

FCC Test Report (WLAN 2.4GHz Band)

Report No.: RFBGQZ-WTW-P21031057-2

FCC ID: M72-EDGE450

Test Model: POLY EDGE E450

Received Date: Mar. 30, 2021

Test Date: Apr. 01 ~ Apr. 19, 2022

Issued Date: May 17, 2022

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FCC Registration /
Designation Number: 788550 / TW0003



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Release Control Record

Issue No.	Description	Date Issued
RFBGQZ-WTW-P21031057-2	Original Release	May 17, 2022

1 Certificate of Conformity

Product: IP Phone

Brand: POLY

Test Model: POLY EDGE E450

Sample Status: Engineering Sample

Applicant: Polycom Inc.

Test Date: Apr. 01 ~ Apr. 19, 2022

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 : Gina Liu, **Date:** May 17, 2022
Gina Liu / Specialist

Approved by : Jeremy Lin, **Date:** May 17, 2022
Jeremy Lin / 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 -13.26 dB at 0.15400 MHz.
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	Pass	Meet the requirement of limit. Minimum passing margin is -6.5 dB at 129.91 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	3.00 dB
	30 MHz ~ 200 MHz	3.59 dB
	200 MHz ~ 1000 MHz	3.60 dB
Radiated Emissions above 1 GHz	1 GHz ~ 18 GHz	2.29 dB
	18 GHz ~ 40 GHz	2.29 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	IP Phone
Brand	POLY
Test Model	POLY EDGE E450
FW Version (FVIN)	MFG 1.0.16
Status of EUT	Engineering Sample
Power Supply Rating	5Vdc from adapter 48Vdc for PoE
Modulation Type	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
Modulation Technology	DSSS, OFDM
Transfer Rate	802.11b: 11/5.5/2/1Mbps 802.11g: 54/48/36/24/18/12/9/6Mbps 802.11n (HT20): up to 72.2Mbps
Operating Frequency	2412 ~ 2462 MHz
Number of Channel	11 for 802.11b, 802.11g, 802.11n (HT20)
Output Power	19.815 mW
Antenna Type	Refer to Note
Antenna Connector	NA
Accessory Device	Refer to Note
Data Cable Supplied	Refer to Note

Note:

1. The EUT provides 1 completed transmitter and 1 receiver.

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

2. The EUT contains following accessory devices.

Adapter	
Brand	Mass Power
Model	S018-1A050300VU
Input Power	100-240Vac 50/60Hz, 0.6A
Output Power	5Vdc, 3A
DC Output Cable	1.5m non-shielded cable without core

PoE (Support unit)	
Brand	CERIO
Model	POE-S48G2

Adapter for PoE (Support unit)	
Brand	L.T.E
Model	LTE36ES-S5-1
Input Power	100-240Vac, 50/60Hz, 0.75A
Output Power	48Vdc, 0.75A
DC Output Cable	1.8m non-shielded cable without core

Coil Cable	
Brand	EXCELTEK
Model	PE00003
Signal Line	570mm

LAN Cable	
Brand	EXCELTEK
Model	PO02008
Signal Line	1.524m

3. The antenna information is listed as below.

Antenna Type	PCB		
Antenna Connector	NA		
Frequency (MHz)	2400	2450	2480
Gain (dBi)	2.66	2.73	2.60

4. Power Setting as below.

	802.11b	802.11g	802.11n (HT20)
CH 1	13	12	13
CH 6	13	12	12
CH 11	13	12	12

5. 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.
6. The EUT is not capable of simultaneous transmission.

3.2 Description of Test Modes

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

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

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT Configure Mode	Applicable To				Description
	RE $\geq$ 1G	RE<1G	PLC	APCM	
A	√	√	√	√	Powered by adapter
B	-	√	√	-	Powered by POE

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

Note:

1. The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **X-plane**.
2. Radiated emission test (below 1GHz) and power line conducted emission test items chosen the worst maximum power.

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 11	1, 6, 11	DSSS	DBPSK	1.0
	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6.0
	802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	MCS0

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, B	802.11n (HT20)	1 to 11	6	OFDM	BPSK	MCS0

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	802.11n (HT20)	1 to 11	6	OFDM	BPSK	MCS0

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 11	1, 6, 11	DSSS	DBPSK	1.0
	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6.0
	802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	MCS0

Test Condition:

Applicable To	Environmental Conditions	Input Power	Tested by
RE $\geq$ 1G	21 deg. C, 70 % RH	120Vac, 60Hz	Greg Lin
RE<1G	20 deg. C, 66 % RH	120Vac, 60Hz 48Vdc	Rex Wang
PLC	22 deg. C, 73 % RH	120Vac, 60Hz 48Vdc	Greg Lin
APCM	25 deg. C, 65 % RH	120Vac, 60Hz	Chun Wu

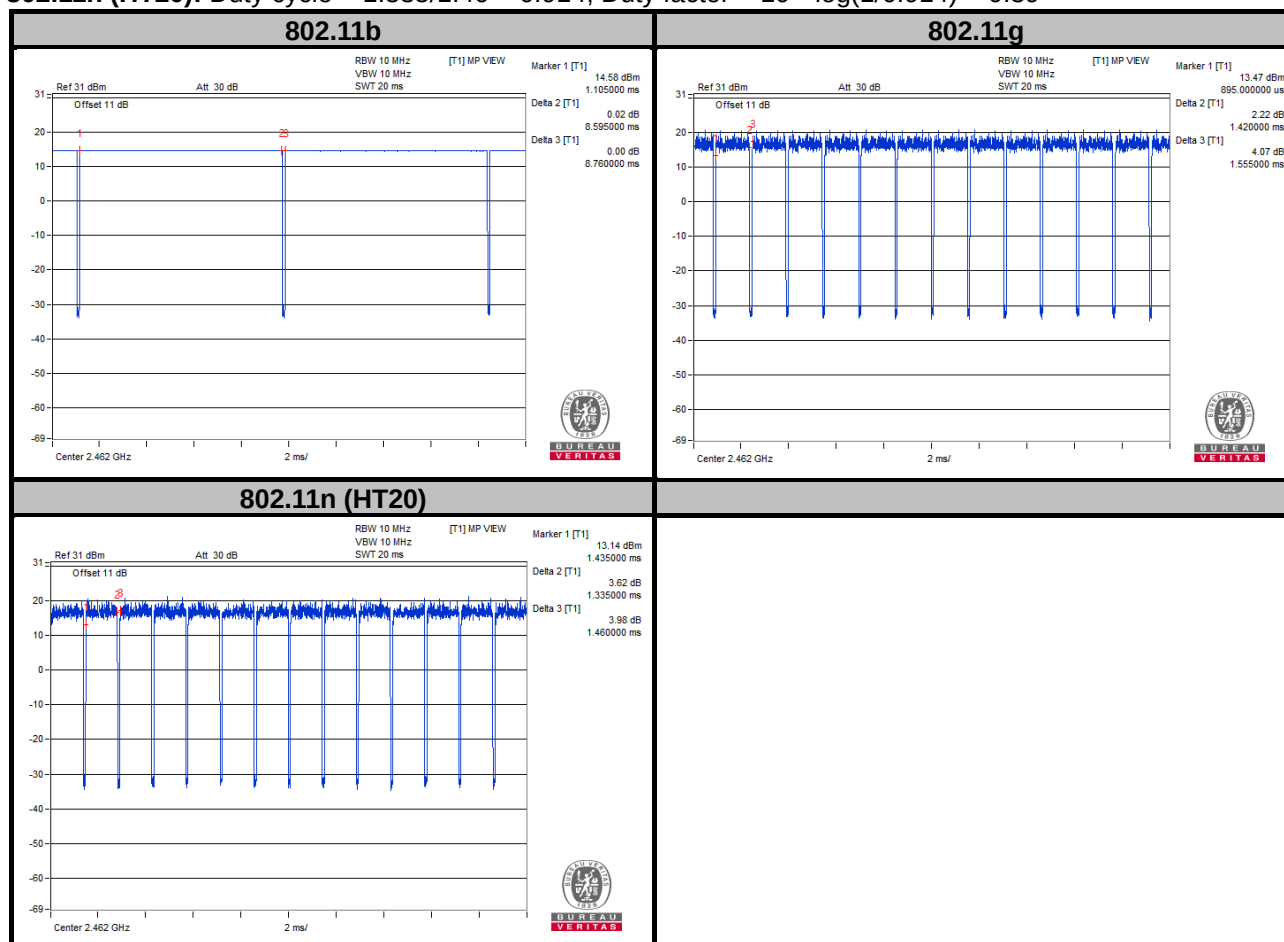
3.3 Duty Cycle of Test Signal

802.11b: Duty cycle = $8.595/8.76 = 0.981$, Duty cycle of test signal is $\geq 98\%$, duty factor is not required.

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

802.11g: Duty cycle = $1.42/1.555 = 0.913$, Duty factor = $10 * \log(1/0.913) = 0.39$

802.11n (HT20): Duty cycle = $1.335/1.46 = 0.914$, Duty factor = $10 * \log(1/0.914) = 0.39$



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.	Load	NA	NA	NA	NA	-
B.	USB Flash	SanDisk	SDDDC3-032G	NA	NA	-
C.	POE	CERIO	POE-S48G2	NA	NA	Provided by client
D.	Adapter	L.T.E	LTE36ES-S5-1	NA	NA	Provided by client
E.	Notebook	HP	11-u018TU	8CG70505V9	NA	-

Note:

1. All power cords of the above support units are non-shielded (1.8m).
2. Item E acted as communication partner to transfer data.

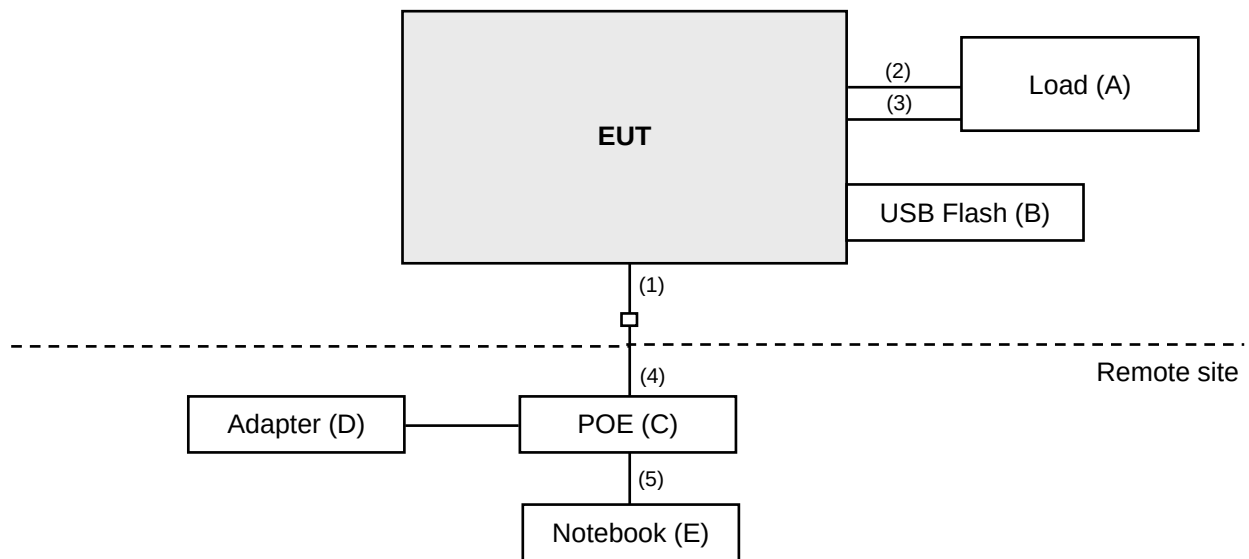
ID	Cable Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	LAN	1	1.524	N	0	RJ45, Cat5e Accessory of EUT
2.	LAN	1	1.5	N	0	RJ45, Cat5e
3.	RJ9	1	1	N	0	-
4.	LAN	1	1.5	N	0	RJ45, Cat5e
5.	LAN	1	10	N	0	RJ45, Cat5e

3.4.1 Configuration of System under Test

Test Mode A



Test 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 15.247 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 30 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
Preamplifier Agilent	8447D	2944A10638	2021/6/5	2022/6/4
Bi_Log Antenna Schwarzbeck	VULB9168	9168-160	2021/10/28	2022/10/27
RF Coaxial Cable WOKEN	8D-FB	Cable-CH9-01	2021/6/5	2022/6/4
Horn Antenna Schwarzbeck	9120D	9120D-1169	2021/11/14	2022/11/13
Preamplifier Agilent	8449B	3008A02367	2022/2/16	2023/2/15
RF Coaxial Cable HUBER+SUHNER&EMCI	SUCOFLEX 104& EMC104-SM- SM8000	CABLE-CH9-02 (248780+171006)	2022/1/15	2023/1/14
RF Coaxial Cable HUBER+SUHNER	SUCOFLEX 104	CABLE-CH9- (250795/4)	2022/1/15	2023/1/14
RF FLITER MICRO-TRONICS	BRM50716	060	2022/1/10	2023/1/9
RF FLITER MICRO-TRONICS	BRM17690	004	2022/1/10	2023/1/9
Boresight antenna tower fixture BV	BAF-02	5	NA	NA
Pre-Amplifier EMCI	EMC 184045	980116	2021/10/5	2022/10/4
Horn Antenna Schwarzbeck	BBHA 9170	BBHA9170241	2021/10/26	2022/10/25
RF Coaxial Cable HUBER+SUHNER&EMCI	SUCOFLEX 104& EMC104-SM- SM8000	CABLE-CH9-02 (248780+171006)	2022/1/15	2023/1/14
RF Coaxial Cable HUBER+SUHNER	SUCOFLEX 104	CABLE-CH9- (250795/4)	2022/1/15	2023/1/14
Boresight antenna tower fixture BV	BAF-02	5	NA	NA
Software BV ADT	ADT_Radiated_ V7.6.15.9.5	NA	NA	NA
Antenna Tower &Turn BV ADT	AT100	AT93021705	NA	NA
Turn Table BV ADT	TT100	TT93021705	NA	NA
Turn Table Controller BV ADT	SC100	SC93021705	NA	NA
Test Receiver Agilent	N9038A	MY51210203	2021/9/22	2022/9/21
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100039	2021/6/10	2022/6/9

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 9.

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:

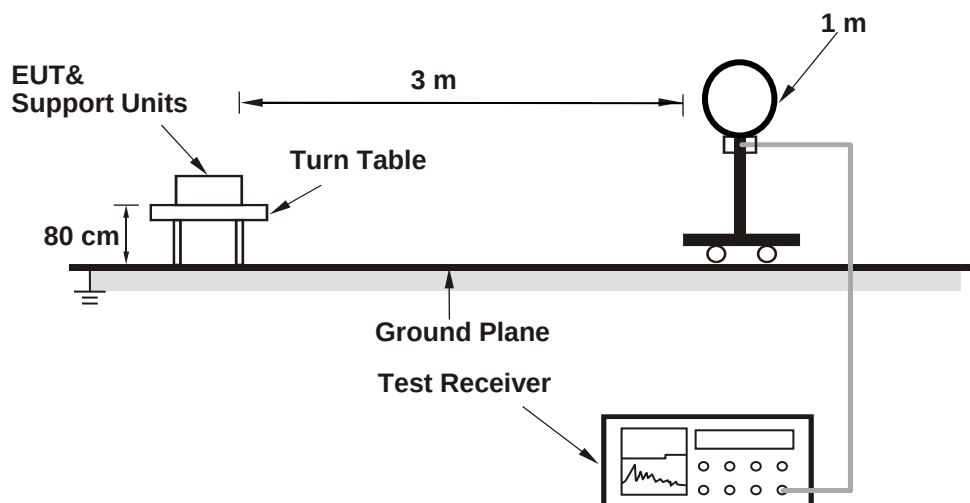
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection (QP) at frequency below 1 GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1 GHz.
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 $\geq 98\%$) for Average detection (AV) at frequency above 1 GHz.
(11b: RBW = 1 MHz, VBW = 10 Hz ; 11g: RBW = 1 MHz, VBW = 10 Hz ;
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

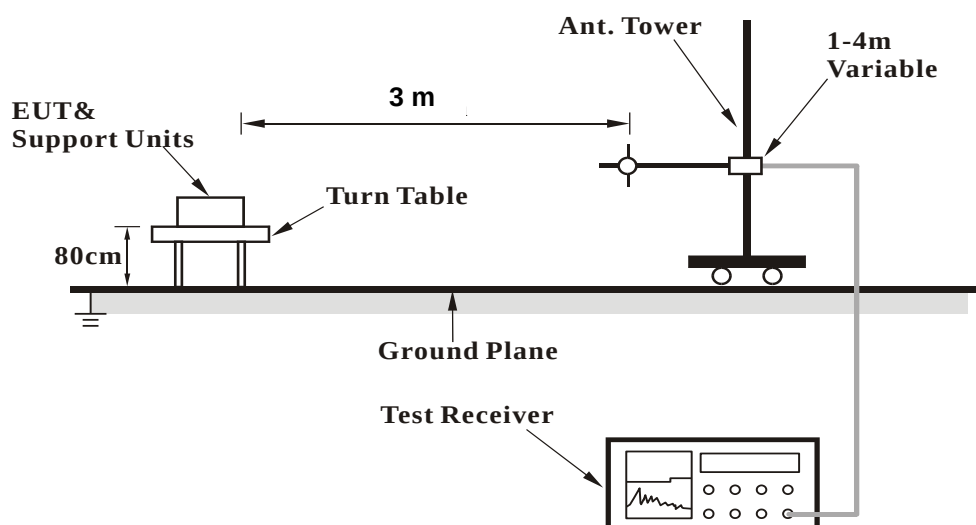
No deviation.

4.1.5 Test Set Up

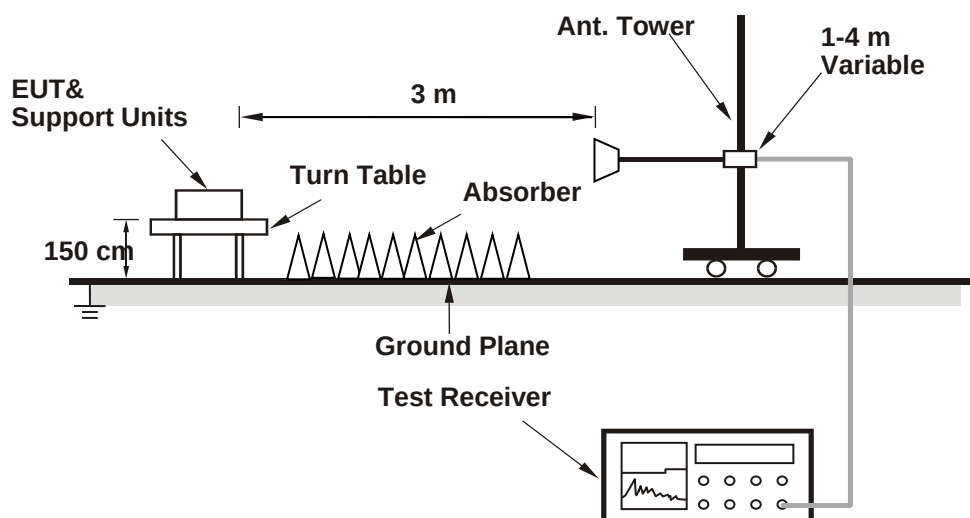
<Radiated Emission below 30 MHz>



<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 :

RF Mode	TX 802.11b	Channel	CH 1 : 2412 MHz
Frequency Range	1 GHz ~ 25 GHz	Detector Function & Bandwidth	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 10 Hz
Input Power	120 Vac, 60 Hz	Environmental Conditions	21°C, 70% RH
Tested By	Greg Lin	Test Date	2022/4/1

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	49.9 PK	74.0	-24.1	2.51 H	117	51.4	-1.5
2	2390.00	38.1 AV	54.0	-15.9	2.51 H	117	39.6	-1.5
3	*2412.00	101.0 PK			2.51 H	117	68.1	32.9
4	*2412.00	98.3 AV			2.51 H	117	65.4	32.9
5	4824.00	47.8 PK	74.0	-26.2	2.23 H	64	42.1	5.7
6	4824.00	35.4 AV	54.0	-18.6	2.23 H	64	29.7	5.7
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	52.1 PK	74.0	-21.9	1.42 V	349	53.6	-1.5
2	2390.00	38.7 AV	54.0	-15.3	1.42 V	349	40.2	-1.5
3	*2412.00	104.6 PK			1.42 V	349	71.7	32.9
4	*2412.00	101.9 AV			1.42 V	349	69.0	32.9
5	4824.00	47.4 PK	74.0	-26.6	1.47 V	125	41.7	5.7
6	4824.00	34.6 AV	54.0	-19.4	1.47 V	125	28.9	5.7

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.

RF Mode	TX 802.11b	Channel	CH 6 : 2437 MHz
Frequency Range	1 GHz ~ 25 GHz	Detector Function & Bandwidth	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 10 Hz
Input Power	120 Vac, 60 Hz	Environmental Conditions	21°C, 70% RH
Tested By	Greg Lin	Test Date	2022/4/1

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2437.00	101.4 PK			2.54 H	120	68.6	32.8
2	*2437.00	98.7 AV			2.54 H	120	65.9	32.8
3	4874.00	47.9 PK	74.0	-26.1	2.18 H	56	42.3	5.6
4	4874.00	35.4 AV	54.0	-18.6	2.18 H	56	29.8	5.6
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2437.00	105.0 PK			1.23 V	350	72.2	32.8
2	*2437.00	102.3 AV			1.23 V	350	69.5	32.8
3	4874.00	47.4 PK	74.0	-26.6	1.44 V	124	41.8	5.6
4	4874.00	34.7 AV	54.0	-19.3	1.44 V	124	29.1	5.6

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.

RF Mode	TX 802.11b	Channel	CH 11 : 2462 MHz
Frequency Range	1 GHz ~ 25 GHz	Detector Function & Bandwidth	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 10 Hz
Input Power	120 Vac, 60 Hz	Environmental Conditions	21°C, 70% RH
Tested By	Greg Lin	Test Date	2022/4/1

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2462.00	101.3 PK			2.42 H	126	68.5	32.8
2	*2462.00	98.6 AV			2.42 H	126	65.8	32.8
3	2483.50	53.3 PK	74.0	-20.7	2.42 H	126	54.8	-1.5
4	2483.50	38.4 AV	54.0	-15.6	2.42 H	126	39.9	-1.5
5	4924.00	47.6 PK	74.0	-26.4	2.24 H	52	42.2	5.4
6	4924.00	35.0 AV	54.0	-19.0	2.24 H	52	29.6	5.4
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2462.00	104.8 PK			1.48 V	349	72.0	32.8
2	*2462.00	102.1 AV			1.48 V	349	69.3	32.8
3	2483.50	54.9 PK	74.0	-19.1	1.48 V	349	56.4	-1.5
4	2483.50	39.0 AV	54.0	-15.0	1.48 V	349	40.5	-1.5
5	4924.00	47.3 PK	74.0	-26.7	1.58 V	139	41.9	5.4
6	4924.00	34.6 AV	54.0	-19.4	1.58 V	139	29.2	5.4

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.

RF Mode	TX 802.11g	Channel	CH 1 : 2412 MHz
Frequency Range	1 GHz ~ 25 GHz	Detector Function & Bandwidth	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 10 Hz
Input Power	120 Vac, 60 Hz	Environmental Conditions	21°C, 70% RH
Tested By	Greg Lin	Test Date	2022/4/1

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	64.2 PK	74.0	-9.8	2.53 H	112	65.7	-1.5
2	2390.00	43.1 AV	54.0	-10.9	2.53 H	112	44.6	-1.5
3	*2412.00	104.2 PK			2.53 H	112	71.3	32.9
4	*2412.00	94.5 AV			2.53 H	112	61.6	32.9
5	4824.00	47.5 PK	74.0	-26.5	2.27 H	59	41.8	5.7
6	4824.00	35.1 AV	54.0	-18.9	2.27 H	59	29.4	5.7
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	67.4 PK	74.0	-6.6	1.45 V	344	68.9	-1.5
2	2390.00	45.1 AV	54.0	-8.9	1.45 V	344	46.6	-1.5
3	*2412.00	107.6 PK			1.45 V	344	74.7	32.9
4	*2412.00	97.9 AV			1.45 V	344	65.0	32.9
5	4824.00	47.2 PK	74.0	-26.8	1.38 V	116	41.5	5.7
6	4824.00	34.3 AV	54.0	-19.7	1.38 V	116	28.6	5.7

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.

RF Mode	TX 802.11g	Channel	CH 6 : 2437 MHz
Frequency Range	1 GHz ~ 25 GHz	Detector Function & Bandwidth	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 10 Hz
Input Power	120 Vac, 60 Hz	Environmental Conditions	21°C, 70% RH
Tested By	Greg Lin	Test Date	2022/4/1

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2437.00	106.0 PK			2.51 H	117	73.2	32.8
2	*2437.00	96.3 AV			2.51 H	117	63.5	32.8
3	4874.00	47.8 PK	74.0	-26.2	2.21 H	59	42.2	5.6
4	4874.00	35.4 AV	54.0	-18.6	2.21 H	59	29.8	5.6
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2437.00	109.4 PK			1.27 V	342	76.6	32.8
2	*2437.00	99.7 AV			1.27 V	342	66.9	32.8
3	4874.00	47.3 PK	74.0	-26.7	1.46 V	125	41.7	5.6
4	4874.00	34.6 AV	54.0	-19.4	1.46 V	125	29.0	5.6

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.

RF Mode	TX 802.11g	Channel	CH 11 : 2462 MHz
Frequency Range	1 GHz ~ 25 GHz	Detector Function & Bandwidth	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 10 Hz
Input Power	120 Vac, 60 Hz	Environmental Conditions	21°C, 70% RH
Tested By	Greg Lin	Test Date	2022/4/1

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2462.00	105.7 PK			2.58 H	122	72.9	32.8
2	*2462.00	96.0 AV			2.58 H	122	63.2	32.8
3	2483.50	64.8 PK	74.0	-9.2	2.58 H	122	66.3	-1.5
4	2483.50	44.8 AV	54.0	-9.2	2.58 H	122	46.3	-1.5
5	4924.00	47.7 PK	74.0	-26.3	2.13 H	52	42.3	5.4
6	4924.00	34.9 AV	54.0	-19.1	2.13 H	52	29.5	5.4
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2462.00	109.2 PK			1.44 V	348	76.4	32.8
2	*2462.00	99.4 AV			1.44 V	348	66.6	32.8
3	2483.50	67.2 PK	74.0	-6.8	1.44 V	348	68.7	-1.5
4	2483.50	45.9 AV	54.0	-8.1	1.44 V	348	47.4	-1.5
5	4924.00	47.0 PK	74.0	-27.0	1.39 V	118	41.6	5.4
6	4924.00	34.3 AV	54.0	-19.7	1.39 V	118	28.9	5.4

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.

RF Mode	TX 802.11n (HT20)	Channel	CH 1 : 2412 MHz
Frequency Range	1 GHz ~ 25 GHz	Detector Function & Bandwidth	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 1 kHz
Input Power	120 Vac, 60 Hz	Environmental Conditions	21°C, 70% RH
Tested By	Greg Lin	Test Date	2022/4/1

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	65.0 PK	74.0	-9.0	2.50 H	127	66.5	-1.5
2	2390.00	45.3 AV	54.0	-8.7	2.50 H	127	46.8	-1.5
3	*2412.00	104.8 PK			2.50 H	127	71.9	32.9
4	*2412.00	94.7 AV			2.50 H	127	61.8	32.9
5	4824.00	48.0 PK	74.0	-26.0	2.27 H	54	42.3	5.7
6	4824.00	35.4 AV	54.0	-18.6	2.27 H	54	29.7	5.7
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	66.3 PK	74.0	-7.7	1.44 V	349	67.8	-1.5
2	2390.00	47.1 AV	54.0	-6.9	1.44 V	349	48.6	-1.5
3	*2412.00	108.5 PK			1.44 V	349	75.6	32.9
4	*2412.00	98.3 AV			1.44 V	349	65.4	32.9
5	4824.00	47.5 PK	74.0	-26.5	1.63 V	127	41.8	5.7
6	4824.00	35.0 AV	54.0	-19.0	1.63 V	127	29.3	5.7

Remarks:

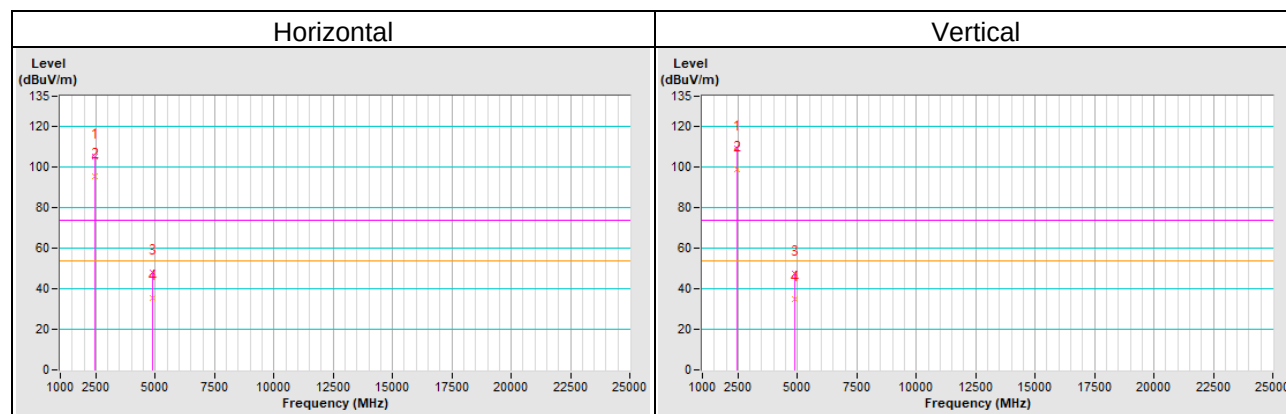
1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.

RF Mode	TX 802.11n (HT20)	Channel	CH 6 : 2437 MHz
Frequency Range	1 GHz ~ 25 GHz	Detector Function & Bandwidth	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 1 kHz
Input Power	120 Vac, 60 Hz	Environmental Conditions	21°C, 70% RH
Tested By	Greg Lin	Test Date	2022/4/1

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2437.00	105.5 PK			2.68 H	126	72.7	32.8
2	*2437.00	95.4 AV			2.68 H	126	62.6	32.8
3	4874.00	48.2 PK	74.0	-25.8	2.19 H	56	42.6	5.6
4	4874.00	35.7 AV	54.0	-18.3	2.19 H	56	30.1	5.6
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2437.00	109.1 PK			1.38 V	352	76.3	32.8
2	*2437.00	99.0 AV			1.38 V	352	66.2	32.8
3	4874.00	47.7 PK	74.0	-26.3	1.53 V	118	42.1	5.6
4	4874.00	35.0 AV	54.0	-19.0	1.53 V	118	29.4	5.6

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * " : Fundamental frequency.



RF Mode	TX 802.11n (HT20)	Channel	CH 11 : 2462 MHz
Frequency Range	1 GHz ~ 25 GHz	Detector Function & Bandwidth	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 1 kHz
Input Power	120 Vac, 60 Hz	Environmental Conditions	21°C, 70% RH
Tested By	Greg Lin	Test Date	2022/4/1

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2462.00	105.4 PK			2.44 H	124	72.6	32.8
2	*2462.00	95.2 AV			2.44 H	124	62.4	32.8
3	2483.50	62.7 PK	74.0	-11.3	2.44 H	124	64.2	-1.5
4	2483.50	42.3 AV	54.0	-11.7	2.44 H	124	43.8	-1.5
5	4924.00	47.5 PK	74.0	-26.5	2.16 H	53	42.1	5.4
6	4924.00	35.0 AV	54.0	-19.0	2.16 H	53	29.6	5.4
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2462.00	109.0 PK			1.44 V	349	76.2	32.8
2	*2462.00	98.8 AV			1.44 V	349	66.0	32.8
3	2483.50	63.2 PK	74.0	-10.8	1.44 V	349	64.7	-1.5
4	2483.50	43.7 AV	54.0	-10.3	1.44 V	349	45.2	-1.5
5	4924.00	47.0 PK	74.0	-27.0	1.57 V	136	41.6	5.4
6	4924.00	34.4 AV	54.0	-19.6	1.57 V	136	29.0	5.4

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * " : Fundamental frequency.

9 kHz ~ 1 GHz Worst-Case Data:

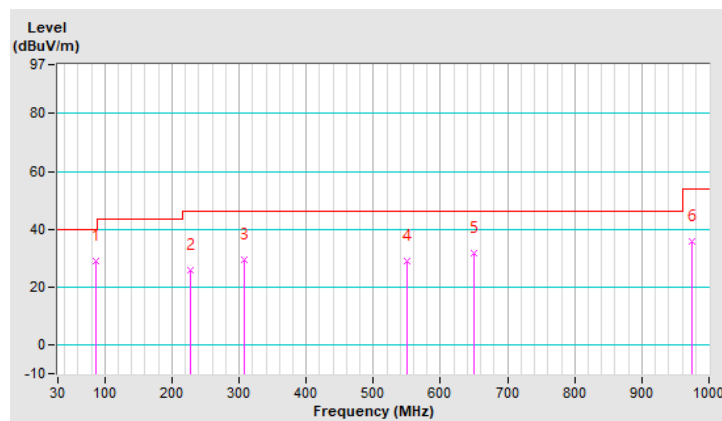
Mode A

RF Mode	TX 802.11n (HT20)	Channel	CH 6 : 2437 MHz
Frequency Range	30 MHz ~ 1 GHz	Detector Function & Bandwidth	(QP) RB = 120kHz
Input Power	120 Vac, 60 Hz	Environmental Conditions	20°C, 66% RH
Tested By	Rex Wang	Test Date	2022/4/8

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	86.26	29.2 QP	40.0	-10.8	1.50 H	334	43.8	-14.6
2	227.88	25.9 QP	46.0	-20.1	1.00 H	240	36.9	-11.0
3	308.39	29.3 QP	46.0	-16.7	1.00 H	304	35.8	-6.5
4	549.92	29.2 QP	46.0	-16.8	1.50 H	3	30.8	-1.6
5	649.83	31.5 QP	46.0	-14.5	1.00 H	281	31.2	0.3
6	973.81	35.9 QP	54.0	-18.1	2.00 H	296	29.7	6.2

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30 MHz ~ 1 GHz.
5. The emission levels were very low against the limit of frequency range 9 kHz ~ 30 MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

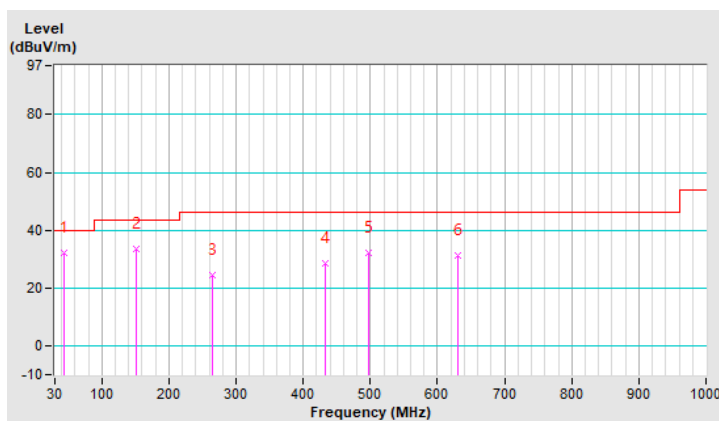


RF Mode	TX 802.11n (HT20)	Channel	CH 6 : 2437 MHz
Frequency Range	30 MHz ~ 1 GHz	Detector Function & Bandwidth	(QP) RB = 120kHz
Input Power	120 Vac, 60 Hz	Environmental Conditions	20°C, 66% RH
Tested By	Rex Wang	Test Date	2022/4/8

Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	44.55	32.3 QP	40.0	-7.7	1.00 V	16	41.6	-9.3
2	150.28	33.4 QP	43.5	-10.1	1.50 V	304	42.2	-8.8
3	263.77	24.3 QP	46.0	-21.7	1.25 V	205	32.6	-8.3
4	433.52	28.7 QP	46.0	-17.3	1.00 V	19	32.5	-3.8
5	496.57	32.2 QP	46.0	-13.8	1.50 V	55	34.8	-2.6
6	629.46	31.3 QP	46.0	-14.7	1.00 V	244	31.2	0.1

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30 MHz ~ 1 GHz.
5. The emission levels were very low against the limit of frequency range 9 kHz ~ 30 MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.



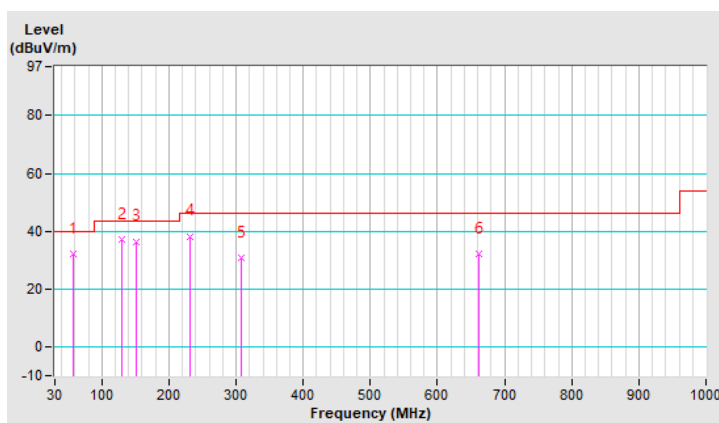
Mode B

RF Mode	TX 802.11n (HT20)	Channel	CH 6 : 2437 MHz
Frequency Range	30 MHz ~ 1 GHz	Detector Function & Bandwidth	(QP) RB = 120kHz
Input Power	120 Vac, 60 Hz	Environmental Conditions	20°C, 66% RH
Tested By	Rex Wang	Test Date	2022/4/8

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	58.13	32.1 QP	40.0	-7.9	1.50 H	159	41.6	-9.5
2	129.91	37.0 QP	43.5	-6.5	1.25 H	266	47.3	-10.3
3	150.28	36.5 QP	43.5	-7.0	1.00 H	328	45.3	-8.8
4	231.76	38.3 QP	46.0	-7.7	1.00 H	52	48.8	-10.5
5	308.39	30.8 QP	46.0	-15.2	2.00 H	303	37.3	-6.5
6	661.47	32.1 QP	46.0	-13.9	1.00 H	10	31.8	0.3

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30 MHz ~ 1 GHz.
5. The emission levels were very low against the limit of frequency range 9 kHz ~ 30 MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

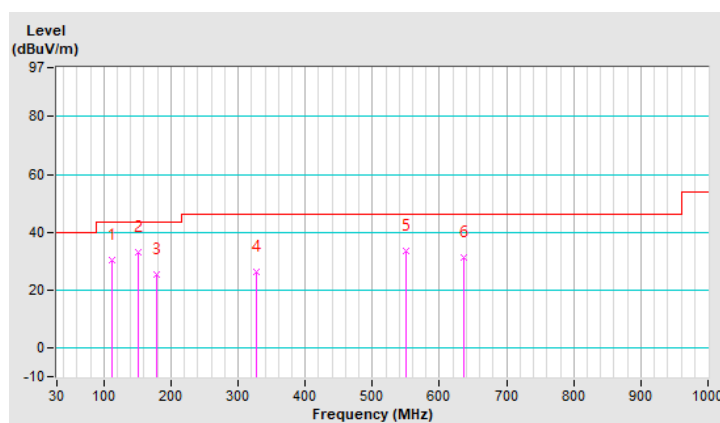


RF Mode	TX 802.11n (HT20)	Channel	CH 6 : 2437 MHz
Frequency Range	30 MHz ~ 1 GHz	Detector Function & Bandwidth	(QP) RB = 120kHz
Input Power	120 Vac, 60 Hz	Environmental Conditions	20°C, 66% RH
Tested By	Rex Wang	Test Date	2022/4/8

Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	112.45	30.3 QP	43.5	-13.2	1.00 V	16	42.2	-11.9
2	150.28	33.0 QP	43.5	-10.5	1.50 V	263	41.8	-8.8
3	178.41	25.5 QP	43.5	-18.0	1.00 V	317	35.4	-9.9
4	327.79	26.1 QP	46.0	-19.9	1.25 V	47	32.2	-6.1
5	549.92	33.3 QP	46.0	-12.7	2.00 V	307	34.9	-1.6
6	637.22	31.2 QP	46.0	-14.8	1.00 V	88	31.1	0.1

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30 MHz ~ 1 GHz.
5. The emission levels were very low against the limit of frequency range 9 kHz ~ 30 MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.



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	ESR3	102783	Dec. 20, 2021	Dec. 19, 2022
RF signal cable (with 10dB PAD) Woken	5D-FB	Cable-cond2-01	Sep. 04, 2021	Sep. 03, 2022
LISN/AMN ROHDE & SCHWARZ (EUT)	ESH2-Z5	100100	Feb. 17, 2022	Feb. 16, 2023
LISN/AMN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100312	Sep. 17, 2021	Sep. 16, 2022
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 2.
 3. The VCCI Site Registration No. is C-12047.

4.2.3 Test Procedures

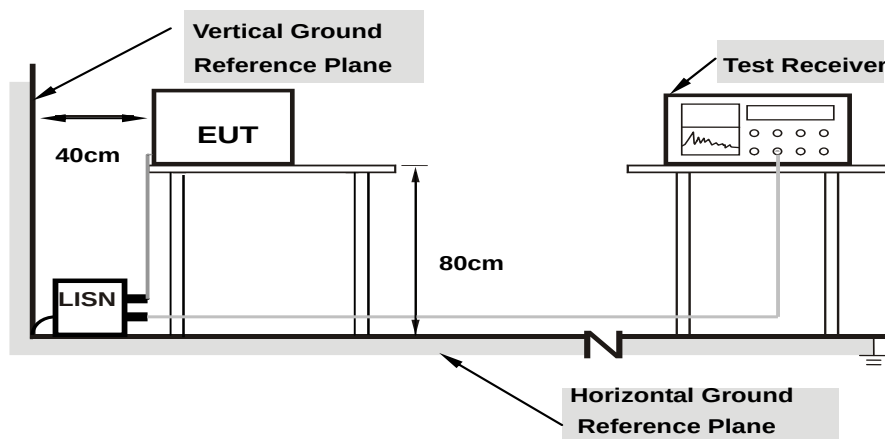
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/50 uH of coupling impedance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

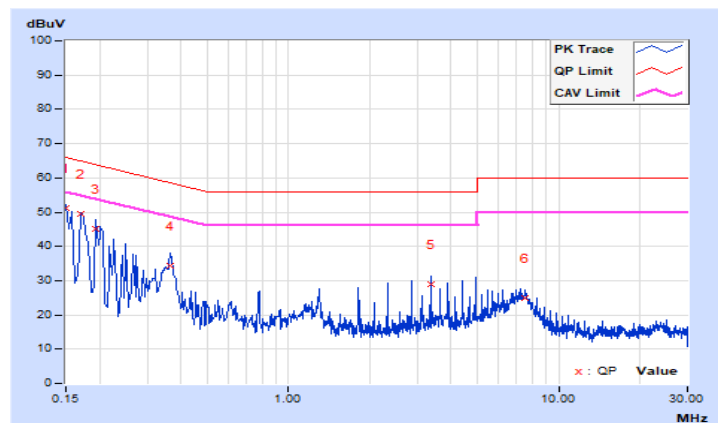
Mode A

Frequency Range	150 kHz ~ 30 MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120 Vac, 60 Hz	Environmental Conditions	22°C, 73% RH
Tested by	Greg Lin	Test Date	2022/4/8

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	0.15000	10.13	41.16	25.01	51.29	35.14	66.00	56.00	-14.71	-20.86
2	0.17000	10.14	39.44	20.88	49.58	31.02	64.96	54.96	-15.38	-23.94
3	0.19400	10.16	34.88	16.63	45.04	26.79	63.86	53.86	-18.82	-27.07
4	0.36600	10.23	24.27	17.45	34.50	27.68	58.59	48.59	-24.09	-20.91
5	3.37400	10.39	18.51	16.23	28.90	26.62	56.00	46.00	-27.10	-19.38
6	7.52200	10.44	14.31	9.28	24.75	19.72	60.00	50.00	-35.25	-30.28

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

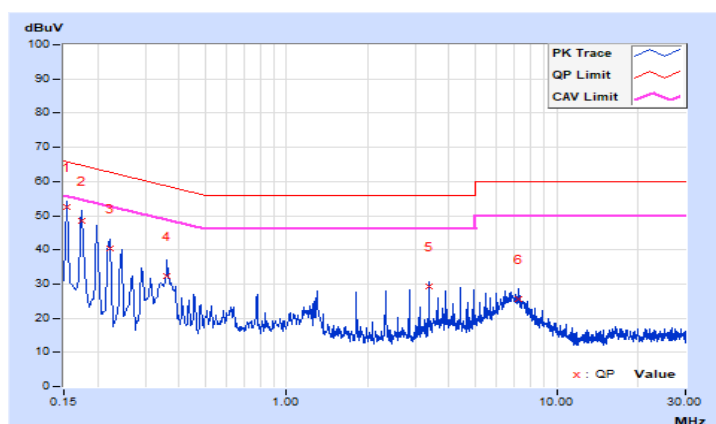


Frequency Range	150 kHz ~ 30 MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120 Vac, 60 Hz	Environmental Conditions	22°C, 73% RH
Tested by	Greg Lin	Test Date	2022/4/8

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	0.15400	10.14	42.38	24.75	52.52	34.89	65.78	55.78	-13.26	-20.89
2	0.17400	10.16	38.47	20.17	48.63	30.33	64.77	54.77	-16.14	-24.44
3	0.22200	10.20	30.26	10.56	40.46	20.76	62.74	52.74	-22.28	-31.98
4	0.36200	10.25	22.09	13.07	32.34	23.32	58.68	48.68	-26.34	-25.36
5	3.37000	10.39	18.81	16.79	29.20	27.18	56.00	46.00	-26.80	-18.82
6	7.25400	10.46	15.21	10.59	25.67	21.05	60.00	50.00	-34.33	-28.95

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



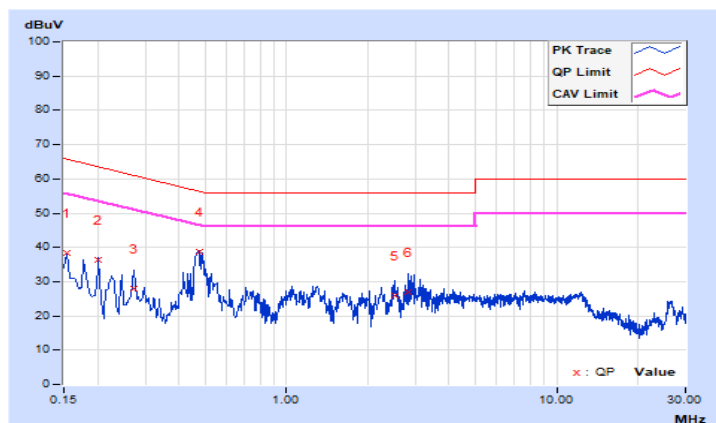
Mode B

Frequency Range	150 kHz ~ 30 MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120 Vac, 60 Hz	Environmental Conditions	22°C, 73% RH
Tested by	Greg Lin	Test Date	2022/4/8

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	0.15400	10.13	28.20	15.07	38.33	25.20	65.78	55.78	-27.45	-30.58
2	0.20200	10.14	26.35	12.70	36.49	22.84	63.53	53.53	-27.04	-30.69
3	0.27400	10.15	17.95	8.75	28.10	18.90	61.00	51.00	-32.90	-32.10
4	0.47400	10.16	28.56	21.12	38.72	31.28	56.44	46.44	-17.72	-15.16
5	2.50600	10.23	15.53	7.33	25.76	17.56	56.00	46.00	-30.24	-28.44
6	2.83000	10.23	16.69	7.77	26.92	18.00	56.00	46.00	-29.08	-28.00

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

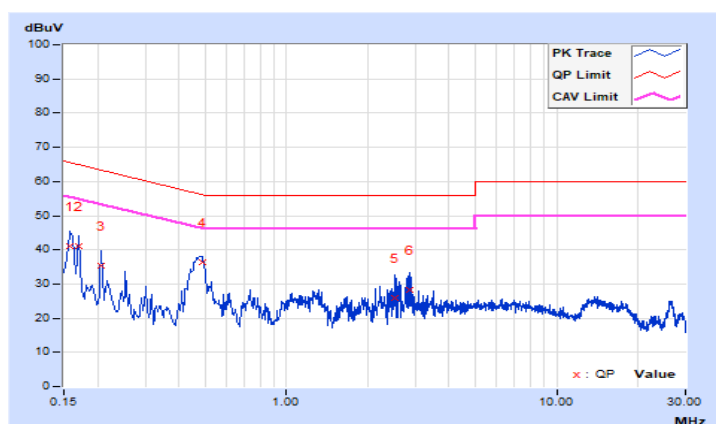


Frequency Range	150 kHz ~ 30 MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120 Vac, 60 Hz	Environmental Conditions	22°C, 73% RH
Tested by	Greg Lin	Test Date	2022/4/8

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	0.15800	10.14	30.95	18.00	41.09	28.14	65.57	55.57	-24.48	-27.43
2	0.17000	10.14	31.05	15.95	41.19	26.09	64.96	54.96	-23.77	-28.87
3	0.20600	10.15	25.31	12.18	35.46	22.33	63.37	53.37	-27.91	-31.04
4	0.48600	10.17	26.26	18.82	36.43	28.99	56.24	46.24	-19.81	-17.25
5	2.52200	10.24	15.57	5.95	25.81	16.19	56.00	46.00	-30.19	-29.81
6	2.84200	10.25	18.01	6.31	28.26	16.56	56.00	46.00	-27.74	-29.44

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

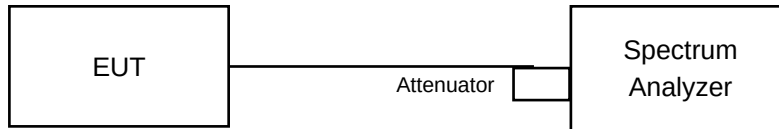


4.3 6 dB Bandwidth Measurement

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	8.63	0.5	Pass
6	2437	8.63	0.5	Pass
11	2462	9.09	0.5	Pass

802.11g

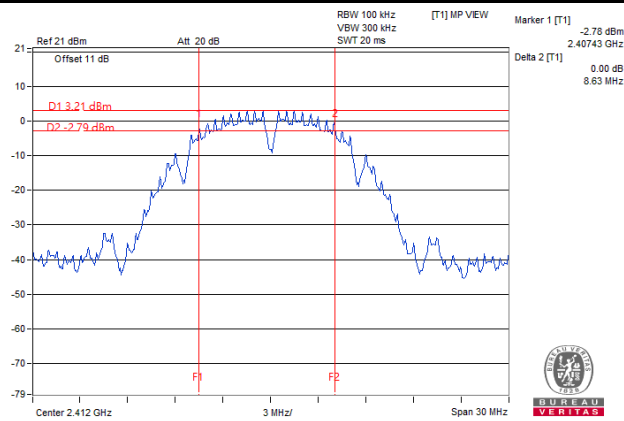
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	16.35	0.5	Pass
6	2437	15.80	0.5	Pass
11	2462	16.14	0.5	Pass

802.11n (HT20)

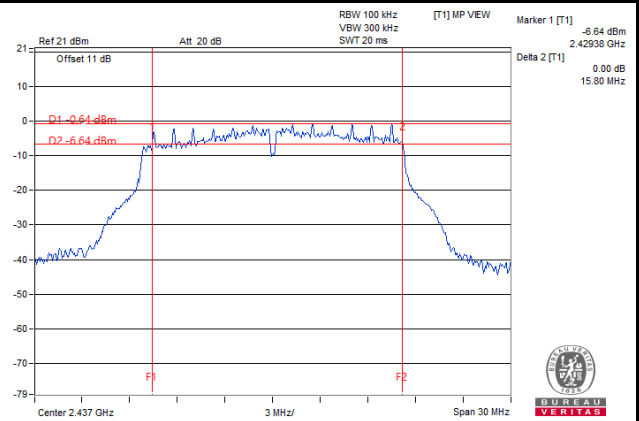
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	17.35	0.5	Pass
6	2437	16.43	0.5	Pass
11	2462	17.24	0.5	Pass

Spectrum Plot of Worst Value

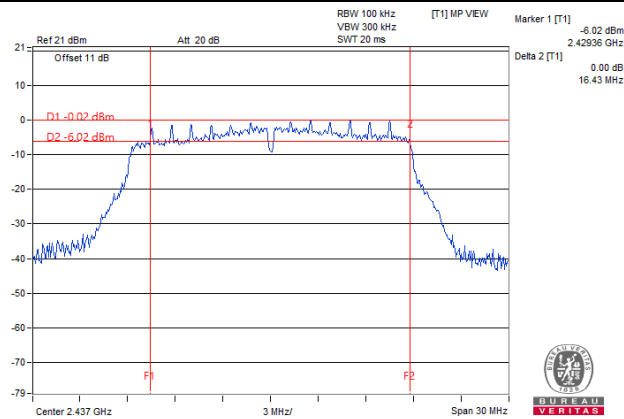
802.11b



802.11g

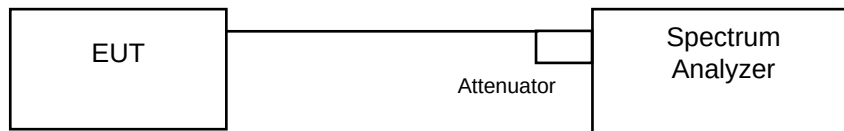


802.11n (HT20)



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	12.26	Pass
6	2437	11.92	Pass
11	2462	12.24	Pass

802.11g

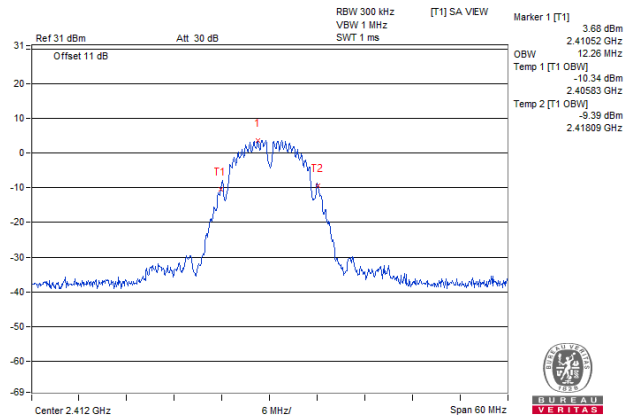
Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	Pass / Fail
1	2412	17.13	Pass
6	2437	16.87	Pass
11	2462	17.21	Pass

802.11n (HT20)

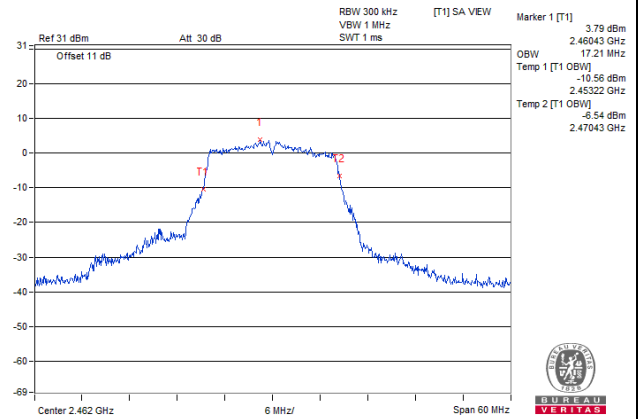
Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	Pass / Fail
1	2412	18.09	Pass
6	2437	17.88	Pass
11	2462	18.24	Pass

Spectrum Plot of Worst Value

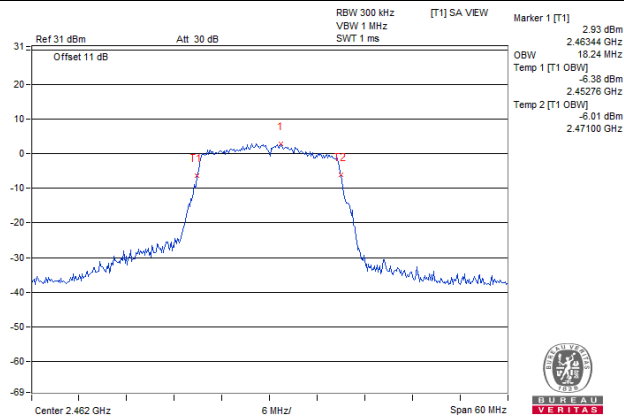
802.11b



802.11g



802.11n (HT20)

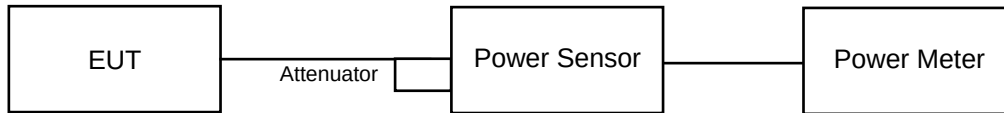


4.5 Conducted Output Power Measurement

4.5.1 Limits of Conducted Output Power Measurement

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

4.5.2 Test Setup



4.5.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.5.4 Test Procedures

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)	Average Power (mW)	Average Power (dBm)	Limit (dBm)	Pass / Fail
1	2412	18.578	12.69	30	Pass
6	2437	18.793	12.74	30	Pass
11	2462	18.493	12.67	30	Pass

802.11g

Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)	Limit (dBm)	Pass / Fail
1	2412	18.323	12.63	30	Pass
6	2437	18.967	12.78	30	Pass
11	2462	18.75	12.73	30	Pass

802.11n (HT20)

Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)	Limit (dBm)	Pass / Fail
1	2412	19.815	12.97	30	Pass
6	2437	18.707	12.72	30	Pass
11	2462	18.493	12.67	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

For Average Power (Duty cycle $\geq 98\%$)

- Set instrument center frequency to DTS channel center frequency.
- Set span to at least 1.5 times the OBW.
- Set RBW to: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
- Set VBW $\geq 3 \times \text{RBW}$.
- Detector = power averaging (RMS) or sample detector (when RMS not available).
- Ensure that the number of measurement points in the sweep $\geq 2 \times \text{span}/\text{RBW}$.
- Sweep time = auto couple.
- Employ trace averaging (RMS) mode over a minimum of 100 traces.
- Use the peak marker function to determine the maximum amplitude level.

For Average Power (Duty cycle $< 98\%$)

- Measure the duty cycle (x).
- Set instrument center frequency to DTS channel center frequency.
- Set span to at least 1.5 times the OBW.
- Set RBW to: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
- Set VBW $\geq 3 \times \text{RBW}$.
- Detector = power averaging (RMS) or sample detector (when RMS not available).
- Ensure that the number of measurement points in the sweep $\geq 2 \times \text{span}/\text{RBW}$.
- Sweep time = auto couple.
- Do not use sweep triggering. Allow sweep to "free run".
- Employ trace averaging (RMS) mode over a minimum of 100 traces.
- Use the peak marker function to determine the maximum amplitude level.
- Add $10 \log (1/x)$, where x is the duty cycle measured in step (a), to the measured PSD to compute the average PSD during the actual transmission time.

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	-21.05	8	Pass
6	2437	-20.53	8	Pass
11	2462	-21.39	8	Pass

802.11g

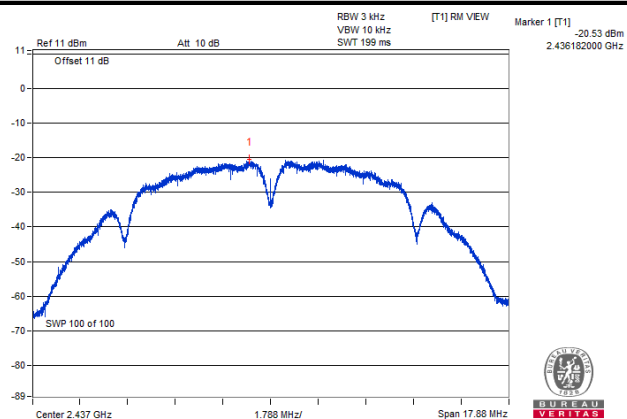
Channel	Frequency (MHz)	PSD (dBm/3 kHz)	Limit (dBm/3 kHz)	Pass / Fail
1	2412	-20.06	8	Pass
6	2437	-19.87	8	Pass
11	2462	-20.02	8	Pass

802.11n (HT20)

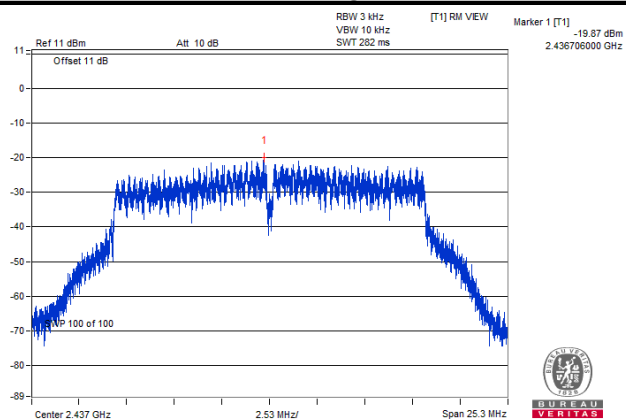
Channel	Frequency (MHz)	PSD (dBm/3 kHz)	Limit (dBm/3 kHz)	Pass / Fail
1	2412	-22.93	8	Pass
6	2437	-23.11	8	Pass
11	2462	-23.18	8	Pass

Spectrum Plot of Worst Value

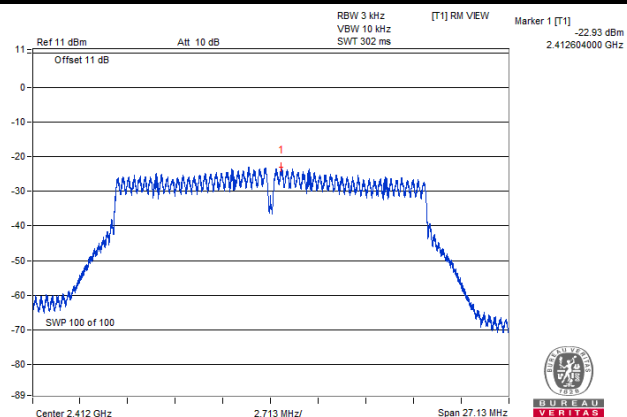
802.11b



802.11g



802.11n (HT20)

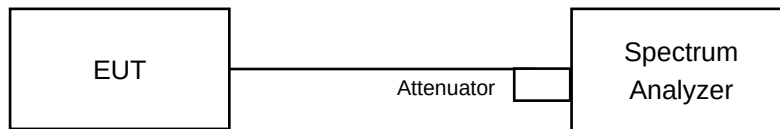


4.7 Conducted Out of Band Emission Measurement

4.7.1 Limits of Conducted Out of Band Emission Measurement

Below 30 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.

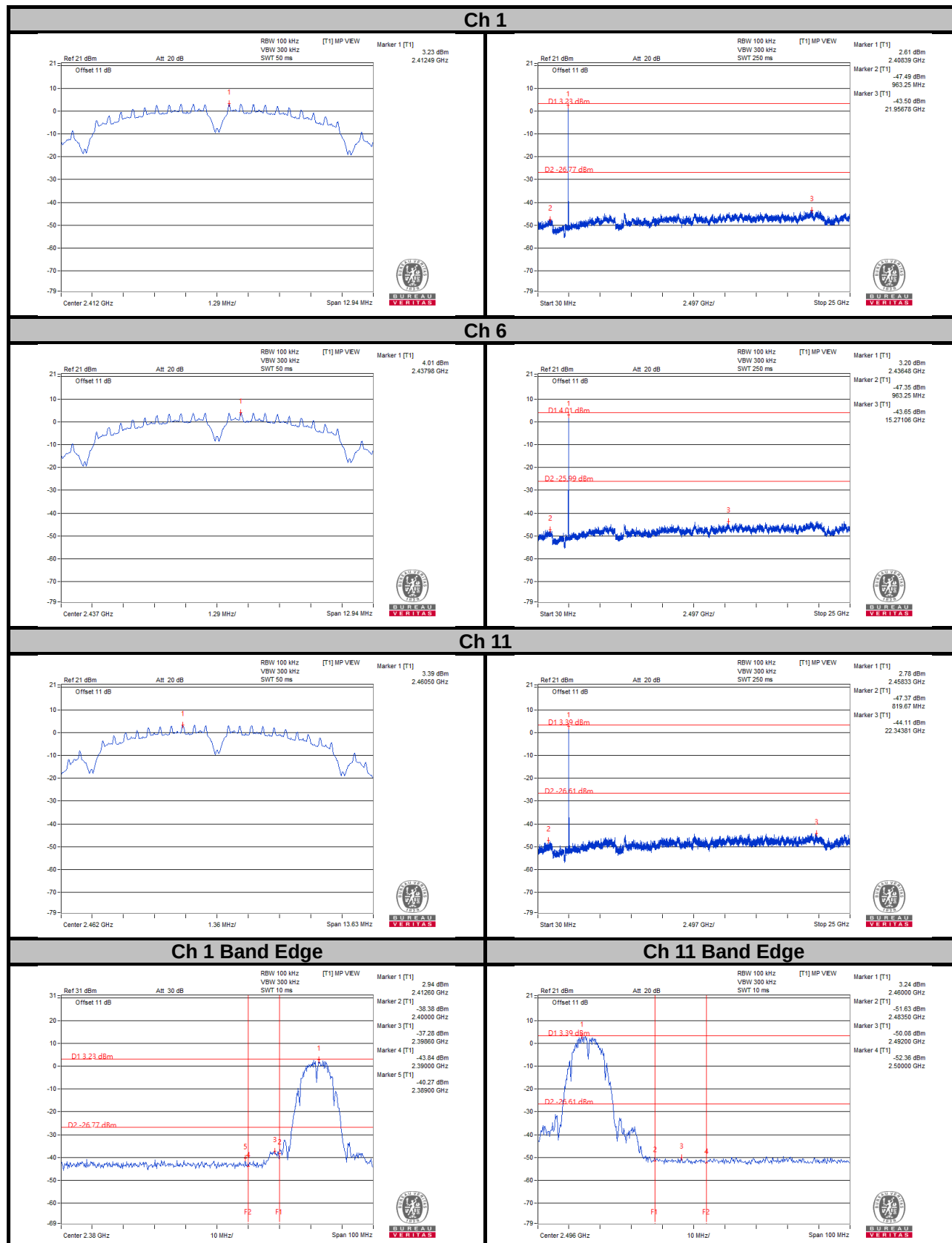
4.7.6 EUT Operating Condition

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

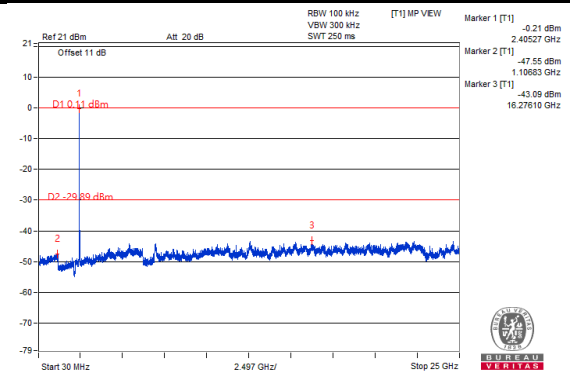
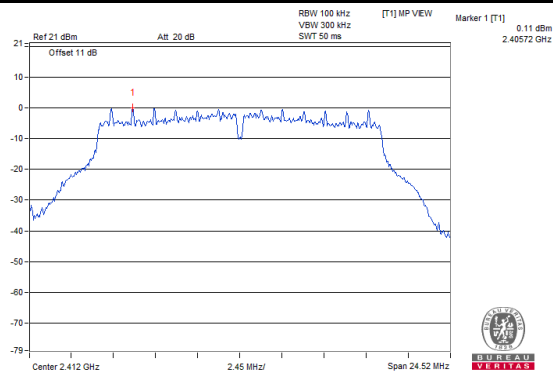
The spectrum plots are attached on the following images. D1 line indicates the highest level, and D2 line indicates the 30 dB offset below D1. It shows compliance with the requirement.

802.11b

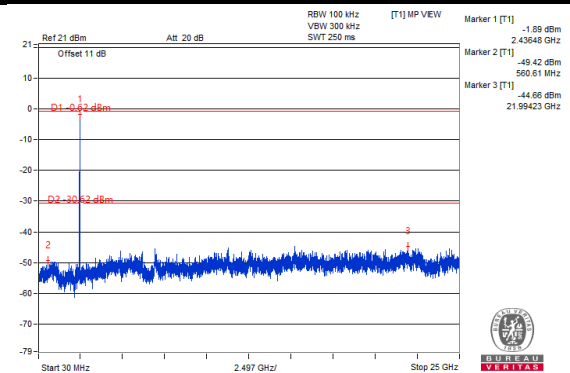
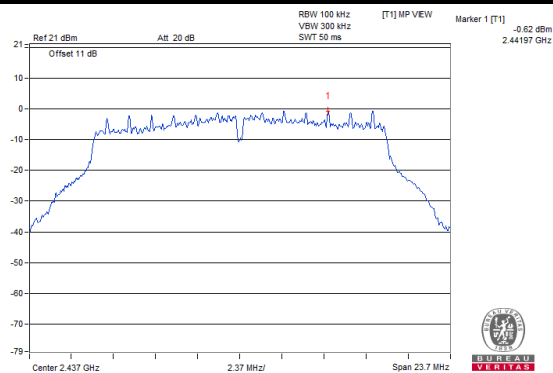


802.11g

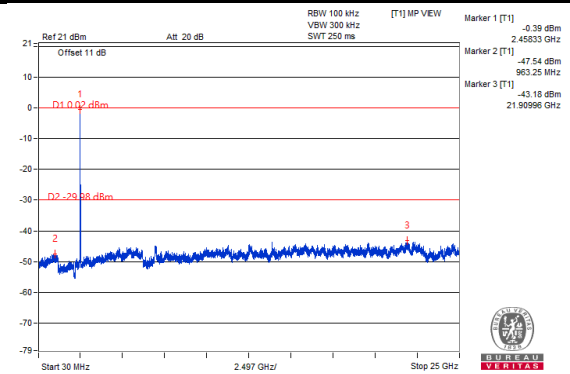
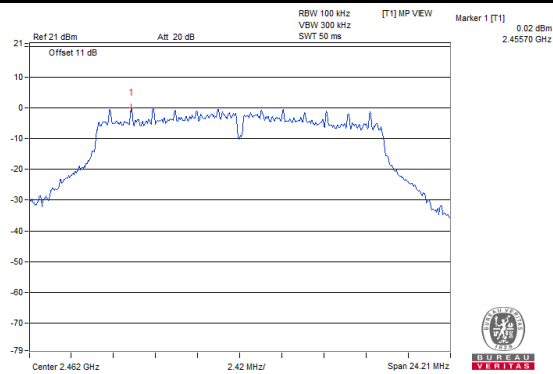
Ch 1



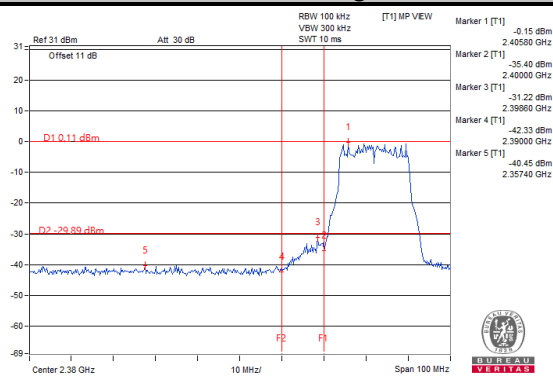
Ch 6



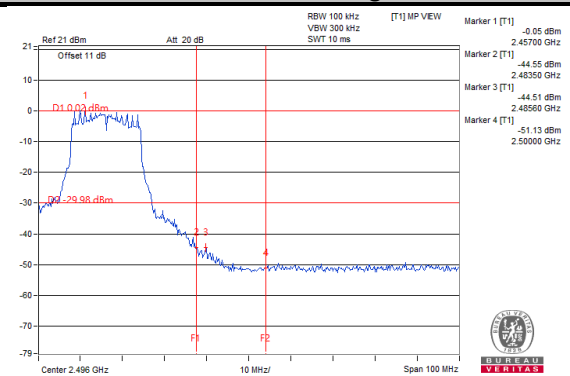
Ch 11



Ch 1 Band Edge

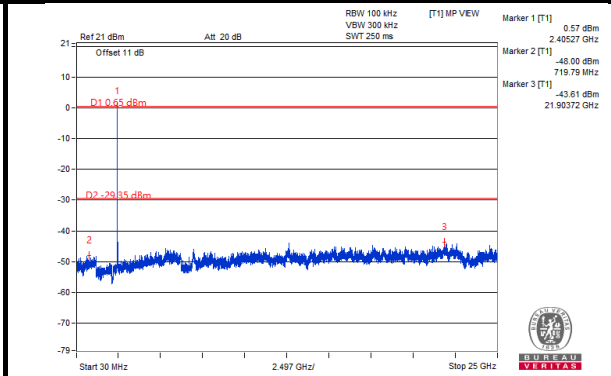
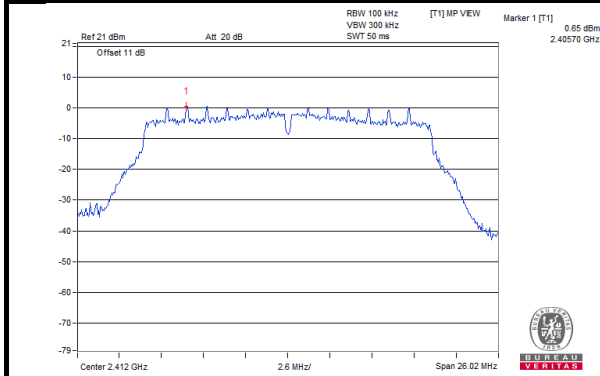


Ch 11 Band Edge

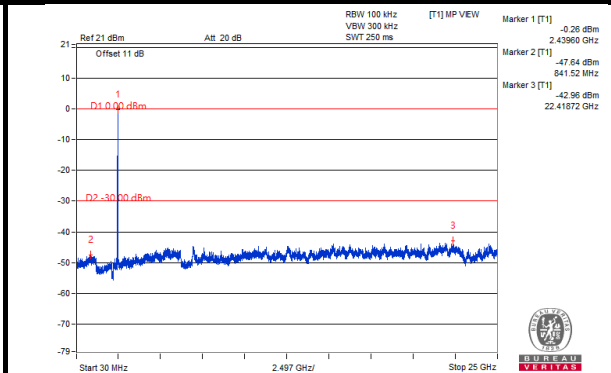
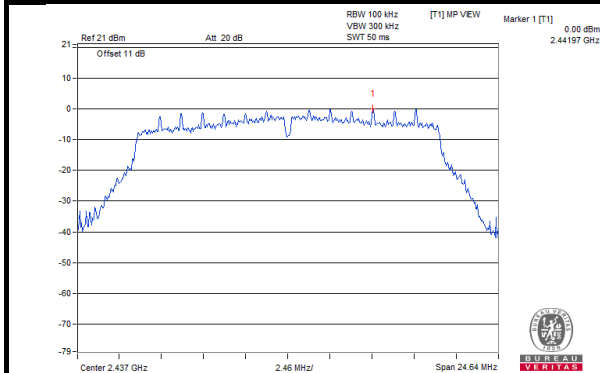


802.11n (HT20)

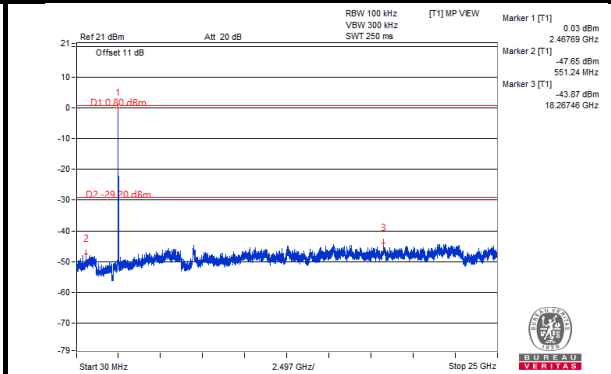
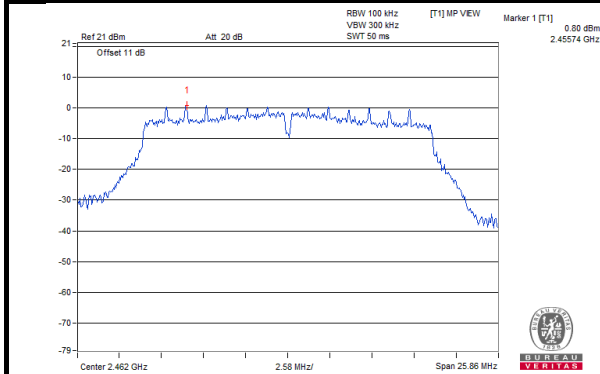
Ch 1



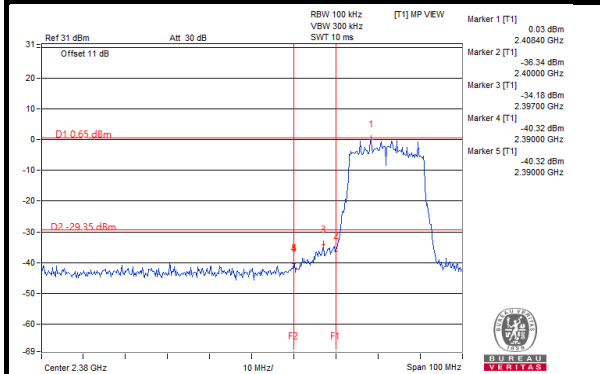
Ch 6



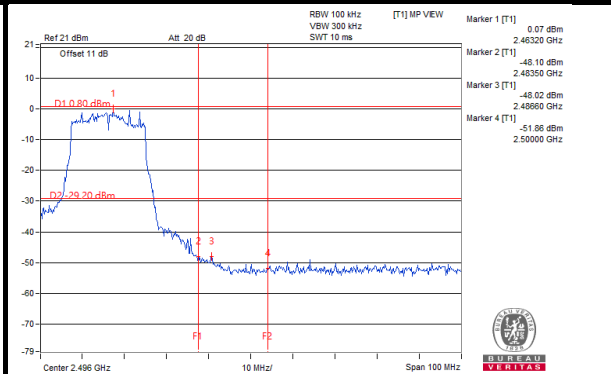
Ch 11



Ch 1 Band Edge



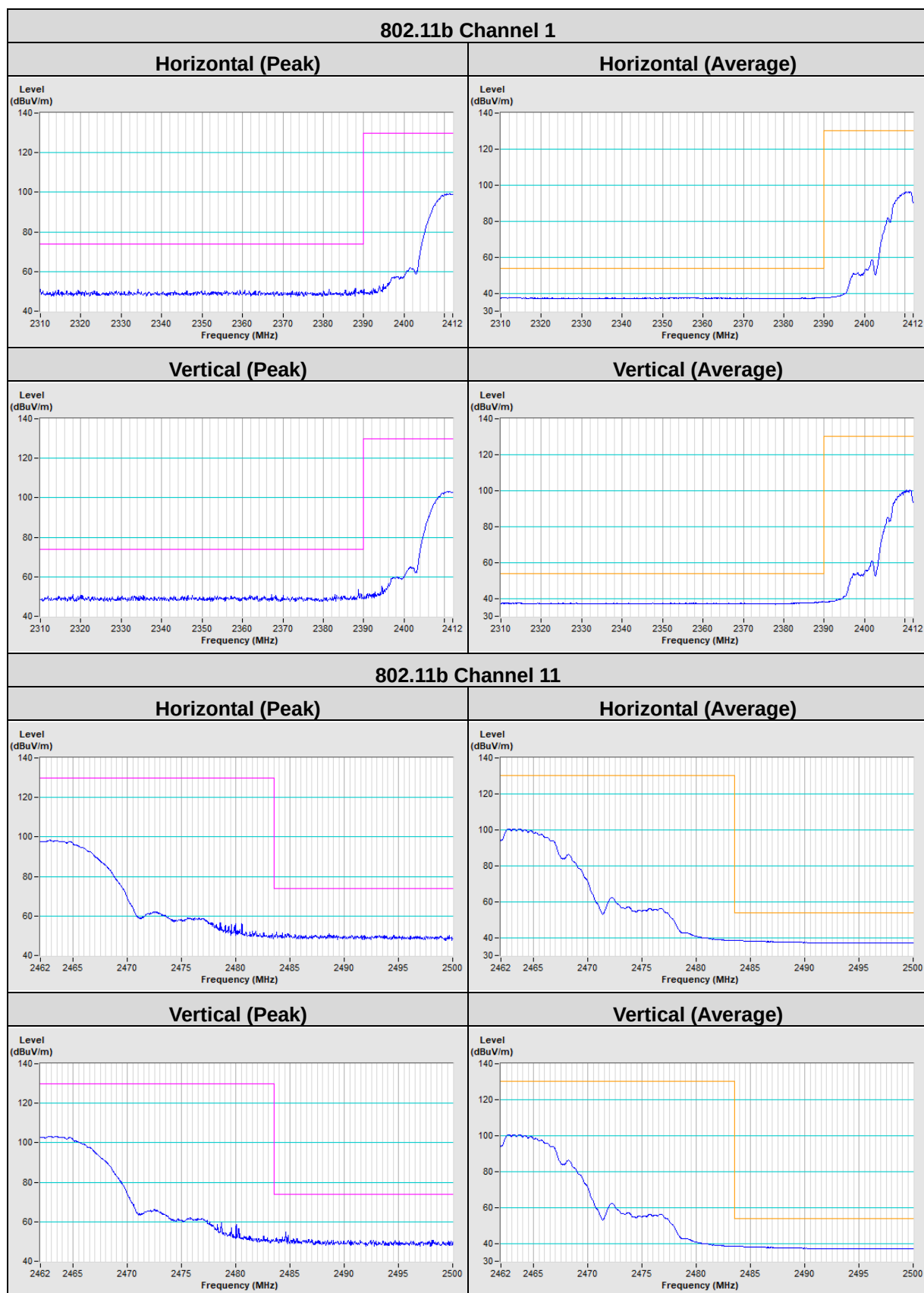
Ch 11 Band Edge

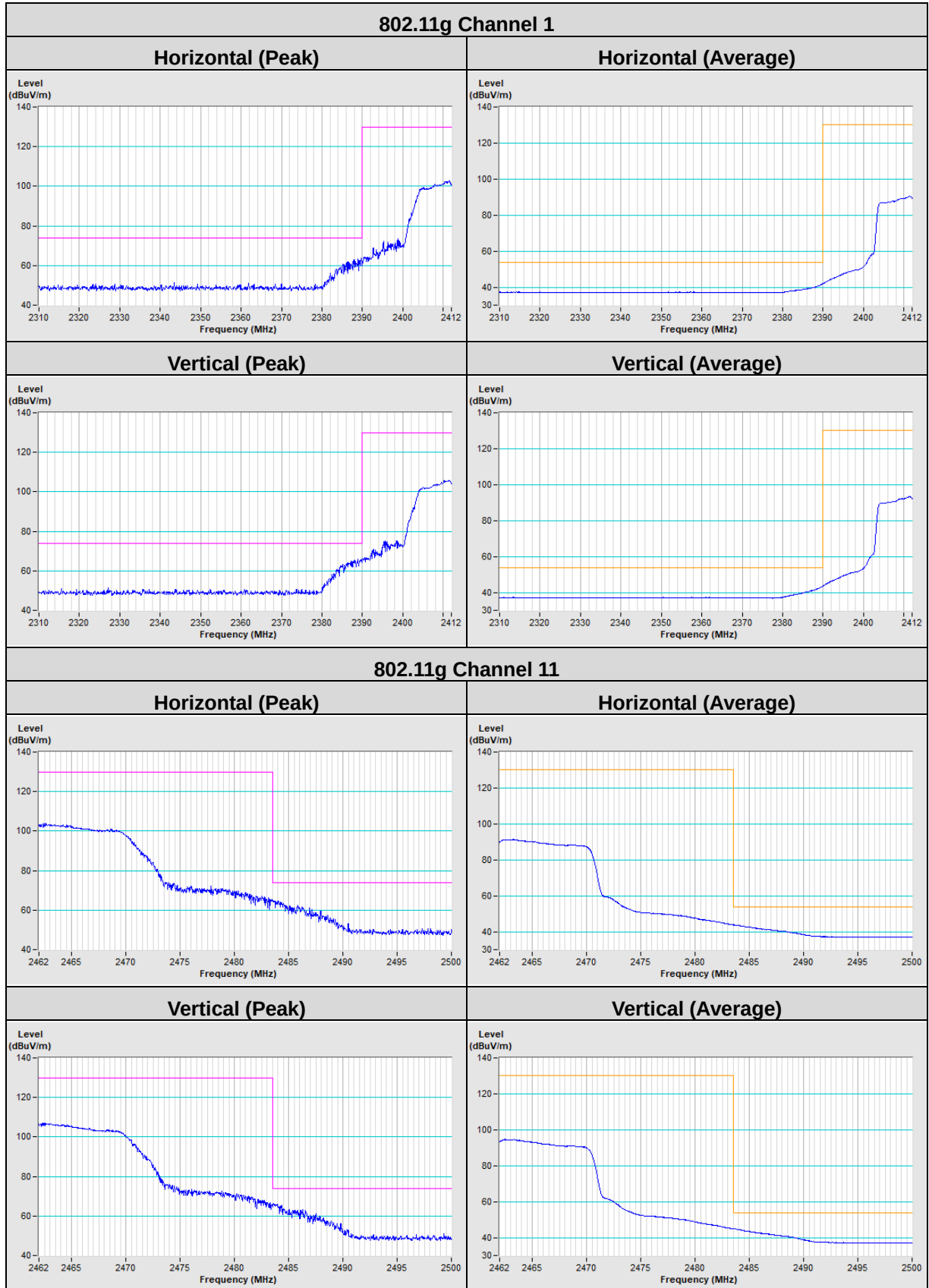


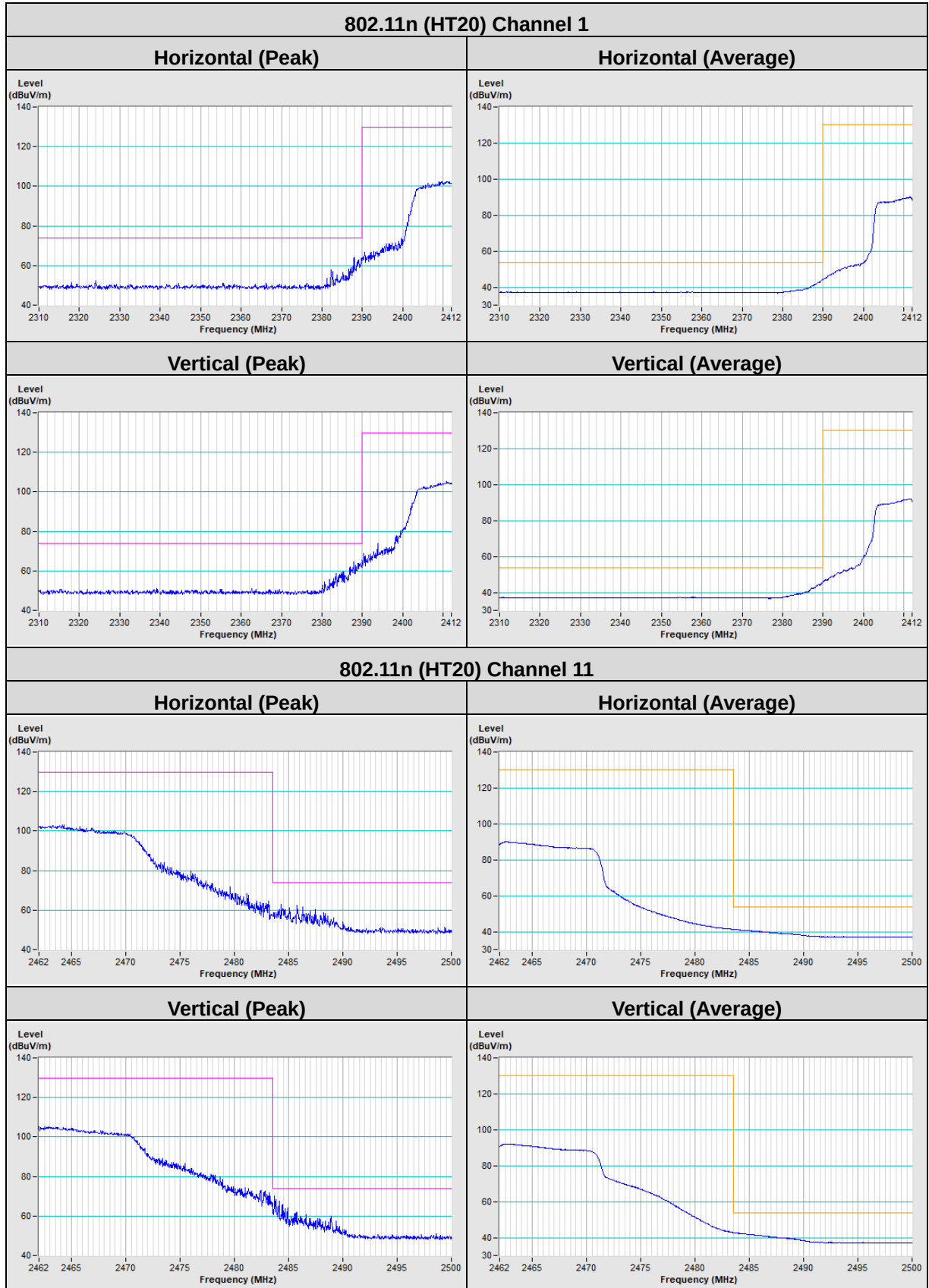
5 Pictures of Test Arrangements

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

Annex A- Band Edge Measurement







Appendix – Information of the Testing Laboratories

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

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

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