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## **CERTIFICATION TEST REPORT**

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**Manufacturing Address:** **InnoVoyce LLC**  
**One Beacon St Floor 15**  
**Boston, Massachusetts 02108 USA**

**Applicant:** **Same as Above**

**Product Name:** **InnoVoyce Surgical Laser System**

**Product Description:** The InnoVoyce Surgical Laser System system is a portable desktop surgical laser system accepting an InnoVoyce fiber of 300, 400, and 600  $\mu\text{m}$  in diameter. The laser emission shall be controlled by the user through the operation of a wired foot switch. The InnoVoyce Surgical Laser System will be used in both a Clinical Suite and Operating room setting. The system's intended use is incision/excision, vaporization, ablation, hemostasis, and coagulation of soft tissue.

**Operating Voltage/Freq.  
of EUT During Testing:** 120V/60 Hz

**Model(s):** **InnoVoyce Surgical Laser**

**FCC ID:** **2BDH3ASY300056**

**Testing Commenced:** 2023-10-31

**Testing Ended:** 2023-12-05

**Summary of Test 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.



**Standards:**

- ❖ FCC Part 15 Subpart C, Section 15.209
- ❖ FCC Part 15 Subpart C, Section 15.215(c) – Additional provisions to the general radiated emission limitations
- ❖ FCC Part 15 Subpart A, Section 15.31(e) – Measurement Standards
- ❖ FCC15.207 - Conducted Limits

**Evaluation Conducted by:**

Ryan Littell, Senior EMC Engineer

Julius Chiller, Senior Wireless Project Engineer

**Report Reviewed by:**

Ken Littell, Vice President of Operations

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## **1 ADMINISTRATIVE INFORMATION**

### **1.1 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.

### **1.2 Measurement Procedure:**

All measurements were performed according to ANSI C63.10 and recommended FCC procedure of measurement of equipment operating under Section 15.209. A list of the measurement equipment can be found in Section 6.



### 1.3 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 is 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	2.54dB	5.07dB
Radiated Emissions <1 GHz @ 10m	2.55dB	5.09dB
Radiated Emissions 1 GHz to 2.7 GHz	1.81dB	3.62dB
Radiated Emissions 2.7 GHz to 18 GHz	1.55dB	3.10dB
AC Power Line Conducted Emissions, 150kHz to 30 MHz	1.38dB	2.76dB
AC Power Line Conducted Emissions, 9kHz to 150kHz	1.66dB	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.



Order Number: F2P28948B

Applicant: InnoVoyce LLC  
Model: InnoVoyce Surgical Laser

#### 1.4 Document History:

Document Number	Description	Issue Date	Approved By
F2P28948B-01E	First Issue	2023-12-05	K. Littell



## 2 SUMMARY OF TEST RESULTS

Test Name	Standard(s)	Results
Field Strength of Emissions	CFR 47 Part 15.209	Complies
Radiated Spurious Emissions	CFR 47 Part 15.209	Complies
Voltage Variations	CFR 47 Part 15.31(e)	Complies
Conducted Emissions	CFR 47 Part 15.207(a)	Complies

Modifications Made to the Equipment
None



### 3 TABLE OF MEASURED RESULTS

Test		13.56 MHz
Field Strength of Fundamental*		-4.375 dB $\mu$ A/m (47.125 dB $\mu$ V/m)
Limit for Fundamental at 30 meters		30 $\mu$ V/m (49.5 dB $\mu$ V/m)
Limit for Fundamental at 3 meters corrected for 40dB/decade distance correction		89.5 dB $\mu$ V/m
Voltage Variations** Nominal 110VAC	93.5VAC (85%)	-4.4 dB $\mu$ A/m
	93.5VAC (85%)	47.1 dB $\mu$ V/m
	126.5VAC (115%)	-4.38 dB $\mu$ A/m
	126.5VAC (115%)	47.125 dB $\mu$ V/m

\* 13.56 MHz Field Strength was measured at 3m. The dB $\mu$ A/m was converted to dB $\mu$ V/m by adding 51.5dB.

\*\*To meet the requirements of 15.31, voltage was varied by  $\pm 15\%$  of the nominal voltage. All tests were then performed at the highest output power voltage setting.





#### **4 ENGINEERING STATEMENT**

This report has been prepared on behalf of InnoVoyce LLC, to provide documentation for the testing described herein. This equipment has been tested and found to comply with part 15.209 of the FCC Rules using ANSI C63.10 and Part 15 standards. The test results found in this test report relate only to the items tested.



## 5 EUT INFORMATION AND DATA

### 5.1 Equipment Under Test:

Product: InnoVoyce Surgical Laser System  
Model(s): **InnoVoyce Surgical Laser**  
Serial No.: 000003  
FCC ID: **2BDH3ASY300056**

### 5.2 Trade Name:

InnoVoyce LLC

### 5.3 Power Supply:

3.3VDC

### 5.4 Applicable Rules:

CFR 47, Part 15.209

### 5.5 Equipment Category:

Radio Transmitter

### 5.6 Antenna:

Internal/Embedded NFC

### 5.7 Accessories:

Device	Manufacturer	Model Number	Serial Number
Foot Pedal	Herga Technology	None Specified	S2391

### 5.8 Test Item Condition:

The equipment to be tested was received in good condition.

### 5.9 Testing Algorithm:

NFC radio emissions were measured while the host device was in Standby mode. Host operation has no effect on NFC operation.

**6 LIST OF MEASUREMENT INSTRUMENTATION**

Equipment Type	Asset Number	Manufacturer	Model	Serial Number	Calibration Due Date
Shielded Chamber	CL166-E	Albatross Projects	B83117-DF435-T261	US140023	2024-11-15
Receiver	CL151	Rohde & Schwarz	ESU40	100319	2024-04-10
Antenna, Bilog	CL211	Sunol Sciences, Inc.	JB1	A021017	2024-10-17
Amplifier w/Monopole & 18" Loop	CL163-Loop	A.H. Systems, Inc.	EHA-52B	100	2023-12-31
Software:	Tile Version 3.4.B.3		Software Verified: 2023-10-31, 2023-12-05		
Software:	EMC 32, Version 8.53.0		Software Verified: 2023-10-31, 2023-12-05		
Temp/Hum. Recorder	CL296	Thermpro	TP50	4	2024-04-27
Low Loss Cable	CL315	Fairview Microwave	FMC0202914-240	None Specified	2024-04-14
Low Loss Cable	CL319	Fairview Microwave	FMC0202914-12	None Specified	2024-04-14
Spectrum Analyzer	0141	Hewlett Packard	8591E	3520A04145	2024-04-11
Transient Limiter	CL102	Hewlett Packard	11947A	3107A03325	2024-04-11
Software:	Tile Version 3.4.B.3.		Software Verified: 2023-11-22		
LISN	CL184	Com-Power	LI-125A	191213	2026-11-02
LISN	CL185	Com-Power	LI-125A	191214	2026-11-02
Temp/Hum Rec	CL294	Thermpro	TP50	2	2024-04-27



## 7 FIELD STRENGTH OF EMISSIONS FROM INTENTIONAL RADIATORS

Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100**	3
88-216	150**	3
216-960	200**	3
Above 960	500	3

### **Notes:**

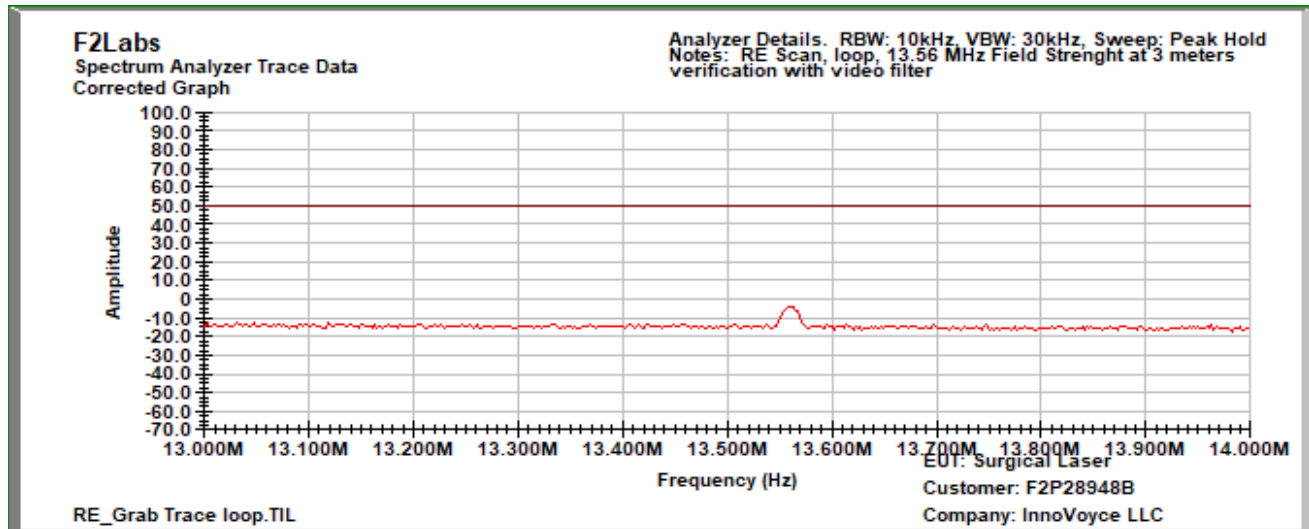
During the pre-scan evaluation, the EUT was rotated in all possible directions and all three orthogonal positions to find the maximum emissions. The orthogonal position that showed the highest emissions was used. The antenna was raised between 1 and 4 meters and the EUT turntable was rotated 360 degrees to maximize the emissions.

13.56 MHz Field Strength was measured at 3m.



## 7.1 Test Data - Field Strength of Emissions from Intentional Radiators

Test Date(s):	2023-10-31	Test Engineer(s):	J. Chiller
Standards:	CFR 47 Part 15.209	Air Temperature:	22.5°C
Results:	Complies	Relative Humidity:	33%





## 7.2 Test Data – Spurious Emissions

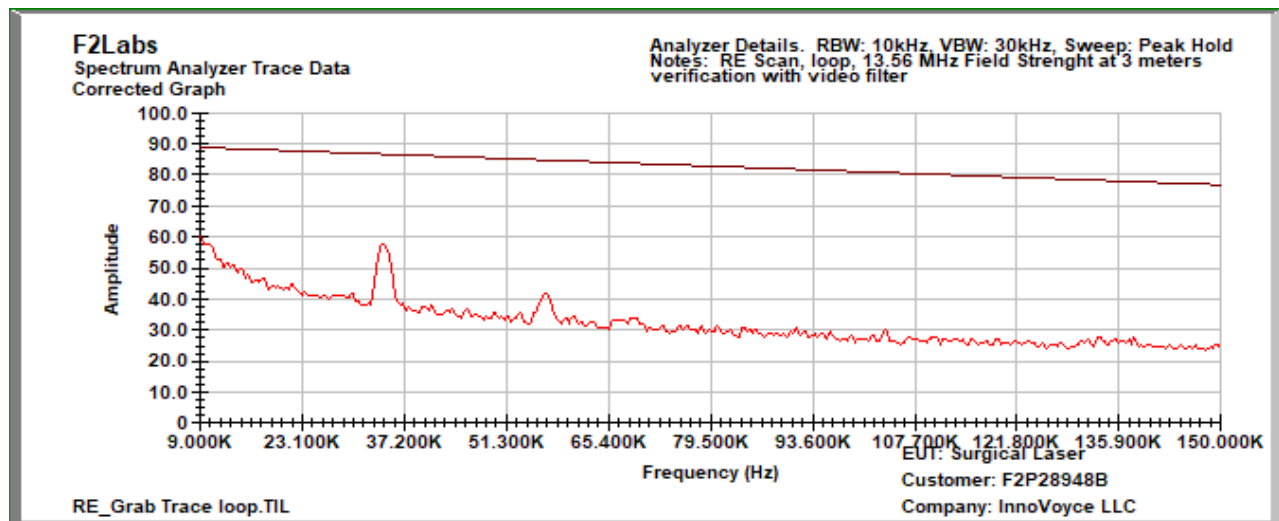
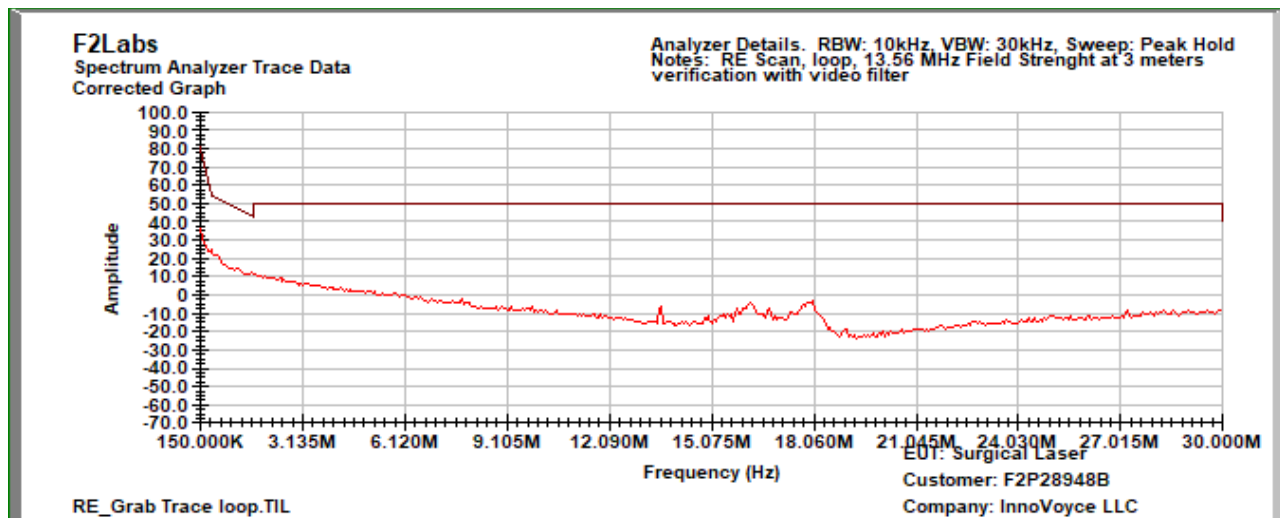
Notes: Plots are peak, max hold pre-scan data included only to determine what frequencies to investigate and measure. During the pre-scan evaluation, the EUT was rotated in all possible directions and three orthogonal positions to find the maximum emissions. The orthogonal position that showed the highest emissions was used. At some frequencies, no emissions from the EUT were measurable over the ambient noise floor. The readings did not change with EUT on and EUT off.

At least 6 of the highest frequencies were measured per ANSI 63.4 in a 3-meter anechoic chamber. Frequencies below 1GHz were measured using a quasi-peak detector. The antenna was raised between 1 and 4 meters and the EUT turntable was rotated 360 degrees to maximize the emissions. Some of the frequencies did not change with the EUT on or off. At those frequencies, the test distance was shortened to 1 meter and still no emissions from the EUT were visible or over the ambient or limit. Frequencies were scanned from 9kHz to 1000 MHz and the highest emissions are listed below.

In the following plots, the red line indicates the measurement with the EUT on. Emissions to be found by the EUT were measured and listed in the table following the plots. The configuration was scanned and maximized to determine worst-case configuration. The following results are from the worst-case configuration confirmed with and without external cabling attached.

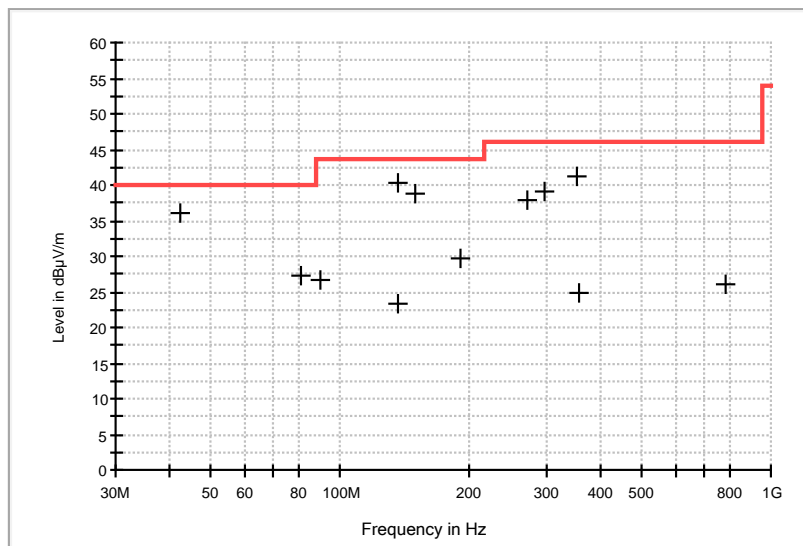


Test Date(s):	2023-10-31; 2023-12-05	Test Engineer(s):	J. Chiller
Standards:	CFR 47 Part 15.209	Air Temperature:	22.2°C
Results:	Complies	Relative Humidity:	42%

**13.56 MHz: 0.009 MHz to 0.15 MHz****13.56 MHz: 0.15 MHz to 30 MHz**



Frequency (MHz)	Ant. Pol.	Antenna Height (cm)	Azimuth (degrees)	Reading (dBμV)	Cable Loss & Antenna Factor (dB)	Emission (dBμV/m)	Limit (dBμV/m)	Margin (dB)
42.220000	V	100.00	222.00	64.4	-28.3	36.10	40.0	-3.9
81.220000	V	100.00	57.00	59.9	-32.5	27.40	40.0	-12.6
89.752000	H	250.00	66.00	59.4	-32.6	26.80	43.5	-16.7
135.536000	H	250.00	10.00	49.5	-26.3	23.20	43.5	-20.3
135.540000	V	100.00	210.00	66.7	-26.3	40.40	43.5	-3.1
148.728000	H	250.00	154.00	65.9	-27.1	38.80	43.5	-4.7
191.020000	V	100.00	143.00	57.6	-27.8	29.80	43.5	-13.7
271.142000	H	250.00	238.00	63.5	-25.8	37.70	46.0	-8.3
298.302000	H	250.00	238.00	64.6	-25.6	39.00	46.0	-7.0
354.756000	H	250.00	44.00	65.2	-24.0	41.20	46.0	-4.8
358.248000	V	100.00	311.00	48.9	-23.9	25.00	46.0	-21.0
782.138000	V	100.00	253.00	42.4	-16.3	26.10	46.0	-19.9



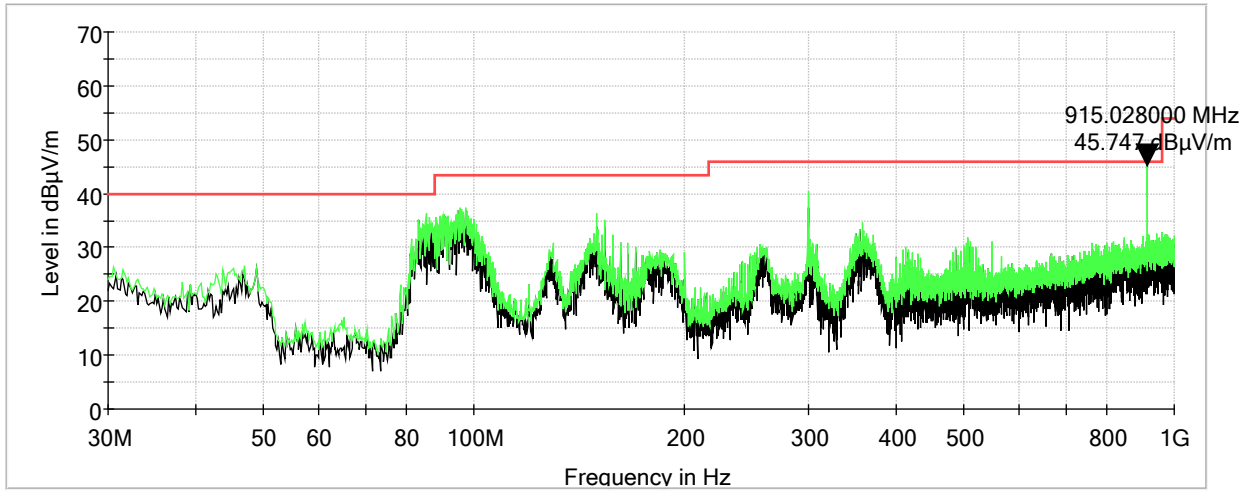
### Scan with External Cabling

Table Editor - [EMI radiated\Test\Result Table_Single]							
(6) 1.000000							
Frequency	Frequency	Frequency	Frequency	Frequency	Frequency	Frequency	Frequency
Name	Frequency	QuasiPeak	Bandwidth	Height	Polarization	Azimuth	Corr.
Unit	MHz	dBμV/m	kHz	cm		deg	dB
1	915.028000	27.7	120.000	100.0	V	4.0	-13.7
2	362.710000	44.2	120.000	100.0	H	278.0	-23.7

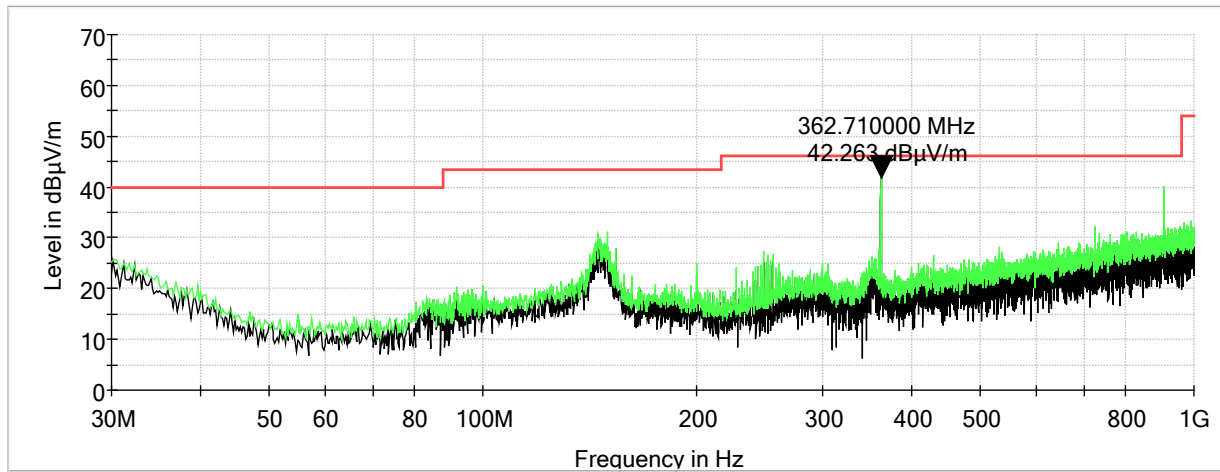




### 13.56 MHz, Characterization Scan, 30 MHz to 1000 MHz, Vertical



### 13.56 MHz, Characterization Scan, 30 MHz to 1000 MHz, Horizontal





## **8 VOLTAGE VARIATIONS**

### **8.1 Requirements**

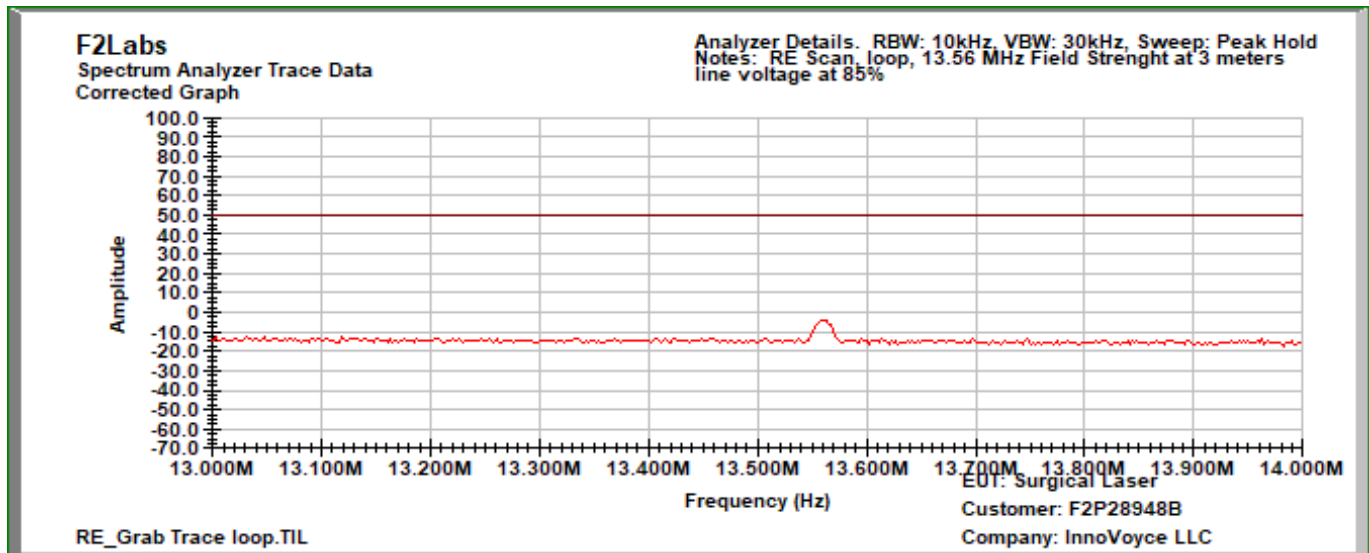
For intentional radiators, measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, shall be performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage. For battery-operated equipment, the equipment tests shall be performed using a new battery.



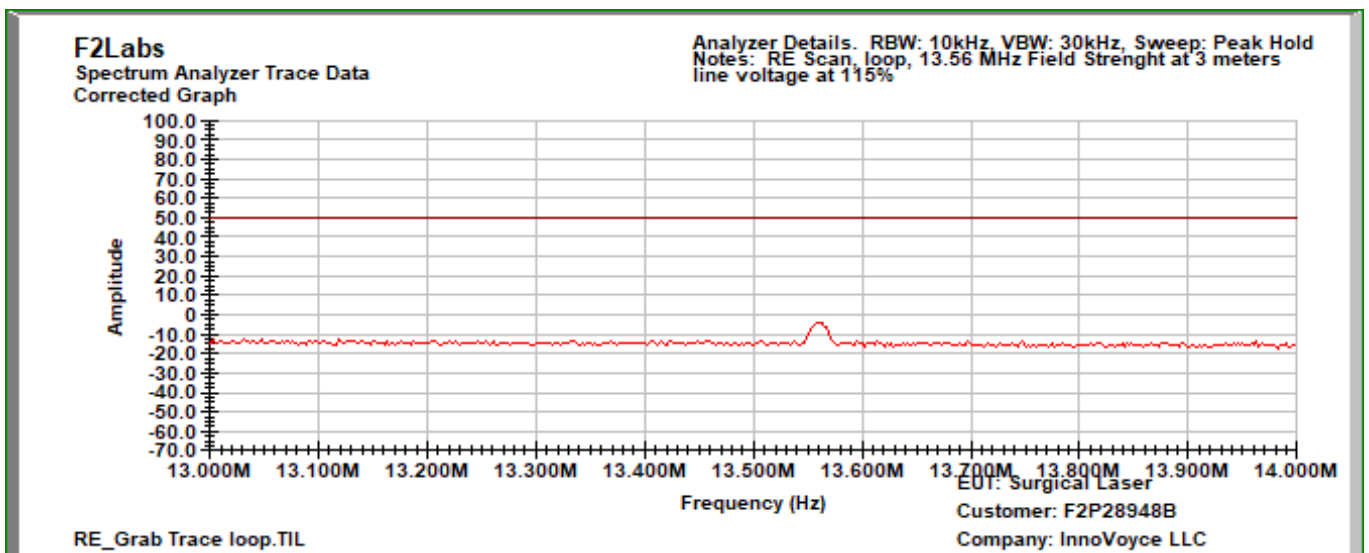
## 8.2 Voltage Variations Test Data

Test Date(s):	2023-11-28	Test Engineer:	J. Chiller
Rule:	15.31(e)	Air Temperature:	20.2° C
Test Results:	Complies	Relative Humidity:	37%

### 85% Voltage Variation



### 115% Voltage Variations





## 9 CONDUCTED EMISSIONS

### 9.1 Requirements

In accordance with FCC CFR 47 Part 15.207(a), "Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50  $\mu$ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency of Emission (MHz)	Conducted Limit (dB $\mu$ V)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

\*Decreases with the logarithm of the frequency.

### 9.2 Procedure

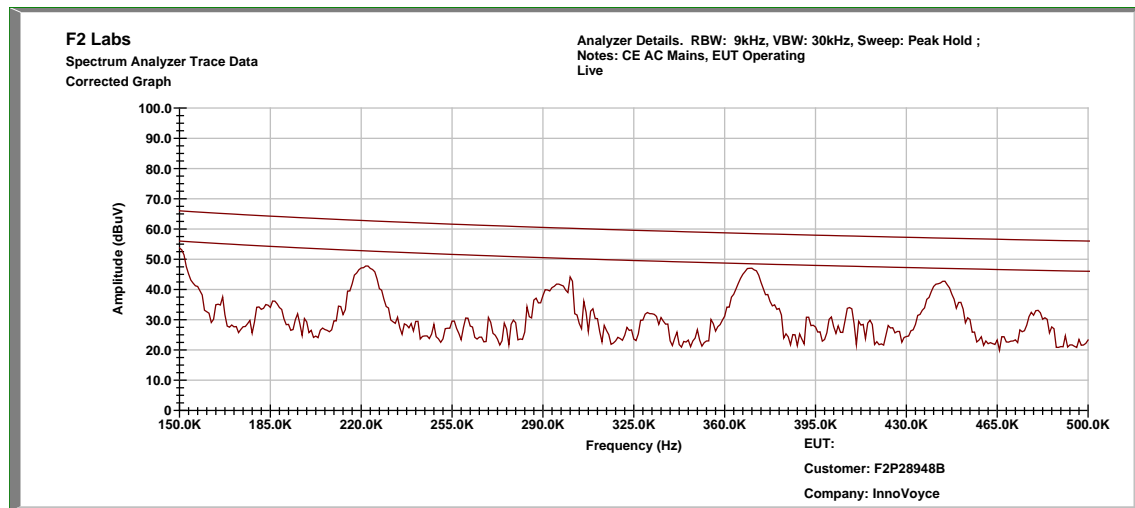
The EUT was placed on a 1.0 x 1.5 meter non-conductive table, 0.8 meter above a horizontal ground plane and 0.4 meter from a vertical ground plane. Power was provided to the EUT through a LISN bonded to a 3 x 2 meter ground plane. The LISN and peripherals were supplied power through a filtered AC power 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.



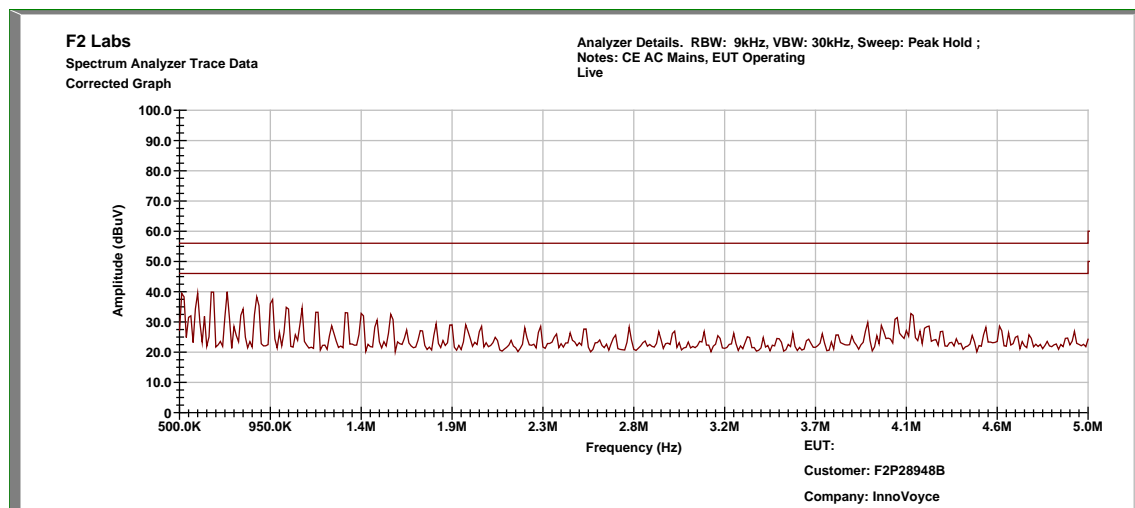
### 9.3 Conducted Emissions Test Data

Test Date:	2023-11-22	Test Engineer:	R. Littell
Rule:	15.207	Air Temperature:	21.1° C
Test Results:	Pass	Relative Humidity:	42%

#### Conducted Test – Live: 0.15 MHz to 0.5 MHz

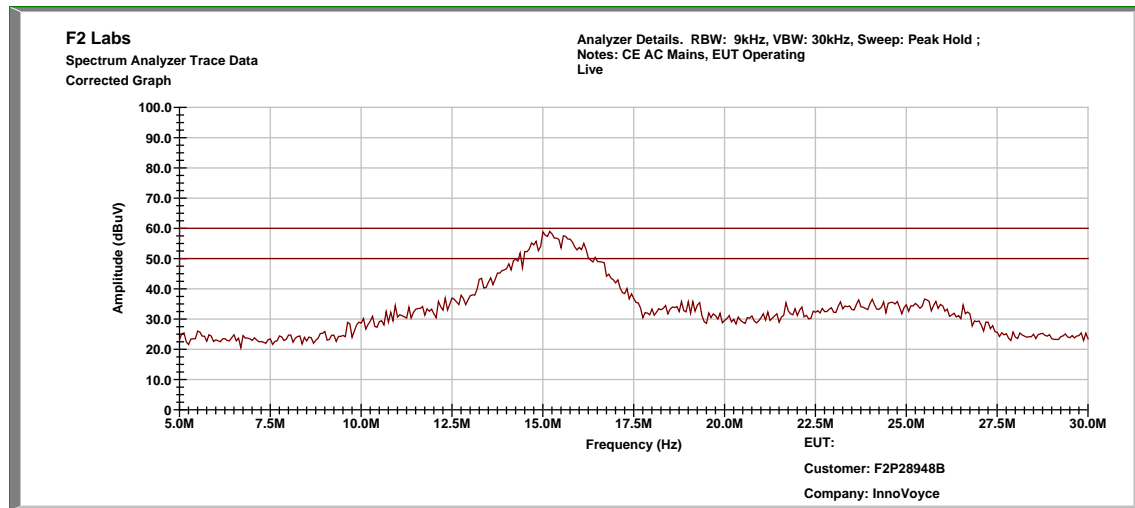


#### Conducted Test – Live: 0.5 MHz to 5.0 MHz





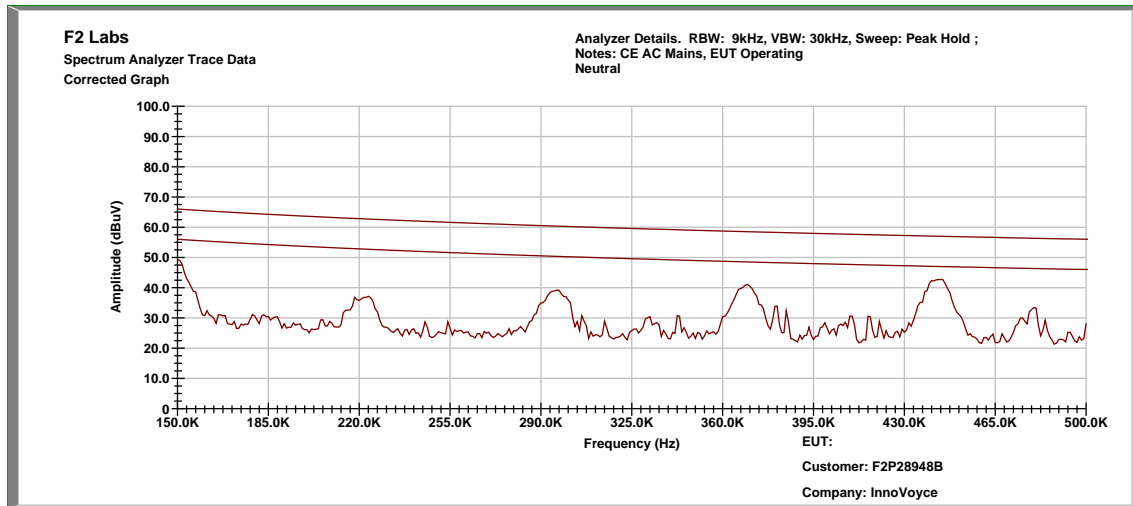
## Conducted Test – Live: 5.0 MHz to 30.0 MHz



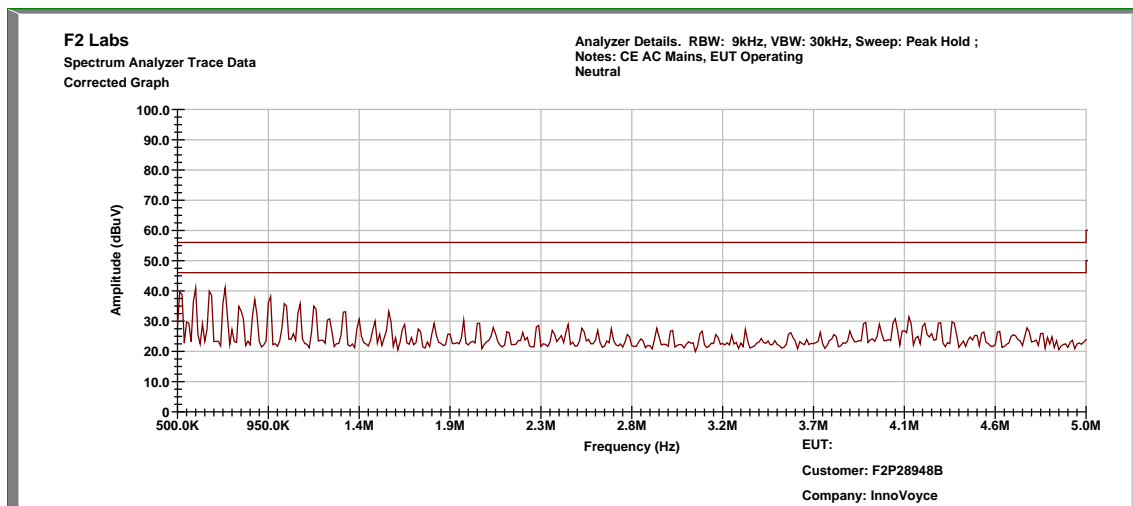
Top Discrete Measurements								
No.	Conductor	Frequency (MHz)	Detector	Level (dBμV)	Adjustment (dB)	Results (dBμV)	Limit (dBμV)	Margin (dB)
1	Line 1	14.375	Quasi-Peak	38.95	10.411	49.36	60.0	-10.6
			Average	29.04	10.411	39.45	50.0	-10.5
2	Line 1	14.8125	Quasi-Peak	45.66	10.431	56.09	60.0	-3.9
			Average	23.71	10.431	34.14	50.0	-15.9
3	Line 1	15.1875	Quasi-Peak	42.59	10.443	53.03	60.0	-7.0
			Average	28.15	10.443	38.59	50.0	-11.4
4	Line 1	15.625	Quasi-Peak	38.35	10.449	48.80	60.0	-11.2
			Average	25.73	10.449	36.18	50.0	-13.8
5	Line 1	16.125	Quasi-Peak	43.28	10.457	53.74	60.0	-6.3
			Average	29.33	10.457	39.79	50.0	-10.2
6	Line 1	16.4375	Quasi-Peak	38.10	10.462	48.56	60.0	-11.4
			Average	27.18	10.462	37.64	50.0	-12.4



### Conducted Test – Neutral: 0.15 MHz to 0.5 MHz

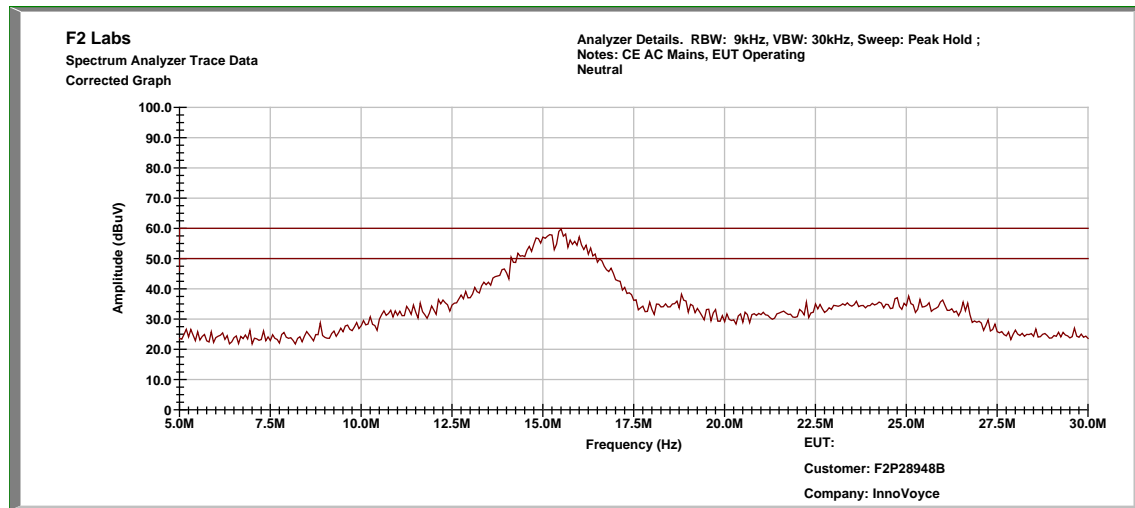


### Conducted Test – Neutral: 0.5 MHz to 5.0 MHz





## Conducted Test – Neutral: 5.0 MHz to 30.0 MHz



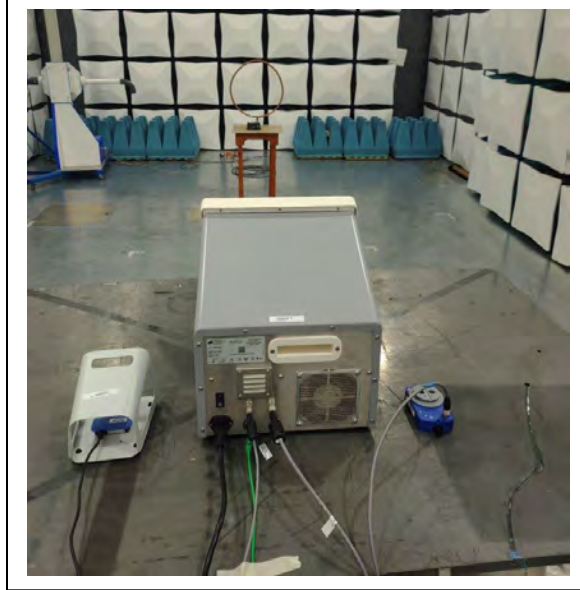
Top Discrete Measurements								
No.	Conductor	Frequency (MHz)	Detector	Level (dB $\mu$ V)	Adjustment (dB)	Results (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)
1	Line 2	14.3125	Quasi-Peak	43.68	10.443	54.12	60.0	-5.9
			Average	27.02	10.443	37.46	50.0	-12.5
2	Line 2	14.8125	Quasi-Peak	45.40	10.463	55.86	60.0	-4.1
			Average	27.30	10.463	37.76	50.0	-12.2
3	Line 2	15.1875	Quasi-Peak	42.90	10.475	53.38	60.0	-6.6
			Average	26.76	10.475	37.24	50.0	-12.8
4	Line 2	15.5	Quasi-Peak	45.27	10.483	55.75	60.0	-4.2
			Average	31.75	10.483	42.23	50.0	-7.8
5	Line 2	16	Quasi-Peak	45.03	10.495	55.53	60.0	-4.5
			Average	29.48	10.495	39.98	50.0	-10.0
6	Line 2	16.3125	Quasi-Peak	37.51	10.503	48.01	60.0	-12.0
			Average	29.38	10.503	39.88	50.0	-10.1





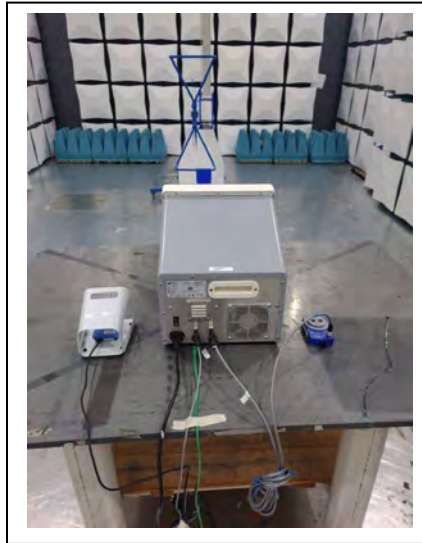
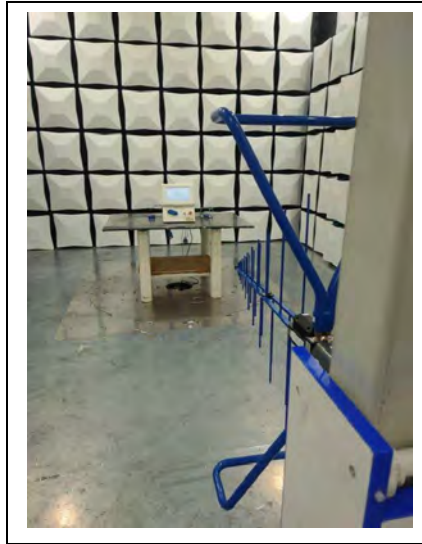
## 10 TEST SETUP PHOTOGRAPHS

### Radiated Spurious Emissions: Less than 30 MHz





## Radiated Spurious Emissions: 30 to 1000 MHz





### Voltage Variations



### Conducted Emissions

