



**EMC Shielding Effectiveness Test Report
EMI ECE Gaskets
TO MIL-DTL-83528F**

| | |
|----------------------------|-------------------------------------|
| <i>Report No.</i> 22672 | <i>Issue Date</i> April 10, 2017 |
| <i>Revision</i> 1.0 | <i>Page</i> 1 of 16 |

EMC SHIELDING EFFECTIVENESS TEST REPORT

Test Specification : MIL-DTL-83528F
Manufacturer : Specialty Silicone Products
Test Samples :

1. SSP502-40 *Nickel Graphite in silicone 40 Shore A*
2. SSP502-65 *Nickel Graphite in silicone 65 Shore A*

| DOCUMENT HISTORY | | | | |
|-------------------------|-------------------|-------------------------|-------------------------------------|-------------------|
| REVISION | ISSUE DATE | AFFECTED PAGE(S) | DESCRIPTION OF MODIFICATIONS | REVISED BY |
| 1.0 | 10 April 2017 | | Initial release | |
| | | | | |
| | | | | |



**EMC Shielding Effectiveness Test Report
EMI ECE Gaskets
TO MIL-DTL-83528F**

Report No.

22672

Issue Date

April 10, 2017

Revision

1.0

Page

2 of 16

**TEST REPORT NO. 22672
from
D.L.S. Electronic Systems, Inc.**

Test for Specialty Silicone Products, Inc


| | | |
|-----------------------------------|------------------------------------|-------------------------------------|
| WRITTEN BY Jereme Irwin | REVIEWED BY Jack Prawica | REVIEWED BY Brian Mattson |
| | | |

| | |
|-----------------------|-------------------|
| TEST PERSONNEL | TITLE |
| Jereme Irwin | EMC Test Engineer |
| | |

| | |
|---------------------|-----------------|
| TEST DATE(S) | April 5-6, 2017 |
|---------------------|-----------------|

| | |
|--|--|
| TEST FACILITY ADDRESS CITY, STATE, ZIP CODE PHONE FAX | D.L.S. Electronic Systems, 1250 Peterson Drive Wheeling, IL. 60090 (847) 537-6400 (847) 537-6488 |
|--|--|

This report may be reproduced in full, partial reproduction may only be made with the written consent of the laboratory. The results in this report apply only to the equipment tested.

| | | |
|--|----------------------------|-------------------------------------|
|  <p>EMC Shielding Effectiveness Test Report EMI ECE Gaskets TO MIL-DTL-83528F</p> | <i>Report No.</i> 22672 | <i>Issue Date</i> April 10, 2017 |
| | <i>Revision</i> 1.0 | <i>Page</i> 3 of 16 |

ADMINISTRATIVE SUMMARY

REASON FOR TEST:

To test the shielding effectiveness of various Gasket materials as specified in MIL-DTL-83528F.

TEST SPECIFICATION:

MIL-DTL-83528F Standard for Measuring the Effectiveness of electrically conductive elastomeric shielding gaskets.

DATE(S) OF TEST:

April 5-6, 2017

TEST SAMPLES:

A total of two samples was presented for testing. Refer to Section 2 of this report for a description of each test sample along with the manufacturer's designation.

MANUFACTURER: Specialty Silicone Products, Inc
Corporate Technology Park
3 McCrea Hill Road
Ballston Spa, NY 12020

MANUFACTURERS REPRESENTATIVE:

Dominic J Testo

DISPOSITION OF TEST SAMPLE:

The samples will be returned to SSP, Inc.

TEST LOCATION:

D.L.S. Electronic Systems, Inc.
1250 Peterson Drive
Wheeling, IL. 60090

TEST PERSONNEL:

Jereme Irwin EMC Test Engineer

SUMMARY OF TEST RESULTS:

The shielding effectiveness of the test samples can be found in data sheets located in Appendix C of this report.



**EMC Shielding Effectiveness Test Report
EMI ECE Gaskets
TO MIL-DTL-83528F**

| | |
|----------------------------|-------------------------------------|
| <i>Report No.</i> 22672 | <i>Issue Date</i> April 10, 2017 |
| <i>Revision</i> 1.0 | <i>Page</i> 4 of 16 |

TABLE OF CONTENTS

ADMINISTRATIVE SUMMARY 3

REASON FOR TEST: 3

TEST SPECIFICATION: 3

DATE(S) OF TEST: 3

TEST SAMPLES: 3

MANUFACTURER: 3

MANUFACTURERS REPRESENTATIVE: 3

DISPOSITION OF TEST SAMPLE: 3

TEST LOCATION: 3

TEST PERSONNEL: 3

SUMMARY OF TEST RESULTS: 3

INTRODUCTION 5

SECTIONS 5

SECTION 1 - CLIENT INFORMATION 5

SECTION 2 - PURPOSE OF TEST 6

SECTION 3 - TEST SAMPLE DESCRIPTION 6

SECTION 4 - TEST SITE; FACILITIES, CONDITIONS AND TOLERANCES 7

SECTION 5 - TEST EQUIPMENT 7

SECTION 6 - SUMMARY OF TEST RESULTS 8

SECTION 7 - SHIELDING EFFECTIVENESS MEASUREMENTS 9


APPENDIX A - TEST EQUIPMENT 10

A.1 Specific Equipment Used 10

APPENDIX B - DESCRIPTION OF TEST METHODS 11

B.1 SHIELDING EFFECTIVENESS MEASUREMENTS 11

APPENDIX C - SUPPLEMENTAL DATA 12

| | | |
|--|----------------------------|-------------------------------------|
|  <p style="text-align: center;">EMC Shielding Effectiveness Test Report EMI ECE Gaskets TO MIL-DTL-83528F</p> | <i>Report No.</i> 22672 | <i>Issue Date</i> April 10, 2017 |
| | <i>Revision</i> 1.0 | <i>Page</i> 5 of 16 |

INTRODUCTION

This report documents the results of a series of EMI/EMC measurements performed on the test samples described in Section 2 of this report. The purpose of this series of tests was to demonstrate compliance of the test sample(s) with the requirements of the MIL-DTL-83528F Specification for comparison data of two different test samples using a MIL-DTL-83528F test fixture.

The testing procedure was verified before testing by a Specialty Silicone Products, Inc. representative.

SECTIONS

SECTION 1 - CLIENT INFORMATION

| | |
|--|---|
| COMPANY NAME ADDRESS CITY, STATE ZIP | Specialty Silicone Products, Inc Corporate Technology Park 3 McCrea Hill Road Ballston Spa, NY 12020 |
| CONTACT NAME TITLE PHONE E-MAIL | Dominic J Testo Account Representative (518) 363-5034 DTesto@sspinc.com |
| MANUFACTURER ADDRESS CITY, STATE ZIP | Specialty Silicone Products, Inc Corporate Technology Park 3 McCrea Hill Road Ballston Spa, NY 12020 |



**EMC Shielding Effectiveness Test Report
EMI ECE Gaskets
TO MIL-DTL-83528F**

| | |
|----------------------------|-------------------------------------|
| <i>Report No.</i> 22672 | <i>Issue Date</i> April 10, 2017 |
| <i>Revision</i> 1.0 | <i>Page</i> 6 of 16 |


SECTION 2 - PURPOSE OF TEST

The purpose of this series of tests was to verify the shielding effectiveness of the two samples for comparison to previous testing performed at DLS Electronic Systems, Inc. A controlled compression of the gasket was set to 10%.

SECTION 3 - TEST SAMPLE DESCRIPTION

The following table provides a list of each type of gasket tested.

| <i>NO.</i> | <i>Gasket Material</i> | <i>Material Description</i> |
|------------|------------------------|--|
| 1. | SSP502-40 | Nickel Graphite in silicone 40 Shore A |
| 2. | SSP502-65 | Nickel Graphite in silicone 65 Shore A |
| | | |
| | | |
| | | |
| | | |
| | | |

| | | |
|--|----------------------------|-------------------------------------|
|  <p>EMC Shielding Effectiveness Test Report EMI ECE Gaskets TO MIL-DTL-83528F</p> | <i>Report No.</i> 22672 | <i>Issue Date</i> April 10, 2017 |
| | <i>Revision</i> 1.0 | <i>Page</i> 7 of 16 |

SECTION 4 - TEST SITE; FACILITIES, CONDITIONS AND TOLERANCES

The EMI measurements were performed through a test fixture designed to the MIL-DTL-83528F test specification. A modified MIL-DTL-83528F test fixture was located between two adjacent shielded enclosures. The receive chamber and the control (transmit) chamber meets the applicable requirements of NSA65-6. AC power is supplied to each enclosure from a dedicated isolation transformer through low-pass line filters, which provide a minimum of 120 dB of attenuation from 10 kHz to 10 GHz.

SECTION 5 - TEST EQUIPMENT

A complete test system equipment list is provided in APPENDIX A of this report. The equipment absolute performance calibration, of the equipment requiring calibration, is performed on an as needed basis in accordance with MIL-STD-45662. However, calibration periods do not exceed one (1) year. The test equipment is capable of making measurements within tolerances of at least +/- 2 dB amplitude and +/-2% frequency deviation. Equipment certifications showing traceability to NIST (National Institute of Standards and Technology) are maintained on file at D.L.S. Electronic Systems in Wheeling, IL. All equipment is checked and verified for proper operation before and after each series of tests.



**EMC Shielding Effectiveness Test Report
EMI ECE Gaskets
TO MIL-DTL-83528F**

Report No.

22672

Issue Date

April 10, 2017

Revision

1.0

Page


8 of 16

SECTION 6 - TEST RESULTS

The following table lists the results for each of the test samples.

| <i>NO.</i> | <i>Material</i> | <i>MINIMUM ATTENUATION LEVEL (dB)</i> | <i>BEST-CASE ATTENUATION LEVEL (dB)</i> |
|------------|------------------|---|---|
| 1. | SSP502-40 | 115@20MHz | 142@100MHz |
| 2. | SSP502-65 | 113@20MHz | 141@200MHz |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

All samples tested met the minimum requirements for shielding effectiveness per MIL-DTL-83528F.

| | | |
|--|----------------------------|-------------------------------------|
|  <p>EMC Shielding Effectiveness Test Report EMI ECE Gaskets TO MIL-DTL-83528F</p> | <i>Report No.</i> 22672 | <i>Issue Date</i> April 10, 2017 |
| | <i>Revision</i> 1.0 | <i>Page</i> 9 of 16 |

SECTION 7 - SHIELDING EFFECTIVENESS MEASUREMENTS

Detailed data sheets, which provide the entire shielding effectiveness results across the entire frequency range for each of the two samples, are provided in APPENDIX C of this report. The following information provides a description of the test data sheet information.

All amplitude measurement levels are recorded in dBuV.
Attenuation Levels are recorded in dB.

The data sheets contain the following categories:

- Frequency: Discreet frequency at which measurement was made. Recorded as MHz or GHz.
- Reference Level: Test level with shielding material not in place. This is an amplitude level recorded in dBuV.
- Attenuation: Added attenuation (10dB) to input of receiver when measuring the reference level so not to damage receiver; attenuation removed for testing of gasket. This value is added to the test level.
- Test Level: Measurement made with shielding material in the test fixture. This is an amplitude level recorded in dBuV.
- Shielding Effectiveness: Equal to [Reference Level minus the (Test Level minus the pre-amp)]. The result is in dB units.



**EMC Shielding Effectiveness Test Report
EMI ECE Gaskets
TO MIL-DTL-83528F**

Report No.

22672

Issue Date

April 10, 2017

Revision

1.0


Page

10 of 16

APPENDIX A - TEST EQUIPMENT

A.1 Specific Equipment Used

| Description | Manufacturer | Model Number | Serial Number | Range | Cal On | Cal Due Dates |
|-------------------------------|-------------------------|--------------|---------------|--------------|----------|---------------|
| Antenna, Biconical | Electro-Metrics | BIA-25 | 2614 | 20-300MHz | 8/04/16 | 8/04/17 |
| Antenna, Horn | ETS-Lindgren | 3117 | 00135193 | 1GHz-18GHz | 8/06/16 | 8/06/17 |
| Antenna, Horn | EMCO | 3106 | 2127 | 200MHz-2GHz | 11/14/16 | 11/14/17 |
| Antenna, Horn | EMCO | 3117 | 00055158 | 1GHz-18GHz | 8/26/16 | 8/26/17 |
| Cable, 25ft, BNC-BNC, RG223/U | Pasternack Enterprises | PE3087-300 | 25ft. SN038 | 10kHz-1GHz | 1/26/17 | 1/26/18 |
| Cable, 25ft, BNC-BNC, RG223/U | Pasternack Enterprises | PE3087-36 | 3ft. SN06 | 10kHz-1GHz | 1/26/17 | 1/26/18 |
| Cable, 6ft, N-N | Teledyne Storm Products | 57500 | 02 | 1GHz-18GHz | 1/04/17 | 1/04/18 |
| Cable, 2ft, N-N | Teledyne Storm Products | 57500 | 03 | 1GHz-18GHz | 1/05/17 | 1/05/18 |
| Cable, 6ft, N-N | Teledyne Storm Products | 57500 | 01 | 1GHz-18GHz | 1/04/17 | 1/04/18 |
| Cable, 10ft, BNC-BNC, RG223/U | Pasternack Enterprises | PE3087-72 | 10ft. SN01 | 10kHz-1GHz | 8/31/16 | 8/31/17 |
| Generator, Signal, 1G-40GHz | Rohde & Schwarz | SMR 40 | 100052 | 1GHz-40GHz | 10/15/16 | 10/15/17 |
| Generator, Signal | Rohde & Schwarz | SMY02 | DE26648 | 9kHz-2GHz | 6/16/16 | 6/16/17 |
| Spectrum Analyzer | Agilent Technologies | E4440A | MY46186619 | 3Hz-26.5GHz | 8/31/16 | 8/31/17 |
| Antenna, Biconical | EMCO | 3109 | 9803-3163 | 20MHz-300MHz | N/A | N/A |
| Antenna, Horn | EMCO | 3106 | 00042811 | 200MHz-2GHz | N/A | N/A |

| | | |
|--|-----------------------------------|--|
|  <p style="text-align: center;">EMC Shielding Effectiveness Test Report EMI ECE Gaskets TO MIL-DTL-83528F</p> | <i>Report No.</i> 22672 | <i>Issue Date</i> April 10, 2017 |
| | <i>Revision</i> 1.0 | <i>Page</i> 11 of 16 |

APPENDIX B - DESCRIPTION OF TEST METHODS

B.1 SHIELDING EFFECTIVENESS MEASUREMENTS

The shielding effectiveness measurements were made in accordance with MIL-DTL-83528F using a spectrum analyzer and a signal generator in conjunction with the appropriate power amplifiers and antennas. The transmitting antenna was located inside of a shielded control chamber located adjacent to the Receiving chamber. Reference levels were measured through the 26 inch by 26 inch opening in the shielded enclosure without the test sample in place. The minimum reference level recorded was 95dB for all frequencies 20MHz-10GHz. References were made with the antennas positioned in horizontal polarity separated by 2 meters for 20-1000MHz and 1 meter for 2-10GHz.

The test levels were then recorded at each frequency and attenuation values were determined by calculating the difference between the reference level and the test level.

Dynamic Range is determined by placing a solid plate between the two chambers, measuring the amplitude of each frequency, then subtracting that from the reference level.



**EMC Shielding Effectiveness Test Report
EMI ECE Gaskets
TO MIL-DTL-83528F**

Report No.

22672

Issue Date

April 10, 2017

Revision

1.0

Page

12 of 16

APPENDIX C - Supplemental Data

| Company: Specialty Silicone Products | | | | Date: 4/05/17 | | |
|--------------------------------------|-----------------------------|------------------------------------|-------------------------------|---|------------------------------------|-----------------------|
| Sample: SSP502-40 | | | | | | |
| Frequency MHz | OPEN Amplitude (dBuV) | SOLID PLATE Amplitude (dBuV) | Gasket Amplitude (dBuV) | Signal Generator Setting (dBm) | Shielding Effectiveness (dB) | Dynamic Range (dB) |
| 20 | 95 | -30 | -20 | -15 | 115 | -125 |
| 30 | 100 | -30 | -21 | -15 | 121 | -130 |
| 40 | 100 | -30 | -21 | -23 | 121 | -130 |
| 60 | 100 | -30 | -20 | -27 | 120 | -130 |
| 80 | 120 | -30 | -20 | -27 | 140 | -150 |
| 100 | 120 | -30 | -22 | -47 | 142 | -150 |
| 200 | 120 | -30 | -19 | -37 | 139 | -150 |
| 400 | 120 | -30 | -20 | -37 | 140 | -150 |
| 600 | 120 | -30 | -21 | -42 | 141 | -150 |
| 800 | 120 | -30 | -20 | -35 | 140 | -150 |
| 1000 | 120 | -30 | -18 | -35 | 138 | -150 |
| 2000 | 120 | -15 | -10 | -47 | 130 | -135 |
| 4000 | 120 | -15 | -6 | -38 | 126 | -135 |
| 6000 | 120 | -15 | -10 | -38 | 130 | -135 |
| 8000 | 120 | -15 | -11 | -42 | 131 | -135 |
| 10000 | 120 | -15 | -12 | -38 | 132 | -135 |



**EMC Shielding Effectiveness Test Report
EMI ECE Gaskets
TO MIL-DTL-83528F**

Report No.

22672

Issue Date

April 10, 2017

Revision

1.0

Page

13 of 16

| Company: Specialty Silicone Products | | | | Date: 4/05/17 | | |
|--------------------------------------|-----------------------------|------------------------------------|-------------------------------|---|------------------------------------|-----------------------|
| Sample: SSP502-65 | | | | | | |
| Frequency MHz | OPEN Amplitude (dBuV) | SOLID PLATE Amplitude (dBuV) | Gasket Amplitude (dBuV) | Signal Generator Setting (dBm) | Shielding Effectiveness (dB) | Dynamic Range (dB) |
| 20 | 95 | -30 | -18 | -15 | 113 | -125 |
| 30 | 100 | -30 | -20 | -15 | 120 | -130 |
| 40 | 100 | -30 | -20 | -23 | 120 | -130 |
| 60 | 100 | -30 | -19 | -27 | 119 | -130 |
| 80 | 120 | -30 | -19 | -27 | 139 | -150 |
| 100 | 120 | -30 | -20 | -47 | 140 | -150 |
| 200 | 120 | -30 | -21 | -37 | 141 | -150 |
| 400 | 120 | -30 | -17 | -37 | 137 | -150 |
| 600 | 120 | -30 | -16 | -42 | 136 | -150 |
| 800 | 120 | -30 | -17 | -35 | 137 | -150 |
| 1000 | 120 | -30 | -19 | -35 | 139 | -150 |
| 2000 | 120 | -15 | -14 | -47 | 134 | -135 |
| 4000 | 120 | -15 | -12 | -38 | 132 | -135 |
| 6000 | 120 | -15 | -13 | -38 | 133 | -135 |
| 8000 | 120 | -15 | -14 | -42 | 134 | -135 |
| 10000 | 120 | -15 | -13 | -38 | 133 | -135 |



**EMC Shielding Effectiveness Test Report
EMI ECE Gaskets
TO MIL-DTL-83528F**

Report No.

22672

Issue Date

April 10, 2017

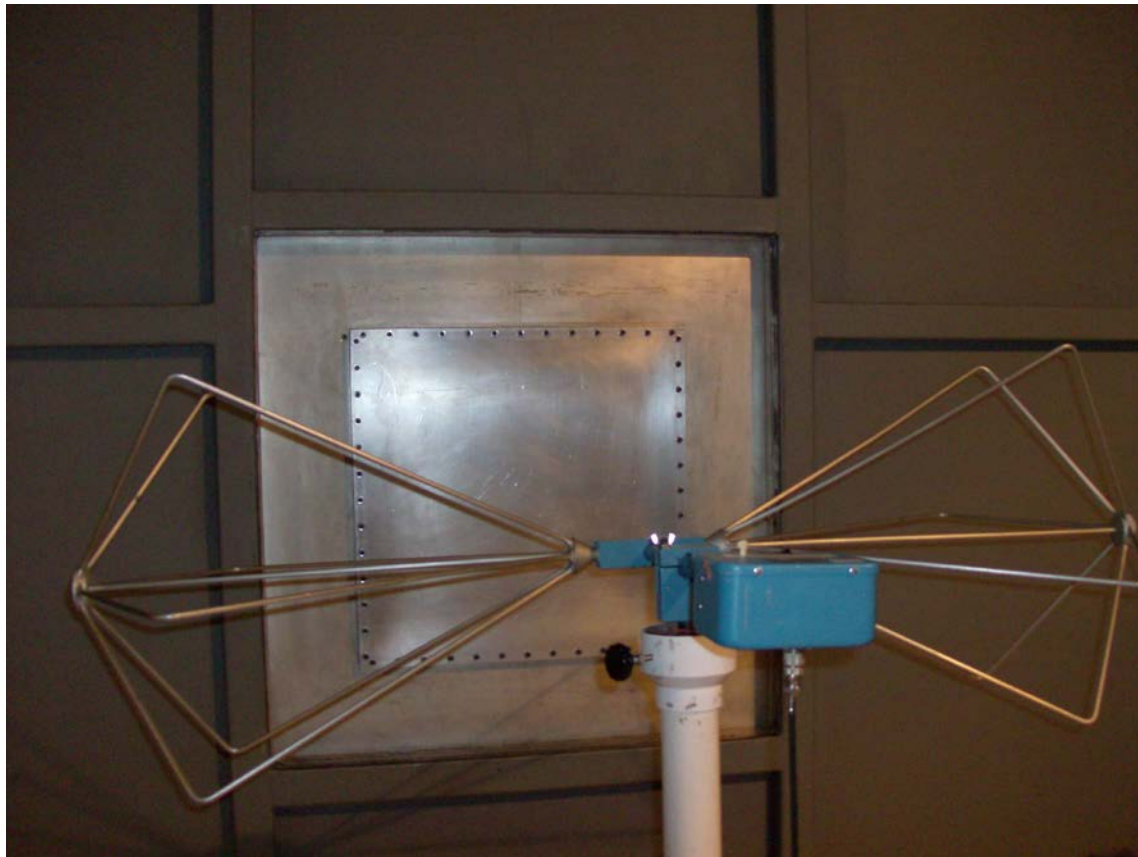
Revision

1.0

Page

14 of 16

Photos taken during test:



20-100MHz Test Setup



**EMC Shielding Effectiveness Test Report
EMI ECE Gaskets
TO MIL-DTL-83528F**

Report No.

22672

Issue Date

April 10, 2017

Revision

1.0

Page

15 of 16



200-1000MHz Test Setup



**EMC Shielding Effectiveness Test Report
EMI ECE Gaskets
TO MIL-DTL-83528F**

Report No.

22672

Issue Date

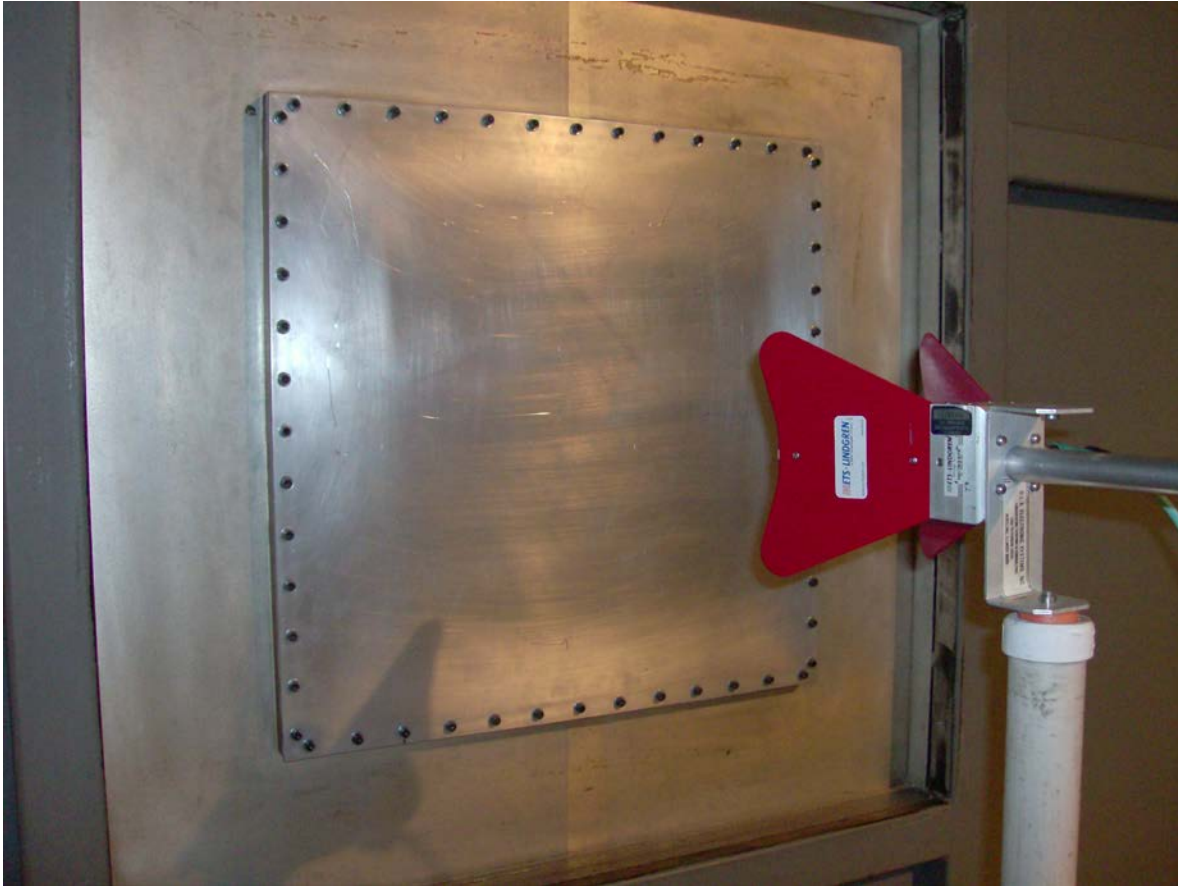
April 10, 2017

Revision

1.0

Page

16 of 16



2-10GHz Test Setup