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|---|--|------------------------------------|------------------|------------------|-----------------|
| Project Number: Design Qualification Test Report | | Tracking Code: 197603_Report_Rev_2 | | | |
| Requested by: James Borgelt | | Date: 5/08/2012 | | Product Rev: N/A | |
| Part #: ACP-16-05-H-00.35-T-S-P-4\ ACR-16-05-H-00.35-S-S1-P-4 | | Lot #: N/A | Tech: Craig Ryan | | Eng: Eric Mings |
| Part description: ACP\ACR | | | | | Qty to test: 17 |
| Test Start: 05/10/2012 | | Test Completed: 06/28/2012 | | | |



DESIGN QUALIFICATION TEST REPORT

**ACP\ACR
ACP-16-05-H-00.35-T-S-P-4\ ACR-16-05-H-00.35-S-S1-P-4**

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: 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 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-103219-TST-XX

FLOWCHARTS**IR & DWV**

| TEST STEP | GROUP A1 2 Mated Sets 24 AWG to 24 AWG | GROUP B1 2 Mated Sets RF-to-Ground | GROUP C1 2 Mated Sets 24 AWG-to-Ground |
|------------------|---|---|---|
| 01 | IR & DWV at 900V test voltage (on both mated sets and on each connector unmated) | IR & DWV at 375V test voltage (on both mated sets and on each connector unmated) | IR & DWV at 900V test voltage (on both mated sets and on each connector unmated) |
| 02 | Thermal Shock (Mated and Undisturbed) | Thermal Shock (Mated and Undisturbed) | Thermal Shock (Mated and Undisturbed) |
| 03 | IR & DWV at 900V test voltage (on both mated sets and on each connector unmated) | IR & DWV at 375V test voltage (on both mated sets and on each connector unmated) | IR & DWV at 900V test voltage (on both mated sets and on each connector unmated) |
| 04 | Cyclic Humidity (Mated and Undisturbed) | Cyclic Humidity (Mated and Undisturbed) | Cyclic Humidity (Mated and Undisturbed) |
| 05 | IR & DWV at 900V test voltage (on both mated sets and on each connector unmated) | IR & DWV at 375V test voltage (on both mated sets and on each connector unmated) | IR & DWV at 900V test voltage (on both mated sets and on each connector unmated) |

DWV on Group B1 to be performed at Test Voltage

DWV test voltage is equal to 75% of the lowest break down voltage from Groups A1, A2 or A3

Thermal Shock = EIA-364-32, Table II, Test Condition I:

-55°C to +85°C 1/2 hour dwell, 100 cycles

Humidity = EIA-364-31, Test Condition B (240 Hours)

and Method III (+25°C to +65°C @ 90% RH to 98% RH)

ambient pre-condition and delete steps 7a and 7b

IR = EIA-364-21

DWV = EIA-364-20, Test Condition 1

FLOWCHARTS Continued**Durability/Mating/Unmating/Gaps**

| TEST STEP | GROUP A1 6 Assemblies |
|----------------------|--|
| 02 | LLCR-1 |
| 03 | Forces - Mating / Unmating |
| 04 | 25 Cycles |
| 05 | Forces - Mating / Unmating |
| 06 | 25 Cycles (50 Total) |
| 07 | Forces - Mating / Unmating |
| 08 | 25 Cycles (75 Total) |
| 09 | Forces - Mating / Unmating |
| 10 | 25 Cycles (100 Total) |
| 11 | Forces - Mating / Unmating |
| 12 | Clean w/Compressed Air |
| 14 | LLCR-2 |
| 15 | Thermal Shock (Mated and Undisturbed) |
| 16 | LLCR-3 |
| 17 | Cyclic Humidity (Mated and Undisturbed) |
| 18 | LLCR-4 |
| 19 | Forces - Mating / Unmating |

Thermal Shock = EIA-364-32, Table II, Test Condition I:

-55°C to +85°C 1/2 hour dwell, 100 cycles

Humidity = EIA-364-31, Test Condition B (240 Hours)

and Method III (+25°C to +65°C @ 90% RH to 98% RH)

ambient pre-condition and delete steps 7a and 7b

Mating / Unmating Forces = EIA-364-13

LLCR = EIA-364-23, LLCR

20 mV Max, 100 mA Max

Use Keithley 580 or 3706 in 4 wire dry circuit mode

FLOWCHARTS Continued**Current Carrying Capacity - Array**

| TEST STEP | GROUP A1 3 Mated Assemblies All Contacts Powered |
|--------------|--|
| 01 | CCC |

(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

CCC, Temp rise = EIA-364-70

ATTRIBUTE DEFINITIONS

The following is a brief, simplified description of attributes.

THERMAL SHOCK:

- 1) EIA-364-32, *Thermal Shock (Temperature Cycling) Test Procedure for Electrical Connectors*.
- 2) Test Condition 1: -55°C to +85°C
- 3) Test Time: ½ hour dwell at each temperature extreme
- 4) Number of Cycles: 100
- 5) All test samples are pre-conditioned at ambient.
- 6) All test samples are exposed to environmental stressing in the mated condition.

HUMIDITY:

- 1) Reference document: EIA-364-31, *Humidity Test Procedure for Electrical Connectors*.
- 2) Test Condition B, 240 Hours.
- 3) Method III, +25° C to + 65° C, 90% to 98% Relative Humidity excluding sub-cycles 7a and 7b.
- 4) All samples are pre-conditioned at ambient.
- 5) All test samples are exposed to environmental stressing in the mated condition.

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.

LLCR:

- 1) EIA-364-23, *Low Level Contact Resistance Test Procedure for Electrical Connectors and Sockets*.
- 2) The following guidelines are used to categorize the changes in LLCR as a result from stressing
 - a. $\leq +5.0$ 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

ATTRIBUTE DEFINITIONS Continued

The following is a brief, simplified description of attributes

INSULATION RESISTANCE (IR):

To determine the resistance of insulation materials to leakage of current through or on the surface of these materials when a DC potential is applied.

1) **PROCEDURE:**

- a. Reference document: EIA-364-21, *Insulation Resistance Test Procedure for Electrical Connectors*.
- b. Test Conditions:
 - i. Between Adjacent Contacts or Signal-to-Ground
 - ii. Electrification Time 2.0 minutes
 - iii. Test Voltage (500 VDC) corresponds to calibration settings for measuring resistances.

2) **MEASUREMENTS:**

- a. When the specified test voltage is applied (VDC), the insulation resistance shall not be less than 1000 MegOhms.

DIELECTRIC WITHSTANDING VOLTAGE (DWV):

To determine if the sockets can operate at its rated voltage and withstand momentary over potentials due to switching, surges, and other similar phenomenon. Separate samples are used to evaluate the effect of environmental stresses so not to influence the readings from arcing that occurs during the measurement process.

1) **PROCEDURE:**

- a. Reference document: EIA-364-20, *Withstanding Voltage Test Procedure for Electrical Connectors*.
- b. Test Conditions:
 - i. Between Adjacent Contacts or Signal-to-Ground
 - ii. Barometric Test Condition 1
 - iii. Rate of Application 500 V/Sec
 - iv. Test Voltage (VAC) until breakdown occurs

2) **MEASUREMENTS/CALCULATIONS**

- a. The breakdown voltage shall be measured and recorded.
- b. The dielectric withstanding voltage shall be recorded as 75% of the minimum breakdown voltage.
- c. The working voltage shall be recorded as one-third (1/3) of the dielectric withstanding voltage (one-fourth of the breakdown voltage).

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 three temperature points are reported:
 - a. Ambient
 - b. 60° C
 - c. 70° C
 - d. 90° 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.

RESULTS

Temperature Rise, CCC at a 20% de-rating

- CCC for a 30°C Temperature Rise ----- 10.6 A per contact with all powered (16 AWG signal wire)
(RF pin Powered at 1.95 Amps)

Mating – Unmating Forces

Mating\Unmating Durability Group

- **Initial**
 - **Mating**
 - Min ----- 5.36 Lbs
 - Max----- 6.72 Lbs
 - **Unmating**
 - Min ----- 2.73 Lbs
 - Max----- 3.72 Lbs
- **After 25 Cycles**
 - **Mating**
 - Min ----- 7.28 Lbs
 - Max----- 9.13 Lbs
 - **Unmating**
 - Min ----- 5.32 Lbs
 - Max----- 7.03 Lbs
- **After 50 Cycles**
 - **Mating**
 - Min ----- 8.85 Lbs
 - Max-----10.61 Lbs
 - **Unmating**
 - Min ----- 7.81 Lbs
 - Max----- 8.66 Lbs
- **After 75 Cycles**
 - **Mating**
 - Min -----10.00 Lbs
 - Max-----10.91 Lbs
 - **Unmating**
 - Min ----- 8.17 Lbs
 - Max----- 9.81 Lbs
- **After 100 Cycles**
 - **Mating**
 - Min ----- 9.74 Lbs
 - Max-----10.80 Lbs
 - **Unmating**
 - Min ----- 8.27 Lbs
 - Max----- 9.77 Lbs
- **After Humidity**
 - **Mating**
 - Min ----- 5.22 Lbs
 - Max----- 6.82 Lbs
 - **Unmating**
 - Min ----- 3.63 Lbs
 - Max----- 5.18 Lbs

RESULTS Continued**Insulation Resistance minimums, IR****16AWG to 16AWG:**

- **Initial**
 - Mated----- 100000 Meg Ohms ----- Pass
 - Unmated ----- 100000 Meg Ohms ----- Pass
- **Thermal**
 - Mated----- 100000 Meg Ohms ----- Pass
 - Unmated ----- 100000 Meg Ohms ----- Pass
- **Humidity**
 - Mated----- 7000 Meg Ohms ----- Pass
 - Unmated ----- 8000 Meg Ohms ----- Pass

RF Signal to Ground:

- **Initial**
 - Mated----- 100000 Meg Ohms ----- Pass
 - Unmated ----- 100000 Meg Ohms ----- Pass
- **Thermal**
 - Mated----- 100000 Meg Ohms ----- Pass
 - Unmated ----- 100000 Meg Ohms ----- Pass
- **Humidity**
 - Mated----- 15000 Meg Ohms ----- Pass
 - Unmated ----- 6000 Meg Ohms ----- Pass

16AWG to Ground:

- **Initial**
 - Mated----- 100000 Meg Ohms ----- Pass
 - Unmated ----- 100000 Meg Ohms ----- Pass
- **Thermal**
 - Mated----- 100000 Meg Ohms ----- Pass
 - Unmated ----- 100000 Meg Ohms ----- Pass
- **Humidity**
 - Mated----- 100000 Meg Ohms ----- Pass
 - Unmated ----- 15000 Meg Ohms ----- Pass

RESULTS Continued**Dielectric Withstanding Voltage minimums, DWV****• Minimums**

- Test Voltage 16AWG to 16AWG-----900 VAC
- Working Voltage -----300 VAC

- Test Voltage 16AWG to Ground-----900 VAC
- Working Voltage -----300 VAC

- Test Voltage RF Signal to Ground-----375 VAC
- Working Voltage -----125 VAC

16AWG to 16AWG:

- Initial DWV -----Passed
- Thermal DWV-----Passed
- Humidity DWV-----Passed

RF Signal to Ground:

- Initial DWV -----Passed
- Thermal DWV-----Passed
- Humidity DWV-----Passed

16AWG to Ground:

- Initial DWV -----Passed
- Thermal DWV-----Passed
- Humidity DWV-----Passed

RESULTS Continued**LLCR:****Mating\Unmating Durability Group (80 LLCR test points)****16 AWG pin:**

- **Initial** ----- 10.63 mOhms Max
- **Durability, 100 Cycles**
 - <= +5.0 mOhms ----- 24 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
- **Thermal**
 - <= +5.0 mOhms ----- 24 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
- **Humidity**
 - <= +5.0 mOhms ----- 24 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

Ground pin:

- **Initial** ----- 19.58 mOhms Max
- **Durability, 100 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
- **Thermal**
 - <= +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
- **Humidity**
 - <= +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

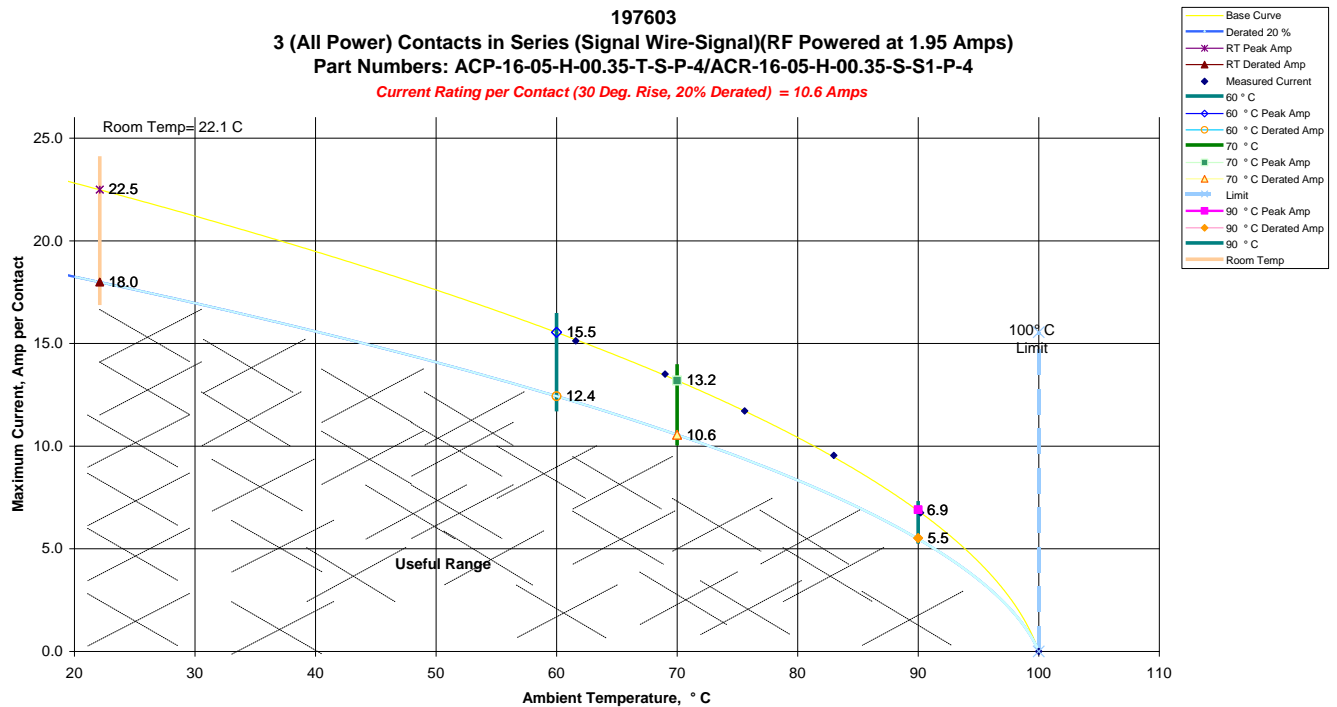
RESULTS Continued**RF Signal pin:**

- **Initial** ----- 164.11 mOhms Max
- **Durability, 100 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
- **Thermal**
 - <= +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
- **Humidity**
 - <= +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

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:



DATA SUMMARIES Continued**MATING/UNMATING FORCE:****Mating\Unmating Durability Group**

| | Initial | | | | 25 Cycles | | | |
|----------------|------------|--------------|----------|-------------|----------------|--------------|----------|-------------|
| | Mating | | Unmating | | Mating | | Unmating | |
| | Newton's | Force (Lbs) | Newton's | Force (Lbs) | Newton's | Force (Lbs) | Newton's | Force (Lbs) |
| Minimum | 23.84 | 5.36 | 12.14 | 2.73 | 32.38 | 7.28 | 23.66 | 5.32 |
| Maximum | 29.89 | 6.72 | 16.55 | 3.72 | 40.61 | 9.13 | 31.27 | 7.03 |
| Average | 26.74 | 6.01 | 14.52 | 3.27 | 36.35 | 8.17 | 28.62 | 6.43 |
| St Dev | 2.04 | 0.46 | 1.53 | 0.34 | 2.62 | 0.59 | 2.67 | 0.60 |
| Count | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| | 50 Cycles | | | | 75 Cycles | | | |
| | Mating | | Unmating | | Mating | | Unmating | |
| | Newton's | Force (Lbs) | Newton's | Force (Lbs) | Newton's | Force (Lbs) | Newton's | Force (Lbs) |
| Minimum | 39.36 | 8.85 | 34.74 | 7.81 | 44.48 | 10.00 | 36.34 | 8.17 |
| Maximum | 47.19 | 10.61 | 38.52 | 8.66 | 48.53 | 10.91 | 43.63 | 9.81 |
| Average | 44.57 | 10.02 | 36.71 | 8.25 | 46.48 | 10.45 | 39.89 | 8.97 |
| St Dev | 2.70 | 0.61 | 1.57 | 0.35 | 1.46 | 0.33 | 2.33 | 0.52 |
| Count | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| | 100 Cycles | | | | After Humidity | | | |
| | Mating | | Unmating | | Mating | | Unmating | |
| | Newton's | Force (Lbs) | Newton's | Force (Lbs) | Newton's | Force (Lbs) | Newton's | Force (Lbs) |
| Minimum | 43.32 | 9.74 | 36.78 | 8.27 | 23.22 | 5.22 | 16.15 | 3.63 |
| Maximum | 48.04 | 10.80 | 43.46 | 9.77 | 30.34 | 6.82 | 23.04 | 5.18 |
| Average | 46.54 | 10.46 | 40.44 | 9.09 | 27.03 | 6.08 | 19.08 | 4.29 |
| St Dev | 1.67 | 0.38 | 2.08 | 0.47 | 2.47 | 0.56 | 2.04 | 0.46 |
| Count | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |

DATA SUMMARIES Continued**INSULATION RESISTANCE (IR):**

| | 16 AWG to 16 AWG | | |
|-----------------|----------------------------|------------------|------------------|
| | Mated | Unmated | Unmated |
| Minimum | ACP-16-05/ACR-16-05 | ACP-16-05 | ACR-16-05 |
| Initial | 100000 | 100000 | 100000 |
| Thermal | 100000 | 100000 | 100000 |
| Humidity | 7000 | 8000 | 100000 |

| | RF Signal to RF Ground | | |
|-----------------|-------------------------------|------------------|------------------|
| | Mated | Unmated | Unmated |
| Minimum | ACP-16-05/ACR-16-05 | ACP-16-05 | ACR-16-05 |
| Initial | 100000 | 100000 | 100000 |
| Thermal | 100000 | 100000 | 100000 |
| Humidity | 15000 | 6000 | 100000 |

| | 16 AWG to RF Ground | | |
|-----------------|----------------------------|------------------|------------------|
| | Mated | Unmated | Unmated |
| Minimum | ACP-16-05/ACR-16-05 | ACP-16-05 | ACR-16-05 |
| Initial | 100000 | 100000 | 100000 |
| Thermal | 100000 | 100000 | 100000 |
| Humidity | 100000 | 15000 | 100000 |

DATA SUMMARIES Continued**ELECTRIC WITHSTANDING VOLTAGE(DWV):**

| Voltage Rating Summary | |
|-------------------------------|----------------------|
| Minimum | ACP/ACR-16AWG |
| Break Down Voltage | Not Tested |
| Test Voltage | 900 |
| Working Voltage | 300 |

| Voltage Rating Summary | |
|-------------------------------|-------------------|
| Minimum | ACP/ACR-RF |
| Break Down Voltage | Not Tested |
| Test Voltage | 375 |
| Working Voltage | 125 |

| 16 AWG to 16 AWG=900V | |
|------------------------------------|--------|
| Initial Test Voltage | Passed |
| After Thermal Test Voltage | Passed |
| After Humidity Test Voltage | Passed |

| 16 AWG to Ground=900V | |
|------------------------------------|--------|
| Initial Test Voltage | Passed |
| After Thermal Test Voltage | Passed |
| After Humidity Test Voltage | Passed |

| RF to Ground=375V | |
|------------------------------------|--------|
| Initial Test Voltage | Passed |
| After Thermal Test Voltage | Passed |
| After Humidity Test Voltage | Passed |

DATA SUMMARIES Continued**LLCR:****Mating\Unmating Durability Group**

- 1) A total of 40 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. $\leq +5.0$ 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 | 5/30/2012 | 5/31/2012 | 6/11/2012 | 6/25/2012 |
| Room Temp (Deg C) | 22 | 23 | 19 | 22 |
| Rel Humidity (%) | 43 | 43 | 44 | 43 |
| Technician | Troy Cook | Troy Cook | Troy Cook | Troy Cook |
| mOhm values | Actual Initial | Delta 100 Cycles | Delta Therm Shck | Delta Humidity |
| Pin Type 1: 16 AWG Signal | | | | |
| Average | 10.15 | 0.28 | 0.16 | 0.24 |
| St. Dev. | 0.27 | 0.64 | 0.15 | 0.42 |
| Min | 9.61 | 0.00 | 0.00 | 0.01 |
| Max | 10.63 | 2.56 | 0.68 | 2.13 |
| Summary Count | 24 | 24 | 24 | 24 |
| Total Count | 24 | 24 | 24 | 24 |
| Pin Type 2: Ground | | | | |
| Average | 18.38 | 0.08 | 0.36 | 0.34 |
| St. Dev. | 0.73 | 0.06 | 0.35 | 0.44 |
| Min | 17.56 | 0.01 | 0.03 | 0.02 |
| Max | 19.58 | 0.21 | 1.17 | 1.44 |
| Summary Count | 8 | 8 | 8 | 8 |
| Total Count | 8 | 8 | 8 | 8 |
| Pin Type 3: RF Signal | | | | |
| Average | 161.98 | 0.09 | 1.36 | 0.40 |
| St. Dev. | 1.59 | 0.06 | 0.40 | 0.13 |
| Min | 159.04 | 0.01 | 0.63 | 0.18 |
| Max | 164.11 | 0.18 | 1.86 | 0.57 |
| Summary Count | 8 | 8 | 8 | 8 |
| Total Count | 8 | 8 | 8 | 8 |

| LLCR Delta Count by Category | | | | | | |
|-------------------------------------|----------|---------------------|----------------------|----------------------|------------------------|---------|
| | Stable | Minor | Acceptable | Marginal | Unstable | Open |
| mOhms | ≤ 5 | $>5 \ \& \ \leq 10$ | $>10 \ \& \ \leq 15$ | $>15 \ \& \ \leq 50$ | $>50 \ \& \ \leq 1000$ | >1000 |
| 100 Cycles | 40 | 0 | 0 | 0 | 0 | 0 |
| Therm Shck | 40 | 0 | 0 | 0 | 0 | 0 |
| Humidity | 40 | 0 | 0 | 0 | 0 | 0 |

EQUIPMENT AND CALIBRATION SCHEDULES**Equipment #:** MO-04**Description:** Multimeter /Data Acquisition System**Manufacturer:** Keithley**Model:** 2700**Serial #:** 0798688**Accuracy:** See Manual

... Last Cal: 03/27/2012, Next Cal: 03/27/2013

Equipment #: RS-09**Description:** Current Shunt**Manufacturer:** Empro**Model:** HA10050**Serial #:** HA10050-1**Accuracy:** +/- 0.25% of RDG

... Last Cal: 05/30/2012, Next Cal: 05/30/2013

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; Speed Accuracy: +/- 5% of indicated speed;

... Last Cal: 05/03/2011, Next Cal: 05/03/2013

Equipment #: THC-02**Description:** Temperature/Humidity Chamber (SJR Room – Unit #1)**Manufacturer:** Thermotron**Model:** SE-1000-6-6**Serial #:** 31808**Accuracy:** See Manual

... Last Cal: 11/04/2011, Next Cal: 11/04/2012

Equipment #: HPM-01**Description:** Hipot Megommeter**Manufacturer:** Hipotronics**Model:** H306B-A**Serial #:** M9905004**Accuracy:** 2 % Full Scale Accuracy

... Last Cal: 05/24/2012, Next Cal: 08/24/2012