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|-------------------------|---------------------------|-----------------------------|----------------------------------|
| Project Number: | | Tracking Code: TC0819--1719 | |
| Requested by: John Reid | | Date:06/03/2008 | Product Rev: 0 |
| Part #: TCSD-120-SR | | Lot #: 5/5/2008 | Tech: Eric Fox Eng: Troy Cook |
| Part description: TCSD | | | Qty to test: 30 |
| Test Start: 05/05/2008 | Test Completed: 5/27/2008 | | |

QUALIFICATION TEST REPORT of STRAIN RELIEF OPTION FOR TCSD

PART DESCRIPTION

TCSD-20-SR

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

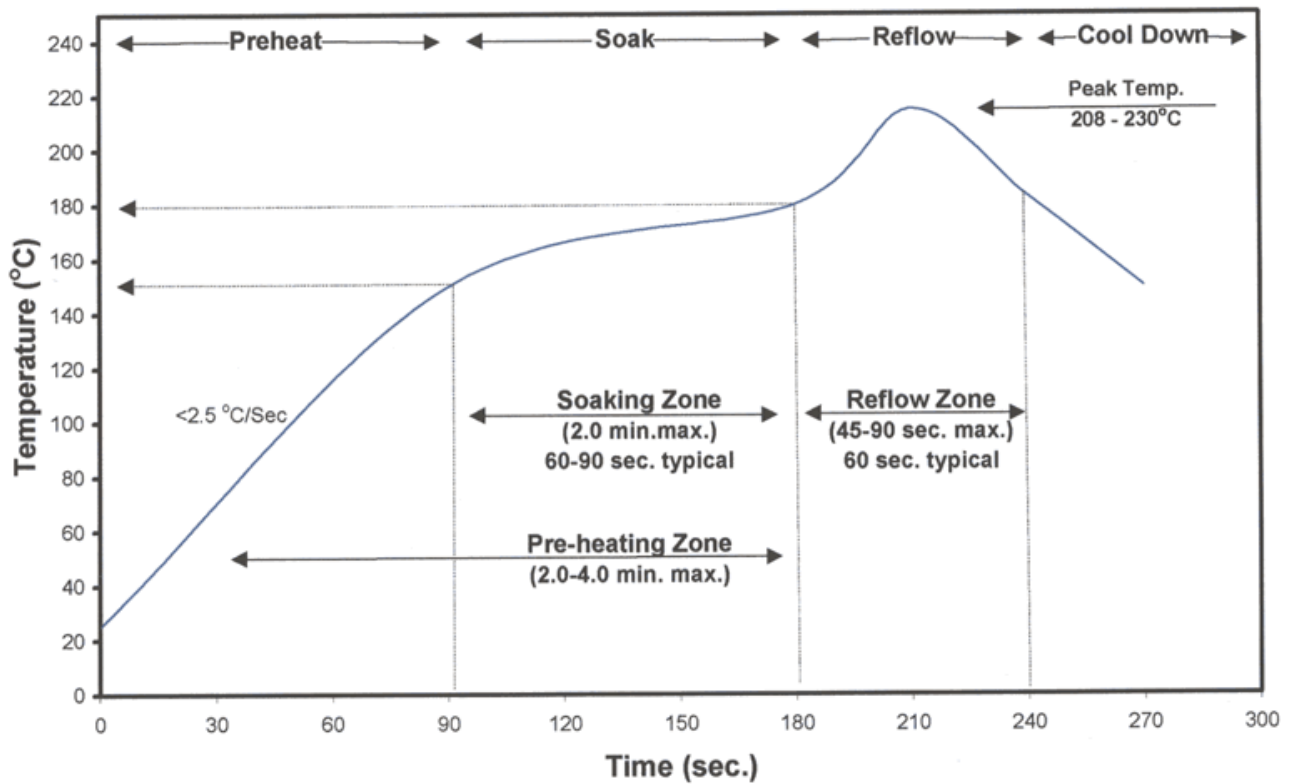
To perform the following tests: Qualifying strain relief extension of TCMD.

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) Re-Flow Time/Temp: See accompanying profile.
- 10) Samtec Test PCBs used: PCB-101190-TST-XX

TYPICAL OVEN PROFILE (Soldering Parts to Test Boards)**Standard Solder Paste Reflow Profile
for Kester Paste Containing
Alloys: Sn63Pb37 or Sn62Pb36Ag02**

FLOWCHARTS**Connector Pull**

| TEST STEP | 5 Pieces | 5 Pieces |
|--------------|-----------------------|-----------------------|
| | GROUP 1 | GROUP 2 |
| | DV SIG 0° | DV SIG 90° |
| 01 | Pull test, Continuity | Pull test, Continuity |

Secure both cables in the center

Monitor continuity and pull

record forces when continuity fails.

Resistance, SIG Contiinity

| TEST STEP | 10 Pieces | 10 Pieces |
|--------------|-------------|--------------|
| | GROUP 1 | GROUP 1A |
| | DV End 90° | DV End 35° |
| | SIG | SIG |
| 01 | Resistance | Resistance |
| 02 | 1000 Cycles | 5000 Cycles |
| 03 | Resistance | Resistance |
| 04 | Data Review | Data Review |
| 05 | 2000 Cycles | 10000 Cycles |
| 06 | Resistance | Resistance |
| 07 | Data Review | Data Review |
| 08 | 3000 Cycles | 15000 Cycles |
| 09 | Resistance | Resistance |
| 10 | Data Review | Data Review |
| 11 | 4000 Cycles | 20000 Cycles |
| 12 | Resistance | Resistance |
| 13 | Data Review | Data Review |
| 14 | 5000 Cycles | 25000 Cycles |
| 15 | Resistance | Resistance |

ATTRIBUTE DEFINITIONS

The following is a brief, simplified description of attributes.

CONNECTOR PULL:

- 1) Secure cable near center and pull on connector
 - a. At 90°, right angle to cable

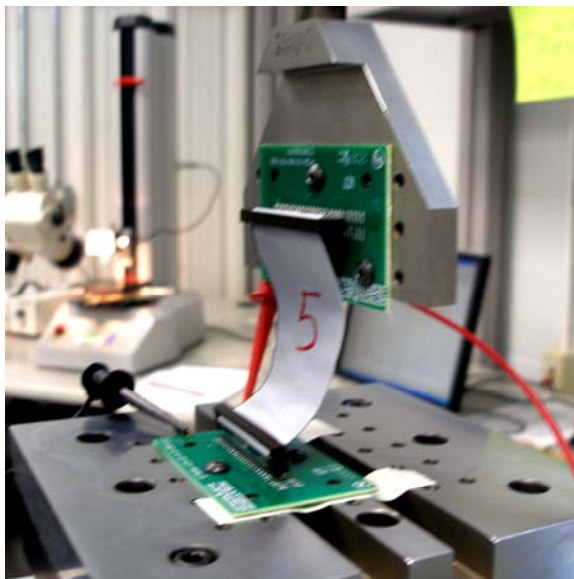


Fig. 1

(Typical set-up, actual part depicted.)

90° Connector pull, notice the electrical continuity hook-up wires.

- b. At 0°, in-line with cable

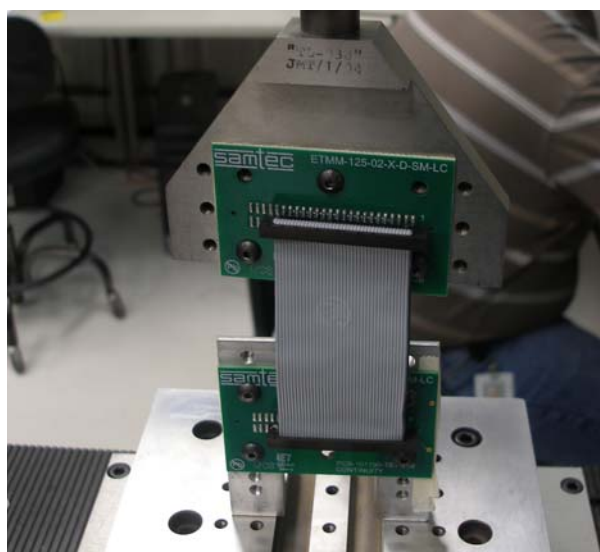


Fig. 2

0° Connector pull

CABLE DURABILITY:

- 1) Oscillate and monitor electrical continuity for open circuit indication.
 - a. $\pm 35^\circ$ Pendulum Mode, **bend up to 25,000 cycles with 8 oz. load on cable end.**
 - b. $\pm 90^\circ$ Flex Mode, **bend up to 5,000 cycles with 8 oz. load on cable end.**

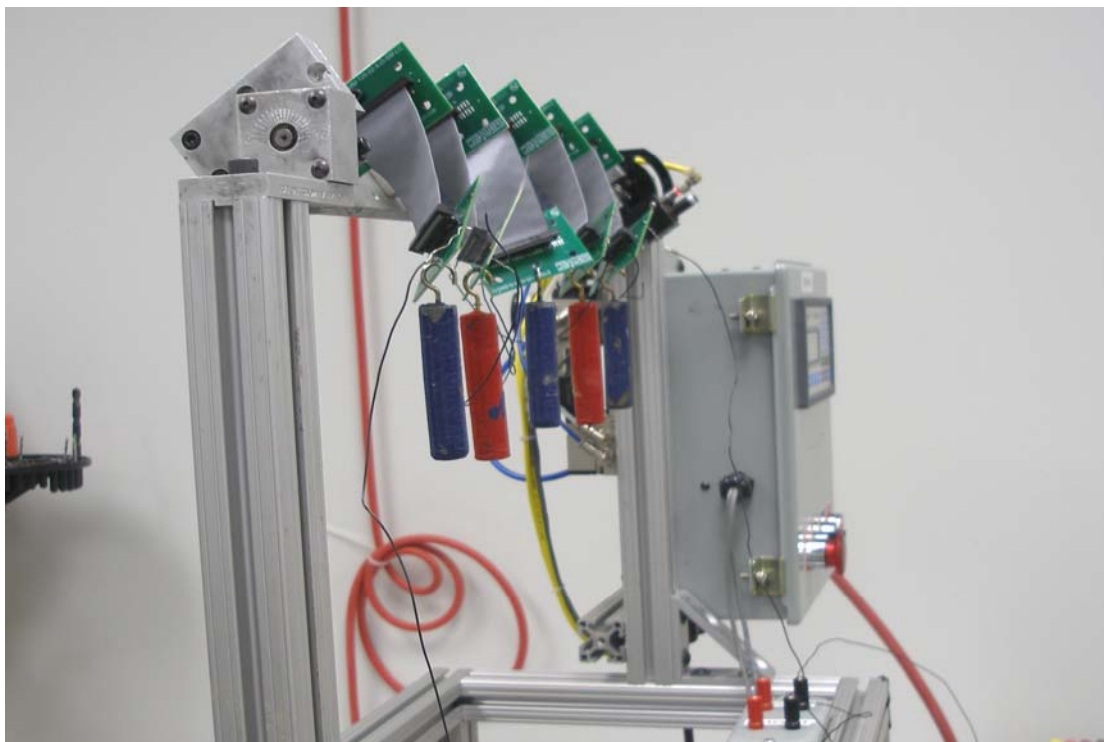


Fig. 3
(Typical set-up, actual part depicted.)

| | |
|-----------------------------|--------------------|
| Tracking Code: TC0819--1719 | Part #: TCSD-20-SR |
| Part description: TCSD | |

RESULTS

Supplemental – Connector/Cable Pull

- 0° ----- 27.50 lbs min
- 90° ----- 13.00 lbs min

Supplemental – Cable Bend up to 25,000 Cycles

- ±35° Pendulum Mode ----- First Failure at 20,524
- ±35° Pendulum Mode ----- 2 Assemblies passed 25,000
- ±90° Flex Mode ----- First Failure at 193
- ±90° Flex Mode ----- Last Failure at 2,443

DATA SUMMARIES**CONNECTOR PULL**

| | <i>0 Deg.</i> | <i>90 Deg.</i> |
|---------|----------------------|-----------------------|
| Pull DV | <u>Force (Lbs)</u> | <u>Force (Lbs)</u> |
| Minimum | 27.50 | 13.00 |
| Maximum | 37.00 | 23.00 |
| Average | 33.0 | 16.2 |

CABLE BEND

| 35 DEGREE | Resistance, Ohms | | | | | |
|------------------|-------------------------|-------------------|--------------------|--------------------|--------------------|--------------------|
| | Initial | After 5000 | After 10000 | After 15000 | After 20000 | After 25000 |
| Avg | 1.4740 | 1.8040 | 2.3940 | 2.3320 | 1.7580 | 1.6000 |
| Min | 1.3900 | 1.6800 | 1.8000 | 1.4900 | 1.5100 | 1.5300 |
| Max | 1.5400 | 2.0200 | 3.2900 | 2.9200 | 2.3500 | 1.6700 |
| St. Dev. | 0.0607 | 0.1343 | 0.5847 | 0.5653 | 0.3522 | 0.0990 |
| Count | 5 | 5 | 5 | 5 | 5 | 2 |

| 90 DEGREE | Resistance, Ohms |
|------------------|-------------------------|
| | Initial |
| Avg | 1.2033 |
| Min | 1.1900 |
| Max | 1.2300 |
| St. Dev. | 0.0231 |
| Count | 3 |

DATA**CONNECTOR PULL**

| | <i>0 Deg.</i> | <i>90 Deg.</i> |
|----------------|----------------------------|----------------------------|
| Sample# | Maximum Force (Lbs) | Maximum Force (Lbs) |
| 1 | 27.50 | 14.50 |
| 2 | 32.50 | 15.00 |
| 3 | 37.00 | 23.00 |
| 4 | 33.50 | 13.00 |
| 5 | 34.50 | 15.50 |

CABLE BEND**35 DEGREE****Resistance, mOhms**

| Cable | Initial | After 5000 Cycles | After 10000 Cycles | After 15000 Cycles | After 20000 Cycles | After 25000 Cycles |
|--------------|----------------|------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
| 1 | 1.52 | 1.78 | 2.26 | 2.59 | 2.35 | Failed 20524 |
| 2 | 1.54 | 1.68 | 3.29 | 2.61 | 1.81 | Failed 20524 |
| 3 | 1.44 | 1.83 | 2.61 | 2.92 | 1.60 | 1.67 |
| 4 | 1.48 | 2.02 | 1.80 | 1.49 | 1.52 | 1.53 |
| 5 | 1.39 | 1.71 | 2.01 | 2.05 | 1.51 | Failed 20524 |

90 DEGREE Resistance, mOhms

| Cable | Initial | Cycles |
|--------------|----------------|---------------|
| 1 | 1.19 | Failed 193 |
| 2 | 1.19 | Failed 2443 |
| 3 | 1.23 | Failed 2443 |

EQUIPMENT AND CALIBRATION SCHEDULES**Equipment #:** TCT-01**Description:** Test Stand**Manufacturer:** Chatillon**Model:** TCD-1000**Serial #:** 05 23 00 02**Accuracy:** Speed Accuracy: +/-5% of max speed; Displacement: +/- .5% or +/- .005, whichever is greater.
... Last Cal: 5/24/07, Next Cal: 5/31/08**Equipment #:** MM-01**Description:** True RMS Multimeter**Manufacturer:** Fluke**Model:** 87 III**Serial #:** 74660176**Accuracy:** See Manual

... Last Cal: 06/14/07, Next Cal: 06/14/08

Equipment #: LC-1000**Description:** Chatillon 1000 Lb Load Cell**Manufacturer:** Chatillon**Model:** Remote-1000**Serial #:** E36263**Accuracy:** +/- 0.3% of Full Scale +/- 1 LSC
... Last Cal: 5/29/07, Next Cal: 5/30/08**Equipment #:** HDR - 01**Description:** HDR Flex Tester**Manufacturer:** Samtec Inc.**Model:** AT-1440-000**Serial #:** AT-1440-000**Accuracy:** N/A

... Last Cal: No Calibration Required, Next Cal:

Equipment #: Null**Description:****Manufacturer:****Model:****Serial #:****Accuracy:**

... Last Cal: , Next Cal: