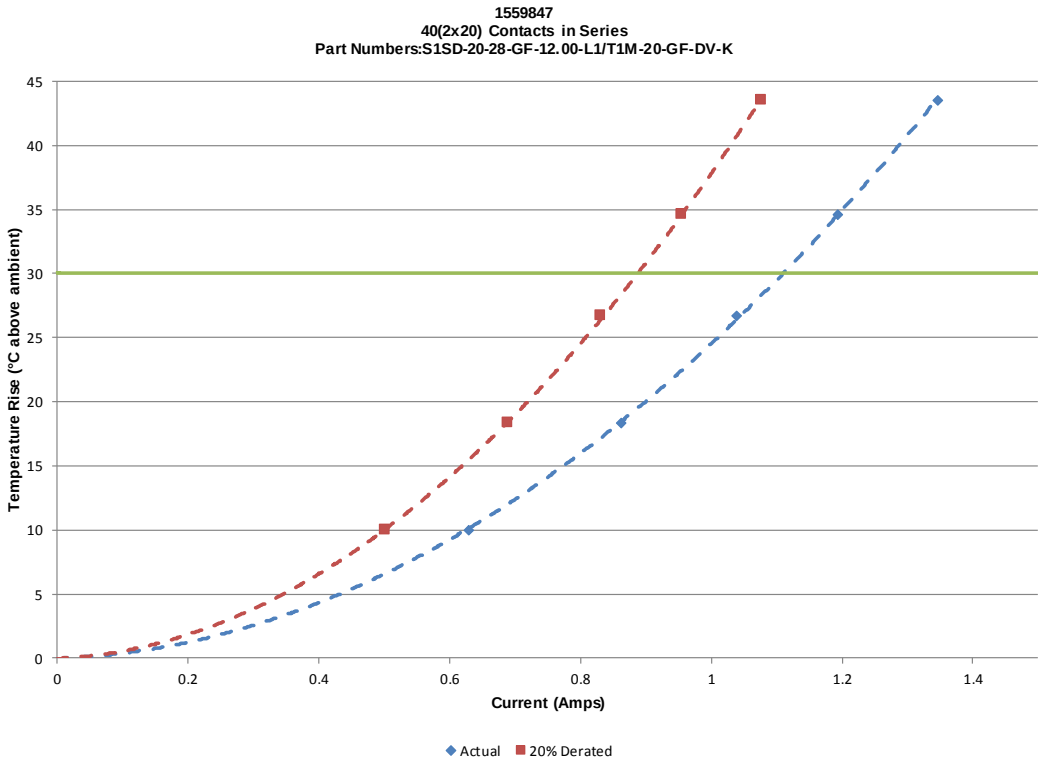


## DATA SUMMARIES Continued

e. Linear configuration with 40 adjacent conductors/contacts powered.

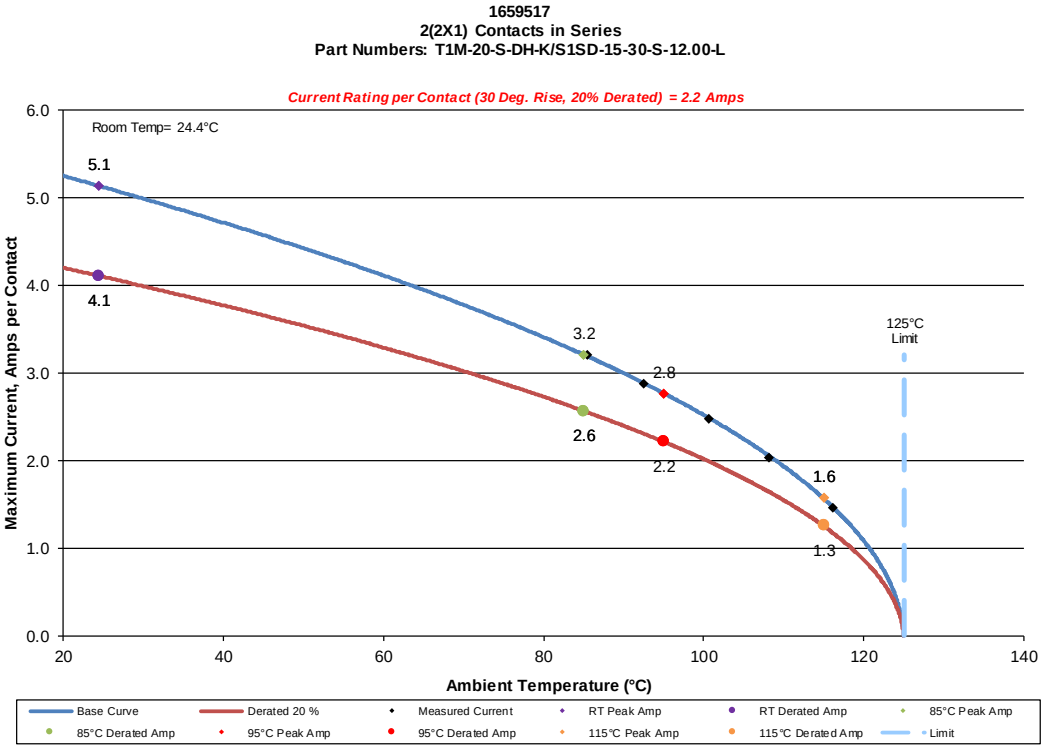


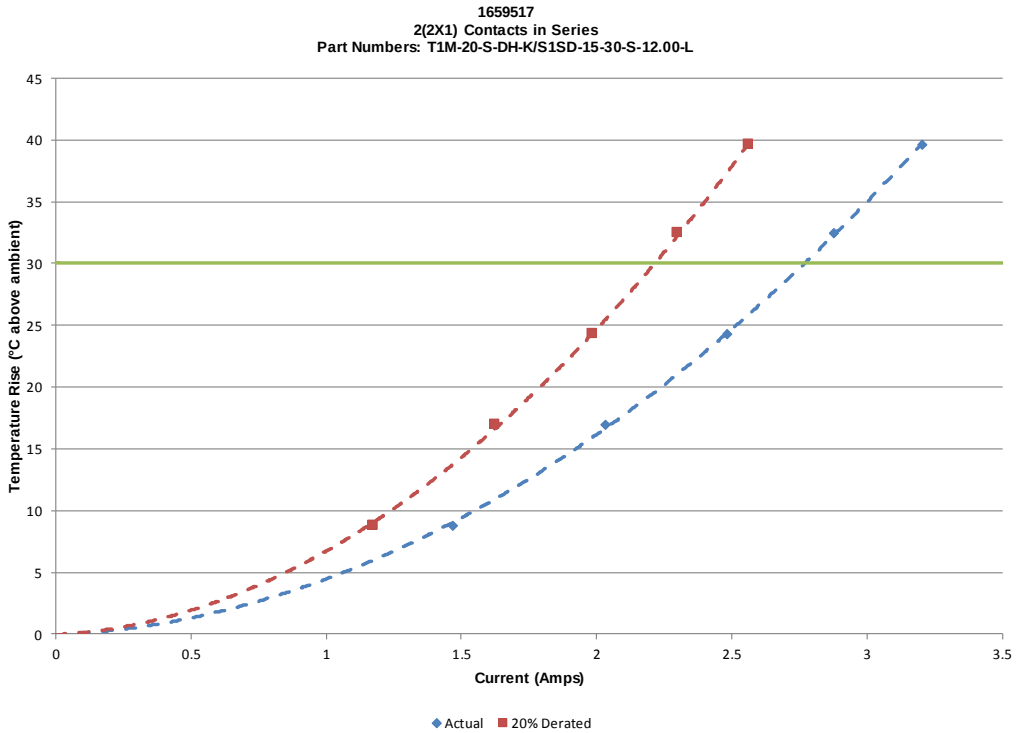



# DATA SUMMARIES Continued

**S1SD-20-28-GF-12.00-L1/T1M-20-GF-DH-K**

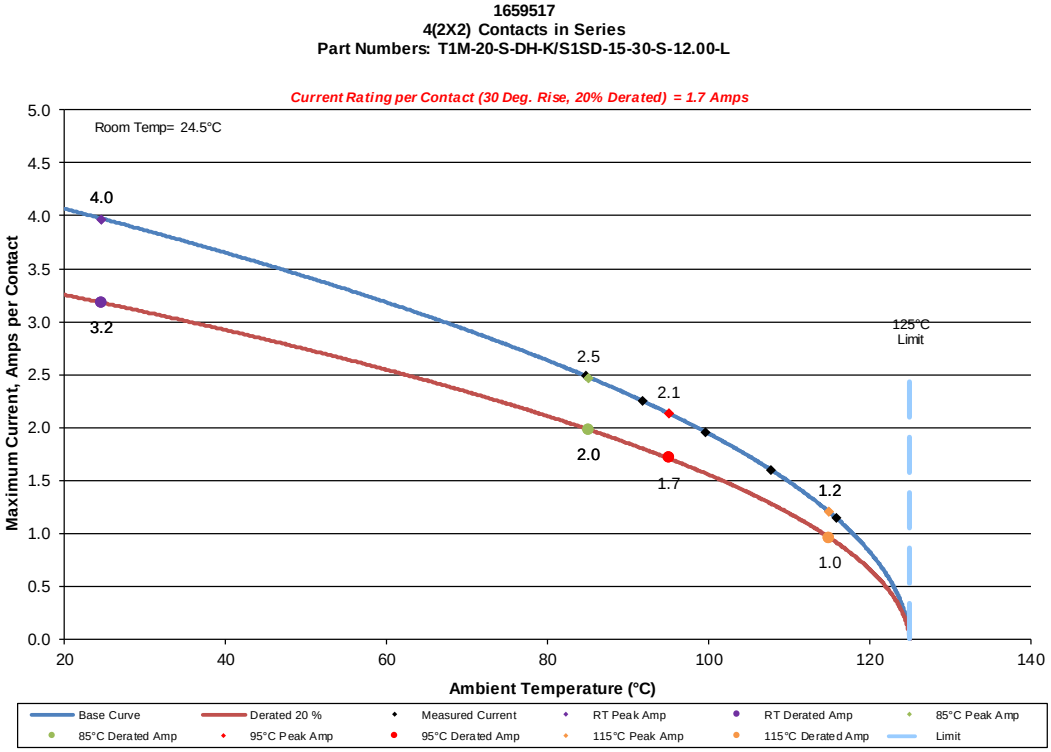
a. Linear configuration with 2 adjacent conductors/contacts powered.

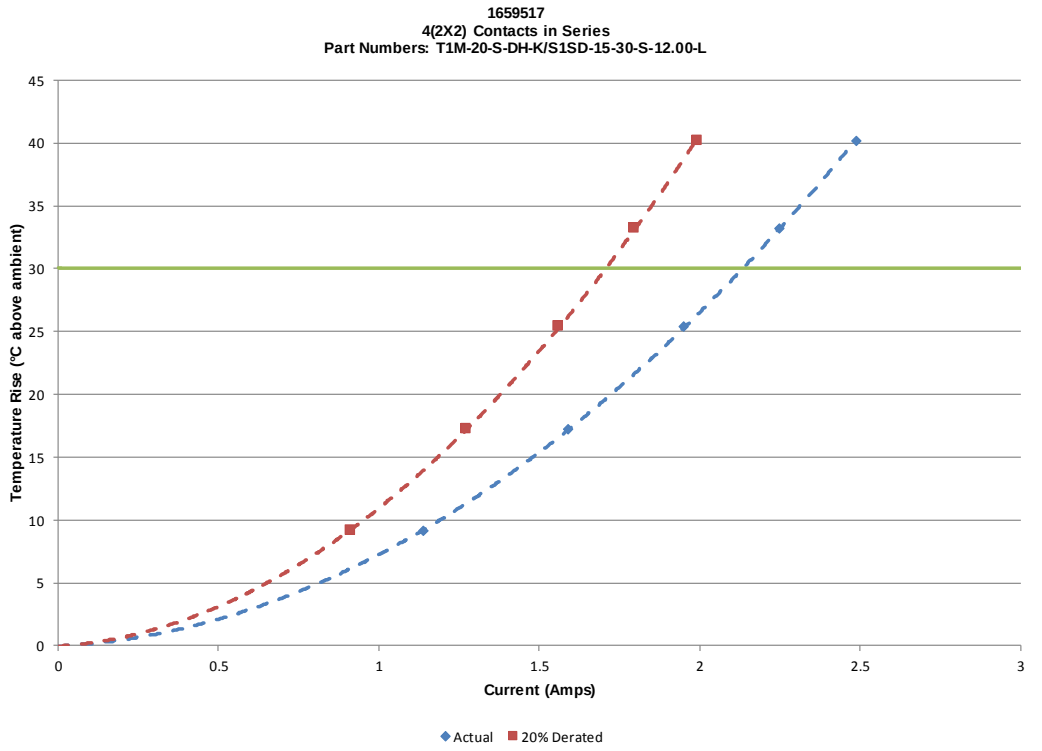


## DATA SUMMARIES Continued

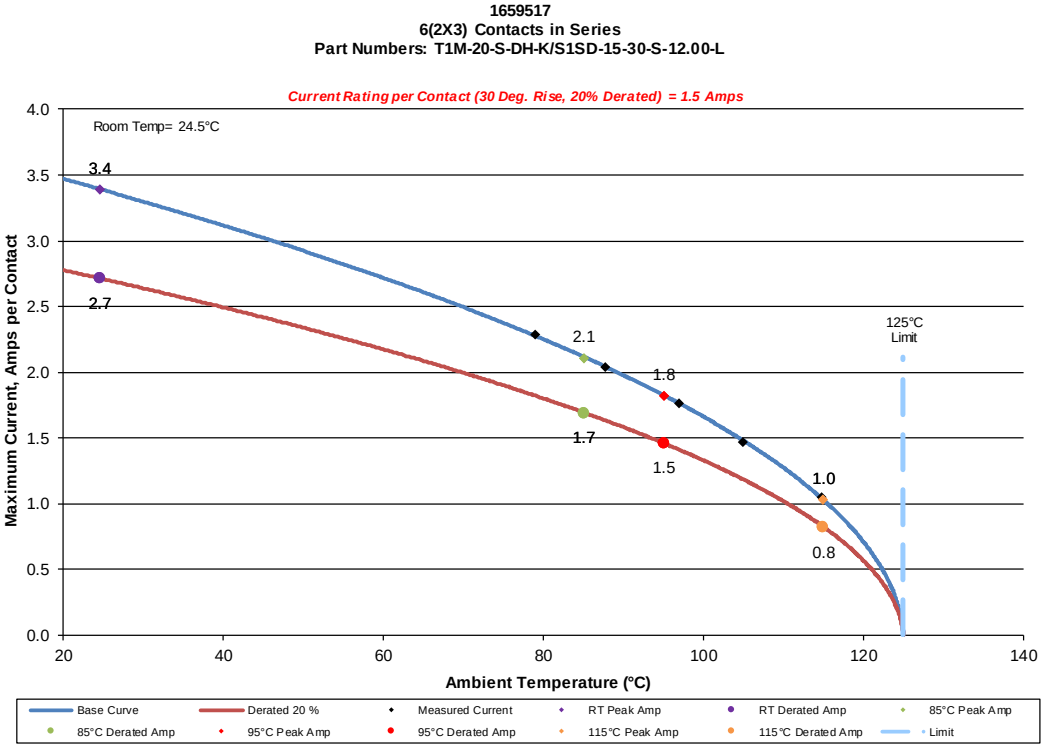
b. Linear configuration with 4 adjacent conductors/contacts powered.

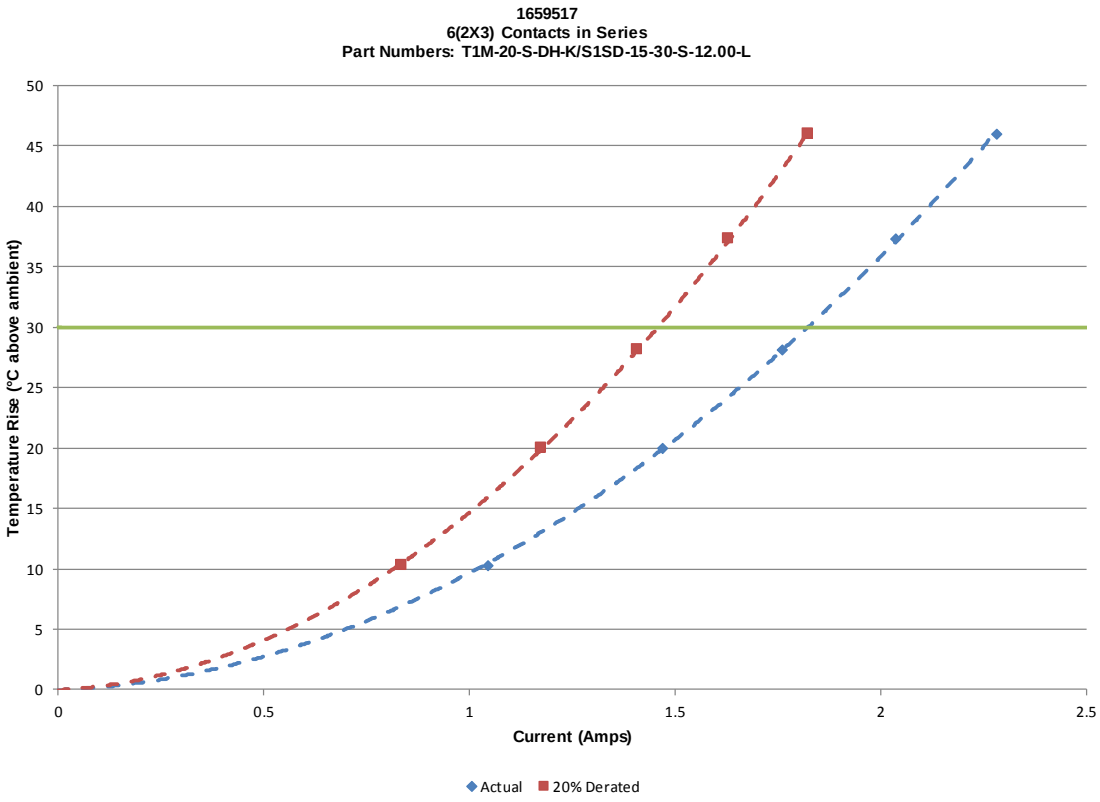


## DATA SUMMARIES Continued

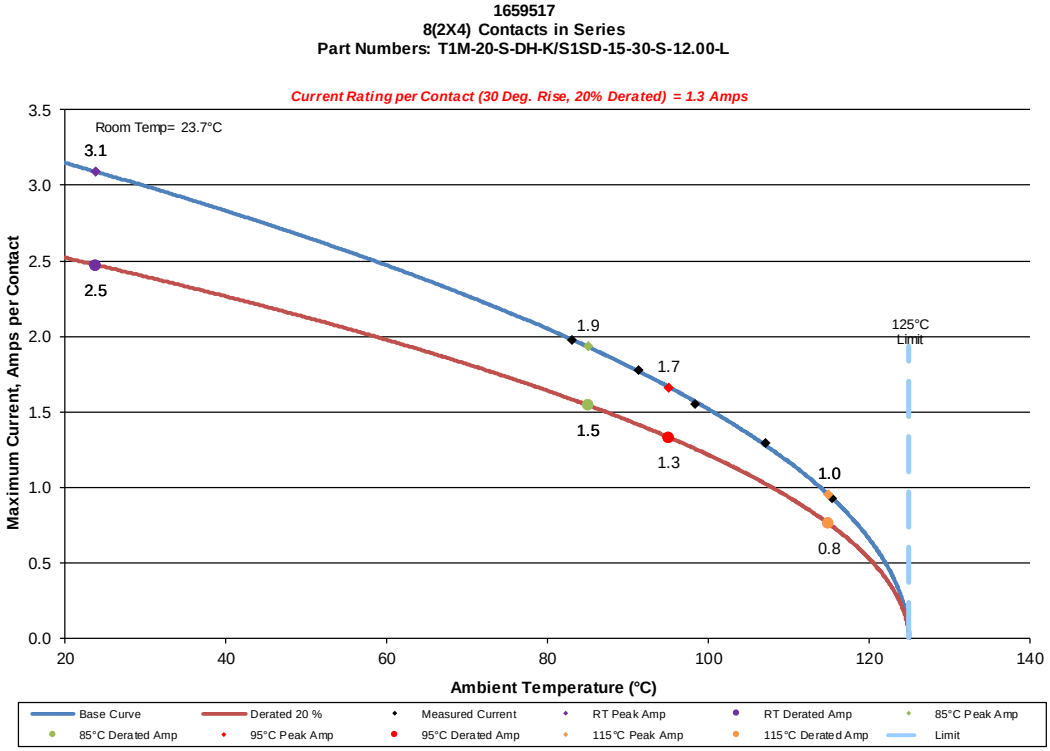
c. Linear configuration with 6 adjacent conductors/contacts powered.

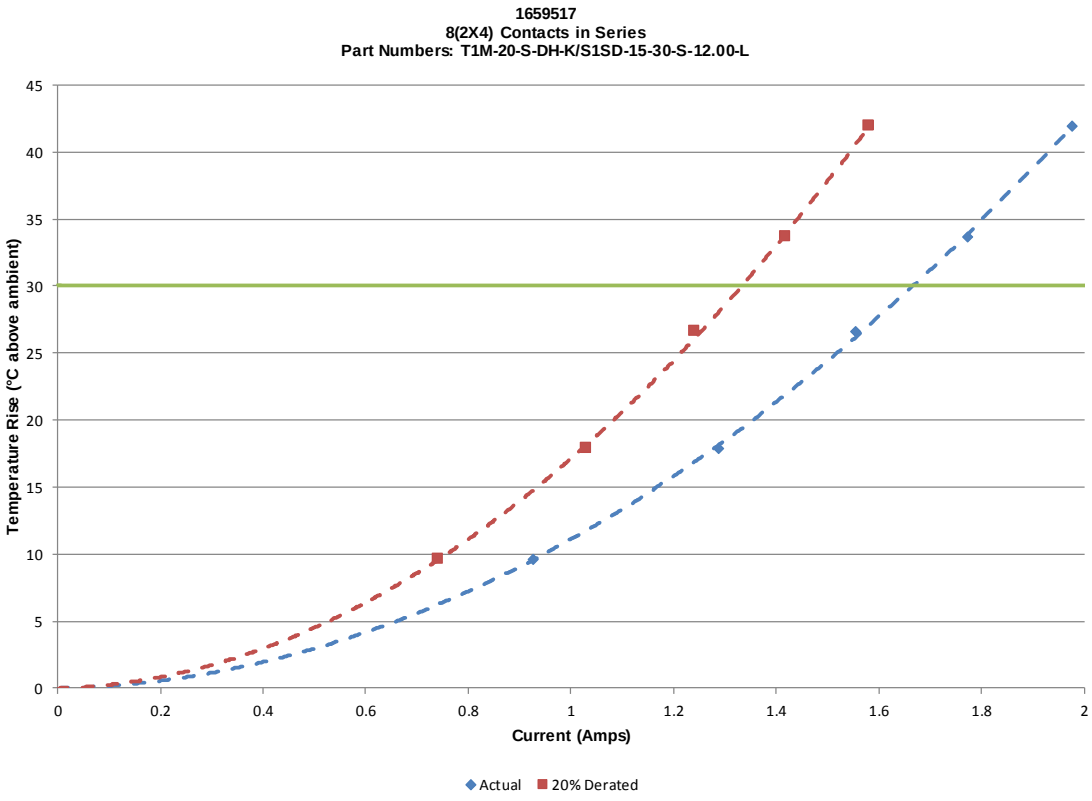


## DATA SUMMARIES Continued

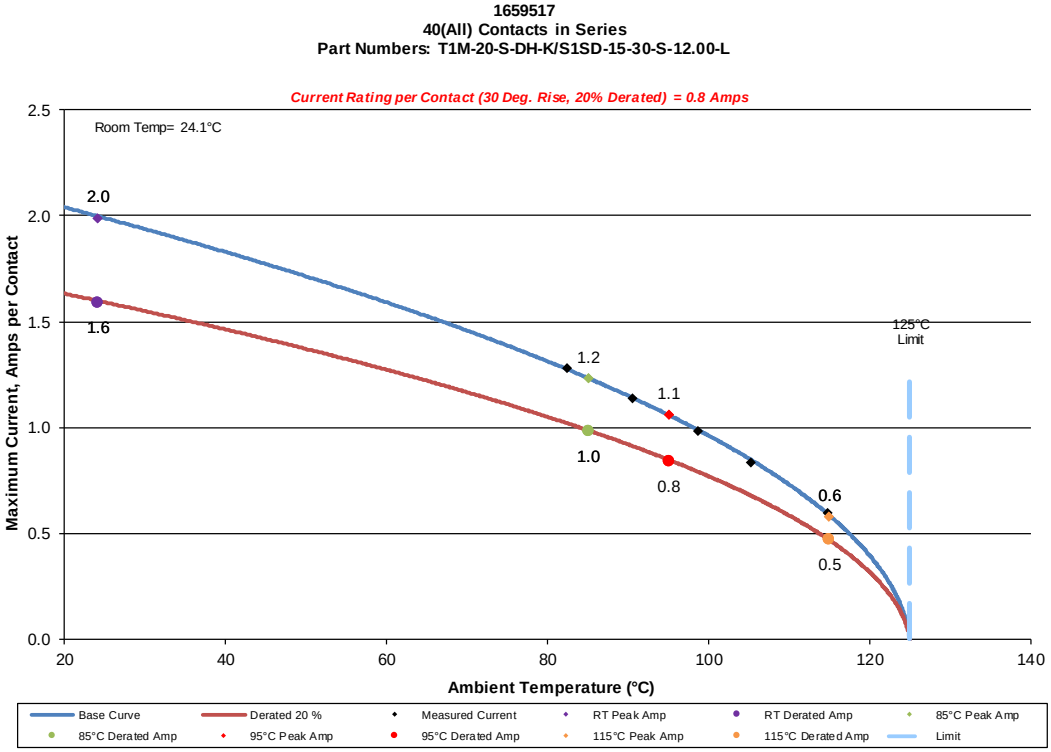
d. Linear configuration with 8 adjacent conductors/contacts powered.

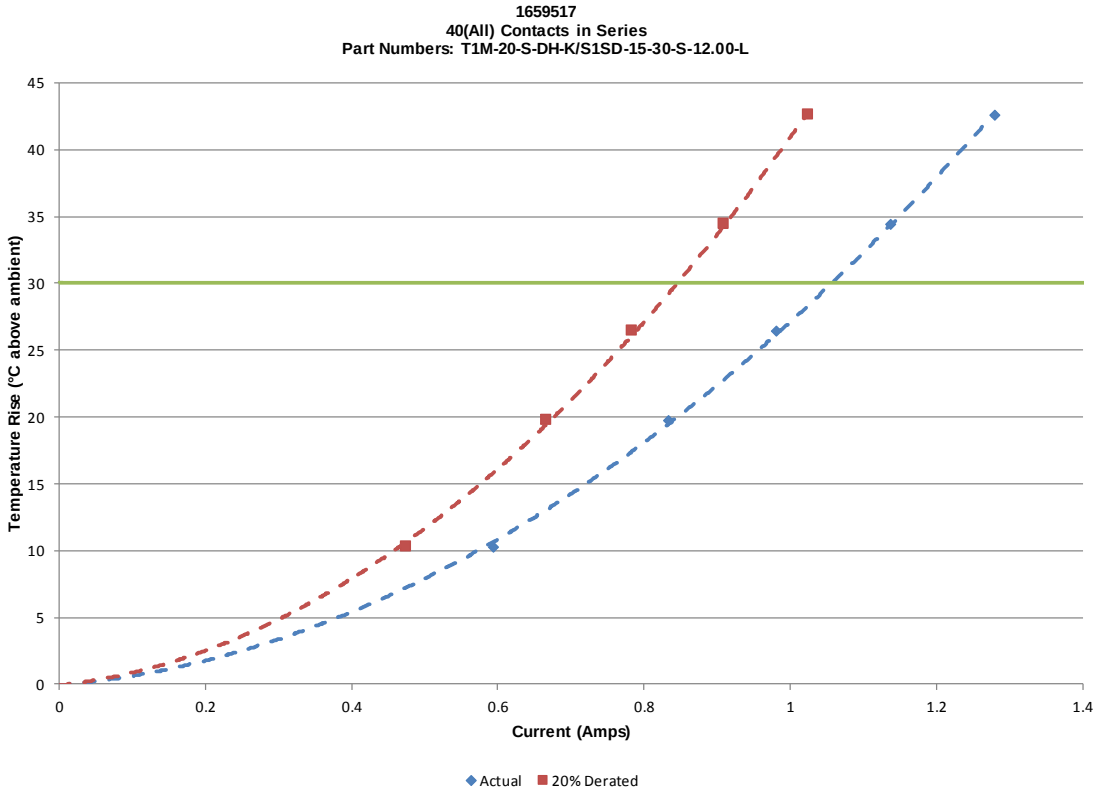


## DATA SUMMARIES Continued

e. Linear configuration with 40 adjacent conductors/contacts powered.



## DATA SUMMARIES Continued

## MATING/UNMATING:

### Mating/Unmating Basic

**S1SD-20-28-GF-06.00-L/T1M-20-GF-DV-K**

| | Initial | | | | After 25 Cycles | | | |
|---|---|---|---|---|---|---|---|---|
| | **Mating** | | **Unmating** | | **Mating** | | **Unmating** | |
| | Newtons | Force (Lbs) | Newtons | Force (Lbs) | Newtons | Force (Lbs) | Newtons | Force (Lbs) |
| Minimum | 24.32 | 5.47 | 14.53 | 3.27 | 26.53 | 5.96 | 19.58 | 4.40 |
| Maximum | 31.92 | 7.18 | 20.99 | 4.72 | 32.57 | 7.32 | 24.22 | 5.45 |
| **Average** | 27.43 | **6.17** | 17.83 | **4.01** | 28.79 | **6.47** | 22.05 | **4.96** |
| St Dev | 2.76 | 0.62 | 2.29 | 0.51 | 2.09 | 0.47 | 1.91 | 0.43 |
| Count | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |

| | After 50 Cycles | | | | After 75 Cycles | | | |
|---|---|---|---|---|---|---|---|---|
| | **Mating** | | **Unmating** | | **Mating** | | **Unmating** | |
| | Newtons | Force (Lbs) | Newtons | Force (Lbs) | Newtons | Force (Lbs) | Newtons | Force (Lbs) |
| Minimum | 28.34 | 6.37 | 21.62 | 4.86 | 29.33 | 6.59 | 23.15 | 5.20 |
| Maximum | 34.46 | 7.75 | 26.46 | 5.95 | 36.01 | 8.10 | 28.65 | 6.44 |
| **Average** | 30.39 | **6.83** | 23.78 | **5.35** | 31.95 | **7.18** | 25.41 | **5.71** |
| St Dev | 2.19 | 0.49 | 2.14 | 0.48 | 2.36 | 0.53 | 2.21 | 0.50 |
| Count | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |

| | After 100 Cycles | | | |
|---|---|---|---|---|
| | **Mating** | | **Unmating** | |
| | Newtons | Force (Lbs) | Newtons | Force (Lbs) |
| Minimum | 30.13 | 6.77 | 24.46 | 5.50 |
| Maximum | 37.53 | 8.44 | 29.66 | 6.67 |
| **Average** | 33.17 | **7.46** | 26.68 | **6.00** |
| St Dev | 2.49 | 0.56 | 2.34 | 0.53 |
| Count | 8 | 8 | 8 | 8 |

## DATA SUMMARIES Continued

**S1SD-20-28-GF-06.00-L/T1M-20-GF-DH-K**

| | Initial | | | | After 25 Cycles | | | |
|---|---|---|---|---|---|---|---|---|
| | **Mating** | | **Unmating** | | **Mating** | | **Unmating** | |
| | Newtons | Force (Lbs) | Newtons | Force (Lbs) | Newtons | Force (Lbs) | Newtons | Force (Lbs) |
| Minimum | 19.59 | 4.40 | 12.33 | 2.77 | 19.85 | 4.46 | 13.43 | 3.02 |
| Maximum | 25.89 | 5.82 | 16.84 | 3.79 | 25.66 | 5.77 | 20.15 | 4.53 |
| **Average** | 22.53 | **5.07** | 14.50 | **3.26** | 22.97 | **5.16** | 16.95 | **3.81** |
| St Dev | 2.32 | 0.52 | 1.56 | 0.35 | 2.29 | 0.52 | 2.10 | 0.47 |
| Count | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |

| | After 50 Cycles | | | | After 75 Cycles | | | |
|---|---|---|---|---|---|---|---|---|
| | **Mating** | | **Unmating** | | **Mating** | | **Unmating** | |
| | Newtons | Force (Lbs) | Newtons | Force (Lbs) | Newtons | Force (Lbs) | Newtons | Force (Lbs) |
| Minimum | 21.61 | 4.86 | 16.81 | 3.78 | 24.22 | 5.45 | 18.27 | 4.11 |
| Maximum | 28.26 | 6.35 | 21.91 | 4.93 | 29.47 | 6.63 | 22.76 | 5.12 |
| **Average** | 25.19 | **5.66** | 19.01 | **4.27** | 26.92 | **6.05** | 20.15 | **4.53** |
| St Dev | 2.29 | 0.51 | 1.79 | 0.40 | 2.08 | 0.47 | 1.76 | 0.40 |
| Count | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |

| | After 100 Cycles | | | |
|---|---|---|---|---|
| | **Mating** | | **Unmating** | |
| | Newtons | Force (Lbs) | Newtons | Force (Lbs) |
| Minimum | 26.42 | 5.94 | 19.30 | 4.34 |
| Maximum | 31.55 | 7.09 | 24.04 | 5.40 |
| **Average** | 28.64 | **6.44** | 20.98 | **4.72** |
| St Dev | 1.58 | 0.36 | 1.51 | 0.34 |
| Count | 8 | 8 | 8 | 8 |

## DATA SUMMARIES Continued

### LLCR Shock &Vibration Group:

1). A total of 192 points were measured.
2). EIA-364-23, *Low Level Contact Resistance Test Procedure for Electrical Connectors and Sockets.*
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 +8.0 mOhms:---------- Minor
   c. +8.1 to +10.0 mOhms:---------- Acceptable
   d. +10.1 to +50.0 mOhms:---------- Marginal
   e. +50.1 to +2000 mOhms ---------- Unstable
   f. >+2000 mOhms:---------- Open Failure

**S1SD-20-28-GF-12.00-L1/T1M-20-GF-DV-K**

| | ***LLCR Measurement Summaries by Pin Type*** | | | |
|---|---|---|---|---|
| Date | 10/30/2018 | 11/1/2018 | | |
| Room Temp (Deg C) | 22 | 22 | | |
| Rel Humidity (%) | 39 | 46 | | |
| Technician | Tony Wagoner | Tony Wagoner | | |
| **mOhm values** | **Actual Initial** | **Delta Shock-Vib** | **Delta** | **Delta** |
| | **Pin Type 1: Signal** | | | |
| Average | 72.34 | 0.77 | | |
| St. Dev. | 2.61 | 0.66 | | |
| Min | 66.06 | 0.00 | | |
| Max | 76.72 | 3.33 | | |
| Summary Count | 192 | 192 | | |
| Total Count | 192 | 192 | | |

| ***LLCR Delta Count by Category*** | | | | | | |
|---|---|---|---|---|---|---|
| | **Stable** | **Minor** | **Acceptable** | **Marginal** | **Unstable** | **Open** |
| **mOhms** | **<=5** | **>5 & <=10** | **>10 & <=15** | **>15 & <=50** | **>50 & <=1000** | **>1000** |
| **Shock-Vib** | **192** | **0** | **0** | **0** | **0** | **0** |

### Nanosecond Event Detection:

| Shock and Vibration Event Detection Summary | |
|---|---|
| Contacts tested | 60 |
| Test Condition | C, 100g's, 6ms, Half-Sine |
| Shock Events | 0 |
| Test Condition | V-B, 7.56 rms g |
| Vibration Events | 0 |
| Total Events | 0 |

## DATA SUMMARIES Continued

**S1SD-20-28-GF-12.00-L1/T1M-20-GF-DH-K**

| | *LLCR Measurement Summaries by Pin Type* | | | |
|---|---|---|---|---|
| Date | 11/1/2018 | 11/3/2018 | | |
| Room Temp (Deg C) | 23 | 22 | | |
| Rel Humidity (%) | 46 | 38 | | |
| Technician | Tony Wagoner | Tony Wagoner | | |
| **mOhm values** | **Actual Initial** | **Delta Shock-Vib** | **Delta** | **Delta** |
| | **Pin Type 1: Signal** | | | |
| Average | 70.39 | 0.53 | | |
| St. Dev. | 3.18 | 0.47 | | |
| Min | 62.45 | 0.00 | | |
| Max | 76.36 | 3.90 | | |
| Summary Count | 192 | 192 | | |
| Total Count | 192 | 192 | | |

| *LLCR Delta Count by Category* | | | | | | |
|---|---|---|---|---|---|---|
| | **Stable** | **Minor** | **Acceptable** | **Marginal** | **Unstable** | **Open** |
| **mOhms** | **<=5** | **>5 & <=10** | **>10 & <=15** | **>15 & <=50** | **>50 & <=1000** | **>1000** |
| **Shock-Vib** | **192** | **0** | **0** | **0** | **0** | **0** |

**Nanosecond Event Detection:**

| Shock and Vibration Event Detection Summary | |
|---|---|
| Contacts tested | 60 |
| Test Condition | C, 100g's, 6ms, Half-Sine |
| Shock Events | 0 |
| Test Condition | V-B, 7.56 rms g |
| Vibration Events | 0 |
| Total Events | 0 |

## EQUIPMENT AND CALIBRATION SCHEDULES

**Equipment #:** HZ-TCT-01
**Description:** Normal force analyzer
**Manufacturer:** Mecmesin Multitester
**Model:** Mecmesin Multitester 2.5-i
**Serial #:** 08-1049-04
**Accuracy:** Last Cal: 4/26/2018, Next Cal: 4/25/2019

**Equipment #:** HZ-MO-01
**Description:** Micro-ohmmeter
**Manufacturer:** Keithley
**Model:** 2700
**Serial #:** 1199807
**Accuracy: Last** Cal: 04/28/2018, Next Cal: 04/28/2019

**Equipment #:** HZ-PS-01
**Description:** Power Supply
**Manufacturer:** Agilent
**Model:** 6031A
**Serial #:** MY41000982
**Accuracy:** Last Cal: 04/28/2018, Next Cal: 04/28/2019

**Equipment #:** SVC-01
**Description:** Shock & Vibration Table
**Manufacturer:** Data Physics
**Model:** LE-DSA-10-20K
**Serial #:** 10037
**Accuracy:** See Manual
… Last Cal: 04/22/2018, Next Cal: 04/22/2019

**Equipment #:** ACLM-01
**Description:** Accelerometer
**Manufacturer:** PCB Piezotronics
**Model:** 352C03
**Serial #:** 115819
**Accuracy:** See Manual
… Last Cal: 07/18/2018, Next Cal: 07/18/2019

**Equipment #:** ED-03
**Description:** Event Detector
**Manufacturer:** Analysis Tech
**Model:** 32EHD
**Serial #:** 1100604
**Accuracy:** See Manual
… Last Cal: 10/31/2018, Next Cal: 10/31/2019