



**F2 Labs**  
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## FCC SDoC Test Report

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**Manufacturer:** Senzar Acoustics, Inc.  
76 Sanderson Avenue  
Lynn, Massachusetts 01902 USA

**Applicant:** Same as Above

**Product Description:** Professional Audio Amplifier with DSP. 4 Channels, 2 Bridged. Mono/Stereo Switch. 2 pairs input, 2 pairs output. Power supply with PFC.

**Operating Voltage/Frequency:** 230V/50 Hz;120V/60 Hz (worst case)

**Equipment Under Test:** **Digital Audio Amplifier**  
Trade Name: Senzar Acoustics, Inc.  
Model: *DM3000.3\**  
*\*Denotes actual model tested as worst-case representative of product family that includes the following: DM3000.3, DC2800.4, DC3200.4, DX2800.4, DC3000.4 and DC4000.4.*

**Equipment Category:** **Digital Device**

**Measurement Location:** F2 Labs in Middlefield, Ohio. Site description and attenuation data are on file with the FCC's Sampling and Measurement Branch at the FCC Laboratory in Columbia, MD.

**Measurement Procedure:** In accordance with ANSI C63.4:2014. A list of the measurement equipment is included with the test data.

**Applicable Rules:** **Federal Register CFR 47, Part 15, subpart B:2017**

- **Radiated Emissions, Part 15.109(a), Class B**
- **Conducted Emissions, Part 15.107(a), Class B**

**Testing Commenced:** June 6, 2019

**Testing Completed:** June 6, 2019

**Summary of Results:**

**In Compliance**

The EUT complies with the EMC requirements when manufactured identically as the unit tested in this report, including any required modifications and/or manufacturer's statement. Any changes to the design or build of this unit subsequent to this testing may deem it non-compliant.



**Evaluation Conducted by:**

Julius Chiller, EMC/Wireless Engineer



**Reviewed by:**

Ken Littell, Director of EMC & Wireless Operations

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Note: Complies/Does Not Comply criteria are based upon the following condition: Where the results are compared to published test standard or manufacturer specified limits, the Complies or Does Not Comply opinion is considered without applying the stated measurement of uncertainty.

This report shall not be duplicated except in full without the written approval of F2 Labs.  
Reports noted as a revision replace all previously issued reports and/or antecedent report revisions issued under this job number.

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**Document History:**

<b>Document Number</b>	<b>Description</b>	<b>Issue Date</b>	<b>Approved By</b>
F2P20478-01E	First Issue	June 12, 2019	K. Littell

## **Exhibit I**

### **Test Procedure and Data Calculation**

**Test Item Condition:**

The equipment to be tested was received in good condition.

**Testing Algorithm:**

EUT was on and fan was running. The highest emissions were recorded in the data tables.

**Radiated Emissions:**

The EUT was tested at a distance of 3 meters. The emissions were maximized by rotating the table and raising/lowering the antenna mounted on a 4-meter mast. Cable and peripheral positions were also varied to produce maximum emissions. Both horizontal and vertical field components were measured. The output of the antenna was connected to the input of the receiver and emissions were measured in the range 30 MHz to 1000 MHz. For emissions measured below 1 GHz, a resolution bandwidth of 120kHz and a quasi-peak detector were used. If applicable, measurements above 1 GHz were made with a resolution bandwidth of 1 MHz and peak and average detectors. The raw measurements were corrected to allow for antenna factor and cable loss. All data for radiated emissions can be found in Exhibit III.

**Conducted Emissions:**

The EUT was placed on a 1.0 x 1.5 meter non-conductive table, 0.8 meter above a horizontal ground plane and 0.4 meter from a vertical ground plane. Power was provided to the EUT through a LISN bonded to a 3 x 2 meter ground plane. The LISN and peripherals were supplied power through a filtered AC power source. The output of the LISN was connected to the input of the receiver via a transient limiter, and emissions in the range 150 kHz to 30 MHz were measured. The measurements were recorded using the quasi-peak and average detectors as directed by the standard, and the resolution bandwidth during testing was 9 kHz. The raw measurements were corrected to allow for attenuation from the LISN, transient limiter and cables. All data for conducted emissions can be found in Exhibit IV.

**Calculation of Data:**

Radiated Emissions - The antenna factors of the biconilog antennas used, and the cable losses are added to the field strength reading recorded from the measurement receiver. The resultant field strength can then be compared to the FCC limits in dB $\mu$ V/m.

The following equation is used to convert to  $\mu$ V/m:  $E_{\mu V/m} = \text{antilog}(E_{dB\mu V/m} / 20)$

**Sample of Field Strength calculation:**  $E_a = V_a + AF + A_e - AG$

Where  $E_a$  = Field Strength (dB $\mu$ V/m)

$V_a = 20 \times \log_{10}$  (Measure RF voltage,  $\mu$ V)

$A_e$  = Cable Loss Factor, dB

AF = Antenna Factor dB (m<sup>-1</sup>)

AG = Amplifier Gain

I.e., If the reading is 57.0 dB $\mu$ V, the antenna factor 8.0 dB, cable loss factor 1.0 dB and Amplifier gain is 25.0 dB, the field strength will be:

$$E_a(\text{dB}\mu\text{V/m}) = 57 + 8 + 1 + (-25) = 41 \text{ dB}\mu\text{V/m} \text{ or}$$

$$E_a(\mu\text{V/m}) = 10^{(41/20)} = 112.20 \mu\text{V/m}$$

**Uncertainty Budget:**

The uncertainty in EMC measurements arises from several factors which affect the results, some associated with environmental conditions in the measurement room, the test equipment being used, and the measurement techniques adopted.

The measurement uncertainty budgets detailed below are calculated from the test and calibration data and are expressed with a 95% confidence factor using a coverage factor of  $k=2$ . The Uncertainty for a laboratory are referred to as  $U_{lab}$ . For Radiated and Conducted Emissions, the Expanded Uncertainty is compared to the  $U_{cispr}$  values to determine if a specific margin is required to deem compliance.

$U_{lab}$

Measurement Range	Combined Uncertainty	Expanded Uncertainty
Radiated Emissions <1 GHz @ 3m	2.54	5.07dB
Radiated Emissions <1 GHz @ 10m	2.55	5.09dB
Radiated Emissions 1 GHz to 2.7 GHz	1.81	3.62dB
Radiated Emissions 2.7 GHz to 18 GHz	1.55	3.10dB
AC Power Line Conducted Emissions, 150kHz to 30 MHz	1.38	2.76dB
AC Power Line Conducted Emissions, 9kHz to 150kHz	1.66	3.32dB

$U_{cispr}$

Measurement Range	Expanded Uncertainty
Radiated Emissions <1 GHz @ 3m	5.2dB
Radiated Emissions <1 GHz @ 10m	5.2dB
Radiated Emissions 1 GHz to 2.7 GHz	Under Consideration
Radiated Emissions 2.7 GHz to 18 GHz	Under Consideration
AC Power Line Conducted Emissions, 150kHz to 30 MHz	3.6dB
AC Power Line Conducted Emissions, 9kHz to 150kHz	4.0dB

If  $U_{lab}$  is less than or equal to  $U_{cispr}$ , then:

- compliance is deemed to occur if no measured disturbance exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance exceeds the disturbance limit.

If  $U_{lab}$  is greater than  $U_{cispr}$  in table 1, then:

- compliance is deemed to occur if no measured disturbance, increased by  $(U_{lab} - U_{cispr})$ , exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance, increased by  $(U_{lab} - U_{cispr})$ , exceeds the disturbance limit.

Note: Only measurements listed in the tables above that relate to tests included in this Test Report are applicable.

## Exhibit II

### EUT Configuration and Cables

#### Equipment Under Test (EUT):

Product Description: Professional Audio Amplifier with DSP. 4 Channels, 2 Bridged. Mono/Stereo Switch. 2 pairs input, 2 pairs output. Power supply with PFC.

Device	Manufacturer	Model Number	Serial Number
Digital Audio Amplifier	Senzar Acoustics, Inc.	DM3000.3*	None Specified

*\*Denotes actual model tested as worst-case representative of product family that includes the following: DM3000.3, DC2800.4, DC3200.4, DX2800.4, DC3000.4 and DC4000.4.*

The EUT complies with the EMC requirements when manufactured identically as the unit tested in this report, including any required modifications and/or manufacturer's statement. Any changes to the design or build of this unit subsequent to this testing may deem it non-compliant.

**Accessories (Support Equipment):** None

#### Cables:

Cable Function	Length	Shielded
AC Mains	>3m	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
USB	<3m	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

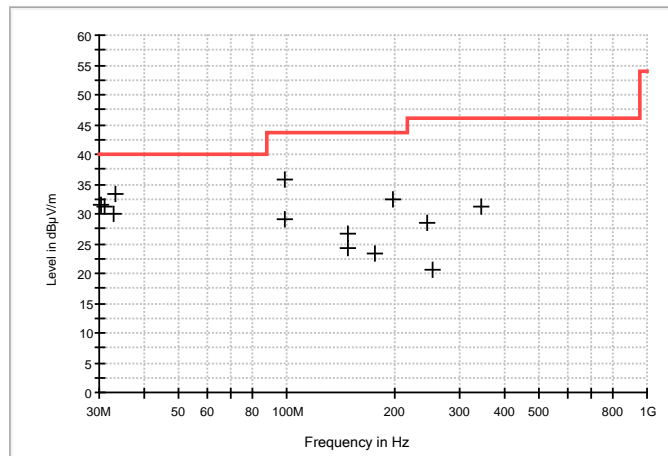
**Exhibit III**

**Radiated Emissions**

<b>Test Date(s):</b>	June 6, 2019	<b>Test Engineer(s):</b>	J. Chiller
<b>Rule:</b>	FCC CFR 47, Part 15, subpart B:2017, Radiated Emissions, Part 15.109(a), Class B	<b>Air Temperature:</b>	20.4° C
<b>Distance:</b>	3m	<b>Relative Humidity:</b>	52%
<b>Test Results:</b>	Complies		

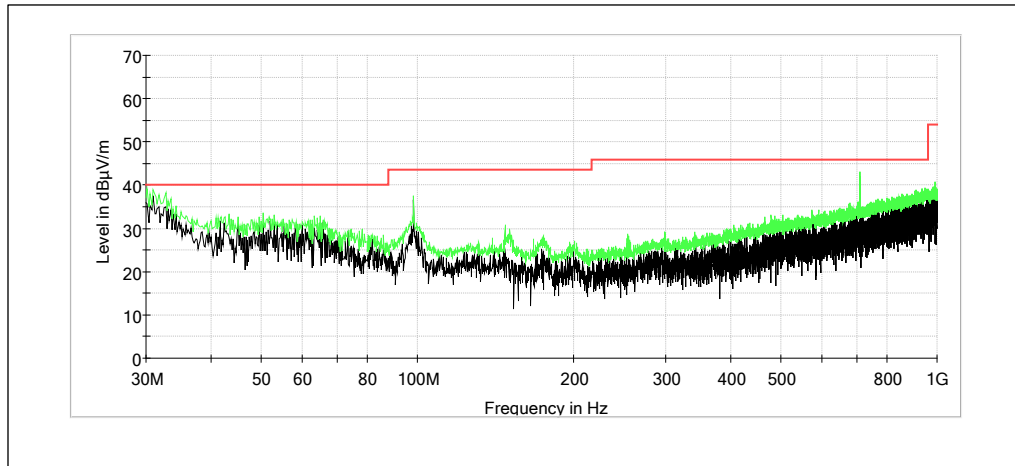
**120V/60 Hz (worst case)**

Frequency (MHz)	Antenna Polarization	Antenna Height (cm)	Azimuth (degrees)	Reading (dBµV)	Correction Factors (dB)	Emission (dBµV/m)	Limit (dBµV/m)	Margin (dB)
30.200000	V	100.00	3.00	23.5	8.1	31.60	40.00	-8.4
30.960000	V	100.00	234.00	23.8	7.5	31.30	40.00	-8.7
32.720000	V	100.00	29.00	24.1	6.0	30.10	40.00	-9.9
33.280000	H	100.00	7.00	27.7	5.6	33.30	40.00	-6.7
98.280000	H	100.00	220.00	32.9	-4.0	28.90	43.50	-14.6
98.280000	V	100.00	319.00	39.9	-4.0	35.90	43.50	-7.6
147.360000	V	100.00	210.00	27.0	-0.4	26.60	43.50	-16.9
147.360000	H	100.00	0.00	24.7	-0.4	24.30	43.50	-19.2
174.520000	V	100.00	210.00	24.8	-1.4	23.40	43.50	-20.1
196.640000	H	100.00	186.00	32.5	-0.1	32.40	43.50	-11.1
245.720000	H	100.00	357.00	28.5	-0.1	28.40	46.00	-17.6
254.080000	V	100.00	132.00	20.7	-0.1	20.60	46.00	-25.4
344.480000	H	100.00	7.00	28.3	3.1	31.40	46.00	-14.6

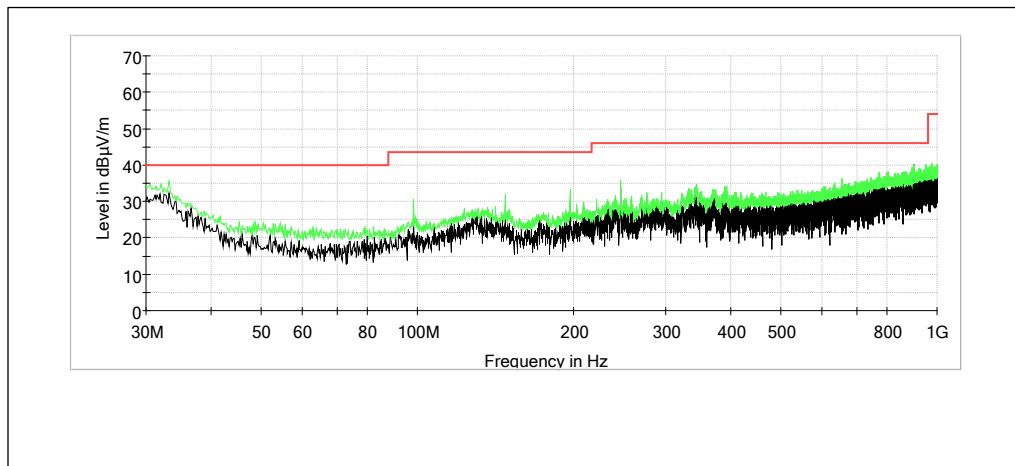




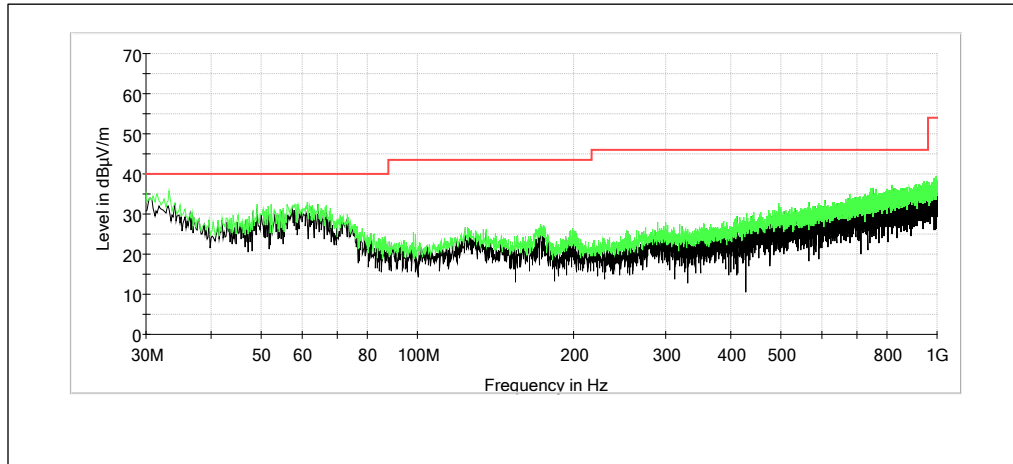
**Characterization Scan: 120V/60 Hz, 30 MHz to 1000 MHz, Vertical**



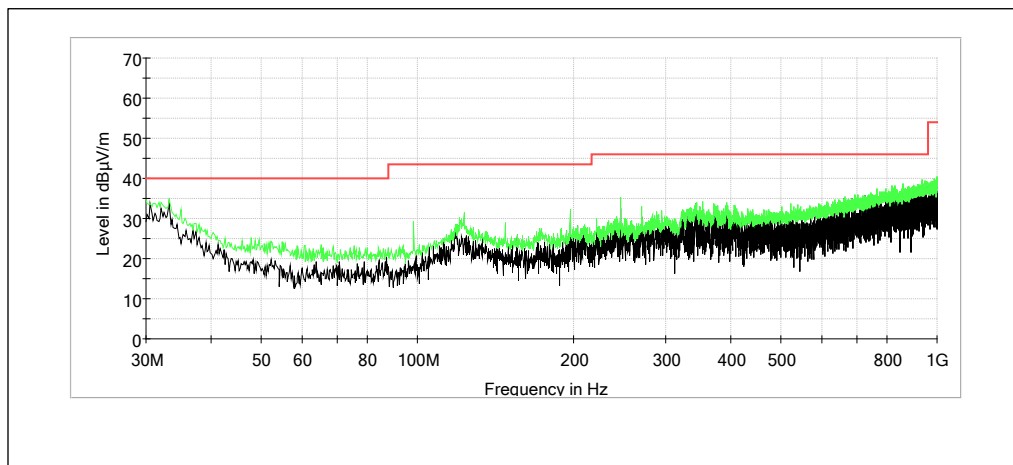
**Characterization Scan: 120V/60 Hz, 30 MHz to 1000 MHz, Horizontal**



**Characterization Scan: 230V/60 Hz, 30 MHz to 1000 MHz, Vertical**



**Characterization Scan: 230V/60 Hz, 30 MHz to 1000 MHz, Horizontal**



**Test Equipment Used:**

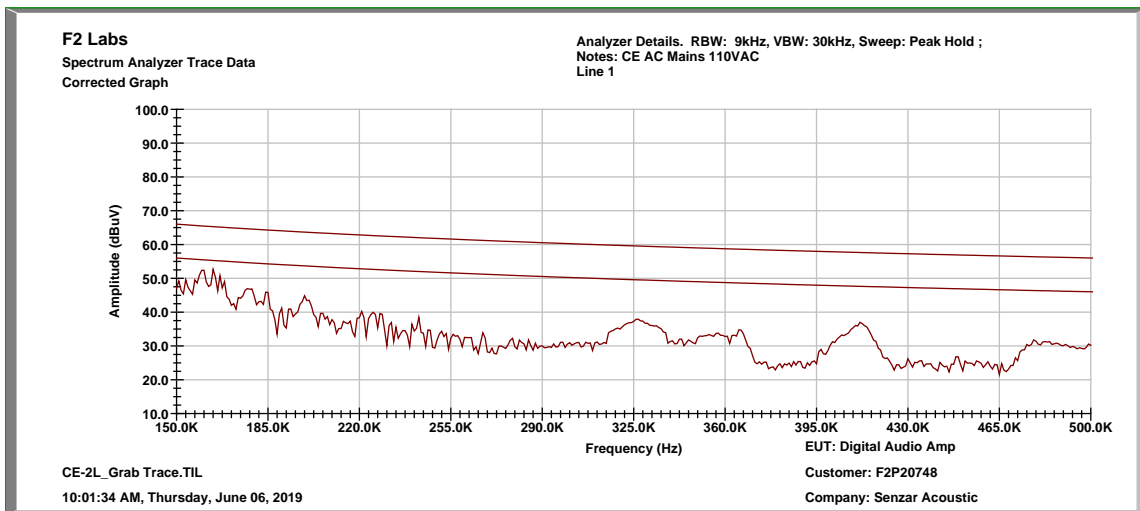
<b>Equipment Type</b>	<b>Asset Number</b>	<b>Manufacturer</b>	<b>Model</b>	<b>Serial Number</b>	<b>Calibration Due Date</b>
Shielded Chamber 2014	CL166-E	AlbatrossProjects	B83117-DF435-T261	US140023	Aug. 30, 2019
Temp/Hum. Recorder	CL261	Extech	445814	04	Mar. 6, 2020
Receiver	CL151	Rohde & Schwarz	ESU40	100319	Oct. 25, 2019
Antenna, JB3 Combination	CL175	Sunol Sciences	JB3	A030315	Oct. 11, 2019
Pre-Amplifier	CL153	Agilent	83006-69007	MY39500791	Aug. 24, 2019
Software:	EMC 32, Version 8.53.0		Software Verified: June 6, 2019		

**Exhibit IV**

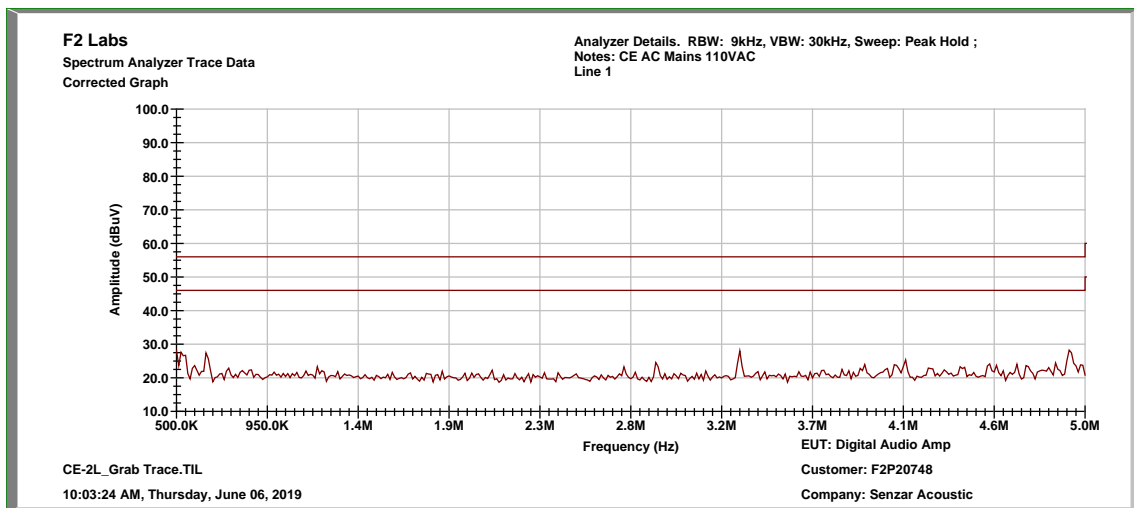
**Conducted Data**

<b>Test Date(s):</b>	June 6, 2019	<b>Test Engineer(s):</b>	J. Chiller
<b>Rule:</b>	FCC CFR 47, Part 15, subpart B:2017, Conducted Emissions, Part 15.107(a), Class B	<b>Air Temperature:</b>	20.4° C
<b>Test Results:</b>	Complies	<b>Relative Humidity:</b>	52%

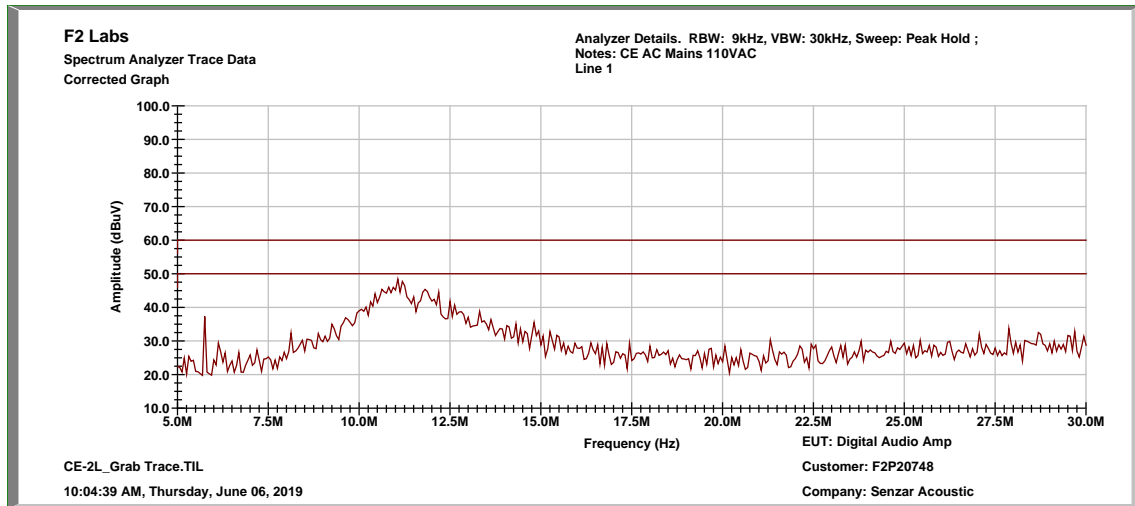
**Conducted Test – Line 1: 0.15 MHz to 0.5 MHz**



**Conducted Test – Line 1: 0.5 MHz to 5.0 MHz**



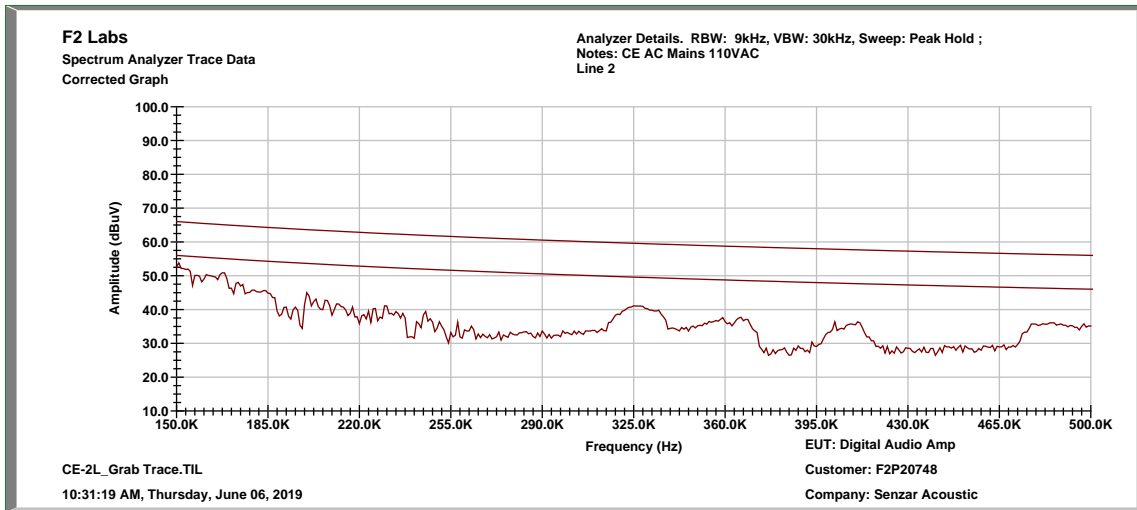
Conducted Test – Line 1: 5.0 MHz to 30.0 MHz



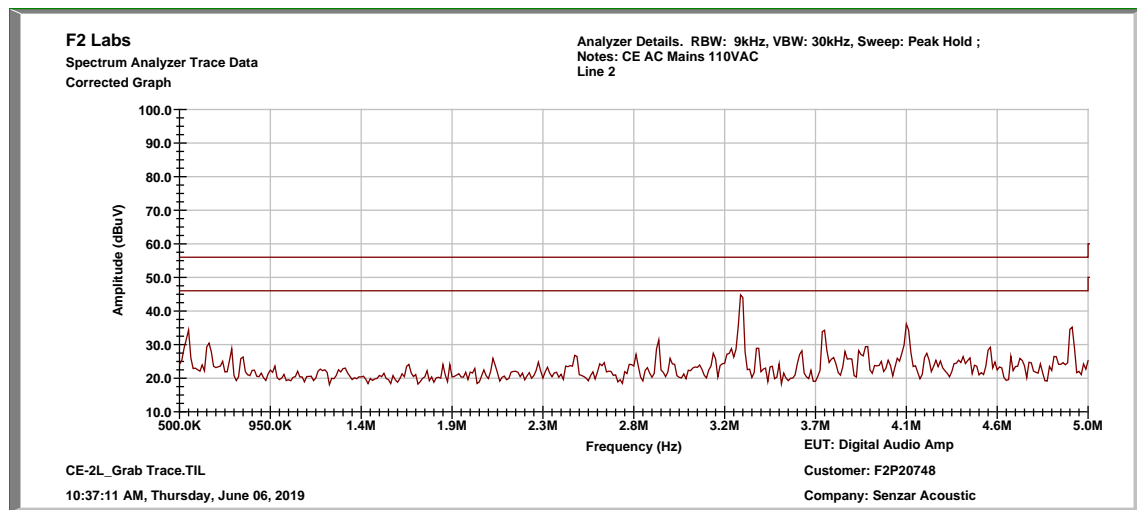
Top Discrete Measurements

No.	Conductor	Frequency (MHz)	Detector	Level (dB $\mu$ V)	Adjustment (dB)	Results (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)
1	Line 1	0.1605	Quasi-Peak	33.21	11.678	44.89	65.438	-20.6
			Average	24.45	11.678	36.13	55.438	-19.3
2	Line 1	0.16925	Quasi-Peak	32.95	11.577	44.53	65.0	-20.5
			Average	24.38	11.577	35.96	55.0	-19.0
3	Line 1	11.4375	Quasi-Peak	31.3	10.785	42.09	60.0	-17.9
			Average	16.3	10.785	27.09	50.0	-22.9
4	Line 1	11.8125	Quasi-Peak	32.82	10.802	43.62	60.0	-16.4
			Average	25.9	10.802	36.70	50.0	-13.3

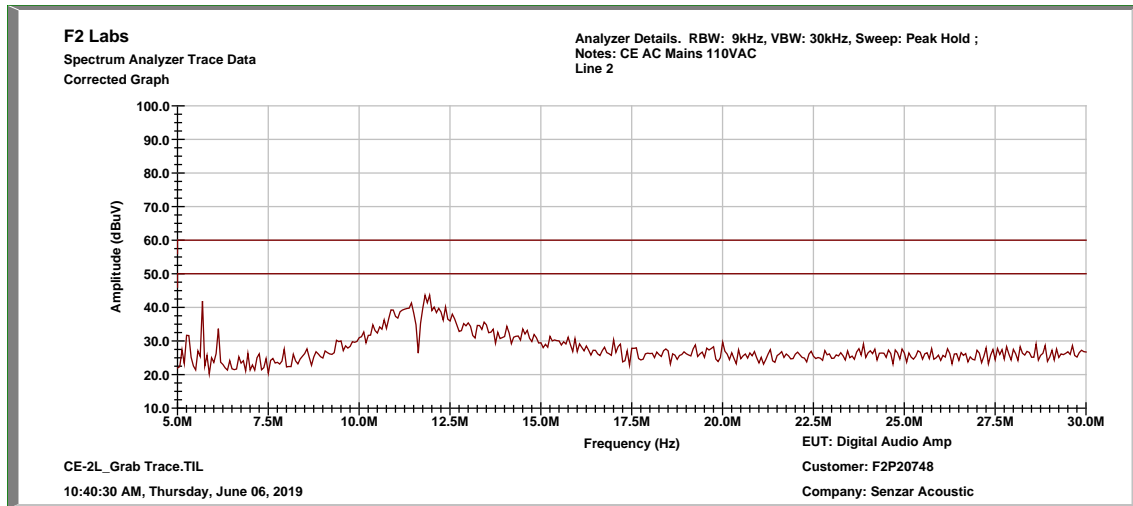
### Conducted Test – Line 2: 0.15 MHz to 0.5 MHz



### Conducted Test – Line 2: 0.5 MHz to 5.0 MHz



Conducted Test – Line 2: 5.0 MHz to 30.0 MHz



Top Discrete Measurements								
No.	Conductor	Frequency (MHz)	Detector	Level (dB $\mu$ V)	Adjustment (dB)	Results (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)
1	Line 2	0.154375	Quasi-Peak	35.52	12.216	47.74	65.762	-18.0
			Average	27.19	12.216	39.41	55.762	-16.4
2	Line 2	0.168375	Quasi-Peak	36.59	12.042	48.63	65.041	-16.4
			Average	24.86	12.042	36.90	55.041	-18.1
3	Line 2	3.29	Quasi-Peak	32.50	10.838	43.34	56.0	-12.7
			Average	29.91	10.838	40.75	46.0	-5.3
4	Line 2	5.687	Quasi-Peak	29.62	10.856	40.48	60.0	-19.5
			Average	24.59	10.856	35.45	50.0	-14.6
5	Line 2	11.937	Quasi-Peak	27.28	11.156	38.44	60.0	-21.6
			Average	15.03	11.156	26.19	50.0	-23.8

**Test Equipment Used:**

<b>Equipment Type</b>	<b>Asset Number</b>	<b>Manufacturer</b>	<b>Model</b>	<b>Serial Number</b>	<b>Calibration Due Date</b>
Temp/Hum. Recorder	CL263	Extech	445814	06	Mar. 6, 2020
Spectrum Analyzer	0141	Hewlett Packard	8591E	3520A04145	Jan. 25, 2020
Transient Limiter	0202	Hewlett Packard	11947A	3107A00729	June 19, 2019
Software:	Tile Version 3.4.B.3.		Software Verified: June 6, 2019		
LISN	CL181	Com-Power	LI-125A	191226	July 3, 2021
LISN	CL182	Com-Power	LI-125A	191225	July 3, 2021



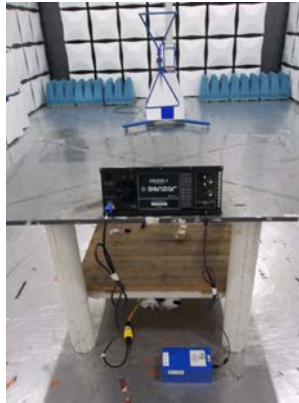
**Exhibit V**

**Modifications**

No modifications were made to the EUT.

**Exhibit VI**  
**Photographs**

**Radiated Emissions**



**Conducted Emissions**



## Exhibit VII

### Labeling of Equipment

It will be the responsibility of the manufacturer or importer to permanently affix the appropriate label when marketing the equipment.

The label shall bear the following statement per FCC 15.19(a)(1)-(5):

- (1) Receivers associated with the operation of a licensed radio service, e.g., FM broadcast under part 73 of this chapter, land mobile operation under part 90 of this chapter, etc., shall bear the following statement in a conspicuous location on the device:

*This device complies with part 15 of the FCC Rules. Operation is subject to the condition that this device does not cause harmful interference.*

- (2) A stand-alone cable input selector switch shall bear the following statement in a conspicuous location on the device:

*This device complies with part 15 of the FCC Rules for use with cable television service.*

- (3) **All other devices shall bear the following statement in a conspicuous location on the device:**

*This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.*

- (4) Where a device is constructed in two or more sections connected by wires and marketed together, the statement specified under paragraph (a) of this section is required to be affixed only to the main control unit.

- (5) When the device is so small or for such use that it is impracticable to label it with the statement specified under paragraph (a) of this section in a font that is four-point or larger, and the device does not have a display that can show electronic labeling, then the information required by this paragraph shall be placed in the user manual and must also either be placed on the device packaging or on a removable label attached to the device.

**Note:** If the product contains a pre-approved wireless module, a label is also required to show the product contains an approved wireless module. The following is an example of what the label should state:

**Contains FCC ID: XXXXXXXX**

**§2.1074 Identification.**

Devices subject to authorization under Supplier's Declaration of Conformity may be labeled with the following logo on a voluntary basis as a visual indication that the product complies with the applicable FCC requirements. The use of the logo on the device does not alleviate the requirement to provide the compliance information required by §2.1077.



**§2.1077 Compliance information.**

(a) If a product must be tested and authorized under Supplier's Declaration of Conformity, a compliance information statement shall be supplied with the product at the time of marketing or importation, containing the following information:

(1) Identification of the product, *e.g.*, name and model number;

(2) A compliance statement as applicable, *e.g.*, for devices subject to part 15 of this chapter as specified in §15.19(a)(3) of this chapter, that the product complies with the rules; and

(3) The identification, by name, address and telephone number or Internet contact information, of the responsible party, as defined in §2.909. The responsible party for Supplier's Declaration of Conformity must be located within the United States.

## Exhibit VIII

### Manual Requirements

**FCC Manual Statement: §15.21 Information to user.**

**Note: This requirement applies to all devices unless exempted by 15.103:**

The user's manual or instruction manual for an intentional or unintentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

**FCC Manual Statement: §15.105 Digital Devices Statement**

**For all Class A Digital Devices, the following statement must be included in the manual:**

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

**For all Class B Digital Devices, the following statement must be included in the manual:**

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.