FCC Part 15.247

TEST REPORT

For

Syntronix Corporation

8F, No.6, Li-Hsin 6th RD., Hsinchu Taiwan

FCC ID: 2AUBRB5JPA

Report Type:	**Product Type:**
Original Report	BT 5.0 MESH Module

Report Producer : Jojo Lu

Report Number : RXZ211103002RF01

Report Date : 2022-02-25

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Revision History

Revision	No.	Report Number	Issue Date	Description	Author/ Revised by
0.0	RXZ211103002	RXZ211103002RF01	2022-02-25	Original Report	Jojo Lu

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1 General Information

1.1 Product Description for Equipment under Test (EUT)

Applicant	Syntronix Corporation
	8F, No.6, Li-Hsin 6th RD., Hsinchu Taiwan
Manufacturer	Syntronix Corporation
	8F, No.6, Li-Hsin 6th RD., Hsinchu Taiwan
Brand(Trade) Name	Syntronix Corporation
Product (Equipment)	BT 5.0 MESH Module
Main Model Name	SBF508M-21
Series Model Name	SBF508M-21T; SBF508M-21U
Model Discrepancy	SBF508M-21: Use 32K Xtal , use QFN48 chipset SBF508M-21T: Drop the 32K Xtal and use the QFN48 chipset SBF508M-21U: Remove (32K Xtal , 1 pole, 2 capacitors) and use QFN48 chipset The above changes do not affect RF parameters.
Frequency Range	2402 ~ 2480 MHz
Transmit Power	BLE(125kbps) Mode : -1.07 dBm BLE(500kbps) Mode : -1.09 dBm BLE(1Mbps) Mode : -1.05 dBm BLE(2Mbps) Mode : -1.06 dBm
Modulation Technique	GFSK
Transmit Data Rate	125kbps, 500kbps, 1Mbps, 2Mbps
Channel Separation	2 MHz
Power Operation (Voltage Range)	☐ AC 120V/60Hz ☐ Adapter I/P ☐ By AC Power Cord ☐ PoE
	☒ DC Type ☐ Battery ☐ DC Power Supply: ☒ External from USB Cable 5V ☐ External DC Adapter
	☐ Host System
Received Date	Nov 03, 2021
Date of Test	Dec 30, 2021 ~ FEB 17, 2022

*All measurement and test data in this report was gathered from production sample serial number: RXZ211103002-01 ~ RXZ211103002-03 (Assigned by BACL, New Taipei Laboratory).

1.2 Objective

This report is prepared on behalf of *Syntronix Corporation* in accordance with Part 2, Subpart J, Part 15, Subparts A and C of the Federal Communication Commission's rules.

1.3 Related Submittal(s)/Grant(s)

N/A.

1.4 Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.
KDB 558074 D01 15.247 Meas Guidance v05r02

1.5 Statement of Compliance

Decision Rule: No, (The test results do not include MU judgment)

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.
The determination of the test results does not require consideration of the uncertainty of the measurement, unless the assessment is required by customer agreement, regulation or standard document specification.
Bay Area Compliance Laboratories Corp. (New Taipei Laboratory) is not responsible for the authenticity of the information provided by the applicant that affects the test results.

1.6 Measurement Uncertainty

Parameter		Uncertainty
AC Mains		+/- 2.36 dB
RF output power, conducted		+/- 0.93 dB
Power Spectral Density, conducted		+/- 0.93 dBm
Occupied Bandwidth		+/- 0.35 MHz
Unwanted Emissions, conducted		+/- 1.69 dBm
Radiated Emission	30 MHz~1GHz	+/- 5.22 dB
	1 GHz~18 GHz	+/- 6.12 dB
	18 GHz~40 GHz	+/- 4.99 dB
Temperature		+/- 1.27 °C
Humidity		+/- 3 %

1.7 Environmental Conditions

Test Site	Test Date	Temperature (℃)	Relative Humidity (%)	ATM Pressure (hPa)	Test Engineer
AC Line Conducted Emissions	2022/1/10	19.6	53	1010	David Hsu
Radiation Spurious Emissions	2022/2/16~2022/2/17	19.8~21.1	67~72	1010	David Hsu
Conducted Spurious Emissions	2022/02/14	21.9	59	1010	Howard Ho
6 dB Emission Bandwidth	2022/02/14	21.9	59	1010	Howard Ho
Maximum Output Power	2022/02/14	21.9	59	1010	Howard Ho
100 kHz Bandwidth of Frequency Band Edge	2022/02/14	21.9	59	1010	Howard Ho
Power Spectral Density	2022/02/14	21.9	59	1010	Howard Ho

1.8 Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (New Taipei Laboratory) to collect test data is located on

☒70, Lane 169, Sec. 2, Datong Road, Xizhi Dist., New Taipei City 22183, Taiwan, R.O.C.

Bay Area Compliance Laboratories Corp.(New Taipei Laboratory) is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code: 3732) and the FCC designation No.TW3732 under the Mutual Recognition Agreement (MRA) in FCC Test.

2 System Test Configuration

2.1 Description of Test Configuration

For BLE mode, there are totally 40 channels.

Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	20	2442
1	2404	--	--
2	2406	--	--
3	2408	37	2476
--	--	38	2478
19	2440	39	2480

For BLE Modes were tested with channel 0, 19 and 39.

The system was configured for testing in engineering mode, which was provided by manufacturer.

2.2 Equipment Modifications

No modification was made to the EUT.

2.3 EUT Exercise Software

The test software was used "BlueLitE_1115R"

Test Frequency		Low	Mid	High
Power Level Setting	BLE 1Mbps	Default	Default	Default
	BLE 2Mbps	Default	Default	Default
	BLE 125kbps	Default	Default	Default
	BLE 500kbps	Default	Default	Default

2.4 Support Equipment List and Details

Description	Manufacturer	Model Number	S/N
NB	DELL	E6410	8N7PXN1

2.5 External Cable List and Details

Cable Description	Length (m)	From	To
Micro USB Cable	1	EUT	NB

2.6 Test Mode

Pre-scan

AC Line Conducted Emissions and Radiated Spurious Emissions

Mode 1: SBF508M-21 (Sample serial number: RXZ211103002-01)

Mode 2: SBF508M-21T (Sample serial number: RXZ211103002-02)

Mode 3: SBF508M-21U (Sample serial number: RXZ211103002-03)

Worst case is the Mode 1: SBF508M-21

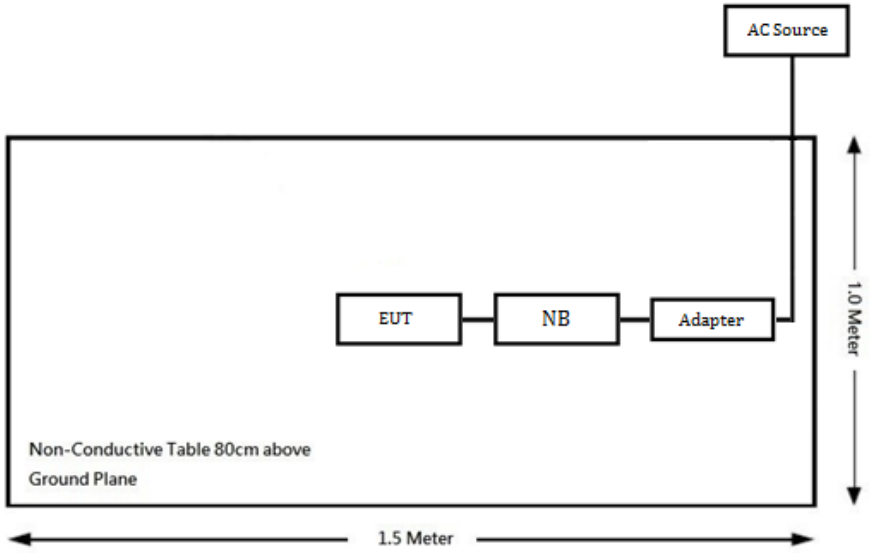
Full System (Model 1: SBF508M-21) for all test item.

2.7 Block Diagram of Test Setup

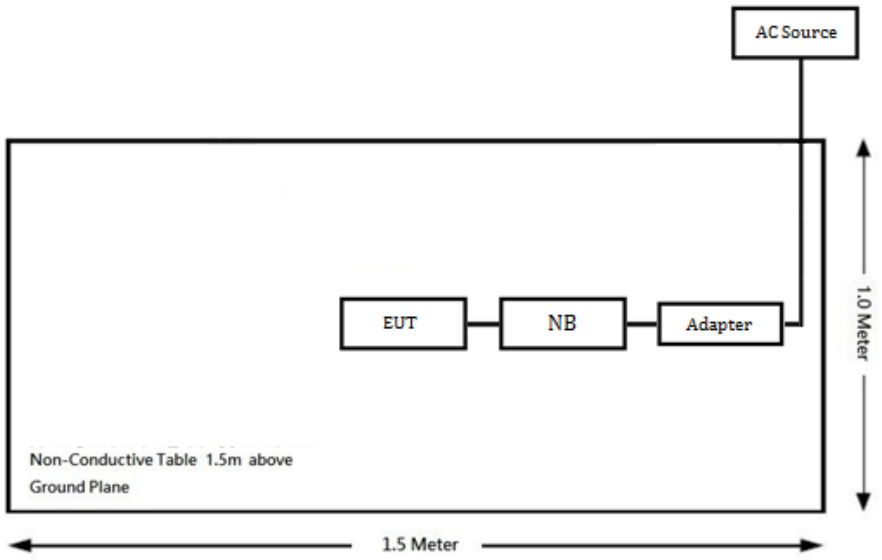
See test photographs attached in setup photos for the actual connections between EUT and support equipment.

Radiation:

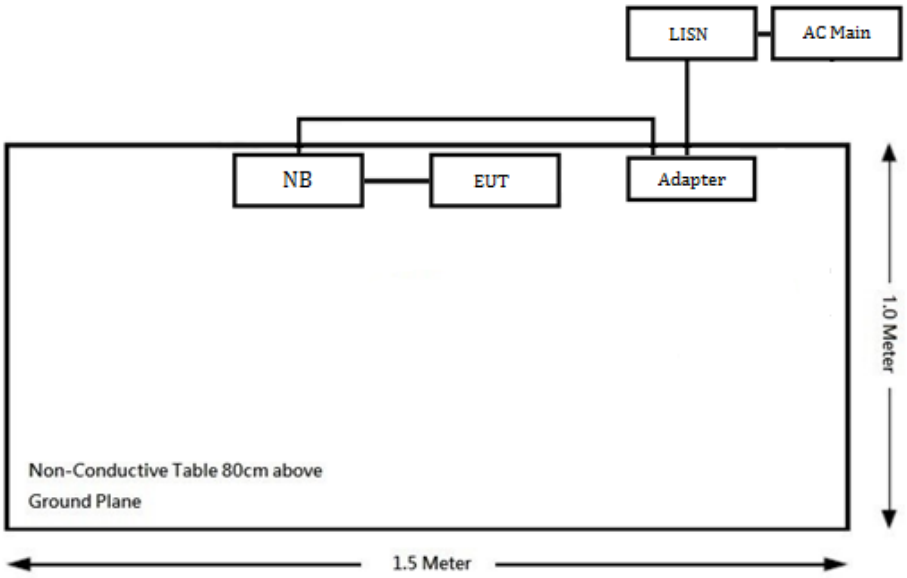
Below 1GHz:



Above 1GHz:



Conduction:



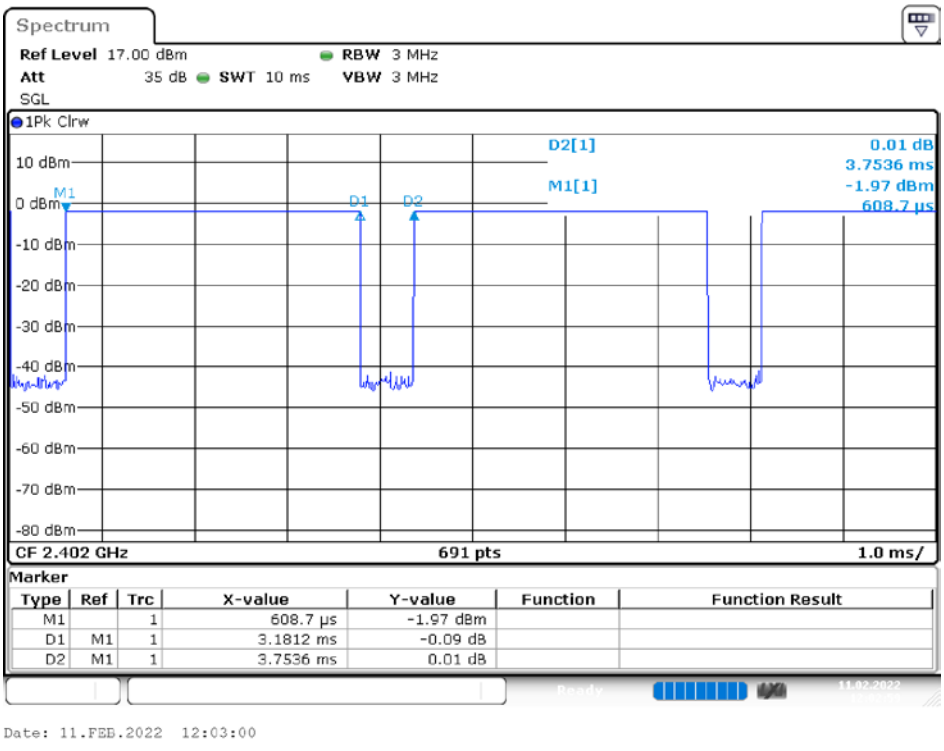
2.8 Duty Cycle

The duty cycle as below:

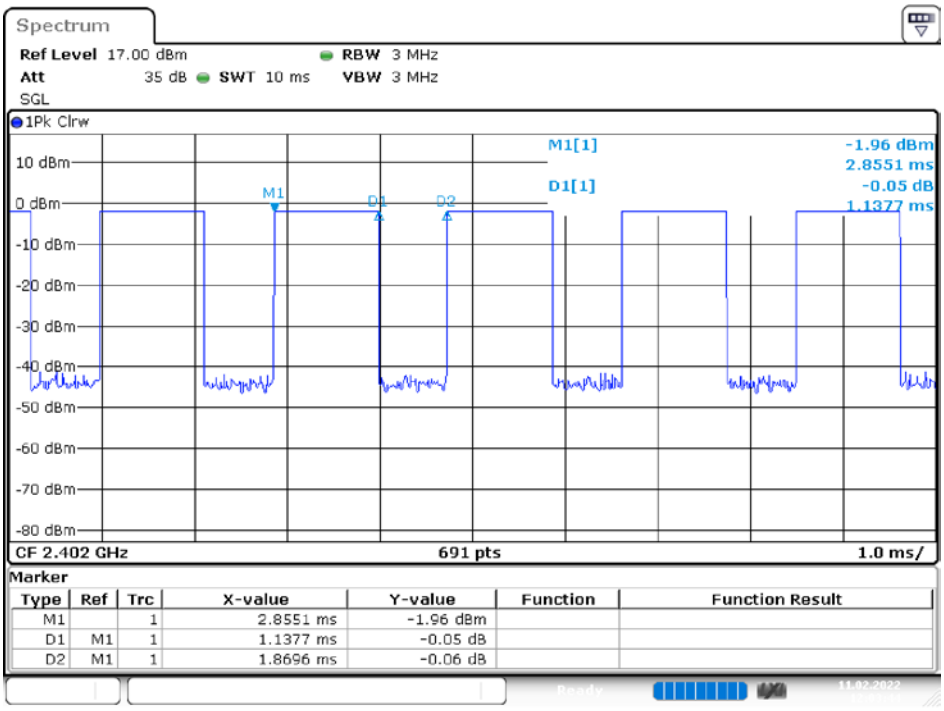
Radio Mode	T_{on} (ms)	$T_{on}+T_{off}$ (ms)	Duty Cycle (%)
BLE(125k)	3.181	3.754	85
BLE(500k)	1.138	1.870	61
BLE(1M)	0.456	0.630	72
BLE(2M)	0.268	0.623	43

Please refer to the following plots.

BLE(125k) Mode

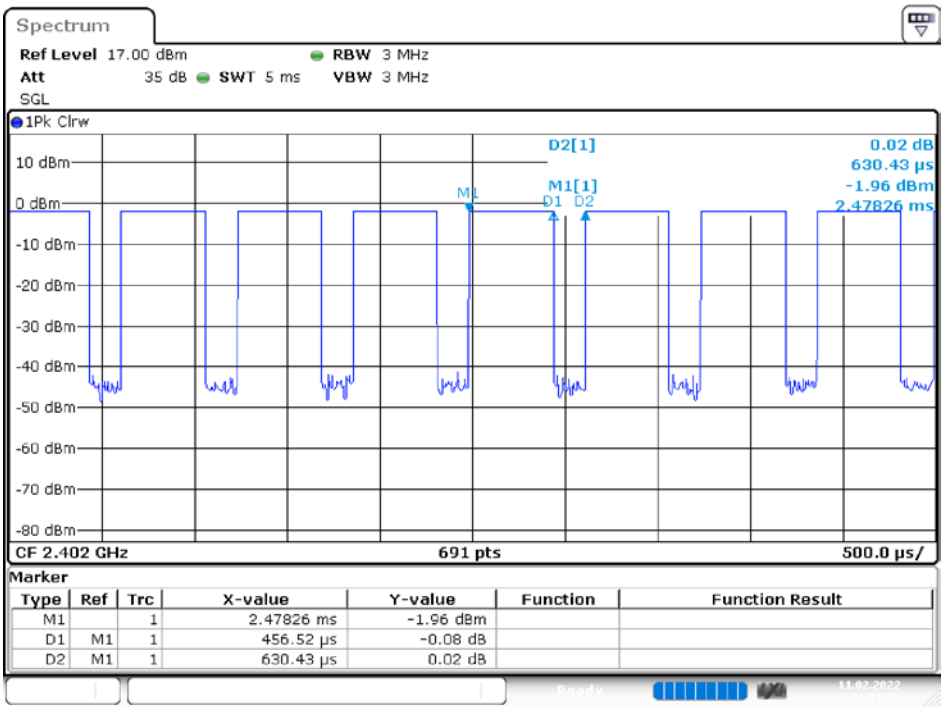


BLE(500k) Mode



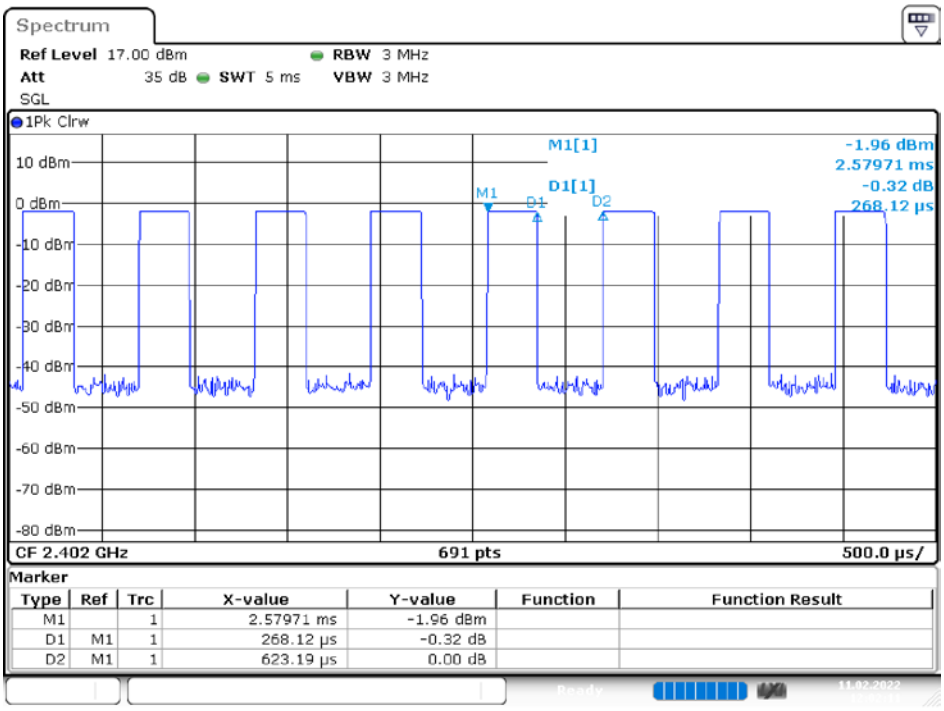
Date: 11.FEB.2022 12:03:44

BLE(1M) Mode



Date: 11.FEB.2022 12:01:34

BLE(2M) Mode



Date: 11.FEB.2022 12:02:11

Summary of Test Results

FCC Rules	Description of Test	Results
§15.247(i), §1.1310, §2.1091	Maximum Permissible Exposure (MPE)	Compliance
§15.203	Antenna Requirement	Compliance
§15.207(a)	AC Line Conducted Emissions	Compliance
§15.205, §15.209, §15.247(d)	Spurious Emissions	Compliance
§15.247(a)(2)	6 dB Emission Bandwidth	Compliance
§15.247(b)(3)	Maximum Peak Output Power	Compliance
§15.247(d)	100 kHz Bandwidth of Frequency Band Edge	Compliance
§15.247(e)	Power Spectral Density	Compliance

3 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due Date
AC Line Conduction Room (CON-A)					
LISN	Rohde & Schwarz	ENV216	101248	2021/06/08	2022/06/07
EMI Test Receiver	Rohde & Schwarz	ESW8	100947	2021/7/23	2022/7/22
Pulse Limiter	Rohde & Schwarz	ESH3Z2	TXZEM104	2021/7/29	2022/7/28
RF Cable	EMEC	EM-CB5D	1	2021/6/11	2022/6/10
Software	AUDIX	E3	V9.150826k	N.C.R	N.C.R
Radiated Room (966-A)					
Bilog Antenna with 6 dB Attenuator	SUNOL SCIENCES & MINI-CIRCUITS	JB6/UNAT-6+	A050115/15542_01	2022/2/14	2023/2/13
Horn Antenna	EMCO	SAS-571	1020	2021/4/23	2022/4/22
Horn Antenna	ETS-Lindgren	3116	62638	2021/8/11	2022/8/10
Preamplifier	Sonoma	310N	130602	2021/6/8	2022/6/7
Preamplifier	A.H. system Inc.	PAM-0118P	470	2021/3/15	2022/3/14
Microware Preamplifier	EM Electronics Corporation	EM18G40G	60656	2021/12/27	2022/12/26
Spectrum Analyzer	Rohde & Schwarz	FSV40	101435	2022/1/13	2023/1/12
EMI Test Receiver	Rohde & Schwarz	ESR7	101419	2021/11/9	2022/11/8
Micro flex Cable	UTIFLEX	UFB197C-1-2362-70U-70U	225757-001	2022/1/24	2023/1/23
Coaxial Cable	COMMATE	PEWC	8Dr	2021/12/24	2022/12/23
Coaxial Cable	UTIFLEX	UFB311A-Q-1440-300300	220490-006	2022/1/24	2023/1/23
Coaxial Cable	JUNFLON	J12J102248-00-B-5	AUG-07-15-044	2021/12/24	2022/12/23
Cable	EMC	EMC105-SM-SM-10000	201003	2022/1/24	2023/1/23
Coaxial Cable	ROSNOL	K1K50-UP0264-K1K50-450CM	160309-1	2021/1/24	2023/1/23

Coaxial Cable	ROSNOL	K1K50-UP0264-K1K50-50CM	15120-1	2022/1/18	2023/1/17
Software	Farad	EZ_EMC	BACL-03A1	N.C.R	N.C.R
Conducted Room					
Spectrum Analyzer	Rohde & Schwarz	FSV40	101204	2021/6/10	2022/6/9
Cable	UTIFLEX	UFA210A	9435	2021/10/5	2022/10/4
Power Sensor	KEYSIGHT	U2021XA	MY54080018	2022/1/24	2023/1/23
Attenuator	MINI-CIRCUITS	BW-S10W5+	1419	2022/2/11	2023/2/10
Attenuator	MCL	BW-S20W5+	1430	2021/6/23	2022/6/22

***Statement of Traceability:** BACL Corp. attests that all of the calibrations on the equipment items listed above were traceable to the SI System of Units via the R.O.C. Center for Measurement Standards of the Electronics Testing Center, Taiwan (ETC) or to another internationally recognized National Metrology Institute (NMI), and were compliant with the current Taiwan Accreditation Foundation (TAF) requirements

4 FCC §15.247(i), §1.1310, § 2.1091 - Maximum Permissible Exposure (MPE)

5.1 Applicable Standard

According to subpart 15.247(i)and subpart §1.1310, systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

Limits for Maximum Permissible Exposure (MPE) (§1.1310, §2.1091)

(B) Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	**Electric Field Strength (V/m)**	**Magnetic Field Strength (A/m)**	**Power Density (mW/cm^2)**	**Averaging Time (minutes)**
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*($180/f^2$)	30
30–300	27.5	0.073	0.2	30
300–1500	/	/	f/1500	30
1500–100,000	/	/	1.0	30

f = frequency in MHz; * = Plane-wave equivalent power density;

According to §1.1310 and §2.1091 RF exposure is calculated.

Calculated Formulary:

Predication of MPE limit at a given distance

$S = PG/4\pi R^2$ = power density (in appropriate units, e.g. mW/cm^2);

P = power input to the antenna (in appropriate units, e.g., mW);

G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain;

R = distance to the center of radiation of the antenna (appropriate units, e.g., cm);

5.2 RF Exposure Evaluation Result

MPE evaluation:

Mode	Frequency Range (MHz)	Antenna Gain		Target Power		Evaluation Distance (cm)	Power Density (mW/cm^2)	MPE Limit (mW/cm^2)
		(dBi)	(numeric)	(dBm)	(mW)			
BLE (125k)	2402-2480	0.00	1.00	-1	0.794	20	0.0002	1
BLE (500k)	2402-2480	0.00	1.00	-1	0.794	20	0.0002	1
BLE (1M)	2402-2480	0.00	1.00	-1	0.794	20	0.0002	1
BLE (2M)	2402-2480	0.00	1.00	-1	0.794	20	0.0002	1

Result: The EUT meets exemption requirement- RF exposure evaluation greater than **20cm** distance specified in § 2.1091. If the device built into a host as a portable usage, the additional RF exposure evaluation may be required as specified by§ 2.1093.

6 FCC §15.203 – Antenna Requirements

6.1 Applicable Standard

According to § 15.203,

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the user of a standard antenna jack or electrical connector is prohibited.

And according to FCC 47 CFR section 15.247 (b), if the transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna does not exceed 6dBi.

6.2 Antenna Information

Manufacturer	Model	Type	Antenna Gain
Syntronix	IFMA	PCB Antenna	0 dBi

Result: Compliance

7 FCC §15.207(a) – AC Line Conducted Emissions

7.1 Applicable Standard

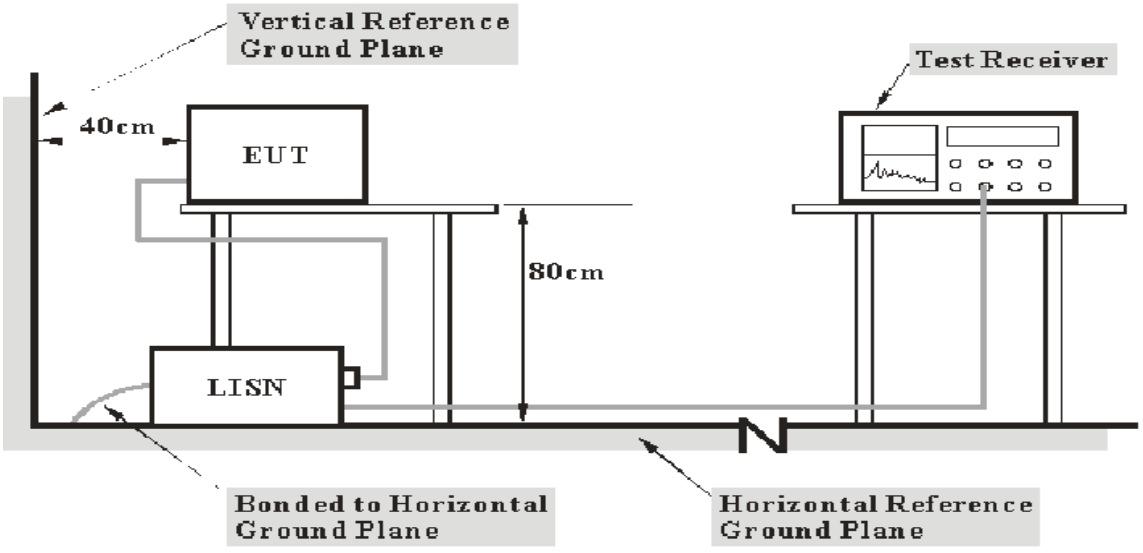
According to §15.207

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 frequencies ranges.

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-Peak	Average
0.15-0.5	66 to 56 Note 1	56 to 46 Note 1
0.5-5	56	46
5-30	60	50

Note 1: Decreases with the logarithm of the frequency.

7.2 EUT Setup



Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.207 limits.

7.3 EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150kHz to 30MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations

Frequency Range	IF B/W
150kHz – 30MHz	9kHz

7.4 Test Procedure

During the conducted emission test, the adapter was connected to the outlet of the LISN.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All data was recorded in the Quasi-peak and average detection mode.

7.5 Corrected Factor & Margin Calculation

The factor is calculated by adding LISN/ISN VDF (Voltage Division Factor), Cable Loss and Transient Limiter Attenuation. The basic equation is as follows:

Factor = LISN VDF + Cable Loss + Transient Limiter Attenuation

The “Over Limit” column of the following data tables indicates the degree of compliance with the applicable limit. For example, an over limit of -7 dB means the emission is 7 dB below the limit. The equation for Over Limit calculation is as follows:

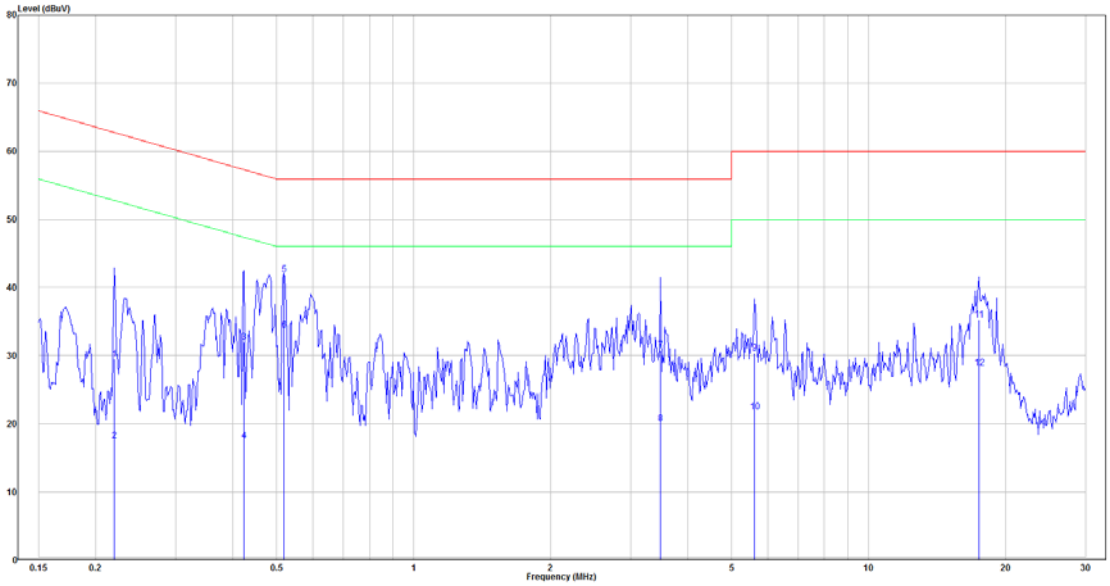
Over Limit = Level – Limit Line

7.6 Test Results

Test Mode: Transmitting

(Worst case is BLE (1M) mode, Low Channel)

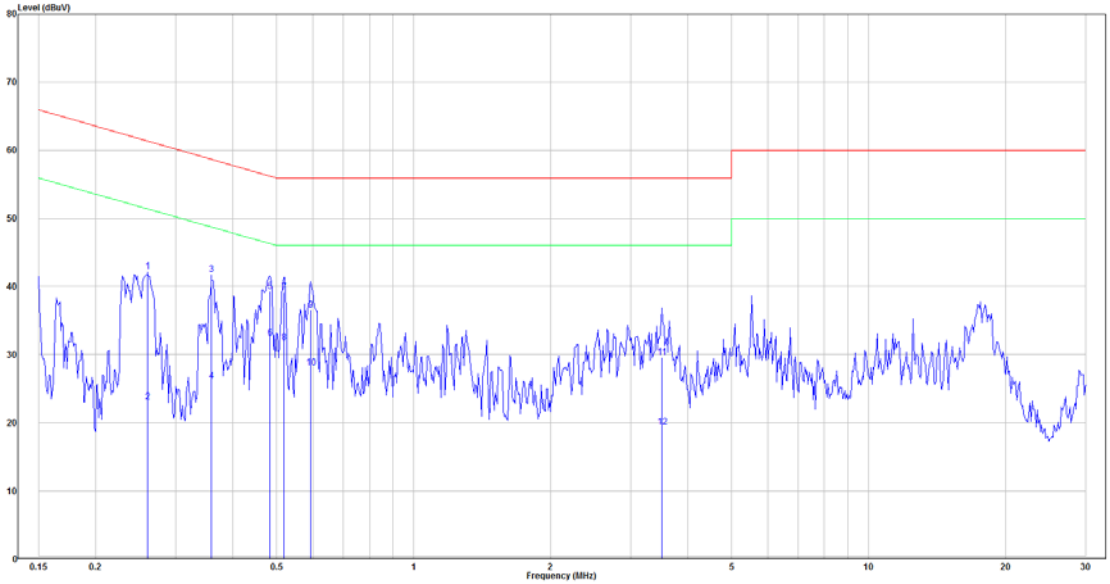
Main: AC120 V, 60 Hz, Line



No.	Frequency	Reading	Correct	Result	Limit	Over limit	Remark
	(MHz)	(dBuV)	Factor(dB)	(dBuV)	(dBuV)	(dB)	
1	0.220	9.94	19.58	29.52	62.83	-33.31	QP
2	0.220	-2.11	19.58	17.48	52.83	-35.36	Average
3	0.424	12.44	19.58	32.02	57.37	-25.35	QP
4	0.424	-2.03	19.58	17.56	47.37	-29.82	Average
5	0.518	22.33	19.59	41.92	56.00	-14.08	QP
6	0.518	14.10	19.59	33.69	46.00	-12.31	Average
7	3.491	11.13	19.68	30.81	56.00	-25.19	QP
8	3.491	0.33	19.68	20.01	46.00	-25.99	Average
9	5.623	10.58	19.73	30.31	60.00	-29.69	QP
10	5.623	2.00	19.73	21.73	50.00	-28.27	Average
11	17.475	15.38	19.85	35.23	60.00	-24.77	QP
12	17.475	8.31	19.85	28.16	50.00	-21.84	Average

Note:
Level = Read Level + Factor
Over Limit = Level – Limit Line
Factor = (LISN, ISN, PLC or current probe) Factor + Cable Loss + Attenuator

Main: AC120 V, 60 Hz, Neutral



No.	Frequency	Reading	Correct	Result	Limit	Over limit	Remark
	(MHz)	(dBuV)	Factor(dB)	(dBuV)	(dBuV)	(dB)	
1	0.260	22.64	19.57	42.21	61.42	-19.21	QP
2	0.260	3.52	19.57	23.09	51.42	-28.33	Average
3	0.360	22.18	19.57	41.75	58.74	-16.99	QP
4	0.360	6.60	19.57	26.17	48.74	-22.57	Average
5	0.484	19.77	19.58	39.35	56.27	-16.92	QP
6	0.484	12.90	19.58	32.48	46.27	-13.79	Average
7	0.518	19.60	19.58	39.18	56.00	-16.82	QP
8	0.518	12.24	19.58	31.82	46.00	-14.18	Average
9	0.595	17.03	19.59	36.62	56.00	-19.38	QP
10	0.595	8.51	19.59	28.10	46.00	-17.90	Average
11	3.509	9.87	19.68	29.55	56.00	-26.45	QP
12	3.509	-0.36	19.68	19.32	46.00	-26.68	Average

Note:
Level = Read Level + Factor
Over Limit = Level – Limit Line
Factor = (LISN, ISN, PLC or current probe) Factor + Cable Loss + Attenuator

8 FCC §15.209, §15.205 , §15.247(d) – Spurious Emissions

8.1 Applicable Standard

As per FCC §15.35(d): Unless otherwise specified, on any frequency or frequencies above 1000 MHz, the radiated emission limits are based on the use of measurement instrumentation employing an average detector function. Unless otherwise specified, measurements above 1000 MHz shall be performed using a minimum resolution bandwidth of 1MHz.

As Per FCC §15.205(a) except as show in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 – 0.110	16.42 – 16.423	608 – 614	4. 5 – 5. 15
0.495 – 0.505	16.69475 – 16.69525	960 – 1240	5. 35 – 5. 46
2.1735 – 2.1905	16.80425 – 16.80475	1300 – 1427	7.25 – 7.75
4.125 – 4.128	25.5 – 25.67	1435 – 1626.5	8.025 – 8.5
4.17725 – 4.17775	37.5 – 38.25	1645.5 – 1646.5	9.0 – 9.2
4.20725 – 4.20775	73 – 74.6	1660 – 1710	9.3 – 9.5
6.215 – 6.218	74.8 – 75.2	1718.8 – 1722.2	10.6 – 12.7
6.26775 – 6.26825	108 – 121.94	2200 – 2300	13.25 – 13.4
6.31175 – 6.31225	123 – 138	2310 – 2390	14.47 – 14.5
8.291 – 8.294	149.9 – 150.05	2483.5 – 2500	15.35 – 16.2
8.362 – 8.366	156.52475 –	2690 – 2900	17.7 – 21.4
8.37625 – 8.38675	156.52525	3260 – 3267	22.01 – 23.12
8.41425 – 8.41475	156.7 – 156.9	3.332 – 3.339	23.6 – 24.0
12.29 – 12.293	162.0125 –167.17	3 3458 – 3 358	31.2 – 31.8
12.51975 – 12.52025	167.72 – 173.2	3.600 – 4.400	36.43 – 36.5
12.57675 – 12.57725	240 – 285		Above 38.6
13.36 – 13.41	322 – 335.4		
	399.9 – 410		

As per FCC §15.209(a): 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:

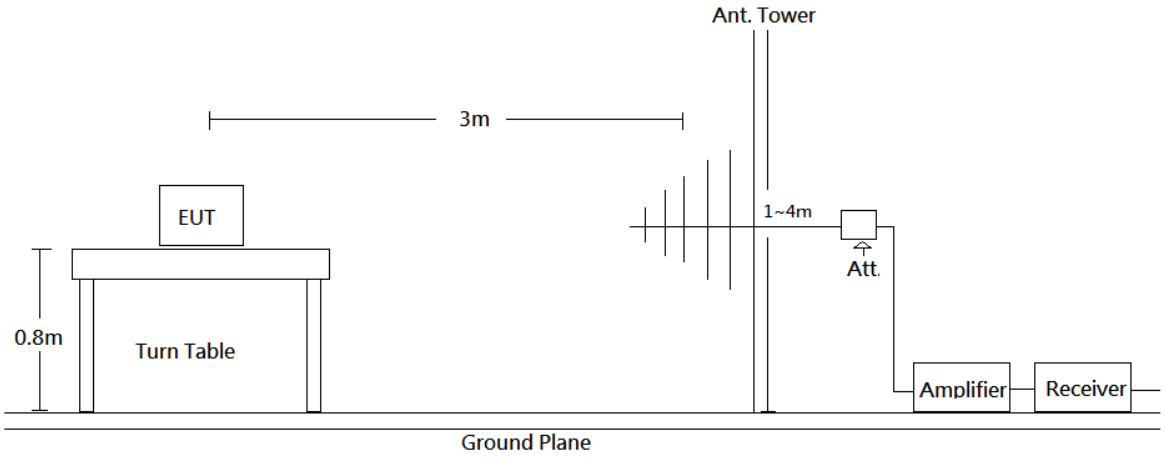
Frequency (MHz)	Field Strength (micro volts/meter)	Measurement Distance (meters)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100**	3
88 - 216	150**	3
216 - 960	200**	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

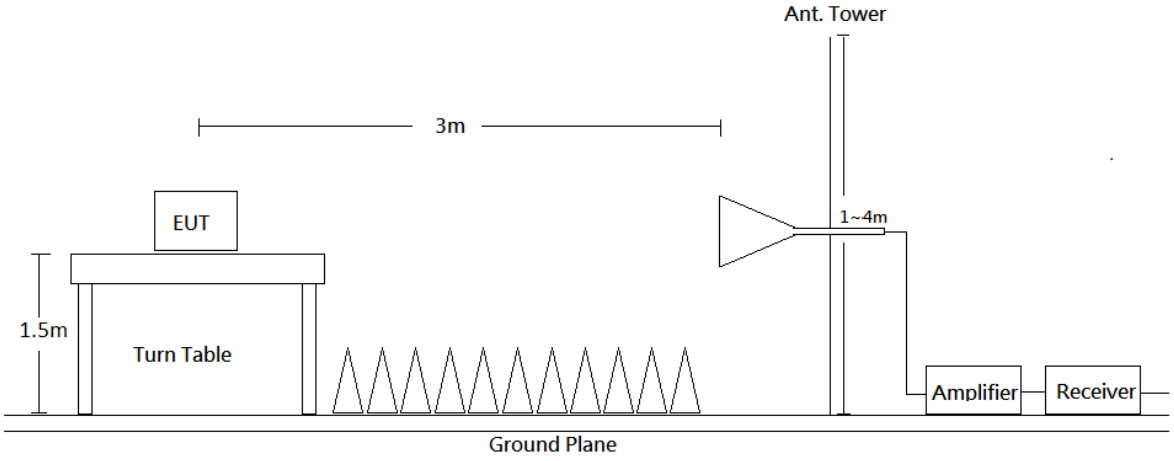
As per FCC §15.247 (d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c).

8.2 EUT Setup

Below 1 GHz:



Above 1 GHz:



Radiated emission tests were performed in the 3 meters chamber test site, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC Part 15.209 and FCC 15.247 Limits.

8.3 EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 26.5 GHz. During the radiated emission test, the EMI test receiver was set with the following configurations measurement method 6.3 in ANSI C63.10.

Frequency Range	RBW	VBW	Duty cycle	Measurement method
30-1000 MHz	120 kHz	/		QP
Above 1 GHz	1 MHz	3 MHz		PK
	1 MHz	10 Hz	>98%	Ave
	1 MHz	$1/T_{on}$	<98%	Ave

8.4 Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

All data was recorded in the Quasi-peak detector mode from 30 MHz to 1 GHz and PK and average detector modes for frequencies above 1 GHz.

8.5 Corrected Factor & Margin Calculation

The Correct Factor is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain

The “Margin” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7 dB means the emission is 7 dB below the limit. The equation for margin calculation is as follows:

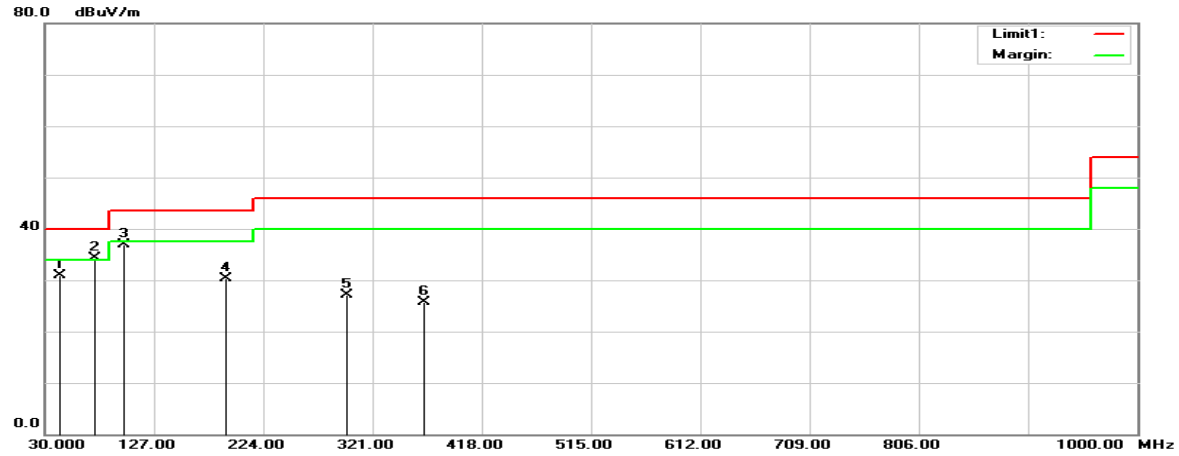
Margin = Result – Limit

8.6 Test Results

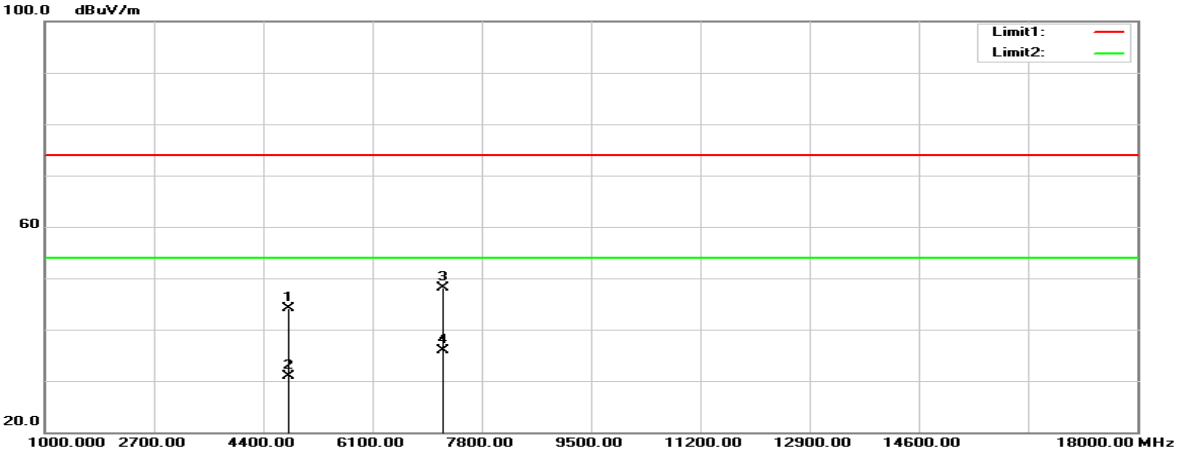
Test Mode: Transmitting (Pre-scan with three orthogonal axis, and worse case as Y axis.)

Horizontal (worst case is BLE 1M mode low channel)

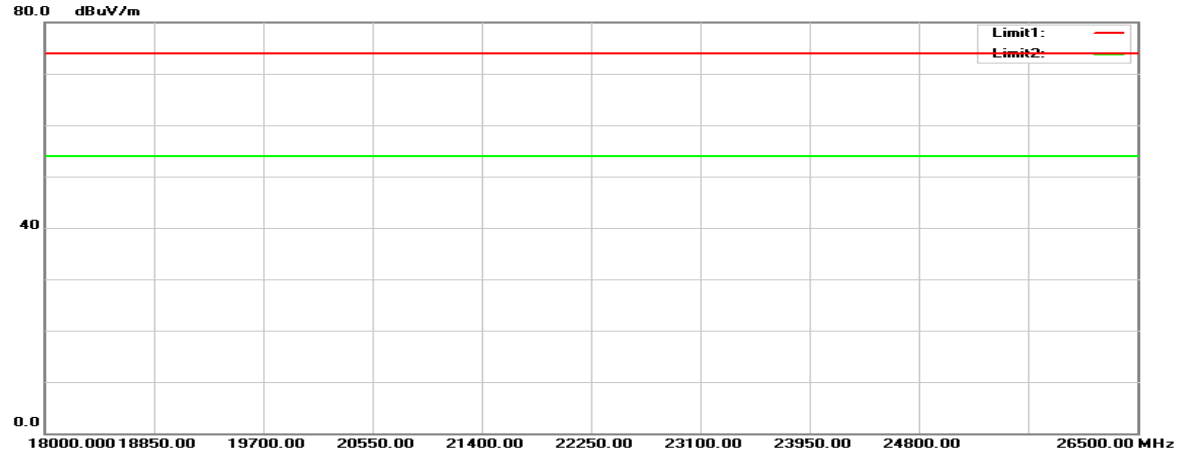
30MHz-1GHz



1GHz-18GHz:

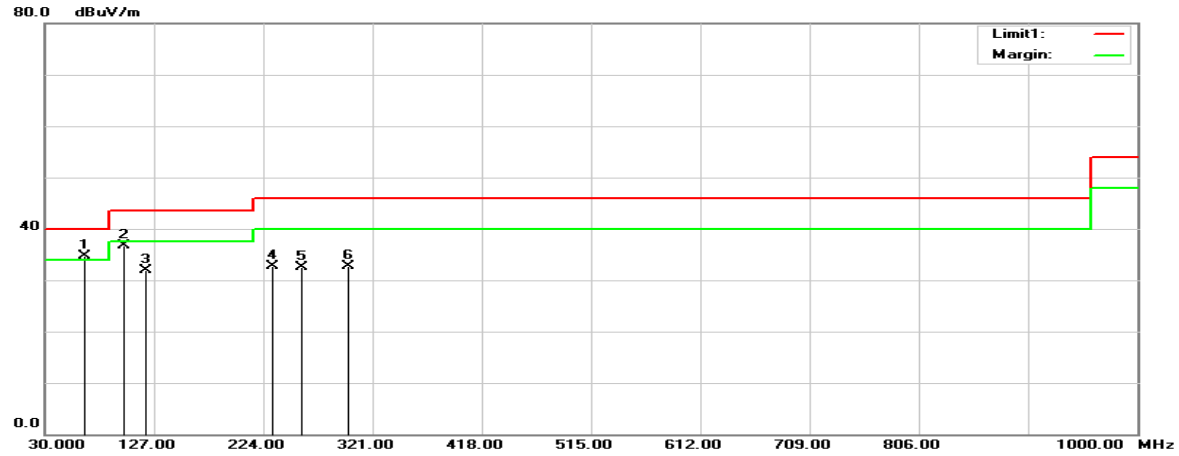


18GHz-26.5GHz:

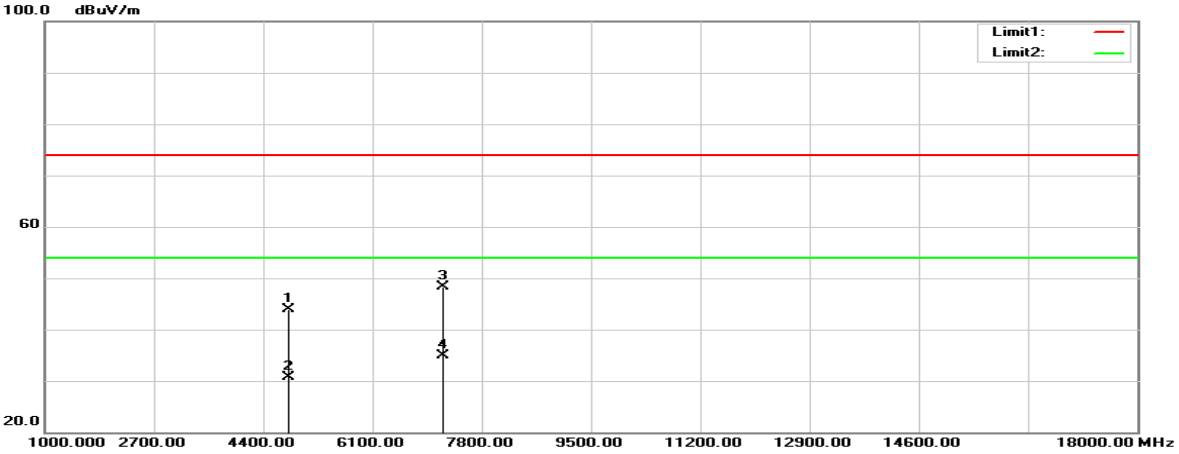


Vertical (worst case is BLE 1M mode low channel)

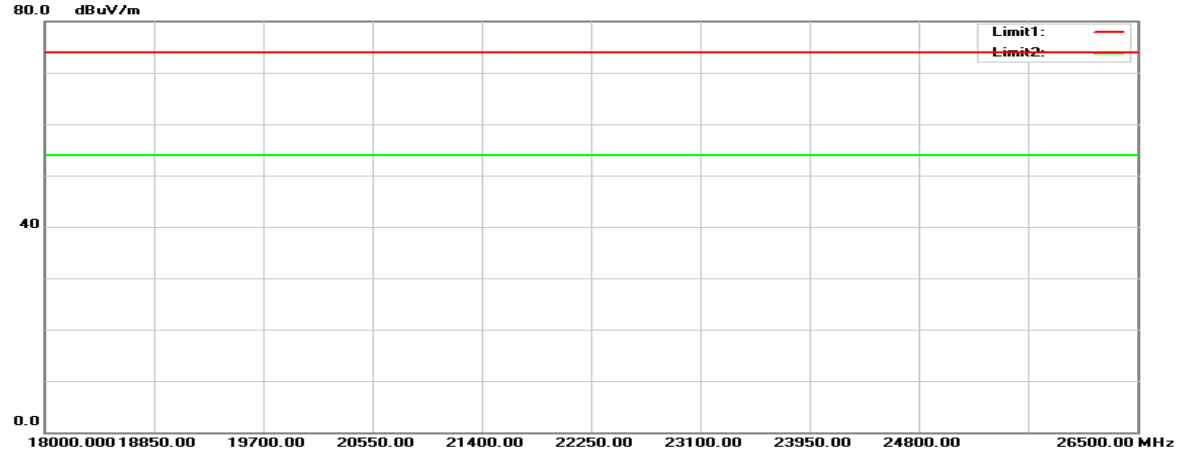
30MHz-1GHz:



1GHz-18GHz:



18GHz-26.5GHz:



Below 1GHz

Horizontal

Frequency (MHz)	Reading (dBµV)	Correct Factor(dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
43.5800	43.90	-12.98	30.92	40.00	-9.08	100	241	peak
74.6200	50.47	-16.26	34.21	40.00	-5.79	100	111	peak
99.8400	51.05	-14.06	36.99	43.50	-6.51	100	65	peak
191.0200	42.97	-12.58	30.39	43.50	-13.11	100	125	peak
298.6900	37.11	-10.09	27.02	46.00	-18.98	100	189	peak
366.5900	34.36	-8.73	25.63	46.00	-20.37	100	116	peak

Vertical

Frequency (MHz)	Reading (dBµV)	Correct Factor(dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
65.8900	51.43	-16.75	34.68	40.00	-5.32	100	241	peak
99.8400	50.81	-14.06	36.75	43.50	-6.75	100	111	peak
119.2400	42.36	-10.54	31.82	43.50	-11.68	100	155	peak
232.7300	45.24	-12.54	32.70	46.00	-13.30	100	120	peak
257.9500	44.39	-11.90	32.49	46.00	-13.51	100	220	peak
299.6600	42.84	-10.10	32.74	46.00	-13.26	100	55	peak

Result = Reading + Correct Factor
Margin = Result – Limit
Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain
Spurious emissions more than 20 dB below the limit were not reported.

Above 1GHz

BLE(125k) Mode

Horizontal

Frequency (MHz)	Reading (dBµV)	Correct Factor(dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
Low channel								
2381.300	55.19	-9.53	45.66	74.00	-28.34	171	200	peak
2381.300	42.71	-9.53	33.18	54.00	-20.82	171	200	AVG
4804.000	42.67	-2.17	40.50	74.00	-33.50	154	138	peak
4804.000	32.58	-2.17	30.41	54.00	-23.59	154	138	AVG
7206.000	54.31	4.18	58.49	74.00	-15.51	130	162	peak
7206.000	47.03	4.18	51.21	54.00	-2.79	130	162	AVG
Middle channel								
4880.000	42.50	-1.88	40.62	74.00	-33.38	161	213	peak
4880.000	32.58	-1.88	30.70	54.00	-23.30	161	213	AVG
7320.000	53.31	5.10	58.41	74.00	-15.59	154	133	peak
7320.000	46.33	5.10	51.43	54.00	-2.57	154	133	AVG
High channel								
2499.070	56.49	-8.22	48.27	74.00	-25.73	104	197	peak
2499.070	42.93	-8.22	34.71	54.00	-19.29	104	197	AVG
4960.000	43.05	-1.49	41.56	74.00	-32.44	162	233	peak
4960.000	33.48	-1.49	31.99	54.00	-22.01	162	233	AVG
7440.000	53.45	5.23	58.68	74.00	-15.32	158	145	peak
7440.000	46.28	5.23	51.51	54.00	-2.49	158	145	AVG

Result = Reading + Correct Factor
Margin = Result – Limit
Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain
Spurious emissions more than 20 dB below the limit were not reported.

Vertical

Frequency (MHz)	Reading (dBµV)	Correct Factor(dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
Low channel								
2333.100	56.89	-9.80	47.09	74.00	-26.91	171	218	peak
2333.100	44.32	-9.80	34.52	54.00	-19.48	171	218	AVG
4804.000	44.34	-2.17	42.17	74.00	-31.83	156	215	peak
4804.000	34.22	-2.17	32.05	54.00	-21.95	156	215	AVG
7206.000	52.42	4.18	56.60	74.00	-17.40	104	320	peak
7206.000	44.77	4.18	48.95	54.00	-5.05	104	320	AVG
Middle channel								
4880.000	43.67	-1.88	41.79	74.00	-32.21	162	238	peak
4880.000	33.64	-1.88	31.76	54.00	-22.24	162	238	AVG
7320.000	52.64	5.10	57.74	74.00	-16.26	155	311	peak
7320.000	44.28	5.10	49.38	54.00	-4.62	155	311	AVG
High channel								
2498.890	56.49	-8.22	48.27	74.00	-25.73	190	217	peak
2498.890	42.47	-8.22	34.25	54.00	-19.75	190	217	AVG
4960.000	42.40	-1.49	40.91	74.00	-33.09	151	167	peak
4960.000	32.59	-1.49	31.10	54.00	-22.90	151	167	AVG
7440.000	52.45	5.23	57.68	74.00	-16.32	166	317	peak
7440.000	44.38	5.23	49.61	54.00	-4.39	166	317	AVG

Result = Reading + Correct Factor
Margin = Result – Limit
Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain
Spurious emissions more than 20 dB below the limit were not reported.

BLE(500k) Mode

Horizontal

Frequency (MHz)	Reading (dBµV)	Correct Factor(dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
Low channel								
2373.600	56.93	-9.59	47.34	74.00	-26.66	150	203	peak
2373.600	42.66	-9.59	33.07	54.00	-20.93	150	203	AVG
4804.000	43.43	-2.17	41.26	74.00	-32.74	153	148	peak
4804.000	33.48	-2.17	31.31	54.00	-22.69	153	148	AVG
7206.000	54.28	4.18	58.46	74.00	-15.54	161	158	peak
7206.000	47.66	4.18	51.84	54.00	-2.16	161	158	AVG
Middle channel								
4880.000	43.23	-1.88	41.35	74.00	-32.65	161	151	peak
4880.000	33.49	-1.88	31.61	54.00	-22.39	161	151	AVG
7320.000	54.34	5.10	59.44	74.00	-14.56	158	248	peak
7320.000	47.58	5.10	52.68	54.00	-1.32	158	248	AVG
High channel								
2486.440	57.45	-8.40	49.05	74.00	-24.95	145	196	peak
2486.440	42.66	-8.40	34.26	54.00	-19.74	145	196	AVG
4960.000	43.82	-1.49	42.33	74.00	-31.67	158	328	peak
4960.000	33.56	-1.49	32.07	54.00	-21.93	158	328	AVG
7440.000	52.45	5.23	57.68	74.00	-16.32	162	195	peak
7440.000	44.28	5.23	49.51	54.00	-4.49	162	195	AVG

Result = Reading + Correct Factor
Margin = Result – Limit
Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain
Spurious emissions more than 20 dB below the limit were not reported.

Vertical

Frequency (MHz)	Reading (dBµV)	Correct Factor(dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
Low channel								
2379.800	56.34	-9.54	46.80	74.00	-27.20	150	215	peak
2379.800	44.00	-9.54	34.46	54.00	-19.54	150	215	AVG
4804.000	42.49	-2.17	40.32	74.00	-33.68	161	216	peak
4804.000	32.87	-2.17	30.70	54.00	-23.30	161	216	AVG
7206.000	52.33	4.18	56.51	74.00	-17.49	154	315	peak
7206.000	44.56	4.18	48.74	54.00	-5.26	154	315	AVG
Middle channel								
4880.000	42.91	-1.88	41.03	74.00	-32.97	156	258	peak
4880.000	32.58	-1.88	30.70	54.00	-23.30	156	258	AVG
7320.000	52.45	5.10	57.55	74.00	-16.45	149	332	peak
7320.000	44.61	5.10	49.71	54.00	-4.29	149	332	AVG
High channel								
2485.120	55.64	-8.43	47.21	74.00	-26.79	139	216	peak
2485.120	42.21	-8.43	33.78	54.00	-20.22	139	216	AVG
4960.000	43.84	-1.49	42.35	74.00	-31.65	168	224	peak
4960.000	32.61	-1.49	31.12	54.00	-22.88	168	224	AVG
7440.000	52.66	5.23	57.89	74.00	-16.11	156	318	peak
7440.000	44.39	5.23	49.62	54.00	-4.38	156	318	AVG

Result = Reading + Correct Factor
Margin = Result – Limit
Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain
Spurious emissions more than 20 dB below the limit were not reported.

BLE(1M) Mode

Horizontal

Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
(MHz)	(dBµV)	Factor(dB/m)	(dBµV/m)	(dBµV/m)	(dB)	(cm)	(°)	
Low channel								
2353.900	56.58	-9.76	46.82	74.00	-27.18	152	158	peak
2353.900	43.69	-9.76	33.93	54.00	-20.07	152	158	AVG
4804.000	46.28	-2.17	44.11	74.00	-29.89	154	71	peak
4804.000	33.05	-2.17	30.88	54.00	-23.12	154	71	AVG
7206.000	43.87	4.18	48.05	74.00	-25.95	162	147	peak
7206.000	31.64	4.18	35.82	54.00	-18.18	162	147	AVG
Middle channel								
4880.000	46.17	-1.88	44.29	74.00	-29.71	151	147	peak
4880.000	32.62	-1.88	30.74	54.00	-23.26	151	147	AVG
7320.000	43.61	5.10	48.71	74.00	-25.29	142	95	peak
7320.000	30.77	5.10	35.87	54.00	-18.13	142	95	AVG
High channel								
2494.990	56.06	-8.28	47.78	74.00	-26.22	153	160	peak
2494.990	43.44	-8.28	35.16	54.00	-18.84	153	160	AVG
4960.000	45.96	-1.49	44.47	74.00	-29.53	153	76	peak
4960.000	30.18	-1.49	28.69	54.00	-25.31	153	76	AVG
7440.000	43.50	5.23	48.73	74.00	-25.27	140	62	peak
7440.000	30.41	5.23	35.64	54.00	-18.36	140	62	AVG

Result = Reading + Correct Factor
Margin = Result – Limit
Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain
Spurious emissions more than 20 dB below the limit were not reported.

Vertical

Frequency (MHz)	Reading (dBµV)	Correct Factor(dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
Low channel								
2364.500	56.65	-9.66	46.99	74.00	-27.01	164	271	peak
2364.500	43.62	-9.66	33.96	54.00	-20.04	164	271	AVG
4804.000	46.07	-2.17	43.90	74.00	-30.10	154	75	peak
4804.000	32.89	-2.17	30.72	54.00	-23.28	154	75	AVG
7206.000	44.22	4.18	48.40	74.00	-25.60	160	194	peak
7206.000	30.76	4.18	34.94	54.00	-19.06	160	194	AVG
Middle channel								
4880.000	48.78	-1.88	46.90	74.00	-27.10	158	77	peak
4880.000	32.23	-1.88	30.35	54.00	-23.65	158	77	AVG
7320.000	43.82	5.10	48.92	74.00	-25.08	152	165	peak
7320.000	30.69	5.10	35.79	54.00	-18.21	152	165	AVG
High channel								
2486.710	56.22	-8.40	47.82	74.00	-26.18	167	280	peak
2486.710	43.67	-8.40	35.27	54.00	-18.73	167	280	AVG
4960.000	45.80	-1.49	44.31	74.00	-29.69	143	196	peak
4960.000	32.89	-1.49	31.40	54.00	-22.60	143	196	AVG
7440.000	42.65	5.23	47.88	74.00	-26.12	156	75	peak
7440.000	30.43	5.23	35.66	54.00	-18.34	156	75	AVG

Result = Reading + Correct Factor
Margin = Result – Limit
Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain
Spurious emissions more than 20 dB below the limit were not reported.

BLE(2M) Mode

Horizontal

Frequency (MHz)	Reading (dBµV)	Correct Factor(dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
Low channel								
2376.100	56.49	-9.57	46.92	74.00	-27.08	164	177	peak
2376.100	42.78	-9.57	33.21	54.00	-20.79	164	177	AVG
4804.000	46.01	-2.17	43.84	74.00	-30.16	152	241	peak
4804.000	32.22	-2.17	30.05	54.00	-23.95	152	241	AVG
7206.000	43.57	4.18	47.75	74.00	-26.25	146	185	peak
7206.000	30.00	4.18	34.18	54.00	-19.82	146	185	AVG
Middle channel								
4880.000	45.55	-1.88	43.67	74.00	-30.33	153	77	peak
4880.000	32.30	-1.88	30.42	54.00	-23.58	153	77	AVG
7320.000	44.79	5.10	49.89	74.00	-24.11	157	241	peak
7320.000	30.75	5.10	35.85	54.00	-18.15	157	241	AVG
High channel								
2495.380	55.85	-8.28	47.57	74.00	-26.43	151	165	peak
2495.380	43.04	-8.28	34.76	54.00	-19.24	151	165	AVG
4960.000	46.22	-1.49	44.73	74.00	-29.27	150	72	peak
4960.000	32.58	-1.49	31.09	54.00	-22.91	150	72	AVG
7440.000	43.37	5.23	48.60	74.00	-25.40	154	165	peak
7440.000	29.90	5.23	35.13	54.00	-18.87	154	165	AVG

Result = Reading + Correct Factor
Margin = Result – Limit
Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain
Spurious emissions more than 20 dB below the limit were not reported.

Vertical

Frequency (MHz)	Reading (dBµV)	Correct Factor(dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
Low channel								
2356.900	56.25	-9.73	46.52	74.00	-27.48	168	280	peak
2356.900	42.78	-9.73	33.05	54.00	-20.95	168	280	AVG
4804.000	46.03	-2.17	43.86	74.00	-30.14	155	35	peak
4804.000	32.21	-2.17	30.04	54.00	-23.96	155	35	AVG
7206.000	43.16	4.18	47.34	74.00	-26.66	148	74	peak
7206.000	30.06	4.18	34.24	54.00	-19.76	148	74	AVG
Middle channel								
4880.000	45.71	-1.88	43.83	74.00	-30.17	157	184	peak
4880.000	32.41	-1.88	30.53	54.00	-23.47	157	184	AVG
7320.000	43.48	5.10	48.58	74.00	-25.42	141	77	peak
7320.000	30.53	5.10	35.63	54.00	-18.37	141	77	AVG
High channel								
2493.280	56.13	-8.31	47.82	74.00	-26.18	170	275	peak
2493.280	42.96	-8.31	34.65	54.00	-19.35	170	275	AVG
4960.000	45.81	-1.49	44.32	74.00	-29.68	152	14	peak
4960.000	32.30	-1.49	30.81	54.00	-23.19	152	14	AVG
7440.000	43.88	5.23	49.11	74.00	-24.89	158	95	peak
7440.000	29.72	5.23	34.95	54.00	-19.05	158	95	AVG

Result = Reading + Correct Factor
Margin = Result – Limit
Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain
Spurious emissions more than 20 dB below the limit were not reported.

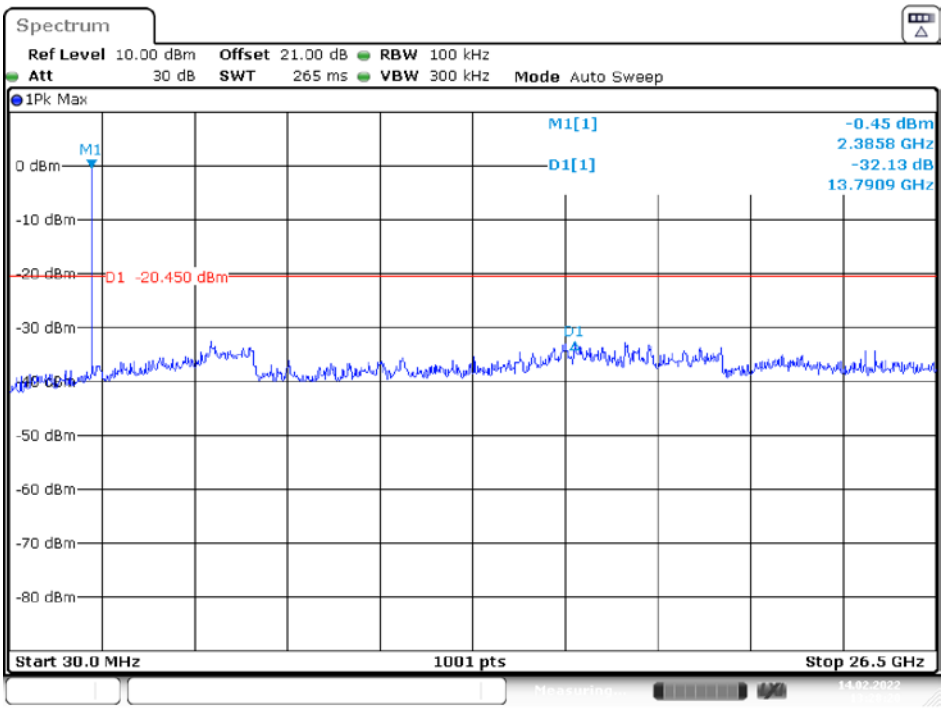
Conducted Spurious Emissions:

Channel	Frequency (MHz)	Delta Peak to Band Emission (dBc)	Limit (dBc)	Result
BLE(125k) Mode				
Low	2402	32.13	≥ 20	PASS
Middle	2440	27.66	≥ 20	PASS
High	2480	28.64	≥ 20	PASS
BLE(500k) Mode				
Low	2402	30.56	≥ 20	PASS
Middle	2440	28.62	≥ 20	PASS
High	2480	28.55	≥ 20	PASS
BLE(1M) Mode				
Low	2402	31.04	≥ 20	PASS
Middle	2440	27.08	≥ 20	PASS
High	2480	29.41	≥ 20	PASS
BLE(2M) Mode				
Low	2402	32.02	≥ 20	PASS
Middle	2440	27.35	≥ 20	PASS
High	2480	31.45	≥ 20	PASS

Please refer to the following plots

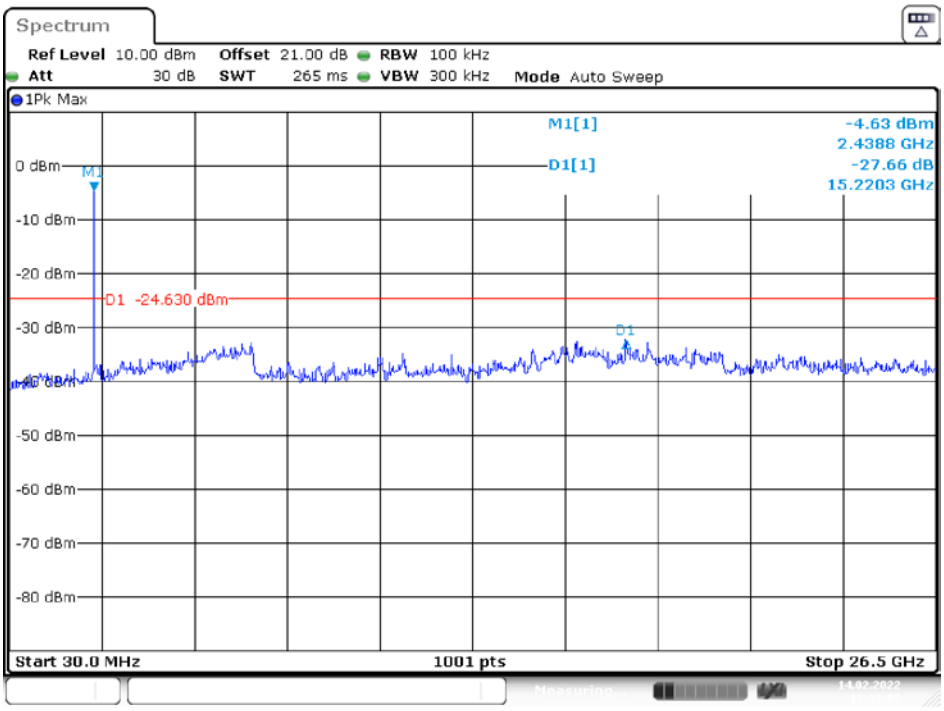
BLE(125k) Mode

Low Channel



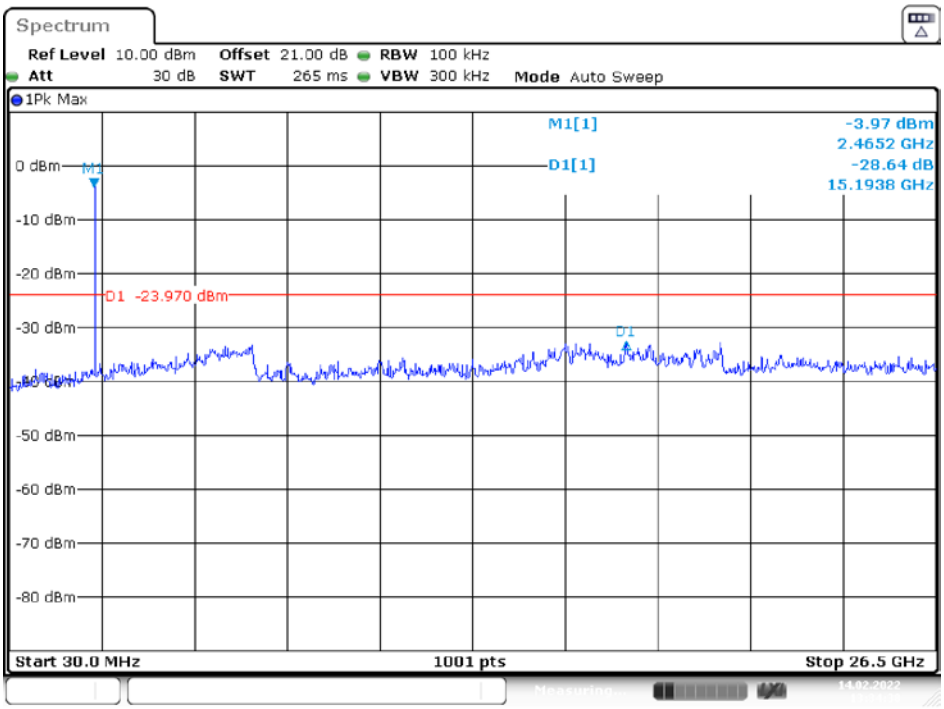
Date: 14.FEB.2022 13:28:21

Middle Channel



Date: 14.FEB.2022 13:32:01

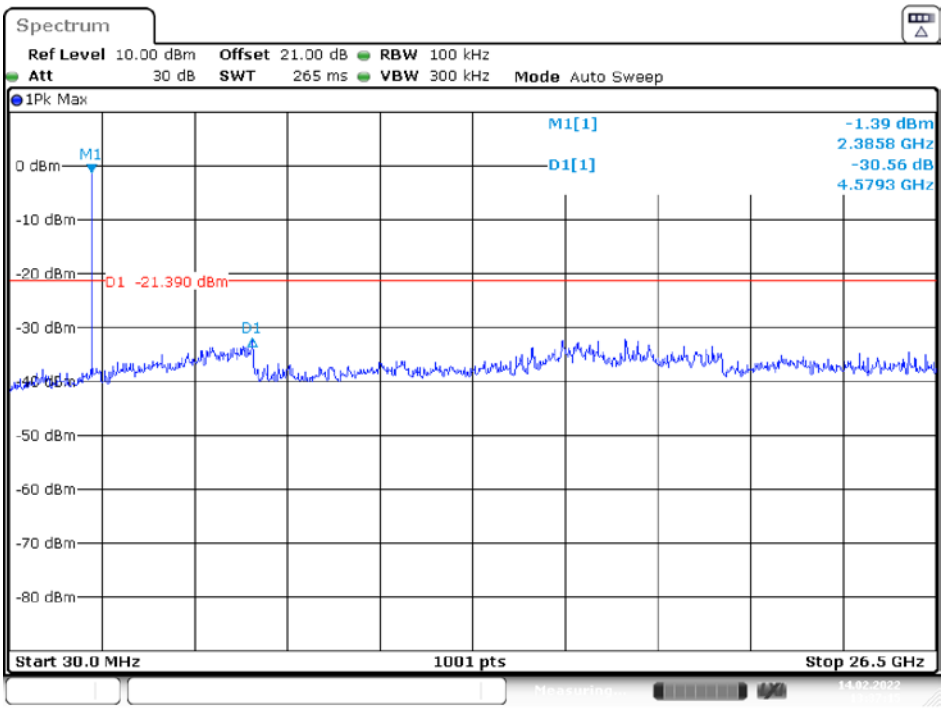
High Channel



Date: 14.FEB.2022 13:34:38

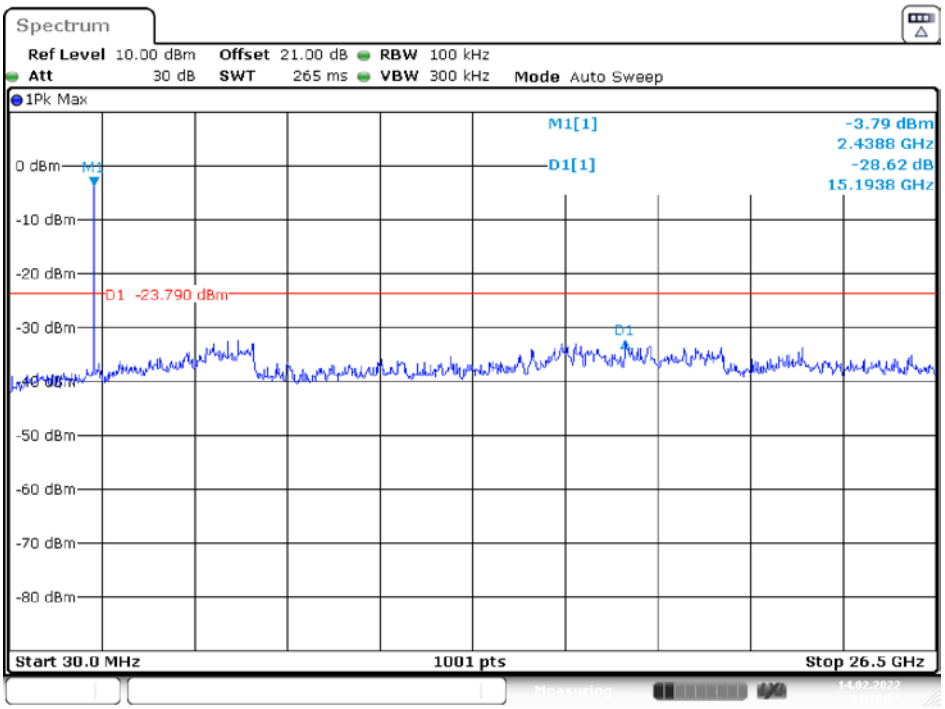
BLE(500k) Mode

Low Channel



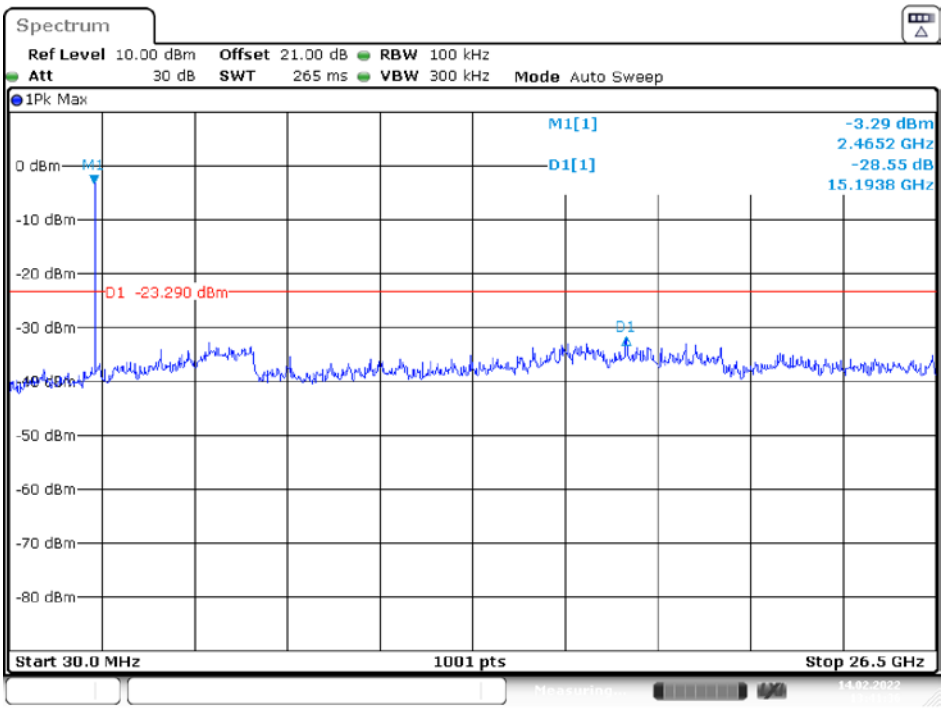
Date: 14.FEB.2022 13:37:16

Middle Channel



Date: 14.FEB.2022 13:39:08

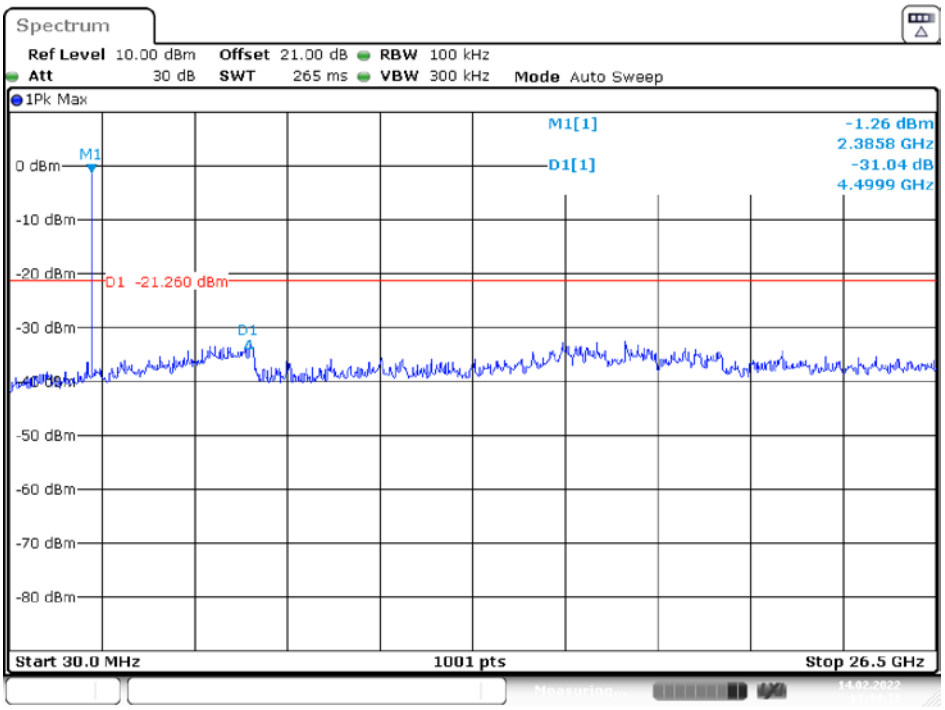
High Channel



Date: 14.FEB.2022 13:41:37

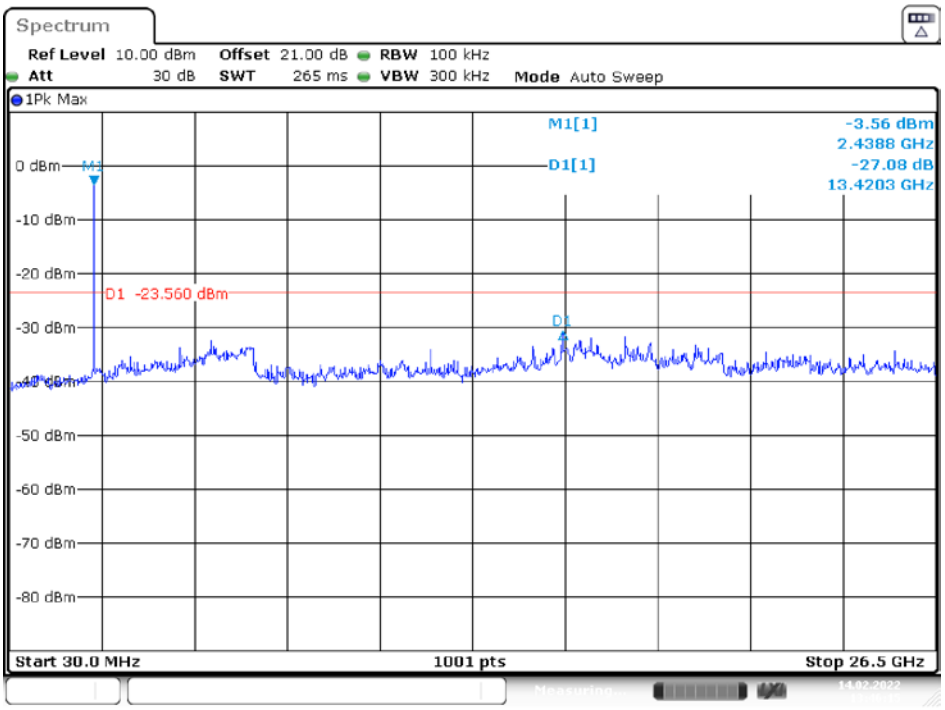
BLE(1M) Mode

Low Channel



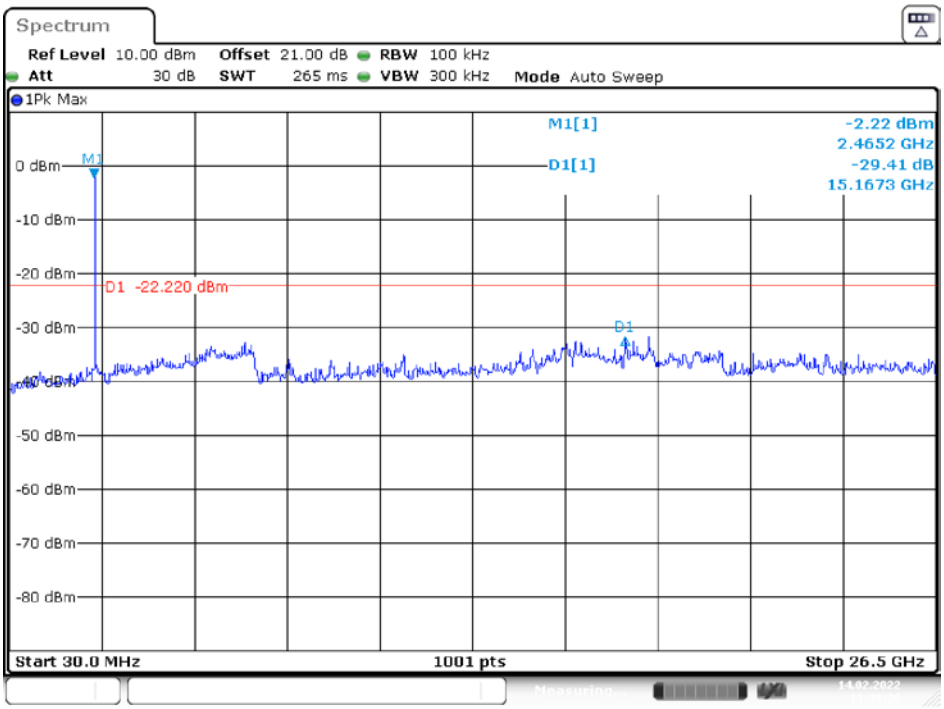
Date: 14.FEB.2022 13:44:32

Middle Channel



Date: 14.FEB.2022 13:46:16

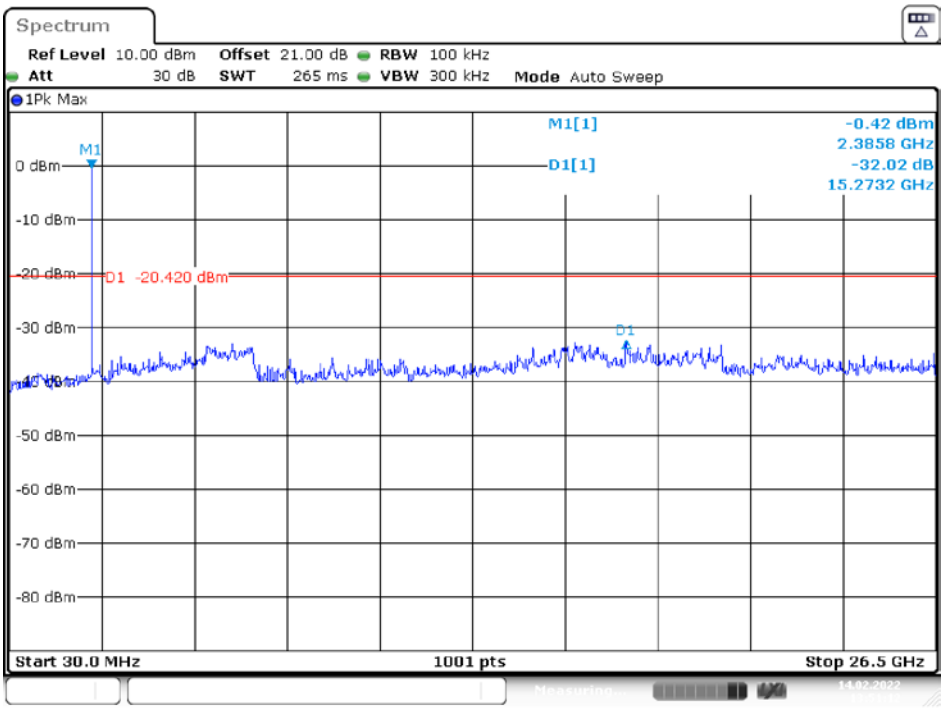
High Channel



Date: 14.FEB.2022 13:48:21

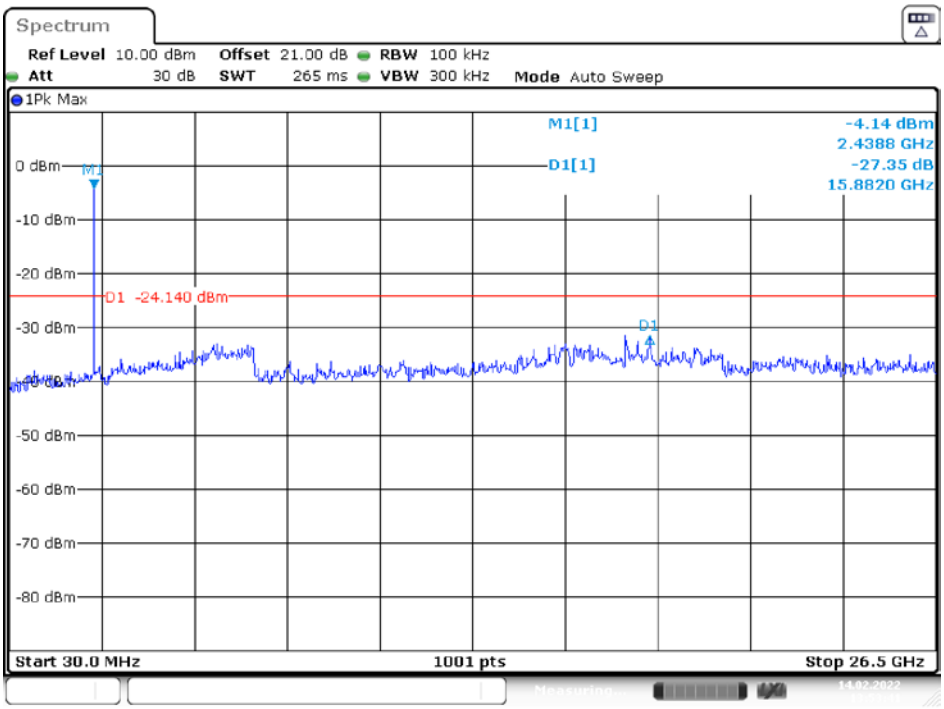
BLE(2M) Mode

Low Channel



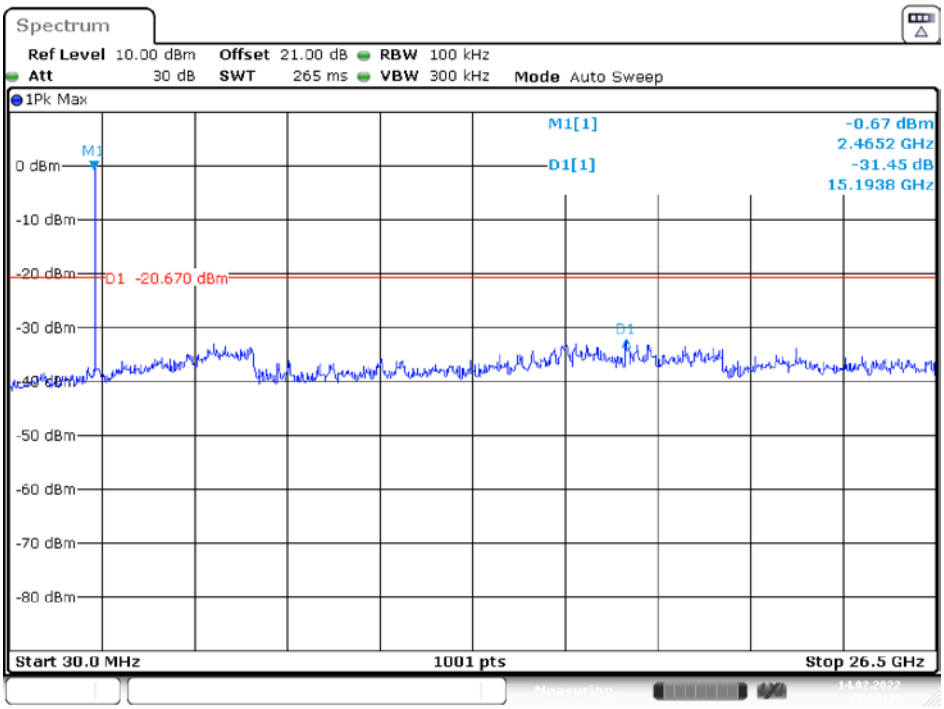
Date: 14.FEB.2022 13:51:13

Middle Channel



Date: 14.FEB.2022 13:53:42

High Channel



Date: 14.FEB.2022 13:56:39

9 FCC §15.247(a)(2) – 6 dB Emission Bandwidth

9.1 Applicable Standard

According to FCC §15.247(a)(2).

Systems using digital modulation techniques may operate in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

9.2 Test Procedure

The steps for the first option are as follows:

a) Set RBW = 100 kHz.

b) Set the VBW ≥ [3 × RBW].

c) Detector = peak.

d) Trace mode = max hold.

e) Sweep = auto couple.

f) Allow the trace to stabilize.

g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

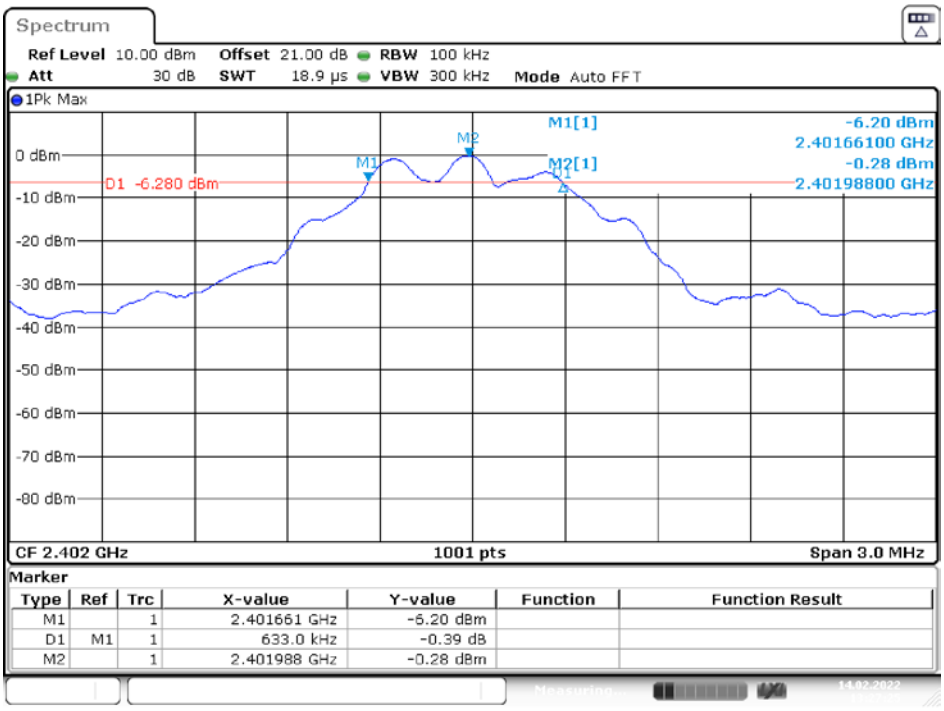
9.3 Test Results

Channel	Frequency (MHz)	6 dB Emission Bandwidth (kHz)	Limit (kHz)	Result
BLE(125k) Mode				
Low	2402	633	> 500	Compliance
Middle	2440	633	> 500	Compliance
High	2480	633	> 500	Compliance
BLE(500k) Mode				
Low	2402	702	> 500	Compliance
Middle	2440	696	> 500	Compliance
High	2480	699	> 500	Compliance
BLE(1M) Mode				
Low	2402	699	> 500	Compliance
Middle	2440	696	> 500	Compliance
High	2480	702	> 500	Compliance
BLE(2M) Mode				
Low	2402	1176	> 500	Compliance
Middle	2440	1179	> 500	Compliance
High	2480	1179	> 500	Compliance

Please refer to the following plots

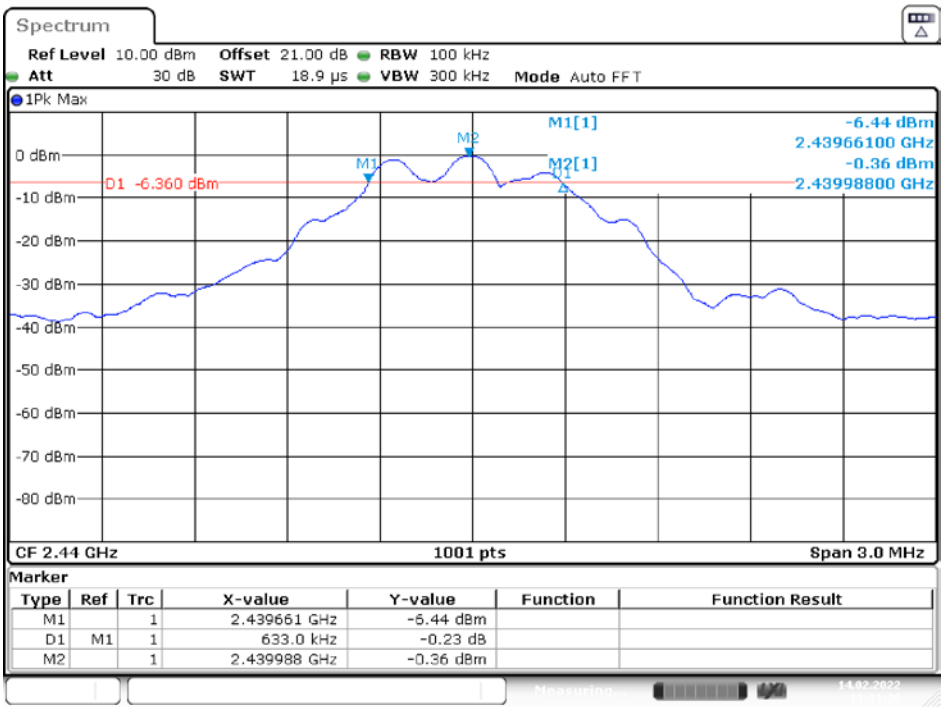
BLE(125k) Mode

Low Channel



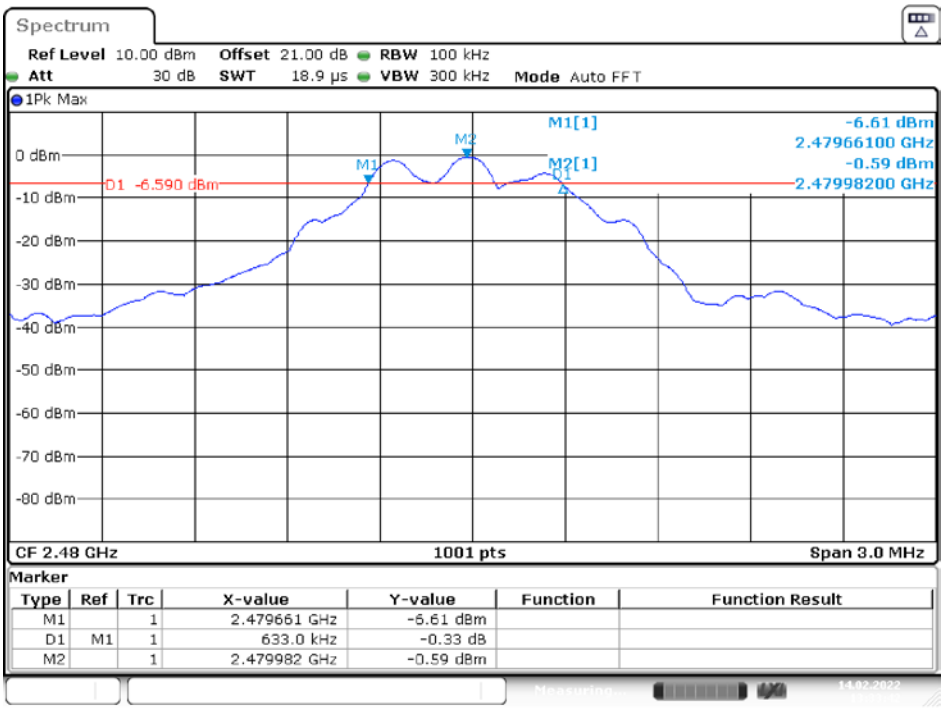
Date: 14.FEB.2022 13:27:25

Middle Channel



Date: 14.FEB.2022 13:31:21

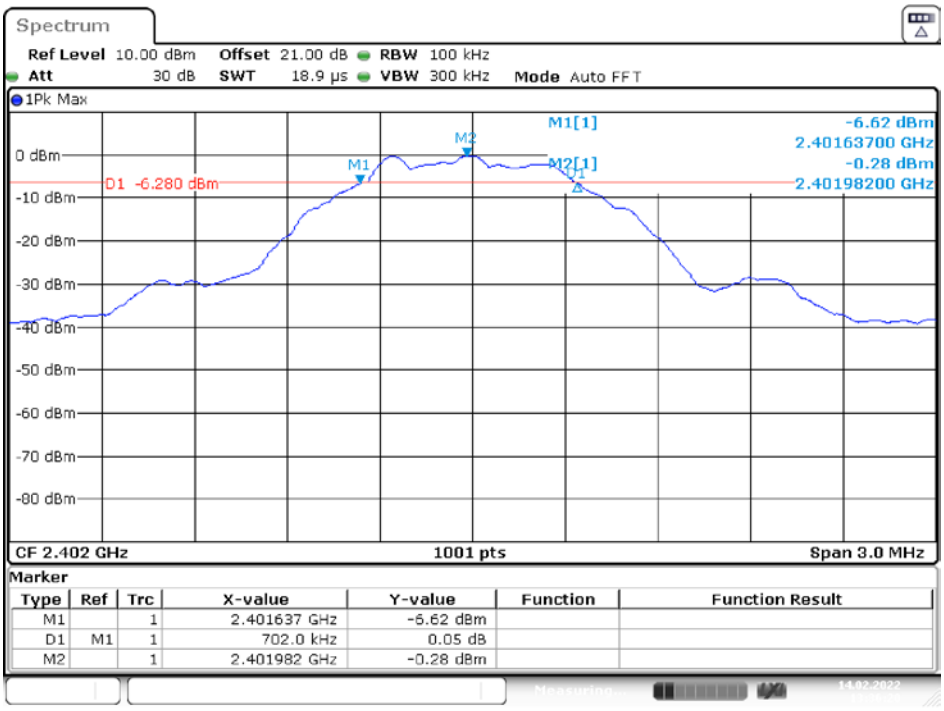
High Channel



Date: 14.FEB.2022 13:33:43

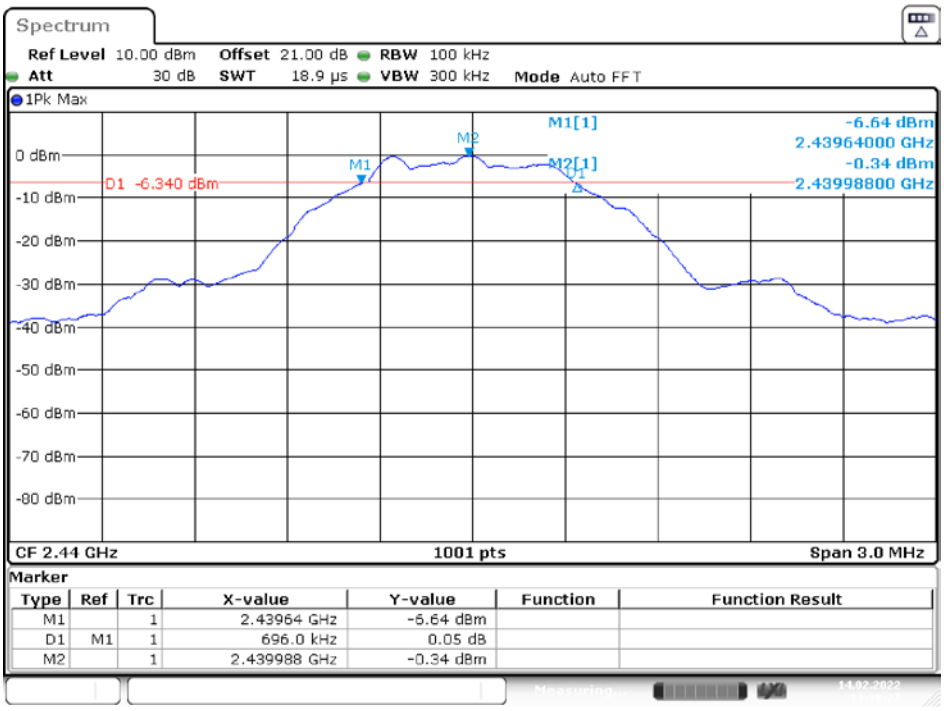
BLE(500k) Mode

Low Channel



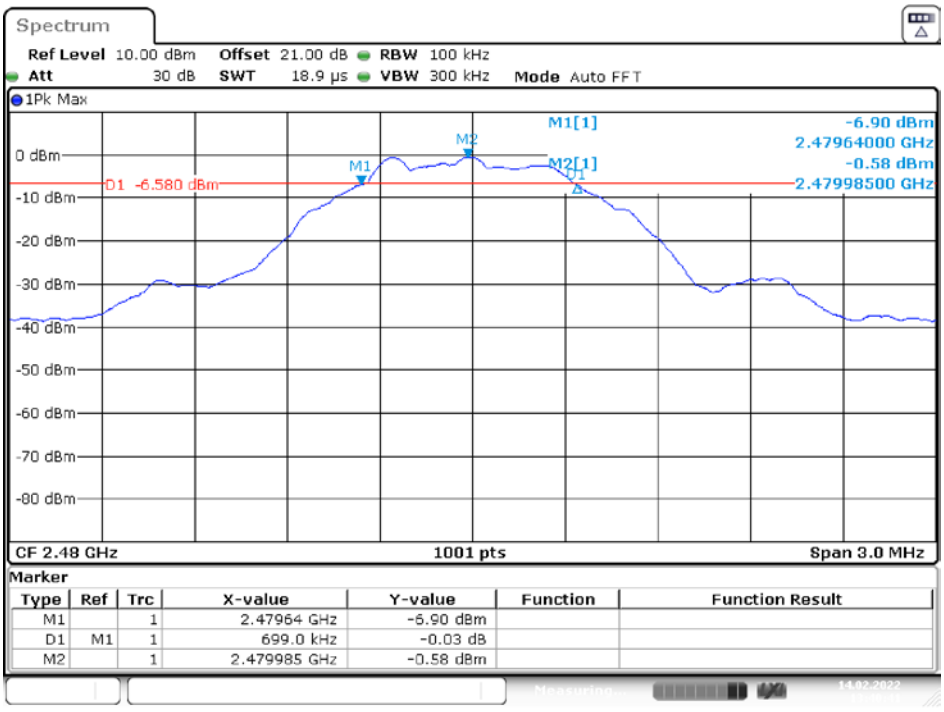
Date: 14.FEB.2022 13:36:20

Middle Channel



Date: 14.FEB.2022 13:38:28

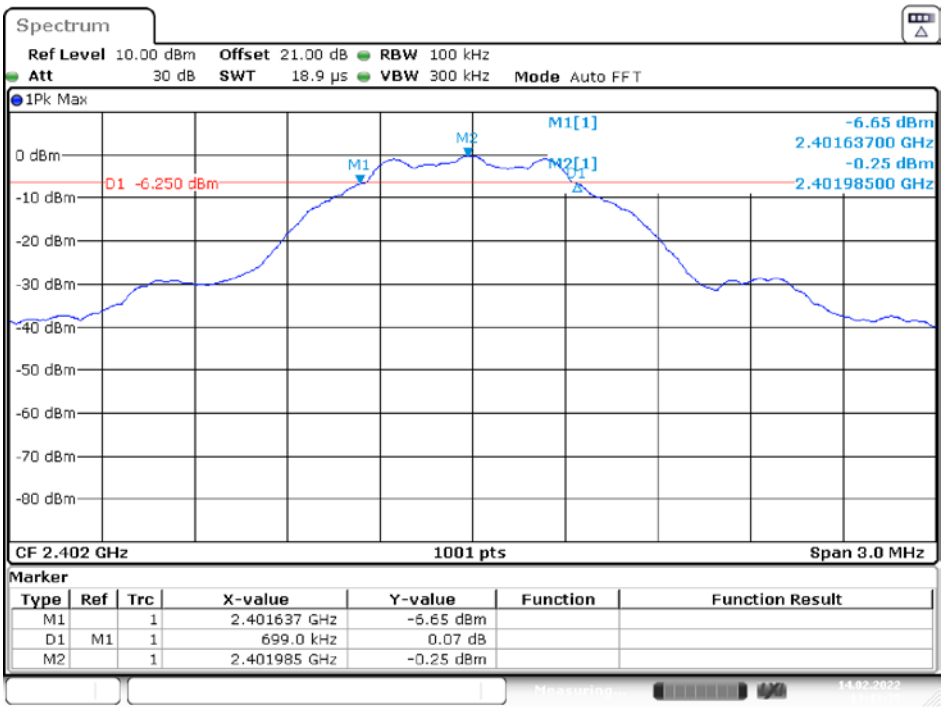
High Channel



Date: 14.FEB.2022 13:40:41

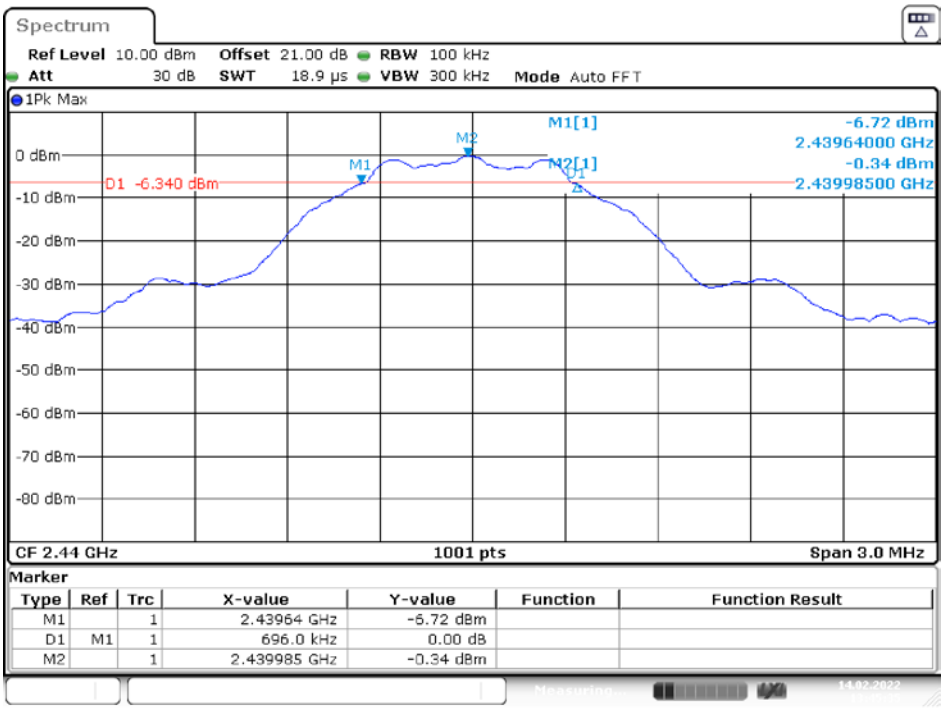
BLE(1M) Mode

Low Channel



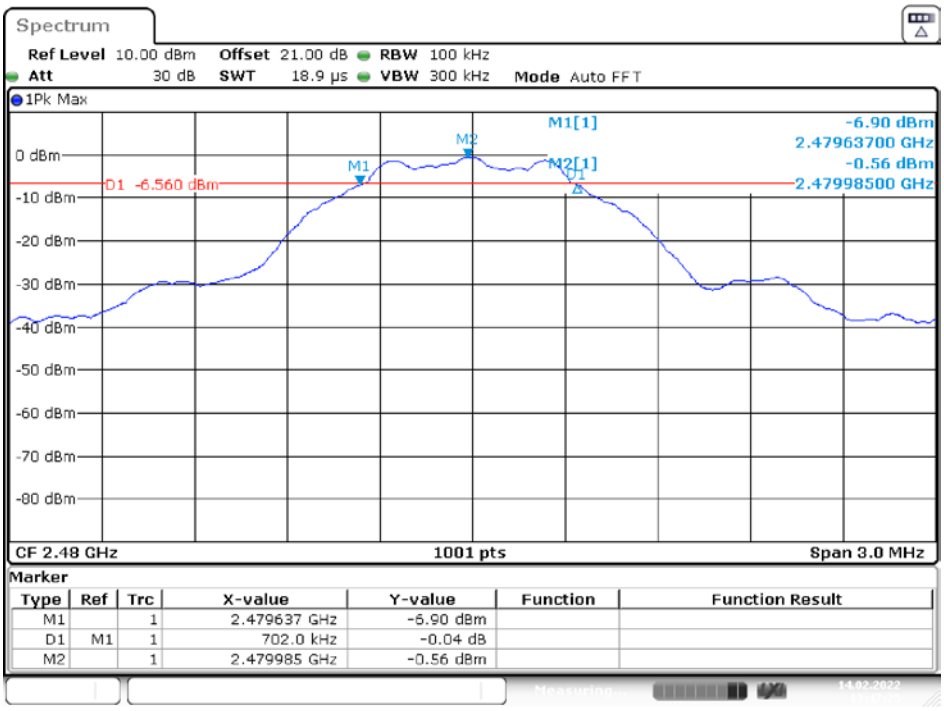
Date: 14.FEB.2022 13:43:36

Middle Channel



Date: 14.FEB.2022 13:45:36

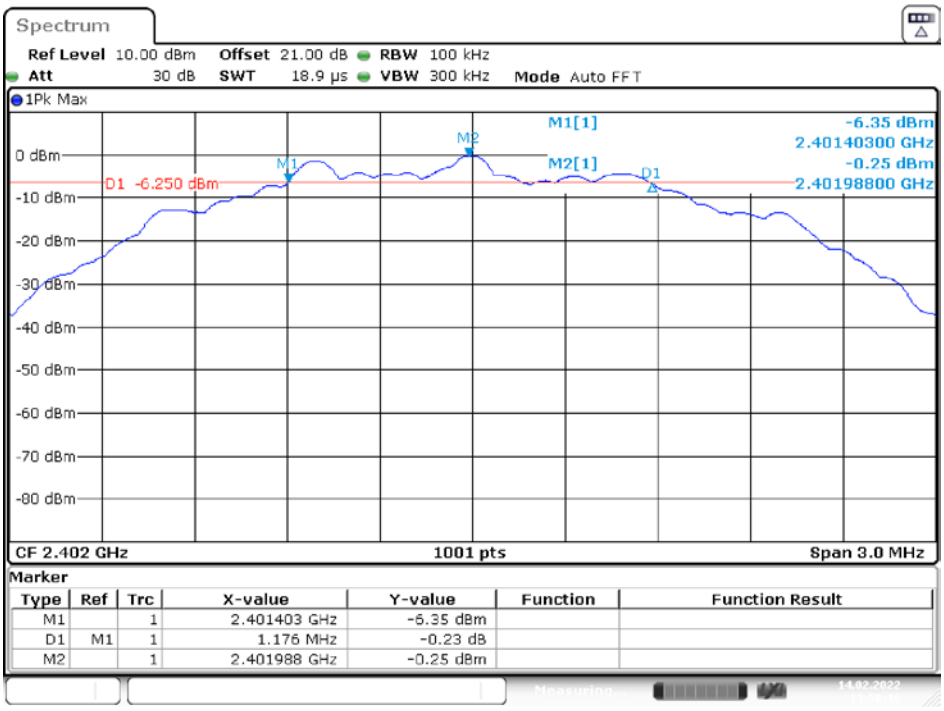
High Channel



Date: 14.FEB.2022 13:47:26

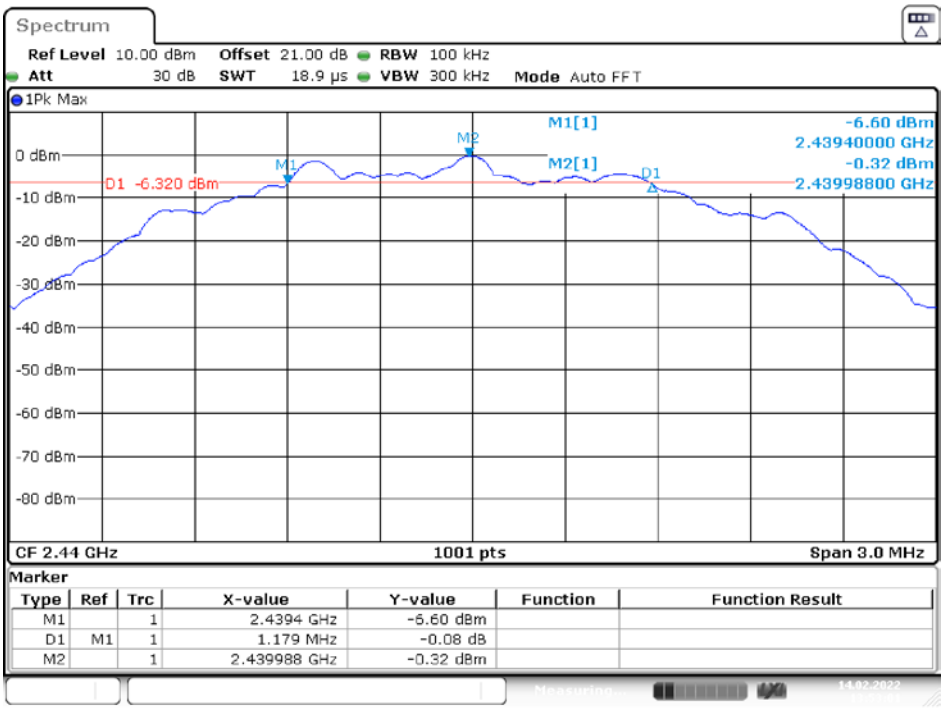
BLE(2M) Mode

Low Channel



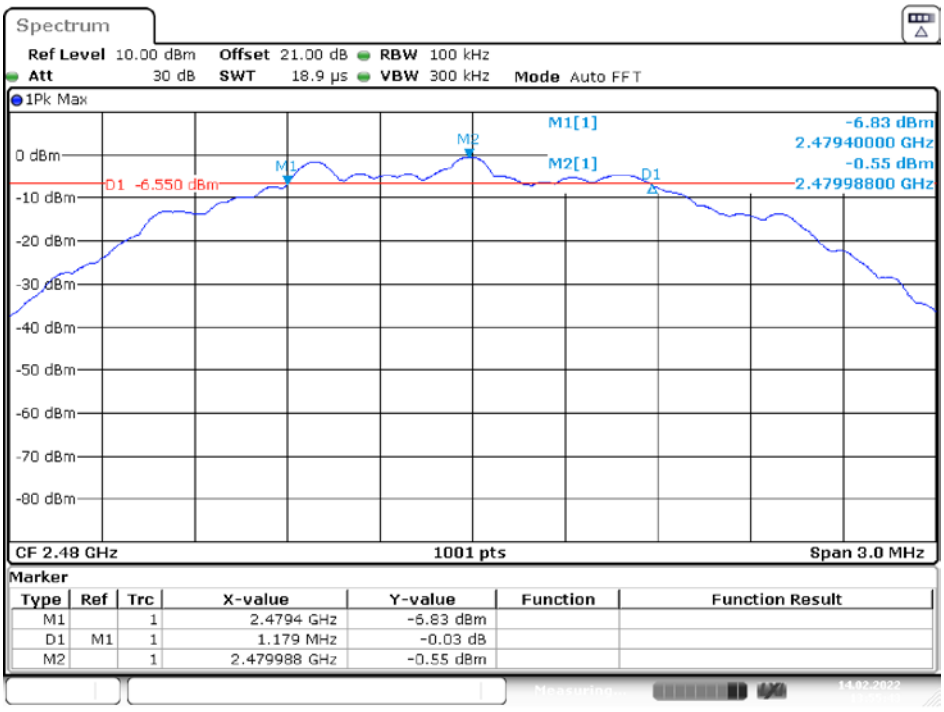
Date: 14.FEB.2022 13:50:17

Middle Channel



Date: 14.FEB.2022 13:53:02

High Channel



Date: 14.FEB.2022 13:55:44

10 FCC §15.247(b)(3) – Maximum Output Power

10.1 Applicable Standard

According to FCC §15.247(b) (3).

Systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

10.2 Test Procedure

1. Place the EUT on a bench and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to measuring equipment.

10.3 Test Results

Channel	Frequency	Maximum peak Conducted Output Power		Limit	Result
	(MHz)	(dBm)	(W)	(W)	
BLE(125kbps) Mode					
Low	2402	-1.07	0.0008	1	PASS
Middle	2440	-1.10	0.0008	1	PASS
High	2480	-1.36	0.0007	1	PASS
BLE(500kbps) Mode					
Low	2402	-1.09	0.0008	1	PASS
Middle	2440	-1.12	0.0008	1	PASS
High	2480	-1.37	0.0007	1	PASS
BLE(1Mbps) Mode					
Low	2402	-1.05	0.0008	1	PASS
Middle	2440	-1.09	0.0008	1	PASS
High	2480	-1.35	0.0007	1	PASS
BLE(2Mbps) Mode					
Low	2402	-1.06	0.0008	1	PASS
Middle	2440	-1.09	0.0008	1	PASS
High	2480	-1.37	0.0007	1	PASS

11 FCC§15.247(d) – 100 kHz Bandwidth of Frequency Band Edge

11.1 Applicable Standard

According to FCC §15.247(d).

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

11.2 Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.

2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.

3. Set RBW to 100 kHz and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.

4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.

5. Repeat above procedures until all measured frequencies were complete.

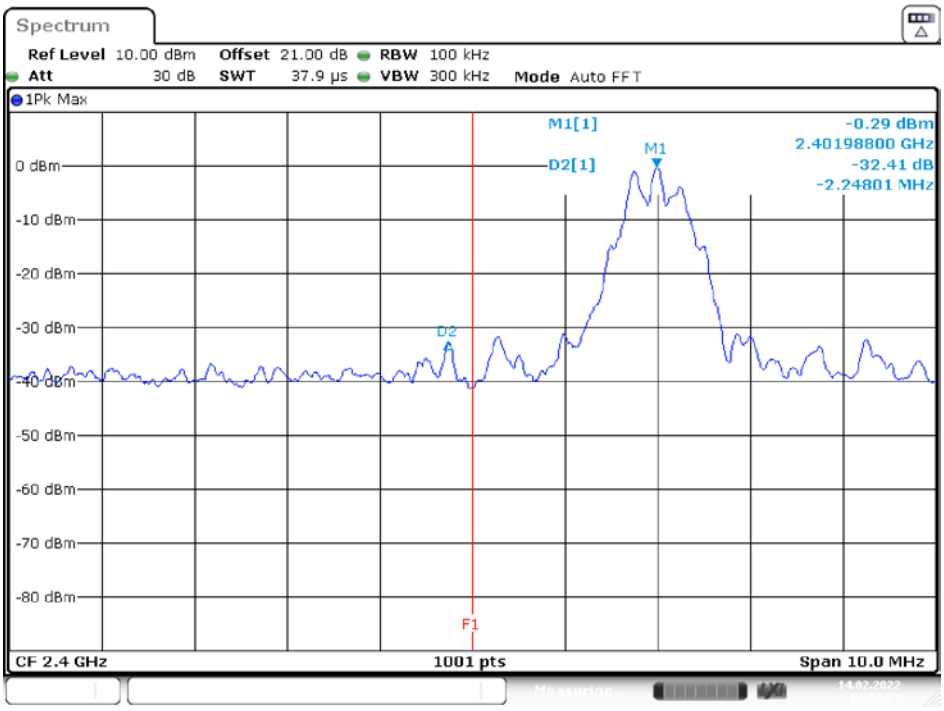
11.3 Test Results

Channel	Frequency (MHz)	Delta Peak to Band Emission (dBc)	Limit (dBc)	Result
BLE(125k) Mode				
Low	2402	32.41	≥ 20	PASS
High	2480	37.31	≥ 20	PASS
BLE(500k) Mode				
Low	2402	37.70	≥ 20	PASS
High	2480	36.35	≥ 20	PASS
BLE(1M) Mode				
Low	2402	38.22	≥ 20	PASS
High	2480	37.17	≥ 20	PASS
BLE(2M) Mode				
Low	2402	34.16	≥ 20	PASS
High	2480	37.28	≥ 20	PASS

Please refer to the following plots

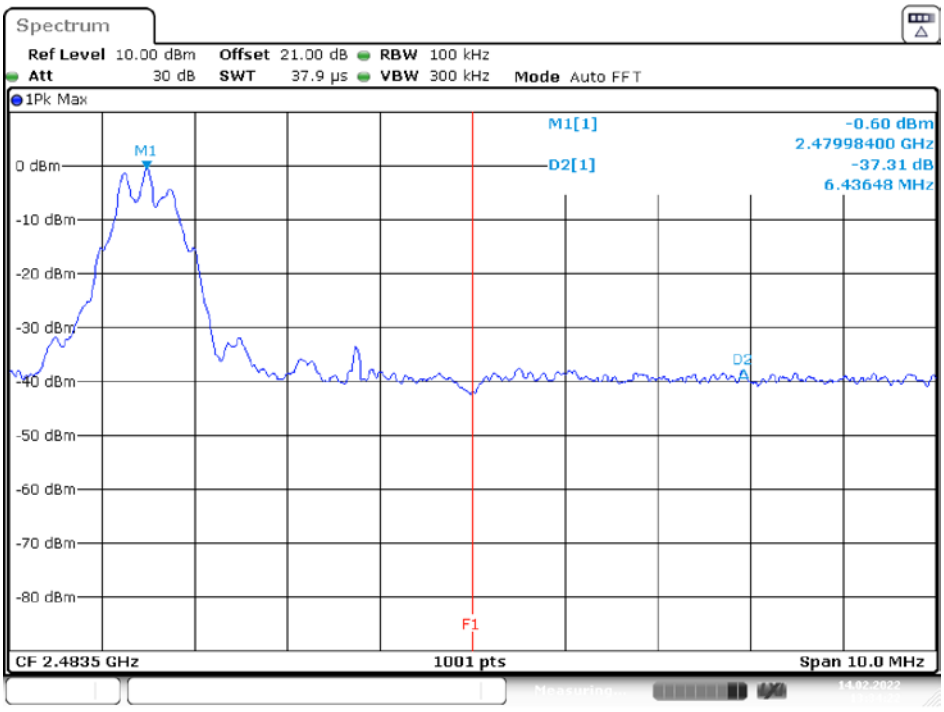
BLE(125k) Mode

Band Edge, Left Side



Date: 14.FEB.2022 13:28:05

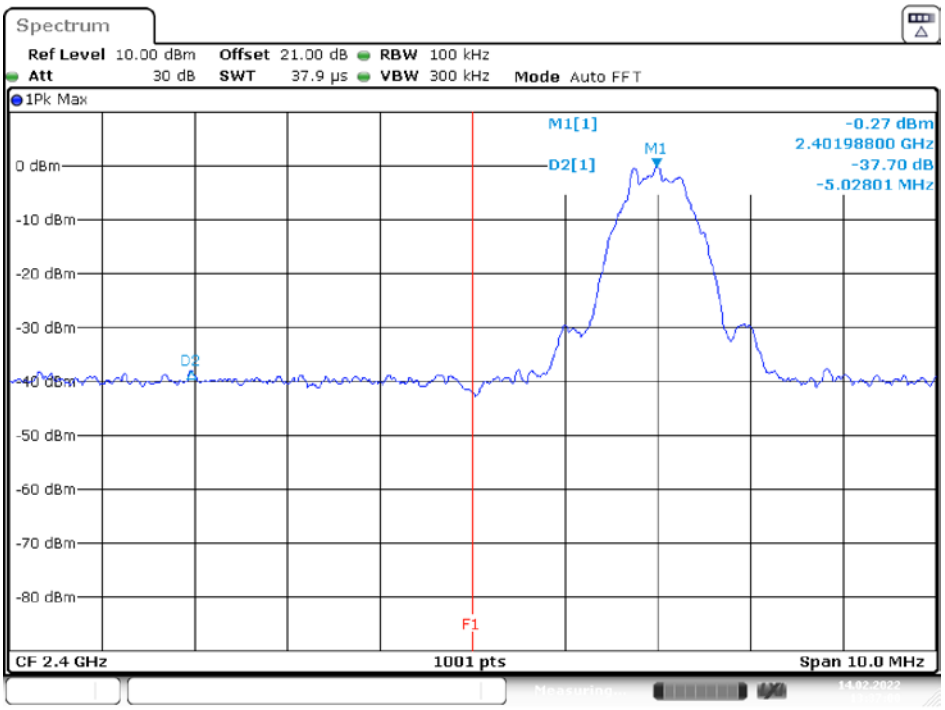
Band Edge, Right Side



Date: 14.FEB.2022 13:34:23

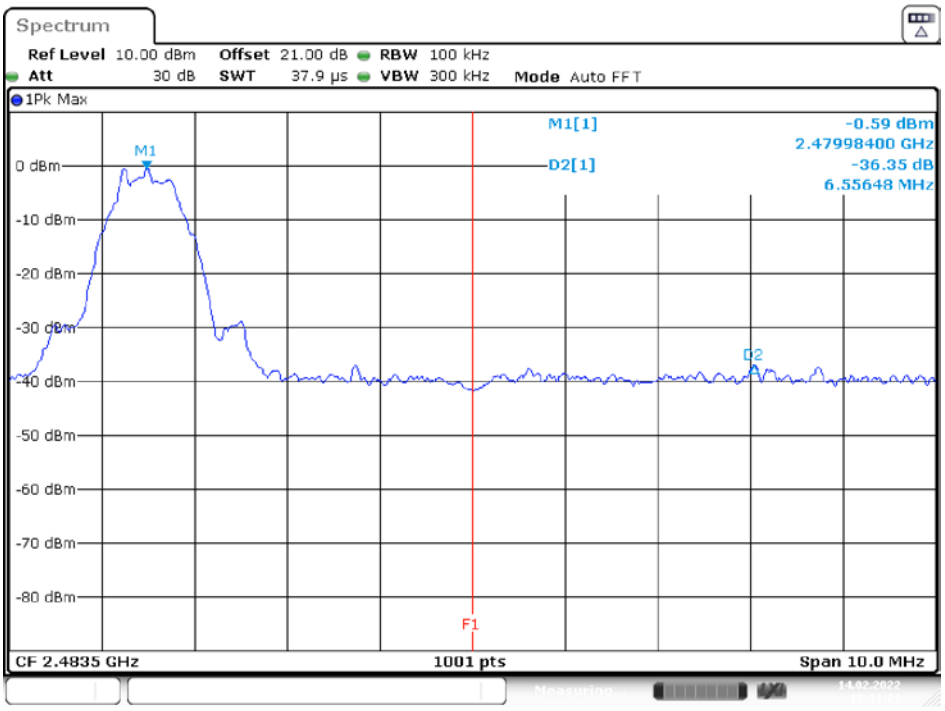
BLE(500k) Mode

Band Edge, Left Side



Date: 14.FEB.2022 13:37:00

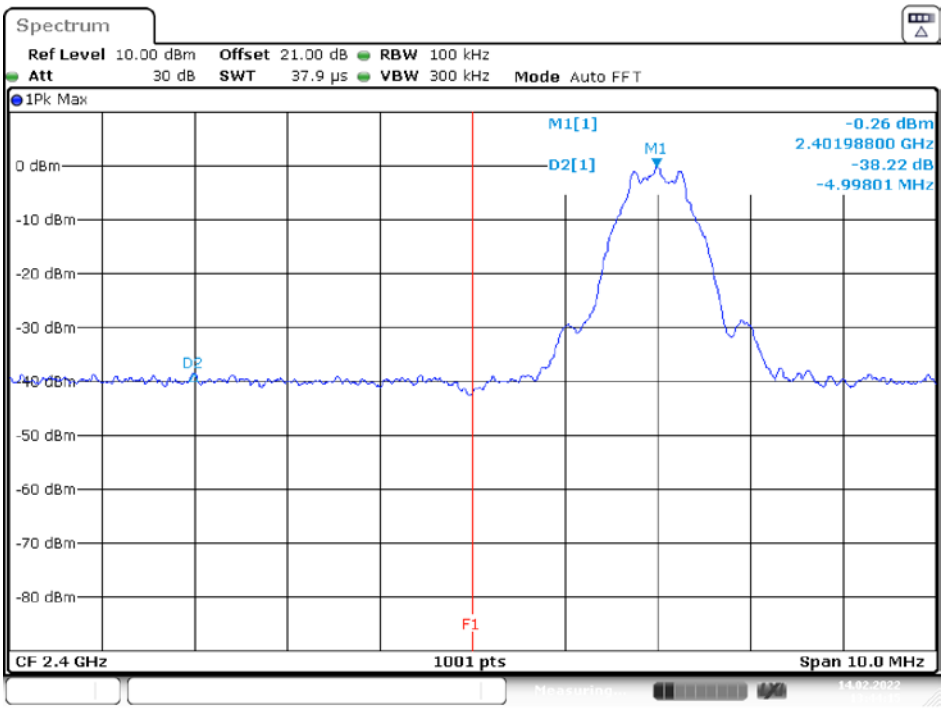
Band Edge, Right Side



Date: 14.FEB.2022 13:41:21

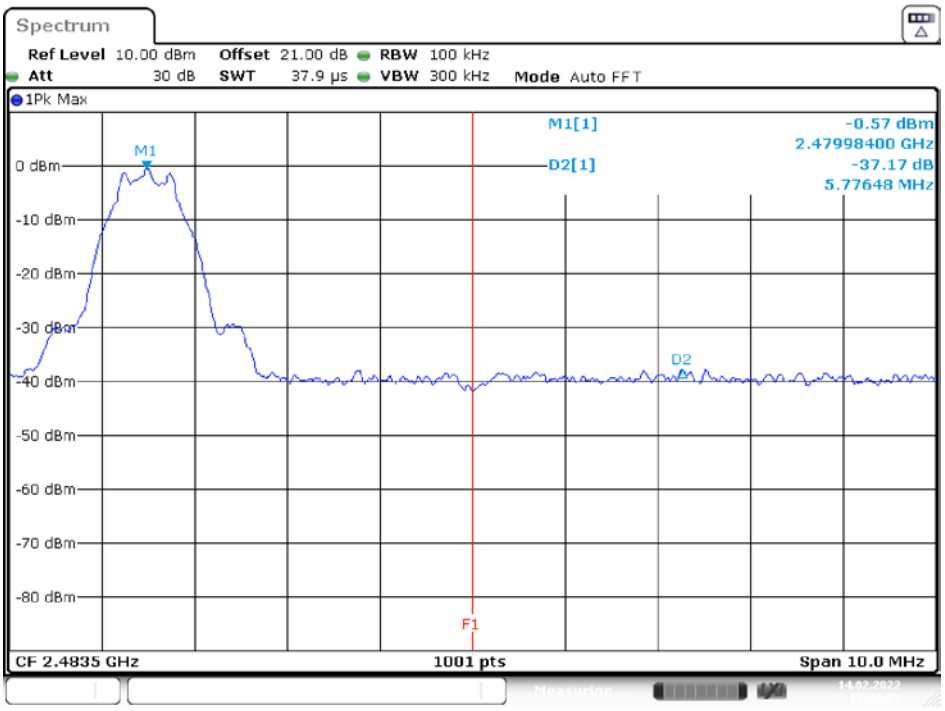
BLE(1M) Mode

Band Edge, Left Side



Date: 14.FEB.2022 13:44:16

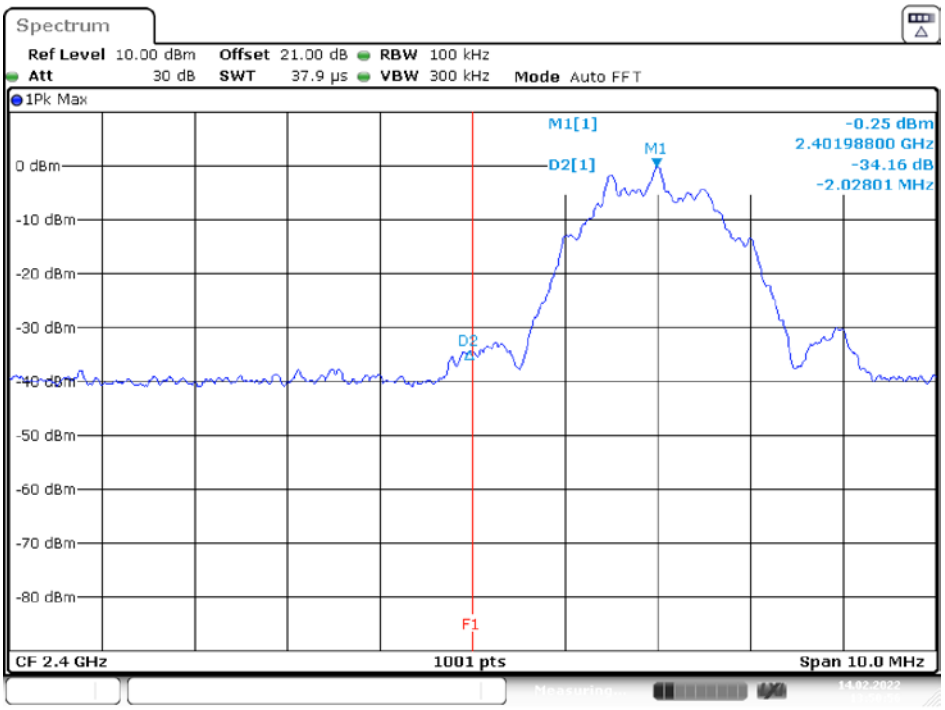
Band Edge, Right Side



Date: 14.FEB.2022 13:48:06

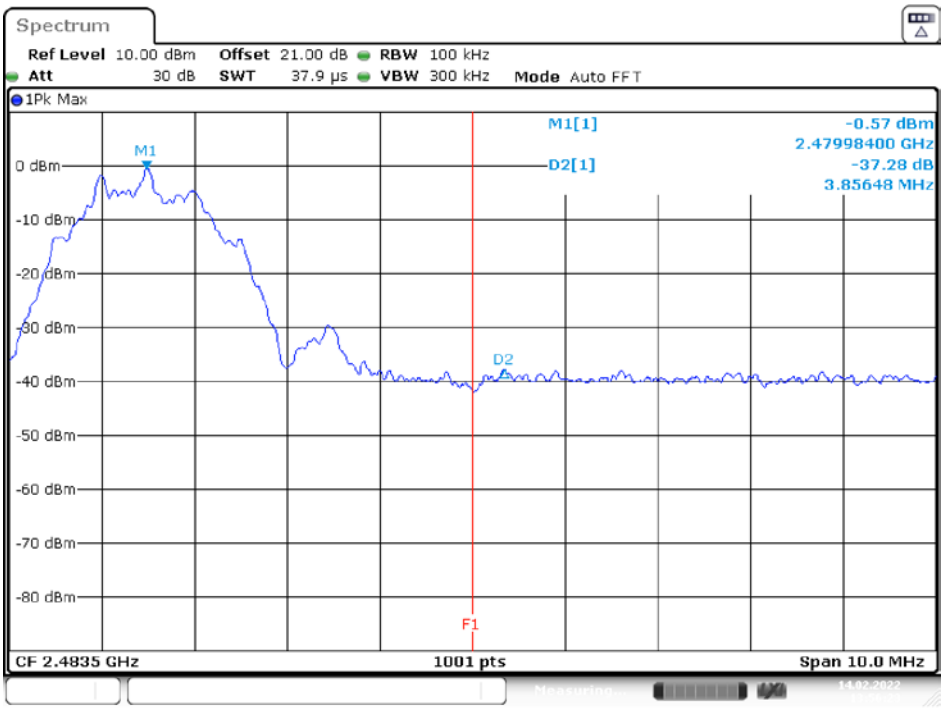
BLE(2M) Mode

Band Edge, Left Side



Date: 14.FEB.2022 13:50:57

Band Edge, Right Side



Date: 14.FEB.2022 13:56:23

12 FCC §15.247(e) – Power Spectral Density

12.2Applicable Standard

According to FCC §15.247(e).

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

12.3Test Procedure

a) Set analyzer center frequency to DTS channel center frequency.

b) Set the span to 1.5 times the DTS bandwidth.

c) Set the RBW to 3 kHz ≤ RBW ≤ 100 kHz.

d) Set the VBW ≥ [3 × RBW].

e) Detector = peak.

f) Sweep time = auto couple.

g) Trace mode = max hold.

h) Allow trace to fully stabilize.

i) Use the peak marker function to determine the maximum amplitude level within the RBW.

j) If measured value exceeds requirement, then reduce RBW (but no less than 3 kHz) and repeat

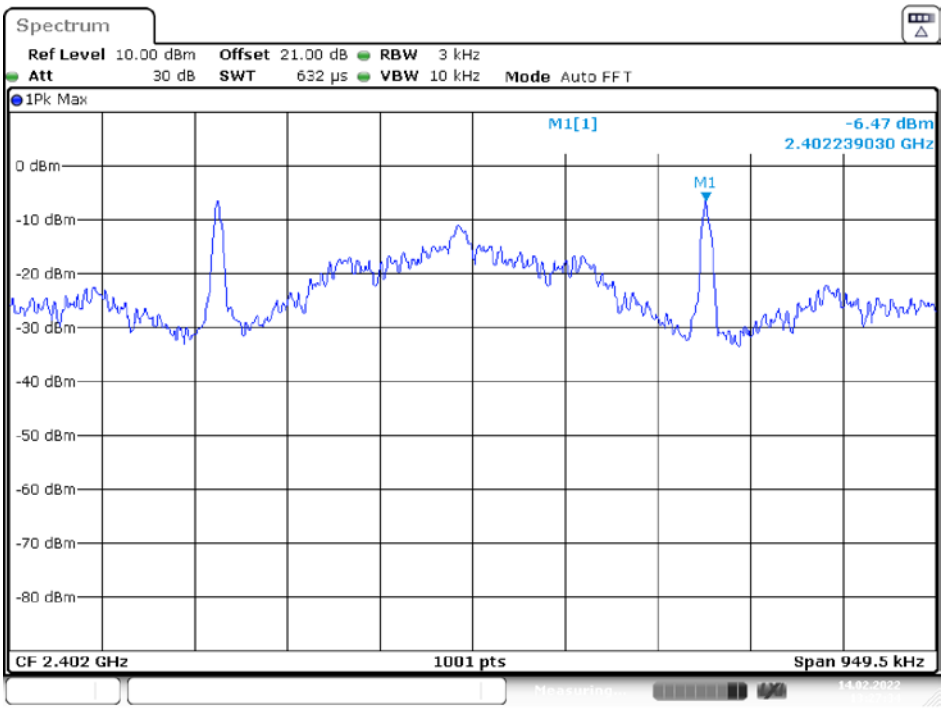
12.4Test Results

Channel	Frequency (MHz)	Power Spectral Density (dBm/3 kHz)	Limit (dBm/3 kHz)	Result
BLE(125k) Mode				
Low	2402	-6.47	8	Compliance
Middle	2440	-6.52	8	Compliance
High	2480	-6.73	8	Compliance
BLE(500k) Mode				
Low	2402	-7.45	8	Compliance
Middle	2440	-7.59	8	Compliance
High	2480	-7.84	8	Compliance
BLE(1M) Mode				
Low	2402	-10.44	8	Compliance
Middle	2440	-10.44	8	Compliance
High	2480	-10.76	8	Compliance
BLE(2M) Mode				
Low	2402	-9.61	8	Compliance
Middle	2440	-9.67	8	Compliance
High	2480	-10.04	8	Compliance

Please refer to the following plots

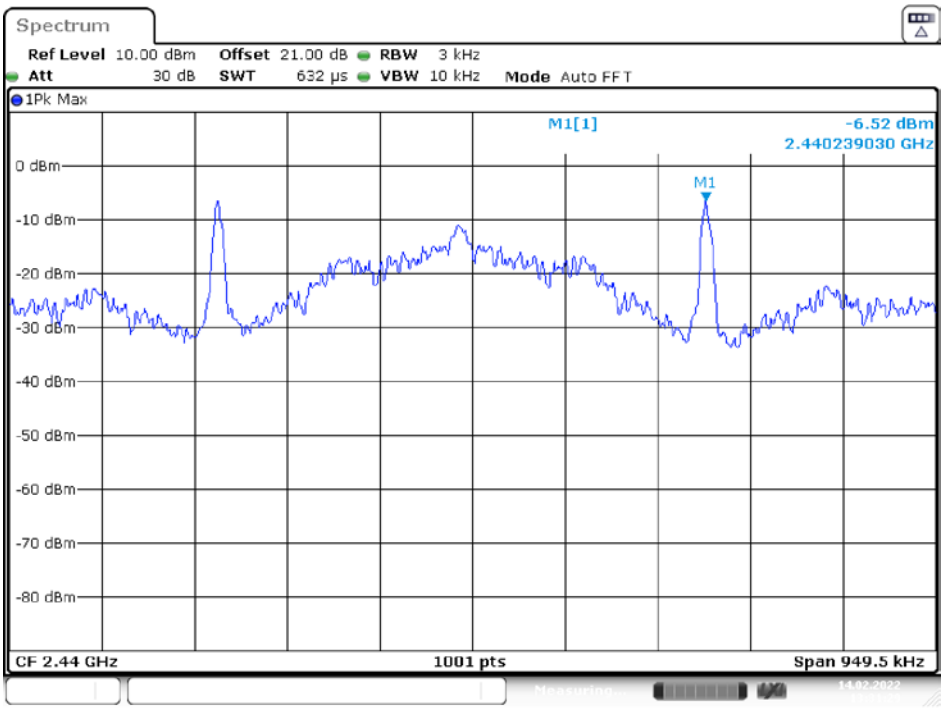
BLE(125k) Mode

Low Channel



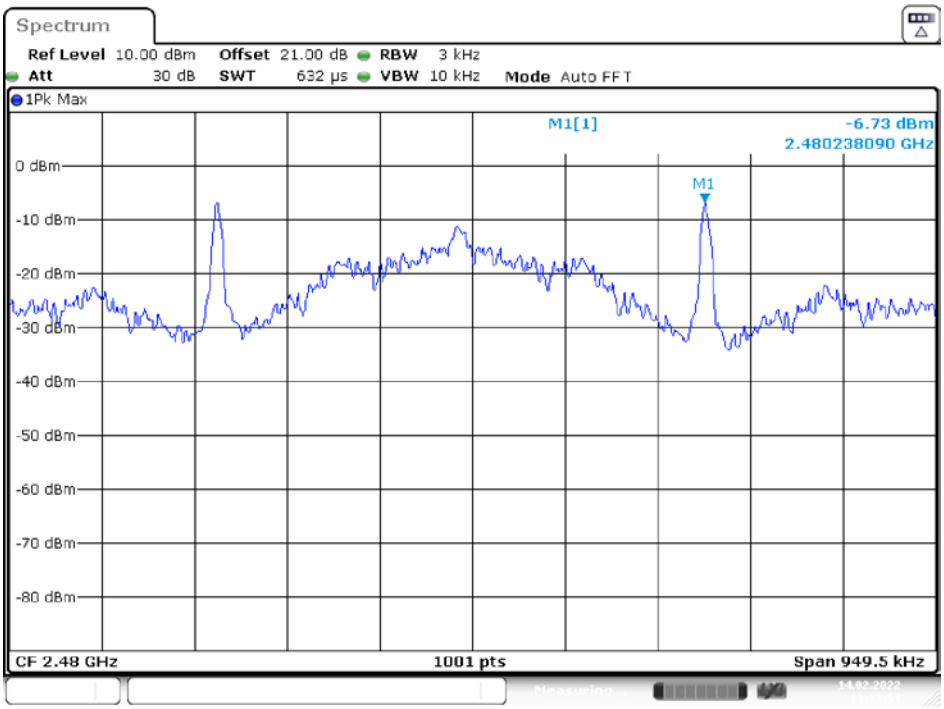
Date: 14.FEB.2022 13:27:34

Middle Channel



Date: 14.FEB.2022 13:31:30

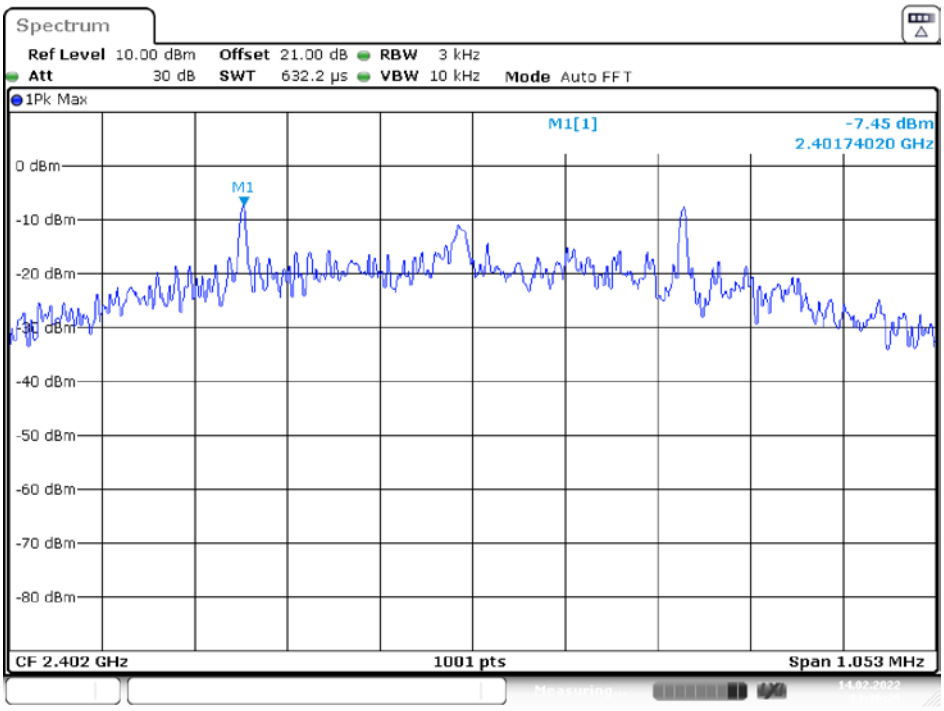
High Channel



Date: 14.FEB.2022 13:33:52

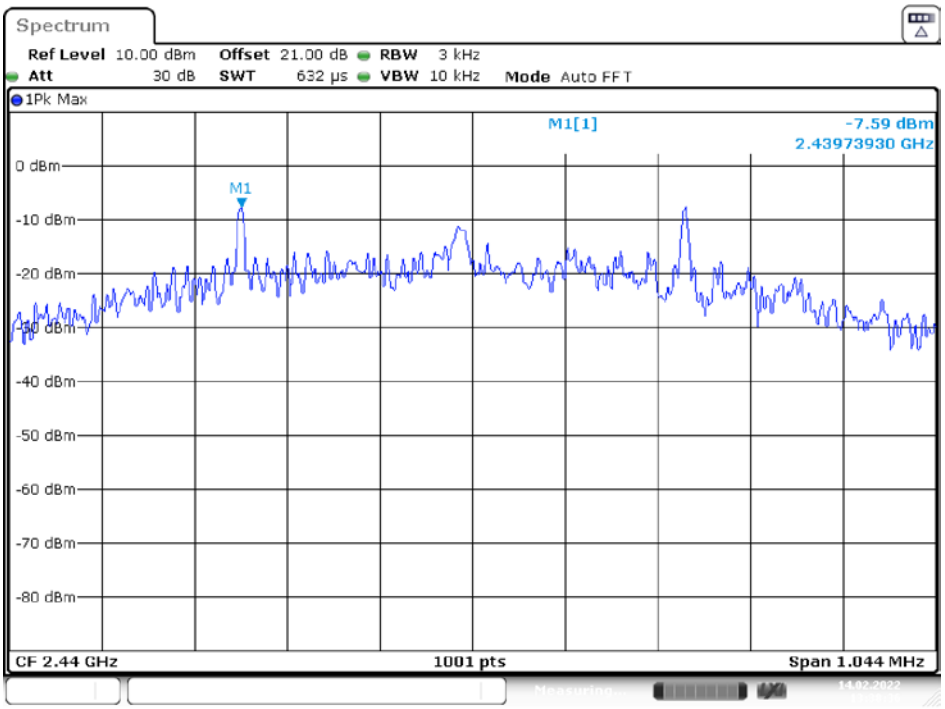
BLE(500k) Mode

Low Channel



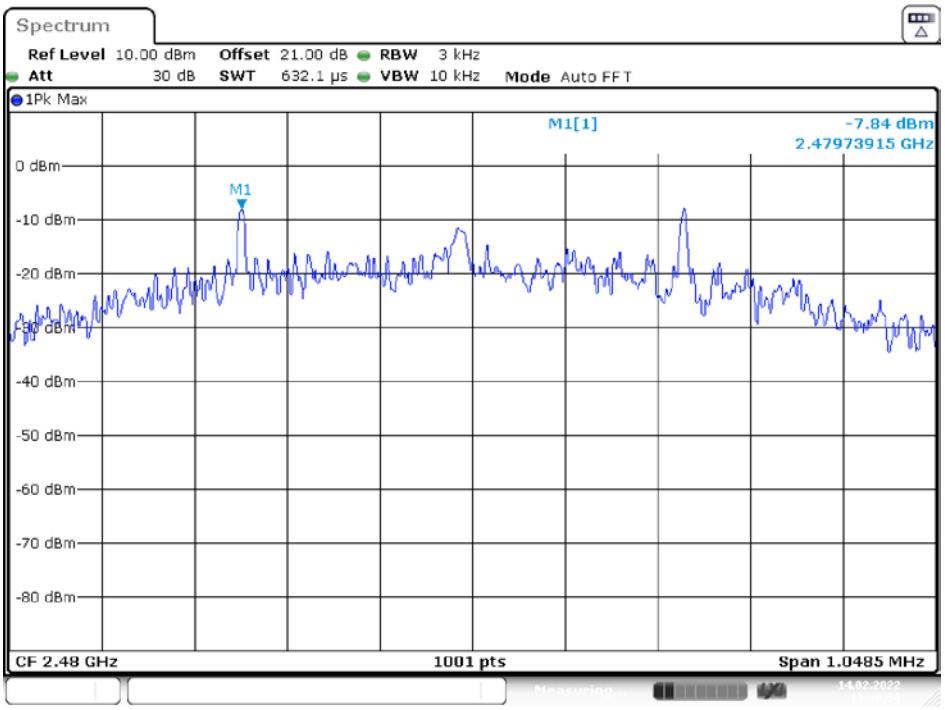
Date: 14.FEB.2022 13:36:29

Middle Channel



Date: 14.FEB.2022 13:38:37

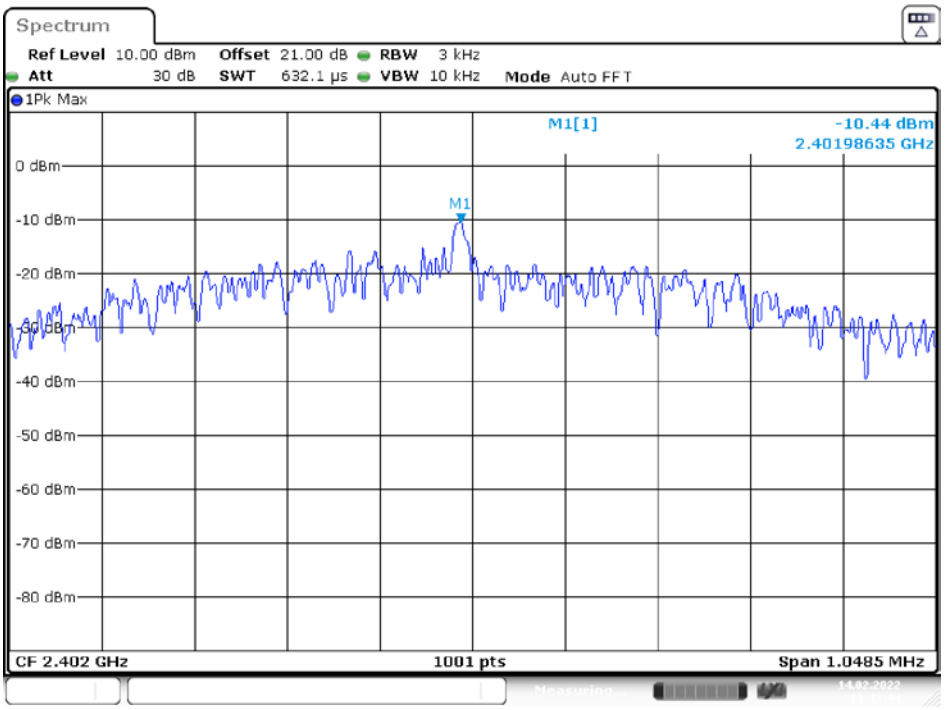
High Channel



Date: 14.FEB.2022 13:40:50

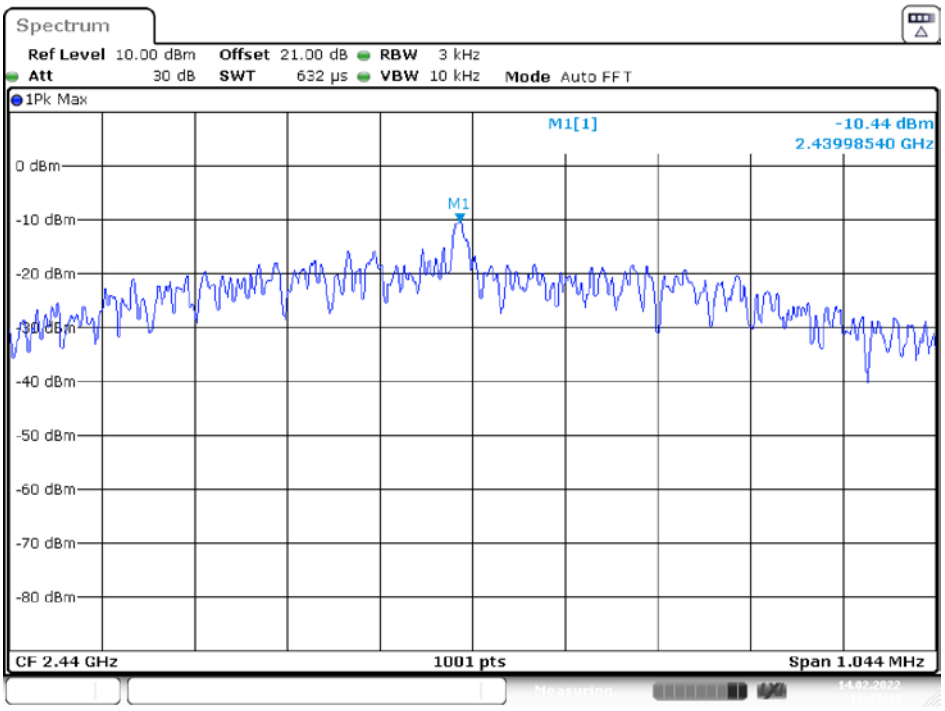
BLE(1M) Mode

Low Channel



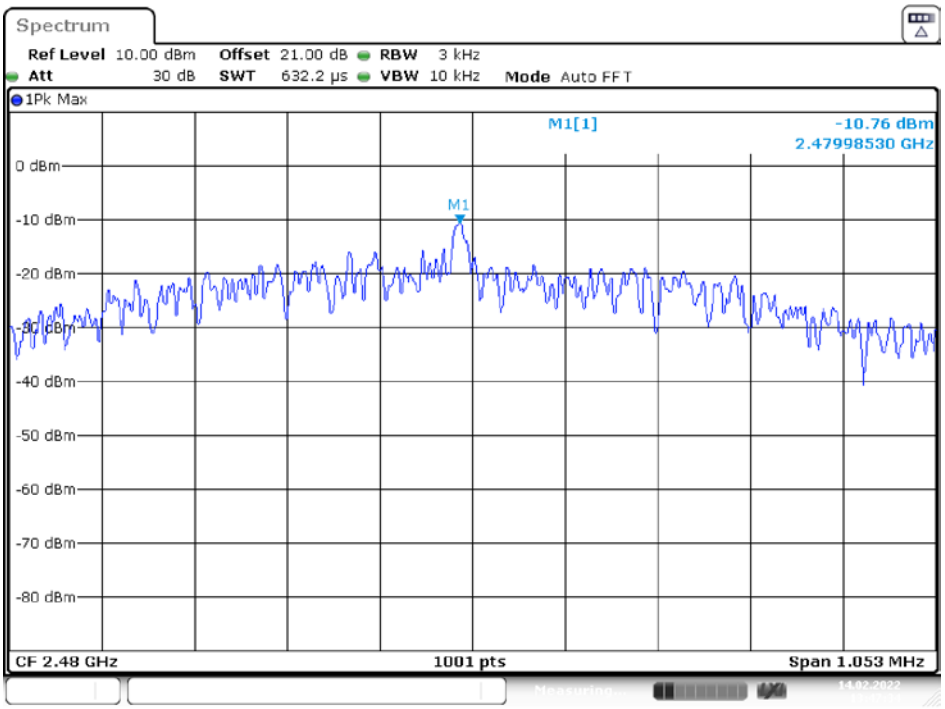
Date: 14.FEB.2022 13:43:45

Middle Channel



Date: 14.FEB.2022 13:45:45

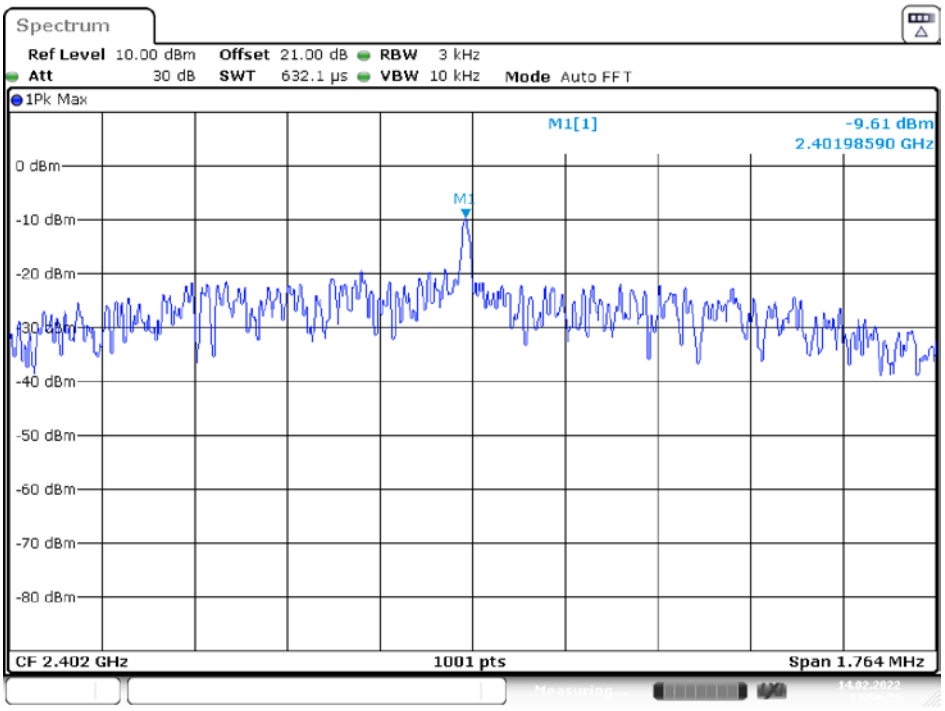
High Channel



Date: 14.FEB.2022 13:47:35

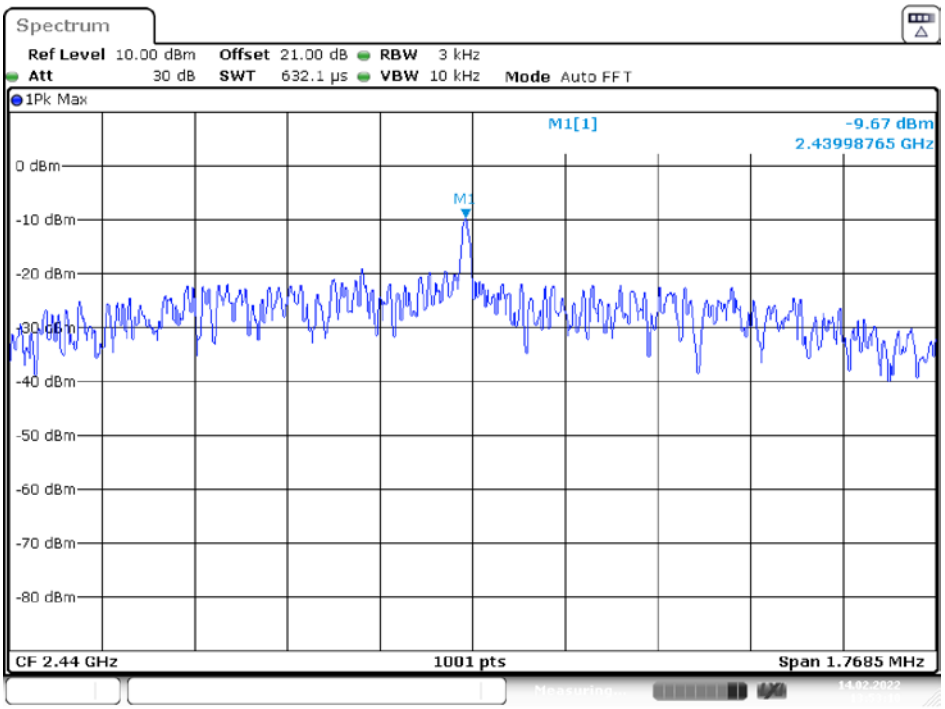
BLE(2M) Mode

Low Channel



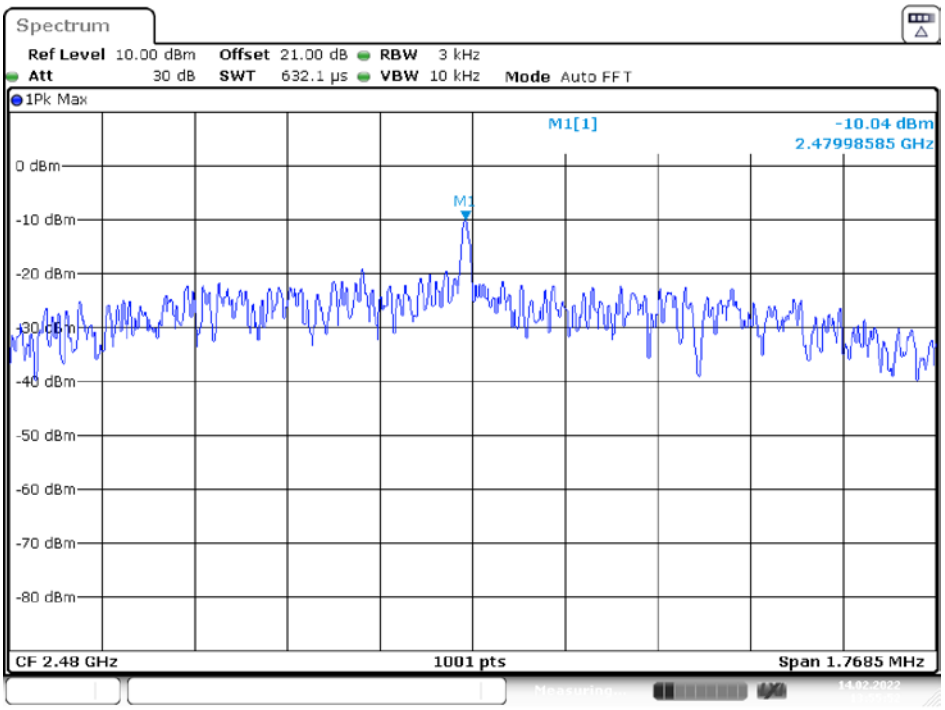
Date: 14.FEB.2022 13:50:26

Middle Channel



Date: 14.FEB.2022 13:53:11

High Channel



Date: 14.FEB.2022 13:55:53

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