



A D T

# FCC TEST REPORT (15.247)

**REPORT NO.:** RF120719C20C  
**MODEL NO.:** NWA1123-NI, NWA5123-NI  
**FCC ID:** I88NWA1123-NI  
**RECEIVED:** Apr. 09, 2014  
**TESTED:** Apr. 09 ~ May 21, 2014  
**ISSUED:** May 23, 2014

**APPLICANT:** ZyXEL Communications Corporation

**ADDRESS:** No. 2, Gongye E. 9th Road Hsinchu Science Park, Hsinchu, Taiwan

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

**LAB ADDRESS:** No. 47, 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.

This report should not be used by the client to claim product certification, approval, or endorsement by TAF or any government agencies.



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



# TABLE OF CONTENTS

RELEASE CONTROL RECORD .....	5
1. CERTIFICATION .....	6
2. SUMMARY OF TEST RESULTS .....	7
2.1 MEASUREMENT UNCERTAINTY .....	7
3. GENERAL INFORMATION .....	8
3.1 GENERAL DESCRIPTION OF EUT .....	8
3.2 DESCRIPTION OF TEST MODES .....	10
3.2.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL .....	11
3.3 DUTY CYCLE OF TEST SIGNAL .....	16
3.4 DESCRIPTION OF SUPPORT UNITS .....	18
3.4.1 CONFIGURATION OF SYSTEM UNDER TEST .....	19
3.5 GENERAL DESCRIPTION OF APPLIED STANDARDS .....	20
4. TEST TYPES AND RESULTS (FOR 2.4GHz BAND) .....	21
4.1 RADIATED EMISSION AND BANDEDGE MEASUREMENT .....	21
4.1.1 LIMITS OF RADIATED EMISSION AND BANDEDGE MEASUREMENT .....	21
4.1.2 TEST INSTRUMENTS .....	22
4.1.3 TEST PROCEDURES .....	23
4.1.4 DEVIATION FROM TEST STANDARD .....	23
4.1.5 TEST SETUP .....	24
4.1.6 EUT OPERATING CONDITIONS .....	24
4.1.7 TEST RESULT .....	25
4.2 CONDUCTED EMISSION MEASUREMENT .....	39
4.2.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT .....	39
4.2.2 TEST INSTRUMENTS .....	39
4.2.3 TEST PROCEDURES .....	40
4.2.4 DEVIATION FROM TEST STANDARD .....	40
4.2.5 TEST SETUP .....	40
4.2.6 EUT OPERATING CONDITIONS .....	40
4.2.7 TEST RESULTS .....	41
4.3 6dB BANDWIDTH MEASUREMENT .....	45
4.3.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT .....	45
4.3.2 TEST SETUP .....	45
4.3.3 TEST INSTRUMENTS .....	45
4.3.4 TEST PROCEDURE .....	45
4.3.5 DEVIATION FROM TEST STANDARD .....	45
4.3.6 EUT OPERATING CONDITIONS .....	45
4.3.7 TEST RESULTS .....	46
4.4 CONDUCTED OUTPUT POWER .....	48
4.4.1 LIMITS OF CONDUCTED OUTPUT POWER MEASUREMENT .....	48
4.4.2 TEST SETUP .....	48
4.4.3 TEST INSTRUMENTS .....	48
4.4.4 TEST PROCEDURES .....	48
4.4.5 DEVIATION FROM TEST STANDARD .....	48
4.4.6 EUT OPERATING CONDITIONS .....	48
4.4.7 TEST RESULTS .....	49
4.5 POWER SPECTRAL DENSITY MEASUREMENT .....	50
4.5.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT .....	50
4.5.2 TEST SETUP .....	50
4.5.3 TEST INSTRUMENTS .....	50
4.5.4 TEST PROCEDURE .....	50



4.5.5	DEVIATION FROM TEST STANDARD.....	50
4.5.6	EUT OPERATING CONDITION.....	50
4.5.7	TEST RESULTS .....	51
4.6	CONDUCTED OUT OF BAND EMISSION MEASUREMENT .....	54
4.6.1	LIMITS OF CONDUCTED OUT OF BAND EMISSION MEASUREMENT .....	54
4.6.2	TEST SETUP.....	54
4.6.3	TEST INSTRUMENTS.....	54
4.6.4	TEST PROCEDURE.....	55
4.6.5	DEVIATION FROM TEST STANDARD.....	55
4.6.6	EUT OPERATING CONDITION.....	55
4.6.7	TEST RESULTS .....	55
4.6.8	TEST RESULTS .....	56
5.	TEST TYPES AND RESULTS (FOR 5.0GHz BAND) .....	64
5.1	RADIATED EMISSION MEASUREMENT .....	64
5.1.1	LIMITS OF RADIATED EMISSION MEASUREMENT .....	64
5.1.2	TEST INSTRUMENTS.....	65
5.1.3	TEST PROCEDURES .....	65
5.1.4	DEVIATION FROM TEST STANDARD.....	65
5.1.5	TEST SETUP.....	65
5.1.6	EUT OPERATING CONDITIONS .....	65
5.1.7	TEST RESULTS .....	66
5.2	CONDUCTED EMISSION MEASUREMENT .....	76
5.2.1	LIMITS OF CONDUCTED EMISSION MEASUREMENT .....	76
5.2.2	TEST INSTRUMENTS.....	76
5.2.3	TEST PROCEDURES .....	76
5.2.4	DEVIATION FROM TEST STANDARD.....	76
5.2.5	TEST SETUP.....	76
5.2.6	EUT OPERATING CONDITIONS .....	76
5.2.7	TEST RESULTS .....	77
5.3	6dB BANDWIDTH MEASUREMENT.....	81
5.3.1	LIMITS OF 6dB BANDWIDTH MEASUREMENT .....	81
5.3.2	TEST SETUP .....	81
5.3.3	TEST INSTRUMENTS.....	81
5.3.4	TEST PROCEDURE.....	81
5.3.5	DEVIATION FROM TEST STANDARD.....	81
5.3.6	EUT OPERATING CONDITIONS .....	81
5.3.7	TEST RESULTS .....	82
5.4	CONDUCTED OUTPUT POWER.....	84
5.4.1	LIMITS OF CONDUCTED OUTPUT POWER MEASUREMENT .....	84
5.4.2	TEST SETUP.....	84
5.4.3	INSTRUMENTS.....	84
5.4.4	TEST PROCEDURES .....	84
5.4.5	DEVIATION FROM TEST STANDARD.....	84
5.4.6	EUT OPERATING CONDITIONS .....	84
5.4.7	TEST RESULTS .....	85
5.5	POWER SPECTRAL DENSITY MEASUREMENT .....	86
5.5.1	LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT .....	86
5.5.2	TEST SETUP.....	86
5.5.3	TEST INSTRUMENTS.....	86
5.5.4	TEST PROCEDURE.....	86
5.5.5	DEVIATION FROM TEST STANDARD.....	86
5.5.6	EUT OPERATING CONDITION.....	86
5.5.7	TEST RESULTS .....	87



A D T

5.6	CONDUCTED OUT OF BAND EMISSION MEASUREMENT .....	89
5.6.1	LIMITS OF CONDUCTED OUT OF BAND EMISSION MEASUREMENT .....	89
5.6.2	TEST SETUP .....	89
5.6.3	TEST INSTRUMENTS .....	89
5.6.4	TEST PROCEDURE .....	89
5.6.5	DEVIATION FROM TEST STANDARD .....	89
5.6.6	EUT OPERATING CONDITION .....	89
5.6.7	TEST RESULTS .....	89
6.	PHOTOGRAPHS OF THE TEST CONFIGURATION .....	96
7.	INFORMATION ON THE TESTING LABORATORIES .....	97
8.	APPENDIX A - MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB .....	98



A D T

## RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF120719C20C	Original release	May 23, 2014

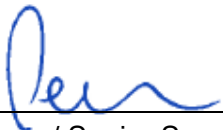



A D T

## 1. CERTIFICATION

**PRODUCT:** 802.11 a/b/g/n Dual-Radio PoE Access Point  
**MODEL NO.:** NWA1123-NI, NWA5123-NI  
**BRAND:** ZyXEL  
**APPLICANT:** ZyXEL Communications Corporation  
**TESTED:** Apr. 09 ~ May 21, 2014  
**TEST SAMPLE:** ENGINEERING SAMPLE  
**STANDARDS:** **FCC Part 15, Subpart C (Section 15.247)**  
ANSI C63.10-2009

The above equipment (model: NWA1123-NI) 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** : May 23, 2014  
Pettie Chen / Senior Specialist

**APPROVED BY** :  , **DATE** : May 23, 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 -6.33dB at 0.32188MHz.
15.205 & 209	Radiated Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -0.1dB at 5725.00MHz.
15.247(d)	Band Edge Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -0.1dB at 5725.00MHz.
15.247(d)	Antenna Port Emission	PASS	Meet the requirement of limit.
15.247(a)(2)	6dB bandwidth	PASS	Meet the requirement of limit.
15.247(b)	Conducted power	PASS	Meet the requirement of limit.
15.247(e)	Power Spectral Density	PASS	Meet the requirement of limit.
15.203	Antenna Requirement	PASS	Antenna connector is IPEX 1 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	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.



### 3. GENERAL INFORMATION

#### 3.1 GENERAL DESCRIPTION OF EUT

<b>EUT</b>	802.11 a/b/g/n Dual-Radio PoE Access Point
<b>MODEL NO.</b>	NWA1123-NI, NWA5123-NI
<b>POWER SUPPLY</b>	12Vdc from adapter 55Vdc from 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 802.11a: 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>	<b>2.4GHz:</b> 2412 ~ 2462MHz <b>5.0GHz:</b> 5745 ~ 5825MHz
<b>NUMBER OF CHANNEL</b>	<b>2.4GHz:</b> 11 for 802.11b, 802.11g, 802.11n (20MHz) 7 for 802.11n (40MHz) <b>5.0GHz:</b> 5 for 802.11a, 802.11n (20MHz) 2 for 802.11n (40MHz)
<b>OUTPUT POWER</b>	279.294mW for 2412 ~ 2462MHz 520.245mW for 5745 ~ 5825MHz
<b>ANTENNA TYPE</b>	Refer to Note
<b>ANTENNA CONNECTOR</b>	Refer to Note
<b>DATA CABLE</b>	N/A
<b>I/O PORTS</b>	Refer to user's manual
<b>ACCESSORY DEVICES</b>	Adapter

**NOTE:**

1. All models are listed as below.

Brand	Model	Different
ZyXEL	NWA1123-NI	All models are identical to each other except for their model designation due to marketing purpose.
	NWA5123-NI	





A D T

2. The EUT incorporates a MIMO function. Physically, the EUT provides two completed transmitters and two receivers.

MODULATION MODE	TX FUNCTION
802.11b	2TX
802.11g	2TX
802.11a	2TX
802.11n (20MHz)	2TX
802.11n (40MHz)	2TX

3. The following antennas were provided to the EUT.

Band	Antenna Type	Brand	Model	Gain (dBi)	Connector
2.4GHz Band	PCB	SINBON	A9701685	4.0	IPEX 1
	PCB	SINBON	A9701686	5.8	IPEX 1
5.0GHz Band	PCB	SINBON	A9701670	5.2	IPEX 1
	PCB	SINBON	A9701671	6.1	IPEX 1

4. The EUT uses following adapter & PoE.

Adapter	
Brand	DVE
Model	DSA-12CA-12
Input Power	100-240Vac, 50/60Hz, 0.3A
Output Power	+12Vdc, 1A
Power Line	1.5m non-shielded cable w/o core

POE (Support unit only)	
Brand	PowerDsine
Model	PD9001G
Input Power	100-250Vac,50/60Hz,0.8A
Output Power	55Vdc,0.60A

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

#### FOR 2.4GHz:

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		

#### FOR 5.0GHz (5745 ~ 5825MHz):

5 channels are provided for 802.11a, 802.11n (20MHz):

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
149	5745MHz	161	5805MHz
153	5765MHz	165	5825MHz
157	5785MHz		

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

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
151	5755MHz	159	5795MHz

### 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	√	√	√	√	Power from adapter
B	-	√	√	-	Power from PoE

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 **Z-plane**.

**NOTE:** “-” means no effect.

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

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

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



A D T

**TEST CONDITION:**

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE $\geq$ 1G	24deg. C, 66%RH	120Vac, 60Hz	Ted Chang Sun Lin
RE<1G	25deg. C, 65%RH	120Vac, 60Hz 48Vdc	Ted Chang
PLC	25deg. C, 65%RH 24deg. C, 64%RH	120Vac, 60Hz 48Vdc	Ted Chang Mach Tsui
APCM	25deg. C, 65%RH	120Vac, 60Hz	Mach Tsui



**FOR 5.0GHz (5745 ~ 5825MHz):**

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	RE≥1G	RE<1G	PLC	APCM	
A	√	√	√	√	Power from adapter
B	-	√	√	-	Power from PoE

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**.  
**NOTE:** “-” means no effect.

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

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

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
A	802.11a	149 to 165	149, 157, 165	OFDM	BPSK	6.0
A	802.11n (20MHz)	149 to 165	149, 157, 165	OFDM	BPSK	7.2
A	802.11n (40MHz)	151 to 159	151, 159	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)
A, B	802.11a	149 to 165	157	OFDM	BPSK	6.0

**POWER LINE CONDUCTED EMISSION TEST:**

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

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
A, B	802.11a	149 to 165	157	OFDM	BPSK	6.0



**BANDEDGE MEASUREMENT:**

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

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
A	802.11a	149 to 165	149, 165	OFDM	BPSK	6.0
A	802.11n (20MHz)	149 to 165	149, 165	OFDM	BPSK	7.2
A	802.11n (40MHz)	151 to 159	151, 159	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)
A	802.11a	149 to 165	149, 157, 165	OFDM	BPSK	6.0
A	802.11n (20MHz)	149 to 165	149, 157, 165	OFDM	BPSK	7.2
A	802.11n (40MHz)	151 to 159	151, 159	OFDM	BPSK	15.0

**TEST CONDITION:**

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE≥1G	24deg. C, 66%RH	120Vac, 60Hz	Ted Chang Sun Lin
RE<1G	25deg. C, 65%RH	120Vac, 60Hz 48Vdc	Ted Chang
PLC	25deg. C, 65%RH 24deg. C, 64%RH	120Vac, 60Hz 48Vdc	Ted Chang Mach Tsui
APCM	25deg. C, 65%RH	120Vac, 60Hz	Mach Tsui

### 3.3 DUTY CYCLE OF TEST SIGNAL

#### 2.4GHz Band:

**802.11b:** Duty cycle of test signal is > 98 %, 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 =  $2.01/2.09 = 0.957$ , Duty factor =  $10 * \log(1/0.957) = 0.19$

**802.11n (20MHz):** Duty cycle =  $1.88/1.94 = 0.964$ , Duty factor =  $10 * \log(1/0.964) = 0.16$

**802.11n (40MHz):** Duty cycle =  $0.905/0.97 = 0.933$ , Duty factor =  $10 * \log(1/0.933) = 0.30$







A D T

### 5.0GHz Band:

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

**802.11a:** Duty cycle =  $1.015/1.0675 = 0.951$ , Duty factor =  $10 * \log(1/0.951) = 0.22$

**802.11n (20MHz):** Duty cycle =  $0.955/1.00625 = 0.949$ , Duty factor =  $10 * \log(1/0.949) = 0.23$

**802.11n (40MHz):** Duty cycle =  $0.9225/0.95875 = 0.962$ , Duty factor =  $10 * \log(1/0.962) = 0.17$





A D T

### 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	D531	CN-0XM006-48643-81U-2610	QDS-BRCM1020
2	POE	PowerDsine	PD9001G	NA	NA

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	10m RJ45 UTP cable
2	10m RJ45 UTP cable

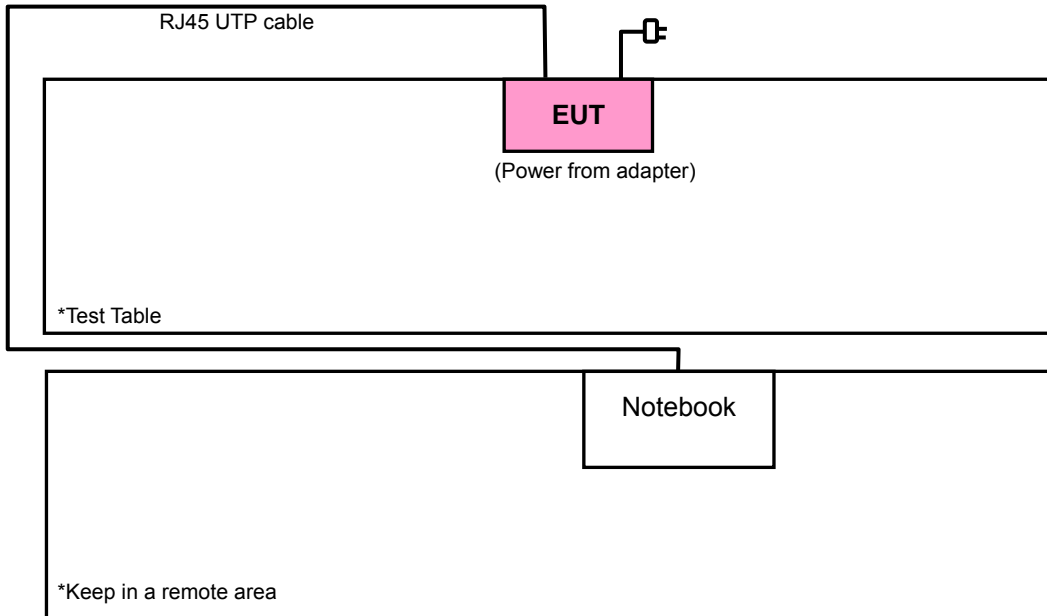
**NOTE:**

1. All power cords of the above support units are non-shielded (1.8 m).
2. Item 1, 2 acted as a communication partner to transfer data.
3. Item 2 was provided by client.

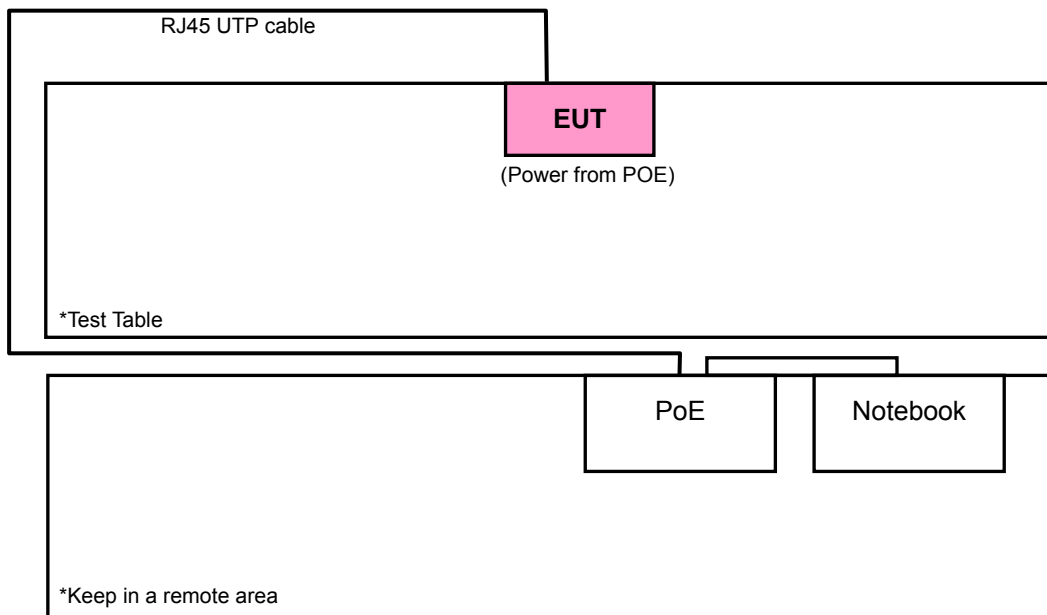


### 3.4.1 CONFIGURATION OF SYSTEM UNDER TEST

#### Test Mode A



#### Test Mode B





A D T

### 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 v03r01**

**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 (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 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.



A D T

#### 4.1.2 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
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100269	Feb. 11, 2014	Feb. 10, 2015
BILOG Antenna SCHWARZBECK	VULB9168	9168-156	Feb. 25, 2014	Feb. 24, 2015
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-209	Sep. 12, 2013	Sep. 11, 2014
HORN Antenna SCHWARZBECK	BBHA 9170	148	Jul. 15, 2013	Jul. 14, 2014
Preamplifier Agilent	8449B	3008A01911	Aug. 22, 2013	Aug. 21, 2014
Preamplifier Agilent	8447D	2944A10638	Oct. 18, 2013	Oct. 17, 2014
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	248780/4 309222/4 274092/4	Aug. 26, 2013	Aug. 25, 2014
RF signal cable Worken	5D-FB	Cable-HYCH9-01	Aug. 11, 2013	Aug. 10, 2014
Software BV ADT	ADT_Radiated_ V7.6.15.9.4	NA	NA	NA
Antenna Tower EMCO	2070/2080	512.835.4684	NA	NA
Turn Table EMCO	2087-2.03	NA	NA	NA
Antenna Tower & Turn Table Controller EMCO	2090	NA	NA	NA
26GHz ~ 40GHz Amplifier	EM26400	815221	Oct. 18, 2013	Oct. 17, 2014
High Speed Peak Power Meter	ML2495A	0824011	Jul. 29, 2013	Jul. 28, 2014
Power Sensor	MA2411B	0738171	Jul. 29, 2013	Jul. 28, 2014
WIT Standard Temperature And Humidity Chamber	TH-4S-C	W981030	Jun. 10, 2013	Jun. 09, 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 9.
  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 215374.
  5. The IC Site Registration No. is IC 7450F-9.



A D T

#### 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. The antenna is a broadband antenna, and its height 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.

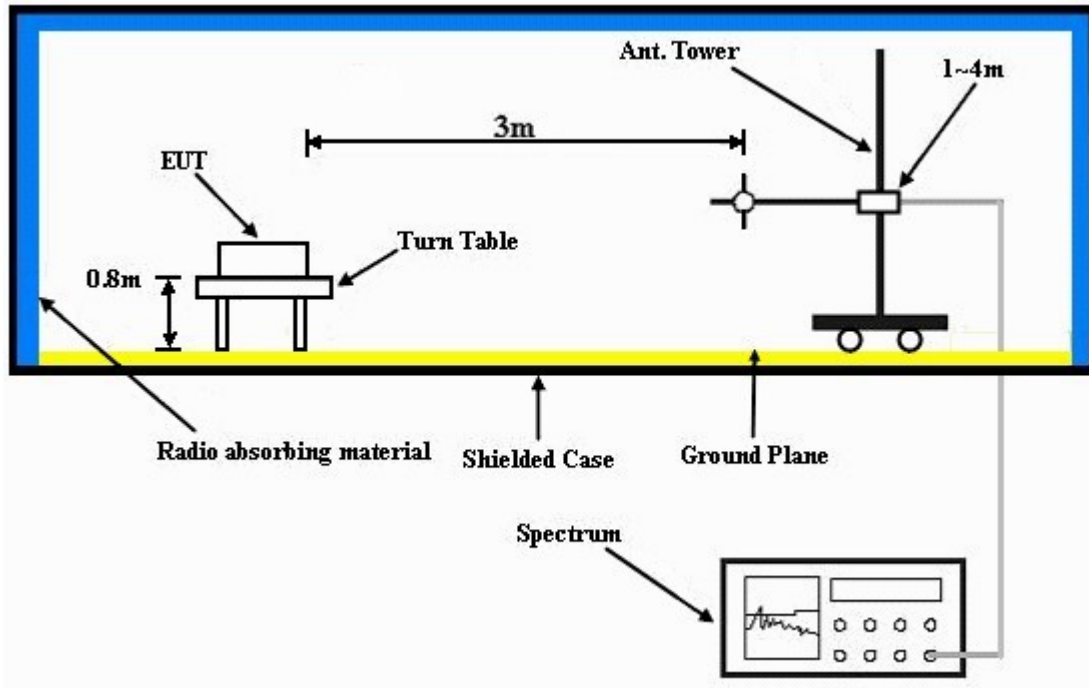
**NOTE:**

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 1kHz(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



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

#### 4.1.6 EUT OPERATING CONDITIONS

- Placed the EUT on the testing table.
- Prepared notebook to act as communication partner and placed it outside of testing area.
- The communication partner 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.
- The communication partner sent data to EUT by command "PING".





A D T

### 4.1.7 TEST RESULT

#### 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	2386.00	64.9 PK	74.0	-9.1	1.06 H	10	32.60	32.30
2	2386.00	52.8 AV	54.0	-1.2	1.06 H	10	20.50	32.30
3	*2412.00	108.8 PK			1.03 H	1	76.30	32.50
4	*2412.00	105.3 AV			1.03 H	1	72.80	32.50
5	4824.00	49.4 PK	74.0	-24.6	1.00 H	23	47.40	2.00
6	4824.00	43.1 AV	54.0	-10.9	1.00 H	23	41.10	2.00
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	2390.00	66.3 PK	74.0	-7.7	1.00 V	12	34.00	32.30
2	2390.00	50.6 AV	54.0	-3.4	1.00 V	12	18.30	32.30
3	*2412.00	105.0 PK			1.00 V	0	72.50	32.50
4	*2412.00	101.2 AV			1.00 V	0	68.70	32.50
5	4824.00	51.8 PK	74.0	-22.2	1.00 V	269	49.80	2.00
6	4824.00	47.4 AV	54.0	-6.6	1.00 V	269	45.40	2.00

#### 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.



A D T

<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	2360.00	62.8 PK	74.0	-11.2	1.04 H	6	30.60	32.20
2	<b>2360.00</b>	<b>53.8 AV</b>	<b>54.0</b>	<b>-0.2</b>	<b>1.04 H</b>	<b>6</b>	<b>21.60</b>	<b>32.20</b>
3	*2437.00	108.6 PK			1.02 H	2	76.10	32.50
4	*2437.00	104.6 AV			1.02 H	2	72.10	32.50
5	4874.00	52.4 PK	74.0	-21.6	1.02 H	67	50.40	2.00
6	4874.00	48.2 AV	54.0	-5.8	1.02 H	67	46.20	2.00
7	7311.00	58.4 PK	74.0	-15.6	1.36 H	221	50.40	8.00
8	7311.00	48.6 AV	54.0	-5.4	1.36 H	221	40.60	8.00

**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	2360.00	60.4 PK	74.0	-13.6	1.02 V	307	28.20	32.20
2	2360.00	47.6 AV	54.0	-6.4	1.02 V	307	15.40	32.20
3	*2437.00	104.4 PK			1.02 V	307	71.90	32.50
4	*2437.00	100.4 AV			1.02 V	307	67.90	32.50
5	4874.00	55.9 PK	74.0	-18.1	1.56 V	18	53.90	2.00
6	4874.00	52.9 AV	54.0	-1.1	1.56 V	18	50.90	2.00
7	7311.00	57.8 PK	74.0	-16.2	1.49 V	206	49.80	8.00
8	7311.00	48.1 AV	54.0	-5.9	1.49 V	206	40.10	8.00

**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.



A D T

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	112.3 PK			1.04 H	21	79.70	32.60
2	*2462.00	108.7 AV			1.04 H	21	76.10	32.60
3	2483.50	65.2 PK	74.0	-8.8	1.87 H	16	32.40	32.80
4	2483.50	52.6 AV	54.0	-1.4	1.87 H	16	19.80	32.80
5	4924.00	47.1 PK	74.0	-26.9	1.05 H	65	45.00	2.10
6	4924.00	40.5 AV	54.0	-13.5	1.05 H	65	38.40	2.10
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	*2462.00	107.9 PK			1.13 V	5	75.30	32.60
2	*2462.00	103.9 AV			1.13 V	5	71.30	32.60
3	2483.50	65.1 PK	74.0	-8.9	1.01 V	279	32.30	32.80
4	2483.50	51.7 AV	54.0	-2.3	1.01 V	279	18.90	32.80
5	4924.00	52.4 PK	74.0	-21.6	1.00 V	270	50.30	2.10
6	4924.00	47.8 AV	54.0	-6.2	1.00 V	270	45.70	2.10

**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.



A D T

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	2360.00	65.1 PK	74.0	-8.9	1.21 H	8	32.90	32.20
2	2360.00	50.6 AV	54.0	-3.4	1.21 H	8	18.40	32.20
3	2390.00	66.4 PK	74.0	-7.6	1.00 H	17	34.10	32.30
4	2390.00	52.9 AV	54.0	-1.1	1.00 H	17	20.60	32.30
5	*2412.00	109.0 PK			1.00 H	4	76.50	32.50
6	*2412.00	98.2 AV			1.00 H	4	65.70	32.50
7	4824.00	47.4 PK	74.0	-26.6	1.09 H	47	45.60	1.80
8	4824.00	36.6 AV	54.0	-17.4	1.09 H	47	34.80	1.80

**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	2360.00	61.3 PK	74.0	-12.7	1.17 V	52	29.10	32.20
2	2360.00	51.6 AV	54.0	-2.4	1.17 V	52	19.40	32.20
3	2390.00	61.2 PK	74.0	-12.8	1.04 V	78	28.90	32.30
4	2390.00	48.8 AV	54.0	-5.2	1.04 V	78	16.50	32.30
5	*2412.00	103.9 PK			1.04 V	78	71.40	32.50
6	*2412.00	92.2 AV			1.04 V	78	59.70	32.50
7	4824.00	44.3 PK	74.0	-29.7	1.04 V	296	42.50	1.80
8	4824.00	34.5 AV	54.0	-19.5	1.04 V	296	32.70	1.80

**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.



A D T

<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	2350.00	70.4 PK	74.0	-3.6	1.02 H	12	38.20	32.20
2	2350.00	53.0 AV	54.0	-1.0	1.02 H	12	20.80	32.20
3	2360.00	66.4 PK	74.0	-7.6	1.27 H	17	34.20	32.20
4	2360.00	51.1 AV	54.0	-2.9	1.27 H	17	18.90	32.20
5	*2437.00	112.2 PK			1.22 H	4	79.70	32.50
6	*2437.00	100.5 AV			1.22 H	4	68.00	32.50
7	4874.00	47.8 PK	74.0	-26.2	1.12 H	52	45.90	1.90
8	4874.00	37.1 AV	54.0	-16.9	1.12 H	52	35.20	1.90
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	2350.00	61.8 PK	74.0	-12.2	1.22 V	28	29.60	32.20
2	2350.00	48.4 AV	54.0	-5.6	1.22 V	28	16.20	32.20
3	2360.00	63.1 PK	74.0	-10.9	1.04 V	82	30.90	32.20
4	2360.00	52.4 AV	54.0	-1.6	1.04 V	82	20.20	32.20
5	*2437.00	109.2 PK			1.04 V	78	76.70	32.50
6	*2437.00	97.4 AV			1.04 V	78	64.90	32.50
7	4874.00	44.8 PK	74.0	-29.2	1.09 V	257	42.90	1.90
8	4874.00	34.5 AV	54.0	-19.5	1.09 V	257	32.60	1.90

**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.



A D T

<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	2360.00	57.1 PK	74.0	-16.9	1.00 H	22	24.90	32.20
2	2360.00	46.9 AV	54.0	-7.1	1.00 H	22	14.70	32.20
3	2375.00	66.9 PK	74.0	-7.1	1.00 H	19	34.60	32.30
4	2375.00	51.8 AV	54.0	-2.2	1.00 H	19	19.50	32.30
5	*2462.00	108.7 PK			1.22 H	8	76.10	32.60
6	*2462.00	97.4 AV			1.22 H	8	64.80	32.60
7	2483.50	72.9 PK	74.0	-1.1	1.45 H	2	40.10	32.80
8	2483.50	51.2 AV	54.0	-2.8	1.45 H	2	18.40	32.80
9	4924.00	47.1 PK	74.0	-26.9	1.04 H	42	45.10	2.00
10	4924.00	36.2 AV	54.0	-17.8	1.04 H	42	34.20	2.00

**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	2360.00	60.9 PK	74.0	-13.1	1.12 V	26	28.70	32.20
2	2360.00	50.6 AV	54.0	-3.4	1.12 V	26	18.40	32.20
3	2375.00	60.5 PK	74.0	-13.5	1.12 V	72	28.20	32.30
4	2375.00	48.2 AV	54.0	-5.8	1.12 V	72	15.90	32.30
5	*2462.00	106.1 PK			1.04 V	62	73.50	32.60
6	*2462.00	94.1 AV			1.04 V	62	61.50	32.60
7	2483.50	71.9 PK	74.0	-2.1	1.04 V	62	39.10	32.80
8	2483.50	52.4 AV	54.0	-1.6	1.04 V	62	19.60	32.80
9	4924.00	44.5 PK	74.0	-29.5	1.02 V	282	42.50	2.00
10	4924.00	34.5 AV	54.0	-19.5	1.02 V	282	32.50	2.00

**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.



A D T

802.11n (20MHz)

<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	2360.00	65.0 PK	74.0	-9.0	1.22 H	6	32.80	32.20
2	2360.00	50.6 AV	54.0	-3.4	1.22 H	6	18.40	32.20
3	2390.00	67.9 PK	74.0	-6.1	1.00 H	18	35.60	32.30
4	2390.00	52.9 AV	54.0	-1.1	1.00 H	18	20.60	32.30
5	*2412.00	108.7 PK			1.02 H	18	76.20	32.50
6	*2412.00	96.8 AV			1.02 H	18	64.30	32.50
7	4824.00	47.6 PK	74.0	-26.4	1.05 H	54	45.80	1.80
8	4824.00	36.9 AV	54.0	-17.1	1.05 H	54	35.10	1.80

**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	2360.00	61.1 PK	74.0	-12.9	1.12 V	42	28.90	32.20
2	2360.00	51.9 AV	54.0	-2.1	1.12 V	42	19.70	32.20
3	2390.00	61.8 PK	74.0	-12.2	1.08 V	40	29.50	32.30
4	2390.00	49.2 AV	54.0	-4.8	1.08 V	40	16.90	32.30
5	*2412.00	103.6 PK			1.08 V	42	71.10	32.50
6	*2412.00	92.0 AV			1.08 V	42	59.50	32.50
7	4824.00	44.4 PK	74.0	-29.6	1.09 V	278	42.60	1.80
8	4824.00	34.2 AV	54.0	-19.8	1.09 V	278	32.40	1.80

**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.



A D T

<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	2350.00	66.8 PK	74.0	-7.2	1.01 H	21	34.60	32.20
2	2350.00	52.8 AV	54.0	-1.2	1.01 H	21	20.60	32.20
3	2360.00	67.1 PK	74.0	-6.9	1.00 H	2	34.90	32.20
4	2360.00	51.6 AV	54.0	-2.4	1.00 H	2	19.40	32.20
5	*2437.00	112.2 PK			1.00 H	18	79.70	32.50
6	*2437.00	100.0 AV			1.00 H	18	67.50	32.50
7	4874.00	48.1 PK	74.0	-25.9	1.04 H	22	46.20	1.90
8	4874.00	37.5 AV	54.0	-16.5	1.04 H	22	35.60	1.90

**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	2350.00	59.4 PK	74.0	-14.6	1.48 V	58	27.20	32.20
2	2350.00	48.4 AV	54.0	-5.6	1.48 V	58	16.20	32.20
3	2360.00	61.9 PK	74.0	-12.1	1.69 V	37	29.70	32.20
4	2360.00	52.4 AV	54.0	-1.6	1.69 V	37	20.20	32.20
5	*2437.00	110.4 PK			1.04 V	79	77.90	32.50
6	*2437.00	98.5 AV			1.04 V	79	66.00	32.50
7	4874.00	44.6 PK	74.0	-29.4	1.05 V	264	42.70	1.90
8	4874.00	34.5 AV	54.0	-19.5	1.05 V	264	32.60	1.90

**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.





A D T

<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	2360.00	64.9 PK	74.0	-9.1	1.00 H	12	32.70	32.20
2	2360.00	51.9 AV	54.0	-2.1	1.00 H	12	19.70	32.20
3	2372.00	64.5 PK	74.0	-9.5	1.00 H	16	32.30	32.20
4	2372.00	52.3 AV	54.0	-1.7	1.00 H	16	20.10	32.20
5	*2462.00	109.8 PK			1.00 H	4	77.20	32.60
6	*2462.00	97.8 AV			1.00 H	4	65.20	32.60
7	2483.50	72.6 PK	74.0	-1.4	1.00 H	4	39.80	32.80
8	2483.50	51.6 AV	54.0	-2.4	1.00 H	4	18.80	32.80
9	4924.00	47.6 PK	74.0	-26.4	1.06 H	77	45.60	2.00
10	4924.00	36.2 AV	54.0	-17.8	1.06 H	77	34.20	2.00

**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	2360.00	61.5 PK	74.0	-12.5	1.37 V	51	29.30	32.20
2	2360.00	51.1 AV	54.0	-2.9	1.37 V	51	18.90	32.20
3	2372.00	61.1 PK	74.0	-12.9	1.42 V	72	28.90	32.20
4	2372.00	47.6 AV	54.0	-6.4	1.42 V	72	15.40	32.20
5	*2462.00	105.7 PK			1.32 V	57	73.10	32.60
6	*2462.00	94.2 AV			1.32 V	57	61.60	32.60
7	2483.50	71.6 PK	74.0	-2.4	1.32 V	37	38.80	32.80
8	2483.50	52.8 AV	54.0	-1.2	1.32 V	37	20.00	32.80
9	4924.00	44.8 PK	74.0	-29.2	1.07 V	289	42.80	2.00
10	4924.00	34.9 AV	54.0	-19.1	1.07 V	289	32.90	2.00

**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.



A D T

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	2360.00	62.1 PK	74.0	-11.9	1.02 H	8	29.90	32.20
2	2360.00	50.2 AV	54.0	-3.8	1.02 H	8	18.00	32.20
3	2390.00	67.3 PK	74.0	-6.7	1.05 H	8	35.00	32.30
4	2390.00	53.0 AV	54.0	-1.0	1.05 H	8	20.70	32.30
5	*2422.00	104.0 PK			1.01 H	7	71.50	32.50
6	*2422.00	93.7 AV			1.01 H	7	61.20	32.50
7	4844.00	47.8 PK	74.0	-26.2	1.05 H	65	45.80	2.00
8	4844.00	35.5 AV	54.0	-18.5	1.05 H	65	33.50	2.00

**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	2360.00	60.9 PK	74.0	-13.1	1.00 V	3	28.70	32.20
2	2360.00	50.6 AV	54.0	-3.4	1.00 V	3	18.40	32.20
3	2390.00	63.6 PK	74.0	-10.4	1.00 V	3	31.30	32.30
4	2390.00	49.1 AV	54.0	-4.9	1.00 V	3	16.80	32.30
5	*2422.00	98.9 PK			1.00 V	355	66.40	32.50
6	*2422.00	89.0 AV			1.00 V	355	56.50	32.50
7	4844.00	45.8 PK	74.0	-28.2	1.05 V	54	43.80	2.00
8	4844.00	33.2 AV	54.0	-20.8	1.05 V	54	31.20	2.00

**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.



A D T

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

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

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	69.8 PK	74.0	-4.2	1.03 H	7	37.50	32.30
2	2390.00	51.9 AV	54.0	-2.1	1.03 H	7	19.60	32.30
3	*2437.00	108.2 PK			1.02 H	17	75.70	32.50
4	*2437.00	98.0 AV			1.02 H	17	65.50	32.50
5	4874.00	45.3 PK	74.0	-28.7	1.58 H	88	43.30	2.00
6	4874.00	34.5 AV	54.0	-19.5	1.58 H	88	32.50	2.00

**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	2390.00	72.0 PK	74.0	-2.0	1.00 V	356	39.70	32.30
2	2390.00	52.5 AV	54.0	-1.5	1.00 V	356	20.20	32.30
3	*2437.00	104.9 PK			1.00 V	355	72.40	32.50
4	*2437.00	94.1 AV			1.00 V	355	61.60	32.50
5	4874.00	47.3 PK	74.0	-26.7	1.05 V	261	45.30	2.00
6	4874.00	35.2 AV	54.0	-18.8	1.05 V	261	33.20	2.00

**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.



A D T

<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	2360.00	62.8 PK	74.0	-11.2	1.06 H	12	30.60	32.20
2	2360.00	51.4 AV	54.0	-2.6	1.06 H	12	19.20	32.20
3	*2452.00	105.1 PK			1.02 H	5	72.50	32.60
4	*2452.00	93.8 AV			1.02 H	5	61.20	32.60
5	2483.50	70.3 PK	74.0	-3.7	1.01 H	9	37.50	32.80
6	2483.50	52.6 AV	54.0	-1.4	1.01 H	9	19.80	32.80
7	4904.00	50.6 PK	74.0	-23.4	1.05 H	65	48.50	2.10
8	4904.00	37.3 AV	54.0	-16.7	1.05 H	65	35.20	2.10
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	2360.00	61.7 PK	74.0	-12.3	1.00 V	0	29.50	32.20
2	2360.00	51.4 AV	54.0	-2.6	1.00 V	0	19.20	32.20
3	*2452.00	102.3 PK			1.00 V	14	69.70	32.60
4	*2452.00	91.8 AV			1.00 V	14	59.20	32.60
5	2483.50	68.3 PK	74.0	-5.7	1.10 V	9	35.50	32.80
6	2483.50	50.8 AV	54.0	-3.2	1.10 V	9	18.00	32.80
7	4904.00	45.7 PK	74.0	-28.3	1.93 V	184	43.60	2.10
8	4904.00	35.3 AV	54.0	-18.7	1.93 V	184	33.20	2.10

**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.



A D T

**BELOW 1GHz WORST-CASE DATA**

**802.11b**

<b>CHANNEL</b>	TX Channel 11	<b>DETECTOR FUNCTION</b>	Quasi-Peak (QP)
<b>FREQUENCY RANGE</b>	30MHz ~ 1GHz		
<b>TEST MODE</b>	A		

**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	249.18	39.0 QP	46.0	-7.0	1.00 H	231	53.20	-14.20
2	399.97	40.8 QP	46.0	-5.2	1.00 H	157	51.00	-10.20
3	499.46	42.9 QP	46.0	-3.1	1.50 H	209	51.30	-8.40
4	600.50	43.1 QP	46.0	-2.9	1.00 H	152	49.30	-6.20
5	749.73	40.4 QP	46.0	-5.6	1.00 H	208	44.20	-3.80
6	1000.00	45.4 QP	54.0	-8.6	1.26 H	138	44.90	0.50

**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	124.82	36.0 QP	43.5	-7.5	1.24 V	11	51.90	-15.90
2	375.10	40.1 QP	46.0	-5.9	1.00 V	147	50.70	-10.60
3	499.46	40.2 QP	46.0	-5.8	1.24 V	277	48.60	-8.40
4	600.50	41.8 QP	46.0	-4.2	1.00 V	231	48.00	-6.20
5	875.64	40.7 QP	46.0	-5.3	1.00 V	201	42.30	-1.60
6	1000.00	43.6 QP	54.0	-10.4	1.00 V	26	43.10	0.50

**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



A D T

<b>CHANNEL</b>	TX Channel 11	<b>DETECTOR FUNCTION</b>	Quasi-Peak (QP)
<b>FREQUENCY RANGE</b>	30MHz ~ 1GHz		
<b>TEST MODE</b>	B		

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	249.18	39.9 QP	46.0	-6.1	1.50 H	256	54.10	-14.20
2	375.10	40.6 QP	46.0	-5.4	2.00 H	245	51.20	-10.60
3	600.17	44.1 QP	46.0	-1.9	1.08 H	216	50.30	-6.20
4	625.37	42.8 QP	46.0	-3.2	1.75 H	316	48.40	-5.60
5	749.73	39.2 QP	46.0	-6.8	1.00 H	209	43.00	-3.80
6	1000.00	47.6 QP	54.0	-6.4	1.00 H	225	47.10	0.50
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	47.80	38.6 QP	40.0	-1.4	1.04 V	12	52.70	-14.10
2	124.82	33.3 QP	43.5	-10.2	1.25 V	16	49.20	-15.90
3	249.18	37.4 QP	46.0	-8.6	1.00 V	2	51.60	-14.20
4	375.10	39.4 QP	46.0	-6.6	1.75 V	165	50.00	-10.60
5	499.46	38.4 QP	46.0	-7.6	1.00 V	165	46.80	-8.40
6	600.50	37.5 QP	46.0	-8.5	2.00 V	72	43.70	-6.20

**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



## 4.2 CONDUCTED EMISSION MEASUREMENT

### 4.2.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

FREQUENCY OF EMISSION (MHz)	CONDUCTED LIMIT (dBµV)	
	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	Apr. 24, 2014	Apr. 23, 2015
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

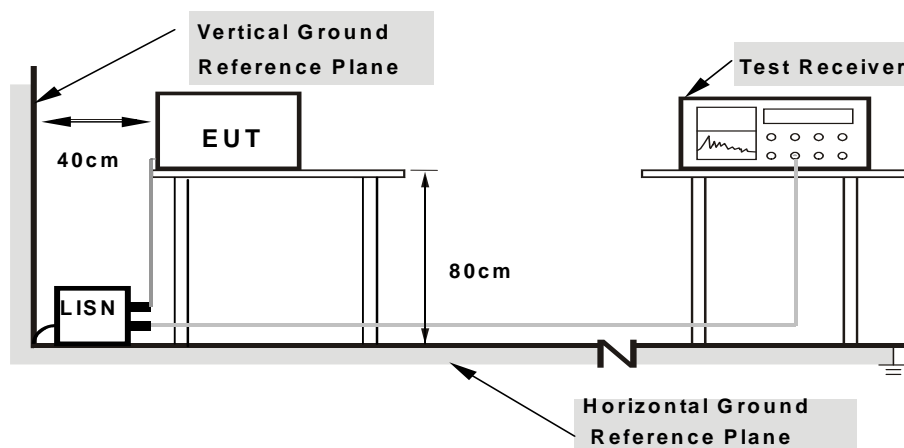
- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling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

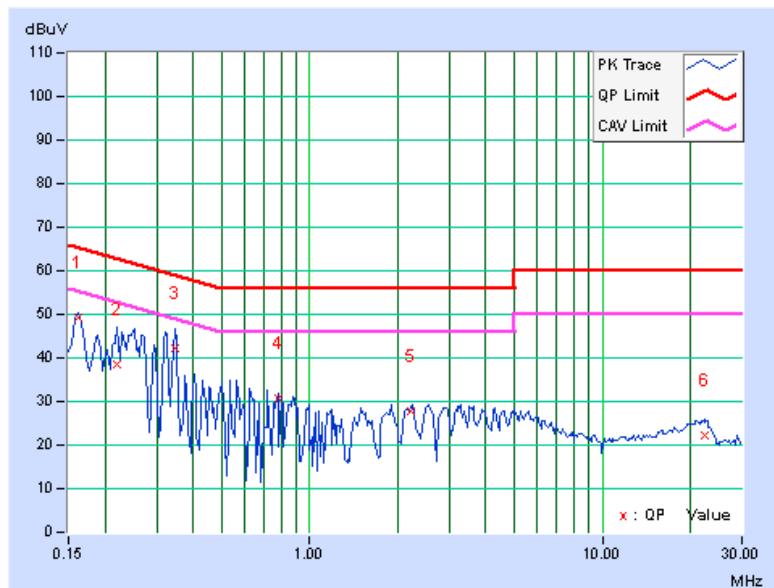
**CONDUCTED WORST-CASE DATA : 802.11b**

<b>PHASE</b>	Line 1	<b>6dB BANDWIDTH</b>	9kHz
<b>TEST MODE</b>	A		

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	0.16172	0.22	48.98	41.58	49.20	41.80	65.38	55.38	-16.17	-13.57
2	0.22031	0.24	38.30	30.47	38.54	30.71	62.81	52.81	-24.27	-22.10
3	0.34531	0.23	41.88	41.50	42.11	41.73	59.07	49.07	-16.97	-7.35
4	0.77891	0.27	30.54	28.70	30.81	28.97	56.00	46.00	-25.19	-17.03
5	2.23047	0.38	27.40	26.90	27.78	27.28	56.00	46.00	-28.22	-18.72
6	22.35547	0.67	21.49	15.61	22.16	16.28	60.00	50.00	-37.84	-33.72

**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.





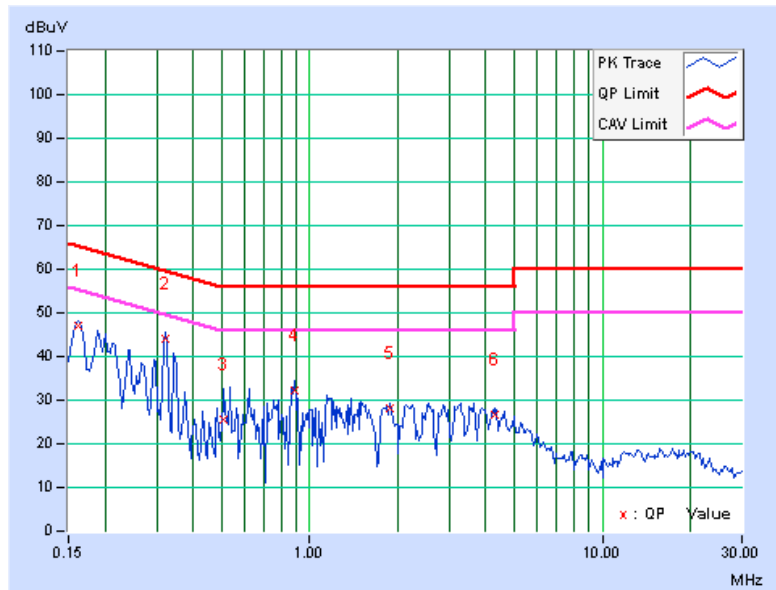
A D T

PHASE	Line 2	6dB BANDWIDTH	9kHz
TEST MODE	A		

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	0.16172	0.23	46.65	37.90	46.88	38.13	65.38	55.38	-18.50	-17.25
2	<b>0.32188</b>	<b>0.28</b>	<b>43.81</b>	<b>43.05</b>	<b>44.09</b>	<b>43.33</b>	<b>59.66</b>	<b>49.66</b>	<b>-15.57</b>	<b>-6.33</b>
3	0.50547	0.30	25.38	22.44	25.68	22.74	56.00	46.00	-30.32	-23.26
4	0.88438	0.29	32.10	31.60	32.39	31.89	56.00	46.00	-23.61	-14.11
5	1.88281	0.38	27.59	27.21	27.97	27.59	56.00	46.00	-28.03	-18.41
6	4.27734	0.49	26.29	22.27	26.78	22.76	56.00	46.00	-29.22	-23.24

**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.





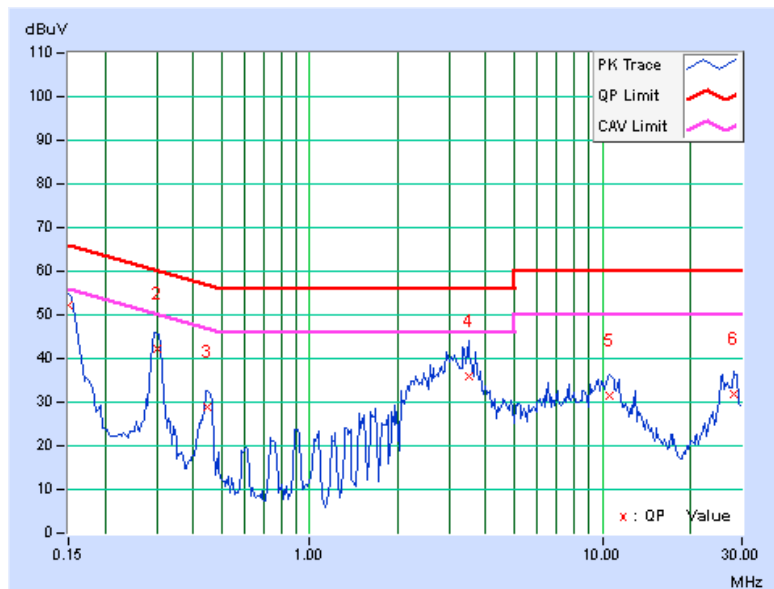
A D T

PHASE	Line 1	6dB BANDWIDTH	9kHz
TEST MODE	B		

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	0.15000	0.21	51.86	38.46	52.07	38.67	66.00	56.00	-13.93	-17.33
2	0.30226	0.23	41.88	28.40	42.11	28.63	60.18	50.18	-18.07	-21.55
3	0.44688	0.23	28.66	19.54	28.89	19.77	56.93	46.93	-28.05	-27.17
4	3.50000	0.42	35.38	21.12	35.80	21.54	56.00	46.00	-20.20	-24.46
5	10.60547	0.52	30.78	24.24	31.30	24.76	60.00	50.00	-28.70	-25.24
6	28.13972	0.58	31.42	30.97	32.00	31.55	60.00	50.00	-28.00	-18.45

**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.





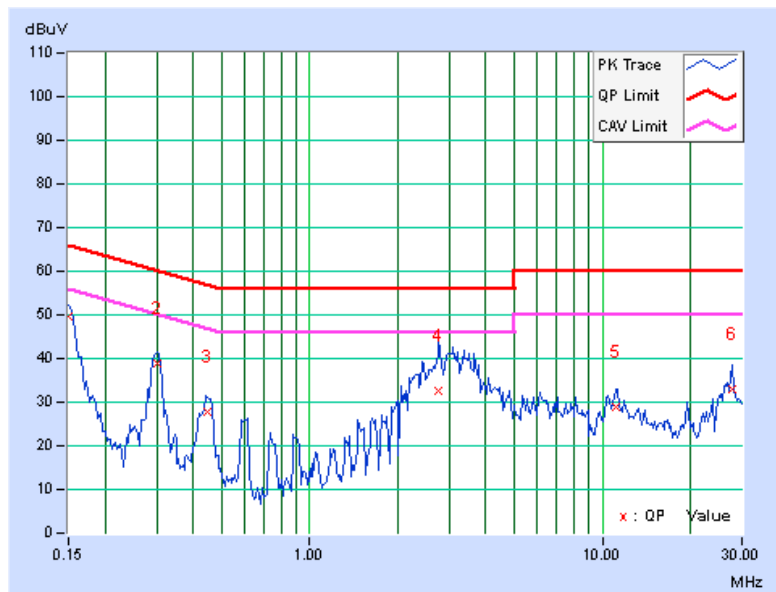
A D T

PHASE	Line 2	6dB BANDWIDTH	9kHz
TEST MODE	B		

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	0.15000	0.23	49.33	39.37	49.56	39.60	66.00	56.00	-16.44	-16.40
2	0.30234	0.27	38.67	32.64	38.94	32.91	60.18	50.18	-21.24	-17.27
3	0.44923	0.30	27.47	18.96	27.77	19.26	56.89	46.89	-29.12	-27.63
4	2.76563	0.43	32.24	20.15	32.67	20.58	56.00	46.00	-23.33	-25.42
5	11.12891	0.60	28.16	19.81	28.76	20.41	60.00	50.00	-31.24	-29.59
6	27.87518	0.68	32.39	31.63	33.07	32.31	60.00	50.00	-26.93	-17.69

**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.

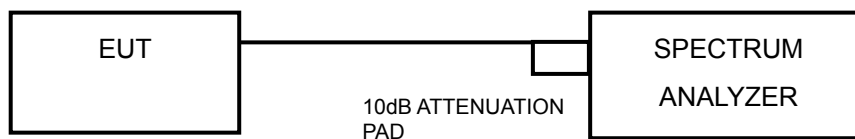


### 4.3 6dB BANDWIDTH MEASUREMENT

#### 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

- Set resolution bandwidth (RBW) = approximately 1% of the emission bandwidth
- Set the video bandwidth (VBW)  $\geq 3 \times$  RBW, Detector = Peak.
- Trace mode = max hold.
- Sweep = auto couple.
- Measure the maximum width of the emission that is constrained by the frequencies associated with the two amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission

#### 4.3.5 DEVIATION FROM TEST STANDARD

No deviation.

#### 4.3.6 EUT OPERATING CONDITIONS

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



A D T

### 4.3.7 TEST RESULTS

#### 802.11b

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1		
1	2412	10.12	10.12	0.5	PASS
6	2437	10.11	10.12	0.5	PASS
11	2462	10.12	10.12	0.5	PASS

#### 802.11g

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1		
1	2412	16.44	16.41	0.5	PASS
6	2437	16.42	16.38	0.5	PASS
11	2462	16.42	16.42	0.5	PASS

#### 802.11n (20MHz)

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1		
1	2412	17.59	17.62	0.5	PASS
6	2437	17.63	17.62	0.5	PASS
11	2462	17.62	17.64	0.5	PASS

#### 802.11n (40MHz)

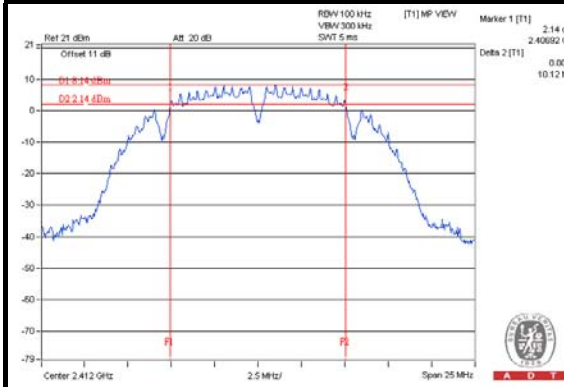
CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1		
3	2422	36.49	36.48	0.5	PASS
6	2437	36.45	36.16	0.5	PASS
9	2452	36.42	36.18	0.5	PASS



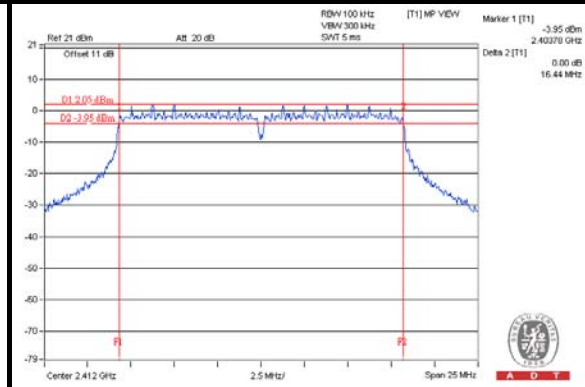
A D T

### SPECTRUM PLOT OF WORST VALUE

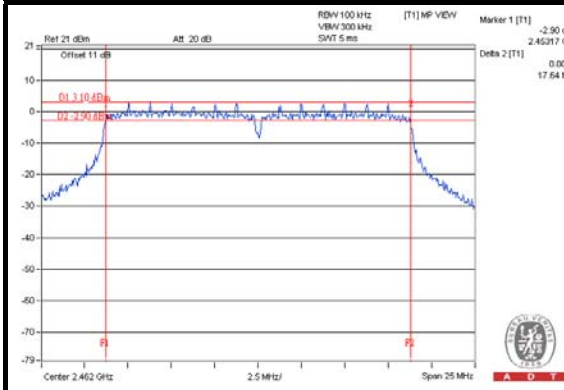
#### 802.11b



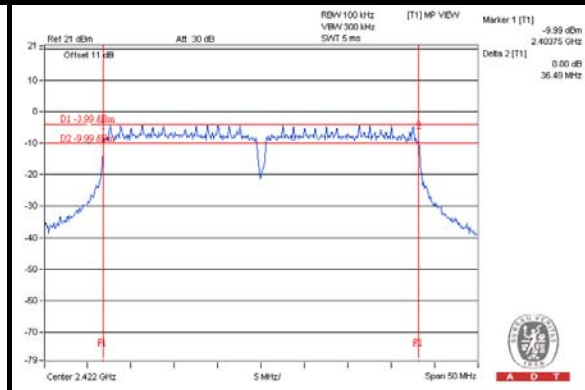
#### 802.11g



#### 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,

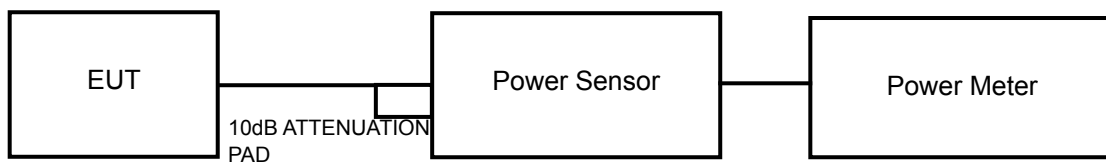
Array Gain = 0 dB (i.e., no array gain) for  $NANT \leq 4$ ;

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 average power level.

### 4.4.5 DEVIATION FROM TEST STANDARD

No deviation.

### 4.4.6 EUT OPERATING CONDITIONS

Same as Item 4.3.6.





A D T

#### 4.4.7 TEST RESULTS

##### 802.11b

CHAN.	FREQ. (MHz)	AVERAGE POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
1	2412	19.77	19.42	182.340	22.61	30	PASS
6	2437	17.58	17.47	113.127	20.54	30	PASS
11	2462	21.07	21.80	279.294	24.46	30	PASS

##### 802.11g

CHAN.	FREQ. (MHz)	AVERAGE POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
1	2412	15.10	14.11	58.122	17.64	30	PASS
6	2437	18.82	19.72	169.964	22.30	30	PASS
11	2462	16.04	15.64	76.823	18.85	30	PASS

##### 802.11n (20MHz)

CHAN.	FREQ. (MHz)	AVERAGE POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
1	2412	14.43	13.93	52.450	17.20	30	PASS
6	2437	18.81	19.46	164.341	22.16	30	PASS
11	2462	16.26	16.32	85.122	19.30	30	PASS

##### 802.11n (40MHz)

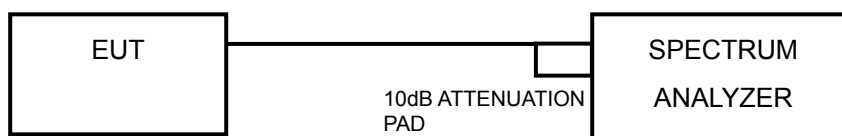
CHAN.	FREQ. (MHz)	AVERAGE POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
3	2422	11.95	11.22	28.911	14.61	30	PASS
6	2437	15.55	16.13	76.912	18.86	30	PASS
9	2452	13.63	13.83	47.222	16.74	30	PASS

## 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 = RMS.
- 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

TX chain	Channel	Freq. (MHz)	PSD (dBm/3kHz)	10 log (N=2) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	1	2412	-13.36	3.01	-10.35	6.04	PASS
	6	2437	-8.73	3.01	-5.72	6.04	PASS
	11	2462	-11.11	3.01	-8.10	6.04	PASS
1	1	2412	-13.12	3.01	-10.11	6.04	PASS
	6	2437	-8.39	3.01	-5.38	6.04	PASS
	11	2462	-10.67	3.01	-7.66	6.04	PASS

**NOTE:** Directional gain =  $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2] = 7.96\text{dBi} > 6\text{dBi}$ , so the power density limit shall be reduced to  $8-(7.96-6) = 6.04\text{dBm}$ .

#### 802.11g

TX chain	Chan.	Freq. (MHz)	PSD (dBm/3kHz)	10 log (N=2) dB	Total PSD without Duty Factor (dBm/3kHz)	Duty Factor	Total PSD with Duty Factor (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	1	2412	-19.24	3.01	-16.23	0.19	-16.04	6.04	PASS
	6	2437	-15.70	3.01	-12.69	0.19	-12.50	6.04	PASS
	11	2462	-18.29	3.01	-15.28	0.19	-15.09	6.04	PASS
1	1	2412	-19.16	3.01	-16.15	0.19	-15.96	6.04	PASS
	6	2437	-14.21	3.01	-11.20	0.19	-11.01	6.04	PASS
	11	2462	-17.61	3.01	-14.60	0.19	-14.41	6.04	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 =  $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2] = 7.96\text{dBi} > 6\text{dBi}$ , so the power density limit shall be reduced to  $8-(7.96-6) = 6.04\text{dBm}$ .
- Refer to section 3.3 for duty cycle spectrum plot.



**802.11n (20MHz)**

TX chain	Chan.	Freq. (MHz)	PSD (dBm/3kHz)	10 log (N=2) dB	Total PSD without Duty Factor (dBm/3kHz)	Duty Factor	Total PSD with Duty Factor (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	1	2412	-20.12	3.01	-17.11	0.16	-16.95	6.04	PASS
	6	2437	-15.64	3.01	-12.63	0.16	-12.47	6.04	PASS
	11	2462	-18.31	3.01	-15.30	0.16	-15.14	6.04	PASS
1	1	2412	-20.47	3.01	-17.46	0.16	-17.30	6.04	PASS
	6	2437	-14.98	3.01	-11.97	0.16	-11.81	6.04	PASS
	11	2462	-18.39	3.01	-15.38	0.16	-15.22	6.04	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 =  $10 \log[10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20}]^2 = 7.96\text{dBi} > 6\text{dBi}$ , so the power density limit shall be reduced to  $8 - (7.96 - 6) = 6.04\text{dBm}$ .
- Refer to section 3.3 for duty cycle spectrum plot.

**802.11n (40MHz)**

TX chain	Chan.	Freq. (MHz)	PSD (dBm/3kHz)	10 log (N=2) dB	Total PSD without Duty Factor (dBm/3kHz)	Duty Factor	Total PSD with Duty Factor (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	3	2422	-25.69	3.01	-22.68	0.30	-22.38	6.04	PASS
	6	2437	-21.20	3.01	-18.19	0.30	-17.89	6.04	PASS
	9	2452	-24.15	3.01	-21.14	0.30	-20.84	6.04	PASS
1	3	2422	-25.66	3.01	-22.65	0.30	-22.35	6.04	PASS
	6	2437	-20.24	3.01	-17.23	0.30	-16.93	6.04	PASS
	9	2452	-24.09	3.01	-21.08	0.30	-20.78	6.04	PASS

**NOTE:**

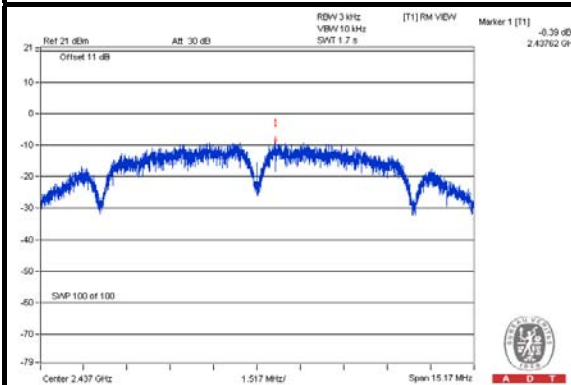
- Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
- Directional gain =  $10 \log[10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20}]^2 = 7.96\text{dBi} > 6\text{dBi}$ , so the power density limit shall be reduced to  $8 - (7.96 - 6) = 6.04\text{dBm}$ .
- Refer to section 3.3 for duty cycle spectrum plot.



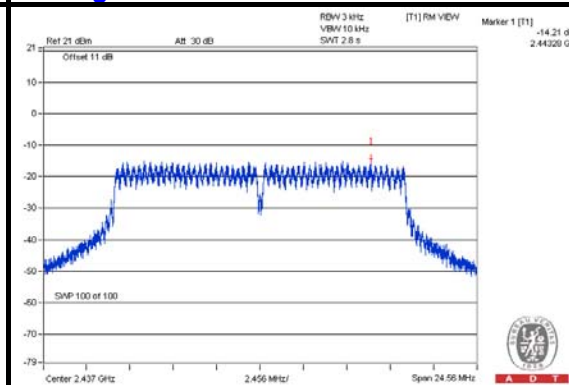
A D T

### SPECTRUM PLOT OF WORST VALUE

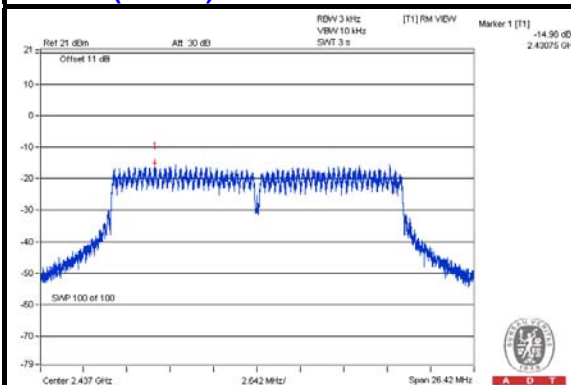
802.11b



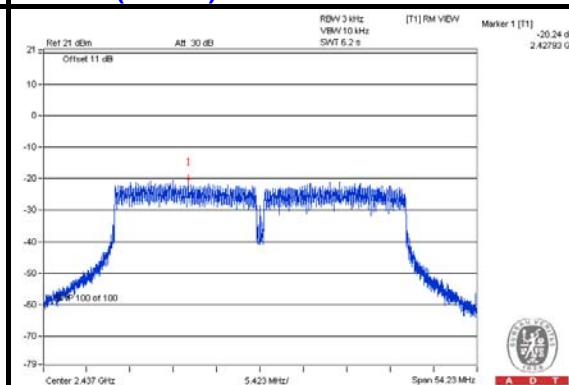
802.11g



802.11n (20MHz)



802.11n (40MHz)

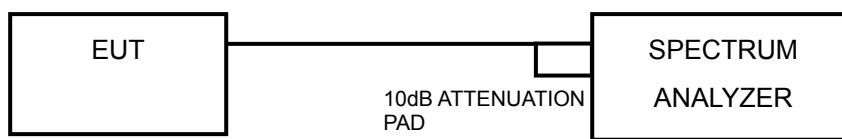


## 4.6 CONDUCTED OUT OF BAND EMISSION MEASUREMENT

### 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.



A D T

#### 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. Ensure that the number of measurement points  $\geq$  span/RBW
4. According to measurement points to set differ measurement span.
5. Detector = peak.
6. Trace Mode = max hold.
7. 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

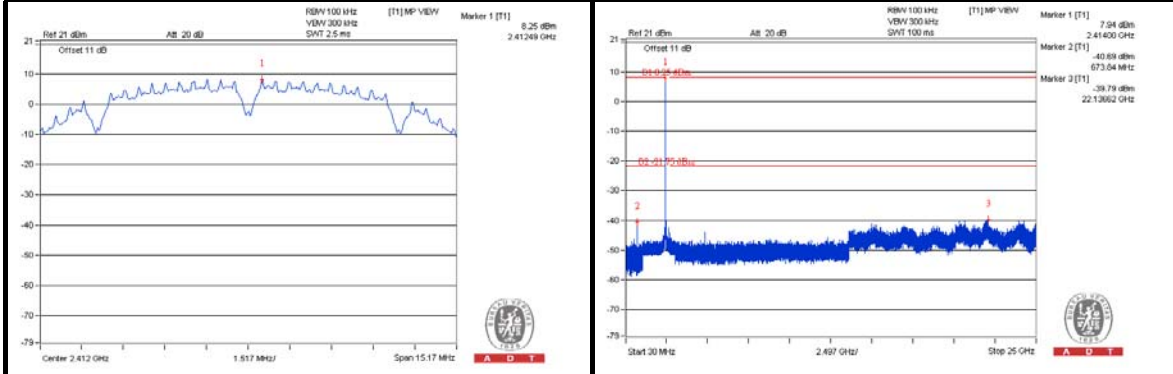
The conducted emission test is performed on each TX port of operating mode without summing or adding 10log (N) since the limit is relative emission limit.

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.

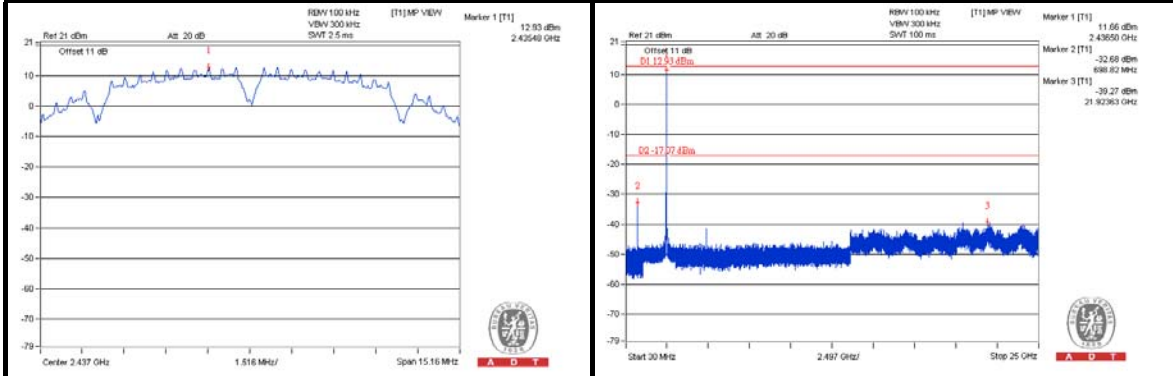
### 4.6.8 TEST RESULTS

802.11b  
CHAIN 0

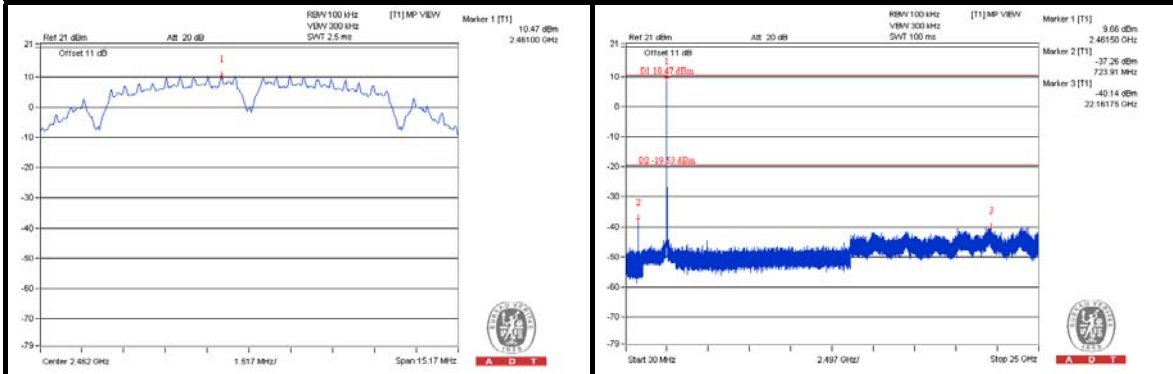
#### CH 1



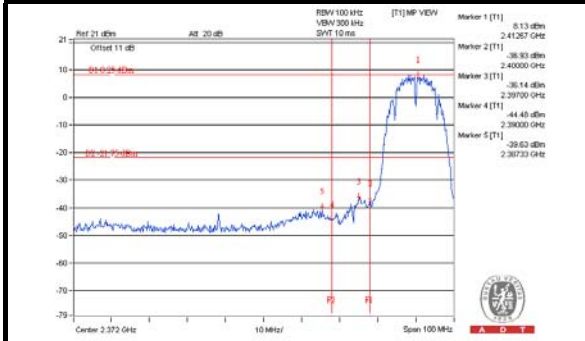
#### CH 6



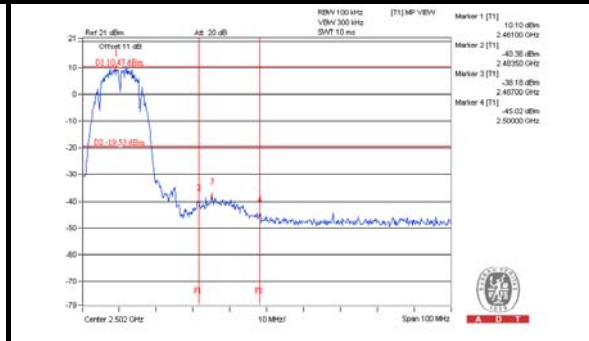
#### CH 11



#### CH 1 Band edge



#### CH 11 Band edge



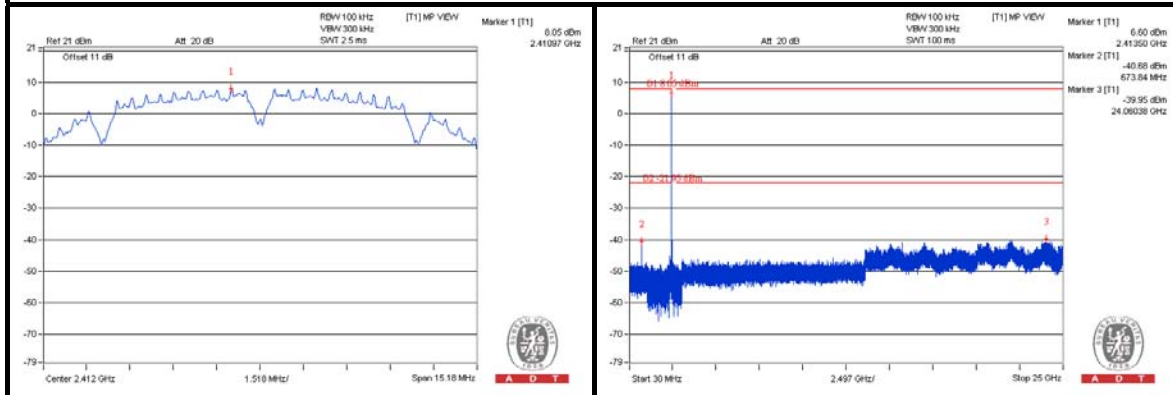




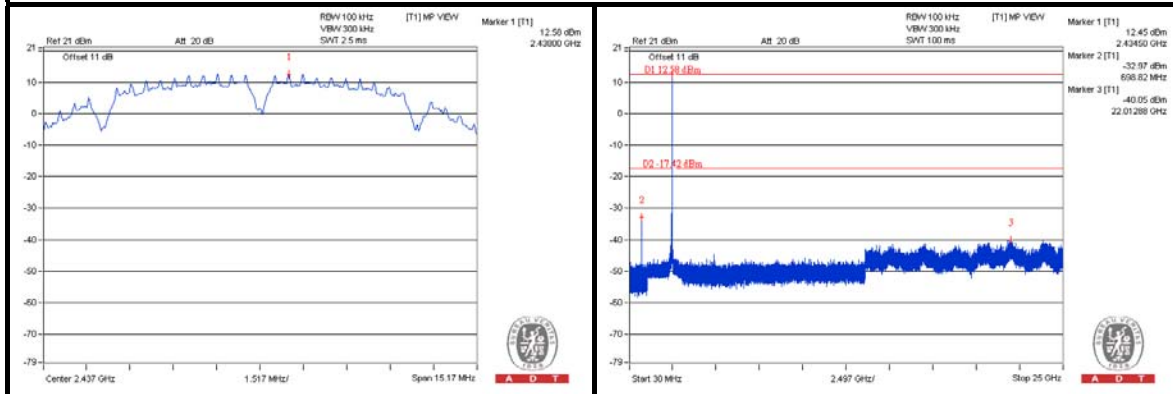
A D T

### CHAIN 1

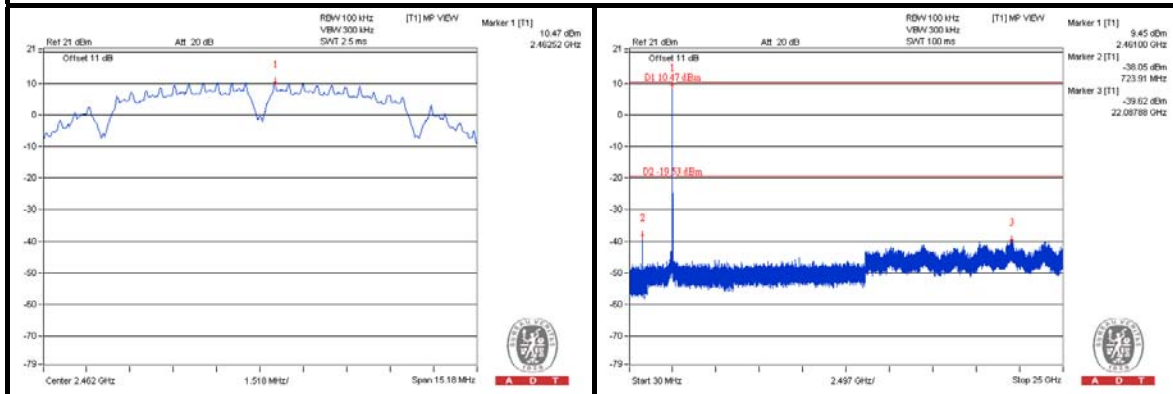
#### CH 1



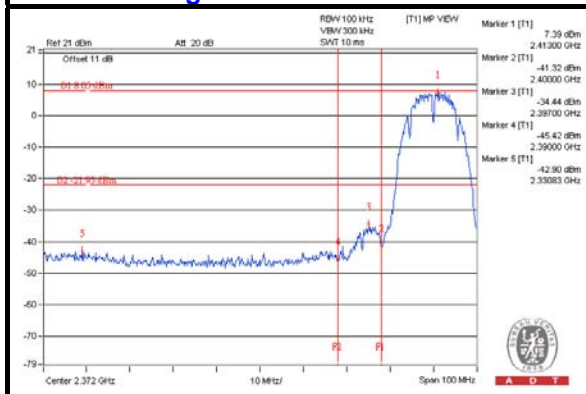
#### CH 6



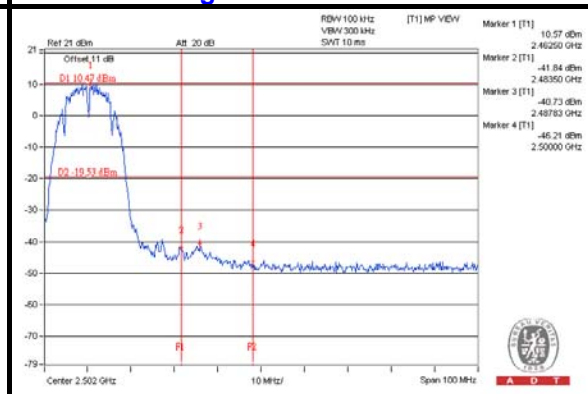
#### CH 11



#### CH 1 Band edge



#### CH 11 Band edge

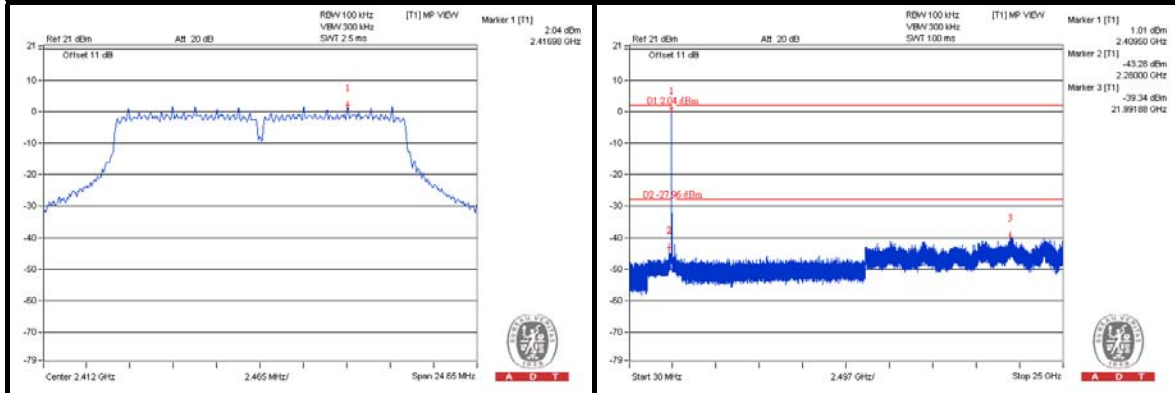




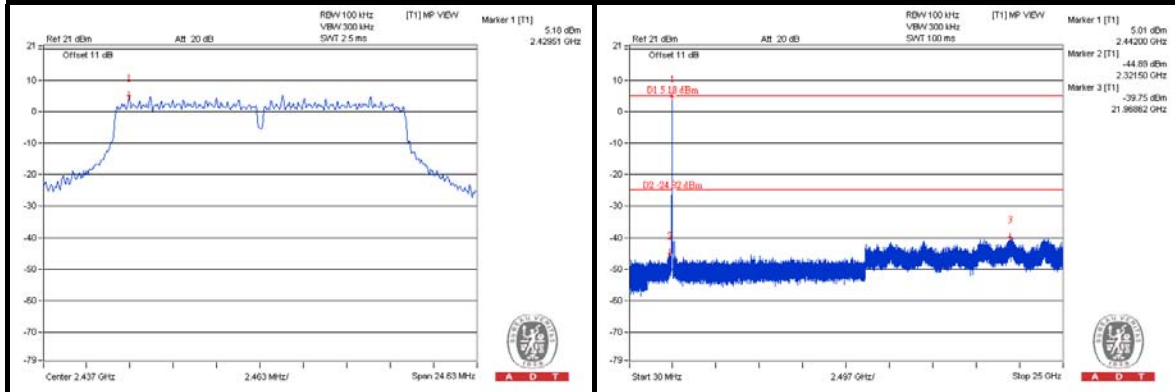
A D T

# 802.11g CHAIN 0

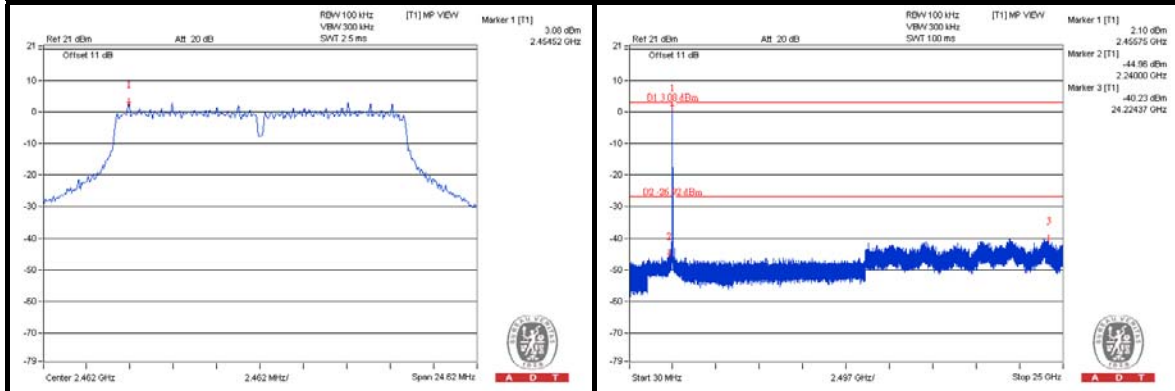
## CH 1



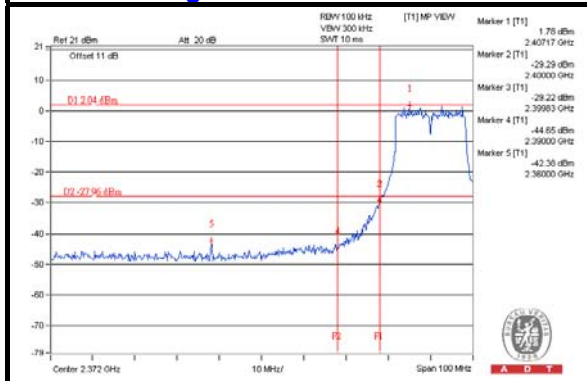
## CH 6



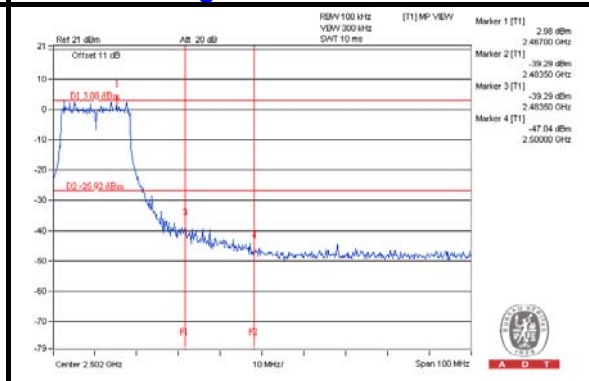
## CH 11



## CH 1 Band edge



## CH 11 Band edge

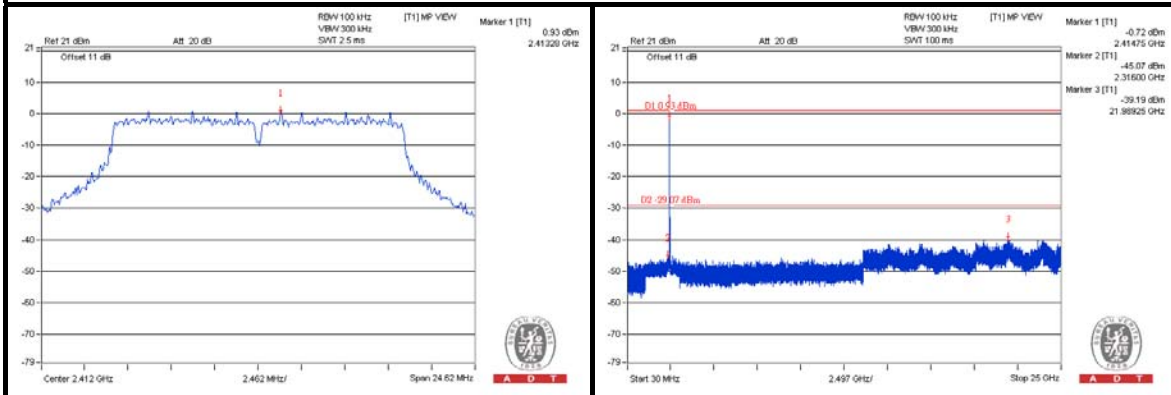




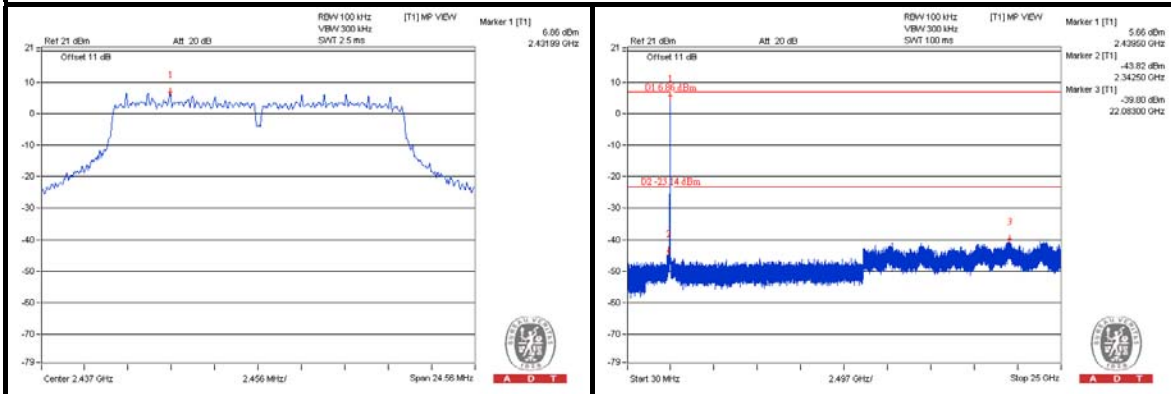
A D T

### CHAIN 1

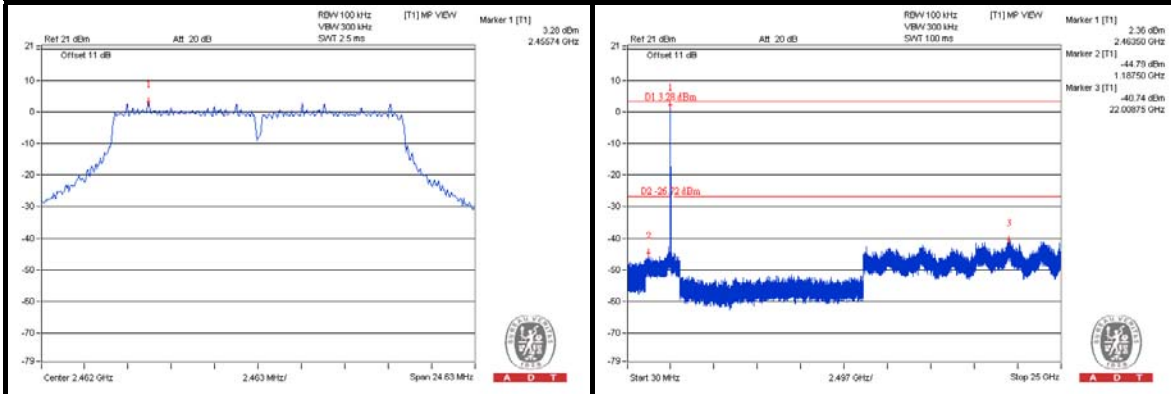
#### CH 1



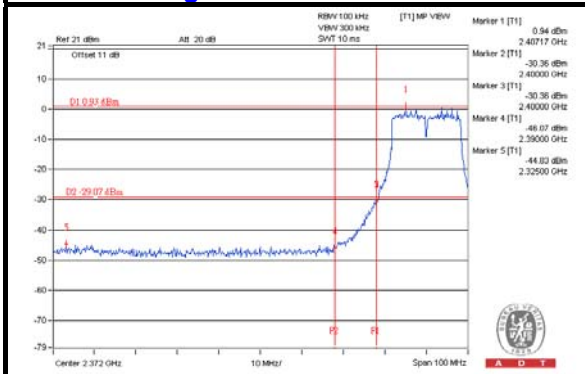
#### CH 6



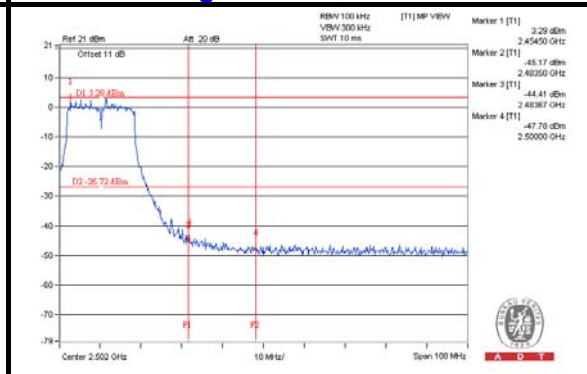
#### CH 11



#### CH 1 Band edge



#### CH 11 Band edge

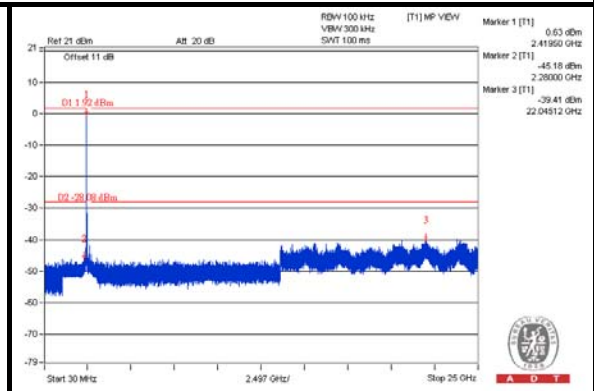
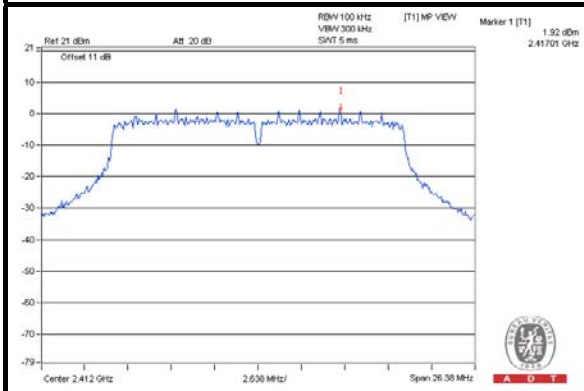




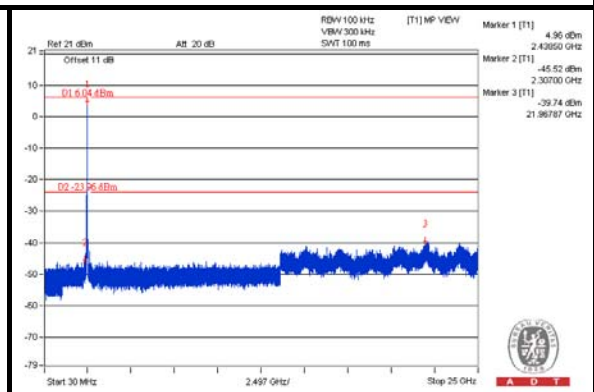
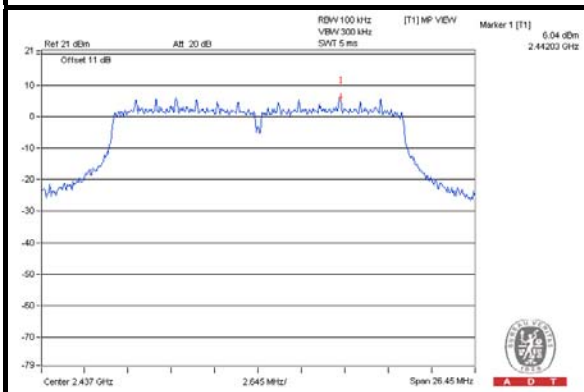
A D T

# 802.11n(20MHz) CHAIN 0

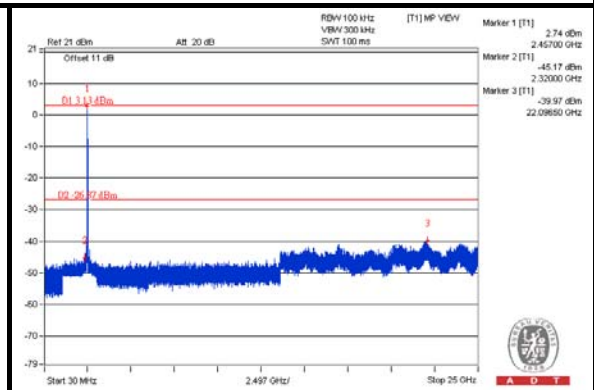
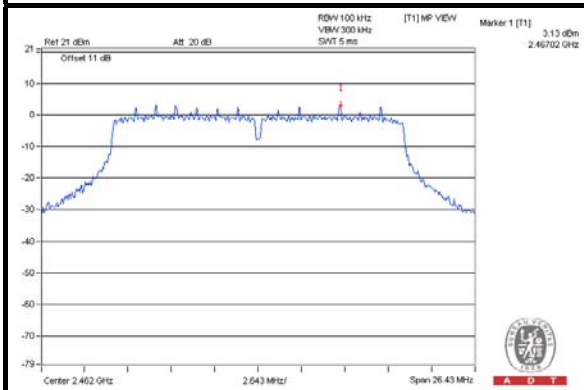
## CH 1



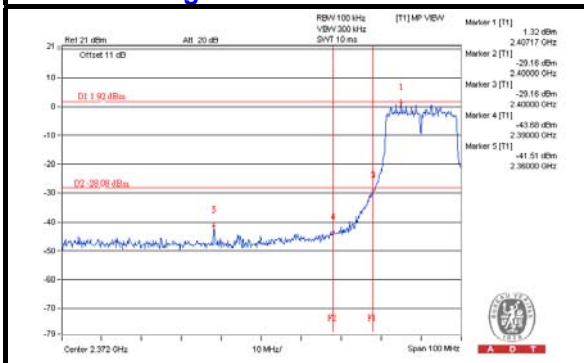
## CH 6



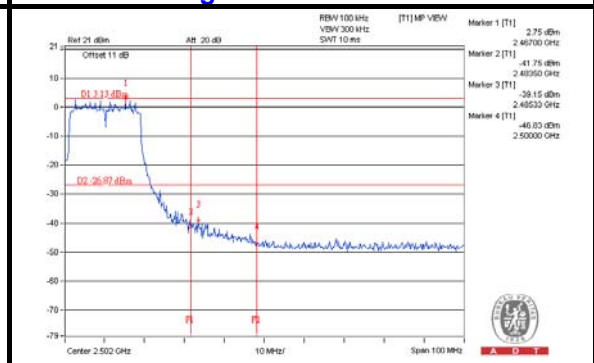
## CH 11



## CH 1 Band edge



## CH 11 Band edge

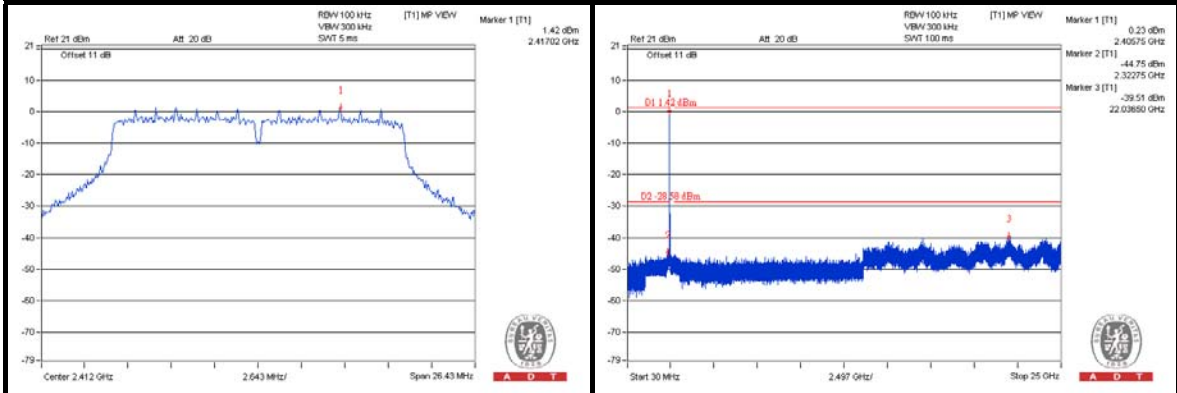




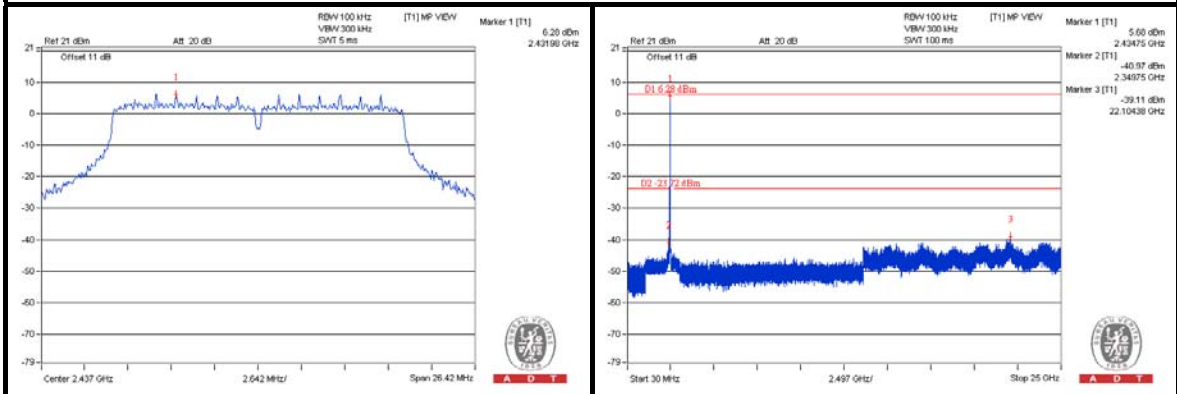
A D T

### CHAIN 1

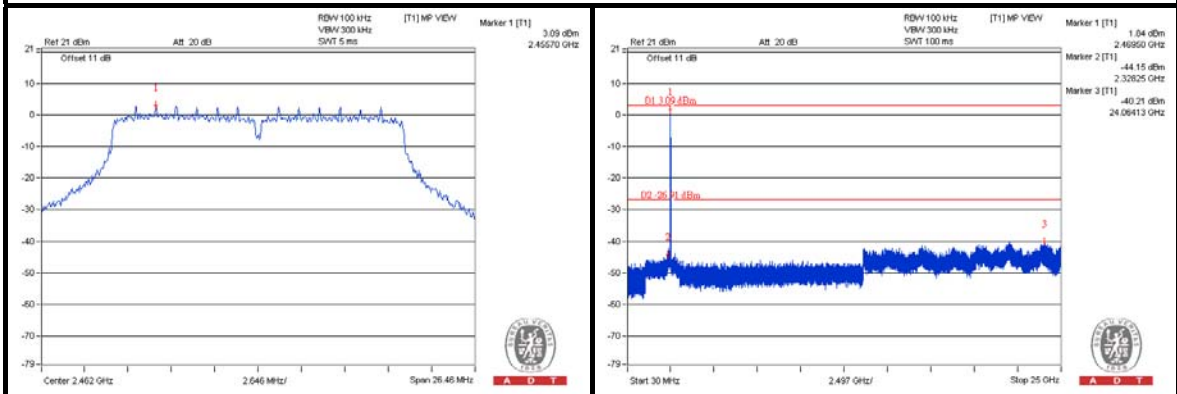
#### CH 1



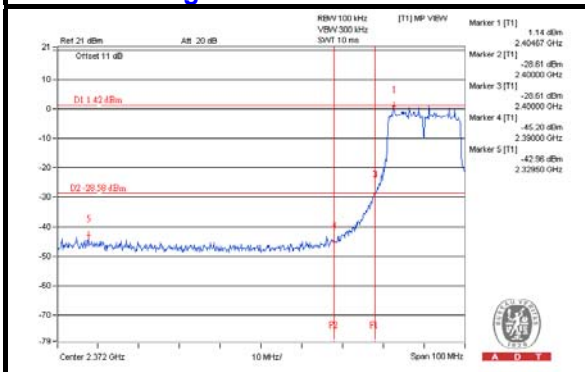
#### CH 6



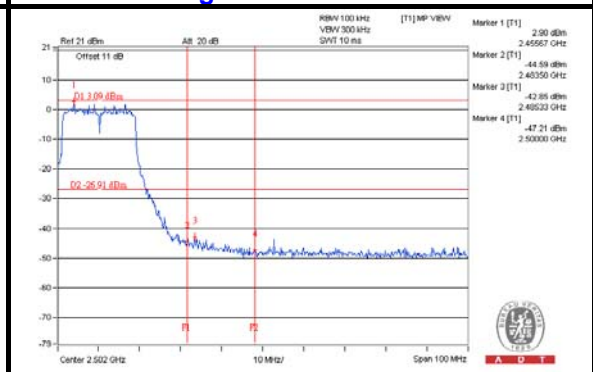
#### CH 11



#### CH 1 Band edge



#### CH 11 Band edge



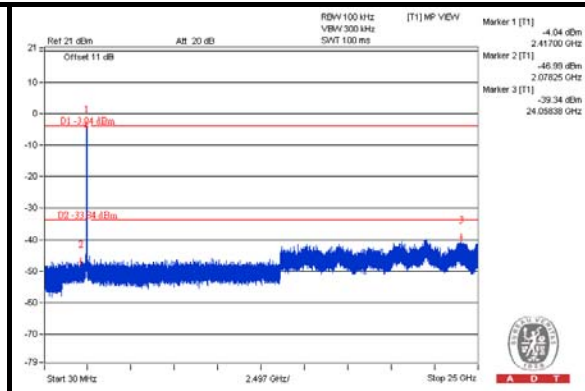
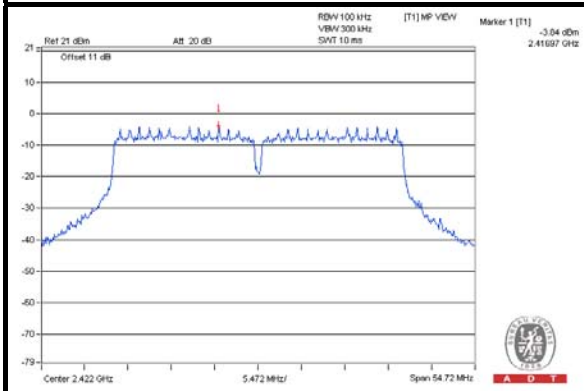




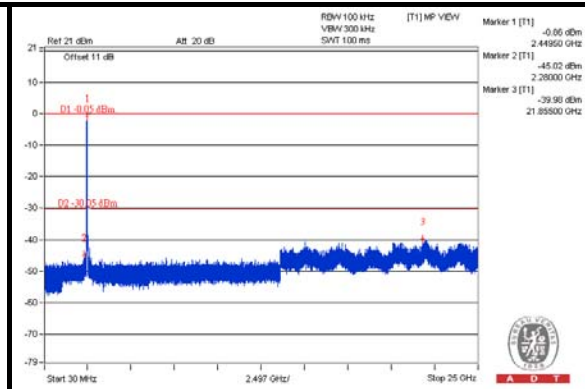
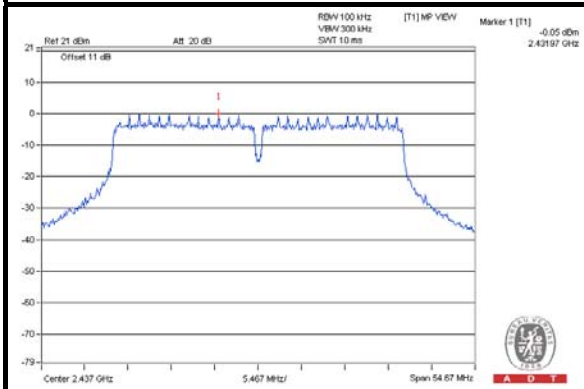
A D T

# 802.11n(40MHz) CHAIN 0

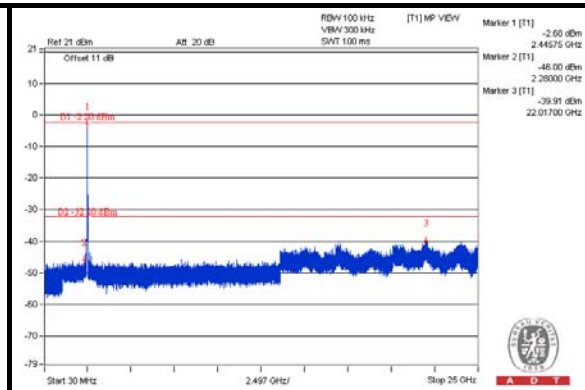
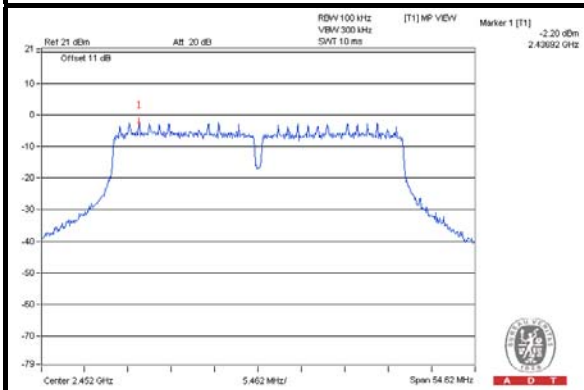
## CH 3



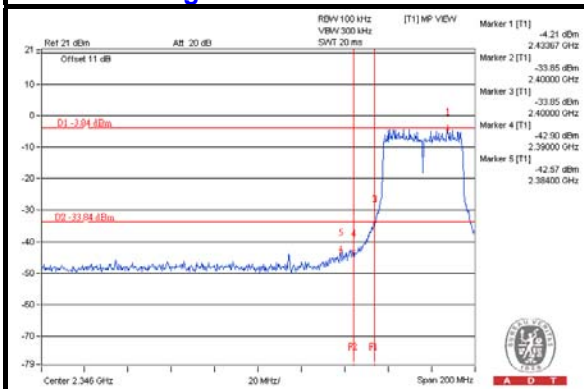
## CH 6



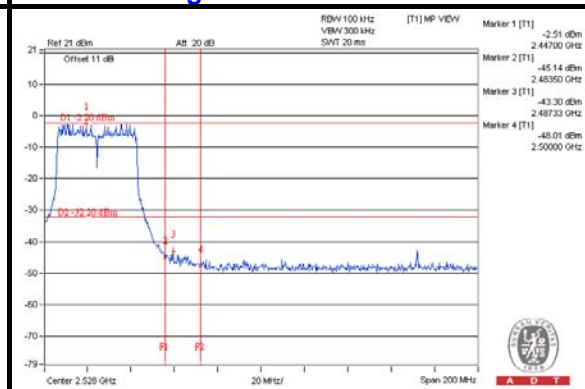
## CH 9



## CH 3 Band edge



## CH 9 Band edge

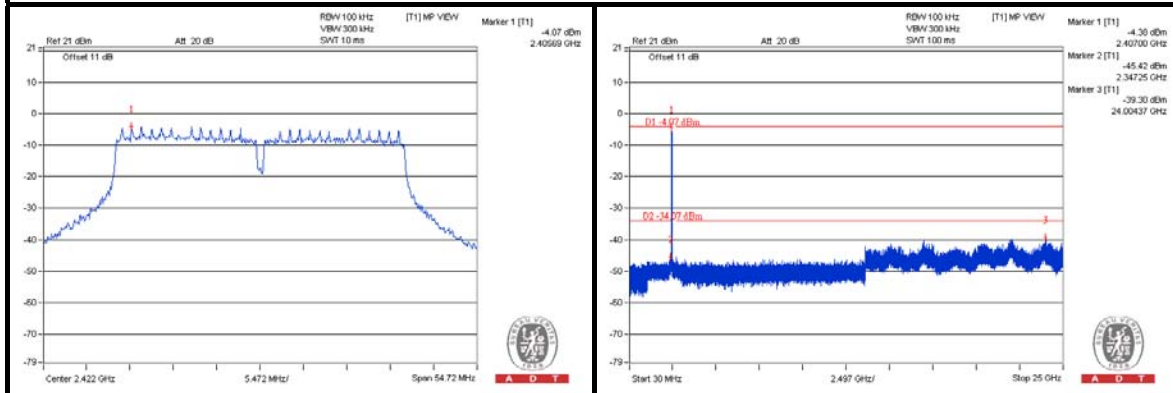




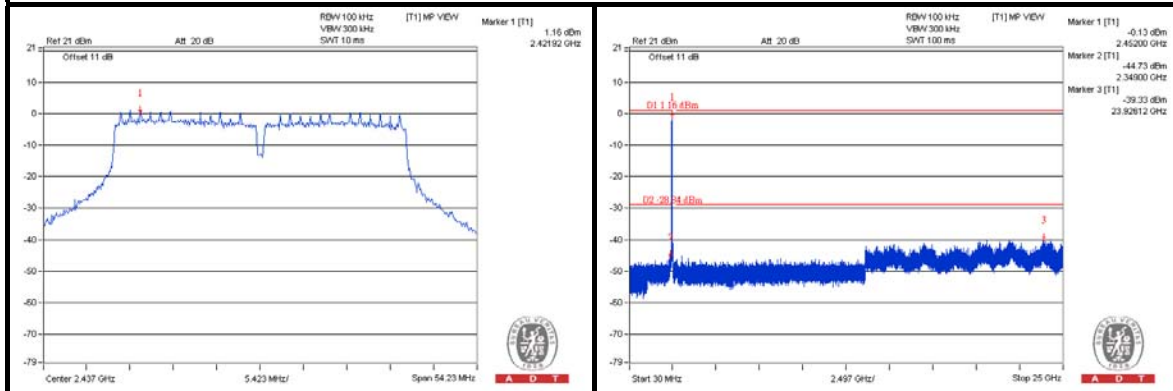
A D T

### CHAIN 1

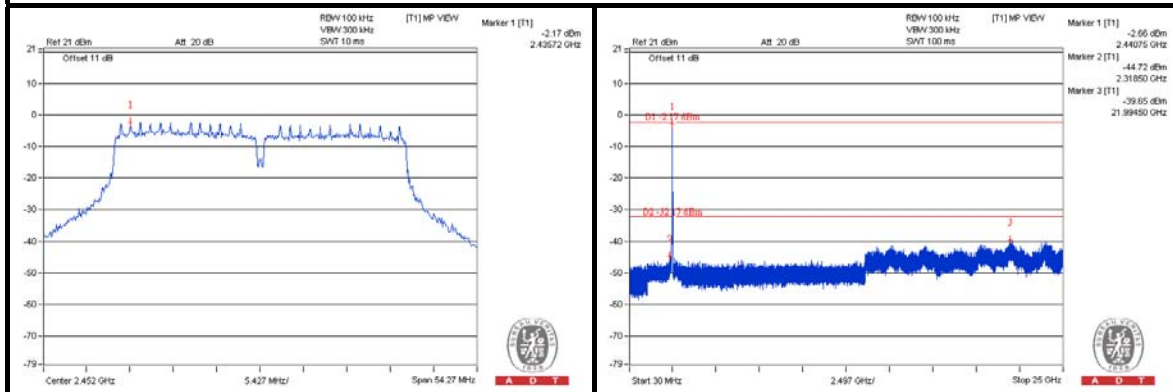
#### CH 3



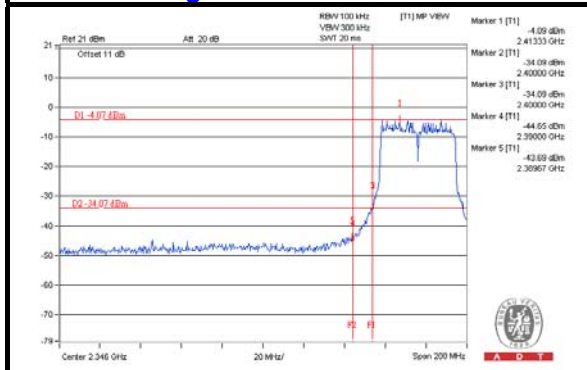
#### CH 6



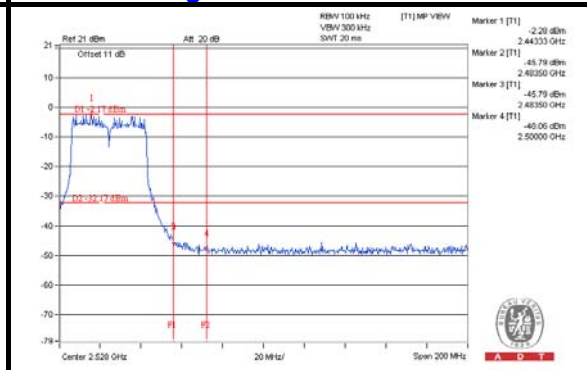
#### CH 9



#### CH 3 Band edge



#### CH 9 Band edge





## 5. TEST TYPES AND RESULTS (FOR 5.0GHz BAND)

### 5.1 RADIATED EMISSION MEASUREMENT

#### 5.1.1 LIMITS OF RADIATED EMISSION 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.





A D T

#### 5.1.2 TEST INSTRUMENTS

Same as item 4.1.2.

#### 5.1.3 TEST PROCEDURES

Same as item 4.1.3.

#### 5.1.4 DEVIATION FROM TEST STANDARD

No deviation.

#### 5.1.5 TEST SETUP

Same as item 4.1.5.

#### 5.1.6 EUT OPERATING CONDITIONS

Same as item 4.1.6.



A D T

### 5.1.7 TEST RESULTS

#### ABOVE 1GHz DATA:

#### 802.11a

<b>CHANNEL</b>	TX Channel 149	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 40GHz		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	5350.00	58.2 PK	74.0	-15.8	1.08 H	209	55.60	2.60
2	5350.00	47.3 AV	54.0	-6.7	1.08 H	209	44.70	2.60
3	#5725.00	74.7 PK	82.4	-7.7	1.08 H	328	34.40	40.30
4	#5725.00	62.4 AV	70.1	-7.7	1.08 H	328	22.10	40.30
5	*5745.00	112.4 PK			1.09 H	322	72.10	40.30
6	*5745.00	100.1 AV			1.09 H	322	59.80	40.30
7	11490.00	63.4 PK	74.0	-10.6	1.14 H	62	47.50	15.90
8	11490.00	50.9 AV	54.0	-3.1	1.14 H	62	35.00	15.90
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	5350.00	56.8 PK	74.0	-17.2	1.34 V	28	54.20	2.60
2	5350.00	48.5 AV	54.0	-5.5	1.34 V	28	45.90	2.60
3	#5725.00	77.2 PK	84.4	-7.2	1.06 V	32	36.90	40.30
4	#5725.00	65.5 AV	72.7	-7.2	1.06 V	32	25.20	40.30
5	*5745.00	114.4 PK			1.05 V	18	74.10	40.30
6	*5745.00	102.7 AV			1.05 V	18	62.40	40.30
7	11490.00	64.5 PK	74.0	-9.5	1.65 V	54	48.60	15.90
8	11490.00	51.6 AV	54.0	-2.4	1.65 V	54	35.70	15.90

#### 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.
7. The limit value is defined as per 15.247.



A D T

<b>CHANNEL</b>	TX Channel 157	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 40GHz		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	5350.00	60.3 PK	74.0	-13.7	1.14 H	318	57.70	2.60
2	5350.00	48.2 AV	54.0	-5.8	1.14 H	318	45.60	2.60
3	*5785.00	114.7 PK			1.08 H	356	74.40	40.30
4	*5785.00	102.7 AV			1.08 H	356	62.40	40.30
5	11570.00	64.3 PK	74.0	-9.7	1.60 H	347	48.40	15.90
6	11570.00	51.6 AV	54.0	-2.4	1.60 H	347	35.70	15.90
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	5350.00	61.0 PK	74.0	-13.0	1.22 V	10	58.40	2.60
2	5350.00	48.4 AV	54.0	-5.6	1.22 V	10	45.80	2.60
3	*5785.00	116.2 PK			1.12 V	2	75.90	40.30
4	*5785.00	106.4 AV			1.12 V	2	66.10	40.30
5	11570.00	66.3 PK	74.0	-7.7	1.16 V	18	50.40	15.90
6	11570.00	52.9 AV	54.0	-1.1	1.16 V	18	37.00	15.90

**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 limit value is defined as per 15.247.



A D T

<b>CHANNEL</b>	TX Channel 165	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 40GHz		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	5350.00	59.3 PK	74.0	-14.7	1.17 H	324	56.70	2.60
2	5350.00	50.2 AV	54.0	-3.8	1.17 H	324	47.60	2.60
3	*5825.00	114.6 PK			1.20 H	319	74.10	40.50
4	*5825.00	102.1 AV			1.20 H	319	61.60	40.50
5	#5850.00	74.7 PK	84.6	-9.9	1.22 H	319	34.20	40.50
6	#5850.00	62.2 AV	72.1	-9.9	1.22 H	319	21.70	40.50
7	11650.00	62.3 PK	74.0	-11.7	1.12 H	71	46.40	15.90
8	11650.00	50.5 AV	54.0	-3.5	1.12 H	71	34.60	15.90

**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	5350.00	67.4 PK	74.0	-6.6	1.12 V	18	64.80	2.60
2	5350.00	53.0 AV	54.0	-1.0	1.12 V	18	50.40	2.60
3	*5825.00	117.9 PK			1.04 V	24	77.40	40.50
4	*5825.00	105.7 AV			1.04 V	24	65.20	40.50
5	#5850.00	77.2 PK	87.9	-10.7	1.04 V	24	36.70	40.50
6	#5850.00	65.0 AV	75.7	-10.7	1.04 V	24	24.50	40.50
7	11650.00	65.5 PK	74.0	-8.5	1.00 V	2	49.60	15.90
8	11650.00	51.9 AV	54.0	-2.1	1.00 V	2	36.00	15.90

**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.
7. The limit value is defined as per 15.247.



A D T

802.11n (20MHz)

<b>CHANNEL</b>	TX Channel 149	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 40GHz		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	5350.00	57.9 PK	74.0	-16.1	1.04 H	347	55.30	2.60
2	5350.00	47.4 AV	54.0	-6.6	1.04 H	347	44.80	2.60
3	#5725.00	78.0 PK	81.5	-3.5	1.06 H	328	37.70	40.30
4	#5725.00	68.5 AV	72.0	-3.5	1.06 H	328	28.20	40.30
5	*5745.00	111.5 PK			1.06 H	326	71.20	40.30
6	*5745.00	102.0 AV			1.06 H	326	61.70	40.30
7	11490.00	62.6 PK	74.0	-11.4	1.39 H	324	46.70	15.90
8	11490.00	50.3 AV	54.0	-3.7	1.39 H	324	34.40	15.90

**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	5350.00	58.8 PK	74.0	-15.2	1.16 V	24	56.20	2.60
2	5350.00	48.2 AV	54.0	-5.8	1.16 V	24	45.60	2.60
3	#5725.00	78.5 PK	83.7	-5.2	1.22 V	36	38.20	40.30
4	#5725.00	67.8 AV	73.0	-5.2	1.22 V	36	27.50	40.30
5	*5745.00	113.7 PK			1.20 V	32	73.40	40.30
6	*5745.00	103.0 AV			1.20 V	32	62.70	40.30
7	11490.00	64.8 PK	74.0	-9.2	1.08 V	65	48.90	15.90
8	11490.00	51.9 AV	54.0	-2.1	1.08 V	65	36.00	15.90

**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.
7. The limit value is defined as per 15.247.



A D T

<b>CHANNEL</b>	TX Channel 157	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 40GHz		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	5360.00	60.2 PK	74.0	-13.8	1.29 H	2	57.60	2.60
2	5360.00	48.4 AV	54.0	-5.6	1.29 H	2	45.80	2.60
3	*5785.00	115.1 PK			1.17 H	352	74.80	40.30
4	*5785.00	102.5 AV			1.17 H	352	62.20	40.30
5	11570.00	62.6 PK	74.0	-11.4	1.15 H	357	46.70	15.90
6	11570.00	50.4 AV	54.0	-3.6	1.15 H	357	34.50	15.90
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	5350.00	62.2 PK	74.0	-11.8	1.09 V	359	59.60	2.60
2	5350.00	49.3 AV	54.0	-4.7	1.09 V	359	46.70	2.60
3	*5785.00	116.5 PK			1.25 V	358	76.20	40.30
4	*5785.00	103.4 AV			1.25 V	358	63.10	40.30
5	11570.00	64.8 PK	74.0	-9.2	1.46 V	312	48.90	15.90
6	11570.00	50.9 AV	54.0	-3.1	1.46 V	312	35.00	15.90

**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 limit value is defined as per 15.247.



A D T

<b>CHANNEL</b>	TX Channel 165	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 40GHz		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	5360.00	60.8 PK	74.0	-13.2	1.14 H	27	58.20	2.60
2	5360.00	51.1 AV	54.0	-2.9	1.14 H	27	48.50	2.60
3	*5825.00	113.9 PK			1.16 H	28	73.40	40.50
4	*5825.00	103.7 AV			1.16 H	28	63.20	40.50
5	#5850.00	74.5 PK	83.9	-9.4	1.16 H	28	34.00	40.50
6	#5850.00	64.3 AV	73.7	-9.4	1.16 H	28	23.80	40.50
7	11650.00	66.5 PK	74.0	-7.5	1.46 H	345	50.60	15.90
8	11650.00	53.0 AV	54.0	-1.0	1.46 H	345	37.10	15.90

**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	5360.00	61.0 PK	74.0	-13.0	1.04 V	18	58.40	2.60
2	5360.00	52.5 AV	54.0	-1.5	1.04 V	18	49.90	2.60
3	*5825.00	115.0 PK			1.04 V	15	74.50	40.50
4	*5825.00	105.1 AV			1.04 V	15	64.60	40.50
5	#5850.00	76.5 PK	85.0	-8.5	1.04 V	16	36.00	40.50
6	#5850.00	66.6 AV	75.1	-8.5	1.04 V	16	26.10	40.50
7	11650.00	67.1 PK	74.0	-6.9	1.12 V	4	51.20	15.90
8	11650.00	53.0 AV	54.0	-1.0	1.12 V	4	37.10	15.90

**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.
7. The limit value is defined as per 15.247.



A D T

802.11n (40MHz)

<b>CHANNEL</b>	TX Channel 151	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 40GHz		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	5120.00	57.2 PK	74.0	-16.8	1.00 H	64	54.80	2.40
2	5120.00	44.0 AV	54.0	-10.0	1.00 H	64	41.60	2.40
3	#5725.00	74.4 PK	77.4	-3.0	1.12 H	345	34.10	40.30
4	#5725.00	65.2 AV	68.2	-3.0	1.12 H	345	24.90	40.30
5	*5755.00	107.4 PK			1.11 H	345	67.10	40.30
6	*5755.00	98.2 AV			1.11 H	345	57.90	40.30
7	11510.00	60.1 PK	74.0	-13.9	1.46 H	89	44.20	15.90
8	11510.00	50.5 AV	54.0	-3.5	1.46 H	89	34.60	15.90

**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	5120.00	59.4 PK	74.0	-14.6	1.02 V	344	57.00	2.40
2	5120.00	50.9 AV	54.0	-3.1	1.02 V	344	48.50	2.40
3	#5725.00	78.7 PK	78.8	-0.1	1.01 V	12	38.40	40.30
4	#5725.00	69.3 AV	69.4	-0.1	1.01 V	12	29.00	40.30
5	*5755.00	108.8 PK			1.01 V	12	68.50	40.30
6	*5755.00	99.4 AV			1.01 V	12	59.10	40.30
7	11510.00	63.1 PK	74.0	-10.9	1.08 V	224	47.20	15.90
8	11510.00	48.8 AV	54.0	-5.2	1.08 V	224	32.90	15.90

**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.
7. The limit value is defined as per 15.247.





A D T

<b>CHANNEL</b>	TX Channel 159	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 40GHz		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	5350.00	59.3 PK	74.0	-14.7	1.00 H	9	56.70	2.60
2	5350.00	50.5 AV	54.0	-3.5	1.00 H	9	47.90	2.60
3	*5795.00	112.8 PK			1.00 H	25	72.40	40.40
4	*5795.00	103.6 AV			1.00 H	25	63.20	40.40
5	#5850.00	70.4 PK	82.8	-12.4	1.00 H	26	29.90	40.50
6	#5850.00	61.2 AV	73.6	-12.4	1.00 H	26	20.70	40.50
7	11590.00	65.0 PK	74.0	-9.0	1.48 H	344	49.20	15.80
8	11590.00	52.5 AV	54.0	-1.5	1.48 H	344	36.70	15.80

**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	5350.00	61.8 PK	74.0	-12.2	1.14 V	18	59.20	2.60
2	5350.00	49.3 AV	54.0	-4.7	1.14 V	18	46.70	2.60
3	*5795.00	114.8 PK			1.04 V	21	74.40	40.40
4	*5795.00	104.8 AV			1.04 V	21	64.40	40.40
5	#5850.00	74.9 PK	84.8	-9.9	1.04 V	21	34.40	40.50
6	#5850.00	64.9 AV	74.8	-9.9	1.04 V	21	24.40	40.50
7	11590.00	62.6 PK	74.0	-11.4	1.32 V	2	46.80	15.80
8	11590.00	50.1 AV	54.0	-3.9	1.32 V	2	34.30	15.80

**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.
7. The limit value is defined as per 15.247.



A D T

**BELOW 1GHz WORST-CASE DATA**

**802.11a**

<b>CHANNEL</b>	TX Channel 157	<b>DETECTOR FUNCTION</b>	Quasi-Peak (QP)
<b>FREQUENCY RANGE</b>	30MHz ~ 1GHz		
<b>TEST MODE</b>	A		

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	124.82	34.0 QP	43.5	-9.5	1.49 H	250	49.90	-15.90
2	249.18	38.8 QP	46.0	-7.2	1.00 H	241	53.00	-14.20
3	399.97	41.8 QP	46.0	-4.2	1.00 H	167	52.00	-10.20
4	499.46	42.9 QP	46.0	-3.1	1.49 H	216	51.30	-8.40
5	600.50	43.4 QP	46.0	-2.6	1.24 H	161	49.60	-6.20
6	1000.00	45.5 QP	54.0	-8.5	1.24 H	141	45.00	0.50
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	124.82	35.8 QP	43.5	-7.7	1.00 V	4	51.70	-15.90
2	375.10	39.7 QP	46.0	-6.3	1.26 V	143	50.30	-10.60
3	499.46	40.2 QP	46.0	-5.8	1.00 V	278	48.60	-8.40
4	600.50	43.1 QP	46.0	-2.9	1.00 V	237	49.30	-6.20
5	875.64	39.6 QP	46.0	-6.4	1.00 V	202	41.20	-1.60
6	1000.00	42.3 QP	54.0	-11.7	1.00 V	32	41.80	0.50

**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



A D T

<b>CHANNEL</b>	TX Channel 157	<b>DETECTOR FUNCTION</b>	Quasi-Peak (QP)
<b>FREQUENCY RANGE</b>	30MHz ~ 1GHz		
<b>TEST MODE</b>	B		

**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	249.18	39.7 QP	46.0	-6.3	2.00 H	265	53.90	-14.20
2	375.10	41.8 QP	46.0	-4.2	1.00 H	235	52.40	-10.60
3	599.77	44.2 QP	46.0	-1.8	1.06 H	221	50.40	-6.20
4	625.37	42.6 QP	46.0	-3.4	1.50 H	155	48.20	-5.60
5	749.73	40.8 QP	46.0	-5.2	1.00 H	145	44.60	-3.80
6	1000.00	46.8 QP	54.0	-7.2	1.25 H	220	46.30	0.50

**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	47.80	38.8 QP	40.0	-1.2	1.28 V	N/A	52.90	-14.10
2	124.82	33.4 QP	43.5	-10.1	1.00 V	18	49.30	-15.90
3	249.18	37.7 QP	46.0	-8.3	1.25 V	12	51.90	-14.20
4	375.10	37.8 QP	46.0	-8.2	1.00 V	191	48.40	-10.60
5	499.46	37.6 QP	46.0	-8.4	1.00 V	198	46.00	-8.40
6	625.37	36.6 QP	46.0	-9.4	2.00 V	20	42.20	-5.60

**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

## 5.2 CONDUCTED EMISSION MEASUREMENT

### 5.2.1 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.

### 5.2.2 TEST INSTRUMENTS

Same as item 4.2.2.

### 5.2.3 TEST PROCEDURES

Same as item 4.2.3.

### 5.2.4 DEVIATION FROM TEST STANDARD

No deviation.

### 5.2.5 TEST SETUP

Same as item 4.2.5.

### 5.2.6 EUT OPERATING CONDITIONS

Same as item 4.1.6

### 5.2.7 TEST RESULTS

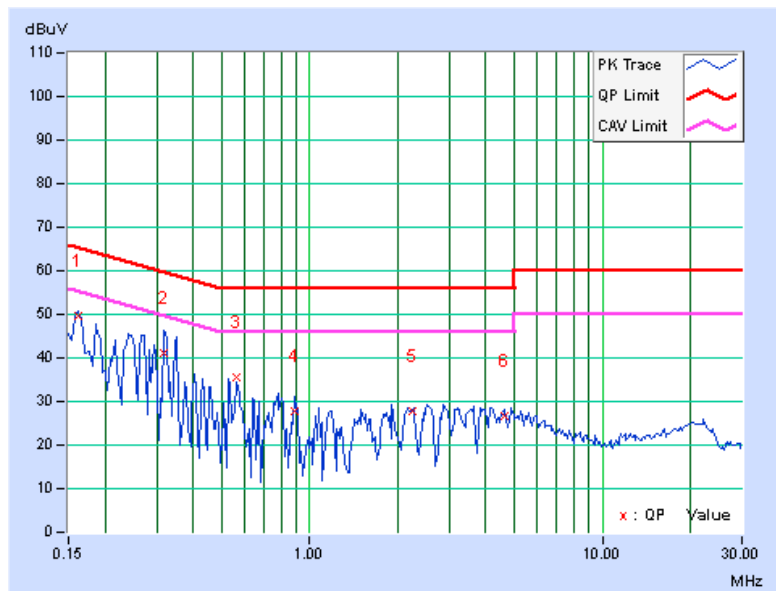
**CONDUCTED WORST-CASE DATA : 802.11a**

<b>PHASE</b>	Line 1	<b>6dB BANDWIDTH</b>	9kHz
<b>TEST MODE</b>	A		

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	0.16172	0.22	49.40	41.76	49.62	41.98	65.38	55.38	-15.75	-13.39
2	0.31797	0.23	40.79	39.98	41.02	40.21	59.76	49.76	-18.74	-9.55
3	0.56406	0.24	35.18	33.69	35.42	33.93	56.00	46.00	-20.58	-12.07
4	0.88438	0.28	27.61	27.19	27.89	27.47	56.00	46.00	-28.11	-18.53
5	2.23438	0.38	27.46	26.80	27.84	27.18	56.00	46.00	-28.16	-18.82
6	4.63281	0.45	26.06	20.19	26.51	20.64	56.00	46.00	-29.49	-25.36

**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.





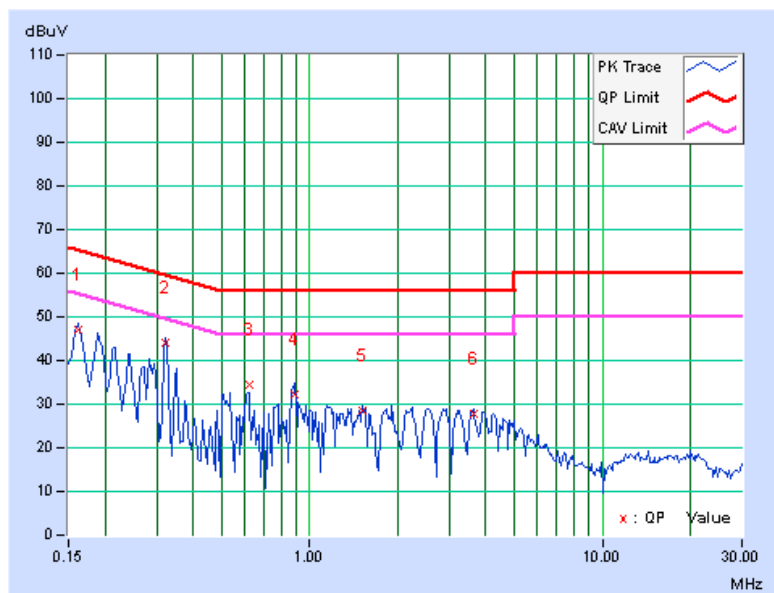
A D T

PHASE	Line 2	6dB BANDWIDTH	9kHz
TEST MODE	A		

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	0.16172	0.23	46.72	37.98	46.95	38.21	65.38	55.38	-18.43	-17.17
2	0.32188	0.28	43.67	42.95	43.95	43.23	59.66	49.66	-15.71	-6.43
3	0.61875	0.30	33.98	31.23	34.28	31.53	56.00	46.00	-21.72	-14.47
4	0.88438	0.29	32.02	31.56	32.31	31.85	56.00	46.00	-23.69	-14.15
5	1.50781	0.34	28.13	27.53	28.47	27.87	56.00	46.00	-27.53	-18.13
6	3.63281	0.47	27.22	23.52	27.69	23.99	56.00	46.00	-28.31	-22.01

**REMARKS:**

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





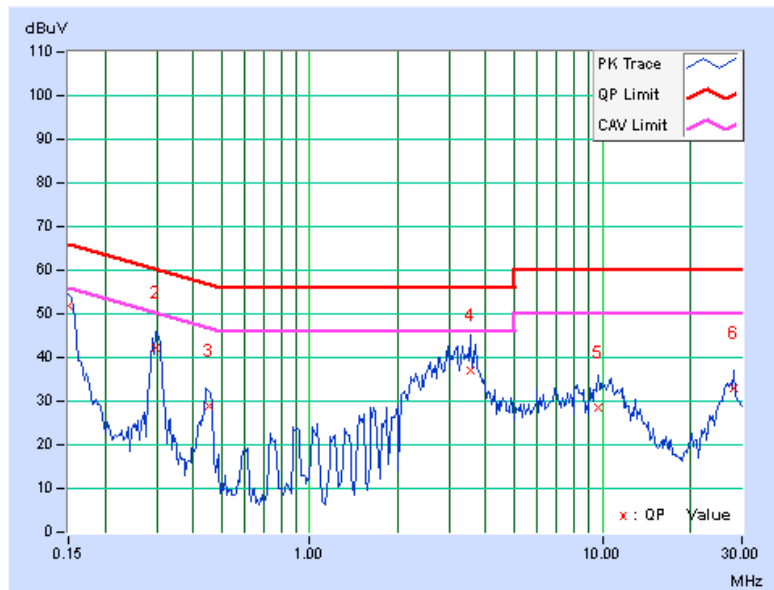
A D T

PHASE	Line 1	6dB BANDWIDTH	9kHz
TEST MODE	B		

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	0.15000	0.21	51.66	38.54	51.87	38.75	66.00	56.00	-14.13	-17.25
2	0.29844	0.23	41.99	28.28	42.22	28.51	60.29	50.29	-18.07	-21.78
3	0.45060	0.23	28.59	18.92	28.82	19.15	56.86	46.86	-28.05	-27.72
4	3.53270	0.42	36.55	25.61	36.97	26.03	56.00	46.00	-19.03	-19.97
5	9.71094	0.51	28.19	21.60	28.70	22.11	60.00	50.00	-31.30	-27.89
6	28.12518	0.58	32.42	31.05	33.00	31.63	60.00	50.00	-27.00	-18.37

**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.





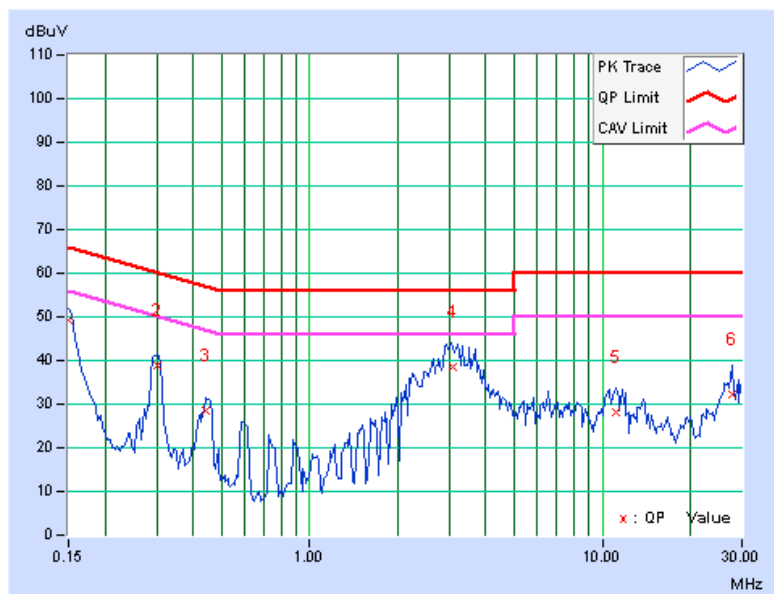
A D T

PHASE	Line 2	6dB BANDWIDTH	9kHz
TEST MODE	B		

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	0.15000	0.23	49.00	39.33	49.23	39.56	66.00	56.00	-16.77	-16.44
2	0.30234	0.27	38.80	33.04	39.07	33.31	60.18	50.18	-21.11	-16.87
3	0.44297	0.30	28.30	20.36	28.60	20.66	57.01	47.01	-28.41	-26.35
4	3.06641	0.44	38.22	28.21	38.66	28.65	56.00	46.00	-17.34	-17.35
5	11.12891	0.60	27.62	19.68	28.22	20.28	60.00	50.00	-31.78	-29.72
6	27.62255	0.69	31.65	31.30	32.34	31.99	60.00	50.00	-27.66	-18.01

**REMARKS:**

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







A D T

### **5.3 6dB BANDWIDTH MEASUREMENT**

#### **5.3.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT**

The minimum of 6dB Bandwidth Measurement is 0.5MHz.

#### **5.3.2 TEST SETUP**

Same as item 4.3.2.

#### **5.3.3 TEST INSTRUMENTS**

Refer to section 4.1.2 to get information of above instrument.

#### **5.3.4 TEST PROCEDURE**

Same as item 4.3.4.

#### **5.3.5 DEVIATION FROM TEST STANDARD**

No deviation.

#### **5.3.6 EUT OPERATING CONDITIONS**

Same as item 4.3.6.



### 5.3.7 TEST RESULTS

#### 802.11a

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1		
149	5745	16.50	16.53	0.5	PASS
157	5785	16.48	16.50	0.5	PASS
165	5825	16.49	16.54	0.5	PASS

#### 802.11n (20MHz)

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1		
149	5745	17.77	17.78	0.5	PASS
157	5785	17.68	17.75	0.5	PASS
165	5825	17.77	17.77	0.5	PASS

#### 802.11n (40MHz)

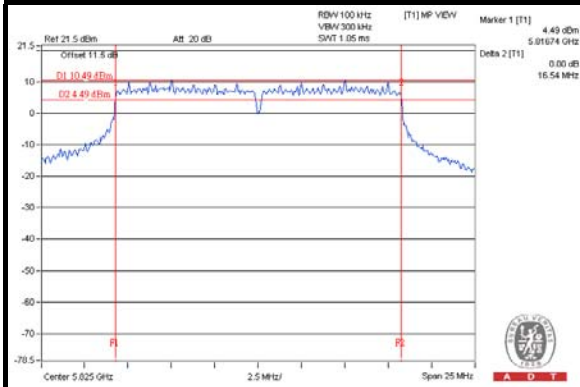
CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1		
151	5755	36.45	36.52	0.5	PASS
159	5795	36.40	36.44	0.5	PASS



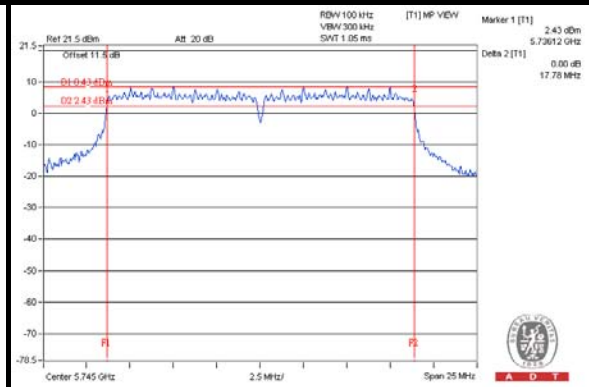
A D T

### SPECTRUM PLOT OF WORST VALUE

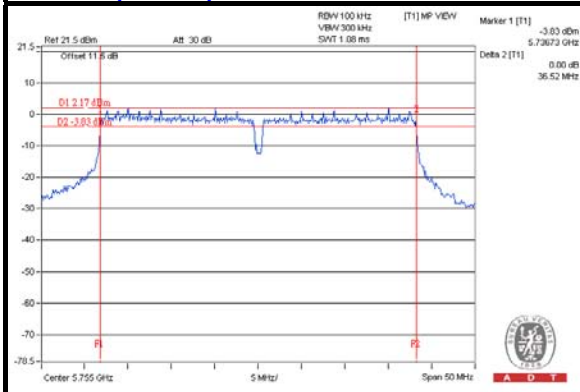
#### 802.11a



#### 802.11n (20MHz)



#### 802.11n (40MHz)





A D T

## 5.4 CONDUCTED OUTPUT POWER

### 5.4.1 LIMITS OF CONDUCTED OUTPUT POWER MEASUREMENT

For systems using digital modulation in the 5725 –5850 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.

### 5.4.2 TEST SETUP

Same as Item 4.4.2.

### 5.4.3 INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

### 5.4.4 TEST PROCEDURES

Same as Item 4.4.4.

### 5.4.5 DEVIATION FROM TEST STANDARD

No deviation.

### 5.4.6 EUT OPERATING CONDITIONS

Same as Item 4.3.6.



## 5.4.7 TEST RESULTS

### 802.11a

CHAN.	FREQ. (MHz)	AVG. POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
149	5745	19.42	20.28	194.158	22.88	29.9	PASS
157	5785	23.82	24.46	520.245	27.16	29.9	PASS
165	5825	23.85	22.54	422.134	26.25	29.9	PASS

**NOTE:** Gain = 6.1dBi > 6dBi, so the conducted power limit shall be reduced to  $30-(6.1-6) = 29.9$ dBm.

### 802.11n (20MHz)

CHAN.	FREQ. (MHz)	AVG. POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
149	5745	19.68	21.24	225.942	23.54	29.9	PASS
157	5785	24.07	22.21	421.611	26.25	29.9	PASS
165	5825	24.01	21.72	400.362	26.02	29.9	PASS

**NOTE:** Gain = 6.1dBi > 6dBi, so the conducted power limit shall be reduced to  $30-(6.1-6) = 29.9$ dBm.

### 802.11n (40MHz)

CHAN.	FREQ. (MHz)	AVG. POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
151	5755	15.67	16.71	83.779	19.23	29.9	PASS
159	5795	24.27	23.01	467.287	26.70	29.9	PASS

**NOTE:** Gain = 6.1dBi > 6dBi, so the conducted power limit shall be reduced to  $30-(6.1-6) = 29.9$ dBm.



A D T

## **5.5 POWER SPECTRAL DENSITY MEASUREMENT**

### **5.5.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT**

The Maximum of Power Spectral Density Measurement is 8dBm.

### **5.5.2 TEST SETUP**

Same as item 4.5.2.

### **5.5.3 TEST INSTRUMENTS**

Refer to section 4.1.2 to get information of above instrument.

### **5.5.4 TEST PROCEDURE.**

Same as item 4.5.4.

### **5.5.5 DEVIATION FROM TEST STANDARD**

No deviation.

### **5.5.6 EUT OPERATING CONDITION**

Same as item 4.3.6.



A D T

## 5.5.7 TEST RESULTS

### 802.11a

TX chain	Chan.	Freq. (MHz)	PSD (dBm/3kHz)	10 log (N=2) dB	Total PSD without Duty Factor (dBm/3kHz)	Duty Factor	Total PSD with Duty Factor (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	149	5745	-15.90	3.01	-12.89	0.22	-12.67	5.33	PASS
	157	5785	-10.77	3.01	-7.76	0.22	-7.54	5.33	PASS
	165	5825	-10.58	3.01	-7.57	0.22	-7.35	5.33	PASS
1	149	5745	-14.43	3.01	-11.42	0.22	-11.20	5.33	PASS
	157	5785	-10.34	3.01	-7.33	0.22	-7.11	5.33	PASS
	165	5825	-12.84	3.01	-9.83	0.22	-9.61	5.33	PASS

**NOTE:** Directional gain =  $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2]$  = 8.67dBi > 6dBi, so the power density limit shall be reduced to  $8-(8.67-6) = 5.33$ dBm.

### 802.11n (20MHz)

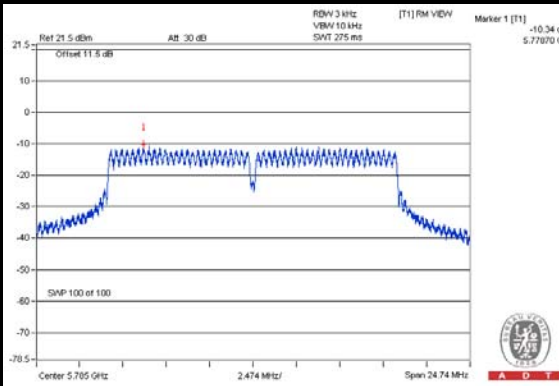
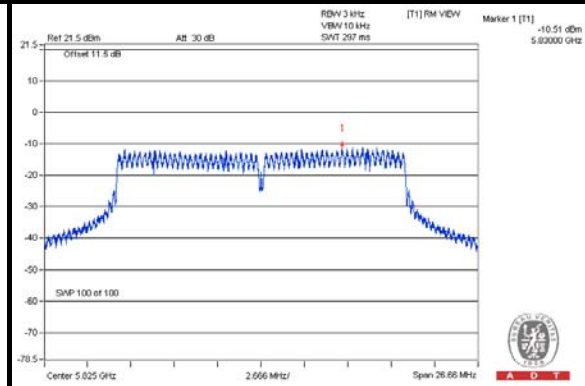
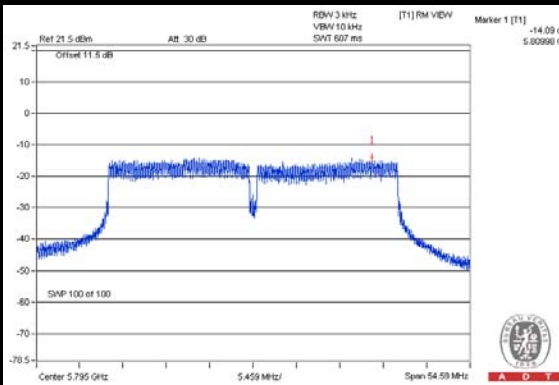
TX chain	Chan.	Freq. (MHz)	PSD (dBm/3kHz)	10 log (N=2) dB	Total PSD without Duty Factor (dBm/3kHz)	Duty Factor	Total PSD with Duty Factor (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	149	5745	-14.90	3.01	-11.89	0.23	-11.66	5.33	PASS
	157	5785	-11.10	3.01	-8.09	0.23	-7.86	5.33	PASS
	165	5825	-10.51	3.01	-7.50	0.23	-7.27	5.33	PASS
1	149	5745	-13.67	3.01	-10.66	0.23	-10.43	5.33	PASS
	157	5785	-11.33	3.01	-8.32	0.23	-8.09	5.33	PASS
	165	5825	-13.20	3.01	-10.19	0.23	-9.96	5.33	PASS

**NOTE:** Directional gain =  $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2]$  = 8.67dBi > 6dBi, so the power density limit shall be reduced to  $8-(8.67-6) = 5.33$ dBm.

### 802.11n (40MHz)

TX chain	Chan.	Freq. (MHz)	PSD (dBm/3kHz)	10 log (N=2) dB	Total PSD without Duty Factor (dBm/3kHz)	Duty Factor	Total PSD with Duty Factor (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	151	5755	-22.14	3.01	-10.88	0.17	-18.96	5.33	PASS
	159	5795	-14.09	3.01	-7.49	0.17	-10.91	5.33	PASS
1	151	5755	-20.30	3.01	-11.80	0.17	-17.12	5.33	PASS
	159	5795	-14.74	3.01	-7.20	0.17	-11.56	5.33	PASS

**NOTE:** Directional gain =  $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2]$  = 8.67dBi > 6dBi, so the power density limit shall be reduced to  $8-(8.67-6) = 5.33$ dBm.

**SPECTRUM PLOT OF WORST VALUE****802.11a****802.11n (20MHz)****802.11n (40MHz)**





A D T

## 5.6 CONDUCTED OUT OF BAND EMISSION MEASUREMENT

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

Below  $-30\text{dB}$  of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

### 5.6.2 TEST SETUP

Same as Item 4.6.2

### 5.6.3 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

### 5.6.4 TEST PROCEDURE

Same as Item 4.6.4

### 5.6.5 DEVIATION FROM TEST STANDARD

No deviation.

### 5.6.6 EUT OPERATING CONDITION

Same as Item 4.3.6

### 5.6.7 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.

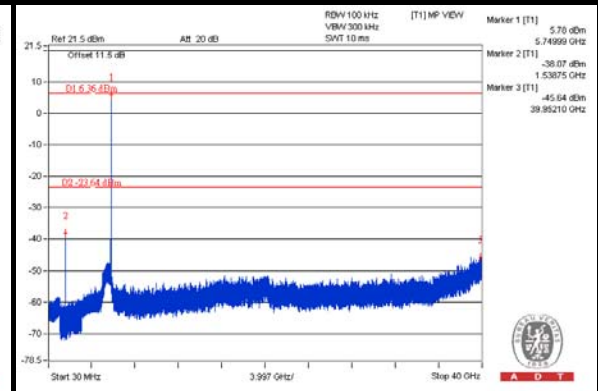
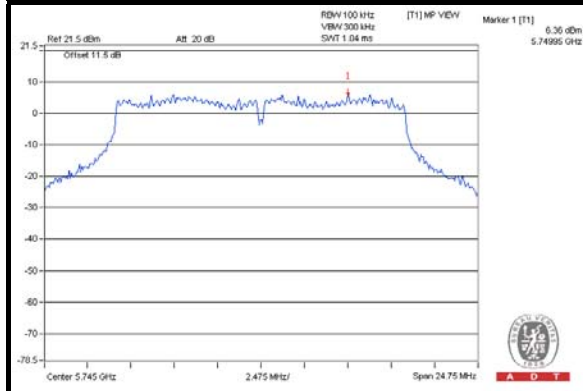
The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 30dB offset below D1. It shows compliance with the requirement.



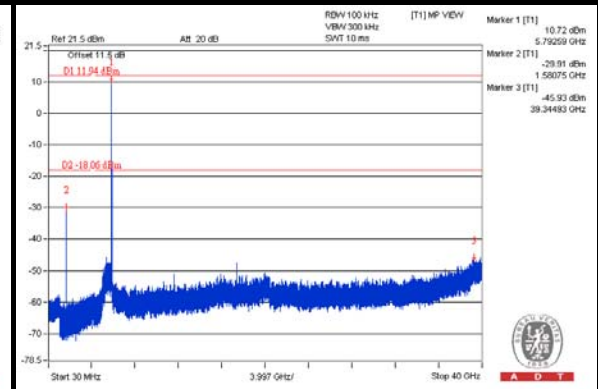
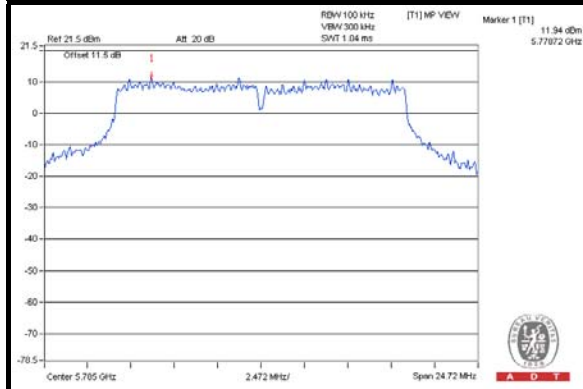
A D T

# 802.11a CHAIN 0

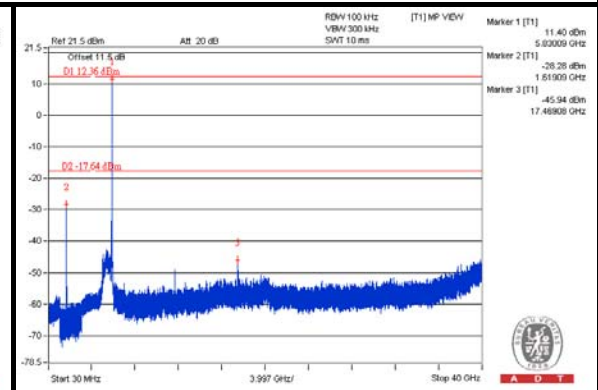
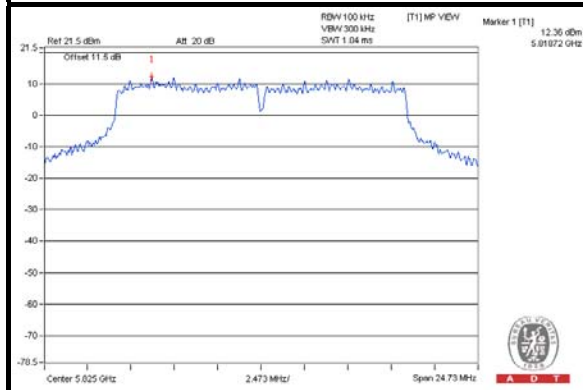
## CH 149



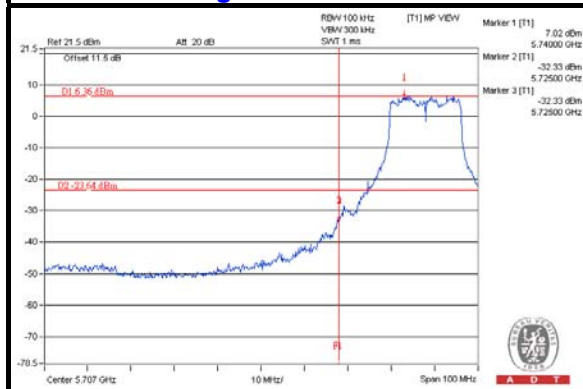
## CH 157



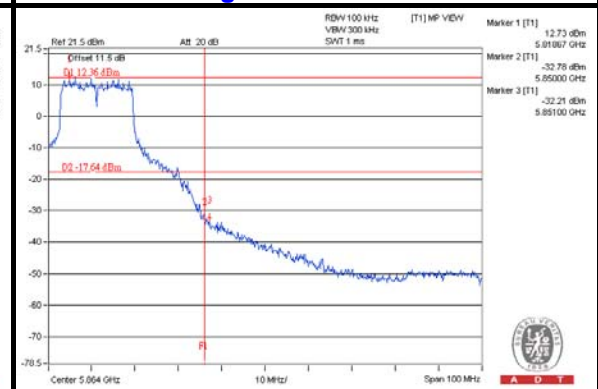
## CH 165



## CH 149 Band edge



## CH 165 Band edge

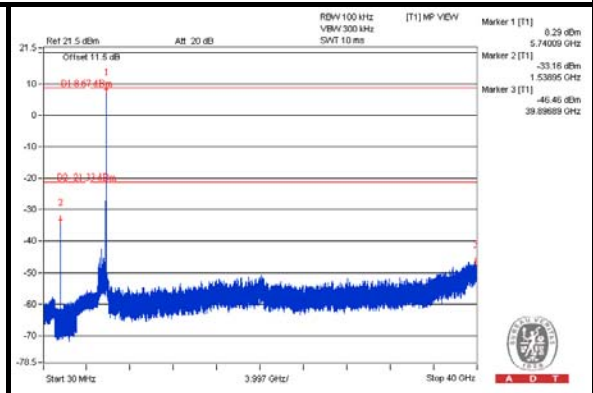
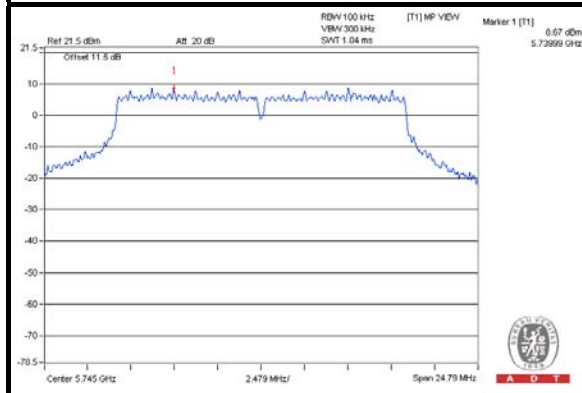




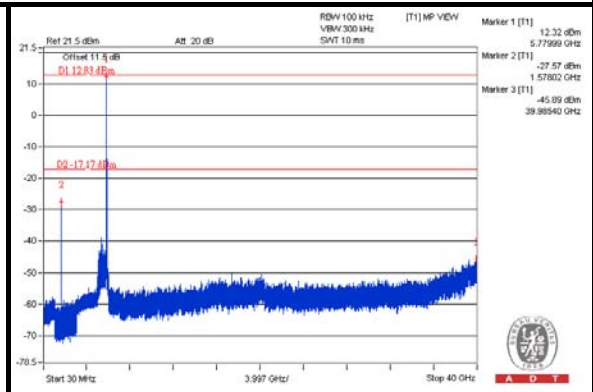
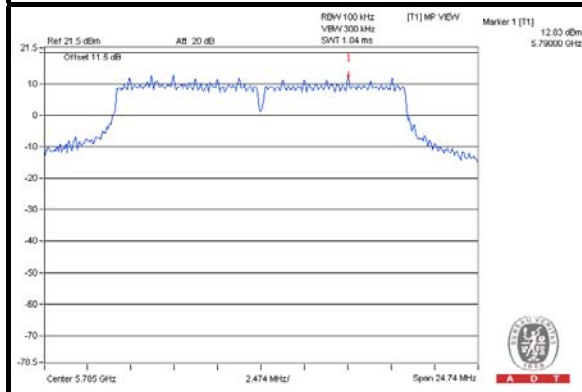
A D T

### CHAIN 1

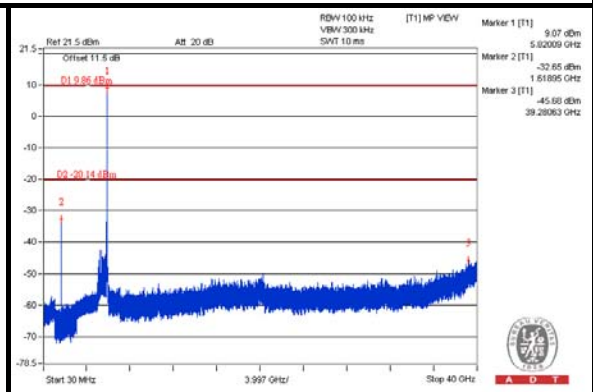
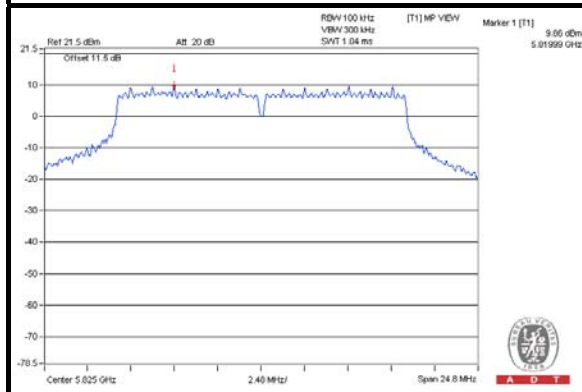
#### CH 149



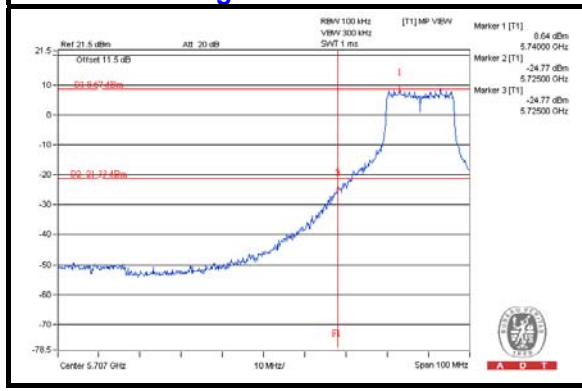
#### CH 157



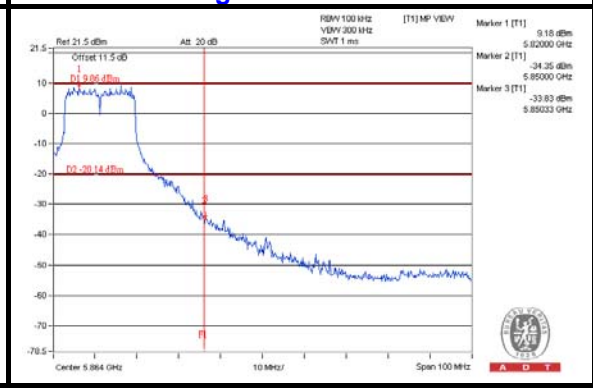
#### CH 165



#### CH 149 Band edge



#### CH 165 Band edge

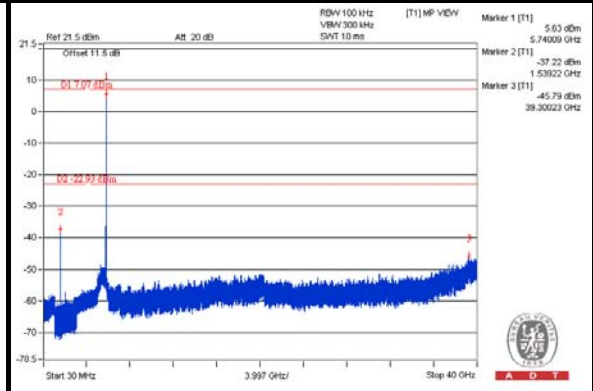
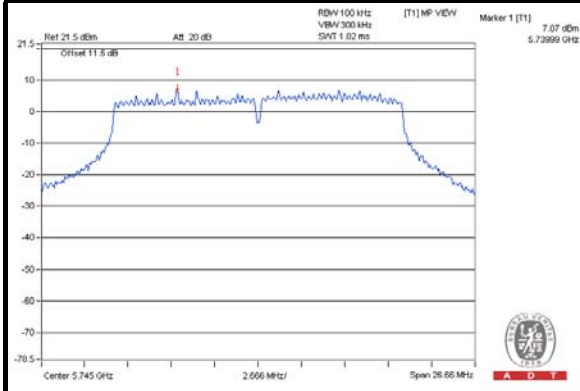




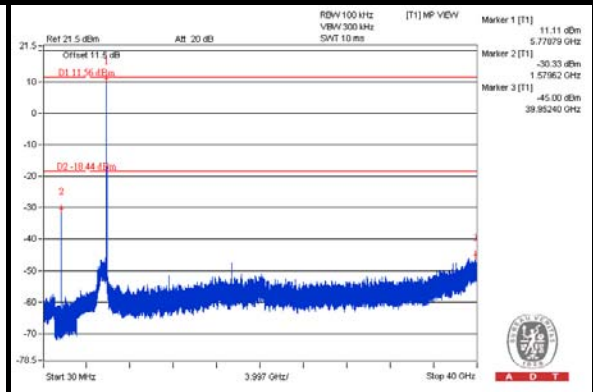
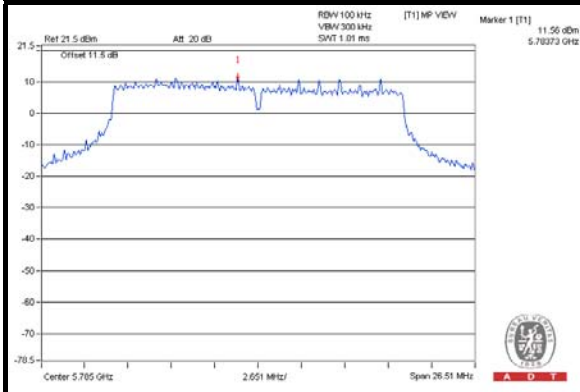
A D T

### 802.11n (20MHz) CHAIN 0

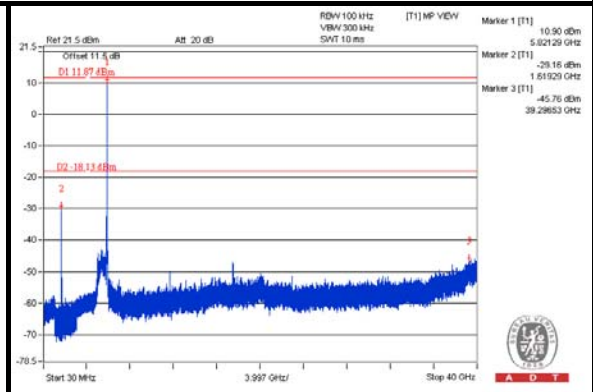
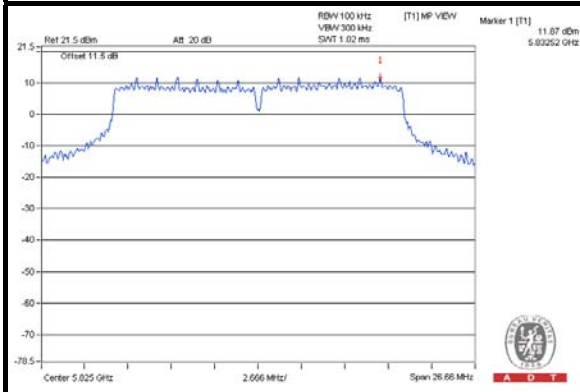
#### CH 149



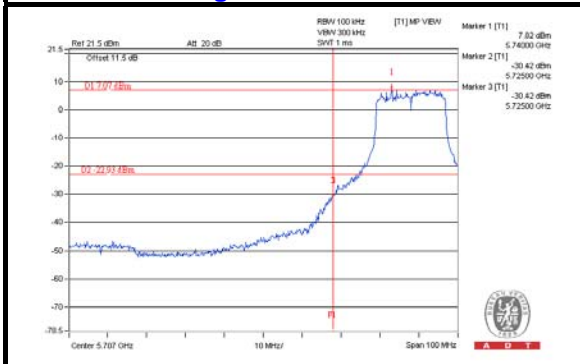
#### CH 157



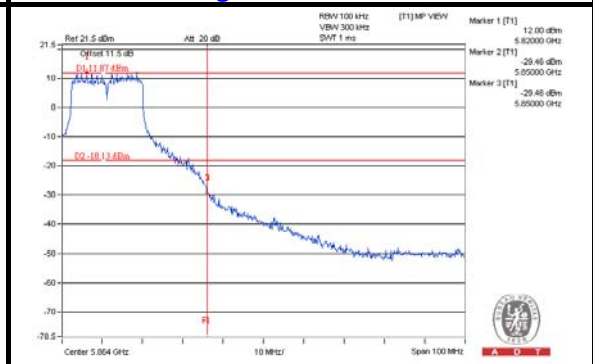
#### CH 165



#### CH 149 Band edge



#### CH 165 Band edge

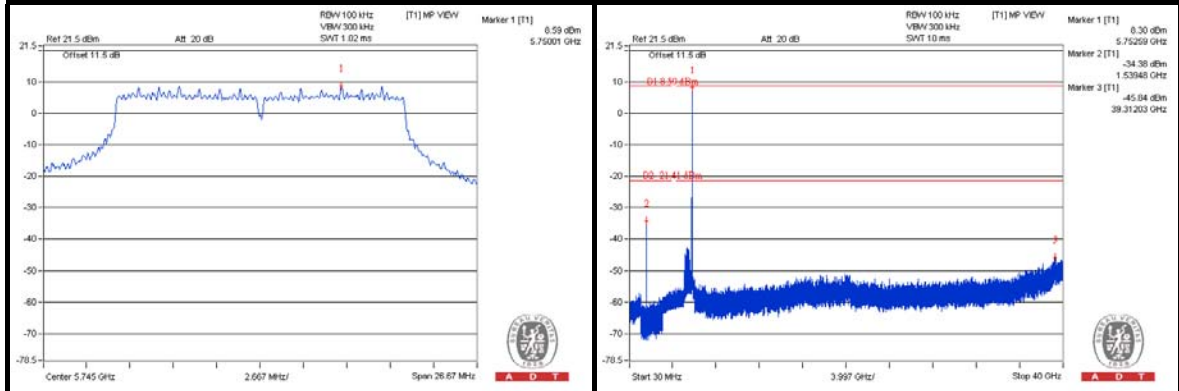




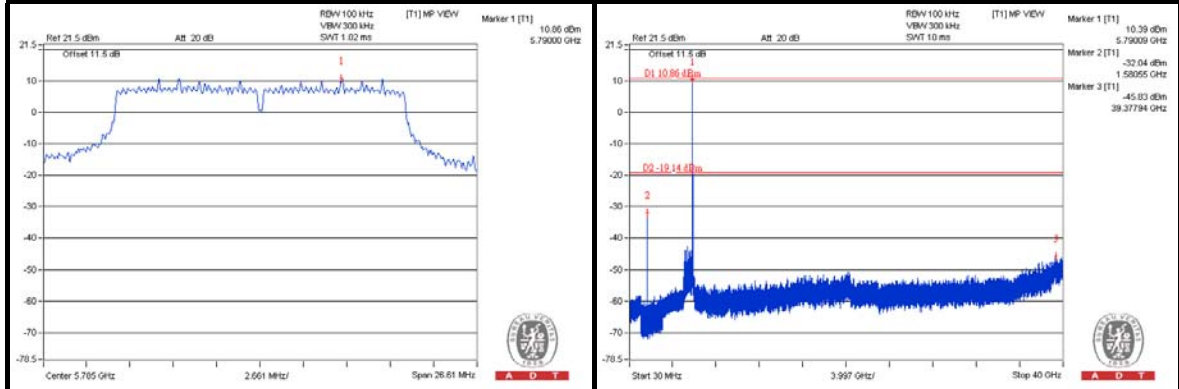
A D T

### CHAIN 1

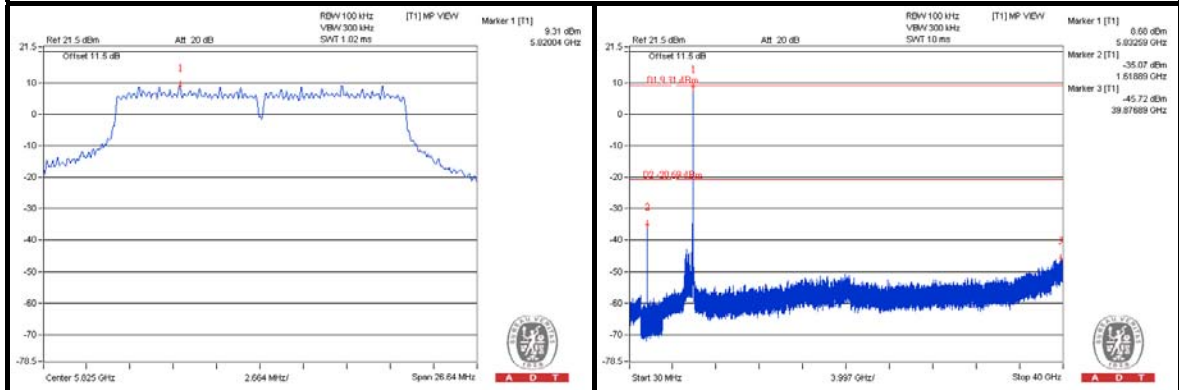
#### CH 149



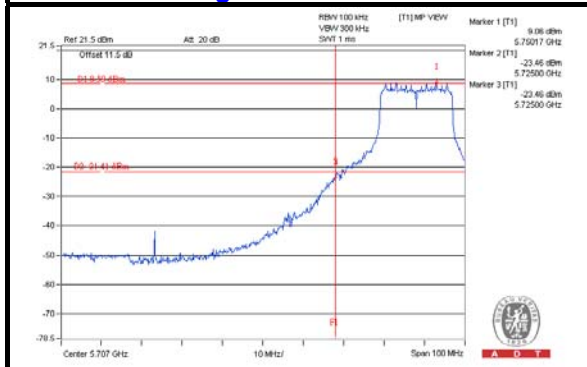
#### CH 157



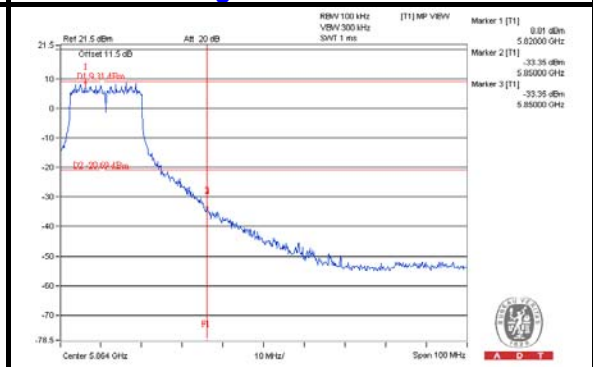
#### CH 165



#### CH 149 Band edge



#### CH 165 Band edge



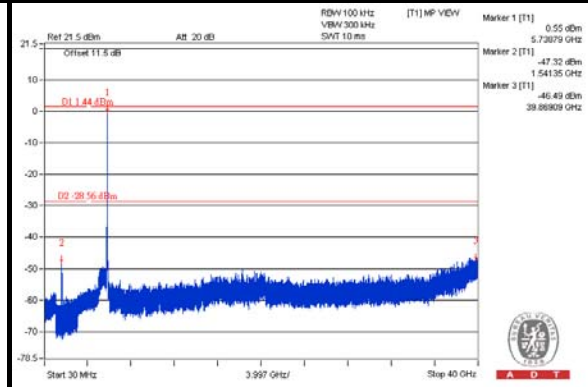
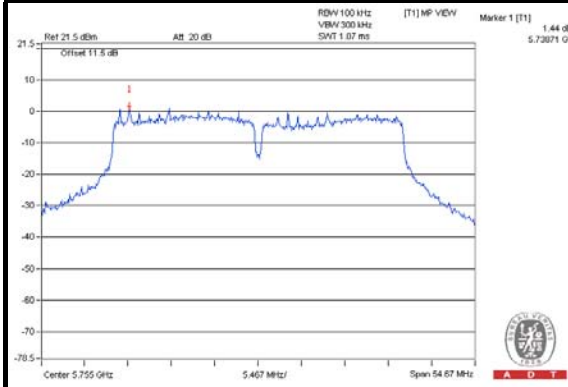


A D T

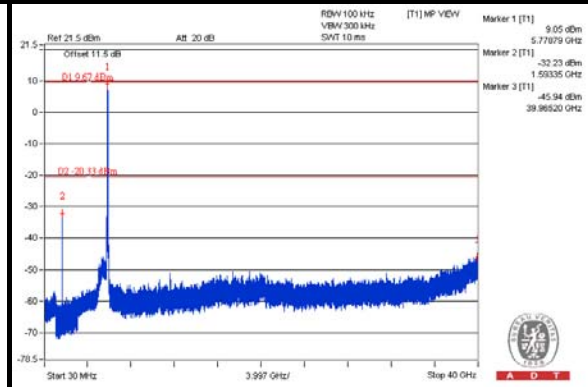
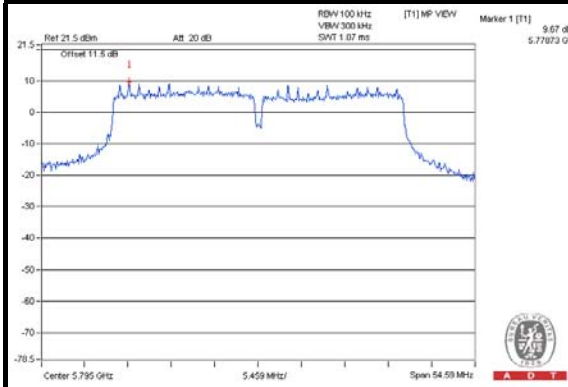
### 802.11n (40MHz)

### CHAIN 0

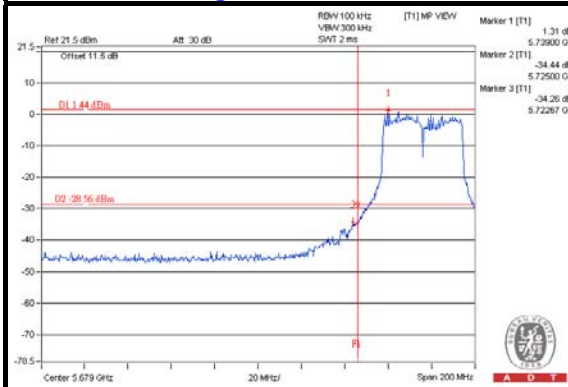
#### CH 151



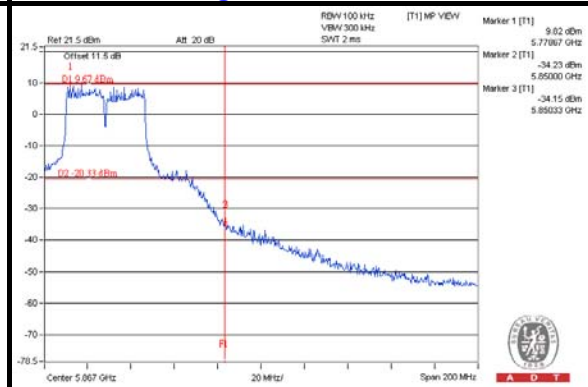
#### CH 159



#### CH 151 Band edge



#### CH 159 Band edge



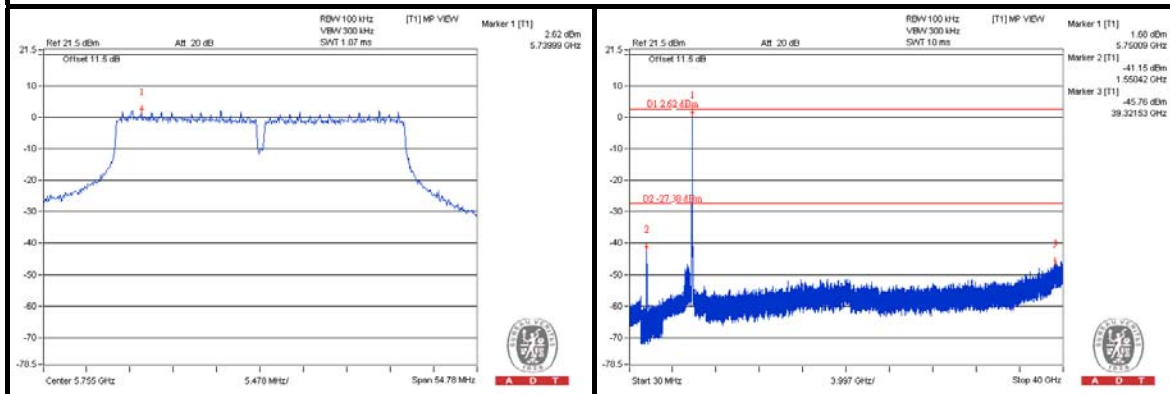




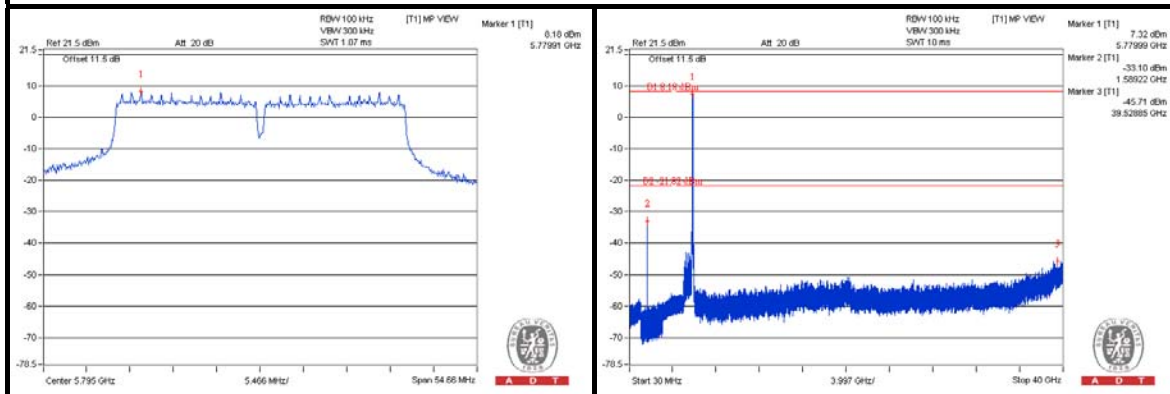
A D T

### CHAIN 1

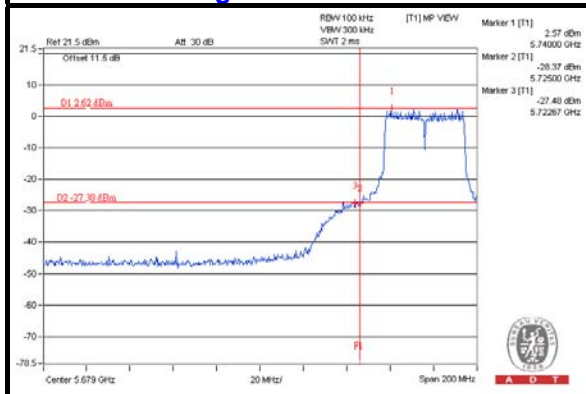
### CH 151



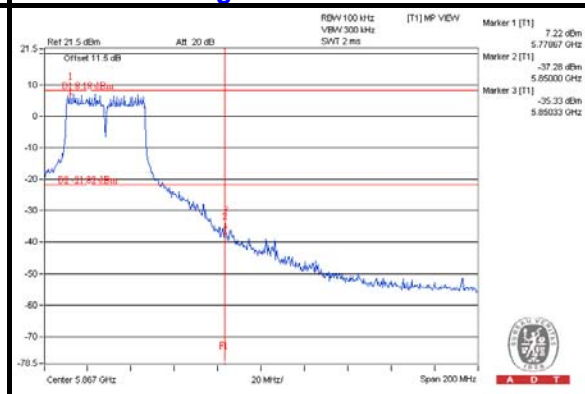
### CH 159



### CH 151 Band edge



### CH 159 Band edge





A D T

## 6. PHOTOGRAPHS OF THE TEST CONFIGURATION

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





A D T

## 7. 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.adt.com.tw](http://www.adt.com.tw)

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



A D T

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

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

**---END---**