

## FCC Test Report (WLAN)

**Report No.:** RF161216E08C

**FCC ID:** UAY-W8997-M1216

**Test Model:** W8997-M1216

**Received Date:** June 18, 2018

**Test Date:** June 27 to July 10, 2018

**Issued Date:** July 13, 2018

**Applicant:** Marvell Semiconductor, Inc.

**Address:** 5488 Marvell Lane, Santa Clara CA95054 USA

**Issued By:** Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch  
Hsin Chu Laboratory

**Lab Address:** E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300,  
Taiwan R.O.C.

**Test Location:** E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300,  
Taiwan R.O.C.

**FCC Registration /  
Designation Number:** 723255 / TW2022



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### Release Control Record

Issue No.	Description	Date Issued
RF161216E08C	Original release.	July 13, 2018

## 1 Certificate of Conformity

**Product:** IEEE 802.11 2X2 MU-MIMO ac/a/b/g/n Wireless LAN + Bluetooth NGFF Module

**Brand:** Marvell

**Test Model:** W8997-M1216

**Sample Status:** ENGINEERING SAMPLE

**Applicant:** Marvell Semiconductor, Inc.

**Test Date:** June 27 to July 10, 2018

**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 EMC characteristics under the conditions specified in this report.

**Prepared by :** Wendy Wu , **Date:** July 13, 2018  
Wendy Wu / Specialist

**Approved by :** May Chen , **Date:** July 13, 2018  
May Chen / Manager

## 2 Summary of Test Results

47 CFR FCC Part 15, Subpart C (Section 15.247)			
FCC Clause	Test Item	Result	Remarks
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -0.1dB at 2483.50MHz.
15.247(b)	Conducted power	PASS	Meet the requirement of limit.
15.203	Antenna Requirement	PASS	Antenna connector are i-pex(MHF), RP-SMA not a standard connector.

### 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) ( $\pm$ )
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	5.33 dB
Radiated Emissions above 1 GHz	1GHz ~ 6GHz	5.10 dB
	6GHz ~ 18GHz	4.85 dB
	18GHz ~ 40GHz	5.24 dB

### 2.2 Modification Record

There were no modifications required for compliance.

### 3 General Information

#### 3.1 General Description of EUT (WLAN)

Product	IEEE 802.11 2X2 MU-MIMO ac/a/b/g/n Wireless LAN + Bluetooth NGFF Module
Brand	Marvell
Test Model	W8997-M1216
Status of EUT	ENGINEERING SAMPLE
Power Supply Rating	DC 3.3V from host equipment
Modulation Type	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM 256QAM for OFDM in 11ac mode
Modulation Technology	DSSS, OFDM
Transfer Rate	802.11b: up to 11Mbps 802.11a/g: up to 54Mbps 802.11n: up to 300Mbps 802.11ac: up to 866.7Mbps
Operating Frequency	<b>2.4GHz:</b> 2.412 ~ 2.462GHz <b>5GHz:</b> 5.18~5.24GHz, 5.26~5.32GHz, 5.50~5.70GHz, 5.745~5.825GHz
Number of Channel	<b>2.4GHz:</b> 802.11b, 802.11g, 802.11n (HT20): 11 802.11n (HT40): 7 <b>5GHz:</b> 802.11a, 802.11n (HT20), 802.11ac (VHT20): 24 802.11n (HT40), 802.11ac (VHT40): 11 802.11ac (VHT80): 5
Output Power	<b>2.4GHz:</b> 918.001mW <b>5.18GHz ~ 5.24GHz:</b> 147.595mW <b>5.26~5.32GHz:</b> 144.557mW <b>5.50~5.70GHz:</b> 123.471mW <b>5.745GHz ~ 5.825GHz:</b> 193.443mW
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	NA
Data Cable Supplied	NA

Note:

- This report is prepared for FCC class II permissive change. The difference compared with the Report No.: RF161216E08 as the following:

◆ Add new antennas as following table:

Original							
Antenna Set.	Brand	Model	Chain No.	Antenna Net. Gain(dBi)	Frequency range (MHz)	Antenna Type	Connector Type
1	MAG.LAYERS	MSA-4008-25GC1-A1	Chain 0(Aux)	2.98	2400~2500	PIFA	i-pex(MHF)
				5.16	4900~5900		
			Chain 1(Main)	2.98	2400~2500		
				5.16	4900~5900		

Newly							
Antenna Set.	Brand	Model	Chain No.	Antenna Net. Gain(dBi)	Frequency range (MHz)	Antenna Type	Connector Type
2	Bondale	G-RA0K10090176-1436B	Chain 0(Aux)	1.9	2400~2500	Dipole	RP-SMA
				3.6	4900~5800		
			Chain 1(Main)	1.9	2400~2500		
				3.6	4900~5800		
3	San Jose	UEN-201	Chain 0(Aux)	2.4	2400~2500	Dipole	RP-SMA
				4.4	4900~5800		
			Chain 1(Main)	2.4	2400~2500		
				4.4	4900~5800		

Note:

- Max. gain was selected for Antenna Port Conducted Measurement test.
- Antenna Set. 3 was selected for Radiated Emissions test.

- According to above condition, only Conducted output power and Radiated Emissions test items need to be performed. And all data were verified to meet the requirements.
- There are WLAN, BT technology used for the EUT.
- Simultaneously transmission condition.

Condition	Technology	
1	WLAN (2.4GHz)	Bluetooth
2	WLAN (5GHz)	Bluetooth

**Note:** The emission of the simultaneous operation has been evaluated and no non-compliance was found.

5. The EUT incorporates a MIMO function.

2.4GHz Band			
MODULATION MODE	DATA RATE (MCS)	TX & RX CONFIGURATION	
802.11b	1 ~ 11Mbps	2TX	2RX
802.11g	6 ~ 54Mbps	2TX	2RX
802.11n (HT20)	MCS 0~7	2TX	2RX
	MCS 8~15	2TX	2RX
802.11n (HT40)	MCS 0~7	2TX	2RX
	MCS 8~15	2TX	2RX
5GHz Band			
MODULATION MODE	DATA RATE (MCS)	TX & RX CONFIGURATION	
802.11a	6 ~ 54Mbps	2TX	2RX
802.11n (HT20)	MCS 0~7	2TX	2RX
	MCS 8~15	2TX	2RX
802.11n (HT40)	MCS 0~7	2TX	2RX
	MCS 8~15	2TX	2RX
802.11ac (VHT20)	MCS0~8 Nss=1	2TX	2RX
	MCS0~8 Nss=2	2TX	2RX
802.11ac (VHT40)	MCS0~9 Nss=1	2TX	2RX
	MCS0~9 Nss=2	2TX	2RX
802.11ac (VHT80)	MCS0~9 Nss=1	2TX	2RX
	MCS0~9 Nss=2	2TX	2RX

6. 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 Description of Test Modes

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

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

7 channels are provided for 802.11n (HT40):

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

### 3.2.1 Test Mode Applicability and Tested Channel Detail

EUT CONFIGURE MODE	APPLICABLE TO			DESCRIPTION
	RE $\geq$ 1G	RE<1G	APCM	
-	√	√	√	-

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

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

- 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.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1
802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6
802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	6.5
802.11n (HT40)	3 to 9	3, 6, 9	OFDM	BPSK	13.5

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

- 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.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11g	1 to 11	6	OFDM	BPSK	6

#### **Antenna Port Conducted Measurement:**

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

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1
802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6
802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	6.5
802.11n (HT40)	3 to 9	3, 6, 9	OFDM	BPSK	13.5

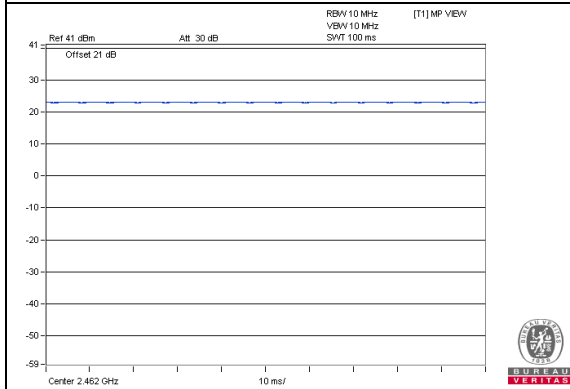
**Test Condition:**

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER (System)	TESTED BY
RE $\geq$ 1G	22deg. C, 64%RH	120Vac, 60Hz	Eason Tseng
RE<1G	24deg. C, 65%RH	120Vac, 60Hz	Frank Chuang
APCM	25deg. C, 60%RH	120Vac, 60Hz	Anderson Chen

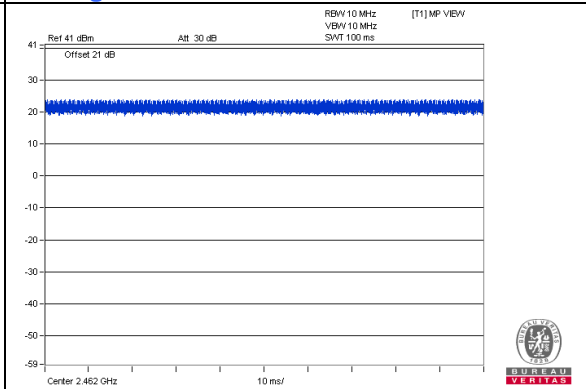
### 3.3 Duty Cycle of Test Signal

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

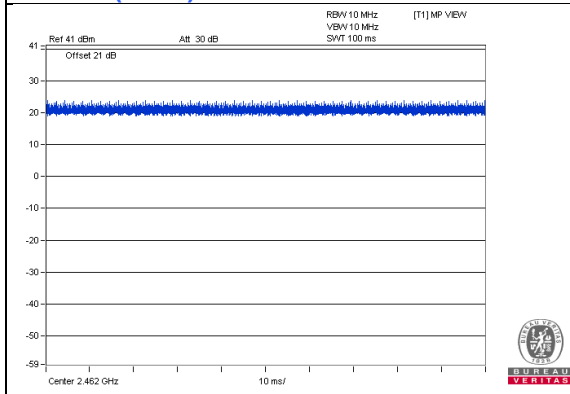
**802.11b**



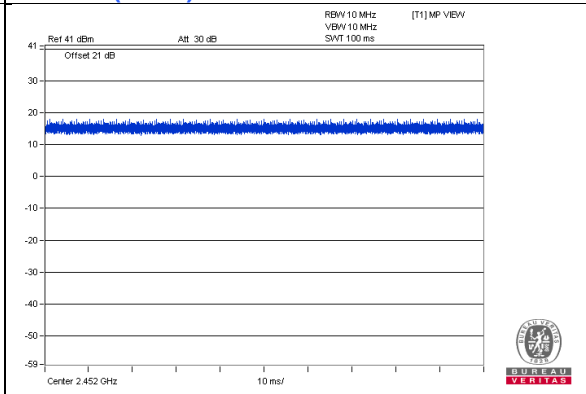
**802.11g**



**802.11n (HT20)**



**802.11n (HT40)**



### 3.4 Description of Support Units

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

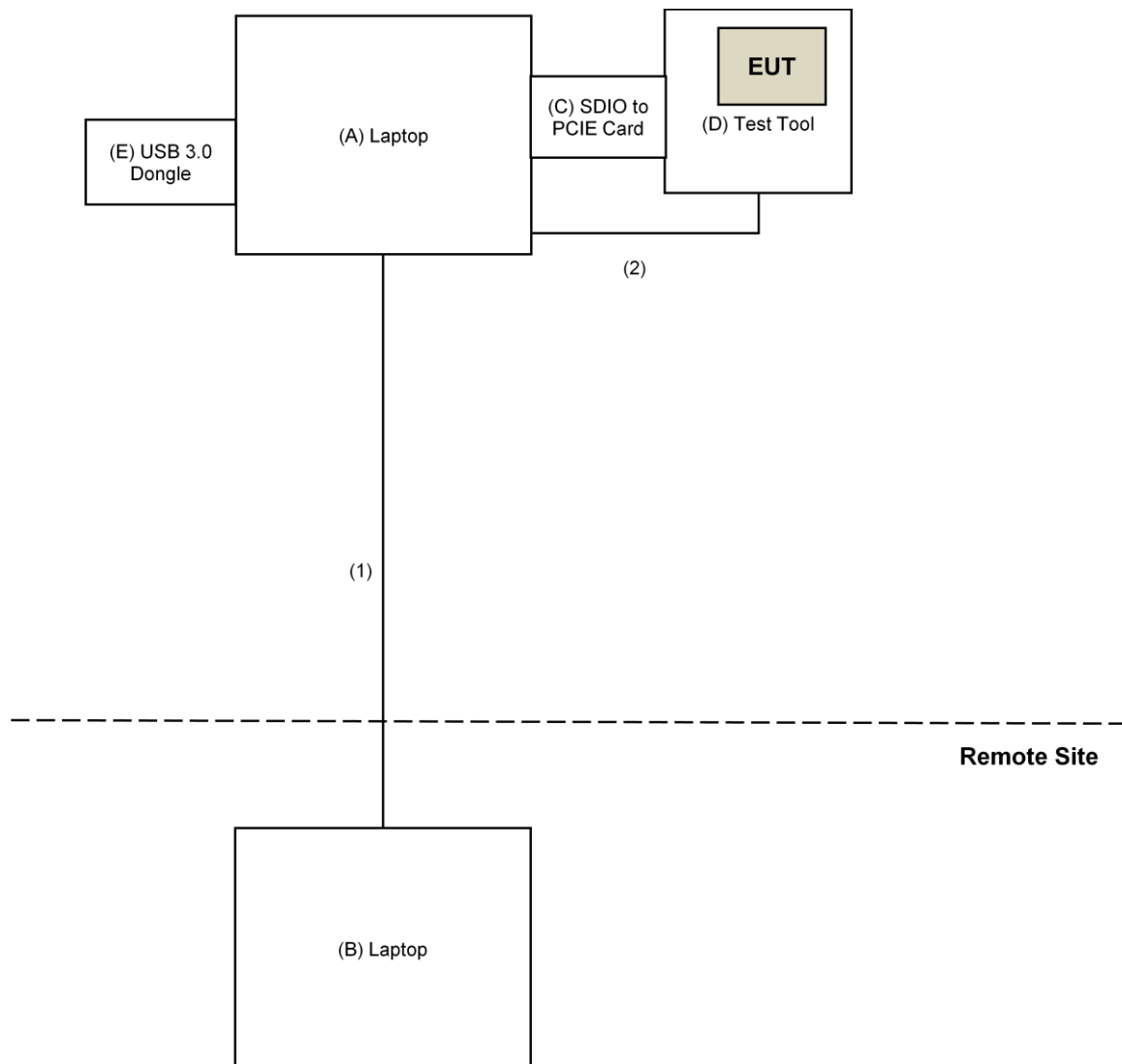
ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Laptop	DELL	E6420	B92T3R1	FCC DoC	Provided by Lab
B.	Laptop	HP	Pavilion 14-ab023TU	5CD5340WXZ	NA	Provided by Lab
C.	SDIO to PCIE Card	AzureWave	NA	NA	NA	Supplied by client
D.	Test Tool	AzureWave	NA	NA	NA	Supplied by client
E.	USB 3.0 Dongle	Transcend	JF790	NA	NA	Supplied by client

Note:

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

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	RJ-45 Cable	1	10	No	0	Provided by Lab
2.	USB Cable	1	1.4	Yes	0	Provided by Lab

### 3.4.1 Configuration of System under Test



### 3.5 General Description of Applied Standards

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

**FCC Part 15, Subpart C (15.247)**  
**KDB 558074 D01 DTS Meas Guidance v04**  
**KDB 662911 D01 Multiple Transmitter Output v02r01**  
**ANSI C63.10-2013**

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

## 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 20dB 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 1000MHz, 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 20dB under any condition of modulation.



#### 4.1.2 Test Instruments

##### For Output power test:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer R&S	FSV40	100964	June 20, 2018	June 19, 2019
Power meter Anritsu	ML2495A	1014008	May 09, 2018	May 08, 2019
Power sensor Anritsu	MA2411B	0917122	May 09, 2018	May 08, 2019

- NOTE:**
1. The test was performed in Oven room 2.
  2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
  3. Tested Date: July 10, 2018

**For other test:**

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Keysight	N9038A	MY54450088	July 08, 2017	July 07, 2018
Pre-Amplifier EMCI	EMC001340	980142	Feb. 09, 2018	Feb. 08, 2019
Loop Antenna <sup>(*)</sup> Electro-Metrics	EM-6879	264	Dec. 16, 2016	Dec. 15, 2018
RF Cable	NA	LOOPCAB-001 LOOPCAB-002	Jan. 15, 2018	Jan. 14, 2019
Pre-Amplifier Mini-Circuits	ZFL-1000VH2B	AMP-ZFL-01	Nov. 09, 2017	Nov. 08, 2018
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-406	Nov. 29, 2017	Nov. 28, 2018
RF Cable	8D	966-4-1 966-4-2 966-4-3	Mar. 21, 2018	Mar. 20, 2019
Fixed attenuator Mini-Circuits	UNAT-5+	PAD-3m-4-01	Oct. 03, 2017	Oct. 02, 2018
Horn_Antenna SCHWARZBECK	BBHA 9120D	9120D-783	Dec. 12, 2017	Dec. 11, 2018
Pre-Amplifier EMCI	EMC12630SE	980385	Jan. 29, 2018	Jan. 28, 2019
RF Cable	EMC104-SM-SM-1200 EMC104-SM-SM-2000 EMC104-SM-SM-5000	160923 150318 150321	Jan. 29, 2018	Jan. 28, 2019
Pre-Amplifier EMCI	EMC184045SE	980387	Jan. 29, 2018	Jan. 28, 2019
Horn_Antenna SCHWARZBECK	BBHA 9170	BBHA9170608	Dec. 14, 2017	Dec. 13, 2018
RF Cable	EMC102-KM-KM-1200	160925	Jan. 29, 2018	Jan. 28, 2019
Software	ADT_Radiated_V8.7.08	NA	NA	NA
Boresight Antenna Tower & Turn Table Max-Full	MF-7802BS	MF780208530	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 calibration interval of the above test instruments is 24 months and the calibrations are traceable to NML/ROC and NIST/USA.
3. The test was performed in 966 Chamber No. 4.
4. The CANADA Site Registration No. is 20331-2
5. Loop antenna was used for all emissions below 30 MHz.
6. Tested Date: June 27 to 28, 2018

#### 4.1.3 Test Procedures

##### **For Radiated emission below 30MHz**

- 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 9kHz at frequency below 30MHz.

##### **For Radiated emission above 30MHz**

- a. The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) 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 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.

##### **Note:**

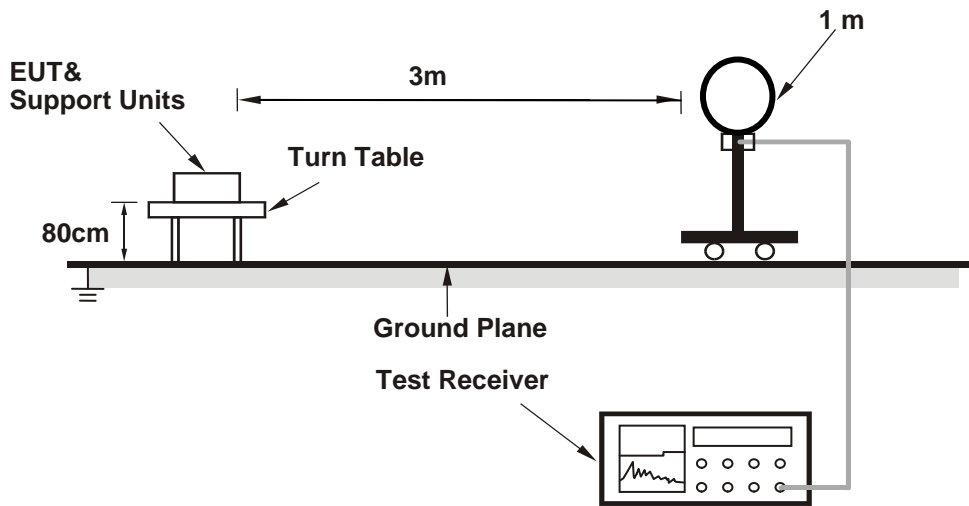
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

4.1.4 Deviation from Test Standard

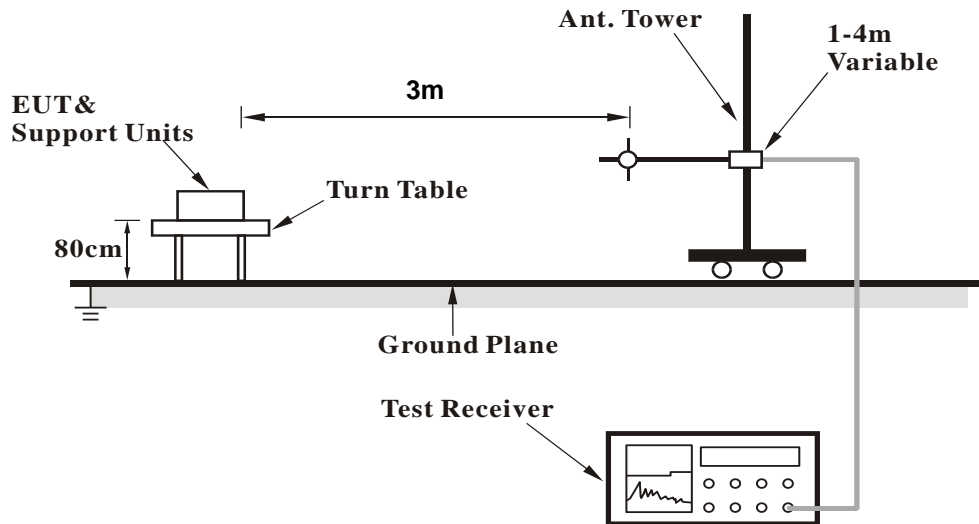
No deviation.

4.1.5 Test Setup

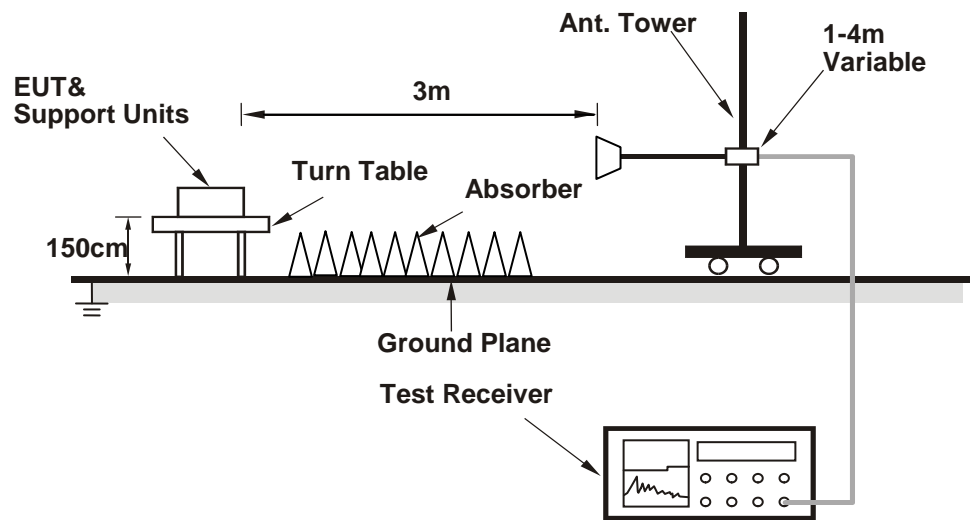
**For Radiated emission below 30MHz**



**For Radiated emission 30MHz to 1GHz**



### For Radiated emission above 1GHz



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

#### 4.1.6 EUT Operating Conditions

- a. Connected the EUT with the Laptop Computer which is placed on remote site.
- b. Controlling software (DUT labtool (1.0.0.109)) has been activated to set the EUT on specific status.

## 4.1.7 Test Results

## Above 1GHz Data:

## 802.11b

<b>CHANNEL</b>	TX Channel 1	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 25GHz		Average (AV)

**ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M**

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	52.6 PK	74.0	-21.4	1.23 H	329	54.8	-2.2
2	2390.00	43.8 AV	54.0	-10.2	1.23 H	329	46.0	-2.2
3	*2412.00	106.3 PK			1.23 H	329	108.7	-2.4
4	*2412.00	104.0 AV			1.23 H	329	106.4	-2.4
5	4824.00	44.7 PK	74.0	-29.3	1.00 H	339	42.9	1.8
6	4824.00	41.7 AV	54.0	-12.3	1.00 H	339	39.9	1.8

**ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M**

NO.	FREQ. (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	58.2 PK	74.0	-15.8	2.63 V	164	60.4	-2.2
2	2390.00	49.5 AV	54.0	-4.5	2.63 V	164	51.7	-2.2
3	*2412.00	114.2 PK			2.63 V	164	116.6	-2.4
4	*2412.00	112.1 AV			2.63 V	164	114.5	-2.4
5	4824.00	55.1 PK	74.0	-18.9	1.93 V	317	53.3	1.8
6	4824.00	53.4 AV	54.0	-0.6	1.93 V	317	51.6	1.8

**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. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " \* ": Fundamental frequency.

<b>CHANNEL</b>	TX Channel 6	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 25GHz		Average (AV)

**ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M**

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	106.1 PK			1.18 H	324	108.7	-2.6
2	*2437.00	103.4 AV			1.18 H	324	106.0	-2.6
3	4874.00	44.3 PK	74.0	-29.7	1.00 H	354	42.3	2.0
4	4874.00	41.6 AV	54.0	-12.4	1.00 H	354	39.6	2.0
5	7311.00	47.1 PK	74.0	-26.9	2.52 H	177	38.7	8.4
6	7311.00	40.8 AV	54.0	-13.2	2.52 H	177	32.4	8.4

**ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M**

NO.	FREQ. (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	114.5 PK			2.54 V	184	117.1	-2.6
2	*2437.00	112.3 AV			2.54 V	184	114.9	-2.6
3	4874.00	54.7 PK	74.0	-19.3	1.99 V	319	52.7	2.0
4	4874.00	53.3 AV	54.0	-0.7	1.99 V	319	51.3	2.0
5	7311.00	53.3 PK	74.0	-20.7	3.24 V	26	44.9	8.4
6	7311.00	49.5 AV	54.0	-4.5	3.24 V	26	41.1	8.4

**REMARKS:**

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

<b>CHANNEL</b>	TX Channel 11	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 25GHz		Average (AV)

**ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M**

NO.	FREQ. (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	106.3 PK			1.23 H	315	108.9	-2.6
2	*2462.00	103.8 AV			1.23 H	315	106.4	-2.6
3	2483.50	52.8 PK	74.0	-21.2	1.23 H	315	55.2	-2.4
4	2483.50	44.2 AV	54.0	-9.8	1.23 H	315	46.6	-2.4
5	2486.70	56.7 PK	74.0	-17.3	1.23 H	315	59.1	-2.4
6	2486.70	46.4 AV	54.0	-7.6	1.23 H	315	48.8	-2.4
7	4924.00	44.3 PK	74.0	-29.7	1.01 H	350	42.3	2.0
8	4924.00	41.6 AV	54.0	-12.4	1.01 H	350	39.6	2.0
9	7386.00	47.4 PK	74.0	-26.6	2.55 H	170	38.8	8.6
10	7386.00	41.1 AV	54.0	-12.9	2.55 H	170	32.5	8.6

**ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M**

NO.	FREQ. (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	114.2 PK			2.44 V	165	116.8	-2.6
2	*2462.00	112.2 AV			2.44 V	165	114.8	-2.6
3	2483.50	57.1 PK	74.0	-16.9	2.44 V	165	59.5	-2.4
4	2483.50	49.2 AV	54.0	-4.8	2.44 V	165	51.6	-2.4
5	2486.70	59.5 PK	74.0	-14.5	2.44 V	165	61.9	-2.4
6	2486.70	53.2 AV	54.0	-0.8	2.44 V	165	55.6	-2.4
7	4924.00	54.2 PK	74.0	-19.8	1.79 V	320	52.2	2.0
8	4924.00	53.6 AV	54.0	-0.4	1.79 V	320	51.6	2.0
9	7386.00	53.1 PK	74.0	-20.9	3.21 V	31	44.5	8.6
10	7386.00	49.2 AV	54.0	-4.8	3.21 V	31	40.6	8.6

**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. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " \* ": Fundamental frequency.



**802.11g**

<b>CHANNEL</b>	TX Channel 1	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 25GHz		Average (AV)

**ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M**

NO.	FREQ. (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	62.4 PK	74.0	-11.6	1.23 H	329	64.6	-2.2
2	2390.00	45.2 AV	54.0	-8.8	1.23 H	329	47.4	-2.2
3	*2412.00	105.2 PK			1.23 H	329	107.6	-2.4
4	*2412.00	95.1 AV			1.23 H	329	97.5	-2.4
5	4824.00	43.7 PK	74.0	-30.3	1.02 H	342	41.9	1.8
6	4824.00	31.8 AV	54.0	-22.2	1.02 H	342	30.0	1.8

**ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M**

NO.	FREQ. (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	69.2 PK	74.0	-4.8	3.45 V	52	71.4	-2.2
2	2390.00	51.5 AV	54.0	-2.5	3.45 V	52	53.7	-2.2
3	*2412.00	114.0 PK			3.45 V	52	116.4	-2.4
4	*2412.00	104.1 AV			3.45 V	52	106.5	-2.4
5	4824.00	49.1 PK	74.0	-24.9	1.81 V	314	47.3	1.8
6	4824.00	36.3 AV	54.0	-17.7	1.81 V	314	34.5	1.8

**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. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " \* ": Fundamental frequency.

<b>CHANNEL</b>	TX Channel 6	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 25GHz		Average (AV)

**ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M**

NO.	FREQ. (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	62.7 PK	74.0	-11.3	1.23 H	329	64.9	-2.2
2	2390.00	45.6 AV	54.0	-8.4	1.23 H	329	47.8	-2.2
3	*2437.00	109.9 PK			1.23 H	329	112.5	-2.6
4	*2437.00	99.7 AV			1.23 H	329	102.3	-2.6
5	4874.00	44.3 PK	74.0	-29.7	1.00 H	357	42.3	2.0
6	4874.00	32.3 AV	54.0	-21.7	1.00 H	357	30.3	2.0
7	7311.00	50.3 PK	74.0	-23.7	2.54 H	154	41.9	8.4
8	7311.00	37.0 AV	54.0	-17.0	2.54 H	154	28.6	8.4

**ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M**

NO.	FREQ. (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	72.0 PK	74.0	-2.0	3.47 V	59	74.2	-2.2
2	2390.00	51.1 AV	54.0	-2.9	3.47 V	59	53.3	-2.2
3	*2437.00	118.3 PK			3.47 V	59	120.9	-2.6
4	*2437.00	108.3 AV			3.47 V	59	110.9	-2.6
5	4874.00	53.2 PK	74.0	-20.8	1.79 V	309	51.2	2.0
6	4874.00	39.5 AV	54.0	-14.5	1.79 V	309	37.5	2.0
7	7311.00	57.1 PK	74.0	-16.9	3.26 V	32	48.7	8.4
8	7311.00	44.2 AV	54.0	-9.8	3.26 V	32	35.8	8.4

**REMARKS:**

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

<b>CHANNEL</b>	TX Channel 11	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 25GHz		Average (AV)

**ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M**

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	105.8 PK			1.18 H	344	108.4	-2.6
2	*2462.00	95.6 AV			1.18 H	344	98.2	-2.6
3	2483.50	64.2 PK	74.0	-9.8	1.18 H	344	66.6	-2.4
4	2483.50	46.3 AV	54.0	-7.7	1.18 H	344	48.7	-2.4
5	4924.00	43.9 PK	74.0	-30.1	1.00 H	342	41.9	2.0
6	4924.00	31.9 AV	54.0	-22.1	1.00 H	342	29.9	2.0
7	7386.00	49.9 PK	74.0	-24.1	2.56 H	154	41.3	8.6
8	7386.00	36.9 AV	54.0	-17.1	2.56 H	154	28.3	8.6

**ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M**

NO.	FREQ. (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	114.4 PK			3.55 V	76	117.0	-2.6
2	*2462.00	104.9 AV			3.55 V	76	107.5	-2.6
3	2483.50	69.3 PK	74.0	-4.7	3.55 V	76	71.7	-2.4
4	2483.50	52.7 AV	54.0	-1.3	3.55 V	76	55.1	-2.4
5	4924.00	49.1 PK	74.0	-24.9	1.74 V	321	47.1	2.0
6	4924.00	36.3 AV	54.0	-17.7	1.74 V	321	34.3	2.0
7	7386.00	48.8 PK	74.0	-25.2	3.24 V	20	40.2	8.6
8	7386.00	37.8 AV	54.0	-16.2	3.24 V	20	29.2	8.6

**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. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " \* ": Fundamental frequency.

**802.11n (HT20)**

<b>CHANNEL</b>	TX Channel 1	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 25GHz		Average (AV)

**ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M**

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	66.1 PK	74.0	-7.9	1.23 H	329	68.3	-2.2
2	2390.00	47.6 AV	54.0	-6.4	1.23 H	329	49.8	-2.2
3	*2412.00	106.1 PK			1.23 H	329	108.5	-2.4
4	*2412.00	96.4 AV			1.23 H	329	98.8	-2.4
5	4824.00	43.8 PK	74.0	-30.2	1.00 H	360	42.0	1.8
6	4824.00	31.7 AV	54.0	-22.3	1.00 H	360	29.9	1.8

**ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M**

NO.	FREQ. (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	72.2 PK	74.0	-1.8	3.01 V	76	74.4	-2.2
2	2390.00	53.8 AV	54.0	-0.2	3.01 V	76	56.0	-2.2
3	*2412.00	115.2 PK			3.61 V	76	117.6	-2.4
4	*2412.00	105.8 AV			3.61 V	76	108.2	-2.4
5	4824.00	48.7 PK	74.0	-25.3	1.83 V	331	46.9	1.8
6	4824.00	36.2 AV	54.0	-17.8	1.83 V	331	34.4	1.8

**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. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " \* ": Fundamental frequency.

<b>CHANNEL</b>	TX Channel 6	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 25GHz		Average (AV)

**ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M**

NO.	FREQ. (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	63.1 PK	74.0	-10.9	1.23 H	329	65.3	-2.2
2	2390.00	44.2 AV	54.0	-9.8	1.23 H	329	46.4	-2.2
3	*2437.00	109.1 PK			1.23 H	329	111.7	-2.6
4	*2437.00	99.0 AV			1.23 H	329	101.6	-2.6
5	2483.50	66.2 PK	74.0	-7.8	1.23 H	329	68.6	-2.4
6	2483.50	47.7 AV	54.0	-6.3	1.23 H	329	50.1	-2.4
7	4874.00	44.5 PK	74.0	-29.5	1.00 H	360	42.5	2.0
8	4874.00	32.5 AV	54.0	-21.5	1.00 H	360	30.5	2.0
9	7311.00	50.1 PK	74.0	-23.9	2.59 H	160	41.7	8.4
10	7311.00	37.0 AV	54.0	-17.0	2.59 H	160	28.6	8.4

**ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M**

NO.	FREQ. (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	69.5 PK	74.0	-4.5	3.52 V	58	71.7	-2.2
2	2390.00	50.7 AV	54.0	-3.3	3.52 V	58	52.9	-2.2
3	*2437.00	118.3 PK			3.52 V	58	120.9	-2.6
4	*2437.00	108.3 AV			3.52 V	58	110.9	-2.6
5	2483.50	73.8 PK	74.0	-0.2	3.52 V	58	76.2	-2.4
6	2483.50	53.1 AV	54.0	-0.9	3.52 V	58	55.5	-2.4
7	4874.00	53.2 PK	74.0	-20.8	1.74 V	311	51.2	2.0
8	4874.00	39.7 AV	54.0	-14.3	1.74 V	311	37.7	2.0
9	7311.00	57.5 PK	74.0	-16.5	3.23 V	28	49.1	8.4
10	7311.00	44.4 AV	54.0	-9.6	3.23 V	28	36.0	8.4

**REMARKS:**

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

<b>CHANNEL</b>	TX Channel 11	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 25GHz		Average (AV)

**ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M**

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	105.7 PK			1.23 H	329	108.3	-2.6
2	*2462.00	95.6 AV			1.23 H	329	98.2	-2.6
3	2483.50	66.6 PK	74.0	-7.4	1.23 H	329	69.0	-2.4
4	2483.50	48.0 AV	54.0	-6.0	1.23 H	329	50.4	-2.4
5	4924.00	43.2 PK	74.0	-30.8	1.00 H	351	41.2	2.0
6	4924.00	31.6 AV	54.0	-22.4	1.00 H	351	29.6	2.0
7	7386.00	50.7 PK	74.0	-23.3	2.59 H	169	42.1	8.6
8	7386.00	37.3 AV	54.0	-16.7	2.59 H	169	28.7	8.6

**ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M**

NO.	FREQ. (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	114.5 PK			3.55 V	76	117.1	-2.6
2	*2462.00	104.5 AV			3.55 V	76	107.1	-2.6
3	2483.50	72.5 PK	74.0	-1.5	3.55 V	76	74.9	-2.4
<b>4</b>	<b>2483.50</b>	<b>53.9 AV</b>	<b>54.0</b>	<b>-0.1</b>	<b>3.55 V</b>	<b>76</b>	<b>56.3</b>	<b>-2.4</b>
5	4924.00	49.3 PK	74.0	-24.7	1.74 V	318	47.3	2.0
6	4924.00	36.7 AV	54.0	-17.3	1.74 V	318	34.7	2.0
7	7386.00	49.4 PK	74.0	-24.6	3.23 V	19	40.8	8.6
8	7386.00	38.5 AV	54.0	-15.5	3.23 V	19	29.9	8.6

**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. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " \* ": Fundamental frequency.

**802.11n (HT40)**

<b>CHANNEL</b>	TX Channel 3	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 25GHz		Average (AV)

**ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M**

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	65.9 PK	74.0	-8.1	1.23 H	329	68.1	-2.2
2	2390.00	47.6 AV	54.0	-6.4	1.23 H	329	49.8	-2.2
3	*2422.00	100.1 PK			1.23 H	329	102.6	-2.5
4	*2422.00	91.4 AV			1.23 H	329	93.9	-2.5
5	4844.00	44.0 PK	74.0	-30.0	1.00 H	360	42.2	1.8
6	4844.00	32.2 AV	54.0	-21.8	1.00 H	360	30.4	1.8
7	7266.00	49.9 PK	74.0	-24.1	2.49 H	161	41.7	8.2
8	7266.00	36.9 AV	54.0	-17.1	2.49 H	161	28.7	8.2

**ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M**

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	64.2 PK	74.0	-9.8	2.47 V	173	66.4	-2.2
2	2390.00	53.8 AV	54.0	-0.2	2.47 V	173	56.0	-2.2
3	*2422.00	109.5 PK			2.47 V	173	112.0	-2.5
4	*2422.00	100.8 AV			2.47 V	173	103.3	-2.5
5	4844.00	44.5 PK	74.0	-29.5	1.76 V	323	42.7	1.8
6	4844.00	32.6 AV	54.0	-21.4	1.76 V	323	30.8	1.8
7	7266.00	51.6 PK	74.0	-22.4	3.25 V	19	43.4	8.2
8	7266.00	37.9 AV	54.0	-16.1	3.25 V	19	29.7	8.2

**REMARKS:**

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

<b>CHANNEL</b>	TX Channel 6	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 25GHz		Average (AV)

**ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M**

NO.	FREQ. (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			1.23 H	329	104.4	-2.6
2	*2437.00	92.7 AV			1.23 H	329	95.3	-2.6
3	4874.00	43.6 PK	74.0	-30.4	1.00 H	356	41.6	2.0
4	4874.00	31.6 AV	54.0	-22.4	1.00 H	356	29.6	2.0
5	7311.00	49.6 PK	74.0	-24.4	2.53 H	162	41.2	8.4
6	7311.00	36.6 AV	54.0	-17.4	2.53 H	162	28.2	8.4

**ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M**

NO.	FREQ. (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	110.9 PK			2.45 V	163	113.5	-2.6
2	*2437.00	101.5 AV			2.45 V	163	104.1	-2.6
3	4874.00	43.9 PK	74.0	-30.1	1.79 V	327	41.9	2.0
4	4874.00	32.1 AV	54.0	-21.9	1.79 V	327	30.1	2.0
5	7311.00	50.9 PK	74.0	-23.1	3.24 V	46	42.5	8.4
6	7311.00	37.5 AV	54.0	-16.5	3.24 V	46	29.1	8.4

**REMARKS:**

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



<b>CHANNEL</b>	TX Channel 9	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 25GHz		Average (AV)

**ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M**

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2452.00	99.3 PK			1.23 H	329	101.9	-2.6
2	*2452.00	90.1 AV			1.23 H	329	92.7	-2.6
3	2483.50	63.8 PK	74.0	-10.2	1.23 H	329	66.2	-2.4
4	2483.50	45.1 AV	54.0	-8.9	1.23 H	329	47.5	-2.4
5	4904.00	44.3 PK	74.0	-29.7	1.01 H	360	42.3	2.0
6	4904.00	32.4 AV	54.0	-21.6	1.01 H	360	30.4	2.0
7	7356.00	50.5 PK	74.0	-23.5	2.55 H	163	41.9	8.6
8	7356.00	37.2 AV	54.0	-16.8	2.55 H	163	28.6	8.6

**ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M**

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2452.00	108.4 PK			2.49 V	164	111.0	-2.6
2	*2452.00	99.1 AV			2.49 V	164	101.7	-2.6
3	2483.50	65.7 PK	74.0	-8.3	2.49 V	164	68.1	-2.4
4	2483.50	50.9 AV	54.0	-3.1	2.49 V	164	53.3	-2.4
5	4904.00	43.7 PK	74.0	-30.3	1.76 V	328	41.7	2.0
6	4904.00	32.0 AV	54.0	-22.0	1.76 V	328	30.0	2.0
7	7356.00	51.2 PK	74.0	-22.8	3.17 V	31	42.6	8.6
8	7356.00	37.7 AV	54.0	-16.3	3.17 V	31	29.1	8.6

**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. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " \* ": Fundamental frequency.

Below 1GHz Data:

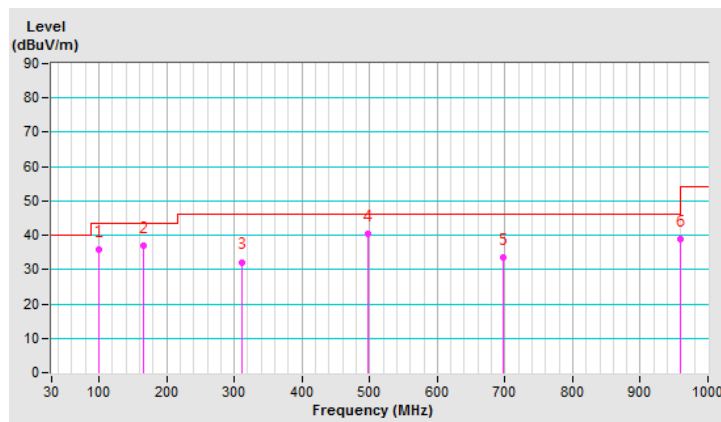
802.11g

<b>CHANNEL</b>	TX Channel 6	<b>DETECTOR FUNCTION</b>	Quasi-Peak (QP)
<b>FREQUENCY RANGE</b>	9kHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	99.84	35.8 QP	43.5	-7.7	1.00 H	309	53.1	-17.3
2	166.02	37.0 QP	43.5	-6.5	1.00 H	256	50.0	-13.0
3	312.15	32.2 QP	46.0	-13.8	1.00 H	210	43.8	-11.6
4	497.93	40.4 QP	46.0	-5.6	1.00 H	52	47.3	-6.9
5	696.77	33.6 QP	46.0	-12.4	1.00 H	309	36.8	-3.2
6	960.21	39.0 QP	54.0	-15.0	1.00 H	234	37.9	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. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. The emission levels were very low against the limit of frequency range 9kHz ~ 30MHz.



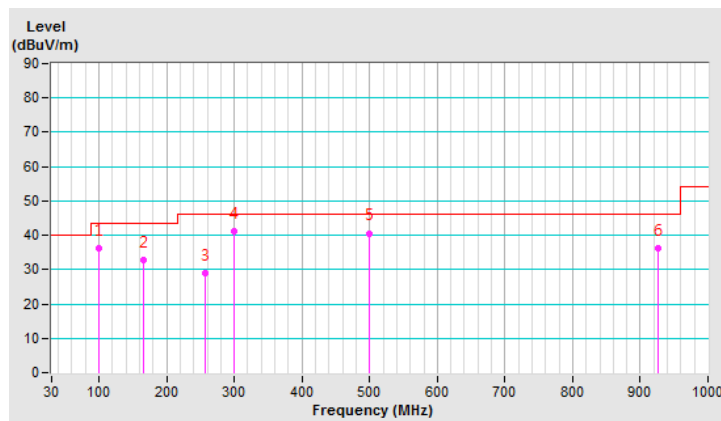
<b>CHANNEL</b>	TX Channel 6	<b>DETECTOR FUNCTION</b>	Quasi-Peak (QP)
<b>FREQUENCY RANGE</b>	9kHz ~ 1GHz		

**ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M**

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	99.97	36.3 QP	43.5	-7.2	1.00 V	214	53.6	-17.3
2	166.27	32.9 QP	43.5	-10.6	1.00 V	80	45.9	-13.0
3	256.33	28.9 QP	46.0	-17.1	1.00 V	7	42.6	-13.7
4	298.76	41.0 QP	46.0	-5.0	1.50 V	160	53.2	-12.2
5	499.49	40.6 QP	46.0	-5.4	1.50 V	121	47.5	-6.9
6	926.33	36.1 QP	46.0	-9.9	1.00 V	170	35.2	0.9

**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. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. The emission levels were very low against the limit of frequency range 9kHz ~ 30MHz.



## 4.2 Conducted Output Power Measurement

### 4.2.1 Limits of Conducted Output Power Measurement

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

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

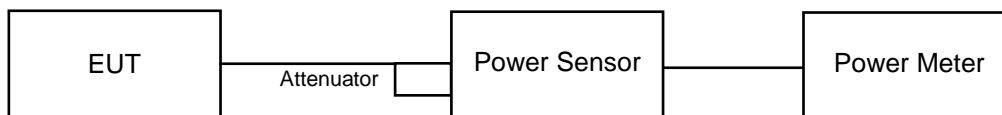
Array Gain = 0 dB (i.e., no array gain) for  $N_{ANT} \leq 4$ ;

Array Gain = 0 dB (i.e., no array gain) for channel widths  $\geq 40$  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.

### 4.2.2 Test Setup



### 4.2.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

### 4.2.4 Test Procedures

A peak power sensor was used on the output port of the EUT. A power meter was used to read the response of the peak power sensor. Record the power level.

Average power sensor was used to perform output power measurement, trigger and gating function of wide band power meter is enabled to measure max output power of TX on burst. Duty factor is not added to measured value..

### 4.2.5 Deviation from Test Standard

No deviation.

### 4.2.6 EUT Operating Conditions

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

## 4.2.7 Test Results

**FOR PEAK POWER**
**802.11b**

Chan.	Freq. (MHz)	Peak Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	22.65	23.02	384.524	25.85	30	Pass
6	2437	22.64	23.12	388.77	25.90	30	Pass
11	2462	22.62	23.04	384.182	25.85	30	Pass

**802.11g**

Chan.	Freq. (MHz)	Peak Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	26.06	26.21	821.475	29.15	30	Pass
6	2437	26.78	26.45	918.001	29.63	30	Pass
11	2462	26.23	26.36	852.273	29.31	30	Pass

**802.11n (HT20)**

Chan.	Freq. (MHz)	Peak Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	26.56	26.21	870.728	29.40	30	Pass
6	2437	26.60	26.38	891.598	29.50	30	Pass
11	2462	26.13	26.19	826.115	29.17	30	Pass

**802.11n (HT40)**

Chan.	Freq. (MHz)	Peak Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
3	2422	26.20	26.13	827.073	29.18	30	Pass
6	2437	26.24	26.26	843.396	29.26	30	Pass
9	2452	23.32	24.25	480.856	26.82	30	Pass

## FOR AVERAGE POWER

### 802.11b

Chan.	Frequency (MHz)	Avg. Power (dBm)		Total Power (mW)	Total Power (dBm)
		Chain 0	Chain 1		
1	2412	20.05	20.57	215.183	23.33
6	2437	20.01	20.47	211.66	23.26
11	2462	19.95	20.45	209.772	23.22

### 802.11g

Chan.	Frequency (MHz)	Avg. Power (dBm)		Total Power (mW)	Total Power (dBm)
		Chain 0	Chain 1		
1	2412	16.12	16.68	87.485	19.42
6	2437	20.12	20.41	212.703	23.28
11	2462	16.22	16.65	88.117	19.45

### 802.11n (HT20)

Chan.	Frequency (MHz)	Avg. Power (dBm)		Total Power (mW)	Total Power (dBm)
		Chain 0	Chain 1		
1	2412	17.20	17.71	111.501	20.47
6	2437	20.13	20.53	216.019	23.34
11	2462	16.51	16.25	86.941	19.39

### 802.11n (HT40)

Chan.	Frequency (MHz)	Avg. Power (dBm)		Total Power (mW)	Total Power (dBm)
		Chain 0	Chain 1		
3	2422	16.23	16.65	88.214	19.46
6	2437	17.17	17.74	111.548	20.47
9	2452	14.40	14.89	58.374	17.66

## 5 Pictures of Test Arrangements

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

## Appendix – Information on 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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**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.

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