



# FCC TEST REPORT (15.247)

**REPORT NO.:** RF131227C13-3  
**MODEL NO.:** Lenovo S660  
**FCC ID:** YCNS660  
**RECEIVED:** Dec. 27, 2013  
**TESTED:** Jan. 06, 2014 ~ Jan. 23, 2014  
**ISSUED:** Jan. 24, 2014

**APPLICANT:** Lenovo Mobile Communication Technology Ltd.

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

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**TEST LOCATION:** 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.	REASON FOR CHANGE	DATE ISSUED
RF131227C13-3	Original release	Jan. 24, 2014



## 1. CERTIFICATION

**PRODUCT:** Lenovo Mobile Phone  
**MODEL NO.:** Lenovo S660  
**BRAND:** lenovo  
**APPLICANT:** Lenovo Mobile Communication Technology Ltd.  
**TESTED:** Jan. 06, 2014 ~ Jan. 23, 2014  
**TEST SAMPLE:** Production Unit  
**STANDARDS:** **FCC Part 15, Subpart C (Section 15.247)**  
ANSI C63.10-2009

The above equipment (model: Lenovo S660) 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** : Jan. 24, 2014  
Vera Huang / Specialist

**APPROVED BY** : Sam chen , **DATE** : Jan. 24, 2014  
Sam Chen / Senior Project Engineer



## 2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC PART 15, SUBPART C (SECTION 15.247)			
STANDARD SECTION	TEST TYPE	RESULT	REMARK
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -20.82dB at 0.28281MHz.
15.247(d) 15.209	Radiated Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -1dB at 2390MHz.
15.247(d)	Band Edge Measurement	PASS	Meet the requirement of limit.
15.247(a)(2)	6dB bandwidth	PASS	Meet the requirement of limit.
15.247(b)	Conducted power	PASS	Meet the requirement of limit.
15.247(e)	Power Spectral Density	PASS	Meet the requirement of limit.
15.203	Antenna Requirement	PASS	No antenna connector is used.

### 2.1 MEASUREMENT UNCERTAINTY

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

MEASUREMENT	FREQUENCY	UNCERTAINTY
Conducted emissions	9kHz~30MHz	2.44 dB
Radiated emissions	30MHz ~ 200MHz	2.93 dB
	200MHz ~1000MHz	2.95 dB
	1GHz ~ 18GHz	2.26 dB
	18GHz ~ 40GHz	1.94 dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of  $k = 2$ .



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### 3. GENERAL INFORMATION

#### 3.1 GENERAL DESCRIPTION OF EUT

<b>EUT</b>	Lenovo Mobile Phone
<b>MODEL NO.</b>	Lenovo S660
<b>MID</b>	66000011
<b>POWER SUPPLY</b>	5.0Vdc (adapter or host equipment) 3.8Vdc (Li-ion 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/ 1.0Mbps 802.11g: 54.0/ 48.0/ 36.0/ 24.0/ 18.0/ 12.0/ 9.0/ 6.0Mbps 802.11n: up to MCS7
<b>OPERATING FREQUENCY</b>	2412 ~ 2462MHz
<b>NUMBER OF CHANNEL</b>	11 for 802.11b, 802.11g, 802.11n (20MHz) 7 for 802.11n (40MHz)
<b>OUTPUT POWER</b>	102.565mW
<b>ANTENNA TYPE</b>	PIFA antenna with -1.87dBi gain
<b>ANTENNA CONNECTOR</b>	NA
<b>DATA CABLE</b>	Refer to Note as below
<b>I/O PORTS</b>	Refer to user's manual
<b>ACCESSORY DEVICES</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 (20MHz)	1TX
802.11n (40MHz)	1TX

2. The EUT contains following accessory devices.

ITEM	BRAND	MODEL	DESCRIPTION
AC Adapter	Lenovo	CP-62	I/P: 100-240Vac, 50/60Hz, 300mA O/P: 5Vdc, 1500mA
Li-ion Battery	Lenovo	BL222	Rating: 3.8Vdc, 3000mAh
Earphone	Lenovo	TS300-01MS21-8S	1.07m cable
USB cable	Lenovo	SLX-A163A	1m cable
LCM + Touch Panel 1	TIANMA	TM046XVHP01-00	--
LCM + Touch Panel 2	YASSY	YT47F02G3	--
Memory 1	SAMSUNG	KMK7X000VM-B314	--
Memory 2	HYNIX	H9TP65A8JDACPR-KGM	--
Camera 1	SUNNY	P8V11A-20	--
Camera 2	O-FILM	L8825A10	--
Phone Cover	N/A	N/A	--

3. The device has 2 configurations as below.

Main Sample (A): LCM + Touch Panel 1 + Memory 1 + Camera 1

2nd Sample (B): LCM + Touch Panel 2 + Memory 2 + Camera 2

4. The above EUT information is declared by the 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 (20MHz):

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

7 channels are provided for 802.11n (40MHz):

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
3	2422MHz	7	2442MHz
4	2427MHz	8	2447MHz
5	2432MHz	9	2452MHz
6	2437MHz		

### 3.2.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

#### FOR 2.4GHz:

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	RE $\geq$ 1G	RE<1G	PLC	APCM	
A	√	√	√	√	Main Sample
B	√	√	-	-	2nd Sample

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 **X-plane**.

#### RADIATED EMISSION TEST (ABOVE 1GHz):

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

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
A	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 (20MHz)	1 to 11	1, 6, 11	OFDM	BPSK	MCS0
	802.11n (40MHz)	3 to 9	3, 6, 9	OFDM	BPSK	MCS0
B	802.11n (40MHz)	3 to 9	3	OFDM	BPSK	MCS0

#### 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)
A, B	802.11n (40MHz)	3 to 9	3	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)
A	802.11n (40MHz)	3 to 9	3	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)
A	802.11b	1 to 11	1, 11	DSSS	DBPSK	1.0
	802.11g	1 to 11	1, 11	OFDM	BPSK	6.0
	802.11n (20MHz)	1 to 11	1, 11	OFDM	BPSK	MCS0
	802.11n (40MHz)	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)
A	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 (20MHz)	1 to 11	1, 6, 11	OFDM	BPSK	MCS0
	802.11n (40MHz)	3 to 9	3, 6, 9	OFDM	BPSK	MCS0

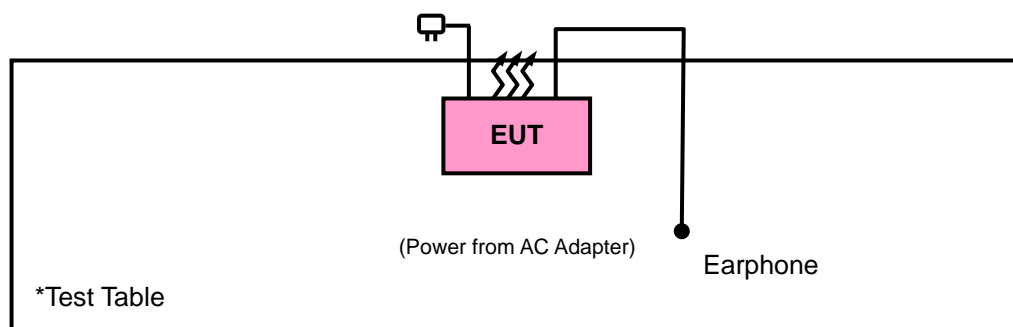
**TEST CONDITION:**

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE≥1G	25deg. C, 65%RH	120Vac, 60Hz	Anson Lin
RE<1G	25deg. C, 65%RH	120Vac, 60Hz	Anson Lin
PLC	25deg. C, 65%RH	120Vac, 60Hz	Johnson Liao
APCM	25deg. C, 65%RH	120Vac, 60Hz	Howard Kao

**3.3 DESCRIPTION OF SUPPORT UNITS**

The EUT has been tested as an independent unit together with other necessary accessories or support units.

**3.3.1 CONFIGURATION OF SYSTEM UNDER TEST**



**3.4 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)**

ANSI C63.10-2009

558074 D01 DTS Meas Guidance v03r01

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

**NOTE:** The EUT is also considered as a kind of computer peripheral, because the connection to computer is necessary for typical use. It has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B. The test report has been issued separately.

## 4. TEST TYPES AND RESULTS (FOR 2.4GHz BAND)

### 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.



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#### 4.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Test Receiver ROHDE & SCHWARZ	ESCI	100744	Apr. 15, 2013	Apr. 14, 2014
Spectrum Analyzer ROHDE & SCHWARZ	FSU43	100115	Dec. 18, 2013	Dec. 17, 2014
BILOG Antenna SCHWARZBECK	VULB9168	9168-472	Mar. 25, 2013	Mar. 24, 2014
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-209	Sep. 12, 2013	Sep. 11, 2014
HORN Antenna SCHWARZBECK	BBHA 9170	9170-480	Dec. 18, 2013	Dec. 17, 2014
Loop Antenna	HFH2-Z2	100070	Jan. 31, 2012	Jan. 30, 2014
Preamplifier Agilent	8447D	2944A10631	Aug. 30, 2013	Aug. 29, 2014
Preamplifier Agilent	8449B	3008A1960	Aug. 30, 2013	Aug. 29, 2014
Preamplifier EMCI	EMC 330H	980112	Dec. 27, 2013	Dec. 26, 2014
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	309219/4	Oct. 18, 2013	Oct. 17, 2014
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	250130/4	Oct. 18, 2013	Oct. 17, 2014
RF signal cable Worken	RG-213	NA	Nov. 07, 2013	Nov. 06, 2014
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
Mini-Circuits Power Splitter	ZN2PD-9G	NA	Jul. 18, 2013	Jul. 17, 2014
JFW 20dB attenuation	50HF-020-SMA	NA	NA	NA
Communications Tester-Wireless	E5515C	MY52102544	Sep. 05, 2012	Sep. 04, 2014
Radio Communication Analyzer	MT8820C	6201300640	Aug. 01, 2013	Jul. 31, 2014

- 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 HP preamplifier (model: 8449B) 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 IC 7450F-10.

#### 4.1.3 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meters semi-anechoic chamber. 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. Height of receiving 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 Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

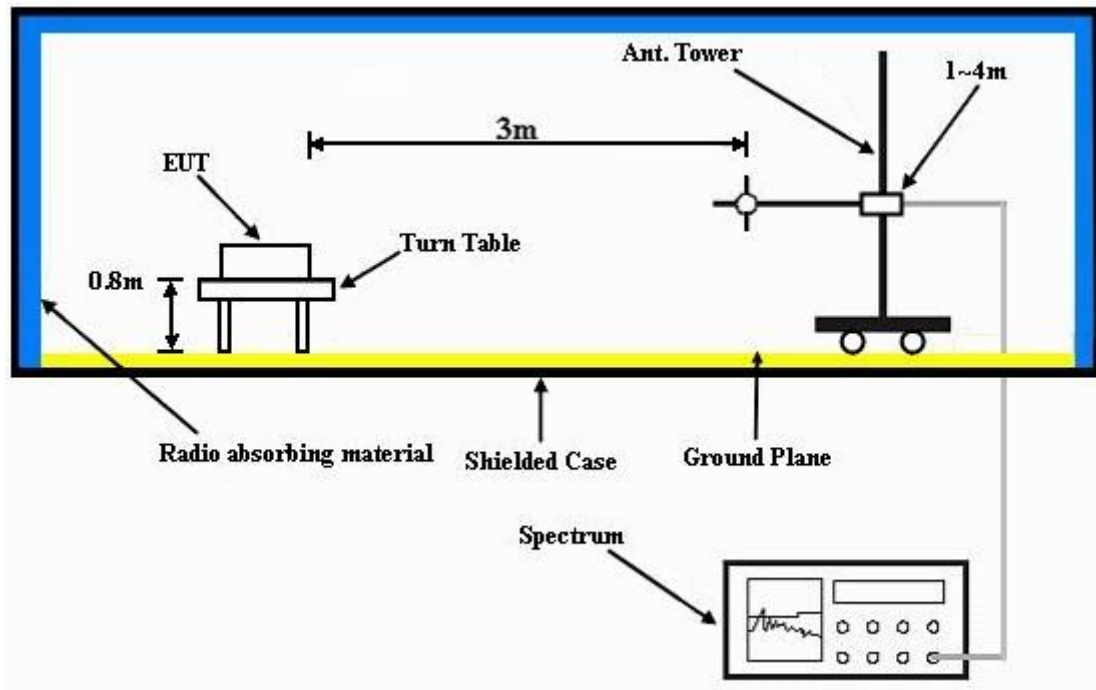
**NOTE:**

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

#### 4.1.4 DEVIATION FROM TEST STANDARD

No deviation.

#### 4.1.5 TEST SETUP



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

#### 4.1.6 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.





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### 4.1.7 TEST RESULTS

#### MODE A

#### ABOVE 1GHz WORST-CASE DATA

#### 802.11b

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

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	43.81	50.88	54	-10.19	26.91	3.54	37.52	106	337	Average
2390	60.39	67.46	74	-13.61	26.91	3.54	37.52	106	337	Peak
2412	101.19	108.21			26.96	3.54	37.52	106	337	Average
2412	106.18	113.2			26.96	3.54	37.52	106	337	Peak
2490	35.16	41.66	54	-18.84	27.2	3.62	37.32	106	337	Average
2490	60.1	66.6	74	-13.9	27.2	3.62	37.32	106	337	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
2352	39.66	46.84	54	-14.34	26.81	3.5	37.49	134	28	Average
2352	61.16	68.34	74	-12.84	26.81	3.5	37.49	134	28	Peak
2412	97.78	104.8			26.96	3.54	37.52	134	28	Average
2412	102.77	109.79			26.96	3.54	37.52	134	28	Peak
2490	34.44	40.94	54	-19.56	27.2	3.62	37.32	134	28	Average
2490	59.58	66.08	74	-14.42	27.2	3.62	37.32	134	28	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 (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Anson Lin

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	38.7	45.9	54	-15.3	26.77	3.5	37.47	104	336	Average
2338	60.45	67.65	74	-13.55	26.77	3.5	37.47	104	336	Peak
2437	99.48	106.32			27.06	3.56	37.46	104	336	Average
2437	104.63	111.47			27.06	3.56	37.46	104	336	Peak
2496	35.73	42.16	54	-18.27	27.2	3.62	37.25	104	336	Average
2496	60.06	66.49	74	-13.94	27.2	3.62	37.25	104	336	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	36.19	43.31	54	-17.81	26.86	3.52	37.5	130	28	Average
2382	59.39	66.51	74	-14.61	26.86	3.52	37.5	130	28	Peak
2437	96.07	102.91			27.06	3.56	37.46	130	28	Average
2437	101.24	108.08			27.06	3.56	37.46	130	28	Peak
2488	34.74	41.24	54	-19.26	27.2	3.62	37.32	130	28	Average
2488	59.76	66.26	74	-14.24	27.2	3.62	37.32	130	28	Peak

**REMARKS:**

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



A D T

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

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
2378	37.16	44.28	54	-16.84	26.86	3.52	37.5	103	336	Average
2378	60.25	67.37	74	-13.75	26.86	3.52	37.5	103	336	Peak
2462	98.75	105.46			27.1	3.58	37.39	103	336	Average
2462	103.18	109.89			27.1	3.58	37.39	103	336	Peak
2484	39.14	45.71	54	-14.86	27.15	3.6	37.32	103	336	Average
2484	59.21	65.78	74	-14.79	27.15	3.6	37.32	103	336	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	35.09	42.21	54	-18.91	26.86	3.52	37.5	128	26	Average
2384	60.46	67.58	74	-13.54	26.86	3.52	37.5	128	26	Peak
2462	95.88	102.59			27.1	3.58	37.39	128	26	Average
2462	100.36	107.07			27.1	3.58	37.39	128	26	Peak
2500	36.49	42.92	54	-17.51	27.2	3.62	37.25	128	26	Average
2500	60.22	66.65	74	-13.78	27.2	3.62	37.25	128	26	Peak

**REMARKS:**

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



A D T

802.11g

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

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	50.89	57.96	54	-3.11	26.91	3.54	37.52	104	335	Average
2390	69.34	76.41	74	-4.66	26.91	3.54	37.52	104	335	Peak
2412	96.19	103.21			26.96	3.54	37.52	104	335	Average
2412	105.78	112.8			26.96	3.54	37.52	104	335	Peak
2484	36.88	43.45	54	-17.12	27.15	3.6	37.32	104	335	Average
2484	60.94	67.51	74	-13.06	27.15	3.6	37.32	104	335	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	46.8	53.87	54	-7.2	26.91	3.54	37.52	134	27	Average
2390	64.67	71.74	74	-9.33	26.91	3.54	37.52	134	27	Peak
2412	91.95	98.97			26.96	3.54	37.52	134	27	Average
2412	101.51	108.53			26.96	3.54	37.52	134	27	Peak
2484	35.49	42.06	54	-18.51	27.15	3.6	37.32	134	27	Average
2484	60.43	67	74	-13.57	27.15	3.6	37.32	134	27	Peak

REMARKS:

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



A D T

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

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	40.82	48.04	54	-13.18	26.77	3.5	37.49	104	334	Average
2348	59.96	67.18	74	-14.04	26.77	3.5	37.49	104	334	Peak
2437	94.92	101.76			27.06	3.56	37.46	104	334	Average
2437	104.53	111.37			27.06	3.56	37.46	104	334	Peak
2486	38.25	44.82	54	-15.75	27.15	3.6	37.32	104	334	Average
2486	60.2	66.77	74	-13.8	27.15	3.6	37.32	104	334	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
2354	38.38	45.56	54	-15.62	26.81	3.5	37.49	131	28	Average
2354	59.96	67.14	74	-14.04	26.81	3.5	37.49	131	28	Peak
2437	91.37	98.21			27.06	3.56	37.46	131	28	Average
2437	101.33	108.17			27.06	3.56	37.46	131	28	Peak
2496	36.4	42.83	54	-17.6	27.2	3.62	37.25	131	28	Average
2496	59.89	66.32	74	-14.11	27.2	3.62	37.25	131	28	Peak

**REMARKS:**

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



A D T

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

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	40.56	47.73	54	-13.44	26.81	3.52	37.5	103	336	Average
2368	59.55	66.72	74	-14.45	26.81	3.52	37.5	103	336	Peak
2462	94.76	101.47			27.1	3.58	37.39	103	336	Average
2462	103.62	110.33			27.1	3.58	37.39	103	336	Peak
2484	47.75	54.32	54	-6.25	27.15	3.6	37.32	103	336	Average
2484	66.59	73.16	74	-7.41	27.15	3.6	37.32	103	336	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
2356	36.6	43.78	54	-17.4	26.81	3.5	37.49	126	26	Average
2356	60.55	67.73	74	-13.45	26.81	3.5	37.49	126	26	Peak
2462	91.09	97.8			27.1	3.58	37.39	126	26	Average
2462	100.14	106.85			27.1	3.58	37.39	126	26	Peak
2484	37.04	43.61	54	-16.96	27.15	3.6	37.32	126	26	Average
2484	66.68	73.25	74	-7.32	27.15	3.6	37.32	126	26	Peak

**REMARKS:**

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



802.11n (20MHz)

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

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	52.37	59.44	54	-1.63	26.91	3.54	37.52	105	349	Average
2390	69.89	76.96	74	-4.11	26.91	3.54	37.52	105	349	Peak
2412	96.47	103.49			26.96	3.54	37.52	105	349	Average
2412	106.06	113.08			26.96	3.54	37.52	105	349	Peak
2484	36.55	43.12	54	-17.45	27.15	3.6	37.32	105	349	Average
2484	57.19	63.76	74	-16.81	27.15	3.6	37.32	105	349	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	48.11	55.18	54	-5.89	26.91	3.54	37.52	130	359	Average
2390	69.42	76.49	74	-4.58	26.91	3.54	37.52	130	359	Peak
2412	92.23	99.25			26.96	3.54	37.52	130	359	Average
2412	102.03	109.05			26.96	3.54	37.52	130	359	Peak
2496	34.79	41.22	54	-19.21	27.2	3.62	37.25	130	359	Average
2496	56.12	62.55	74	-17.88	27.2	3.62	37.25	130	359	Peak

REMARKS:

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



A D T

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

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	40.98	48.1	54	-13.02	26.86	3.52	37.5	102	350	Average
2374	58.38	65.5	74	-15.62	26.86	3.52	37.5	102	350	Peak
2437	95.58	102.42			27.06	3.56	37.46	102	350	Average
2437	105.06	111.9			27.06	3.56	37.46	102	350	Peak
2484	39.2	45.77	54	-14.8	27.15	3.6	37.32	102	350	Average
2484	56.63	63.2	74	-17.37	27.15	3.6	37.32	102	350	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
2388	38.38	45.43	54	-15.62	26.91	3.54	37.5	130	356	Average
2388	57.48	64.53	74	-16.52	26.91	3.54	37.5	130	356	Peak
2437	91.82	98.66			27.06	3.56	37.46	130	356	Average
2437	101.32	108.16			27.06	3.56	37.46	130	356	Peak
2500	36.21	42.64	54	-17.79	27.2	3.62	37.25	130	356	Average
2500	56.55	62.98	74	-17.45	27.2	3.62	37.25	130	356	Peak

**REMARKS:**

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





A D T

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

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	39.92	47.04	54	-14.08	26.86	3.52	37.5	102	352	Average
2372	56.9	64.02	74	-17.1	26.86	3.52	37.5	102	352	Peak
2462	94.23	100.94			27.1	3.58	37.39	102	352	Average
2462	103.95	110.66			27.1	3.58	37.39	102	352	Peak
2484	47.89	54.46	54	-6.11	27.15	3.6	37.32	102	352	Average
2484	71.34	77.91	74	-2.66	27.15	3.6	37.32	102	352	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
2386	36.98	44.05	54	-17.02	26.91	3.52	37.5	128	355	Average
2386	56.25	63.32	74	-17.75	26.91	3.52	37.5	128	355	Peak
2462	91.01	97.72			27.1	3.58	37.39	128	355	Average
2462	100.65	107.36			27.1	3.58	37.39	128	355	Peak
2484	43.83	50.4	54	-10.17	27.15	3.6	37.32	128	355	Average
2484	67.09	73.66	74	-6.91	27.15	3.6	37.32	128	355	Peak

**REMARKS:**

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



A D T

802.11n (40MHz)

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 3	FREQUENCY RANGE	1GHz ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Anson Lin

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	51.49	58.56	54	-2.51	26.91	3.54	37.52	108	347	Average
2390	73	80.07	74	-1	26.91	3.54	37.52	108	347	Peak
2422	90.59	97.48			27.01	3.56	37.46	108	347	Average
2422	99.83	106.72			27.01	3.56	37.46	108	347	Peak
2498	38.34	44.77	54	-15.66	27.2	3.62	37.25	108	347	Average
2498	56.26	62.69	74	-17.74	27.2	3.62	37.25	108	347	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	46.53	53.6	54	-7.47	26.91	3.54	37.52	129	359	Average
2390	68.81	75.88	74	-5.19	26.91	3.54	37.52	129	359	Peak
2422	86.55	93.44			27.01	3.56	37.46	129	359	Average
2422	96.8	103.69			27.01	3.56	37.46	129	359	Peak
2486	36.2	42.77	54	-17.8	27.15	3.6	37.32	129	359	Average
2486	56.57	63.14	74	-17.43	27.15	3.6	37.32	129	359	Peak

REMARKS:

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



A D T

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

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	46.7	53.77	54	-7.3	26.91	3.54	37.52	105	348	Average
2390	63.91	70.98	74	-10.09	26.91	3.54	37.52	105	348	Peak
2437	90.44	97.28			27.06	3.56	37.46	105	348	Average
2437	100.23	107.07			27.06	3.56	37.46	105	348	Peak
2484	42.33	48.9	54	-11.67	27.15	3.6	37.32	105	348	Average
2484	63.6	70.17	74	-10.4	27.15	3.6	37.32	105	348	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
2388	42.46	49.51	54	-11.54	26.91	3.54	37.5	129	358	Average
2388	59.72	66.77	74	-14.28	26.91	3.54	37.5	129	358	Peak
2437	85.95	92.79			27.06	3.56	37.46	129	358	Average
2437	95.87	102.71			27.06	3.56	37.46	129	358	Peak
2484	39.64	46.21	54	-14.36	27.15	3.6	37.32	129	358	Average
2484	60.61	67.18	74	-13.39	27.15	3.6	37.32	129	358	Peak

**REMARKS:**

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



A D T

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 9	FREQUENCY RANGE	1GHz ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Anson Lin

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
2384	41.63	48.75	54	-12.37	26.86	3.52	37.5	102	352	Average
2384	61.81	68.93	74	-12.19	26.86	3.52	37.5	102	352	Peak
2452	90.27	97.02			27.06	3.58	37.39	102	352	Average
2452	99.89	106.64			27.06	3.58	37.39	102	352	Peak
2484	47.42	53.99	54	-6.58	27.15	3.6	37.32	102	352	Average
2484	69.85	76.42	74	-4.15	27.15	3.6	37.32	102	352	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	39.06	46.18	54	-14.94	26.86	3.52	37.5	130	357	Average
2380	59.14	66.26	74	-14.86	26.86	3.52	37.5	130	357	Peak
2452	86.14	92.89			27.06	3.58	37.39	130	357	Average
2452	95.78	102.53			27.06	3.58	37.39	130	357	Peak
2488	42.52	49.02	54	-11.48	27.2	3.62	37.32	130	357	Average
2488	65.38	71.88	74	-8.62	27.2	3.62	37.32	130	357	Peak

**REMARKS:**

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



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**BELOW 1GHz WORST-CASE DATA: 802.11n (40MHz)**

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 3	FREQUENCY RANGE	30MHz ~ 1GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) QP
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Anson Lin

**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
57.27	27.93	46.22	40	-12.07	12.25	0.81	31.35	100	154	Peak
162.03	30.23	48.14	43.5	-13.27	12.54	1.4	31.85	100	139	Peak
255.99	36.85	55.24	46	-9.15	11.65	1.85	31.89	100	159	Peak
347.6	43.45	58.98	46	-2.55	14.08	2.22	31.83	100	168	Peak
441.4	35.89	49.15	46	-10.11	16.16	2.58	32	100	184	Peak
762.7	27.92	34.04	46	-18.08	21.7	3.6	31.42	100	137	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
43.5	27.87	44.68	40	-12.13	13.59	0.71	31.11	100	154	Peak
57.54	26.68	44.97	40	-13.32	12.25	0.81	31.35	100	183	Peak
256.26	30.56	48.95	46	-15.44	11.65	1.85	31.89	100	158	Peak
347.6	37.48	53.01	46	-8.52	14.08	2.22	31.83	100	162	Peak
438.6	34.94	48.27	46	-11.06	16.1	2.57	32	100	192	Peak
831.3	28.01	33.34	46	-17.99	22.63	3.77	31.73	100	130	Peak

**REMARKS:**

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor  
Margin Value = Emission Level - Limit Value



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**MODE B**

**ABOVE 1GHz WORST-CASE DATA: 802.11n (40MHz)**

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 3	FREQUENCY RANGE	1GHz ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Anson Lin

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	48.79	55.86	54	-5.21	26.91	3.54	37.52	132	349	Average
2390	68.42	75.49	74	-5.58	26.91	3.54	37.52	132	349	Peak
2422	90.67	97.56			27.01	3.56	37.46	132	349	Average
2422	99.22	106.11			27.01	3.56	37.46	132	349	Peak
2484	38.6	45.17	54	-15.4	27.15	3.6	37.32	132	349	Average
2484	50.69	57.26	74	-23.31	27.15	3.6	37.32	132	349	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	44.91	51.98	54	-9.09	26.91	3.54	37.52	127	32	Average
2390	64.2	71.27	74	-9.8	26.91	3.54	37.52	127	32	Peak
2422	84.94	91.83			27.01	3.56	37.46	127	32	Average
2422	95.32	102.21			27.01	3.56	37.46	127	32	Peak
2484	35.34	41.91	54	-18.66	27.15	3.6	37.32	127	32	Average
2484	50.45	57.02	74	-23.55	27.15	3.6	37.32	127	32	Peak

**REMARKS:**

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



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**BELOW 1GHz WORST-CASE DATA: 802.11n (40MHz)**

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 3	FREQUENCY RANGE	30MHz ~ 1GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) QP
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Anson Lin

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
57.81	26.45	44.84	40	-13.55	12.15	0.81	31.35	100	178	Peak
165	27.74	45.88	43.5	-15.76	12.25	1.42	31.81	100	136	Peak
258.96	34.73	52.99	46	-11.27	11.74	1.86	31.86	100	251	Peak
353.2	41.23	56.65	46	-4.77	14.22	2.24	31.88	100	159	Peak
450.5	35.13	48.14	46	-10.87	16.35	2.62	31.98	100	163	Peak
653.5	25.33	33.8	46	-20.67	20.26	3.26	31.99	100	142	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
42.96	27.17	43.97	40	-12.83	13.58	0.7	31.08	100	155	Peak
167.7	23.45	41.82	43.5	-20.05	11.96	1.43	31.76	100	154	Peak
259.23	28.15	46.41	46	-17.85	11.74	1.86	31.86	100	138	Peak
353.2	37.01	52.43	46	-8.99	14.22	2.24	31.88	100	186	Peak
435.8	34.74	48.14	46	-11.26	16.04	2.56	32	100	137	Peak
798.4	27.6	33.13	46	-18.4	22.2	3.69	31.42	100	124	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 OF EMISSION (MHz)	CONDUCTED LIMIT (dB $\mu$ V)	
	Quasi-peak	Average
0.15 ~ 0.5	66 to 56	56 to 46
0.5 ~ 5	56	46
5 ~ 30	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.
  3. All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

### 4.2.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Test Receiver ROHDE & SCHWARZ	ESCS30	100288	Nov. 17, 2013	Nov. 16, 2014
RF signal cable Woken	5D-FB	Cable-HYCO2-01	Dec. 27, 2013	Dec. 26, 2014
LISN ROHDE & SCHWARZ (EUT)	ESH2-Z5	100100	Dec. 23, 2013	Dec. 22, 2014
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100312	Jul. 08, 2013	Jul. 07, 2014
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

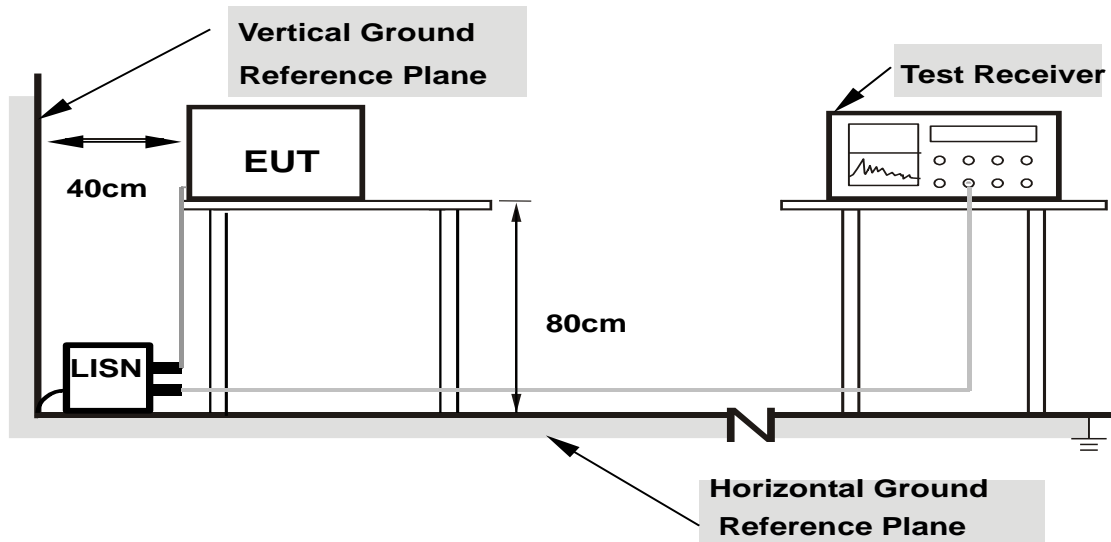
- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling 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 150kHz 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.
  - 2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

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

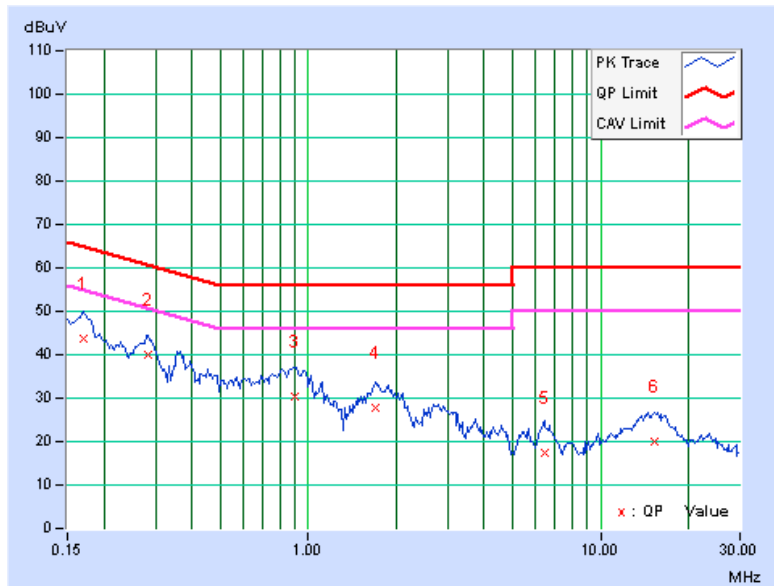
**CONDUCTED WORST-CASE DATA :**

<b>PHASE</b>	Line 1	<b>6dB BANDWIDTH</b>	9kHz
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No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
			1	0.16953	0.27	43.40	32.10	43.67	32.37	64.98
<b>2</b>	<b>0.28281</b>	<b>0.29</b>	<b>39.62</b>	<b>29.45</b>	<b>39.91</b>	<b>29.74</b>	<b>60.73</b>	<b>50.73</b>	<b>-20.82</b>	<b>-20.99</b>
3	0.89609	0.33	30.08	23.10	30.41	23.43	56.00	46.00	-25.59	-22.57
4	1.69922	0.35	27.43	20.97	27.78	21.32	56.00	46.00	-28.22	-24.68
5	6.42969	0.46	16.91	10.10	17.37	10.56	60.00	50.00	-42.63	-39.44
6	15.32813	0.53	19.37	12.19	19.90	12.72	60.00	50.00	-40.10	-37.28

**REMARKS:**

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

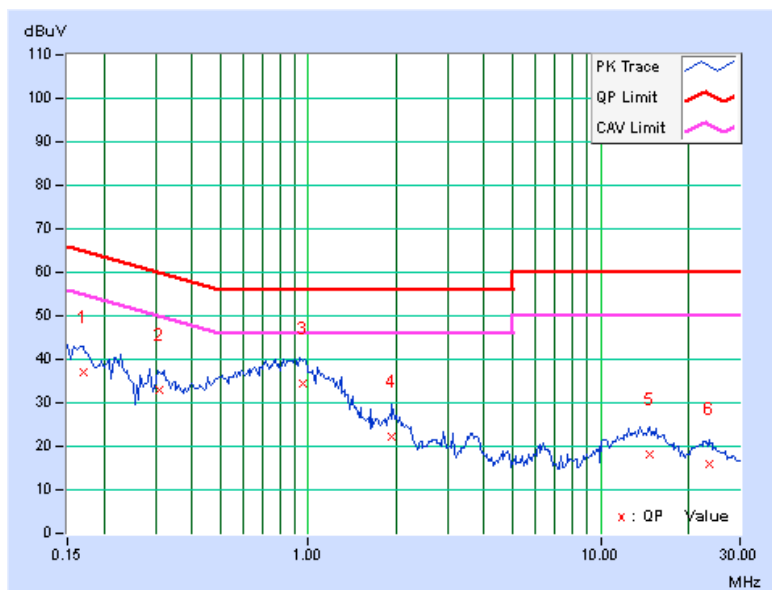


PHASE	Line 2	6dB BANDWIDTH	9kHz
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No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16953	0.27	36.64	27.86	36.91	28.13	64.98	54.98	-28.07	-26.85
2	0.31016	0.29	32.79	23.95	33.08	24.24	59.97	49.97	-26.89	-25.73
3	0.95469	0.34	33.97	23.71	34.31	24.05	56.00	46.00	-21.69	-21.95
4	1.93750	0.37	22.01	15.27	22.38	15.64	56.00	46.00	-33.62	-30.36
5	14.67188	0.56	17.64	10.76	18.20	11.32	60.00	50.00	-41.80	-38.68
6	23.44922	0.59	15.28	7.43	15.87	8.02	60.00	50.00	-44.13	-41.98

**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

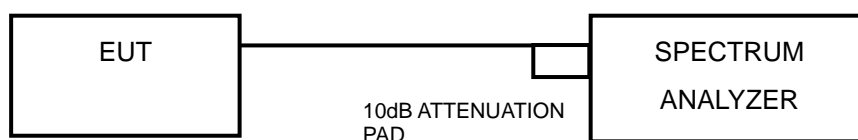


### 4.3 6dB BANDWIDTH MEASUREMENT

#### 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) = approximately 1% of the emission bandwidth
- 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 RESULTS

#### 802.11b

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	10.05	0.5	PASS
6	2437	10.05	0.5	PASS
11	2462	10.03	0.5	PASS

#### 802.11g

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	15.10	0.5	PASS
6	2437	15.35	0.5	PASS
11	2462	14.85	0.5	PASS

#### 802.11n (20MHz)

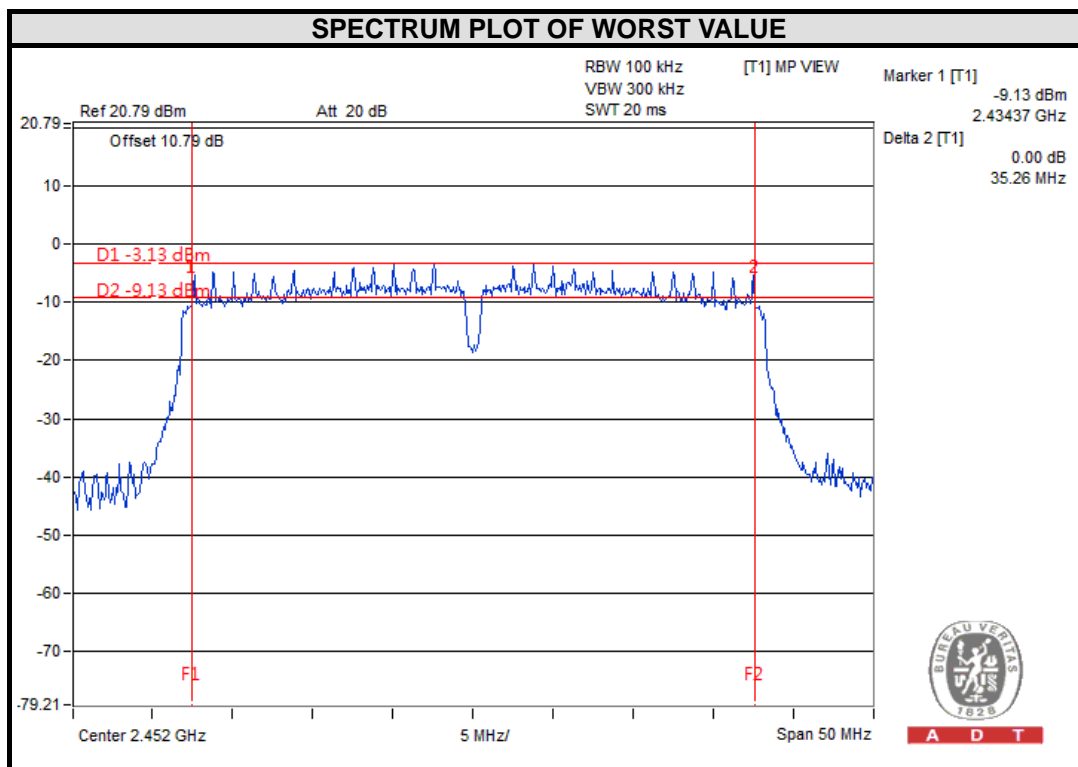
CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	15.09	0.5	PASS
6	2437	15.46	0.5	PASS
11	2462	16.30	0.5	PASS



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### 802.11n (40MHz)

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
3	2422	35.18	0.5	PASS
6	2437	35.27	0.5	PASS
9	2452	35.26	0.5	PASS

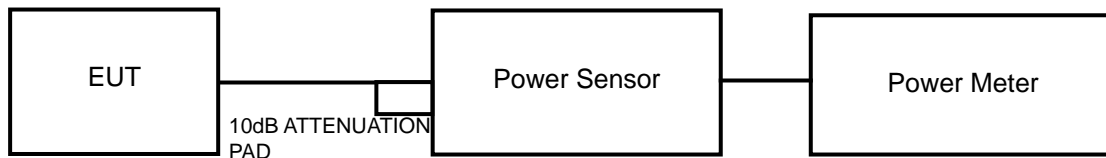


## 4.4 CONDUCTED OUTPUT POWER

### 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 peak power level.

### 4.4.5 DEVIATION FROM TEST STANDARD

No deviation.

### 4.4.6 EUT OPERATING CONDITIONS

Same as Item 4.3.6.





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#### 4.4.7 TEST RESULTS

##### 802.11b

CHANNEL	FREQUENCY (MHz)	PEAK POWER (mW)	PEAK POWER (dBm)	LIMIT (dBm)	PASS/FAIL
1	2412	56.105	17.49	30	PASS
6	2437	56.885	17.55	30	PASS
11	2462	55.208	17.42	30	PASS

##### 802.11g

CHANNEL	FREQUENCY (MHz)	PEAK POWER (mW)	PEAK POWER (dBm)	LIMIT (dBm)	PASS/FAIL
1	2412	86.497	19.37	30	PASS
6	2437	98.175	19.92	30	PASS
11	2462	101.625	20.07	30	PASS

##### 802.11n (20MHz)

CHANNEL	FREQUENCY (MHz)	PEAK POWER (mW)	PEAK POWER (dBm)	LIMIT (dBm)	PASS/FAIL
1	2412	83.946	19.24	30	PASS
6	2437	97.051	19.87	30	PASS
11	2462	102.565	20.11	30	PASS

##### 802.11n (40MHz)

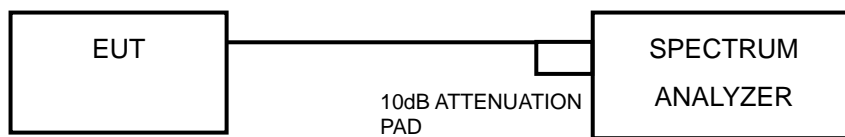
CHANNEL	FREQUENCY (MHz)	PEAK POWER (mW)	PEAK POWER (dBm)	LIMIT (dBm)	PASS/FAIL
3	2422	79.616	19.01	30	PASS
6	2437	92.470	19.66	30	PASS
9	2452	94.624	19.76	30	PASS

## 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 the RBW = 3 kHz, VBW = 10 kHz, Detector = peak.
- Sweep time = auto couple, Trace mode = max hold, allow trace to fully stabilize.
- Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.

### 4.5.5 DEVIATION FROM TEST STANDARD

No deviation.

### 4.5.6 EUT OPERATING CONDITION

Same as Item 4.3.6



#### 4.5.7 TEST RESULTS

##### 802.11b

Channel	FREQ. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
1	2412	-8.34	8	PASS
6	2437	-7.02	8	PASS
11	2462	-6.53	8	PASS

##### 802.11g

Channel	FREQ. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
1	2412	-10.32	8	PASS
6	2437	-10.91	8	PASS
11	2462	-11.61	8	PASS

##### 802.11n (20MHz)

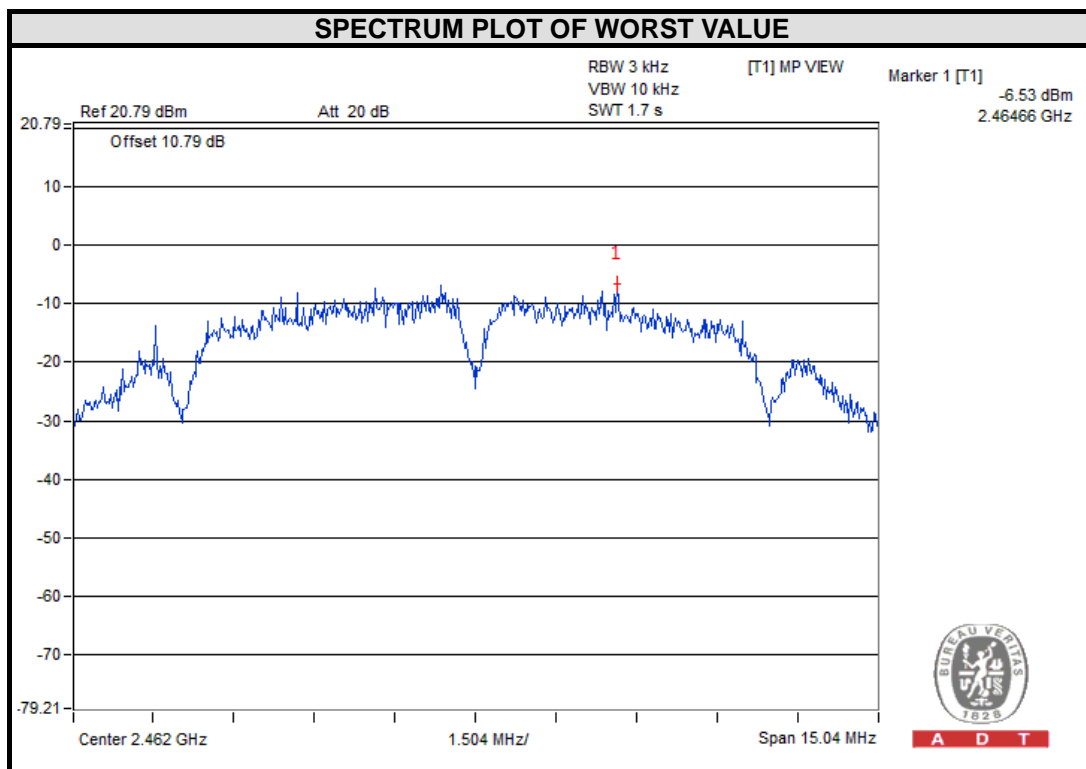
Channel	FREQ. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
1	2412	-12.68	8	PASS
6	2437	-12.18	8	PASS
11	2462	-11.49	8	PASS



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802.11n (40MHz)

Channel	FREQ. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
3	2422	-16.37	8	PASS
6	2437	-18.29	8	PASS
9	2452	-16.49	8	PASS

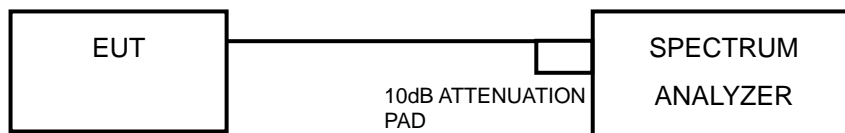


## 4.6 CONDUCTED OUT OF BAND EMISSION MEASUREMENT

### 4.6.1 LIMITS OF CONDUCTED OUT OF BAND EMISSION MEASUREMENT

Below  $-20\text{dB}$  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.



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## MEASUREMENT PROCEDURE OOB

1. Set RBW = 100 kHz.
2. Set VBW  $\geq$  300 kHz.
3. Set span to encompass the spectrum to be examined.
4. Detector = peak.
5. Trace Mode = max hold.
6. Sweep = auto couple.

### 4.6.5 DEVIATION FROM TEST STANDARD

No deviation.

### 4.6.6 EUT OPERATING CONDITION

Same as Item 4.3.6

### 4.6.7 TEST RESULTS

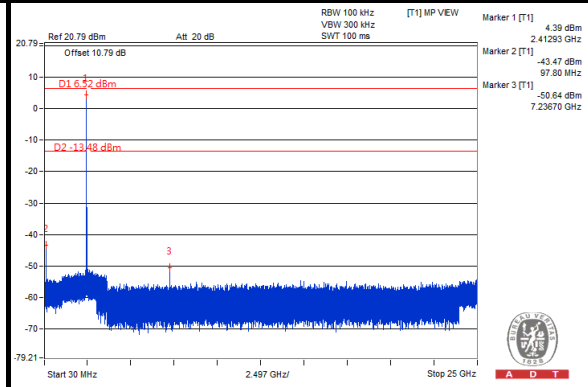
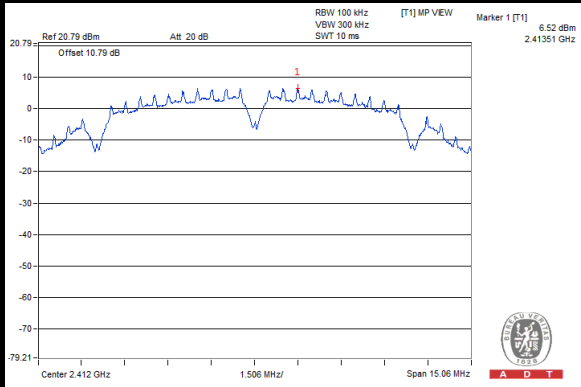
The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement.



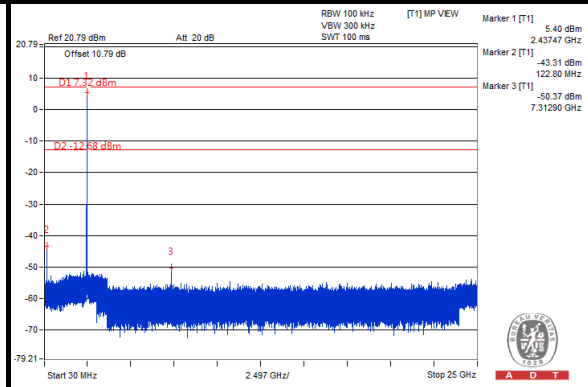
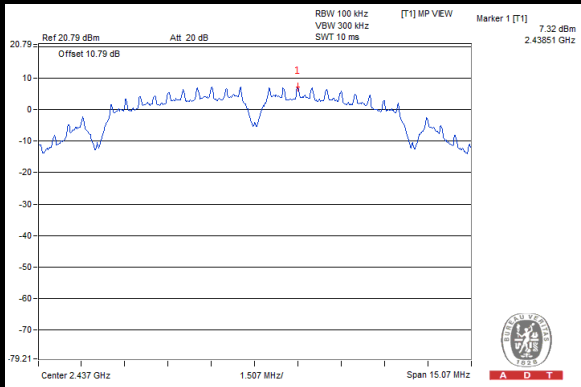
A D T

### 802.11b

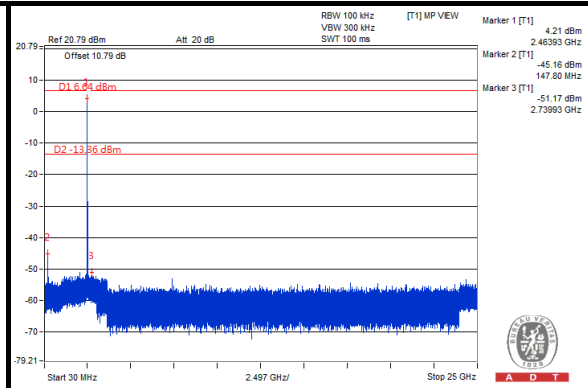
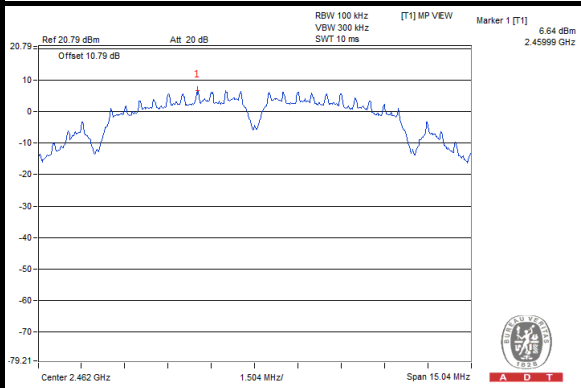
#### CH 1



#### CH 6



#### CH 11

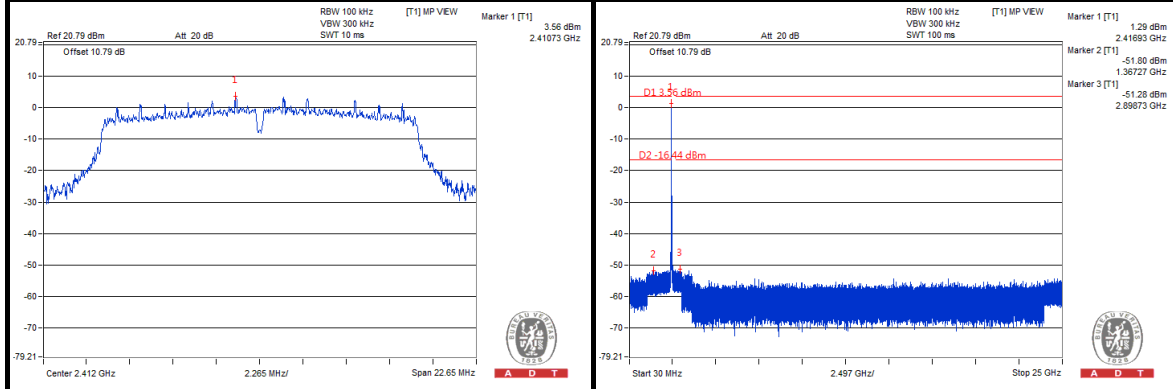




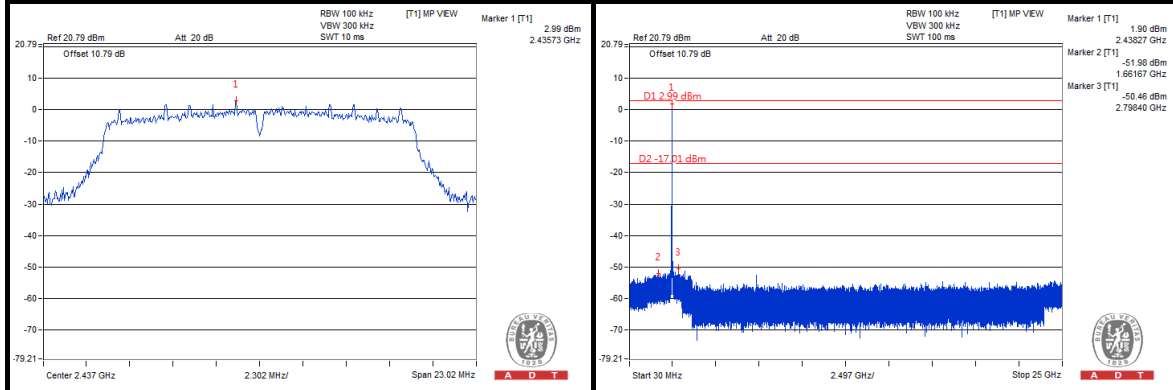
A D T

### 802.11g

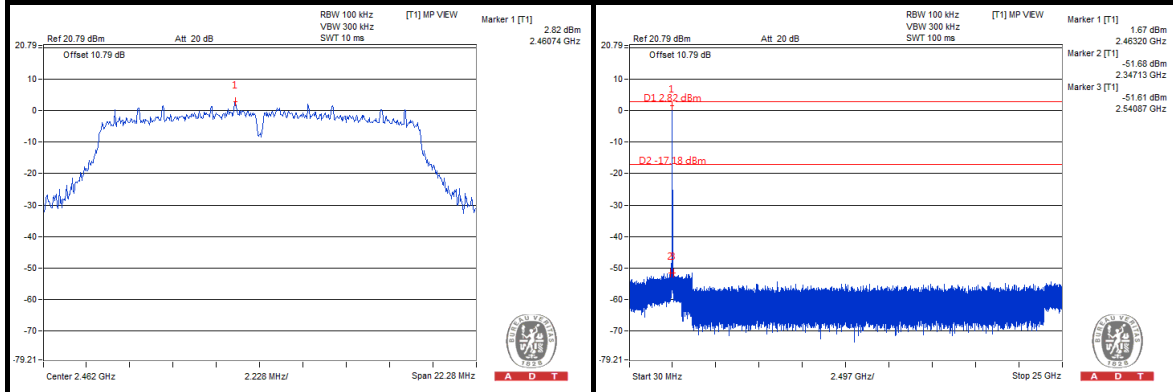
#### CH 1



#### CH 6



#### CH 11



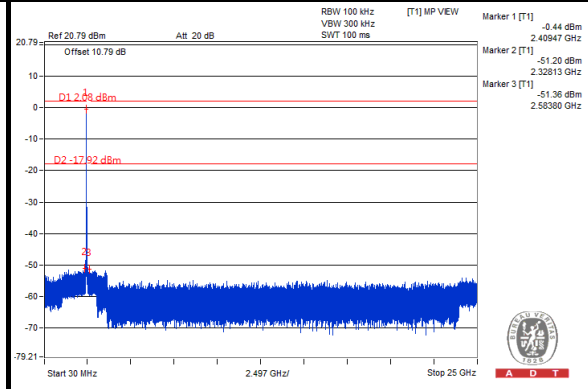
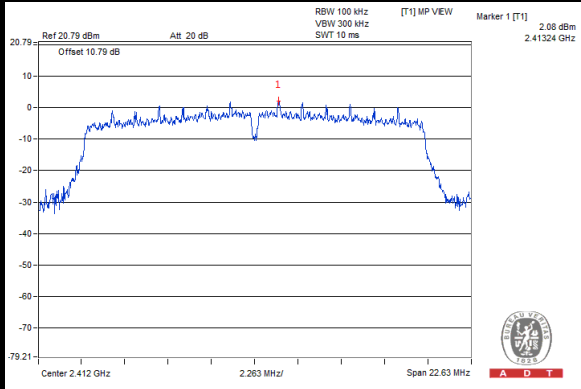




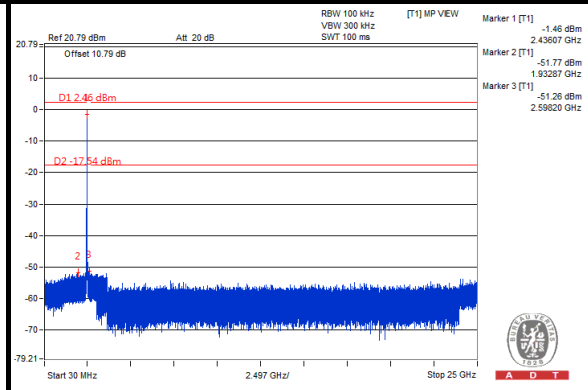
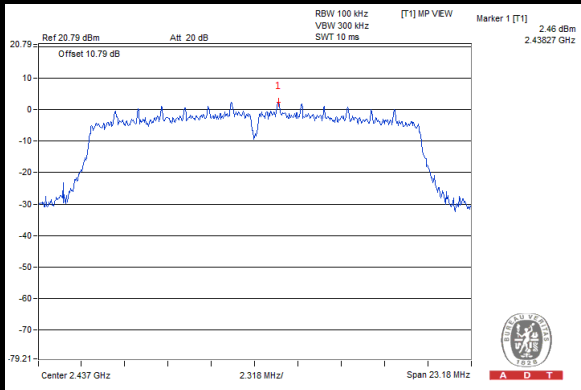
A D T

### 802.11n (20MHz)

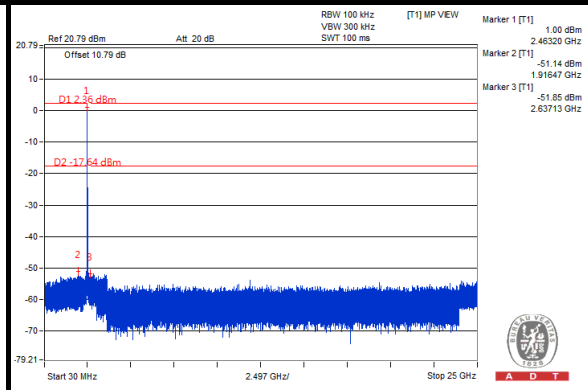
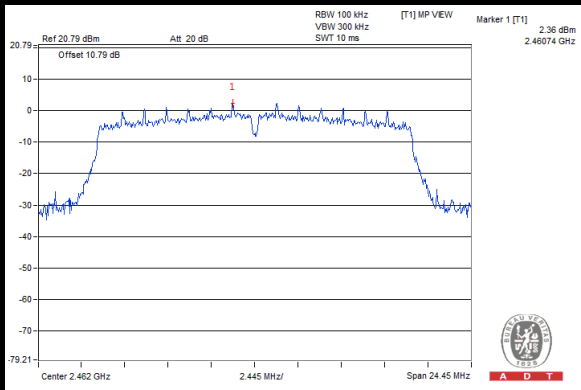
#### CH 1



#### CH 6



#### CH 11

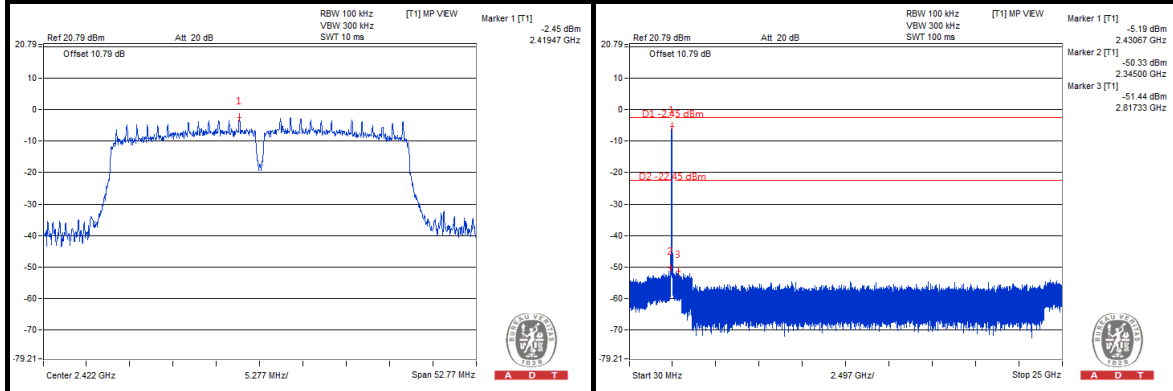




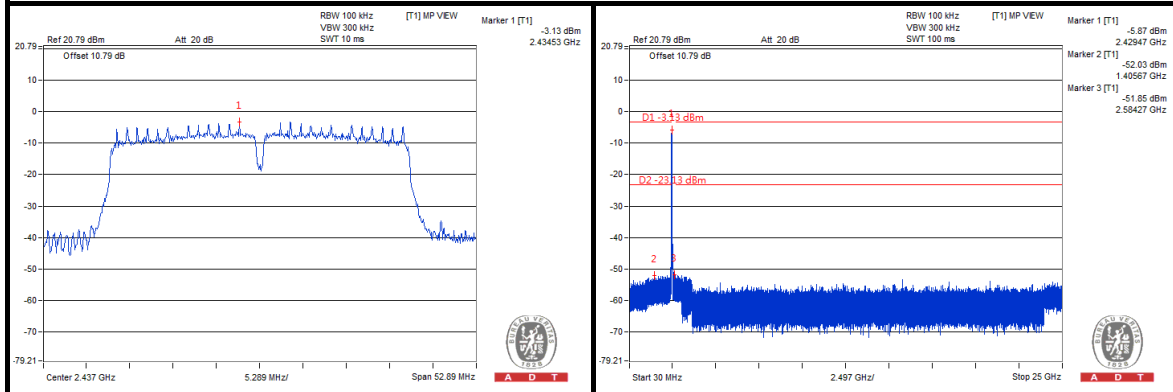
A D T

### 802.11n (40MHz)

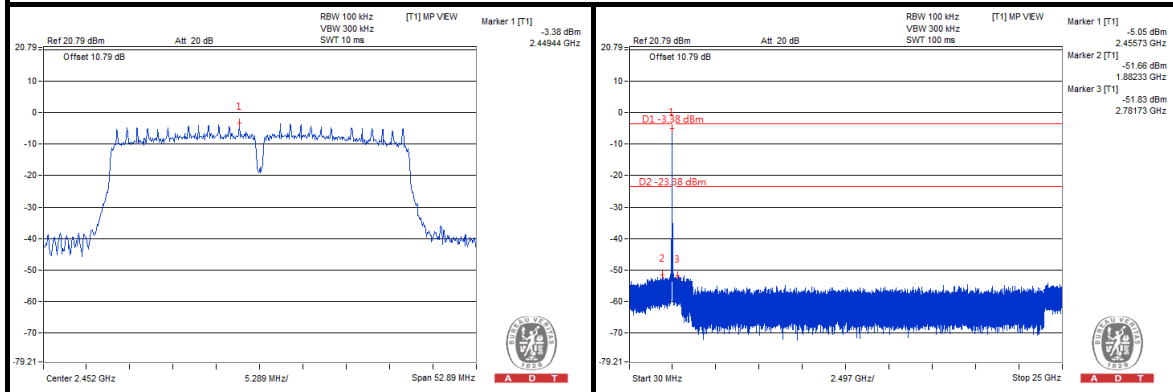
#### CH 3



#### CH 6



#### CH 9





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## 5. PHOTOGRAPHS OF THE TEST CONFIGURATION

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



## 6. 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:

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

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



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## 7. APPENDIX A - MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB

No any modifications are made to the EUT by the lab during the test.

---END---