



|                                                                |                            |                       |                                    |
|----------------------------------------------------------------|----------------------------|-----------------------|------------------------------------|
| Project Number: Crimp Characterization Testing                 |                            | Tracking Code: 185885 |                                    |
| Requested by: Bryon Saylor                                     |                            | Date: 05/03/2012      | Product Rev:                       |
| Part #: T-1M74-01-CRIMP-26-DWC                                 |                            | Lot #:                | Tech: Peter Chen<br>Eng: Vico Zhao |
| Part description: Individual Crimp Contacts with Wire Attached |                            |                       | Qty to test:                       |
| Test Start: 03/18/2012                                         | Test Completed: 03/23/2012 |                       |                                    |

## CRIMP HEIGHT CHARACTERIZATION SUMMARY REPORT



**T-1M74-01-CRIMP-26-DWC**  
**Used In: MMTX**

|                                                                |                                |
|----------------------------------------------------------------|--------------------------------|
| Tracking Code: 185885                                          | Part #: T-1M74-01-CRIMP-26-DWC |
| Part description: Individual Crimp Contacts with Wire Attached |                                |

**REVISION HISTORY**

| DATE     | REV. NUM. | DESCRIPTION   | ENG |
|----------|-----------|---------------|-----|
| 5/3/2012 | 1         | Initial Issue | AM  |
|          |           |               |     |
|          |           |               |     |
|          |           |               |     |
|          |           |               |     |
|          |           |               |     |
|          |           |               |     |
|          |           |               |     |
|          |           |               |     |
|          |           |               |     |

## 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.

All contents contained herein are the property of Samtec. No portion of this report, in part or in full shall be reproduced without prior written approval of Samtec.

### SCOPE

To characterize initial mechanical and electrical crimp performance vs. crimp height.

### APPLICABLE DOCUMENTS

Standards: EIA Publication 364  
USCAR2-5  
USCAR FCLT

### 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) Test samples were not cleaned prior to testing.
- 4) Any additional preparation will be noted in the individual test sequences.
- 5) Two hundred and twenty (220) contacts with wires crimped were submitted for this evaluation. (see flow chart for sample distribution)

## FLOWCHARTS

### Wire Crimp Height Verification - LLCR / Pull Test

| TEST STEP | GROUPS A1 - A11<br>10 Crimps               |
|-----------|--------------------------------------------|
| 01        | Visual Inspection                          |
| 02        | Measure crimp height via crimp micrometers |
| 03        | LLCR                                       |
| 04        | Pull-out force                             |

#### Crimp Manufacturing Instructions:

Cable length to be 6" minimum

Insulation crimp to not constrain jacket

Pull-out Force: EIA-364-38C

LLCR: EIA-364-23

20 mV Max, 100 mA Max

Use Keithley 580 or 3706 in 4 wire dry circuit mode

### Wire Crimp Height Verification - Cross Section

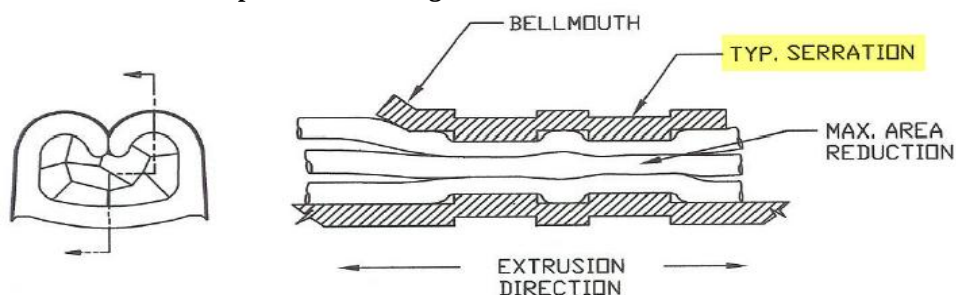
| TEST STEP | GROUPS A1 - A11<br>3 Crimps                        |
|-----------|----------------------------------------------------|
| 01        | Visual Inspection                                  |
| 02        | Measure crimp height via crimp micrometers         |
| 03        | ** Cross Section                                   |
| 04        | Photos of Crimps                                   |
| 05        | Count / Verify # of Strands                        |
| 06        | *** Examine for compliance with Pass/Fail criteria |

#### Crimp Manufacturing Instructions:

Cable length to be 6" minimum

Insulation crimp to not constrain jacket

\* Cross section to be performed through the serration area shown below



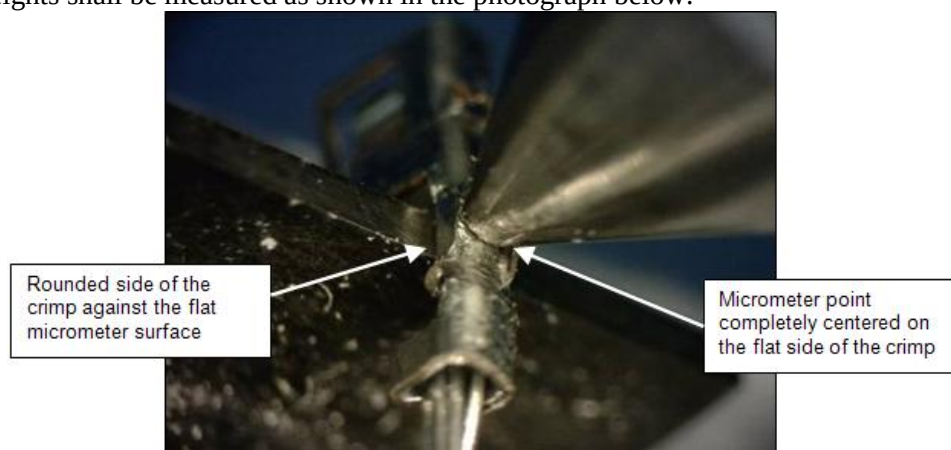
\*\* Examine for compliance with PASS/FAIL criteria: No broken/missed wires, voids, cracks in the contact material or other applicable defects shall be allowed.

## ATTRIBUTE DEFINITIONS

The following is a brief, simplified description of attributes.

### CRIMP HEIGHT:

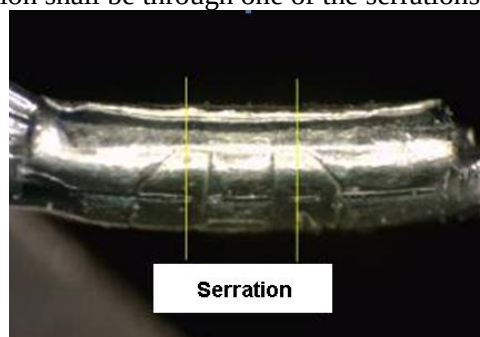
- 1) Crimp heights shall be measured as shown in the photograph below:



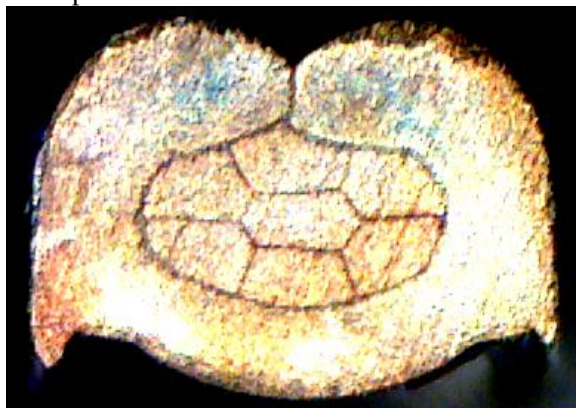
- 2) The crimp heights shall be measured on samples that have not been cross-sectioned. The above photograph was used to provide a clear view of the measurement point without the rest of the sample impeding the view.

### CROSS-SECTION:

- 1) Contacts shall be cross-sectioned and polished without being potted.
- 2) The location of the cross-section shall be through one of the serrations designated in the below photograph.

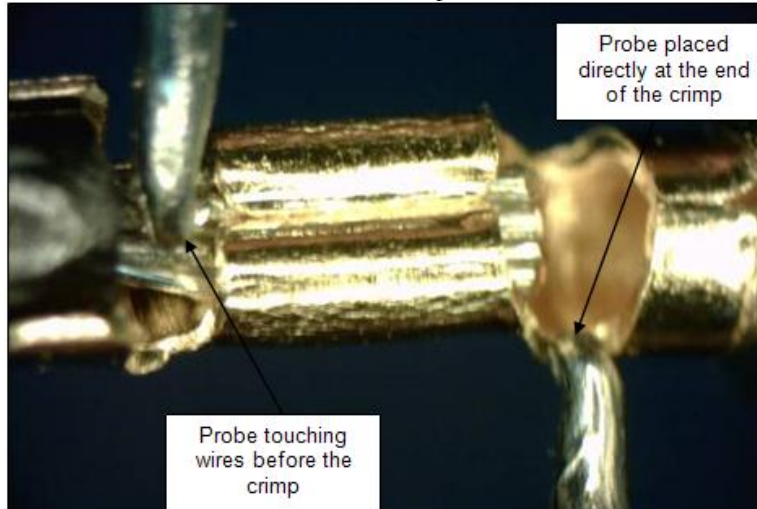


- 3) Polished crimp contact cross-sections shall be etched in a mild etchant to provide contrast for the microscopic examination.
- 4) Etched samples shall be examined under 40X magnification.
- 5) The final cross-section shall be presented as follows:



**LOW LEVEL CONTACT RESISTANCE (LLCR):**

- 1) The LLCR shall be measured and recorded in accordance with EIA-364-23A, *Low Level Contact Resistance Test Procedure for Electrical Connectors and Sockets*.
- 2) A four wire, Kelvin measurement shall be made at the probe locations indicated in the below photograph:



- 3) Test Conditions:
  - a. Maximum Open Circuit Voltage: 20 mV
  - b. Maximum Test Current: 100 mA

**CRIMP PULL FORCE:**

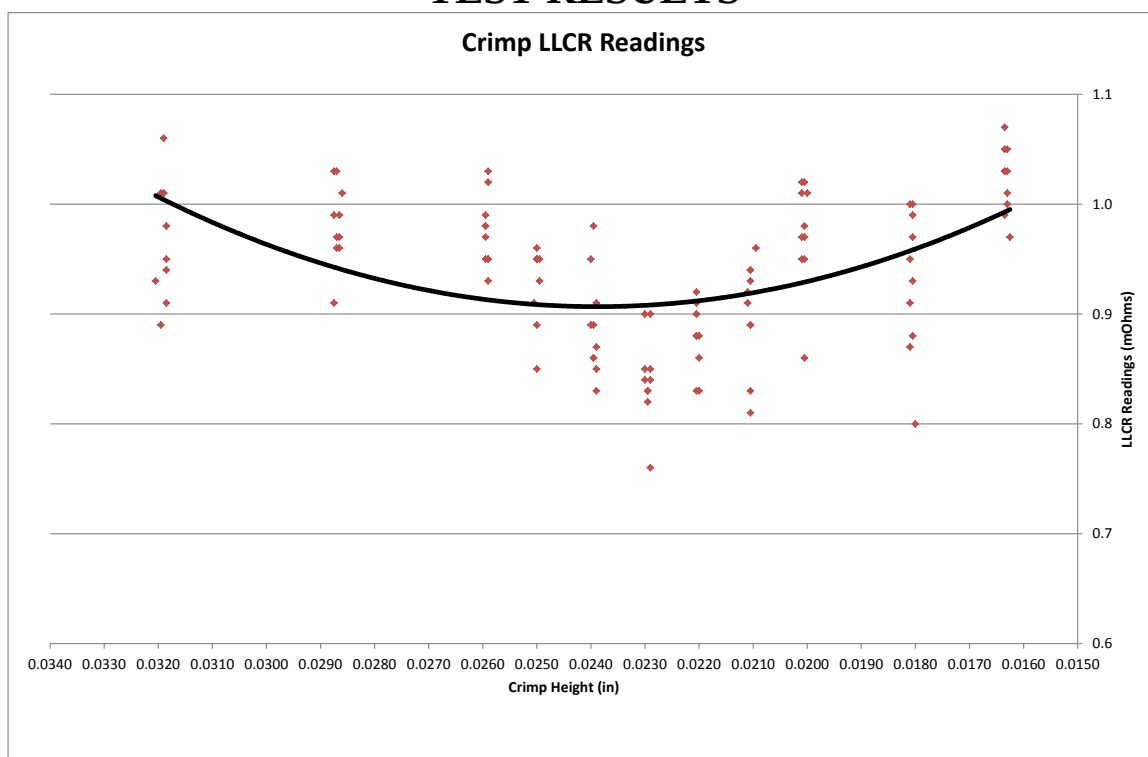
- 1) The test was performed in accordance with EIA-364-08B.
- 2) Secure contact near center and pull wire at 0°, in-line with contact.
- 3) The test stand speed shall be 25 ±6 mm.

EIA-364-08B defines the types of separation resulting from this test as follows:

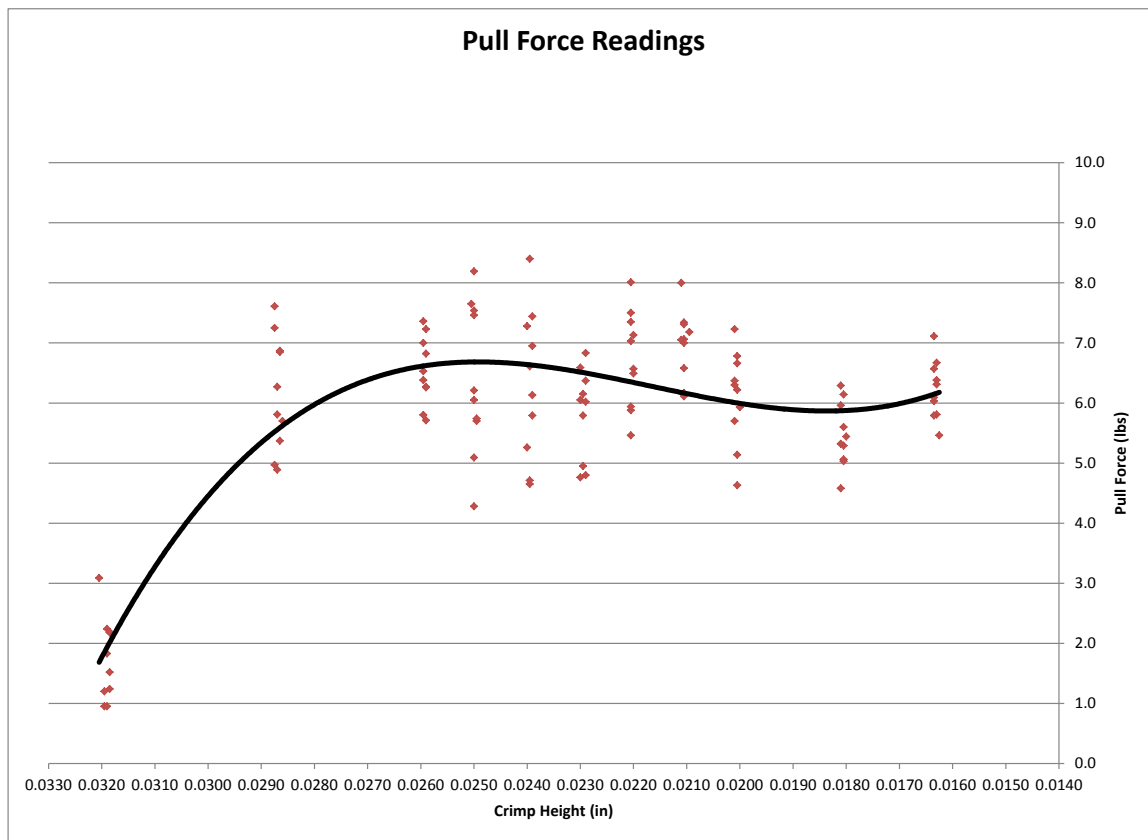
- 1) Slip (pull out).
- 2) Conductor broken in crimp area (some or all).
- 3) Contact broke in crimp area (some or all).
- 4) Conductor broken outside crimp area.
- 5) Contact broken outside crimp area.

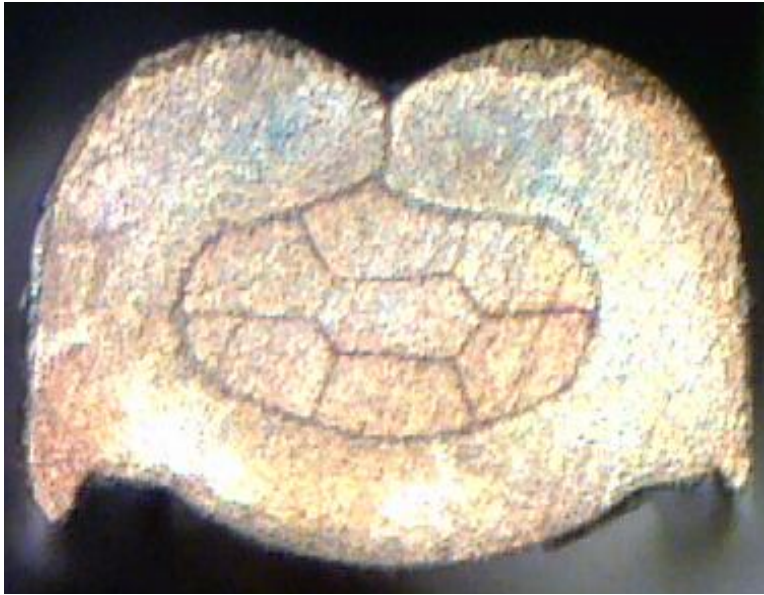
## TEST RESULTS

### Crimp LLCR Readings



### Pull Force Readings



**CROSS-SECTION PHOTO:**

Typical sample at nominal height



**EQUIPMENT AND CALIBRATION SCHEDULES****Equipment #:** MC-41**Description:** Crimp Micrometer**Manufacturer:** Mitutoyo**Model:** 342-371**Serial #:** 05020827**Accuracy:** See Manual

... Last Cal: 06/10/2011, Next Cal: 06/10/2012

**Equipment #:** MO-01**Description:** Micro-Ohmmeter**Manufacturer:** Keithley**Model:** 580**Serial #:** 0772740**Accuracy:** See Manual

... Last Cal: 08/29/2011, Next Cal: 08/29/2012

**Equipment #:** TCT-04**Description:** Dillon Quantrol TC21 25-1000 mm/min series test stand**Manufacturer:** Dillon Quantrol**Model:** TC2 I series test stand**Serial #:** 04-1041-04**Accuracy:** Speed Accuracy: +/- 5% of indicated speed

... Last Cal: 05/20/2011, Next Cal: 05/20/2012

**Equipment #:****Description:** Newton Load Cell**Manufacturer:** Mecmesin**Model:** ILC – Load Cell**Serial #:****Accuracy:** See Manual

... Last Cal: 1/11/2012, Next Cal: 7/11/2012