FCC PART 15.247

TEST REPORT

For

Shenzhen Vanson Smartlinking Technology CO., Ltd.

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FCC ID: 2AZ2N-BT001

Report Type:	**Product Type:**
Original Report	Bluetooth Smart Controller

Report Number: RSZ210316002-RF

Report Date: 2021-04-02

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Product	Bluetooth Smart Controller
Tested Model	DBL0362CN0V
Frequency Range	BLE: 2402-2480MHz
Maximum Conducted Peak Output Power	BLE: 6.32dBm
Modulation Technique	BLE: GFSK
Antenna Specification*	Internal Antenna: 0dBi(provided by the applicant)
Voltage Range	DC 5-24V
Date of Test	2021-03-24 to 2021-03-30
Sample serial number	RSZ210316002-RF-S1(Assigned by ATC, Shenzhen)
Received date	2021-03-16
Sample/EUT Status	Good condition

Objective

This test report is in accordance with Part 2-Subpart J, Part 15-Subparts A and C of the Federal Communication Commission's rules.

The tests were performed in order to determine compliance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.207, 15.209 and 15.247 rules.

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.

And KDB 558074 D01 15.247 Meas Guidance v05r02.

All emissions measurement was performed at Shenzhen Accurate Technology Co., Ltd. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Measurement Uncertainty

Item		Expanded Measurement uncertainty
Conducted Emissions	AC Mains	*2.72 dB (k=2, 95% level of confidence)*
Radiated emission	30MHz-1GHz	*4.28 dB (k=2, 95% level of confidence)*
	1GHz-18GHz	*4.98 dB (k=2, 95% level of confidence)*

Note: The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval. Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.

Test Facility

The test site used by Shenzhen Accurate Technology Co., Ltd. to collect test data is located on the 1/F., Building A, Changyuan New Material Port, Science & Industry Park, Nanshan District, Shenzhen, Guangdong, P.R. China.

The test site has been approved by the FCC under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No.: 708358, the FCC Designation No.: CN1189.

Listed by Innovation, Science and Economic Development Canada (ISEDC), the Registration Number is 5077A-2.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

For BLE mode, 40 channels are provided to testing:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	20	2442
1	2404	21	2444
2	2406	22	2446
3	2408	23	2448
4	2410	24	2450
5	2412	25	2452
6	2414	26	2454
7	2416	27	2456
8	2418	28	2458
9	2420	29	2460
10	2422	30	2462
11	2424	31	2464
12	2426	32	2466
13	2428	33	2468
14	2430	34	2470
15	2432	35	2472
16	2434	36	2474
17	2436	37	2476
18	2438	38	2478
19	2440	39	2480

EUT was tested with Channel 0, 19 and 39.

Equipment Modifications

No modification was made to the EUT tested.

EUT Exercise Software

The EUT was configured in engineering mode and the power level was default.

Duty cycle

Test Result: Compliant. Please refer to the Appendix BLE.

Support Equipment List and Details

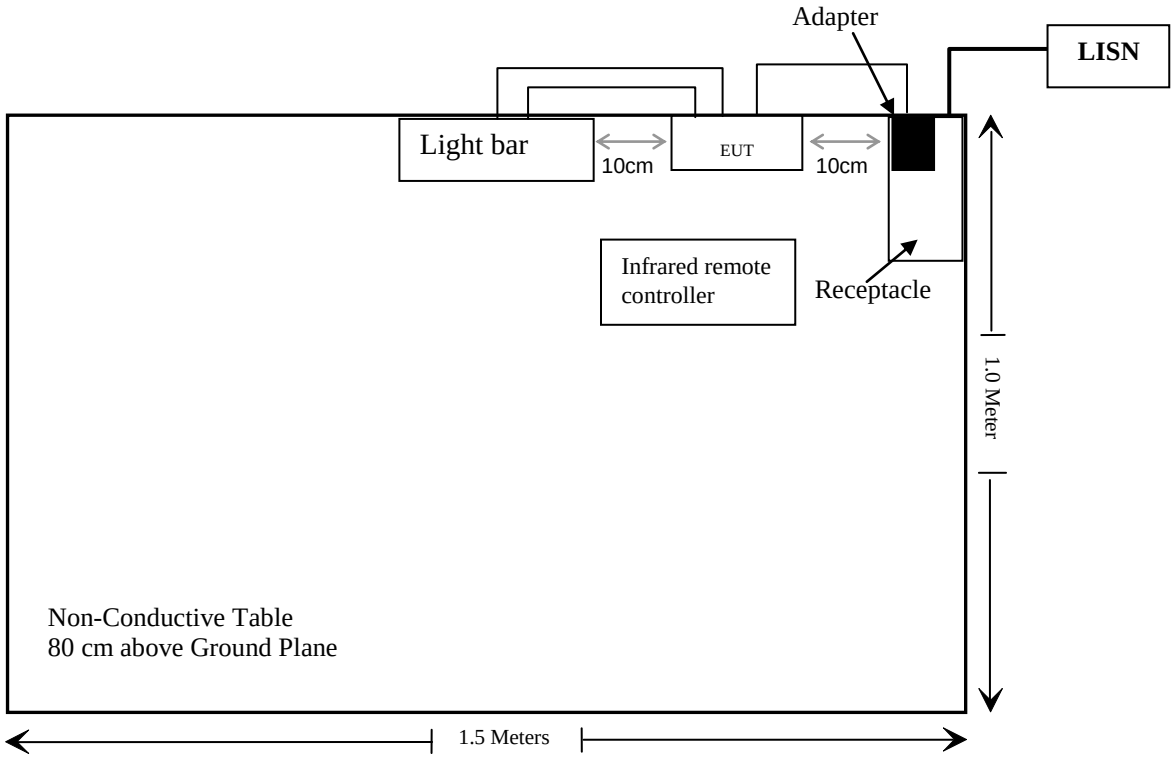
Manufacturer	Description	Model	Serial Number
Yanson Smartlinkiing	Adapter	WS-1202500	Unknown

External I/O Cable

Cable Description	Length (m)	From Port	To
Un-shielding Detachable DC Cable	1.5	EUT	Adapter
Un-shielding Un-Detachable Control Line*2	0.08	Controller	Light bar

Block Diagram of Test Setup

For conducted emission:



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.247 (i), §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 Conducted Output Power	Compliance
§15.247(d)	100 kHz Bandwidth of Frequency Band Edge	Compliance
§15.247(e)	Power Spectral Density	Compliance

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Conducted Emissions Test					
Rohde & Schwarz	Test Receiver	ESPI3	100396	2020/12/24	2021/12/23
R & S	L.I.S.N.	ENV216	101314	2020/12/25	2021/12/24
Rohde & Schwarz	Pulse Limiter	ESH3-Z2	100815	2020/12/25	2021/12/24
Anritsu Corp	50Ω Coaxial Switch	MP59B	6200506474	2020/12/25	2021/12/24
RF Coaxial Cable	Unknown	N-2m	No.2	2020/12/25	2021/12/24
Radiated Emissions Test					
Rohde&Schwarz	Test Receiver	ESR	101817	2020/12/24	2021/12/23
Rohde & Schwarz	Spectrum Analyzer	FSV-40	101495	2020/12/24	2021/12/23
A.H. Systems, inc.	Preamplifier	PAM-0118P	531	2020/07/08	2021/07/07
SONOMA INSTRUMENT	Amplifier	310 N	186131	2020/12/25	2021/12/24
Schwarzbeck	Bilog Antenna	VULB9163	9163-323	2020/01/04	2023/01/03
Schwarzbeck	Horn Antenna	BBHA9120D	9120D-1067	2020/01/05	2023/01/04
Schwarzbeck	Horn Antenna	BBHA9170	9170-359	2020/01/05	2023/01/04
Quinstar	Amplifier	QLW-18405536-J0	15964001002	2020/11/28	2021/11/27
RF Coaxial Cable	Unknown	N-5m	No.3	2020/12/25	2021/12/24
RF Coaxial Cable	Unknown	N-5m	No.4	2020/12/25	2021/12/24
RF Coaxial Cable	Unknown	N-1m	No.5	2020/12/25	2021/12/24
RF Coaxial Cable	Unknown	N-1m	No.6	2020/12/25	2021/12/24
RF Conducted Test					
Rohde & Schwarz	Spectrum Analyzer	FSV-40	101495	2020/12/24	2021/12/23
WEINSCHEL	10dB Attenuator	5324	AU 3842	Each time	

*** Statement of Traceability:** Shenzhen Accurate Technology Co., Ltd. attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

FCC §15.247 (i) & §2.1091- MAXIMUM PER MISSIBLE EXPOSURE (MPE)

Applicable Standard

According to subpart 15.247 (i) and subpart 2.1091 systems operating under the provisions of this section shall be operated in a manner that ensures the public is not exposed to RF energy level in excess of the communication guidelines.

Limits for General Population/Uncontrolled Exposure

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

Result

Calculated Formulary:

Predication of MPE limit at a given distance

$$S = \frac{PG}{4\pi R^2}$$

S = 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)

For worst case:

Mode	Frequency (MHz)	Antenna Gain		Tune up conducted power		Evaluation Distance (cm)	Power Density (mW/cm^2)	MPE Limit (mW/cm^2)
		(dBi)	(numeric)	(dBm)	(mW)			
BLE	2402-2480	0	1.00	6.5	4.47	20	0.0009	1

To maintain compliance with the FCC's RF exposure guidelines, place the equipment at least 20cm from nearby persons.

Result: Compliance

FCC §15.203 - ANTENNA REQUIREMENT

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. The structure and application of the EUT were analyzed to determine compliance with section §15.203 of the rules. §15.203 state that the subject device must meet the following criteria:

a. Antenna must be permanently attached to the unit.
b. Antenna must use a unique type of connector to attach to the EUT.

Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.
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 exceeds 6 dBi.

Antenna Connector Construction

The EUT has one internal antenna arrangement, which was permanently attached and the antenna gain is 0 dBi, fulfill the requirement of this section. Please refer to the EUT photos.

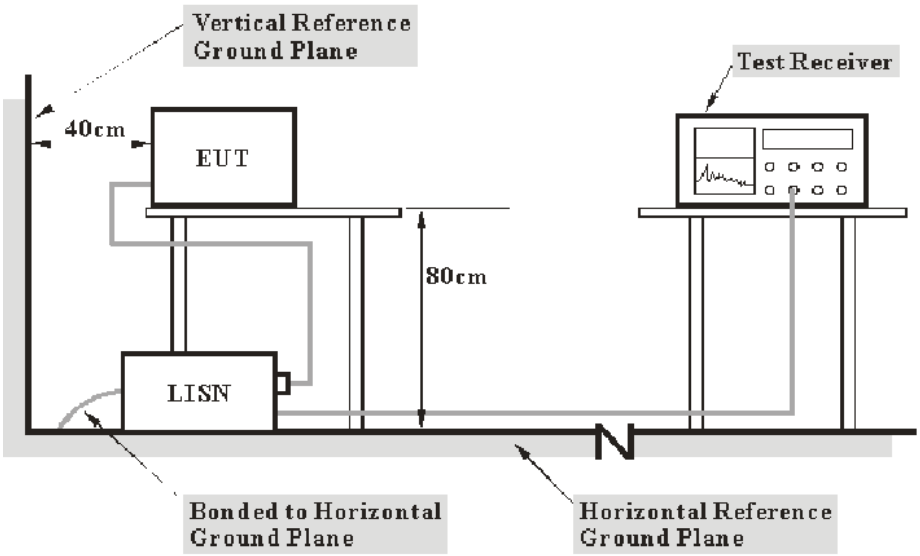
Result: Compliance.

FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS

Applicable Standard

FCC §15.207

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.

The spacing between the peripherals was 10 cm.

EMI Test Receiver Setup

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

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

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

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

Transd Factor & Margin Calculation

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

Transd Factor = LISN VDF + Cable Loss

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 = Limit – level
Level= reading level+ Transd Factor

Test Data

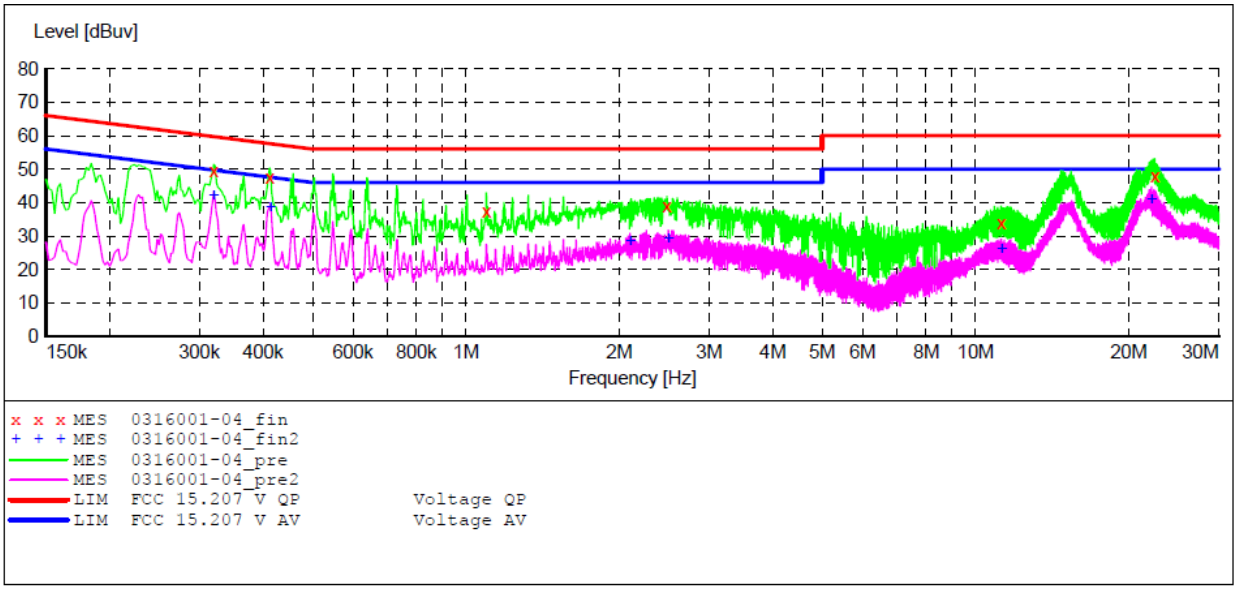
Environmental Conditions

Temperature:	24 ℃
Relative Humidity:	48 %
ATM Pressure:	101.0 kPa

The testing was performed by Fan Yang on 2021-03-24.

EUT operation mode: Transmitting (Worst case as below)

AC 120V/60 Hz, Line



MEASUREMENT RESULT: "0316001-04_fin"

2021-3-24 20:47

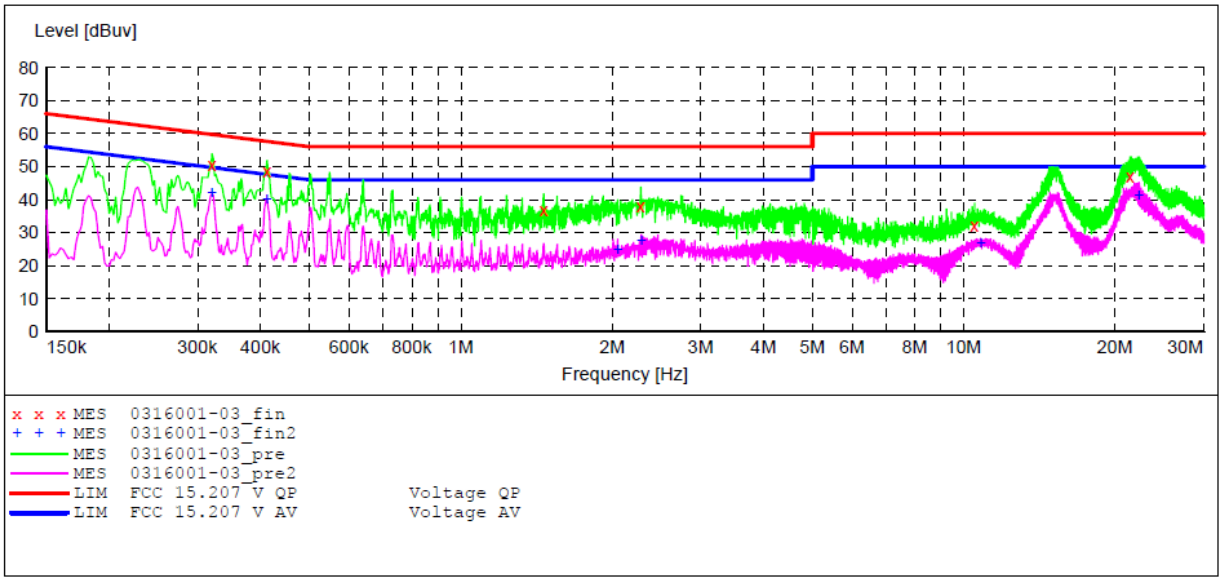
Frequency MHz	Level dBuv	Transd dB	Limit dBuv	Margin dB	Detector	Line	PE
0.320000	49.70	10.9	60	10.3	QP	L1	GND
0.412000	47.60	11.0	58	10.4	QP	L1	GND
1.096000	37.20	11.1	56	18.8	QP	L1	GND
2.480000	39.00	11.3	56	17.0	QP	L1	GND
11.235000	34.00	11.6	60	26.0	QP	L1	GND
22.480000	47.90	11.7	60	12.1	QP	L1	GND

MEASUREMENT RESULT: "0316001-04_fin2"

2021-3-24 20:47

Frequency MHz	Level dBuv	Transd dB	Limit dBuv	Margin dB	Detector	Line	PE
0.320000	42.30	10.9	50	7.7	AV	L1	GND
0.414000	39.10	11.0	48	8.9	AV	L1	GND
2.100000	28.40	11.3	46	17.6	AV	L1	GND
2.495000	29.10	11.3	46	16.9	AV	L1	GND
11.250000	26.00	11.6	50	24.0	AV	L1	GND
22.160000	40.70	11.7	50	9.3	AV	L1	GND

AC 120V/60 Hz, Neutral



MEASUREMENT RESULT: "0316001-03_fin"

2021-3-24 20:45

Frequency MHz	Level dBuv	Transd dB	Limit dBuv	Margin dB	Detector	Line	PE
0.320000	50.70	10.9	60	9.3	QP	N	GND
0.412000	48.60	11.0	58	9.4	QP	N	GND
1.462000	36.90	11.2	56	19.1	QP	N	GND
2.280000	38.00	11.3	56	18.0	QP	N	GND
10.505000	32.00	11.6	60	28.0	QP	N	GND
21.410000	47.10	11.7	60	12.9	QP	N	GND

MEASUREMENT RESULT: "0316001-03_fin2"

2021-3-24 20:45

Frequency MHz	Level dBuv	Transd dB	Limit dBuv	Margin dB	Detector	Line	PE
0.320000	42.70	10.9	50	7.3	AV	N	GND
0.412000	40.80	11.0	48	7.2	AV	N	GND
2.050000	25.20	11.3	46	20.8	AV	N	GND
2.285000	27.80	11.3	46	18.2	AV	N	GND
10.810000	27.20	11.6	50	22.8	AV	N	GND
22.310000	41.60	11.7	50	8.4	AV	N	GND

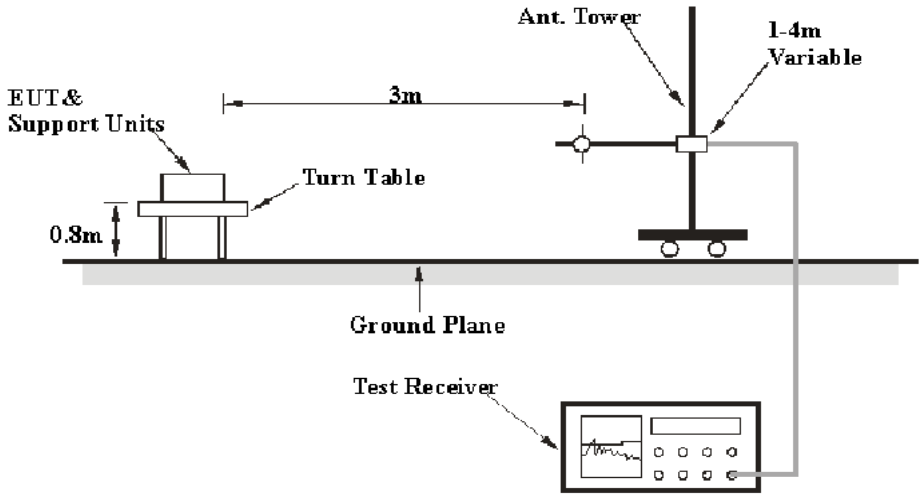
FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS

Applicable Standard

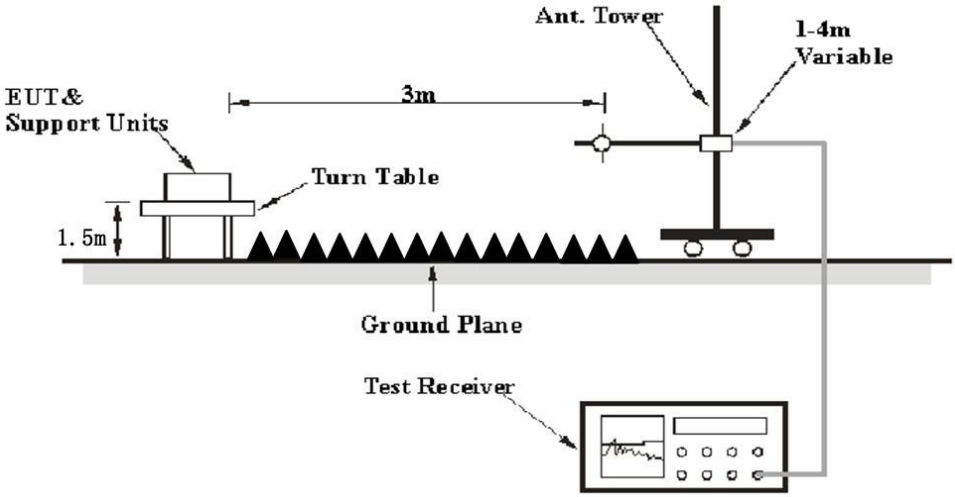
FCC §15.247 (d); §15.209; §15.205;

EUT Setup

Below 1 GHz:



Above 1GHz:



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

EMI Test Receiver & Spectrum Analyzer Setup

During the radiated emission test, the EMI test receiver & Spectrum Analyzer Setup were set with the following configurations:

Frequency Range	RBW	Video B/W	IF B/W	Measurement
30 MHz – 1000 MHz	100 kHz	300 kHz	120 kHz	QP
Above 1 GHz	1MHz	3 MHz	/	PK
	1MHz	10 Hz Note 1	/	Average
	1MHz	＞1/T Note 2	/	Average

Note 1: when duty cycle is no less than 98%
Note 2: when duty cycle is less than 98%

Test Procedure

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

Data was recorded in Quasi-peak detection mode for frequency range of 30 MHz-1 GHz, peak and Average detection modes for frequencies above 1 GHz.

Factor & Margin Calculation

The 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:

Factor = Meter Reading + 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 -7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

Margin = Result-Limit
Result = Reading + Factor

Test Data

Environmental Conditions

Temperature:	24 ℃
Relative Humidity:	48 %
ATM Pressure:	101.0 kPa

The testing was performed by Fan Yang on 2021-03-30.

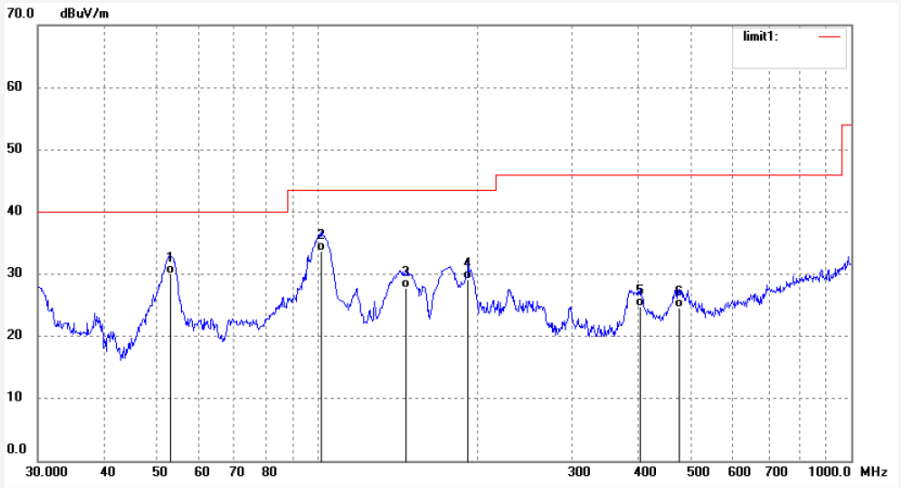
EUT operation mode: Transmitting

30 MHz~1 GHz: *(Worst case as below)*

Middle Channel
Horizontal

No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	56.0007	30.90	-11.59	19.31	40.00	-20.69	QP			
2	103.4419	48.57	-12.38	36.19	43.50	-7.31	QP			
3	169.5988	47.26	-12.74	34.52	43.50	-8.98	QP			
4	319.9370	28.11	-7.94	20.17	46.00	-25.83	QP			
5	389.3548	32.13	-6.17	25.96	46.00	-20.04	QP			
6	472.1759	28.16	-4.59	23.57	46.00	-22.43	QP			

Vertical



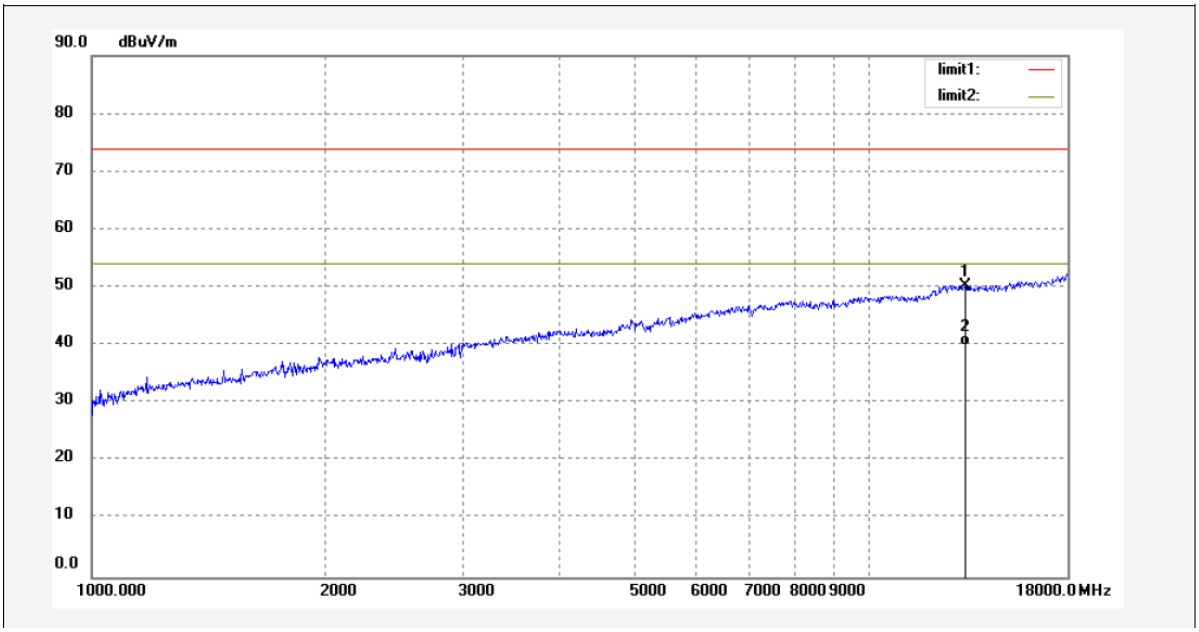
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	53.1313	41.50	-11.49	30.01	40.00	-9.99	QP			
2	102.0014	45.89	-12.13	33.76	43.50	-9.74	QP			
3	146.3735	41.86	-14.20	27.66	43.50	-15.84	QP			
4	191.7450	40.71	-11.56	29.15	43.50	-14.35	QP			
5	401.8385	30.52	-5.73	24.79	46.00	-21.21	QP			
6	475.4990	29.08	-4.50	24.58	46.00	-21.42	QP			

1 GHz-25 GHz:

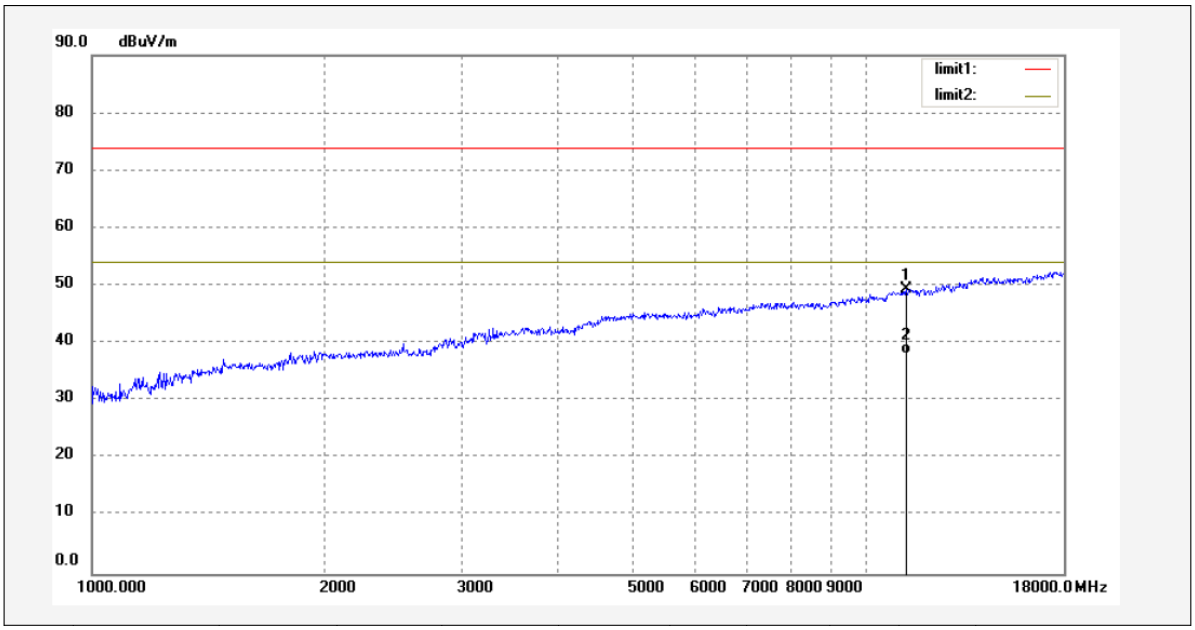
Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/QP/Ave.		Height (m)	Polar (H/V)				
Low Channel (2402 MHz)									
2310	50.76	PK	346	1.5	H	-6.84	43.92	74	30.08
2310	50.89	PK	164	1.6	V	-6.84	44.05	74	29.95
2390	50.88	PK	169	2.0	H	-6.44	44.44	74	29.56
2390	50.76	PK	327	1.3	V	-6.44	44.32	74	29.68
4804	41.30	PK	263	1.0	H	2.81	44.11	74	29.89
4804	41.76	PK	343	1.9	V	2.81	44.57	74	29.43
Middle Channel (2440 MHz)									
4880	42.27	PK	344	1.2	H	3.04	45.31	74	28.69
4880	41.72	PK	25	1.8	V	3.04	44.76	74	29.24
High Channel (2480 MHz)									
2483.5	50.98	PK	75	2.0	H	-5.96	45.02	74	28.98
2483.5	50.67	PK	29	1.8	V	-5.96	44.71	74	29.29
2500	50.33	PK	351	1.2	H	-5.88	44.45	74	29.55
2500	50.43	PK	316	2.0	V	-5.88	44.55	74	29.45
4960	41.22	PK	101	1.6	H	3.29	44.51	74	29.49
4960	42.49	PK	210	1.4	V	3.29	45.78	74	28.22

Note 1:
Corrected Factor = Antenna factor (RX) + Cable Loss – Amplifier Factor
Corrected Amplitude = Corrected Factor + Reading
Margin = Limit - Corrected. Amplitude
The other spurious emission which is 20dB to the limit was not recorded.
Note 2:
All results of Peak are 20dB below the limit, so results of Average were not recorded.

Pre-scan for Peak
Middle Channel
Horizontal:



Vertical:



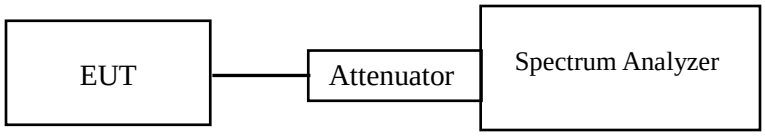
FCC §15.247(a) (2) – 6 dB EMISSION BANDWIDTH

Applicable Standard

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.

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 it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 6 dB from the reference level. Record the frequency difference as the emission bandwidth.
4. Repeat above procedures until all frequencies measured were complete.



Test Data

Environmental Conditions

Temperature:	24 °C
Relative Humidity:	48 %
ATM Pressure:	101.0 kPa

The testing was performed by Fan Yang on 2021-03-24.

EUT operation mode: Transmitting

Test Result: Compliant. Please refer to the Appendix BLE.

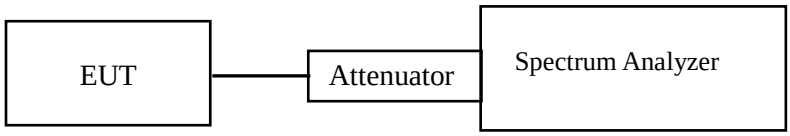
FCC §15.247(b) (3) - MAXIMUM CONDUCTED OUTPUT POWER

Applicable Standard

According to FCC §15.247(b) (3), for 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.

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 one test equipment.
3. Add a correction factor to the display.



Test Data

Environmental Conditions

Temperature:	24 ℃
Relative Humidity:	48 %
ATM Pressure:	101.0 kPa

The testing was performed by Fan Yang on 2021-03-24

EUT operation mode: Transmitting

Test Result: Compliant. Please refer to the Appendix BLE.

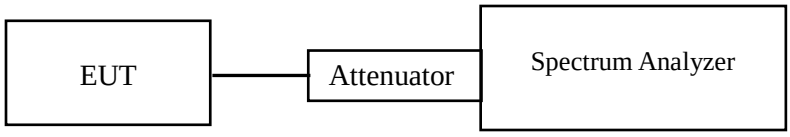
FCC §15.247(d) – 100 kHz BANDWIDTH OF FREQUENCY BAND EDGE

Applicable Standard

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)).

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.



Test Data

Environmental Conditions

Temperature:	24 °C
Relative Humidity:	48 %
ATM Pressure:	101.0 kPa

The testing was performed by Fan Yang on 2021-03-24

EUT operation mode: Transmitting

Test Result: Compliant. Please refer to the Appendix BLE.

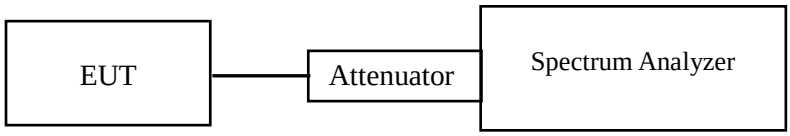
FCC §15.247(e) - POWER SPECTRAL DENSITY

Applicable Standard

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.

Test Procedure

1. Use this procedure when the maximum peak conducted output power in the fundamental emission is used to demonstrate compliance.
2. Set the RBW to: 3kHz≤ RBW≤100 kHz.
3. Set the VBW ≥ 3×RBW.
4. Set the span to 1.5 times the DTS bandwidth.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level within the RBW.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.



Test Data

Environmental Conditions

Temperature:	24 °C
Relative Humidity:	48 %
ATM Pressure:	101.0 kPa

The testing was performed by Fan Yang on 2021-03-24

EUT operation mode: Transmitting

Test Result: Compliant. Please refer to the Appendix BLE.

APPENDIX BLE

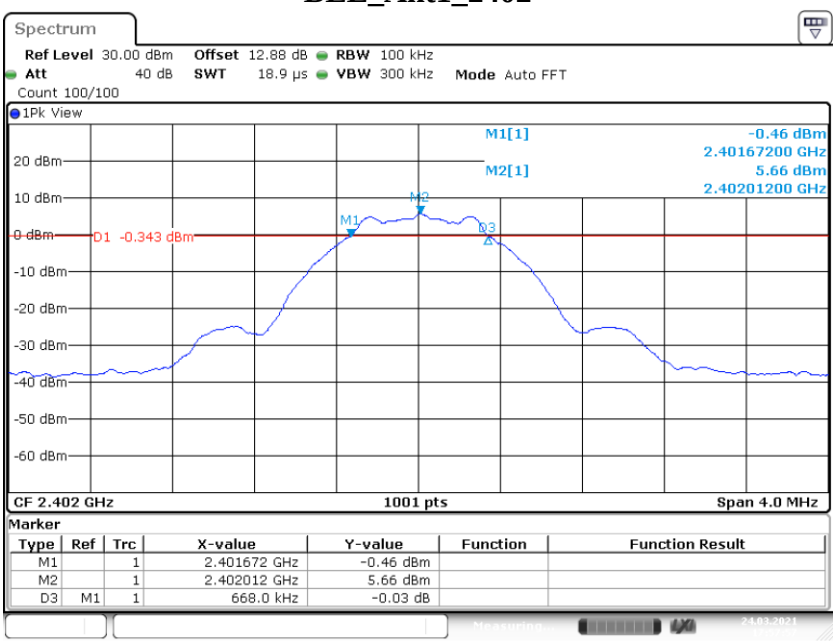
Appendix A: DTS Bandwidth

Test Result

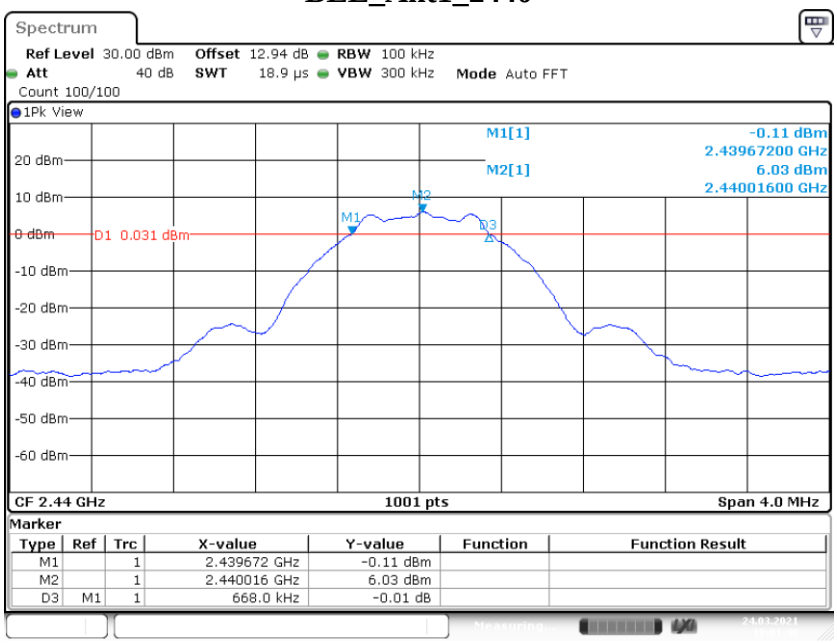
TestMode	Antenna	Channel	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
BLE	Ant1	2402	0.668	2401.672	2402.340	0.5	PASS
		2440	0.668	2439.672	2440.340	0.5	PASS
		2480	0.668	2479.672	2480.340	0.5	PASS

Test Graphs

BLE_Ant1_2402

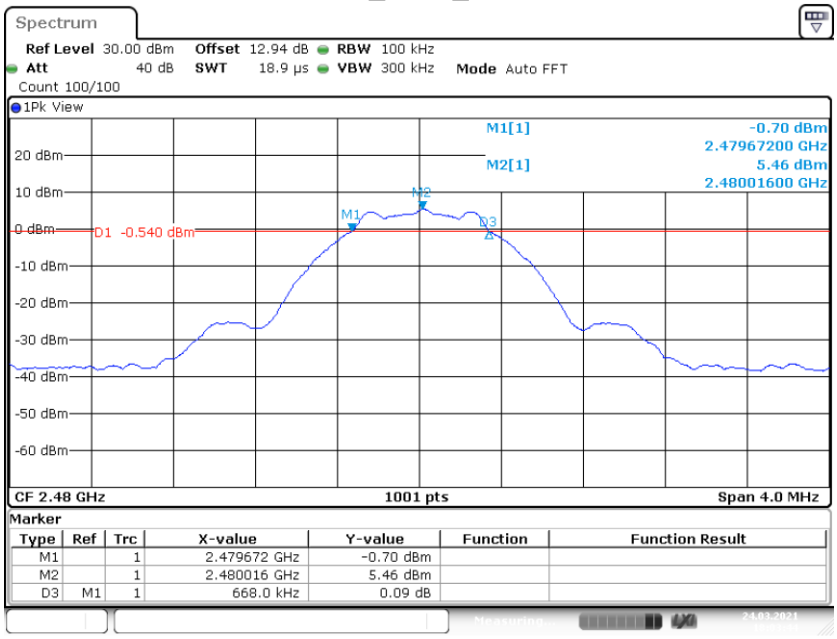


BLE_Ant1_2440



Date: 24.MAR.2021 18:01:41

BLE_Ant1_2480



Date: 24.MAR.2021 18:03:45

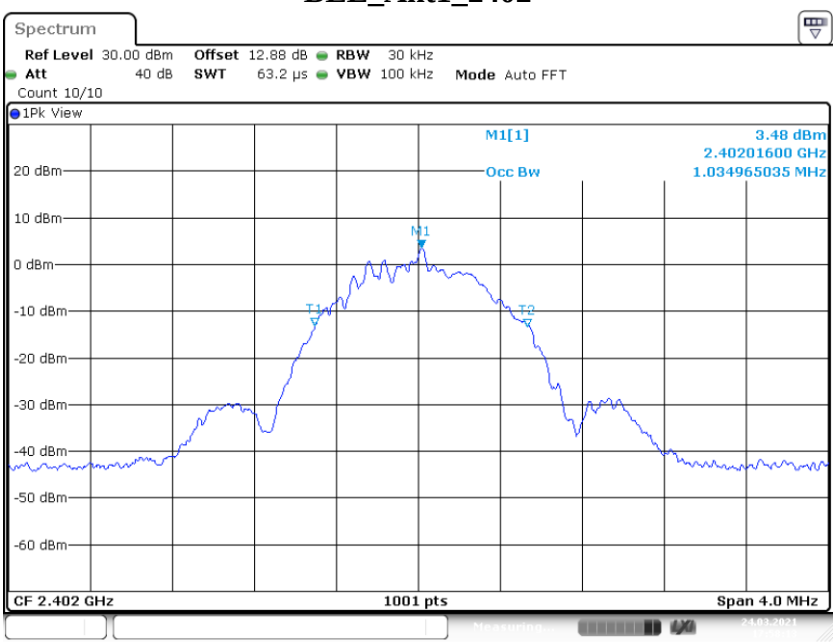
Appendix B: Occupied Channel Bandwidth

Test Result

TestMode	Antenna	Channel	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
BLE	Ant1	2402	1.035	2401.497	2402.531	---	PASS
		2440	1.035	2439.497	2440.531	---	PASS
		2480	1.031	2479.497	2480.527	---	PASS

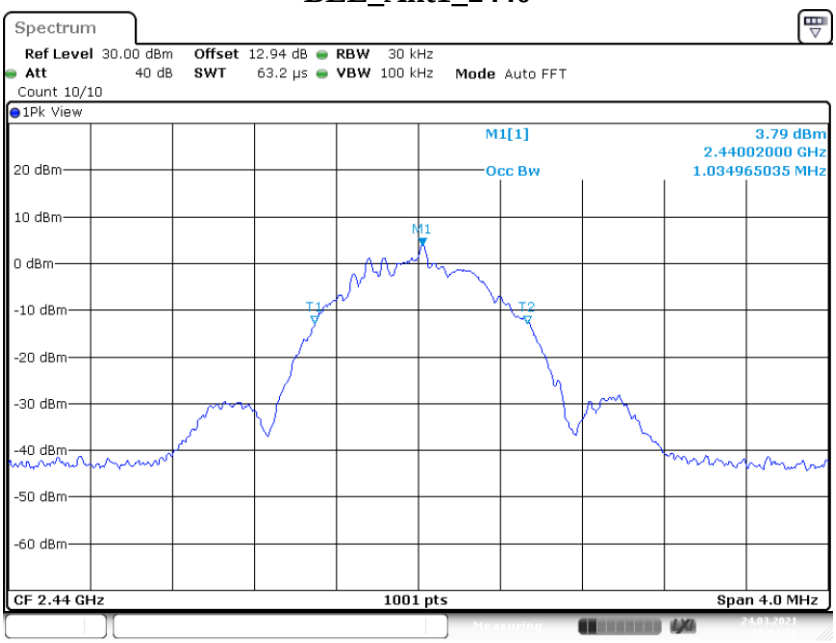
Test Graphs

BLE_Ant1_2402



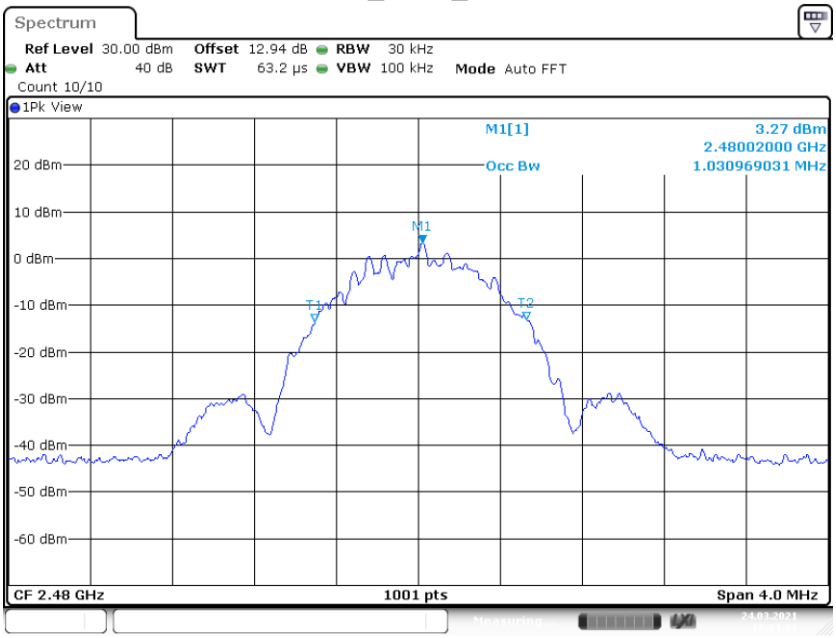
Date: 24.MAR.2021 17:58:14

BLE_Ant1_2440



Date: 24.MAR.2021 18:01:57

BLE_Ant1_2480



Date: 24.MAR.2021 18:04:02

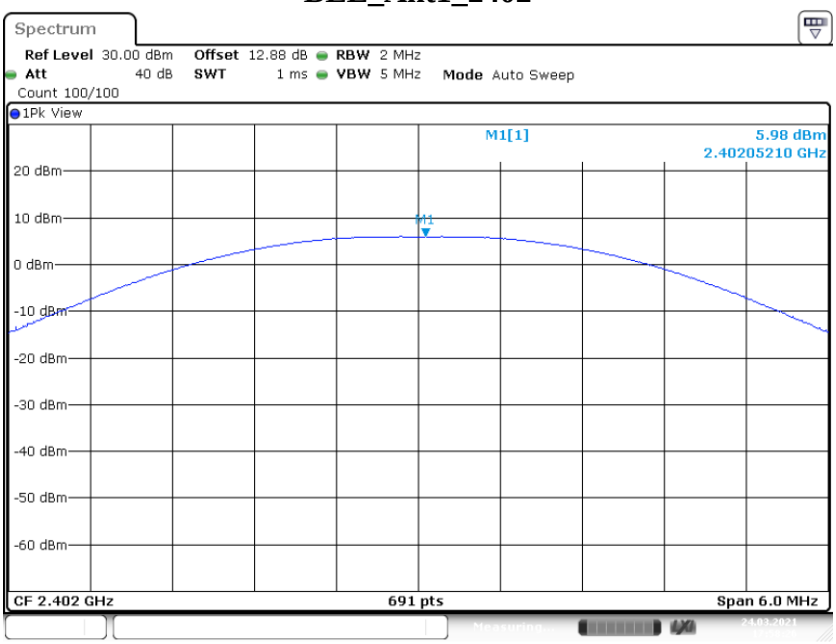
Appendix C: Maximum conducted output power

Test Result

TestMode	Antenna	Channel	Result[dBm]	Limit[dBm]	Verdict
BLE	Ant1	2402	5.98	<=30	PASS
		2440	6.32	<=30	PASS
		2480	5.79	<=30	PASS

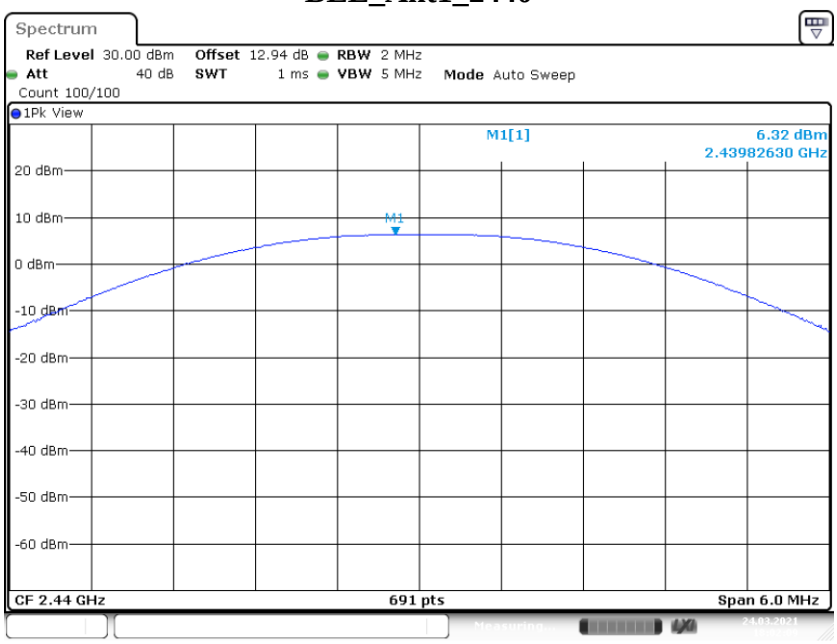
Test Graphs

BLE_Ant1_2402



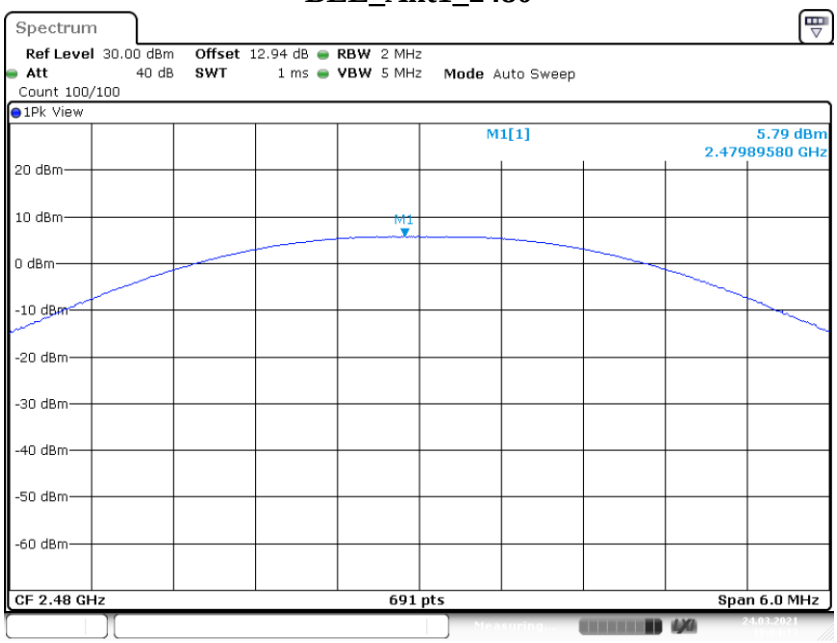
Date: 24.MAR.2021 17:58:26

BLE_Ant1_2440



Date: 24.MAR.2021 18:02:10

BLE_Ant1_2480



Date: 24.MAR.2021 18:04:14

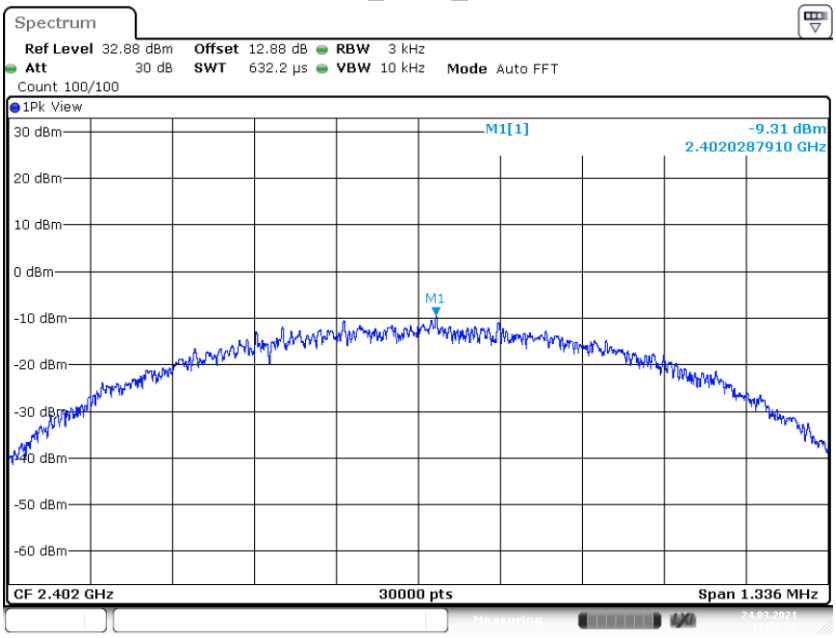
Appendix D: Maximum power spectral density

Test Result

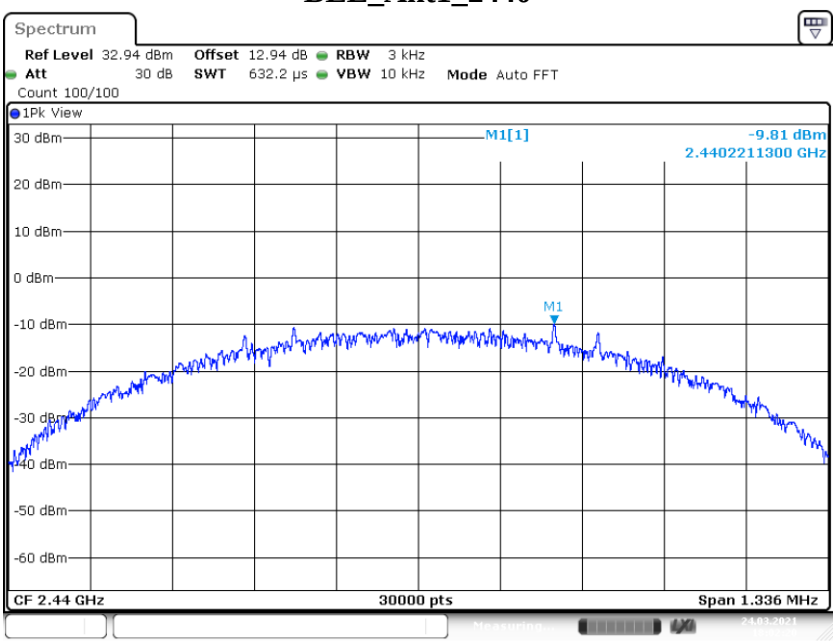
TestMode	Antenna	Channel	Result[dBm/3kHz]	Limit[dBm/3kHz]	Verdict
BLE	Ant1	2402	-9.31	<=8	PASS
		2440	-9.81	<=8	PASS
		2480	-10.99	<=8	PASS

Test Graphs

BLE_Ant1_2402

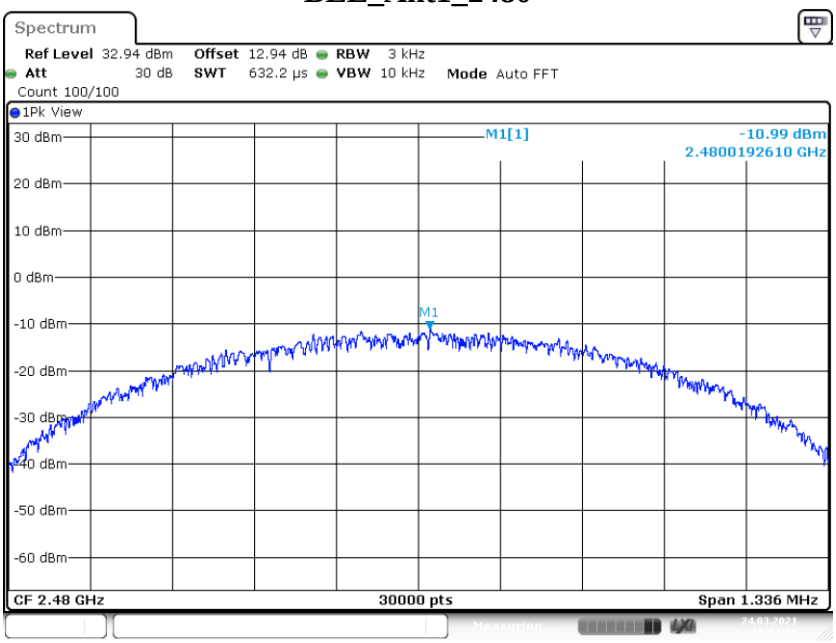


BLE_Ant1_2440



Date: 24.MAR.2021 18:02:21

BLE_Ant1_2480

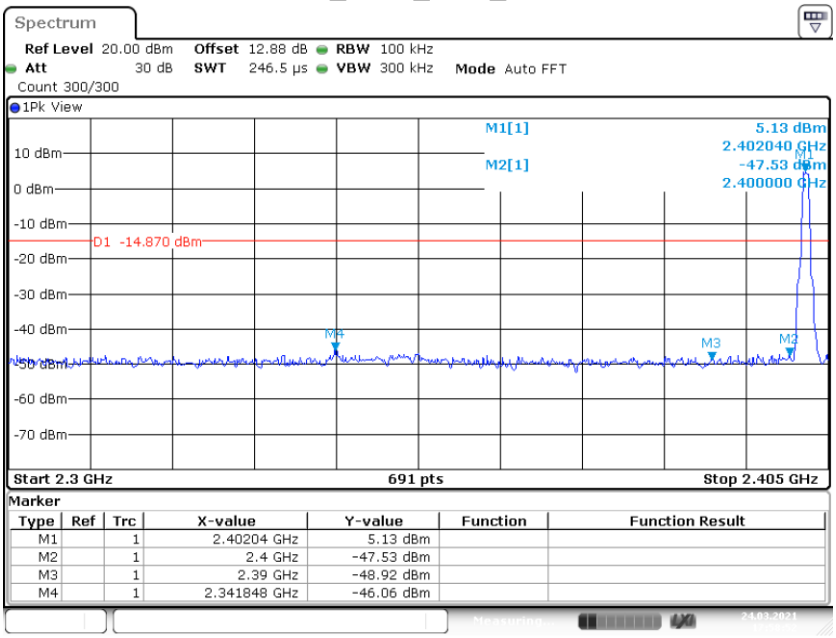


Date: 24.MAR.2021 18:04:26

Appendix E: Band edge measurements

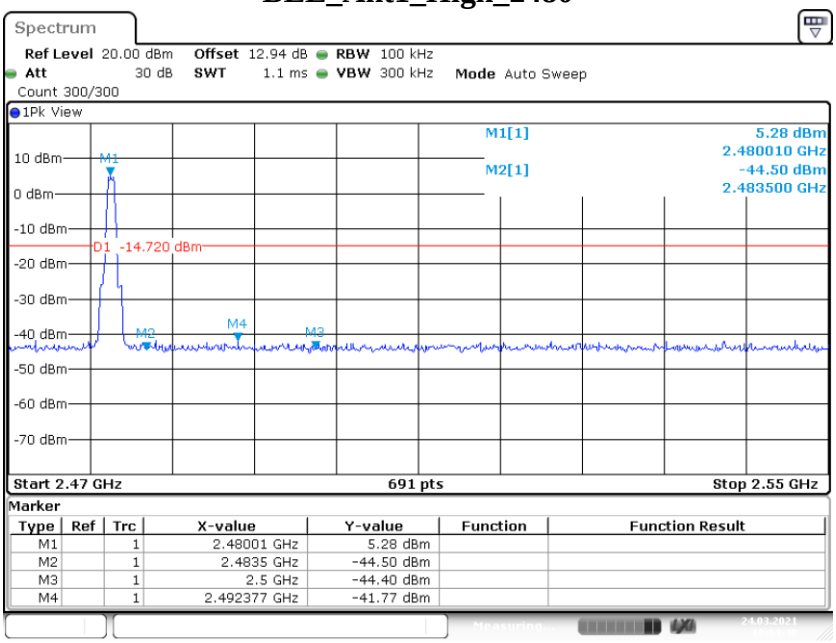
Test Graphs

BLE_Ant1_Low_2402



Date: 24.MAR.2021 17:58:53

BLE_Ant1_High_2480



Date: 24.MAR.2021 18:04:41

Appendix F:

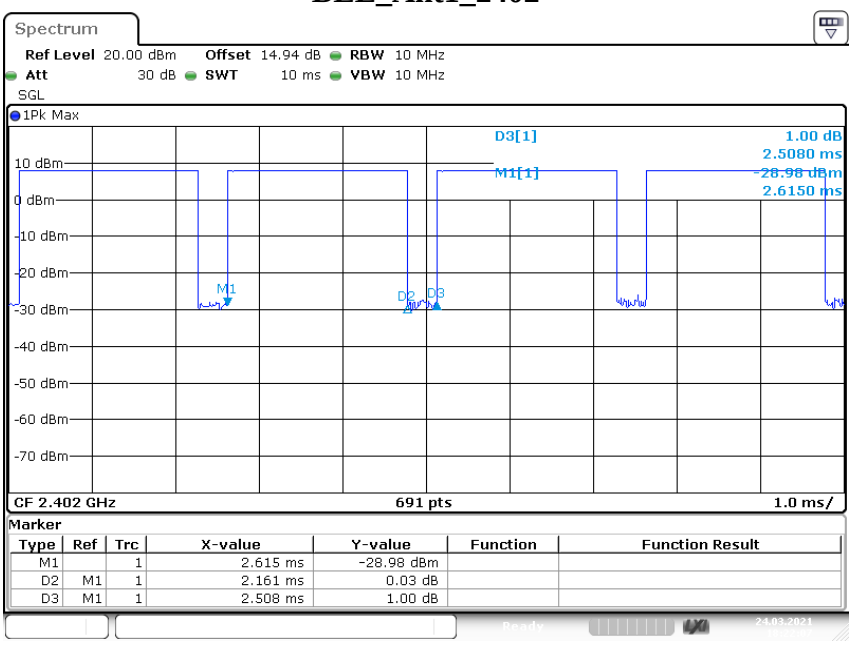
Appendix G: Duty Cycle

Test Result

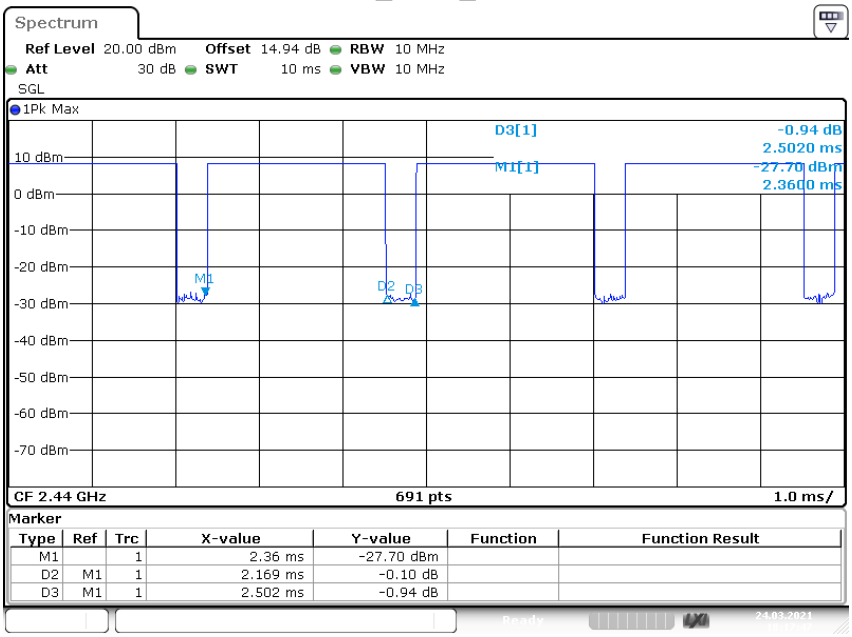
TestMode	Antenna	Channel	Transmission Duration [ms]	Transmission Period [ms]	Duty Cycle [%]
BLE	Ant1	2402	2.161	2.508	86.16
		2440	2.169	2.502	86.16
		2480	2.146	2.491	86.15

Test Graphs

BLE_Ant1_2402

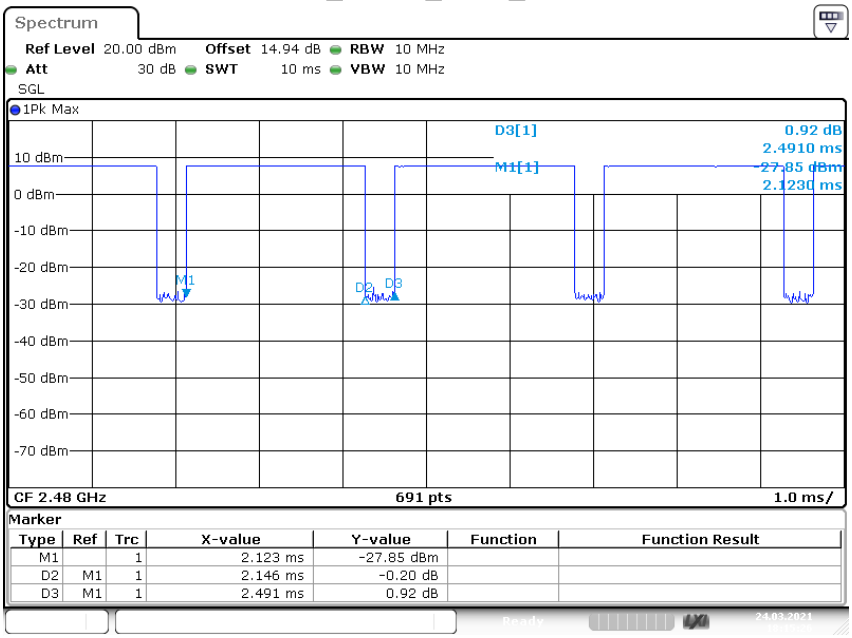


BLE_Ant1_2440



Date: 24.MAR.2021 18:17:47

BLE_BT4.0_Ant1_2480



Date: 24.MAR.2021 18:15:26

******* END OF REPORT *******