



# RF TEST REPORT

**Applicant** Huawei Technologies Co., Ltd.  
**FCC ID** QISPOT-LX3  
**Product** Smart Phone  
**Model** POT-LX3  
**Report No.** R1810H0133-R4  
**Issue Date** November 12, 2018

TA Technology (Shanghai) Co., Ltd. tested the above equipment in accordance with the requirements in **FCC CFR47 Part 15C (2018)**. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

*Performed by: Peng Tao*

*Approved by: Kai Xu*

---

**TA Technology (Shanghai) Co., Ltd.**

*No.145, Jintang Rd, Tangzhen Industry Park, Pudong Shanghai, China*

*TEL: +86-021-50791141/2/3*

*FAX: +86-021-50791141/2/3-8000*



# TABLE OF CONTENT

- 1. Test Laboratory ..... 4
  - 1.1. Notes of the test report..... 4
  - 1.2. Test facility ..... 4
  - 1.3. Testing Location..... 5
- 2. General Description of Equipment under Test..... 6
- 3. Applied Standards ..... 9
- 4. Test Configuration ..... 10
- 5. Test Case Results ..... 11
  - 5.1. Unwanted Emission ..... 11
- 6. Main Test Instruments ..... 53



## Summary of measurement results

Number	Summary of measurements of results	Clause in FCC rules	Verdict
1	Unwanted Emissions	15.247(d),15.205,15.209	PASS
Date of Testing: November 7, 2018~ November 9, 2018			

## 1. Test Laboratory

### 1.1. Notes of the test report

This report shall not be reproduced in full or partial, without the written approval of **TA technology (shanghai) co., Ltd.** The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein .Measurement Uncertainties were not taken into account and are published for informational purposes only. This report is written to support regulatory compliance of the applicable standards stated above.

### 1.2. Test facility

#### **CNAS (accreditation number: L2264)**

TA Technology (Shanghai) Co., Ltd. has obtained the accreditation of China National Accreditation Service for Conformity Assessment (CNAS).

#### **FCC (Designation number: CN1179, Test Firm Registration Number: 446626)**

TA Technology (Shanghai) Co., Ltd. has been listed on the US Federal Communications Commission list of test facilities recognized to perform electromagnetic emissions measurements.

#### **IC (recognition number is 8510A)**

TA Technology (Shanghai) Co., Ltd. has been listed by industry Canada to perform electromagnetic emission measurement.

#### **VCCI (recognition number is C-4595, T-2154, R-4113, G-10766)**

TA Technology (Shanghai) Co., Ltd. has been listed by industry Japan to perform electromagnetic emission measurement.

#### **A2LA (Certificate Number: 3857.01)**

TA Technology (Shanghai) Co., Ltd. has been listed by American Association for Laboratory Accreditation to perform electromagnetic emission measurement.



### 1.3. Testing Location

Company: TA Technology (Shanghai) Co., Ltd.  
Address: No.145, Jintang Rd, Tangzhen Industry Park, Pudong  
City: Shanghai  
Post code: 201201  
Country: P. R. China  
Contact: Xu Kai  
Telephone: +86-021-50791141/2/3  
Fax: +86-021-50791141/2/3-8000  
Website: <http://www.ta-shanghai.com>  
E-mail: [xukai@ta-shanghai.com](mailto:xukai@ta-shanghai.com)

## 2. General Description of Equipment under Test

### Client Information

Applicant	Huawei Technologies Co., Ltd.
Applicant address	Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.China.
Manufacturer	Huawei Technologies Co., Ltd.
Manufacturer address	Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.China.

### General information

EUT Description	
Model	POT-LX3
IMEI	IMEI1: 868219040015296 IMEI2: 868219040018191
Hardware Version	HL3POTM
Software Version	5.0.1.50M(SP3C900E61R1P9log)
Power Supply	Battery/AC adapter
Antenna Type	Internal Antenna
Antenna Connector	A permanently attached antenna (meet with the standard FCC Part 15.203 requirement)
Antenna Gain	/
Test Mode	Bluetooth V4.2 LE 802.11b 802.11g, 802.11n(HT20/HT40);
Modulation Type	BLE :GFSK 802.11b: DSSS; 802.11g/n(HT20/HT40): OFDM
Operating Frequency Range(s)	802.11b/g/n(HT20): 2412 ~ 2462 MHz 802.11n(HT40): 2422 ~ 2452 MHz BLE: 2402 ~2480 MHz
EUT Accessory	
Adapter 1	Manufacturer: Huawei Technologies Co., Ltd. (SALCOMP(GUIGANG)CO., LTD. Model: HW-050200U02
Adapter 2	Manufacturer: Huawei Technologies Co., Ltd. (HUIZHOU BYD ELECTRONIC CO., LTD.) Model: HW-050200U02
Adapter 3	Manufacturer: Huawei Technologies Co., Ltd.



	(SHENZHEN HUNTKEY ELECTRIC CO., LTD.) Model: HW-050200U02
Adapter 4	Manufacturer: Huawei Technologies Co., Ltd. (Dongguan Phitek Electronics Co., Ltd.) Model: HW-050200U02
Adapter 5	Manufacturer: Huawei Technologies Co., Ltd. (HUIZHOU BYD ELECTRONIC CO., LTD.) Model: HW-050200U01
Adapter 6	Manufacturer: Huawei Technologies Co., Ltd. (SHENZHEN HUNTKEY ELECTRIC CO., LTD.) Model: HW-050200U01
Adapter 7	Manufacturer: Huawei Technologies Co., Ltd. (Dongguan Phitek Electronics Co., Ltd.) Model: HW-050200U01
Battery 1	Manufacturer: Huawei Technologies Co., Ltd. (SCUD (FUJIAN) Electronics Co., Ltd.) Model: HB396286ECW
Battery 2	Manufacturer: Huawei Technologies Co., Ltd. (Huizhou Desay Battery Co., Ltd.) Model: HB396286ECW
Battery 3	Manufacturer: Huawei Technologies Co., Ltd. (Sunwoda Electronic Co., Ltd.) Model: HB396286ECW
Battery 4	Manufacturer: Huawei Technologies Co., Ltd. (Dongguan NVT Technology Co., Ltd) Model: HB396286ECW
Earphone 1	Manufacturer: Jiangxi Lianchuang Hongsheng Electronic Co., LTD Model: MEND1532B528A02
Earphone 2	Manufacturer: Boluo County Quancheng Electronic Co., ltd Model: 1293-3283-3.5mm-322
USB Cable 1	Manufacturer: NingBo Broad Telecommunication Co., Ltd. Model: WA0001
USB Cable 2	Manufacturer: HONGLIN TECHNOLOGY CO., LTD. Model: 130-26669
USB Cable 3	Manufacturer: FOXCONN INTERCONNECT TECHNOLOGY LIMITED Model: CUBB01M-HC304-DH
USB Cable 4	Manufacturer: LuXshare Model: L99U2017-CS-H
Note: The information of the EUT is declared by the manufacturer.	



Item	Configure 1	Configure 2	Configure 3	Configure 4
Software	The same	The same	The same	The same
Hardware	The same	The same	The same	The same
Memory	32G	32G	64G	64G
SIM card slot	2* SIM card	1* SIM card	2* SIM card	1* SIM card
Other	The same	The same	The same	The same

Note: Customer declaration, four configures is the same, except for memory and SIM card slot. There are more than one Configure, each one should be applied throughout the compliance test respectively, however, only the worst case (Configure 1) will be recorded in this report.



### 3. Applied Standards

According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

#### Test standards

- **FCC CFR47 Part 15C (2018) Radio Frequency Devices**
- **ANSI C63.10 (2013)**
- **KDB 558074 D01 DTS Meas Guidance v05**

## 4. Test Configuration

### Test Mode

The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application.

The radiated emission was measured in the following position: EUT stand-up position (Z axis), lie-down position (X, Y axis). The worst emission was found in lie-down position (X axis) and the worst case was recorded.

In order to find the worst case condition, Pre-tests are needed at the presence of different data rate. Preliminary tests have been done on all the configuration for confirming worst case. Data rate below means worst-case rate of each test item.

Worst-case data rates are shown as following table.

Band	Data Rate
Bluetooth(Low Energy)	1Mbps
802.11b	1 Mbps
802.11g	6 Mbps
802.11n HT20	MCS0
802.11n HT40	MCS0

## 5. Test Case Results

### 5.1. Unwanted Emission

#### Ambient condition

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	102.5kPa

#### Method of Measurement

The test set-up was made in accordance to the general provisions of ANSI C63.10-2013.

The Equipment Under Test (EUT) was set up on a non-conductive table in the semi-anechoic chamber. The test was performed at the distance of 3 m between the EUT and the receiving antenna.

The turntable shall be rotated from 0 to 360 degrees for detecting the maximum of radiated spurious signal level. The measurements shall be repeated with orthogonal polarization of the test antenna. The data of cable loss and antenna factor has been calibrated in full testing frequency range before the testing. Sweep the Restricted Band and the emissions less than 20 dB below the permissible value are reported.

The radiated emissions measurements were made in a typical installation configuration.

Sweep the whole frequency band through the range from 9 kHz to the 10th harmonic of the carrier, and the emissions less than 20 dB below the permissible value are reported.

This method refer to ANSI C63.10-2013.

The procedure for peak unwanted emissions measurements above 1000 MHz is as follows:

I) Peak emission levels are measured by setting the instrument as follows:

- 1) RBW = 1 MHz.
- 2) VBW  $\geq$  [3 × RBW]
- 3) Detector = peak.
- 4) Sweep time = auto.
- 5) Trace mode = max hold.
- 6) Allow sweeps to continue until the trace stabilizes. Note that if the transmission is not continuous, then the time required for the trace to stabilize will increase by a factor of approximately 1 / D, where D is the duty cycle.

II) Average emission levels are measured by setting the instrument as follows:

- a) RBW = 1 MHz.
- b) VBW  $\geq$  [3 × RBW].
- c) Detector = RMS (power averaging), if [span / (# of points in sweep)]  $\leq$  RBW / 2. Satisfying this condition can require increasing the number of points in the sweep or reducing the span. If the



condition is not satisfied, then the detector mode shall be set to peak.

d) Averaging type = power (i.e., rms) (As an alternative, the detector and averaging type may be set for linear voltage averaging. Some instruments require linear display mode to use linear voltage averaging. Log or dB averaging shall not be used.)

e) Sweep time = auto.

f) Perform a trace average of at least 100 traces if the transmission is continuous. If the transmission is not continuous, then the number of traces shall be increased by a factor of  $1 / D$ , where  $D$  is the duty cycle. For example, with 50% duty cycle, at least 200 traces shall be averaged. (If a specific emission is demonstrated to be continuous—i.e., 100% duty cycle—then rather than turning ON and OFF with the transmit cycle, at least 100 traces shall be averaged.)

g) If tests are performed with the EUT transmitting at a duty cycle less than 98%, then a correction factor shall be added to the measurement results prior to comparing with the emission limit, to compute the emission level that would have been measured had the test been performed at 100% duty cycle. The correction factor is computed as follows:

1) If power averaging (rms) mode was used in the preceding step e), then the correction factor is  $[10 \log (1 / D)]$ , where  $D$  is the duty cycle. For example, if the transmit duty cycle was 50%, then 3 dB shall be added to the measured emission levels.

2) If linear voltage averaging mode was used in the preceding step e), then the correction factor is  $[20 \log (1 / D)]$ , where  $D$  is the duty cycle. For example, if the transmit duty cycle was 50%, then 6 dB shall be added to the measured emission levels.

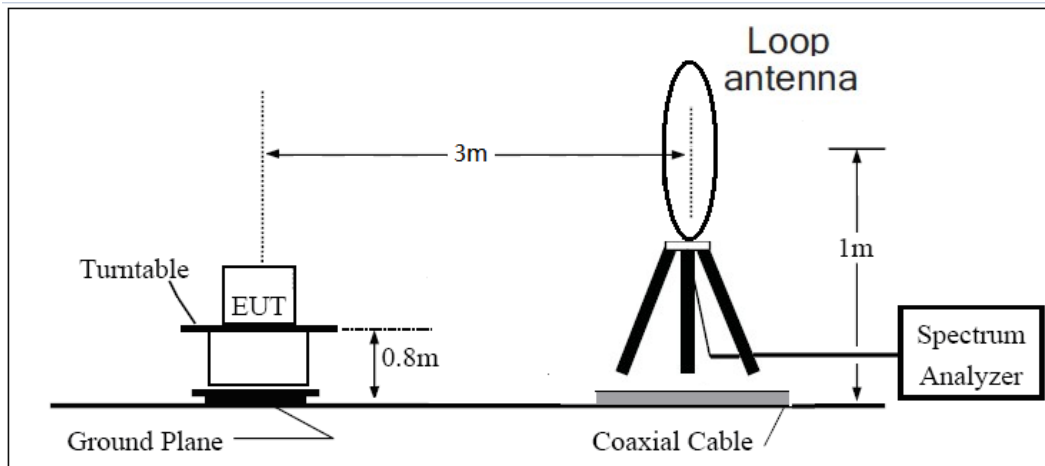
3) If a specific emission is demonstrated to be continuous (100% duty cycle) rather than turning ON and OFF with the transmit cycle, then no duty cycle correction is required for that emission.

The field strength of spurious emission was measured in the following position: EUT stand-up position (Z axis), lie-down position (X, Y axis). The worst emission was found in lie-down position (X axis) and the loop antenna is vertical, the others are vertical and horizontal.

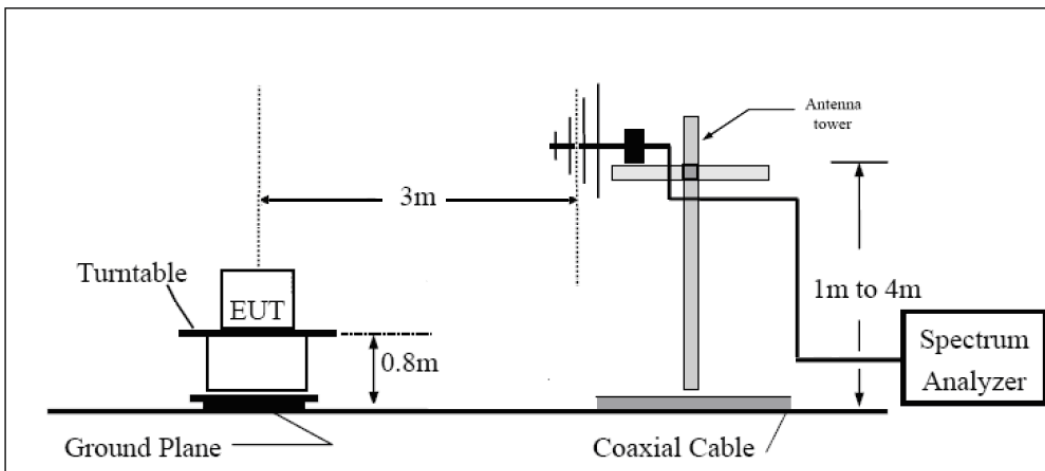
The test is in transmitting mode.

**Test setup**

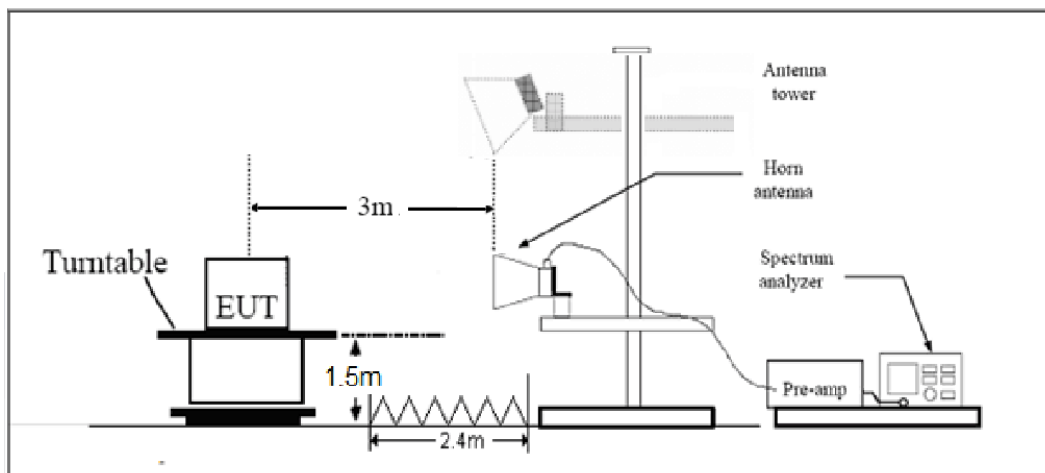
**9KHz ~ 30MHz**



**30MHz ~ 1GHz**



**Above 1GHz**



Note: Area side:2.4mX3.6m

**Limits**

Rule Part 15.247(d) specifies that “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)).”

Limit in restricted band

Frequency of emission (MHz)	Field strength(uV/m)	Field strength(dBuV/m)
0.009–0.490	2400/F(kHz)	/
0.490–1.705	24000/F(kHz)	/
1.705–30.0	30	/
30-88	100	40
88-216	150	43.5
216-960	200	46
Above960	500	54

§15.35(b)

There is also a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit.

Peak Limit=74 dBuV/m

Average Limit=54 dBuV/m

Spurious Radiated Emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
<sup>1</sup> 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	( <sup>2</sup> )
13.36 - 13.41			

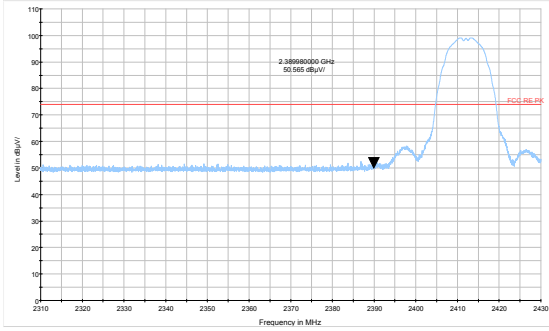
**Measurement Uncertainty**

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor  $k = 1.96$ .

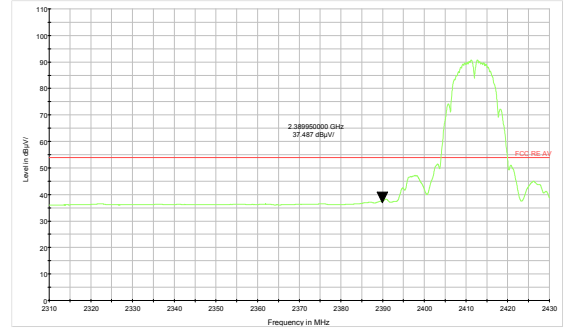
Frequency	Uncertainty
9KHz-30MHz	3.55 dB
30MHz-200MHz	4.016 dB
200MHz-1GHz	3.28 dB
1-18GHz	3.70 dB
18-26.5GHz	5.78 dB



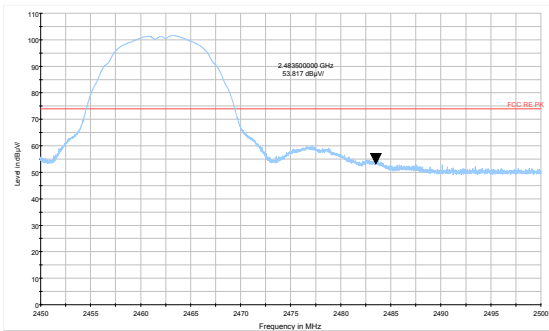
**Test Results:**  
**Configure 1**



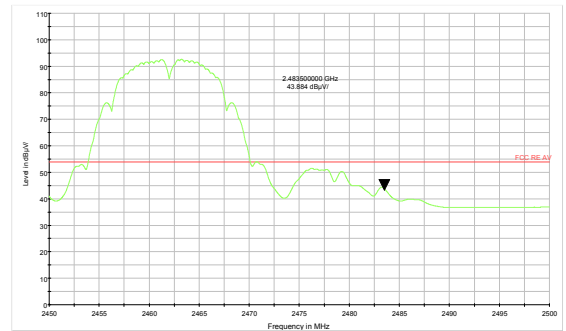
802.11b-Channel 1 Peak



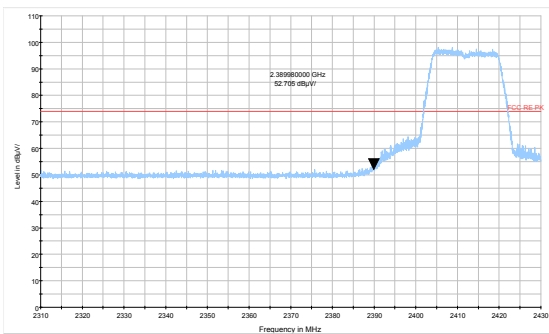
802.11b-Channel 1 Average



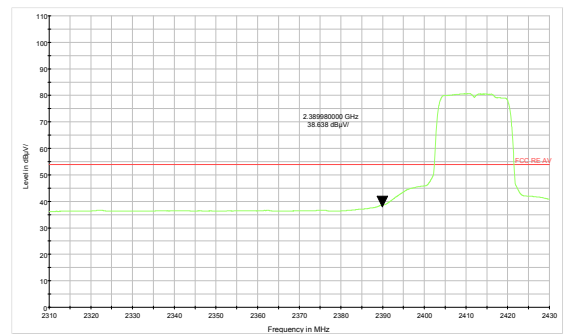
802.11b-Channel 11 Peak



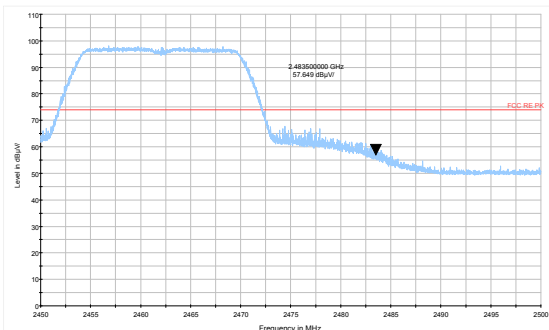
802.11b-Channel 11 Average



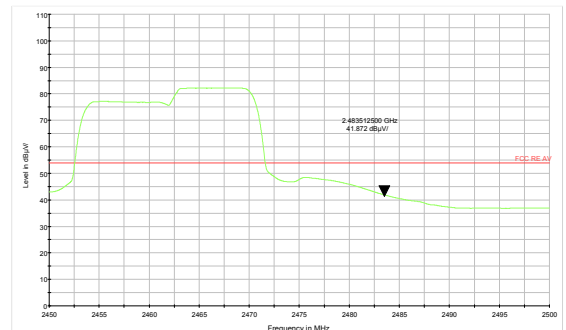
802.11g-Channel 1 Peak



802.11g-Channel 1 Average

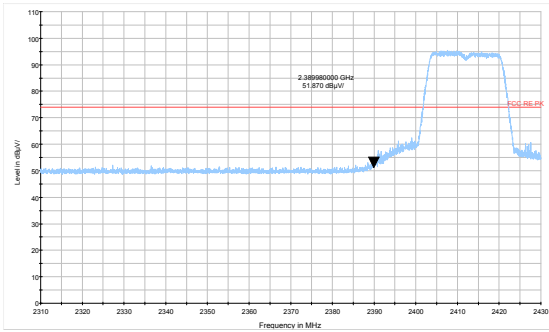


802.11g-Channel 11 Peak

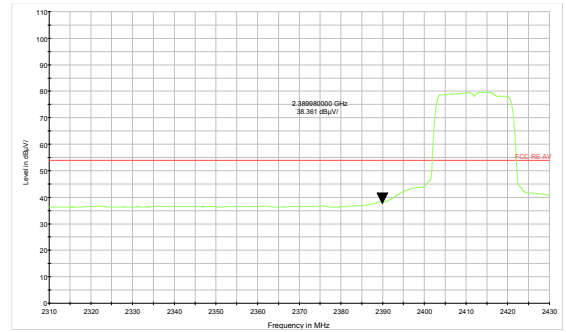


802.11g-Channel 11 Average

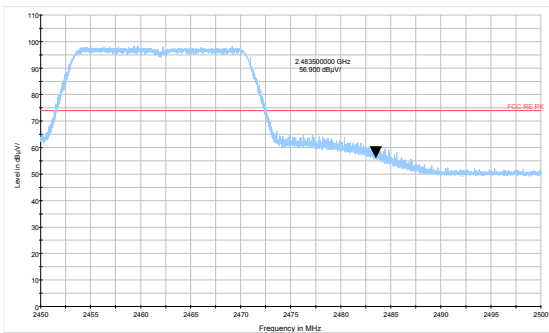




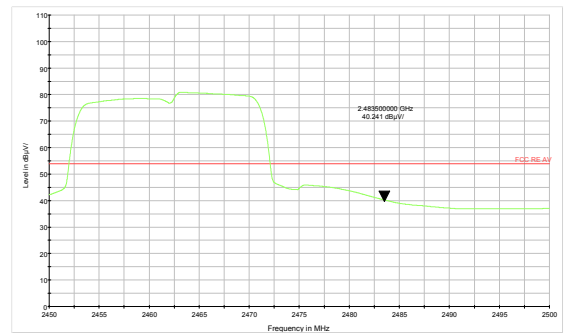
802.11n HT20 -Channel 1 Peak



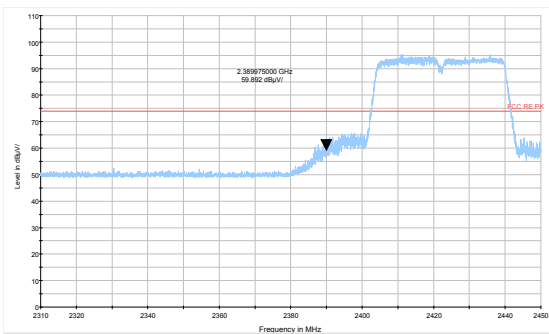
802.11n HT20 -Channel 1 Average



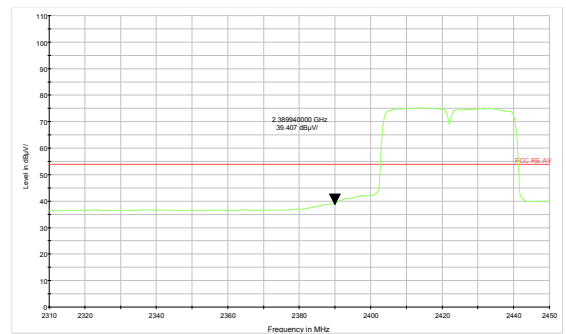
802.11n HT20 -Channel 11 Peak



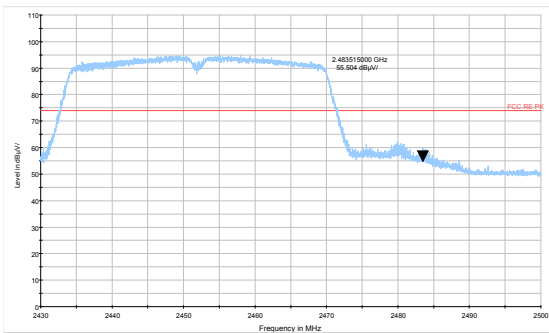
802.11n HT20 -Channel 11 Average



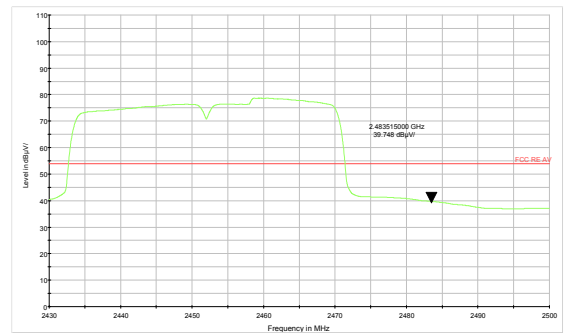
802.11n HT40 -Channel 3 Peak



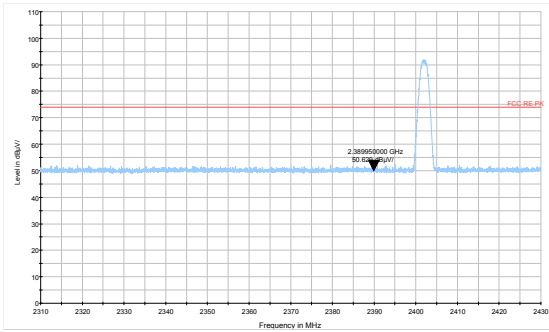
802.11n HT40 -Channel 3 Average



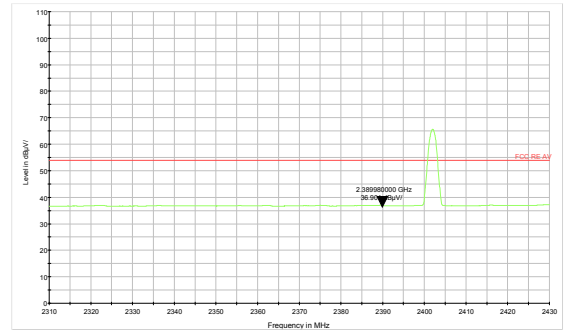
802.11n HT40 -Channel 9 Peak



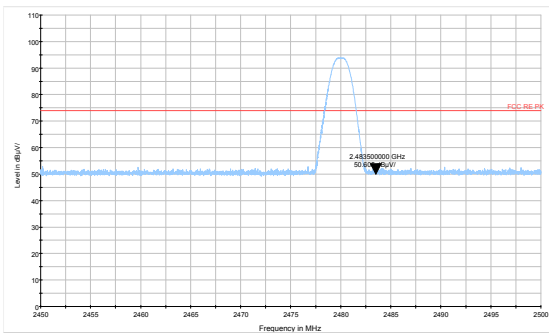
802.11n HT40 -Channel 9 Average



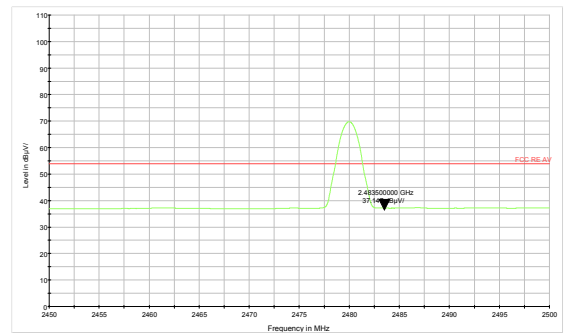
BLE Channel 0 Peak



BLE Channel 0 Average



BLE Channel 39 Peak



BLE Channel 39 Average

**Result of RE**

**Test result**

**Configure 1**

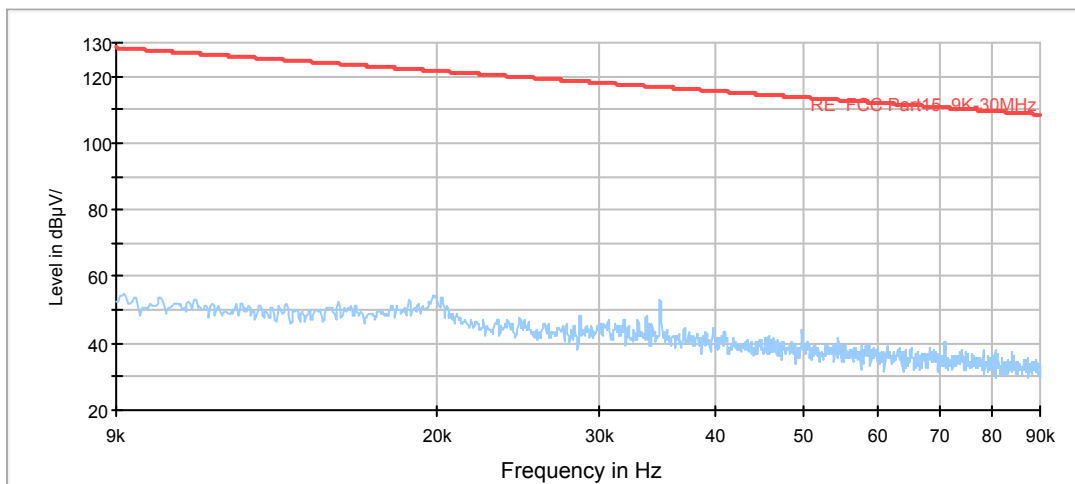
Sweep the whole frequency band through the range from 9kHz to the 10th harmonic of the carrier, the Emissions in the frequency band 9kHz-30MHz and 18GHz-26.5GHz are more than 20dB below the limit are not reported.

The following graphs display the maximum values of horizontal and vertical by software. For above 1GHz, Blue trace uses the peak detection, Green trace uses the average detection.

During the test, the Radiates Emission from 9kHz to 1GHz was performed in all modes with all channels, 802.11b, Channel 11 are selected as the worst condition. The test data of the worst-case condition was recorded in this report.

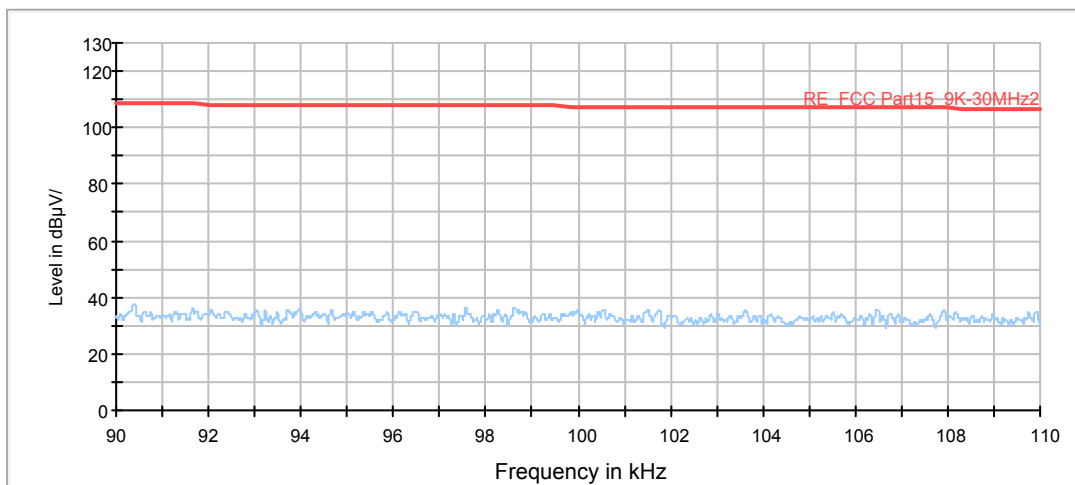
**Continuous TX mode:**

FCC RE 9K-90KHz AV



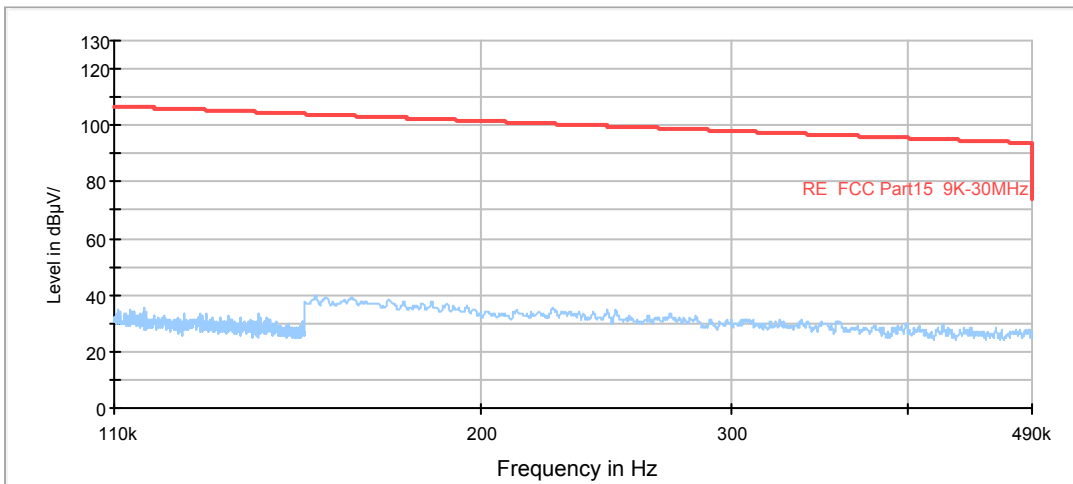
Radiates Emission from 9KHz to 90KHz

FCC RE 90K-110KHz QP



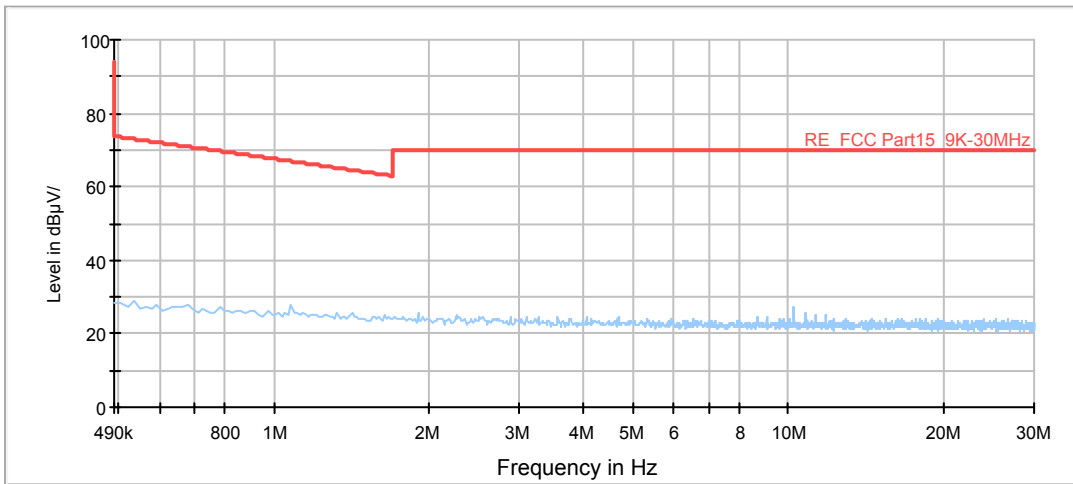
Radiates Emission from 90KHz to 110KHz

FCC RE 110K-490KHz AV



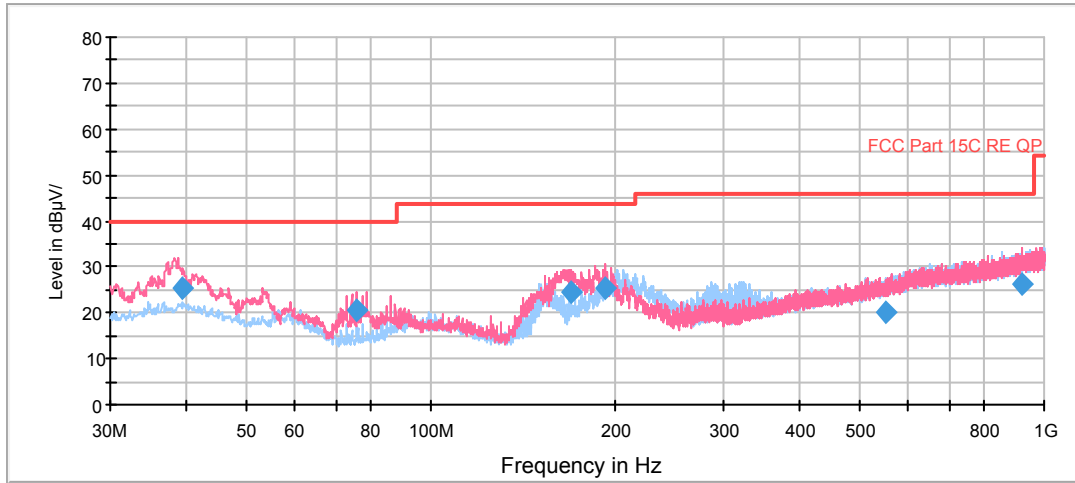
Radiates Emission from 110KHz to 490KHz

FCC RE 490K-30MHz QP



Radiates Emission from 490KHz to 30MHz

RE 0.03-1GHz QP Class B



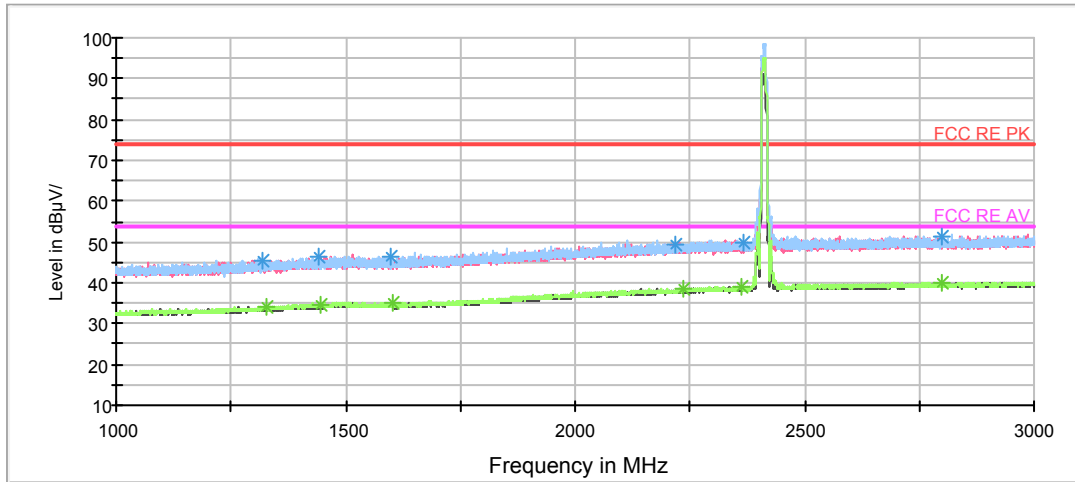
Radiates Emission from 30MHz to 1GHz

Frequency (MHz)	Quasi-Peak (dBuV/m)	Reading value (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
39.330000	25.5	8.6	100.0	V	331.0	16.9	14.5	40.0
75.912500	20.6	10.3	200.0	V	0.0	10.3	19.4	40.0
169.795000	24.5	13.9	100.0	V	256.0	10.6	19.0	43.5
191.995000	25.4	13.8	100.0	V	208.0	11.6	18.1	43.5
553.312500	19.9	-2.1	200.0	H	302.0	22.0	26.1	46.0
919.251250	26.2	-0.6	100.0	V	128.0	26.8	19.8	46.0

- Remark: 1. Quasi-Peak = Reading value + Correction factor  
 2. Correction Factor = Antenna factor+ Insertion loss(cable loss+amplifier gain)  
 3. Margin = Limit – Quasi-Peak

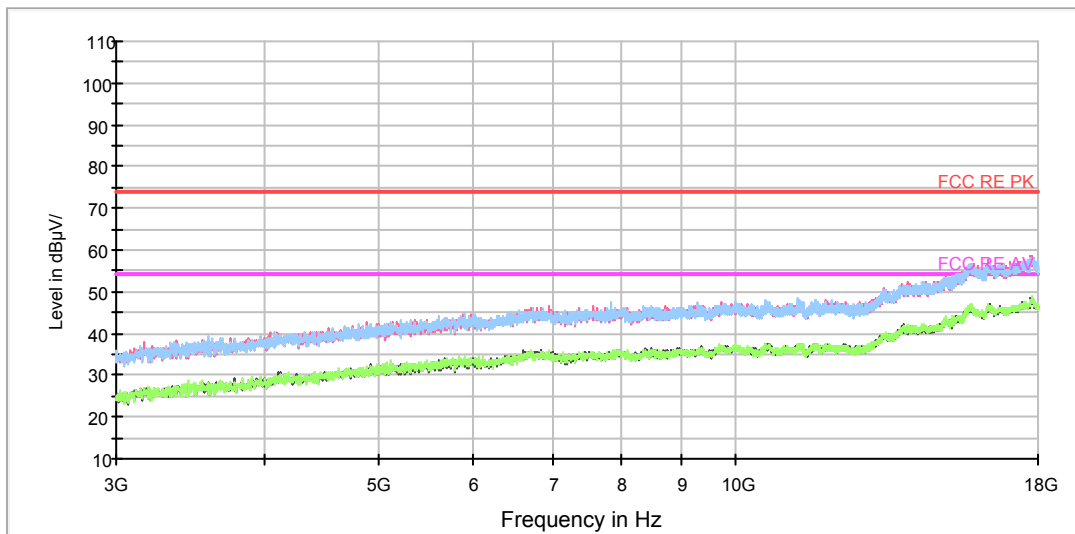
802.11b CH1

RE 1G-3GHz PK+AV Class B



Note: The signal beyond the limit is carrier.  
Radiates Emission from 1GHz to 3GHz

RE 3-18GHz PK+AV



Radiates Emission from 3GHz to 18GHz



Frequency (MHz)	Peak (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Reading value (dBuV/m)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
1318.750000	45.3	200.0	V	299.0	46.0	-0.7	28.7	74
1439.500000	46.5	100.0	H	120.0	46.3	0.2	27.5	74
1599.000000	46.2	100.0	V	58.0	45.6	0.6	27.8	74
2219.250000	49.5	100.0	V	0.0	45.0	4.5	24.5	74
2368.750000	49.8	100.0	H	355.0	44.6	5.2	24.2	74
2799.250000	51.2	100.0	V	0.0	44.9	6.3	22.8	74

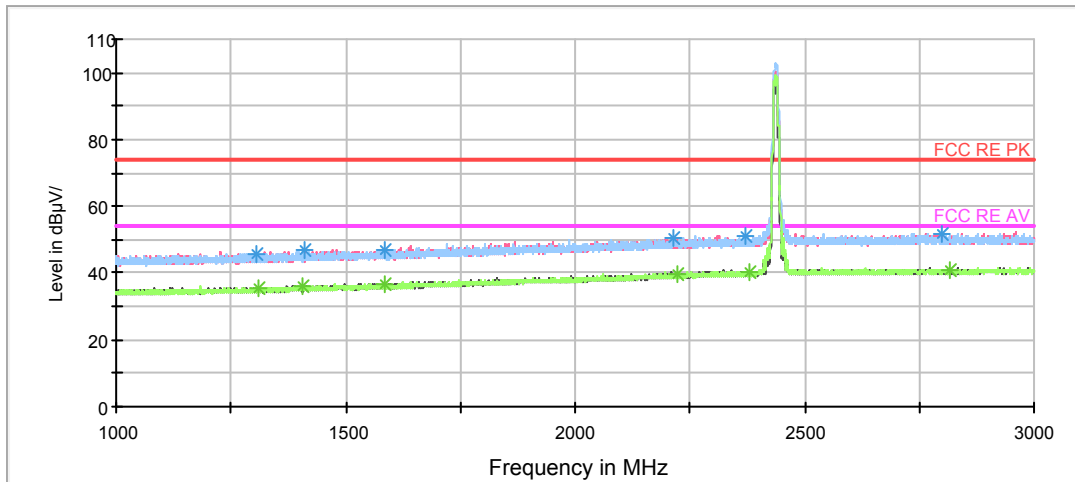
Remark: 1. Correction Factor = Antenna factor+ Insertion loss (cable loss + amplifier gain)

Frequency (MHz)	Average (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Reading value (dBuV/m)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
1326.250000	34.1	200.0	V	188.0	34.7	-0.6	19.9	54
1443.250000	34.7	200.0	V	0.0	34.5	0.2	19.3	54
1602.500000	35.2	200.0	H	344.0	34.5	0.7	18.8	54
2235.000000	38.4	200.0	H	318.0	33.8	4.6	15.6	54
2362.500000	38.9	100.0	H	77.0	33.7	5.2	15.1	54
2800.750000	40.1	100.0	H	3.0	33.8	6.3	13.9	54

Remark: 1. Correction Factor = Antenna factor+ Insertion loss (cable loss + amplifier gain)

802.11b CH6

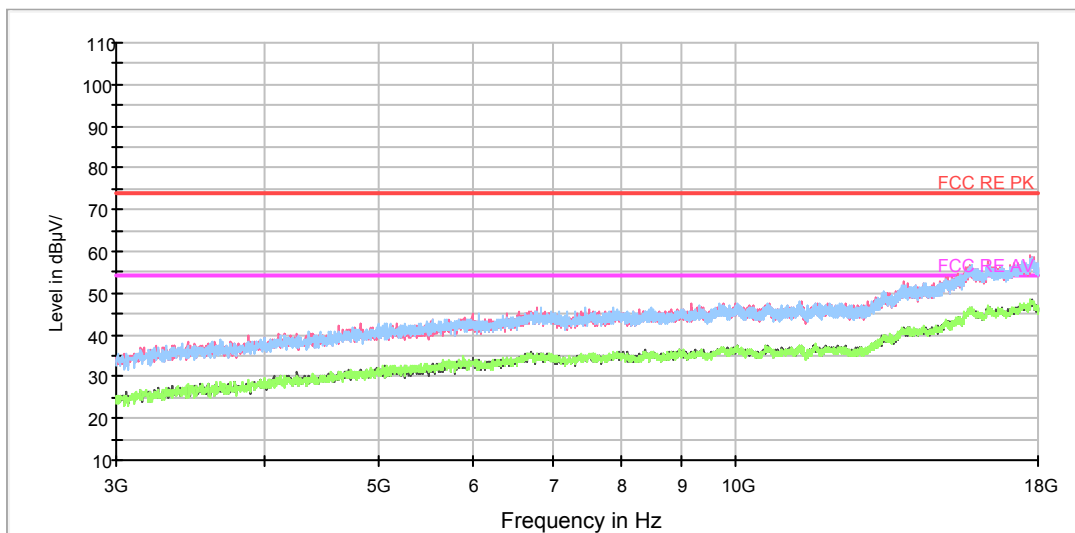
FCC RE 1G-18GHz PK+AV Class B



Note: The signal beyond the limit is carrier.

Radiates Emission from 1GHz to 3GHz

RE 3-18GHz PK+AV



Radiates Emission from 3GHz to 18GHz





Frequency (MHz)	Peak (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Reading value (dBuV/m)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
1305.500000	45.6	100.0	V	331.0	46.1	-0.5	28.4	74
1409.500000	46.6	100.0	V	282.0	46.6	0.0	27.4	74
1585.000000	46.9	200.0	V	10.0	45.9	1.0	27.1	74
2212.750000	50.2	200.0	H	239.0	45.8	4.4	23.8	74
2370.750000	51.1	200.0	H	178.0	45.8	5.3	22.9	74
2799.500000	51.5	200.0	V	182.0	45.3	6.2	22.5	74

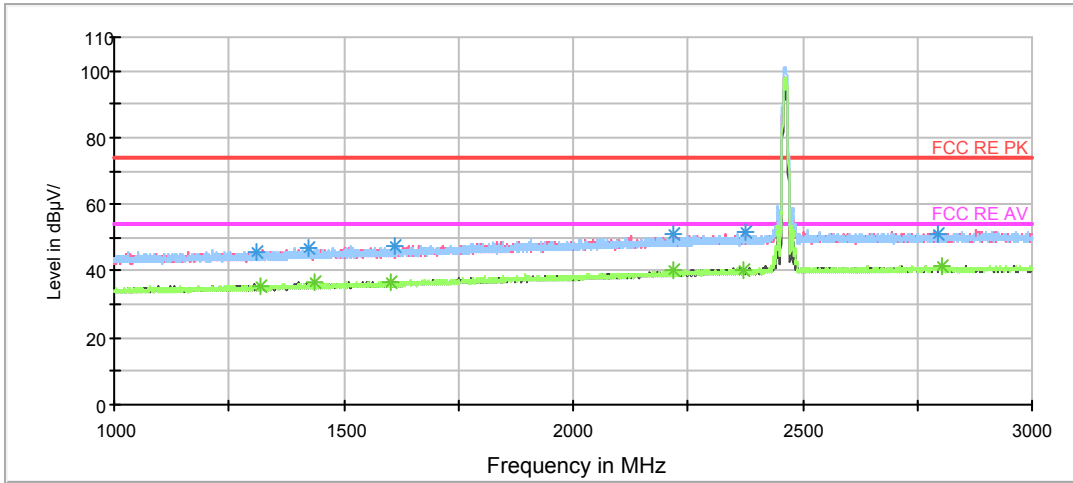
Remark: 1. Correction Factor = Antenna factor+ Insertion loss (cable loss + amplifier gain)

Frequency (MHz)	Average (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Reading value (dBuV/m)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
1308.250000	35.5	100.0	V	0.0	36.0	-0.5	18.5	54
1405.250000	35.9	100.0	V	0.0	35.9	0.0	18.1	54
1584.250000	36.8	100.0	H	254.0	35.8	1.0	17.2	54
2221.250000	39.8	200.0	H	189.0	35.3	4.5	14.2	54
2381.250000	40.4	100.0	V	354.0	35.1	5.3	13.6	54
2815.000000	40.9	200.0	H	279.0	34.6	6.3	13.1	54

Remark: 1. Correction Factor = Antenna factor+ Insertion loss (cable loss + amplifier gain)

802.11b CH11

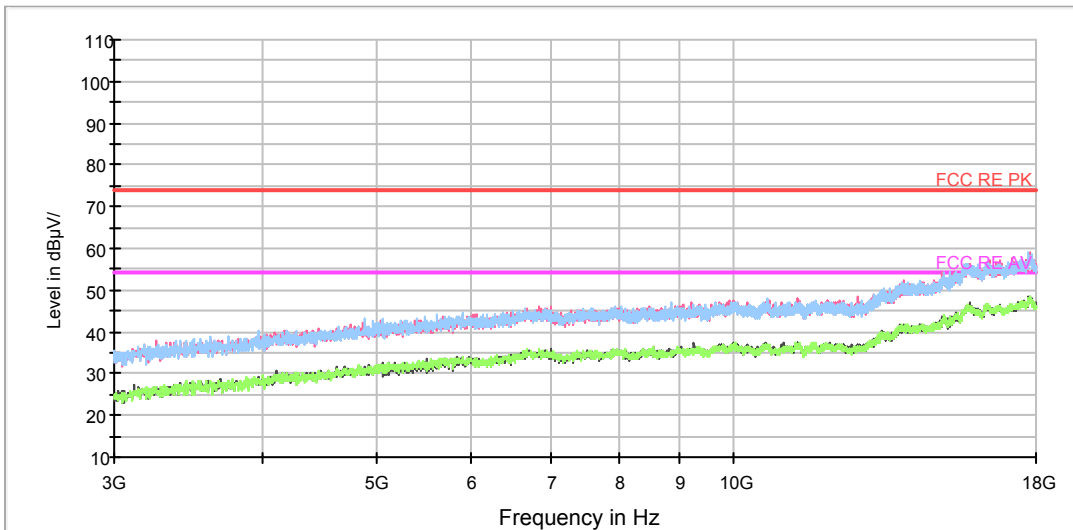
FCC RE 1G-18GHz PK+AV Class B



Note: The signal beyond the limit is carrier.

Radiates Emission from 1GHz to 3GHz

RE 3-18GHz PK+AV



Radiates Emission from 3GHz to 18GHz



Frequency (MHz)	Peak (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Reading value (dBuV/m)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
1309.750000	45.7	200.0	H	210.0	46.2	-0.5	28.3	74
1423.750000	46.6	200.0	H	358.0	46.5	0.1	27.4	74
1612.500000	47.3	100.0	H	1.0	46.1	1.2	26.7	74
2220.250000	51.3	200.0	V	171.0	46.8	4.5	22.7	74
2376.500000	51.7	200.0	H	157.0	46.4	5.3	22.3	74
2796.000000	51.0	200.0	H	272.0	44.8	6.2	23.0	74

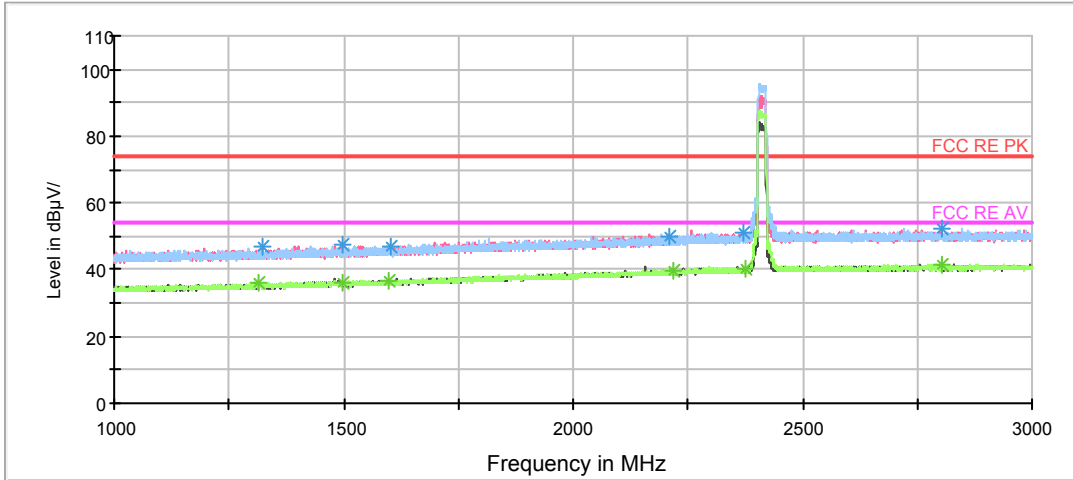
Remark: 1. Correction Factor = Antenna factor+ Insertion loss (cable loss + amplifier gain)

Frequency (MHz)	Average (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Reading value (dBuV/m)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
1318.500000	35.5	200.0	H	241.0	35.9	-0.4	18.5	54
1436.250000	36.7	100.0	H	212.0	36.5	0.2	17.3	54
1604.250000	36.7	200.0	V	2.0	35.6	1.1	17.3	54
2219.250000	40.2	200.0	H	353.0	35.7	4.5	13.8	54
2371.750000	40.5	200.0	H	357.0	35.2	5.3	13.5	54
2803.000000	41.3	200.0	V	161.0	35.1	6.2	12.7	54

Remark: 1. Correction Factor = Antenna factor+ Insertion loss (cable loss + amplifier gain)

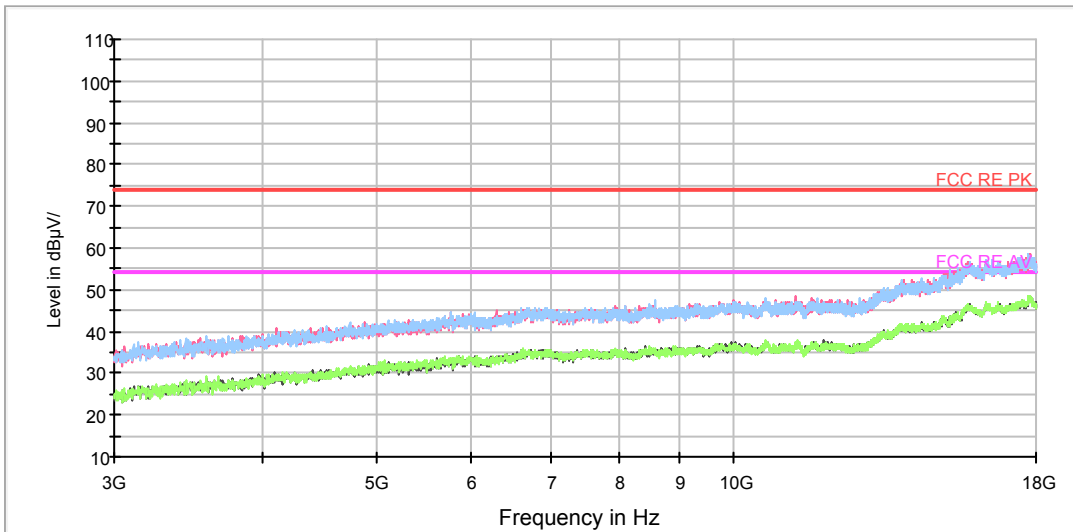
802.11g CH1

FCC RE 1G-18GHz PK+AV Class B



Note: The signal beyond the limit is carrier.  
Radiates Emission from 1GHz to 3GHz

RE 3-18GHz PK+AV



Radiates Emission from 3GHz to 18GHz



Frequency (MHz)	Peak (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Reading value (dBuV/m)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
1321.250000	46.8	100.0	V	79.0	47.2	-0.4	27.2	74
1497.750000	47.4	200.0	V	12.0	46.9	0.5	26.6	74
1602.500000	46.7	200.0	V	5.0	45.6	1.1	27.3	74
2211.250000	49.8	200.0	V	250.0	45.4	4.4	24.2	74
2371.250000	51.1	200.0	H	212.0	45.8	5.3	22.9	74
2802.000000	52.3	200.0	V	228.0	46.1	6.2	21.7	74

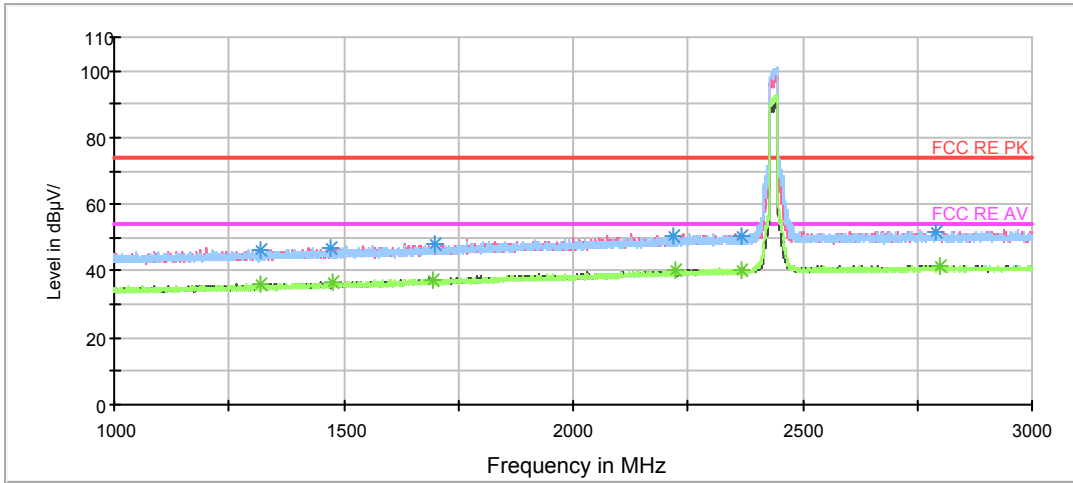
Remark: 1. Correction Factor = Antenna factor+ Insertion loss (cable loss + amplifier gain)

Frequency (MHz)	Average (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Reading value (dBuV/m)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
1313.750000	36.1	100.0	V	184.0	36.5	-0.4	17.9	54
1498.000000	36.3	200.0	H	302.0	35.8	0.5	17.7	54
1596.500000	36.7	200.0	H	357.0	35.6	1.1	17.3	54
2220.000000	39.9	200.0	H	322.0	35.4	4.5	14.1	54
2373.750000	40.4	100.0	H	0.0	35.1	5.3	13.6	54
2801.500000	41.5	100.0	V	286.0	35.3	6.2	12.5	54

Remark: 1. Correction Factor = Antenna factor+ Insertion loss (cable loss + amplifier gain)

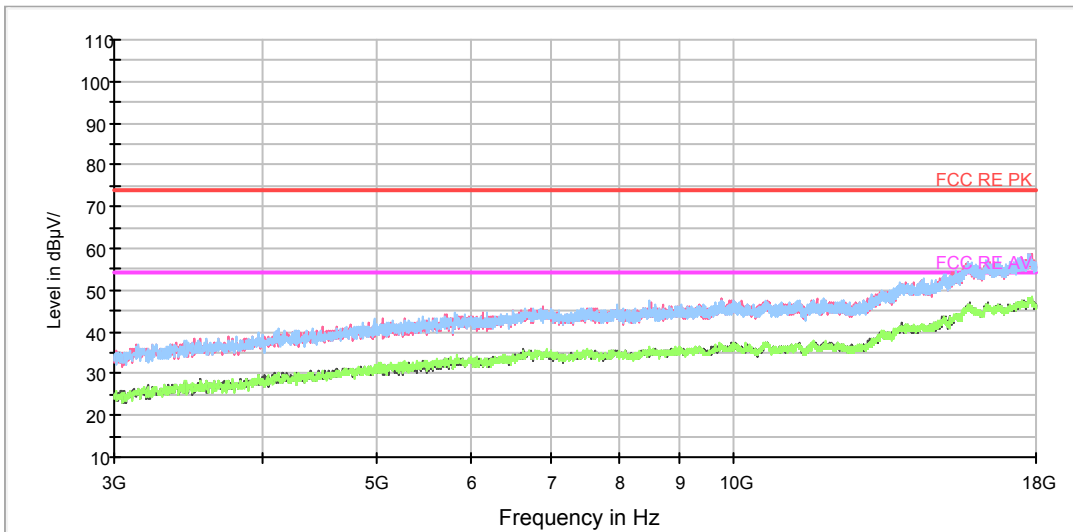
802.11g CH6

FCC RE 1G-18GHz PK+AV Class B



Note: The signal beyond the limit is carrier.  
Radiates Emission from 1GHz to 3GHz

RE 3-18GHz PK+AV



Radiates Emission from 3GHz to 18GHz



Frequency (MHz)	Peak (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Reading value (dBuV/m)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
1320.000000	46.1	200.0	H	0.0	46.5	-0.4	27.9	74
1473.250000	46.7	200.0	V	0.0	46.4	0.3	27.3	74
1700.500000	47.9	200.0	H	335.0	46.2	1.7	26.1	74
2217.750000	50.5	200.0	H	159.0	46.0	4.5	23.5	74
2365.750000	50.6	200.0	V	170.0	45.3	5.3	23.4	74
2790.500000	51.6	100.0	V	358.0	45.4	6.2	22.4	74

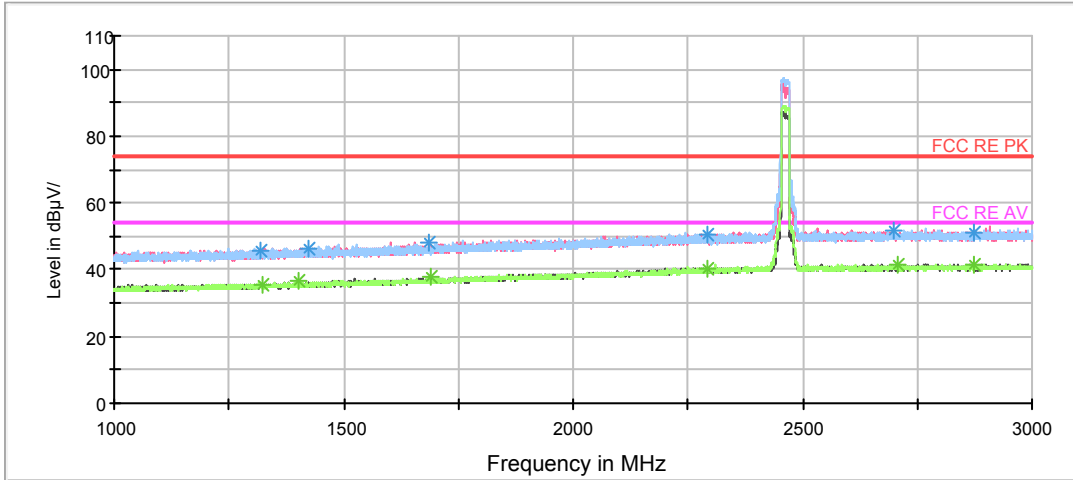
Remark: 1. Correction Factor = Antenna factor+ Insertion loss (cable loss + amplifier gain)

Frequency (MHz)	Average (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Reading value (dBuV/m)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
1319.750000	35.9	100.0	V	104.0	36.3	-0.4	18.1	54
1477.750000	36.7	200.0	H	327.0	36.3	0.4	17.3	54
1696.000000	37.5	100.0	V	104.0	35.8	1.7	16.5	54
2223.750000	40.0	200.0	H	348.0	35.5	4.5	14.0	54
2368.000000	40.4	200.0	V	0.0	35.1	5.3	13.6	54
2801.250000	41.5	200.0	H	356.0	35.3	6.2	12.5	54

Remark: 1. Correction Factor = Antenna factor+ Insertion loss (cable loss + amplifier gain)

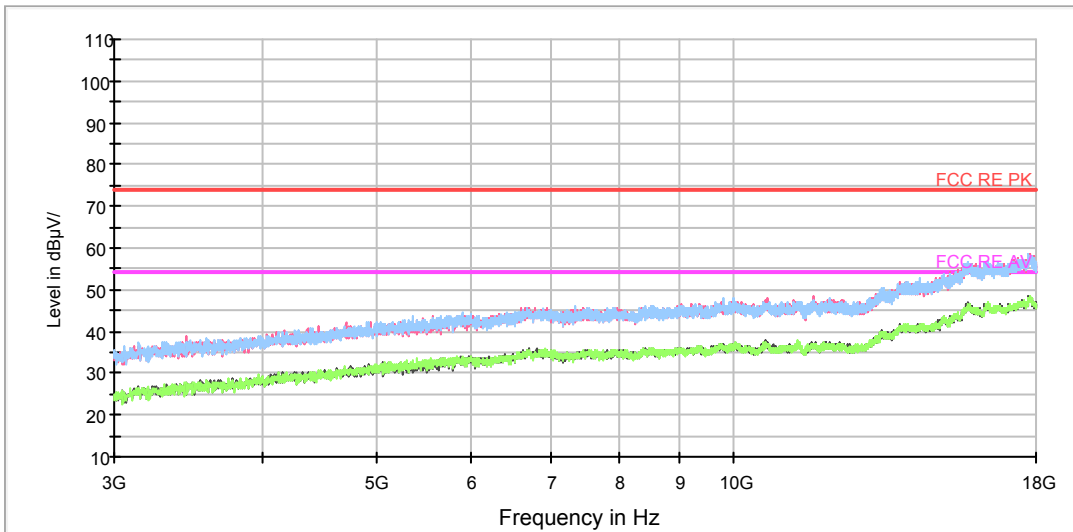
802.11g CH11

FCC RE 1G-18GHz PK+AV Class B



Note: The signal beyond the limit is carrier.  
Radiates Emission from 1GHz to 3GHz

RE 3-18GHz PK+AV



Radiates Emission from 3GHz to 18GHz





Frequency (MHz)	Peak (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Reading value (dBuV/m)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
1319.000000	45.7	200.0	H	358.0	46.1	-0.4	28.3	74
1423.500000	46.5	100.0	H	78.0	46.4	0.1	27.5	74
1684.250000	48.2	100.0	V	358.0	46.6	1.6	25.8	74
2293.750000	50.3	200.0	V	0.0	45.4	4.9	23.7	74
2700.750000	51.4	200.0	H	241.0	45.3	6.1	22.6	74
2873.500000	51.1	100.0	H	232.0	44.8	6.3	22.9	74

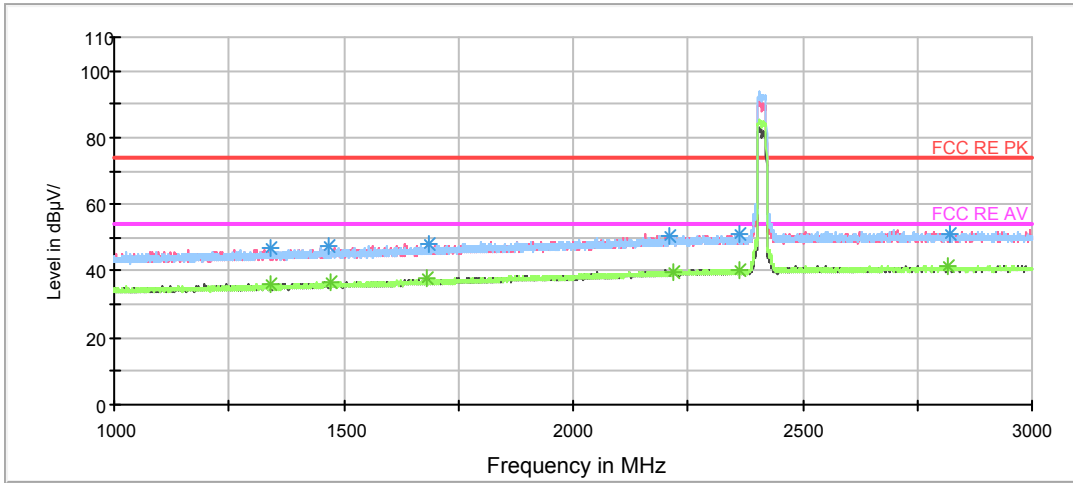
Remark: 1. Correction Factor = Antenna factor+ Insertion loss (cable loss + amplifier gain)

Frequency (MHz)	Average (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Reading value (dBuV/m)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
1323.250000	35.5	200.0	V	121.0	35.9	-0.4	18.5	54
1402.500000	36.4	200.0	V	30.0	36.4	0.0	17.6	54
1691.500000	37.6	200.0	V	22.0	35.9	1.7	16.4	54
2293.250000	40.3	200.0	H	310.0	35.4	4.9	13.7	54
2706.250000	41.4	200.0	H	349.0	35.3	6.1	12.6	54
2873.750000	41.2	100.0	V	358.0	34.9	6.3	12.8	54

Remark: 1. Correction Factor = Antenna factor+ Insertion loss (cable loss + amplifier gain)

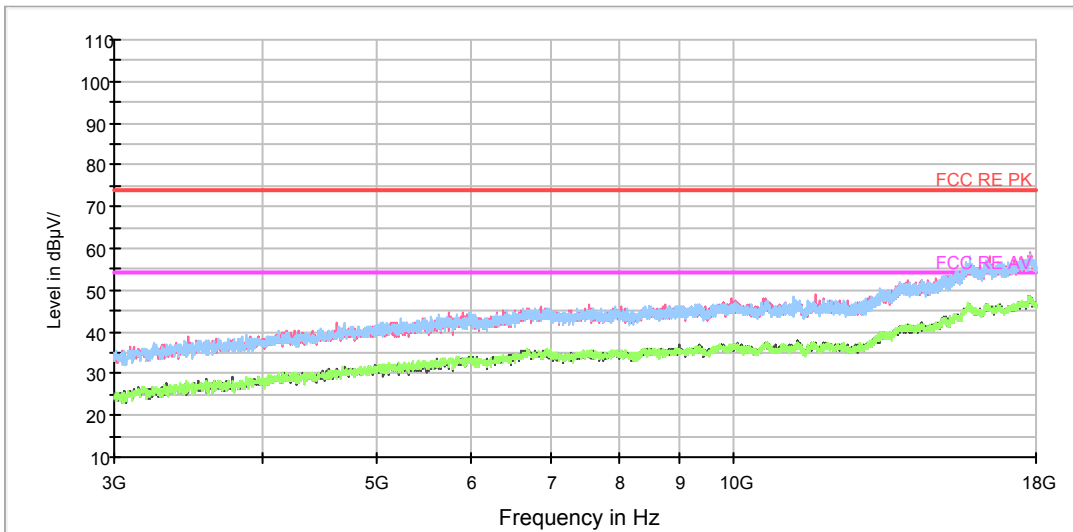
802.11n (HT20) CH1

FCC RE 1G-18GHz PK+AV Class B



Note: The signal beyond the limit is carrier.  
Radiates Emission from 1GHz to 3GHz

RE 3-18GHz PK+AV



Radiates Emission from 3GHz to 18GHz



Frequency (MHz)	Peak (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Reading value (dBuV/m)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
1340.250000	46.7	200.0	H	349.0	47.0	-0.3	27.3	74
1467.500000	47.7	200.0	H	0.0	47.4	0.3	26.3	74
1684.250000	47.9	100.0	V	310.0	46.3	1.6	26.1	74
2209.000000	50.2	100.0	H	0.0	45.8	4.4	23.8	74
2363.750000	50.9	200.0	H	147.0	45.6	5.3	23.1	74
2822.000000	51.3	100.0	H	3.0	45.0	6.3	22.7	74

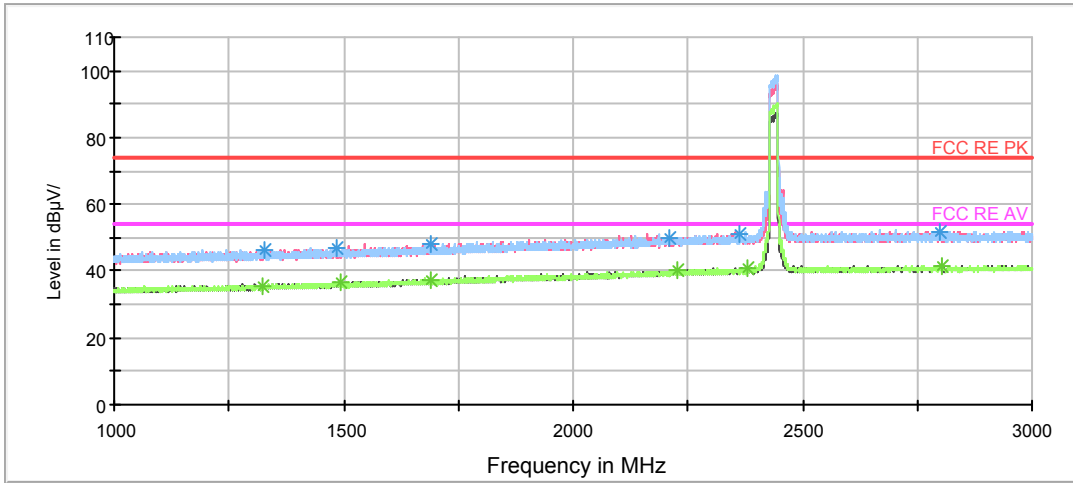
Remark: 1. Correction Factor = Antenna factor+ Insertion loss (cable loss + amplifier gain)

Frequency (MHz)	Average (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Reading value (dBuV/m)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
1341.500000	36.1	200.0	H	359.0	36.4	-0.3	17.9	54
1473.500000	36.6	100.0	H	105.0	36.3	0.3	17.4	54
1682.500000	37.6	200.0	H	358.0	36.0	1.6	16.4	54
2216.500000	39.9	100.0	V	300.0	35.4	4.5	14.1	54
2364.000000	40.5	100.0	H	75.0	35.2	5.3	13.5	54
2817.000000	41.5	200.0	V	98.0	35.2	6.3	12.5	54

Remark: 1. Correction Factor = Antenna factor+ Insertion loss (cable loss + amplifier gain)

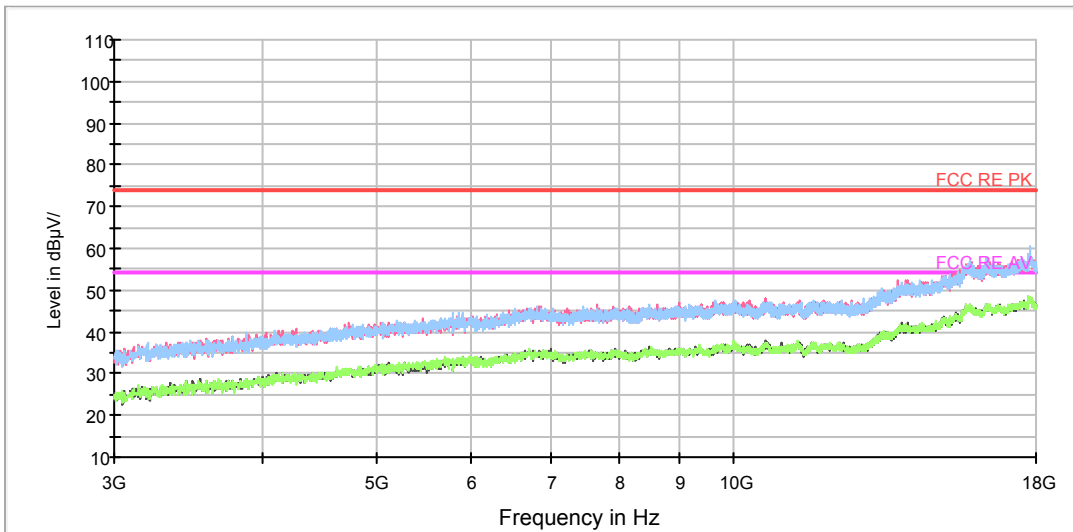
802.11n (HT20) CH6

FCC RE 1G-18GHz PK+AV Class B



Note: The signal beyond the limit is carrier.  
Radiates Emission from 1GHz to 3GHz

RE 3-18GHz PK+AV



Radiates Emission from 3GHz to 18GHz



Frequency (MHz)	Peak (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Reading value (dBuV/m)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
1326.750000	46.0	100.0	H	92.0	46.4	-0.4	28.0	74
1485.500000	46.9	100.0	H	72.0	46.5	0.4	27.1	74
1688.250000	48.0	100.0	V	351.0	46.4	1.6	26.0	74
2209.500000	49.8	200.0	H	95.0	45.4	4.4	24.2	74
2363.250000	51.2	100.0	H	62.0	45.9	5.3	22.8	74
2801.000000	51.8	200.0	V	10.0	45.6	6.2	22.2	74

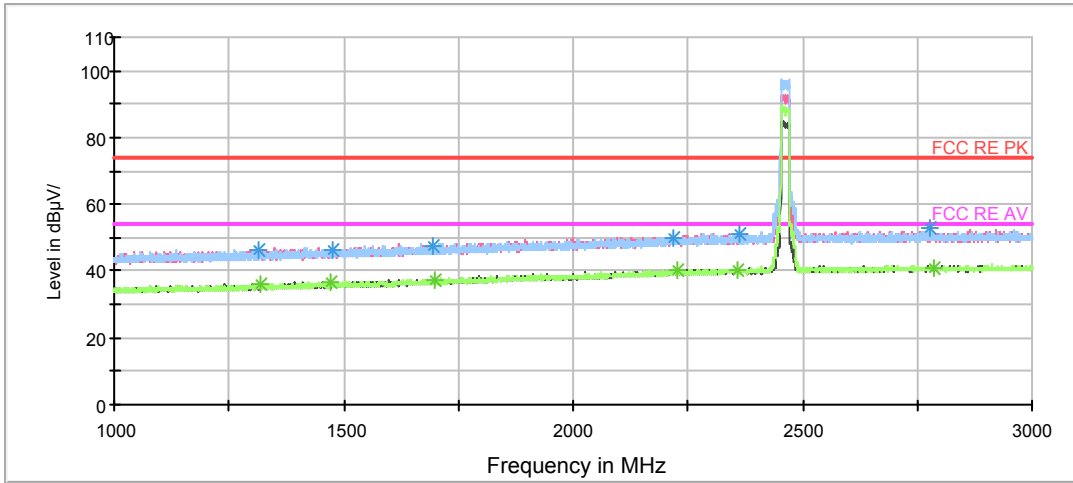
Remark: 1. Correction Factor = Antenna factor+ Insertion loss (cable loss + amplifier gain)

Frequency (MHz)	Average (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Reading value (dBuV/m)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
1324.750000	35.7	100.0	V	334.0	36.1	-0.4	18.3	54
1492.000000	36.4	100.0	V	354.0	36.0	0.4	17.6	54
1688.500000	37.4	100.0	V	0.0	35.8	1.6	16.6	54
2225.500000	40.0	100.0	H	43.0	35.4	4.6	14.0	54
2380.750000	40.8	200.0	H	312.0	35.5	5.3	13.2	54
2804.750000	41.5	100.0	H	0.0	35.3	6.2	12.5	54

Remark: 1. Correction Factor = Antenna factor+ Insertion loss (cable loss + amplifier gain)

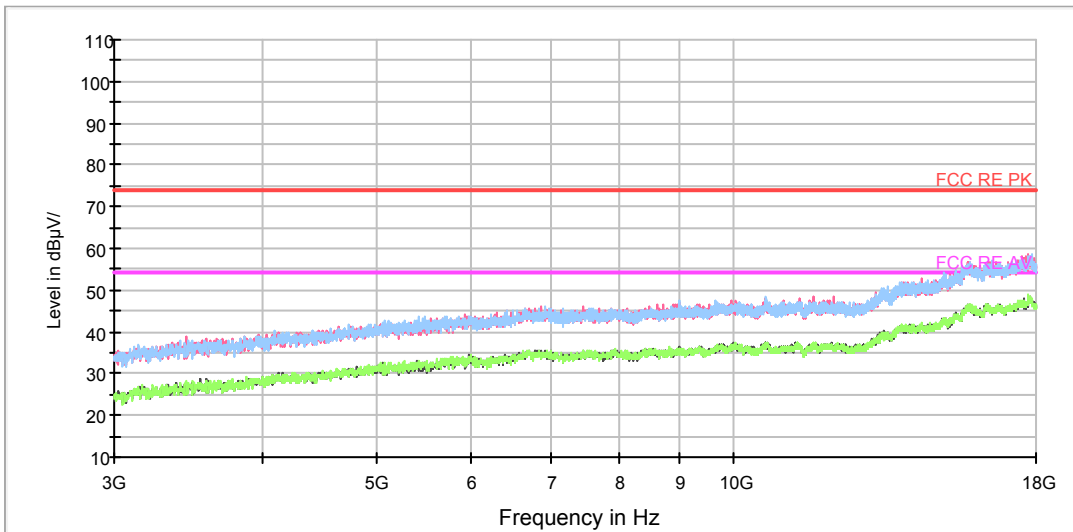
802.11n (HT20) CH11

FCC RE 1G-18GHz PK+AV Class B



Note: The signal beyond the limit is carrier.  
Radiates Emission from 1GHz to 3GHz

RE 3-18GHz PK+AV



Radiates Emission from 3GHz to 18GHz



Frequency (MHz)	Peak (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Reading value (dBuV/m)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
1315.500000	46.2	100.0	V	211.0	46.6	-0.4	27.8	74
1477.000000	46.5	100.0	V	220.0	46.1	0.4	27.5	74
1694.000000	47.8	100.0	H	20.0	46.1	1.7	26.2	74
2220.500000	49.9	200.0	V	3.0	45.4	4.5	24.1	74
2364.250000	50.9	200.0	V	108.0	45.6	5.3	23.1	74
2778.750000	53.0	100.0	H	147.0	46.7	6.3	21.0	74

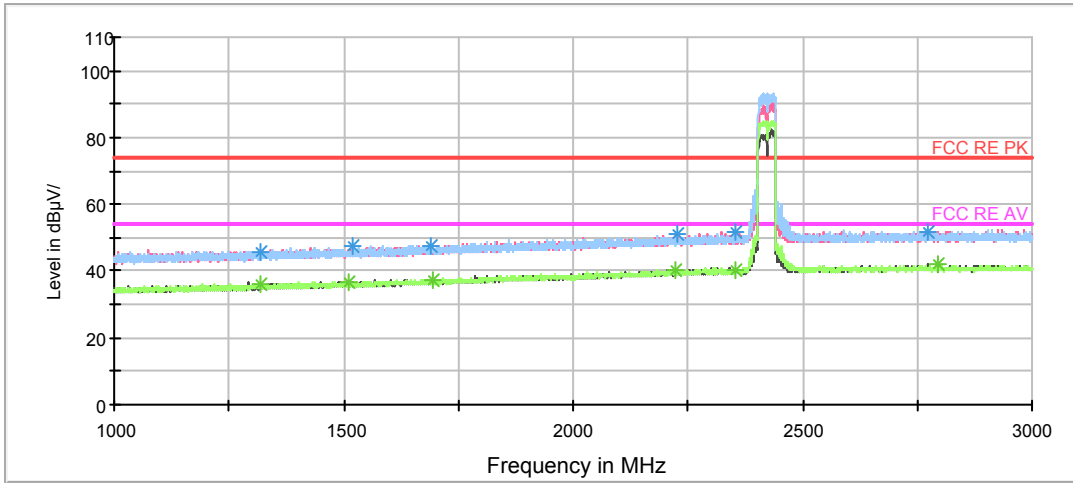
Remark: 1. Correction Factor = Antenna factor+ Insertion loss (cable loss + amplifier gain)

Frequency (MHz)	Average (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Reading value (dBuV/m)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
1319.000000	35.9	100.0	V	312.0	36.3	-0.4	18.1	54
1472.750000	36.6	100.0	V	345.0	36.3	0.3	17.4	54
1697.000000	37.5	200.0	V	160.0	35.8	1.7	16.5	54
2227.500000	40.0	100.0	V	251.0	35.4	4.6	14.0	54
2356.000000	40.4	100.0	H	97.0	35.2	5.2	13.6	54
2784.000000	41.1	200.0	H	99.0	34.9	6.2	12.9	54

Remark: 1. Correction Factor = Antenna factor+ Insertion loss (cable loss + amplifier gain)

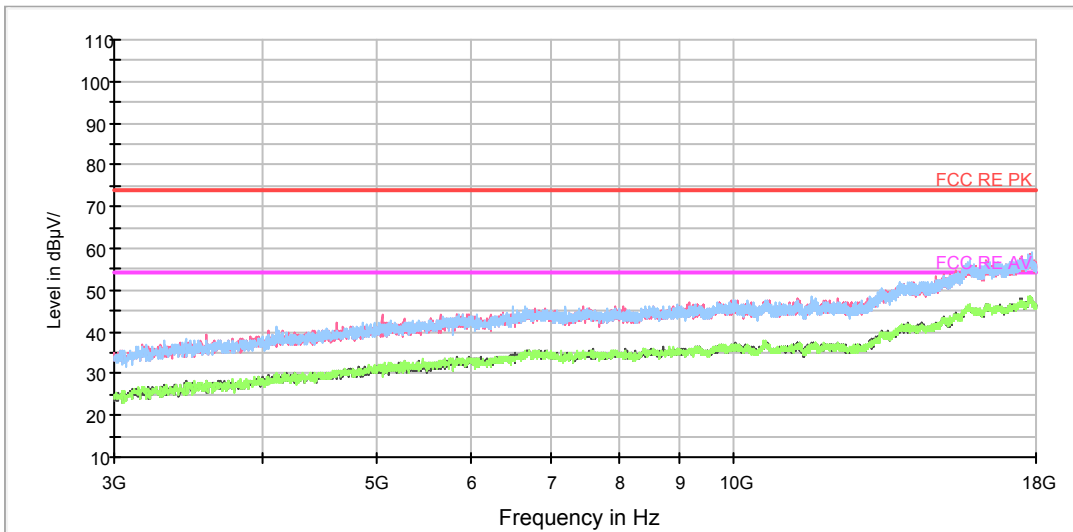
802.11n (HT40) CH3

FCC RE 1G-18GHz PK+AV Class B



Note: The signal beyond the limit is carrier.  
Radiates Emission from 1GHz to 3GHz

RE 3-18GHz PK+AV



Radiates Emission from 3GHz to 18GHz





Frequency (MHz)	Peak (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Reading value (dBuV/m)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
1317.000000	46.0	100.0	V	356.0	46.4	-0.4	28.0	74
1517.750000	47.5	200.0	H	9.0	46.9	0.6	26.5	74
1690.750000	47.5	100.0	V	204.0	45.9	1.6	26.5	74
2225.250000	51.0	100.0	H	4.0	46.5	4.5	23.0	74
2352.000000	51.5	200.0	H	227.0	46.3	5.2	22.5	74
2773.000000	51.6	200.0	V	14.0	45.4	6.2	22.4	74

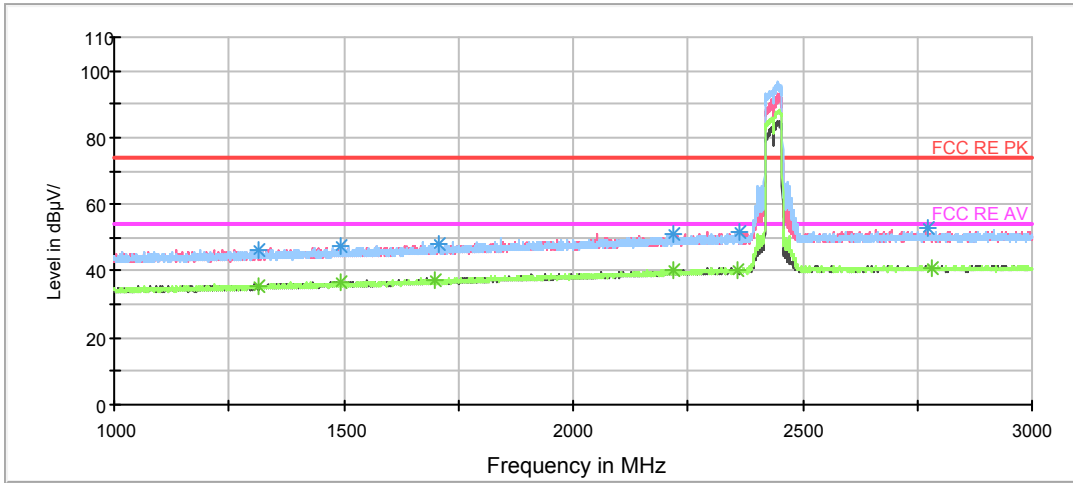
Remark: 1. Correction Factor = Antenna factor+ Insertion loss (cable loss + amplifier gain)

Frequency (MHz)	Average (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Reading value (dBuV/m)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
1319.250000	36.0	200.0	H	359.0	36.4	-0.4	18.0	54
1512.500000	36.6	200.0	H	356.0	36.1	0.5	17.4	54
1694.000000	37.3	100.0	H	0.0	35.6	1.7	16.7	54
2223.500000	40.3	100.0	H	126.0	35.8	4.5	13.7	54
2354.500000	40.4	200.0	V	0.0	35.2	5.2	13.6	54
2792.750000	42.1	100.0	V	358.0	35.9	6.2	11.9	54

Remark: 1. Correction Factor = Antenna factor+ Insertion loss (cable loss + amplifier gain)

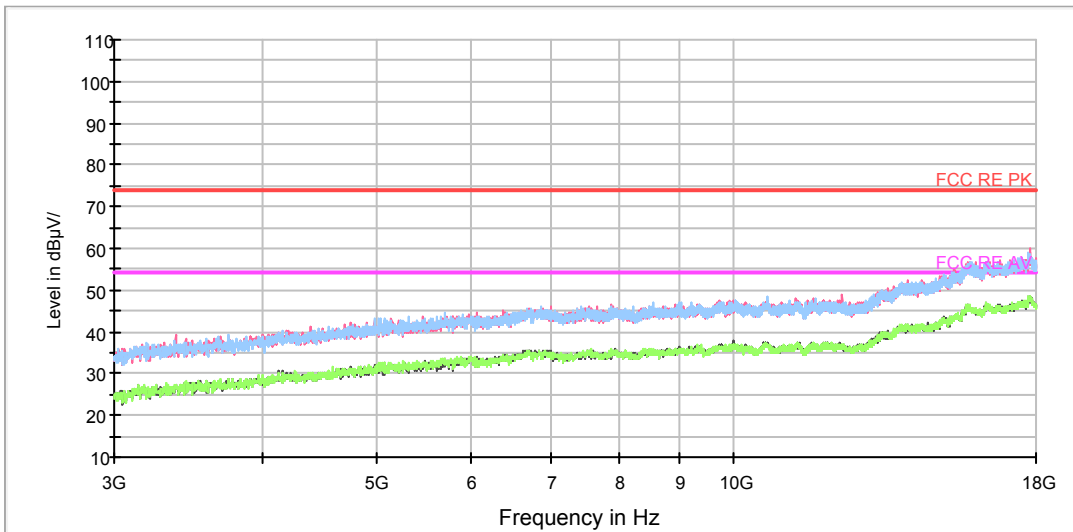
802.11n (HT40) CH6

FCC RE 1G-18GHz PK+AV Class B



Note: The signal beyond the limit is carrier.  
Radiates Emission from 1GHz to 3GHz

RE 3-18GHz PK+AV



Radiates Emission from 3GHz to 18GHz



Frequency (MHz)	Peak (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Reading value (dBuV/m)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
1316.000000	46.1	100.0	H	178.0	46.5	-0.4	27.9	74
1492.750000	47.2	100.0	H	0.0	46.8	0.4	26.8	74
1705.250000	48.1	100.0	H	4.0	46.4	1.7	25.9	74
2217.750000	50.9	200.0	H	234.0	46.4	4.5	23.1	74
2360.500000	51.5	100.0	H	13.0	46.2	5.3	22.5	74
2772.750000	52.7	200.0	H	275.0	46.5	6.2	21.3	74

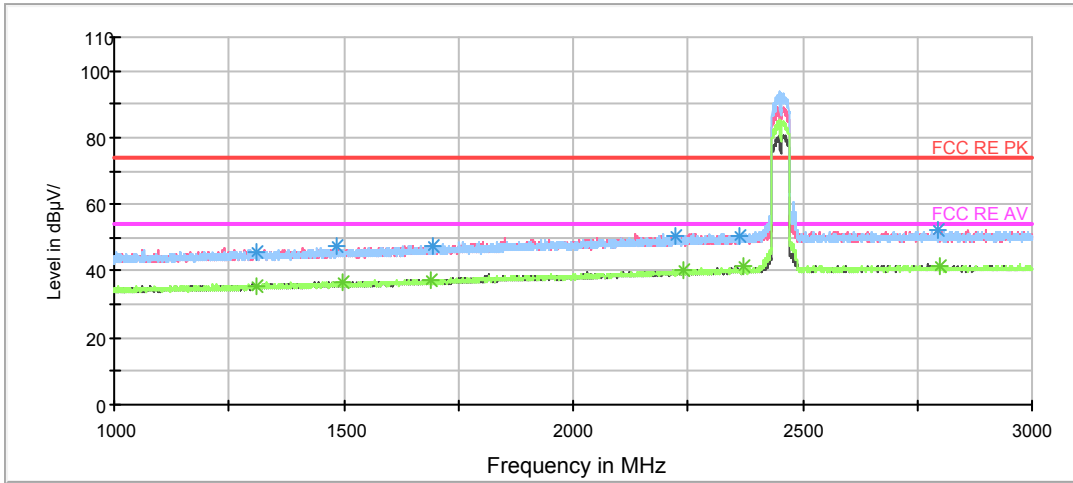
Remark: 1. Correction Factor = Antenna factor+ Insertion loss (cable loss + amplifier gain)

Frequency (MHz)	Average (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Reading value (dBuV/m)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
1313.000000	35.8	100.0	H	66.0	36.2	-0.4	18.2	54
1495.500000	36.8	100.0	H	287.0	36.3	0.5	17.2	54
1699.750000	37.5	200.0	V	86.0	35.8	1.7	16.5	54
2217.750000	40.1	200.0	H	234.0	35.6	4.5	13.9	54
2357.500000	40.4	200.0	V	0.0	35.2	5.2	13.6	54
2782.250000	41.2	100.0	V	306.0	35.0	6.2	12.8	54

Remark: 1. Correction Factor = Antenna factor+ Insertion loss (cable loss + amplifier gain)

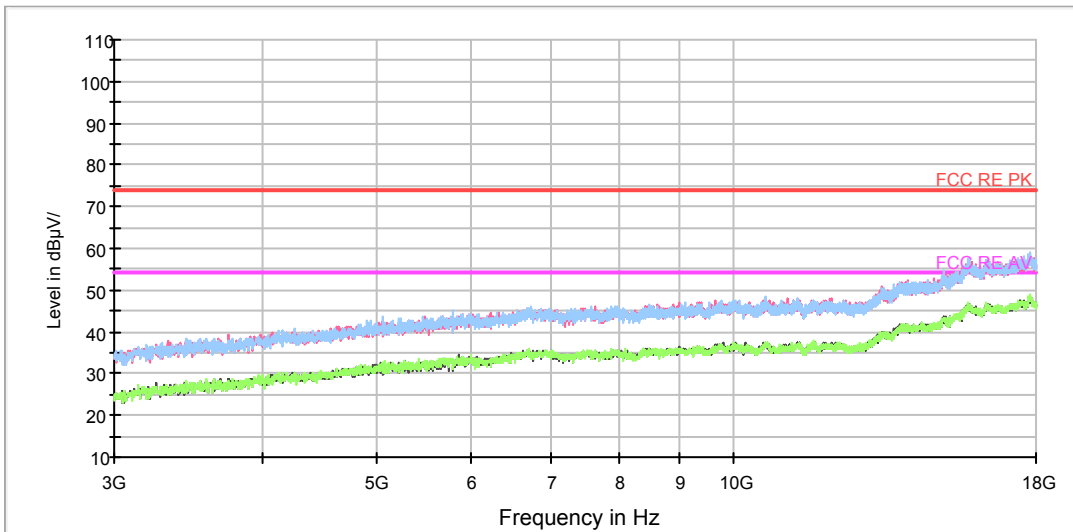
802.11n (HT40) CH9

FCC RE 1G-18GHz PK+AV Class B



Note: The signal beyond the limit is carrier.  
Radiates Emission from 1GHz to 3GHz

RE 3-18GHz PK+AV



Radiates Emission from 3GHz to 18GHz



Frequency (MHz)	Peak (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Reading value (dBuV/m)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
1310.000000	45.9	100.0	H	86.0	46.4	-0.5	28.1	74
1485.250000	47.7	200.0	H	216.0	47.3	0.4	26.3	74
1694.000000	47.7	200.0	H	326.0	46.0	1.7	26.3	74
2221.250000	50.6	100.0	V	0.0	46.1	4.5	23.4	74
2364.500000	50.5	200.0	V	57.0	45.2	5.3	23.5	74
2796.750000	52.1	200.0	H	216.0	45.9	6.2	21.9	74

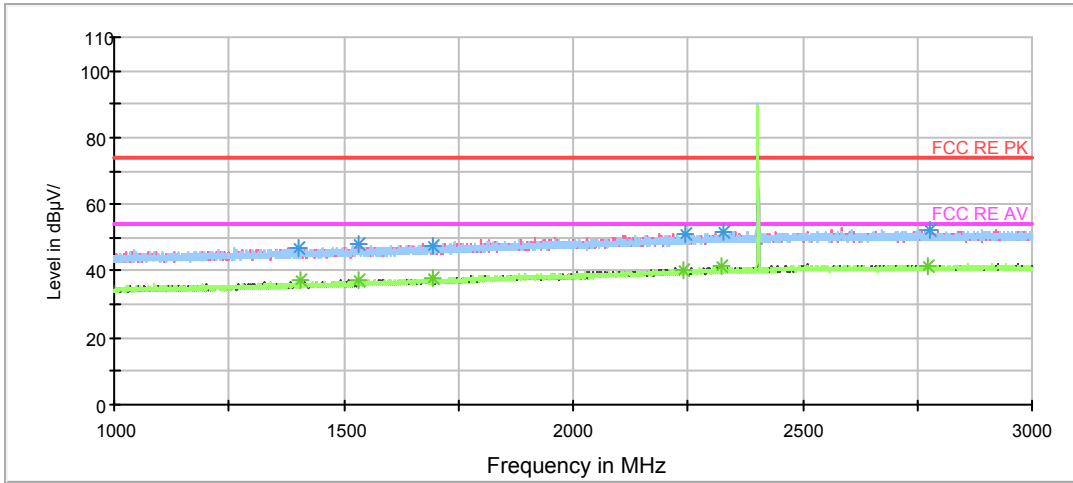
Remark: 1. Correction Factor = Antenna factor+ Insertion loss (cable loss + amplifier gain)

Frequency (MHz)	Average (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Reading value (dBuV/m)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
1308.000000	35.7	100.0	V	0.0	36.2	-0.5	18.3	54
1496.250000	36.9	200.0	V	128.0	36.4	0.5	17.1	54
1689.750000	37.4	100.0	H	3.0	35.8	1.6	16.6	54
2239.000000	40.2	200.0	H	159.0	35.6	4.6	13.8	54
2373.000000	41.6	100.0	H	6.0	36.3	5.3	12.4	54
2799.250000	41.6	100.0	V	356.0	35.4	6.2	12.4	54

Remark: 1. Correction Factor = Antenna factor+ Insertion loss (cable loss + amplifier gain)

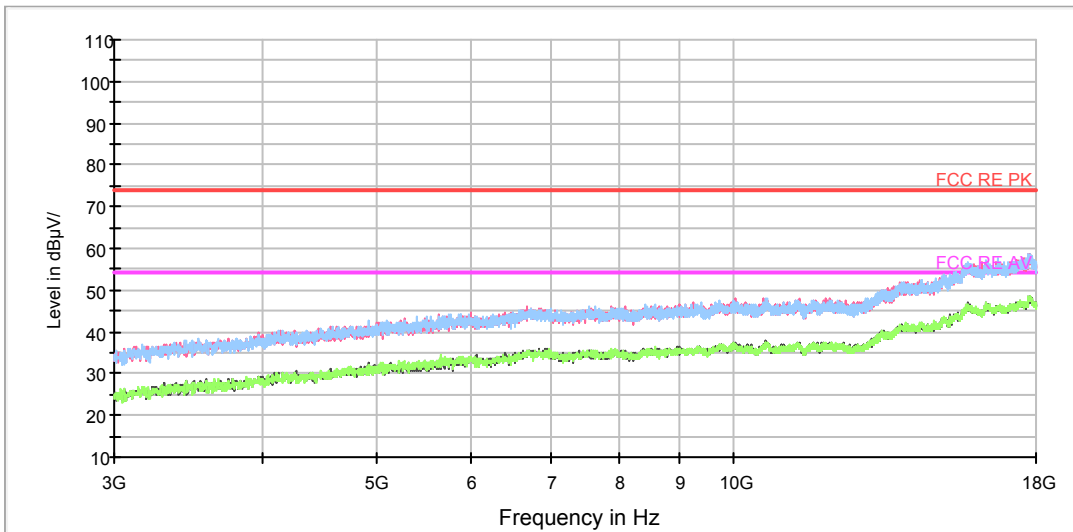
**BLE-Channel 0**

FCC RE 1G-18GHz PK+AV Class B



Note: The signal beyond the limit is carrier.  
Radiates Emission from 1GHz to 3GHz

RE 3-18GHz PK+AV



Radiates Emission from 3GHz to 18GHz



Frequency (MHz)	Peak (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Reading value (dBuV/m)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
1402.750000	47.0	200.0	H	243.0	47.0	0.0	27.0	74
1534.000000	48.2	100.0	H	336.0	47.5	0.7	25.8	74
1695.750000	47.7	200.0	H	243.0	46.0	1.7	26.3	74
2242.500000	51.0	200.0	V	151.0	46.4	4.6	23.0	74
2327.000000	51.7	100.0	V	0.0	46.6	5.1	22.3	74
2776.750000	52.4	200.0	H	283.0	46.1	6.3	21.6	74

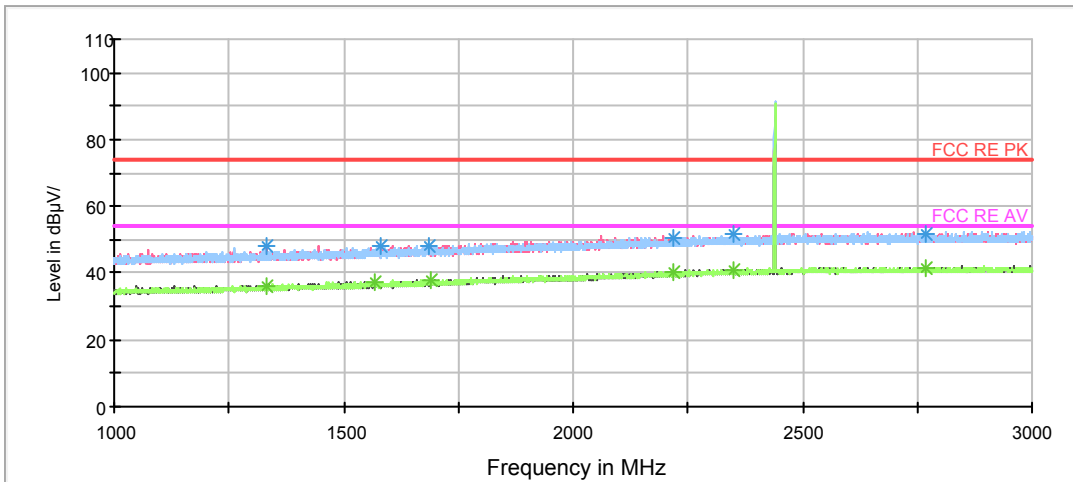
Remark: 1. Correction Factor = Antenna factor+ Insertion loss (cable loss + amplifier gain)

Frequency (MHz)	Average (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Reading value (dBuV/m)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
1406.000000	37.1	200.0	V	1.0	37.1	0.0	16.9	54
1534.000000	37.3	200.0	V	4.0	36.6	0.7	16.7	54
1696.500000	37.9	200.0	V	0.0	36.2	1.7	16.1	54
2238.500000	40.4	100.0	H	1.0	35.8	4.6	13.6	54
2324.750000	41.5	200.0	H	104.0	36.4	5.1	12.5	54
2771.500000	41.6	100.0	H	251.0	35.4	6.2	12.4	54

Remark: 1. Correction Factor = Antenna factor+ Insertion loss (cable loss + amplifier gain)

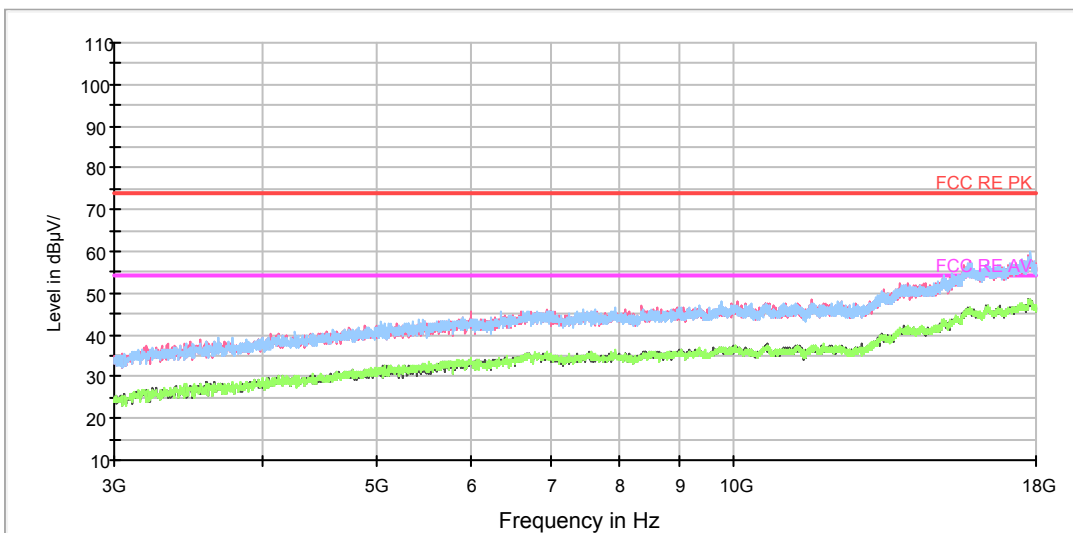
**BLE-Channel 19**

FCC RE 1G-18GHz PK+AV Class B



Note: The signal beyond the limit is carrier.  
Radiates Emission from 1GHz to 3GHz

RE 3-18GHz PK+AV



Radiates Emission from 3GHz to 18GHz





Frequency (MHz)	Peak (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Reading value (dBuV/m)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
1330.500000	48.1	200.0	V	16.0	48.5	-0.4	25.9	74
1579.500000	47.9	100.0	V	249.0	46.9	1.0	26.1	74
1686.000000	47.9	200.0	H	328.0	46.3	1.6	26.1	74
2219.750000	50.4	100.0	V	188.0	45.9	4.5	23.6	74
2350.250000	51.6	100.0	H	0.0	46.4	5.2	22.4	74
2768.000000	52.0	200.0	V	22.0	45.8	6.2	22.0	74

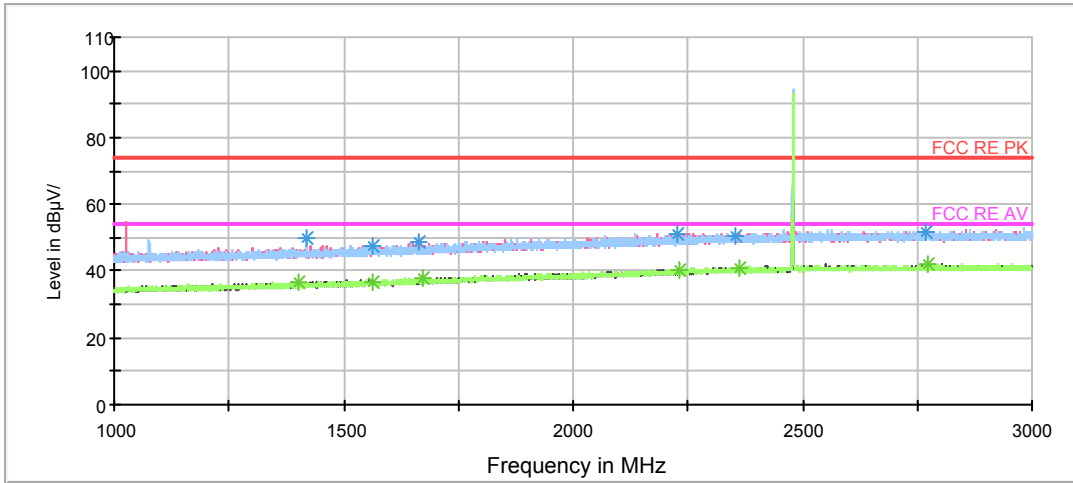
Remark: 1. Correction Factor = Antenna factor+ Insertion loss (cable loss + amplifier gain)

Frequency (MHz)	Average (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Reading value (dBuV/m)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
1332.000000	36.0	100.0	H	277.0	36.4	-0.4	18.0	54
1567.750000	37.3	200.0	H	238.0	36.4	0.9	16.7	54
1688.750000	37.6	200.0	V	11.0	36.0	1.6	16.4	54
2220.000000	40.4	100.0	V	269.0	35.9	4.5	13.6	54
2351.250000	41.0	200.0	H	147.0	35.8	5.2	13.0	54
2767.500000	41.4	200.0	V	80.0	35.2	6.2	12.6	54

Remark: 1. Correction Factor = Antenna factor+ Insertion loss (cable loss + amplifier gain)

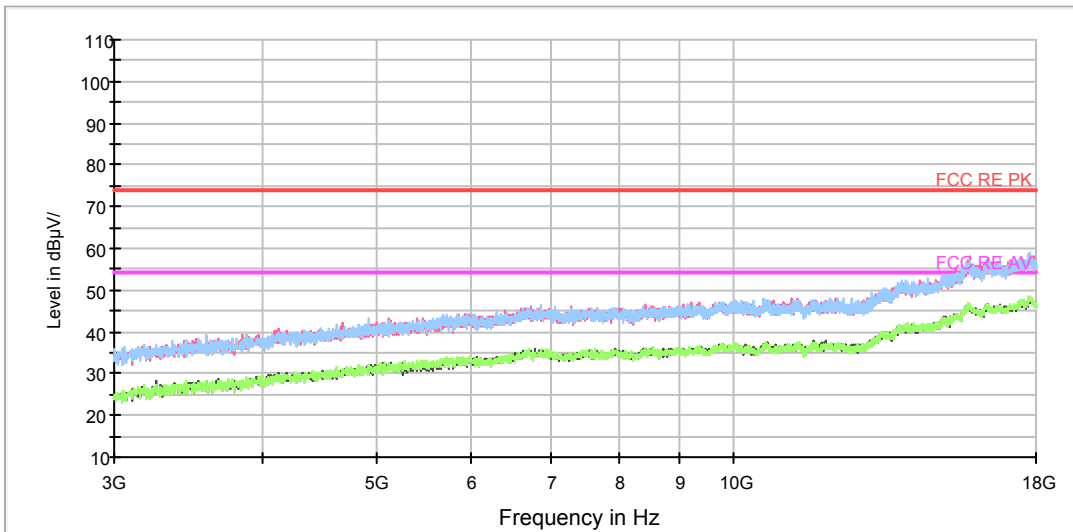
**BLE-Channel 39**

FCC RE 1G-18GHz PK+AV Class B



Note: The signal beyond the limit is carrier.  
Radiates Emission from 1GHz to 3GHz

RE 3-18GHz PK+AV



Radiates Emission from 3GHz to 18GHz



Frequency (MHz)	Peak (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Reading value (dBuV/m)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
1418.000000	49.6	100.0	H	311.0	49.5	0.1	24.4	74
1562.250000	47.7	200.0	H	83.0	46.8	0.9	26.3	74
1665.500000	48.6	100.0	H	2.0	47.1	1.5	25.4	74
2228.500000	51.3	200.0	H	354.0	46.7	4.6	22.7	74
2351.750000	50.7	200.0	V	26.0	45.5	5.2	23.3	74
2768.750000	51.7	100.0	V	349.0	45.5	6.2	22.3	74

Remark: 1. Correction Factor = Antenna factor+ Insertion loss (cable loss + amplifier gain)

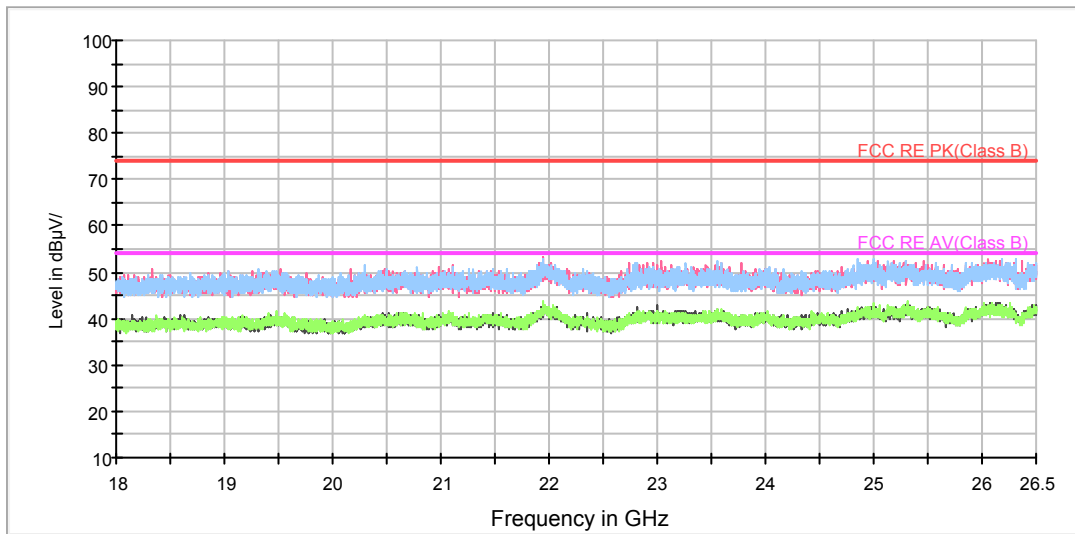
Frequency (MHz)	Average (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Reading value (dBuV/m)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
1401.750000	36.6	100.0	H	120.0	36.6	0.0	17.4	54
1565.500000	36.9	100.0	V	260.0	36.0	0.9	17.1	54
1670.750000	37.7	100.0	H	23.0	36.2	1.5	16.3	54
2232.750000	40.3	200.0	H	359.0	35.7	4.6	13.7	54
2363.250000	41.0	100.0	V	357.0	35.7	5.3	13.0	54
2772.750000	42.1	200.0	H	178.0	35.9	6.2	11.9	54

Remark: 1. Correction Factor = Antenna factor+ Insertion loss (cable loss + amplifier gain)



During the test, the Radiates Emission from 18GHz to 26.5GHz was performed in all modes with all channels, 802.11b Channel 11 are selected as the worst condition. The test data of the worst-case condition was recorded in this report.

RE 18-26.5GHz PK+AV



Radiates Emission from 18GHz to 26.5GHz



## 6. Main Test Instruments

Name	Manufacturer	Type	Serial Number	Calibration Date	Expiration Date
Spectrum Analyzer	R&S	FSV30	100815	2017-12-17	2018-12-16
EMI Test Receiver	R&S	ESCI	100948	2018-05-20	2019-05-19
Loop Antenna	SCHWARZBECK	FMZB1519	1519-047	2017-09-26	2019-09-25
TRILOG Broadband Antenna	Schwarzbeck	VULB 9163	9163-201	2017-11-18	2019-11-17
Double Ridged Waveguide Horn Antenna	R&S	HF907	100126	2018-07-07	2020-07-06
Standard Gain Horn	ETS-Lindgren	3160-09	00102643	2018-06-20	2020-06-19
Software	R&S	EMC32	9.26.0	/	/

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