TEST REPORT

Applicant Name :	Thundercomm Technology Co., Ltd
Address :	No. 107, Middle Datagu Road, Xiantao Street, Yubei District, Chongqing, China, 401122
Report Number :	SZ1221125-56971E-RF-00CA1
FCC ID:	2AOHHTURBOXC610

Test Standard (s)

FCC PART 15.247

Sample Description

Product Type:	TurboX C610 SOM
Model No.:	TurboX C610
Multiple Model(s) No.:	TurboX C610 Open Kit(Difference declaration please see the DoS)
Trade Mark:	TURBOX™
Date Received:	2022/11/25
Report Date:	2022/12/09

Test Result:	Pass*

* In the configuration tested, the EUT complied with the standards above.

Prepared and Checked By:

Blaker Zhang

RF Engineer

Approved By:

Jacob Kong

RF Supervisor

Note: BACL is not responsible for the authenticity of any test data provided by the applicant. Data included from the applicant that may affect test results are marked with an asterisk '*'. Customer model name, addresses, names, trademarks etc. are not considered data.
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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	RSZ200929002-00C	Original Report	2021-02-06
1	SZ1221125-56971E-RF-00CA1	Amended Report	2022-12-09

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Product	TurboX C610 SOM
Tested Model	TurboX C610
Frequency Range	Bluetooth LE: 2402~2480MHz Wi-Fi: 2412~2462MHz/2422-2452MHz
Maximum Conducted Peak Power	Bluetooth LE: 7.93dBm Wi-Fi: 17.62dBm(802.11b), 17.61dBm(802.11g), 17.48dBm(802.11n-HT20), 16.32dBm(802.11n-HT40)
Modulation Technique	Bluetooth LE: GFSK Wi-Fi: DSSS, OFDM
Antenna Specification*	PIFA Antenna: 2dBi(provided by the applicant)
Voltage Range	DC 3.8V
Date of Test	2020-10-05 to 2021-01-22
Sample number	RSZ200929002-RF-S1(Assigned by BACL, Shenzhen)
Received date	2020-09-29
Sample/EUT Status	Good condition
Adapter information	N/A

Objective

This 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.

Note: This is the CIPC application, the details as follow:

(1) Changing the company address to "No. 107, Middle Datagu Road, Xiantao Street, Yubei District, Chongqing, China, 401122".

(2) Adding Memory SKU3 and SKU10

Based on above differences, it will affect partly EUT photos , so the partly EUT photos will be added, all test datas and other photos please refer to the original report RSZ200929002-00C.

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.

For Radiated Emissions testing, please refer to DA 00-705 Released March 30, 2000, Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems.

All emissions measurement was performed at Bay Area Compliance Laboratories Corp. (Shenzhen). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Measurement Uncertainty

Parameter		Uncertainty
Occupied Channel Bandwidth		±5%
RF Output Power with Power meter		±0.73dB
RF conducted test with spectrum		±1.6dB
AC Power Lines Conducted Emissions		±1.95dB
Emissions, Radiated	Below 1GHz	±4.75dB
	Above 1GHz	±4.88dB
Temperature		±1℃
Humidity		±6%
Supply voltages		±0.4%

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 Bay Area Compliance Laboratories Corp. (Shenzhen) to collect test data is located on the 5F(B-West) , 6F, 7F, the 3rd Phase of Wan Li Industrial Building D, Shihua Rd, FuTian Free Trade Zone, Shenzhen, China.

Each test item follows test standards and with no deviation.

EXHIBIT - EUT PHOTOGRAPHS

Please refer to the report number is SZ1221125-56971E-EUT.

PRODUCT SIMILARITY DECLARATION LETTER

Applicant: Thundercomm Technology Co., Ltd
Address: No. 107, Middle Datagu Road, Xiantao Street, Yubei District, Chongqing, China, 401122
Tel: 18664928002
Email: Qiyong.zhou@thundercomm.com

Product Similarity Declaration

Date: 2022-12-09

To:
Bay Area Compliance Laboratories Corp.
1274 Anvilwood Avenue
Sunnyvale, CA94089

Dear Sir/Madam,
We, Thundercomm Technology Co., Ltd, hereby declare that we have a product named as TurboX C610 SOM,(model:TurboX C610) was tested by BACL, Meanwhile, for our marketing purpose, we would like to list a series model (TurboX C610 open kit) on reports and certificate, all the models are identical in schematics.The difference is that the series model has one more IO board. No other changes are made on them.

TurboX C610 has different SKU according to different DDR and EMMC. SKU1 is with DDR 2 GB + EMMC 16GB, SKU3 is with DDR 4GB + EMMC 64GB, SKU 10 is with DDR 8GB + EMMC 64GB.

We confirm that all information above is true, and we'll be responsible for all the consequences. Please contact me if you have any question.

Sincerely,

Signature: Qiyong Zhou

Printed Name:Qiyong Zhou

Title:Manager

BELOW IS THE REFERENCED REPORT

FCC PART 15.247

TEST REPORT

For

Thundercomm Technology Co., Ltd

Building 4, No. 99, Data Valley Middle Road, Xiantao District, Yubei District, Chongqing

FCC ID: 2AOHHTURBOXC610

Report Type:	**Product Type:**
Original Report	TurboX C610 SOM

Report Number: RSZ200929002-00C

Report Date: 2021-02-06

Reviewed By: Jacob Kong
RF Engineer

Prepared By: Bay Area Compliance Laboratories Corp. (Shenzhen)
6/F., West Wing, Third Phase of Wanli Industrial Building, Shihua Road, Futian Free Trade Zone, Shenzhen, Guangdong, China
Tel: +86-755-33320018
Fax: +86-755-33320008
www.baclcorp.com.cn

Note: This report may contain data that are not covered by the A2LA accreditation and are marked with an asterisk "★".

BACL is not responsible for the authenticity of any test data provided by the applicant. Data included from the applicant that may affect test results are marked with an asterisk '*'. Customer model name, addresses, names, trademarks etc. are not considered data.

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GENERAL INFORMATION

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Maximum Conducted Peak Power	Bluetooth LE: 7.93dBm Wi-Fi: 17.62dBm(802.11b), 17.61dBm(802.11g), 17.48dBm(802.11n-HT20), 16.32dBm(802.11n-HT40)
Modulation Technique	Bluetooth LE: GFSK Wi-Fi: DSSS, OFDM
Antenna Specification*	PIFA Antenna: 2dBi(provided by the applicant)
Voltage Range	DC 3.8V
Date of Test	2020-10-05 to 2021-01-22
Sample number	RSZ200929002-RF-S1(Assigned by BACL, Shenzhen)
Received date	2020-09-29
Sample/EUT Status	Good condition
Adapter information	N/A

Objective

This 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 Bay Area Compliance Laboratories Corp. (Shenzhen). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Measurement Uncertainty

Parameter		Uncertainty
Occupied Channel Bandwidth		±5%
RF Output Power with Power meter		±0.73dB
RF conducted test with spectrum		±1.6dB
AC Power Lines Conducted Emissions		±1.95dB
Emissions, Radiated	Below 1GHz	±4.75dB
	Above 1GHz	±4.88dB
Temperature		±1℃
Humidity		±6%
Supply voltages		±0.4%

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 Bay Area Compliance Laboratories Corp. (Shenzhen) to collect test data is located on the 6/F., West Wing, Third Phase of Wanli Industrial Building, Shihua Road, Futian Free Trade Zone, Shenzhen, Guangdong, 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.: 342867, the FCC Designation No.: CN1221.

The test site has been registered with ISED Canada under ISED Canada Registration Number 3062B.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

For 802.11b, 802.11g and 802.11n-HT20 mode, 11 channels are provided to testing:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2412	8	2447
2	2417	9	2452
3	2422	10	2457
4	2427	11	2462
5	2432	/	/
6	2437	/	/
7	2442	/	/

For 802.11b, 802.11g, 802.11n-HT20 mode, EUT was tested with Channel 1, 7 and 11

For 802.11n-HT40 mode, 7 channels are provided to testing:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2422	6	2447
2	2427	7	2452
3	2432	/	/
4	2437	/	/
5	2442	/	/

EUT was tested with Channel 1, 5 and 7.

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

“QRCT3”software was made to the EUT tested. The power level was provided by the applicant.

The device was tested with the worst case was performed as below

Mode	Data rate	Power level*		
		Low channel	Middle channel	High channel
802.11b	1 Mbps	15	16	15
802.11g	6 Mbps	14	15	14
802.11n-HT20	MCS0	13	14	13
802.11n-HT40	MCS0	13	13	12
BLE	/	Default	Default	Default

Pre-scan with all the data rates, the above data rate is the worst case for Wi-Fi test.

Duty cycle

Test Result Compliant. Please refer to the Appendix BLE & Appendix Wi-Fi.

Support Equipment List and Details

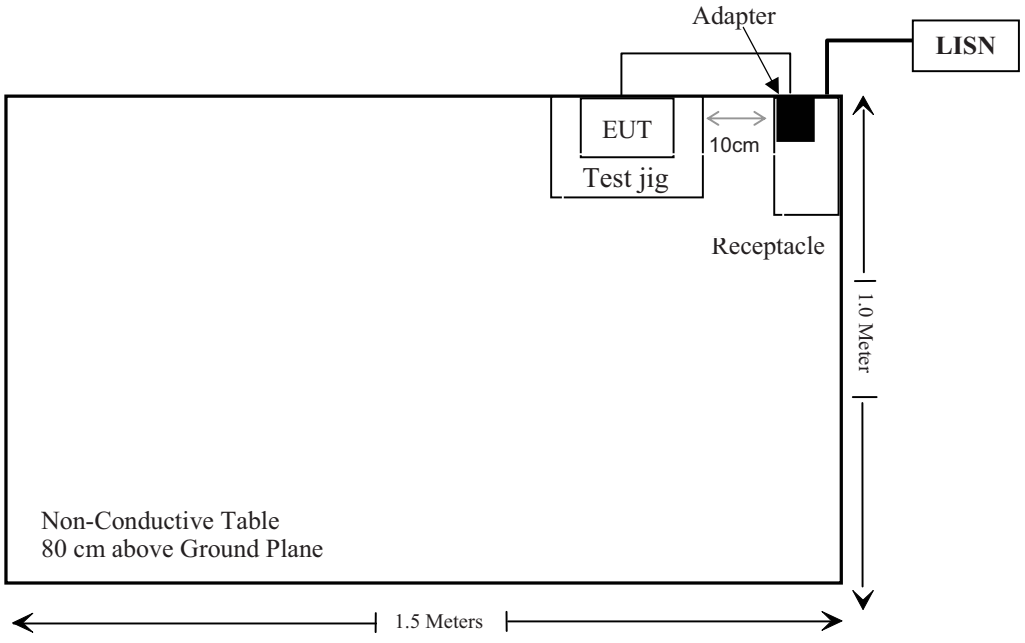
Manufacturer	Description	Model	Serial Number
Thundercomm Technology Co., Ltd	Test jig	C610 IO Board	NA
GUANGDONG LIANYUNDA ELECTRONIC CO., LTD.	Adapter	LYD1202000B	Unknown

External I/O Cable

Cable Description	Length (m)	From Port	To
Un-shielding un-Detachable DC Cable	1.2	Test jig	Adapter

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	EMI Test Receiver	ESCI	101120	2020/08/04	2021/08/03
Rohde & Schwarz	LISN	ENV216	101613	2020/08/04	2021/08/03
Rohde & Schwarz	Transient Limitor	ESH3Z2	DE25985	2019/11/29	2020/11/28
Unknow	CE Cable	CE Cable	UF A210B-1-0720-504504	2019/11/29	2020/11/28
Rohde & Schwarz	CE Test software	EMC 32	V8.53.0	NCR	NCR
Radiated Emission Test					
R&S	EMI Test Receiver	ESR3	102455	2020/08/04	2021/08/03
Sonoma instrument	Pre-amplifier	310 N	186238	2020/08/04	2021/08/03
Sunol Sciences	Broadband Antenna	JB1	A040904-1	2017/12/22	2020/12/21
Unknow	Cable 2	RF Cable 2	F-03-EM197	2019/11/29	2020/11/28
Unknow	Cable	Chamber Cable 1	F-03-EM236	2019/11/29	2020/11/28
Rohde & Schwarz	Auto test software	EMC 32	V9.10	NCR	NCR
Rohde & Schwarz	Spectrum Analyzer	FSV40-N	102259	2020/08/04	2021/08/03
COM-POWER	Pre-amplifier	PA-122	181919	2019/11/29	2020/11/28
COM-POWER	Pre-amplifier	PA-122	181919	2020/11/29	2021/11/28
Sunol Sciences	Horn Antenna	DRH-118	A052604	2017/12/22	2020/12/21
Insulted Wire Inc.	RF Cable	SPS-2503-3150	02222010	2019/11/29	2020/11/28
Insulted Wire Inc.	RF Cable	SPS-2503-3150	02222010	2020/11/29	2021/11/28
Unknow	RF Cable	W1101-EQ1 OUT	F-19-EM005	2019/11/29	2020/11/28
Unknow	RF Cable	W1101-EQ1 OUT	F-19-EM005	2020/11/29	2021/11/28
SNSD	Band Reject filter	BSF2402-2480MN-0898-001	2.4G filter	2020/04/20	2021/04/20
Quinstar	Amplifier	QLW-18405536-J0	15964001002	2019/11/29	2020/11/28
Quinstar	Amplifier	QLW-18405536-J0	15964001002	2020/11/29	2021/11/28
Ducommun Technolagies	Horn antenna	ARH-4223-02	1007726-02 1304	2017/12/06	2020/12/05
Ducommun Technolagies	Horn antenna	ARH-4223-02	1007726-02 1304	2020/12/06	2023/12/05

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
RF Conducted Test					
Tonscend Corporation	RF control Unit	JS0806-2	19D8060154	2020/08/04	2021/08/03
Rohde & Schwarz	Signal and Spectrum Analyzer	FSV40	101473	2020/08/04	2021/08/03
Unknown	RF Cable	Unknown	2301 276	2019/11/29	2020/11/28
Unknown	RF Cable	Unknown	2301 276	2020/11/29	2021/11/28

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) 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 PERMISSIBLE 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/cm2)
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)

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	2	1.58	8	6.31	20	0.0020	1
WIFI	2412-2462	2	1.58	17.8	60.26	20	0.0189	1

Note: 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 been tested with a PIFA antenna and the antenna gain is 2.0 dBi, fulfill the requirement of this section. Please refer to the EUT photos.

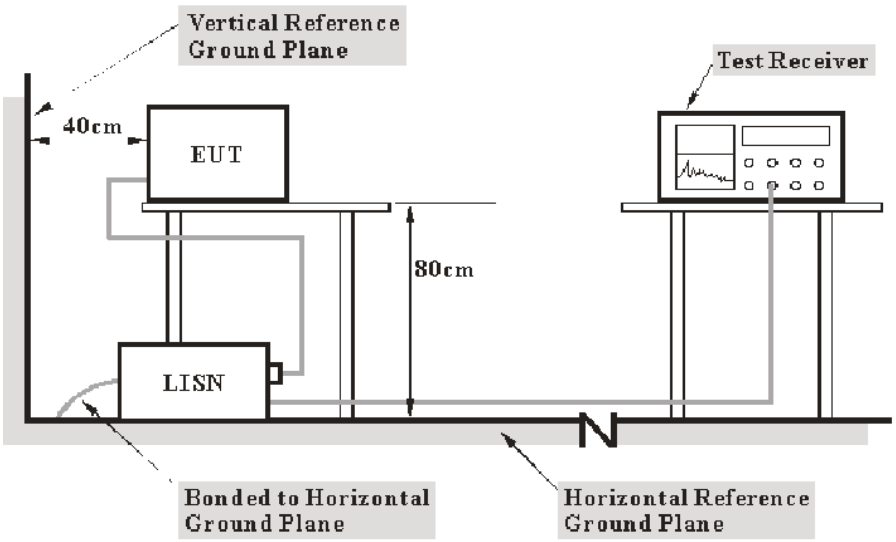
Result: Compliance.

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.

Corrected Factor & Margin Calculation

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

Correction Factor = LISN VDF + Cable Loss + Transient Limiter Attenuation

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 – Corrected Amplitude

Test Data

Environmental Conditions

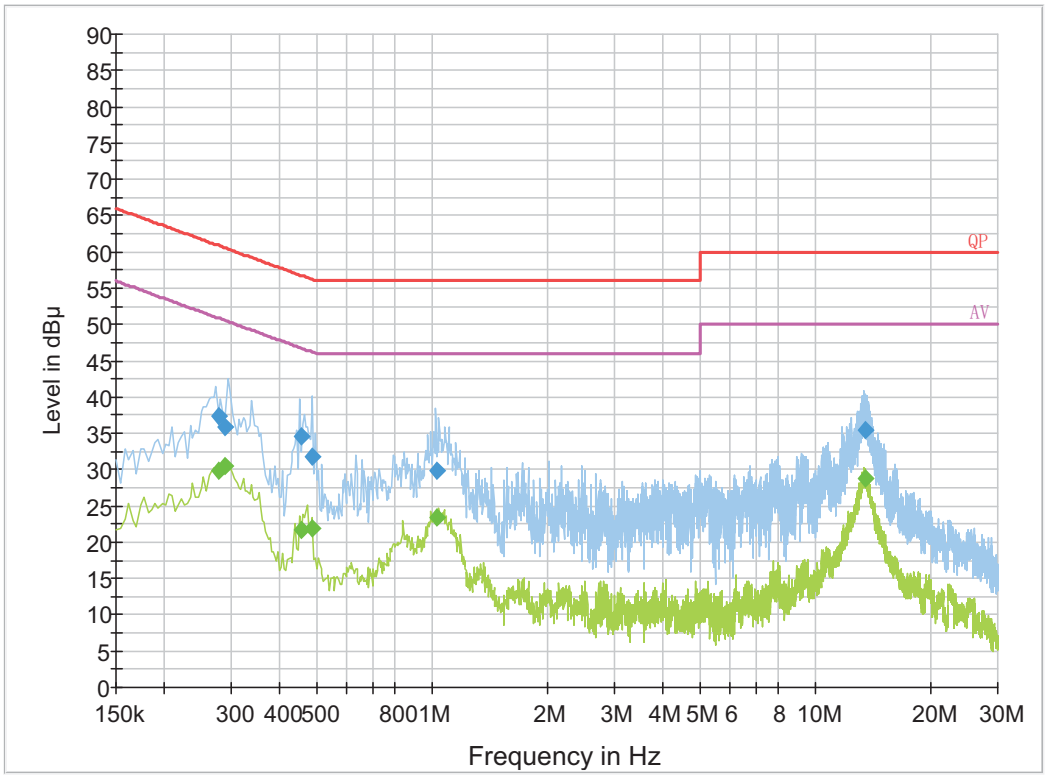
Temperature:	25 ℃
Relative Humidity:	65 %
ATM Pressure:	101.0 kPa

The testing was performed by Haiguo Li on 2020-10-15.

EUT operation mode: Transmitting

BLE Mode: *(the worst case is BLE 2M Mode, High channel)*

AC 120V/60 Hz, Line



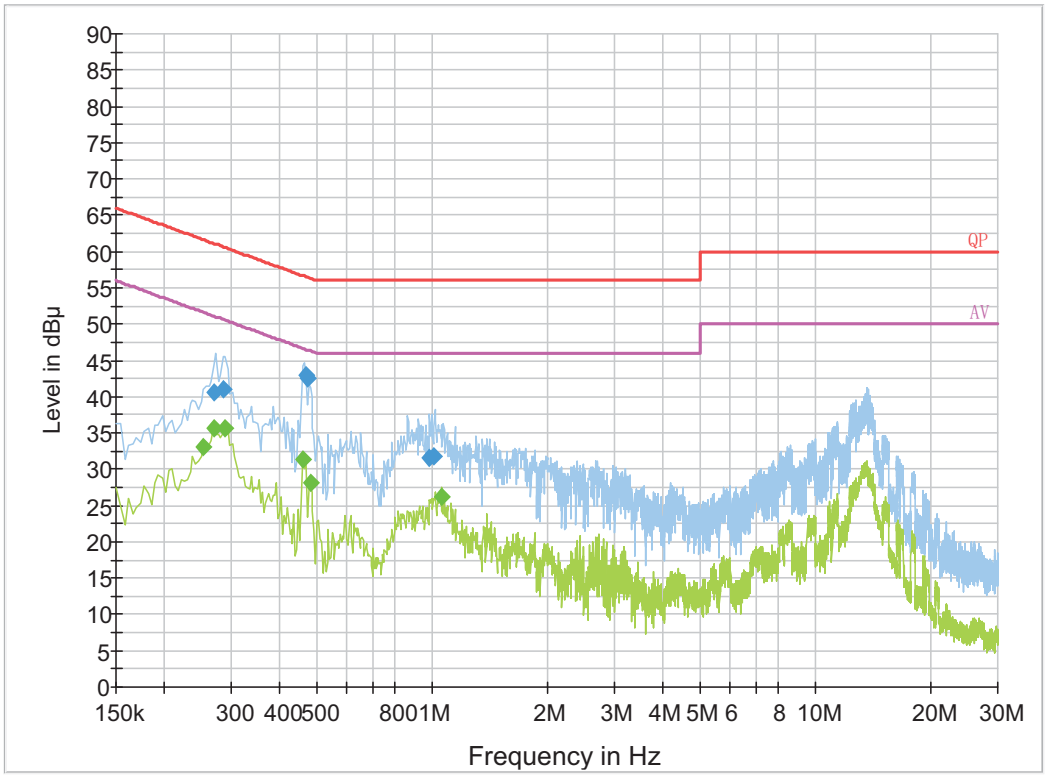
Final Result 1

Frequency (MHz)	QuasiPeak (dB µ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dB µ V)
0.278501	37.4	9.000	L1	19.8	23.5	60.9
0.289500	35.9	9.000	L1	19.7	24.6	60.5
0.455190	34.7	9.000	L1	19.8	22.1	56.8
0.486650	31.8	9.000	L1	19.8	24.4	56.2
1.034610	29.9	9.000	L1	19.9	26.1	56.0
13.501030	35.4	9.000	L1	20.0	24.6	60.0

Final Result 2

Frequency (MHz)	Average (dB µ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dB µ V)
0.278501	29.9	9.000	L1	19.8	21.0	50.9
0.289500	30.5	9.000	L1	19.7	20.0	50.5
0.455190	21.7	9.000	L1	19.8	25.1	46.8
0.486650	21.9	9.000	L1	19.8	24.3	46.2
1.034610	23.4	9.000	L1	19.9	22.6	46.0
13.501030	28.8	9.000	L1	20.0	21.2	50.0

AC 120V/60 Hz, Neutral:



Final Result 1

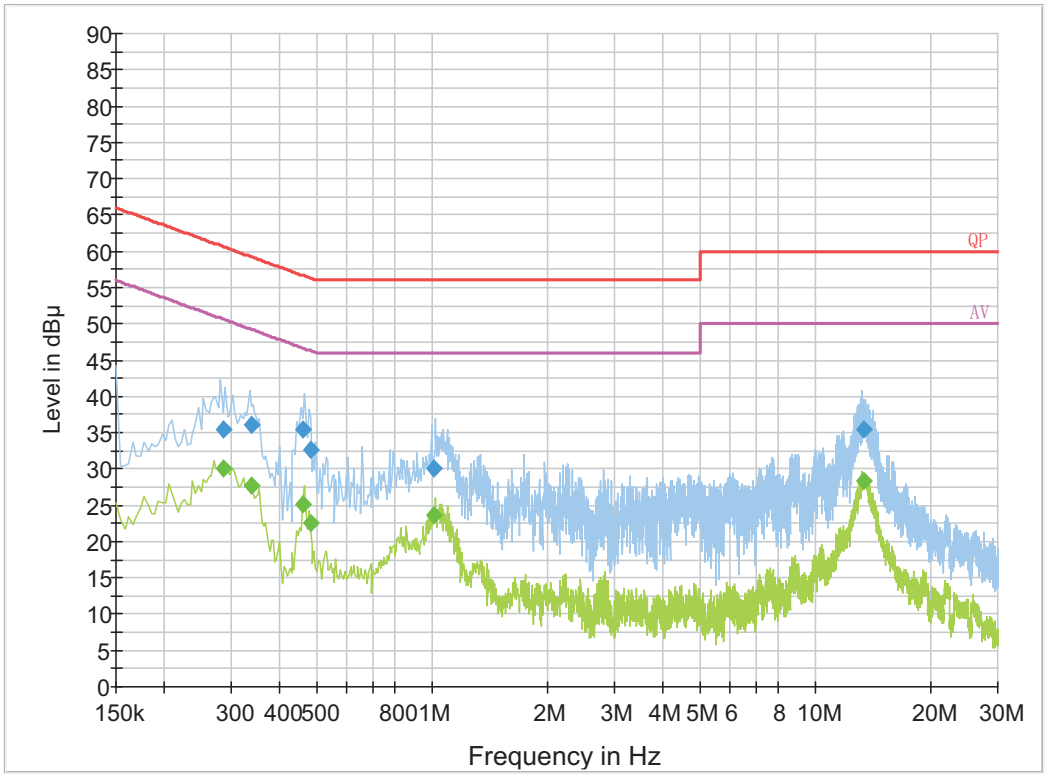
Frequency (MHz)	QuasiPeak (dB µ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dB µ V)
0.269500	40.6	9.000	N	19.7	20.5	61.1
0.285500	41.1	9.000	N	19.7	19.6	60.7
0.471010	42.9	9.000	N	19.8	13.6	56.5
0.474770	42.5	9.000	N	19.8	13.9	56.4
0.987210	31.5	9.000	N	19.8	24.5	56.0
1.014730	31.8	9.000	N	19.8	24.2	56.0

Final Result 2

Frequency (MHz)	Average (dB µ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dB µ V)
0.254000	33.0	9.000	N	19.8	18.6	51.6
0.270000	35.7	9.000	N	19.7	15.4	51.1
0.290000	35.6	9.000	N	19.7	14.9	50.5
0.462000	31.3	9.000	N	19.8	15.4	46.7
0.482000	28.1	9.000	N	19.8	18.2	46.3
1.062000	26.2	9.000	N	19.8	19.8	46.0

Wi-Fi Mode: *(the worst case is 802.11g Mode, High channel)*

AC 120V/60 Hz, Line



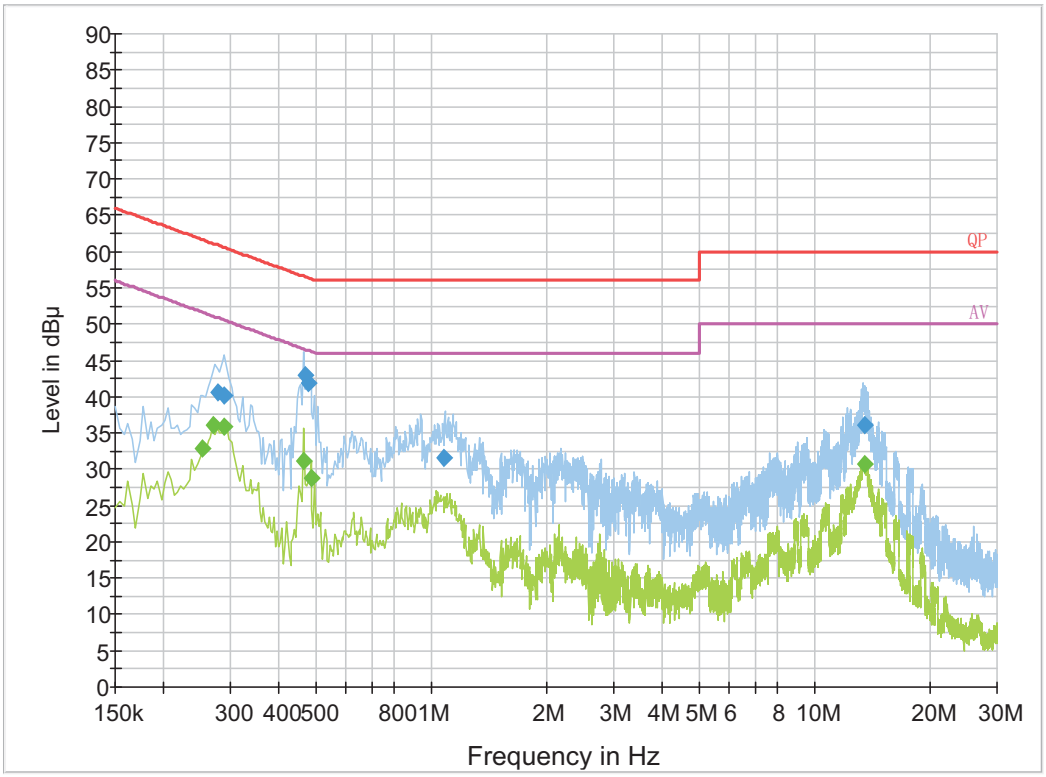
Final Result 1

Frequency (MHz)	QuasiPeak (dB µ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dB µ V)
0.286500	35.5	9.000	L1	19.7	25.1	60.6
0.339010	36.0	9.000	L1	19.9	23.2	59.2
0.463010	35.5	9.000	L1	19.8	21.1	56.6
0.482770	32.5	9.000	L1	19.8	23.8	56.3
1.010670	30.0	9.000	L1	19.9	26.0	56.0
13.379250	35.5	9.000	L1	20.0	24.5	60.0

Final Result 2

Frequency (MHz)	Average (dB µ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dB µ V)
0.286500	30.0	9.000	L1	19.7	20.6	50.6
0.339010	27.8	9.000	L1	19.9	21.4	49.2
0.463010	25.1	9.000	L1	19.8	21.5	46.6
0.482770	22.5	9.000	L1	19.8	23.8	46.3
1.010670	23.6	9.000	L1	19.9	22.4	46.0
13.379250	28.4	9.000	L1	20.0	21.6	50.0

AC 120V/60 Hz, Neutral:



Final Result 1

Frequency (MHz)	QuasiPeak (dB µ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dB µ V)
0.278501	40.5	9.000	N	19.7	20.4	60.9
0.289500	40.1	9.000	N	19.7	20.4	60.5
0.471010	43.0	9.000	N	19.8	13.5	56.5
0.478710	41.8	9.000	N	19.8	14.6	56.4
1.081650	31.5	9.000	N	19.8	24.5	56.0
13.500910	36.0	9.000	N	19.9	24.0	60.0

Final Result 2

Frequency (MHz)	Average (dB µ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dB µ V)
0.254000	32.8	9.000	N	19.8	18.8	51.6
0.270000	36.0	9.000	N	19.7	15.1	51.1
0.290000	35.9	9.000	N	19.7	14.6	50.5
0.466000	31.2	9.000	N	19.8	15.4	46.6
0.486000	28.9	9.000	N	19.8	17.3	46.2
13.510000	30.8	9.000	N	19.9	19.2	50.0

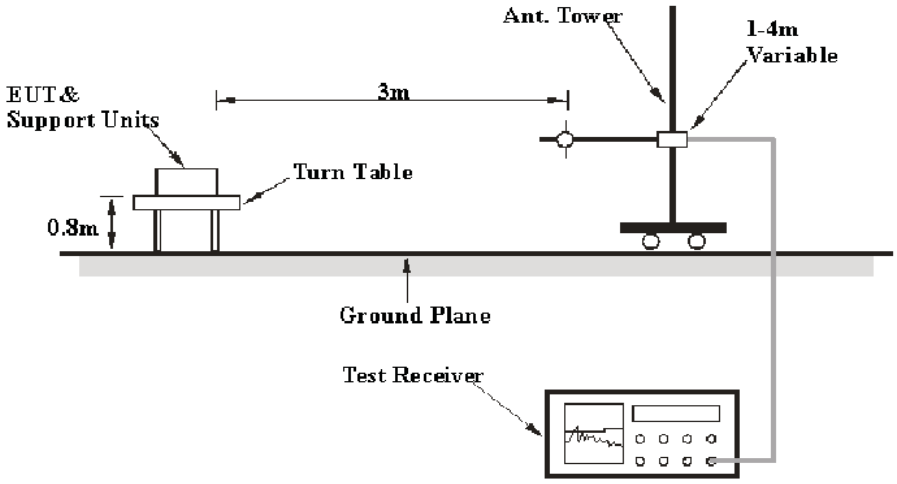
FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS

Applicable Standard

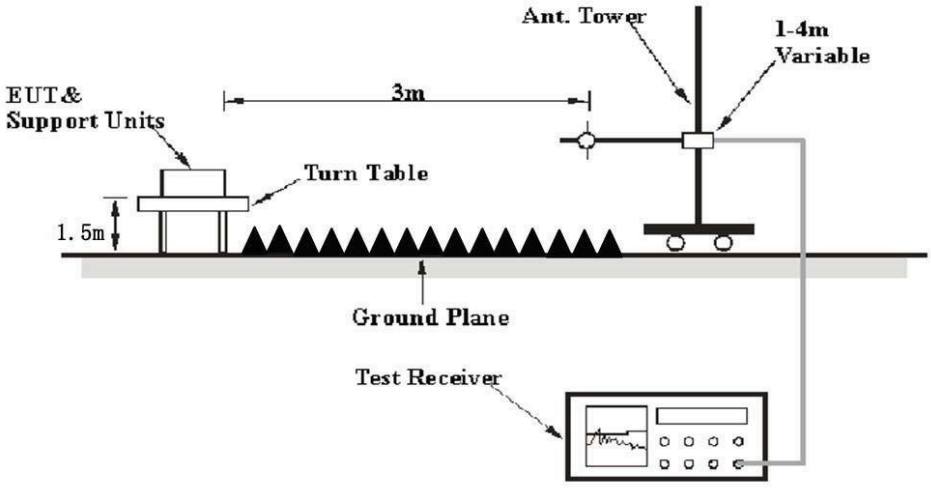
FCC §15.247 (d); §15.209; §15.205;

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.

Corrected Amplitude & Margin Calculation

The Corrected Amplitude 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:

Corrected Amplitude = 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 = Limit – Corrected Amplitude

Test Data

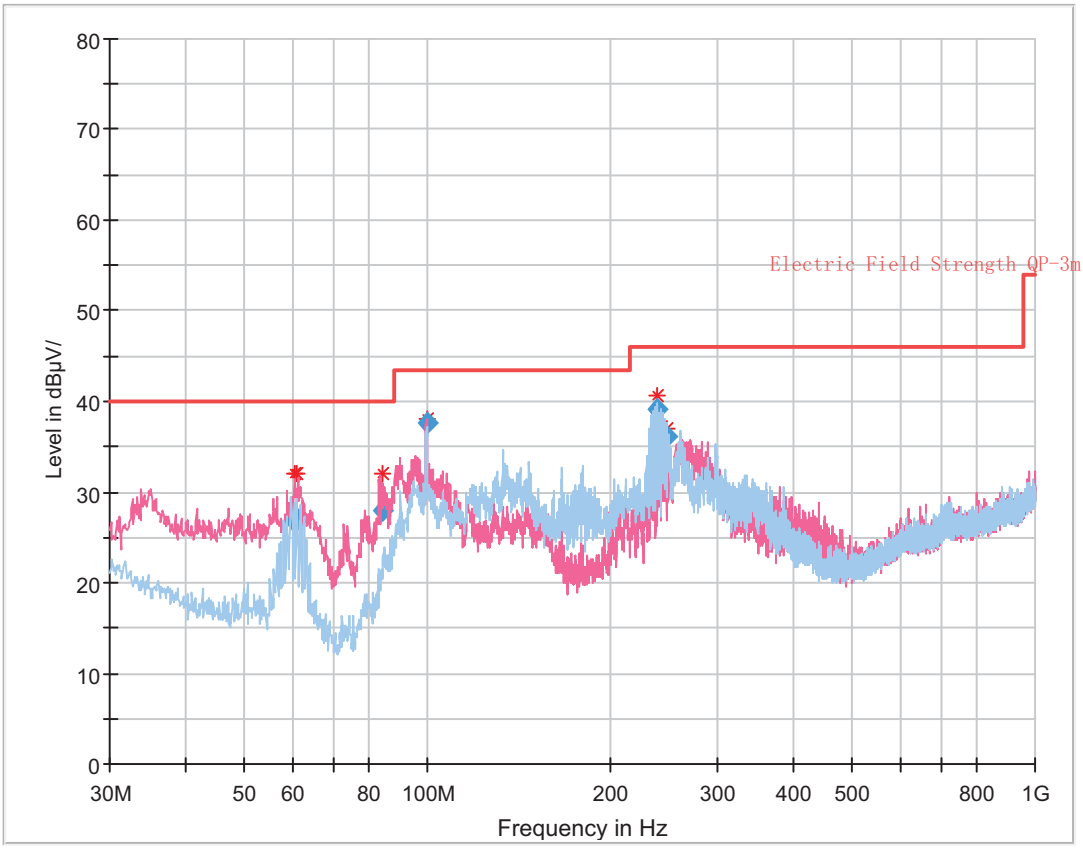
Environmental Conditions

Temperature:	14.1~30 ℃
Relative Humidity:	44~55 %
ATM Pressure:	101.0 kPa

The testing was performed by Hollandy Yang on 2020-10-15 for below 1GHz and Leven Gan from 2020-10-15 to 2020-12-17 for above 1GHz.

EUT operation mode: Transmitting

30 MHz~1 GHz: (the worst case is 802.11g Mode, High channel)



Final_Result

Frequency (MHz)	QuasiPeak (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
60.289750	26.72	40.00	13.28	105.0	V	228.0	-17.1
61.037000	27.07	40.00	12.93	109.0	V	219.0	-17.1
84.406250	27.96	40.00	12.04	122.0	V	142.0	-16.4
99.858750	37.69	43.50	5.81	108.0	V	294.0	-14.0
238.478375	39.08	46.00	6.92	133.0	H	251.0	-10.8
247.611000	36.17	46.00	9.83	109.0	H	254.0	-10.8

1 GHz-25 GHz (Wi-Fi):

802.11b Mode:

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 (2412 MHz)									
2388.42	28.89	PK	211	1.0	H	31.87	60.76	74	13.24
2388.42	14.75	Ave.	211	1.0	H	31.87	46.62	54	7.38
2485.12	28.96	PK	301	1.2	H	32.13	61.09	74	12.91
2485.12	14.80	Ave.	301	1.2	H	32.13	46.93	54	7.07
4824.00	44.76	PK	350	2.0	H	6.28	51.04	74	22.96
4824.00	35.18	Ave.	350	2.0	H	6.28	41.46	54	12.54
Middle Channel (2442 MHz)									
4884.00	45.09	PK	65	2.0	H	6.76	51.85	74	22.15
4884.00	36.26	Ave.	65	2.0	H	6.76	43.02	54	10.98
High Channel (2462 MHz)									
2388.21	28.61	PK	353	2.4	H	31.87	60.48	74	13.52
2388.21	14.45	Ave.	353	2.4	H	31.87	46.32	54	7.68
2483.51	29.29	PK	250	1.3	H	32.13	61.42	74	12.58
2483.51	15.49	Ave.	250	1.3	H	32.13	47.62	54	6.38
4924.00	46.71	PK	253	2.5	H	6.76	53.47	74	20.53
4924.00	37.95	Ave.	253	2.5	H	6.76	44.71	54	9.29

802.11g Mode:

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 (2412 MHz)									
2389.02	29.11	PK	172	1.0	H	31.87	60.98	74	13.02
2389.02	15.71	Ave.	172	1.0	H	31.87	47.58	54	6.42
2484.69	29.20	PK	278	2.1	H	32.13	61.33	74	12.67
2484.69	15.37	Ave.	278	2.1	H	32.13	47.50	54	6.50
4824.00	43.94	PK	231	1.4	H	6.28	50.22	74	23.78
4824.00	32.79	Ave.	231	1.4	H	6.28	39.07	54	14.93
Middle Channel (2442 MHz)									
4884.00	44.08	PK	41	1.1	H	6.76	50.84	74	23.16
4884.00	32.98	Ave.	41	1.1	H	6.76	39.74	54	14.26
High Channel (2462 MHz)									
2389.64	28.78	PK	272	1.7	H	31.87	60.65	74	13.35
2389.64	15.21	Ave.	272	1.7	H	31.87	47.08	54	6.92
2483.90	29.07	PK	330	1.9	H	32.13	61.20	74	12.80
2483.90	15.75	Ave.	330	1.9	H	32.13	47.88	54	6.12
4924.00	44.20	PK	214	1.0	H	6.76	50.96	74	23.04
4924.00	33.12	Ave.	214	1.0	H	6.76	39.88	54	14.12

802.11n-HT20 Mode:

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 (2412 MHz)									
2386.75	28.65	PK	306	1.5	H	31.87	60.52	74	13.48
2386.75	15.74	Ave.	306	1.5	H	31.87	47.61	54	6.39
2485.36	29.01	PK	174	2.2	H	32.13	61.14	74	12.86
2485.36	15.42	Ave.	174	2.2	H	32.13	47.55	54	6.45
4824.00	44.08	PK	77	2.2	H	6.28	50.36	74	23.64
4824.00	32.11	Ave.	77	2.2	H	6.28	38.39	54	15.61
Middle Channel (2442 MHz)									
4884.00	43.95	PK	142	1.3	H	6.76	50.71	74	23.29
4884.00	32.36	Ave.	142	1.3	H	6.76	39.12	54	14.88
High Channel (2462 MHz)									
2387.64	28.76	PK	156	2.4	H	31.87	60.63	74	13.37
2387.64	15.43	Ave.	156	2.4	H	31.87	47.30	54	6.70
2483.99	29.31	PK	254	1.2	H	32.13	61.44	74	12.56
2483.99	15.80	Ave.	254	1.2	H	32.13	47.93	54	6.07
4924.00	44.21	PK	284	2.1	H	6.76	50.97	74	23.03
4924.00	32.44	Ave.	284	2.1	H	6.76	39.20	54	14.80

802.11n-HT40 Mode:

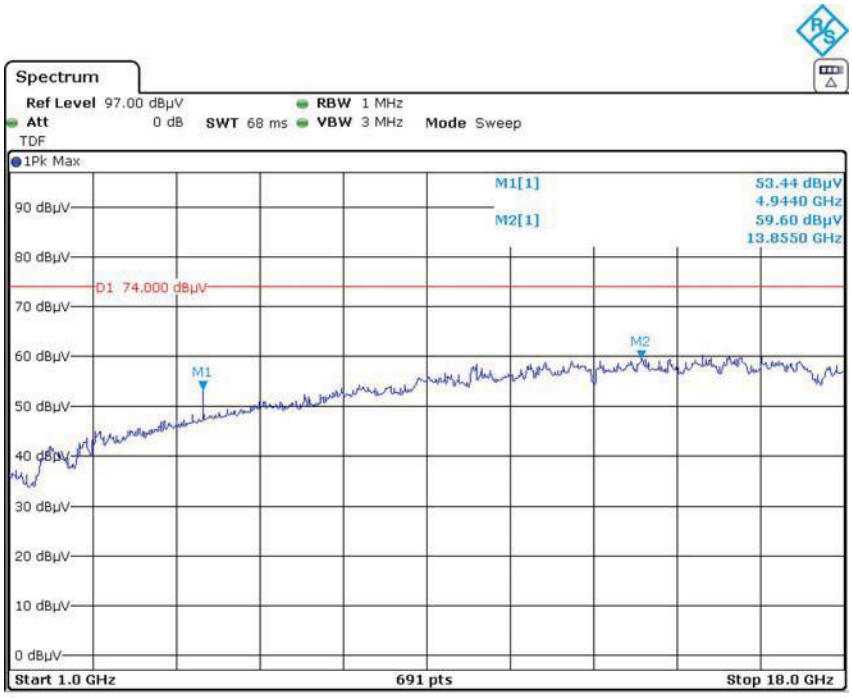
Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/QP/Ave.		Height (m)	Polar (H/V)				
Low Channel (2422 MHz)									
2388.98	29.16	PK	159	2.5	H	31.87	61.03	74	12.97
2388.98	15.53	Ave.	159	2.5	H	31.87	47.40	54	6.60
2484.65	29.56	PK	342	2.1	H	32.13	61.69	74	12.31
2484.65	15.55	Ave.	342	2.1	H	32.13	47.68	54	6.32
4844.00	43.87	PK	9	2.3	H	6.28	50.15	74	23.85
4844.00	31.79	Ave.	9	2.3	H	6.28	38.07	54	15.93
Middle Channel (2442 MHz)									
4884.00	43.81	PK	51	2.2	H	6.76	50.57	74	23.43
4884.00	31.92	Ave.	51	2.2	H	6.76	38.68	54	15.32
High Channel (2452 MHz)									
2387.64	28.76	PK	50	2.4	H	31.87	60.63	74	13.37
2387.64	15.39	Ave.	50	2.4	H	31.87	47.26	54	6.74
2483.86	28.97	PK	142	1.0	H	32.13	61.10	74	12.90
2483.86	15.70	Ave.	142	1.0	H	32.13	47.83	54	6.17
4904.00	43.94	PK	309	1.3	H	6.76	50.70	74	23.30
4904.00	32.13	Ave.	309	1.3	H	6.76	38.89	54	15.11

1 GHz-25 GHz (BLE):

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)				
1M									
Low Channel (2402 MHz)									
2388.94	28.45	PK	327	1.8	H	31.87	60.32	74	13.68
2388.94	15.86	Ave.	327	1.8	H	31.87	47.73	54	6.27
2484.12	28.37	PK	32	1.5	H	32.13	60.50	74	13.50
2484.12	15.72	Ave.	32	1.5	H	32.13	47.85	54	6.15
4804.00	44.56	PK	40	2.4	H	6.28	50.84	74	23.16
4804.00	31.95	Ave.	40	2.4	H	6.28	38.23	54	15.77
Middle Channel (2440 MHz)									
4880.00	44.71	PK	286	1.2	H	6.76	51.47	74	22.53
4880.00	32.42	Ave.	286	1.2	H	6.76	39.18	54	14.82
High Channel (2480 MHz)									
2384.86	28.41	PK	261	1.9	H	31.87	60.28	74	13.72
2384.86	15.69	Ave.	261	1.9	H	31.87	47.56	54	6.44
2483.94	28.72	PK	31	1.3	H	32.13	60.85	74	13.15
2483.94	15.87	Ave.	31	1.3	H	32.13	48.00	54	6.00
4960.00	44.69	PK	87	2.0	H	6.80	51.49	74	22.51
4960.00	32.53	Ave.	87	2.0	H	6.80	39.33	54	14.67
2M									
Low Channel (2402 MHz)									
2388.94	28.32	PK	327	1.8	H	31.87	60.19	74	13.81
2388.94	16.75	Ave.	327	1.8	H	31.87	48.62	54	5.38
2484.12	29.32	PK	32	1.5	H	32.13	61.45	74	12.55
2484.12	14.32	Ave.	32	1.5	H	32.13	46.45	54	7.55
4804.00	42.66	PK	40	2.4	H	6.28	48.94	74	25.06
4804.00	32.42	Ave.	40	2.4	H	6.28	38.70	54	15.30
Middle Channel (2440 MHz)									
4880.00	41.98	PK	286	1.2	H	6.76	48.74	74	25.26
4880.00	34.82	Ave.	286	1.2	H	6.76	41.58	54	12.42
High Channel (2480 MHz)									
2384.86	26.36	PK	261	1.9	H	31.87	58.23	74	15.77
2384.86	14.62	Ave.	261	1.9	H	31.87	46.49	54	7.51
2483.94	25.36	PK	31	1.3	H	32.13	57.49	74	16.51
2483.94	14.66	Ave.	31	1.3	H	32.13	46.79	54	7.21
4960.00	41.38	PK	87	2.0	H	6.80	48.18	74	25.82
4960.00	32.59	Ave.	87	2.0	H	6.80	39.39	54	14.61

Note:
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.

Pre-scan with 802.11b Mode, High channel
Horizontal



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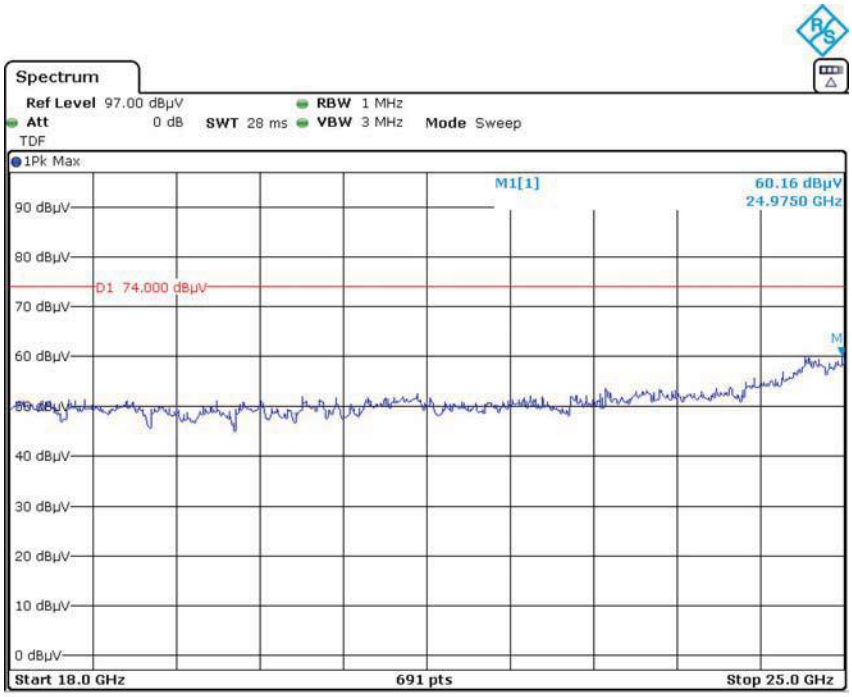

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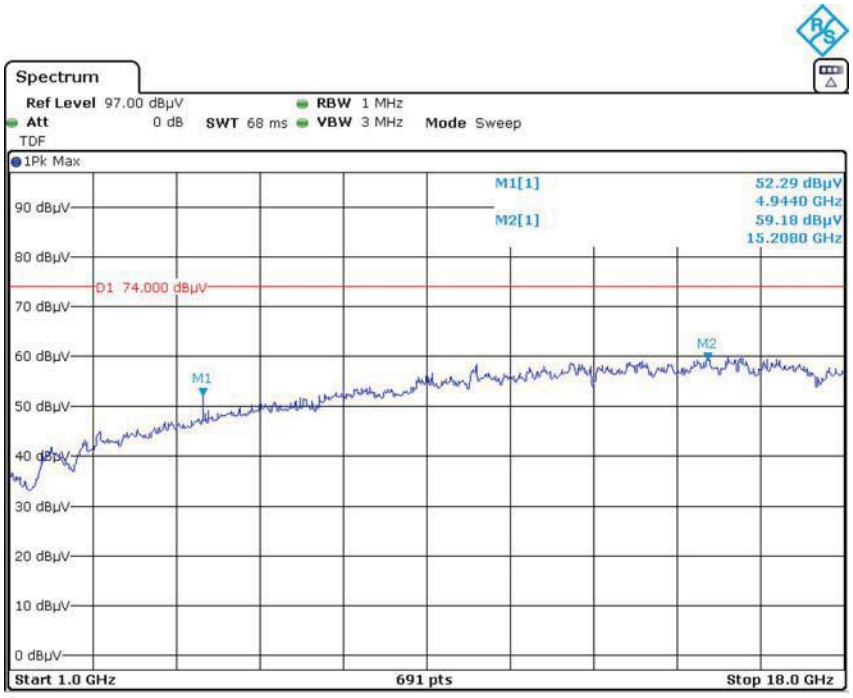
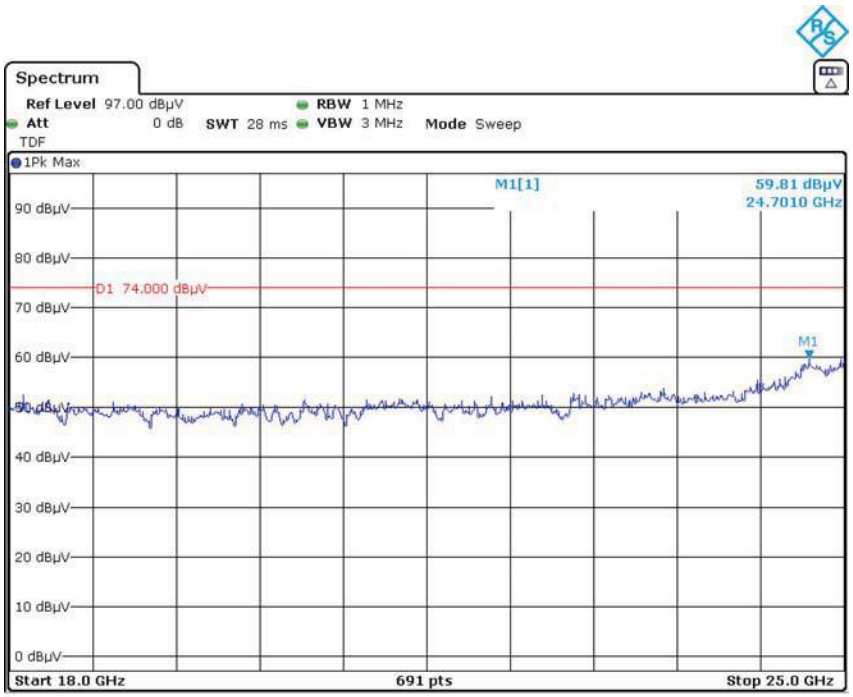
Vertical



Date: 15.OCT.2020 21:54:10



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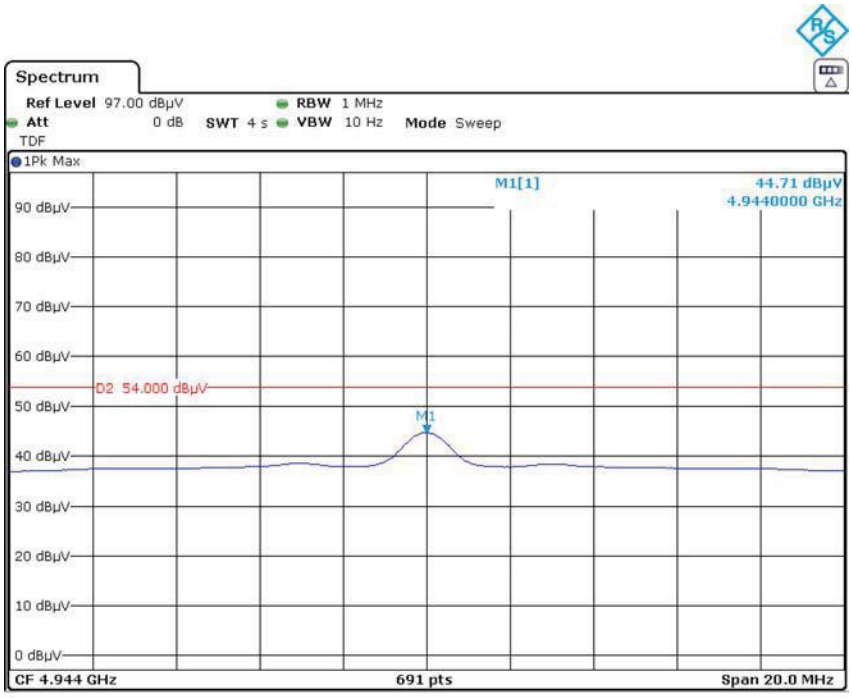
Pre-scan for Average
Horizontal



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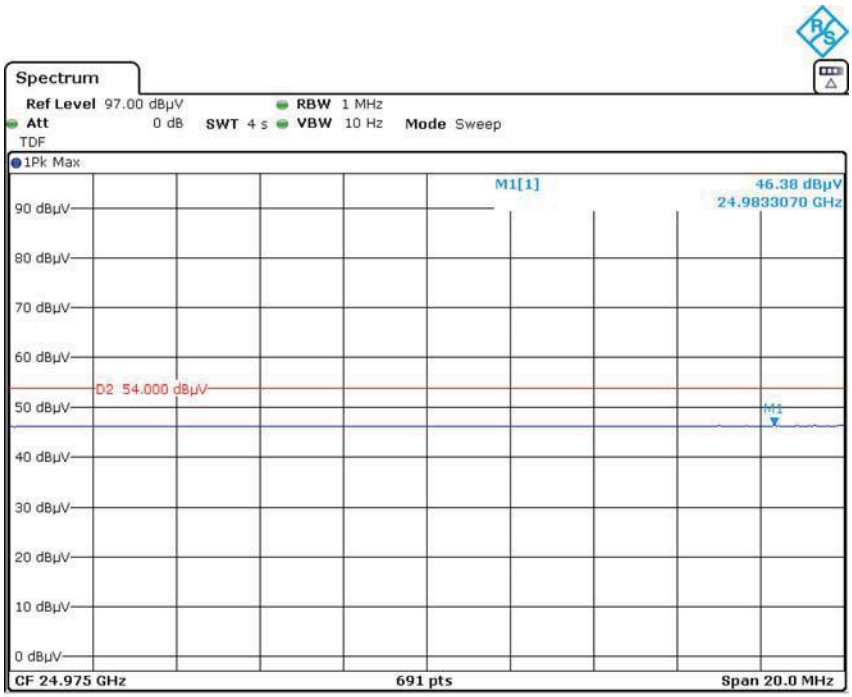

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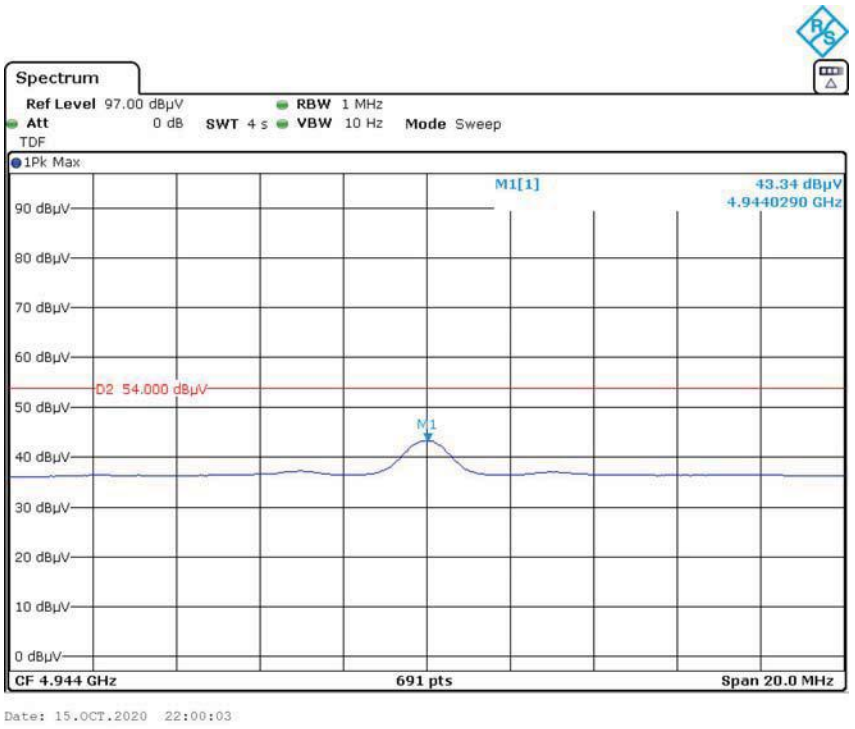
Vertical


Spectrum
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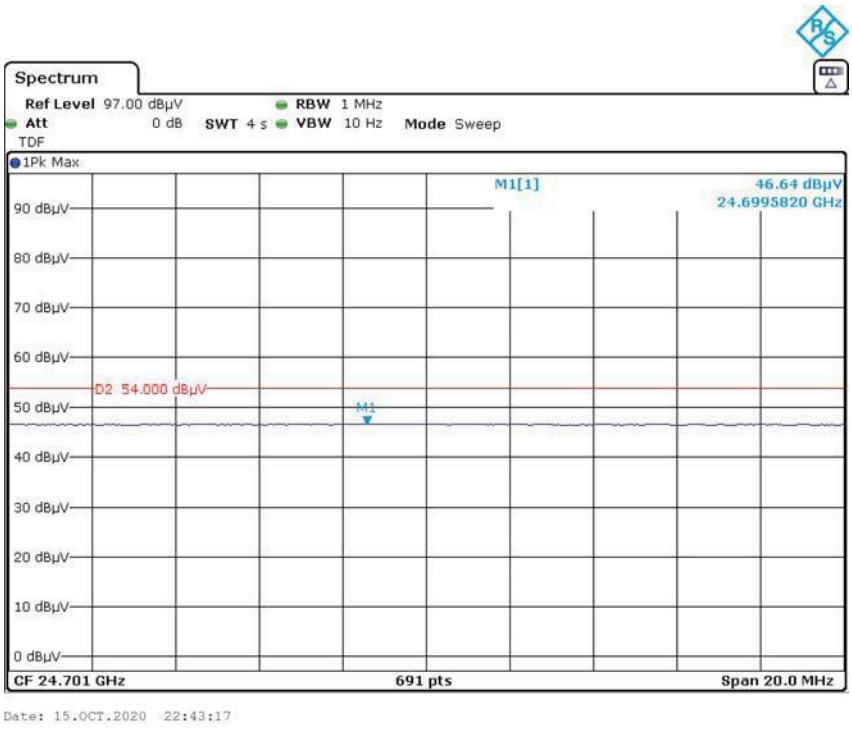
RBW 1 MHz
Att 0 dB SWT 4 s VBW 10 Hz Mode Sweep
TDF
1Pk Max
M1[1] 43.34 dBµV
4.9440290 GHz
90 dBµV
80 dBµV
70 dBµV
60 dBµV
D2 54.000 dBµV
50 dBµV
M1
40 dBµV
30 dBµV
20 dBµV
10 dBµV
0 dBµV
CF 4.944 GHz
691 pts
Span 20.0 MHz
Date: 15.OCT.2020 22:00:03


Spectrum
Ref Level 97.00 dBµV
RBW 1 MHz
Att 0 dB SWT 4 s VBW 10 Hz Mode Sweep
TDF
1Pk Max
M1[1] 46.64 dBµV
24.6995820 GHz
90 dBµV
80 dBµV
70 dBµV
60 dBµV
D2 54.000 dBµV
50 dBµV
M1
40 dBµV
30 dBµV
20 dBµV
10 dBµV
0 dBµV
CF 24.701 GHz
691 pts
Span 20.0 MHz
Date: 15.OCT.2020 22:43:17

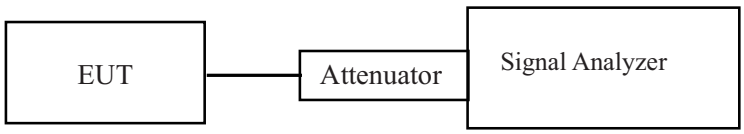
FCC §15.247(a) (2) – 6 dB EMISSION BANDWIDTH

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:	27 ℃
Relative Humidity:	56 %
ATM Pressure:	101.0 kPa

The testing was performed by James Fu from 2020-10-05 to 2021-01-22.

EUT operation mode: Transmitting

Test Result Compliant. Please refer to the Appendix BLE & Appendix Wi-Fi.

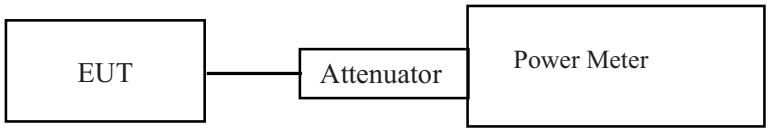
FCC §15.247(b) (3) - MAXIMUM CONDUCTED OUTPUT POWER

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:	27 ℃
Relative Humidity:	56 %
ATM Pressure:	101.0 kPa

The testing was performed by James Fu from 2020-10-05 to 2021-01-22.

EUT operation mode: Transmitting

Test Result Compliant. Please refer to the Appendix BLE & Appendix Wi-Fi.

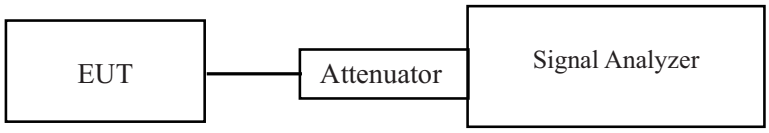
FCC §15.247(d) – 100 kHz BANDWIDTH OF FREQUENCY BAND EDGE

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:	27 ℃
Relative Humidity:	56 %
ATM Pressure:	101.0 kPa

The testing was performed by James Fu from 2020-10-05 to 2021-01-22.

EUT operation mode: Transmitting

Test Result Compliant. Please refer to the Appendix BLE & Appendix Wi-Fi.

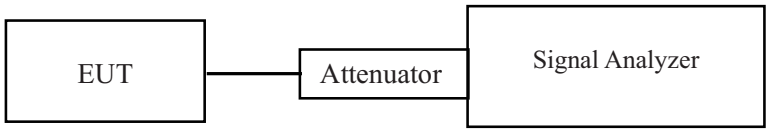
FCC §15.247(e) - POWER SPECTRAL DENSITY

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:	27 ℃
Relative Humidity:	56 %
ATM Pressure:	101.0 kPa

The testing was performed by James Fu from 2020-10-10 to 2020-10-11.

EUT operation mode: Transmitting

Test Result Compliant. Please refer to the Appendix BLE & Appendix Wi-Fi.

APPENDIX Wi-Fi

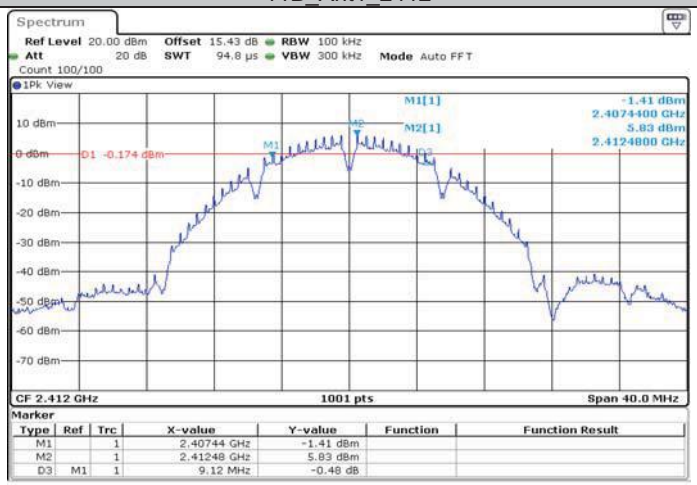
AppendixA: DTS Bandwidth

Test Result

TestMode	Antenna	Channel	DTS BW [MHz]	Limit[MHz]	Verdict
11B	Ant1	2412	9.120	0.5	PASS
		2442	8.160	0.5	PASS
		2462	9.120	0.5	PASS
11G	Ant1	2412	15.200	0.5	PASS
		2442	15.800	0.5	PASS
		2462	15.720	0.5	PASS
11N20SISO	Ant1	2412	15.760	0.5	PASS
		2442	16.160	0.5	PASS
		2462	16.520	0.5	PASS
11N40SISO	Ant1	2422	35.600	0.5	PASS
		2442	35.840	0.5	PASS
		2452	36.080	0.5	PASS

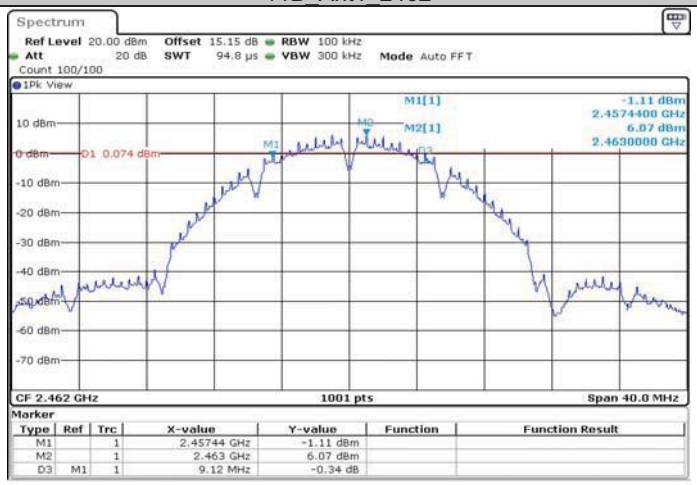
Test Graphs

11B_Ant1_2412

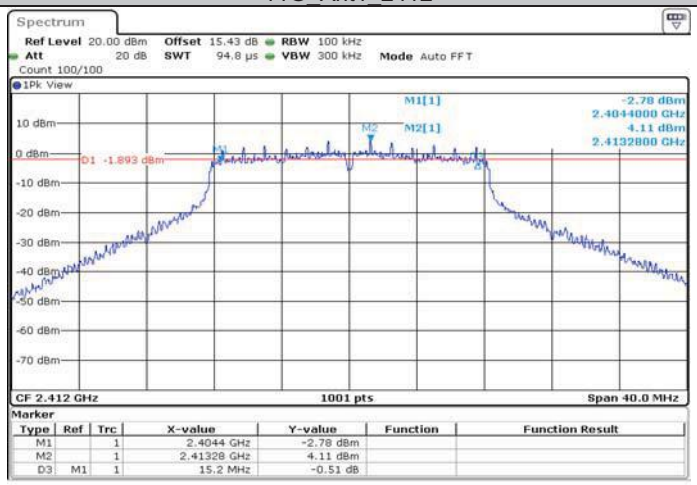


11B_Ant1_2442

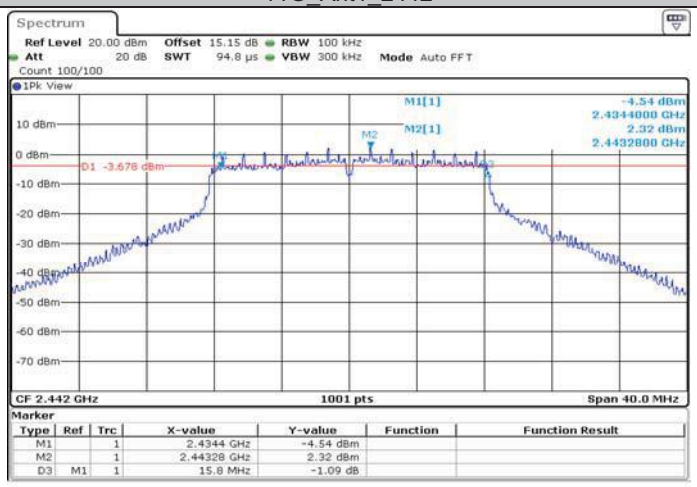
11B_Ant1_2462



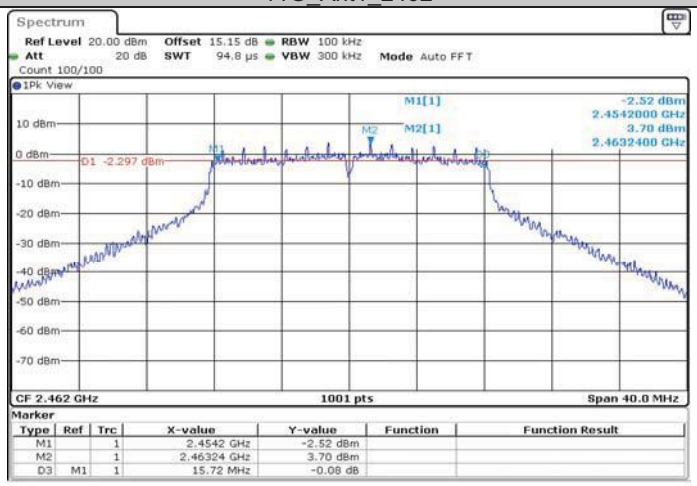
11G_Ant1_2412



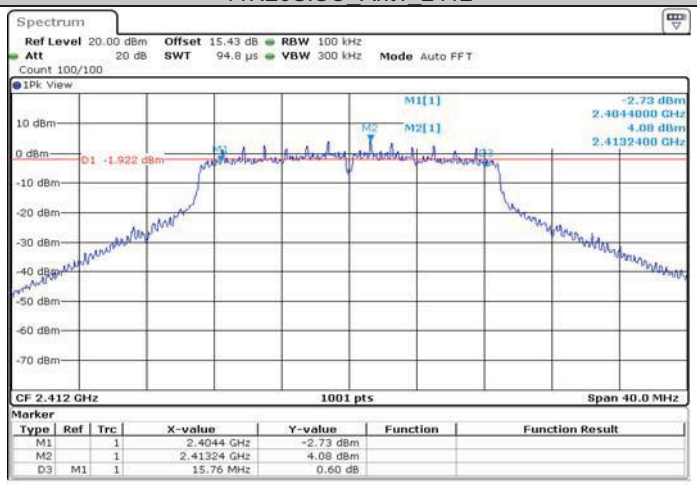
11G_Ant1_2442



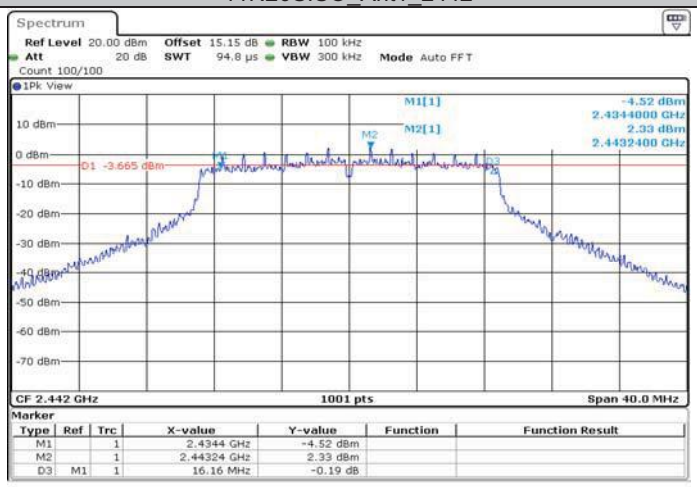
11G_Ant1_2462



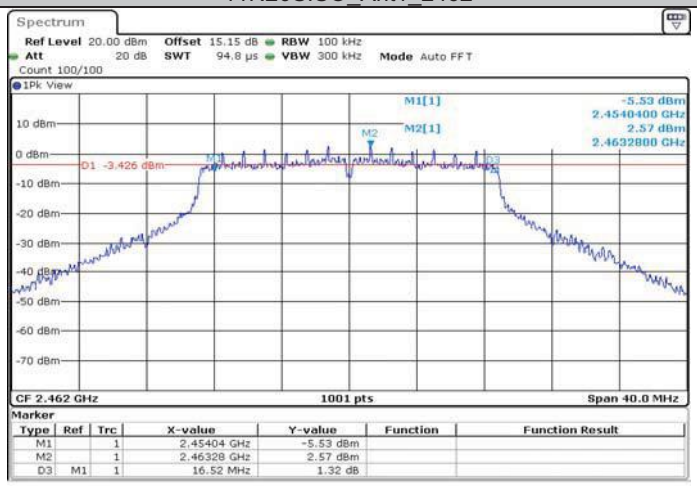
11N20SISO_Ant1_2412



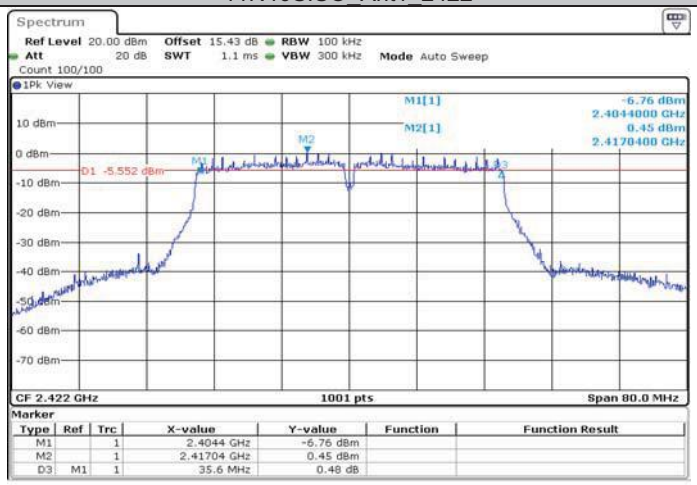
11N20SISO_Ant1_2442



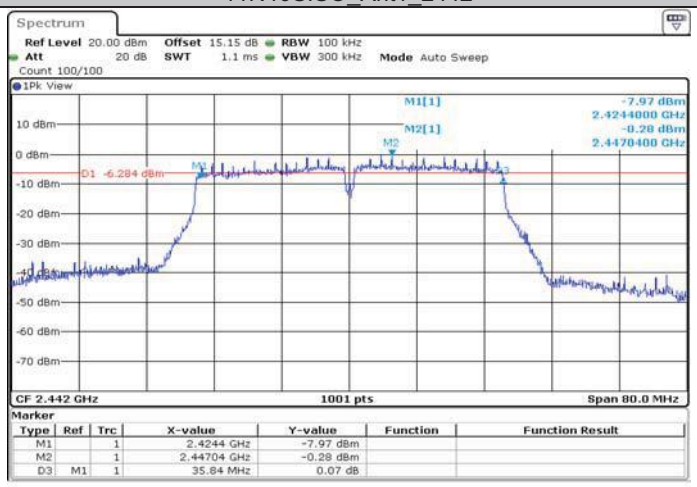
11N20SISO_Ant1_2462



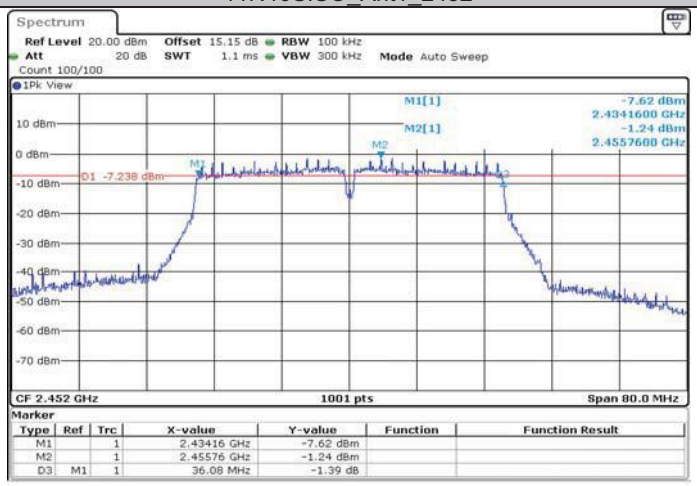
11N40SISO_Ant1_2422



11N40SISO_Ant1_2442



11N40SISO_Ant1_2452



AppendixB: Occupied Channel Bandwidth

Test Result

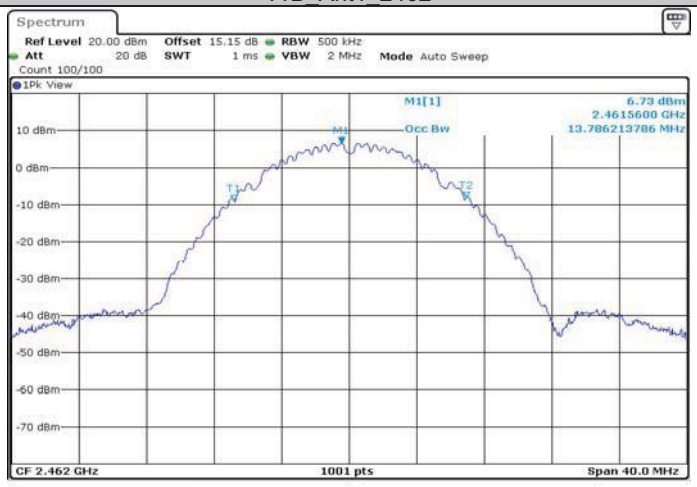
TestMode	Antenna	Channel	OCB [MHz]	Limit[MHz]	Verdict
11B	Ant1	2412	13.706	---	PASS
		2442	13.746	---	PASS
		2462	13.786	---	PASS
11G	Ant1	2412	17.263	---	PASS
		2442	17.383	---	PASS
		2462	17.343	---	PASS
11N20SISO	Ant1	2412	18.342	---	PASS
		2442	18.462	---	PASS
		2462	18.462	---	PASS
11N40SISO	Ant1	2422	36.364	---	PASS
		2442	36.364	---	PASS
		2452	36.603	---	PASS

Test Graphs

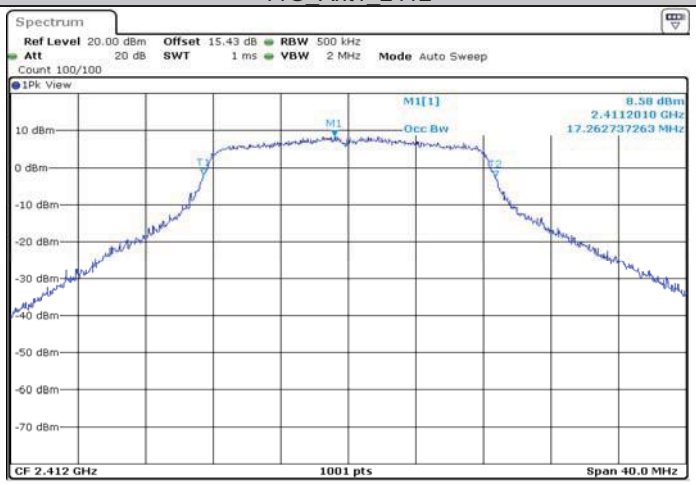
11B_Ant1_2412

11B_Ant1_2442

11B_Ant1_2462



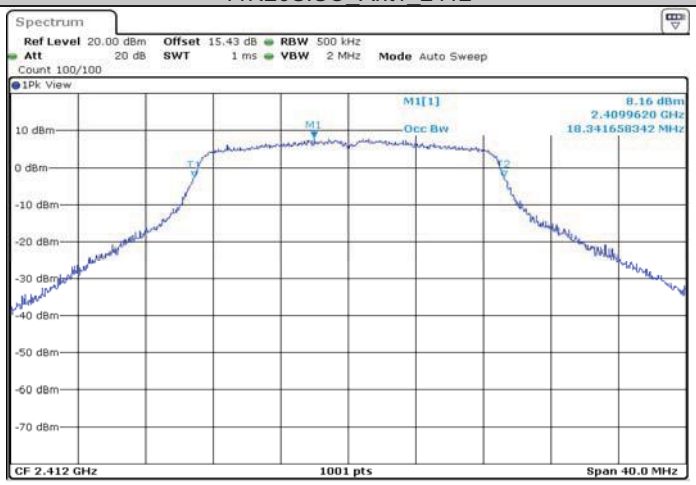
11G_Ant1_2412



11G_Ant1_2442

11G_Ant1_2462

11N20SISO_Ant1_2412



11N20SISO_Ant1_2442

11N20SISO_Ant1_2462

11N40SISO_Ant1_2422

11N40SISO_Ant1_2442

11N40SISO_Ant1_2452

AppendixC: Maximum conducted output power

Test Result(PK)

TestMode	Antenna	Channel	Result[dBm]	Limit[dBm]	Verdict
11B	Ant1	2412	17.62	<=30	PASS
		2442	17.45	<=30	PASS
		2462	16.97	<=30	PASS
11G	Ant1	2412	17.61	<=30	PASS
		2442	17.51	<=30	PASS
		2462	17.60	<=30	PASS
11N20SISO	Ant1	2412	15.86	<=30	PASS
		2442	17.48	<=30	PASS
		2462	16.24	<=30	PASS
11N40SISO	Ant1	2422	16.32	<=30	PASS
		2442	15.59	<=30	PASS
		2452	14.69	<=30	PASS

Test Result(AV)

TestMode	Antenna	Channel	Result[dBm]	Limit[dBm]	Verdict
11B	Ant1	2412	15.83	<=30	PASS
		2442	15.89	<=30	PASS
		2462	15.26	<=30	PASS
11G	Ant1	2412	12.62	<=30	PASS
		2442	12.57	<=30	PASS
		2462	12.51	<=30	PASS
11N20SISO	Ant1	2412	10.45	<=30	PASS
		2442	11.42	<=30	PASS
		2462	10.73	<=30	PASS
11N40SISO	Ant1	2422	10.94	<=30	PASS
		2442	10.34	<=30	PASS
		2452	10.06	<=30	PASS

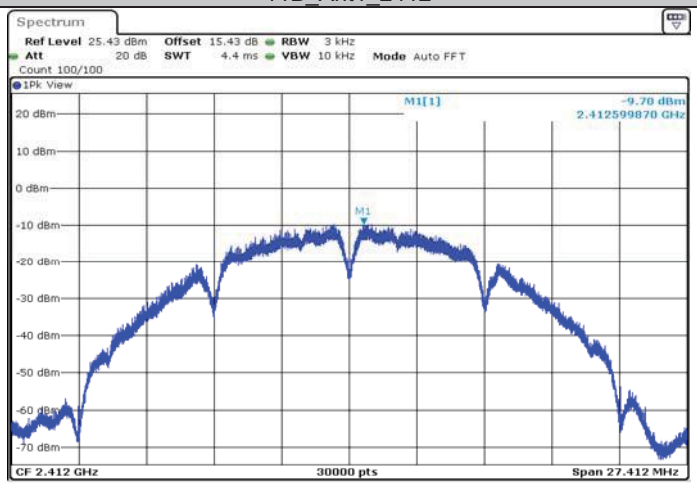
AppendixD: Maximum power spectral density

Test Result

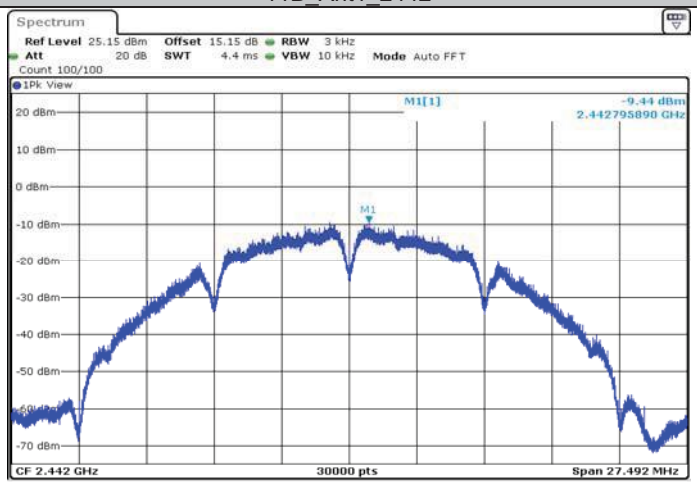
TestMode	Antenna	Channel	Result[dBm/3kHz]	Limit[dBm/3kHz]	Verdict
11B	Ant1	2412	-9.70	<=8	PASS
		2442	-9.44	<=8	PASS
		2462	-7.27	<=8	PASS
11G	Ant1	2412	-11.75	<=8	PASS
		2442	-12.04	<=8	PASS
		2462	-10.03	<=8	PASS
11N20SISO	Ant1	2412	-14.13	<=8	PASS
		2442	-14.33	<=8	PASS
		2462	-11.43	<=8	PASS
11N40SISO	Ant1	2422	-16.64	<=8	PASS
		2442	-16.77	<=8	PASS
		2452	-15.16	<=8	PASS

Test Graphs

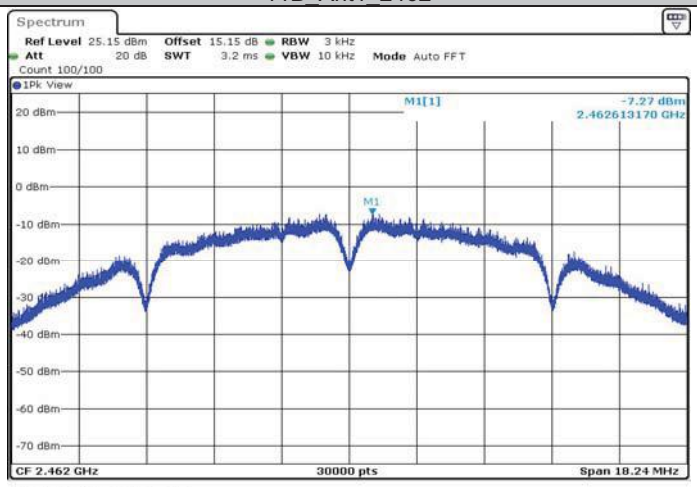
11B_Ant1_2412



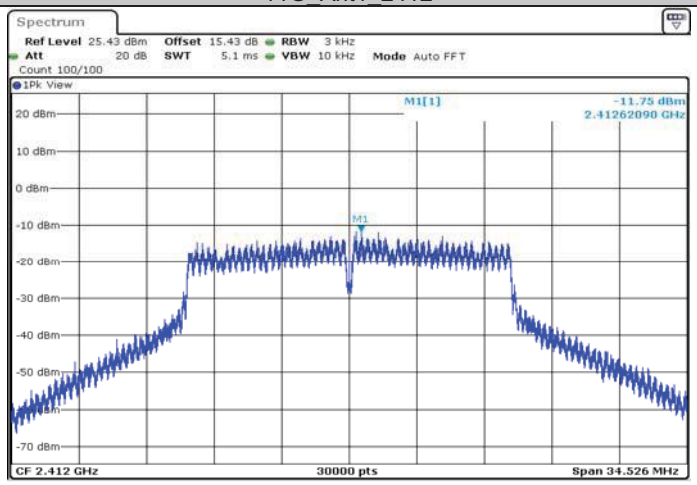
11B_Ant1_2442



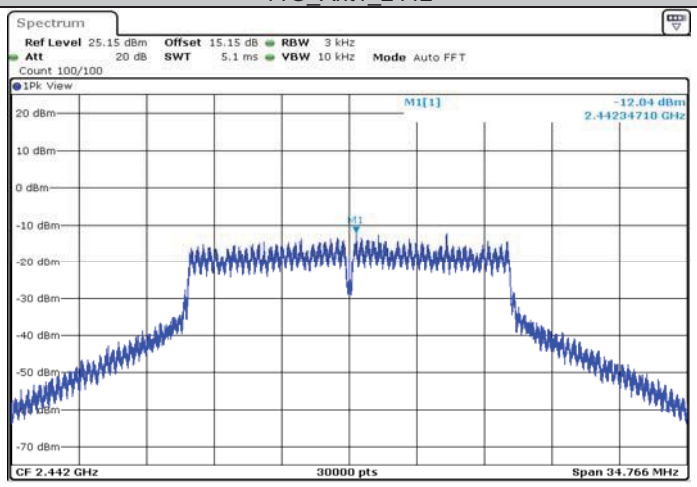
11B_Ant1_2462



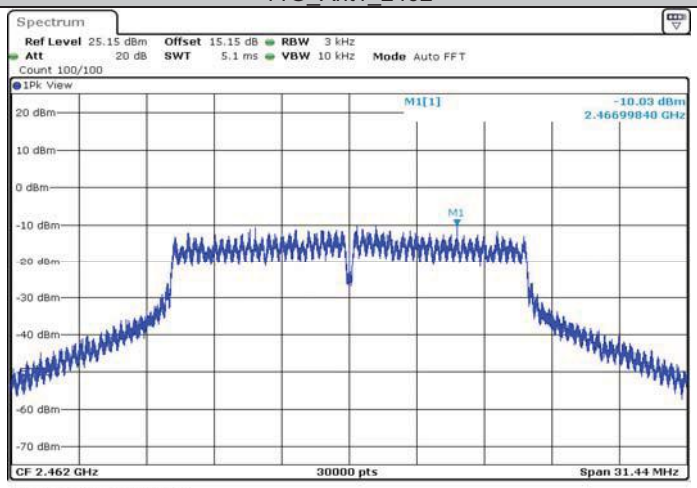
11G_Ant1_2412



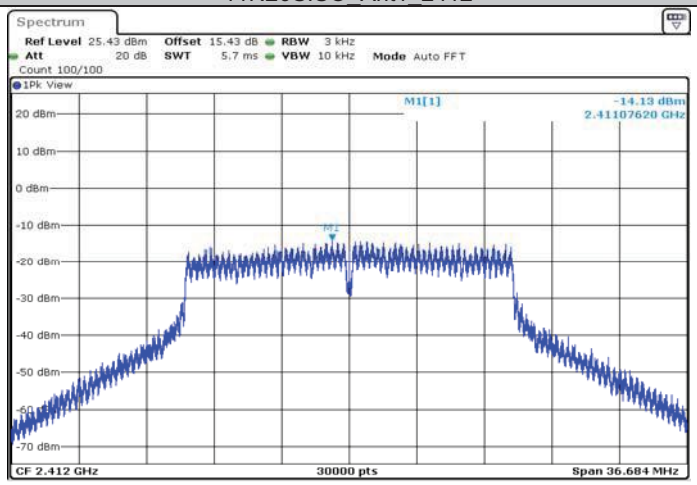
11G_Ant1_2442



11G_Ant1_2462



11N20SISO_Ant1_2412



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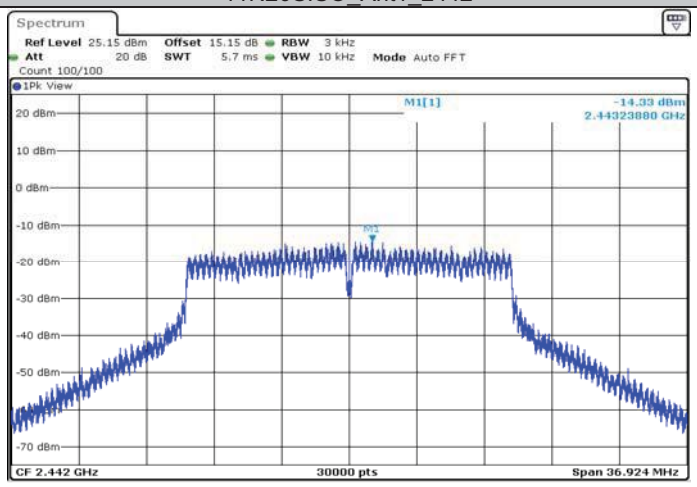
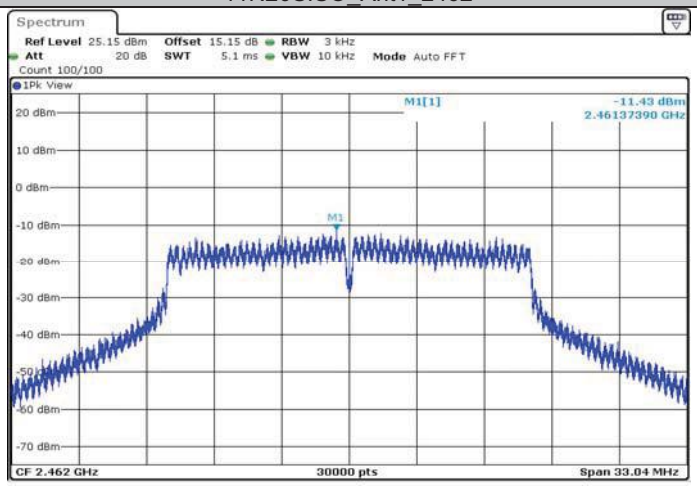
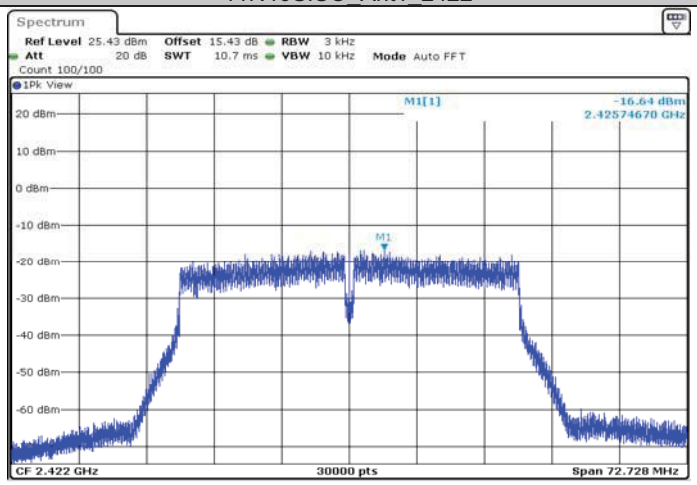


11N20SISO_Ant1_2462



11N40SISO_Ant1_2422



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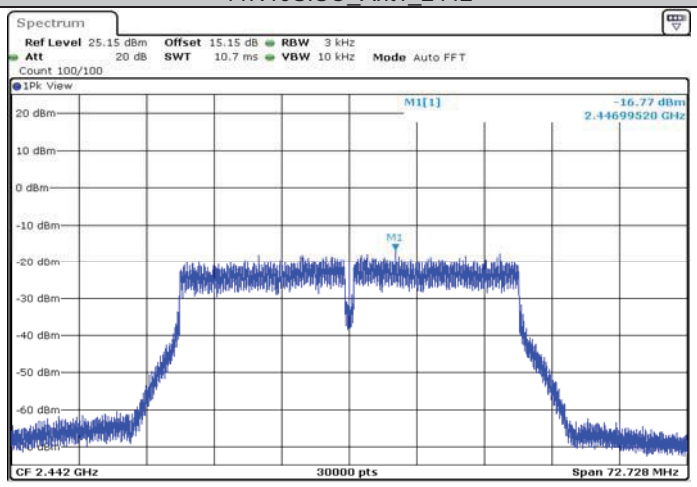
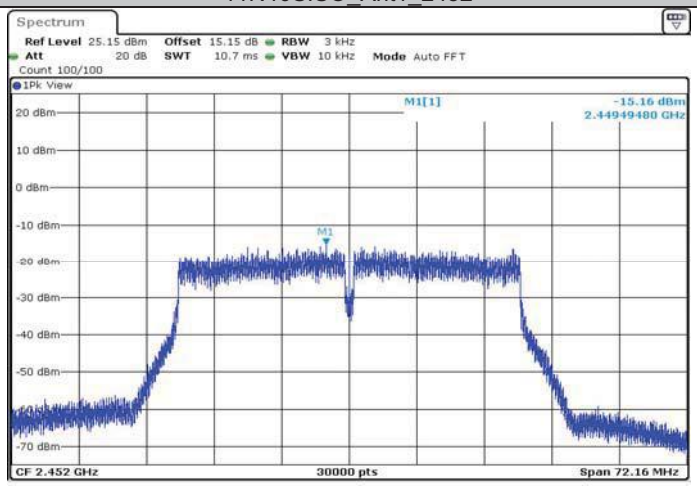


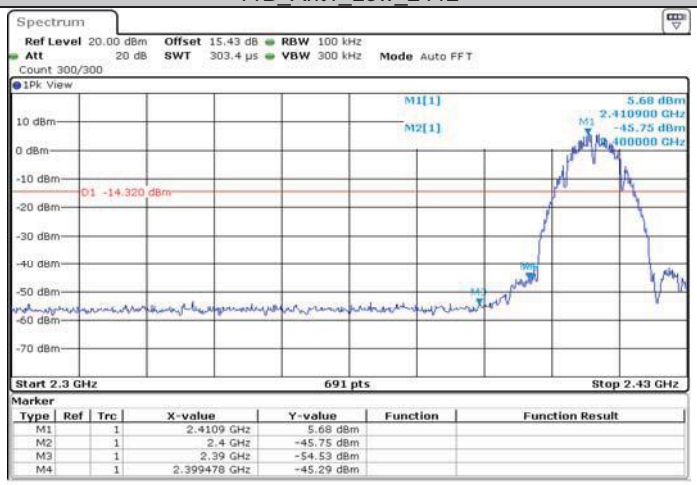
11N40SISO_Ant1_2452



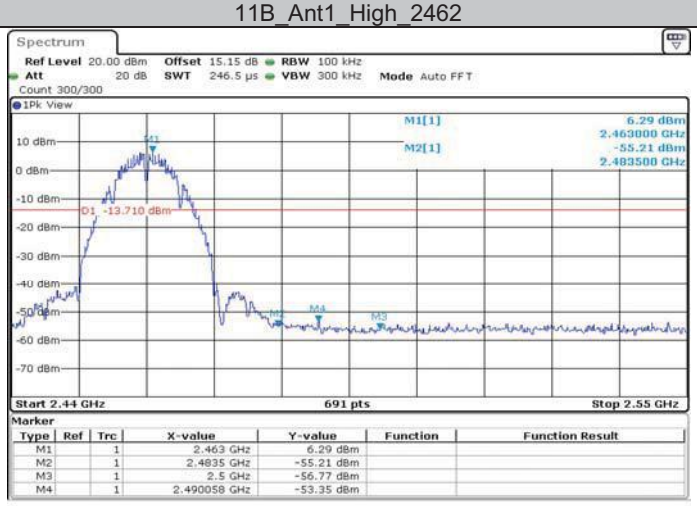
AppendixE:Band edge measurements

Test Graphs

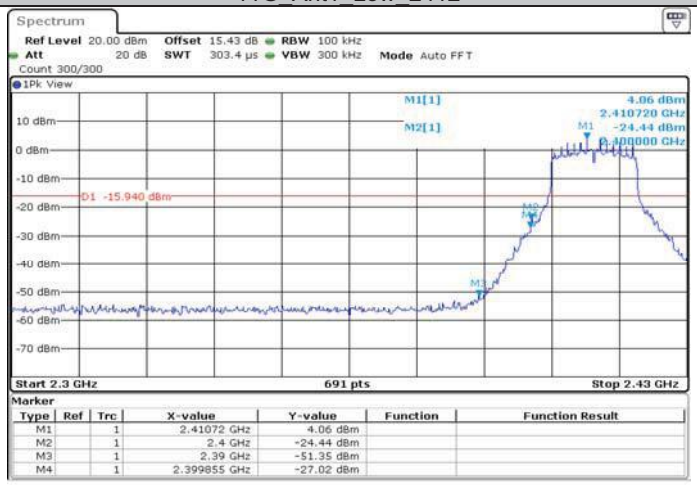
11B_Ant1_Low_2412



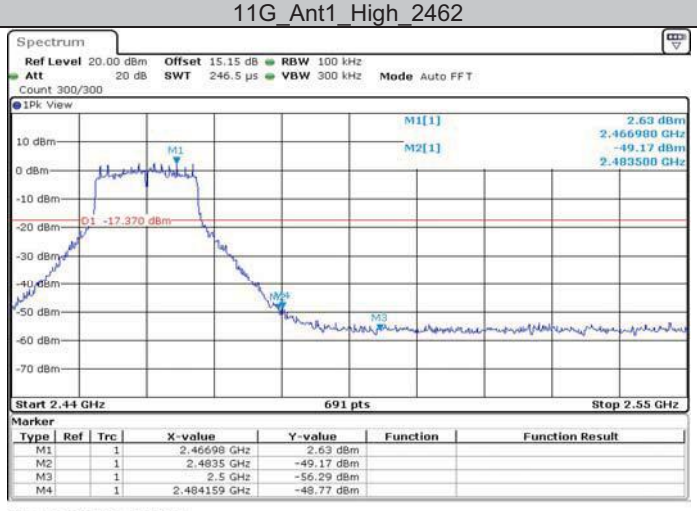
11B_Ant1_High_2462



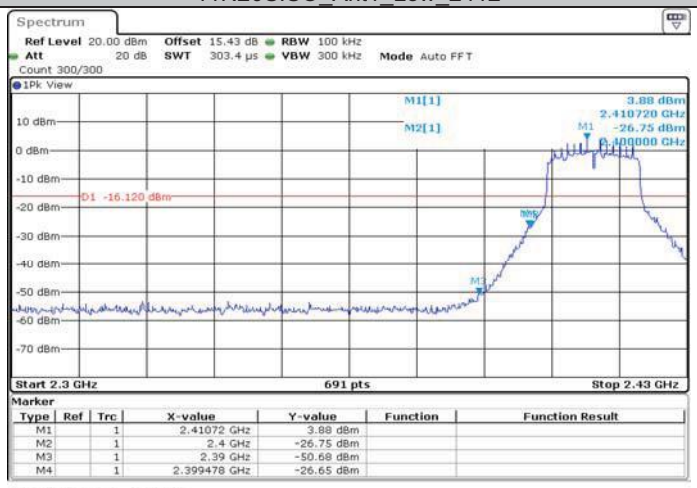
11G_Ant1_Low_2412



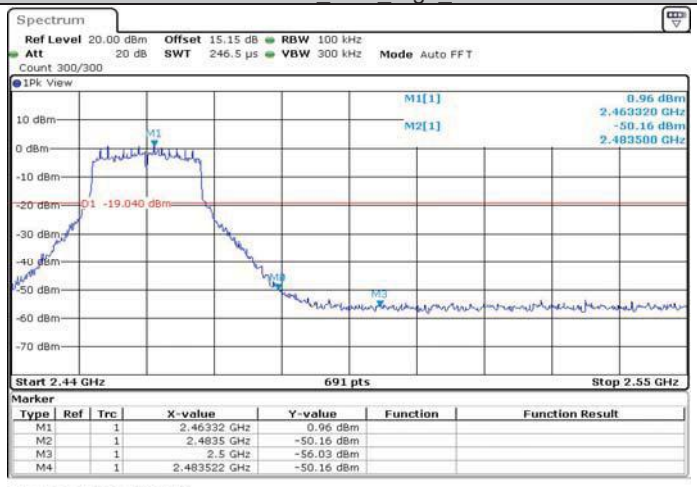
11G_Ant1_High_2462



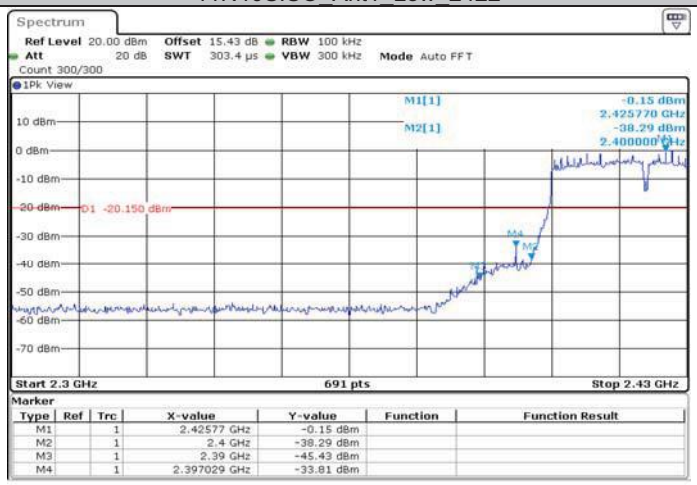
11N20SISO_Ant1_Low_2412



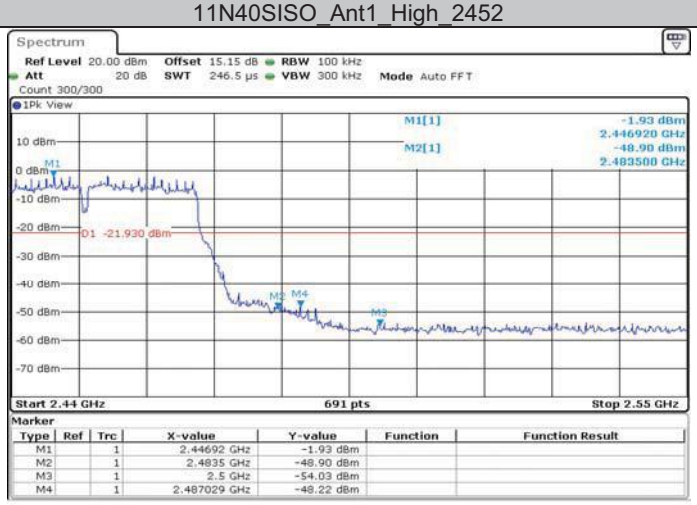
11N20SISO_Ant1_High_2462



11N40SISO_Ant1_Low_2422



11N40SISO_Ant1_High_2452



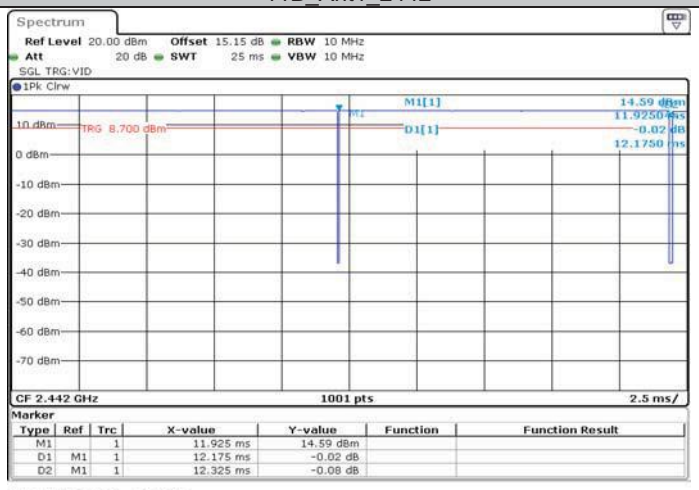
AppendixG: DutyCycle

Test Result

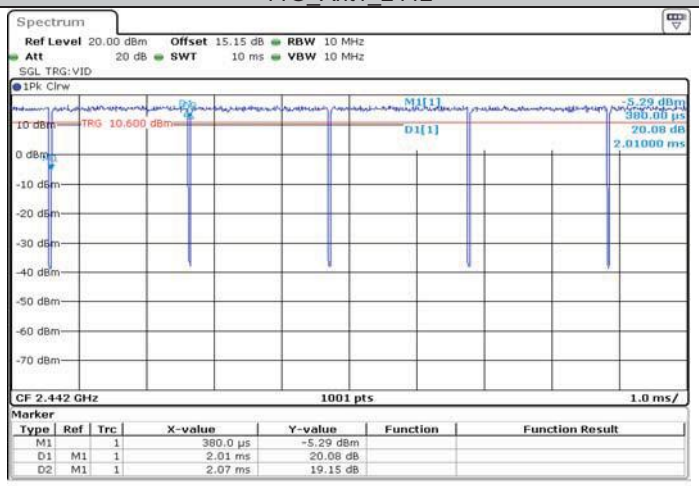
TestMode	Antenna	Channel	TransmissionDuration [ms]	Transmission Period [ms]	Duty Cycle [%]
11B	Ant1	2442	12.18	12.33	98.78
11G	Ant1	2442	2.01	2.07	97.10
11N20SISO	Ant1	2442	1.87	1.93	96.89
11N40SISO	Ant1	2442	0.91	0.98	92.86

Test Graphs

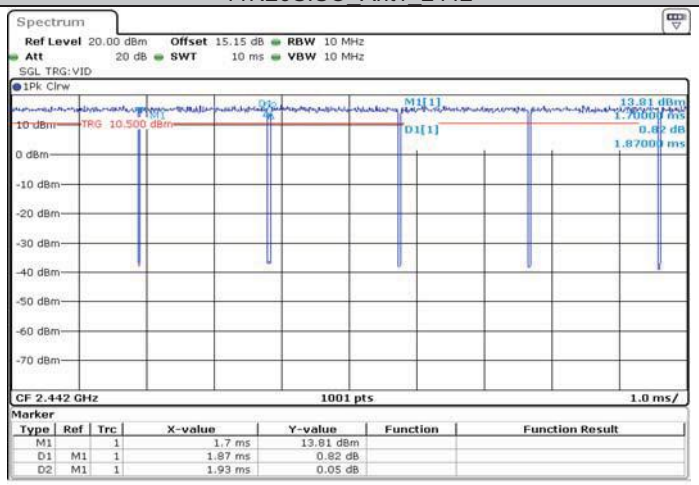
11B_Ant1_2442



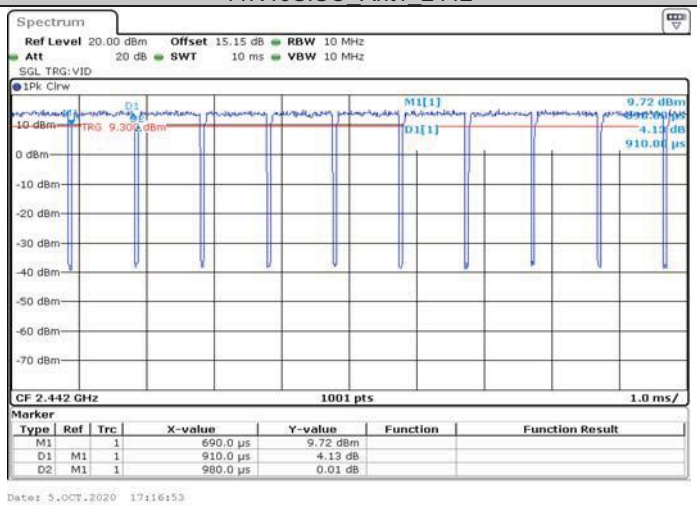
11G_Ant1_2442



11N20SISO_Ant1_2442



11N40SISO_Ant1_2442



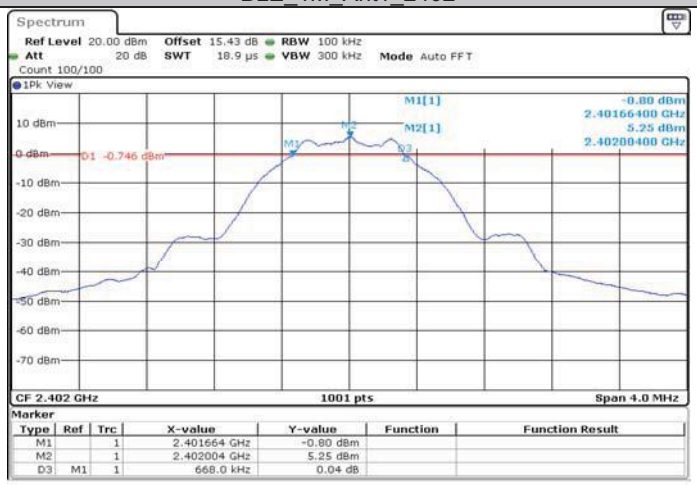
APPENDIX BLE

AppendixA: DTS Bandwidth
Test Result

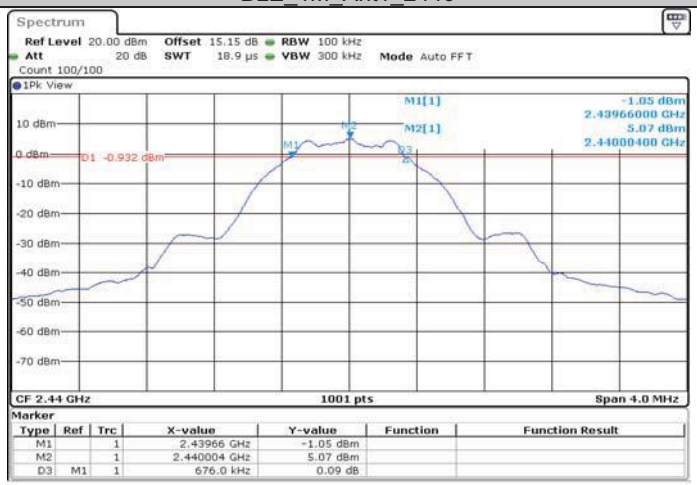
TestMode	Antenna	Channel	DTS BW [MHz]	Limit[MHz]	Verdict
BLE_1M	Ant1	2402	0.668	0.5	PASS
		2440	0.676	0.5	PASS
		2480	0.672	0.5	PASS
BLE_2M	Ant1	2402	1.148	0.5	PASS
		2440	1.156	0.5	PASS
		2480	1.160	0.5	PASS

Test Graphs

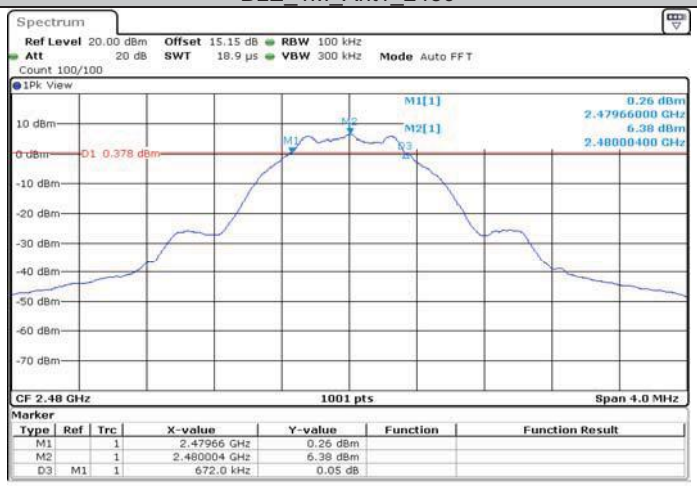
BLE_1M_Ant1_2402



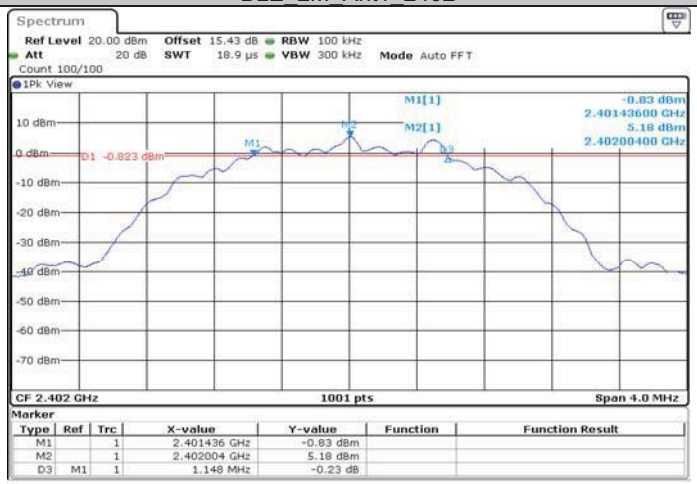
BLE_1M_Ant1_2440



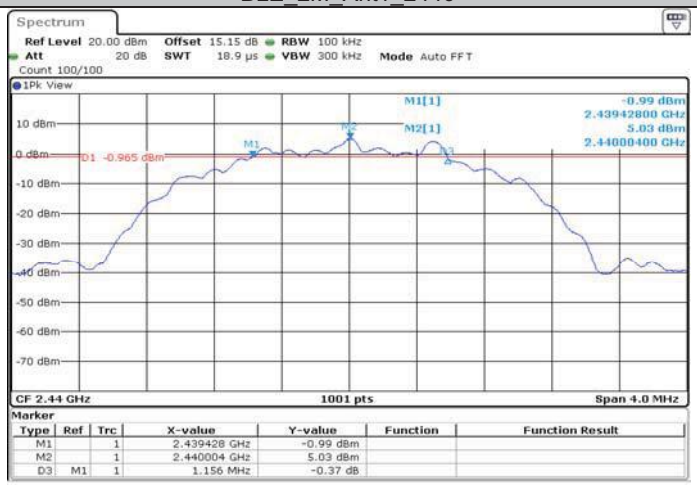
BLE_1M_Ant1_2480



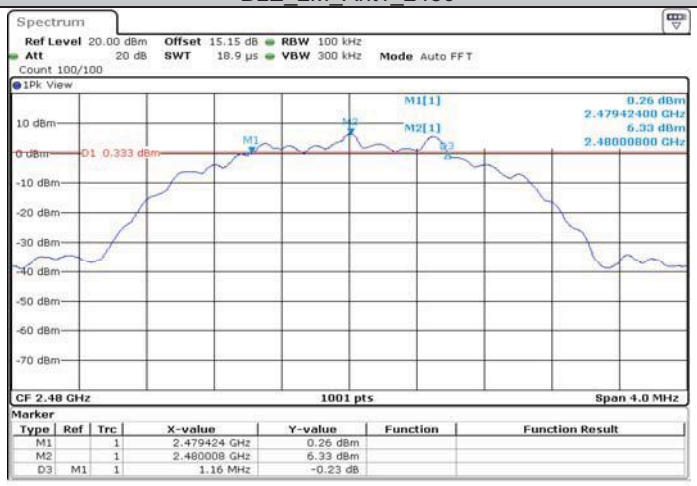
BLE_2M_Ant1_2402



BLE_2M_Ant1_2440



BLE_2M_Ant1_2480



AppendixB: Occupied Channel Bandwidth

Test Result

TestMode	Antenna	Channel	OCB [MHz]	Limit[MHz]	Verdict
BLE_1M	Ant1	2402	1.027	---	PASS
		2440	1.027	---	PASS
		2480	1.031	---	PASS
BLE_2M	Ant1	2402	2.038	---	PASS
		2440	2.038	---	PASS
		2480	2.034	---	PASS

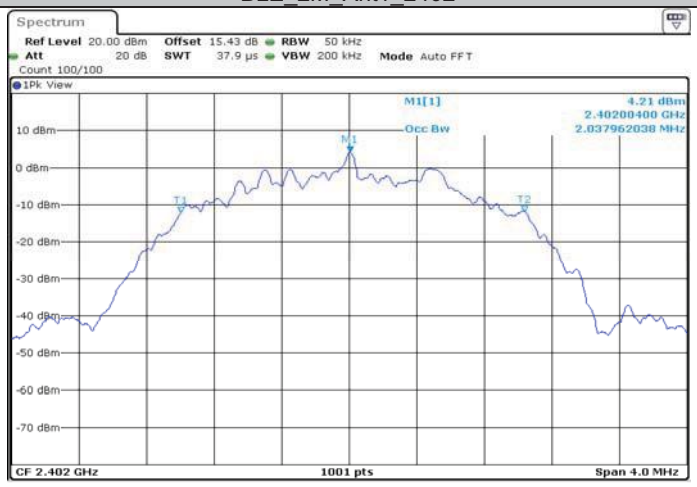
Test Graphs

BLE_1M_Ant1_2402

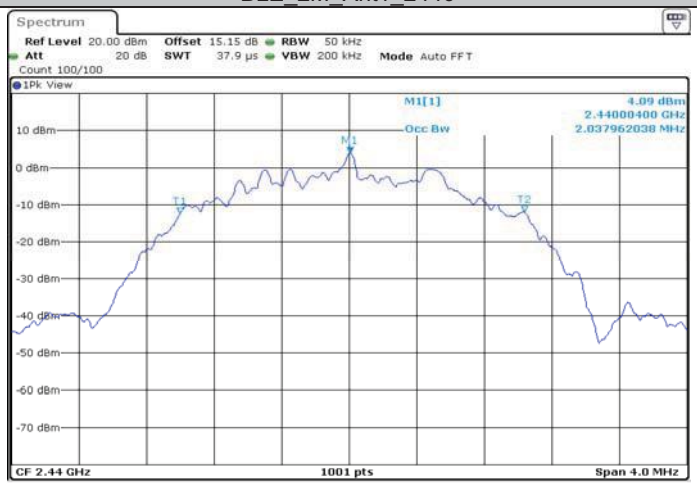
BLE_1M_Ant1_2440

BLE_1M_Ant1_2480

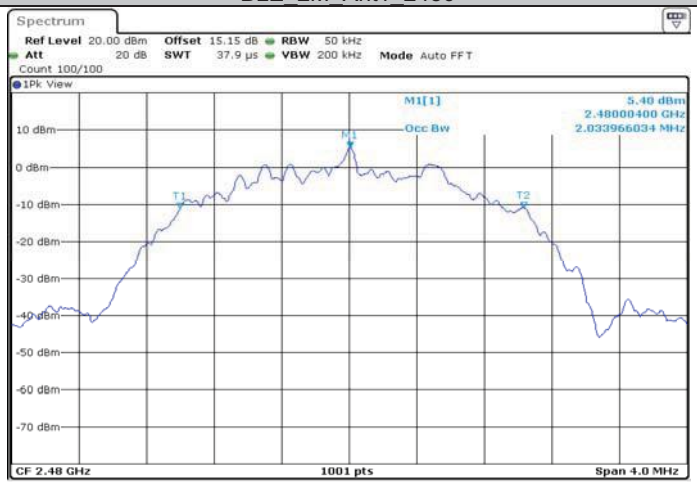
BLE_2M_Ant1_2402



BLE_2M_Ant1_2440



BLE_2M_Ant1_2480



AppendixC: Maximum conducted Peakoutput power
Test Result

TestMode	Antenna	Channel	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	2402	6.21	<=30	PASS
		2440	6.59	<=30	PASS
		2480	7.80	<=30	PASS
BLE_2M	Ant1	2402	6.27	<=30	PASS
		2440	6.74	<=30	PASS
		2480	7.93	<=30	PASS

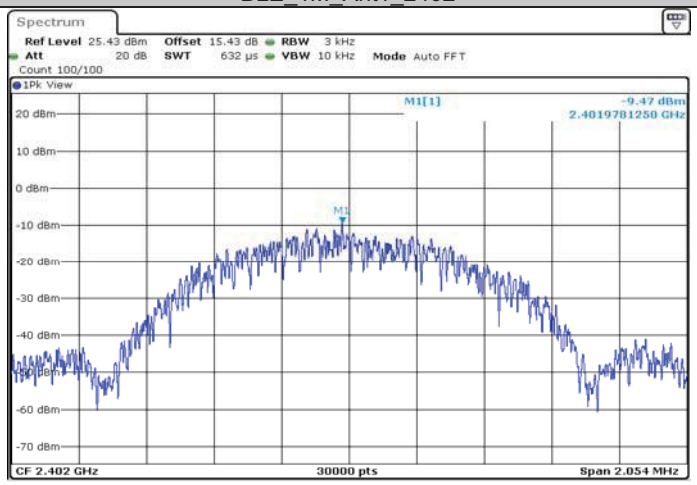
AppendixD: Maximum power spectral density

Test Result

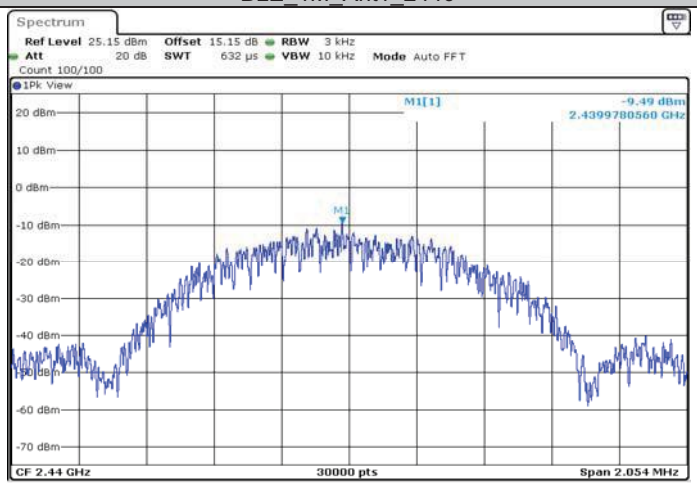
TestMode	Antenna	Channel	Result[dBm/3-100kHz]	Limit[dBm/3kHz]	Verdict
BLE_1M	Ant1	2402	-9.47	<=8	PASS
		2440	-9.49	<=8	PASS
		2480	-8.27	<=8	PASS
BLE_2M	Ant1	2402	-13.62	<=8	PASS
		2440	-13.60	<=8	PASS
		2480	-12.39	<=8	PASS

Test Graphs

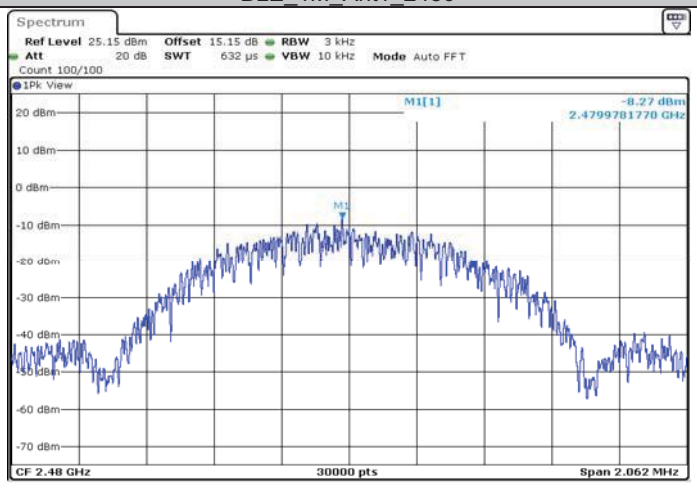
BLE_1M_Ant1_2402



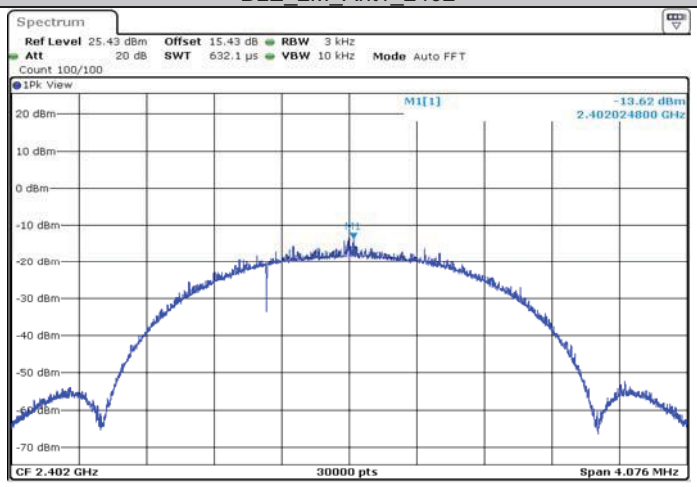
BLE_1M_Ant1_2440



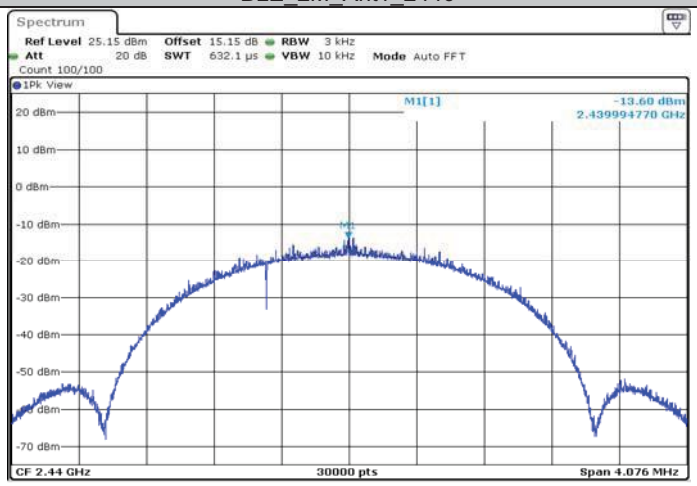
BLE_1M_Ant1_2480



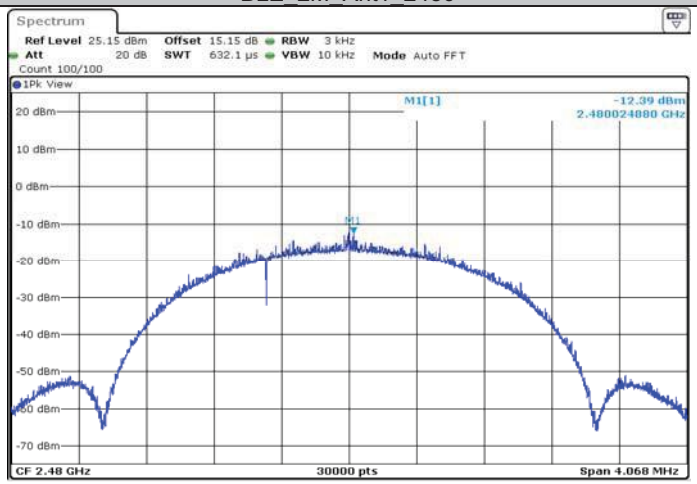
BLE_2M_Ant1_2402



BLE_2M_Ant1_2440

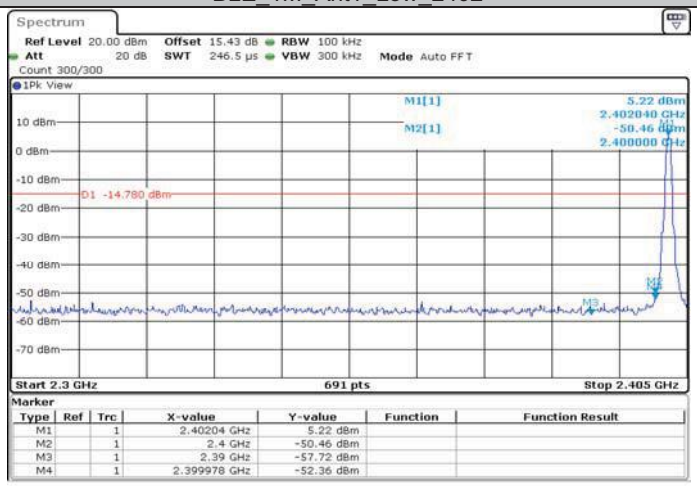


BLE_2M_Ant1_2480

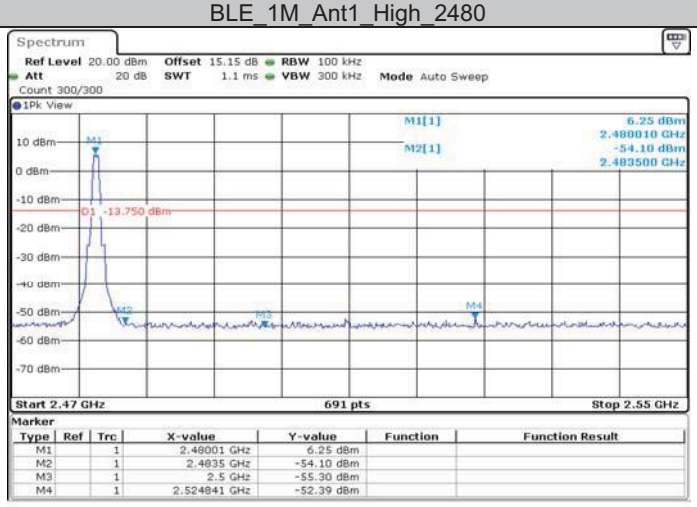


AppendixE:Band edge measurements
Test Graphs

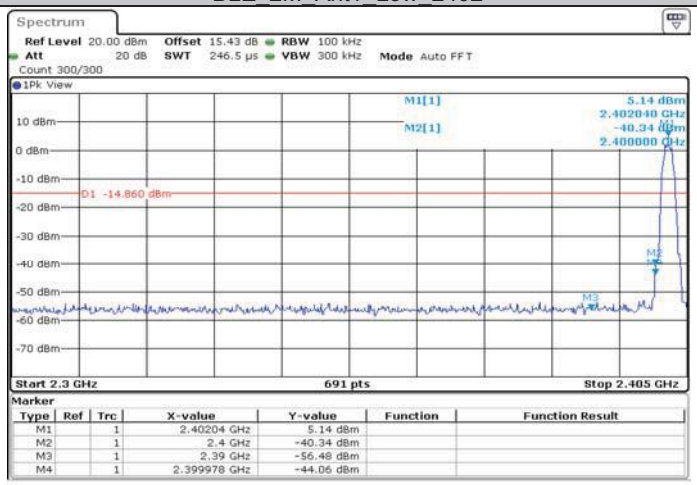
BLE_1M_Ant1_Low_2402



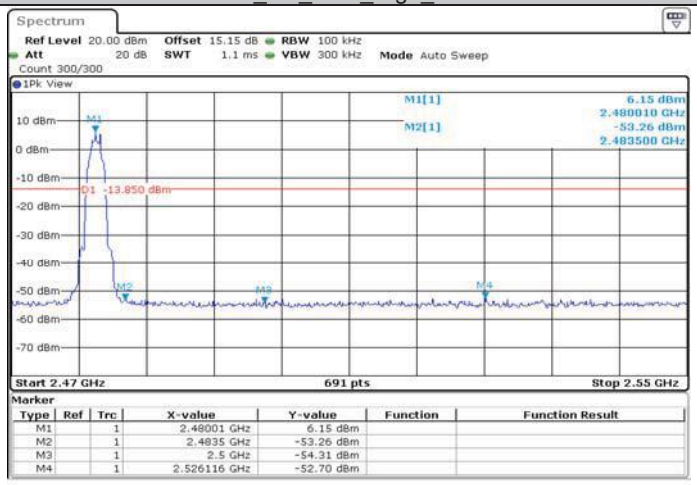
BLE_1M_Ant1_High_2480



BLE_2M_Ant1_Low_2402



BLE_2M_Ant1_High_2480



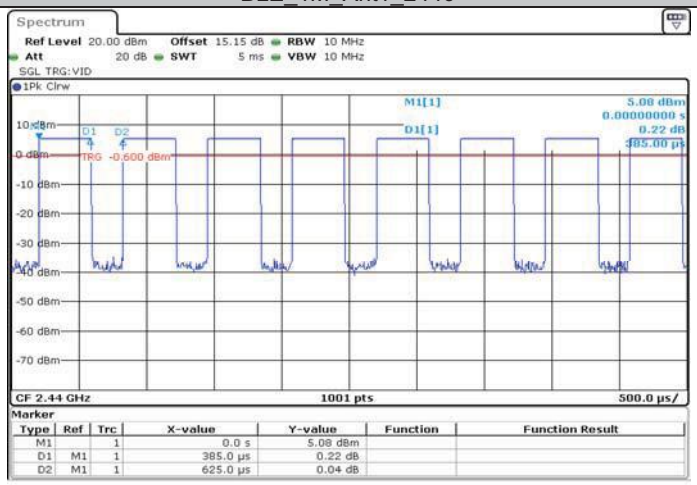
AppendixF: DutyCycle

Test Result

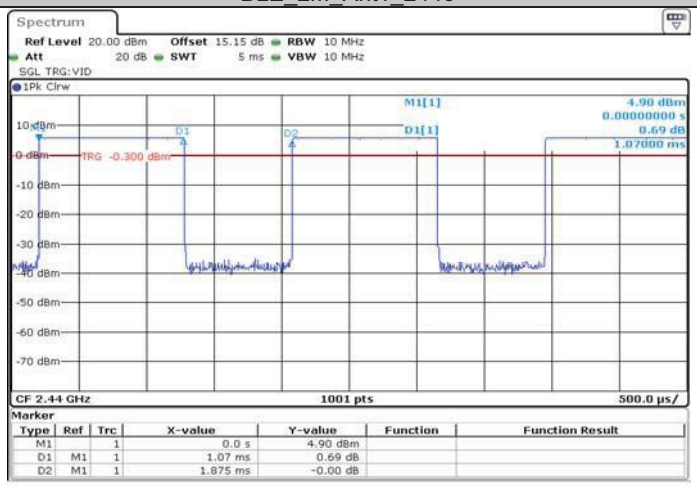
TestMode	Antenna	Channel	TransmissionDuration [ms]	Transmission Period [ms]	Duty Cycle [%]
BLE_1M	Ant1	2440	0.38	0.63	61.60
BLE_2M	Ant1	2440	1.07	1.88	57.07

Test Graphs

BLE_1M_Ant1_2440



BLE_2M_Ant1_2440



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