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Sabritec Test Report

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

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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.

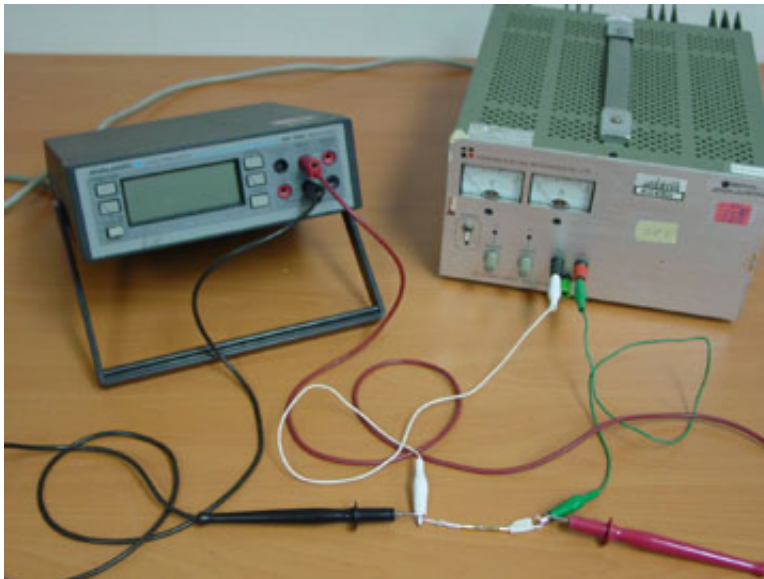


Figure 2 Contact Resistance Test Set Up.

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.

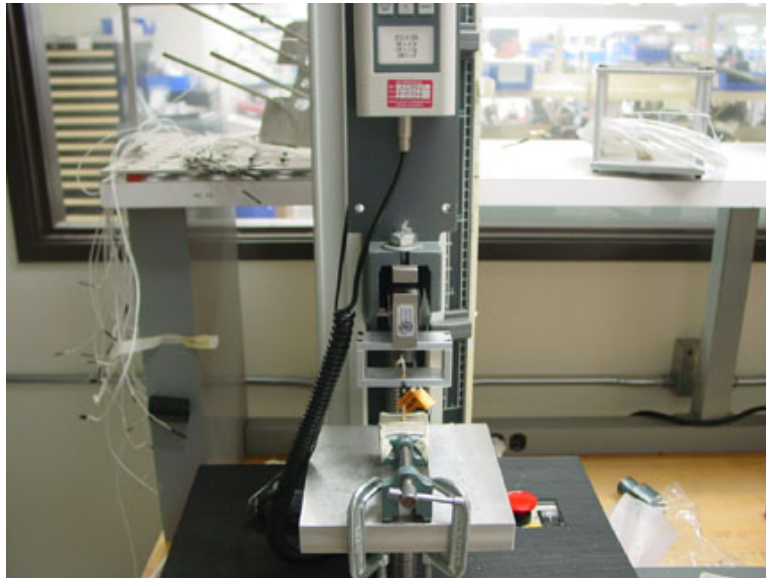


Figure 3 Contact Engagement/Separation Force Test Set Up.

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.

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

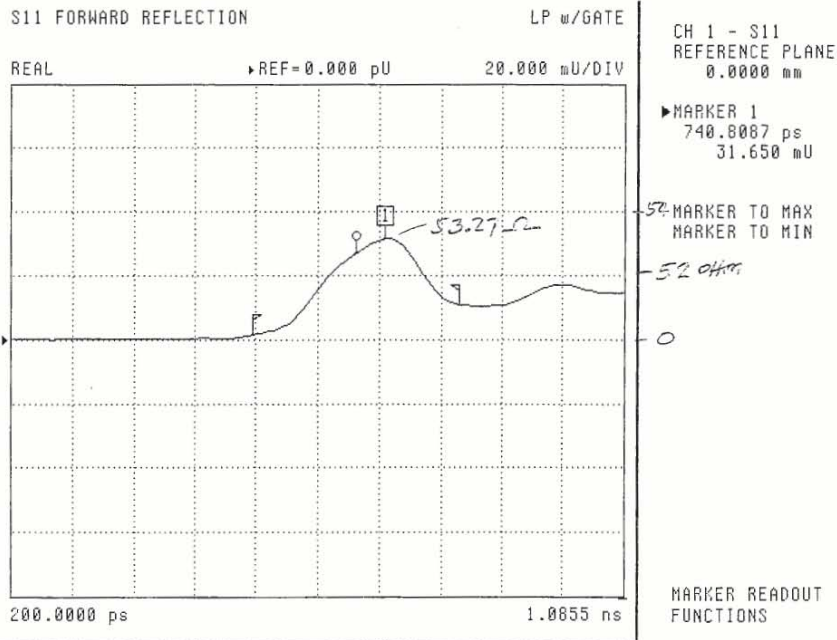
Impedance

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

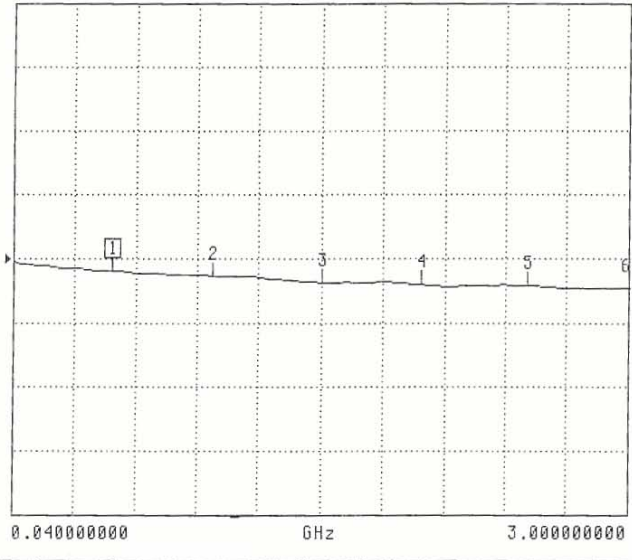
MODEL: DATE: 09/02/05 16:53 Page 1
 DEVICE ID: 019812-2013 OPERATOR:

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 BNDWIDTH: 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

Wilton

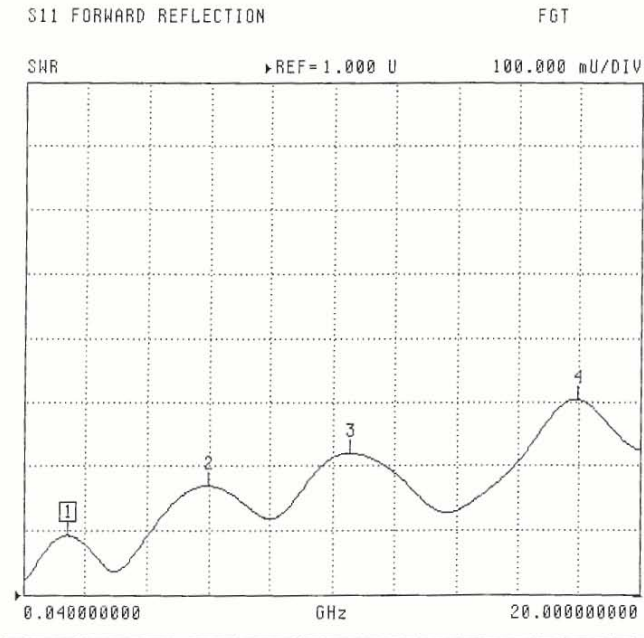
VSWR OF MATED CONNECTOR

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

VSWR of Mated Contact Assemblies with RG-316 Cable

Wiltron

*VSWR OF MATED CABLE ASSEMBLY,
 WITH RG 316 CABLE*

37369A

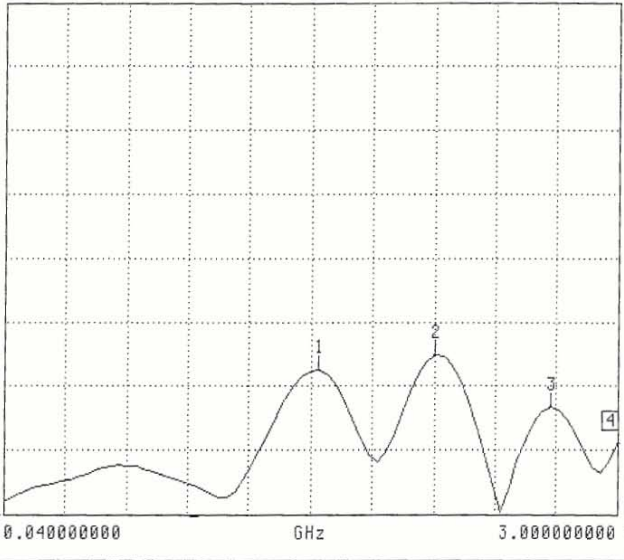
MODEL: DATE: 09/02/05 16:50 Page 1
 DEVICE ID: 019812-2013 OPERATOR:

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

Customer:	N/A	Date:	9/7/05	Job No:	-
Customer Part No:	N/A	Sabritec Part No:	023214-2001/023114-2001		
Specification:	MIL-STD-1344, Method 2014	S/N or Date Code:	S/N 1, 2, 3		
Temp:	77F	Relative Humidity:	60 %	Bar. Pressure:	29.9
Test Equipment/Tools (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

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

Customer:	N/A	Date:	9/08/05	Job No:	-
Customer Part No:	N/A	Sabritec Part No:	023114-2001/023214-2001		
Specification:	MIL-STD-1344, method 3003	S/N or Date Code:	S/N 1,2,3		
Temp:	75F	Relative Humidity:	60%	Bar. Pressure:	29.9
Test Equipment/Tools (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

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

Customer:	N/A	Date:	9/09/05	Job No:	-
Customer Part No:	N/A	Sabritec Part No:	023114-2001/023214-2001		
Specification:	MIL-STD-1344, method 3003	S/N or Date Code:	S/N 1,2,3		
Temp:	75F	Relative Humidity:	60%	Bar. Pressure:	29.9
Test Equipment/Tools (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

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

Paragraph Reference	Test Procedure	Date	Department	Initials
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