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United States of America
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CERTIFICATION TEST REPORT

Manufacturer:	**Bargetender, LLC** **301 Rylane** **Jackson, Missouri 63755 USA**
Applicant:	**Same As Above**
Product Name:	**Bargetender BT-ADS (1.x)**
Product Description:	The BT-ADS is comprised of two or more sensors plus a gateway device to collect/aggregate sensor data and relay to a BLE-capable device. The system reports real-time freeboard/draft.
Model(s):	**BT-ADS**
FCC ID:	**2A26D-159184**
Testing Commenced:	2021-08-19
Testing Ended:	2022-02-09
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 15.247**
- **FCC15.207 - Conducted Limits**
- **FCC Part 15.31(e)**
- **ANSI C63.10:2013**

Evaluation Conducted by:

Julius Chiller, EMC/Wireless Engineer

Report Reviewed by:

Ken Littell, Vice President of EMC

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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 of DTS operating under Section 15.247 and in KDB558074. 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. Note: Only measurements listed below which relate to tests included in this Test Report are applicable to it.

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

This Uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

1.4 Document History

Document Number	Description	Issue Date	Approved By
F2P26088-01E	First Issue	2022-02-09	K. Littell

2 SUMMARY OF TEST RESULTS

Test Name	Standard(s)	Results
Occupied Bandwidth	CFR 47 Part 15.247(a)(2) / KDB558074	Complies
Conducted Output Power	CFR 47 Part 15.247(b)(3) / KDB558074	Complies
Voltage Variations	CFR 47 Part 15.31(e)	Complies
Conducted Spurious Emissions	CFR 47 Part 15.247(d) / Part 15.207 / KDB558074	Complies
Radiated Spurious Emission with 1.2dBi Integral Antenna	CFR 47 Part 15.247(d) / Part 15.209 / KDB558074	Complies
Peak Power Spectral Density	CFR 47 Part 15.247(e) / KDB558074	Complies
Conducted Emissions	CFR 47 Part 15.207(a)	Complies

Modifications Made to the Equipment
None

3 TABLE OF MEASURED RESULTS

Test		High Channel 2.402 GHz	Mid Channel 2.440 GHz	Low Channel 2.480 GHz
Conducted Output Power		1.11mW / 0.45dBm	1.08mW / 0.32dBm	1.02mW 0.10dBm
Conducted Output Power Limit		1 Watt, (30dBm)	1 Watt, (30dBm)	1 Watt, (30dBm)
E.I.R.P.		2.79mW / 4.45dBm	2.70mW / 4.32dBm	2.57mW / 4.10dBm
E.I.R.P. Limit		4 Watts / 36.02dBm	4 Watts, 36.02dBm	4 Watts, 36.02dBm
Peak Power Spectral Density		-8.30 dBm	-11.41 dBm	-9.63 dBm
Peak Power Spectral Density Limit		8 dBm	8 dBm	8 dBm
-6dB Occupied Bandwidth		0.682 MHz	0.706 MHz	0.696 MHz
-6dB Occupied Bandwidth Limit		≥ 500KHz	≥ 500KHz	≥ 500KHz
Voltage Variations	-15%	1.05mW / 0.21dBm	1.03mW / 0.14dBm	1.01mW / 0.03dBm
	+15%	1.16mW / 0.63dBm	1.11mW / 0.46dBm	1.01mW / 0.03dBm
Limit		1W / 30dBm	1W / 30dBm	1W / 30dBm

Test		Low Channel 908.1 MHz	Mid Channel 915.3 MHz	High Channel 923.4 MHz
-6dB Occupied Bandwidth		0.538 MHz	0.544 MHz	0.541 MHz
Limit		>500kHz	>500kHz	>500kHz
Conducted Output Power		15.85mW / 12.0dBm	15.35mW / 11.86dBm	14.69mW / 11.67dBm
Limit		1W / 30dBm	1W / 30dBm	1W / 30dBm
E.I.R.P.		19.95mW / 13.0dBm	19.32mW / 12.86dBm	18.49mW / 12.67dBm
Limit		4W	4W	4W
Peak Power Spectral Density		1.24 dBm	1.87 dBm	1.90 dBm
Peak Power Spectral Density Limit		8 dBm	8 dBm	8 dBm
Voltage Variations	-15%	14.72mW / 11.68dBm	14.29mW / 11.55dBm	14.03mW / 11.47dBm
	+15%	17.58mW / 12.45dBm	16.83mW / 12.26dBm	16.18mW / 12.09dBm
Limit		1W / 30dBm	1W / 30dBm	1W / 30dBm

***To meet the requirements of 15.31, voltage was varied by ±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 Bargetender, LLC to provide documentation for the testing described herein. This equipment has been tested and found to comply with Part 15.247 of the FCC Rules using ANSI C63.10:2013 and KDB558074 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: Multi-Input Freeboard Device
Model: **BT-ADS**
Serial No.: None Specified
FCC ID: **2A26D-159184**

5.2 Trade Name:

Bargetender, LLC

5.3 Power Supply:

USB Charger; 4.2V Lithium Battery

5.4 Applicable Rules:

CFR 47, Part 15.247, subpart C

5.5 Equipment Category:

Radio Transmitter-DTS

5.6 Antenna:

900 MHz, 1dBi; 2.4 GHz, 4dBi

5.7 Accessories:

N/A

5.8 Test Item Condition:

The equipment to be tested was received in good condition.

5.9 Testing Algorithm:

EUT has one radio chip operating in the 902-920 MHz and 2.4 GHz BLE bands. Measurements were made on the low-mid and high channels in use in each band. The highest emissions were recorded in the data tables.

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	2022-03-09
Temp/Hum. Recorder	CL232	Extech	445814	01	2022-03-04
Receiver	CL151	Rohde & Schwarz	ESU40	100319	2022-07-08
Pre-amplifier	CL153	Keysight Tech.	83006A	MY39500791	2022-02-12
Low Loss Cable Set	--	Pasternack	PE3C0666-252 / PE3C066-50CM	None Spec.	2023-10-12
Pre-Amplifier	CL285	Com-Power	PAM-0207	322	2022-07-08
Antenna, JB3 Combination	CL175	Sunol Sciences	JB3	A030315	2022-09-14
Horn Antenna	CL098	Emco	3115	9809-5580	2023-01-26
Active 18” Loop Antenna	CL163-Loop	AH Systems, Inc.	EHA-52B	100	2022-09-14
Horn Antenna	CL114	AH Systems, Inc.	SAS-572	237	2023-07-30
Software:	Tile Version 3.4.B.3		Software Verified: 2021-08-19 to 2021-08-23		
Software:	EMC 32, Version 8.53.0		Software Verified: 2021-08-19 to 2021-08-23		
Spectrum Analyzer	0204	Hewlett Packard	HP8591A	3149A02546	2022-02-04
Software:	EMC Analyzer 85712D Rev. A.00.01			Date Verified:	2021-08-23
Transient Limiter	0202	Hewlett Packard	11947A	3107A00729	2022-02-04
LISN	CL181	Com-Power	LI-125A	191226	2023-12-01
LISN	CL182	Com-Power	LI-125A	191225	2023-12-01
Receiver	CL204	Rohde & Schwarz	ESR7	101714	2022-07-07

7 FCC PART 15.247(a)(2) – OCCUPIED BANDWIDTH

7.1 Requirements:

The 6dB bandwidth shall be greater than 500 kHz.

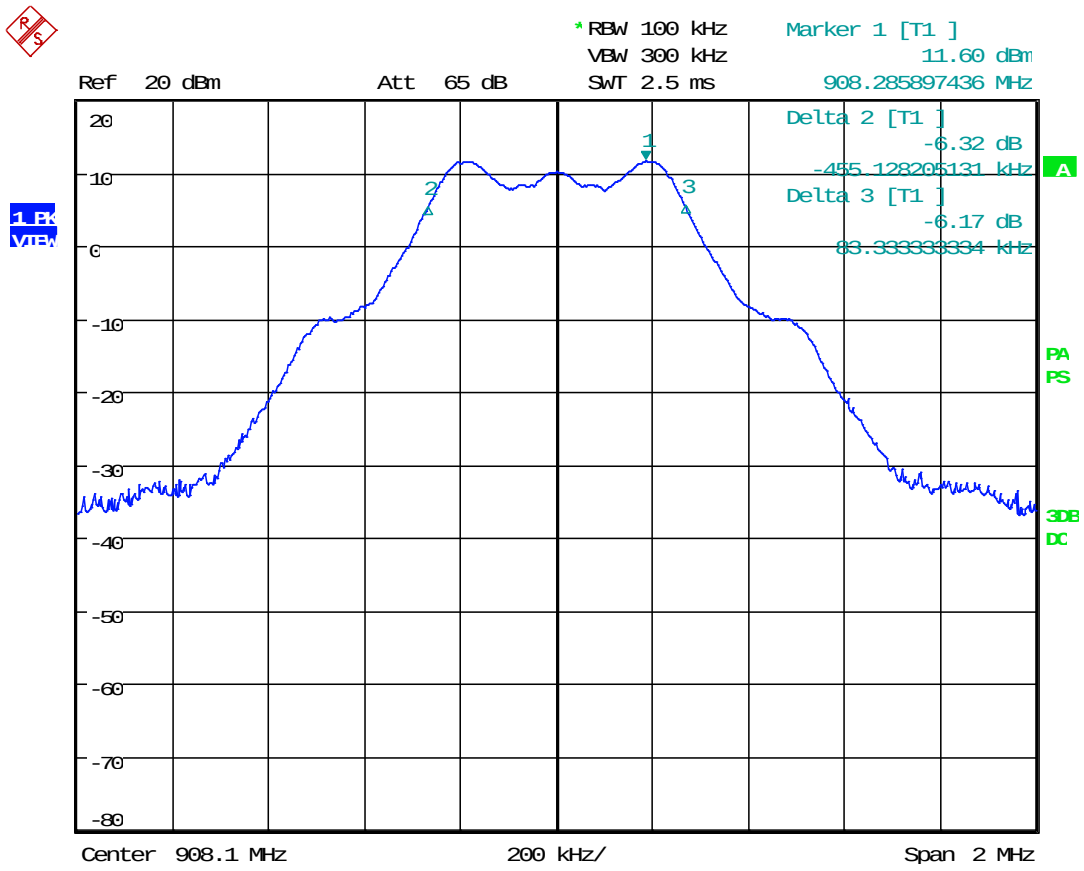
Bandwidth measurements were made at the low, mid and upper frequencies. The bandwidth was measured using the analyzer's marker function.

7.2 Occupied Bandwidth Test Data

Test Date:	2021-08-20	Test Engineer:	J. Chiller
Standards:	CFR 47 Part 15.247(a)(2); KDB558074	Air Temperature:	23.3ºC
		Relative Humidity:	43%

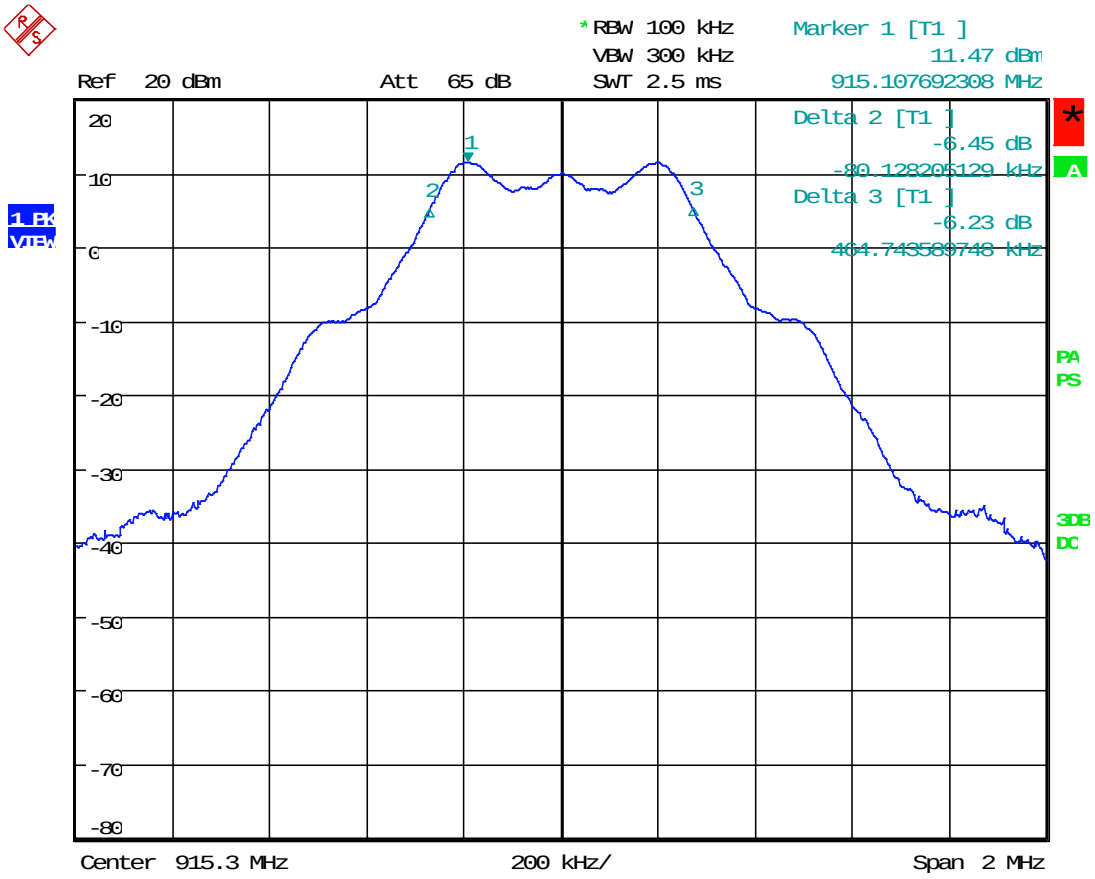
DSSS 240kbps / 195kHz deviation

900 MHz: -6dB, Low Channel



Date: 20.AUG.2021 15:58:07

900 MHz: -6dB, Mid Channel



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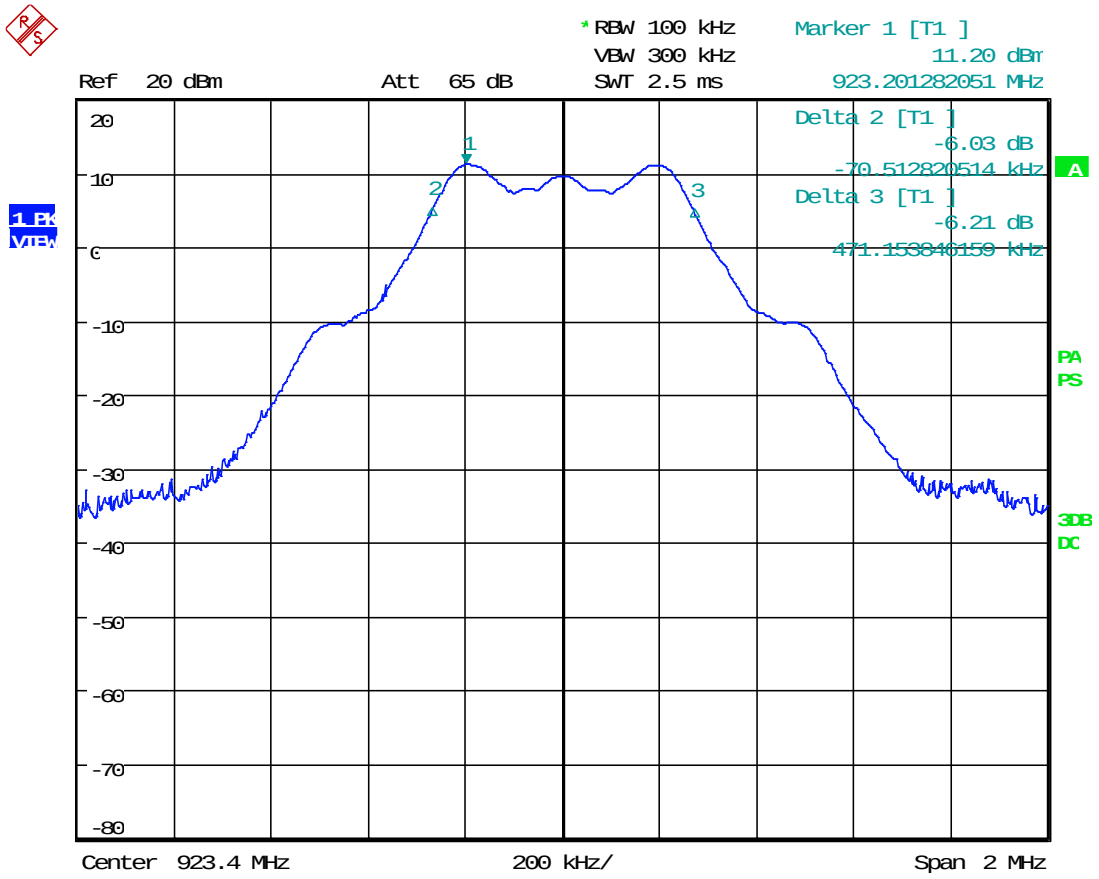
900 MHz: -6dB, High Channel



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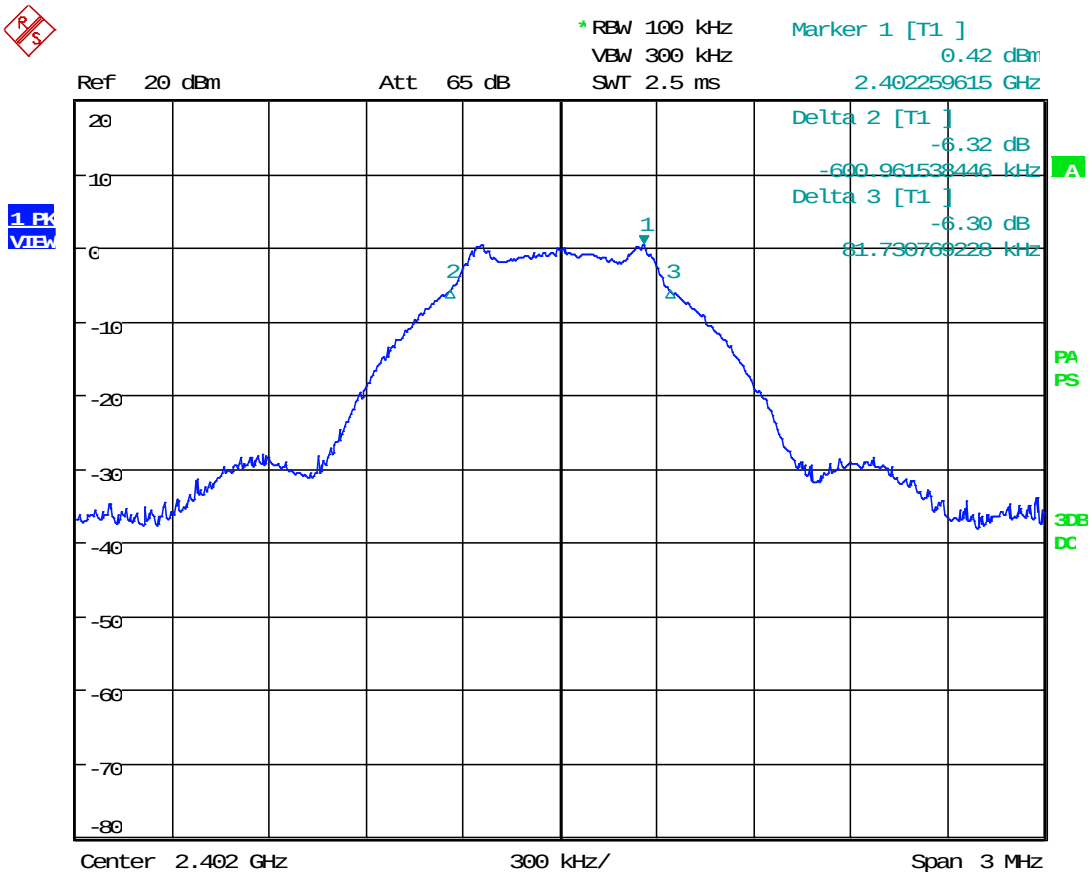
1Mbps LE 1M

BLE: -6dB, Low Channel



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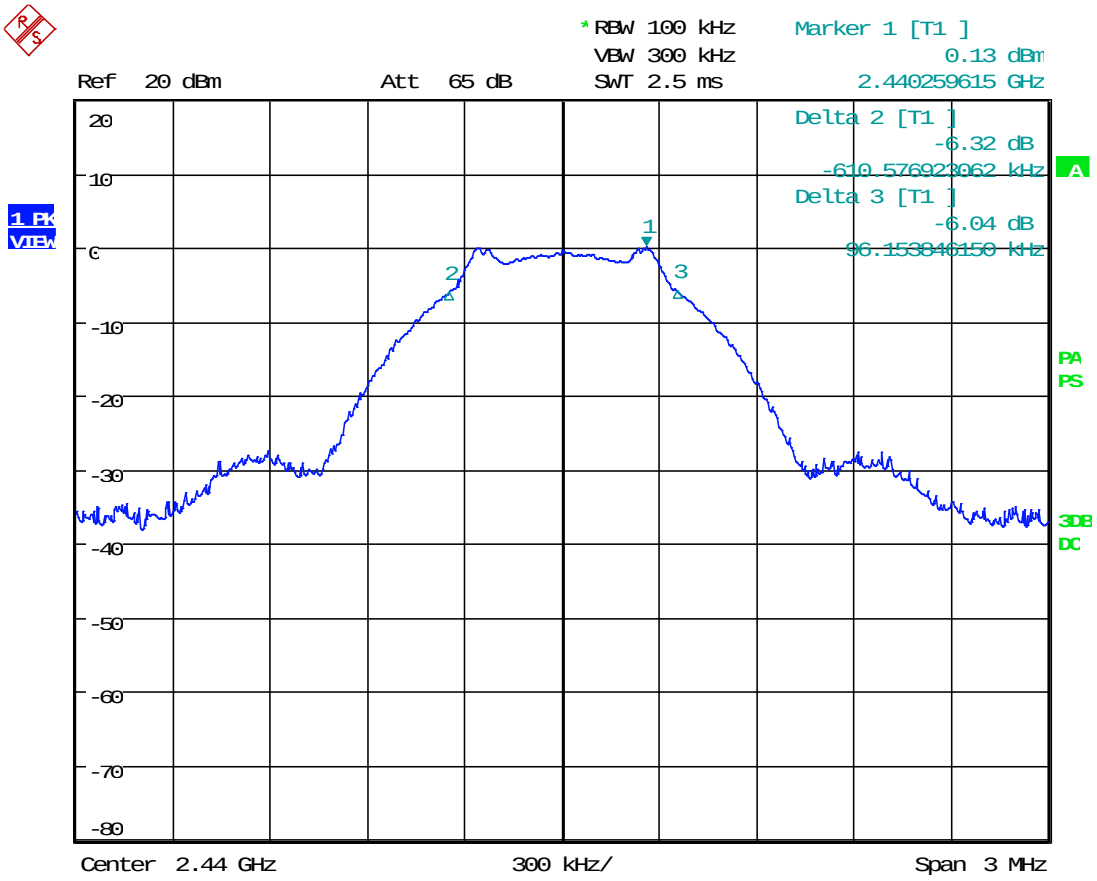
BLE: -6dB, Mid Channel



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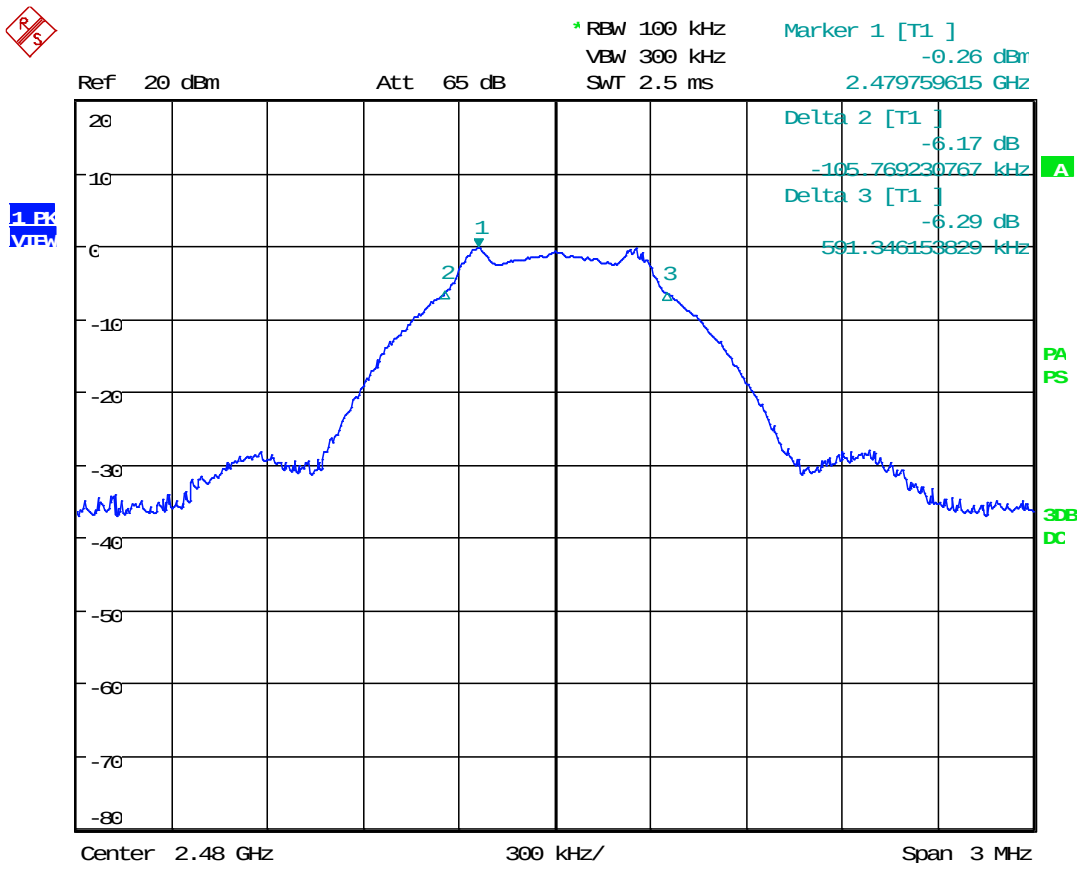
BLE: -6dB, High Channel



Date: 20.AUG.2021 16:13:53

8 FCC PART 15.247(b)(3) – CONDUCTED OUTPUT POWER

The EUT antenna port was fitted with an SMA connector and directly connected to the input of the receiver. The peak power output was measured.

8.1 Requirements:

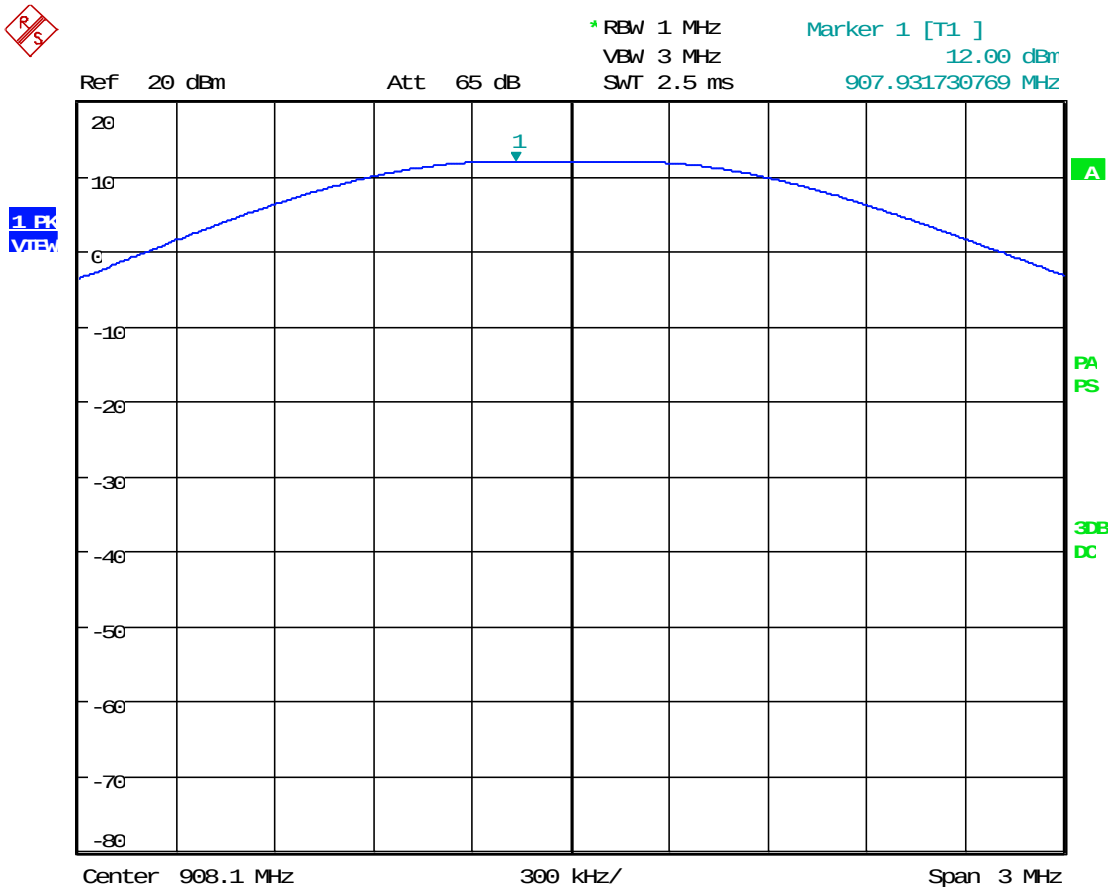
The peak power output shall be 1 watt (30 dBm) or less when using an antenna with a gain of less than 6dBi. For antennas having a gain of more than 6dBi, the limit is reduced by 1dB for every dB the antenna gain is over 6dBi.

8.2 Conducted Output Power Test Data

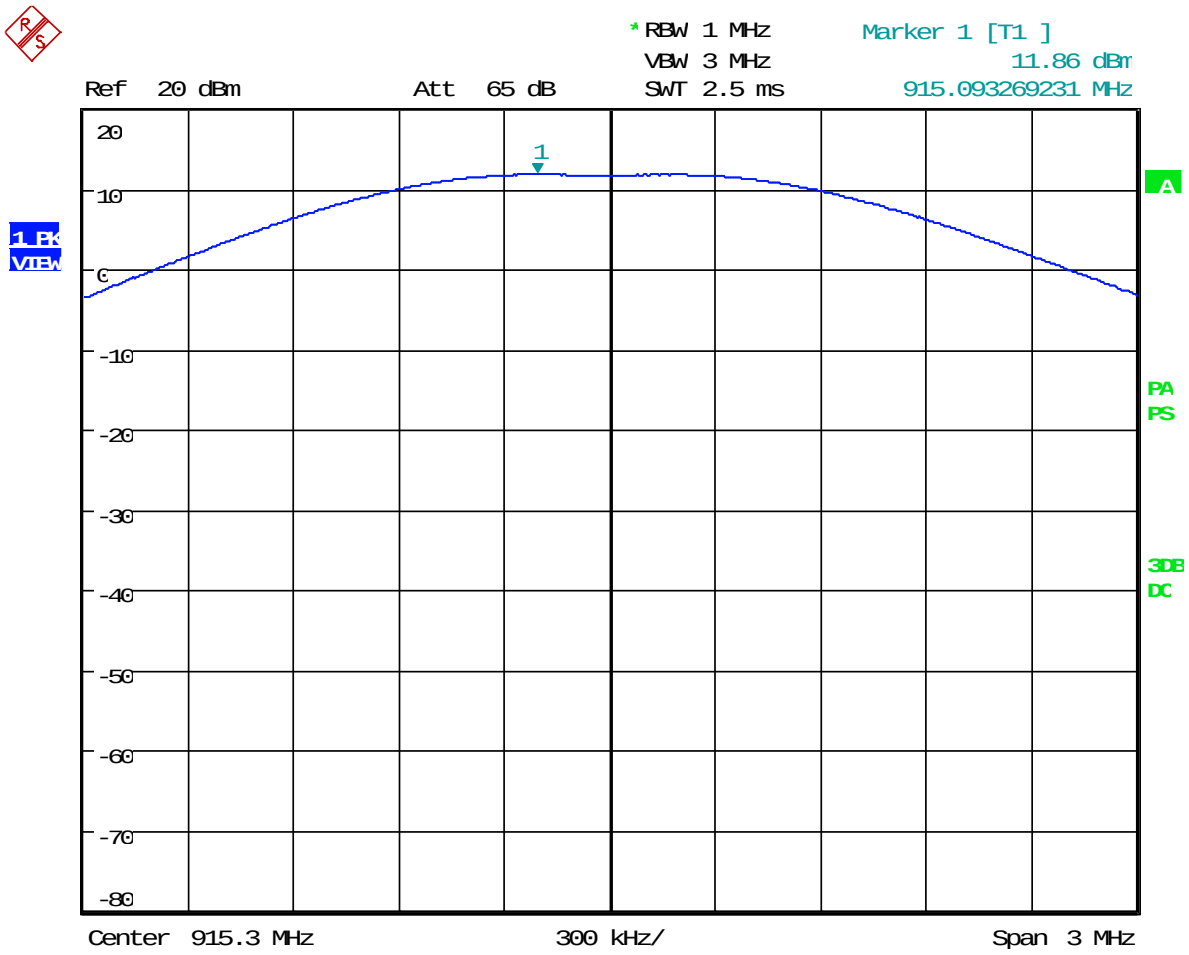
Test Date:	2021-08-20	**Test Engineer:**	J. Chiller
Standards:	CFR 47 Part 15.247(b)(3); KDB558074	**Air Temperature:**	26.0ºC
		Relative Humidity:	39%

DSSS 240kbps

900 MHz: Low Channel



900 MHz: Mid Channel



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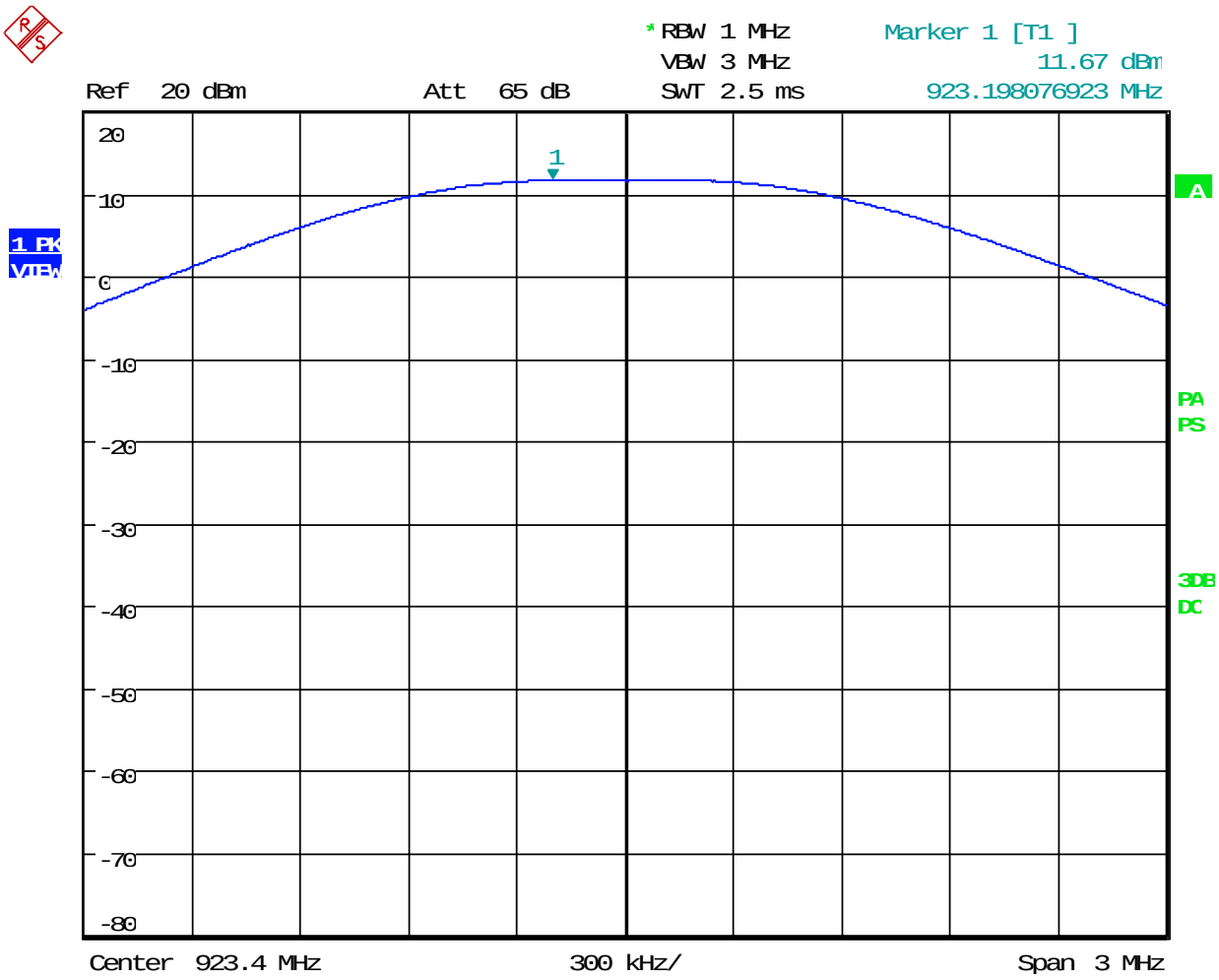
900 MHz: High Channel



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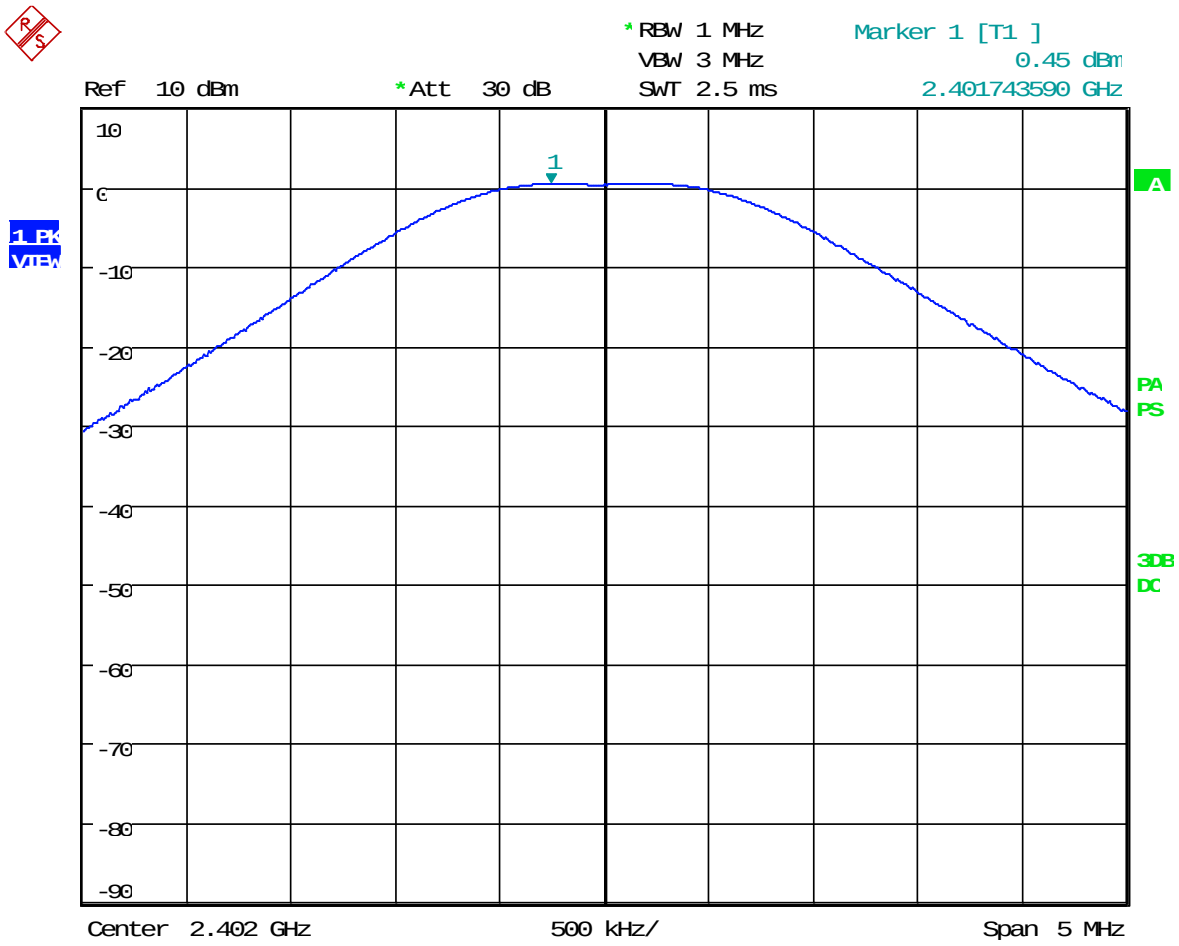
1Mbps LE 1M

BLE: Low Channel



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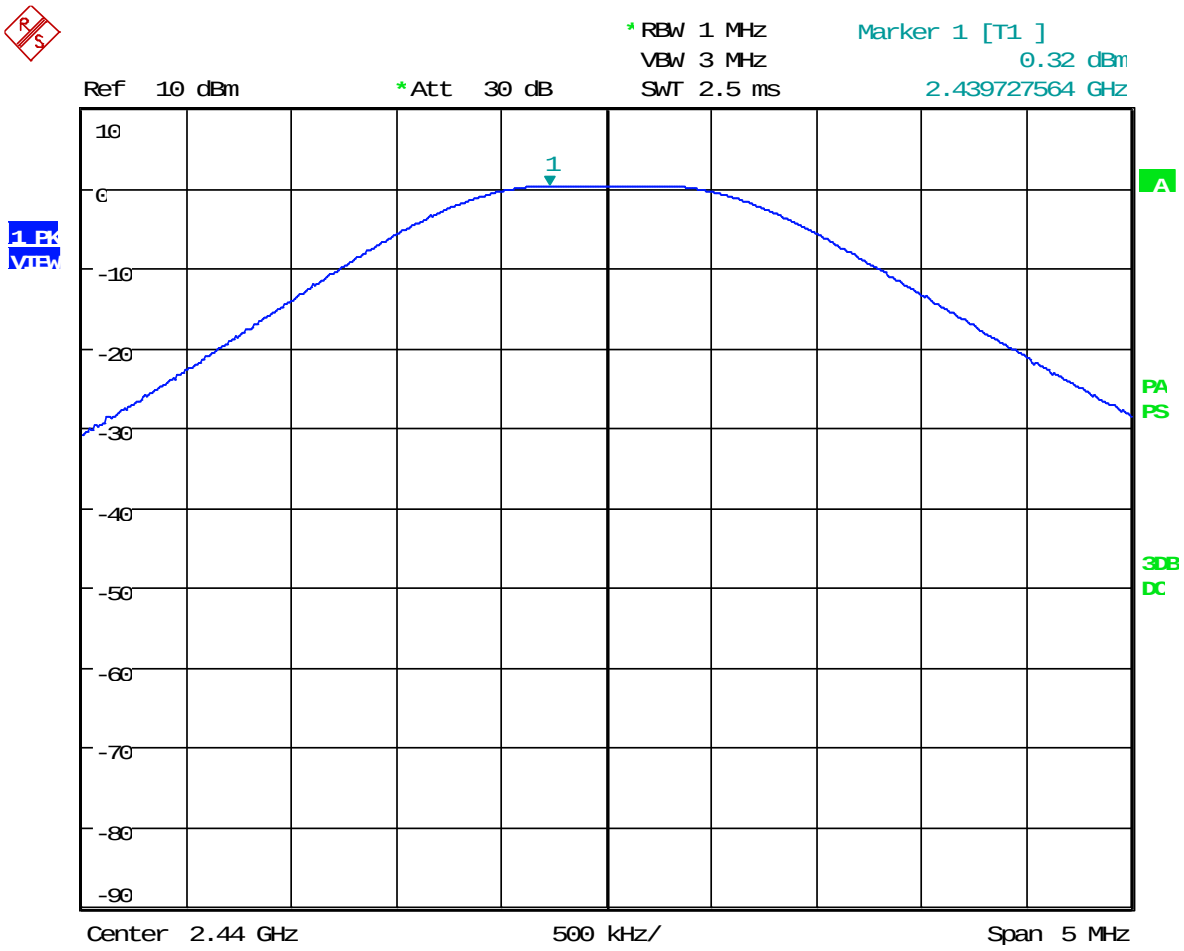
BLE: Mid Channel



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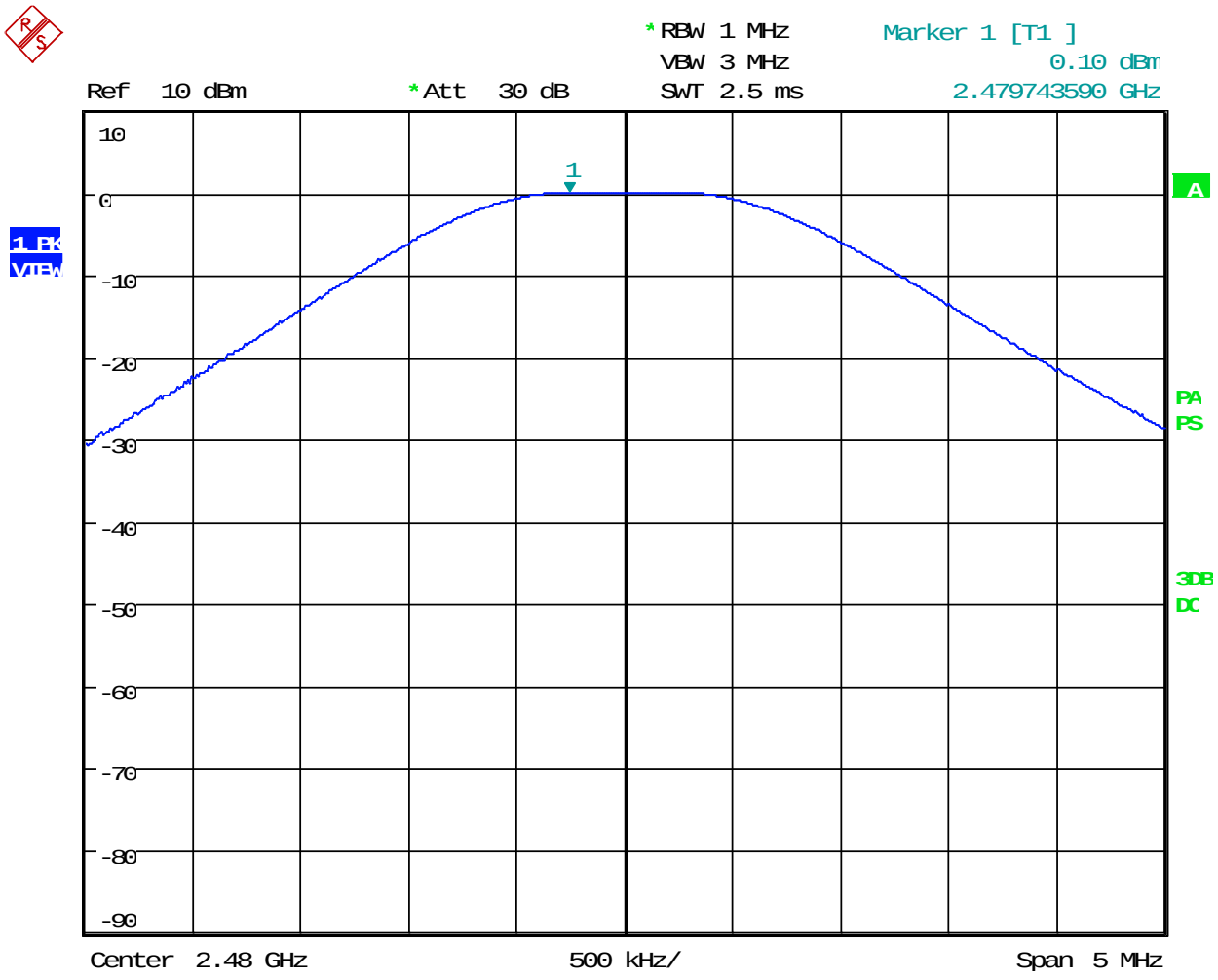
BLE: High Channel



Date: 20.AUG.2021 16:27:44

9 FCC PART 15.31(e) – VOLTAGE VARIATIONS

9.1 Requirements

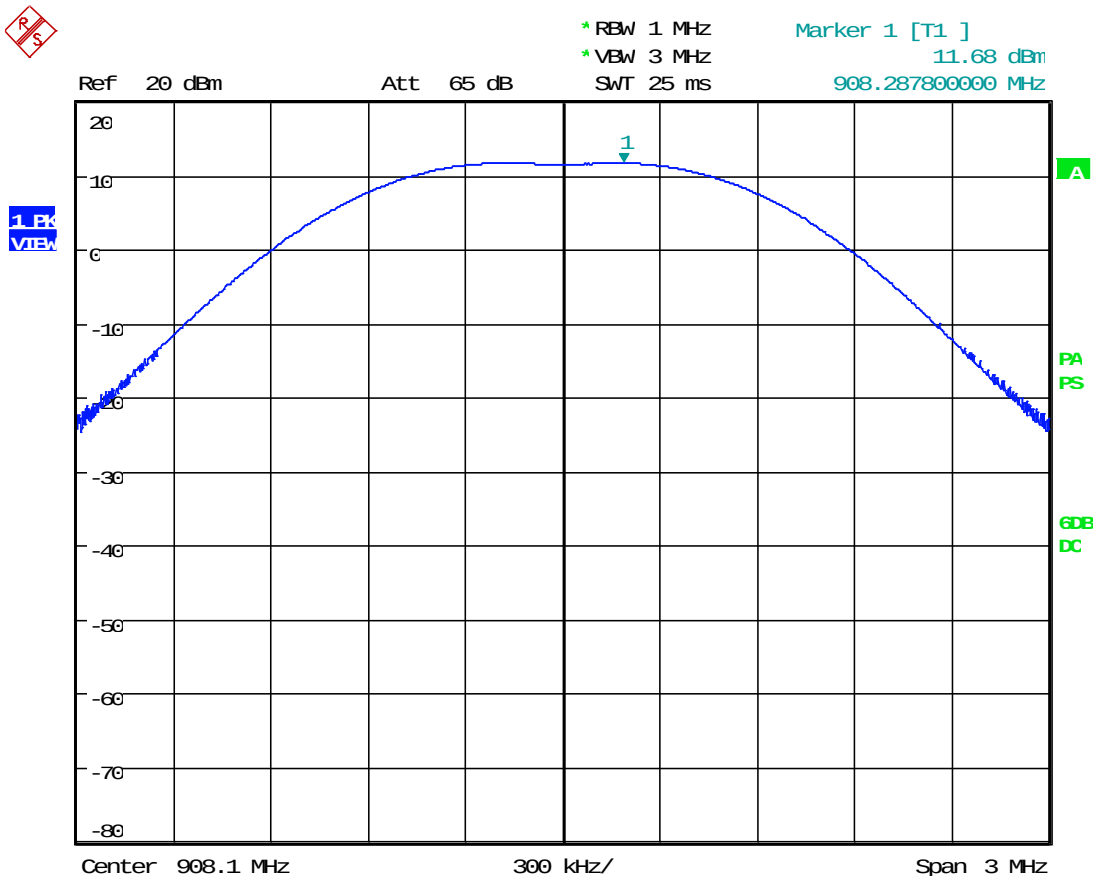
For intentional radiators, measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, shall be performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage. For battery-operated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

9.2 Voltage Variations Test Data

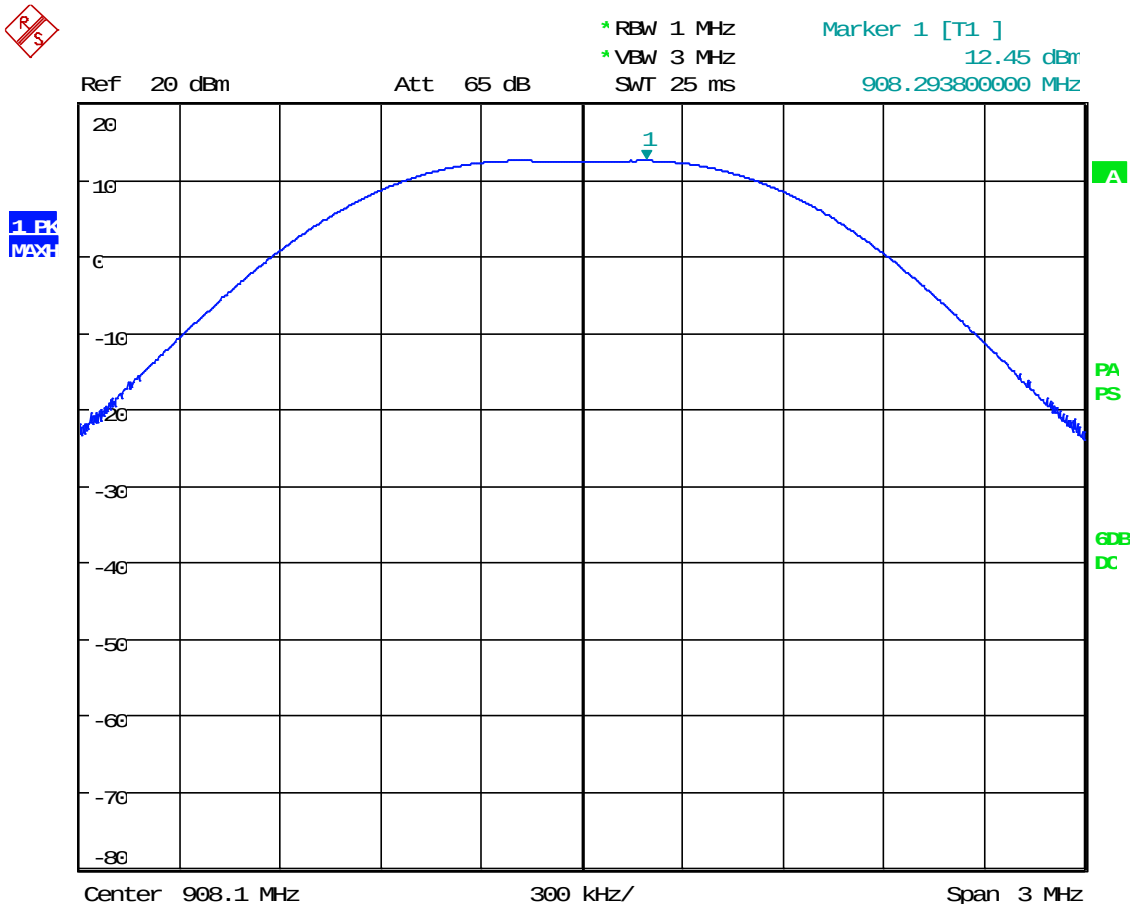
Test Date(s):	2021-08-23	**Test Engineer:**	J. Chiller
Rule:	15.31(e)	**Air Temperature:**	24.4º C
Test Results:	Complies	**Relative Humidity:**	42%

Nominal Voltage: 4.2VDC

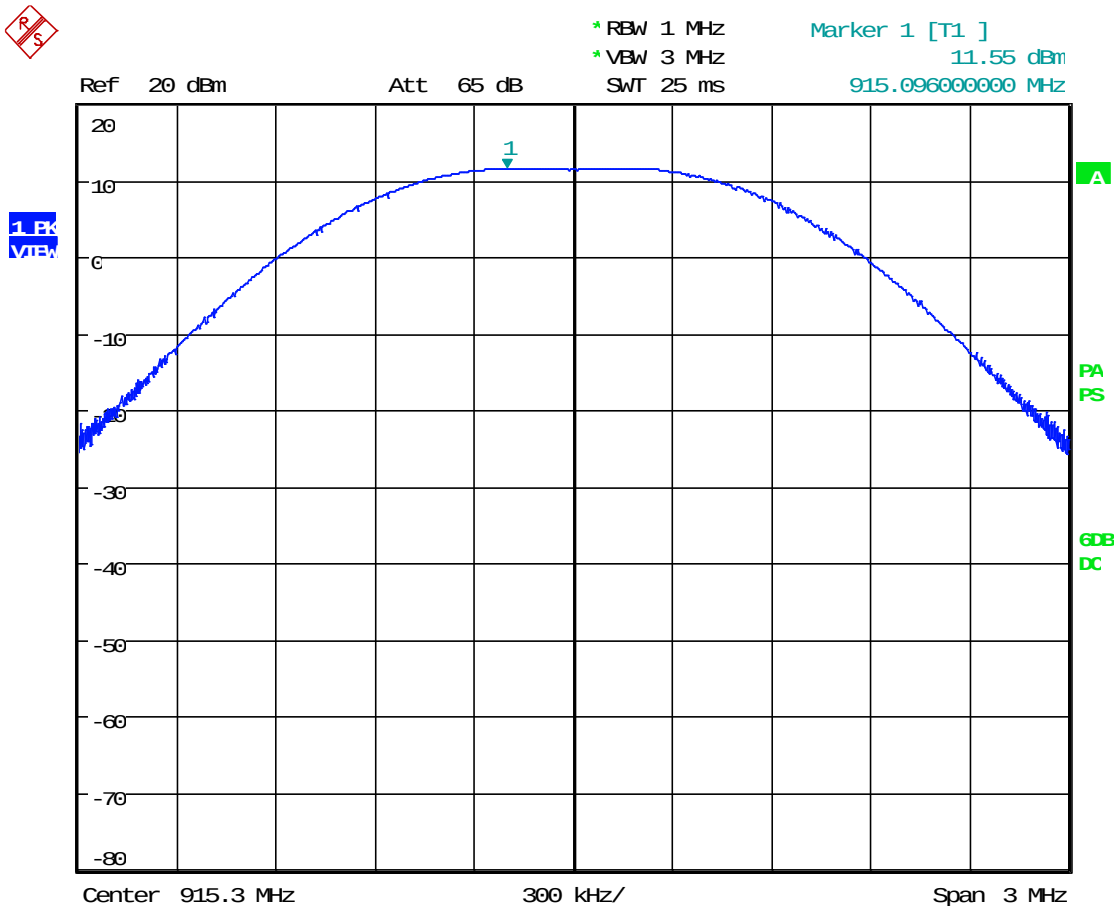
900 MHz, -15%: Low Channel



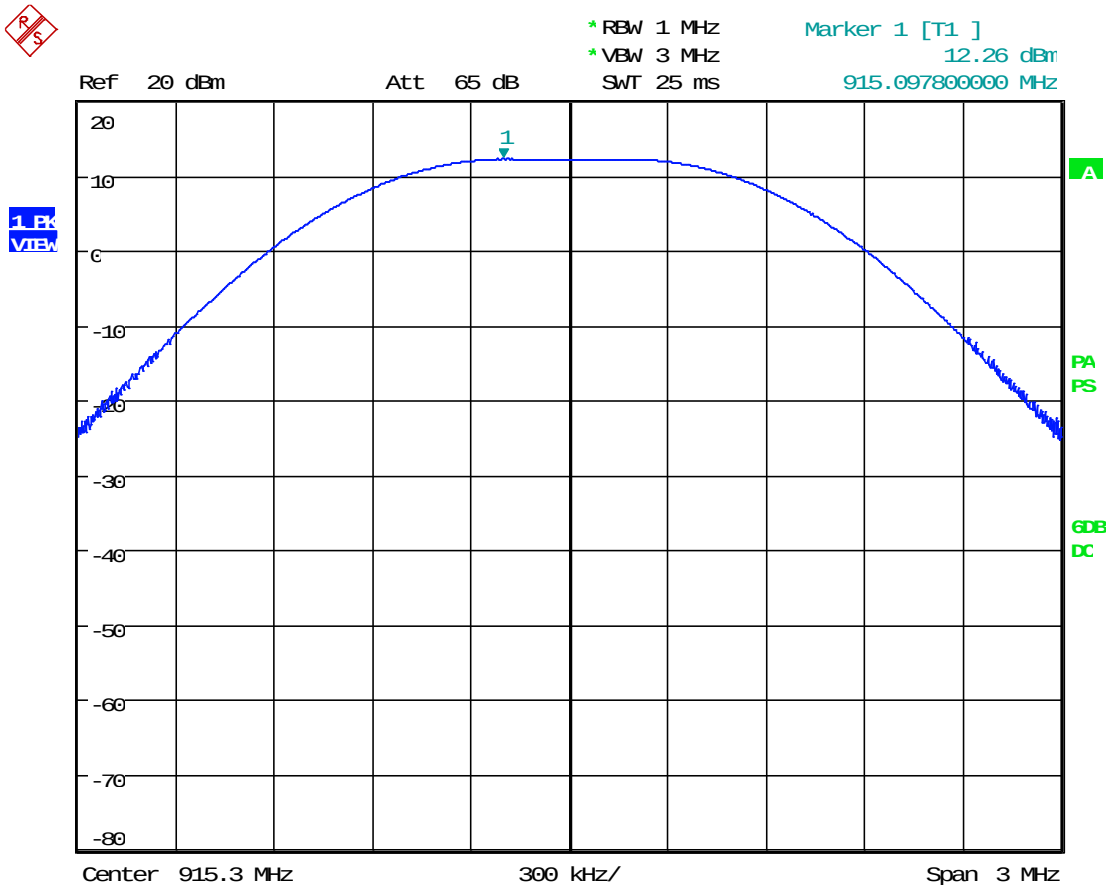
900 MHz, +15%: Low Channel



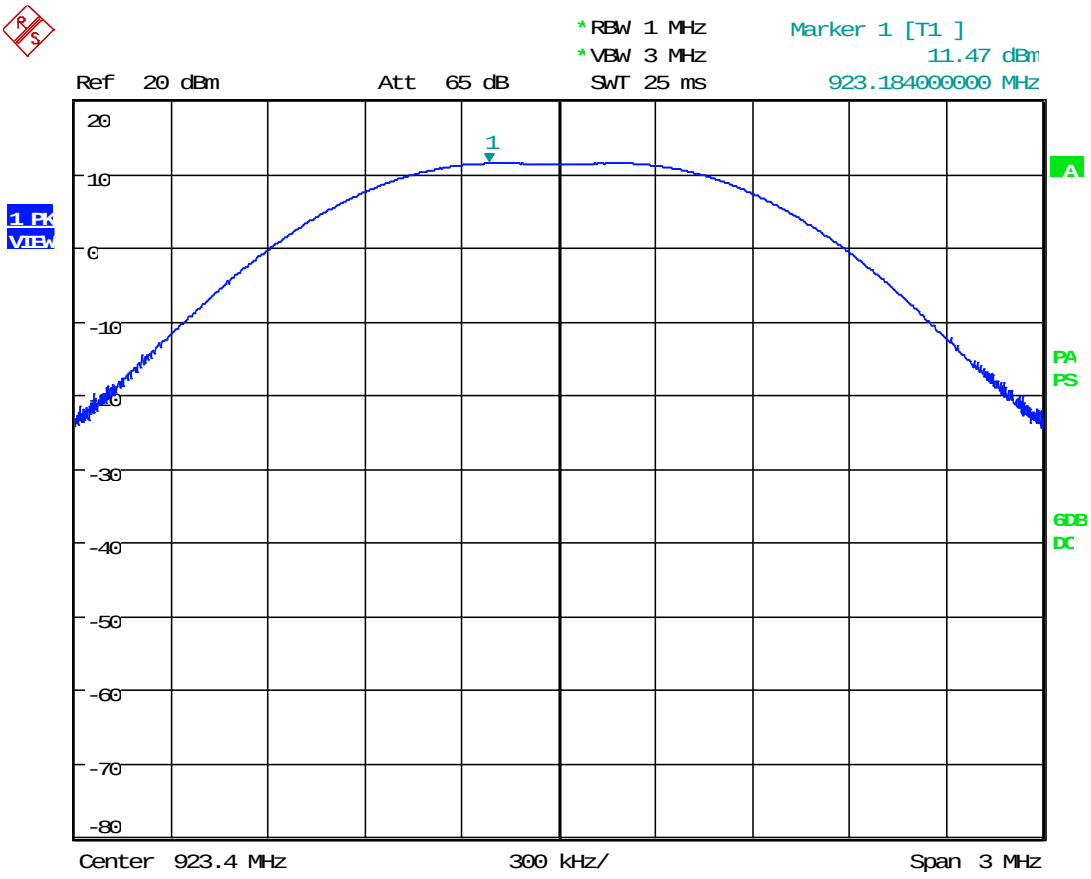
900 MHz, -15%: Mid Channel



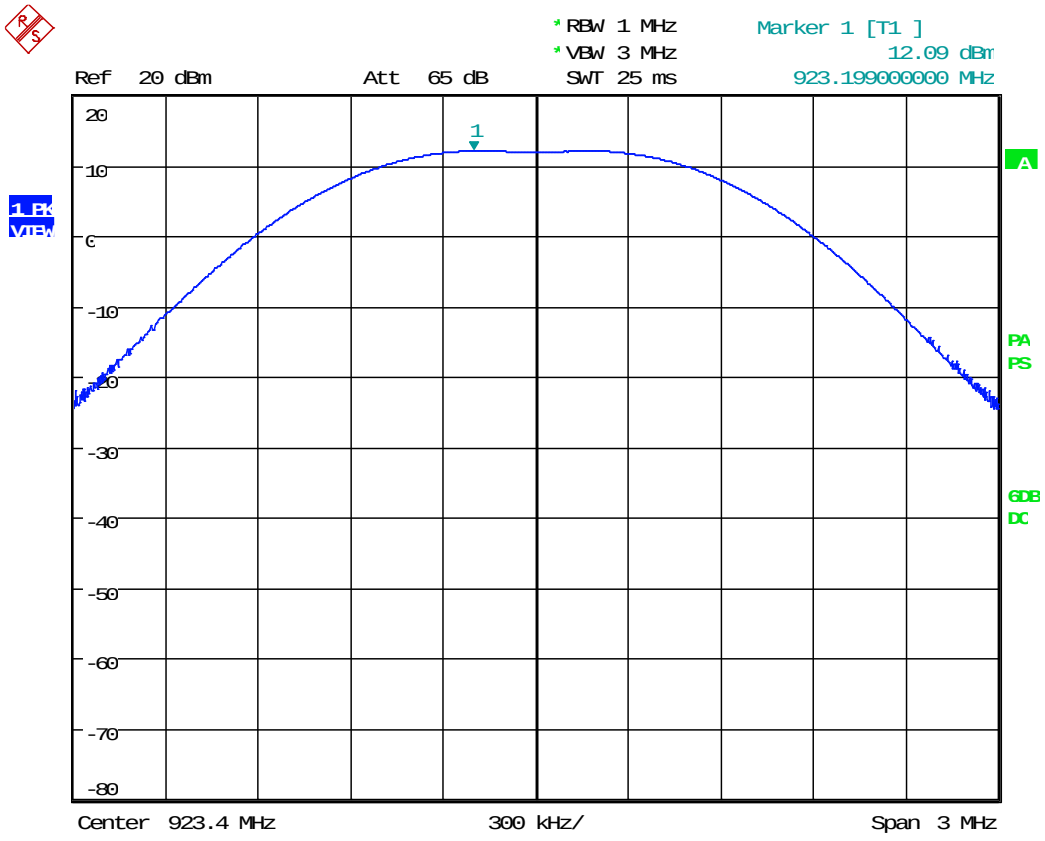
900 MHz, +15%: Mid Channel



900 MHz, -15%: High Channel



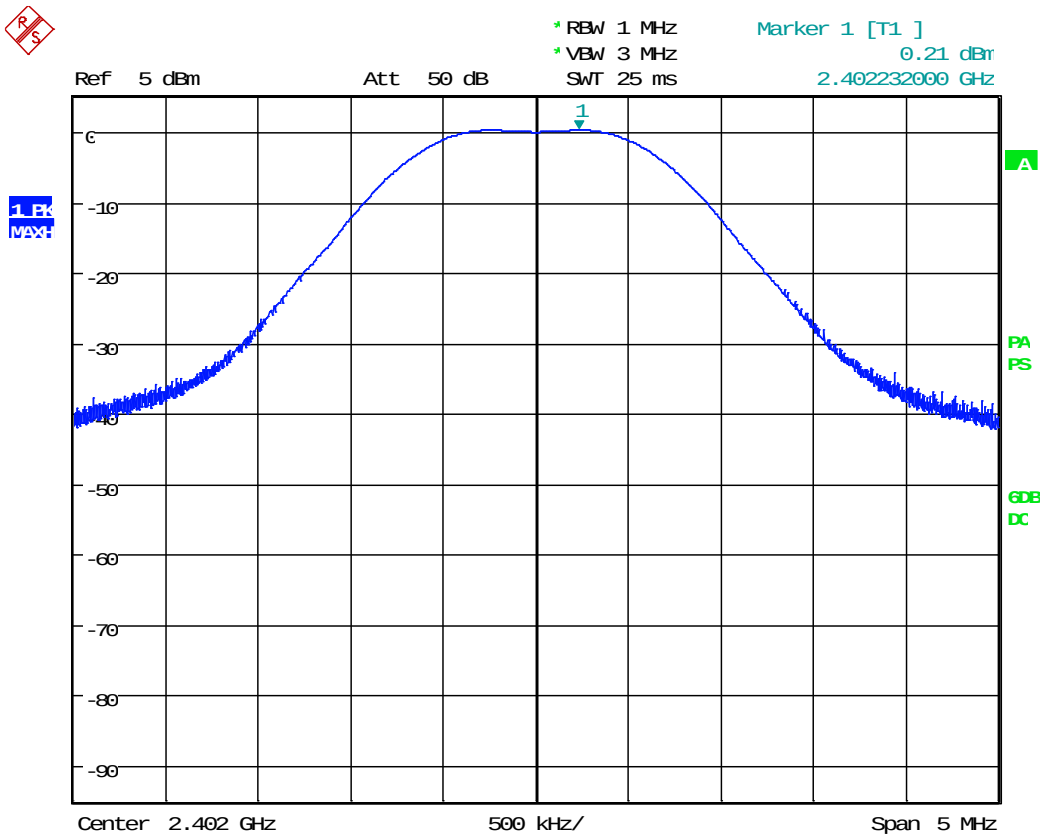
900 MHz, +15%: High Channel



Date: 23.AUG.2021 12:15:41

Test Date(s):	2021-08-23	Test Engineer:	J. Chiller
Rule:	15.31(e)	Air Temperature:	24.4º C
Test Results:	Complies	Relative Humidity:	41%

BLE, -15%: Low Channel



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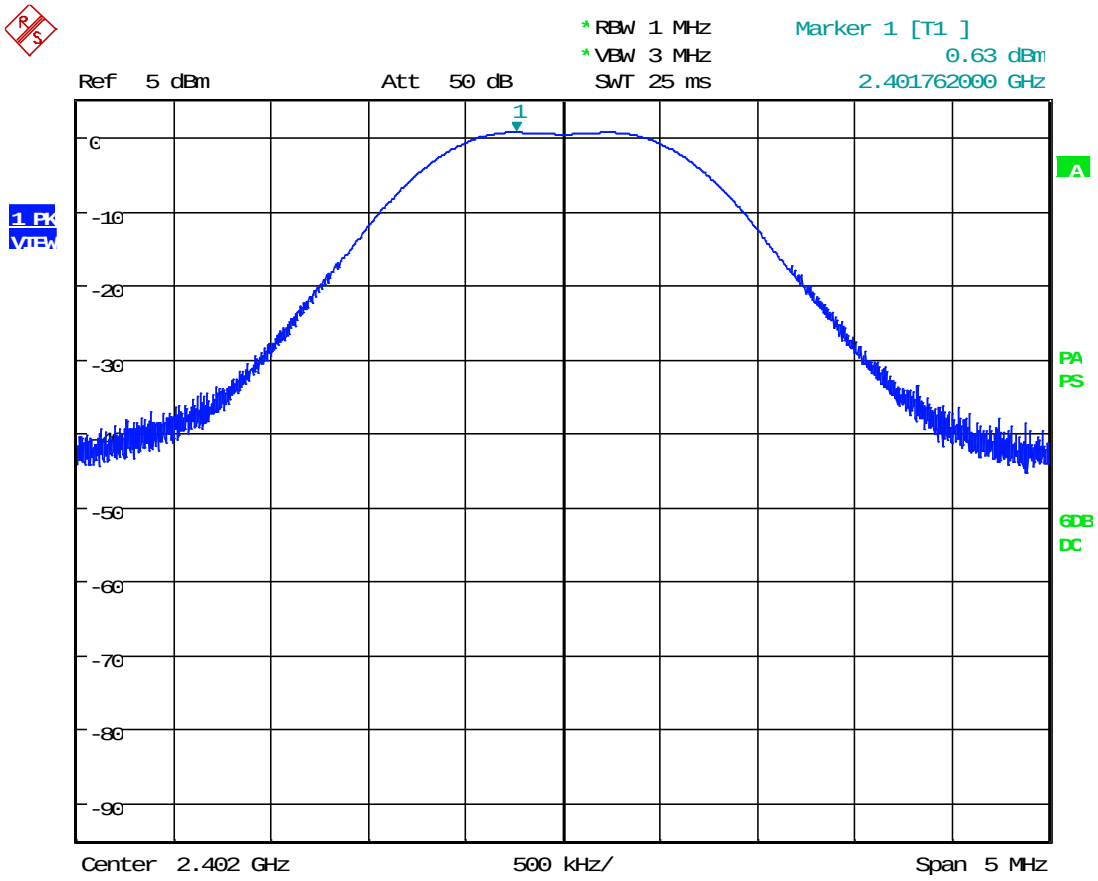
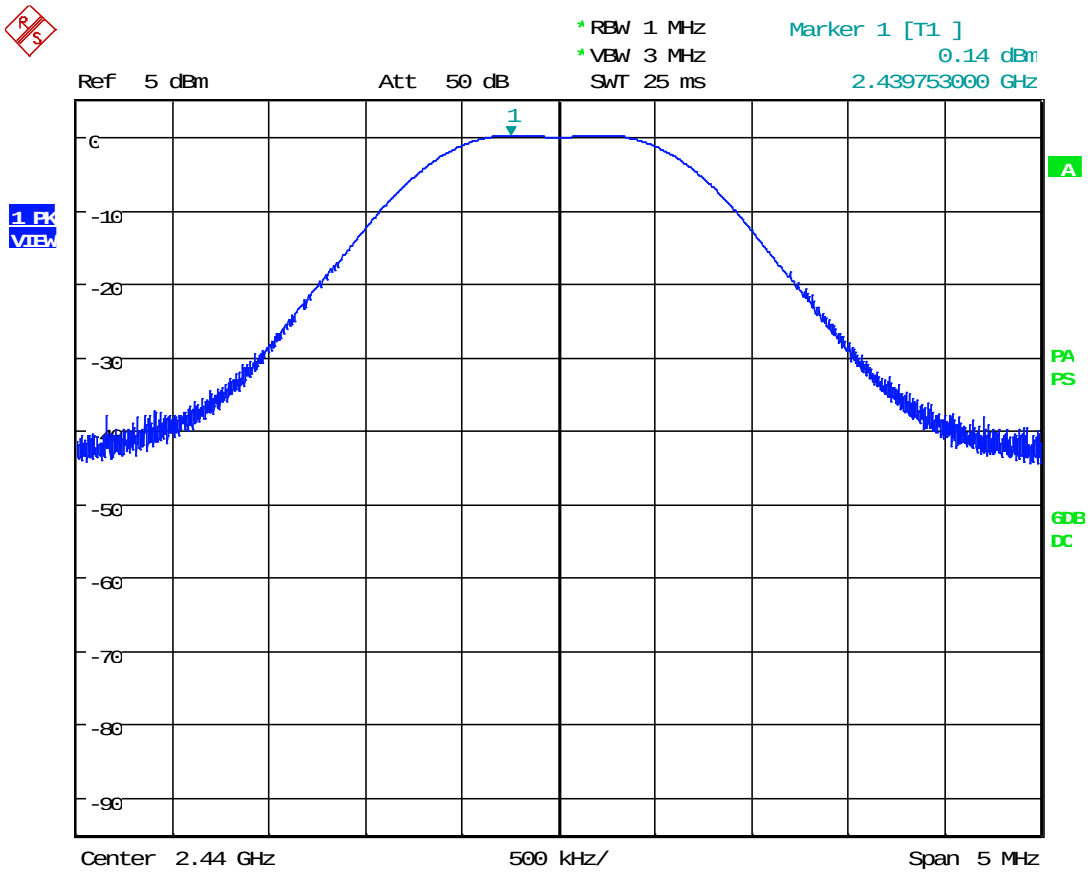
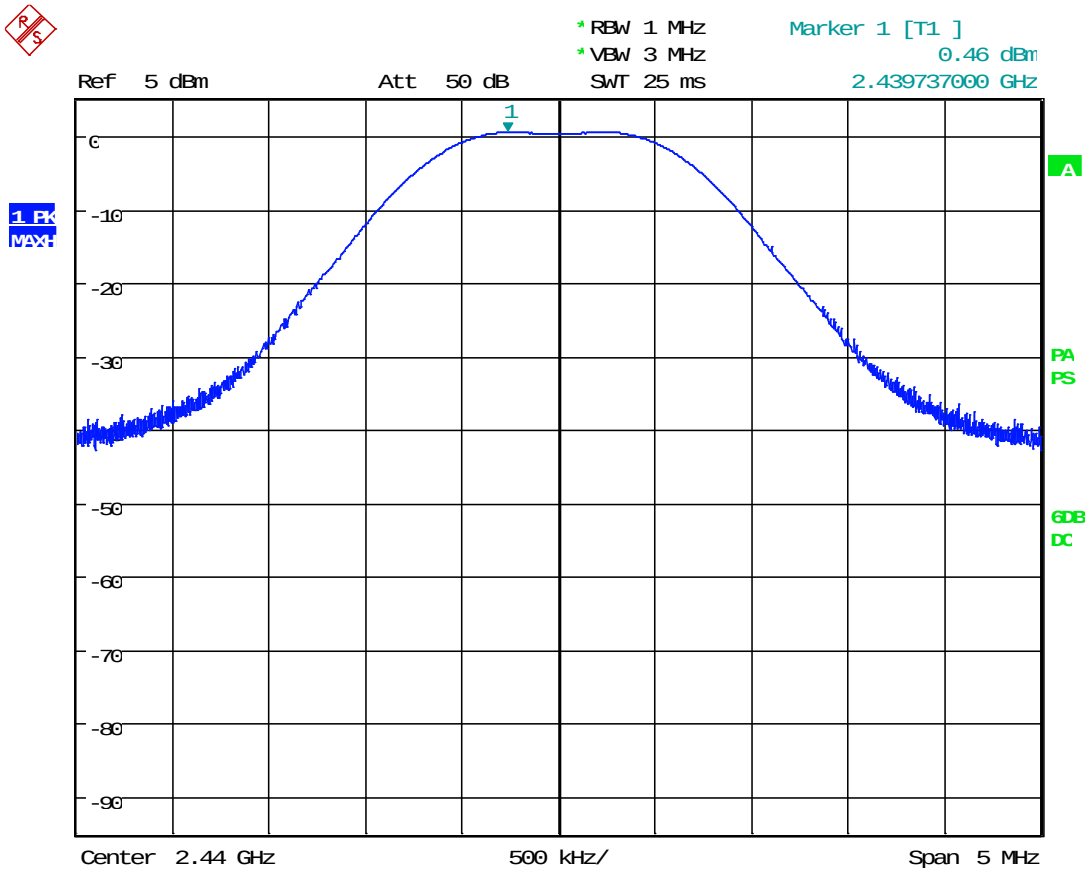
BLE, +15%: Low Channel



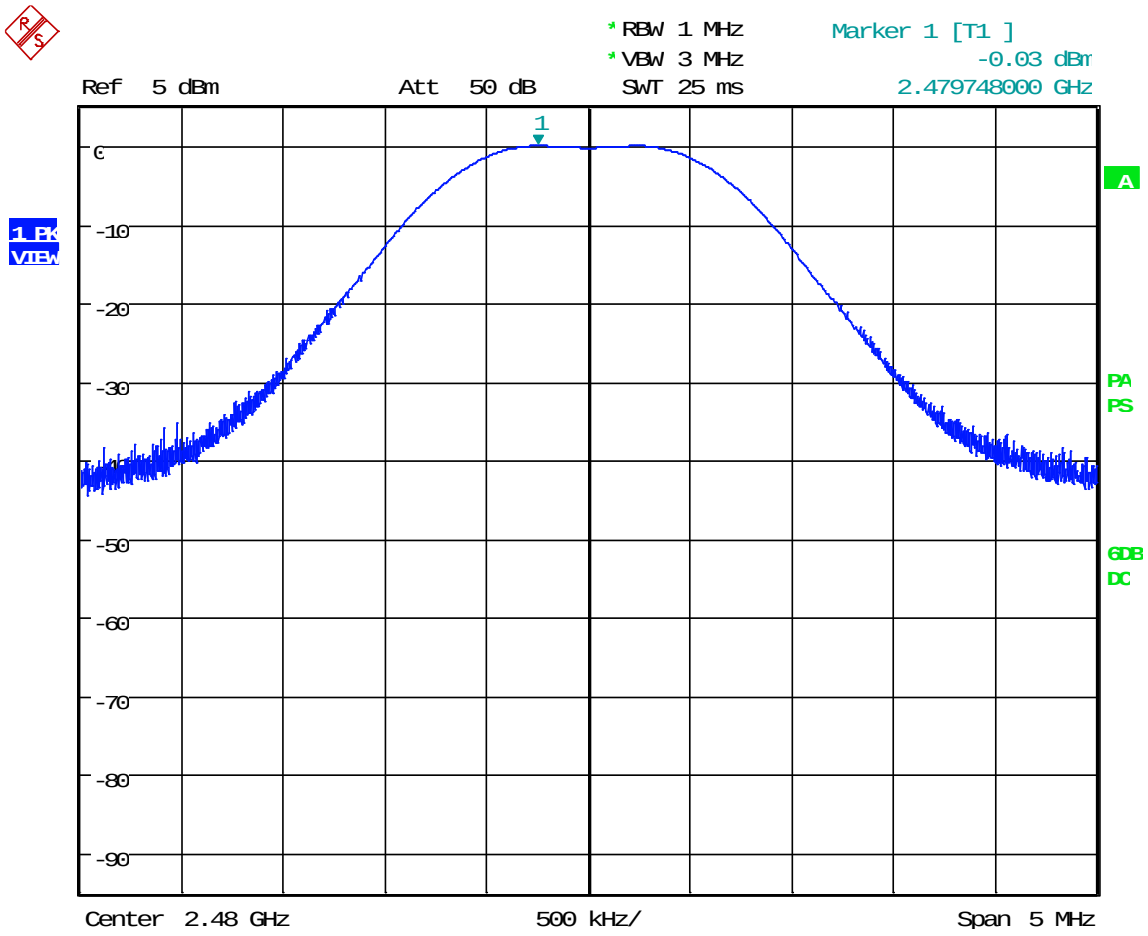
BLE, -15%: Mid Channel



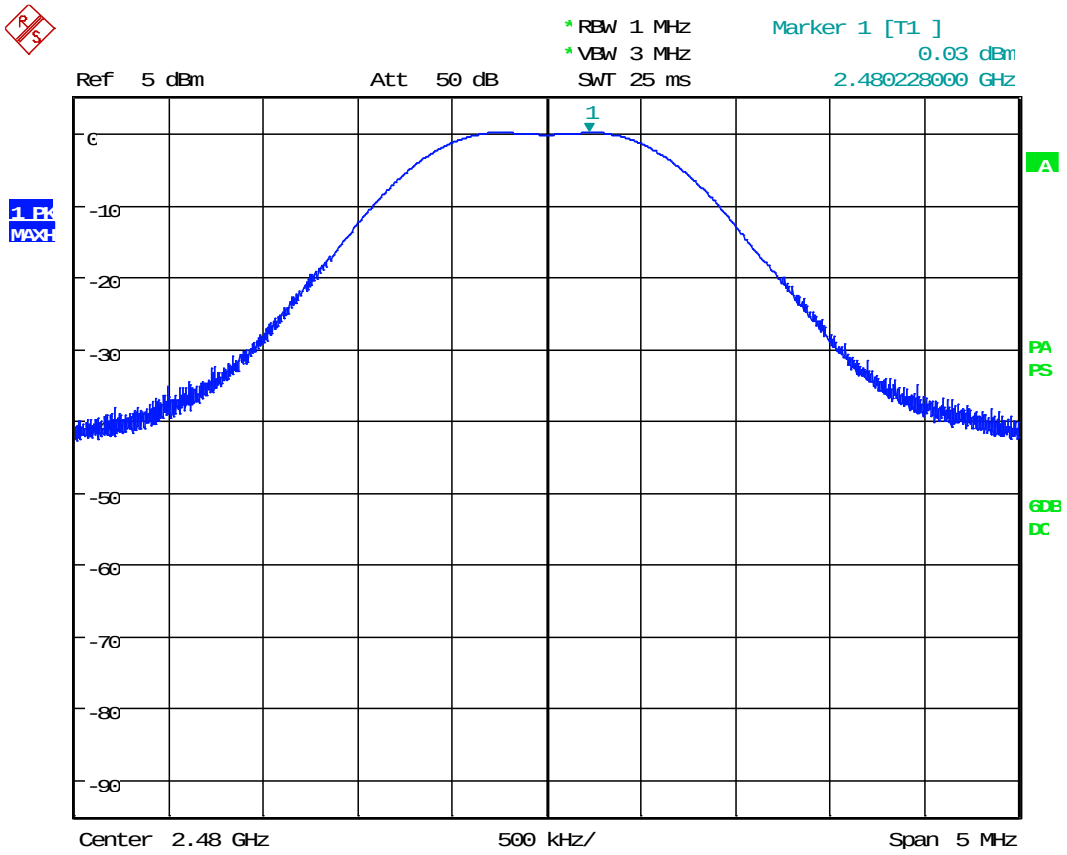
BLE, +15%: Mid Channel



BLE, -15%: High Channel



BLE, +15%: High Channel



Date: 23.AUG.2021 12:42:22

10 FCC Part 15.247(d) – CONDUCTED SPURIOUS EMISSIONS

The following tests were performed to demonstrate compliance.

RF Antenna Conducted Test

The EUT antenna port was fitted with an SMA connector and directly connected to the input of the spectrum analyzer.

10.1 Requirements:

All Spurious Emissions must be at least 20dB down from the highest emission level measured within the authorized band up through the tenth harmonic.

Spurious emissions measurements were made at the low, mid, and upper channels with the appropriate spectrum analyzer impulse bandwidth. Additionally, 20dB down points were measured for the low and high channels to verify band edge compliance.

10.2 Conducted Spurious Emissions Test Data

Test Date:	2021-08-20; 2022-02-09	**Test Engineer:**	J. Chiller
Standards:	CFR 47 Part 15.247(d) / Part 15.207 KDB558074	**Air Temperature:**	24.2ºC
		Relative Humidity:	38%

900 MHz: Low Channel, 0.009 MHz to 0.15 MHz

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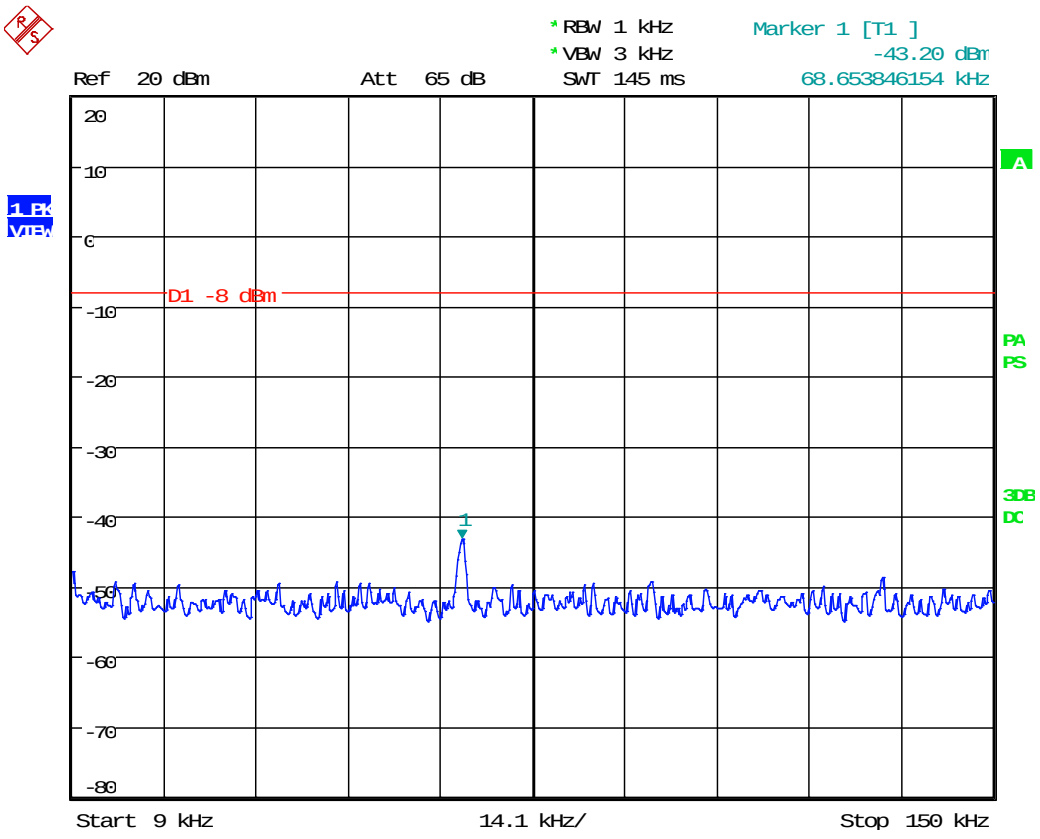

900 MHz: Low Channel, 0.15MHz to 30.0 MHz

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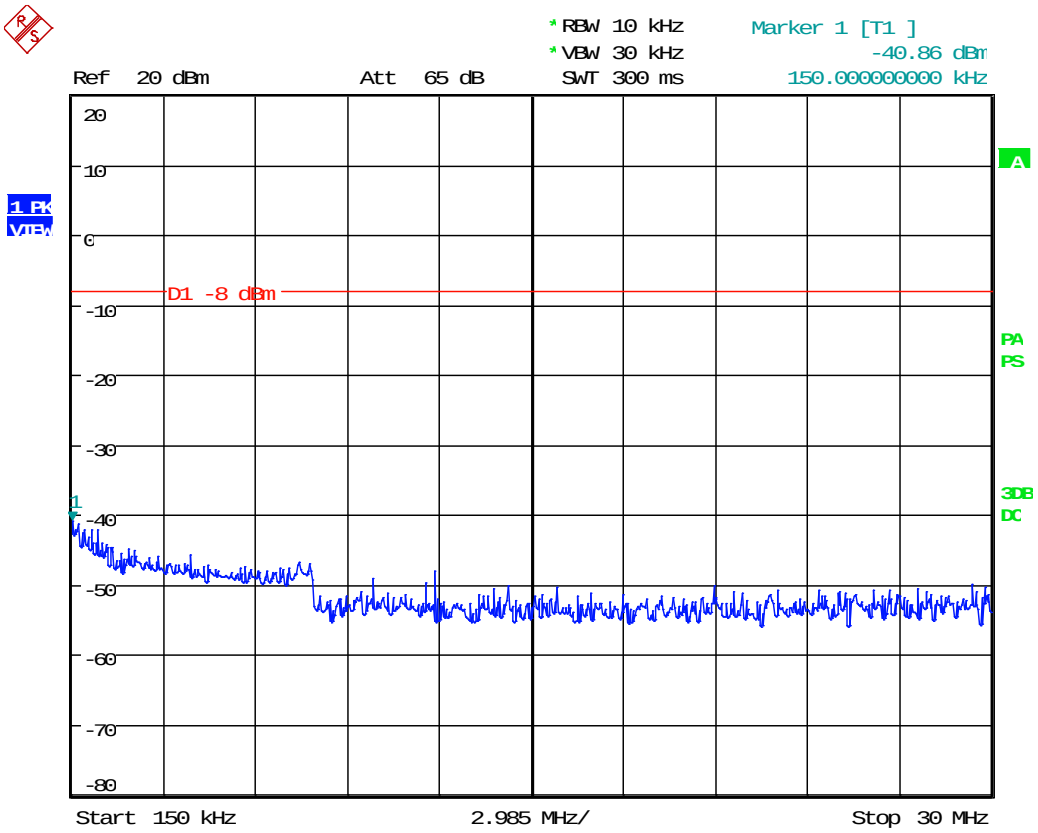

900 MHz: Low Channel, 30 MHz to 1000 MHz

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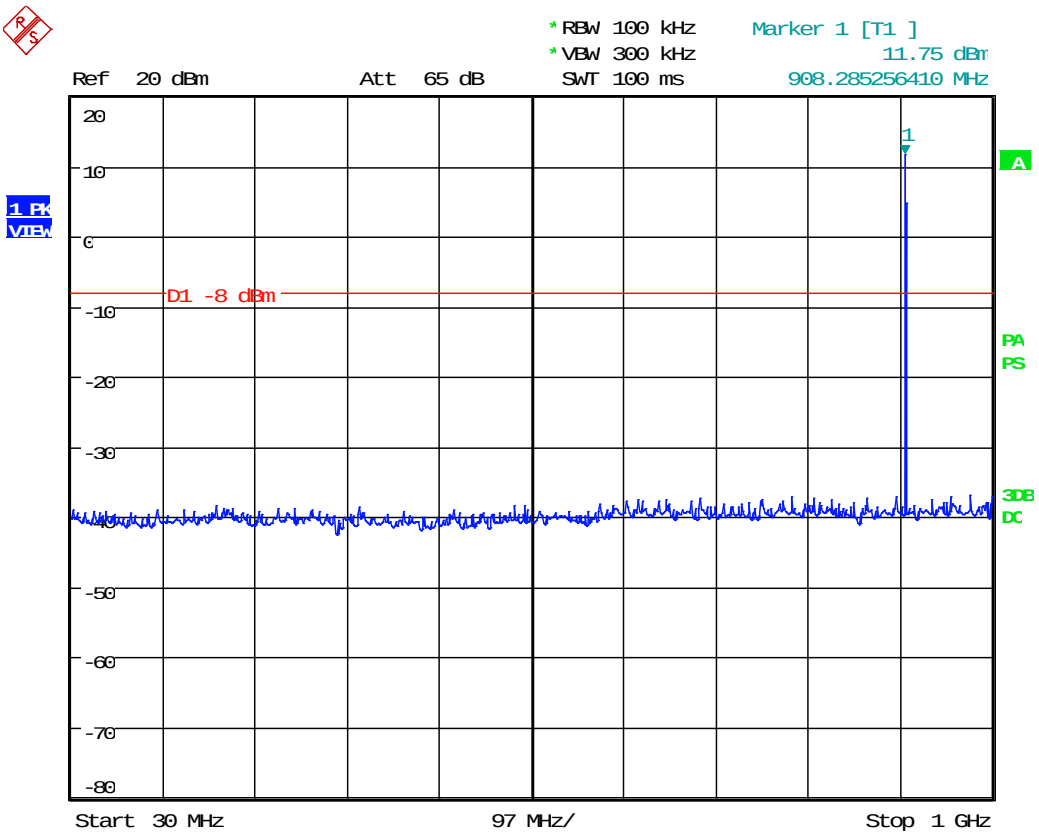

900 MHz: Low Channel, 1 GHz to 10 GHz

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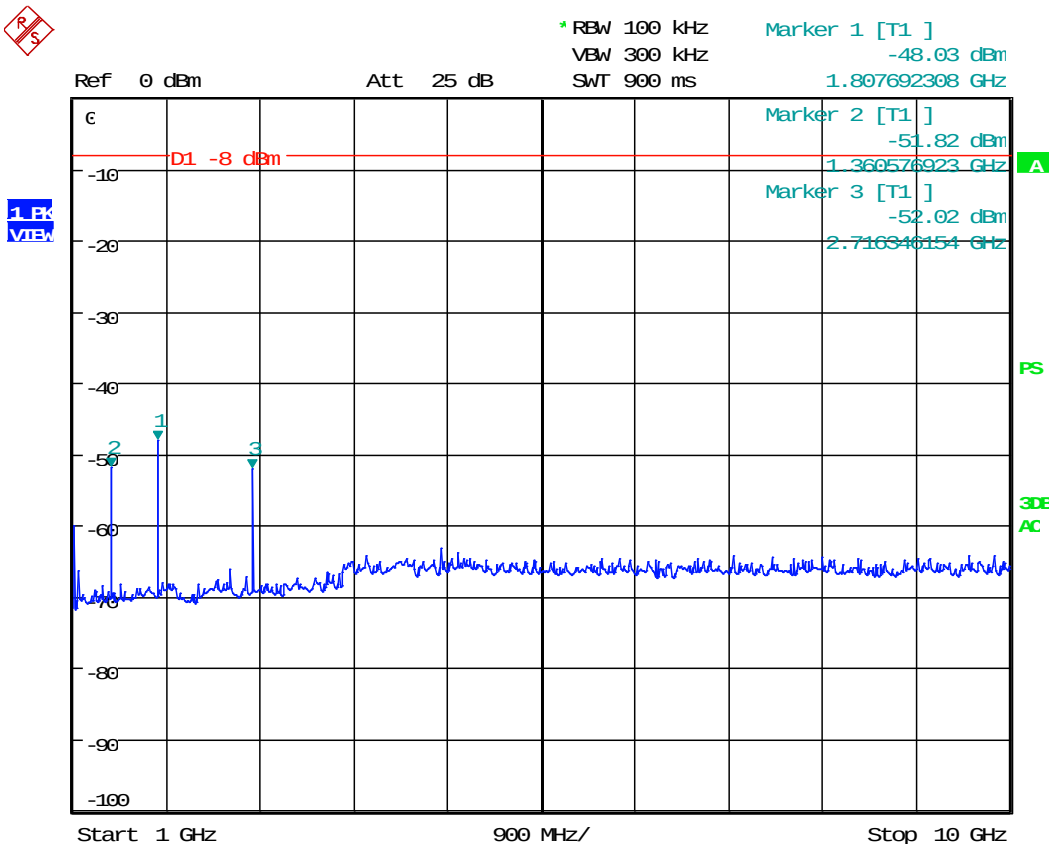

900 MHz: Mid Channel, 0.009 MHz to 0.15 MHz

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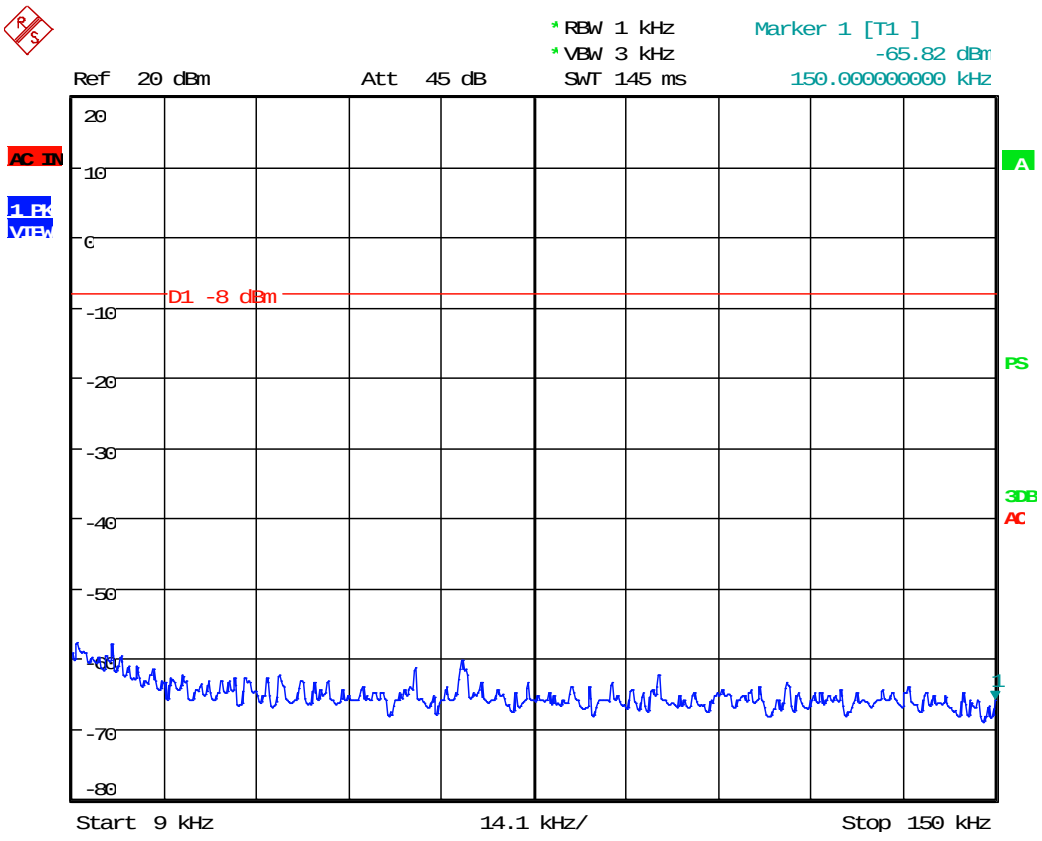

900 MHz: Mid-Channel, 0.15MHz to 30.0 MHz

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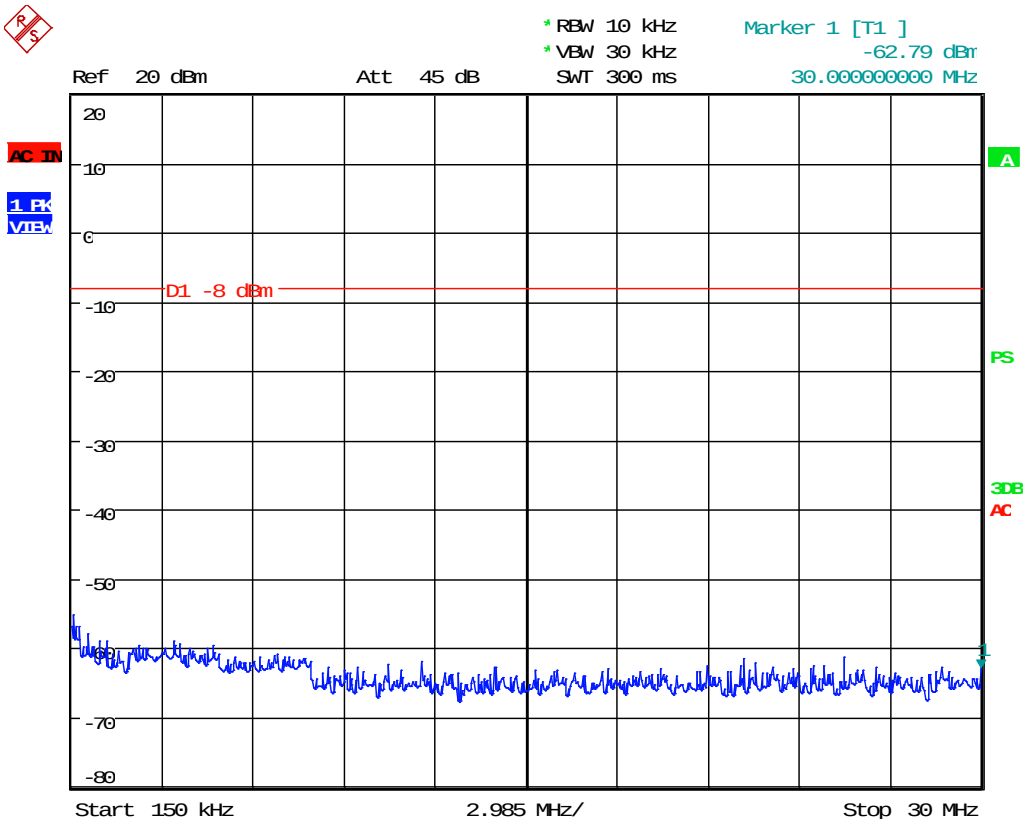
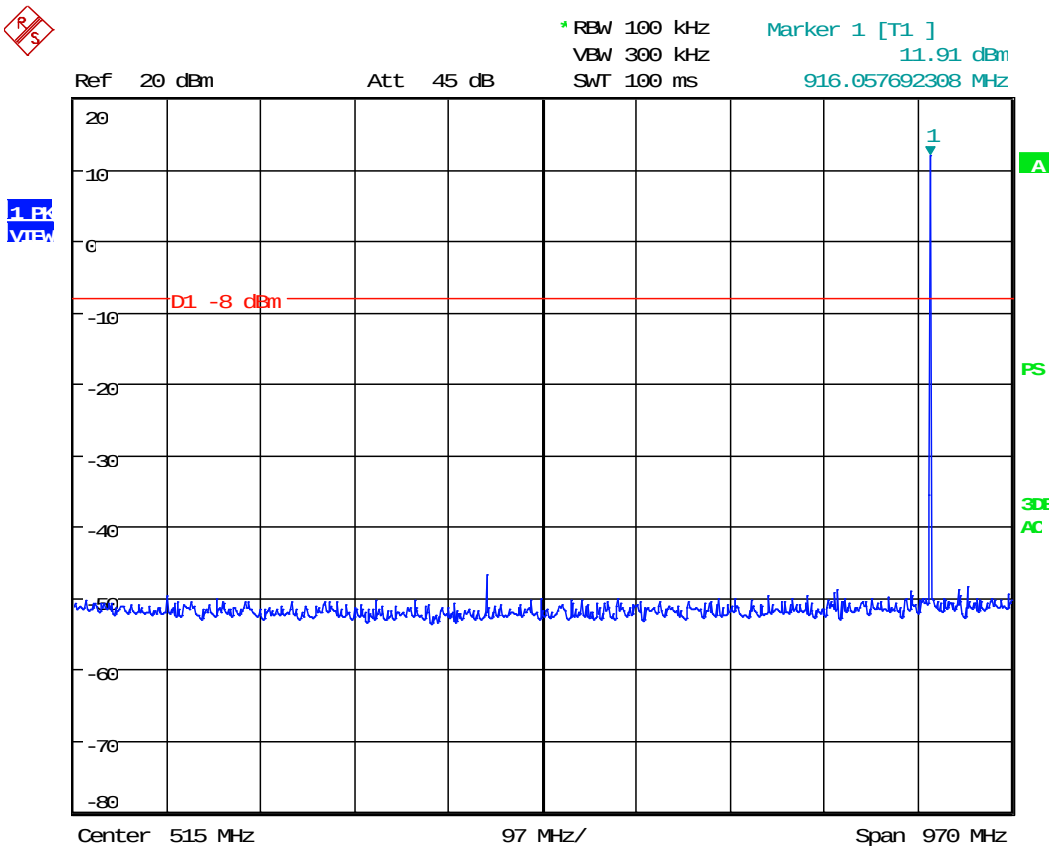


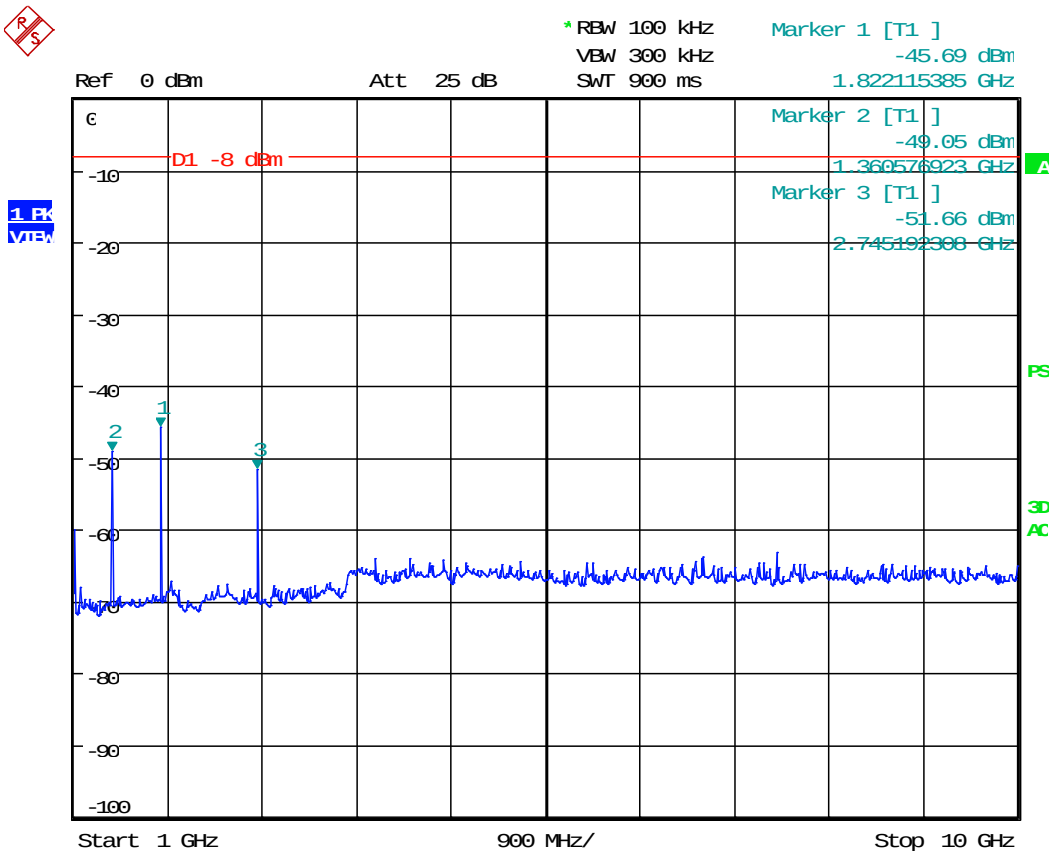
900 MHz: Mid-Channel, 30 MHz to 1000 MHz

.



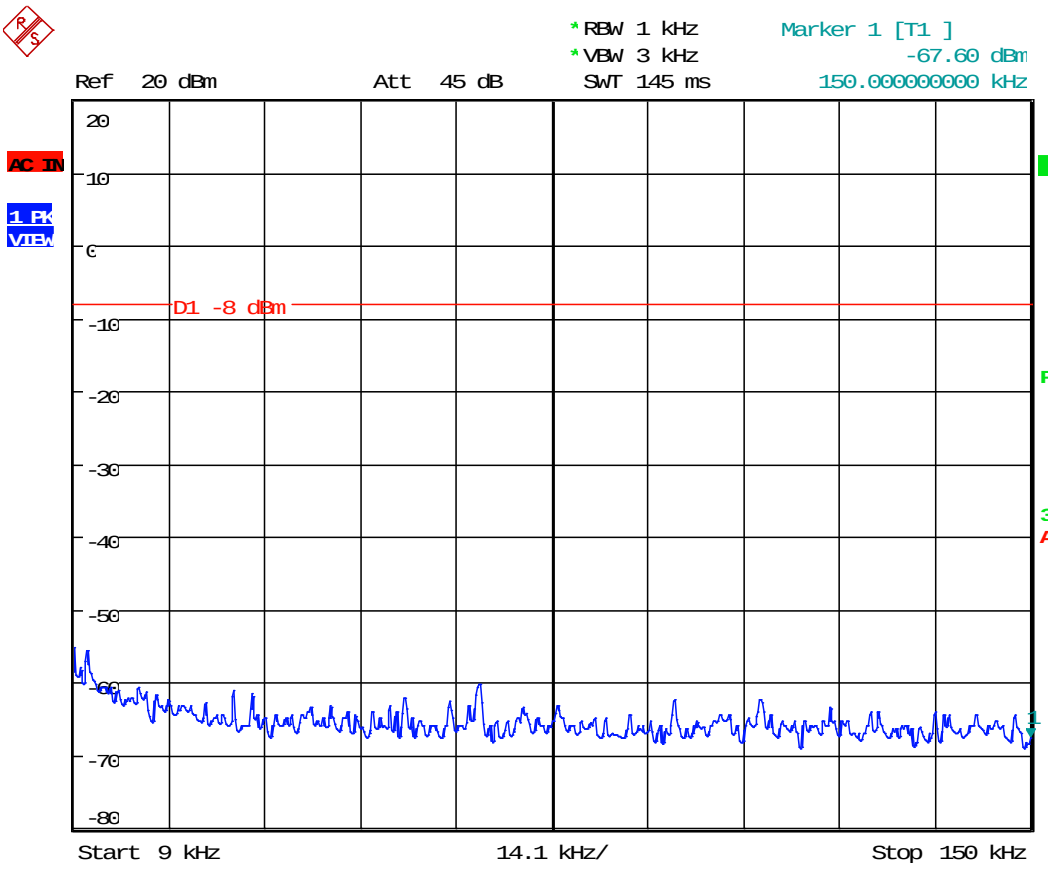
900 MHz: Mid-Channel, 1 GHz to 10 GHz

.



900 MHz: High Channel, 0.009 MHz to 0.15 MHz

.



900 MHz: High Channel, 0.15MHz to 30.0 MHz

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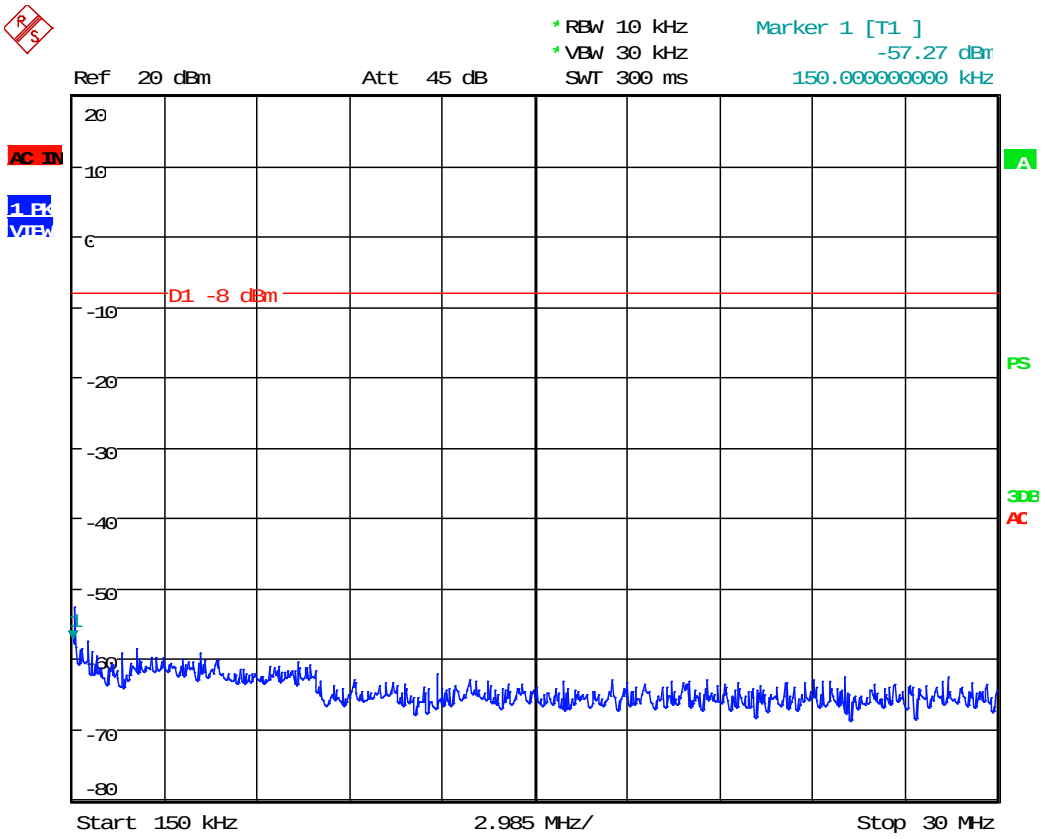

900 MHz: High Channel, 30 MHz to 1000 MHz

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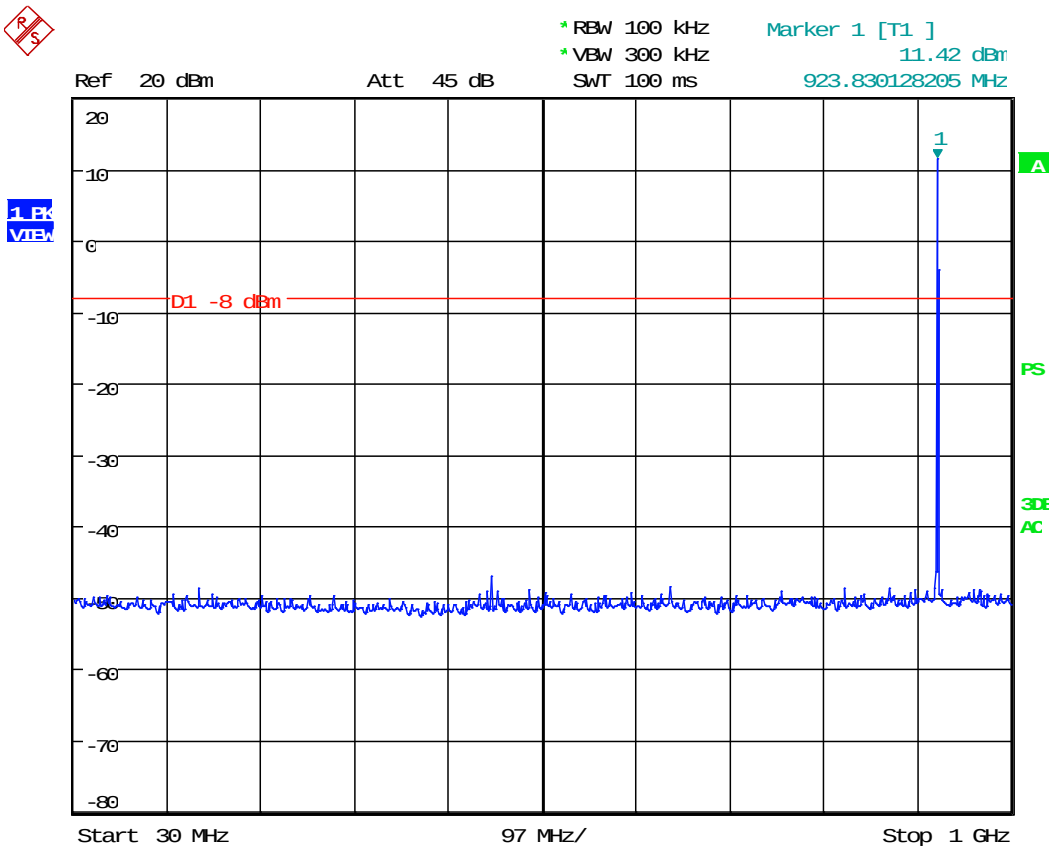
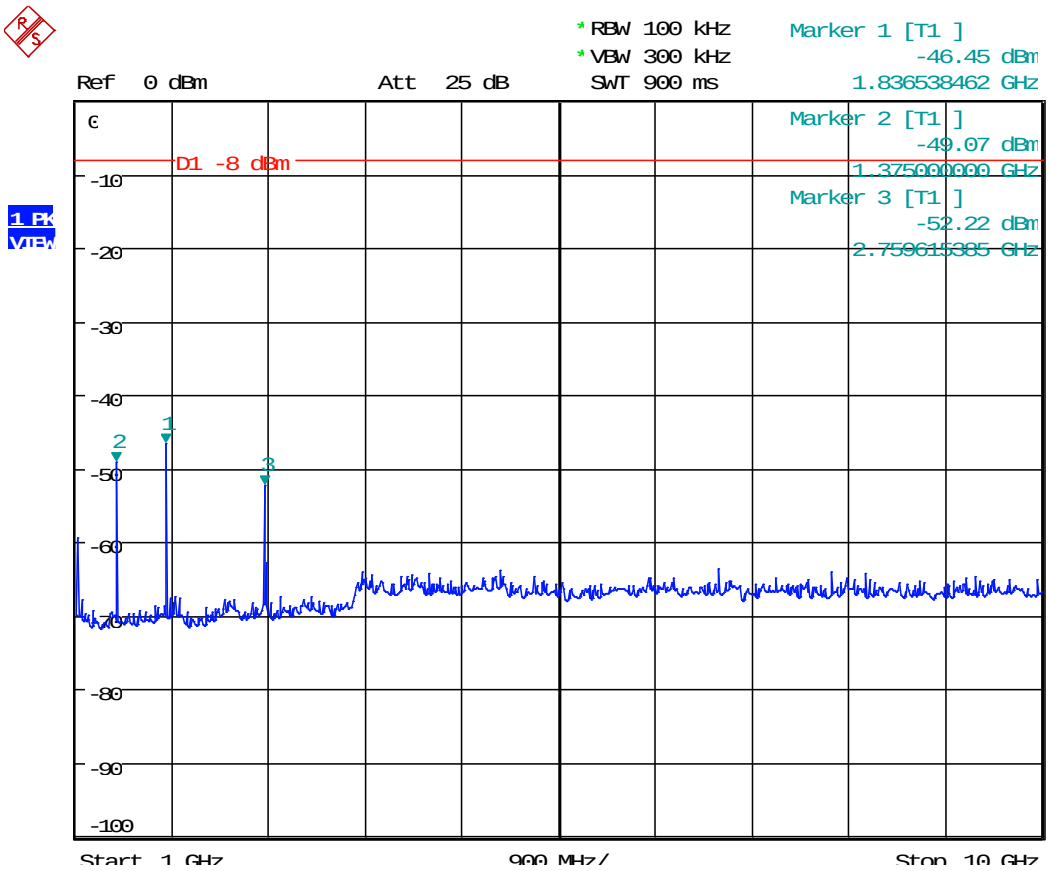
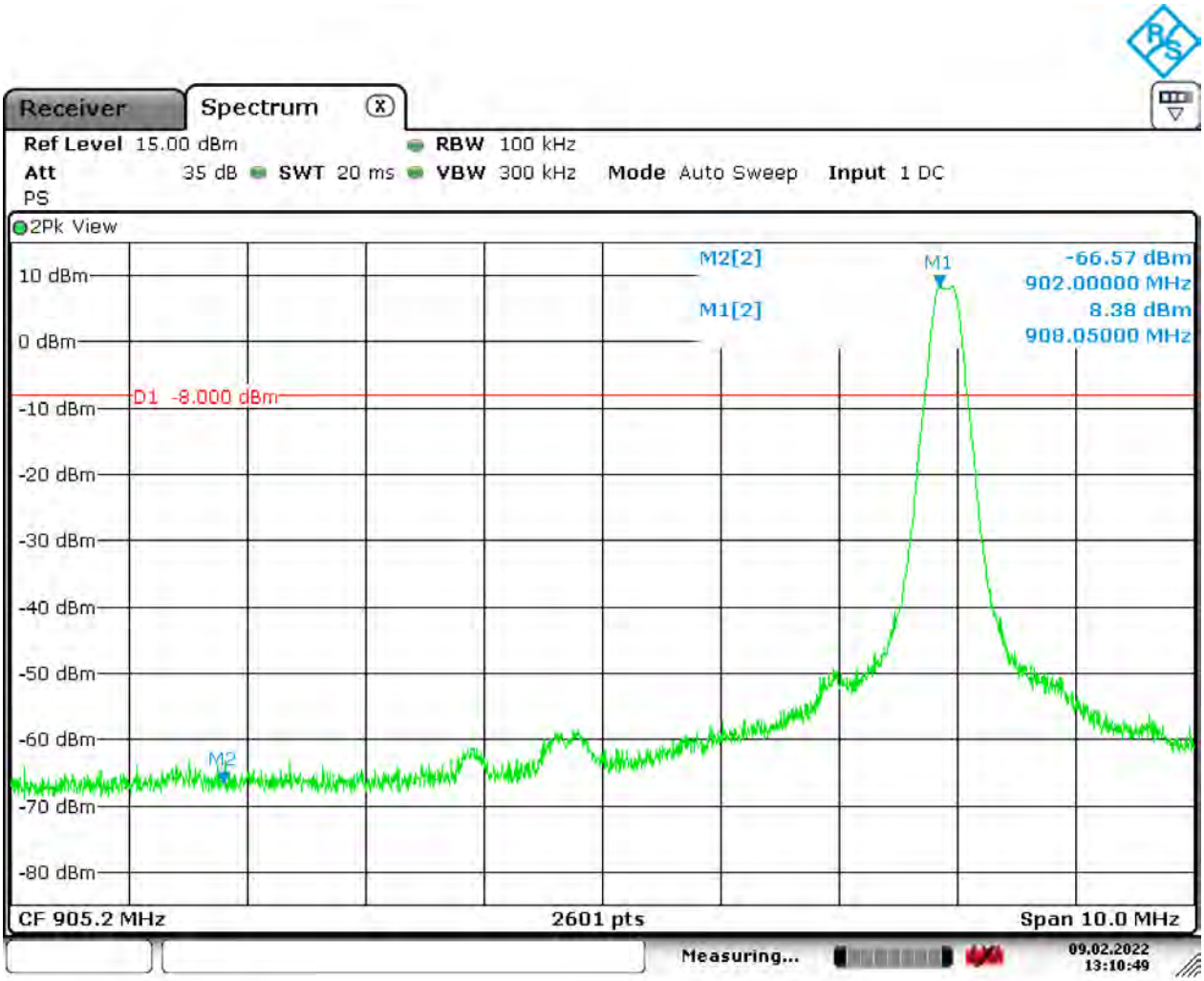


900 MHz: High Channel, 1 GHz to 10 GHz

.

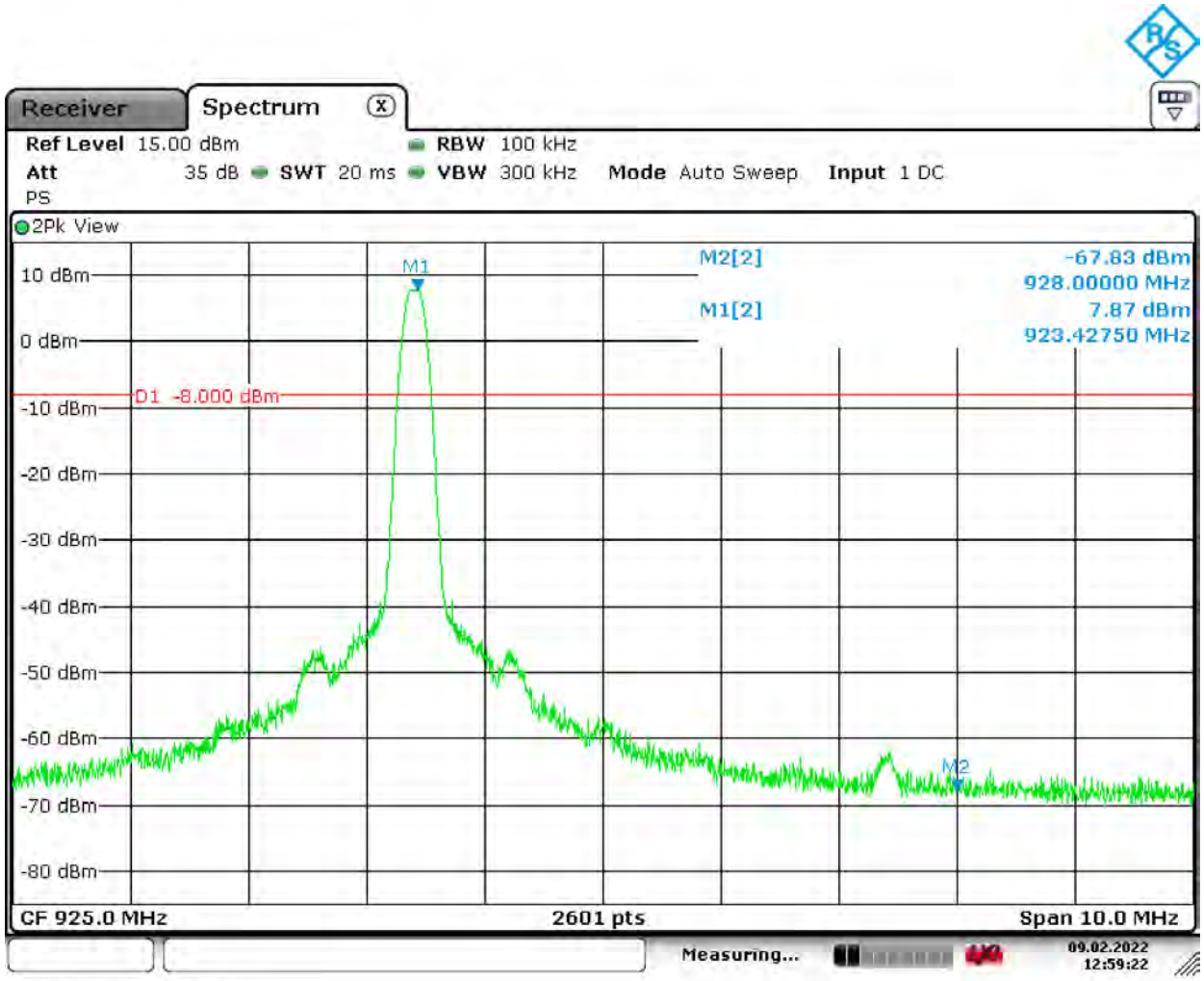


900 MHz, Lower Band Edge



Date: 9.FEB.2022 13:10:49

900 MHz, Upper Band Edge



Date: 9.FEB.2022 12:59:21

BLE: Low Channel, 0.009 MHz to 0.15 MHz

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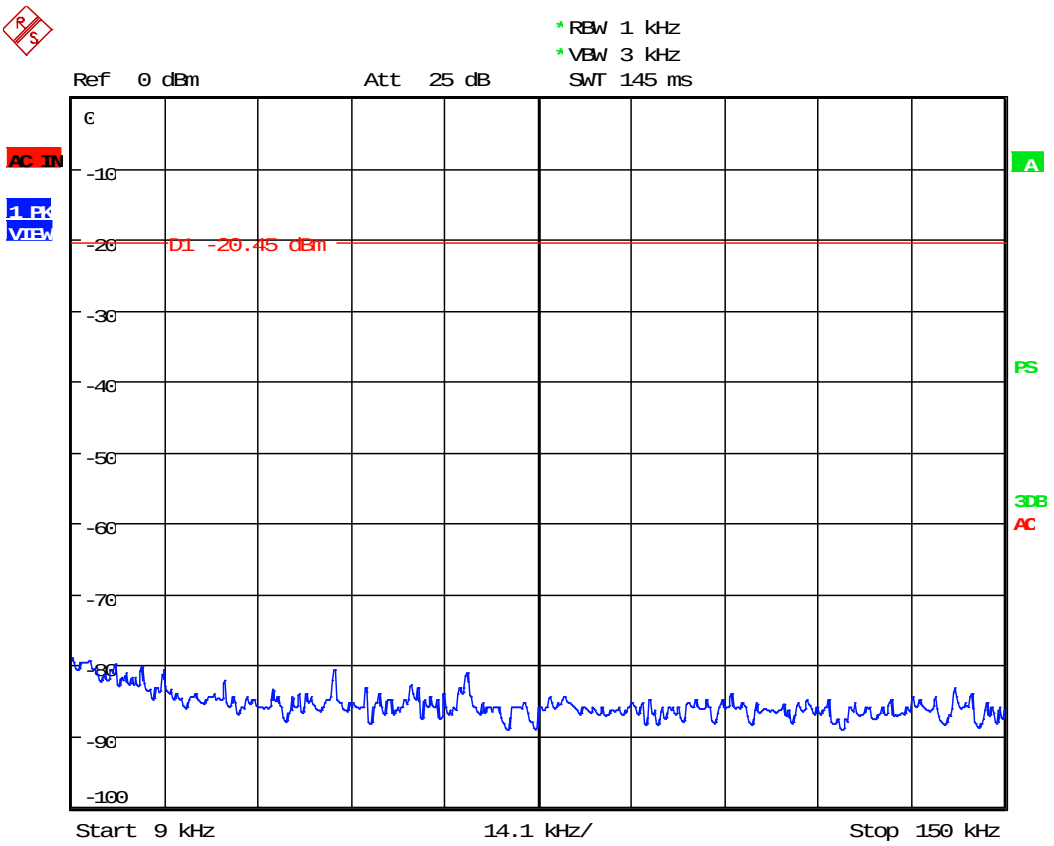

BLE: Low Channel, 0.15MHz to 30.0 MHz

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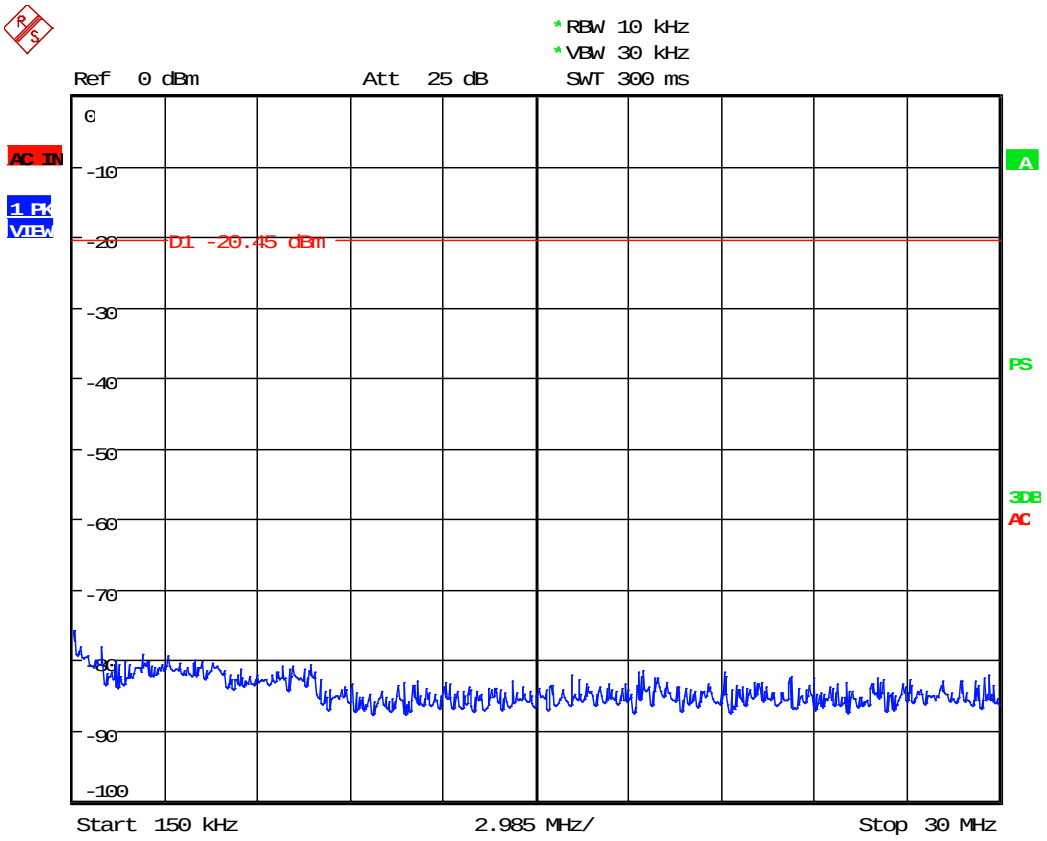

BLE: Low Channel, 30 MHz to 1000 MHz

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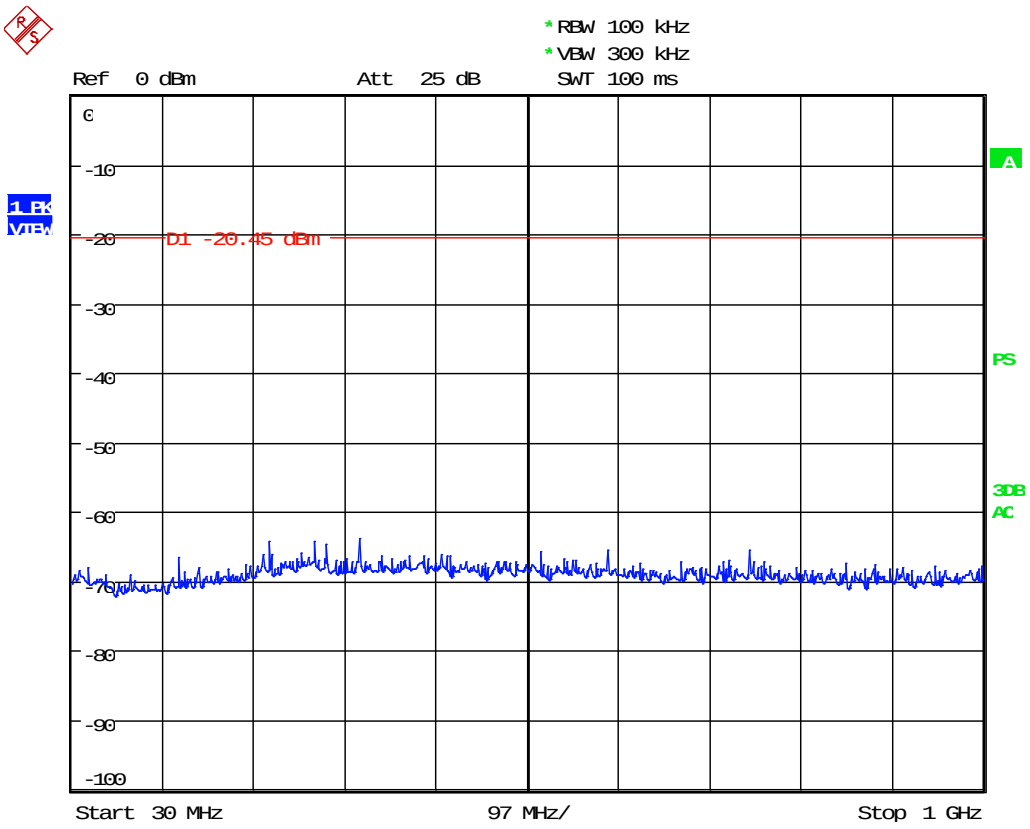

BLE: Low Channel, 1 GHz to 10 GHz

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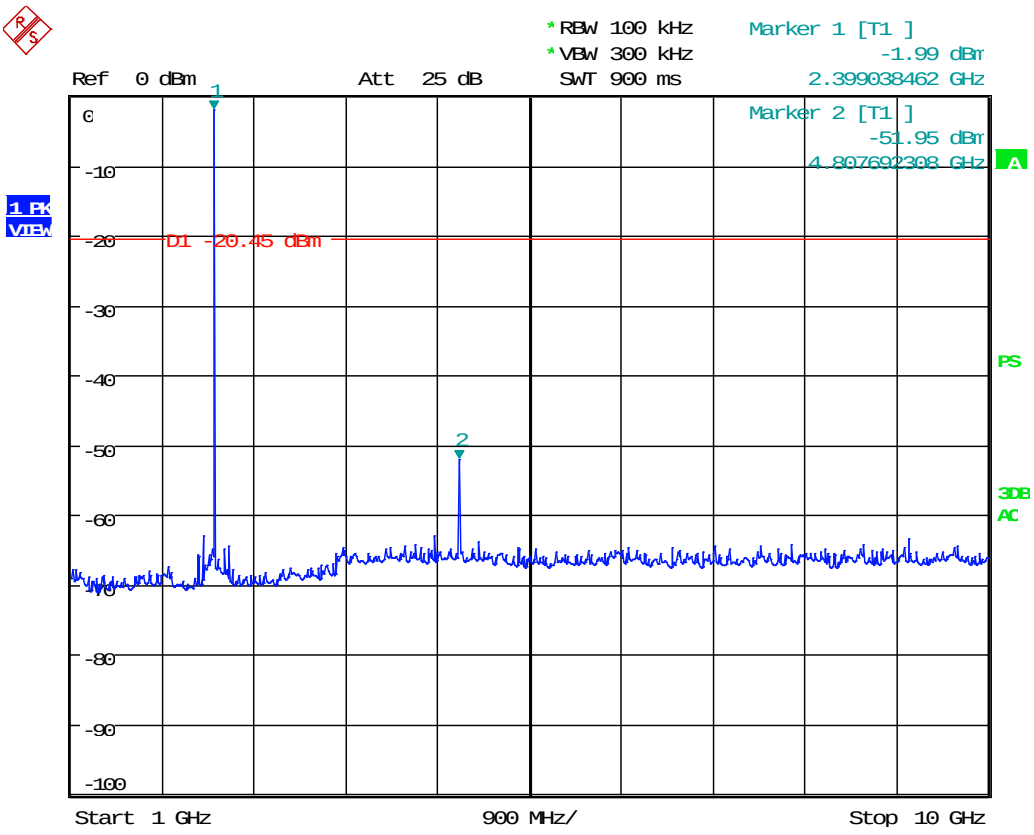

BLE: Low Channel, 10 GHz to 18 GHz

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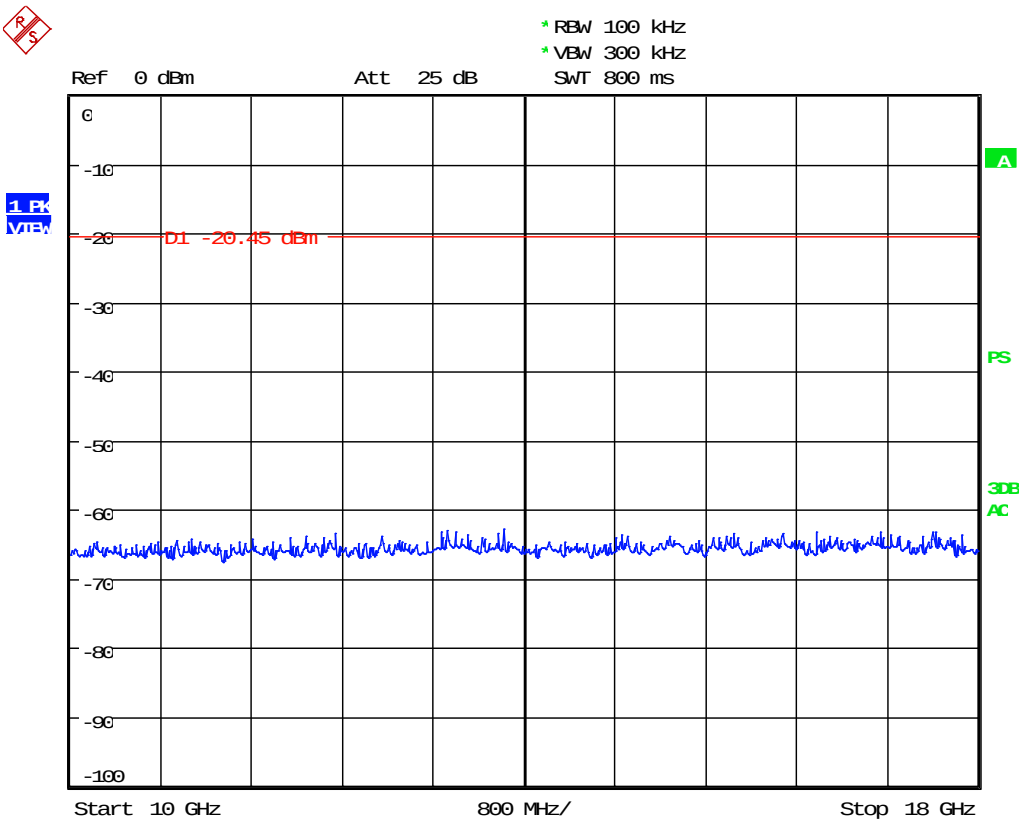
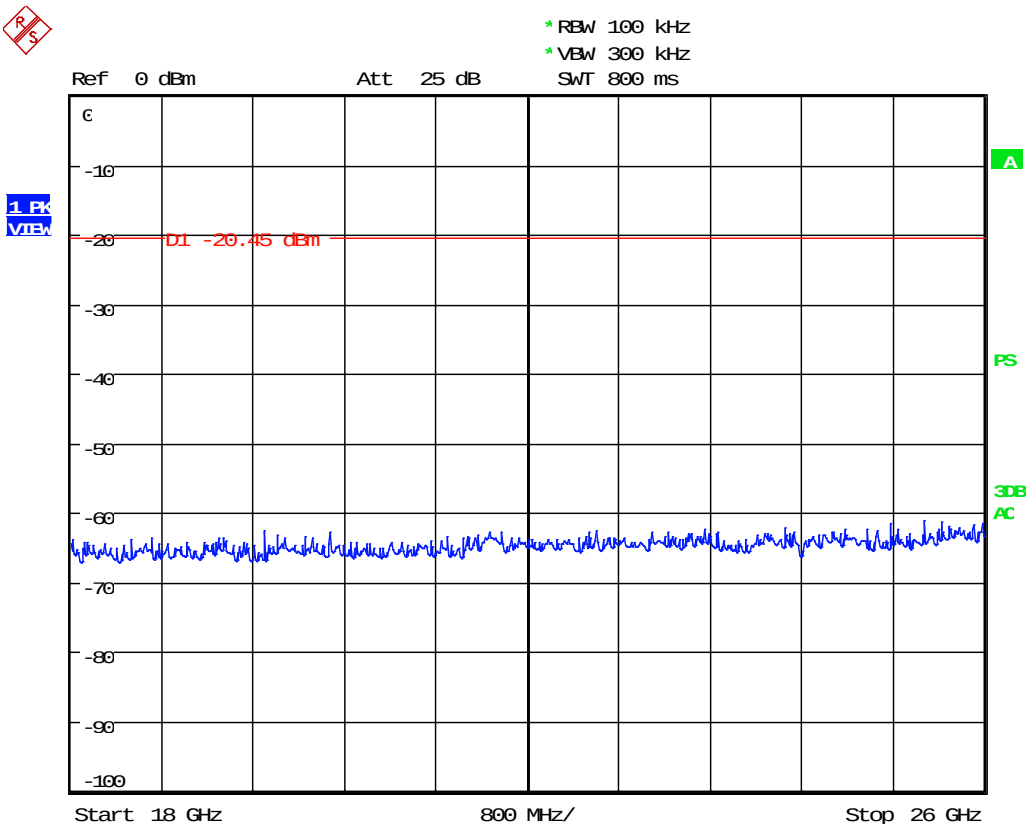


BLE: Low Channel 18 GHz to 26 GHz

.



BLE: Mid Channel, 0.009 MHz to 0.15 MHz

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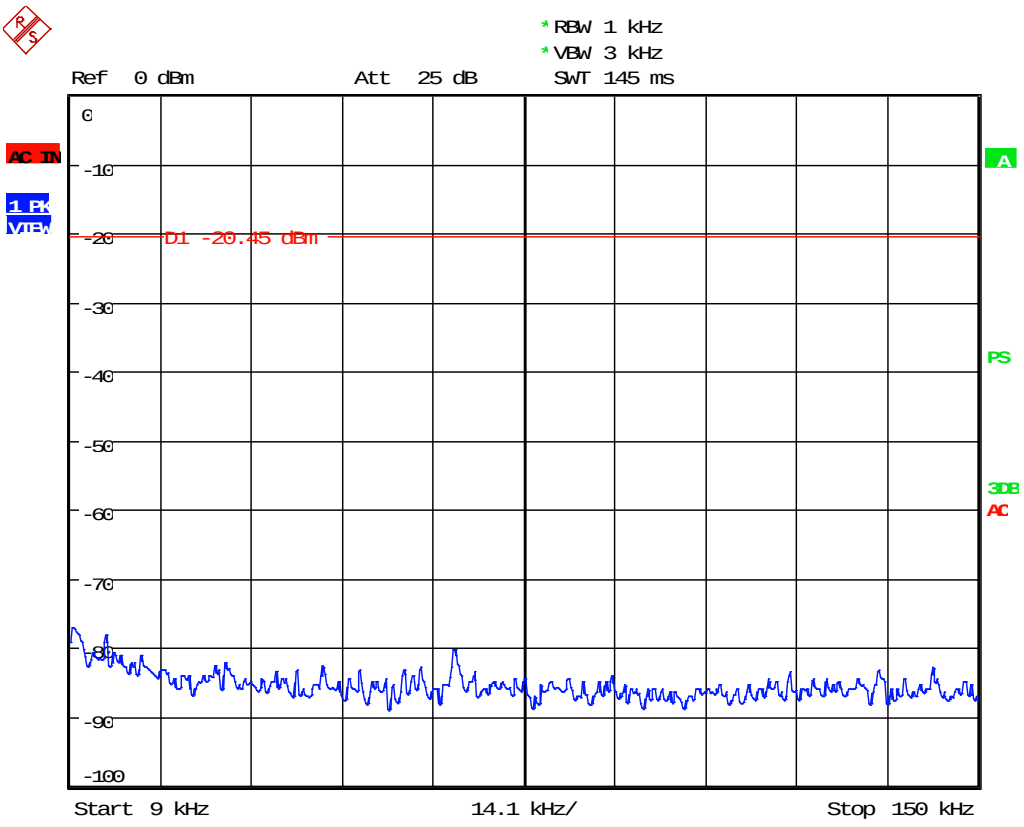

BLE: Mid-Channel, 0.15MHz to 30.0 MHz

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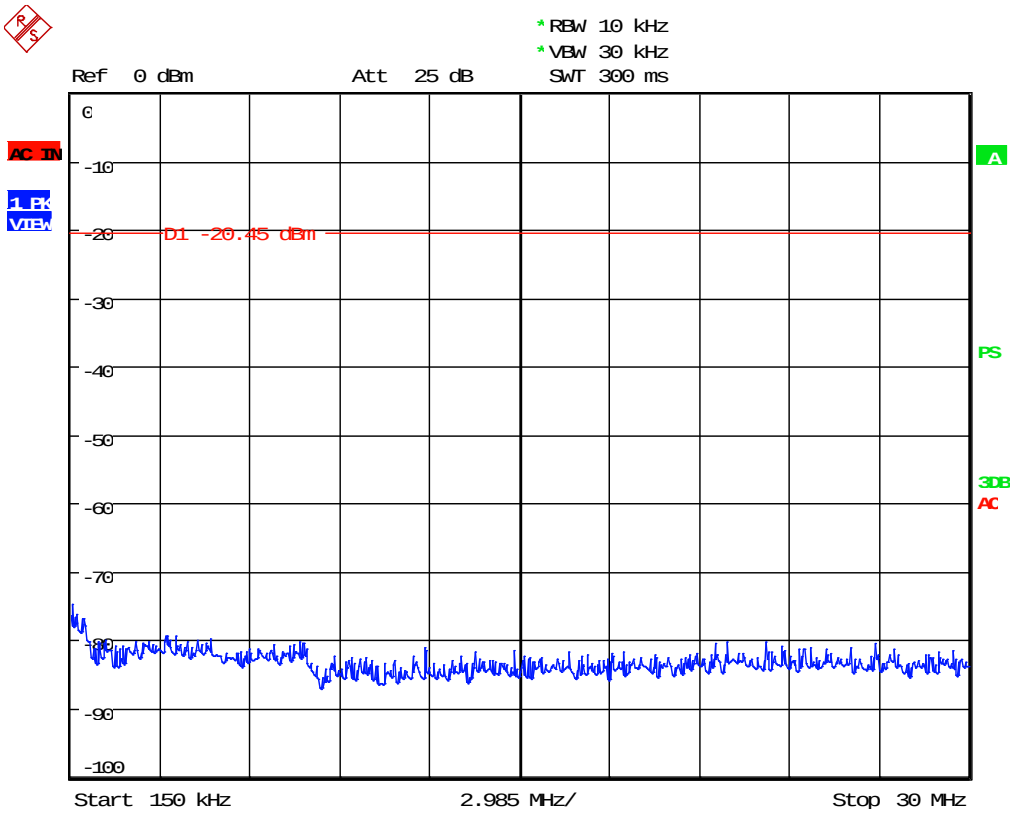
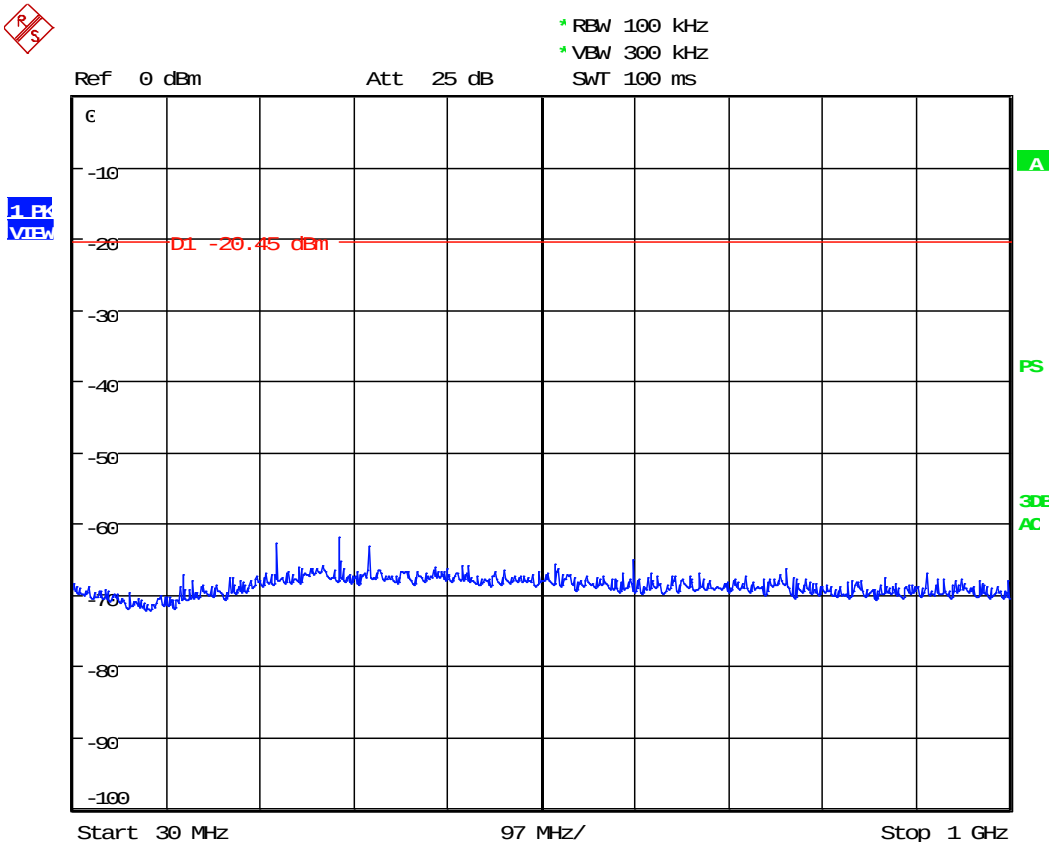


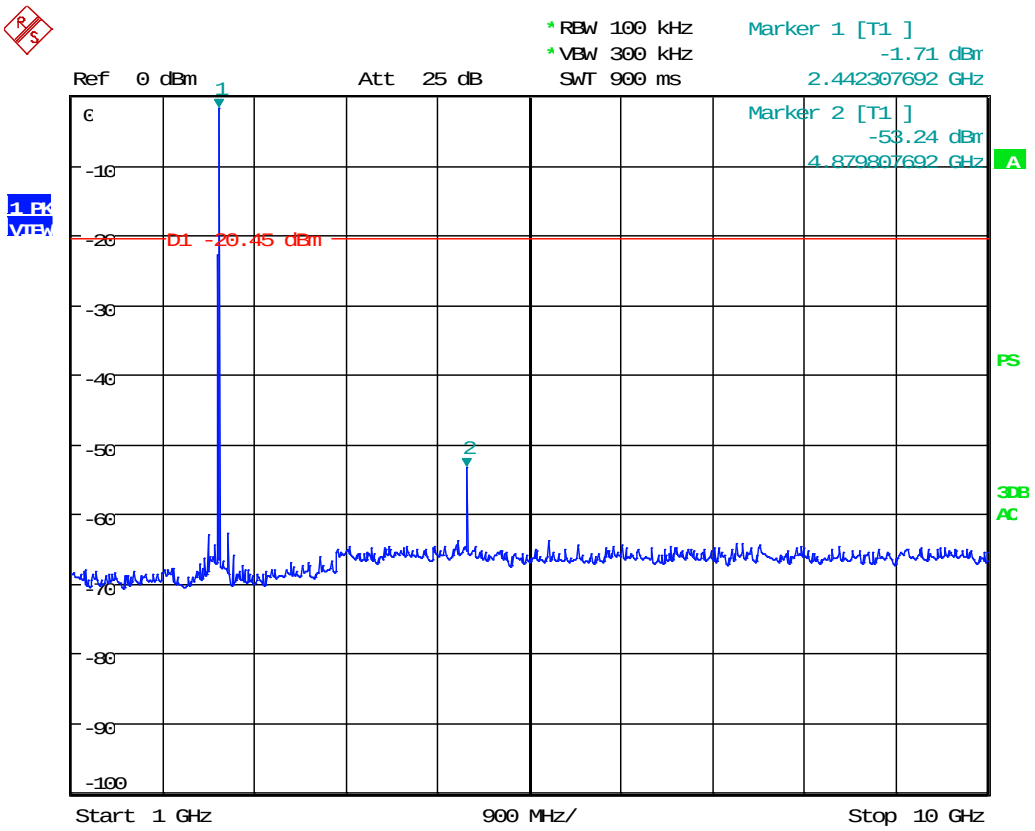
BLE: Mid-Channel, 30 MHz to 1000 MHz

.



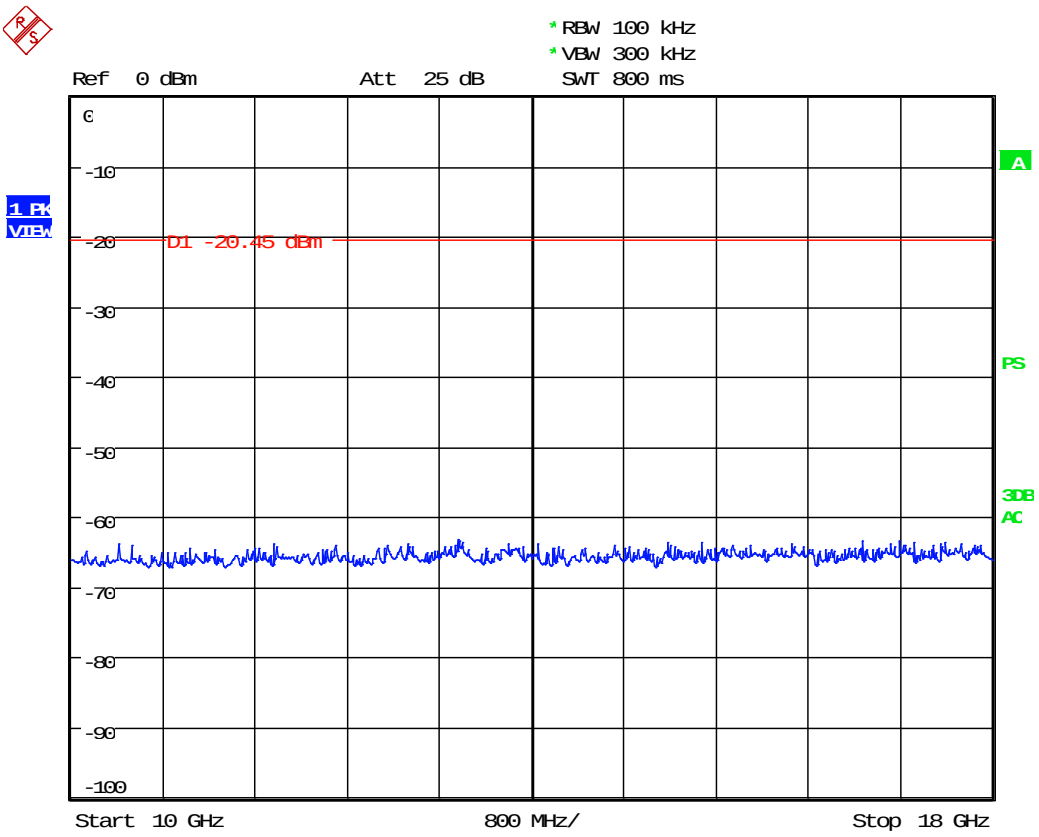
BLE: Mid-Channel, 1 GHz to 10 GHz

.



BLE: Mid Channel, 10 GHz to 18 GHz

.



BLE: Mid Channel 18 GHz to 26 GHz

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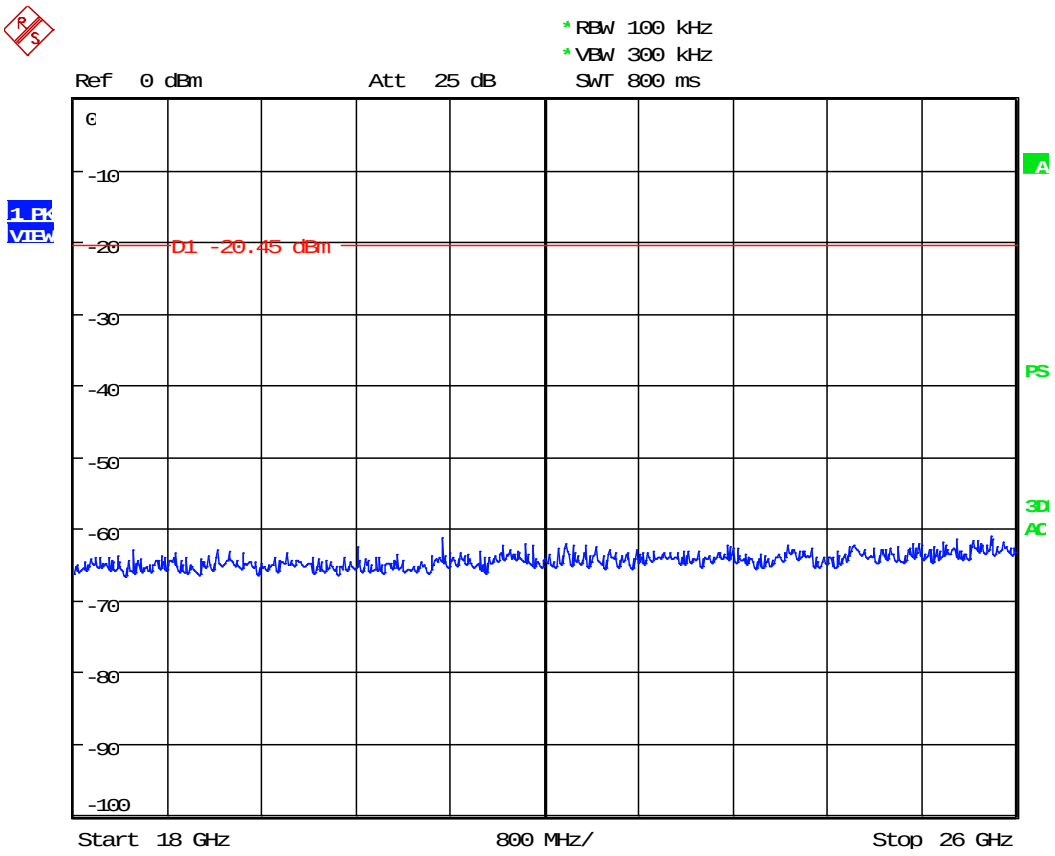

BLE: High Channel, 0.009 MHz to 0.15 MHz

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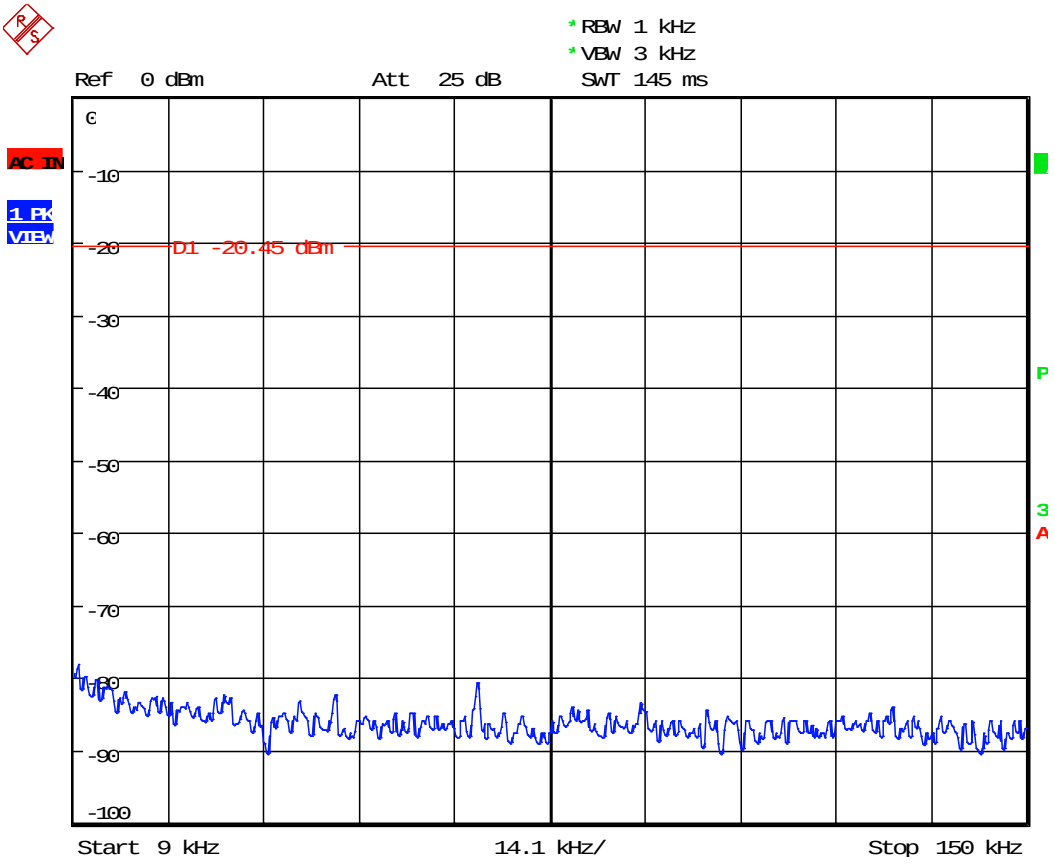

BLE: High Channel, 0.15MHz to 30.0 MHz

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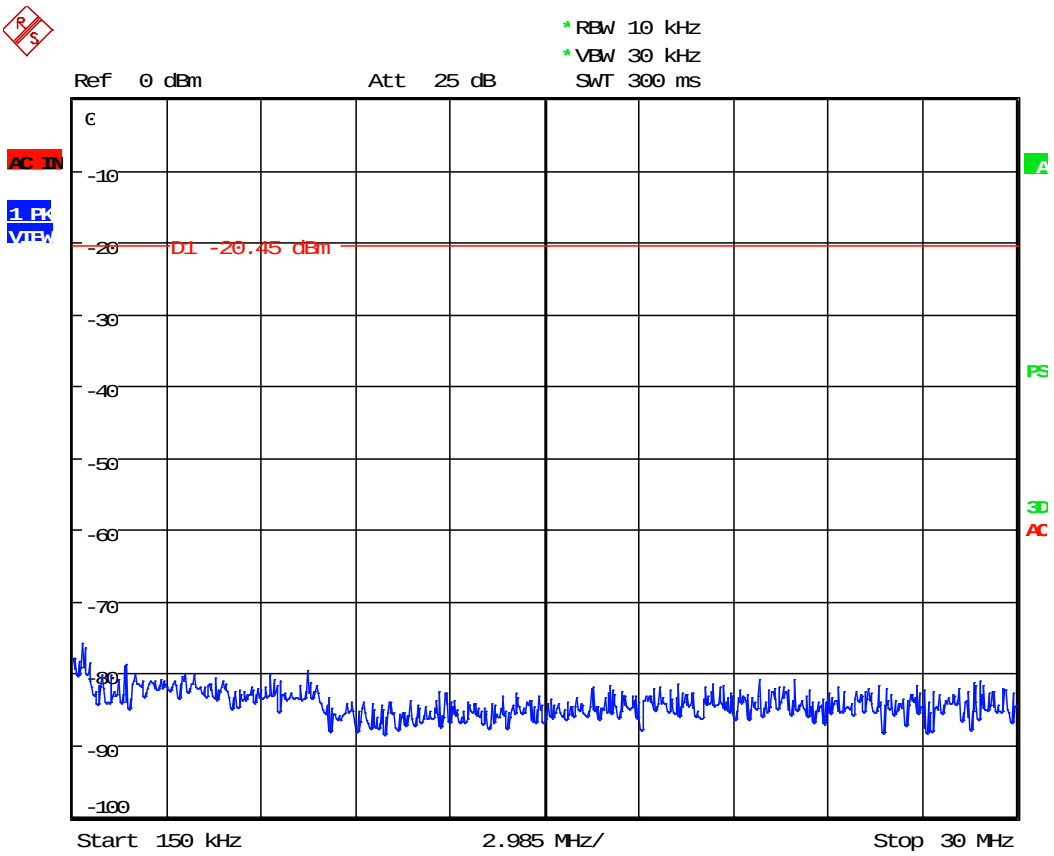
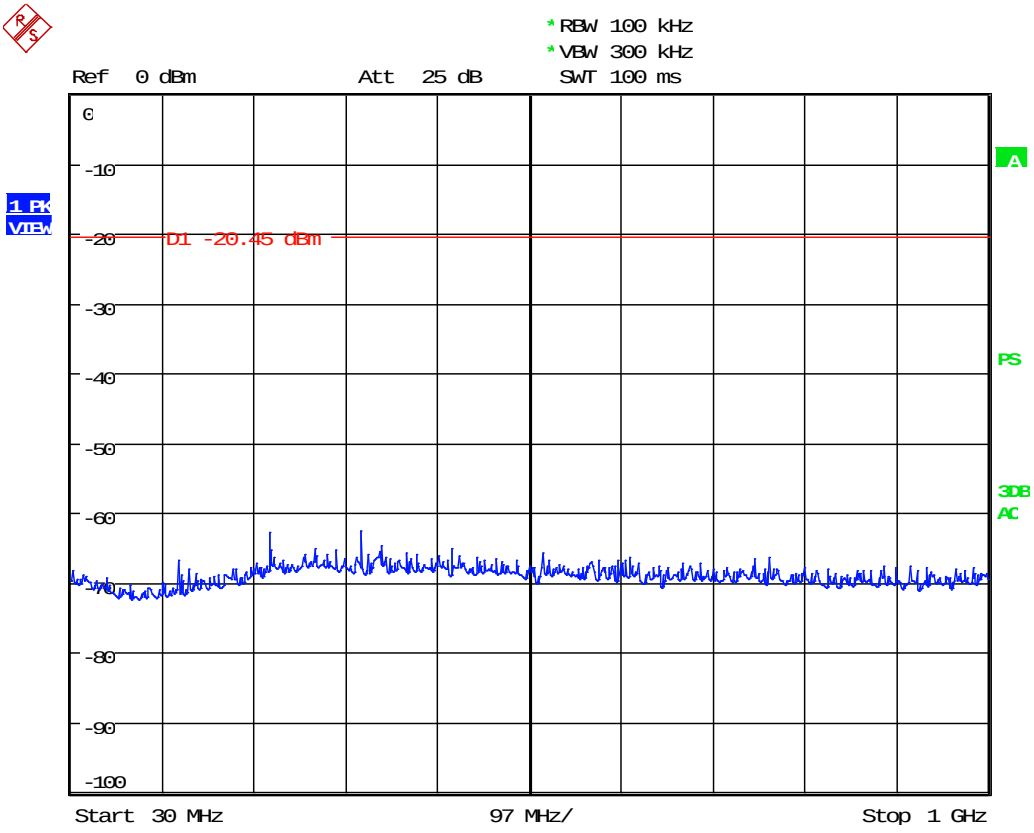


BLE: High Channel, 30 MHz to 1000 MHz

.



BLE: High Channel, 1 GHz to 10 GHz

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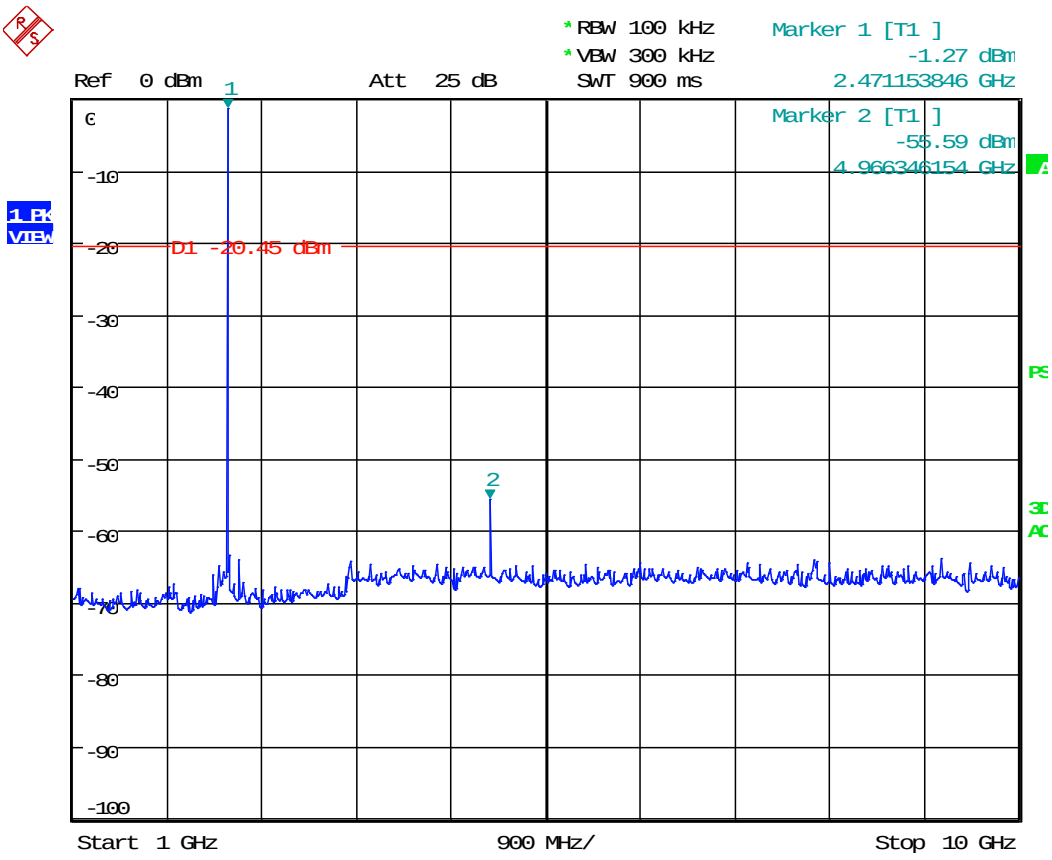
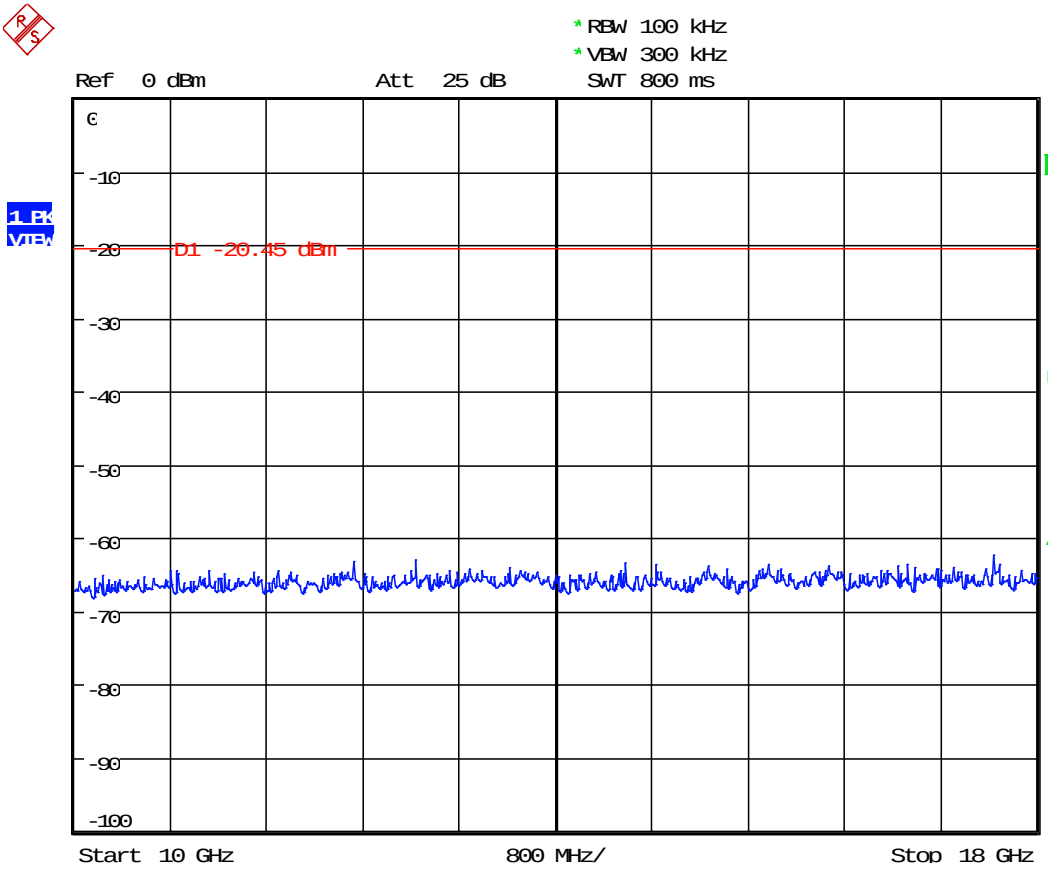


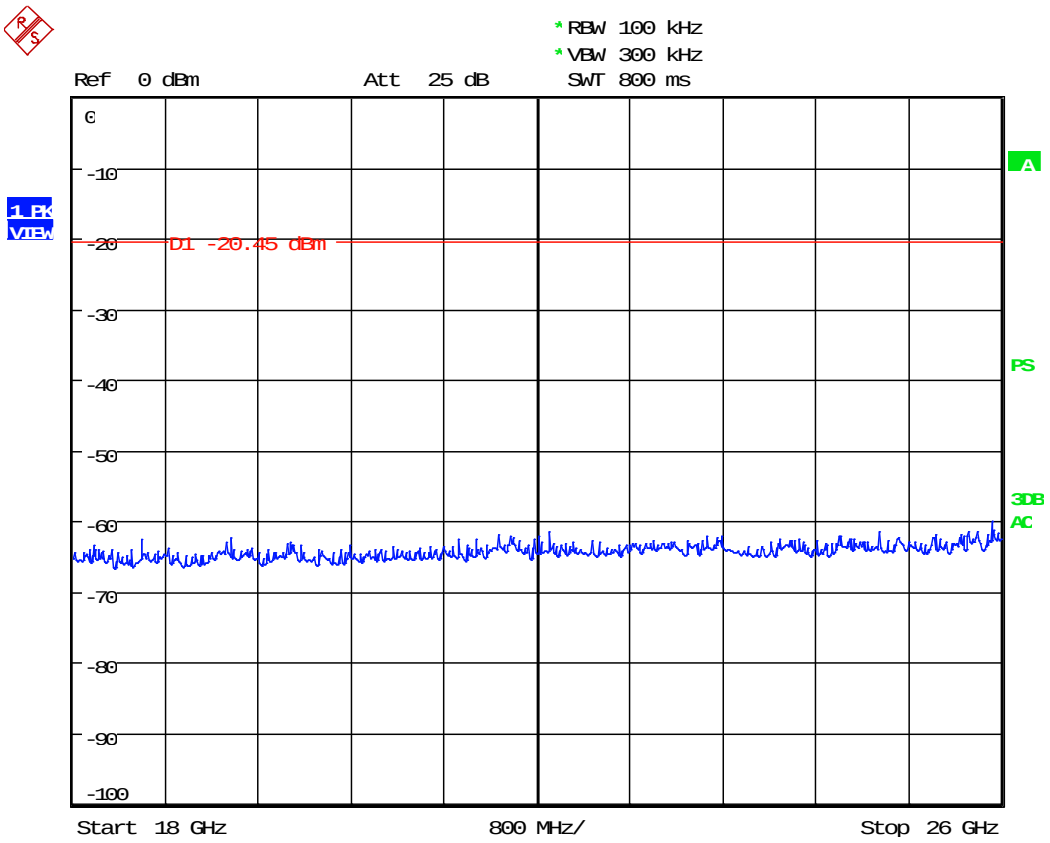
BLE: High Channel, 10 GHz to 18 GHz

.

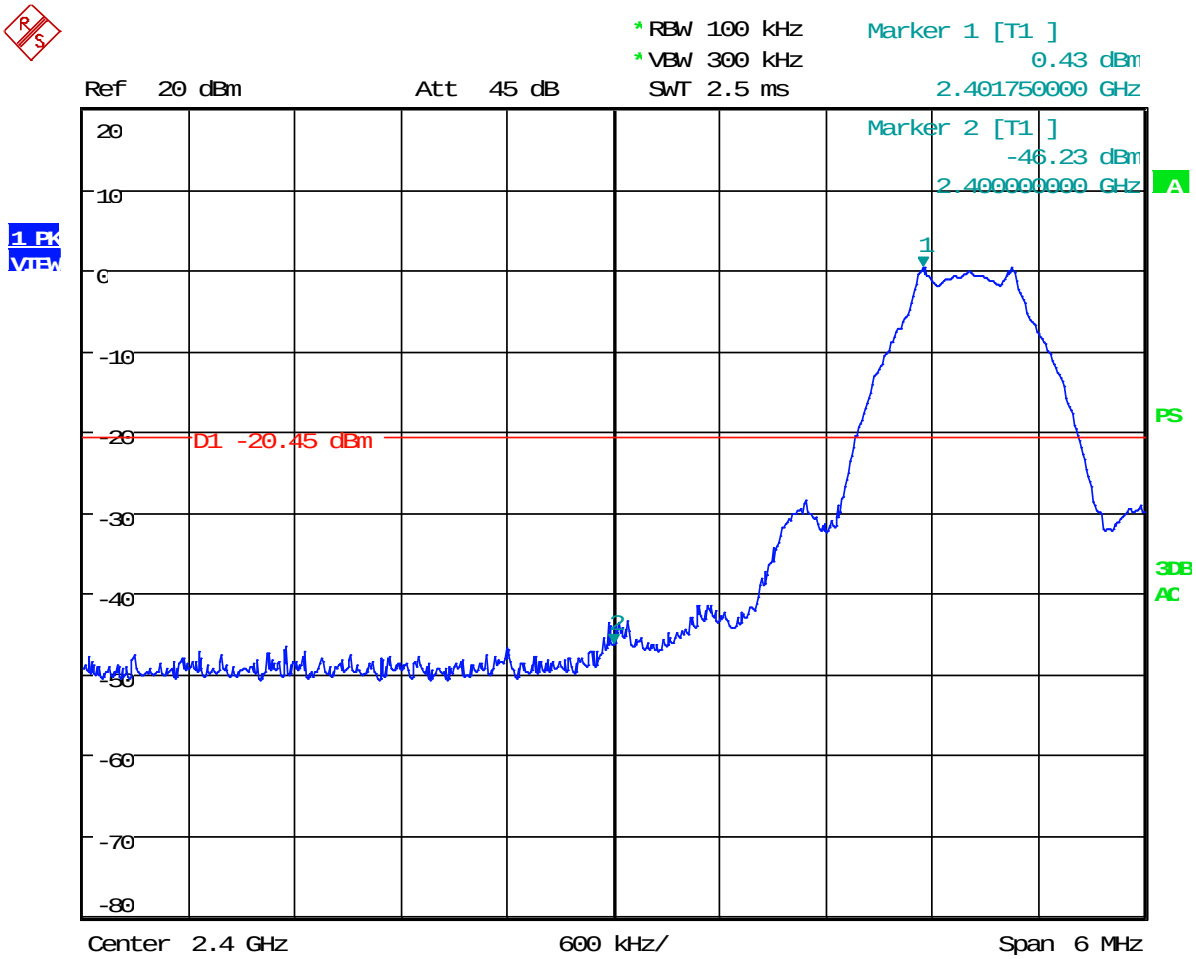


BLE: High Channel 18 GHz to 26 GHz

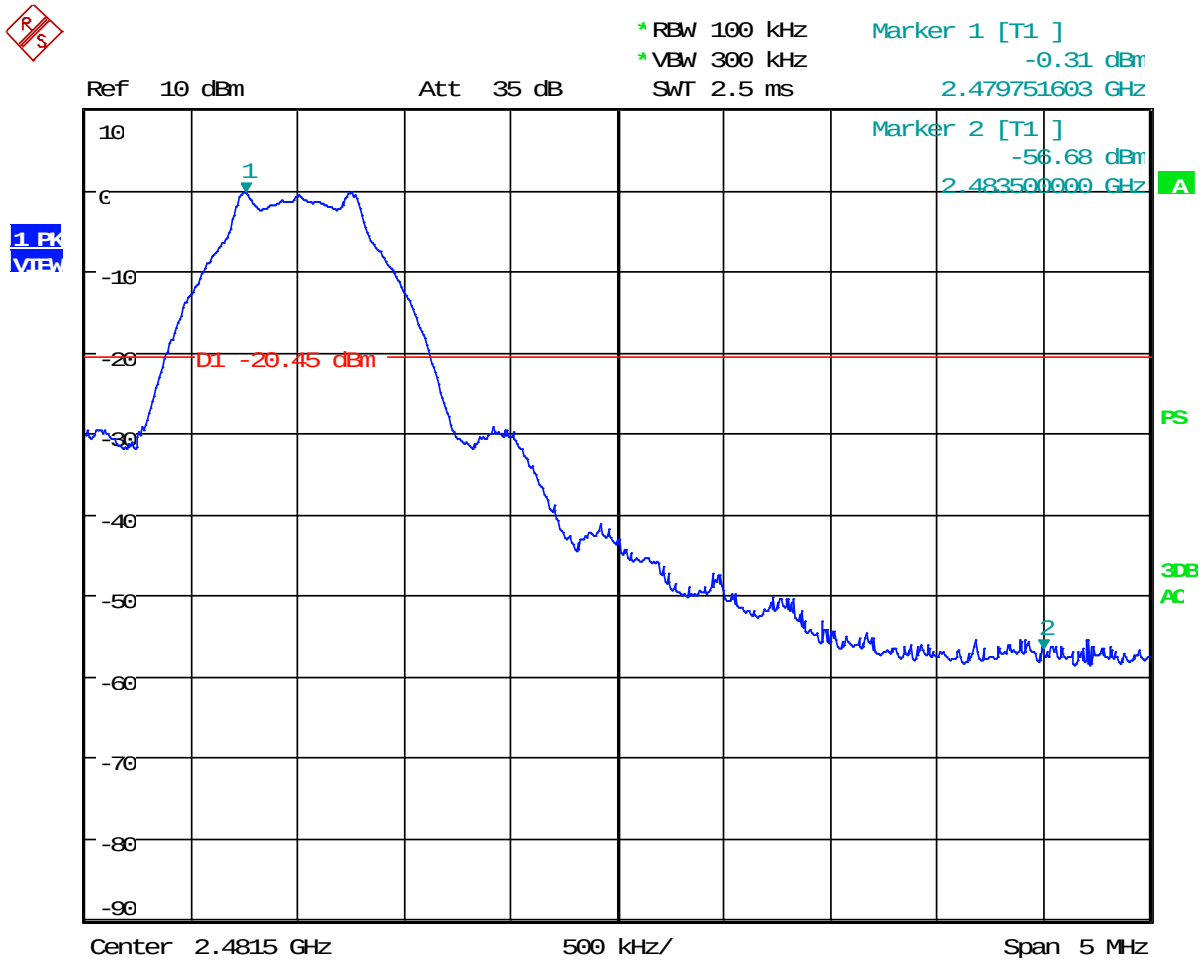
.



BLE, Lower Band Edge



BLE, Upper Band Edge



11 RADIATED SPURIOUS EMISSION

The EUT antenna port was fitted with its integral/internal chip antenna. Radiated emissions were measured in a Semi-Anechoic Chamber. All emissions generated that fall in the restricted bands per FCC Part 15.205 were examined.

11.1 Requirements:

All emissions that fall in the restricted bands defined in FCC Part 15.205 shall not exceed the maximum field strength listed in FCC Part 15.209(a).

11.2 Radiated Spurious Emission Test Data

Test Date(s):	2021-08-19	**Test Engineer:**	J. Chiller
Standards:	CFR 47 Part 15.247(d); Part 15.209 / KDB558074	**Air Temperature:**	24.0ºC
		Relative Humidity:	38%

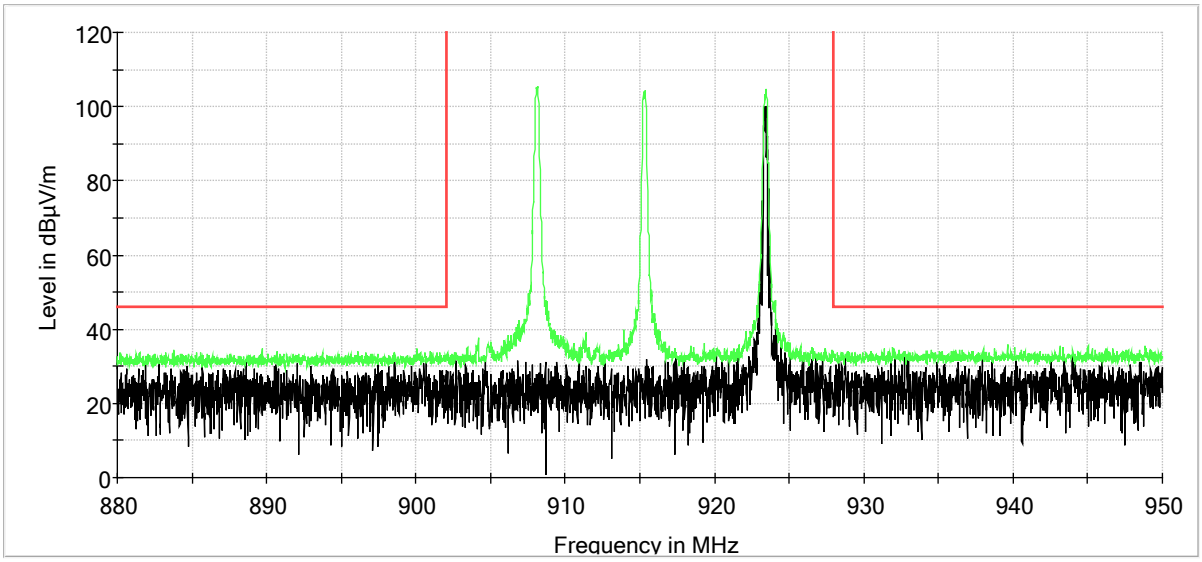
Notes: Plots are peak, max hold prescan data included only to determine what frequencies to investigate and measure. The EUT was initially placed in a semi-anechoic chamber, and rotated in all three orthogonal positions to maximize the emissions. Characterization measurements were then performed to determine at which frequencies significant emissions occurred. These graphs are shown below.

The equipment was fully exercised with all cabling attached to the EUT and was positioned in a Semi-Anechoic Chamber for maximum emissions. While the equipment was energized, the receiving antenna was scanned from 1.0 meter to 4.0 meters in both vertical and horizontal polarities while the turntable was adjusted 360 degrees to determine the maximum field strength. The tables of measured results can be found below.

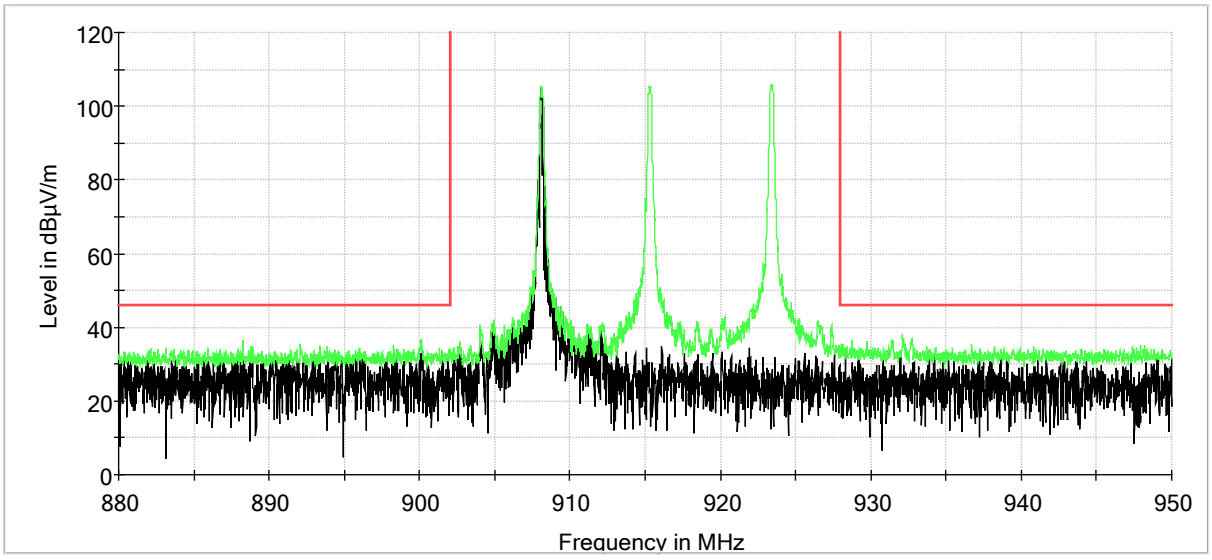
Some of the frequencies did not change with the EUT on or off. At those frequencies, the test distance was shortened to 1 meter and still no emissions from the EUT were visible or over the ambient or limit.

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. The plots are for reference only and the limit lines are not actual limit lines but merely a guide.

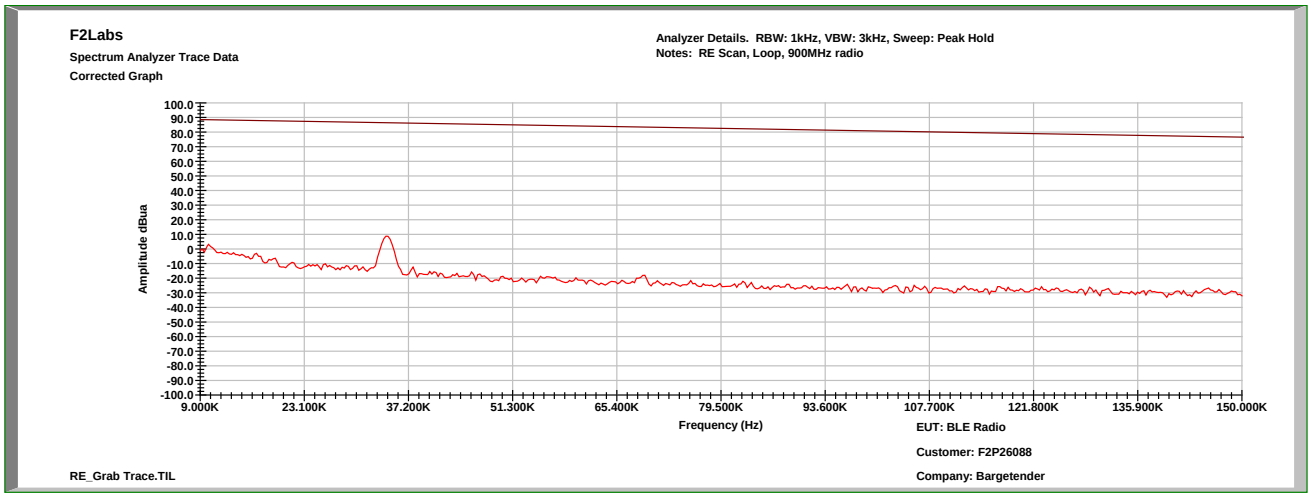
900 MHz: Band Edge, Vertical



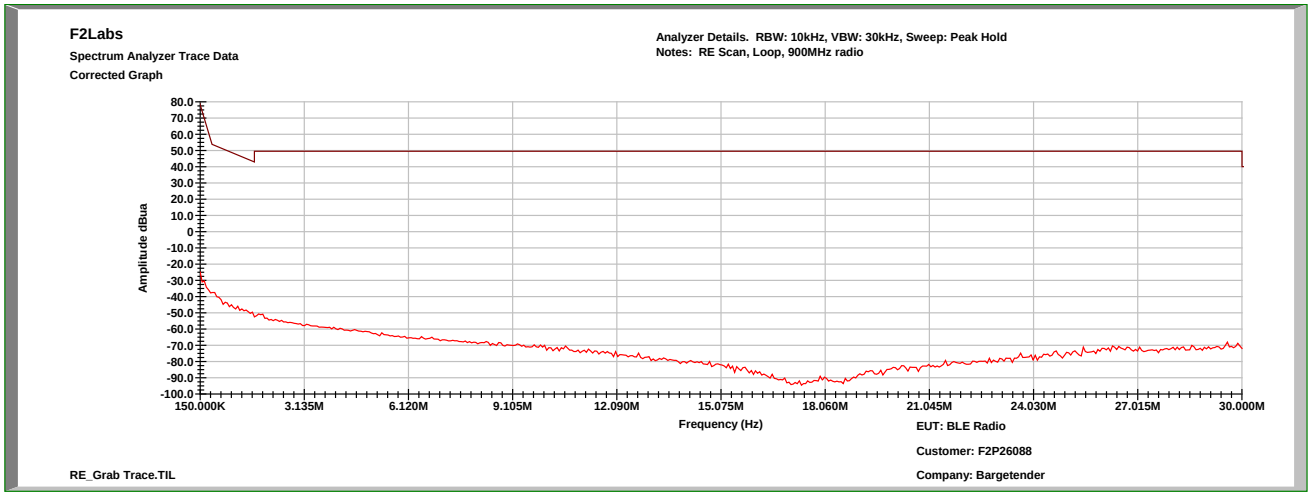
900 MHz: Band Edge, Horizontal



900 MHz: 0.009 MHz to 0.15 MHz



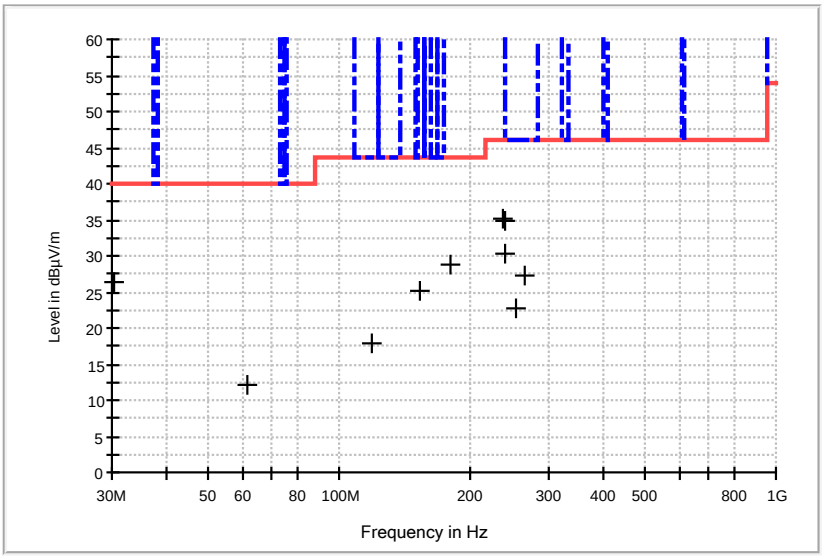
900 MHz: 0.15 MHz to 30 MHz



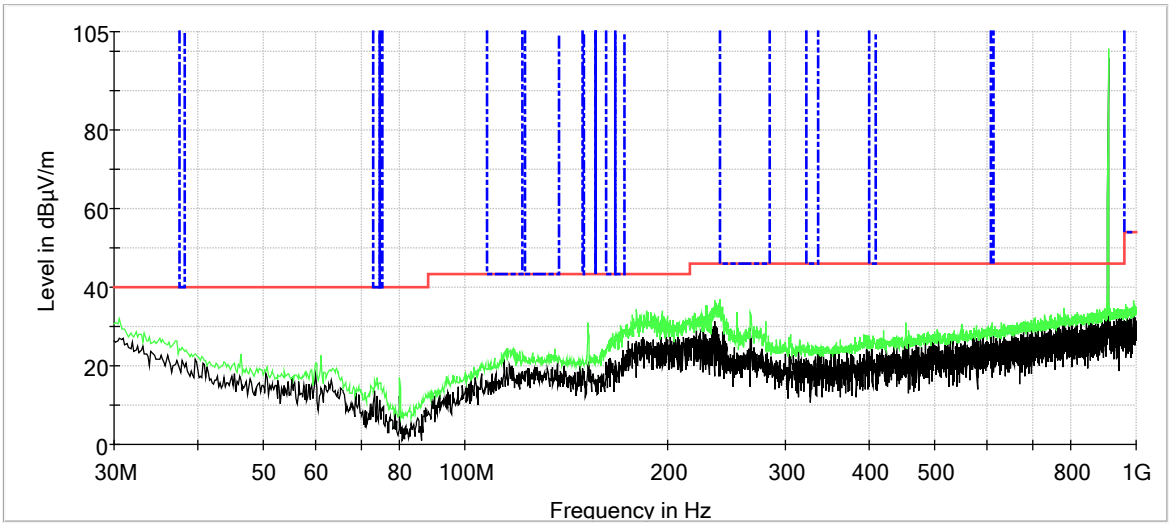
900 MHz: Measurements

QuasiPeak

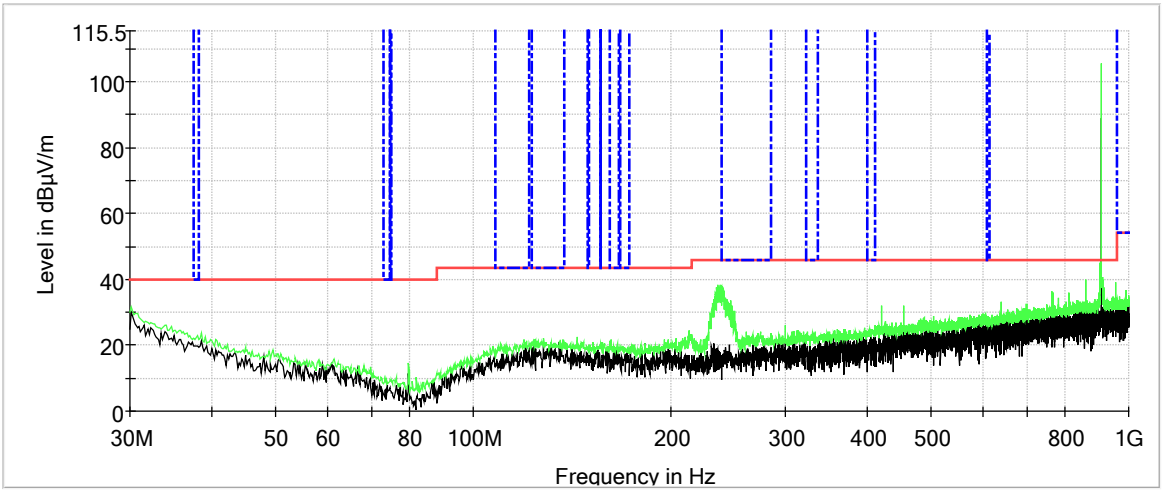
Frequency (MHz)	Antenna Polarization	Antenna Height (cm)	Azimuth (deg)	Reading (dBµV)	Cable Loss & Antenna Factor (dB)	Emission (dBµV/m)	Limit (dBµV/m)	Margin (dB)
30.390000	V	100.00	0.00	27.6	-1.4	26.20	40.0	-13.8
61.040000	V	100.00	0.00	27.0	-14.9	12.10	40.0	-27.9
118.460000	V	100.00	0.00	26.6	-8.6	18.00	43.5	-25.5
152.410000	V	100.00	307.00	34.6	-9.4	25.20	43.5	-18.3
180.160000	V	100.00	168.00	39.2	-10.5	28.70	43.5	-14.8
236.800000	H	100.00	340.00	44.6	-9.6	35.00	46.0	-11.0
239.910000	H	100.00	236.00	44.3	-9.5	34.80	46.0	-11.2
239.910000	V	100.00	176.00	39.8	-9.5	30.30	46.0	-15.7
254.260000	V	100.00	234.00	32.2	-9.4	22.80	46.0	-23.2
266.490000	V	100.00	256.00	35.3	-8.0	27.30	46.0	-18.7



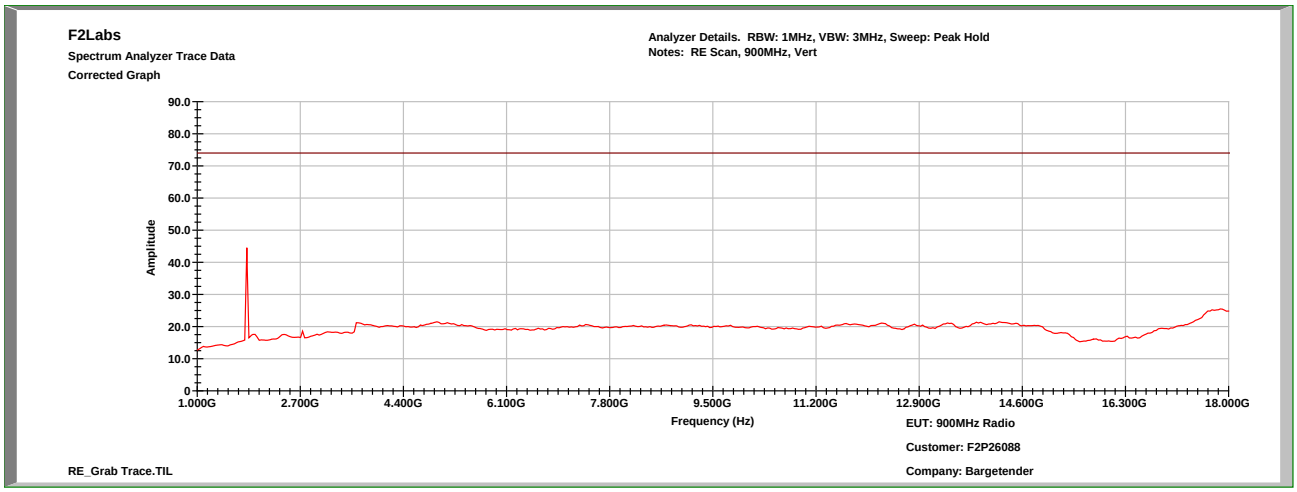
900 MHz: 30 MHz to 1000 MHz, Vertical



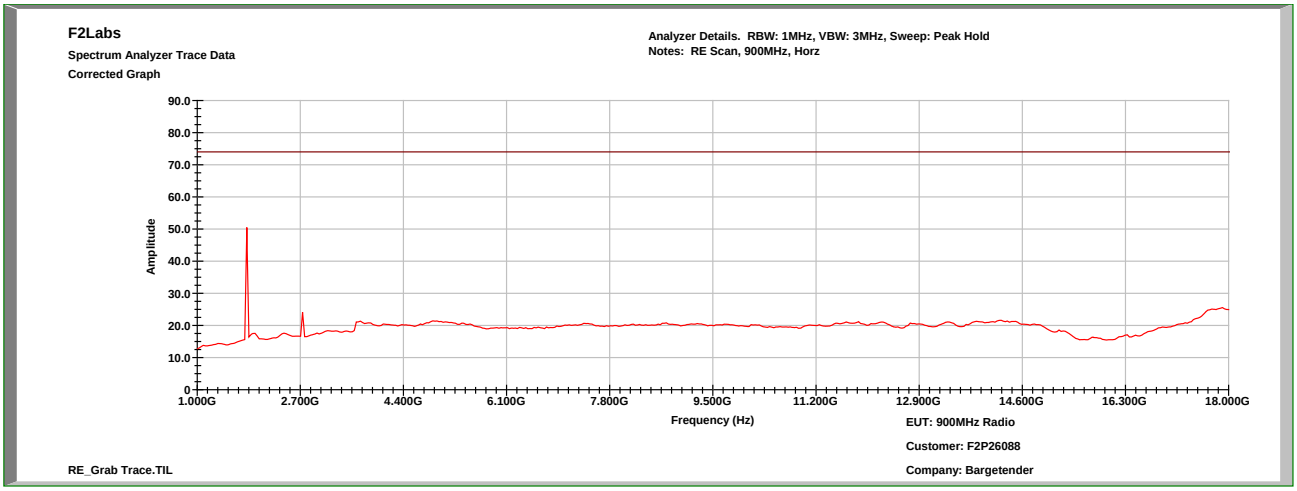
900 MHz: 30 MHz to 1000 MHz, Horizontal



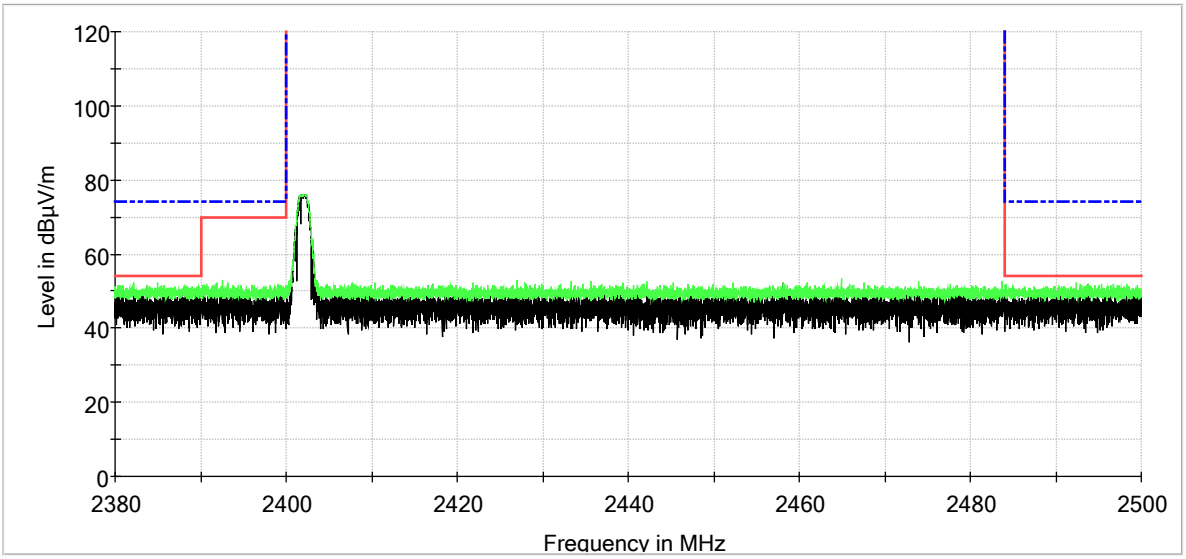
900 MHz: 1 GHz to 18 GHz, Vertical



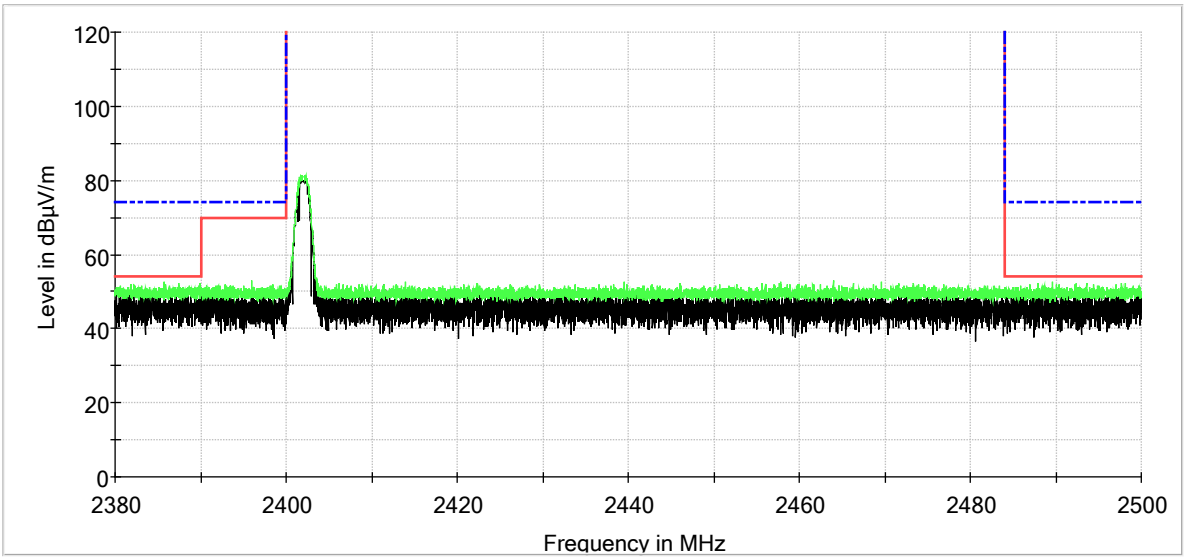
900 MHz: 1 GHz to 18 GHz, Horizontal



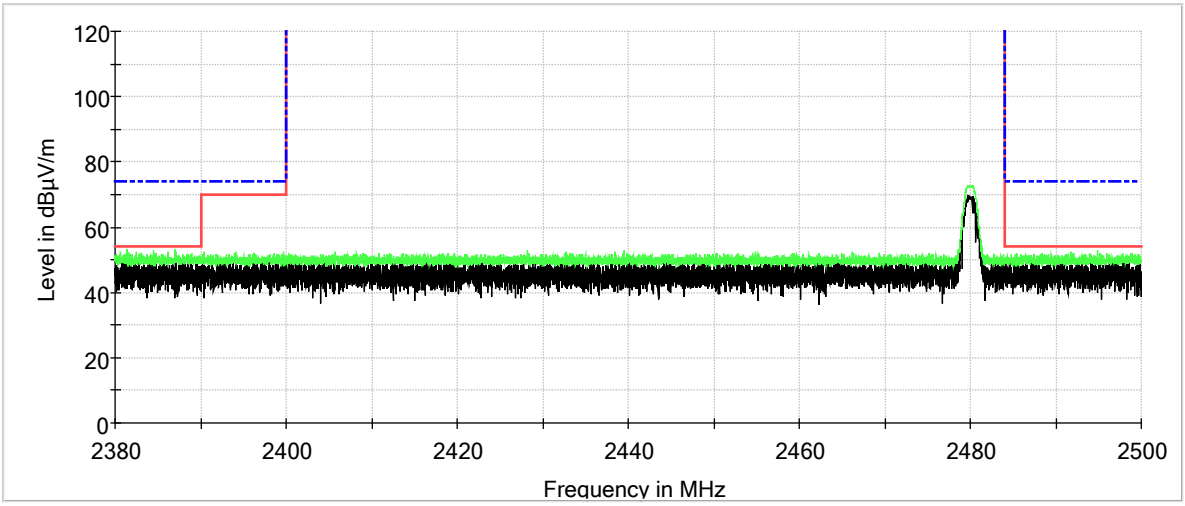
BLE: Low Band Edge, Vertical



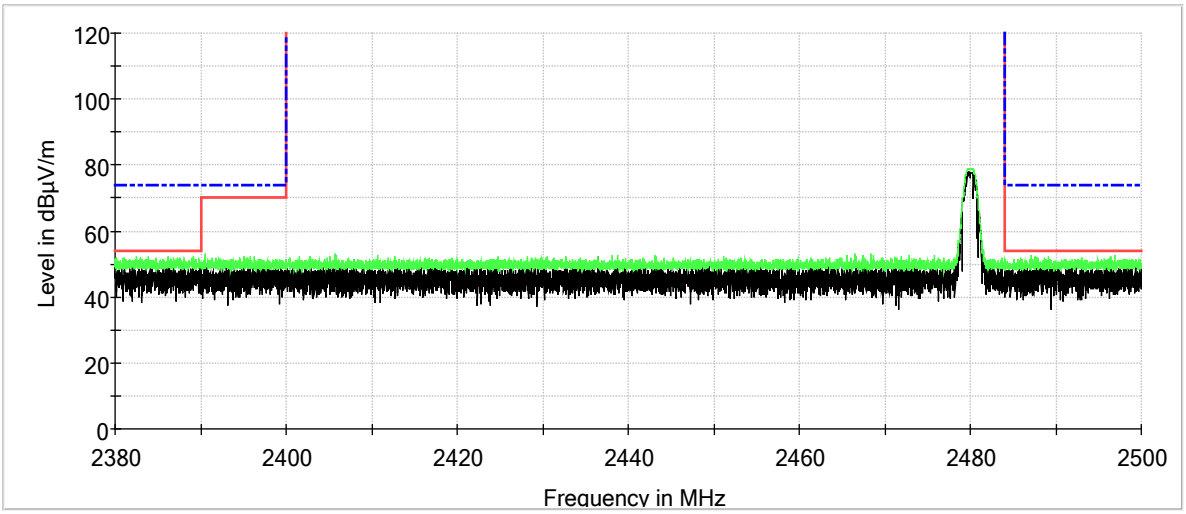
BLE: Low Band Edge, Horizontal



BLE: Upper Band Edge, Vertical



BLE: Upper Band Edge, Horizontal

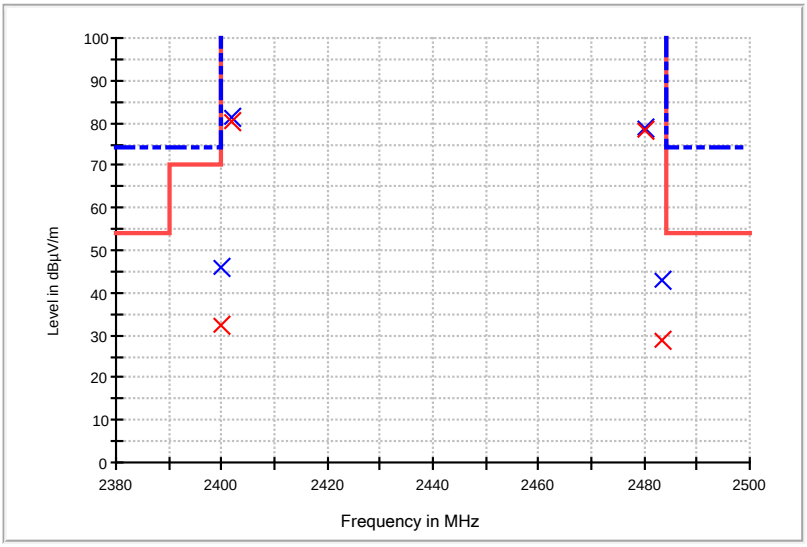


BLE: Band Edge Measurements - MaxPeak

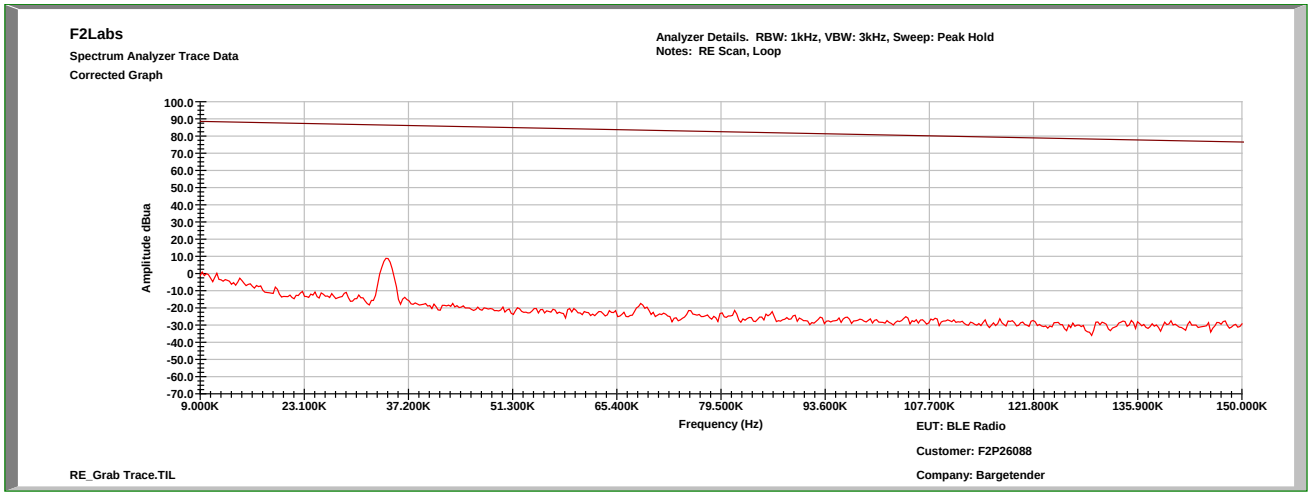
Frequency (MHz)	Antenna Polarization	Reading (dBµV)	Cable Loss & Antenna Factor (dB)	Emission (dBµV/m)	Limit (dBµV/m)	Margin (dB)
2400.000000	H	40.2	5.8	46.00	74.0	-28.0
2402.000000	H	75.6	5.8	81.40	74.0	-
2480.000000	H	73.3	5.7	79.00	74.0	-
2483.500000	H	36.9	5.8	42.70	74.0	-31.3

BLE: Band Edge Measurements - Average

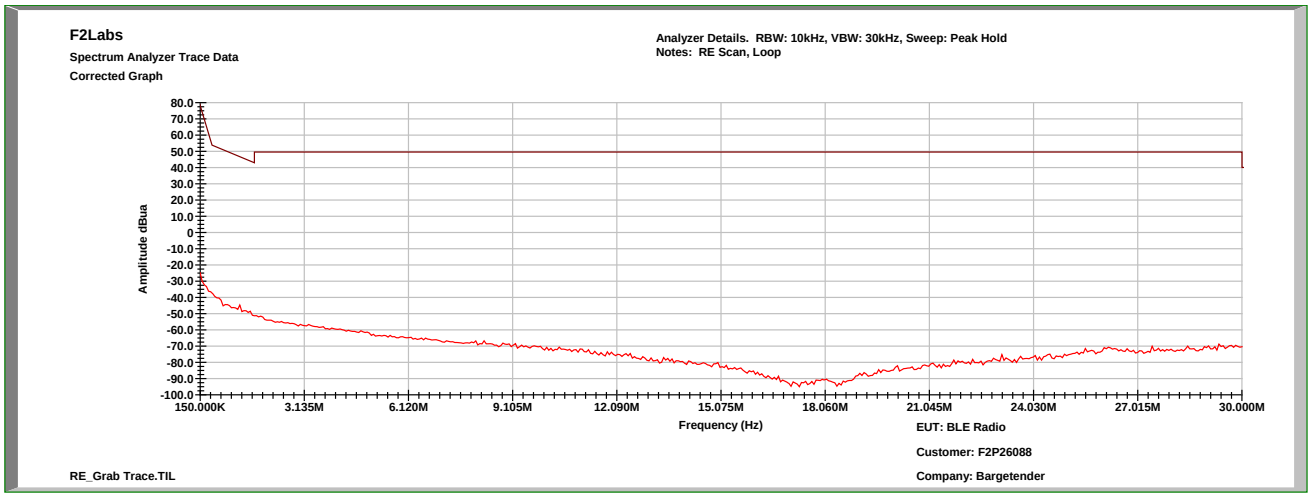
Frequency (MHz)	Antenna Polarization	Reading (dBµV)	Cable Loss & Antenna Factor (dB)	Emission (dBµV/m)	Limit (dBµV/m)	Margin (dB)
2400.000000	H	26.6	5.8	32.40	54.0	-21.6
2402.000000	H	74.7	5.8	80.50	54.0	-
2480.000000	H	72.4	5.7	78.10	54.0	-
2483.500000	H	23.1	5.8	28.90	54.0	-25.1



BLE: 0.009 MHz to 0.15 MHz



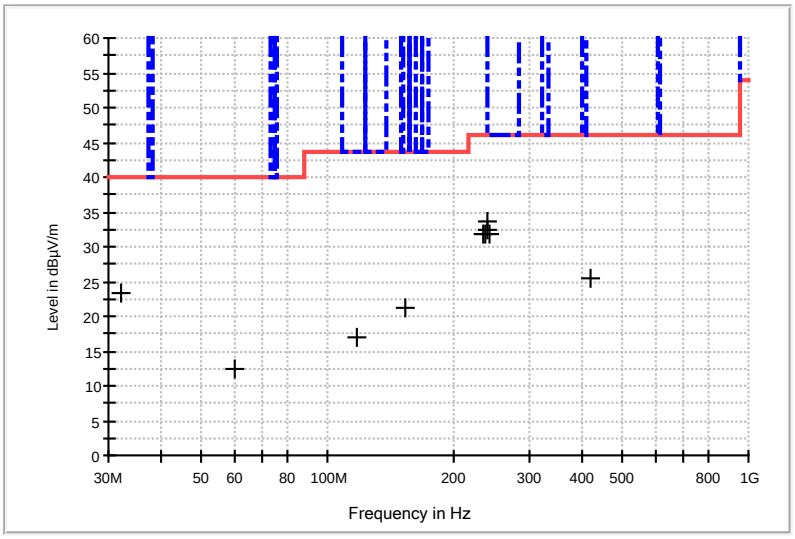
BLE: 0.15 MHz to 30 MHz



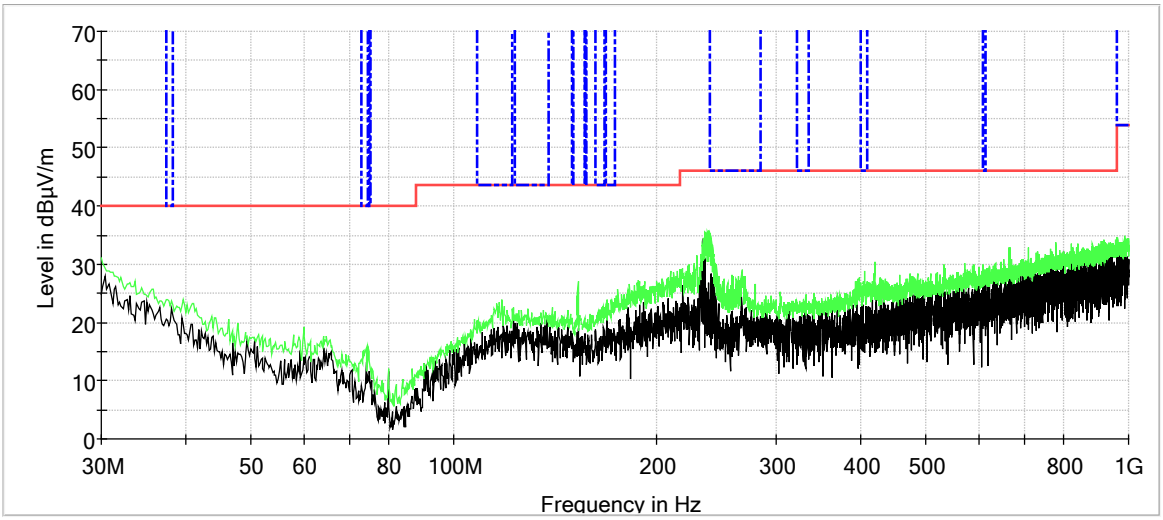
BLE: Measurements

QuasiPeak

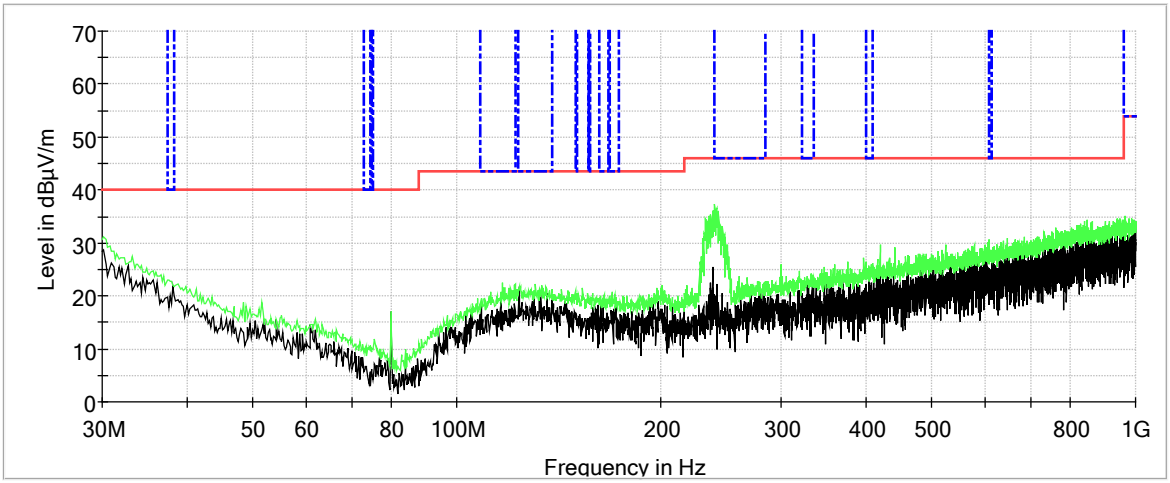
Frequency (MHz)	Antenna Polarization	Antenna Height (cm)	Azimuth (deg)	Reading (dBµV)	Cable Loss & Antenna Factor (dB)	Emission (dBµV/m)	Limit (dBµV/m)	Margin (dB)
32.130000	V	100.00	0.00	25.9	-2.7	23.20	40.0	-16.8
59.880000	V	100.00	0.00	27.5	-15.0	12.50	40.0	-27.5
116.910000	V	100.00	49.00	25.6	-8.7	16.90	43.5	-26.6
152.800000	V	100.00	0.00	30.7	-9.4	21.30	43.5	-22.2
232.540000	H	100.00	248.00	41.7	-9.9	31.80	46.0	-14.2
235.640000	V	100.00	158.00	41.5	-9.7	31.80	46.0	-14.2
238.940000	V	100.00	271.00	41.9	-9.5	32.40	46.0	-13.6
239.910000	H	100.00	96.00	43.2	-9.5	33.70	46.0	-12.3
243.010000	H	100.00	116.00	41.4	-9.5	31.90	46.0	-14.1
420.130000	V	100.00	155.00	29.3	-3.8	25.50	46.0	-20.5



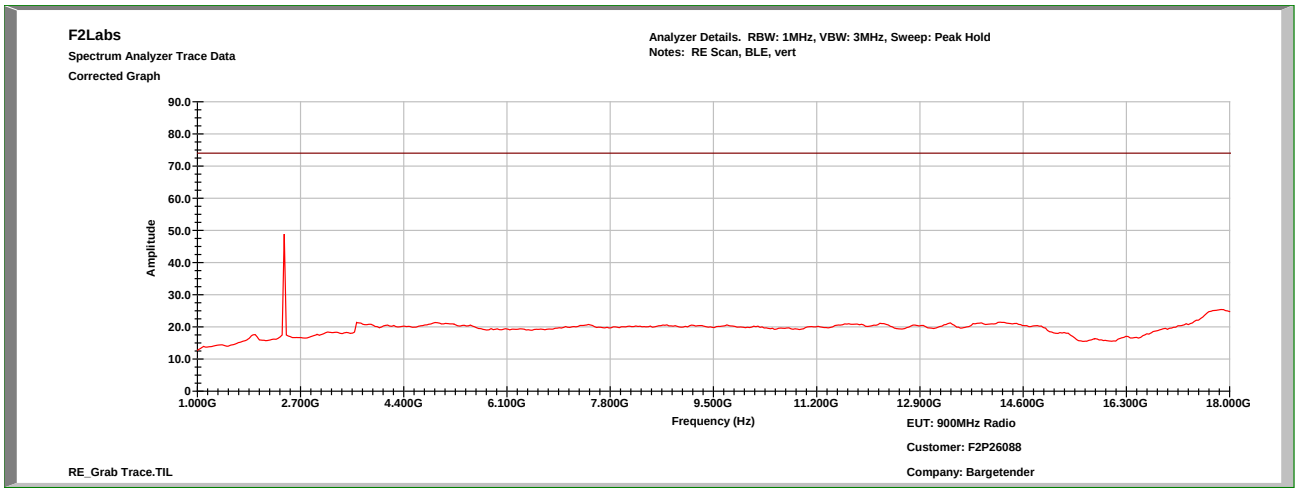
BLE: 30 MHz to 1000 MHz, Vertical



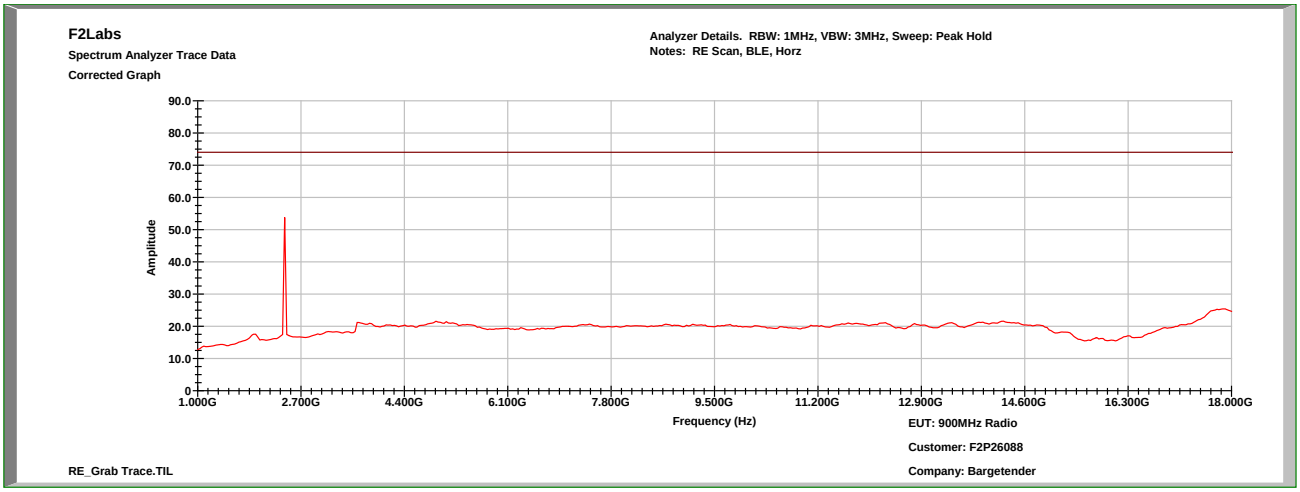
BLE: 30 MHz to 1000 MHz, Horizontal



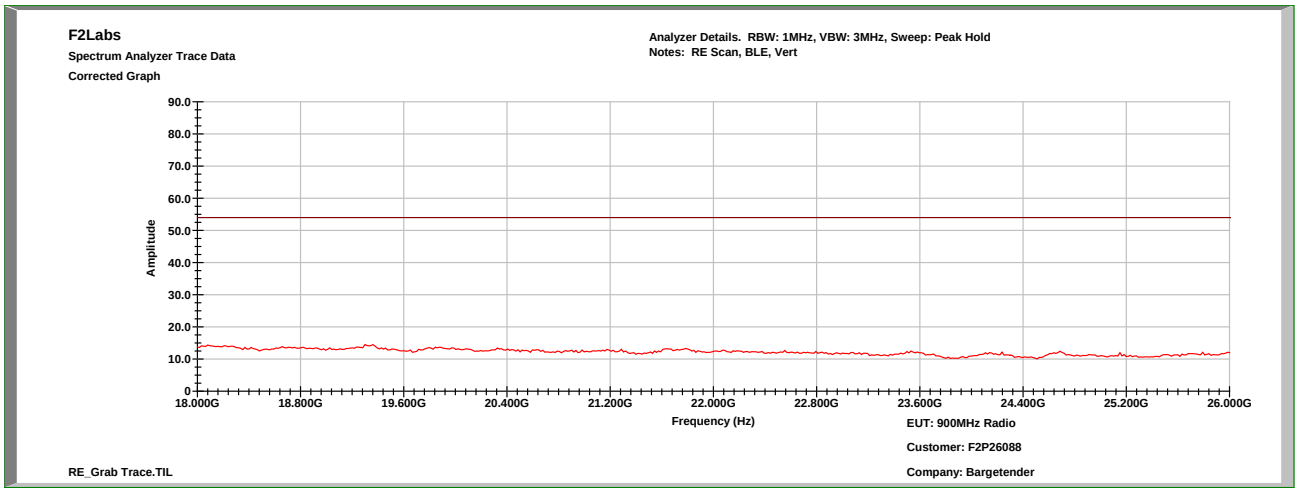
BLE: 1 GHz to 18 GHz, Vertical



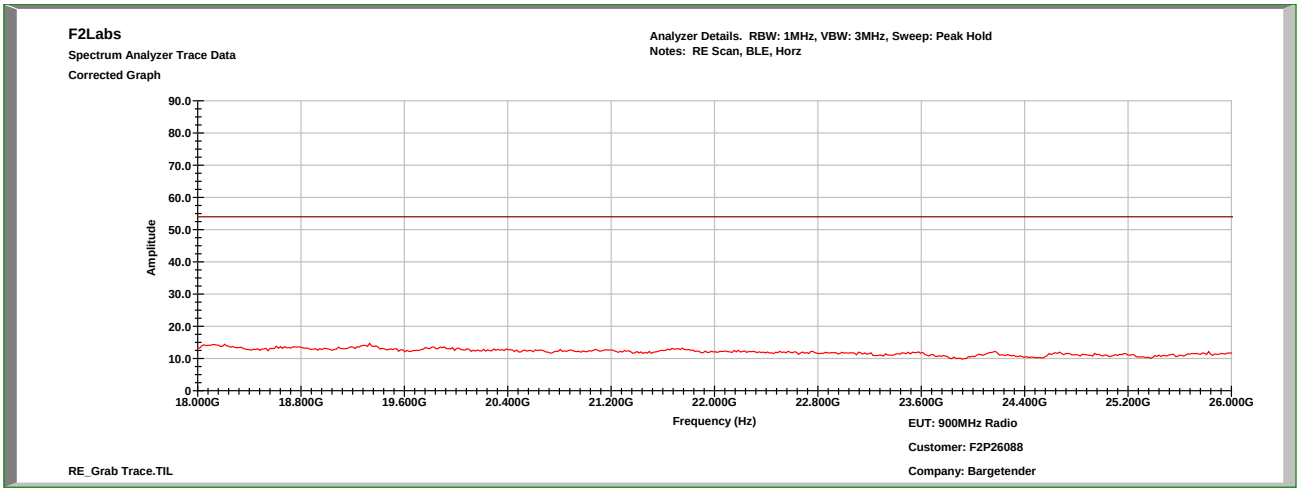
BLE: 1 GHz to 18 GHz, Horizontal



BLE: 18 GHz to 26 GHz, Vertical



BLE: 18 GHz to 26 GHz, Horizontal



12 FCC PART 15.247(e) – PEAK POWER SPECTRAL DENSITY (PSD)

Peak power spectral density measurements were performed.

12.1 Requirements:

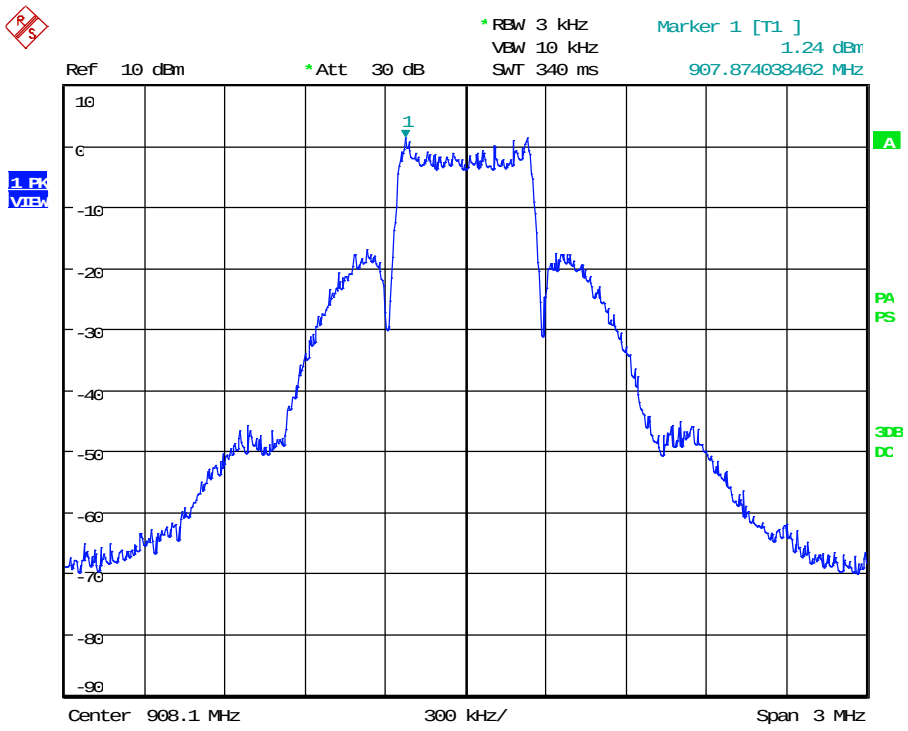
The peak power spectral density shall not exceed +8dBm in any 3 kHz band during any time interval of continuous transmission.

Power spectral density measurements were performed at a resolution bandwidth of 3 kHz (video bandwidth set at 10 KHz). The peak spectral densities were measured at the low, mid, and upper channels.

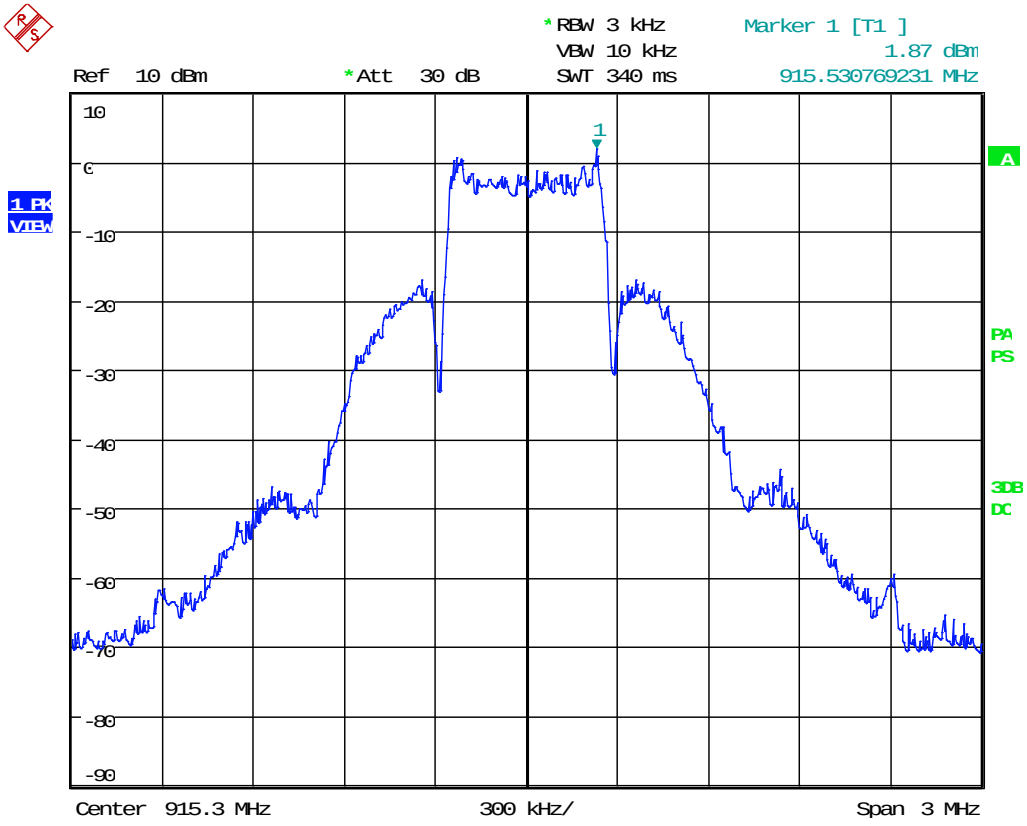
12.2 Peak Power Spectral Density Test Data

Test Date(s):	2021-08-20	Test Engineer:	J. Chiller
Standards:	CFR 47 Part 15.247(e); KDB558074	Air Temperature:	26.2ºC
		Relative Humidity:	39%

900 MHz: Low Channel

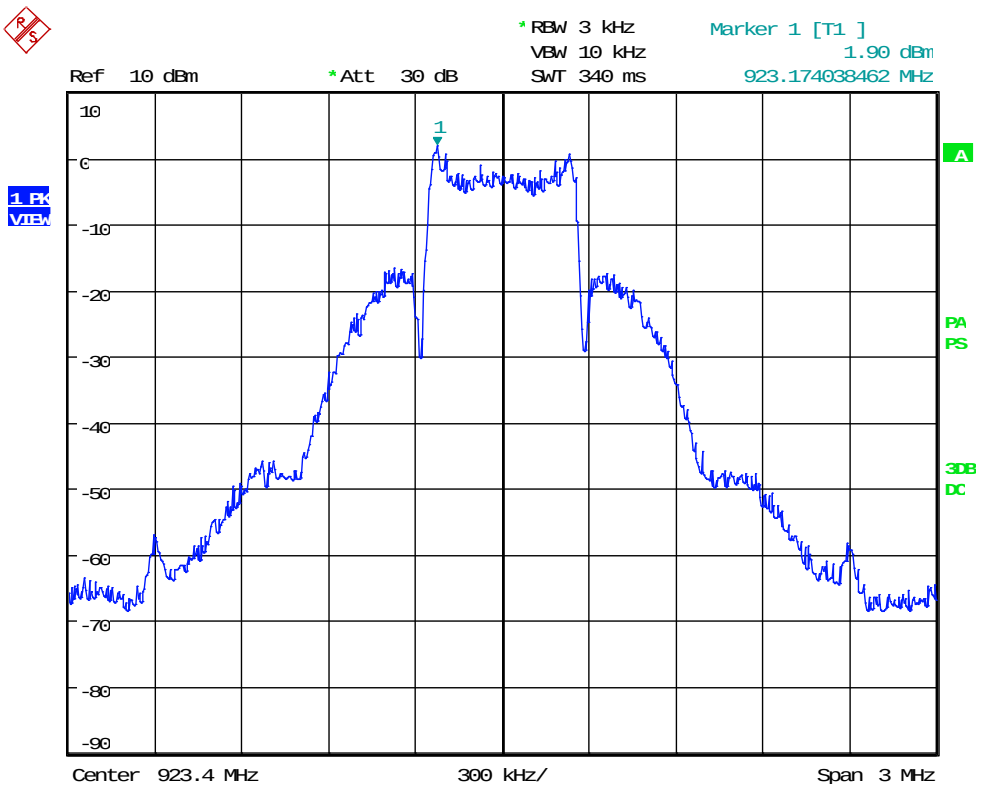


900 MHz: Mid Channel



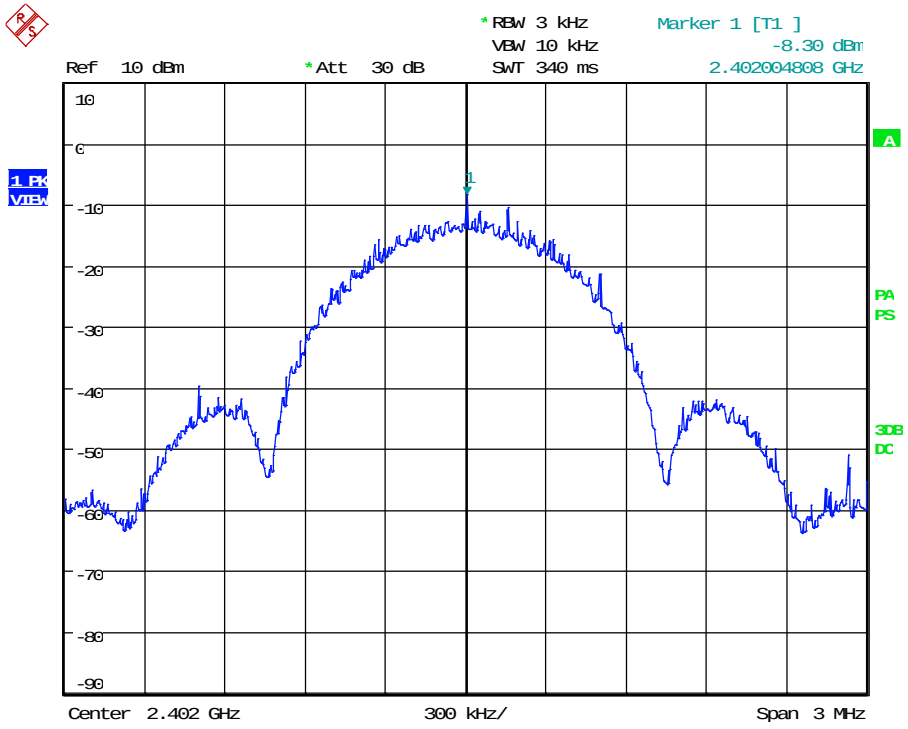
Date: 20.AUG.2021 16:35:16

900 MHz: High Channel



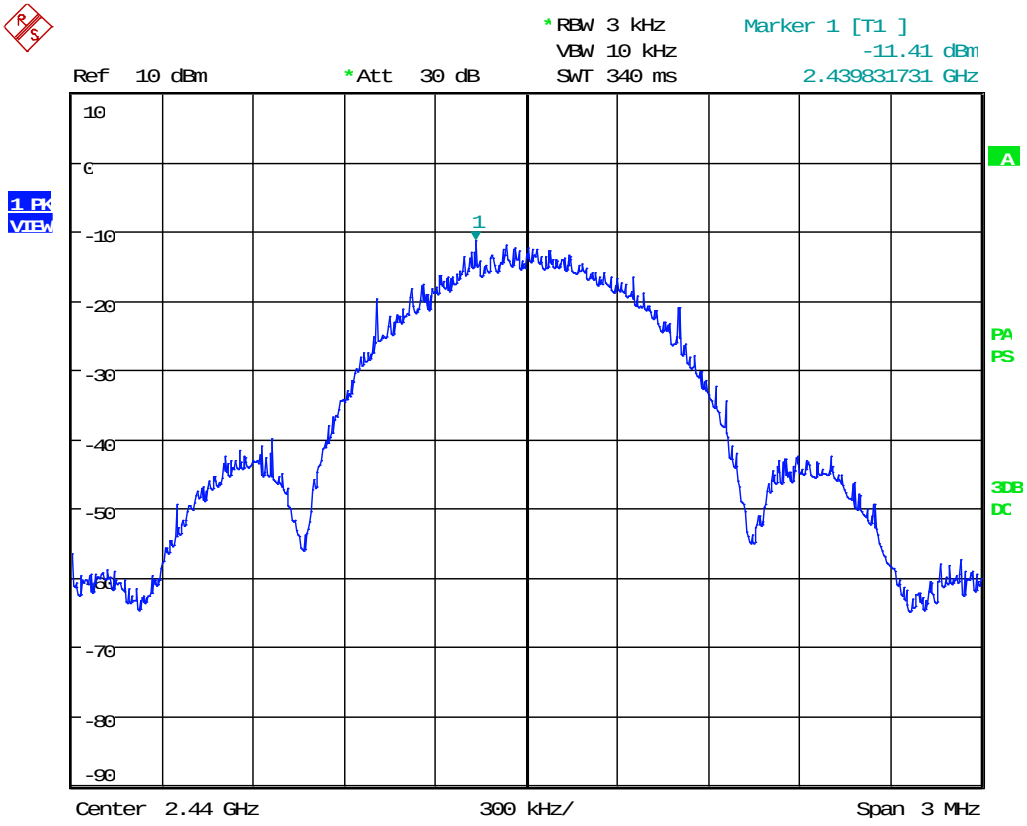
Date: 20.AUG.2021 16:36:18

BLE: Low Channel



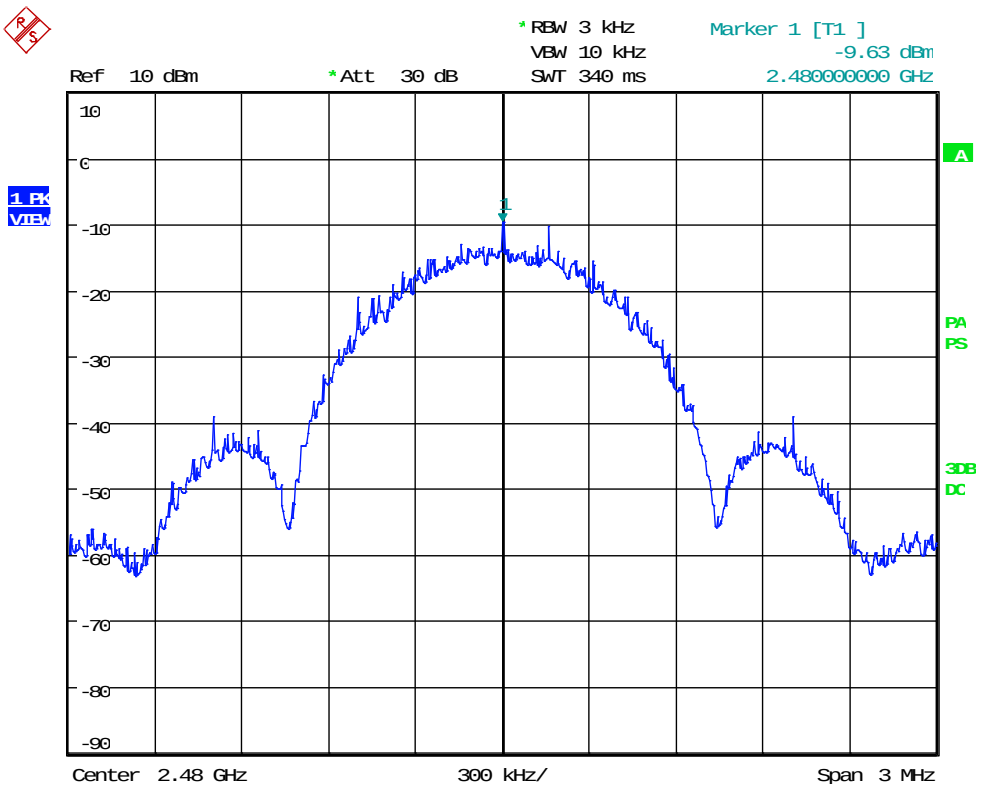
Date: 20.AUG.2021 16:38:10

BLE: Mid Channel



Date: 20.AUG.2021 16:39:10

BLE: High Channel



Date: 20.AUG.2021 16:40:12

13 CONDUCTED EMISSIONS

13.1 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 μH/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 (dBμV)	
	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.

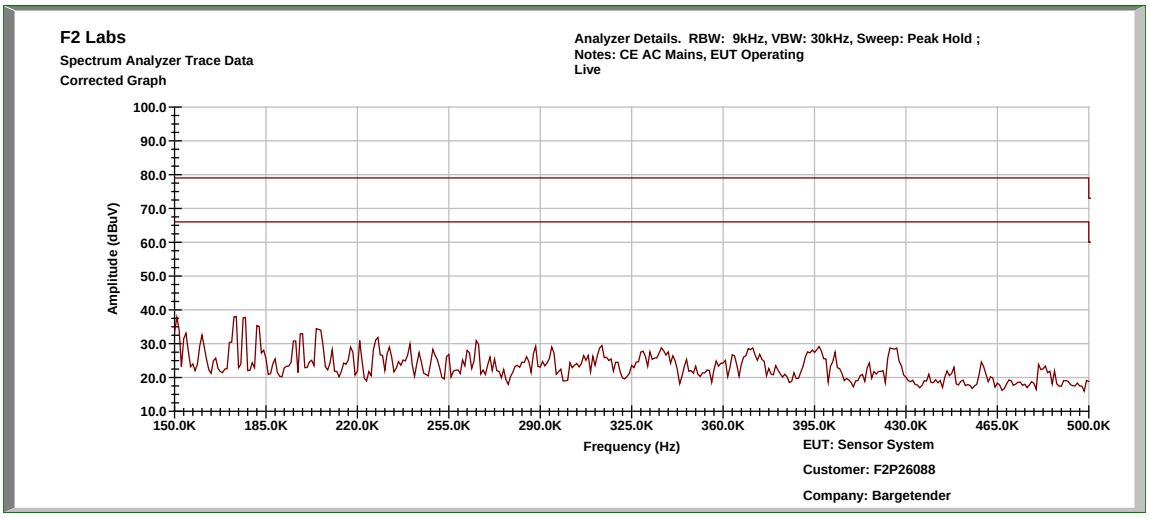
13.2 Procedure

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.

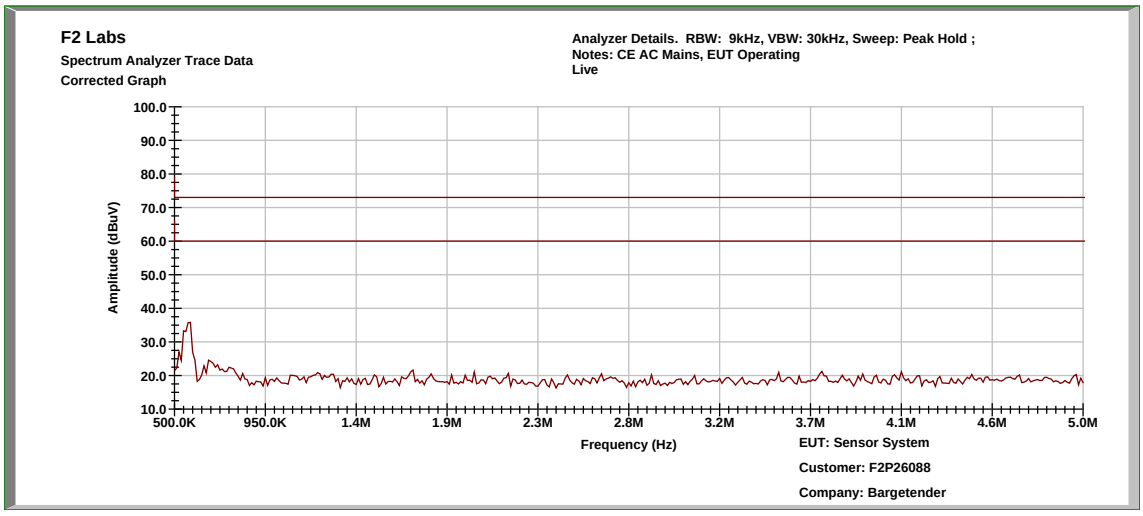
13.3 Conducted Emissions Test Data

Test Date:	2021-08-23	**Test Engineer:**	J. Chiller
Rule:	15.207	**Air Temperature:**	22.8º C
Test Results:	Pass	**Relative Humidity:**	41%

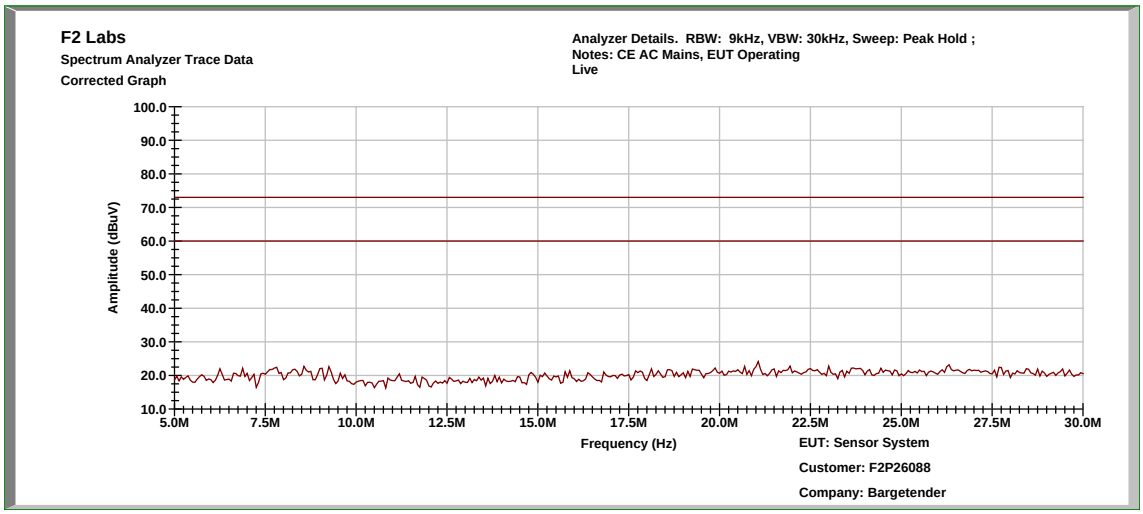
Conducted Test – Live: 0.15 MHz to 0.5 MHz



Conducted Test – Live: 0.5 MHz to 5.0 MHz

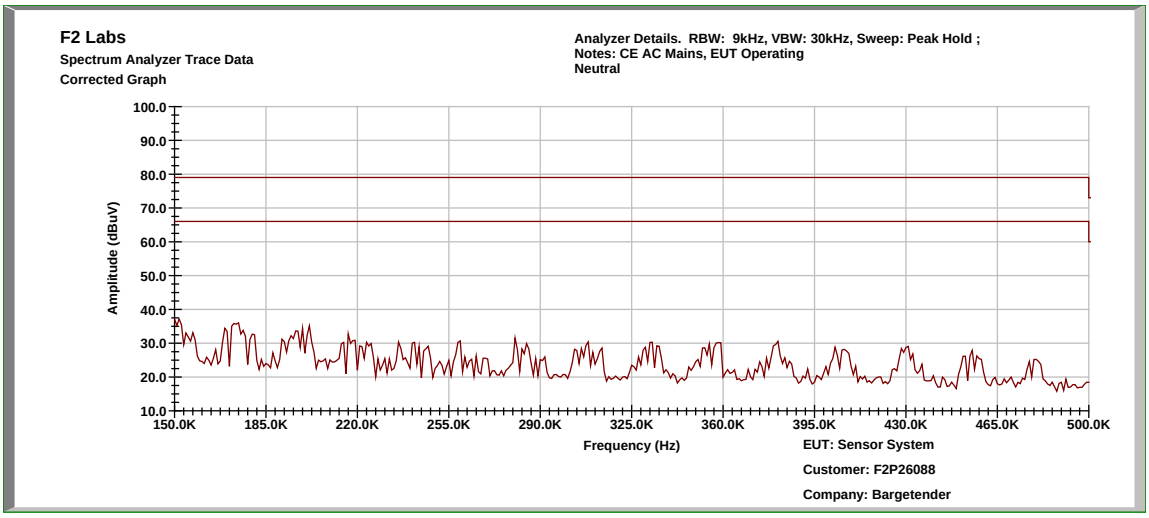


Conducted Test – Live: 5.0 MHz to 30.0 MHz

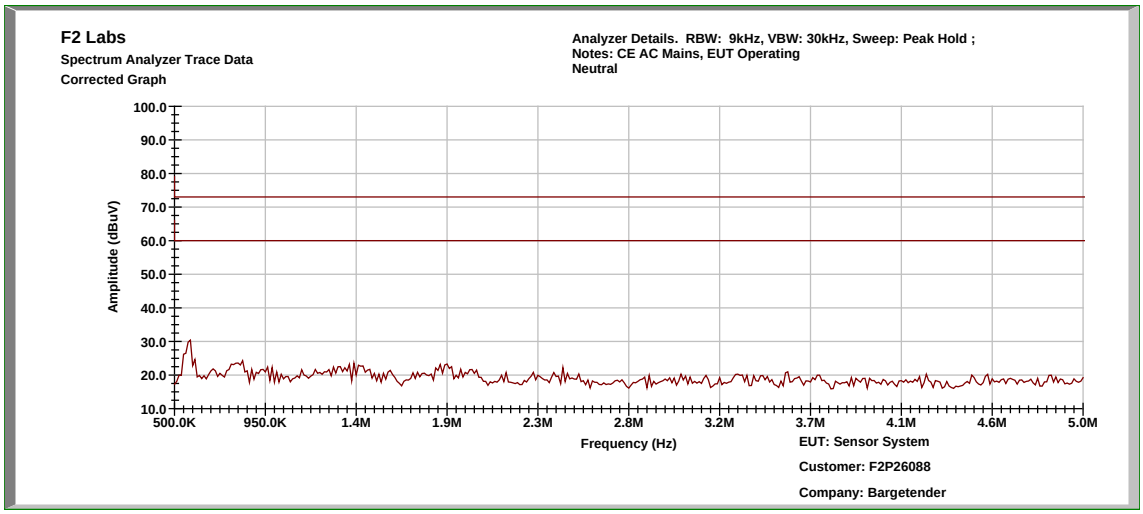


Note: No measurable points of significance.

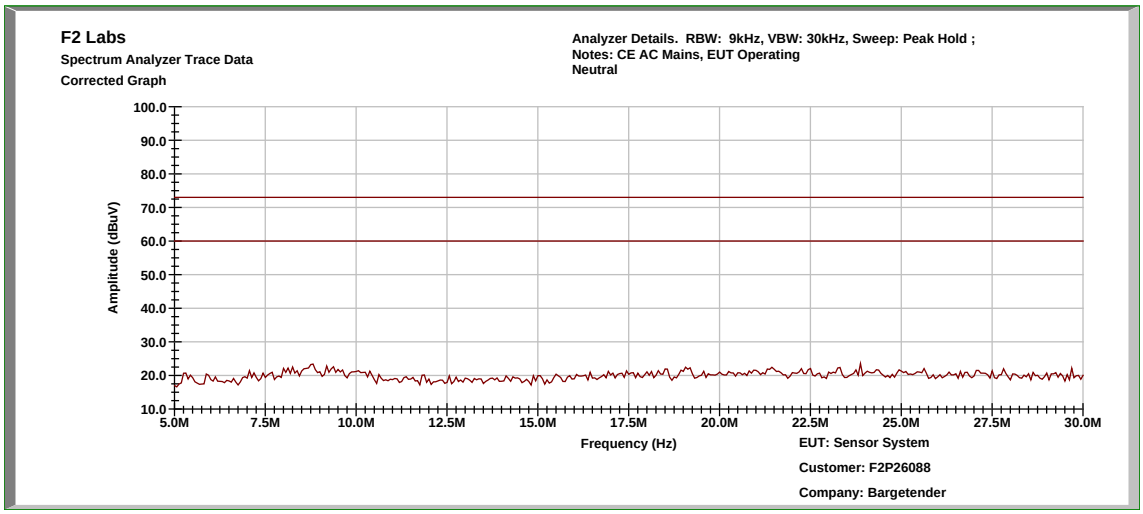
Conducted Test – Neutral: 0.15 MHz to 0.5 MHz



Conducted Test – Neutral: 0.5 MHz to 5.0 MHz



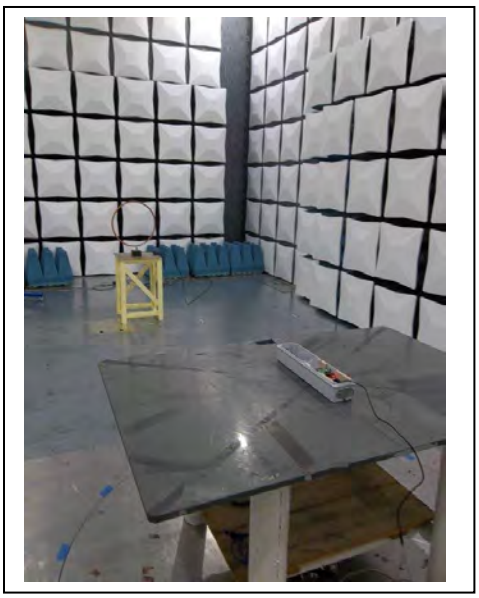
Conducted Test – Neutral: 5.0 MHz to 30.0 MHz



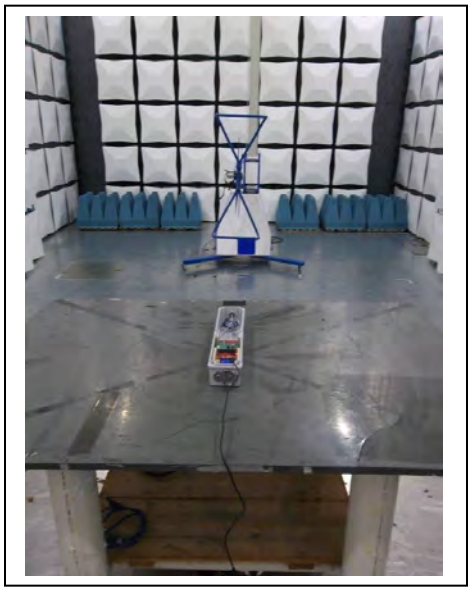
Note: No measurable points of significance.

14 PHOTOGRAPHS, TEST SETUPS

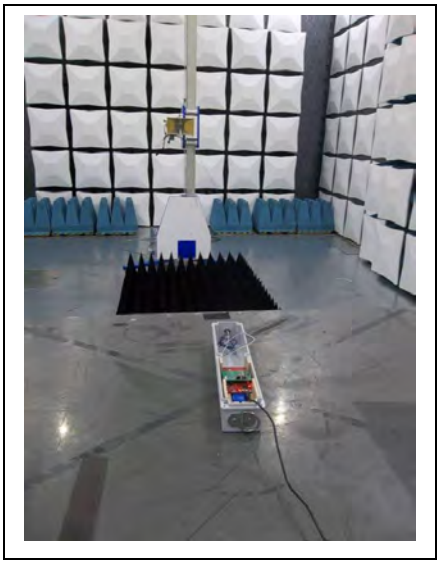
Radiated Spurious Emission: 0.009 MHz to 30 MHz



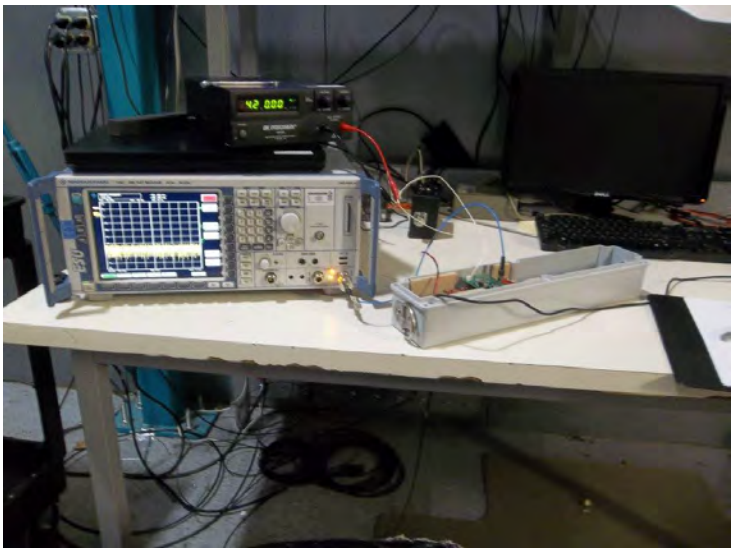
Radiated Spurious Emission: 30 MHz to 1000 MHz



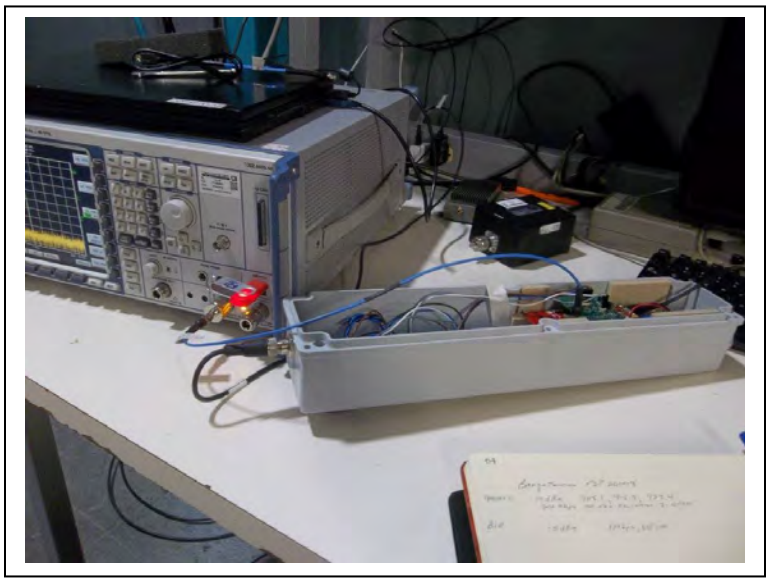
Radiated Spurious Emission, Greater than 1 GHz



Voltage Variations



Conducted Output Power, Peak Power Spectral Density, Occupied Bandwidth, and Conducted Spurious Emissions



Conducted Emissions