

## FCC Test Report

**Report No.:** RF150901C09A

**FCC ID:** HFS-FT75

**Test Model:** FT7

**Received Date:** Sep. 01, 2015

**Test Date:** Sep. 04, 2015 ~ Sep. 18, 2015

**Issued Date:** Dec. 09, 2015

**Applicant:** Quanta Computer Inc.

**Address:** No. 188, Wen Hwa 2nd Rd., Guishan Dist., Tao Yuan City 333, Taiwan

**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.



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### Release Control Record

Issue No.	Description	Date Issued
RF150901C09A	Original Release	Dec. 09, 2015



# 1 Certificate of Conformity

**Product:** Tablet  
**Brand:** C-Spire  
**Test Model:** FT7  
**Sample Status:** Identical Prototype  
**Applicant:** Quanta Computer Inc.  
**Test Date:** Sep. 04, 2015 ~ Sep. 18, 2015  
**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 :** Vera Huang , **Date:** Dec. 09, 2015  
Vera Huang / Specialist

**Approved by :** Stanley Wu , **Date:** Dec. 09, 2015  
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 is -16.65 dB at 0.72031 MHz.
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -1 dB at 2484 MHz.
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:

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	150kHz ~ 30MHz	2.44 dB
Radiated Emissions up to 1 GHz	30MHz ~ 200MHz	2.93 dB
	200MHz ~ 1000MHz	2.95 dB
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	2.26 dB
	18GHz ~ 40GHz	1.94 dB

### 2.2 Modification Record

There were no modifications required for compliance.

### 3 General Information

#### 3.1 General Description of EUT

Product	Tablet
Brand	C-Spire
Test Model	FT7
Power Supply Rating	5.0Vdc (adapter or host equipment) 3.8Vdc (Li-ion battery)
Modulation Type	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
Modulation Technology	DSSS, OFDM
Transfer Rate	802.11b: 11.0 / 5.5 / 2.0 / 1.0 Mbps 802.11g: 54.0 / 48.0 / 36.0 / 24.0 / 18.0 / 12.0 / 9.0 / 6.0 Mbps 802.11n: up to MCS7
Operating Frequency	2412 ~ 2472MHz
Number of Channel	13 for 802.11b, 802.11g, 802.11n (20MHz)
Output Power	106.91mW
Antenna Type	Chip antenna with -0.2 dBi gain
Antenna Connector	N/A
Accessory Device	Refer to Note as below
Data Cable Supplied	Refer to Note as below

Note:

- The EUT provides one completed transmitter and one receiver.

Modulation Mode	TX Function
802.11b	1TX
802.11g	1TX
802.11n (20MHz)	1TX

- The EUT contains following accessory devices.

Product	Brand	Model	Description
Adapter	Tamura	NSS050200B	I/P: 100-240Vac, 0.3A O/P: 5Vdc, 2A
Battery	Veken	141016	3.8Vdc, 3780mAh
USB Cable	Elinke	18-94U1DG1-004G	1.03m cable
LCD Panel	Shenzhen Laibao Hi-Technology Co.,Ltd	ST070SI000BKF	6.98"
Photo Camera	Kingcome	HM7P2-ALRFHQ	2M
Video Camera	Globaloptics	GEGR150012-2R	8M
CPU	Qualcomm	MSM8916	--
eMMC (ROM)	Kingston	EMMC16G-S100-R09	16GB
RAM	Samsung	K4E8E304EE-EGCE	8GB
BT/WLAN Module	Qualcomm	WCN3620	--
WWAN Module	Qualcomm	WCN3620	--

- 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

13 channels are provided for 802.11b, 802.11g and 802.11n (20MHz):

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

#### 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

**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 **Y-plane**.

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

#### **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.

EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
-	802.11b	1 to 13	1, 6, 11, 12, 13	DSSS	DBPSK	1.0
-	802.11g	1 to 13	1, 6, 11, 12, 13	OFDM	BPSK	6.0
-	802.11n (20MHz)	1 to 13	1, 6, 11, 12, 13	OFDM	BPSK	7.2

#### **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.

EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
-	802.11g	1 to 13	13	OFDM	BPSK	6.0



**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)
-	802.11g	1 to 13	13	OFDM	BPSK	6.0

**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 13	1, 13	DSSS	DBPSK	1.0
-	802.11g	1 to 13	1, 13	OFDM	BPSK	6.0
-	802.11n (20MHz)	1 to 13	1, 13	OFDM	BPSK	7.2

**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 13	1, 6, 11, 12, 13	DSSS	DBPSK	1.0
-	802.11g	1 to 13	1, 6, 11, 12, 13	OFDM	BPSK	6.0
-	802.11n (20MHz)	1 to 13	1, 6, 11, 12, 13	OFDM	BPSK	7.2

**Test Condition:**

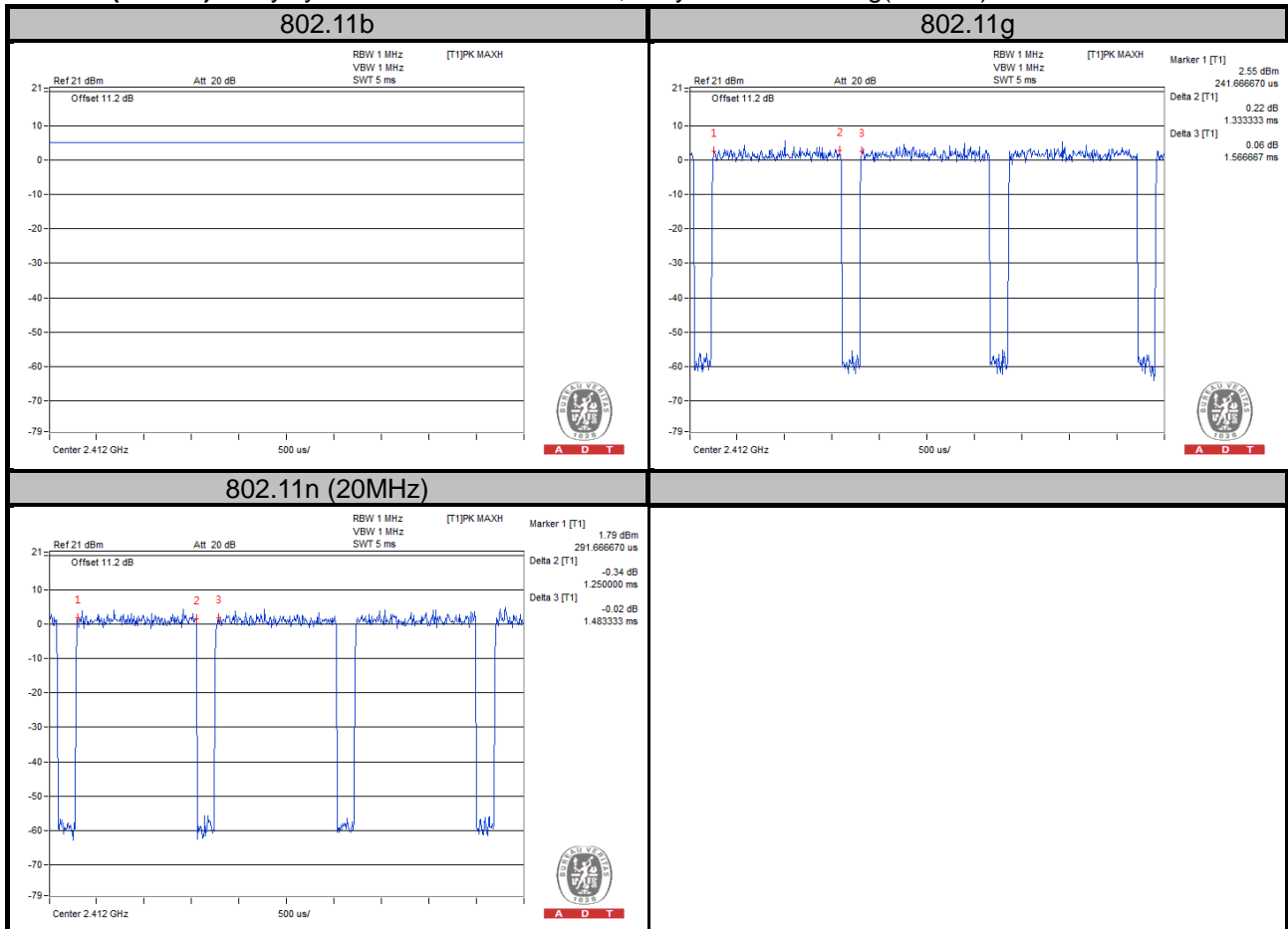
Applicable To	Environmental Conditions	Input Power	Tested by
RE≥1G	25deg. C, 65%RH	120Vac, 60Hz	Gavin Wu
RE<1G	25deg. C, 65%RH	120Vac, 60Hz	Gavin Wu
PLC	25deg. C, 65%RH	120Vac, 60Hz	Toby Tian
APCM	25deg. C, 65%RH	3.8Vdc	Carlos Chen

### 3.3 Duty Cycle of Test Signal

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

**802.11g:** Duty cycle =  $1.333/1.566 = 0.851$ , Duty factor =  $10 * \log(1/0.851) = 0.70$

**802.11n (20MHz):** Duty cycle =  $1.250/1.483 = 0.843$ , Duty factor =  $10 * \log(1/0.843) = 0.74$



### 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.

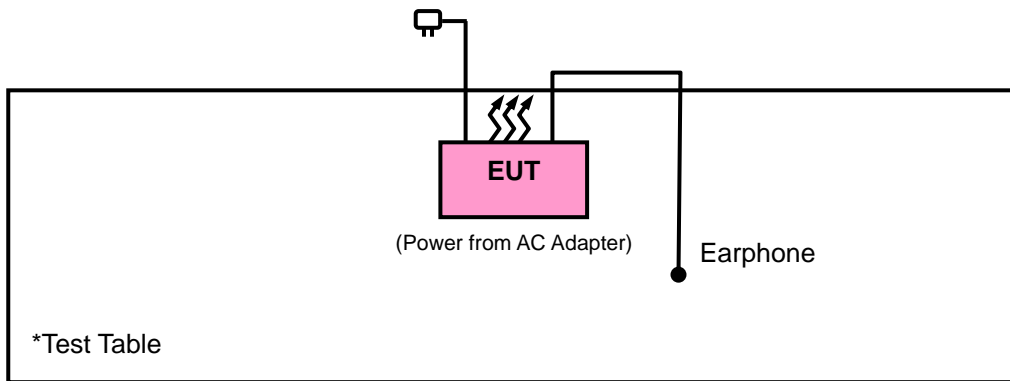
No.	Product	Brand	Model No.	Serial No.	FCC ID
1.	Earphone	N/A	N/A	N/A	N/A

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 v03r03**

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**

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Test Receiver Agilent	N9038A	MY51210203	Jan. 21, 2015	Jan. 21, 2016
Spectrum Analyzer Agilent	N9010A	MY52220314	Sep. 03, 2015	Sep. 02, 2016
Spectrum Analyzer ROHDE & SCHWARZ	F5U43	101261	Dec. 10, 2014	Dec. 09, 2015
BILOG Antenna SCHWARZBECK	VULB9168	9168-472	Feb. 04, 2015	Feb. 04, 2016
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-969	Feb. 09, 2015	Feb. 09, 2016
HORN Antenna SCHWARZBECK	BBHA 9170	9170-480	Feb. 04, 2015	Feb. 04, 2016
Loop Antenna	EM-6879	269	Jul. 31, 2015	Jul. 30, 2016
Preamplifier EMCI	EMC 012645	980115	Dec. 12, 2014	Dec. 11, 2015
Preamplifier EMCI	EMC 184045	980116	Jan. 09, 2015	Jan. 08, 2016
Preamplifier EMCI	EMC 330H	980112	Dec. 27, 2014	Dec. 26, 2015
Power Meter Anritsu	ML2495A	1448002	Jan. 05, 2015	Jan. 04, 2016
Power Sensor Anritsu	MA2411B	1339230	Jan. 05, 2015	Jan. 04, 2016
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	309219/4 2950114	Oct. 18, 2014	Oct. 17, 2015
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	250130/4	Oct. 18, 2014	Oct. 17, 2015
RF Coaxial Cable Worken	8D-FB	Cable-Ch10-01	Nov. 07, 2014	Nov. 06, 2015
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 1GHz 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 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:**

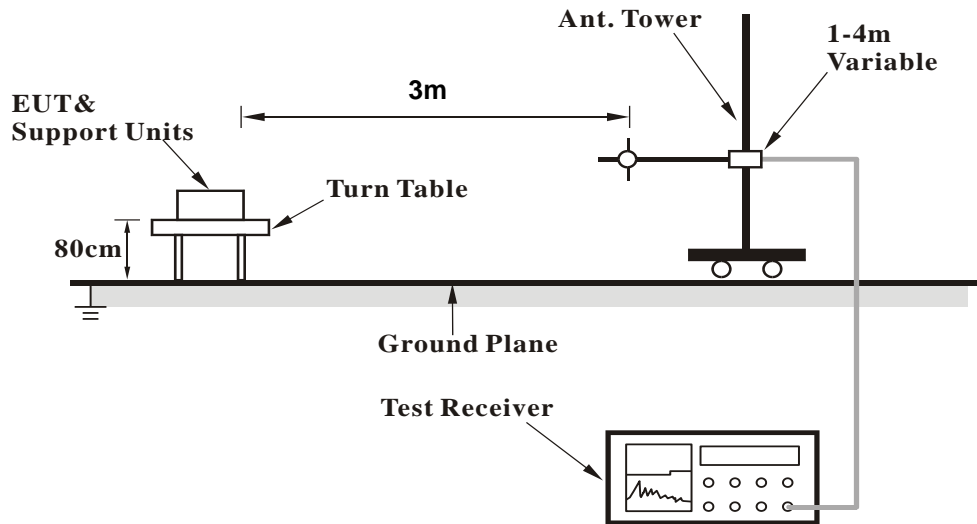
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection (QP) at frequency below 1 GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1 GHz.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

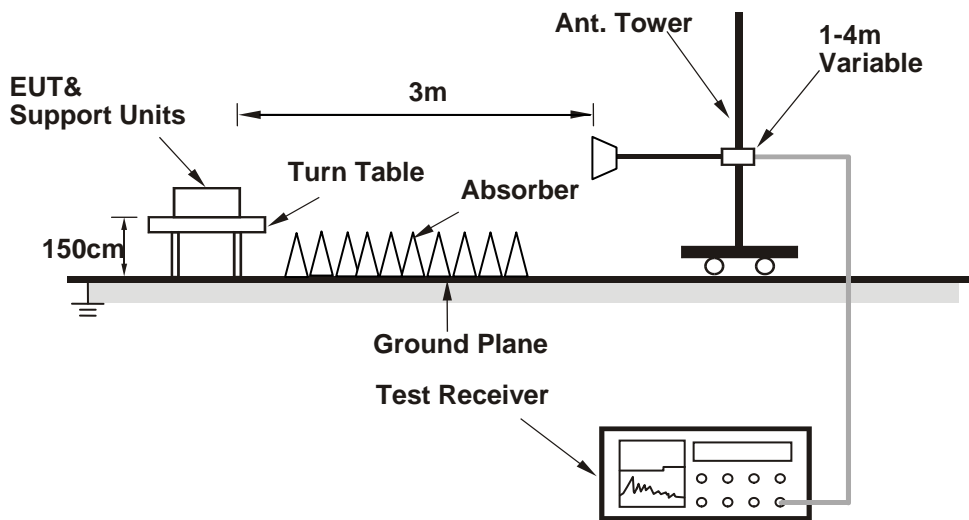
No deviation.

#### 4.1.5 Test Set Up

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



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



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 1GHz Data :**
**802.11b**

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	FREQUENCY RANGE	1GHz ~ 25GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Gavin Wu

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

FREQ. (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
2334	33.39	40.1	54	-20.61	26.72	4.04	37.47	184	64	Average
2334	56.21	62.92	74	-17.79	26.72	4.04	37.47	184	64	Peak
2412	96.19	102.66			26.96	4.09	37.52	184	64	Average
2412	100.24	106.71			26.96	4.09	37.52	184	64	Peak
2488	34.49	40.45	54	-19.51	27.2	4.16	37.32	184	64	Average
2488	57.62	63.58	74	-16.38	27.2	4.16	37.32	184	64	Peak

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

FREQ. (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	33.78	40.31	54	-20.22	26.91	4.08	37.52	182	24	Average
2390	56.74	63.27	74	-17.26	26.91	4.08	37.52	182	24	Peak
2412	98.46	104.93			26.96	4.09	37.52	182	24	Average
2412	102.62	109.09			26.96	4.09	37.52	182	24	Peak
2484	34.49	40.51	54	-19.51	27.15	4.15	37.32	182	24	Average
2484	56.3	62.32	74	-17.7	27.15	4.15	37.32	182	24	Peak

**REMARKS:**

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





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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 6	FREQUENCY RANGE	1GHz ~ 25GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Gavin Wu

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (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
2318	33.38	40.1	54	-20.62	26.72	4.03	37.47	181	62	Average
2318	56.21	62.93	74	-17.79	26.72	4.03	37.47	181	62	Peak
2437	96.45	102.73			27.06	4.12	37.46	181	62	Average
2437	100.43	106.71			27.06	4.12	37.46	181	62	Peak
2486	34.13	40.15	54	-19.87	27.15	4.15	37.32	181	62	Average
2486	57.84	63.86	74	-16.16	27.15	4.15	37.32	181	62	Peak

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (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
2316	33.25	40.02	54	-20.75	26.67	4.03	37.47	218	24	Average
2316	57.03	63.8	74	-16.97	26.67	4.03	37.47	218	24	Peak
2437	98.54	104.82			27.06	4.12	37.46	218	24	Average
2437	102.46	108.74			27.06	4.12	37.46	218	24	Peak
2500	34.27	40.16	54	-19.73	27.2	4.16	37.25	218	24	Average
2500	56.93	62.82	74	-17.07	27.2	4.16	37.25	218	24	Peak

## REMARKS:

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



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 11	FREQUENCY RANGE	1GHz ~ 25GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Gavin Wu

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (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	33.61	40.23	54	-20.39	26.81	4.07	37.5	198	63	Average
2366	57.05	63.67	74	-16.95	26.81	4.07	37.5	198	63	Peak
2462	95.64	101.8			27.1	4.13	37.39	198	63	Average
2462	99.57	105.73			27.1	4.13	37.39	198	63	Peak
2500	34.81	40.7	54	-19.19	27.2	4.16	37.25	198	63	Average
2500	57.46	63.35	74	-16.54	27.2	4.16	37.25	198	63	Peak

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (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
2346	33.54	40.21	54	-20.46	26.77	4.05	37.49	215	22	Average
2346	56.5	63.17	74	-17.5	26.77	4.05	37.49	215	22	Peak
2462	97.71	103.87			27.1	4.13	37.39	215	22	Average
2462	101.72	107.88			27.1	4.13	37.39	215	22	Peak
2496	35.22	41.11	54	-18.78	27.2	4.16	37.25	215	22	Average
2496	56.64	62.53	74	-17.36	27.2	4.16	37.25	215	22	Peak

## REMARKS:

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



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 12	FREQUENCY RANGE	1GHz ~ 25GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Gavin Wu

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (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
2374	34.13	40.7	54	-19.87	26.86	4.07	37.5	169	156	Average
2374	56.27	62.84	74	-17.73	26.86	4.07	37.5	169	156	Peak
2467	88.95	95.04			27.1	4.13	37.32	169	156	Average
2467	92.98	99.07			27.1	4.13	37.32	169	156	Peak
2496	35.21	41.1	54	-18.79	27.2	4.16	37.25	169	156	Average
2496	56.5	62.39	74	-17.5	27.2	4.16	37.25	169	156	Peak

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (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
2382	40.52	47.08	54	-13.48	26.86	4.08	37.5	110	66	Average
2382	56.9	63.46	74	-17.1	26.86	4.08	37.5	110	66	Peak
2467	90.91	97			27.1	4.13	37.32	110	66	Average
2467	94.89	100.98			27.1	4.13	37.32	110	66	Peak
2496	36.13	42.02	54	-17.87	27.2	4.16	37.25	110	66	Average
2496	57.07	62.96	74	-16.93	27.2	4.16	37.25	110	66	Peak

## REMARKS:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor  
Margin value = Emission level – Limit value
- 2467MHz: Fundamental frequency.



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 13	FREQUENCY RANGE	1GHz ~ 25GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Gavin Wu

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (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
2350	34.07	40.74	54	-19.93	26.77	4.05	37.49	174	153	Average
2350	56.63	63.3	74	-17.37	26.77	4.05	37.49	174	153	Peak
2472	90.53	96.55			27.15	4.15	37.32	174	153	Average
2472	94.6	100.62			27.15	4.15	37.32	174	153	Peak
2500	41.94	47.83	54	-12.06	27.2	4.16	37.25	174	153	Average
2500	57.21	63.1	74	-16.79	27.2	4.16	37.25	174	153	Peak

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (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	40.65	47.21	54	-13.35	26.86	4.08	37.5	125	73	Average
2380	56.65	63.21	74	-17.35	26.86	4.08	37.5	125	73	Peak
2472	93.31	99.33			27.15	4.15	37.32	125	73	Average
2472	97.26	103.28			27.15	4.15	37.32	125	73	Peak
2484	45.51	51.53	54	-8.49	27.15	4.15	37.32	125	73	Average
2484	58.33	64.35	74	-15.67	27.15	4.15	37.32	125	73	Peak

## REMARKS:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor  
Margin value = Emission level – Limit value
- 2472MHz: Fundamental frequency.

**802.11g**

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	FREQUENCY RANGE	1GHz ~ 25GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Gavin Wu

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

FREQ. (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	36.62	43.19	54	-17.38	26.86	4.07	37.5	205	62	Average
2372	56.05	62.62	74	-17.95	26.86	4.07	37.5	205	62	Peak
2412	90.66	97.13			26.96	4.09	37.52	205	62	Average
2412	100.27	106.74			26.96	4.09	37.52	205	62	Peak
2500	34.34	40.23	54	-19.66	27.2	4.16	37.25	205	62	Average
2500	56.56	62.45	74	-17.44	27.2	4.16	37.25	205	62	Peak

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

FREQ. (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	37.66	44.19	54	-16.34	26.91	4.08	37.52	195	277	Average
2390	56.77	63.3	74	-17.23	26.91	4.08	37.52	195	277	Peak
2412	92.16	98.63			26.96	4.09	37.52	195	277	Average
2412	102.21	108.68			26.96	4.09	37.52	195	277	Peak
2500	34.37	40.26	54	-19.63	27.2	4.16	37.25	195	277	Average
2500	57.22	63.11	74	-16.78	27.2	4.16	37.25	195	277	Peak

**REMARKS:**

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



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 6	FREQUENCY RANGE	1GHz ~ 25GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Gavin Wu

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (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	33.06	39.57	54	-20.94	26.91	4.08	37.5	199	64	Average
2386	57.21	63.72	74	-16.79	26.91	4.08	37.5	199	64	Peak
2437	89.07	95.35			27.06	4.12	37.46	199	64	Average
2437	99.12	105.4			27.06	4.12	37.46	199	64	Peak
2494	34.42	40.31	54	-19.58	27.2	4.16	37.25	199	64	Average
2494	57.36	63.25	74	-16.64	27.2	4.16	37.25	199	64	Peak
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (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
2384	33.59	40.15	54	-20.41	26.86	4.08	37.5	212	281	Average
2384	56.43	62.99	74	-17.57	26.86	4.08	37.5	212	281	Peak
2437	91.97	98.25			27.06	4.12	37.46	212	281	Average
2437	101.55	107.83			27.06	4.12	37.46	212	281	Peak
2492	34.37	40.26	54	-19.63	27.2	4.16	37.25	212	281	Average
2492	56.95	62.84	74	-17.05	27.2	4.16	37.25	212	281	Peak

REMARKS:

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



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 11	FREQUENCY RANGE	1GHz ~ 25GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Gavin Wu

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (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
2358	33.54	40.17	54	-20.46	26.81	4.05	37.49	200	62	Average
2358	56.04	62.67	74	-17.96	26.81	4.05	37.49	200	62	Peak
2462	89.7	95.86			27.1	4.13	37.39	200	62	Average
2462	99.25	105.41			27.1	4.13	37.39	200	62	Peak
2500	39.23	45.12	54	-14.77	27.2	4.16	37.25	200	62	Average
2500	56.7	62.59	74	-17.3	27.2	4.16	37.25	200	62	Peak

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (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	33.81	40.38	54	-20.19	26.86	4.07	37.5	206	281	Average
2372	55.94	62.51	74	-18.06	26.86	4.07	37.5	206	281	Peak
2462	91.67	97.83			27.1	4.13	37.39	206	281	Average
2462	101.34	107.5			27.1	4.13	37.39	206	281	Peak
2484	40.02	46.04	54	-13.98	27.15	4.15	37.32	206	281	Average
2484	57.82	63.84	74	-16.18	27.15	4.15	37.32	206	281	Peak

## REMARKS:

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



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 12	FREQUENCY RANGE	1GHz ~ 25GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Gavin Wu

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (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	34.1	40.73	54	-19.9	26.81	4.05	37.49	190	160	Average
2362	57.87	64.5	74	-16.13	26.81	4.05	37.49	190	160	Peak
2467	86.94	93.03			27.1	4.13	37.32	190	160	Average
2467	96.56	102.65			27.1	4.13	37.32	190	160	Peak
2486	44.49	50.51	54	-9.51	27.15	4.15	37.32	190	160	Average
2486	62.24	68.26	74	-11.76	27.15	4.15	37.32	190	160	Peak

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (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	40.33	46.99	54	-13.67	26.77	4.04	37.47	125	69	Average
2336	56.19	62.85	74	-17.81	26.77	4.04	37.47	125	69	Peak
2467	89.05	95.14			27.1	4.13	37.32	125	69	Average
2467	98.75	104.84			27.1	4.13	37.32	125	69	Peak
2486	47.47	53.49	54	-6.53	27.15	4.15	37.32	125	69	Average
2486	66.03	72.05	74	-7.97	27.15	4.15	37.32	125	69	Peak

## REMARKS:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor  
Margin value = Emission level – Limit value
- 2467MHz: Fundamental frequency.





EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 13	FREQUENCY RANGE	1GHz ~ 25GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Gavin Wu

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (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
2348	33.94	40.61	54	-20.06	26.77	4.05	37.49	190	159	Average
2348	56.77	63.44	74	-17.23	26.77	4.05	37.49	190	159	Peak
2472	85.92	91.94			27.15	4.15	37.32	190	159	Average
2472	95.55	101.57			27.15	4.15	37.32	190	159	Peak
2484	50.07	56.09	54	-3.93	27.15	4.15	37.32	190	159	Average
2484	70.29	76.31	74	-3.71	27.15	4.15	37.32	190	159	Peak

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (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
2320	39.39	46.11	54	-14.61	26.72	4.03	37.47	125	74	Average
2320	56.82	63.54	74	-17.18	26.72	4.03	37.47	125	74	Peak
2472	87.88	93.9			27.15	4.15	37.32	125	74	Average
2472	97.44	103.46			27.15	4.15	37.32	125	74	Peak
2484	52.61	58.63	54	-1.39	27.15	4.15	37.32	125	74	Average
<b>2484</b>	<b>73</b>	<b>79.02</b>	<b>74</b>	<b>-1</b>	<b>27.15</b>	<b>4.15</b>	<b>37.32</b>	<b>125</b>	<b>74</b>	<b>Peak</b>

## REMARKS:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor  
Margin value = Emission level – Limit value
- 2472MHz: Fundamental frequency.

**802.11n (20MHz)**

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	FREQUENCY RANGE	1GHz ~ 25GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Gavin Wu

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

FREQ. (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
2368	35.19	41.81	54	-18.81	26.81	4.07	37.5	205	64	Average
2368	56.74	63.36	74	-17.26	26.81	4.07	37.5	205	64	Peak
2412	88.53	95			26.96	4.09	37.52	205	64	Average
2412	98.5	104.97			26.96	4.09	37.52	205	64	Peak
2494	34.38	40.27	54	-19.62	27.2	4.16	37.25	205	64	Average
2494	56.44	62.33	74	-17.56	27.2	4.16	37.25	205	64	Peak

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

FREQ. (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	36.11	42.64	54	-17.89	26.91	4.08	37.52	194	278	Average
2390	56.95	63.48	74	-17.05	26.91	4.08	37.52	194	278	Peak
2412	90.09	96.56			26.96	4.09	37.52	194	278	Average
2412	100.23	106.7			26.96	4.09	37.52	194	278	Peak
2488	34.55	40.51	54	-19.45	27.2	4.16	37.32	194	278	Average
2488	56.82	62.78	74	-17.18	27.2	4.16	37.32	194	278	Peak

**REMARKS:**

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



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 6	FREQUENCY RANGE	1GHz ~ 25GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Gavin Wu

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (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	35.71	42.22	54	-18.29	26.91	4.08	37.5	202	64	Average
2386	55.82	62.33	74	-18.18	26.91	4.08	37.5	202	64	Peak
2437	87.8	94.08			27.06	4.12	37.46	202	64	Average
2437	98.67	104.95			27.06	4.12	37.46	202	64	Peak
2486	34.06	40.08	54	-19.94	27.15	4.15	37.32	202	64	Average
2486	56.96	62.98	74	-17.04	27.15	4.15	37.32	202	64	Peak

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (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	33.54	40.2	54	-20.46	26.77	4.04	37.47	192	276	Average
2336	56.56	63.22	74	-17.44	26.77	4.04	37.47	192	276	Peak
2437	90.56	96.84			27.06	4.12	37.46	192	276	Average
2437	100.37	106.65			27.06	4.12	37.46	192	276	Peak
2490	34.55	40.51	54	-19.45	27.2	4.16	37.32	192	276	Average
2490	57.35	63.31	74	-16.65	27.2	4.16	37.32	192	276	Peak

## REMARKS:

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



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 11	FREQUENCY RANGE	1GHz ~ 25GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Gavin Wu

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (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
2338	33.48	40.14	54	-20.52	26.77	4.04	37.47	198	63	Average
2338	57.03	63.69	74	-16.97	26.77	4.04	37.47	198	63	Peak
2462	89.02	95.18			27.1	4.13	37.39	198	63	Average
2462	98.53	104.69			27.1	4.13	37.39	198	63	Peak
2484	37.96	43.98	54	-16.04	27.15	4.15	37.32	198	63	Average
2484	57.39	63.41	74	-16.61	27.15	4.15	37.32	198	63	Peak

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (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
2340	33.48	40.16	54	-20.52	26.77	4.04	37.49	210	266	Average
2340	57.94	64.62	74	-16.06	26.77	4.04	37.49	210	266	Peak
2462	91.26	97.42			27.1	4.13	37.39	210	266	Average
2462	100.81	106.97			27.1	4.13	37.39	210	266	Peak
2492	38.31	44.2	54	-15.69	27.2	4.16	37.25	210	266	Average
2492	58.27	64.16	74	-15.73	27.2	4.16	37.25	210	266	Peak

## REMARKS:

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



A D T

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 12	FREQUENCY RANGE	1GHz ~ 25GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Gavin Wu

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (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	34.17	40.7	54	-19.83	26.91	4.08	37.52	192	158	Average
2390	57.49	64.02	74	-16.51	26.91	4.08	37.52	192	158	Peak
2467	85.8	91.89			27.1	4.13	37.32	192	158	Average
2467	95.56	101.65			27.1	4.13	37.32	192	158	Peak
2484	42.83	48.85	54	-11.17	27.15	4.15	37.32	192	158	Average
2484	61.84	67.86	74	-12.16	27.15	4.15	37.32	192	158	Peak

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (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	39.67	46.24	54	-14.33	26.86	4.07	37.5	124	88	Average
2376	58.4	64.97	74	-15.6	26.86	4.07	37.5	124	88	Peak
2467	87.69	93.78			27.1	4.13	37.32	124	88	Average
2467	98.49	104.58			27.1	4.13	37.32	124	88	Peak
2484	45.14	51.16	54	-8.86	27.15	4.15	37.32	124	88	Average
2484	66.79	72.81	74	-7.21	27.15	4.15	37.32	124	88	Peak

## REMARKS:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor  
Margin value = Emission level – Limit value
- 2467MHz: Fundamental frequency.



A D T

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 13	FREQUENCY RANGE	1GHz ~ 25GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Gavin Wu

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (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	34.15	40.72	54	-19.85	26.86	4.07	37.5	192	159	Average
2376	57.22	63.79	74	-16.78	26.86	4.07	37.5	192	159	Peak
2472	85.38	91.4			27.15	4.15	37.32	192	159	Average
2472	95.18	101.2			27.15	4.15	37.32	192	159	Peak
2484	50.19	56.21	54	-3.81	27.15	4.15	37.32	192	159	Average
2484	70.92	76.94	74	-3.08	27.15	4.15	37.32	192	159	Peak

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (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
2350	38.36	45.03	54	-15.64	26.77	4.05	37.49	120	90	Average
2350	56.9	63.57	74	-17.1	26.77	4.05	37.49	120	90	Peak
2472	87.31	93.33			27.15	4.15	37.32	120	90	Average
2472	96.51	102.53			27.15	4.15	37.32	120	90	Peak
2484	52.95	58.97	54	-1.05	27.15	4.15	37.32	120	90	Average
2484	71.43	77.45	74	-2.57	27.15	4.15	37.32	120	90	Peak

## REMARKS:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor  
Margin value = Emission level – Limit value
- 2472MHz: Fundamental frequency.

**9kHz ~ 30MHz DATA:**

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

**30MHz ~ 1GHz WORST-CASE DATA:**
**802.11g**

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 13	FREQUENCY RANGE	30MHz ~ 1GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Quasi-peak (QP)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Gavin Wu

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

FREQ. (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
42.69	25.94	42.78	40	-14.06	13.58	0.66	31.08	110	346	Peak
205.77	27.05	47.8	43.5	-16.45	9.6	1.32	31.67	101	195	Peak
212.25	25.01	45.38	43.5	-18.49	9.89	1.35	31.61	108	92	Peak
524.7	21.22	32.83	46	-24.78	17.88	2.14	31.63	110	296	Peak
636.7	24.01	33.75	46	-21.99	20.04	2.33	32.11	104	177	Peak
648.6	24.82	34.3	46	-21.18	20.2	2.35	32.03	120	302	Peak

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

FREQ. (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
40.53	25.07	41.89	40	-14.93	13.55	0.65	31.02	106	261	Peak
54.3	26.55	44.58	40	-13.45	12.56	0.74	31.33	119	338	Peak
58.62	27.97	46.48	40	-12.03	12.04	0.8	31.35	128	14	Peak
535.2	20.45	31.88	46	-25.55	18.13	2.15	31.71	123	218	Peak
608.7	21.78	31.88	46	-24.22	19.72	2.28	32.1	127	277	Peak
731.9	24.83	32.62	46	-21.17	21.27	2.51	31.57	122	302	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 0.50MHz.

### 4.2.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Test Receiver ROHDE & SCHWARZ	ESCS 30	100288	Apr. 27, 2015	Apr. 26, 2016
RF signal cable (with 10dB PAD) Woken	5D-FB	Cable-cond2-01	Dec. 26, 2014	Dec. 25, 2015
LISN ROHDE & SCHWARZ (EUT)	ESH2-Z5	100100	Dec. 30, 2014	Dec. 29, 2015
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100312	Jul. 21, 2015	Jul. 20, 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 2.

3. The VCCI Site Registration No. is C-2047.



#### 4.2.3 Test Procedures

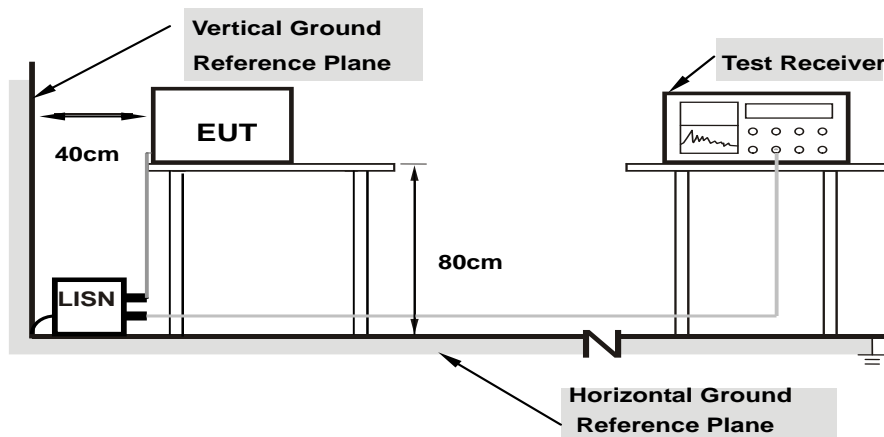
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm / 50uH of coupling 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 150 kHz to 30MHz was searched. Emission levels under (Limit - 20dB) 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

Same as 4.1.6.

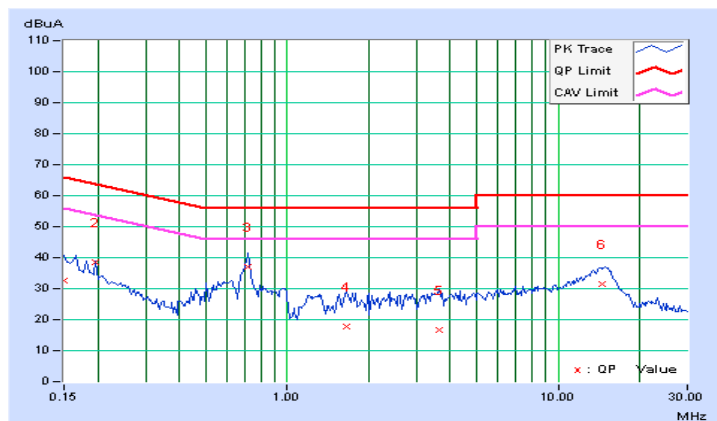
#### 4.2.7 Test Results

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	2015/9/9

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	0.15000	9.94	22.59	13.67	32.53	23.61	66.00	56.00	-33.47	-32.39
2	0.19687	9.95	28.70	11.63	38.65	21.58	63.74	53.74	-25.10	-32.17
<b>3</b>	<b>0.72031</b>	<b>10.01</b>	<b>27.18</b>	<b>19.34</b>	<b>37.19</b>	<b>29.35</b>	<b>56.00</b>	<b>46.00</b>	<b>-18.81</b>	<b>-16.65</b>
4	1.65625	10.12	7.59	-0.63	17.71	9.49	56.00	46.00	-38.29	-36.51
5	3.63281	10.25	6.50	-3.04	16.75	7.21	56.00	46.00	-39.25	-38.79
6	14.46094	10.53	20.79	15.46	31.32	25.99	60.00	50.00	-28.68	-24.01

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

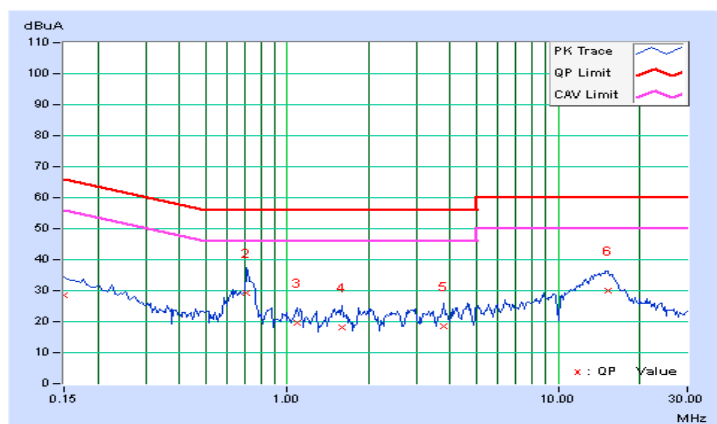


Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	25°C, 65%RH
Tested by	Toby Tian	Test Date	2015/9/9

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	0.15000	9.95	18.67	7.14	28.62	17.09	66.00	56.00	-37.38	-38.91
2	0.70859	10.04	19.20	9.51	29.24	19.55	56.00	46.00	-26.76	-26.45
3	1.09375	10.09	9.48	-9.79	19.57	0.30	56.00	46.00	-36.43	-45.70
4	1.60156	10.15	8.11	1.62	18.26	11.77	56.00	46.00	-37.74	-34.23
5	3.80469	10.29	8.07	1.10	18.36	11.39	56.00	46.00	-37.64	-34.61
6	15.23047	10.68	19.27	6.41	29.95	17.09	60.00	50.00	-30.05	-32.91

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

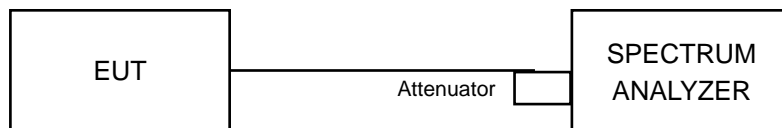


### 4.3 6dB Bandwidth Measurement

#### 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	7.12	0.5	Pass
6	2437	7.14	0.5	Pass
11	2462	7.58	0.5	Pass
12	2467	7.61	0.5	Pass
13	2472	7.58	0.5	Pass

## 802.11g

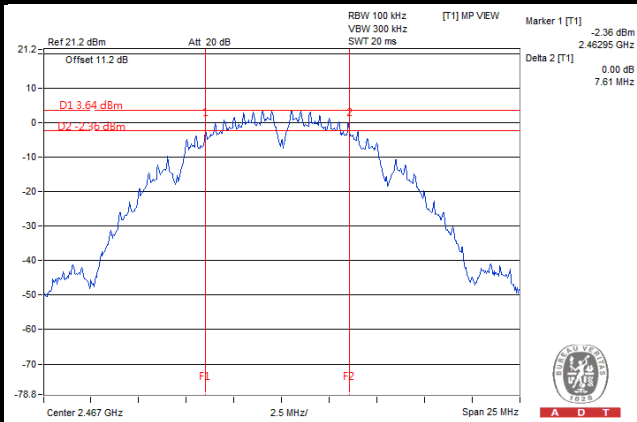
Channel	Frequency (MHz)	6db Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	16.35	0.5	Pass
6	2437	16.40	0.5	Pass
11	2462	16.41	0.5	Pass
12	2467	16.39	0.5	Pass
13	2472	16.41	0.5	Pass

## 802.11n (20MHz)

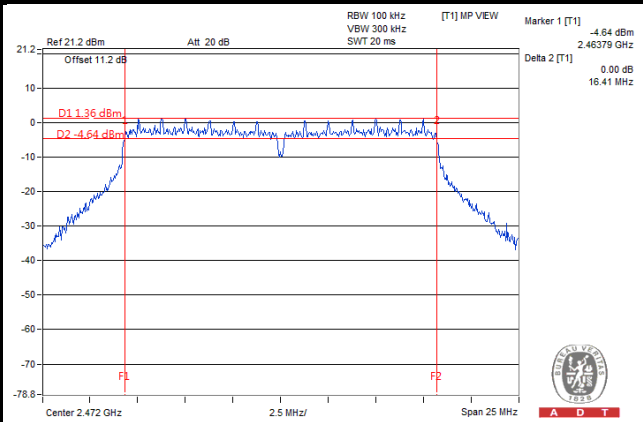
Channel	Frequency (MHz)	6db Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	17.35	0.5	Pass
6	2437	17.62	0.5	Pass
11	2462	17.62	0.5	Pass
12	2467	17.64	0.5	Pass
13	2472	17.64	0.5	Pass

### Spectrum Plot of Worst Value

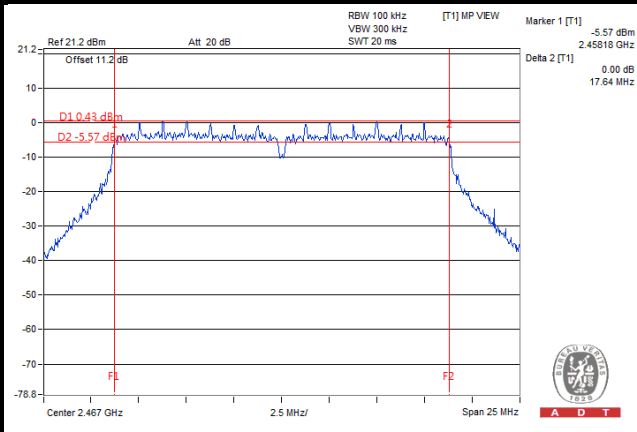
#### 802.11b



#### 802.11g



#### 802.11n (20MHz)

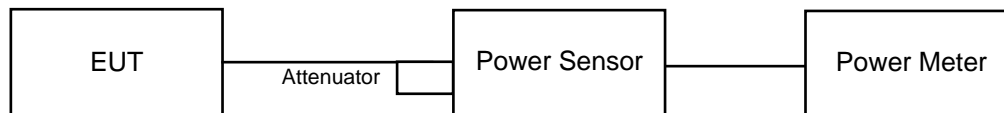


## 4.4 Conducted Output Power Measurement

### 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 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

Same as 4.3.6.

#### 4.4.7 Test Results

##### 802.11b

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass / Fail
1	2412	32.81	15.16	30	Pass
6	2437	31.33	14.96	30	Pass
11	2462	31.92	15.04	30	Pass
12	2467	30.55	14.85	30	Pass
13	2472	28.97	14.62	30	Pass

##### 802.11g

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass / Fail
1	2412	106.91	20.29	30	Pass
6	2437	102.57	20.11	30	Pass
11	2462	105.68	20.24	30	Pass
12	2467	101.16	20.05	30	Pass
13	2472	102.09	20.09	30	Pass

##### 802.11n (20MHz)

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass / Fail
1	2412	94.19	19.74	30	Pass
6	2437	89.95	19.54	30	Pass
11	2462	92.90	19.68	30	Pass
12	2467	91.41	19.61	30	Pass
13	2472	92.04	19.64	30	Pass

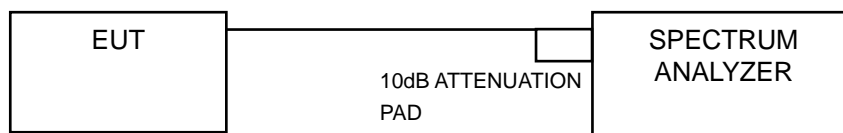


## 4.5 Power Spectral Density Measurement

### 4.5.1 Limits of Power Spectral Density Measurement

The Maximum of Power Spectral Density Measurement is 8dBm.

### 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

Same as Item 4.3.6

## 4.5.7 Test Results

## 802.11b

Channel	Frequency (MHz)	PSD (dBm)	Limit (dBm)	Pass / Fail
1	2412	-11.79	8	Pass
6	2437	-12.16	8	Pass
11	2462	-11.09	8	Pass
12	2467	-11.57	8	Pass
13	2472	-11.42	8	Pass

## 802.11g

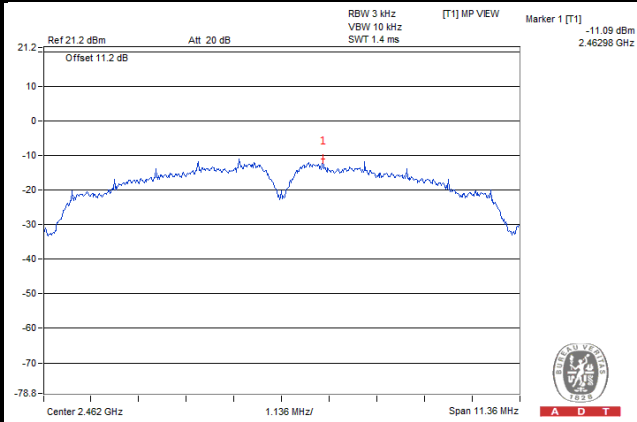
Channel	Frequency (MHz)	PSD (dBm)	Limit (dBm)	Pass / Fail
1	2412	-15.02	8	Pass
6	2437	-15.63	8	Pass
11	2462	-15.16	8	Pass
12	2467	-13.43	8	Pass
13	2472	-14.35	8	Pass

## 802.11n (20MHz)

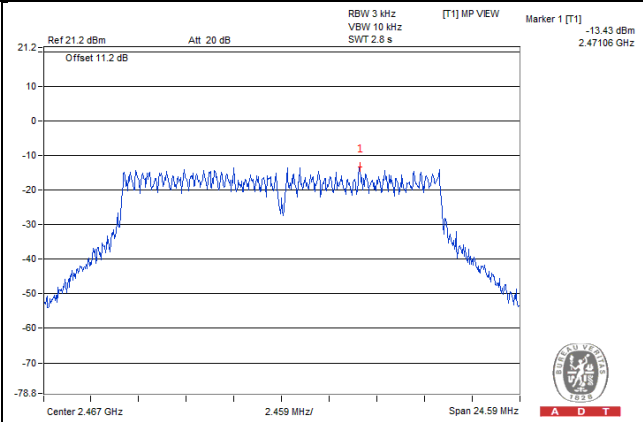
Channel	Frequency (MHz)	PSD (dBm)	Limit (dBm)	Pass / Fail
1	2412	-15.46	8	Pass
6	2437	-14.83	8	Pass
11	2462	-15.61	8	Pass
12	2467	-14.27	8	Pass
13	2472	-15.30	8	Pass

### Spectrum Plot of Worst Value

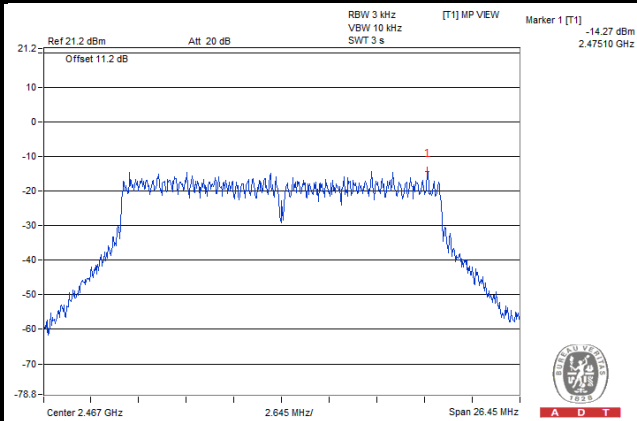
#### 802.11b



#### 802.11g



#### 802.11n (20MHz)

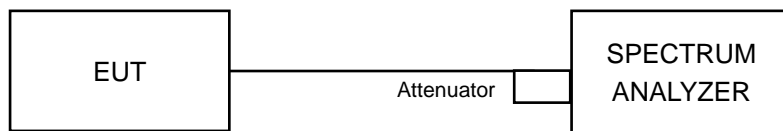


## 4.6 Conducted Out of Band Emission Measurement

### 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.

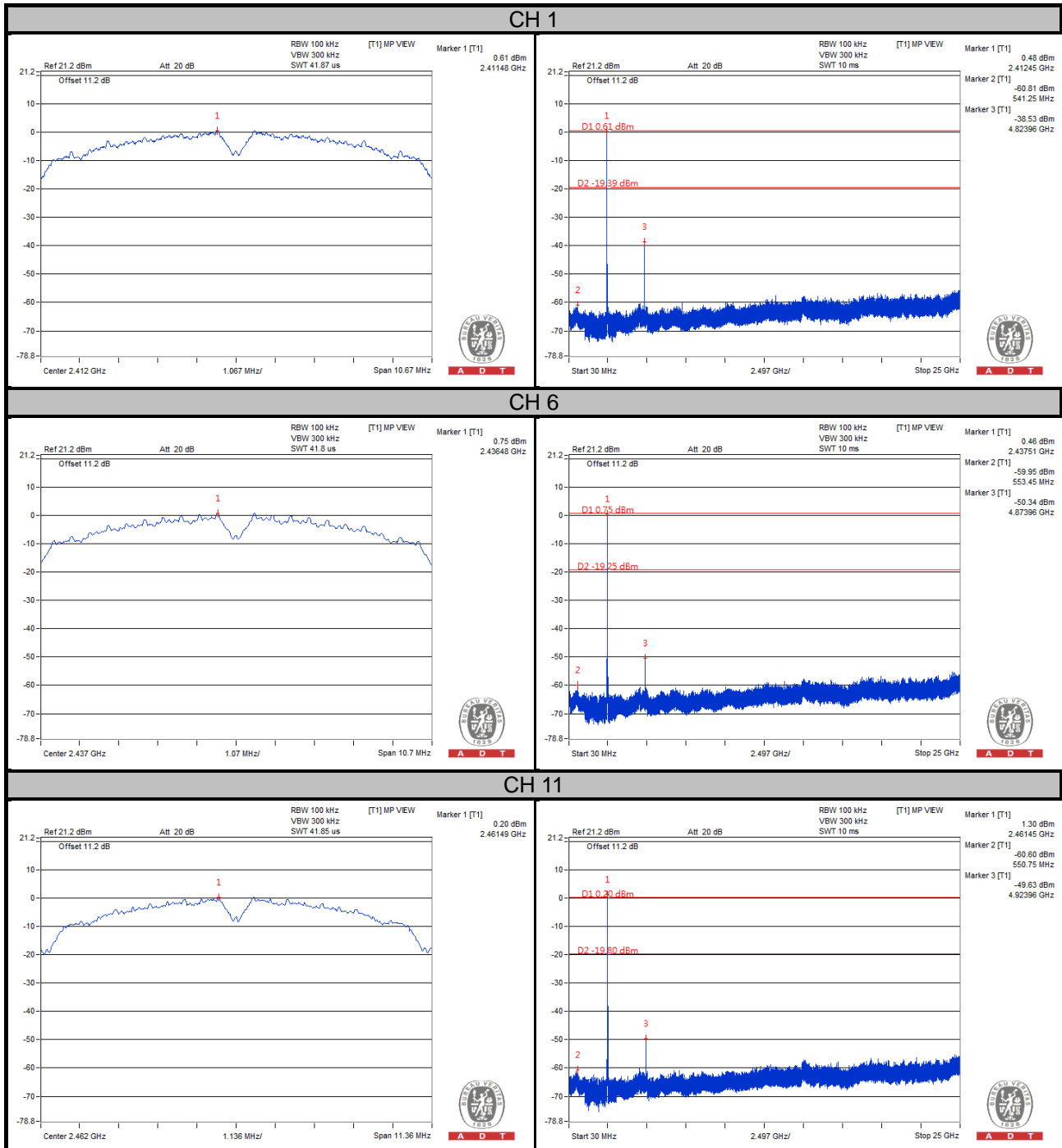
### 4.6.6 EUT Operating Condition

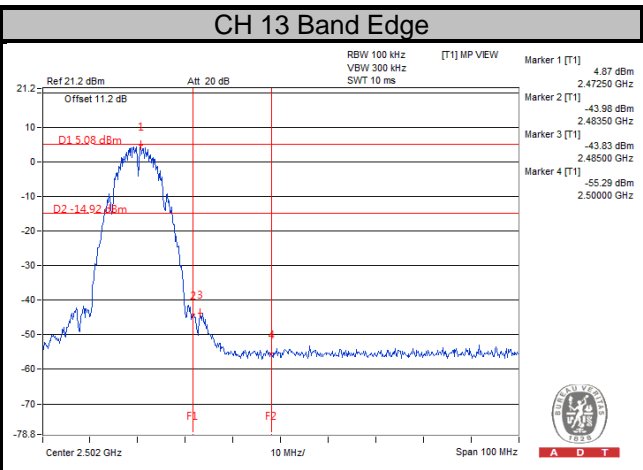
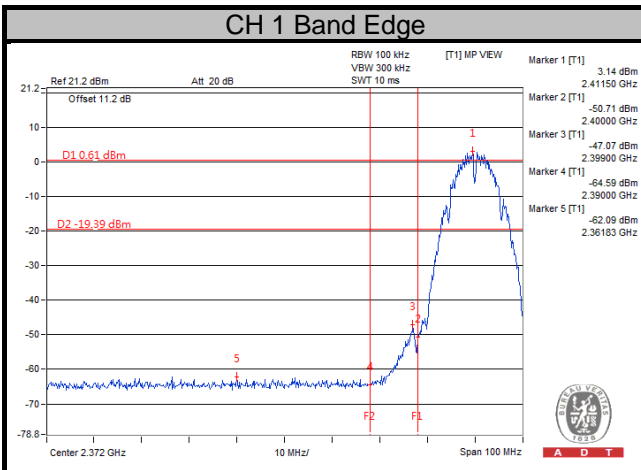
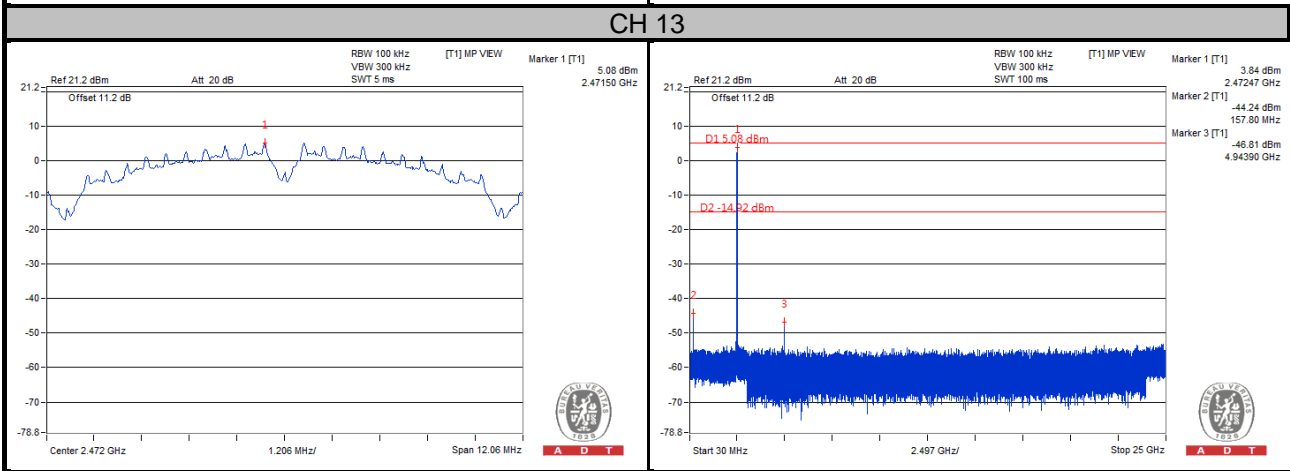
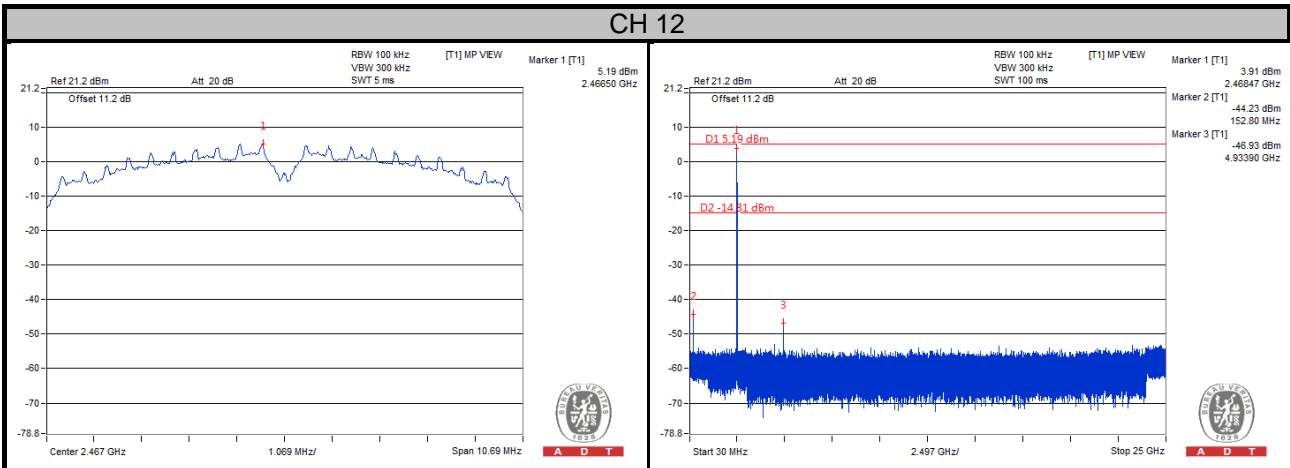
Same as Item 4.3.6

### 4.6.7 Test Results

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

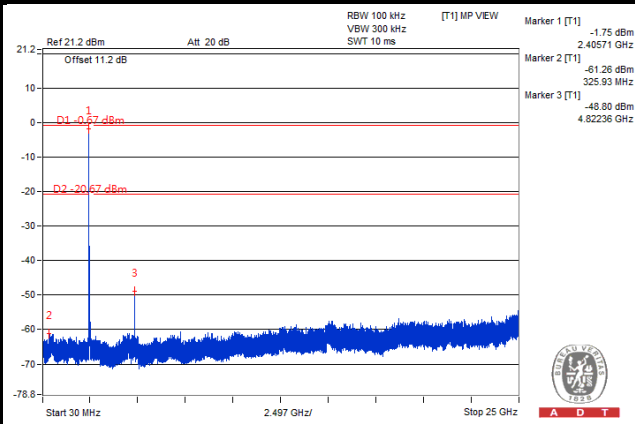
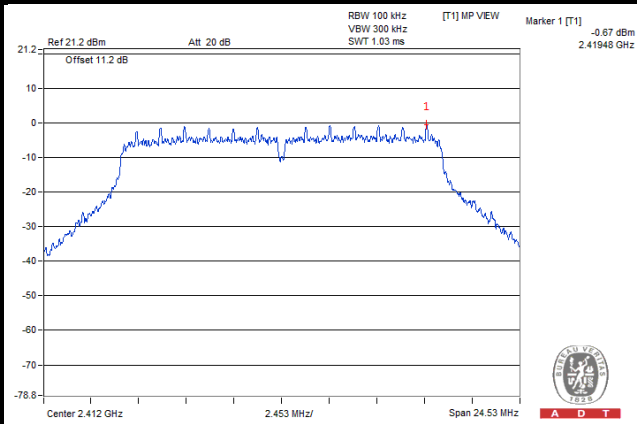
#### 802.11b



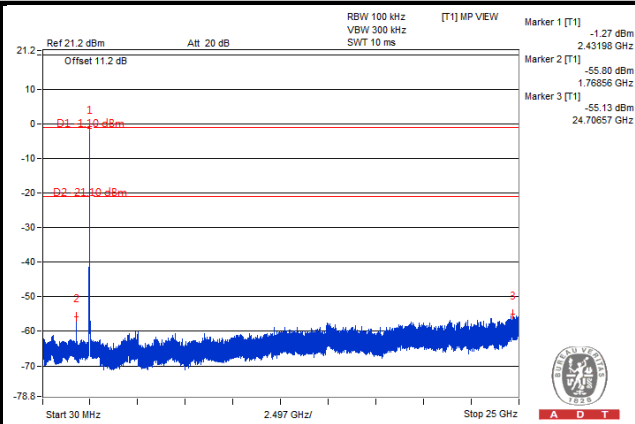
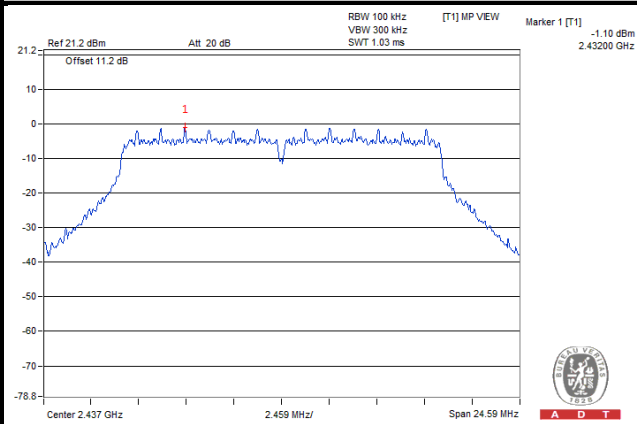


802.11g

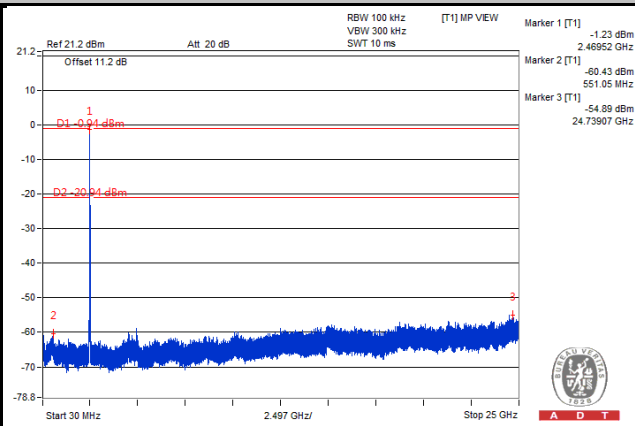
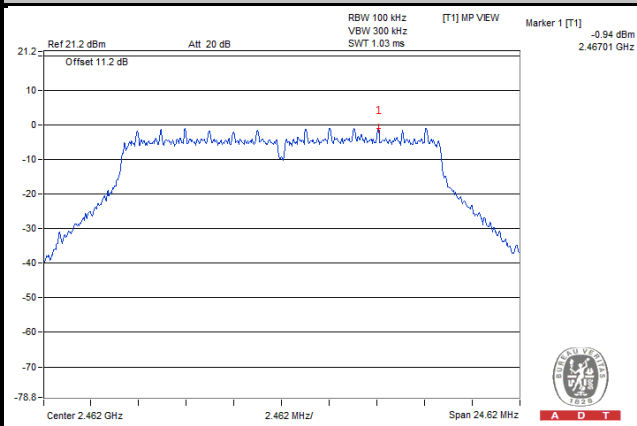
CH 1



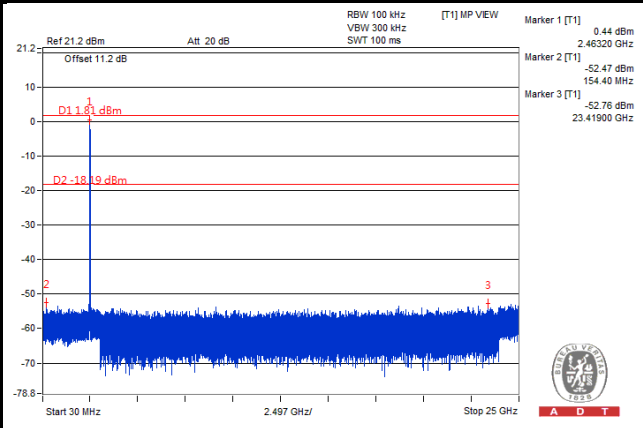
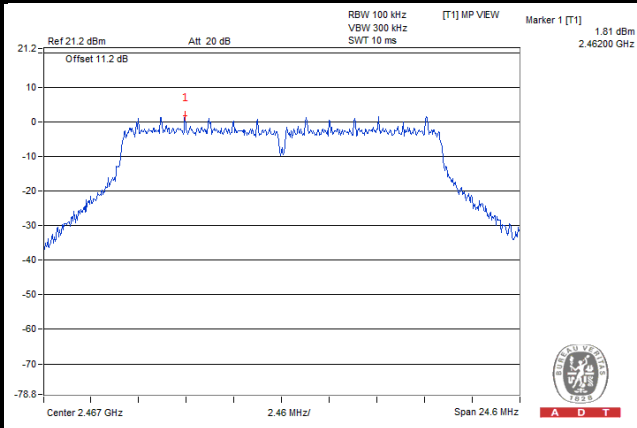
CH 6



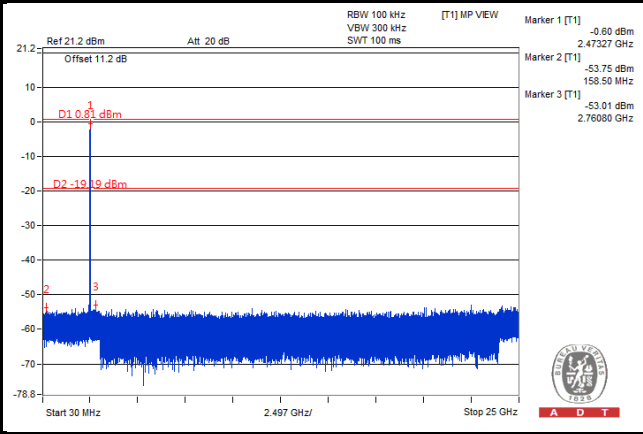
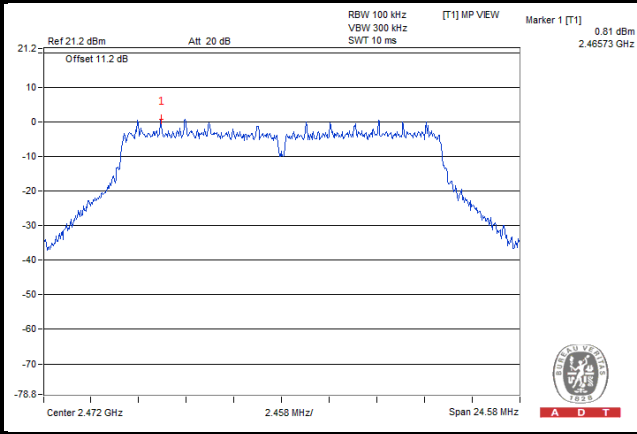
CH 11



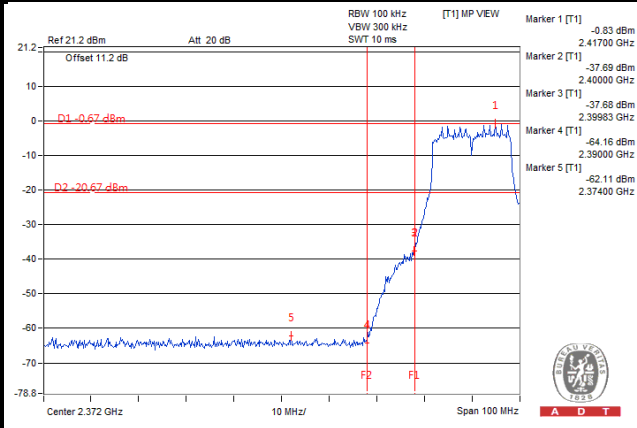
### CH 12



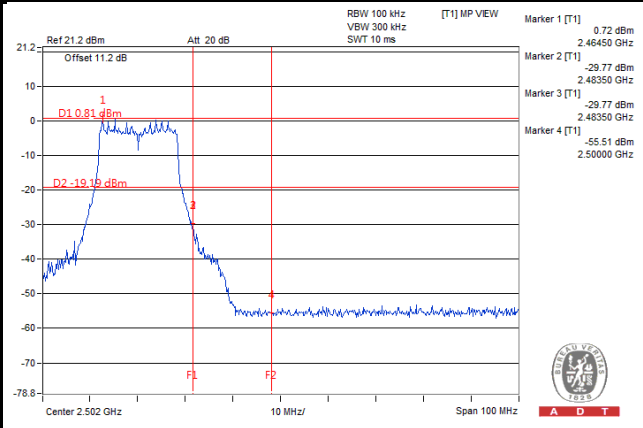
### CH 13



### CH 1 Band Edge



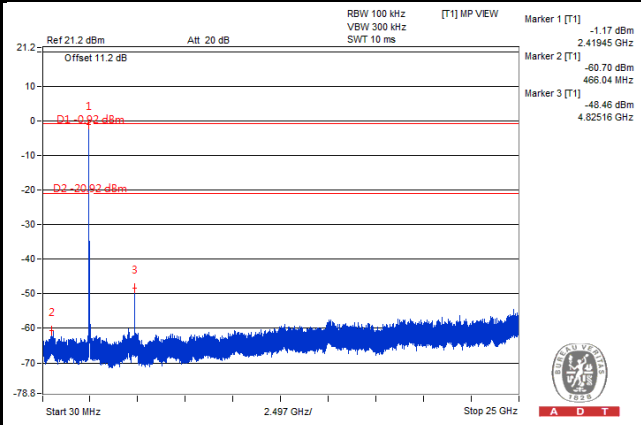
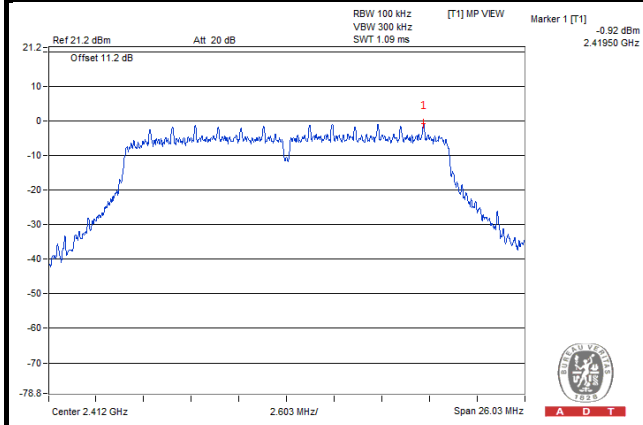
### CH 13 Band Edge



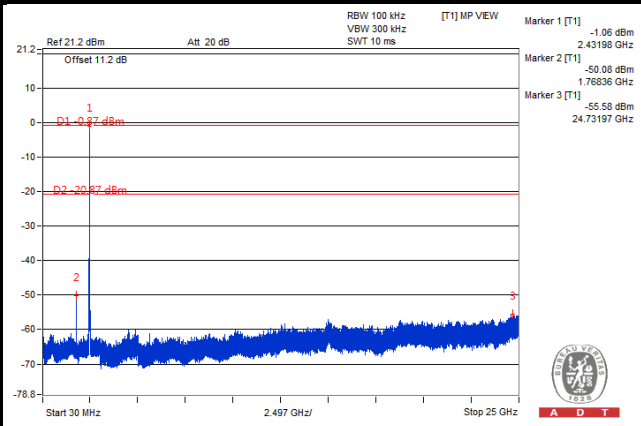
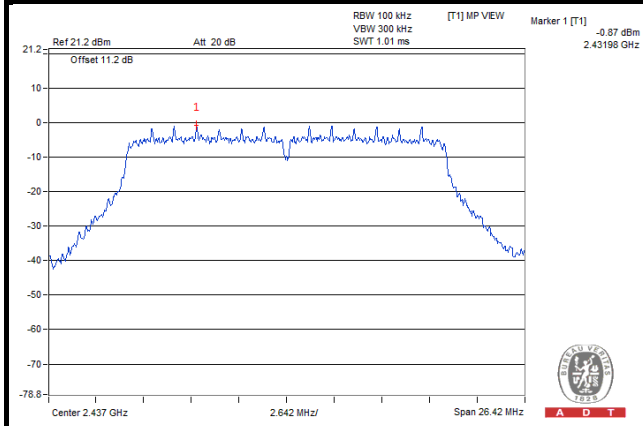


# 802.11n (20MHz)

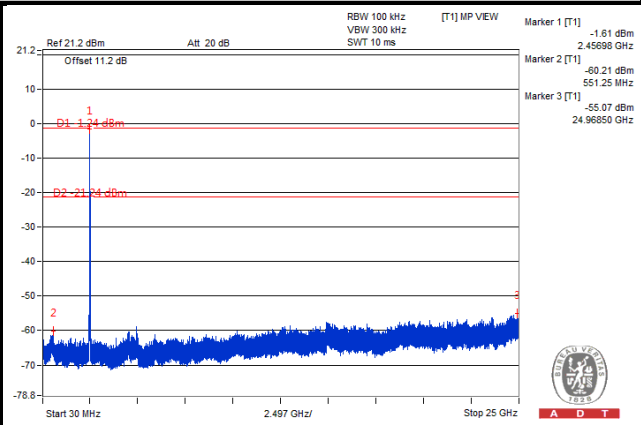
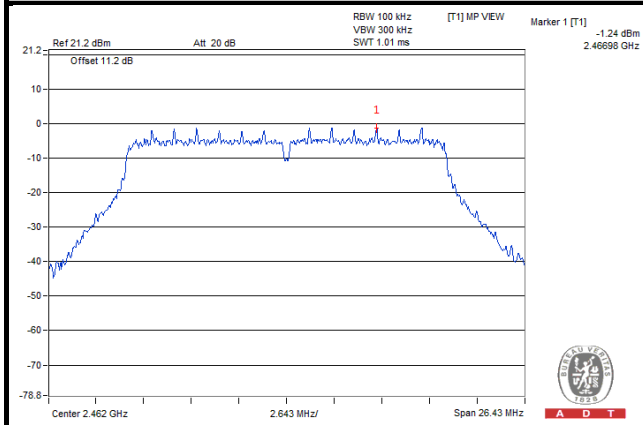
## CH 1

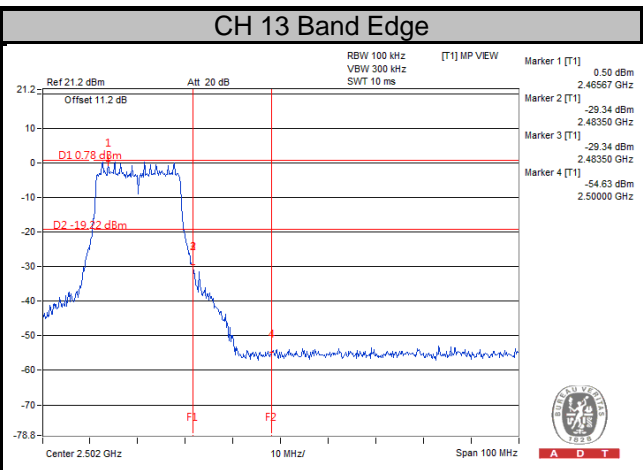
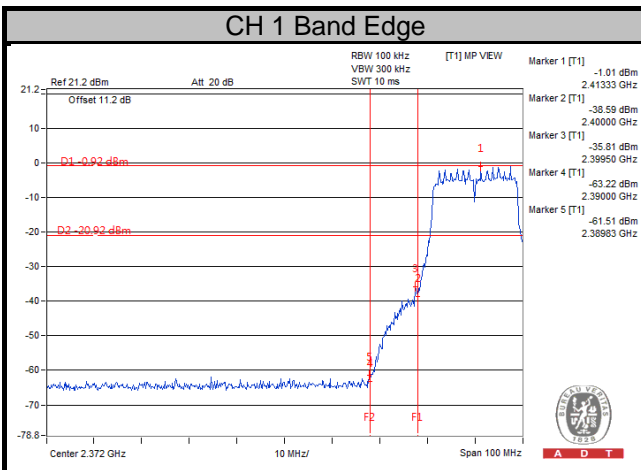
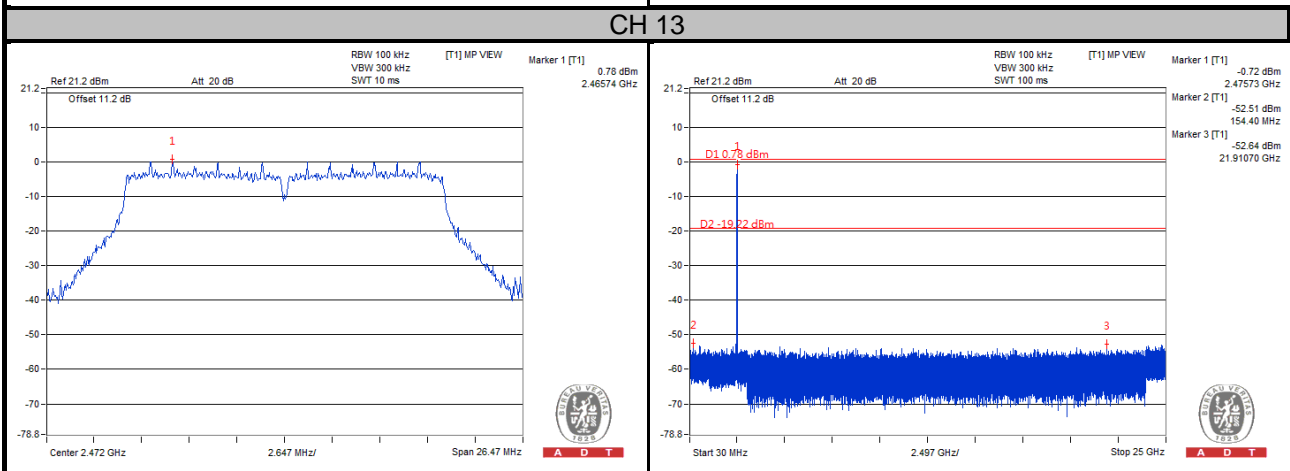
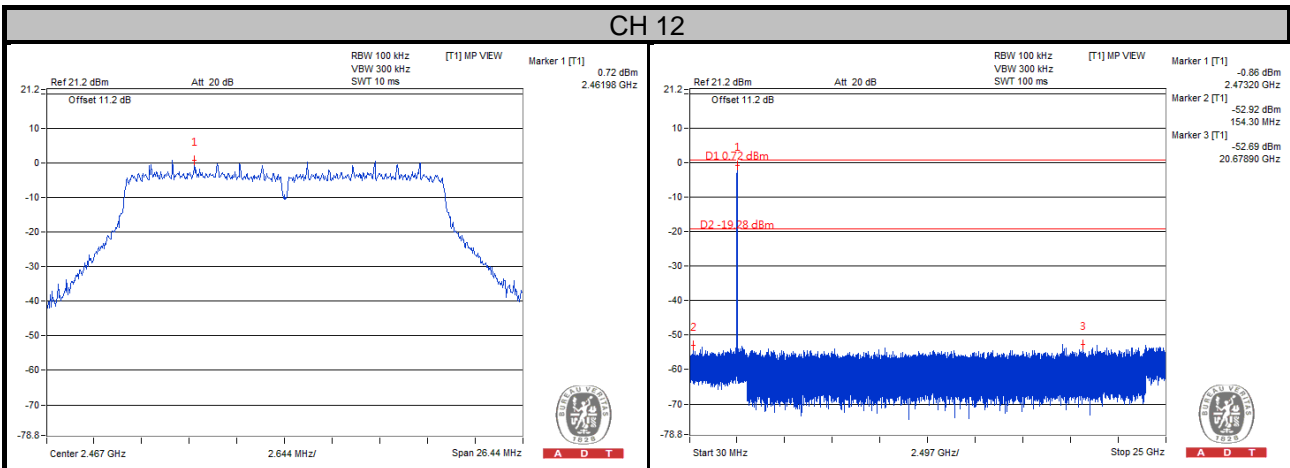


## CH 6



## CH 11







## 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.

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

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