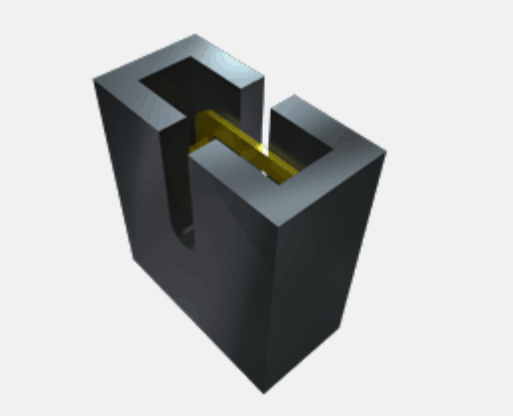
Project Number: Design Qualification Test Report	Tracking Code: 440550_Report_Rev_1
Requested by: Vico Zhao	Date: 12/5/2014
Part #: 2SN-BK-G/TMM-102-01-L-D-SM	
Part description: 2SN/TMM	Tech: Kason He
Test Start: 11/25/2014	Test Completed: 11/28/2014



DESIGN QUALIFICATION TEST REPORT

2SN/TMM
2SN-BK-G/TMM-102-01-L-D-SM

REVISION HISTORY

DATA	REV.NUM.	DESCRIPTION	ENG
12/05/2014	**1**	**Initial Issue**	**KH**

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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.

FLOWCHARTS

Mating/Unmating/Durability

Group 1
2SN-BK-G
TMM-102-01-L-D-SM
8 Assemblies

Step	Description
1.	Contact Gaps
2.	LLCR (1)
3.	Mating/Unmating Force (2)
4.	Cycles Quantity = 25 Cycles
5.	Mating/Unmating Force (2)
6.	Contact Gaps
7.	LLCR (1) Max Delta = 15 mOhm

(1) LLCR = EIA-364-23
Open Circuit Voltage = 20 mV Max
Test Current = 100 mA Max
(2) Mating/Unmating Force = EIA-364-13

Current Carrying Capacity

Group 1
2SN-BK-G
TMM-102-01-L-D-SM
1 Pins Powered
Signal

Step	Description
1.	CCC (1) Rows = 1 Number of Positions = 1

(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

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 three 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

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RESULTS

Temperature Rise, CCC at a 20% de-rating

- **CCC for a 30°C Temperature Rise ----------3.4 A per contact with 1 contacts (1 x 1) powered**

Mating/Unmating Forces

Initial

- **Mating**
  - **Min ---------- 0.33 Lbs**
  - **Max---------- 0.50 Lbs**
- **Unmating**
  - **Min ---------- 0.27 Lbs**
  - **Max---------- 0.38 Lbs**

- **After 25 Cycles**
  - **Mating**
    - **Min ---------- 0.41 Lbs**
    - **Max---------- 0.50 Lbs**
  - **Unmating**
    - **Min ---------- 0.34 Lbs**
    - **Max---------- 0.56 Lbs**

LLCR Mating/Unmating Durability (8 LLCR test points)

- **Initial ---------- 11.29 mOhms Max**
- **Durability, 25 Cycles**
  - **<= +5.0 mOhms ---------- 8 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**

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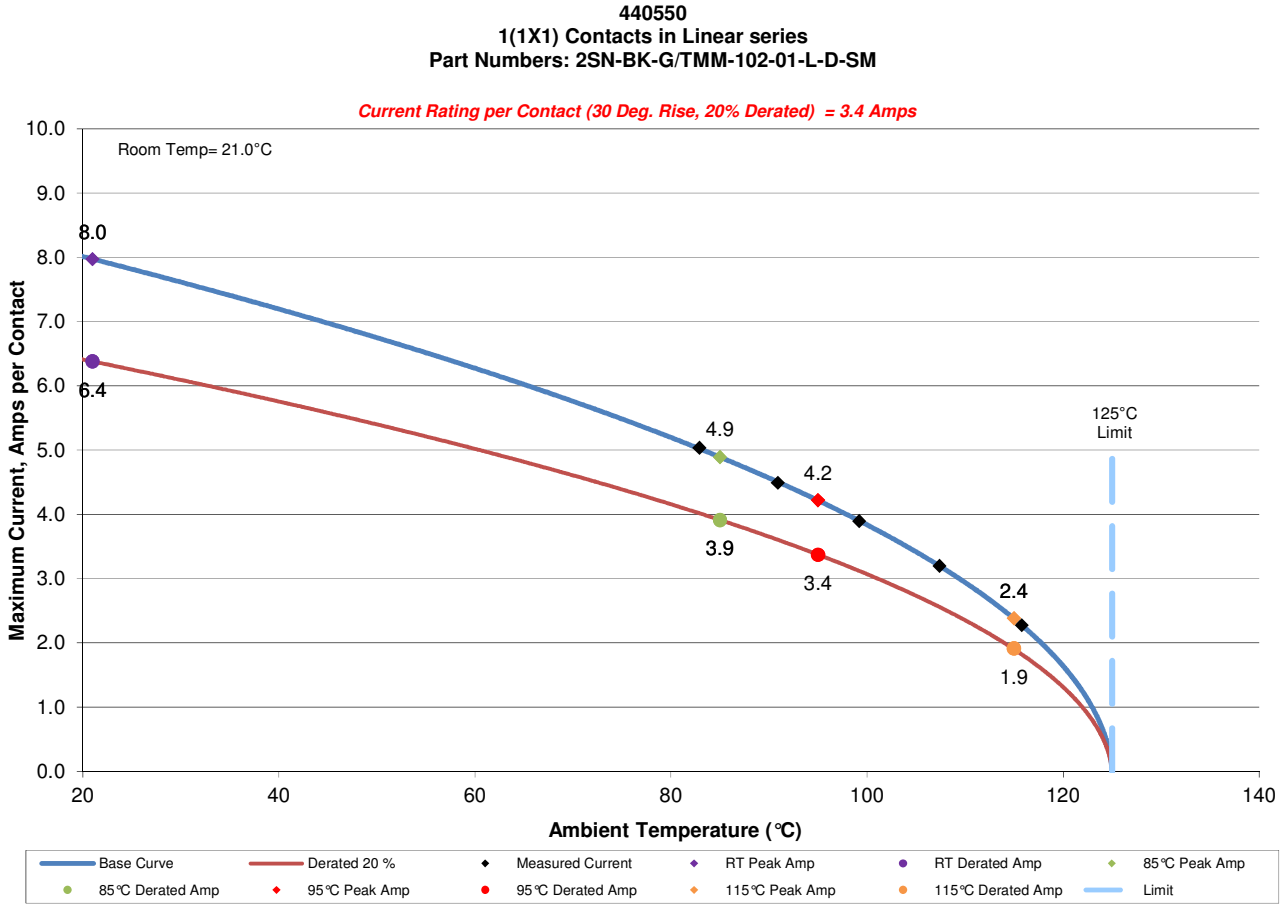
DATA SUMMARIES

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 1 adjacent conductors/contacts powered



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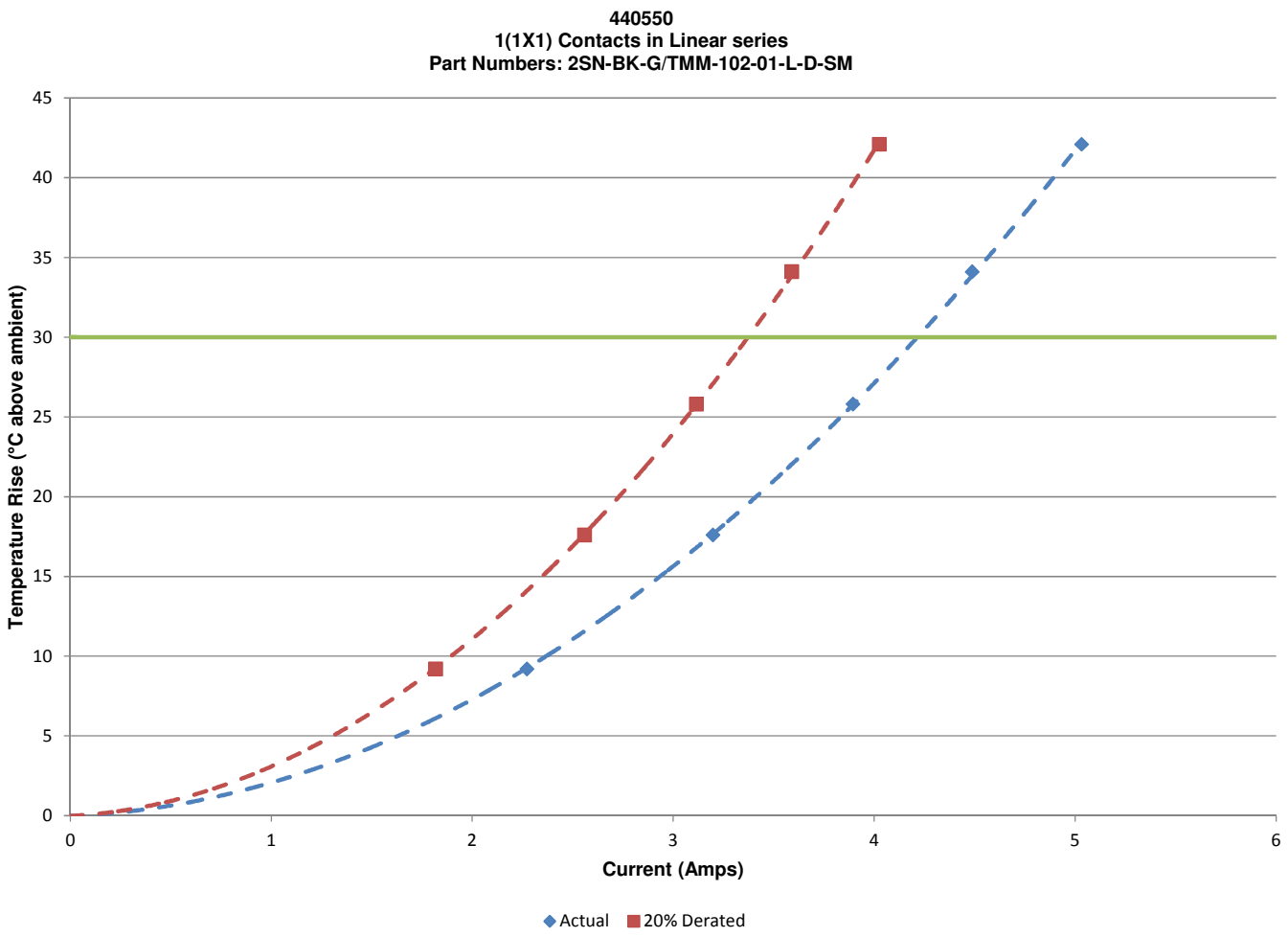

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DATA SUMMARIES Continued

MATING-UNMATING FORCE:

	Initial				After 25 Cycles			
	Mating		**Unmating**		**Mating**		**Unmating**	
	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)
Minimum	1.47	0.33	1.20	0.27	1.82	0.41	1.51	0.34
Maximum	2.22	0.50	1.69	0.38	2.22	0.50	2.49	0.56
Average	1.80	**0.41**	1.39	**0.31**	2.00	**0.45**	1.90	**0.43**
St Dev	0.27	0.06	0.17	0.04	0.13	0.03	0.34	0.08
Count	8	8	8	8	8	8	8	8

DATA SUMMARIES Continued

LLCR Mating/Unmating Durability Group

1). A total of 8 points were measured.
2). EIA-364-23, *Low Level Contact Resistance Test Procedure for Electrical Connectors and Sockets.*
3). A computer program, *LLCR 221.exe*, ensures repeatability for data acquisition.
4). 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

	LLCR Measurement Summaries by Pin Type			
Date	2014/11/25	2014/11/25		
Room Temp (Deg C)	20	20		
Rel Humidity (%)	50	50		
Technician	Kason He	Kason He		
mOhm values	**Actual Initial**	**Delta 25 Cycles**	**Delta**	**Delta**
	Pin Type 1: Signal			
Average	10.86	0.30		
St. Dev.	0.42	0.18		
Min	10.26	0.07		
Max	11.29	0.59		
Summary Count	8	8		
Total Count	8	8		

LLCR Delta Count by Category						
	Stable	**Minor**	**Acceptable**	**Marginal**	**Unstable**	**Open**
mOhms	**<=5**	**>5 & <=10**	**>10 & <=15**	**>15 & <=50**	**>50 & <=1000**	**>1000**
25 Cycles	**8**	**0**	**0**	**0**	**0**	**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: 4/25/2014, Next Cal: 4/24/2015

Equipment #: HZ-MO-05
Description: Micro-ohmmeter
Manufacturer: Keithley
Model: 3706
Serial #: 1285188
Accuracy: Last Cal: 11/13/2014, Next Cal: 11/12/2015

Equipment #: HZ-PS-01
Description: 120 Amp Power Supply
Manufacturer: Agilent
Model: 6031A PS
Serial #: MY41000982
Accuracy: See Manual
… Last Cal: 07/01/2014, Next Cal: 07/30/2015

Equipment #: HZ-MO-01
Description: Multimeter /Data Acquisition System
Manufacturer: Keithley
Model: 2700
Serial #: 1199807
Accuracy: See Manual
… Last Cal: 07/01/2014, Next Cal: 06/30/2015