



# FCC TEST REPORT

**REPORT NO.:** RF140808C12

**MODEL NO.:** EnStation2 (Refer to item 3.1 for more details)

**FCC ID:** A8J-ENSTA2

**RECEIVED:** Jul. 31, 2014

**TESTED:** Jul. 31 ~ Aug. 04, 2014

**ISSUED:** Aug. 11, 2014

**APPLICANT:** EnGenius Technologies

**ADDRESS:** 1580 Scenic Avenue, Costa Mesa, CA92626

**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:** 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
RF140808C12	Original release	Aug. 11, 2014




## 1. CERTIFICATION

**PRODUCT:** 2.4GHz b/g/n N300 CPE  
**MODEL NO.:** EnStation2 (Refer to item 3.1 for more details)  
**BRAND:** EnGenius (Refer to item 3.1 for more details)  
**APPLICANT:** EnGenius Technologies  
**TESTED:** Jul. 31 ~ Aug. 04, 2014  
**TEST SAMPLE:** ENGINEERING SAMPLE  
**STANDARDS:** **FCC Part 15, Subpart C (Section 15.247)**  
ANSI C63.10-2009

The above equipment (model: EnStation2) 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** :  , **DATE** : Aug. 11, 2014  
Pettie Chen / Senior Specialist

**APPROVED BY** :  , **DATE** : Aug. 11, 2014  
Ken Liu / Senior Manager

## 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 -13.50dB at 0.28675MHz.
15.205 & 209	Radiated Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -0.4dB at 2288.00MHz.
15.247(d)	Band Edge Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -1.0dB at 2483.50MHz.
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	Antenna connector is IPEX not a standard connector.

### 2.1 MEASUREMENT UNCERTAINTY

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

MEASUREMENT	FREQUENCY	UNCERTAINTY
Conducted emissions	150kHz~30MHz	2.44 dB
Radiated emissions	30MHz ~ 200MHz	3.34 dB
	200MHz ~1000MHz	3.35 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  $k = 2$ .



### 3. GENERAL INFORMATION

#### 3.1 GENERAL DESCRIPTION OF EUT

<b>EUT</b>	2.4GHz b/g/n N300 CPE
<b>MODEL NO.</b>	EnStation2 (Refer to NOTE for more details)
<b>POWER SUPPLY</b>	24Vdc (PoE)
<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 300.0Mbps
<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>	293.517mW
<b>ANTENNA TYPE</b>	Ant 1: PIFA antenna with 10.5dBi gain Ant 2: PIFA antenna with 11dBi gain
<b>ANTENNA CONNECTOR</b>	IPEX
<b>DATA CABLE</b>	NA
<b>I/O PORTS</b>	Refer to user's manual
<b>ACCESSORY DEVICES</b>	PoE, Adapter for PoE

**NOTE:**

1. The following brands and model are provided to this EUT.

<b>BRAND</b>	<b>MODEL</b>	<b>DESCRIPTION</b>
EnGenius	EnStation2	All product names are electrically identical, different models are for marketing purpose.
emplus	EST200	

\* EnStation2 is the main test model.

2. The EUT is Fixed point-to-point product.
3. The EUT incorporates a MIMO function. Physically, the EUT provides two completed transmitters and two receivers.

<b>MODULATION MODE</b>	<b>TX FUNCTION</b>
802.11b	2TX
802.11g	2TX
802.11n (20MHz)	2TX
802.11n (40MHz)	2TX



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4. The EUT consumes power from the following PoE.

PoE	
<b>BRAND:</b>	EnGenius
<b>MODEL:</b>	EPE-1212
<b>RATING:</b>	12-24Vdc

Adapter for PoE	
<b>BRAND:</b>	Powertron
<b>MODEL:</b>	PA1015-3HU
<b>INPUT:</b>	100-240V~ 50-60Hz 0.4A
<b>OUTPUT:</b>	24V/ 0.6A 14.4W Max
<b>POWER LINE:</b>	1.5m non-shielded cable without core

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

### 3.2 DESCRIPTION OF TEST MODES

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

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	RE≥1G	RE<1G	PLC	APCM	
-	√	√	√	√	-

Where **RE≥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 **Z-plane**.

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

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

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1.0
-	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6.0
-	802.11n (20MHz)	1 to 11	1, 6, 11	OFDM	BPSK	7.2
-	802.11n (40MHz)	3 to 9	3, 6, 9	OFDM	BPSK	15.0

#### **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)
-	802.11b	1 to 11	6	DSSS	DBPSK	1.0

#### **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)
-	802.11b	1 to 11	6	DSSS	DBPSK	1.0



**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 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	7.2
-	802.11n (40MHz)	3 to 9	3, 9	OFDM	BPSK	15.0

**ANTENNA PORT CONDUCTED MEASUREMENT:**

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

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1.0
-	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6.0
-	802.11n (20MHz)	1 to 11	1, 6, 11	OFDM	BPSK	7.2
-	802.11n (40MHz)	3 to 9	3, 6, 9	OFDM	BPSK	15.0

**TEST CONDITION:**

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER (SYSTEM)	TESTED BY
RE≥1G	22deg. C, 74%RH	120Vac, 60Hz	Nick Hsu Jones Chang
RE<1G	22deg. C, 74%RH	120Vac, 60Hz	Jones Chang
PLC	25deg. C, 70%RH	120Vac, 60Hz	Nick Hsu
APCM	24deg. C, 64%RH	120Vac, 60Hz	Match Tsui

### 3.3 DUTY CYCLE OF TEST SIGNAL

**802.11b:** Duty cycle of test signal is =100 %, duty factor is not required.

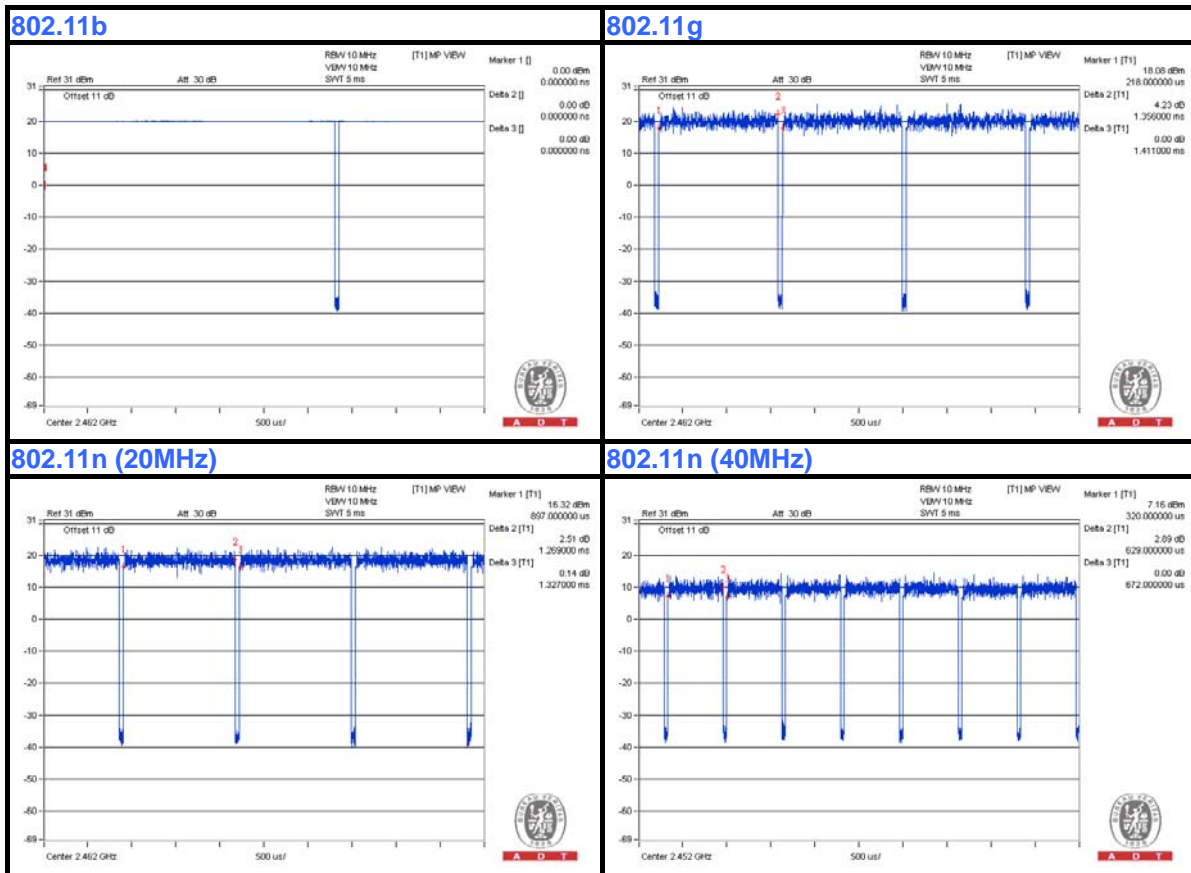
**802.11g, 802.11n (20MHz), 802.11n (40MHz):**

Duty cycle is < 98%, duty factor shall be considered.

**802.11g:** Duty cycle =  $1.356/1.411 = 0.961$ , Duty factor =  $10 * \log(1/0.961) = 0.17$

**802.11n (20MHz):** Duty cycle =  $1.269/1.327 = 0.956$ , Duty factor =  $10 * \log(1/0.956) = 0.19$

**802.11n (40MHz):** Duty cycle =  $0.629/0.672 = 0.936$ , Duty factor =  $10 * \log(1/0.936) = 0.29$



### 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.

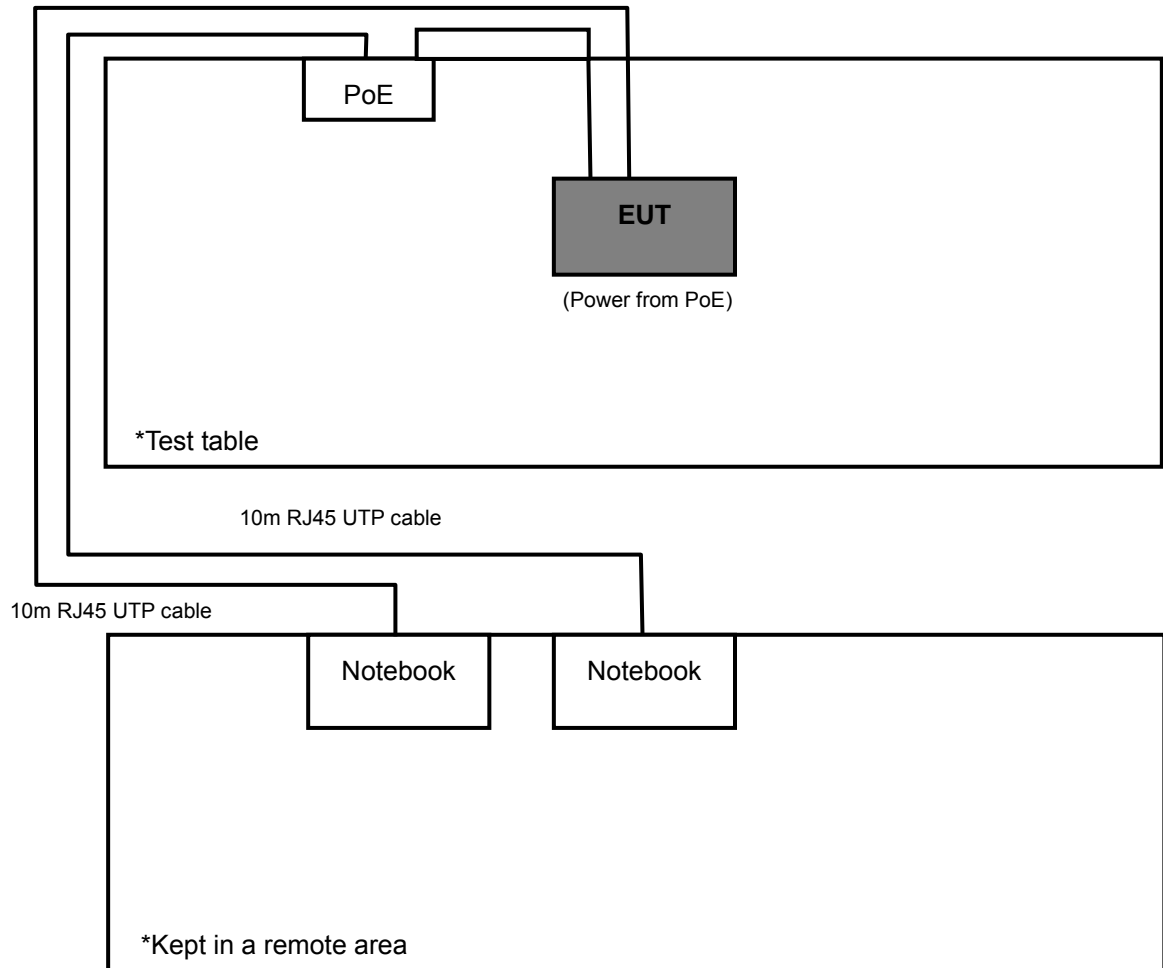
NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	Notebook	DELL	E5410	1HC2XM1	FCC DoC Approved
2	Notebook	lenovo	20AYA00MTW	MP042ERE	FCC DoC Approved

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	10m RJ45 UTP cable without core
2	10m RJ45 UTP cable without core

**NOTE:**

1. All power cords of the above support units are non shielded (1.8m).
2. Items 1-2 acted as communication partner to transfer data.

### 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 v03r02**

**662911 D01 Multiple Transmitter Output v02r01**

**ANSI C63.10-2009**

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 (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 30dB 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 30dB 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	ESIB7	100187	Jan. 02, 2014	Jan. 01, 2015
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100039	Mar. 03, 2014	Mar. 02, 2015
BILOG Antenna SCHWARZBECK	VULB9168	9168-160	Feb. 26, 2014	Feb. 25, 2015
HORN Antenna SCHWARZBECK	9120D	209	Sep. 12, 2013	Sep. 11, 2014
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Feb. 17, 2014	Feb. 16, 2015
Preamplifier Agilent	8447D	2944A10633	Oct. 07, 2013	Oct. 06, 2014
Preamplifier Agilent	8449B	3008A01964	Aug. 26, 2013	Aug. 25, 2014
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	214378/4	Aug. 26, 2013	Aug. 25, 2014
RF signal cable HUBER+SUHNNER	SUCOFLEX 106	12738/6 +309224/4	Aug. 26, 2013	Aug. 25, 2014
Software BV ADT	ADT_Radiated_ V7.6.15.9.4	NA	NA	NA
Antenna Tower inn-co GmbH	MA 4000	013303	NA	NA
Antenna Tower Controller inn-co GmbH	CO2000	017303	NA	NA
Turn Table BV ADT	TT100	TT93021703	NA	NA
Turn Table Controller BV ADT	SC100	SC93021703	NA	NA
JFW 20dB attenuation	50HF-020-SMA	NA	NA	NA
High Speed Peak Power Meter	ML2495A	0824011	Jul. 26, 2014	Jul. 25, 2015
Power Sensor	MA2411B	0738171	Jul. 26, 2014	Jul. 25, 2015

- 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 3.
  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 988962.
  5. The IC Site Registration No. is IC 7450F-3.



#### 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:**

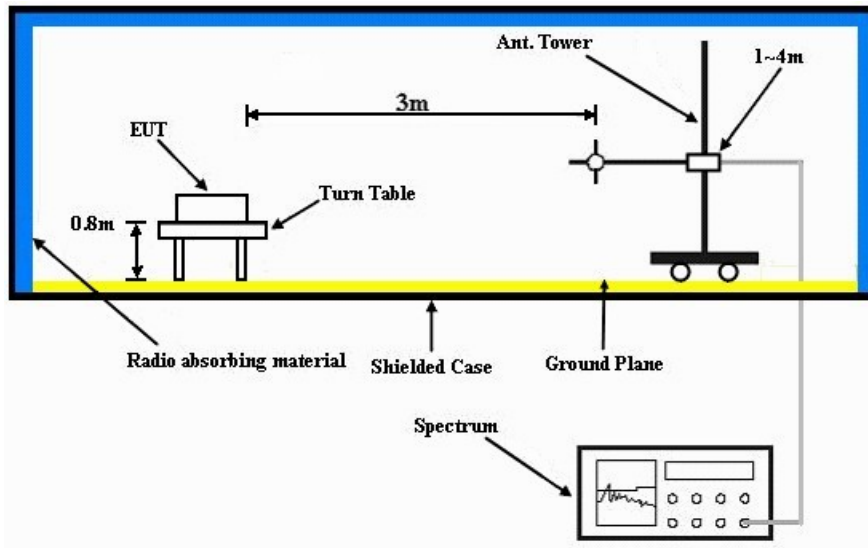
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
3. The resolution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

#### 4.1.4 DEVIATION FROM TEST STANDARD

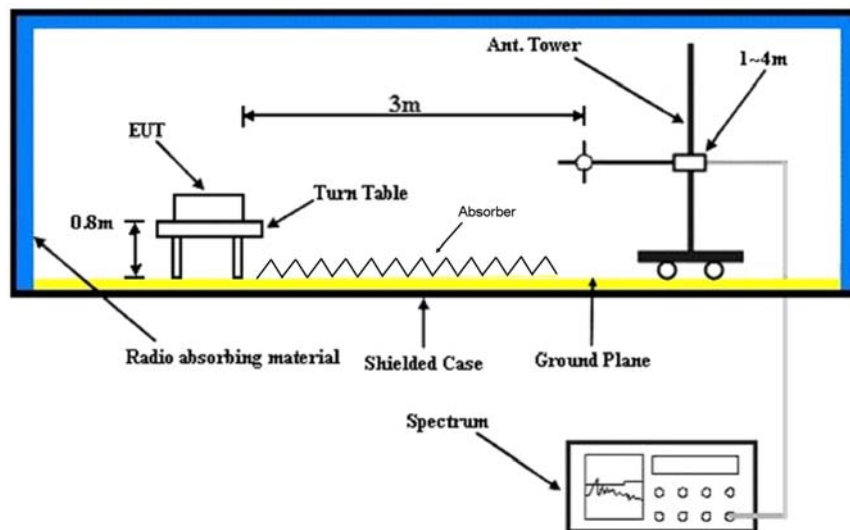
No deviation.

### 4.1.5 TEST SETUP

#### Frequency range 30MHz~1GHz



#### Frequency range above 1GHz



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



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#### 4.1.6 EUT OPERATING CONDITIONS

- a. Placed the EUT on the testing table.
- b. Prepared notebooks to act as communication partners and placed them outside of testing area.
- c. The communication partners connected with EUT via a RJ45 cable and run a test program (provided by manufacturer) to enable EUT under transmission condition continuously at specific channel frequency.
- d. The communication partner sent data to EUT by command "PING".
- e. The necessary accessories enable the system in full functions.



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## 4.1.7 TEST RESULTS

### ABOVE 1GHz DATA :

#### 802.11b

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2288.00	55.2 PK	74.0	-18.8	1.03 H	329	55.30	-0.10
2	2288.00	52.6 AV	54.0	-1.4	1.03 H	329	52.70	-0.10
3	2374.00	61.6 PK	74.0	-12.4	1.00 H	352	30.70	30.90
4	2374.00	51.2 AV	54.0	-2.8	1.00 H	352	20.30	30.90
5	2390.00	61.4 PK	74.0	-12.6	1.00 H	352	30.40	31.00
6	2390.00	50.6 AV	54.0	-3.4	1.00 H	352	19.60	31.00
7	*2412.00	115.1 PK			1.00 H	343	84.00	31.10
8	*2412.00	111.5 AV			1.00 H	343	80.40	31.10
9	4824.00	49.6 PK	74.0	-24.4	1.01 H	26	44.70	4.90
10	4824.00	44.4 AV	54.0	-9.6	1.01 H	26	39.50	4.90
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2288.00	52.7 PK	74.0	-21.3	1.13 V	346	52.80	-0.10
2	2288.00	50.4 AV	54.0	-3.6	1.13 V	346	50.50	-0.10
3	2320.00	58.3 PK	74.0	-15.7	1.17 V	1	27.50	30.80
4	2320.00	50.2 AV	54.0	-3.8	1.17 V	1	19.40	30.80
5	2390.00	64.2 PK	74.0	-9.8	1.14 V	344	33.20	31.00
6	2390.00	52.4 AV	54.0	-1.6	1.14 V	344	21.40	31.00
7	*2412.00	113.9 PK			1.12 V	344	82.80	31.10
8	*2412.00	109.7 AV			1.12 V	344	78.60	31.10
9	4824.00	48.7 PK	74.0	-25.3	1.13 V	360	43.80	4.90
10	4824.00	40.6 AV	54.0	-13.4	1.13 V	360	35.70	4.90
11	#7236.00	52.5 PK	83.9	-31.4	1.00 V	0	41.60	10.90
12	#7236.00	41.1 AV	79.7	-38.6	1.00 V	0	30.20	10.90

#### REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " \* " : Fundamental frequency.
6. " # " : The radiated frequency is out of the restricted band.



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

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

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2288.00	55.6 PK	74.0	-18.4	1.08 H	344	55.70	-0.10
2	2288.00	52.9 AV	54.0	-1.1	1.08 H	344	53.00	-0.10
3	*2437.00	116.4 PK			1.00 H	353	85.20	31.20
4	*2437.00	112.8 AV			1.00 H	353	81.60	31.20
5	2483.50	64.4 PK	74.0	-9.6	1.00 H	354	33.00	31.40
6	2483.50	52.6 AV	54.0	-1.4	1.00 H	354	21.20	31.40
7	4874.00	49.7 PK	74.0	-24.3	1.23 H	316	44.70	5.00
8	4874.00	42.8 AV	54.0	-11.2	1.23 H	316	37.80	5.00

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

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2288.00	50.3 PK	74.0	-23.7	1.17 V	343	50.40	-0.10
2	2288.00	47.0 AV	54.0	-7.0	1.17 V	343	47.10	-0.10
3	2360.00	61.1 PK	74.0	-12.9	1.15 V	348	30.20	30.90
4	2360.00	52.1 AV	54.0	-1.9	1.15 V	348	21.20	30.90
5	*2437.00	115.3 PK			1.15 V	349	84.10	31.20
6	*2437.00	111.4 AV			1.15 V	349	80.20	31.20
7	2483.50	60.3 PK	74.0	-13.7	1.18 V	333	28.90	31.40
8	2483.50	48.6 AV	54.0	-5.4	1.18 V	333	17.20	31.40
9	4874.00	50.0 PK	74.0	-24.0	1.00 V	355	45.00	5.00
10	4874.00	44.6 AV	54.0	-9.4	1.00 V	355	39.60	5.00

**REMARKS:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " \* ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.



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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2288.00	55.6 PK	74.0	-18.4	1.08 H	344	55.70	-0.10
2	2288.00	52.9 AV	54.0	-1.1	1.08 H	344	53.00	-0.10
3	*2462.00	116.5 PK			1.00 H	353	85.20	31.30
4	*2462.00	112.9 AV			1.00 H	353	81.60	31.30
5	2483.50	64.4 PK	74.0	-9.6	1.00 H	354	33.00	31.40
6	2483.50	52.6 AV	54.0	-1.4	1.00 H	354	21.20	31.40
7	4924.00	49.9 PK	74.0	-24.1	1.23 H	316	44.70	5.20
8	4924.00	43.0 AV	54.0	-11.0	1.23 H	316	37.80	5.20
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2288.00	49.7 PK	74.0	-24.3	1.18 V	358	49.80	-0.10
2	2288.00	46.3 AV	54.0	-7.7	1.18 V	358	46.40	-0.10
3	*2462.00	112.1 PK			1.12 V	354	80.80	31.30
4	*2462.00	108.5 AV			1.12 V	354	77.20	31.30
5	2483.50	64.5 PK	74.0	-9.5	1.11 V	351	33.10	31.40
6	2483.50	52.3 AV	54.0	-1.7	1.11 V	351	20.90	31.40
7	4924.00	48.4 PK	74.0	-25.6	1.10 V	359	43.20	5.20
8	4924.00	38.1 AV	54.0	-15.9	1.10 V	359	32.90	5.20

**REMARKS:**

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



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802.11g

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

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

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2288.00	56.8 PK	74.0	-17.2	1.03 H	346	56.90	-0.10
2	<b>2288.00</b>	<b>53.6 AV</b>	<b>54.0</b>	<b>-0.4</b>	<b>1.03 H</b>	<b>346</b>	<b>53.70</b>	<b>-0.10</b>
3	2320.00	55.8 PK	74.0	-18.2	1.00 H	52	25.00	30.80
4	2320.00	44.3 AV	54.0	-9.7	1.00 H	52	13.50	30.80
5	2390.00	63.6 PK	74.0	-10.4	1.00 H	356	32.60	31.00
6	2390.00	52.2 AV	54.0	-1.8	1.00 H	356	21.20	31.00
7	*2412.00	114.2 PK			1.00 H	1	83.10	31.10
8	*2412.00	104.9 AV			1.00 H	1	73.80	31.10
9	4824.00	48.0 PK	74.0	-26.0	1.16 H	132	43.10	4.90
10	4824.00	34.9 AV	54.0	-19.1	1.16 H	132	30.00	4.90

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

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2288.00	53.2 PK	74.0	-20.8	1.14 V	344	53.30	-0.10
2	2288.00	50.0 AV	54.0	-4.0	1.14 V	344	50.10	-0.10
3	2320.00	59.1 PK	74.0	-14.9	1.13 V	339	28.30	30.80
4	2320.00	52.3 AV	54.0	-1.7	1.13 V	339	21.50	30.80
5	2390.00	71.2 PK	74.0	-2.8	1.12 V	345	40.20	31.00
6	2390.00	52.8 AV	54.0	-1.2	1.12 V	345	21.80	31.00
7	*2412.00	112.3 PK			1.08 V	0	81.20	31.10
8	*2412.00	102.3 AV			1.08 V	0	71.20	31.10
9	4824.00	47.6 PK	74.0	-26.4	1.19 V	180	42.70	4.90
10	4824.00	34.4 AV	54.0	-19.6	1.19 V	180	29.50	4.90

**REMARKS:**

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



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

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

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2288.00	56.7 PK	74.0	-17.3	1.06 H	342	56.80	-0.10
2	2288.00	53.5 AV	54.0	-0.5	1.06 H	342	53.60	-0.10
3	2390.00	62.0 PK	74.0	-12.0	1.00 H	342	31.00	31.00
4	2390.00	51.3 AV	54.0	-2.7	1.00 H	342	20.30	31.00
5	*2437.00	119.4 PK			1.00 H	345	88.20	31.20
6	*2437.00	109.9 AV			1.00 H	345	78.70	31.20
7	2483.50	64.1 PK	74.0	-9.9	1.00 H	348	32.70	31.40
8	2483.50	52.0 AV	54.0	-2.0	1.00 H	348	20.60	31.40
9	4874.00	48.4 PK	74.0	-25.6	1.09 H	355	43.40	5.00
10	4874.00	35.0 AV	54.0	-19.0	1.09 H	355	30.00	5.00

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

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2288.00	52.9 PK	74.0	-21.1	1.16 V	343	53.00	-0.10
2	2288.00	49.4 AV	54.0	-4.6	1.16 V	343	49.50	-0.10
3	2360.00	61.5 PK	74.0	-12.5	1.15 V	344	30.60	30.90
4	2360.00	52.6 AV	54.0	-1.4	1.15 V	344	21.70	30.90
5	*2437.00	118.4 PK			1.12 V	346	87.20	31.20
6	*2437.00	107.2 AV			1.12 V	346	76.00	31.20
7	2483.50	67.2 PK	74.0	-6.8	1.08 V	341	35.80	31.40
8	2483.50	51.9 AV	54.0	-2.1	1.08 V	341	20.50	31.40
9	4874.00	47.9 PK	74.0	-26.1	1.25 V	183	42.90	5.00
10	4874.00	34.2 AV	54.0	-19.8	1.25 V	183	29.20	5.00

**REMARKS:**

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





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

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

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2288.00	56.5 PK	74.0	-17.5	1.08 H	341	56.60	-0.10
2	2288.00	53.3 AV	54.0	-0.7	1.08 H	341	53.40	-0.10
3	*2462.00	115.8 PK			1.00 H	350	84.50	31.30
4	*2462.00	106.6 AV			1.00 H	350	75.30	31.30
5	2483.50	67.4 PK	74.0	-6.6	1.00 H	345	36.00	31.40
6	2483.50	52.3 AV	54.0	-1.7	1.00 H	345	20.90	31.40
7	4924.00	48.1 PK	74.0	-25.9	1.25 H	16	42.90	5.20
8	4924.00	34.7 AV	54.0	-19.3	1.25 H	16	29.50	5.20

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

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2288.00	52.8 PK	74.0	-21.2	1.15 V	346	52.90	-0.10
2	2288.00	49.5 AV	54.0	-4.5	1.15 V	346	49.60	-0.10
3	*2462.00	114.5 PK			1.12 V	0	83.20	31.30
4	*2462.00	104.0 AV			1.12 V	0	72.70	31.30
5	2483.50	69.6 PK	74.0	-4.4	1.10 V	341	38.20	31.40
6	2483.50	52.4 AV	54.0	-1.6	1.10 V	341	21.00	31.40
7	4924.00	47.9 PK	74.0	-26.1	1.15 V	346	42.70	5.20
8	4924.00	34.5 AV	54.0	-19.5	1.15 V	346	29.30	5.20

**REMARKS:**

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



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## 802.11n (20MHz)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2288.00	56.1 PK	74.0	-17.9	1.07 H	335	56.20	-0.10
2	2288.00	52.9 AV	54.0	-1.1	1.07 H	335	53.00	-0.10
3	2390.00	61.3 PK	74.0	-12.7	1.00 H	359	30.30	31.00
4	2390.00	50.7 AV	54.0	-3.3	1.00 H	359	19.70	31.00
5	*2412.00	112.9 PK			1.00 H	358	81.80	31.10
6	*2412.00	103.3 AV			1.00 H	358	72.20	31.10
7	4824.00	47.3 PK	74.0	-26.7	1.21 H	190	42.40	4.90
8	4824.00	34.2 AV	54.0	-19.8	1.21 H	190	29.30	4.90
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2288.00	52.3 PK	74.0	-21.7	1.13 V	344	52.40	-0.10
2	2288.00	49.4 AV	54.0	-4.6	1.13 V	344	49.50	-0.10
3	2390.00	72.0 PK	74.0	-2.0	1.16 V	343	41.00	31.00
4	2390.00	52.9 AV	54.0	-1.1	1.16 V	343	21.90	31.00
5	*2412.00	112.0 PK			1.15 V	338	80.90	31.10
6	*2412.00	102.0 AV			1.15 V	338	70.90	31.10
7	4824.00	47.0 PK	74.0	-27.0	1.30 V	44	42.10	4.90
8	4824.00	33.9 AV	54.0	-20.1	1.30 V	44	29.00	4.90

## REMARKS:

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



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

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

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2288.00	57.1 PK	74.0	-16.9	1.05 H	340	57.20	-0.10
2	<b>2288.00</b>	<b>53.6 AV</b>	<b>54.0</b>	<b>-0.4</b>	<b>1.05 H</b>	<b>340</b>	<b>53.70</b>	<b>-0.10</b>
3	2390.00	61.9 PK	74.0	-12.1	1.00 H	350	30.90	31.00
4	2390.00	51.6 AV	54.0	-2.4	1.00 H	350	20.60	31.00
5	*2437.00	119.4 PK			1.00 H	351	88.20	31.20
6	*2437.00	110.3 AV			1.00 H	351	79.10	31.20
7	2483.50	64.9 PK	74.0	-9.1	1.01 H	355	33.50	31.40
8	2483.50	52.6 AV	54.0	-1.4	1.01 H	355	21.20	31.40
9	4874.00	47.6 PK	74.0	-26.4	1.10 H	148	42.60	5.00
10	4874.00	34.5 AV	54.0	-19.5	1.10 H	148	29.50	5.00

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

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2288.00	52.1 PK	74.0	-21.9	1.14 V	335	52.20	-0.10
2	2288.00	49.3 AV	54.0	-4.7	1.14 V	335	49.40	-0.10
3	2360.00	65.4 PK	74.0	-8.6	1.12 V	343	34.50	30.90
4	2360.00	52.2 AV	54.0	-1.8	1.12 V	343	21.30	30.90
5	*2437.00	117.6 PK			1.14 V	338	86.40	31.20
6	*2437.00	107.7 AV			1.14 V	338	76.50	31.20
7	2483.50	63.6 PK	74.0	-10.4	1.15 V	346	32.20	31.40
8	2483.50	51.3 AV	54.0	-2.7	1.15 V	346	19.90	31.40
9	4874.00	47.4 PK	74.0	-26.6	1.25 V	38	42.40	5.00
10	4874.00	34.2 AV	54.0	-19.8	1.25 V	38	29.20	5.00

**REMARKS:**

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



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

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

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2288.00	56.6 PK	74.0	-17.4	1.08 H	342	56.70	-0.10
2	2288.00	53.3 AV	54.0	-0.7	1.08 H	342	53.40	-0.10
3	*2462.00	114.3 PK			1.00 H	1	83.00	31.30
4	*2462.00	104.5 AV			1.00 H	1	73.20	31.30
5	2483.50	68.6 PK	74.0	-5.4	1.00 H	349	37.20	31.40
6	2483.50	52.3 AV	54.0	-1.7	1.00 H	349	20.90	31.40
7	4924.00	48.1 PK	74.0	-25.9	1.16 H	288	42.90	5.20
8	4924.00	34.5 AV	54.0	-19.5	1.26 H	20	29.30	5.20

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

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2288.00	52.8 PK	74.0	-21.2	1.16 V	346	52.90	-0.10
2	2288.00	49.7 AV	54.0	-4.3	1.16 V	346	49.80	-0.10
3	*2462.00	112.5 PK			1.15 V	244	81.20	31.30
4	*2462.00	102.3 AV			1.15 V	244	71.00	31.30
5	2483.50	69.0 PK	74.0	-5.0	1.10 V	343	37.60	31.40
6	2483.50	53.0 AV	54.0	-1.0	1.10 V	343	21.60	31.40
7	4924.00	47.8 PK	74.0	-26.2	1.26 V	20	42.60	5.20
8	4924.00	34.2 AV	54.0	-19.8	1.26 V	20	29.00	5.20

**REMARKS:**

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



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802.11n (40MHz)

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

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

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2288.00	56.6 PK	74.0	-17.4	1.08 H	343	56.70	-0.10
2	<b>2288.00</b>	<b>53.6 AV</b>	<b>54.0</b>	<b>-0.4</b>	<b>1.08 H</b>	<b>343</b>	<b>53.70</b>	<b>-0.10</b>
3	2390.00	61.0 PK	74.0	-13.0	1.00 H	340	30.00	31.00
4	2390.00	51.5 AV	54.0	-2.5	1.00 H	340	20.50	31.00
5	*2422.00	107.7 PK			1.00 H	352	76.50	31.20
6	*2422.00	98.2 AV			1.00 H	352	67.00	31.20
7	4844.00	47.2 PK	74.0	-26.8	1.08 H	200	42.20	5.00
8	4844.00	33.7 AV	54.0	-20.3	1.08 H	200	28.70	5.00

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

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2288.00	52.1 PK	74.0	-21.9	1.15 V	346	52.20	-0.10
2	2288.00	49.1 AV	54.0	-4.9	1.15 V	346	49.20	-0.10
3	2390.00	70.2 PK	74.0	-3.8	1.16 V	350	39.20	31.00
4	2390.00	52.7 AV	54.0	-1.3	1.16 V	350	21.70	31.00
5	*2422.00	106.9 PK			1.14 V	342	75.70	31.20
6	*2422.00	95.3 AV			1.14 V	342	64.10	31.20
7	4844.00	47.0 PK	74.0	-27.0	1.28 V	150	42.00	5.00
8	4844.00	33.5 AV	54.0	-20.5	1.28 V	150	28.50	5.00

**REMARKS:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " \* ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.



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

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

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2288.00	56.6 PK	74.0	-17.4	1.06 H	338	56.70	-0.10
2	<b>2288.00</b>	<b>53.6 AV</b>	<b>54.0</b>	<b>-0.4</b>	<b>1.06 H</b>	<b>338</b>	<b>53.70</b>	<b>-0.10</b>
3	2390.00	59.5 PK	74.0	-14.5	1.01 H	349	28.50	31.00
4	2390.00	49.4 AV	54.0	-4.6	1.01 H	349	18.40	31.00
5	*2437.00	111.9 PK			1.00 H	1	80.70	31.20
6	*2437.00	102.0 AV			1.00 H	1	70.80	31.20
7	2483.50	56.2 PK	74.0	-17.8	1.03 H	351	24.80	31.40
8	2483.50	50.3 AV	54.0	-3.7	1.03 H	351	18.90	31.40
9	4874.00	46.9 PK	74.0	-27.1	1.15 H	193	41.90	5.00
10	4874.00	33.6 AV	54.0	-20.4	1.15 H	193	28.60	5.00

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

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2288.00	52.0 PK	74.0	-22.0	1.11 V	337	52.10	-0.10
2	2288.00	48.9 AV	54.0	-5.1	1.11 V	337	49.00	-0.10
3	2390.00	69.5 PK	74.0	-4.5	1.15 V	347	38.50	31.00
4	2390.00	52.4 AV	54.0	-1.6	1.15 V	347	21.40	31.00
5	*2437.00	109.8 PK			1.14 V	346	78.60	31.20
6	*2437.00	99.9 AV			1.14 V	346	68.70	31.20
7	2483.50	64.9 PK	74.0	-9.1	1.16 V	340	33.50	31.40
8	2483.50	51.5 AV	54.0	-2.5	1.16 V	340	20.10	31.40
9	4874.00	46.8 PK	74.0	-27.2	1.25 V	273	41.80	5.00
10	4874.00	33.4 AV	54.0	-20.6	1.25 V	273	28.40	5.00

**REMARKS:**

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



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

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

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2288.00	56.2 PK	74.0	-17.8	1.06 H	349	56.30	-0.10
2	2288.00	53.6 AV	54.0	-0.4	1.06 H	349	53.70	-0.10
3	*2452.00	106.8 PK			1.00 H	355	75.50	31.30
4	*2452.00	97.5 AV			1.00 H	355	66.20	31.30
5	2483.50	72.1 PK	74.0	-1.9	1.00 H	359	40.70	31.40
6	2483.50	52.8 AV	54.0	-1.2	1.00 H	359	21.40	31.40
7	4904.00	47.2 PK	74.0	-26.8	1.07 H	233	42.10	5.10
8	4904.00	33.7 AV	54.0	-20.3	1.07 H	233	28.60	5.10

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

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2288.00	52.2 PK	74.0	-21.8	1.16 V	350	52.30	-0.10
2	2288.00	49.6 AV	54.0	-4.4	1.16 V	350	49.70	-0.10
3	*2452.00	106.0 PK			1.12 V	341	74.70	31.30
4	*2452.00	95.0 AV			1.12 V	341	63.70	31.30
5	2483.50	72.2 PK	74.0	-1.8	1.11 V	342	40.80	31.40
6	2483.50	52.7 AV	54.0	-1.3	1.11 V	342	21.30	31.40
7	4904.00	47.0 PK	74.0	-27.0	1.21 V	29	41.90	5.10
8	4904.00	33.3 AV	54.0	-20.7	1.21 V	29	28.20	5.10

**REMARKS:**

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



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**BELOW 1GHz WORST-CASE DATA:**

**802.11b**

<b>CHANNEL</b>	TX Channel 6	<b>DETECTOR FUNCTION</b>	Quasi-Peak (QP)
<b>FREQUENCY RANGE</b>	30MHz ~ 1GHz		

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

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	57.12	32.5 QP	40.0	-7.5	2.00 H	279	47.10	-14.60
2	96.01	30.3 QP	43.5	-13.2	2.00 H	222	49.60	-19.30
3	146.56	28.5 QP	43.5	-15.0	2.00 H	92	42.50	-14.00
4	294.32	26.7 QP	46.0	-19.3	1.01 H	208	39.10	-12.40
5	399.31	27.8 QP	46.0	-18.2	2.00 H	110	38.20	-10.40
6	852.33	31.7 QP	46.0	-14.3	1.50 H	124	33.10	-1.40

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

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	45.45	38.5 QP	40.0	-1.5	1.00 V	250	53.20	-14.70
2	96.01	36.3 QP	43.5	-7.2	1.00 V	56	55.60	-19.30
3	142.67	29.0 QP	43.5	-14.5	1.00 V	317	43.30	-14.30
4	399.31	28.0 QP	46.0	-18.0	1.49 V	16	38.40	-10.40
5	856.22	32.8 QP	46.0	-13.2	1.00 V	183	34.10	-1.30
6	893.16	32.6 QP	46.0	-13.4	1.00 V	176	33.30	-0.70

**REMARKS:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value



## 4.2 CONDUCTED EMISSION MEASUREMENT

### 4.2.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

FREQUENCY 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	100289	Nov. 29, 2013	Nov. 28, 2014
RF signal cable Woken	5D-FB	Cable-HYC01-01	Dec. 27, 2013	Dec. 26, 2014
LISN ROHDE & SCHWARZ (EUT)	ESH3-Z5	835239/001	Feb. 13, 2014	Feb. 12, 2015
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100311	Jul. 21, 2014	Jul. 20, 2015
Software ADT	BV ADT_Cond_ V7.3.7.3	NA	NA	NA

- NOTE:** 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in HwaYa Shielded Room 1.
3. The VCCI Site Registration No. is C-2040.

#### 4.2.3 TEST PROCEDURES

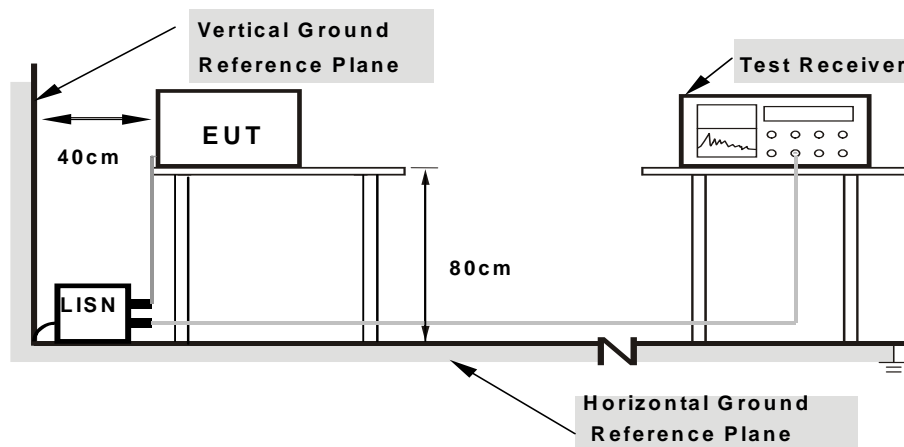
- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling 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.

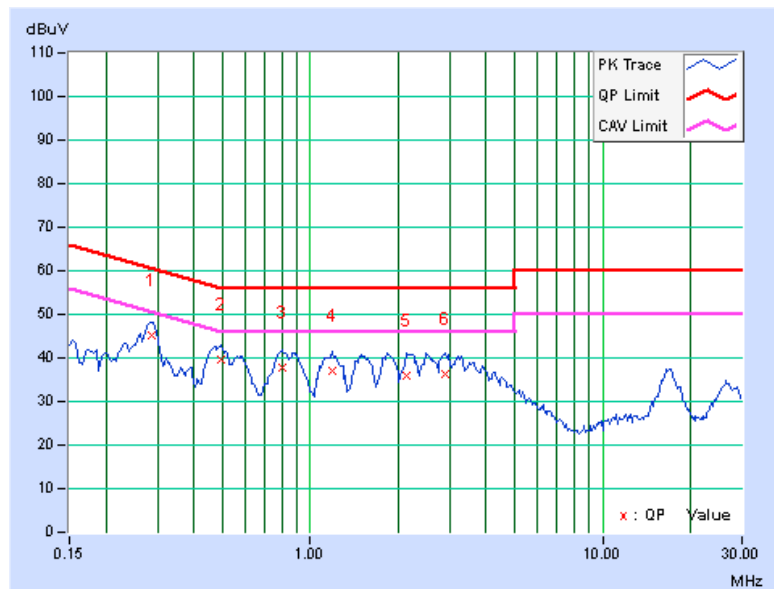
## 4.2.7 TEST RESULTS

### CONDUCTED WORST-CASE DATA : 802.11b

PHASE	Line 1	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	0.28675	0.23	44.88	36.89	45.11	37.12	60.62	50.62	-15.51	-13.50
2	0.49375	0.23	39.28	31.08	39.51	31.31	56.10	46.10	-16.59	-14.79
3	0.80625	0.27	37.66	29.93	37.93	30.20	56.00	46.00	-18.07	-15.80
4	1.19141	0.31	36.85	30.21	37.16	30.52	56.00	46.00	-18.84	-15.48
5	2.12500	0.37	35.46	27.06	35.83	27.43	56.00	46.00	-20.17	-18.57
6	2.89453	0.40	36.06	28.60	36.46	29.00	56.00	46.00	-19.54	-17.00

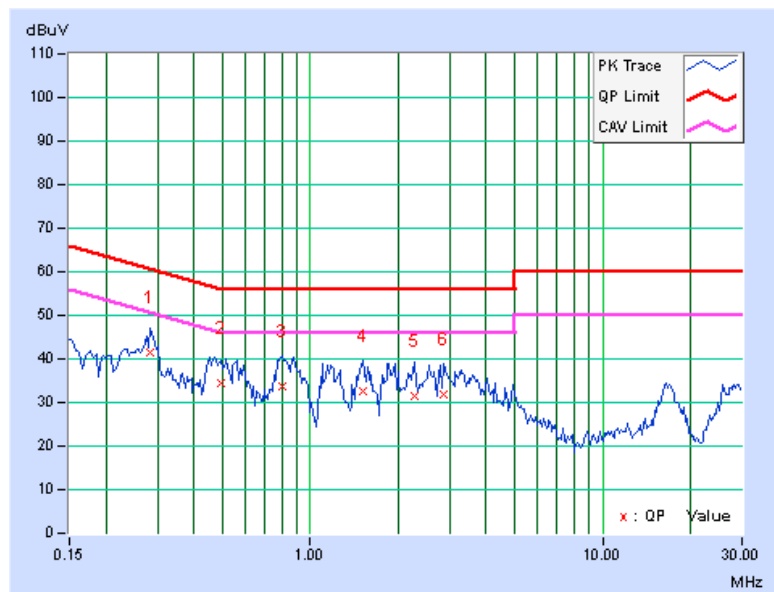
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
  2. The emission levels of other frequencies were very low against the limit.
  3. Margin value = Emission level - Limit value
  4. Correction factor = Insertion loss + Cable loss
  5. Emission Level = Correction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



PHASE	Line 2	6dB BANDWIDTH	9kHz
-------	--------	---------------	------

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	0.28281	0.26	41.07	32.40	41.33	32.66	60.73	50.73	-19.40	-18.07
2	0.49669	0.30	34.02	25.07	34.32	25.37	56.06	46.06	-21.74	-20.69
3	0.80625	0.29	33.27	24.06	33.56	24.35	56.00	46.00	-22.44	-21.65
4	1.51953	0.34	32.18	23.99	32.52	24.33	56.00	46.00	-23.48	-21.67
5	2.28516	0.40	31.15	22.05	31.55	22.45	56.00	46.00	-24.45	-23.55
6	2.87109	0.43	31.24	21.96	31.67	22.39	56.00	46.00	-24.33	-23.61

- 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.

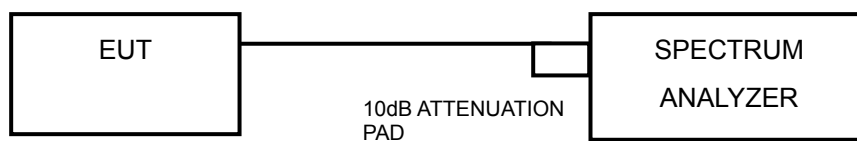


## 4.3 6dB BANDWIDTH MEASUREMENT

### 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 RESULTS

## 802.11b

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1		
1	2412	10.13	10.11	0.5	PASS
6	2437	10.13	10.13	0.5	PASS
11	2462	10.13	10.11	0.5	PASS

## 802.11g

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1		
1	2412	16.33	16.41	0.5	PASS
6	2437	16.14	16.39	0.5	PASS
11	2462	16.42	16.38	0.5	PASS

## 802.11n (20MHz)

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1		
1	2412	17.40	17.61	0.5	PASS
6	2437	17.08	17.58	0.5	PASS
11	2462	17.33	17.59	0.5	PASS

## 802.11n (40MHz)

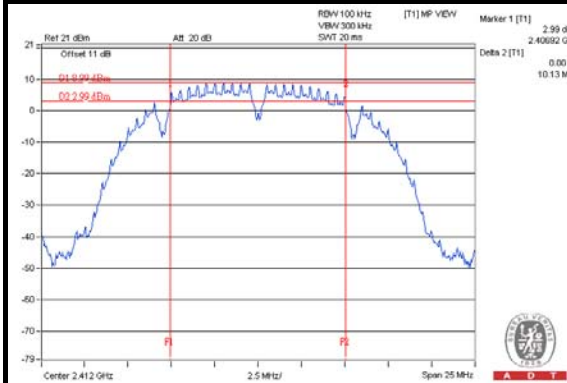
CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1		
3	2422	36.43	36.46	0.5	PASS
6	2437	36.44	36.43	0.5	PASS
9	2452	36.46	36.43	0.5	PASS



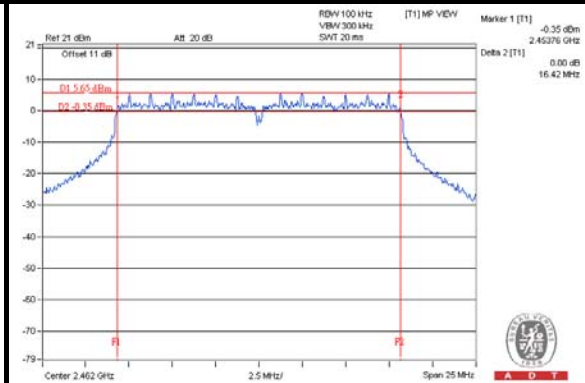
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### SPECTRUM PLOT OF WORST VALUE

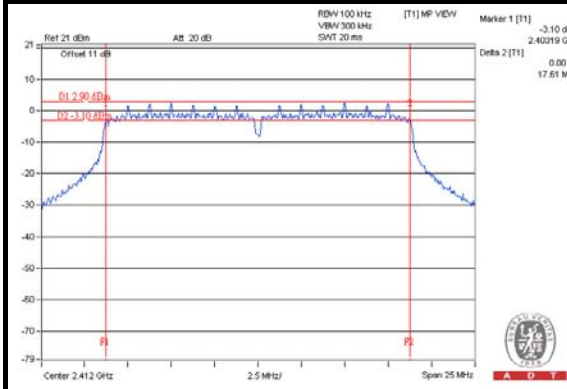
**802.11b**



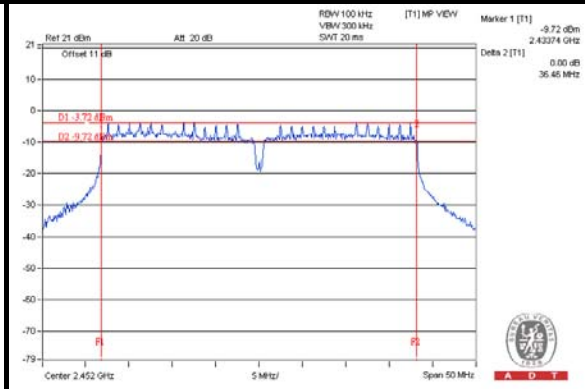
**802.11g**



**802.11n (20MHz)**



**802.11n (40MHz)**



## 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)

Per KDB 662911 D01 Multiple Transmitter Output v02r01 Method of conducted output power measurement on IEEE 802.11 devices,

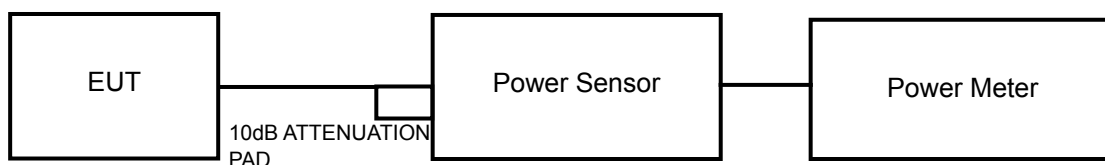
Array Gain = 0 dB (i.e., no array gain) for  $NANT \leq 4$ ;

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

Array Gain =  $5 \log(NANT/NSS)$  dB or 3 dB, whichever is less for 20-MHz channel widths with  $NANT \geq 5$ .

For power measurements on all other devices: Array Gain =  $10 \log(NANT/NSS)$  dB.

### 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

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





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#### 4.4.5 DEVIATION FROM TEST STANDARD

No deviation.

#### 4.4.6 EUT OPERATING CONDITIONS

Same as Item 4.3.6.



#### 4.4.7 TEST RESULTS

##### 802.11b

CHAN.	FREQ. (MHz)	AVG. POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
1	2412	18.93	18.70	152.294	21.83	28.33	PASS
6	2437	21.76	21.57	<b>293.517</b>	24.68	28.33	PASS
11	2462	18.94	18.85	155.079	21.91	28.33	PASS

Max. Gain = 11 > 6dBi, so the conducted power limit shall be reduced to  $30 - [(11-6)/3] = 28.33\text{dBm}$ .

##### 802.11g

CHAN.	FREQ. (MHz)	AVG. POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
1	2412	15.01	15.41	66.450	18.22	28.33	PASS
6	2437	20.11	19.49	191.485	22.82	28.33	PASS
11	2462	17.33	16.85	102.492	20.11	28.33	PASS

Max. Gain = 11 > 6dBi, so the conducted power limit shall be reduced to  $30 - [(11-6)/3] = 28.33\text{dBm}$ .

##### 802.11n (20MHz)

CHAN.	FREQ. (MHz)	AVG. POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
1	2412	14.23	14.42	54.154	17.34	28.33	PASS
6	2437	19.91	19.65	190.206	22.79	28.33	PASS
11	2462	15.50	15.42	70.315	18.47	28.33	PASS

Max. Gain = 11 > 6dBi, so the conducted power limit shall be reduced to  $30 - [(11-6)/3] = 28.33\text{dBm}$ .

##### 802.11n (40MHz)

CHAN.	FREQ. (MHz)	AVG. POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
3	2422	11.69	11.20	27.940	14.46	28.33	PASS
6	2437	15.66	16.01	76.715	18.85	28.33	PASS
9	2452	10.70	11.04	24.455	13.88	28.33	PASS

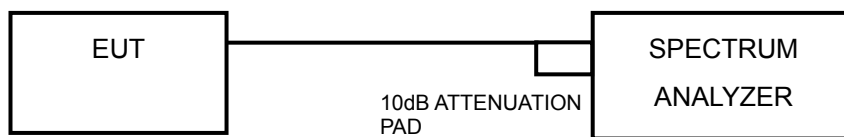
Max. Gain = 11 > 6dBi, so the conducted power limit shall be reduced to  $30 - [(11-6)/3] = 28.33\text{dBm}$ .

## 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

- a) Set instrument center frequency to DTS channel center frequency.
- b) Set span to at least 1.5 times the OBW.
- c) Set RBW to:  $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$ .
- d) Set VBW  $\geq 3 \times \text{RBW}$ .
- e) Detector = power averaging (RMS) or sample detector (when RMS not available).
- f) Ensure that the number of measurement points in the sweep  $\geq 2 \times \text{span}/\text{RBW}$ .
- g) Sweep time = auto couple.
- h) Employ trace averaging (RMS) mode over a minimum of 100 traces.
- i) Use the peak marker function to determine the maximum amplitude level.

### 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

TX chain	Channel	Freq. (MHz)	PSD (dBm)	10 log (N=2) dB	Total PSD (dBm)	Limit (dBm)	PASS /FAIL
0	1	2412	-10.76	3.01	-7.75	5.41	PASS
	6	2437	-8.13	3.01	-5.12	5.41	PASS
	11	2462	-10.12	3.01	-7.11	5.41	PASS
1	1	2412	-10.90	3.01	-7.89	5.41	PASS
	6	2437	-8.34	3.01	-5.33	5.41	PASS
	11	2462	-10.39	3.01	-7.38	5.41	PASS

**NOTE:** Directional gain =  $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2]$  = 13.76dBi > 6dBi , so the power density limit shall be reduced to  $8 - [(13.76 - 6)/3] = 5.41$ dBm.

### 802.11g

TX chain	Channel	Freq. (MHz)	PSD (dBm)	10 log (N=2) dB	Duty Factor	Total PSD (dBm)	Limit (dBm)	PASS /FAIL
0	1	2412	-15.57	3.01	0.17	-12.39	5.41	PASS
	6	2437	-11.19	3.01	0.17	-8.01	5.41	PASS
	11	2462	-10.53	3.01	0.17	-7.35	5.41	PASS
1	1	2412	-15.80	3.01	0.17	-12.62	5.41	PASS
	6	2437	-12.04	3.01	0.17	-8.86	5.41	PASS
	11	2462	-14.05	3.01	0.17	-10.87	5.41	PASS

**NOTE:**

- Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
- Directional gain =  $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2]$  = 13.76dBi > 6dBi , so the power density limit shall be reduced to  $8 - [(13.76 - 6)/3] = 5.41$ dBm.
- Refer to section 3.3 for duty cycle spectrum plot.



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### 802.11n (20MHz)

TX chain	Channel	Freq. (MHz)	PSD (dBm)	10 log (N=2) dB	Duty Factor	Total PSD (dBm)	Limit (dBm)	PASS /FAIL
0	1	2412	-15.86	3.01	0.19	-12.66	5.41	PASS
	6	2437	-11.43	3.01	0.19	-8.23	5.41	PASS
	11	2462	-9.69	3.01	0.19	-6.49	5.41	PASS
1	1	2412	-17.43	3.01	0.19	-14.23	5.41	PASS
	6	2437	-11.94	3.01	0.19	-8.74	5.41	PASS
	11	2462	-16.14	3.01	0.19	-12.94	5.41	PASS

#### NOTE:

1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Directional gain =  $10 \log[(10^{G^1/20} + 10^{G^2/20} + \dots + 10^{G^N/20})^2]$  = 13.76dBi > 6dBi , so the power density limit shall be reduced to  $8 - [(13.76 - 6)/3] = 5.41$ dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

### 802.11n (40MHz)

TX chain	Channel	Freq. (MHz)	PSD (dBm)	10 log (N=2) dB	Duty Factor	Total PSD (dBm)	Limit (dBm)	PSD (dBm)
0	3	2422	-21.16	3.01	0.29	-17.86	5.41	PASS
	6	2437	-18.39	3.01	0.29	-15.09	5.41	PASS
	9	2452	-22.71	3.01	0.29	-19.41	5.41	PASS
1	3	2422	-22.99	3.01	0.29	-19.69	5.41	PASS
	6	2437	-17.87	3.01	0.29	-14.57	5.41	PASS
	9	2452	-22.59	3.01	0.29	-19.29	5.41	PASS

#### NOTE:

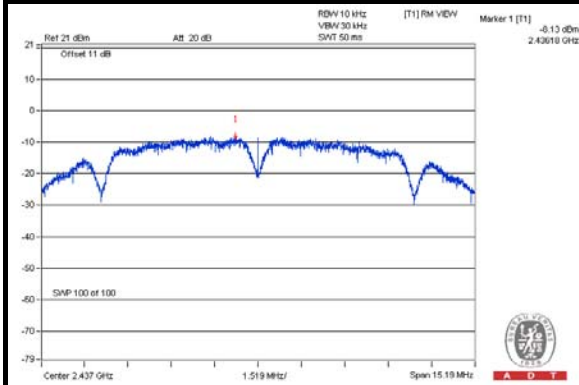
1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Directional gain =  $10 \log[(10^{G^1/20} + 10^{G^2/20} + \dots + 10^{G^N/20})^2]$  = 13.76dBi > 6dBi , so the power density limit shall be reduced to  $8 - [(13.76 - 6)/3] = 5.41$ dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.



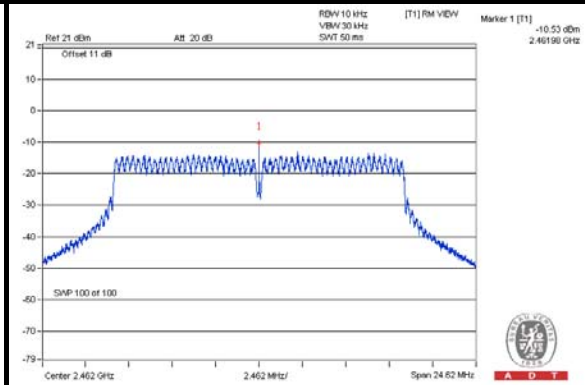
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### SPECTRUM PLOT OF WORST VALUE

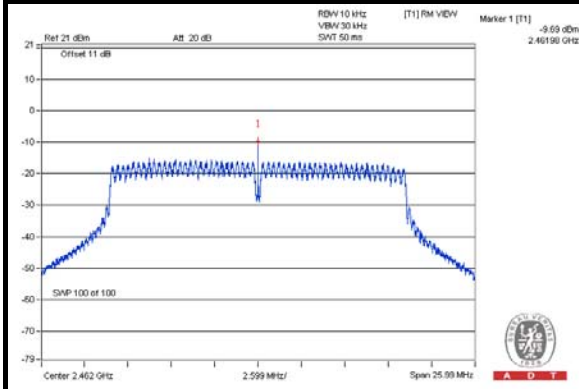
**802.11b**



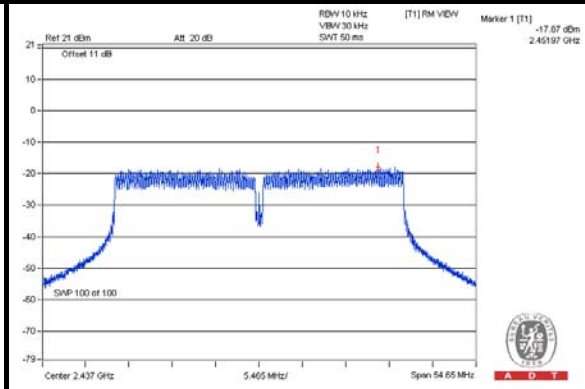
**802.11g**



**802.11n (20MHz)**



**802.11n (40MHz)**

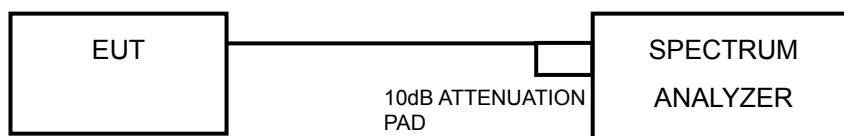


## 4.6 CONDUCTED OUT OF BAND EMISSION MEASUREMENT

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

Below  $-30\text{dB}$  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 = average.
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 conducted emission test is performed on each TX port of operating mode without summing or adding  $10\log(N)$  since the limit is relative emission limit. Only worst data of each operating mode is presented.

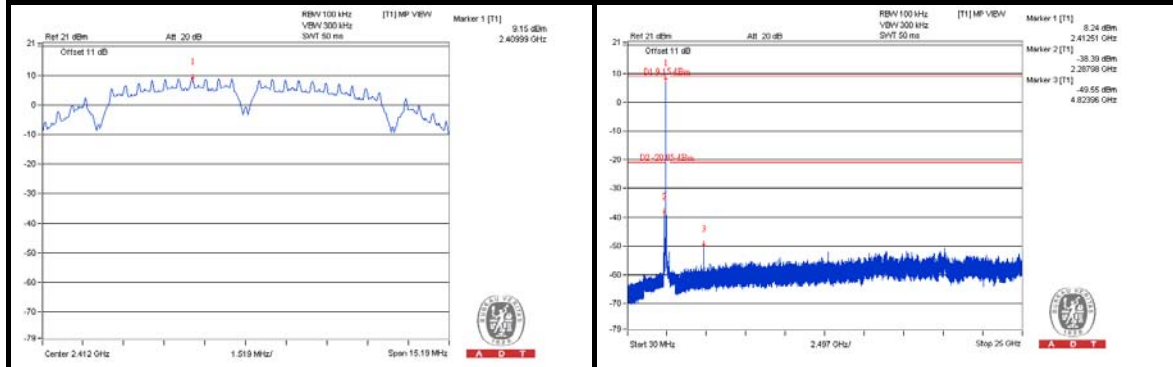
The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 30dB offset below D1. It shows compliance with the requirement.



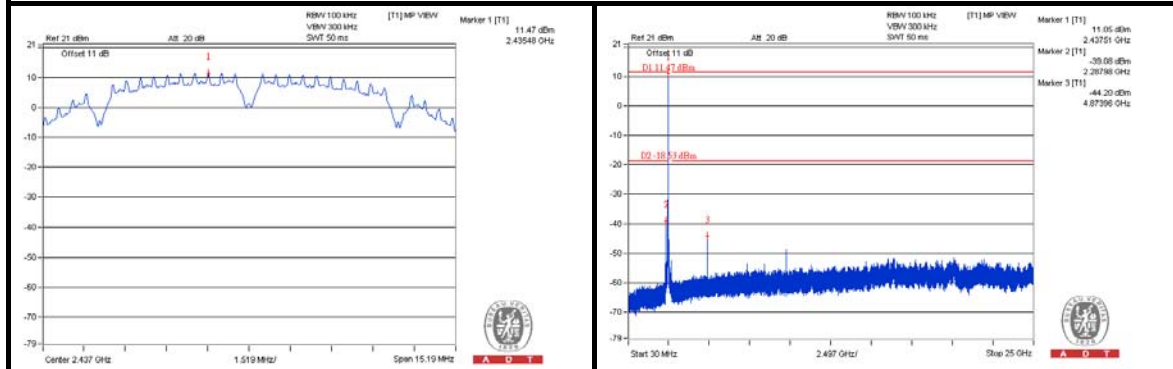
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# 802.11b CHAIN 0

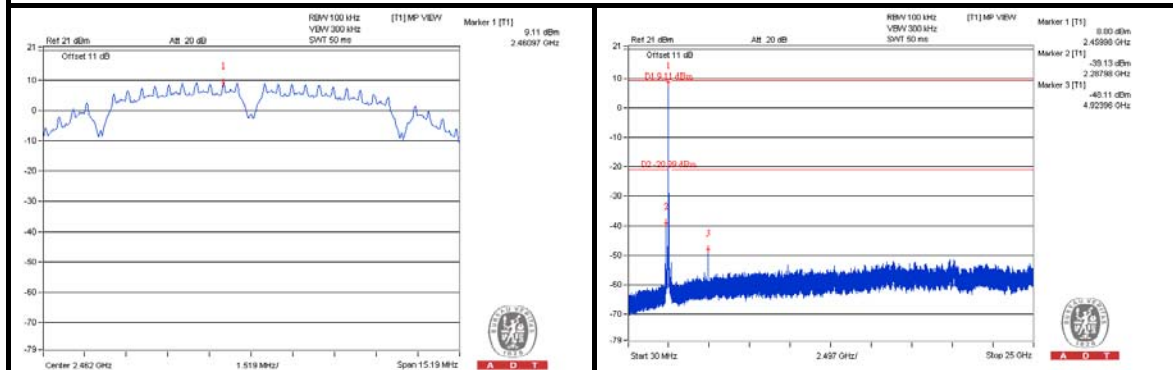
## CH 1



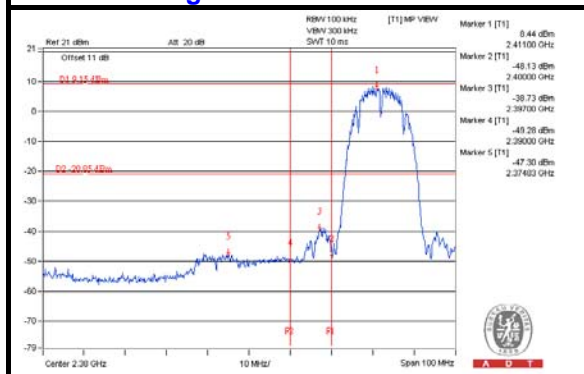
## CH 6



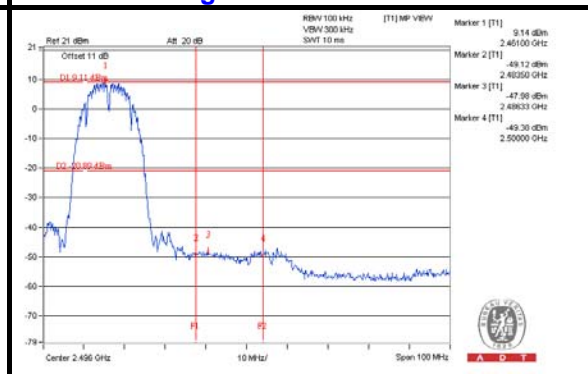
## CH 11



## CH 1 Band edge



## CH 11 Band edge

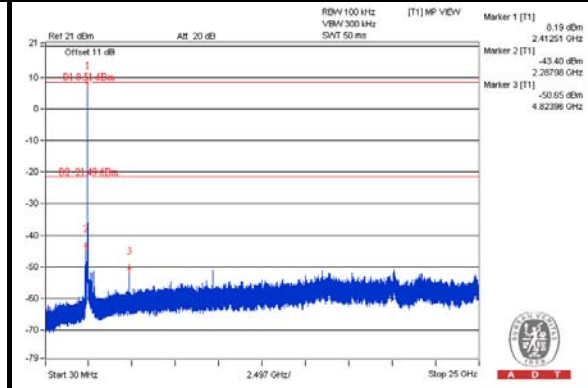
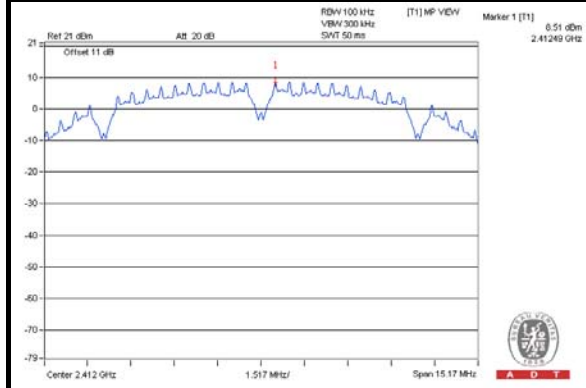




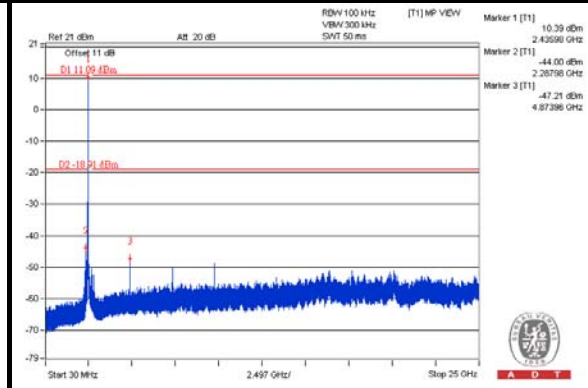
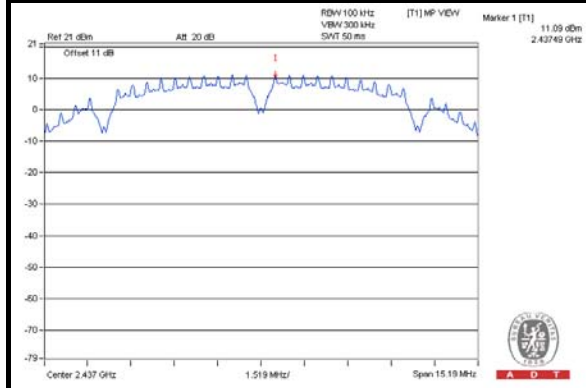
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### CHAIN 1

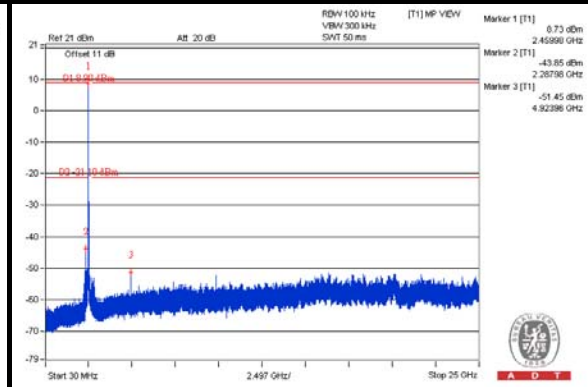
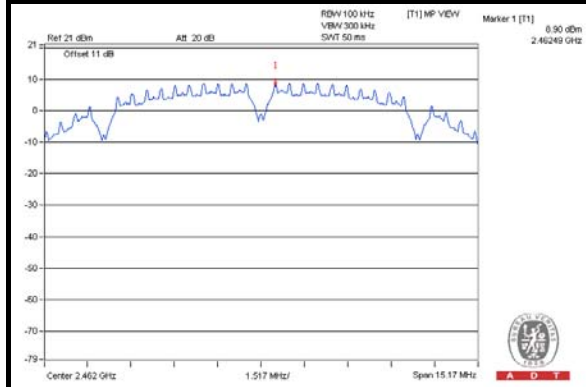
#### CH 1



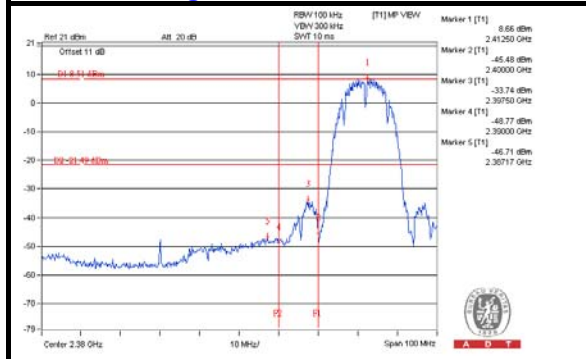
#### CH 6



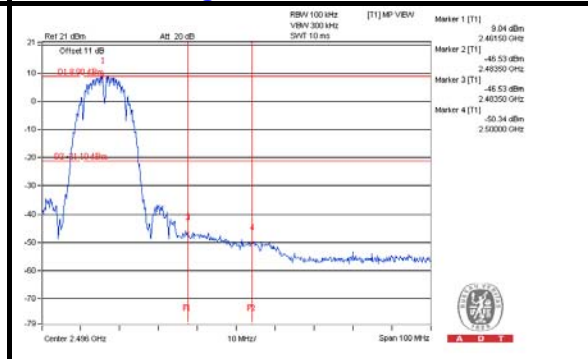
#### CH 11



#### CH 1 Band edge



#### CH 11 Band edge

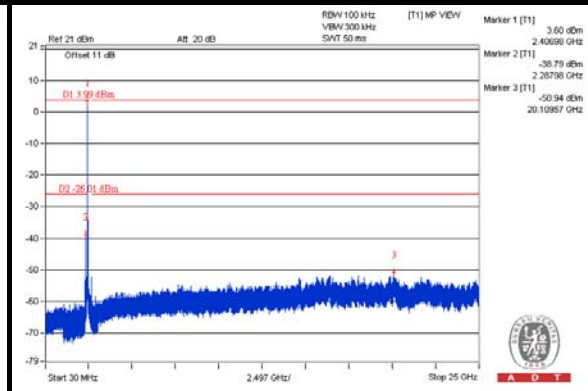
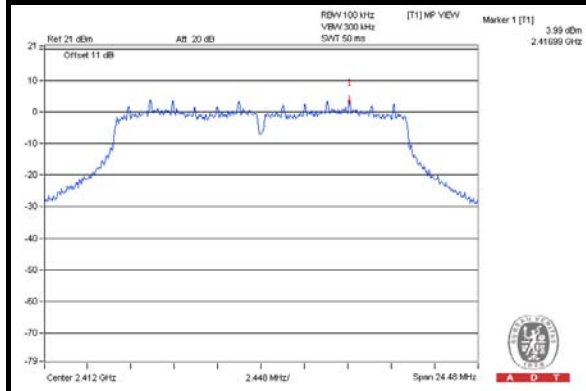




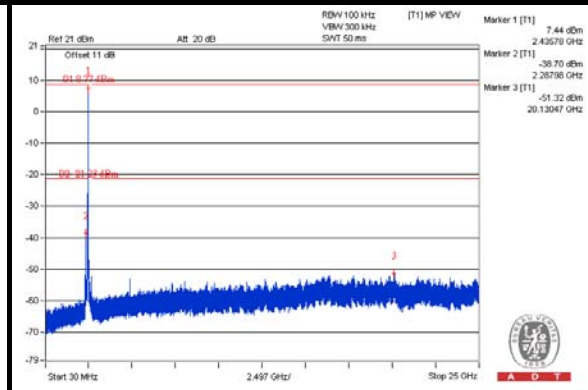
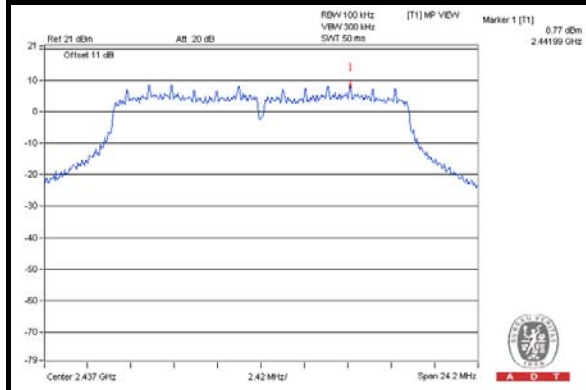
A D T

# 802.11g CHAIN 0

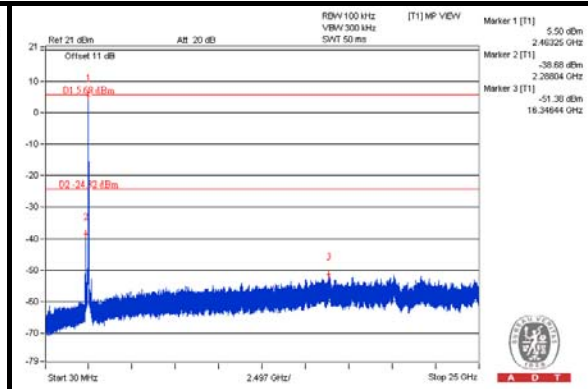
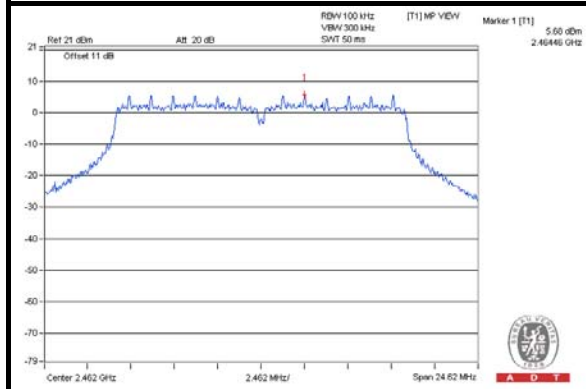
## CH 1



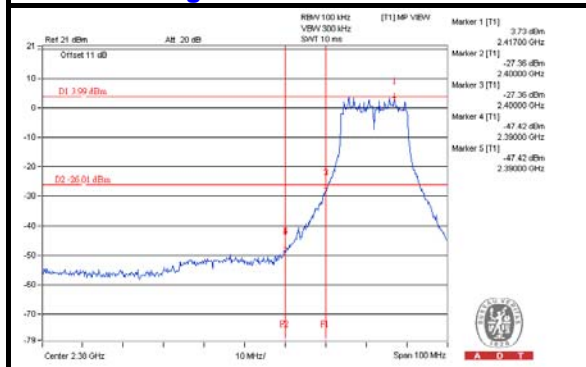
## CH 6



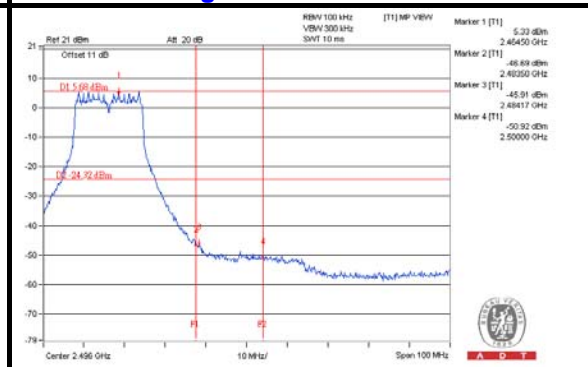
## CH 11



## CH 1 Band edge



## CH 11 Band edge

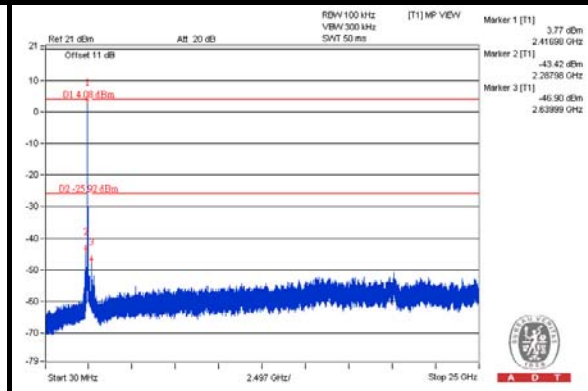
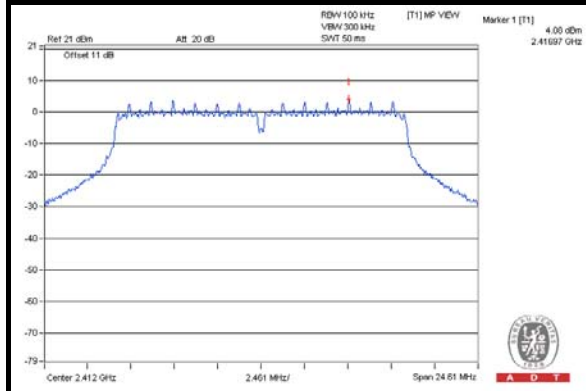




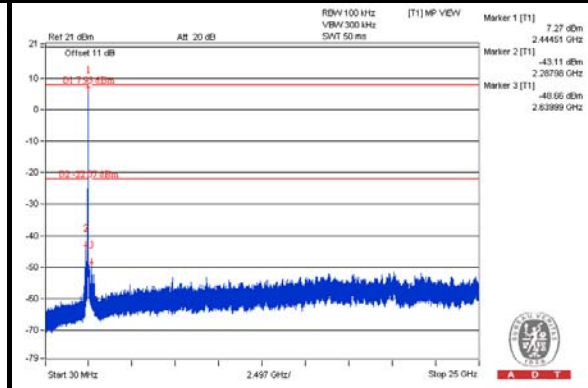
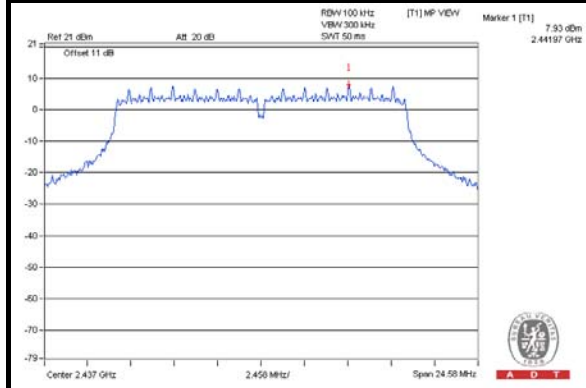
A D T

### CHAIN 1

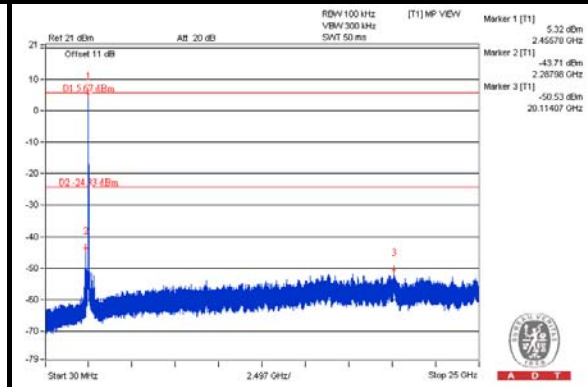
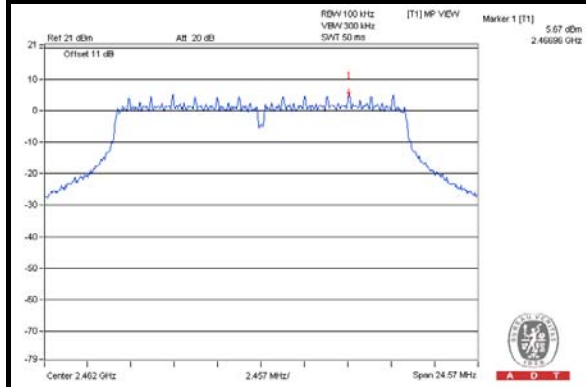
#### CH 1



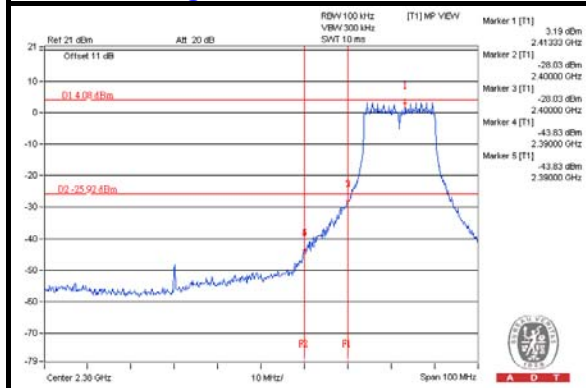
#### CH 6



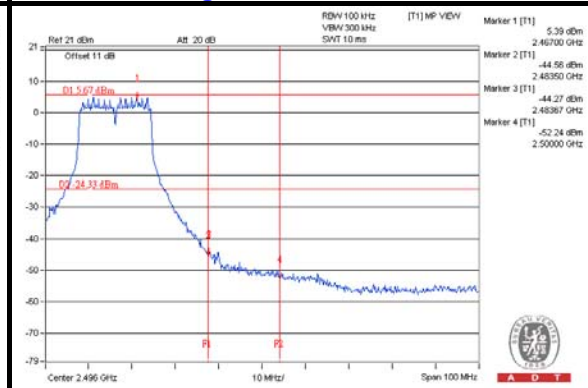
#### CH 11



#### CH 1 Band edge



#### CH 11 Band edge

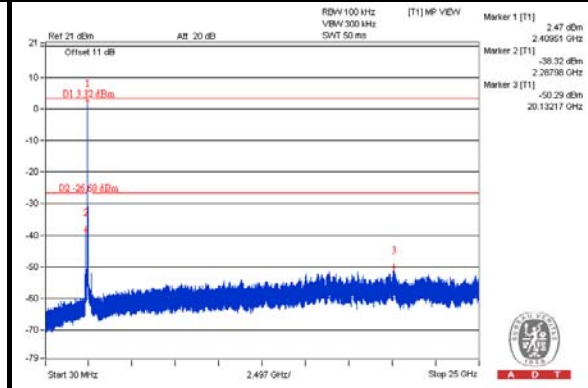
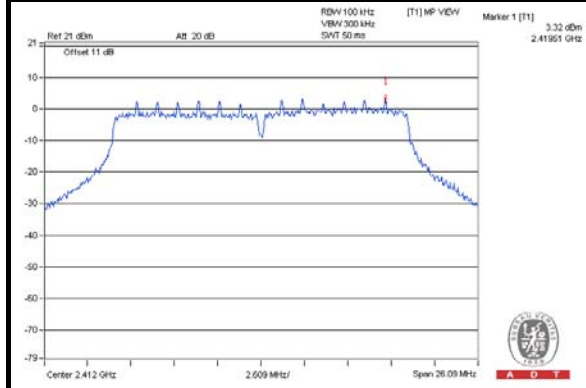




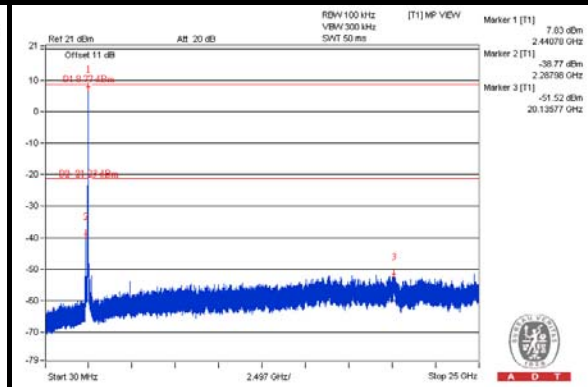
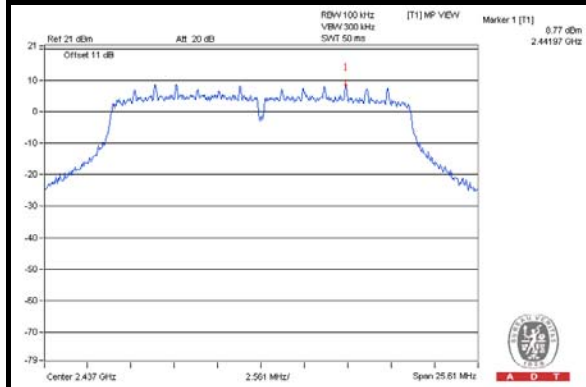
A D T

# 802.11n (20MHz) CHAIN 0

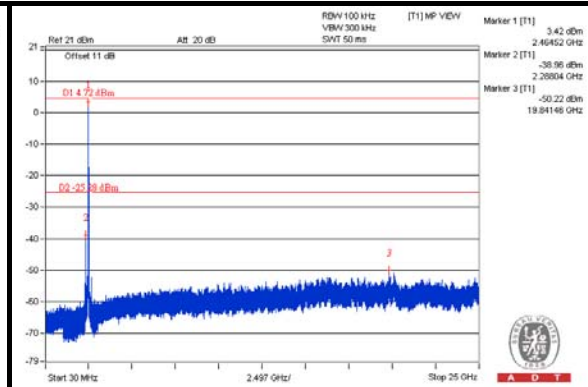
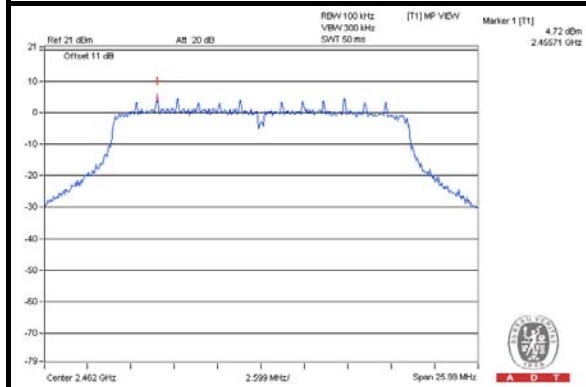
## CH 1



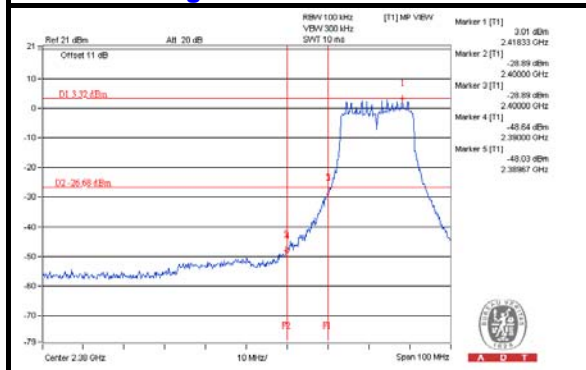
## CH 6



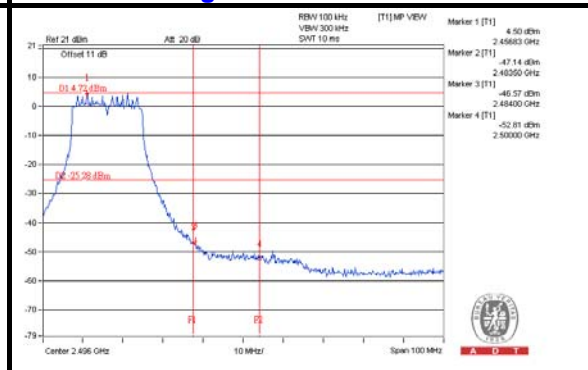
## CH 11



## CH 1 Band edge



## CH 11 Band edge

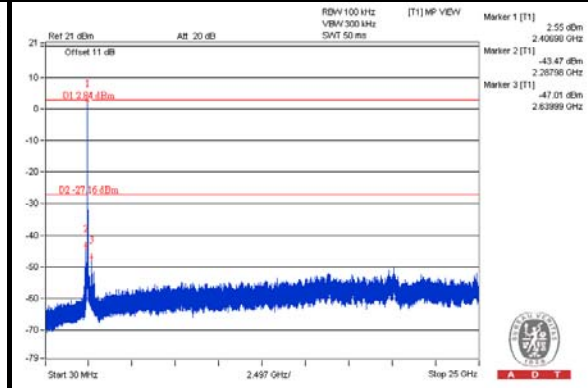
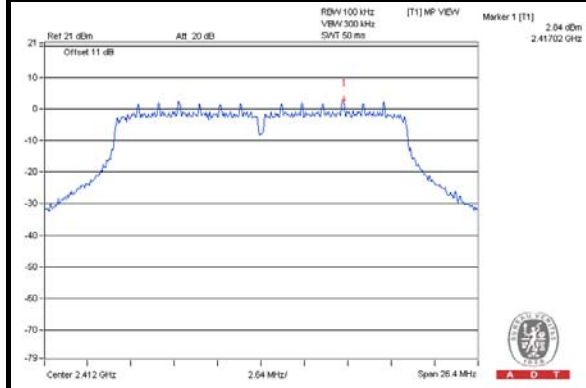




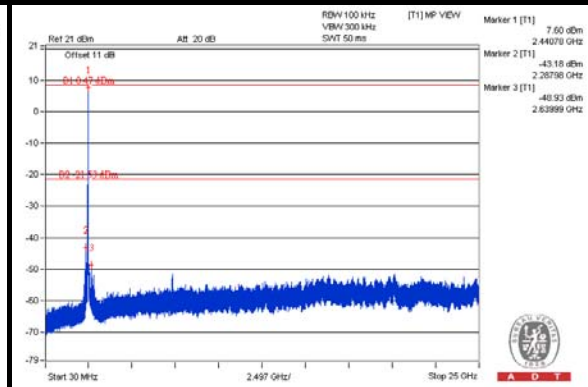
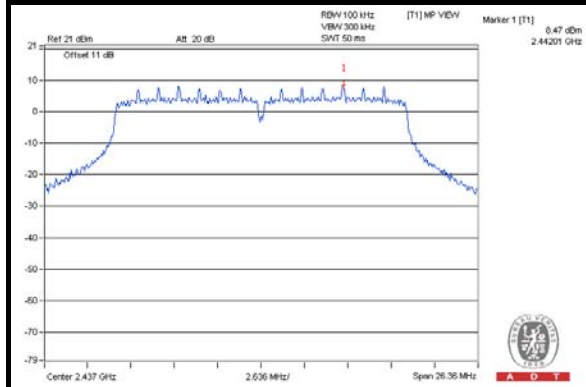
A D T

### CHAIN 1

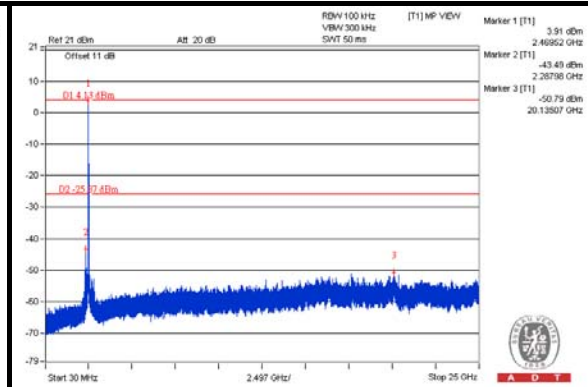
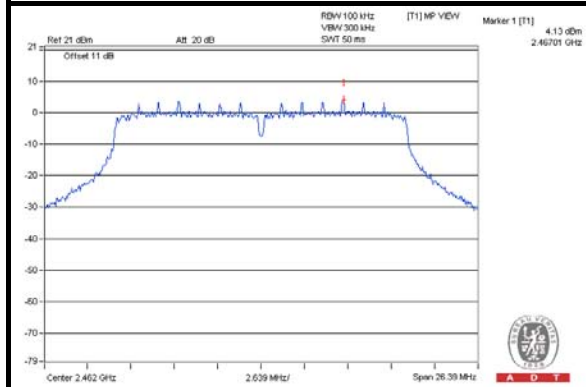
#### CH 1



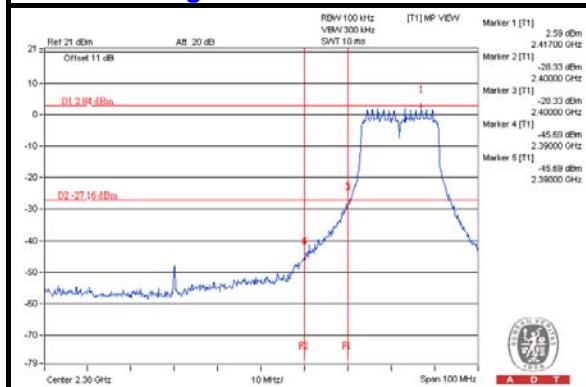
#### CH 6



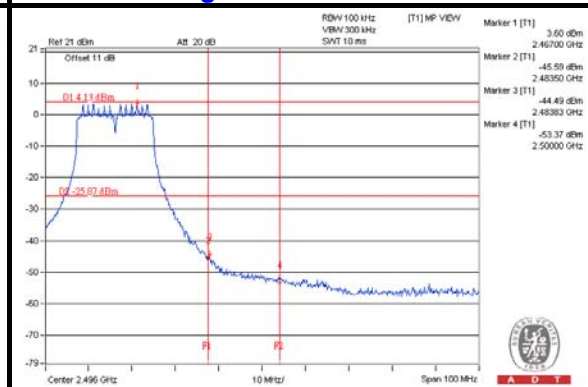
#### CH 11



#### CH 1 Band edge



#### CH 11 Band edge

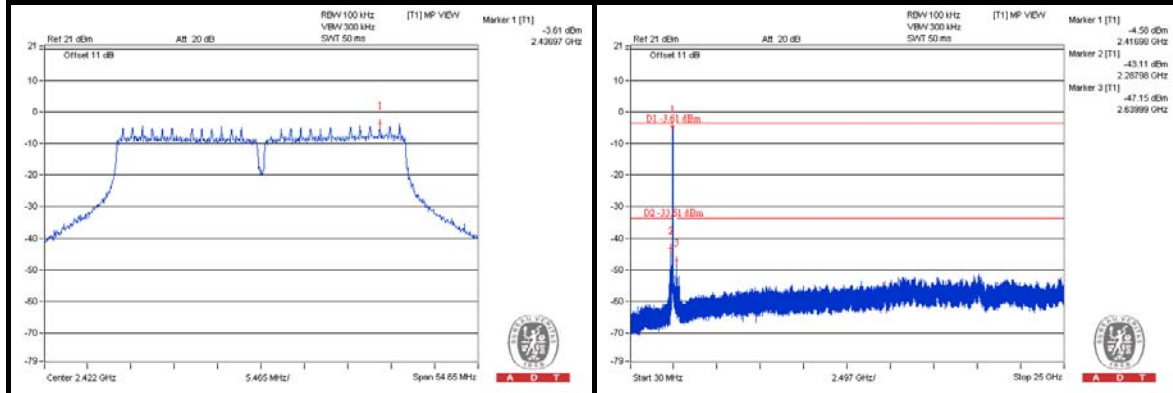




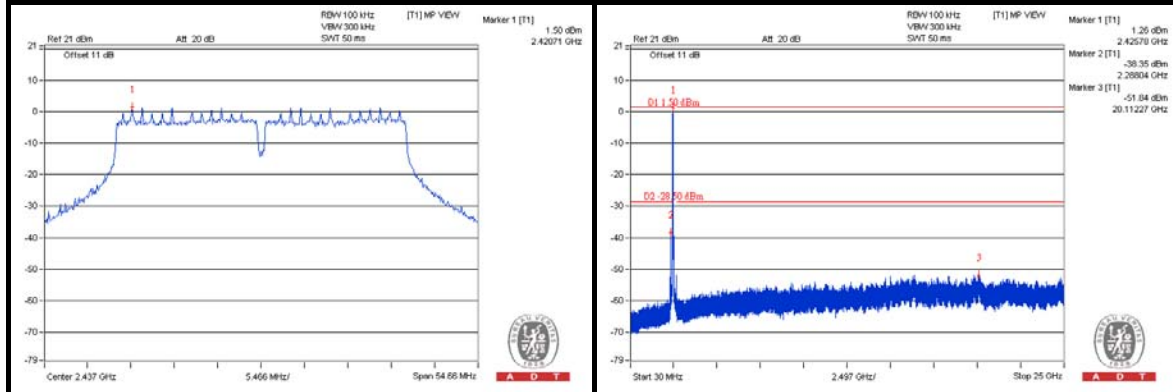
A D T

### 802.11n (40MHz) CHAIN 0

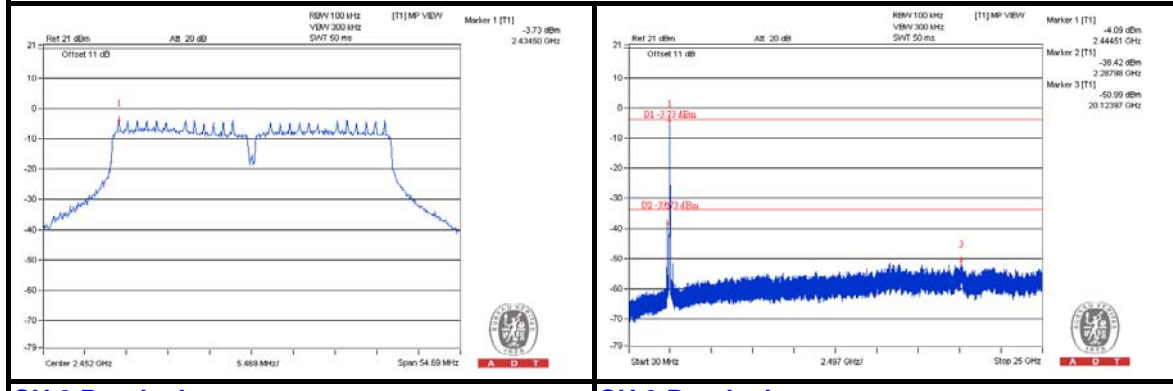
#### CH 3



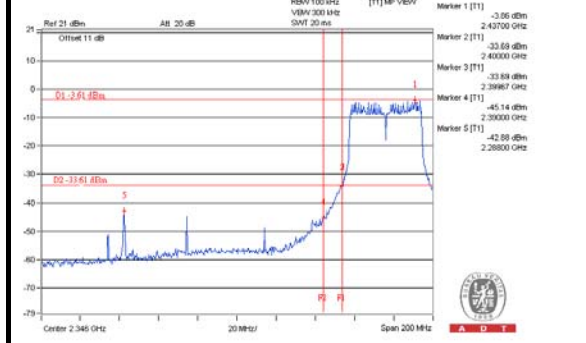
#### CH 6



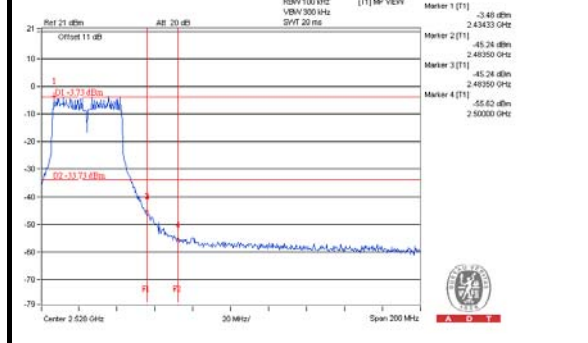
#### CH 9



#### CH 3 Band edge



#### CH 9 Band edge



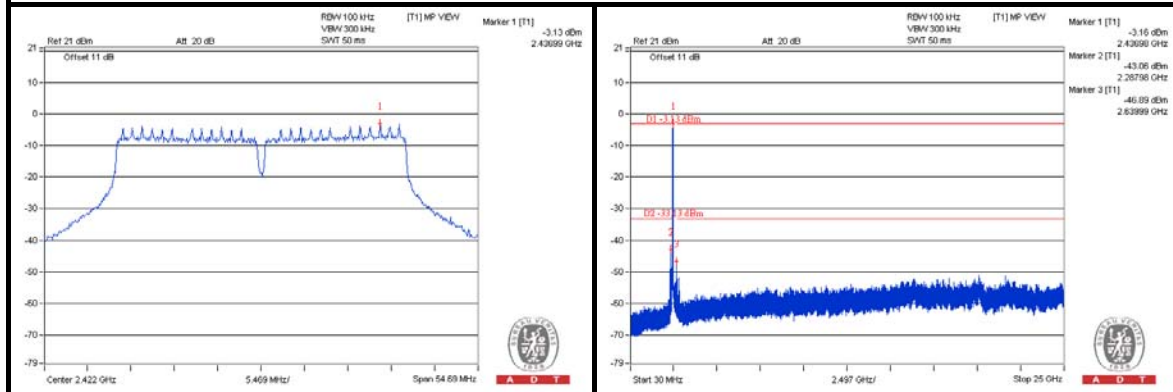




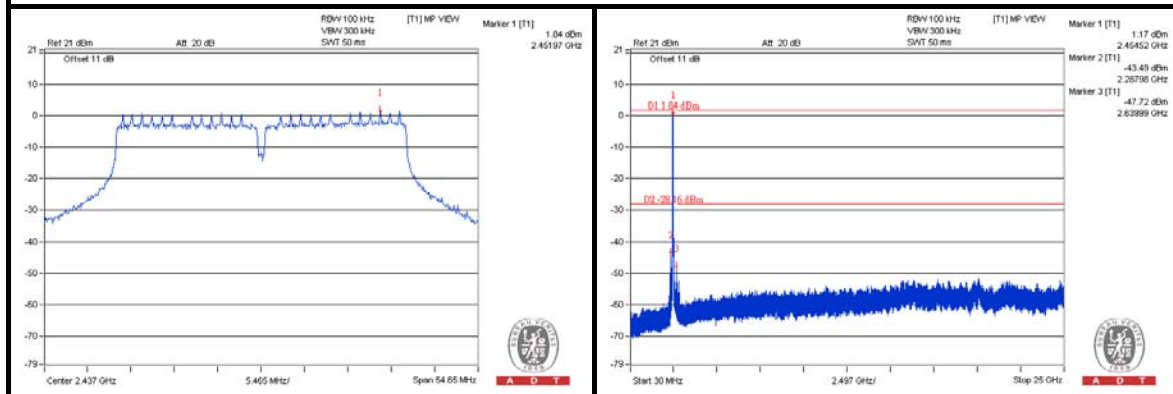
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### CHAIN 1

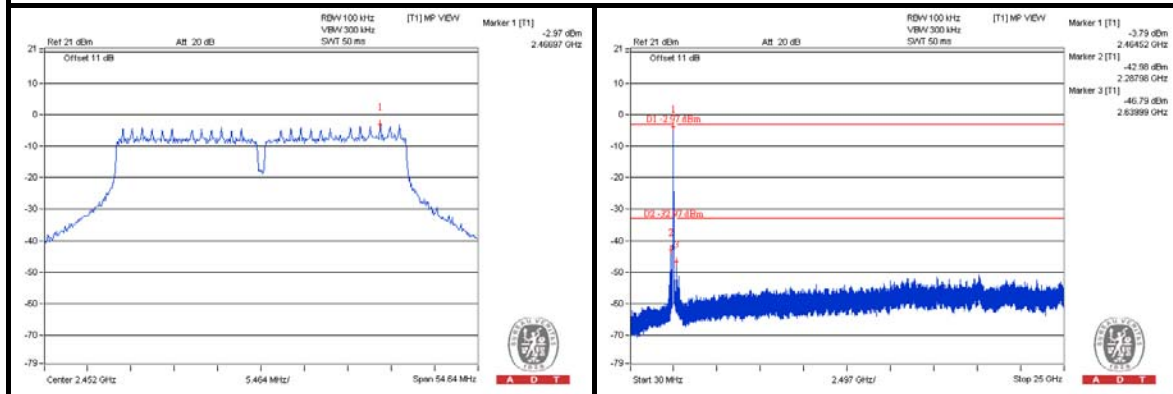
#### CH 3



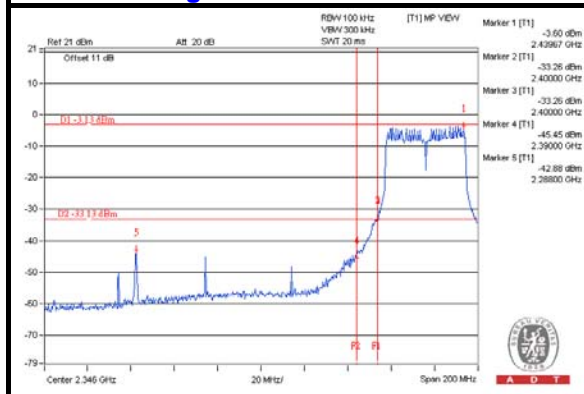
#### CH 6



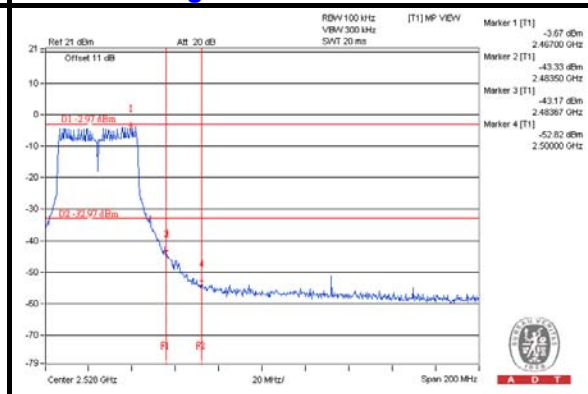
#### CH 9



#### CH 3 Band edge



#### CH 9 Band edge





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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:

**Linko EMC/RF Lab:**

Tel: 886-2-26052180

Fax: 886-2-26051924

**Hsin Chu EMC/RF Lab:**

Tel: 886-3-5935343

Fax: 886-3-5935342

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

Tel: 886-3-3183232

Fax: 886-3-3270892

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

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

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



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

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

**---END---**