

FCC Test Report

Report No.: RFBHJP-WTW-P21010398-2

FCC ID: UK7-DW13

Test Model: DW13F1, DW13F2, DW13M1 (refer to section 3.1 for more details)

Received Date: Jan. 15, 2021

Test Date: Jan. 29, 2021 ~ Mar. 15, 2021

Issued Date: Apr. 28, 2021

Applicant: Fossil Group, Inc.

Address: 901 S. Central Expressway, Richardson, Tx 75080, USA

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
RFBHJP-WTW-P21010398-2	Original Release	Apr. 28, 2021

1 Certificate of Conformity

Product: Smart Watch

Test Model: DW13F1, DW13F2, DW13M1 (refer to section 3.1 for more details)

Sample Status: Identical Prototype

Applicant: Fossil Group, Inc.

Test Date: Jan. 29, 2021 ~ Mar. 15, 2021

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: Apr. 28, 2021
Vera Huang / Specialist

Approved by :  , Date: Apr. 28, 2021
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 -16.88 dB at 0.61731 MHz.
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	Pass	Meet the requirement of limit. Minimum passing margin is -2.7 dB at 2483.5 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:

- 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.
- 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	Smart Watch
Test Model	DW13F1, DW13F2, DW13M1
Status of EUT	Identical Prototype
Power Supply Rating	5.0 Vdc (adapter or host equipment) 3.88 Vdc (Li-ion battery)
Modulation Type	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
Modulation Technology	DSSS, OFDM
Transfer Rate	802.11b: 11.0 / 5.5 / 2.0 / 1.0 Mbps 802.11g: 54.0 / 48.0 / 36.0 / 24.0 / 18.0 / 12.0 / 9.0 / 6.0 Mbps 802.11n: up to 72.2 Mbps
Operating Frequency	2412 ~ 2472 MHz
Number of Channel	13 for 802.11b, 802.11g, 802.11n (HT20)
Output Power	94.406 mW
Antenna Type	Refer to Note as below
Antenna Connector	N/A
Accessory Device	Refer to Note as below
Data Cable Supplied	Refer to Note as below

Note:

- The EUT provides 1 completed transmitter and 1 receiver.

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

- All models are listed as below. Only model: DW13F1 as a representative for final test.

Model	Antenna Type	Antenna Gain (dBi)	Difference
		2.4G / BT	
DW13F1	PIFA	-5.25	All models are electrically identical, different antenna gain due to enclosure, and different model names are for marketing purpose.
DW13F2	PIFA	-6.82	
DW13M1	PIFA	-5.37	

- The EUT contains following accessory devices.

Product	Brand	Model	Description
Charging Dock	Simula	CB407D-6040-202	Voltage Rating: 5V
Battery	Lishen	DAGP382427SA	3.88 Vdc, 300 mAh

- 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.
- The above EUT information is declared by manufacturer and for more detailed features description, please refers to the manufacturer's specifications or user's manual.

3.2 Description of Test Modes

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

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

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT Configure Mode	Applicable To				Description
	RE≥1G	RE<1G	PLC	APCM	
A	√	√	√	√	EUT + Adapter
B	-	-	√	-	EUT + Notebook

Where **RE≥1G**: Radiated Emission above 1 GHz
PLC: Power Line Conducted Emission

RE<1G: Radiated Emission below 1 GHz
APCM: Antenna Port Conducted Measurement

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

Radiated Emission Test (Above 1 GHz):

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

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

Radiated Emission Test (Below 1 GHz):

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

EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
A	802.11b	1 to 13	13	OFDM	BPSK	6.5

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)
A, B	802.11b	1 to 13	13	OFDM	BPSK	6.5

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)
A	802.11b	1 to 13	1, 11, 12, 13	DSSS	DBPSK	1.0
A	802.11g	1 to 13	1, 11, 12, 13	OFDM	BPSK	6.0
A	802.11n (HT20)	1 to 13	1, 11, 12, 13	OFDM	BPSK	6.5

Antenna Port Conducted Measurement:

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

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

Test Condition:

Applicable To	Environmental Conditions	Input Power	Tested by
RE $\geq$ 1G	25 deg. C, 65 % RH	120 Vac, 60 Hz	Tim Chen
RE<1G	25 deg. C, 65 % RH	120 Vac, 60 Hz	Tim Chen
PLC	25 deg. C, 65 % RH	120 Vac, 60 Hz	Tim Chen
APCM	25 deg. C, 60 % RH	3.88 Vdc	Ivan Tseng

3.3 Duty Cycle of Test Signal

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

802.11b: Duty cycle = $8.163/8.401 = 0.972$, Duty factor = $10 * \log(1/0.972) = 0.12$

802.11g: Duty cycle = $1.355/1.558 = 0.87$, Duty factor = $10 * \log(1/0.87) = 0.61$

802.11n (HT20): Duty cycle = $1.267/1.469 = 0.862$, Duty factor = $10 * \log(1/0.862) = 0.64$



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	Adapter	ASUS	AD827M	NA	NA	--
B	Notebook	DELL	Inspiron 14R	8LRKKW1	NA	--

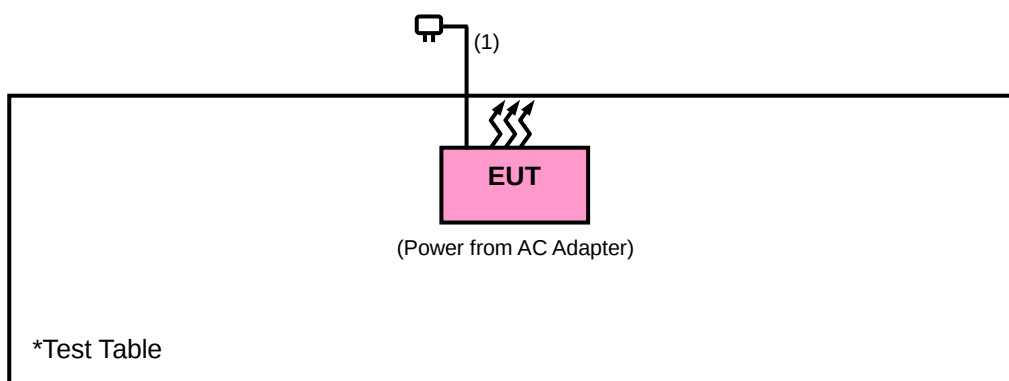
Note:

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

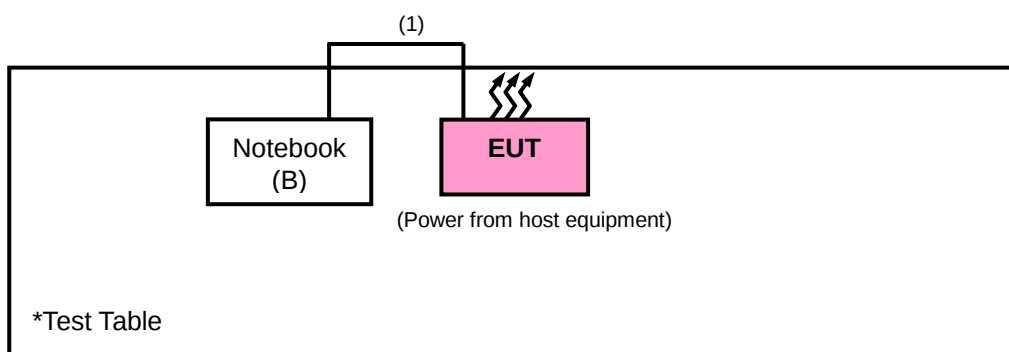
ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	Charging Cable	1	0.85	N	0	Provided by client

3.4.1 Configuration of System under Test

Mode A



Mode B



3.5 General Description of Applied Standards and References

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

Test Standard:

FCC Part 15, Subpart C (15.247)

ANSI C63.10-2013

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

References Test Guidance:

KDB 558074 D01 Meas Guidance v05r02

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

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

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

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

NOTE:

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

4.1.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Spectrum Analyzer Agilent	N9010A	MY52220314	Dec. 07, 2020	Dec. 06, 2021
Spectrum Analyzer ROHDE & SCHWARZ	FSV40	100980	Apr. 20, 2020 Apr. 14, 2021	Apr. 19, 2021 Apr. 13, 2022
Signal Analyzer Keysight	N9010A	MY56070348	Sep. 16, 2020	Sep. 15, 2021
Spectrum Analyzer ROHDE & SCHWARZ	FSU43	101261	Apr. 16, 2020	Apr. 15, 2021
HORN Antenna SCHWARZBECK	BBHA 9120D	9120D-969	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 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

- Note: 1. The calibration interval of the above test instruments is 12 / 24 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:

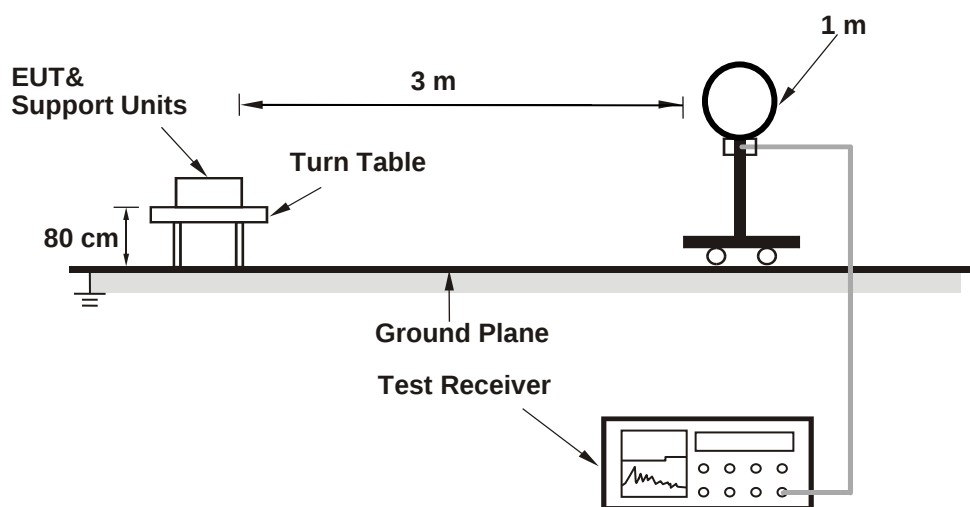
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection (QP) or Peak detection (PK) at frequency below 1 GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1 GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is $\geq 1/T$ (Duty cycle < 98 %) or 10 Hz (Duty cycle ≥ 98 %) for Average detection (AV) at frequency above 1 GHz.
(11b: RBW = 1 MHz, VBW = 300 Hz ; 11g: RBW = 1 MHz, VBW = 1 kHz ;
11n (HT20): RBW = 1 MHz, VBW = 1 kHz)
4. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

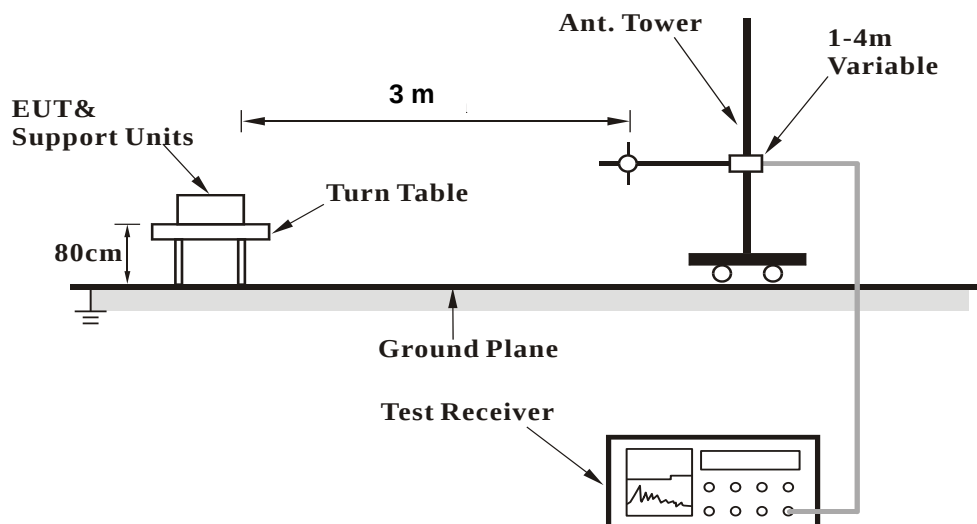
No deviation.

4.1.5 Test Set Up

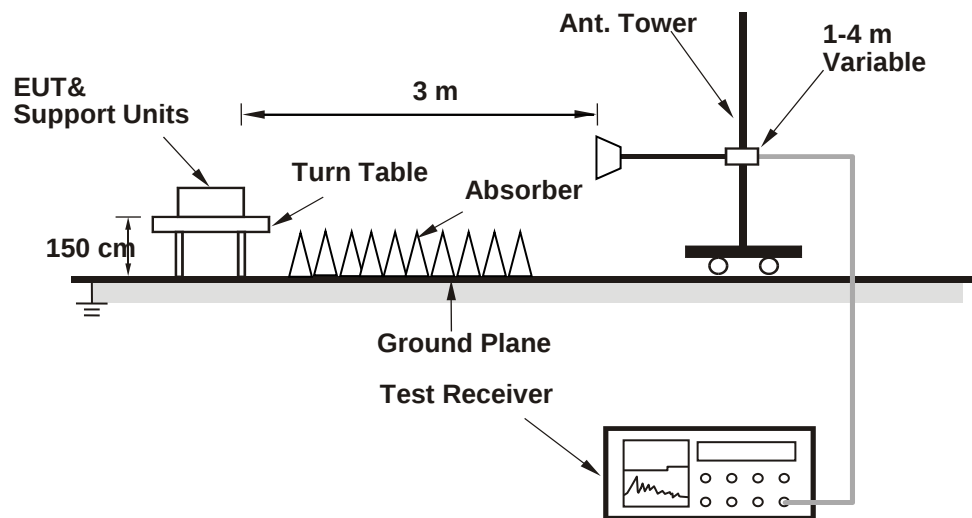
<Radiated Emission below 30 MHz>



<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

- Placed the EUT on a testing table.
- 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	37	44.05	-7.05	54	-17	120	334	Average
2390	46.1	53.15	-7.05	74	-27.9	120	334	Peak
2412	94.49	101.54	-7.05	-----	-----	120	334	Average
2412	96.26	103.31	-7.05	-----	-----	120	334	Peak
4824	31.41	47.26	-15.85	54	-22.59	264	208	Average
4824	38.55	54.4	-15.85	74	-35.45	264	208	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	35.14	42.19	-7.05	54	-18.86	298	16	Average
2390	45.71	52.76	-7.05	74	-28.29	298	16	Peak
2412	89.48	96.53	-7.05	-----	-----	298	16	Average
2412	91.2	98.25	-7.05	-----	-----	298	16	Peak
4824	31.8	47.65	-15.85	54	-22.2	179	39	Average
4824	38.92	54.77	-15.85	74	-35.08	179	39	Peak

Remarks:

- Emission Level = Read Level + Factor
Margin value = Emission level – Limit value
- 2412 MHz: Fundamental frequency.
- 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	35.43	42.48	-7.05	54	-18.57	120	333	Average
2390	44.77	51.82	-7.05	74	-29.23	120	333	Peak
2437	93.12	100.12	-7	-----	-----	120	333	Average
2437	94.85	101.85	-7	-----	-----	120	333	Peak
2483.5	35.21	42.07	-6.86	54	-18.79	120	333	Average
2483.5	44.53	51.39	-6.86	74	-29.47	120	333	Peak
4874	31.68	47.62	-15.94	54	-22.32	158	233	Average
4874	38.9	54.84	-15.94	74	-35.1	158	233	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	34.79	41.84	-7.05	54	-19.21	298	15	Average
2390	44.72	51.77	-7.05	74	-29.28	298	15	Peak
2437	89	96	-7	-----	-----	298	15	Average
2437	90.84	97.84	-7	-----	-----	298	15	Peak
2483.5	34.71	41.57	-6.86	54	-19.29	298	15	Average
2483.5	44.53	51.39	-6.86	74	-29.47	298	15	Peak
4874	33.19	49.13	-15.94	54	-20.81	203	125	Average
4874	40.37	56.31	-15.94	74	-33.63	203	125	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	94.09	101.02	-6.93	-----	-----	124	334	Average
2462	95.9	102.83	-6.93	-----	-----	124	334	Peak
2483.5	35.92	42.78	-6.86	54	-18.08	124	334	Average
2483.5	45.94	52.8	-6.86	74	-28.06	124	334	Peak
4924	31.91	47.78	-15.87	54	-22.09	243	301	Average
4924	39.03	54.9	-15.87	74	-34.97	243	301	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	89.56	96.49	-6.93	-----	-----	279	32	Average
2462	91.38	98.31	-6.93	-----	-----	279	32	Peak
2483.5	35.24	42.1	-6.86	54	-18.76	279	32	Average
2483.5	46.14	53	-6.86	74	-27.86	279	32	Peak
4924	29.65	45.52	-15.87	54	-24.35	165	163	Average
4924	36.74	52.61	-15.87	74	-37.26	165	163	Peak

Remarks:

- Emission Level = Read Level + Factor
Margin value = Emission level – Limit value
- 2462 MHz: Fundamental frequency.
- 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	93.98	100.84	-6.86	-----	-----	260	347	Average
2467	96.13	102.99	-6.86	-----	-----	260	347	Peak
2486.1	39.76	46.62	-6.86	54	-14.24	260	347	Average
2486.1	48.19	55.05	-6.86	74	-25.81	260	347	Peak
4934	30.93	46.8	-15.87	54	-23.07	248	223	Average
4934	38.02	53.89	-15.87	74	-35.98	248	223	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	87.29	94.15	-6.86	-----	-----	311	296	Average
2467	89.02	95.88	-6.86	-----	-----	311	296	Peak
2486.1	36.23	43.09	-6.86	54	-17.77	311	296	Average
2486.1	45.44	52.3	-6.86	74	-28.56	311	296	Peak
4934	31.08	46.95	-15.87	54	-22.92	156	85	Average
4934	38.14	54.01	-15.87	74	-35.86	156	85	Peak

Remarks:

- Emission Level = Read Level + Factor
Margin value = Emission level – Limit value
- 2467 MHz: Fundamental frequency.
- 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	95.65	102.51	-6.86	-----	-----	257	347	Average
2472	97.43	104.29	-6.86	-----	-----	257	347	Peak
2483.5	51.3	58.16	-6.86	54	-2.7	257	347	Average
2483.5	54.83	61.69	-6.86	74	-19.17	257	347	Peak
4944	32.15	47.94	-15.79	54	-21.85	167	112	Average
4944	39.3	55.09	-15.79	74	-34.7	167	112	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	90.25	97.11	-6.86	-----	-----	304	298	Average
2472	91.74	98.6	-6.86	-----	-----	304	298	Peak
2483.5	45.21	52.07	-6.86	54	-8.79	304	298	Average
2483.5	51.25	58.11	-6.86	74	-22.75	304	298	Peak
4944	30.35	46.14	-15.79	54	-23.65	240	323	Average
4944	37.5	53.29	-15.79	74	-36.5	240	323	Peak

Remarks:

- Emission Level = Read Level + Factor
Margin value = Emission level – Limit value
- 2472 MHz: Fundamental frequency.
- 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	39.9	46.95	-7.05	54	-14.1	100	352	Average
2390	54.8	61.85	-7.05	74	-19.2	100	352	Peak
2412	87.16	94.21	-7.05	-----	-----	100	352	Average
2412	94.47	101.52	-7.05	-----	-----	100	352	Peak
4824	31.83	47.68	-15.85	54	-22.17	169	212	Average
4824	38.94	54.79	-15.85	74	-35.06	169	212	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	35.65	42.7	-7.05	54	-18.35	274	28	Average
2390	50.14	57.19	-7.05	74	-23.86	274	28	Peak
2412	82.03	89.08	-7.05	-----	-----	274	28	Average
2412	88.89	95.94	-7.05	-----	-----	274	28	Peak
4824	32.13	47.98	-15.85	54	-21.87	275	156	Average
4824	39.27	55.12	-15.85	74	-34.73	275	156	Peak

Remarks:

- Emission Level = Read Level + Factor
Margin value = Emission level – Limit value
- 2412 MHz: Fundamental frequency.
- 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
2384.8	37.7	44.7	-7	54	-16.3	102	353	Average
2384.8	46.59	53.59	-7	74	-27.41	102	353	Peak
2437	88.29	95.29	-7	-----	-----	102	353	Average
2437	96.05	103.05	-7	-----	-----	102	353	Peak
2489.3	36.29	43.16	-6.87	54	-17.71	102	353	Average
2489.3	45.89	52.76	-6.87	74	-28.11	102	353	Peak
4874	31.97	47.91	-15.94	54	-22.03	136	211	Average
4874	39.17	55.11	-15.94	74	-34.83	136	211	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	34.72	41.77	-7.05	54	-19.28	264	37	Average
2390	45.39	52.44	-7.05	74	-28.61	264	37	Peak
2437	81.68	88.68	-7	-----	-----	264	37	Average
2437	89.41	96.41	-7	-----	-----	264	37	Peak
2483.5	34.63	41.49	-6.86	54	-19.37	264	37	Average
2483.5	44.92	51.78	-6.86	74	-29.08	264	37	Peak
4874	33.55	49.49	-15.94	54	-20.45	187	260	Average
4874	40.71	56.65	-15.94	74	-33.29	187	260	Peak

Remarks:

- Emission Level = Read Level + Factor
Margin value = Emission level – Limit value
- 2437 MHz: Fundamental frequency.
- 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	89.31	96.24	-6.93	-----	-----	100	352	Average
2462	95.65	102.58	-6.93	-----	-----	100	352	Peak
2483.5	41.24	48.1	-6.86	54	-12.76	100	352	Average
2483.5	58.31	65.17	-6.86	74	-15.69	100	352	Peak
4924	32.32	48.19	-15.87	54	-21.68	199	237	Average
4924	39.41	55.28	-15.87	74	-34.59	199	237	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	83.34	90.27	-6.93	-----	-----	268	34	Average
2462	90.21	97.14	-6.93	-----	-----	268	34	Peak
2483.5	36.18	43.04	-6.86	54	-17.82	268	34	Average
2483.5	49.84	56.7	-6.86	74	-24.16	268	34	Peak
4924	30.03	45.9	-15.87	54	-23.97	228	141	Average
4924	37.1	52.97	-15.87	74	-36.9	228	141	Peak

Remarks:

- Emission Level = Read Level + Factor
Margin value = Emission level – Limit value
- 2462 MHz: Fundamental frequency.
- 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	88.7	95.56	-6.86	-----	-----	261	349	Average
2467	95.61	102.47	-6.86	-----	-----	261	349	Peak
2483.5	45.04	51.9	-6.86	54	-8.96	261	349	Average
2483.5	63.22	70.08	-6.86	74	-10.78	261	349	Peak
4934	32.57	48.44	-15.87	54	-21.43	185	226	Average
4934	38.79	54.66	-15.87	74	-35.21	185	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
2467	81.33	88.19	-6.86	-----	-----	306	297	Average
2467	88.11	94.97	-6.86	-----	-----	306	297	Peak
2483.5	39.94	46.8	-6.86	54	-14.06	306	297	Average
2483.5	58.32	65.18	-6.86	74	-15.68	306	297	Peak
4934	31.55	47.42	-15.87	54	-22.45	231	325	Average
4934	38.66	54.53	-15.87	74	-35.34	231	325	Peak

Remarks:

- Emission Level = Read Level + Factor
Margin value = Emission level – Limit value
- 2467 MHz: Fundamental frequency.
- 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	82.89	89.75	-6.86	-----	-----	262	5	Average
2472	89.05	95.91	-6.86	-----	-----	262	5	Peak
2483.5	49.26	56.12	-6.86	54	-4.74	262	5	Average
2483.5	64.82	71.68	-6.86	74	-9.18	262	5	Peak
4944	32.9	48.69	-15.79	54	-21.1	177	201	Average
4944	40.04	55.83	-15.79	74	-33.96	177	201	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	74.42	81.28	-6.86	-----	-----	302	317	Average
2472	81.01	87.87	-6.86	-----	-----	302	317	Peak
2483.5	42.44	49.3	-6.86	54	-11.56	302	317	Average
2483.5	58.22	65.08	-6.86	74	-15.78	302	317	Peak
4944	33.02	48.81	-15.79	54	-20.98	266	133	Average
4944	40.15	55.94	-15.79	74	-33.85	266	133	Peak

Remarks:

- Emission Level = Read Level + Factor
Margin value = Emission level – Limit value
- 2472 MHz: Fundamental frequency.
- 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	41.12	48.17	-7.05	54	-12.88	101	353	Average
2390	57.27	64.32	-7.05	74	-16.73	101	353	Peak
2412	87.83	94.88	-7.05	-----	-----	101	353	Average
2412	94.93	101.98	-7.05	-----	-----	101	353	Peak
4824	31.95	47.8	-15.85	54	-22.05	133	259	Average
4824	39.05	54.9	-15.85	74	-34.95	133	259	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	36.3	43.35	-7.05	54	-17.7	234	25	Average
2390	47.19	54.24	-7.05	74	-26.81	234	25	Peak
2412	80.95	88	-7.05	-----	-----	234	25	Average
2412	87.86	94.91	-7.05	-----	-----	234	25	Peak
4824	32.26	48.11	-15.85	54	-21.74	255	101	Average
4824	39.41	55.26	-15.85	74	-34.59	255	101	Peak

Remarks:

- Emission Level = Read Level + Factor
Margin value = Emission level – Limit value
- 2412 MHz: Fundamental frequency.
- 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
2385.5	38.2	45.23	-7.03	54	-15.8	100	353	Average
2385.5	46.89	53.92	-7.03	74	-27.11	100	353	Peak
2437	88.22	95.22	-7	-----	-----	100	353	Average
2437	95.03	102.03	-7	-----	-----	100	353	Peak
2488.8	36.77	43.64	-6.87	54	-17.23	100	353	Average
2488.8	45.32	52.19	-6.87	74	-28.68	100	353	Peak
4874	31.77	47.71	-15.94	54	-22.23	133	52	Average
4874	38.78	54.72	-15.94	74	-35.22	133	52	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	34.72	41.77	-7.05	54	-19.28	264	34	Average
2390	45.33	52.38	-7.05	74	-28.67	264	34	Peak
2437	81.01	88.01	-7	-----	-----	264	34	Average
2437	88.35	95.35	-7	-----	-----	264	34	Peak
2483.5	34.81	41.67	-6.86	54	-19.19	264	34	Average
2483.5	44.95	51.81	-6.86	74	-29.05	264	34	Peak
4874	33.09	49.03	-15.94	54	-20.91	187	263	Average
4874	40.15	56.09	-15.94	74	-33.85	187	263	Peak

Remarks:

- Emission Level = Read Level + Factor
Margin value = Emission level – Limit value
- 2437 MHz: Fundamental frequency.
- 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	88.41	95.34	-6.93	-----	-----	264	350	Average
2462	94.33	101.26	-6.93	-----	-----	264	350	Peak
2483.5	40.92	47.78	-6.86	54	-13.08	264	350	Average
2483.5	59.54	66.4	-6.86	74	-14.46	264	350	Peak
4924	32.32	48.19	-15.87	54	-21.68	237	109	Average
4924	39.43	55.3	-15.87	74	-34.57	237	109	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	81.74	88.67	-6.93	-----	-----	317	298	Average
2462	88.36	95.29	-6.93	-----	-----	317	298	Peak
2483.5	36.8	43.66	-6.86	54	-17.2	317	298	Average
2483.5	54.5	61.36	-6.86	74	-19.5	317	298	Peak
4924	30.67	46.54	-15.87	54	-23.33	176	301	Average
4924	37.74	53.61	-15.87	74	-36.26	176	301	Peak

Remarks:

- Emission Level = Read Level + Factor
Margin value = Emission level – Limit value
- 2462 MHz: Fundamental frequency.
- 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	87.95	94.81	-6.86	-----	-----	264	349	Average
2467	94.86	101.72	-6.86	-----	-----	264	349	Peak
2483.5	46.02	52.88	-6.86	54	-7.98	264	349	Average
2483.5	62.76	69.62	-6.86	74	-11.24	264	349	Peak
4934	31.16	47.03	-15.87	54	-22.84	149	213	Average
4934	38.29	54.16	-15.87	74	-35.71	149	213	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	80.37	87.23	-6.86	-----	-----	300	299	Average
2467	87.42	94.28	-6.86	-----	-----	300	299	Peak
2483.5	41.58	48.44	-6.86	54	-12.42	300	299	Average
2483.5	57.18	64.04	-6.86	74	-16.82	300	299	Peak
4934	31.53	47.4	-15.87	54	-22.47	203	171	Average
4934	38.66	54.53	-15.87	74	-35.34	203	171	Peak

Remarks:

- Emission Level = Read Level + Factor
Margin value = Emission level – Limit value
- 2467 MHz: Fundamental frequency.
- 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	82.81	89.67	-6.86	-----	-----	262	4	Average
2472	89.57	96.43	-6.86	-----	-----	262	4	Peak
2483.5	50.66	57.52	-6.86	54	-3.34	262	4	Average
2483.5	65.09	71.95	-6.86	74	-8.91	262	4	Peak
4944	32.37	48.16	-15.79	54	-21.63	281	162	Average
4944	39.51	55.3	-15.79	74	-34.49	281	162	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	74.12	80.98	-6.86	-----	-----	302	316	Average
2472	80.89	87.75	-6.86	-----	-----	302	316	Peak
2483.5	43.05	49.91	-6.86	54	-10.95	302	316	Average
2483.5	57.5	64.36	-6.86	74	-16.5	302	316	Peak
4944	31.83	47.62	-15.79	54	-22.17	231	107	Average
4944	39.01	54.8	-15.79	74	-34.99	231	107	Peak

Remarks:

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

9 kHz ~ 30 MHz Data:

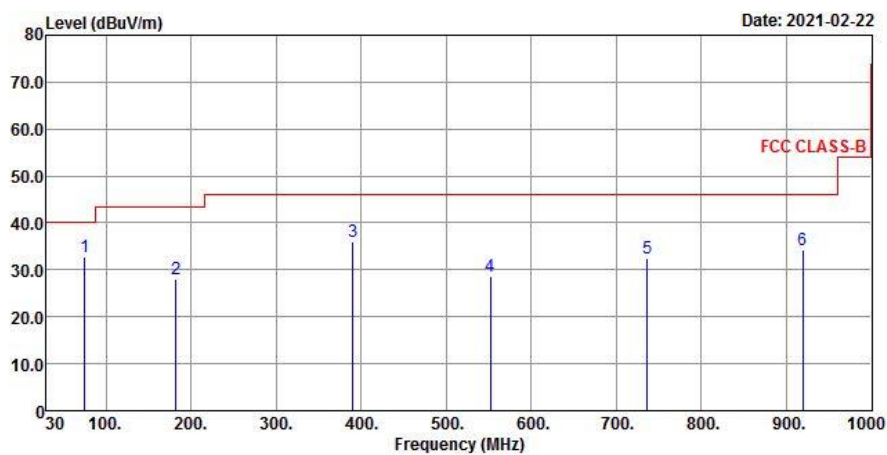
The amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required to be report.

30 MHz ~ 1 GHz Worst-Case Data:

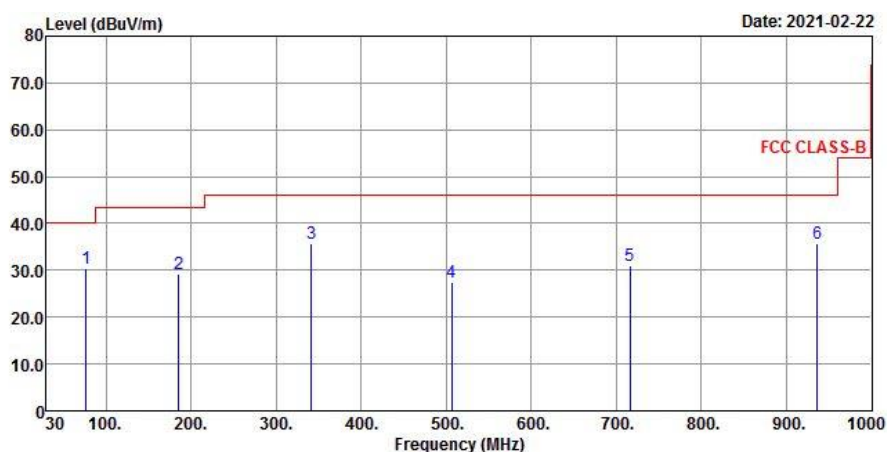
802.11b

EUT Test Condition		Measurement Detail	
Channel	Channel 13	Frequency Range	30 MHz ~ 1 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Quasi-peak (QP)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Tim 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
74.62	32.71	48.59	-15.88	40	-7.29	250	183	QP
182.29	28.19	43.09	-14.9	43.5	-15.31	174	265	QP
389.87	36.04	44.85	-8.81	46	-9.96	354	111	QP
551.86	28.54	32.85	-4.31	46	-17.46	311	43	QP
736.16	32.41	32.55	-0.14	46	-13.59	299	158	QP
919.49	34.33	31.55	2.78	46	-11.67	107	340	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
76.56	30.55	47.17	-16.62	40	-9.45	341	18	QP
185.2	29.13	44.31	-15.18	43.5	-14.37	169	55	QP
341.37	35.73	46	-10.27	46	-10.27	248	111	QP
506.27	27.36	32.84	-5.48	46	-18.64	230	199	QP
715.79	30.96	31.91	-0.95	46	-15.04	198	354	QP
935.98	35.77	32.77	3	46	-10.23	154	235	QP

Remarks:

- Emission Level = Read Level + Factor
Margin value = Emission level – Limit value.
- 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. 04, 2020	Dec. 03, 2021
RF signal cable Woken	5D-FB	Cable-cond1-01	Jan. 16, 2021	Jan. 15, 2022
V-LISN/AMN SCHWARZBECK (EUT)	NNLK 8121	8121-731	Apr. 20, 2020	Apr. 19, 2021
LISN/AMN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100311	Aug. 28, 2020	Aug. 27, 2021
Software ADT	BV ADT_Cond_ V7.3.7.4	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. Test Date: 2021/02/20

4.2.3 Test Procedures

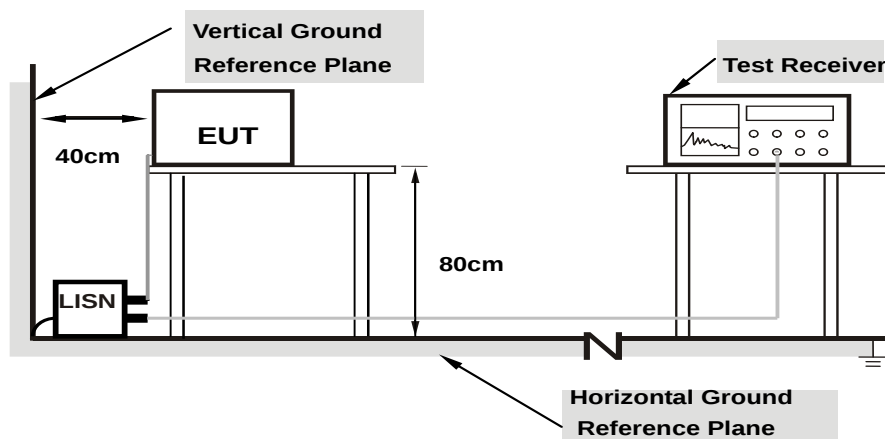
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/50 uH of coupling impedance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

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

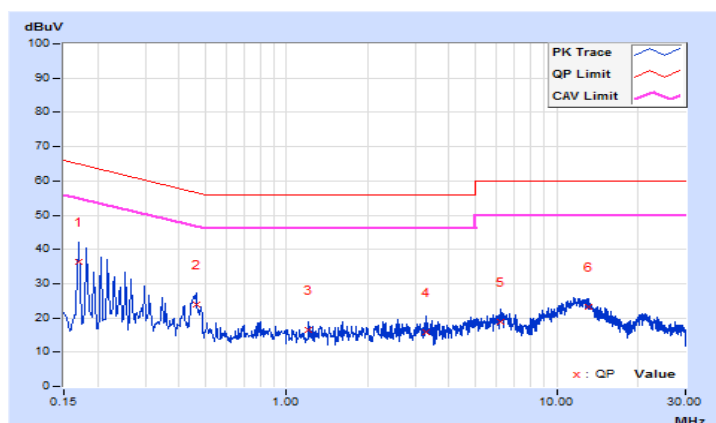
4.2.7 Test Results

Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	23°C, 67%RH
Tested by	Tim Chen	Test Date	2021/2/20
Test Mode	Mode A		

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	0.17000	10.10	26.20	4.64	36.30	14.74	64.96	54.96	-28.66	-40.22
2	0.46200	10.20	13.73	5.60	23.93	15.80	56.66	46.66	-32.73	-30.86
3	1.20200	10.31	6.22	0.44	16.53	10.75	56.00	46.00	-39.47	-35.25
4	3.27000	10.44	5.48	0.52	15.92	10.96	56.00	46.00	-40.08	-35.04
5	6.20200	10.61	8.25	1.45	18.86	12.06	60.00	50.00	-41.14	-37.94
6	13.13400	10.97	12.16	1.08	23.13	12.05	60.00	50.00	-36.87	-37.95

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

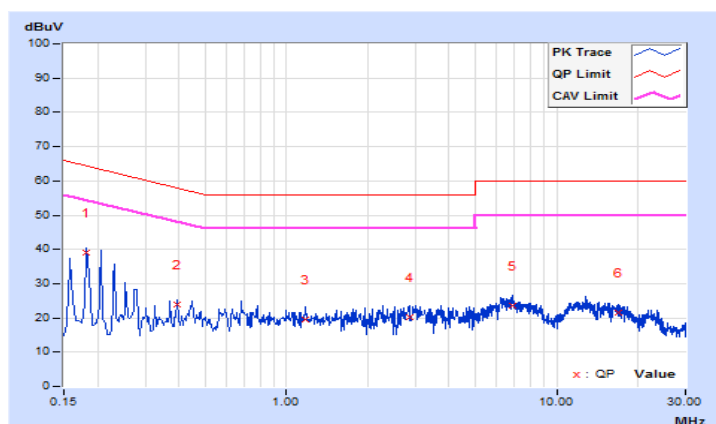


Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	23°C, 67%RH
Tested by	Tim Chen	Test Date	2021/2/20
Test Mode	Mode A		

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	0.18200	10.09	28.80	8.29	38.89	18.38	64.39	54.39	-25.50	-36.01
2	0.39400	10.19	13.63	3.37	23.82	13.56	57.98	47.98	-34.16	-34.42
3	1.18200	10.30	9.10	1.73	19.40	12.03	56.00	46.00	-36.60	-33.97
4	2.84600	10.39	9.77	1.60	20.16	11.99	56.00	46.00	-35.84	-34.01
5	6.83000	10.57	13.05	1.97	23.62	12.54	60.00	50.00	-36.38	-37.46
6	16.85000	10.96	10.75	1.28	21.71	12.24	60.00	50.00	-38.29	-37.76

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

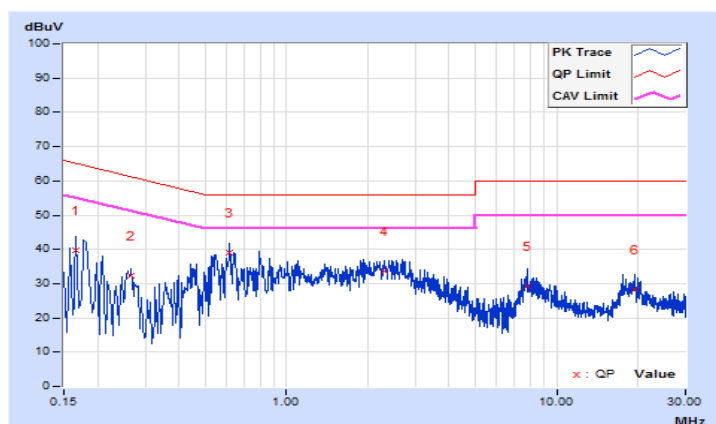


Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	23°C, 67%RH
Tested by	Tim Chen	Test Date	2021/2/20
Test Mode	Mode B		

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	0.16600	10.05	29.83	8.31	39.88	18.36	65.16	55.16	-25.28	-36.80
2	0.26600	10.06	22.28	9.13	32.34	19.19	61.24	51.24	-28.90	-32.05
3	0.61731	10.11	29.01	14.21	39.12	24.32	56.00	46.00	-16.88	-21.68
4	2.29400	10.21	23.30	13.27	33.51	23.48	56.00	46.00	-22.49	-22.52
5	7.76200	10.50	18.83	7.94	29.33	18.44	60.00	50.00	-30.67	-31.56
6	19.44200	11.04	17.19	6.61	28.23	17.65	60.00	50.00	-31.77	-32.35

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

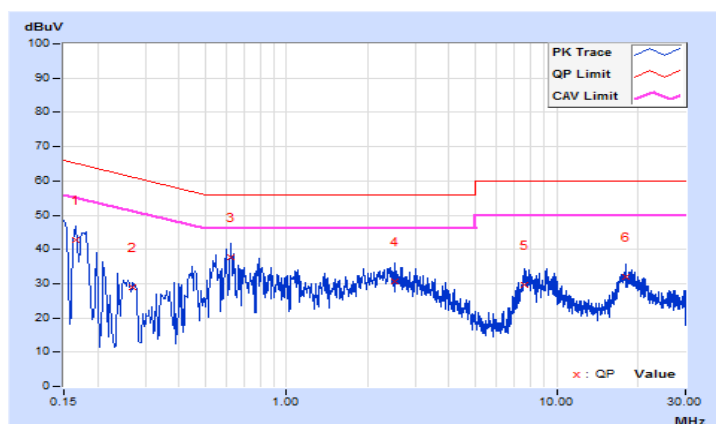


Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	23°C, 67%RH
Tested by	Tim Chen	Test Date	2021/2/20
Test Mode	Mode B		

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	0.16600	10.04	32.85	10.33	42.89	20.37	65.16	55.16	-22.27	-34.79
2	0.26992	10.05	19.02	6.85	29.07	16.90	61.12	51.12	-32.05	-34.22
3	0.62200	10.11	27.68	12.86	37.79	22.97	56.00	46.00	-18.21	-23.03
4	2.51800	10.21	20.28	8.69	30.49	18.90	56.00	46.00	-25.51	-27.10
5	7.63400	10.40	19.33	8.72	29.73	19.12	60.00	50.00	-30.27	-30.88
6	17.94600	10.75	21.08	10.90	31.83	21.65	60.00	50.00	-28.17	-28.35

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

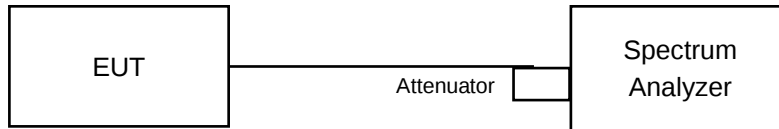


4.3 6 dB Bandwidth Measurement

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

- Set resolution bandwidth (RBW) = 100 kHz
- Set the video bandwidth (VBW) $\geq 3 \times$ RBW, Detector = Peak.
- Trace mode = max hold.
- Sweep = auto couple.
- 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	9.03	0.5	Pass
6	2437	8.61	0.5	Pass
11	2462	8.57	0.5	Pass
12	2467	8.61	0.5	Pass
13	2472	8.56	0.5	Pass

802.11g

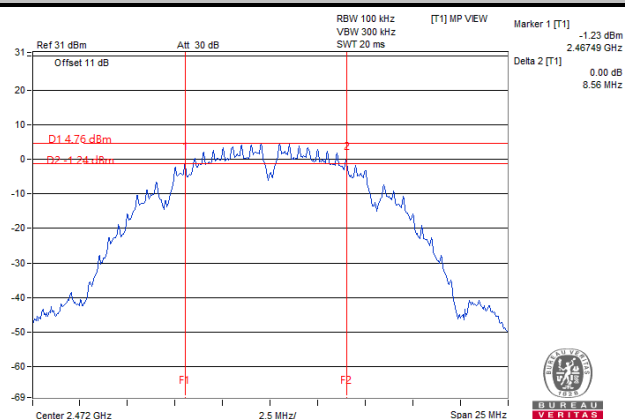
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	16.42	0.5	Pass
6	2437	16.42	0.5	Pass
11	2462	16.42	0.5	Pass
12	2467	16.42	0.5	Pass
13	2472	16.39	0.5	Pass

802.11n (HT20)

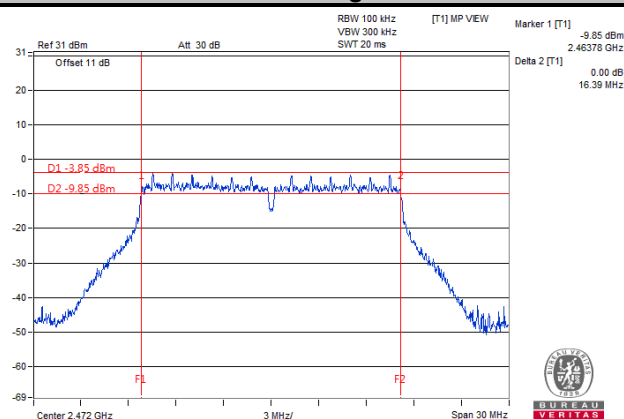
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	17.64	0.5	Pass
6	2437	17.64	0.5	Pass
11	2462	17.64	0.5	Pass
12	2467	17.64	0.5	Pass
13	2472	17.61	0.5	Pass

Spectrum Plot of Worst Value

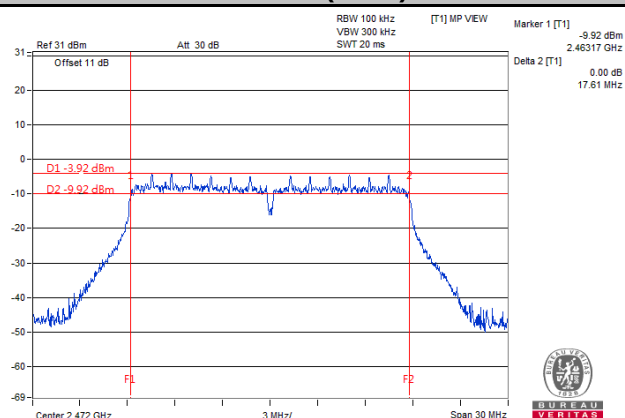
802.11b



802.11g

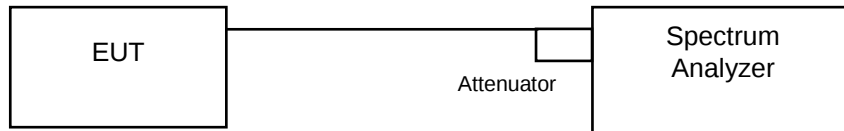


802.11n (HT20)



4.4 Occupied Bandwidth Measurement

4.4.1 Test Setup



4.4.2 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.4.3 Test Procedure

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

4.4.4 Deviation from Test Standard

No deviation.

4.4.5 EUT Operating Conditions

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

4.4.6 Test Results

802.11b

Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	Pass / Fail
1	2412	13.08	Pass
6	2437	13.08	Pass
11	2462	13.08	Pass
12	2467	13.08	Pass
13	2472	13.08	Pass

802.11g

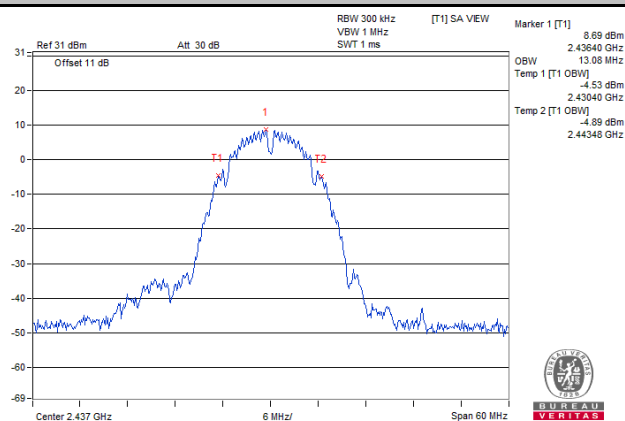
Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	Pass / Fail
1	2412	17.04	Pass
6	2437	16.92	Pass
11	2462	16.92	Pass
12	2467	16.92	Pass
13	2472	16.98	Pass

802.11n (HT20)

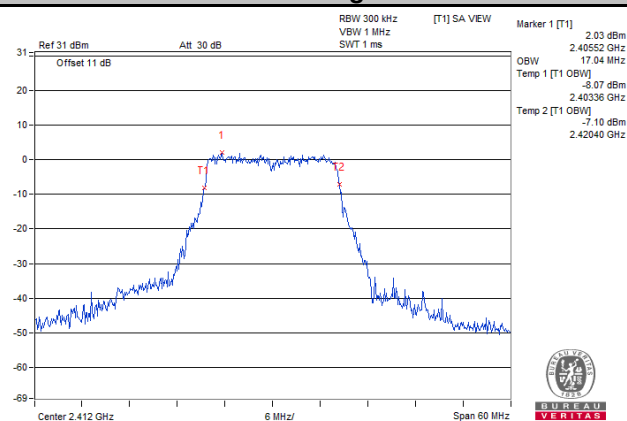
Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	Pass / Fail
1	2412	18.00	Pass
6	2437	18.00	Pass
11	2462	18.00	Pass
12	2467	18.00	Pass
13	2472	18.00	Pass

Spectrum Plot of Worst Value

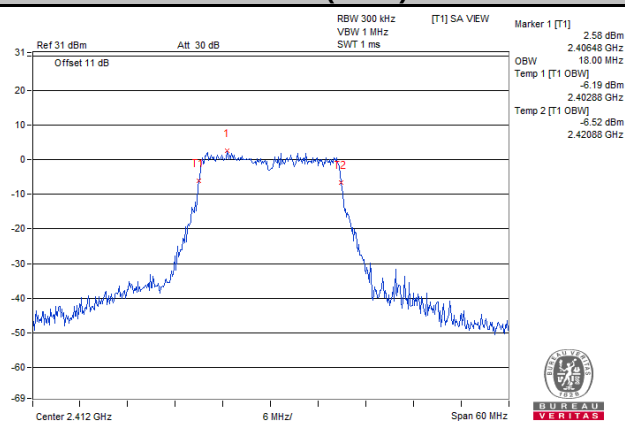
802.11b



802.11g



802.11n (HT20)



802.11n (HT40)

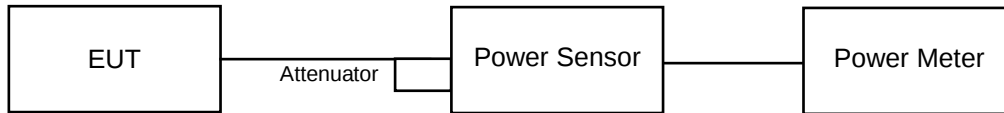


4.5 Conducted Output Power Measurement

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)

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		Average Power		Limit (dBm)	Pass / Fail
		(mW)	(dBm)	(mW)	(dBm)		
1	2412	69.984	18.45	38.815	15.89	30	Pass
6	2437	72.277	18.59	39.355	15.95	30	Pass
11	2462	73.114	18.64	39.174	15.93	30	Pass
12	2467	68.707	18.37	36.392	15.61	30	Pass
13	2472	37.411	15.73	20.324	13.08	30	Pass

802.11g

Channel	Frequency (MHz)	Peak Power		Average Power		Limit (dBm)	Pass / Fail
		(mW)	(dBm)	(mW)	(dBm)		
1	2412	81.658	19.12	12.19	10.86	30	Pass
6	2437	79.068	18.98	11.967	10.78	30	Pass
11	2462	82.604	19.17	12.19	10.86	30	Pass
12	2467	84.528	19.27	11.858	10.74	30	Pass
13	2472	38.905	15.90	4.955	6.95	30	Pass

802.11n (HT20)

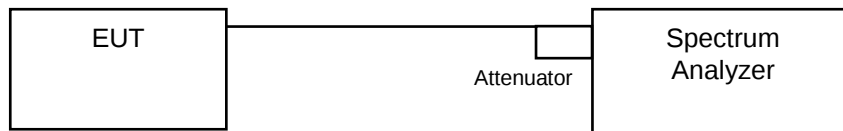
Channel	Frequency (MHz)	Peak Power		Average Power		Limit (dBm)	Pass / Fail
		(mW)	(dBm)	(mW)	(dBm)		
1	2412	90.991	19.59	12.417	10.94	30	Pass
6	2437	82.794	19.18	11.803	10.72	30	Pass
11	2462	94.406	19.75	12.531	10.98	30	Pass
12	2467	88.92	19.49	12.474	10.96	30	Pass
13	2472	39.264	15.94	5	6.99	30	Pass

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

- Set analyzer center frequency to DTS channel center frequency.
- Set the span to 1.5 times the DTS bandwidth.
- Set the RBW to: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
- Set the VBW $\geq 3 \times \text{RBW}$.
- Detector = peak.
- Sweep time = auto couple.
- Trace mode = max hold.
- Allow trace to fully stabilize.
- 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	-5.49	8	Pass
6	2437	-5.55	8	Pass
11	2462	-5.83	8	Pass
12	2467	-7.01	8	Pass
13	2472	-9.88	8	Pass

802.11g

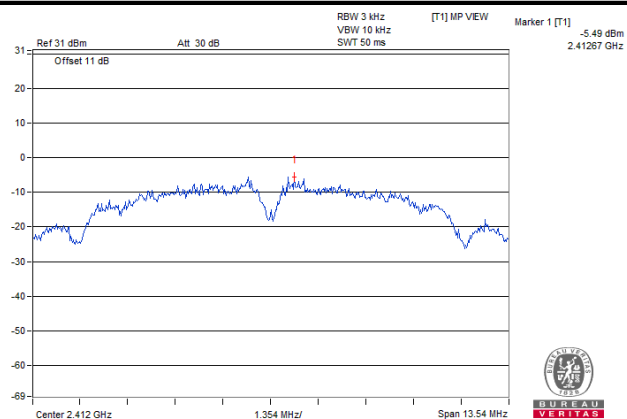
Channel	Frequency (MHz)	PSD (dBm/3 kHz)	Limit (dBm/3 kHz)	Pass / Fail
1	2412	-14.14	8	Pass
6	2437	-14.01	8	Pass
11	2462	-13.86	8	Pass
12	2467	-13.65	8	Pass
13	2472	-18.15	8	Pass

802.11n (HT20)

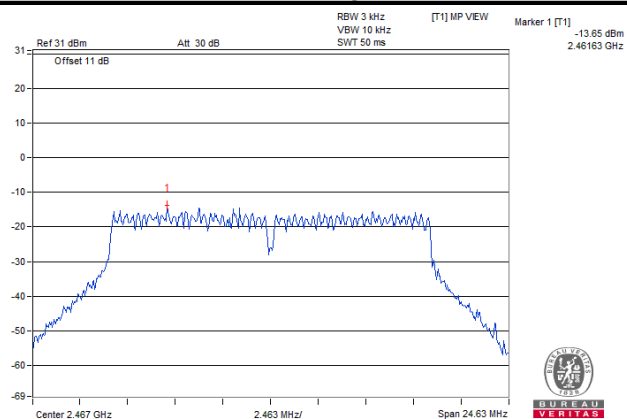
Channel	Frequency (MHz)	PSD (dBm/3 kHz)	Limit (dBm/3 kHz)	Pass / Fail
1	2412	-14.42	8	Pass
6	2437	-14.85	8	Pass
11	2462	-13.48	8	Pass
12	2467	-13.81	8	Pass
13	2472	-18.68	8	Pass

Spectrum Plot of Worst Value

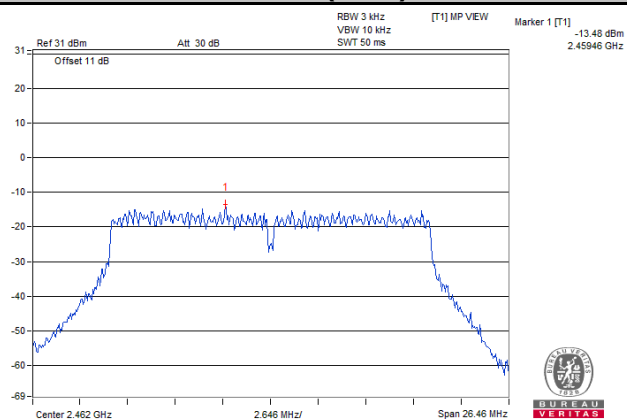
802.11b



802.11g



802.11n (HT20)

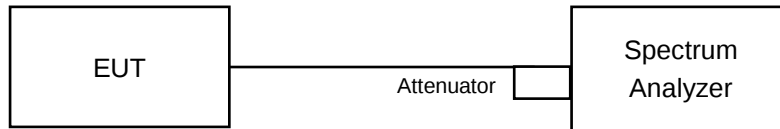


4.7 Conducted Out of Band Emission Measurement

4.7.1 Limits of Conducted Out of Band Emission Measurement

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

4.7.2 Test Setup



4.7.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.7.4 Test Procedure

MEASUREMENT PROCEDURE REF

1. Set the RBW = 100 kHz.
2. Set the VBW $\geq$ 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 OOB

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

4.7.5 Deviation from Test Standard

No deviation.

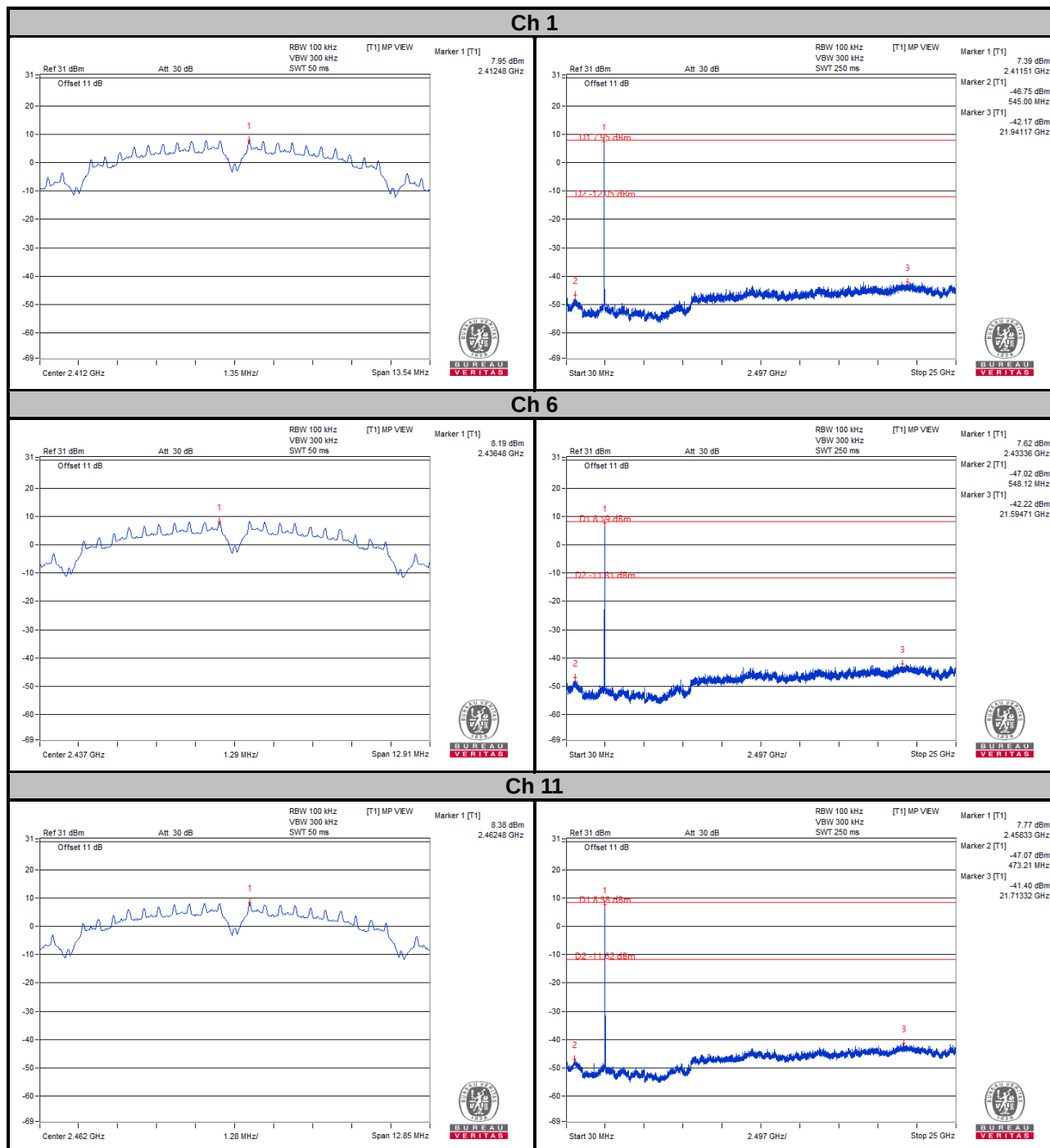
4.7.6 EUT Operating Condition

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

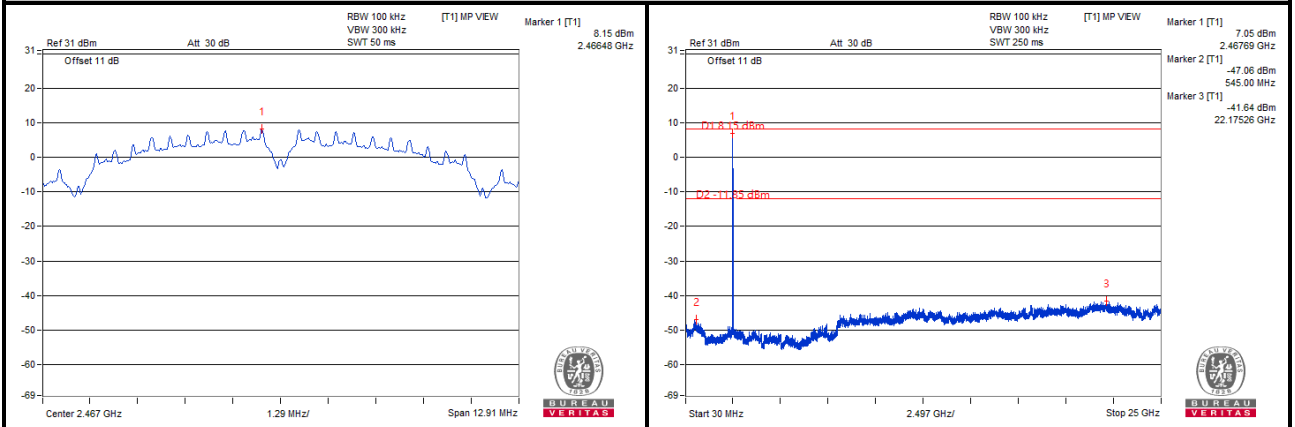
4.7.7 Test Results

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

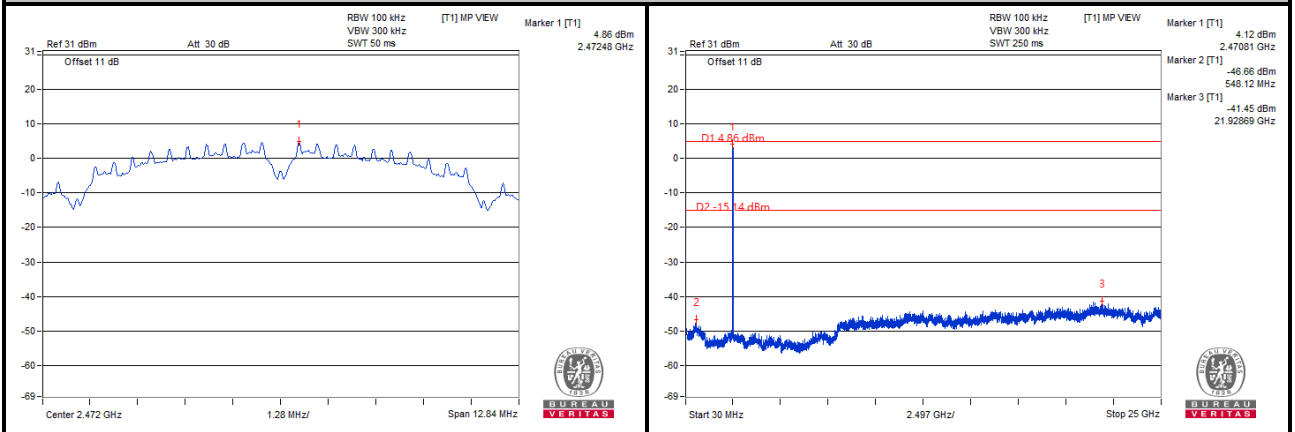
802.11b

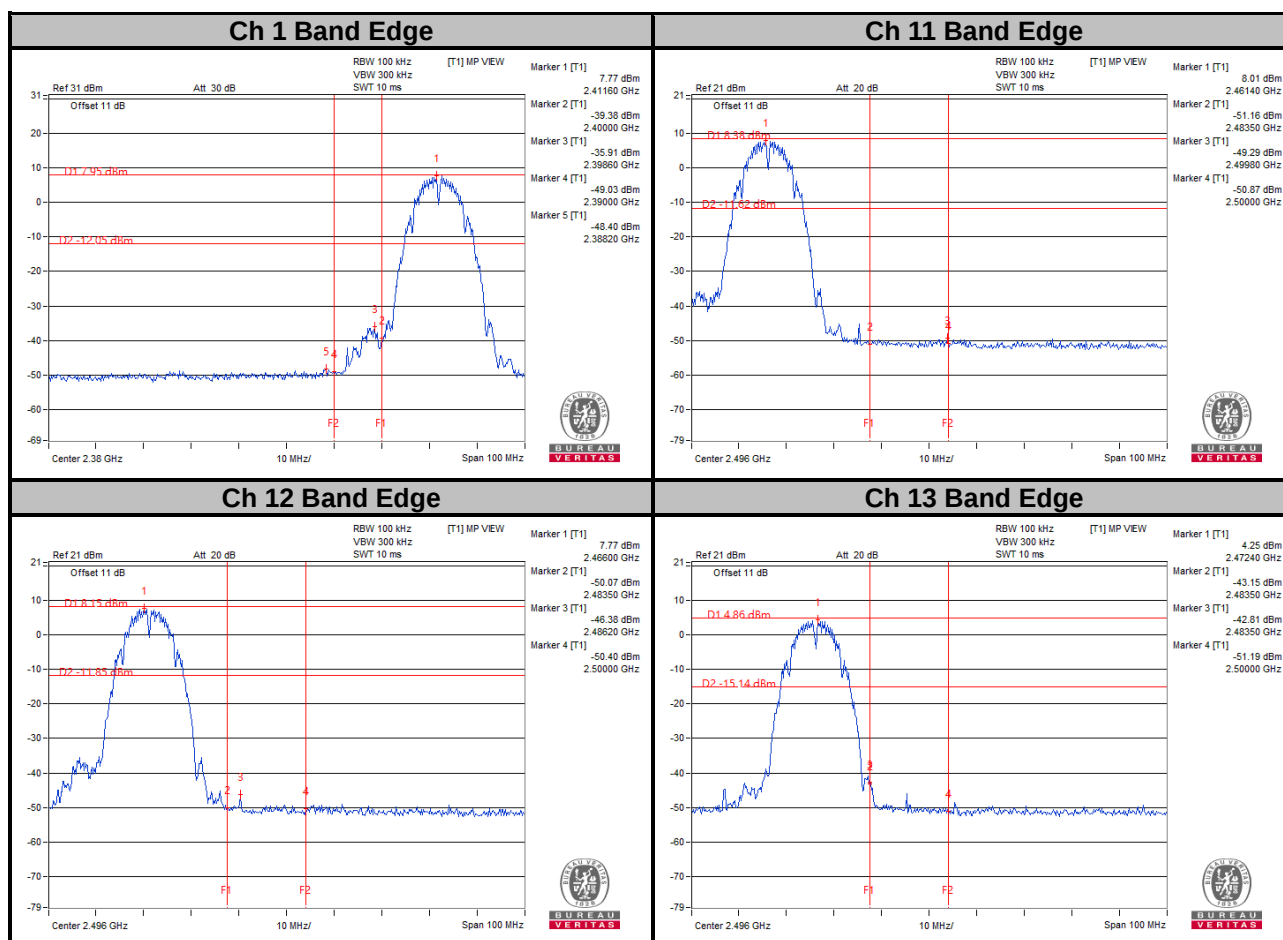


Ch 12



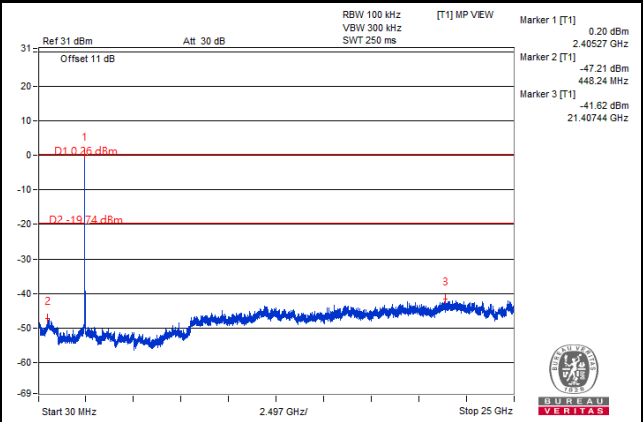
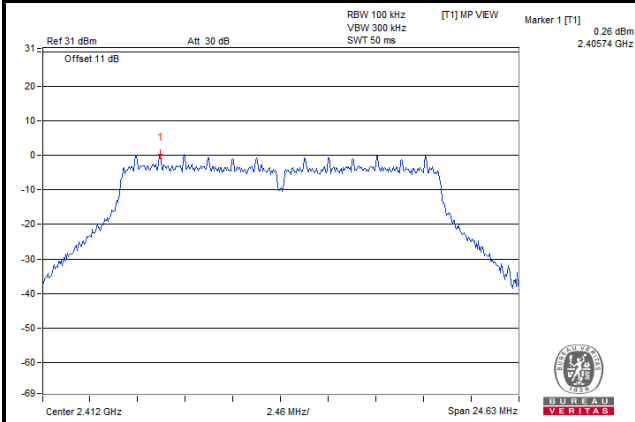
Ch 13



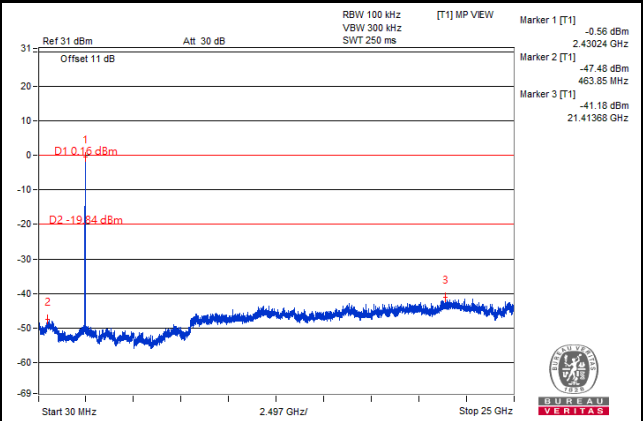
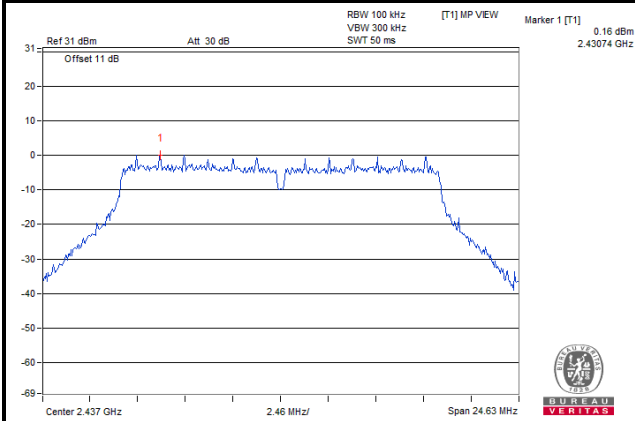


802.11g

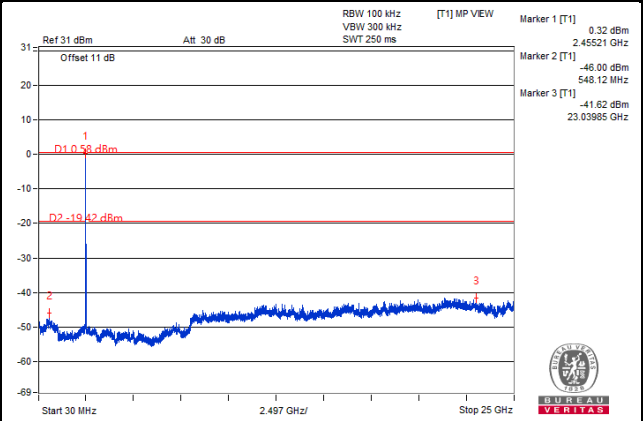
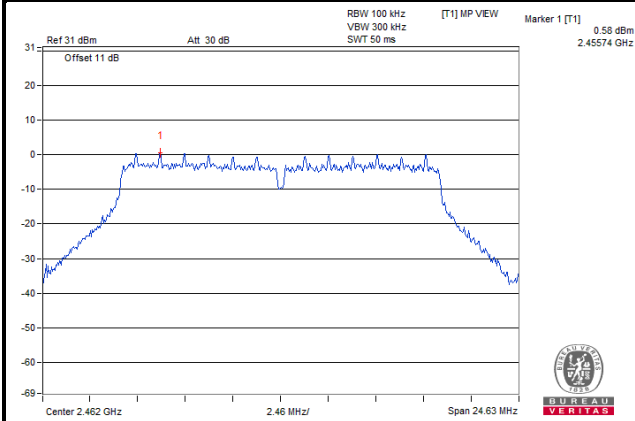
Ch 1



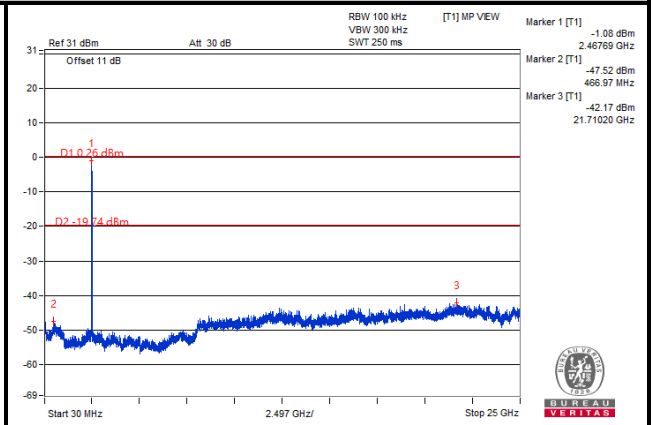
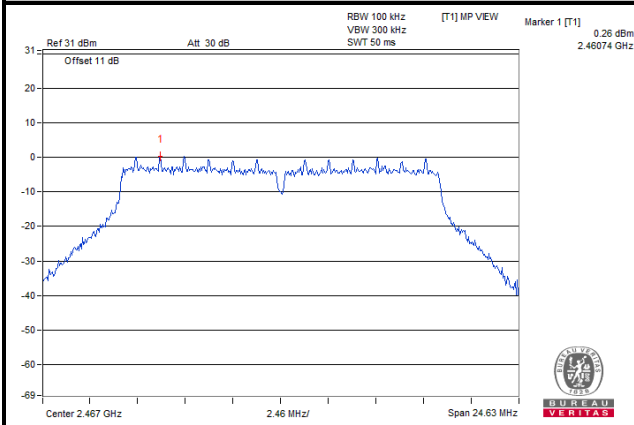
Ch 6



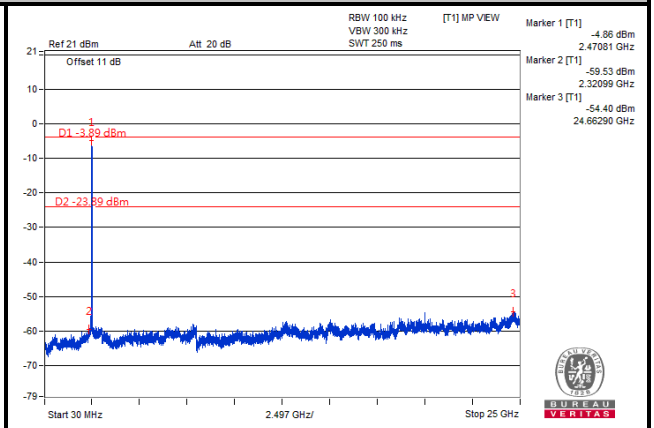
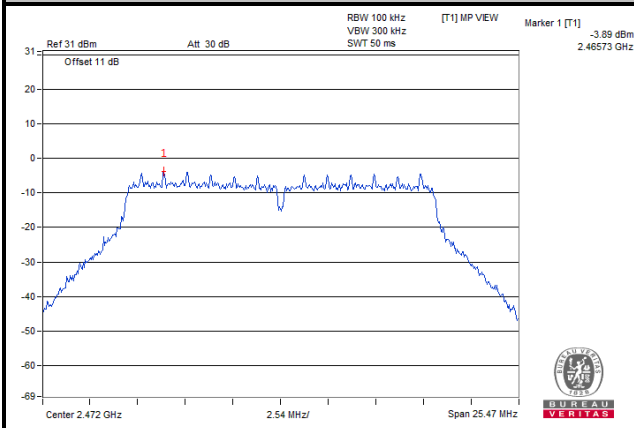
Ch 11

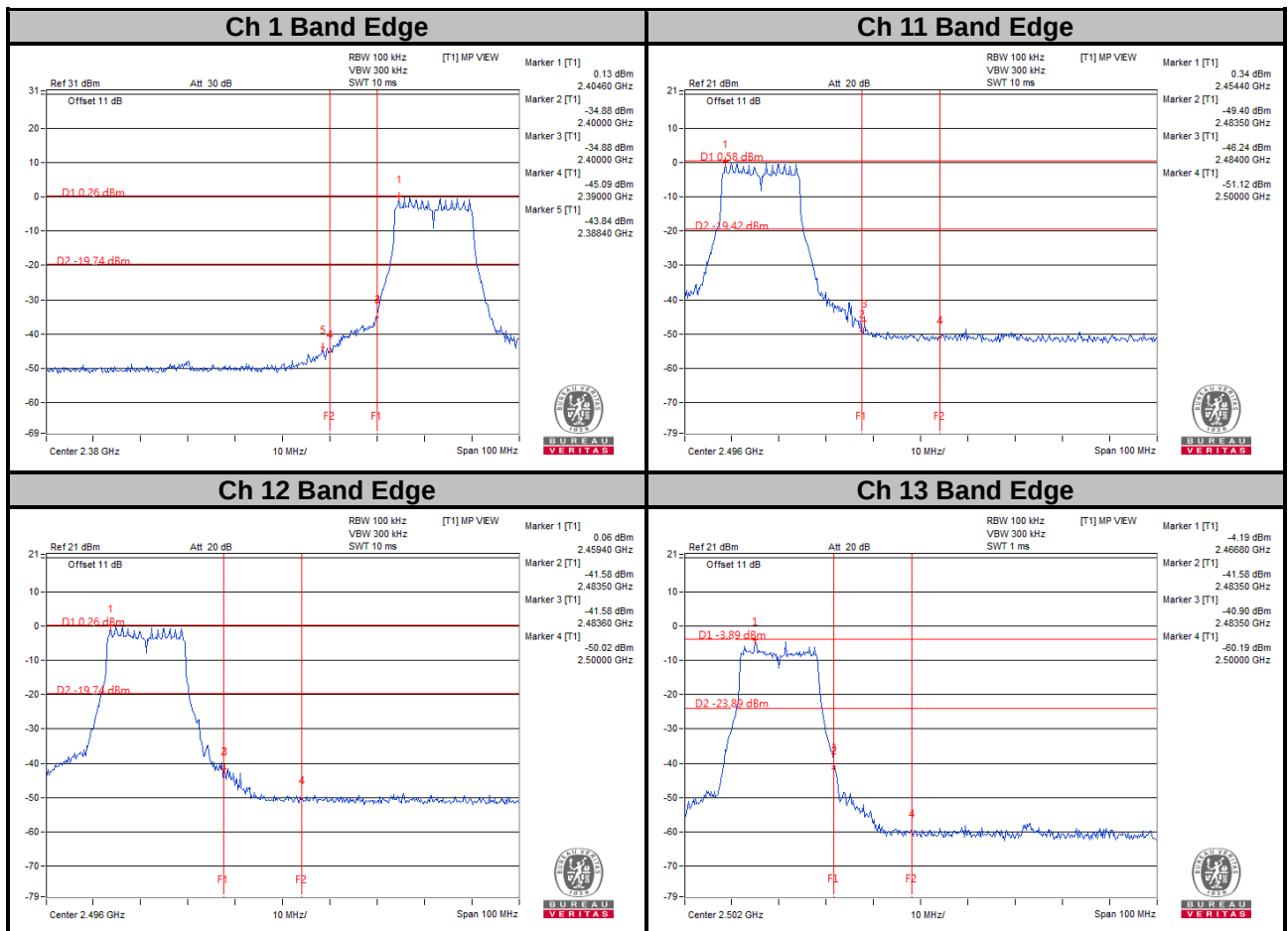


Ch 12



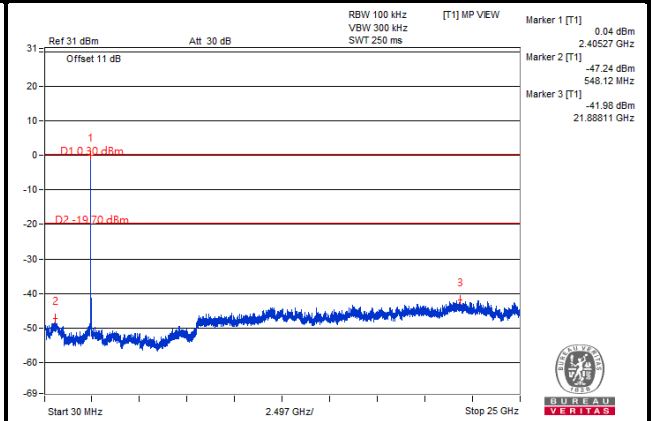
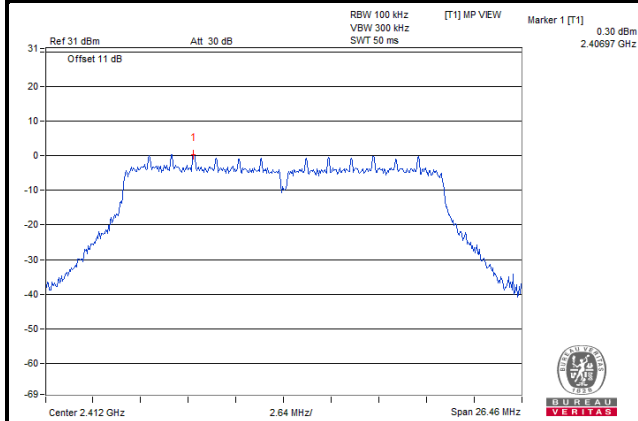
Ch 13



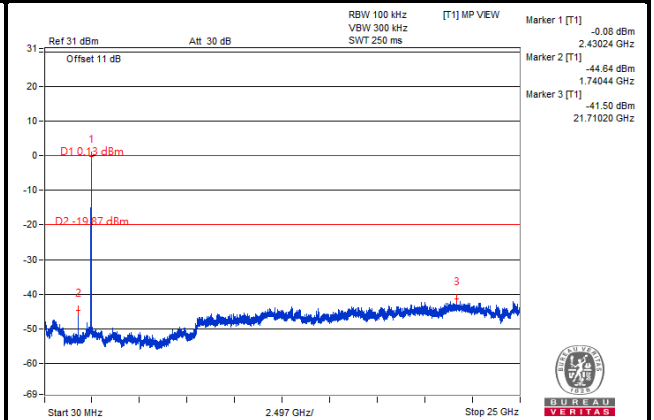
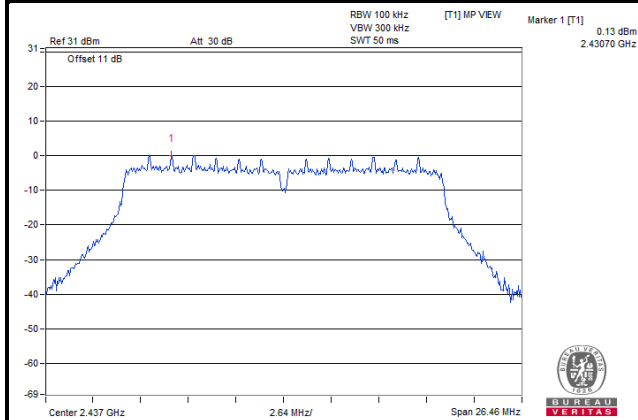


802.11n (HT20)

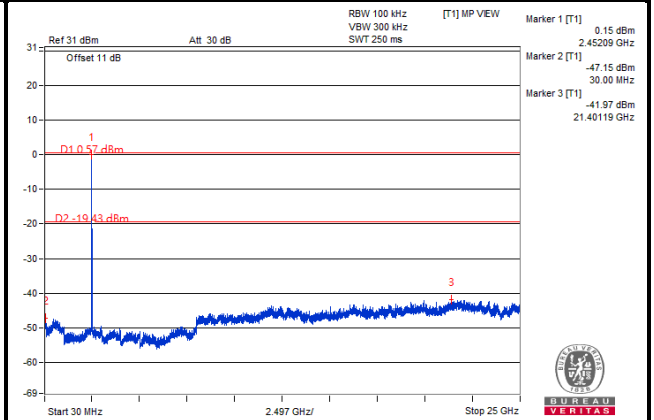
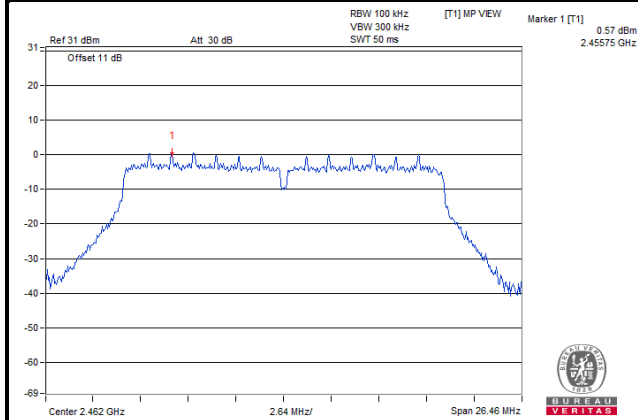
Ch 1



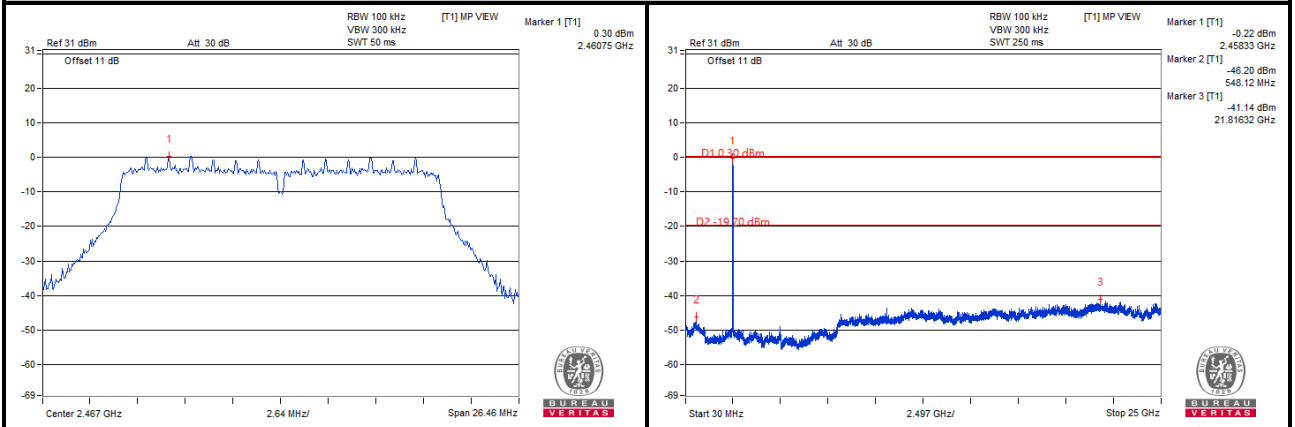
Ch 6



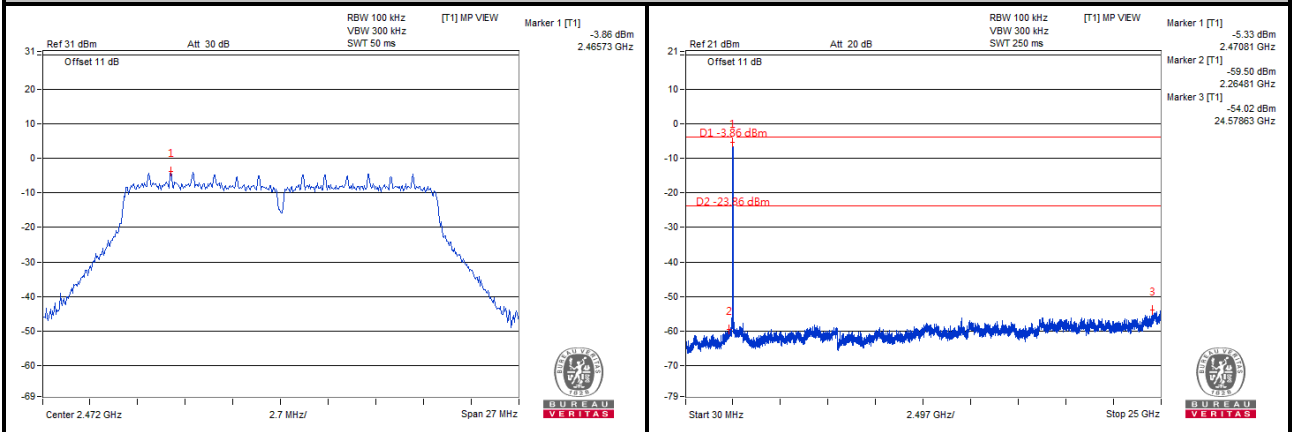
Ch 11

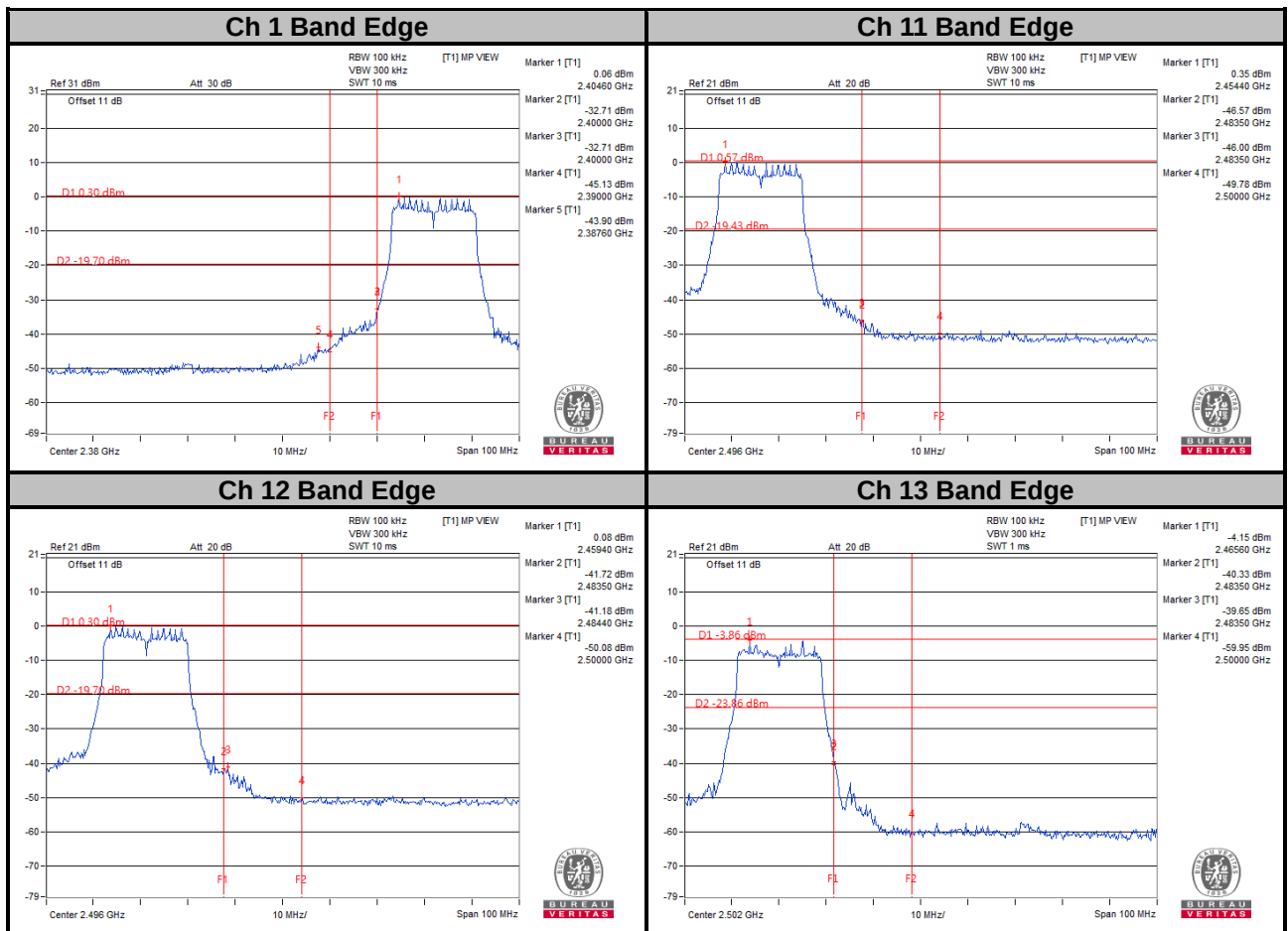


Ch 12



Ch 13



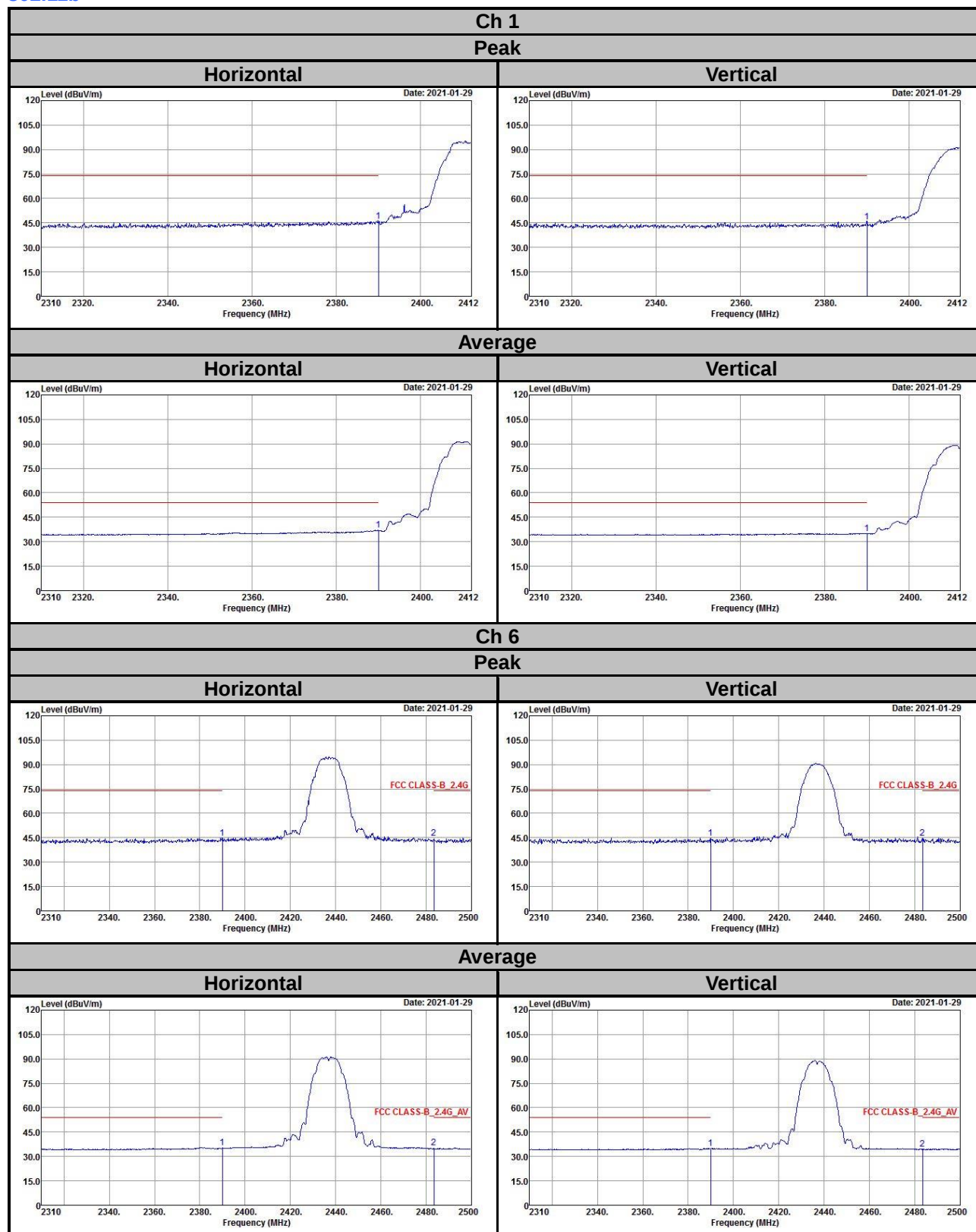


5 Pictures of Test Arrangements

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

Annex A- Band Edge Measurement

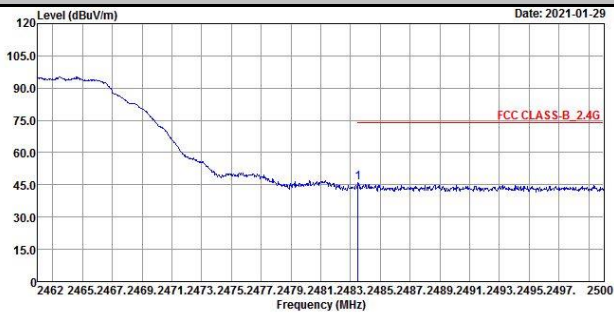
802.11b



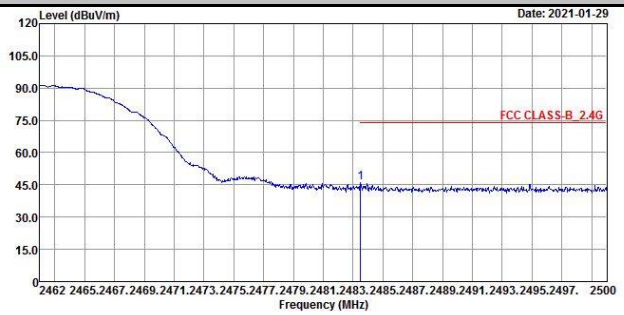
Ch 11

Peak

Horizontal

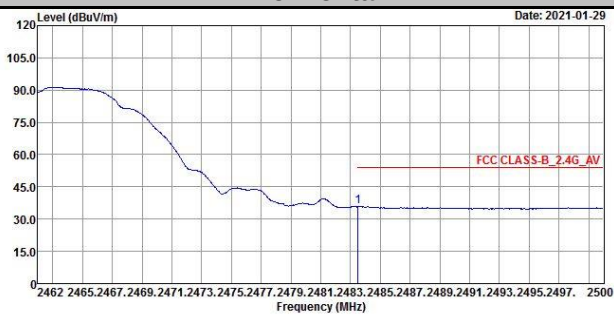


Vertical

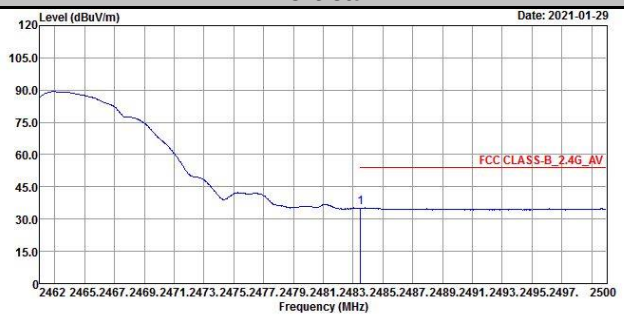


Average

Horizontal



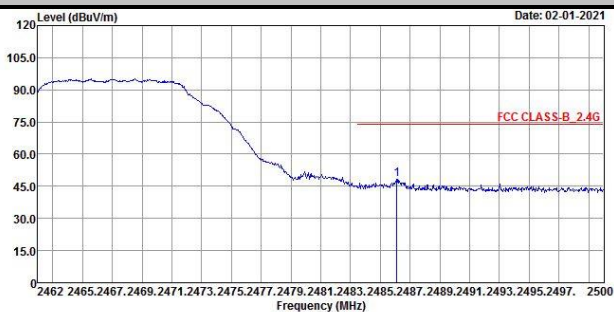
Vertical



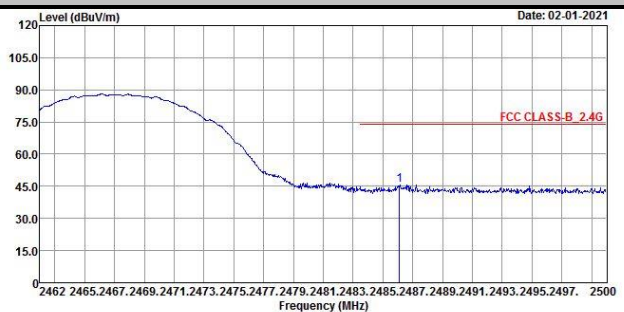
Ch 12

Peak

Horizontal

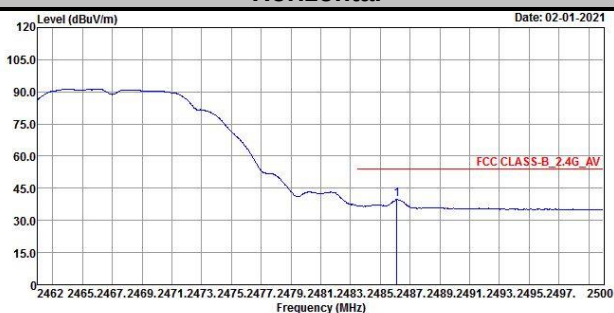


Vertical

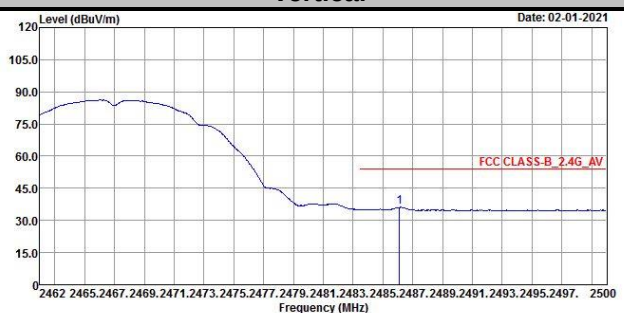


Average

Horizontal



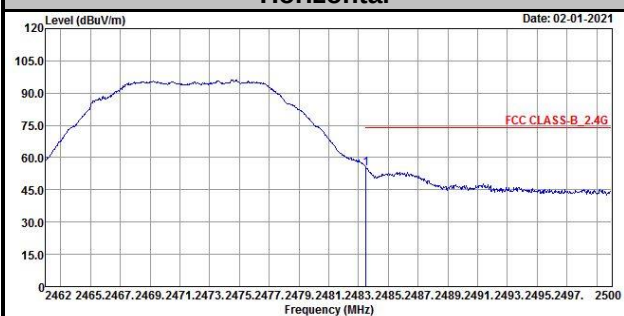
Vertical



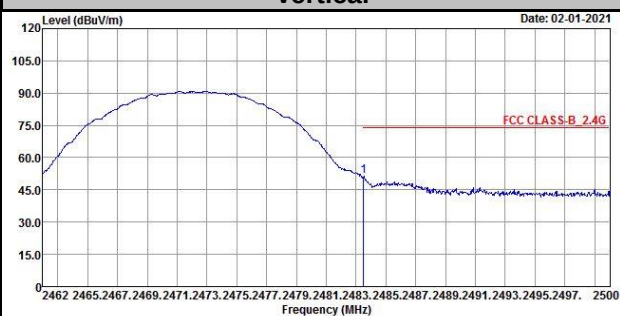
Ch 13

Peak

Horizontal

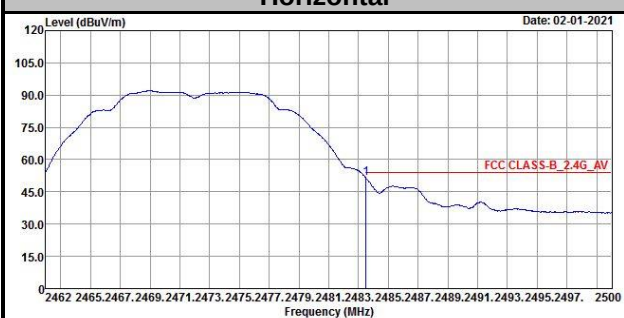


Vertical

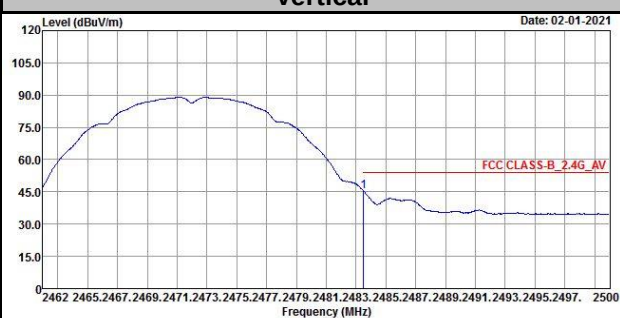


Average

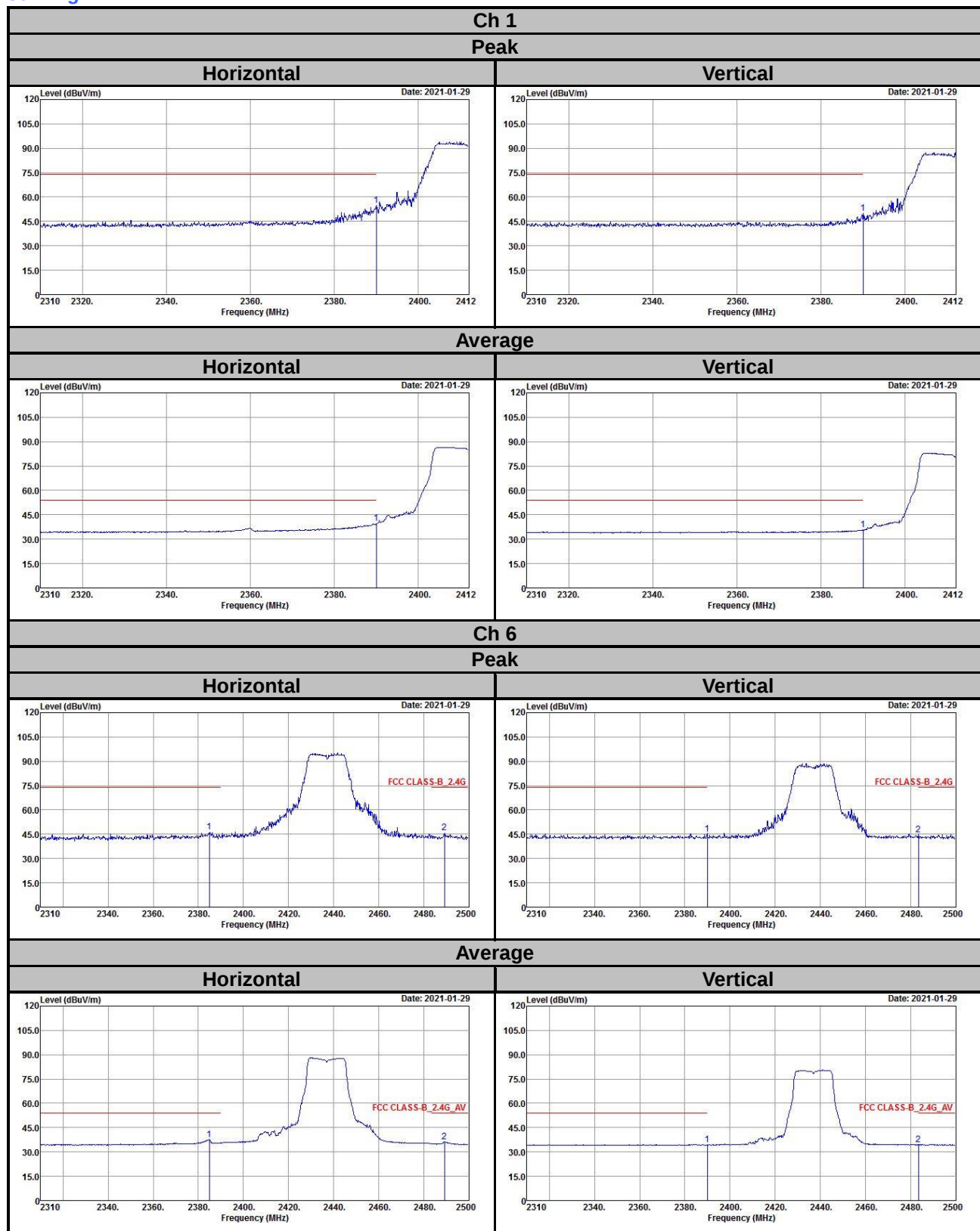
Horizontal



Vertical



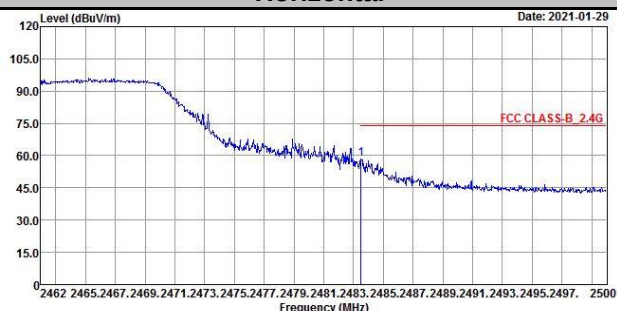
802.11g



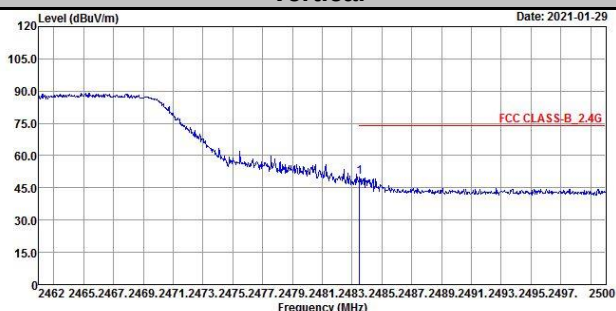
Ch 11

Peak

Horizontal

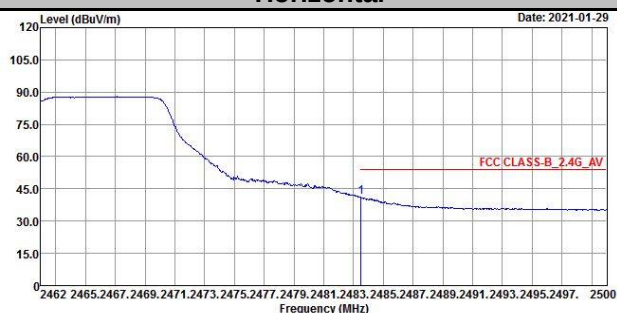


Vertical

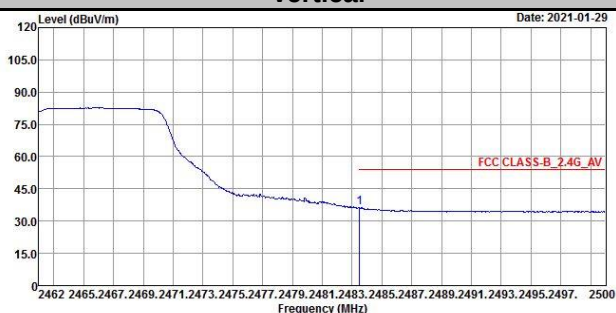


Average

Horizontal



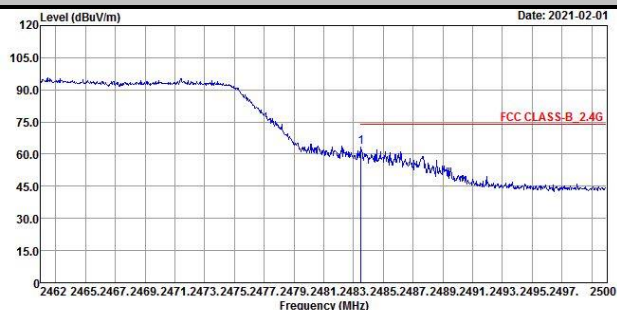
Vertical



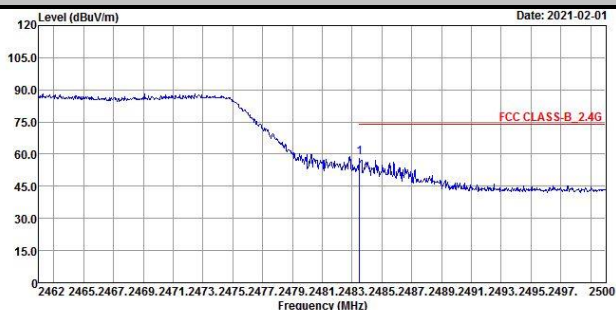
Ch 12

Peak

Horizontal

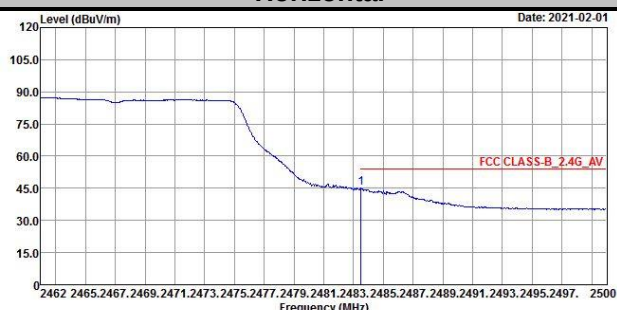


Vertical

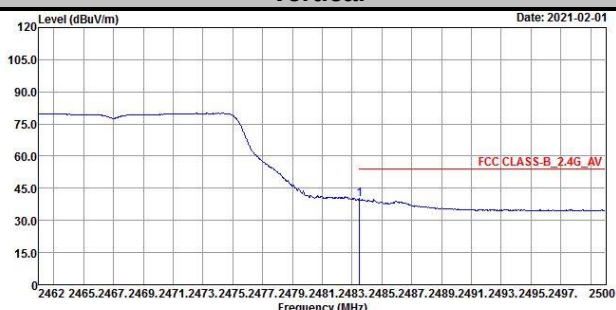


Average

Horizontal



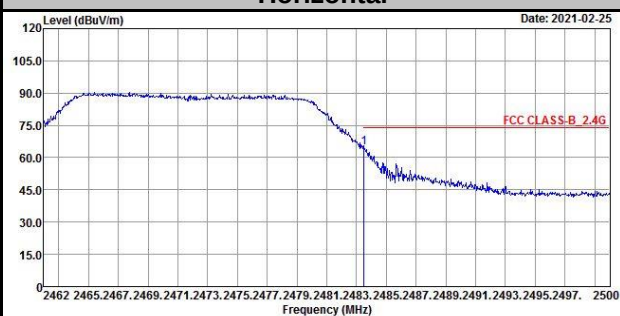
Vertical



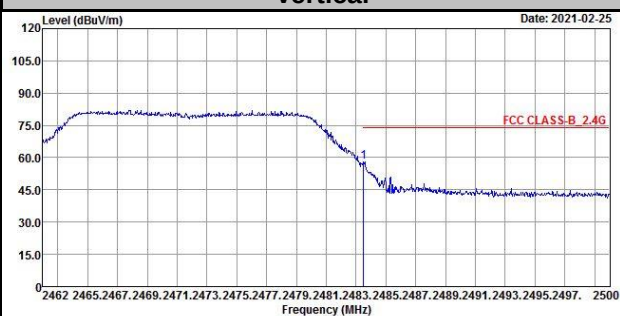
Ch 13

Peak

Horizontal

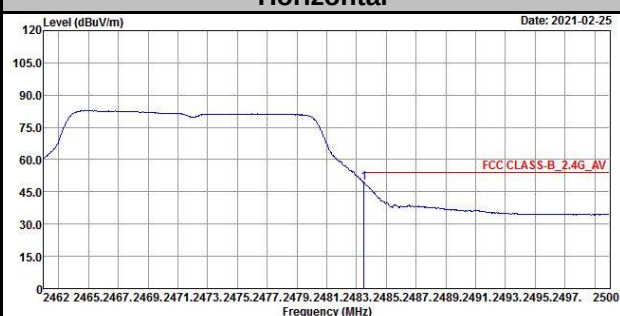


Vertical

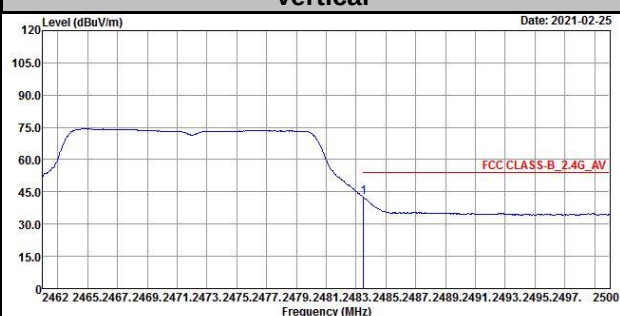


Average

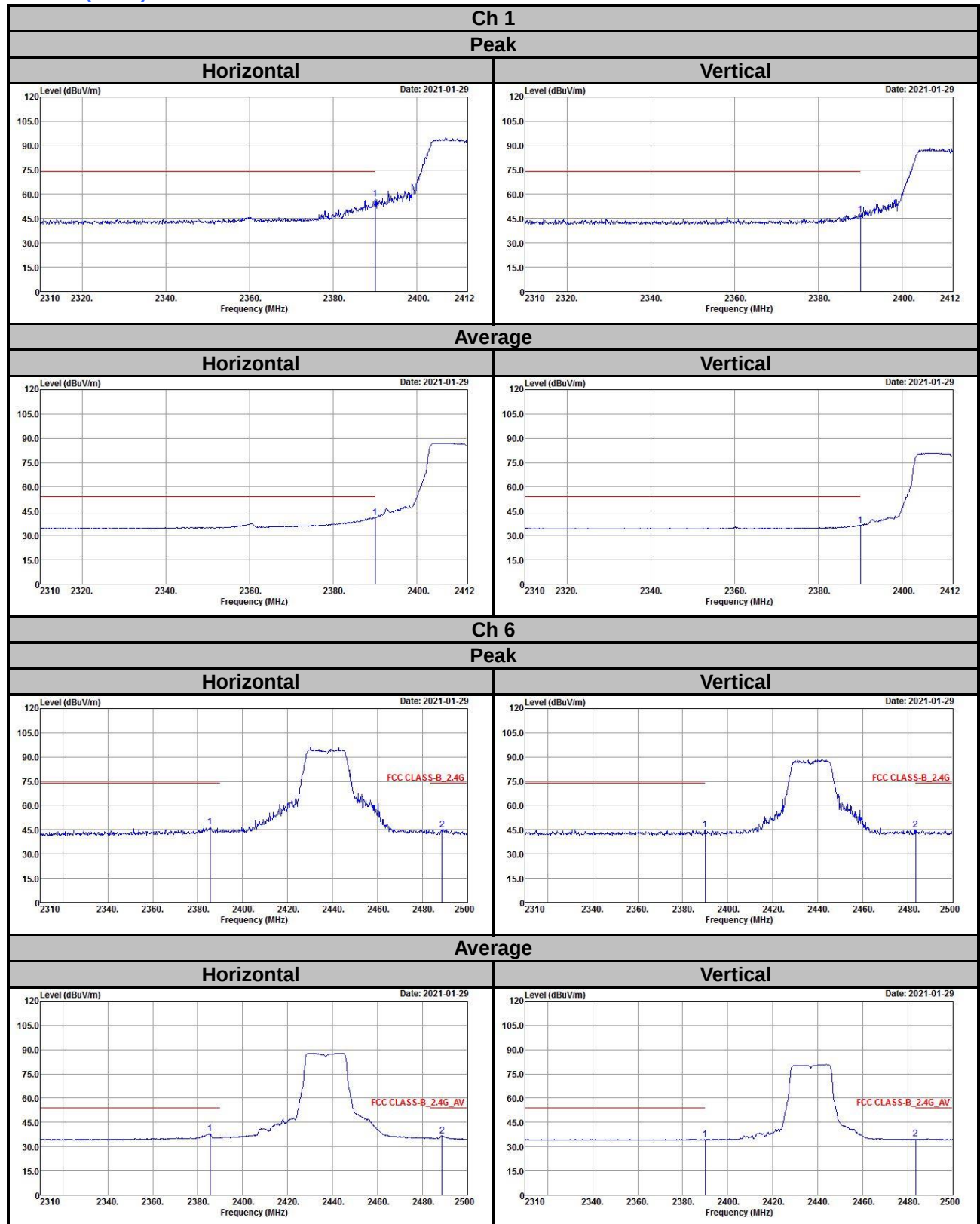
Horizontal



Vertical



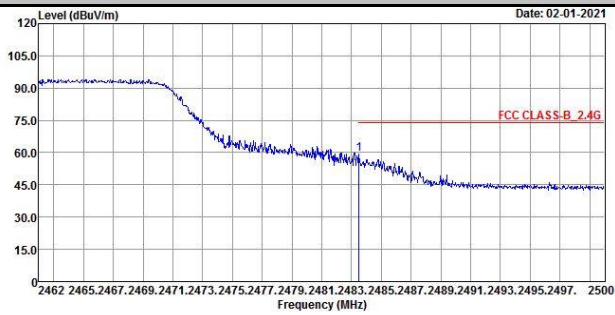
802.11n (HT20)



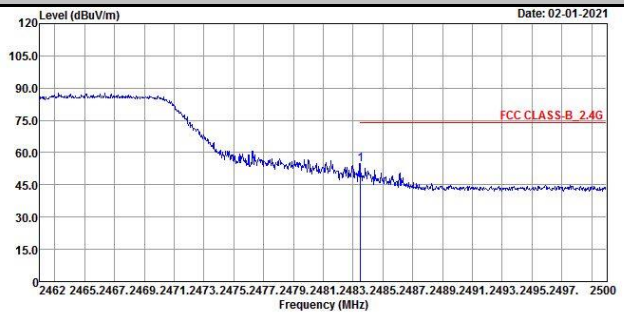
Ch 11

Peak

Horizontal

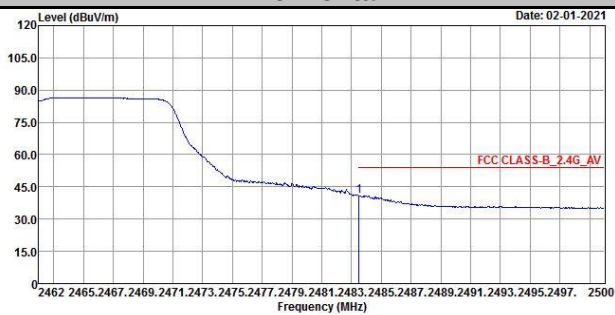


Vertical

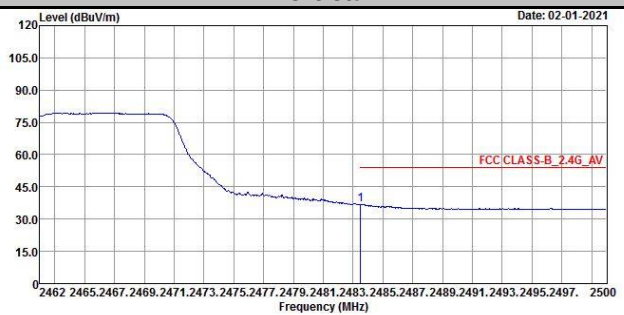


Average

Horizontal



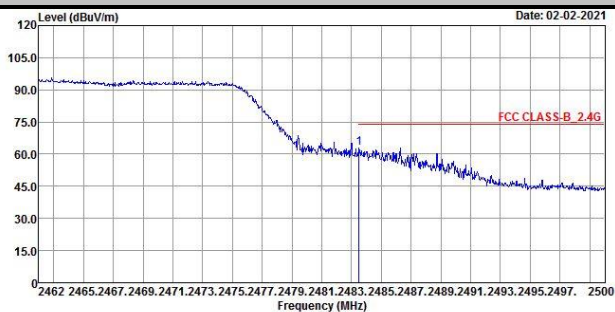
Vertical



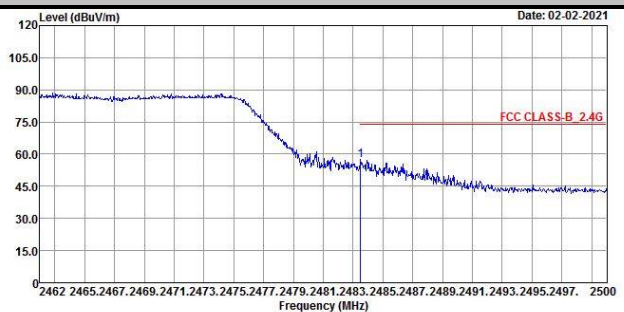
Ch 12

Peak

Horizontal

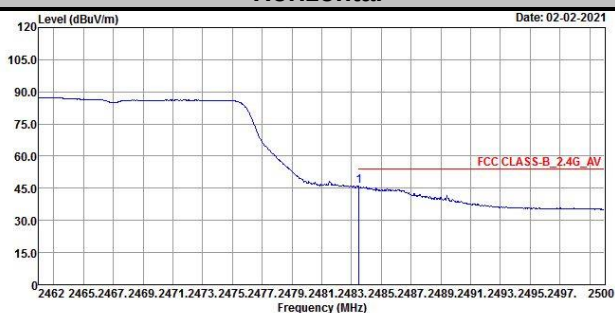


Vertical

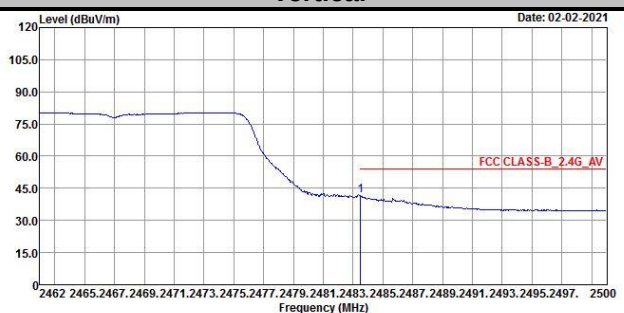


Average

Horizontal



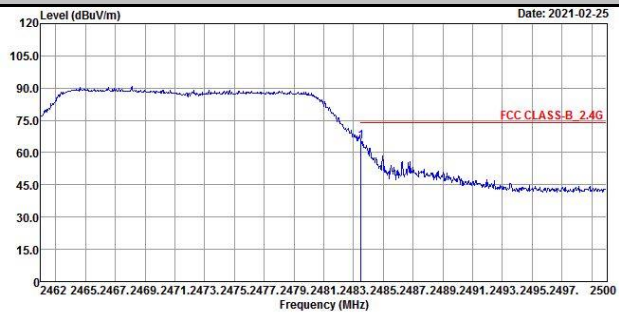
Vertical



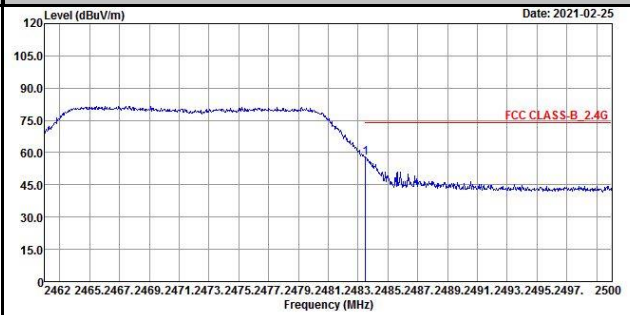
Ch 13

Peak

Horizontal

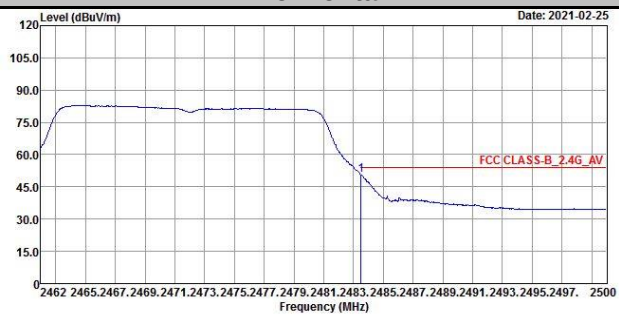


Vertical

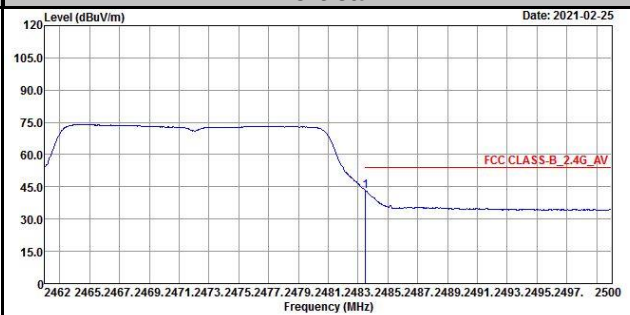


Average

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:

Lin Kou EMC/RF Lab

Tel: 886-2-26052180

Fax: 886-2-26051924

Hsin Chu EMC/RF/Telecom Lab

Tel: 886-3-6668565

Fax: 886-3-6668323

Hwa Ya EMC/RF/Safety Lab

Tel: 886-3-3183232

Fax: 886-3-3270892

Email: service.adt@tw.bureauveritas.com

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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