

## FCC Test Report

**Report No.:** RF170918E11

**FCC ID:** BKMFBJ26H005

**Test Model:** J26H005

**Received Date:** Sep. 18, 2017

**Test Date:** Sep. 27 to Oct. 06, 2017

**Issued Date:** Nov. 23, 2017

**Applicant:** Seiko Epson Corporation

**Address:** 3-3-5 Owa Suwa-shi Nagano-Ken 392-8502, Japan

**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
RF170918E11	Original release.	Nov. 23, 2017

## 1 Certificate of Conformity

**Product:** 11ac+BT Combo Module

**Brand:** Epson

**Test Model:** J26H005

**Sample Status:** ENGINEERING SAMPLE

**Applicant:** Seiko Epson Corporation

**Test Date:** Sep. 27 to Oct. 06, 2017

**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:** Nov. 23, 2017  
Wendy Wu / Specialist

**Approved by :** May Chen , **Date:** Nov. 23, 2017  
May Chen / Manager

## 2 Summary of Test Results

47 CFR FCC Part 15, Subpart C (Section 15.247)			
FCC Clause	Test Item	Result	Remarks
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -8.84dB at 16.46484MHz.
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 2390.00MHz.
15.247(d)	Antenna Port Emission	PASS	Meet the requirement of limit.
15.247(a)(2)	6dB bandwidth	PASS	Meet the requirement of limit.
15.247(b)	Conducted power	PASS	Meet the requirement of limit.
15.247(e)	Power Spectral Density	PASS	Meet the requirement of limit.
15.203	Antenna Requirement	PASS	No antenna connector is used.

### 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) ( $\pm$ )
Conducted Emissions at mains ports	150kHz ~ 30MHz	1.84 dB
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	5.32 dB
Radiated Emissions above 1 GHz	1GHz ~ 6GHz	5.14 dB
	6GHz ~ 18GHz	5.04 dB
	18GHz ~ 40GHz	5.25 dB

### 2.2 Modification Record

There were no modifications required for compliance.

### 3 General Information

#### 3.1 General Description of EUT

Product	11ac+BT Combo Module
Brand	Epson
Test Model	J26H005
Status of EUT	ENGINEERING SAMPLE
Power Supply Rating	3.3Vdc from host equipment
Modulation Type	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM 256QAM for OFDM in 11ac mode only
Modulation Technology	DSSS, OFDM
Transfer Rate	802.11b: up to 11Mbps 802.11a/g: up to 54Mbps 802.11n: up to 150Mbps 802.11ac: up to 433.3Mbps
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 <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> 316.957mW <b>5GHz:</b> <b>5.18 ~ 5.24GHz:</b> 102.802mW <b>5.26 ~ 5.32GHz:</b> 97.949mW <b>5.50 ~ 5.70GHz:</b> 92.683mW <b>5.745 ~ 5.825GHz:</b> 120.504mW
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	NA
Data Cable Supplied	NA

Note:

1. There are WLAN, BT technology used for the EUT.
2. Simultaneously transmission condition.

Condition	Technology		
1	WLAN 2.4GHz	WLAN 5GHz	Bluetooth

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

3. The antennas provided to the EUT, please refer to the following table:

Ant No.	Antenna Gain (dBi)	Frequency rang (GHz)	Antenna type	Connector type
1	3.09	2.4~2.4835	PCB Printed	none
	5.94	5.15~5.25		
	5.94	5.25~5.35		
	6.29	5.47~5.725		
	7.12	5.725~5.85		
2	2.53	2.4~2.4835	PCB Printed	none
	3.94	5.15~5.25		
	3.94	5.25~5.35		
	5.10	5.47~5.725		
	5.23	5.725~5.85		

Note: This report chose the max. Antenna gain to do final test.

4. The EUT incorporates a SISO function.

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

5. 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		

### 3.2.1 Test Mode Applicability and Tested Channel Detail

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

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

**NOTE:** The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **Z-plane**.

#### **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

#### **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

#### **Power Line Conducted Emission Test:**

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

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

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:

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

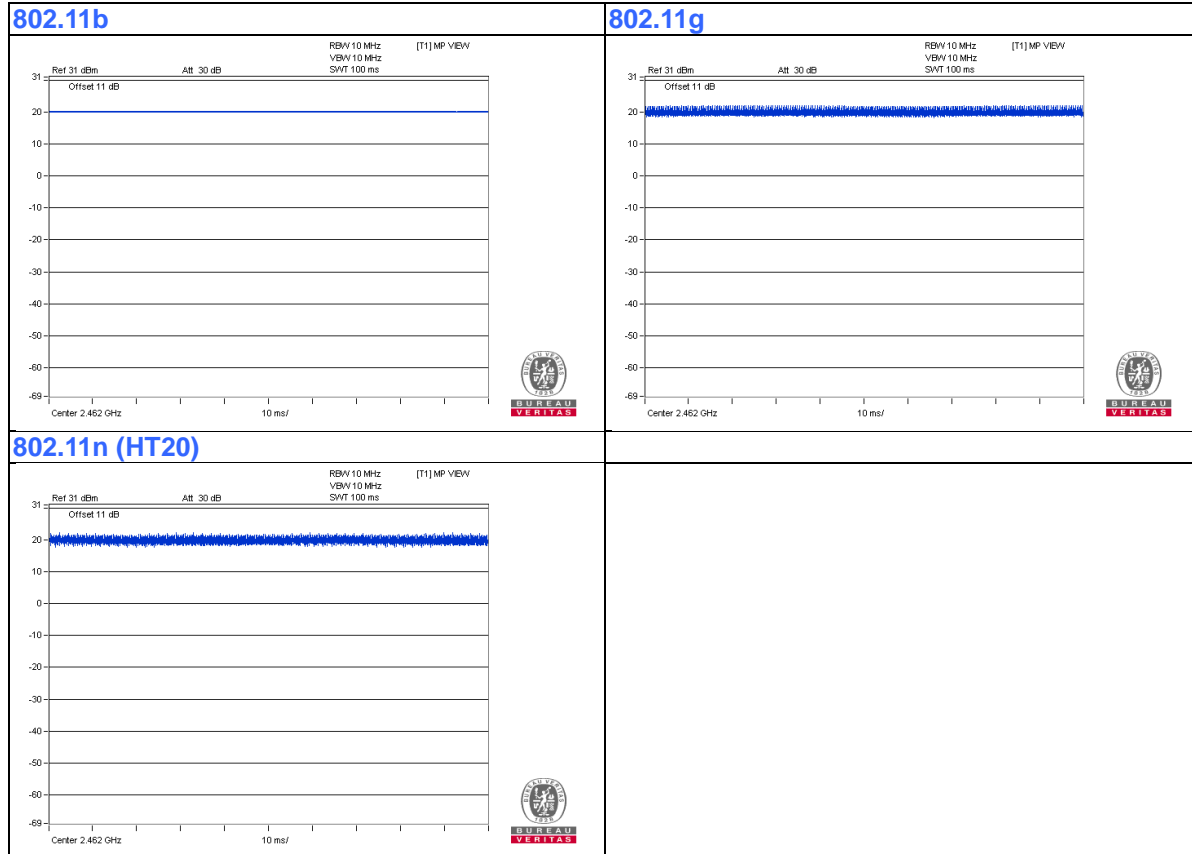
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1
802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6
802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	6.5

### Test Condition:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER (System)	TESTED BY
RE $\geq$ 1G	23deg. C, 68%RH	120Vac, 60Hz	Weiwei Lo
RE<1G	23deg. C, 68%RH	120Vac, 60Hz	Weiwei Lo
PLC	26deg. C, 74%RH	120Vac, 60Hz	Andy Ho
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.



### 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.

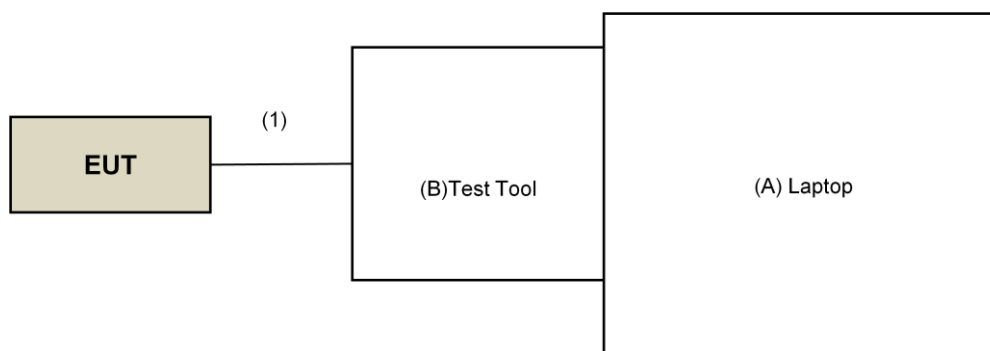
ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Laptop	DELL	E6420	482T3R1	FCC DoC	Provided by Lab
B.	Test Tool	HON HAI	NA	NA	NA	Supplied by client

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.	Console Cable	1	0.06	No	0	Supplied by client(for RF Setup)

#### 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**  
**ANSI C63.10-2013**

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

**NOTE:** The EUT has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (DoC). The test report has been issued separately.

## 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 below 1GHz test:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Agilent	N9038A	MY50010156	July 12, 2017	July 11, 2018
Pre-Amplifier <sup>(*)</sup> EMCI	EMC001340	980142	Jan. 20, 2016	Jan. 19, 2018
Loop Antenna <sup>(*)</sup> Electro-Metrics	EM-6879	264	Dec. 16, 2016	Dec. 15, 2018
RF Cable	NA	LOOPCAB-001 LOOPCAB-002	Jan. 17, 2017	Jan. 16, 2018
Pre-Amplifier Mini-Circuits	ZFL-1000VH2B	AMP-ZFL-05	May 06, 2017	May 05, 2018
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-361	Dec. 29, 2016	Dec. 28, 2017
RF Cable	8D	966-3-1 966-3-2 966-3-3	Apr. 01, 2017	Mar. 31, 2018
Fixed attenuator Mini-Circuits	UNAT-5+	PAD-3m-3-01	Oct. 03, 2017	Oct. 02, 2018
Software	ADT_Radiated_V8.7.08	NA	NA	NA
Antenna Tower & Turn Table Max-Full	MF-7802	MF780208406	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. 3.
4. Loop antenna was used for all emissions below 30 MHz.
5. The CANADA Site Registration No. is 20331-1
6. Tested Date: Oct. 06, 2017



**For other test:**

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Agilent	N9038A	MY50010156	July 12, 2017	July 11, 2018
Horn_Antenna SCHWARZBECK	BBHA9120-D	9120D-406	Dec. 28, 2016	Dec. 27, 2017
Pre-Amplifier EMCI	EMC12630SE	980384	Feb. 02, 2017	Feb. 01, 2018
RF Cable	EMC104-SM-SM-1200 EMC104-SM-SM-2000 EMC104-SM-SM-5000	160922 150317 150322	Feb. 02, 2017 Mar. 29, 2017 Mar. 29, 2017	Feb. 01, 2018 Mar. 28, 2018 Mar. 28, 2018
Spectrum Analyzer Keysight	N9030A	MY54490679	July 25, 2017	July 24, 2018
Pre-Amplifier EMCI	EMC184045SE	980386	Feb. 02, 2017	Feb. 01, 2018
Horn_Antenna SCHWARZBECK	BBHA 9170	BBHA9170608	Dec. 15, 2016	Dec. 14, 2017
RF Cable	SUCOFLEX 102	36432/2 36433/2	Jan. 15, 2017	Jan. 14, 2018
Software	ADT_Radiated_V8.7.08	NA	NA	NA
Antenna Tower & Turn Table Max-Full	MF-7802	MF780208406	NA	NA
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA
Spectrum Analyzer R&S	FSv40	100964	July 1, 2017	June 30, 2018
Power meter Anritsu	ML2495A	1014008	May 11, 2017	May 10, 2018
Power sensor Anritsu	MA2411B	0917122	May 11, 2017	May 10, 2018

**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 966 Chamber No. 3.
3. The CANADA Site Registration No. is 20331-1
- 4 Tested Date: Sep. 27 to 30 2017

#### 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. Both X and Y axes 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 detect 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:**

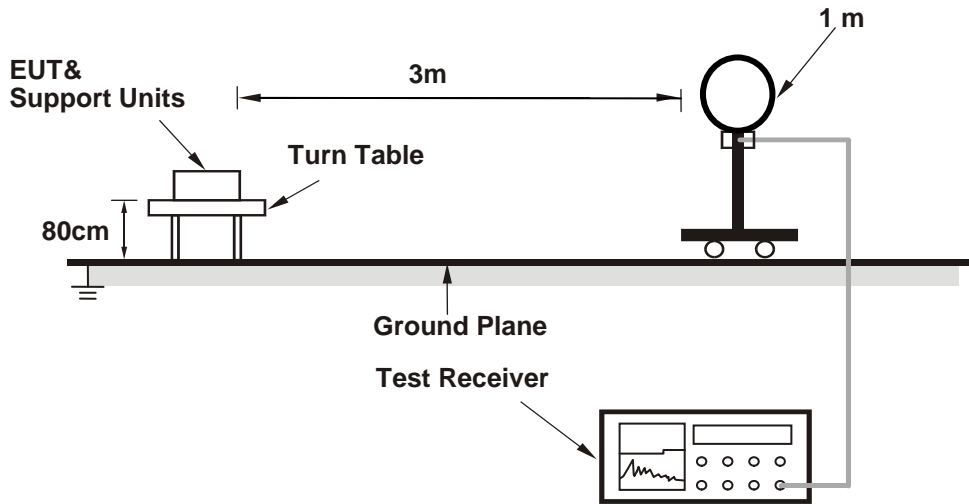
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
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

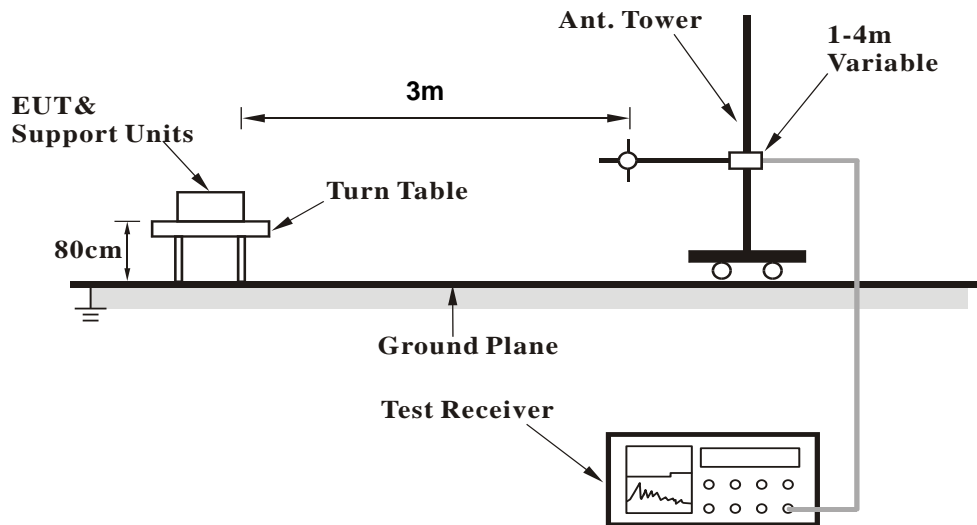
No deviation.

#### 4.1.5 Test Setup

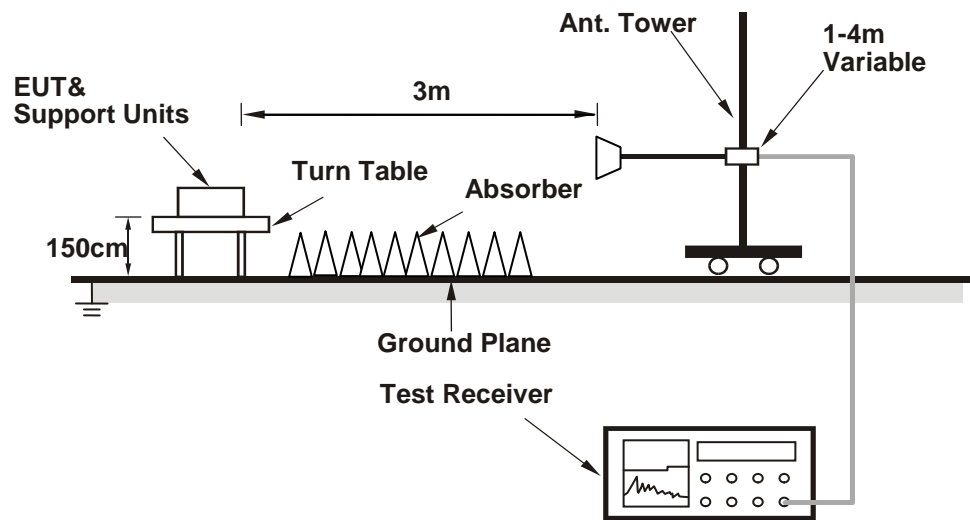
##### For Radiated emission below 30MHz



##### 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

- Connected the EUT with the Laptop.
- Controlling software (MPTool.exe[Ver1.0.0.10]) 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	54.6 PK	74.0	-19.4	1.46 H	134	56.2	-1.6
2	2390.00	42.8 AV	54.0	-11.2	1.46 H	134	44.4	-1.6
3	*2412.00	96.8 PK			1.46 H	134	98.3	-1.5
4	*2412.00	94.3 AV			1.46 H	134	95.8	-1.5
5	4824.00	47.2 PK	74.0	-26.8	2.26 H	345	44.2	3.0
6	4824.00	44.9 AV	54.0	-9.1	2.26 H	345	41.9	3.0

#### 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	56.8 PK	74.0	-17.2	2.46 V	257	58.4	-1.6
2	2390.00	46.6 AV	54.0	-7.4	2.46 V	257	48.2	-1.6
3	*2412.00	103.1 PK			2.46 V	257	104.6	-1.5
4	*2412.00	100.8 AV			2.46 V	257	102.3	-1.5
5	4824.00	54.9 PK	74.0	-19.1	1.42 V	188	51.9	3.0
6	4824.00	53.5 AV	54.0	-0.5	1.42 V	188	50.5	3.0

#### REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. 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	54.5 PK	74.0	-19.5	1.42 H	128	56.1	-1.6
2	2390.00	43.0 AV	54.0	-11.0	1.42 H	128	44.6	-1.6
3	*2437.00	98.7 PK			1.42 H	128	100.2	-1.5
4	*2437.00	95.7 AV			1.42 H	128	97.2	-1.5
5	2483.50	53.6 PK	74.0	-20.4	1.42 H	128	55.0	-1.4
6	2483.50	40.4 AV	54.0	-13.6	1.42 H	128	41.8	-1.4
7	4874.00	47.2 PK	74.0	-26.8	2.25 H	354	44.0	3.2
8	4874.00	45.2 AV	54.0	-8.8	2.25 H	354	42.0	3.2
9	7311.00	43.5 PK	74.0	-30.5	2.17 H	317	34.6	8.9
10	7311.00	34.6 AV	54.0	-19.4	2.17 H	317	25.7	8.9

**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	56.7 PK	74.0	-17.3	2.52 V	246	58.3	-1.6
2	2390.00	46.8 AV	54.0	-7.2	2.52 V	246	48.4	-1.6
3	*2437.00	104.8 PK			2.52 V	246	106.3	-1.5
4	*2437.00	102.2 AV			2.52 V	246	103.7	-1.5
5	2483.50	55.8 PK	74.0	-18.2	2.52 V	246	57.2	-1.4
6	2483.50	44.2 AV	54.0	-9.8	2.52 V	246	45.6	-1.4
7	4874.00	54.8 PK	74.0	-19.2	1.30 V	245	51.6	3.2
8	4874.00	53.5 AV	54.0	-0.5	1.30 V	245	50.3	3.2
9	7311.00	43.2 PK	74.0	-30.8	1.34 V	225	34.3	8.9
10	7311.00	34.6 AV	54.0	-19.4	1.34 V	225	25.7	8.9

**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. " \* ": 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	98.8 PK			1.42 H	129	100.2	-1.4
2	*2462.00	95.9 AV			1.42 H	129	97.3	-1.4
3	2483.50	53.1 PK	74.0	-20.9	1.42 H	129	54.5	-1.4
4	2483.50	40.1 AV	54.0	-13.9	1.42 H	129	41.5	-1.4
5	4924.00	47.3 PK	74.0	-26.7	2.28 H	355	44.0	3.3
6	4924.00	44.9 AV	54.0	-9.1	2.28 H	355	41.6	3.3
7	7386.00	44.2 PK	74.0	-29.8	2.14 H	320	35.1	9.1
8	7386.00	35.0 AV	54.0	-19.0	2.14 H	320	25.9	9.1

**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	104.9 PK			2.39 V	273	106.3	-1.4
2	*2462.00	102.4 AV			2.39 V	273	103.8	-1.4
3	2483.50	55.3 PK	74.0	-18.7	2.39 V	273	56.7	-1.4
4	2483.50	43.9 AV	54.0	-10.1	2.39 V	273	45.3	-1.4
5	4924.00	54.2 PK	74.0	-19.8	1.51 V	214	50.9	3.3
6	4924.00	53.8 AV	54.0	-0.2	1.51 V	214	50.5	3.3
7	7386.00	43.4 PK	74.0	-30.6	1.37 V	213	34.3	9.1
8	7386.00	34.7 AV	54.0	-19.3	1.37 V	213	25.6	9.1

**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. " \* ": 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	69.3 PK	74.0	-4.7	1.44 H	295	70.9	-1.6
2	2390.00	53.7 AV	54.0	-0.3	1.44 H	295	55.3	-1.6
3	*2412.00	105.3 PK			1.44 H	295	106.8	-1.5
4	*2412.00	96.2 AV			1.44 H	295	97.7	-1.5
5	4824.00	46.8 PK	74.0	-27.2	2.33 H	349	43.8	3.0
6	4824.00	44.7 AV	54.0	-9.3	2.33 H	349	41.7	3.0

**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	63.8 PK	74.0	-10.2	2.46 V	270	65.4	-1.6
2	2390.00	50.3 AV	54.0	-3.7	2.46 V	270	51.9	-1.6
3	*2412.00	102.8 PK			2.46 V	270	104.3	-1.5
4	*2412.00	93.9 AV			2.46 V	270	95.4	-1.5
5	4824.00	47.2 PK	74.0	-26.8	1.47 V	214	44.2	3.0
6	4824.00	44.9 AV	54.0	-9.1	1.47 V	214	41.9	3.0

**REMARKS:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. 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	65.7 PK	74.0	-8.3	1.50 H	147	67.3	-1.6
2	2390.00	51.7 AV	54.0	-2.3	1.50 H	147	53.3	-1.6
3	*2437.00	106.2 PK			1.50 H	147	107.7	-1.5
4	*2437.00	96.2 AV			1.50 H	147	97.7	-1.5
5	2483.50	58.0 PK	74.0	-16.0	1.50 H	147	59.4	-1.4
6	2483.50	44.7 AV	54.0	-9.3	1.50 H	147	46.1	-1.4
7	4874.00	50.0 PK	74.0	-24.0	2.27 H	354	46.8	3.2
8	4874.00	47.4 AV	54.0	-6.6	2.27 H	354	44.2	3.2
9	7311.00	46.4 PK	74.0	-27.6	2.14 H	318	37.5	8.9
10	7311.00	37.4 AV	54.0	-16.6	2.14 H	318	28.5	8.9

**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	67.9 PK	74.0	-6.1	2.39 V	262	69.5	-1.6
2	2390.00	53.9 AV	54.0	-0.1	2.39 V	262	55.5	-1.6
3	*2437.00	108.7 PK			2.39 V	262	110.2	-1.5
4	*2437.00	98.5 AV			2.39 V	262	100.0	-1.5
5	2483.50	60.2 PK	74.0	-13.8	2.39 V	262	61.6	-1.4
6	2483.50	46.9 AV	54.0	-7.1	2.39 V	262	48.3	-1.4
7	4874.00	49.6 PK	74.0	-24.4	1.54 V	222	46.4	3.2
8	4874.00	47.0 AV	54.0	-7.0	1.54 V	222	43.8	3.2
9	7311.00	46.7 PK	74.0	-27.3	1.43 V	227	37.8	8.9
10	7311.00	37.8 AV	54.0	-16.2	1.43 V	227	28.9	8.9

**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. " \* ": 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	104.8 PK			1.44 H	295	106.2	-1.4
2	*2462.00	95.7 AV			1.44 H	295	97.1	-1.4
3	2483.50	67.5 PK	74.0	-6.5	1.44 H	295	68.9	-1.4
4	2483.50	53.7 AV	54.0	-0.3	1.44 H	295	55.1	-1.4
5	4924.00	47.3 PK	74.0	-26.7	2.28 H	356	44.0	3.3
6	4924.00	44.8 AV	54.0	-9.2	2.28 H	356	41.5	3.3
7	7386.00	43.9 PK	74.0	-30.1	2.19 H	326	34.8	9.1
8	7386.00	34.7 AV	54.0	-19.3	2.19 H	326	25.6	9.1

**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	102.5 PK			2.43 V	266	103.9	-1.4
2	*2462.00	93.5 AV			2.43 V	266	94.9	-1.4
3	2483.50	62.1 PK	74.0	-11.9	2.43 V	266	63.5	-1.4
4	2483.50	50.4 AV	54.0	-3.6	2.43 V	266	51.8	-1.4
5	4924.00	47.1 PK	74.0	-26.9	1.48 V	216	43.8	3.3
6	4924.00	44.4 AV	54.0	-9.6	1.48 V	216	41.1	3.3
7	7386.00	44.0 PK	74.0	-30.0	1.36 V	200	34.9	9.1
8	7386.00	35.0 AV	54.0	-19.0	1.36 V	200	25.9	9.1

**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. " \* ": 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	68.3 PK	74.0	-5.7	1.47 H	139	69.9	-1.6
2	2390.00	51.5 AV	54.0	-2.5	1.47 H	139	53.1	-1.6
3	*2412.00	101.0 PK			1.47 H	139	102.5	-1.5
4	*2412.00	92.0 AV			1.47 H	139	93.5	-1.5
5	4824.00	47.1 PK	74.0	-26.9	2.28 H	359	44.1	3.0
6	4824.00	44.4 AV	54.0	-9.6	2.28 H	359	41.4	3.0

**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	70.6 PK	74.0	-3.4	1.06 V	69	72.2	-1.6
2	2390.00	53.7 AV	54.0	-0.3	1.06 V	69	55.3	-1.6
3	*2412.00	103.2 PK			1.06 V	69	104.7	-1.5
4	*2412.00	94.2 AV			1.06 V	69	95.7	-1.5
5	4824.00	46.9 PK	74.0	-27.1	1.53 V	200	43.9	3.0
6	4824.00	44.3 AV	54.0	-9.7	1.53 V	200	41.3	3.0

**REMARKS:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. 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	66.3 PK	74.0	-7.7	1.44 H	141	67.9	-1.6
2	2390.00	51.8 AV	54.0	-2.2	1.44 H	141	53.4	-1.6
3	*2437.00	106.2 PK			1.44 H	141	107.7	-1.5
4	*2437.00	97.4 AV			1.44 H	141	98.9	-1.5
5	2483.50	63.2 PK	74.0	-10.8	1.44 H	141	64.6	-1.4
6	2483.50	44.4 AV	54.0	-9.6	1.44 H	141	45.8	-1.4
7	4874.00	49.8 PK	74.0	-24.2	2.25 H	349	46.6	3.2
8	4874.00	47.1 AV	54.0	-6.9	2.25 H	349	43.9	3.2
9	7311.00	46.6 PK	74.0	-27.4	2.11 H	315	37.7	8.9
10	7311.00	37.6 AV	54.0	-16.4	2.11 H	315	28.7	8.9

**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	68.6 PK	74.0	-5.4	2.45 V	276	70.2	-1.6
2	2390.00	53.9 AV	54.0	-0.1	2.45 V	276	55.5	-1.6
3	*2437.00	108.4 PK			2.45 V	276	109.9	-1.5
4	*2437.00	99.6 AV			2.45 V	276	101.1	-1.5
5	2483.50	65.5 PK	74.0	-8.5	2.45 V	276	66.9	-1.4
6	2483.50	46.6 AV	54.0	-7.4	2.45 V	276	48.0	-1.4
7	4874.00	46.8 PK	74.0	-27.2	1.46 V	224	43.6	3.2
8	4874.00	44.0 AV	54.0	-10.0	1.46 V	224	40.8	3.2
9	7311.00	44.0 PK	74.0	-30.0	1.34 V	190	35.1	8.9
10	7311.00	35.0 AV	54.0	-19.0	1.34 V	190	26.1	8.9

**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. " \* ": 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	104.2 PK			1.47 H	297	105.6	-1.4
2	*2462.00	94.7 AV			1.47 H	297	96.1	-1.4
3	2483.50	69.6 PK	74.0	-4.4	1.47 H	297	71.0	-1.4
4	2483.50	53.6 AV	54.0	-0.4	1.47 H	297	55.0	-1.4
5	4924.00	46.7 PK	74.0	-27.3	1.42 H	215	43.4	3.3
6	4924.00	43.9 AV	54.0	-10.1	1.42 H	215	40.6	3.3
7	7386.00	43.9 PK	74.0	-30.1	1.35 H	176	34.8	9.1
8	7386.00	35.2 AV	54.0	-18.8	1.35 H	176	26.1	9.1

**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	101.9 PK			2.45 V	276	103.3	-1.4
2	*2462.00	92.5 AV			2.45 V	276	93.9	-1.4
3	2483.50	64.2 PK	74.0	-9.8	2.45 V	276	65.6	-1.4
4	2483.50	51.3 AV	54.0	-2.7	2.45 V	276	52.7	-1.4
5	4924.00	49.4 PK	74.0	-24.6	2.20 V	357	46.1	3.3
6	4924.00	46.9 AV	54.0	-7.1	2.20 V	357	43.6	3.3
7	7386.00	46.8 PK	74.0	-27.2	2.16 V	309	37.7	9.1
8	7386.00	37.8 AV	54.0	-16.2	2.16 V	309	28.7	9.1

**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. " \* ": 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	105.32	26.4 QP	43.5	-17.1	2.00 H	19	38.1	-11.7
2	162.14	22.9 QP	43.5	-20.6	1.00 H	0	31.2	-8.3
3	196.09	21.6 QP	43.5	-21.9	1.00 H	210	32.8	-11.2
4	254.17	24.7 QP	46.0	-21.3	2.00 H	60	34.1	-9.4
5	521.77	27.5 QP	46.0	-18.5	1.50 H	360	30.0	-2.5
6	549.02	27.7 QP	46.0	-18.3	2.00 H	212	29.9	-2.2

**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	51.22	22.0 QP	40.0	-18.0	1.50 V	0	30.3	-8.3
2	138.76	21.8 QP	43.5	-21.7	1.00 V	360	30.4	-8.6
3	199.65	19.9 QP	43.5	-23.6	2.00 V	62	31.2	-11.3
4	229.14	21.2 QP	46.0	-24.8	2.00 V	268	31.9	-10.7
5	589.42	28.5 QP	46.0	-17.5	2.00 V	84	29.6	-1.1
6	705.75	29.8 QP	46.0	-16.2	2.00 V	172	29.4	0.4

**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

## 4.2 Conducted Emission Measurement

### 4.2.1 Limits of Conducted Emission Measurement

Frequency (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15 - 0.5	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30.0	60	50

Note: 1. The lower limit shall apply at the transition frequencies.

2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

### 4.2.2 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver R&S	ESCS 30	847124/029	Oct. 24, 2016	Oct. 23, 2017
Line-Impedance Stabilization Network (for EUT) R&S	ESH3-Z5	848773/004	Oct. 26, 2016	Oct. 25, 2017
Line-Impedance Stabilization Network (for Peripheral) R&S	ENV216	100072	June 03, 2017	June 02, 2018
50 ohms Terminator	N/A	EMC-02	Sep. 22, 2017	Sep. 21, 2018
RF Cable	5D-FB	COCCAB-001	Sep. 29, 2017	Sep. 28, 2018
10 dB PAD Mini-Circuits	HAT-10+	CONATT-004	June 18, 2017	June 17, 2018
Software BVADT	BVADT_Cond_ V7.3.7.4	NA	NA	NA

**Note:**

1. The calibration interval of the above test instruments are 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Shielded Room No. 1.
3. Tested Date: Oct. 04, 2017

#### 4.2.3 Test Procedures

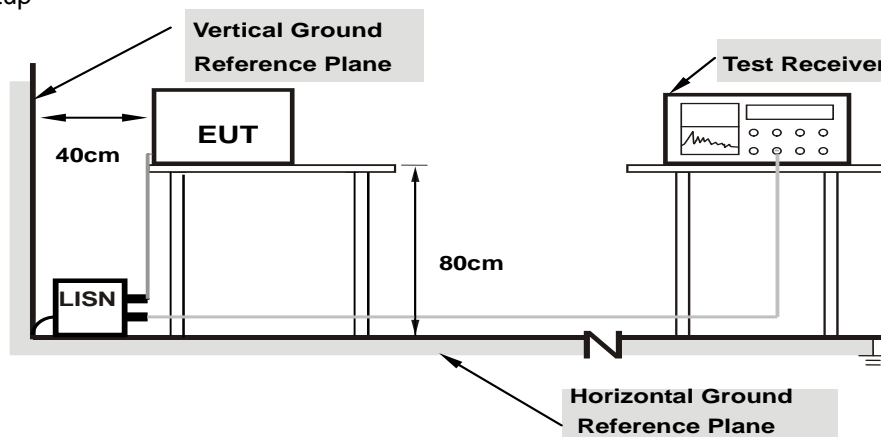
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

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

#### 4.2.4 Deviation from Test Standard

No deviation.

#### 4.2.5 Test Setup



**Note:** 1.Support units were connected to second LISN.

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

#### 4.2.6 EUT Operating Conditions

Same as 4.1.6.



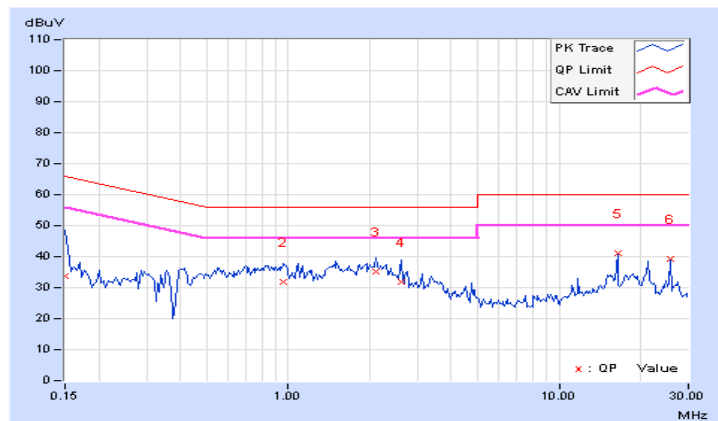
#### 4.2.7 Test Results

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
-------	----------	-------------------	--------------------------------

No	Freq. [MHz]	Corr.	Reading Value		Emission Level		Limit		Margin	
		Factor (dB)	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	10.07	23.71	15.44	33.78	25.51	66.00	56.00	-32.22	-30.49
2	0.96250	10.14	21.81	14.02	31.95	24.16	56.00	46.00	-24.05	-21.84
3	2.10547	10.15	24.98	16.38	35.13	26.53	56.00	46.00	-20.87	-19.47
4	2.61719	10.19	21.78	10.85	31.97	21.04	56.00	46.00	-24.03	-24.96
5	16.46484	11.06	29.90	29.35	40.96	40.41	60.00	50.00	-19.04	-9.59
6	25.87187	11.33	28.05	28.02	39.38	39.35	60.00	50.00	-20.62	-10.65

#### 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.

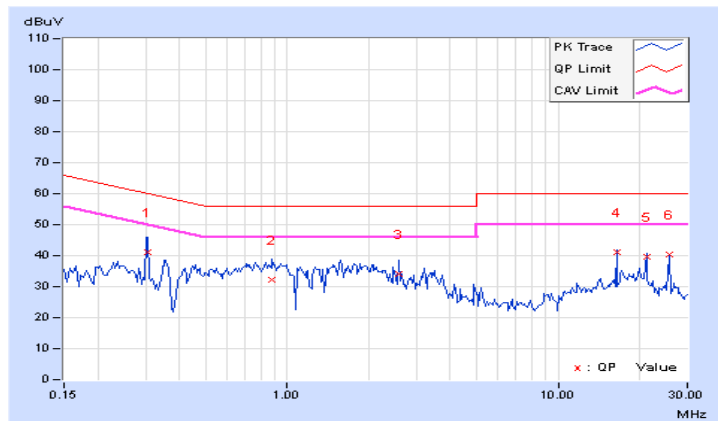


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
-------	-------------	-------------------	--------------------------------

No	Freq. [MHz]	Corr.	Reading Value		Emission Level		Limit		Margin	
		Factor (dB)	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.30625	10.07	31.09	13.37	41.16	23.44	60.07	50.07	-18.91	-26.63
2	0.88047	10.11	22.23	14.46	32.34	24.57	56.00	46.00	-23.66	-21.43
3	2.57422	10.19	23.78	11.33	33.97	21.52	56.00	46.00	-22.03	-24.48
<b>4</b>	<b>16.46484</b>	<b>10.85</b>	<b>30.42</b>	<b>30.31</b>	<b>41.27</b>	<b>41.16</b>	<b>60.00</b>	<b>50.00</b>	<b>-18.73</b>	<b>-8.84</b>
5	21.16797	11.00	28.48	27.79	39.48	38.79	60.00	50.00	-20.52	-11.21
6	25.87500	10.97	29.51	28.62	40.48	39.59	60.00	50.00	-19.52	-10.41

**REMARKS:**

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

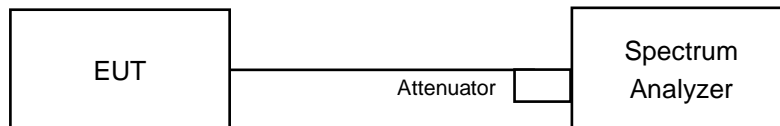


### 4.3 6dB Bandwidth Measurement

#### 4.3.1 Limits of 6dB Bandwidth Measurement

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

#### 4.3.2 Test Setup



#### 4.3.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

#### 4.3.4 Test Procedure

- a. Set resolution bandwidth (RBW) = 100kHz
- b. Set the video bandwidth (VBW)  $\geq 3 \times$  RBW, Detector = Peak.
- c. Trace mode = max hold.
- d. Sweep = auto couple.
- e. Measure the maximum width of the emission that is constrained by the frequencies associated with the two amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission

#### 4.3.5 Deviation from Test Standard

No deviation.

#### 4.3.6 EUT Operating Conditions

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

#### 4.3.7 Test Result

##### 802.11b

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	10.18	0.5	PASS
6	2437	10.15	0.5	PASS
11	2462	10.15	0.5	PASS

##### 802.11g

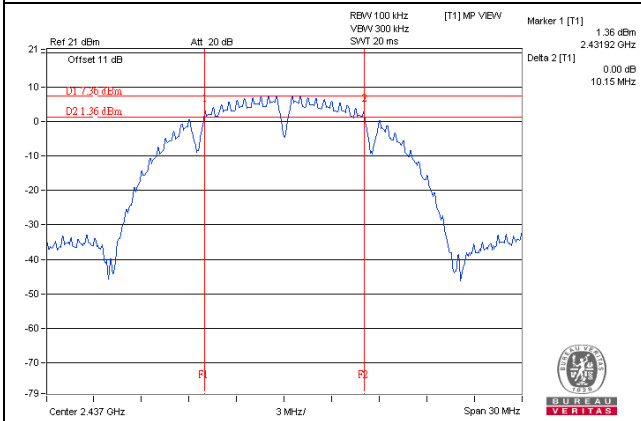
Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	16.58	0.5	PASS
6	2437	16.58	0.5	PASS
11	2462	16.57	0.5	PASS

##### 802.11n (HT20)

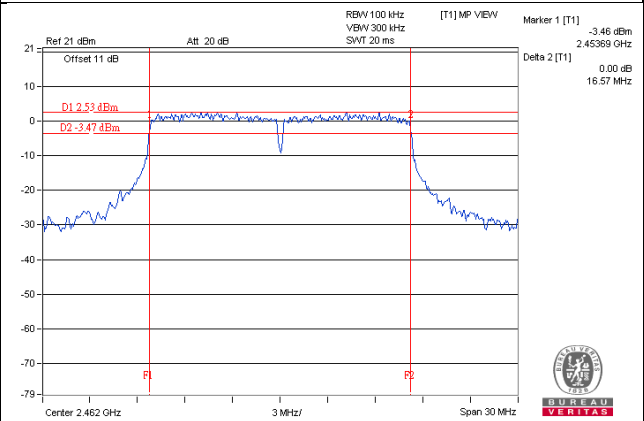
Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	17.73	0.5	Pass
6	2437	17.74	0.5	Pass
11	2462	17.72	0.5	Pass

### Spectrum Plot of Worst Value

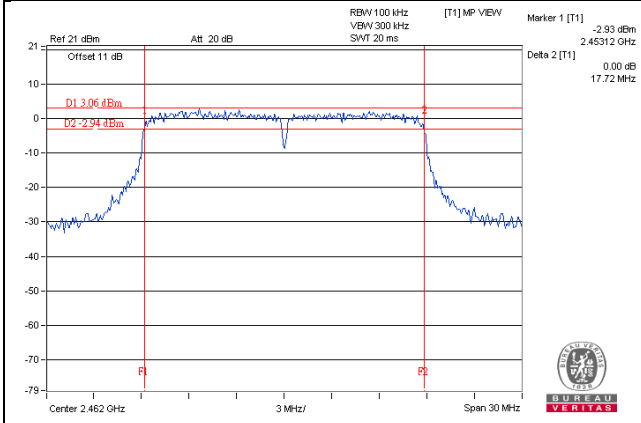
#### 802.11b : CH6



#### 802.11g : CH11



#### 802.11n (HT20) : CH11

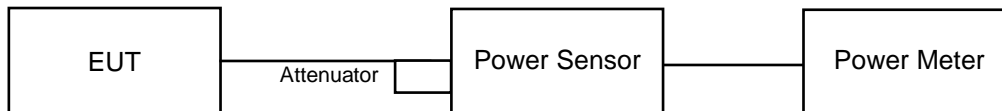


## 4.4 Conducted Output Power Measurement

### 4.4.1 Limits of Conducted Output Power Measurement

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

### 4.4.2 Test Setup



### 4.4.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

### 4.4.4 Test Procedures

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

### 4.4.5 Deviation from Test Standard

No deviation.

### 4.4.6 EUT Operating Conditions

Same as Item 4.3.6.

#### 4.4.7 Test Results

#### FOR PEAK POWER

##### 802.11b

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass/Fail
1	2412	92.897	19.68	30	Pass
6	2437	127.938	21.07	30	Pass
11	2462	130.017	21.14	30	Pass

##### 802.11g

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass/Fail
1	2412	299.226	24.76	30	Pass
6	2437	316.957	25.01	30	Pass
11	2462	304.089	24.83	30	Pass

##### 802.11n (HT20)

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass/Fail
1	2412	249.459	23.97	30	Pass
6	2437	309.742	24.91	30	Pass
11	2462	259.418	24.14	30	Pass

## FOR AVERAGE POWER

### 802.11b

Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)
1	2412	56.364	17.51
6	2437	73.961	18.69
11	2462	77.446	18.89

### 802.11g

Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)
1	2412	58.345	17.66
6	2437	126.474	21.02
11	2462	53.333	17.27

### 802.11n (HT20)

Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)
1	2412	48.641	16.87
6	2437	118.032	20.72
11	2462	48.529	16.86

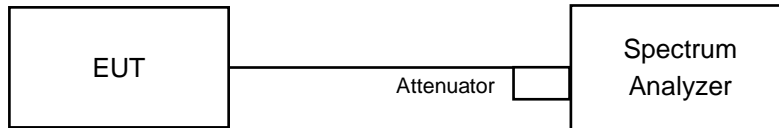


## 4.5 Power Spectral Density Measurement

### 4.5.1 Limits of Power Spectral Density Measurement

The Maximum of Power Spectral Density Measurement is 8dBm in any 3 kHz.

### 4.5.2 Test Setup



### 4.5.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

### 4.5.4 Test Procedure

- a. Set analyzer center frequency to DTS channel center frequency.
- b. Set the span to 1.5 times the DTS bandwidth.
- c. Set the RBW to:  $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$ .
- d. Set the VBW  $\geq 3 \times \text{RBW}$ .
- e. Detector = peak.
- f. Sweep time = auto couple.
- g. Trace mode = max hold.
- h. Allow trace to fully stabilize.
- i. Use the peak marker function to determine the maximum amplitude level within the RBW.

### 4.5.5 Deviation from Test Standard

No deviation.

### 4.5.6 EUT Operating Condition

Same as Item 4.3.6

#### 4.5.7 Test Results

##### 802.11b

Channel	Freq. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
1	2412	-12.87	8	Pass
6	2437	-12.92	8	Pass
11	2462	-12.86	8	Pass

##### 802.11g

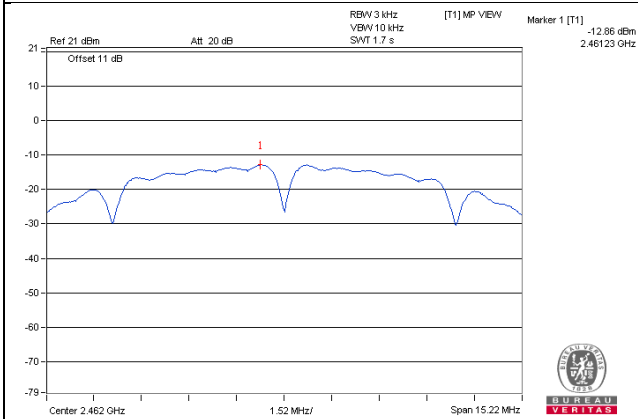
Channel	Freq. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
1	2412	-10.56	8	Pass
6	2437	-7.07	8	Pass
11	2462	-12.25	8	Pass

##### 802.11n (HT20)

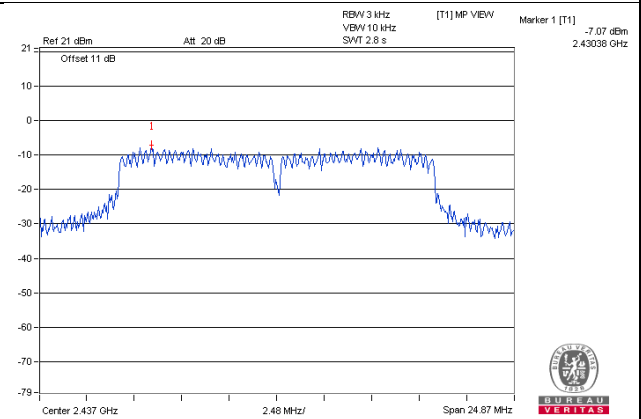
Channel	Freq. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
1	2412	-11.26	8	Pass
6	2437	-8.23	8	Pass
11	2462	-10.77	8	Pass

### Spectrum Plot of Worst Value

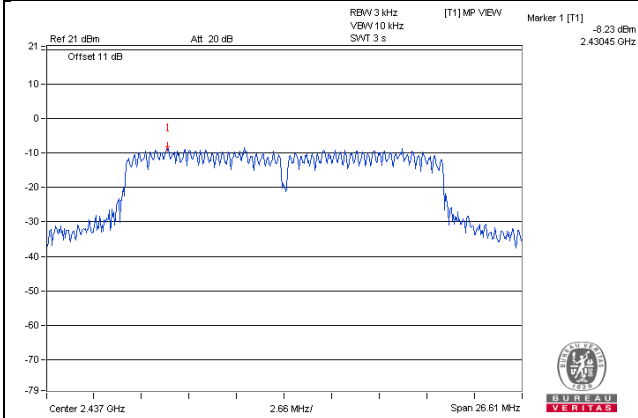
**802.11b : CH11**



**802.11g : CH6**



**802.11n (HT20) : CH6**

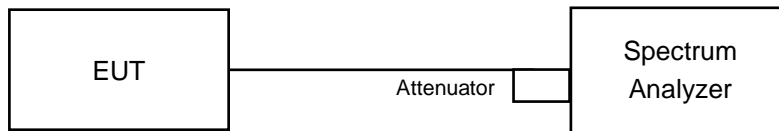


## 4.6 Conducted Out of Band Emission Measurement

### 4.6.1 Limits of Conducted Out of Band Emission Measurement

Below 20dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

### 4.6.2 Test Setup



### 4.6.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

### 4.6.4 Test Procedure

#### MEASUREMENT PROCEDURE REF

1. Set the RBW = 100 kHz.
2. Set the VBW  $\geq$  300 kHz.
3. Detector = peak.
4. Sweep time = auto couple.
5. Trace mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.

#### MEASUREMENT PROCEDURE OOB

1. Set RBW = 100 kHz.
2. Set VBW  $\geq$  300 kHz.
3. Detector = peak.
4. Sweep = auto couple.
5. Trace Mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum amplitude level.

### 4.6.5 Deviation from Test Standard

No deviation.

### 4.6.6 EUT Operating Condition

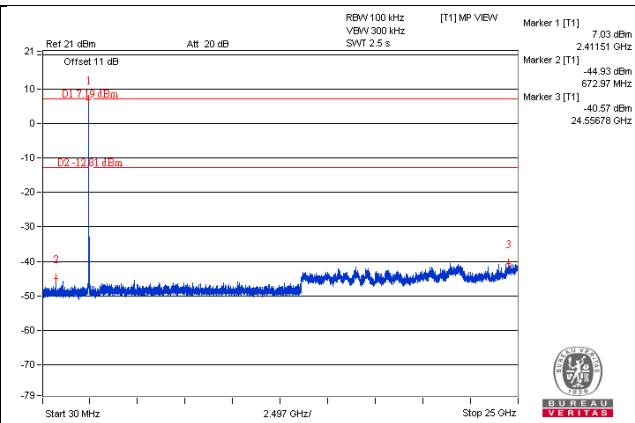
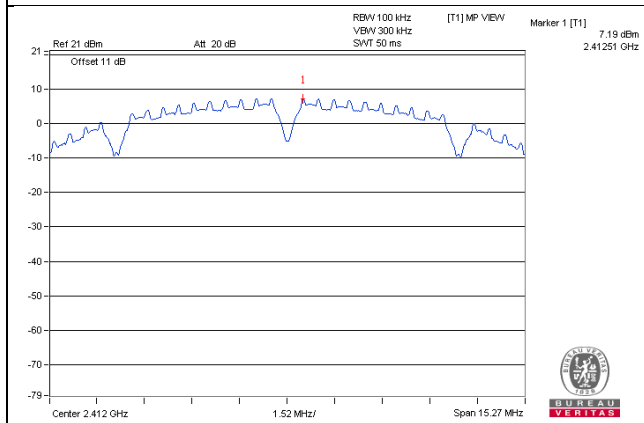
Same as Item 4.3.6

### 4.6.7 Test Results

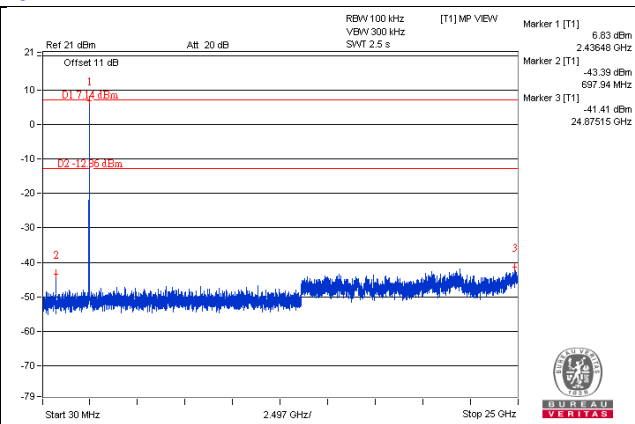
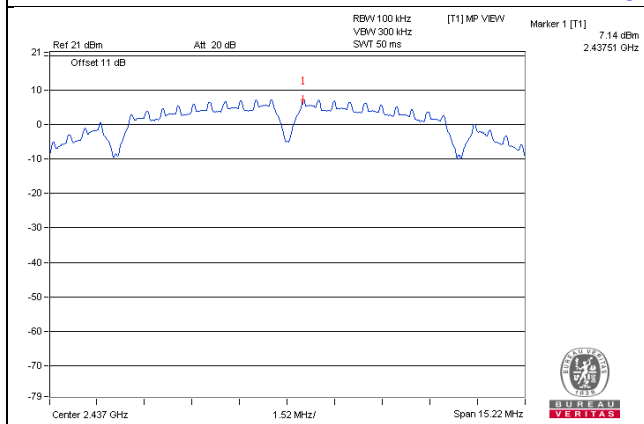
The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement.

802.11b

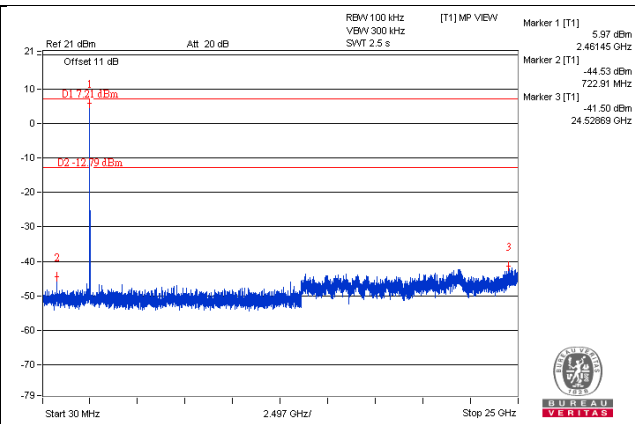
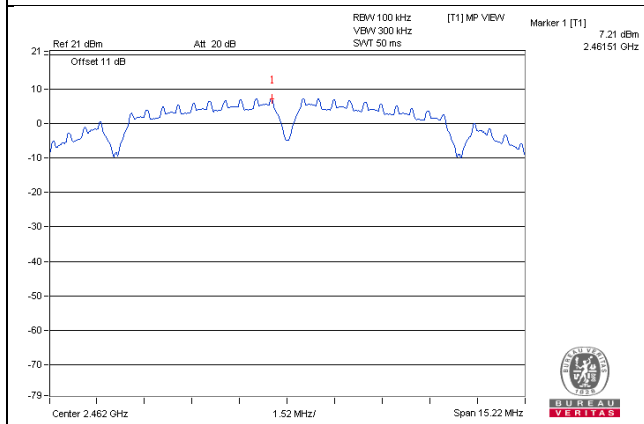
CH 1



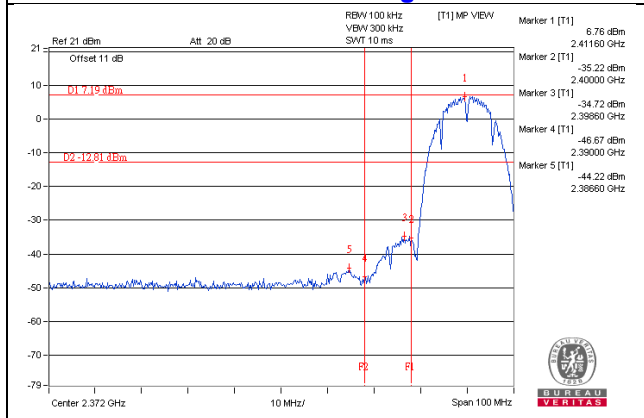
CH 6



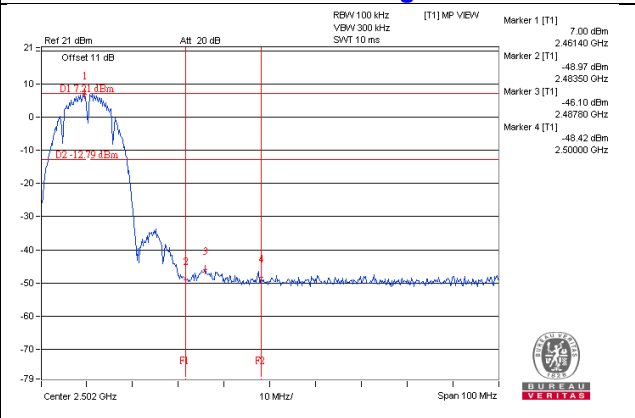
CH 11



CH 1 Band edge

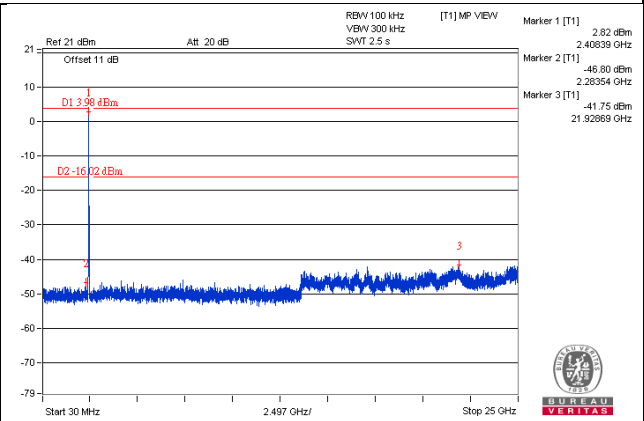
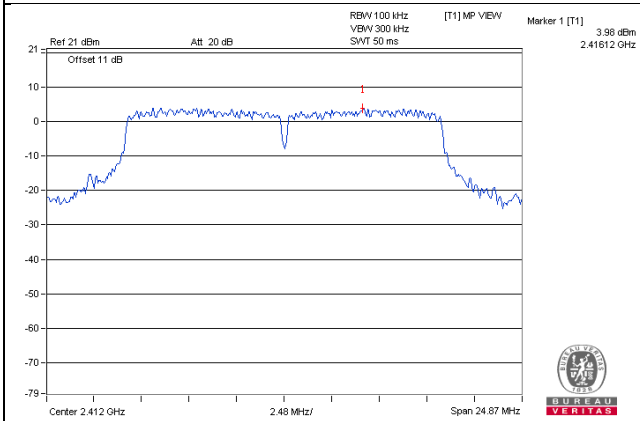


CH 11 Band edge

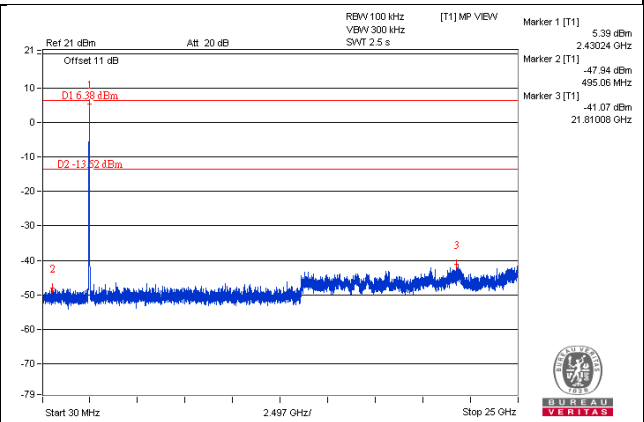
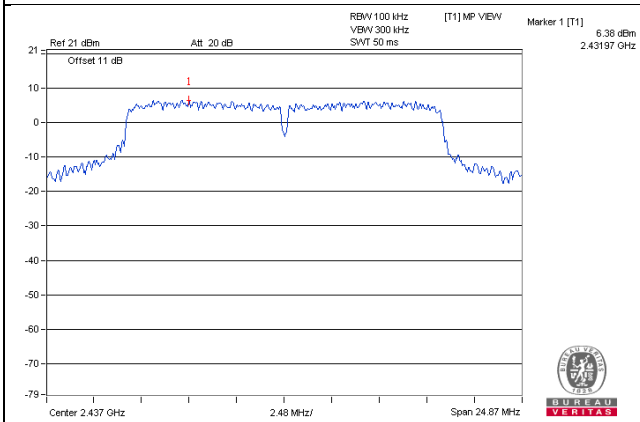


# 802.11g

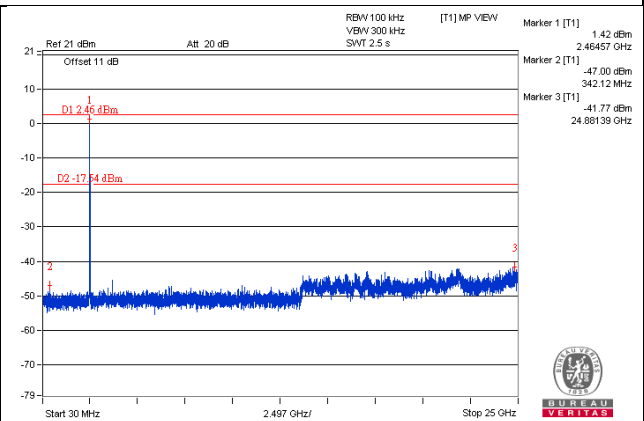
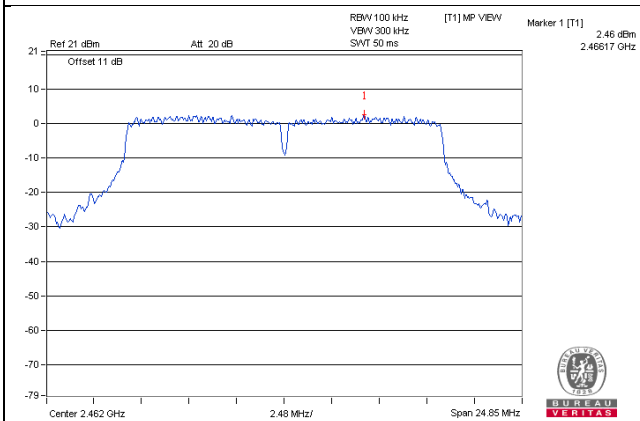
## CH 1



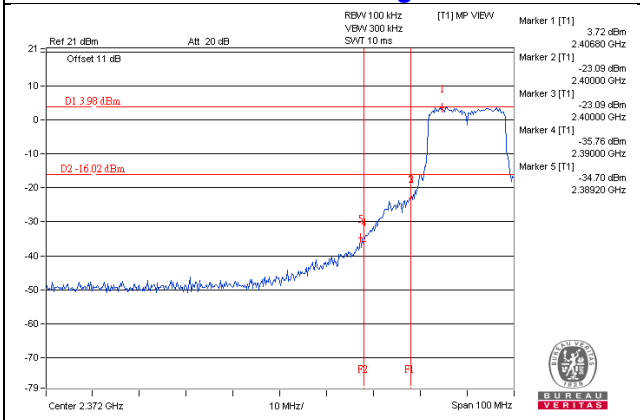
## CH 6



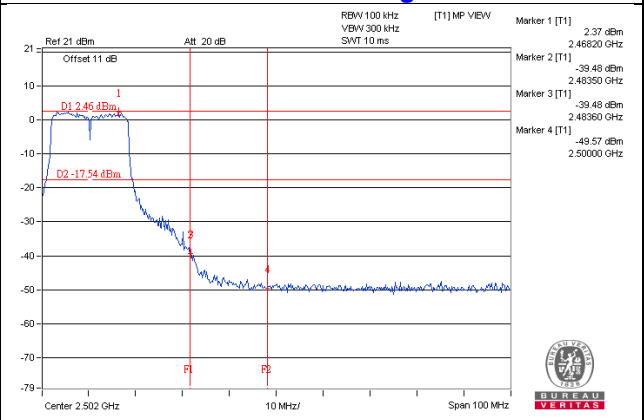
## CH 11



### CH 1 Band edge

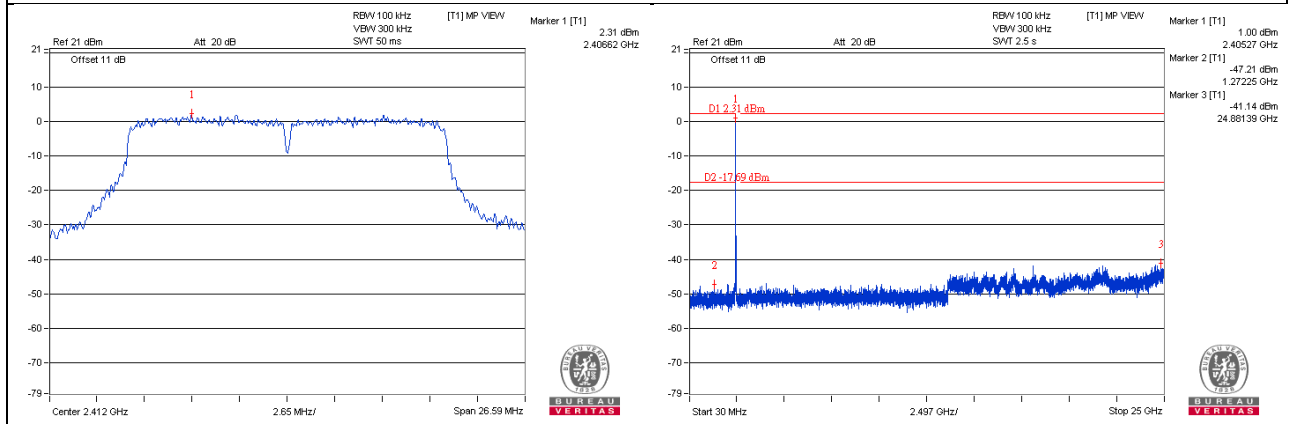


### CH 11 Band edge

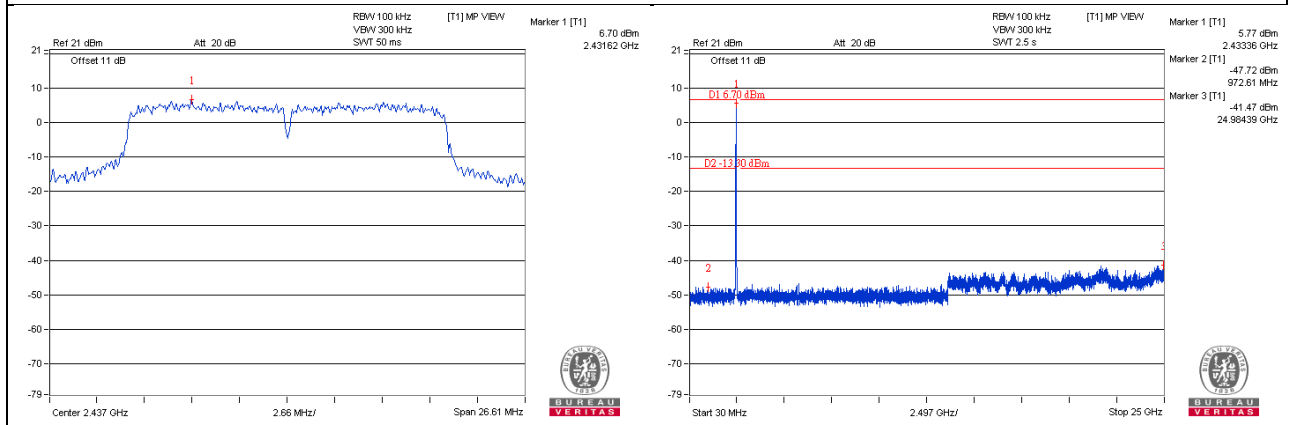


# 802.11n (HT20)

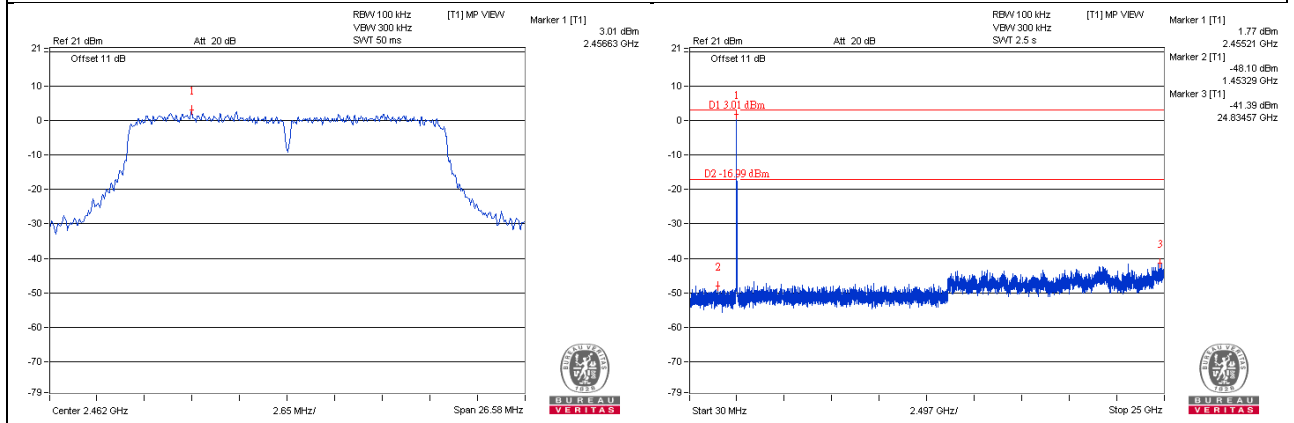
## CH 1



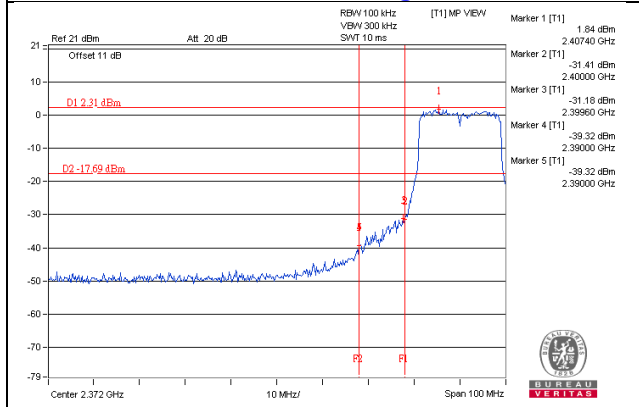
## CH 6



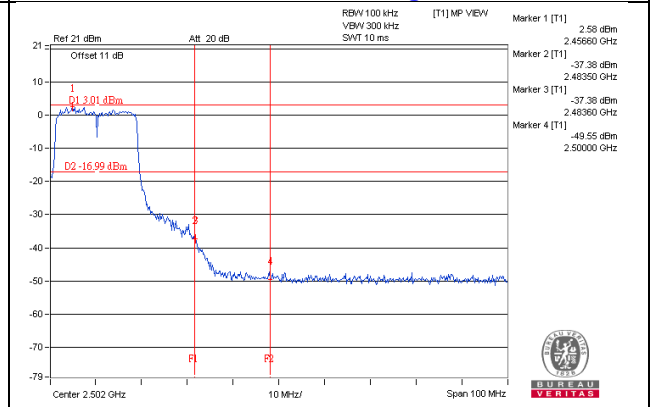
## CH 11



### CH 1 Band edge



### CH 11 Band edge



## 5 Pictures of Test Arrangements

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



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

Tel: 886-3-6668565

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**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 ---