

## FCC Test Report

**Report No.:** RF160621C18-2

**FCC ID:** B32CARBON10

**Test Model:** Carbon 10

**Received Date:** Jun. 21, 2016

**Test Date:** Jul. 11, 2016 ~ Jul. 25, 2016

**Issued Date:** Aug. 02, 2016

**Applicant:** Verifone, Inc.

**Address:** 1400 West Stanford Ranch Road Suite 200 Rocklin CA 95765 USA

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

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

**Test Location (1):** No. 19, Hwa Ya 2nd Rd, Wen Hwa Tsuen, Kwei Shan Hsiang, Taoyuan Hsien 333, Taiwan, R.O.C.

**Test Location (2):** No.215, Sec. 3, Beixin Rd., Xindian Dist., New Taipei City 231, Taiwan, R.O.C



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

## Table of Contents

<b>Release Control Record</b> .....	<b>4</b>
<b>1 Certificate of Conformity</b> .....	<b>5</b>
<b>2 Summary of Test Results</b> .....	<b>6</b>
2.1 Measurement Uncertainty .....	6
2.2 Modification Record .....	6
<b>3 General Information</b> .....	<b>7</b>
3.1 General Description of EUT .....	7
3.2 Description of Test Modes .....	9
3.2.1 Test Mode Applicability and Tested Channel Detail .....	10
3.3 Duty Cycle of Test Signal .....	12
3.4 Description of Support Units .....	13
3.4.1 Configuration of System under Test .....	13
3.5 General Description of Applied Standards .....	13
<b>4 Test Types and Results</b> .....	<b>14</b>
4.1 Radiated Emission and Bandedge Measurement .....	14
4.1.1 Limits of Radiated Emission and Bandedge Measurement .....	14
4.1.2 Test Instruments .....	15
4.1.3 Test Procedures .....	16
4.1.4 Deviation from Test Standard .....	16
4.1.5 Test Set Up .....	17
4.1.6 EUT Operating Conditions .....	17
4.1.7 Test Results .....	18
4.2 Conducted Emission Measurement .....	31
4.2.1 Limits of Conducted Emission Measurement .....	31
4.2.2 Test Instruments .....	31
4.2.3 Test Procedures .....	32
4.2.4 Deviation from Test Standard .....	32
4.2.5 Test Setup .....	32
4.2.6 EUT Operating Conditions .....	32
4.2.7 Test Results .....	33
4.3 6 dB Bandwidth Measurement .....	35
4.3.1 Limits of 6 dB Bandwidth Measurement .....	35
4.3.2 Test Setup .....	35
4.3.3 Test Instruments .....	35
4.3.4 Test Procedure .....	35
4.3.5 Deviation from Test Standard .....	35
4.3.6 EUT Operating Conditions .....	35
4.3.7 Test Result .....	36
4.4 Conducted Output Power Measurement .....	38
4.4.1 Limits of Conducted Output Power Measurement .....	38
4.4.2 Test Setup .....	38
4.4.3 Test Instruments .....	38
4.4.4 Test Procedures .....	38
4.4.5 Deviation from Test Standard .....	38
4.4.6 EUT Operating Conditions .....	38
4.4.7 Test Results .....	39
4.5 Power Spectral Density Measurement .....	40
4.5.1 Limits of Power Spectral Density Measurement .....	40
4.5.2 Test Setup .....	40
4.5.3 Test Instruments .....	40
4.5.4 Test Procedure .....	40
4.5.5 Deviation from Test Standard .....	40
4.5.6 EUT Operating Condition .....	40

4.5.7 Test Results .....	41
4.6 Conducted Out of Band Emission Measurement .....	43
4.6.1 Limits of Conducted Out of Band Emission Measurement.....	43
4.6.2 Test Setup.....	43
4.6.3 Test Instruments .....	43
4.6.4 Test Procedure .....	43
4.6.5 Deviation from Test Standard .....	43
4.6.6 EUT Operating Condition .....	43
4.6.7 Test Results .....	44
<b>5 Pictures of Test Arrangements.....</b>	<b>52</b>
<b>Appendix – Information on the Testing Laboratories .....</b>	<b>53</b>

### Release Control Record

Issue No.	Description	Date Issued
RF160621C18-2	Original Release	Aug. 02, 2016

## 1 Certificate of Conformity

**Product:** Carbon 10  
**Brand:** Verifone  
**Test Model:** Carbon 10  
**Sample Status:** Identical Prototype  
**Applicant:** Verifone, Inc.  
**Test Date:** Jul. 11, 2016 ~ Jul. 25, 2016  
**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 :** Gina Liu , **Date:** Aug. 02, 2016  
Gina Liu / Specialist

**Approved by :** Stanley Wu , **Date:** Aug. 02, 2016  
Stanley Wu / Assistant 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 above 1GHz is -10.75 dB at 4.74425 MHz.
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	Pass	Meet the requirement of limit. Minimum passing margin above 1GHz is -4.37 dB at 2486 MHz.
15.247(d)	Antenna Port Emission	Pass	Meet the requirement of limit.
15.247(a)(2)	6 dB 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:

The listed uncertainties are the worst case uncertainty for the entire range of measurement. Please note that the uncertainty values are provided for informational purposes only and are not used in determining the PASS/FAIL results.

Measurement	Frequency	Expanded Uncertainty (k=2) ( $\pm$ )
Conducted Emissions at mains ports	150 kHz ~ 30 MHz	2.44 dB
Radiated Emissions up to 1 GHz	30 MHz ~ 200 MHz	2.93 dB
	200 MHz ~ 1000 MHz	2.95 dB
Radiated Emissions above 1 GHz	1 GHz ~ 18 GHz	2.26 dB
	18 GHz ~ 40 GHz	1.94 dB

### 2.2 Modification Record

There were no modifications required for compliance.

### 3 General Information

#### 3.1 General Description of EUT

<b>Product</b>	Carbon 10
<b>Brand</b>	Verifone
<b>Test Model</b>	Carbon 10
<b>Status of EUT</b>	Identical Prototype
<b>Power Supply Rating</b>	5Vdc (Adapter) 3.74Vdc (Battery)
<b>Modulation Type</b>	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
<b>Modulation Technology</b>	DSSS, OFDM
<b>Transfer Rate</b>	802.11b: 11.0 / 5.5 / 2.0 / 1.0 Mbps 802.11g: 54.0 / 48.0 / 36.0 / 24.0 / 18.0 / 12.0 / 9.0 / 6.0 Mbps 802.11n: up to MCS7
<b>Operating Frequency</b>	2412 ~ 2462 MHz
<b>Number of Channel</b>	11 for 802.11b, 802.11g, 802.11n (HT20) 7 for 802.11n (HT40)
<b>Output Power</b>	216.27 mW
<b>Antenna Type</b>	PCB antenna with 1.97 dBi gain
<b>Antenna Connector</b>	N/A
<b>Accessory Device</b>	Refer to Note as below
<b>Data Cable Supplied</b>	Refer to Note as below

Note:

1. The EUT provides one completed transmitter and one receiver.

Modulation Mode	TX Function
802.11b	1TX
802.11g	1TX
802.11n (HT20)	1TX
802.11n (HT40)	1TX

2. The EUT contains following accessory devices.

Product	Brand	Model	Description
Adapter 1 (US Plug)	Verifone	A111-3050223U	I/P: 100-240Vac, 50/60Hz, 500mA O/P: 5Vdc, 2200mA 1.75m non-shielded cable w/o core
Adapter 2 (US Plug)	Verifone	AM11A-050AS-R	I/P: 100-240Vac, 50/60Hz, 500mA O/P: 5Vdc, 2200mA 1.75m non-shielded cable w/o core
Adapter 3 (EU Plug)	Verifone	A111-3050223E	I/P: 100-240Vac, 50/60Hz, 500mA O/P: 5Vdc, 2200mA 1.75m non-shielded cable w/o core
Adapter 4 (EU Plug)	Verifone	AM11E-050AS-R	I/P: 100-240Vac, 50/60Hz, 500mA O/P: 5Vdc, 2200mA 1.75m non-shielded cable w/o core
Adapter 5 (AU Plug)	Verifone	A111-3050223S	I/P: 100-240Vac, 50/60Hz, 500mA O/P: 5Vdc, 2200mA 1.75m non-shielded cable w/o core
Adapter 6 (AU Plug)	Verifone	AM11S-050AS-R	I/P: 100-240Vac, 50/60Hz, 500mA O/P: 5Vdc, 2200mA 1.75m non-shielded cable w/o core
Battery	Verifone	BPK179-001	3.74Vdc, 7680mAh
BT/WLAN Module	AzureWare	AW-NB177NF	

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



### 3.2 Description of Test Modes

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

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

7 channels are provided for 802.11n (HT40):

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

### 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 1 GHz      **RE<1G**: Radiated Emission below 1 GHz  
**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 **X-plane**.  
**NOTE:** “-” means no effect.

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

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

EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
-	802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1.0
-	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6.0
-	802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	MCS0
-	802.11n (HT40)	3 to 9	3, 6, 9	OFDM	BPSK	MCS0

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

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

EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
-	802.11n (HT40)	1 to 11	9	OFDM	BPSK	MCS0

#### **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.

EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
-	802.11n (HT40)	1 to 11	9	OFDM	BPSK	MCS0

### **Bandedge 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.

EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
-	802.11b	1 to 11	1, 11	DSSS	DBPSK	1.0
-	802.11g	1 to 11	1, 11	OFDM	BPSK	6.0
-	802.11n (HT20)	1 to 11	1, 11	OFDM	BPSK	MCS0
-	802.11n (HT40)	3 to 9	3, 9	OFDM	BPSK	MCS0

### **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.

EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
-	802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1.0
-	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6.0
-	802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	MCS0
-	802.11n (HT40)	3 to 9	3, 6, 9	OFDM	BPSK	MCS0

### **Test Condition:**

Applicable To	Environmental Conditions	Input Power	Tested by
RE $\geq$ 1G	25 deg. C, 65 % RH	120 Vac, 60 Hz	Gavin Wu
RE<1G	25 deg. C, 65 % RH	120 Vac, 60 Hz	Gavin Wu
PLC	25 deg. C, 65 % RH	120 Vac, 60 Hz	Toby Tian
APCM	25 deg. C, 65 % RH	3.74 Vdc	Luke Chen

### 3.3 Duty Cycle of Test Signal

**802.11b:** Duty cycle of test signal is 100 %

**802.11g:** Duty cycle =  $1.392/1.448 = 0.961$ , Duty factor =  $10 * \log(1/0.961) = 0.17$

**802.11n (HT20):** Duty cycle =  $1.306/1.362 = 0.959$ , Duty factor =  $10 * \log(1/0.959) = 0.18$

**802.11n (HT40):** Duty cycle =  $649/697 = 0.931$ , Duty factor =  $10 * \log(1/0.931) = 0.31$



### 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.

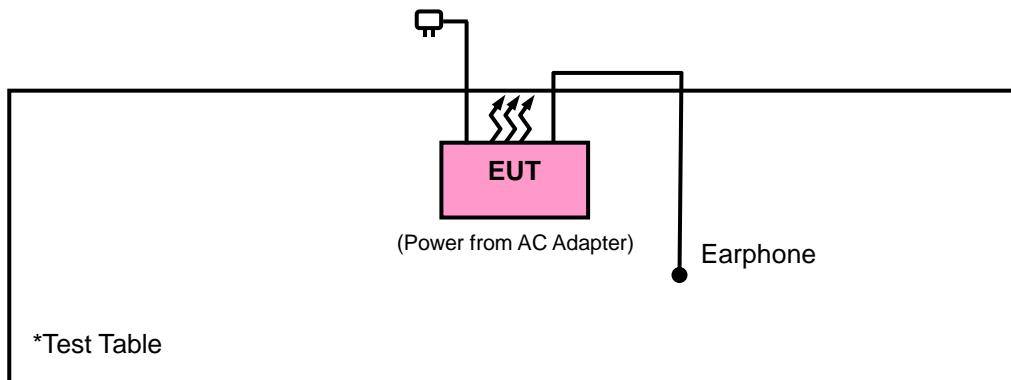
No.	Product	Brand	Model No.	Serial No.	FCC ID
1.	Earphone	N/A	N/A	N/A	N/A

No.	Signal Cable Description Of The Above Support Units
1.	N/A

Note:

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

#### 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)**

**558074 D01 DTS Meas Guidance v03r05**

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 20 dB below the highest level of the desired power:

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

**NOTE:**

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

## 4.1.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Test Receiver Agilent	N9038A	MY51210203	Jan. 21, 2016	Jan. 20, 2017
Spectrum Analyzer Agilent	N9010A	MY52220314	Sep. 03, 2015	Sep. 02, 2016
Spectrum Analyzer ROHDE & SCHWARZ	FSU43	101261	Dec. 17, 2015	Dec. 16, 2016
BILOG Antenna SCHWARZBECK	VULB9168	9168-472	Jan. 07, 2016	Jan. 06, 2017
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-969	Jan. 04, 2016	Jan. 03, 2017
HORN Antenna SCHWARZBECK	BBHA 9170	9170-480	Jan. 08, 2016	Jan. 07, 2017
Loop Antenna	EM-6879	269	Jul. 31, 2015	Jul. 30, 2016
Preamplifier EMCI	EMC 012645	980115	Dec. 21, 2015	Dec. 20, 2016
Preamplifier EMCI	EMC 184045	980116	Dec. 21, 2015	Dec. 20, 2016
Preamplifier EMCI	EMC 330H	980112	Dec. 28, 2015	Dec. 27, 2016
Power Meter Anritsu	ML2495A	1232002	Sep. 21, 2015	Sep. 20, 2016
Power Sensor Anritsu	MA2411B	1207325	Sep. 21, 2015	Sep. 20, 2016
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	309219/4 2950114	Oct. 12, 2015	Oct. 11, 2016
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	250130/4	Oct. 12, 2015	Oct. 11, 2016
RF Coaxial Cable Worken	8D-FB	Cable-Ch10-01	Oct. 12, 2015	Oct. 11, 2016
Software BV ADT	E3 6.120103	NA	NA	NA
Antenna Tower MF	MFA-440H	NA	NA	NA
Turn Table MF	MFT-201SS	NA	NA	NA
Antenna Tower & Turn Table Controller MF	MF-7802	NA	NA	NA

- Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in HwaYa Chamber 10.
3. The horn antenna and preamplifier (model: EMC 184045) are used only for the measurement of emission frequency above 1 GHz if tested.
4. The FCC Site Registration No. is 690701.
5. The IC Site Registration No. is IC7450F-10.

#### 4.1.3 Test Procedures

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

**Note:**

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection (QP) at frequency below 1 GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1 GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for RMS Average (Duty cycle < 98 %) for Average detection (AV) at frequency above 1 GHz, then the measurement results was added to a correction factor ( $10 \log(1/\text{duty cycle})$ ).
4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10 Hz (Duty cycle  $\geq 98$  %) for Average detection (AV) at frequency above 1 GHz.
5. All modes of operation were investigated and the worst-case emissions are reported.

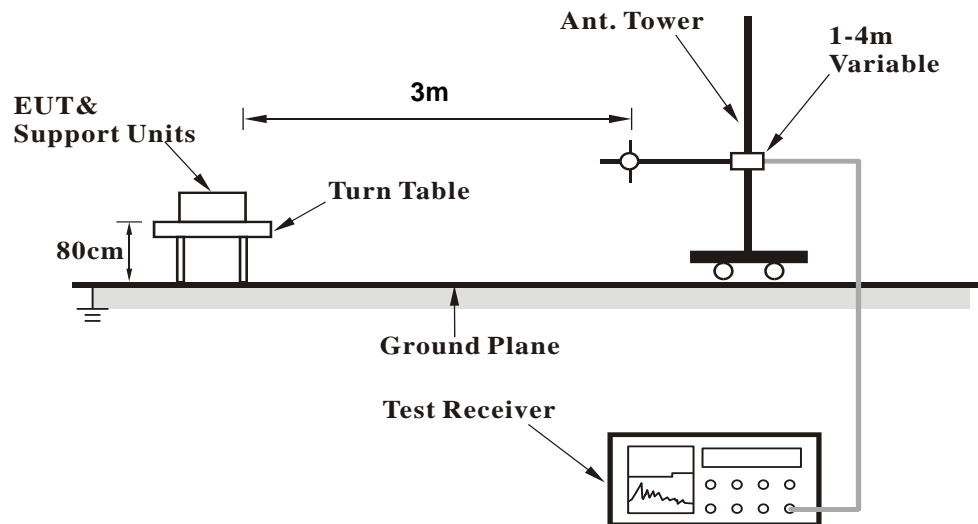
#### 4.1.4 Deviation from Test Standard

No deviation.

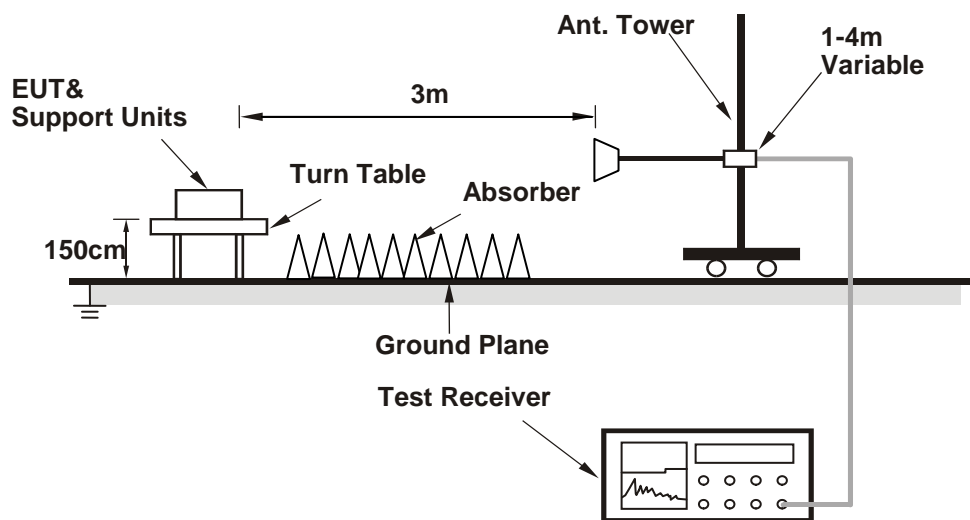


#### 4.1.5 Test Set Up

##### <Frequency Range below 1 GHz>



##### <Frequency Range above 1 GHz>



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

#### 4.1.6 EUT Operating Conditions

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

4.1.7 Test Results

Above 1 GHz Data :

802.11b

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

Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	41.35	47.88	54	-12.65	26.91	4.08	37.52	150	143	Average
2390	57.1	63.63	74	-16.9	26.91	4.08	37.52	150	143	Peak
2412	102.7	109.17			26.96	4.09	37.52	150	143	Average
2412	107.42	113.89			26.96	4.09	37.52	150	143	Peak
2484	37.75	43.77	54	-16.25	27.15	4.15	37.32	150	143	Average
2484	58.36	64.38	74	-15.64	27.15	4.15	37.32	150	143	Peak

Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2356	36.89	43.52	54	-17.11	26.81	4.05	37.49	111	179	Average
2356	56.81	63.44	74	-17.19	26.81	4.05	37.49	111	179	Peak
2412	97	103.47			26.96	4.09	37.52	111	179	Average
2412	101.83	108.3			26.96	4.09	37.52	111	179	Peak
2490	35.19	41.15	54	-18.81	27.2	4.16	37.32	111	179	Average
2490	57.19	63.15	74	-16.81	27.2	4.16	37.32	111	179	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor  
Margin value = Emission level – Limit value
- 2412 MHz: Fundamental frequency.

EUT Test Condition		Measurement Detail	
Channel	Channel 6	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Gavin Wu

Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2370	37.27	43.84	54	-16.73	26.86	4.07	37.5	146	119	Average
2370	57.71	64.28	74	-16.29	26.86	4.07	37.5	146	119	Peak
2437	102.87	109.15			27.06	4.12	37.46	146	119	Average
2437	107.48	113.76			27.06	4.12	37.46	146	119	Peak
2492	38.73	44.62	54	-15.27	27.2	4.16	37.25	146	119	Average
2492	57.24	63.13	74	-16.76	27.2	4.16	37.25	146	119	Peak
Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2336	35.39	42.05	54	-18.61	26.77	4.04	37.47	111	189	Average
2336	56.71	63.37	74	-17.29	26.77	4.04	37.47	111	189	Peak
2437	97.24	103.52			27.06	4.12	37.46	111	189	Average
2437	101.96	108.24			27.06	4.12	37.46	111	189	Peak
2488	35.94	41.9	54	-18.06	27.2	4.16	37.32	111	189	Average
2488	56.62	62.58	74	-17.38	27.2	4.16	37.32	111	189	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor  
Margin value = Emission level – Limit value
- 2437 MHz: Fundamental frequency.

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

Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2330	36.65	43.36	54	-17.35	26.72	4.04	37.47	144	125	Average
2330	57.25	63.96	74	-16.75	26.72	4.04	37.47	144	125	Peak
2462	102.9	109.06			27.1	4.13	37.39	144	125	Average
2462	107.53	113.69			27.1	4.13	37.39	144	125	Peak
2488	43.74	49.7	54	-10.26	27.2	4.16	37.32	144	125	Average
2488	58.53	64.49	74	-15.47	27.2	4.16	37.32	144	125	Peak
Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2362	34.63	41.26	54	-19.37	26.81	4.05	37.49	110	185	Average
2362	56.52	63.15	74	-17.48	26.81	4.05	37.49	110	185	Peak
2462	97.18	103.34			27.1	4.13	37.39	110	185	Average
2462	101.9	108.06			27.1	4.13	37.39	110	185	Peak
2492	38.21	44.1	54	-15.79	27.2	4.16	37.25	110	185	Average
2492	56.55	62.44	74	-17.45	27.2	4.16	37.25	110	185	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor  
Margin value = Emission level – Limit value
- 2462 MHz: Fundamental frequency.

802.11g

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

Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	45.7	52.23	54	-8.3	26.91	4.08	37.52	134	131	Average
2390	64.07	70.6	74	-9.93	26.91	4.08	37.52	134	131	Peak
2412	99.86	106.33			26.96	4.09	37.52	134	131	Average
2412	109.5	115.97			26.96	4.09	37.52	134	131	Peak
2488	40.95	46.91	54	-13.05	27.2	4.16	37.32	134	131	Average
2488	56.83	62.79	74	-17.17	27.2	4.16	37.32	134	131	Peak
Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	37.87	44.4	54	-16.13	26.91	4.08	37.52	110	168	Average
2390	58.34	64.87	74	-15.66	26.91	4.08	37.52	110	168	Peak
2412	94.17	100.64			26.96	4.09	37.52	110	168	Average
2412	103.83	110.3			26.96	4.09	37.52	110	168	Peak
2486	37.61	43.63	54	-16.39	27.15	4.15	37.32	110	168	Average
2486	57.14	63.16	74	-16.86	27.15	4.15	37.32	110	168	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor  
Margin value = Emission level – Limit value
- 2412 MHz: Fundamental frequency.

EUT Test Condition		Measurement Detail	
Channel	Channel 6	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Gavin Wu

Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2378	37.16	43.73	54	-16.84	26.86	4.07	37.5	131	125	Average
2378	57.9	64.47	74	-16.1	26.86	4.07	37.5	131	125	Peak
2437	99.49	105.77			27.06	4.12	37.46	131	125	Average
2437	109.34	115.62			27.06	4.12	37.46	131	125	Peak
2488	38.48	44.44	54	-15.52	27.2	4.16	37.32	131	125	Average
2488	56.46	62.42	74	-17.54	27.2	4.16	37.32	131	125	Peak
Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2372	35.05	41.62	54	-18.95	26.86	4.07	37.5	121	159	Average
2372	56.74	63.31	74	-17.26	26.86	4.07	37.5	121	159	Peak
2437	93.88	100.16			27.06	4.12	37.46	121	159	Average
2437	103.69	109.97			27.06	4.12	37.46	121	159	Peak
2490	36.25	42.21	54	-17.75	27.2	4.16	37.32	121	159	Average
2490	57.35	63.31	74	-16.65	27.2	4.16	37.32	121	159	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor  
Margin value = Emission level – Limit value
- 2437 MHz: Fundamental frequency.

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

Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2386	38	44.51	54	-16	26.91	4.08	37.5	130	131	Average
2386	56.28	62.79	74	-17.72	26.91	4.08	37.5	130	131	Peak
2462	99.41	105.57			27.1	4.13	37.39	130	131	Average
2462	109.4	115.56			27.1	4.13	37.39	130	131	Peak
2484	46.48	52.5	54	-7.52	27.15	4.15	37.32	130	131	Average
2484	68.74	74.76	74	-5.26	27.15	4.15	37.32	130	131	Peak
Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2366	35.53	42.15	54	-18.47	26.81	4.07	37.5	109	163	Average
2366	56.74	63.36	74	-17.26	26.81	4.07	37.5	109	163	Peak
2462	93.61	99.77			27.1	4.13	37.39	109	163	Average
2462	103.61	109.77			27.1	4.13	37.39	109	163	Peak
2484	41.28	47.3	54	-12.72	27.15	4.15	37.32	109	163	Average
2484	63.98	70	74	-10.02	27.15	4.15	37.32	109	163	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor  
Margin value = Emission level – Limit value
- 2462 MHz: Fundamental frequency.

802.11n (HT20)

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

**Antennal Polarity & Test Distance: Horizontal at 3 m**

Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	42.61	49.14	54	-11.39	26.91	4.08	37.52	116	127	Average
2390	61.98	68.51	74	-12.02	26.91	4.08	37.52	116	127	Peak
2412	98.07	104.54			26.96	4.09	37.52	116	127	Average
2412	107.86	114.33			26.96	4.09	37.52	116	127	Peak
2486	42.04	48.06	54	-11.96	27.15	4.15	37.32	116	127	Average
2486	57.46	63.48	74	-16.54	27.15	4.15	37.32	116	127	Peak

**Antennal Polarity & Test Distance: Vertical at 3 m**

Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	39.13	45.66	54	-14.87	26.91	4.08	37.52	112	162	Average
2390	57.49	64.02	74	-16.51	26.91	4.08	37.52	112	162	Peak
2412	92.43	98.9			26.96	4.09	37.52	112	162	Average
2412	102.19	108.66			26.96	4.09	37.52	112	162	Peak
2496	36.92	42.81	54	-17.08	27.2	4.16	37.25	112	162	Average
2496	56.59	62.48	74	-17.41	27.2	4.16	37.25	112	162	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor  
Margin value = Emission level – Limit value
- 2412 MHz: Fundamental frequency.



EUT Test Condition		Measurement Detail	
Channel	Channel 6	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Gavin Wu

Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2376	37.52	6.59	54	-16.48	26.86	4.07	0	117	123	Average
2376	57.37	26.44	74	-16.63	26.86	4.07	0	117	123	Peak
2437	98.1	66.92			27.06	4.12	0	117	123	Average
2437	107.92	76.74			27.06	4.12	0	117	123	Peak
2498	38.21	6.85	54	-15.79	27.2	4.16	0	117	123	Average
2498	58.44	27.08	74	-15.56	27.2	4.16	0	117	123	Peak
Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2342	35.53	4.72	54	-18.47	26.77	4.04	0	110	172	Average
2342	56.63	25.82	74	-17.37	26.77	4.04	0	110	172	Peak
2437	92.71	61.53			27.06	4.12	0	110	172	Average
2437	102.55	71.37			27.06	4.12	0	110	172	Peak
2500	35.47	4.11	54	-18.53	27.2	4.16	0	110	172	Average
2500	56.16	24.8	74	-17.84	27.2	4.16	0	110	172	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor  
Margin value = Emission level – Limit value
- 2437 MHz: Fundamental frequency.

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

Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2366	38.54	45.16	54	-15.46	26.81	4.07	37.5	115	140	Average
2366	56.7	63.32	74	-17.3	26.81	4.07	37.5	115	140	Peak
2462	98.39	104.55			27.1	4.13	37.39	115	140	Average
2462	107.96	114.12			27.1	4.13	37.39	115	140	Peak
2484	46.65	52.67	54	-7.35	27.15	4.15	37.32	115	140	Average
2484	69.15	75.17	74	-4.85	27.15	4.15	37.32	115	140	Peak
Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2388	35.25	41.76	54	-18.75	26.91	4.08	37.5	109	156	Average
2388	56.67	63.18	74	-17.33	26.91	4.08	37.5	109	156	Peak
2462	92.93	99.09			27.1	4.13	37.39	109	156	Average
2462	102.52	108.68			27.1	4.13	37.39	109	156	Peak
2484	40.2	46.22	54	-13.8	27.15	4.15	37.32	109	156	Average
2484	61.13	67.15	74	-12.87	27.15	4.15	37.32	109	156	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor  
Margin value = Emission level – Limit value
- 2462 MHz: Fundamental frequency.

802.11n (HT40)

EUT Test Condition		Measurement Detail	
Channel	Channel 3	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Gavin Wu

**Antennal Polarity & Test Distance: Horizontal at 3 m**

Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2388	47.31	53.82	54	-6.69	26.91	4.08	37.5	137	136	Average
2388	63.17	69.68	74	-10.83	26.91	4.08	37.5	137	136	Peak
2422	94.65	100.99			27.01	4.11	37.46	137	136	Average
2422	104.78	111.12			27.01	4.11	37.46	137	136	Peak
2496	40.31	46.2	54	-13.69	27.2	4.16	37.25	137	136	Average
2496	57.64	63.53	74	-16.36	27.2	4.16	37.25	137	136	Peak

**Antennal Polarity & Test Distance: Vertical at 3 m**

Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	43.16	49.69	54	-10.84	26.91	4.08	37.52	100	185	Average
2390	58.56	65.09	74	-15.44	26.91	4.08	37.52	100	185	Peak
2422	90.23	96.57			27.01	4.11	37.46	100	185	Average
2422	100.46	106.8			27.01	4.11	37.46	100	185	Peak
2498	37.56	43.45	54	-16.44	27.2	4.16	37.25	100	185	Average
2498	57.1	62.99	74	-16.9	27.2	4.16	37.25	100	185	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor  
Margin value = Emission level – Limit value
- 2422 MHz: Fundamental frequency.

EUT Test Condition		Measurement Detail	
Channel	Channel 6	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Gavin Wu

Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	42.63	49.16	54	-11.37	26.91	4.08	37.52	137	137	Average
2390	58.55	65.08	74	-15.45	26.91	4.08	37.52	137	137	Peak
2437	94.42	100.7			27.06	4.12	37.46	137	137	Average
2437	104.68	110.96			27.06	4.12	37.46	137	137	Peak
2484	44.53	50.55	54	-9.47	27.15	4.15	37.32	137	137	Average
2484	60.89	66.91	74	-13.11	27.15	4.15	37.32	137	137	Peak

Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2388	39.06	45.57	54	-14.94	26.91	4.08	37.5	100	187	Average
2388	57.43	63.94	74	-16.57	26.91	4.08	37.5	100	187	Peak
2437	89.12	95.4			27.06	4.12	37.46	100	187	Average
2437	100.51	106.79			27.06	4.12	37.46	100	187	Peak
2484	40.58	46.6	54	-13.42	27.15	4.15	37.32	100	187	Average
2484	57.23	63.25	74	-16.77	27.15	4.15	37.32	100	187	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor  
Margin value = Emission level – Limit value
- 2437 MHz: Fundamental frequency.

EUT Test Condition		Measurement Detail	
Channel	Channel 9	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Gavin Wu

Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2310	40.7	47.47	54	-13.3	26.67	4.01	37.45	137	137	Average
2310	55.97	62.74	74	-18.03	26.67	4.01	37.45	137	137	Peak
2452	94.1	100.3			27.06	4.13	37.39	137	137	Average
2452	104.41	110.61			27.06	4.13	37.39	137	137	Peak
<b>2486</b>	<b>49.63</b>	<b>55.65</b>	<b>54</b>	<b>-4.37</b>	<b>27.15</b>	<b>4.15</b>	<b>37.32</b>	<b>137</b>	<b>137</b>	<b>Average</b>
2486	66.54	72.56	74	-7.46	27.15	4.15	37.32	137	137	Peak
Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2380	38.28	44.84	54	-15.72	26.86	4.08	37.5	100	185	Average
2380	59.28	65.84	74	-14.72	26.86	4.08	37.5	100	185	Peak
2452	90.45	96.65			27.06	4.13	37.39	100	185	Average
2452	100.47	106.67			27.06	4.13	37.39	100	185	Peak
2484	45.83	51.85	54	-8.17	27.15	4.15	37.32	100	185	Average
2484	63.6	69.62	74	-10.4	27.15	4.15	37.32	100	185	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor  
Margin value = Emission level – Limit value
- 2452 MHz: Fundamental frequency.

**9 kHz ~ 30 MHz DATA:**

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

**30 MHz ~ 1 GHz WORST-CASE DATA:**

**802.11n (HT40)**

EUT Test Condition		Measurement Detail	
Channel	Channel 9	Frequency Range	30 MHz ~ 1 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Quasi-peak (QP)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Gavin Wu

Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
73.65	24.42	45.47	40	-15.58	9.81	0.85	31.71	117	255	Peak
118.27	25.27	45.18	43.5	-18.23	10.83	1.15	31.89	119	56	Peak
210.42	35.9	56.34	43.5	-7.6	9.81	1.34	31.59	112	84	Peak
244.37	43.33	62.47	46	-2.67	11.24	1.47	31.85	126	112	QP
269.59	42.55	60.98	46	-3.45	12.05	1.55	32.03	136	95	Peak
329.73	30.8	47.23	46	-15.2	13.66	1.72	31.81	103	63	Peak
Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
39.7	35.38	52.19	40	-4.62	13.54	0.64	30.99	119	312	Peak
73.65	29.34	50.39	40	-10.66	9.81	0.85	31.71	130	208	Peak
115.36	23.29	43.49	43.5	-20.21	10.55	1.12	31.87	107	0	Peak
229.82	28.37	48.19	46	-17.63	10.62	1.42	31.86	116	183	Peak
244.37	37.29	56.43	46	-8.71	11.24	1.47	31.85	129	169	Peak
269.59	28.4	46.83	46	-17.6	12.05	1.55	32.03	111	294	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor  
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 0.50 MHz.

### 4.2.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Test Receiver ROHDE & SCHWARZ	ESCI	100613	Nov. 16, 2015	Nov. 15, 2016
RF signal cable (with 10dB PAD) Woken	5D-FB	Cable-cond1-01	Dec. 26, 2015	Dec. 25, 2016
LISN ROHDE & SCHWARZ (EUT)	ESH3-Z5	835239/001	Feb. 26, 2016	Feb. 25, 2017
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100311	Jul. 24, 2015	Jul. 23, 2016
Software ADT	BV ADT_Cond_ V7.3.7.3	NA	NA	NA

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

2. The test was performed in HwaYa Shielded Room 1.

3. The VCCI Site Registration No. is C-2040.

#### 4.2.3 Test Procedures

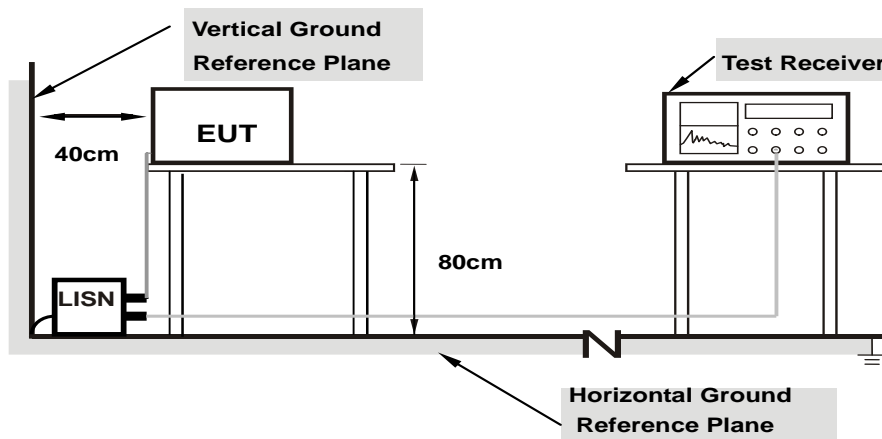
- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/50 uH of coupling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

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

#### 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

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



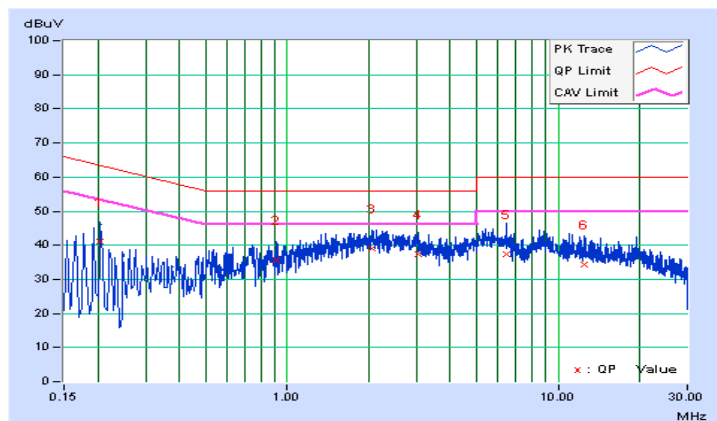
#### 4.2.7 Test Results

Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	25°C, 65%RH
Tested by	Toby Tian	Test Date	2016/7/14

Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.20474	10.03	31.05	15.46	41.08	25.49	63.42	53.42	-22.34	-27.93
2	0.91245	10.19	25.55	16.94	35.74	27.13	56.00	46.00	-20.26	-18.87
3	2.06590	10.27	28.91	21.67	39.18	31.94	56.00	46.00	-16.82	-14.06
4	3.05513	10.34	26.87	19.44	37.21	29.78	56.00	46.00	-18.79	-16.22
5	6.42946	10.54	26.95	19.81	37.49	30.35	60.00	50.00	-22.51	-19.65
6	12.49387	10.87	23.61	17.39	34.48	28.26	60.00	50.00	-25.52	-21.74

Remarks:

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

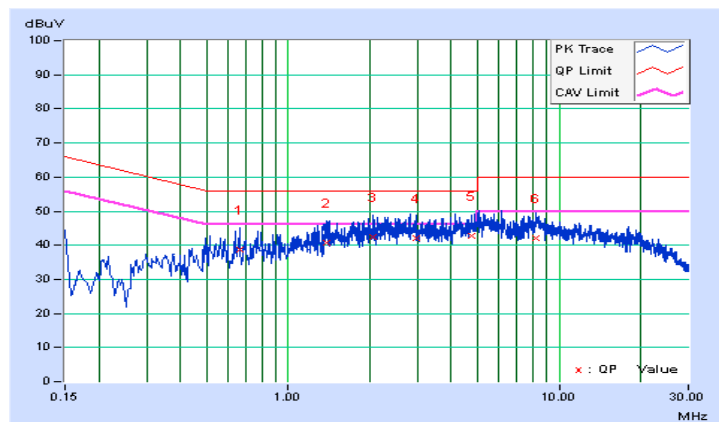


Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	25°C, 65%RH
Tested by	Toby Tian	Test Date	2016/7/14

Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.66221	10.16	28.47	17.51	38.63	27.67	56.00	46.00	-17.37	-18.33
2	1.39338	10.24	30.53	21.76	40.77	32.00	56.00	46.00	-15.23	-14.00
3	2.05808	10.28	32.01	23.00	42.29	33.28	56.00	46.00	-13.71	-12.72
4	2.95347	10.35	31.59	22.72	41.94	33.07	56.00	46.00	-14.06	-12.93
<b>5</b>	<b>4.74425</b>	<b>10.48</b>	<b>32.23</b>	<b>24.77</b>	<b>42.71</b>	<b>35.25</b>	<b>56.00</b>	<b>46.00</b>	<b>-13.29</b>	<b>-10.75</b>
6	8.20069	10.69	31.42	23.12	42.11	33.81	60.00	50.00	-17.89	-16.19

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

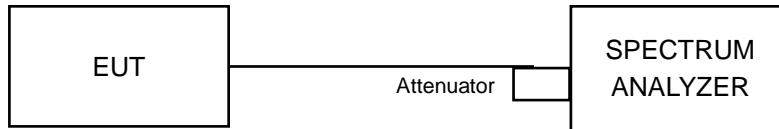


### 4.3 6 dB Bandwidth Measurement

#### 4.3.1 Limits of 6 dB Bandwidth Measurement

The minimum of 6 dB 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

- Set resolution bandwidth (RBW) = 100 kHz
- Set the video bandwidth (VBW)  $\geq 3 \times$  RBW, Detector = Peak.
- Trace mode = max hold.
- Sweep = auto couple.
- 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)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	10.06	0.5	Pass
6	2437	10.08	0.5	Pass
11	2462	10.06	0.5	Pass

##### 802.11g

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	16.39	0.5	Pass
6	2437	16.39	0.5	Pass
11	2462	16.41	0.5	Pass

##### 802.11n (HT20)

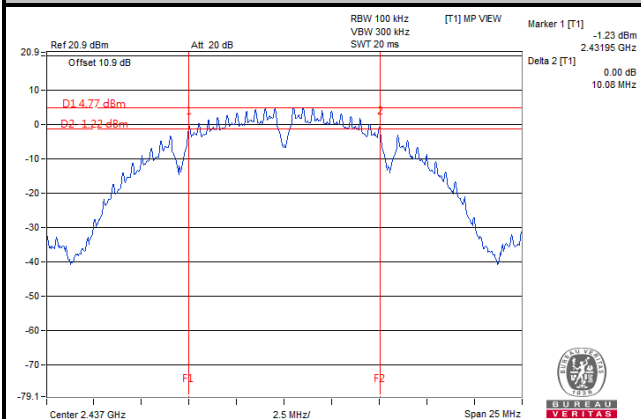
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	17.64	0.5	Pass
6	2437	17.62	0.5	Pass
11	2462	17.63	0.5	Pass

##### 802.11n (HT40)

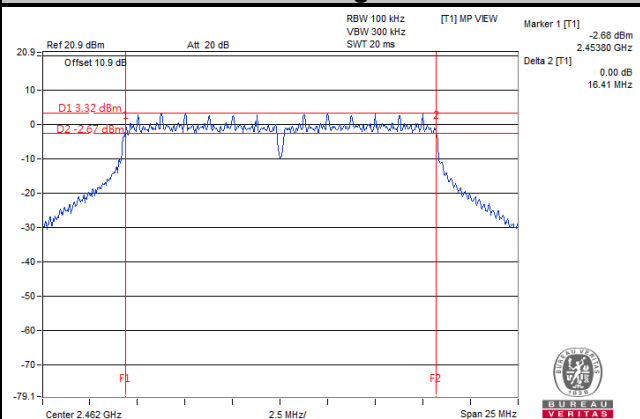
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
3	2422	35.70	0.5	Pass
6	2437	35.60	0.5	Pass
9	2452	35.83	0.5	Pass

### Spectrum Plot of Worst Value

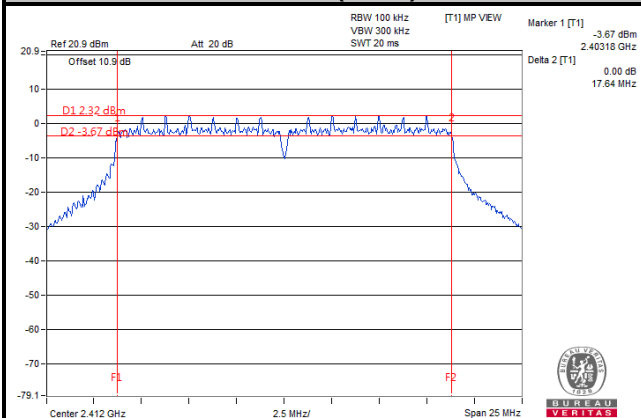
#### 802.11b



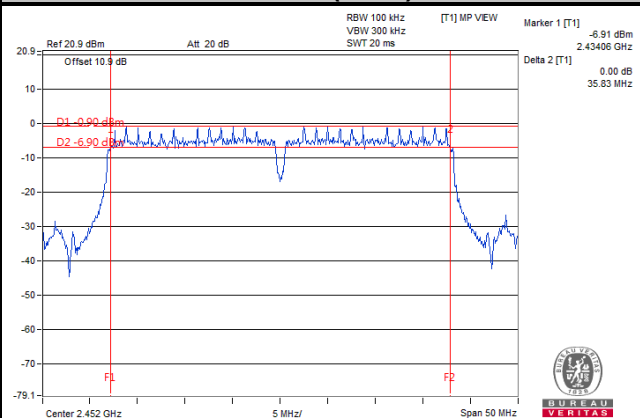
#### 802.11g



#### 802.11n (HT20)



#### 802.11n (HT40)

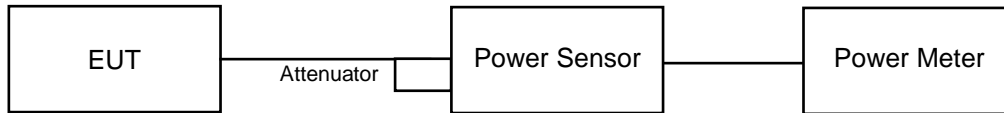


#### 4.4 Conducted Output Power Measurement

##### 4.4.1 Limits of Conducted Output Power Measurement

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

##### 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 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.

##### 4.4.5 Deviation from Test Standard

No deviation.

##### 4.4.6 EUT Operating Conditions

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

#### 4.4.7 Test Results

##### 802.11b

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass / Fail
1	2412	42.76	16.31	30	Pass
6	2437	44.16	16.45	30	Pass
11	2462	46.03	16.63	30	Pass

##### 802.11g

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass / Fail
1	2412	206.06	23.14	30	Pass
6	2437	216.27	23.35	30	Pass
11	2462	214.29	23.31	30	Pass

##### 802.11n (HT20)

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass / Fail
1	2412	170.22	22.31	30	Pass
6	2437	165.58	22.19	30	Pass
11	2462	167.11	22.23	30	Pass

##### 802.11n (HT40)

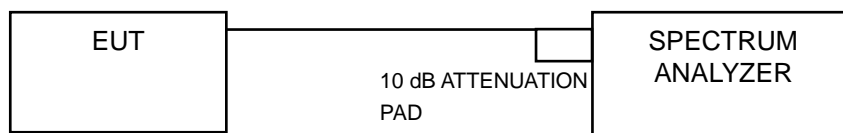
Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass / Fail
3	2422	147.23	21.68	30	Pass
6	2437	154.53	21.89	30	Pass
9	2452	152.41	21.83	30	Pass

## 4.5 Power Spectral Density Measurement

### 4.5.1 Limits of Power Spectral Density Measurement

The Maximum of Power Spectral Density Measurement is 8 dBm.

### 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

- Set analyzer center frequency to DTS channel center frequency.
- Set the span to 1.5 times the DTS bandwidth.
- Set the RBW to:  $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$ .
- Set the VBW  $\geq 3 \times \text{RBW}$ .
- Detector = peak.
- Sweep time = auto couple.
- Trace mode = max hold.
- Allow trace to fully stabilize.
- 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

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



#### 4.5.7 Test Results

##### 802.11b

Channel	Frequency (MHz)	PSD (dBm)	Limit (dBm)	Pass / Fail
1	2412	-8.72	8	Pass
6	2437	-8.77	8	Pass
11	2462	-8.36	8	Pass

##### 802.11g

Channel	Frequency (MHz)	PSD (dBm)	Limit (dBm)	Pass / Fail
1	2412	-10.40	8	Pass
6	2437	-10.84	8	Pass
11	2462	-10.43	8	Pass

##### 802.11n (HT20)

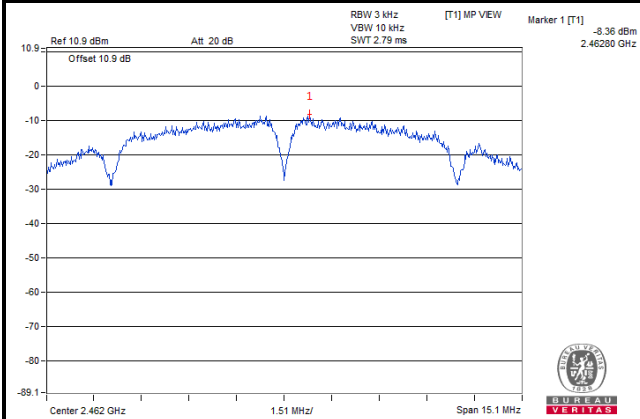
Channel	Frequency (MHz)	PSD (dBm)	Limit (dBm)	Pass / Fail
1	2412	-12.58	8	Pass
6	2437	-12.34	8	Pass
11	2462	-12.34	8	Pass

##### 802.11n (HT40)

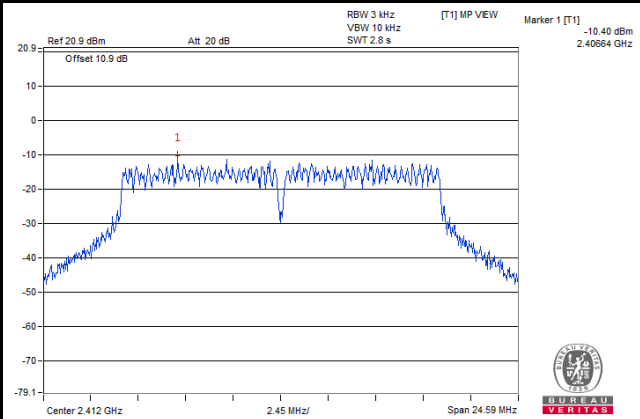
Channel	Frequency (MHz)	PSD (dBm)	Limit (dBm)	Pass / Fail
3	2422	-15.73	8	Pass
6	2437	-15.54	8	Pass
9	2452	-15.83	8	Pass

### Spectrum Plot of Worst Value

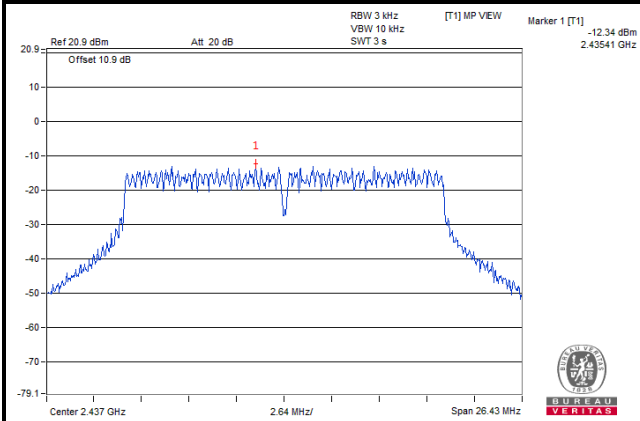
#### 802.11b



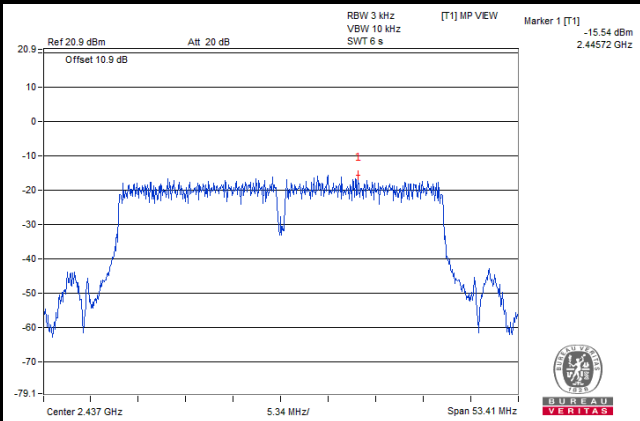
#### 802.11g



#### 802.11n (HT20)



#### 802.11n (HT40)

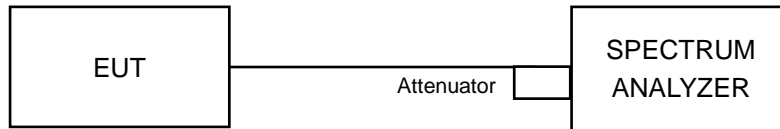


## 4.6 Conducted Out of Band Emission Measurement

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

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

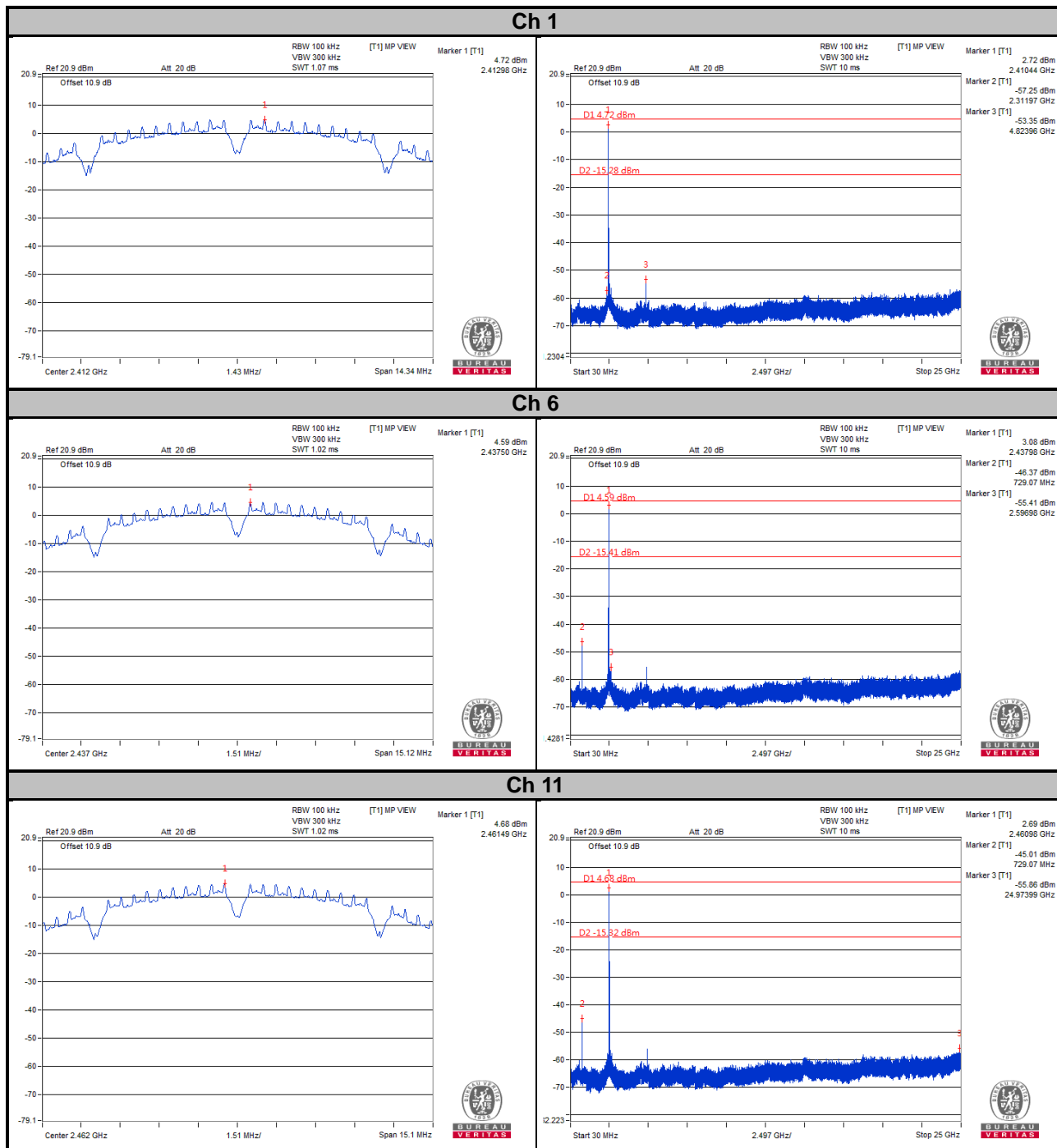
### 4.6.6 EUT Operating Condition

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

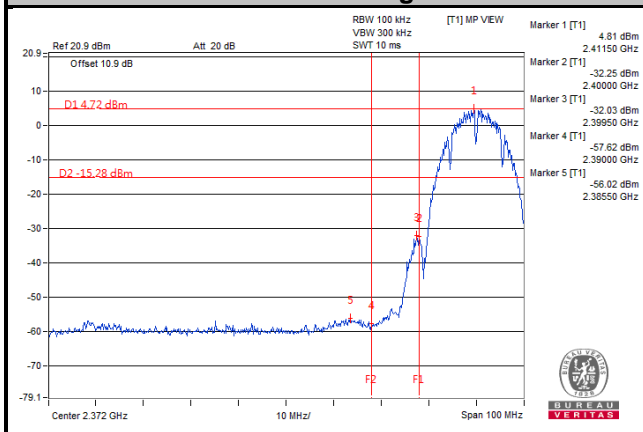
### 4.6.7 Test Results

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

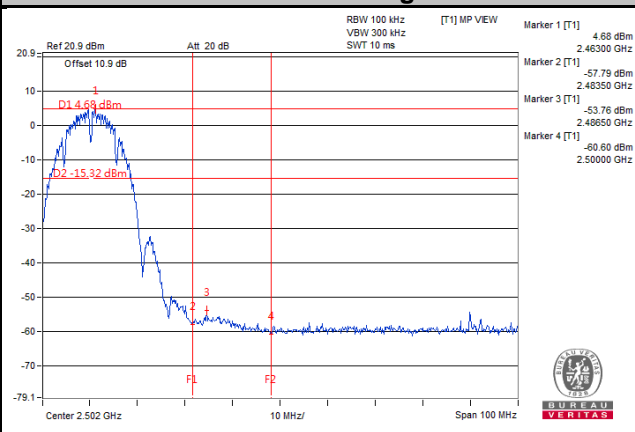
#### 802.11b



### Ch 1 Band Edge

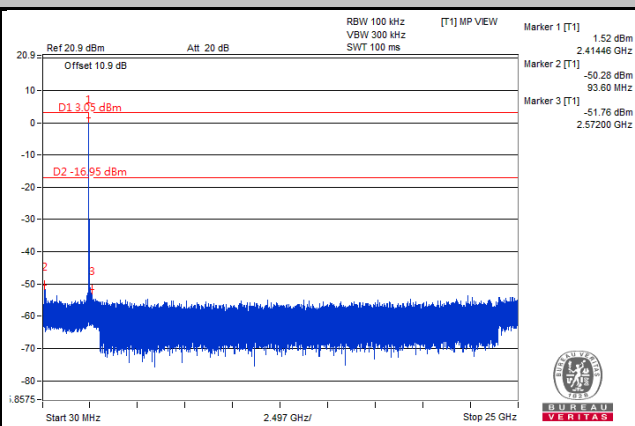
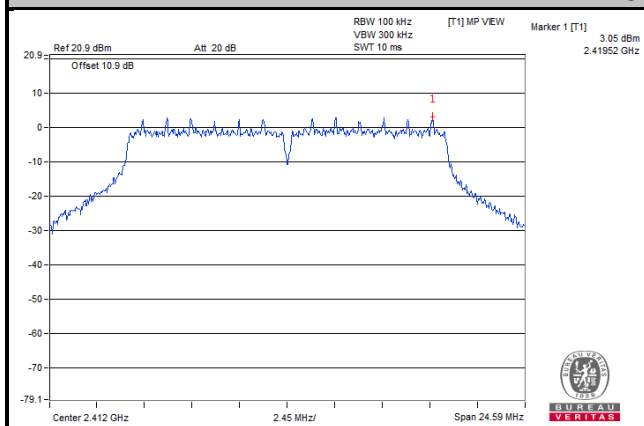


### Ch 11 Band Edge

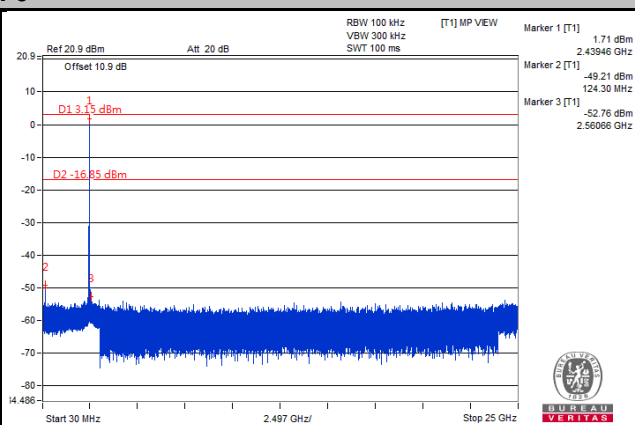
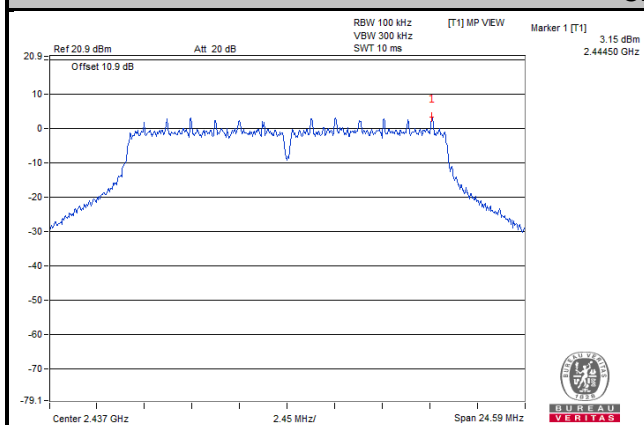


# 802.11g

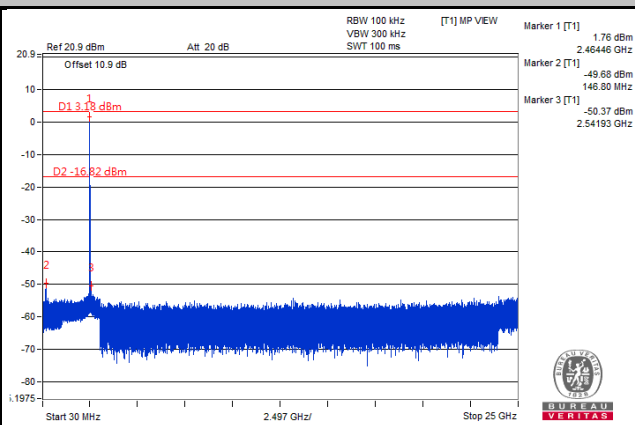
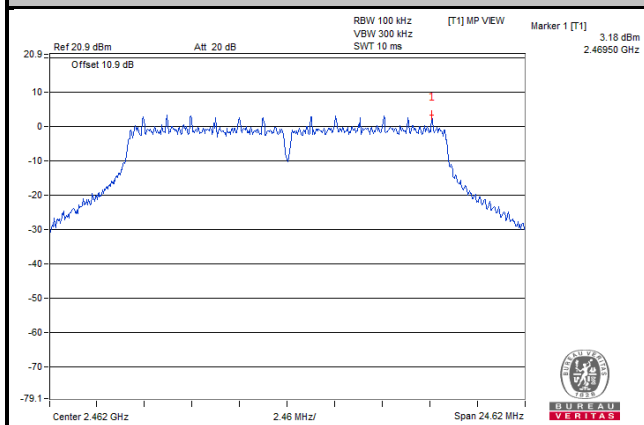
## Ch 1



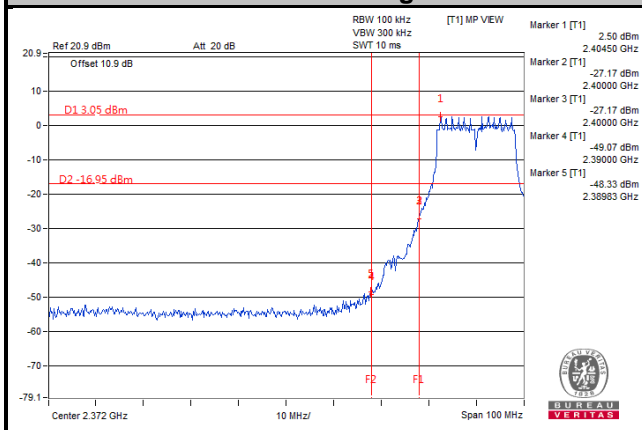
## Ch 6



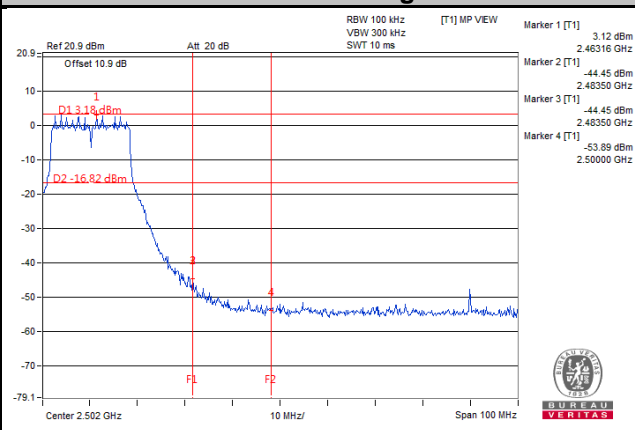
## Ch 11



### Ch 1 Band Edge

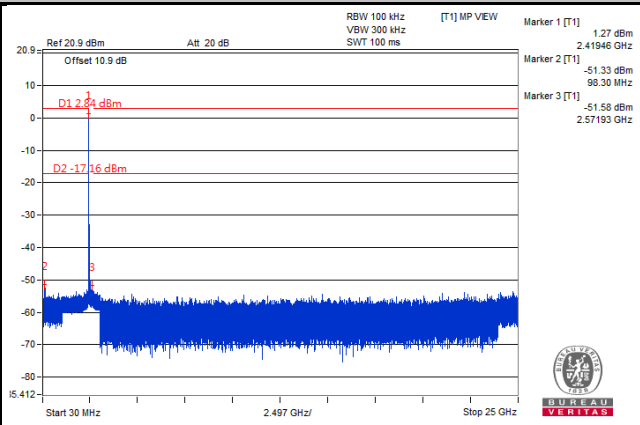
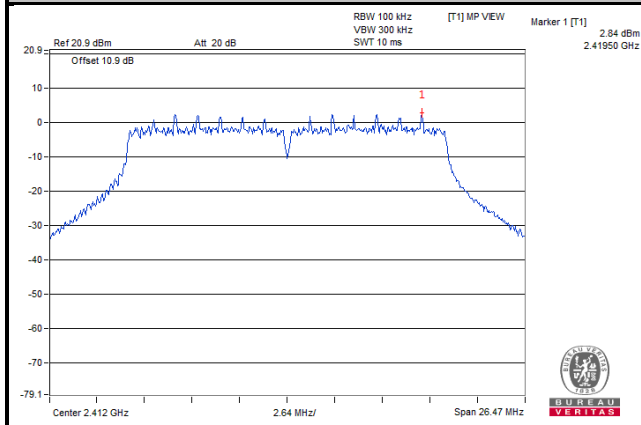


### Ch 11 Band Edge

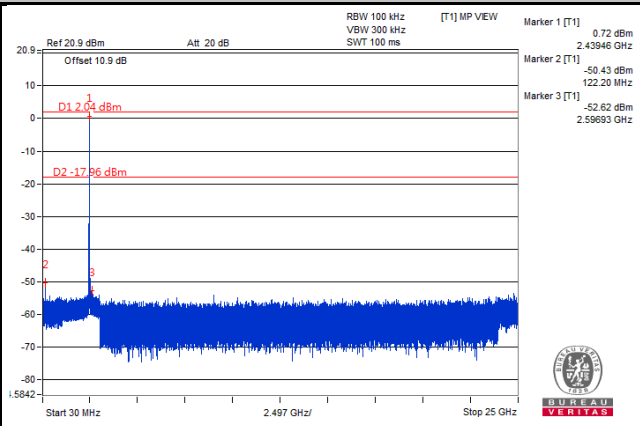
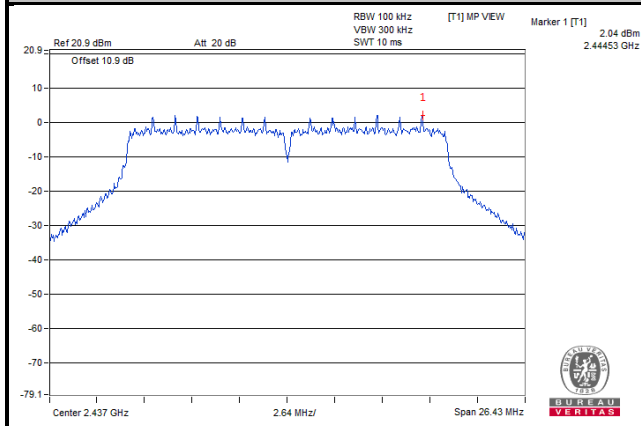


# 802.11n (HT20)

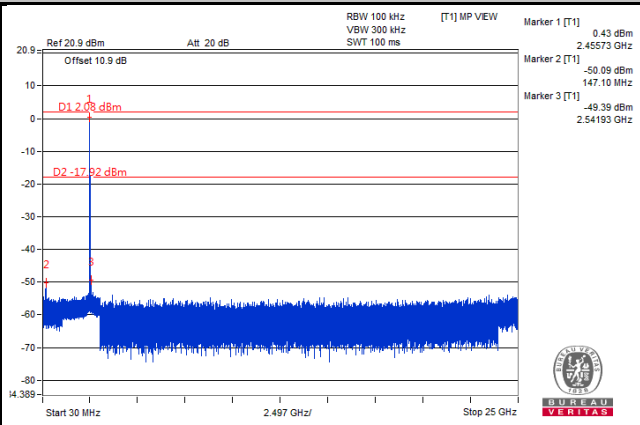
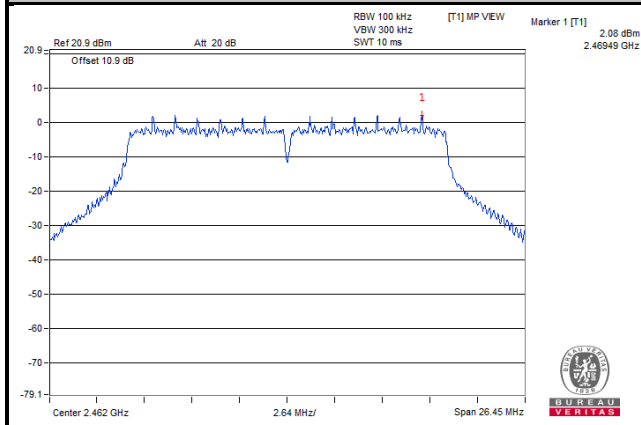
## Ch 1



## Ch 6

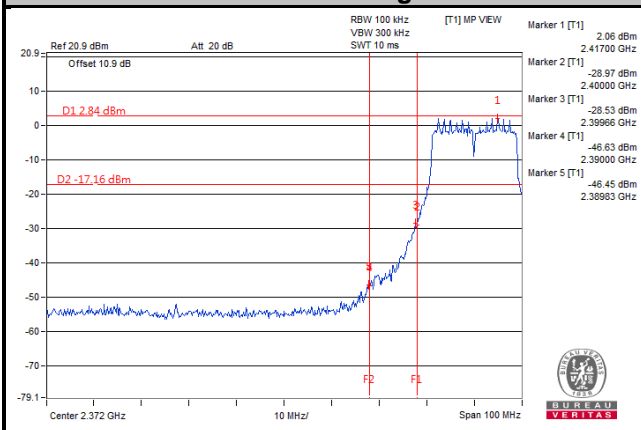


## Ch 11

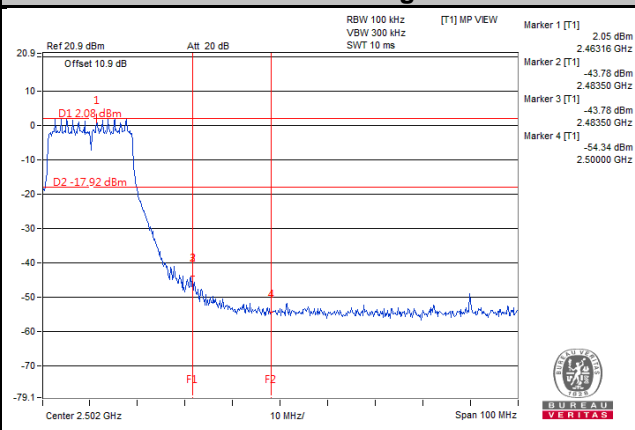




### Ch 1 Band Edge

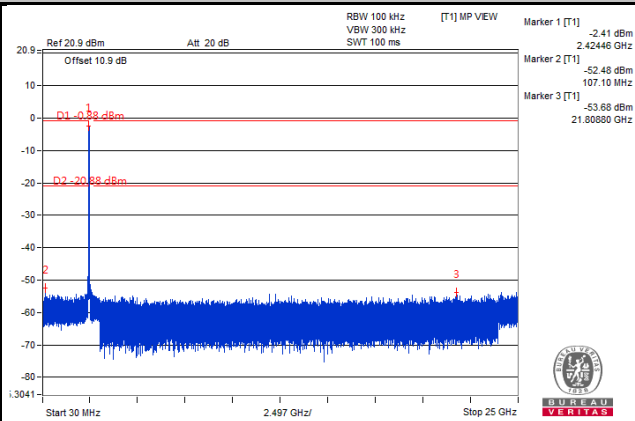
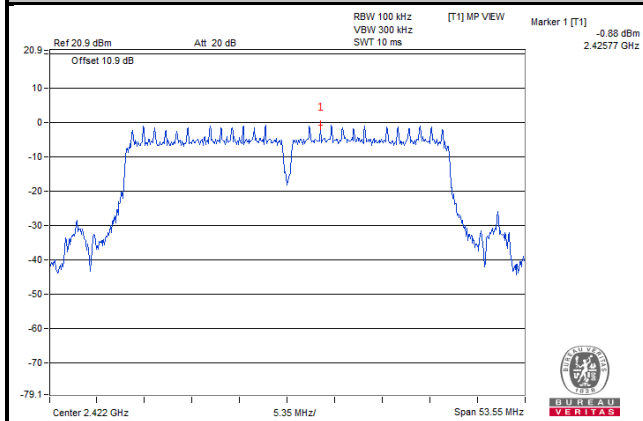


### Ch 11 Band Edge

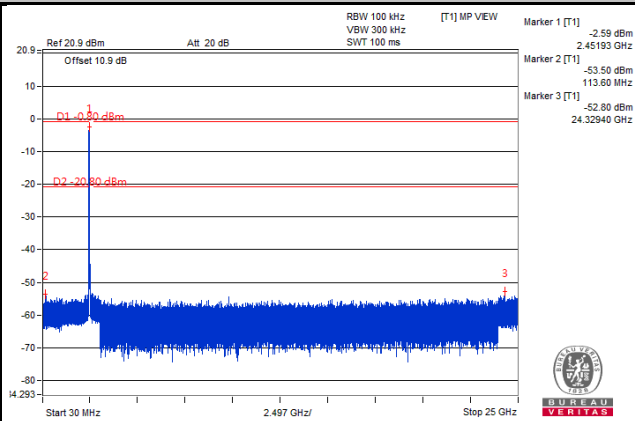
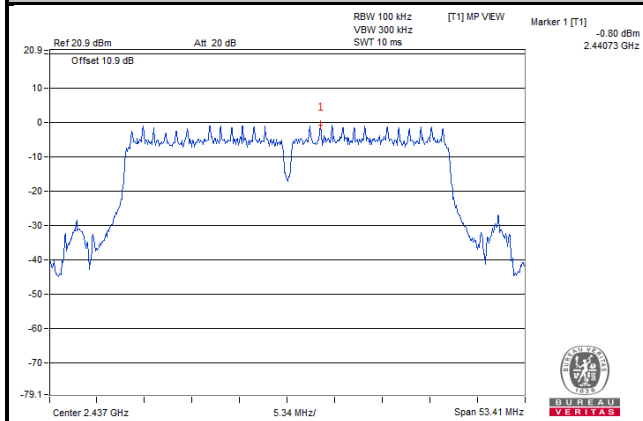


# 802.11n (HT40)

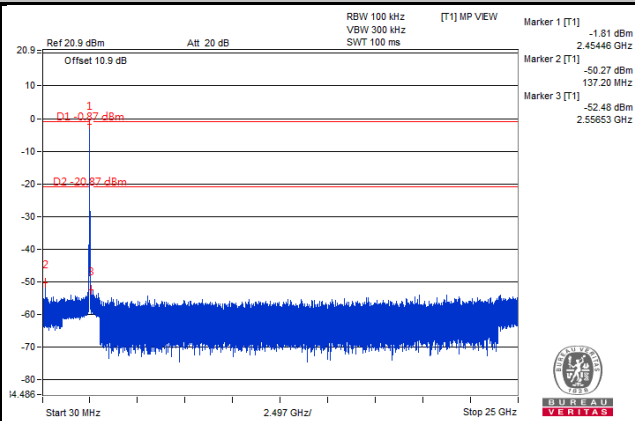
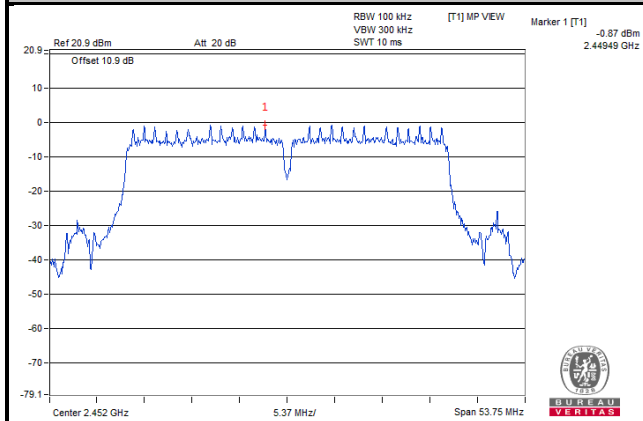
## Ch 3

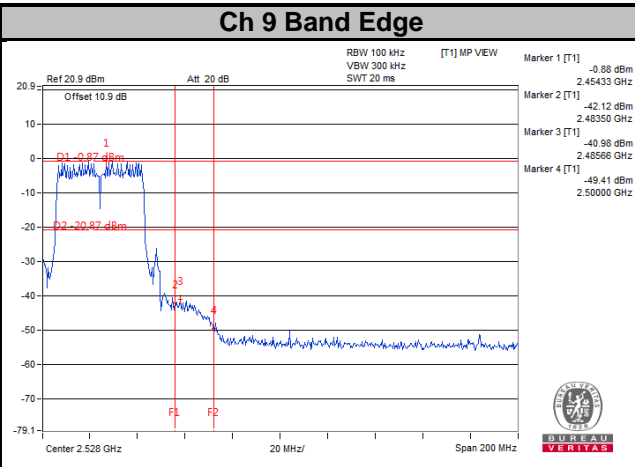
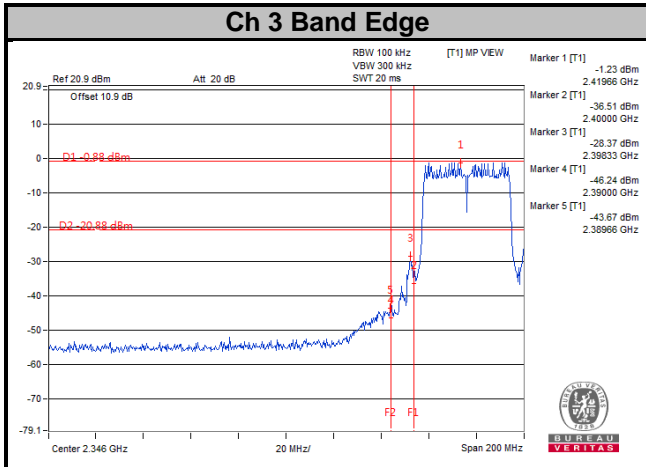


## Ch 6



## Ch 9





## 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 accredited and approved according to ISO/IEC 17025.

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

**Linko EMC/RF Lab**

Tel: 886-2-26052180

Fax: 886-2-26051924

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

Tel: 886-3-6668565

Fax: 886-3-6668323

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

Tel: 886-3-3183232

Fax: 886-3-3270892

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

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

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

--- END ---