

TEST REPORT

CERTIFICATE OF CONFORMITY

Standard: 47 CFR FCC Part 15, Subpart C (Section 15.247)

Report No.: RFBHTZ-WTW-P22090089-1

FCC ID.: PPQLILYW131

Model No.: LILY-W131

Received Date: Sep. 16, 2022

Test Date: Feb. 08 ~ Feb. 10, 2023

Issued Date: Mar. 02, 2023

Applicant: LITE-ON Technology Corp.

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FCC Registration /
Designation Number: 788550 / TW0003

Approved by:



Date:

Mar. 02, 2023

Jeremy Lin / Project Engineer

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Prepared by : Gina Liu / Specialist

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Release Control Record

Issue No.	Description	Date Issued
RFBHTZ-WTW-P22090089-1	Original Release	Mar. 02, 2023

1 Certificate

Product: LILY-W1

Brand: LITEON

Test Model: LILY-W131

Sample Status: Engineering Sample

Applicant: LITE-ON Technology Corp.

Test Date: Feb. 08 ~ Feb. 10, 2023

Standard: 47 CFR FCC Part 15, Subpart C (Section 15.247)

Measurement ANSI C63.10-2013

procedure: KDB 558074 D01 15.247 Meas Guidance v05r02

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	N/A	Refer to note
15.247(e)	Power Spectral Density	N/A	Refer to note
15.247(a)(2)	6 dB Bandwidth	N/A	Refer to note
15.247(d)	Conducted Out of Band Emissions	N/A	Refer to note
15.207	AC Power Conducted Emissions	Pass	Minimum passing margin is -4.37 dB at 13.68200 MHz
15.205 / 15.209 / 15.247(d)	Unwanted Emissions below 1 GHz	Pass	Minimum passing margin is -3.2 dB at 35.82 MHz
15.205 / 15.209 / 15.247(d)	Unwanted Emissions above 1 GHz	Pass	Minimum passing margin is -2.6 dB at 2483.50 MHz and 2390.00 MHz
15.203	Antenna Requirement	Pass	No antenna connector is used.

Note:

1. This report is a partial report, only test item of AC Power Conducted Emissions and Unwanted Emissions tests were performed for this report. Other testing data please refer to PHOENIX report no.: F160785E3 for module (Brand: u-blox AG, Model: Lily-W1).
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	2.79 dB
Unwanted Emissions below 1 GHz	9 kHz ~ 30 MHz	2.44 dB
	30 MHz ~ 1 GHz	2.95 dB
Unwanted Emissions above 1 GHz	1 GHz ~ 18 GHz	2.26 dB
	18 GHz ~ 40 GHz	1.94 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	LILY-W1
Brand	LITEON
Test Model	LILY-W131
Status of EUT	Engineering Sample
Power Supply Rating	208- 240Vac
Modulation Type	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
Modulation Technology	DSSS, OFDM
Transfer Rate	802.11b: 11.0 / 5.5 / 2.0 / 1.0 Mbps 802.11g: 54.0 / 48.0 / 36.0 / 24.0 / 18.0 / 12.0 / 9.0 / 6.0 Mbps 802.11n: up to 72.2 Mbps
Operating Frequency	2412 ~ 2462 MHz
Number of Channel	11 for 802.11b, 802.11g, 802.11n (HT20)

Note:

1. This report is prepared for FCC class II permissive change. This report is issued as a supplementary report to PHOENIX report no.: F160785E3. The difference compared with original report are adding end-product and antenna. Therefore, only test item of AC Power Conducted Emissions and Unwanted Emissions tests were performed for this report. Other testing data please refer to original report.
2. The EUT is authorized for use in specific End-product. Please refer to below for more details. The model of 'W1-UC168-0MK1ER' was chosen for final test.

Model	W1-UC168-0MK1ER	W1-UC168-0MF1FR	W1-UC168-0MF1F0
LTE module (FCC ID: PPQ202008EG91NAXD)	✓		
Wi-Fi module (FCC ID: PPQLILYW131)	✓	✓	✓
RFID module (FCC ID: PPQRYORR2L)	✓	✓	
Ethernet	✓	✓	✓
LCD module	✓	✓	✓

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

3.2 Antenna Description of EUT

1. The antenna information is listed as below.

Brand	Antenna Type	Connector	Antenna Gain (dBi)		
			2400	2450	2500
Auden	Dipole	I-PEX	2.2	2.6	3.0

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

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

2.4 GHz Band		
Modulation Mode	TX & RX Configuration	
802.11b	1TX	1RX
802.11g	1TX	1RX
802.11n (HT20)	1TX	1RX

3.3 Channel List

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

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		

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:	The worst case was found when positioned on Z-axis.

Following channel(s) was (were) selected for the final test as listed below:

Test Item	Mode	Tested Channel	Modulation	Data Rate Parameter
AC Power Conducted Emissions	802.11n (HT20)	1	BPSK	6.5Mb/s
Unwanted Emissions below 1 GHz	802.11n (HT20)	1	BPSK	6.5Mb/s
Unwanted Emissions above 1 GHz	802.11b	1, 6, 11	DBPSK	1Mb/s
	802.11g	1, 6, 11	BPSK	6Mb/s
	802.11n (HT20)	1, 6, 11	BPSK	6.5Mb/s

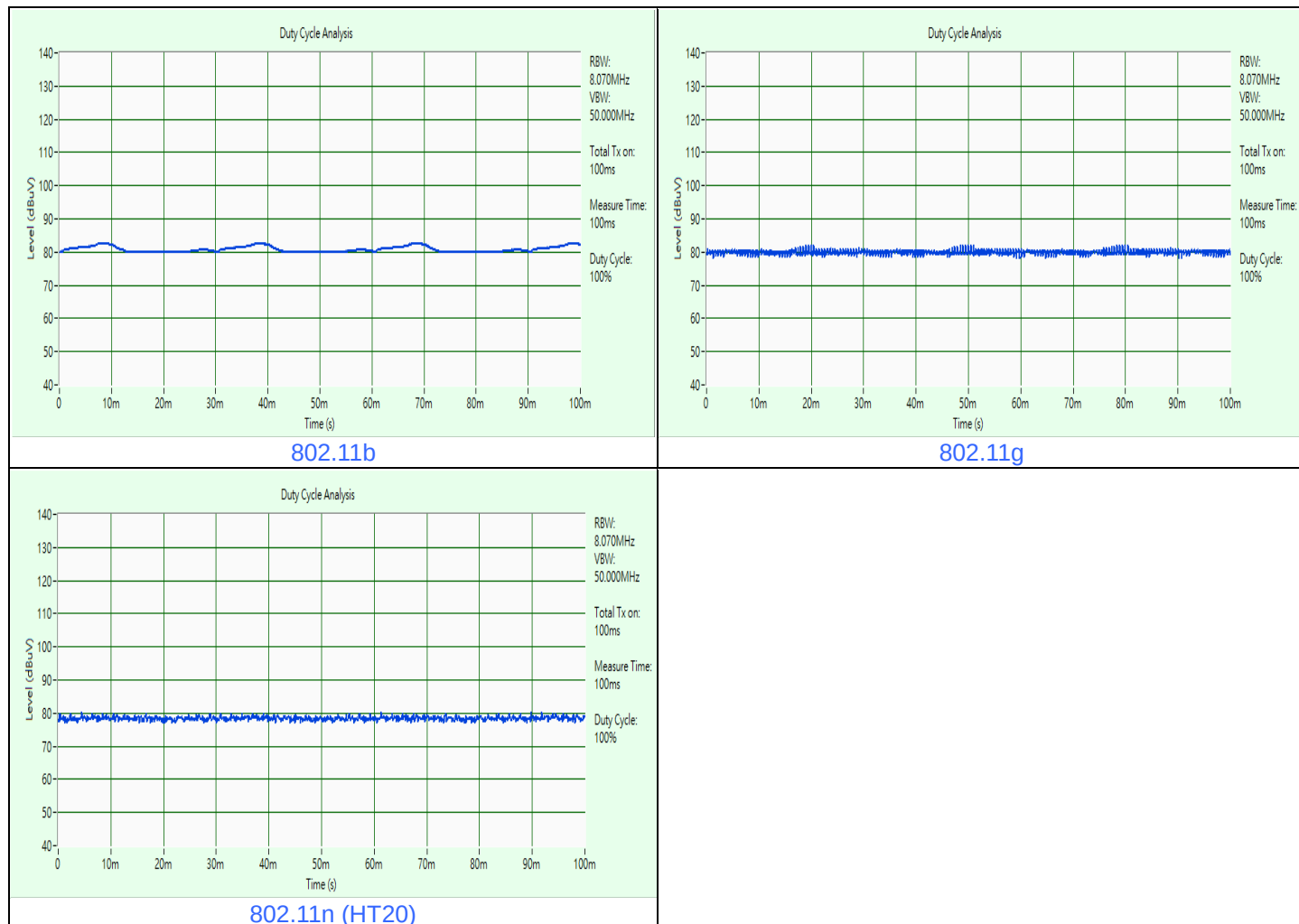
3.5 Duty Cycle of Test Signal

Duty cycle of test signal is 100 %, duty factor is not required.

802.11b: Duty cycle = 100 ms / 100 ms x 100% = 100%

802.11g: Duty cycle = 100 ms / 100 ms x 100% = 100%

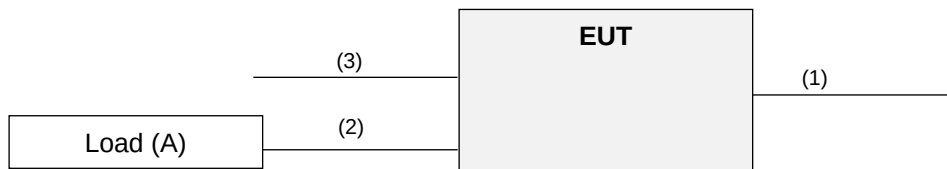
802.11n (HT20): Duty cycle = 100 ms / 100 ms x 100% = 100%



3.6 Test Program Used and Operation Descriptions

Controlling software Tera Term _4.98 has been activated to set the EUT under transmission condition continuously at specific channel frequency.

3.7 Connection Diagram of EUT and Peripheral Devices



3.8 Configuration of Peripheral Devices and Cable Connections

No.	Product	Brand	Model No.	Serial No.	FCC ID
A	Load	N/A	N/A	N/A	N/A

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	POWER CABLE (DC out)	1	5.0	Y	0	Accessory of EUT
2.	RJ-45 Cable	2	1.8	N	0	Provided by Lab
3.	POWER CABLE (AC in)	1	1.8	Y	0	Accessory of EUT

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 AC Power Conducted Emissions

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Test Receiver ROHDE & SCHWARZ	ESR3	102783	Dec. 21, 2022	Dec. 20, 2023
RF signal cable (with 10dB PAD) Woken	5D-FB	Cable-cond2-01	Sep. 03, 2022	Sep. 02, 2023
LISN/AMN ROHDE & SCHWARZ (EUT)	ESH2-Z5	100100	Feb. 17, 2022	Feb. 16, 2023
LISN/AMN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100312	Sep. 22, 2022	Sep. 21, 2023
Software ADT	BV ADT_Cond_ V7.3.7.4	NA	NA	NA

Notes:

1. The test was performed in HY - Conduction 2.
2. Tested Date: 2023/2/10

4.2 Unwanted Emissions below 1 GHz

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Antenna Tower & Turn Max-Full	MFA-440H	AT93021705	N/A	N/A
Bi_Log Antenna Schwarzbeck	VULB9168	9168-472	Oct. 21, 2022	Oct. 20, 2023
Loop Antenna TESEQ	HLA 6121	45745	Jul. 27, 2022	Jul. 26, 2023
Pre-Amplifier EMCI	EMC 330H	980112	Oct. 01, 2022	Sep. 30, 2023
RF Coaxial Cable EMCI	5D-NM-BM	140903+140902	Jan. 07, 2023	Jan. 06, 2024
RF Coaxial Cable WORKEN	8D-FB	Cable-Ch10-01	Oct. 01, 2022	Sep. 30, 2023
Software BV ADT	ADT_Radiated_ V7.6.15.9.5	N/A	N/A	N/A
Turn Table Max-Full	MFT-201SS	N/A	N/A	N/A
Turn Table Controller Max-Full	MG-7802	N/A	N/A	N/A

Notes:

1. The test was performed in HY - 966 chamber 5.
2. Tested Date: 2023/2/9

4.3 Unwanted Emissions above 1 GHz

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Antenna Tower & Turn Max-Full	MFA-440H	AT93021705	N/A	N/A
Boresight antenna tower fixture BV	BAF-02	7	N/A	N/A
Horn Antenna Schwarzbeck	BBHA 9120D	9120D-969	Nov. 13, 2022	Nov. 12, 2023
	BBHA 9170	148	Nov. 13, 2022	Nov. 12, 2023
Pre-Amplifier EMCI	EMC 184045	980116	Oct. 01, 2022	Sep. 30, 2023
Pre-Amplifier EMCI	EMC 012645	980115	Oct. 01, 2022	Sep. 30, 2023
RF Coaxial Cable EMCI	EMC102-KM-KM-600	150928	Jul. 09, 2022	Jul. 08, 2023
	EMC102-KM-KM-3000	150929	Jul. 09, 2022	Jul. 08, 2023
	EMC104-SM-SM- 8000+3000	171005	Oct. 01, 2022	Sep. 30, 2023
RF Coaxial Cable HUBER SUHNER	SUCOFLEX 104	EMC104-SM-SM- 1000(140807)	Oct. 01, 2022	Sep. 30, 2023
RF FILTER MICRO-TRONICS	BRM17690	004	Jan. 11, 2023	Jan. 10, 2024
	BRM50716	060	Jan. 11, 2023	Jan. 10, 2024
Signal Analyzer Agilent	N9010A	MY52220314	Dec. 09, 2022	Dec. 08, 2023
Software BV ADT	ADT_Radiated_ V7.6.15.9.5	N/A	N/A	N/A
Turn Table Max-Full	MFT-201SS	N/A	N/A	N/A
Turn Table Controller Max-Full	MG-7802	N/A	N/A	N/A

Notes:

1. The test was performed in HY - 966 chamber 5.
2. Tested Date: 2023/2/8

5 Limits of Test Items

5.1 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.

5.2 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).

5.3 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

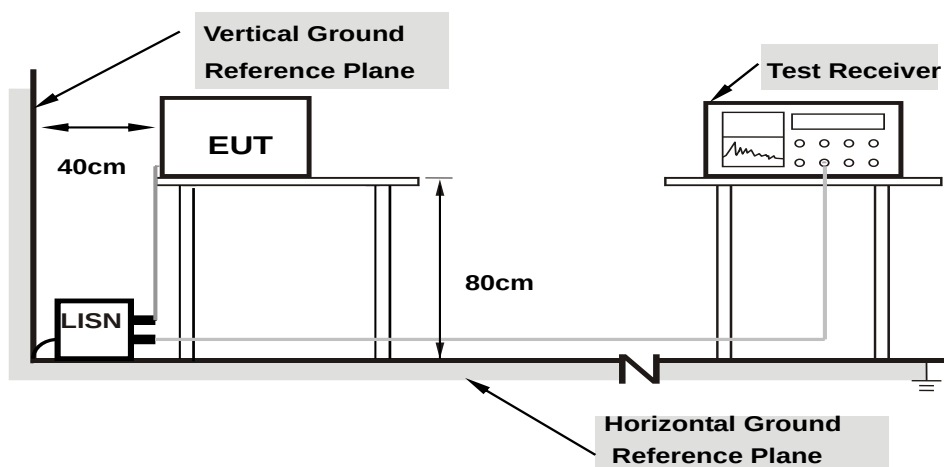
Notes:

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 AC Power Conducted Emissions

6.1.1 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).

6.1.2 Test Procedure

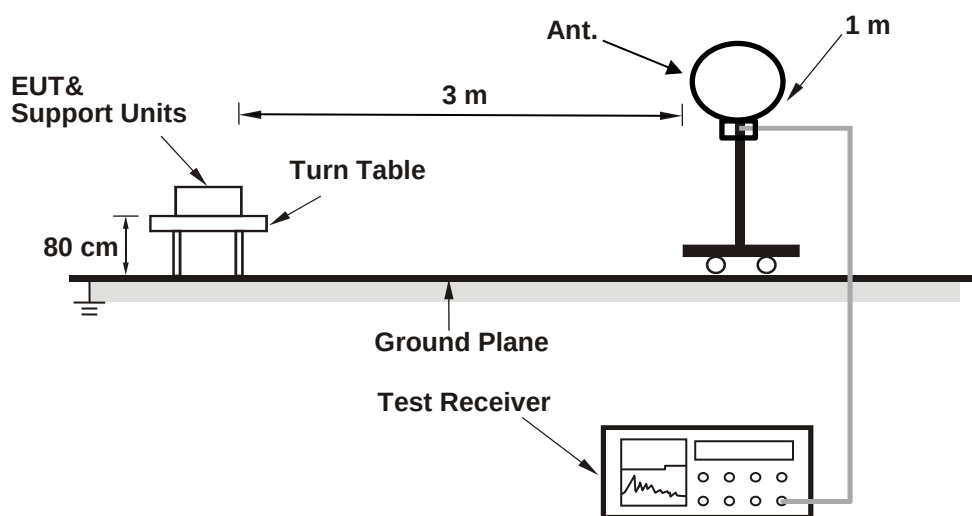
- The EUT was placed on a 0.8 meter to the top of table and placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The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

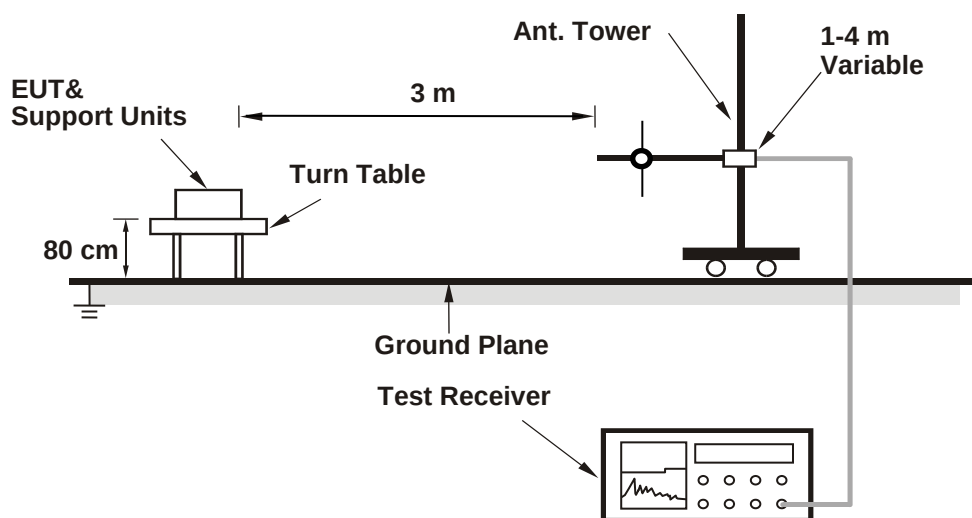
6.2 Unwanted Emissions below 1 GHz

6.2.1 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).

6.2.2 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

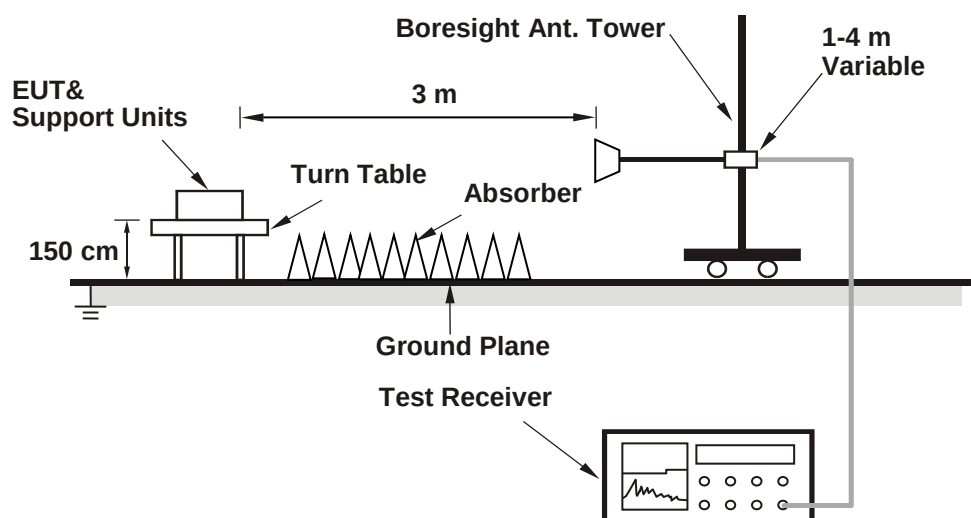
- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the 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.

6.3 Unwanted Emissions above 1 GHz

6.3.1 Test Setup



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

6.3.2 Test Procedure

- 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.
- The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- 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.
- 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.
- 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:

- 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.
- For fundamental and harmonic signal measurement, 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.
- All modes of operation were investigated and the worst-case emissions are reported.

7 Test Results of Test Item

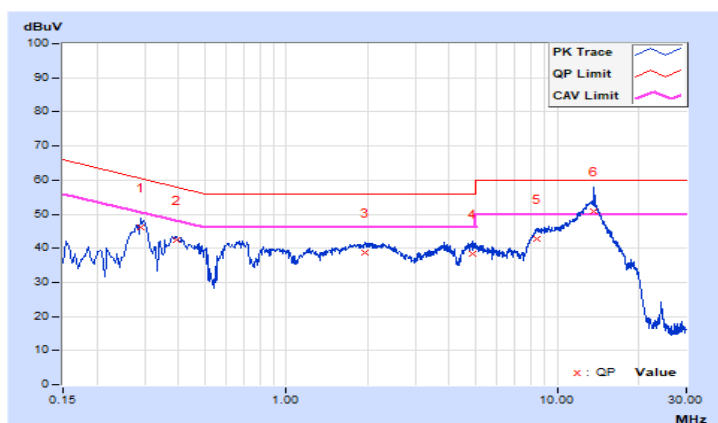
7.1 AC Power Conducted Emissions

Frequency Range	150 kHz ~ 30 MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Tested by	Vincent Chen	Environmental Conditions	23°C, 67% RH

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	0.29000	10.15	36.08	27.06	46.23	37.21	60.52	50.52	-14.29	-13.31
2	0.39239	10.16	32.12	22.39	42.28	32.55	58.01	48.01	-15.73	-15.46
3	1.94600	10.22	28.50	20.85	38.72	31.07	56.00	46.00	-17.28	-14.93
4	4.85000	10.26	28.10	22.01	38.36	32.27	56.00	46.00	-17.64	-13.73
5	8.41800	10.28	32.58	27.44	42.86	37.72	60.00	50.00	-17.14	-12.28
6	13.68200	10.34	40.55	35.29	50.89	45.63	60.00	50.00	-9.11	-4.37

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

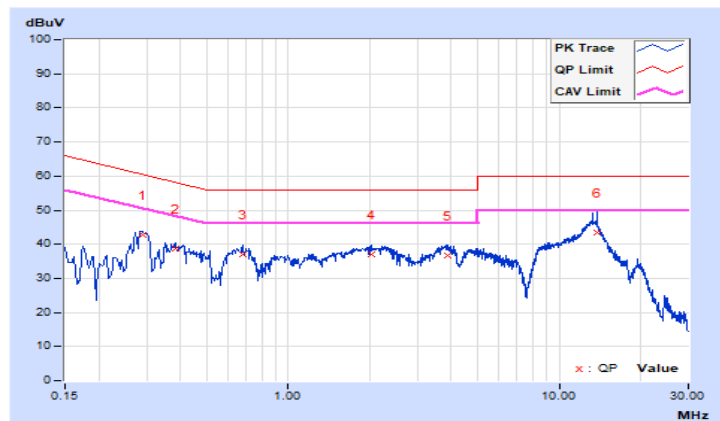


Frequency Range	150 kHz ~ 30 MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Tested by	Vincent Chen	Environmental Conditions	23°C, 67% RH

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	0.28906	10.16	32.67	23.70	42.83	33.86	60.55	50.55	-17.72	-16.69
2	0.38200	10.17	28.46	19.47	38.63	29.64	58.24	48.24	-19.61	-18.60
3	0.67800	10.18	26.85	19.71	37.03	29.89	56.00	46.00	-18.97	-16.11
4	2.03000	10.23	26.81	18.55	37.04	28.78	56.00	46.00	-18.96	-17.22
5	3.86600	10.28	26.40	20.20	36.68	30.48	56.00	46.00	-19.32	-15.52
6	13.76600	10.44	33.16	27.78	43.60	38.22	60.00	50.00	-16.40	-11.78

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



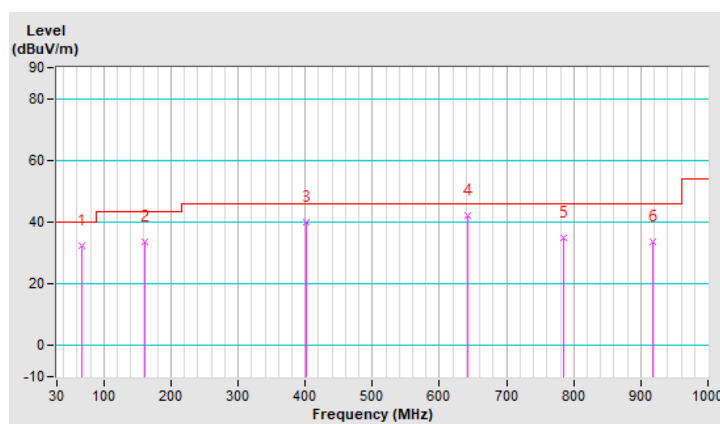
7.2 Unwanted Emissions below 1 GHz

RF Mode	802.11n (HT20)	Channel	CH 1 : 2412 MHz
Frequency Range	30 MHz ~ 1 GHz	Detector Function & Bandwidth	(QP) RB = 120kHz
Environmental Conditions	25°C, 72% RH	Tested By	Vincent Chen

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	67.83	32.5 QP	40.0	-7.5	1.00 H	349	46.5	-14.0
2	161.92	33.7 QP	43.5	-9.8	1.00 H	244	46.3	-12.6
3	402.48	39.9 QP	46.0	-6.1	1.50 H	272	49.4	-9.5
4	642.07	42.1 QP	46.0	-3.9	1.00 H	39	46.5	-4.4
5	785.63	34.8 QP	46.0	-11.2	2.00 H	2	36.3	-1.5
6	917.55	33.6 QP	46.0	-12.4	1.00 H	18	34.4	-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.

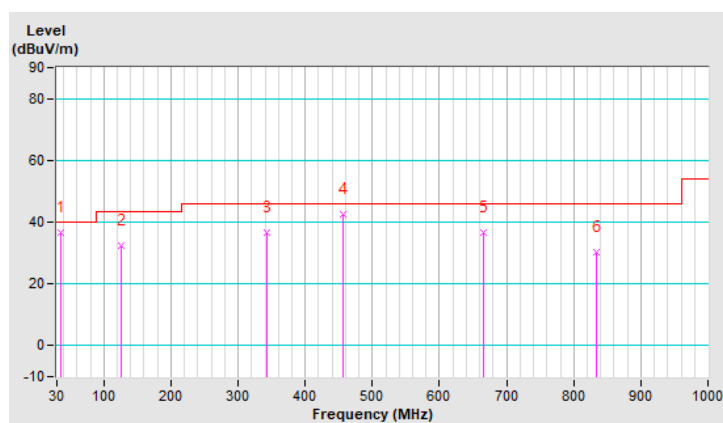


RF Mode	802.11n (HT20)	Channel	CH 1 : 2412 MHz
Frequency Range	30 MHz ~ 1 GHz	Detector Function & Bandwidth	(QP) RB = 120kHz
Environmental Conditions	25°C, 72% RH	Tested By	Vincent Chen

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	35.82	36.8 QP	40.0	-3.2	1.50 V	274	49.6	-12.8
2	126.03	32.3 QP	43.5	-11.2	1.00 V	306	46.0	-13.7
3	342.34	36.7 QP	46.0	-9.3	2.00 V	286	47.7	-11.0
4	455.83	42.5 QP	46.0	-3.5	1.00 V	330	50.4	-7.9
5	666.32	36.8 QP	46.0	-9.2	2.00 V	212	41.0	-4.2
6	834.13	30.3 QP	46.0	-15.7	1.00 V	257	31.9	-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.



7.3 Unwanted Emissions above 1 GHz

RF Mode	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

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	60.8 PK	74.0	-13.2	2.25 H	0	28.7	32.1
2	2390.00	49.8 AV	54.0	-4.2	2.25 H	0	17.7	32.1
3	*2412.00	101.4 PK			2.25 H	0	69.4	32.0
4	*2412.00	99.1 AV			2.25 H	0	67.1	32.0
5	4824.00	48.5 PK	74.0	-25.5	1.60 H	116	56.5	-8.0
6	4824.00	40.3 AV	54.0	-13.7	1.60 H	116	48.3	-8.0
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	60.6 PK	74.0	-13.4	3.74 V	80	28.5	32.1
2	2390.00	49.6 AV	54.0	-4.4	3.74 V	80	17.5	32.1
3	*2412.00	94.7 PK			3.74 V	80	62.7	32.0
4	*2412.00	92.4 AV			3.74 V	80	60.4	32.0
5	4824.00	48.3 PK	74.0	-25.7	2.77 V	75	56.3	-8.0
6	4824.00	40.1 AV	54.0	-13.9	2.77 V	75	48.1	-8.0

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

RF Mode	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

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	101.5 PK			2.01 H	3	69.5	32.0
2	*2437.00	99.2 AV			2.01 H	3	67.2	32.0
3	4874.00	49.1 PK	74.0	-24.9	1.93 H	206	56.9	-7.8
4	4874.00	41.3 AV	54.0	-12.7	1.93 H	206	49.1	-7.8
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	*2437.00	94.8 PK			3.76 V	81	62.8	32.0
2	*2437.00	92.5 AV			3.76 V	81	60.5	32.0
3	4874.00	48.9 PK	74.0	-25.1	3.39 V	186	56.7	-7.8
4	4874.00	40.6 AV	54.0	-13.4	3.39 V	186	48.4	-7.8

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

RF Mode	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

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	102.6 PK			2.01 H	0	70.6	32.0
2	*2462.00	100.3 AV			2.01 H	0	68.3	32.0
3	2483.50	60.8 PK	74.0	-13.2	2.01 H	0	28.8	32.0
4	2483.50	50.1 AV	54.0	-3.9	2.01 H	0	18.1	32.0
5	4924.00	49.7 PK	74.0	-24.3	2.86 H	146	57.5	-7.8
6	4924.00	41.4 AV	54.0	-12.6	2.86 H	146	49.2	-7.8
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	*2462.00	96.2 PK			3.88 V	89	64.2	32.0
2	*2462.00	93.9 AV			3.88 V	89	61.9	32.0
3	2483.50	60.6 PK	74.0	-13.4	3.88 V	89	28.6	32.0
4	2483.50	50.0 AV	54.0	-4.0	3.88 V	89	18.0	32.0
5	4924.00	48.8 PK	74.0	-25.2	3.02 V	235	56.6	-7.8
6	4924.00	40.6 AV	54.0	-13.4	3.02 V	235	48.4	-7.8

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

RF Mode	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

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	62.2 PK	74.0	-11.8	2.25 H	358	30.1	32.1
2	2390.00	50.6 AV	54.0	-3.4	2.25 H	358	18.5	32.1
3	*2412.00	101.0 PK			2.25 H	358	69.0	32.0
4	*2412.00	94.2 AV			2.25 H	358	62.2	32.0
5	4824.00	46.8 PK	74.0	-27.2	3.80 H	268	54.8	-8.0
6	4824.00	36.1 AV	54.0	-17.9	3.80 H	268	44.1	-8.0
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	60.3 PK	74.0	-13.7	3.73 V	77	28.2	32.1
2	2390.00	49.7 AV	54.0	-4.3	3.73 V	77	17.6	32.1
3	*2412.00	94.3 PK			3.73 V	77	62.3	32.0
4	*2412.00	87.5 AV			3.73 V	77	55.5	32.0
5	4824.00	46.3 PK	74.0	-27.7	2.78 V	315	54.3	-8.0
6	4824.00	36.0 AV	54.0	-18.0	2.78 V	315	44.0	-8.0

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

RF Mode	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

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	101.8 PK			2.12 H	0	69.8	32.0
2	*2437.00	95.0 AV			2.12 H	0	63.0	32.0
3	4874.00	47.0 PK	74.0	-27.0	2.59 H	342	54.8	-7.8
4	4874.00	37.8 AV	54.0	-16.2	2.59 H	342	45.6	-7.8
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	*2437.00	95.1 PK			3.77 V	86	63.1	32.0
2	*2437.00	88.3 AV			3.77 V	86	56.3	32.0
3	4874.00	46.6 PK	74.0	-27.4	2.61 V	172	54.4	-7.8
4	4874.00	36.9 AV	54.0	-17.1	2.61 V	172	44.7	-7.8

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

RF Mode	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

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	100.0 PK			2.12 H	8	68.0	32.0
2	*2462.00	93.2 AV			2.12 H	8	61.2	32.0
3	2483.50	63.7 PK	74.0	-10.3	2.12 H	8	31.7	32.0
4	2483.50	51.4 AV	54.0	-2.6	2.12 H	8	19.4	32.0
5	4924.00	46.6 PK	74.0	-27.4	3.40 H	219	54.4	-7.8
6	4924.00	37.1 AV	54.0	-16.9	3.40 H	219	44.9	-7.8
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	*2462.00	93.8 PK			3.84 V	94	61.8	32.0
2	*2462.00	87.0 AV			3.84 V	94	55.0	32.0
3	2483.50	61.1 PK	74.0	-12.9	3.84 V	94	29.1	32.0
4	2483.50	50.1 AV	54.0	-3.9	3.84 V	94	18.1	32.0
5	4924.00	46.5 PK	74.0	-27.5	2.09 V	177	54.3	-7.8
6	4924.00	36.9 AV	54.0	-17.1	2.09 V	177	44.7	-7.8

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

RF Mode	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 = 10 Hz

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	62.6 PK	74.0	-11.4	2.24 H	357	30.5	32.1
2	2390.00	51.4 AV	54.0	-2.6	2.24 H	357	19.3	32.1
3	*2412.00	101.0 PK			2.24 H	357	69.0	32.0
4	*2412.00	93.1 AV			2.24 H	357	61.1	32.0
5	4824.00	46.9 PK	74.0	-27.1	2.64 H	40	54.9	-8.0
6	4824.00	37.4 AV	54.0	-16.6	2.64 H	40	45.4	-8.0
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	60.2 PK	74.0	-13.8	3.72 V	96	28.1	32.1
2	2390.00	49.9 AV	54.0	-4.1	3.72 V	96	17.8	32.1
3	*2412.00	94.3 PK			3.72 V	96	62.3	32.0
4	*2412.00	86.4 AV			3.72 V	96	54.4	32.0
5	4824.00	46.8 PK	74.0	-27.2	3.33 V	85	54.8	-8.0
6	4824.00	37.2 AV	54.0	-16.8	3.33 V	85	45.2	-8.0

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

RF Mode	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 = 10 Hz

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	103.1 PK			2.25 H	355	71.1	32.0
2	*2437.00	95.2 AV			2.25 H	355	63.2	32.0
3	4874.00	47.0 PK	74.0	-27.0	2.54 H	147	54.8	-7.8
4	4874.00	36.8 AV	54.0	-17.2	2.54 H	147	44.6	-7.8
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	*2437.00	96.4 PK			3.81 V	89	64.4	32.0
2	*2437.00	88.5 AV			3.81 V	89	56.5	32.0
3	4874.00	46.6 PK	74.0	-27.4	3.29 V	218	54.4	-7.8
4	4874.00	36.5 AV	54.0	-17.5	3.29 V	218	44.3	-7.8

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

RF Mode	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 = 10 Hz

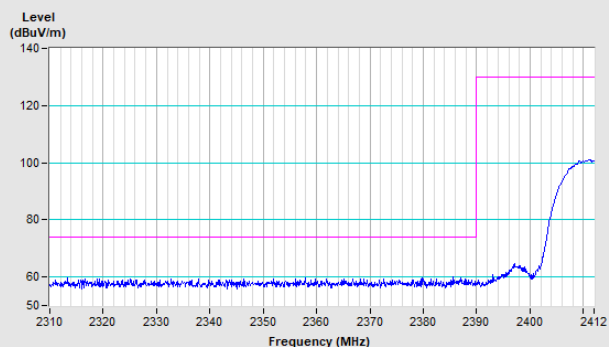
Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2462.00	100.0 PK			1.98 H	359	68.0	32.0
2	*2462.00	92.1 AV			1.98 H	359	60.1	32.0
3	2483.50	61.2 PK	74.0	-12.8	1.98 H	359	29.2	32.0
4	2483.50	50.8 AV	54.0	-3.2	1.98 H	359	18.8	32.0
5	4924.00	46.8 PK	74.0	-27.2	3.03 H	317	54.6	-7.8
6	4924.00	37.7 AV	54.0	-16.3	3.03 H	317	45.5	-7.8
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	*2462.00	93.3 PK			3.95 V	86	61.3	32.0
2	*2462.00	85.4 AV			3.95 V	86	53.4	32.0
3	2483.50	60.7 PK	74.0	-13.3	3.95 V	86	28.7	32.0
4	2483.50	50.0 AV	54.0	-4.0	3.95 V	86	18.0	32.0
5	4924.00	46.5 PK	74.0	-27.5	1.78 V	316	54.3	-7.8
6	4924.00	37.1 AV	54.0	-16.9	1.78 V	316	44.9	-7.8

Remarks:

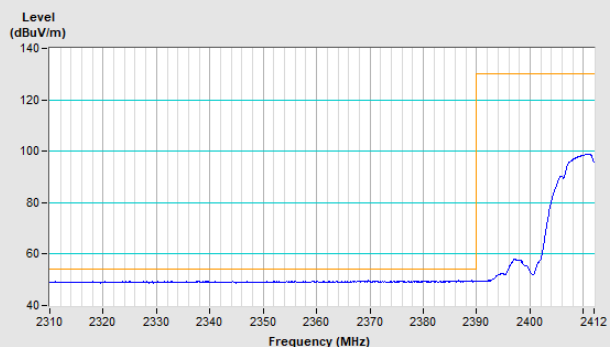
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2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency, the limit was restricted at the RF Output Power.

802.11b Channel 1

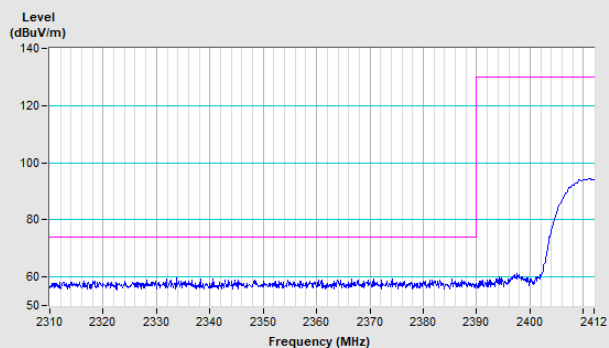
Horizontal (Peak)



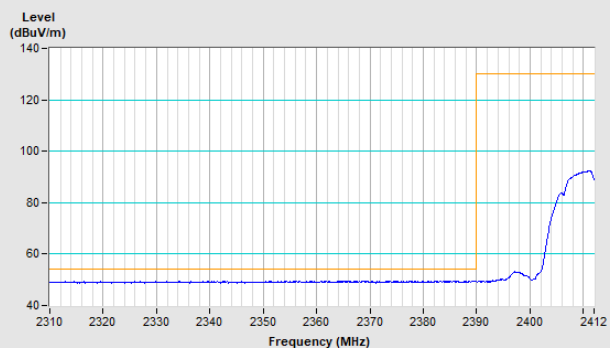
Horizontal (Average)



Vertical (Peak)

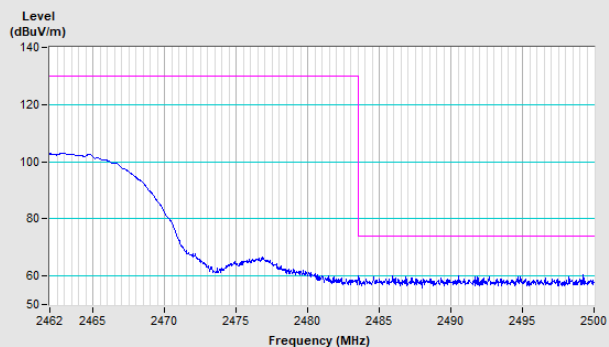


Vertical (Average)

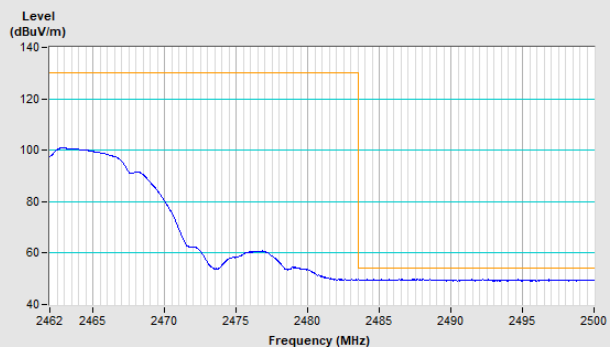


802.11b Channel 11

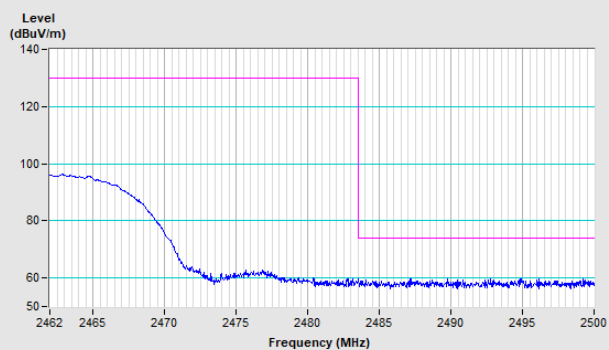
Horizontal (Peak)



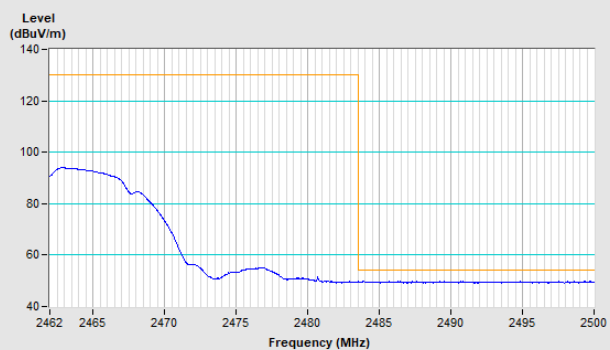
Horizontal (Average)



Vertical (Peak)

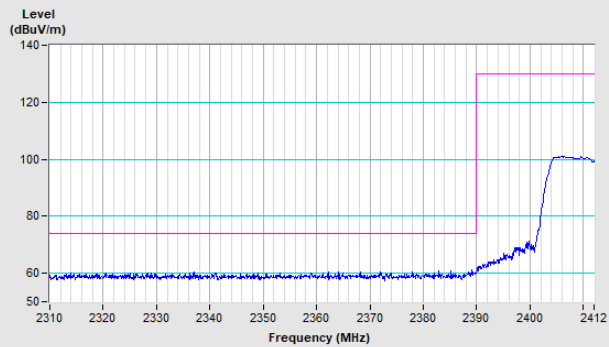


Vertical (Average)

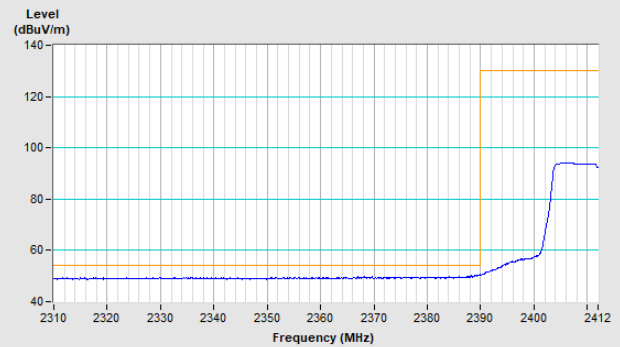


802.11g Channel 1

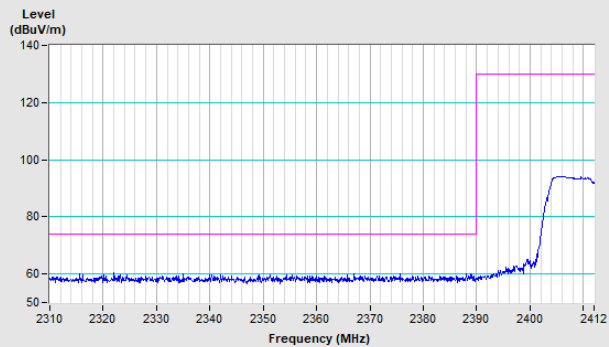
Horizontal (Peak)



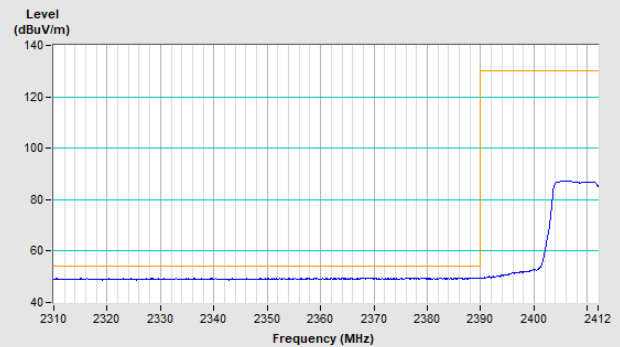
Horizontal (Average)



Vertical (Peak)

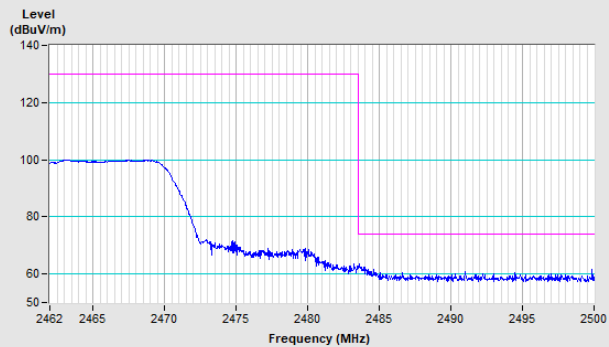


Vertical (Average)

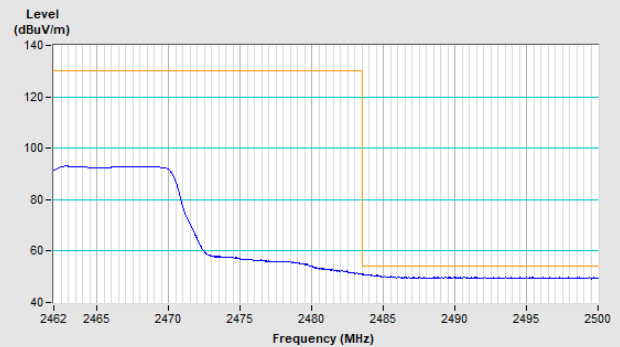


802.11g Channel 11

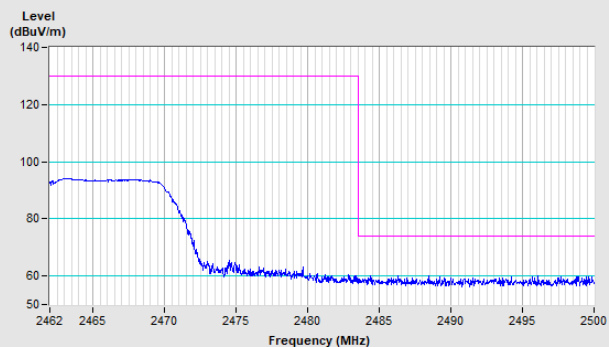
Horizontal (Peak)



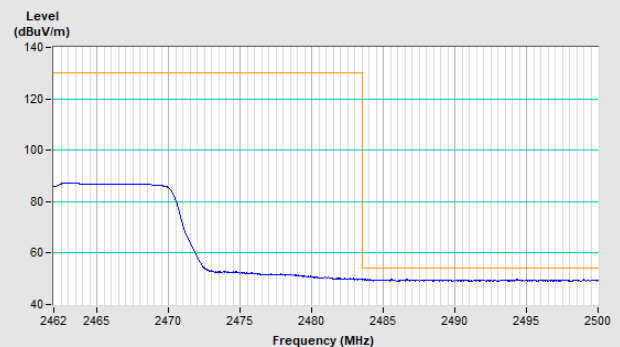
Horizontal (Average)



Vertical (Peak)

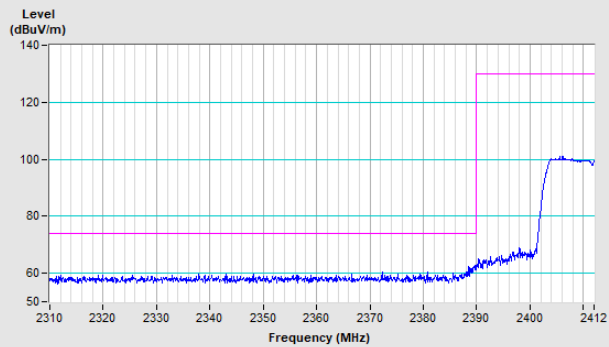


Vertical (Average)

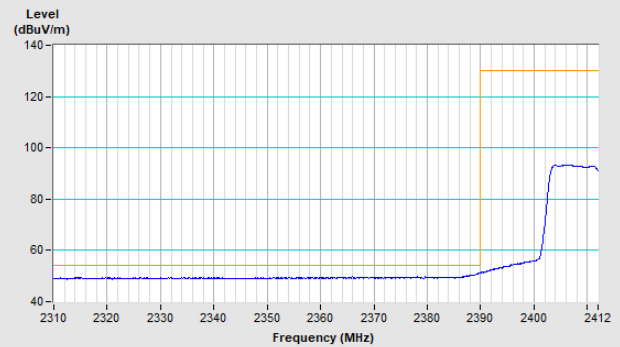


802.11n (HT20) Channel 1

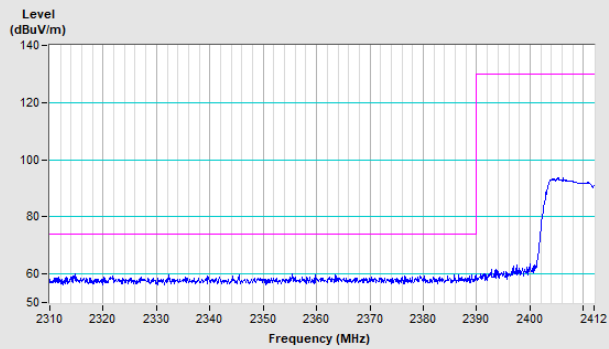
Horizontal (Peak)



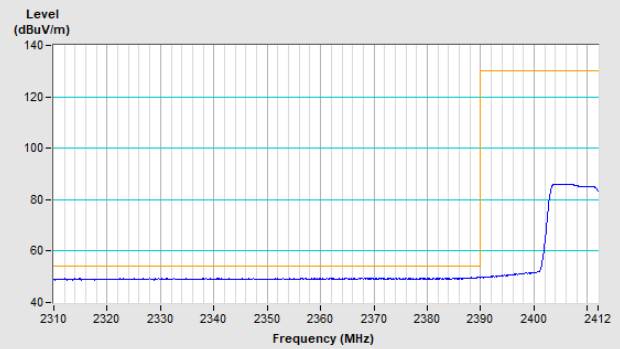
Horizontal (Average)



Vertical (Peak)

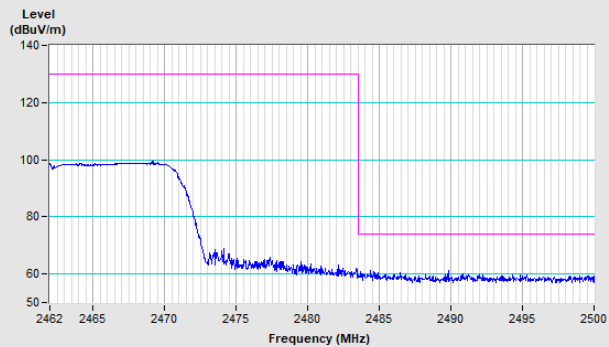


Vertical (Average)

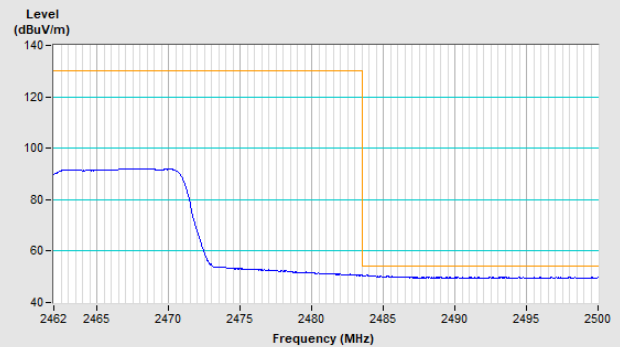


802.11n (HT20) Channel 11

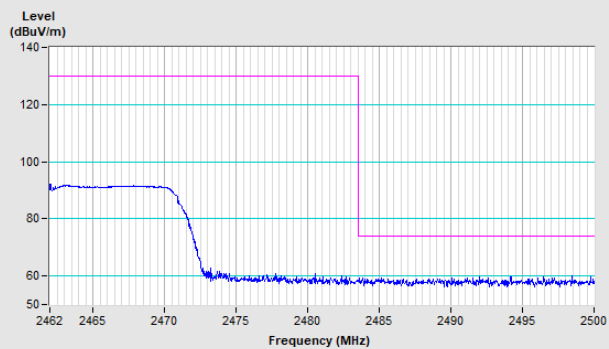
Horizontal (Peak)



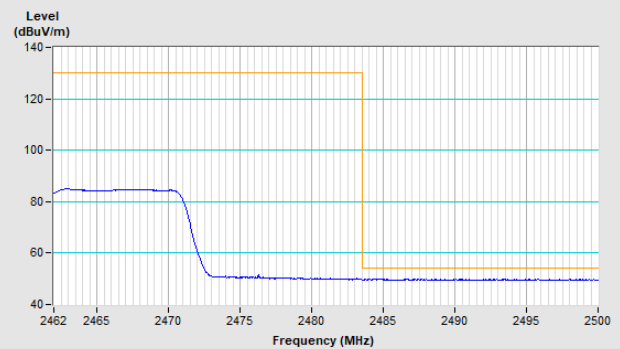
Horizontal (Average)



Vertical (Peak)



Vertical (Average)



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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