FCC Test Report

Report No.:	RFBGSN-WTW-P20070580-8
FCC ID:	2AX8C-3544
Test Model:	FL44TE
Received Date:	Jul. 29, 2020
Test Date:	Nov. 10 ~ Nov. 25, 2020
Issued Date:	Dec. 01, 2020
Applicant:	Amazon.com Services LLC
Address:	410 Terry Ave N Seattle, WA 98109 650 694 8333
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
Test Location:	No.19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City 33383, Taiwan
FCC Registration / Designation Number:	788550 / TW0003

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Release Control Record

Issue No.	Description	Date Issued
RFBGSN-WTW-P20070580-8	Original Release	Dec. 01, 2020

1 Certificate of Conformity

Product:	Fleet Edge
Brand:	N/A
Test Model:	FL44TE
Sample Status:	Engineering Sample
Applicant:	Amazon.com Services LLC
Test Date:	Nov. 10 ~ Nov. 25, 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:** Dec. 01, 2020

Gina Liu / Specialist

Approved by : _____ , **Date:** Dec. 01, 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 dB at 17.358 MHz.
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	Pass	Meet the requirement of limit. Minimum passing margin is -1.32 dB at 2487.878 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	2.93 dB
	200 MHz ~ 1000 MHz	2.95 dB
Radiated Emissions above 1 GHz	1 GHz ~ 18 GHz	2.26 dB
	18 GHz ~ 40 GHz	1.94 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	Fleet Edge
Brand	N/A
Test Model	FL44TE
Status of EUT	Engineering Sample
Power Supply Rating	12 Vdc
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 300.0 Mbps
Operating Frequency	2412 ~ 2472 MHz
Number of Channel	13 for 802.11b, 802.11g, 802.11n (HT20) 9 for 802.11n (HT40)
Output Power	276.22 mW
Antenna Type	Refer to Note as below
Antenna Connector	N/A
Accessory Device	Refer to Note as below
Data Cable Supplied	N/A

Note:

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

Modulation Mode	Tx Function
802.11b	1TX
802.11g	1TX
802.11n (HT20)	2TX
802.11n (HT40)	2TX

2. The EUT contains following accessory devices.

Product	Brand	Model	Description
BT/WLAN Module	Intel	9560NGW	802.11 a/b/g/n/ac Wireless LAN + Bluetooth 5
WWAN Module	Quectel	EM06-A	WCDMA, LTE

3. The antenna information is listed as below.

Antenna information				Peak gain w/ cable loss (dBi)			
Brand	**Type**	**Antenna Part number**	**Ant.**	**BT/WLAN 2.4 GHz**	**WLAN 5.15~5.35 GHz**	**WLAN 5.47~5.725 GHz**	**WLAN 5.725~5.85 GHz**
TAOGLAS	Multiband	MA491.A.BICG.005.gb	0	-1.85	-4.8	-4.8	-4.8
			1	-3.05	-3.5	-3.5	-3.5

4. 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.
5. 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		

9 channels are provided for 802.11n (HT40):

Channel	Frequency (MHz)	Channel	Frequency (MHz)
3	2422	8	2447
4	2427	9	2452
5	2432	10	2457
6	2437	11	2462
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: For radiated emission (below 1GHz) and power line conducted emission test items, the worst radiated emission mode was selected.
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
-	802.11n (HT40)	3 to 9	3, 6, 9, 10, 11	OFDM	BPSK	13.5

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)
-	802.11b	1 to 13	11	DSSS	DBPSK	1.0

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)
-	802.11b	1 to 13	11	DSSS	DBPSK	1.0

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
-	802.11n (HT40)	3 to 9	3, 9, 10, 11	OFDM	BPSK	13.5

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
-	802.11n (HT40)	3 to 9	3, 6, 9, 10, 11	OFDM	BPSK	13.5

Test Condition:

Applicable To	Environmental Conditions	Input Power	Tested by
RE≥1G	25 deg. C, 65 % RH	120 Vac, 60 Hz	Tim Chen, Cyril Chen
RE<1G	25 deg. C, 65 % RH	120 Vac, 60 Hz	Cyril Chen
PLC	25 deg. C, 65 % RH	120 Vac, 60 Hz	Tim Chen
APCM	25 deg. C, 65 % RH	120 Vac, 60 Hz	Gavin Wu

3.3 Duty Cycle of Test Signal

Duty cycle of test signal is ≥ 98 %, duty factor is not required.

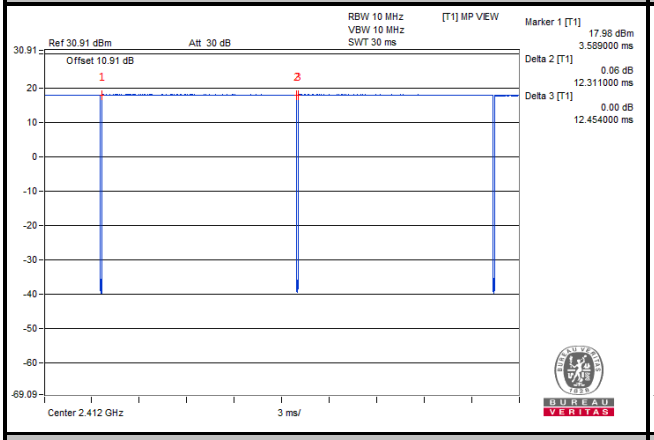
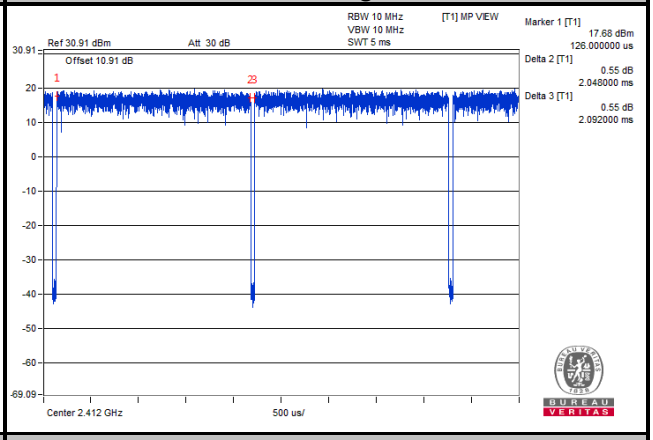
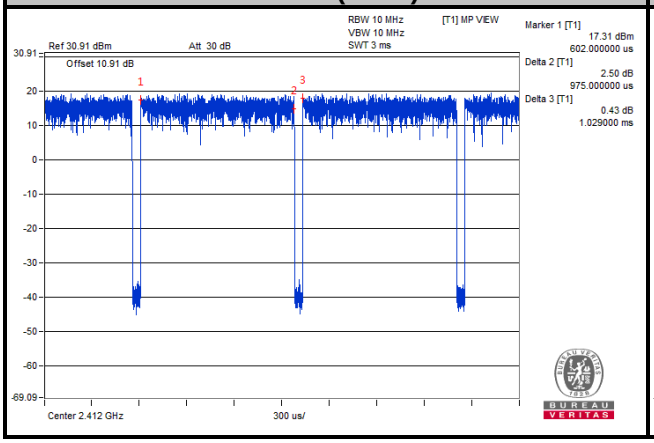
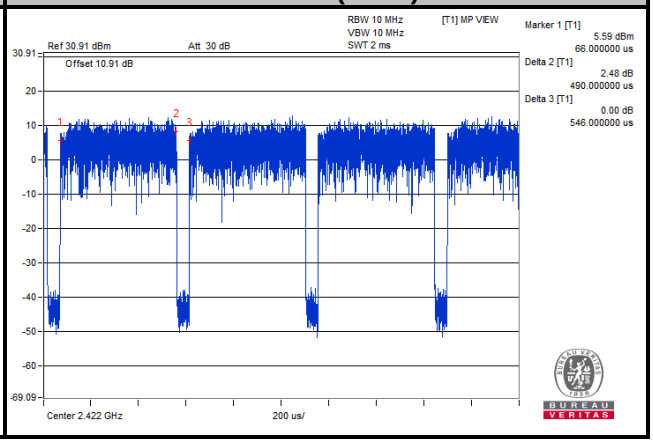
802.11b: Duty cycle = 12.311/12.454 = 0.989

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

802.11g: Duty cycle = 2.048/2.092 = 0.979, Duty factor = 10 * log(1/0.979) = 0.09

802.11n (HT20): Duty cycle = 0.975/1.029 = 0.948, Duty factor = 10 * log(1/0.948) = 0.23

802.11n (HT40): Duty cycle = 0.49/0.546 = 0.897, Duty factor = 10 * log(1/0.897) = 0.47

802.11b	802.11g
	
802.11n (HT20)	**802.11n (HT40)**
	

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.

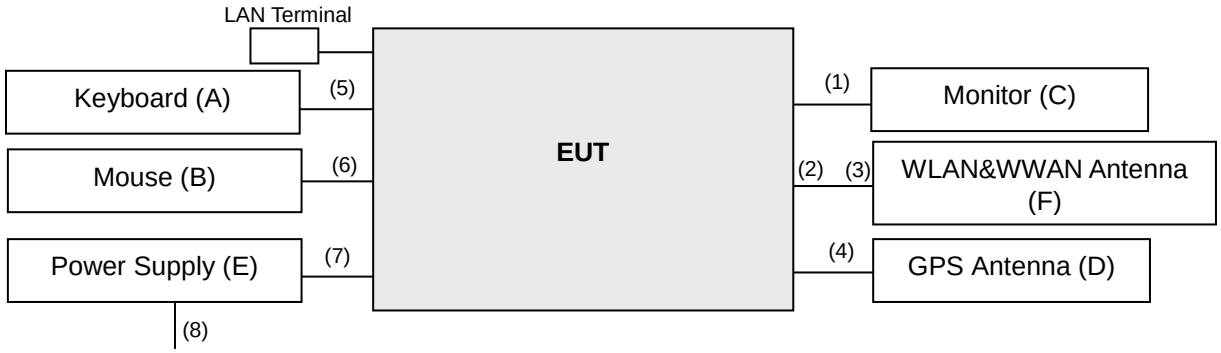
ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A	Keyboard	DELL	RT7D50	CN-0J4624-37172-44T-000M	FCC DOC Approved	--
B	Mouse	DELL	MS111-L	N/A	N/A	--
C	Monitor	ViewSonic	VX2457-MHD	UG0182942333	N/A	--
D	GPS Antenna	NA	NA	NA	NA	Provided by client
E	Power Supply	NA	NA	NA	NA	--
F	WLAN&WWAN Antenna	TAOGLAS	MA491.A.BICG.005.gb	NA	NA	Provided by client

Note:

1. All power cords of the above support units are non-shielded (1.8m).

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	HDMI Cable	1	2	N	0	-
2.	RF Cable	1	0.5	N	0	-
3.	RF Cable	1	0.5	N	0	-
4.	RF Cable	1	0.5	N	0	-
5.	USB Cable	1	2.4	N	0	-
6.	USB Cable	1	2.2	N	0	-
7.	DC power Cable	1	1.2	N	0	-
8.	Power Cable	1	1.8	N	0	-

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
KDB 662911 D01 Multiple Transmitter Output v02r01

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	N9038A	MY51210203	Mar. 18, 2020	Mar. 17, 2021
Spectrum Analyzer Agilent	N9010A	MY52220314	Dec. 12, 2019	Dec. 11, 2020
Spectrum Analyzer ROHDE & SCHWARZ	FSU43	101261	Apr. 16, 2020	Apr. 15, 2021
Spectrum Analyzer ROHDE & SCHWARZ	FSV40	100980	Apr. 20, 2020	Apr. 19, 2021
HORN Antenna SCHWARZBECK	BBHA 9120D	9120D-969	Nov. 24, 2019	Nov. 23, 2020
			Nov. 22, 2020	Nov. 21, 2021
BILOG Antenna SCHWARZBECK	VULB 9168	9168-472	Nov. 06, 2020	Nov. 05, 2021
Fixed Attenuator WOKEN	MDCS18N-10	MDCS18N-10-01	Apr. 14, 2020	Apr. 13, 2021
Loop Antenna	EM-6879	269	Sep. 17, 2020	Sep. 16, 2021
Preamplifier EMCI	EMC001340	980201	Oct. 21, 2020	Oct. 20, 2021
Preamplifier EMCI	EMC 012645	980115	Oct. 07, 2020	Oct. 06, 2021
Preamplifier EMCI	EMC 184045	980116	Oct. 07, 2020	Oct. 06, 2021
Preamplifier EMCI	EMC 330H	980112	Oct. 07, 2020	Oct. 06, 2021
Power Meter Anritsu	ML2495A	1012010	Sep. 01, 2020	Aug. 31, 2021
Power Sensor Anritsu	MA2411B	1315050	Sep. 01, 2020	Aug. 31, 2021
RF Coaxial Cable EMCI	EMC104-SM-SM-8000	171005	Oct. 07, 2020	Oct. 06, 2021
RF Coaxial Cable HUBER+SUHNNER	SUCOFLEX 104	EMC104-SM-SM-1000(140807)	Oct. 07, 2020	Oct. 06, 2021
RF Coaxial Cable WOKEN	8D-FB	Cable-Ch10-01	Oct. 07, 2020	Oct. 06, 2021
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA
Software BV ADT	E3 6.120103	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
USB Wideband Power Sensor KEYSIGHT	U2021XA	MY55050005/MY55190004/MY55190007/MY55210005	Jul. 13, 2020	Jul. 12, 2021

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 Chamber 10.

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:

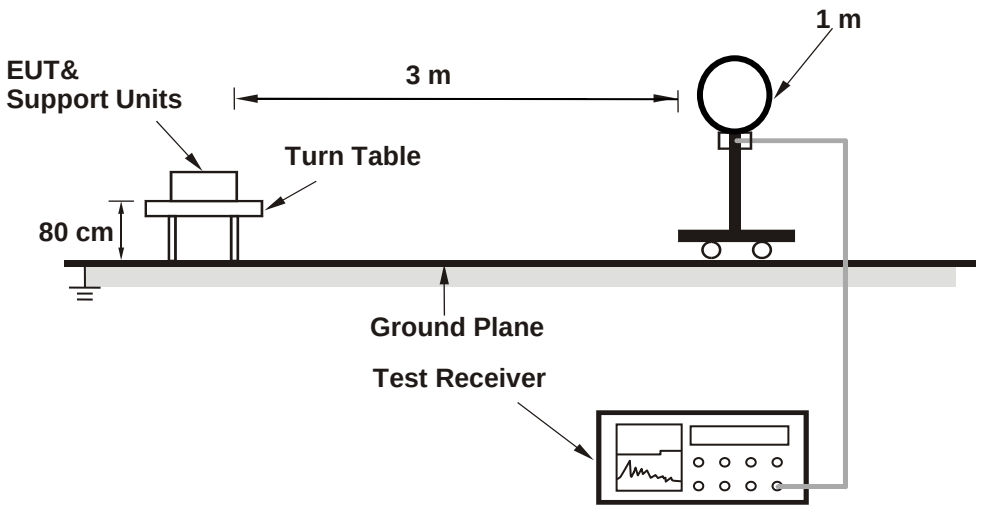
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection (QP) or Peak detection (PK) at frequency below 1 GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) 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 = 1 MHz, VBW =10 Hz ; 11g: RBW = 1 MHz, VBW = 1 kHz ;
   11n (HT20): RBW = 1 MHz, VBW = 3 kHz ; 11n (HT40): RBW = 1 MHz, VBW = 3 kHz)
4. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

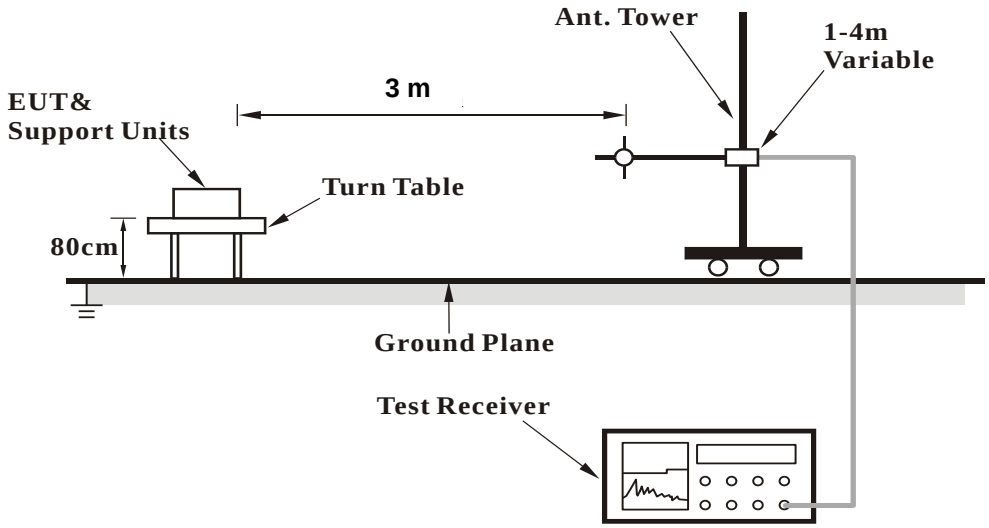
No deviation.

4.1.5 Test Set Up

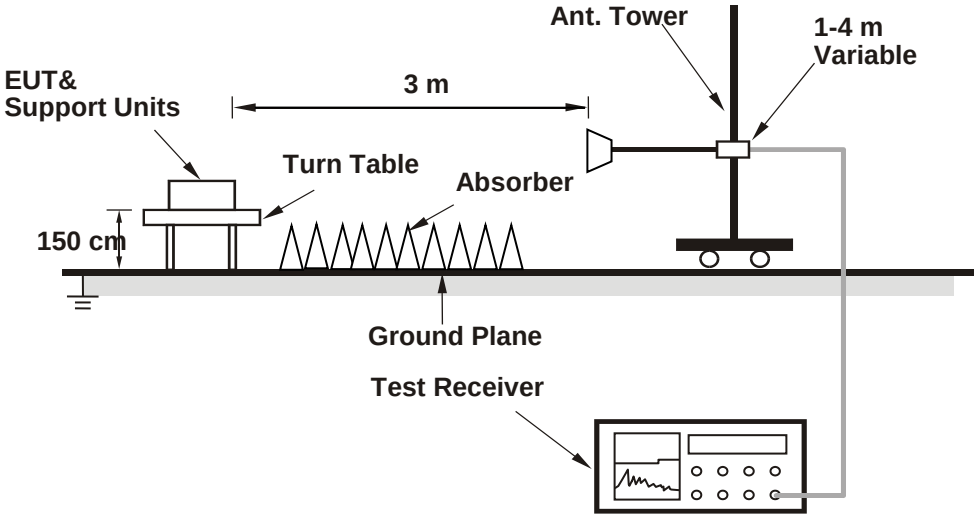
<Radiated Emission below 30 MHz>



<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).

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**	Tim Chen

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**
2390	45.6	51.52	-5.92	54	-8.4	100	33	Average
2390	51.92	57.84	-5.92	74	-22.08	100	33	Peak
2412	95.8	101.75	-5.95	------	------	100	33	Average
2412	98.64	104.59	-5.95	------	------	100	33	Peak
4824	38.85	54.47	-15.62	54	-15.15	102	20	Average
4824	45.54	61.16	-15.62	74	-28.46	102	20	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**
2390	42.75	48.67	-5.92	54	-11.25	400	49	Average
2390	53.78	59.7	-5.92	74	-20.22	400	49	Peak
2412	95.65	101.6	-5.95	------	------	400	49	Average
2412	99.08	105.03	-5.95	------	------	400	49	Peak
4824	38.43	54.05	-15.62	54	-15.57	100	350	Average
4824	45.26	60.88	-15.62	74	-28.74	100	350	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**	Tim Chen

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**
2390	38.16	44.08	-5.92	54	-15.84	100	25	Average
2390	47.58	53.5	-5.92	74	-26.42	100	25	Peak
2437	98.33	104.22	-5.89	------	------	100	25	Average
2437	101.62	107.51	-5.89	------	------	100	25	Peak
2484.61	48.09	53.79	-5.7	54	-5.91	100	25	Average
2484.61	53.13	58.83	-5.7	74	-20.87	100	25	Peak
4874	40.1	55.66	-15.56	54	-13.9	103	19	Average
4874	46.14	61.7	-15.56	74	-27.86	103	19	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**
2390	37.55	43.47	-5.92	54	-16.45	112	39	Average
2390	48.59	54.51	-5.92	74	-25.41	112	39	Peak
2437	96.84	102.73	-5.89	------	------	112	39	Average
2437	99.52	105.41	-5.89	------	------	112	39	Peak
2484.8	42.91	48.61	-5.7	54	-11.09	112	39	Average
2484.8	49.89	55.59	-5.7	74	-24.11	112	39	Peak
4874	39.78	55.34	-15.56	54	-14.22	130	3	Average
4874	46.32	61.88	-15.56	74	-27.68	130	3	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**	Tim Chen

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	99.47	105.28	-5.81	------	------	113	21	Average
2462	101.44	107.25	-5.81	------	------	113	21	Peak
2487.878	52.68	58.36	-5.68	54	-1.32	113	21	Average
2487.878	65.34	71.02	-5.68	74	-8.66	113	21	Peak
4924	39.21	54.72	-15.51	54	-14.79	107	27	Average
4924	44.46	59.97	-15.51	74	-29.54	107	27	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	97.77	103.58	-5.81	------	------	100	36	Average
2462	99.75	105.56	-5.81	------	------	100	36	Peak
2487.764	48.6	54.28	-5.68	54	-5.4	100	36	Average
2487.764	62.11	67.79	-5.68	74	-11.89	100	36	Peak
4924	38.53	54.04	-15.51	54	-15.47	123	64	Average
4924	44.53	60.04	-15.51	74	-29.47	123	64	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**	Tim Chen

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	98.39	104.11	-5.72	------	------	110	22	Average
2467	100.53	106.25	-5.72	------	------	110	22	Peak
2484.116	50.89	56.59	-5.7	54	-3.11	110	22	Average
2484.116	67.63	73.33	-5.7	74	-6.37	110	22	Peak
4934	43.3	58.81	-15.51	54	-10.7	100	56	Average
4934	43.3	58.81	-15.51	74	-30.7	100	56	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	95.62	101.34	-5.72	------	------	100	36	Average
2467	97.6	103.32	-5.72	------	------	100	36	Peak
2484.078	46.62	52.32	-5.7	54	-7.38	100	36	Average
2484.078	64.46	70.16	-5.7	74	-9.54	100	36	Peak
4934	37.56	53.07	-15.51	54	-16.44	105	28	Average
4934	43.94	59.45	-15.51	74	-30.06	105	28	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**	Tim Chen

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	97.46	103.17	-5.71	------	------	107	21	Average
2472	100.87	106.58	-5.71	------	------	107	21	Peak
2487.65	51.57	57.25	-5.68	54	-2.43	107	21	Average
2487.65	69.99	75.67	-5.68	74	-4.01	107	21	Peak
4944	32.06	47.55	-15.49	54	-21.94	238	228	Average
4944	41.36	56.85	-15.49	74	-32.64	238	228	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	94.95	100.66	-5.71	------	------	106	34	Average
2472	97.05	102.76	-5.71	------	------	106	34	Peak
2487.574	48.8	54.48	-5.68	54	-5.2	106	34	Average
2487.574	67.59	73.27	-5.68	74	-6.41	106	34	Peak
4944	32.18	47.67	-15.49	54	-21.82	183	163	Average
4944	41.57	57.06	-15.49	74	-32.43	183	163	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**	Tim Chen

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**
2390	41.48	47.4	-5.92	54	-12.52	117	22	Average
2390	54.47	60.39	-5.92	74	-19.53	117	22	Peak
2412	94.95	100.9	-5.95	------	------	117	22	Average
2412	102.92	108.87	-5.95	------	------	117	22	Peak
4824	31.64	47.26	-15.62	54	-22.36	218	242	Average
4824	41.92	57.54	-15.62	74	-32.08	218	242	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**
2390	41.5	47.42	-5.92	54	-12.5	110	42	Average
2390	53.37	59.29	-5.92	74	-20.63	110	42	Peak
2412	93.19	99.14	-5.95	------	------	110	42	Average
2412	100.36	106.31	-5.95	------	------	110	42	Peak
4824	31.48	47.1	-15.62	54	-22.52	183	190	Average
4824	41.12	56.74	-15.62	74	-32.88	183	190	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**	Tim Chen

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**
2390	40.41	46.33	-5.92	54	-13.59	175	26	Average
2390	52.77	58.69	-5.92	74	-21.23	175	26	Peak
2437	99.42	105.31	-5.89	------	------	175	26	Average
2437	106.74	112.63	-5.89	------	------	175	26	Peak
2483.5	51.12	56.82	-5.7	54	-2.88	175	26	Average
2483.5	64.04	69.74	-5.7	74	-9.96	175	26	Peak
4874	32.05	47.61	-15.56	54	-21.95	219	226	Average
4874	41.6	57.16	-15.56	74	-32.4	219	226	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**
2390	39.6	45.52	-5.92	54	-14.4	104	40	Average
2390	50.59	56.51	-5.92	74	-23.41	104	40	Peak
2437	96.77	102.66	-5.89	------	------	104	40	Average
2437	104.23	110.12	-5.89	------	------	104	40	Peak
2483.5	44.83	50.53	-5.7	54	-9.17	104	40	Average
2483.5	58.21	63.91	-5.7	74	-15.79	104	40	Peak
4874	31.81	47.37	-15.56	54	-22.19	198	180	Average
4874	43.18	58.74	-15.56	74	-30.82	198	180	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**	Tim Chen

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	95.67	101.48	-5.81	------	------	112	21	Average
2462	102.86	108.67	-5.81	------	------	112	21	Peak
2483.5	46.2	51.9	-5.7	54	-7.8	112	21	Average
2483.5	60.36	66.06	-5.7	74	-13.64	112	21	Peak
4924	32.3	47.81	-15.51	54	-21.7	224	219	Average
4924	42.88	58.39	-15.51	74	-31.12	224	219	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	93.85	99.66	-5.81	------	------	106	35	Average
2462	101.13	106.94	-5.81	------	------	106	35	Peak
2483.5	44.08	49.78	-5.7	54	-9.92	106	35	Average
2483.5	56.61	62.31	-5.7	74	-17.39	106	35	Peak
4924	32.1	47.61	-15.51	54	-21.9	192	192	Average
4924	42.89	58.4	-15.51	74	-31.11	192	192	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**	Tim Chen

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	90.08	95.8	-5.72	------	------	171	24	Average
2467	97.86	103.58	-5.72	------	------	171	24	Peak
2483.5	40.26	45.96	-5.7	54	-13.74	171	24	Average
2483.5	52.68	58.38	-5.7	74	-21.32	171	24	Peak
4934	34.07	49.58	-15.51	54	-19.93	152	144	Average
4934	42.96	58.47	-15.51	74	-31.04	152	144	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	89.16	94.88	-5.72	------	------	100	320	Average
2467	97.45	103.17	-5.72	------	------	100	320	Peak
2483.5	40.11	45.81	-5.7	54	-13.89	100	320	Average
2483.5	53.06	58.76	-5.7	74	-20.94	100	320	Peak
4934	34.22	49.73	-15.51	54	-19.78	102	178	Average
4934	42.72	58.23	-15.51	74	-31.28	102	178	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**	Tim Chen

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	73.55	79.26	-5.71	------	------	149	27	Average
2472	81.33	87.04	-5.71	------	------	149	27	Peak
2483.5	45.58	51.28	-5.7	54	-8.42	149	27	Average
2483.5	58.86	64.56	-5.7	74	-15.14	149	27	Peak
4944	33.54	49.03	-15.49	54	-20.46	136	277	Average
4944	42.1	57.59	-15.49	74	-31.9	136	277	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	70.81	76.52	-5.71	------	------	101	321	Average
2472	78.8	84.51	-5.71	------	------	101	321	Peak
2483.5	43.72	49.42	-5.7	54	-10.28	101	321	Average
2483.5	55.42	61.12	-5.7	74	-18.58	101	321	Peak
4944	33.04	48.53	-15.49	54	-20.96	102	13	Average
4944	42.15	57.64	-15.49	74	-31.85	102	13	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**	Tim Chen

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**
2390	38.45	44.37	-5.92	54	-15.55	100	218	Average
2390	47.21	53.13	-5.92	74	-26.79	100	218	Peak
2412	93.12	99.07	-5.95	------	------	100	218	Average
2412	100.9	106.85	-5.95	------	------	100	218	Peak
4824	34.46	50.08	-15.62	54	-19.54	163	29	Average
4824	42.56	58.18	-15.62	74	-31.44	163	29	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**
2390	39.63	45.55	-5.92	54	-14.37	100	147	Average
2390	49.32	55.24	-5.92	74	-24.68	100	147	Peak
2412	98.51	104.46	-5.95	------	------	100	147	Average
2412	105.22	111.17	-5.95	------	------	100	147	Peak
4824	34.17	49.79	-15.62	54	-19.83	106	178	Average
4824	42.53	58.15	-15.62	74	-31.47	106	178	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**	Cyril Chen

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**
2390	37.62	43.54	-5.92	54	-16.38	100	240	Average
2390	47.49	53.41	-5.92	74	-26.51	100	240	Peak
2437	96.62	102.51	-5.89	------	------	100	240	Average
2437	103.25	109.14	-5.89	------	------	100	240	Peak
2483.5	38.84	44.54	-5.7	54	-15.16	100	240	Average
2483.5	48.07	53.77	-5.7	74	-25.93	100	240	Peak
4874	31.89	47.45	-15.56	54	-22.11	157	130	Average
4874	40.89	56.45	-15.56	74	-33.11	157	130	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**
2390	38.03	43.95	-5.92	54	-15.97	100	146	Average
2390	47.3	53.22	-5.92	74	-26.7	100	146	Peak
2437	99.23	105.12	-5.89	------	------	100	146	Average
2437	106.25	112.14	-5.89	------	------	100	146	Peak
2483.5	40.65	46.35	-5.7	54	-13.35	100	146	Average
2483.5	51.79	57.49	-5.7	74	-22.21	100	146	Peak
4874	32.4	47.96	-15.56	54	-21.6	129	123	Average
4874	40.81	56.37	-15.56	74	-33.19	129	123	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**	Cyril Chen

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	95.15	100.96	-5.81	------	------	100	240	Average
2462	102.07	107.88	-5.81	------	------	100	240	Peak
2483.5	40.51	46.21	-5.7	54	-13.49	100	240	Average
2483.5	53.78	59.48	-5.7	74	-20.22	100	240	Peak
4924	31.97	47.48	-15.51	54	-22.03	155	106	Average
4924	41.89	57.4	-15.51	74	-32.11	155	106	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	98.24	104.05	-5.81	------	------	100	161	Average
2462	105.37	111.18	-5.81	------	------	100	161	Peak
2483.5	46.41	52.11	-5.7	54	-7.59	100	161	Average
2483.5	58.76	64.46	-5.7	74	-15.24	100	161	Peak
4924	31.64	47.15	-15.51	54	-22.36	122	154	Average
4924	41.97	57.48	-15.51	74	-32.03	122	154	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**	Cyril Chen

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	89.62	95.34	-5.72	------	------	100	239	Average
2467	97.26	102.98	-5.72	------	------	100	239	Peak
2483.5	41.3	47	-5.7	54	-12.7	100	239	Average
2483.5	49.81	55.51	-5.7	74	-24.19	100	239	Peak
4934	31.95	47.46	-15.51	54	-22.05	122	182	Average
4934	41.5	57.01	-15.51	74	-32.5	122	182	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	95.13	100.85	-5.72	------	------	100	158	Average
2467	102.05	107.77	-5.72	------	------	100	158	Peak
2483.5	44.14	49.84	-5.7	54	-9.86	100	158	Average
2483.5	53.18	58.88	-5.7	74	-20.82	100	158	Peak
4934	32.6	48.11	-15.51	54	-21.4	138	145	Average
4934	41.85	57.36	-15.51	74	-32.15	138	145	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**	Cyril Chen

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	72.78	78.49	-5.71	------	------	100	238	Average
2472	80.11	85.82	-5.71	------	------	100	238	Peak
2483.5	47.94	53.64	-5.7	54	-6.06	100	238	Average
2483.5	58.56	64.26	-5.7	74	-15.44	100	238	Peak
4944	31.7	47.19	-15.49	54	-22.3	133	173	Average
4944	41.59	57.08	-15.49	74	-32.41	133	173	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	77	82.71	-5.71	------	------	100	164	Average
2472	84.3	90.01	-5.71	------	------	100	164	Peak
2483.5	51.42	57.12	-5.7	54	-2.58	100	164	Average
2483.5	62.95	68.65	-5.7	74	-11.05	100	164	Peak
4944	31.75	47.24	-15.49	54	-22.25	154	128	Average
4944	41.51	57	-15.49	74	-32.49	154	128	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 (HT40)

EUT Test Condition		Measurement Detail	
Channel	Channel 3	**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**	Cyril Chen

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**
2390	39.44	45.36	-5.92	54	-14.56	100	240	Average
2390	48.3	54.22	-5.92	74	-25.7	100	240	Peak
2422	90.55	96.43	-5.88	------	------	100	240	Average
2422	97.65	103.53	-5.88	------	------	100	240	Peak
2483.5	38.24	43.94	-5.7	54	-15.76	100	240	Average
2483.5	47.32	53.02	-5.7	74	-26.68	100	240	Peak
4844	31.16	46.75	-15.59	54	-22.84	140	190	Average
4844	40.42	56.01	-15.59	74	-33.58	140	190	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**
2390	40	45.92	-5.92	54	-14	100	147	Average
2390	47.79	53.71	-5.92	74	-26.21	100	147	Peak
2422	93.36	99.24	-5.88	------	------	100	147	Average
2422	100.28	106.16	-5.88	------	------	100	147	Peak
2483.5	39.87	45.57	-5.7	54	-14.13	100	147	Average
2483.5	49.83	55.53	-5.7	74	-24.17	100	147	Peak
4844	30.67	46.26	-15.59	54	-23.33	176	130	Average
4844	40.84	56.43	-15.59	74	-33.16	176	130	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 2422 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**	Cyril Chen

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**
2390	37.97	43.89	-5.92	54	-16.03	100	220	Average
2390	48.93	54.85	-5.92	74	-25.07	100	220	Peak
2437	90.88	96.77	-5.89	------	------	100	220	Average
2437	97.87	103.76	-5.89	------	------	100	220	Peak
2483.5	39.35	45.05	-5.7	54	-14.65	100	220	Average
2483.5	49.04	54.74	-5.7	74	-24.96	100	220	Peak
4874	31.29	46.85	-15.56	54	-22.71	123	154	Average
4874	41.05	56.61	-15.56	74	-32.95	123	154	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**
2390	38.58	44.5	-5.92	54	-15.42	115	146	Average
2390	47.21	53.13	-5.92	74	-26.79	115	146	Peak
2437	93.82	99.71	-5.89	------	------	115	146	Average
2437	101.36	107.25	-5.89	------	------	115	146	Peak
2483.5	42.54	48.24	-5.7	54	-11.46	115	146	Average
2483.5	51.54	57.24	-5.7	74	-22.46	115	146	Peak
4874	31.54	47.1	-15.56	54	-22.46	150	178	Average
4874	41.03	56.59	-15.56	74	-32.97	150	178	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 9	**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**	Cyril Chen

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**
2390	37.51	43.43	-5.92	54	-16.49	100	240	Average
2390	47.18	53.1	-5.92	74	-26.82	100	240	Peak
2452	90.61	96.43	-5.82	------	------	100	240	Average
2452	98.3	104.12	-5.82	------	------	100	240	Peak
2483.5	43.62	49.32	-5.7	54	-10.38	100	240	Average
2483.5	52.73	58.43	-5.7	74	-21.27	100	240	Peak
4904	32.1	47.65	-15.55	54	-21.9	163	127	Average
4904	41.46	57.01	-15.55	74	-32.54	163	127	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**
2390	39.42	45.34	-5.92	54	-14.58	100	161	Average
2390	47.67	53.59	-5.92	74	-26.33	100	161	Peak
2452	92.48	98.3	-5.82	------	------	100	161	Average
2452	99.23	105.05	-5.82	------	------	100	161	Peak
2483.5	47.23	52.93	-5.7	54	-6.77	100	161	Average
2483.5	55.39	61.09	-5.7	74	-18.61	100	161	Peak
4904	30.85	46.4	-15.55	54	-23.15	119	189	Average
4904	41.02	56.57	-15.55	74	-32.98	119	189	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 2452 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 10	**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**	Cyril Chen

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**
2390	37.45	43.37	-5.92	54	-16.55	103	239	Average
2390	47.65	53.57	-5.92	74	-26.35	103	239	Peak
2457	86.1	91.91	-5.81	------	------	103	239	Average
2457	92.49	98.3	-5.81	------	------	103	239	Peak
2483.5	43.34	49.04	-5.7	54	-10.66	103	239	Average
2483.5	57.77	63.47	-5.7	74	-16.23	103	239	Peak
4914	31.68	47.21	-15.53	54	-22.32	172	144	Average
4914	42.23	57.76	-15.53	74	-31.77	172	144	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**
2390	39.53	45.45	-5.92	54	-14.47	103	162	Average
2390	47.35	53.27	-5.92	74	-26.65	103	162	Peak
2457	89.14	94.95	-5.81	------	------	103	162	Average
2457	96.02	101.83	-5.81	------	------	103	162	Peak
2483.5	48.51	54.21	-5.7	54	-5.49	103	162	Average
2483.5	62.27	67.97	-5.7	74	-11.73	103	162	Peak
4914	31.59	47.12	-15.53	54	-22.41	132	181	Average
4914	41.75	57.28	-15.53	74	-32.25	132	181	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 2457 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**	Cyril Chen

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**
2390	37.42	43.34	-5.92	54	-16.58	100	239	Average
2390	47.57	53.49	-5.92	74	-26.43	100	239	Peak
2462	78.94	84.75	-5.81	------	------	100	239	Average
2462	85.7	91.51	-5.81	------	------	100	239	Peak
2483.5	44.36	50.06	-5.7	54	-9.64	100	239	Average
2483.5	55.26	60.96	-5.7	74	-18.74	100	239	Peak
4924	31.03	46.54	-15.51	54	-22.97	193	103	Average
4924	41.11	56.62	-15.51	74	-32.89	193	103	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**
2390	38.91	44.83	-5.92	54	-15.09	100	159	Average
2390	47.37	53.29	-5.92	74	-26.63	100	159	Peak
2462	81.93	87.74	-5.81	------	------	100	159	Average
2462	89.29	95.1	-5.81	------	------	100	159	Peak
2483.5	47.87	53.57	-5.7	54	-6.13	100	159	Average
2483.5	60.86	66.56	-5.7	74	-13.14	100	159	Peak
4924	31.83	47.34	-15.51	54	-22.17	130	150	Average
4924	42.15	57.66	-15.51	74	-31.85	130	150	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.

9 kHz ~ 30 MHz Data:

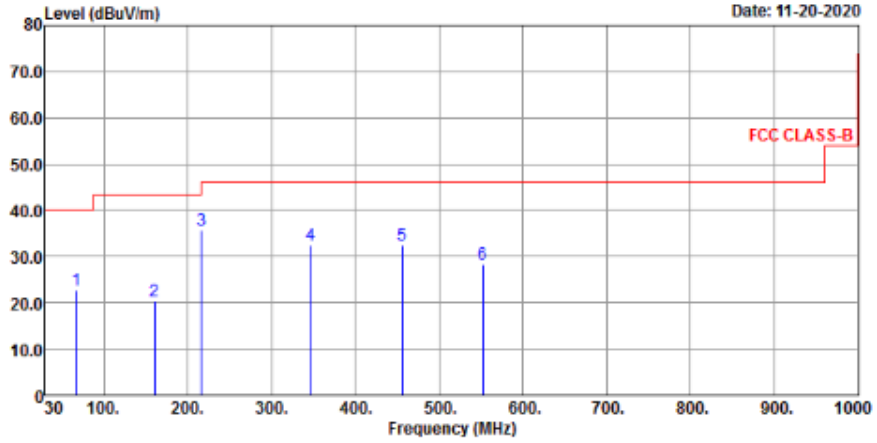
The amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required to be report.

30 MHz ~ 1 GHz Worst-Case Data:

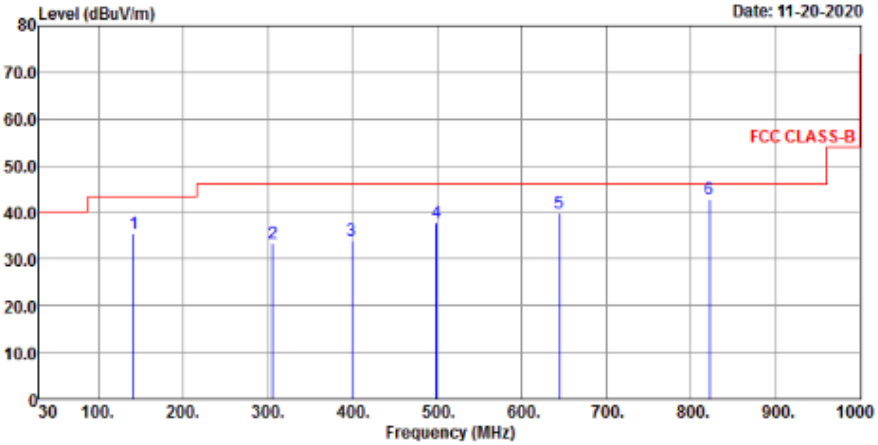
802.11b

EUT Test Condition		Measurement Detail	
Channel	Channel 11	**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**	Cyril Chen

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**
66.86	22.77	35.96	-13.19	40	-17.23	108	211	QP
159.98	20.28	31.9	-11.62	43.5	-23.22	194	132	QP
216.24	35.62	50.59	-14.97	46	-10.38	157	208	QP
346.22	32.61	42.49	-9.88	46	-13.39	136	217	QP
455.83	32.61	38.9	-6.29	46	-13.39	154	189	QP
551.86	28.21	32.62	-4.41	46	-17.79	133	162	QP
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**
141.55	35.47	47.45	-11.98	43.5	-8.03	155	131	QP
305.48	33.36	44.33	-10.97	46	-12.64	189	264	QP
399.57	33.83	42.19	-8.36	46	-12.17	194	107	QP
499.48	37.87	43.33	-5.46	46	-8.13	168	211	QP
644.98	39.94	41.57	-1.63	46	-6.06	139	264	QP
821.52	42.67	40.47	2.2	46	-3.33	101	234	QP

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 Woken	5D-FB	Cable-cond1-01	Sep. 04, 2020	Sep. 03, 2021
LISN ROHDE & SCHWARZ (EUT)	ENV216	101826	Feb. 20, 2020	Feb. 19, 2021
V-LISN SCHWARZBECK (Peripheral)	NNBL 8226-2	8226-142	Jul. 31, 2020	Jul. 30, 2021
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

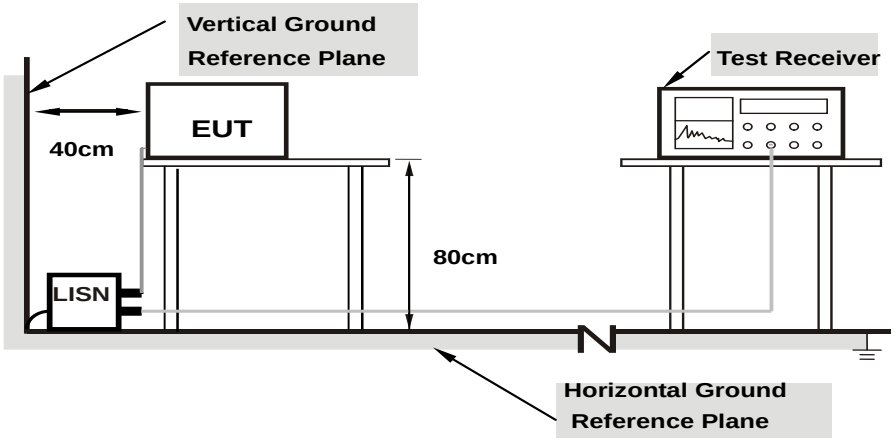
a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/50 uH of coupling 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.

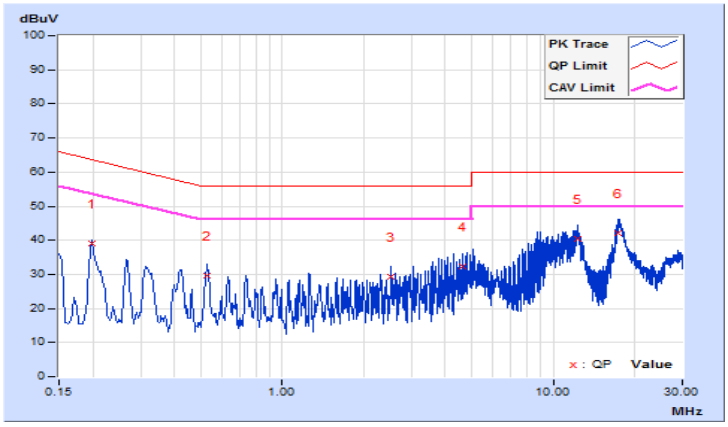
4.2.7 Test Results

Frequency Range	150kHz ~ 30MHz	**Detector Function & Resolution Bandwidth**	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	**Environmental Conditions**	24℃, 67%RH
Tested by	Tim Chen	**Test Date**	2020/11/21

Phase Of Power : Line (L)										
No	**Frequency (MHz)**	**Correction Factor (dB)**	**Reading Value (dBuV)**		**Emission Level (dBuV)**		**Limit (dBuV)**		**Margin (dB)**	
			Q.P.	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**
1	0.19800	9.66	29.28	25.03	38.94	34.69	63.69	53.69	-24.75	-19.00
2	0.53000	9.66	20.10	14.14	29.76	23.80	56.00	46.00	-26.24	-22.20
3	2.51400	9.71	19.65	15.68	29.36	25.39	56.00	46.00	-26.64	-20.61
4	4.62600	9.75	22.54	11.88	32.29	21.63	56.00	46.00	-23.71	-24.37
5	12.38600	9.82	30.63	20.79	40.45	30.61	60.00	50.00	-19.55	-19.39
6	**17.35800**	**9.85**	**32.11**	**26.15**	**41.96**	**36.00**	**60.00**	**50.00**	**-18.04**	**-14.00**

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

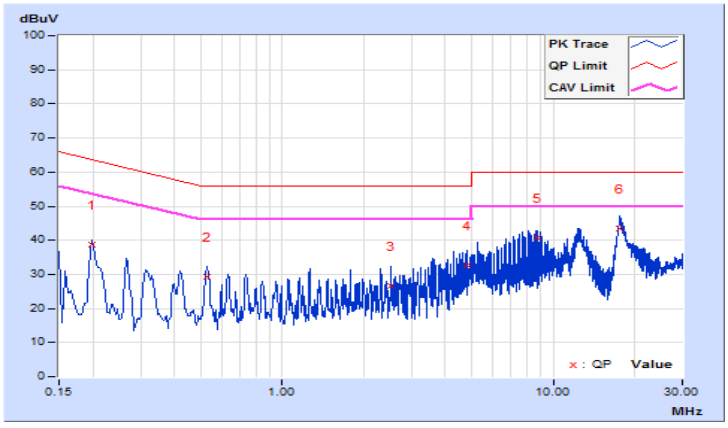


Frequency Range	150kHz ~ 30MHz	**Detector Function & Resolution Bandwidth**	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	**Environmental Conditions**	24℃, 67%RH
Tested by	Tim Chen	**Test Date**	2020/11/21

Phase Of Power : Neutral (N)										
No	**Frequency (MHz)**	**Correction Factor (dB)**	**Reading Value (dBuV)**		**Emission Level (dBuV)**		**Limit (dBuV)**		**Margin (dB)**	
			Q.P.	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**
1	0.19800	9.68	29.16	25.28	38.84	34.96	63.69	53.69	-24.85	-18.73
2	0.52984	9.68	19.47	13.53	29.15	23.21	56.00	46.00	-26.85	-22.79
3	2.52200	9.74	16.74	9.17	26.48	18.91	56.00	46.00	-29.52	-27.09
4	4.84200	9.78	23.02	17.69	32.80	27.47	56.00	46.00	-23.20	-18.53
5	8.74200	9.82	30.83	25.91	40.65	35.73	60.00	50.00	-19.35	-14.27
6	17.61800	9.96	33.52	25.02	43.48	34.98	60.00	50.00	-16.52	-15.02

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

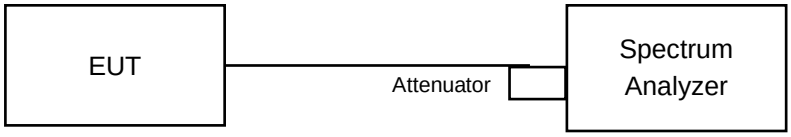


4.3 6 dB Bandwidth Measurement

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	10.10	0.5	Pass
6	2437	10.11	0.5	Pass
11	2462	10.09	0.5	Pass
12	2467	10.12	0.5	Pass
13	2472	9.61	0.5	Pass

802.11g

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	16.40	0.5	Pass
6	2437	16.37	0.5	Pass
11	2462	16.39	0.5	Pass
12	2467	16.40	0.5	Pass
13	2472	16.36	0.5	Pass

802.11n (HT20)

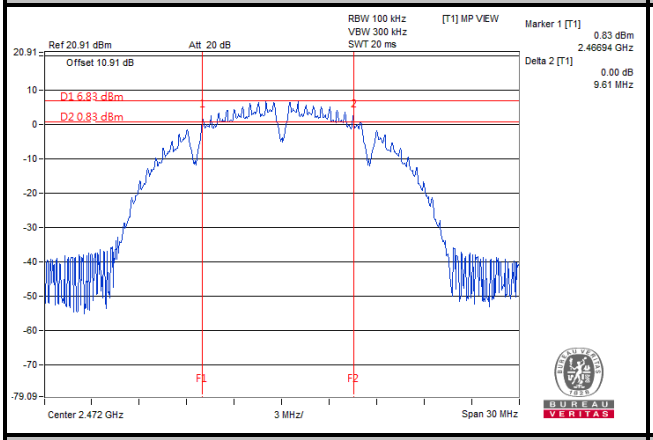
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
1	2412	17.65	17.64	0.5	Pass
6	2437	17.62	17.63	0.5	Pass
11	2462	17.61	17.66	0.5	Pass
12	2467	17.62	17.63	0.5	Pass
13	2472	17.62	17.63	0.5	Pass

802.11n (HT40)

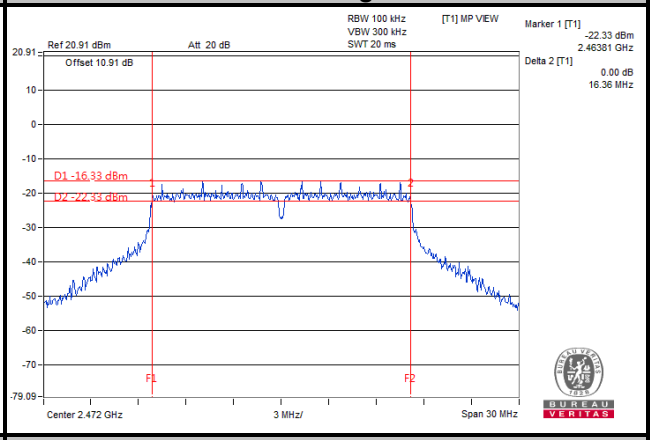
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
3	2422	36.41	36.44	0.5	Pass
6	2437	36.40	36.46	0.5	Pass
9	2452	36.44	36.49	0.5	Pass
10	2457	36.48	36.49	0.5	Pass
11	2462	36.47	36.50	0.5	Pass

Spectrum Plot of Worst Value

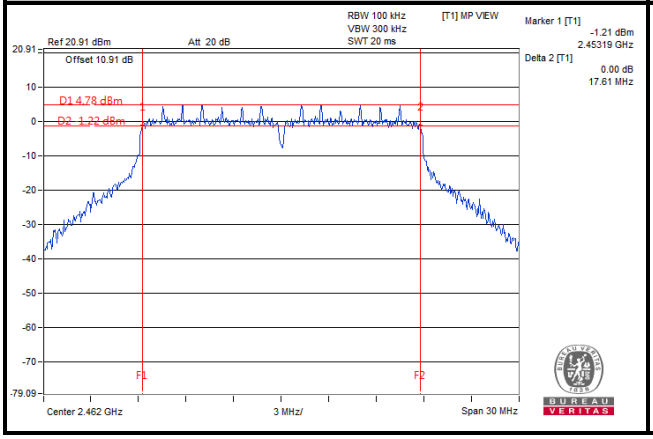
802.11b



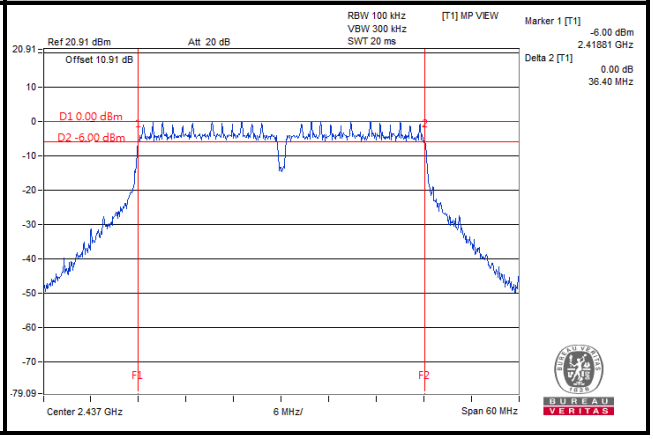
802.11g



802.11n (HT20)

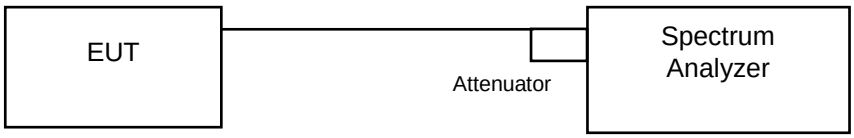


802.11n (HT40)



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	15.00	Pass
6	2437	15.10	Pass
11	2462	15.00	Pass
12	2467	15.10	Pass
13	2472	14.90	Pass

802.11g

Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	Pass / Fail
1	2412	16.92	Pass
6	2437	17.12	Pass
11	2462	16.92	Pass
12	2467	17.02	Pass
13	2472	17.02	Pass

802.11n (HT20)

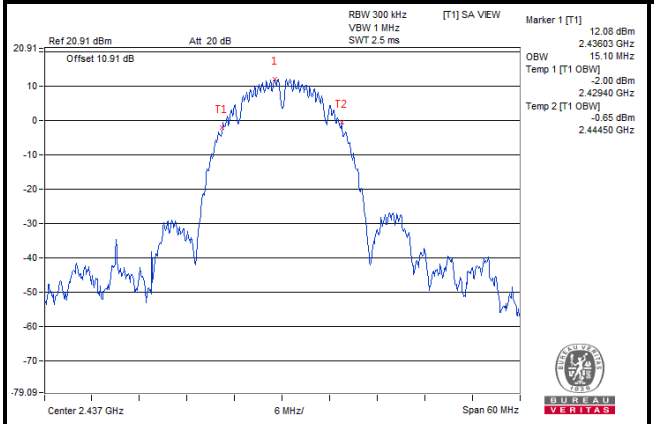
Channel	Frequency (MHz)	Occupied Bandwidth (MHz)		Pass / Fail
		Chain 0	Chain 1	
1	2412	17.98	18.08	Pass
6	2437	18.08	17.98	Pass
11	2462	18.17	17.98	Pass
12	2467	18.08	17.98	Pass
13	2472	18.17	18.08	Pass

802.11n (HT40)

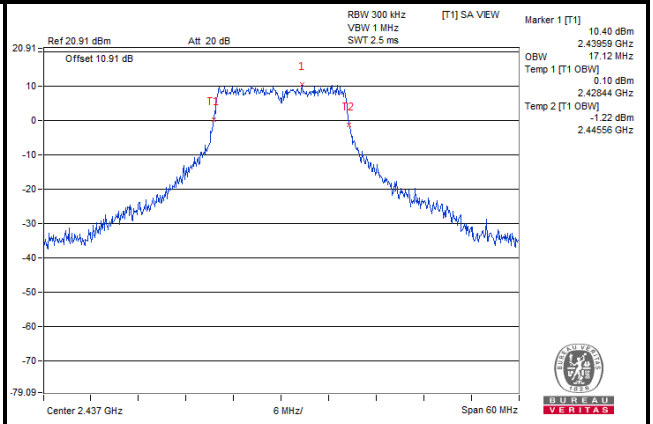
Channel	Frequency (MHz)	Occupied Bandwidth (MHz)		Pass / Fail
		Chain 0	Chain 1	
3	2422	36.92	36.73	Pass
6	2437	36.54	36.54	Pass
9	2452	36.73	36.92	Pass
10	2457	36.73	36.92	Pass
11	2462	36.54	36.73	Pass

Spectrum Plot of Worst Value

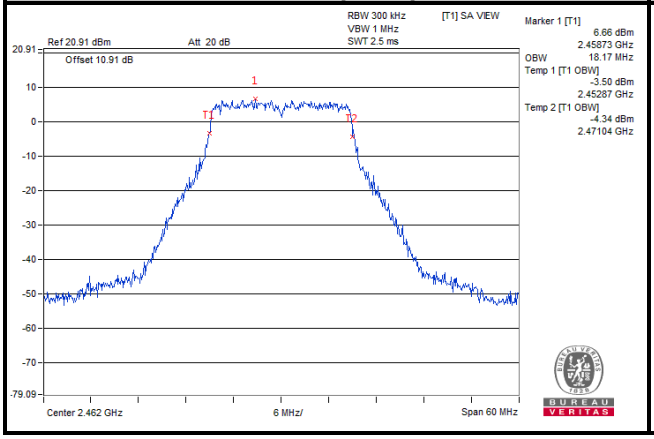
802.11b



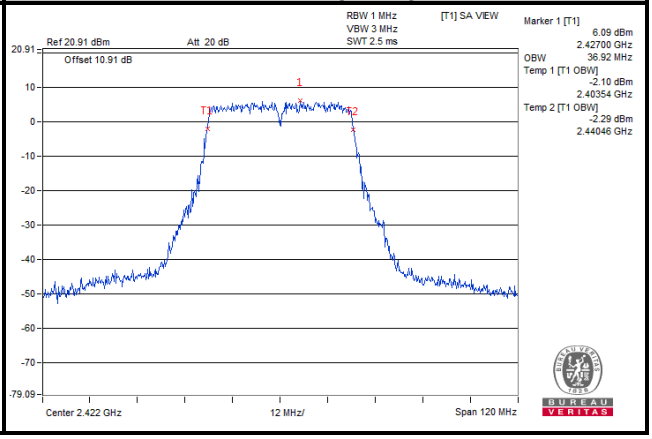
802.11g



802.11n (HT20)



802.11n (HT40)



4.5 Conducted Output Power Measurement

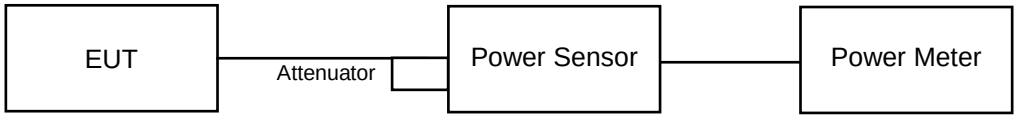
4.5.1 Limits of Conducted Output Power Measurement

For systems using digital modulation in the 2400–2483.5 MHz bands: 1 Watt (30 dBm)
Per KDB 662911 D01 Multiple Transmitter Output Method of conducted output power measurement on IEEE 802.11 devices,

Array Gain = 0 dB (i.e., no array gain) for NANT ≤ 4;
Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any NANT;
Array Gain = 5 log(NANT/NSS) dB or 3 dB, whichever is less for 20 MHz channel widths with NANT ≥ 5.

For power measurements on all other devices: Array Gain = 10 log(NANT/NSS) dB.

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.

Average power sensor was used to perform output power measurement, trigger and gating function of wide band power meter is enabled to measure max output power of TX on burst. Duty factor is not added to measured value.

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)	Average Power (mW)	Average Power (dBm)	Limit (dBm)	Pass / Fail
1	2412	116.681	20.67	85.704	19.33	30	Pass
6	2437	165.577	22.19	118.032	20.72	30	Pass
11	2462	107.647	20.32	72.611	18.61	30	Pass
12	2467	77.983	18.92	52.602	17.21	30	Pass
13	2472	54.45	17.36	32.584	15.13	30	Pass

802.11g

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Average Power (mW)	Average Power (dBm)	Limit (dBm)	Pass / Fail
1	2412	124.451	20.95	49.431	16.94	30	Pass
6	2437	209.894	23.22	123.88	20.93	30	Pass
11	2462	133.352	21.25	47.098	16.73	30	Pass
12	2467	65.464	18.16	21.135	13.25	30	Pass
13	2472	0.826	-0.83	0.2296	-6.39	30	Pass

802.11n (HT20)

Channel	Frequency (MHz)	Peak Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	20.30	19.37	193.649	22.87	30	Pass
6	2437	21.54	21.26	276.22	24.41	30	Pass
11	2462	20.26	19.69	199.28	22.99	30	Pass
12	2467	17.22	16.75	100.038	20.00	30	Pass
13	2472	-3.52	-2.42	1.0174	0.07	30	Pass

Channel	Frequency (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	15.30	15.00	65.507	18.16	30	Pass
6	2437	16.98	16.73	96.986	19.87	30	Pass
11	2462	15.41	15.26	68.327	18.35	30	Pass
12	2467	12.39	12.16	33.782	15.29	30	Pass
13	2472	-8.56	-8.85	0.2696	-5.69	30	Pass

802.11n (HT40)

Channel	Frequency (MHz)	Peak Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
3	2422	18.49	18.13	135.645	21.32	30	Pass
6	2437	19.29	19.21	168.286	22.26	30	Pass
9	2452	18.77	18.31	143.1	21.56	30	Pass
10	2457	15.34	15.23	67.541	18.30	30	Pass
11	2462	9.71	9.01	17.316	12.38	30	Pass

Channel	Frequency (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
3	2422	13.22	13.16	41.691	16.20	30	Pass
6	2437	13.87	13.74	48.037	16.82	30	Pass
9	2452	13.30	13.15	42.033	16.24	30	Pass
10	2457	8.89	8.91	15.525	11.91	30	Pass
11	2462	1.57	1.31	2.788	4.45	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	-4.34	8	Pass
6	2437	-2.43	8	Pass
11	2462	-3.06	8	Pass
12	2467	-4.65	8	Pass
13	2472	-7.82	8	Pass

802.11g

Channel	Frequency (MHz)	PSD (dBm/3 kHz)	Limit (dBm/3 kHz)	Pass / Fail
1	2412	-9.18	8	Pass
6	2437	-6.56	8	Pass
11	2462	-8.68	8	Pass
12	2467	-11.66	8	Pass
13	2472	-30.43	8	Pass

802.11n (HT20)

TX Chain	Channel	Freq. (MHz)	PSD (dBm/3 kHz)	10 log (N=2) dB	Total PSD (dBm/3 kHz)	Limit (dBm/3 kHz)	Pass / Fail
0	1	2412	-10.04	3.01	-7.03	8	Pass
	6	2437	-9.80	3.01	-6.79	8	Pass
	11	2462	-10.09	3.01	-7.08	8	Pass
	12	2467	-13.43	3.01	-10.42	8	Pass
	13	2472	-34.20	3.01	-31.19	8	Pass
1	1	2412	-10.86	3.01	-7.85	8	Pass
	6	2437	-9.84	3.01	-6.83	8	Pass
	11	2462	-10.95	3.01	-7.94	8	Pass
	12	2467	-13.72	3.01	-10.71	8	Pass
	13	2472	-32.23	3.01	-29.22	8	Pass

NOTE:

1. Directional gain = $10\log[(10^{G1/20} + 10^{G2/20} + \ldots. + 10^{GN/20})^2 / N_{ANT}]$ = 0.58 dBi < 6 dBi, so the limit no need to be reduced.
2. Method E) 2) c) of power density measurement of KDB 662911 is using for calculating total power density.

802.11n (HT40)

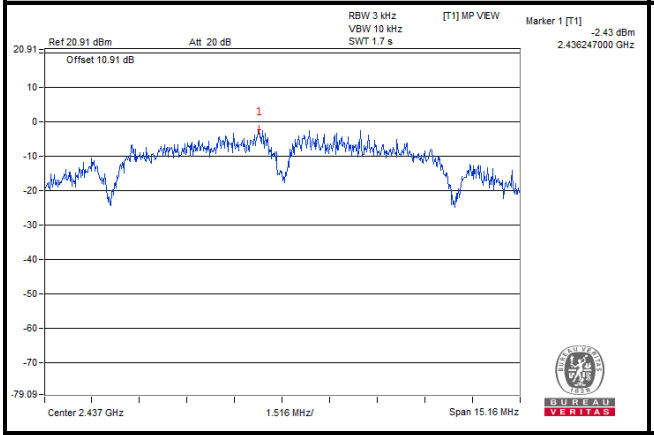
TX Chain	Channel	Freq. (MHz)	PSD (dBm/3 kHz)	10 log (N=2) dB	Total PSD (dBm/3 kHz)	Limit (dBm/3 kHz)	Pass / Fail
0	3	2422	-16.27	3.01	-13.26	8	Pass
	6	2437	-15.49	3.01	-12.48	8	Pass
	9	2452	-16.01	3.01	-13	8	Pass
	10	2457	-19.01	3.01	-16	8	Pass
	11	2462	-25.74	3.01	-22.73	8	Pass
1	3	2422	-16.67	3.01	-13.66	8	Pass
	6	2437	-15.76	3.01	-12.75	8	Pass
	9	2452	-16.19	3.01	-13.18	8	Pass
	10	2457	-19.11	3.01	-16.1	8	Pass
	11	2462	-25.81	3.01	-22.8	8	Pass

NOTE:

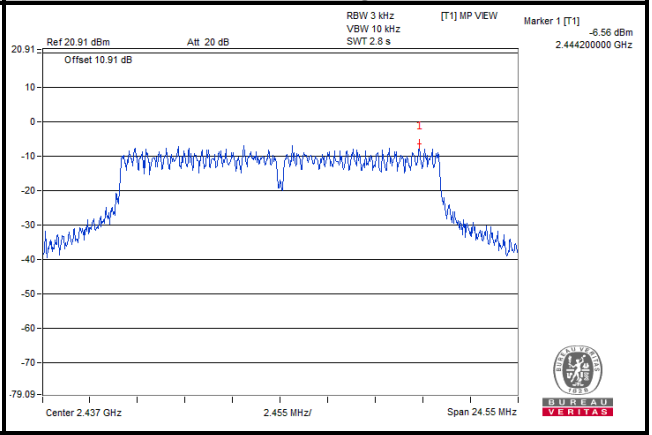
1. Directional gain = $10\log[(10^{G1/20} + 10^{G2/20} + \ldots. + 10^{GN/20})^2 / N_{ANT}]$ = 0.58 dBi < 6 dBi, so the limit no need to be reduced.
2. Method E) 2) c) of power density measurement of KDB 662911 is using for calculating total power density.

Spectrum Plot of Worst Value

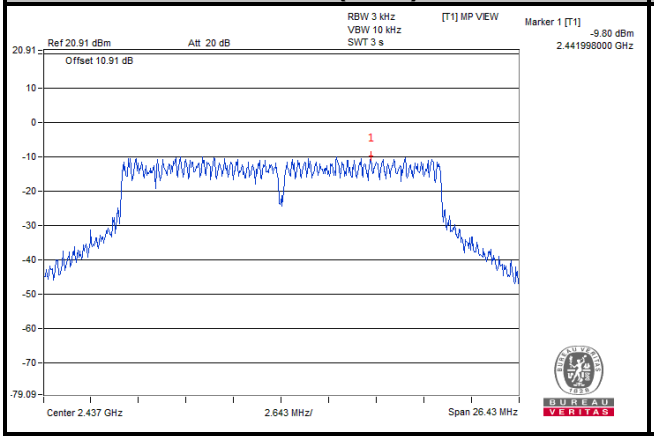
802.11b



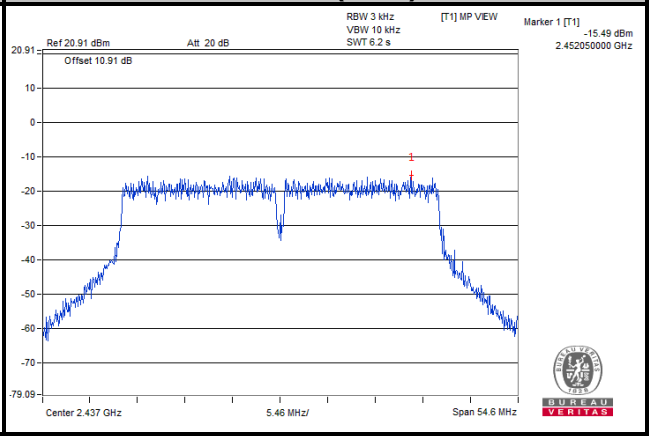
802.11g



802.11n (HT20)



802.11n (HT40)

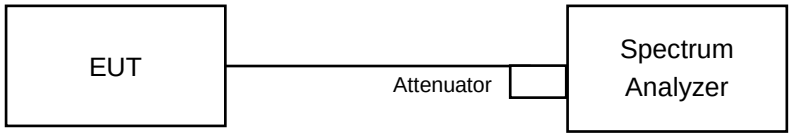


4.7 Conducted Out of Band Emission Measurement

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.

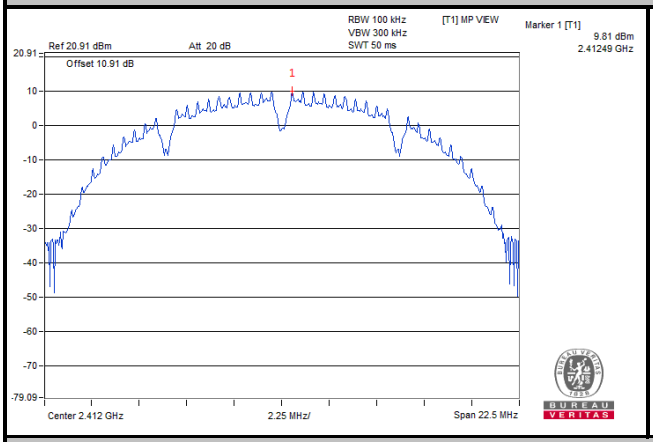
4.7.7 Test Results

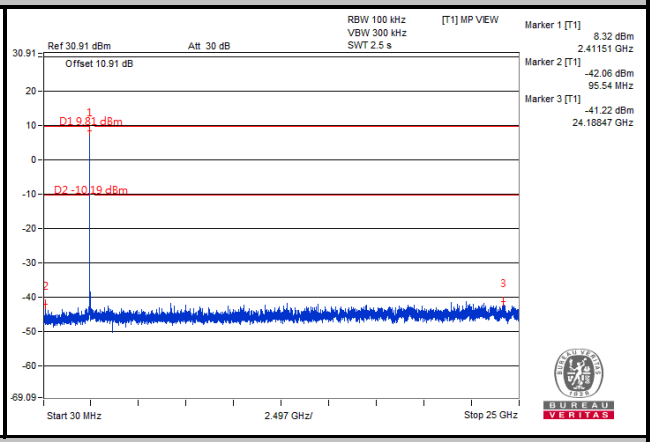
The conducted emission test is performed on each TX port of operating mode without summing or adding 10log (N) since the limit is relative emission limit.

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.

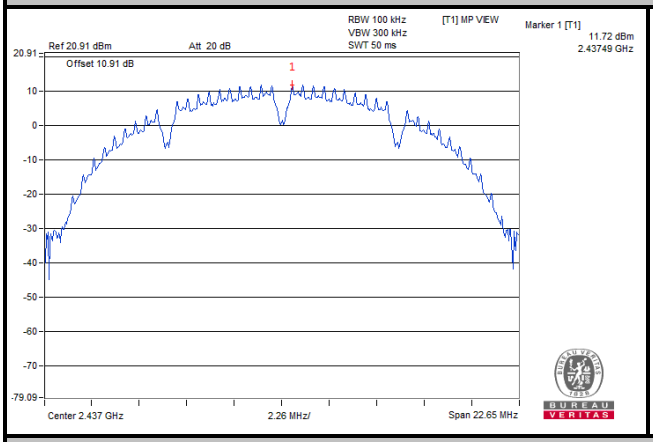
802.11b

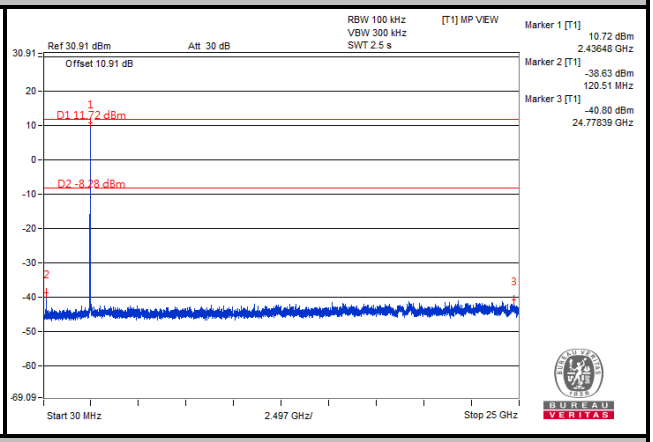
Ch 1



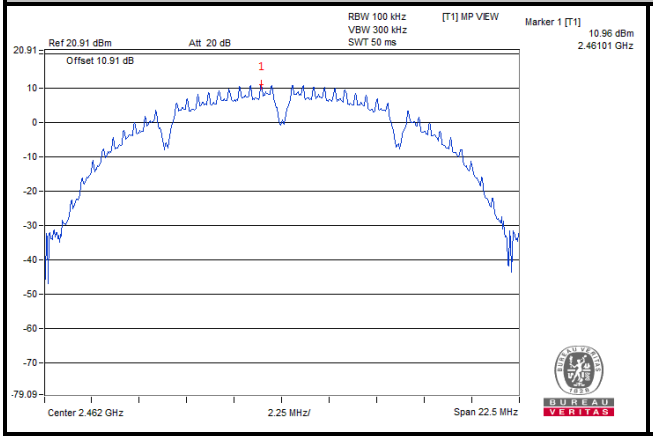


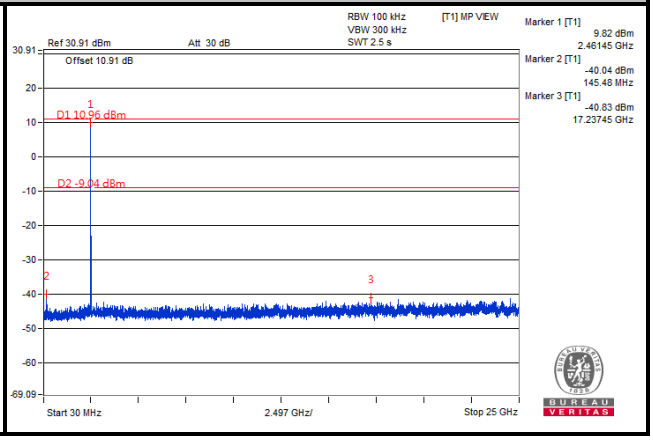
Ch 6



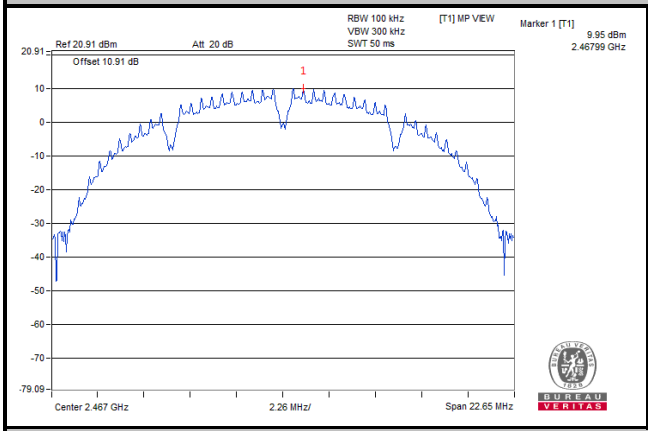


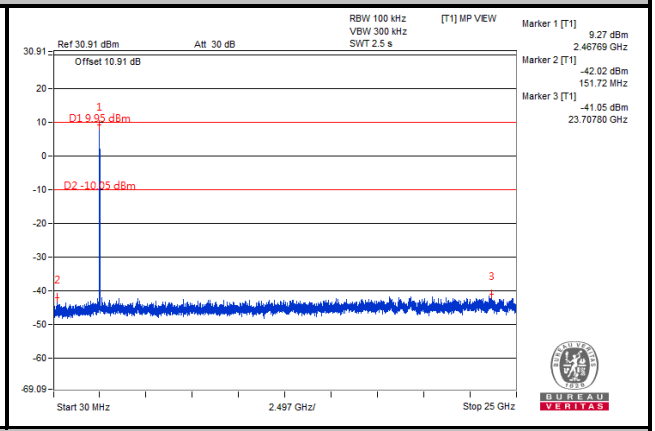
Ch 11





Ch 12





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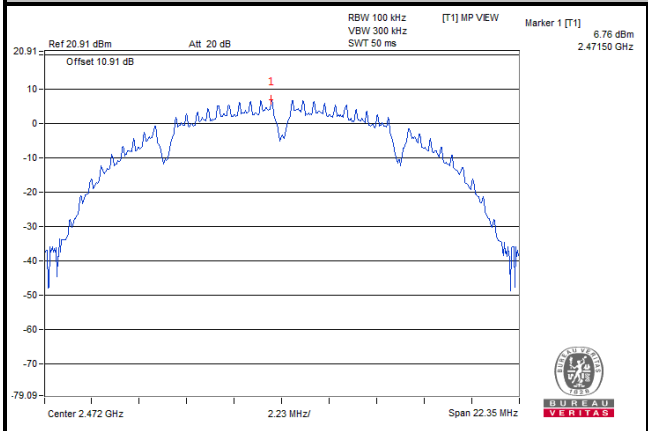
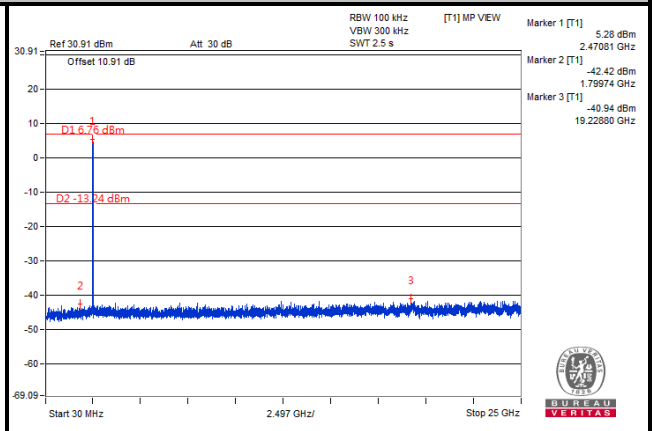
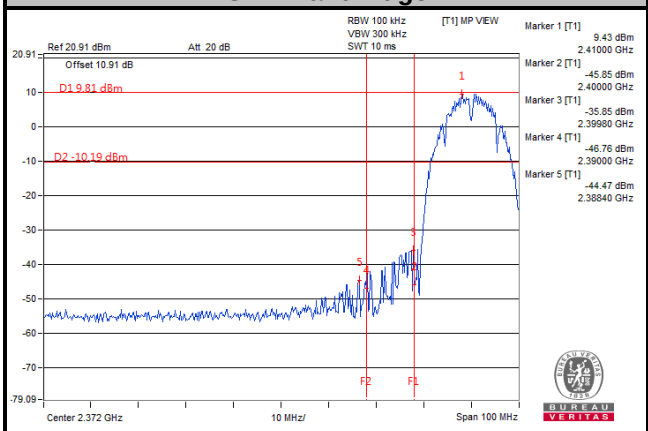
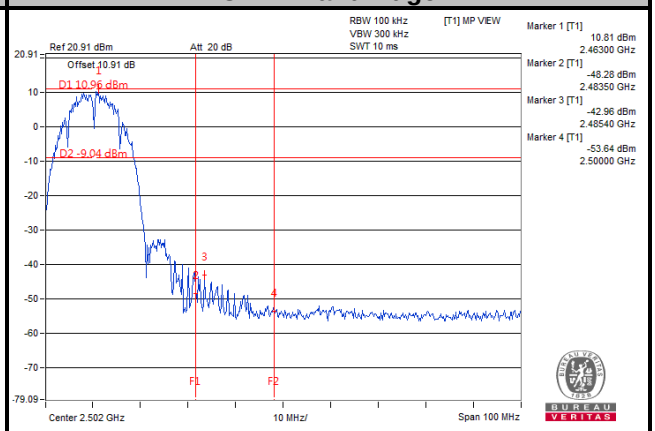




Ch 1 Band Edge



Ch 11 Band Edge



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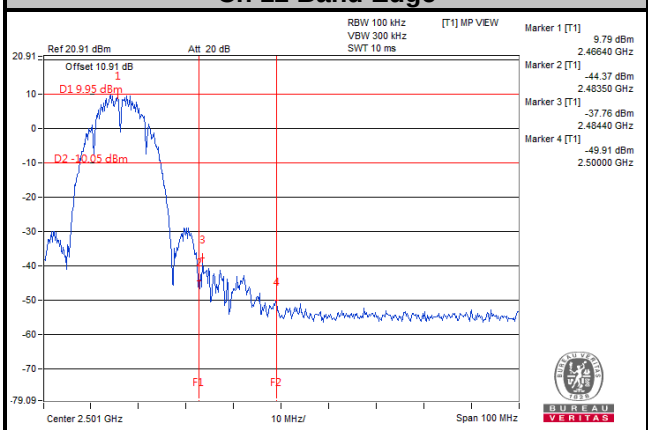

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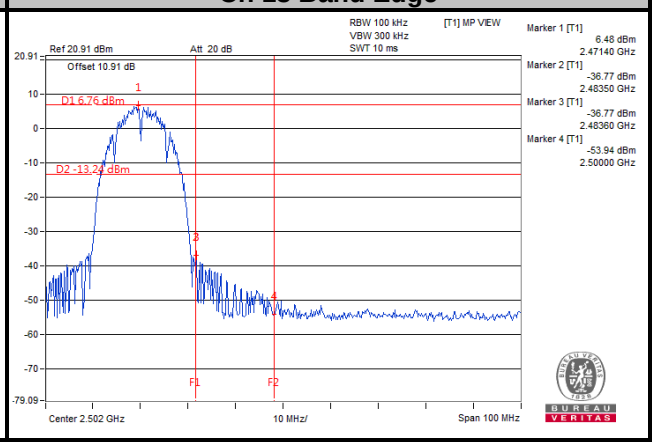

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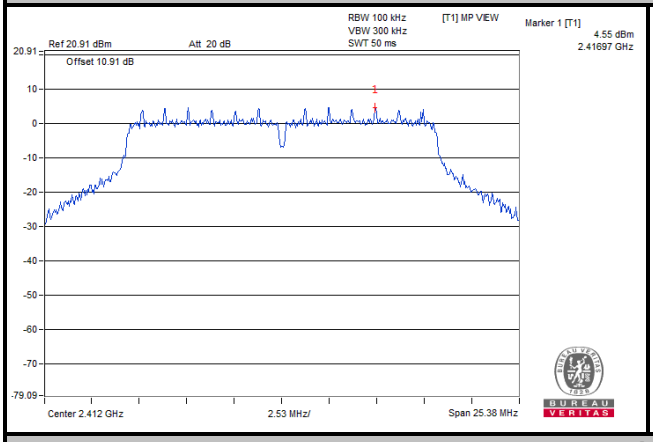
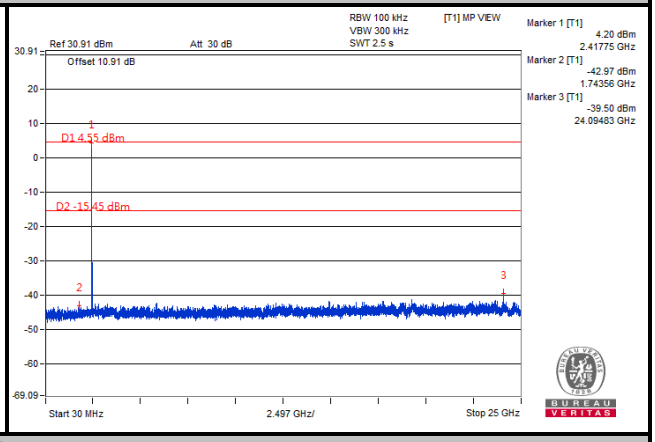
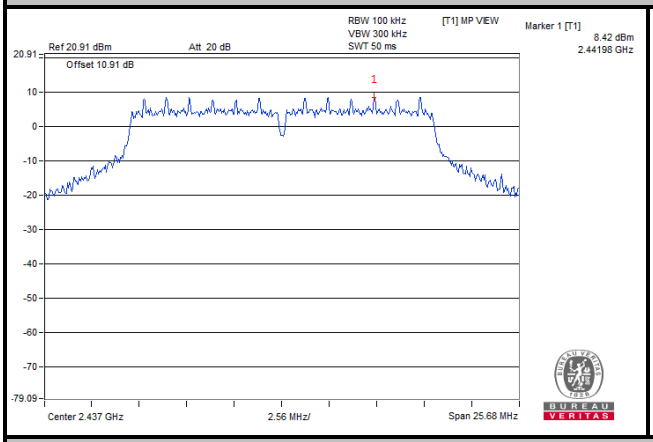
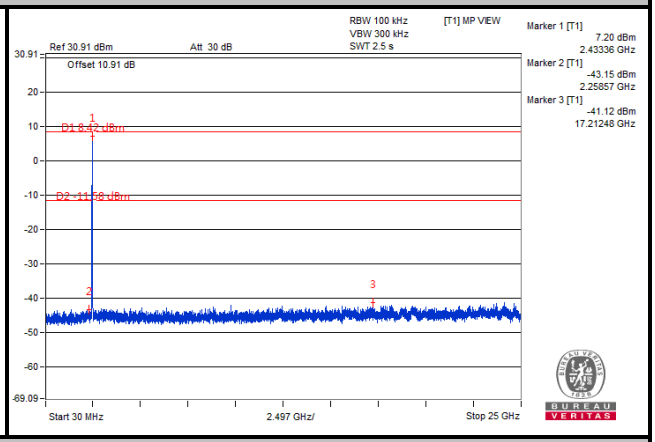
Ch 1



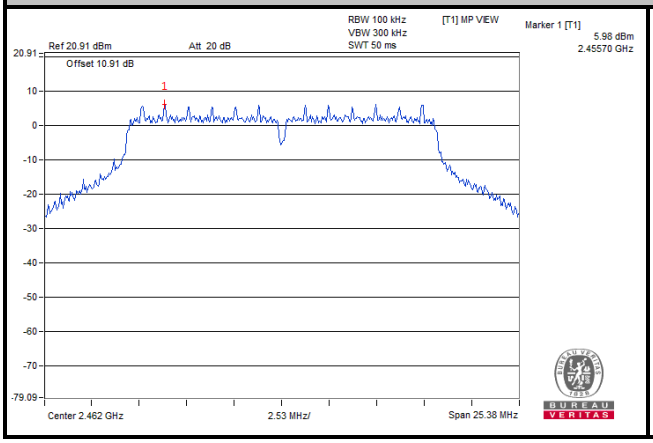


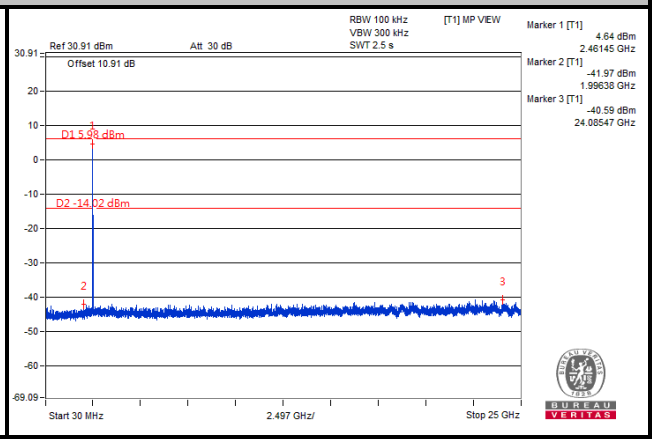
Ch 6





Ch 11





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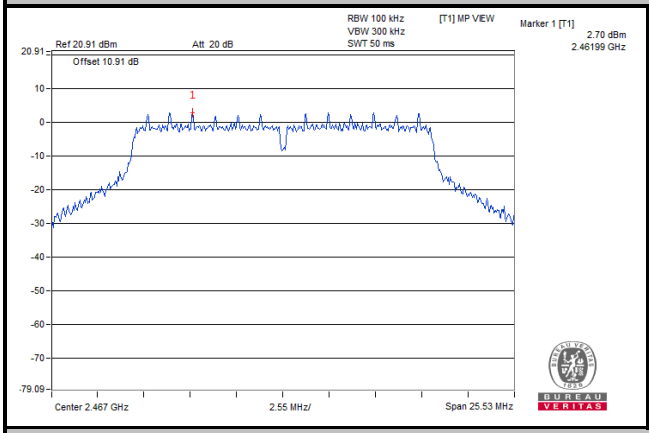

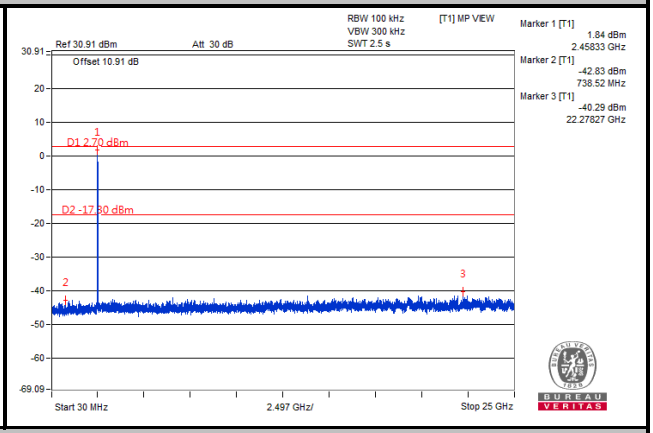

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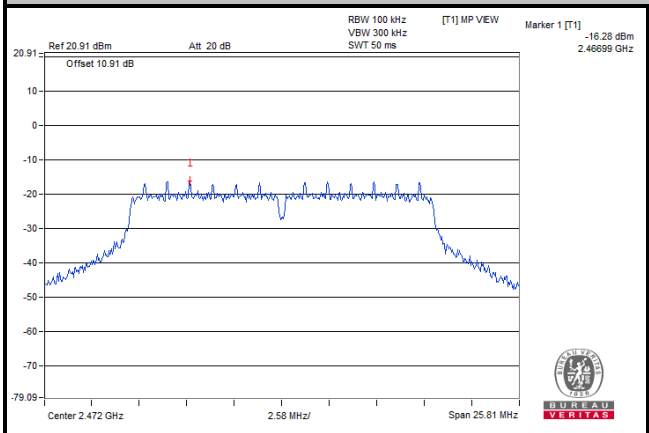
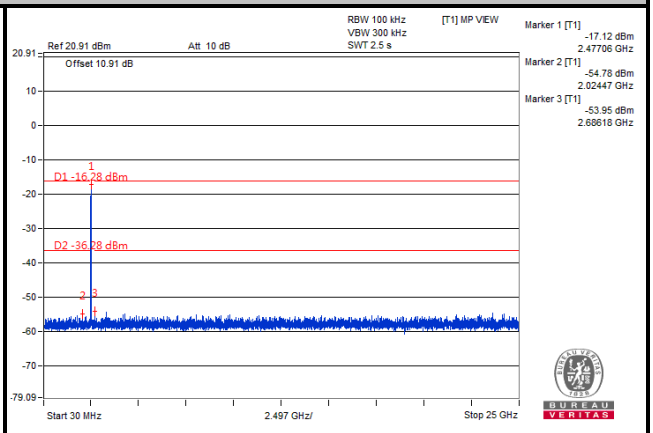
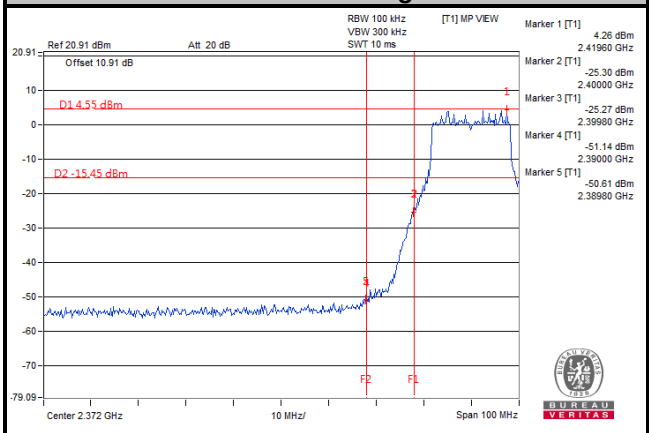
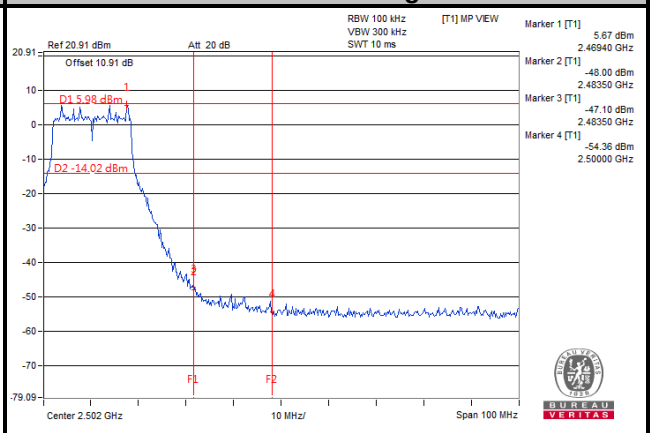




Ch 1 Band Edge



Ch 11 Band Edge



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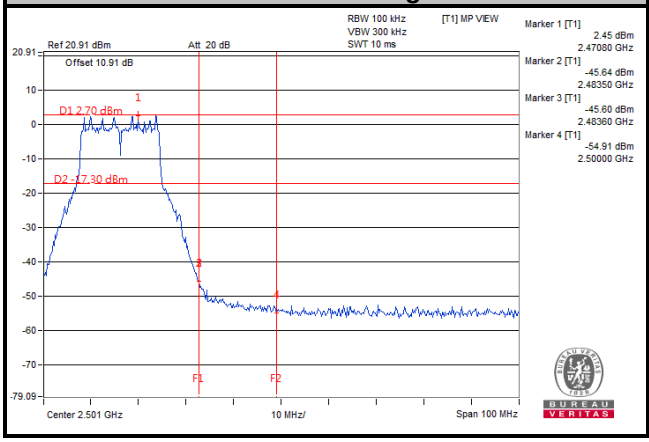

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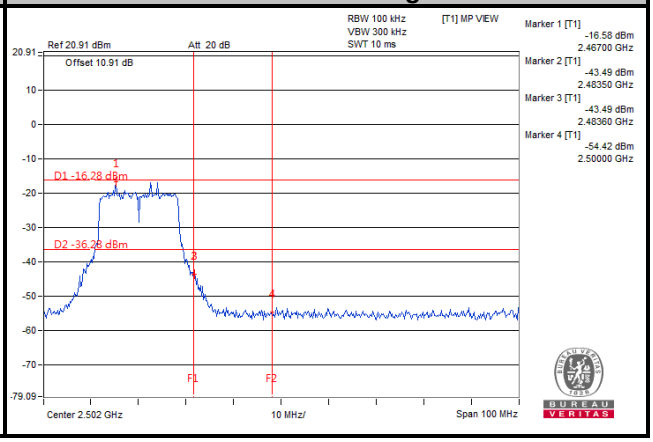
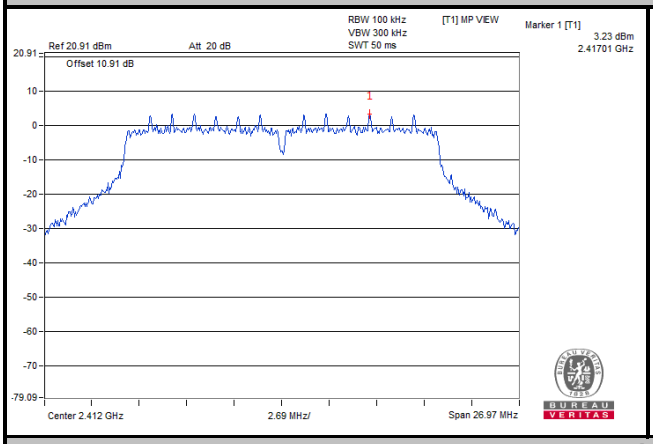
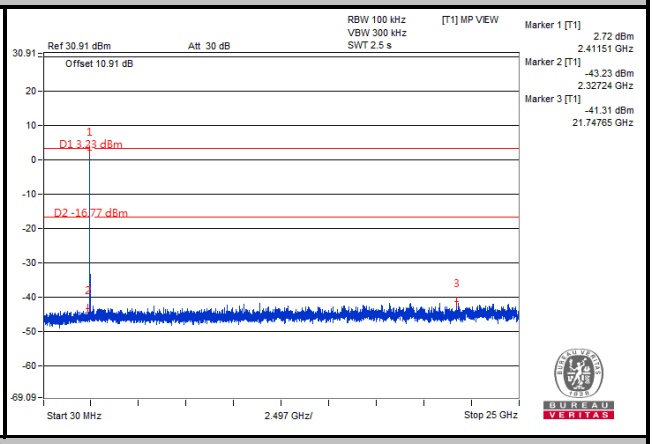


802.11n (HT20)

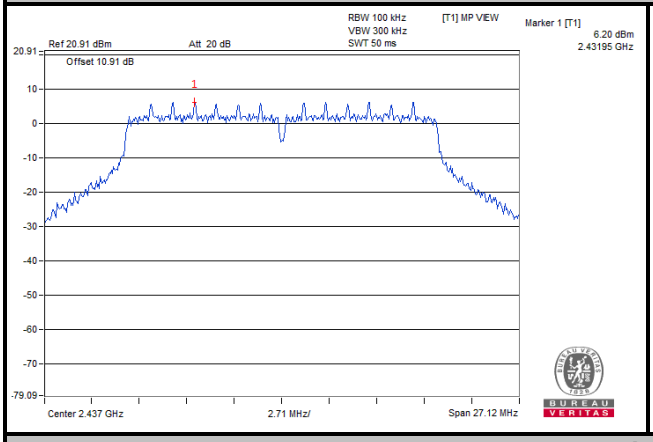
CHAIN 0

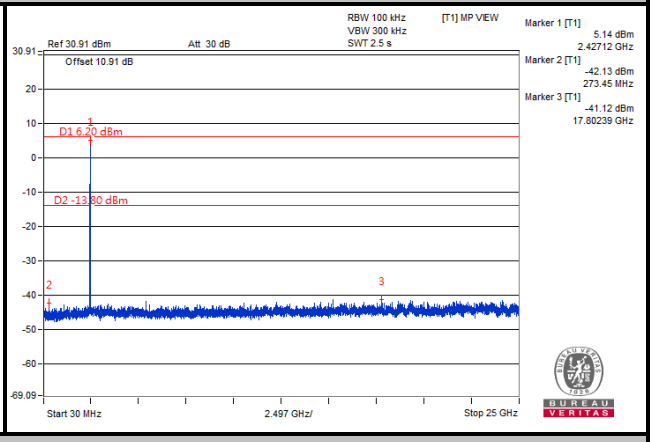
Ch 1



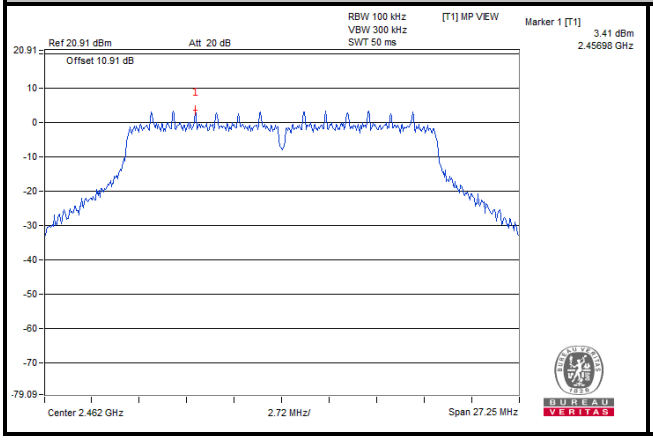


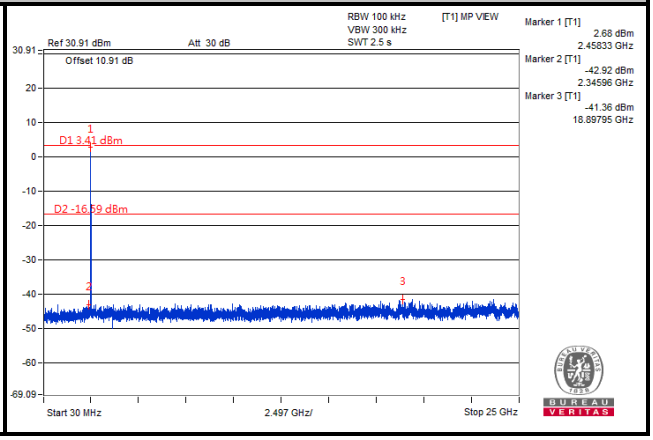
Ch 6



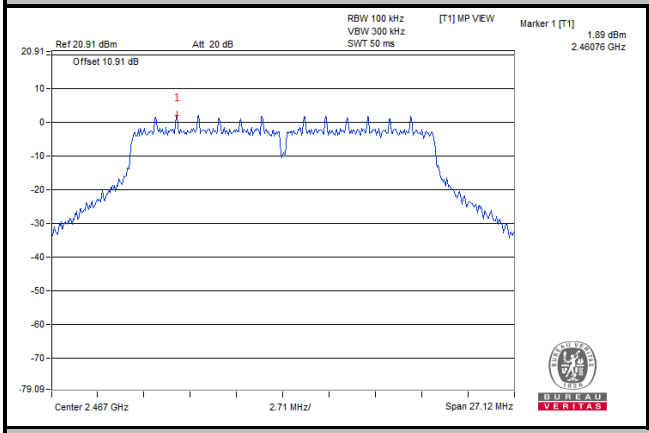


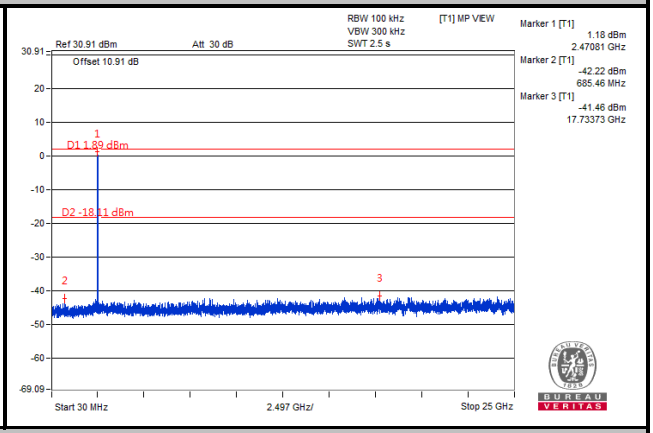
Ch 11



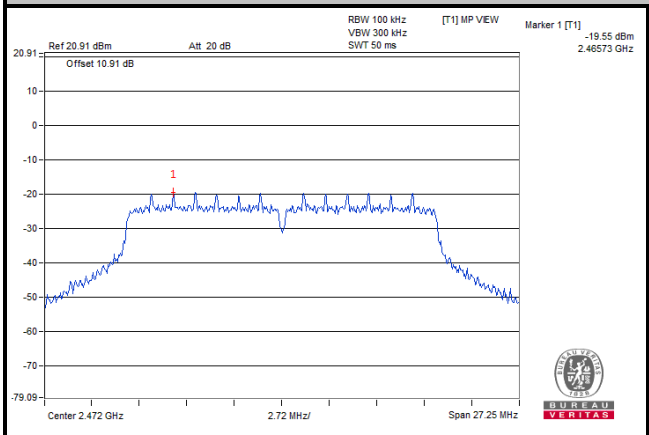


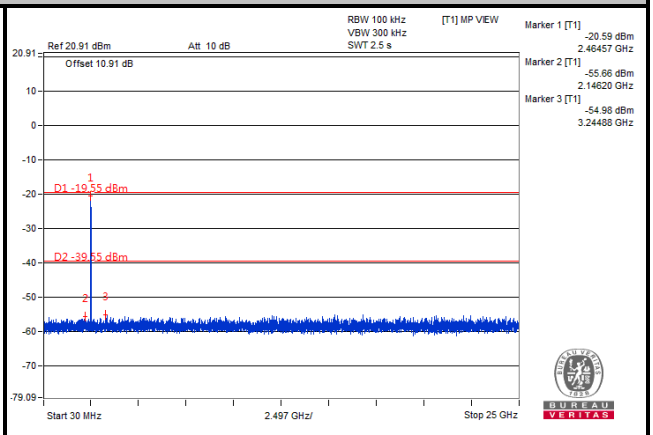
Ch 12



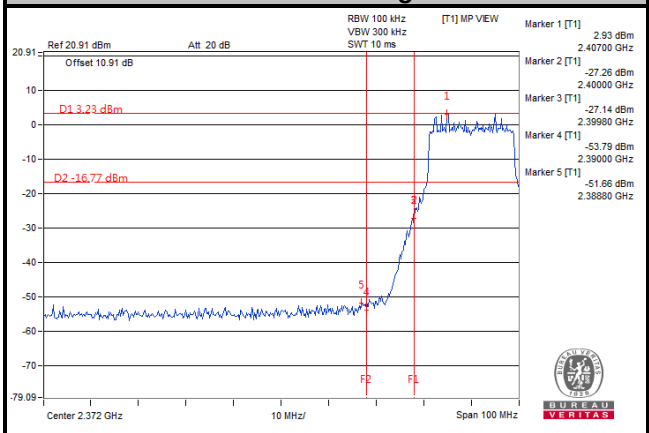


Ch 13

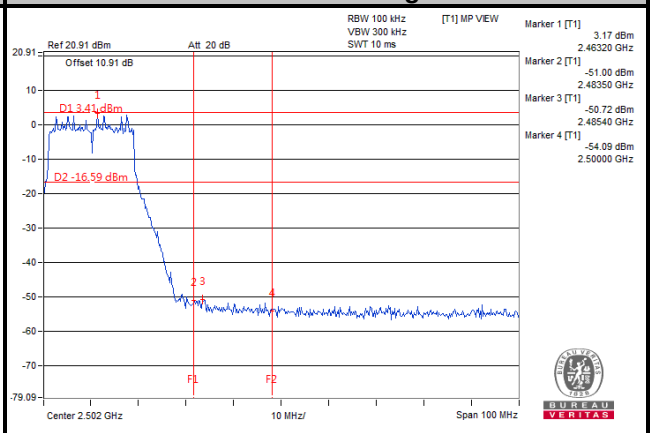




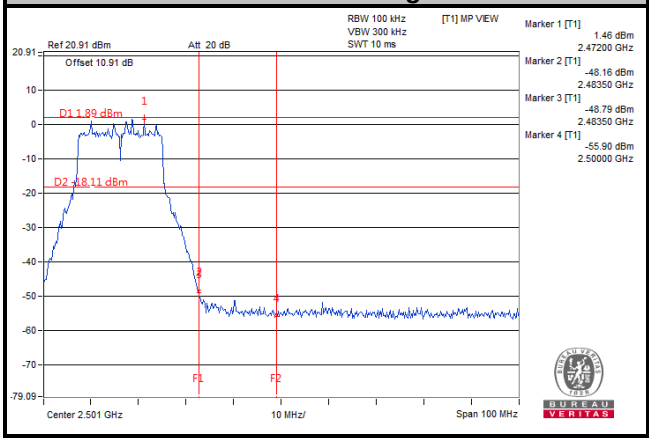
Ch 1 Band Edge



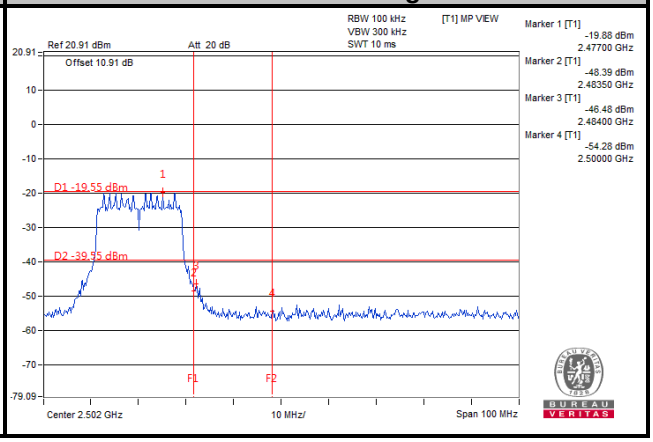
Ch 11 Band Edge



Ch 12 Band Edge

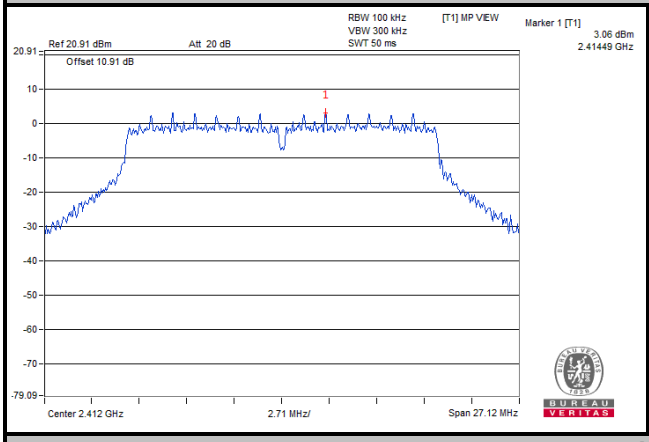


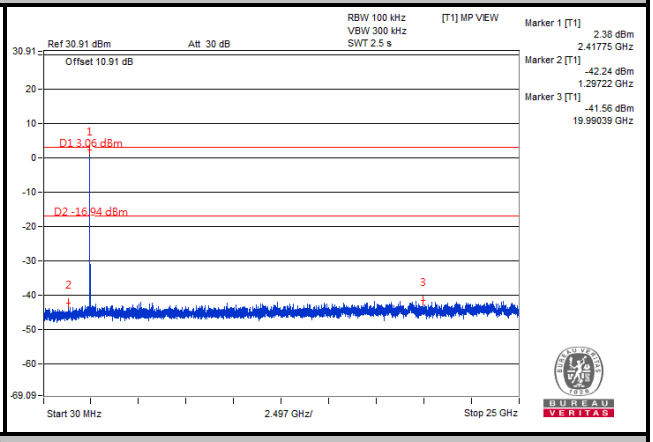
Ch 13 Band Edge



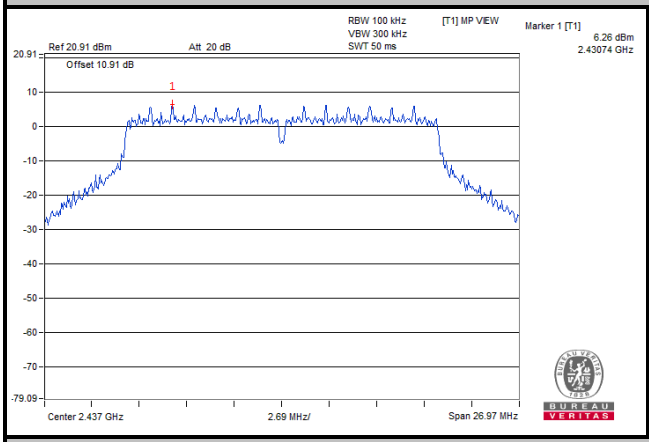
CHAIN 1

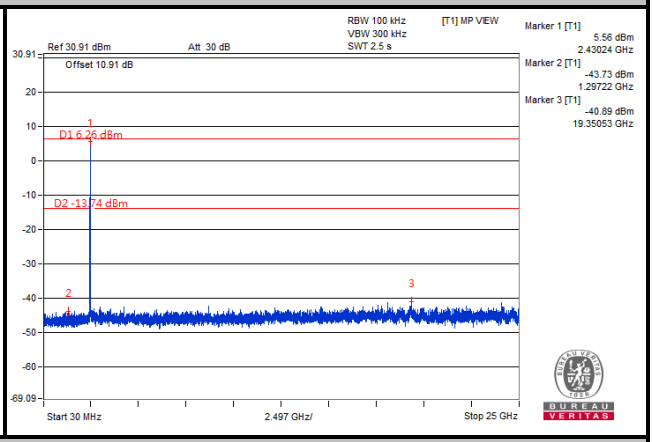
Ch 1



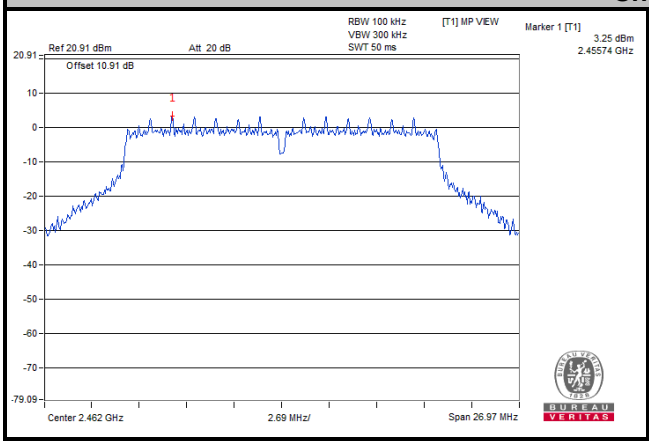


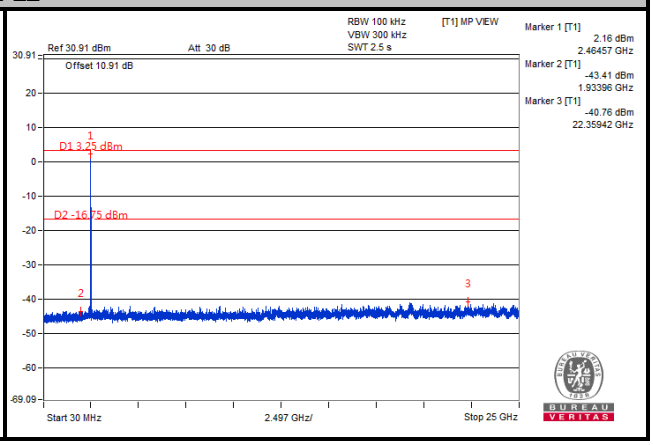
Ch 6



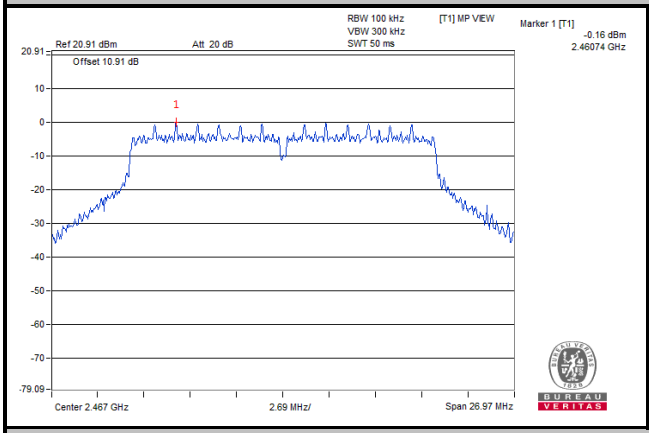


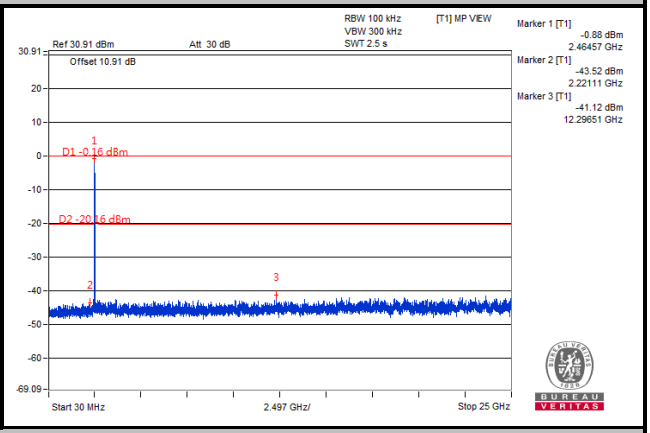
Ch 11



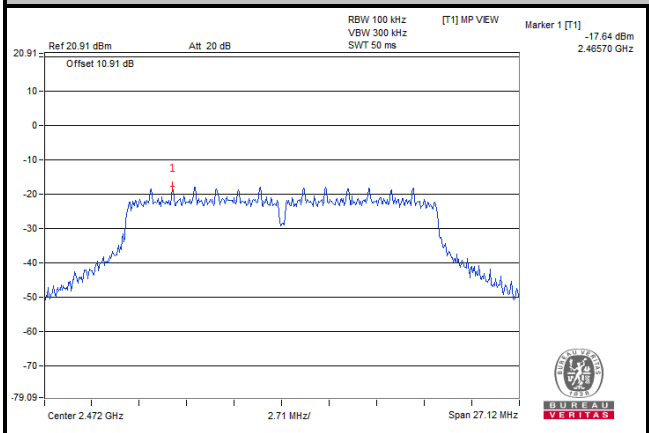


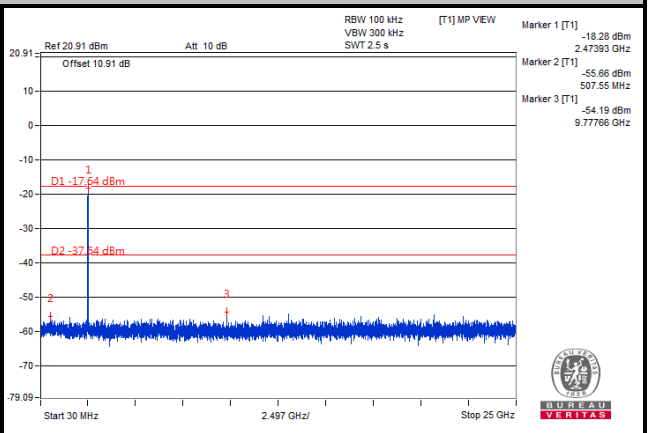
Ch 12



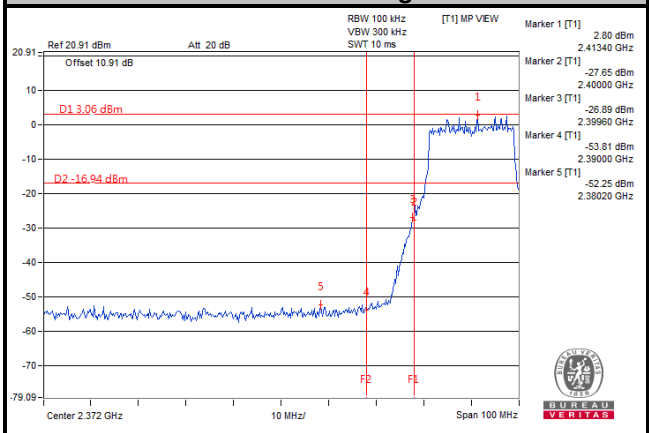


Ch 13

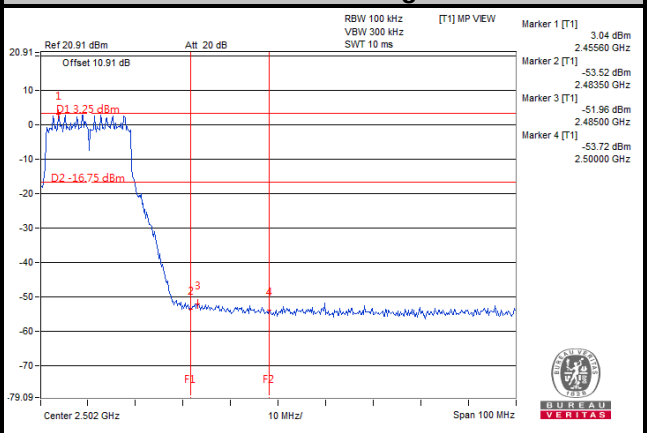




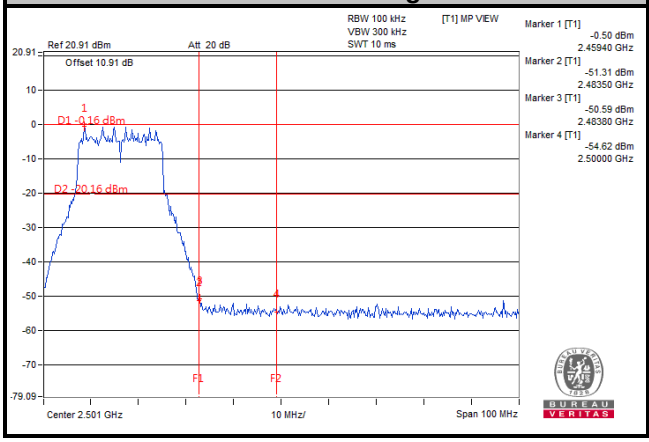
Ch 1 Band Edge



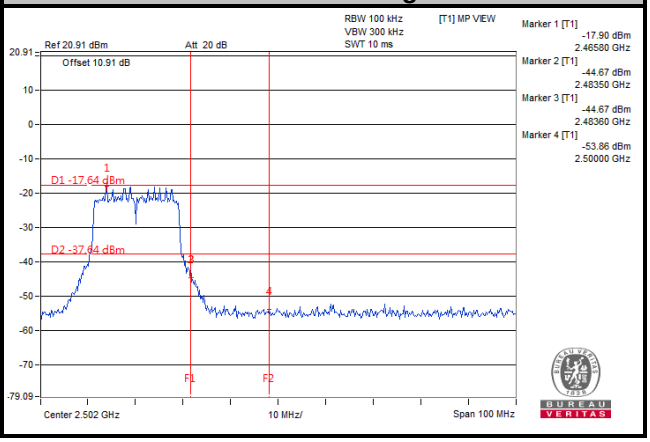
Ch 11 Band Edge



Ch 12 Band Edge



Ch 13 Band Edge



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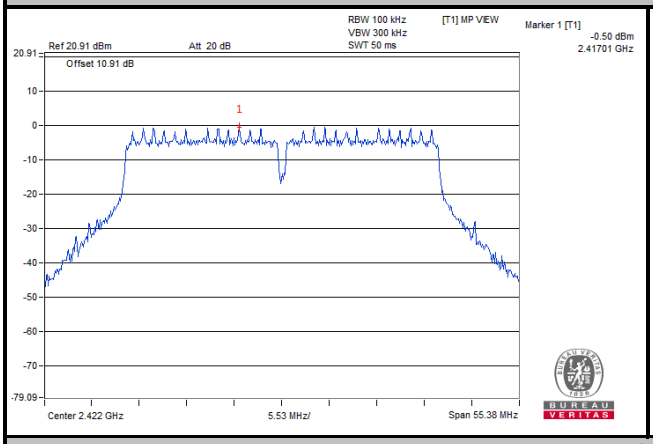
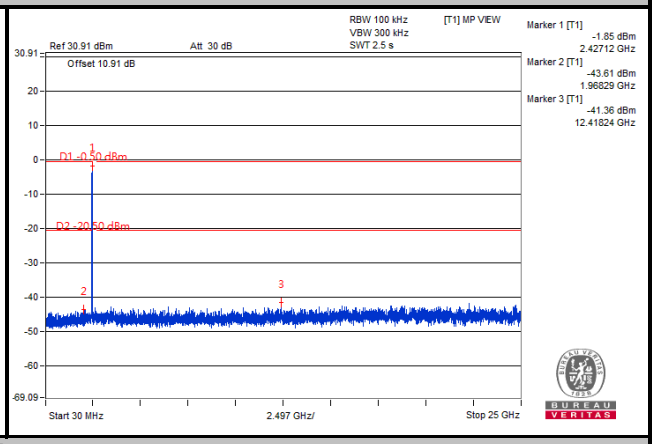
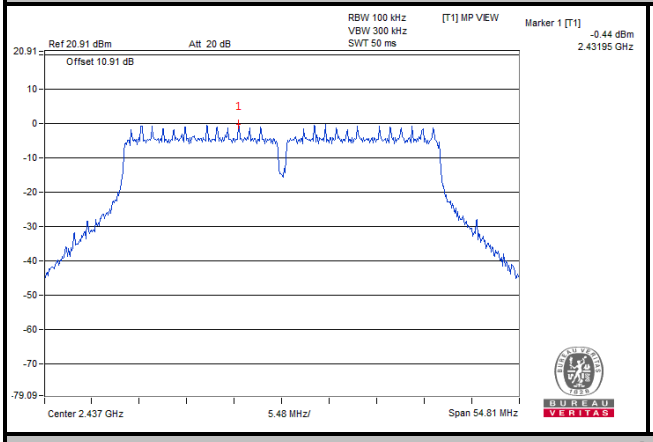
CHAIN 0

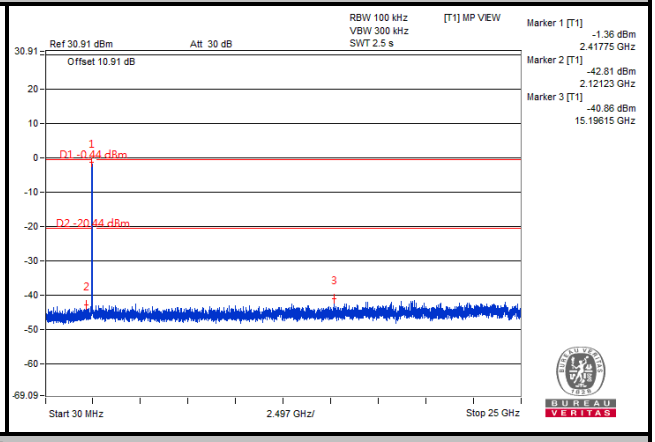
Ch 3



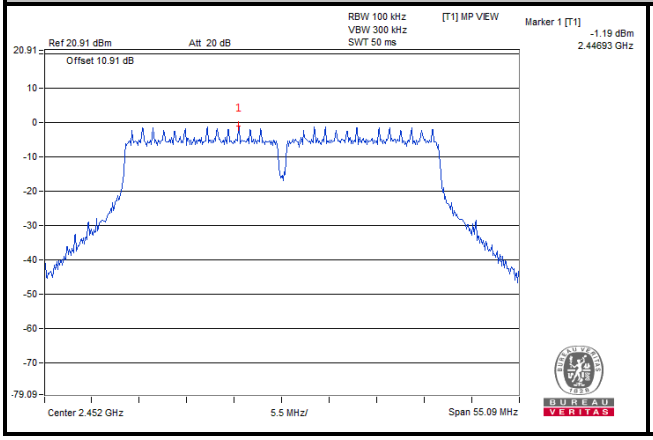


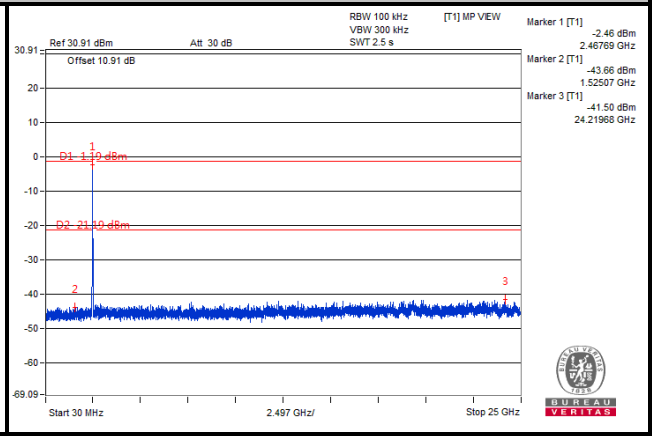
Ch 6



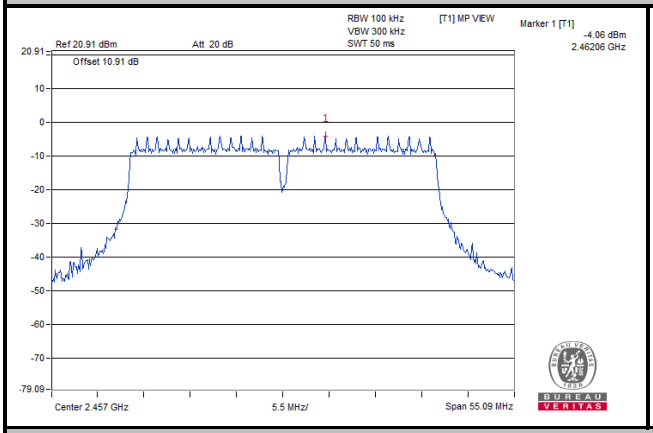


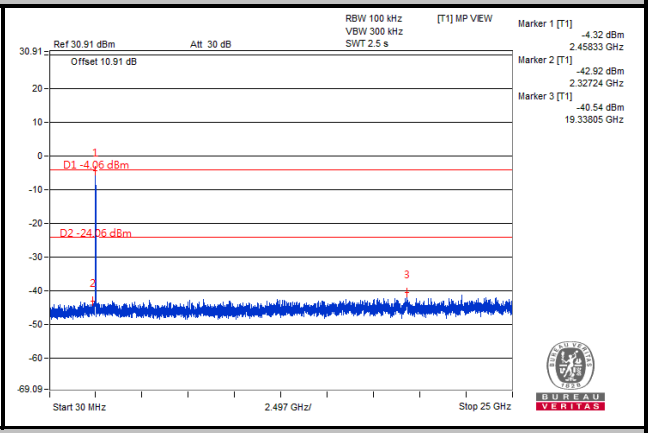
Ch 9



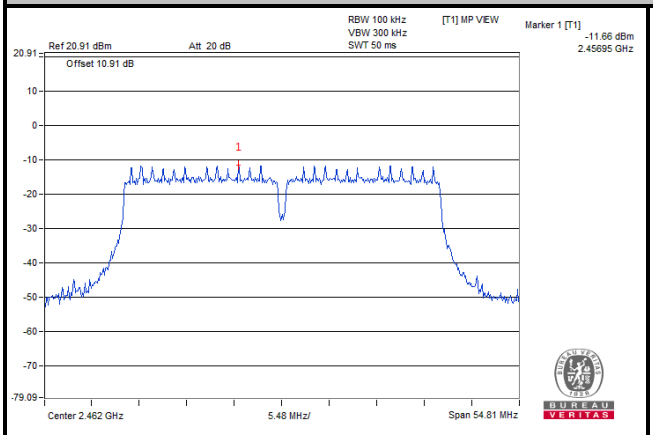


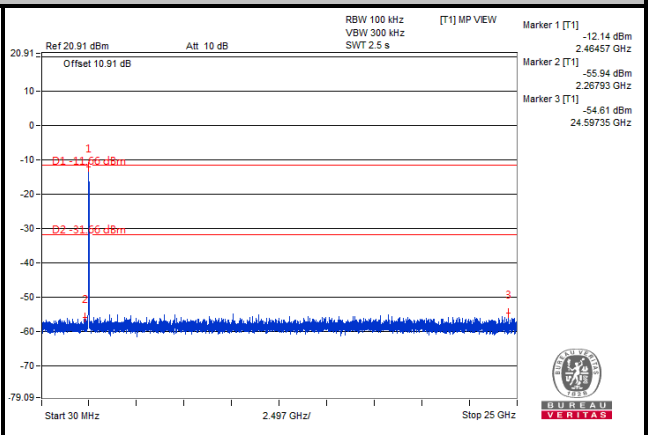
Ch 10



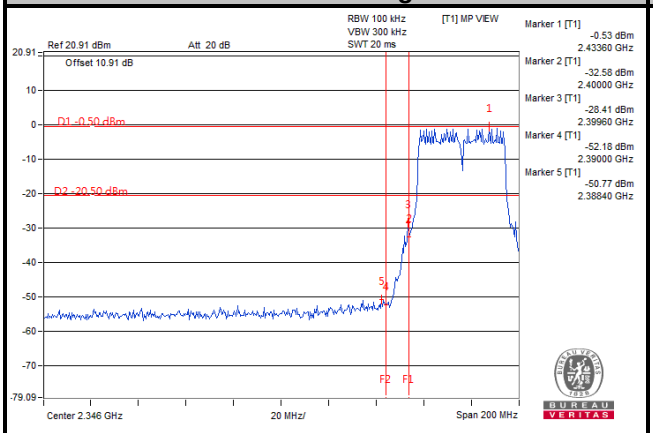


Ch 11

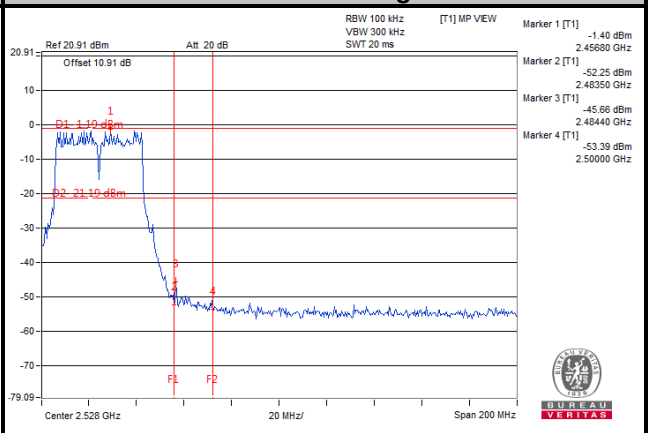




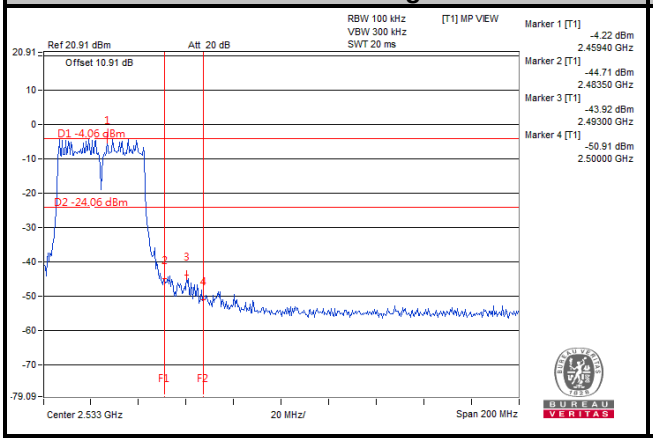
Ch 3 Band Edge



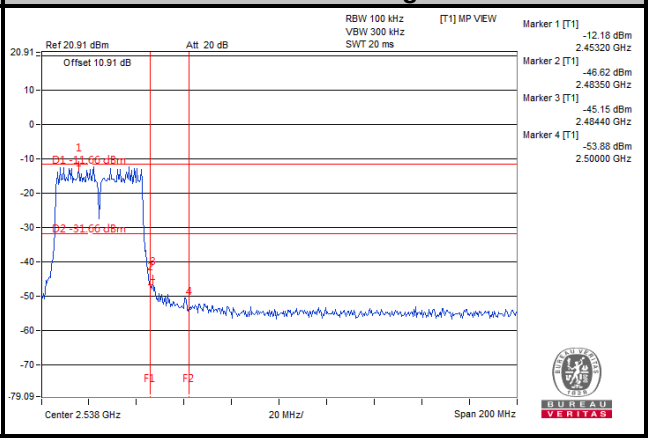
Ch 9 Band Edge



Ch 10 Band Edge

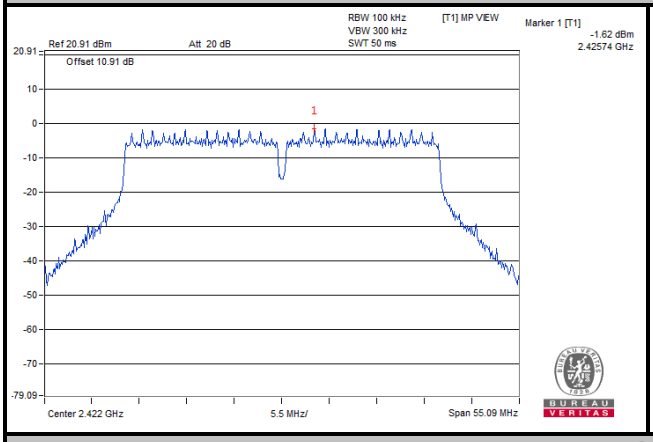


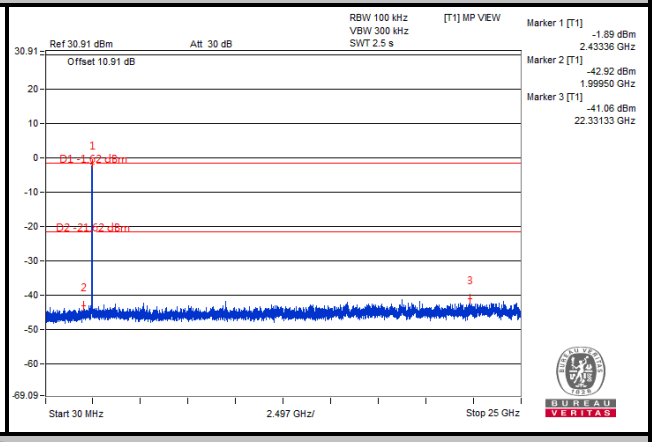
Ch 11 Band Edge



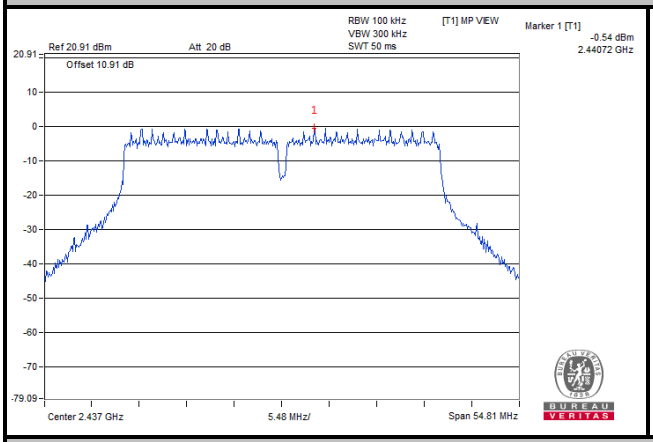
CHAIN 1

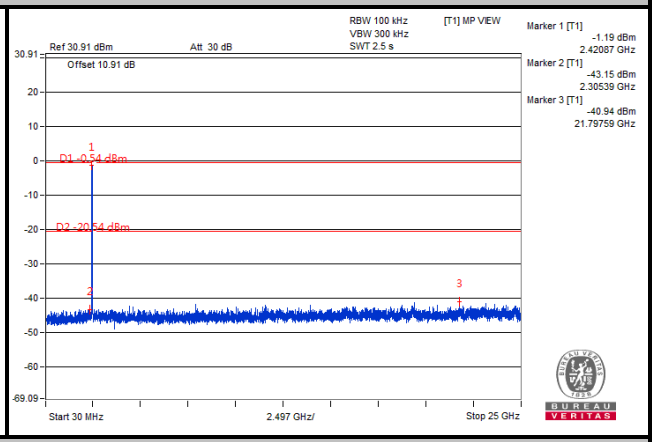
Ch 3



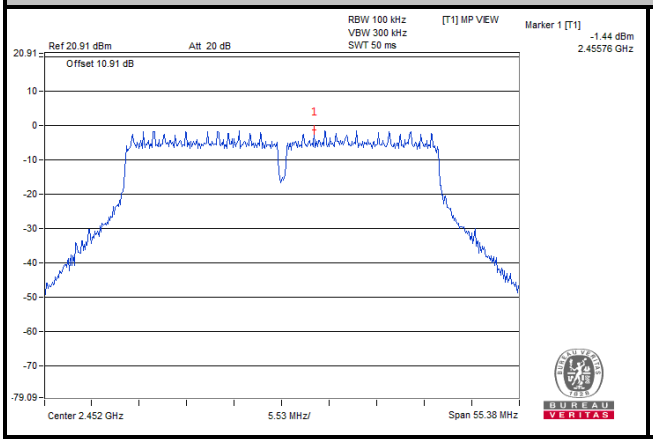


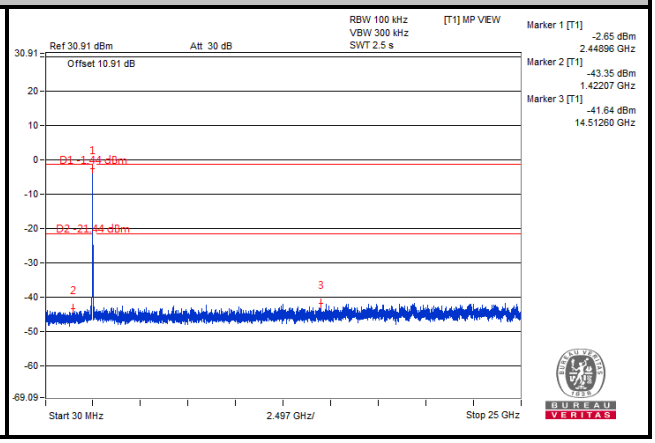
Ch 6



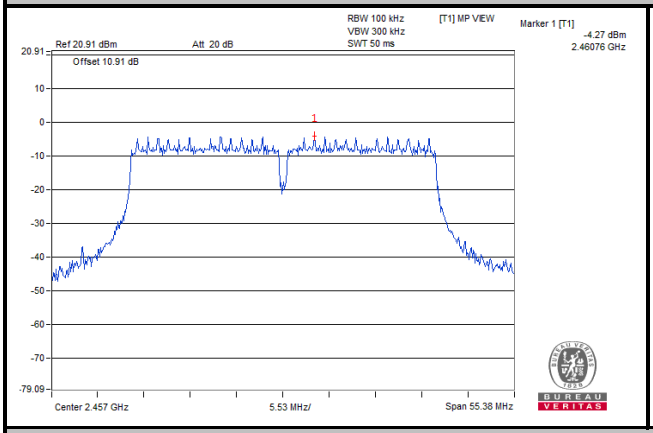


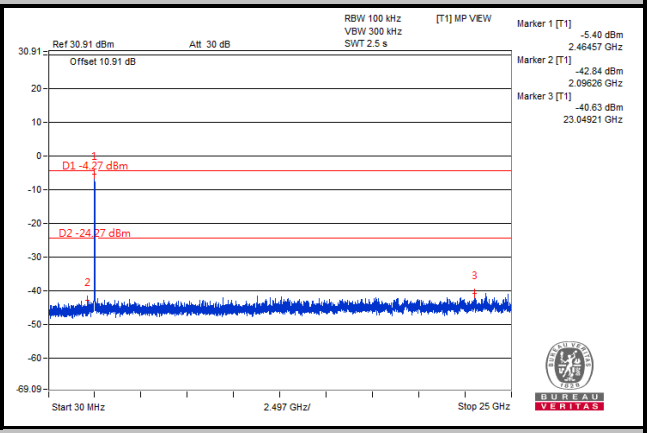
Ch 9



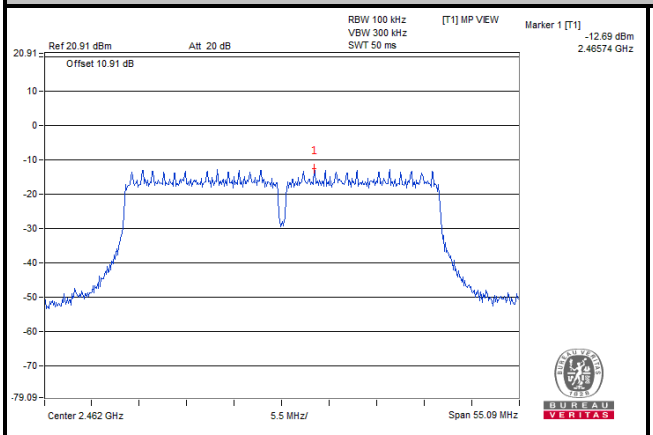


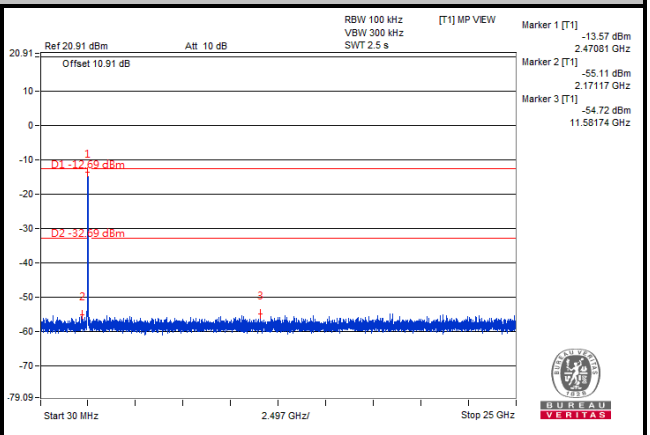
Ch 10



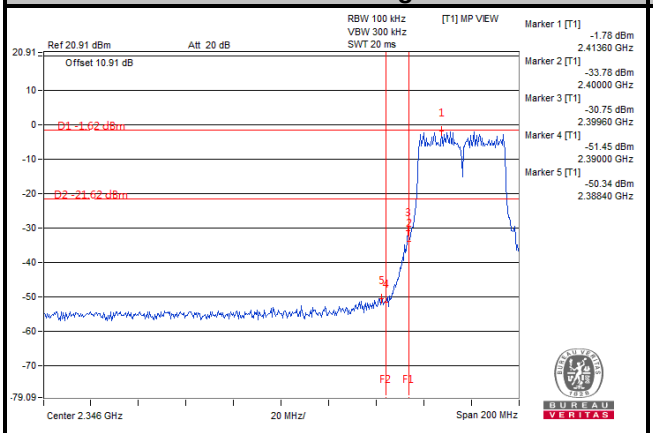


Ch 11

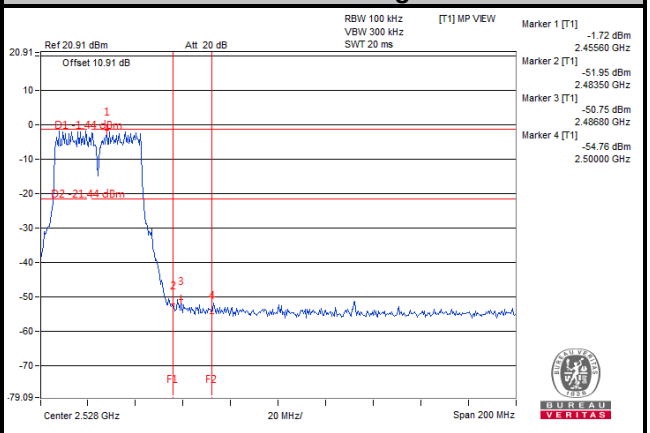




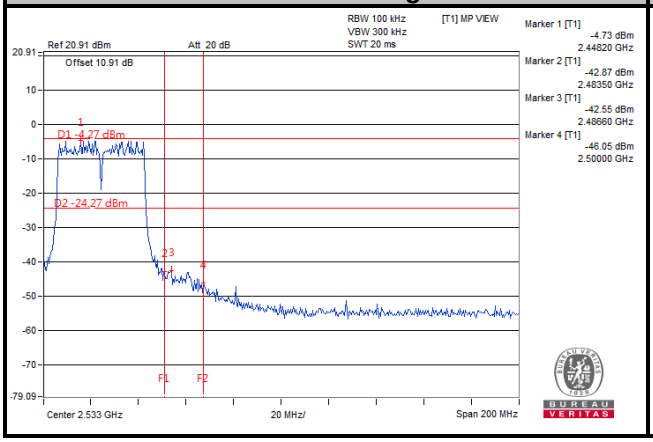
Ch 3 Band Edge



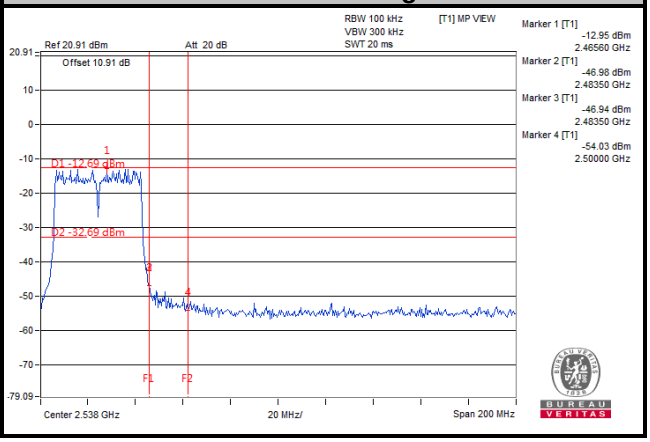
Ch 9 Band Edge



Ch 10 Band Edge



Ch 11 Band Edge



5 Pictures of Test Arrangements

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

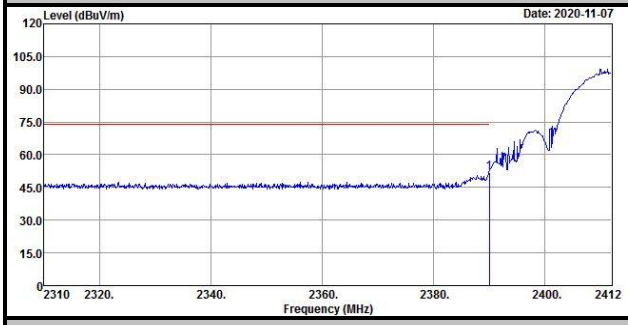
Annex A- Band Edge Measurement

802.11b

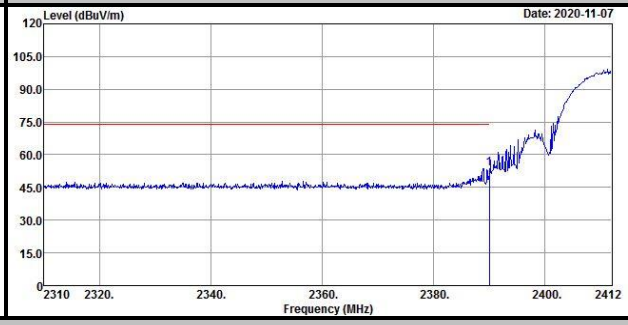
Ch 1

Peak

Horizontal

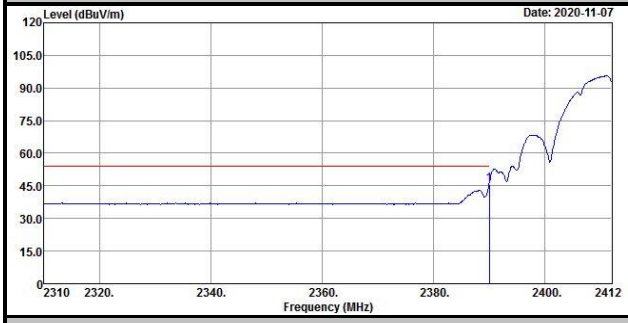


Vertical

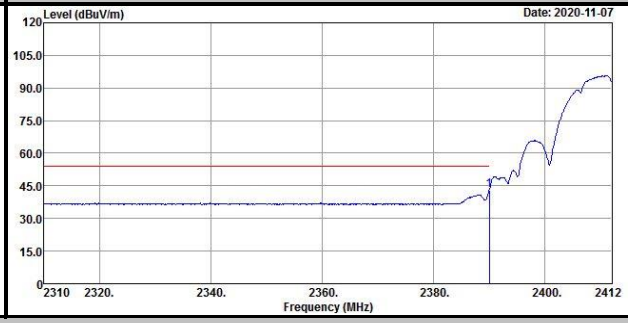


Average

Horizontal



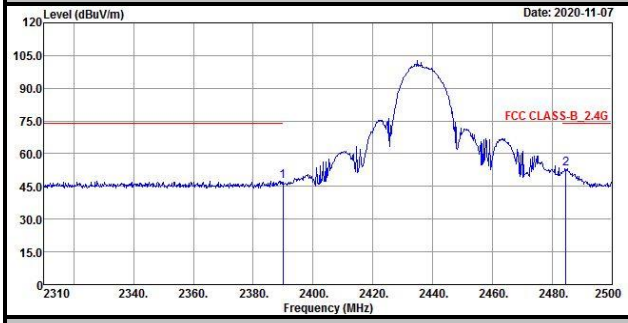
Vertical



Ch 6

Peak

Horizontal



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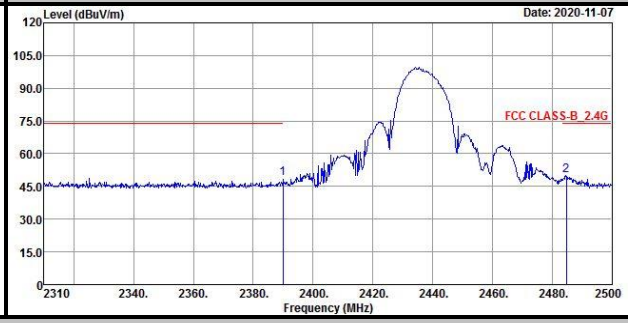
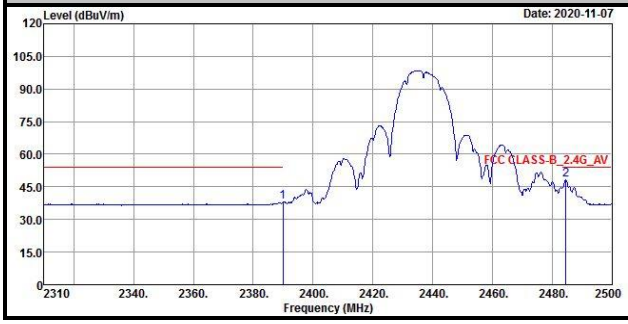
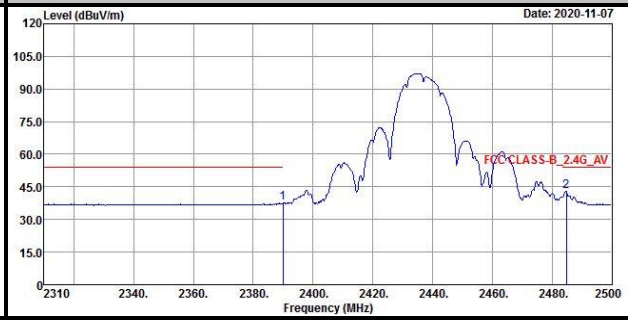


Average

Horizontal



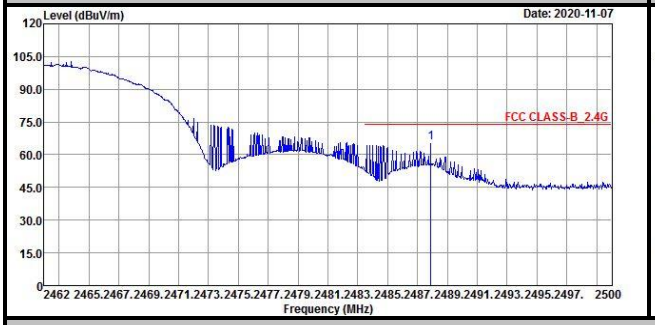
Vertical



Ch 11

Peak

Horizontal



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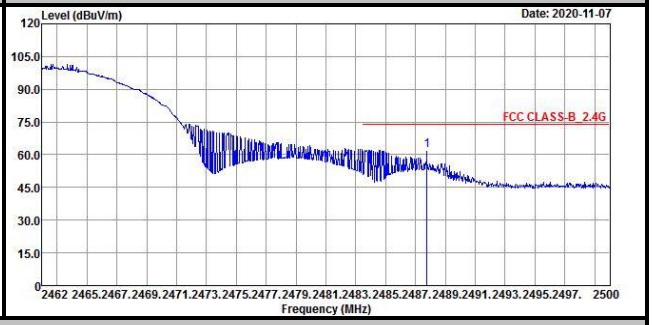
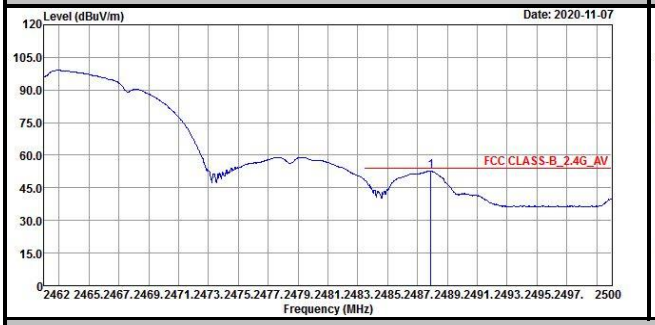
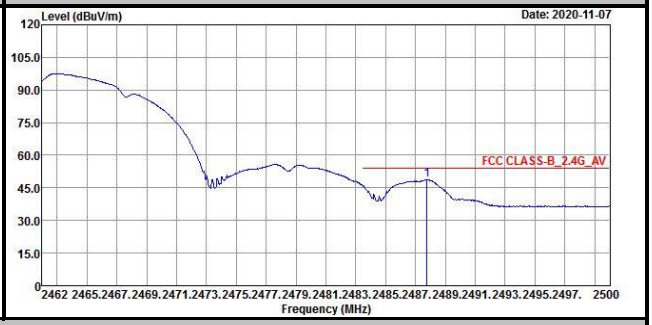


Average

Horizontal



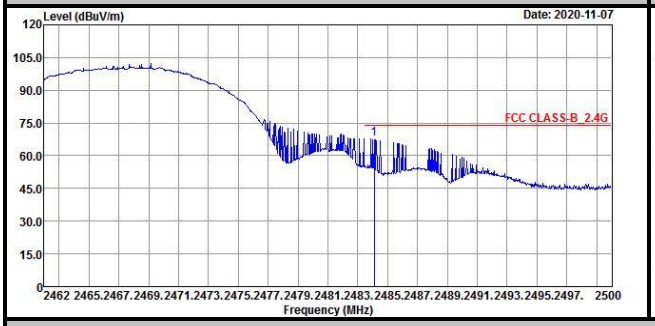
Vertical



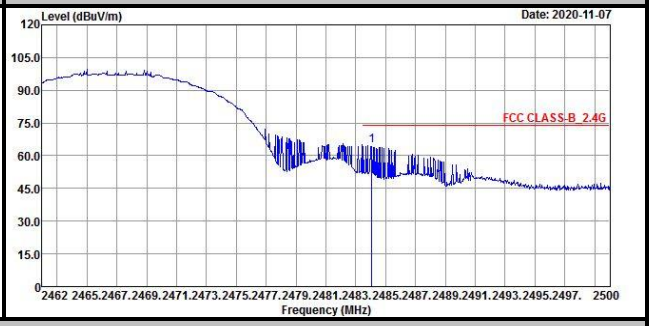
Ch 12

Peak

Horizontal

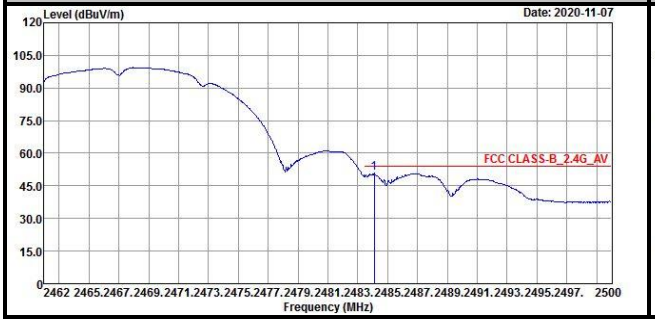


Vertical

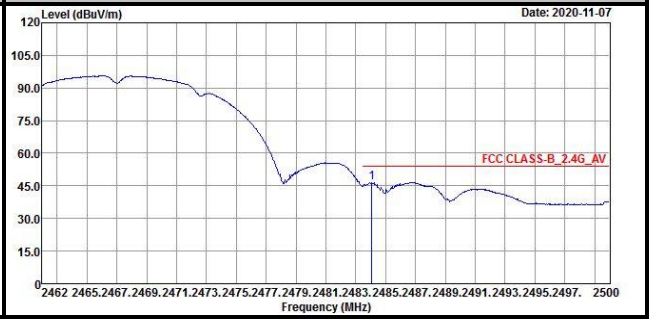


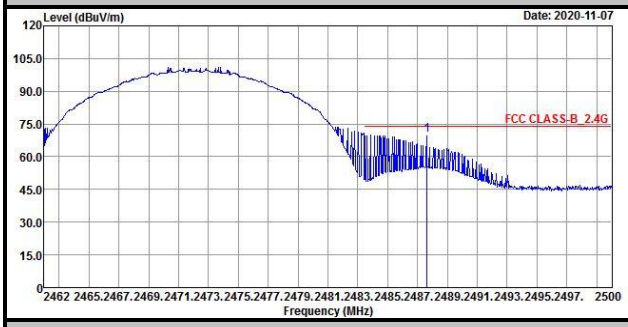
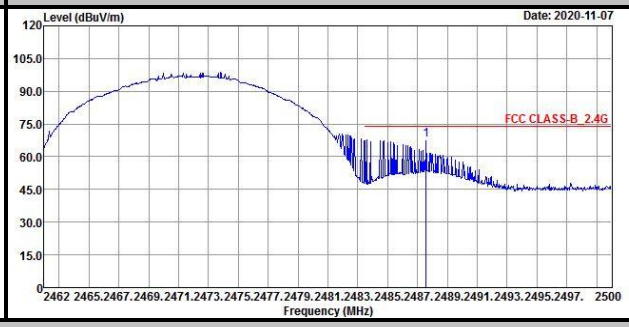
Average

Horizontal



Vertical



Ch 13	
Peak	
Horizontal	Vertical
	
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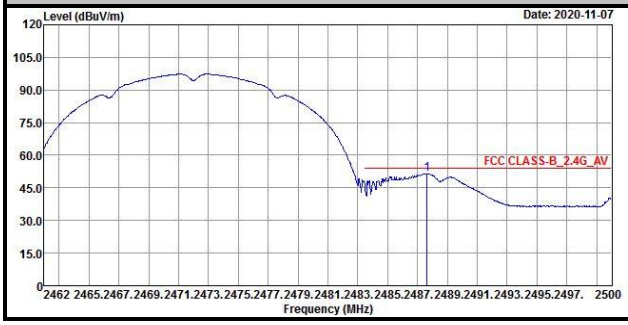
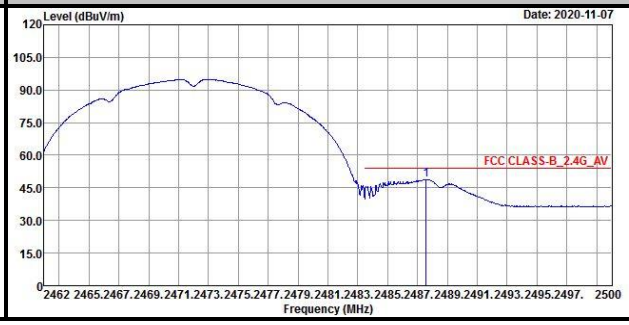
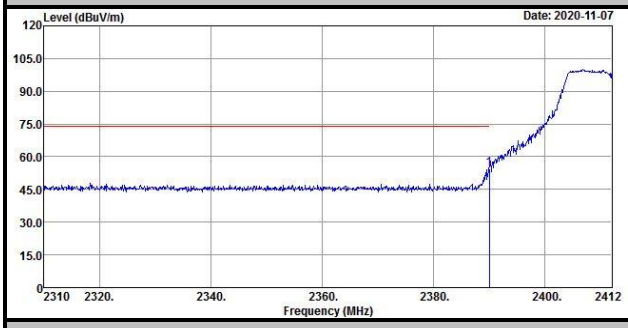
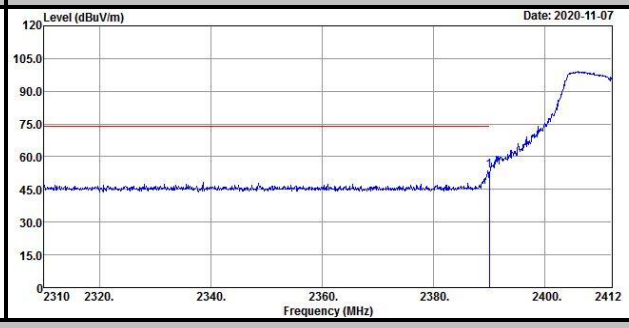
Horizontal	Vertical
	

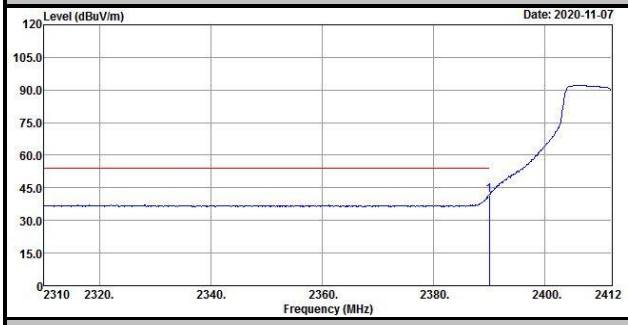
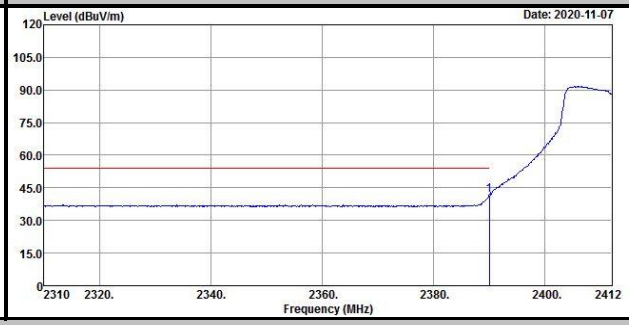
802.11g

Ch 1

Peak

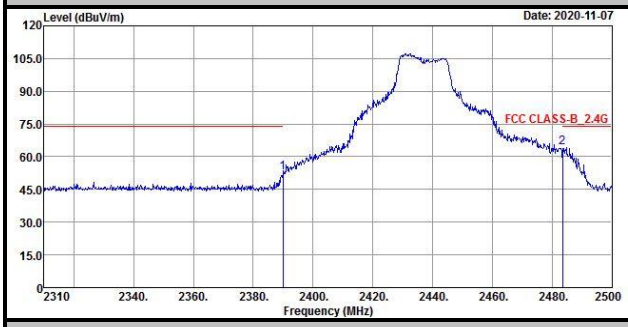
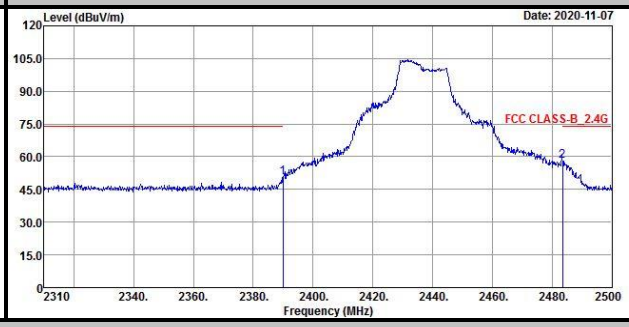
Horizontal	Vertical
	

Average

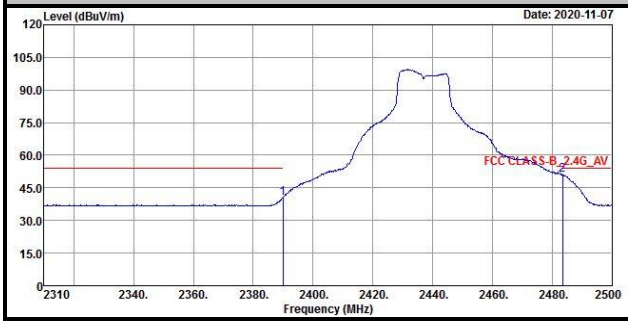
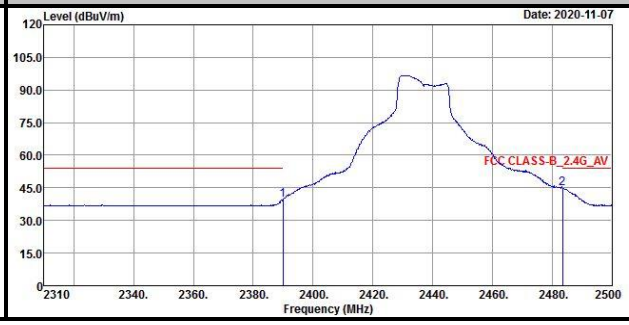
Horizontal	Vertical
	

Ch 6

Peak

Horizontal	Vertical
	

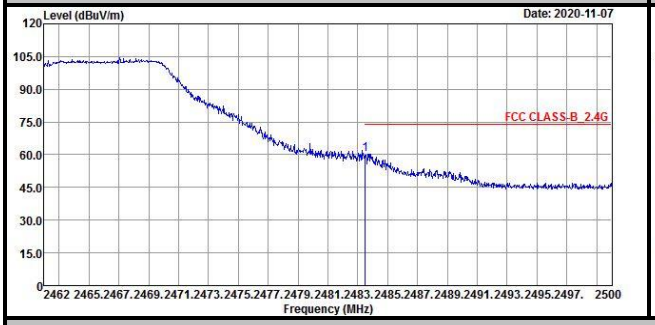
Average

Horizontal	Vertical
	

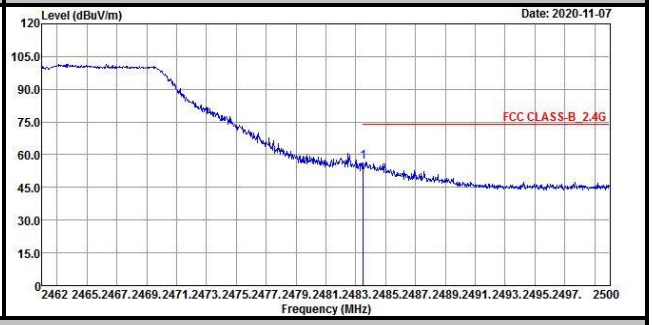
Ch 11

Peak

Horizontal



Vertical



Average

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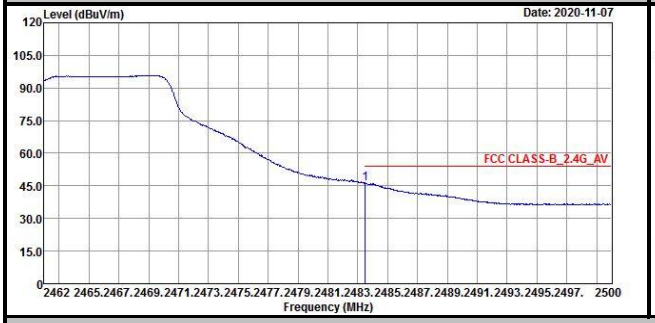

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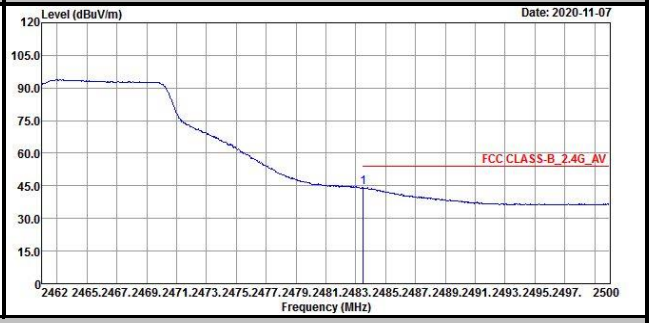
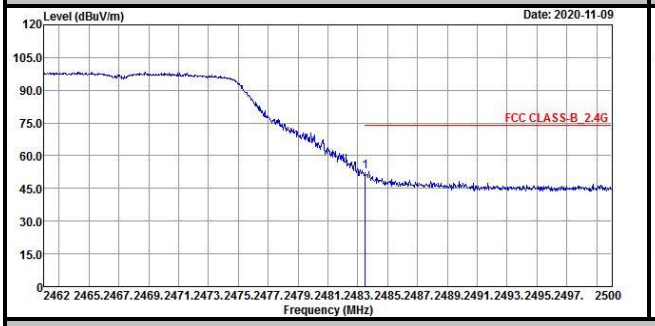


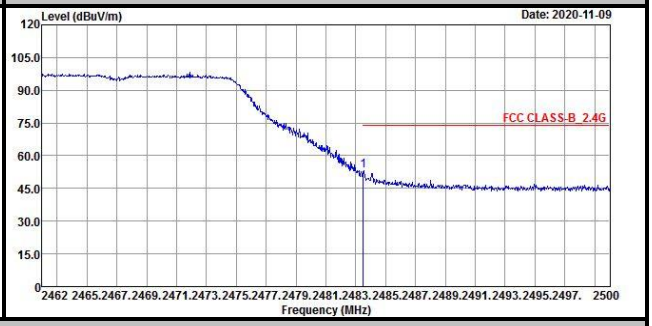
Ch 12

Peak

Horizontal

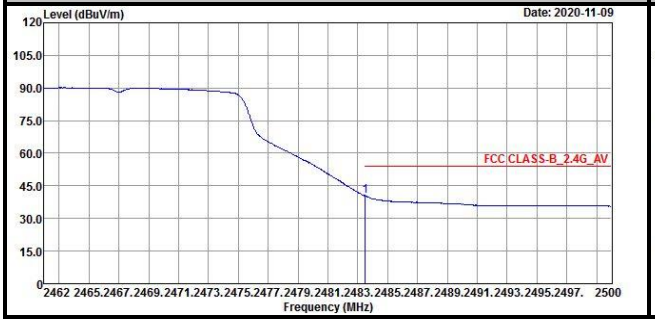


Vertical



Average

Horizontal



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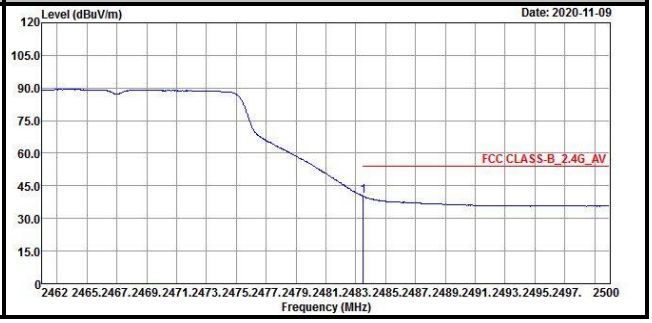
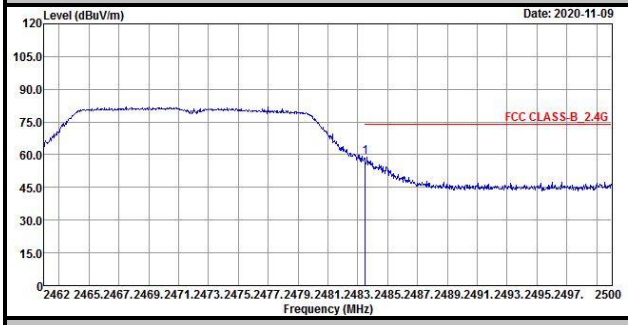
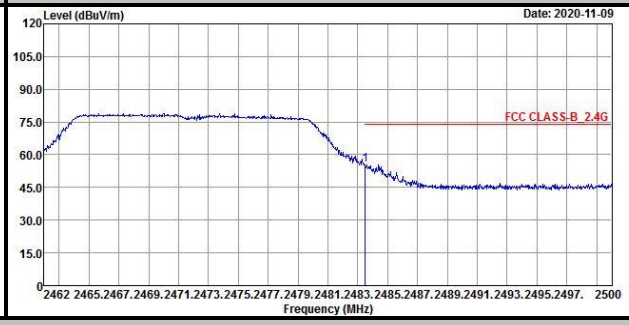
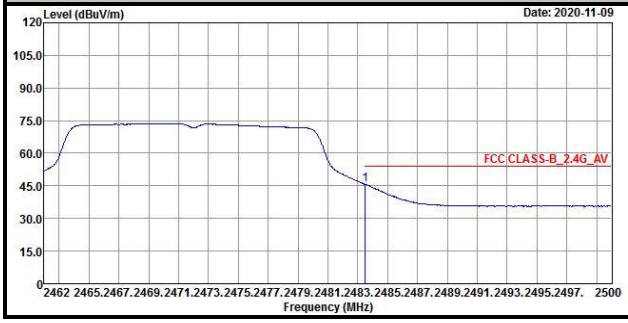
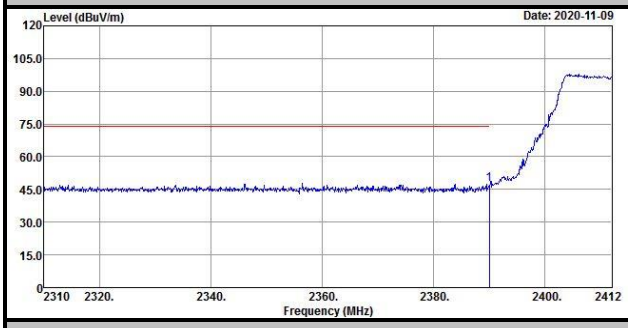
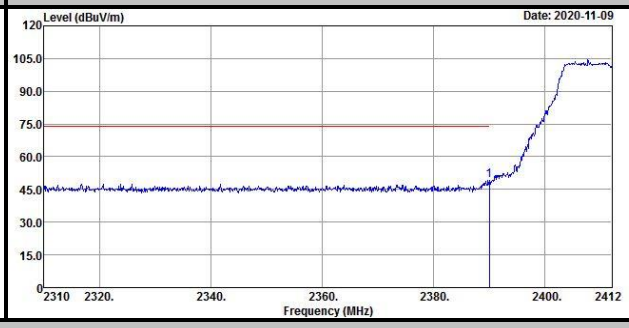


Ch 13	
Peak	
Horizontal	Vertical
	
Average	
Horizontal	Vertical
	

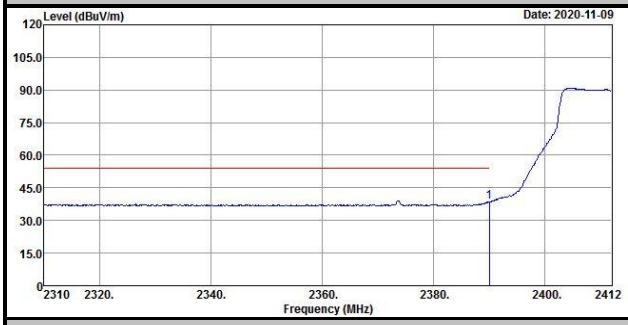
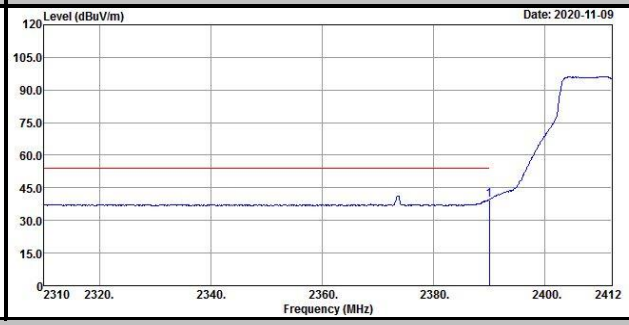
802.11n (HT20)

Ch 1

Peak

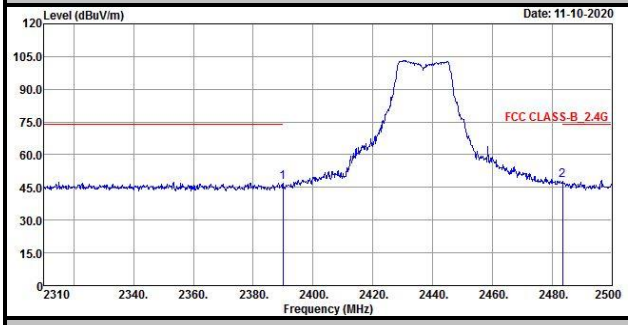
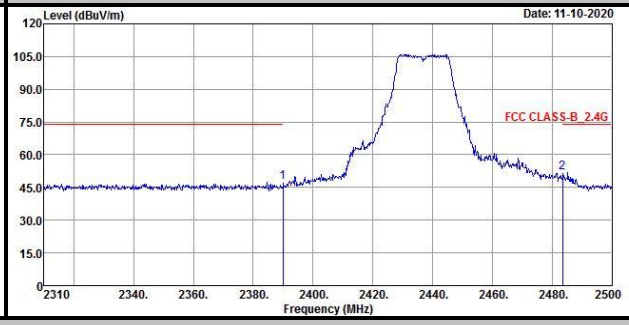
Horizontal	Vertical
	

Average

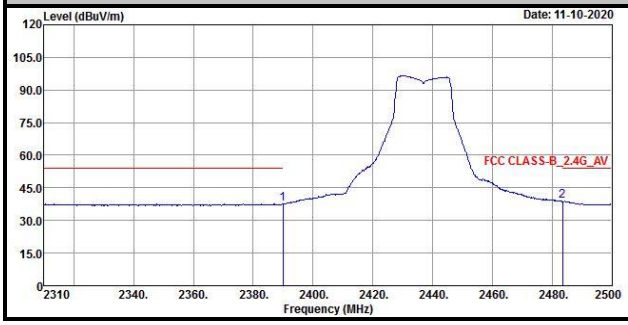
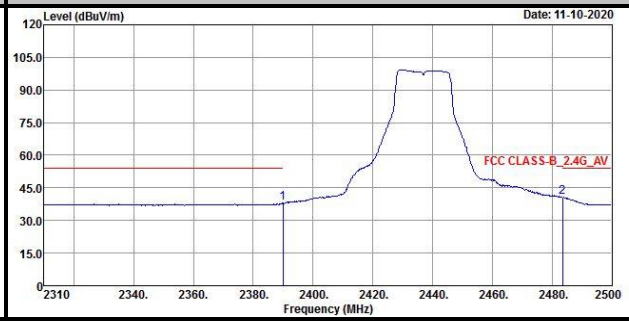
Horizontal	Vertical
	

Ch 6

Peak

Horizontal	Vertical
	

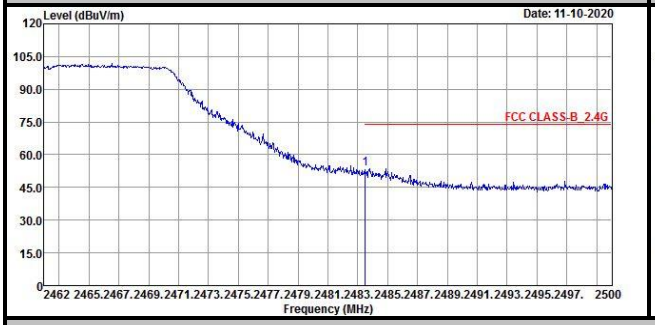
Average

Horizontal	Vertical
	

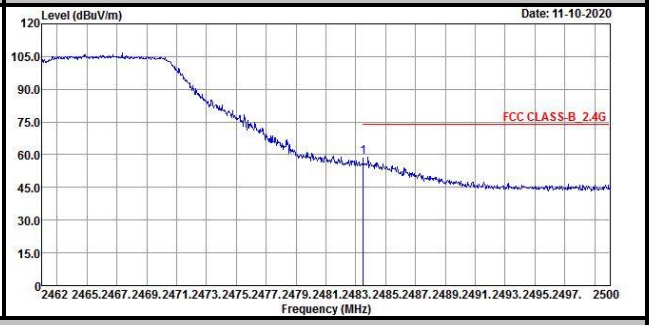
Ch 11

Peak

Horizontal

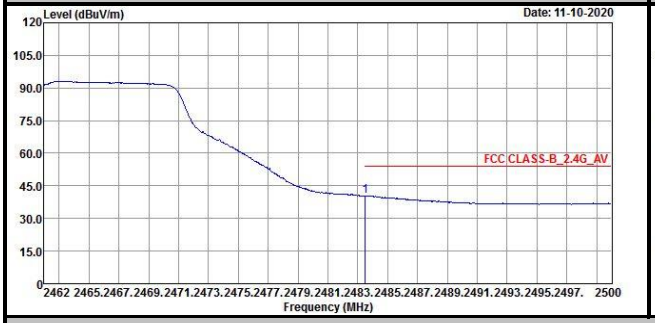


Vertical

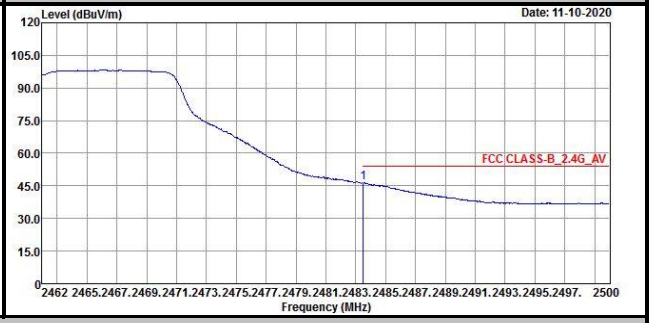


Average

Horizontal



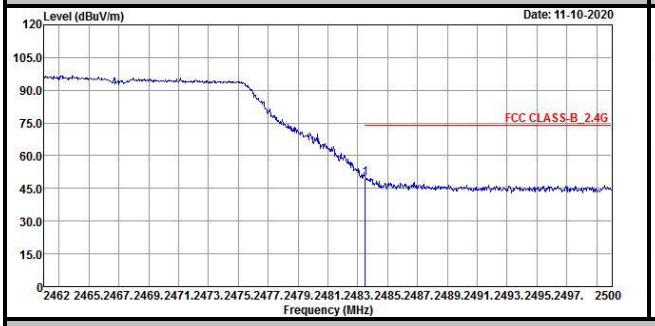
Vertical



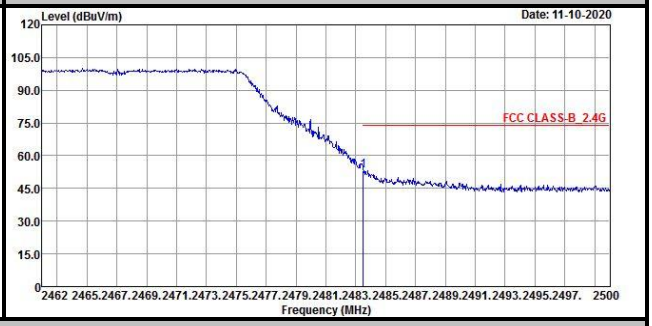
Ch 12

Peak

Horizontal

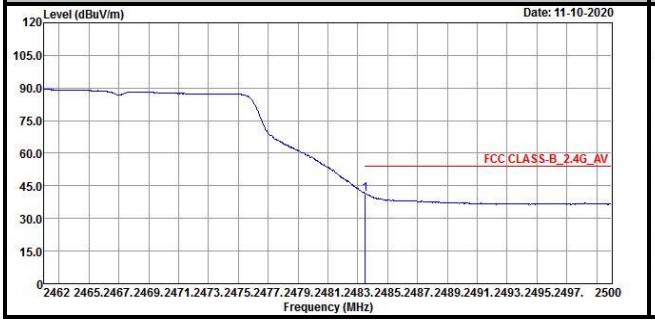


Vertical

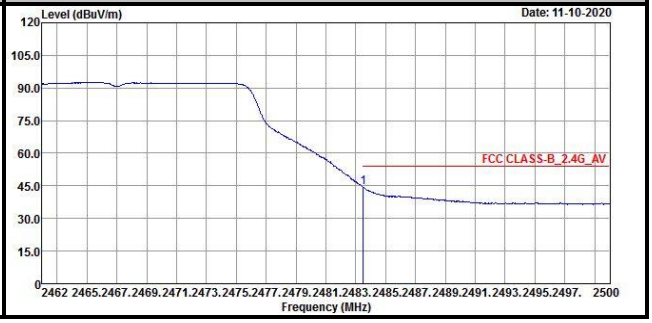


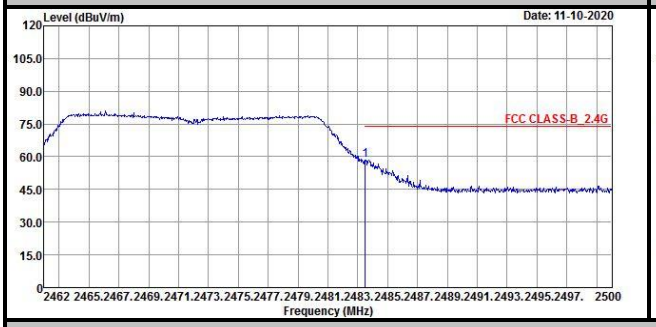
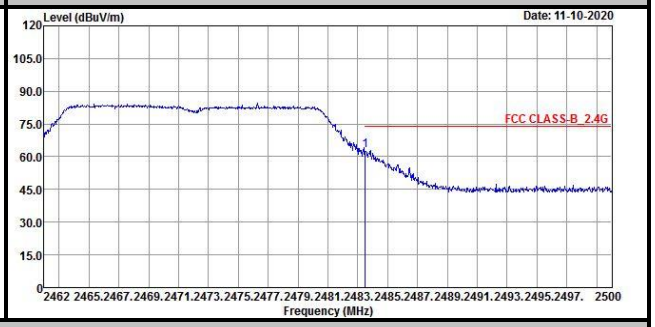
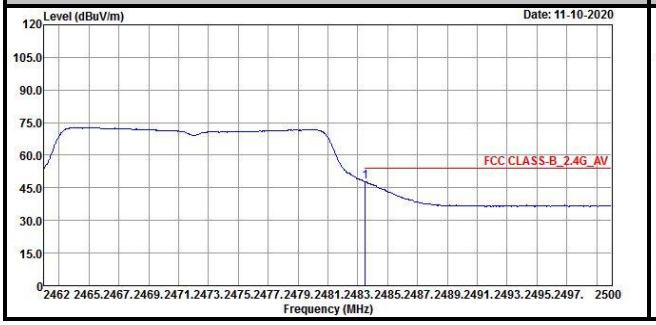
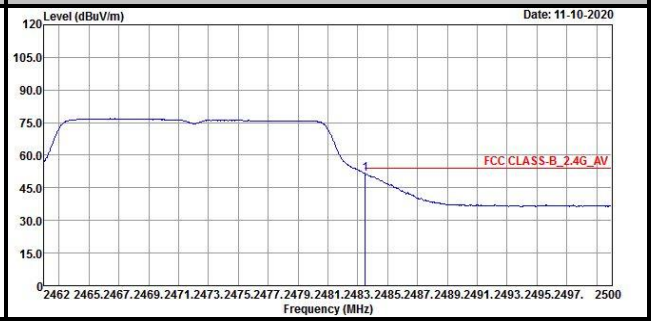
Average

Horizontal



Vertical

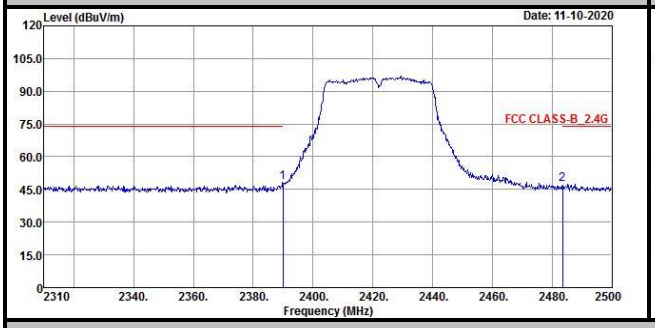
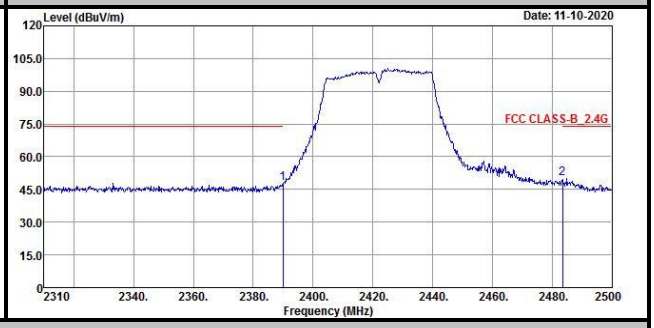


Ch 13	
Peak	
Horizontal	Vertical
	
Average	
Horizontal	Vertical
	

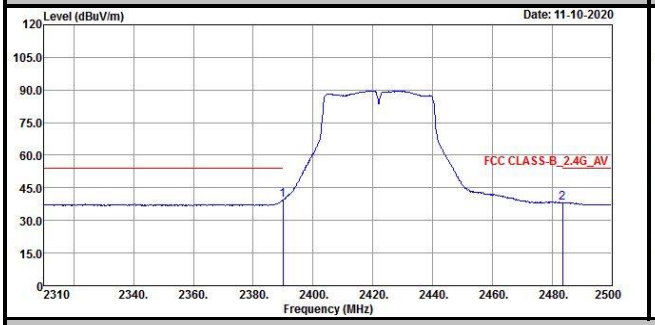
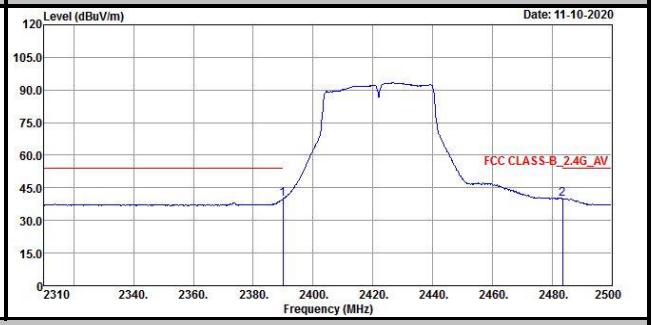
802.11n (HT40)

Ch 3

Peak

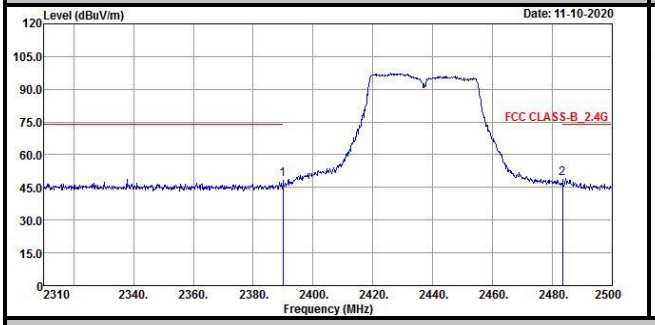
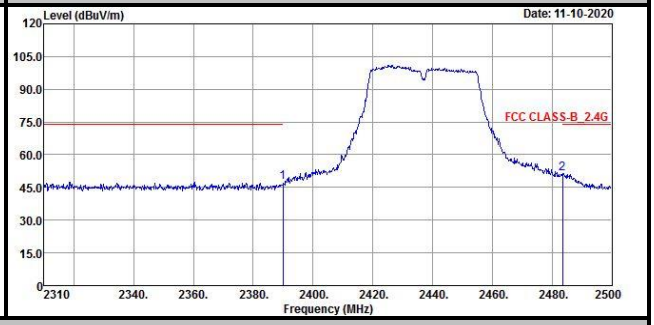
Horizontal	Vertical
	

Average

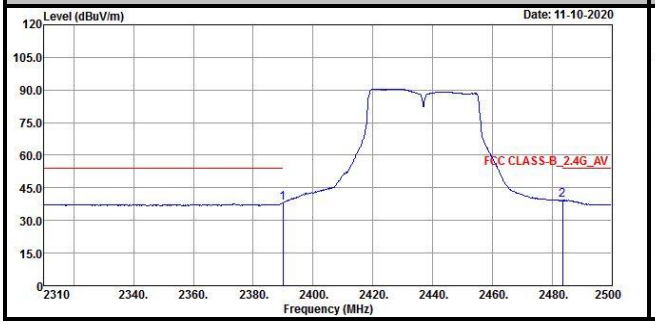
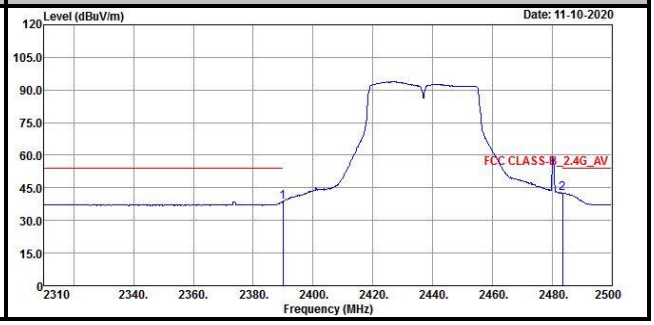
Horizontal	Vertical
	

Ch 6

Peak

Horizontal	Vertical
	

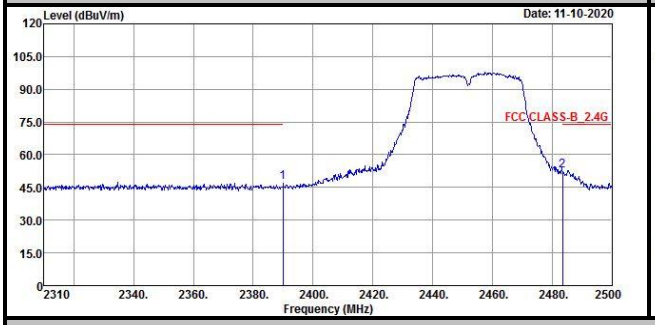
Average

Horizontal	Vertical
	

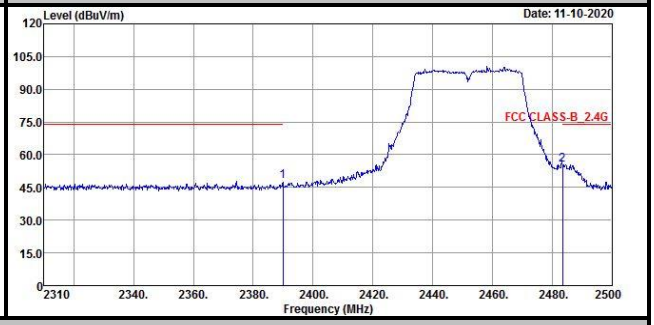
Ch 9

Peak

Horizontal

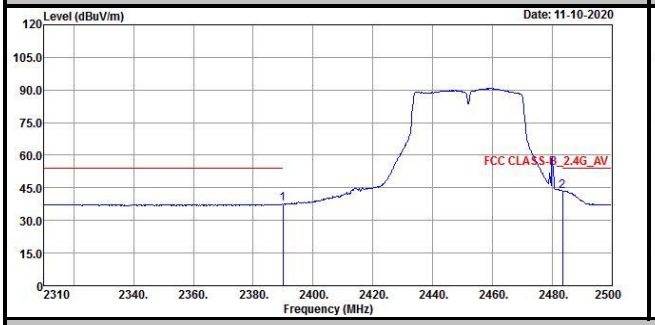


Vertical

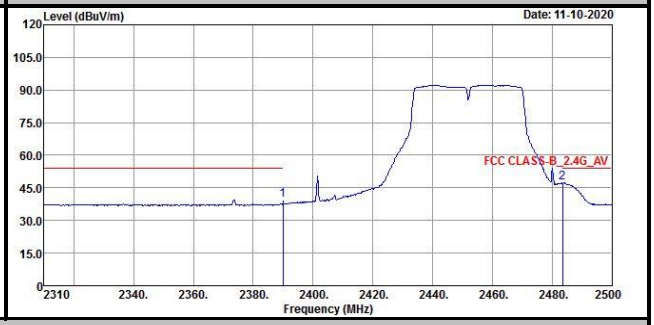


Average

Horizontal



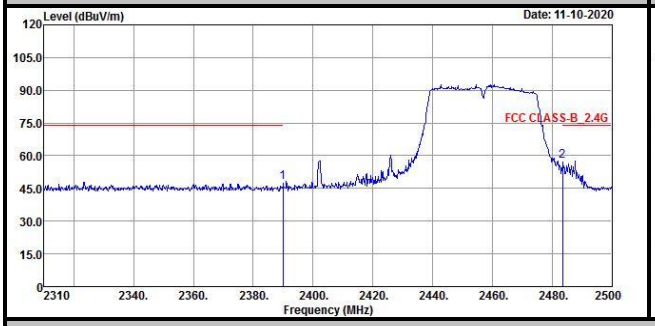
Vertical



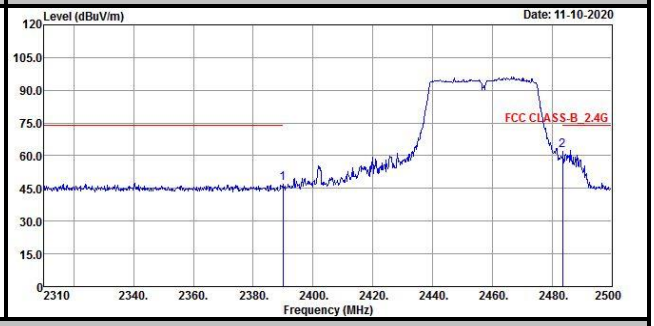
Ch 10

Peak

Horizontal

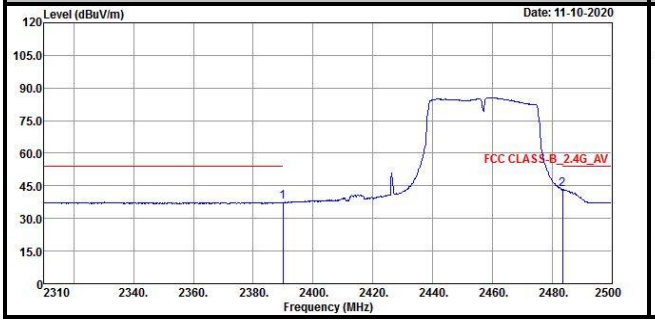


Vertical

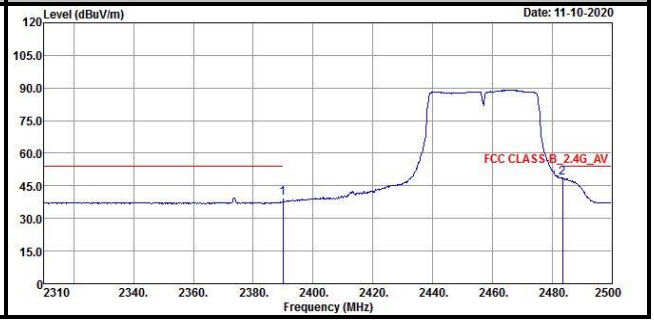


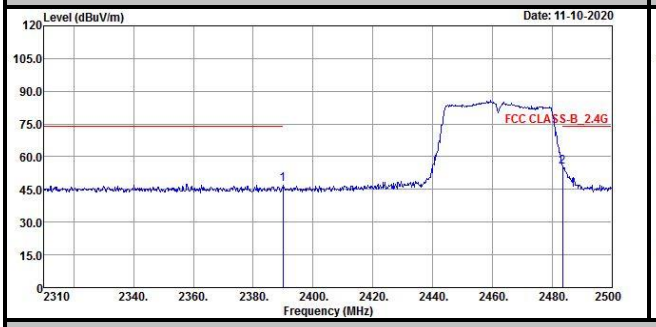
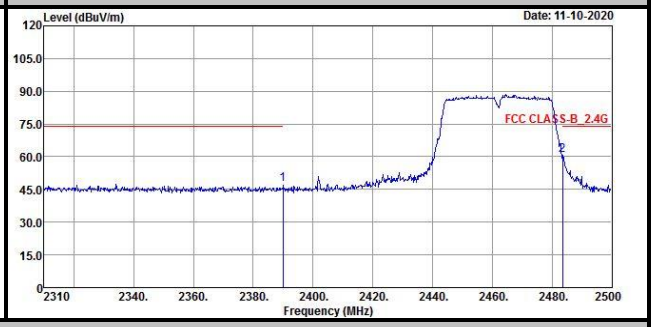
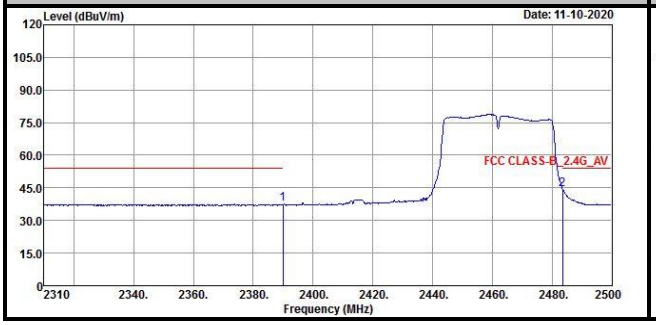
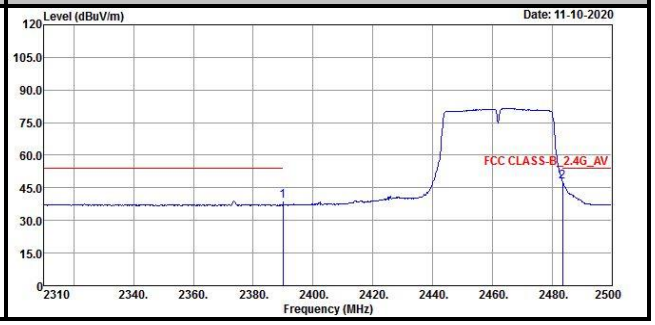
Average

Horizontal



Vertical



Ch 11	
Peak	
Horizontal	Vertical
	
Average	
Horizontal	Vertical
	

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.

If you have any comments, please feel free to contact us at the following:

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Web Site: www.bureauveritas-adt.com

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

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