



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

<i>Report No.</i> 22673	<i>Issue Date</i> April 10, 2017
<i>Revision</i> 1.0	<i>Page</i> 1 of 17

EMC SHIELDING EFFECTIVENESS TEST REPORT

- Test Specification : MIL-DTL-83528F**
Manufacturer : Specialty Silicone Products
Test Samples :
- 1. SSP547-65 Silver Copper in silicone 65 shore A**
 - 2. SSP548-65 Silver Aluminum in silicone 65 shore A**
 - 3. E50265-COMPOSITE NICKEL GRAPHITE IN SILICONE WITH REINFORCED LAYER OF CONDUCTIVE FABRIC**

DOCUMENT HISTORY				
REVISION	ISSUE DATE	AFFECTED PAGE(S)	DESCRIPTION OF MODIFICATIONS	REVISED BY
1.0	07 April 2017		Initial release	



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**TEST REPORT NO. 22673
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
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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
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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 three 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.



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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 three 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



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SECTION 2 - PURPOSE OF TEST

The purpose of this series of tests was to verify the shielding effectiveness of the three 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.	SSP547-65	Silver Copper in silicone 65 shore A
2.	SSP548-65	Silver Aluminum in silicone 65 shore A
3.	E50265-COMPOSITE	NICKEL GRAPHITE IN SILICONE WITH REINFORCED LAYER OF CONDUCTIVE FABRIC

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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.



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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.	SSP547-65	110@10GHz	144@80MHz
2.	SSP548-65	104@8GHz	143@100MHz
3.	E50265-COMPOSITE	102@4GHz	143@80MHz

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

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SECTION 7 - SHIELDING EFFECTIVENESS MEASUREMENTS

Detailed data sheets, which provide the entire shielding effectiveness results across the entire frequency range for each of the four 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.




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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

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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.



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APPENDIX C - Supplemental Data

Company: Specialty Silicone Products				Date: 4/05/17		
Sample: SSP547-65						
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	-20	-15	115	-125
30	100	-30	-24	-15	124	-130
40	100	-30	-23	-23	123	-130
60	100	-30	-21	-27	121	-130
80	120	-30	-24	-27	144	-150
100	120	-30	-23	-47	143	-150
200	120	-30	-22	-37	142	-150
400	120	-30	-17	-37	137	-150
600	120	-30	-18	-42	138	-150
800	120	-30	-21	-35	141	-150
1000	120	-30	-14	-35	134	-150
2000	120	-15	-4	-47	124	-135
4000	120	-15	4	-38	116	-135
6000	120	-15	6	-38	114	-135
8000	120	-15	9	-42	111	-135
10000	120	-15	10	-38	110	-135



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Company: Specialty Silicone Products				Date: 4/06/17		
Sample: SSP548-65						
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	-19	-15	114	-125
30	100	-30	-22	-15	122	-130
40	100	-30	-23	-23	123	-130
60	100	-30	-21	-27	121	-130
80	120	-30	-22	-27	142	-150
100	120	-30	-23	-47	143	-150
200	120	-30	-21	-37	141	-150
400	120	-30	-16	-37	136	-150
600	120	-30	-20	-42	140	-150
800	120	-30	-21	-35	141	-150
1000	120	-30	-15	-35	135	-150
2000	120	-15	-2	-47	122	-135
4000	120	-15	6	-38	114	-135
6000	120	-15	12	-38	108	-135
8000	120	-15	16	-42	104	-135
10000	120	-15	15	-38	105	-135



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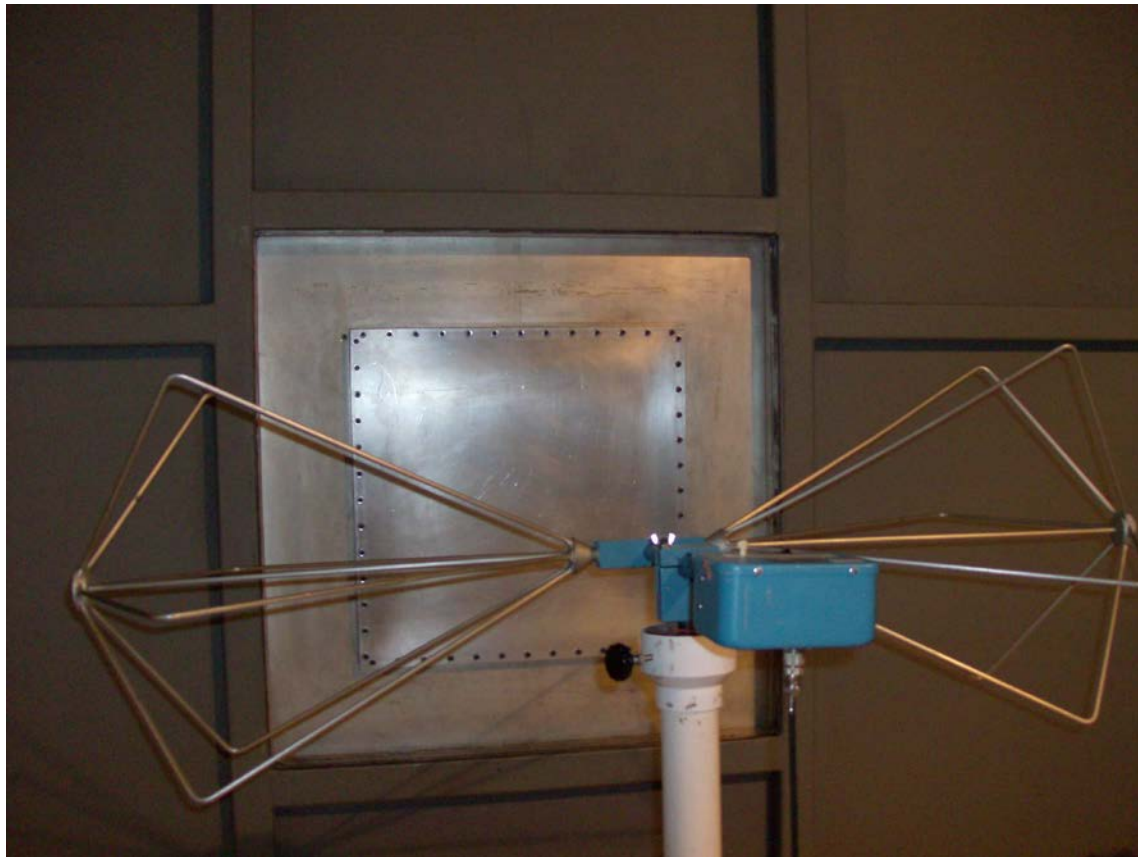
Company: Specialty Silicone Products				Date: 4/06/17		
Sample: E50265-COMPOSITE						
Frequency MHz	OPEN Amplitude (dBuV)	SOLID PLATE Amplitude (dBuV)	Gasket Amplitude (dBuV)	Signal Generator Setting (dBm)	Shielding Effectiveness (dB)	Dynamic Range (dB)
20	95	-30	-18	-15	113	-125
30	100	-30	-23	-15	123	-130
40	100	-30	-24	-23	124	-130
60	100	-30	-22	-27	122	-130
80	120	-30	-23	-27	143	-150
100	120	-30	-21	-47	141	-150
200	120	-30	-16	-37	136	-150
400	120	-30	-15	-37	135	-150
600	120	-30	-12	-42	132	-150
800	120	-30	-5	-35	125	-150
1000	120	-30	-8	-35	128	-150
2000	120	-15	9	-47	111	-135
4000	120	-15	18	-38	102	-135
6000	120	-15	15	-38	105	-135
8000	120	-15	13	-42	107	-135
10000	120	-15	8	-38	112	-135



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Photos taken during test:



20-100MHz Test Setup



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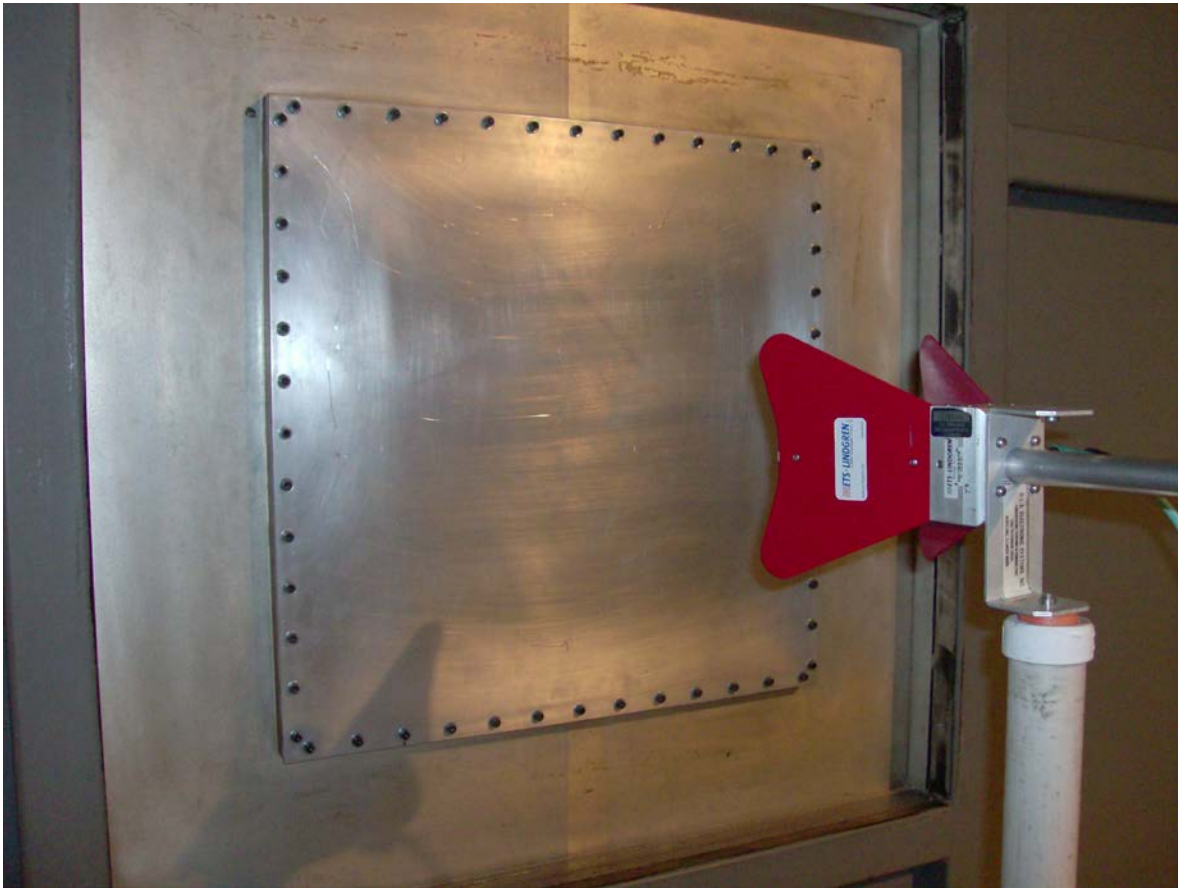


200-1000MHz Test Setup



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2-10GHz Test Setup