FCC Test Report

Report No.:	RF191231C03-2
FCC ID:	UK7-C1N
Test Model:	C1NF1
Received Date:	Dec. 31, 2019
Test Date:	Jan. 06, 2020 ~ Feb. 21, 2020
Issued Date:	Jul. 07, 2020
Applicant:	Fossil Group, Inc.
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Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Lin Kou Laboratories
Lab Address:	No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan
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FCC Registration / Designation Number:	427177 / TW0011

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Release Control Record

Issue No.	Description	Date Issued
RF191231C03-2	Original Release	Jul. 07, 2020

1 Certificate of Conformity

Product: Smart Watch

Brand: FOSSIL

Test Model: C1NF1

Sample Status: Identical Prototype

Applicant: Fossil Group, Inc.

Test Date: Jan. 06, 2020 ~ Feb. 21, 2020

Standards: 47 CFR FCC Part 15, Subpart C (Section 15.247)
ANSI C63.10:2013

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's RF characteristics under the conditions specified in this report.

Prepared by : _____ , **Date:** Jul. 07, 2020
Shelly Hsueh / Specialist

Approved by : _____ , **Date:** Jul. 07, 2020
Dylan Chiou / Senior Project Engineer

2 Summary of Test Results

47 CFR FCC Part 15, Subpart C (Section 15.247)			
FCC Clause	**Test Item**	**Result**	**Remarks**
15.207	AC Power Conducted Emission	Pass	Meet the requirement of limit. Minimum passing margin is -14.49 dB at 0.15400 MHz.
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	Pass	Meet the requirement of limit. Minimum passing margin is -1.18 dB at 2483.52 MHz.
15.247(d)	Antenna Port Emission	Pass	Meet the requirement of limit.
15.247(a)(2)	6 dB Bandwidth	Pass	Meet the requirement of limit.
---	Occupied Bandwidth Measurement	Pass	Reference only
15.247(b)	Conducted power	Pass	Meet the requirement of limit.
15.247(e)	Power Spectral Density	Pass	Meet the requirement of limit.
15.203	Antenna Requirement	Pass	No antenna connector is used.

Note:

1. For 2.4G band compliance with rule 15.247(d)of the band-edge items, the test plots were recorded in Annex A. Test Procedures refer to report 4.1.3.
2. Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement	Frequency	Expanded Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150 kHz ~ 30 MHz	2.79 dB
Radiated Emissions up to 1 GHz	9 kHz ~ 30 MHz	3.04 dB
	30 MHz ~ 200 MHz	2.0153 dB
	200 MHz ~ 1000 MHz	2.0224 dB
Radiated Emissions above 1 GHz	1 GHz ~ 18 GHz	1.0121 dB
	18 GHz ~ 40 GHz	1.1508 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	Smart Watch
Brand	FOSSIL
Test Model	C1NF1
Status of EUT	Identical Prototype
Power Supply Rating	3.85 Vdc (Li-ion battery)
Modulation Type	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
Modulation Technology	DSSS, OFDM
Transfer Rate	802.11b: 11.0 / 5.5 / 2.0 / 1.0 Mbps 802.11g: 54.0 / 48.0 / 36.0 / 24.0 / 18.0 / 12.0 / 9.0 / 6.0 Mbps 802.11n: up to 72.2 Mbps
Operating Frequency	2412 ~ 2472 MHz
Number of Channel	13 for 802.11b, 802.11g, 802.11n (HT20)
Output Power	83.56 mW
Antenna Type	Loop antenna with -5.15 dBi gain
Antenna Connector	N/A
Accessory Device	Refer to Note as below
Data Cable Supplied	N/A

Note:

1. The EUT incorporates a SISO function. Physically, the EUT provides 1 completed transmitters and 1 receivers.

Modulation Mode	Tx Function
802.11b	1TX
802.11g	1TX
802.11n (HT20)	1TX

2. The above Antenna information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications, the laboratory shall not be held responsible.
3. The above EUT information is declared by manufacturer and for more detailed features description, please refers to the manufacturer's specifications or user's manual.

3.2 Description of Test Modes

13 channels are provided for 802.11b, 802.11g and 802.11n (HT20):

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2412	8	2447
2	2417	9	2452
3	2422	10	2457
4	2427	11	2462
5	2432	12	2467
6	2437	13	2472
7	2442		

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT Configure Mode	Applicable To				Description
	RE≥1G	RE<1G	PLC	APCM	
-	√	√	√	√	-

Where **RE≥1G:** Radiated Emission above 1 GHz **RE<1G:** Radiated Emission below 1 GHz
PLC: Power Line Conducted Emission **APCM:** Antenna Port Conducted Measurement

NOTE: The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **Z-plane**.
NOTE: "-"means no effect.

Radiated Emission Test (Above 1 GHz):

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
-	802.11b	1 to 13	1, 6, 11, 12, 13	DSSS	DBPSK	1.0
-	802.11g	1 to 13	1, 6, 11, 12, 13	OFDM	BPSK	6.0
-	802.11n (HT20)	1 to 13	1, 6, 11, 12, 13	OFDM	BPSK	6.5

Radiated Emission Test (Below 1 GHz):

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
-	802.11g	1 to 13	13	OFDM	BPSK	6.0

Power Line Conducted Emission Test:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
-	802.11g	1 to 13	13	OFDM	BPSK	6.0

Bandedge Measurement:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
-	802.11b	1 to 13	1, 11, 12, 13	DSSS	DBPSK	1.0
-	802.11g	1 to 13	1, 11, 12, 13	OFDM	BPSK	6.0
-	802.11n (HT20)	1 to 13	1, 11, 12, 13	OFDM	BPSK	6.5

Antenna Port Conducted Measurement:

☒ This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.
☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
-	802.11b	1 to 13	1, 6, 11, 12, 13	DSSS	DBPSK	1.0
-	802.11g	1 to 13	1, 6, 11, 12, 13	OFDM	BPSK	6.0
-	802.11n (HT20)	1 to 13	1, 6, 11, 12, 13	OFDM	BPSK	6.5

Test Condition:

Applicable To	Environmental Conditions	Input Power	Tested by
RE≥1G	25 deg. C, 65 % RH	120 Vac, 60 Hz	Karl Lee
RE<1G	25 deg. C, 65 % RH	120 Vac, 60 Hz	Karl Lee
PLC	25 deg. C, 65 % RH	120 Vac, 60 Hz	Jisyong Wang
APCM	25 deg. C, 65 % RH	3.85 Vdc	Gavin Wu

3.3 Duty Cycle of Test Signal

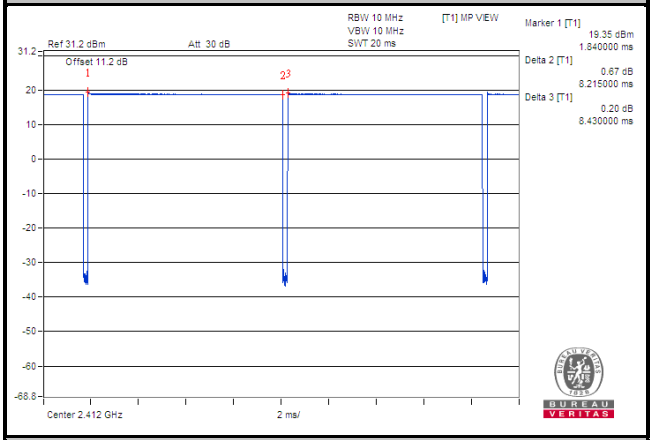
Duty cycle of test signal is < 98 %, duty factor shall be considered.

802.11b: Duty cycle = 8.215/8.43 = 0.974, Duty factor = 10 * log(1/0.974) = 0.11

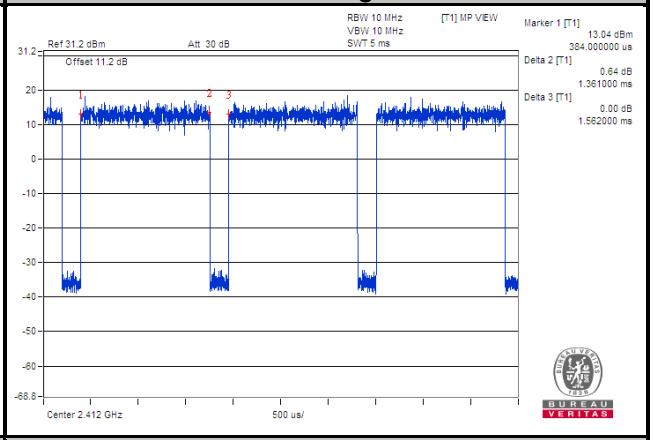
802.11g: Duty cycle = 1.361/1.562 = 0.971, Duty factor = 10 * log(1/0.971) = 0.60

802.11n (HT20): Duty cycle = 1.273/1.488 = 0.856, Duty factor = 10 * log(1/0.856) = 0.68

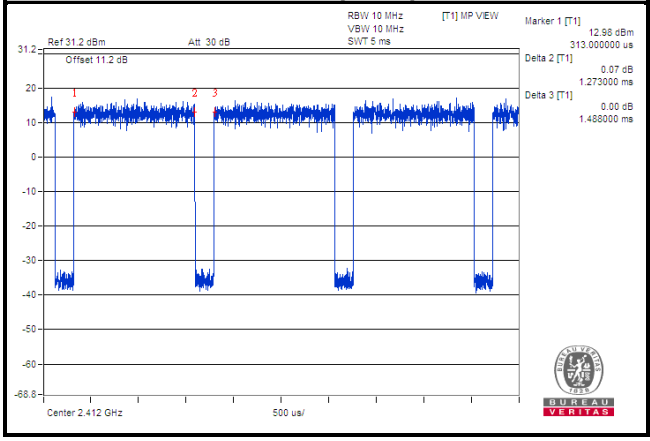
802.11b



802.11g



802.11n (HT20)



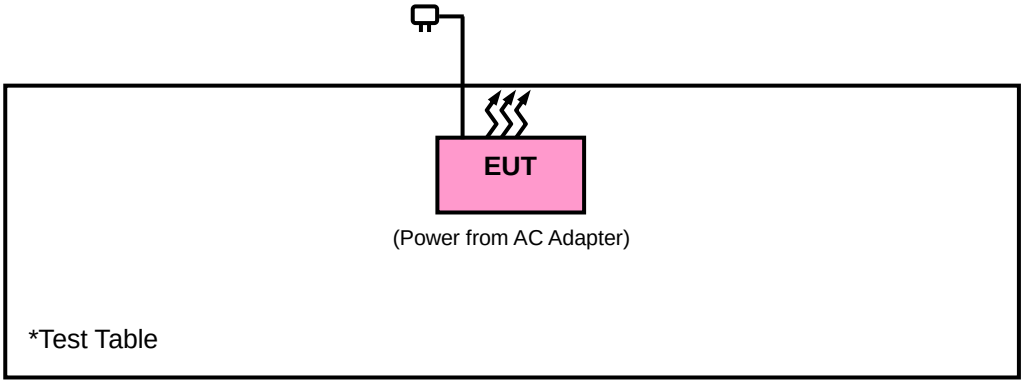
3.4 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

No.	Product	Brand	Model No.	Serial No.	FCC ID
1.	Adapter	ASUS	AD827M	N/A	N/A

No.	Signal Cable Description Of The Above Support Units
1.	1m shielded cable

3.4.1 Configuration of System under Test



3.5 General Description of Applied Standards and References

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards and references:

Test Standard:

FCC Part 15, Subpart C (15.247)
ANSI C63.10-2013

All test items have been performed and recorded as per the above standards.

References Test Guidance:

KDB 558074 D01 Meas Guidance v05r02

All test items have been performed as a reference to the above KDB test guidance.

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 20 dB below the highest level of the desired power:

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 ~ 0.490	2400/F (kHz)	300
0.490 ~ 1.705	24000/F (kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

NOTE:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. For frequencies above 1000 MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20 dB under any condition of modulation.

4.1.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Test Receiver Agilent Technologies	N9038A	MY52260177	Aug. 26, 2019	Aug. 25, 2020
Spectrum Analyzer ROHDE & SCHWARZ	FSU43	101261	Apr. 15, 2019	Apr. 14, 2020
HORN Antenna ETS-Lindgren	3117	00143293	Nov. 24, 2019	Nov. 23, 2020
BILOG Antenna SCHWARZBECK	VULB 9168	9168-616	Nov. 12, 2019	Nov. 11, 2020
Fixed Attenuator Mini-Circuits	MDCS18N-10	MDCS18N-10-01	Apr. 15, 2019	Apr. 14, 2020
Bluetooth Tester	CBT	100980	Jul. 14, 2019	Jul. 13, 2020
Loop Antenna	EM-6879	269	Sep. 16, 2019	Sep. 15, 2020
Preamplifier Agilent	310N	187226	Jun. 18, 2019	Jun. 17, 2020
Preamplifier Agilent	83017A	MY39501357	Jun. 18, 2019	Jun. 17, 2020
Preamplifier EMCI	EMC 184045	980116	Oct. 08, 2019	Oct. 07, 2020
Power Meter Anritsu	ML2495A	1012010	Sep. 04, 2019	Sep. 03, 2020
Power Sensor Anritsu	MA2411B	1315050	Sep. 04, 2019	Sep. 03, 2020
RF signal cable ETS-LINDGREN RF signal cable ETS-LINDGREN	5D-FB 8D-FB	Cable-CH1-01(RFC-SMS-100-SMS-120+RFC-SMS-100-SMS-400) Cable-CH1-02(RFC-SMS-100-SMS-24)	Jun. 18, 2019	Jun. 17, 2020
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA
Software BV ADT	E3 8.130425b	NA	NA	NA
Antenna Tower MF	NA	NA	NA	NA
Turn Table MF	NA	NA	NA	NA
Antenna Tower &Turn Table Controller MF	MF-7802	NA	NA	NA
Antenna Tower MF	MFA-440H	NA	NA	NA
Turn Table MF	MFT-201SS	NA	NA	NA
Antenna Tower &Turn Table Controller MF	MF-7802	NA	NA	NA

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

4.1.3 Test Procedures

For Radiated Emission below 30 MHz

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
c. Parallel, perpendicular, and ground-parallel orientations of the antenna are set to make the measurement.
d. For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
e. The test-receiver system was set to Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

Note:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9 kHz at frequency below 30 MHz.

For Radiated Emission above 30 MHz

a. The EUT was placed on the top of a rotating table 0.8 meters (for 30 MHz ~ 1 GHz) / 1.5 meters (for above 1 GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
f. The test-receiver system was set to peak and average detected function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

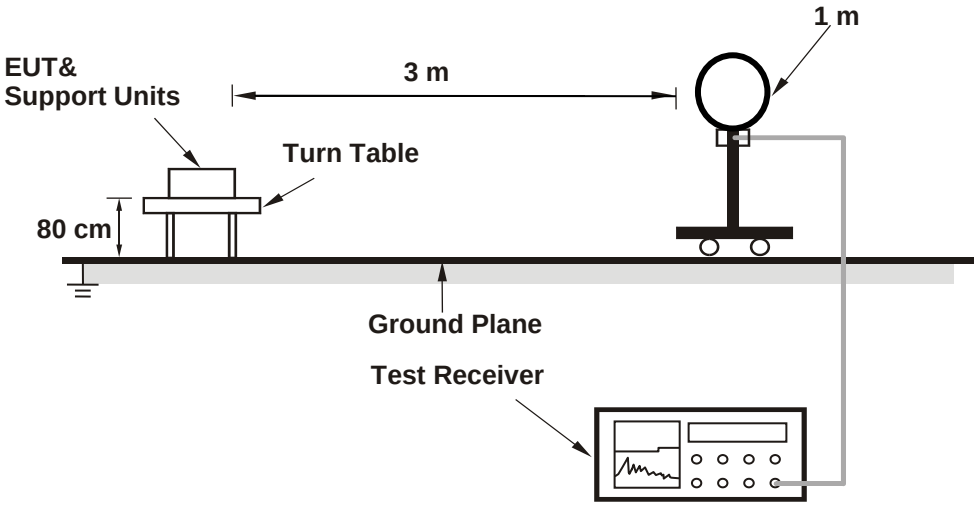
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection (QP) or Peak detection (PK) at frequency below 1 GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1 GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is ≥ 1/T (Duty cycle < 98 %) or 10 Hz (Duty cycle ≥ 98 %) for Average detection (AV) at frequency above 1 GHz.
   (11b: RBW = 10 MHz, VBW =10 MHz ; 11g: RBW = 10 MHz, VBW =10 MHz ;
   11n (HT20): RBW = 10 MHz, VBW =10 MHz)
4. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

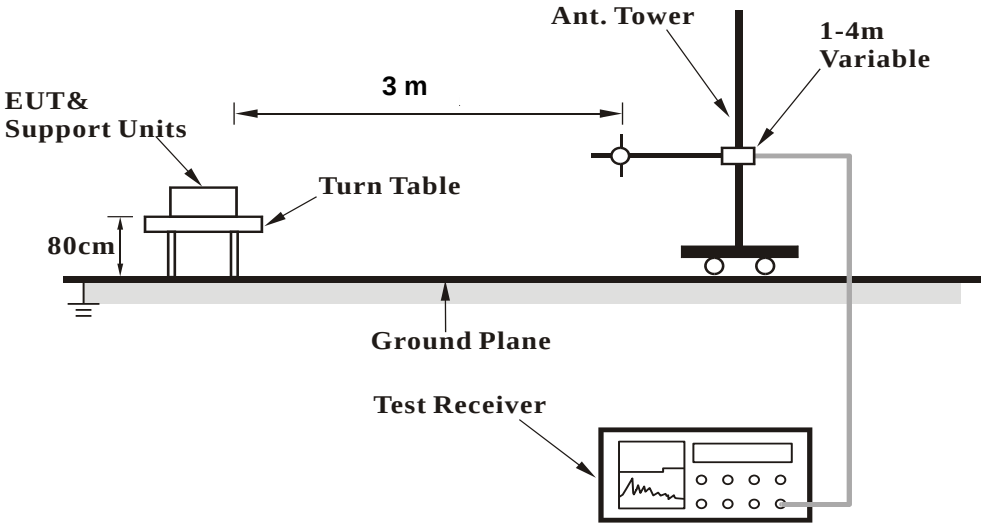
No deviation.

4.1.5 Test Set Up

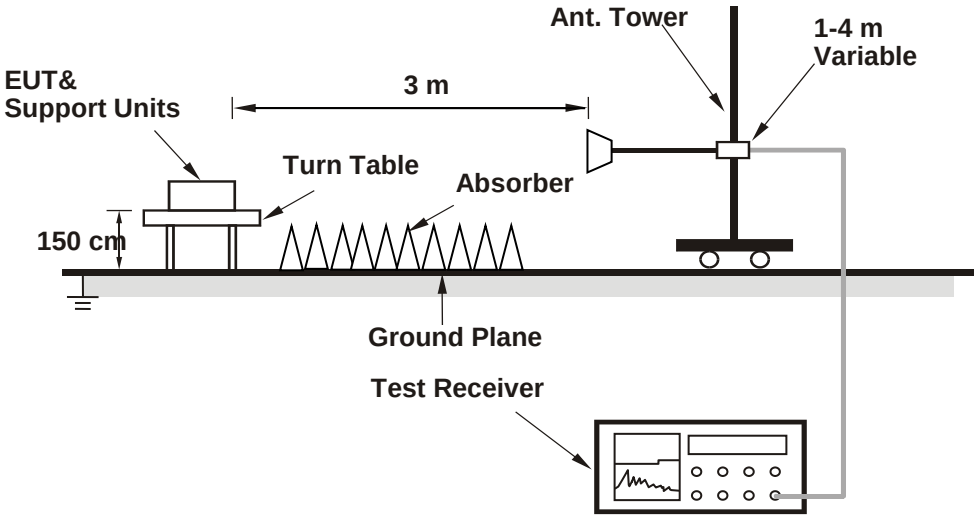
<Radiated Emission below 30 MHz>



<Radiated Emission 30 MHz to 1 GHz>



<Radiated Emission above 1 GHz>



For the actual test configuration, please refer to the attached file (Test Setup Photo).

KDB 414788 OFS and Chamber Correlation Justification (For Radiated emission below 30MHz)

- Base on FCC 15.31 (f) (2): measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field.

- Open-field site and chamber correlation testing had been performed and chamber measured test result is the worst case test result.

4.1.6 EUT Operating Conditions

a. Placed the EUT on a testing table.
b. Use the software to control the EUT under transmission condition continuously at specific channel frequency.

4.1.7 Test Results

Above 1 GHz Data：

802.11b

EUT Test Condition		Measurement Detail	
Channel	Channel 1	**Frequency Range**	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Karl Lee

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2387.22	40.13	35.64	4.49	54	-13.87	100	32	Average
2387.22	51.83	47.34	4.49	74	-22.17	100	32	Peak
2412	90.54	85.99	4.55			100	32	Average
2412	93.06	88.51	4.55			100	32	Peak
4824	41.76	31.47	10.29	54	-12.24	113	25	Average
4824	49.41	39.12	10.29	74	-24.59	113	25	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2385.96	41.25	36.76	4.49	54	-12.75	172	26	Average
2385.96	51.96	47.47	4.49	74	-22.04	172	26	Peak
2412	91.56	87.01	4.55			172	26	Average
2412	94.48	89.93	4.55			172	26	Peak
4824	41.64	31.35	10.29	54	-12.36	112	252	Average
4824	48.98	38.69	10.29	74	-25.02	112	252	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 2412 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 6	**Frequency Range**	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Karl Lee

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2384.16	40.06	35.59	4.47	54	-13.94	100	2384.16	40.06
2384.16	51.21	46.74	4.47	74	-22.79	100	2384.16	51.21
2437	90.5	85.91	4.59			100	2437	90.5
2437	93.06	88.47	4.59			100	2437	93.06
2497.48	40.6	35.93	4.67	54	-13.4	100	2497.48	40.6
2497.48	51.74	47.07	4.67	74	-22.26	100	2497.48	51.74
4874	41.69	31.48	10.21	54	-12.31	188	4874	41.69
4874	48.28	38.07	10.21	74	-25.72	188	4874	48.28
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2386.14	40.1	35.61	4.49	54	-13.9	172	2386.14	40.1
2386.14	52.13	47.64	4.49	74	-21.87	172	2386.14	52.13
2437	91.44	86.85	4.59			172	2437	91.44
2437	94.93	90.34	4.59			172	2437	94.93
2499.8	40.62	35.95	4.67	54	-13.38	172	2499.8	40.62
2499.8	51.67	47	4.67	74	-22.33	172	2499.8	51.67
4874	41.76	31.55	10.21	54	-12.24	116	4874	41.76
4874	48.02	37.81	10.21	74	-25.98	116	4874	48.02

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 2437 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 11	**Frequency Range**	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Karl Lee

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2462	89.26	84.64	4.62			202	348	Average
2462	92.28	87.66	4.62			202	348	Peak
2483.6	42.1	37.44	4.66	54	-11.9	202	348	Average
2483.6	51.79	47.13	4.66	74	-22.21	202	348	Peak
4924	41.79	31.54	10.25	54	-12.21	115	5	Average
4924	49.69	39.44	10.25	74	-24.31	115	5	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2462	90.36	85.74	4.62			100	7	Average
2462	93.12	88.5	4.62			100	7	Peak
2483.84	42.55	37.89	4.66	54	-11.45	100	7	Average
2483.84	52.01	47.35	4.66	74	-21.99	100	7	Peak
4924	41.77	31.52	10.25	54	-12.23	157	308	Average
4924	48.85	38.6	10.25	74	-25.15	157	308	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 2462 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 12	**Frequency Range**	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Karl Lee

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2467	89.5	84.87	4.63			202	348	Average
2467	92.32	87.69	4.63			202	348	Peak
2484.36	48.08	43.42	4.66	54	-5.92	202	348	Average
2484.36	55.11	50.45	4.66	74	-18.89	202	348	Peak
4934	41.8	31.54	10.26	54	-12.2	155	5	Average
4934	48.03	37.77	10.26	74	-25.97	155	5	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2467	90.17	85.54	4.63			100	7	Average
2467	93.53	88.9	4.63			100	7	Peak
2484.44	51.62	46.96	4.66	54	-2.38	100	7	Average
2484.44	57.53	52.87	4.66	74	-16.47	100	7	Peak
4934	41.88	31.62	10.26	54	-12.12	189	240	Average
4934	48.14	37.88	10.26	74	-25.86	189	240	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 2467 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 13	**Frequency Range**	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Karl Lee

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2472	88.42	83.78	4.64			202	348	Average
2472	91.03	86.39	4.64			202	348	Peak
2485.2	46.45	41.79	4.66	54	-7.55	202	348	Average
2485.2	54.21	49.55	4.66	74	-19.79	202	348	Peak
4944	41.79	31.44	10.35	54	-12.21	159	5	Average
4944	48.15	37.8	10.35	74	-25.85	159	5	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2472	89.42	84.78	4.64			100	7	Average
2472	92.02	87.38	4.64			100	7	Peak
2485.08	51.88	47.22	4.66	54	-2.12	100	7	Average
2485.08	56.3	51.64	4.66	74	-17.7	100	7	Peak
4944	41.87	31.52	10.35	54	-12.13	135	55	Average
4944	47.59	37.24	10.35	74	-26.41	135	55	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 2472 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

802.11g

EUT Test Condition		Measurement Detail	
Channel	Channel 1	**Frequency Range**	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Karl Lee

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2389.2	41.37	36.88	4.49	54	-12.63	114	348	Average
2389.2	51.61	47.12	4.49	74	-22.39	114	348	Peak
2412	83.51	78.96	4.55			114	348	Average
2412	90.45	85.9	4.55			114	348	Peak
4824	41.83	31.54	10.29	54	-12.17	147	185	Average
4824	47.71	37.42	10.29	74	-26.29	147	185	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2389.83	41.24	36.74	4.5	54	-12.76	172	26	Average
2389.83	51.6	47.1	4.5	74	-22.4	172	26	Peak
2412	84.39	79.84	4.55			172	26	Average
2412	91.54	86.99	4.55			172	26	Peak
4824	42.03	31.74	10.29	54	-11.97	133	325	Average
4824	48.28	37.99	10.29	74	-25.72	133	325	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 2412 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 6	**Frequency Range**	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Karl Lee

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2385.42	40.2	35.73	4.47	54	-13.8	202	348	Average
2385.42	51.59	47.12	4.47	74	-22.41	202	348	Peak
2437	83.77	79.18	4.59			202	348	Average
2437	90.08	85.49	4.59			202	348	Peak
2494.52	40.57	35.9	4.67	54	-13.43	202	348	Average
2494.52	53.03	48.36	4.67	74	-20.97	202	348	Peak
4874	40.78	30.57	10.21	54	-13.22	132	222	Average
4874	47.33	37.12	10.21	74	-26.67	132	222	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2387.04	40.11	35.62	4.49	54	-13.89	172	26	Average
2387.04	51.33	46.84	4.49	74	-22.67	172	26	Peak
2437	84.41	79.82	4.59			172	26	Average
2437	91.98	87.39	4.59			172	26	Peak
2494.64	40.55	35.88	4.67	54	-13.45	172	26	Average
2494.64	51.53	46.86	4.67	74	-22.47	172	26	Peak
4874	41.66	31.45	10.21	54	-12.34	152	25	Average
4874	48.68	38.47	10.21	74	-25.32	152	25	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 2437 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 11	**Frequency Range**	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Karl Lee

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2462	83.33	78.71	4.62			202	348	Average
2462	90.58	85.96	4.62			202	348	Peak
2483.64	42.75	38.09	4.66	54	-11.25	202	348	Average
2483.64	53.88	49.22	4.66	74	-20.12	202	348	Peak
4924	41.78	31.53	10.25	54	-12.22	166	54	Average
4924	48.51	38.26	10.25	74	-25.49	166	54	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2462	84.43	79.81	4.62			100	7	Average
2462	91.37	86.75	4.62			100	7	Peak
2483.88	44.27	39.61	4.66	54	-9.73	100	7	Average
2483.88	56.14	51.48	4.66	74	-17.86	100	7	Peak
4924	41.76	31.51	10.25	54	-12.24	133	321	Average
4924	48.14	37.89	10.25	74	-25.86	133	321	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 2462 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 12	**Frequency Range**	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Karl Lee

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2467	83.77	79.14	4.63			202	348	Average
2467	90.59	85.96	4.63			202	348	Peak
2483.52	46.71	42.05	4.66	54	-7.29	202	348	Average
2483.52	60.71	56.05	4.66	74	-13.29	202	348	Peak
4934	41.8	31.54	10.26	54	-12.2	124	7	Average
4934	47.78	37.52	10.26	74	-26.22	124	7	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2467	84.62	79.99	4.63			100	7	Average
2467	91.46	86.83	4.63			100	7	Peak
2484.08	50.4	45.74	4.66	54	-3.6	100	7	Average
2484.08	64.61	59.95	4.66	74	-9.39	100	7	Peak
4934	41.8	31.54	10.26	54	-12.2	148	225	Average
4934	48.89	38.63	10.26	74	-25.11	148	225	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 2467 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 13	**Frequency Range**	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Karl Lee

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2472	81.74	77.1	4.64			202	348	Average
2472	88.26	83.62	4.64			202	348	Peak
2483.52	47.67	43.01	4.66	54	-6.33	202	348	Average
2483.52	63.21	58.55	4.66	74	-10.79	202	348	Peak
4944	41.88	31.53	10.35	54	-12.12	165	59	Average
4944	47.96	37.61	10.35	74	-26.04	165	59	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2472	82.55	77.91	4.64			100	7	Average
2472	89.99	85.35	4.64			100	7	Peak
2483.52	**52.82**	**48.16**	**4.66**	**54**	**-1.18**	**100**	**7**	**Average**
2483.52	64.54	59.88	4.66	74	-9.46	100	7	Peak
4944	41.79	31.44	10.35	54	-12.21	127	205	Average
4944	48.27	37.92	10.35	74	-25.73	127	205	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 2472 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

802.11n (HT20)

EUT Test Condition		Measurement Detail	
Channel	Channel 1	**Frequency Range**	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Karl Lee

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2389.74	40.48	35.99	4.49	54	-13.52	202	348	Average
2389.74	51.81	47.32	4.49	74	-22.19	202	348	Peak
2412	83.55	79	4.55			202	348	Average
2412	90.12	85.57	4.55			202	348	Peak
4824	41.63	31.34	10.29	54	-12.37	105	191	Average
4824	48.38	38.09	10.29	74	-25.62	105	191	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2389.83	41.79	37.29	4.5	54	-12.21	172	26	Average
2389.83	51.89	47.39	4.5	74	-22.11	172	26	Peak
2412	84.63	80.08	4.55			172	26	Average
2412	91.24	86.69	4.55			172	26	Peak
4824	41.78	31.49	10.29	54	-12.22	147	112	Average
4824	47.69	37.4	10.29	74	-26.31	147	112	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 2412 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 6	**Frequency Range**	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Karl Lee

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2389.02	40.09	35.6	4.49	54	-13.91	202	348	Average
2389.02	51.33	46.84	4.49	74	-22.67	202	348	Peak
2437	83.62	79.03	4.59			202	348	Average
2437	90.34	85.75	4.59			202	348	Peak
2484.64	40.54	35.88	4.66	54	-13.46	202	348	Average
2484.64	51.72	47.06	4.66	74	-22.28	202	348	Peak
4874	41.59	31.38	10.21	54	-12.41	162	2	Average
4874	47.09	36.88	10.21	74	-26.91	162	2	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2389.74	40.15	35.66	4.49	54	-13.85	172	5	Average
2389.74	51.59	47.1	4.49	74	-22.41	172	5	Peak
2437	84.71	80.12	4.59			172	5	Average
2437	91.96	87.37	4.59			172	5	Peak
2485.64	40.62	35.96	4.66	54	-13.38	172	5	Average
2485.64	52.31	47.65	4.66	74	-21.69	172	5	Peak
4874	41.65	31.44	10.21	54	-12.35	124	113	Average
4874	46.87	36.66	10.21	74	-27.13	124	113	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 2437 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 11	**Frequency Range**	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Karl Lee

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2462	83.59	78.97	4.62			202	348	Average
2462	90.27	85.65	4.62			202	348	Peak
2483.68	42.46	37.8	4.66	54	-11.54	202	348	Average
2483.68	54.87	50.21	4.66	74	-19.13	202	348	Peak
4924	41.88	31.63	10.25	54	-12.12	134	199	Average
4924	48.69	38.44	10.25	74	-25.31	134	199	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2462	84.36	79.74	4.62			100	7	Average
2462	91.19	86.57	4.62			100	7	Peak
2483.56	45	40.34	4.66	54	-9	100	7	Average
2483.56	57.29	52.63	4.66	74	-16.71	100	7	Peak
4924	41.83	31.58	10.25	54	-12.17	135	255	Average
4924	47.64	37.39	10.25	74	-26.36	135	255	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 2462 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 12	**Frequency Range**	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Karl Lee

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2467	81.25	76.62	4.63			202	348	Average
2467	88.01	83.38	4.63			202	348	Peak
2483.52	44.92	40.26	4.66	54	-9.08	202	348	Average
2483.52	57.86	53.2	4.66	74	-16.14	202	348	Peak
4934	41.84	31.58	10.26	54	-12.16	112	5	Average
4934	47.64	37.38	10.26	74	-26.36	112	5	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2467	82.35	77.72	4.63			100	7	Average
2467	89.1	84.47	4.63			100	7	Peak
2483.76	48.76	44.1	4.66	54	-5.24	100	7	Average
2483.76	61.95	57.29	4.66	74	-12.05	100	7	Peak
4934	41.8	31.54	10.26	54	-12.2	133	256	Average
4934	47.71	37.45	10.26	74	-26.29	133	256	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 2467 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 13	**Frequency Range**	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Karl Lee

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2472	81.22	76.58	4.64			202	348	Average
2472	88.74	84.1	4.64			202	348	Peak
2483.52	47.89	43.23	4.66	54	-6.11	202	348	Average
2483.52	62.5	57.84	4.66	74	-11.5	202	348	Peak
4944	41.94	31.59	10.35	54	-12.06	185	9	Average
4944	48.58	38.23	10.35	74	-25.42	185	9	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2472	82.33	77.69	4.64			100	7	Average
2472	89.68	85.04	4.64			100	7	Peak
2483.52	52.29	47.63	4.66	54	-1.71	100	7	Average
2483.52	66.96	62.3	4.66	74	-7.04	100	7	Peak
4944	41.89	31.54	10.35	54	-12.11	133	345	Average
4944	47.8	37.45	10.35	74	-26.2	133	345	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 2472 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

9 kHz ~ 30 MHz Data:

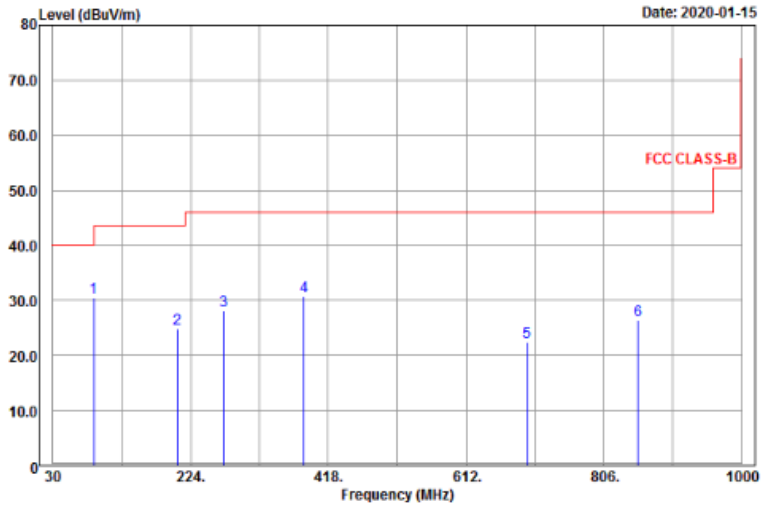
The amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required to be report.

30 MHz ~ 1 GHz Worst-Case Data:

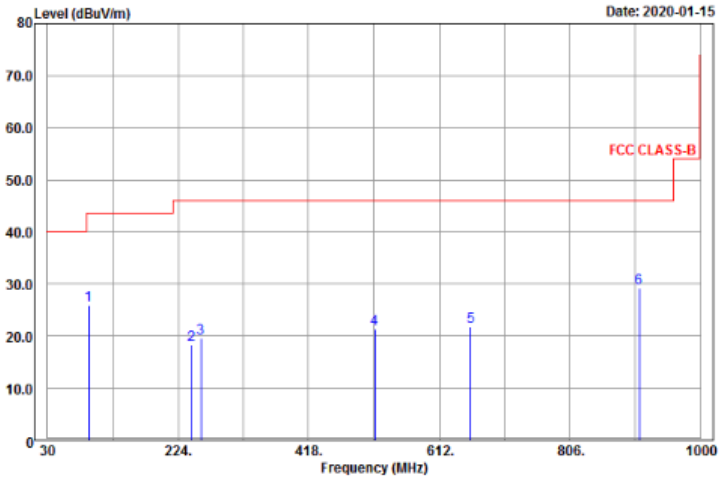
802.11g

EUT Test Condition		Measurement Detail	
Channel	Channel 13	**Frequency Range**	30 MHz ~ 1 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Quasi-peak (QP)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Karl Lee

Horizontal



Vertical



Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
88.05	30.57	50.13	-19.56	43.5	-12.93	188	205	Peak
205.77	24.91	43.09	-18.18	43.5	-18.59	112	214	Peak
270.84	28.13	44.65	-16.52	46	-17.87	105	2	Peak
384	30.63	44.81	-14.18	46	-15.37	138	174	Peak
698.3	22.36	31.61	-9.25	46	-23.64	192	222	Peak
854.4	26.3	33.01	-6.71	46	-19.7	184	175	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
90.75	25.91	44.71	-18.8	43.5	-17.59	124	206	Peak
243.84	18.27	35.24	-16.97	46	-27.73	188	285	Peak
257.88	19.61	36.31	-16.7	46	-26.39	134	199	Peak
516.3	21.37	33.51	-12.14	46	-24.63	188	26	Peak
658.4	21.88	31.79	-9.91	46	-24.12	105	26	Peak
909	29.13	34.9	-5.77	46	-16.87	124	215	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value.
2. The emission levels of other frequencies were very low against the limit.

4.2 Conducted Emission Measurement

4.2.1 Limits of Conducted Emission Measurement

Frequency (MHz)	Conducted Limit (dBuV)	
	Quasi-Peak	Average
0.15 - 0.5	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30.0	60	50

Note: 1. The lower limit shall apply at the transition frequencies.
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.

4.2.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Test Receiver ROHDE & SCHWARZ	ESCI	100613	Dec. 11, 2019	Dec. 10, 2020
RF signal cable (with 10dB PAD) Woken	5D-FB	Cable-cond1-01	Sep. 05, 2019	Sep. 04, 2020
LISN/AMN ROHDE & SCHWARZ (EUT)	ESH3-Z5	835239/001	Mar. 17, 2019	Mar. 16, 2020
LISN/AMN ROHDE & SCHWARZ (Peripheral)	ENV216	101196	Apr. 16, 2019	Apr. 15, 2020
Software ADT	BV ADT_Cond_ V7.3.7.3	NA	NA	NA

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in HwaYa Shielded Room 1.
3. The VCCI Site Registration No. is C-12040.

4.2.3 Test Procedures

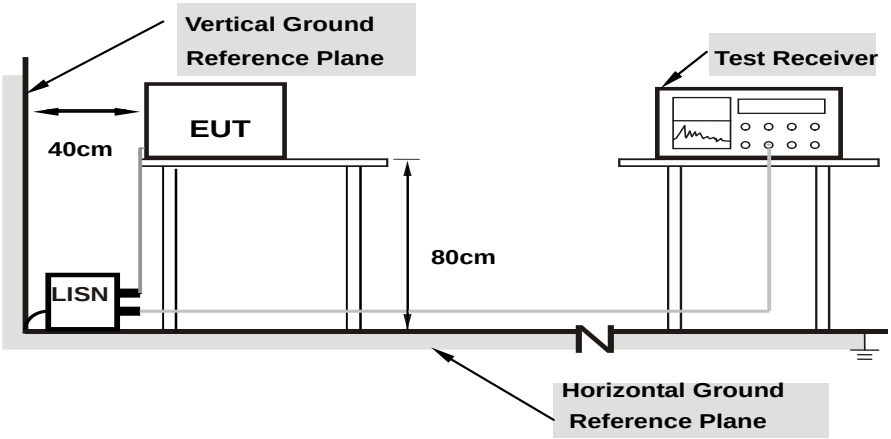
a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/50 uH of coupling impedance for the measuring instrument.
b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
c. The frequency range from 150 kHz to 30 MHz was searched. Emission levels under (Limit – 20 dB) was not recorded.

Note: The resolution bandwidth and video bandwidth of test receiver is 9 kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15 MHz – 30 MHz.

4.2.4 Deviation from Test Standard

No deviation.

4.2.5 Test Setup



Note: 1.Support units were connected to second LISN.

For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.2.6 EUT Operating Conditions

a. Placed the EUT on a testing table.
b. Use the software to control the EUT under transmission condition continuously at specific channel frequency.

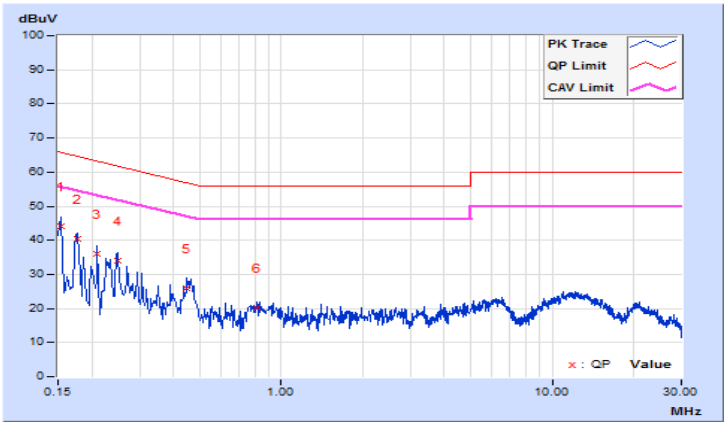
4.2.7 Test Results

Frequency Range	150kHz ~ 30MHz	Detector Function & Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	25℃, 65%RH

Phase Of Power : Line (L)										
No	Frequency	Correction Factor	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
	(MHz)	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	**0.15400**	**9.67**	**34.35**	**31.62**	**44.02**	**41.29**	**65.78**	**55.78**	**-21.76**	**-14.49**
2	0.17708	9.66	30.81	28.04	40.47	37.70	64.62	54.62	-24.15	-16.92
3	0.21000	9.66	26.27	24.08	35.93	33.74	63.21	53.21	-27.28	-19.47
4	0.25000	9.67	24.31	21.75	33.98	31.42	61.76	51.76	-27.78	-20.34
5	0.44999	9.69	16.27	15.97	25.96	25.66	56.88	46.88	-30.92	-21.22
6	0.81400	9.72	10.32	9.29	20.04	19.01	56.00	46.00	-35.96	-26.99

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

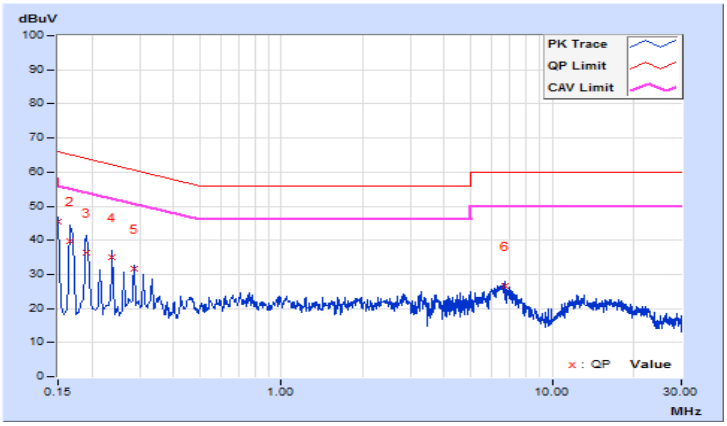


Frequency Range	150kHz ~ 30MHz	Detector Function & Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	25℃, 65%RH

Phase Of Power : Neutral (N)										
No	Frequency	Correction Factor	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
	(MHz)	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	9.64	35.69	31.21	45.33	40.85	66.00	56.00	-20.67	-15.15
2	0.16600	9.64	30.07	28.97	39.71	38.61	65.16	55.16	-25.45	-16.55
3	0.19000	9.64	26.61	22.74	36.25	32.38	64.04	54.04	-27.79	-21.66
4	0.23800	9.64	25.50	21.60	35.14	31.24	62.17	52.17	-27.03	-20.93
5	0.28600	9.65	22.00	21.80	31.65	31.45	60.64	50.64	-28.99	-19.19
6	6.70600	9.86	16.77	13.98	26.63	23.84	60.00	50.00	-33.37	-26.16

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

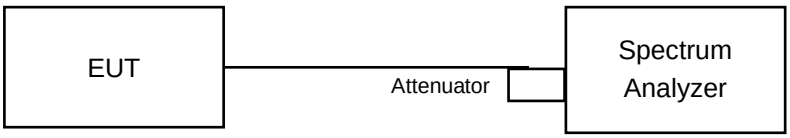


4.3 6 dB Bandwidth Measurement

4.3.1 Limits of 6 dB Bandwidth Measurement

The minimum of 6 dB Bandwidth Measurement is 0.5 MHz.

4.3.2 Test Setup



4.3.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.3.4 Test Procedure

a. Set resolution bandwidth (RBW) = 100 kHz
b. Set the video bandwidth (VBW) ≥ 3 x RBW, Detector = Peak.
c. Trace mode = max hold.
d. Sweep = auto couple.
e. Measure the maximum width of the emission that is constrained by the frequencies associated with the two amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission

4.3.5 Deviation from Test Standard

No deviation.

4.3.6 EUT Operating Conditions

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

4.3.7 Test Results

802.11b

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	8.54	0.5	Pass
6	2437	8.60	0.5	Pass
11	2462	9.07	0.5	Pass
12	2467	8.59	0.5	Pass
13	2472	8.58	0.5	Pass

802.11g

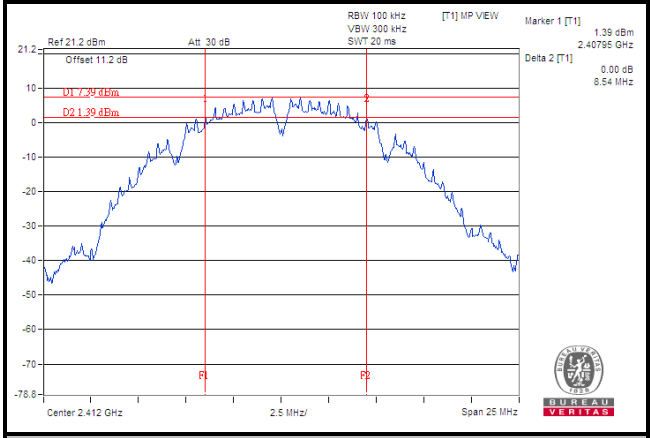
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	16.38	0.5	Pass
6	2437	16.37	0.5	Pass
11	2462	16.42	0.5	Pass
12	2467	16.39	0.5	Pass
13	2472	16.36	0.5	Pass

802.11n (HT20)

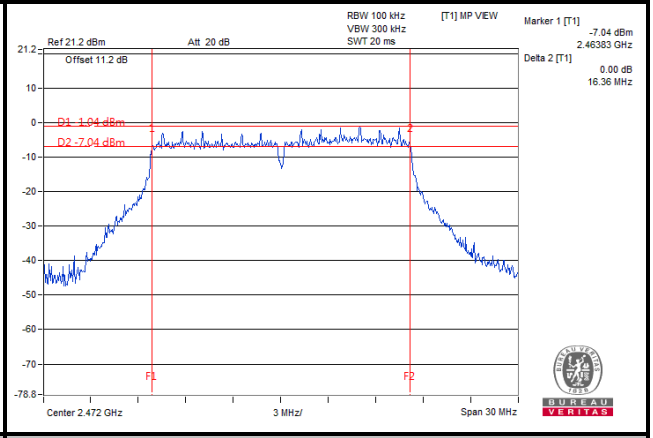
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	17.31	0.5	Pass
6	2437	17.36	0.5	Pass
11	2462	17.64	0.5	Pass
12	2467	17.63	0.5	Pass
13	2472	17.62	0.5	Pass

Spectrum Plot of Worst Value

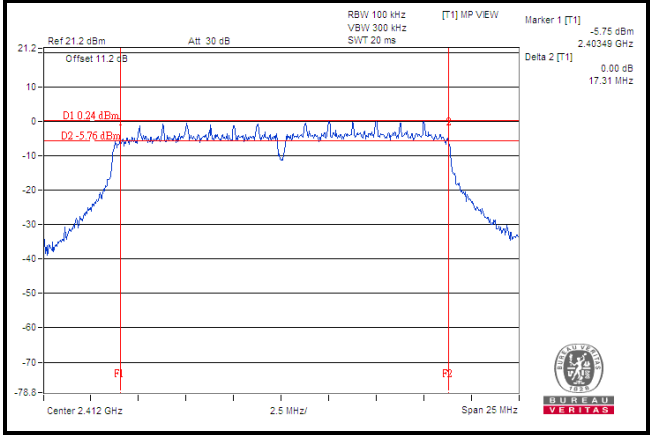
802.11b



802.11g

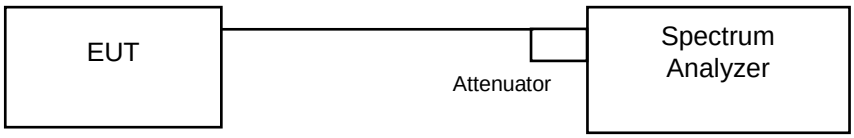


802.11n (HT20)



4.4 Occupied Bandwidth Measurement

4.4.1 Test Setup



4.4.2 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.4.3 Test Procedure

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with resolution bandwidth in the range of 1 % to 5 % of the anticipated emission bandwidth, and a video bandwidth at least 3x the resolution bandwidth and set the detector to sampling. The width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5 % of the total mean power of a given emission.

4.4.4 Deviation from Test Standard

No deviation.

4.4.5 EUT Operating Conditions

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

4.4.6 Test Results

802.11b

Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	Pass / Fail
1	2412	13.27	Pass
6	2437	13.46	Pass
11	2462	13.94	Pass
12	2467	13.75	Pass
13	2472	12.98	Pass

802.11g

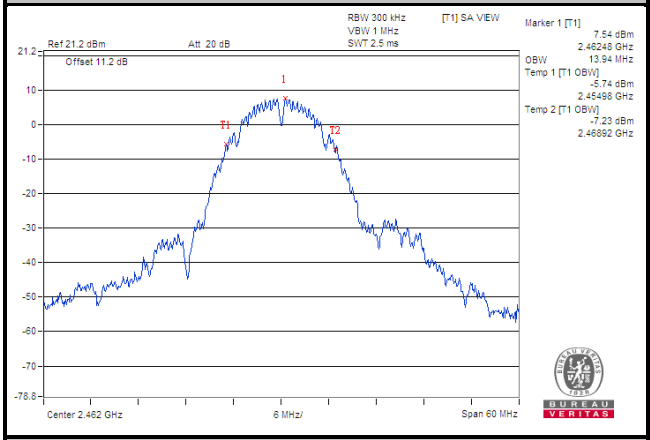
Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	Pass / Fail
1	2412	16.92	Pass
6	2437	17.21	Pass
11	2462	17.40	Pass
12	2467	17.21	Pass
13	2472	16.92	Pass

802.11n (HT20)

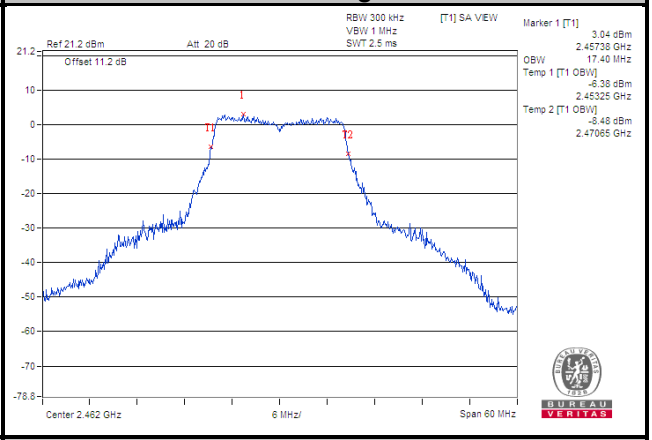
Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	Pass / Fail
1	2412	18.07	Pass
6	2437	18.07	Pass
11	2462	18.17	Pass
12	2467	18.17	Pass
13	2472	17.88	Pass

Spectrum Plot of Worst Value

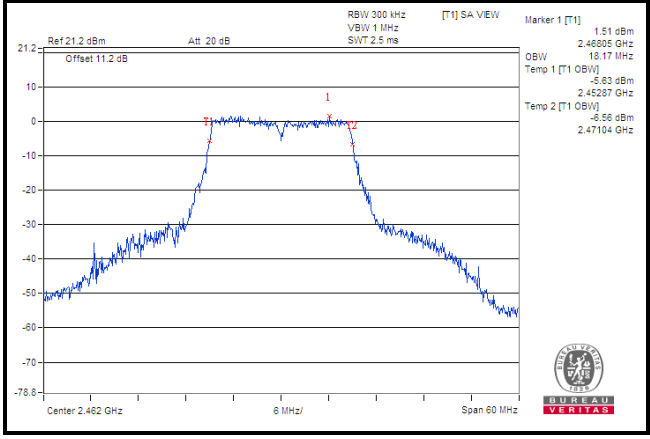
802.11b



802.11g



802.11n (HT20)

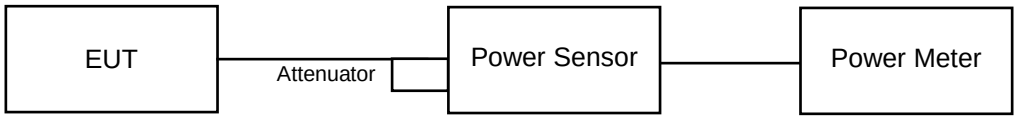


4.5 Conducted Output Power Measurement

4.5.1 Limits of Conducted Output Power Measurement

For systems using digital modulation in the 2400–2483.5 MHz bands: 1 Watt (30 dBm)

4.5.2 Test Setup



4.5.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.5.4 Test Procedures

A peak power sensor was used on the output port of the EUT. A power meter was used to read the response of the peak power sensor. Record the power level.

4.5.5 Deviation from Test Standard

No deviation.

4.5.6 EUT Operating Conditions

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

4.5.7 Test Results

802.11b

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass / Fail
1	2412	68.234	18.34	30	Pass
6	2437	64.863	18.12	30	Pass
11	2462	69.984	18.45	30	Pass
12	2467	72.444	18.60	30	Pass
13	2472	48.865	16.89	30	Pass

802.11g

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass / Fail
1	2412	83.176	19.20	30	Pass
6	2437	82.224	19.15	30	Pass
11	2462	78.163	18.93	30	Pass
12	2467	82.794	19.18	30	Pass
13	2472	66.681	18.24	30	Pass

802.11n (HT20)

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass / Fail
1	2412	83.56	19.22	30	Pass
6	2437	82.035	19.14	30	Pass
11	2462	79.983	19.03	30	Pass
12	2467	75.858	18.80	30	Pass
13	2472	68.234	18.34	30	Pass

4.6 Power Spectral Density Measurement

4.6.1 Limits of Power Spectral Density Measurement

The Maximum of Power Spectral Density Measurement is 8 dBm in any 3 kHz band during any time interval of continuous transmission.

4.6.2 Test Setup

4.6.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.6.4 Test Procedure

a. Set analyzer center frequency to DTS channel center frequency.
b. Set the span to 1.5 times the DTS bandwidth.
c. Set the RBW to: 3 kHz ≤ RBW ≤ 100 kHz.
d. Set the VBW ≥ 3 × RBW.
e. Detector = peak.
f. Sweep time = auto couple.
g. Trace mode = max hold.
h. Allow trace to fully stabilize.
i. Use the peak marker function to determine the maximum amplitude level within the RBW.

4.6.5 Deviation from Test Standard

No deviation.

4.6.6 EUT Operating Condition

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

4.6.7 Test Results

802.11b

Channel	Frequency (MHz)	PSD (dBm/3 kHz)	Limit (dBm/3 kHz)	Pass / Fail
1	2412	-7.19	8	Pass
6	2437	-7.24	8	Pass
11	2462	-6.66	8	Pass
12	2467	-6.25	8	Pass
13	2472	-8.27	8	Pass

802.11g

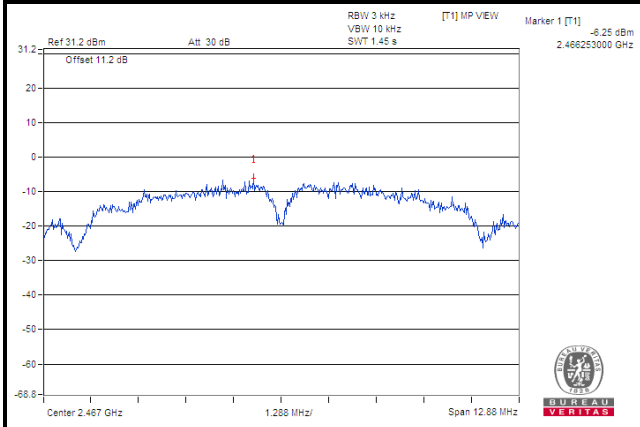
Channel	Frequency (MHz)	PSD (dBm/3 kHz)	Limit (dBm/3 kHz)	Pass / Fail
1	2412	-12.42	8	Pass
6	2437	-12.22	8	Pass
11	2462	-13.07	8	Pass
12	2467	-12.34	8	Pass
13	2472	-16.42	8	Pass

802.11n (HT20)

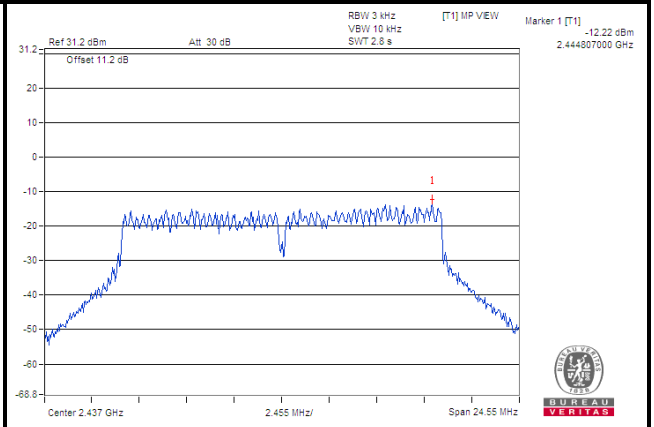
Channel	Frequency (MHz)	PSD (dBm/3 kHz)	Limit (dBm/3 kHz)	Pass / Fail
1	2412	-12.48	8	Pass
6	2437	-12.74	8	Pass
11	2462	-12.87	8	Pass
12	2467	-13.04	8	Pass
13	2472	-15.76	8	Pass

Spectrum Plot of Worst Value

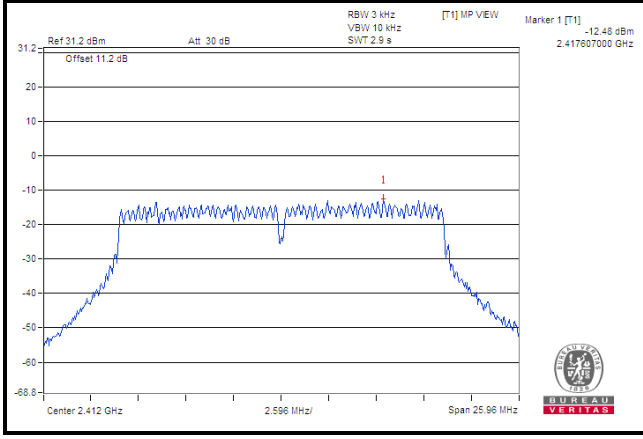
802.11b



802.11g



802.11n (HT20)

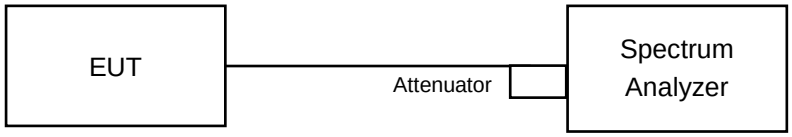


4.7 Conducted Out of Band Emission Measurement

4.7.1 Limits of Conducted Out of Band Emission Measurement

Below -20 dB of the highest emission level of operating band (in 100 kHz Resolution Bandwidth).

4.7.2 Test Setup



4.7.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.7.4 Test Procedure

MEASUREMENT PROCEDURE REF

1. Set the RBW = 100 kHz.
2. Set the VBW ≥ 300 kHz.
3. Detector = peak.
4. Sweep time = auto couple.
5. Trace mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.

MEASUREMENT PROCEDURE OOBE

1. Set RBW = 100 kHz.
2. Set VBW ≥ 300 kHz.
3. Detector = peak.
4. Sweep = auto couple.
5. Trace Mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum amplitude level.

4.7.5 Deviation from Test Standard

No deviation.

4.7.6 EUT Operating Condition

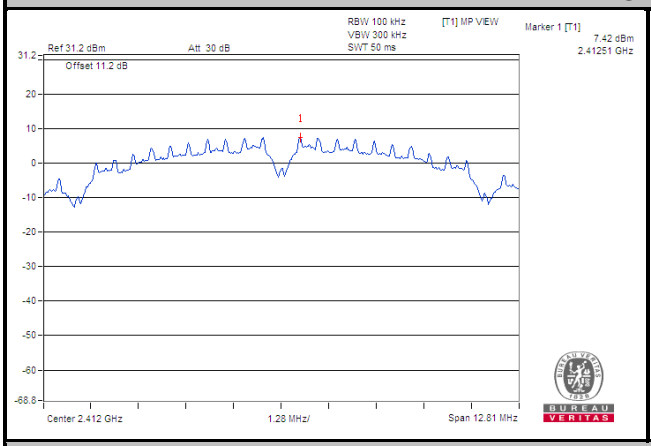
The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

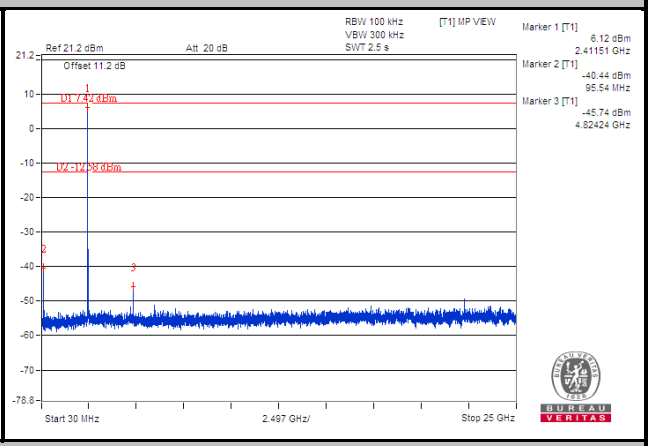
4.7.7 Test Results

The spectrum plots are attached on the following images. D1 line indicates the highest level, and D2 line indicates the 20 dB offset below D1. It shows compliance with the requirement.

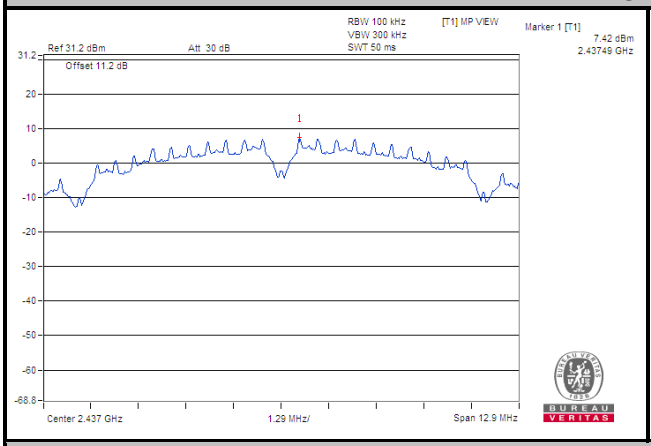
802.11b

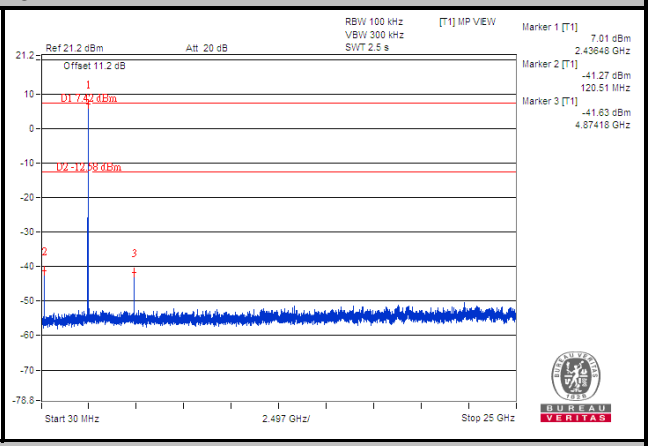
Ch 1



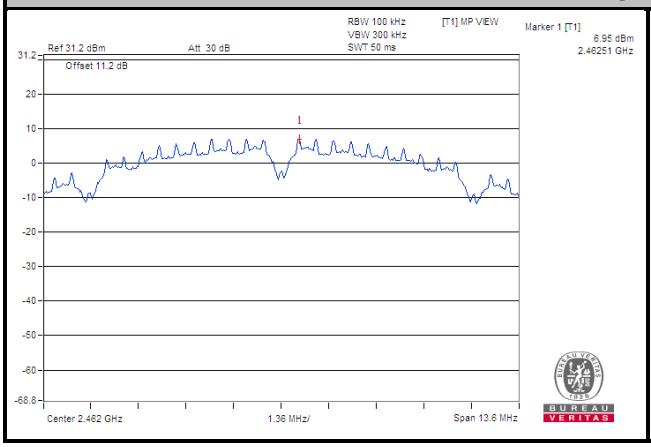


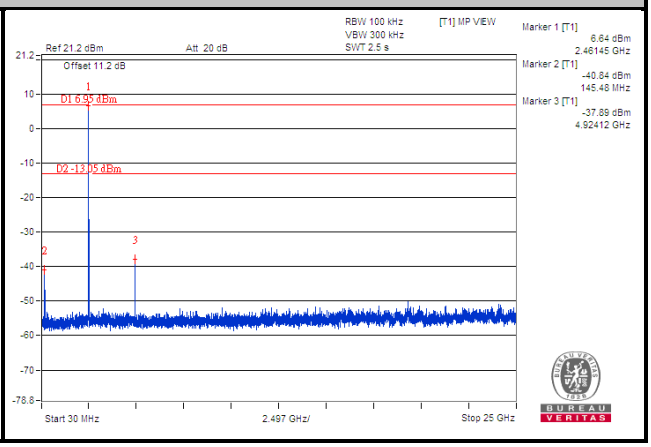
Ch 6



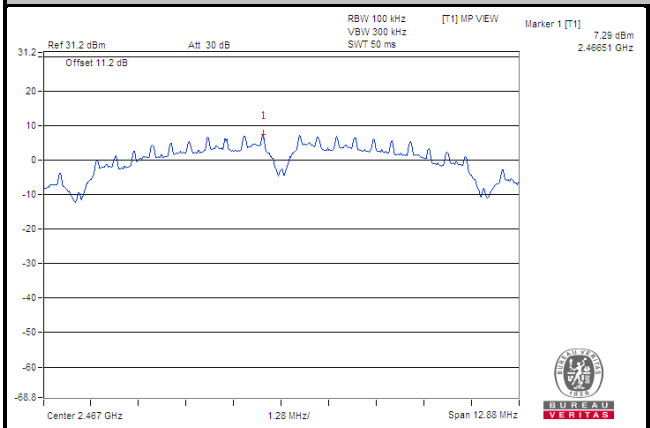


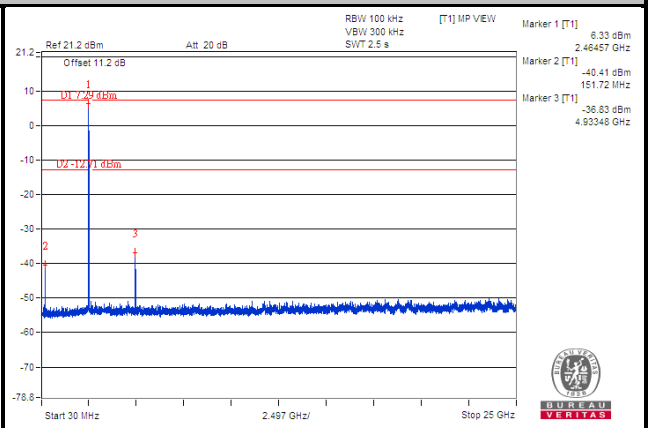
Ch 11



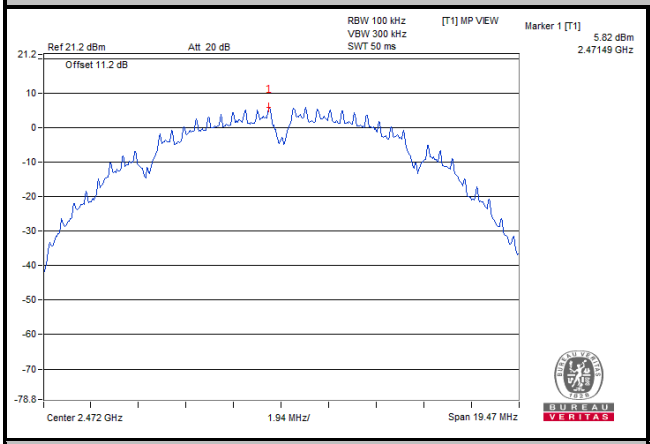


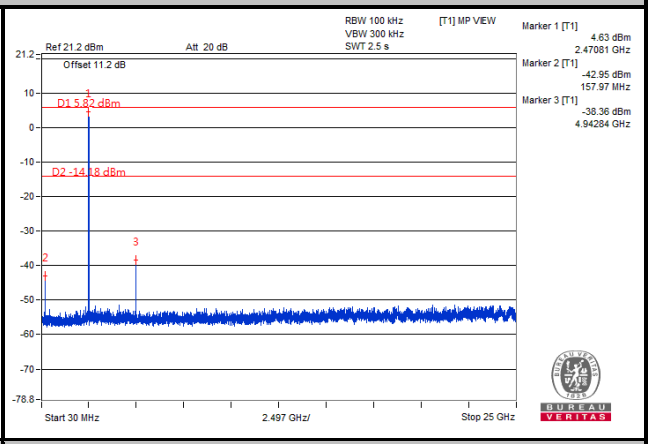
Ch 12



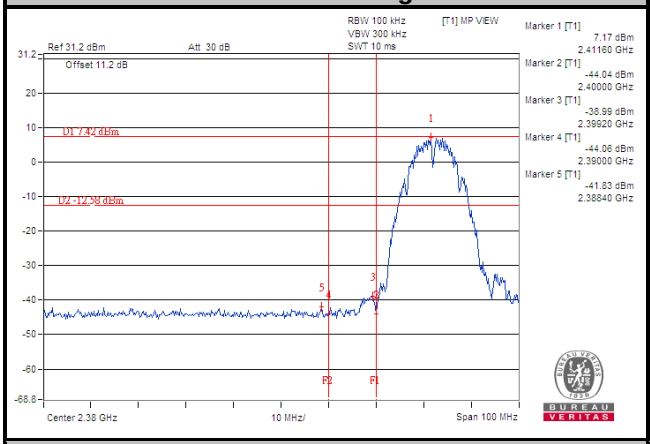


Ch 13

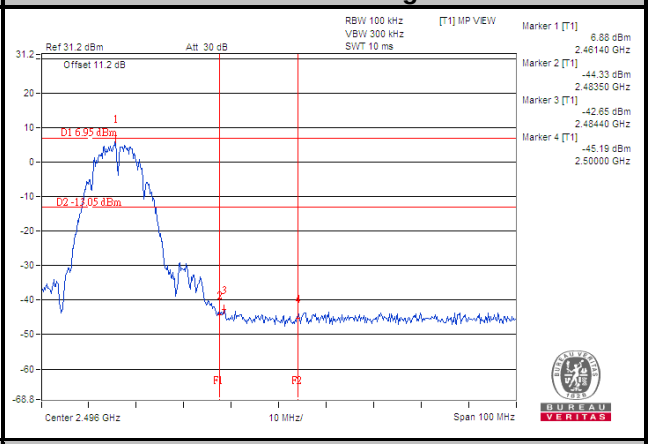




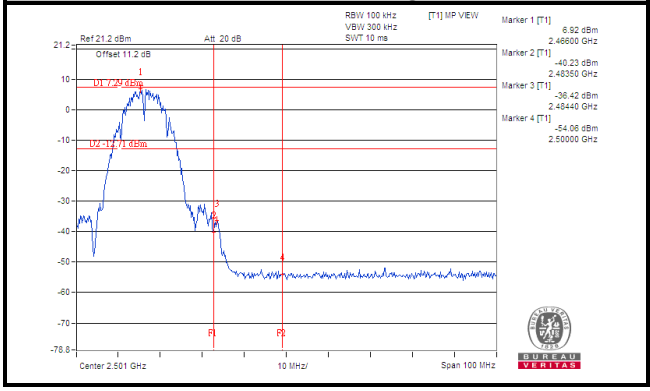
Ch 1 Band Edge



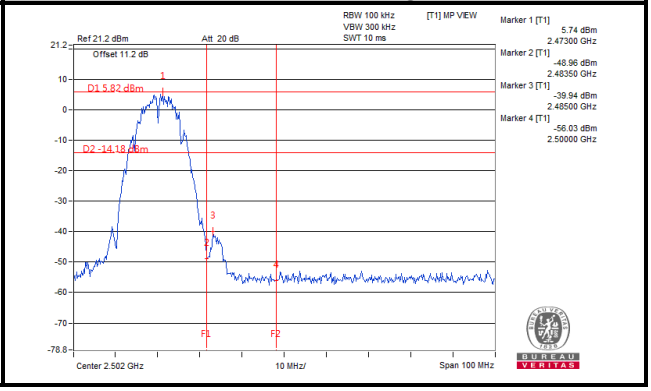
Ch 11 Band Edge



Ch 12 Band Edge

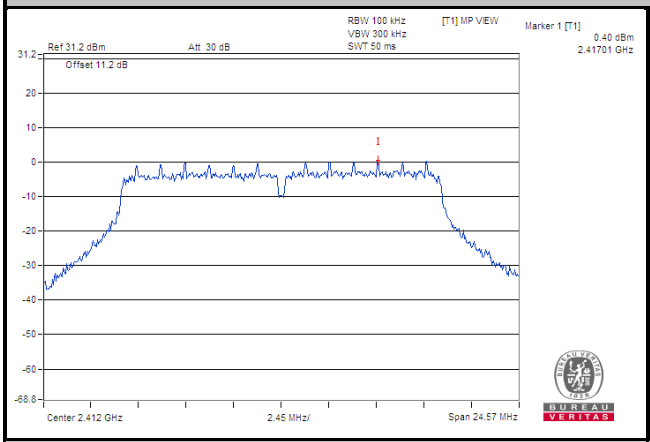


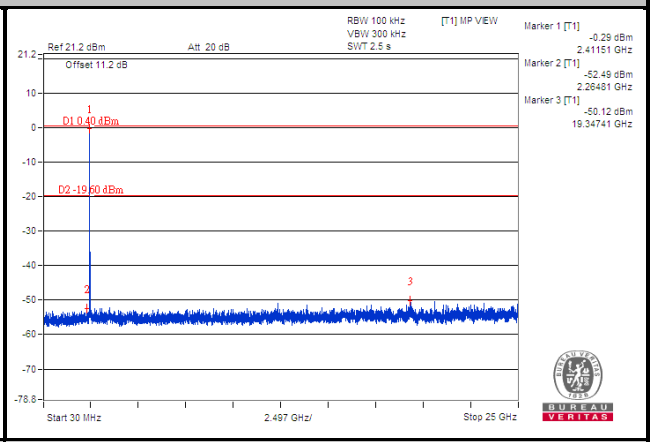
Ch 13 Band Edge



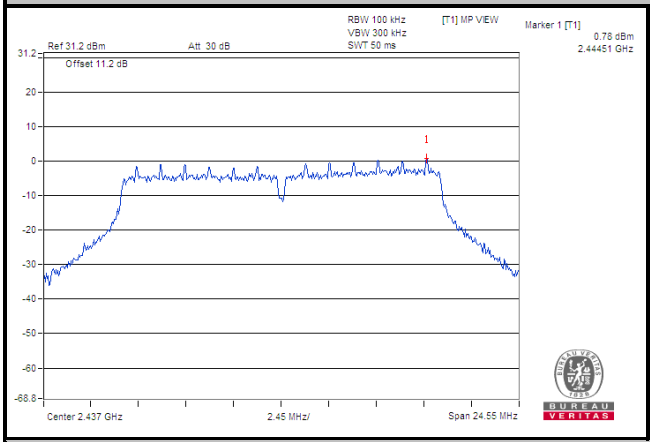
802.11g

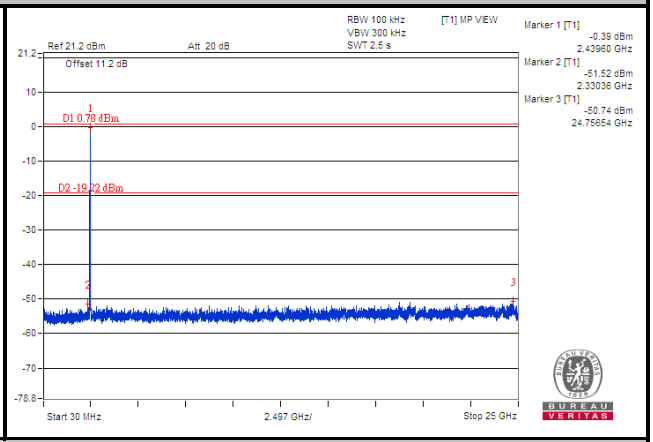
Ch 1



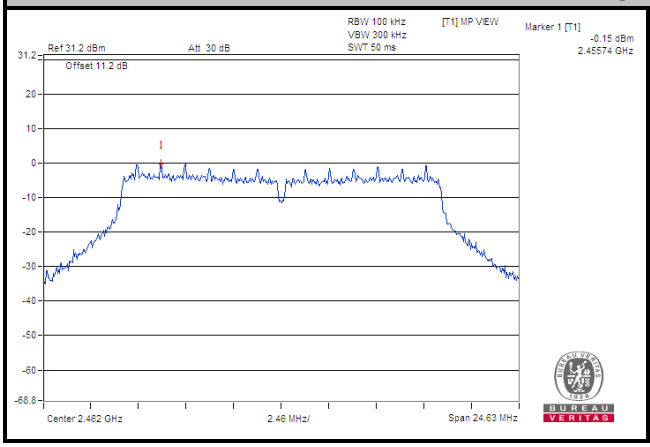


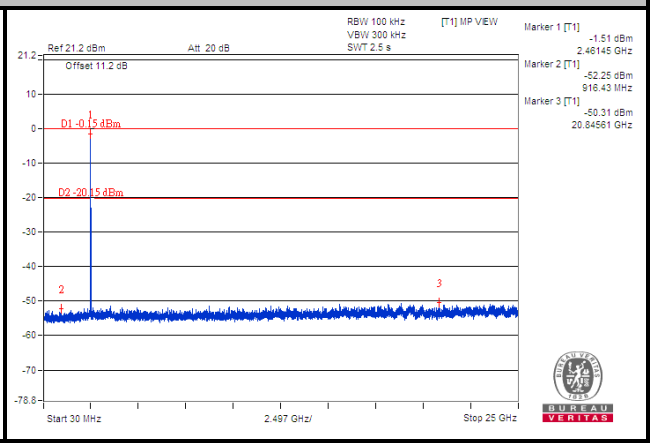
Ch 6



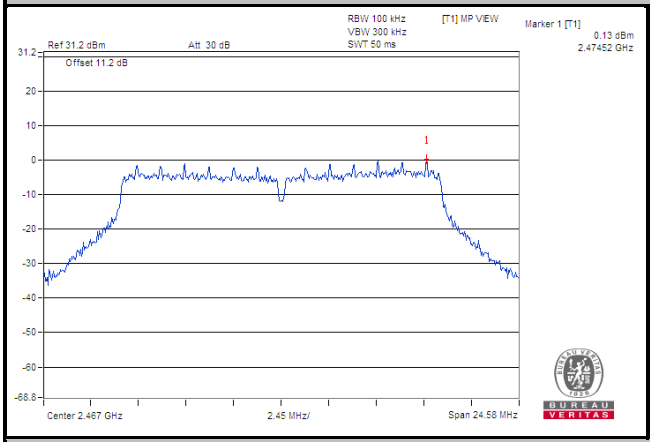


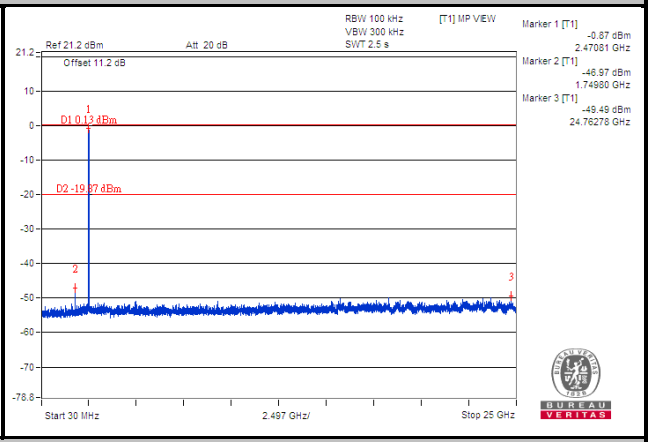
Ch 11



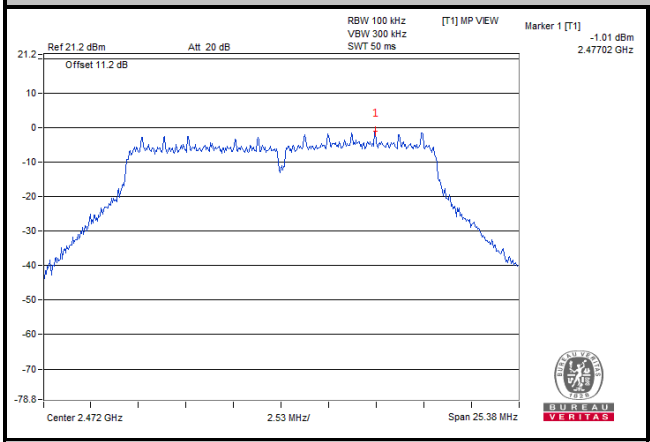


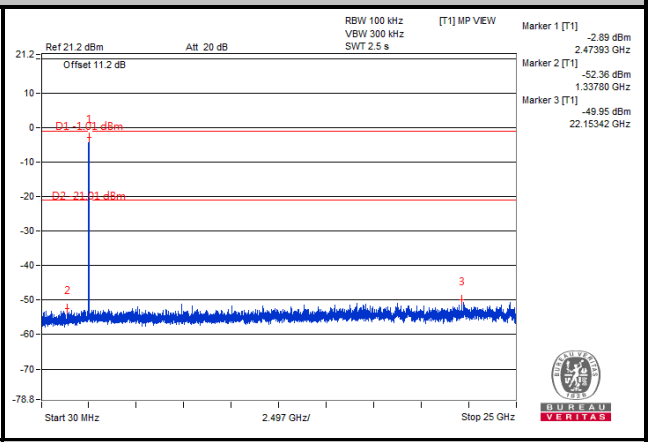
Ch 12



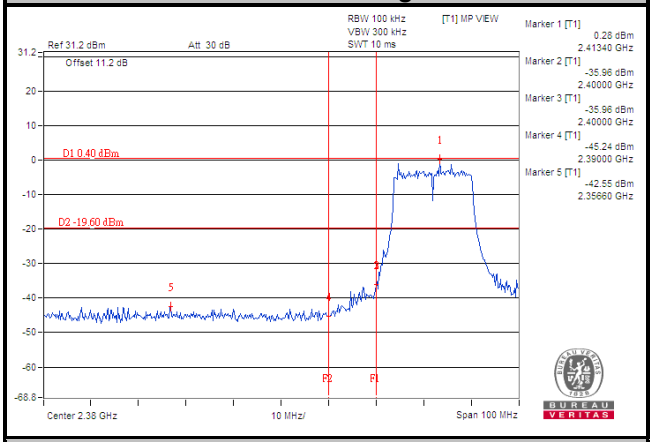


Ch 13

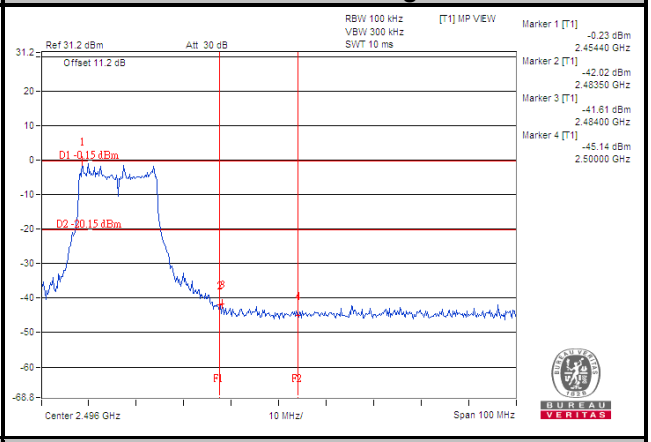




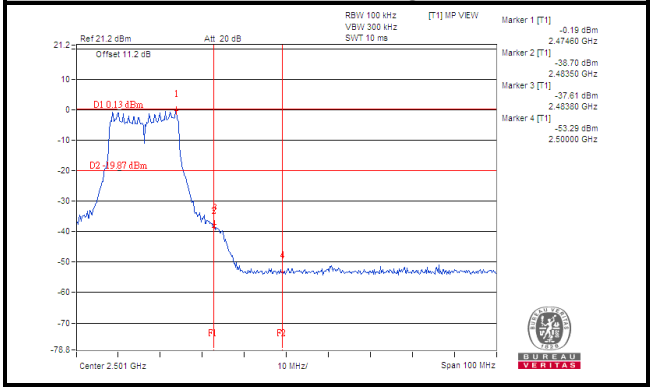
Ch 1 Band Edge



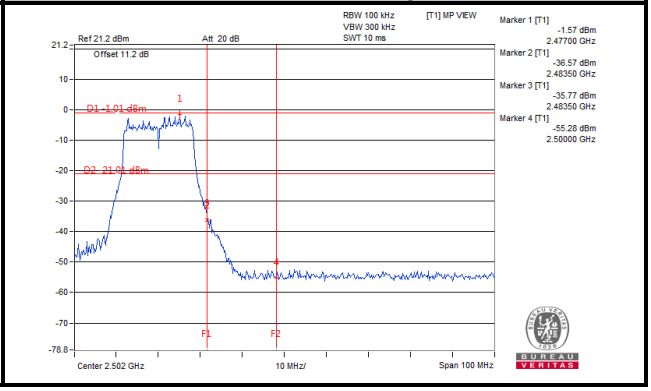
Ch 11 Band Edge



Ch 12 Band Edge

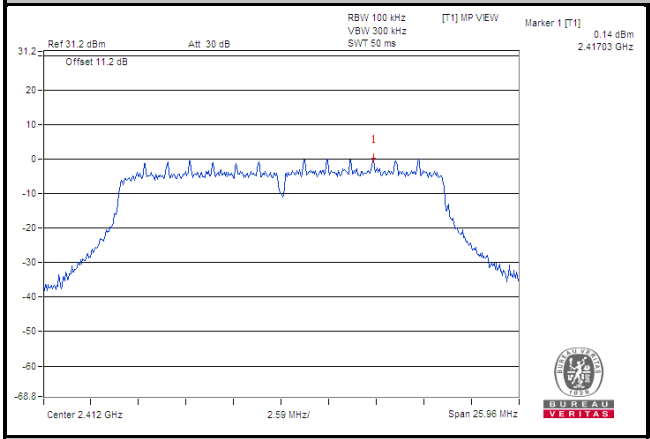


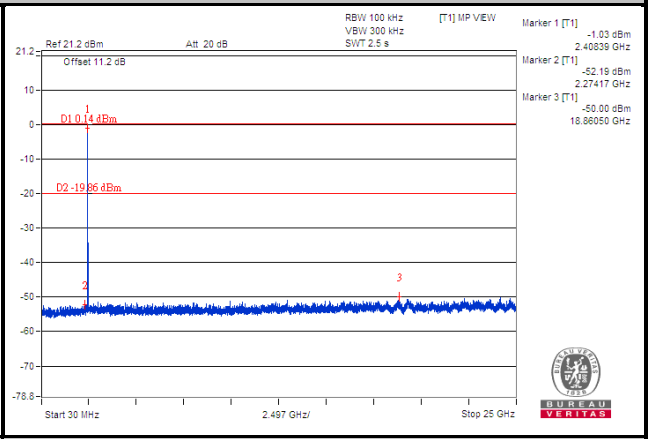
Ch 13 Band Edge



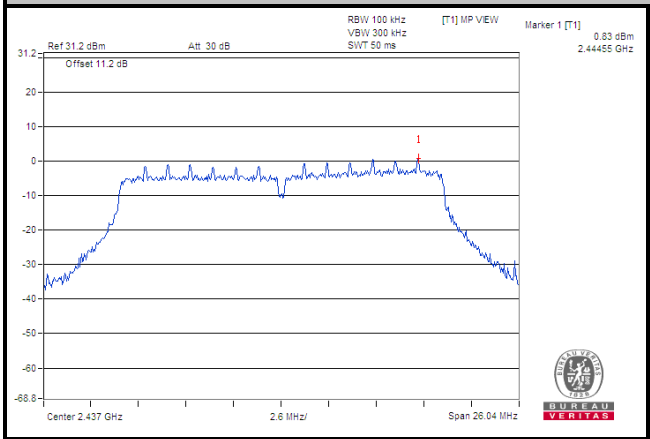
802.11n (HT20)

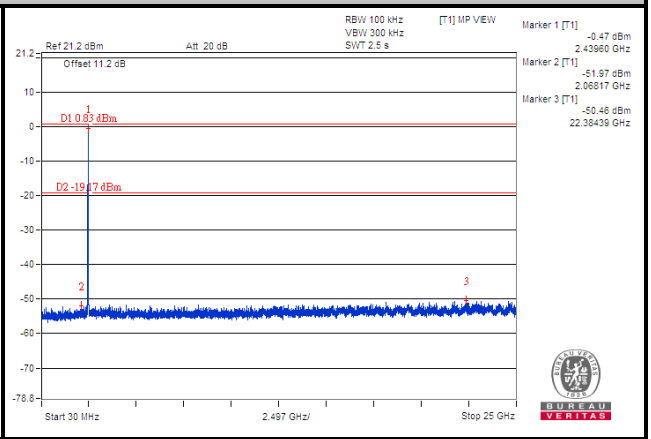
Ch 1



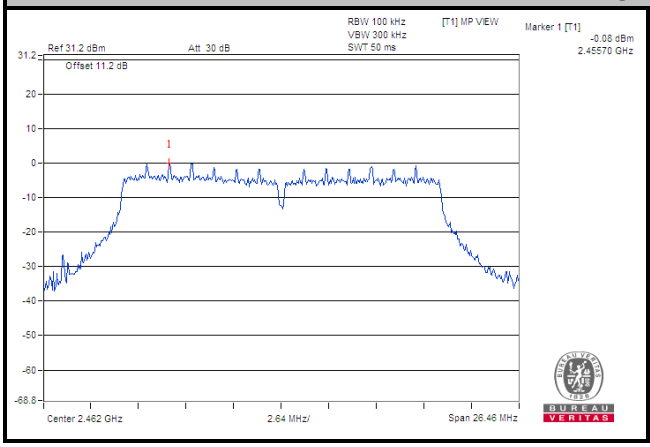


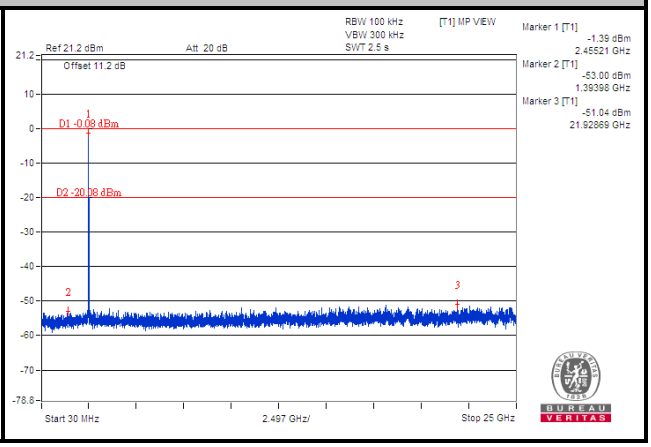
Ch 6



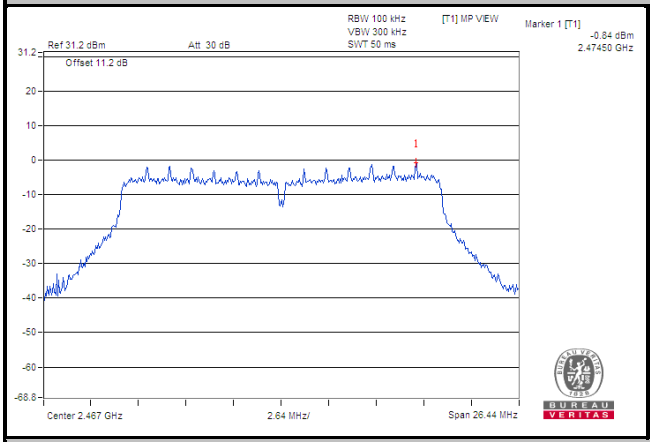


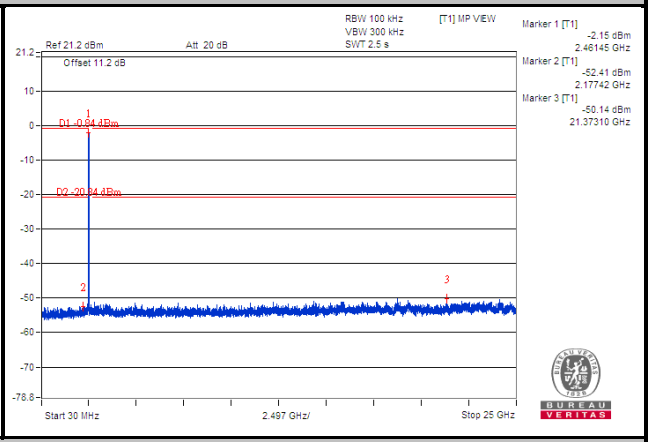
Ch 11



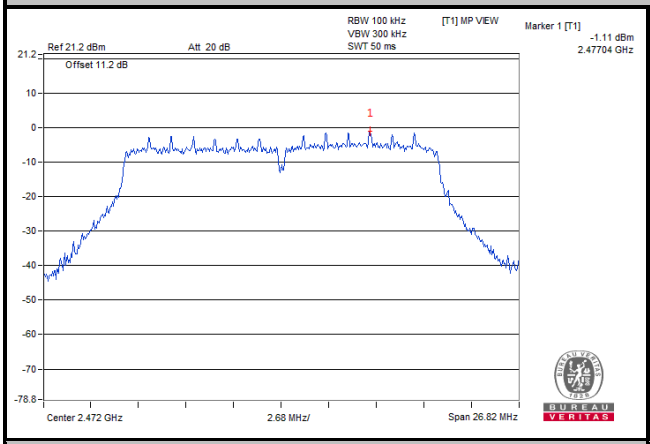


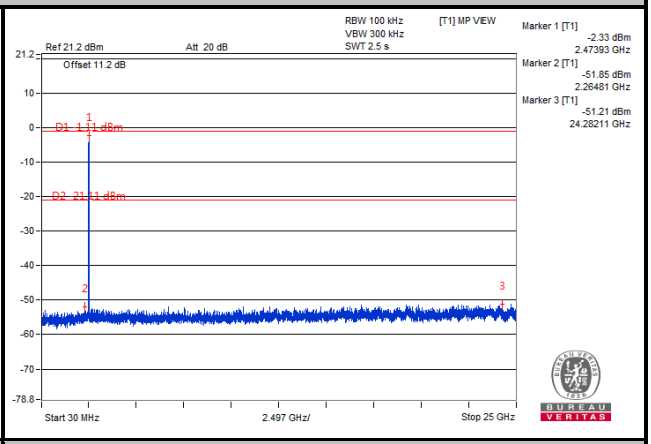
Ch 12



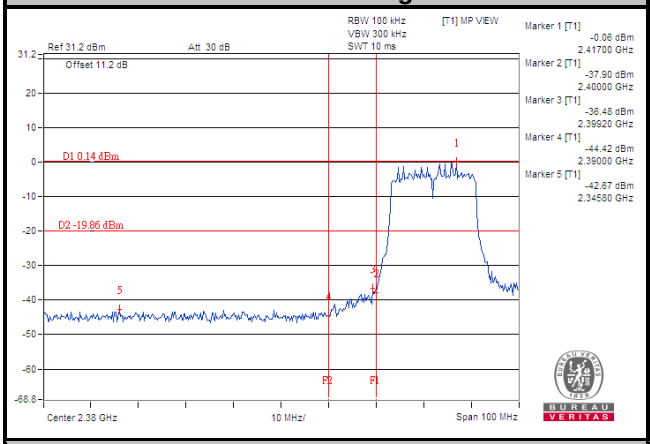


Ch 13

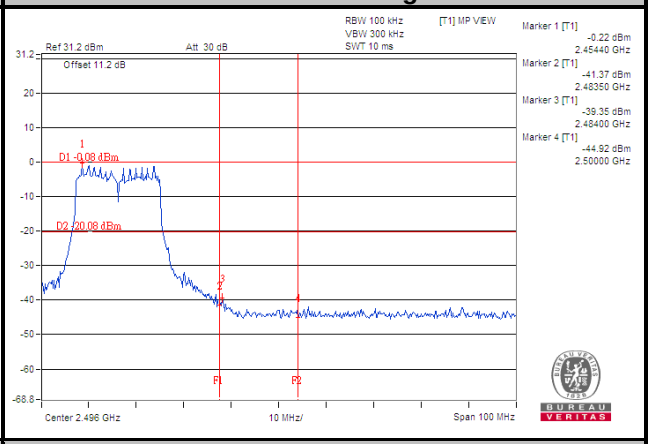




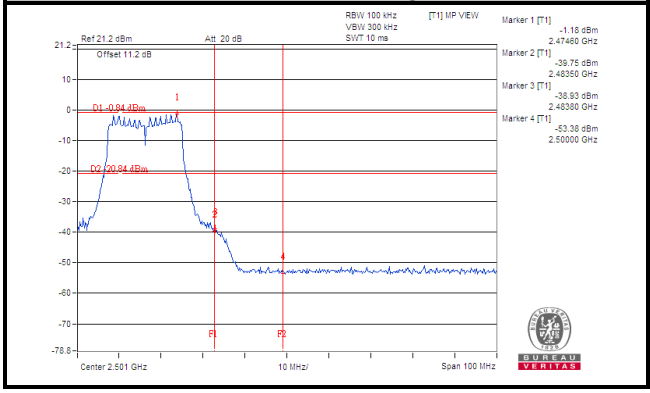
Ch 1 Band Edge



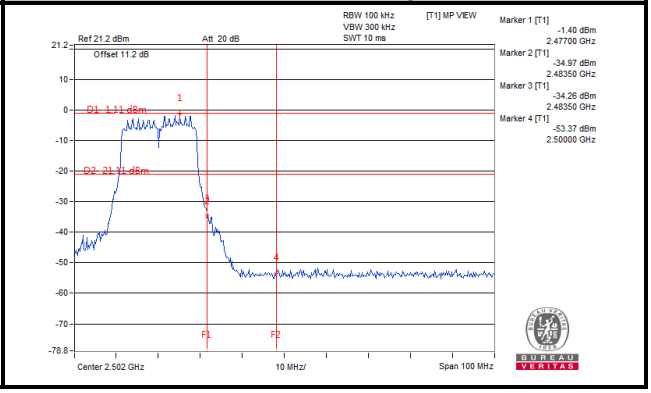
Ch 11 Band Edge



Ch 12 Band Edge



Ch 13 Band Edge

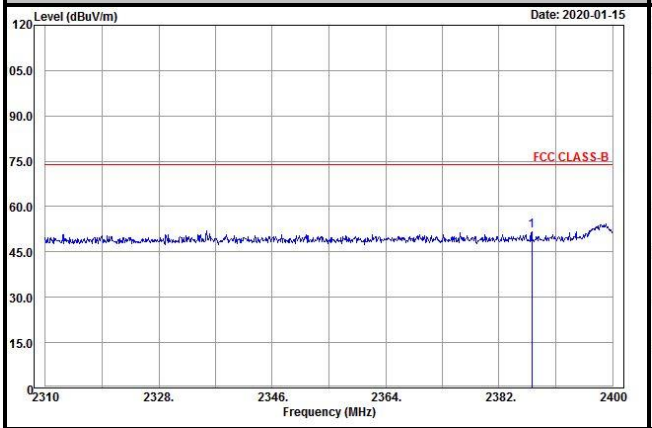
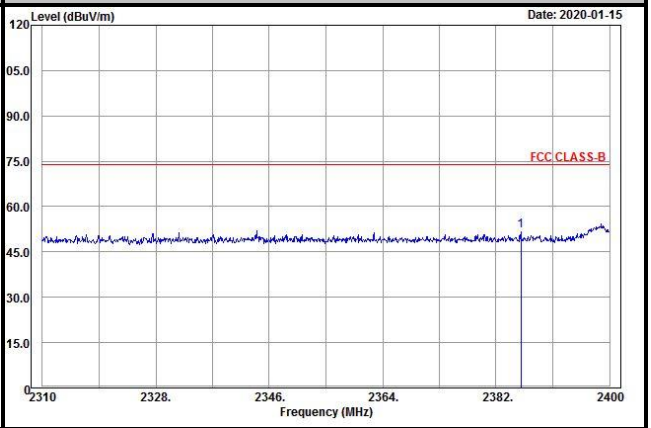
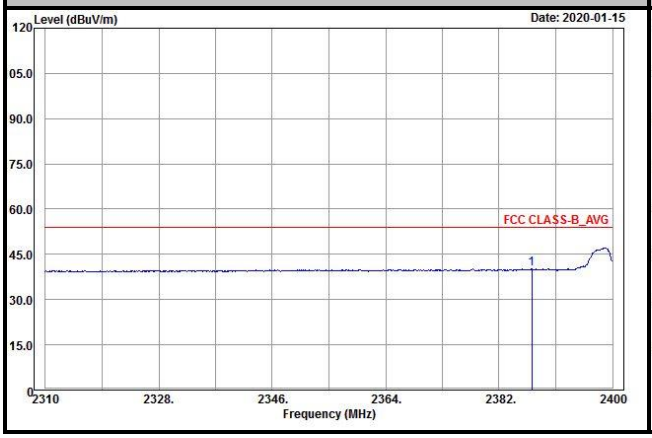
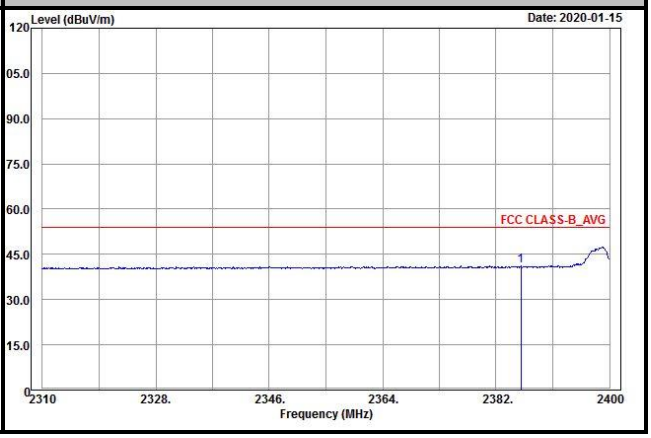


5 Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo).

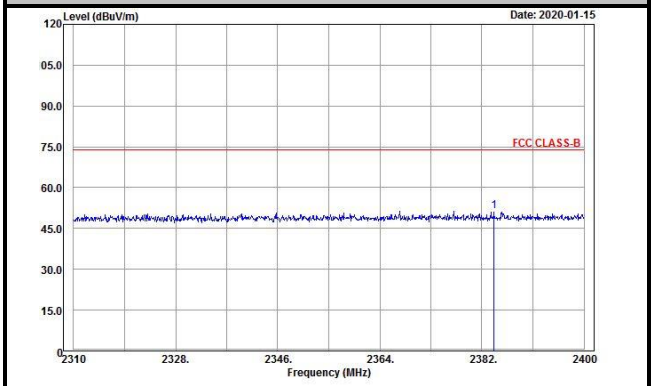
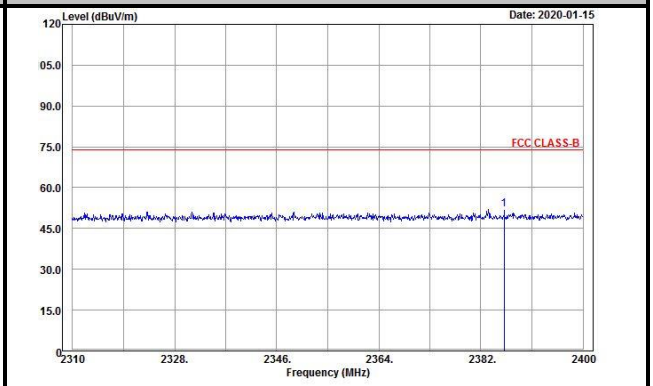
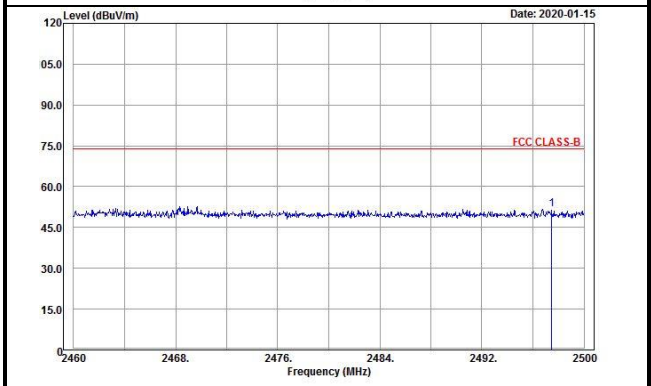
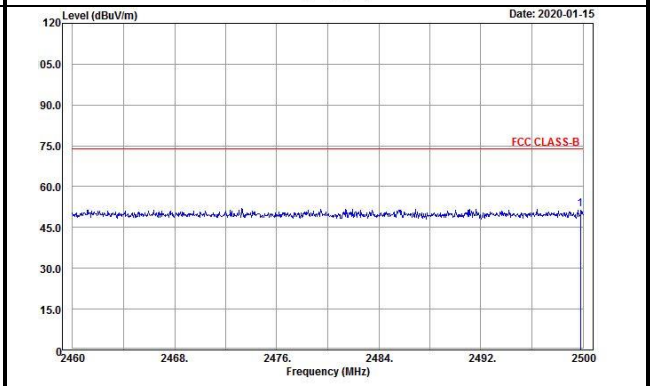
Annex A- Band Edge Measurement

802.11b

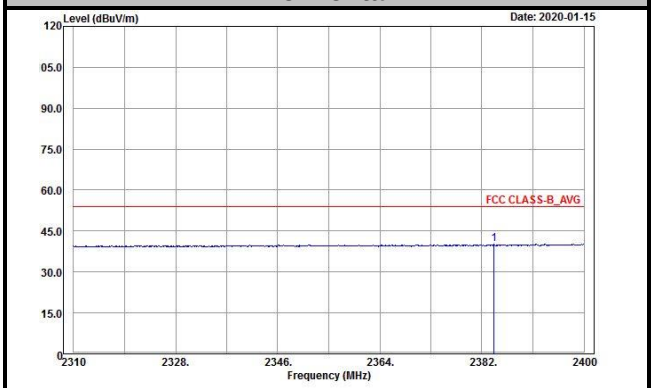
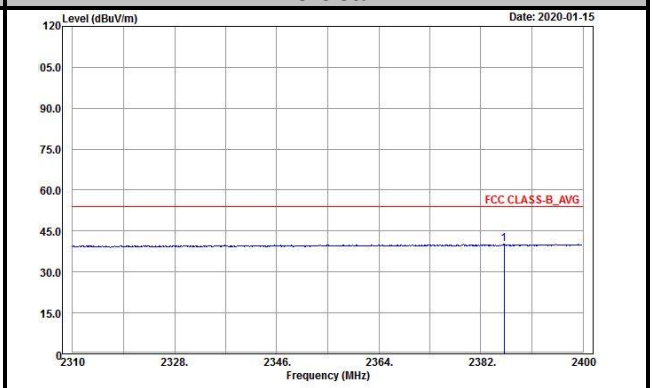
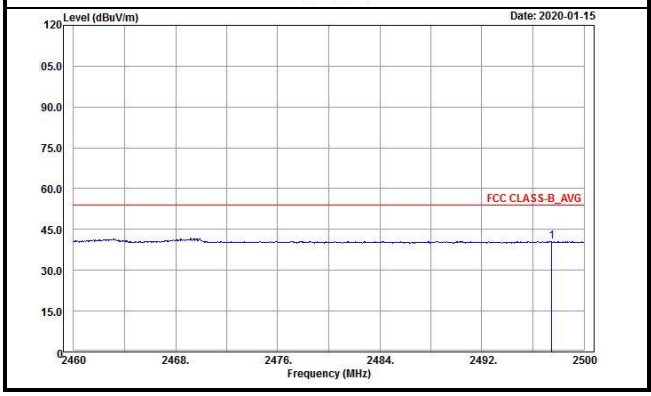
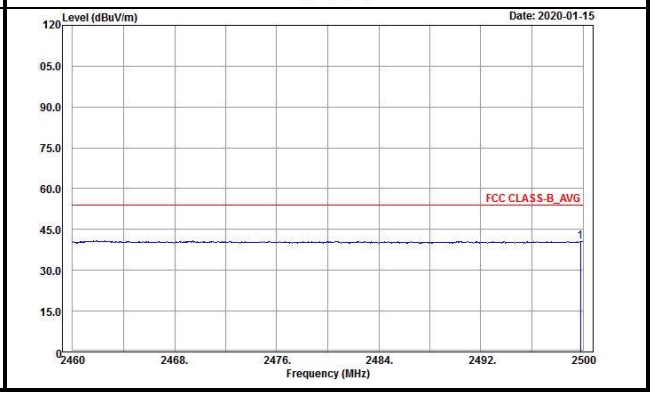
Ch 1	
Peak	
Horizontal	Vertical
	
Average	
Horizontal	Vertical
	

Ch 6

Peak

Horizontal	Vertical
	
	

Average

Horizontal	Vertical
	
	

Ch 11	
Peak	
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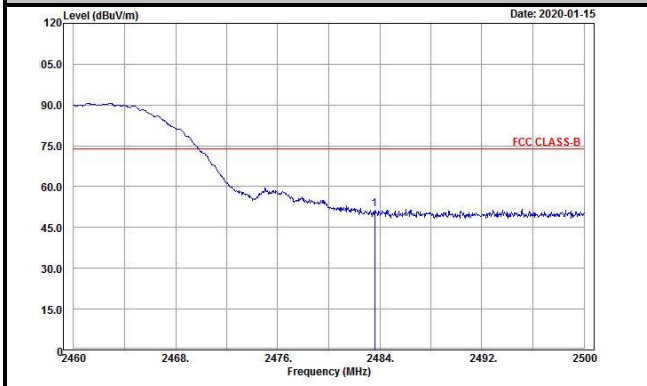	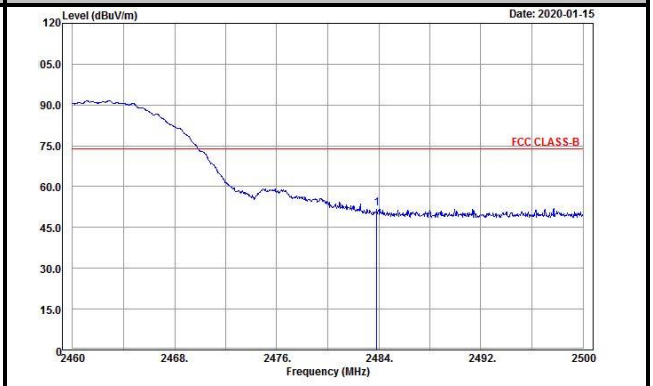
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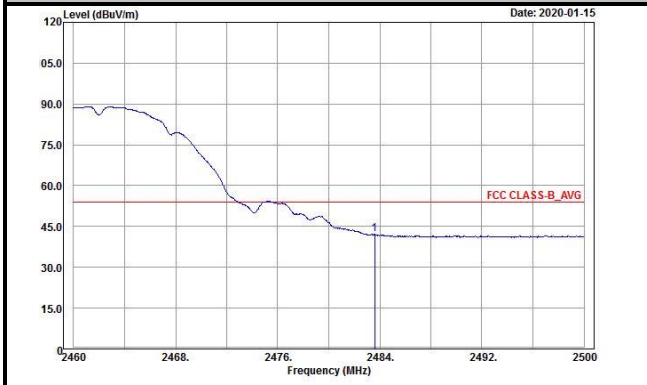	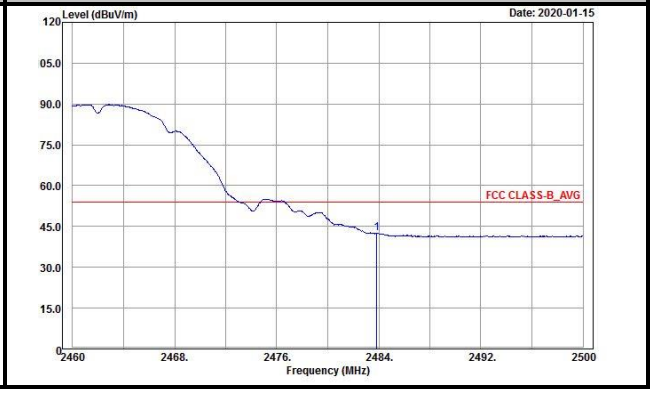

Ch 12	
Peak	
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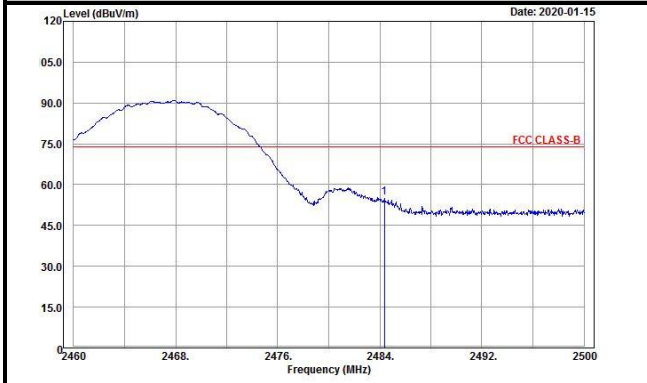	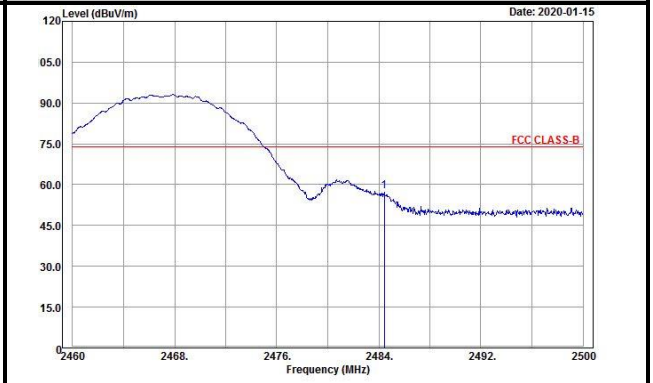
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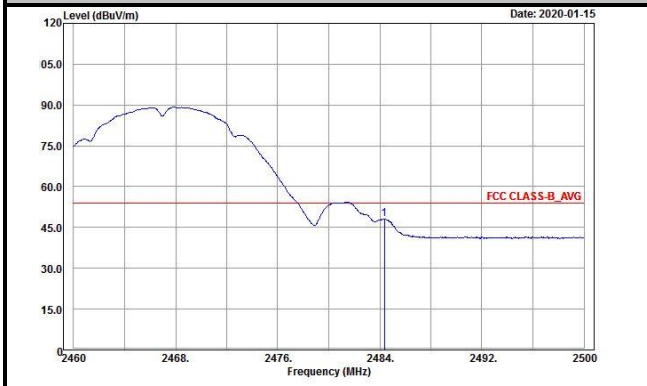	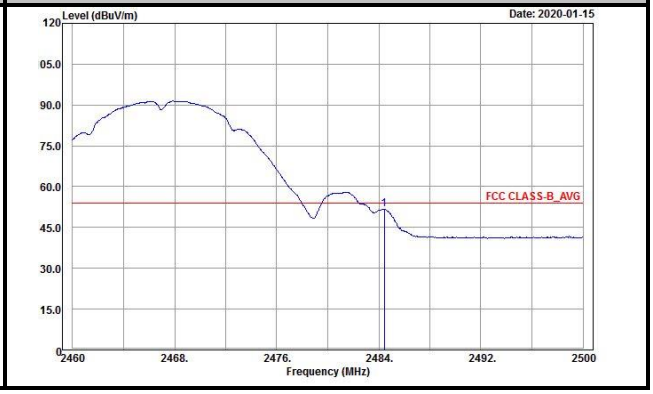

Ch 13	
Peak	
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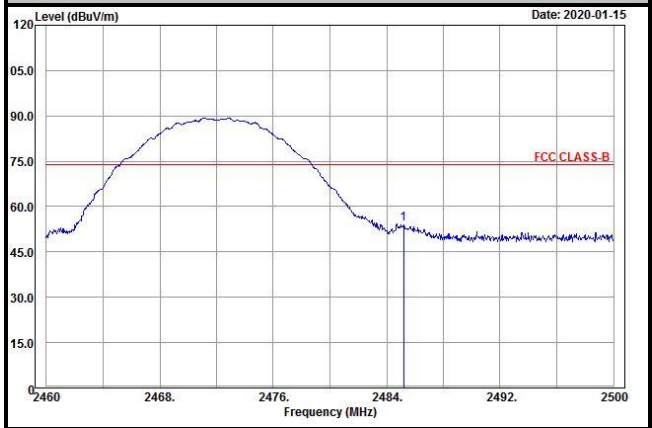	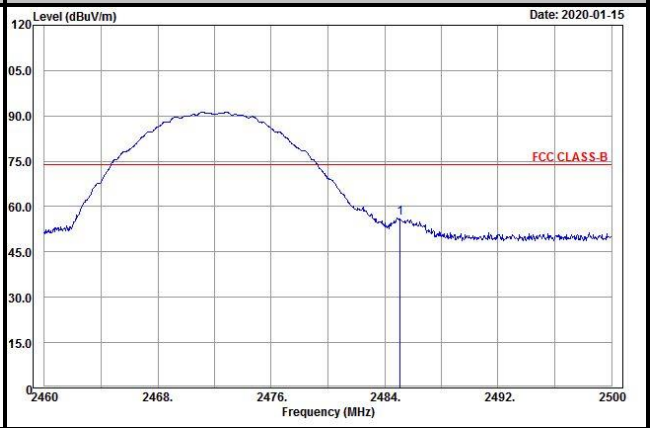
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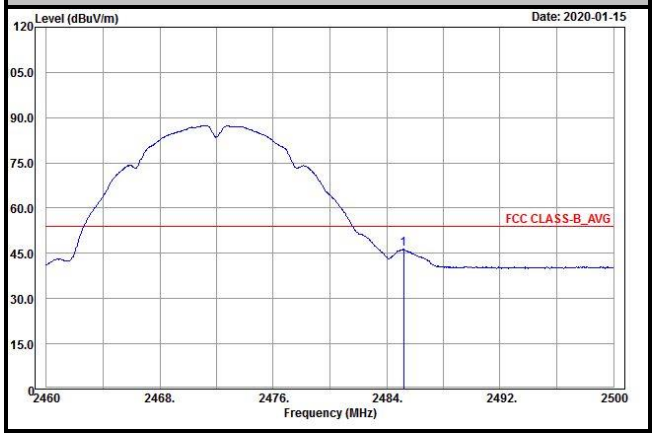
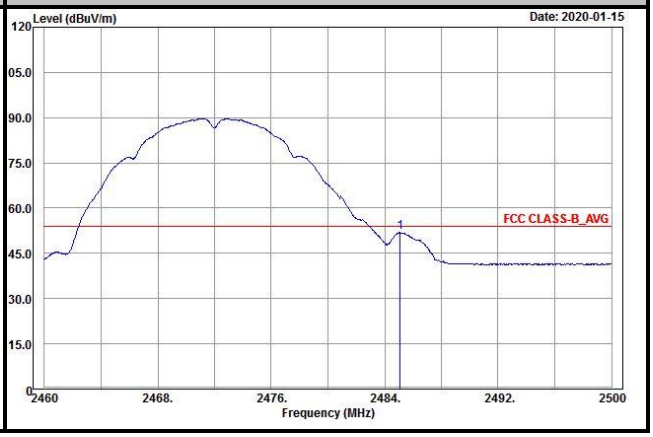
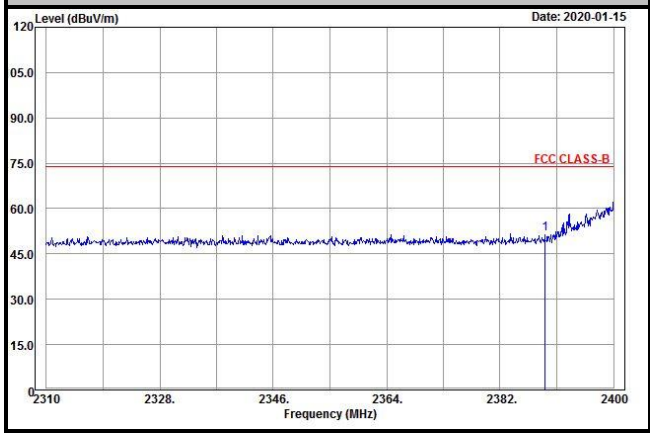
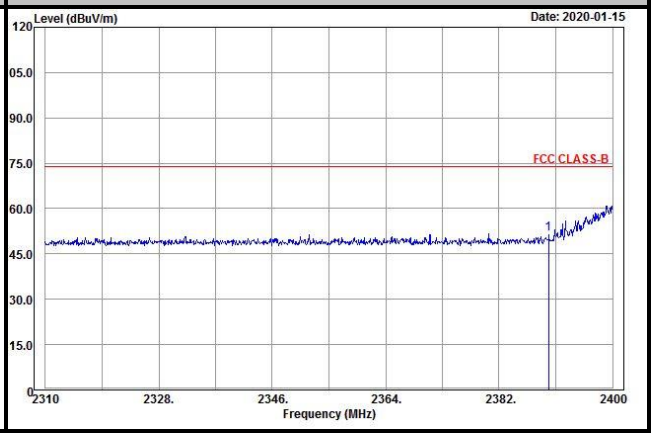
	

802.11g

Ch 1	
Peak	
Horizontal	**Vertical**
	
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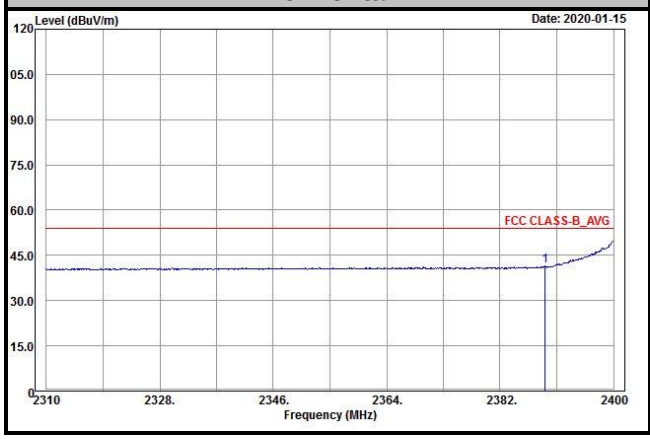
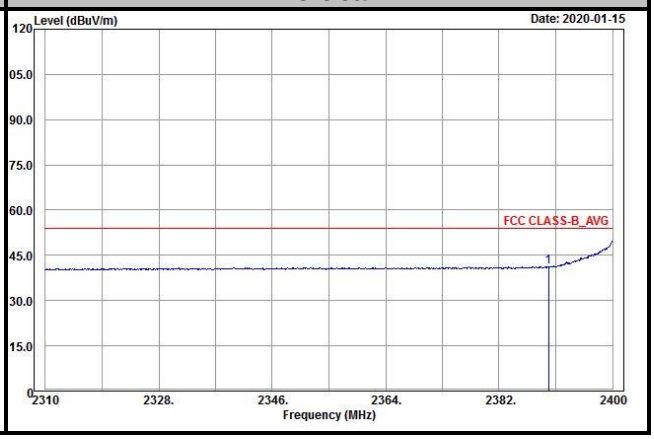
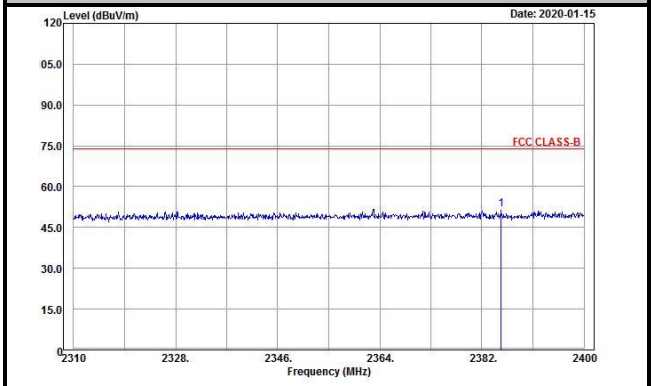
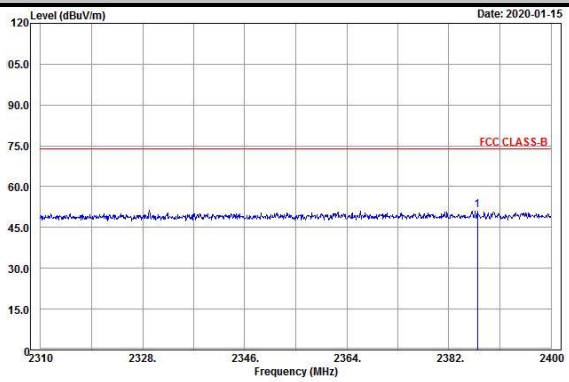
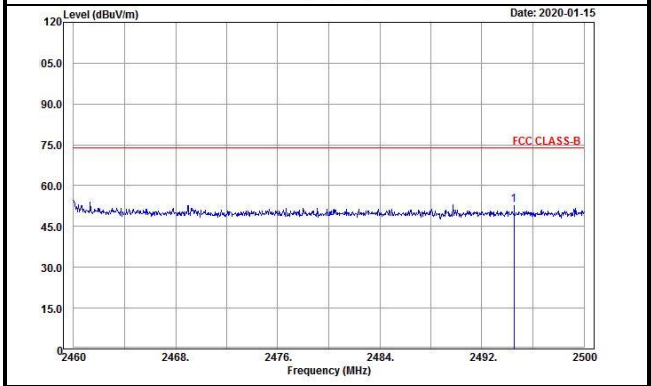
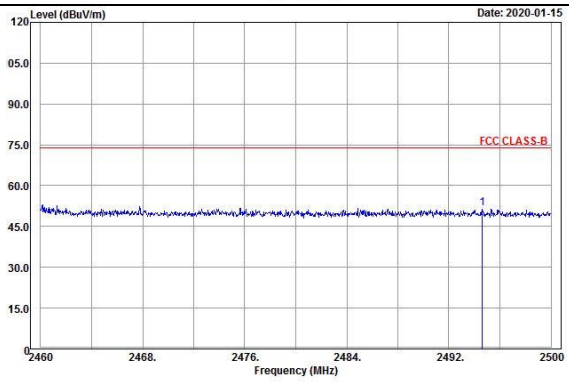
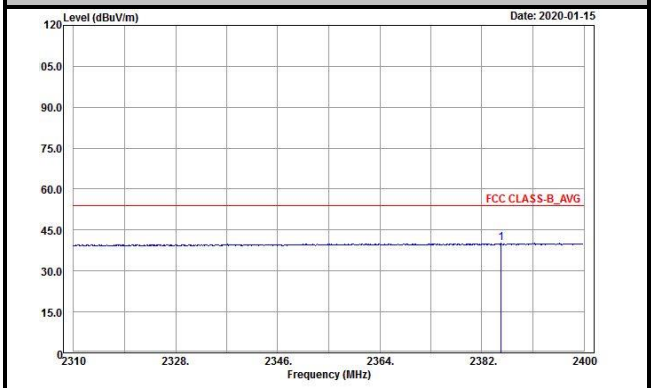
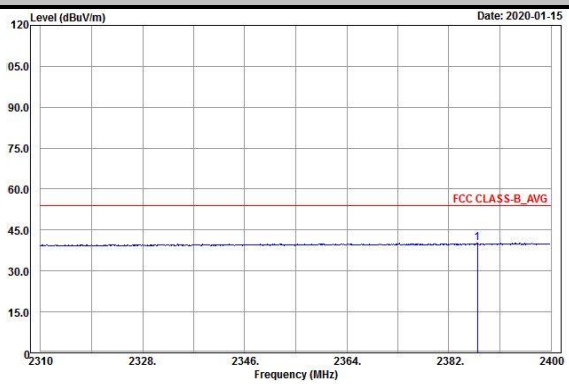
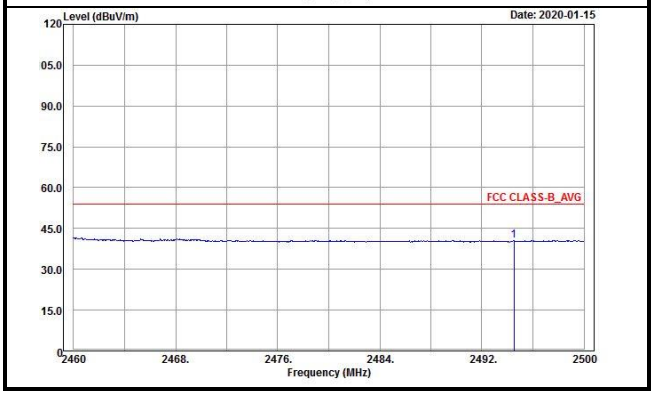
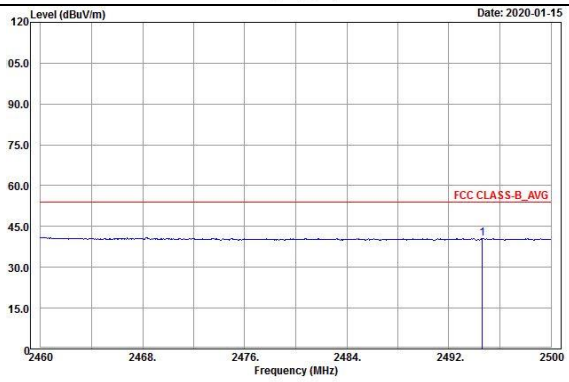
	

Ch 6

Peak

Horizontal	Vertical
	
	

Average

Horizontal	Vertical
	
	

Ch 11	
Peak	
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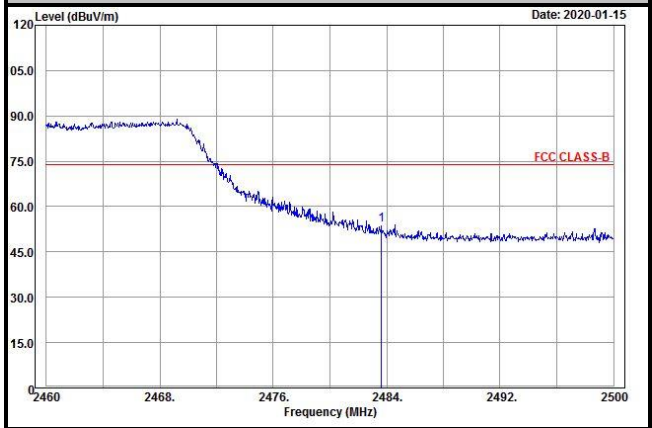	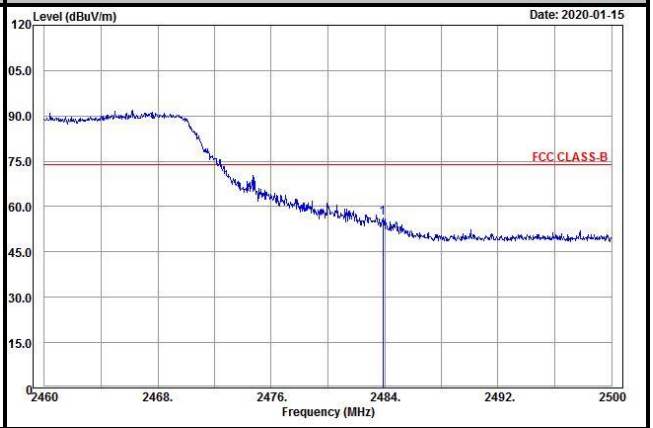
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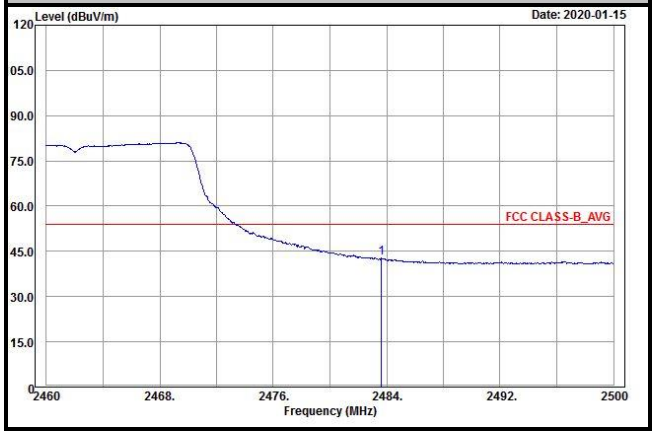
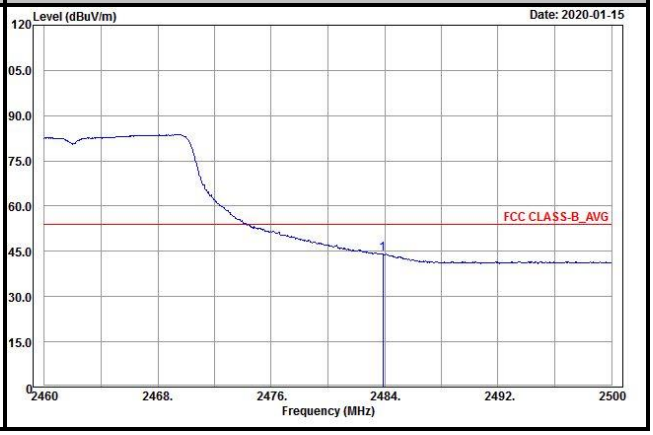
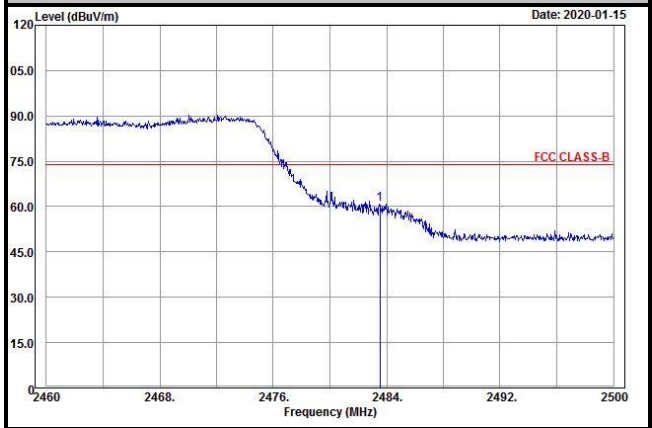
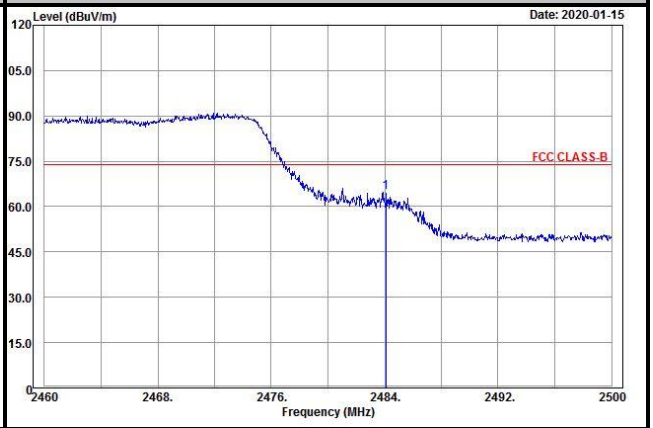
Horizontal	**Vertical**
	

Ch 12	
Peak	
Horizontal	**Vertical**
	
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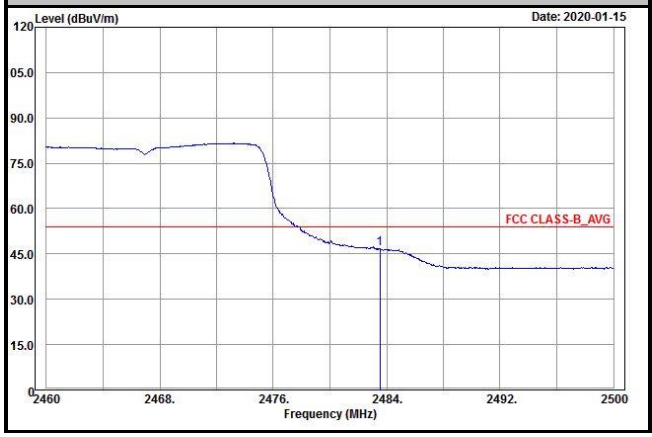
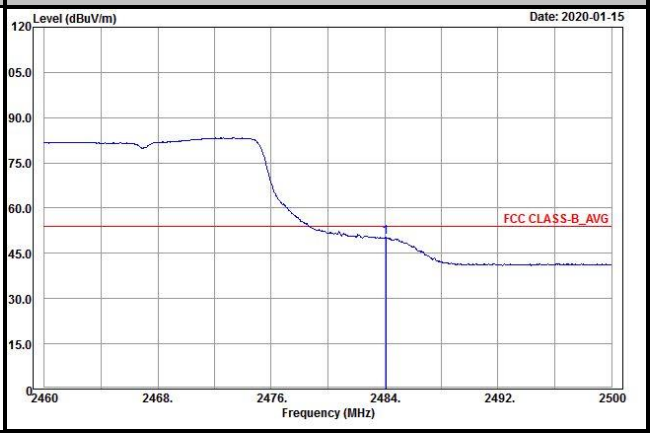
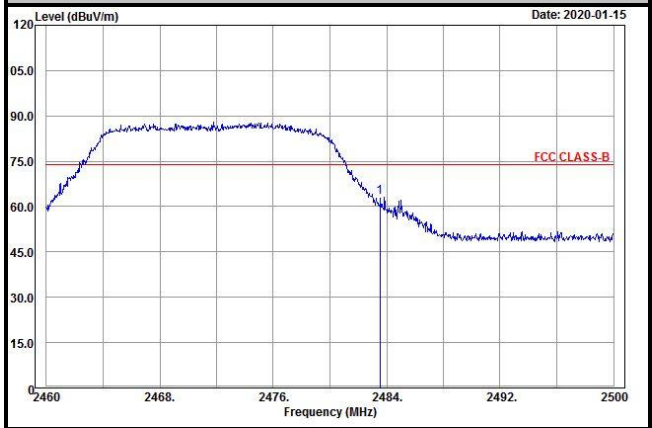
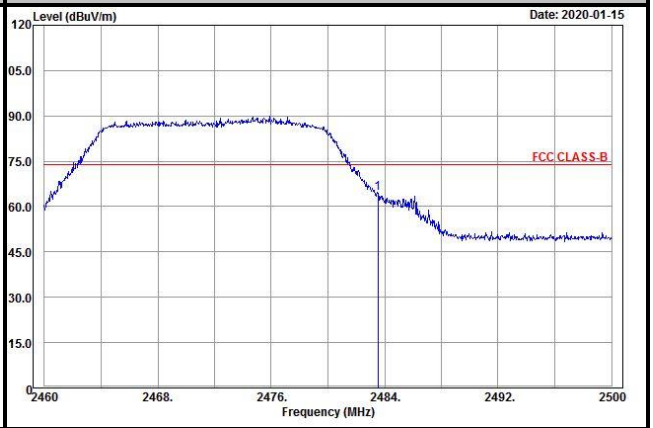
Horizontal	**Vertical**
	

Ch 13	
Peak	
Horizontal	**Vertical**
	
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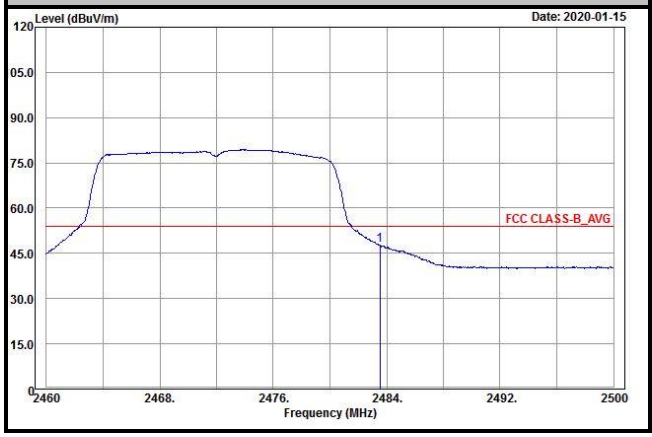
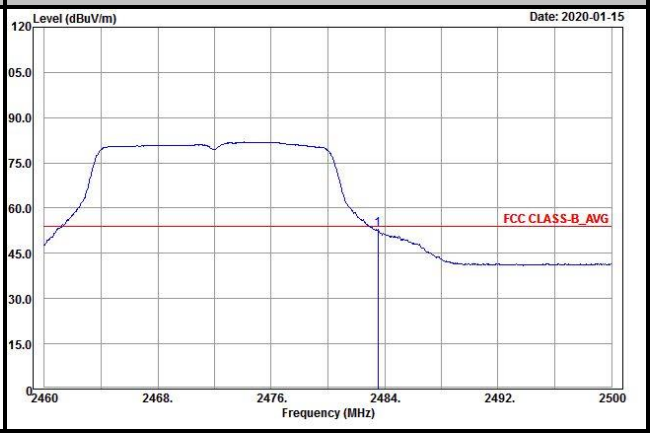
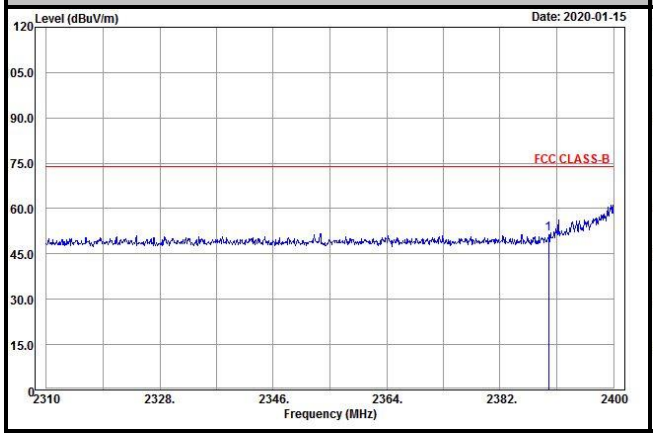
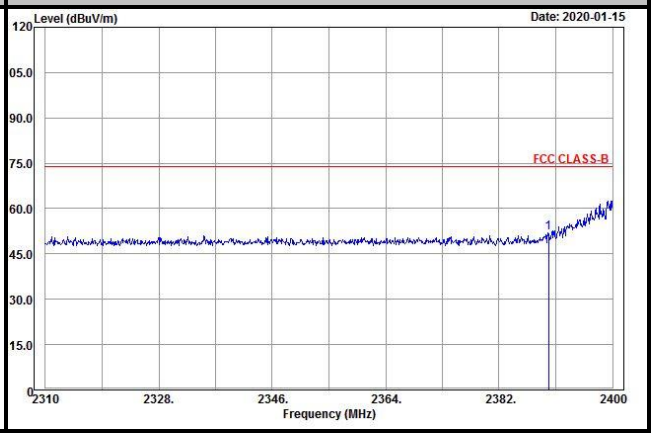
Horizontal	**Vertical**
	

802.11n (HT20)

Ch 1	
Peak	
Horizontal	Vertical
	
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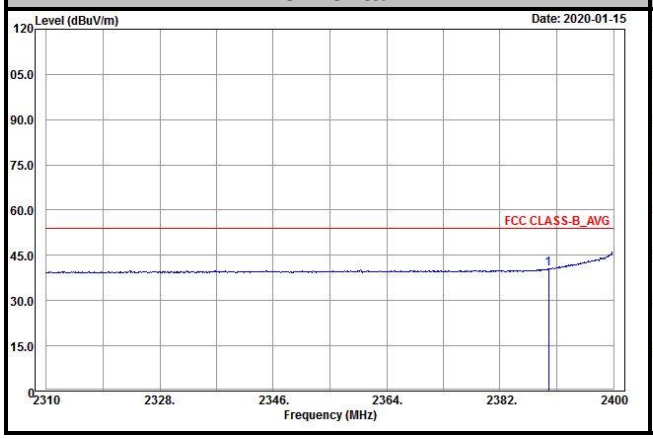
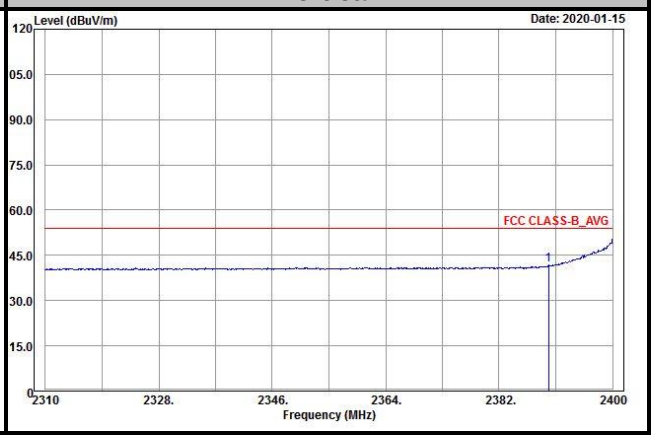
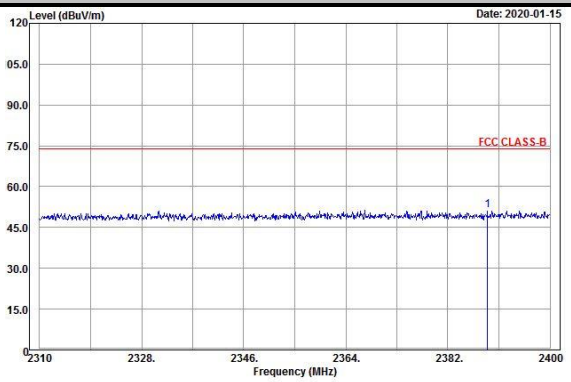
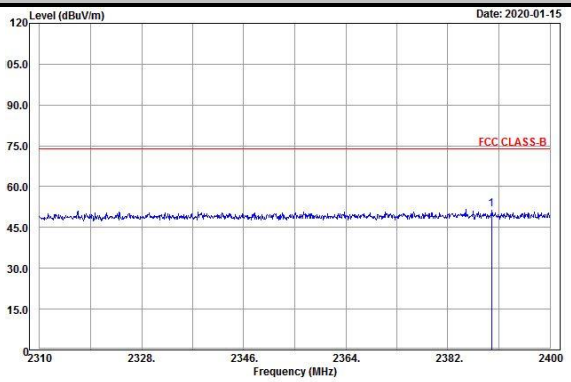
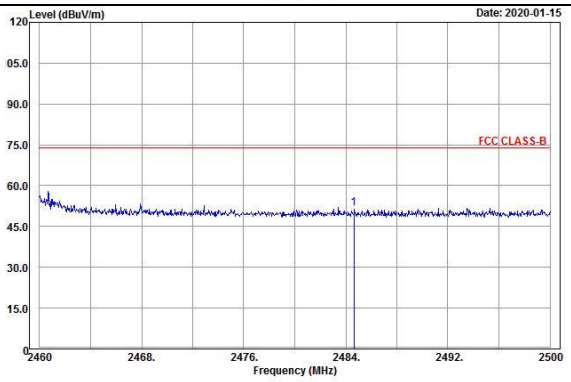
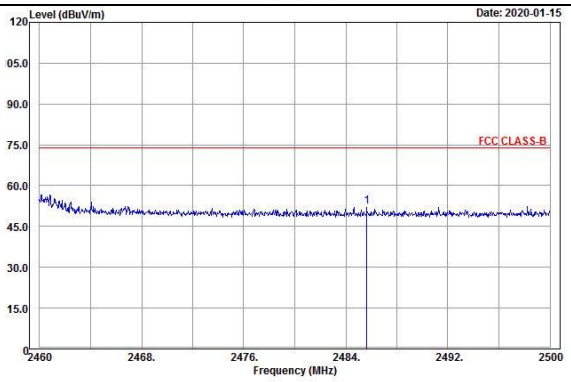
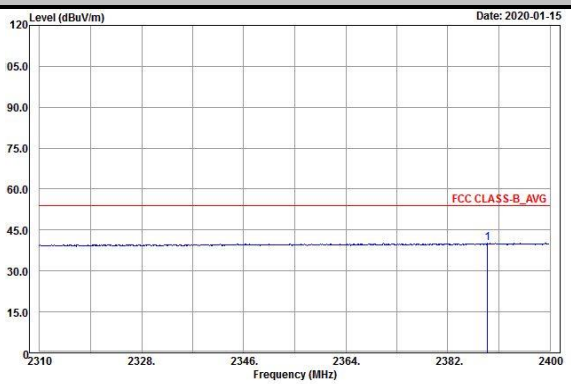
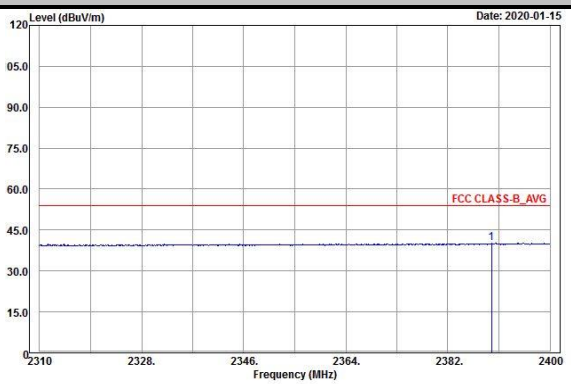
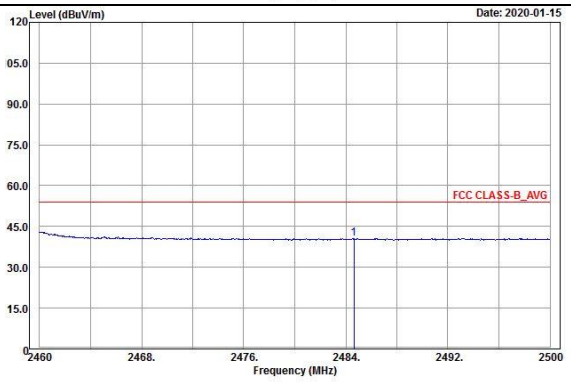
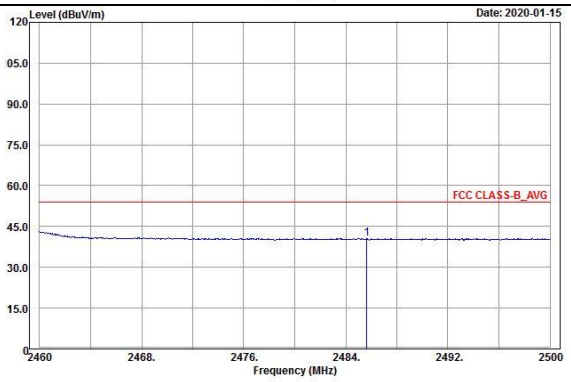
Horizontal	Vertical
	

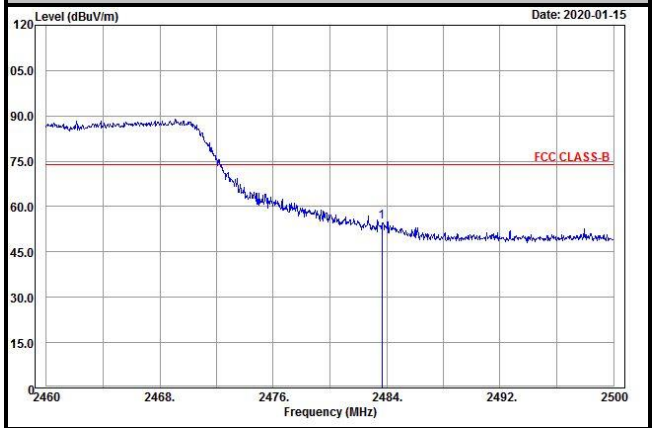
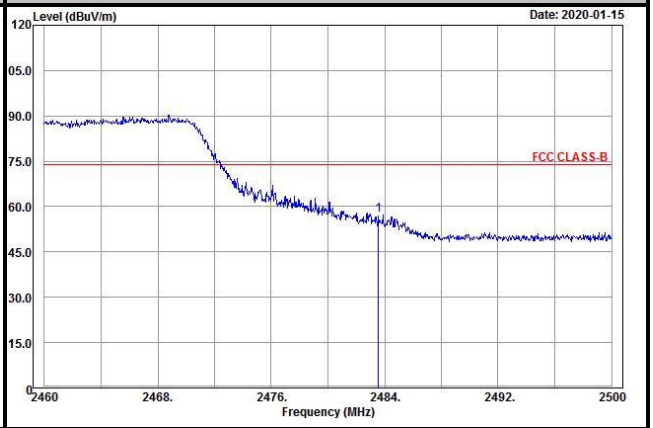
Ch 6

Peak

Horizontal	Vertical
	
	

Average

Horizontal	Vertical
	
	

Ch 11	
Peak	
Horizontal	**Vertical**
	
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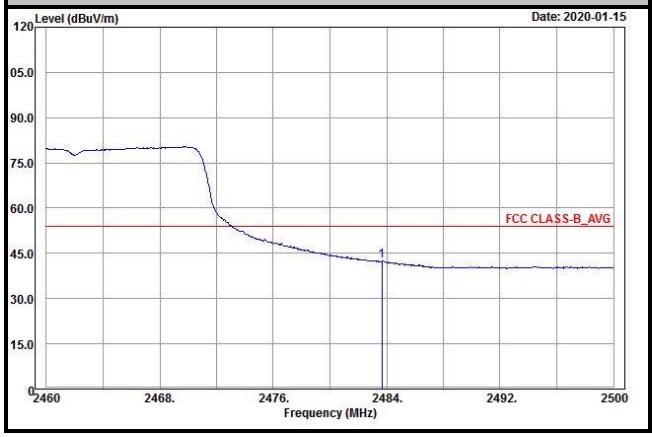
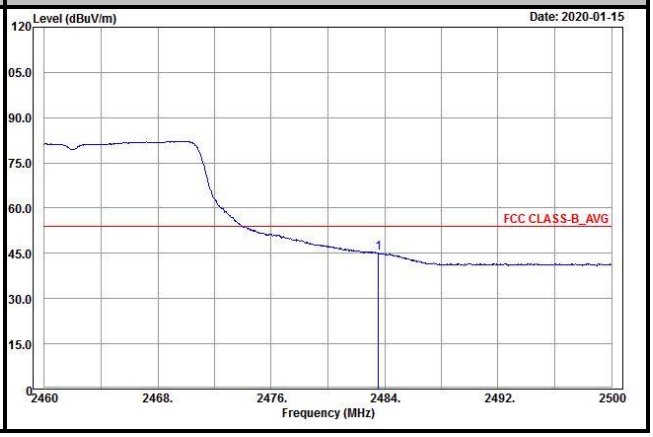
Horizontal	**Vertical**
	

Ch 12	
Peak	
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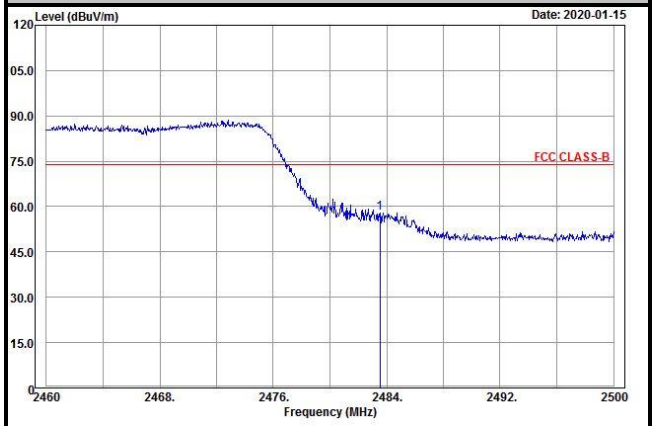	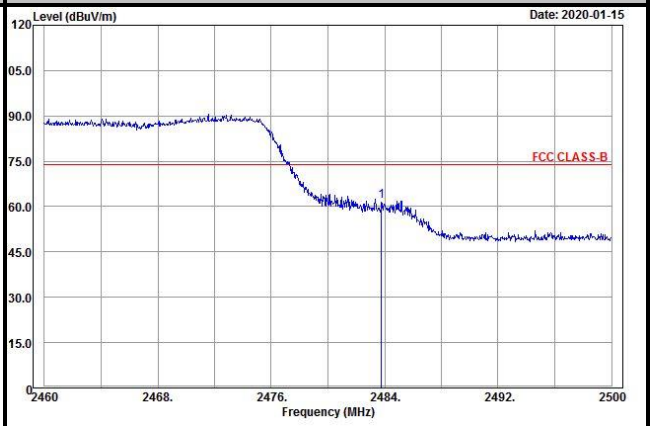
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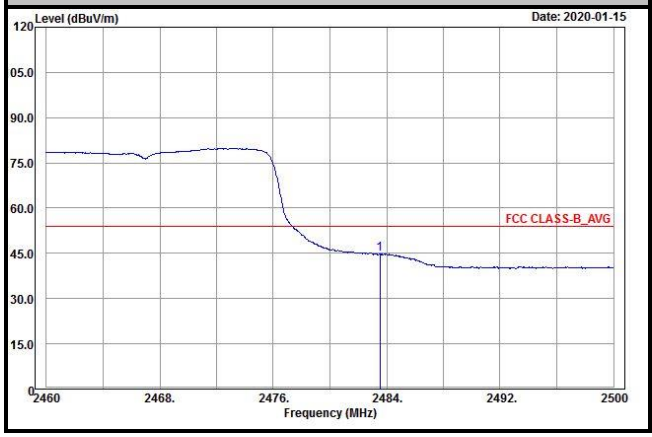	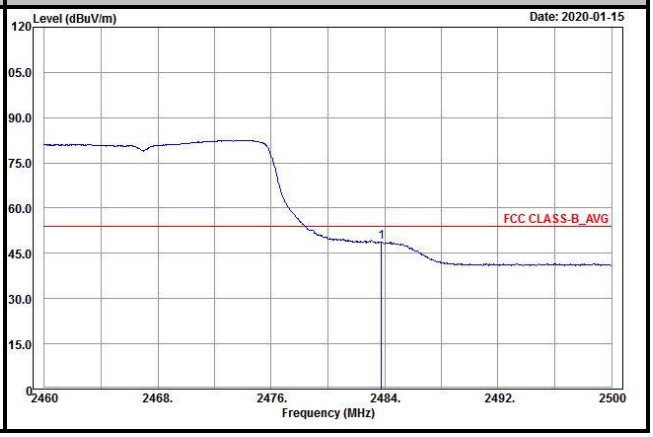

Ch 13	
Peak	
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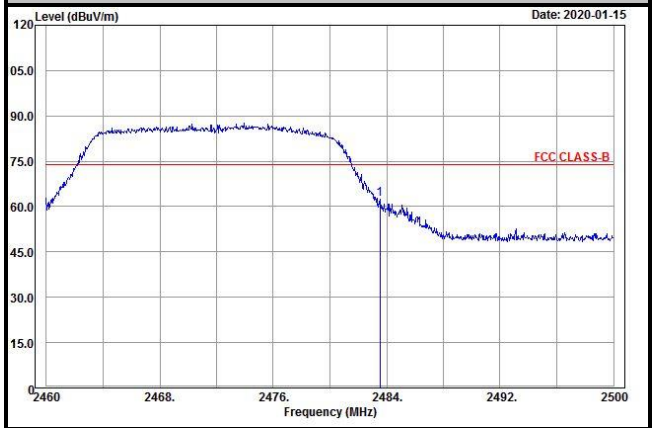	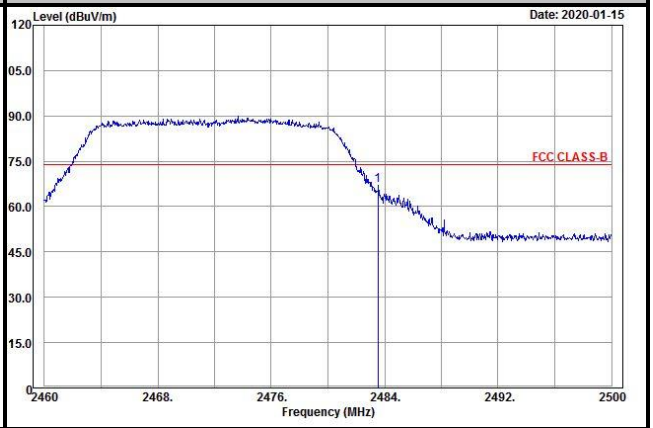
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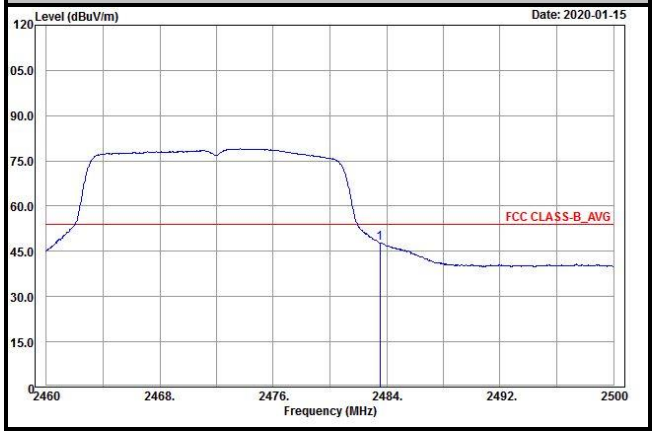	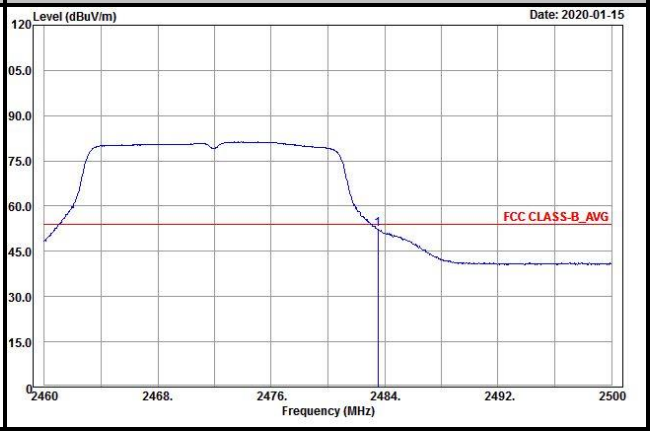

Appendix – Information of the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are FCC recognized accredited test firms and accredited according to ISO/IEC 17025.

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The address and road map of all our labs can be found in our web site also.

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