

## FCC Test Report

### (Spot Check)

**Report No.:** RF200219C04-2

**FCC ID:** TX2-RTL8822CE

**Test Model:** RTL8822CE

**Received Date:** Feb. 19, 2020

**Test Date:** Feb. 24, 2020 ~ Feb. 25, 2020

**Issued Date:** Mar. 02, 2020

**Applicant:** Realtek Semiconductor Corp.

**Address:** No. 2, Innovation Road II, Hsinchu Science Park, Hsinchu 300, Taiwan

**Issued By:** Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch  
Lin Kou Laboratories

**Lab Address:** No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan

**Test Location:** No.19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City  
33383, Taiwan

**FCC Registration /  
Designation Number:** 788550 / TW0003



This report is for your exclusive use. Any copying or replication of this report to or for any other person or entity, or use of our name or trademark, is permitted only with our prior written permission. This report sets forth our findings solely with respect to the test samples identified herein. The results set forth in this report are not indicative or representative of the quality or characteristics of the lot from which a test sample was taken or any similar or identical product unless specifically and expressly noted. Our report includes all of the tests requested by you and the results thereof based upon the information that you provided to us. You have 60 days from date of issuance of this report to notify us of any material error or omission caused by our negligence, provided, however, that such notice shall be in writing and shall specifically address the issue you wish to raise. A failure to raise such issue within the prescribed time shall constitute your unqualified acceptance of the completeness of this report, the tests conducted and the correctness of the report contents. Unless specific mention, the uncertainty of measurement has been explicitly taken into account to declare the compliance or non-compliance to the specification. The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any government agencies.

## Table of Contents

<b>Release Control Record .....</b>	<b>3</b>
<b>1 Certificate of Conformity .....</b>	<b>4</b>
<b>2 Summary of Test Results.....</b>	<b>5</b>
2.1 Measurement Uncertainty.....	5
2.2 Modification Record .....	5
<b>3 General Information .....</b>	<b>6</b>
3.1 General Description of EUT .....	6
3.2 Description of Test Modes.....	8
3.2.1 Test Mode Applicability and Tested Channel Detail.....	9
3.3 Description of Support Units .....	10
3.3.1 Configuration of System under Test .....	10
3.4 General Description of Applied Standards and References .....	11
<b>4 Test Types and Results .....</b>	<b>12</b>
4.1 Radiated Emission and Bandedge Measurement .....	12
4.1.1 Limits of Radiated Emission and Bandedge Measurement .....	12
4.1.2 Test Instruments .....	13
4.1.3 Test Procedures.....	14
4.1.4 Deviation from Test Standard .....	15
4.1.5 Test Set Up .....	15
4.1.6 EUT Operating Conditions.....	16
4.1.7 Test Results .....	17
<b>5 Pictures of Test Arrangements.....</b>	<b>28</b>
<b>Appendix – Information of the Testing Laboratories .....</b>	<b>29</b>

### Release Control Record

Issue No.	Description	Date Issued
RF200219C04-2	Original Release	Mar. 02, 2020

## 1 Certificate of Conformity

**Product:** 802.11a/b/g/n/ac RTL8822CE Combo Module

**Brand:** REALTEK

**Test Model:** RTL8822CE

**Sample Status:** Engineering Sample

**Applicant:** Realtek Semiconductor Corp.

**Test Date:** Feb. 24, 2020 ~ Feb. 25, 2020

**Standards:** 47 CFR FCC Part 15, Subpart C (Section 15.247)  
ANSI C63.10:2013

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's RF characteristics under the conditions specified in this report.

Prepared by : Lena Wang , Date: Mar. 02, 2020  
Lena Wang / Specialist

Approved by : Dylan Chiou , Date: Mar. 02, 2020  
Dylan Chiou / Senior Project Engineer

## 2 Summary of Test Results

47 CFR FCC Part 15, Subpart C (Section 15.247)			
FCC Clause	Test Item	Result	Remarks
15.207	AC Power Conducted Emission	N/A	Refer to Note
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	Pass	Meet the requirement of limit. Minimum passing margin is -3.67 dB at 2483.5 MHz.
15.247(d)	Antenna Port Emission	N/A	Refer to Note
15.247(a)(2)	6 dB Bandwidth	N/A	Refer to Note
15.247(b)	Conducted power	N/A	Refer to Note
15.247(e)	Power Spectral Density	N/A	Refer to Note
15.203	Antenna Requirement	N/A	Refer to Note

Note:

1. This report is a partial report, only spot check test items such as Radiated Spurious Emissions was were performed for this report. Other testing data please refer to BV CPS report no.: RE180816E04 for module (Brand: Realtek, RTL8822CE).
2. Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

### 2.1 Measurement Uncertainty

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

Measurement	Frequency	Expanded Uncertainty (k=2) (±)
Radiated Emissions up to 1 GHz	9 kHz ~ 30 MHz	3.04 dB
	30 MHz ~ 200 MHz	2.93 dB
	200 MHz ~ 1000 MHz	2.95 dB
Radiated Emissions above 1 GHz	1 GHz ~ 18 GHz	2.26 dB
	18 GHz ~ 40 GHz	1.94 dB

### 2.2 Modification Record

There were no modifications required for compliance.

### 3 General Information

#### 3.1 General Description of EUT

<b>Product</b>	802.11a/b/g/n/ac RTL8822CE Combo Module
<b>Brand</b>	REALTEK
<b>Test Model</b>	RTL8822CE
<b>Status of EUT</b>	Engineering Sample
<b>Power Supply Rating</b>	3.3 Vdc (host equipment)
<b>Modulation Type</b>	CCK, DQPSK, DBPSK for DSSS 256QAM, 64QAM, 16QAM, QPSK, BPSK for OFDM
<b>Modulation Technology</b>	DSSS, OFDM
<b>Transfer Rate</b>	802.11b: 11.0 / 5.5 / 2.0 / 1.0 Mbps 802.11g: 54.0 / 48.0 / 36.0 / 24.0 / 18.0 / 12.0 / 9.0 / 6.0 Mbps 802.11n: up to 300 Mbps 802.11ac up to 866.7 Mbps
<b>Operating Frequency</b>	2412 ~ 2472 MHz
<b>Number of Channel</b>	13 for 802.11b, 802.11g, 802.11n (HT20) / (VHT20) 9 for 802.11n (HT40) / (VHT40)
<b>Antenna Type</b>	Refer to Note as below
<b>Antenna Connector</b>	N/A
<b>Accessory Device</b>	N/A
<b>Data Cable Supplied</b>	N/A

Note:

- This report is a partial report, only spot check test items such as Radiated Spurious Emissions was were performed for this report. Other testing data please refer to BV CPS report no.: RE180816E04 for module (Brand: Realtek, RTL8822CE).
- The EUT is authorized for use in specific End-product. Please refer to below for more details.

Product	Brand	Model
Notebook Computer	HP	TPN-I137

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

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

\* The modulation and bandwidth are similar for 802.11n mode for HT20 / HT40 and 802.11ac mode for HT20 / HT40, therefore investigated worst case to representative mode in test report. (Final test mode refer section 3.2.1)

6. The antenna information is listed as below.

Antenna Type	Manufacturer	Parts Number	Antenna Gain (dBi)			
			BT /WLAN 2.4 GHz	WLAN 5.15~5.35 GHz	WLAN 5.47~5.725 GHz	WLAN 5.725~5.85 GHz
Laptop Mode						
PIFA	INPAQ	Tx1/Rx1 Antenna: 6036B0263501 (WA-P-LB-02-733) Tx2/Rx2. Antenna: 6036B0263701 (WA-P-LB-02-734)	Tx1: 0.12 Tx2: 0.68	Tx1: -1.26 Tx2: 0.29	Tx1: -0.47 Tx2: -0.83	Tx1: -0.56 Tx2: -1.34
	AWAN	Tx1/Rx1 Antenna: 6036B0263601 (AUP5Y-100000) Tx2/Rx2. Antenna: 6036B0263401 (AUP5Y-100001)	Tx1: 1.80 Tx2: 1.36	Tx1: 1.34 Tx2: 0.38	Tx1: 2.86 Tx2: -1.84	Tx1: -0.56 Tx2: -3.28
Table Mode						
PIFA	INPAQ	Tx1/Rx1 Antenna: 6036B0263501 (WA-P-LB-02-733) Tx2/Rx2. Antenna: 6036B0263701 (WA-P-LB-02-734)	Tx1: -2.35 Tx2: -1.71	Tx1: -2.51 Tx2: -1.07	Tx1: -1.62 Tx2: -2.13	Tx1: -1.62 Tx2: -2.49
	AWAN	Tx1/Rx1 Antenna: 6036B0263601 (AUP5Y-100000) Tx2/Rx2. Antenna: 6036B0263401 (AUP5Y-100001)	Tx1: -1.47 Tx2: -1.96	Tx1: -0.01 Tx2: -2.01	Tx1: -1.44 Tx2: -4.7	Tx1: -0.76 Tx2: -5.47

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

### 3.2 Description of Test Modes

13 channels are provided for 802.11b, 802.11g and 802.11n (HT20), (VHT20):

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

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

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



### 3.2.1 Test Mode Applicability and Tested Channel Detail

EUT Configure Mode	Applicable To		Description
	RE $\geq$ 1G	RE<1G	
-	√	√	-

Where **RE $\geq$ 1G**: Radiated Emission above 1 GHz **RE<1G**: Radiated Emission below 1 GHz

**NOTE:** The EUT had been pre-tested on the positioned of each 3 axis of tablet mode and NB mode. The worst case was found when positioned on **NB mode**.

**NOTE:** "-" means no effect.

#### **Radiated Emission Test (Above 1 GHz):**

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

EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
-	802.11b	1 to 13	1, 12, 13	DSSS	DBPSK	1.0
-	802.11g	1 to 13	12, 13	OFDM	BPSK	6.0
-	802.11n (HT20)	1 to 13	12, 13	OFDM	BPSK	6.5
-	802.11n (HT40)	3 to 11	10, 11	OFDM	BPSK	13.5

#### **Radiated Emission Test (Below 1 GHz):**

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

EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
-	802.11n (HT40)	1 to 13	11	OFDM	BPSK	13.5

#### **Test Condition:**

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

### 3.3 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

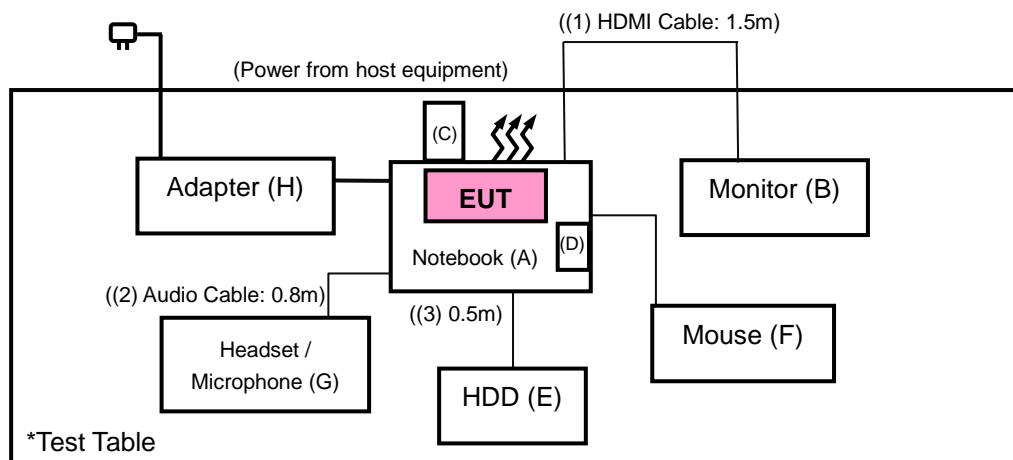
No.	Product	Brand	Model No.	Serial No.	FCC ID
A	Notebook Computer	HP	TPN-I137	N/A	N/A
B	Monitor	ViewSonic	VX2457-MHD	UG0182942333	N/A
C	USB 2.0 FLASH	HP	v250W	09	N/A
D	SD Card	SanDisk	N/A	N/A	N/A
E	HDD	G-Technology	0G04843	03	N/A
F	MOUSE	Dell	N/A	N/A	N/A
G	Headset / Microphone	HTC	N/A	N/A	N/A
H	Adapter	HP	TPN-AA05	N/A	N/A

No.	Signal Cable Description Of The Above Support Units
1.	HDMI Cable: 1.5m
2.	Audio Cable: 0.8m
3.	HDD Cable: 0.5m

Note:

1. All power cords of the above support units are non-shielded (1.8m).
2. Items A was provided by client.

#### 3.3.1 Configuration of System under Test



### **3.4 General Description of Applied Standards and References**

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

#### **Test Standard:**

**FCC Part 15, Subpart C (15.247)**

ANSI C63.10-2013

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

#### **References Test Guidance:**

**KDB 558074 D01 Meas Guidance v05r02**

**KDB 662911 D01 Multiple Transmitter Output v02r01**

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

## 4 Test Types and Results

### 4.1 Radiated Emission and Bandedge Measurement

#### 4.1.1 Limits of Radiated Emission and Bandedge Measurement

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

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

**NOTE:**

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

#### 4.1.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Test Receiver Agilent	N9038A	MY51210203	Mar. 18, 2019	Mar. 17, 2020
Spectrum Analyzer Agilent	N9010A	MY52220314	Dec. 12, 2019	Dec. 11, 2020
HORN Antenna SCHWARZBECK	BBHA 9120D	9120D-969	Nov. 24, 2019	Nov. 23, 2020
BILOG Antenna SCHWARZBECK	VULB 9168	9168-472	Nov. 08, 2019	Nov. 07, 2020
Fixed Attenuator WORKEN	MDCS18N-10	MDCS18N-10-01	Apr. 15, 2019	Apr. 14, 2020
Loop Antenna	EM-6879	269	Sep. 16, 2019	Sep. 15, 2020
Preamplifier EMCI	EMC001340	980201	Oct. 14, 2019	Oct. 13, 2020
Preamplifier EMCI	EMC 012645	980115	Oct. 08, 2019	Oct. 07, 2020
Preamplifier EMCI	EMC 330H	980112	Oct. 08, 2019	Oct. 07, 2020
RF Coaxial Cable HUBER+SUHNNER	EMC104-SM-SM-8000&3000	140811+170717	Oct. 08, 2019	Oct. 07, 2020
RF Coaxial Cable HUBER+SUHNNER	SUCOFLEX 104	EMC104-SM-SM-1000(140807)	Oct. 08, 2019	Oct. 07, 2020
RF Coaxial Cable Worken	8D-FB	Cable-Ch10-01	Oct. 08, 2019	Oct. 07, 2020
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA
Software BV ADT	E3 6.120103	NA	NA	NA
Antenna Tower MF	MFA-440H	NA	NA	NA
Turn Table MF	MFT-201SS	NA	NA	NA
Antenna Tower & Turn Table Controller MF	MF-7802	NA	NA	NA

- Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in HwaYa Chamber 10.

#### 4.1.3 Test Procedures

##### **For Radiated Emission below 30 MHz**

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. Parallel, perpendicular, and ground-parallel orientations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

##### **Note:**

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9 kHz at frequency below 30 MHz.

##### **For Radiated Emission above 30 MHz**

- a. The EUT was placed on the top of a rotating table 0.8 meters (for 30 MHz ~ 1 GHz) / 1.5 meters (for above 1 GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f. The test-receiver system was set to peak and average detected function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

##### **Note:**

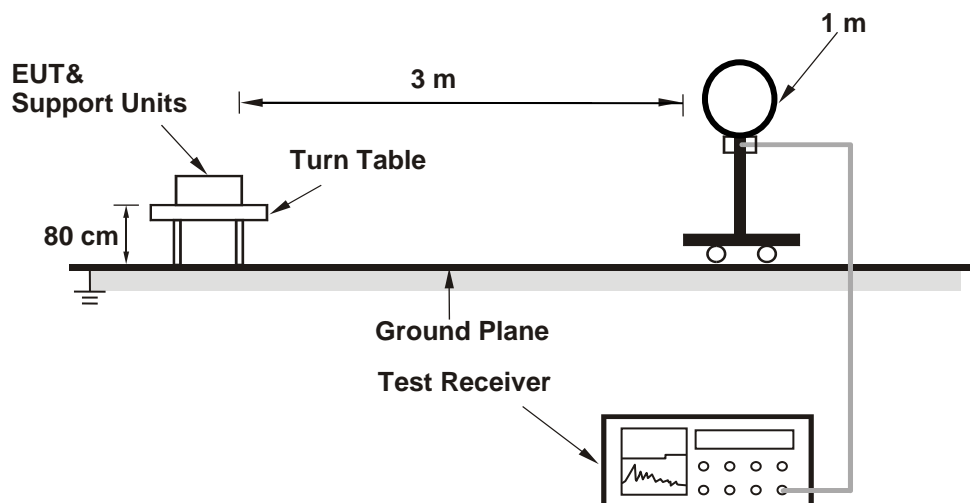
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection (QP) or Peak detection (PK) at frequency below 1 GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1 GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is  $\geq 1/T$  (Duty cycle  $< 98\%$ ) or 10 Hz (Duty cycle  $\geq 98\%$ ) for Average detection (AV) at frequency above 1 GHz.  
(11b: RBW = 1 MHz, VBW = 1 Hz ; 11g: RBW = 1 MHz, VBW = 1 kHz ;  
11n (HT20): RBW = 1 MHz, VBW = 1 kHz ; 11n (HT40): RBW = 1 MHz, VBW = 1 kHz)
4. All modes of operation were investigated and the worst-case emissions are reported.

#### 4.1.4 Deviation from Test Standard

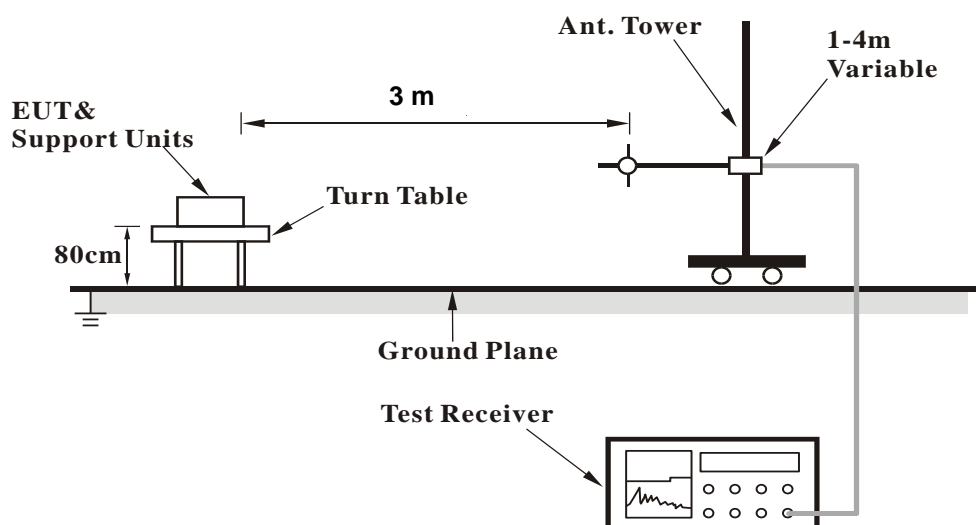
No deviation.

#### 4.1.5 Test Set Up

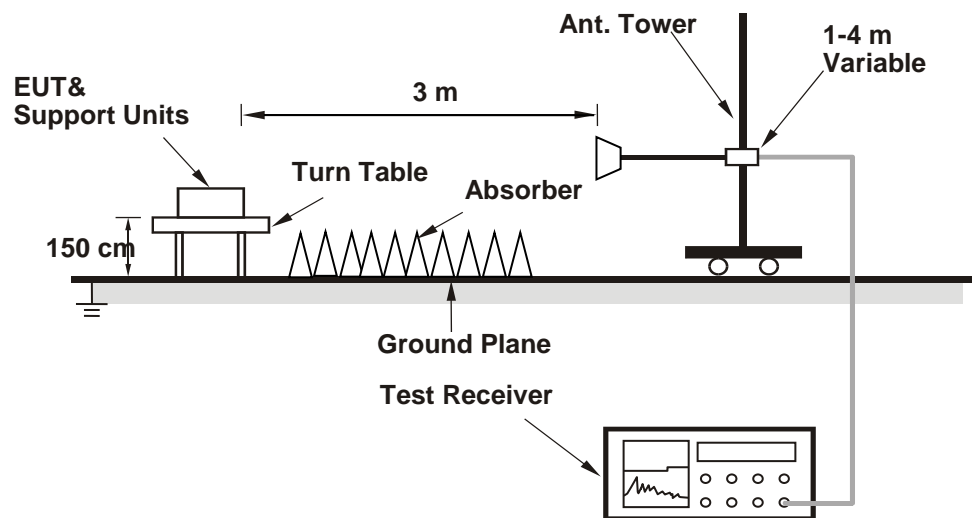
##### <Radiated Emission below 30 MHz>



##### <Radiated Emission 30 MHz to 1 GHz>



### <Radiated Emission above 1 GHz>



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

#### 4.1.6 EUT Operating Conditions

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



#### 4.1.7 Test Results

#### Above 1 GHz Data : 802.11b

EUT Test Condition		Measurement Detail	
Channel	Channel 1	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Tim Chen

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	43.32	48.85	-5.53	54	-10.68	110	35	Average
2390	52.18	57.71	-5.53	74	-21.82	110	35	Peak
2412	103.44	109	-5.56	-----	-----	110	35	Average
2412	105.72	111.28	-5.56	-----	-----	110	35	Peak
4824	36.75	51.74	-14.99	54	-17.25	230	317	Average
4824	45.04	60.03	-14.99	74	-28.96	230	317	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2386.02	44.18	49.68	-5.5	54	-9.82	382	152	Average
2386.02	51.44	56.94	-5.5	74	-22.56	382	152	Peak
2412	101.92	107.48	-5.56	-----	-----	382	152	Average
2412	104.03	109.59	-5.56	-----	-----	382	152	Peak
4824	35.81	50.8	-14.99	54	-18.19	100	188	Average
4824	45.49	60.48	-14.99	74	-28.51	100	188	Peak

#### Remarks:

- Emission Level = Read Level + Factor  
Margin value = Emission level – Limit value
- 2412 MHz: Fundamental frequency.
- The emission levels of other frequencies were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 12	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Tim Chen

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2467	97.62	102.91	-5.29	-----	-----	133	31	Average
2467	100	105.29	-5.29	-----	-----	133	31	Peak
2483.5	41.44	46.68	-5.24	54	-12.56	133	31	Average
2483.5	51.23	56.47	-5.24	74	-22.77	133	31	Peak
4934	34.63	49.52	-14.89	54	-19.37	232	318	Average
4934	44.56	59.45	-14.89	74	-29.44	232	318	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2467	98.32	103.61	-5.29	-----	-----	306	90	Average
2467	100.76	106.05	-5.29	-----	-----	306	90	Peak
2483.5	44.11	49.35	-5.24	54	-9.89	306	90	Average
2483.5	52.02	57.26	-5.24	74	-21.98	306	90	Peak
4934	34.79	49.68	-14.89	54	-19.21	104	189	Average
4934	45.01	59.9	-14.89	74	-28.99	104	189	Peak

Remarks:

- Emission Level = Read Level + Factor  
Margin value = Emission level – Limit value
- 2467 MHz: Fundamental frequency.
- The emission levels of other frequencies were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 13	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Tim Chen

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2472	92.7	97.97	-5.27	-----	-----	119	45	Average
2472	95.06	100.33	-5.27	-----	-----	119	45	Peak
2483.5	40.18	45.42	-5.24	54	-13.82	119	45	Average
2483.5	49.07	54.31	-5.24	74	-24.93	119	45	Peak
4944	33.65	48.53	-14.88	54	-20.35	228	311	Average
4944	43.39	58.27	-14.88	74	-30.61	228	311	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2472	90.16	95.43	-5.27	-----	-----	332	161	Average
2472	92.2	97.47	-5.27	-----	-----	332	161	Peak
2483.5	37.46	42.7	-5.24	54	-16.54	332	161	Average
2483.5	48.54	53.78	-5.24	74	-25.46	332	161	Peak
4944	34.15	49.03	-14.88	54	-19.85	100	185	Average
4944	44.48	59.36	-14.88	74	-29.52	100	185	Peak

Remarks:

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

# 802.11g

EUT Test Condition		Measurement Detail	
Channel	Channel 12	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Tim Chen

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2467	92.01	97.3	-5.29	-----	-----	111	35	Average
2467	98.64	103.93	-5.29	-----	-----	111	35	Peak
2483.5	41.11	46.35	-5.24	54	-12.89	111	35	Average
2483.5	54.52	59.76	-5.24	74	-19.48	111	35	Peak
4934	34.29	49.18	-14.89	54	-19.71	233	315	Average
4934	44.75	59.64	-14.89	74	-29.25	233	315	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2467	92.03	97.32	-5.29	-----	-----	100	180	Average
2467	96.05	101.34	-5.29	-----	-----	100	180	Peak
2483.5	39.57	44.81	-5.24	54	-14.43	100	180	Average
2483.5	49.96	55.2	-5.24	74	-24.04	100	180	Peak
4934	33.88	48.77	-14.89	54	-20.12	102	193	Average
4934	43.99	58.88	-14.89	74	-30.01	102	193	Peak

## Remarks:

- Emission Level = Read Level + Factor  
Margin value = Emission level – Limit value
- 2467 MHz: Fundamental frequency.
- The emission levels of other frequencies were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 13	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Tim Chen

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2472	89.72	94.99	-5.27	-----	-----	128	33	Average
2472	96.47	101.74	-5.27	-----	-----	128	33	Peak
2483.5	42.95	48.19	-5.24	54	-11.05	128	33	Average
2483.5	55.33	60.57	-5.24	74	-18.67	128	33	Peak
4944	34.28	49.16	-14.88	54	-19.72	226	313	Average
4944	43.64	58.52	-14.88	74	-30.36	226	313	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2472	86.12	91.39	-5.27	-----	-----	101	181	Average
2472	92.83	98.1	-5.27	-----	-----	101	181	Peak
2483.5	40.45	45.69	-5.24	54	-13.55	101	181	Average
2483.5	52.15	57.39	-5.24	74	-21.85	101	181	Peak
4944	34.3	49.18	-14.88	54	-19.7	100	183	Average
4944	43.98	58.86	-14.88	74	-30.02	100	183	Peak

Remarks:

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

# 802.11n (HT20)

EUT Test Condition		Measurement Detail	
Channel	Channel 12	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Tim Chen

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2467	91.74	97.03	-5.29	-----	-----	119	25	Average
2467	98.6	103.89	-5.29	-----	-----	119	25	Peak
2483.5	42.81	48.05	-5.24	54	-11.19	119	25	Average
2483.5	55.1	60.34	-5.24	74	-18.9	119	25	Peak
4934	34.74	49.63	-14.89	54	-19.26	226	314	Average
4934	44.48	59.37	-14.89	74	-29.52	226	314	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2467	90.78	96.07	-5.29	-----	-----	365	159	Average
2467	97.8	103.09	-5.29	-----	-----	365	159	Peak
2483.5	39.92	45.16	-5.24	54	-14.08	365	159	Average
2483.5	51.96	57.2	-5.24	74	-22.04	365	159	Peak
4934	34.15	49.04	-14.89	54	-19.85	102	192	Average
4934	44.38	59.27	-14.89	74	-29.62	102	192	Peak

## Remarks:

- Emission Level = Read Level + Factor  
Margin value = Emission level – Limit value
- 2467 MHz: Fundamental frequency.
- The emission levels of other frequencies were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 13	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Tim Chen

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2472	89.91	95.18	-5.27	-----	-----	124	29	Average
2472	96.55	101.82	-5.27	-----	-----	124	29	Peak
2483.5	42.13	47.37	-5.24	54	-11.87	124	29	Average
2483.5	52.76	58	-5.24	74	-21.24	124	29	Peak
4944	34.24	49.12	-14.88	54	-19.76	226	313	Average
4944	44.75	59.63	-14.88	74	-29.25	226	313	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2472	86.64	91.91	-5.27	-----	-----	113	185	Average
2472	93.52	98.79	-5.27	-----	-----	113	185	Peak
2483.5	39.3	44.54	-5.24	54	-14.7	113	185	Average
2483.5	49.65	54.89	-5.24	74	-24.35	113	185	Peak
4944	33.39	48.27	-14.88	54	-20.61	106	191	Average
4944	43.13	58.01	-14.88	74	-30.87	106	191	Peak

Remarks:

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

# 802.11n (HT40)

EUT Test Condition		Measurement Detail	
Channel	Channel 10	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Tim Chen

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	36.91	42.44	-5.53	54	-17.09	122	49	Average
2390	47.26	52.79	-5.53	74	-26.74	122	49	Peak
2457	89.59	94.97	-5.38	-----	-----	122	49	Average
2457	96.22	101.6	-5.38	-----	-----	122	49	Peak
2483.5	43.49	48.73	-5.24	54	-10.51	122	49	Average
2483.5	56.61	61.85	-5.24	74	-17.39	122	49	Peak
4914	33.14	48.02	-14.88	54	-20.86	224	308	Average
4914	43.06	57.94	-14.88	74	-30.94	224	308	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	36.84	42.37	-5.53	54	-17.16	306	87	Average
2390	47.02	52.55	-5.53	74	-26.98	306	87	Peak
2457	89.9	95.28	-5.38	-----	-----	306	87	Average
2457	96.73	102.11	-5.38	-----	-----	306	87	Peak
2483.5	43.31	48.55	-5.24	54	-10.69	306	87	Average
2483.5	55.56	60.8	-5.24	74	-18.44	306	87	Peak
4914	32.78	47.66	-14.88	54	-21.22	100	179	Average
4914	43.65	58.53	-14.88	74	-30.35	100	179	Peak

## Remarks:

- Emission Level = Read Level + Factor  
Margin value = Emission level – Limit value
- 2457 MHz: Fundamental frequency.
- The emission levels of other frequencies were very low against the limit.



EUT Test Condition		Measurement Detail	
Channel	Channel 11	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Tim Chen

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	36.92	42.45	-5.53	54	-17.08	118	30	Average
2390	47.1	52.63	-5.53	74	-26.9	118	30	Peak
2462	86.39	91.76	-5.37	-----	-----	118	30	Average
2462	93.07	98.44	-5.37	-----	-----	118	30	Peak
<b>2483.5</b>	<b>50.33</b>	<b>55.57</b>	<b>-5.24</b>	<b>54</b>	<b>-3.67</b>	<b>118</b>	<b>30</b>	<b>Average</b>
2483.5	65.51	70.75	-5.24	74	-8.49	118	30	Peak
4924	32.8	47.68	-14.88	54	-21.2	223	303	Average
4924	43.36	58.24	-14.88	74	-30.64	223	303	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	36.2	41.73	-5.53	54	-17.8	118	185	Average
2390	47.5	53.03	-5.53	74	-26.5	118	185	Peak
2462	82.81	88.18	-5.37	-----	-----	118	185	Average
2462	89.89	95.26	-5.37	-----	-----	118	185	Peak
2483.5	46.26	51.5	-5.24	54	-7.74	118	185	Average
2483.5	61.2	66.44	-5.24	74	-12.8	118	185	Peak
4924	32.84	47.72	-14.88	54	-21.16	100	186	Average
4924	43.39	58.27	-14.88	74	-30.61	100	186	Peak

Remarks:

1. Emission Level = Read Level + Factor  
Margin value = Emission level – Limit value
2. 2462 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

### 9 kHz ~ 30 MHz Data:

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

### 30 MHz ~ 1 GHz Worst-Case Data:

#### 802.11n (HT40)

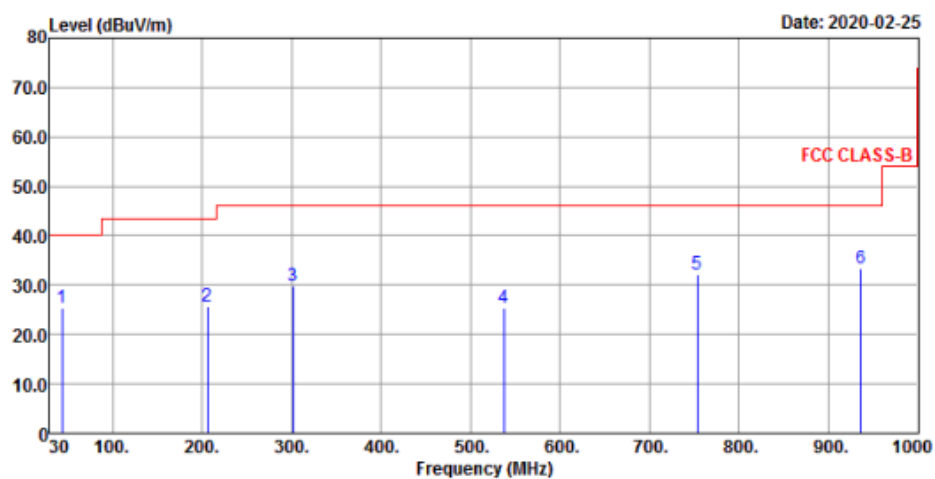
EUT Test Condition		Measurement Detail	
Channel	Channel 11	Frequency Range	30 MHz ~ 1 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Quasi-peak (QP)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Tim Chen

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
43.58	25.51	37.43	-11.92	40	-14.49	161	53	Peak
205.57	25.54	40.67	-15.13	43.5	-17.96	142	64	Peak
301.6	29.91	41.03	-11.12	46	-16.09	101	289	Peak
537.31	25.32	30.14	-4.82	46	-20.68	104	333	Peak
753.62	32.05	31.05	1	46	-13.95	162	138	Peak
935.98	33.45	30.01	3.44	46	-12.55	175	25	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
38.73	26.25	38.62	-12.37	40	-13.75	262	137	Peak
262.8	23.52	36.04	-12.52	46	-22.48	292	31	Peak
451.95	24.45	30.85	-6.4	46	-21.55	151	285	Peak
631.4	29.54	31.32	-1.78	46	-16.46	143	10	Peak
839.95	33.03	30.64	2.39	46	-12.97	107	244	Peak
941.8	33.72	30.18	3.54	46	-12.28	144	71	Peak

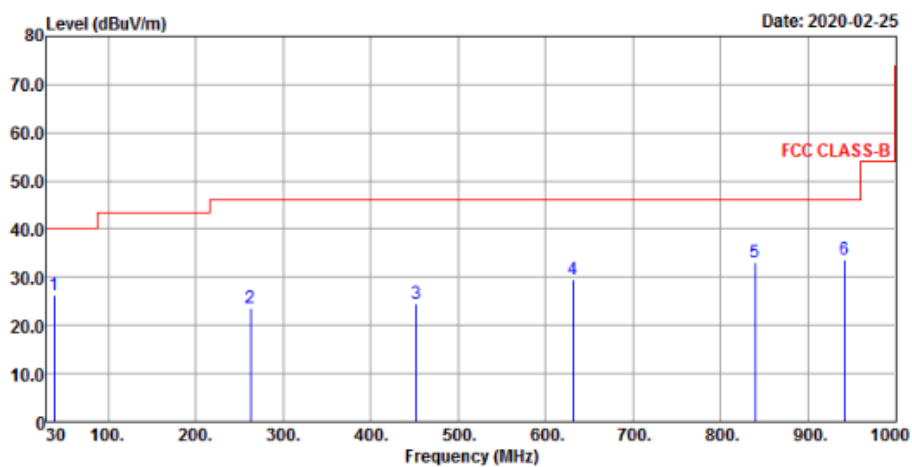
#### Remarks:

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

## Horizontal



## Vertical



## 5 Pictures of Test Arrangements

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

## Appendix – Information of the Testing Laboratories

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

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

**Lin Kou EMC/RF Lab**

Tel: 886-2-26052180

Fax: 886-2-26051924

**Hsin Chu EMC/RF/Telecom Lab**

Tel: 886-3-6668565

Fax: 886-3-6668323

**Hwa Ya EMC/RF/Safety Lab**

Tel: 886-3-3183232

Fax: 886-3-3270892

**Email:** [service.adt@tw.bureauveritas.com](mailto:service.adt@tw.bureauveritas.com)

**Web Site:** [www.bureauveritas-adt.com](http://www.bureauveritas-adt.com)

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

--- END ---