



**Keystone Compliance, LLC
131 Columbus Inner Belt
New Castle, PA 16101**

**Phone: 724-657-9940
Fax: 724-657-9920**

MOS Equipment

2002-277ED-2



Shielding Effectiveness Test Report 2002-277ED-2 Rev. N/C

Test Standards: IEEE 299-2006

For

MOS Equipment

201 W Montecito Street
Santa Barbara, CA 93101


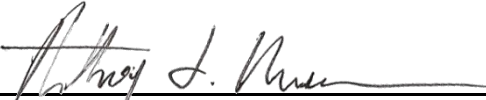
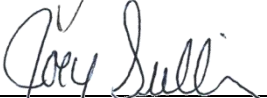
On

Block Box Lab

Model Number: N/A; Part Number: N/A; Serial Number: N/A

Performed By: Keystone Compliance, LLC.
131 Columbus Inner Belt
New Castle, PA 16101

Keystone Compliance, LLC. does hereby certify that all inspections and tests have been performed in accordance with the documents referenced herein with exceptions as noted in this report. The results in this report pertain to the specified equipment tested, as received. This report shall not be reproduced, except in full, without the written authorization of Keystone Compliance, LLC.

Prepared By:	 _____	Date:	10/7/2020
	Maria Rodgers, Technical Writer		
Approved By:	 _____	Date:	10/7/2020
	Tony Masone Jr., Lab Manager		
Approved By:	 _____	Date:	10/7/2020
	Joey Sullivan, Quality Manager		



SHIELDING EFFECTIVENESS TEST REPORT FOR MOS EQUIPMENT

Document History				
Revision	Issue Date	Description of Modifications	Revised By	Approved By
N/C	10/7/2020	Initial release	N/A	T.M.

SHIELDING EFFECTIVENESS TEST REPORT FOR MOS EQUIPMENT

Client Information	
Purchase Order	2002-277EA
Quote Number	2002-277ED-2
EUT Arrival Date	8/13/2020 -- Received in good condition
Company Name	MOS Equipment
Address	201 W Montecito Street
City, State Zip	Santa Barbara, CA 93101
Contact Name	Amanda Benenati
Email	amanda@mosequipment.com

Test Facility Information	
Test Laboratory	Keystone Compliance, LLC.
Address	131 Columbus Inner Belt
City, State, Zip Code	New Castle, PA 16101
Phone	(724) 657-9940
Fax	724-657-9920
Web Site	www.keystonecompliance.com
Contact Name	Tony Masone Jr.
Title	Lab Manager
E-Mail Address	Tonyjr@keystonecompliance.com

Test Program Information	
Test Personnel	Travis Gennaro – EMC Test Technician
Test Title & Test Dates	Shielding Effectiveness – September 11, 2020 to September 15, 2020

SHIELDING EFFECTIVENESS TEST REPORT FOR MOS EQUIPMENT

TABLE OF CONTENTS

Introduction	6
Acronyms and Abbreviations	6
Configuration	7
Summary of Tests Performed & Results	8
Section 1 – Test Conditions and Equipment	9
1.1 Instrumentation and Equipment	9
1.2 Tolerances	9
Section 2 – References	10
2.1 Applicable Specifications	10
Section 3 – Test Descriptions, Test Equipment, Test Data, & Test Setup Photographs	11
3.1 Shielding Effectiveness Test.....	11
3.1.1 Shielding Effectiveness Test Description	12
3.1.2 Shielding Effectiveness Test Equipment Log	13
3.1.3 Shielding Effectiveness Test Data	14
3.1.4 Shielding Effectiveness Test Setup Photographs	17
Section 4 – Conclusion.....	18

LIST OF TABLES

Table 1 Tests Performed & Results	8
Table 2 Tests Performed & Results	18

SHIELDING EFFECTIVENESS TEST REPORT FOR MOS EQUIPMENT

Introduction

This report documents the results of the EMC tests performed on the Block Box Lab, Model Number: N/A; Part Number: N/A; Serial Number: N/A, submitted by MOS Equipment

The EMC test programs described herein were performed in accordance with the applicable requirements of IEEE 299-2006.

All test data is included in Section 3 of this document.

All tests performed at Keystone Compliance New Castle, PA EMC test facility. All tests were performed using the test set-ups of the relevant standard for tests performed in laboratory conditions.

Acronyms and Abbreviations

EMC – Electromagnetic Compatibility	EMI – Electromagnetic Interference
EUT – Equipment Under Test	M/N – Model Number
P/N – Part Number	S/N – Serial Number
Vac – Voltage Alternating Current	DC – Direct Current
AM – Amplitude Modulation	dB – Decibel
deg – Degree	H/V – Horizontal or Vertical Polarity
m – Meters	cm – Centimeter
V/m – Volts per meter	dBuV/m – Decibel microvolts per meter
kV – Kilovolt	Hz – Hertz
kHz – Kilohertz	MHz – Megahertz
GHz – Gigahertz	pF – Picofarad
Ω – Ohm	QP – Quasi-Peak
N/A – Not Applicable	

SHIELDING EFFECTIVENESS TEST REPORT FOR MOS EQUIPMENT

Configuration

Testing performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations, and settings used to complete the evaluation. The actual test parameters specified in the test data; this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation, indicated in the test data.

EUT		
Description		Manufacturer
Block Box Lab		MOS Equipment
Model Number	Part Number	Serial Number
N/A	N/A	N/A

	<div style="background-color: #e67e22; color: white; padding: 5px; margin-bottom: 10px;">EUT</div> <div style="text-align: center; padding: 20px;">Block Box Lab</div>
--	--

SHIELDING EFFECTIVENESS TEST REPORT FOR MOS EQUIPMENT
Summary of Tests Performed & Results
Table 1 Tests Performed & Results

Report Paragraph	Test Description	Specification	Notes	Results
IEEE 299-2006				
3.1	Shielding Effectiveness	IEEE 299-2006	1.5-40GHz	Determined by Customer

SHIELDING EFFECTIVENESS TEST REPORT FOR MOS EQUIPMENT

Section 1 – Test Conditions and Equipment**1.1 Instrumentation and Equipment**

Measuring and test equipment, utilized in the performance of these tests, was calibrated in accordance with ANSI/NCSL Z540-3-2006, by Keystone Compliance, LLC or a commercial facility, utilizing reference standards (or interim standards) whose calibrations have been certified as being traceable to the National Institute of Standards & Technology (NIST). All reference standards utilized in the above calibration system are supported by certificates, reports, or data sheets attesting to the date, accuracy, and conditions under which the results furnished were obtained. All subordinate standards, measuring and test equipment are supported by like data when such information is essential to achieve the accuracy control required by the procedure.

Keystone Compliance, LLC attests that the commercial sources providing calibration services on the above-referenced equipment, other than the NIST Standards are in fact capable of performing the required services to the satisfaction of Keystone Compliance, LLC Quality Assurance. Certifications of all calibrations performed are retained on file in the Keystone Compliance, LLC Quality Assurance Department, and are available for inspection upon request by customer representatives.

The test equipment utilized during this test program is listed on individual Test Equipment Logs located in Section 3 of this document.

1.2 Tolerances

All test conditions were maintained within all applicable specified tolerances.

SHIELDING EFFECTIVENESS TEST REPORT FOR MOS EQUIPMENT

Section 2 – References

2.1 Applicable Specifications

Reference Specification Title	IEEE 299-2006 Method for Measuring the Effectiveness of Electromagnetic Shielding Enclosures
-------------------------------	---

Calibration Information	ANSI/NCSL Z540-3-2006 Calibration Laboratories and Measuring Test Equipment— General Requirements
-------------------------	--

SHIELDING EFFECTIVENESS TEST REPORT FOR MOS EQUIPMENT

Section 3 – Test Descriptions, Test Equipment, Test Data, & Test Setup Photographs

3.1 Shielding Effectiveness Test

- a) The Shielding Effectiveness test requirements for the Block Box Lab are specified in IEEE 299-2006.
- b) The Shielding Effectiveness test description for the Block Box Lab is located in Paragraph 3.1.1 of this document.
- c) The Shielding Effectiveness test equipment used to test the Block Box Lab is located in Paragraph 3.1.2 of this document.
- d) All recorded test data for the Shielding Effectiveness test on the Block Box Lab is located in Paragraph 3.1.3 of this document.
- e) The Shielding Effectiveness test setup photographs for the Block Box Lab are located in Paragraph 3.1.4 of this document.

SHIELDING EFFECTIVENESS TEST REPORT FOR MOS EQUIPMENT

3.1.1 Shielding Effectiveness Test Description

Test Description

Using the configuration(s) noted within this report, multiple shielding effectiveness tests were performed. The frequency range investigated is also noted in this report.

Sample Calculation

Shielding Effectiveness: "Open Bulkhead" measurement – Test Screen Measurement
--

Measurement Bandwidths					
-------------------------------	--	--	--	--	--

Start Frequency:	1.5GHz	Stop Frequency:	40GHz	Step Size:	10/decade
------------------	--------	-----------------	-------	------------	-----------

SHIELDING EFFECTIVENESS TEST REPORT FOR MOS EQUIPMENT

3.1.2 Shielding Effectiveness Test Equipment Log

Equipment Log	
Customer:	MOS Equipment
Date:	9/11/20
Test Engineer:	T. Gennaro

Test Equipment					
Asset No.	Description	Manufacturer	Model	Serial No.	Cal. Due
EF058	Signal Generator	Rohde & Schwarz	SMR20	100742	12/20/2020
EG007	RF Amplifier	Hewlett Packard	8349B	2644A01939	UWCE
EG066	RF Amplifier	Exodus Advanced Communications	AMP4037	10005	UWCE
EE039	DRG Antenna	Rohde & Schwarz	HF906	100066	UWCE
EE051	DRG Antenna	EMCO	3115	2434	10/16/2021
EE017	DRG Antenna	ETS Lindgren	3116	00026390	2/19/2022
EE071	Horn Antenna (18-26.5GHz)	Exodus Advanced Communications	EHA42-300-24	None	UWCE
EE072	Horn Antenna (26.5-31.5GHz)	Exodus Advanced Communications	EHA34-300-24	None	UWCE
EE073	Horn Antenna (31.5-40GHz)	Exodus Advanced Communications	EHA28-300-24	None	UWCE

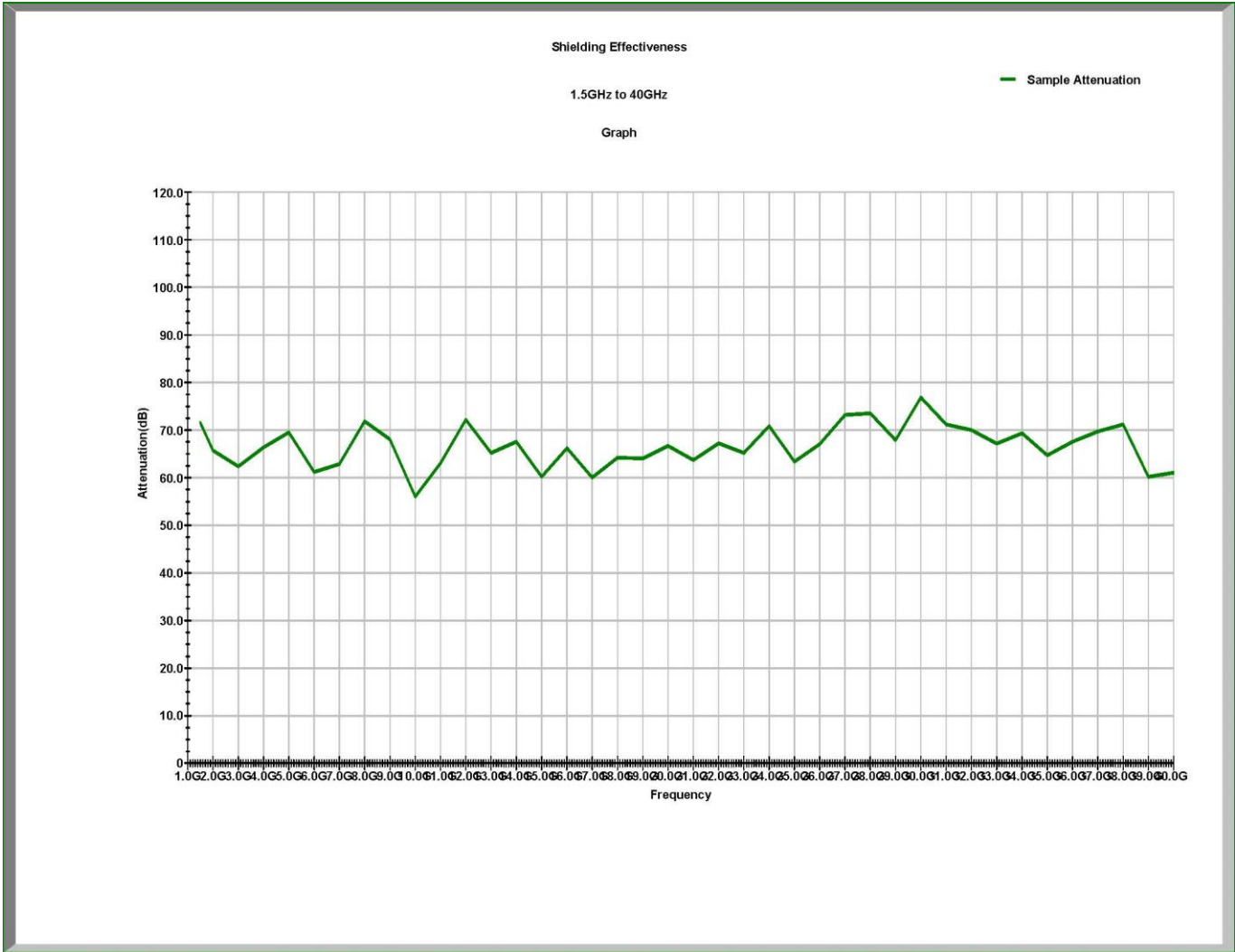
UWCE: Used with Calibrated Equipment

SHIELDING EFFECTIVENESS TEST REPORT FOR MOS EQUIPMENT

3.1.3 Shielding Effectiveness Test Data

Shielding Effectiveness Data Sheet			
Customer:	MOS Equipment		
Date:	9/11/20	Test Engineer:	T. Gennaro
Config. #:	1	Power:	N/A
		Job Site:	Keystone Compliance
Test Specifications			
Test Spec.:	IEEE 299-2006		
Test Data			
Test Parameters			
Start Frequency:	1.5GHz	Stop Frequency:	40GHz
		Test Distance:	2 meters
EUT Operating Modes			
N/A			
Comments			
None			
Deviations From Test Standard			
None			
Results			
N/A			

SHIELDING EFFECTIVENESS TEST REPORT FOR MOS EQUIPMENT

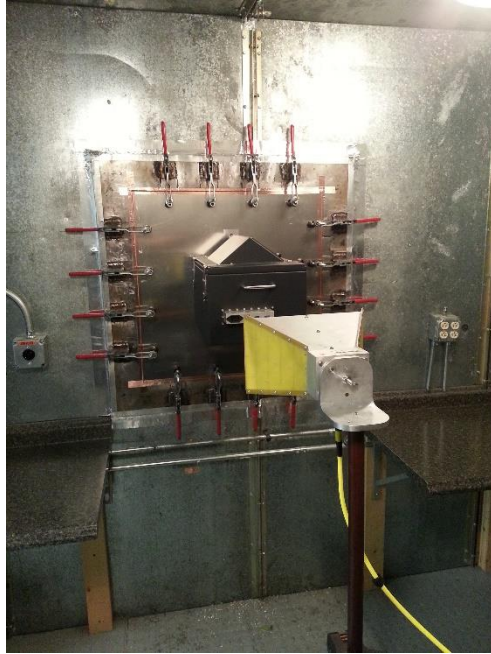


SHIELDING EFFECTIVENESS TEST REPORT FOR MOS EQUIPMENT

Shielding Effectiveness – Block Box	
Frequency	Attenuation (dB)
1.5GHz	71.50
2GHz	65.67
3GHz	62.33
4GHz	66.34
5GHz	69.50
6GHz	61.17
7GHz	62.84
8GHz	71.83
9GHz	68.00
10GHz	56.00
11GHz	63.00
12GHz	72.16
13GHz	65.17
14GHz	67.50
15GHz	60.17
16GHz	66.17
17GHz	60.00
18GHz	64.17
19GHz	64.00
20GHz	66.66
21GHz	63.67
22GHz	67.17
23GHz	65.16
24GHz	70.83
25GHz	63.34
26GHz	67.00
27GHz	73.16
28GHz	73.50
29GHz	67.84
30GHz	76.83
31GHz	71.16
32GHz	70.00
33GHz	67.16
34GHz	69.33
35GHz	64.67
36GHz	67.50
37GHz	69.67
38GHz	71.17
39GHz	60.17
40GHz	61.00

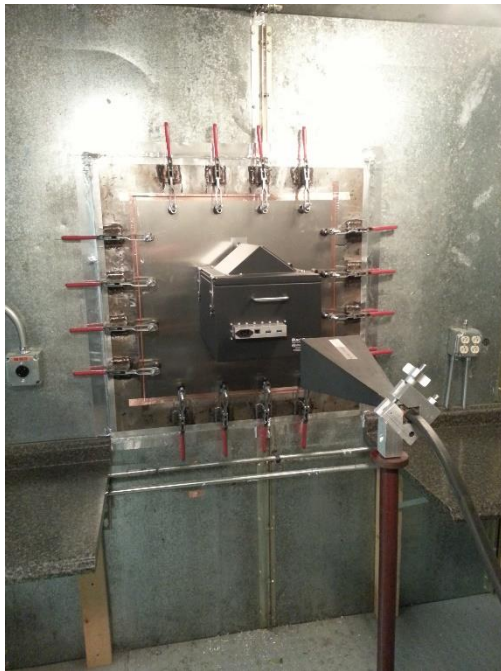
SHIELDING EFFECTIVENESS TEST REPORT FOR MOS EQUIPMENT

3.1.4 Shielding Effectiveness Test Setup Photographs



Shielding Effectiveness

1.5GHz to 17GHz



Shielding Effectiveness

18GHz to 40GHz

SHIELDING EFFECTIVENESS TEST REPORT FOR MOS EQUIPMENT
Section 4 – Conclusion

- a) The Block Box Lab, Model Number: N/A; Part Number: N/A; Serial Number: N/A, was subjected to the following EMC Tests in accordance with IEEE 299-2006 and the specifications as shown in Table 2:

Table 2 Tests Performed & Results

Test Description	Specification	Results
IEEE 299-2006		
Shielding Effectiveness	IEEE 299-2006	Determined by Customer

- b) The Block Box Lab was returned to MOS Equipment after completion of the Shielding Effectiveness Test.