PARTIAL TEST REPORT
(SPOT CHECK)

CERTIFICATE OF CONFORMITY

Standard:	**47 CFR FCC Part 15, Subpart C (Section 15.247)**
Report No.:	RFBDYS-WTW-P20080137B
FCC ID:	TVE-2317069
Product:	Secured Wireless Access Point
Brand:	Fortinet
Model No.:	FAP-231FL
Series Model:	FORTIAP-231FLxxxxxx, FortiAP 231FLxxxxxx, FAP-231FLxxxxxx (where "x" can be used as "A-Z", or "0-9", or "-", or blank for software changes or marketing purposes only)
Received Date:	2022/9/12
Test Date:	2022/9/17 ~ 2022/9/21
Issued Date:	2022/12/01
Applicant:	Fortinet, Inc.
Address:	899 Kifer Road, Sunnyvale, CA 94086 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., Kewi Shan Dist., Taoyuan City 33383, Taiwan
FCC Registration / Designation Number:	788550 / TW0003

Approved by: Jeremy . Lin , **Date:** **2022/12/01**

Jeremy Lin / Project Engineer

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Prepared by : Polly Chien / Specialist

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Release Control Record

Issue No.	Description	Date Issued
RFBDYS-WTW-P20080137B	Original release.	2022/12/01

1 Certificate

Product:	Secured Wireless Access Point
Brand:	Fortinet
Test Model:	FAP-231FL
Series Model:	FORTIAP-231FLxxxxxx, FortiAP 231FLxxxxxx, FAP-231FLxxxxxx (where "x" can be used as "A-Z", or "0-9", or "-", or blank for software changes or marketing purposes only)
Sample Status:	Engineering sample
Applicant:	Fortinet, Inc.
Test Date:	2022/9/17 ~ 2022/9/21
Standard:	47 CFR FCC Part 15, Subpart C (Section 15.247)
Measurement procedure:	ANSI C63.10-2013 KDB 558074 D01 15.247 Meas Guidance v05r02 KDB 662911 D01 Multiple Transmitter Output v02r01

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.

2 Summary of Test Results

47 CFR FCC Part 15, Subpart C (Section 15.247)			
Standard / Clause	Test Item	Result	Remark
15.247(b)	RF Output Power	Pass	Meet the requirement of limit.
15.247(e)	Power Spectral Density	Pass	Refer to note 1
15.247(a)(2)	6 dB Bandwidth	Pass	Refer to note 1
15.247(d)	Conducted Out of Band Emissions	Pass	Refer to note 1
15.207	AC Power Conducted Emissions	Pass	Minimum passing margin is -4.56 dB at 0.47062 MHz
15.205 / 15.209 / 15.247(d)	Unwanted Emissions below 1 GHz	Pass	Minimum passing margin is -5.5 dB at 53.28 MHz
15.205 / 15.209 / 15.247(d)	Unwanted Emissions above 1 GHz	Pass	Minimum passing margin is -5.7 dB at 4874.00 MHz
15.203	Antenna Requirement	Pass	Antenna connector is i-pex(MHF) not a standard connector.

Note:
1. This report is a partial report. Therefore, only Output Power, AC Power Conducted Emission and Radiated Emissions were verified and recorded in this report. Other testing data please refer to the original BV CPS report no.: RFBDYS-WTW-P20080137.
2. Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

2.1 Measurement Uncertainty

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

Measurement	Specification	Expanded Uncertainty (k=2) (±)
AC Power Conducted Emissions	9 kHz ~ 30 MHz	2.99 dB
Unwanted Emissions below 1 GHz	9 kHz ~ 30 MHz	3.59 dB
	30 MHz ~ 1 GHz	3.60 dB
Unwanted Emissions above 1 GHz	1 GHz ~ 18 GHz	2.29 dB
	18 GHz ~ 40 GHz	2.29 dB

The other instruments specified are routine verified to remain within the calibrated levels, no measurement uncertainty is required to be calculated.

2.2 Supplementary Information

There is not any deviation from the test standards for the test method, and no modifications required for compliance.

3 General Information

3.1 General Description

Product	Secured Wireless Access Point
Brand	Fortinet
Test Model	FAP-231FL
Series Model	FORTIAP-231FLxxxxxx, FortiAP 231FLxxxxxx, FAP-231FLxxxxxx (where "x" can be used as "A-Z", or "0-9", or "-", or blank for software changes or marketing purposes only)
Model Difference	Refer to note
Status of EUT	Engineering sample
Power Supply Rating	12Vdc from Adapter 54Vdc from PoE
Modulation Type	802.11b: BPSK, QPSK, CCK 802.11g/n: BPSK, QPSK, 16QAM, 64QAM 802.11ax: BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM
Modulation Technology	DSSS, OFDM, OFDMA
Transfer Rate	802.11b:11/5.5/2/1Mbps 802.11g: 54/48/36/24/18/12/9/6Mbps 802.11n (HT20/40): up to MCS15 VHT20/40: up to MCS9 802.11ax: up to MCS11
Operating Frequency	2.412 GHz ~ 2.462 GHz
Number of Channel	2GHz traffic radio: 802.11b, 802.11g, 802.11n (HT20), 802.11n (VHT20) , 802.11ax (HE20): 11 802.11n (HT40), 802.11n (VHT40), 802.11ax (HE40): 7 Scanning radio: 802.11b, 802.11g, 802.11n (HT20): 11 802.11n (HT40): 7
Output Power	2G traffic radio: CDD Mode: 365.668 mW (25.63 dBm) 2G traffic radio: Beamforming Mode: 173.207 mW (22.39 dBm) Scanning radio: CDD Mode: 128.825 mW (21.10 dBm)

Note:

1. This report is a supplementary report to the original BV CPS report no.: RFBDYS-WTW-P20080137. The differences compared with the original design is as below. Exhibit prepared for FCC Spot Check Verification report, the format, test items and amount of spot-check test data are decided by applicant's engineering judgment, for more details please refer to declaration letter exhibit. Therefore, only Output Power, AC Power Conducted Emission and Radiated Emissions were verified and recorded in this report. AC Power Conducted Emission and Radiated Emission tests according to original report radiated emission worst channel.

   Difference:

   a) Removing BLE and Zigbee antenna & function

2. The following models are provided to this EUT. The model FAP-231FL was chosen for final test.

Brand	Test Model	Series Model	Difference
Fortinet	FAP-231FL	FORTIAP-231FLxxxxxx, FortiAP 231FLxxxxxx, FAP-231FLxxxxxx	Where "x" can be used as "A-Z", or "0-9", or "-", or blank for software changes or marketing purposes only.

3. The EUT consumes power from the following power supply. (Support unit only)

Adapter	
Brand	Asian Power Devices Inc.
Model	WA-30J12R
Input Power	100-240Vac, 50-60Hz, 0.9A MAX
Output Power	12Vdc, 2.5A
Power Line	1.5m cable without core attached on adapter

POE	
Brand	EnGenius
Model	EPA5006GPR
Input Power	100-240Vac, 50-60Hz, 0.8A
Output Power	54Vdc, 0.6A

4. The simultaneous operation mode was determined by client.

No	Mode
1	2G traffic radio (Radio 1) + 5GHz traffic radio (Radio 2) + 5G Scanning radio (Radio 3)
3	5GHz traffic radio (Radio 2) + 2G Scanning radio (Radio 3)

*5GHz traffic radio (Radio 2) and 5G Scanning radio (Radio 3) cannot transmit in the same band at same time.
2G traffic radio (Radio 1) and 2G Scanning radio (Radio 3) cannot transmit at same time.

3.2 Antenna Description of EUT

1. The antenna information is listed as below.

Antenna Type		PIFA	
Antenna Connector		i-pex(MHF)	
Antenna No.		Gain (dBi)	
		2.4~2.4835GHz	5.180~5.825GHz
1	Chain0	4.9	5.2
2	Chain1	3.8	5.5
3	Scan	4.0	5.1

* Detail antenna specification please refer to antenna datasheet and/or antenna measurement report.

2. The EUT incorporates a MIMO function:

Modulation Mode	CDD Mode	Beamforming Mode	TX Function	Radio
802.11b	Support	Not Support	2TX	2G traffic radio (Radio 1)
802.11g	Support	Not Support	2TX	
802.11n (HT20)	Support	Support	2TX	
802.11n (HT40)	Support	Support	2TX	
VHT20	Support	Support	2TX	
VHT40	Support	Support	2TX	
802.11ax (HE20)	Support	Support	2TX	
802.11ax (HE40)	Support	Support	2TX	
802.11b	Support	Not Support	1TX	Scanning radio (Radio 3)
802.11g	Support	Not Support	1TX	
802.11n (HT20)	Support	Not Support	1TX	
802.11n (HT40)	Support	Not Support	1TX	
Note: The EUT support Beamforming and CDD mode, therefore both mode were investigated and the worst case scenario was identified. The worst case data were presented in test report.				

3.3 Channel List

11 channels are provided for 802.11b, 802.11g, 802.11n (HT20), VHT20 and 802.11ax (HE20):

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

7 channels are provided for 802.11n (HT40), VHT40 and 802.11ax (HE40):

Channel	Frequency	Channel	Frequency
3	2422 MHz	7	2442 MHz
4	2427 MHz	8	2447 MHz
5	2432 MHz	9	2452 MHz
6	2437 MHz		

3.4 Test Mode Applicability and Tested Channel Detail

Pre-Scan:	EUT can be used in the following ways: X-axis/ Y-axis/ Z-axis. Pre-scan these ways and find the worst case as a representative test condition.
Worst Case:	1. X-axis/ Y-axis/ Z-axis Worst Condition: Y-axis (For 2G traffic radio) and Z-plane (For Scanning radio). 2. 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:

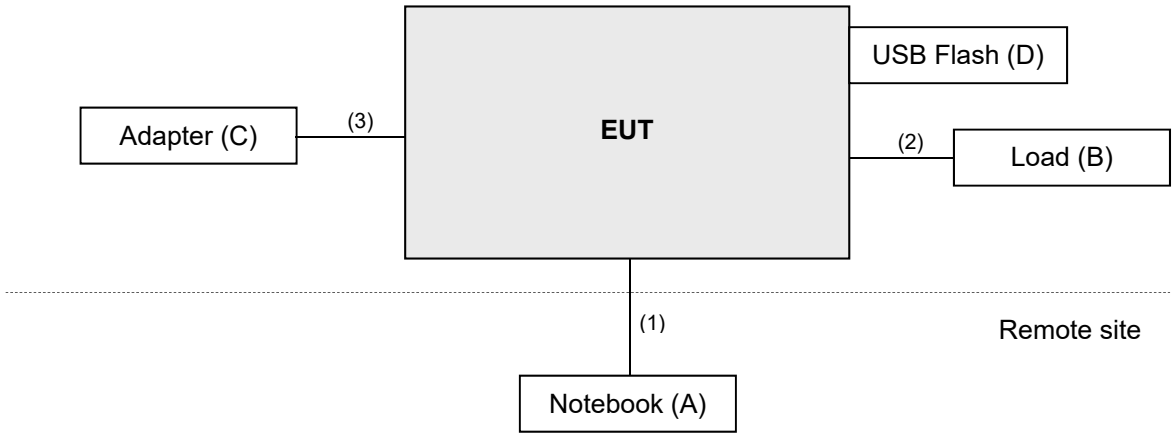
Test Item	EUT Configure Mode	Remark	Mode	Signal Mode	Tested Channel	Modulation	Data Rate Parameter
RF Output Power	B	2G traffic radio	802.11b	CDD	1, 6, 11	DBPSK	1Mb/s
			802.11g	CDD	1, 6, 11	BPSK	6Mb/s
			802.11n (HT20)	CDD & Beamforming	1, 6, 11	BPSK	6.5Mb/s
			802.11n (HT40)	CDD & Beamforming	3, 6, 9	BPSK	13.5Mb/s
			VHT20	CDD & Beamforming	1, 6, 11	BPSK	6.5Mb/s
			VHT40	CDD & Beamforming	3, 6, 9	BPSK	13.5Mb/s
			802.11ax (HE20)	CDD & Beamforming	1, 6, 11	BPSK	MCS0
			802.11ax (HE40)	CDD & Beamforming	3, 6, 9	BPSK	MCS0
		Scanning radio	802.11b	CDD	1, 6, 11	DBPSK	1Mb/s
			802.11g	CDD	1, 6, 11	BPSK	6Mb/s
			802.11n (HT20)	CDD	1, 6, 11	BPSK	6.5Mb/s
			802.11n (HT40)	CDD	3, 6, 9	BPSK	13.5Mb/s
AC Power Conducted Emissions	A, B	2G traffic radio	802.11ax (HE20)	CDD	6	BPSK	MCS0
	A, B	Scanning radio	802.11b	CDD	6	DBPSK	1Mb/s
Unwanted Emissions below 1 GHz	A, B	2G traffic radio	802.11ax (HE20)	CDD	6	BPSK	MCS0
	A, B	Scanning radio	802.11b	CDD	6	DBPSK	1Mb/s
Unwanted Emissions above 1 GHz	B	2G traffic radio	802.11ax (HE20)	CDD	6	DBPSK	MCS0
	B	Scanning radio	802.11b	CDD	6	BPSK	1Mb/s
EUT Configure Mode:		A	Power from adapter				
		B	Power from PoE				

3.5 Test Program Used and Operation Descriptions

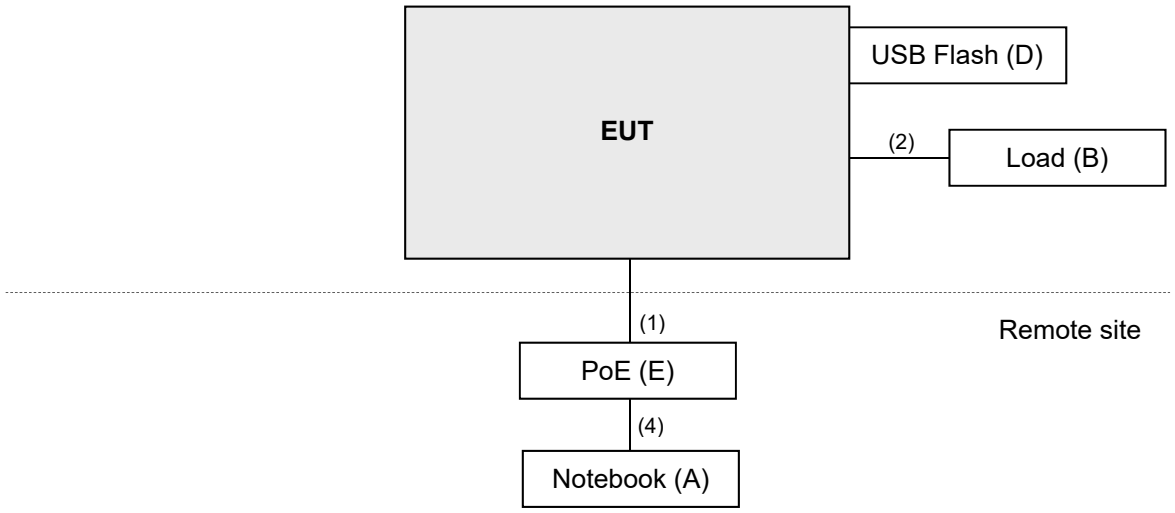
Controlling software QSPR has been activated to set the EUT under transmission condition continuously at specific channel frequency.

3.6 Connection Diagram of EUT and Peripheral Devices

Mode A



Mode B



3.7 Configuration of Peripheral Devices and Cable Connections

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Notebook	Lenovo	20J4 MD A003TW	PF-11H9AK	FCC DoC Approved	Provided by Lab
B.	Load	NA	NA	NA	NA	Provided by Lab
C.	Adapter	Asian Power Devices Inc.	WA-30J12R	NA	NA	Supplied by applicant
D.	USB Flash	Sandisk	NA	03	NA	Provided by Lab
E.	POE	EnGenius	EPA5006GPR	NA	NA	Supplied by applicant

ID	Cable Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	RJ-45 Cable	1	7.0	N	0	Provided by Lab
2.	RJ-45 Cable	2	1.5	N	0	Provided by Lab
3.	Power cable	1	1.5	-	0	Supplied by applicant
4.	RJ-45 Cable	1	1.5	N	0	Provided by Lab

4 Test Instruments

The calibration interval of the all test instruments are 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

4.1 RF Output Power

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Peak Power Analyzer KEYSIGHT	8990B	MY51000485	2022/1/18	2023/1/17
Power sensor Keysight	U2021XA	MY55380009	2022/3/23	2023/3/22
Wideband Power Sensor(N1923A) KEYSIGHT	N1923A	MY58020002	2022/1/17	2023/1/16

Notes:

1. The test was performed in Oven room.
2. Tested Date: 2022/9/21

4.2 AC Power Conducted Emissions

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
DC-LISN SCHWARZBECK MESS-ELETRONIK	NNBM 8126G	8126G-069	2021/11/10	2022/11/9
LISN R&S	ESH3-Z5	100220	2021/11/25	2022/11/24
LISN ROHDE & SCHWARZ	ENV216	101826	2022/3/14	2023/3/13
RF Coaxial Cable WOKEN	5D-FB	Cable-cond1-01	2022/1/15	2023/1/14
Software BVADT	BVADT_Cond_ V7.3.7.4	N/A	N/A	N/A
Test Receiver Rohde&Schwarz	ESCI	100613	2021/12/3	2022/12/2
V-LISN Schwarzbeck	NNBL 8226-2	8226-142	2022/8/31	2023/8/30

Notes:

1. The test was performed in HY - Conduction 1.
2. Tested Date: 2022/9/19 ~ 2022/9/21

4.3 Unwanted Emissions below 1 GHz

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Antenna Tower &Turn BV ADT	AT100	AT93021705	N/A	N/A
Bi_Log Antenna Schwarbeck	VULB9168	9168-160	2021/10/28	2022/10/27
Loop Antenna TESEQ	HLA 6121	45745	2022/7/27	2023/7/26
Preamplifier Agilent	8447D	2944A10638	2022/5/14	2023/5/13
RF Coaxial Cable EMCI	5D-NM-BM	140903+140902	2022/1/15	2023/1/14
RF Coaxial Cable WOKEN	8D-FB	Cable-CH9-01	2022/5/14	2023/5/13
Software BV ADT	ADT_Radiated_ V7.6.15.9.5	N/A	N/A	N/A
Spectrum Analyzer R&S	FSW43	101867	2022/1/7	2023/1/6
Test Receiver Agilent	N9038A	MY51210203	2021/9/22	2022/9/21
Turn Table BV ADT	TT100	TT93021705	N/A	N/A
Turn Table Controller BV ADT	SC100	SC93021705	N/A	N/A

Notes:

1. The test was performed in HY - 966 chamber 4.
2. Tested Date: 2022/9/19 ~ 2022/9/21

4.4 Unwanted Emissions above 1 GHz

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Antenna Tower &Turn BV ADT	AT100	AT93021705	N/A	N/A
Boresight antenna tower fixture BV	BAF-02	5	N/A	N/A
Horn Antenna Schwarzbeck	9120D	9120D-1169	2021/11/14	2022/11/13
	BBHA 9170	BBHA9170241	2021/10/26	2022/10/25
Pre-Ammlifier EMCI	EMC 184045	980116	2021/10/5	2022/10/4
Preamplifier Agilent	8449B	3008A02367	2022/2/16	2023/2/15
RF Coaxial Cable HUBER+SUHNER	SUCOFLEX 104	CABLE-CH9-(250795/4)	2022/1/15	2023/1/14
RF Coaxial Cable HUBER+SUHNER&EMCI	SUCOFLEX 104& EMC104-SM-SM8000	CABLE-CH9-02 (248780+171006)	2022/1/15	2023/1/14
RF FLITER MICRO-TRONICS	BRM17690	004	2022/1/10	2023/1/9
	BRM50716	060	2022/1/10	2023/1/9
Software BV ADT	ADT_Radiated_ V7.6.15.9.5	N/A	N/A	N/A
Spectrum Analyzer R&S	FSW43	101867	2022/1/7	2023/1/6
Test Receiver Agilent	N9038A	MY51210203	2021/9/22	2022/9/21
Turn Table BV ADT	TT100	TT93021705	N/A	N/A
Turn Table Controller BV ADT	SC100	SC93021705	N/A	N/A

Notes:

1. The test was performed in HY - 966 chamber 4.
2. Tested Date: 2022/9/17 ~ 2022/9/19

5 Limits of Test Items

5.1 RF Output Power

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

Per KDB 662911 D01 Multiple Transmitter Output Method of conducted output power measurement on IEEE 802.11 devices,

Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$;
Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any N_{ANT};
Array Gain = 5 log(N_{ANT}/N_{SS}) dB or 3 dB, whichever is less, for 20-MHz channel widths with $N_{ANT} \geq 5$.

For power measurements on all other devices: Array Gain = 10 log(N_{ANT}/N_{SS}) dB.

5.2 AC Power Conducted Emissions

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

Notes:

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.

5.3 Unwanted Emissions below 1 GHz

Radiated emissions up to 1 GHz 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

Notes:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).

5.4 Unwanted Emissions above 1 GHz

Radiated emissions above 1 GHz 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)
Above 960	500	3

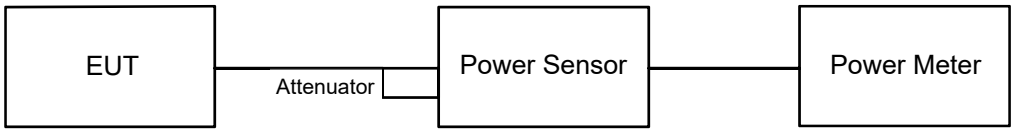
Notes:

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.

6 Test Arrangements

6.1 RF Output Power

6.1.1 Test Setup

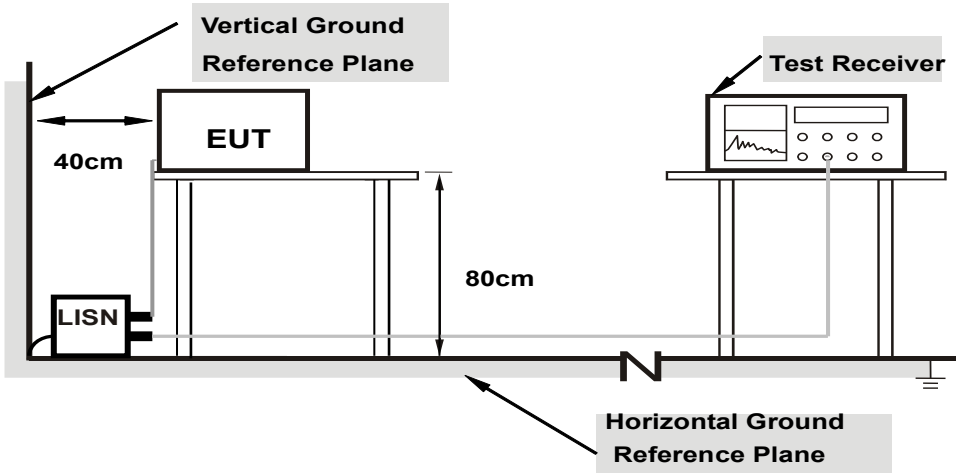


6.1.2 Test Procedure

Average Power:
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.

6.2 AC Power Conducted Emissions

6.2.1 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).

6.2.2 Test Procedure

a. The EUT was placed on a 0.8 meter to the top of table and placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50 uH of coupling impedance for the measuring instrument.

b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

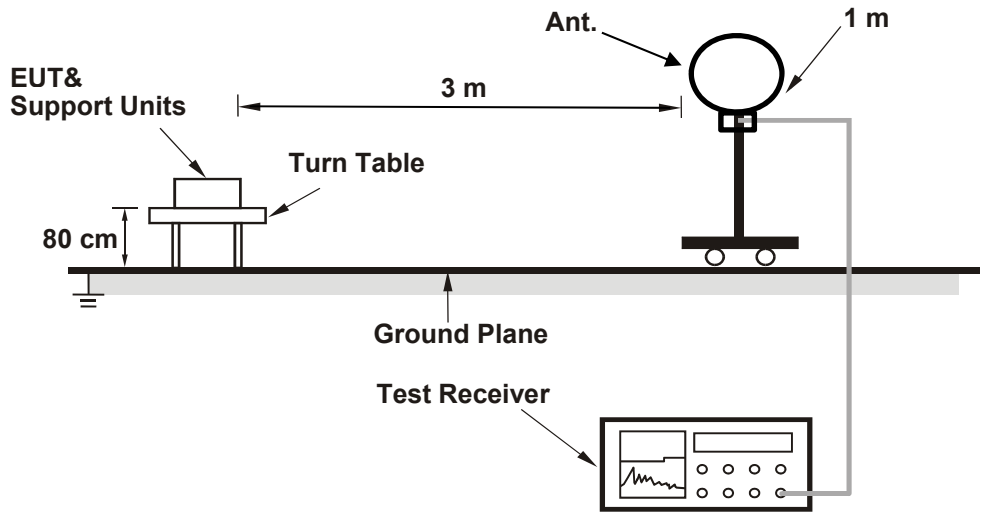
c. The frequency range from 150 kHz to 30 MHz was searched. Emission levels under (Limit – 20 dB) was not recorded.

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

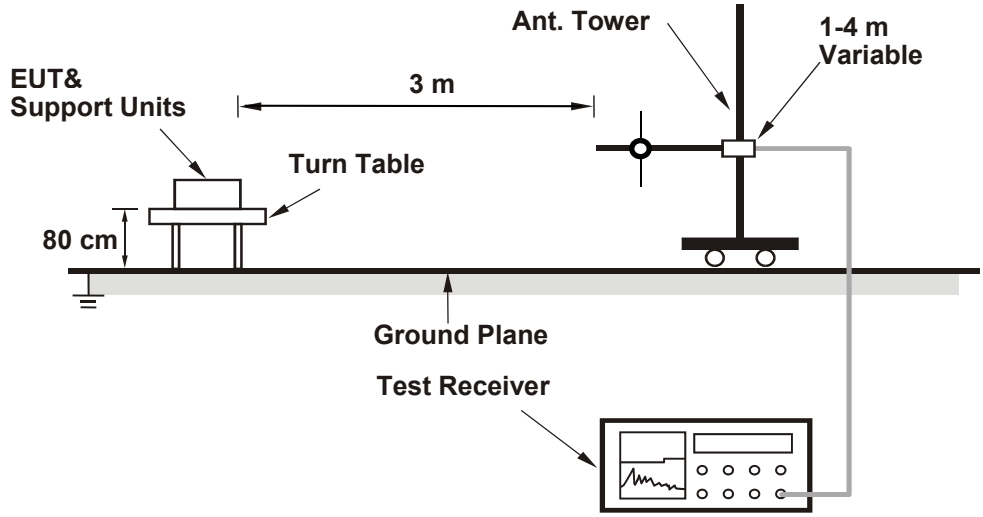
6.3 Unwanted Emissions below 1 GHz

6.3.1 Test Setup

For Radiated emission below 30 MHz



For Radiated emission above 30 MHz



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

6.3.2 Test Procedure

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 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. 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, except for the frequency band (9 kHz to 90 kHz and 110 kHz to 490 kHz) set to average detect function and peak detect function.

Notes:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 200 Hz at frequency below 150 kHz.
2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9 kHz or 10 kHz at frequency (150 kHz to 30 MHz).
3. All modes of operation were investigated and the worst-case emissions are reported.

For Radiated emission above 30 MHz

a. The EUT was placed on the top of a rotating table 0.8 meters 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.

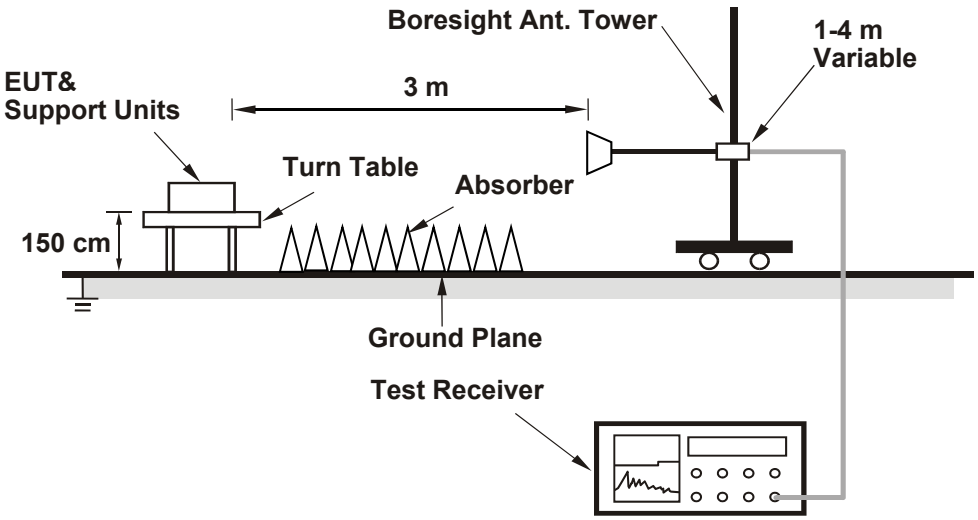
e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.

Notes:

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. All modes of operation were investigated and the worst-case emissions are reported.

6.4 Unwanted Emissions above 1 GHz

6.4.1 Test Setup



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

6.4.2 Test Procedure

a. The EUT was placed on the top of a rotating table 1.5 meters 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 peak and average detects 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.

Notes:

1. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) and Average detection (AV) at frequency above 1 GHz.
2. For fundamental and harmonic signal measurement, the resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is ≥ 1/T (Duty cycle < 98%) or 10 Hz (Duty cycle ≥ 98%) for Average detection (AV) at frequency above 1 GHz.
3. All modes of operation were investigated and the worst-case emissions are reported.

7 Test Results of Test Item

7.1 RF Output Power

Input Power:	120 Vac, 60 Hz	Environmental Conditions:	23°C, 65% RH	Tested By:	Tim Chen

2G traffic radio:

802.11b CDD

Chan.	Chan. Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Test Result
		Chain 0	Chain 1				
1	2412	21.45	21.68	286.868	24.58	30	Pass
6	2437	21.59	21.42	282.887	24.52	30	Pass
11	2462	20.21	20.30	212.106	23.27	30	Pass

Notes:

1. Directional gain is the maximum gain of antennas.
2. The maximum gain is 4.9 dBi < 6 dBi, so the output power limit shall not be reduced.

802.11g CDD

Chan.	Chan. Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Test Result
		Chain 0	Chain 1				
1	2412	19.87	19.99	196.821	22.94	30	Pass
6	2437	22.69	22.55	365.668	25.63	30	Pass
11	2462	20.33	20.06	209.286	23.21	30	Pass

Notes:

1. Directional gain is the maximum gain of antennas.
2. The maximum gain is 4.9 dBi < 6 dBi, so the output power limit shall not be reduced.

802.11n (HT20) CDD

Chan.	Chan. Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Test Result
		Chain 0	Chain 1				
1	2412	19.20	19.48	171.892	22.35	30	Pass
6	2437	22.27	22.39	342.036	25.34	30	Pass
11	2462	19.52	19.34	175.438	22.44	30	Pass

Notes:

1. Directional gain is the maximum gain of antennas.
2. The maximum gain is 4.9 dBi < 6 dBi, so the output power limit shall not be reduced.

802.11n (HT40) CDD

Chan.	Chan. Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Test Result
		Chain 0	Chain 1				
3	2422	19.48	19.77	183.557	22.64	30	Pass
6	2437	19.74	19.62	185.811	22.69	30	Pass
9	2452	17.74	17.61	117.106	20.69	30	Pass

Notes:

1. Directional gain is the maximum gain of antennas.
2. The maximum gain is 4.9 dBi < 6 dBi, so the output power limit shall not be reduced.

VHT20 CDD

Chan.	Chan. Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Test Result
		Chain 0	Chain 1				
1	2412	19.23	19.49	172.673	22.37	30	Pass
6	2437	22.29	22.36	341.621	25.34	30	Pass
11	2462	19.52	19.34	175.438	22.44	30	Pass

Notes:

1. Directional gain is the maximum gain of antennas.
2. The maximum gain is 4.9 dBi < 6 dBi, so the output power limit shall not be reduced.

VHT40 CDD

Chan.	Chan. Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Test Result
		Chain 0	Chain 1				
3	2422	19.52	19.82	185.477	22.68	30	Pass
6	2437	19.80	19.68	188.396	22.75	30	Pass
9	2452	17.75	17.69	118.315	20.73	30	Pass

Notes:

1. Directional gain is the maximum gain of antennas.
2. The maximum gain is 4.9 dBi < 6 dBi, so the output power limit shall not be reduced.

802.11ax (HE20) CDD

Chan.	Chan. Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Test Result
		Chain 0	Chain 1				
1	2412	19.42	19.52	177.035	22.48	30	Pass
6	2437	22.42	22.39	347.963	25.42	30	Pass
11	2462	19.56	19.40	177.461	22.49	30	Pass

Notes:

1. Directional gain is the maximum gain of antennas.
2. The maximum gain is 4.9 dBi < 6 dBi, so the output power limit shall not be reduced.

802.11ax (HE40) CDD

Chan.	Chan. Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Test Result
		Chain 0	Chain 1				
3	2422	19.55	19.85	186.762	22.71	30	Pass
6	2437	19.85	19.71	190.146	22.79	30	Pass
9	2452	17.81	17.75	119.961	20.79	30	Pass

Notes:

1. Directional gain is the maximum gain of antennas.
2. The maximum gain is 4.9 dBi < 6 dBi, so the output power limit shall not be reduced.

802.11n (HT20) Beamforming

Chan.	Chan. Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Test Result
		Chain 0	Chain 1				
1	2412	16.45	16.35	87.309	19.41	28.09	Pass
6	2437	19.37	19.27	171.025	22.33	28.09	Pass
11	2462	16.52	16.28	87.336	19.41	28.09	Pass

Notes:

1. Directional gain = gain of antenna element + 10 log (2 of TX antenna elements)
2. The directional gain is 7.91 dBi > 6 dBi, so the output power limit shall be reduced to 30-(7.91-6) = 28.09 dBm.

802.11n (HT40) Beamforming

Chan.	Chan. Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Test Result
		Chain 0	Chain 1				
3	2422	16.73	16.61	92.912	19.68	28.09	Pass
6	2437	16.78	16.67	94.095	19.74	28.09	Pass
9	2452	14.71	14.60	58.42	17.67	28.09	Pass

Notes:

1. Directional gain = gain of antenna element + 10 log (2 of TX antenna elements)
2. The directional gain is 7.91 dBi > 6 dBi, so the output power limit shall be reduced to 30-(7.91-6) = 28.09 dBm.

VHT20 Beamforming

Chan.	Chan. Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Test Result
		Chain 0	Chain 1				
1	2412	16.49	16.38	88.017	19.45	28.09	Pass
6	2437	19.41	19.31	172.607	22.37	28.09	Pass
11	2462	16.53	16.35	88.13	19.45	28.09	Pass

Notes:

1. Directional gain = gain of antenna element + 10 log (2 of TX antenna elements)
2. The directional gain is 7.91 dBi > 6 dBi, so the output power limit shall be reduced to 30-(7.91-6) = 28.09 dBm.

VHT40 Beamforming

Chan.	Chan. Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Test Result
		Chain 0	Chain 1				
3	2422	16.75	16.64	93.447	19.71	28.09	Pass
6	2437	16.81	16.70	94.747	19.77	28.09	Pass
9	2452	14.73	14.62	58.69	17.69	28.09	Pass

Notes:

1. Directional gain = gain of antenna element + 10 log (2 of TX antenna elements)
2. The directional gain is 7.91 dBi > 6 dBi, so the output power limit shall be reduced to 30-(7.91-6) = 28.09 dBm.

802.11ax (HE20) Beamforming

Chan.	Chan. Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Test Result
		Chain 0	Chain 1				
1	2412	16.52	16.41	88.627	19.48	28.09	Pass
6	2437	19.43	19.32	173.207	22.39	28.09	Pass
11	2462	16.55	16.41	88.938	19.49	28.09	Pass

Notes:

1. Directional gain = gain of antenna element + 10 log (2 of TX antenna elements)
2. The directional gain is 7.91 dBi > 6 dBi, so the output power limit shall be reduced to 30-(7.91-6) = 28.09 dBm.

802.11ax (HE40) Beamforming

Chan.	Chan. Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Test Result
		Chain 0	Chain 1				
3	2422	16.76	16.68	93.983	19.73	28.09	Pass
6	2437	16.83	16.72	95.184	19.79	28.09	Pass
9	2452	14.76	14.65	59.097	17.72	28.09	Pass

Notes:

1. Directional gain = gain of antenna element + 10 log (2 of TX antenna elements)
2. The directional gain is 7.91 dBi > 6 dBi, so the output power limit shall be reduced to 30-(7.91-6) = 28.09 dBm.

Input Power:	120 Vac, 60 Hz	Environmental Conditions:	23°C, 65% RH	Tested By:	Tim Chen

Scanning radio:

802.11b

Chan.	Chan. Freq. (MHz)	Average Power (mW)	Average Power (dBm)	Power Limit (dBm)	Test Result
1	2412	94.406	19.75	30	Pass
6	2437	128.825	21.10	30	Pass
11	2462	116.95	20.68	30	Pass

Note: The antenna gain is 4 dBi < 6 dBi, so the output power limit shall not be reduced.

802.11g

Chan.	Chan. Freq. (MHz)	Average Power (mW)	Average Power (dBm)	Power Limit (dBm)	Test Result
1	2412	64.863	18.12	30	Pass
6	2437	124.738	20.96	30	Pass
11	2462	45.186	16.55	30	Pass

Note: The antenna gain is 4 dBi < 6 dBi, so the output power limit shall not be reduced.

802.11n (HT20)

Chan.	Chan. Freq. (MHz)	Average Power (mW)	Average Power (dBm)	Power Limit (dBm)	Test Result
1	2412	64.565	18.10	30	Pass
6	2437	118.032	20.72	30	Pass
11	2462	43.152	16.35	30	Pass

Note: The antenna gain is 4 dBi < 6 dBi, so the output power limit shall not be reduced.

802.11n (HT40)

Chan.	Chan. Freq. (MHz)	Average Power (mW)	Average Power (dBm)	Power Limit (dBm)	Test Result
3	2422	41.21	16.15	30	Pass
6	2437	56.105	17.49	30	Pass
9	2452	25.468	14.06	30	Pass

Note: The antenna gain is 4 dBi < 6 dBi, so the output power limit shall not be reduced.

7.2 AC Power Conducted Emissions

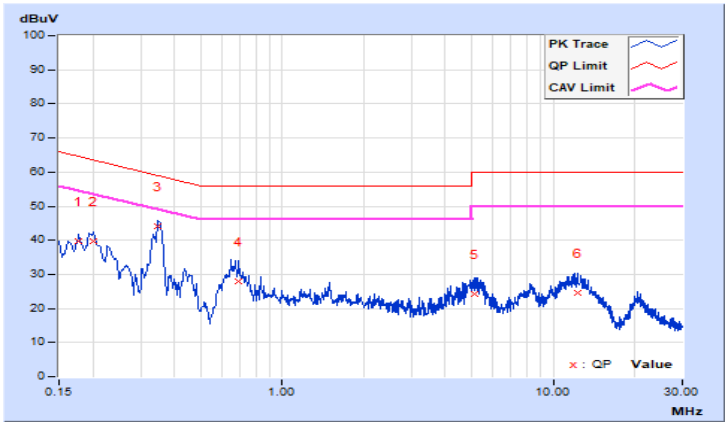
2G traffic radio:

RF Mode	TX 802.11ax (HE20)	**Channel**	CH 6：2437 MHz
Frequency Range	150 kHz ~ 30 MHz	**Detector Function & Resolution Bandwidth**	Quasi-Peak (QP) / Average (AV), 9 kHz
Input Power	120 Vac, 60 Hz	**Environmental Conditions**	25°C, 75% RH
Tested By	Rex Wang	**Test 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	0.17800	9.70	30.11	20.82	39.81	30.52	64.58	54.58	-24.77	-24.06
2	0.20148	9.72	29.94	20.37	39.66	30.09	63.55	53.55	-23.89	-23.46
3	0.34600	9.78	34.46	27.01	44.24	36.79	59.06	49.06	-14.82	-12.27
4	0.69000	9.82	18.12	13.31	27.94	23.13	56.00	46.00	-28.06	-22.87
5	5.13800	9.97	14.18	6.08	24.15	16.05	60.00	50.00	-35.85	-33.95
6	12.29800	10.09	14.35	8.83	24.44	18.92	60.00	50.00	-35.56	-31.08

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

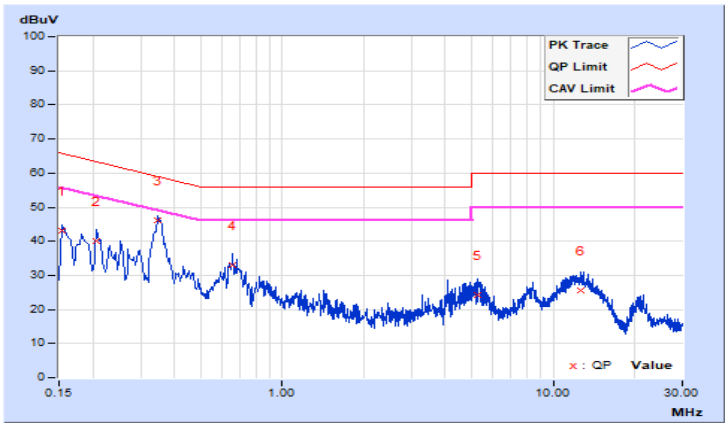


RF Mode	TX 802.11ax (HE20)	**Channel**	CH 6：2437 MHz
Frequency Range	150 kHz ~ 30 MHz	**Detector Function & Resolution Bandwidth**	Quasi-Peak (QP) / Average (AV), 9 kHz
Input Power	120 Vac, 60 Hz	**Environmental Conditions**	25°C, 75% RH
Tested By	Rex Wang	**Test Mode**	A

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	0.15400	9.68	33.41	23.16	43.09	32.84	65.78	55.78	-22.69	-22.94
2	0.20600	9.72	30.45	21.93	40.17	31.65	63.37	53.37	-23.20	-21.72
3	0.34600	9.79	36.36	29.13	46.15	38.92	59.06	49.06	-12.91	-10.14
4	0.65400	9.83	23.27	16.99	33.10	26.82	56.00	46.00	-22.90	-19.18
5	5.28600	9.99	14.23	5.84	24.22	15.83	60.00	50.00	-35.78	-34.17
6	12.59400	10.10	15.49	10.08	25.59	20.18	60.00	50.00	-34.41	-29.82

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

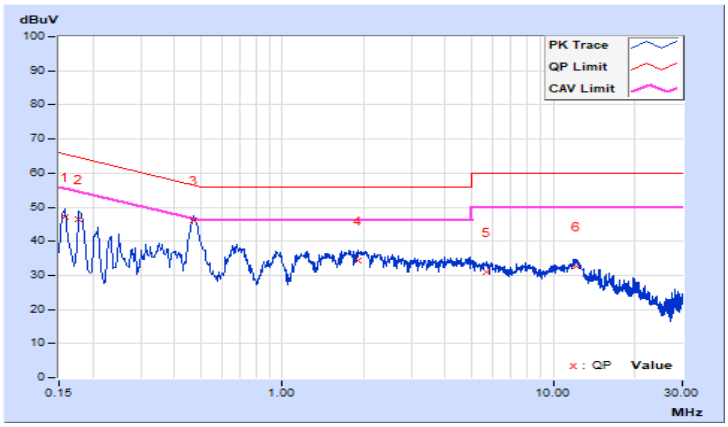


RF Mode	TX 802.11ax (HE20)	Channel	CH 6：2437 MHz
Frequency Range	150 kHz ~ 30 MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9 kHz
Input Power	120 Vac, 60 Hz	Environmental Conditions	21.4°C, 68.1% RH
Tested By	Thomas Cheng	Test Mode	B

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	0.15800	9.69	37.52	25.41	47.21	35.10	65.57	55.57	-18.36	-20.47
2	0.17800	9.70	36.91	21.53	46.61	31.23	64.58	54.58	-17.97	-23.35
3	0.46938	9.80	36.32	31.48	46.12	41.28	56.52	46.52	-10.40	-5.24
4	1.91400	9.89	24.38	19.53	34.27	29.42	56.00	46.00	-21.73	-16.58
5	5.67000	9.98	20.92	13.95	30.90	23.93	60.00	50.00	-29.10	-26.07
6	12.16600	10.08	22.68	15.74	32.76	25.82	60.00	50.00	-27.24	-24.18

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

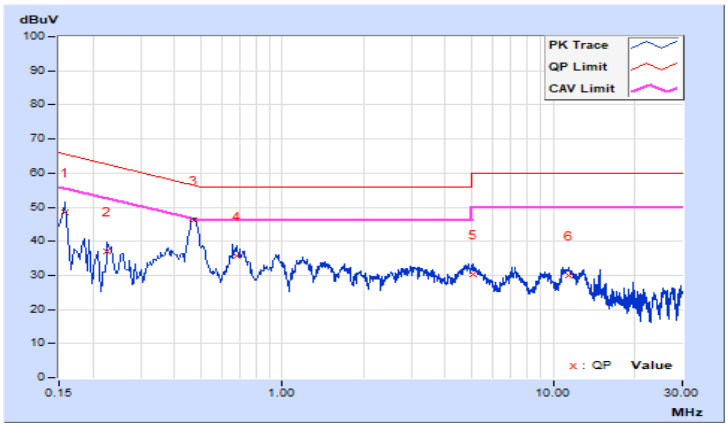


RF Mode	TX 802.11ax (HE20)	Channel	CH 6：2437 MHz
Frequency Range	150 kHz ~ 30 MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9 kHz
Input Power	120 Vac, 60 Hz	Environmental Conditions	21.4°C, 68.1% RH
Tested By	Thomas Cheng	Test Mode	B

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	0.15800	9.69	38.82	24.99	48.51	34.68	65.57	55.57	-17.06	-20.89
2	0.22600	9.73	27.20	13.81	36.93	23.54	62.60	52.60	-25.67	-29.06
3	**0.47062**	**9.82**	**36.46**	**32.12**	**46.28**	**41.94**	**56.50**	**46.50**	**-10.22**	**-4.56**
4	0.67800	9.83	25.99	20.97	35.82	30.80	56.00	46.00	-20.18	-15.20
5	5.03800	9.99	20.22	12.89	30.21	22.88	60.00	50.00	-29.79	-27.12
6	11.39400	10.08	19.83	13.56	29.91	23.64	60.00	50.00	-30.09	-26.36

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



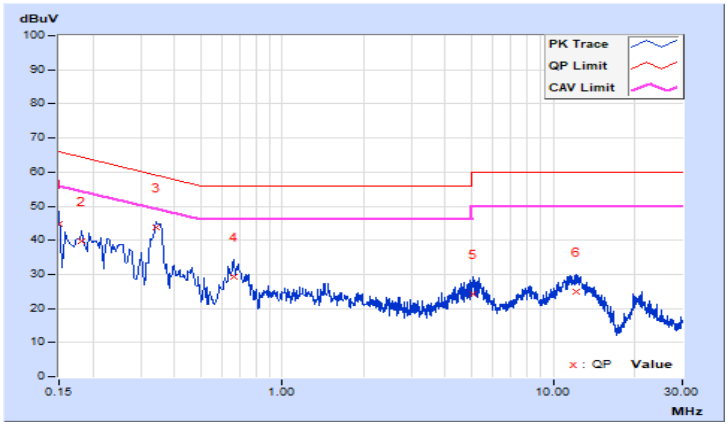
Scanning radio:

RF Mode	TX 802.11b	**Channel**	CH 6：2437 MHz
Frequency Range	150 kHz ~ 30 MHz	**Detector Function & Resolution Bandwidth**	Quasi-Peak (QP) / Average (AV), 9 kHz
Input Power	120 Vac, 60 Hz	**Environmental Conditions**	25°C, 75% RH
Tested By	Rex Wang	**Test 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	0.15000	9.68	35.15	23.75	44.83	33.43	66.00	56.00	-21.17	-22.57
2	0.18200	9.71	29.95	20.77	39.66	30.48	64.39	54.39	-24.73	-23.91
3	0.34200	9.78	33.96	26.17	43.74	35.95	59.15	49.15	-15.41	-13.20
4	0.66200	9.82	19.47	14.66	29.29	24.48	56.00	46.00	-26.71	-21.52
5	5.05400	9.97	14.25	6.53	24.22	16.50	60.00	50.00	-35.78	-33.50
6	12.19800	10.08	14.74	8.93	24.82	19.01	60.00	50.00	-35.18	-30.99

Remarks:

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

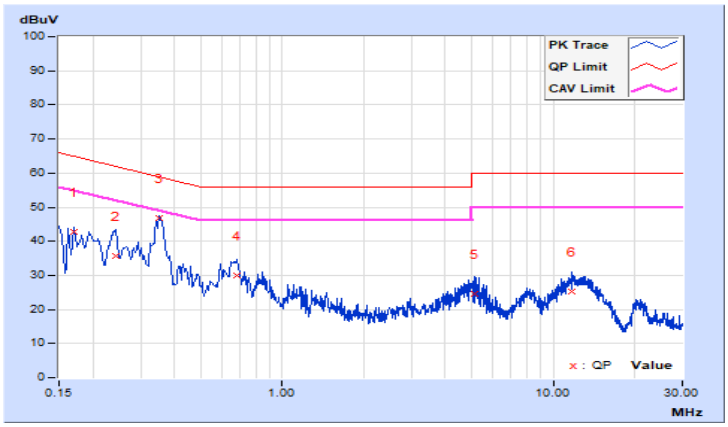


RF Mode	TX 802.11b	Channel	CH 6：2437 MHz
Frequency Range	150 kHz ~ 30 MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9 kHz
Input Power	120 Vac, 60 Hz	Environmental Conditions	25°C, 75% RH
Tested By	Rex Wang	Test Mode	A

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	0.17000	9.70	33.10	23.40	42.80	33.10	64.96	54.96	-22.16	-21.86
2	0.24165	9.74	25.97	17.29	35.71	27.03	62.04	52.04	-26.33	-25.01
3	0.35000	9.79	37.03	30.80	46.82	40.59	58.96	48.96	-12.14	-8.37
4	0.68200	9.83	20.29	14.92	30.12	24.75	56.00	46.00	-25.88	-21.25
5	5.13800	9.99	14.62	6.30	24.61	16.29	60.00	50.00	-35.39	-33.71
6	11.78200	10.09	15.21	9.75	25.30	19.84	60.00	50.00	-34.70	-30.16

Remarks:

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

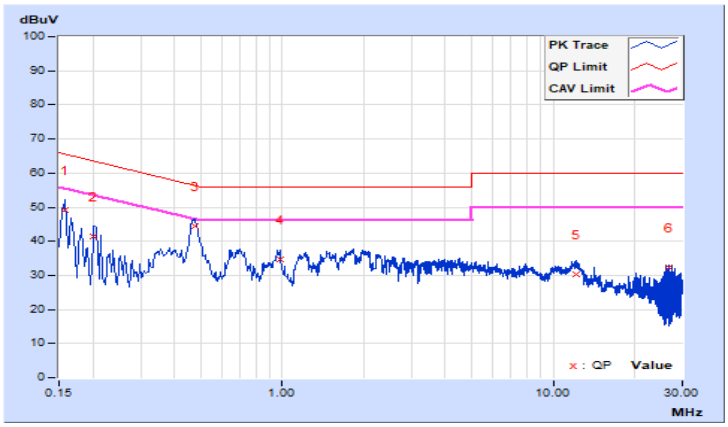


RF Mode	TX 802.11b	**Channel**	CH 6：2437 MHz
Frequency Range	150 kHz ~ 30 MHz	**Detector Function & Resolution Bandwidth**	Quasi-Peak (QP) / Average (AV), 9 kHz
Input Power	120 Vac, 60 Hz	**Environmental Conditions**	25°C, 75% RH
Tested By	Rex Wang	**Test Mode**	B

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	0.15800	9.62	39.54	25.71	49.16	35.33	65.57	55.57	-16.41	-20.24
2	0.20200	9.64	31.69	16.60	41.33	26.24	63.53	53.53	-22.20	-27.29
3	0.47400	9.69	34.88	31.02	44.57	40.71	56.44	46.44	-11.87	-5.73
4	0.98153	9.70	24.84	20.31	34.54	30.01	56.00	46.00	-21.46	-15.99
5	12.11400	9.82	20.55	15.69	30.37	25.51	60.00	50.00	-29.63	-24.49
6	26.77000	9.87	22.44	21.71	32.31	31.58	60.00	50.00	-27.69	-18.42

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

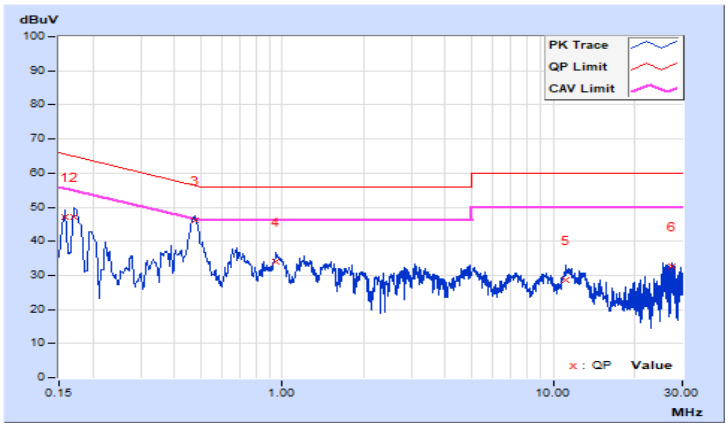


RF Mode	TX 802.11b	**Channel**	CH 6：2437 MHz
Frequency Range	150 kHz ~ 30 MHz	**Detector Function & Resolution Bandwidth**	Quasi-Peak (QP) / Average (AV), 9 kHz
Input Power	120 Vac, 60 Hz	**Environmental Conditions**	25°C, 75% RH
Tested By	Rex Wang	**Test Mode**	B

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	0.15728	9.62	37.63	26.16	47.25	35.78	65.61	55.61	-18.36	-19.83
2	0.17000	9.63	37.39	22.00	47.02	31.63	64.96	54.96	-17.94	-23.33
3	0.47560	9.69	36.46	30.56	46.15	40.25	56.42	46.42	-10.27	-6.17
4	0.95000	9.70	24.43	20.68	34.13	30.38	56.00	46.00	-21.87	-15.62
5	11.17800	9.82	18.88	13.57	28.70	23.39	60.00	50.00	-31.30	-26.61
6	27.53800	9.87	22.84	20.70	32.71	30.57	60.00	50.00	-27.29	-19.43

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



7.3 Unwanted Emissions below 1 GHz

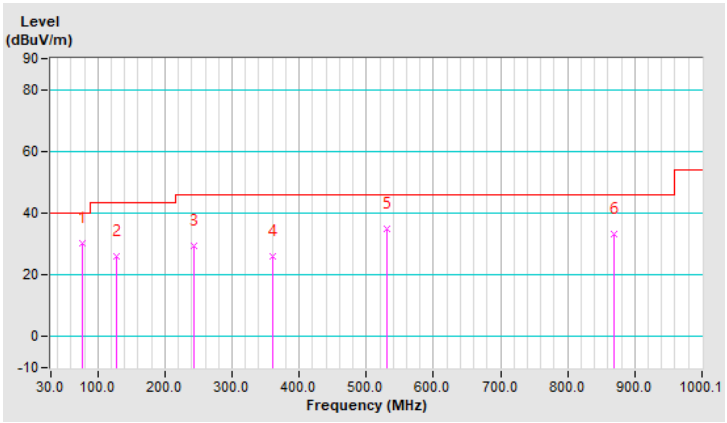
2G traffic radio

RF Mode	TX 802.11ax (HE20)	**Channel**	CH 6：2437 MHz
Frequency Range	9 kHz ~ 1 GHz	**Detector Function & Bandwidth**	(QP) RB = 120kHz
Input Power	120 Vac, 60 Hz	**Environmental Conditions**	21°C, 68% RH
Tested By	Thomas Cheng	**Test Mode**	A

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	77.53	30.4 QP	40.0	-9.6	3.24 H	272	47.4	-17.0
2	127.98	25.9 QP	43.5	-17.6	1.10 H	45	39.5	-13.6
3	243.42	29.6 QP	46.0	-16.4	3.35 H	342	44.2	-14.6
4	359.83	26.2 QP	46.0	-19.8	1.28 H	339	36.4	-10.2
5	531.54	35.1 QP	46.0	-10.9	3.42 H	314	40.6	-5.5
6	869.14	33.2 QP	46.0	-12.8	3.01 H	90	31.9	1.3

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.

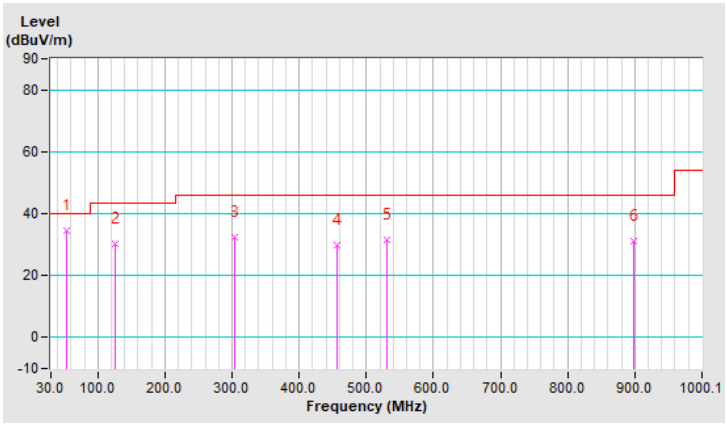


RF Mode	TX 802.11ax (HE20)	Channel	CH 6：2437 MHz
Frequency Range	9 kHz ~ 1 GHz	Detector Function & Bandwidth	(QP) RB = 120kHz
Input Power	120 Vac, 60 Hz	Environmental Conditions	21°C, 68% RH
Tested By	Thomas Cheng	Test Mode	A

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	**53.28**	**34.5 QP**	**40.0**	**-5.5**	**1.70 V**	**81**	**47.2**	**-12.7**
2	126.04	30.4 QP	43.5	-13.1	3.65 V	268	44.1	-13.7
3	303.57	32.3 QP	46.0	-13.7	1.29 V	225	44.2	-11.9
4	455.87	29.7 QP	46.0	-16.3	1.38 V	263	36.9	-7.2
5	531.54	31.4 QP	46.0	-14.6	2.21 V	162	36.9	-5.5
6	899.21	31.3 QP	46.0	-14.7	1.38 V	333	29.7	1.6

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 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.

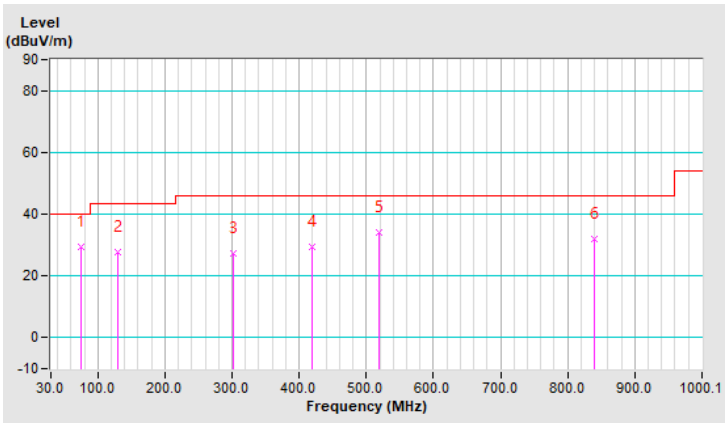


RF Mode	TX 802.11ax (HE20)	Channel	CH 6：2437 MHz
Frequency Range	9 kHz ~ 1 GHz	Detector Function & Bandwidth	(QP) RB = 120kHz
Input Power	120 Vac, 60 Hz	Environmental Conditions	21°C, 68% RH
Tested By	Thomas Cheng	Test Mode	B

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	75.59	29.4 QP	40.0	-10.6	2.71 H	165	45.8	-16.4
2	129.92	27.6 QP	43.5	-15.9	2.57 H	143	41.0	-13.4
3	302.60	27.5 QP	46.0	-18.5	2.33 H	337	39.5	-12.0
4	419.01	29.4 QP	46.0	-16.6	1.54 H	256	38.1	-8.7
5	518.93	34.1 QP	46.0	-11.9	3.83 H	73	39.8	-5.7
6	840.03	32.0 QP	46.0	-14.0	1.21 H	151	30.9	1.1

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.

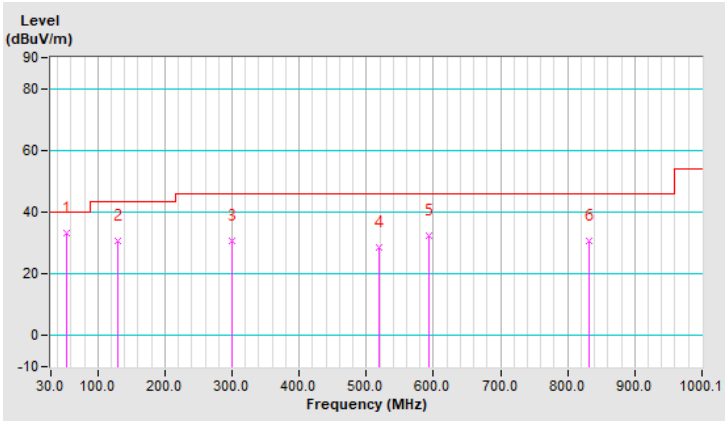


RF Mode	TX 802.11ax (HE20)	Channel	CH 6：2437 MHz
Frequency Range	9 kHz ~ 1 GHz	Detector Function & Bandwidth	(QP) RB = 120kHz
Input Power	120 Vac, 60 Hz	Environmental Conditions	21°C, 68% RH
Tested By	Thomas Cheng	Test Mode	B

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	53.28	33.3 QP	40.0	-6.7	2.34 V	165	46.0	-12.7
2	128.95	30.8 QP	43.5	-12.7	1.33 V	116	44.3	-13.5
3	299.69	30.8 QP	46.0	-15.2	3.25 V	339	42.9	-12.1
4	518.93	28.6 QP	46.0	-17.4	2.11 V	227	34.3	-5.7
5	593.63	32.5 QP	46.0	-13.5	1.20 V	240	36.1	-3.6
6	832.27	30.7 QP	46.0	-15.3	2.48 V	66	29.7	1.0

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.



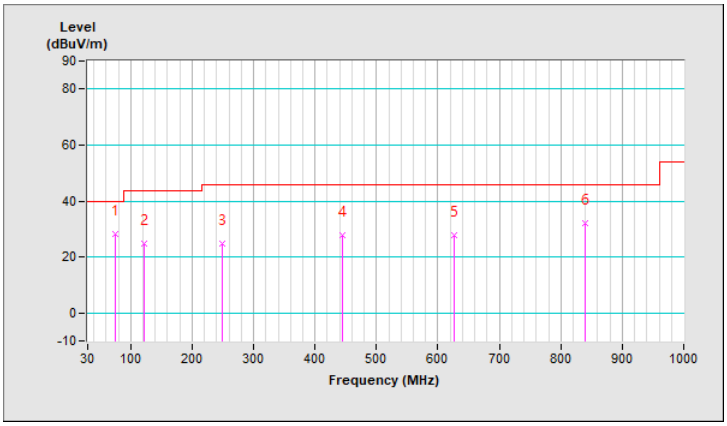
Scanning radio:

RF Mode	TX 802.11b	**Channel**	CH 6：2437 MHz
Frequency Range	9 kHz ~ 1 GHz	**Detector Function & Bandwidth**	(QP) RB = 120kHz
Input Power	120 Vac, 60 Hz	**Environmental Conditions**	23°C, 67% RH
Tested By	Adair Peng	**Test Mode**	A

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	74.62	28.2 QP	40.0	-11.8	1.00 H	2	40.2	-12.0
2	121.19	24.8 QP	43.5	-18.7	1.00 H	150	35.8	-11.0
3	249.24	24.8 QP	46.0	-21.2	1.50 H	334	33.7	-8.9
4	444.23	27.6 QP	46.0	-18.4	1.50 H	227	31.1	-3.5
5	625.64	27.6 QP	46.0	-18.4	1.50 H	37	27.3	0.3
6	840.03	31.9 QP	46.0	-14.1	1.50 H	243	28.0	3.9

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.

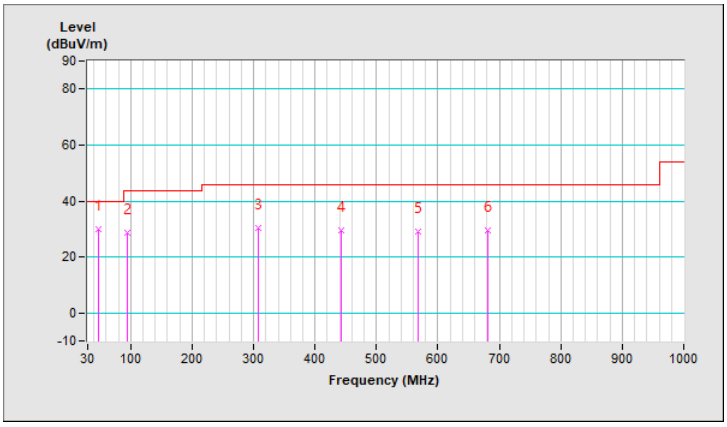


RF Mode	TX 802.11b	Channel	CH 6：2437 MHz
Frequency Range	9 kHz ~ 1 GHz	Detector Function & Bandwidth	(QP) RB = 120kHz
Input Power	120 Vac, 60 Hz	Environmental Conditions	23°C, 67% RH
Tested By	Adair Peng	Test Mode	A

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	48.43	30.0 QP	40.0	-10.0	1.50 V	224	38.8	-8.8
2	94.03	28.8 QP	43.5	-14.7	1.50 V	24	43.1	-14.3
3	308.42	30.3 QP	46.0	-15.7	1.50 V	342	36.7	-6.4
4	443.26	29.3 QP	46.0	-16.7	2.00 V	274	32.8	-3.5
5	568.41	28.9 QP	46.0	-17.1	1.00 V	239	30.1	-1.2
6	680.94	29.4 QP	46.0	-16.6	1.50 V	197	28.6	0.8

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.

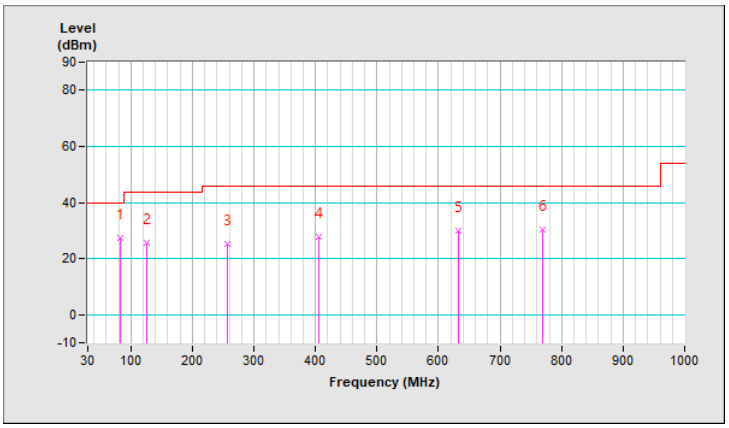


RF Mode	TX 802.11b	Channel	CH 6：2437 MHz
Frequency Range	9 kHz ~ 1 GHz	Detector Function & Bandwidth	(QP) RB = 120kHz
Input Power	120 Vac, 60 Hz	Environmental Conditions	23°C, 67% RH
Tested By	Adair Peng	Test Mode	B

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	82.39	27.3 QP	40.0	-12.7	1.00 H	229	41.2	-13.9
2	126.04	25.8 QP	43.5	-17.7	1.50 H	335	36.2	-10.4
3	256.03	25.0 QP	46.0	-21.0	2.00 H	121	33.6	-8.6
4	406.40	27.9 QP	46.0	-18.1	1.50 H	23	32.6	-4.7
5	631.46	29.8 QP	46.0	-16.2	1.50 H	119	29.4	0.4
6	769.22	30.5 QP	46.0	-15.5	1.00 H	298	27.5	3.0

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.

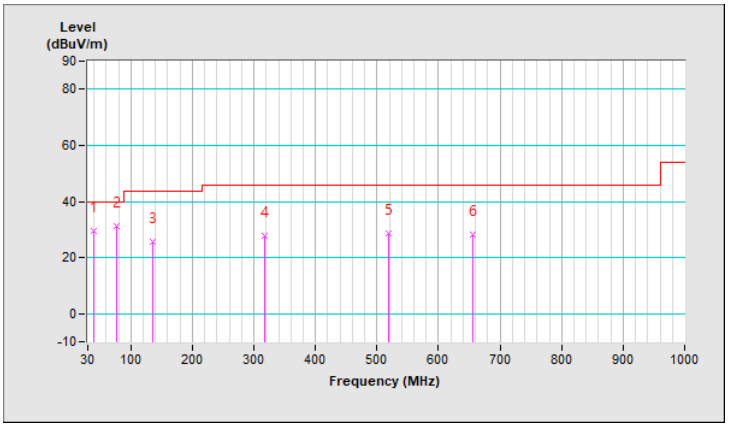


RF Mode	TX 802.11b	**Channel**	CH 6：2437 MHz
Frequency Range	9 kHz ~ 1 GHz	**Detector Function & Bandwidth**	(QP) RB = 120kHz
Input Power	120 Vac, 60 Hz	**Environmental Conditions**	23°C, 67% RH
Tested By	Adair Peng	**Test Mode**	B

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	39.70	29.5 QP	40.0	-10.5	1.50 V	339	39.1	-9.6
2	77.53	31.1 QP	40.0	-8.9	1.50 V	293	43.9	-12.8
3	134.77	25.5 QP	43.5	-18.0	1.00 V	11	35.1	-9.6
4	318.12	27.7 QP	46.0	-18.3	1.50 V	38	34.0	-6.3
5	518.93	28.6 QP	46.0	-17.4	1.50 V	227	30.5	-1.9
6	656.68	28.0 QP	46.0	-18.0	2.00 V	222	27.5	0.5

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.



7.4 Unwanted Emissions above 1 GHz

2G traffic radio:

RF Mode	TX 802.11ax (HE20)	**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**	23°C, 67% RH
Tested By	Adair Peng		

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	118.9 PK			1.78 H	50	85.1	33.8
2	*2437.00	106.0 AV			1.78 H	50	72.2	33.8
3	4874.00	45.8 PK	74.0	-28.2	2.23 H	287	34.7	11.1
4	4874.00	33.5 AV	54.0	-20.5	2.23 H	287	22.4	11.1
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	113.0 PK			3.73 V	14	79.2	33.8
2	*2437.00	101.1 AV			3.73 V	14	67.3	33.8
3	4874.00	45.3 PK	74.0	-28.7	1.99 V	302	34.2	11.1
4	4874.00	34.0 AV	54.0	-20.0	1.99 V	302	22.9	11.1

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.
5. " * ": Fundamental frequency, the limit was restricted at the RF Output Power.

Scanning radio:

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	18.4°C, 65.2% RH
Tested By	Rex Wang		

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	111.3 PK			2.38 H	322	77.5	33.8
2	*2437.00	107.7 AV			2.38 H	322	73.9	33.8
3	4874.00	52.6 PK	74.0	-21.4	1.49 H	358	41.5	11.1
4	**4874.00**	**48.3 AV**	**54.0**	**-5.7**	**1.49 H**	**358**	**37.2**	**11.1**
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	107.0 PK			3.59 V	360	73.2	33.8
2	*2437.00	103.7 AV			3.59 V	360	69.9	33.8
3	4874.00	50.7 PK	74.0	-23.3	3.65 V	344	39.6	11.1
4	4874.00	45.9 AV	54.0	-8.1	3.65 V	344	34.8	11.1

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.
5. " * ": Fundamental frequency, the limit was restricted at the RF Output Power.

8 Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo)

9 Information of the Testing Laboratories

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

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

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

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