



**Shielding Effectiveness & EMP Survivability Test  
Report  
EMI ECE Gaskets  
TO MIL-DTL-83528H**

|                            |                                   |
|----------------------------|-----------------------------------|
| <i>Report No.</i><br>25514 | <i>Issue Date</i><br>July 15,2020 |
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**Shielding Effectiveness & EMP Survivability TEST REPORT**

**Test Specification : MIL-DTL-83528H**  
**Manufacturer : Specialty Silicone Products, Inc.**  
**Test Samples : SSP 2368-65**

| <b>DOCUMENT HISTORY</b> |                   |                         |                                     |                   |
|-------------------------|-------------------|-------------------------|-------------------------------------|-------------------|
| <b>REVISION</b>         | <b>ISSUE DATE</b> | <b>AFFECTED PAGE(S)</b> | <b>DESCRIPTION OF MODIFICATIONS</b> | <b>REVISED BY</b> |
| 1.0                     | July 15, 2020     |                         | Initial release                     |                   |
|                         |                   |                         |                                     |                   |
|                         |                   |                         |                                     |                   |



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**TEST REPORT NO. 25514  
from  
D.L.S. Electronic Systems,  
Test for Specialty Silicone Products, Inc.**

|                                   |                                    |                                     |
|-----------------------------------|------------------------------------|-------------------------------------|
| <b>WRITTEN BY</b><br>Jereme Irwin | <b>REVIEWED BY</b><br>Jack Prawica | <b>REVIEWED BY</b><br>Brian Mattson |
|                                   |                                    |                                     |

|                       |                   |
|-----------------------|-------------------|
| <b>TEST PERSONNEL</b> | <b>TITLE</b>      |
| Jereme Irwin          | EMC Test Engineer |
|                       |                   |

|                     |                 |
|---------------------|-----------------|
| <b>TEST DATE(S)</b> | July 8-10, 2020 |
|---------------------|-----------------|

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

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## ADMINISTRATIVE SUMMARY

### REASON FOR TEST:

To test the Shielding Effectiveness and EMP Survivability of one material types as specified in MIL-DTL-83528H.

### TEST SPECIFICATION:

MIL-DTL 83528H GASKET MATERIAL, CONDUCTIVE, SHIELDING GASKET,  
ELECTRONIC, ELASTOMER, EMI/RFI  
GENERAL SPECIFICATION

### DATE(S) OF TEST:

July 8-10, 2020

### TEST SAMPLES:

A total of one unique sample 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.  
3 McCrea Hill Road  
Ballston Spa, NY 12020

### MANUFACTURERS REPRESENTATIVE:

Dominic Testo

### DISPOSITION OF TEST SAMPLE:

Samples will be returned to SSP, Inc.

### TEST LOCATION:

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

### TEST PERSONNEL:

Jereme Irwin                      EMC Test Engineer

### SUMMARY OF TEST RESULTS:

Test results can be found under Section 6. The EMP Waveforms and Shielding Effectiveness of the test samples can be found in data sheets located in Appendix C of this report.



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**MANUFACTURERS REPRESENTATIVE:** ..... 3

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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-83528H Specification for comparison data of one test sample using a MIL-DTL-83528H test fixture.

## SECTIONS

### SECTION 1 - CLIENT INFORMATION

|   |  |
|---|--|
| <i>COMPANY NAME</i><br><i>ADDRESS</i><br><i>CITY, STATE ZIP</i> | <b>Specialty Silicone Products, Inc.<br/>3 McCrea Hill Road<br/>Ballston Spa, NY 12020</b> |
| <i>CONTACT NAME</i><br><i>PHONE</i><br><i>EMAIL</i>             | <b>Dominic Testo<br/>518-363-5034<br/>dtesto@sspinc.com</b>                                |
| <i>MANUFACTURER</i><br><i>ADDRESS</i><br><i>CITY, STATE ZIP</i> | <b>Specialty Silicone Products, Inc.<br/>3 McCrea Hill Road<br/>Ballston Spa, NY 12020</b> |



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**SECTION 2 - PURPOSE OF TEST**

The purpose of this series of tests was to verify the EMP Survivability and Shielding Effectiveness of the ECE sample.

**SECTION 3 - TEST SAMPLE DESCRIPTION**

The following table provides a list of each type of **EMP** material tested.

| <i>NO.</i> | <i>Material</i>    | <i>Batch #</i> |
|------------|--------------------|----------------|
| 1.         | <b>SSP 2368-65</b> | <b>AC060</b>   |
|            |                    |                |

The following table provides a list of each type of **Shielding Effectiveness** material tested.

| <i>NO.</i> | <i>Material</i>    | <i>Batch #</i> |
|------------|--------------------|----------------|
| 1.         | <b>SSP 2368-65</b> | <b>N/A</b>     |
|            |                    |                |



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## **SECTION 4 - TEST SITE; FACILITIES, CONDITIONS AND TOLERANCES**

The EMP tests were performed through a test fixture designed to the MIL-DTL-83528H test specification. The test sample was placed in between the two half of the fixture applying 10% compression. A calibrated caliper was used to determine the proper compression amount. A 1MHz 900Ap-p pulse was generated into the fixture and verified with an oscilloscope.

The Shielding Effectiveness measurements were performed through a test fixture designed to the MIL-DTL-83528H test specification. 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 **EMP** test samples.

| <b>Part Number</b> | <b>Pre-Test Ohms-<br/>cm</b> | <b>Post-Test Ohms-<br/>cm</b> |
|--------------------|------------------------------|-------------------------------|
| <b>SSP 2368-65</b> |                              |                               |
| <b>Sample #1</b>   | <b>0.009</b>                 | <b>0.010</b>                  |
| <b>Sample #2</b>   | <b>0.010</b>                 | <b>0.010</b>                  |
| <b>Sample #3</b>   | <b>0.008</b>                 | <b>0.008</b>                  |

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

| <b>NO.</b> | <b>Material</b>    | <b>MINIMUM<br/>ATTENUATION LEVEL<br/>(dB)</b> | <b>BEST-CASE<br/>ATTENUATION<br/>LEVEL (dB)</b> |
|------------|--------------------|---|---|
| 1.         | <b>SSP 2368-65</b> | <b>116 @ 20MHz</b>                            | <b>148 @ 100MHz</b>                             |
|            |                    |   |   |





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**APPENDIX A - TEST EQUIPMENT**

**A.1 Specific Equipment Used**

**TEST INSTRUMENTATION**

**TABLE 1**

| <b>Description</b>            | <b>Manufacturer</b>           | <b>Model Number</b> | <b>Serial Number</b> | <b>Range</b>       | <b>Cal On</b> | <b>Cal Due Dates</b> |
|-------------------------------|-------------------------------|---------------------|----------------------|--------------------|---------------|----------------------|
| Meter, MilliOhm               | Quad Tech                     | 1880                | 1261146              | 1Microohm-2Megaohm | 01/15/2020    | 01/15/2021           |
| Oscilloscope, Digital, 1.5GHz | Agilent Technologies          | 54845A              | US40000161           | DC-1.5GHz, 8MS/s   | 01/15/2020    | 01/15/2021           |
| Probe, Current, Injection     | Fischer Custom Communications | F-120-9A            | 342                  | 10kHz-230MHz       | 07/08/2020    | 07/08/2021           |
| Probe, Current, Rogowski      | PEM                           | CWT 6R              | 6997-8287            | 1200A              | 1/15/2020     | 1/15/2021            |
| Test Fixture                  | DLS Electronic Systems        | EMP                 | 01                   | N/A                | 07/08/2020    | 07/08/2021           |
| Digital Caliper               | Mitutoyo                      | CD-6inch-CS         | RS000108             | 0-6 inches         | 10/21/2019    | 10/21/2020           |

All primary equipment is calibrated against known reference standards with a verified traceable path NIST.



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TABLE 2

| Description                    | Manufacturer         | Model Number | Serial Number | Range        | Cal On     | Cal Due Dates |
|--------------------------------|----------------------|--------------|---------------|--------------|------------|---------------|
| Antenna, Biconical, 20M-220MHz | Electro-Metrics      | BIA-25C      | 2614          | 20MHz-300MHz | 08/30/2019 | 08/30/2020    |
| Antenna, Horn, 200M-2GHz       | Electro-Metrics      | 3106         | 9501-2607     | 200MHz-2GHz  | 07/09/2020 | 07/09/2021    |
| Antenna, Horn, 200M-2GHz       | EMCO                 | 3106         | 2127          | 200MHz-2GHz  | 01/17/2020 | 01/17/2021    |
| Antenna, Horn, 1G-18GHz        | ETS-Lindgren         | 3117         | 00135193      | 1GHz-18GHz   | 07/18/2019 | 07/18/2020    |
| Antenna, Horn, 1G-18GHz        | ETS-Lindgren         | 3117         | 00055158      | 1GHz-18GHz   | 10/30/2019 | 10/30/2020    |
| Attenuator, RF, 10dB           | JFW Industries       | 50FH-010-10  | 012           | DC-1GHz      | 06/02/2020 | 06/02/2021    |
| Generator, Signal,             | Rohde & Schwarz      | SML 01       | 101121        | 9kHz-1.1GHz  | 06/22/2020 | 06/22/2021    |
| Generator, Signal              | Rohde & Schwarz      | SMR20        | 100052        | 1-20GHz      | 06/24/2020 | 06/24/2021    |
| Spectrum Analyzer, 44GHz       | Agilent Technologies | E4440A       | MY46186619    | 3Hz-26.5GHz  | 09/13/2019 | 09/13/2020    |

TABLE 3

| Description                    | Manufacturer       | Model Number | Serial Number | Range         |
|--------------------------------|--------------------|--------------|---------------|---------------|
| Amplifier, RF, Power, 10K-220M | Amplifier Research | 2500LM11     | 22714         | 10kHz-220MHz  |
| Amplifier, RF, Power, 80M-1GHz | Amplifier Research | 500W1000     | 309687        | 80MHz-1000MHz |
| Antenna, Biconical, 20M-220MHz | EMCO               | 3109         | 9803-3163     | 20MHz-300MHz  |



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## **APPENDIX B - DESCRIPTION OF TEST METHODS**

### **B.1 - EMP Survivability Test Methods**

The sample is placed in a test fixture and the gasket is compressed 10%. A 1MHz pulse is applied at 900A P-P. A before and after resistance measurement is taken, and then inspected for damage (if any) after the test. Any spare samples are then tested for repeatability.

### **B.2 – Shielding Effectiveness Test Methods**

The shielding effectiveness measurements were made 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. The test fixture is a 24"x24" opening. 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.

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

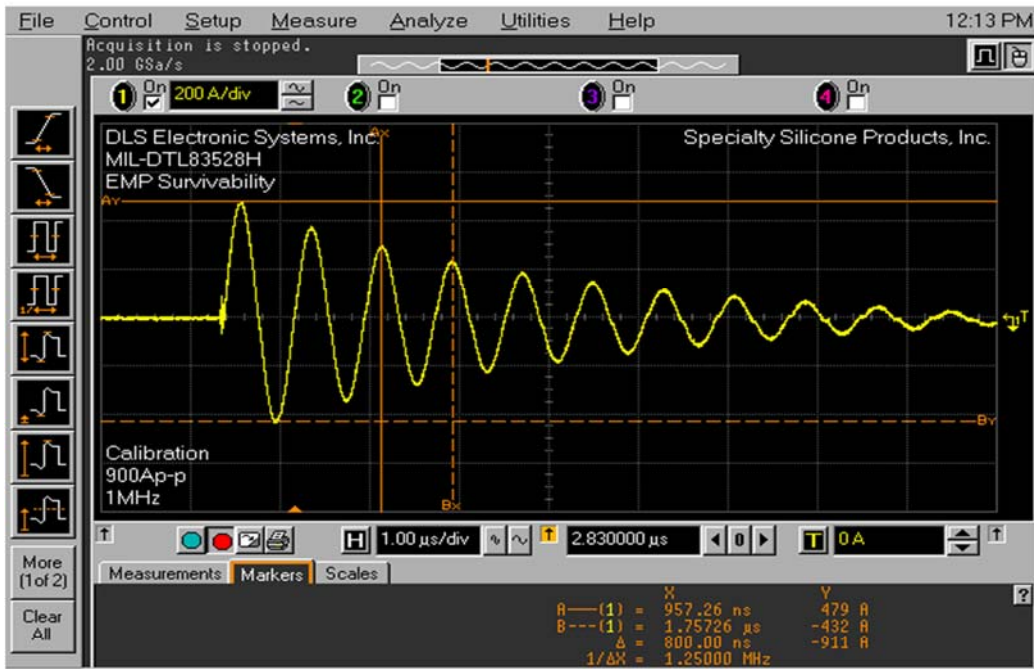
- Frequency: Discrete frequency at which measurement was made. Recorded as MHz or GHz.
- Reference Level: Test level with shielding material not in place. This is an amplitude level recorded in dBuV.
- Attenuation: Added attenuation (10dB) to input of receiver when measuring the reference level so not 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 C - Supplemental Data:**

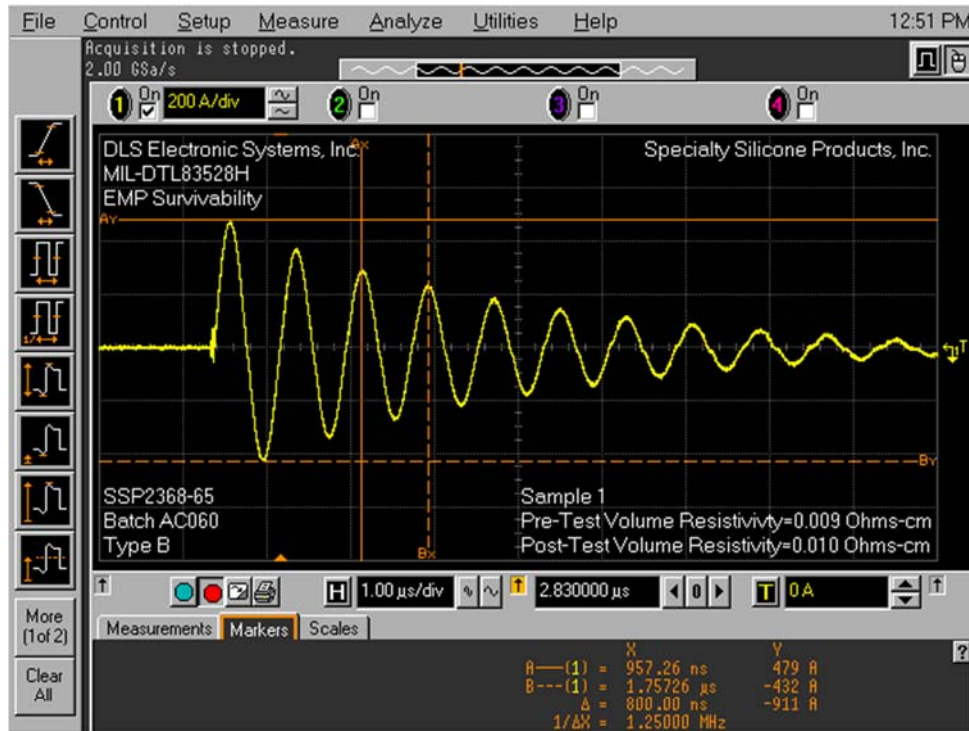
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|             |  |           |           |                      |          |           |
|-------------|--|-----------|-----------|----------------------|----------|-----------|
| Acquisition | Sampling mode real time Configuration 4GSa/s<br>Memory depth manual Memory depth 32768pts<br>Sampling rate manual Sampling rate 2.00 GSa/s<br>Averaging off<br>9-bit BW Filter off Interpolation off |           |           |                      |          |           |
| Channel 1   | Scale 200 A/div Offset -2.0 A Coupling DC Impedance 1M Ohm<br>Attenuation 200.0 : 1 Atten units ratio Skew 0.0 s<br>Ext adapter None Ext coupler None<br>Ext gain 1.00E+00 Ext offset 0.0E+00        |           |           |                      |          |           |
| Time base   | Scale 1.00 μs/div Position 2.830000 μs Reference center  |           |           |                      |          |           |
| Trigger     | Mode edge Sweep triggered<br>Hysteresis normal Holdoff time 60 ns Coupling DC<br>Source channel 1 Trigger level 0 A Slope rising   |           |           |                      |          |           |
| Measure     | current  | mean      | std dev   | min                  | max      |           |
|             | DCVrms (1)   | 144.359 A | 128.727 A | 33.7616 A            | 10.409 A | 148.888 A |
|             | Frequency (1+)   | Edge?     | -----     | -----                | -----    | -----     |
| Marker      | current  | mean      | X         | Y                    |          |           |
|             | DCVrms (1)   | 144.359 A | 128.727 A | A—(1) = 957.26 ns    | 479 A    |           |
|             | Frequency (1+)   | Edge?     | -----     | B---(1) = 1.75726 μs | -432 A   |           |
|             |  |           |           | Δ = 800.00 ns        | -911 A   |           |
|             |  |           |           | 1/ΔX = 1.25000 MHz   |          |           |

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Acquisition Sampling mode real time Configuration 4GSa/s  
Memory depth manual Memory depth 32768pts  
Sampling rate manual Sampling rate 2.00 GSa/s  
Averaging off  
9-bit B/W Filter off Interpolation off

Channel 1 Scale 200 A/div Offset -2.0 A Coupling DC Impedance 1M Ohm  
Attenuation 200.0 : 1 Atten units ratio Skew 0.0 s  
Ext adapter None Ext coupler None  
Ext gain 1.00E+00 Ext offset 0.0E+00

Time base Scale 1.00 μs/div Position 2.830000 μs Reference center

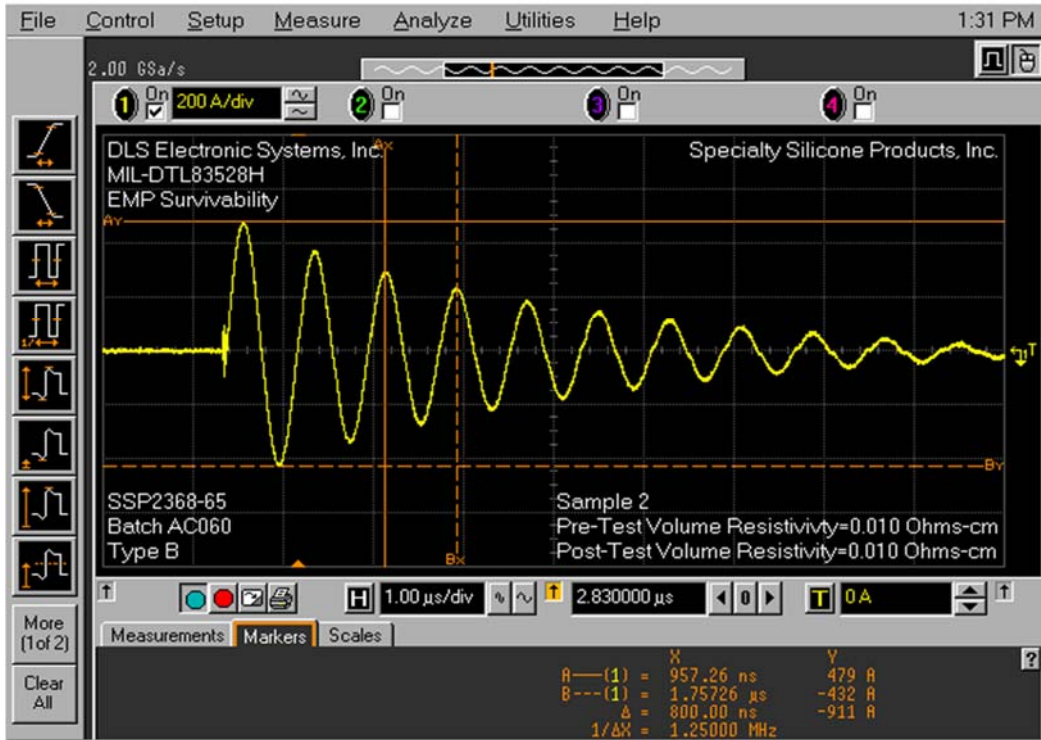
Trigger Mode edge Sweep triggered  
Hysteresis normal Holdoff time 60 ns Coupling DC  
Source channel 1 Trigger level 0 A Slope rising

| Measure        | current   | mean      | std dev | min       | max       |
|----------------|-----------|-----------|---------|-----------|-----------|
| DCVrms (1)     | 142.561 A | 142.561 A | 0.0 A   | 142.561 A | 142.561 A |
| Frequency (1+) | Edge?     | -----     | -----   | -----     | -----     |

| Marker         | current   | mean      | X                    | Y      |
|----------------|-----------|-----------|----------------------|--------|
| DCVrms (1)     | 142.561 A | 142.561 A | A—(1) = 957.26 ns    | 479 A  |
| Frequency (1+) | Edge?     | -----     | B---(1) = 1.75726 μs | -432 A |
|                |           |           | Δ = 800.00 ns        | -911 A |
|                |           |           | 1/ΔX = 1.25000 MHz   |        |

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Acquisition Sampling mode real time Configuration 4GSa/s  
Memory depth manual Memory depth 32768pts  
Sampling rate manual Sampling rate 2.00 GSa/s  
Averaging off  
9-bit BW Filter off Interpolation off

Channel 1 Scale 200 A/div Offset -2.0 A Coupling DC Impedance 1M Ohm  
Attenuation 200.0 : 1 Atten units ratio Skew 0.0 s  
Ext adapter None Ext coupler None  
Ext gain 1.00E+00 Ext offset 0.0E+00

Time base Scale 1.00 us/div Position 2.830000 us Reference center

Trigger Mode edge Sweep triggered  
Hysteresis normal Holdoff time 60 ns Coupling DC  
Source channel 1 Trigger level 0 A Slope rising

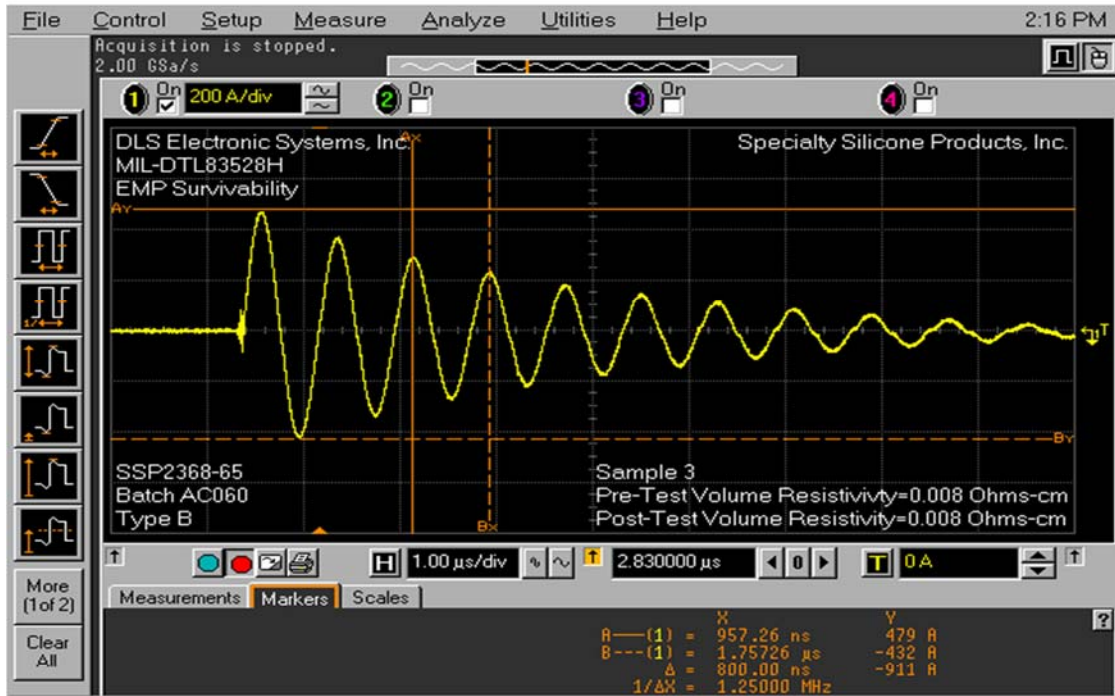
| Measure        | current   | mean      | std dev | min       | max       |
|----------------|-----------|-----------|---------|-----------|-----------|
| DCVrms (1)     | 142.898 A | 142.898 A | 0.0 A   | 142.898 A | 142.898 A |
| Frequency (1+) | Edge?     |           |         |           |           |

| Marker         | current   | mean      | X                      | Y      |
|----------------|-----------|-----------|------------------------|--------|
| DCVrms (1)     | 142.898 A | 142.898 A | A---(1) = 957.26 ns    | 479 A  |
| Frequency (1+) | Edge?     |           | B---(1) = 1.75726 us   | -432 A |
|                |           |           | delta = 800.00 ns      | -911 A |
|                |           |           | 1/deltaX = 1.25000 MHz |        |



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Acquisition Sampling mode real time Configuration 4GSa/s  
 Memory depth manual Memory depth 32768pts  
 Sampling rate manual Sampling rate 2.00 GSa/s  
 Averaging off  
 9-bit BW Filter off Interpolation off

Channel 1 Scale 200 A/div Offset -2.0 A Coupling DC Impedance 1M Ohm  
 Attenuation 200.0 : 1 Atten units ratio Skew 0.0 s  
 Ext adapter None Ext coupler None  
 Ext gain 1.00E+00 Ext offset 0.0E+00

Time base Scale 1.00 μs/div Position 2.830000 μs Reference center

Trigger Mode edge Sweep triggered  
 Hysteresis normal Holdoff time 60 ns Coupling DC  
 Source channel 1 Trigger level 0 A Slope rising

| Measure        | current   | mean      | std dev | min       | max       |
|----------------|-----------|-----------|---------|-----------|-----------|
| DCVrms (1)     | 141.522 A | 141.522 A | 0.0 A   | 141.522 A | 141.522 A |
| Frequency (1+) | Edge?     | -----     | -----   | -----     | -----     |

| Marker         | current   | mean      | X                    | Y      |
|----------------|-----------|-----------|----------------------|--------|
| DCVrms (1)     | 141.522 A | 141.522 A | A---(1) = 957.26 ns  | 479 A  |
| Frequency (1+) | Edge?     | -----     | B---(1) = 1.75726 μs | -432 A |
|                |           |           | Δ = 800.00 ns        | -911 A |
|                |           |           | 1/ΔX = 1.25000 MHz   |        |



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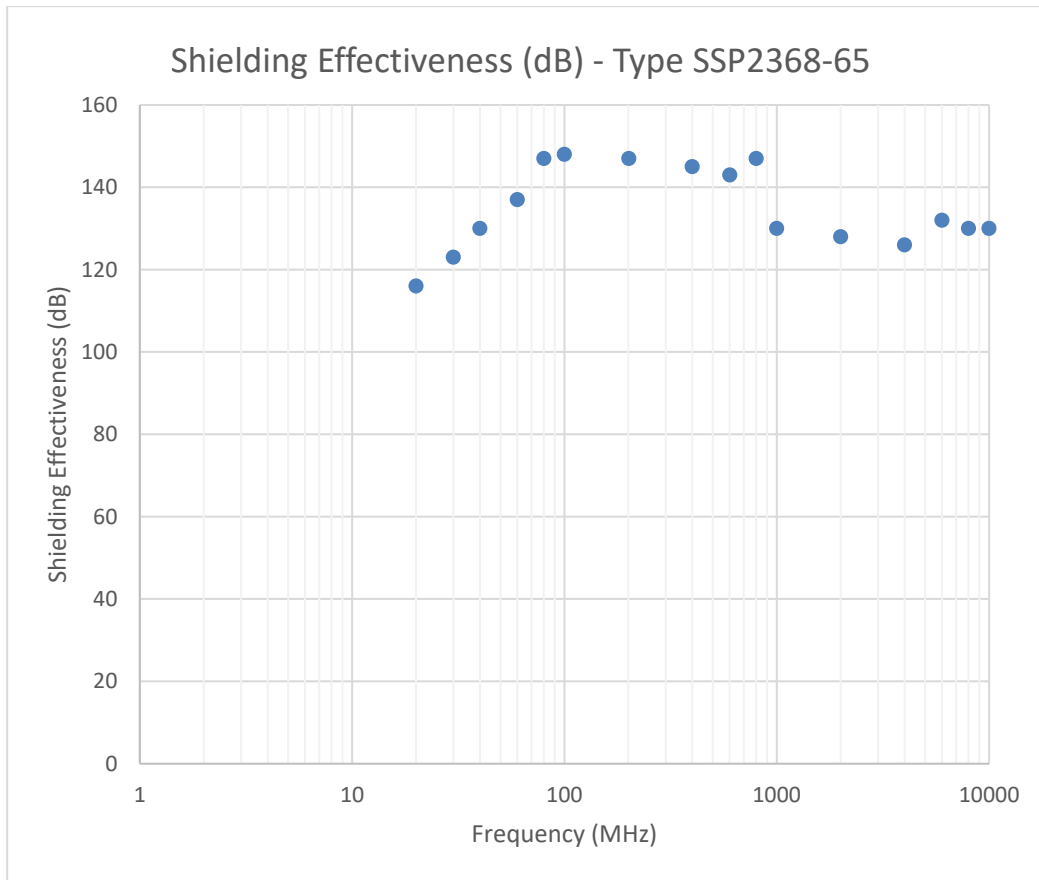
| <b>Company: Specialty Silicone Products, Inc.</b> |                                      |   |  | <b>Date: 7/10/20</b>                              |   |                               |
|---|--------------------------------------|---|--|---|---|-------------------------------|
| <b>Type: SSP 2368-65</b>                          |                                      |   |  |   |   |                               |
| <b>Frequency<br/>MHz</b>                          | <b>OPEN<br/>Amplitude<br/>(dBuV)</b> | <b>SOLID<br/>PLATE<br/>Amplitude<br/>(dBuV)</b> | <b>Gasket<br/>Amplitude<br/>(dBuV)</b> | <b>Signal<br/>Generator<br/>Setting<br/>(dBm)</b> | <b>Shielding<br/>Effectiveness<br/>(dB)</b> | <b>Dynamic<br/>Range (dB)</b> |
| 20  | 90                                   | -30   | -26                                    | -12   | 116   | -120                          |
| 30  | 100                                  | -30   | -23                                    | -12   | 123   | -130                          |
| 40  | 105                                  | -30   | -25                                    | -13   | 130   | -135                          |
| 60  | 110                                  | -30   | -27                                    | -13   | 137   | -140                          |
| 80  | 120                                  | -30   | -27                                    | -25   | 147   | -150                          |
| 100   | 120                                  | -30   | -28                                    | -37   | 148   | -150                          |
| 200   | 120                                  | -30   | -27                                    | -44   | 147   | -150                          |
| 400   | 120                                  | -30   | -25                                    | -46   | 145   | -150                          |
| 600   | 120                                  | -30   | -23                                    | -37   | 143   | -150                          |
| 800   | 120                                  | -30   | -27                                    | -37   | 147   | -150                          |
| 1000  | 120                                  | -15   | -10                                    | -38   | 130   | -135                          |
| 2000  | 120                                  | -15   | -8                                     | -38   | 128   | -135                          |
| 4000  | 120                                  | -15   | -6                                     | -38   | 126   | -135                          |
| 6000  | 120                                  | -15   | -12                                    | -35   | 132   | -135                          |
| 8000  | 120                                  | -15   | -10                                    | -35   | 130   | -135                          |
| 10000   | 120                                  | -15   | -10                                    | -35   | 130   | -135                          |





**Shielding Effectiveness & EMP Survivability Test  
Report  
EMI ECE Gaskets  
TO MIL-DTL-83528H**

|                            |                                   |
|----------------------------|-----------------------------------|
| <i>Report No.</i><br>25514 | <i>Issue Date</i><br>July 15,2020 |
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**Shielding Effectiveness & EMP Survivability Test  
Report  
EMI ECE Gaskets  
TO MIL-DTL-83528H**

**Photos:**



**EMP Calibration**

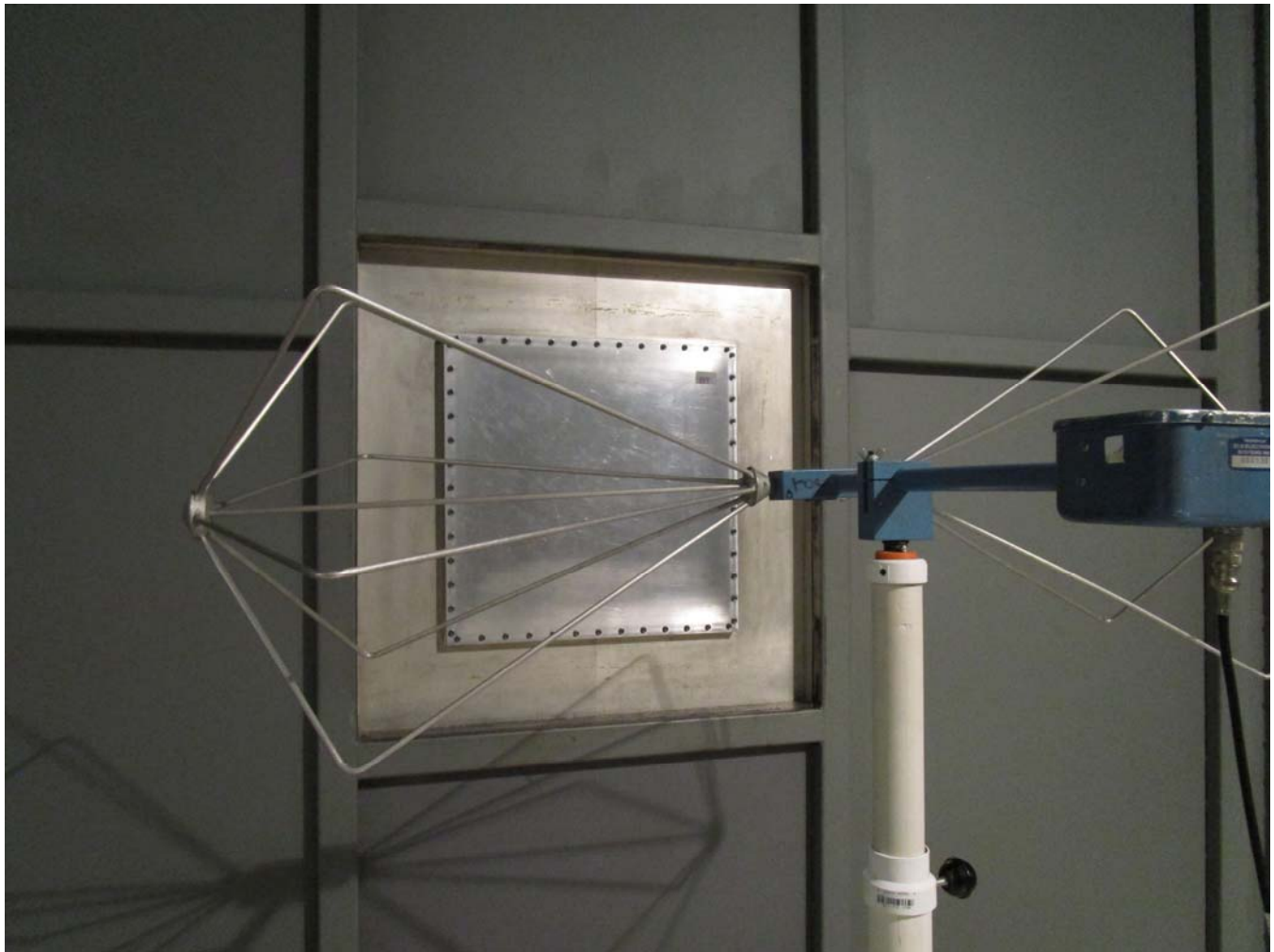
**Shielding Effectiveness & EMP Survivability Test  
Report  
EMI ECE Gaskets  
TO MIL-DTL-83528H**



**EMP Test**



**Shielding Effectiveness & EMP Survivability Test  
Report  
EMI ECE Gaskets  
TO MIL-DTL-83528H**



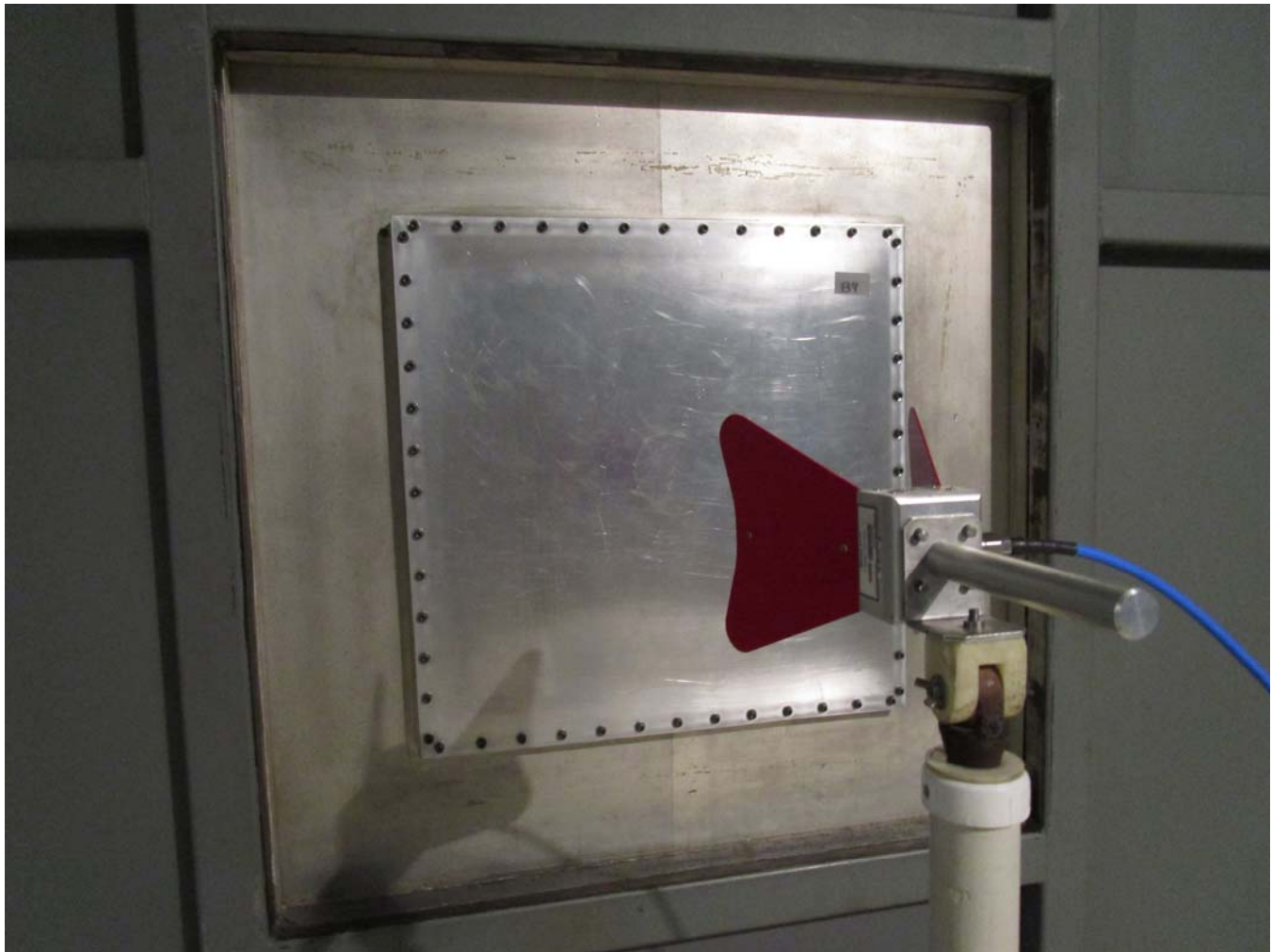
**Shielding Effectiveness 20-100MHz**

**Shielding Effectiveness & EMP Survivability Test  
Report  
EMI ECE Gaskets  
TO MIL-DTL-83528H**



**Shielding Effectiveness 400-800MHz**

**Shielding Effectiveness & EMP Survivability Test  
Report  
EMI ECE Gaskets  
TO MIL-DTL-83528H**



**Shielding Effectiveness 1-10GHz**