TEST REPORT

Applicant Name :	FCC: VTech Telecommunications Ltd ISEDC: VTECH TELECOMMUNICATIONS LIMITED
Address :	FCC: 23/F Tai Ping Ind Center Block 1 57 Ting Kok Rd Tai Po NT, Hong Kong ISEDC: BL.1 23/F Tai Ping Industr Ctr. 57 Ting Kok Road Tai Po, NT Hongkong
ReportNumber:	SZ1211009-52658E-RFB
FCC ID:	EW780-S110-00
IC	1135B-80S11000

Test Standard (s)

FCC PART 15.247;RSS-GEN ISSUE 5, FEBRUARY 2021 AMENDMENT 2; RSS-247, ISSUE 2, FEBRUARY 2017

Sample Description

Product Type:	SIP Phone corded
Model No.:	D865
Trade Mark:	SNOM
Date Received:	2021/10/09
Date of Test:	2021/10/26~2022/02/23
Report Date:	2022/04/06

Test Result:	Pass*

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

Prepared and Checked By:

Ting Lü

EMC Engineer

Approved By:

Candy Li

EMC Engineer

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

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

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

HVIN	35-400320BSA
FVIN	10.1.95.0-HW4
Frequency Range	BLE: 2402-2480MHz Wi-Fi: 2412-2462MHz
Maximum Conducted Peak Output Power	BLE 1M: 8.13dBm; BLE 2M: 5.96dBm; Wi-Fi: 13.59dBm(802.11b), 15.67dBm(802.11g) 17.2dBm(802.11n-HT20), 17.5dBm(802.11n-HT40)
Modulation Technique	BLE: GFSK Wi-Fi: DSSS, OFDM
Antenna Specification*	BLE : Antenna : 0 dBi Wi-Fi :Antenna : 2 dBi (It is provided by the applicant)
Voltage Range	DC 5.0Vfrom adapter and DC48V from POE
Sample serial number	SZ1211009-52658E-RF-S1for RF conducted SZ1211009-52658E-RF-S2 for Radiated test (Assigned by ATC)
Sample/EUT Status	Good condition
Adapter 1 information	Model:NBS12E050200UV Input: AC 100-240V, 50/60Hz, 0.3A Output: DC 5.0V,2.0A, 10.0W
Adapter 2 information	Model: R122-0502000ID Input: AC 100-240V, 50/60Hz, 0.6A Output: DC 5.0V,2.0A, 10.0W

Objective

This report is in accordance with Part 2-Subpart J, Part 15-Subparts A and C of the Federal Communication Commission's rules and RSS-GEN Issue 5, February 2021 Amendment 2 and RSS-247, Issue 2, February 2017 of the Innovation, Science and Economic Development Canada rules.

Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliant Testing of Unlicensed Wireless Devices and RSS-GEN Issue 5, February 2021 Amendment 2 and RSS-247, Issue 2, February 2017.

And KDB 558074 D01 15.247 Meas Guidance v05r02.

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

Each test item follows test standards and with no deviation.

Measurement Uncertainty

Parameter		Uncertainty
Occupied Channel Bandwidth		5%
RF Frequency		$0.082*10^{-7}$
RF output power, conducted		0.73dB
Unwanted Emission, conducted		1.6dB
AC Power Lines Conducted Emissions		2.72dB
Emissions, Radiated	9kHz - 30MHz	2.66dB
	30MHz - 1GHz	4.28dB
	1GHz - 18GHz	4.98dB
	18GHz -26.5GHz	5.06dB
	26.5GHz -40GHz	4.72dB
Temperature		1℃
Humidity		6%
Supply voltages		0.4%

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

Test Facility

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

The test site has been approved by the FCC under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No.: 708358,the FCC Designation No.: CN1189. Accredited by American Association for Laboratory Accreditation (A2LA) The Certificate Number is 429 7.01.

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

SYSTEM TEST CONFIGURATION

Description of Test Configuration

For 2.4G Wi-Fi:

Channel List

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 802.11b, 802.11g, 802.11n-HT20, EUT was tested with Channel 1, 6 and 11.
For 802.11n-HT40, EUT was tested with Channel 3, 6 and 9.

For BLE 1M&2M:

Channel List

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

EUT was tested with Channel 0, 19 and 39.

Equipment Modifications

No modification was made to the EUT tested.

EUT Exercise Software

"Tear Term.exe"*(BLE 1M and 2.4G Wi-Fi) and "RTLBT APP"*(BLE 2M) exercise software was made to the EUT tested. The device was tested with the worst case was performed as below:

Mode	Date rate	Power Level*		
		Low Channel	Middle Channel	High Channel
802.11b	1Mbps	50	50	50
802.11g	6Mbps	53	53	53
802.11n-HT20	MCS0	53	53	53
802.11n-HT40	MCS0	55	55	55
BLE 1M	1Mbps	Default	Default	Default
BLE 2M	2Mbps	Default	Default	Default

The software and power level was provided by the applicant.

The worse-case data rates are determined to be as above for each mode based upon investigations by measuring the output power and PSD across all data rates, bandwidths and modulations.
The device supports SISO in all modes and MIMO in 802.11 n modes, per pretest, the MIMO mode was the worst mode for 802.11 n modes. All the antenna ports have the same power level for SISO and MIMO modes.

Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
Sandisk	U disk	SDCZ33-016G-Z35	Unknown
Lenovo	U disk	L3C	Unknown
DELL	PC	Latitude E5430	JG3NLV1
DELL	PC	Latitude E5430	590NLV1
HIKVISION	Router	DS-3WR03	10021642429
Vtech	IP phone	D862	Unknown
Unknown	POE	VX-PI1000GB	1712086039
Unknown	Load	CX5122	Unknown
Unknown	Earphone	D02	Unknown

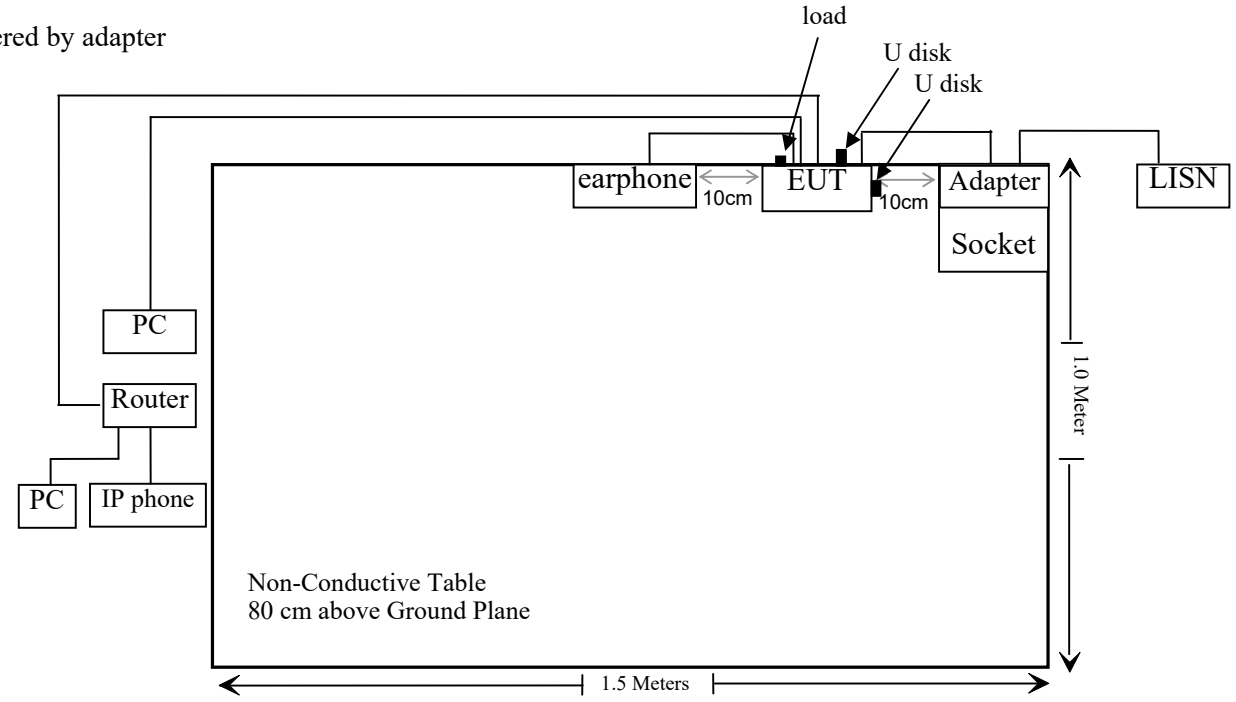
External I/O Cable

Cable Description	Length (m)	From/Port	To
Un-shielded un-detachable AC cable	1.0	Socket	LISN
Un-shielded un-detachable DC cable	1.5	EUT	Adapter
Un-shielded detachable RJ45 cable	8.0	EUT	PC
Un-shielded detachable RJ45 cable	8.0	EUT	Router
Un-shielded detachable RJ45 cable	1.5	Router	PC
Un-shielded detachable RJ45 cable	1.5	Router	IP phone
Un-shielded detachable AC cable	1.0	POE	LISN
Un-shielded detachable RJ45 cable	1.5	POE	EUT
Un-shielded detachable RJ45 cable	8.0	POE	Router

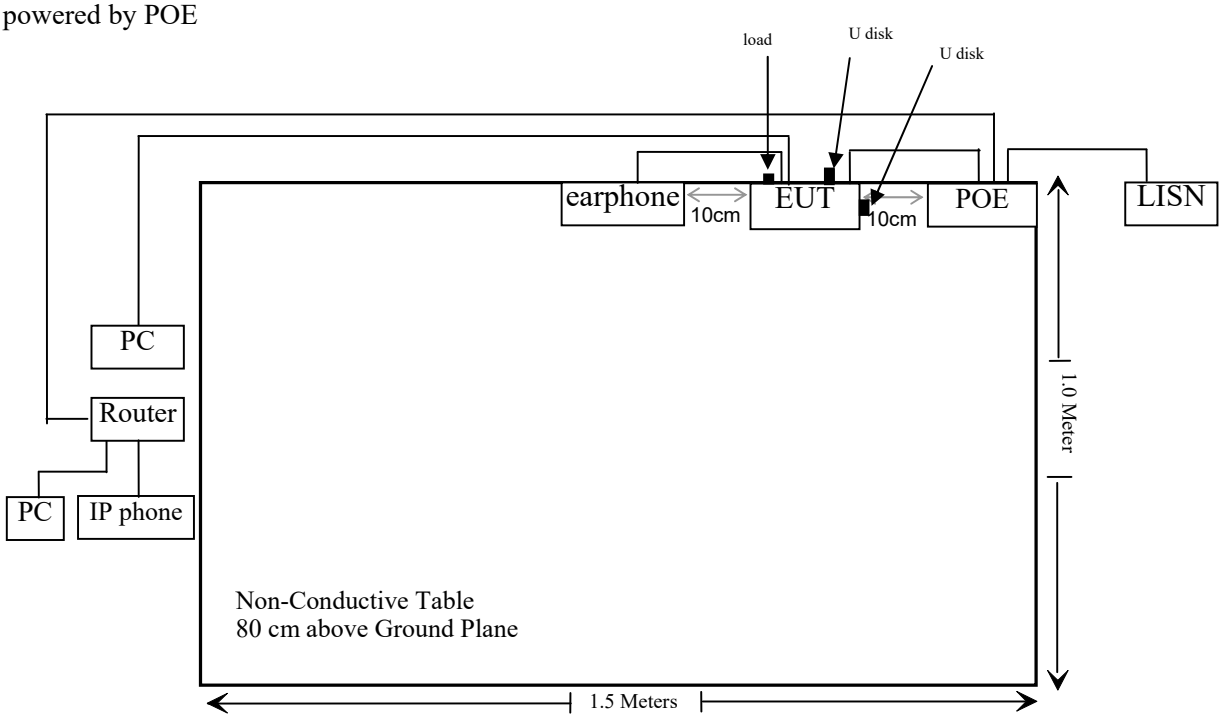
Block Diagram of Test Setup

For conducted emission

powered by adapter

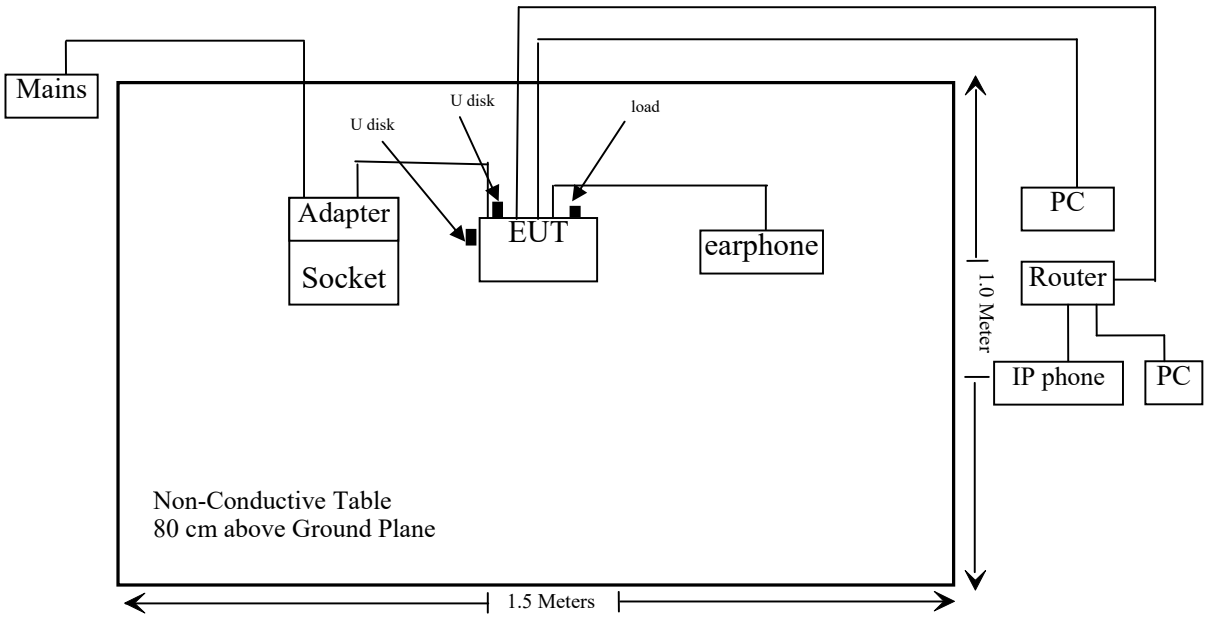


powered by POE

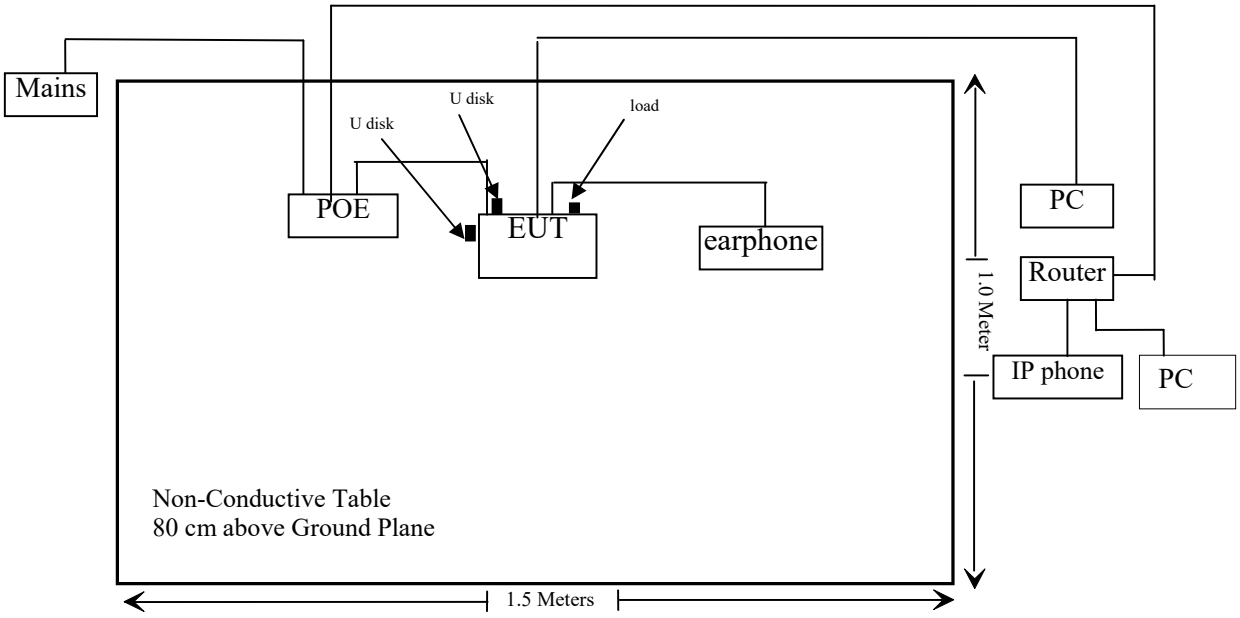


For re below 1 G

powered by adapter

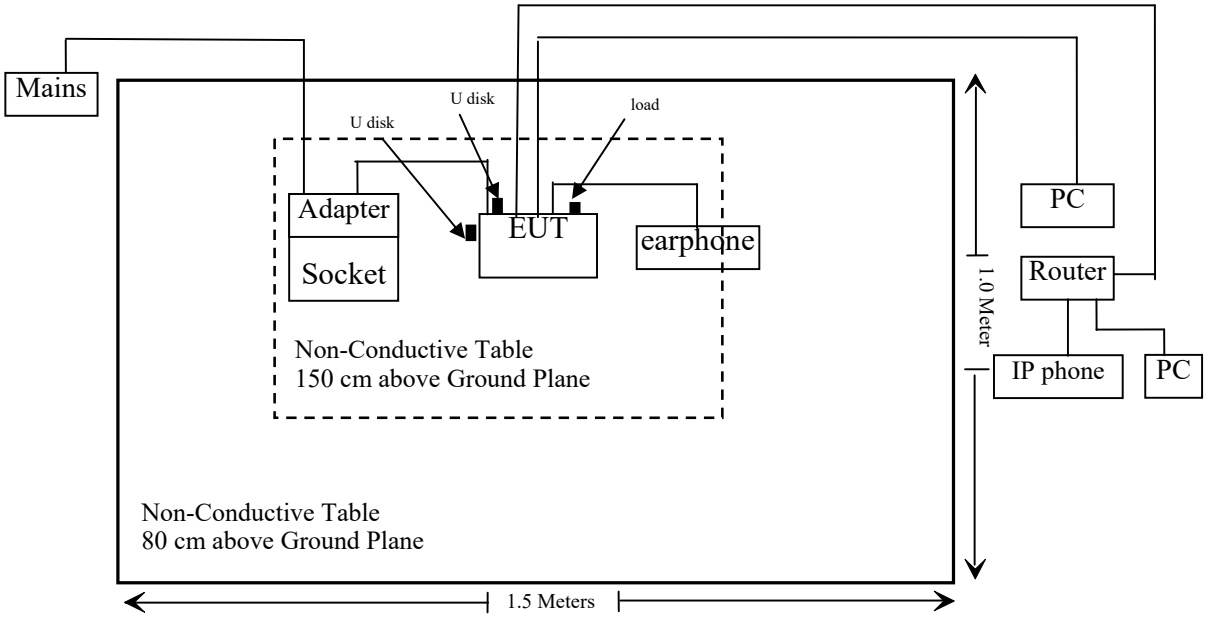


powered by POE



For RE above 1 G

powered by adapter



SUMMARY OF TEST RESULTS

FCC Rules	RSS Rules	Description of Test	Result
FCC §15.247 (i) & §2.1091	RSS-102§4	MAXIMUM PERMISSIBLE EXPOSURE (MPE)& EXPOSURE LIMITS	Compliant
§15.203	RSS-Gen§6.8	Antenna Requirement	Compliant
§15.207 (a)	RSS-Gen§8.8	AC Line Conducted Emissions	Compliant
§15.205, §15.209, §15.247(d)	RSS-GEN § 8.10 &RSS-247 § 5.5	Spurious Emissions	Compliant
§15.247 (a)(2)	RSS- Gen§6.7 RSS-247 § 5.2 (a)	99% Occupied Bandwidth &6 dB Emission Bandwidth	Compliant
§15.247(b)(3)	RSS-247 § 5.4(d)	Maximum Conducted Output Power	Compliant
§15.247(d)	RSS-247 § 5.5	100kHz Bandwidth of Frequency Band Edge	Compliant
§15.247(e)	RSS-247 §5.2 (b)	Power Spectral Density	Compliant

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Conducted Emissions Test					
Rohde& Schwarz	EMI Test Receiver	ESCI	100784	2021/02/03	2022/02/02
R & S	L.I.S.N.	ENV216	101314	2020/12/25	2021/12/24
Anritsu Corp	50ΩCoaxial Switch	MP59B	6200506474	2020/12/25	2021/12/24
Unknown	RF Coaxial Cable	N-2m	No.2	2020/12/25	2021/12/24
Conducted Emission Test Software: e3 19821b (V9)					
Radiated Emissions Test(Below 1GHz)					
Rohde& Schwarz	Test Receiver	ESR	101817	2020/12/24	2021/12/23
SONOMA INSTRUMENT	Amplifier	310 N	186131	2020/12/25	2021/12/24
Anritsu Corp	50 Coaxial Switch	MP59B	6100237248	2020/12/25	2021/12/24
Schwarzbeck	Bilog Antenna	VULB9163	9163-323	2020/01/05	2023/01/04
Unknown	RF Coaxial Cable	N-5m	No.3	2020/12/25	2021/12/24
Unknown	RF Coaxial Cable	N-1m	No.5	2020/12/25	2021/12/24

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiated Emissions Test(Above 1GHz)					
Rohde&Schwarz	Spectrum Analyzer	FSV40	101495	2020/12/24	2021/12/23
Rohde&Schwarz	Spectrum Analyzer	FSV-40	101495	2021/12/13	2022/12/12
A.H. Systems, inc.	Preamplifier	PAM-0118P	531	2021/11/09	2022/11/08
Quinstar	Amplifier	QLW-18405536-J0	15964001002	2020/11/28	2021/11/27
Quinstar	Amplifier	QLW-18405536-J0	15964001002	2021/11/11	2022/11/10
Schwarzbeck	Horn Antenna	BBHA9120D	9120D-1067	2020/01/05	2023/01/04
Schwarzbeck	HORN ANTENNA	BBHA9170	9170-359	2020/01/05	2023/01/04
Unknown	RF Coaxial Cable	N-5m	No.4	2020/12/25	2021/12/24
Unknown	RF Coaxial Cable	N-5m	No.4	2021/12/25	2022/12/24
Unknown	RF Coaxial Cable	N-1m	No.6	2020/12/25	2021/12/24
Unknown	RF Coaxial Cable	N-1m	No.6	2021/12/25	2022/12/24
Unknown	RF Coaxial Cable	No.10	N050	2020/12/14	2021/12/13
Unknown	RF Coaxial Cable	No.10	N050	2021/12/14	2022/12/13
Unknown	RF Coaxial Cable	No.12	N040	2020/12/14	2021/12/13
Unknown	RF Coaxial Cable	No.12	N040	2021/12/14	2022/12/13
Unknown	RF Coaxial Cable	No.15	N600	2020/12/14	2021/12/13
Unknown	RF Coaxial Cable	No.15	N600	2021/12/14	2022/12/13
Wainwright	High Pass Filter	WHKX3.6/18G-10SS	5	2020/12/25	2021/12/24
Wainwright	High Pass Filter	WHKX3.6/18G-10SS	5	2021/12/14	2022/12/13
Radiated Emission Test Software: e3 19821b (V9)					

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
RF Conducted Test					
Rohde&Schwarz	Spectrum Analyzer	FSV-40	101495	2020/12/24	2021/12/23
Rohde&Schwarz	Spectrum Analyzer	FSV-40	101495	2021/12/13	2022/12/12
Tonscend	RF Control Unit	JS0806-2	19G8060182	2021/07/06	2022/07/05
HP	20dB Attenuator	8491A	53857	2020/12/25	2021/12/24
HP	20dB Attenuator	8491A	53857	2021/12/14	2022/12/13
Unknown	6dB Attenuator	Unknown	F-03-EM123	2020/11/28	2021/11/27
Unknown	6dB Attenuator	Unknown	F-03-EM123	2021/11/26	2022/11/25
WEINSCHEL	10dB Attenuator	5324	F-03-EM122	2020/11/29	2021/11/28
WEINSCHEL	10dB Attenuator	5324	AU3842	2021/11/26	2022/11/25
Unknown	RF Cable	RF Cable1	RF Cable1	Each Time	

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

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

Applicable Standard

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

Limits for General Population/Uncontrolled Exposure

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

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

Result

Calculated Formulary:

Predication of MPE limit at a given distance

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

S = power density (in appropriate units, e.g. mW/cm^2)
P = power input to the antenna (in appropriate units, e.g., mW).
G = power gain of the antenna in the direction of interest relative to an isotropic radiator,the power gain factor, is normally numeric gain.
R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

For simultaneously transmit system, the calculated power density should comply with:

$$\sum_i \frac{S_i}{S_{Limit,i}} \le 1$$

Mode	Frequency (MHz)	Antenna Gain		Tune up conducted power		Evaluation Distance (cm)	Power Density (mW/cm^2)	MPE Limit (mW/cm^2)
		(dBi)	(numeric)	(dBm)	(mW)			
BT	2402-2480	0	1.00	8.5	7.08	20	0.0014	1
BLE	2402-2480	0	1.00	8.5	7.08	20	0.0014	1
2.4GHz Wi-Fi	2412-2462	2	1.58	18.0	63.10	20	0.0199	1
5GHz Wi-Fi	5150-5250	2	1.58	18.0	63.10	20	0.0199	1
	5250-5350	2	1.58	18.0	63.10	20	0.0199	1
	5470-5725	2	1.58	20.0	100.00	20	0.0315	1
	5725-5850	2	1.58	20.0	100.00	20	0.0315	1

Note: 1. The tune up conducted power was declared by the applicant.
2. The BT and Wi-Fi can transmit at the same time.

Simultaneoustransmitting consideration (worst case):

The ratio=MPE_{BT}/limit+$MPE_{Wi\text{-}Fi}$/limit =0.0014/1+0.0315/1=0.0329＜1.0

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

Result: Compliant.

RSS-102 § 4 –EXPOSURE LIMITS

Applicable Standard

According to RSS-102 §4:

Table 4: RF Field Strength Limits for Devices Used by the General Public (Uncontrolled Environment)				
Frequency Range (MHz)	Electric Field (V/m rms)	Magnetic Field (A/m rms)	Power Density (W/m^2)	Reference Period (minutes)
0.003-10[21]	83	90	-	Instantaneous*
0.1-10	-	0.73/ ƒ	-	6**
1.1-10	87/ $ƒ^{0.5}$	-	-	6**
10-20	27.46	0.0728	2	6
20-48	58.07/ $ƒ^{0.25}$	0.1540/ $ƒ^{0.25}$	8.944/ $ƒ^{0.5}$	6
48-300	22.06	0.05852	1.291	6
300-6000	3.142 $ƒ^{0.3417}$	0.008335 $ƒ^{0.3417}$	0.02619 $ƒ^{0.6834}$	6
6000-15000	61.4	0.163	10	6
15000-150000	61.4	0.163	10	616000/ $ƒ^{1.2}$
150000-300000	0.158 $ƒ^{0.5}$	4.21 x 10^{-4} $ƒ^{0.5}$	6.67 x 10^{-5} ƒ	616000/$ƒ^{1.2}$

Note: ƒ is frequency in MHz.
* Based on nerve stimulation (NS).
** Based on specific absorption rate (SAR).

Calculated Formulary:

Predication of MPE limit at a given distance

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

S = power density (in appropriate units, e.g. mW/cm^2)
P = power input to the antenna (in appropriate units, e.g., mW).
G = power gain of the antenna in the direction of interest relative to an isotropic radiator,the power gain factor, is normally numeric gain.
R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

For simultaneously transmit system, the calculated power density should comply with:

$$\sum_i \frac{S_i}{S_{Limit,i}} \le 1$$

Mode	Frequency (MHz)	Antenna Gain		Max Tune Up Conducted Power		Distance (m)	Power Density (W/m^2)	MPE Limit (W/m^2)
		(dBi)	(numeric)	(dBm)	(W)			
BT	2402-2480	0	1.00	8.5	0.0071	0.2	0.014	5.351
BLE	2402-2480	0	1.00	8.5	0.0071	0.2	0.014	5.351
2.4G Wi-Fi	2412-2462	2	1.58	18.0	0.0631	0.2	0.199	5.366
5G Wi-Fi	5150-5250	2	1.58	18.0	0.0631	0.2	0.199	9.011
	5250-5350	2	1.58	18.0	0.0631	0.2	0.199	9.13
	5470-5725	2	1.58	20.0	0.1000	0.2	0.315	9.39
	5725-5850	2	1.58	20.0	0.1000	0.2	0.315	9.687

Note: 1. The tune up conducted power was declared by the applicant.
2. The BT and Wi-Fi can transmit at the same time.

Simultaneoustransmitting consideration (worst case):

The ratio=MPE_{BT}/limit+MPE_{Wi-Fi}/limit =0.014/5.351+0.199/5.366=0.04＜1.0

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

Result: Compliant.

§ 15.203&RSS-Gen §6.8ANTENNA 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.

The applicant for equipment certification shall provide a list of all antenna types that may be used with the transmitter, where applicable (i.e. for transmitters with detachable antenna), indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna. The test report shall demonstrate the compliance of the transmitter with the limit for maximum equivalent isotropically radiated power (e.i.r.p.) specified in the applicable RSS, when the transmitter is equipped with any antenna type, selected from this list.

For expediting the testing, measurements may be performed using only the antenna with highest gain of each combination of transmitter and antenna type, with the transmitter output power set at the maximum level. However, the transmitter shall comply with the applicable requirements under all operational conditions and when in combination with any type of antenna from the list provided in the test report (and in the notice to be included in the user manual, provided below).

When measurements at the antenna port are used to determine the RF output power, the effective gain of the device’s antenna shall be stated, based on a measurement or on data from the antenna’s manufacturer.

The test report shall state the RF power, output power setting and spurious emission measurements with each antenna type that is used with the transmitter being tested.

For licence-exempt equipment with detachable antennas, the user manual shall also contain the following notice in a conspicuous location:

This radio transmitter [enter the device’s ISED certification number] has been approved by Innovation, Science and Economic Development Canada to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.
Immediately following the above notice, the manufacturer shall provide a list of all antenna types which can be used with the transmitter, indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna type.

Antenna Connector Construction

The EUT hastwo internal PCB antennas arrangement for Wi-Fi, and one internal monopole antenna arrangement for BLE, which was permanently attached, fulfill the requirement of this section. Please refer to the EUT photos.

ANT	Type	Antenna Gain	Impedance	Frequency Range
Wi-Fi	PCB	2 dBi	50 Ω	2.4~2.5GHz / 5150-5850 GHz
BLE	Monopole	0 dBi	50 Ω	2.4~2.5GHz

Result: Compliant.

§ 15.207 (a)&RSS-GEN §8.8 AC LINE CONDUCTED EMISSIONS

Applicable Standard

FCC § 15.207 (a)&RSS-GEN §8.8

Unless stated otherwise in the applicable RSS, for radio apparatus that are designed to be connected to the public utility AC power network, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the range 150 kHz to 30 MHz shall not exceed the limits in table 4, as measured using a 50 μH / 50 Ω line impedance stabilization network. This requirement applies for the radio frequency voltage measured between each power line and the ground terminal of each AC power-line mains cable of the EUT.

For an EUT that connects to the AC power lines indirectly, through another device, the requirement for compliance with the limits in table 4 shall apply at the terminals of the AC power-line mains cable of a representative support device, while it provides power to the EUT. The lower limit applies at the boundary between the frequency ranges. The device used to power the EUT shall be representative of typical applications.

Table 4 - AC Power Lines Conducted Emission Limits		
Frequency range (MHz)	Conducted limit (dBμV)	
	Quasi-Peak	Average
0.15 – 0.5	66 to 56[1]	56 to 46[1]
0.5 – 5	56	46
5 – 30	60	50

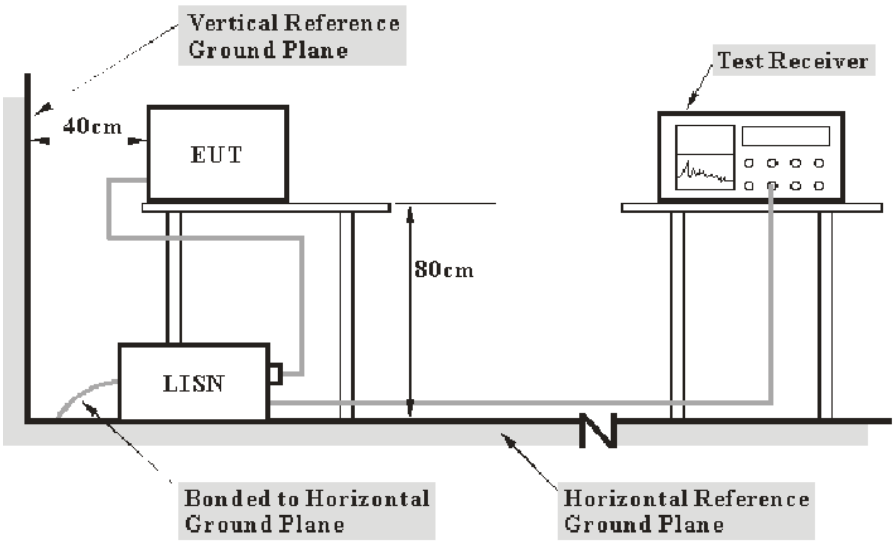
Note 1: The level decreases linearly with the logarithm of the frequency.

For an EUT with a permanent or detachable antenna operating between 150 kHz and 30 MHz, the AC power-line conducted emissions must be measured using the following configurations:

(a) Perform the AC power-line conducted emissions test with the antenna connected to determine compliance with the limits of table 4 outside the transmitter's fundamental emission band.

(b) Retest with a dummy load instead of the antenna to determine compliance with the limits of table 4 within the transmitter's fundamental emission band. For a detachable antenna, remove the antenna and connect a suitable dummy load to the antenna connector. For a permanent antenna, remove the antenna and terminate the RF output with a dummy load or network that simulates the antenna in the fundamental frequency band.

EUT Setup



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

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.207& RSS-247/RSS-Gen limits.

The spacing between the peripherals was 10 cm.

The external I/O cables were draped along the test table and formed a bundle 30 to 40cm long in the middle.

EMI Test Receiver Setup

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

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

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

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

Corrected Factor & Margin Calculation

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

Factor = LISN VDF + Cable Loss

The "**Over limit**" column of the following data tables indicates the degree of compliance with the applicablelimit. For example, an Over limit of -7dB means the emission is 7 dB below the limit. The equation forcalculation is as follows:

Over Limit = Level – Limit
Level = Read Level + Factor

Test Data

Environmental Conditions

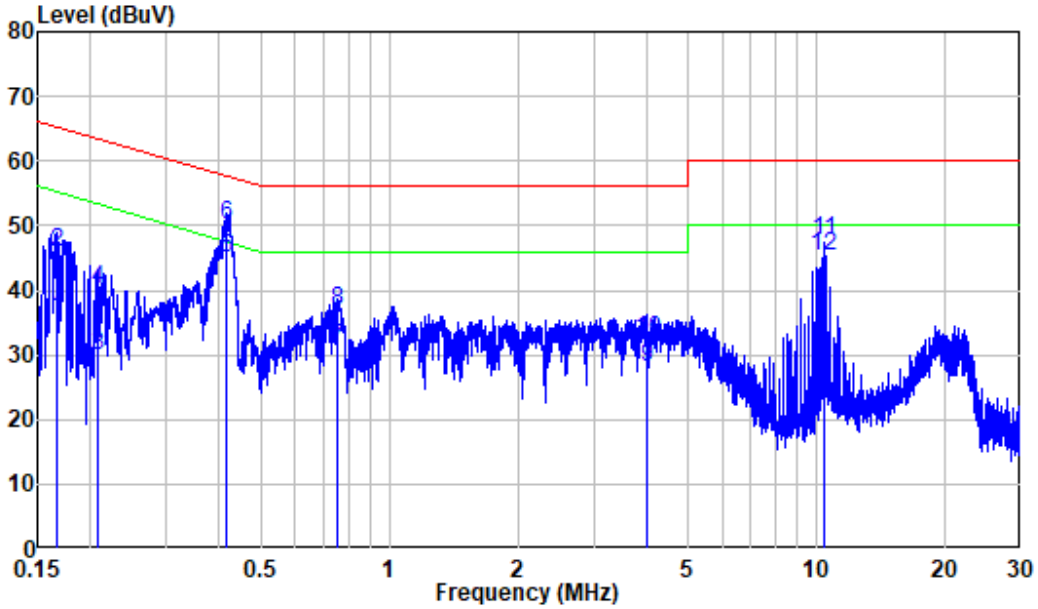
Temperature:	25 ℃
Relative Humidity:	64%
ATM Pressure:	101.0 kPa

The testing was performed by Bin Duanfrom2021-11-15 to 2021-11-23.

EUT operation mode: Transmitting(worst case is 802.11g mode, high channel)

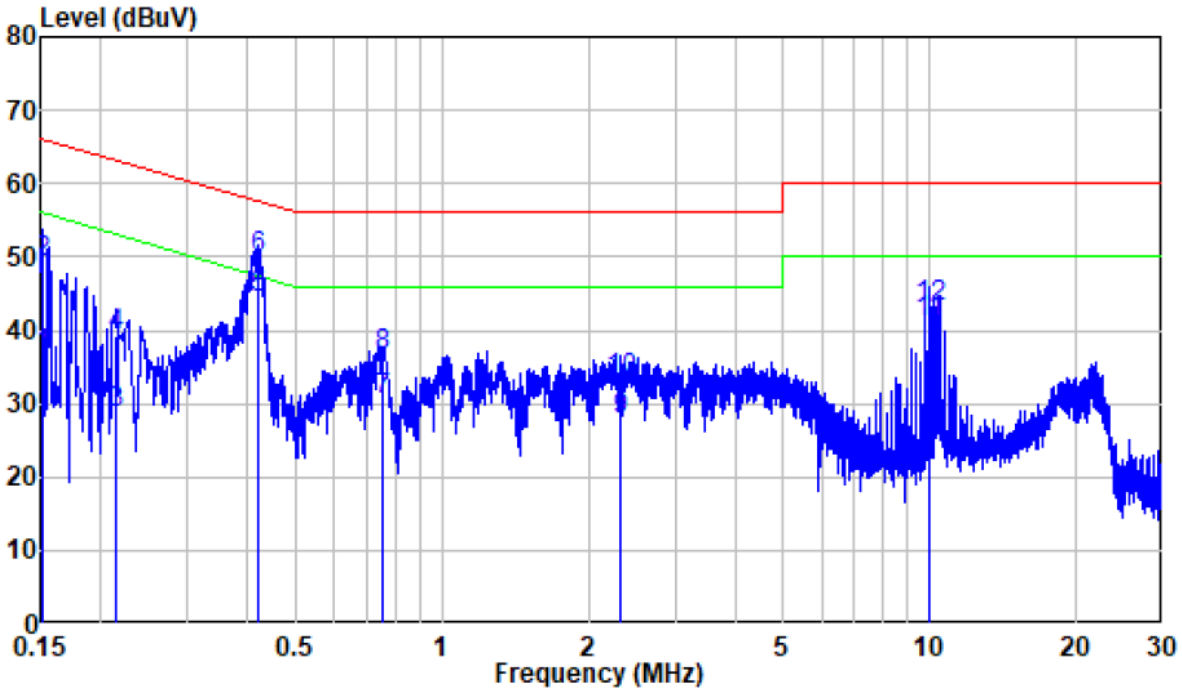
For POE

AC 120V/60 Hz, Line



	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dBuV	dBuV	dB	
1	0.166	9.86	25.90	35.76	55.14	-19.38	Average
2	0.166	9.86	35.90	45.76	65.14	-19.38	QP
3	0.207	9.80	20.08	29.88	53.32	-23.44	Average
4	0.207	9.80	30.28	40.08	63.32	-23.24	QP
5	0.416	9.80	35.03	44.83	47.52	-2.69	Average
6	0.416	9.80	40.44	50.24	57.52	-7.28	QP
7	0.757	9.81	21.28	31.09	46.00	-14.91	Average
8	0.757	9.81	27.10	36.91	56.00	-19.09	QP
9	3.998	9.94	18.24	28.18	46.00	-17.82	Average
10	3.998	9.94	22.46	32.40	56.00	-23.60	QP
11	10.349	10.09	37.75	47.84	50.00	-2.16	Average
12	10.349	10.09	35.07	45.16	60.00	-14.84	QP

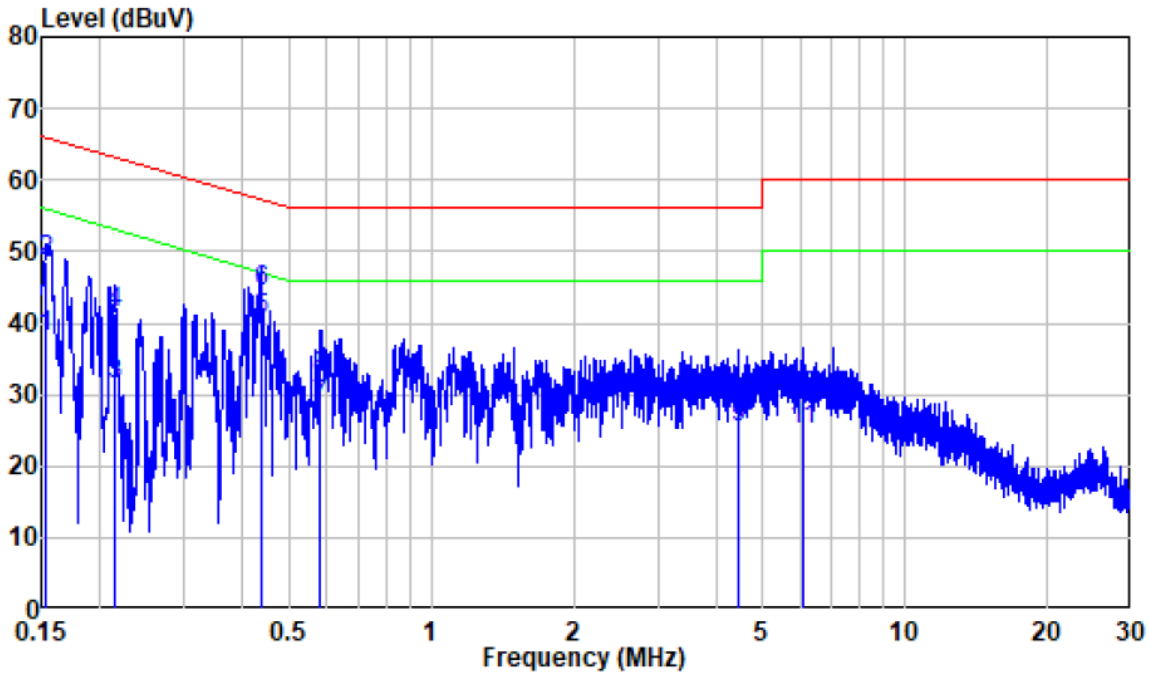
AC 120V/60 Hz, Neutral



	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dBuV	dBuV	dB	
1	0.152	9.90	26.73	36.63	55.91	-19.28	Average
2	0.152	9.90	39.17	49.07	65.91	-16.84	QP
3	0.215	9.99	18.66	28.65	53.02	-24.37	Average
4	0.215	9.99	29.19	39.18	63.02	-23.84	QP
5	0.418	9.92	34.58	44.50	47.48	-2.98	Average
6	0.418	9.92	39.93	49.85	57.48	-7.63	QP
7	0.752	9.91	20.71	30.62	46.00	-15.38	Average
8	0.752	9.91	26.61	36.52	56.00	-19.48	QP
9	2.311	9.94	17.94	27.88	46.00	-18.12	Average
10	2.311	9.94	23.23	33.17	56.00	-22.83	QP
11	9.952	10.10	30.88	40.98	50.00	-9.02	Average
12	9.952	10.10	33.08	43.18	60.00	-16.82	QP

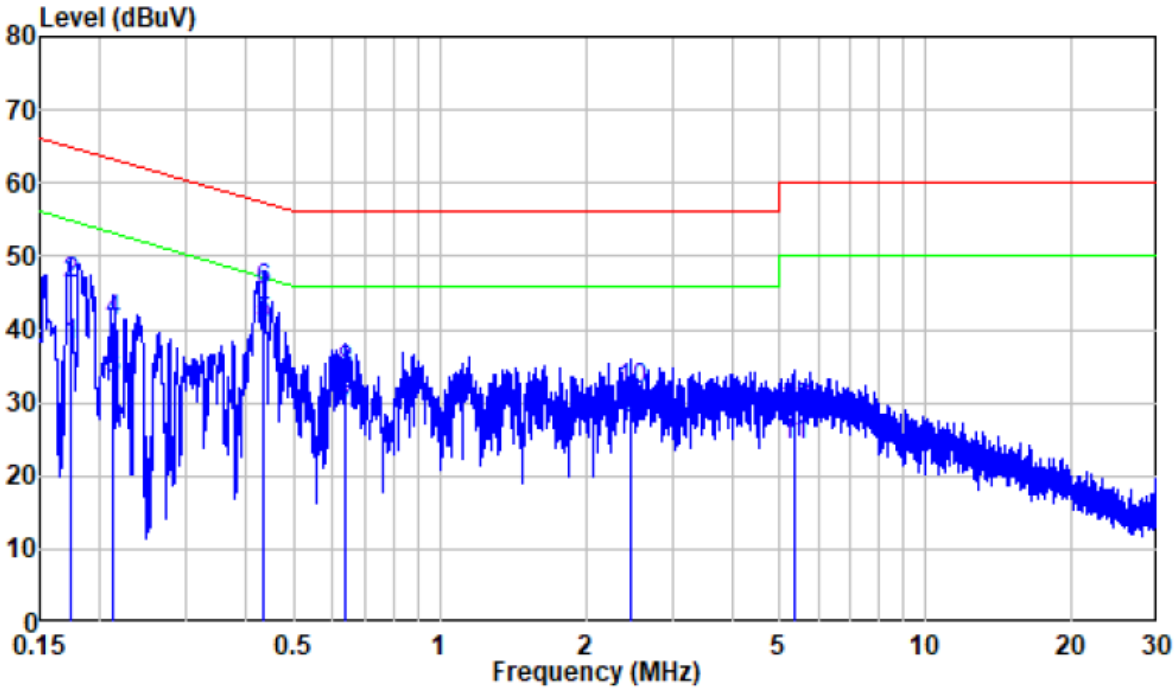
For Adapter NBS12E050200UV

AC 120V/60 Hz, Line



	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dBuV	dBuV	dB	
1	0.154	9.89	28.26	38.15	55.80	-17.65	Average
2	0.154	9.89	38.59	48.48	65.80	-17.32	QP
3	0.215	9.80	21.53	31.33	53.01	-21.68	Average
4	0.215	9.80	31.55	41.35	63.01	-21.66	QP
5	0.436	9.80	30.60	40.40	47.13	-6.73	Average
6	0.436	9.80	34.43	44.23	57.13	-12.90	QP
7	0.582	9.81	18.52	28.33	46.00	-17.67	Average
8	0.582	9.81	22.58	32.39	56.00	-23.61	QP
9	4.433	9.96	15.42	25.38	46.00	-20.62	Average
10	4.433	9.96	19.74	29.70	56.00	-26.30	QP
11	6.080	10.03	15.13	25.16	50.00	-24.84	Average
12	6.080	10.03	19.50	29.53	60.00	-30.47	QP

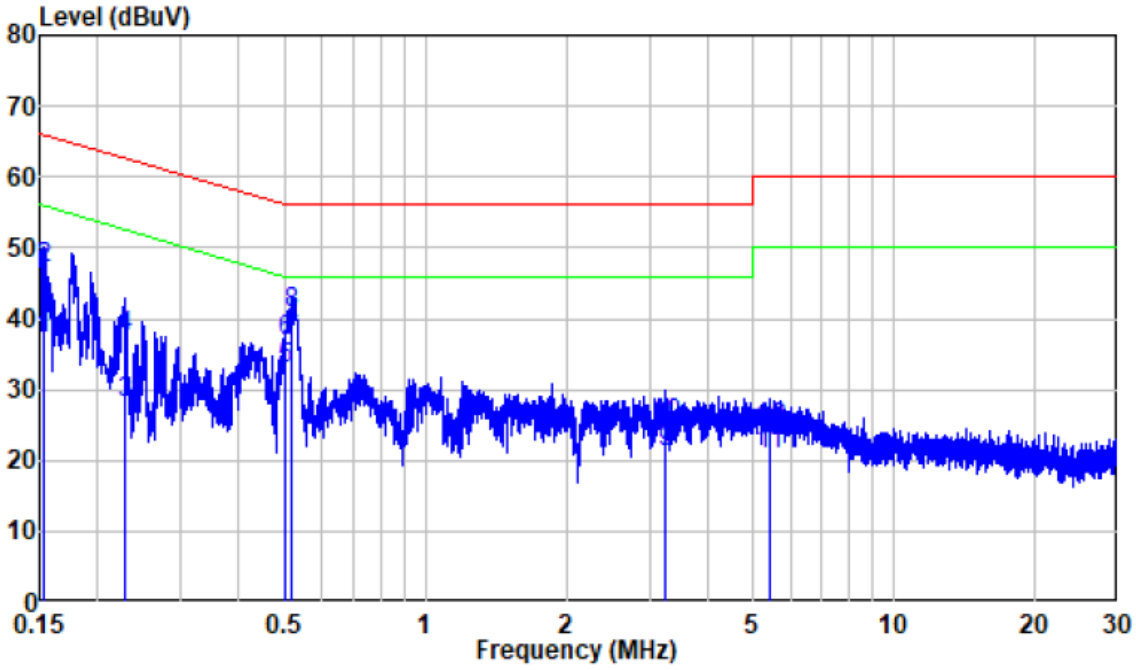
AC 120V/60 Hz, Neutral



	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dBuV	dBuV	dB	
1	0.173	9.95	27.92	37.87	54.81	-16.94	Average
2	0.173	9.95	36.13	46.08	64.81	-18.73	QP
3	0.213	9.99	23.17	33.16	53.11	-19.95	Average
4	0.213	9.99	31.21	41.20	63.11	-21.91	QP
5	0.434	9.92	30.97	40.89	47.17	-6.28	Average
6	0.434	9.92	35.41	45.33	57.17	-11.84	QP
7	0.641	9.91	18.72	28.63	46.00	-17.37	Average
8	0.641	9.91	24.20	34.11	56.00	-21.89	QP
9	2.470	9.95	17.93	27.88	46.00	-18.12	Average
10	2.470	9.95	21.74	31.69	56.00	-24.31	QP
11	5.362	10.05	14.21	24.26	50.00	-25.74	Average
12	5.362	10.05	18.96	29.01	60.00	-30.99	QP

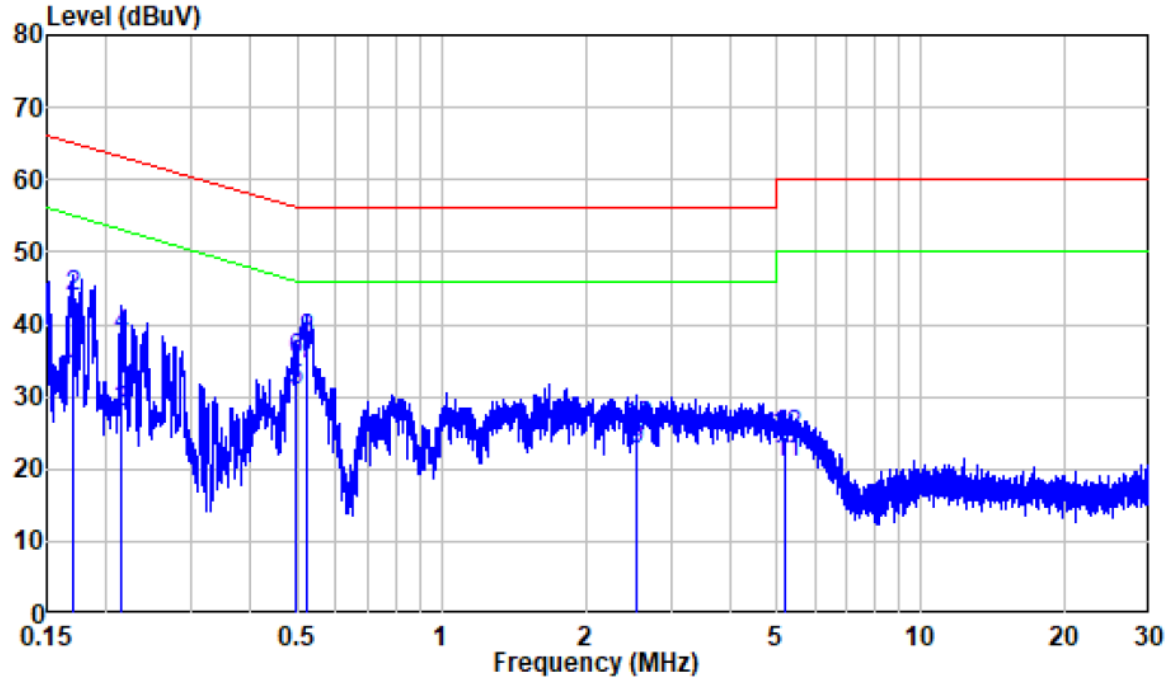
For Adapter R122-0502000ID

AC 120V/60 Hz, Line



	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dBuV	dBuV	dB	
1	0.153	9.89	27.38	37.27	55.82	-18.55	Average
2	0.153	9.89	37.17	47.06	65.82	-18.76	QP
3	0.228	9.80	18.36	28.16	52.52	-24.36	Average
4	0.228	9.80	27.70	37.50	62.52	-25.02	QP
5	0.499	9.80	22.96	32.76	46.02	-13.26	Average
6	0.499	9.80	26.99	36.79	56.02	-19.23	QP
7	0.517	9.81	27.08	36.89	46.00	-9.11	Average
8	0.517	9.81	30.83	40.64	56.00	-15.36	QP
9	3.258	9.93	11.16	21.09	46.00	-24.91	Average
10	3.258	9.93	15.10	25.03	56.00	-30.97	QP
11	5.404	10.00	10.72	20.72	50.00	-29.28	Average
12	5.404	10.00	14.39	24.39	60.00	-35.61	QP

AC 120V/60 Hz, Neutral



	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dBuV	dBuV	dB	
1	0.170	9.94	22.74	32.68	54.95	-22.27	Average
2	0.170	9.94	33.78	43.72	64.95	-21.23	QP
3	0.215	9.99	17.77	27.76	53.01	-25.25	Average
4	0.215	9.99	28.41	38.40	63.01	-24.61	QP
5	0.498	9.90	21.03	30.93	46.03	-15.10	Average
6	0.498	9.90	25.22	35.12	56.03	-20.91	QP
7	0.521	9.91	24.49	34.40	46.00	-11.60	Average
8	0.521	9.91	27.79	37.70	56.00	-18.30	QP
9	2.555	9.97	12.81	22.78	46.00	-23.22	Average
10	2.555	9.97	15.78	25.75	56.00	-30.25	QP
11	5.221	10.05	10.74	20.79	50.00	-29.21	Average
12	5.221	10.05	14.27	24.32	60.00	-35.68	QP

§15.205, §15.209,§15.247(d)&RSS-GEN § 8.10 & RSS-247 § 5.5SPURIOUS EMISSIONS

Applicable Standard

FCC §15.247 (d); §15.209;§15.205;

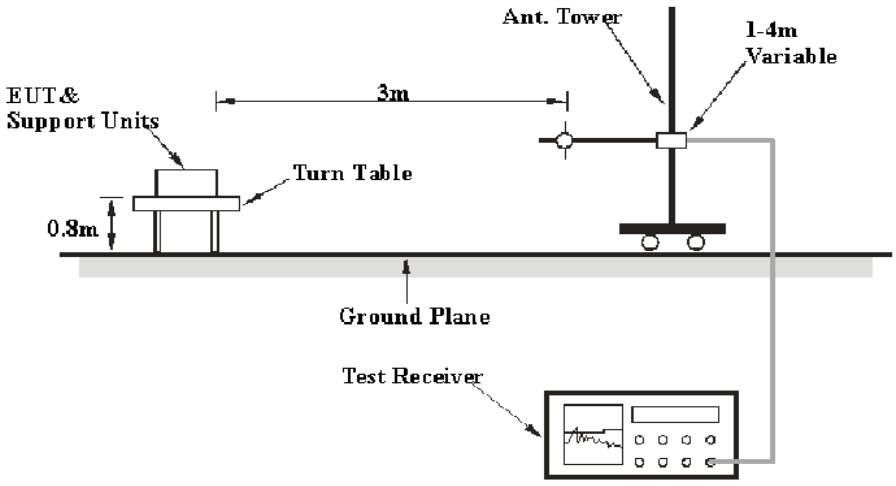
According to RSS-GEN § 8.10 & RSS-247 § 5.5

Restricted frequency bands, identified in table 7, are designated primarily for safety-of-life services (distress calling and certain aeronautical activities), certain satellite downlinks, radio astronomy and some government uses. Except where otherwise indicated, the following conditions related to the restricted frequency bands apply:(a) The transmit frequency, including fundamental components of modulation, of licence-exempt radio apparatus shall not fall within the restricted frequency bands listed in table 7 except for apparatus compliant with RSS-287, Emergency Position Indicating Radio Beacons (EPIRB), Emergency Locator Transmitters (ELT), Personal Locator Beacons (PLB), and Maritime Survivor Locator Devices (MSLD).(b) Unwanted emissions that fall into restricted frequency bands listed in table 7 shall comply with the limits specified in table 5 and table 6.(c)Unwanted emissions that do not fall within the restricted frequency bands listed in table 7 shall comply either with the limits specified in the applicable RSS or with those specified in table 5 and table 6.

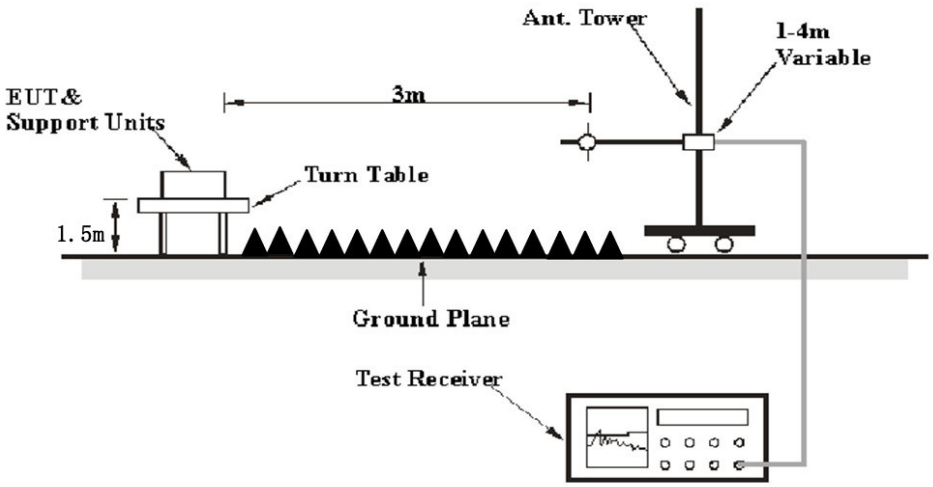
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that inthe 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under section 5.4(d), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

EUT Setup

Below 1 GHz:



Above 1GHz:



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

The external I/O cables were draped along the test table and formed a bundle 30 to 40cm long in the middle.

EMI Test Receiver& Spectrum Analyzer Setup

The system was investigatedfrom 30 MHz to 25 GHz.

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

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

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

Test Procedure

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

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

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

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.

Repeat above procedures until all measured frequencies were complete.

Corrected Factor& Margin Calculation

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

Factor = Antenna Factor + Cable Loss - Amplifier Gain

The "**Over Limit/Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, anOver Limit/margin of -7dB means the emission is 7dB below the limit. The equation for calculation is as follows:

Over Limit = Level / Corrected Amplitude–Limit
Level / Corrected Amplitude = Read Level + Factor

Test Data

Environmental Conditions

Temperature:	25~26.3℃
Relative Humidity:	51~64 %
ATM Pressure:	101.0~101.2 kPa

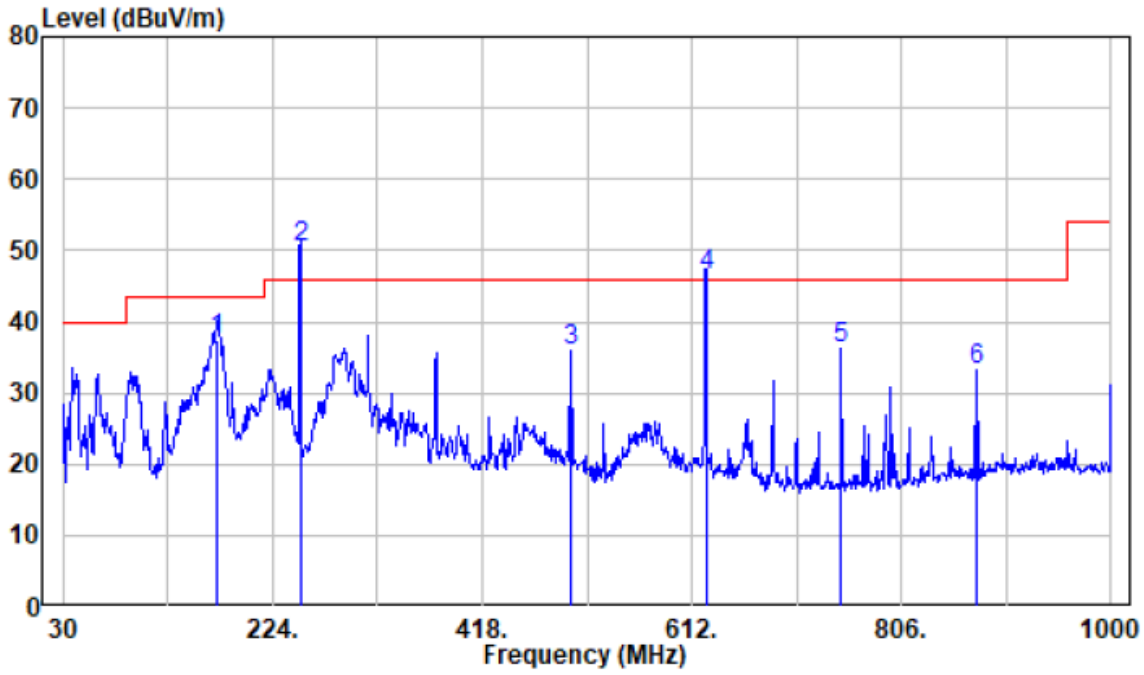
The testing was performed by BinDeng on 2021-11-23 for below 1GHz and by Caro Hufrom 2021-10-26 to 2022-02-18 for above 1GHz.

EUT operation mode: Transmitting(Pre-scan in the X,Y and Z axes of orientation, the worst case X-axis of orientationwas recorded)

30 MHz~1 GHz: *(worst case is 802.11g mode, high channel)*

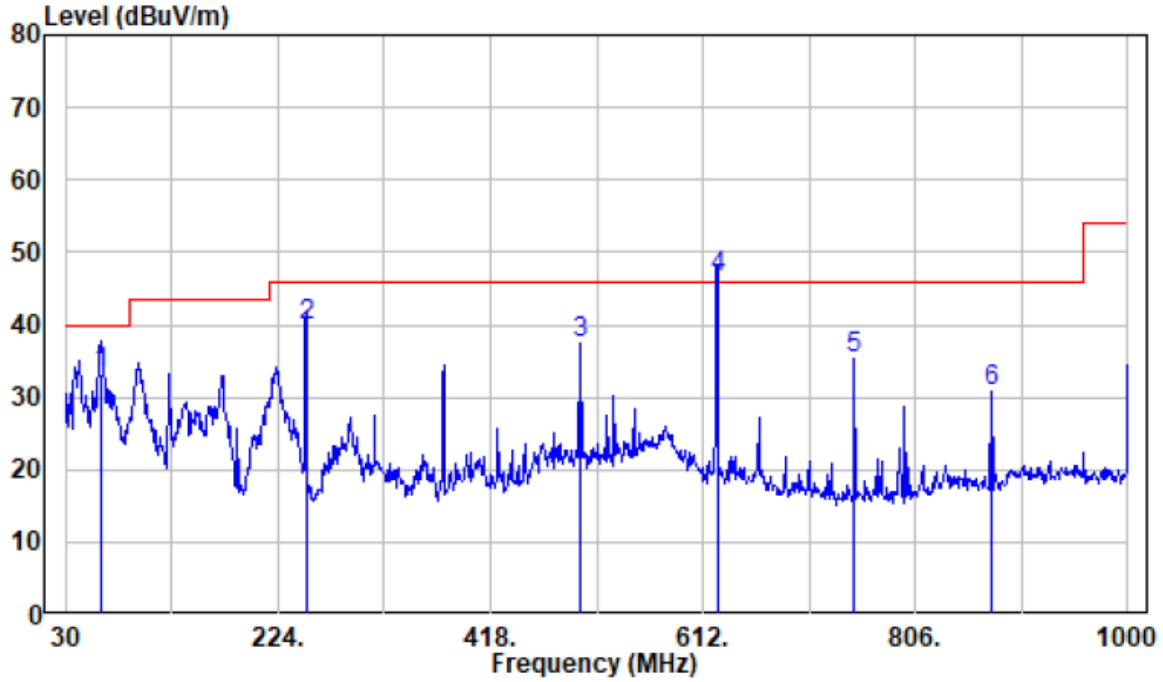
For POE

Horizontal



	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	171.62	-21.03	58.35	37.32	43.50	-6.18	QP
2	250.19	-18.53	68.98	50.45	46.00	4.45	QP*
3	500.45	-14.18	50.25	36.07	46.00	-9.93	Peak
4	625.58	-11.49	58.12	46.63	46.00	0.63	QP *
5	750.71	-11.05	47.39	36.34	46.00	-9.66	Peak
6	875.84	-9.12	42.26	33.14	46.00	-12.86	Peak

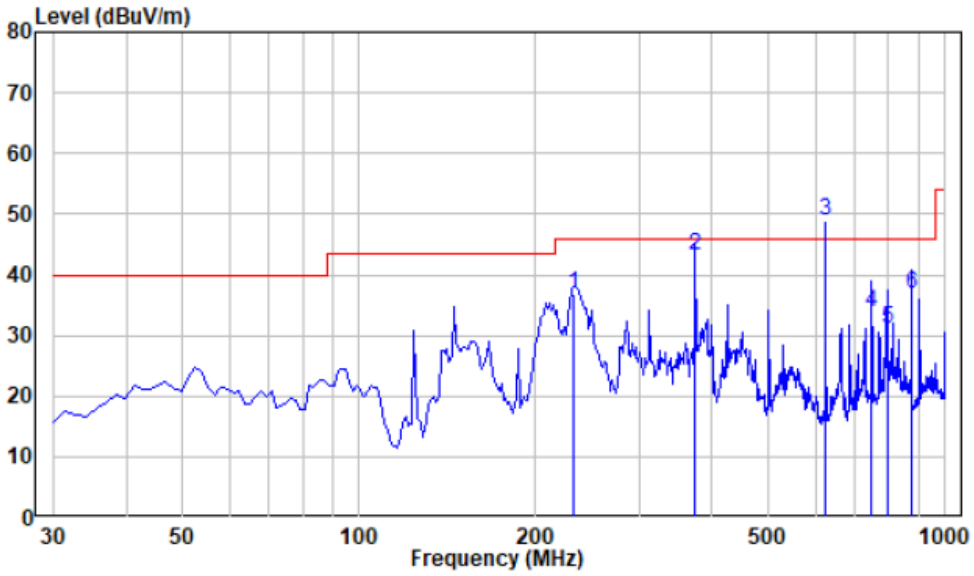
Vertical



	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	62.01	-19.87	53.11	33.24	40.00	-6.76	QP
2	250.19	-18.53	58.36	39.83	46.00	-6.17	QP
3	500.45	-14.18	51.58	37.40	46.00	-8.60	Peak
4	625.58	-11.49	57.84	46.35	46.00	0.35	QP*
5	750.71	-11.05	46.50	35.45	46.00	-10.55	Peak
6	875.84	-9.12	39.84	30.72	46.00	-15.28	Peak

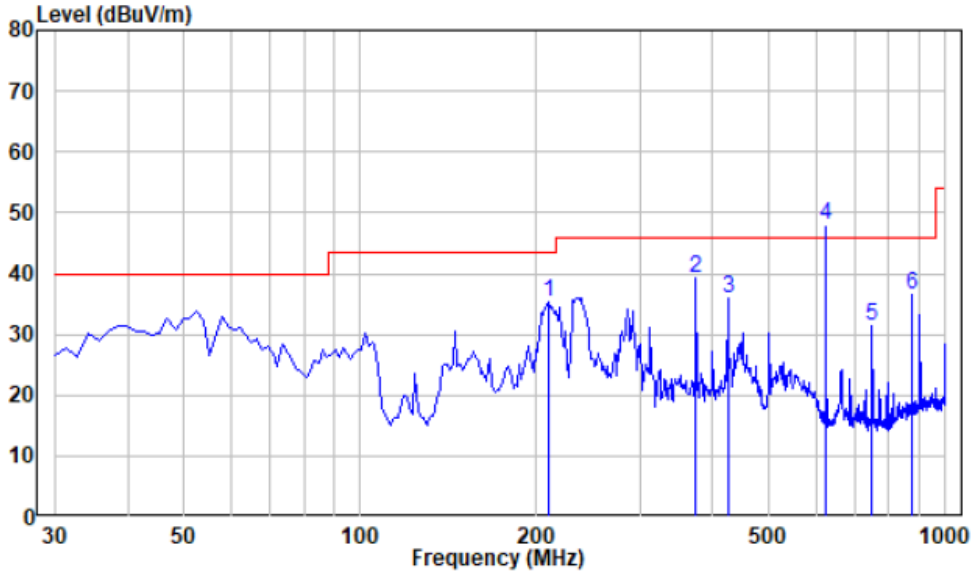
For Adapter NBS12E050200UV

Horizontal



	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	232.535	-18.82	55.66	36.84	46.00	-9.16	QP
2	374.203	-15.71	58.83	43.12	46.00	-2.88	QP
3	624.722	-11.50	60.51	49.01	46.00	3.01	QP*
4	749.810	-11.05	44.73	33.68	46.00	-12.32	QP
5	796.294	-11.47	42.42	30.95	46.00	-15.05	QP
6	874.884	-9.17	45.92	36.75	46.00	-9.25	QP

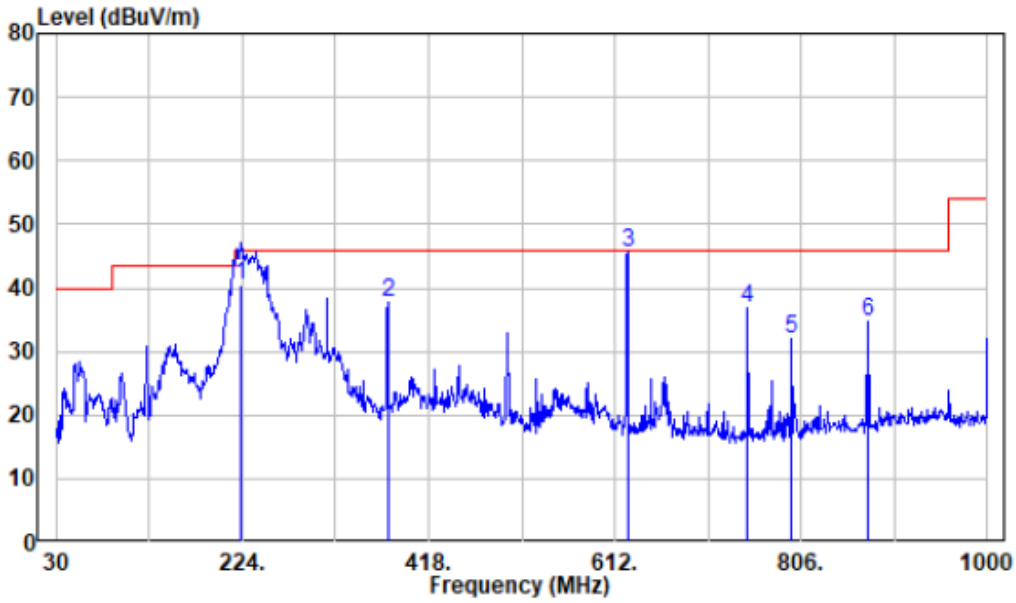
Vertical



	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	209.942	-19.01	54.36	35.35	43.50	-8.15	Peak
2	374.420	-15.71	54.96	39.25	46.00	-6.75	Peak
3	425.029	-14.40	50.38	35.98	46.00	-10.02	Peak
4	624.652	-11.50	59.61	48.11	46.00	2.11	QP*
5	749.768	-11.05	42.37	31.32	46.00	-14.68	Peak
6	874.884	-9.17	45.62	36.45	46.00	-9.55	Peak

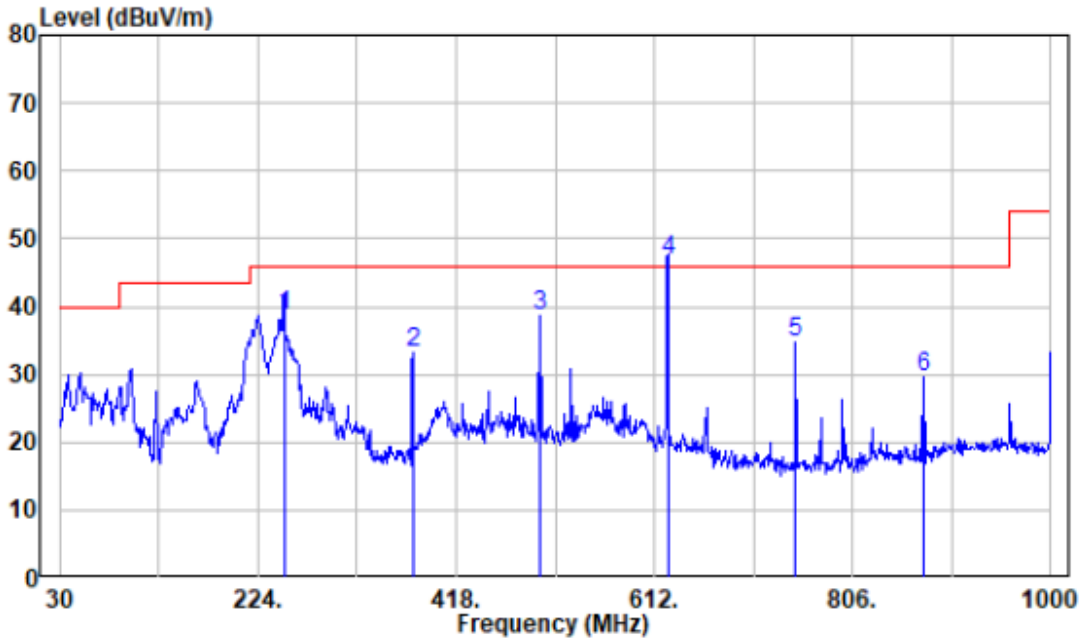
For Adapter R122-0502000ID

Horizontal



	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	223.03	-18.95	59.32	40.37	46.00	-5.63	QP
2	375.32	-15.70	53.52	37.82	46.00	-8.18	Peak
3	625.58	-11.49	57.15	45.66	46.00	-0.34	QP
4	750.71	-11.05	47.95	36.90	46.00	-9.10	Peak
5	796.30	-11.47	43.34	31.87	46.00	-14.13	Peak
6	875.84	-9.12	43.88	34.76	46.00	-11.24	Peak

Vertical



	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	250.19	-18.53	57.26	38.73	46.00	-7.27	QP
2	375.32	-15.70	48.80	33.10	46.00	-12.90	Peak
3	500.45	-14.18	52.84	38.66	46.00	-7.34	Peak
4	625.58	-11.49	58.30	46.81	46.00	0.81	QP *
5	750.71	-11.05	45.86	34.81	46.00	-11.19	Peak
6	875.84	-9.12	38.64	29.52	46.00	-16.48	Peak

Note *: The data recorded above represents the worst case for all supported operating modes, there were no spurious emission in the range 30MHz -1GHz over the limit in §15.209&RSS-GEN caused by radio, the emission list at above table was investigated and was not caused by the radio, the emission was present when the radio was disabled. Those emissions comply with the FCC Part 15, Subpart B-Unintentional radiators §15.109(b) and ICES-003 limit set for Class A digital device as the EUT is declared as a Class A equipment according the user manual.

1 GHz-25 GHz(Worst case: powered by Adapter 1)

For Wi-Fi

Antenna 0

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/QP/AV		Height (m)	Polar (H/V)				
802.11b Mode									
Low Channel (2412 MHz)									
2310	68.55	PK	108	1.5	H	-6.84	61.71	74	-12.29
2310	54.22	AV	108	1.5	H	-6.84	47.38	54	-6.62
2310	68.74	PK	202	1.2	V	-6.84	61.90	74	-12.1
2310	54.51	AV	202	1.2	V	-6.84	47.67	54	-6.33
2390	67.91	PK	215	2.3	H	-6.44	61.47	74	-12.53
2390	53.72	AV	215	2.3	H	-6.44	47.28	54	-6.72
2390	68.33	PK	224	2.1	V	-6.44	61.89	74	-12.11
2390	54.07	AV	224	2.1	V	-6.44	47.63	54	-6.37
4824	47.83	PK	42	2.2	H	2.87	50.70	74	-23.3
4824	48.35	PK	143	1.9	V	2.87	51.22	74	-22.78
Middle Channel (2437MHz)									
4874	48.44	PK	42	1.7	H	3.01	51.45	74	-22.55
4874	48.02	PK	211	1.7	V	3.01	51.03	74	-22.97
High Channel (2462 MHz)									
2483.5	67.37	PK	16	2.5	H	-5.96	61.41	74	-12.59
2483.5	53.30	AV	16	2.5	H	-5.96	47.34	54	-6.66
2483.5	68.34	PK	329	1.1	V	-5.96	62.38	74	-11.62
2483.5	53.79	AV	329	1.1	V	-5.96	47.83	54	-6.17
2500	68.15	PK	185	1.3	H	-5.88	62.27	74	-11.73
2500	53.28	AV	185	1.3	H	-5.88	47.4	54	-6.6
2500	67.55	PK	173	1.2	V	-5.88	61.67	74	-12.33
2500	53.62	AV	173	1.2	V	-5.88	47.74	54	-6.26
4924	48.26	PK	110	1.7	H	3.17	51.43	74	-22.57
4924	47.94	PK	235	1.8	V	3.17	51.11	74	-22.89

Antenna 0:

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/QP/AV		Height (m)	Polar (H/V)				
802.11g Mode									
Low Channel (2412 MHz)									
2310	68.15	PK	63	2.1	H	-6.84	61.31	74	-12.69
2310	54.33	AV	63	2.1	H	-6.84	47.49	54	-6.51
2310	68.35	PK	163	1.9	V	-6.84	61.51	74	-12.49
2310	54.89	AV	163	1.9	V	-6.84	48.05	54	-5.95
2390	67.83	PK	27	1.7	H	-6.44	61.39	74	-12.61
2390	53.87	AV	27	1.7	H	-6.44	47.43	54	-6.57
2390	67.71	PK	61	1.6	V	-6.44	61.27	74	-12.73
2390	54.42	AV	61	1.6	V	-6.44	47.98	54	-6.02
4824	47.57	PK	152	2.3	H	2.87	50.44	74	-23.56
4824	47.53	PK	173	1.4	V	2.87	50.40	74	-23.6
Middle Channel (2437 MHz)									
4874	48.18	PK	221	2.1	H	3.01	51.19	74	-22.81
4874	48.04	PK	235	2.1	V	3.01	51.05	74	-22.95
High Channel (2462 MHz)									
2483.5	67.02	PK	109	1.3	H	-5.96	61.06	74	-12.94
2483.5	53.34	AV	109	1.3	H	-5.96	47.38	54	-6.62
2483.5	67.24	PK	178	2.1	V	-5.96	61.28	74	-12.72
2483.5	53.94	AV	178	2.1	V	-5.96	47.98	54	-6.02
2500	67.22	PK	14	1.7	H	-5.88	61.34	74	-12.66
2500	53.43	AV	14	1.7	H	-5.88	47.55	54	-6.45
2500	67.10	PK	328	1.1	V	-5.88	61.22	74	-12.78
2500	54.10	AV	328	1.1	V	-5.88	48.22	54	-5.78
4924	48.16	PK	134	2.5	H	3.17	51.33	74	-22.67
4924	48.17	PK	78	2.1	V	3.17	51.34	74	-22.66

Antenna 1

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/QP/AV		Height (m)	Polar (H/V)				
802.11b Mode									
Low Channel (2412 MHz)									
2310	68.77	PK	112	2.5	H	-6.84	61.93	74	-12.07
2310	54.25	AV	112	2.5	H	-6.84	47.41	54	-6.59
2310	68.75	PK	191	2.4	V	-6.84	61.91	74	-12.09
2310	54.43	AV	191	2.4	V	-6.84	47.59	54	-6.41
2390	68.42	PK	68	1	H	-6.44	61.98	74	-12.02
2390	53.72	AV	68	1	H	-6.44	47.28	54	-6.72
2390	68.47	PK	10	1.5	V	-6.44	62.03	74	-11.97
2390	54.16	AV	10	1.5	V	-6.44	47.72	54	-6.28
4824	48.02	PK	151	2.4	H	2.87	50.89	74	-23.11
4824	47.59	PK	194	2.1	V	2.87	50.46	74	-23.54
Middle Channel (2437MHz)									
4874	48.44	PK	92	2.2	H	3.01	51.45	74	-22.55
4874	48.02	PK	296	2.2	V	3.01	51.03	74	-22.97
High Channel (2462 MHz)									
2483.5	67.84	PK	163	1.9	H	-5.96	61.88	74	-12.12
2483.5	53.42	AV	163	1.9	H	-5.96	47.46	54	-6.54
2483.5	68.57	PK	224	1.8	V	-5.96	62.61	74	-11.39
2483.5	53.76	AV	224	1.8	V	-5.96	47.8	54	-6.2
2500	67.74	PK	48	1.7	H	-5.88	61.86	74	-12.14
2500	53.44	AV	48	1.7	H	-5.88	47.56	54	-6.44
2500	67.58	PK	136	1.7	V	-5.88	61.7	74	-12.3
2500	53.61	AV	136	1.7	V	-5.88	47.73	54	-6.27
4924	47.72	PK	311	1.9	H	3.17	50.89	74	-23.11
4924	48.07	PK	131	1.2	V	3.17	51.24	74	-22.76

Antenna 1:

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/QP/AV		Height (m)	Polar (H/V)				
802.11g Mode									
Low Channel (2412 MHz)									
2310	68.47	PK	128	1.9	H	-6.84	61.63	74	-12.37
2310	54.48	AV	128	1.9	H	-6.84	47.64	54	-6.36
2310	68.38	PK	191	1.9	V	-6.84	61.54	74	-12.46
2310	55.06	AV	191	1.9	V	-6.84	48.22	54	-5.78
2390	67.57	PK	67	1.6	H	-6.44	61.13	74	-12.87
2390	54.02	AV	67	1.6	H	-6.44	47.58	54	-6.42
2390	67.58	PK	13	1.7	V	-6.44	61.14	74	-12.86
2390	54.70	AV	13	1.7	V	-6.44	48.26	54	-5.74
4824	47.80	PK	111	2.2	H	2.87	50.67	74	-23.33
4824	47.65	PK	291	1.2	V	2.87	50.52	74	-23.48
Middle Channel (2437 MHz)									
4874	48.03	PK	65	1.8	H	3.01	51.04	74	-22.96
4874	47.83	PK	209	1.8	V	3.01	50.84	74	-23.16
High Channel (2462 MHz)									
2483.5	67.29	PK	192	2.3	H	-5.96	61.33	74	-12.67
2483.5	53.39	AV	192	2.3	H	-5.96	47.43	54	-6.57
2483.5	67.82	PK	273	1.9	V	-5.96	61.86	74	-12.14
2483.5	53.98	AV	273	1.9	V	-5.96	48.02	54	-5.98
2500	67.06	PK	343	1.1	H	-5.88	61.18	74	-12.82
2500	53.64	AV	343	1.1	H	-5.88	47.76	54	-6.24
2500	66.97	PK	277	2.5	V	-5.88	61.09	74	-12.91
2500	53.83	AV	277	2.5	V	-5.88	47.95	54	-6.05
4924	48.14	PK	156	1.7	H	3.17	51.31	74	-22.69
4924	47.94	PK	230	1.3	V	3.17	51.11	74	-22.89

2TX:

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/QP/AV		Height (m)	Polar (H/V)				
802.11n20 Mode									
Low Channel (2412 MHz)									
2310	67.61	PK	133	1.5	H	-6.84	60.77	74	-13.23
2310	54.53	AV	133	1.5	H	-6.84	47.69	54	-6.31
2310	68.71	PK	175	1.2	V	-6.84	61.87	74	-12.13
2310	54.82	AV	175	1.2	V	-6.84	47.98	54	-6.02
2390	67.87	PK	356	1	H	-6.44	61.43	74	-12.57
2390	54.12	AV	356	1	H	-6.44	47.68	54	-6.32
2390	67.93	PK	224	1.2	V	-6.44	61.49	74	-12.51
2390	54.61	AV	224	1.2	V	-6.44	48.17	54	-5.83
4824	47.52	PK	294	2.4	H	2.87	50.39	74	-23.61
4824	47.57	PK	69	1.3	V	2.87	50.44	74	-23.56
Middle Channel (2437MHz)									
4874	47.95	PK	189	1.1	H	3.01	50.96	74	-23.04
4874	47.98	PK	262	1.1	V	3.01	50.99	74	-23.01
High Channel (2462 MHz)									
2483.5	67.66	PK	296	2	H	-5.96	61.7	74	-12.3
2483.5	53.85	AV	296	2	H	-5.96	47.89	54	-6.11
2483.5	67.23	PK	1	2.2	V	-5.96	61.27	74	-12.73
2483.5	54.10	AV	1	2.2	V	-5.96	48.14	54	-5.86
2500	67.51	PK	102	1.3	H	-5.88	61.63	74	-12.37
2500	53.66	AV	102	1.3	H	-5.88	47.78	54	-6.22
2500	67.39	PK	91	1.3	V	-5.88	61.51	74	-12.49
2500	54.03	AV	91	1.3	V	-5.88	48.15	54	-5.85
4924	47.96	PK	10	1.6	H	3.17	51.13	74	-22.87
4924	47.64	PK	356	1.7	V	3.17	50.81	74	-23.19

2TX:

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/QP/AV		Height (m)	Polar (H/V)				
802.11n40 Mode									
Low Channel (2422 MHz)									
2310	72.43	PK	243	1.1	H	-6.84	65.59	74	-8.41
2310	56.25	AV	243	1.1	H	-6.84	49.41	54	-4.59
2310	68.04	PK	210	2.2	V	-6.84	61.20	74	-12.8
2310	56.29	AV	210	2.2	V	-6.84	49.45	54	-4.55
2390	70.16	PK	224	1.6	H	-6.44	63.72	74	-10.28
2390	55.54	AV	224	1.6	H	-6.44	49.10	54	-4.9
2390	68.19	PK	14	2.5	V	-6.44	61.75	74	-12.25
2390	55.51	AV	14	2.5	V	-6.44	49.07	54	-4.93
4844	47.70	PK	39	1.8	H	2.92	50.62	74	-23.38
4844	47.81	PK	298	2.4	V	2.92	50.73	74	-23.27
Middle Channel (2437MHz)									
4874	47.76	PK	289	1.6	H	3.01	50.77	74	-23.23
4874	47.98	PK	227	1.6	V	3.01	50.99	74	-23.01
High Channel (2452 MHz)									
2483.5	67.59	PK	164	2.5	H	-5.96	61.63	74	-12.37
2483.5	54.68	AV	164	2.5	H	-5.96	48.72	54	-5.28
2483.5	73.36	PK	152	1.9	V	-5.96	67.4	74	-6.6
2483.5	56.35	AV	152	1.9	V	-5.96	50.39	54	-3.61
2500	67.17	PK	250	2.5	H	-5.88	61.29	74	-12.71
2500	54.64	AV	250	2.5	H	-5.88	48.76	54	-5.24
2500	71.70	PK	178	1.5	V	-5.88	65.82	74	-8.18
2500	56.77	AV	178	1.5	V	-5.88	50.89	54	-3.11
4904	47.87	PK	97	1.9	H	3.11	50.98	74	-23.02
4904	47.96	PK	288	2.2	V	3.11	51.07	74	-22.93

BLE 1M:

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/QP/AV		Height (m)	Polar (H/V)				
BLE 1M									
Low Channel (2402 MHz)									
2310	68.46	PK	249	2.4	H	-6.84	61.62	74	-12.38
2310	54.31	AV	249	2.4	H	-6.84	47.47	54	-6.53
2310	68.46	PK	158	1.5	V	-6.84	61.62	74	-12.38
2310	54.55	AV	158	1.5	V	-6.84	47.71	54	-6.29
2390	67.86	PK	133	2	H	-6.44	61.42	74	-12.58
2390	53.90	AV	133	2	H	-6.44	47.46	54	-6.54
2390	67.67	PK	309	1.6	V	-6.44	61.23	74	-12.77
2390	54.23	AV	309	1.6	V	-6.44	47.79	54	-6.21
4804	48.15	PK	137	1.6	H	2.81	50.96	74	-23.04
4804	48.31	PK	321	1.6	V	2.81	51.12	74	-22.88
Middle Channel (2440 MHz)									
4880	48.68	PK	195	2.1	H	3.04	51.72	74	-22.28
4880	48.33	PK	216	2.1	V	3.04	51.37	74	-22.63
High Channel (2480 MHz)									
2483.5	67.46	PK	193	2.1	H	-5.96	61.5	74	-12.5
2483.5	53.39	AV	193	2.1	H	-5.96	47.43	54	-6.57
2483.5	67.00	PK	321	1	V	-5.96	61.04	74	-12.96
2483.5	53.50	AV	321	1	V	-5.96	47.54	54	-6.46
2500	67.93	PK	328	1.6	H	-5.88	62.05	74	-11.95
2500	53.31	AV	328	1.6	H	-5.88	47.43	54	-6.57
2500	67.83	PK	64	1.9	V	-5.88	61.95	74	-12.05
2500	53.51	AV	64	1.9	V	-5.88	47.63	54	-6.37
4960	47.77	PK	349	1.7	H	3.29	51.06	74	-22.94
4960	48.15	PK	194	1.7	V	3.29	51.44	74	-22.56

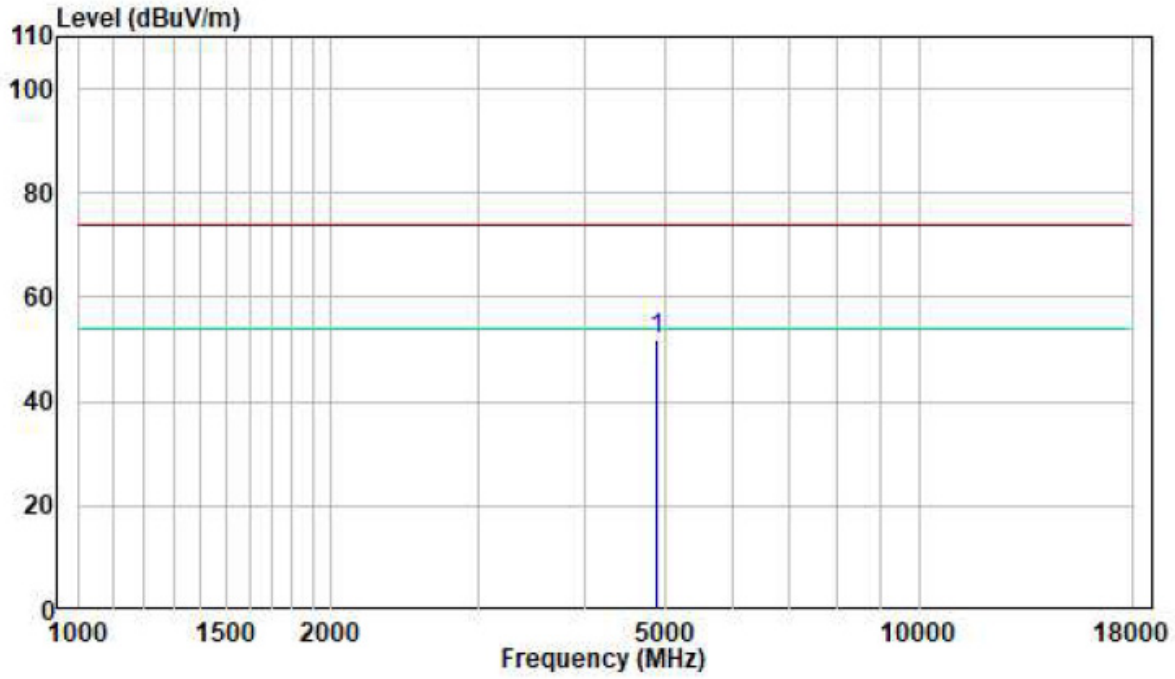
BLE 2M:

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/QP/AV		Height (m)	Polar (H/V)				
BLE 2M									
Low Channel (2402 MHz)									
2310	71.12	PK	243	1.7	H	-7.24	63.88	74	-10.12
2310	53.95	AV	243	1.7	H	-7.24	46.71	54	-7.29
2310	71.77	PK	319	2.5	V	-7.24	64.53	74	-9.47
2310	54.07	AV	319	2.5	V	-7.24	46.83	54	-7.17
2390	74.36	PK	254	2.4	H	-7.22	67.14	74	-6.86
2390	53.66	AV	254	2.4	H	-7.22	46.44	54	-7.56
2390	72.33	PK	214	1.9	V	-7.22	65.11	74	-8.89
2390	53.60	AV	214	1.9	V	-7.22	46.38	54	-7.62
4804	54.24	PK	117	1.5	H	-3.51	50.73	74	-23.27
4804	54.71	PK	191	1.5	V	-3.51	51.20	74	-22.80
Middle Channel (2440 MHz)									
4880	54.42	PK	108	1.9	H	-3.38	51.04	74	-22.96
4880	54.95	PK	357	1.9	V	-3.38	51.57	74	-22.43
High Channel (2480 MHz)									
2483.5	69.09	PK	274	1	H	-7.2	61.89	74	-12.11
2483.5	54.20	AV	274	1	H	-7.2	47	54	-7.00
2483.5	69.09	PK	74	1.2	V	-7.2	61.89	74	-12.11
2483.5	54.18	AV	74	1.2	V	-7.2	46.98	54	-7.02
2500	69.00	PK	131	2.2	H	-7.18	61.82	74	-12.18
2500	54.84	AV	131	2.2	H	-7.18	47.66	54	-6.34
2500	69.17	PK	151	1.5	V	-7.18	61.99	74	-12.01
2500	54.82	AV	151	1.5	V	-7.18	47.64	54	-6.36
4960	54.00	PK	40	1.7	H	-3.01	50.99	74	-23.01
4960	53.53	PK	113	1.7	V	-3.01	50.52	74	-23.48

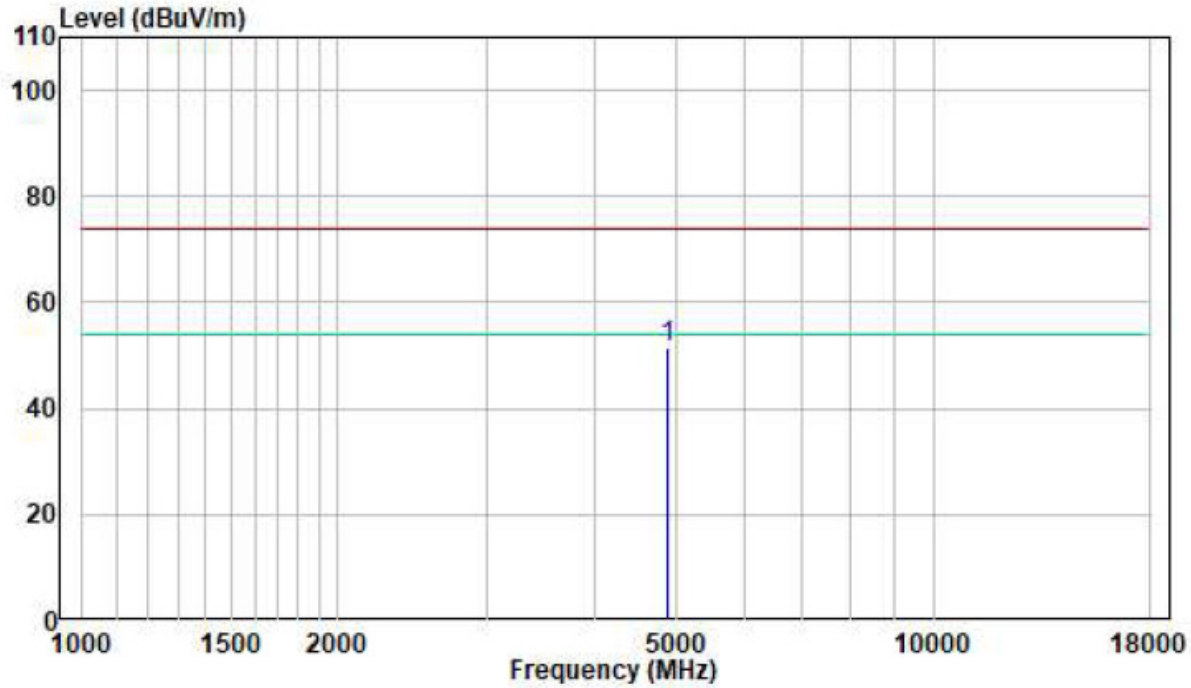
Note:
Corrected Factor = Antenna factor (RX) + Cable Loss – Amplifier Factor
Corrected Amplitude = Corrected Factor + Reading
Margin = Corrected. Amplitude - Limit
The other spurious emission which is in the noise floor was not recorded.
When the test result of peak was less than the limit of average, just peak value were recorded.

1-18 GHz:
Pre-scan plots:

802.11 b Middle Channel
Horizontal

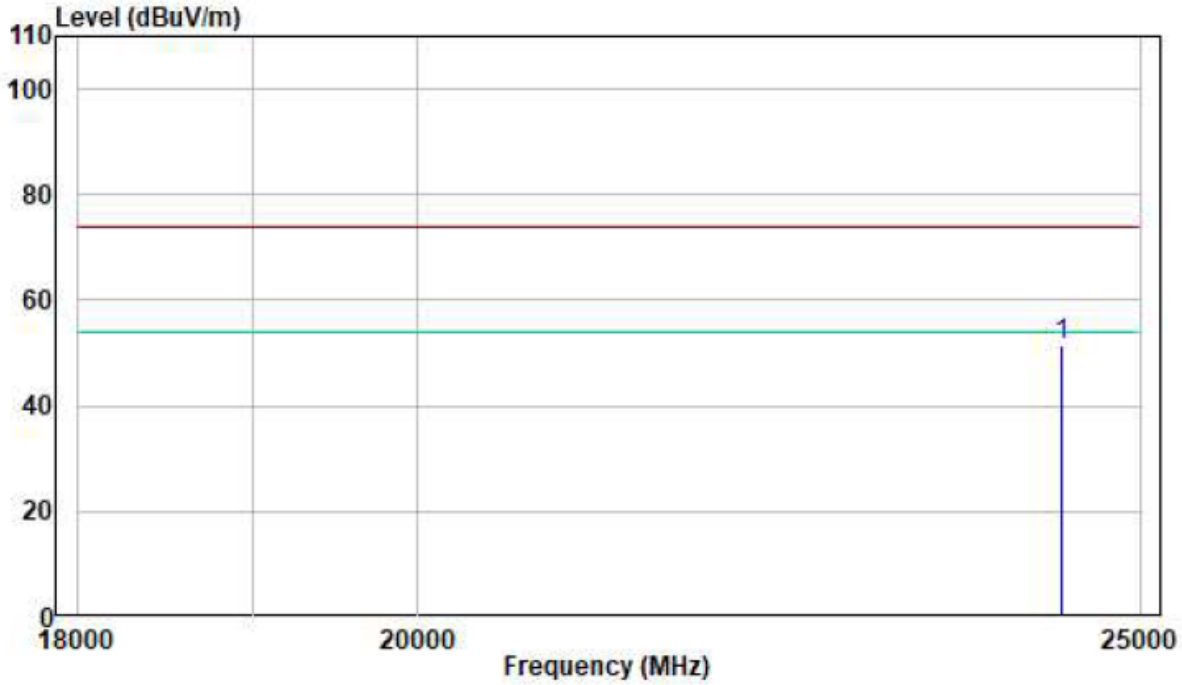


Vertical

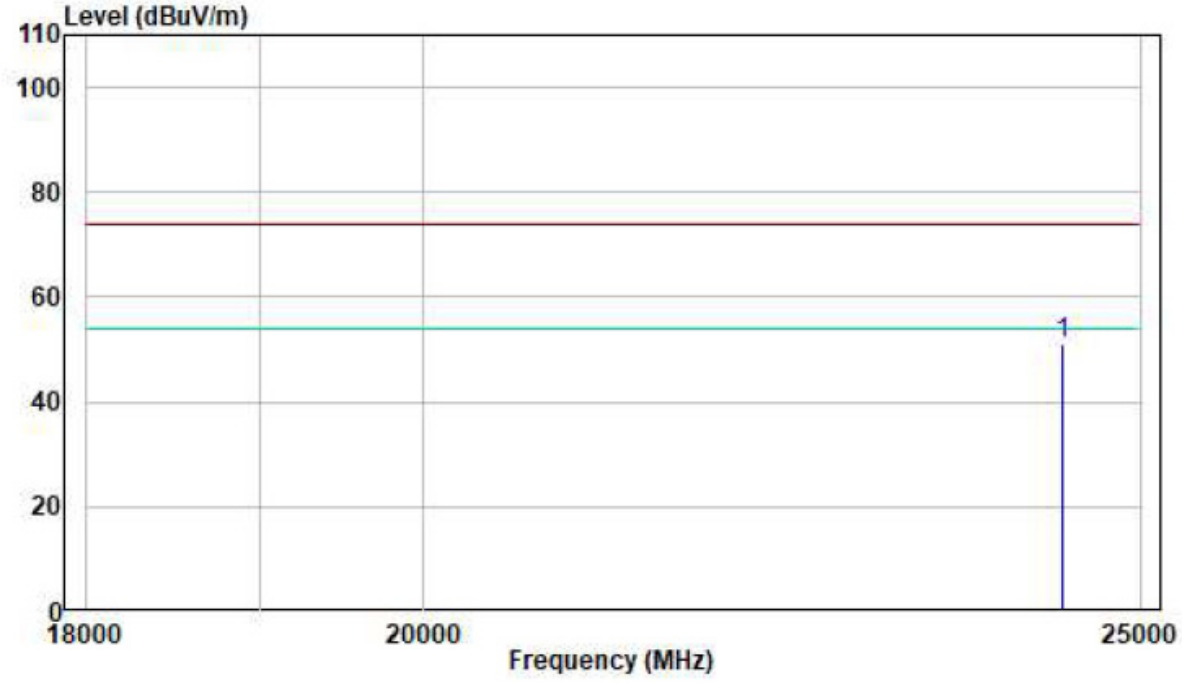


18 -25GHz:
Pre-scan plots:

802.11 b Middle Channel
Horizontal



Vertical



§15.247 (a)(2)&RSS-Gen§6.7RSS-247 § 5.2 (a)99% OCCUPIED BANDWIDTH &6dB 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.

The occupied bandwidth or the "99% emission bandwidth" is defined as the frequency range between two points, one above and the other below the carrier frequency, within which 99% of the total transmitted power of the fundamental transmitted emission is contained. The occupied bandwidth shall be reported for all equipment in addition to the specified bandwidth required in the applicable RSSs.

In some cases, the "6 dB bandwidth" is required, which is defined as the frequency range between two points, one at the lowest frequency below and one at the highest frequency above the carrier frequency, at which the maximum power level of the transmitted emission is attenuated 6 dB below the maximum in-band power level of the modulated signal, where the two points are on the outskirts of the in-band emission.

Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 6 dB from the reference level. Record the frequency difference as the emission bandwidth.
4. Repeat above procedures until all frequencies measured were complete.

The following conditions shall be observed for measuring the occupied bandwidth and 6 dB bandwidth:
• The transmitter shall be operated at its maximum carrier power measured under normal test conditions.

• The span of the spectrum analyzer shall be set large enough to capture all products of the modulation process, including the emission skirts, around the carrier frequency, but small enough to avoid having other emissions (e.g. on adjacent channels) within the span.

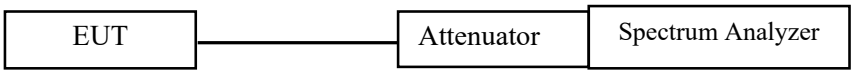
• The detector of the spectrum analyzer shall be set to "Sample". However, a peak, or peak hold, may be used in place of the sampling detector since this usually produces a wider bandwidth than the actual bandwidth (worst-case measurement). Use of a peak hold (or "Max Hold") may be necessary to determine the occupied / 6 dB bandwidth if the device is not transmitting continuously.

• The resolution bandwidth (RBW) shall be in the range of 1% to 5% of the actual occupied / 6 dB bandwidth and the video bandwidth (VBW) shall not be smaller than three times the RBW value. Video averaging is not permitted.

Note: It may be necessary to repeat the measurement a few times until the RBW and VBW are in compliance with the above requirement.

For the 99% emission bandwidth, the trace data points are recovered and directly summed in linear power level terms. The recovered amplitude data points, beginning at the lowest frequency, are placed

in a running sum until 0.5% of the total is reached, and that frequency recorded. The process is repeated for the highest frequency data points (starting at the highest frequency, at the right side of the span, and going down in frequency). This frequency is then recorded. The difference between the two recorded frequencies is the occupied bandwidth (or the 99% emission bandwidth).



Test Data

Environmental Conditions

Temperature:	23~27 ℃
Relative Humidity:	55~62 %
ATM Pressure:	101.0 kPa

The testing was performed by Paul liufrom 2021-10-27 to 2022-02-23.

EUT operation mode: Transmitting

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

§15.247(b)(3)&RSS-247 § 5.4(d)MAXIMUM CONDUCTED OUTPUT POWER

Applicable Standard

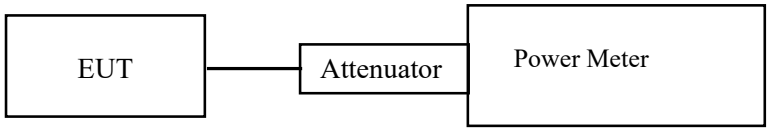
According to FCC §15.247(b) (3), for systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted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

For DTSs employing digital modulation techniques operating in the bands 902-928 MHz and 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1 W. The e.i.r.p. shall not exceed 4 W, except as provided in section 5.4(e).

As an alternative to a peak power measurement, compliance can be based on a measurement of the maximum conducted output power. The maximum conducted output power is the total transmit power delivered to all antennas and antenna elements, averaged across all symbols in the signalling 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 transmitting at a reduced power level. If multiple modes of operation are implemented, the maximum conducted output power is the highest total transmit power occurring in any mode.

Test Procedure

1. Place the EUT on a bench and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to one test equipment.
3. Add a correction factor to the display.



Test Data

Environmental Conditions

Temperature:	23~27 ℃
Relative Humidity:	55~62 %
ATM Pressure:	101.0 kPa

The testing was performed by Paul liufrom 2021-10-28 to 2022-02-23.

EUT operation mode: Transmitting

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

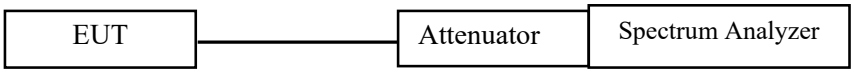
§ 15.247(d)&RSS-247 § 5.5100kHz BANDWIDTH OF FREQUENCY BAND EDGE

Applicable Standard

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

Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set RBW to 100 kHz and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.



Test Data

Environmental Conditions

Temperature:	23~27 ℃
Relative Humidity:	55~62 %
ATM Pressure:	101.0 kPa

The testing was performed by Paul liufrom 2021-10-28 to 2022-02-23.

EUT operation mode: Transmitting

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

§15.247(e)&RSS-247 § 5.2 (b)POWER SPECTRAL DENSITY

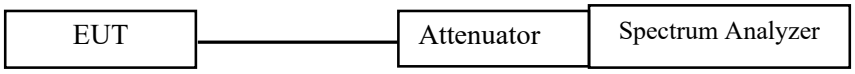
Applicable Standard

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.

The transmitter power spectral density conducted from the transmitter to the antenna shall not be greater than8 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 section 5.4(d), (i.e. the power spectral density shall be determined using the same method as is used to determine the conducted output power).

Test Procedure

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



Test Data

Environmental Conditions

Temperature:	23~27 ℃
Relative Humidity:	55~62 %
ATM Pressure:	101.0 kPa

The testing was performed by Paul liufrom 2021-10-28 to 2022-02-23.

EUT operation mode: Transmitting

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

APPENDIX Wi-Fi

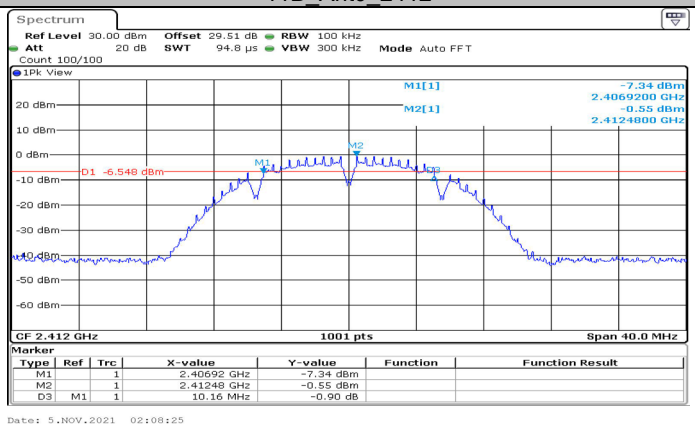
Appendix A: DTS Bandwidth

Test Result

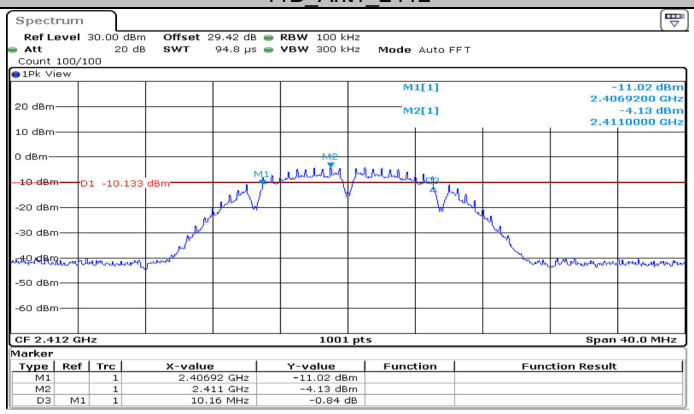
TestMode	Antenna	Channel	DTS BW [MHz]	Limit[MHz]	Verdict
11B	Ant0	2412	10.160	0.5	PASS
	Ant1	2412	10.160	0.5	PASS
	Ant0	2437	10.160	0.5	PASS
	Ant1	2437	10.160	0.5	PASS
	Ant0	2462	10.160	0.5	PASS
	Ant1	2462	10.160	0.5	PASS
11G	Ant0	2412	16.400	0.5	PASS
	Ant1	2412	15.760	0.5	PASS
	Ant0	2437	15.720	0.5	PASS
	Ant1	2437	16.080	0.5	PASS
	Ant0	2462	15.880	0.5	PASS
	Ant1	2462	16.120	0.5	PASS
11N20MIMO	Ant0	2412	15.800	0.5	PASS
	Ant1	2412	17.360	0.5	PASS
	Ant0	2437	16.640	0.5	PASS
	Ant1	2437	17.000	0.5	PASS
	Ant0	2462	17.000	0.5	PASS
	Ant1	2462	17.040	0.5	PASS
11N40MIMO	Ant0	2422	35.280	0.5	PASS
	Ant1	2422	35.280	0.5	PASS
	Ant0	2437	35.280	0.5	PASS
	Ant1	2437	35.280	0.5	PASS
	Ant0	2452	35.280	0.5	PASS
	Ant1	2452	35.280	0.5	PASS

Test Graphs

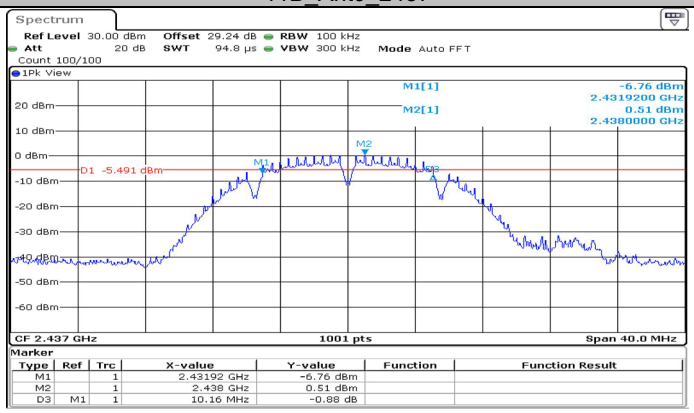
11B_Ant0_2412



11B_Ant1_2412



11B_Ant0_2437



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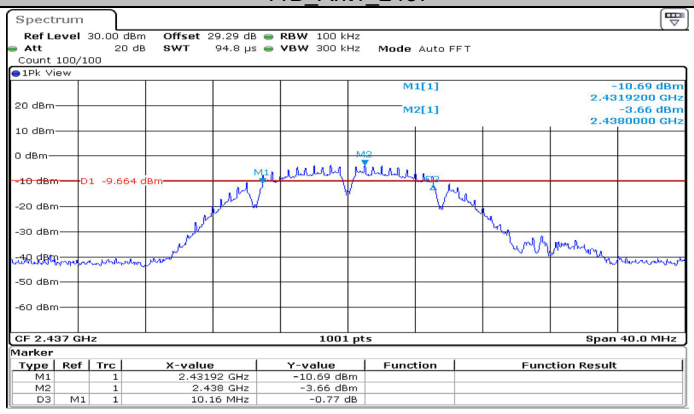
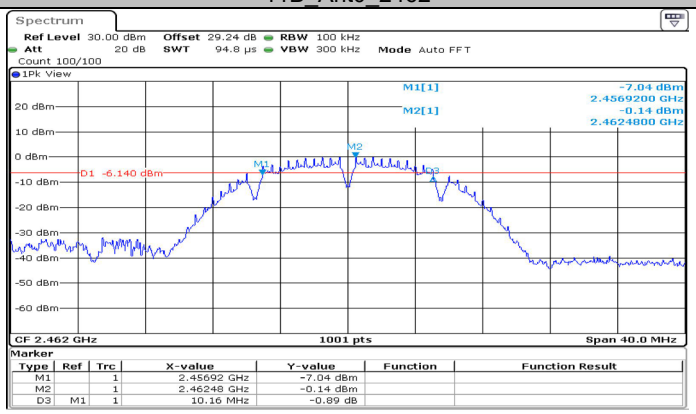


11B_Ant0_2462



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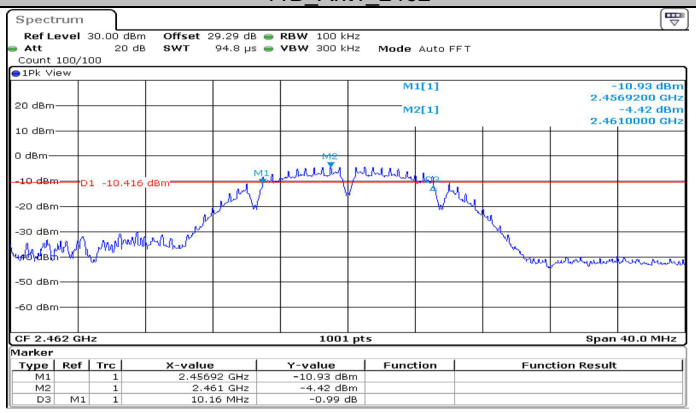
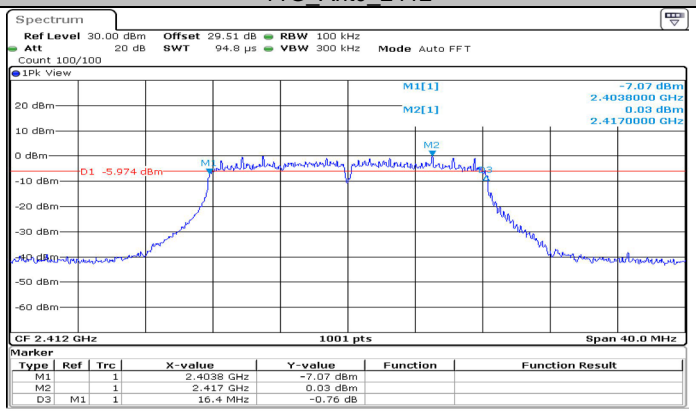


11G_Ant0_2412



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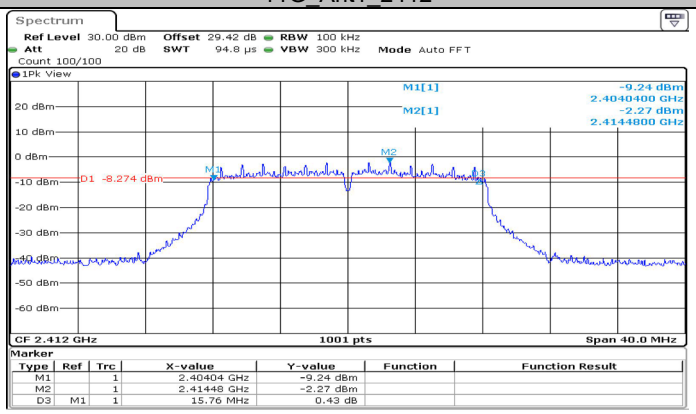

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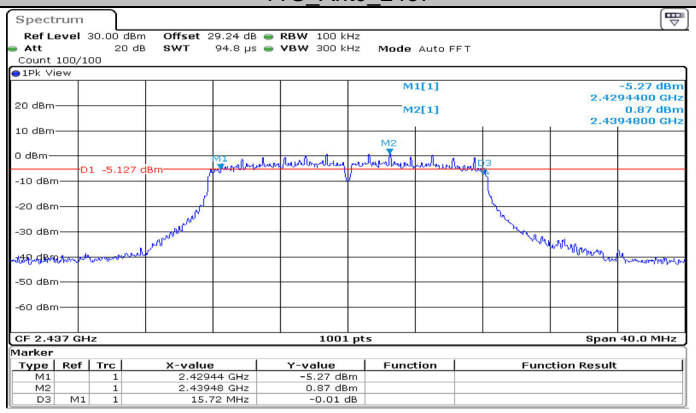
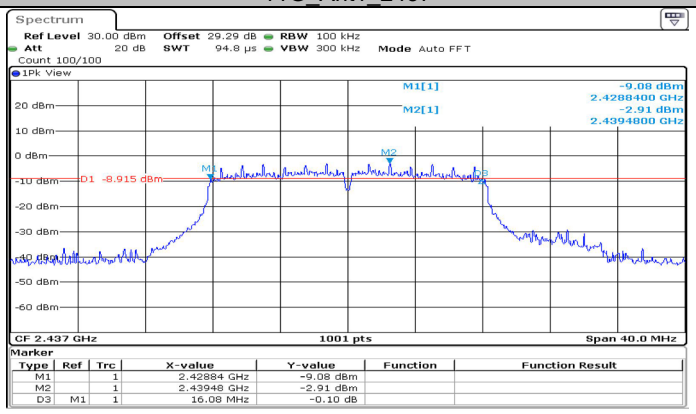


11G_Ant1_2437



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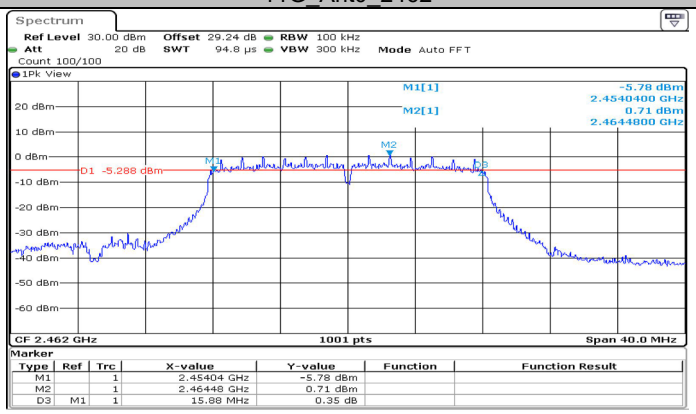
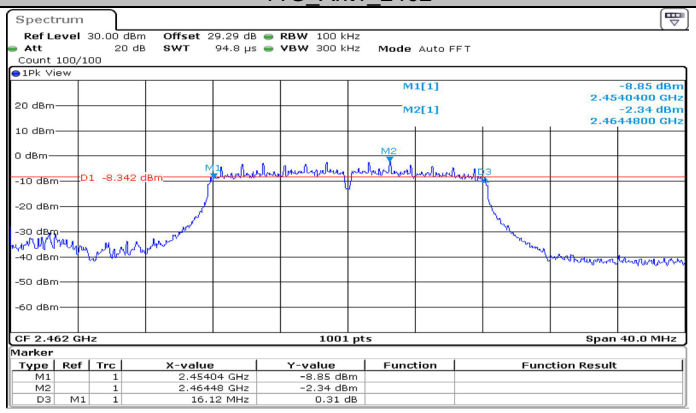
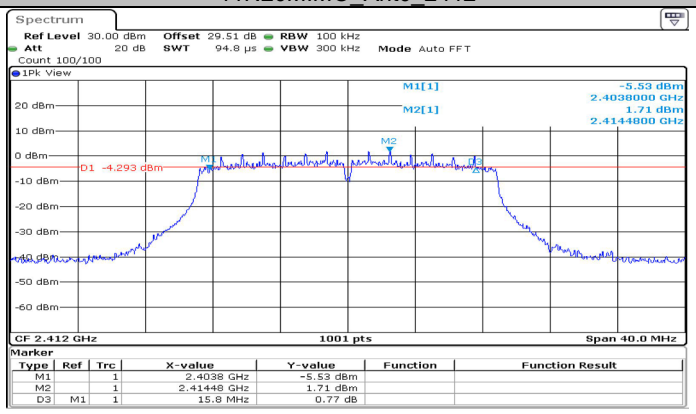


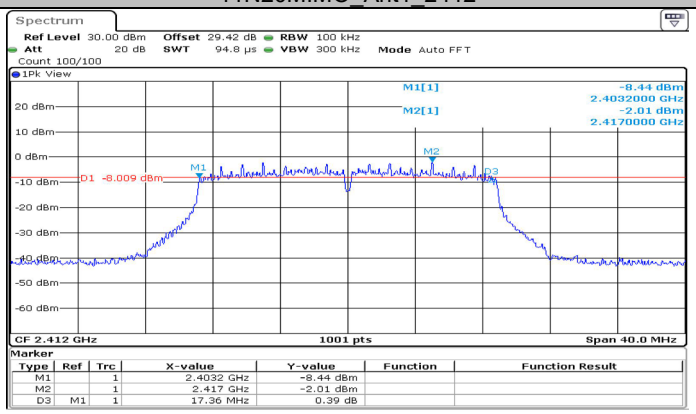
11G_Ant1_2462



11N20MIMO_Ant0_2412



11N20MIMO_Ant1_2412



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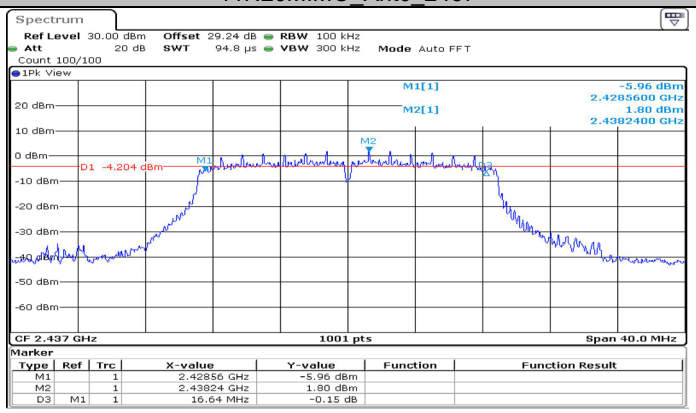

11N20MIMO_Ant1_2437