



TESTING LABORATORY
CERTIFICATE#4323.01



FCC PART 15.247

TEST REPORT

For

Shopify Inc.

151 O'Connor Street, Ground Floor, Ottawa, Ontario, Canada

FCC ID: 2AY2DS2004

Report Type: Original Report	Product Type: POS tablet
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Report Number:	RKSA210419002-00B
Report Date:	2021-05-29
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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Applicant	Shopify Inc.
Product Type	POS tablet
Tested Model	S2004
Power Supply	DC 5V from adapter and DC 3.85V from battery
Maximum Output Power	2.4G Wi-Fi: 802.11b: 16.41 dBm 802.11g: 23.68 dBm 802.11n20: 23.63 dBm 802.11n40: 21.46 dBm BLE(1Mbps): 2.48 dBm BLE(2Mbps): 2.73 dBm
RF Function	2.4G Wi-Fi, BLE(1Mbps), BLE(2Mbps)
Operating Band/Frequency	2.4G Wi-Fi: 2412-2462 MHz(802.11b/g/n20), 2422-2452 MHz(802.11n40) BLE(1Mbps)/BLE(2Mbps): 2402-2480 MHz
Channel Number	2.4G Wi-Fi: 11(802.11b/g/n20), 7(802.11n40) 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: FPC Antenna BLE(1Mbps), BLE(2Mbps): FPC Antenna
*Maximum Antenna Gain	2.4G Wi-Fi: 0.71 dBi BLE(1Mbps)/BLE(2Mbps): 0.71 dBi

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: RKSA210419002-1 (Assigned by the BACL. The EUT supplied by the applicant was received on 2021-04-19)*

Objective

This report is prepared on behalf of *Shopify Inc.* in accordance with Part 2-Subpart J, Part 15-Subparts A and C of the Federal Communication Commissions 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 submissions with FCC ID: 2AY2DS2004
FCC Part 15.407 NII submissions with FCC ID: 2AY2DS2004
FCC Part 15B JBP submissions with FCC ID: 2AY2DS2004

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) and the FCC designation No. CN1185 under the FCC KDB 974614 D01 and CAB identifier CN0004 under the ISSED 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.

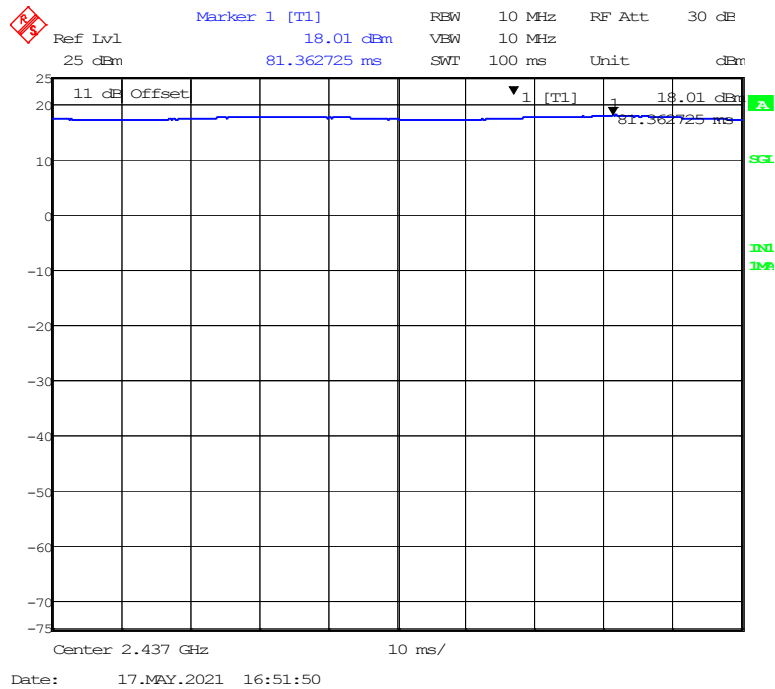
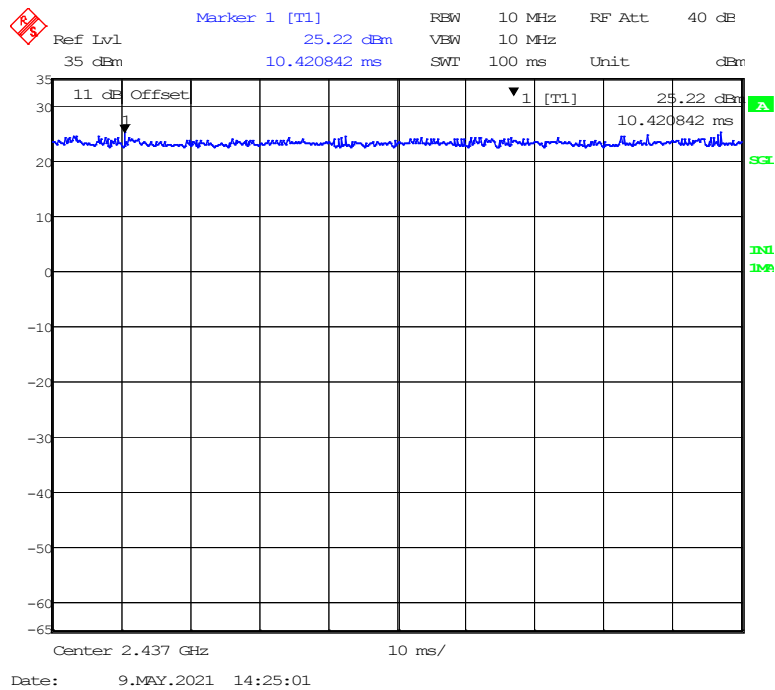
EUT Exercise Software

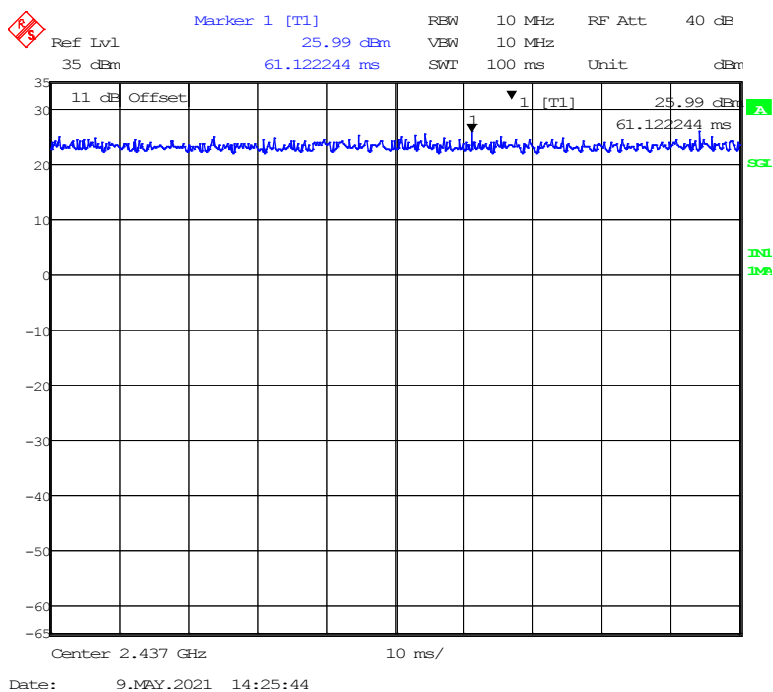
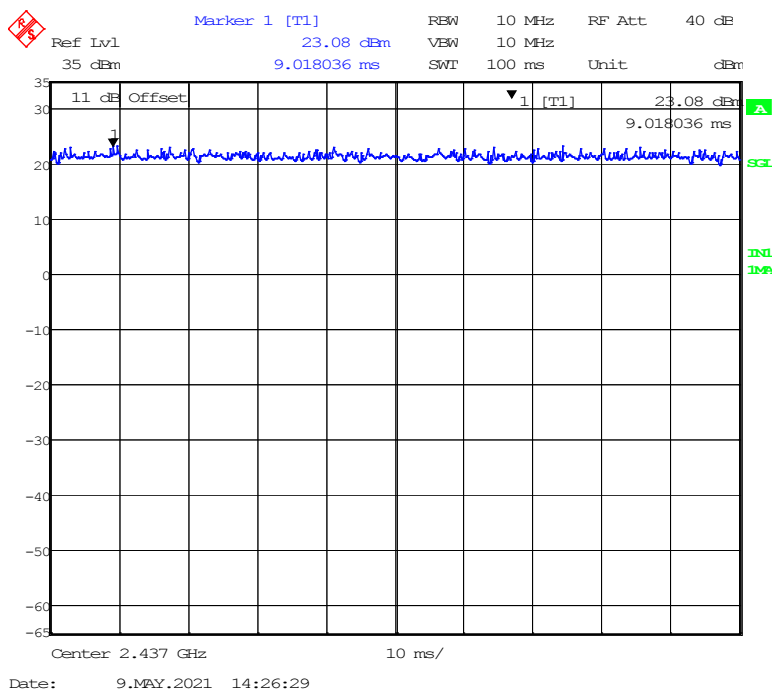
RF test tool: QRCT

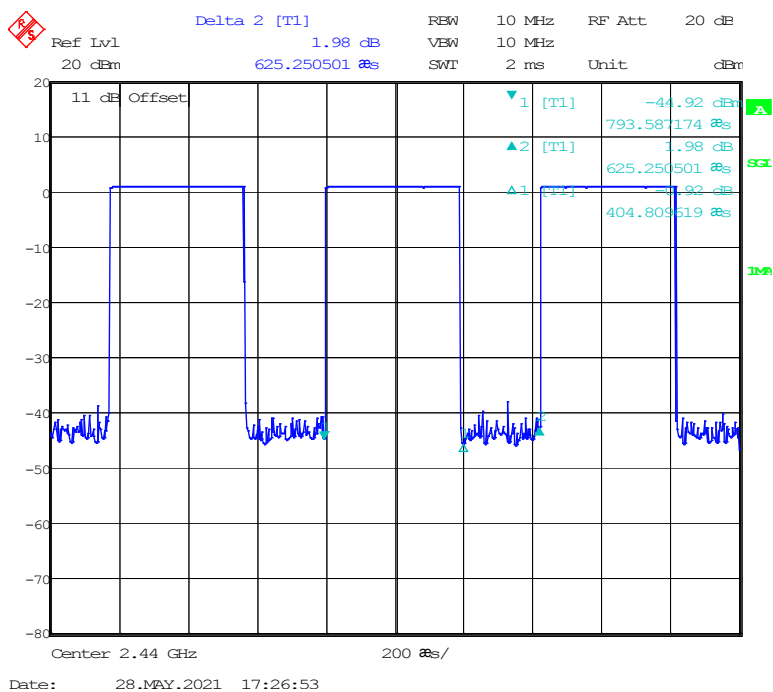
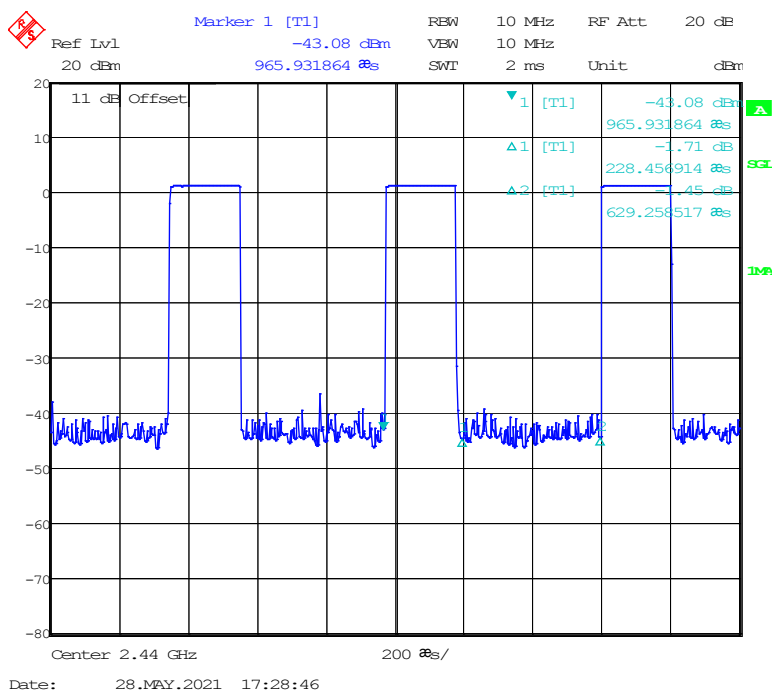
Pre-scan with all the data rates, and the worst case was performed as below:

Mode	Data Rate	Channel	Power Level setting
802.11b	1 Mbps	Low	13.5
		Middle	13.5
		High	13.5
802.11g	6 Mbps	Low	15.5
		Middle	15.5
		High	15.5
802.11n-HT20	MCS0	Low	15.0
		Middle	15.0
		High	15.0
802.11n-HT40	MCS0	Low	12.5
		Middle	12.5
		High	12.5
BLE	1Mbps	Low	Default
		Middle	Default
		High	Default
	2Mbps	Low	Default
		Middle	Default
		High	Default

Note: The power level setting was declared by the applicant.

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 _{on} (ms)	T _{on+off} (ms)	10log(1/x)
802.11b	100	100	100	0
802.11g	100	100	100	0
802.11n-HT20	100	100	100	0
802.11n-HT40	100	100	100	0
BLE(1Mbps)	64.80	0.405	0.625	1.884
BLE(2Mbps)	36.25	0.228	0.629	4.407

Note: “x” means the Duty Cycle.

Support Equipment List and Details

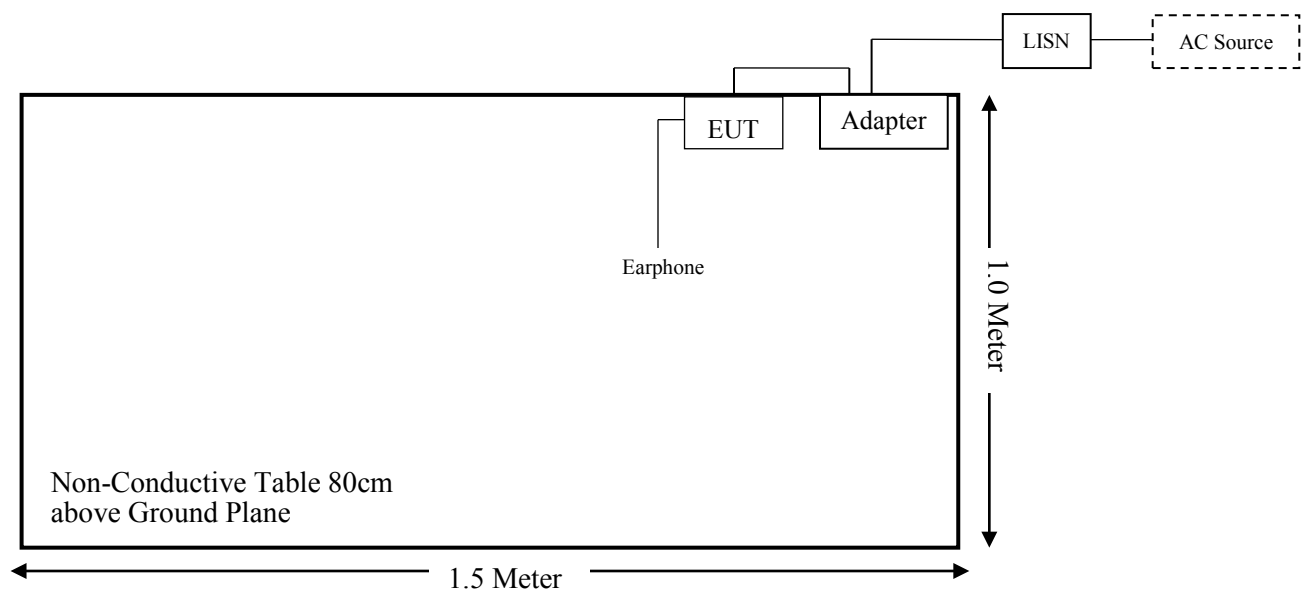
Manufacturer	Description	Model	Serial Number
SHENZHEN TIANYIN ELECTRONICS CO.,LTD	Adapter	TPA-23A050200UU01	/
BOLD	Earphone	/	/

External I/O Cable

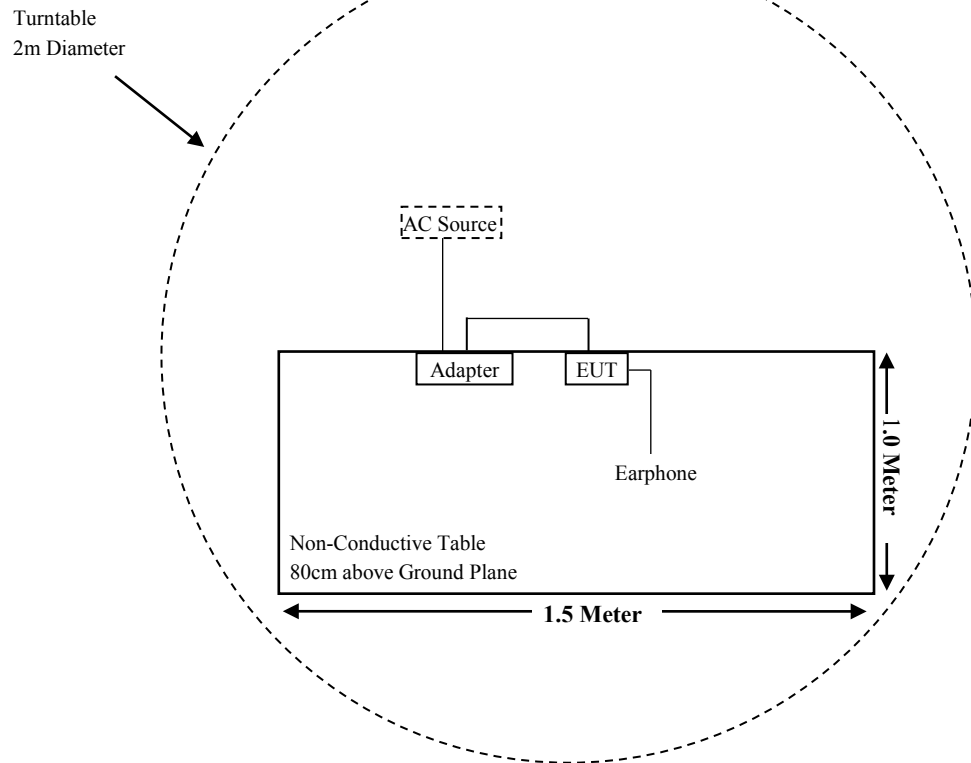
Cable Description	Length (m)	From Port	To
Power Cable	1.0	EUT	Adapter
Power Cable	1.0	Adapter	LISN/AC source

Block Diagram of Test Setup

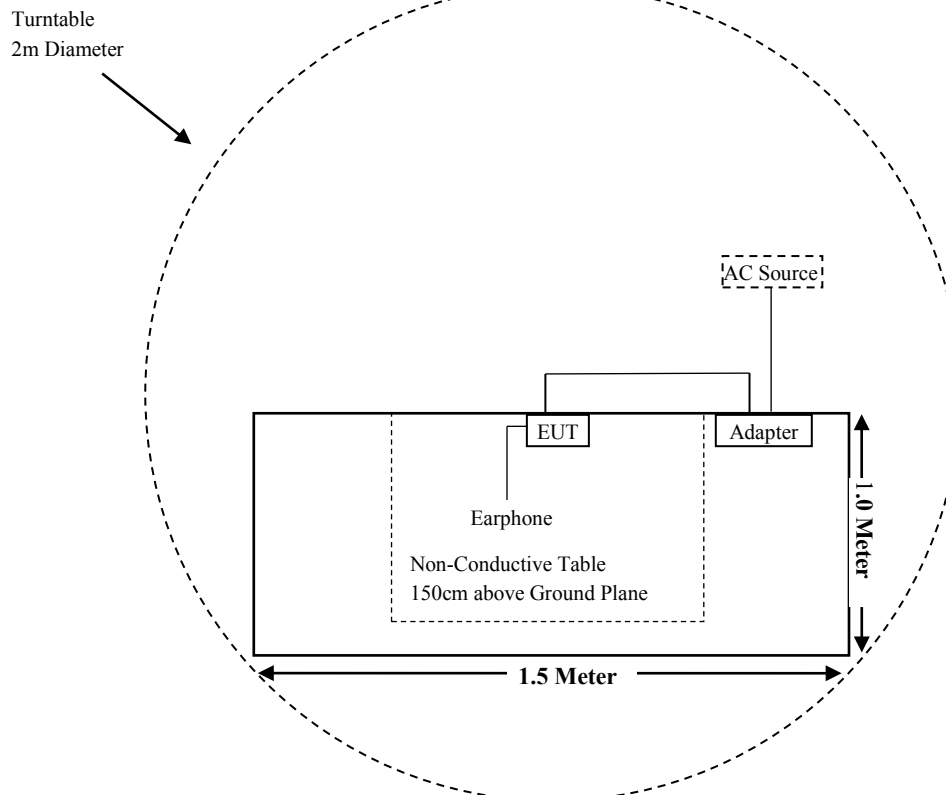
For Conducted Emissions:



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	2020-11-27	2021-11-26
Sunol Sciences	Broadband Antenna	JB3	A090314-1	2020-08-05	2023-08-04
Sonoma Instrument	Pre-amplifier	310N	171205	2020-08-14	2021-08-13
Rohde & Schwarz	Auto test Software	EMC32	100361	N/A	N/A
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	100207/040	2021-04-01	2022-03-31
ETS-LINDGREN	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	2021-03-22	2022-03-21
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	N/A	N/A
MICRO-COAX	Coaxial Cable	Cable-6	006	2020-08-15	2021-08-14
MICRO-COAX	Coaxial Cable	Cable-11	011	2020-08-15	2021-08-14
MICRO-COAX	Coaxial Cable	Cable-12	012	2020-08-15	2021-08-14
MICRO-COAX	Coaxial Cable	Cable-13	013	2020-08-15	2021-08-14
RF Conducted Test					
Rohde & Schwarz	EMI Test Receiver	ESIB26	100146	2020-11-27	2021-11-26
Rohde & Schwarz	Signal Analyzer	FSIQ26	100048/027	2020-11-27	2021-11-26
Narda	Attenuator	10dB	010	2020-08-15	2021-08-14
Agilent	Power Meter	N1912A	MY5000492	2020-11-18	2021-11-17
Agilent	Power Sensor	N1921A	MY54210024	2020-11-18	2021-11-17
Shopify Inc.	RF Cable	Shopify Inc. C01	C01	Each Time	N/A
Conducted Emission Test					
Rohde & Schwarz	EMI Test Receiver	ESR	1316.3003K03-101746-zn	2020-07-28	2021-07-27
Rohde & Schwarz	LISN	ENV216	101115	2020-11-27	2021-11-26
Audix	Test Software	e3	V9	N/A	N/A
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: RKSA210419002-20B

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	2.50	1.78	5.0	0.6	3.0	Yes
BLE(2Mbps)	2402-2480	3.00	2.00	5.0	0.6	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 0.71 dBi, fulfill the requirement of this section. Please refer to the EUT photos.

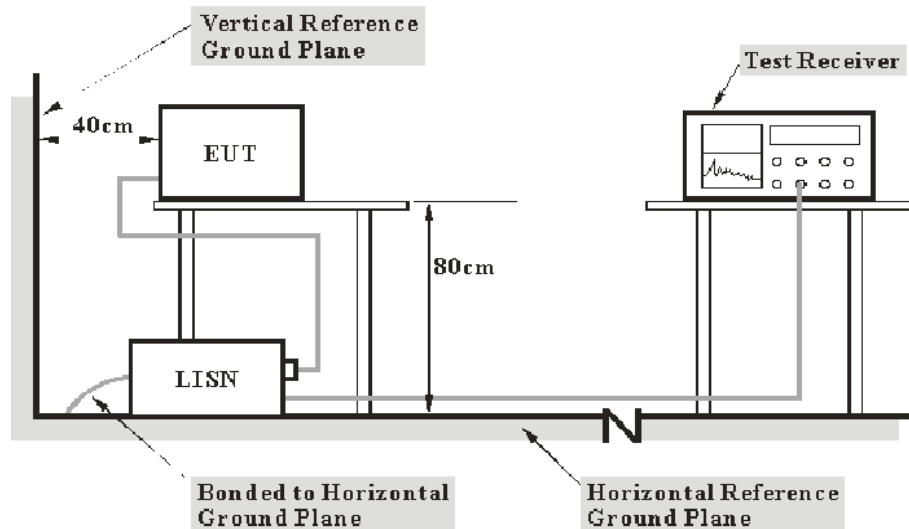
Result: Compliant.

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.

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

Factor & Over Limit Calculation

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

Factor (dB) = LISN VDF (dB) + Cable Loss (dB) + Transient Limiter Attenuation (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:

Over Limit (dB) = Read level (dBμV) + Factor (dB) - Limit (dBμV)

Test Results Summary

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

Test Data

Environmental Conditions

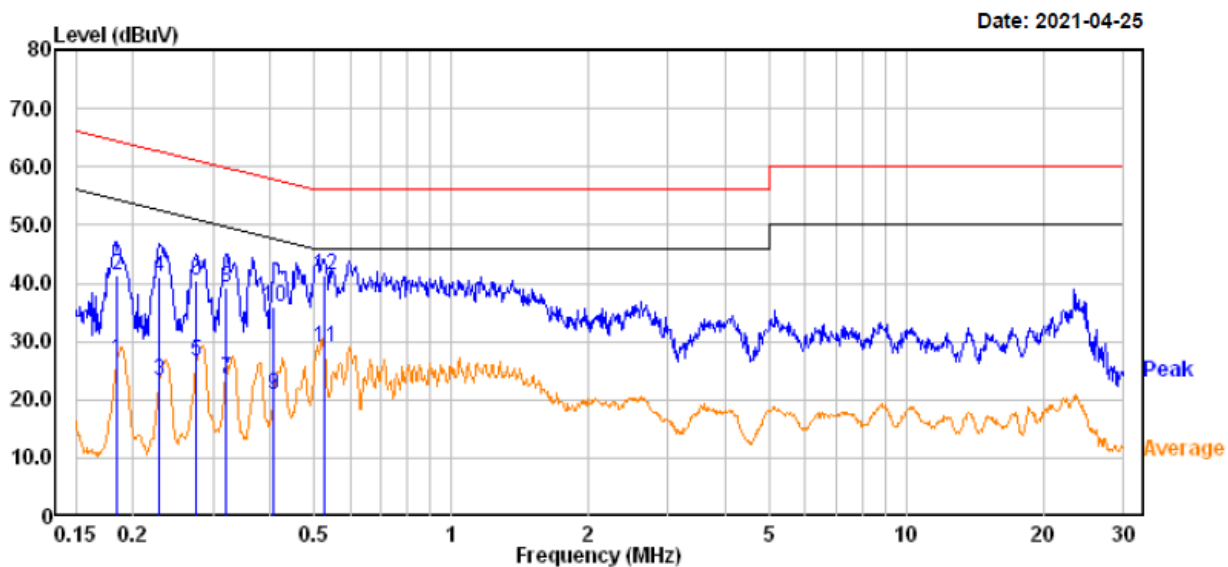
Temperature:	24.7 °C
Relative Humidity:	50 %
ATM Pressure:	101.5 kPa

The testing was performed by Stone Zhang on 2021-04-25.

Test Result: Compliant.

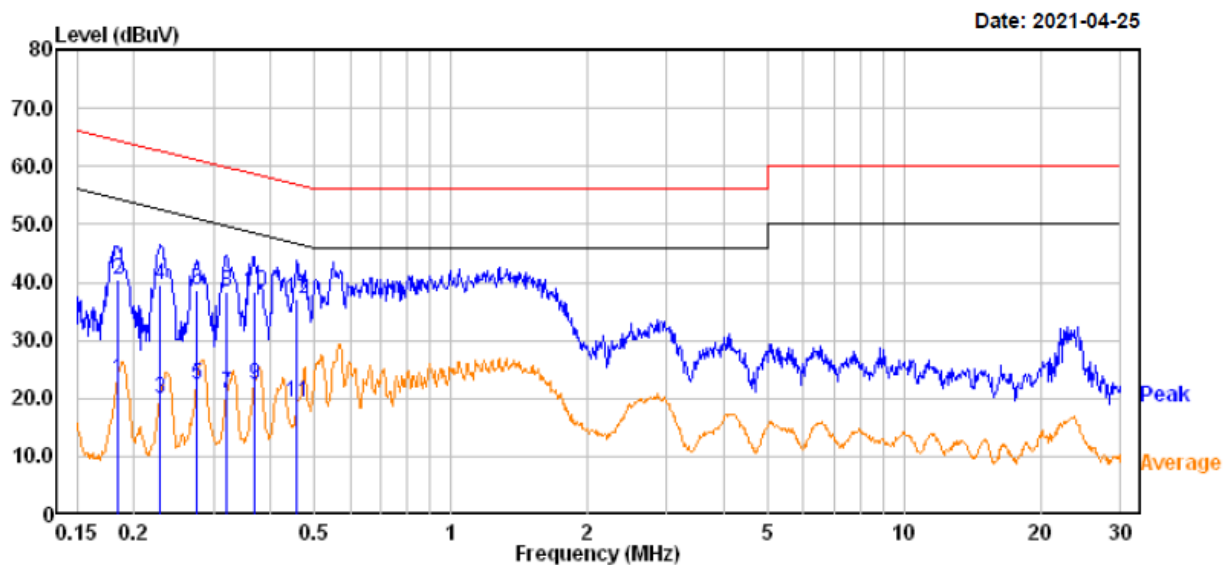
For Wi-Fi Mode:

EUT operation mode: Transmitting in 802.11g 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	0.185	7.11	19.82	26.93	54.26	-27.33	Average
2	0.185	21.61	19.82	41.43	64.26	-22.83	QP
3	0.229	3.50	19.82	23.32	52.48	-29.16	Average
4	0.229	21.20	19.82	41.02	62.48	-21.46	QP
5	0.276	6.60	19.82	26.42	50.95	-24.53	Average
6	0.276	20.50	19.82	40.32	60.95	-20.63	QP
7	0.320	3.80	19.82	23.62	49.71	-26.09	Average
8	0.320	19.30	19.82	39.12	59.71	-20.59	QP
9	0.408	1.20	19.74	20.94	47.68	-26.74	Average
10	0.408	16.20	19.74	35.94	57.68	-21.74	QP
11	0.527	9.31	19.75	29.06	46.00	-16.94	Average
12	0.527	21.51	19.75	41.26	56.00	-14.74	QP

AC 120V/60 Hz, Neutral

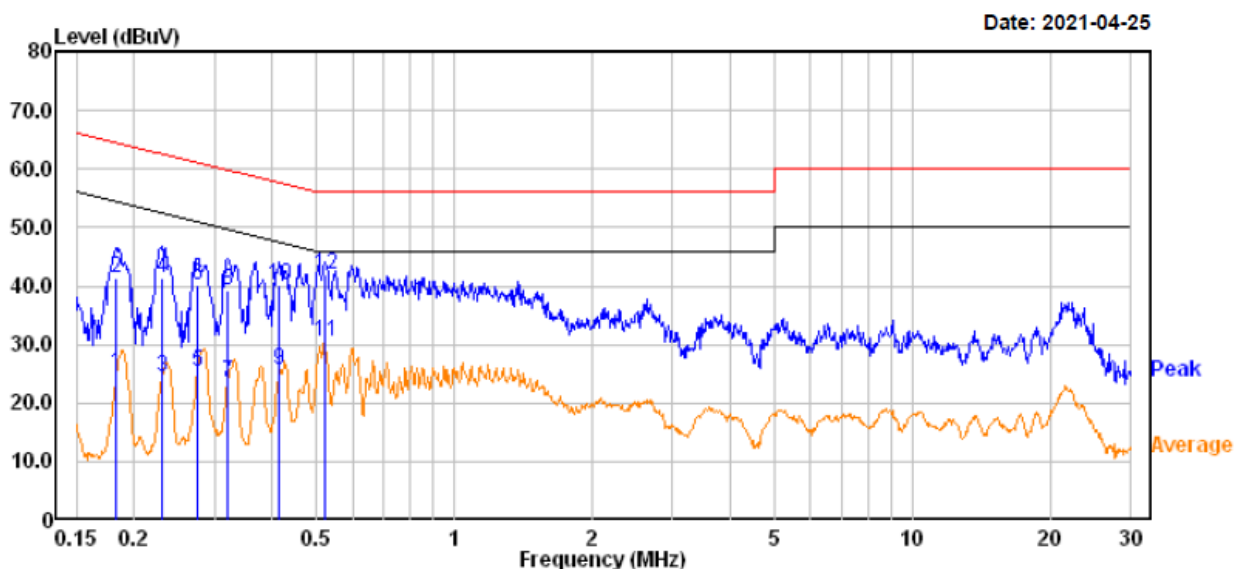


	Freq	Read		Limit	Over	
	MHz	Level	Factor	Level	Line	Limit Remark
	MHz	dBuV	dB	dBuV	dBuV	dB
1	0.184	3.40	19.83	23.23	54.30	-31.07 Average
2	0.184	20.60	19.83	40.43	64.30	-23.87 QP
3	0.228	0.00	19.82	19.82	52.52	-32.70 Average
4	0.228	19.70	19.82	39.52	62.52	-23.00 QP
5	0.274	2.50	19.82	22.32	50.99	-28.67 Average
6	0.274	18.70	19.82	38.52	60.99	-22.47 QP
7	0.320	1.10	19.82	20.92	49.71	-28.79 Average
8	0.320	18.40	19.82	38.22	59.71	-21.49 QP
9	0.368	2.50	19.78	22.28	48.55	-26.27 Average
10	0.368	18.60	19.78	38.38	58.55	-20.17 QP
11	0.458	-0.30	19.75	19.45	46.73	-27.28 Average
12	0.458	17.50	19.75	37.25	56.73	-19.48 QP

Note:

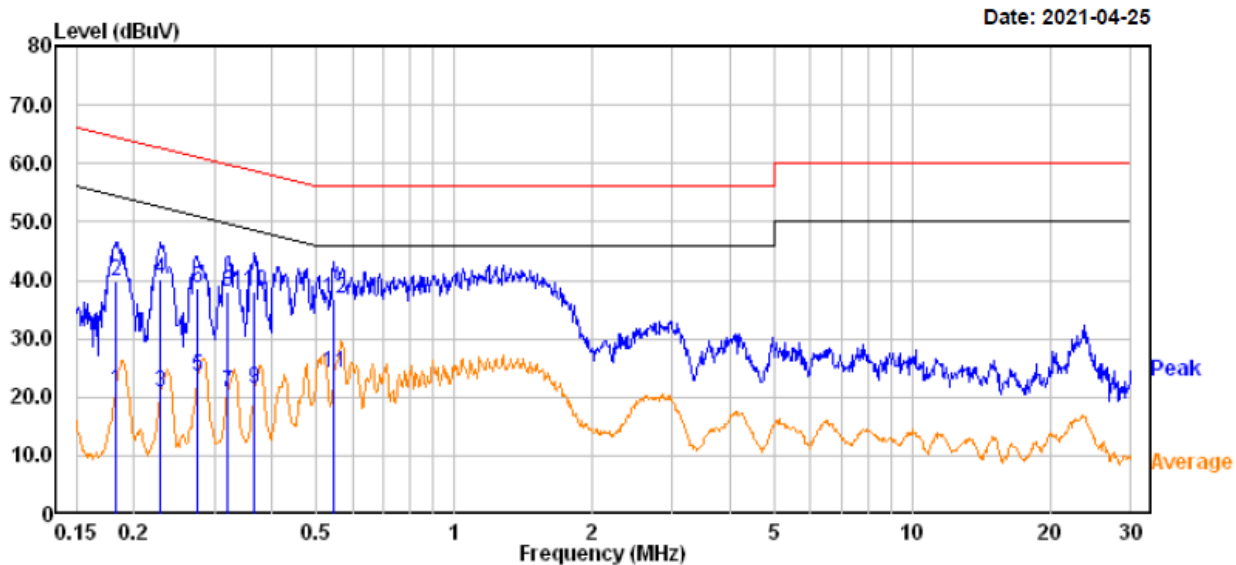
1) Factor (dB) = LISN VDF (dB) + Cable Loss (dB) + Transient Limiter Attenuation (dB)

2) Over Limit (dB) = Read level (dBuV) + Factor (dB) - Limit (dBuV)

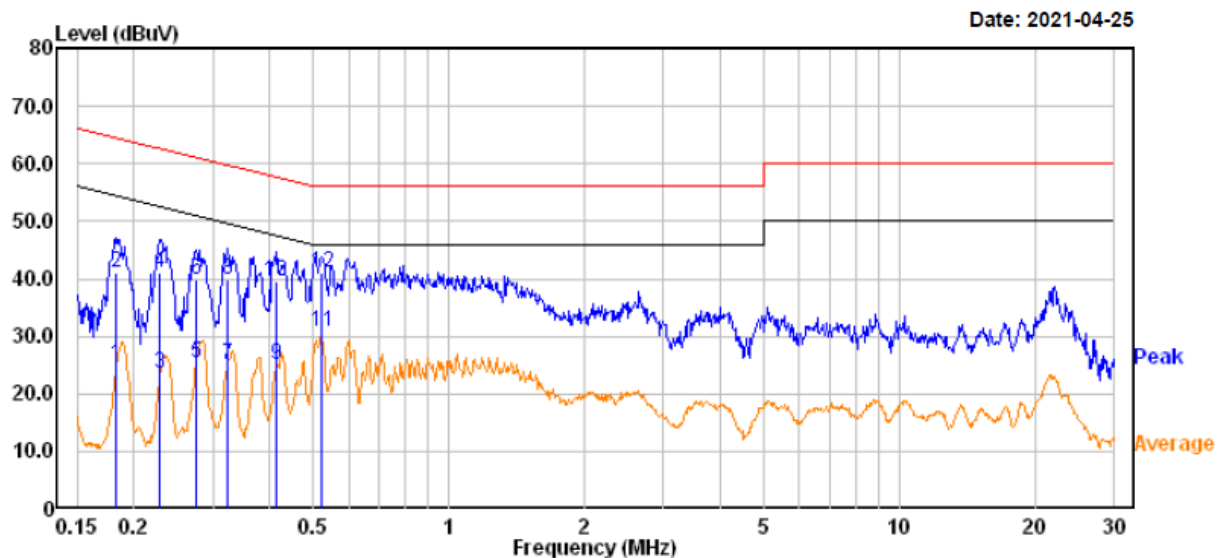
For BLE Mode:**Data rate: 1Mbps***EUT operation mode: Transmitting in high channel (worst case)***AC 120V/60 Hz, Line**

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	
1	0.183	5.20	19.83	25.03	54.34	-29.31	Average
2	0.183	21.40	19.83	41.23	64.34	-23.11	QP
3	0.230	4.70	19.82	24.52	52.44	-27.92	Average
4	0.230	21.50	19.82	41.32	62.44	-21.12	QP
5	0.274	5.50	19.82	25.32	50.99	-25.67	Average
6	0.274	20.20	19.82	40.02	60.99	-20.97	QP
7	0.320	3.80	19.82	23.62	49.71	-26.09	Average
8	0.320	19.30	19.82	39.12	59.71	-20.59	QP
9	0.415	6.00	19.74	25.74	47.55	-21.81	Average
10	0.415	20.40	19.74	40.14	57.55	-17.41	QP
11	0.524	10.61	19.75	30.36	46.00	-15.64	Average
12	0.524	22.21	19.75	41.96	56.00	-14.04	QP

AC 120V/60 Hz, Neutral

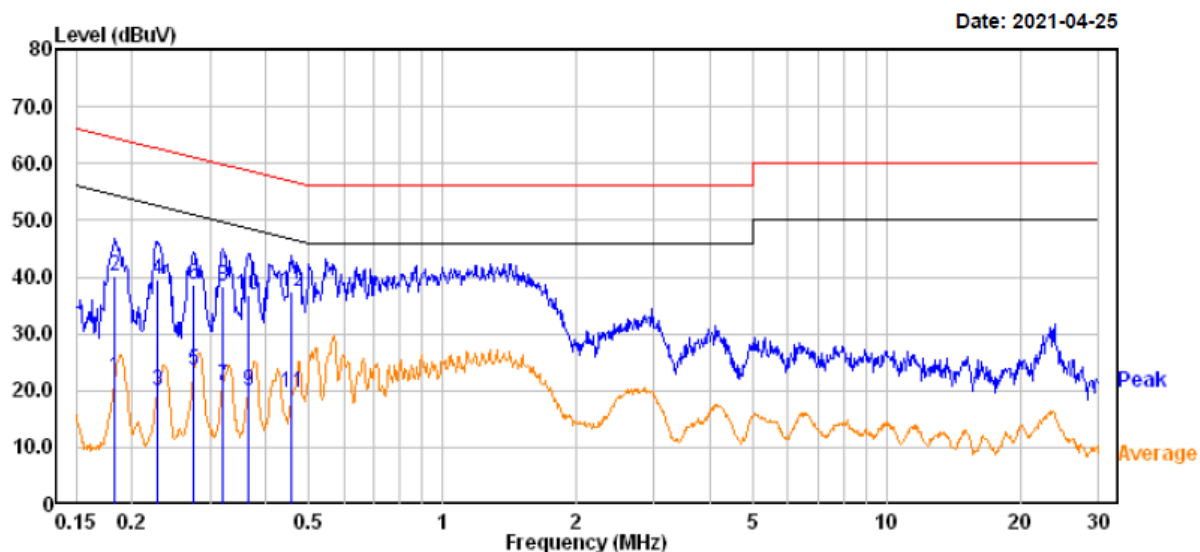


	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	
1	0.182	1.20	19.83	21.03	54.39	-33.36	Average
2	0.182	20.00	19.83	39.83	64.39	-24.56	QP
3	0.229	1.00	19.82	20.82	52.48	-31.66	Average
4	0.229	20.20	19.82	40.02	62.48	-22.46	QP
5	0.276	3.80	19.82	23.62	50.95	-27.33	Average
6	0.276	18.90	19.82	38.72	60.95	-22.23	QP
7	0.320	1.00	19.82	20.82	49.71	-28.89	Average
8	0.320	18.20	19.82	38.02	59.71	-21.69	QP
9	0.366	1.59	19.79	21.38	48.59	-27.21	Average
10	0.366	18.19	19.79	37.98	58.59	-20.61	QP
11	0.548	4.40	19.75	24.15	46.00	-21.85	Average
12	0.548	17.00	19.75	36.75	56.00	-19.25	QP

Data rate: 2Mbps*EUT operation mode: Transmitting in 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	0.183	5.10	19.83	24.93	54.34	-29.41	Average
2	0.183	21.30	19.83	41.13	64.34	-23.21	QP
3	0.229	3.60	19.82	23.42	52.48	-29.06	Average
4	0.229	21.20	19.82	41.02	62.48	-21.46	QP
5	0.274	5.40	19.82	25.22	50.99	-25.77	Average
6	0.274	20.10	19.82	39.92	60.99	-21.07	QP
7	0.322	5.10	19.82	24.92	49.67	-24.75	Average
8	0.322	20.00	19.82	39.82	59.67	-19.85	QP
9	0.413	5.20	19.74	24.94	47.60	-22.66	Average
10	0.413	19.90	19.74	39.64	57.60	-17.96	QP
11	0.522	10.90	19.76	30.66	46.00	-15.34	Average
12	0.522	21.20	19.76	40.96	56.00	-15.04	QP

AC 120V/60 Hz, Neutral



	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	
1	0.183	2.40	19.83	22.23	54.34	-32.11	Average
2	0.183	20.40	19.83	40.23	64.34	-24.11	QP
3	0.228	0.10	19.82	19.92	52.52	-32.60	Average
4	0.228	19.80	19.82	39.62	62.52	-22.90	QP
5	0.276	3.80	19.82	23.62	50.95	-27.33	Average
6	0.276	18.90	19.82	38.72	60.95	-22.23	QP
7	0.320	1.10	19.82	20.92	49.71	-28.79	Average
8	0.320	18.40	19.82	38.22	59.71	-21.49	QP
9	0.364	0.10	19.79	19.89	48.63	-28.74	Average
10	0.364	17.00	19.79	36.79	58.63	-21.84	QP
11	0.458	-0.20	19.75	19.55	46.73	-27.18	Average
12	0.458	17.60	19.75	37.35	56.73	-19.38	QP

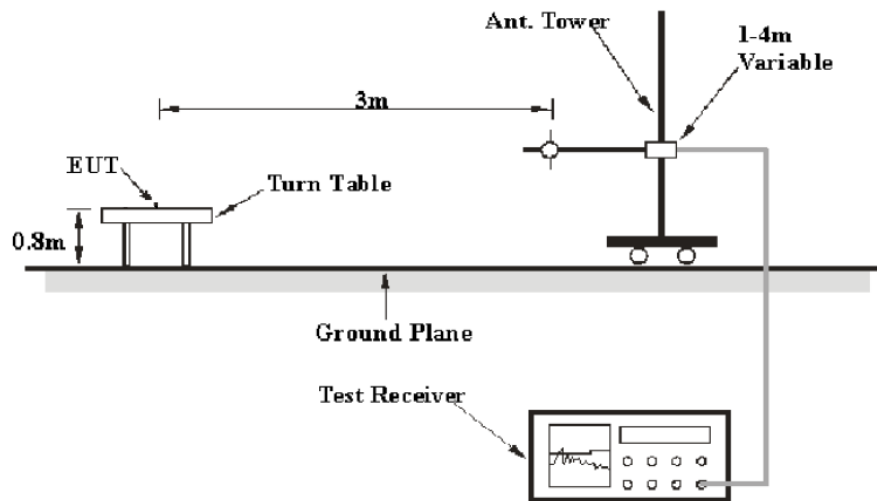
FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS

Applicable Standard

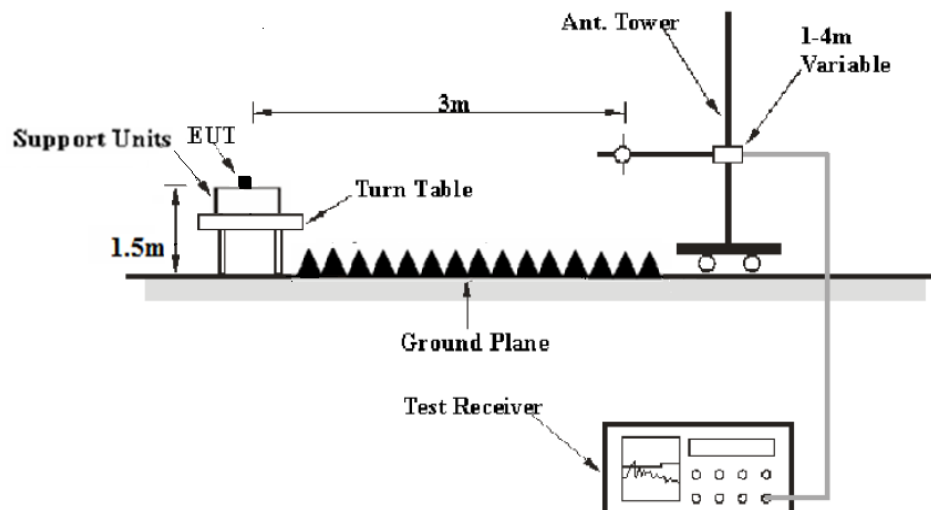
FCC §15.247 (d); §15.209; §15.205;

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.

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

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 (dBμV/m) = Meter Reading (dBμV) + 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 (dBμV/m) – Corrected Amplitude (dBμV/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:	21.1~24.5 °C
Relative Humidity:	50~52 %
ATM Pressure:	101.2~101.5 kPa

The testing was performed by Stone Zhang from 2021-04-23 to 2021-05-17.

Test Result: Compliant.

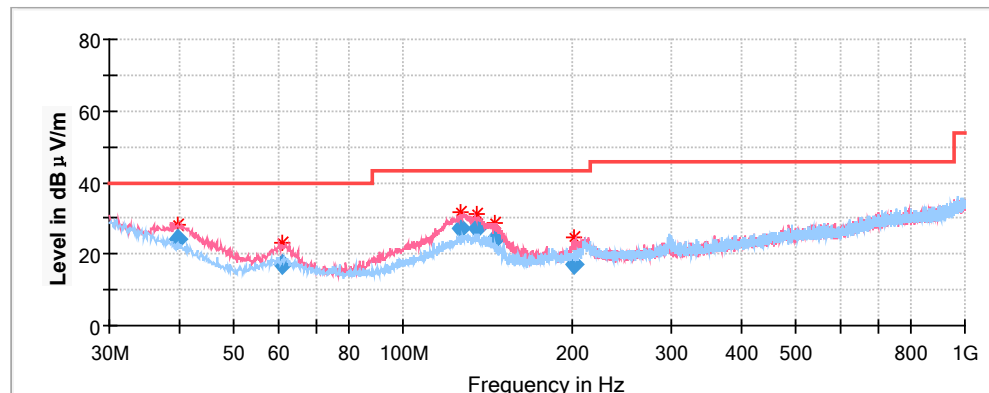
EUT operation mode: Transmitting

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 802.11g mode in Z-axis of orientation** was recorded



Frequency (MHz)	Corrected Amplitude	Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
	QuasiPeak (dBμV/m)	Height (cm)	Polar (H/V)				
39.857550	23.98	100.0	V	204.0	-10.3	40.00	16.02
60.792750	17.18	100.0	V	339.0	-14.6	40.00	22.82
126.309150	27.30	100.0	V	302.0	-11.1	43.50	16.20
135.102150	27.05	100.0	V	264.0	-11.4	43.50	16.45
145.507600	24.18	100.0	V	289.0	-12.3	43.50	19.32
201.651950	17.00	100.0	V	29.0	-12.0	43.50	26.50

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

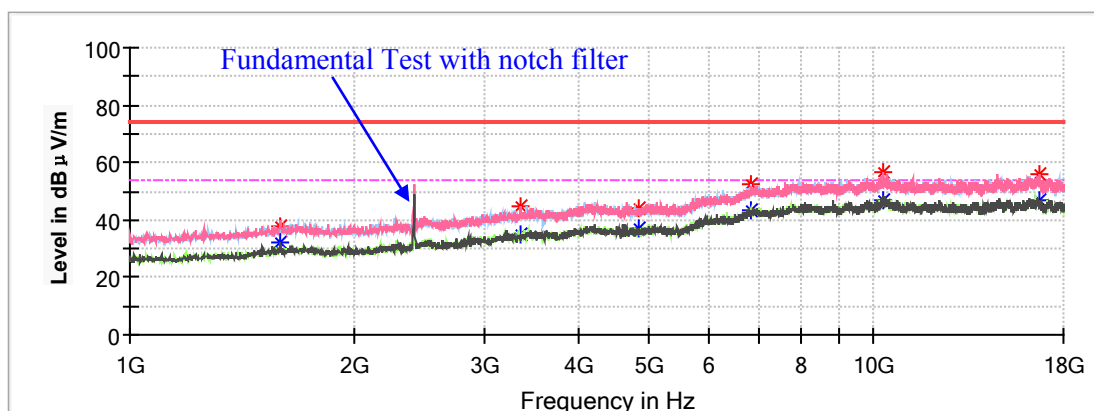
(Pre-scan in the X,Y and Z axes of orientation, the worst case **Z-axis of orientation** was recorded)

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: 2412MHz

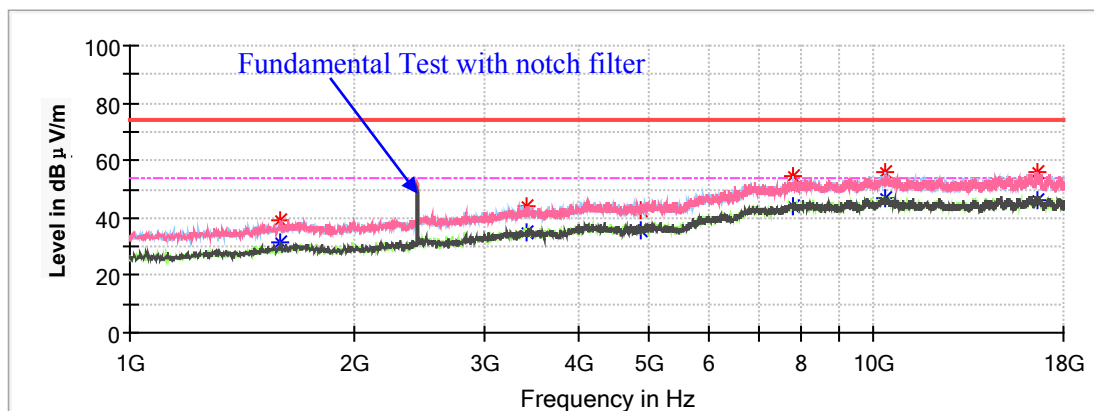
Full Spectrum



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)				
1591.600000	---	32.37	200.0	V	18.0	-9.1	54.00	21.63
1591.600000	38.09	---	200.0	V	18.0	-9.1	74.00	35.91
3354.500000	---	34.77	150.0	V	18.0	-2.2	54.00	19.23
3354.500000	44.67	---	150.0	V	18.0	-2.2	74.00	29.33
4824.000000	---	37.35	150.0	V	328.0	1.0	54.00	16.65
4824.000000	44.27	---	150.0	V	328.0	1.0	74.00	29.73
6848.000000	---	43.13	150.0	V	150.0	8.2	54.00	10.87
6848.000000	52.50	---	150.0	V	150.0	8.2	74.00	21.50
10280.300000	---	46.66	150.0	V	137.0	12.5	54.00	7.34
10280.300000	56.81	---	150.0	V	137.0	12.5	74.00	17.19
16679.100000	---	46.95	200.0	V	91.0	11.9	54.00	7.05
16679.100000	55.69	---	200.0	V	91.0	11.9	74.00	18.31

Middle Channel: 2437MHz

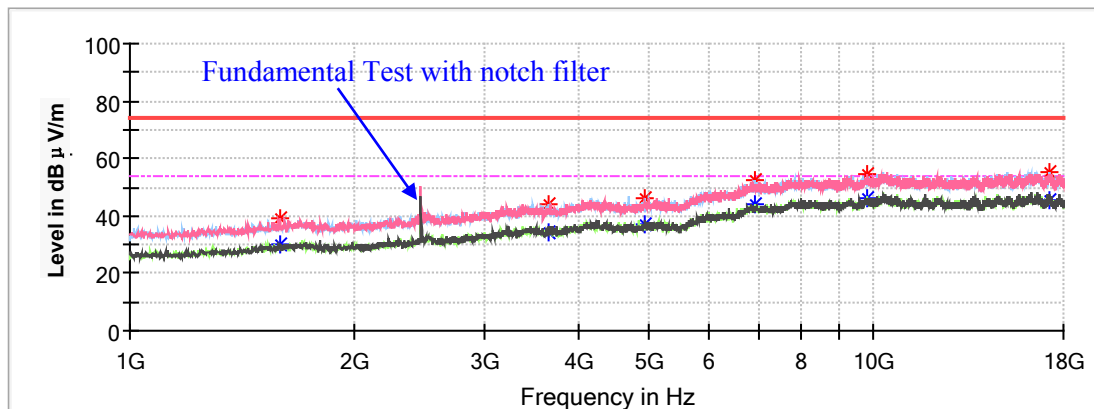
Full Spectrum



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)				
1591.600000	---	31.20	200.0	V	220.0	-9.1	54.00	22.80
1591.600000	39.02	---	200.0	V	220.0	-9.1	74.00	34.98
3422.500000	---	35.24	200.0	V	350.0	-2.0	54.00	18.76
3422.500000	43.77	---	200.0	V	350.0	-2.0	74.00	30.23
4874.000000	---	35.85	200.0	V	327.0	1.1	54.00	18.15
4874.000000	42.99	---	200.0	V	327.0	1.1	74.00	31.01
7800.000000	---	44.24	150.0	H	122.0	10.2	54.00	9.76
7800.000000	54.41	---	150.0	H	122.0	10.2	74.00	19.59
10346.600000	---	46.81	200.0	H	256.0	12.7	54.00	7.19
10346.600000	55.79	---	200.0	H	256.0	12.7	74.00	18.21
16604.300000	---	46.47	200.0	H	37.0	11.9	54.00	7.53
16604.300000	55.80	---	200.0	H	37.0	11.9	74.00	18.20

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)				
1593.300000	---	29.91	200.0	V	0.0	-9.1	54.00	24.09
1593.300000	38.88	---	200.0	V	0.0	-9.1	74.00	35.12
3652.000000	---	34.42	200.0	H	277.0	-1.1	54.00	19.58
3652.000000	44.09	---	200.0	H	277.0	-1.1	74.00	29.91
4924.000000	---	37.15	200.0	H	169.0	1.1	54.00	16.85
4924.000000	46.07	---	200.0	H	169.0	1.1	74.00	27.93
6941.500000	---	44.11	150.0	H	0.0	8.7	54.00	9.89
6941.500000	52.27	---	150.0	H	0.0	8.7	74.00	21.73
9780.500000	---	46.03	150.0	V	310.0	11.9	54.00	7.97
9780.500000	54.76	---	150.0	V	310.0	11.9	74.00	19.24
17255.400000	---	45.58	150.0	V	148.0	11.4	54.00	8.42
17255.400000	54.96	---	150.0	V	148.0	11.4	74.00	19.04

802.11g Mode:

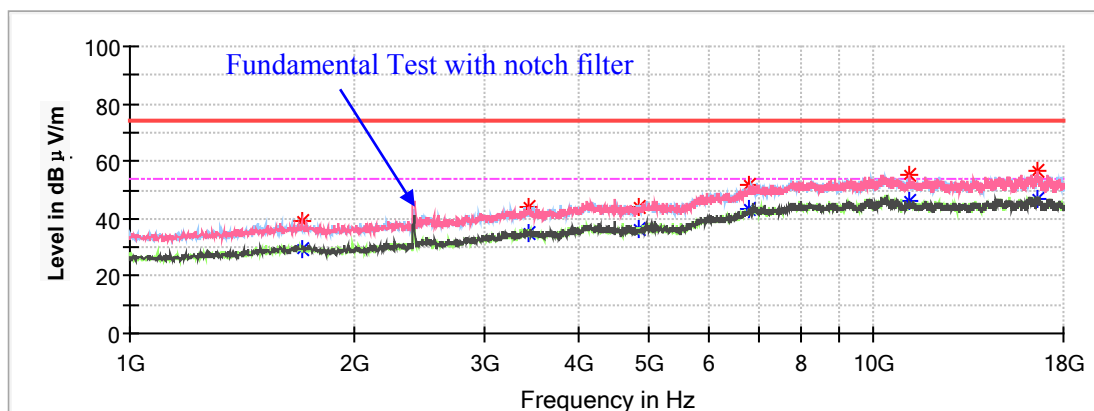
(Pre-scan in the X,Y and Z axes of orientation, the worst case **Z-axis of orientation** was recorded)

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: 2412MHz

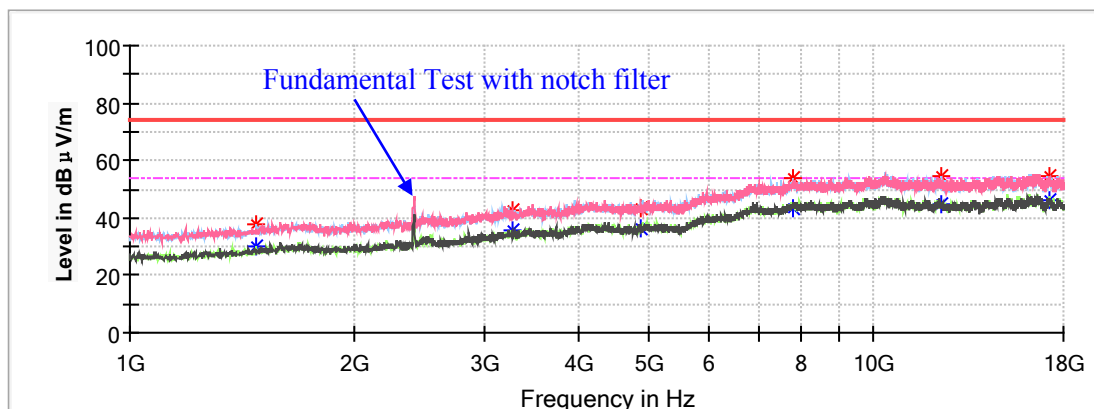
Full Spectrum



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)				
1700.400000	---	29.59	200.0	H	76.0	-8.7	54.00	24.41
1700.400000	39.36	---	200.0	H	76.0	-8.7	74.00	34.64
3439.500000	---	35.31	200.0	H	152.0	-2.0	54.00	18.69
3439.500000	44.12	---	200.0	H	152.0	-2.0	74.00	29.88
4824.000000	---	36.66	150.0	H	302.0	1.0	54.00	17.34
4824.000000	44.23	---	150.0	H	302.0	1.0	74.00	29.77
6808.900000	---	43.28	200.0	H	165.0	8.1	54.00	10.72
6808.900000	52.03	---	200.0	H	165.0	8.1	74.00	21.97
11137.100000	---	46.03	150.0	V	283.0	11.6	54.00	7.97
11137.100000	55.26	---	150.0	V	283.0	11.6	74.00	18.74
16604.300000	---	46.68	200.0	H	0.0	11.9	54.00	7.32
16604.300000	56.49	---	200.0	H	0.0	11.9	74.00	17.51

Middle Channel: 2437MHz

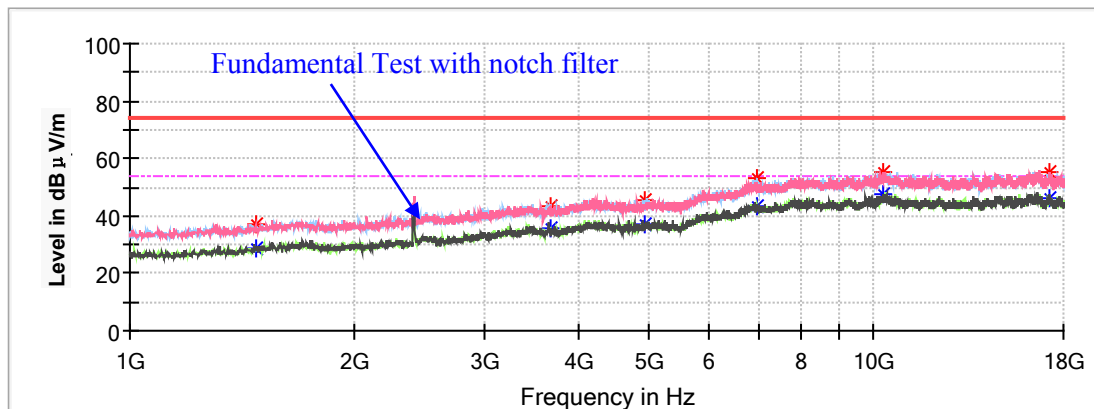
Full Spectrum



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)				
1476.000000	---	29.92	200.0	H	5.0	-9.5	54.00	24.08
1476.000000	37.95	---	200.0	H	5.0	-9.5	74.00	36.05
3261.000000	---	35.66	150.0	V	4.0	-2.5	54.00	18.34
3261.000000	42.99	---	150.0	V	4.0	-2.5	74.00	31.01
4874.000000	---	36.14	200.0	H	190.0	1.1	54.00	17.86
4874.000000	43.56	---	200.0	H	190.0	1.1	74.00	30.44
7805.100000	---	43.69	150.0	V	212.0	10.2	54.00	10.31
7805.100000	54.18	---	150.0	V	212.0	10.2	74.00	19.82
12303.300000	---	44.76	150.0	H	300.0	11.6	54.00	9.24
12303.300000	54.26	---	150.0	H	300.0	11.6	74.00	19.74
17202.700000	---	46.07	200.0	H	283.0	11.5	54.00	7.93
17202.700000	54.62	---	200.0	H	283.0	11.5	74.00	19.38

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)				
1474.300000	---	28.83	200.0	H	0.0	-9.6	54.00	25.17
1474.300000	37.18	---	200.0	H	0.0	-9.6	74.00	36.82
3667.300000	---	35.85	150.0	H	50.0	-1.0	54.00	18.15
3667.300000	43.70	---	150.0	H	50.0	-1.0	74.00	30.30
4924.000000	---	37.08	200.0	V	286.0	1.1	54.00	16.92
4924.000000	45.21	---	200.0	V	286.0	1.1	74.00	28.79
6955.100000	---	43.51	200.0	V	311.0	8.7	54.00	10.49
6955.100000	52.87	---	200.0	V	311.0	8.7	74.00	21.13
10307.500000	---	47.26	150.0	V	345.0	12.6	54.00	6.74
10307.500000	55.27	---	150.0	V	345.0	12.6	74.00	18.73
17201.000000	---	46.00	200.0	V	131.0	11.5	54.00	8.00
17201.000000	55.35	---	200.0	V	131.0	11.5	74.00	18.65

802.11n-HT20 Mode :

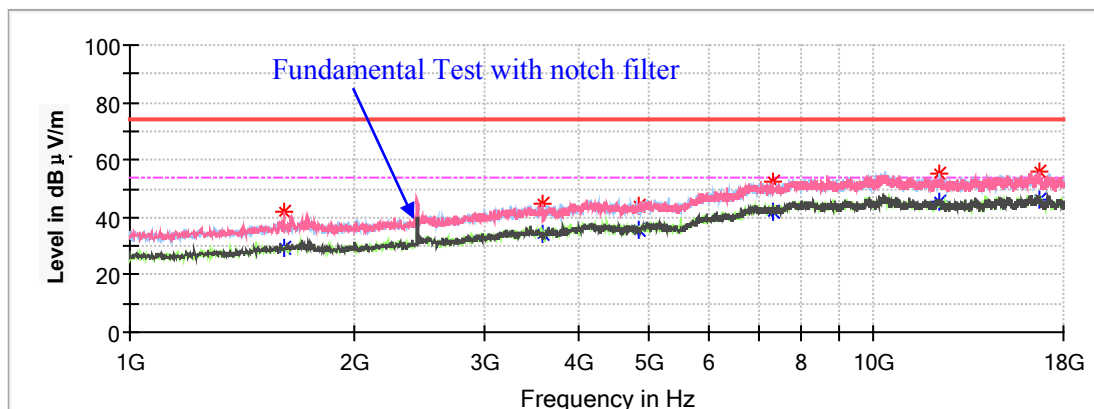
(Pre-scan in the X,Y and Z axes of orientation, the worst case **Z-axis of orientation** was recorded)

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

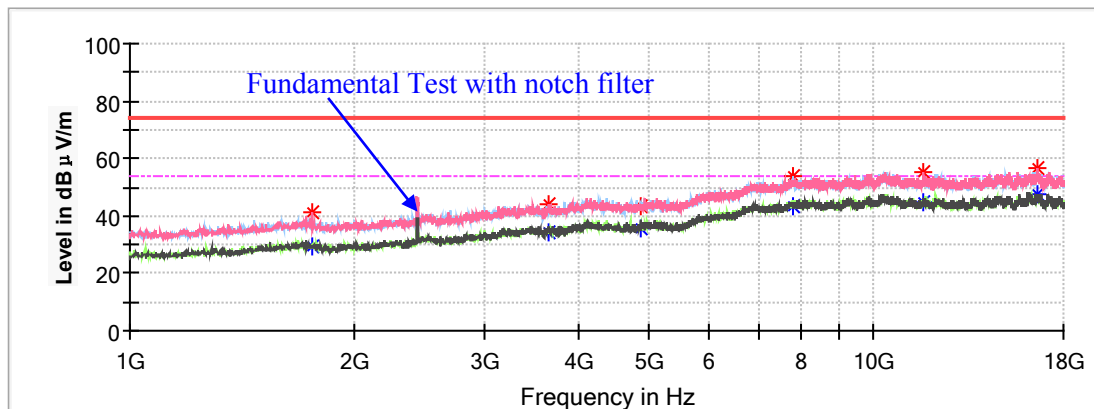
Full Spectrum



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)				
1610.300000	---	29.41	200.0	V	8.0	-9.0	54.00	24.59
1610.300000	41.65	---	200.0	V	8.0	-9.0	74.00	32.35
3578.900000	---	34.13	200.0	H	166.0	-1.4	54.00	19.87
3578.900000	44.68	---	200.0	H	166.0	-1.4	74.00	29.32
4824.000000	---	35.64	200.0	V	0.0	1.0	54.00	18.36
4824.000000	44.20	---	200.0	V	0.0	1.0	74.00	29.80
7325.700000	---	42.19	200.0	V	251.0	9.1	54.00	11.81
7325.700000	52.41	---	200.0	V	251.0	9.1	74.00	21.59
12288.000000	---	45.35	200.0	H	345.0	11.6	54.00	8.65
12288.000000	55.29	---	200.0	H	345.0	11.6	74.00	18.71
16692.700000	---	46.13	150.0	V	185.0	11.9	54.00	7.87
16692.700000	55.89	---	150.0	V	185.0	11.9	74.00	18.11

Middle Channel: 2437MHz

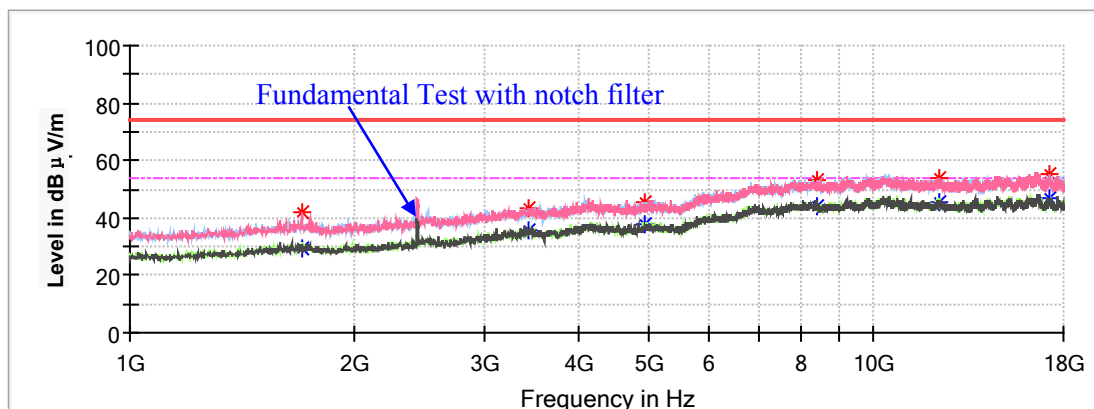
Full Spectrum



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)				
1759.900000	---	29.49	150.0	H	108.0	-8.5	54.00	24.51
1759.900000	40.95	---	150.0	H	108.0	-8.5	74.00	33.05
3657.100000	---	34.57	150.0	H	300.0	-1.1	54.00	19.43
3657.100000	44.38	---	150.0	H	300.0	-1.1	74.00	29.62
4874.000000	---	35.62	150.0	V	256.0	1.1	54.00	18.38
4874.000000	43.53	---	150.0	V	256.0	1.1	74.00	30.47
7806.800000	---	43.53	200.0	H	191.0	10.2	54.00	10.47
7806.800000	53.71	---	200.0	H	191.0	10.2	74.00	20.29
11640.300000	---	44.73	200.0	V	103.0	11.7	54.00	9.27
11640.300000	55.01	---	200.0	V	103.0	11.7	74.00	18.99
16585.600000	---	47.31	150.0	H	199.0	11.9	54.00	6.69
16585.600000	56.73	---	150.0	H	199.0	11.9	74.00	17.27

High Channel: 2462MHz

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)				
1700.400000	---	29.65	200.0	V	234.0	-8.7	54.00	24.35
1700.400000	41.91	---	200.0	V	234.0	-8.7	74.00	32.09
3436.100000	---	35.32	150.0	V	153.0	-2.0	54.00	18.68
3436.100000	43.68	---	150.0	V	153.0	-2.0	74.00	30.32
4924.000000	---	37.63	200.0	H	58.0	1.1	54.00	16.37
4924.000000	45.45	---	200.0	H	58.0	1.1	74.00	28.55
8379.700000	---	44.26	200.0	V	78.0	10.7	54.00	9.74
8379.700000	53.19	---	200.0	V	78.0	10.7	74.00	20.81
12262.500000	---	45.77	150.0	V	283.0	11.6	54.00	8.23
12262.500000	53.72	---	150.0	V	283.0	11.6	74.00	20.28
17201.000000	---	47.06	200.0	V	105.0	11.5	54.00	6.94
17201.000000	55.35	---	200.0	V	105.0	11.5	74.00	18.65

802.11n-HT40 Mode:

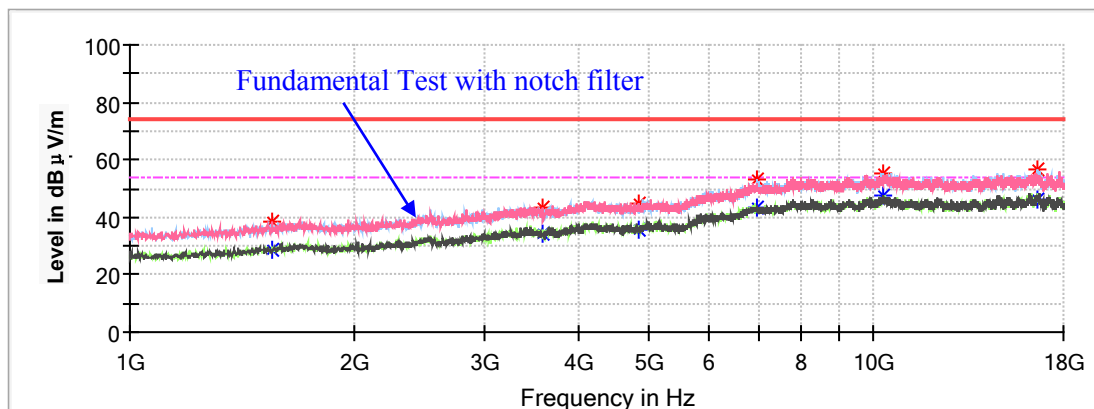
(Pre-scan in the X,Y and Z axes of orientation, the worst case **Z-axis of orientation** was recorded)

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

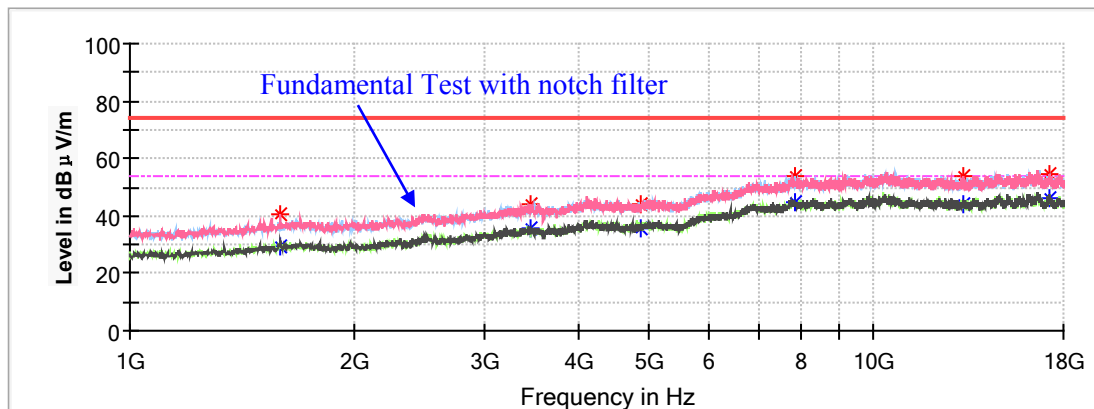
Full Spectrum



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)				
1550.800000	38.26	---	150.0	V	269.0	-9.2	74.00	35.74
1550.800000	---	28.77	150.0	V	269.0	-9.2	54.00	25.23
3589.100000	43.03	---	200.0	V	238.0	-1.4	74.00	30.97
3589.100000	---	34.59	200.0	V	238.0	-1.4	54.00	19.41
4844.000000	44.90	---	150.0	H	0.0	1.0	74.00	29.10
4844.000000	---	35.41	150.0	H	0.0	1.0	54.00	18.59
6953.400000	53.26	---	200.0	V	25.0	8.7	74.00	20.74
6953.400000	---	43.55	200.0	V	25.0	8.7	54.00	10.45
10300.700000	---	47.61	200.0	V	251.0	12.6	54.00	6.39
10300.700000	55.23	---	200.0	V	251.0	12.6	74.00	18.77
16587.300000	---	46.05	200.0	H	216.0	11.9	54.00	7.95
16587.300000	56.46	---	200.0	H	216.0	11.9	74.00	17.54

Middle Channel: 2437MHz

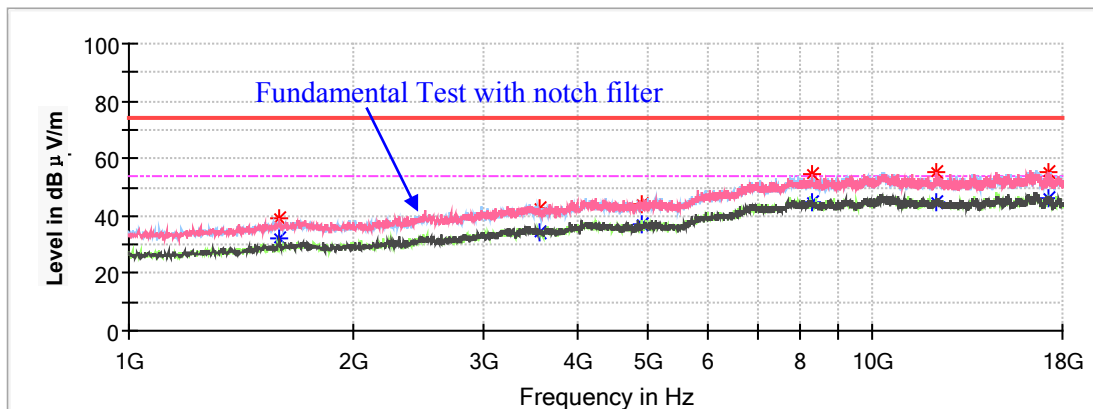
Full Spectrum



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)				
1595.000000	---	29.68	150.0	V	1.0	-9.1	54.00	24.32
1595.000000	40.54	---	150.0	V	1.0	-9.1	74.00	33.46
3454.800000	---	35.94	200.0	V	225.0	-1.9	54.00	18.06
3454.800000	43.71	---	200.0	V	225.0	-1.9	74.00	30.29
4874.000000	---	35.83	150.0	H	63.0	1.1	54.00	18.17
4874.000000	44.10	---	150.0	H	63.0	1.1	74.00	29.90
7822.100000	---	44.51	150.0	H	63.0	10.2	54.00	9.49
7822.100000	53.79	---	150.0	H	63.0	10.2	74.00	20.21
13192.400000	---	44.12	150.0	V	152.0	11.0	54.00	9.88
13192.400000	53.59	---	150.0	V	152.0	11.0	74.00	20.41
17274.100000	---	46.21	200.0	V	238.0	11.4	54.00	7.79
17274.100000	54.67	---	200.0	V	238.0	11.4	74.00	19.33

High Channel: 2452MHz

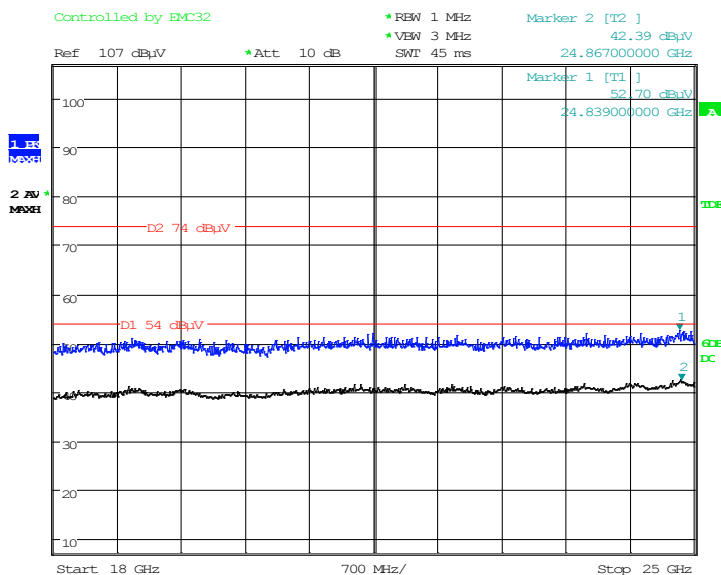
Full Spectrum



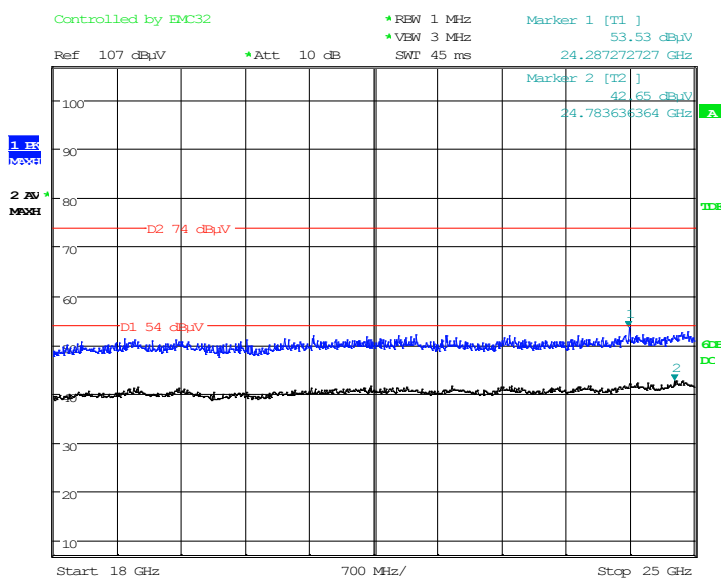
Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dB μ V/m)	Margin (dB)
	MaxPeak (dB μ V/m)	Average (dB μ V/m)	Height (cm)	Polar (H/V)				
1593.300000	---	32.11	150.0	V	190.0	-9.1	54.00	21.89
1593.300000	38.92	---	150.0	V	190.0	-9.1	74.00	35.08
3575.500000	---	34.60	200.0	H	0.0	-1.4	54.00	19.40
3575.500000	42.81	---	200.0	H	0.0	-1.4	74.00	31.19
4904.000000	---	36.95	200.0	V	263.0	1.1	54.00	17.05
4904.000000	44.17	---	200.0	V	263.0	1.1	74.00	29.83
8284.500000	---	44.86	200.0	V	129.0	10.8	54.00	9.14
8284.500000	54.34	---	200.0	V	129.0	10.8	74.00	19.66
12191.100000	---	44.75	200.0	V	103.0	11.6	54.00	9.25
12191.100000	55.09	---	200.0	V	103.0	11.6	74.00	18.91
17197.600000	---	46.25	150.0	V	216.0	11.5	54.00	7.75
17197.600000	55.59	---	150.0	V	216.0	11.5	74.00	18.41

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 802.11g mode in Z-axis of orientation** was recorded

Horizontal

Date: 23.APR.2021 12:09:11

Vertical

Date: 23.APR.2021 12:19:23

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 Z-axis of orientation in vertical polarization 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								
2390.000000	54.15	---	150.0	V	60.0	3.8	74.00	19.85
2390.000000	---	51.08	150.0	V	60.0	3.8	54.00	2.92
High Channel: 2462MHz								
2483.500000	54.42	---	200.0	V	81.0	4.1	74.00	19.58
2483.500000	---	46.96	200.0	V	81.0	4.1	54.00	7.04

802.11g Mode: (Pre-scan in the X,Y and Z axes of orientation, the worst case Z-axis of orientation in vertical polarization 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								
2390.000000	56.39	---	200.0	V	69.0	3.8	74.00	17.61
2390.000000	---	49.47	200.0	V	69.0	3.8	54.00	4.53
High Channel: 2462MHz								
2483.500000	74.00	17.61	150.0	V	55.0	4.1	74.00	17.94
2483.500000	54.00	4.53	150.0	V	55.0	4.1	54.00	3.96

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

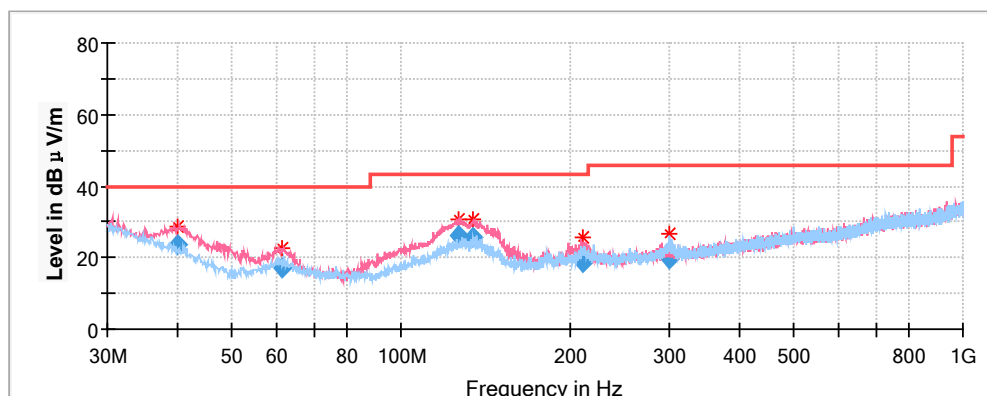
Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
	MaxPeak (dBμV/m)	Average (dBμV/m)	Height (cm)	Polar (H/V)				
Low Channel: 2412MHz								
2390.000000	57.29	---	150.0	V	71.0	3.8	74.00	16.71
2390.000000	---	50.88	150.0	V	71.0	3.8	54.00	3.12
High Channel: 2462MHz								
2483.500000	58.68	---	150.0	V	64.0	4.1	74.00	15.32
2483.500000	---	51.55	150.0	V	64.0	4.1	54.00	2.45

802.11n-HT40 Mode: (Pre-scan in the X,Y and Z axes of orientation, the worst case Z-axis of orientation in vertical polarization 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								
2390.000000	54.71	---	150.0	V	62.0	3.8	74.00	19.29
2390.000000	---	49.83	150.0	V	62.0	3.8	54.00	4.17
High Channel: 2452MHz								
2483.500000	56.00	---	150.0	V	62.0	4.1	74.00	18.00
2483.500000	---	50.49	150.0	V	62.0	4.1	54.00	3.51

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 **high** channel of operation in the Z 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)				
40.017700	28.51	100.0	V	101.0	-10.7	40.00	11.49
61.230750	22.78	100.0	V	258.0	-14.7	40.00	17.22
126.314450	30.68	100.0	V	295.0	-11.0	43.50	12.82
134.656300	30.51	100.0	V	270.0	-11.4	43.50	12.99
210.360050	25.85	100.0	V	247.0	-12.0	43.50	17.65
301.284500	26.75	100.0	H	96.0	-10.8	46.00	19.25

1GHz-18GHz:**BLE(1Mbps) mode:**

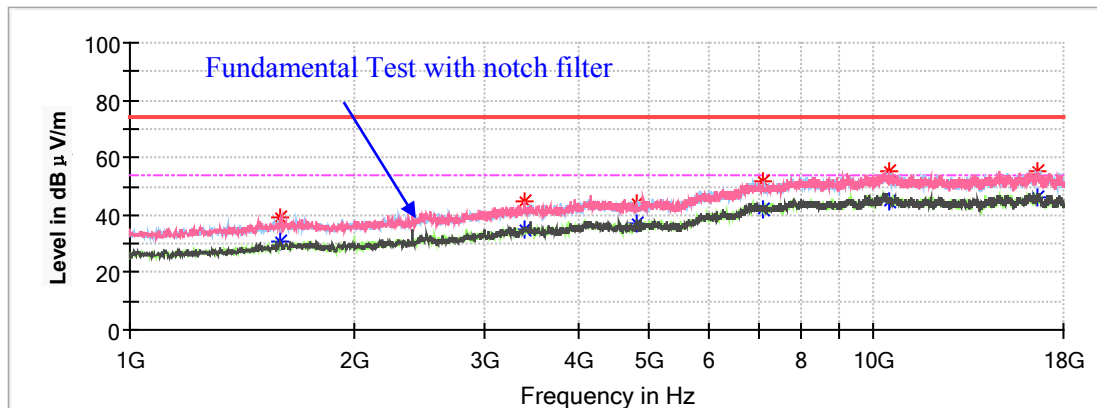
(Pre-scan in the X,Y and Z axes of orientation, the worst case **Z-axis of orientation** was recorded)

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

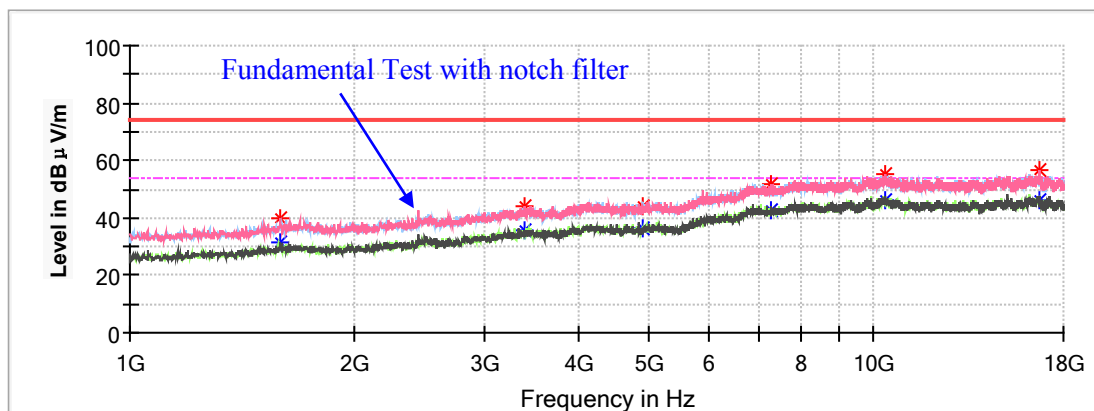
Full Spectrum



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)				
1591.600000	39.40	---	150.0	V	224.0	-9.1	74.00	34.60
1591.600000	---	30.55	150.0	V	224.0	-9.1	54.00	23.45
3393.600000	---	35.27	200.0	V	335.0	-2.1	54.00	18.73
3393.600000	44.89	---	200.0	V	335.0	-2.1	74.00	29.11
4804.000000	---	36.83	200.0	V	115.0	1.0	54.00	17.17
4804.000000	44.13	---	200.0	V	115.0	1.0	74.00	29.87
7082.600000	---	42.07	150.0	V	173.0	9.0	54.00	11.93
7082.600000	51.77	---	150.0	V	173.0	9.0	74.00	22.23
10475.800000	---	44.78	200.0	V	6.0	13.0	54.00	9.22
10475.800000	55.10	---	200.0	V	6.0	13.0	74.00	18.90
16633.200000	---	46.00	150.0	V	237.0	11.9	54.00	8.00
16633.200000	55.36	---	150.0	V	237.0	11.9	74.00	18.64

Middle Channel: 2440MHz

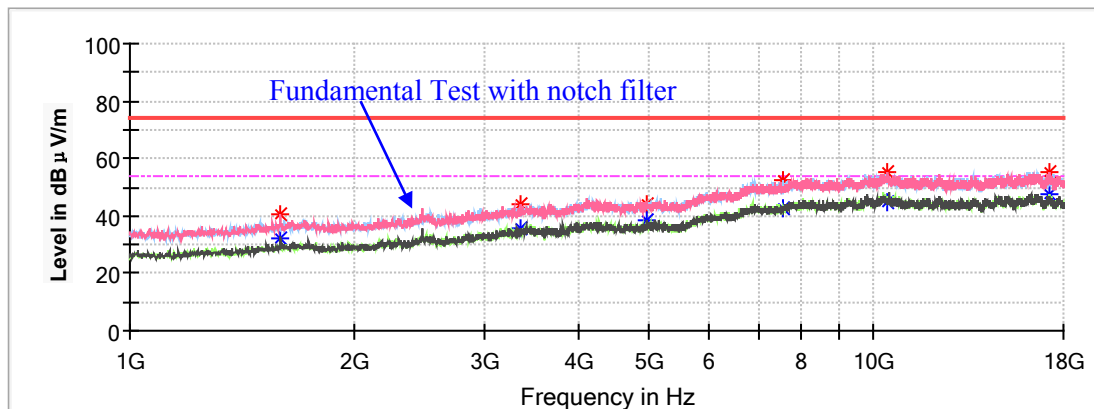
Full Spectrum



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)				
1593.300000	---	31.31	200.0	V	153.0	-9.1	54.00	22.69
1593.300000	39.87	---	200.0	V	153.0	-9.1	74.00	34.13
3388.500000	---	35.54	150.0	V	77.0	-2.1	54.00	18.46
3388.500000	43.84	---	150.0	V	77.0	-2.1	74.00	30.16
4880.000000	---	36.39	200.0	H	81.0	1.1	54.00	17.61
4880.000000	44.33	---	200.0	H	81.0	1.1	74.00	29.67
7284.900000	---	42.39	150.0	V	0.0	9.1	54.00	11.61
7284.900000	51.91	---	150.0	V	0.0	9.1	74.00	22.09
10380.600000	---	46.24	150.0	H	153.0	12.7	54.00	7.76
10380.600000	55.45	---	150.0	H	153.0	12.7	74.00	18.55
16662.100000	---	46.40	150.0	V	186.0	11.9	54.00	7.60
16662.100000	56.35	---	150.0	V	186.0	11.9	74.00	17.65

High Channel: 2480MHz

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)				
1591.600000	40.49	---	150.0	V	206.0	-9.1	74.00	33.51
1591.600000	---	32.43	150.0	V	206.0	-9.1	54.00	21.57
3359.600000	---	35.48	200.0	V	292.0	-2.2	54.00	18.52
3359.600000	43.80	---	200.0	V	292.0	-2.2	74.00	30.20
4960.000000	44.07	---	200.0	V	60.0	1.1	74.00	29.93
4960.000000	---	38.49	200.0	V	60.0	1.1	54.00	15.51
7556.900000	---	42.32	150.0	H	26.0	9.4	54.00	11.68
7556.900000	52.74	---	150.0	H	26.0	9.4	74.00	21.26
10443.500000	---	45.08	200.0	H	37.0	12.9	54.00	8.92
10443.500000	54.99	---	200.0	H	37.0	12.9	74.00	19.01
17230.300000	55.43	---	150.0	V	143.0	11.5	74.00	18.57
17230.300000	---	47.81	150.0	V	143.0	11.5	54.00	6.19

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

Controlled by EMC32

*RBW 1 MHz Marker 1 [T1] 53.40 dB μ V

*VEW 3 MHz 24.75500000 GHz

*SWI 45 ms

Ref 107 dB μ V *Att 10 dB

Marker 2 [T2] 42.85 dB μ V 24.93000000 GHz

1. RBW

2. VEW

3. SWI

4. Att

5. Ref

6. Marker 1

7. Marker 2

8. Start

9. Stop

10. Resolution

11. Bandwidth

12. Frequency

13. Power

14. Units

15. Scale

16. Grid

17. Trace

18. Color

19. Line

20. Width

21. Style

22. Label

23. Position

24. Angle

25. Font

26. Size

27. Weight

28. Color

29. Line

30. Width

31. Style

32. Label

33. Position

34. Angle

35. Font

36. Size

37. Weight

38. Color

39. Line

40. Width

41. Style

42. Label

43. Position

44. Angle

45. Font

46. Size

47. Weight

48. Color

49. Line

50. Width

51. Style

52. Label

53. Position

54. Angle

55. Font

56. Size

57. Weight

58. Color

59. Line

60. Width

61. Style

62. Label

63. Position

64. Angle

65. Font

66. Size

67. Weight

68. Color

69. Line

70. Width

71. Style

72. Label

73. Position

74. Angle

75. Font

76. Size

77. Weight

78. Color

79. Line

80. Width

81. Style

82. Label

83. Position

84. Angle

85. Font

86. Size

87. Weight

88. Color

89. Line

90. Width

91. Style

92. Label

93. Position

94. Angle

95. Font

96. Size

97. Weight

98. Color

99. Line

100. Width

101. Style

102. Label

103. Position

104. Angle

105. Font

106. Size

107. Weight

108. Color

109. Line

110. Width

111. Style

112. Label

113. Position

114. Angle

115. Font

116. Size

117. Weight

118. Color

119. Line

120. Width

121. Style

122. Label

123. Position

124. Angle

125. Font

126. Size

127. Weight

128. Color

129. Line

130. Width

131. Style

132. Label

133. Position

134. Angle

135. Font

136. Size

137. Weight

138. Color

139. Line

140. Width

141. Style

142. Label

143. Position

144. Angle

145. Font

146. Size

147. Weight

148. Color

149. Line

150. Width

151. Style

152. Label

153. Position

154. Angle

155. Font

156. Size

157. Weight

158. Color

159. Line

160. Width

161. Style

162. Label

163. Position

164. Angle

165. Font

166. Size

167. Weight

168. Color

169. Line

170. Width

171. Style

172. Label

173. Position

174. Angle

175. Font

176. Size

177. Weight

178. Color

179. Line

180. Width

181. Style

182. Label

183. Position

184. Angle

185. Font

186. Size

187. Weight

188. Color

189. Line

190. Width

191. Style

192. Label

193. Position

194. Angle

195. Font

196. Size

197. Weight

198. Color

199. Line

200. Width

201. Style

202. Label

203. Position

204. Angle

205. Font

206. Size

207. Weight

208. Color

209. Line

210. Width

211. Style

212. Label

213. Position

214. Angle

215. Font

216. Size

217. Weight

218. Color

219. Line

220. Width

221. Style

222. Label

223. Position

224. Angle

225. Font

226. Size

227. Weight

228. Color

229. Line

230. Width

231. Style

232. Label

233. Position

234. Angle

235. Font

236. Size

237. Weight

238. Color

239. Line

240. Width

241. Style

242. Label

243. Position

244. Angle

245. Font

246. Size

247. Weight

248. Color

249. Line

250. Width

251. Style

252. Label

253. Position

254. Angle

255. Font

256. Size

257. Weight

258. Color

259. Line

260. Width

261. Style

262. Label

263. Position

264. Angle

265. Font

266. Size

267. Weight

268. Color

269. Line

270. Width

271. Style

272. Label

273. Position

274. Angle

275. Font

276. Size

277. Weight

278. Color

279. Line

280. Width

281. Style

282. Label

283. Position

284. Angle

285. Font

286. Size

287. Weight

288. Color

289. Line

290. Width

291. Style

292. Label

293. Position

294. Angle

295. Font

296. Size

297. Weight

298. Color

299. Line

300. Width

301. Style

302. Label

303. Position

304. Angle

305. Font

306. Size

307. Weight

308. Color

309. Line

310. Width

311. Style

312. Label

313. Position

314. Angle

315. Font

316. Size

317. Weight

318. Color

319. Line

320. Width

321. Style

322. Label

323. Position

324. Angle

325. Font

326. Size

327. Weight

328. Color

329. Line

330. Width

331. Style

332. Label

333. Position

334. Angle

335. Font

336. Size

337. Weight

338. Color

339. Line

340. Width

Date: 23.APR.2021 12:28:00

Controlled by EMC32

★ RBW 1 MHz Marker 1 [T1] 53.35 dBμV

★ VBW 3 MHz 24.83900000 GHz

★ SWF 45 ms

Ref 107 dBμV

★ Att 10 dB

Marker 2 [T2] 42.41 dBμV

24.83900000 GHz

1. F5 New1

2. F5 New1

D1 54 dBμV

D2 74 dBμV

Start 18 GHz

700 MHz/

Stop 25 GHz

Date: 23.APR.2021 12:36:57

Restricted Bands Emissions Test:

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

Note:

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

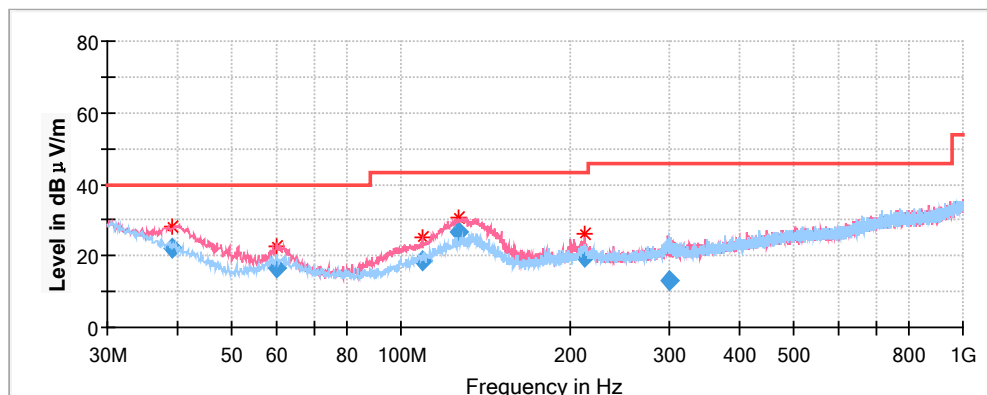
Corrected Amplitude (dBμV/m) = Corrected Factor (dB/m) + Reading (dBμV)

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	52.02	---	200.0	H	309.0	3.8	74.00	21.98
2390.00	---	46.17	200.0	H	309.0	3.8	54.00	7.83
High Channel: 2480MHz								
2483.50	---	46.67	200.0	H	342.0	4.1	54.00	7.33
2483.50	53.32	---	200.0	H	342.0	4.1	74.00	20.68

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 **high** channel of operation in the Z axis of orientation was recorded)*



Frequency (MHz)	Corrected Amplitude	Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dB μ V/m)	Margin (dB)
	QuasiPeak (dB μ V/m)	Height (cm)	Polar (H/V)				
39.270900	22.03	100.0	V	224.0	-9.9	40.00	17.97
59.937650	16.59	100.0	V	229.0	-14.5	40.00	23.41
109.300900	18.42	100.0	V	320.0	-12.8	43.50	25.08
126.491800	26.43	100.0	V	0.0	-11.1	43.50	17.07
212.004050	19.61	100.0	V	205.0	-12.0	43.50	23.89
299.565550	13.33	100.0	V	101.0	-10.8	46.00	32.67

1GHz-18GHz:**BLE(2Mbps) mode:**

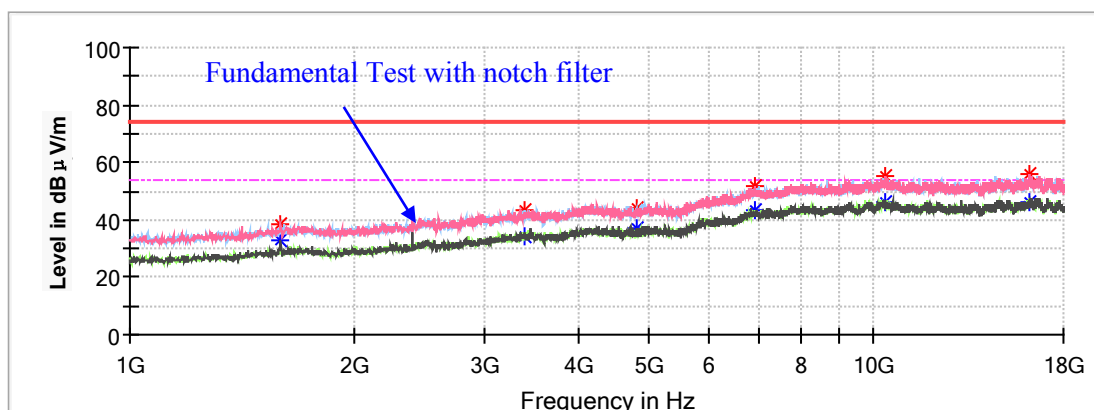
(Pre-scan in the X,Y and Z axes of orientation, the worst case **Z-axis of orientation** was recorded)

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

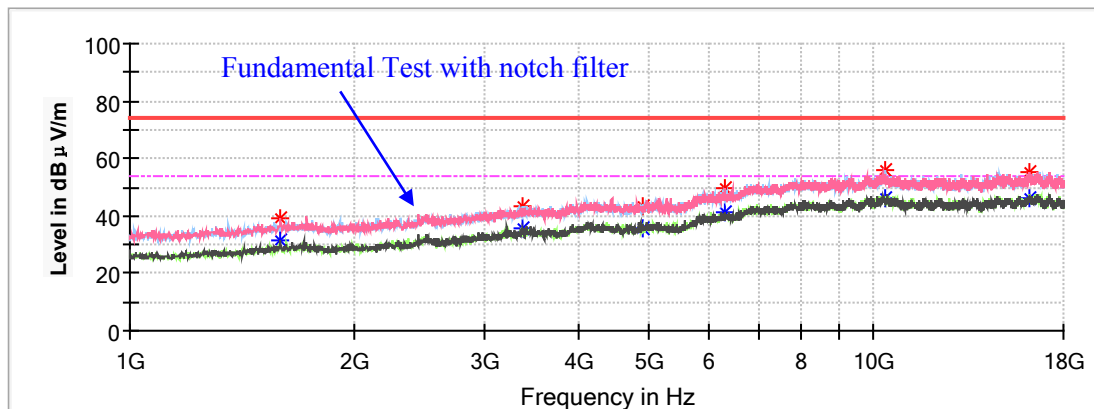
Full Spectrum



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)				
1596.700000	---	32.57	150.0	V	219.0	-9.1	54.00	21.43
1596.700000	38.54	---	150.0	V	219.0	-9.1	74.00	35.46
3386.800000	---	34.06	150.0	H	11.0	-2.1	54.00	19.94
3386.800000	43.46	---	150.0	H	11.0	-2.1	74.00	30.54
4804.000000	43.97	---	150.0	H	319.0	1.0	74.00	30.03
4804.000000	---	36.82	150.0	H	319.0	1.0	54.00	17.18
6919.400000	---	43.40	200.0	H	295.0	8.6	54.00	10.60
6919.400000	51.48	---	200.0	H	295.0	8.6	74.00	22.52
10389.100000	---	46.07	150.0	V	244.0	12.8	54.00	7.93
10389.100000	55.13	---	150.0	V	244.0	12.8	74.00	18.87
16155.500000	---	46.08	150.0	V	244.0	12.3	54.00	7.92
16155.500000	55.66	---	150.0	V	244.0	12.3	74.00	18.34

Middle Channel: 2440MHz

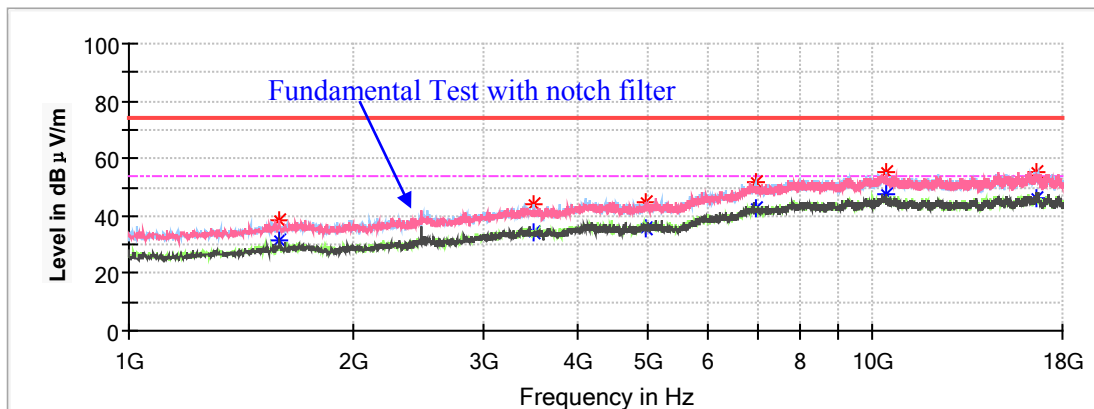
Full Spectrum



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)				
1593.300000	---	31.20	150.0	V	209.0	-9.1	54.00	22.80
1593.300000	39.00	---	150.0	V	209.0	-9.1	74.00	35.00
3378.300000	---	35.40	150.0	V	25.0	-2.1	54.00	18.60
3378.300000	43.42	---	150.0	V	25.0	-2.1	74.00	30.58
4880.000000	---	35.80	200.0	H	350.0	1.1	54.00	18.20
4880.000000	43.24	---	200.0	H	350.0	1.1	74.00	30.76
6305.700000	---	40.91	150.0	V	25.0	6.1	54.00	13.09
6305.700000	49.88	---	150.0	V	25.0	6.1	74.00	24.12
10344.900000	---	46.00	200.0	H	199.0	12.7	54.00	8.00
10344.900000	55.87	---	200.0	H	199.0	12.7	74.00	18.13
16238.800000	---	46.44	200.0	H	237.0	12.2	54.00	7.56
16238.800000	55.49	---	200.0	H	237.0	12.2	74.00	18.51

High Channel: 2480MHz

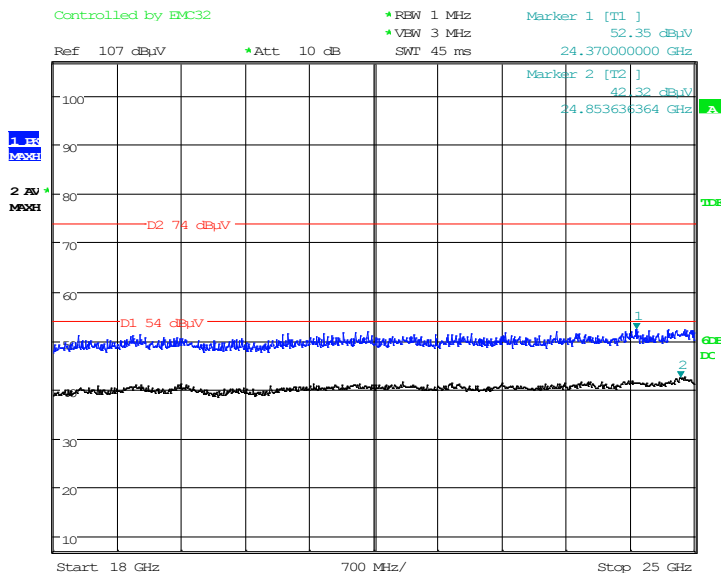
Full Spectrum



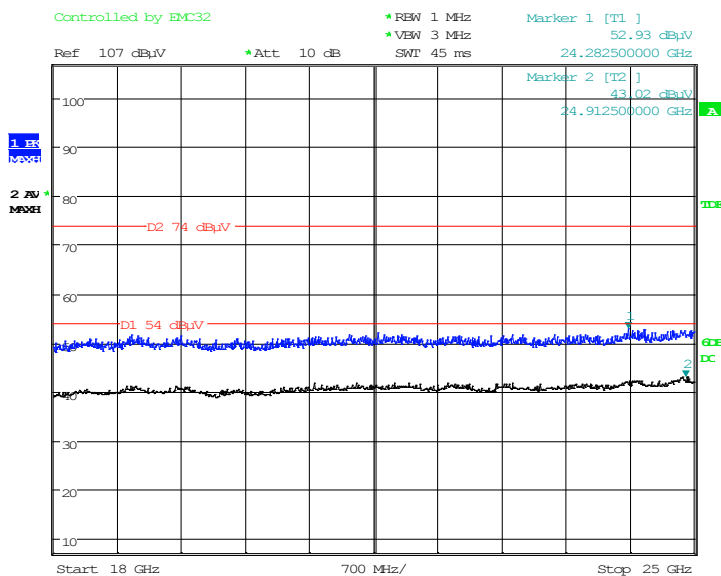
Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
	MaxPeak (dBμV/m)	Average (dBμV/m)	Height (cm)	Polar (H/V)				
1596.700000	38.44	---	200.0	V	187.0	-9.1	74.00	35.56
1596.700000	---	31.31	200.0	V	187.0	-9.1	54.00	22.69
3499.000000	---	33.99	150.0	H	244.0	-1.8	54.00	20.01
3499.000000	44.10	---	150.0	H	244.0	-1.8	74.00	29.90
4960.000000	---	35.66	150.0	V	354.0	1.1	54.00	18.34
4960.000000	44.46	---	150.0	V	354.0	1.1	74.00	29.54
6950.000000	51.71	---	150.0	H	345.0	8.7	74.00	22.29
6950.000000	---	42.83	150.0	H	345.0	8.7	54.00	11.17
10435.000000	54.94	---	200.0	V	0.0	12.9	74.00	19.06
10435.000000	---	47.69	200.0	V	0.0	12.9	54.00	6.31
16629.800000	---	45.87	150.0	H	91.0	11.9	54.00	8.13
16629.800000	55.54	---	150.0	H	91.0	11.9	74.00	18.46

18GHz-25GHz

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

Horizontal

Date: 23.APR.2021 12:45:51

Vertical

Date: 23.APR.2021 12:57:18

Restricted Bands Emissions Test:

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

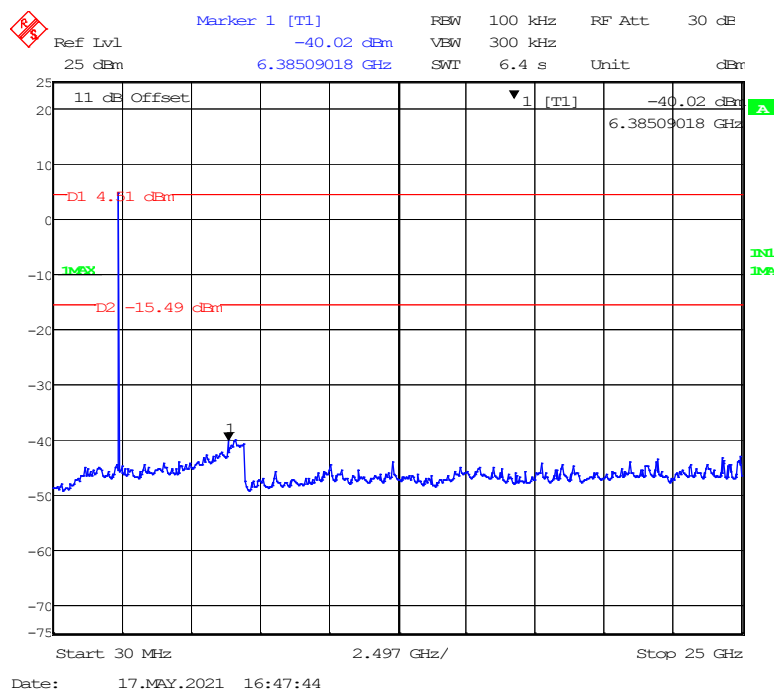
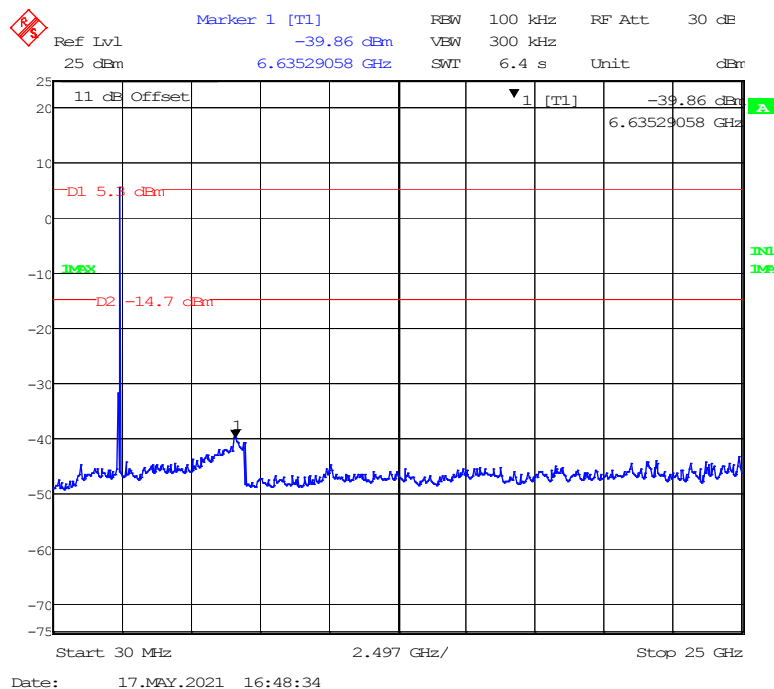
Note:

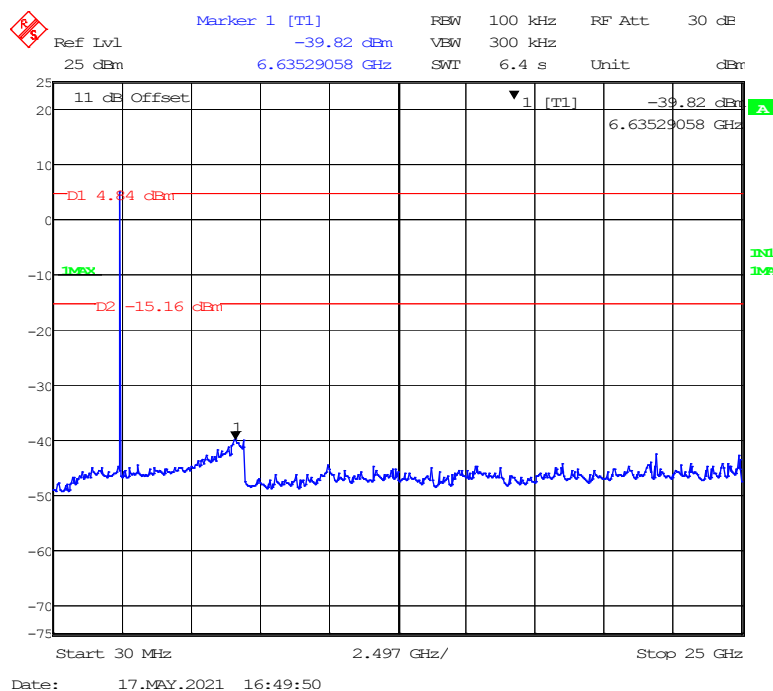
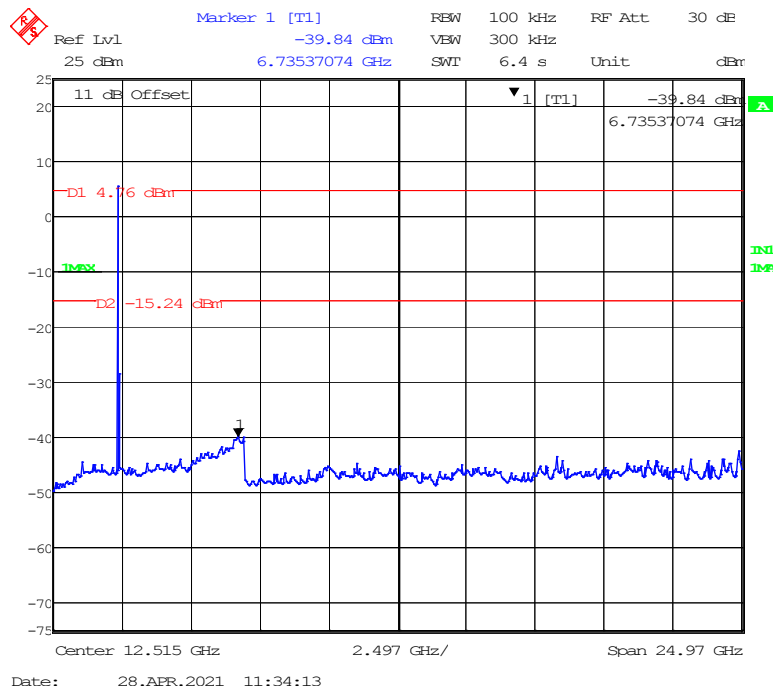
1. Corrected Factor (dB/m) = Antenna factor (RX) (dB/m) + Cable Loss (dB) – Amplifier Factor (dB)

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

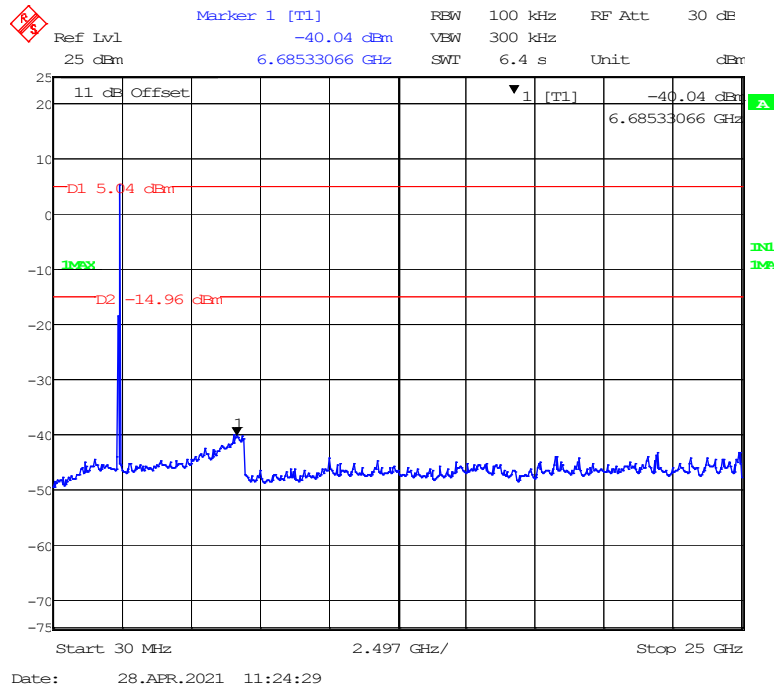
Margin (dB) = Limit (dBμV/m) – Corrected Amplitude (dBμV/m)

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	51.68	---	200.0	H	182.0	3.8	74.00	22.32
2390.00	---	45.88	200.0	H	182.0	3.8	54.00	8.12
High Channel: 2480MHz								
2483.50	52.86	---	200.0	H	207.0	4.1	74.00	21.14
2483.50	---	46.40	200.0	H	207.0	4.1	54.00	7.60

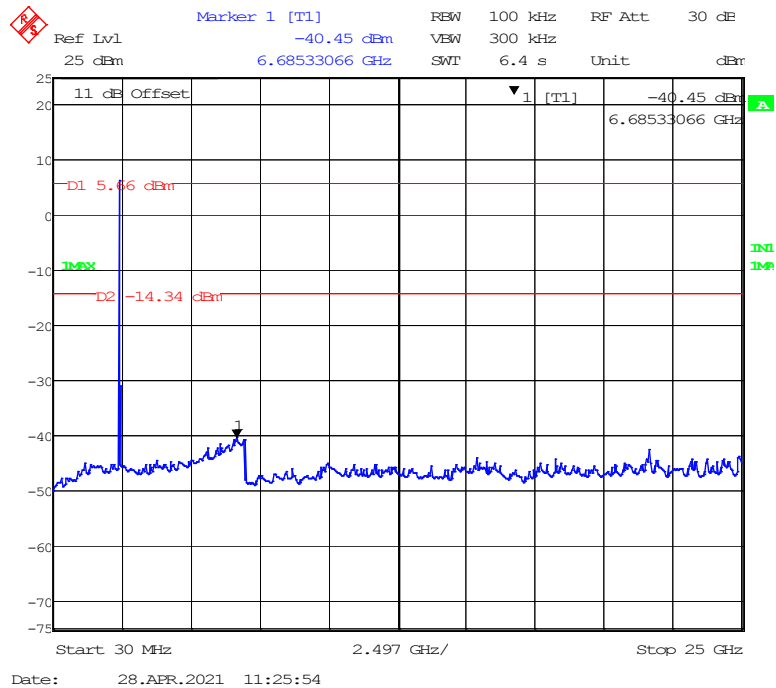
Conducted Spurious Emissions at Antenna Port**802.11b Mode Low Channel****802.11b Mode Middle Channel**

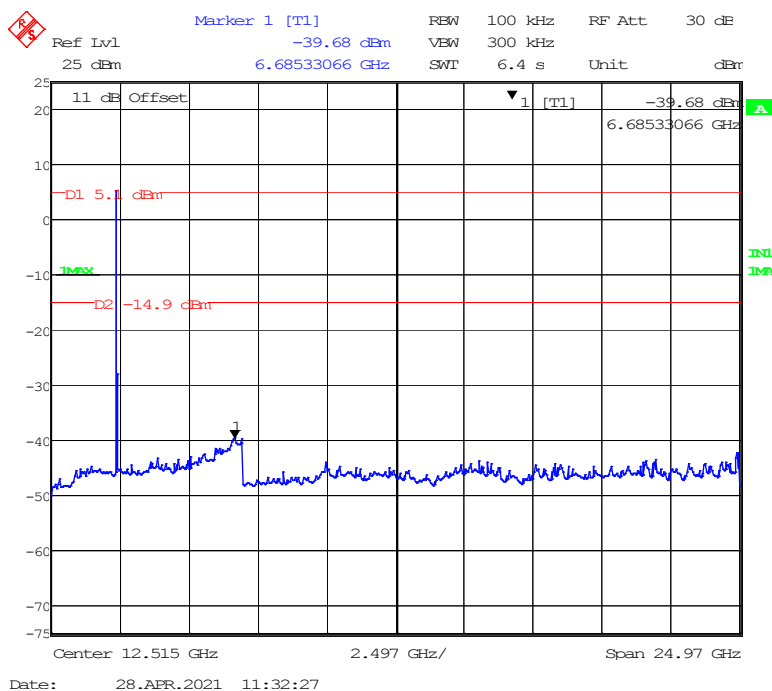
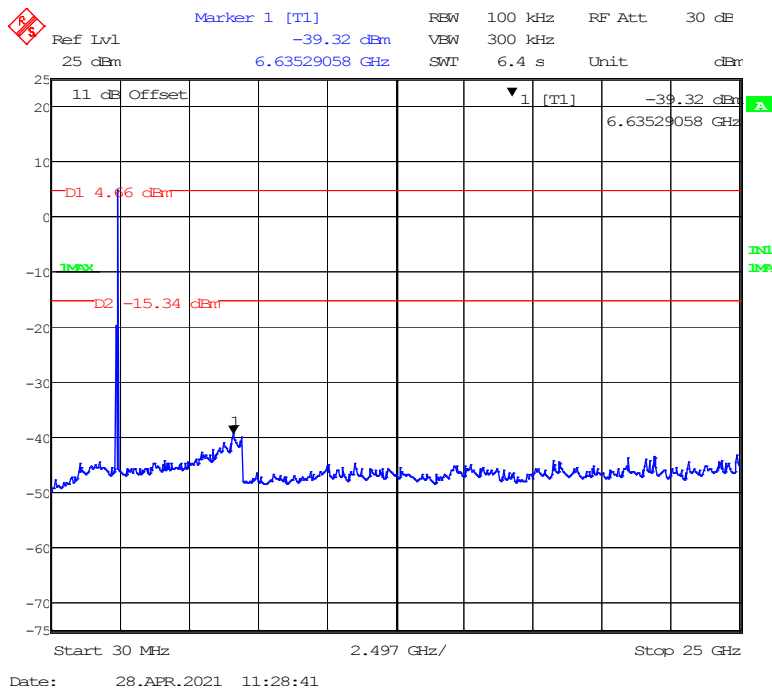
802.11b Mode High Channel**802.11g Mode Low Channel**

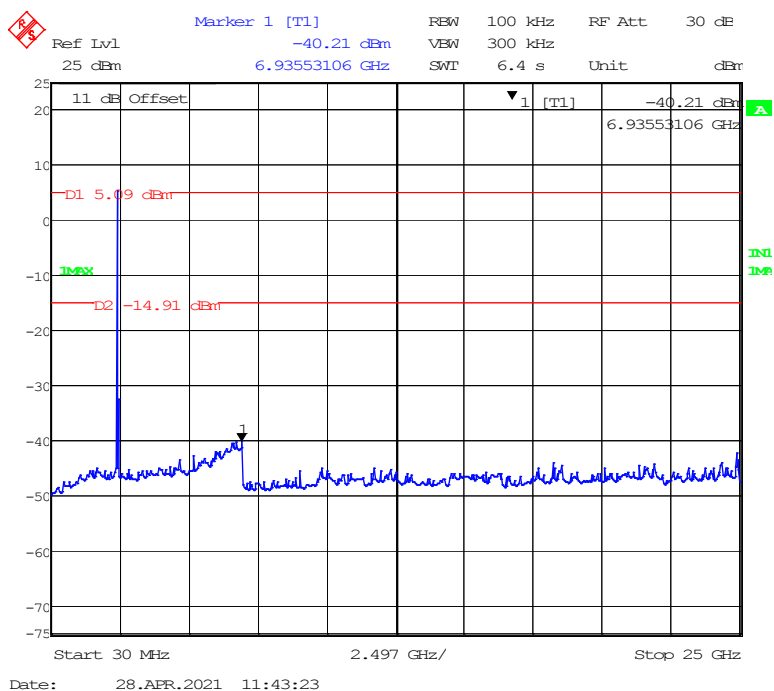
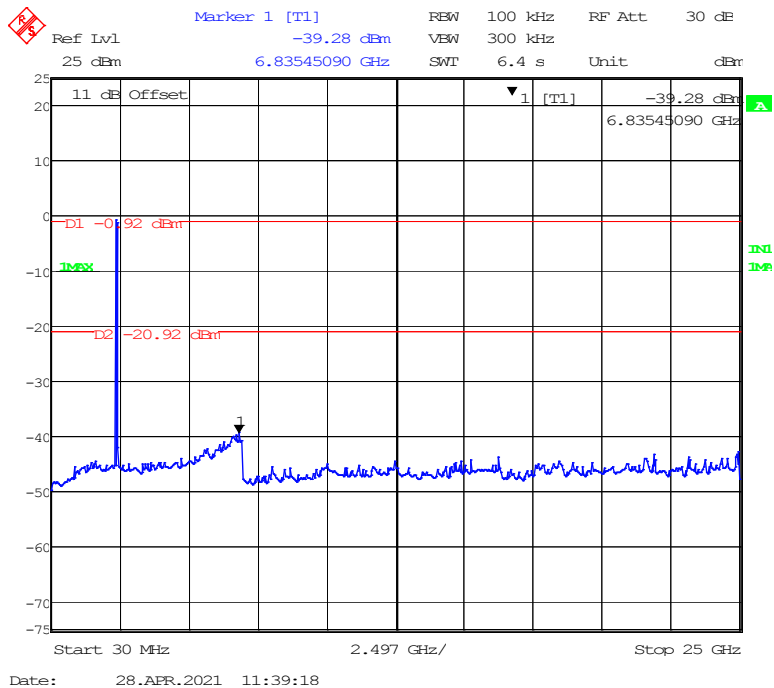
802.11g Mode Middle Channel



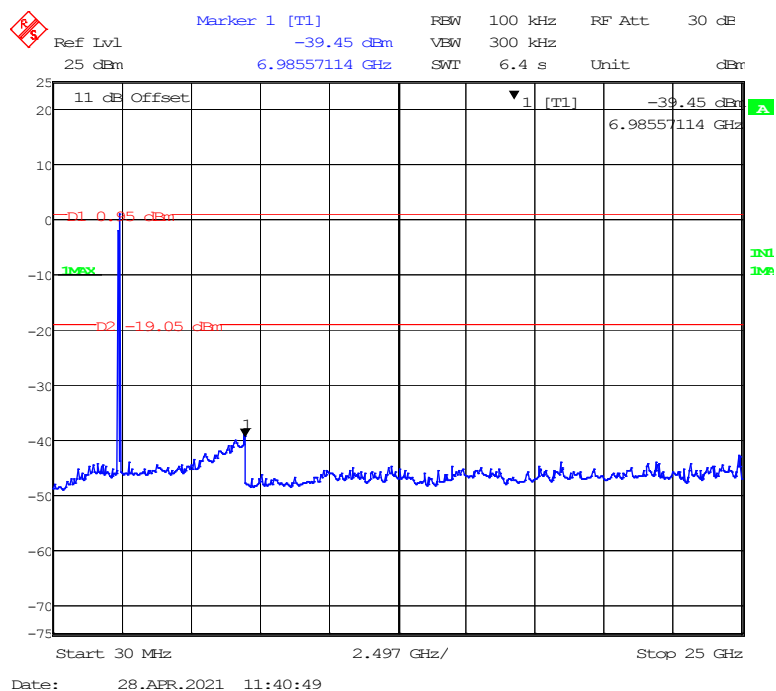
802.11g Mode High Channel



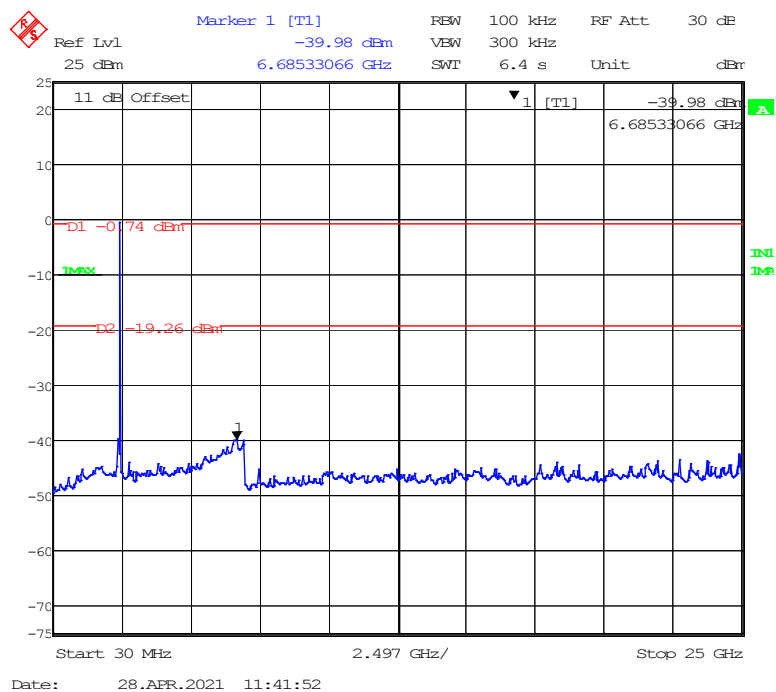
802.11n-HT20 Mode Low Channel**802.11n-HT20 Mode Middle Channel**

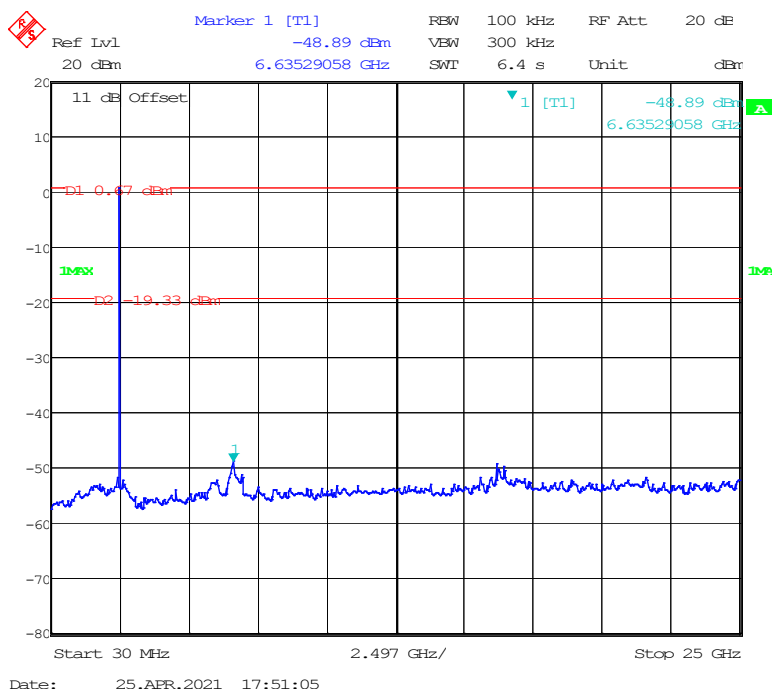
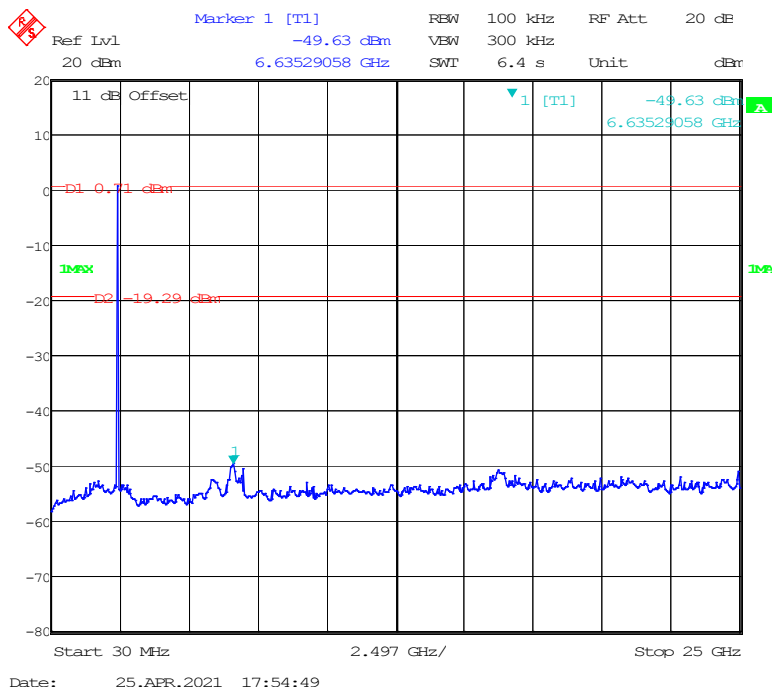
802.11n-HT20 Mode High Channel**802.11n-HT40 Mode Low Channel**

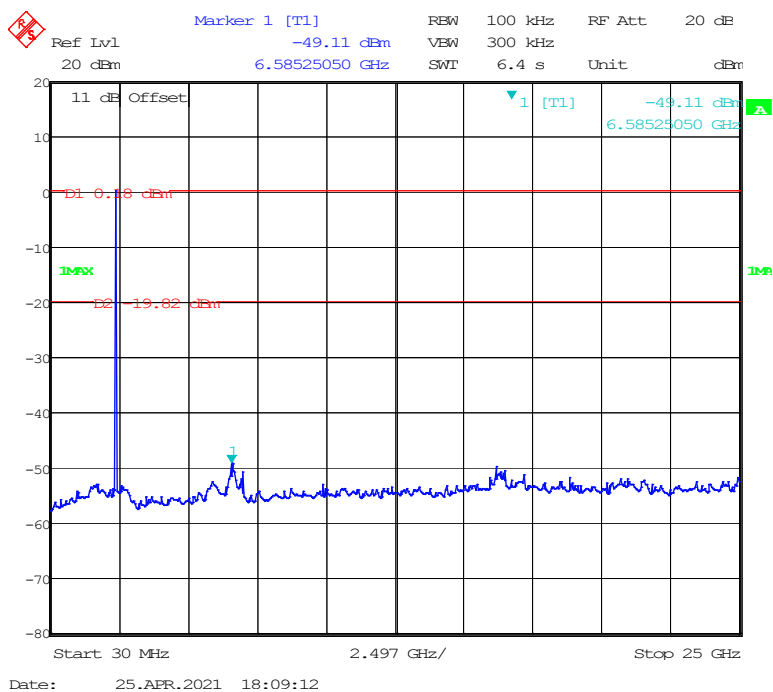
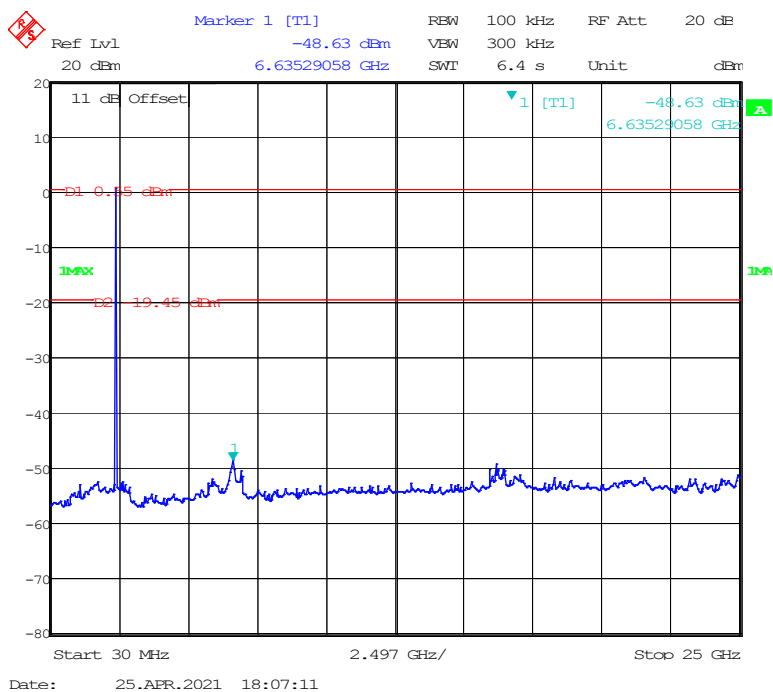
802.11n-HT40 Mode Middle Channel

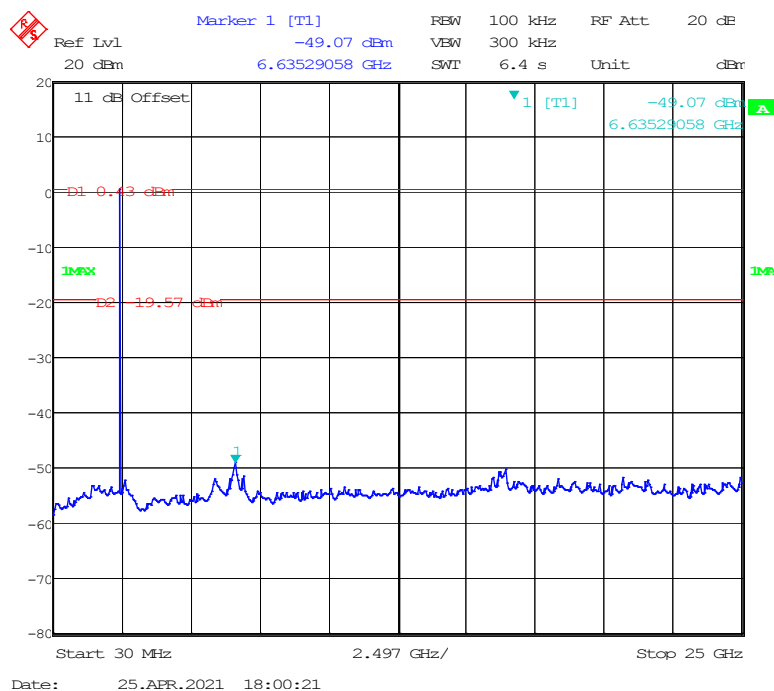
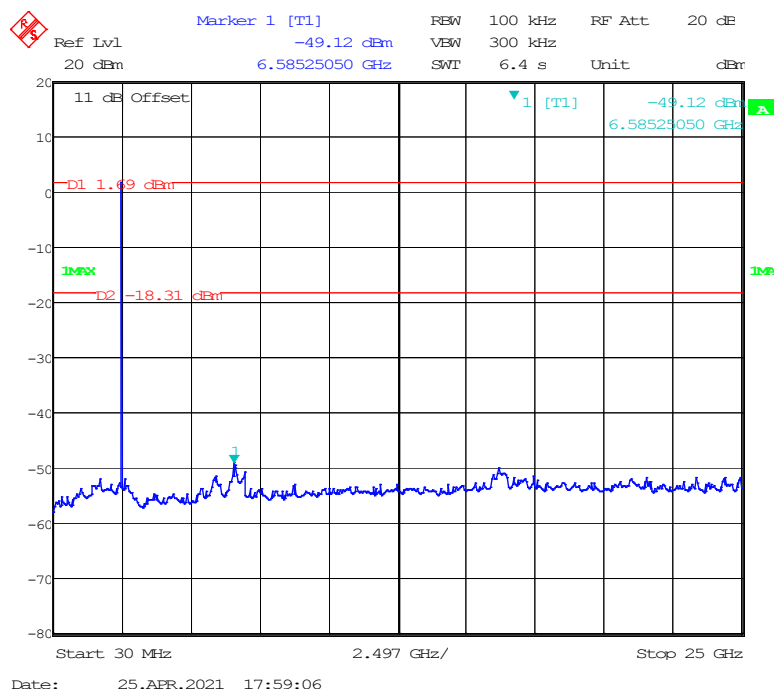


802.11n-HT40 Mode High Channel



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**

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

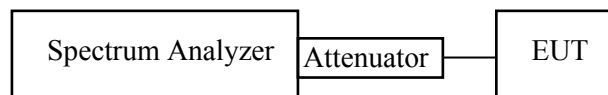
Applicable Standard

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:	24.3-24.7 °C
Relative Humidity:	45-50 %
ATM Pressure:	101.3-101.5 kPa

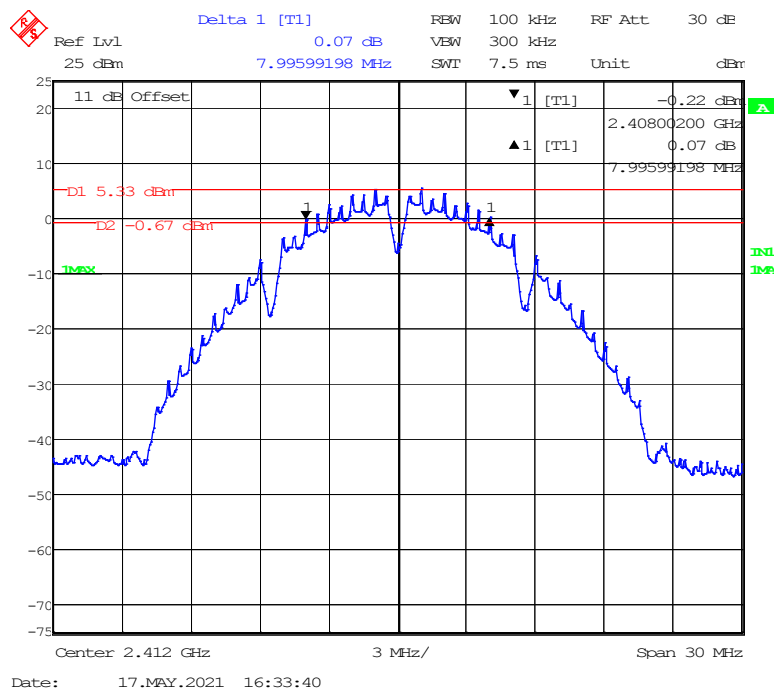
The testing was performed by Stone Zhang from 2021-04-25 to 2021-05-17.

Test Result: Compliant.

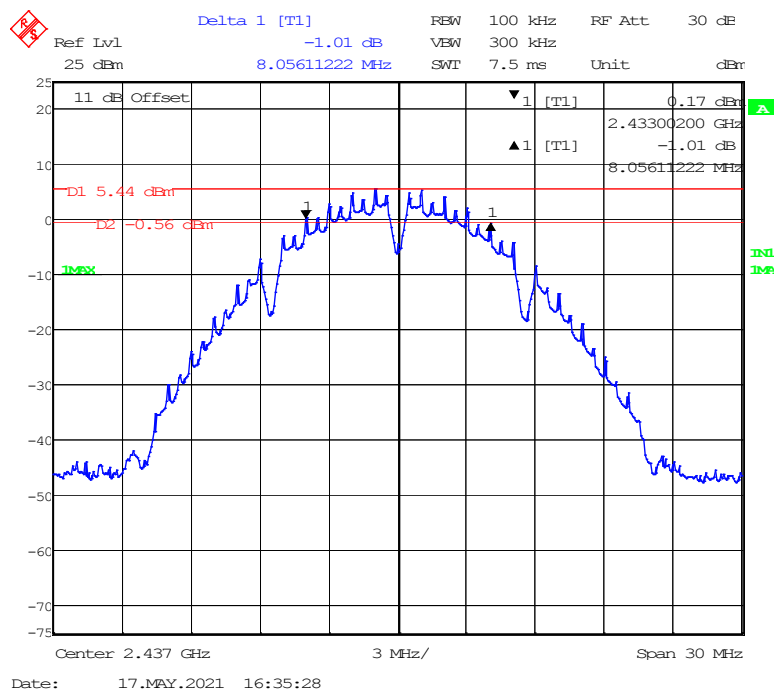
EUT operation mode: Transmitting

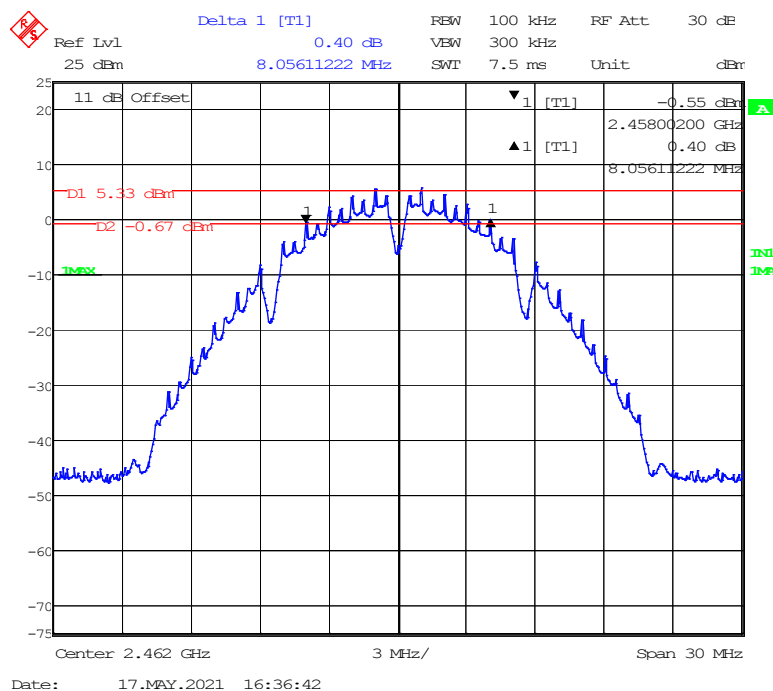
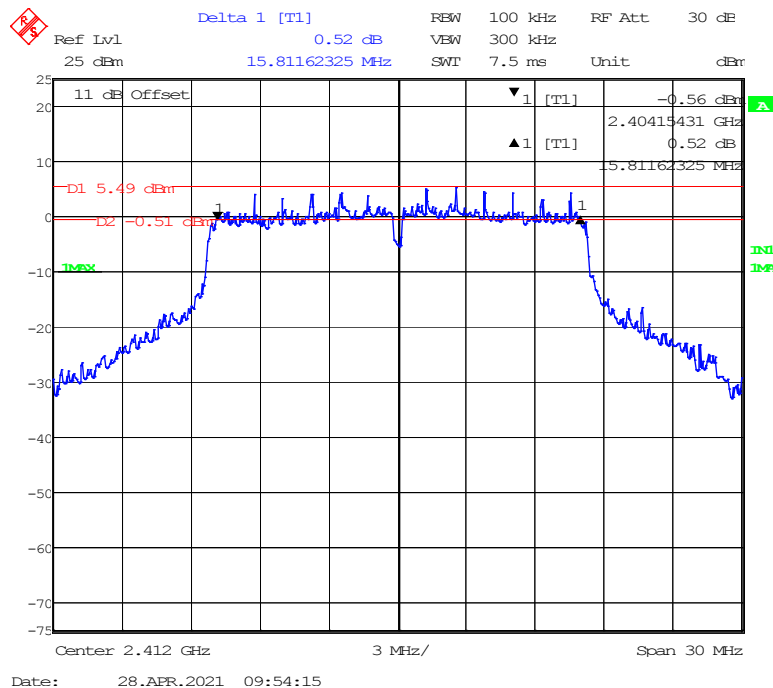
Channel	Frequency (MHz)	6 dB Emission Bandwidth (MHz)	Limit (MHz)
802.11b Mode			
Low	2412	7.996	≥ 0.5
Middle	2437	8.056	≥ 0.5
High	2462	8.056	≥ 0.5
802.11g Mode			
Low	2412	15.812	≥ 0.5
Middle	2437	15.511	≥ 0.5
High	2462	15.571	≥ 0.5
802.11n-HT20 Mode			
Low	2412	16.473	≥ 0.5
Middle	2437	16.052	≥ 0.5
High	2462	16.473	≥ 0.5
802.11n-HT40 Mode			
Low	2422	35.471	≥ 0.5
Middle	2437	35.351	≥ 0.5
High	2452	35.832	≥ 0.5
BLE(1Mbps) Mode			
Low	2402	0.727	≥ 0.5
Middle	2440	0.727	≥ 0.5
High	2480	0.727	≥ 0.5
BLE(2Mbps) Mode			
Low	2402	1.184	≥ 0.5
Middle	2440	1.190	≥ 0.5
High	2480	1.178	≥ 0.5

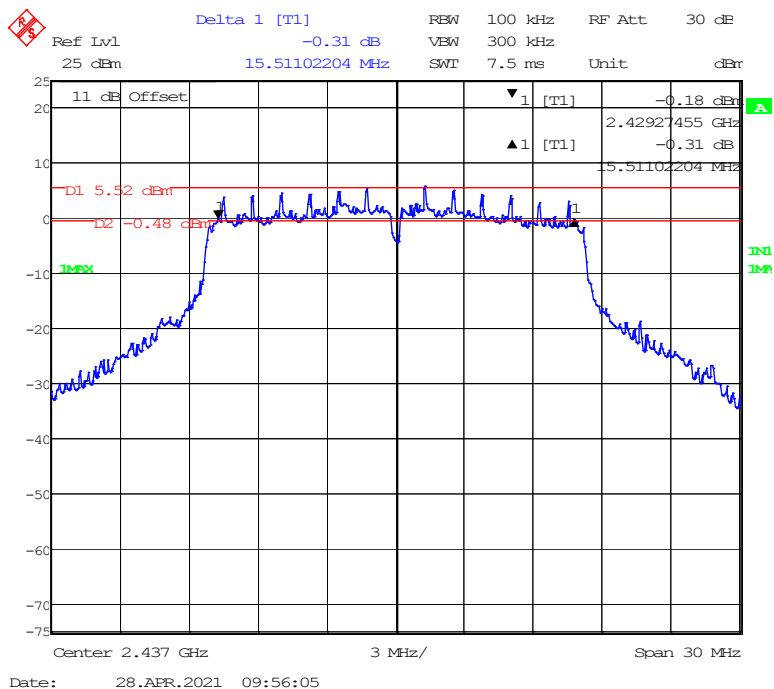
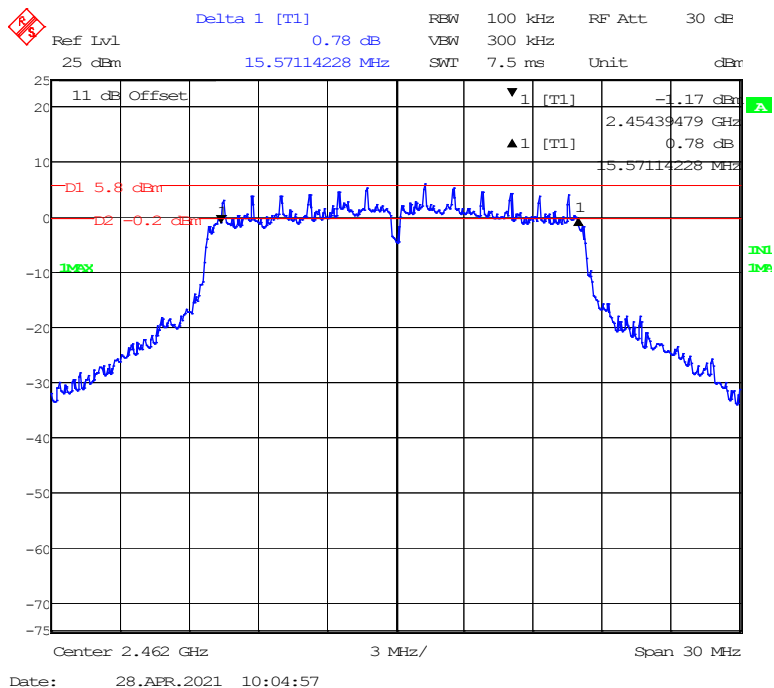
802.11b Mode Low Channel



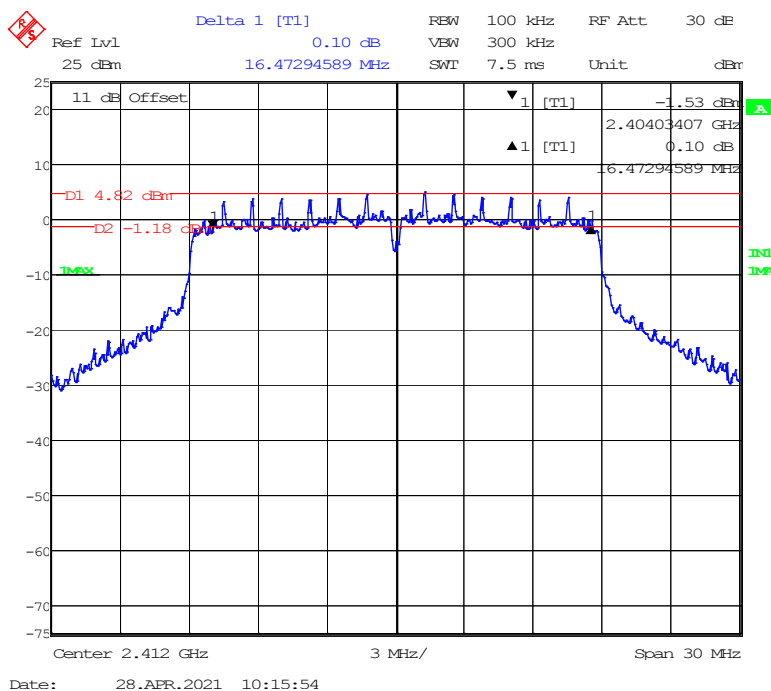
802.11b Mode Middle Channel



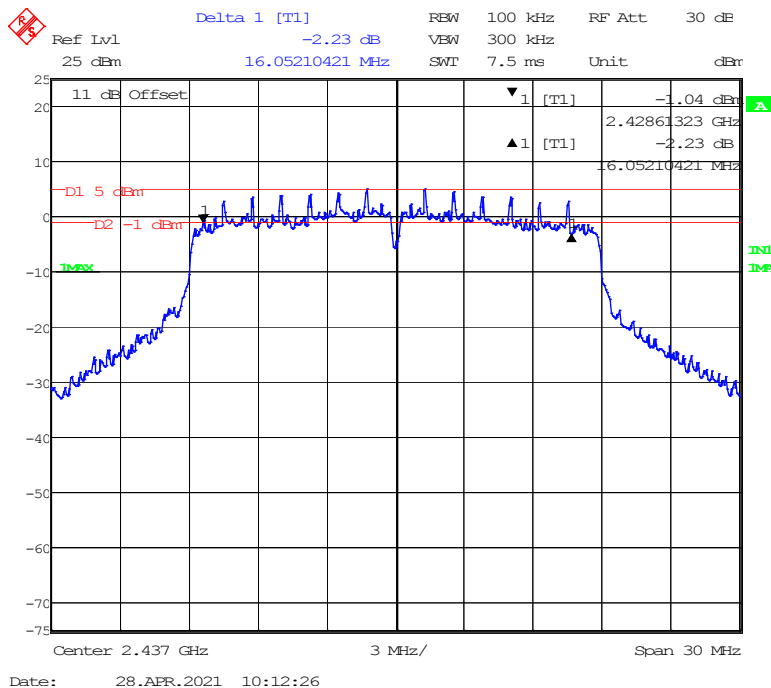
802.11b Mode High Channel**802.11g Mode Low Channel**

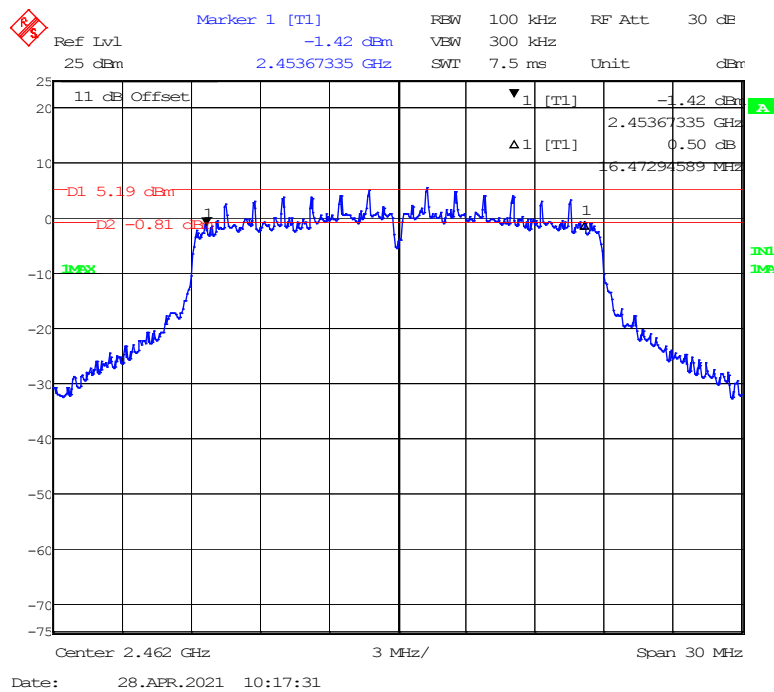
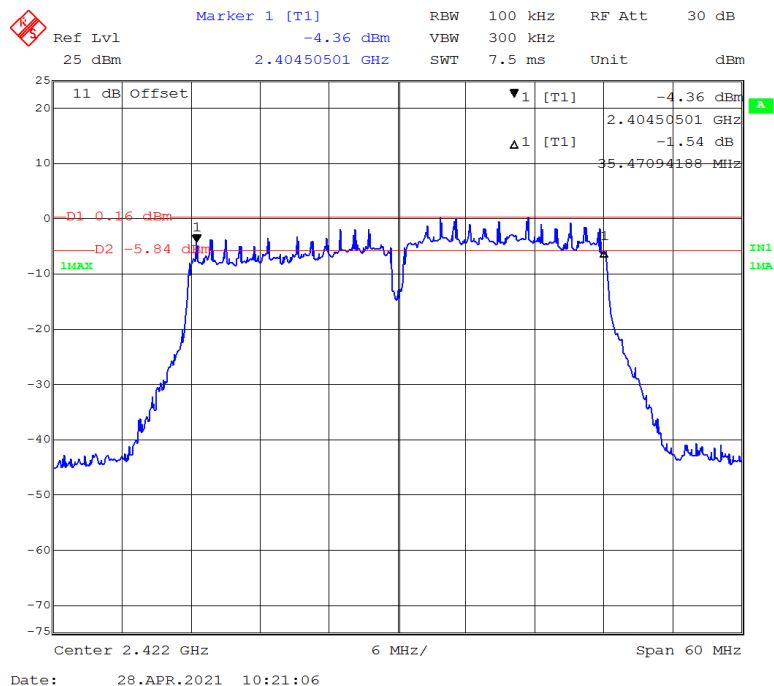
802.11g Mode Middle Channel**802.11g Mode High Channel**

802.11n-HT20 Mode Low Channel

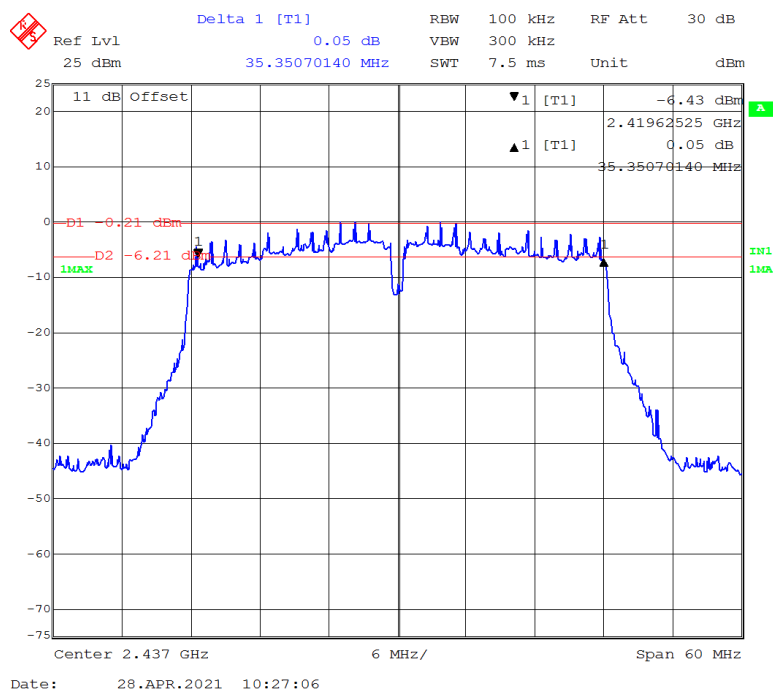


802.11n-HT20 Mode Middle Channel

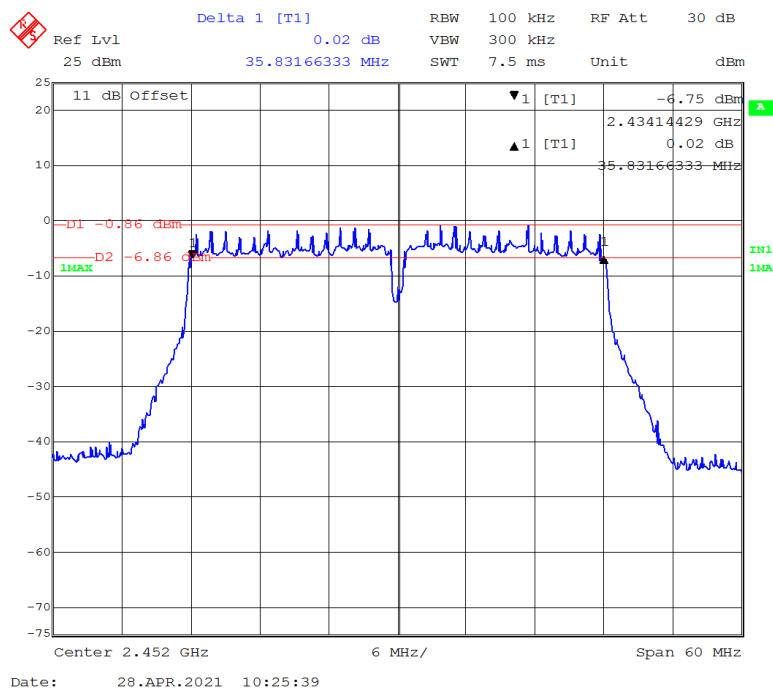


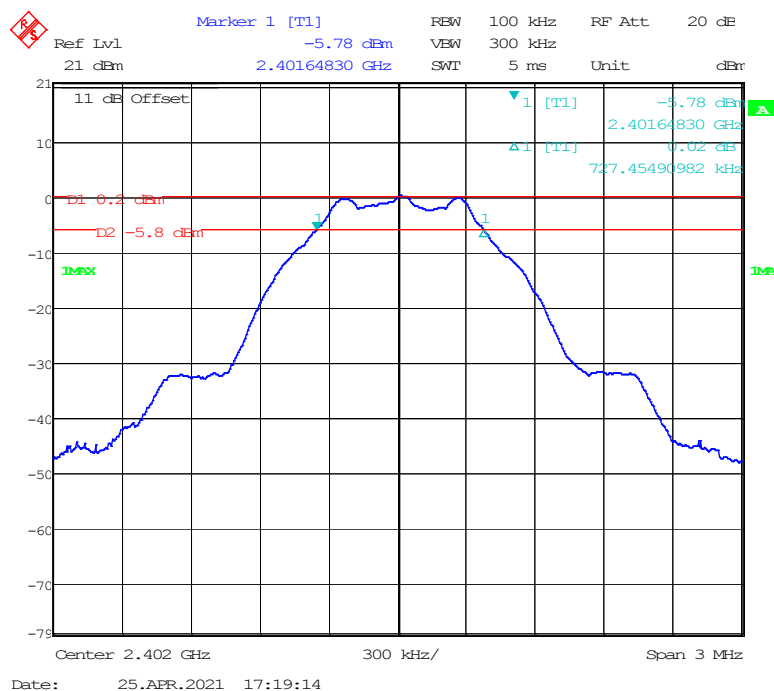
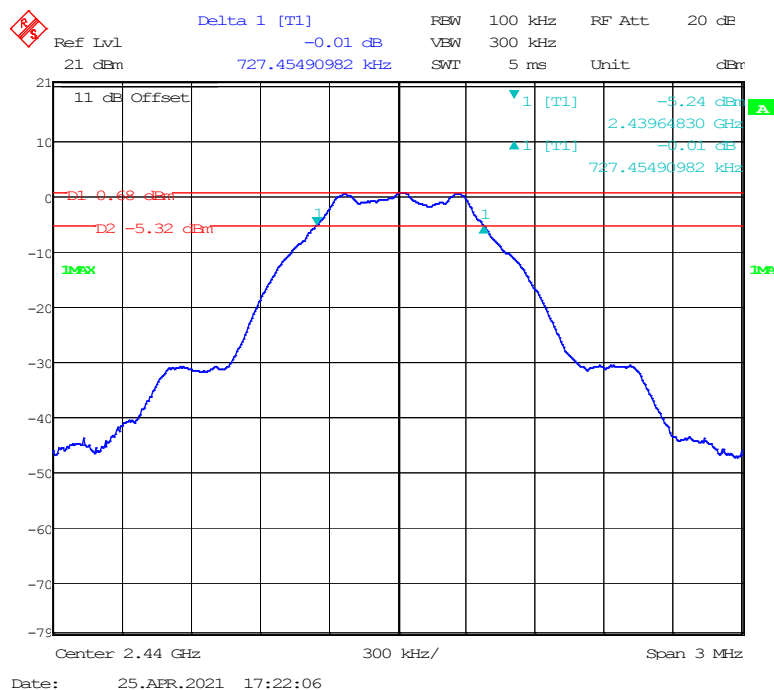
802.11n-HT20 Mode High Channel**802.11n-HT40 Mode Low Channel**

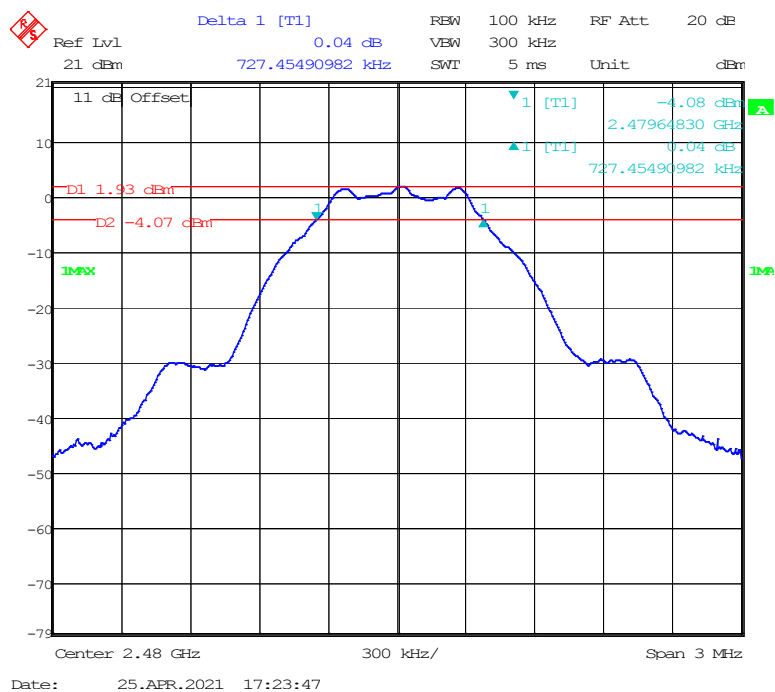
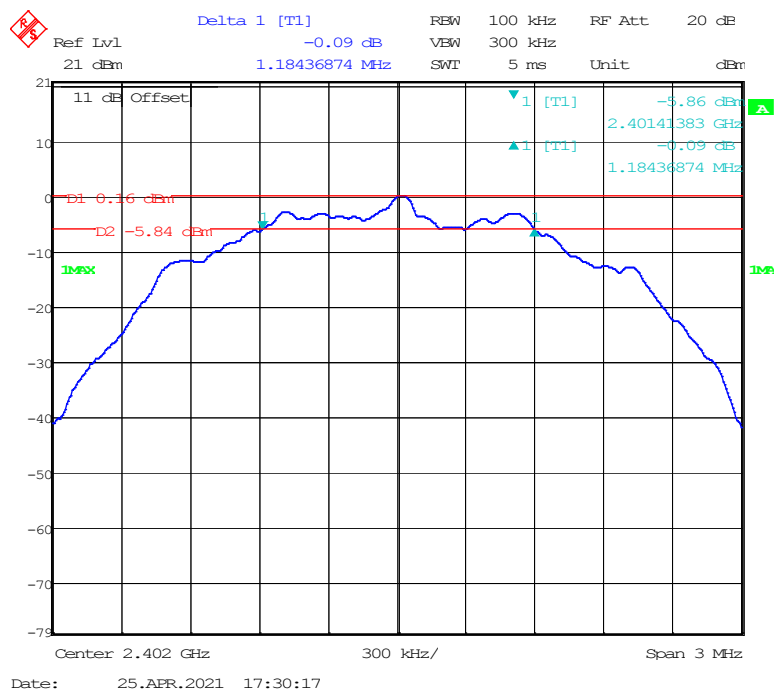
802.11n-HT40 Mode Middle Channel

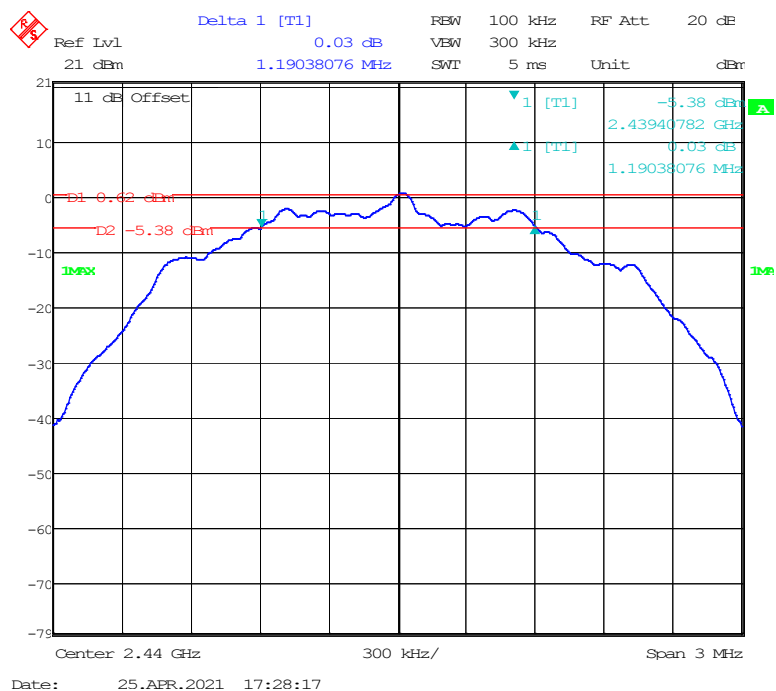
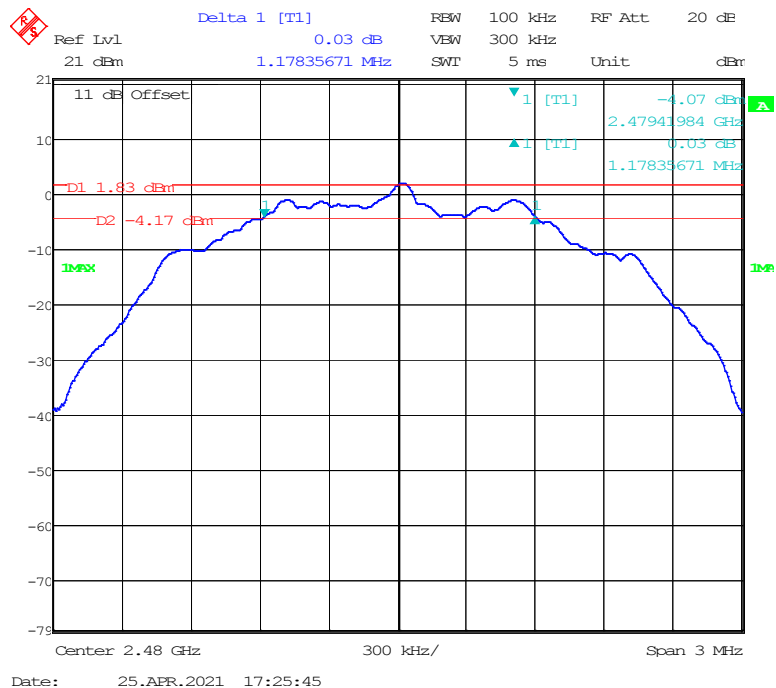


802.11n-HT40 Mode High Channel



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**

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**

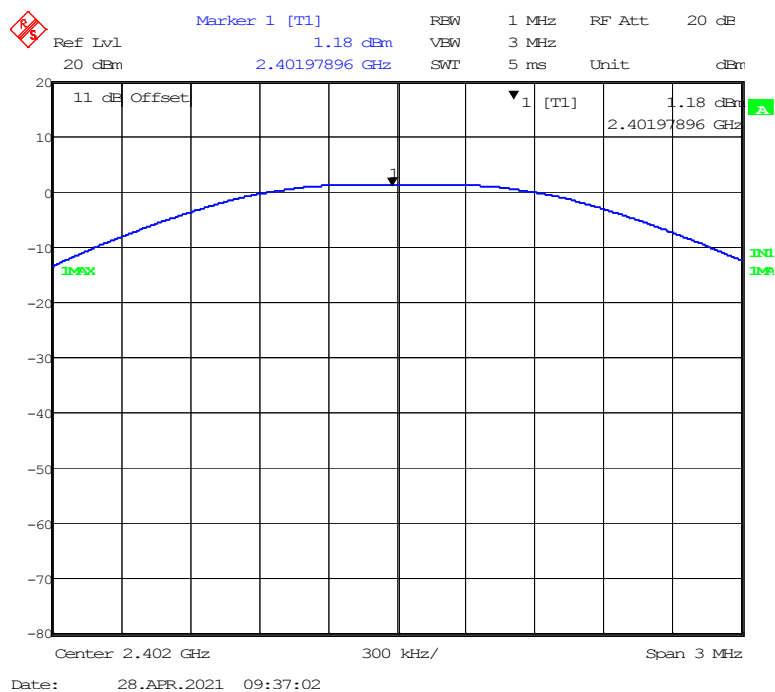
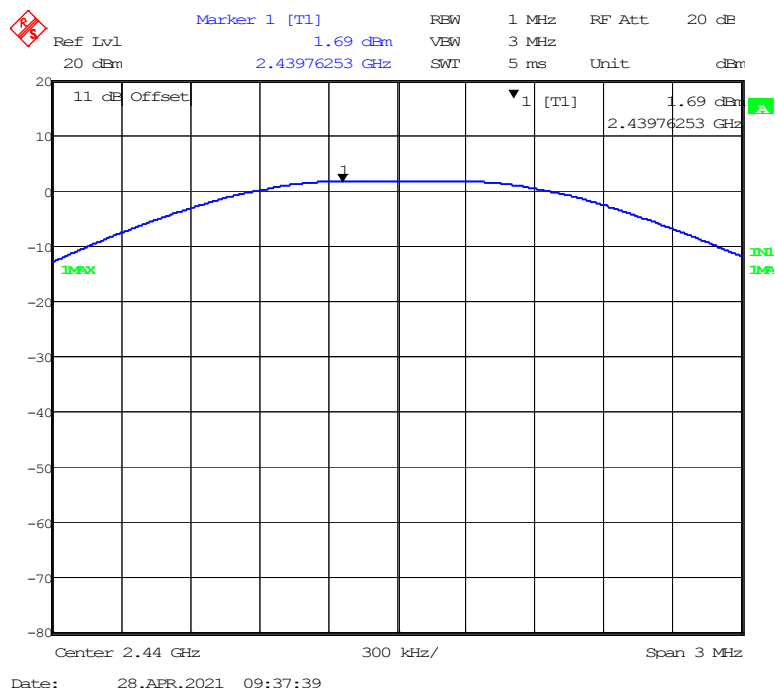
Temperature:	24.3-24.9 °C
Relative Humidity:	48-50 %
ATM Pressure:	101.2-101.5 kPa

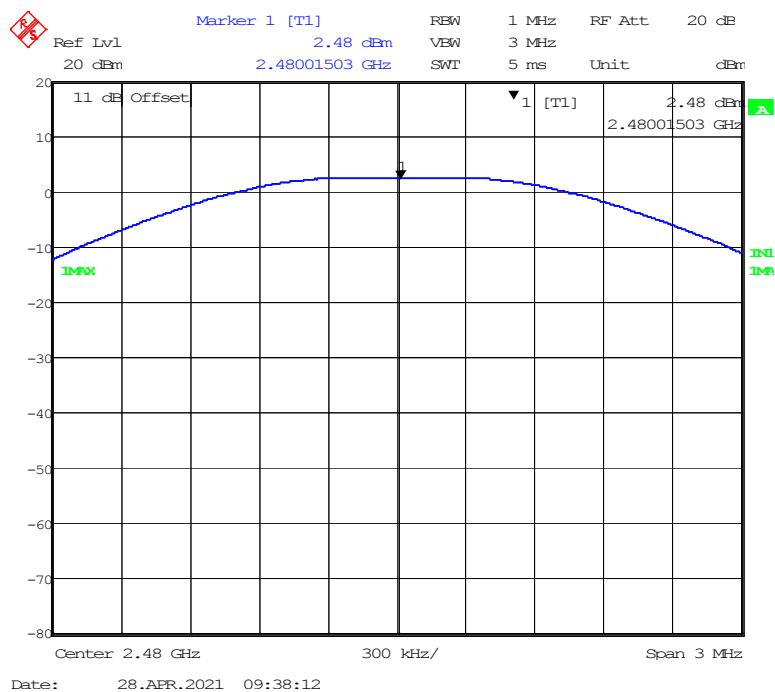
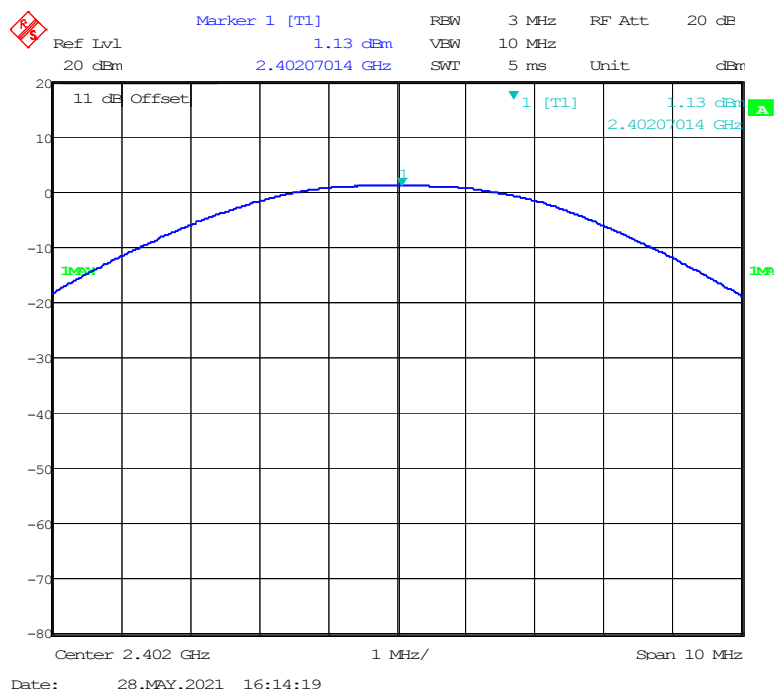
The testing was performed by Stone Zhang from 2021-04-28 to 2021-05-28.

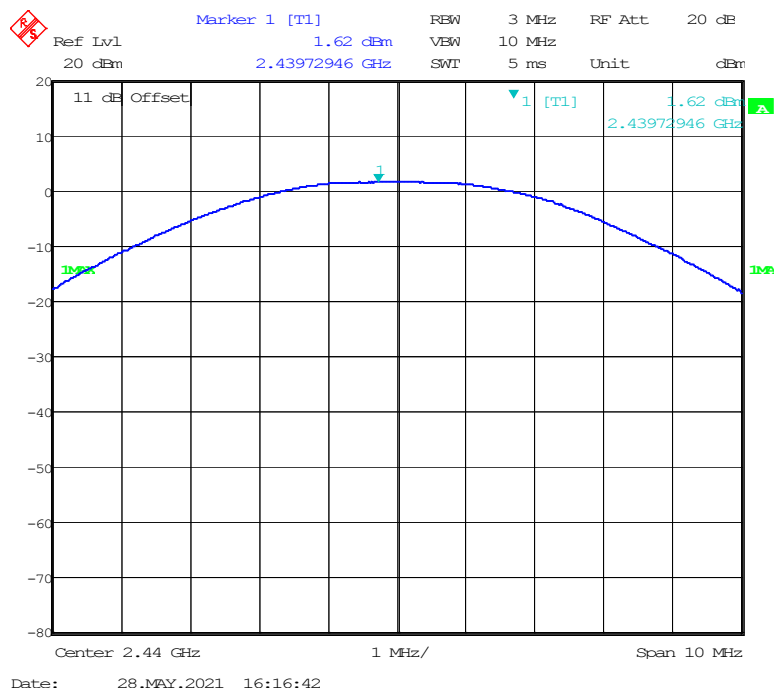
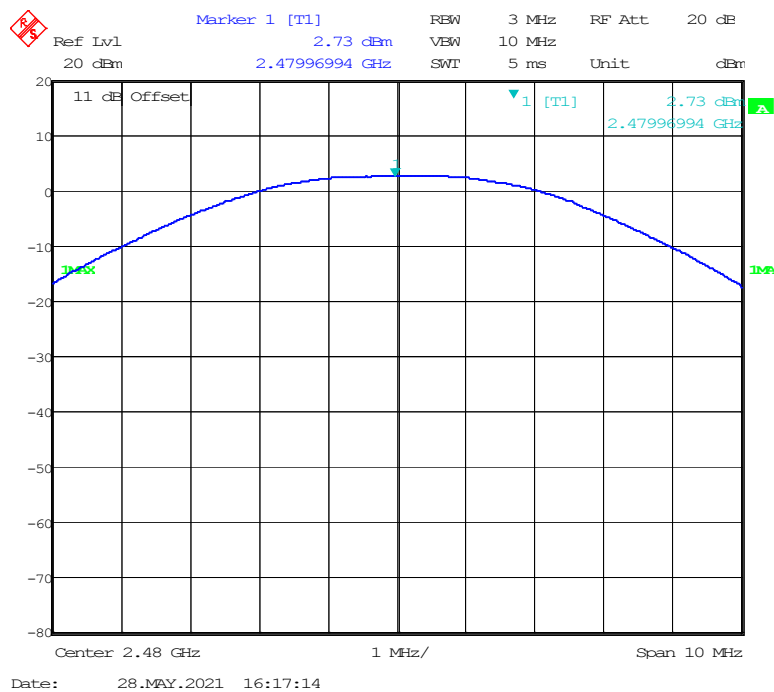
Test Result: Compliant.

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	16.41	13.28	30	Pass
Middle	2437	16.36	13.53	30	Pass
High	2462	16.34	13.38	30	Pass
802.11g Mode					
Low	2412	23.42	12.58	30	Pass
Middle	2437	23.58	12.66	30	Pass
High	2462	23.68	12.55	30	Pass
802.11n-HT20 Mode					
Low	2412	23.51	12.51	30	Pass
Middle	2437	23.32	12.37	30	Pass
High	2462	23.63	12.47	30	Pass
802.11n-HT40 Mode					
Low	2422	21.30	9.48	30	Pass
Middle	2437	21.46	9.69	30	Pass
High	2452	21.10	9.20	30	Pass
BLE (1Mbps) Mode					
Low	2402	1.18	/	30	Pass
Middle	2440	1.69	/	30	Pass
High	2480	2.48	/	30	Pass
BLE (2Mbps) Mode					
Low	2402	1.13	/	30	Pass
Middle	2440	1.62	/	30	Pass
High	2480	2.73	/	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.

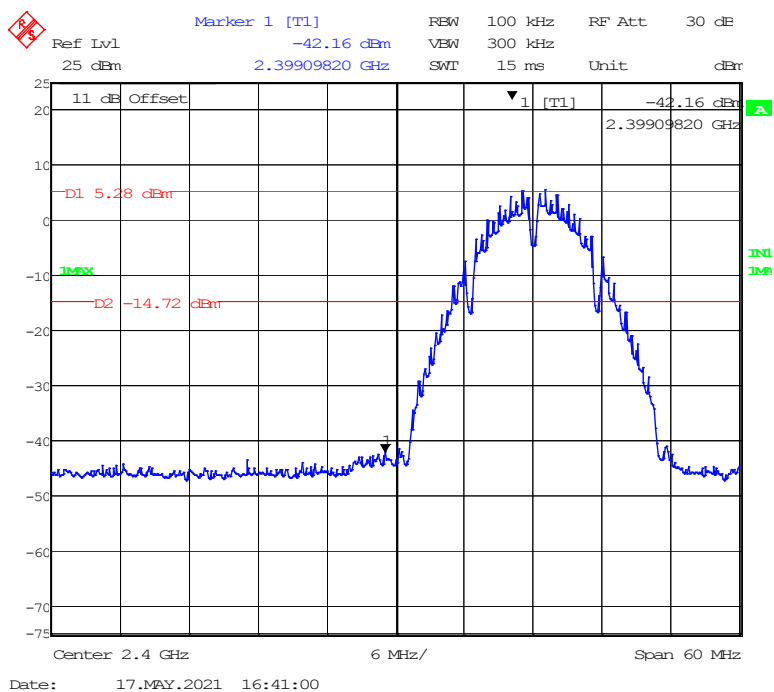
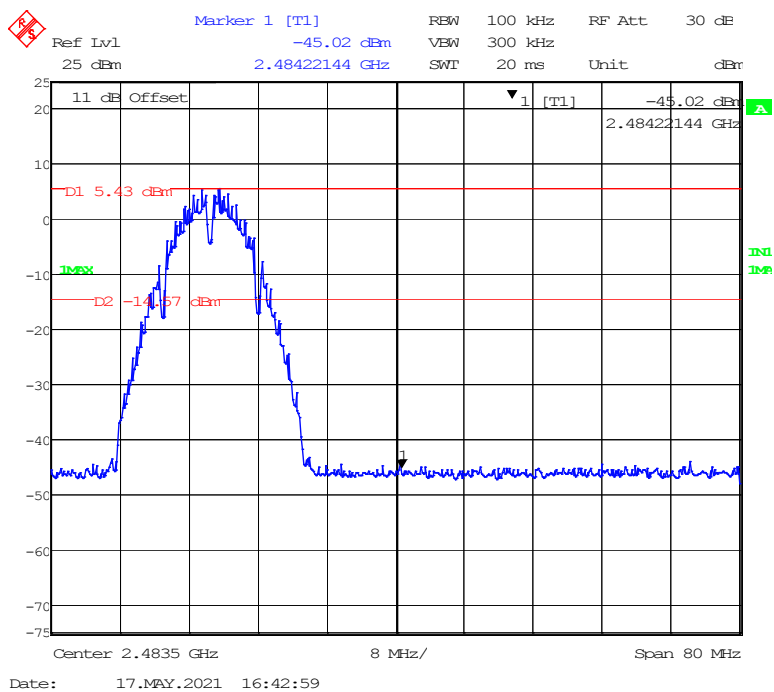
Test Data

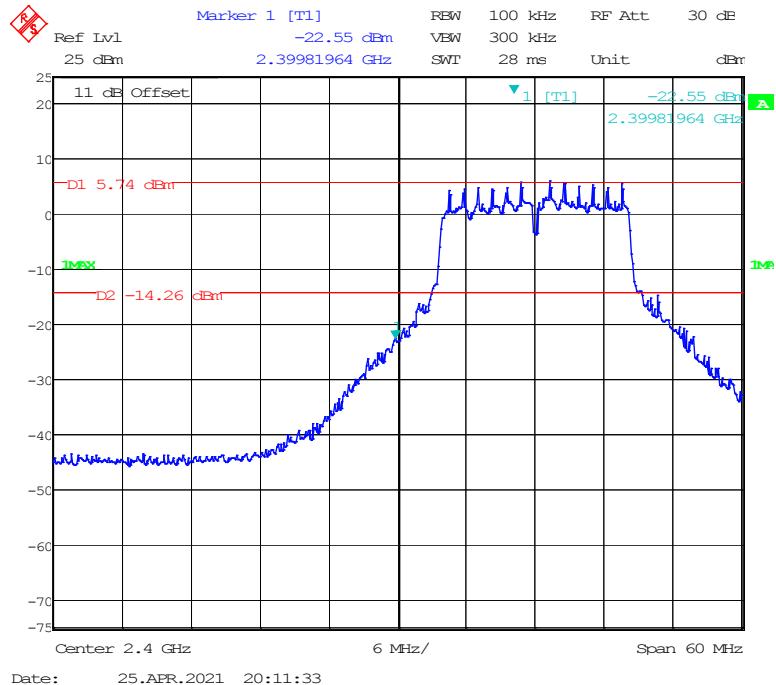
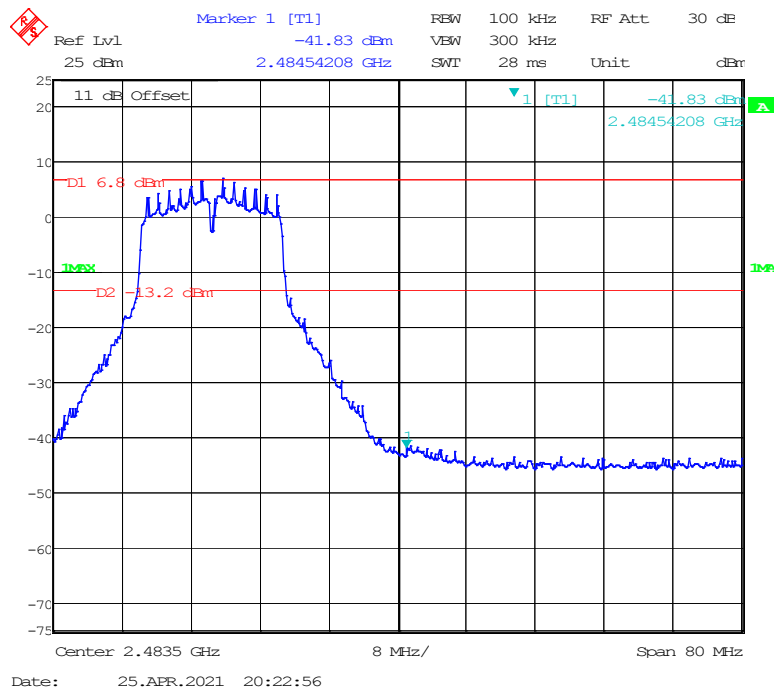
Environmental Conditions

Temperature:	24.5-25.1 °C
Relative Humidity:	46-50 %
ATM Pressure:	101.1-101.3 kPa

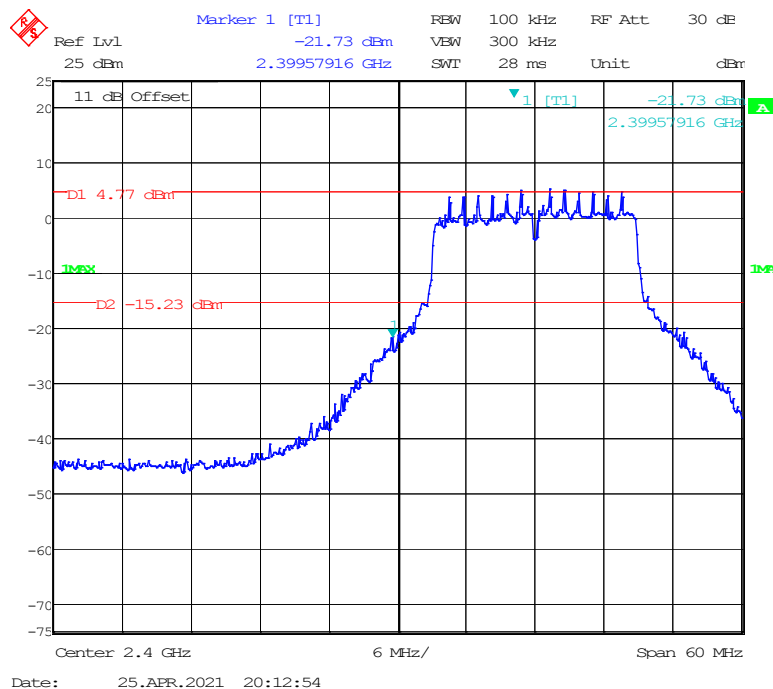
The testing was performed by Stone Zhang from 2021-04-25 to 2021-05-17.

Test Result: Compliant.

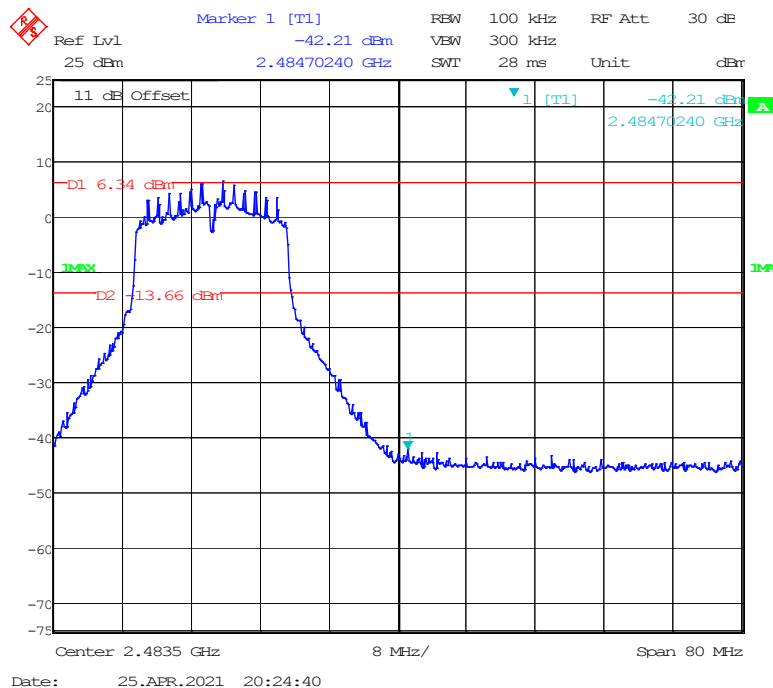
*EUT operation mode: Transmitting***802.11b Mode Left Side****802.11b Mode Right Side**

802.11g Mode Left Side**802.11g Mode Right Side**

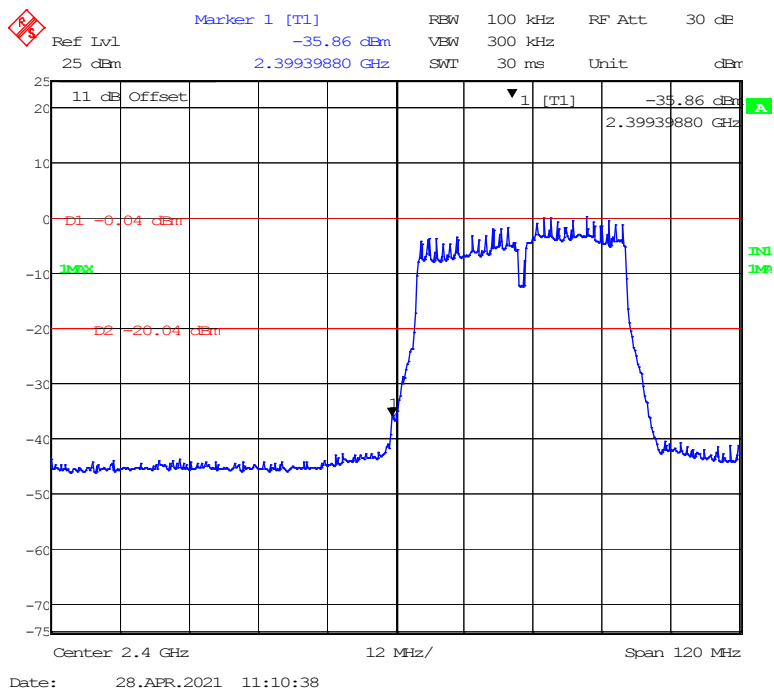
802.11n-HT20 Mode Left Side



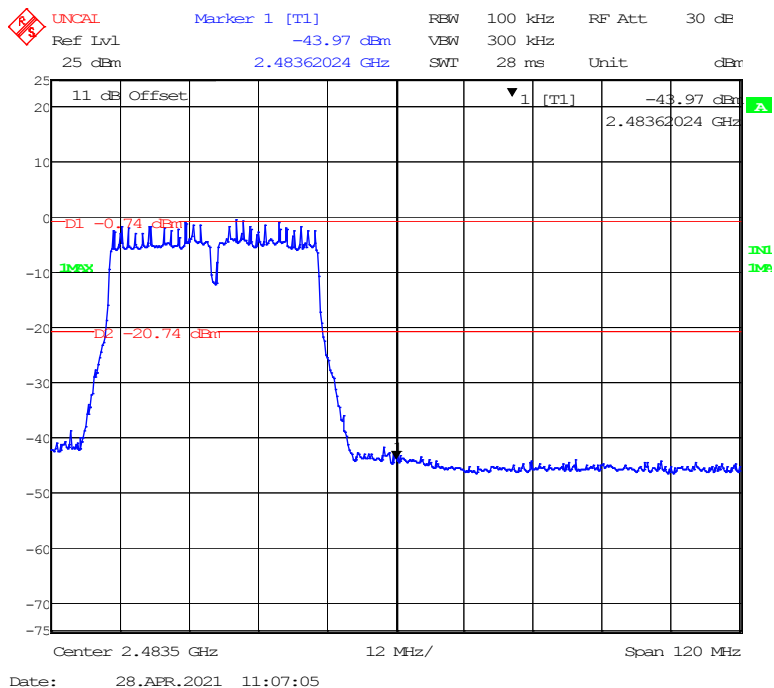
802.11n-HT20 Mode Right Side



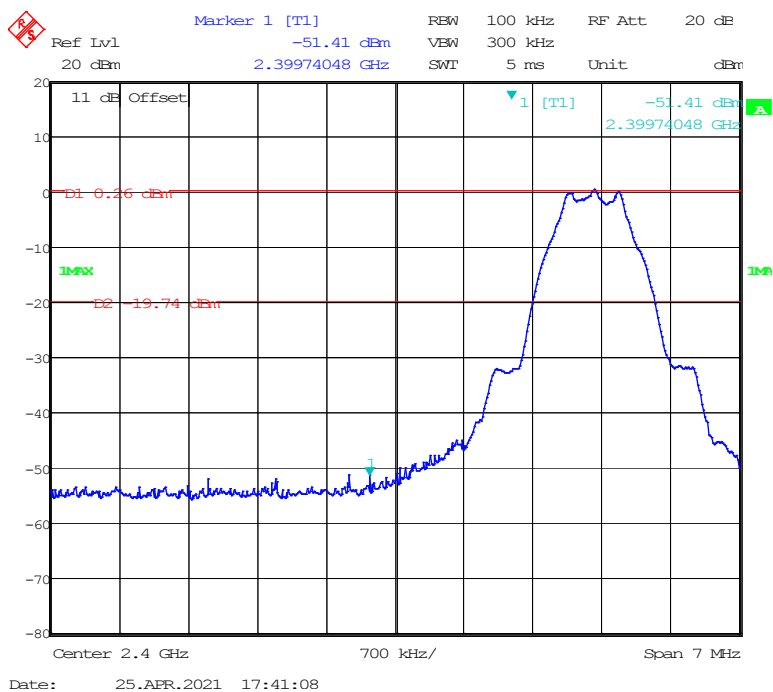
802.11n-HT40 Mode Left Side



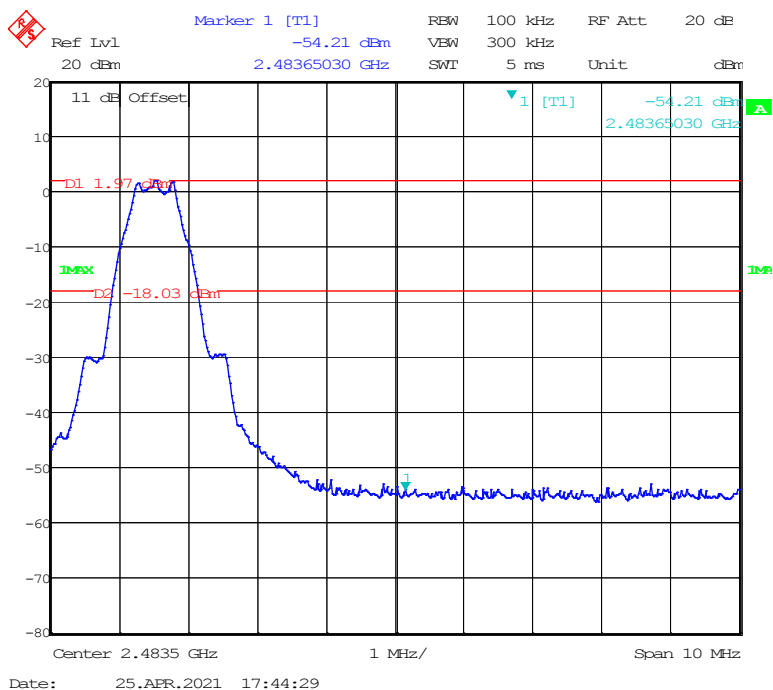
802.11n-HT40 Mode Right Side

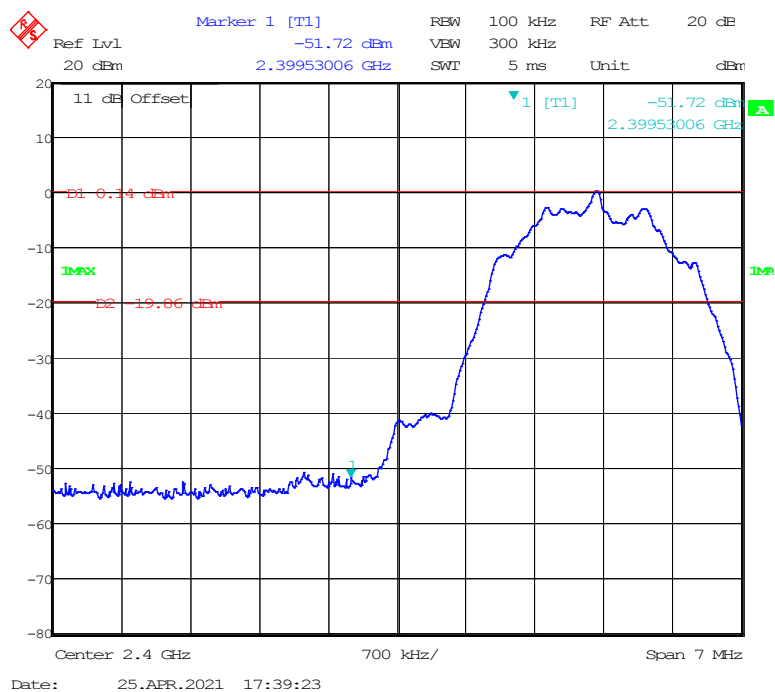
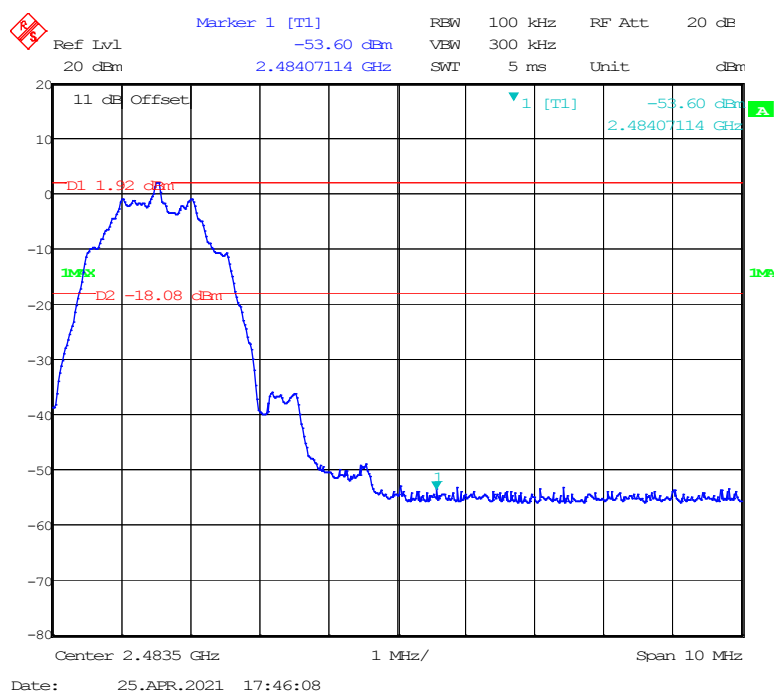


BLE(1Mbps) Mode Left Side



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

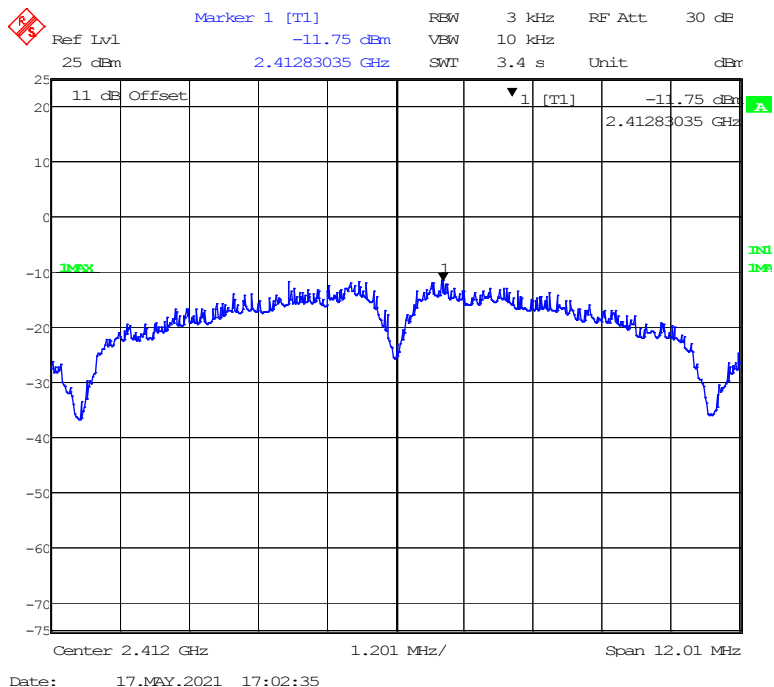
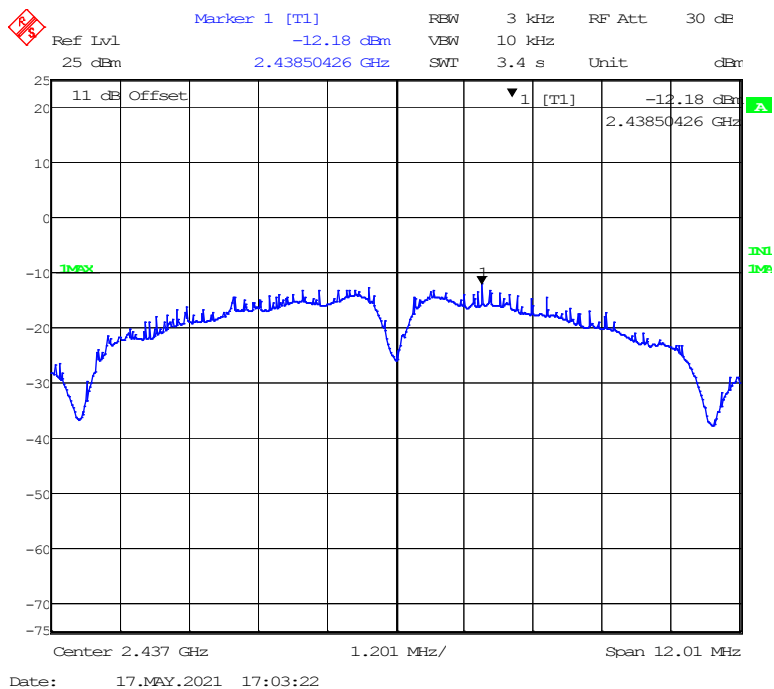
Temperature:	24.5-24.7 °C
Relative Humidity:	48-52 %
ATM Pressure:	101.1-101.3 kPa

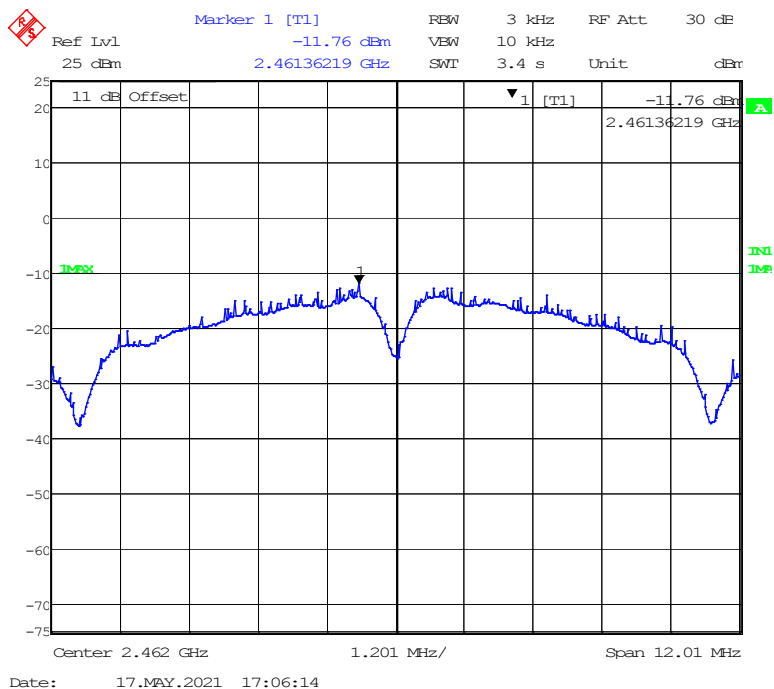
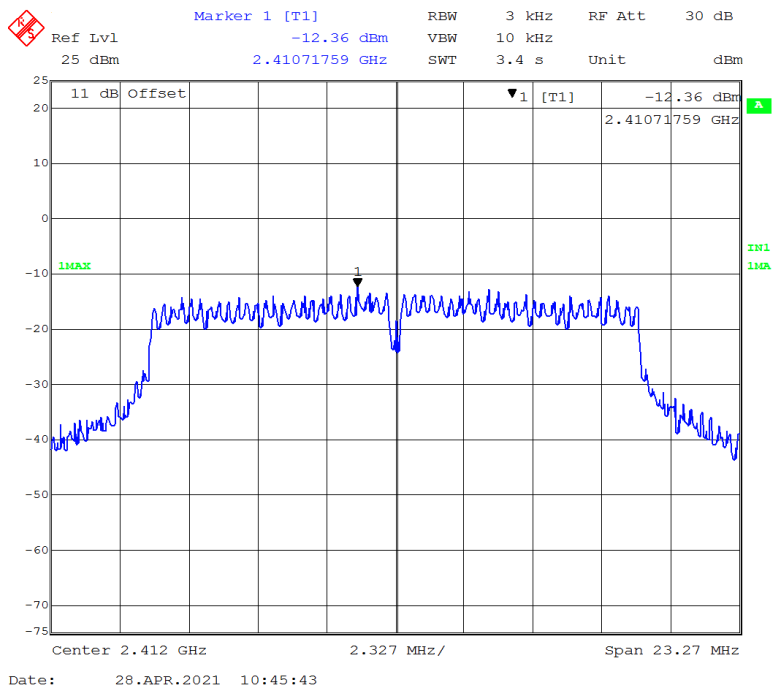
The testing was performed by Stone Zhang from 2021-04-25 to 2021-05-28.

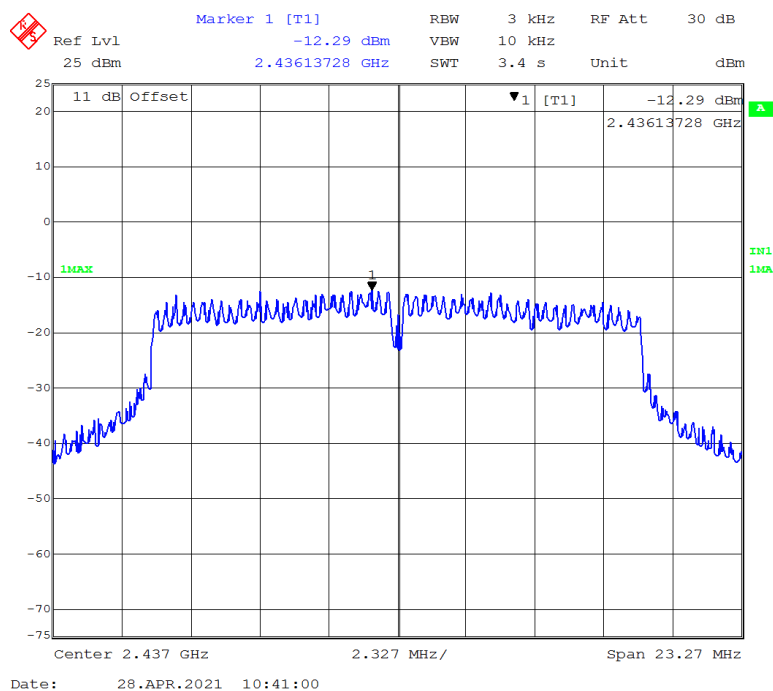
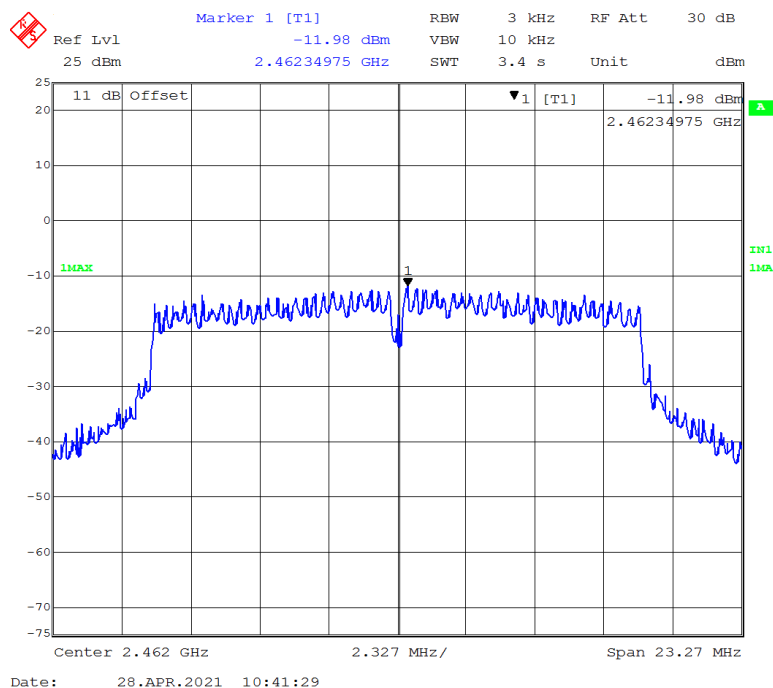
Test Result: Compliant.

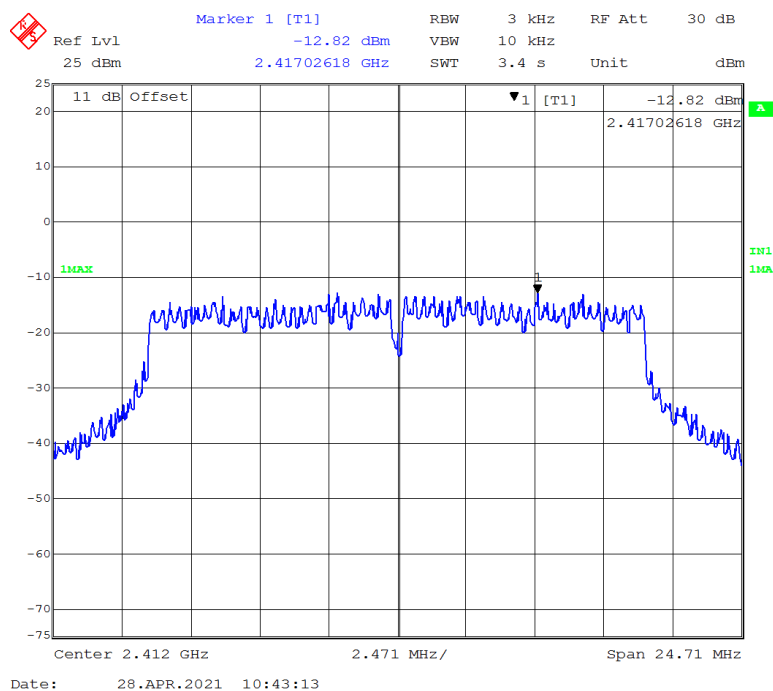
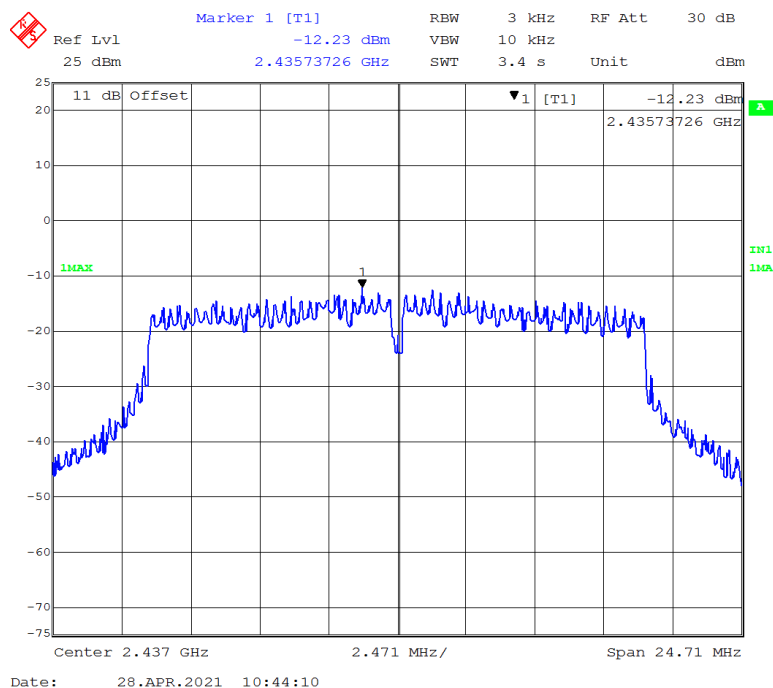
EUT operation mode: Transmitting

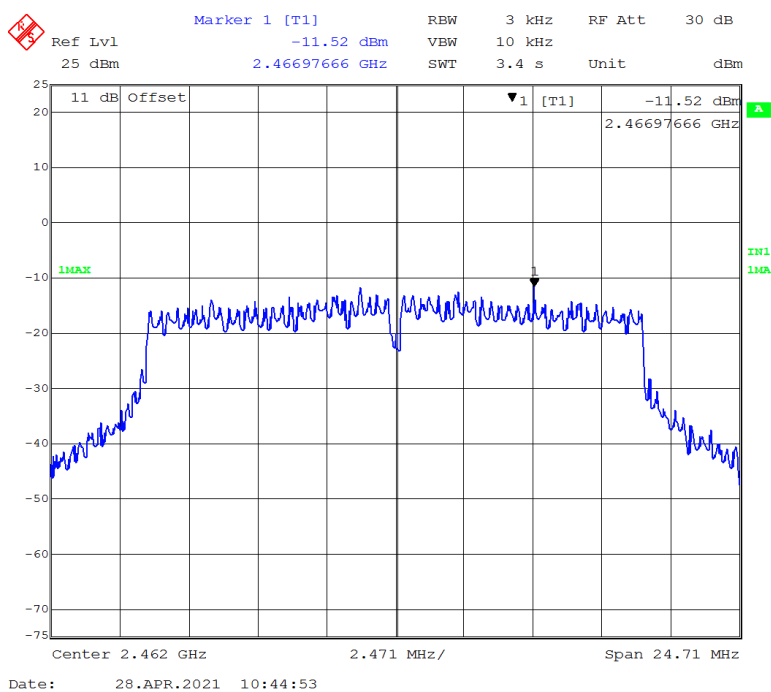
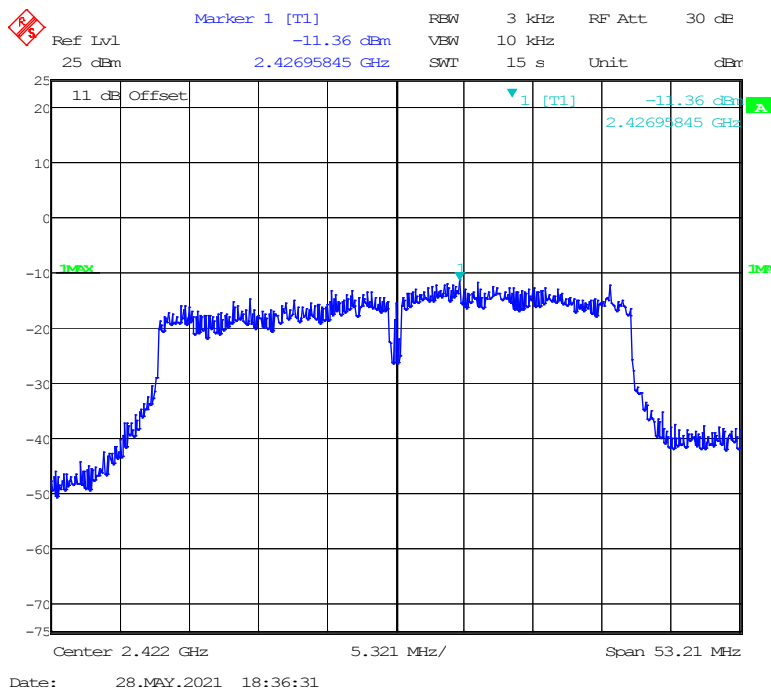
Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)
802.11b Mode			
Low	2412	-11.75	≤ 8
Middle	2437	-12.18	≤ 8
High	2462	-11.76	≤ 8
802.11g Mode			
Low	2412	-12.36	≤ 8
Middle	2437	-12.29	≤ 8
High	2462	-11.98	≤ 8
802.11n-HT20 mode			
Low	2412	-12.82	≤ 8
Middle	2437	-12.33	≤ 8
High	2462	-11.52	≤ 8
802.11n-HT40 mode			
Low	2422	-11.36	≤ 8
Middle	2437	-11.30	≤ 8
High	2452	-11.70	≤ 8
BLE (1Mbps) mode			
Low	2402	-14.38	≤ 8
Middle	2440	-13.94	≤ 8
High	2480	-12.71	≤ 8
BLE (2Mbps) mode			
Low	2402	-17.24	≤ 8
Middle	2440	-16.91	≤ 8
High	2480	-16.09	≤ 8

802.11b Low Channel**802.11b Middle Channel**

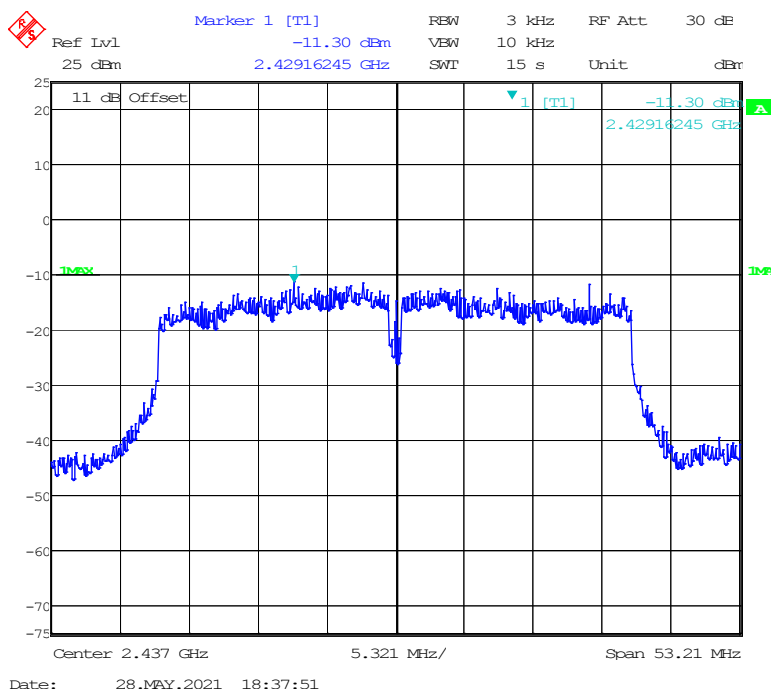
802.11b High Channel**802.11g Low Channel**

802.11g Middle Channel**802.11g High Channel**

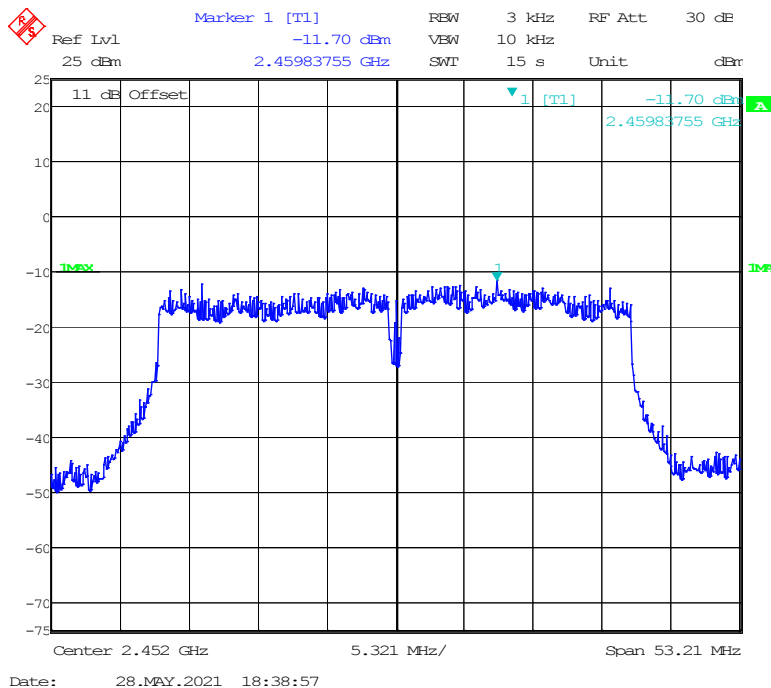
802.11n-HT20 Low Channel**802.11n-HT20 Middle Channel**

802.11n-HT20 High Channel**802.11n-HT40 Low Channel**

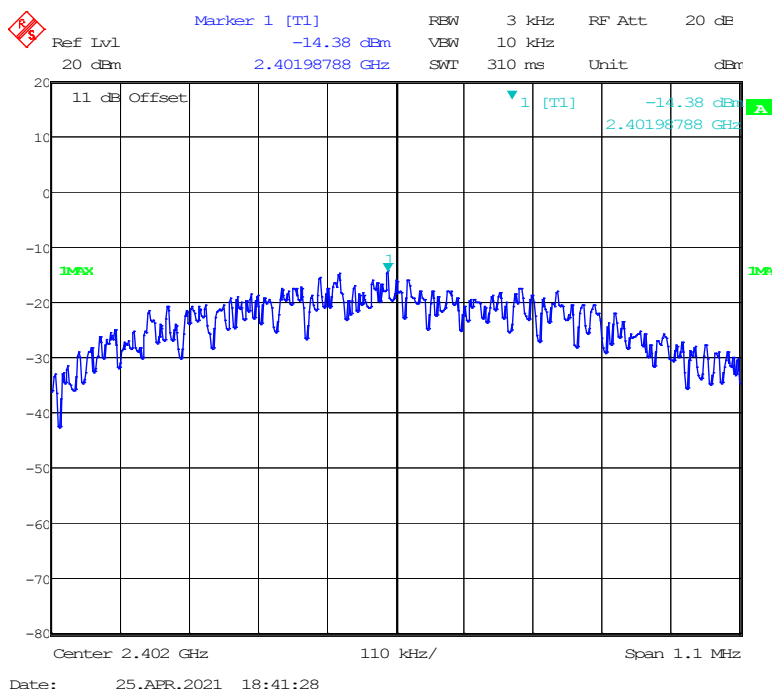
802.11n-HT40 Middle Channel



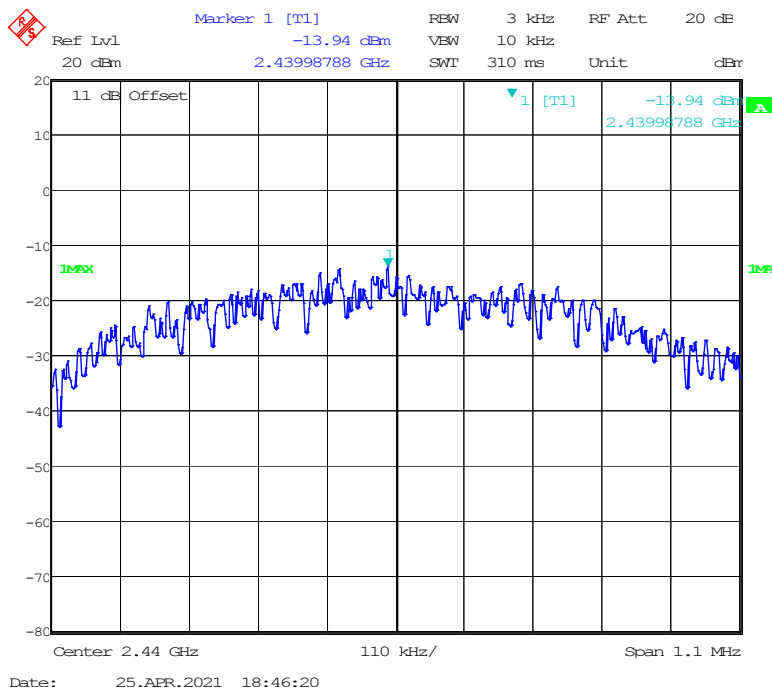
802.11n-HT40 High Channel

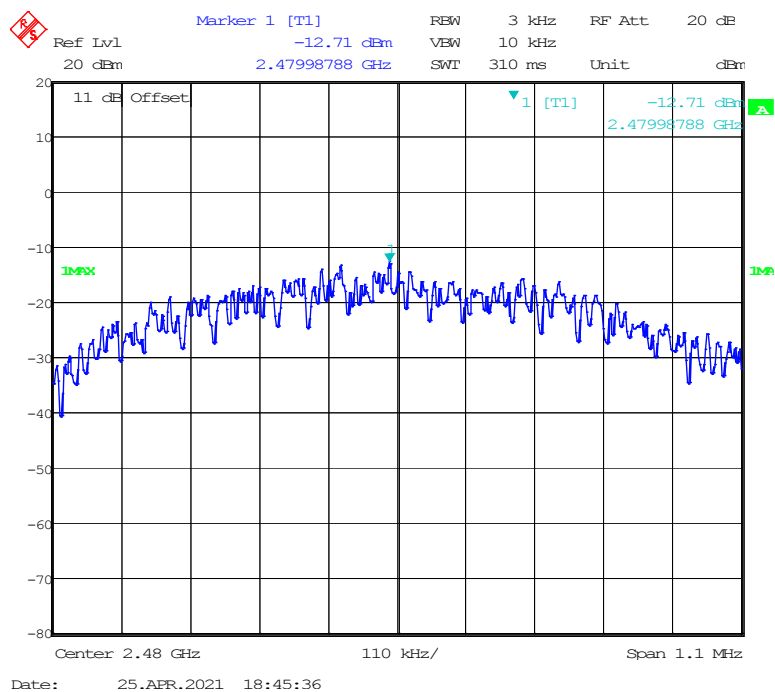
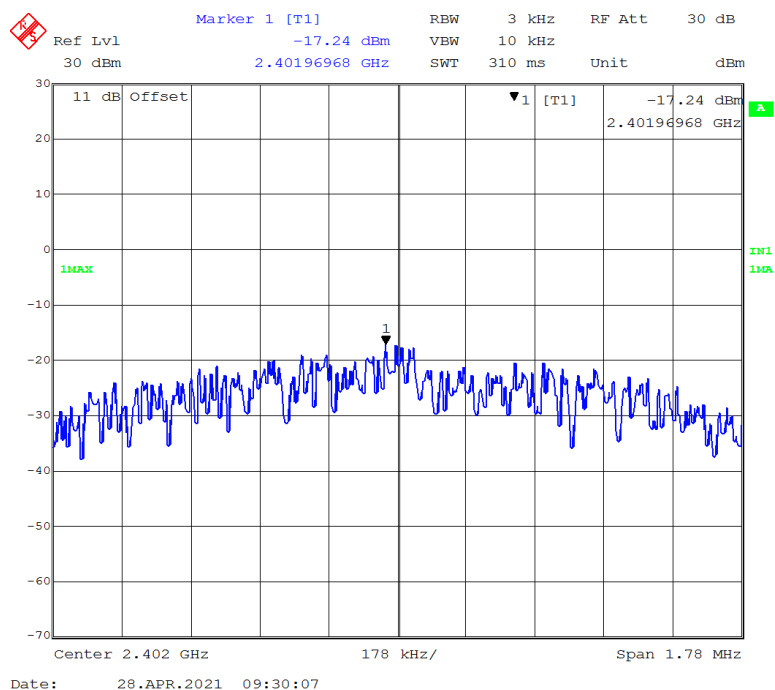


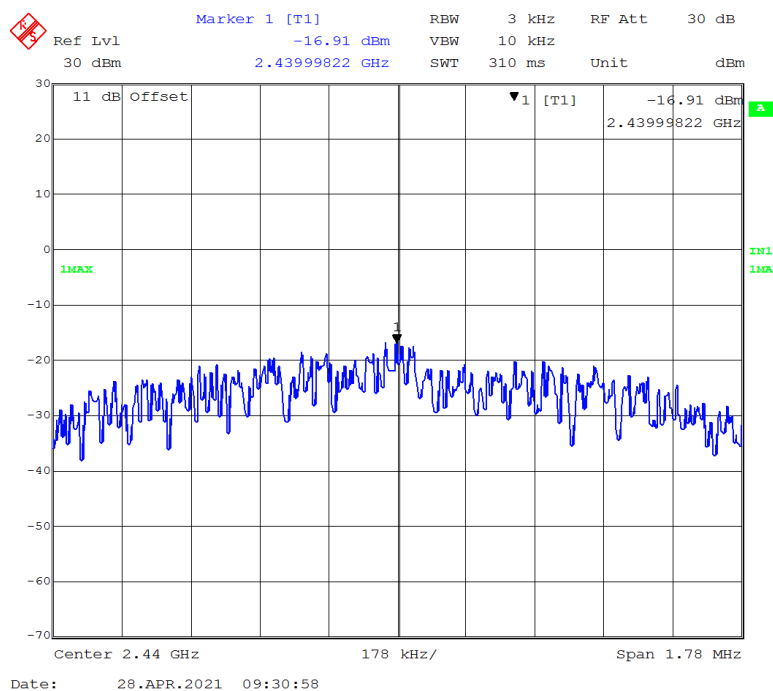
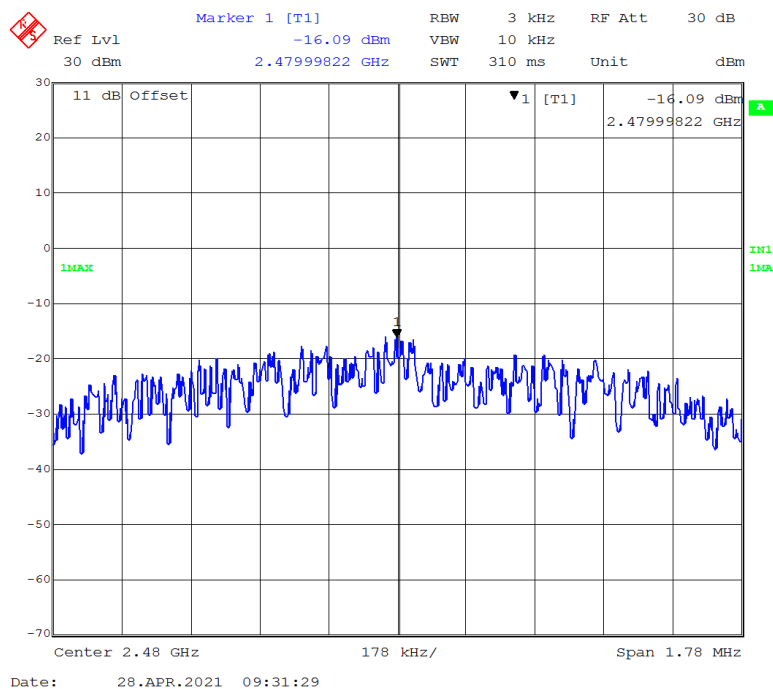
BLE(1Mbps) Mode Low Channel



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