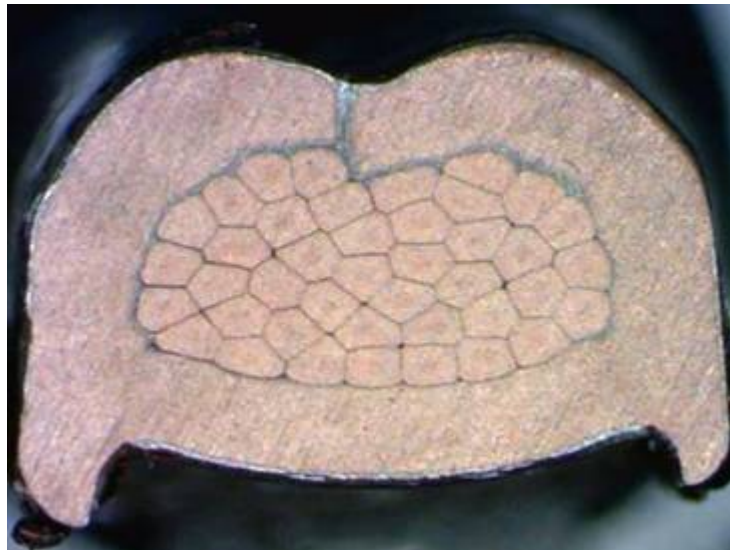




| | | | |
|--|----------------------------|-----------------------|----------------------------------|
| Project Number: Crimp Characterization Testing | | Tracking Code: 198744 | |
| Requested by: Bryon Saylor | | Date: 06/21/2012 | Product Rev: AD |
| Part #: C-246-01-CRIMP-14-DWC | | Lot #: N/A | Tech: Kason He Eng: Vico Zhao |
| Part description: Individual Crimp Contacts with Wire Attached | | | Qty to test: 143 |
| Test Start: 06/01/2012 | Test Completed: 06/07/2012 | | |

CRIMP HEIGHT CHARACTERIZATION SUMMARY REPORT



C-246-01-CRIMP-14-DWC

Used In: MPSS/MPCC

REVISION HISTORY

| DATE | REV. NUM. | DESCRIPTION | ENG |
|-------------|------------------|--------------------|------------|
| 06/21/2012 | 1 | Initial Issue | VZ |
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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 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 | GROUP A1~A11 |
|-----------|--|
| | 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

Min/Max crimp heights to be determined by crimp technician

The overall crimp range to be divided into 9 equal groups

Pull-out Force: EIA-364-38C

Wire Crimp Height Verification - Cross Section

| TEST STEP | GROUP A1~A11 |
|-----------|--|
| | 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:

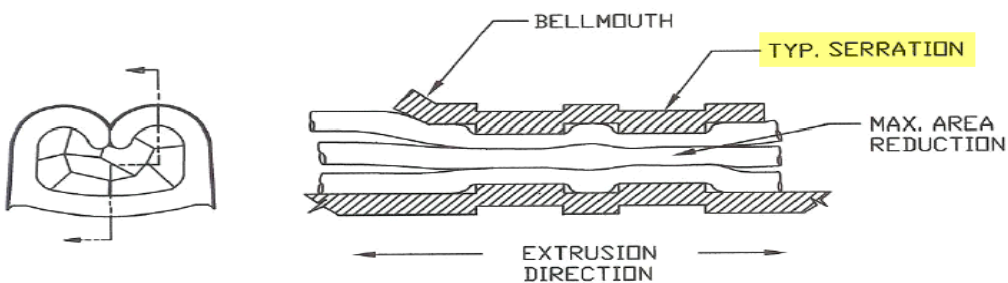
Cable length to be 6" minimum

Insulation crimp to not constrain jacket

Min/Max crimp heights to be determined by crimp technician

The overall crimp range to be divided into 9 equal groups

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



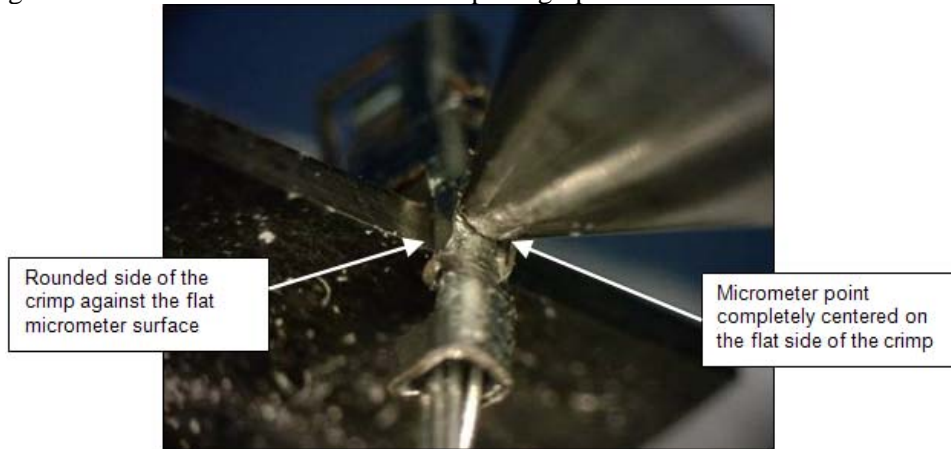
*** Examine for compliance with PASS/FAIL criteria: No broken/missed wires, voids, cracks in the contact material or other applicable defects shall be allowed.

ATTRIBUTE DEFINITIONS

The following is a brief, simplified description of attributes.

CRIMP HEIGHT:

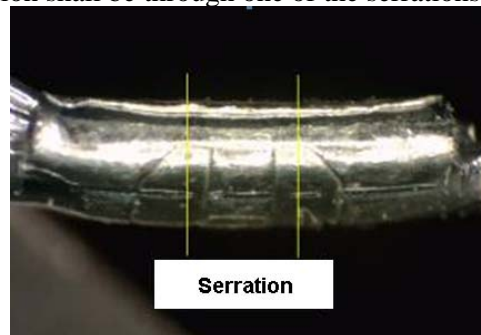
- 1) Crimp heights shall be measured as shown in the photograph below:



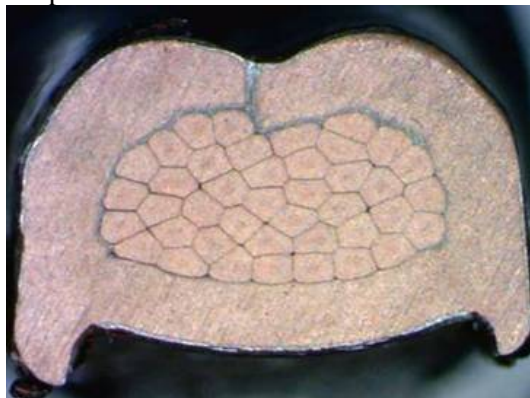
- 2) The crimp heights shall be measured on samples that have not been cross-sectioned. The above photograph was used to provide a clear view of the measurement point without the rest of the sample impeding the view.

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.

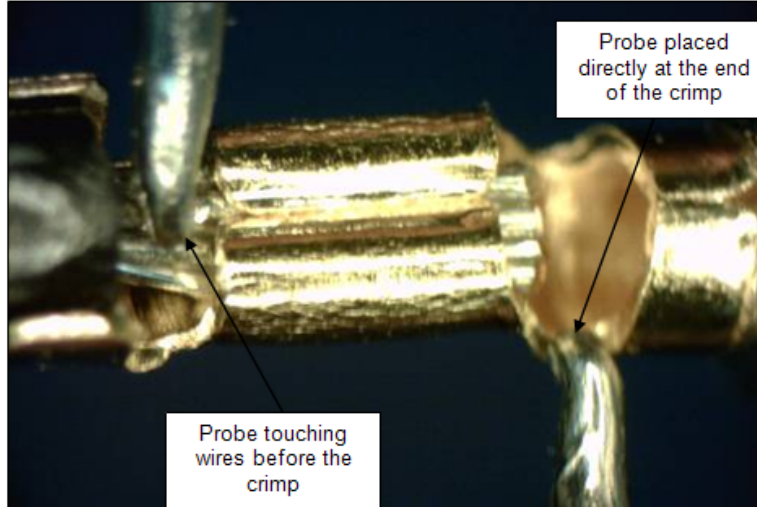


- 3) Polished crimp contact cross-sections shall be etched in a mild etchant to provide contrast for the microscopic examination.
- 4) Etched samples shall be examined under 40X magnification.
- 5) The final cross-section shall be presented as follows:



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

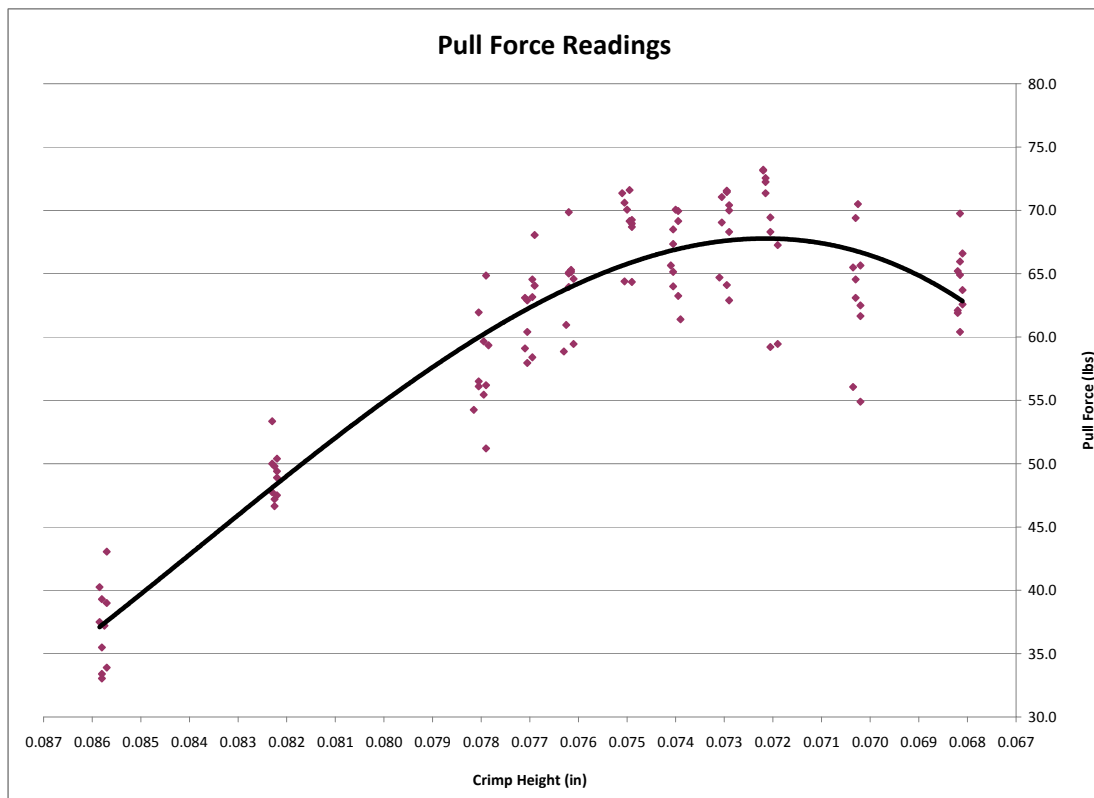
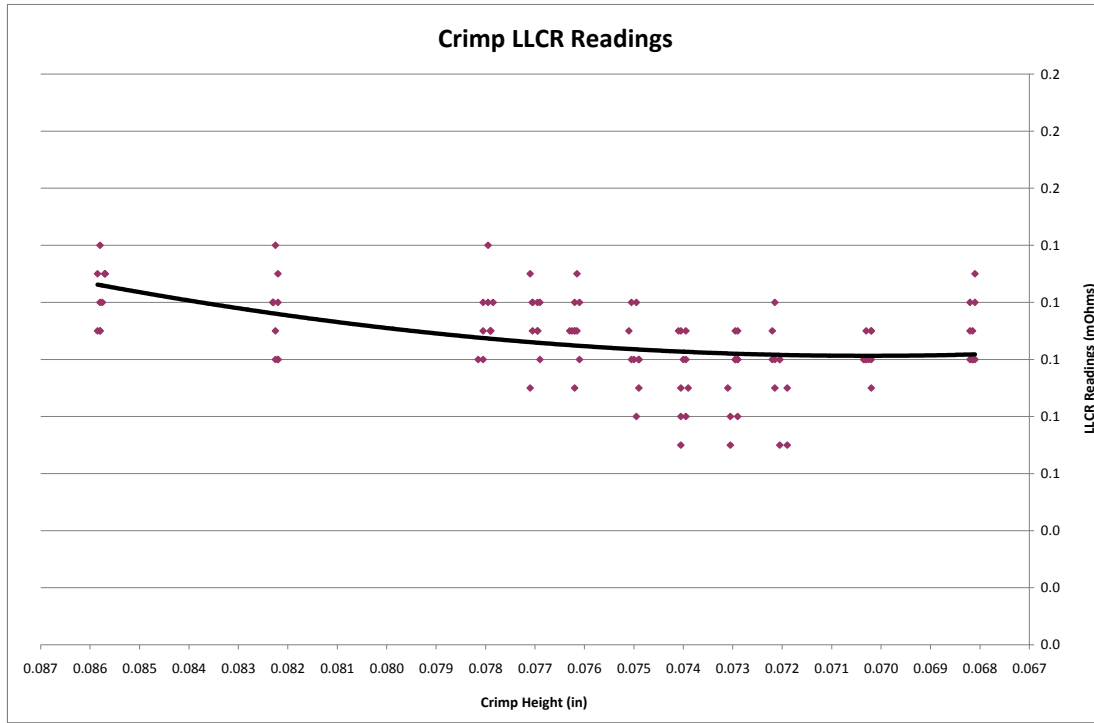
CRIMP PULL FORCE:

- 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.

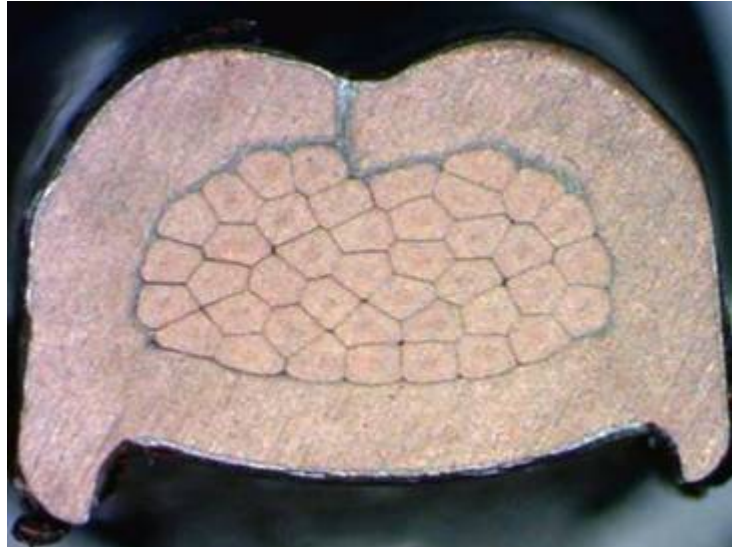
EIA-364-08B defines the types of separation resulting from this test as follows:

- 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



CROSS-SECTION PHOTO:



Typical sample at nominal height

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: 4/27/2012, Next Cal: 4/26/2013**Equipment #:** HZ-MO-03**Description:** Micro-Ohmmeter**Manufacturer:** Keithley**Model:** 580**Serial #:** 156883**Accuracy:** See Manual

... Last Cal: 09/14/2011, Next Cal: 09/13/2012

Equipment #: HZ-MM-01**Description:** Micrometer**Manufacturer:** Mitutoyo**Model:** 342-371**Serial #:** N/A**Accuracy:** See Manual

... Last Cal: 1/11/2012, Next Cal: 1/10/2013