RF TEST REPORT

Applicant	Micron Electronics LLC.
FCC ID	ZKQ-PL4Z
Product	Tracker
Brand	Prime
Model	AT4V
Marketing	AT4V
Report No.	R1802A0077-R2
Issue Date	March 21, 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: Xianqing Li

Approved by: Kai Xu

TA Technology (Shanghai) Co., Ltd.

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Summary of measurement results

Number	Summary of measurements of results	Clause in FCC rules	Verdict
1	Maximum conducted output power	15.247(b)(3)	PASS
2	6 dB bandwidth	15.247(a)(2)	PASS
3	Power spectral density	15.247(e)	PASS
4	Band Edge	15.247(d)	PASS
5	Spurious RF Conducted Emissions	15.247(d)	PASS
6	Radiated Emissions in restricted frequency bands	15.247(d),15.205,15.209	PASS
7	Radiated Emissions	15.247(d),15.205,15.209	PASS
8	Conducted Emissions	15.207	PASS
Date of Testing: March 7, 2018 ~ March 19, 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
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Contact:	Xu Kai
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Fax:	+86-021-50791141/2/3-8000
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E-mail:	xukai@ta-shanghai.com

2. General Description of Equipment under Test

Client Information

Applicant	Micron Electronics LLC.
Applicant address	1001 Yamato Road, Suite 400, Boca Raton, Florida, United States.
Manufacturer	Micron Electronics LLC.
Manufacturer address	1001 Yamato Road, Suite 400, Boca Raton, Florida, United States.

General information

EUT Description	
Model	AT4V
IMEI	866908030004607
Hardware Version	F602_V1_PCB
Software Version	F602V01.01B02
Power Supply	AC adapter
Antenna Type	Internal Antenna
Antenna Connector	A permanently attached antenna (meet with the standard FCC Part 15.203 requirement
Antenna Gain	-5.8dBi
additional beamforming gain	0 dB
Test Mode	802.11b 802.11g, 802.11n(HT20/HT40);
Modulation Type	802.11b: DSSS; 802.11g/n(HT20/HT40): OFDM
Max. Conducted Power	Wi-Fi 2.4G :14.98dBm
Operating Frequency Range(s)	802.11b/g/n(HT20): 2412 ~ 2462 MHz 802.11n(HT40): 2422 ~ 2452 MHz
EUT Accessory	
Adapter	Manufacturer: Shenzhen Jingrichang Electronic Technology Co., Ltd. Model: JT-M050100
Note: The information of the EUT is declared by the manufacturer.	

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 v04**

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.

The test software is used WIFI-TOOL

Worst-case data rates are shown as following table.

Band	**Data Rate**
802.11b	1 Mbps
802.11g	6 Mbps
802.11n HT20	MCS0
802.11n HT40	MCS0

5. Test Case Results

5.1. Maximum conducted output power

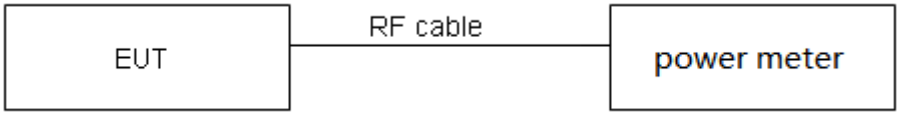
Ambient condition

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Methods of Measurement

During the process of the testing, The EUT was connected to Average Power meter with a known loss. The EUT is max power transmission with proper modulation. The signal transmission is continuous.

Test Setup



Limits

Rule Part 15.247 (b) (3) specifies that " For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz: 1 Watt."

Peak Output Power	≤ 1W (30dBm)

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor k = 2, U= 0.44 dB.

Test Results

Single Antenna Power Index			
Packet Type	**CH1**	**CH6**	**CH11**
802.11b	38	38	38
802.11g	34	36	36
802.11n HT20	34	36	36
Packet Type	**CH3**	**CH6**	**CH9**
802.11n HT40	36	36	36

Band	T_{on} (ms)	$T_{(on+off)}$ (ms)	Duty cycle	Duty cycle correction Factor(dB)
802.11b	8.35	8.45	0.99	NA
802.11g	1.38	1.49	0.92	0.34
802.11n HT20	1.28	1.39	0.92	0.35
802.11n HT40	0.63	0.74	0.85	0.69
Note: when Duty cycle>0.98, Duty cycle correction Factor not required.				

Network Standards	Carrier frequency (MHz)	Read Value (dBm)	Output Power (dBm)	Limit (dBm)	Conclusion
802.11b	2412	14.98	14.98	30	PASS
	2437	14.49	14.49	30	PASS
	2462	14.62	14.62	30	PASS
802.11g	2412	12.79	13.13	30	PASS
	2437	13.47	13.81	30	PASS
	2462	13.40	13.74	30	PASS
802.11n HT20	2412	12.65	13.00	30	PASS
	2437	13.43	13.78	30	PASS
	2462	13.36	13.71	30	PASS
802.11n HT40	2422	13.32	14.01	30	PASS
	2437	13.07	13.76	30	PASS
	2452	13.18	13.87	30	PASS
Note: Output Power= Read Value +Duty cycle correction factor					

5.2. 6dB Bandwidth

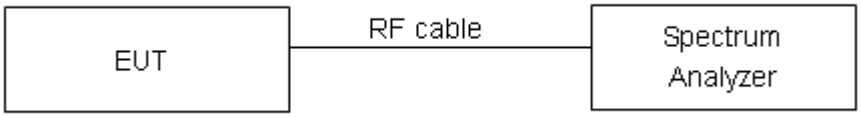
Ambient condition

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Method of Measurement

The EUT was connected to the spectrum analyzer through an external attenuator (20dB) and a known loss cable. RBW is set to 100 kHz; VBW is set to 300 kHz on spectrum analyzer. Dector=Peak, Trace mode=max hold.

Test Setup



Limits

Rule Part 15.247 (a) (2) specifies that “Systems using digital modulation techniques may operate in the 902–928 MHz, 2400–2483.5 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.”

minimum 6 dB bandwidth	≥ 500 kHz

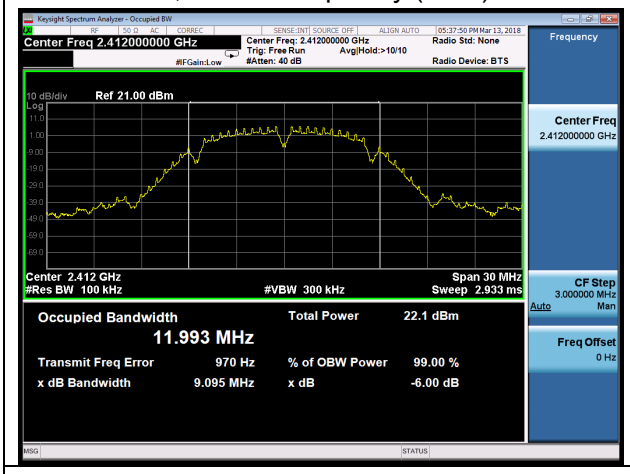
Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor k = 2, U= 936 Hz.

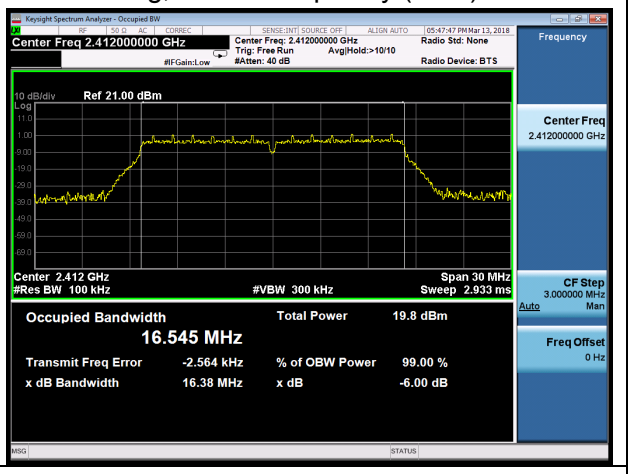
Test Results:

Network Standards	Carrier frequency (MHz)	99% bandwidth (MHz)	Minimum 6 dB bandwidth (MHz)	Limit (kHz)	Conclusion
802.11b	2412	11.993	9.095	500	PASS
	2437	11.984	9.091	500	PASS
	2462	12.035	9.091	500	PASS
802.11g	2412	16.545	16.380	500	PASS
	2437	16.559	16.390	500	PASS
	2462	16.568	16.38	500	PASS
802.11n HT20	2412	17.567	16.91	500	PASS
	2437	17.578	17.08	500	PASS
	2462	17.579	16.66	500	PASS
802.11n HT40	2422	36.048	36.11	500	PASS
	2437	36.094	36.32	500	PASS
	2452	36.105	36.32	500	PASS

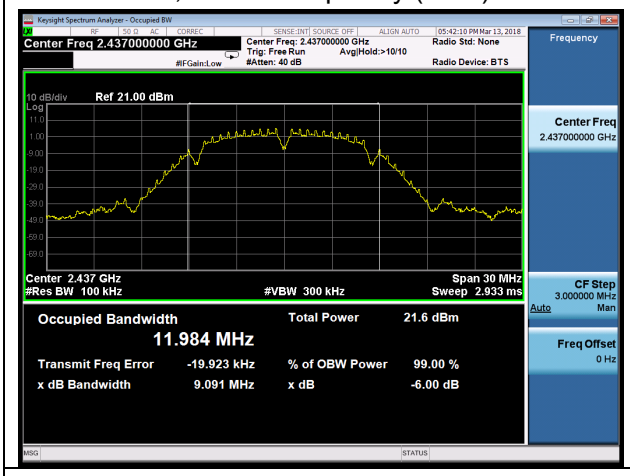
802.11b, Carrier frequency (MHz): 2412



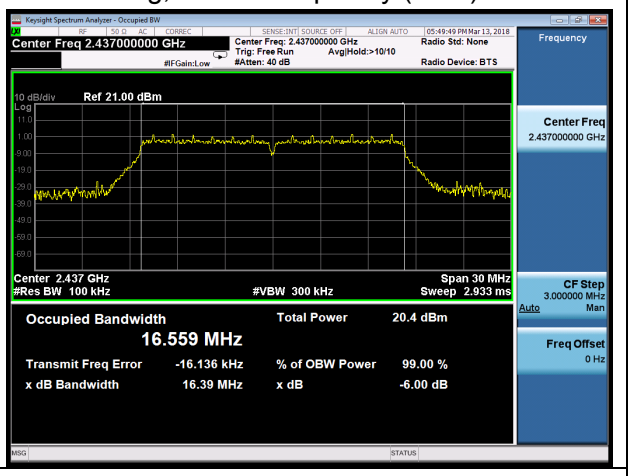
802.11g, Carrier frequency (MHz): 2412



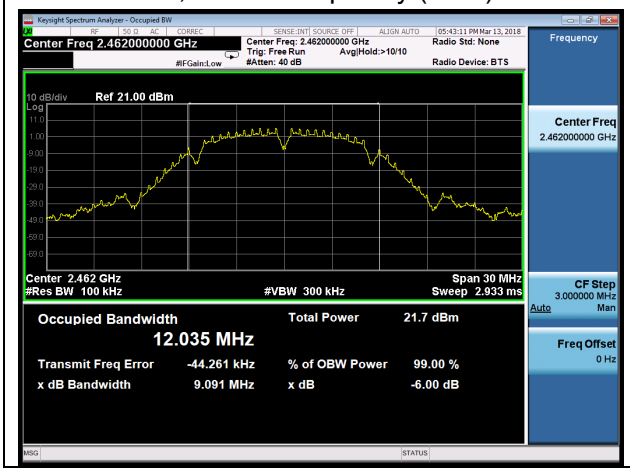
802.11b, Carrier frequency (MHz): 2437



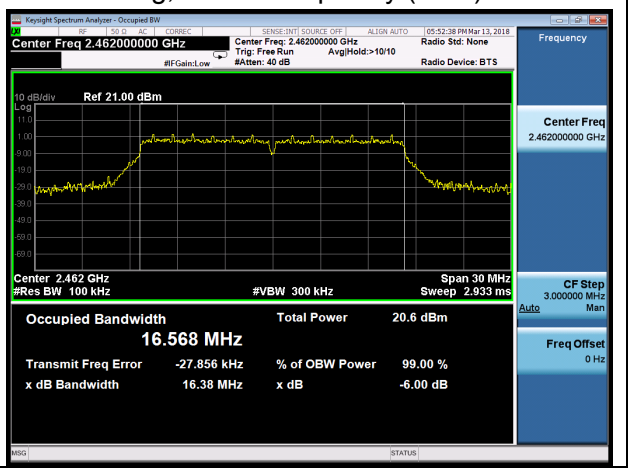
802.11g, Carrier frequency (MHz): 2437



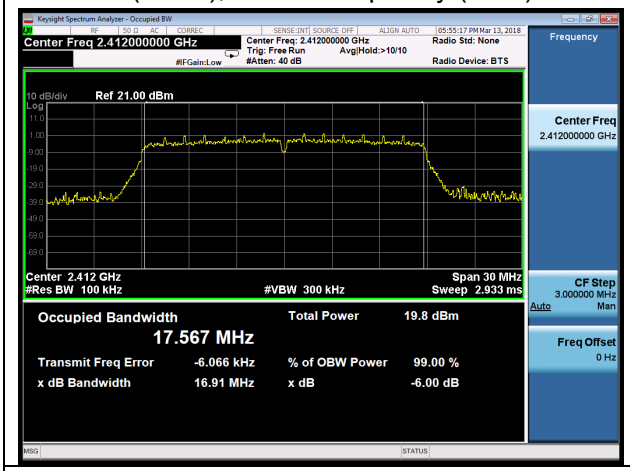
802.11b, Carrier frequency (MHz):2462



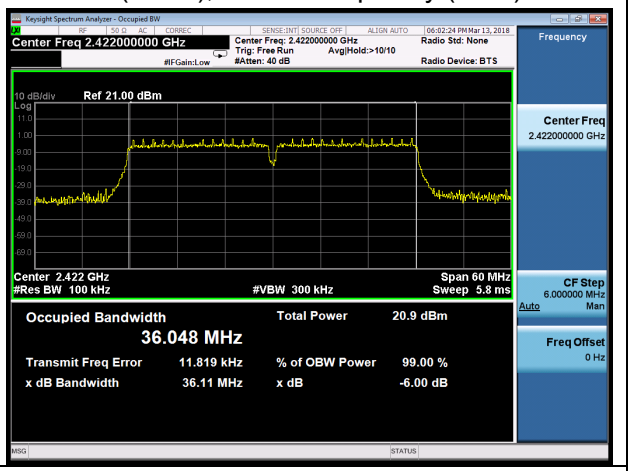
802.11g, Carrier frequency (MHz):2462



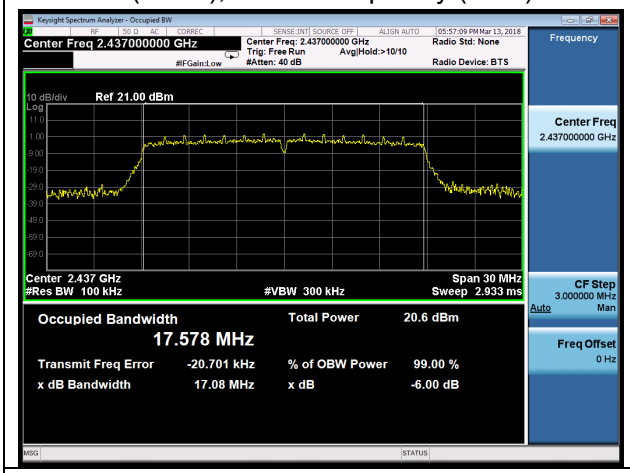
802.11n(HT20), Carrier frequency (MHz): 2412



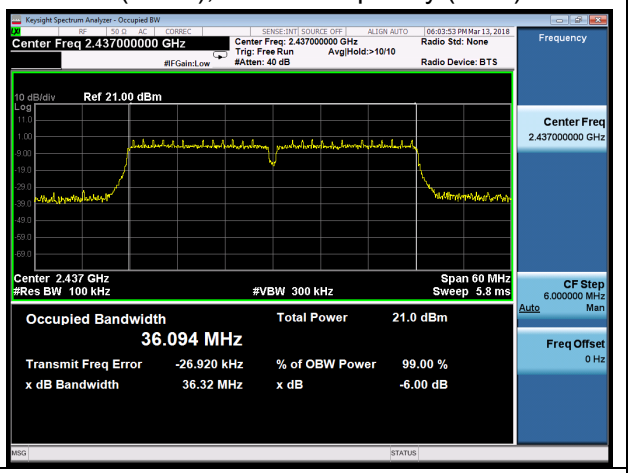
802.11n(HT40), Carrier frequency (MHz): 2422



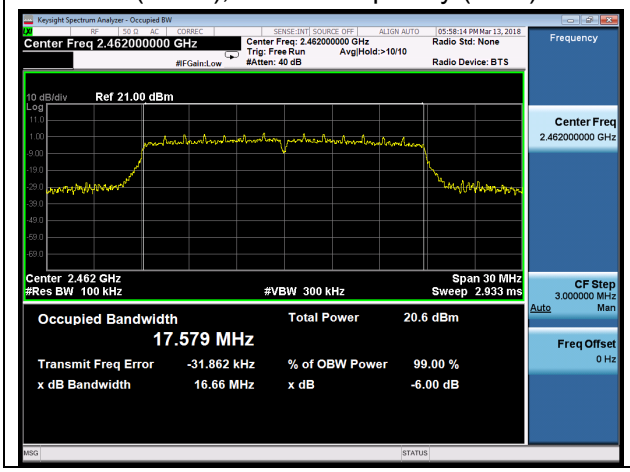
802.11n(HT20), Carrier frequency (MHz): 2437



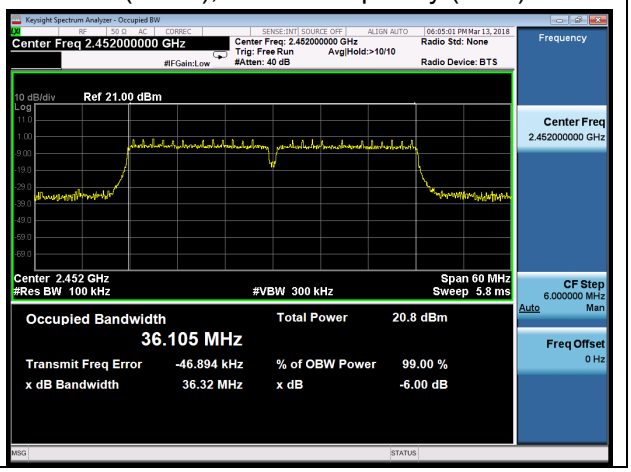
802.11n(HT40), Carrier frequency (MHz): 2437



802.11n(HT20), Carrier frequency (MHz):2462



802.11n(HT40), Carrier frequency (MHz):2452



5.3. Band Edge

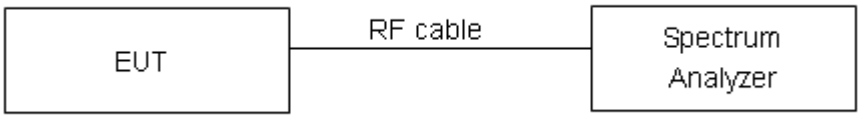
Ambient condition

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Method of Measurement

The EUT was connected to the spectrum analyzer through an external attenuator (20dB) and a known loss cable the band edge of the lowest and highest channels were measured. The peak detector is used and RBW is set to 100 kHz and VBW is set to 300 kHz on spectrum analyzer. Spectrum analyzer plots are included on the following pages.

Test Setup



Limits

Rule Part 15.247(d) specifies that “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.”

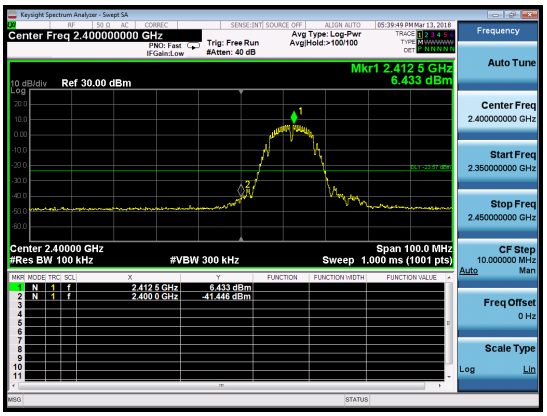
Measurement Uncertainty

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

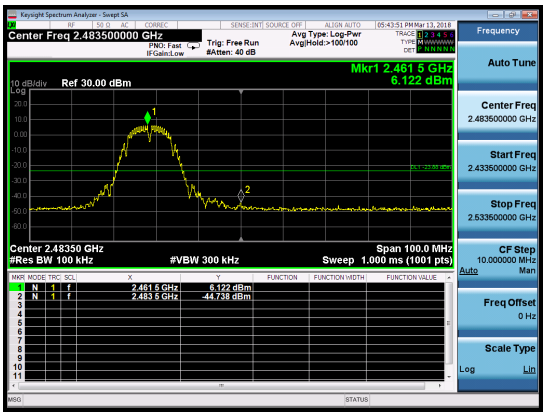
Frequency	Uncertainty
2GHz-3GHz	1.407 dB

Test Results: PASS

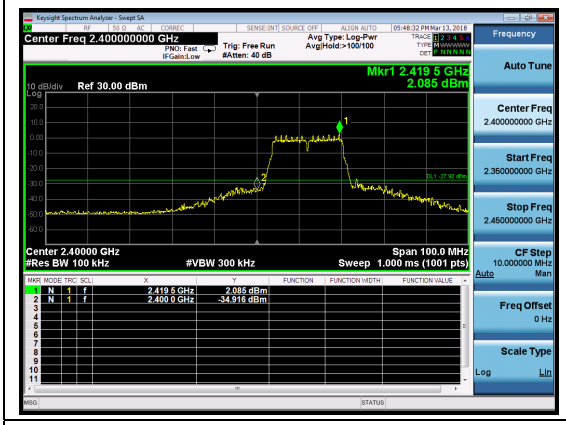
802.11b, Channel No.: 1



802.11b, Channel No.: 11

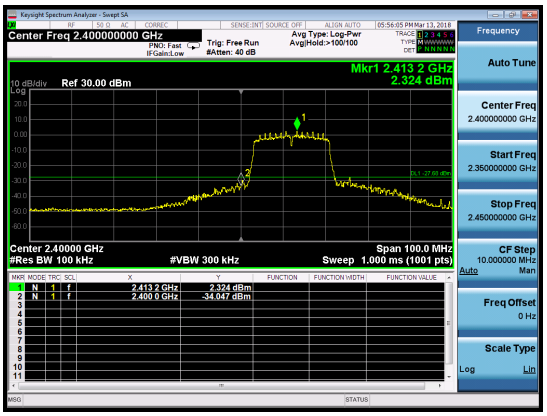


802.11g, Channel No.: 1



802.11g, Channel No.: 11

802.11n(HT20), Channel No.: 1



802.11n(HT20), Channel No.: 11

802.11n(HT40), Channel No.: 3

802.11n(HT40), Channel No.: 9

5.4. Power Spectral Density

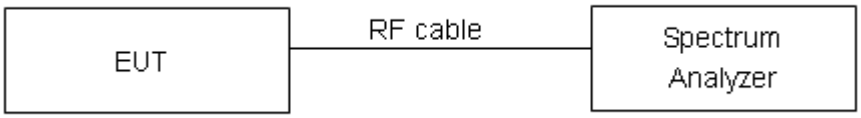
Ambient condition

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Method of Measurement

During the process of the testing, The EUT was connected to Spectrum Analyzer with a known loss. The EUT is max power transmission with proper modulation. Method AVGPSD-2 in KDB558074 D01 was used for this test..

Test setup



Limits

Rule Part 15.247(e) specifies that" 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. ''

Limits	≤ 8 dBm / 3kHz

Measurement Uncertainty

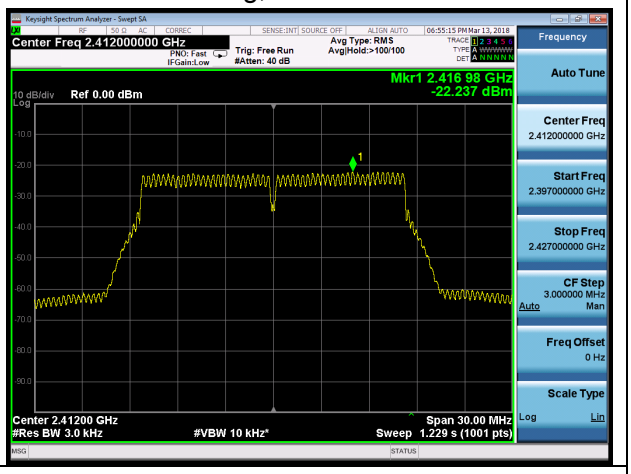
The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor k = 2, U= 0.75dB.

Test Results:

Network Standards	Channel Number	Read Value (dBm / 3kHz)	Power Spectral Density (dBm / 3kHz)	Limit (dBm / 3kHz)	Conclusion
802.11b	1	-17.52	-17.52	8	PASS
	6	-18.03	-18.03	8	PASS
	11	-17.79	-17.79	8	PASS
802.11g	1	-22.24	-21.89	8	PASS
	6	-21.55	-21.21	8	PASS
	11	-21.40	-21.06	8	PASS
802.11n HT20	1	-21.91	-21.56	8	PASS
	6	-21.27	-20.91	8	PASS
	11	-21.26	-20.91	8	PASS
802.11n HT40	3	-24.91	-24.22	8	PASS
	6	-25.01	-24.32	8	PASS
	9	-25.08	-24.39	8	PASS
Note: Power Spectral Density =Read Value+Duty cycle correction factor					

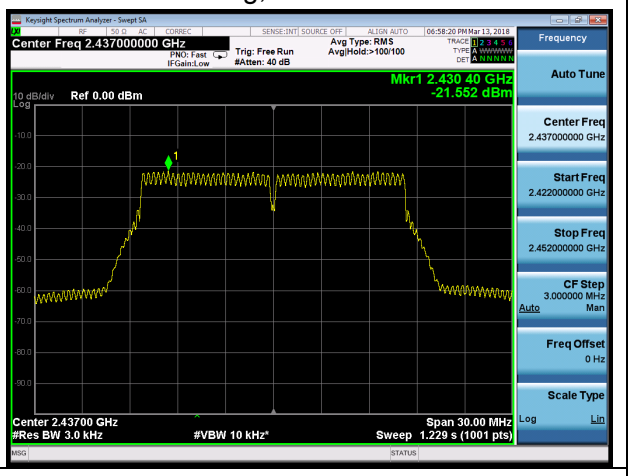
802.11b, Channel No.: 1

802.11g, Channel No.: 1



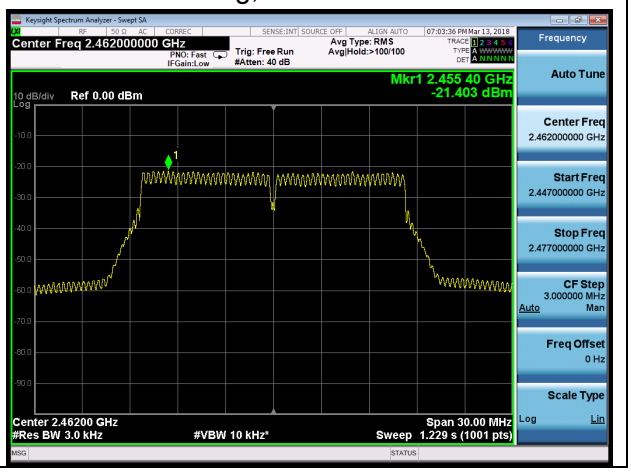
802.11b, Channel No.: 6

802.11g, Channel No.: 6

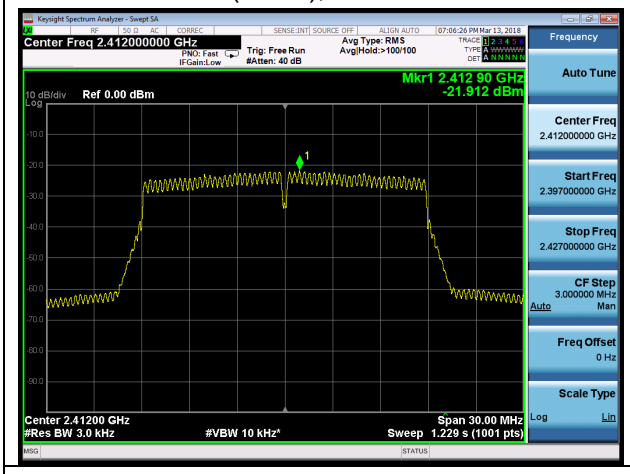


802.11b, Channel No.: 11

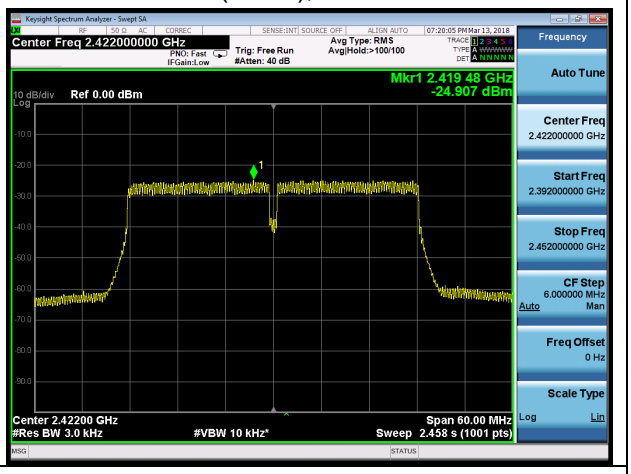
802.11g, Channel No.: 11



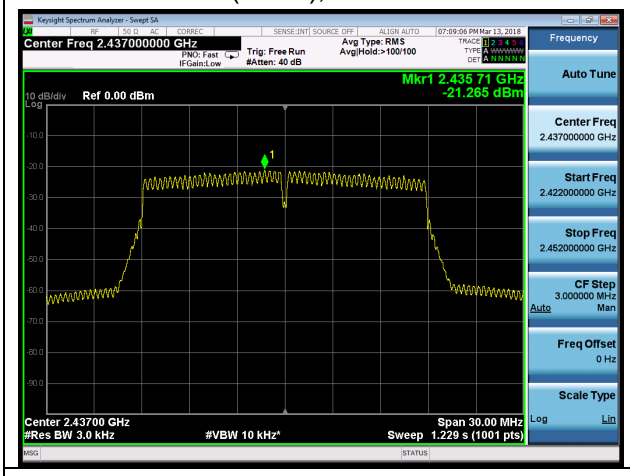
802.11n(HT20), Channel No. 1



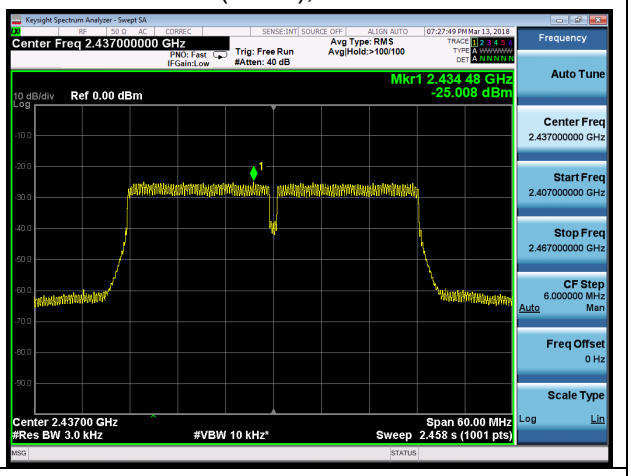
802.11n(HT40), Channel No. 3



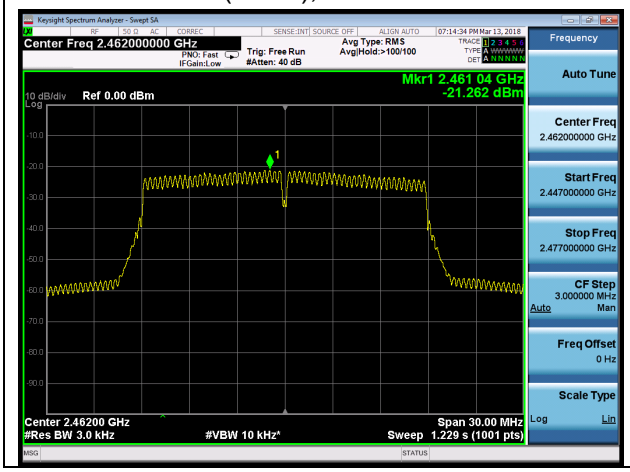
802.11n(HT20), Channel No. 6



802.11n(HT40), Channel No. 6



802.11n(HT20), Channel No. 11



802.11n(HT40), Channel No. 9

5.5. Spurious RF Conducted Emissions

Ambient condition

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Method of Measurement

The EUT was connected to the spectrum analyzer with a known loss. The spectrum analyzer scans from 30MHz to the 10th harmonic of the carrier. The peak detector is used. Set RBW to100kHz and VBW to 300 kHz, Sweep is set to ATUO.
The test is in transmitting mode.

Test setup

Limits

Rule Part 15.247(d) pacifies that “In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 30 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power.” 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.”

Network Standards	Carrier frequency (MHz)	Reference value (dBm)	Limit
802.11b	2412	5.41	-24.60
	2437	5.34	-24.66
	2462	5.73	-24.28
802.11g	2412	2.18	-27.82
	2437	2.59	-27.41
	2462	2.61	-27.39
802.11n HT20	2412	2.32	-27.68
	2437	2.49	-27.51
	2462	2.32	-27.68
802.11n HT40	2422	-0.85	-30.85
	2437	-0.76	-30.76
	2452	-0.41	-30.41

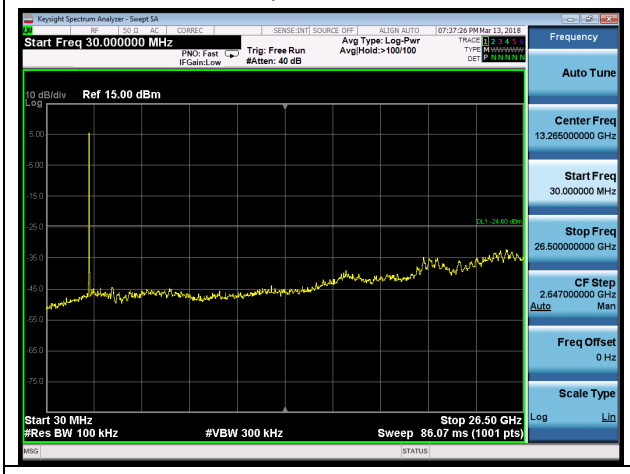
Measurement Uncertainty

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

Frequency	Uncertainty
100kHz-2GHz	0.684 dB
2GHz-26GHz	1.407 dB

Test Results:

802.11b, Channel No.: 1



802.11g, Channel No.: 1

802.11b, Channel No.: 6

802.11g, Channel No.: 6

802.11b, Channel No.: 11

802.11g, Channel No.: 11

802.11n(HT20), Channel No. 1

802.11n(HT40), Channel No. 3

802.11n(HT20), Channel No. 6

802.11n(HT40), Channel No. 6

802.11n(HT20), Channel No. 11

802.11n(HT40), Channel No. 9

5.6. Radiated Emissions in the Restricted Band

Ambient condition

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Method of Measurement

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.

This method refer to KDB 558074.
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 ≥ [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 ≥ [3 × RBW].
c) Detector = RMS (power averaging), if [span / (# of points in sweep)] ≤ 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.

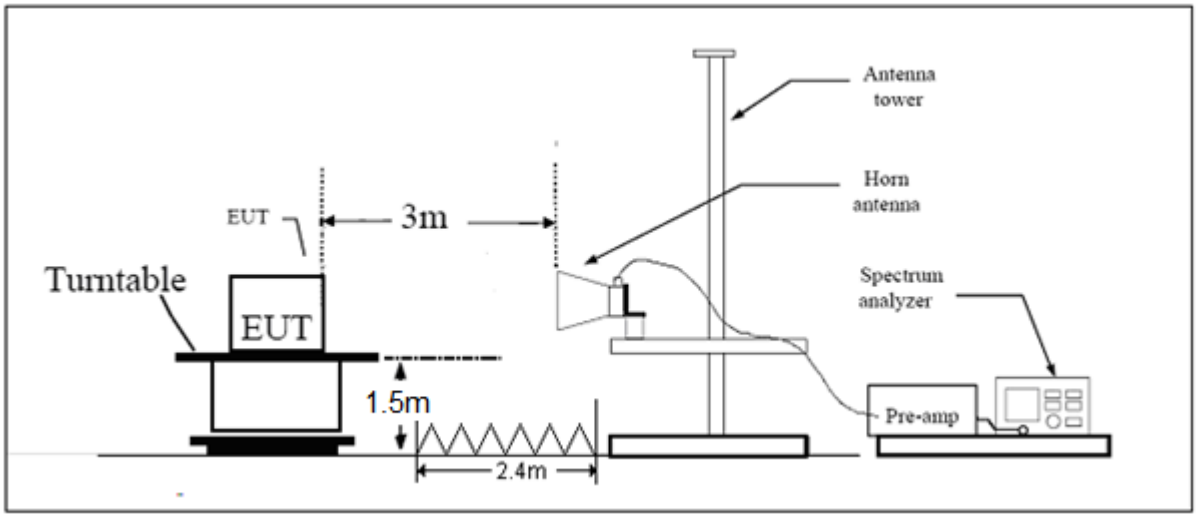
2) If linear voltage averaging mode was used in the preceding step e), then the correction factor is [20 log (1 / D)], where D is the duty cycle. For example, if the transmit duty cycle was 50%, then 6 dB shall be added to the measured emission levels.

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 stand-up position (Z axis) and the antenna is vertical.

The test is in transmitting mode.

Test setup



Note: Area side: 2.4mX3.6m

Limits

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
[1]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	[2]
13.36 - 13.41			

Limit in restricted band

Frequency of emission (MHz)	Field strength(uV/m)	Field strength(dBuV/m)
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

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor k = 1.96, U= 3.55 dB.

Test Results:

Band	T_{on} (ms)	$T_{(on+off)}$ (ms)	Duty cycle	Duty cycle correction Factor(dB)
802.11b	8.35	8.45	0.99	NA
802.11g	1.38	1.49	0.92	0.34
802.11n HT20	1.28	1.39	0.92	0.35
802.11n HT40	0.63	0.74	0.85	0.69
Note: when Duty cycle>0.98, Duty cycle correction Factor not required.				

802.11b-Channel 1

Frequency (MHz)	Peak (dBuV/m)	Average (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Duty cycle correction Factor(dB)	conclusion value (dBuV/m)	Margin (dB)	Limit (dBuV/m)
2390	51.497	--	200.0	V	135	0	51.497	22.503	74
2390	--	36.925	200.0	V	135	0	36.925	17.075	54

802.11b-Channel 11

Frequency (MHz)	Peak (dBuV/m)	Average (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Duty cycle correction Factor(dB)	conclusion value (dBuV/m)	Margin (dB)	Limit (dBuV/m)
2483.5	57.149	--	200.0	V	135	0	57.149	16.851	74
2483.5	--	51.047	200.0	V	135	0	51.047	2.953	54

802.11g-Channel 1

Frequency (MHz)	Peak (dBuV/m)	Average (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Duty cycle correction Factor(dB)	conclusion value (dBuV/m)	Margin (dB)	Limit (dBuV/m)
2390	59.365	--	150	V	65	0.34	59.705	14.295	74
2390	--	41.599	150	V	65	0.34	41.939	12.061	54

802.11g-Channel 11

Frequency (MHz)	Peak (dBuV/m)	Average (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Duty cycle correction Factor(dB)	conclusion value (dBuV/m)	Margin (dB)	Limit (dBuV/m)
2483.5	69.240	--	150	V	78	0.34	69.58	4.420	74
2483.5	--	51.158	150	V	78	0.34	51.498	2.502	54

802.11n HT20 -Channel 1

Frequency (MHz)	Peak (dBuV/m)	Average (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Duty cycle correction Factor(dB)	conclusion value (dBuV/m)	Margin (dB)	Limit (dBuV/m)
2390	59.995	--	200	V	90	0.35	60.345	13.655	74
2390	--	39.547	200	V	90	0.35	39.897	14.103	54

802.11n HT20-Channel 11

Frequency (MHz)	Peak (dBuV/m)	Average (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Duty cycle correction Factor(dB)	conclusion value (dBuV/m)	Margin (dB)	Limit (dBuV/m)
2483.5	68.853	--	200	V	90	0.35	69.203	4.797	74
2483.5	--	46.967	200	V	90	0.35	47.317	6.683	54

802.11n HT40 -Channel 3

Frequency (MHz)	Peak (dBuV/m)	Average (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Duty cycle correction Factor(dB)	conclusion value (dBuV/m)	Margin (dB)	Limit (dBuV/m)
2390	59.095	--	150	V	46	0.69	59.785	14.215	74
2390	--	43.747	150	V	46	0.69	44.437	9.563	54

802.11n HT40-Channel 9

Frequency (MHz)	Peak (dBuV/m)	Average (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Duty cycle correction Factor(dB)	conclusion value (dBuV/m)	Margin (dB)	Limit (dBuV/m)
2483.5	70.342	--	150	V	46	0.69	71.032	2.968	74
2483.5	--	52.092	150	V	46	0.69	52.782	1.218	54

5.7. Radiates 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 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.

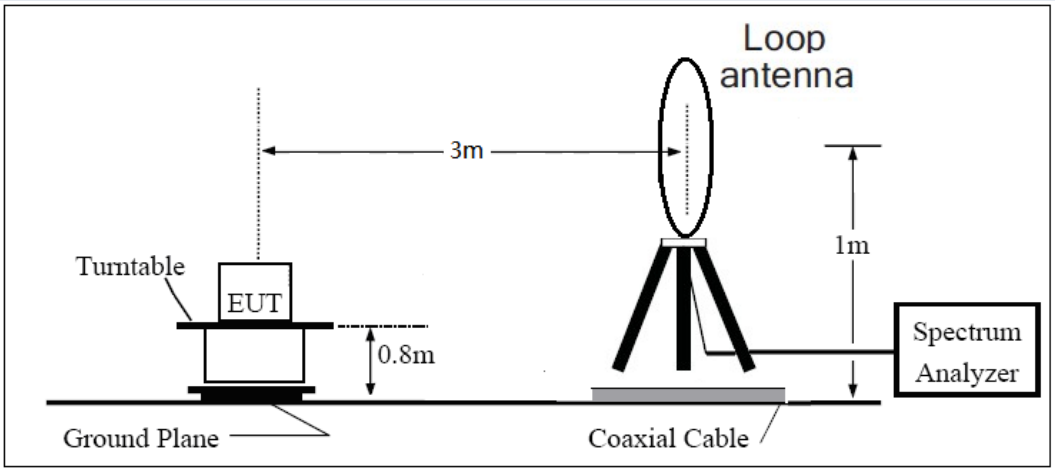
During the test, below 30MHz, the center of the loop shall be 1 meters; above 30MHz, the height of receive antenna shall be moved from 1 to 4 meters, and the antenna shall be performed under horizontal and vertical polarization. The turntable shall be rotated from 0 to 360 degrees for detecting the maximum 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.
Set the spectrum analyzer in the following:
Below 1GHz (detector: Peak and Quasi-Peak)
RBW=100 kHz / VBW=300 kHz / Sweep=AUTO
Above 1GHz (detector: Peak):
(a) PEAK: RBW=1MHz / VBW=3MHz/ Sweep=AUTO
(b) AVERAGE: RBW=1MHz / VBW=10Hz, when duty cycle is no less than 98%
VBW≥1/T when duty cycle is less than 98%,where T is transmit on time
Sweep=AUTO

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.

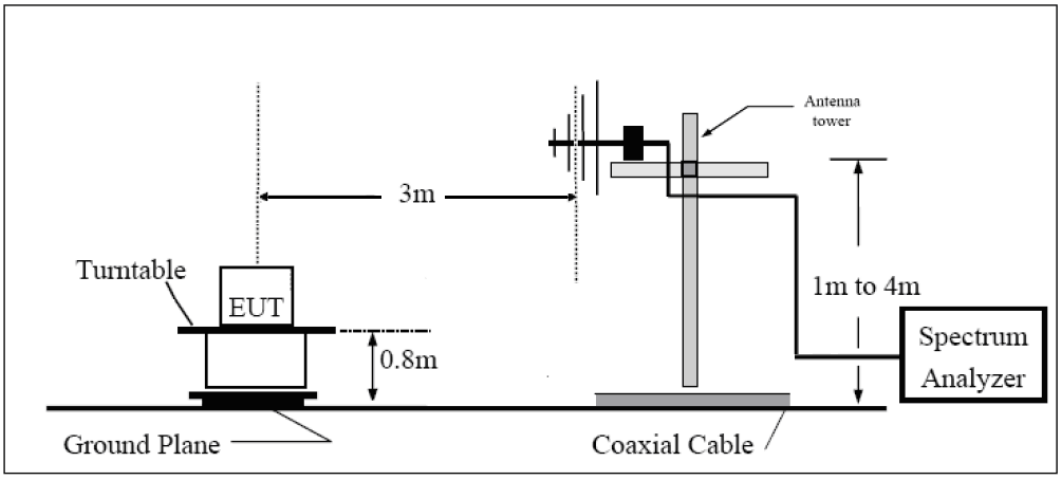
The test is in transmitting mode.

Test setup

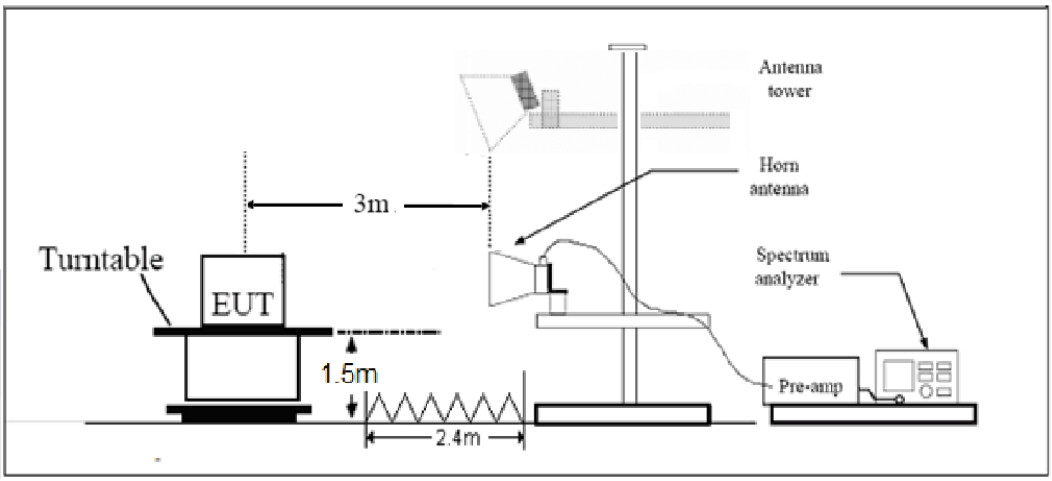
9KHz ~ 30MHz



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.

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	4.19 dB
200MHz-1GHz	3.63 dB
Above 1GHz	3.68 dB

Test result

Sweep from 9 kHz to 30MHz, and the emissions more than 20 dB below the permissible value are not reported.

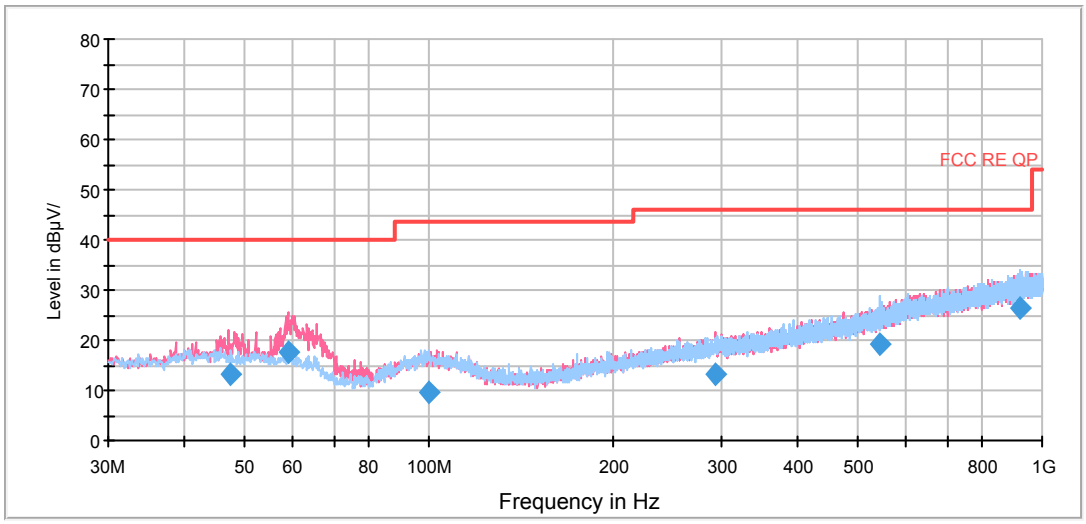
The following graphs display the maximum values of horizontal and vertical by software.

For above 1GHz, Blue trace uses the peak detection, Green trace uses the average detection.

During the test, the Radiates Emission from 30MHz to 1GHz was performed in all modes with all channels, 802.11b, Channel 6 are selected as the worst condition. The test data of the worst-case condition was recorded in this report.

Continuous TX mode:

FCC 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)
47.536250	13.1	0.0	100.0	V	162.0	13.1	26.9	40.0
58.977500	17.8	5.1	100.0	V	139.0	12.7	22.2	40.0
99.965000	9.6	-3.7	125.0	H	20.0	13.3	33.9	43.5
293.875000	13.2	-2.4	125.0	V	34.0	15.6	32.8	46.0
543.977500	19.1	-2.5	125.0	H	26.0	21.6	26.9	46.0
923.972500	26.2	-0.7	100.0	H	96.0	26.9	19.8	46.0

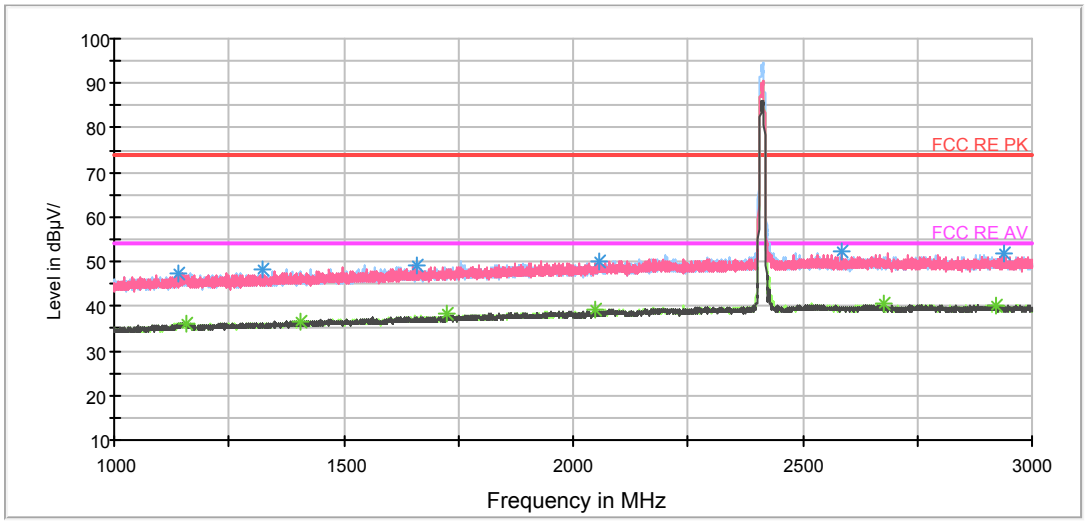
Remark: 1. Quasi-Peak = Reading value + Correction factor

2. Correction Factor = Antenna factor+ Insertion loss(cable loss+amplifier gain)

3. Margin = Limit – Quasi-Peak

802.11b CH1

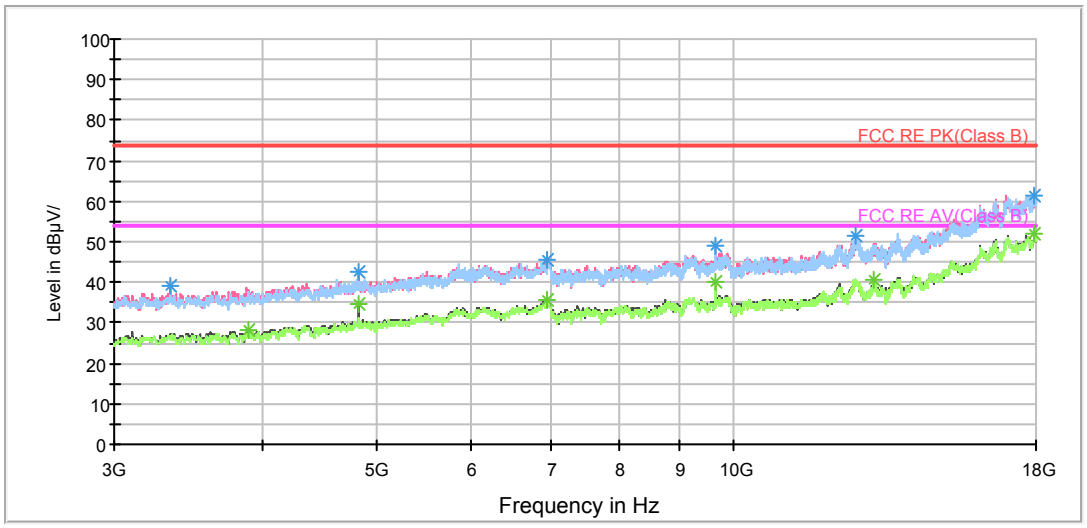
RE 1G-6GHz PK+AV Class B



Note: The signal beyond the limit is carrier.

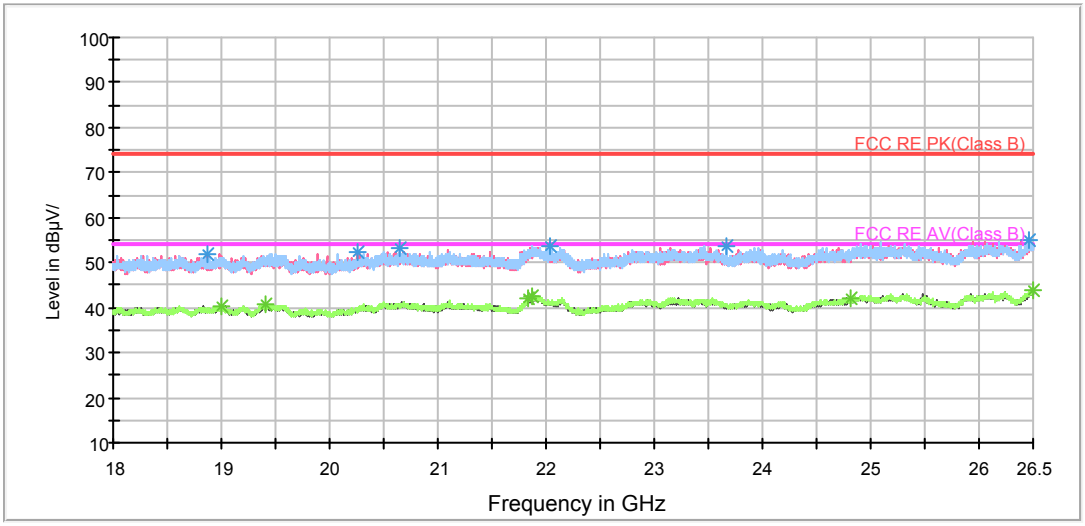
Radiates Emission from 1GHz to 3GHz

RE 3-18GHz PK+AV



Radiates Emission from 3GHz to 18GHz

BELL_RE 18-26.5GHz PK+AV



Radiates Emission from 18GHz to 26.5GHz

Frequency (MHz)	Peak (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Reading value (dBuV/m)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
1138.750000	47.5	100.0	V	51.0	45.2	2.3	26.5	74
1321.000000	48.5	100.0	H	0.0	45.7	2.8	25.5	74
1661.250000	49.3	100.0	V	0.0	45.3	4.0	24.7	74
2055.500000	50.1	100.0	H	242.0	44.7	5.4	23.9	74
2583.500000	52.2	100.0	V	0.0	45.0	7.2	21.8	74
2940.750000	51.8	100.0	H	48.0	44.3	7.5	22.2	74

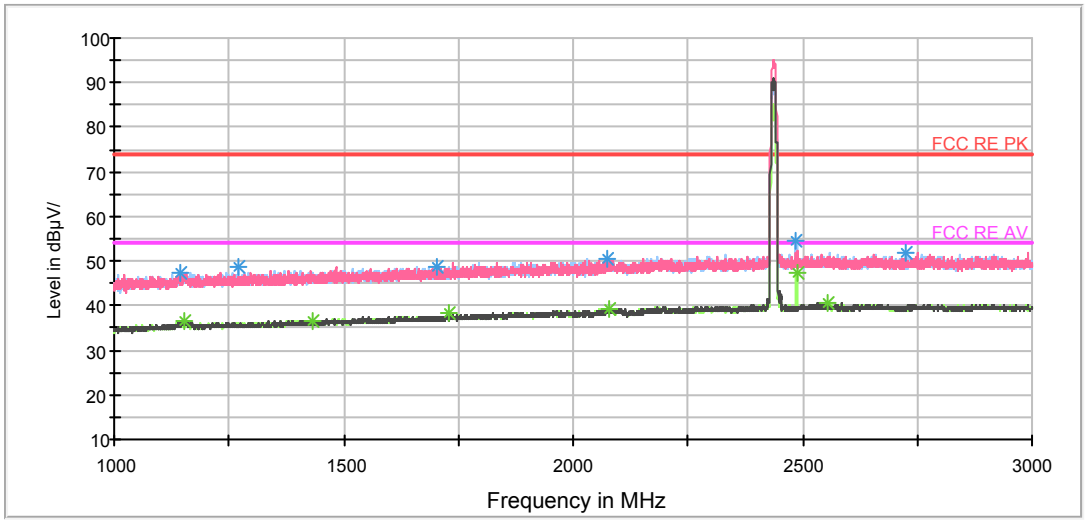
Remark: 1. Correction Factor = Antenna factor+ Insertion loss (cable loss + amplifier gain)

Frequency (MHz)	Average (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Reading value (dBuV/m)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
1155.250000	36.3	100.0	V	42.0	34.0	2.3	17.7	54
1406.250000	36.6	100.0	V	98.0	33.5	3.1	17.4	54
1725.250000	38.1	100.0	V	154.0	33.9	4.2	15.9	54
2046.250000	39.1	100.0	H	358.0	33.7	5.4	14.9	54
2674.750000	40.4	100.0	H	195.0	33.1	7.3	13.6	54
2921.500000	40.2	100.0	V	0.0	32.7	7.5	13.8	54

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

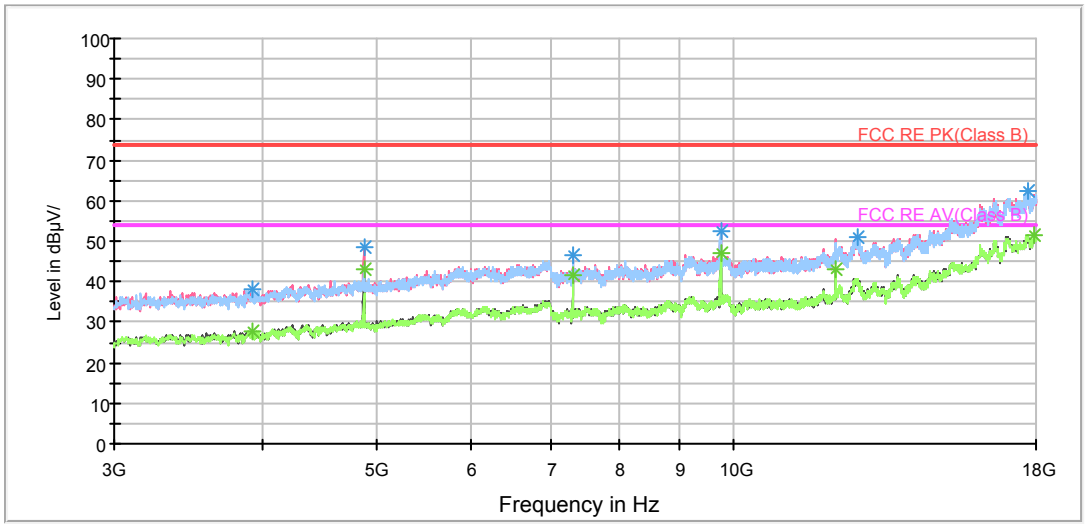
802.11b CH6

RE 1G-6GHz PK+AV Class B



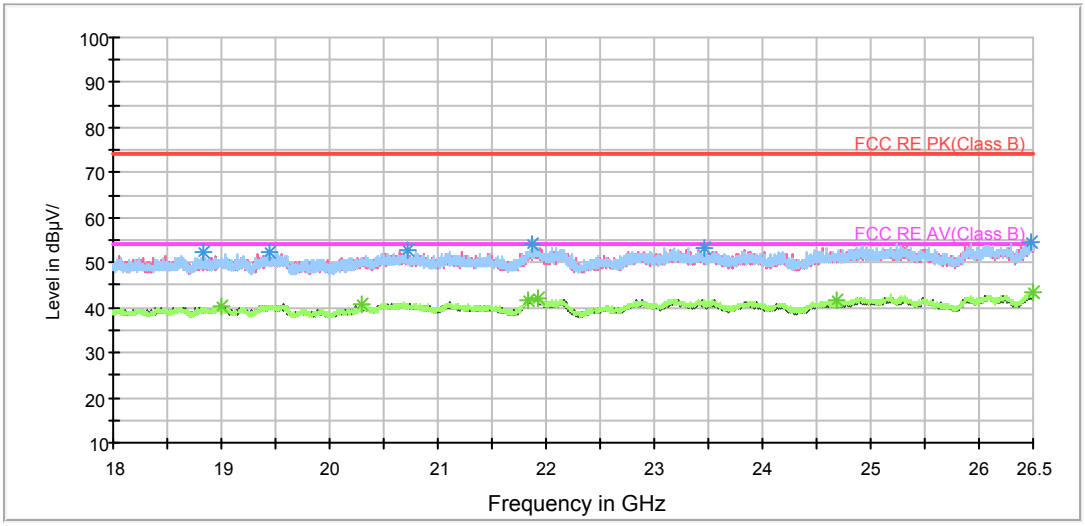
Note: The signal beyond the limit is carrier.
Radiates Emission from 1GHz to 3GHz

RE 3-18GHz PK+AV



Radiates Emission from 3GHz to 18GHz

BELL_RE 18-26.5GHz PK+AV



Radiates Emission from 18GHz to 26.5GHz

Frequency (MHz)	Peak (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Reading value (dBuV/m)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
1143.750000	47.4	100.0	H	304.0	45.1	2.3	26.6	74
1270.500000	48.6	100.0	H	174.0	45.9	2.7	25.4	74
1704.750000	48.7	100.0	H	0.0	44.6	4.1	25.3	74
2074.750000	50.4	100.0	V	42.0	44.9	5.5	23.6	74
2486.750000	54.7	100.0	H	174.0	47.6	7.1	19.3	74
2726.250000	51.9	100.0	H	0.0	44.6	7.3	22.1	74

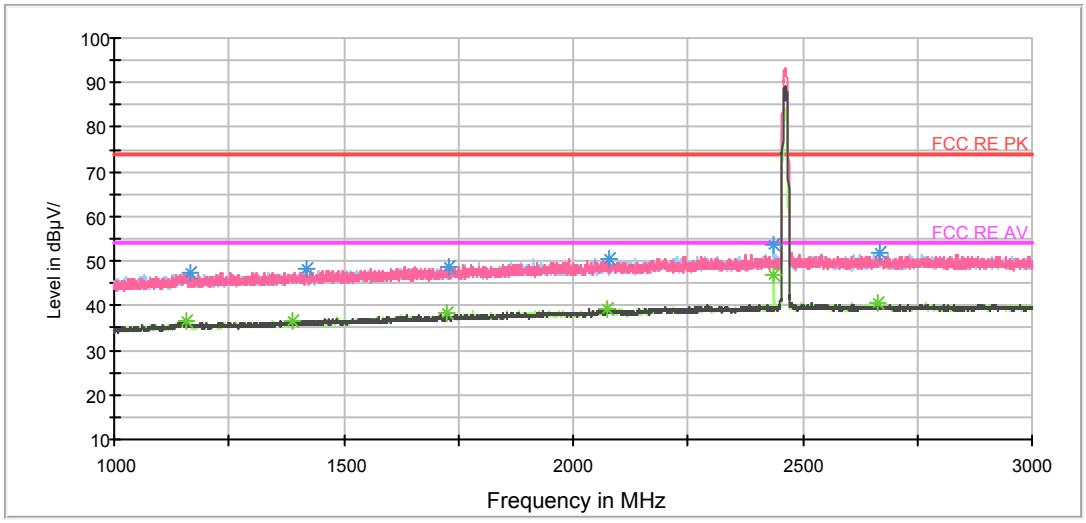
Remark: 1. Correction Factor = Antenna factor+ Insertion loss (cable loss + amplifier gain)

Frequency (MHz)	Average (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Reading value (dBuV/m)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
1154.500000	36.5	100.0	V	356.0	34.2	2.3	17.5	54
1431.250000	36.7	100.0	V	212.0	33.5	3.2	17.3	54
1728.000000	38.1	100.0	H	276.0	33.9	4.2	15.9	54
2079.500000	39.4	100.0	H	352.0	33.9	5.5	14.6	54
2487.000000	47.1	100.0	H	174.0	40.0	7.1	6.9	54
2555.250000	40.6	100.0	V	0.0	33.4	7.2	13.4	54

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

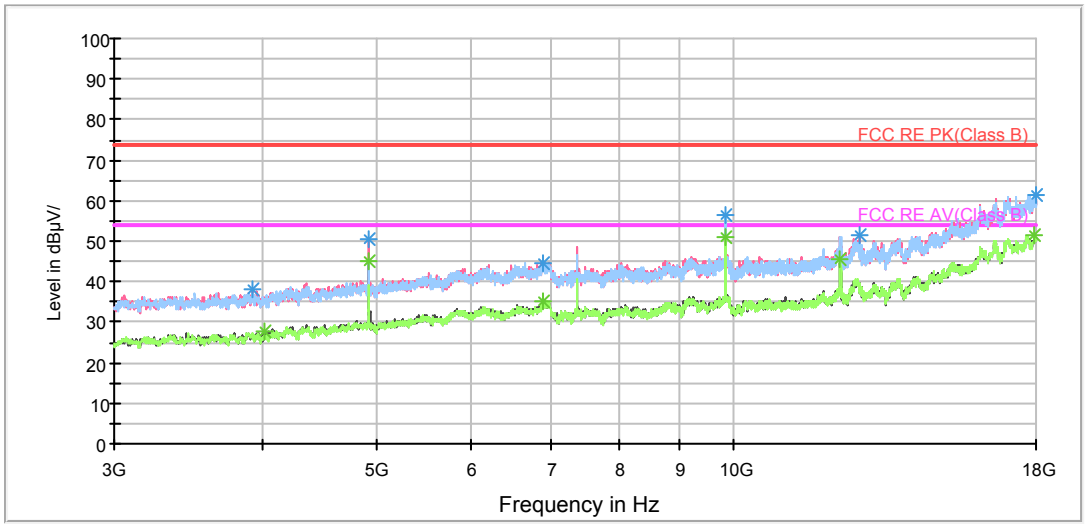
802.11b CH11

RE 1G-6GHz PK+AV Class B



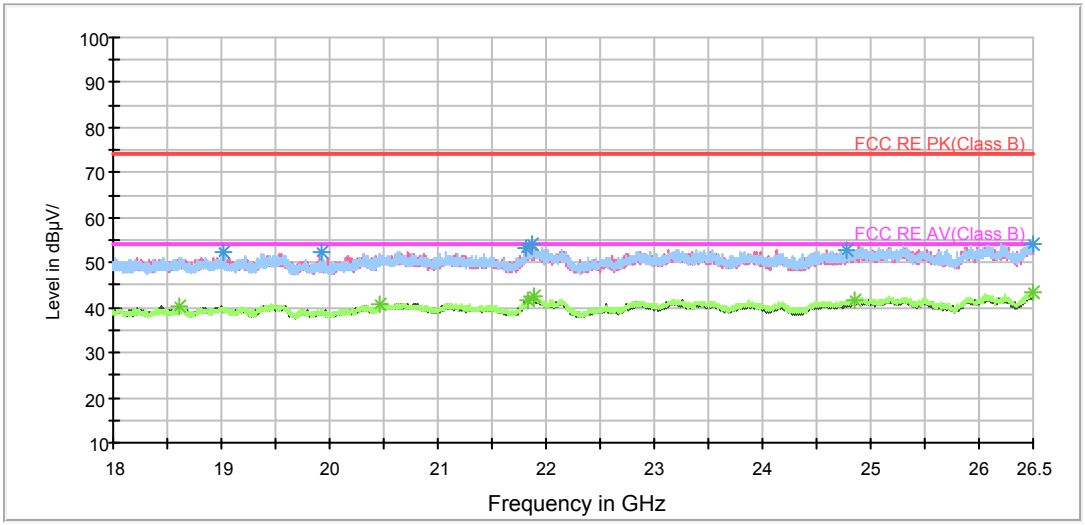
Note: The signal beyond the limit is carrier.
Radiates Emission from 1GHz to 3GHz

RE 3-18GHz PK+AV



Radiates Emission from 3GHz to 18GHz

BELL_RE 18-26.5GHz PK+AV



Radiates Emission from 18GHz to 26.5GHz

Frequency (MHz)	Peak (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Reading value (dBuV/m)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
1165.750000	47.3	100.0	V	323.0	45.0	2.3	26.7	74
1420.500000	48.3	100.0	V	11.0	45.2	3.1	25.7	74
1727.250000	48.9	100.0	V	42.0	44.7	4.2	25.1	74
2077.750000	50.5	100.0	H	297.0	45.0	5.5	23.5	74
2436.750000	53.8	100.0	H	0.0	46.9	6.9	20.2	74
2667.000000	52.0	100.0	V	8.0	44.7	7.3	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)
1158.500000	36.3	100.0	H	306.0	34.0	2.3	17.7	54
1389.250000	36.7	100.0	V	3.0	33.7	3.0	17.3	54
1725.250000	38.1	100.0	V	280.0	33.9	4.2	15.9	54
2075.250000	39.3	100.0	H	167.0	33.8	5.5	14.7	54
2438.000000	47.0	100.0	H	0.0	40.1	6.9	7.0	54
2662.750000	40.7	100.0	H	147.0	33.4	7.3	13.3	54

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

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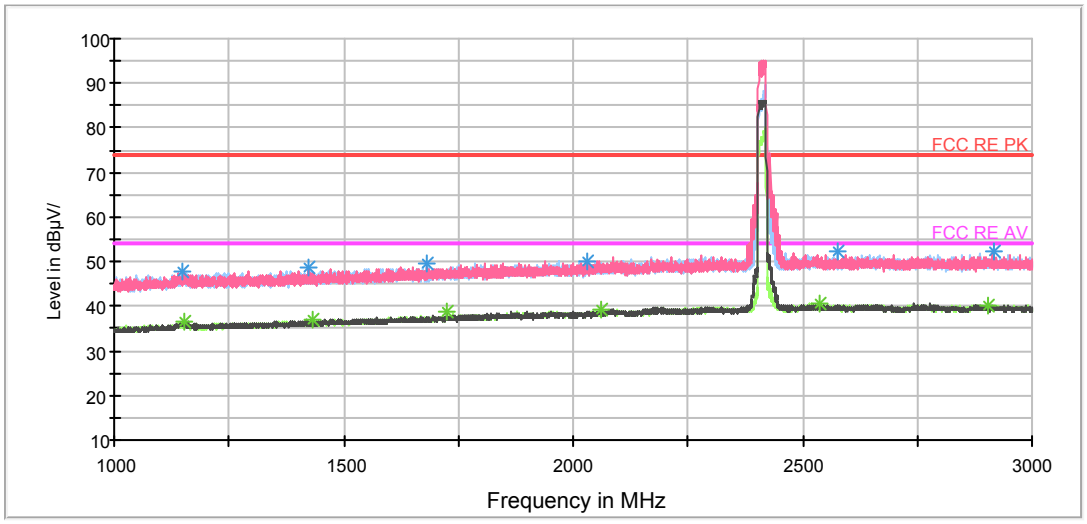
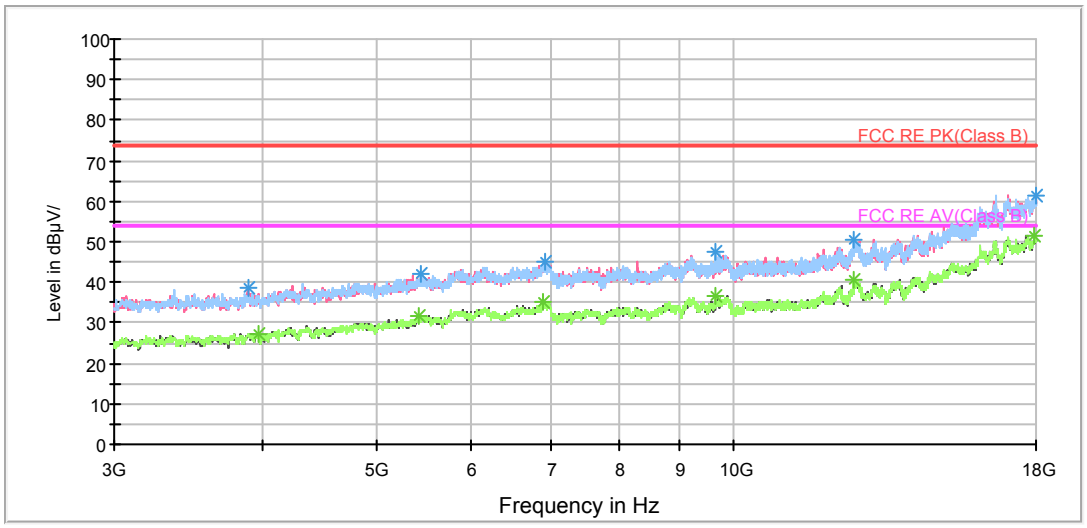
RE 1G-6GHz PK+AV Class B



Note: The signal beyond the limit is carrier.

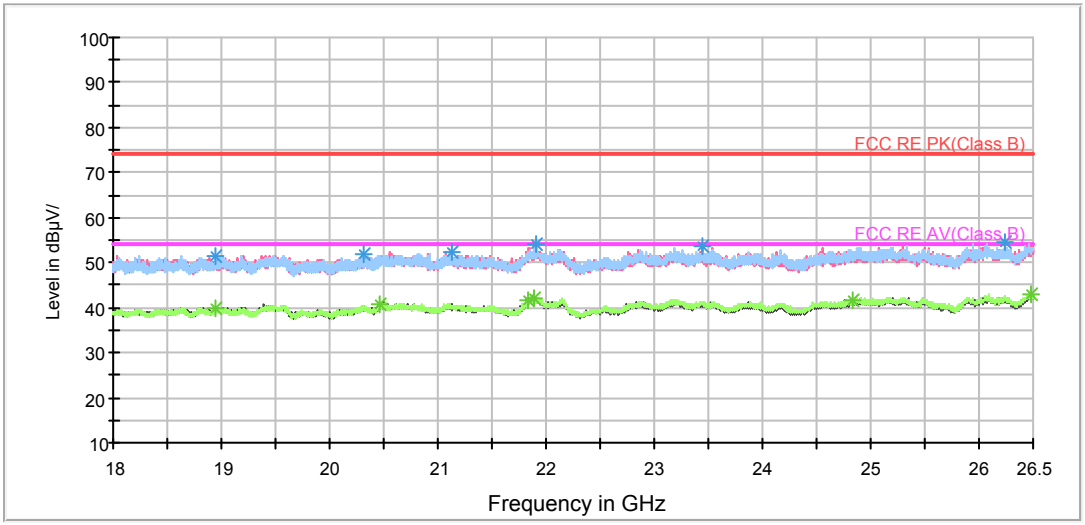
Radiates Emission from 1GHz to 3GHz

RE 3-18GHz PK+AV



Radiates Emission from 3GHz to 18GHz

BELL_RE 18-26.5GHz PK+AV



Radiates Emission from 18GHz to 26.5GHz

Frequency (MHz)	Peak (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Reading value (dBuV/m)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
1150.000000	47.6	100.0	H	341.0	45.3	2.3	26.4	74
1424.750000	48.9	100.0	V	101.0	45.8	3.1	25.1	74
1683.000000	49.7	100.0	H	59.0	45.6	4.1	24.3	74
2032.500000	50.2	100.0	V	91.0	44.9	5.3	23.8	74
2577.750000	52.5	100.0	H	290.0	45.3	7.2	21.5	74
2916.500000	52.3	100.0	V	241.0	44.8	7.5	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)
1152.000000	36.5	100.0	V	46.0	34.2	2.3	17.5	54
1431.500000	36.9	100.0	V	0.0	33.7	3.2	17.1	54
1724.750000	38.9	100.0	V	101.0	34.7	4.2	15.1	54
2061.750000	39.2	100.0	V	260.0	33.7	5.5	14.8	54
2535.500000	40.6	100.0	V	73.0	33.4	7.2	13.4	54
2905.250000	40.3	100.0	H	349.0	32.8	7.5	13.7	54

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

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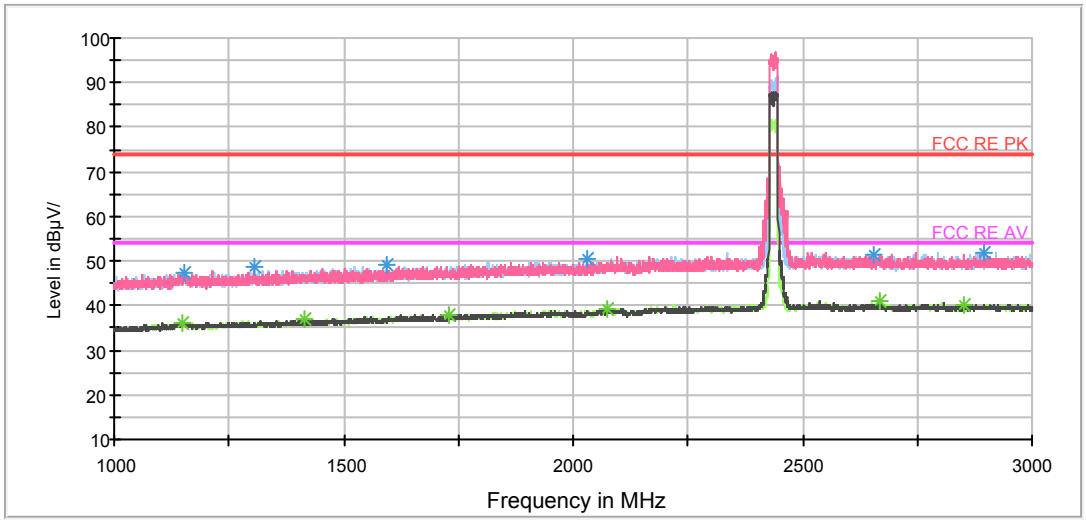
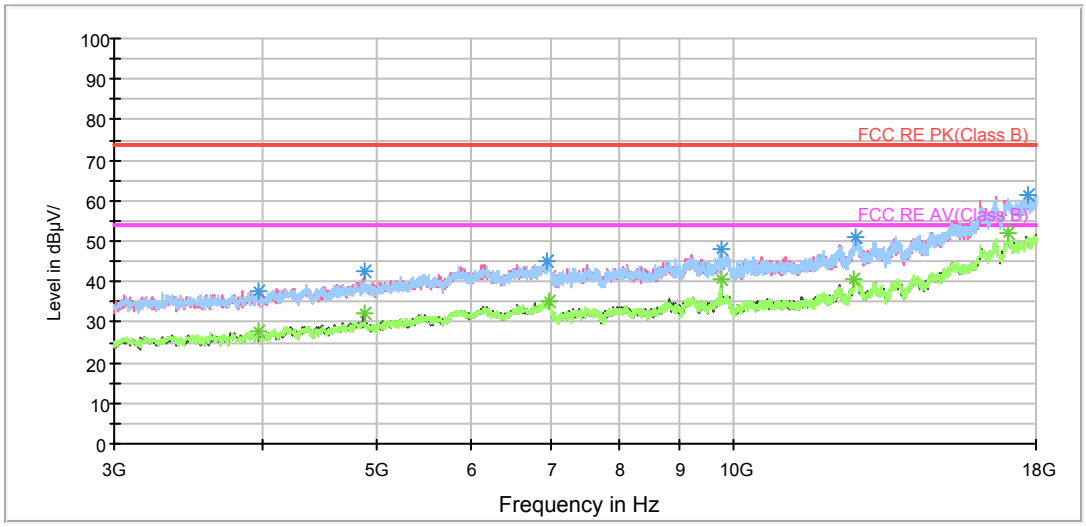
RE 1G-6GHz PK+AV Class B



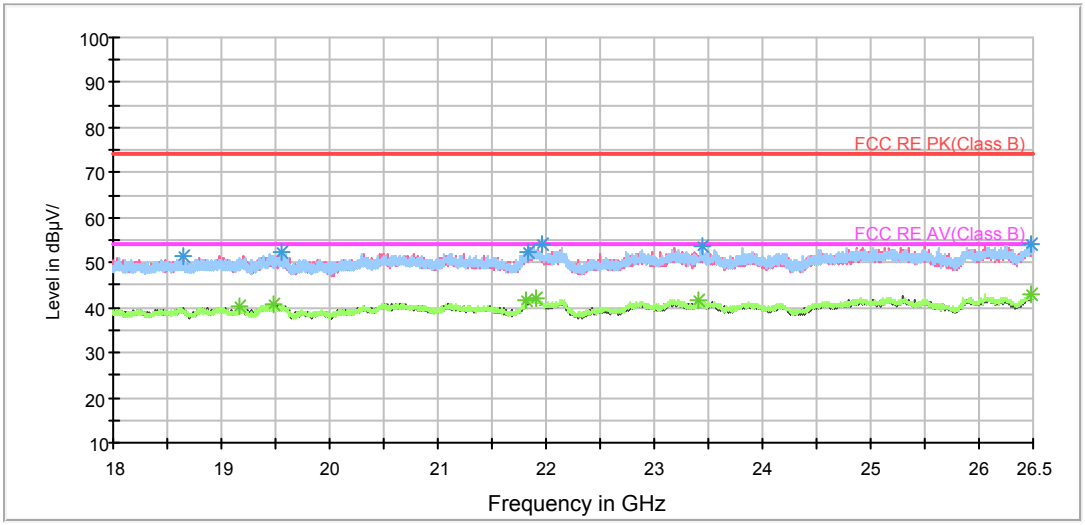
Note: The signal beyond the limit is carrier.
Radiates Emission from 1GHz to 3GHz

RE 3-18GHz PK+AV



Radiates Emission from 3GHz to 18GHz

BELL_RE 18-26.5GHz PK+AV



Radiates Emission from 18GHz to 26.5GHz

Frequency (MHz)	Peak (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Reading value (dBuV/m)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
1154.250000	47.2	100.0	H	0.0	44.9	2.3	26.8	74
1303.500000	48.6	100.0	V	18.0	45.8	2.8	25.4	74
1594.000000	49.0	100.0	H	0.0	45.3	3.7	25.0	74
2028.500000	50.5	100.0	H	145.0	45.2	5.3	23.5	74
2655.000000	51.6	100.0	H	145.0	44.3	7.3	22.4	74
2894.500000	51.9	100.0	V	10.0	44.4	7.5	22.1	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)
1150.500000	36.3	100.0	V	154.0	34.0	2.3	17.7	54
1413.250000	36.8	100.0	V	346.0	33.7	3.1	17.2	54
1729.000000	38.0	100.0	H	60.0	33.8	4.2	16.0	54
2072.250000	39.2	100.0	H	220.0	33.7	5.5	14.8	54
2666.500000	40.9	100.0	H	257.0	33.6	7.3	13.1	54
2851.500000	40.3	100.0	V	192.0	32.9	7.4	13.7	54

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

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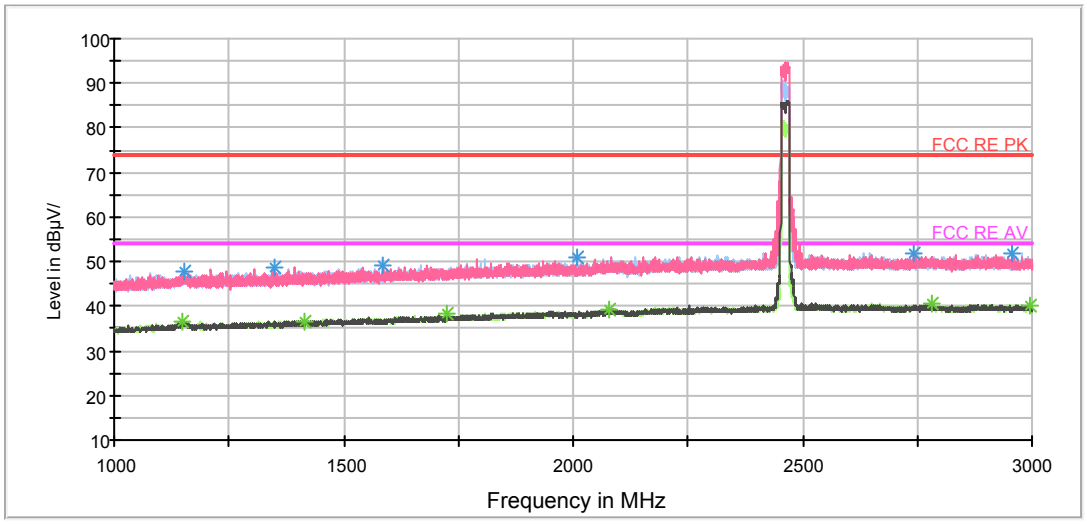
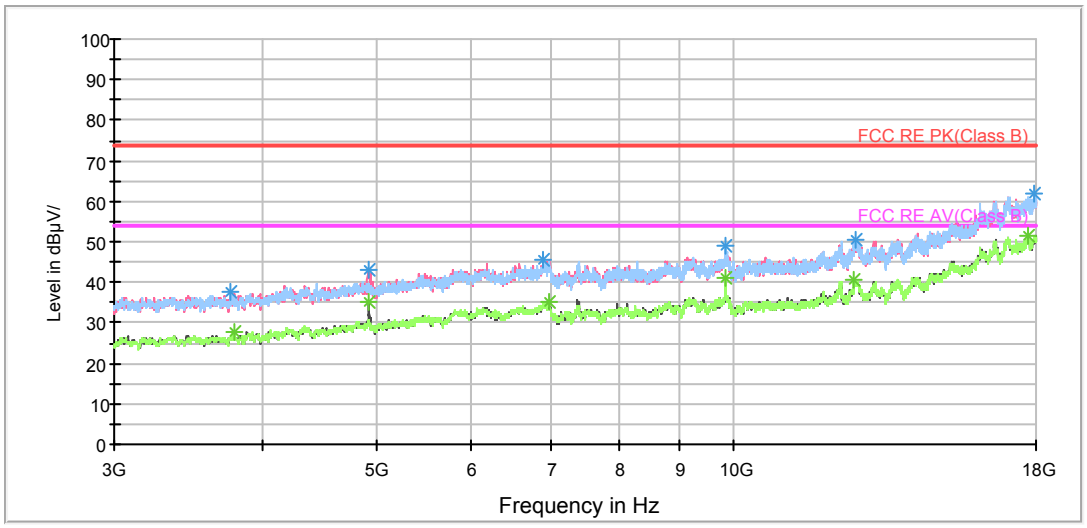
RE 1G-6GHz PK+AV Class B



Note: The signal beyond the limit is carrier.

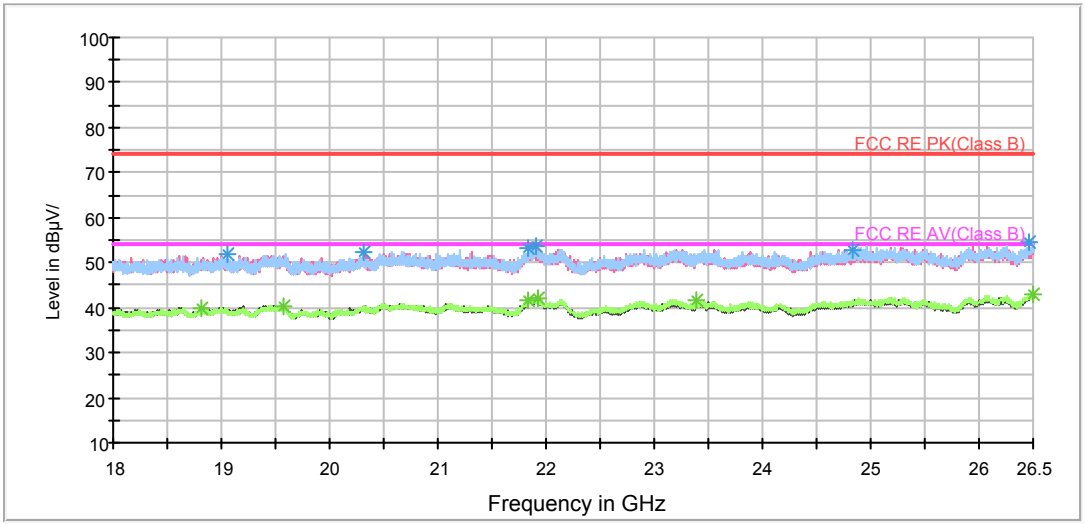
Radiates Emission from 1GHz to 3GHz

RE 3-18GHz PK+AV



Radiates Emission from 3GHz to 18GHz

BELL_RE 18-26.5GHz PK+AV



Radiates Emission from 18GHz to 26.5GHz

Frequency (MHz)	Peak (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Reading value (dBuV/m)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
1152.500000	47.6	100.0	H	356.0	45.3	2.3	26.4	74
1349.000000	48.5	100.0	H	359.0	45.6	2.9	25.5	74
1587.250000	49.3	100.0	V	203.0	45.6	3.7	24.7	74
2008.000000	51.0	100.0	H	344.0	45.8	5.2	23.0	74
2742.500000	51.7	100.0	H	0.0	44.3	7.4	22.3	74
2957.750000	51.9	100.0	H	331.0	44.4	7.5	22.1	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)
1150.250000	36.5	100.0	V	80.0	34.2	2.3	17.5	54
1415.500000	36.7	100.0	H	0.0	33.6	3.1	17.3	54
1725.000000	38.2	100.0	V	14.0	34.0	4.2	15.8	54
2079.000000	39.3	100.0	V	0.0	33.8	5.5	14.7	54
2780.000000	40.6	100.0	V	2.0	33.2	7.4	13.4	54
2995.250000	40.2	100.0	H	357.0	32.6	7.6	13.8	54

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

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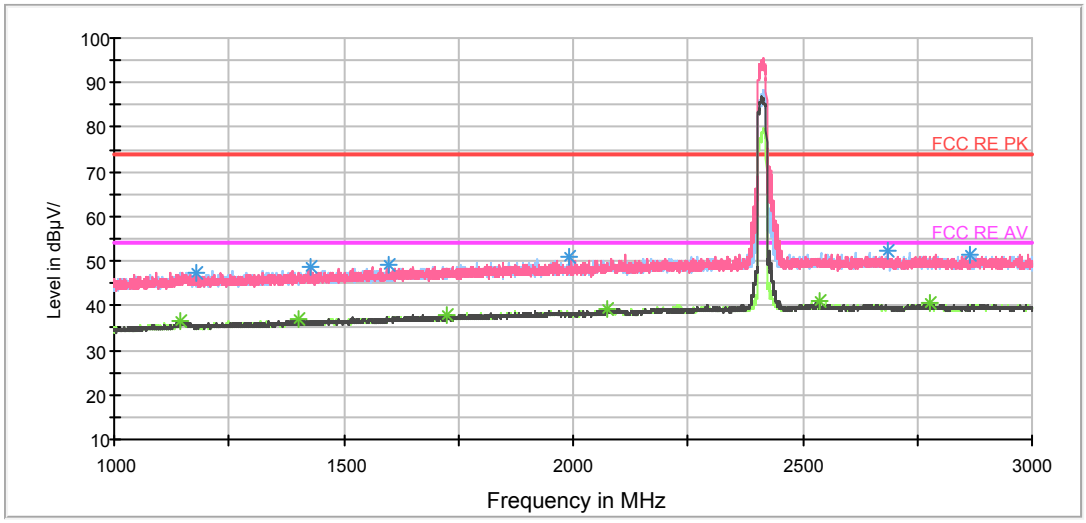
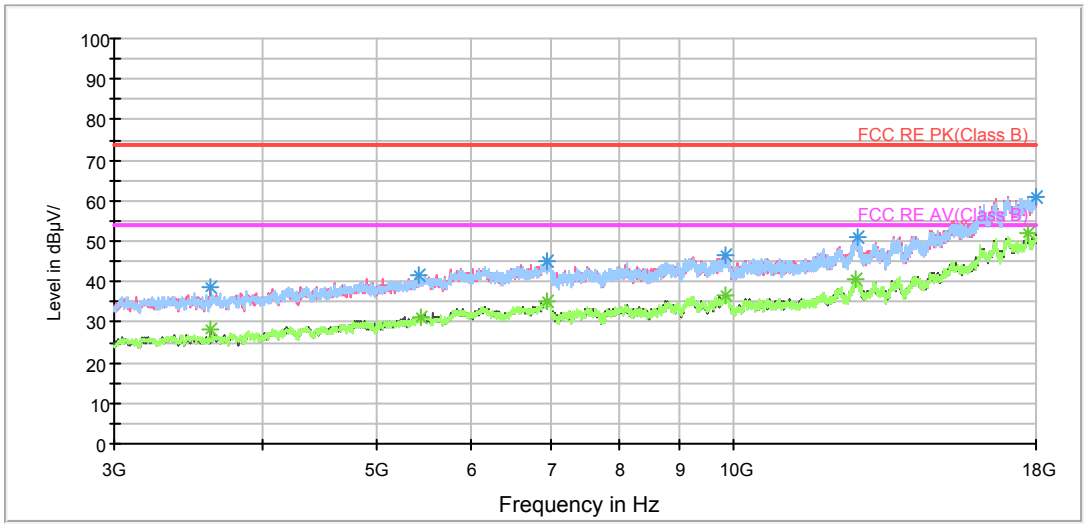
RE 1G-6GHz PK+AV Class B



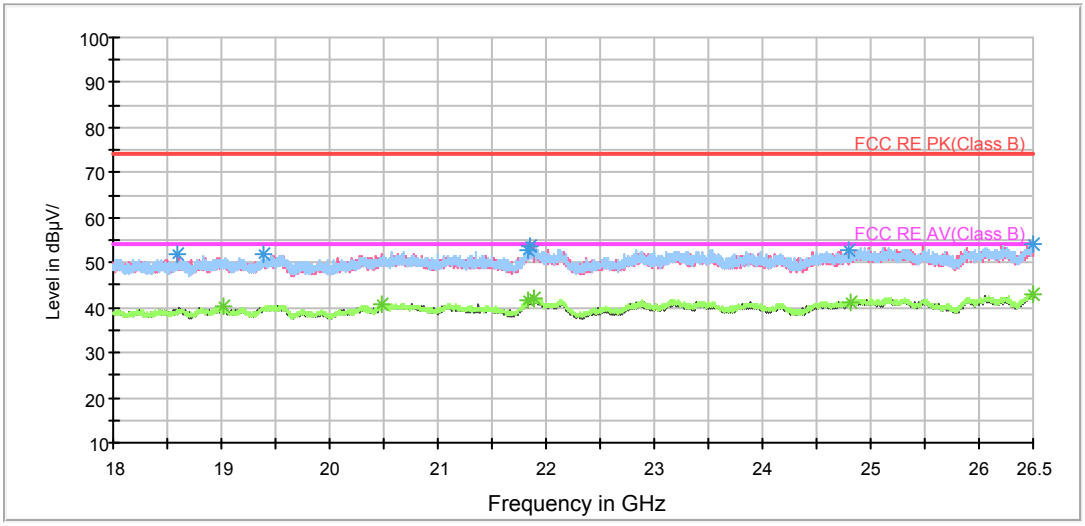
Note: The signal beyond the limit is carrier.
Radiates Emission from 1GHz to 3GHz

RE 3-18GHz PK+AV



Radiates Emission from 3GHz to 18GHz

BELL_RE 18-26.5GHz PK+AV



Radiates Emission from 18GHz to 26.5GHz

Frequency (MHz)	Peak (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Reading value (dBuV/m)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
1178.500000	47.6	100.0	V	24.0	45.2	2.4	26.4	74
1428.000000	48.5	100.0	V	4.0	45.4	3.1	25.5	74
1597.000000	49.0	100.0	V	6.0	45.3	3.7	25.0	74
1993.250000	51.0	100.0	V	0.0	45.8	5.2	23.0	74
2686.000000	52.4	100.0	V	41.0	45.1	7.3	21.6	74
2863.500000	51.3	100.0	V	172.0	43.8	7.5	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)
1143.500000	36.4	100.0	V	0.0	34.1	2.3	17.6	54
1401.750000	36.8	100.0	H	354.0	33.7	3.1	17.2	54
1724.500000	37.9	100.0	V	346.0	33.7	4.2	16.1	54
2075.750000	39.2	100.0	V	18.0	33.7	5.5	14.8	54
2536.250000	40.9	100.0	V	24.0	33.7	7.2	13.1	54
2777.750000	40.5	100.0	V	0.0	33.1	7.4	13.5	54

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

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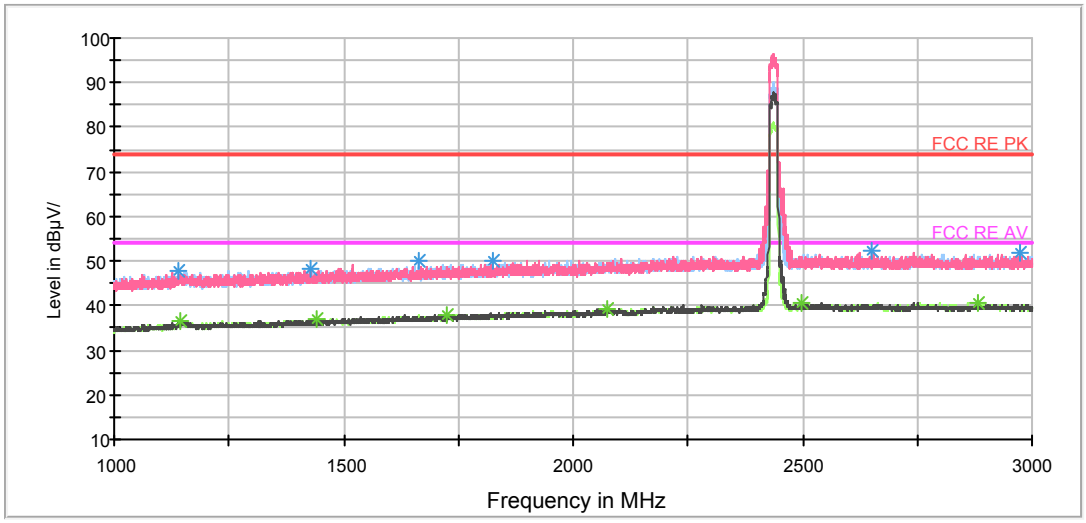
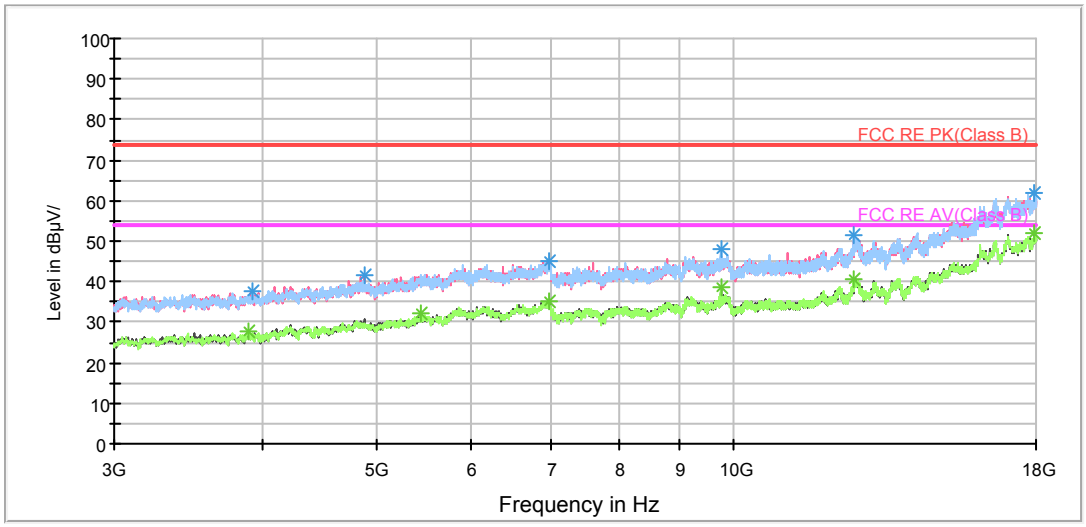
RE 1G-6GHz PK+AV Class B



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