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CERTIFICATION TEST REPORT

Manufacturer: **GI Bionics LLC**
11107 Roselle Street, Suite 213
San Diego, California 92121 USA

Applicant: **Same as Above**

Product Name: **Probe**

Product Description: The Fecobionics system consists of a battery powered insertable probe, a wireless Data Hub which collects data from the probe and transmits data to PC application running on a laptop and a Data Hub charger. The Fecobionics probe is intended to be inserted into the rectum to diagnose defecation abnormalities. It wirelessly transmits pressure, temperature, motion, orientation, and cross-sectional area data to computer that displays the data in real-time.

**Operating Voltage/Freq.
of EUT During Testing:** **Battery-Operated**

Model: **AR-100**

FCC ID: **2BBFTAR100SG01**

Testing Commenced: **2023-12-11**

Testing Ended: **2025-04-03**

Summary of Test Results: **In Compliance, with Modifications**

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 15.249**
- ❖ **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**



Evaluation Conducted by:

Erik Tobin, EMC Engineer

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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 the 2013 version of ANSI C63.10 and recommended FCC procedure of measurement for devices operating under Section 15.249. 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 No(s): F2P29439B

Applicant: GI Bionics LLC
Model: AR-100

1.4 Document History:

Document Number	Description	Issue Date	Approved By
F2P29439B-07E	First Issue	2025-04-18	K. Littell

**2 SUMMARY OF TEST RESULTS**

Test Name	Standard(s)	Results
99% Occupied Bandwidth	CFR 47 Part 15.215(c)	Complies
-20dB Occupied Bandwidth	CFR 47 Part 15.215(c)	Complies
Field Strength of Emissions	CFR 47 Part 15.249(a)(d)	Complies*
Variation of the Input Power	CFR 47 Part 15.31(e)	Complies**
Conducted Emissions	CFR 47 Part 15.207(a)	Not Applicable – Battery Operated Only

***Product was operated using AAA non-rechargeable batteries. Requirements of 15.31 were met by using new batteries.*

Modifications Made to the Equipment
<i>*Power setting was set to +9dBm to meet Field Strength, Band Edge, and Harmonics requirements.</i>



3 TABLE OF MEASURED RESULTS

Test	902.4 MHz	915 MHz	927 MHz
Field Strength of Fundamental*	93.1 dB μ V/m, 45.2 mV/m	92.9 dB μ V/m 44.2 mV/m	92.4 dB μ V/m 41.7 mV/m
Limit for Fundamental	94 dB μ V/m, 50 mV/m	94 dB μ V/m, 50 mV/m	94 dB μ V/m, 50 mV/m
-20dB Occupied Bandwidth	0.245 MHz	0.240 MHz	0.295 MHz
99% Occupied Bandwidth	0.238 MHz	0.230 MHz	0.237 MHz

**Power setting: +9dBm.*

The -20dB bandwidth of the emission shall be contained within the frequency band designated in the rule section under which the equipment is operated.



4 ENGINEERING STATEMENT

This report has been prepared on behalf of GI Bionics LLC, to provide documentation for the testing described herein. This equipment has been tested and found to comply with part 15.249 of the FCC Rules using ANSI C63.10 2013 standard. 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: **Probe**

Model: AR-100

Serial No.: 2023120102-29

Firmware: v2.2.09_16csa

Hardware: 430-205 Rev K

FCC ID: **2BBFTAR100SG01**

5.2 Trade Name:

GI Bionics LLC

5.3 Power Supply:

Battery-Operated

5.4 Applicable Rules:

CFR 47, Part 15.249

5.5 Antenna:

Integral Antenna

5.6 Accessories:

Device	Manufacturer	Model Number	Serial Number
UART Interface*	Texas Instruments	CC1300	None Specified

**The UART Interface is the secondary device connected between the radio and control computer. This is the configuration that the manufacturer supplied for controlling the radio during testing.*

5.7 Test Item Condition:

The equipment to be tested was received in good condition.

5.8 Testing Algorithm:

EUT was set to transmit a continuous modulated signal in the 900 MHz band. EUT was controlled with Texas Instruments Smart RF Studio Software V2.29. Measurements were made on the low, mid and high frequencies of 902.4, 915 and 927 MHz. EUT is a one-time use disposable product with a battery that does not last more than a few minutes due to its use life. Because of this, the EUT was connected to an external battery source for testing, due to the amount of time the device needs to be on and transmitting for testing.

**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	2025-05-31
Receiver	CL151	Rohde & Schwarz	ESU40	100319	2025-04-09
Horn Antenna	CL098	Emco	3115	9809-5580	2026-01-21
Pre-Amplifier	CL153	Keysight Tech.	83006A	MY39500791	2026-01-09
Preamplifier	CL284	AH Systems, Inc.	PAM-1001	131	2025-04-10
Active 18" Loop Antenna	CL163-Loop	A.H. Systems, Inc.	EHA-52B	100	2026-04-01
Antenna, JB3 Combination	CL175	Sunol Sciences	JB3	A030315	2025-09-18
Low Loss Cable Set	CL315/CL318	Fairview Microwave	FMC0202914-72/FMC0202914-240	None Spec.	2025-04-10
Software:	Tile Version 3.4.B.3		Software Verified: 2023-12-11; 2025-04-03		
Software:	EMC 32 Version 8.53.0		Software Verified: 2023-12-11; 2025-04-03		
Temp/Hum. Recorder	CL293	Thermpro	TP50	1	2025-05-31
Temp/Hum Recorder	CL232	Extech	445814	01	2025-05-19



7 FCC PART 15.215(e), OCCUPIED BANDWIDTH

7.1 Requirements:

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the -20dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage.

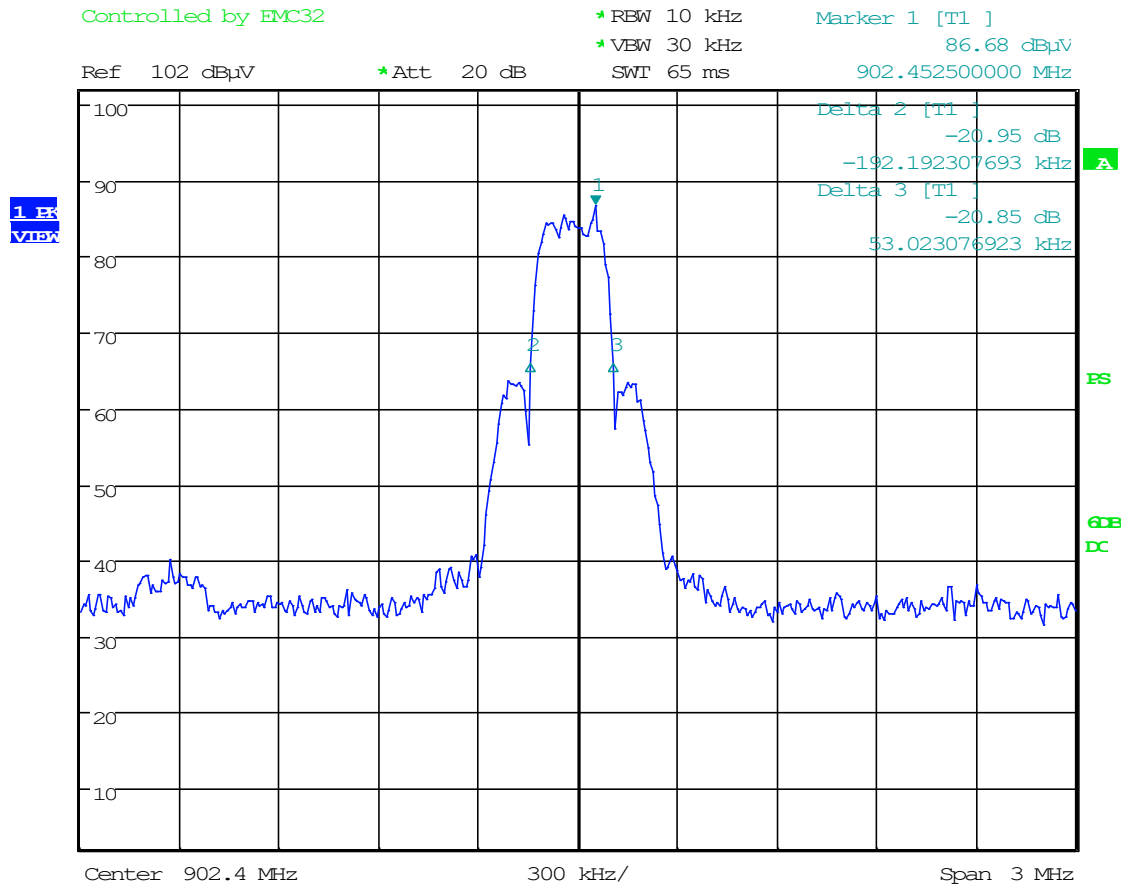
Bandwidth measurements were made at the low, mid and high frequencies. The -20 dB bandwidth was measured using the marker delta method. The 99% bandwidth was measured using the analyzer's OBW function.



7.2 Occupied Bandwidth Test Data

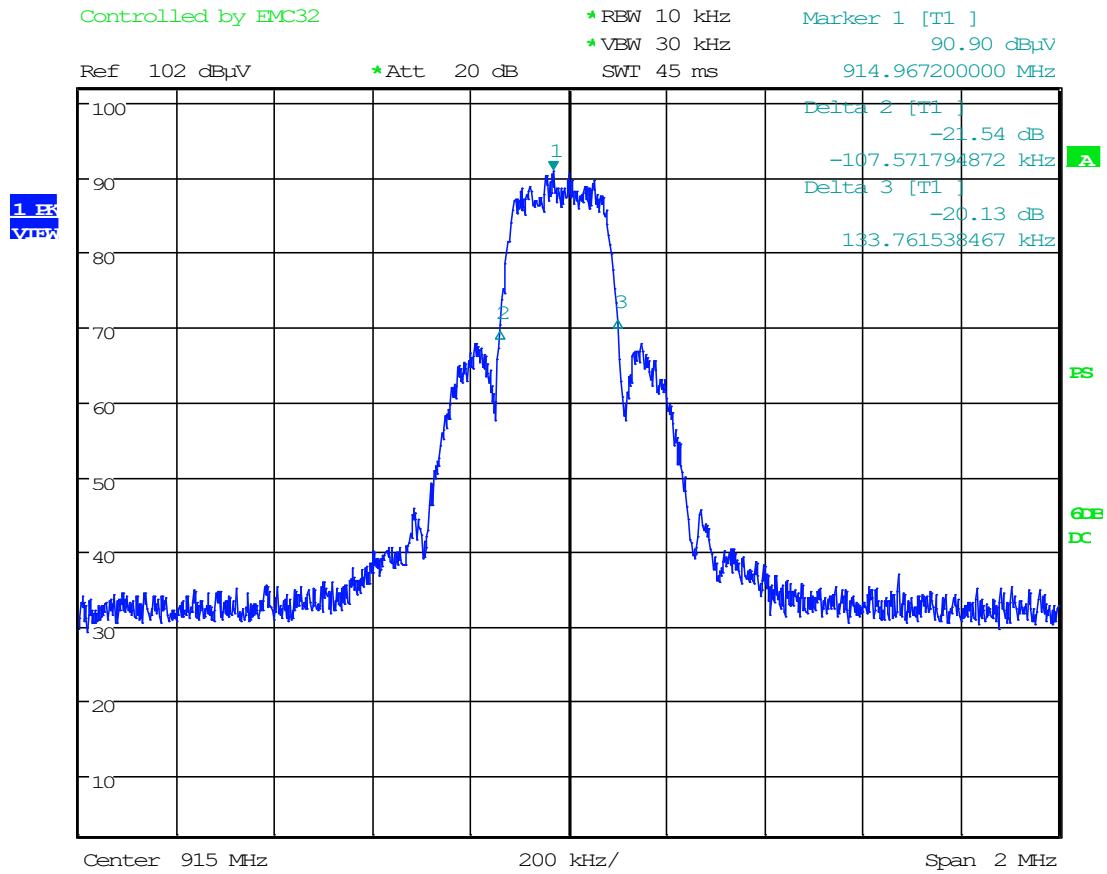
Test Date(s):	2023-12-12 ; 2025-04-03	Test Engineer:	J. Chiller ; E. Tobin
Standards:	CFR 47 Part 15.215(c)	Air Temperature:	21.6°C
		Relative Humidity:	38%

OBW, -20dB: 902.4 MHz



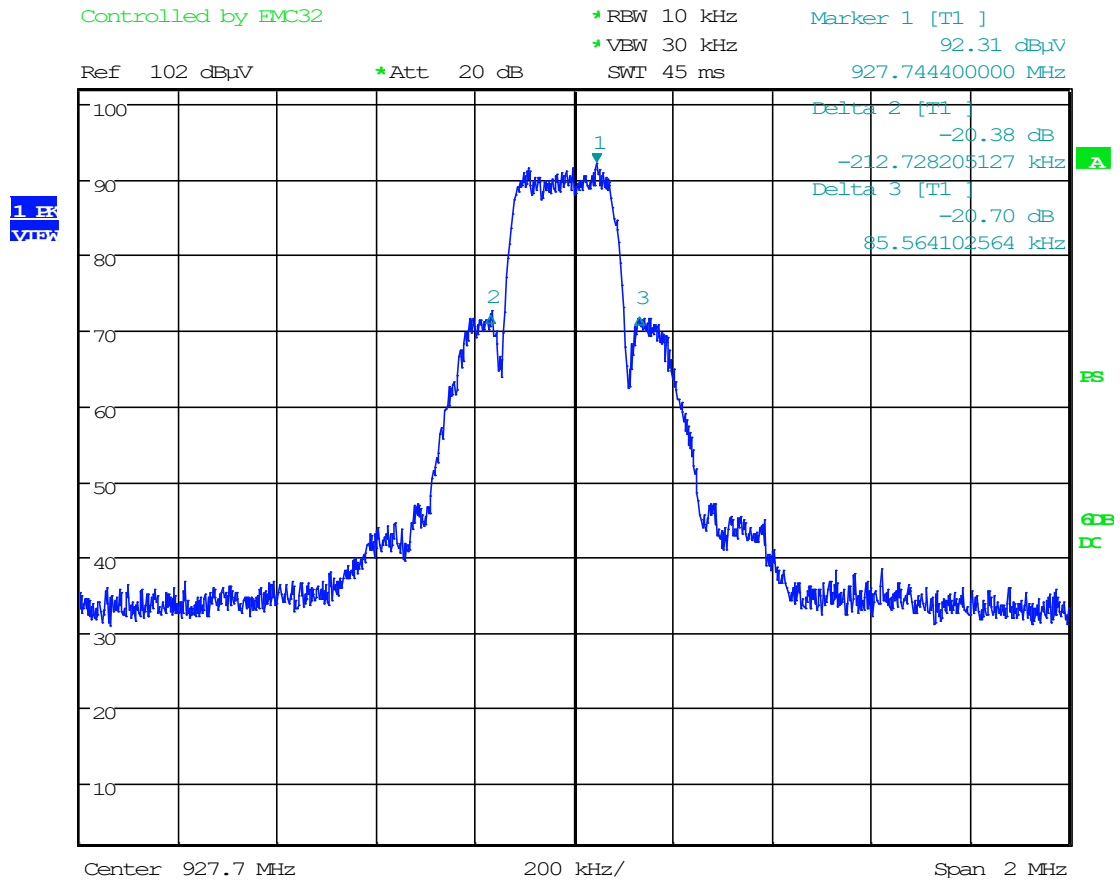


OBW, -20dB: 915 MHz



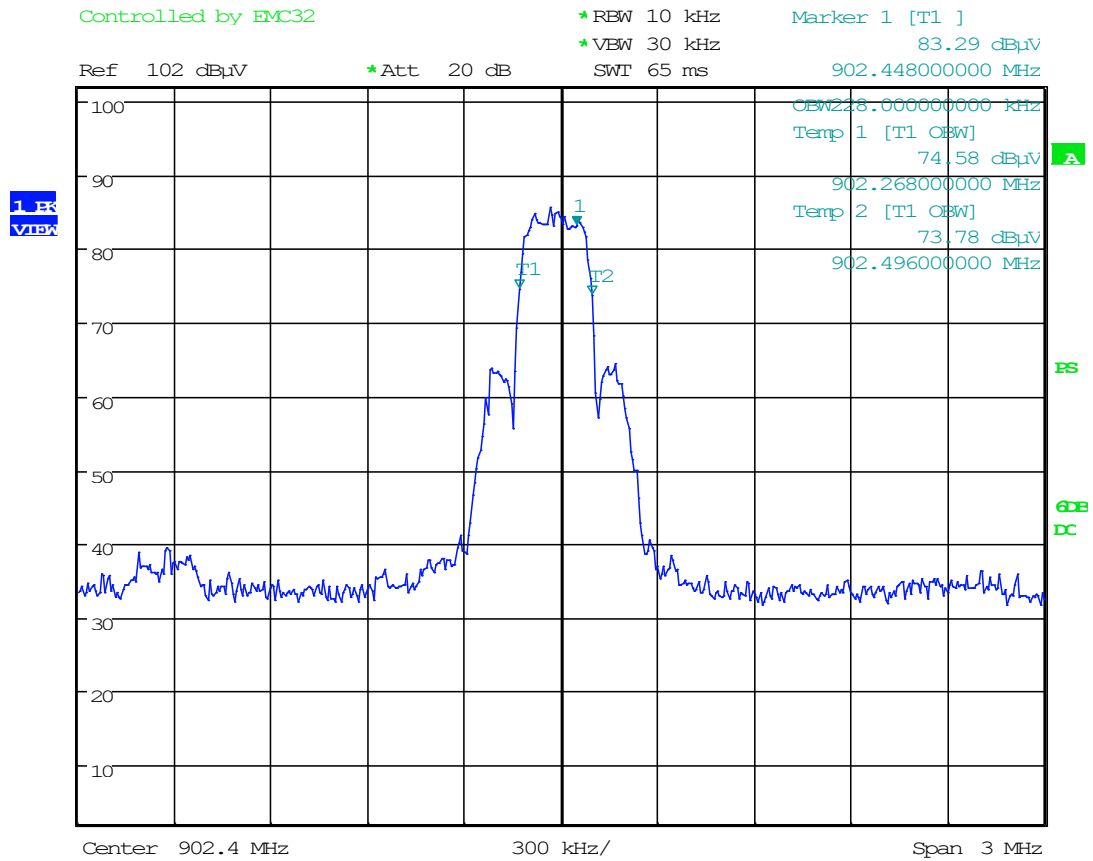


OBW, -20dB: 927 MHz



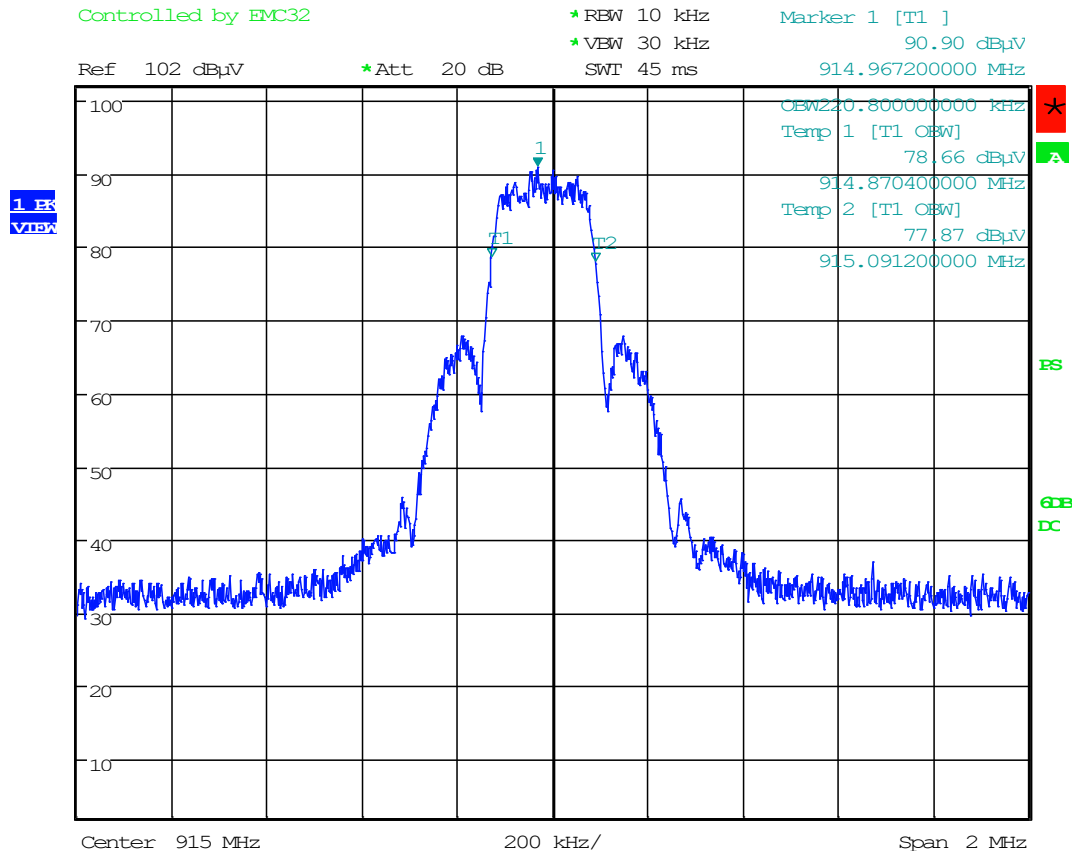


OBW, 99%: 902.4 MHz



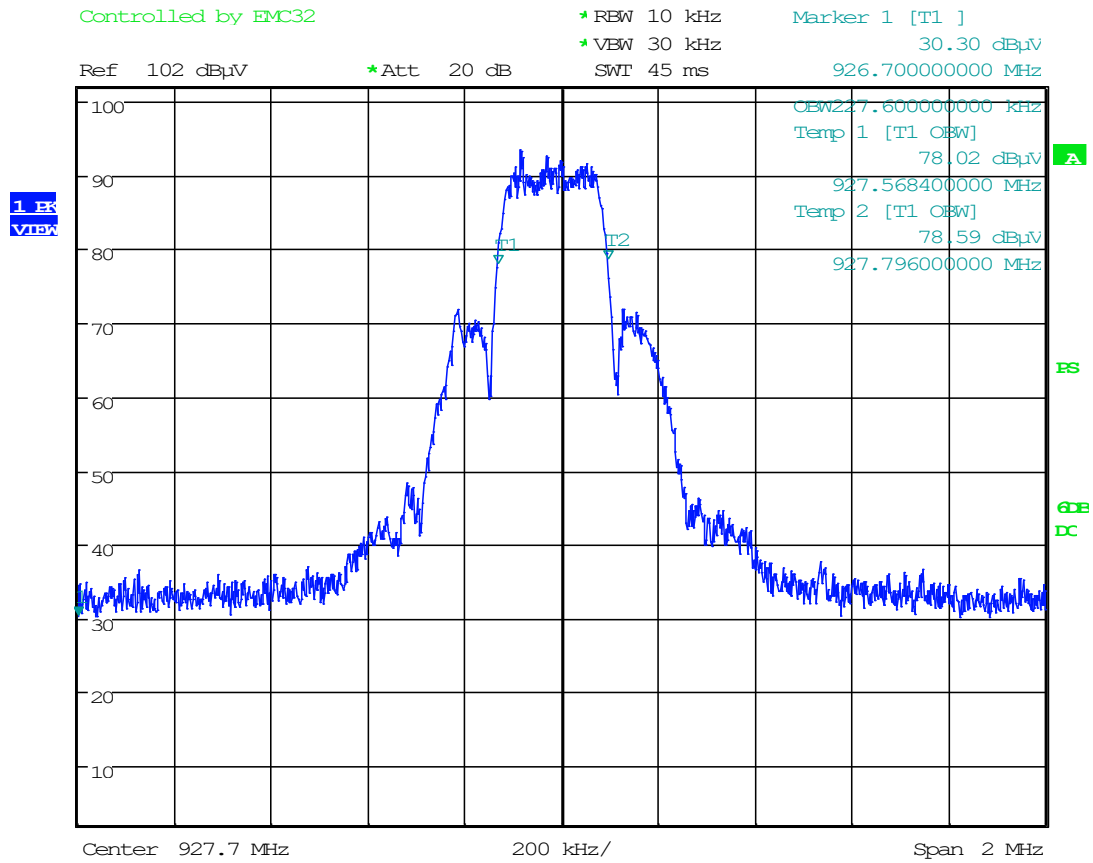


OBW, 99%: 915 MHz





OBW, 99%: 927 MHz



**8 FCC PART 15.249(a)(d) – FIELD STRENGTH OF EMISSIONS FROM INTENTIONAL RADIATORS**

(a) Except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental Frequency	Field Strength of Fundamental (millivolts/meter)	Field Strength of Harmonics (microvolts/meter)
902-928 MHz	50	500
2400-2483.5 MHz	50	500
5725-5875 MHz	50	500
24.0-24.25 GHz	250	2500

(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

NOTE: During the pre-scan evaluation, the EUT was rotated in all possible directions to find the maximum emissions in both test mode and normal operating mode. The position that showed the highest emissions was tested, which was while connected to and resting vertically against the UHART control box in test mode. Further, the pre-scan results showed that the emissions from the product in its normal operating mode were below this worst-case orientation in test mode. The receive test antenna was raised between 1 and 4 meters and the EUT turntable was rotated 360 degrees to maximize the emissions.

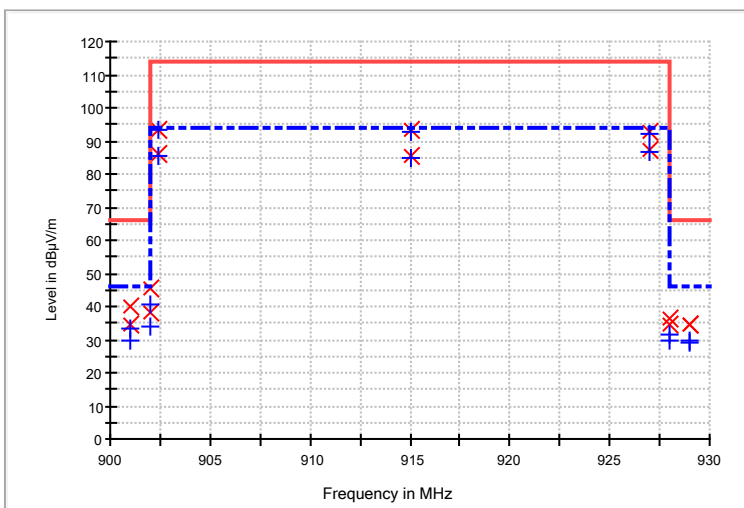


8.1 Test Data - Field Strength of Emissions from Intentional Radiators

Test Date(s):	2025-04-03	Test Engineer(s):	E. Tobin
Standards:	CFR 47 Part 15.249(a)	Air Temperature:	21.6°C
		Relative Humidity:	35%

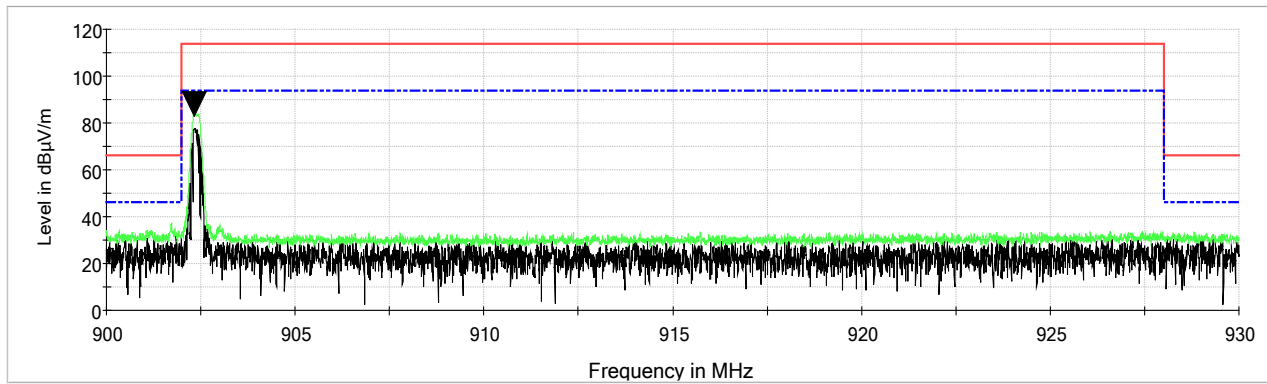
All modulations (200 kbps, 2-GFSK, 50kHz deviation, 100 deviation)

Frequency (MHz)	MaxPeak (dBμV/m)	QuasiPeak (dBμV/m)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBμV/m)
901.000000	39.8	33.2	120.000	100.0	H	330.0	-13.5	12.8	46.0
901.000000	34.7	29.6	120.000	175.0	V	190.0	-13.5	16.4	46.0
902.000000	38.4	33.7	120.000	175.0	V	190.0	-13.6	12.3	46.0
902.000000	45.7	40.4	120.000	100.0	H	330.0	-13.6	5.6	46.0
902.400000	93.6	93.1	120.000	100.0	H	330.0	-13.6	0.9	94.0
902.400000	85.9	85.4	120.000	175.0	V	190.0	-13.6	8.6	94.0
915.000000	85.6	85.0	120.000	165.0	V	110.0	-13.3	9.0	94.0
915.000000	93.5	92.9	120.000	100.0	H	335.0	-13.3	1.1	94.0
927.000000	92.8	92.4	120.000	100.0	H	235.0	-12.9	1.6	94.0
927.000000	87.2	86.7	120.000	165.0	V	190.0	-12.9	7.3	94.0
928.000000	36.1	31.3	120.000	100.0	H	235.0	-12.9	14.7	46.0
928.000000	34.5	29.5	120.000	165.0	V	190.0	-12.9	16.5	46.0
929.000000	34.4	29.4	120.000	100.0	H	235.0	-12.7	16.6	46.0
929.000000	34.3	28.9	120.000	165.0	V	190.0	-12.7	17.1	46.0

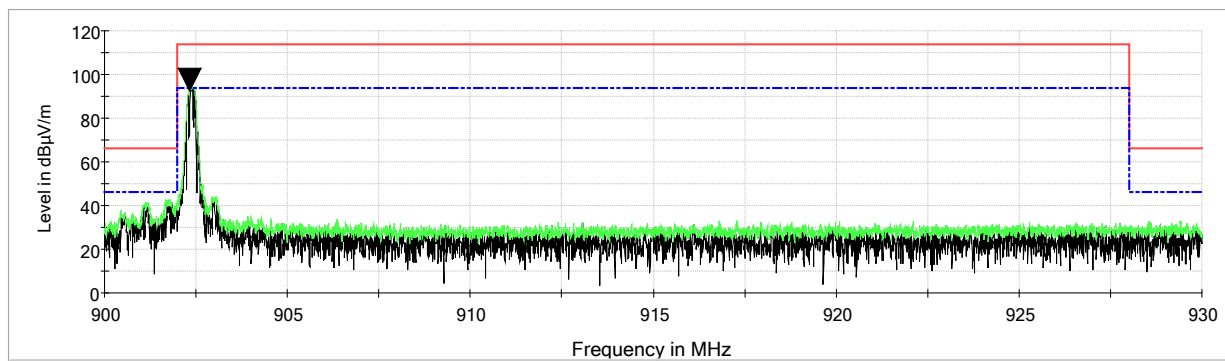




902.4 MHz, Vertical

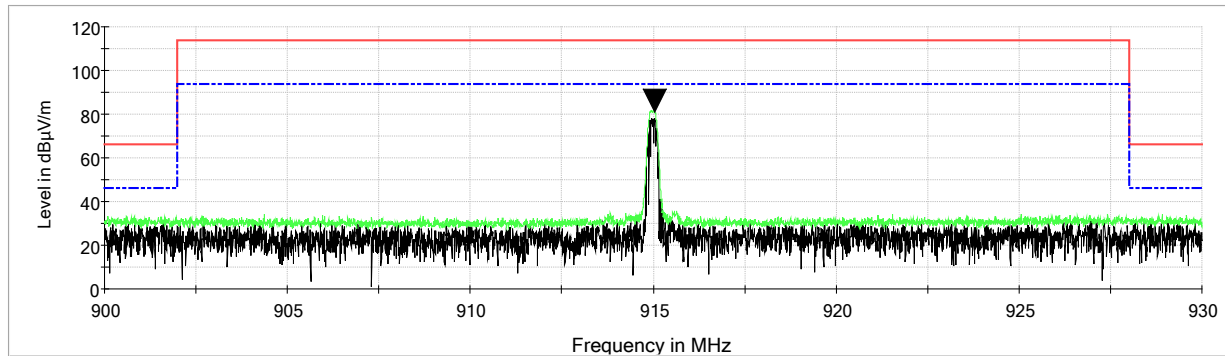


902.4 MHz, Horizontal

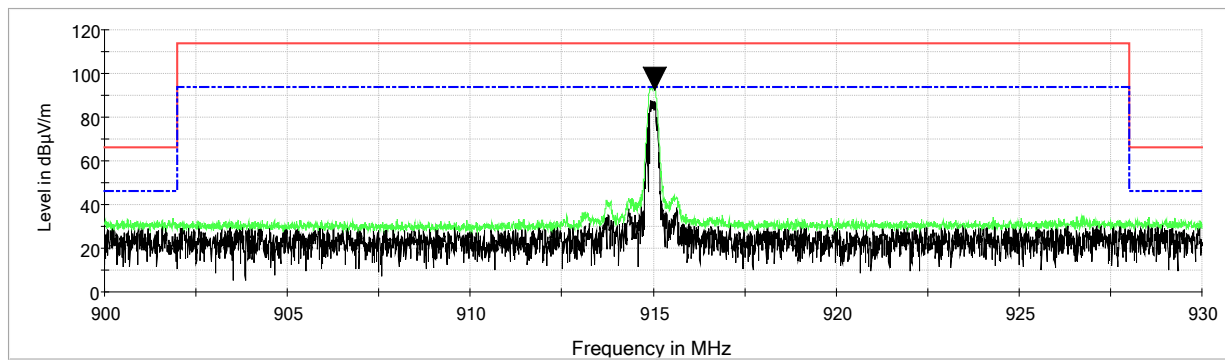




915 MHz, Vertical

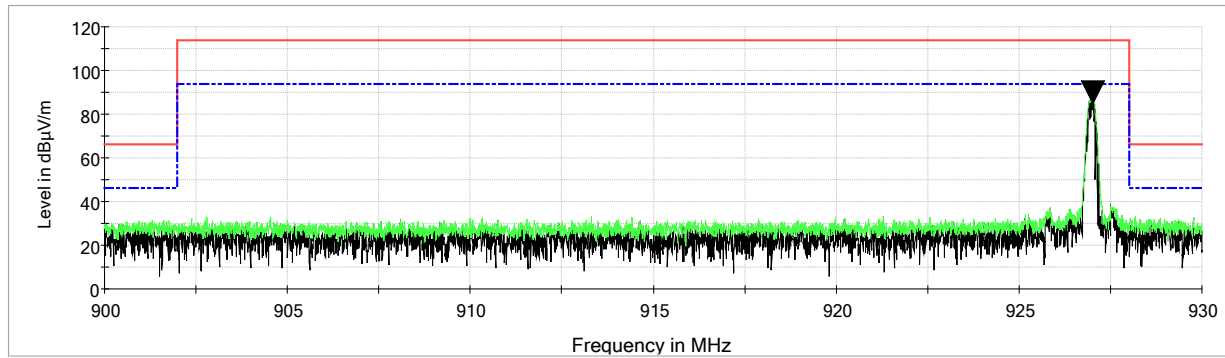


915 MHz, Horizontal

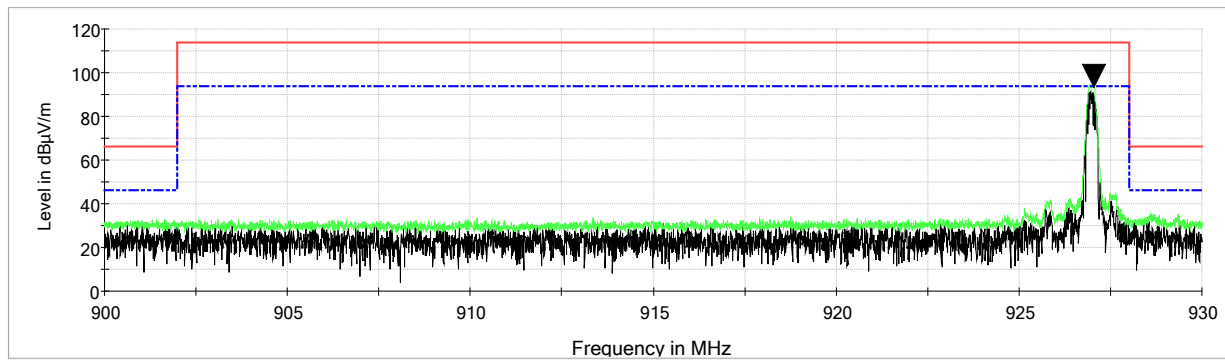




927 MHz, Vertical



927 MHz, Horizontal





8.2 Test Data – Spurious Emissions

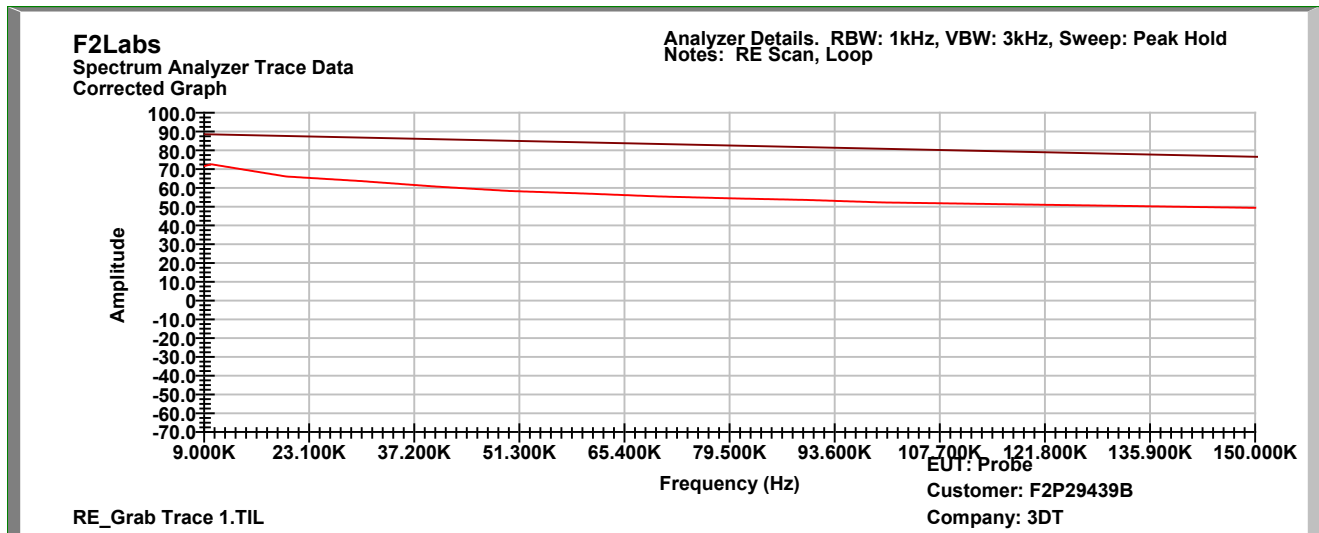
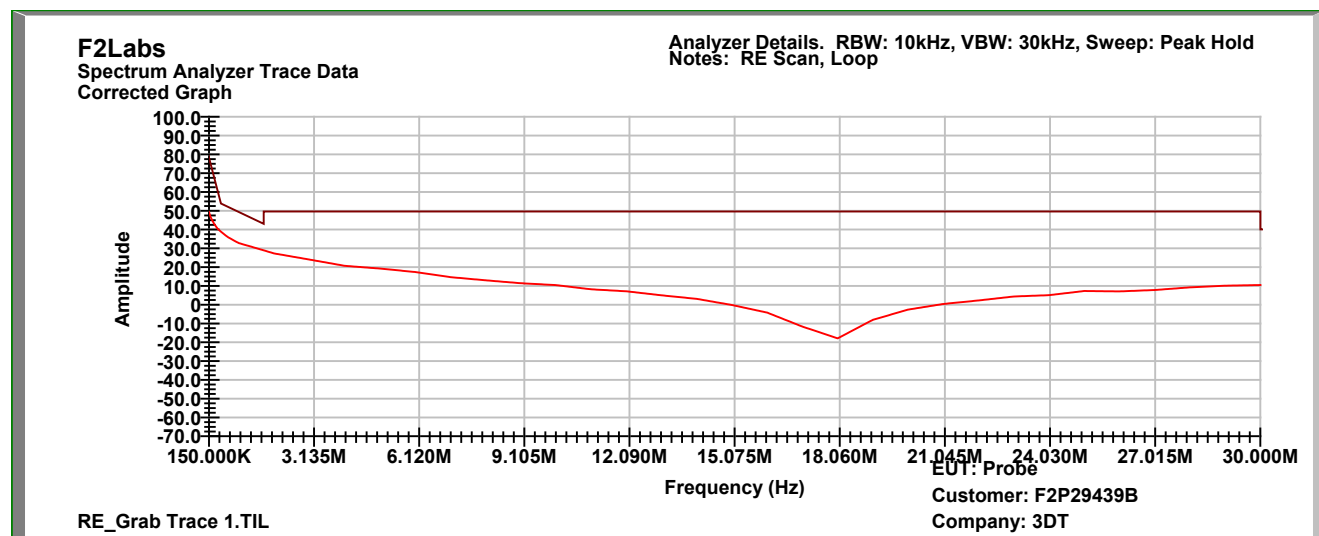
Notes: Plots are peak, max hold pre-scan data included only to determine what frequencies to investigate and measure. During the pre-scan evaluation, the EUT was rotated in all possible directions to find the maximum emissions in both test mode and normal operating mode. The position that showed the highest emissions was tested, which was while connected to and resting vertically against the UHART control box in test mode. Further, the pre-scan results showed that the emissions from the product in its normal operating mode were below this worst-case orientation in test mode. At some frequencies, no emissions from the EUT were visible 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 1 GHz 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. Frequencies were scanned from 9kHz to 13 GHz and the highest emissions are listed below.

In the following plots, the black line indicates ambient noise and the red line indicates the measurement with the EUT on. Emissions to be found by the EUT were measured and listed in tables below. The following graphs represent scans at the 920.8 MHz frequency.

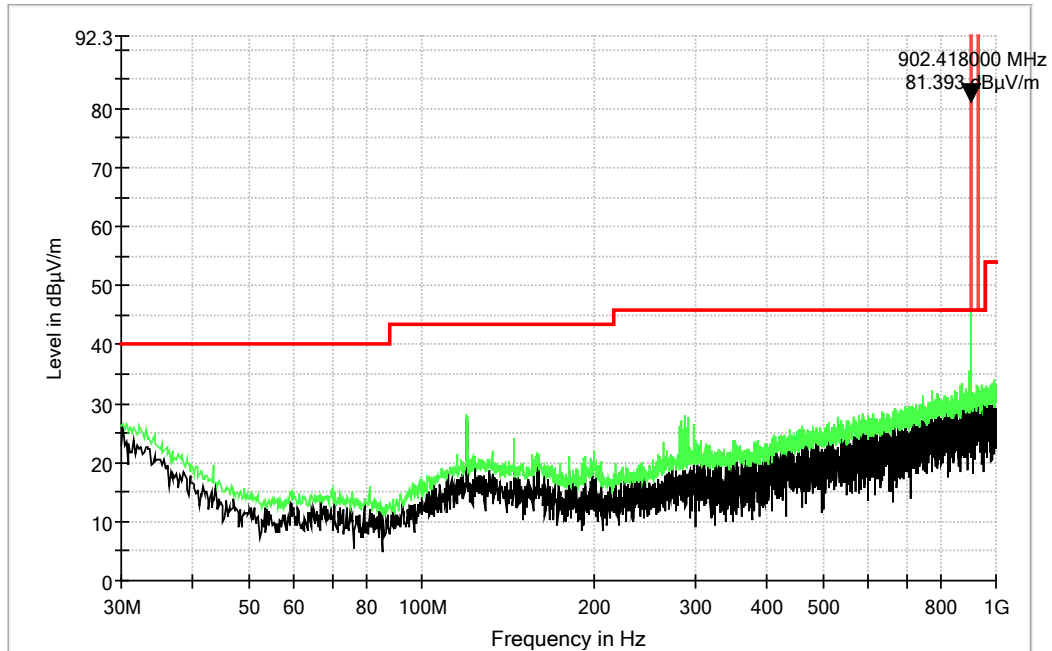


Test Date(s):	2023-12-12 ; 2025-04-03	Test Engineer:	J. Chiller ; E. Tobin
Standards:	CFR 47 Part 15.249(d) / Part 15.209	Air Temperature:	21.6°C
		Relative Humidity:	37%

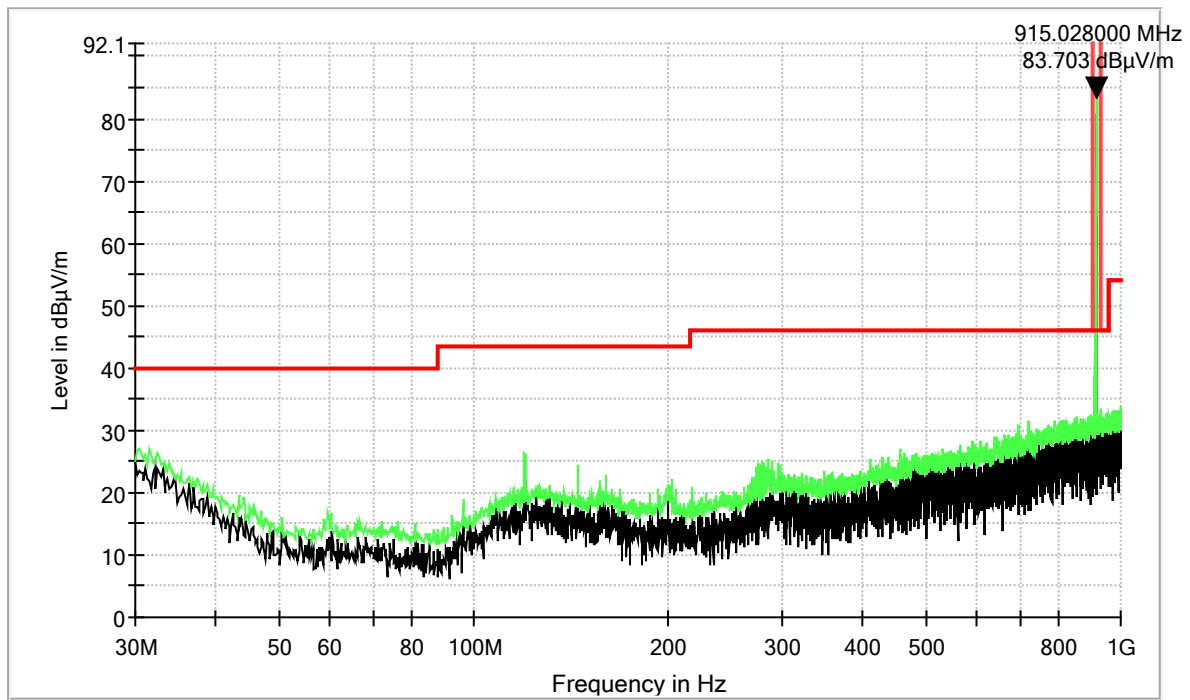
Characterization Scan, 0.009 MHz to 0.15 MHz (Loop)**Characterization Scan, 0.15 MHz to 30 MHz (Loop)**



Low Channel: Characterization Scan, 30 MHz to 1000 MHz, Vertical

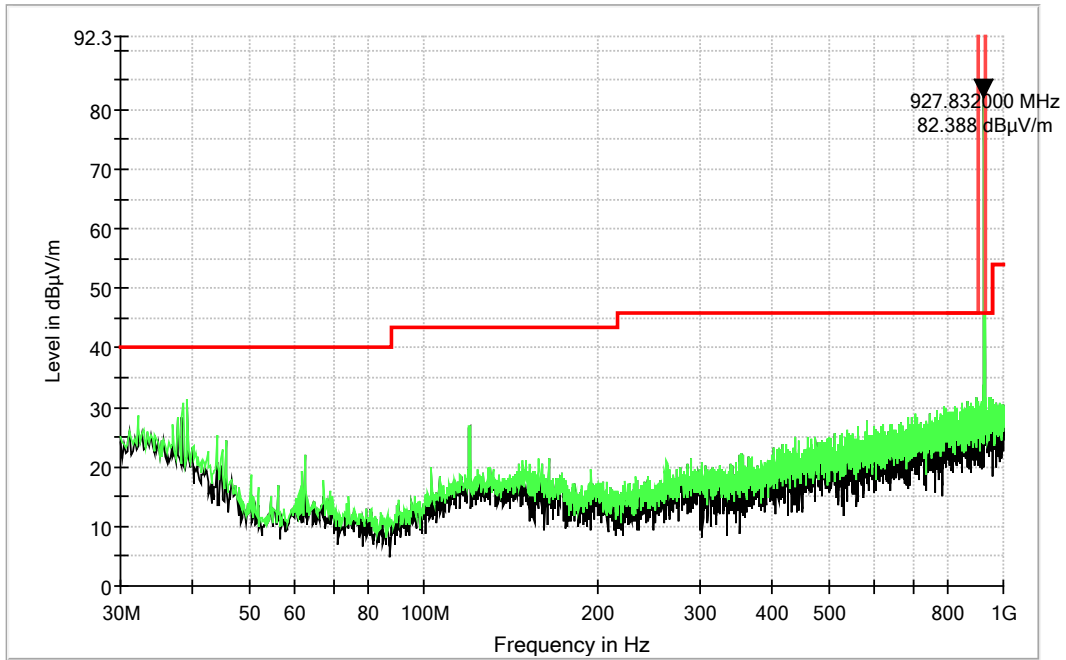


Mid Channel: Characterization Scan, 30 MHz to 1000 MHz, Vertical



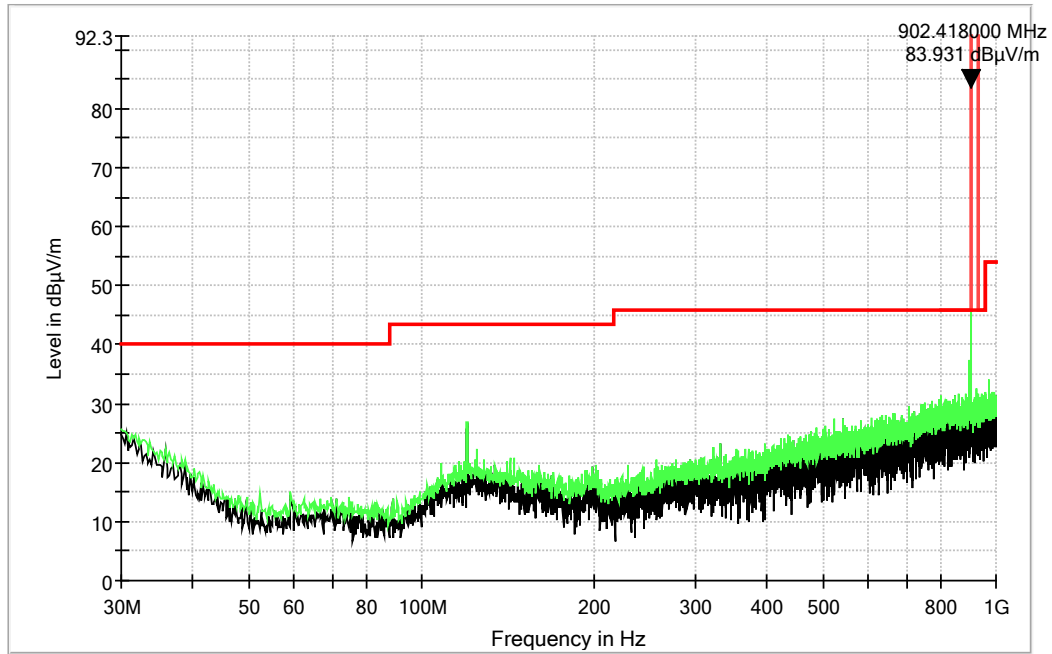


High Channel: Characterization Scan, 30 MHz to 1000 MHz, Vertical

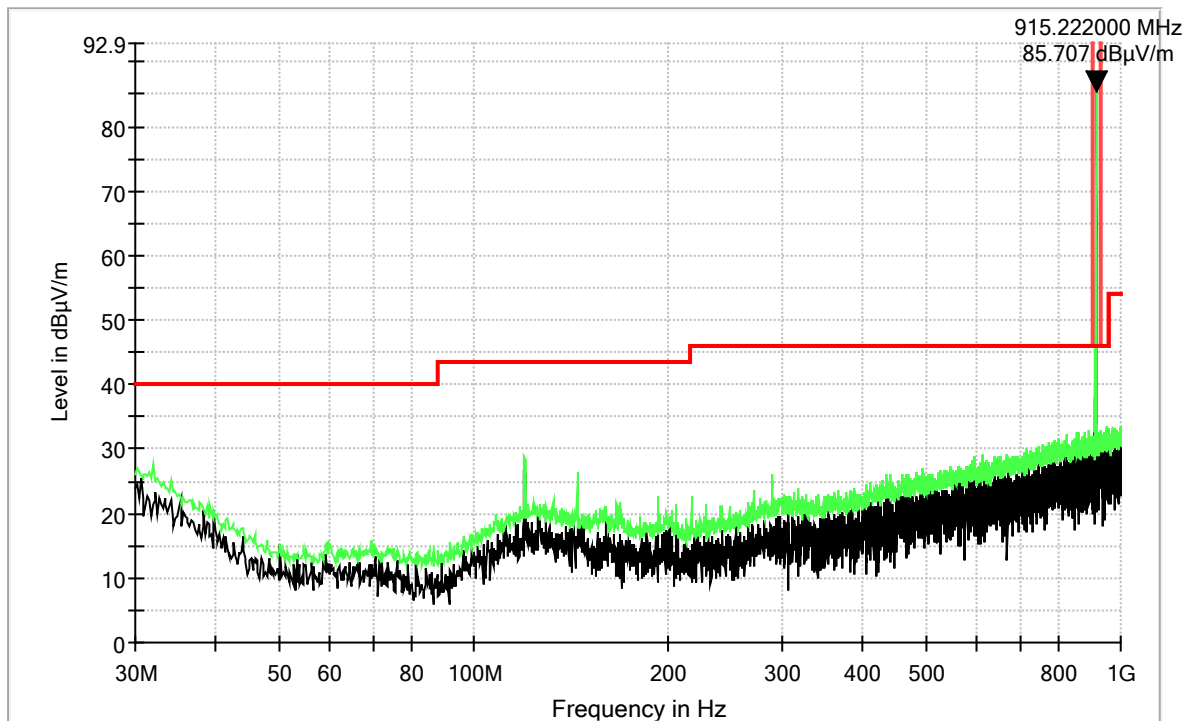




Low Channel: Characterization Scan, 30 MHz to 1000 MHz, Horizontal

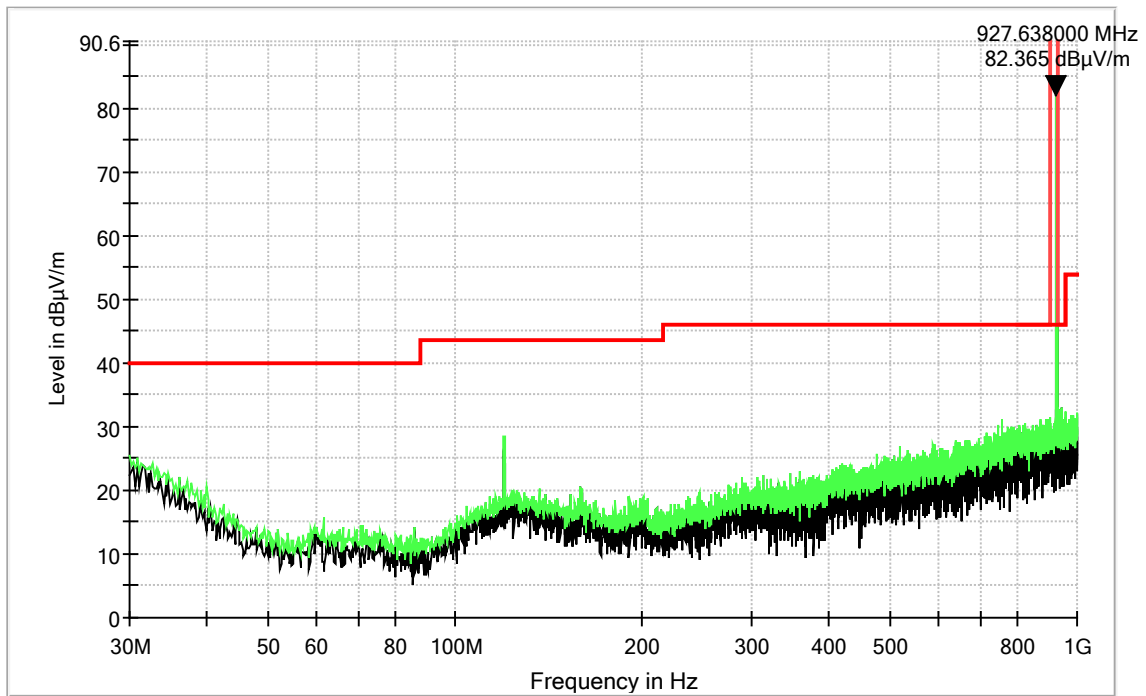


Mid Channel: Characterization Scan, 30 MHz to 1000 MHz, Horizontal





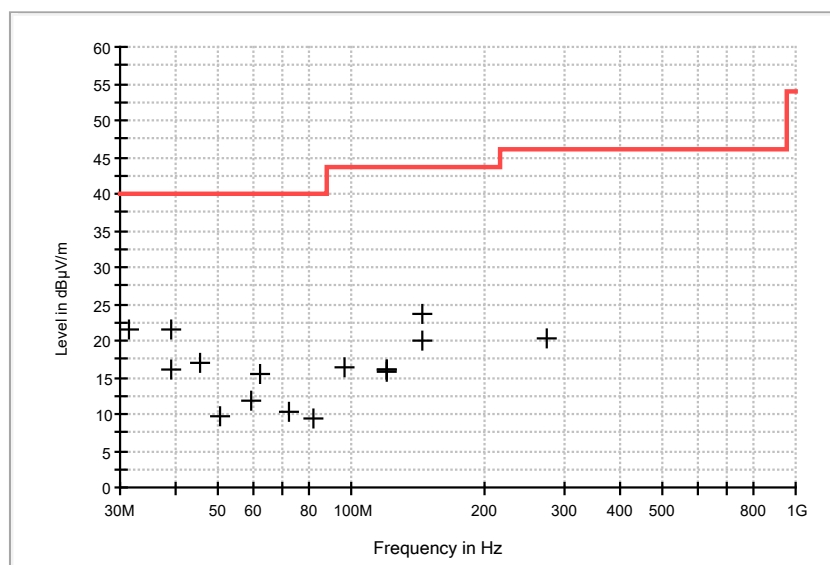
High Channel: Characterization Scan, 30 MHz to 1000 MHz, Horizontal





Measurements, 30 MHz to 1000 MHz

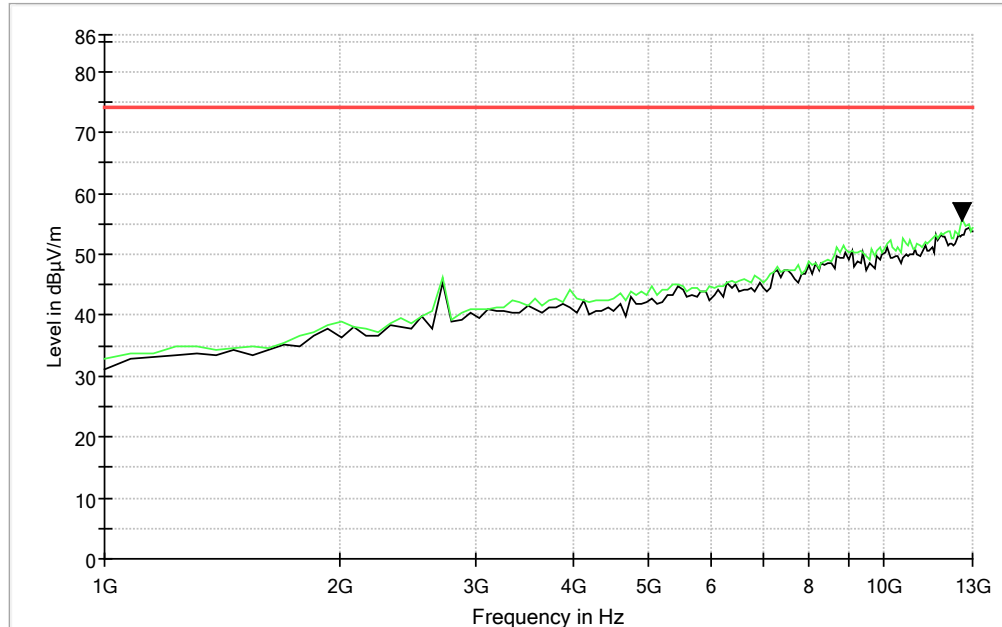
Frequency (MHz)	QuasiPeak (dB μ V/m)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dB μ V/m)
31.560000	21.4	120.000	100.0	V	357.0	-20.4	18.6	40.0
39.120000	15.9	120.000	100.0	H	0.0	-26.1	24.1	40.0
39.120000	21.6	120.000	100.0	V	356.0	-26.1	18.4	40.0
45.520000	16.9	120.000	100.0	V	356.0	-30.4	23.1	40.0
50.560000	9.8	120.000	100.0	V	357.0	-32.4	30.2	40.0
59.280000	11.7	120.000	100.0	H	0.0	-32.8	28.3	40.0
62.400000	15.6	120.000	100.0	V	356.0	-32.5	24.4	40.0
72.280000	10.3	120.000	100.0	V	357.0	-31.8	29.7	40.0
81.600000	9.3	120.000	100.0	H	0.0	-32.5	30.7	40.0
96.560000	16.4	120.000	100.0	V	357.0	-30.9	27.1	43.5
119.840000	16.0	120.000	100.0	V	356.0	-26.1	27.5	43.5
119.840000	16.0	120.000	100.0	H	162.0	-26.1	27.5	43.5
119.840000	15.9	120.000	100.0	V	357.0	-26.1	27.6	43.5
144.640000	23.7	120.000	100.0	H	175.0	-26.9	19.8	43.5
144.840000	20.1	120.000	100.0	V	357.0	-27.0	23.4	43.5
276.000000	20.2	120.000	100.0	V	32.0	-25.7	25.8	46.0



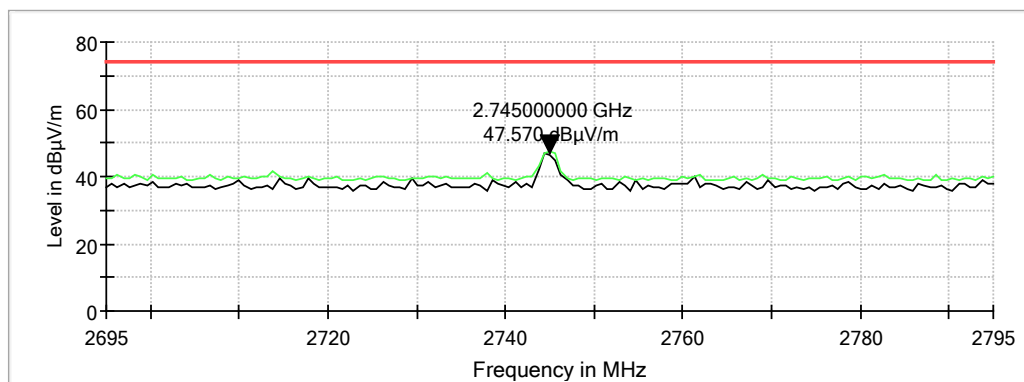
Note: The data represents results of all three channels.



Characterization Scan, 1 GHz to 13 GHz, Vertical

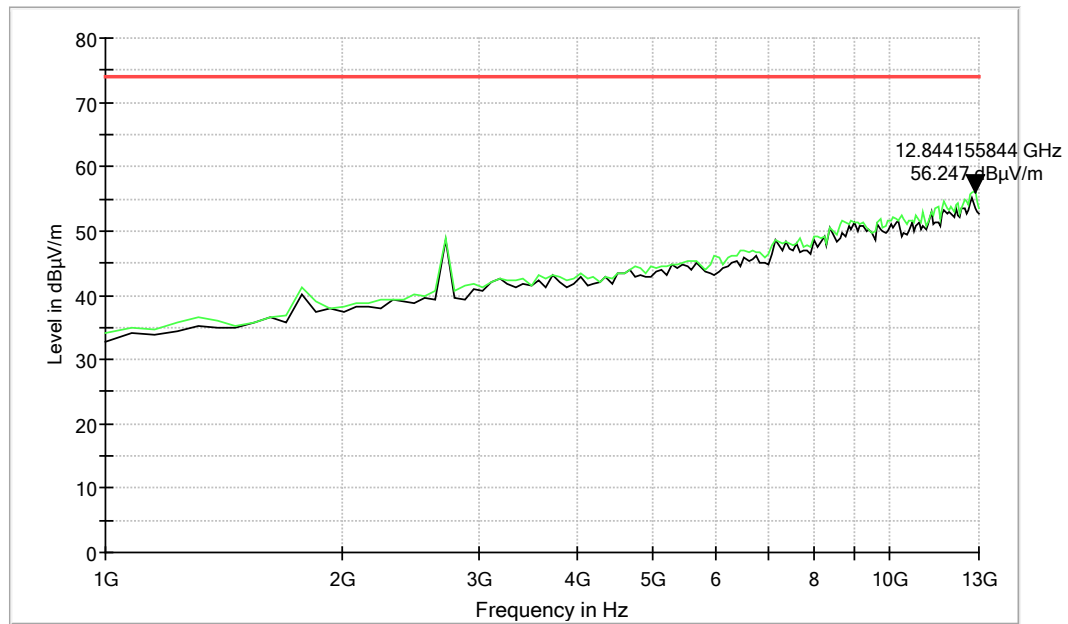


Characterization Scan, 2695 MHz to 2795 MHz, Vertical





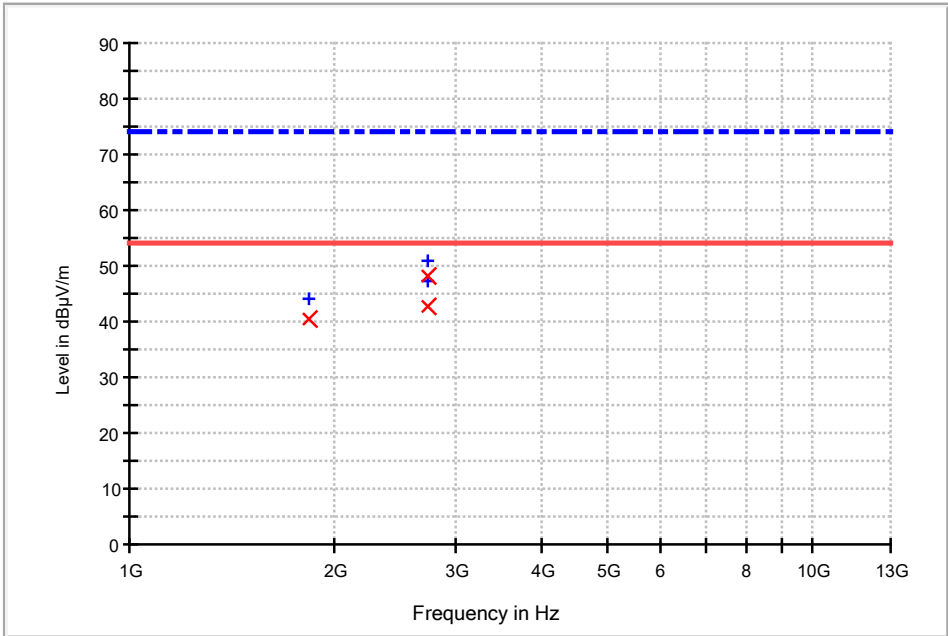
Characterization Scan, 1 GHz to 13 GHz, Horizontal





Measurements, Greater than 1 GHz

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin - AVG (dB)	Limit - AVG (dBµV/m)
1830.000000	44.2	40.5	1000.0	1000.000	175.0	H	240.0	4.3	13.5	54.0
2745.000000	47.1	42.8	1000.0	1000.000	175.0	H	240.0	7.5	11.2	54.0
2745.000000	51.0	48.2	1000.0	1000.000	193.0	V	258.0	7.5	5.9	54.0





9 PHOTOGRAPHS – TEST SETUPS

Radio Sample



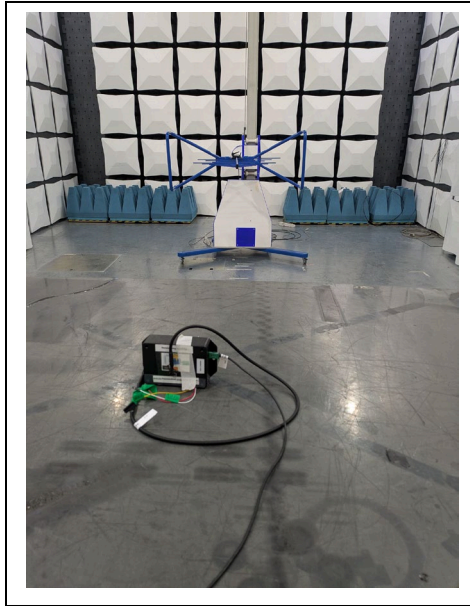


**Occupied Bandwidth, Field Strength of Emissions;
Radiated Spurious Emissions, 30 MHz to 1000 MHz**



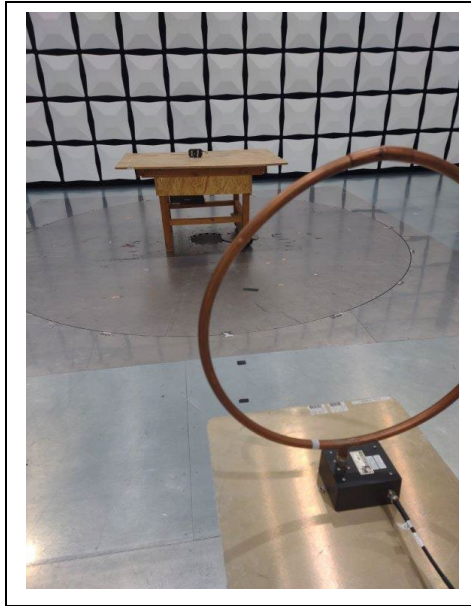


Field Strength, Band Edge (testing conducted Apr. 3, 2025)





Radiated Spurious Emissions, Less Than 30 MHz



Radiated Spurious, 1 GHz to 13 GHz

