



TESTING LABORATORY
CERTIFICATE#4323.01



FCC PART 15.247

TEST REPORT

For

Shanghai Sunmi Technology Co.,Ltd.

Room 605, Block 7, KIC Plaza, No.388 Song Hu Road, Yang Pu District, Shanghai 200433 China

FCC ID: 2AH25T8910

Report Type: Original Report	Product Type: Handheld Wireless Terminal
Project Engineer:	CK Huang
Report Number:	RKSA201026002-00B
Report Date:	2021-01-28
Reviewed By:	Oscar Ye EMC Manager
Prepared By:	Bay Area Compliance Laboratories Corp. (Kunshan) No.248 Chenghu Road, Kunshan, Jiangsu province, China Tel: +86-0512-86175000 Fax: +86-0512-88934268 www.baclcorp.com.cn

TABLE OF CONTENTS

GENERAL INFORMATION.....	4
PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT)	4
OBJECTIVE	4
RELATED SUBMITTAL(S)/GRANT(S).....	4
TEST METHODOLOGY	5
MEASUREMENT UNCERTAINTY	5
TEST FACILITY	5
SYSTEM TEST CONFIGURATION	6
DESCRIPTION OF TEST CONFIGURATION	6
EQUIPMENT MODIFICATIONS	6
EUT EXERCISE SOFTWARE	7
SUPPORT EQUIPMENT LIST AND DETAILS	11
EXTERNAL I/O CABLE.....	11
BLOCK DIAGRAM OF TEST SETUP	11
SUMMARY OF TEST RESULTS	13
TEST EQUIPMENT LIST	14
FCC §1.1307(b) & §2.1093 - RF EXPOSURE INFORMATION	15
TEST RESULT	15
FCC §15.203 - ANTENNA REQUIREMENT.....	16
APPLICABLE STANDARD	16
ANTENNA CONNECTOR CONSTRUCTION	16
FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS	17
APPLICABLE STANDARD	17
EUT SETUP	17
EMI TEST RECEIVER SETUP.....	17
TEST PROCEDURE	18
FACTOR & OVER LIMIT CALCULATION.....	18
TEST RESULTS SUMMARY	18
TEST DATA	18
FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS.....	25
APPLICABLE STANDARD	25
EUT SETUP	25
EMI TEST RECEIVER SETUP.....	26
TEST PROCEDURE	26
CORRECTED AMPLITUDE & MARGIN CALCULATION	26
TEST RESULTS SUMMARY	26
TEST DATA	27
FCC §15.247(a) (2) – 6 dB EMISSION BANDWIDTH.....	64
APPLICABLE STANDARD	64
TEST PROCEDURE	64
TEST DATA	64
FCC §15.247(b) (3) - MAXIMUM CONDUCTED OUTPUT POWER.....	75
APPLICABLE STANDARD	75
TEST PROCEDURE	75
TEST DATA	76

FCC §15.247(d) – BAND EDGE.....	80
APPLICABLE STANDARD	80
TEST PROCEDURE	80
TEST DATA	80
FCC §15.247(e) - POWER SPECTRAL DENSITY	87
APPLICABLE STANDARD	87
TEST PROCEDURE	87
TEST DATA	87

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Applicant:	Shanghai Sunmi Technology Co.,Ltd.
Product Type:	Handheld Wireless Terminal
Tested Model:	T8910
Power Supply:	DC 3.8V from battery and DC 5.0V from adapter
RF Function:	2.4G Wi-Fi, BLE(1Mbps), BLE(2Mbps)
Operating Band/Frequency:	2.4G Wi-Fi: 2412-2462 MHz(b/g/n20), 2422-2452 MHz(n40) BLE(1Mbps)/BLE(2Mbps): 2402-2480 MHz
Channel Number:	2.4G Wi-Fi: 11(b/g/n20), 7(n40) BLE(1Mbps)/BLE(2Mbps): 40
Channel Separation:	2.4G Wi-Fi: 5 MHz, BLE(1Mbps)/BLE(2Mbps): 2 MHz
Modulation Type:	2.4G Wi-Fi: OFDM,DSSS; BLE(1Mbps)/BLE(2Mbps): GFSK
Antenna Type:	2.4G Wi-Fi/BLE: FPC Antenna
*Maximum Antenna Gain:	2.4G Wi-Fi/BLE: 0.16 dBi

Adapter-1 Information:

Model: TPA-23A050200UU01

Input: AC100-240V 50/60Hz 0.3A

Output: DC5.0V, 2000mA

Adapter-2 Information:

Model: UC13US

Input: AC100-240V 50/60Hz 0.35A

Output:DC5.0V, 2A

Note: The Maximum Antenna Gain was declared by the manufacturer.

*All measurement and test data in this report was gathered from production sample serial number: RKSA201026002-1 (Assigned by BACL, Kunshan). The EUT supplied by the applicant was received on 2020-10-26.

Objective

This report is prepared on behalf of *Shanghai Sunmi Technology Co.,Ltd.* 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.

Related Submittal(s)/Grant(s)

FCC Part 15.247 DSS for BT3.0 submissions with FCC ID: 2AH25T8910
 FCC Part 15.247 DSS for RFID submissions with FCC ID: 2AH25T8910
 FCC Part 15.407 NII submissions with FCC ID: 2AH25T8910
 FCC Part 22H/24E/27/90 PCE submissions with FCC ID: 2AH25T8910
 FCC Part 15.225 DXX submissions with FCC ID: 2AH25T8910
 FCC Part 15B JBP submissions with FCC ID: 2AH25T8910

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 FCC KDB 558074 D01 15.247 Meas Guidance v05r02.

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

Measurement Uncertainty

Item		Uncertainty
AC Power Lines Conducted Emissions		3.19dB
RF conducted test with spectrum		0.9dB
RF Output Power with Power meter		0.5dB
Radiated emission	30MHz~1GHz	6.11dB
	1GHz~6GHz	4.45dB
	6GHz~18GHz	5.23dB
	18GHz~40GHz	5.65dB
Occupied Bandwidth		0.5kHz
Temperature		1.0°C
Humidity		6%

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Kunshan) to collect test data is located on the No.248 Chenghu Road, Kunshan, Jiangsu province, China.

Bay Area Compliance Laboratories Corp. (Kunshan) Lab is accredited to ISO/IEC 17025 by A2LA (Lab code: 4323.01), the FCC designation No. CN1185 under the FCC KDB 974614 D01 and CAB identifier CN0004 under the ISED requirement. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2014

SYSTEM TEST CONFIGURATION

Description of Test Configuration

Test channel list is as below:

For 802.11b, 802.11g and 802.11n-HT20 mode, EUT was tested with Channel 1, 6 and 11;

For 802.11n-HT40 mode, EUT was tested with Channel 3, 6 and 9;

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

For BLE mode, EUT was tested with channel 0, 19 and 39.

Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	20	2442
1	2404	...	...
...	...	...	...
...	...	...	...
18	2438	38	2478
19	2440	39	2480

Equipment Modifications

No modification was made to the EUT tested.

EUT Exercise Software

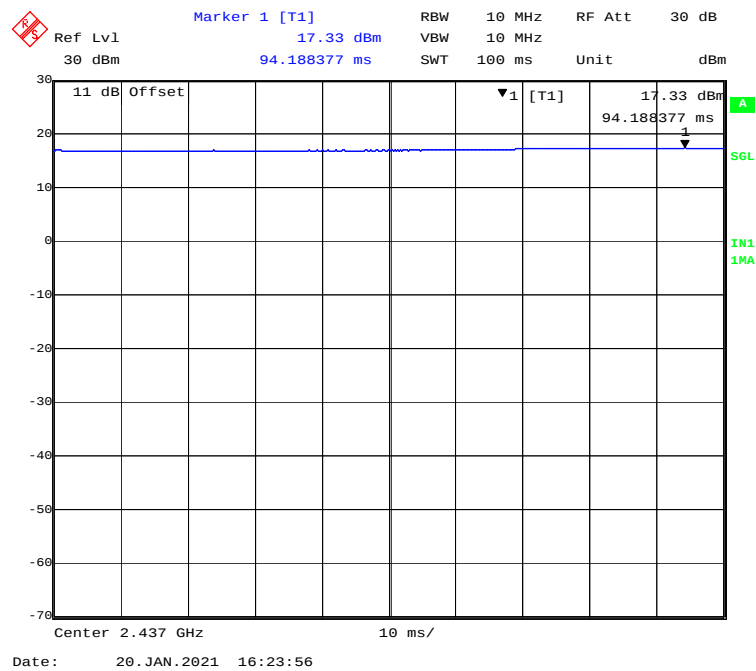
RF test software: The EUT tested in engineering mode.

Pre-scan with all the data rates, and the worst case was performed as below:

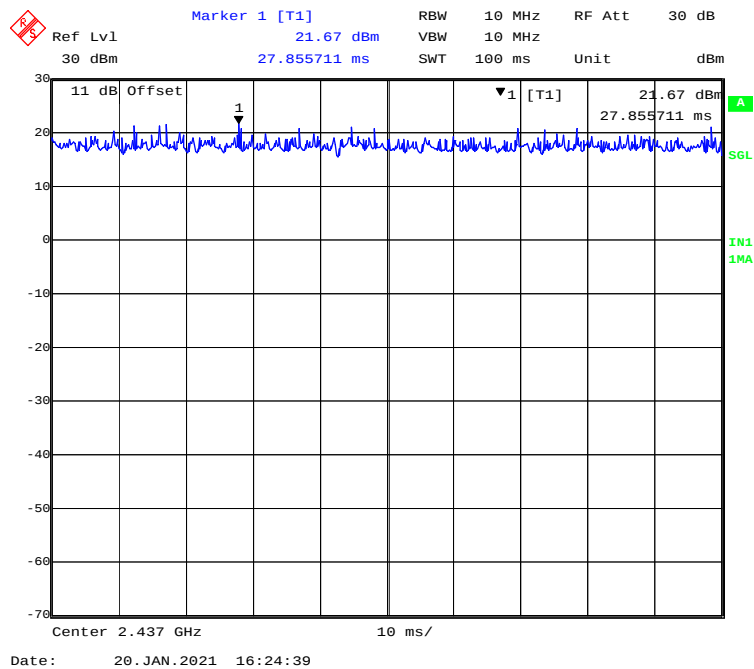
Mode	Data Rate	Power Level
802.11b	1Mbps	16
802.11g	6Mbps	16
802.11n-HT20	MCS0	16
802.11n-HT40	MCS0	16
BLE	1Mbps	Default
	2Mbps	Default

Duty Cycle:

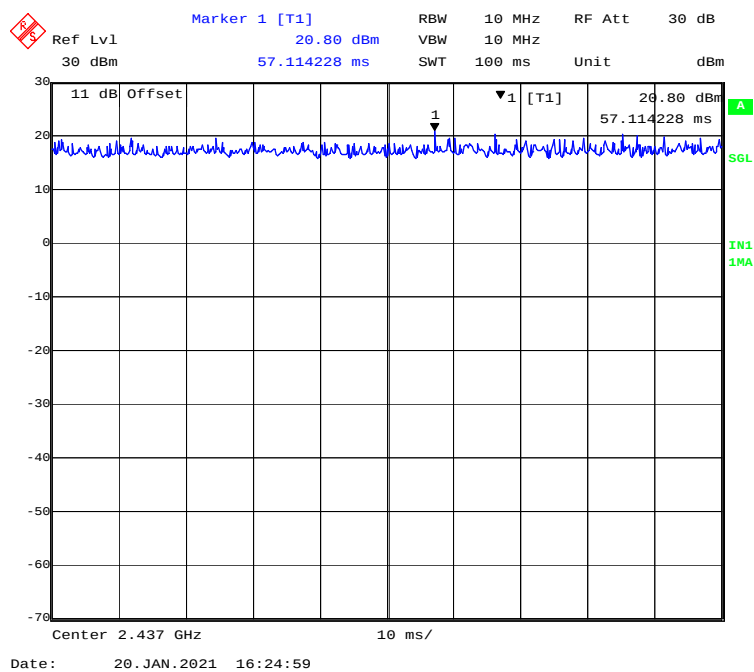
802.11b Mode Middle Channel

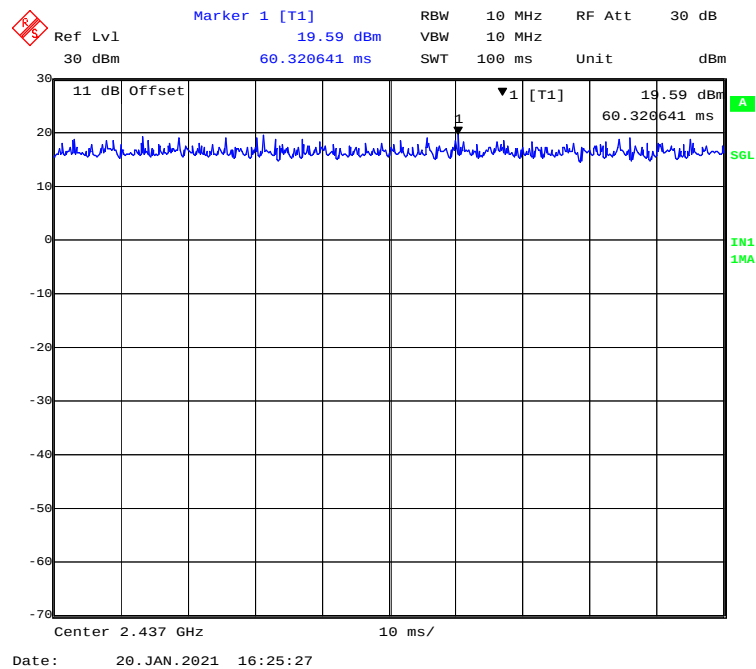
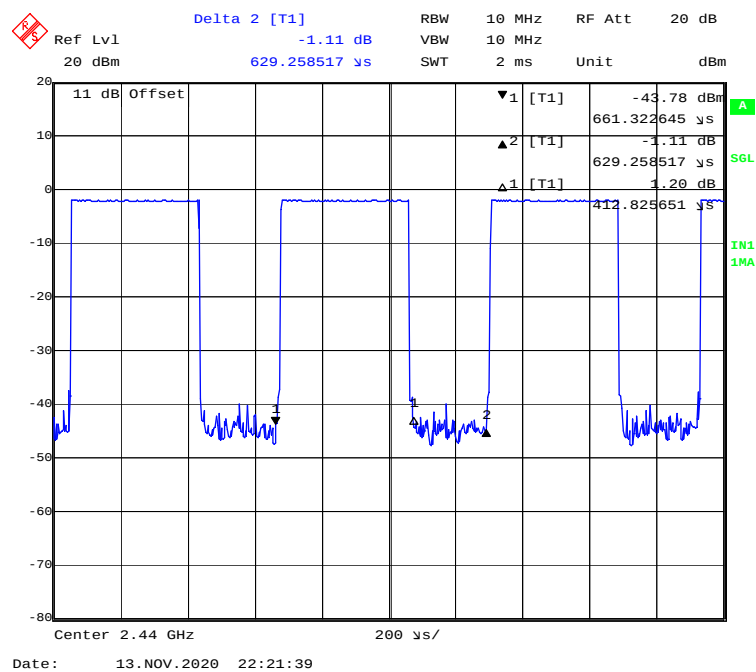


802.11g Mode Middle Channel

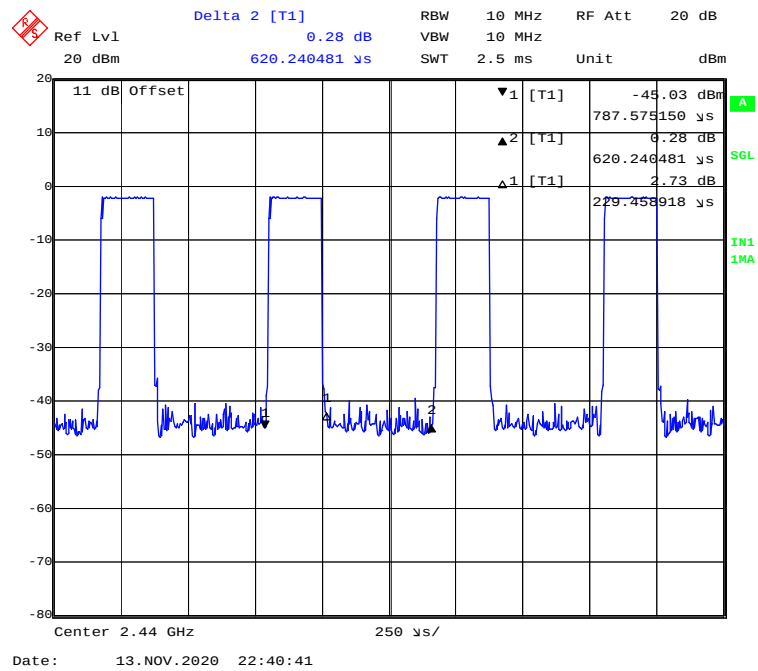


802.11n-HT20 Mode Middle Channel



802.11n-HT40 Mode Middle Channel**BLE(1Mbps) Mode Middle Channel**

BLE(2Mbps) Mode Middle Channel



Mode	Duty Cycle (%)	T(ms)	1/T(kHz)	10log(1/x)
802.11b	100.00	/	/	0.00
802.11g	100.00	/	/	0.00
802.11n-HT20	100.00	/	/	0.00
802.11n-HT40	100.00	/	/	0.00
BLE (1Mbps)	65.66	0.413	2.42	1.83
BLE (2Mbps)	36.94	0.229	4.37	4.33

Note: “x” means the Duty Cycle.

Support Equipment List and Details

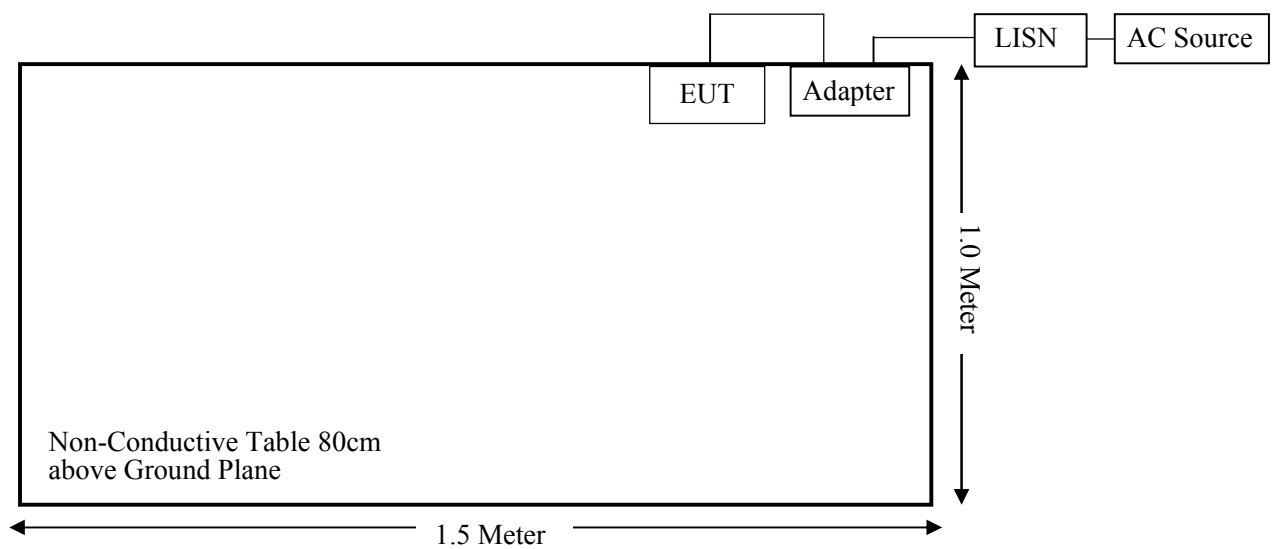
Manufacturer	Description	Model	Serial Number
/	/	/	/

External I/O Cable

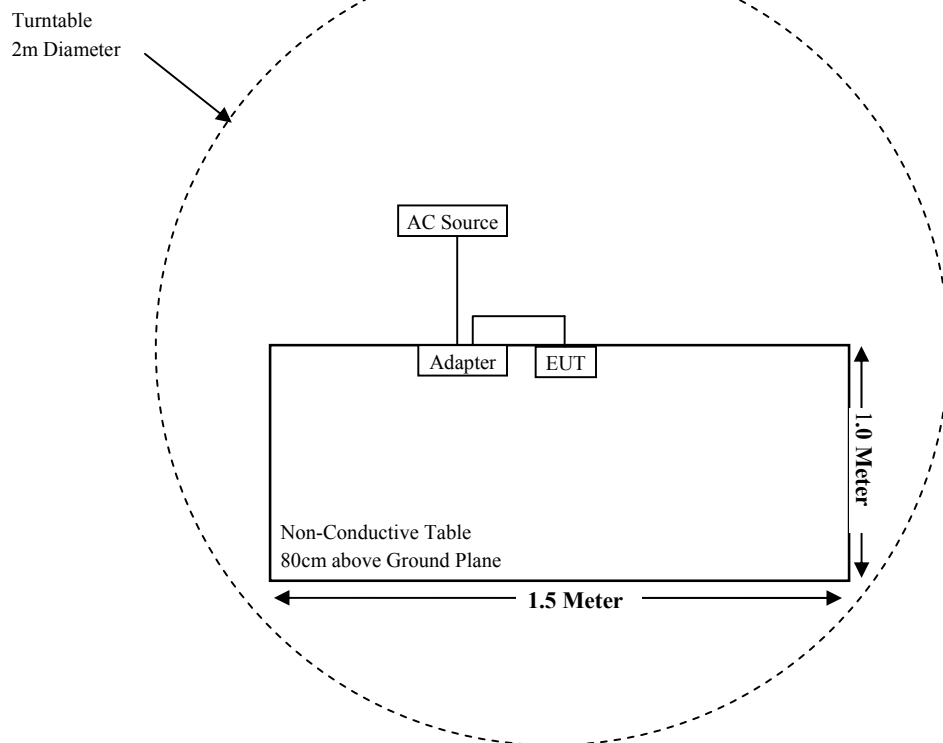
Cable Description	Length (m)	From Port	To
Power cable1	1.0	EUT	Adapter
Power cable2	1.0	Adapter	LISN/AC Source

Block Diagram of Test Setup

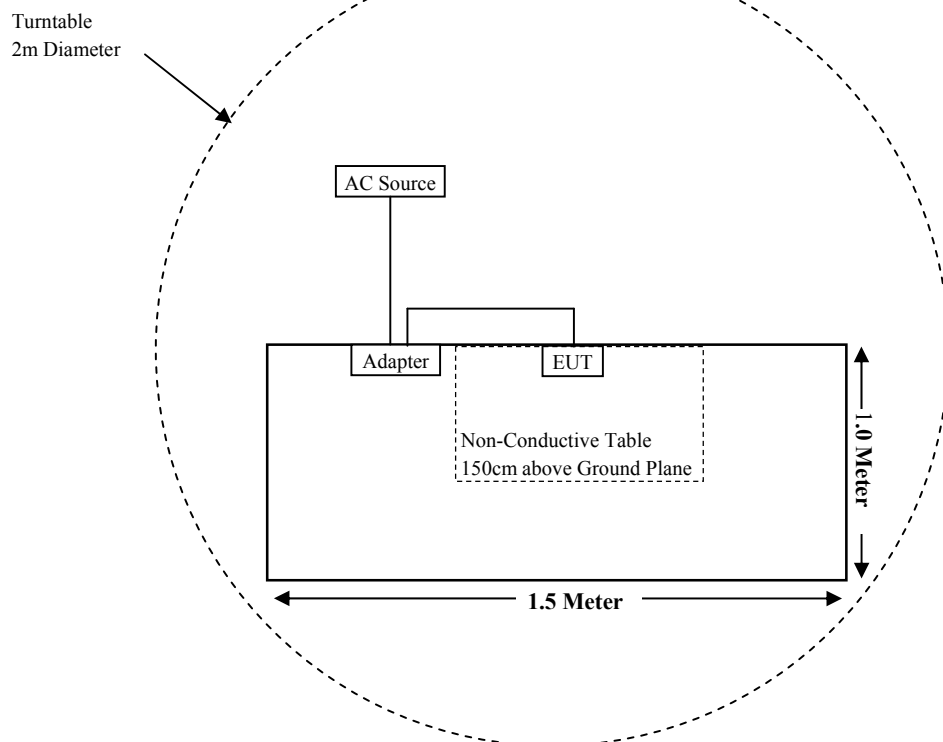
For Conducted Emissions:



For Radiated Emissions (Below 1GHz):



For Radiated Emissions (Above 1GHz):



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§1.1307(b)(1) & §2.1093	RF Exposure Information	Compliant
§15.203	Antenna Requirement	Compliant
§15.207 (a)	AC Line Conducted Emissions	Compliant
§15.247(d)	Spurious Emissions at Antenna Port	Compliant
§15.205, §15.209, §15.247(d)	Spurious Emissions	Compliant
§15.247 (a)(2)	6 dB Emission Bandwidth	Compliant
§15.247(b)(3)	Maximum Conducted Output Power	Compliant
§15.247(d)	Band Edge	Compliant
§15.247(e)	Power Spectral Density	Compliant

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiated Emission Test (Chamber 1#)					
Rohde & Schwarz	EMI Test Receiver	ESCI	100195	2019-12-14	2020-12-13
Rohde & Schwarz	EMI Test Receiver	ESCI	100195	2020-11-27	2021-11-26
Sunol Sciences	Hybrid Antenna	JB3	A090314-2	2020-01-07	2023-01-06
Sonoma Instrument	Pre-amplifier	310N	171205	2020-08-14	2021-08-13
Rohde & Schwarz	Auto test Software	EMC32	100361	/	/
MICRO-COAX	Coaxial Cable	Cable-8	008	2020-08-15	2021-08-14
MICRO-COAX	Coaxial Cable	Cable-9	009	2020-08-15	2021-08-14
MICRO-COAX	Coaxial Cable	Cable-10	010	2020-08-15	2021-08-14
Radiated Emission Test (Chamber 2#)					
Rohde & Schwarz	EMI Test Receiver	ESU40	100207	2020-04-01	2021-03-31
ETS	Horn Antenna	3115	9311-4159	2020-07-15	2023-07-14
ETS-LINDGREN	Horn Antenna	3116	2516	2020-01-07	2023-01-06
A.H.Systems,inc	Amplifier	PAM-0118P	512	2020-08-14	2021-08-13
EM Electronics Corporation	Amplifier	EM18G40G	060726	2020-03-22	2021-03-21
MICRO-TRONICS	Band Reject Filter	BRM50702	G024	2020-08-05	2021-08-04
Narda	Attenuator	10dB	010	2020-08-15	2021-08-14
Rohde & Schwarz	Auto test Software	EMC32	100361	/	/
MICRO-COAX	Coaxial Cable	Cable-4	004	2020-08-15	2021-08-14
MICRO-COAX	Coaxial Cable	Cable-5	005	2020-08-15	2021-08-14
RF Conducted Test					
Rohde & Schwarz	EMI Test Receiver	ESIB26	100146	2019-12-14	2020-12-13
Rohde & Schwarz	EMI Test Receiver	ESIB26	100146	2020-11-27	2021-11-26
Narda	Attenuator	10dB	010	2020-08-15	2021-08-14
Agilent	Power Meter	N1912A	MY5000492	2019-11-18	2020-11-17
Agilent	Power Sensor	N1921A	MY54210024	2019-11-18	2020-11-17
Sunmi	RF Cable	Sunmi C01	C01	Each Time	/
Conducted Emission Test					
Rohde & Schwarz	EMI Test Receiver	ESR	1316.3003K03-101746-zn	2020-07-28	2021-07-27
Rohde & Schwarz	LISN	ENV216	101115	2019-12-14	2020-12-13
Audix	Test Software	e3	V9	--	--
Rohde & Schwarz	Pulse limiter	ESH3-Z2	100552	2020-08-10	2021-08-09
MICRO-COAX	Coaxial Cable	Cable-15	015	2020-08-15	2021-08-14

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Kunshan) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

FCC §1.1307(b) & §2.1093 - RF EXPOSURE INFORMATION

Applicable Standard

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

According to KDB447498 D01 General RF Exposure Guidance v06:

The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:

$[(\text{max. power of channel, including tune-up tolerance, mW})/(\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}] \leq 3.0$ for 1-g SAR and ≤ 7.5 for 10-g extremity SAR, where

- $f(\text{GHz})$ is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation
- The result is rounded to one decimal place for comparison
- 3.0 and 7.5 are referred to as the numeric thresholds in the step 2 below

The test exclusions are applicable only when the minimum test separation distance is ≤ 50 mm and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is < 5 mm, a distance of 5 mm according to 5) in section 4.1 is applied to determine SAR test exclusion.

Test Result

For Wi-Fi:

Compliant, please refer to the SAR report: RKSA201026002-20B

For BLE:

For worst case:

Mode	Frequency Range (MHz)	Max Tune-up Conducted Power		Calculated Distance (mm)	Calculated Value	Threshold (1-g SAR)	SAR Test Exclusion
		(dBm)	(mW)				
BLE(1Mbps)	2402-2480	-1.0	0.79	5.0	0.2	3.0	Yes
BLE(2Mbps)	2402-2480	-1.0	0.79	5.0	0.2	3.0	Yes

Result: So the standalone SAR evaluation is not necessary.

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 an FPC antenna for 2.4G Wi-Fi and BLE which the antenna gain is 0.16 dBi, fulfill the requirement of this section. Please refer to the EUT photos.

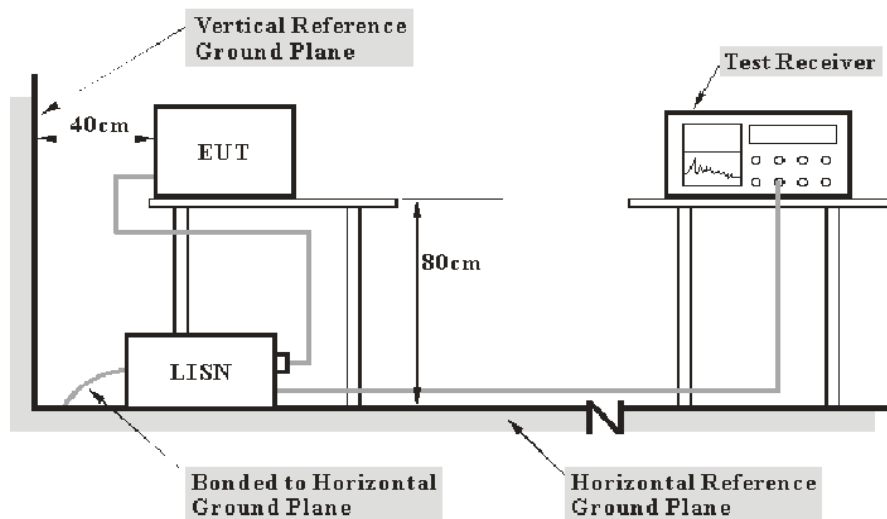
Result: Compliant.

FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS

Applicable Standard

FCC §15.207(a)

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 measurement procedure of EUT setup is according with ANSI C63.10-2013. The related limit was specified in FCC Part 15.207.

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

ANSI C63.10-2013 clause 6.2

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.

Factor & Over Limit Calculation

The Factor is calculated by adding LISN VDF (Voltage Division Factor), Cable Loss and Attenuator. The basic equation is as follows:

$$\text{Factor (dB)} = \text{LISN VDF (dB)} + \text{Cable Loss (dB)} + \text{Attenuator (dB)}$$

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

$$\text{Over Limit (dB)} = \text{Read level (dB}\mu\text{V)} + \text{Factor (dB)} - \text{Limit (dB}\mu\text{V)}$$

Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Part 15.207.

Test Data

Environmental Conditions

Temperature:	24.6~25 °C
Relative Humidity:	49~50 %
ATM Pressure:	101.2~101.5 kPa

The testing was performed by CK Huang from 2020-11-24 to 2020-11-30.

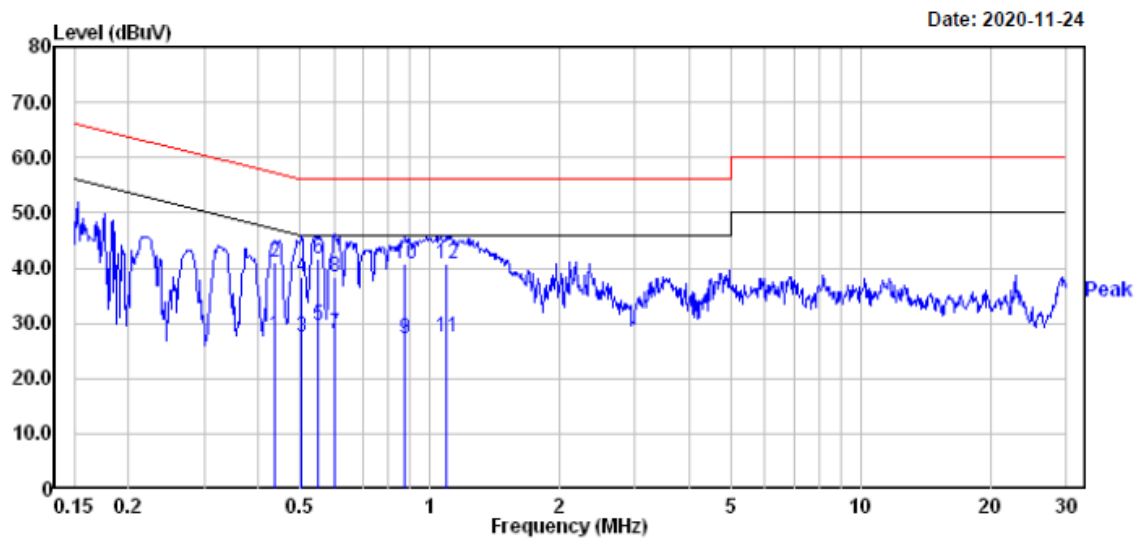
Test Result: Compliant.

Note: Both Adapter1 and Adapter2 have been tested, the worst Adapter1 data were recorded in this report.

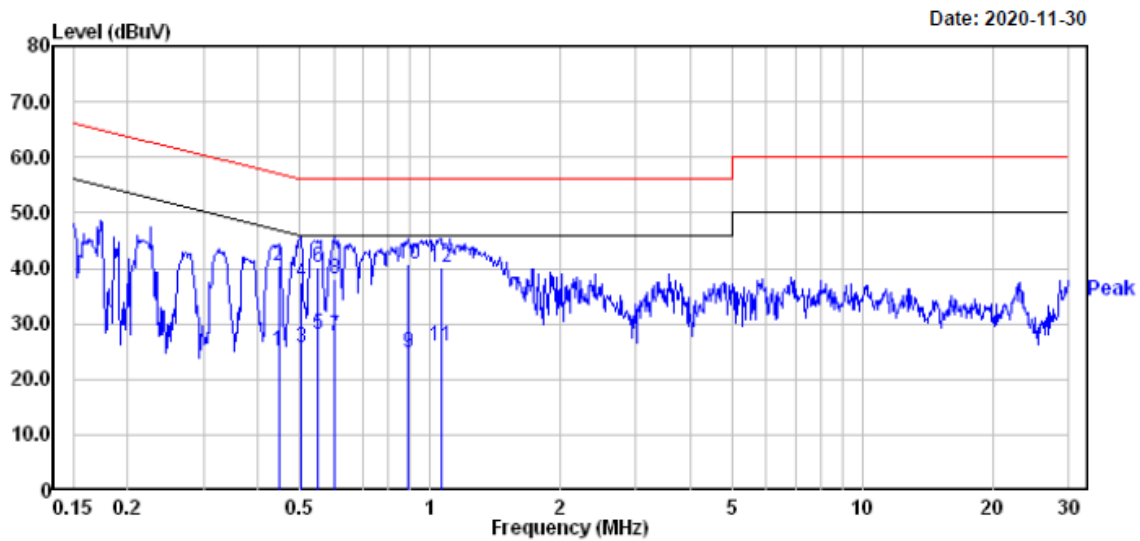
For Wi-Fi Mode:

EUT operation mode: Transmitting in 802.11n-HT40 mode high channel (worst case)

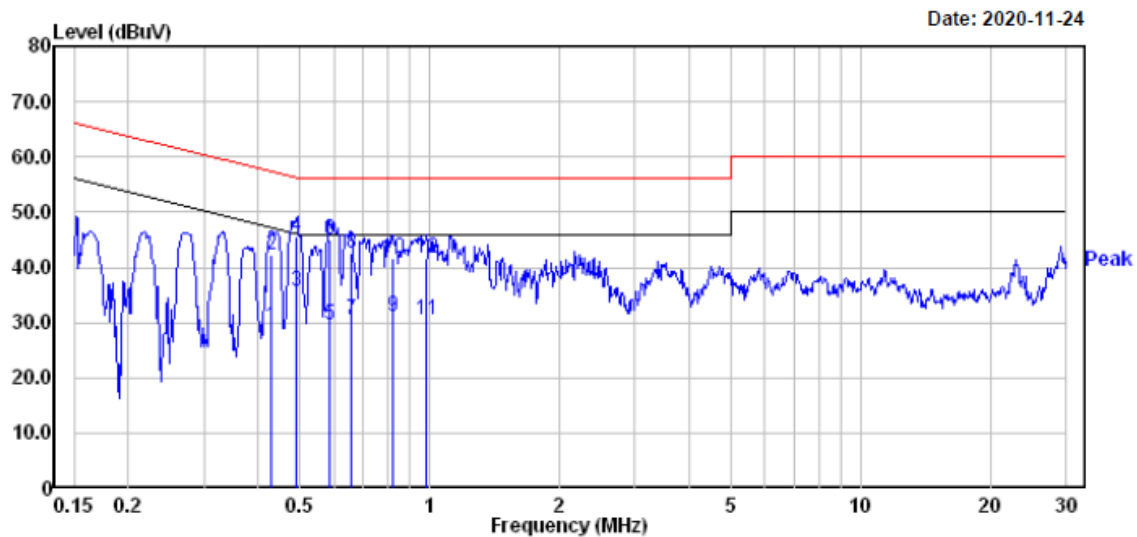
AC 120V/60 Hz, Line



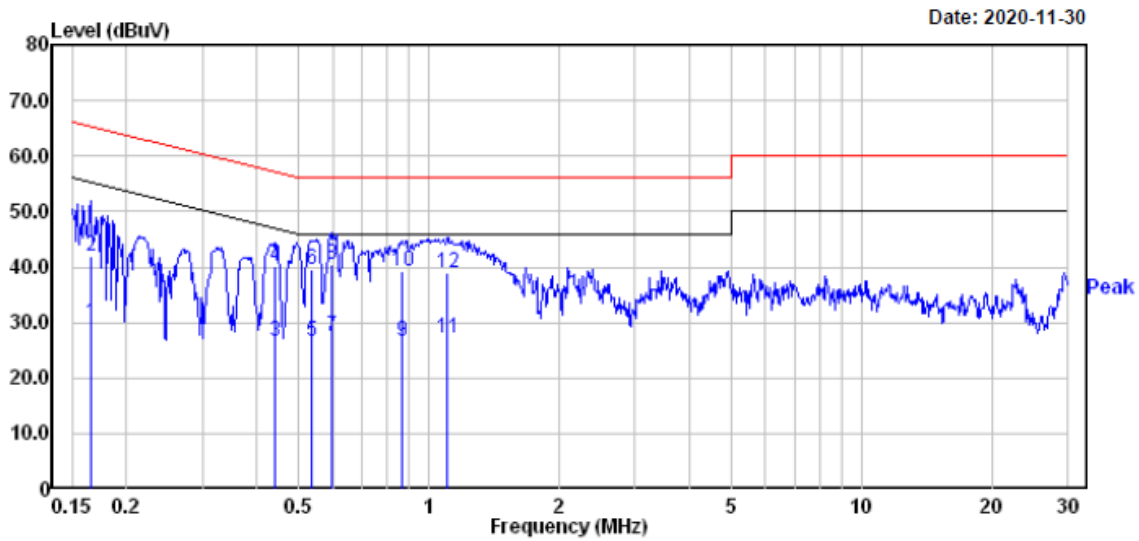
	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBUV	dB	dBUV	dBUV	dB	
1	0.437	7.90	19.75	27.65	47.11	-19.46	Average
2	0.437	21.20	19.75	40.95	57.11	-16.16	QP
3	0.505	7.80	19.76	27.56	46.00	-18.44	Average
4	0.505	18.50	19.76	38.26	56.00	-17.74	QP
5	0.552	9.90	19.75	29.65	46.00	-16.35	Average
6	0.552	22.00	19.75	41.75	56.00	-14.25	QP
7	0.601	8.40	19.75	28.15	46.00	-17.85	Average
8	0.601	18.60	19.75	38.35	56.00	-17.65	QP
9	0.876	7.59	19.73	27.32	46.00	-18.68	Average
10	0.876	20.99	19.73	40.72	56.00	-15.28	QP
11	1.094	7.60	19.82	27.42	46.00	-18.58	Average
12	1.094	20.90	19.82	40.72	56.00	-15.28	QP

AC 120V/60 Hz, Neutral

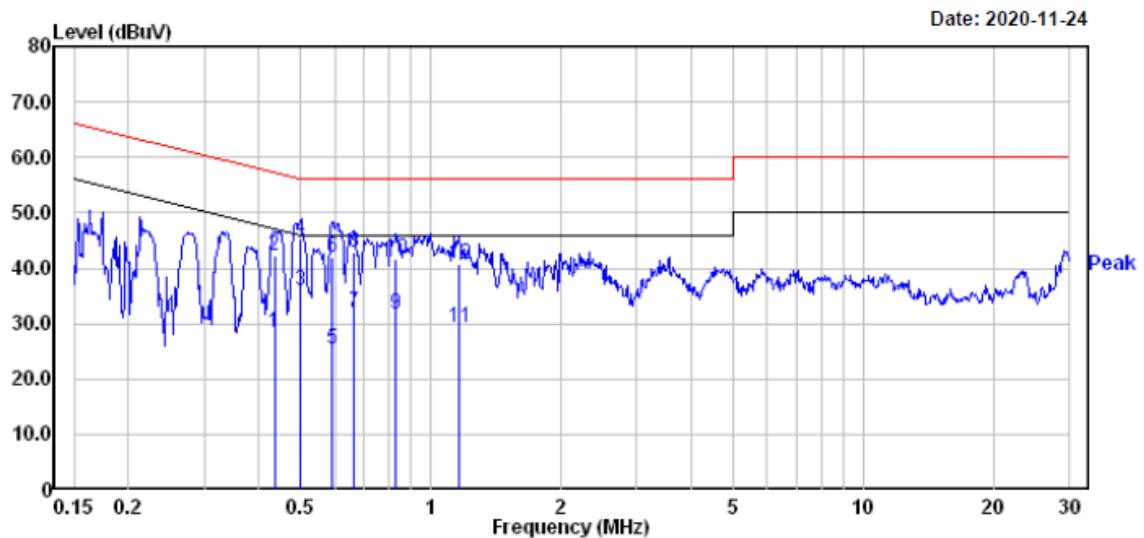
	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	
1	0.447	5.40	19.75	25.15	46.93	-21.78	Average
2	0.447	20.70	19.75	40.45	56.93	-16.48	QP
3	0.502	5.80	19.76	25.56	46.00	-20.44	Average
4	0.502	17.80	19.76	37.56	56.00	-18.44	QP
5	0.552	8.40	19.75	28.15	46.00	-17.85	Average
6	0.552	20.50	19.75	40.25	56.00	-15.75	QP
7	0.601	7.90	19.75	27.65	46.00	-18.35	Average
8	0.601	18.30	19.75	38.05	56.00	-17.95	QP
9	0.894	5.00	19.73	24.73	46.00	-21.27	Average
10	0.894	21.00	19.73	40.73	56.00	-15.27	QP
11	1.060	6.10	19.82	25.92	46.00	-20.08	Average
12	1.060	20.40	19.82	40.22	56.00	-15.78	QP

For BLE Mode:**Data rate: 1Mbps***EUT operation mode: Transmitting in low channel (worst case)***AC 120V/60 Hz, Line**

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	
1	0.431	9.50	19.75	29.25	47.24	-17.99	Average
2	0.431	22.40	19.75	42.15	57.24	-15.09	QP
3	0.492	16.00	19.76	35.76	46.14	-10.38	Average
4	0.492	25.80	19.76	45.56	56.14	-10.58	QP
5	0.585	9.70	19.75	29.45	46.00	-16.55	Average
6	0.585	25.30	19.75	45.05	56.00	-10.95	QP
7	0.658	10.80	19.75	30.55	46.00	-15.45	Average
8	0.658	22.70	19.75	42.45	56.00	-13.55	QP
9	0.822	11.51	19.70	31.21	46.00	-14.79	Average
10	0.822	21.81	19.70	41.51	56.00	-14.49	QP
11	0.984	10.80	19.81	30.61	46.00	-15.39	Average
12	0.984	22.00	19.81	41.81	56.00	-14.19	QP

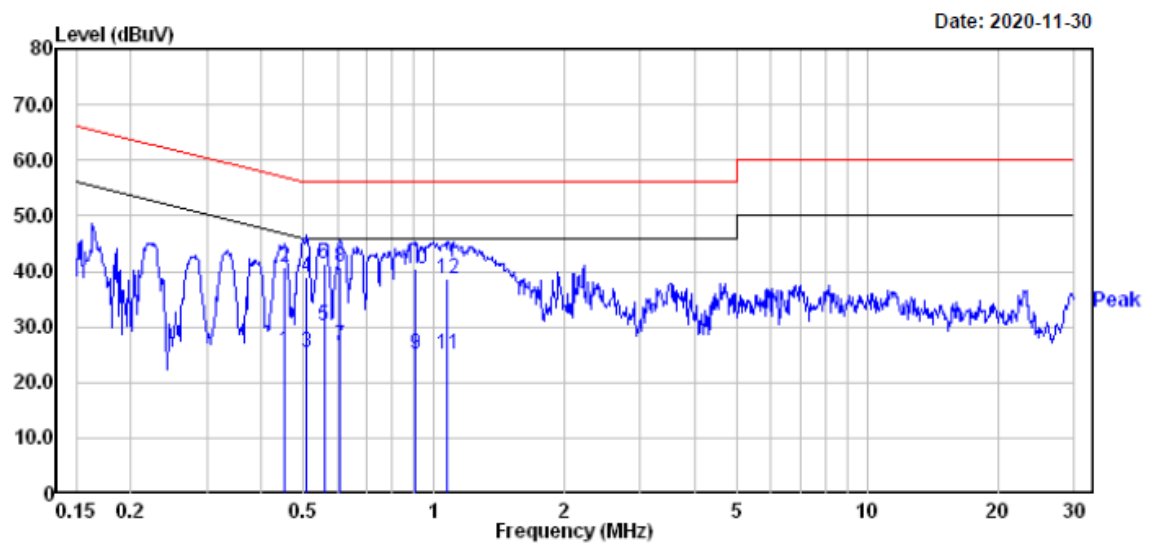
AC 120V/60 Hz, Neutral

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	
1	0.165	10.10	19.83	29.93	55.21	-25.28	Average
2	0.165	22.10	19.83	41.93	65.21	-23.28	QP
3	0.442	6.70	19.75	26.45	47.02	-20.57	Average
4	0.442	20.30	19.75	40.05	57.02	-16.97	QP
5	0.538	6.71	19.75	26.46	46.00	-19.54	Average
6	0.538	19.91	19.75	39.66	56.00	-16.34	QP
7	0.595	7.70	19.75	27.45	46.00	-18.55	Average
8	0.595	20.70	19.75	40.45	56.00	-15.55	QP
9	0.866	6.90	19.72	26.62	46.00	-19.38	Average
10	0.866	19.40	19.72	39.12	56.00	-16.88	QP
11	1.106	7.51	19.81	27.32	46.00	-18.68	Average
12	1.106	19.01	19.81	38.82	56.00	-17.18	QP

Data rate: 2Mbps*EUT operation mode: Transmitting in low channel (worst case)***AC 120V/60 Hz, Line**

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	
1	0.435	8.70	19.75	28.45	47.15	-18.70	Average
2	0.435	22.50	19.75	42.25	57.15	-14.90	QP
3	0.499	16.30	19.76	36.06	46.01	-9.95	Average
4	0.499	25.40	19.76	45.16	56.01	-10.85	QP
5	0.592	5.70	19.75	25.45	46.00	-20.55	Average
6	0.592	22.10	19.75	41.85	56.00	-14.15	QP
7	0.665	12.10	19.75	31.85	46.00	-14.15	Average
8	0.665	23.20	19.75	42.95	56.00	-13.05	QP
9	0.830	12.00	19.71	31.71	46.00	-14.29	Average
10	0.830	21.80	19.71	41.51	56.00	-14.49	QP
11	1.166	9.40	19.81	29.21	46.00	-16.79	Average
12	1.166	21.00	19.81	40.81	56.00	-15.19	QP

AC 120V/60 Hz, Neutral



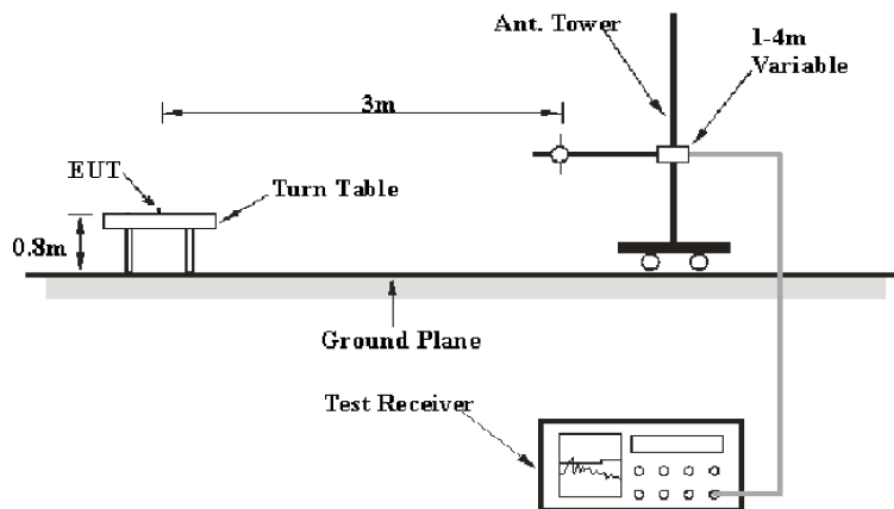
	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	
1	0.454	5.90	19.75	25.65	46.80	-21.15	Average
2	0.454	21.10	19.75	40.85	56.80	-15.95	QP
3	0.510	5.70	19.76	25.46	46.00	-20.54	Average
4	0.510	19.20	19.76	38.96	56.00	-17.04	QP
5	0.558	10.30	19.75	30.05	46.00	-15.95	Average
6	0.558	21.70	19.75	41.45	56.00	-14.55	QP
7	0.608	6.70	19.75	26.45	46.00	-19.55	Average
8	0.608	20.90	19.75	40.65	56.00	-15.35	QP
9	0.909	5.30	19.74	25.04	46.00	-20.96	Average
10	0.909	20.60	19.74	40.34	56.00	-15.66	QP
11	1.077	5.20	19.82	25.02	46.00	-20.98	Average
12	1.077	18.90	19.82	38.72	56.00	-17.28	QP

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

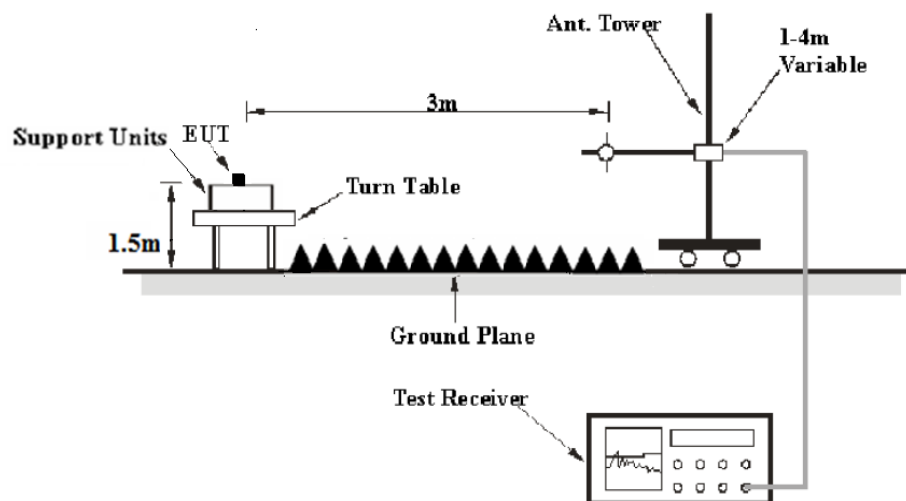
FCC §15.247 (d); §15.209; §15.205;

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 Setup

The system was investigated from 30 MHz to 25 GHz.

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

Frequency Range	RBW	Video B/W	IF B/W	Detector
30 MHz – 1000 MHz	120 kHz	300 kHz	120 kHz	QP
Above 1GHz	1MHz	3 MHz	/	PK
	1MHz	3 MHz	/	Ave.

Test Procedure

According to ANSI C63.10-2013 clause 6.5, 6.6 and 6.7.

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 (dB μ V/m) = Meter Reading (dB μ V) + Antenna Factor (dB/m) + Cable Loss (dB) - Amplifier Gain (dB)

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 (dB) = Limit (dB μ V/m) - Corrected Amplitude (dB μ V/m)

Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Title 47, Part 15, Subpart C, section 15.205, 15.209 and 15.247.

Test Data**Environmental Conditions**

Temperature:	24.1~25.5 °C
Relative Humidity:	50~52 %
ATM Pressure:	101.1~101.5 kPa

The testing was performed by CK Huang from 2020-11-13 to 2021-01-25.

Test Result: Compliant.

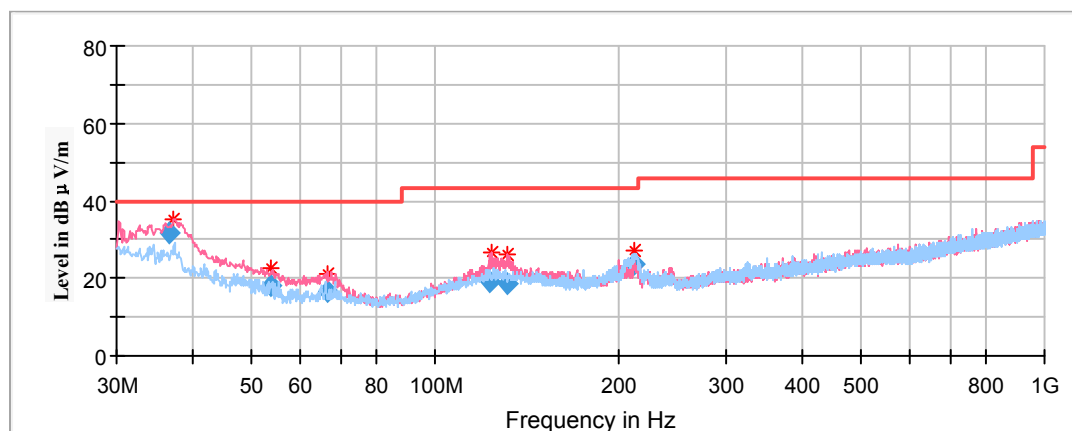
EUT operation mode: Transmitting

Note: Both Adapter1 and Adapter2 have been tested, the worst Adapter1 data were recorded in this report.

For Wi-Fi Mode:

Spurious Emission Test:**30MHz-1GHz:**

Pre-Scan with 802.11b, 802.11g, 802.11n-HT20 and 802.11n-HT40 modes of operation in the X,Y and Z axes of orientation, the worst case **high channel of 802.11n-HT20 Mode in Y-axis of orientation** was recorded



Frequency (MHz)	Corrected Amplitude	Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
	Quasi-peak (dBμV/m)	Height (cm)	Polar (H/V)				
36.590400	31.48	100.0	V	187.0	-9.0	40.00	8.52
53.626800	18.19	100.0	V	143.0	-18.0	40.00	21.81
66.483100	16.36	100.0	V	187.0	-17.4	40.00	23.64
123.203150	19.08	100.0	V	136.0	-11.5	43.50	24.42
130.973800	18.38	100.0	V	306.0	-11.5	43.50	25.12
212.756450	23.52	200.0	H	287.0	-12.7	43.50	19.98

1GHz-18GHz:**802.11b Mode:**

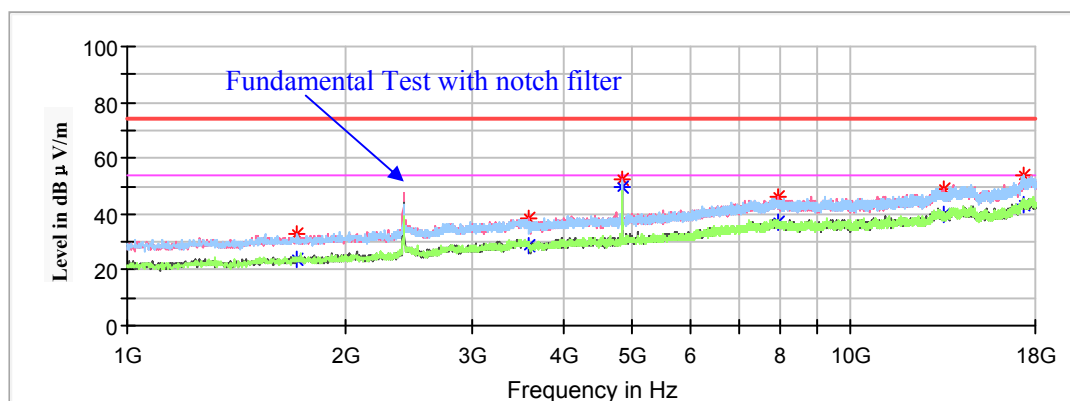
(Pre-scan in the X,Y and Z axes of orientation, the worst case **Y-axis of orientation** was recorded)

Note:

1. This test was performed with the 2.4-2.5GHz notch filter.
2. Corrected Factor (dB/m) = Antenna factor (RX) (dB/m) + Cable Loss (dB) – Amplifier Factor (dB)
 Corrected Amplitude (dBμV/m) = Corrected Factor (dB/m) + Reading (dBμV)
 Margin (dB) = Limit (dBμV/m) – Corrected Amplitude (dBμV/m)

Low Channel: 2412MHz

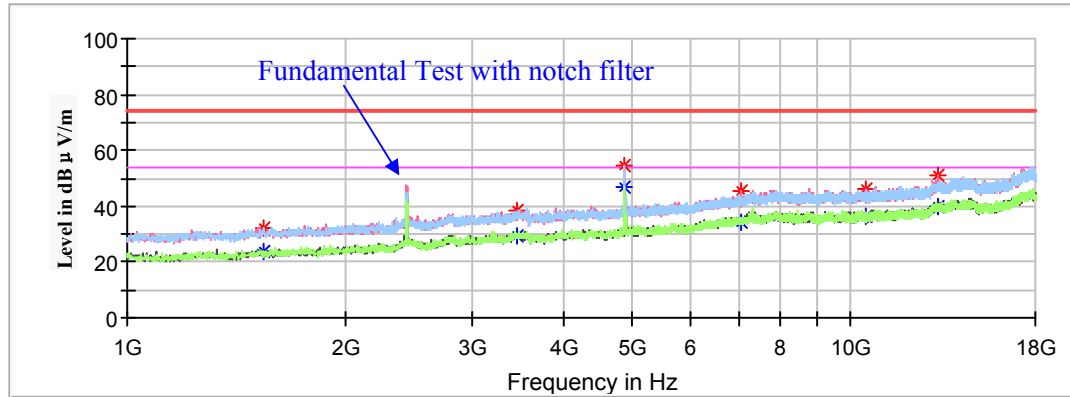
Full Spectrum



Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
	MaxPeak (dBμV/m)	Average (dBμV/m)	Height (cm)	Polar (H/V)				
1719.100000	33.04	---	150.0	H	349.0	-15.5	74.00	40.96
1719.100000	---	23.85	150.0	H	349.0	-15.5	54.00	30.15
3597.600000	---	28.85	150.0	V	0.0	-8.5	54.00	25.15
3597.600000	38.79	---	150.0	V	0.0	-8.5	74.00	35.21
4824.000000	---	49.46	150.0	V	45.0	-5.5	54.00	4.54
4824.000000	52.34	---	150.0	V	45.0	-5.5	74.00	21.66
7917.300000	---	36.94	150.0	V	10.0	1.7	54.00	17.06
7917.300000	46.29	---	150.0	V	10.0	1.7	74.00	27.71
13425.300000	---	39.69	150.0	V	84.0	5.6	54.00	14.31
13425.300000	49.28	---	150.0	V	84.0	5.6	74.00	24.72
17340.400000	---	43.36	200.0	H	5.0	8.3	54.00	10.64
17340.400000	53.93	---	200.0	H	5.0	8.3	74.00	20.07

Middle Channel: 2437MHz

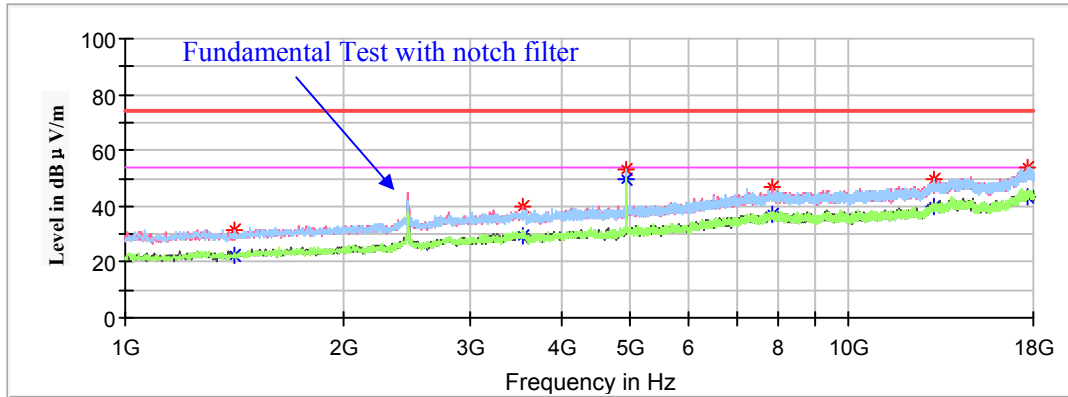
Full Spectrum



Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
	MaxPeak (dBμV/m)	Average (dBμV/m)	Height (cm)	Polar (H/V)				
1545.700000	---	24.05	200.0	H	245.0	-16.2	54.00	29.95
1545.700000	32.34	---	200.0	H	245.0	-16.2	74.00	41.66
3466.700000	---	29.64	200.0	V	89.0	-8.9	54.00	24.36
3466.700000	38.57	---	200.0	V	89.0	-8.9	74.00	35.43
4874.000000	---	47.12	200.0	H	327.0	-5.4	54.00	6.88
4874.000000	54.82	---	200.0	H	327.0	-5.4	74.00	19.18
7065.600000	---	34.61	200.0	V	203.0	0.1	54.00	19.39
7065.600000	45.25	---	200.0	V	203.0	0.1	74.00	28.75
10467.300000	---	36.29	200.0	H	350.0	2.3	54.00	17.71
10467.300000	46.45	---	200.0	H	350.0	2.3	74.00	27.55
13211.100000	---	39.64	150.0	H	160.0	5.4	54.00	14.36
13211.100000	50.97	---	150.0	H	160.0	5.4	74.00	23.03

High Channel: 2462MHz

Full Spectrum



Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
	MaxPeak (dBμV/m)	Average (dBμV/m)	Height (cm)	Polar (H/V)				
1418.200000	31.71	---	150.0	H	335.0	-16.8	74.00	42.29
1418.200000	---	22.26	150.0	H	335.0	-16.8	54.00	31.74
3544.900000	---	29.71	200.0	V	172.0	-8.7	54.00	24.29
3544.900000	39.77	---	200.0	V	172.0	-8.7	74.00	34.23
4924.000000	---	49.36	200.0	H	322.0	-5.3	54.00	4.64
4924.000000	53.03	---	200.0	H	322.0	-5.3	74.00	20.97
7842.500000	46.67	---	200.0	V	331.0	1.6	74.00	27.33
7842.500000	---	36.77	200.0	V	331.0	1.6	54.00	17.23
13138.000000	---	39.61	200.0	H	354.0	5.3	54.00	14.39
13138.000000	49.35	---	200.0	H	354.0	5.3	74.00	24.65
17631.100000	---	43.05	150.0	H	97.0	8.9	54.00	10.95
17631.100000	54.03	---	150.0	H	97.0	8.9	74.00	19.97

802.11g Mode:

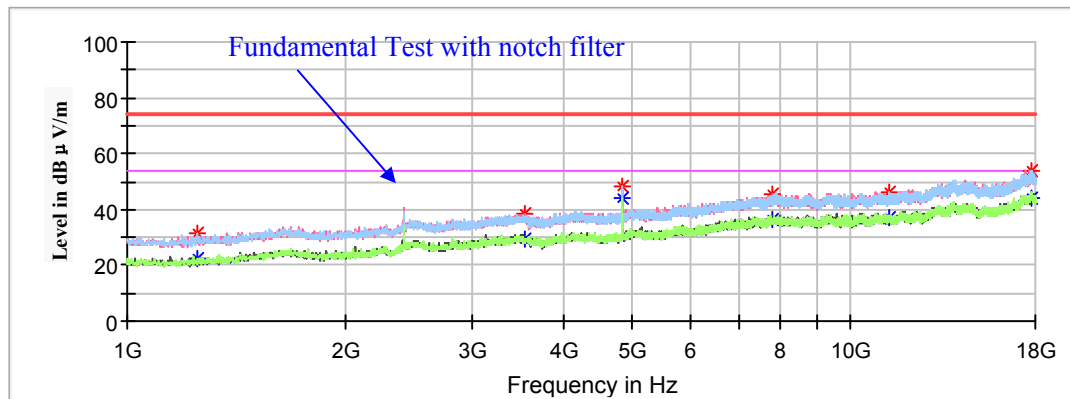
(Pre-scan in the X,Y and Z axes of orientation, the worst case **Y-axis of orientation** was recorded)

Note:

1. This test was performed with the 2.4-2.5GHz notch filter.
2. Corrected Factor (dB/m) = Antenna factor (RX) (dB/m) + Cable Loss (dB) – Amplifier Factor (dB)
 Corrected Amplitude (dBμV/m) = Corrected Factor (dB/m) + Reading (dBμV)
 Margin (dB) = Limit (dBμV/m) – Corrected Amplitude (dBμV/m)

Low Channel: 2412MHz

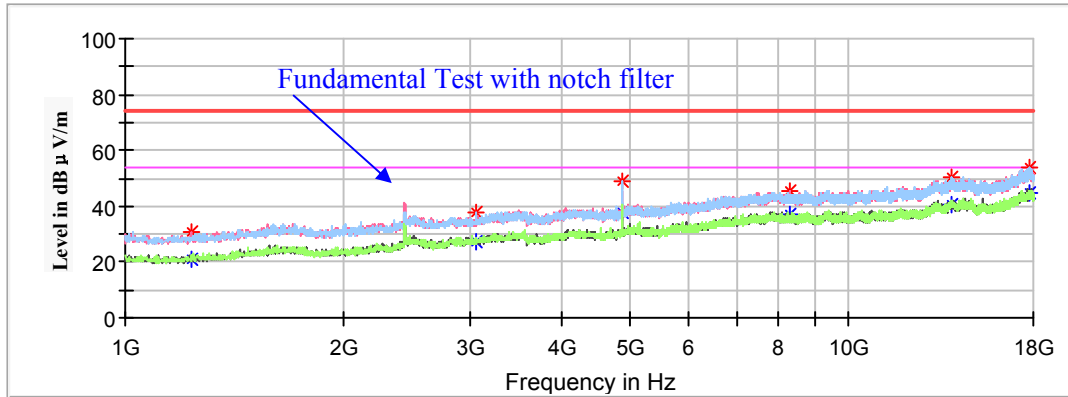
Full Spectrum



Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
	MaxPeak (dBμV/m)	Average (dBμV/m)	Height (cm)	Polar (H/V)				
1246.500000	31.29	---	150.0	H	123.0	-17.7	74.00	42.71
1246.500000	---	22.29	150.0	H	123.0	-17.7	54.00	31.71
3539.800000	---	29.19	150.0	V	0.0	-8.7	54.00	24.81
3539.800000	38.80	---	150.0	V	0.0	-8.7	74.00	35.20
4824.000000	---	44.21	150.0	H	336.0	-5.5	54.00	9.79
4824.000000	48.20	---	150.0	H	336.0	-5.5	74.00	25.80
7800.000000	---	36.39	150.0	V	173.0	1.5	54.00	17.61
7800.000000	45.69	---	150.0	V	173.0	1.5	74.00	28.31
11279.900000	---	37.34	200.0	H	15.0	2.8	54.00	16.66
11279.900000	46.01	---	200.0	H	15.0	2.8	74.00	27.99
17745.000000	---	44.14	200.0	H	257.0	8.8	54.00	9.86
17745.000000	54.10	---	200.0	H	257.0	8.8	74.00	19.90

Middle Channel: 2437MHz

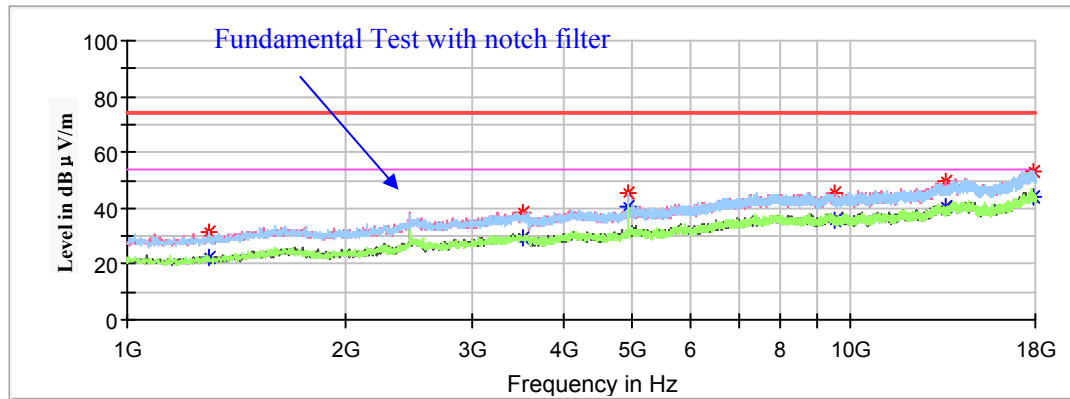
Full Spectrum



Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
	MaxPeak (dBμV/m)	Average (dBμV/m)	Height (cm)	Polar (H/V)				
1231.200000	30.54	---	200.0	V	292.0	-17.8	74.00	43.46
1231.200000	---	20.67	200.0	V	292.0	-17.8	54.00	33.33
3060.400000	38.03	---	200.0	H	194.0	-9.9	74.00	35.97
3060.400000	---	27.01	200.0	H	194.0	-9.9	54.00	26.99
4874.000000	48.61	---	200.0	H	321.0	-5.4	74.00	25.39
4874.000000	---	37.67	200.0	H	321.0	-5.4	54.00	16.33
8289.600000	45.52	---	150.0	V	0.0	1.5	74.00	28.48
8289.600000	---	37.39	150.0	V	0.0	1.5	54.00	16.61
13855.400000	50.49	---	150.0	H	136.0	6.0	74.00	23.51
13855.400000	---	40.49	150.0	H	136.0	6.0	54.00	13.51
17818.100000	---	45.07	150.0	H	124.0	8.8	54.00	8.93
17818.100000	53.76	---	150.0	H	124.0	8.8	74.00	20.24

High Channel: 2462MHz

Full Spectrum



Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
	MaxPeak (dBμV/m)	Average (dBμV/m)	Height (cm)	Polar (H/V)				
1295.800000	31.65	---	200.0	H	354.0	-17.5	74.00	42.35
1295.800000	---	22.31	200.0	H	354.0	-17.5	54.00	31.69
3519.400000	---	29.57	150.0	V	91.0	-8.7	54.00	24.43
3519.400000	38.64	---	150.0	V	91.0	-8.7	74.00	35.36
4924.000000	45.39	---	150.0	H	345.0	-5.3	74.00	28.61
4924.000000	---	40.48	150.0	H	345.0	-5.3	54.00	13.52
9486.400000	---	35.56	200.0	H	207.0	2.1	54.00	18.44
9486.400000	45.55	---	200.0	H	207.0	2.1	74.00	28.45
13554.500000	49.57	---	150.0	V	208.0	5.7	74.00	24.43
13554.500000	---	40.38	150.0	V	208.0	5.7	54.00	13.62
17909.900000	---	43.75	150.0	V	327.0	8.8	54.00	10.25
17909.900000	53.46	---	150.0	V	327.0	8.8	74.00	20.54

802.11n-HT20 Mode:

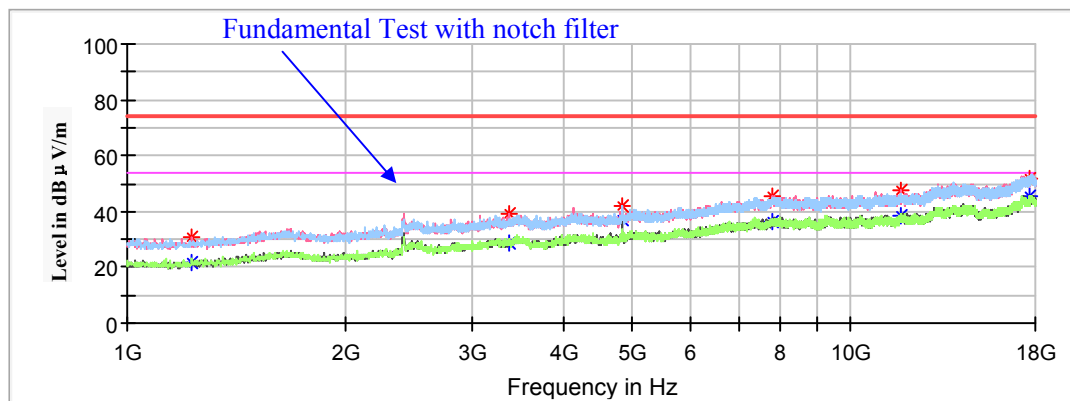
(Pre-scan in the X,Y and Z axes of orientation, the worst case **Y-axis of orientation** was recorded)

Note:

1. This test was performed with the 2.4-2.5GHz notch filter.
2. Corrected Factor (dB/m) = Antenna factor (RX) (dB/m) + Cable Loss (dB) – Amplifier Factor (dB)
 Corrected Amplitude (dBμV/m) = Corrected Factor (dB/m) + Reading (dBμV)
 Margin (dB) = Limit (dBμV/m) – Corrected Amplitude (dBμV/m)

Low Channel : 2412MHz

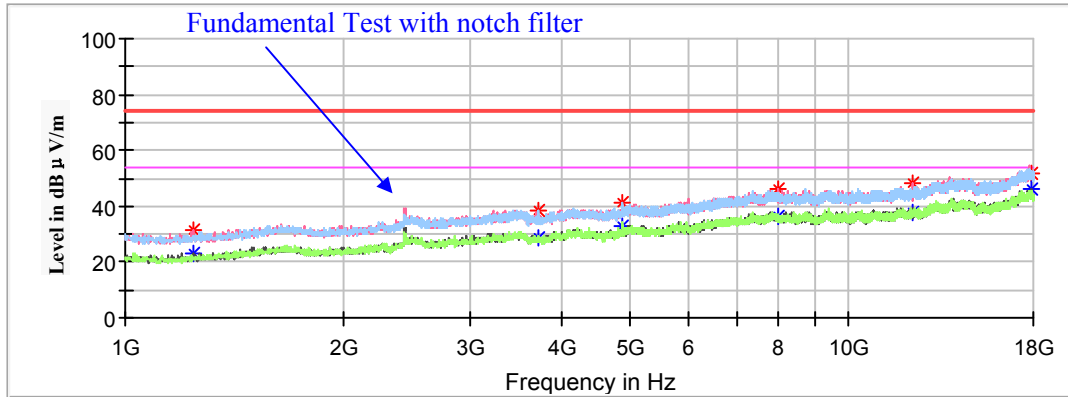
Full Spectrum



Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
	MaxPeak (dBμV/m)	Average (dBμV/m)	Height (cm)	Polar (H/V)				
1229.500000	---	21.85	200.0	H	186.0	-17.8	54.00	32.15
1229.500000	30.83	---	200.0	H	186.0	-17.8	74.00	43.17
3366.400000	---	28.69	150.0	V	76.0	-9.2	54.00	25.31
3366.400000	38.88	---	150.0	V	76.0	-9.2	74.00	35.12
4824.000000	41.66	---	200.0	V	230.0	-5.5	74.00	32.34
4824.000000	---	37.29	200.0	V	230.0	-5.5	54.00	16.71
7784.700000	---	36.69	200.0	H	7.0	1.5	54.00	17.31
7784.700000	45.55	---	200.0	H	7.0	1.5	74.00	28.45
11711.700000	---	38.74	150.0	V	24.0	3.2	54.00	15.26
11711.700000	47.60	---	150.0	V	24.0	3.2	74.00	26.40
17680.400000	51.43	---	150.0	V	36.0	8.9	74.00	22.57
17680.400000	---	45.78	150.0	V	36.0	8.9	54.00	8.22

Middle Channel: 2437MHz

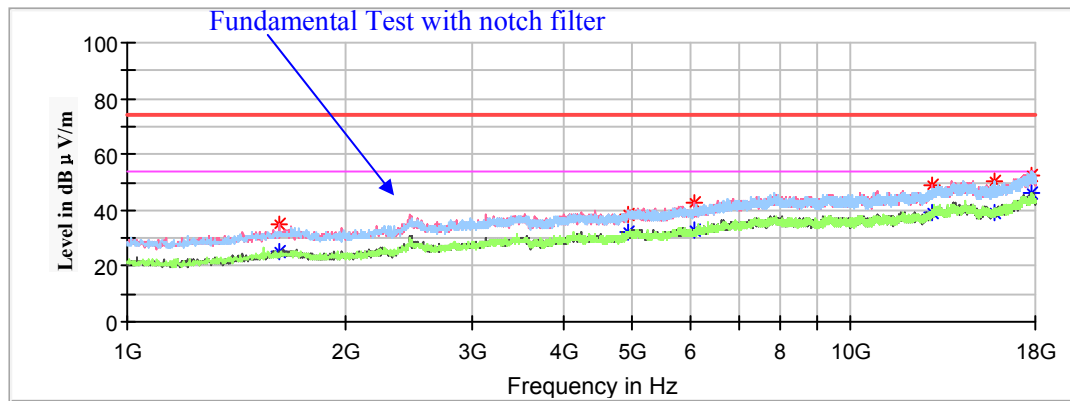
Full Spectrum



Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dB μ V/m)	Margin (dB)
	MaxPeak (dB μ V/m)	Average (dB μ V/m)	Height (cm)	Polar (H/V)				
1241.400000	---	22.87	150.0	V	283.0	-17.8	54.00	31.13
1241.400000	31.45	---	150.0	V	283.0	-17.8	74.00	42.55
3726.800000	---	29.00	200.0	H	2.0	-8.0	54.00	25.00
3726.800000	38.23	---	200.0	H	2.0	-8.0	74.00	35.77
4874.000000	40.98	---	200.0	H	322.0	-5.4	74.00	33.02
4874.000000	---	32.69	200.0	H	322.0	-5.4	54.00	21.31
7978.500000	---	36.06	150.0	V	103.0	1.8	54.00	17.94
7978.500000	46.32	---	150.0	V	103.0	1.8	74.00	27.68
12282.900000	48.47	---	150.0	V	36.0	3.3	74.00	25.53
12282.900000	---	37.85	150.0	V	36.0	3.3	54.00	16.15
17872.500000	51.42	---	200.0	V	305.0	8.8	74.00	22.58
17872.500000	---	46.28	200.0	V	305.0	8.8	54.00	7.72

High Channel : 2462MHz

Full Spectrum



Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
	MaxPeak (dBμV/m)	Average (dBμV/m)	Height (cm)	Polar (H/V)				
1620.500000	---	25.08	150.0	V	224.0	-15.9	54.00	28.92
1620.500000	34.76	---	150.0	V	224.0	-15.9	74.00	39.24
4924.000000	---	31.89	150.0	H	351.0	-5.3	54.00	22.11
4924.000000	38.73	---	150.0	H	351.0	-5.3	74.00	35.27
6071.100000	---	33.12	150.0	V	15.0	-2.7	54.00	20.88
6071.100000	42.69	---	150.0	V	15.0	-2.7	74.00	31.31
12993.500000	---	39.29	200.0	H	156.0	5.2	54.00	14.71
12993.500000	48.88	---	200.0	H	156.0	5.2	74.00	25.12
15784.900000	---	39.01	150.0	H	175.0	4.9	54.00	14.99
15784.900000	50.04	---	150.0	H	175.0	4.9	74.00	23.96
17736.500000	---	46.02	200.0	V	257.0	8.8	54.00	7.98
17736.500000	52.71	---	200.0	V	257.0	8.8	74.00	21.29

802.11n-HT40 Mode:

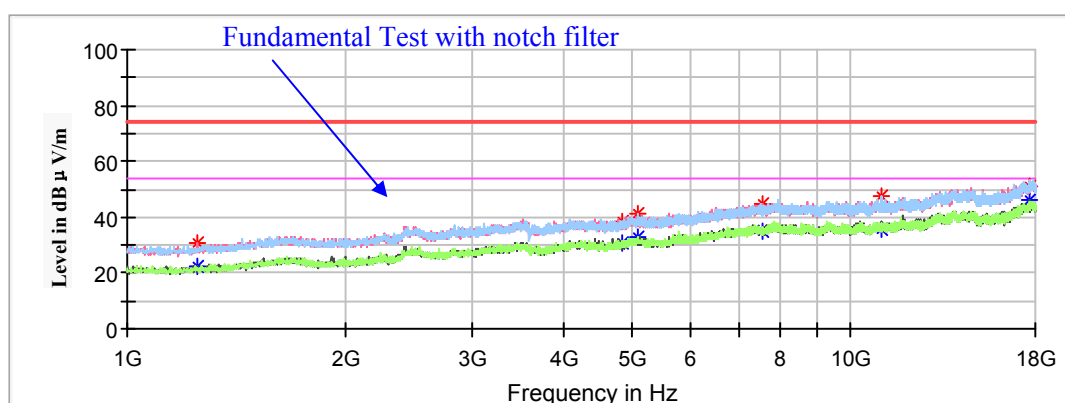
(Pre-scan in the X,Y and Z axes of orientation, the worst case **Y-axis of orientation** was recorded)

Note:

1. This test was performed with the 2.4-2.5GHz notch filter.
2. Corrected Factor (dB/m) = Antenna factor (RX) (dB/m) + Cable Loss (dB) – Amplifier Factor (dB)
 Corrected Amplitude (dB μ V /m) = Corrected Factor (dB/m) + Reading (dB μ V)
 Margin (dB) = Limit (dB μ V/m) – Corrected Amplitude (dB μ V /m)

Low Channel : 2422MHz

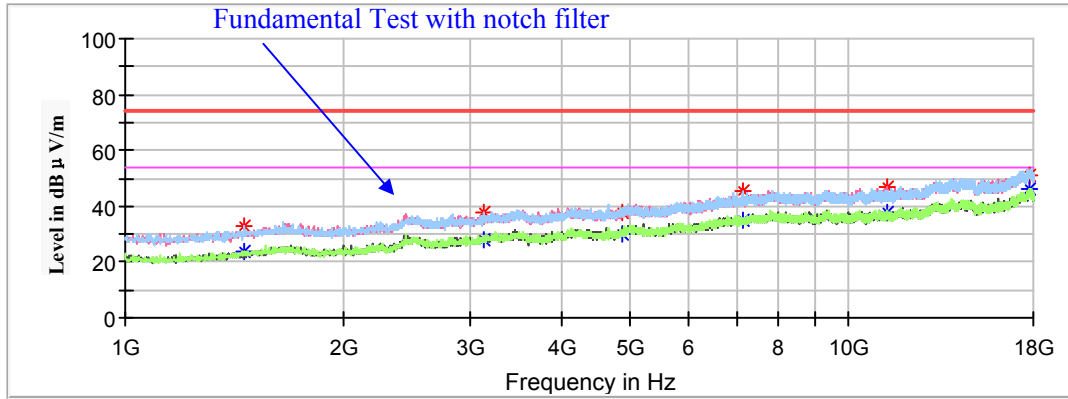
Full Spectrum



Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dB μ V/m)	Margin (dB)
	MaxPeak (dB μ V/m)	Average (dB μ V/m)	Height (cm)	Polar (H/V)				
1251.600000	30.75	---	200.0	V	38.0	-17.7	74.00	43.25
1251.600000	---	22.45	200.0	V	38.0	-17.7	54.00	31.55
4844.000000	38.58	---	150.0	V	318.0	-5.5	74.00	35.42
4844.000000	---	30.94	150.0	V	318.0	-5.5	54.00	23.06
5069.800000	---	33.00	200.0	H	64.0	-5.0	54.00	21.00
5069.800000	41.46	---	200.0	H	64.0	-5.0	74.00	32.54
7570.500000	---	35.27	150.0	V	305.0	1.1	54.00	18.73
7570.500000	45.07	---	150.0	V	305.0	1.1	74.00	28.93
11036.800000	---	36.00	150.0	V	267.0	2.9	54.00	18.00
11036.800000	47.45	---	150.0	V	267.0	2.9	74.00	26.55
17719.500000	51.18	---	150.0	V	41.0	8.9	74.00	22.82
17719.500000	---	45.82	150.0	V	41.0	8.9	54.00	8.18

Middle Channel: 2437MHz

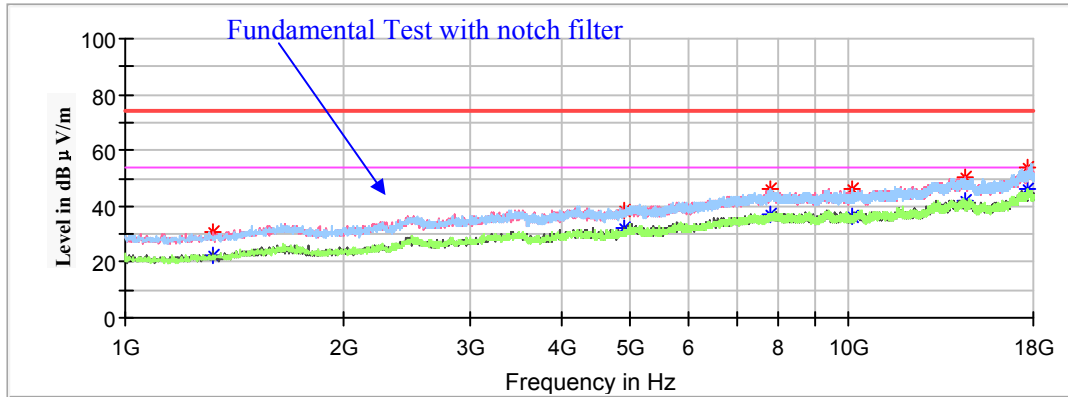
Full Spectrum



Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dB μ V/m)	Margin (dB)
	MaxPeak (dB μ V/m)	Average (dB μ V/m)	Height (cm)	Polar (H/V)				
1460.700000	32.78	---	150.0	H	115.0	-16.6	74.00	41.22
1460.700000	---	23.86	150.0	H	115.0	-16.6	54.00	30.14
3136.900000	---	27.99	200.0	V	191.0	-9.7	54.00	26.01
3136.900000	37.70	---	200.0	V	191.0	-9.7	74.00	36.30
4874.000000	37.93	---	150.0	V	346.0	-5.4	74.00	36.07
4874.000000	---	30.33	150.0	V	346.0	-5.4	54.00	23.67
7121.700000	---	34.64	200.0	H	134.0	0.2	54.00	19.36
7121.700000	45.40	---	200.0	H	134.0	0.2	74.00	28.60
11298.600000	---	37.59	150.0	V	129.0	2.8	54.00	16.41
11298.600000	46.61	---	150.0	V	129.0	2.8	74.00	27.39
17736.500000	51.21	---	200.0	H	159.0	8.8	74.00	22.79
17736.500000	---	46.20	200.0	H	159.0	8.8	54.00	7.80

High Channel : 2452MHz

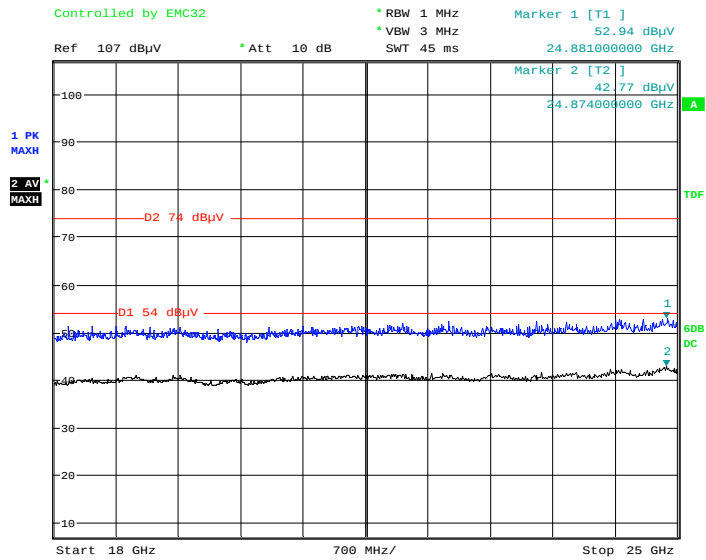
Full Spectrum



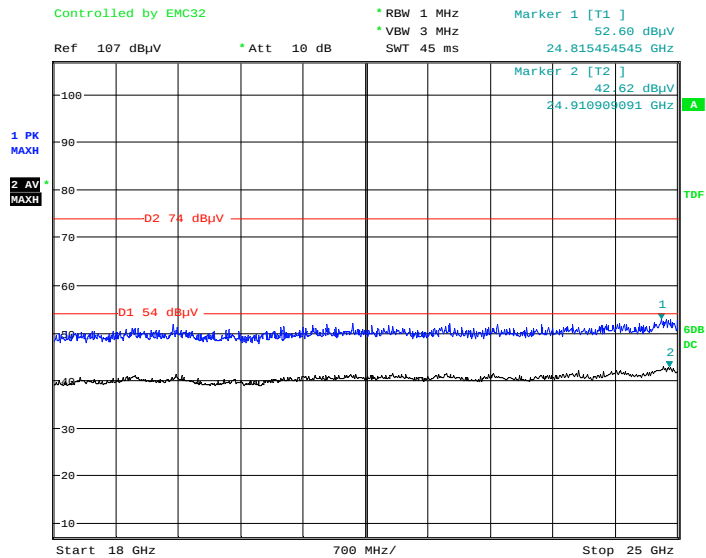
Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
	MaxPeak (dBμV/m)	Average (dBμV/m)	Height (cm)	Polar (H/V)				
1324.700000	---	22.15	200.0	V	26.0	-17.3	54.00	31.85
1324.700000	31.09	---	200.0	V	26.0	-17.3	74.00	42.91
4904.000000	38.49	---	200.0	V	0.0	-5.4	74.00	35.51
4904.000000	---	31.83	200.0	V	0.0	-5.4	54.00	22.17
7771.100000	46.13	---	200.0	H	15.0	1.5	74.00	27.87
7771.100000	---	36.76	200.0	H	15.0	1.5	54.00	17.24
10135.800000	---	36.41	150.0	H	205.0	2.0	54.00	17.59
10135.800000	46.31	---	150.0	H	205.0	2.0	74.00	27.69
14516.700000	50.48	---	200.0	V	297.0	6.5	74.00	23.52
14516.700000	---	42.27	200.0	V	297.0	6.5	54.00	11.73
17671.900000	53.77	---	150.0	V	249.0	8.9	74.00	20.23
17671.900000	---	45.93	150.0	V	249.0	8.9	54.00	8.07

18GHz-25GHz

Pre-Scan with 802.11b, 802.11g, 802.11n-HT20 and 802.11n-HT40 modes of operation in the X,Y and Z axes of orientation, the worst case **high channel of 802.11n-HT40 Mode in Y-axis of orientation** was recorded

Horizontal

Date: 25.JAN.2021 19:50:39

Vertical

Date: 25.JAN.2021 20:00:13

Restricted Bands Emissions Test:

Note:

1. Corrected Factor (dB/m) = Antenna factor (RX) (dB/m) + Cable Loss (dB) – Amplifier Factor (dB)

Corrected Amplitude (dB μ V/m) = Corrected Factor (dB/m) + Reading (dB μ V)Margin (dB) = Limit (dB μ V/m) – Corrected Amplitude (dB μ V/m)**802.11b Mode:** (Pre-scan in the X, Y and Z axes of orientation, the worst case Y-axis of orientation was recorded)

Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
	MaxPeak (dBμV/m)	Average (dBμV/m)	Height (cm)	Polar (H/V)				
Low Channel: 2412MHz								
2390.00	49.83	---	200.0	V	358.0	-2.9	74.00	24.17
2390.00	---	48.36	200.0	V	358.0	-2.9	54.00	5.64
High Channel: 2462MHz								
2483.50	50.57	---	200.0	V	297.0	-2.5	74.00	23.43
2483.50	---	48.58	200.0	V	297.0	-2.5	54.00	5.42

802.11g Mode: (Pre-scan in the X,Y and Z axes of orientation, the worst case Y-axis of orientation was recorded)

Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
	MaxPeak (dBμV/m)	Average (dBμV/m)	Height (cm)	Polar (H/V)				
Low Channel: 2412MHz								
2390.00	49.98	---	200.0	V	236.0	-2.9	74.00	24.02
2390.00	---	46.50	200.0	V	236.0	-2.9	54.00	7.50
High Channel: 2462MHz								
2483.50	50.46	---	200.0	V	270.0	-2.5	74.00	23.54
2483.50	---	48.36	200.0	V	270.0	-2.5	54.00	5.64

802.11n-HT20 Mode: (Pre-scan in the X,Y and Z axes of orientation, the worst case Y-axis of orientation was recorded)

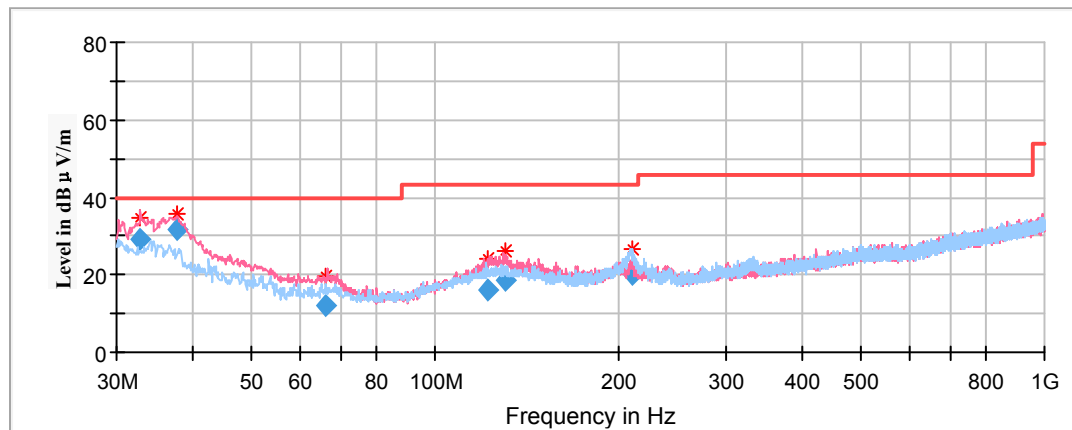
Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
	MaxPeak (dBμV/m)	Average (dBμV/m)	Height (cm)	Polar (H/V)				
Low Channel: 2412MHz								
2390.00	---	50.44	200.0	V	321.0	-2.9	54.00	3.56
2390.00	63.42	---	200.0	V	321.0	-2.9	74.00	10.58
High Channel: 2462MHz								
2483.50	60.87	---	200.0	V	195.0	-2.5	74.00	13.13
2483.50	---	51.29	200.0	V	195.0	-2.5	54.00	2.71

802.11n-HT40 Mode: (Pre-scan in the X,Y and Z axes of orientation, the worst case Y-axis of orientation was recorded)

Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
	MaxPeak (dBμV/m)	Average (dBμV/m)	Height (cm)	Polar (H/V)				
Low Channel: 2422MHz								
2390.00	57.36	---	200.0	V	139.0	-2.9	74.00	16.64
2390.00	---	49.95	200.0	V	139.0	-2.9	54.00	4.05
High Channel: 2452MHz								
2483.50	53.71	---	150.0	V	169.0	-2.5	74.00	20.29
2483.50	---	47.96	150.0	V	169.0	-2.5	54.00	6.04

For BLE(1Mbps) Mode:**Spurious Emission Test:****30MHz-1GHz:**

(Pre-scan with low, middle and high channels of operation in the X,Y and Z axes of orientation, the worst case **low channel of operation in the Y axis of orientation** was recorded)



Frequency (MHz)	Corrected Amplitude	Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
	Quasi-peak (dBμV/m)	Height (cm)	Polar (H/V)				
32.765950	29.31	100.0	V	164.0	-6.4	40.00	10.69
37.852350	31.59	100.0	V	177.0	-9.8	40.00	8.41
66.230200	12.17	100.0	V	280.0	-17.4	40.00	27.83
122.346250	16.17	100.0	V	254.0	-11.6	43.50	27.33
130.667700	18.79	100.0	V	152.0	-11.4	43.50	24.71
210.341550	20.26	200.0	H	136.0	-12.5	43.50	23.24

1GHz-18GHz

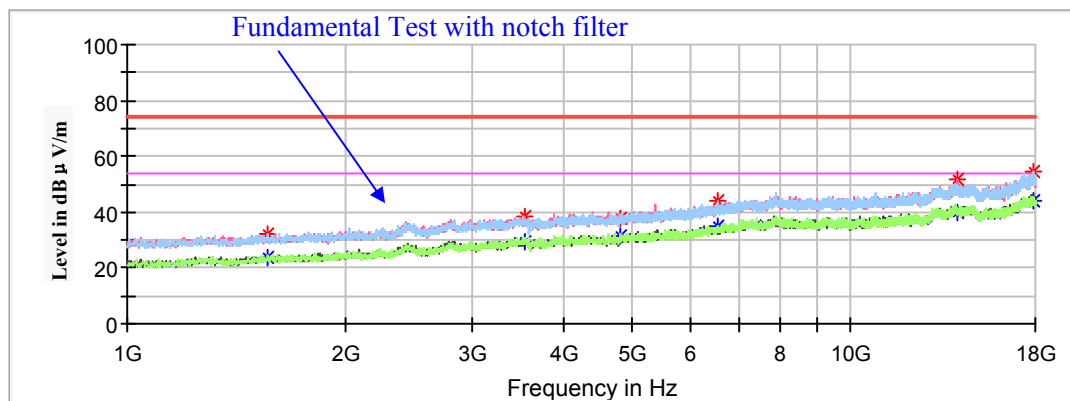
(Pre-scan in the X,Y and Z axes of orientation, the worst case **Y-axis of orientation** was recorded)

Note:

1. This test was performed with the 2.4-2.5GHz notch filter.
2. Corrected Factor (dB/m) = Antenna factor (RX) (dB/m) + Cable Loss (dB) – Amplifier Factor (dB)
 Corrected Amplitude (dBμV/m) = Corrected Factor (dB/m) + Reading (dBμV)
 Margin (dB) = Limit (dBμV/m) – Corrected Amplitude (dBμV/m)

Low Channel: 2402MHz

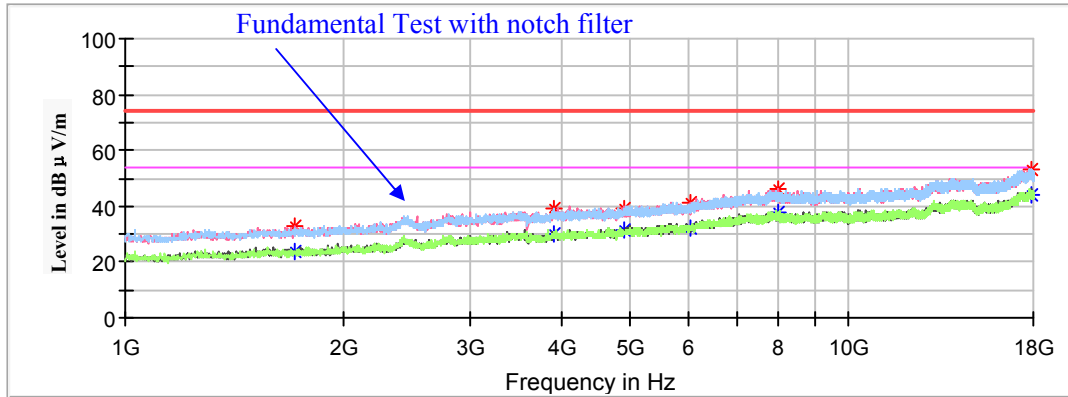
Full Spectrum



Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
	MaxPeak (dBμV/m)	Average (dBμV/m)	Height (cm)	Polar (H/V)				
1564.400000	---	23.81	200.0	H	219.0	-16.1	54.00	30.19
1564.400000	32.13	---	200.0	H	219.0	-16.1	74.00	41.87
3536.400000	---	29.20	150.0	H	110.0	-8.7	54.00	24.80
3536.400000	38.59	---	150.0	H	110.0	-8.7	74.00	35.41
4804.000000	---	31.39	150.0	V	8.0	-5.6	54.00	22.61
4804.000000	37.99	---	150.0	V	8.0	-5.6	74.00	36.01
6540.300000	43.98	---	150.0	V	109.0	-1.1	74.00	30.02
6540.300000	---	34.92	150.0	V	109.0	-1.1	54.00	19.08
14045.800000	---	40.06	150.0	V	315.0	6.2	54.00	13.94
14045.800000	51.49	---	150.0	V	315.0	6.2	74.00	22.51
17894.600000	54.32	---	200.0	V	6.0	8.8	74.00	19.68
17894.600000	---	44.26	200.0	V	6.0	8.8	54.00	9.74

Middle Channel: 2440MHz

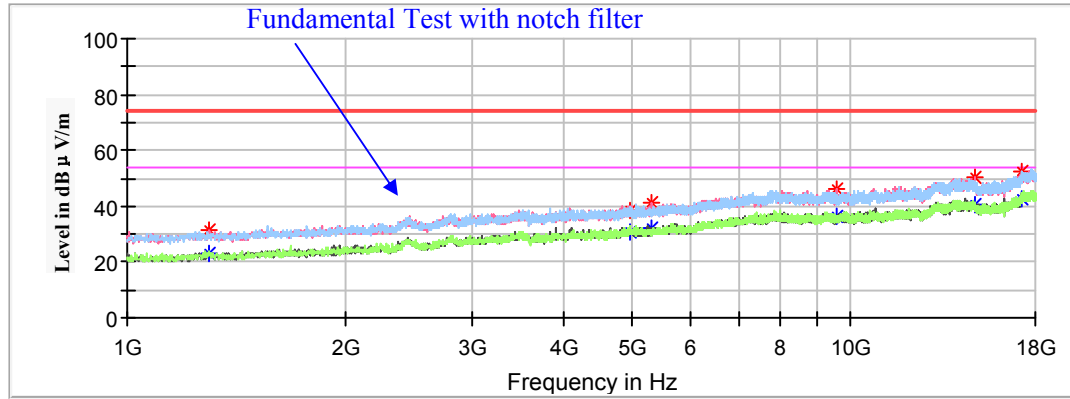
Full Spectrum



Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dB μ V/m)	Margin (dB)
	MaxPeak (dB μ V/m)	Average (dB μ V/m)	Height (cm)	Polar (H/V)				
1719.100000	32.80	---	150.0	V	263.0	-15.5	74.00	41.20
1719.100000	---	23.47	150.0	V	263.0	-15.5	54.00	30.53
3901.900000	---	30.37	150.0	H	149.0	-7.4	54.00	23.63
3901.900000	39.02	---	150.0	H	149.0	-7.4	74.00	34.98
4880.000000	38.90	---	200.0	H	0.0	-5.4	74.00	35.10
4880.000000	---	31.30	200.0	H	0.0	-5.4	54.00	22.70
6023.500000	---	32.09	200.0	V	297.0	-2.9	54.00	21.91
6023.500000	41.19	---	200.0	V	297.0	-2.9	74.00	32.81
7985.300000	---	37.62	150.0	V	200.0	1.8	54.00	16.38
7985.300000	46.34	---	150.0	V	200.0	1.8	74.00	27.66
17894.600000	---	44.39	200.0	H	346.0	8.8	54.00	9.61
17894.600000	53.39	---	200.0	H	346.0	8.8	74.00	20.61

High Channel: 2480MHz

Full Spectrum

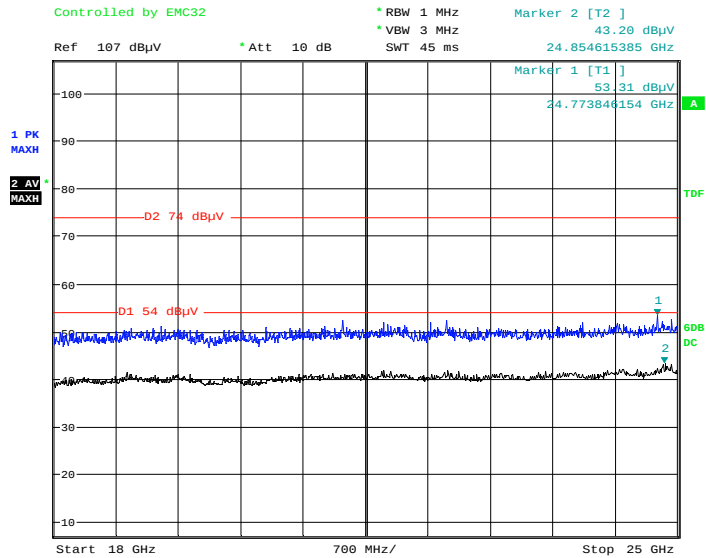


Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBµV/m)	Margin (dB)
	MaxPeak (dBµV/m)	Average (dBµV/m)	Height (cm)	Polar (H/V)				
1300.900000	---	23.10	200.0	H	258.0	-17.4	54.00	30.90
1300.900000	31.58	---	200.0	H	258.0	-17.4	74.00	42.42
4960.000000	---	30.68	200.0	V	81.0	-5.3	54.00	23.32
4960.000000	38.50	---	200.0	V	81.0	-5.3	74.00	35.50
5319.700000	---	32.17	150.0	V	189.0	-4.4	54.00	21.83
5319.700000	41.09	---	150.0	V	189.0	-4.4	74.00	32.91
9566.300000	---	36.20	150.0	V	144.0	2.1	54.00	17.80
9566.300000	46.08	---	150.0	V	144.0	2.1	74.00	27.92
14851.600000	---	40.24	200.0	H	195.0	5.5	54.00	13.76
14851.600000	50.03	---	200.0	H	195.0	5.5	74.00	23.97
17218.000000	---	42.85	150.0	H	4.0	7.9	54.00	11.15
17218.000000	52.79	---	150.0	H	4.0	7.9	74.00	21.21

18GHz-25GHz

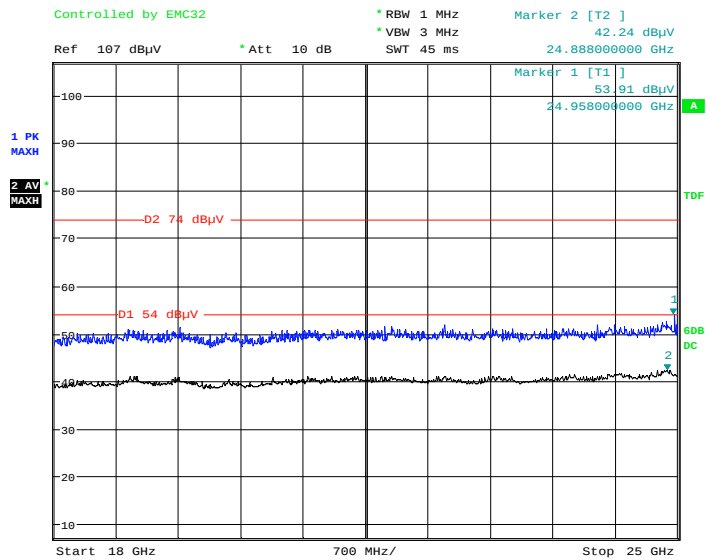
(The worst case **low** channel of operation in the **Y** axis of orientation was recorded)

Horizontal



Date: 25.JAN.2021 20:06:54

Vertical



Date: 25.JAN.2021 20:17:37

Restricted Bands Emissions Test:

(Pre-scan in the X,Y and Z axes of orientation, the worst case **Y-axis of orientation** was recorded)

Note:

1. Corrected Factor (dB/m) = Antenna factor (RX) (dB/m) + Cable Loss (dB) – Amplifier Factor (dB)

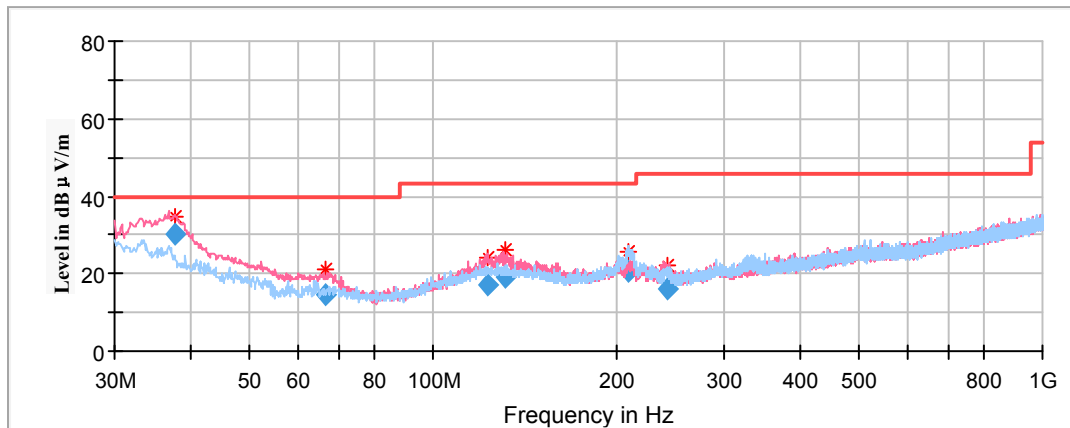
Corrected Amplitude (dBμV/m) = Corrected Factor (dB/m) + Reading (dBμV)

Margin (dB) = Limit (dBμV/m) – Corrected Amplitude (dBμV/m)

Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
	MaxPeak (dBμV/m)	Average (dBμV/m)	Height (cm)	Polar (H/V)				
Low Channel: 2402MHz								
2390.00	44.37	---	200.0	V	0.0	-2.9	74.00	29.63
2390.00	---	42.55	200.0	V	0.0	-2.9	54.00	11.45
High Channel: 2480MHz								
2483.50	46.60	---	150.0	V	31.0	-2.5	74.00	27.40
2483.50	---	43.18	150.0	V	31.0	-2.5	54.00	10.82

For BLE(2Mbps) Mode:**Spurious Emission Test:****30MHz-1GHz:**

(Pre-scan with low, middle and high channels of operation in the X,Y and Z axes of orientation, the worst case **low channel of operation in the Y axis of orientation** was recorded)



Frequency (MHz)	Corrected Amplitude	Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dB μ V/m)	Margin (dB)
	Quasi-peak (dB μ V/m)	Height (cm)	Polar (H/V)				
37.599700	30.28	100.0	V	70.0	-9.7	40.00	9.72
66.440500	14.57	100.0	V	222.0	-17.4	40.00	25.43
122.859700	17.15	100.0	V	203.0	-11.5	43.50	26.35
131.289750	18.88	100.0	V	127.0	-11.5	43.50	24.62
208.906050	20.59	200.0	H	293.0	-12.3	43.50	22.91
242.692950	16.05	100.0	V	53.0	-13.4	46.00	29.95

1GHz-18GHz

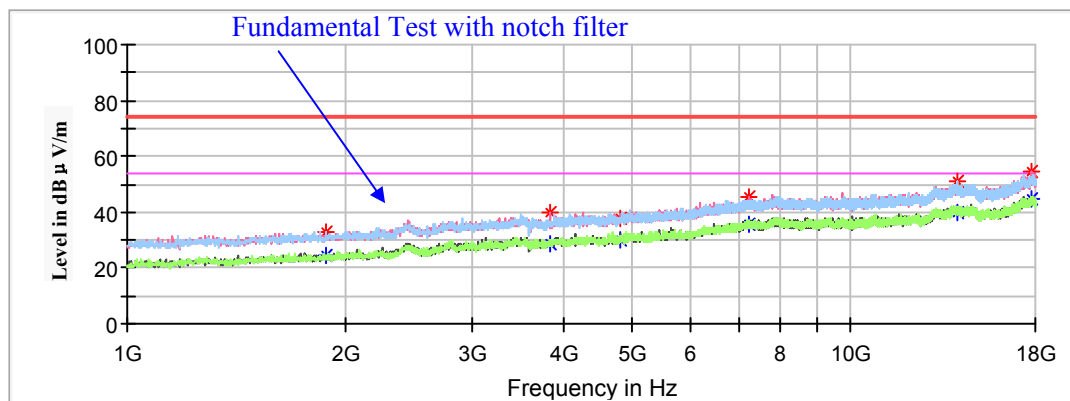
(Pre-scan in the X,Y and Z axes of orientation, the worst case **Y-axis of orientation** was recorded)

Note:

1. This test was performed with the 2.4-2.5GHz notch filter.
2. Corrected Factor (dB/m) = Antenna factor (RX) (dB/m) + Cable Loss (dB) – Amplifier Factor (dB)
 Corrected Amplitude (dB μ V/m) = Corrected Factor (dB/m) + Reading (dB μ V)
 Margin (dB) = Limit (dB μ V/m) – Corrected Amplitude (dB μ V/m)

Low Channel: 2402MHz

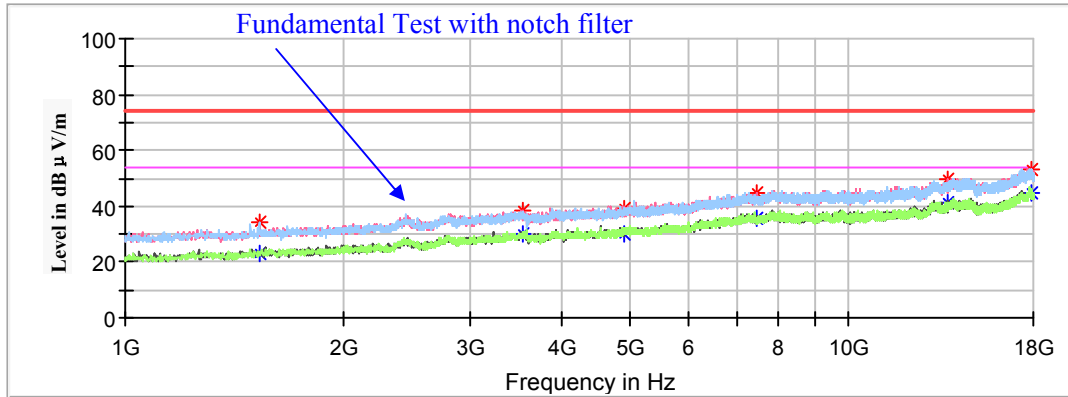
Full Spectrum



Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dB μ V/m)	Margin (dB)
	MaxPeak (dB μ V/m)	Average (dB μ V/m)	Height (cm)	Polar (H/V)				
1884.000000	---	24.18	200.0	H	263.0	-14.9	54.00	29.82
1884.000000	32.88	---	200.0	H	263.0	-14.9	74.00	41.12
3850.900000	---	28.64	200.0	V	72.0	-7.5	54.00	25.36
3850.900000	39.83	---	200.0	V	72.0	-7.5	74.00	34.17
4804.000000	---	29.73	200.0	V	153.0	-5.6	54.00	24.27
4804.000000	37.86	---	200.0	V	153.0	-5.6	74.00	36.14
7206.000000	---	35.49	200.0	V	314.0	0.5	54.00	18.51
7206.000000	45.40	---	200.0	V	314.0	0.5	74.00	28.60
14015.200000	---	40.02	200.0	V	110.0	6.2	54.00	13.98
14015.200000	50.74	---	200.0	V	110.0	6.2	74.00	23.26
17799.400000	---	44.81	150.0	V	258.0	8.8	54.00	9.19
17799.400000	54.37	---	150.0	V	258.0	8.8	74.00	19.63

Middle Channel: 2440MHz

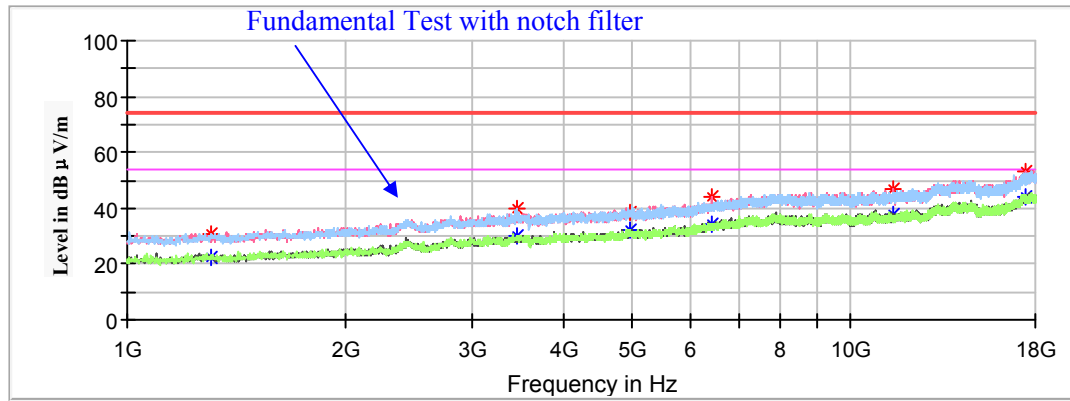
Full Spectrum



Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
	MaxPeak (dBμV/m)	Average (dBμV/m)	Height (cm)	Polar (H/V)				
1530.400000	34.20	---	200.0	H	77.0	-16.2	74.00	39.80
1530.400000	---	23.25	200.0	H	77.0	-16.2	54.00	30.75
3551.700000	38.67	---	150.0	V	160.0	-8.6	74.00	35.33
3551.700000	---	30.07	150.0	V	160.0	-8.6	54.00	23.93
4880.000000	39.06	---	200.0	V	310.0	-5.4	74.00	34.94
4880.000000	---	30.28	200.0	V	310.0	-5.4	54.00	23.72
7443.000000	44.96	---	150.0	V	338.0	0.9	74.00	29.04
7443.000000	---	35.38	150.0	V	338.0	0.9	54.00	18.62
13721.100000	49.35	---	150.0	V	135.0	5.9	74.00	24.65
13721.100000	---	41.39	150.0	V	135.0	5.9	54.00	12.61
17889.500000	---	44.68	150.0	H	199.0	8.8	54.00	9.32
17889.500000	53.30	---	150.0	H	199.0	8.8	74.00	20.70

High Channel: 2480MHz

Full Spectrum

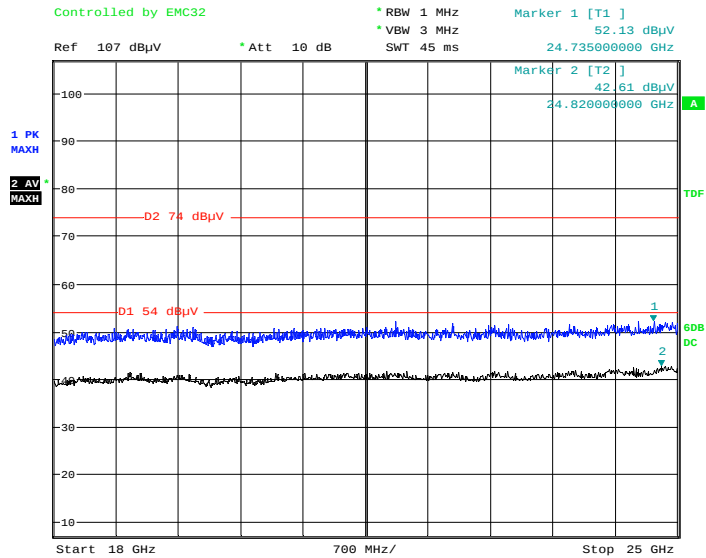


Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
	MaxPeak (dBμV/m)	Average (dBμV/m)	Height (cm)	Polar (H/V)				
1306.000000	---	22.60	150.0	H	231.0	-17.4	54.00	31.40
1306.000000	31.01	---	150.0	H	231.0	-17.4	74.00	42.99
3448.000000	---	29.73	150.0	H	141.0	-9.0	54.00	24.27
3448.000000	39.79	---	150.0	H	141.0	-9.0	74.00	34.21
4960.000000	---	31.89	150.0	H	11.0	-5.3	54.00	22.11
4960.000000	38.23	---	150.0	H	11.0	-5.3	74.00	35.77
6419.600000	---	34.02	150.0	V	259.0	-1.5	54.00	19.98
6419.600000	43.96	---	150.0	V	259.0	-1.5	74.00	30.04
11456.700000	---	37.43	150.0	V	234.0	2.8	54.00	16.57
11456.700000	46.55	---	150.0	V	234.0	2.8	74.00	27.45
17454.300000	---	44.14	200.0	H	103.0	8.7	54.00	9.86
17454.300000	53.01	---	200.0	H	103.0	8.7	74.00	20.99

18GHz-25GHz

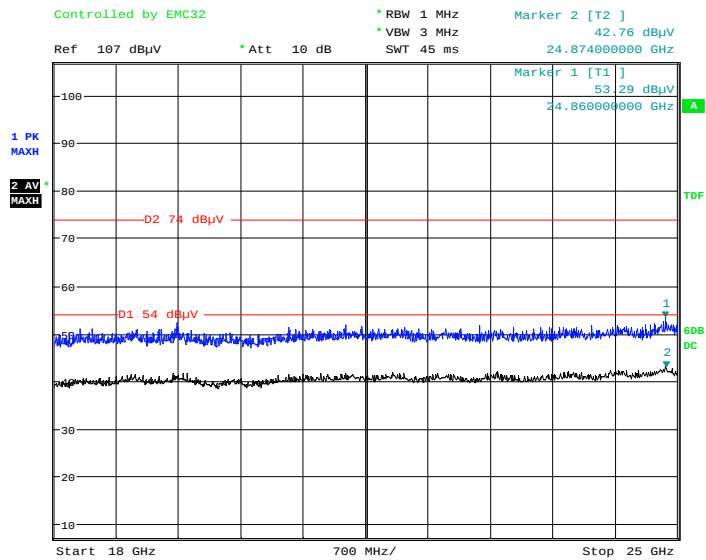
(The worst case **low** channel of operation in the **Y** axis of orientation was recorded)

Horizontal



Date: 25.JAN.2021 20:26:12

Vertical



Date: 25.JAN.2021 20:37:50

Restricted Bands Emissions Test:

(Pre-scan in the X,Y and Z axes of orientation, the worst case **Y-axis of orientation** was recorded)

Note:

1. Corrected Factor (dB/m) = Antenna factor (RX) (dB/m) + Cable Loss (dB) – Amplifier Factor (dB)

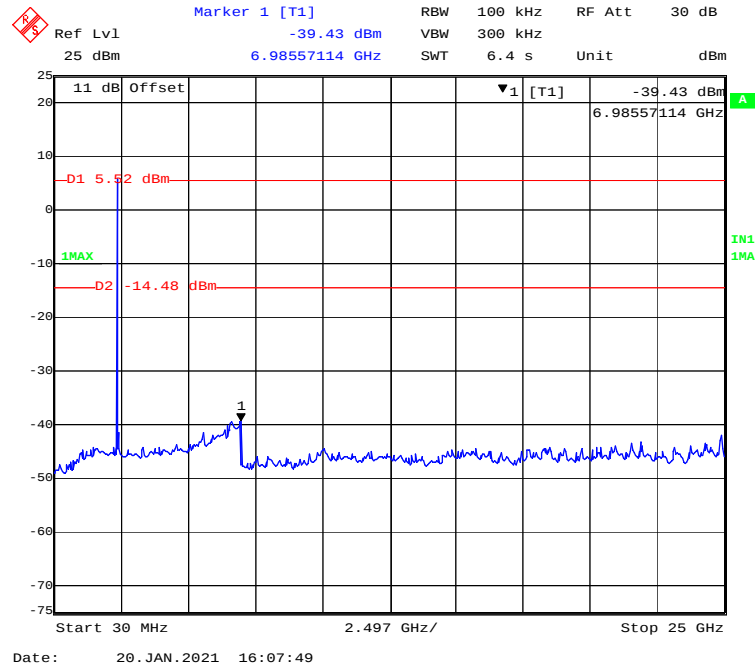
Corrected Amplitude (dBμV/m) = Corrected Factor (dB/m) + Reading (dBμV)

Margin (dB) = Limit (dBμV/m) – Corrected Amplitude (dBμV/m)

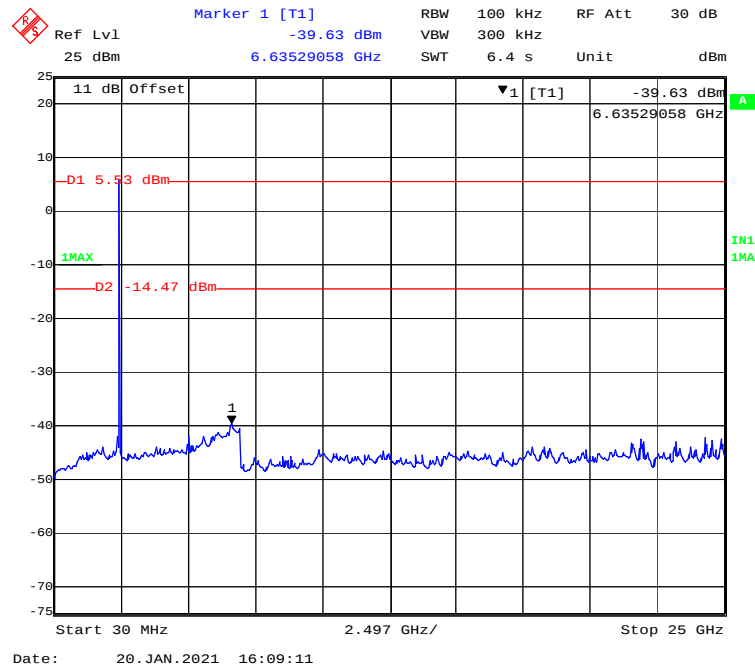
Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
	MaxPeak (dBμV/m)	Average (dBμV/m)	Height (cm)	Polar (H/V)				
Low Channel: 2402MHz								
2390.00	46.17	---	200.0	H	6.0	-2.9	74.00	27.83
2390.00	---	42.22	200.0	H	6.0	-2.9	54.00	11.78
High Channel: 2480MHz								
2483.50	47.25	---	150.0	H	86.0	-2.5	74.00	26.75
2483.50	---	43.27	150.0	H	86.0	-2.5	54.00	10.73

Conducted Spurious Emissions at Antenna Port

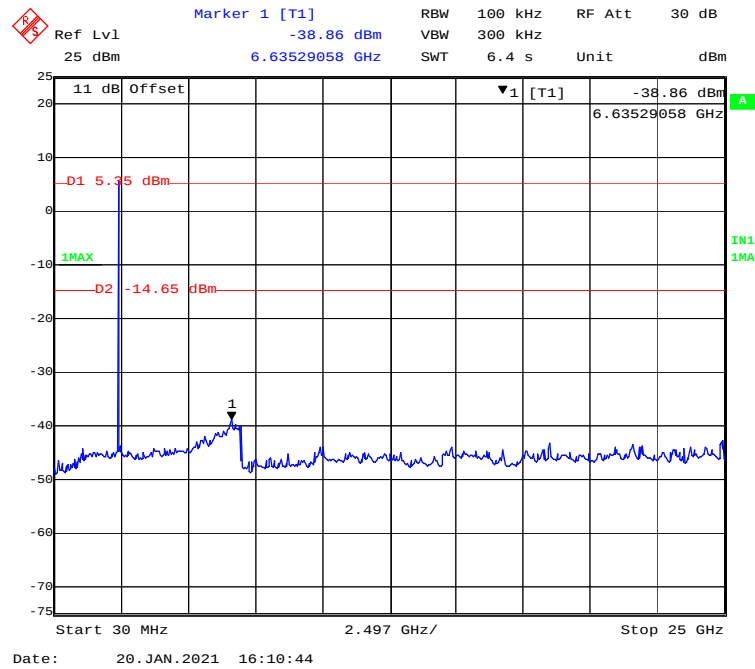
802.11b Mode Low Channel



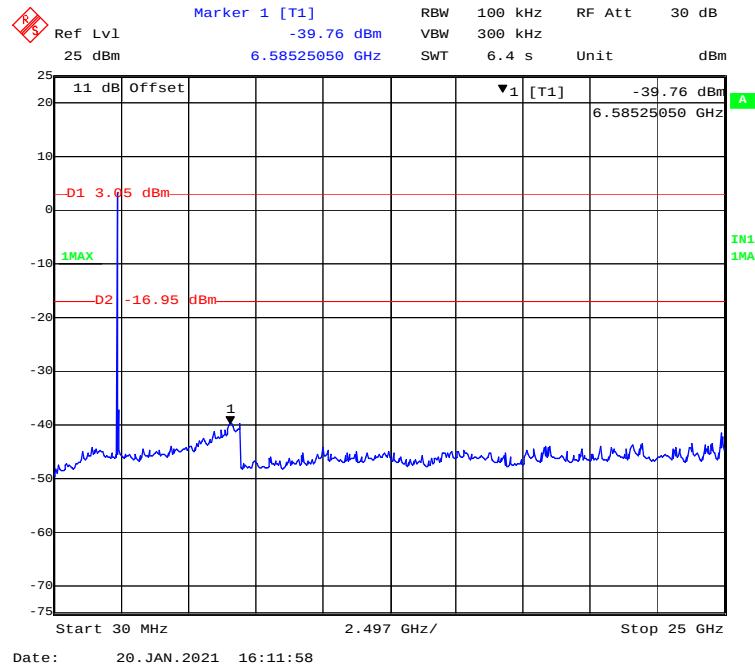
802.11b Mode Middle Channel



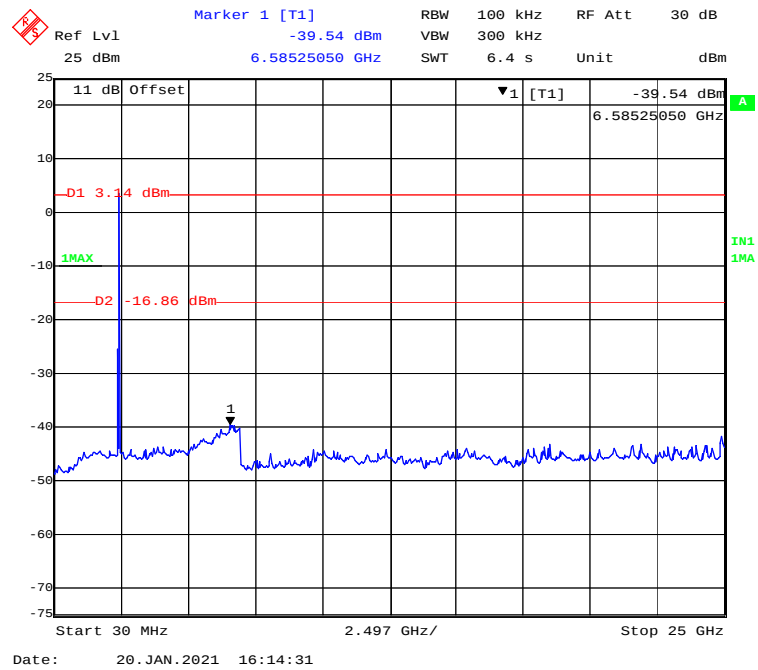
802.11b Mode High Channel



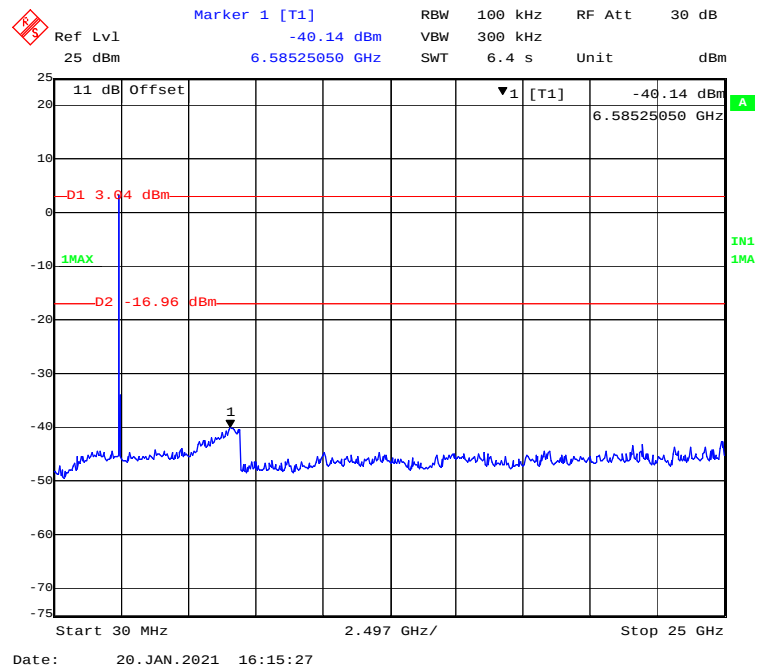
802.11g Mode Low Channel



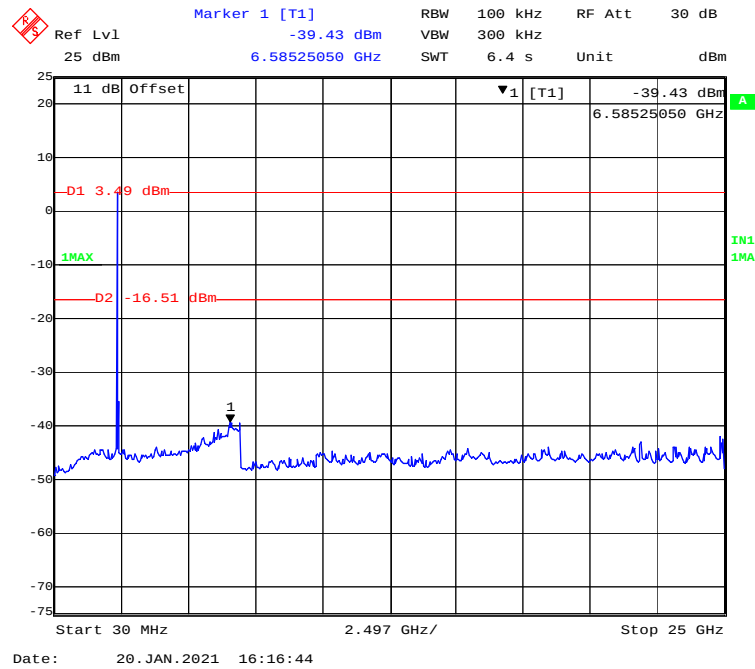
802.11g Mode Middle Channel



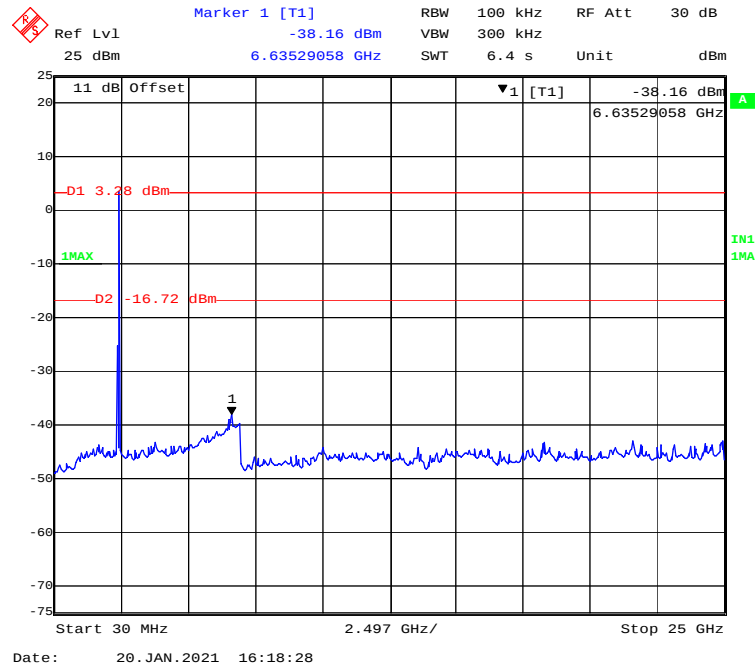
802.11g Mode High Channel



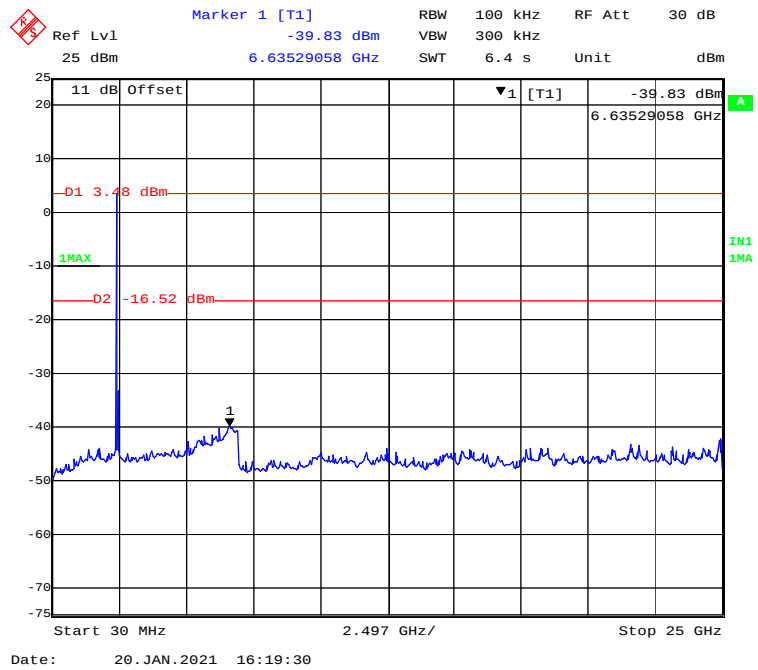
802.11n-HT20 Mode Low Channel



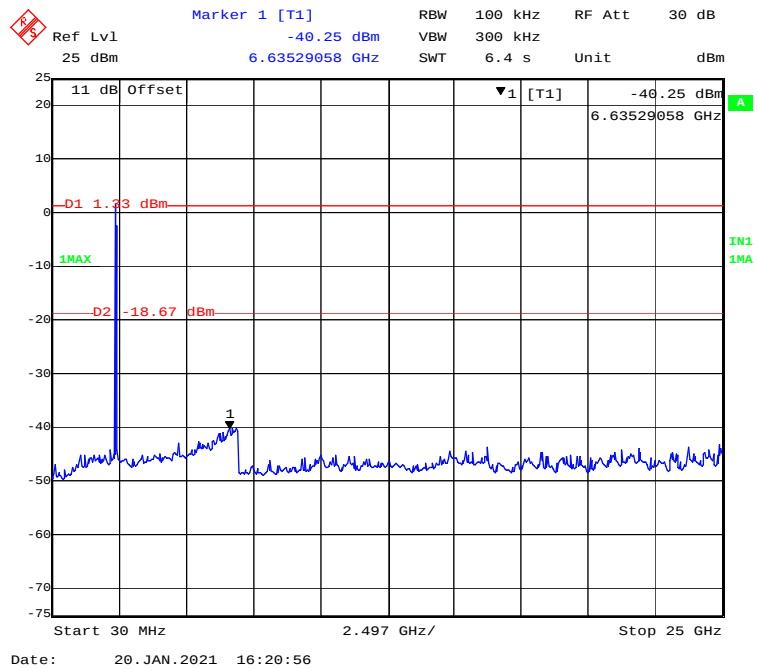
802.11n-HT20 Mode Middle Channel



802.11n-HT20 Mode High Channel



802.11n-HT40 Mode Low Channel



Ref Lvl 25 dBm
 Marker 1 [T1] -40.10 dBm
 RBW 100 kHz
 VBW 300 kHz
 SWT 6.4 s
 RF Att 30 dB
 Unit dBm

11 dB Offset
 ▼1 [T1]
 -40.10 dBm
 6.63529058 GHz

D1 1.23 dBm
 D2 -18.77 dBm
 1

Start 30 MHz
 2.497 GHz/
 Stop 25 GHz

Date: 20. JAN. 2021 16:20:22

Ref Lvl 25 dBm
Marker 1 [T1] -39.85 dBm
RBW 100 kHz
VBW 300 kHz
SWT 6.4 s
RF Att 30 dB
Unit dBm

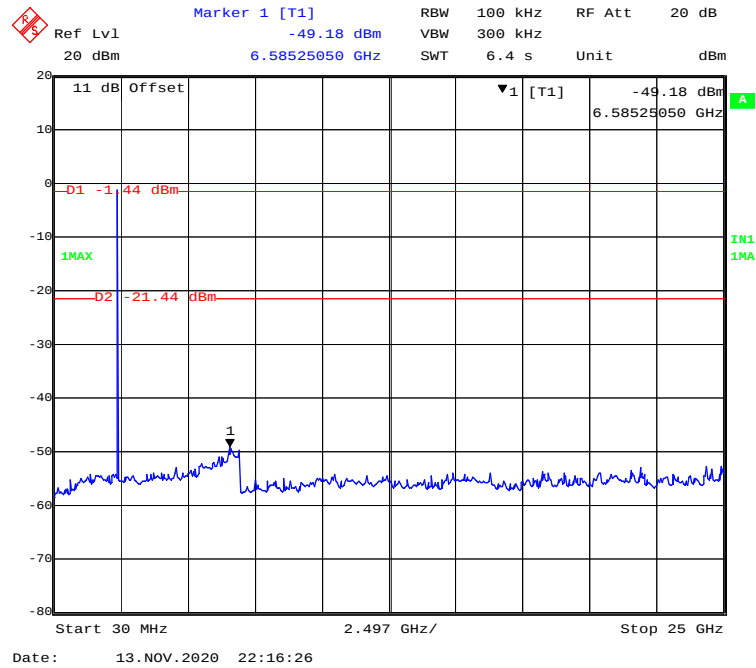
11 dB Offset
▼1 [T1] -39.85 dBm
6.63529058 GHz

D1 1.66 dBm
D2 -18.94 dBm
1MAX
1MA
1

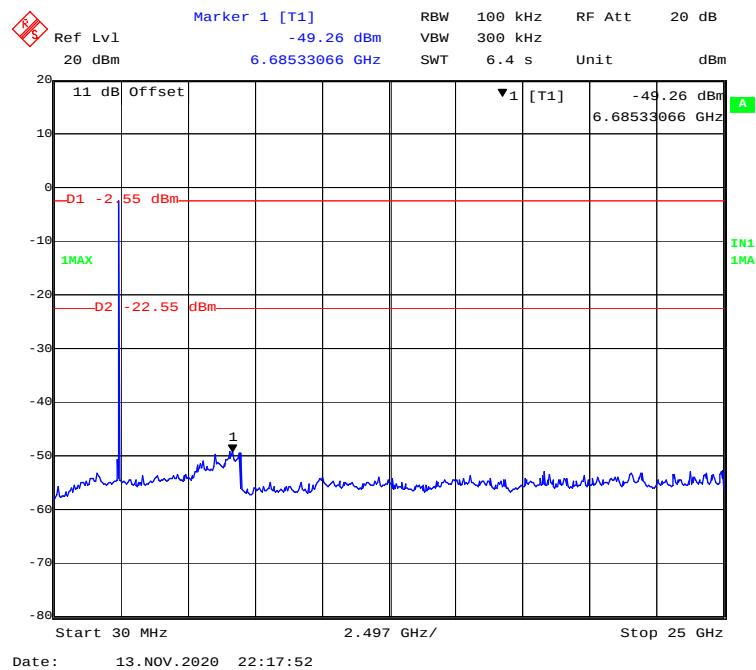
Start 30 MHz
2.497 GHz/
Stop 25 GHz

Date: 20. JAN. 2021 16:22:20

BLE(1Mbps) Mode Low Channel



BLE(1Mbps) Mode Middle Channel



Marker 1 [T1]
 -49.56 dBm
 6.68533066 GHz

Ref Lvl 20 dBm
 RBW 100 kHz
 VBW 300 kHz
 SWT 6.4 s
 RF Att 20 dB
 Unit dBm

Start 30 MHz
 2.497 GHz/
 Stop 25 GHz

Date: 13.NOV.2020 22:20:21

Ref Lvl 20 dBm

Marker 1 [T1] -47.69 dBm

RBW 100 kHz

VBW 300 kHz

SWT 6.4 s

RF Att 20 dB

Unit dBm

11 dB Offset

▼1 [T1] -47.69 dBm

6.73537074 GHz

D1 -2.59 dBm

1MAX

D2 -22.59 dBm

1

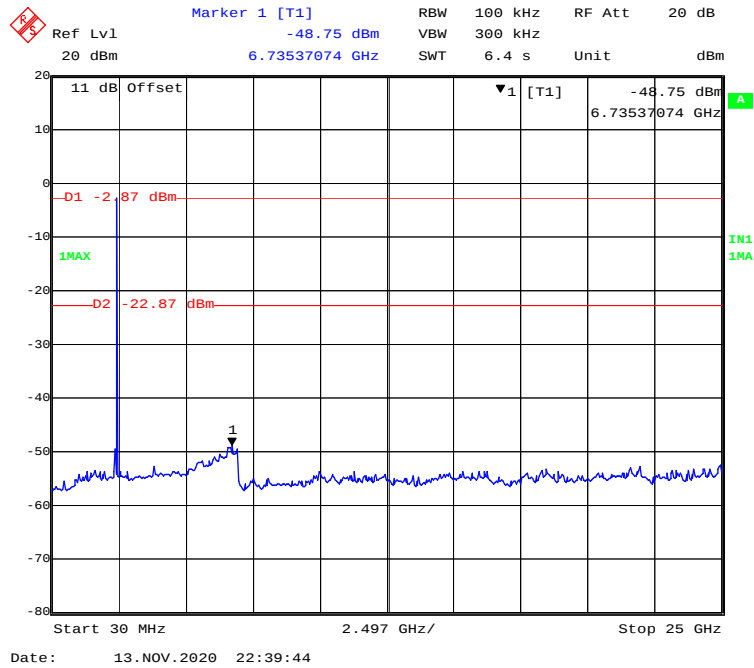
Start 30 MHz

2.497 GHz/

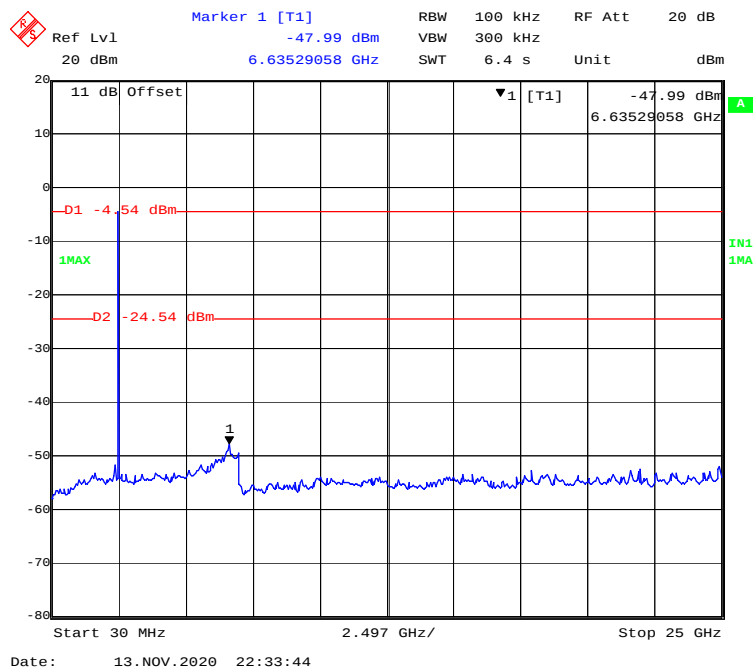
Stop 25 GHz

Date: 13.NOV.2020 22:36:31

BLE(2Mbps) Mode Middle Channel



BLE(2Mbps) Mode High Channel



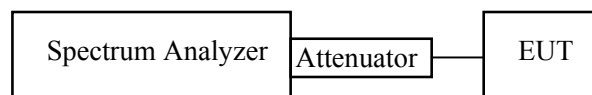
FCC §15.247(a) (2) – 6 dB EMISSION BANDWIDTH**Applicable Standard**

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

According to ANSI C63.10-2013 sub-clause 11.8.1

1. Set RBW = 100 kHz.
2. Set the video bandwidth (VBW) $\geq 3 \times$ RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

**Test Data****Environmental Conditions**

Temperature:	23.4-24.6 °C
Relative Humidity:	49-52 %
ATM Pressure:	101.1-101.5 kPa

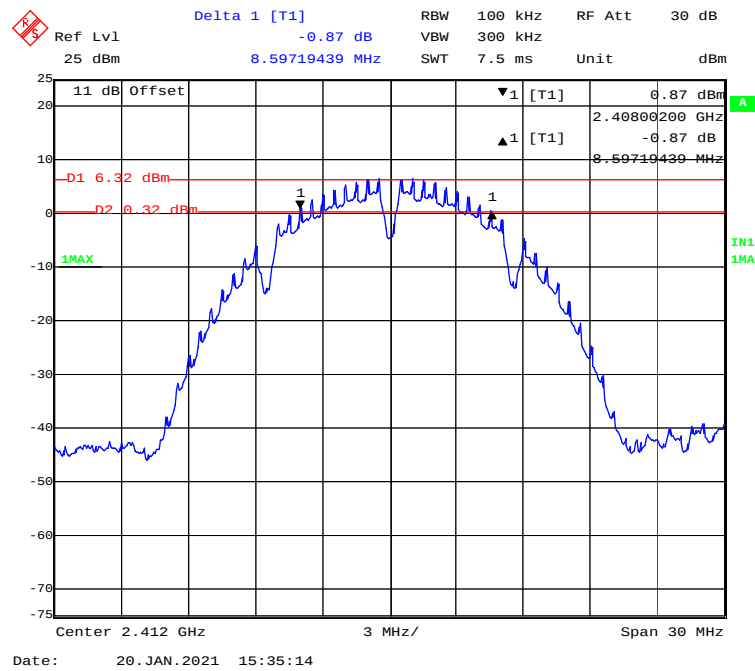
The testing was performed by CK Huang from 2020-11-13 to 2021-01-20.

Test Result: Compliant.

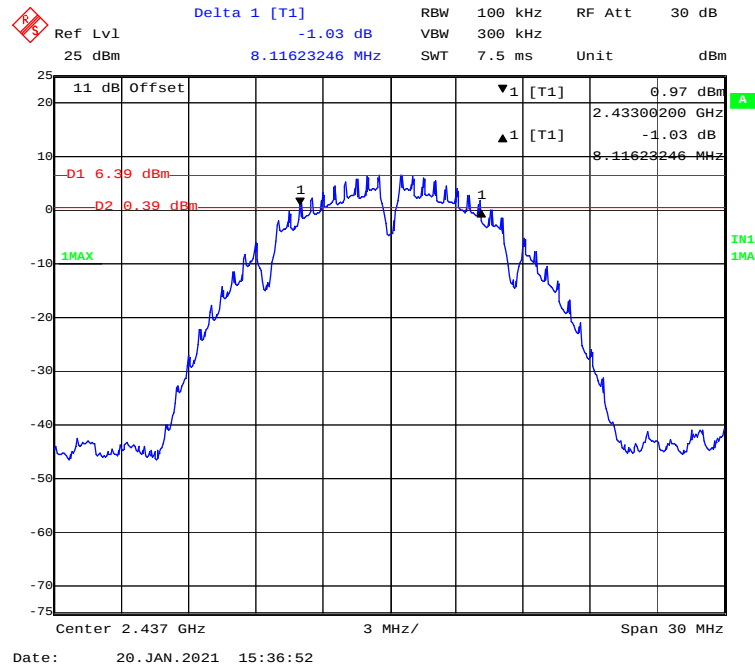
EUT operation mode: Transmitting

Channel	Frequency (MHz)	6 dB Emission Bandwidth (MHz)	Limit (MHz)
802.11b Mode			
Low	2412	8.597	≥ 0.5
Middle	2437	8.116	≥ 0.5
High	2462	8.537	≥ 0.5
802.11g Mode			
Low	2412	15.511	≥ 0.5
Middle	2437	15.691	≥ 0.5
High	2462	15.691	≥ 0.5
802.11n-HT20 Mode			
Low	2412	16.112	≥ 0.5
Middle	2437	15.992	≥ 0.5
High	2462	15.571	≥ 0.5
802.11n-HT40 Mode			
Low	2422	35.351	≥ 0.5
Middle	2437	35.351	≥ 0.5
High	2452	35.351	≥ 0.5
BLE(1Mbps) Mode			
Low	2402	0.691	≥ 0.5
Middle	2440	0.703	≥ 0.5
High	2480	0.697	≥ 0.5
BLE(2Mbps) Mode			
Low	2402	1.263	≥ 0.5
Middle	2440	1.263	≥ 0.5
High	2480	1.263	≥ 0.5

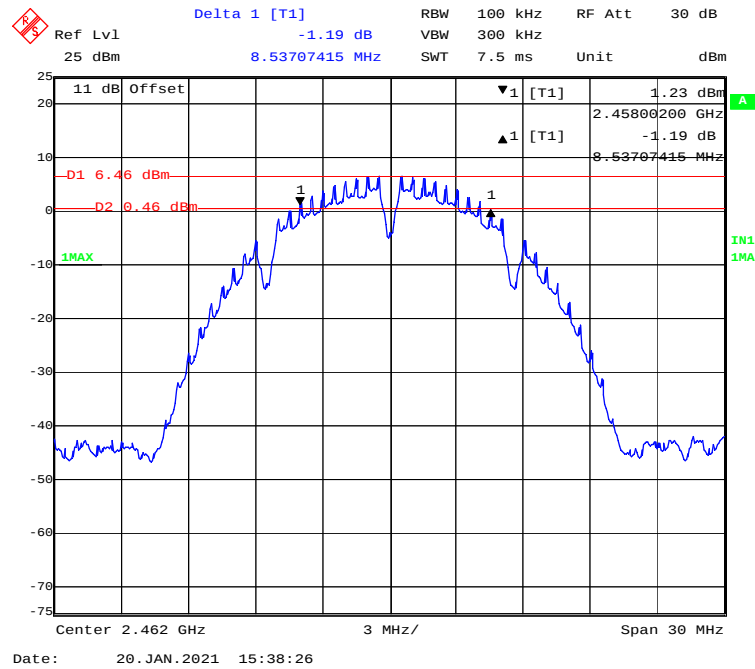
802.11b Mode Low Channel



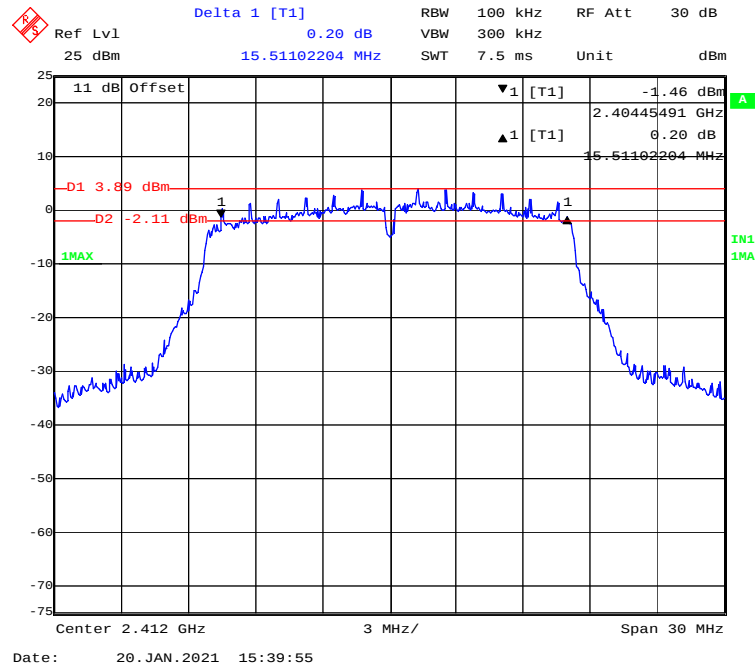
802.11b Mode Middle Channel



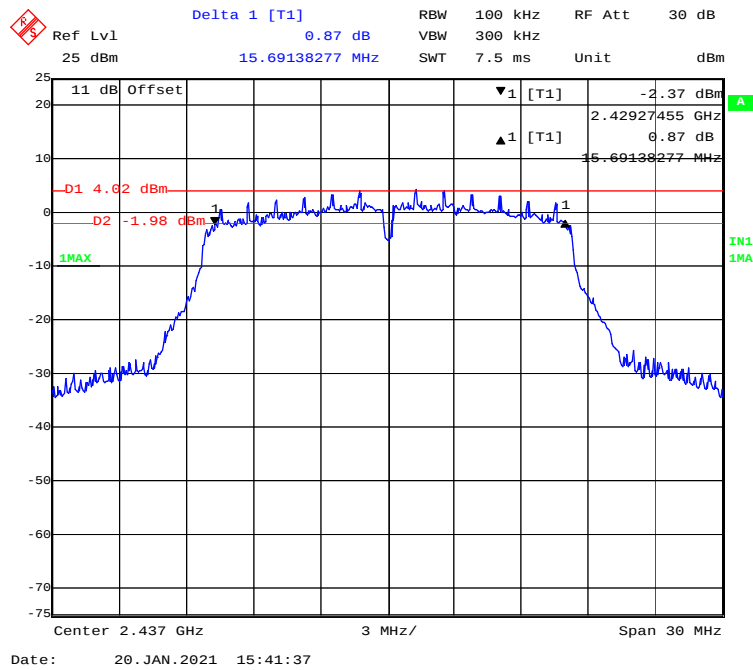
802.11b Mode High Channel



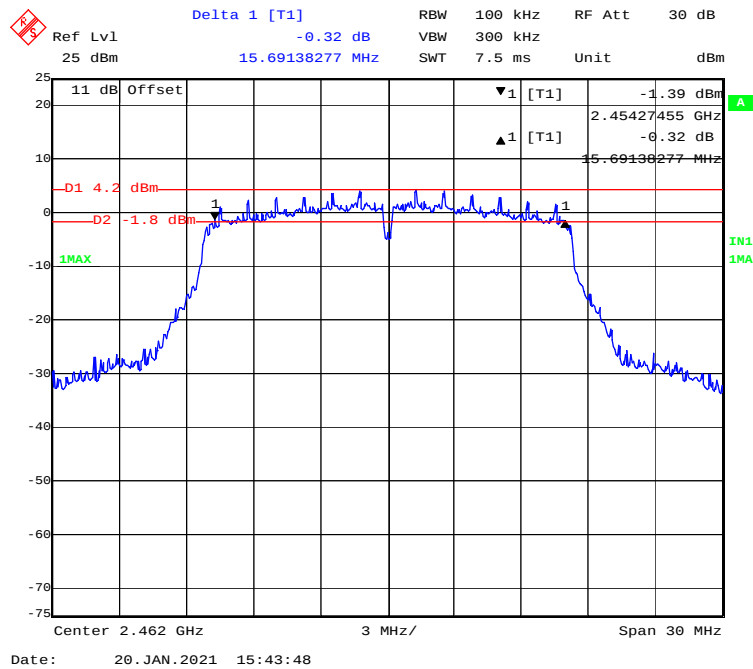
802.11g Mode Low Channel



802.11g Mode Middle Channel



802.11g Mode High Channel



Delta 1 [T1] -0.53 dB
 RBW 100 kHz RF Att 30 dB
 Ref Lvl 25 dBm VBW 300 kHz
 16.11222445 MHz SWT 7.5 ms Unit dBm

11 dB Offset
 ▼1 [T1] -1.26 dBm
 ▲1 [T1] -0.53 dB
 2.40445491 GHz
 16.11222445 MHz
 D1 4.61 dBm
 D2 -1.99 dBm
 1MAX
 1MAX
 Center 2.412 GHz 3 MHz/
 Span 30 MHz
 Date: 20. JAN. 2021 15:45:56

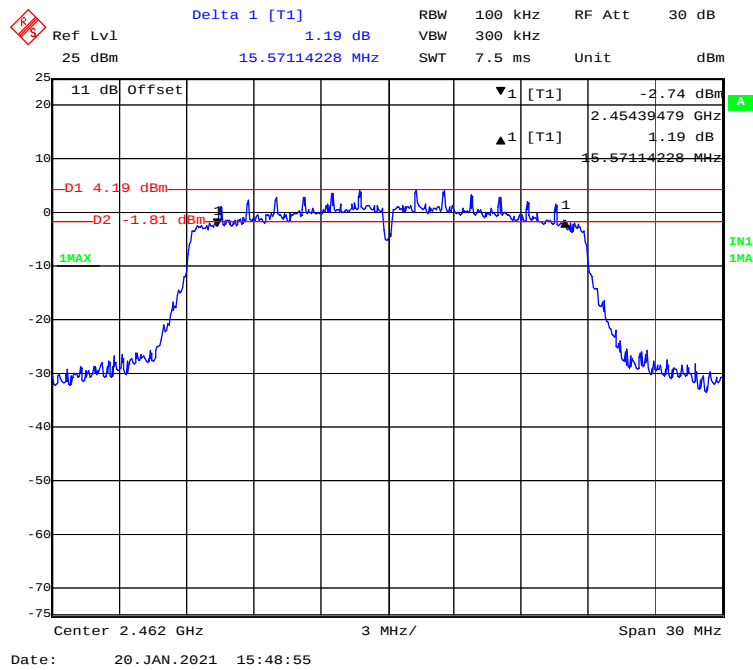
Ref Lvl 25 dBm
 Delta 1 [T1] -0.95 dB
 RBW 100 kHz
 VBW 300 kHz
 SWT 7.5 ms
 RF Att 30 dB
 Unit dBm

11 dB Offset
 ▼1 [T1] -0.64 dBm
 ▲1 [T1] -0.95 dB
 2.42945491 GHz
 15.99198397 MHz
 -D1 4.14 dBm
 D2 -1.86 dBm
 1MAX
 IN1
 1MA

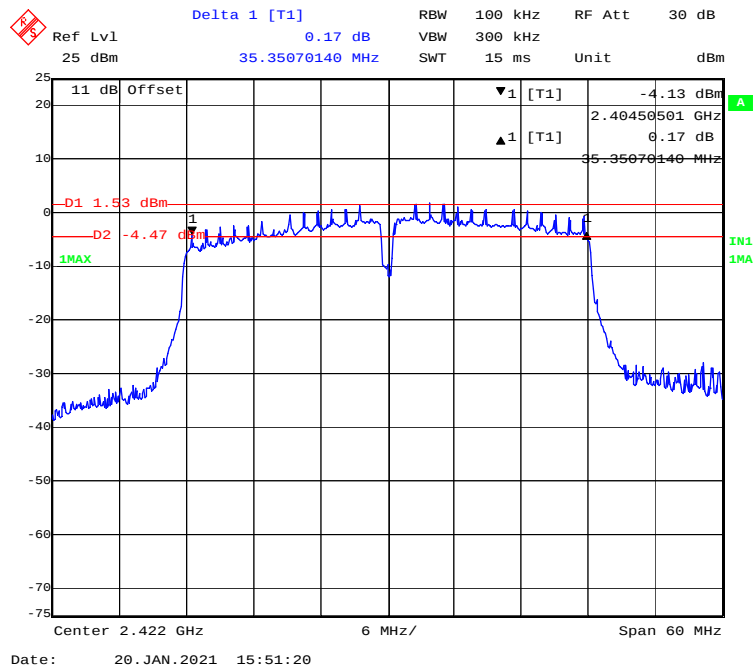
Center 2.437 GHz
 3 MHz/
 Span 30 MHz

Date: 20. JAN. 2021 15:46:56

802.11n-HT20 Mode High Channel



802.11n-HT40 Mode Low Channel



Delta 1 [T1]

Ref Lvl 25 dBm

Delta 1 [T1] -0.60 dB

RBW 100 kHz

RF Att 30 dB

SWT 15 ms

Unit dBm

35.35070140 MHz

11 dB Offset

▼1 [T1] -3.66 dBm

▲1 [T1] -0.60 dB

2.41950501 GHz

35.35070140 MHz

D1 1.57 dBm

D2 -4.43 dBm

1MAX

1MIN

Center 2.437 GHz

6 MHz/

Span 60 MHz

Date: 20. JAN. 2021 15:52:48

Ref Lvl 25 dBm
 Delta 1 [T1] 0.15 dB
 RBW 100 kHz
 VBW 300 kHz
 SWT 15 ms
 RF Att 30 dB
 Unit dBm

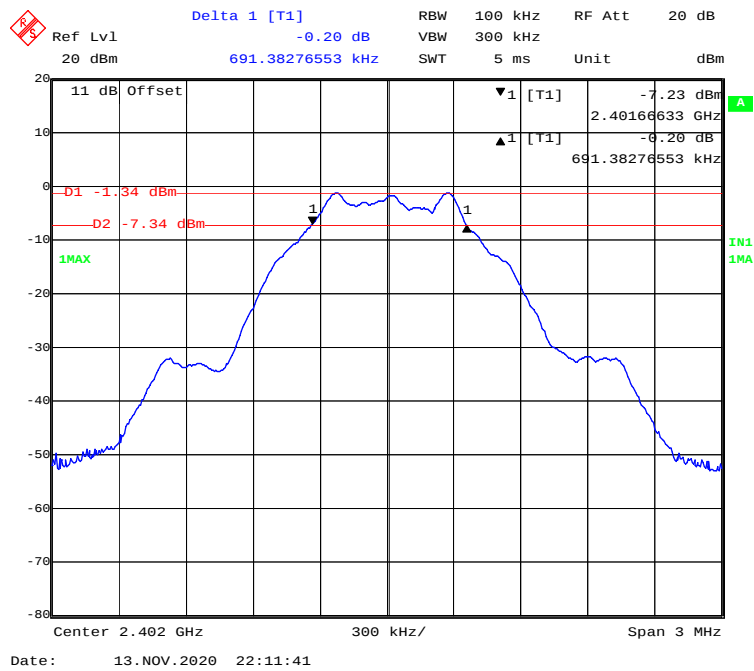
11 dB Offset
 ▼1 [T1] -5.78 dBm
 ▲1 [T1] 0.15 dB
 2.43438477 GHz
 35.35070140 MHz

D1 1.52 dBm
 D2 -4.48 dBm
 1MAX
 1MAX

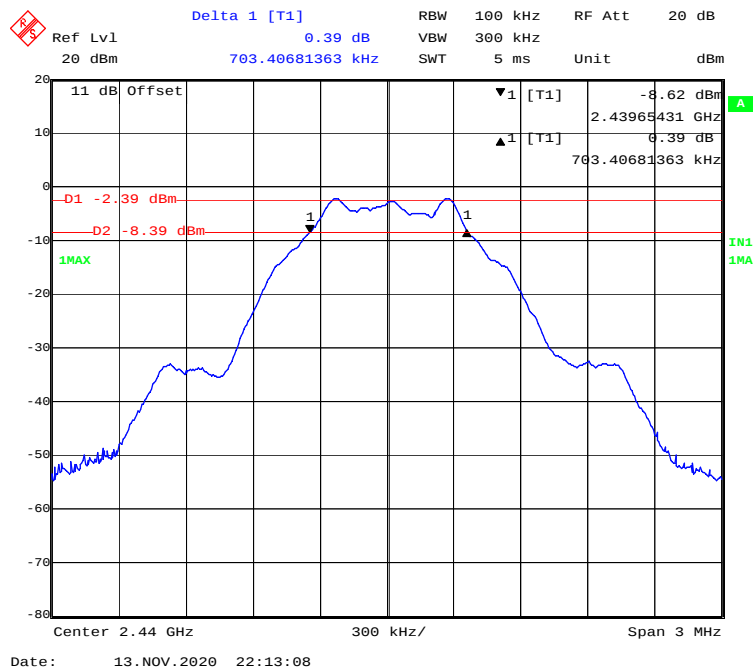
Center 2.452 GHz
 6 MHz/
 Span 60 MHz

Date: 20. JAN. 2021 15:54:24

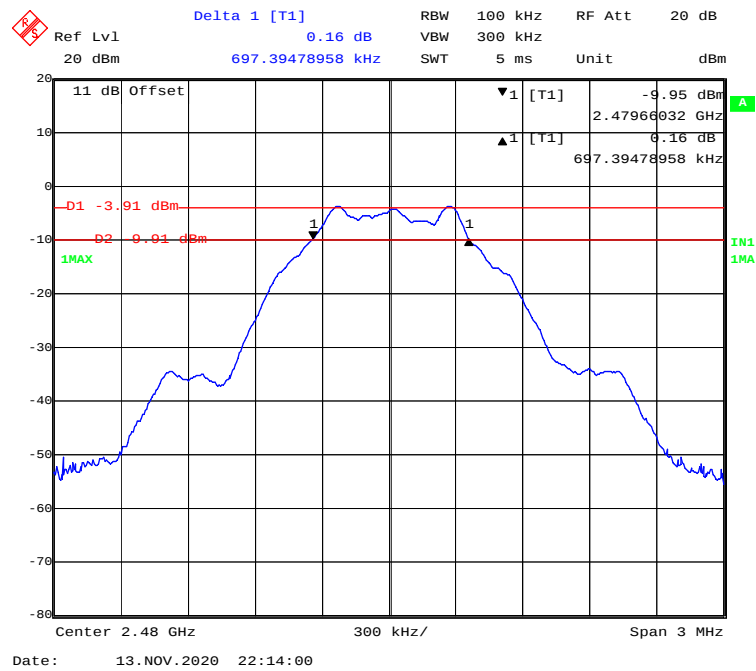
BLE(1Mbps) Mode Low Channel



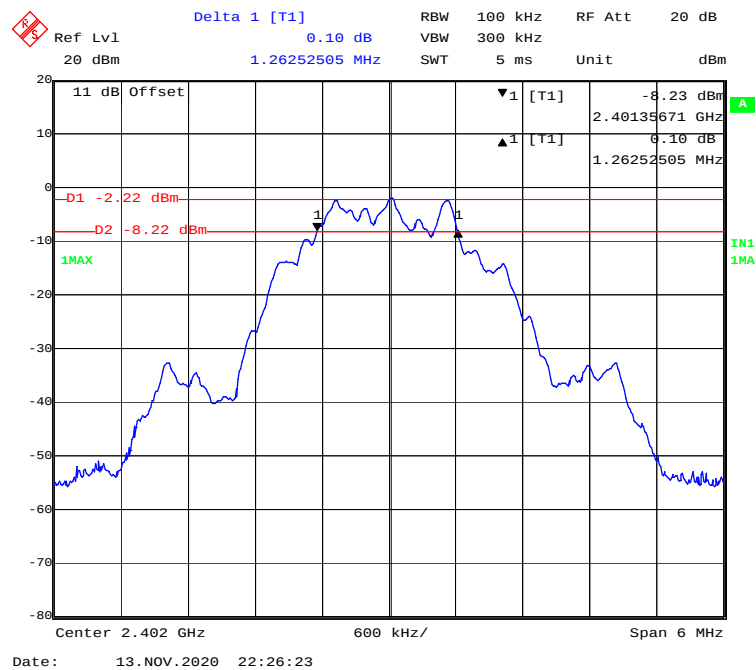
BLE(1Mbps) Mode Middle Channel



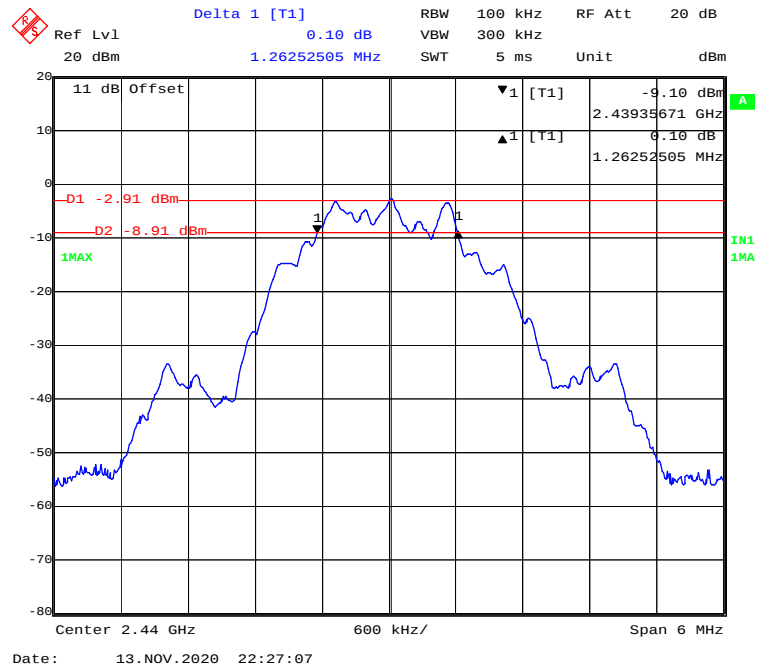
BLE(1Mbps) Mode High Channel



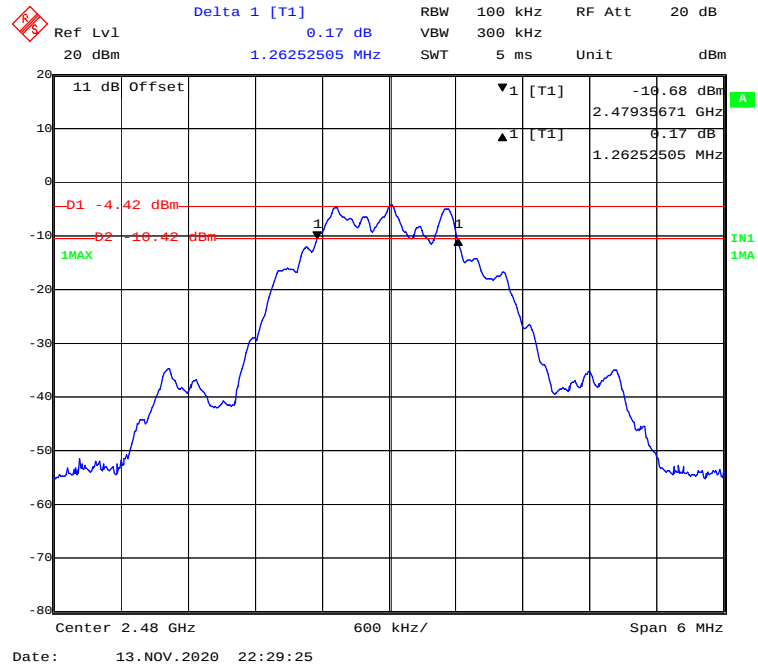
BLE(2Mbps) Mode Low Channel



BLE(2Mbps) Mode Middle Channel



BLE(2Mbps) Mode High Channel



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

Applicable Standard

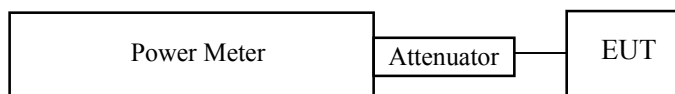
According to FCC §15.247(b) (3), for systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, Compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted 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

For Wi-Fi:

According to ANSI C63.10-2013 sub-clause 11.9.1.3

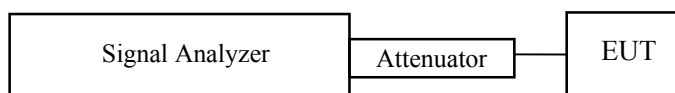
The maximum peak conducted output power may be measured using a broadband peak RF power meter. The power meter shall have a video bandwidth that is greater than or equal to the DTS bandwidth and shall use a fast-responding diode detector.



For BLE:

According to ANSI C63.10-2013 sub-clause 11.9.1.1

1. Set the RBW $\geq$ DTS bandwidth.
2. Set VBW $\geq 3 \times$ RBW.
3. Set span $\geq 3 \times$ RBW
4. Sweep time = auto couple.
5. Detector = peak.
6. Trace mode = max hold.
7. Allow trace to fully stabilize.
8. Use peak marker function to determine the peak amplitude level.



Test Data**Environmental Conditions**

Temperature:	23.6 °C
Relative Humidity:	51 %
ATM Pressure:	101.6 kPa

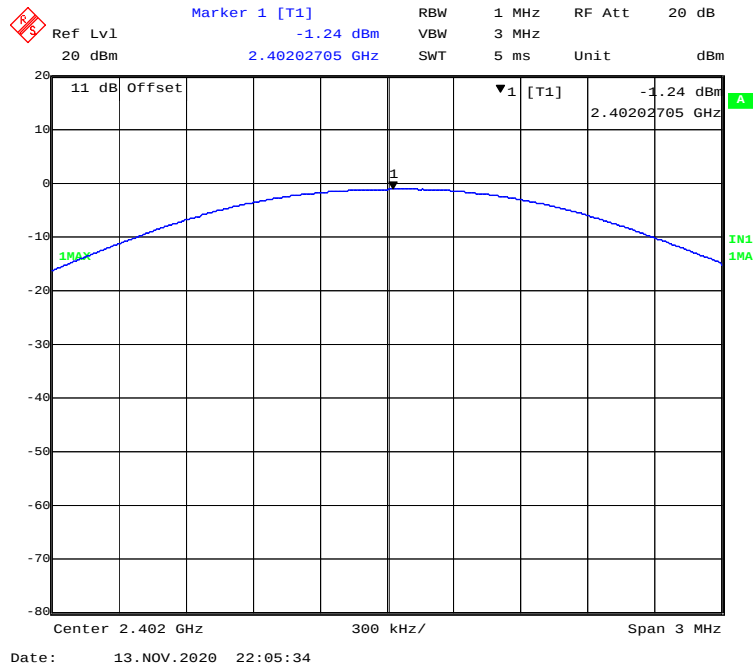
The testing was performed by CK Huang on 2020-11-13.

Test Result: Compliant.

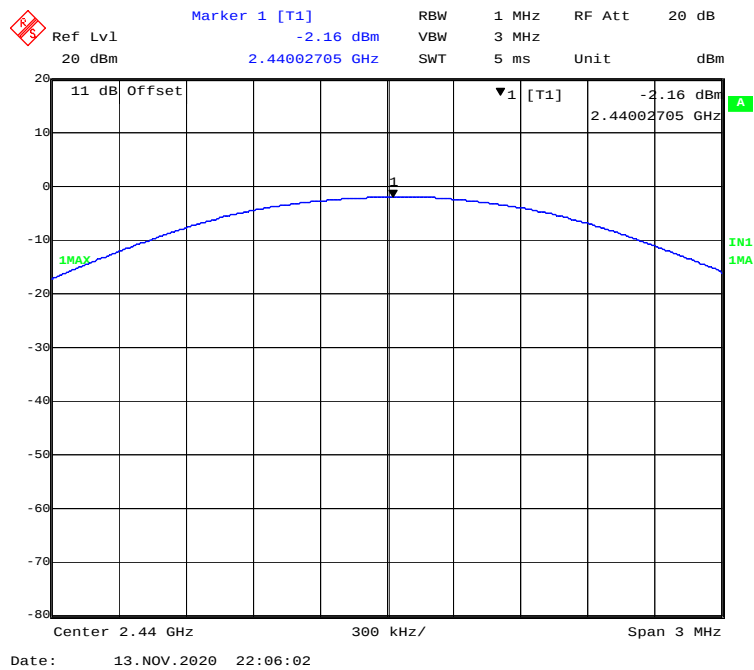
EUT operation mode: Transmitting

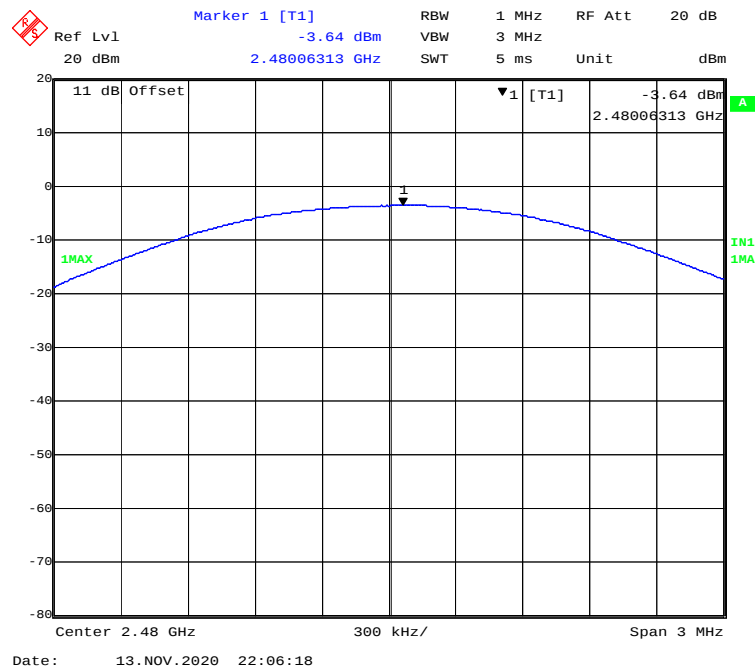
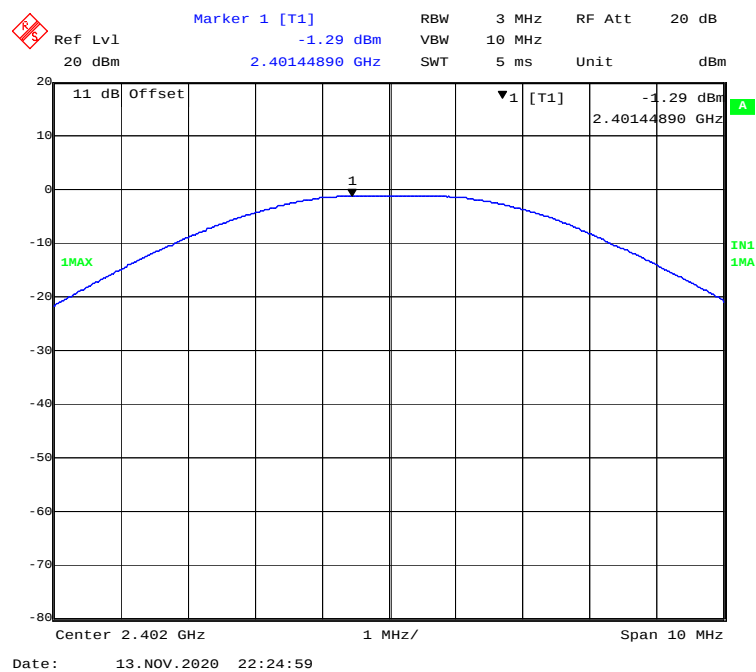
Channel	Frequency (MHz)	Max Conducted Peak Output Power (dBm)	Max Conducted Average Power (dBm)	Limit (dBm)	Result
802.11b Mode					
Low	2412	17.61	14.00	30	Pass
Middle	2437	17.76	14.34	30	Pass
High	2462	17.84	14.32	30	Pass
802.11g Mode					
Low	2412	22.10	13.01	30	Pass
Middle	2437	22.36	13.30	30	Pass
High	2462	22.20	13.18	30	Pass
802.11n-HT20 Mode					
Low	2412	22.05	12.88	30	Pass
Middle	2437	22.21	13.20	30	Pass
High	2462	22.14	13.06	30	Pass
802.11n-HT40 Mode					
Low	2422	22.54	12.53	30	Pass
Middle	2437	22.40	12.33	30	Pass
High	2452	22.92	12.51	30	Pass
BLE (1Mbps) Mode					
Low	2402	-1.24	/	30	Pass
Middle	2440	-2.16	/	30	Pass
High	2480	-3.64	/	30	Pass
BLE (2Mbps) Mode					
Low	2402	-1.29	/	30	Pass
Middle	2440	-2.09	/	30	Pass
High	2480	-3.63	/	30	Pass

BLE(1Mbps) Mode Low Channel

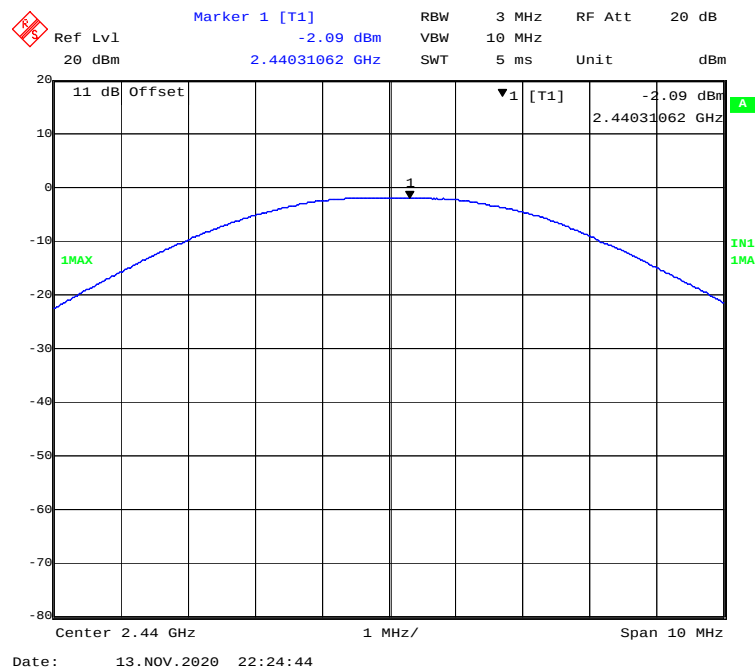


BLE(1Mbps) Mode Middle Channel

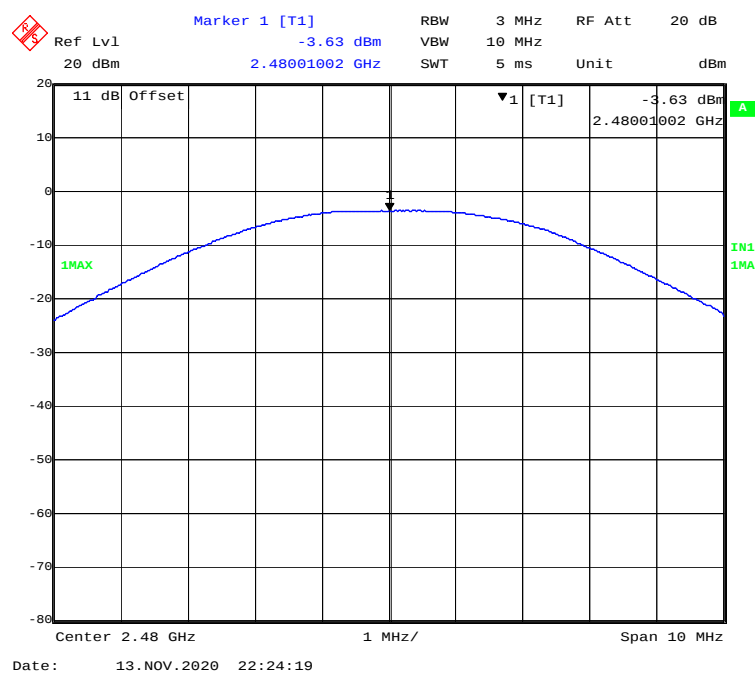


BLE(1Mbps) Mode High Channel**BLE(2Mbps) Mode Low Channel**

BLE(2Mbps) Mode Middle Channel



BLE(2Mbps) Mode High Channel



FCC §15.247(d) – 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

According to ANSI C63.10-2013 sub-clause 6.10.

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

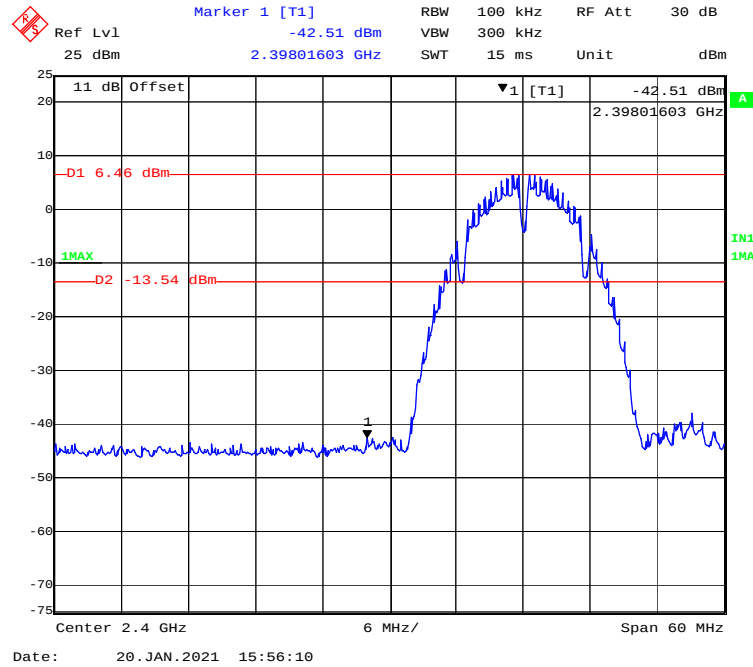
Temperature:	23.4-24.6 °C
Relative Humidity:	49-52 %
ATM Pressure:	101.2-101.6 kPa

The testing was performed by CK Huang from 2020-11-13 to 2021-01-20.

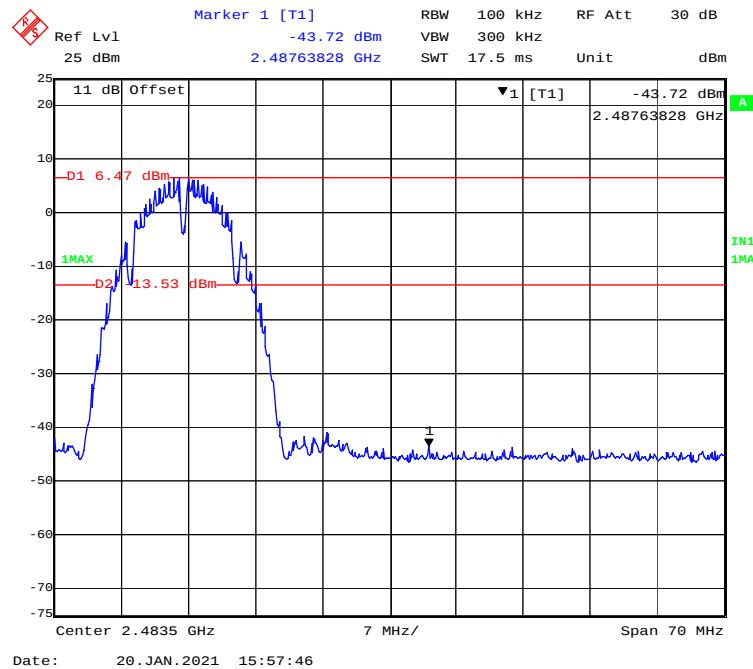
Test Result: Compliant.

EUT operation mode: Transmitting

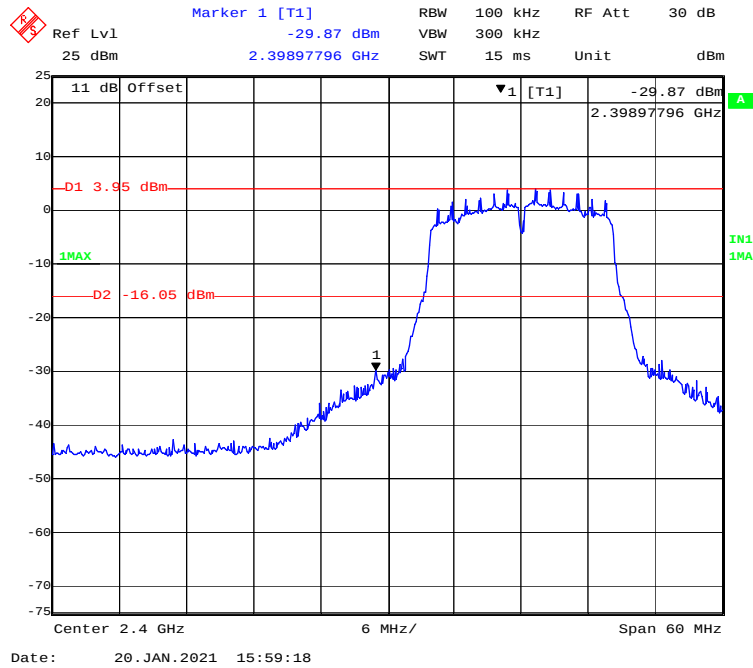
802.11b Mode Left Side



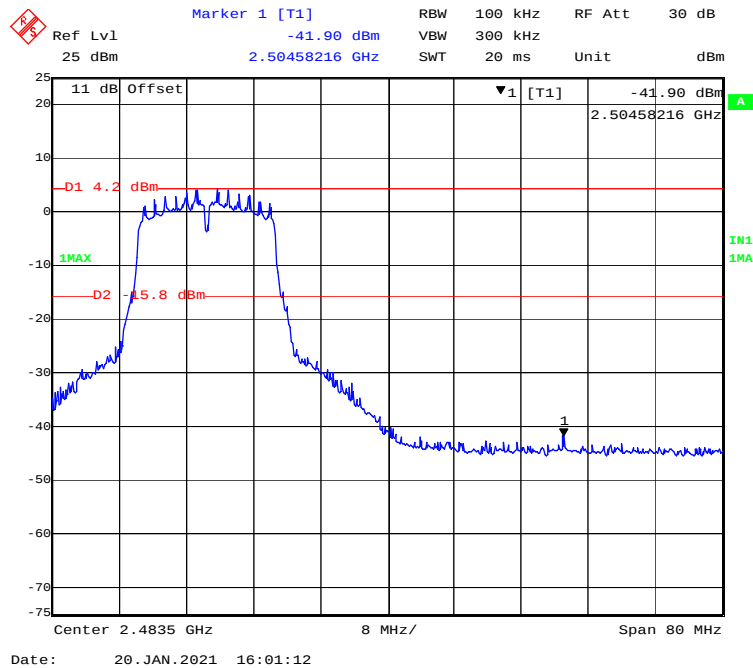
802.11b Mode Right Side



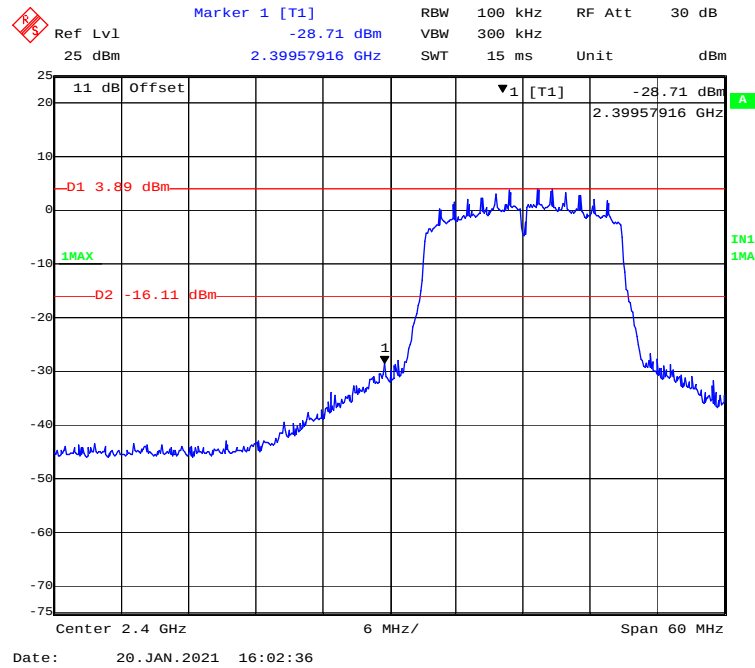
802.11g Mode Left Side



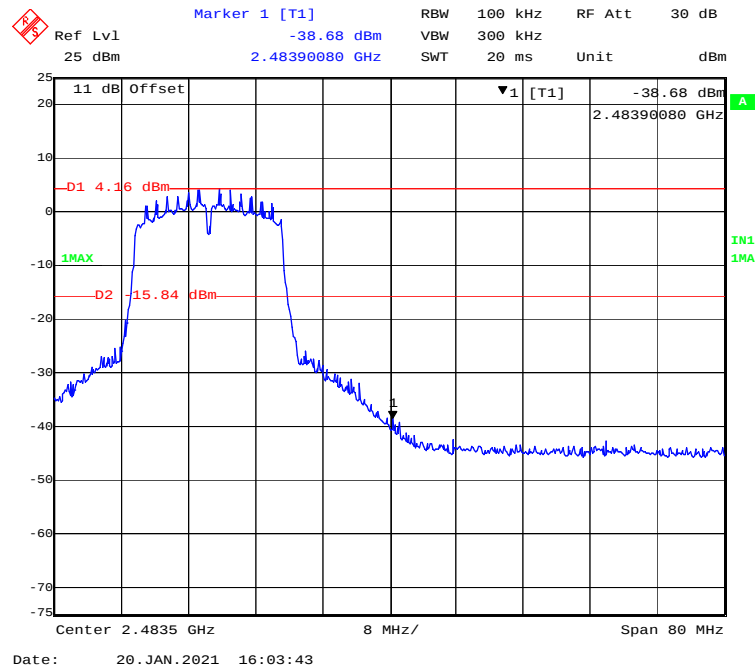
802.11g Mode Right Side



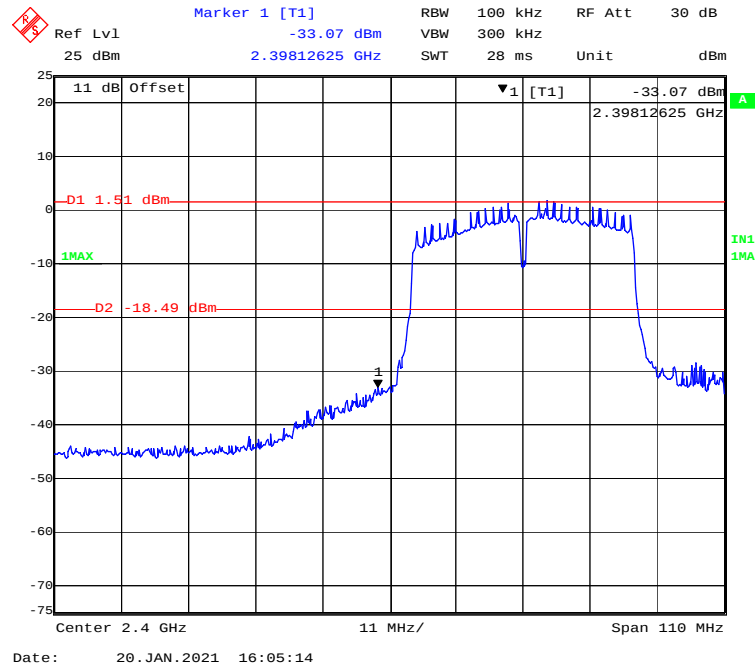
802.11n-HT20 Mode Left Side



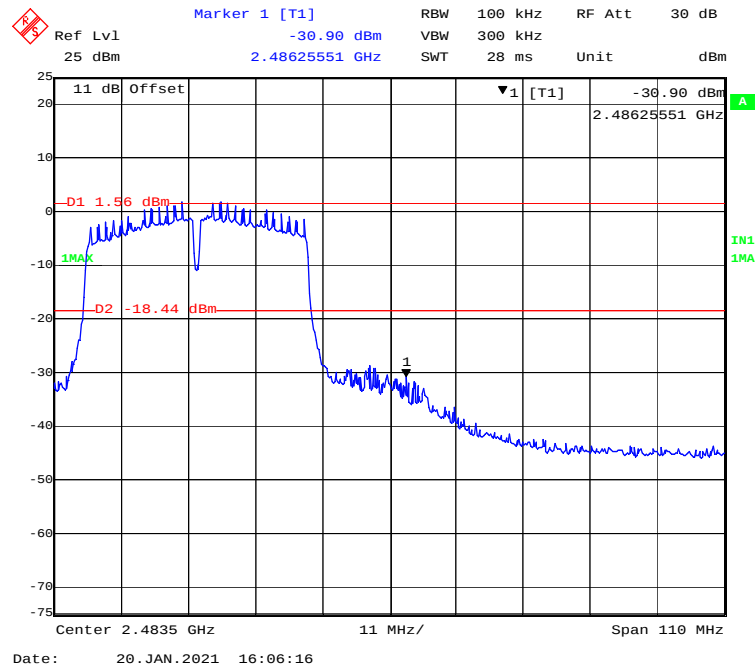
802.11n-HT20 Mode Right Side



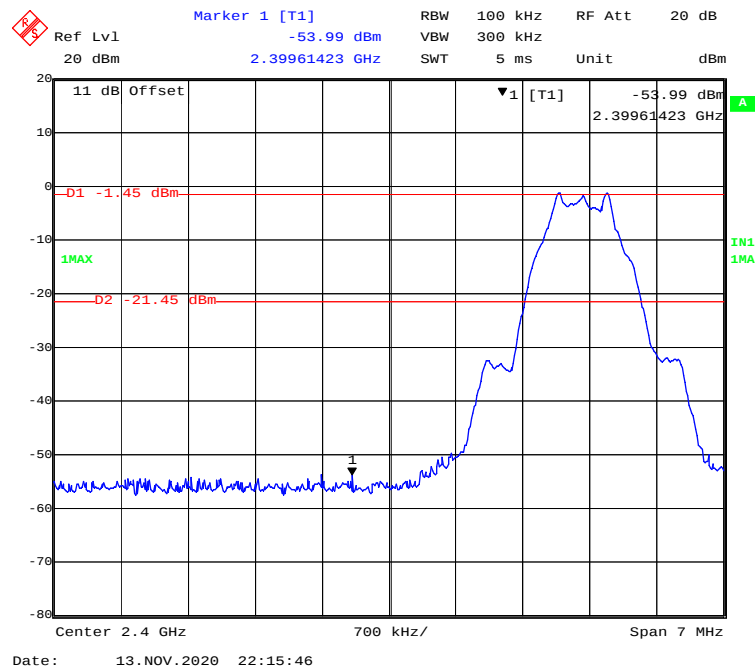
802.11n-HT40 Mode Left Side



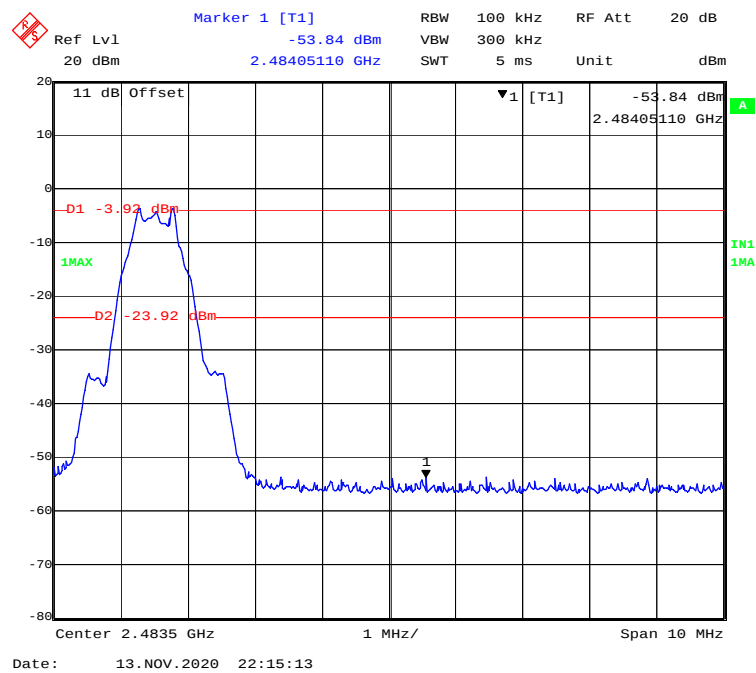
802.11n-HT40 Mode Right Side



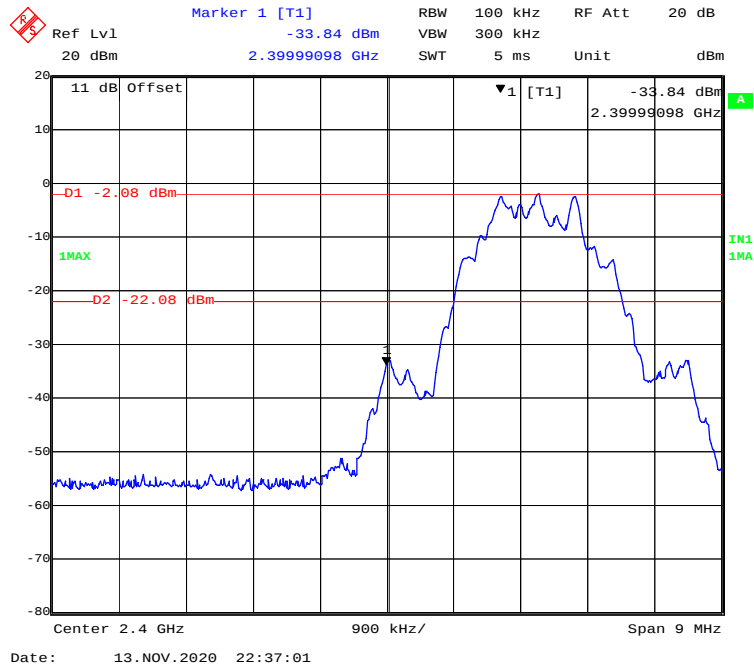
BLE (1Mbps) Mode Left Side



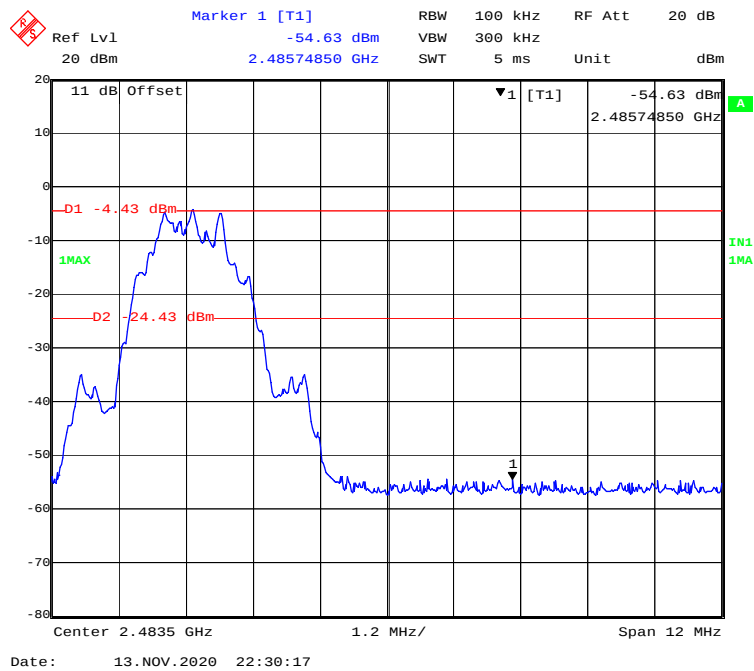
BLE (1Mbps) Mode Right Side



BLE(2Mbps) Mode Left Side



BLE(2Mbps) Mode Right Side



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

According to ANSI C63.10-2013 sub-clause 11.10.2

The following procedure shall be used if maximum peak conducted output power was used to determine compliance, and it is optional if the maximum conducted (average) output power was used to determine compliance:

1. Set the RBW to: $3\text{kHz} \leq \text{RBW} \leq 100\text{ kHz}$.
2. Set the VBW $\geq [3 \times \text{RBW}]$.
3. Set the span to 1.5 times the DTS bandwidth.
4. Detector = peak.
5. Sweep time = auto couple.
6. Trace mode = max hold.
7. Allow trace to fully stabilize.
8. Use the peak marker function to determine the maximum amplitude level within the RBW.
9. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

Test Data

Environmental Conditions

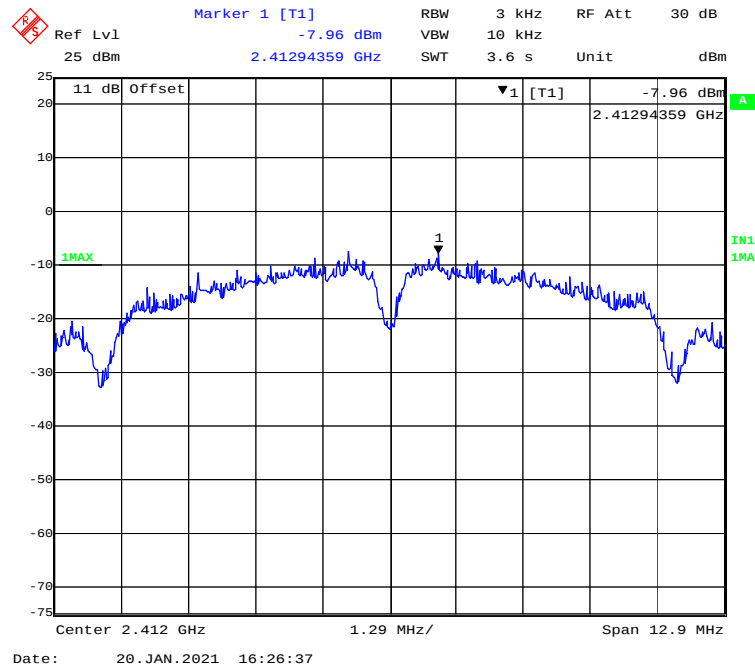
Temperature:	23.4-24.6 °C
Relative Humidity:	49-52 %
ATM Pressure:	101.2-101.6 kPa

The testing was performed by CK Huang from 2020-11-13 to 2021-01-20.

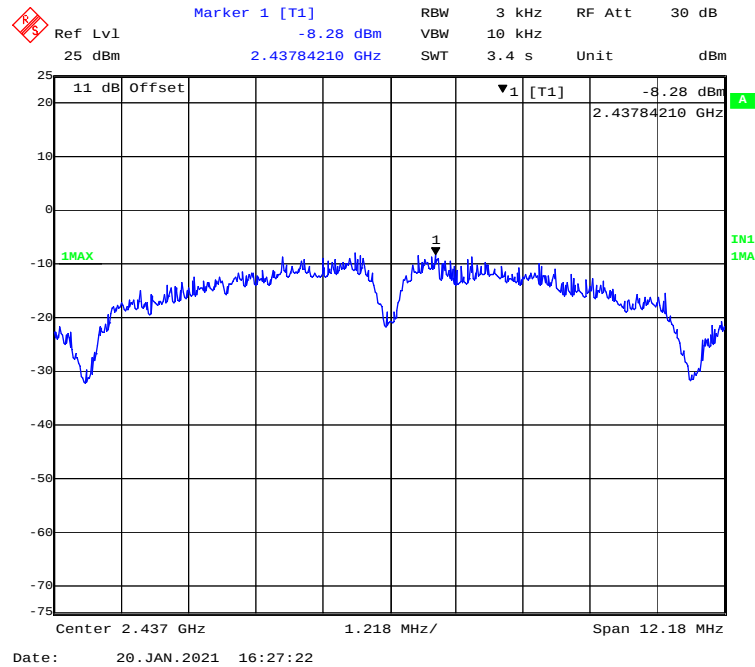
Test Result: Compliant.

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)
802.11b Mode			
Low	2412	-7.96	≤ 8
Middle	2437	-8.28	≤ 8
High	2462	-7.23	≤ 8
802.11g Mode			
Low	2412	-10.10	≤ 8
Middle	2437	-10.55	≤ 8
High	2462	-10.11	≤ 8
802.11n-HT20 mode			
Low	2412	-11.71	≤ 8
Middle	2437	-10.72	≤ 8
High	2462	-8.87	≤ 8
802.11n-HT40 mode			
Low	2422	-12.53	≤ 8
Middle	2437	-13.14	≤ 8
High	2452	-13.94	≤ 8
BLE (1Mbps) mode			
Low	2402	-11.57	≤ 8
Middle	2440	-12.46	≤ 8
High	2480	-14.00	≤ 8
BLE (2Mbps) mode			
Low	2402	-16.79	≤ 8
Middle	2440	-17.67	≤ 8
High	2480	-19.17	≤ 8

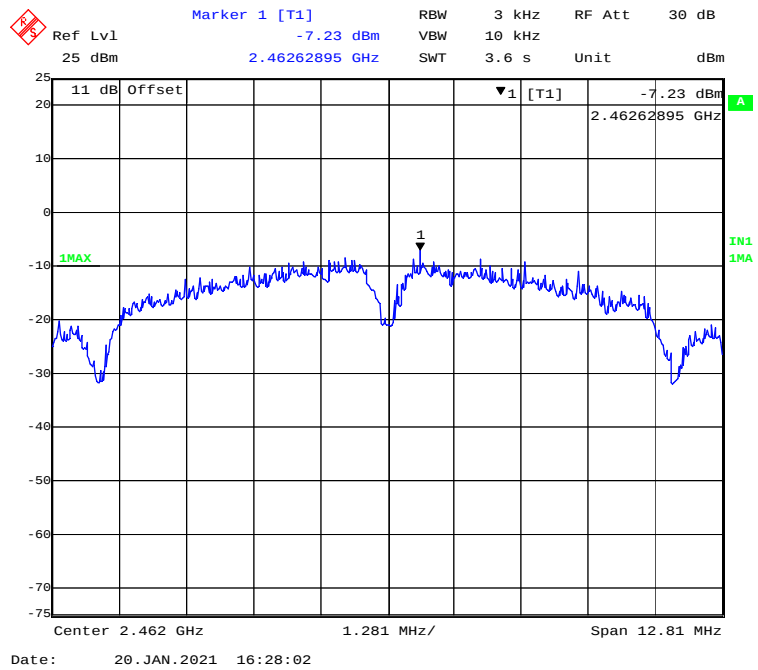
802.11b Mode Low Channel



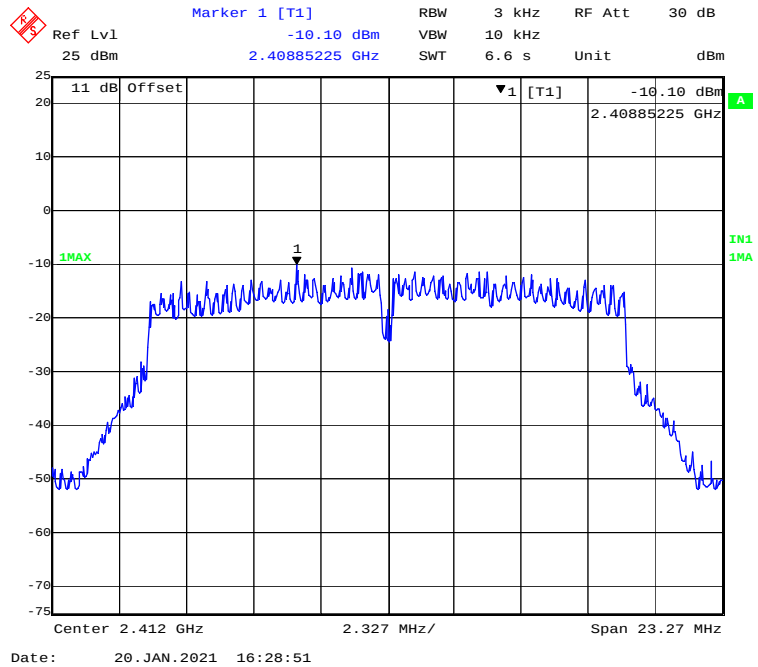
802.11b Mode Middle Channel



802.11b Mode High Channel



802.11g Mode Low Channel



Marker 1 [T1]
 -10.55 dBm
 2.43825012 GHz

RBW 3 kHz
 RF Att 30 dB
 SWT 6.6 s
 Unit dBm

Ref Lvl 25 dBm

11 dB Offset

▼1 [T1]

-10.55 dBm

2.43825012 GHz

1MAX

1

IN1 1MA

Center 2.437 GHz

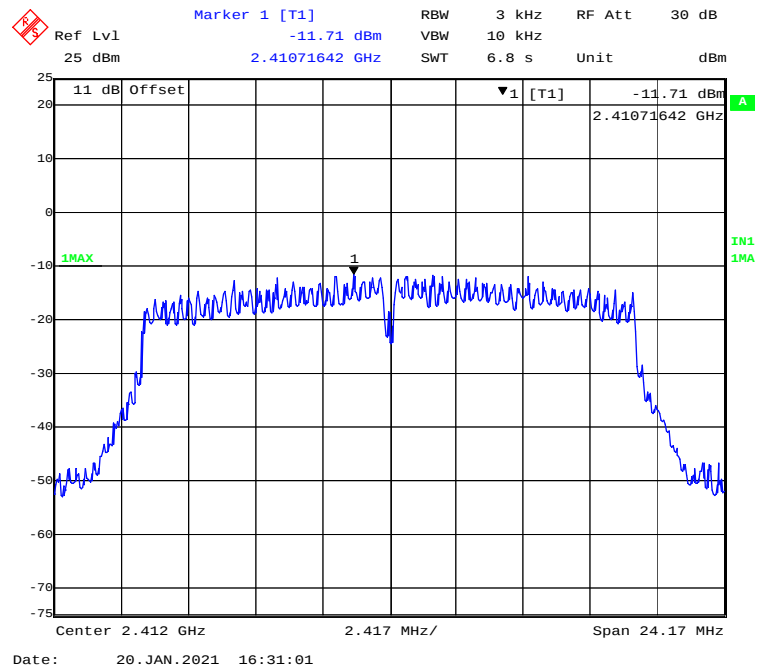
2.354 MHz/

Span 23.54 MHz

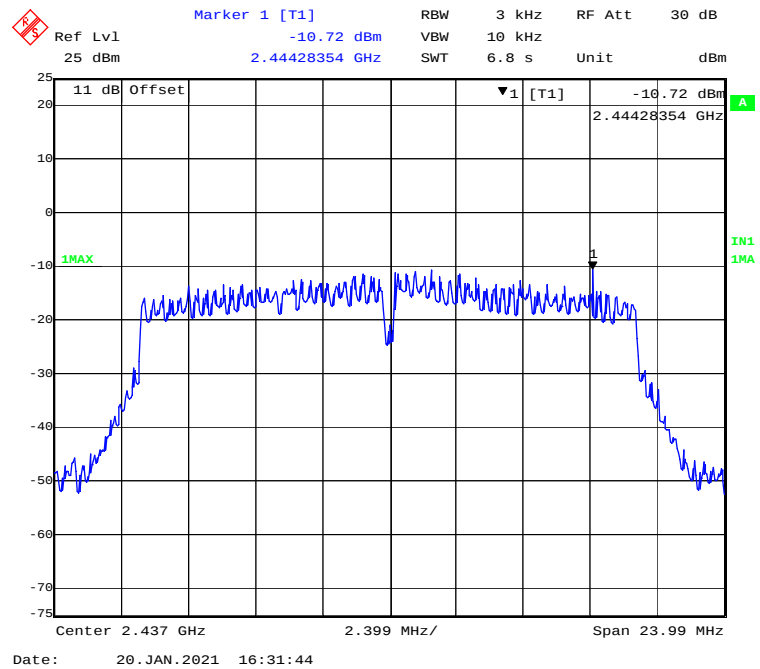
Date: 20.JAN.2021 16:29:29

[illegible]

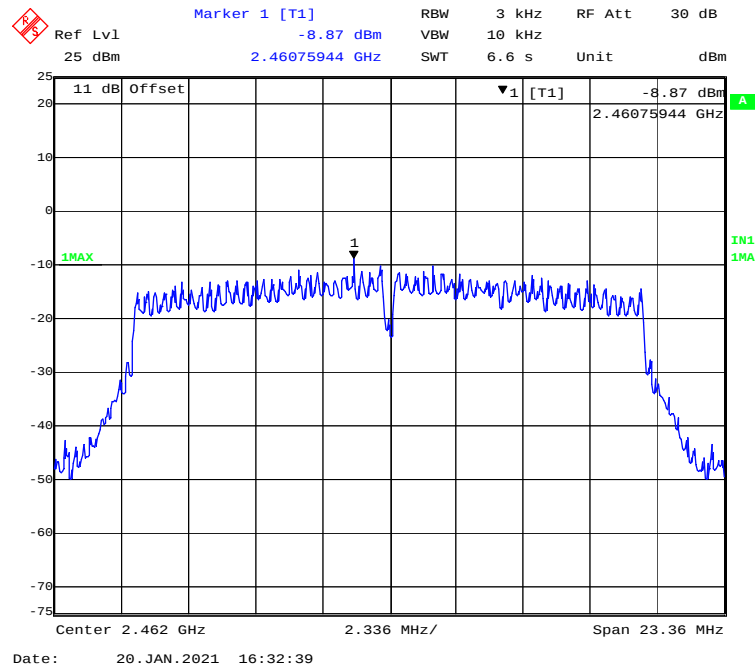
802.11n-HT20 Mode Low Channel



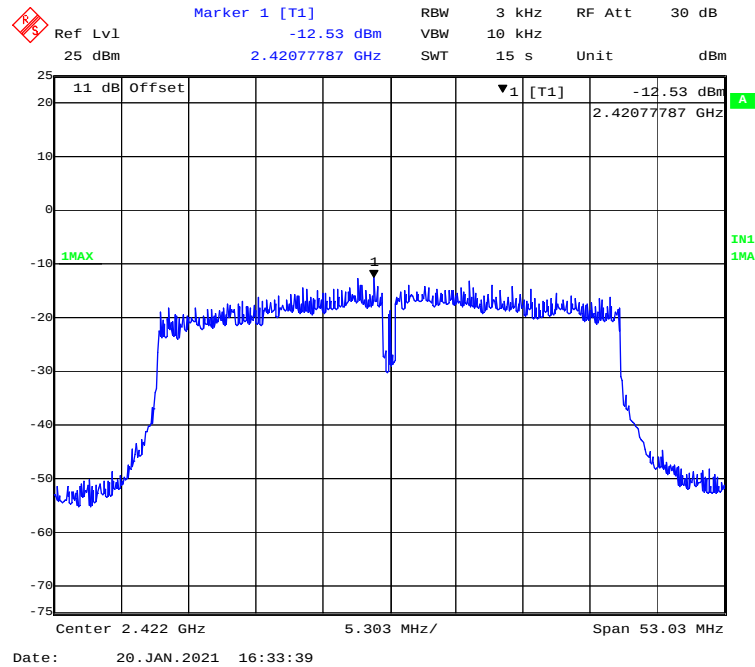
802.11n-HT20 Mode Middle Channel



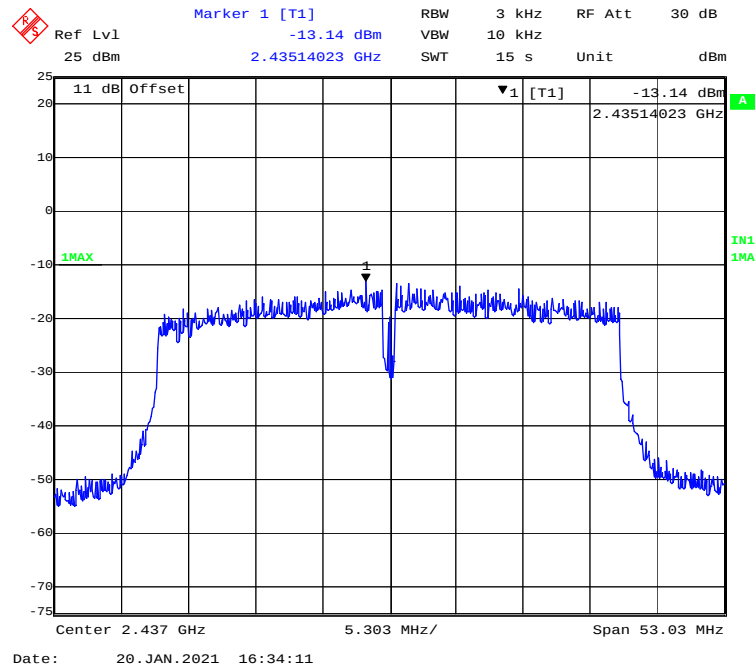
802.11n-HT20 Mode High Channel



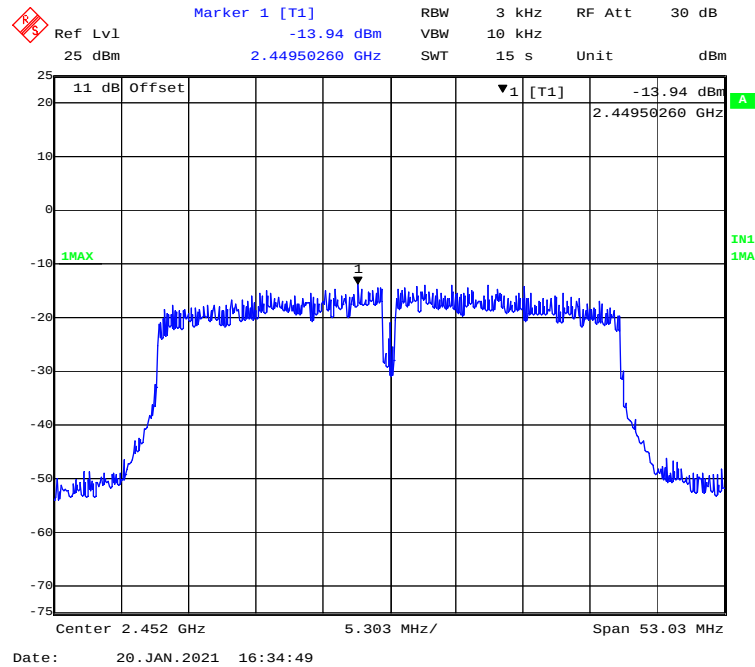
802.11n-HT40 Mode Low Channel



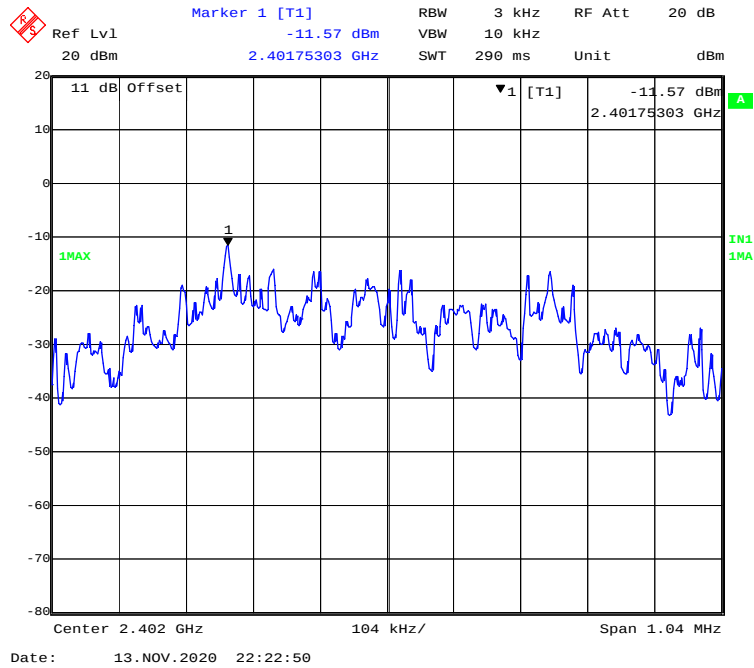
802.11n-HT40 Mode Middle Channel



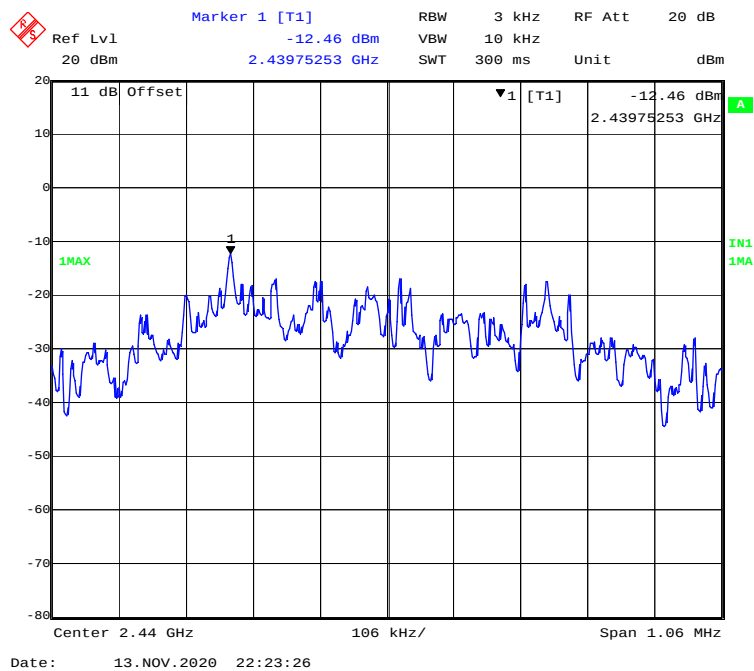
802.11n-HT40 Mode High Channel



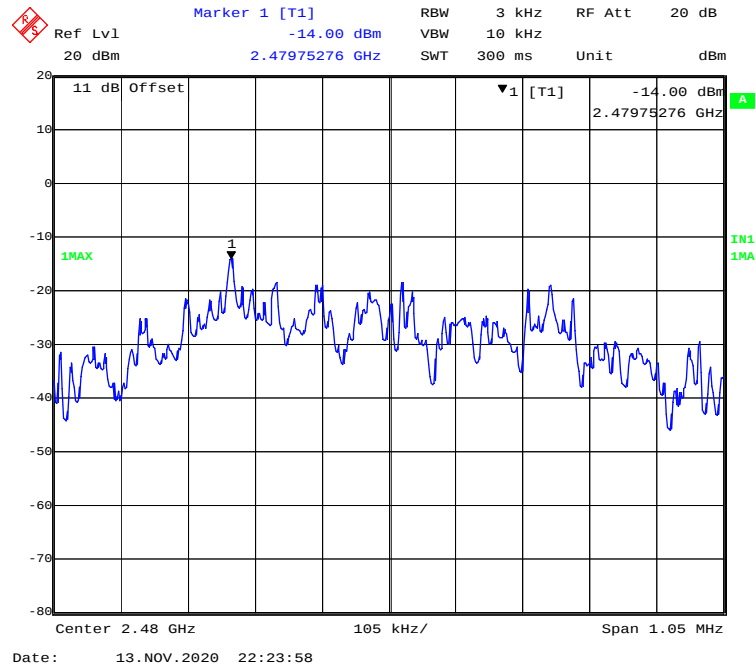
BLE(1Mbps) Mode Low Channel



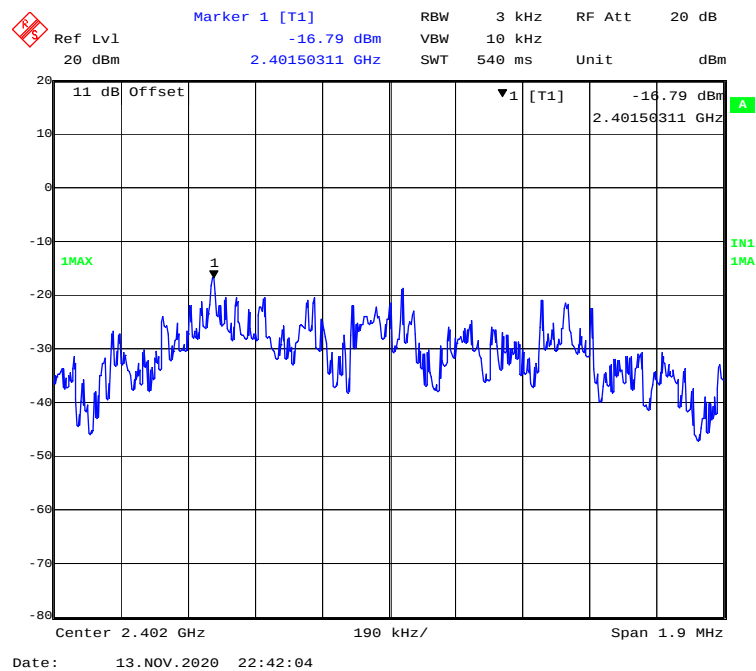
BLE(1Mbps) Mode Middle Channel



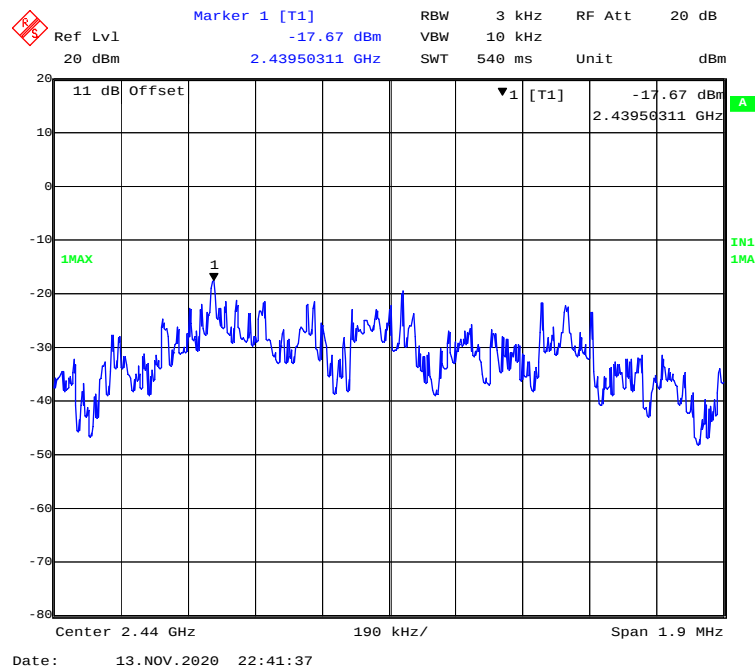
BLE(1Mbps) Mode High Channel



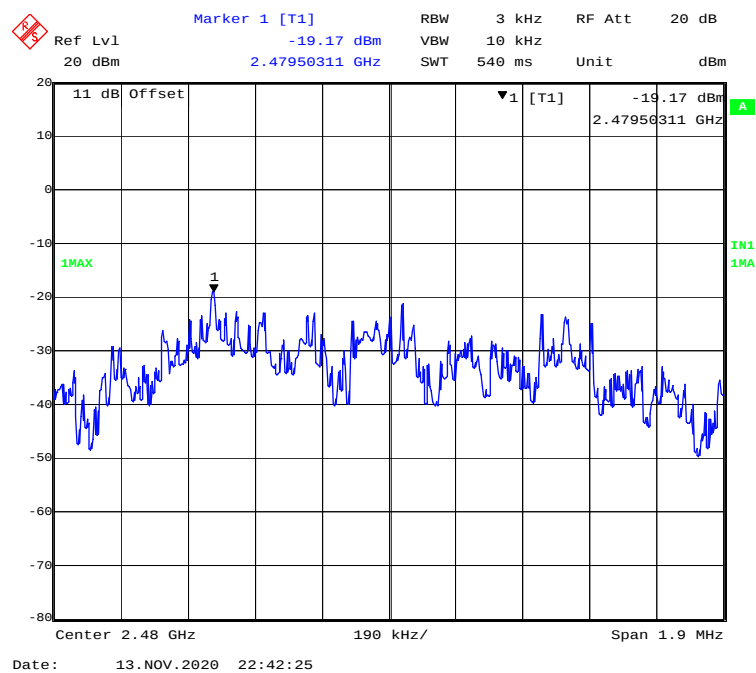
BLE(2Mbps) Mode Low Channel



BLE(2Mbps) Mode Middle Channel



BLE(2Mbps) Mode High Channel



Declarations

- 1: 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.
- 2: Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.
- 3: Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.
- 4: The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval.
- 5: This report cannot be reproduced except in full, without prior written approval of the Company.
- 6: This report is valid only with a valid digital signature. The digital signature may be available only under the Adobe software above version 7.0.

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