

**Test Report**

Testing of- MDCX coax pin and socket contacts to establish baseline test requirements—

STR #556  
Revision -  
09/09/05

Written by/Approved:

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| Revision Letter | Page Number | Paragraph / Appendix | Description of Revision | Approval Date |
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**1 Scope**

The purpose of this test report is to document all of the test results from tests developed by Sabritec to establish baseline requirements. The test samples that were tested were MDCX coax pin and socket assemblies terminated to RG-316 cable.

**2 Order of Precedence**

In case of a conflict between the text of this document and the applicable referenced documents, the text of this document took precedence.

**3 Description of Test Articles**

Sabritec internal part number, quantity tested, and a general description of articles tested to the requirements of this document are as in Table 1.

**Table 1: Connector Part Numbers and Descriptions.**

| Sabritec Part Number | Quantity | General Description  |
|----------------------|----------|--|
| 023114-2001          | 3        | Cable Assembly, MDCX coax socket contact terminated with RG-316 coax cable |
| 023214-2001          | 3        | Cable Assembly, MDCX coax pin contact terminated with RG-316 coax cable    |
| 102-2994-300         | 3        | Center Contact Pin, MDCX socket for RG-316 coax cable                      |
| 102-2995-300         | 3        | Center Contact Socket, MDCX pin for RG-316for coax cable                   |

**4 Standard Ambient Test Conditions**

All tests and examinations specified by Qualification Test Procedure 556 were tested within the ranges stated in this paragraph, unless specified otherwise.

Temperature: 21°C to 27°C  
 Relative Humidity: 20% to 80%  
 Barometric Pressure: 725 +50/-70 mm Hg

**5 References**

Production Test Procedure Environmental, Mechanical, and Electrical Production Test Procedures  
 MIL-STD-1344 Test Methods for Electrical Connectors

**6 Test Equipment and Facilities**

**6.1 Test Equipment**

The following test equipment was used when testing was accomplished to the criteria of this specification.

**Table 2: Test Equipment**

| Manufacturer  | Description and Model   | Sabritec S/N |
|---------------|-------------------------|--------------|
| Topward       | Power supply- TPS 2000  | 1220         |
| Analogic      | Ohm meter- DP100        | 025          |
| Chatillon     | Force gauge- DFGS-R-500 | 055          |
| General Radio | Megohmmeter- Model 1863 | 296          |

**6.2 Facilities**

All tests were performed in the Sabritec qualification test lab.

**7 Calibration and Source Inspection**

**7.1 Calibration**

All test equipment used in the performance of the tests required was calibrated in accordance with ANSI/NCSL Z540-1-1994. Records of all equipment were maintained in accordance with ANSI/NCSL Z540-1-1994 and made available for review.

**8 Test Sequence**

3 sets of connectors and 3 sets of center pins were procured for the tests

**Table 3: Test Sequence**

| Test Procedure                      | Paragraph Reference |
|-------------------------------------|---------------------|
| Insertion Loss                      | 9.1                 |
| Voltage Standing Wave Ratio         | 9.2                 |
| Contact Resistance                  | 9.3                 |
| Contact Engagement/Separation Force | 9.4                 |
| Insulation Resistance               | 9.5                 |
| Durability                          | 9.6                 |
| Contact Resistance                  | 9.7                 |
| Contact Engagement/Separation Force | 9.8                 |
| Insulation Resistance               | 9.9                 |

**9 Test Report**

The date each test is completed, department responsible for testing, and initials of the tester were logged into the test procedure checklist, which can be seen at the end of this document.

**9.1 Insertion Loss**

**Requirements:**

Using a 50 Ohm measurement system, the swept insertion loss from 40 MHz to 3 GHz, at +25C must be less than .635dB. (Note: The attenuation of the RG-316 cable at 3 GHz is .58dB max/ft. The total cable length of the 2 samples is 9 inches, which is .435 dB max. The loss of the coax contact is approximately .1 dB/mated pair. Therefore the insertion loss of the mated cable assemblies shall be .435 + .200 = .635 dB max. One pin and socket contact assembly shall be tested. This sample set shall be terminated to an SMA connector on the opposing end of the RG-316 cable. Figure 1 displays a picture of the test unit.



**Figure 1 Insertion Loss and VSWR test unit**

**Results:**

The test units meet the insertion loss requirements specified above. Test data can be seen in Appendix A.

**9.2 Voltage Standing Wave Ratio (VSWR)**

**Requirements:**

Using a 50 Ohm measurement system, the VSWR of the cable assembly shall be 1.3:1 maximum at 3 GHz. Using the time domain with gate function on, measure the VSWR of the mated connectors. It shall be 1.35:1 maximum up to 20 GHz. One pin and socket contact assembly shall be tested. This sample set shall be terminated to an SMA connector on the opposing end of the RG-316 cable. Figure 1 displays a picture of the test unit.

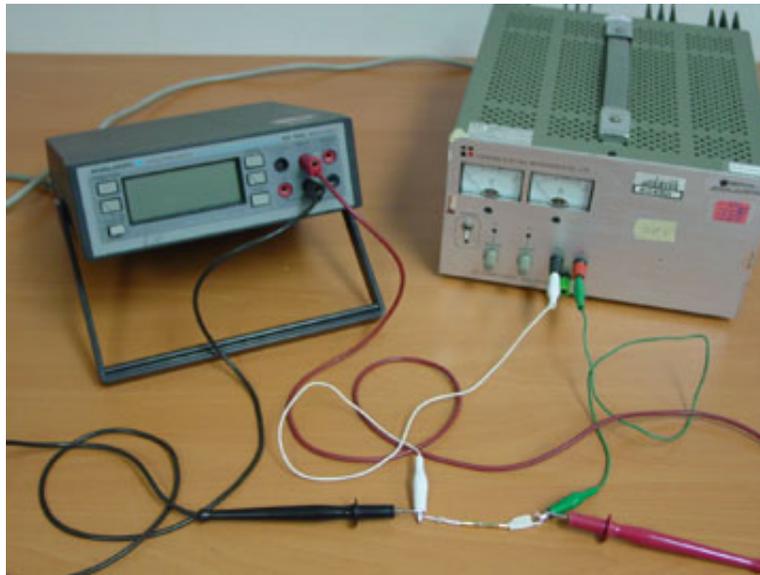
**Results:**

The test units meet the VSWR requirements specified above. Test Data can be seen in Appendix A.

**9.3 Contact Resistance**

**Requirements:**

Contact resistance shall be tested per the requirements of MIL-STD-202, method 307. The maximum contact resistance excluding cable shall be 6 milliOhms. Contact resistance measurements of the contact assembly with 1 inch of terminated cable on the pin and socket shall be tested for reference.



**Figure 2 Contact Resistance Test Set Up.**

**Results:**

All test units have met the requirements specified above. The test set up can be seen in Figure 1 above. The test data sheet can be obtained in Appendix A.

#### 9.4 Contact Engagement/Separation Force

**Requirements:**

Contact Engagement and Separation Force shall be tested per the requirements of MIL-STD-1344, Method 2014, except the mating pin contact (023214-2001) shall be used in place of a gage pin. The maximum engagement force shall be 1 lb. The minimum separation force shall be 0.4 lbs. The test set up can be seen in Figure 2 below.



**Figure 3 Contact Engagement/Separation Force Test Set Up.**

**Results:**

All test units passed the requirements specified above. Test data can be seen in Appendix A.

#### 9.5 Insulation Resistance

**Requirements:**

Insulation resistance shall be tested per the requirements of MIL-STD-1344, method 3003. The magnitude of voltage used shall be 250VDC with a minimum resistance of 1000 MOhms.



**Figure 4 Insulation Resistance Test Set Up.**

**Results:**

All test units met the insulation resistance requirements specified above. Test data can be seen in Appendix A.

#### **9.6 Durability**

**Requirements:**

Durability shall be tested per the requirements of MIL-STD-1344, method 2016. A minimum of 500 cycles shall be subjected at a maximum cycle rate of 300 cycles/hour. The test units shall show no evidence of defects detrimental to the mechanical or electrical performance when subjected to durability.

**Results:**

All test units were subjected to 500 cycles of durability using the same test set up shown on Figure 1 or performed manually and passed. There was no evidence of defects detrimental to the mechanical performance of the connector were visible. Test data sheets can be seen in Appendix A.

#### **9.7 Contact Resistance**

**Requirements:**

Refer to paragraph 9.3. Center contacts with no terminated cable shall not be required to be tested.

**Results:**

All test units met the requirements specified above. The test data sheets can be seen in Appendix A.

#### **9.8 Contact Mating/Unmating Forces**

**Requirements:**

Refer to paragraph 9.4.

**Results:**

All test units met the requirements specified above. The test data sheets can be seen in Appendix A.

Test Report

## 9.9 Insulation Resistance

### Requirements:

Refer to paragraph 9.5.

### Results:

All test units met the requirements specified above. The test data sheets can be seen in Appendix A.

**Appendix A – Test Data Sheets**

(10 sheets attached)

Impedance Data Sheet

Wiltron

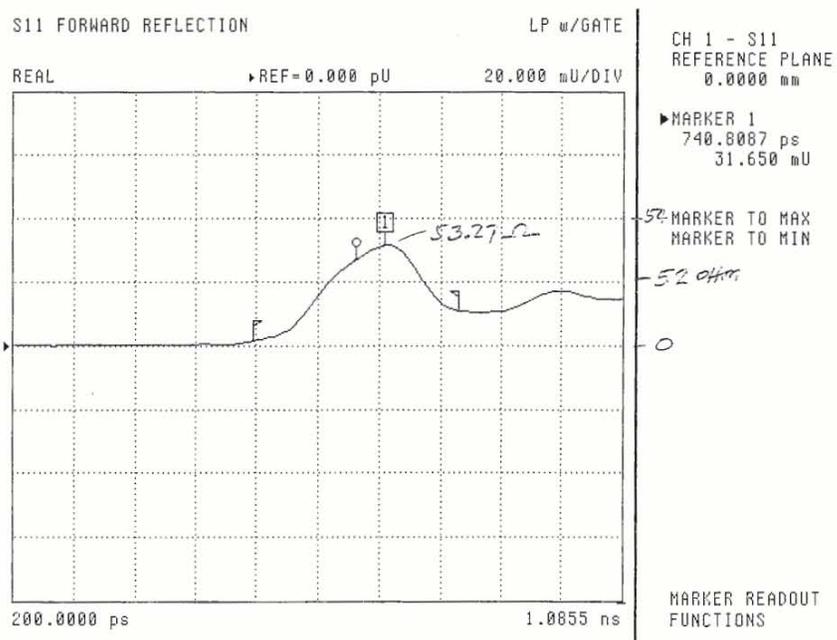
*Impedance*

37369A

|            |                 |             |             |       |             |         |
|------------|-----------------|-------------|-------------|-------|-------------|---------|
| MODEL:     |                 | DATE:       | 09/02/05    | 17:07 | Page        | 1       |
| DEVICE ID: | 019812-2013     | OPERATOR:   |             |       |             |         |
| START:     | 0.040000000 GHz | GATE START: | 548.0252 ps |       | ERROR CORR: | 12-TERM |
| STOP:      | 6.000000000 GHz | GATE STOP:  | 846.7995 ps |       | AVERAGING:  | 1 PT    |
| STEP:      | 0.040000000 GHz | GATE:       | NOMINAL     |       | IF BNDWDTH: | 1 KHZ   |
|            |                 | WINDOW:     | NOMINAL     |       |             |         |

```

-----CH1-----
PARAMETER:          -S11-
NORMALIZATION:      OFF
REFERENCE PLANE:    0.0000 mm
SMOOTHING:          0.0 PERCENT
DELAY APERTURE:     -
PROCESSING:         LP STEP W/GATE
GATING:             ON
    
```



Insertion Loss of Mated Cable Assembly with RG-316 Cable

Wilton

INSERTION LOSS OF MATED CABLE ASSEMBLY  
WITH RG 316

37369A

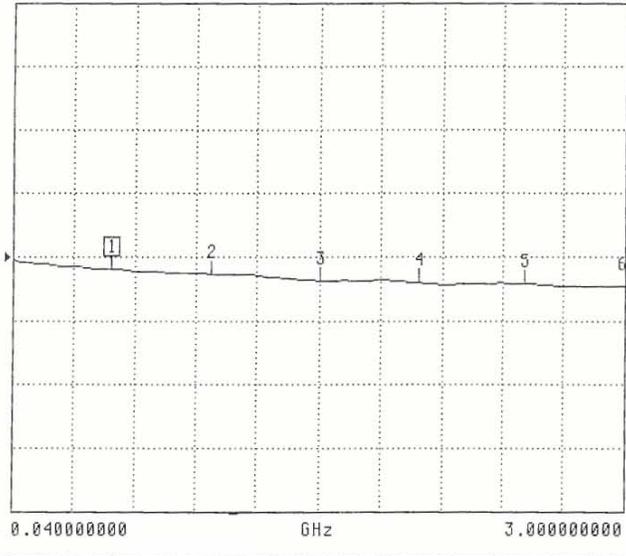
MODEL: DATE: 09/02/05 16:53 Page 1  
DEVICE ID: 019812-2013 OPERATOR:

START: 0.040000000 GHz GATE START: - ERROR CORR: 12-TERM  
STOP: 3.000000000 GHz GATE STOP: - AVERAGING: 1 PT  
STEP: 0.040000000 GHz GATE: - IF BNDWDTH: 1 KHz  
WINDOW: -

-----CH3-----  
PARAMETER: -S21-  
NORMALIZATION: OFF  
REFERENCE PLANE: 0.0000 mm  
SMOOTHING: 0.0 PERCENT  
DELAY APERTURE: -

S21 FORWARD TRANSMISSION

LOG MAGNITUDE REF=0.000 dB 1.000 dB/DIV



CH 3 - S21  
REFERENCE PLANE  
0.0000 mm  
MARKER 1  
0.520000000 GHz  
-0.206 dB  
MARKER TO MAX  
MARKER TO MIN  
2 1.000000000 GHz  
-0.286 dB  
3 1.520000000 GHz  
-0.381 dB  
4 2.000000000 GHz  
-0.403 dB  
5 2.520000000 GHz  
-0.433 dB  
6 3.000000000 GHz  
-0.477 dB

MARKER READOUT  
FUNCTIONS

VSWR of Mated Contacts

Wilttron

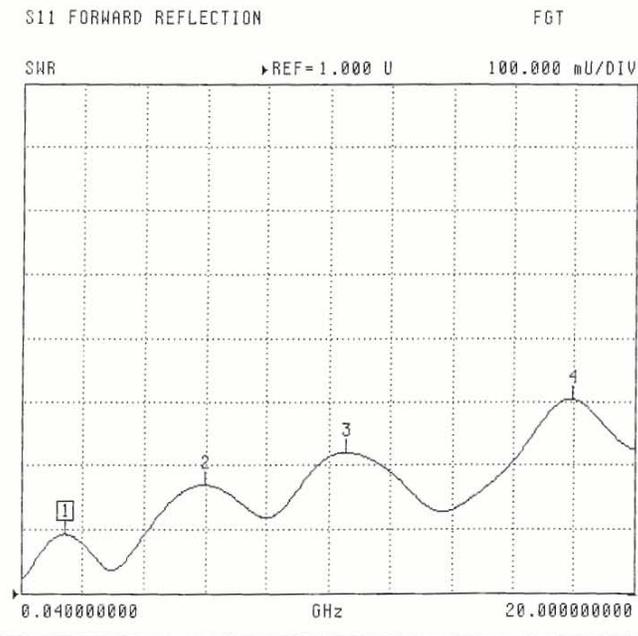
VSWR OF MATED CONNECTOR

37369A

MODEL: DATE: 09/02/05 16:47 Page 1  
 DEVICE ID: 019812-2013 OPERATOR:

START: 0.040000000 GHz GATE START: 548.0252 ps ERROR CORR: 12-TERM  
 STOP: 20.000000000 GHz GATE STOP: 841.8146 ps AVERAGING: 1 PT  
 STEP: 0.040000000 GHz GATE: NOMINAL IF BNDWDTH: 1 KHz  
 WINDOW: NOMINAL

-----CH1-----  
 PARAMETER: -S11-  
 NORMALIZATION: OFF  
 REFERENCE PLANE: 0.0000 mm  
 SMOOTHING: 0.0 PERCENT  
 DELAY APERTURE: -  
 PROCESSING: FREQ W/GATE  
 GATING: ON



CH 1 - S11  
 REFERENCE PLANE  
 0.0000 mm

MARKER 1  
 1.400000000 GHz  
 1.092 U

MARKER TO MAX  
 MARKER TO MIN

2 6.000000000 GHz  
 1.168 U

3 10.560000000 GHz  
 1.219 U

4 17.960000000 GHz  
 1.303 U

MARKER READOUT  
 FUNCTIONS

**VSWR of Mated Contact Assemblies with RG-316 Cable**

Wilton

VSWR OF MATED CABLE ASSEMBLY,  
WITH RG 316 CABLE

37369A

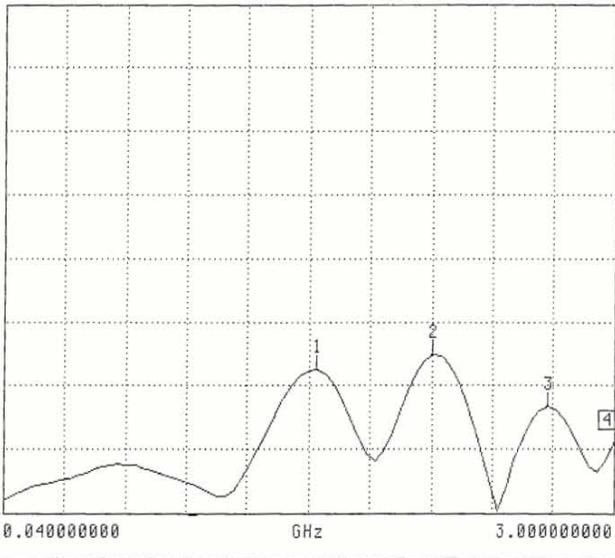
MODEL: DATE: 09/02/05 16:50 Page 1  
 DEVICE ID: 019812-2013 OPERATOR:

START: 0.040000000 GHz GATE START: - ERROR CORR: 12-TERM  
 STOP: 3.000000000 GHz GATE STOP: - AVERAGING: 1 PT  
 STEP: 0.040000000 GHz GATE: - IF BNDWDTH: 1 KHz  
 WINDOW: -

-----CH1-----  
 PARAMETER: -S11-  
 NORMALIZATION: OFF  
 REFERENCE PLANE: 0.0000 mm  
 SMOOTHING: 0.0 PERCENT  
 DELAY APERTURE: -

S11 FORWARD REFLECTION

SWR REF=1.000 U 100.000 mU/DIV



CH 1 - S11  
 REFERENCE PLANE  
 0.0000 mm  
 MARKER 4  
 3.000000000 GHz  
 1.111 U  
 MARKER TO MAX  
 MARKER TO MIN  
 1 1.560000000 GHz  
 1.225 U  
 2 2.120000000 GHz  
 1.248 U  
 3 2.680000000 GHz  
 1.167 U

MARKER READOUT  
 FUNCTIONS

**Pre Durability Contact Engagement/Separation Force Data Sheet**

|  |                           |   |                          |                         |                |   |
|--|---------------------------|---|--------------------------|-------------------------|----------------|---|
| <b>Customer:</b>   | N/A                       |   | <b>Date:</b>             | 9/7/05                  | <b>Job No:</b> | - |
| <b>Customer Part No:</b>   | N/A                       |   | <b>Sabritec Part No:</b> | 023214-2001/023114-2001 |                |   |
| <b>Specification:</b>  | MIL-STD-1344, Method 2014 |   | <b>S/N or Date Code:</b> | S/N 1, 2, 3             |                |   |
| <b>Temp:</b>   | 77F                       | <b>Relative Humidity:</b>                               | 60 %                     | <b>Bar. Pressure:</b>   | 29.9           |   |
| <b>Test Equipment/Tools</b><br>(Equipment name, Model, S/N, Calibration Due Date): |                           | Chatillon, Model DFGS-R-500, S/N044, Due Date: 11-11-05 |                          |                         |                |   |

**Requirements:** Connector mating and unmating shall be tested per the requirements of MIL-STD-1344, method 2013, unless otherwise specified. The dimension that defines the fully mated condition shall be defined.

| S/N | Mating Force (lbs) | Un-Mating Force (lbs) |
|-----|--------------------|-----------------------|
| 1   | .4                 | .6                    |
| 2   | .4                 | .6                    |
| 3   | .8                 | .8                    |

**PASS**

**ADDITIONAL NOTES:**

|                 |                   |
|-----------------|-------------------|
| Tested By:      | Phil Landstrom    |
| Engineer:       | Takahiro Kibuishi |
| Government QAR: | N/A               |
| Customer QAR:   | N/A               |

**Pre Durability Contact Resistance Data Sheet**

|  |  |                           |  |                       |      |
|--|--|---------------------------|--|-----------------------|------|
| <b>Customer:</b>   | N/A  | <b>Date:</b>              | 9/8/05   | <b>Job No:</b>        | -    |
| <b>Customer Part No:</b>   | N/A  | <b>Sabritec Part No:</b>  | 023114-2001, 023214-2001, 102-2994-300, 102-2995-300 |                       |      |
| <b>Specification:</b>  | MIL-STD-202, method 307  | <b>S/N or Date Code:</b>  | 1,2,3-A,B,C  |                       |      |
| <b>Temp:</b>   | 73F  | <b>Relative Humidity:</b> | 53%  | <b>Bar. Pressure:</b> | 29.9 |
| <b>Test Equipment/Tools</b><br>(Equipment name, Model, S/N, Calibration Due Date): | Topward Electronics, Model TPS 1220, S/N 220, Due Date: 5/13/06/<br>ANALOGIC, Model DP100, S/N 025, Due Date 1/17/06 |                           |  |                       |      |

**Requirements:** Contact resistance shall be tested per the requirements of MIL-STD-202, method 307, unless otherwise specified.

Maximum voltage drop (Inner contact with no terminated cable) =   6   mV

| S/N                              | Cable Type | Test Current (A) | Voltage Drop (mV) |
|----------------------------------|------------|------------------|-------------------|
| <b>023114-2001/023214-2001</b>   |            |                  |                   |
| 1-center                         | RG-316     | 1                | 19.6              |
| 1-outer                          | RG-316     | 1                | 2.4               |
| 2-center                         | RG-316     | 1                | 18.2              |
| 2-outer                          | RG-316     | 1                | 3.2               |
| 3-center                         | RG-316     | 1                | 17.5              |
| 3-outer                          | RG-316     | 1                | 4.6               |
| <b>102-2994-300/102-2995-300</b> |            |                  |                   |
| A                                | None       | 1                | 4.5               |
| B                                | None       | 1                | 4.6               |
| C                                | None       | 1                | 4.1               |

**PASS**

**ADDITIONAL NOTES:**

|                 |                   |
|-----------------|-------------------|
| Tested By:      | Phil Landstrom    |
| Engineer:       | Takahiro Kibuishi |
| Government QAR: | N/A               |
| Customer QAR:   | N/A               |

**Pre Durability Insulation Resistance Data Sheet**

|  |   |                           |                         |                       |      |
|--|---|---------------------------|-------------------------|-----------------------|------|
| <b>Customer:</b>   | N/A   | <b>Date:</b>              | 9/08/05                 | <b>Job No:</b>        | -    |
| <b>Customer Part No:</b>   | N/A   | <b>Sabritec Part No:</b>  | 023114-2001/023214-2001 |                       |      |
| <b>Specification:</b>  | MIL-STD-1344, method 3003                           | <b>S/N or Date Code:</b>  | S/N 1,2,3               |                       |      |
| <b>Temp:</b>   | 75F   | <b>Relative Humidity:</b> | 60%                     | <b>Bar. Pressure:</b> | 29.9 |
| <b>Test Equipment/Tools</b><br>(Equipment name, Model, S/N, Calibration Due Date): | General Radio, Model-1864, SN/296, Due Date: 5/6/06 |                           |                         |                       |      |

**Requirement:** 1000 megOhm minimum requirement at 200VDC

| S/N | Resistance (Gigaohms) | Pass/Fail |
|-----|-----------------------|-----------|
| 1   | >1                    | Pass      |
| 2   | >1                    | Pass      |
| 3   | >1                    | Pass      |

**PASS**

**ADDITIONAL NOTES:**

|                 |                   |
|-----------------|-------------------|
| Tested By:      | Phil Landstrom    |
| Engineer:       | Takahiro Kibuishi |
| Government QAR: | N/A               |
| Customer QAR:   | N/A               |

**Post Durability Contact Resistance Test Data Sheet**

|  |                        |  |                          |                       |      |
|--|------------------------|--|--------------------------|-----------------------|------|
| <b>Customer:</b>   | N/A                    | <b>Date:</b>   | 9/09/05                  | <b>Job No:</b>        |      |
| <b>Customer Part No:</b>   | N/A                    | <b>Sabritec Part No:</b>   | 023214-2001, 023114-2001 |                       |      |
| <b>Specification:</b>  | MIL-STD-202,method 307 | <b>S/N or Date Code:</b>   | SN1,2                    |                       |      |
| <b>Temp:</b>   | 74F                    | <b>Relative Humidity:</b>  | 53%                      | <b>Bar. Pressure:</b> | 29.9 |
| <b>Test Equipment/Tools</b><br>(Equipment name, Model, S/N, Calibration Due Date): |                        | Topward Electronics, Model TPS 1220, S/N 220, Due Date: 5/13/06/<br>ANALOGIC, Model DP100, S/N 025, Due Date 1/17/06 |                          |                       |      |

**Requirements:** Contact resistance shall be tested per the requirements of MIL-STD-202, method 307, unless otherwise specified.

Maximum voltage drop (Inner contact with no terminated cable) =   6   mV

| S/N      | Cable Type | Test Current (A) | Voltage Drop (mV) |
|----------|------------|------------------|-------------------|
| 1-center | RG-316     | 1                | 19.7              |
| 1 outer  | RG-316     | 1                | 1.4               |
| 2-center | RG-316     | 1                | 17.5              |
| 2 outer  | RG-316     | 1                | 2.3               |

**PASS**

**ADDITIONAL NOTES:**

Serial Number 3 was not tested because the terminations of the contacts were mishandled causing damage to the cable.

|                 |                   |
|-----------------|-------------------|
| Tested By:      | Phil Landstrom    |
| Engineer:       | Takahiro Kibuishi |
| Government QAR: | N/A               |
| Customer QAR:   | N/A               |

**Post Durability Insulation Resistance Data Sheet**

|  |                           |   |                         |                       |      |
|--|---------------------------|---|-------------------------|-----------------------|------|
| <b>Customer:</b>   | N/A                       | <b>Date:</b>  | 9/09/05                 | <b>Job No:</b>        | -    |
| <b>Customer Part No:</b>   | N/A                       | <b>Sabritec Part No:</b>                            | 023114-2001/023214-2001 |                       |      |
| <b>Specification:</b>  | MIL-STD-1344, method 3003 | <b>S/N or Date Code:</b>                            | S/N 1,2,3               |                       |      |
| <b>Temp:</b>   | 75F                       | <b>Relative Humidity:</b>                           | 60%                     | <b>Bar. Pressure:</b> | 29.9 |
| <b>Test Equipment/Tools</b><br>(Equipment name, Model, S/N, Calibration Due Date): |                           | General Radio, Model-1864, SN/296, Due Date: 5/6/06 |                         |                       |      |

**Requirement:** 1000 megOhm minimum requirement at 200VDC

| S/N | Resistance (Gigaohms) | Pass/Fail |
|-----|-----------------------|-----------|
| 1   | >1                    | Pass      |
| 2   | >1                    | Pass      |
| 3   | >1                    | Pass      |

**PASS**

**ADDITIONAL NOTES:**

|                 |                   |
|-----------------|-------------------|
| Tested By:      | Phil Landstrom    |
| Engineer:       | Takahiro Kibuishi |
| Government QAR: | N/A               |
| Customer QAR:   | N/A               |

**Post Durability Contact Engagement/Separation Force Data Sheet**

|  |                                       |                           |                         |                       |      |
|--|---------------------------------------|---------------------------|-------------------------|-----------------------|------|
| <b>Customer:</b>   | N/A                                   | <b>Date:</b>              | 9/8/05                  | <b>Job No:</b>        | -    |
| <b>Customer Part No:</b>   | N/A                                   | <b>Sabritec Part No:</b>  | 023214-2001/023114-2001 |                       |      |
| <b>Specification:</b>  | MIL-STD-1344, method 2013             | <b>S/N or Date Code:</b>  | S/N 1, 2, 3             |                       |      |
| <b>Temp:</b>   | 77F                                   | <b>Relative Humidity:</b> | 60 %                    | <b>Bar. Pressure:</b> | 29.9 |
| <b>Test Equipment/Tools</b><br>(Equipment name, Model, S/N, Calibration Due Date): | CHATILLON DFGRS-R-500 S/N044 11-11-05 |                           |                         |                       |      |

**Requirements:** Connector mating and unmating shall be tested per the requirements of MIL-STD-1344, method 2013, unless otherwise specified. The dimension that defines the fully mated condition shall be defined. The maximum and minimum mating/unmating force shall be   N/A  .

| S/N | Mating Force (lbs) | Un-Mating Force (lbs) |
|-----|--------------------|-----------------------|
| 1   | .6                 | .6                    |
| 2   | .4                 | .6                    |
| 3   | .8                 | .8                    |

**ADDITIONAL NOTES:**

|                 |                   |
|-----------------|-------------------|
| Tested By:      | Phil Landstrom    |
| Engineer:       | Takahiro Kibuishi |
| Government QAR: | N/A               |
| Customer QAR:   | N/A               |

**TEST PROCEDURE CHECKLIST**

| <b>Paragraph Reference</b> | <b>Test Procedure</b>         | <b>Date</b> | <b>Department</b> | <b>Initials</b> |
|----------------------------|-------------------------------|-------------|-------------------|-----------------|
| 9.1                        | Insertion Loss                | 9/2/05      | ENG.              | FQ              |
| 9.2                        | VSWR                          | 9/2/05      | ENG.              | FQ              |
| 9.3                        | Contact Resistance            | 9/8/05      | ENG.              | PL              |
| 9.4                        | Contact Engagement/Separation | 9/8/05      | ENG.              | PL              |
| 9.5                        | Insulation Resistance         | 9/8/05      | ENG.              | PL              |
| 9.6                        | Durability                    | 9/8/05      | ENG.              | PL              |
| 9.7                        | Contact Resistance            | 9/9/05      | ENG.              | PL              |
| 9.8                        | Contact Engagement/Separation | 9/9/05      | ENG.              | PL              |
| 9.9                        | Insulation Resistance         | 9/9/05      | ENG.              | PL              |