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# FCC TEST REPORT (15.247)

**REPORT NO.:** RF130730C17

**MODEL NO.:** ENH900EXT

**FCC ID:** A8J-ENH900EXT

**RECEIVED:** Jul. 30, 2013

**TESTED:** Aug. 06 ~ Oct. 25, 2013

**ISSUED:** Oct. 25, 2013

**APPLICANT:** EnGenius Technologies

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**ISSUED BY:** Bureau Veritas Consumer Products Services  
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## 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 DESCRIPTION OF SUPPORT UNITS .....	15
3.3.1 CONFIGURATION OF SYSTEM UNDER TEST .....	15
3.4 GENERAL DESCRIPTION OF APPLIED STANDARDS .....	17
4. TEST TYPES AND RESULTS (FOR 2.4GHz BAND).....	18
4.1 RADIATED EMISSION AND BANDEDGE MEASUREMENT .....	18
4.1.1 LIMITS OF RADIATED EMISSION AND BANDEDGE MEASUREMENT.....	18
4.1.2 TEST INSTRUMENTS.....	19
4.1.3 TEST PROCEDURES .....	21
4.1.4 DEVIATION FROM TEST STANDARD .....	21
4.1.5 TEST SETUP.....	22
4.1.6 EUT OPERATING CONDITIONS .....	22
4.1.7 TEST RESULTS .....	23
4.2 CONDUCTED EMISSION MEASUREMENT .....	37
4.2.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT .....	37
4.2.2 TEST INSTRUMENTS.....	37
4.2.3 TEST PROCEDURES .....	38
4.2.4 DEVIATION FROM TEST STANDARD .....	38
4.2.5 TEST SETUP.....	38
4.2.6 EUT OPERATING CONDITIONS .....	38
4.2.7 TEST RESULTS .....	39
4.3 6dB BANDWIDTH MEASUREMENT.....	41
4.3.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT.....	41
4.3.2 TEST SETUP.....	41
4.3.3 TEST INSTRUMENTS.....	41
4.3.4 TEST PROCEDURE.....	41
4.3.5 DEVIATION FROM TEST STANDARD .....	41
4.3.6 EUT OPERATING CONDITIONS .....	41
4.3.7 TEST RESULTS .....	42
4.4 CONDUCTED OUTPUT POWER .....	43
4.4.1 LIMITS OF CONDUCTED OUTPUT POWER MEASUREMENT.....	43
4.4.2 TEST SETUP.....	43
4.4.3 TEST INSTRUMENTS.....	43
4.4.4 TEST PROCEDURES .....	43
4.4.5 DEVIATION FROM TEST STANDARD .....	44
4.4.6 EUT OPERATING CONDITIONS .....	44
4.4.7 TEST RESULTS .....	45
4.5 POWER SPECTRAL DENSITY MEASUREMENT.....	47



4.5.1	LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT .....	47
4.5.2	TEST SETUP .....	47
4.5.3	TEST INSTRUMENTS .....	47
4.5.4	TEST PROCEDURE .....	47
4.5.5	DEVIATION FROM TEST STANDARD .....	47
4.5.6	EUT OPERATING CONDITION .....	47
4.5.7	TEST RESULTS .....	48
4.6	CONDUCTED OUT OF BAND EMISSION MEASUREMENT .....	50
4.6.1	LIMITS OF CONDUCTED OUT OF BAND EMISSION MEASUREMENT .....	50
4.6.2	TEST SETUP .....	50
4.6.3	TEST INSTRUMENTS .....	50
4.6.4	TEST PROCEDURE .....	50
4.6.5	DEVIATION FROM TEST STANDARD .....	51
4.6.6	EUT OPERATING CONDITION .....	51
4.6.7	TEST RESULTS .....	51
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 .....	75
5.2.1	LIMITS OF CONDUCTED EMISSION MEASUREMENT .....	75
5.2.2	TEST INSTRUMENTS .....	75
5.2.3	TEST PROCEDURES .....	75
5.2.4	DEVIATION FROM TEST STANDARD .....	75
5.2.5	TEST SETUP .....	75
5.2.6	EUT OPERATING CONDITIONS .....	75
5.2.7	TEST RESULTS .....	76
5.3	6dB BANDWIDTH MEASUREMENT .....	78
5.3.1	LIMITS OF 6dB BANDWIDTH MEASUREMENT .....	78
5.3.2	TEST SETUP .....	78
5.3.3	TEST INSTRUMENTS .....	78
5.3.4	TEST PROCEDURE .....	78
5.3.5	DEVIATION FROM TEST STANDARD .....	78
5.3.6	EUT OPERATING CONDITIONS .....	78
5.3.7	TEST RESULTS .....	79
5.4	CONDUCTED OUTPUT POWER .....	80
5.4.1	LIMITS OF CONDUCTED OUTPUT POWER MEASUREMENT .....	80
5.4.2	TEST SETUP .....	80
5.4.3	INSTRUMENTS .....	80
5.4.4	TEST PROCEDURES .....	80
5.4.5	DEVIATION FROM TEST STANDARD .....	80
5.4.6	EUT OPERATING CONDITIONS .....	80



A D T

5.4.7	TEST RESULTS .....	81
5.5	POWER SPECTRAL DENSITY MEASUREMENT.....	83
5.5.1	LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT .....	83
5.5.2	TEST SETUP.....	83
5.5.3	TEST INSTRUMENTS.....	83
5.5.4	TEST PROCEDURE.....	83
5.5.5	DEVIATION FROM TEST STANDARD .....	83
5.5.6	EUT OPERATING CONDITION.....	83
5.5.7	TEST RESULTS .....	84
5.6	CONDUCTED OUT OF BAND EMISSION MEASUREMENT .....	86
5.6.1	LIMITS OF CONDUCTED OUT OF BAND EMISSION MEASUREMENT.....	86
5.6.2	TEST SETUP.....	86
5.6.3	TEST INSTRUMENTS.....	86
5.6.4	TEST PROCEDURE.....	86
5.6.5	DEVIATION FROM TEST STANDARD .....	86
5.6.6	EUT OPERATING CONDITION.....	86
5.6.7	TEST RESULTS .....	86
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



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## RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF130730C17	Original release	Oct. 25, 2013



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## 1. CERTIFICATION

**PRODUCT:** Wireless Access Point  
**MODEL NO.:** ENH900EXT  
**BRAND:** EnGenius  
**APPLICANT:** EnGenius Technologies  
**TESTED:** Aug. 06 ~ Oct. 25, 2013  
**TEST SAMPLE:** ENGINEERING SAMPLE  
**STANDARDS:** **FCC Part 15, Subpart C (Section 15.247)**  
ANSI C63.10-2009

The above equipment (model: ENH900EXT) 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 :** Oct. 25, 2013  
Polly Chien / Specialist

**APPROVED BY :**  , **DATE :** Oct. 25, 2013  
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 -2.68dB at 0.50547MHz.
15.247(d) 15.209	Radiated Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -1.0dB at 2483.50MHz.
15.247(d)	Band Edge Measurement	PASS	Meet the requirement of limit.
15.247(a)(2)	6dB bandwidth	PASS	Meet the requirement of limit.
15.247(b)	Conducted power	PASS	Meet the requirement of limit.
15.247(e)	Power Spectral Density	PASS	Meet the requirement of limit.
15.203	Antenna Requirement	PASS	Antenna connector is N-Type. (The device is professionally installed)

### 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	3.19 dB
	200MHz ~1000MHz	3.21 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>	Wireless Access Point
<b>MODEL NO.</b>	ENH900EXT
<b>POWER SUPPLY</b>	48Vdc (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 450.0Mbps
<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>	947.827mW for 2412 ~ 2462MHz 791.780mW for 5745 ~ 5825MHz
<b>ANTENNA TYPE</b>	<b>2.4GHz:</b> Dipole antenna with 5dBi gain <b>5.0GHz:</b> Dipole antenna with 7dBi gain
<b>ANTENNA CONNECTOR</b>	N-Type (The device is professionally installed)
<b>DATA CABLE</b>	0.55m non-shielded RJ45 cable without core
<b>I/O PORTS</b>	Refer to user's manual
<b>ACCESSORY DEVICES</b>	POE, Adapter for POE used

**NOTE:**

1. The EUT is 3\*3 MIMO with 11n beam forming function, in 802.11n (20MHz / 40MHz) MCS index is 16~23, the Nss=3.

MODULATION MODE	TX FUNCTION
802.11b	3TX
802.11g	3TX
802.11a	3TX
802.11n (20MHz)(MCS16~23 / Nss=3)	3TX
802.11n (40MHz)(MCS16~23 / Nss=3)	3TX





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2. The EUT consumes power from the following adapter and POE.

POE	
<b>BRAND:</b>	EnGenius
<b>MODEL:</b>	EPE-48GR
<b>OUTPUT:</b>	48Vdc, 0.8A, 38.4W Max.

ADAPTER FOR POE	
<b>BRAND:</b>	Powertron Electronics Corp.
<b>MODEL:</b>	PA1040-480IB080
<b>INPUT:</b>	100-240Vac, 50-60Hz, 1.5A
<b>OUTPUT:</b>	48Vdc, 0.8A, 38.4W Max.
<b>POWER LINE:</b>	DC 1.6m power cable with one core attached on adapter

3. The above EUT information is declared by manufacturer and for more detailed feature 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≥1G	RE<1G	PLC	APCM	
-	√	√	√	√	-

Where **RE≥1G**: Radiated Emission above 1GHz      **RE<1G**: Radiated Emission below 1GHz  
**PLC**: Power Line Conducted Emission      **APCM**: Antenna Port Conducted Measurement

**NOTE:** The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on Y-plane.

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

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

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

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

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

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11g	1 to 11	6	OFDM	BPSK	6.0

**POWER LINE CONDUCTED EMISSION TEST:**

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

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11g	1 to 11	6	OFDM	BPSK	6.0



**BANDEDGE MEASUREMENT:**

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

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

**ANTENNA PORT CONDUCTED MEASUREMENT:**

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

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

**TEST CONDITION:**

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER (POE)	TESTED BY
RE≥1G	29deg. C, 69%RH	48Vdc	Martin Lee
RE<1G	27deg. C, 66%RH	48Vdc	Martin Lee
PLC	25deg. C, 68%RH	48Vdc	Leo Tsai
APCM	24deg. C, 68%RH	48Vdc	Nick Chen



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

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

Where **RE≥1G:** Radiated Emission above 1GHz      **RE<1G:** Radiated Emission below 1GHz  
**PLC:** Power Line Conducted Emission      **APCM:** Antenna Port Conducted Measurement

**NOTE:** The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on Y-plane.

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

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

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

**POWER LINE CONDUCTED EMISSION TEST:**

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

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11n (20MHz)	149 to 165	149	OFDM	BPSK	7.2



**BANDEDGE MEASUREMENT:**

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

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

**TEST CONDITION:**

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER (POE)	TESTED BY
RE≥1G	29deg. C, 69%RH	48Vdc	Martin Lee, Alan Wu
RE<1G	27deg. C, 66%RH	48Vdc	Martin Lee
PLC	25deg. C, 68%RH	48Vdc	Leo Tsai
APCM	24deg. C, 68%RH	48Vdc	Nick Chen



### 3.3 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	E5420	BPQ7MQ1	FCC Doc Approved
2	NOTEBOOK	DELL	E5520	8Y4DMQ1	FCC Doc Approved

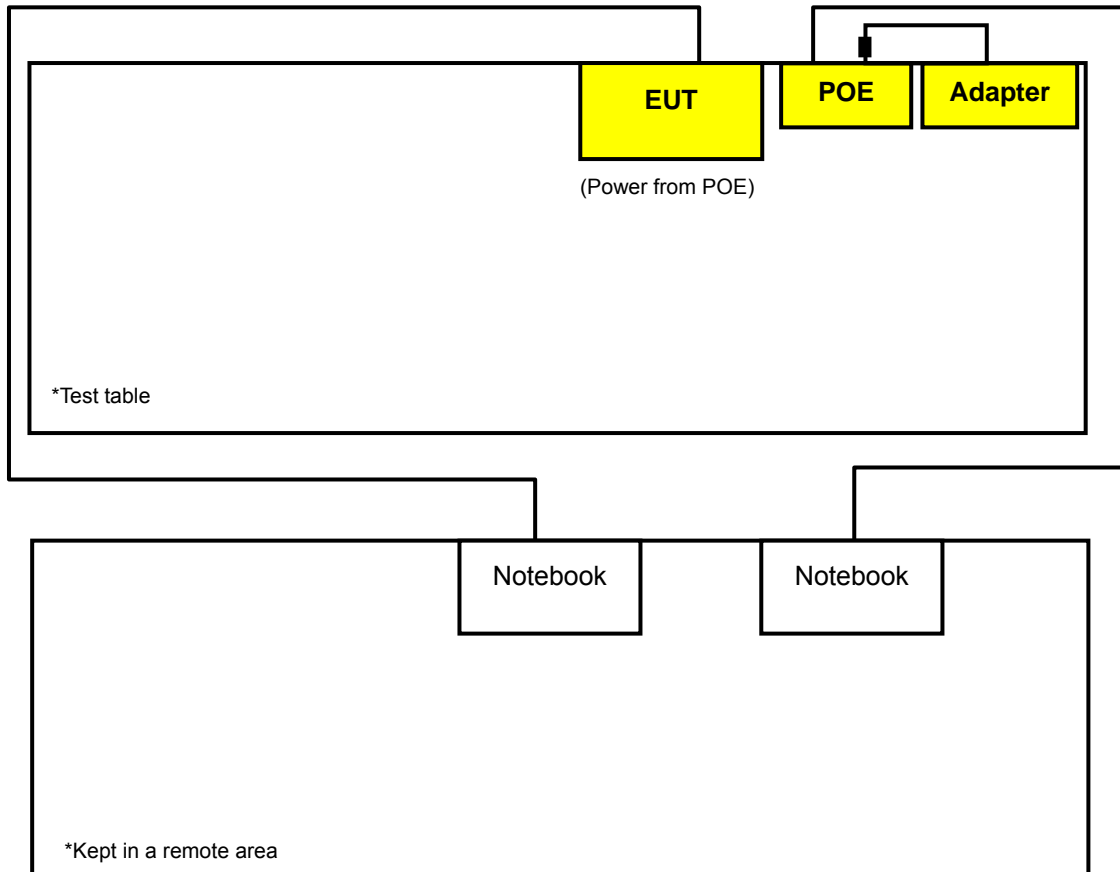
NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	3m RJ45 Cable without core
2	3m RJ45 Cable without core

**NOTE:**

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

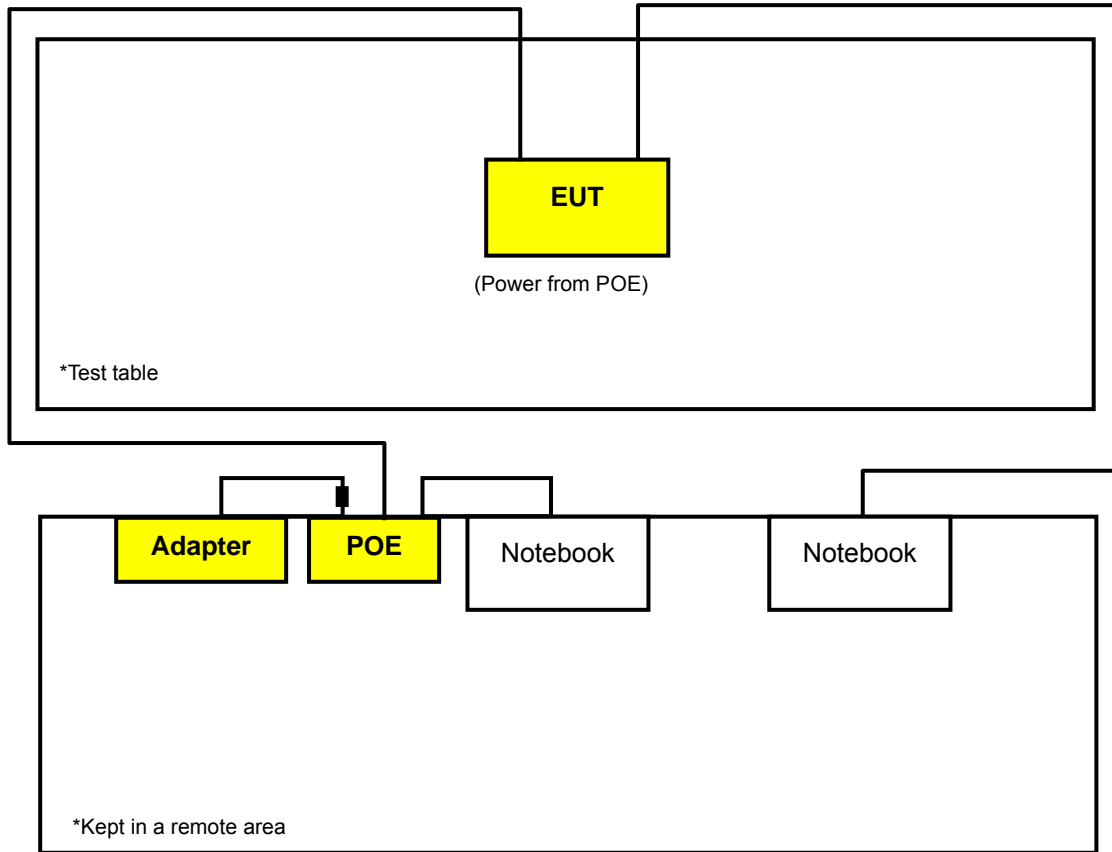
#### 3.3.1 CONFIGURATION OF SYSTEM UNDER TEST

##### For Conducted Emission Test





### For Radiated Emissions Test







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### 3.4 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

**FCC Part 15, Subpart C (15.247)**

**558074 D01 DTS Meas Guidance v03r01**

**662911 D02 Multiple Transmitter Output v02**

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 20dB below the highest level of the desired power:

FREQUENCIES (MHz)	FIELD STRENGTH (microvolts/meter)	MEASUREMENT DISTANCE (meters)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

**NOTE:**

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



#### 4.1.2 TEST INSTRUMENTS

**Tested date: Aug. 06 ~Aug .15, 2013**

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Test Receiver ROHDE & SCHWARZ	ESCI	100424	Aug. 21, 2012	Aug. 20, 2013
Spectrum Analyzer ROHDE & SCHWARZ	FSU 43	100115	Oct. 25, 2012	Oct. 24, 2013
BILOG Antenna SCHWARZBECK	VULB9168	9168-155	Mar. 25, 2013	Mar. 24, 2014
HORN Antenna SCHWARZBECK	BBHA 9120D	9120D-404	Dec. 22, 2012	Dec. 21, 2013
HORN Antenna SCHWARZBECK	BBHA 9170	148	Jul. 15, 2013	Jul. 14, 2014
Loop Antenna	HFH2-Z2	100070	Jan. 31, 2012	Jan. 30, 2014
Preamplifier Agilent	8449B	3008A01961	Oct. 25, 2012	Oct. 24, 2013
Preamplifier Agilent	8447D	2944A10738	Oct. 23, 2012	Oct. 22, 2013
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	309220/4	Aug. 28, 2012	Aug. 27, 2013
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	250724/4	Aug. 28, 2012	Aug. 27, 2013
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	295012/4	Aug. 28, 2012	Aug. 27, 2013
Software BV ADT	ADT_Radiated_ V7.6.15.9.4	NA	NA	NA
Antenna Tower inn-co GmbH	MA 4000	010303	NA	NA
Antenna Tower Controller inn-co GmbH	CO2000	019303	NA	NA
Turn Table BV ADT	TT100.	TT93021704	NA	NA
Turn Table Controller BV ADT	SC100.	SC93021704	NA	NA
26GHz ~ 40GHz Amplifier	EM26400	815221	Oct. 25, 2012	Oct. 24, 2013
High Speed Peak Power Meter	ML2495A	0824012	Aug. 22, 2012	Aug. 21, 2013
Power Sensor	MA2411B	0738171	Jul. 29, 2013	Jul. 28, 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 calibration interval of the loop antenna is 24 months and the calibrations are traceable to NML/ROC and NIST/USA.
  3. The test was performed in HwaYa Chamber 4.
  4. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
  5. The FCC Site Registration No. is 460141.
  6. The IC Site Registration No. is IC7450F-4.



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**Tested date: Oct .25, 2013**

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Test Receiver ROHDE & SCHWARZ	ESCI	100424	Sep. 09, 2013	Sep. 08, 2014
Spectrum Analyzer ROHDE & SCHWARZ	FSU43	101261	Dec. 17, 2012	Dec. 16, 2013
BILOG Antenna SCHWARZBECK	VULB9168	9168-155	Mar. 25, 2013	Mar. 24, 2014
HORN Antenna SCHWARZBECK	BBHA 9120D	9120D-404	Dec. 22, 2012	Dec. 21, 2013
HORN Antenna SCHWARZBECK	BBHA 9170	148	Jul. 15, 2013	Jul. 14, 2014
Loop Antenna	HFH2-Z2	100070	Jan. 31, 2012	Jan. 30, 2014
Preamplifier Agilent	8449B	3008A01964	Aug. 26, 2013	Aug. 25, 2014
Preamplifier Agilent	8447D	2944A10738	Oct. 18, 2013	Oct. 17, 2014
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	309220/4	Aug. 26, 2013	Aug. 25, 2014
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	250724/4	Aug. 26, 2013	Aug. 25, 2014
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	295012/4	Aug. 26, 2013	Aug. 25, 2014
Software BV ADT	ADT_Radiated_V7.6.15.9.4	NA	NA	NA
Antenna Tower inn-co GmbH	MA 4000	010303	NA	NA
Antenna Tower Controller inn-co GmbH	CO2000	019303	NA	NA
Turn Table BV ADT	TT100.	TT93021704	NA	NA
Turn Table Controller BV ADT	SC100.	SC93021704	NA	NA
26GHz ~ 40GHz Amplifier	EM26400	815221	Oct. 18, 2013	Oct. 17, 2014
High Speed Peak Power Meter	ML2495A	0824012	Sep. 12, 2013	Sep. 11, 2014
Power Sensor	MA2411B	0738171	Jul. 29, 2013	Jul. 28, 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 calibration interval of the loop antenna is 24 months and the calibrations are traceable to NML/ROC and NIST/USA.
3. The test was performed in HwaYa Chamber 4.
4. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
5. The FCC Site Registration No. is 460141.
6. The IC Site Registration No. is IC7450F-4.



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#### 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.

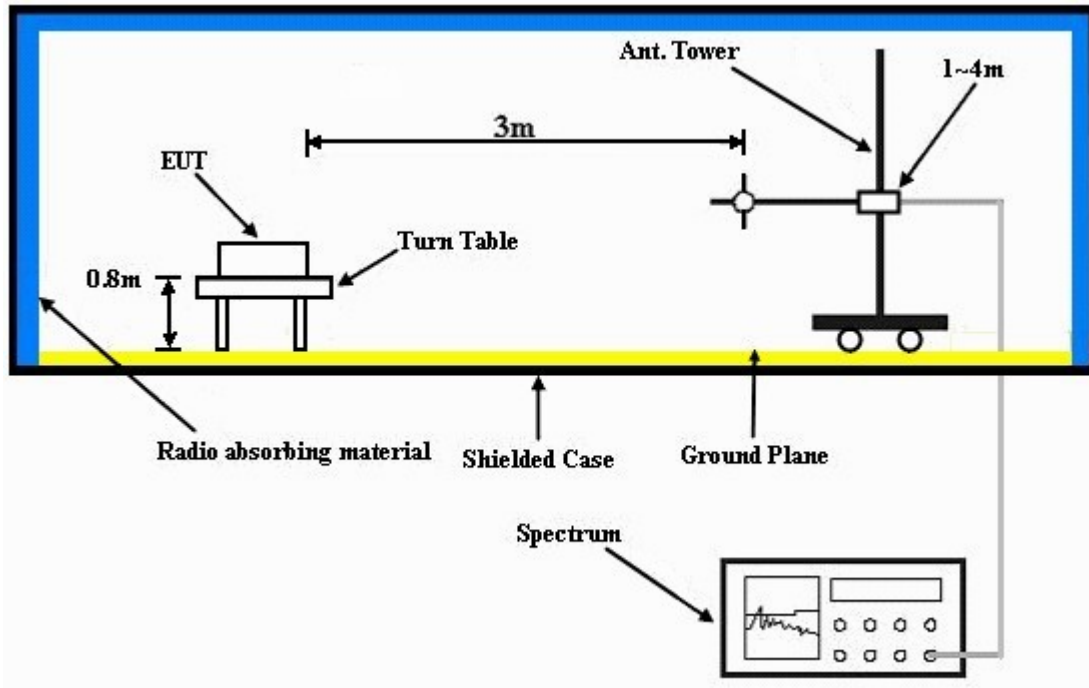
**NOTE:**

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  $\geq 1/T$  (Duty cycle < 98%) or 10Hz(Duty cycle > 98%) for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.

#### 4.1.4 DEVIATION FROM TEST STANDARD

No deviation.

#### 4.1.5 TEST SETUP



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

#### 4.1.6 EUT OPERATING CONDITIONS

- a. Placed the EUT on the testing table.
- b. Prepared notebook to act as communication partner and placed it outside of testing area.
- c. The communication partner connected with EUT via a RJ45 cable and ran a test program (provided by manufacturer) to enable EUT under transmission condition continuously at specific channel frequency.
- d. The communication partner sent data to EUT by command "PING".



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### 4.1.7 TEST RESULTS

#### ABOVE 1GHz DATA :

#### 802.11b

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	48Vdc	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	29deg. C, 69%RH	TESTED BY	Martin Lee

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2288.00	63.2 PK	74.0	-10.8	1.41 H	83	31.70	31.50
2	2288.00	51.8 AV	54.0	-2.2	1.41 H	83	20.30	31.50
3	2360.00	63.0 PK	74.0	-11.0	1.40 H	84	31.20	31.80
4	2360.00	52.3 AV	54.0	-1.7	1.40 H	84	20.50	31.80
5	*2412.00	118.8 PK			1.13 H	97	86.80	32.00
6	*2412.00	115.3 AV			1.13 H	97	83.30	32.00
7	4824.00	44.7 PK	74.0	-29.3	1.33 H	65	39.90	4.80
8	4824.00	31.8 AV	54.0	-22.2	1.33 H	65	27.00	4.80
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	2288.00	57.0 PK	74.0	-17.0	1.57 V	337	25.50	31.50
2	2288.00	47.7 AV	54.0	-6.3	1.57 V	337	16.20	31.50
3	2360.00	57.6 PK	74.0	-16.4	1.57 V	337	25.80	31.80
4	2360.00	47.0 AV	54.0	-7.0	1.57 V	337	15.20	31.80
5	*2412.00	109.6 PK			1.57 V	337	77.60	32.00
6	*2412.00	106.2 AV			1.57 V	337	74.20	32.00
7	4824.00	43.7 PK	74.0	-30.3	1.45 V	62	38.90	4.80
8	4824.00	31.6 AV	54.0	-22.4	1.45 V	62	26.80	4.80

#### 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)  
– Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. “ \* “: Fundamental frequency.



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 6	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	48Vdc	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	29deg. C, 69%RH	TESTED BY	Martin Lee

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	64.1 PK	74.0	-9.9	1.21 H	273	32.30	31.80
2	2360.00	52.1 AV	54.0	-1.9	1.21 H	273	20.30	31.80
3	*2437.00	120.8 PK			1.20 H	267	88.80	32.00
4	*2437.00	117.3 AV			1.20 H	267	85.30	32.00
5	4874.00	44.8 PK	74.0	-29.2	1.20 H	333	40.00	4.80
6	4874.00	31.4 AV	54.0	-22.6	1.20 H	333	26.60	4.80
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	58.4 PK	74.0	-15.6	1.57 V	358	26.60	31.80
2	2360.00	48.4 AV	54.0	-5.6	1.57 V	358	16.60	31.80
3	*2437.00	111.8 PK			1.57 V	358	79.80	32.00
4	*2437.00	108.0 AV			1.57 V	358	76.00	32.00
5	4874.00	44.4 PK	74.0	-29.6	1.44 V	0	39.60	4.80
6	4874.00	31.4 AV	54.0	-22.6	1.44 V	0	26.60	4.80

**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) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. “ \* “: Fundamental frequency.





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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 11	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	48Vdc	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	29deg. C, 69%RH	TESTED BY	Martin Lee

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	63.9 PK	74.0	-10.1	1.40 H	302	32.10	31.80
2	2360.00	51.8 AV	54.0	-2.2	1.40 H	302	20.00	31.80
3	*2462.00	121.0 PK			1.38 H	98	88.80	32.20
4	*2462.00	117.6 AV			1.38 H	98	85.40	32.20
5	2500.00	65.8 PK	74.0	-8.2	1.31 H	271	33.50	32.30
6	2500.00	52.2 AV	54.0	-1.8	1.31 H	271	19.90	32.30
7	4924.00	45.6 PK	74.0	-28.4	1.36 H	25	40.60	5.00
8	4924.00	31.9 AV	54.0	-22.1	1.36 H	25	26.90	5.00

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2360.00	58.0 PK	74.0	-16.0	1.56 V	6	26.20	31.80
2	2360.00	47.8 AV	54.0	-6.2	1.56 V	6	16.00	31.80
3	*2462.00	113.7 PK			1.56 V	6	81.50	32.20
4	*2462.00	110.5 AV			1.56 V	6	78.30	32.20
5	2500.00	60.9 PK	74.0	-13.1	1.56 V	6	28.60	32.30
6	2500.00	49.3 AV	54.0	-4.7	1.56 V	6	17.00	32.30
7	4924.00	45.1 PK	74.0	-28.9	1.44 V	25	40.10	5.00
8	4924.00	31.9 AV	54.0	-22.1	1.44 V	25	26.90	5.00

**REMARKS:**

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



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802.11g

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	48Vdc	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	29deg. C, 69%RH	TESTED BY	Martin Lee

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	68.7 PK	74.0	-5.3	1.67 H	92	36.80	31.90
2	2390.00	52.2 AV	54.0	-1.8	1.67 H	92	20.30	31.90
3	*2412.00	117.7 PK			1.67 H	92	85.70	32.00
4	*2412.00	108.5 AV			1.67 H	92	76.50	32.00
5	4824.00	44.7 PK	74.0	-29.3	1.12 H	36	39.90	4.80
6	4824.00	31.5 AV	54.0	-22.5	1.12 H	36	26.70	4.80

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	2390.00	60.6 PK	74.0	-13.4	1.58 V	358	28.70	31.90
2	2390.00	49.6 AV	54.0	-4.4	1.58 V	358	17.70	31.90
3	*2412.00	108.7 PK			1.58 V	358	76.70	32.00
4	*2412.00	100.3 AV			1.58 V	358	68.30	32.00
5	4824.00	44.5 PK	74.0	-29.5	1.35 V	65	39.70	4.80
6	4824.00	31.4 AV	54.0	-22.6	1.35 V	65	26.60	4.80

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) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. “ \* “: Fundamental frequency.



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 6	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	48Vdc	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	29deg. C, 69%RH	TESTED BY	Martin Lee

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	67.3 PK	74.0	-6.7	1.41 H	92	35.50	31.80
2	2360.00	51.1 AV	54.0	-2.9	1.41 H	92	19.30	31.80
3	2390.00	65.3 PK	74.0	-8.7	1.41 H	92	33.40	31.90
4	2390.00	51.2 AV	54.0	-2.8	1.41 H	92	19.30	31.90
5	*2437.00	118.5 PK			1.19 H	92	86.50	32.00
6	*2437.00	110.0 AV			1.19 H	92	78.00	32.00
7	4874.00	44.7 PK	74.0	-29.3	1.36 H	258	39.90	4.80
8	4874.00	32.4 AV	54.0	-21.6	1.36 H	258	27.60	4.80

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	57.4 PK	74.0	-16.6	1.00 V	162	25.60	31.80
2	2360.00	47.5 AV	54.0	-6.5	1.00 V	162	15.70	31.80
3	2390.00	59.8 PK	74.0	-14.2	1.00 V	162	27.90	31.90
4	2390.00	47.8 AV	54.0	-6.2	1.00 V	162	15.90	31.90
5	*2437.00	110.2 PK			1.00 V	162	78.20	32.00
6	*2437.00	101.9 AV			1.00 V	162	69.90	32.00
7	4874.00	45.2 PK	74.0	-28.8	1.52 V	325	40.40	4.80
8	4874.00	31.9 AV	54.0	-22.1	1.52 V	325	27.10	4.80

**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) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. “ \* “: Fundamental frequency.



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 11	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	48Vdc	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	29deg. C, 69%RH	TESTED BY	Martin Lee

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	117.9 PK			1.28 H	85	85.70	32.20
2	*2462.00	108.5 AV			1.28 H	85	76.30	32.20
3	2483.50	64.9 PK	74.0	-9.1	1.28 H	85	32.60	32.30
4	<b>2483.50</b>	<b>53.0 AV</b>	<b>54.0</b>	<b>-1.0</b>	<b>1.28 H</b>	<b>85</b>	<b>20.70</b>	<b>32.30</b>
5	4924.00	44.9 PK	74.0	-29.1	1.33 H	65	39.90	5.00
6	4924.00	31.9 AV	54.0	-22.1	1.33 H	65	26.90	5.00
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	108.0 PK			1.77 V	360	75.80	32.20
2	*2462.00	99.4 AV			1.77 V	360	67.20	32.20
3	2483.50	60.8 PK	74.0	-13.2	1.77 V	4	28.50	32.30
4	2483.50	50.0 AV	54.0	-4.0	1.77 V	4	17.70	32.30
5	4924.00	45.6 PK	74.0	-28.4	1.63 V	25	40.60	5.00
6	4924.00	32.1 AV	54.0	-21.9	1.63 V	25	27.10	5.00

**REMARKS:**

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



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802.11n (20MHz)

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	48Vdc	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	29deg. C, 69%RH	TESTED BY	Martin Lee

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	68.8 PK	74.0	-5.2	1.77 H	259	36.90	31.90
2	2390.00	52.9 AV	54.0	-1.1	1.77 H	259	21.00	31.90
3	*2412.00	115.4 PK			1.33 H	92	83.40	32.00
4	*2412.00	106.2 AV			1.33 H	92	74.20	32.00
5	4824.00	45.7 PK	74.0	-28.3	1.25 H	0	40.90	4.80
6	4824.00	31.9 AV	54.0	-22.1	1.25 H	0	27.10	4.80

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	2390.00	60.0 PK	74.0	-14.0	1.56 V	355	28.10	31.90
2	2390.00	49.1 AV	54.0	-4.9	1.56 V	355	17.20	31.90
3	*2412.00	107.9 PK			1.56 V	355	75.90	32.00
4	*2412.00	97.6 AV			1.56 V	355	65.60	32.00
5	4824.00	44.9 PK	74.0	-29.1	1.02 V	222	40.10	4.80
6	4824.00	31.4 AV	54.0	-22.6	1.02 V	222	26.60	4.80

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) – Pre-Amplifier 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

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 6	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	48Vdc	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	29deg. C, 69%RH	TESTED BY	Martin Lee

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	65.4 PK	74.0	-8.6	1.17 H	92	33.60	31.80
2	2360.00	52.2 AV	54.0	-1.8	1.17 H	92	20.40	31.80
3	*2437.00	118.2 PK			1.17 H	267	86.20	32.00
4	*2437.00	108.7 AV			1.17 H	267	76.70	32.00
5	2483.50	64.8 PK	74.0	-9.2	1.11 H	93	32.50	32.30
6	2483.50	52.2 AV	54.0	-1.8	1.11 H	93	19.90	32.30
7	4874.00	44.5 PK	74.0	-29.5	1.00 H	20	39.70	4.80
8	4874.00	31.4 AV	54.0	-22.6	1.00 H	20	26.60	4.80

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	58.6 PK	74.0	-15.4	1.19 V	148	26.80	31.80
2	2360.00	47.8 AV	54.0	-6.2	1.19 V	148	16.00	31.80
3	*2437.00	107.8 PK			1.19 V	147	75.80	32.00
4	*2437.00	97.9 AV			1.19 V	147	65.90	32.00
5	2483.50	59.8 PK	74.0	-14.2	1.19 V	148	27.50	32.30
6	2483.50	48.8 AV	54.0	-5.2	1.19 V	148	16.50	32.30
7	4874.00	44.1 PK	74.0	-29.9	1.42 V	254	39.30	4.80
8	4874.00	31.5 AV	54.0	-22.5	1.42 V	254	26.70	4.80

**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)  
– Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. “ \* “: Fundamental frequency.



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 11	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	48Vdc	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	29deg. C, 69%RH	TESTED BY	Martin Lee

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	116.3 PK			1.34 H	88	84.10	32.20
2	*2462.00	107.0 AV			1.34 H	88	74.80	32.20
3	2483.50	68.3 PK	74.0	-5.7	1.24 H	81	36.00	32.30
4	<b>2483.50</b>	<b>53.0 AV</b>	<b>54.0</b>	<b>-1.0</b>	<b>1.24 H</b>	<b>81</b>	<b>20.70</b>	<b>32.30</b>
5	4924.00	45.1 PK	74.0	-28.9	1.35 H	25	40.10	5.00
6	4924.00	31.2 AV	54.0	-22.8	1.35 H	25	26.20	5.00
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	108.1 PK			1.84 V	357	75.90	32.20
2	*2462.00	98.7 AV			1.84 V	357	66.50	32.20
3	2483.50	60.6 PK	74.0	-13.4	1.84 V	357	28.30	32.30
4	2483.50	50.0 AV	54.0	-4.0	1.84 V	357	17.70	32.30
5	4924.00	46.2 PK	74.0	-27.8	1.07 V	71	41.20	5.00
6	4924.00	32.1 AV	54.0	-21.9	1.07 V	71	27.10	5.00

**REMARKS:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier 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)

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 3	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	48Vdc	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	29deg. C, 69%RH	TESTED BY	Martin Lee

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	68.2 PK	74.0	-5.8	1.33 H	85	36.30	31.90
2	2390.00	52.3 AV	54.0	-1.7	1.33 H	85	20.40	31.90
3	*2422.00	109.8 PK			1.29 H	81	77.80	32.00
4	*2422.00	100.8 AV			1.29 H	81	68.80	32.00
5	4844.00	44.7 PK	74.0	-29.3	1.45 H	0	39.90	4.80
6	4844.00	31.3 AV	54.0	-22.7	1.45 H	0	26.50	4.80
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	2390.00	62.5 PK	74.0	-11.5	1.90 V	5	30.60	31.90
2	2390.00	49.1 AV	54.0	-4.9	1.90 V	5	17.20	31.90
3	*2422.00	101.0 PK			1.90 V	5	69.00	32.00
4	*2422.00	91.8 AV			1.90 V	5	59.80	32.00
5	4844.00	45.0 PK	74.0	-29.0	1.27 V	214	40.20	4.80
6	4844.00	31.8 AV	54.0	-22.2	1.27 V	214	27.00	4.80

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)  
– Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. “ \* “: Fundamental frequency.





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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 6	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	48Vdc	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	29deg. C, 69%RH	TESTED BY	Martin Lee

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	66.5 PK	74.0	-7.5	1.94 H	90	34.60	31.90
2	2390.00	51.8 AV	54.0	-2.2	1.94 H	90	19.90	31.90
3	*2437.00	115.1 PK			1.94 H	88	83.10	32.00
4	*2437.00	106.1 AV			1.94 H	88	74.10	32.00
5	2483.50	64.4 PK	74.0	-9.6	1.91 H	88	32.10	32.30
6	2483.50	52.9 AV	54.0	-1.1	1.91 H	88	20.60	32.30
7	2500.00	66.9 PK	74.0	-7.1	1.94 H	90	34.60	32.30
8	2500.00	52.4 AV	54.0	-1.6	1.94 H	90	20.10	32.30
9	4874.00	45.6 PK	74.0	-28.4	1.28 H	2	40.80	4.80
10	4874.00	32.0 AV	54.0	-22.0	1.28 H	2	27.20	4.80

**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) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. “ \* “: Fundamental frequency.



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 6	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	48Vdc	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	29deg. C, 69%RH	TESTED BY	Martin Lee

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	59.0 PK	74.0	-15.0	1.57 V	355	27.10	31.90
2	2390.00	47.8 AV	54.0	-6.2	1.57 V	355	15.90	31.90
3	*2437.00	106.0 PK			1.57 V	356	74.00	32.00
4	*2437.00	96.6 AV			1.57 V	356	64.60	32.00
5	2483.50	59.5 PK	74.0	-14.5	1.57 V	356	27.20	32.30
6	2483.50	49.1 AV	54.0	-4.9	1.57 V	356	16.80	32.30
7	2500.00	56.9 PK	74.0	-17.1	1.57 V	322	24.60	32.30
8	2500.00	48.3 AV	54.0	-5.7	1.57 V	322	16.00	32.30
9	4874.00	45.0 PK	74.0	-29.0	1.02 V	222	40.20	4.80
10	4874.00	31.4 AV	54.0	-22.6	1.02 V	222	26.60	4.80

**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) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. “ \* “: Fundamental frequency.



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 9	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	48Vdc	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	29deg. C, 69%RH	TESTED BY	Martin Lee

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	*2452.00	111.0 PK			1.08 H	92	78.90	32.10
2	*2452.00	101.3 AV			1.08 H	92	69.20	32.10
3	2483.50	68.9 PK	74.0	-5.1	1.12 H	94	36.60	32.30
4	2483.50	52.4 AV	54.0	-1.6	1.12 H	94	20.10	32.30
5	4904.00	44.5 PK	74.0	-29.5	1.24 H	25	39.60	4.90
6	4904.00	30.8 AV	54.0	-23.2	1.24 H	25	25.90	4.90
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2452.00	102.3 PK			1.30 V	11	70.20	32.10
2	*2452.00	93.3 AV			1.30 V	11	61.20	32.10
3	2483.50	63.0 PK	74.0	-11.0	1.56 V	13	30.70	32.30
4	2483.50	50.6 AV	54.0	-3.4	1.56 V	13	18.30	32.30
5	4904.00	45.6 PK	74.0	-28.4	1.23 V	325	40.70	4.90
6	4904.00	32.0 AV	54.0	-22.0	1.23 V	325	27.10	4.90

**REMARKS:**

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



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**BELOW 1GHz WORST-CASE DATA : 802.11g**

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 6	FREQUENCY RANGE	Below 1000MHz
INPUT POWER	48Vdc	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	27deg. C, 66%RH	TESTED BY	Martin Lee

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	121.10	41.9 QP	43.5	-1.6	1.05 H	265	58.40	-16.50
2	128.86	39.0 QP	43.5	-4.5	1.50 H	270	54.80	-15.80
3	171.55	39.8 QP	43.5	-3.7	1.50 H	265	54.40	-14.60
4	249.17	34.4 QP	46.0	-11.6	2.00 H	117	49.00	-14.60
5	375.29	34.8 QP	46.0	-11.2	1.26 H	222	46.20	-11.40
6	625.60	39.5 QP	46.0	-6.5	1.75 H	28	46.10	-6.60

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	51.24	35.6 QP	40.0	-4.4	1.50 V	347	50.10	-14.50
2	119.16	39.6 QP	43.5	-3.9	1.00 V	321	56.20	-16.60
3	375.29	36.5 QP	46.0	-9.5	1.75 V	3	47.90	-11.40
4	625.60	33.6 QP	46.0	-12.4	1.00 V	271	40.20	-6.60
5	749.79	32.4 QP	46.0	-13.6	2.04 V	69	36.70	-4.30
6	901.14	35.8 QP	46.0	-10.2	1.00 V	214	37.80	-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)  
– Pre-Amplifier 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	100289	Nov. 16, 2012	Nov. 15, 2013
RF signal cable Woken	5D-FB	Cable-HYC01-01	Dec. 28, 2012	Dec. 27, 2013
V-LISN SCHWARZBECK (Peripheral)	NNBL 8226-2	8226-142	Jun. 27, 2013	Jun. 26, 2014
LISN ROHDE & SCHWARZ (EUT)	ESH3-Z5	835239/001	Feb. 04, 2013	Feb. 03, 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 1.  
3. The VCCI Site Registration No. is C-2040.

#### 4.2.3 TEST PROCEDURES

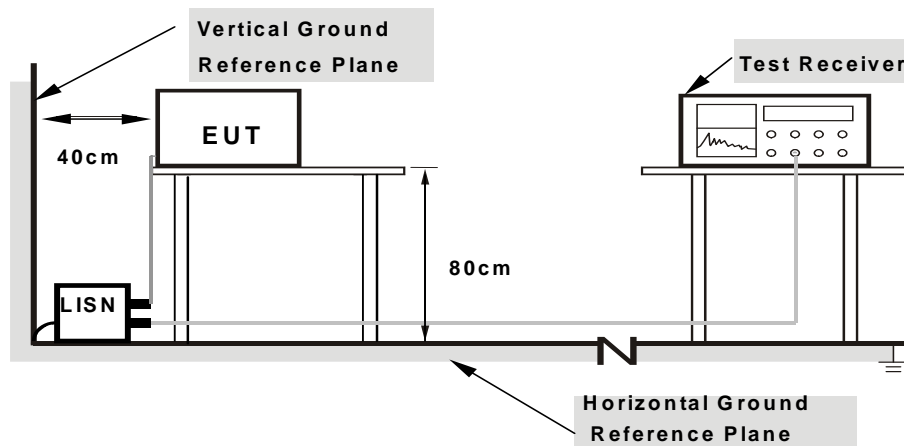
- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling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

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

#### 4.2.4 DEVIATION FROM TEST STANDARD

No deviation.

#### 4.2.5 TEST SETUP



- Note:**
- 1.Support units were connected to second LISN.
  - 2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

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

#### 4.2.6 EUT OPERATING CONDITIONS

Same as 4.1.6.

### 4.2.7 TEST RESULTS

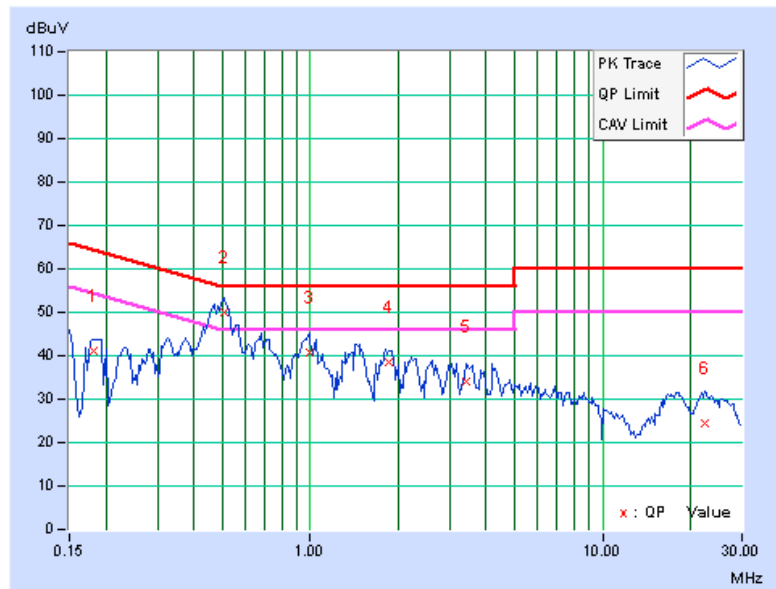
**CONDUCTED WORST-CASE DATA : 802.11g**

<b>PHASE</b>	Line 1	<b>6dB BANDWIDTH</b>	9kHz
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No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.18125	0.16	41.13	35.53	41.29	35.69	64.43	54.43	-23.14	-18.74
<b>2</b>	<b>0.50547</b>	<b>0.23</b>	<b>49.85</b>	<b>43.09</b>	<b>50.08</b>	<b>43.32</b>	<b>56.00</b>	<b>46.00</b>	<b>-5.92</b>	<b>-2.68</b>
3	0.98984	0.25	40.39	33.63	40.64	33.88	56.00	46.00	-15.36	-12.12
4	1.85938	0.28	38.32	32.70	38.60	32.98	56.00	46.00	-17.40	-13.02
5	3.42578	0.37	33.58	27.64	33.95	28.01	56.00	46.00	-22.05	-17.99
6	22.25781	1.34	22.95	15.06	24.29	16.40	60.00	50.00	-35.71	-33.60

**REMARKS:**

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

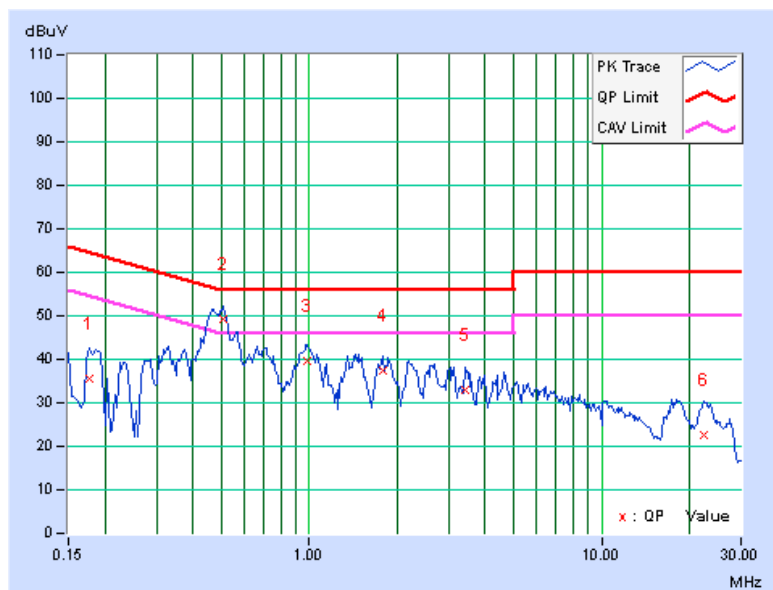


PHASE	Line 2	6dB BANDWIDTH	9kHz
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No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.17734	0.17	35.33	24.42	35.50	24.59	64.61	54.61	-29.11	-30.02
2	0.50547	0.24	49.00	42.12	49.24	42.36	56.00	46.00	-6.76	-3.64
3	0.98594	0.25	39.24	32.59	39.49	32.84	56.00	46.00	-16.51	-13.16
4	1.78516	0.27	37.23	31.10	37.50	31.37	56.00	46.00	-18.50	-14.63
5	3.39844	0.35	32.67	26.75	33.02	27.10	56.00	46.00	-22.98	-18.90
6	22.26953	1.01	21.50	13.74	22.51	14.75	60.00	50.00	-37.49	-35.25

**REMARKS:**

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



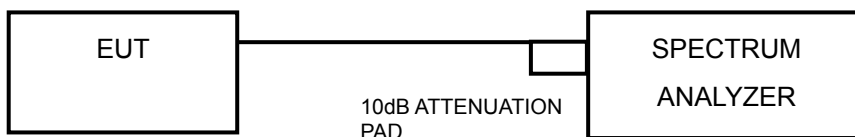


### 4.3 6dB BANDWIDTH MEASUREMENT

#### 4.3.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

#### 4.3.2 TEST SETUP



#### 4.3.3 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

#### 4.3.4 TEST PROCEDURE

- a. Set resolution bandwidth (RBW) = 100kHz
- b. Set the video bandwidth (VBW)  $\geq 3 \times$  RBW, Detector = Peak.
- c. Trace mode = max hold.
- d. Sweep = auto couple.
- e. Measure the maximum width of the emission that is constrained by the frequencies associated with the two amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission

#### 4.3.5 DEVIATION FROM TEST STANDARD

No deviation.

#### 4.3.6 EUT OPERATING CONDITIONS

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



## 4.3.7 TEST RESULTS

## 802.11b

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)			MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2		
1	2412	6.12	6.06	6.14	0.5	PASS
6	2437	6.16	6.09	6.02	0.5	PASS
11	2462	6.10	6.08	6.10	0.5	PASS

## 802.11g

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)			MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2		
1	2412	16.44	16.46	16.44	0.5	PASS
6	2437	16.48	16.56	16.44	0.5	PASS
11	2462	16.44	16.48	16.46	0.5	PASS

## 802.11n (20MHz)

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)			MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2		
1	2412	17.66	17.67	17.65	0.5	PASS
6	2437	17.66	17.66	17.68	0.5	PASS
11	2462	17.65	17.67	17.65	0.5	PASS

## 802.11n (40MHz)

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)			MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2		
3	2422	35.89	36.46	36.15	0.5	PASS
6	2437	36.14	36.46	36.45	0.5	PASS
9	2452	36.16	36.44	36.46	0.5	PASS

## 4.4 CONDUCTED OUTPUT POWER

### 4.4.1 LIMITS OF CONDUCTED OUTPUT POWER MEASUREMENT

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

Per KDB 662911 D01 Multiple Transmitter Output v02 Method of conducted output power measurement on IEEE 802.11 devices,

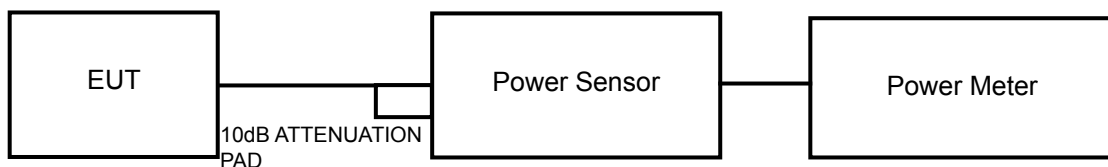
Array Gain = 0 dB (i.e., no array gain) for  $NANT \leq 4$ ;

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

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



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#### 4.4.5 DEVIATION FROM TEST STANDARD

No deviation.

#### 4.4.6 EUT OPERATING CONDITIONS

Same as Item 4.3.6.



## 4.4.7 TEST RESULTS

## FOR PEAK POWER

## 802.11b

CHAN.	CHAN. FREQ. (MHz)	PEAK POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
1	2412	20.38	20.19	19.88	310.891	24.93	30	PASS
6	2437	21.48	20.66	20.79	376.968	25.76	30	PASS
11	2462	21.71	20.58	21.21	394.670	25.96	30	PASS

## 802.11g

CHAN.	CHAN. FREQ. (MHz)	PEAK POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
1	2412	24.74	23.04	23.80	739.107	28.69	30	PASS
6	2437	25.25	25.03	24.69	<b>947.827</b>	29.77	30	PASS
11	2462	21.57	21.86	22.60	478.981	26.80	30	PASS

## 802.11n (20MHz)

CHAN.	CHAN. FREQ. (MHz)	PEAK POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
1	2412	21.94	21.63	22.32	472.469	26.74	30	PASS
6	2437	24.63	23.79	24.10	786.774	28.96	30	PASS
11	2462	23.81	22.47	22.68	602.393	27.80	30	PASS

## 802.11n (40MHz)

CHAN.	CHAN. FREQ. (MHz)	PEAK POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
3	2422	19.27	18.09	17.68	207.559	23.17	30	PASS
6	2437	25.30	24.98	24.03	906.549	29.57	30	PASS
9	2452	21.29	19.81	20.28	336.965	25.28	30	PASS



## FOR AVERAGE POWER

## 802.11b

CHAN.	FREQUENCY (MHz)	AVG. POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)
		CHAIN 0	CHAIN 1	CHAIN 2		
1	2412	16.94	16.93	16.49	143.314	21.56
6	2437	18.24	17.42	17.54	178.643	22.52
11	2462	18.40	17.25	17.99	185.222	22.68

## 802.11g

CHAN.	FREQUENCY (MHz)	AVG. POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)
		CHAIN 0	CHAIN 1	CHAIN 2		
1	2412	16.80	15.96	15.21	120.498	20.81
6	2437	17.66	16.27	16.27	143.073	21.56
11	2462	14.65	14.83	14.74	89.368	19.51

## 802.11n (20MHz)

CHAN.	FREQUENCY (MHz)	AVG. POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)
		CHAIN 0	CHAIN 1	CHAIN 2		
1	2412	14.72	13.68	14.85	83.532	19.22
6	2437	17.27	16.33	16.57	141.681	21.51
11	2462	15.01	13.92	14.24	82.902	19.19

## 802.11n (40MHz)

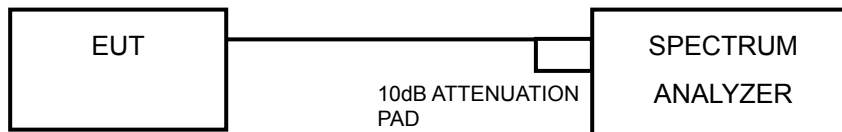
CHAN.	FREQUENCY (MHz)	AVG. POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)
		CHAIN 0	CHAIN 1	CHAIN 2		
3	2422	11.38	10.46	10.17	35.256	15.47
6	2437	16.30	15.39	15.10	109.611	20.40
9	2452	13.05	11.96	12.01	51.773	17.14

## 4.5 POWER SPECTRAL DENSITY MEASUREMENT

### 4.5.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

The Maximum of Power Spectral Density Measurement is 8dBm.

### 4.5.2 TEST SETUP



### 4.5.3 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

### 4.5.4 TEST PROCEDURE

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

### 4.5.5 DEVIATION FROM TEST STANDARD

No deviation.

### 4.5.6 EUT OPERATING CONDITION

Same as Item 4.3.6



## 4.5.7 TEST RESULTS

### 802.11b

TX chain	Channel	Freq. (MHz)	PSD (dBm/3kHz)	10 log (N=3) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	1	2412	-5.78	4.77	-1.01	4.23	PASS
	6	2437	-3.55	4.77	1.22	4.23	PASS
	11	2462	-4.07	4.77	0.70	4.23	PASS
1	1	2412	-5.07	4.77	-0.30	4.23	PASS
	6	2437	-4.33	4.77	0.44	4.23	PASS
	11	2462	-4.34	4.77	0.43	4.23	PASS
2	1	2412	-5.04	4.77	-0.27	4.23	PASS
	6	2437	-3.93	4.77	0.84	4.23	PASS
	11	2462	-4.46	4.77	0.31	4.23	PASS

**NOTE:** Directional gain =  $5\text{dBi} + 10\log(3) = 9.77\text{dBi} > 6\text{dBi}$  , so the power density limit shall be reduced to  $8-(9.77-6) = 4.23\text{dBm}$ .

### 802.11g

TX chain	Channel	Freq. (MHz)	PSD (dBm/3kHz)	10 log (N=3) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	1	2412	-9.01	4.77	-4.12	4.23	PASS
	6	2437	-8.45	4.77	-3.56	4.23	PASS
	11	2462	-6.93	4.77	-2.04	4.23	PASS
1	1	2412	-9.39	4.77	-4.50	4.23	PASS
	6	2437	-9.21	4.77	-4.32	4.23	PASS
	11	2462	-9.48	4.77	-4.59	4.23	PASS
2	1	2412	-7.62	4.77	-2.73	4.23	PASS
	6	2437	-9.24	4.77	-4.35	4.23	PASS
	11	2462	-10.88	4.77	-5.99	4.23	PASS

**NOTE:** Directional gain =  $5\text{dBi} + 10\log(3) = 9.77\text{dBi} > 6\text{dBi}$  , so the power density limit shall be reduced to  $8-(9.77-6) = 4.23\text{dBm}$ .





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### 802.11n (20MHz)

TX chain	Channel	Freq. (MHz)	PSD (dBm/3kHz)	10 log (N=3) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	1	2412	-11.66	4.77	-6.77	8	PASS
	6	2437	-8.10	4.77	-3.21	8	PASS
	11	2462	-3.90	4.77	0.99	8	PASS
1	1	2412	-11.65	4.77	-6.76	8	PASS
	6	2437	-9.48	4.77	-4.59	8	PASS
	11	2462	-11.49	4.77	-6.60	8	PASS
2	1	2412	-10.65	4.77	-5.76	8	PASS
	6	2437	-8.46	4.77	-3.57	8	PASS
	11	2462	-12.15	4.77	-7.26	8	PASS

**NOTE:** 802.11n (20MHz)(MCS16~23 / Nss=3)

Directional gain = 5dBi + 10log(3/3) = 5dBi < 6dBi , so the power spectral density limit is not reduced.

### 802.11n (40MHz)

TX chain	Channel	Freq. (MHz)	PSD (dBm/3kHz)	10 log (N=3) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	3	2422	-16.35	4.77	-11.38	8	PASS
	6	2437	-9.38	4.77	-4.41	8	PASS
	9	2452	-14.27	4.77	-9.30	8	PASS
1	3	2422	-18.07	4.77	-13.10	8	PASS
	6	2437	-10.95	4.77	-5.98	8	PASS
	9	2452	-16.28	4.77	-11.31	8	PASS
2	3	2422	-18.35	4.77	-13.38	8	PASS
	6	2437	-12.86	4.77	-7.89	8	PASS
	9	2452	-17.14	4.77	-12.17	8	PASS

**NOTE:** 802.11n (40MHz)(MCS16~23 / Nss=3)

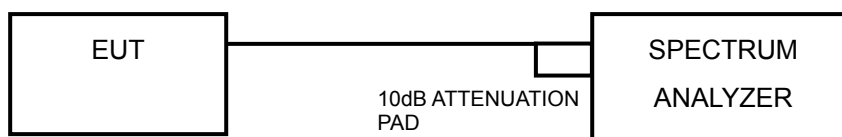
Directional gain = 5dBi + 10log(3/3) = 5dBi < 6dBi , so the power spectral density limit is not reduced.

## 4.6 CONDUCTED OUT OF BAND EMISSION MEASUREMENT

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

Below -20dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

### 4.6.2 TEST SETUP



### 4.6.3 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

### 4.6.4 TEST PROCEDURE

#### MEASUREMENT PROCEDURE REF

1. Set the RBW = 100 kHz.
2. Set the VBW  $\geq$  300 kHz.
3. Detector = peak.
4. Sweep time = auto couple.
5. Trace mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.



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## MEASUREMENT PROCEDURE OOBE

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

### 4.6.5 DEVIATION FROM TEST STANDARD

No deviation.

### 4.6.6 EUT OPERATING CONDITION

Same as Item 4.3.6

### 4.6.7 TEST RESULTS

The 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.

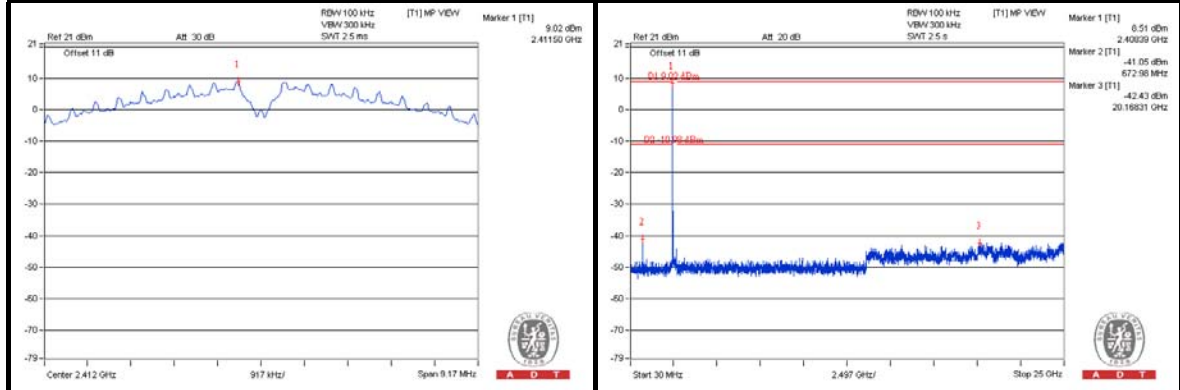
The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement.



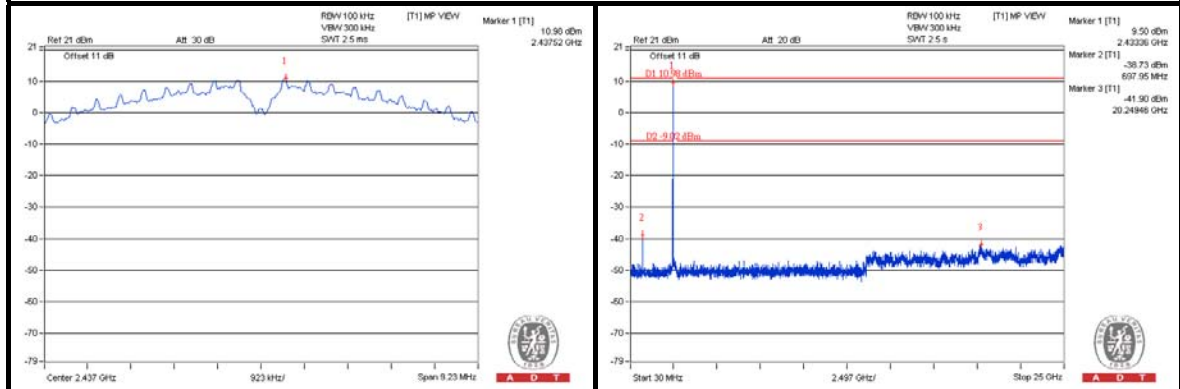
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# 802.11b CHAIN 0

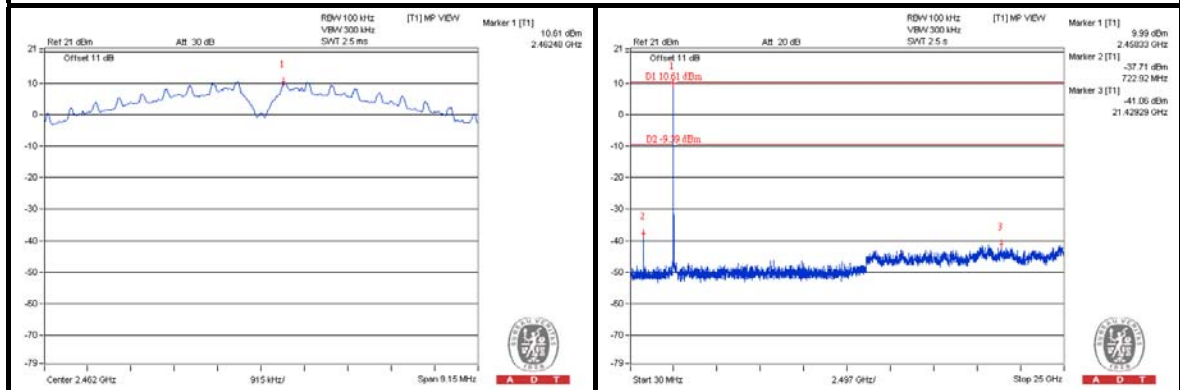
## CH 1



## CH 6



## CH 11

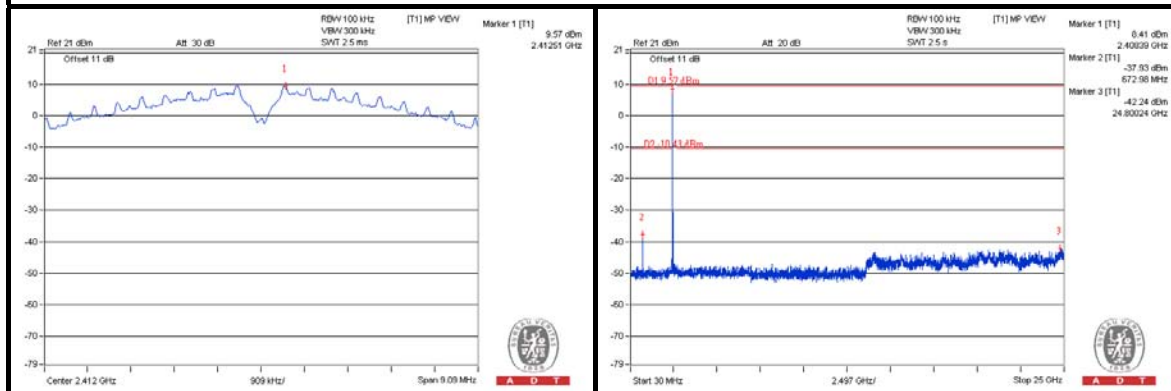




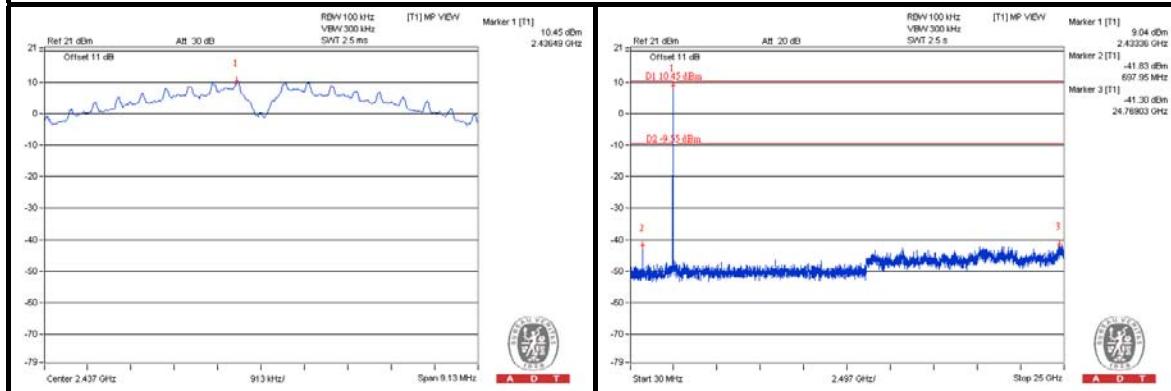
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### CHAIN 1

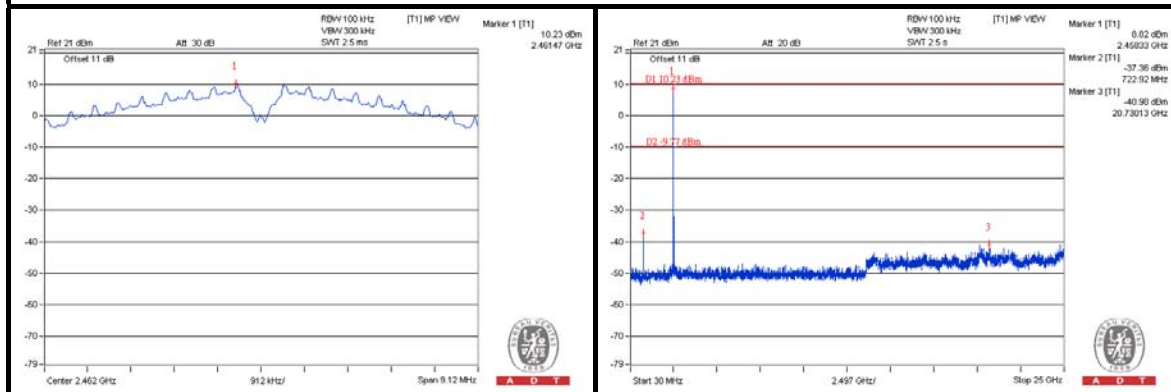
#### CH 1



#### CH 6



#### CH 11

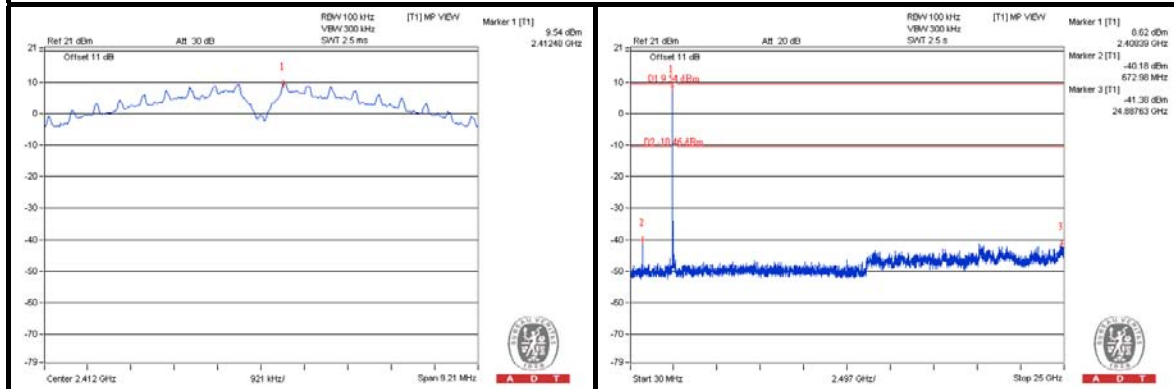




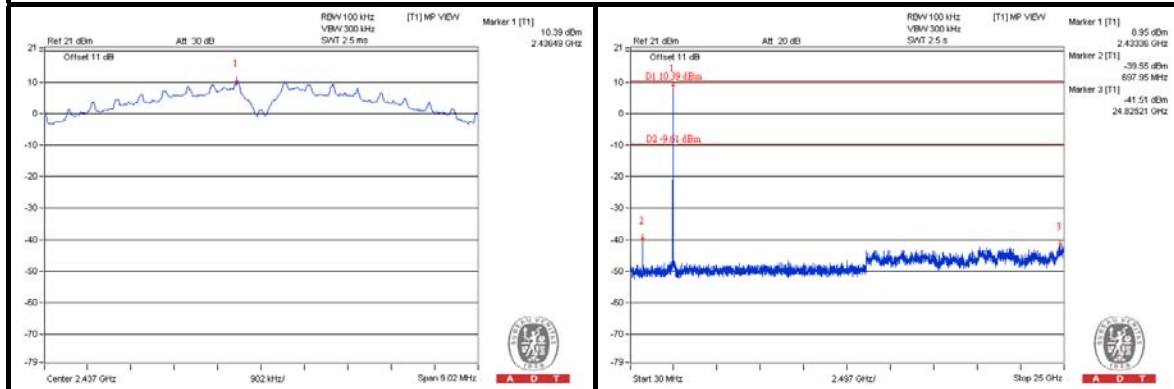
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## CHAIN 2

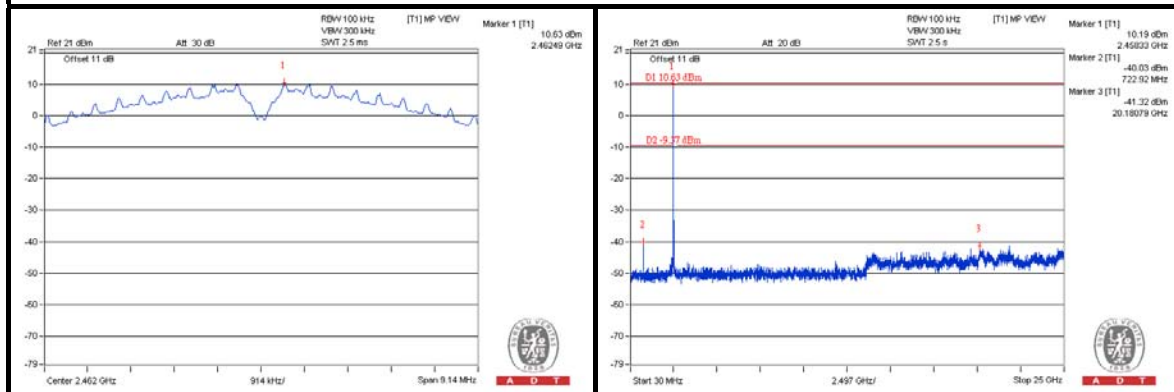
### CH 1



### CH 6



### CH 11

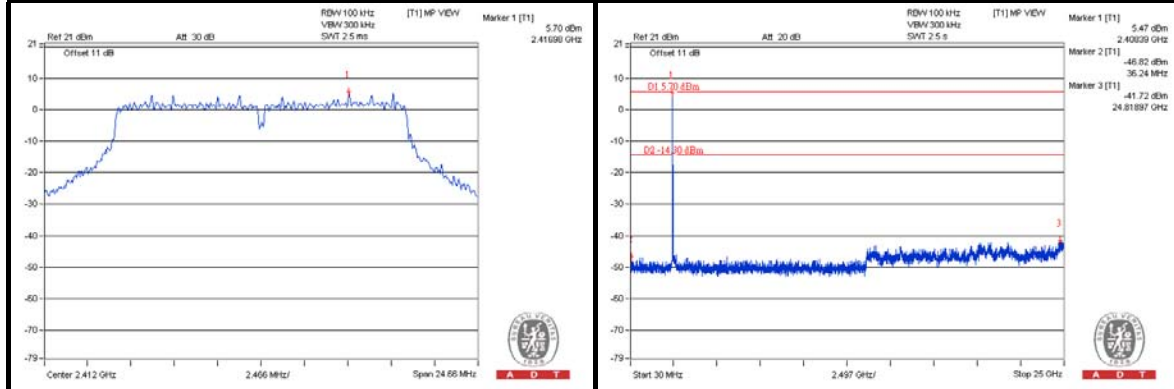




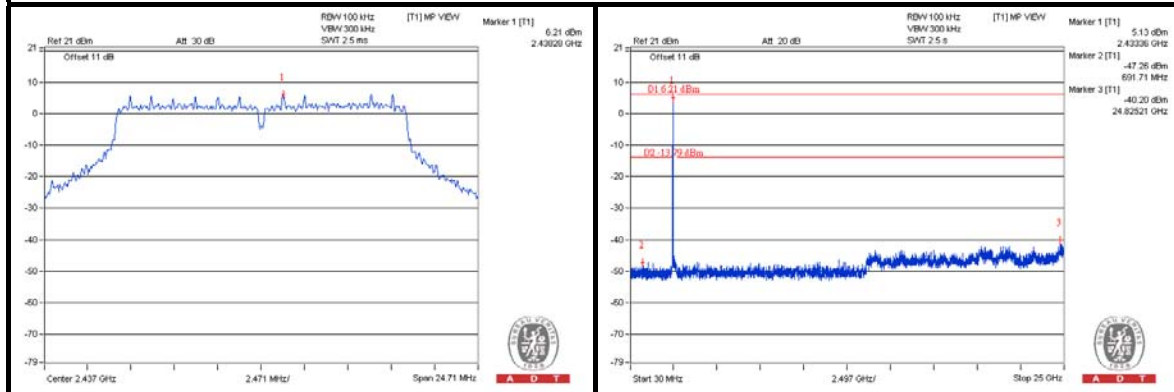
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# 802.11g CHAIN 0

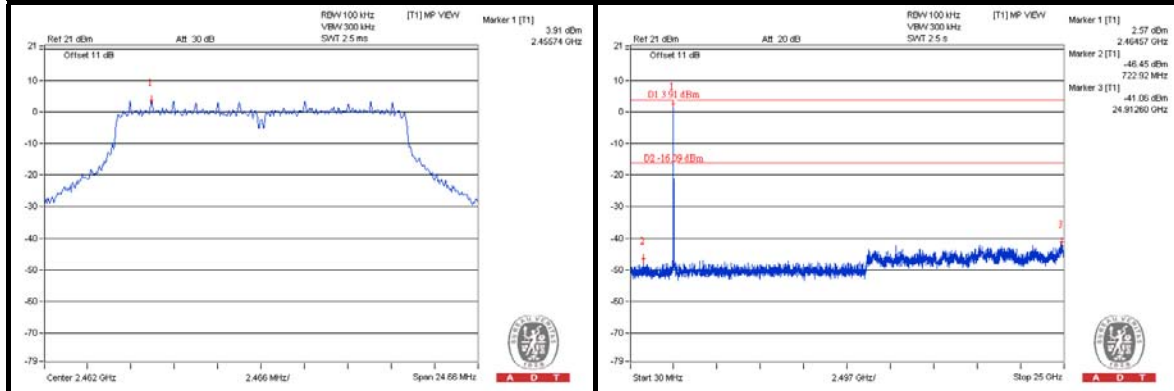
## CH 1



## CH 6



## CH 11

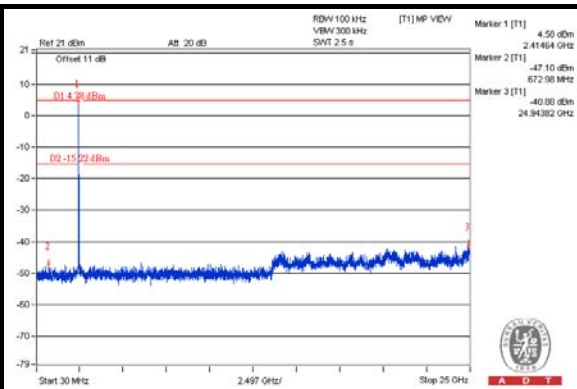
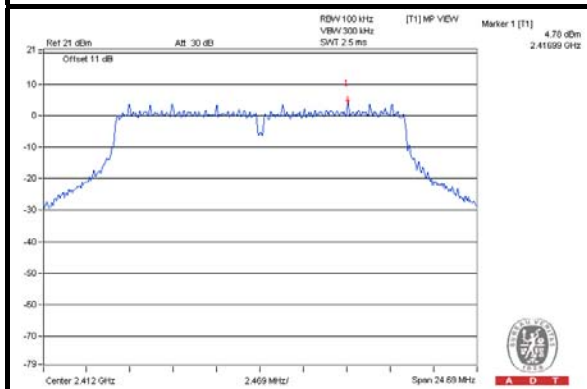




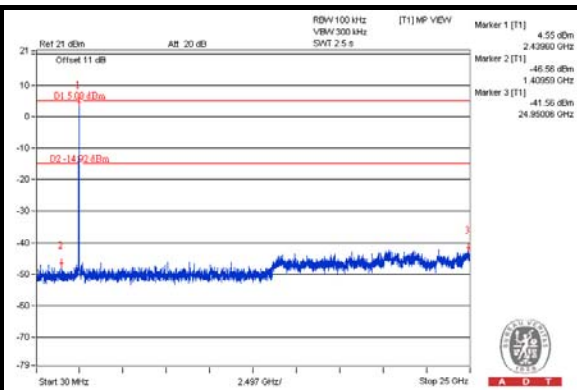
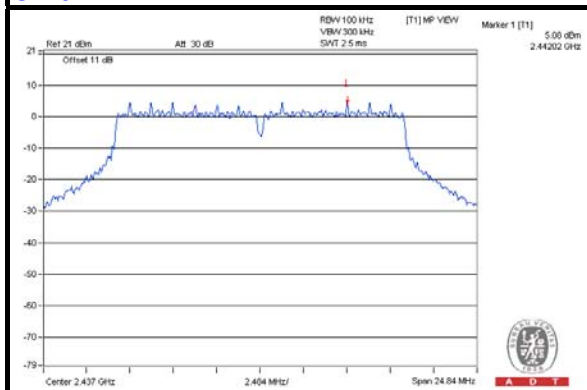
A D T

### CHAIN 1

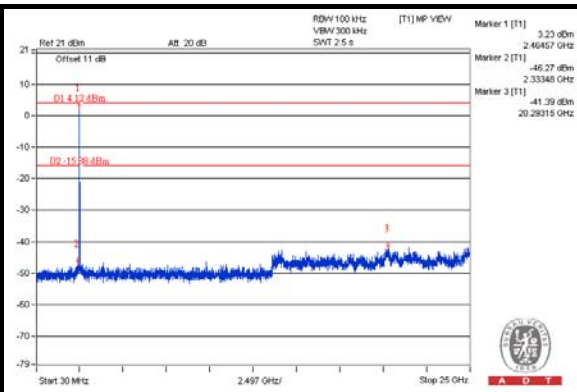
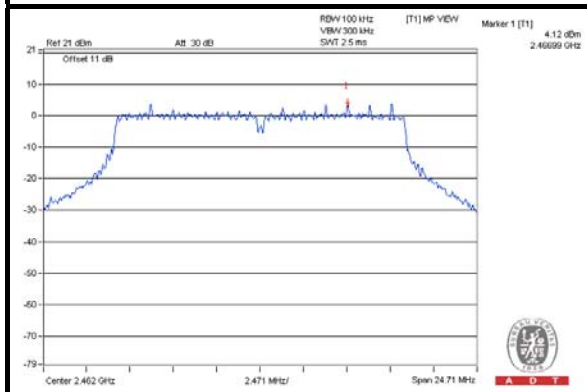
#### CH 1



#### CH 6



#### CH 11



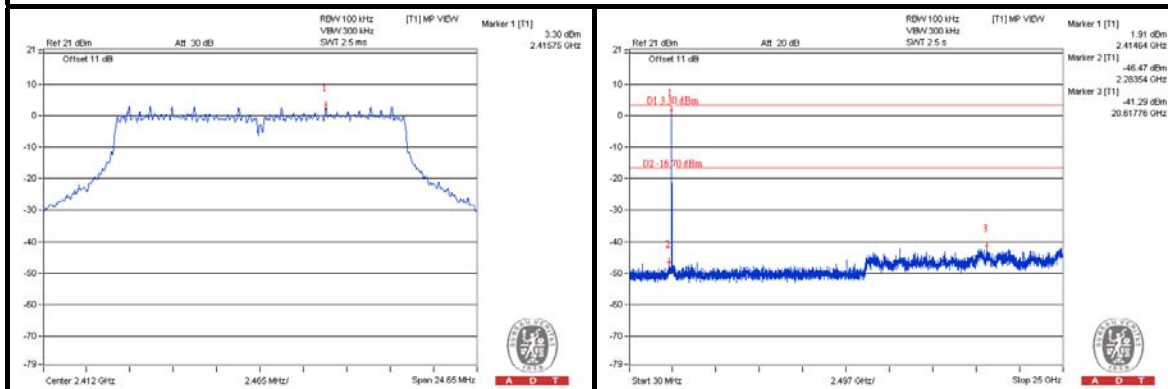




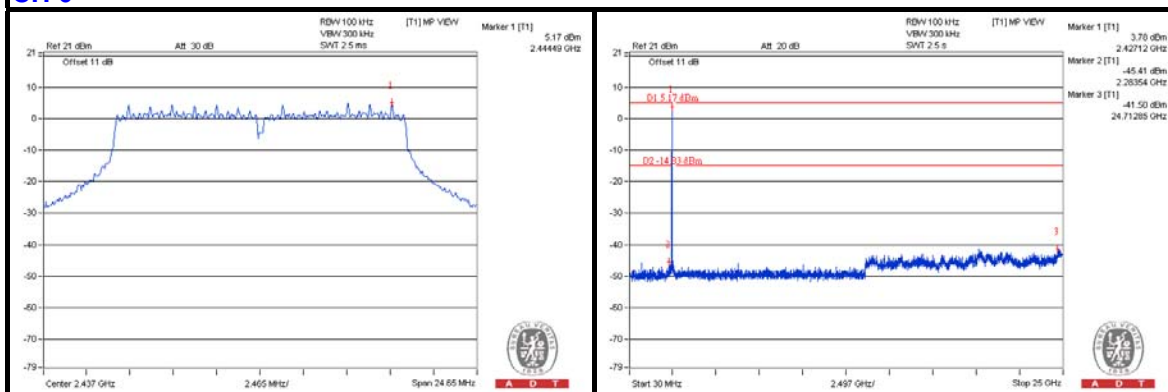
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## CHAIN 2

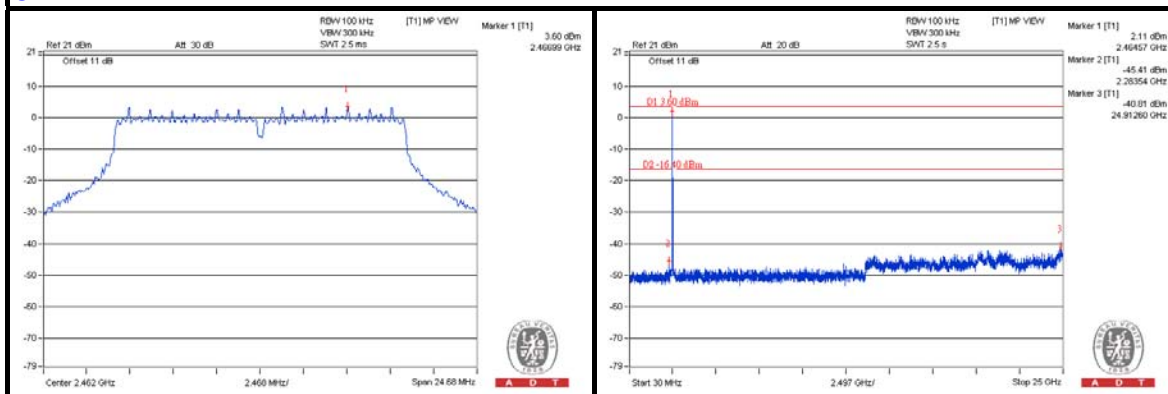
### CH 1



### CH 6



### CH 11

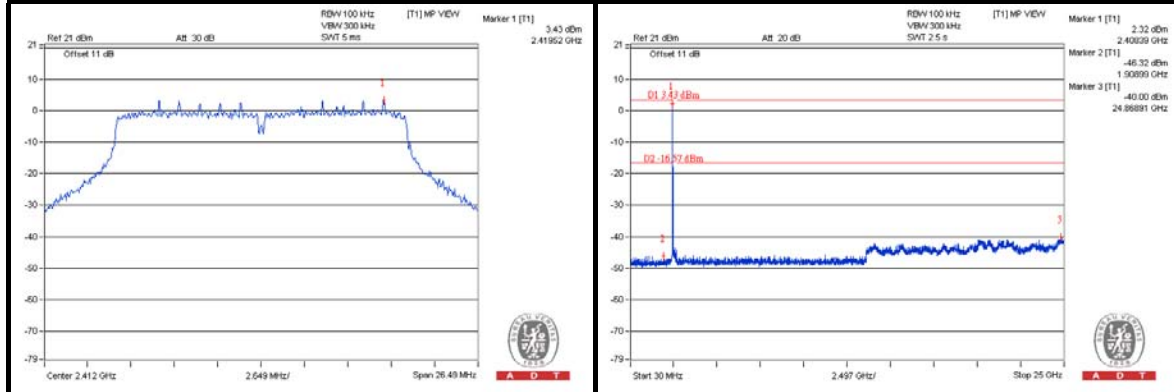




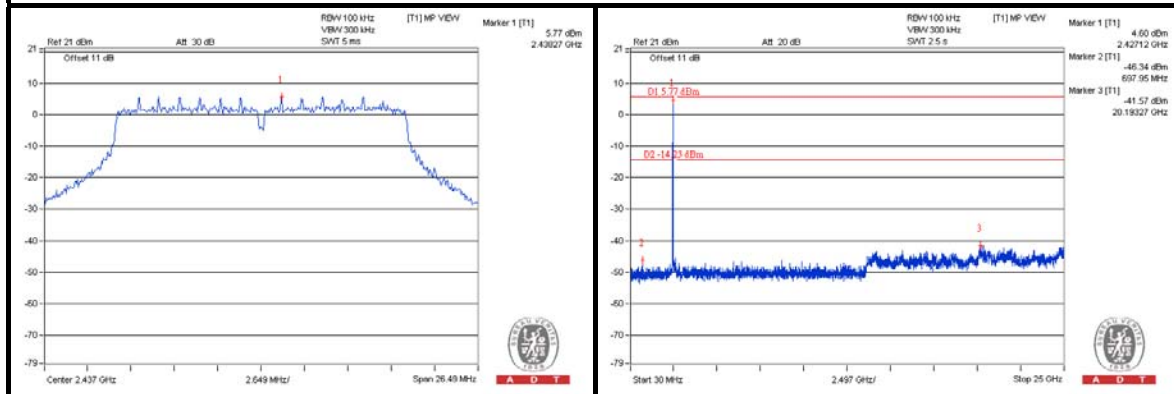
A D T

# 802.11n (20MHz) CHAIN 0

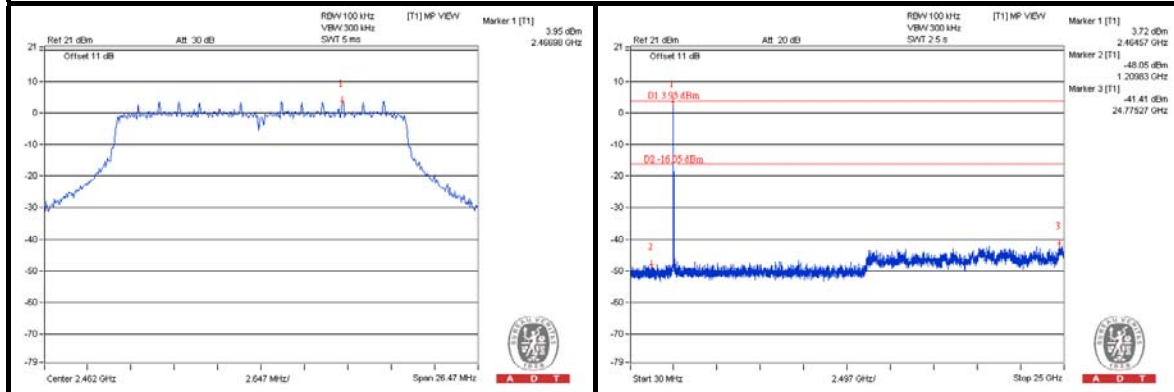
## CH 1



## CH 6



## CH 11

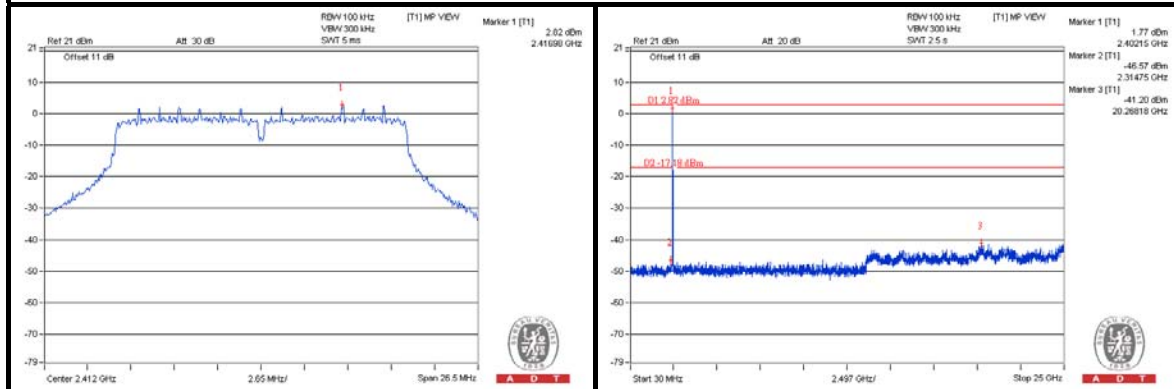




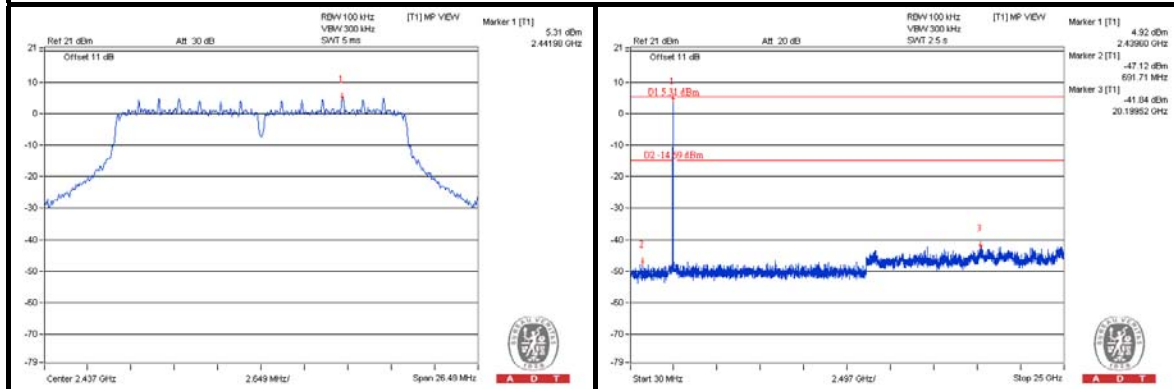
A D T

### CHAIN 1

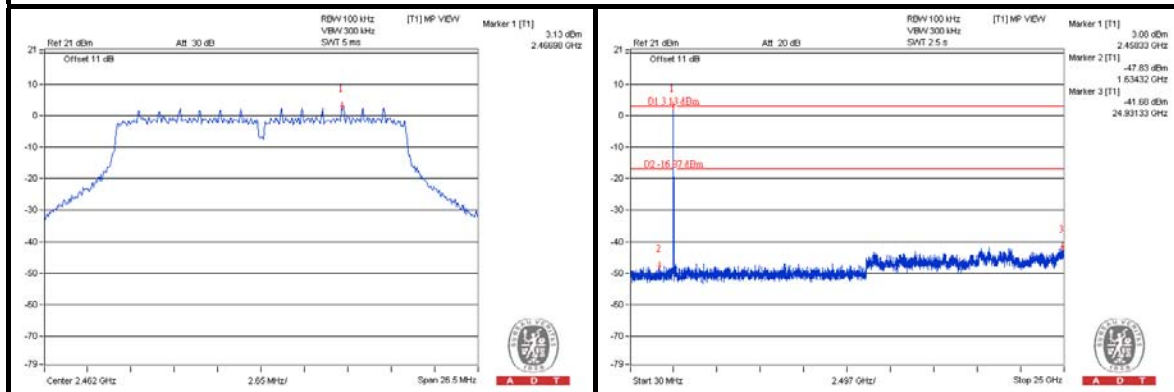
#### CH 1



#### CH 6



#### CH 11

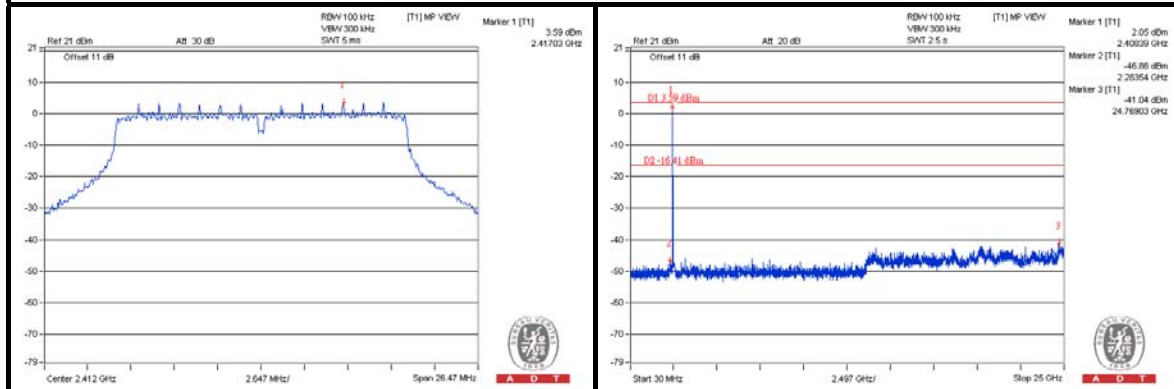




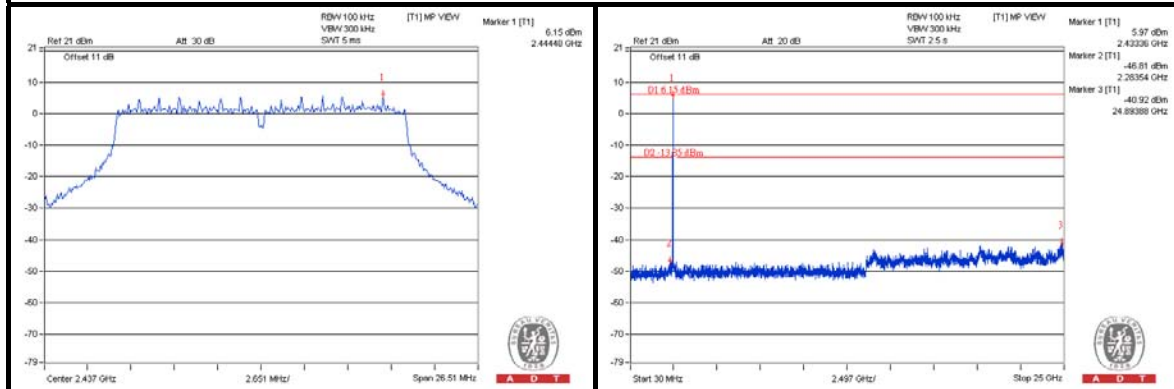
A D T

## CHAIN 2

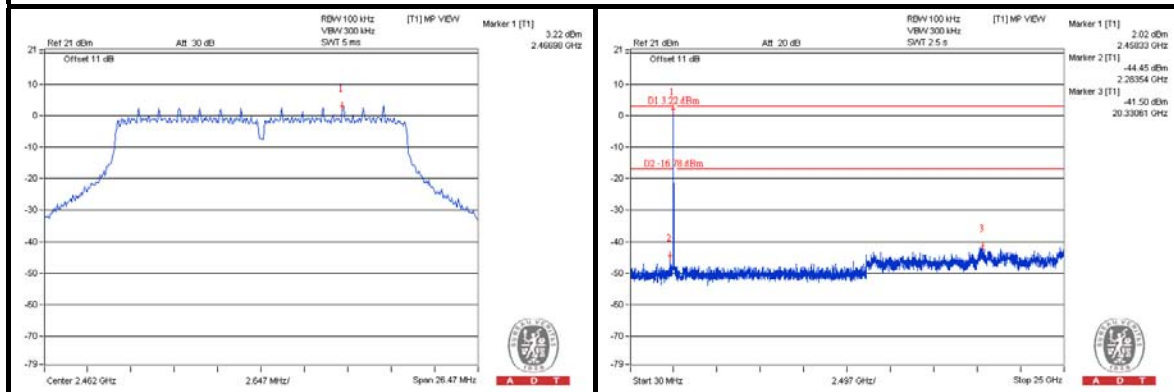
### CH 1



### CH 6



### CH 11

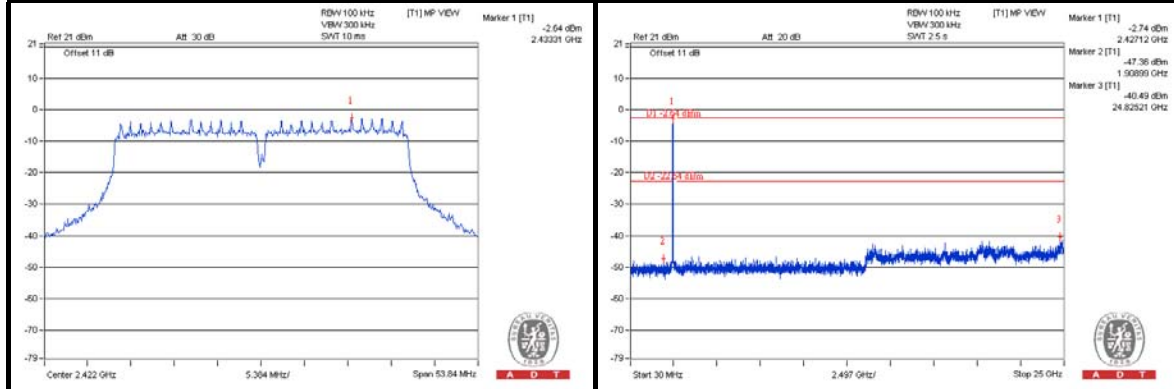




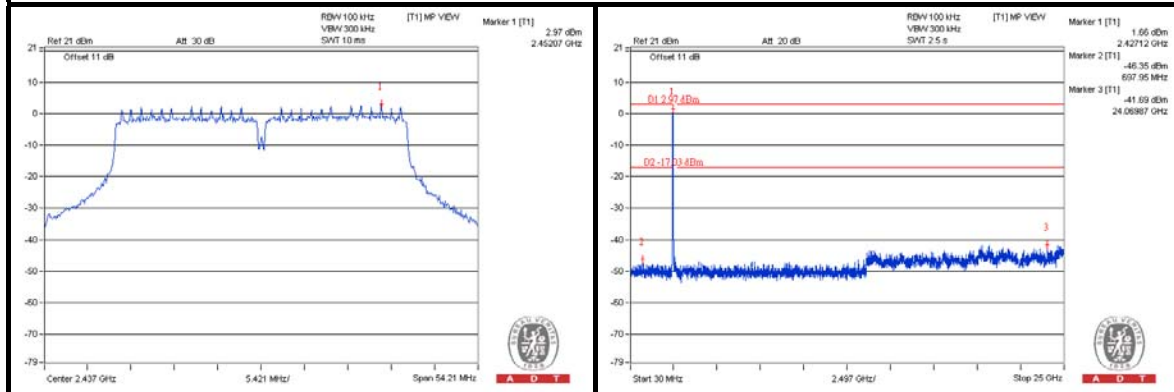
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# 802.11n (40MHz) CHAIN 0

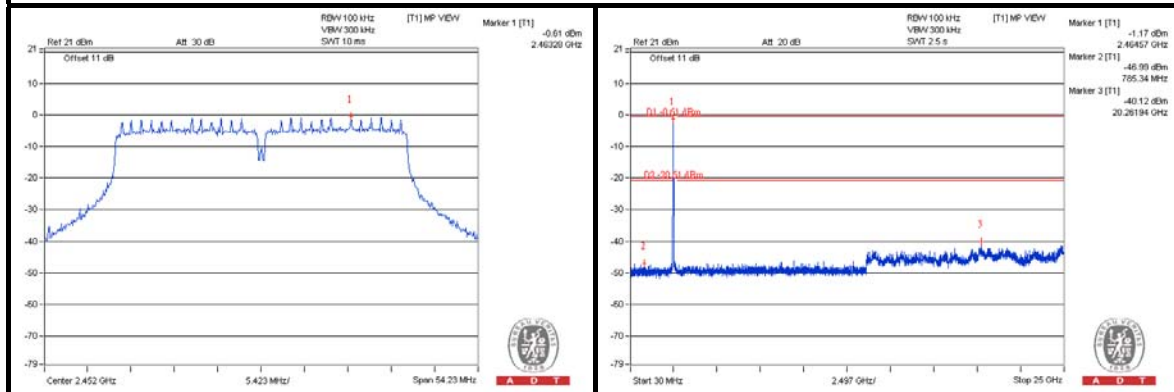
## CH 3



## CH 6



## CH 9

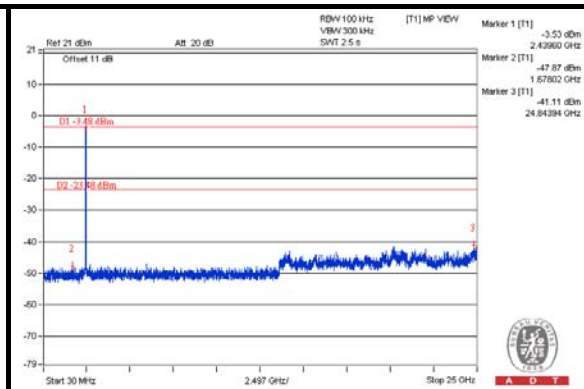
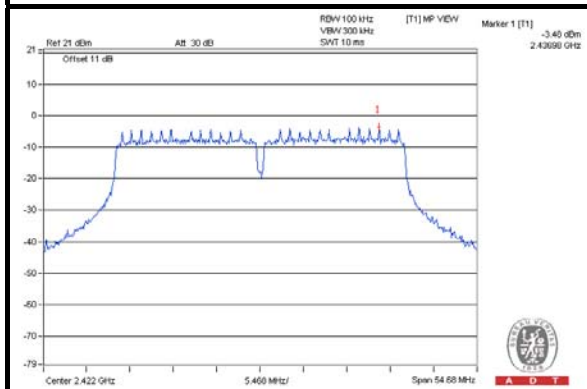




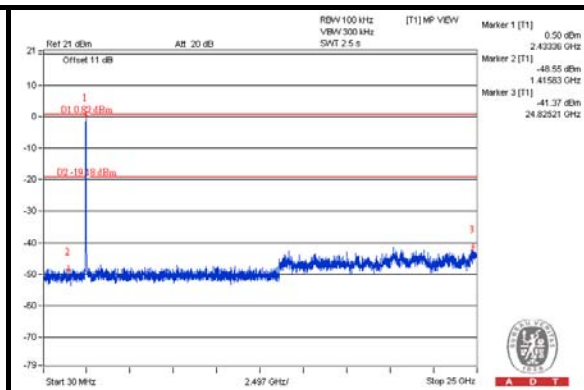
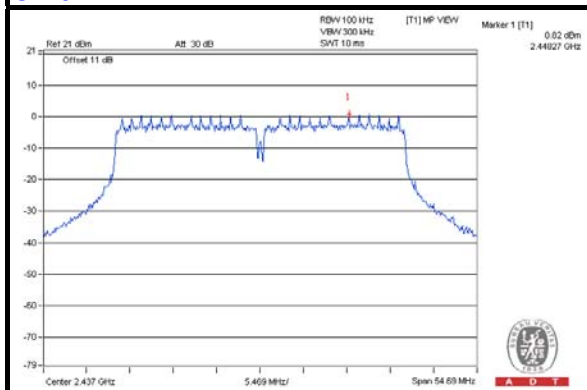
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### CHAIN 1

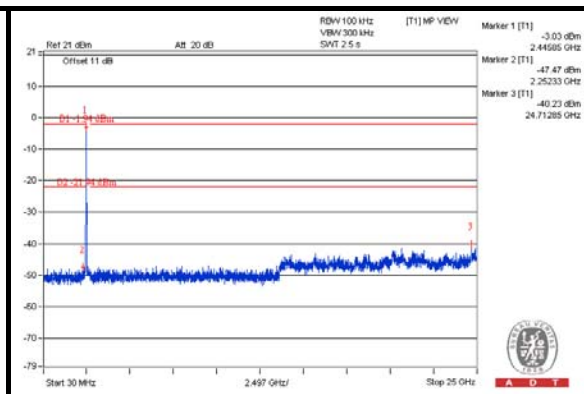
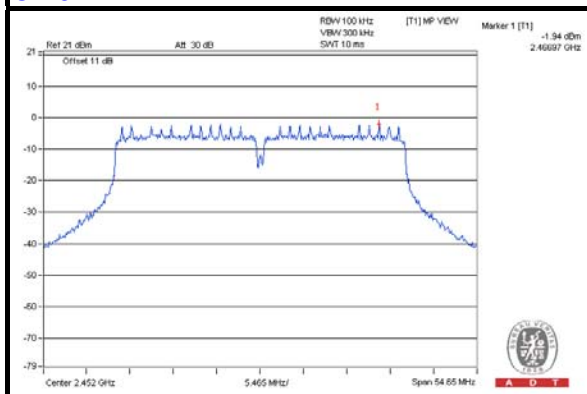
#### CH 3



#### CH 6



#### CH 9

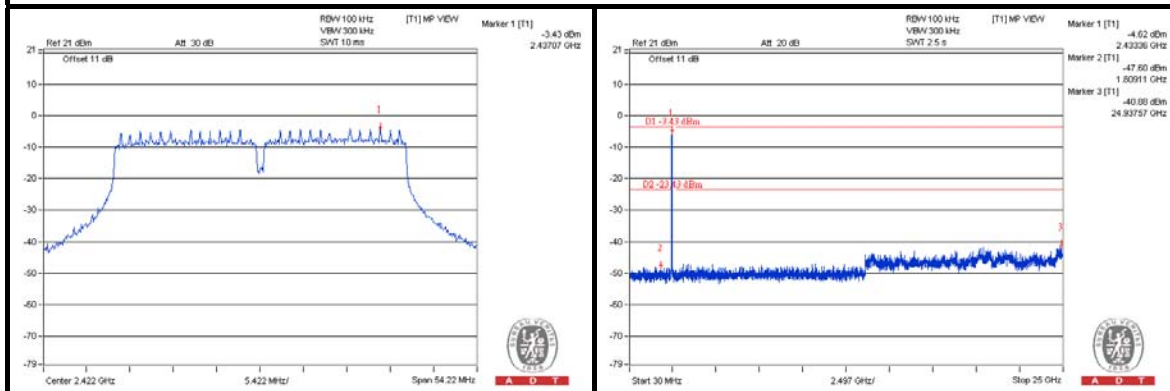




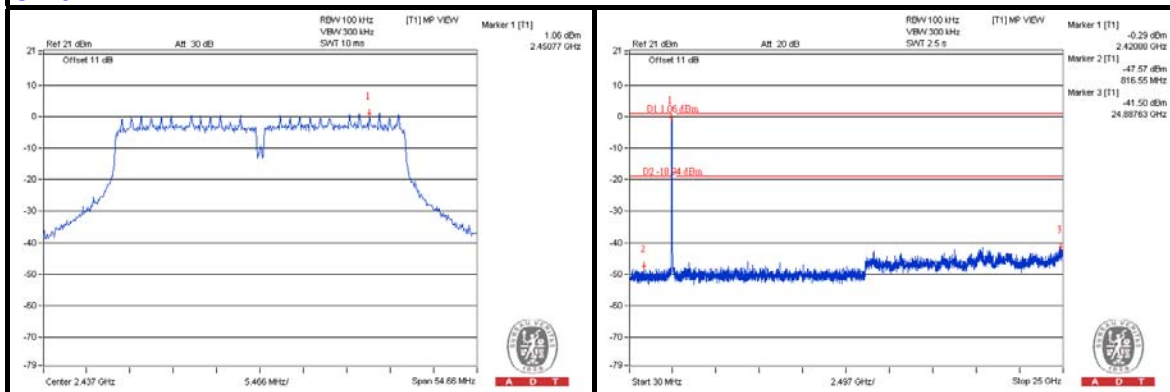
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### CHAIN 2

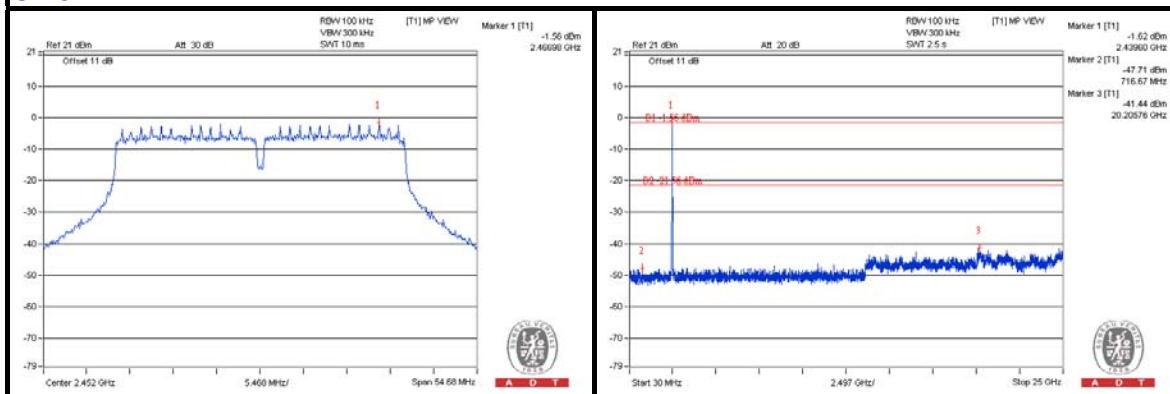
### CH 3



### CH 6



### CH 9





## 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 20dB below the highest level of the desired power:

FREQUENCIES (MHz)	FIELD STRENGTH (microvolts/meter)	MEASUREMENT DISTANCE (meters)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

**NOTE:**

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





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#### 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.



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### 5.1.7 TEST RESULTS

#### ABOVE 1GHz DATA :

##### 802.11a

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 149	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER	48Vdc	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	27deg. C, 66%RH	TESTED BY	Alan Wu

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	#5725.00	62.0 PK	90.6	-28.6	1.05 H	21	55.70	6.30
2	#5725.00	52.0 AV	80.6	-28.6	1.05 H	21	45.70	6.30
3	*5745.00	110.6 PK			1.00 H	17	70.40	40.20
4	*5745.00	100.6 AV			1.00 H	17	60.40	40.20
5	11490.00	58.3 PK	74.0	-15.7	1.00 H	69	38.90	19.40
6	11490.00	45.5 AV	54.0	-8.5	1.00 H	69	26.10	19.40

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5725.00	47.5 PK	76.1	-28.6	1.05 V	25	41.20	6.30
2	#5725.00	37.5 AV	66.1	-28.6	1.05 V	25	31.20	6.30
3	*5745.00	96.1 PK			1.19 V	285	55.90	40.20
4	*5745.00	86.1 AV			1.19 V	285	45.90	40.20
5	11490.00	57.4 PK	74.0	-16.6	1.00 V	174	38.00	19.40
6	11490.00	43.2 AV	54.0	-10.8	1.00 V	174	23.80	19.40

#### REMARKS:

- Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
- Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
- The other emission levels were very low against the limit.
- Margin value = Emission Level – Limit value
- " \* ": Fundamental frequency.
- The limit value is defined as per 15.247.
- "#":The radiated frequency is out the restricted band.



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 157	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER	48Vdc	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	27deg. C, 66%RH	TESTED BY	Alan Wu

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	*5785.00	110.2 PK			1.51 H	17	69.80	40.40
2	*5785.00	100.2 AV			1.51 H	17	59.80	40.40
3	11570.00	59.2 PK	74.0	-14.8	1.00 H	61	40.10	19.10
4	11570.00	45.8 AV	54.0	-8.2	1.00 H	61	26.70	19.10
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	*5785.00	96.8 PK			1.65 V	200	56.40	40.40
2	*5785.00	86.8 AV			1.65 V	200	46.40	40.40
3	11570.00	58.8 PK	74.0	-15.2	1.05 V	180	39.70	19.10
4	11570.00	44.2 AV	54.0	-9.8	1.05 V	180	25.10	19.10

**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)  
– Pre-Amplifier 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.



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 165	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER	48Vdc	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	27deg. C, 66%RH	TESTED BY	Martin Lee

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	*5825.00	110.0 PK			1.00 H	14	69.60	40.40
2	*5825.00	99.8 AV			1.00 H	14	59.40	40.40
3	#5850.00	58.9 PK	90.0	-31.1	1.00 H	11	52.30	6.60
4	#5850.00	48.7 AV	79.8	-31.1	1.00 H	11	42.10	6.60
5	11650.00	59.6 PK	74.0	-14.4	1.00 H	67	40.70	18.90
6	11650.00	45.3 AV	54.0	-8.7	1.00 H	67	26.40	18.90
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	*5825.00	96.5 PK			1.00 V	149	56.10	40.40
2	*5825.00	87.0 AV			1.00 V	149	46.60	40.40
3	#5850.00	45.4 PK	76.5	-31.1	1.00 V	149	38.80	6.60
4	#5850.00	35.9 AV	67.0	-31.1	1.00 V	149	29.30	6.60
5	11650.00	60.5 PK	74.0	-13.5	1.35 V	85	41.60	18.90
6	11650.00	46.1 AV	54.0	-7.9	1.35 V	85	27.20	18.90

**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) – Pre-Amplifier 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.
7. "#":The radiated frequency is out the restricted band.



A D T

802.11n (20MHz)

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 149	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER	48Vdc	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	27deg. C, 66%RH	TESTED BY	Martin Lee

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	#5725.00	64.3 PK	92.6	-28.3	1.00 H	261	58.00	6.30
2	#5725.00	54.5 AV	82.8	-28.3	1.00 H	261	48.20	6.30
3	*5745.00	112.6 PK			1.00 H	261	72.40	40.20
4	*5745.00	102.8 AV			1.00 H	261	62.60	40.20
5	11490.00	60.6 PK	74.0	-13.4	1.20 H	25	41.20	19.40
6	11490.00	46.5 AV	54.0	-7.5	1.20 H	25	27.10	19.40

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5725.00	49.5 PK	77.8	-28.3	1.14 V	285	43.20	6.30
2	#5725.00	39.7 AV	68.0	-28.3	1.14 V	285	33.40	6.30
3	*5745.00	97.8 PK			1.14 V	285	57.60	40.20
4	*5745.00	88.0 AV			1.14 V	285	47.80	40.20
5	11490.00	59.6 PK	74.0	-14.4	1.05 V	23	40.20	19.40
6	11490.00	46.0 AV	54.0	-8.0	1.05 V	23	26.60	19.40

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)  
– Pre-Amplifier 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.
7. "#":The radiated frequency is out the restricted band.



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 157	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER	48Vdc	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	27deg. C, 66%RH	TESTED BY	Martin Lee

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	*5785.00	111.2 PK			1.28 H	340	70.80	40.40
2	*5785.00	101.2 AV			1.28 H	340	60.80	40.40
3	11570.00	58.3 PK	74.0	-15.7	1.70 H	260	39.20	19.10
4	11570.00	44.8 AV	54.0	-9.2	1.69 H	258	25.70	19.10
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	*5785.00	97.9 PK			1.02 V	216	57.50	40.40
2	*5785.00	87.9 AV			1.02 V	216	47.50	40.40
3	11570.00	59.3 PK	74.0	-14.7	1.67 V	259	40.20	19.10
4	11570.00	45.5 AV	54.0	-8.5	1.67 V	259	26.40	19.10

**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) – Pre-Amplifier 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.



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 165	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER	48Vdc	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	27deg. C, 66%RH	TESTED BY	Martin Lee

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	*5825.00	110.3 PK			1.05 H	263	69.90	40.40
2	*5825.00	100.2 AV			1.05 H	263	59.80	40.40
3	#5850.00	67.8 PK	90.3	-22.5	1.05 H	263	61.20	6.60
4	#5850.00	57.7 AV	80.2	-22.5	1.05 H	263	51.10	6.60
5	11650.00	59.8 PK	74.0	-14.2	1.32 H	25	40.90	18.90
6	11650.00	46.5 AV	54.0	-7.5	1.32 H	25	27.60	18.90
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	*5825.00	96.2 PK			1.00 V	114	55.80	40.40
2	*5825.00	86.6 AV			1.00 V	114	46.20	40.40
3	#5850.00	53.7 PK	76.2	-22.5	1.00 V	114	47.10	6.60
4	#5850.00	44.1 AV	66.6	-22.5	1.00 V	114	37.50	6.60
5	11650.00	59.1 PK	74.0	-14.9	1.47 V	25	40.20	18.90
6	11650.00	45.4 AV	54.0	-8.6	1.47 V	25	26.50	18.90

**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) – Pre-Amplifier 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.
7. "#":The radiated frequency is out the restricted band.



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802.11n (40MHz)

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 151	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER	48Vdc	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	27deg. C, 66%RH	TESTED BY	Martin Lee

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	#5725.00	64.7 PK	87.6	-22.9	1.25 H	90	58.40	6.30
2	#5725.00	54.7 AV	77.6	-22.9	1.25 H	90	48.40	6.30
3	*5755.00	107.6 PK			1.25 H	83	67.40	40.20
4	*5755.00	97.6 AV			1.25 H	83	57.40	40.20
5	11510.00	58.6 PK	74.0	-15.4	1.40 H	30	39.30	19.30
6	11510.00	44.3 AV	54.0	-9.7	1.40 H	30	25.00	19.30

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	#5725.00	56.9 PK	79.8	-22.9	1.25 V	90	50.60	6.30
2	#5725.00	46.9 AV	69.8	-22.9	1.25 V	90	40.60	6.30
3	*5755.00	99.8 PK			1.93 V	120	59.60	40.20
4	*5755.00	89.8 AV			1.93 V	120	49.60	40.20
5	11510.00	57.6 PK	74.0	-16.4	1.10 V	310	38.30	19.30
6	11510.00	44.6 AV	54.0	-9.4	1.10 V	301	25.30	19.30

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) – Pre-Amplifier 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.
7. "#":The radiated frequency is out the restricted band.





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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 159	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER	48Vdc	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	27deg. C, 66%RH	TESTED BY	Martin Lee

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	*5795.00	106.5 PK			1.65 H	110	66.10	40.40
2	*5795.00	96.5 AV			1.65 H	110	56.10	40.40
3	#5850.00	63.4 PK	86.5	-23.1	1.70 H	110	56.80	6.60
4	#5850.00	53.4 AV	76.5	-23.1	1.70 H	110	46.80	6.60
5	11590.00	58.2 PK	74.0	-15.8	1.02 H	120	39.20	19.00
6	11590.00	45.9 AV	54.0	-8.1	1.02 H	120	26.90	19.00
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	*5795.00	98.4 PK			1.90 V	122	58.00	40.40
2	*5795.00	88.4 AV			1.90 V	122	48.00	40.40
3	#5850.00	55.3 PK	78.4	-23.1	1.70 V	110	48.70	6.60
4	#5850.00	45.3 AV	68.4	-23.1	1.70 V	110	38.70	6.60
5	11590.00	58.1 PK	74.0	-15.9	1.30 V	30	39.10	19.00
6	11590.00	45.9 AV	54.0	-8.1	1.30 V	30	26.90	19.00

**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) – Pre-Amplifier 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.
7. "#":The radiated frequency is out the restricted band.



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**BELOW 1GHz WORST-CASE DATA : 802.11n (20MHz)**

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 149	FREQUENCY RANGE	Below 1000MHz
INPUT POWER	48Vdc	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	27deg. C, 66%RH	TESTED BY	Martin Lee

**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	119.16	40.8 QP	43.5	-2.7	1.55 H	263	57.40	-16.60
2	128.86	39.4 QP	43.5	-4.1	1.49 H	257	55.20	-15.80
3	173.49	40.0 QP	43.5	-3.5	1.49 H	261	54.90	-14.90
4	375.29	40.4 QP	46.0	-5.6	1.00 H	225	51.80	-11.40
5	625.60	38.6 QP	46.0	-7.4	1.75 H	30	45.20	-6.60
6	749.79	32.8 QP	46.0	-13.2	2.25 H	30	37.10	-4.30
7	901.14	34.5 QP	46.0	-11.5	1.49 H	321	36.50	-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	41.54	35.9 QP	40.0	-4.1	1.85 V	7	51.10	-15.20
2	121.10	38.9 QP	43.5	-4.6	1.00 V	7	55.40	-16.50
3	187.07	34.5 QP	43.5	-9.0	1.25 V	200	50.50	-16.00
4	375.29	35.8 QP	46.0	-10.2	1.00 V	88	47.20	-11.40
5	625.60	34.0 QP	46.0	-12.0	1.00 V	268	40.60	-6.60
6	901.14	35.2 QP	46.0	-10.8	2.00 V	227	37.20	-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) – Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value



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## 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

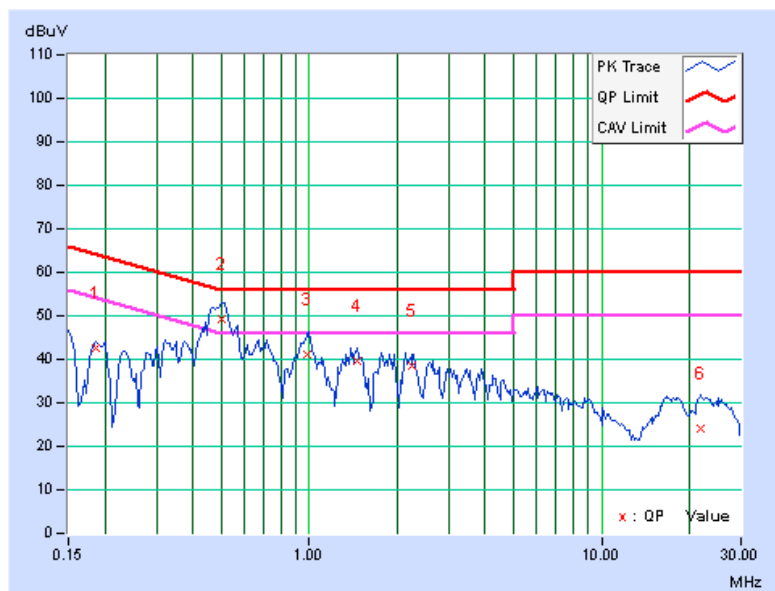
CONDUCTED WORST-CASE DATA : 802.11n (20MHz)

PHASE	Line 1	6dB BANDWIDTH	9kHz
-------	--------	---------------	------

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.18516	0.16	42.28	39.38	42.44	39.54	64.25	54.25	-21.81	-14.71
2	0.50156	0.23	49.04	40.24	49.27	40.47	56.00	46.00	-6.73	-5.53
3	0.97813	0.25	40.79	34.71	41.04	34.96	56.00	46.00	-14.96	-11.04
4	1.45703	0.27	39.52	33.68	39.79	33.95	56.00	46.00	-16.21	-12.05
5	2.23438	0.30	38.12	32.66	38.42	32.96	56.00	46.00	-17.58	-13.04
6	21.81250	1.32	22.78	14.85	24.10	16.17	60.00	50.00	-35.90	-33.83

**REMARKS:**

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

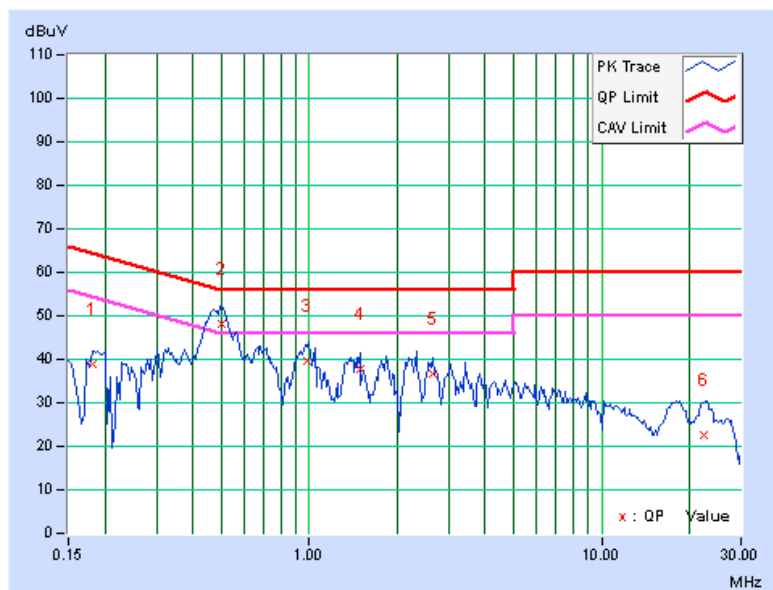


PHASE	Line 2	6dB BANDWIDTH	9kHz
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No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.18125	0.17	38.63	31.86	38.80	32.03	64.43	54.43	-25.63	-22.40
2	0.50156	0.24	47.80	38.80	48.04	39.04	56.00	46.00	-7.96	-6.96
3	0.98203	0.25	39.50	33.07	39.75	33.32	56.00	46.00	-16.25	-12.68
4	1.48828	0.26	37.59	31.38	37.85	31.64	56.00	46.00	-18.15	-14.36
5	2.64063	0.31	36.24	30.84	36.55	31.15	56.00	46.00	-19.45	-14.85
6	22.31641	1.01	21.69	14.06	22.70	15.07	60.00	50.00	-37.30	-34.93

**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





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## **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	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)			MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2		
149	5745	16.37	16.40	16.39	0.5	PASS
157	5785	16.39	16.40	16.40	0.5	PASS
165	5825	16.38	16.40	16.41	0.5	PASS

#### 802.11n (20MHz)

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)			MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2		
149	5745	17.61	17.59	17.58	0.5	PASS
157	5785	17.59	17.59	17.57	0.5	PASS
165	5825	17.62	17.62	17.60	0.5	PASS

#### 802.11n (40MHz)

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)			MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2		
151	5755	36.47	36.38	36.44	0.5	PASS
159	5795	36.47	36.42	36.46	0.5	PASS



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## 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 v01r02 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

#### FOR PEAK POWER

##### 802.11a

CHAN.	CHAN. FREQ. (MHz)	PEAK POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
149	5745	24.56	23.88	24.08	785.961	28.95	29	PASS
157	5785	24.21	24.31	23.57	760.917	28.81	29	PASS
165	5825	24.00	24.90	23.51	784.607	28.95	29	PASS

**NOTE:** Directional gain = 7dBi > 6dBi , so the conducted power limit shall be reduced to 30-(7-6) = 29dBm.

##### 802.11n (20MHz)

CHAN.	CHAN. FREQ. (MHz)	PEAK POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
149	5745	24.83	23.77	23.97	<b>791.780</b>	28.99	29	PASS
157	5785	24.41	24.06	23.98	780.776	28.93	29	PASS
165	5825	24.73	23.56	23.95	772.466	28.88	29	PASS

**NOTE:** Directional gain = 7dBi > 6dBi , so the conducted power limit shall be reduced to 30-(7-6) = 29dBm.

##### 802.11n (40MHz)

CHAN.	CHAN. FREQ. (MHz)	PEAK POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
151	5755	24.01	23.89	24.65	788.417	28.97	29	PASS
159	5795	24.21	24.32	23.41	753.309	28.77	29	PASS

**NOTE:** Directional gain = 7dBi > 6dBi , so the conducted power limit shall be reduced to 30-(7-6) = 29dBm.



**FOR AVERAGE POWER**

**802.11a**

CHANNEL	FREQUENCY (MHz)	AVG. POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)
		CHAIN 0	CHAIN 1	CHAIN 2		
149	5745	16.75	15.48	15.59	118.857	20.75
157	5785	15.84	15.88	15.37	111.532	20.47
165	5825	15.77	15.38	14.82	102.610	20.11

**802.11n (20MHz)**

CHANNEL	FREQUENCY (MHz)	AVG. POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)
		CHAIN 0	CHAIN 1	CHAIN 2		
149	5745	16.95	16.73	16.59	142.247	21.53
157	5785	15.01	15.44	15.26	100.265	20.01
165	5825	15.84	15.57	14.75	104.283	20.18

**802.11n (40MHz)**

CHANNEL	FREQUENCY (MHz)	AVG. POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)
		CHAIN 0	CHAIN 1	CHAIN 2		
151	5755	15.54	15.06	15.26	101.447	20.06
159	5795	15.55	15.23	15.01	100.931	20.04



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## **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.



### 5.5.7 TEST RESULTS

#### 802.11a

TX chain	Channel	Freq. (MHz)	PSD (dBm/3kHz)	10 log (N=3) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	149	5745	-11.15	4.77	-6.38	2.23	PASS
	157	5785	-11.76	4.77	-6.99	2.23	PASS
	165	5825	-13.66	4.77	-8.89	2.23	PASS
1	149	5745	-11.42	4.77	-6.65	2.23	PASS
	157	5785	-12.91	4.77	-8.14	2.23	PASS
	165	5825	-12.65	4.77	-7.88	2.23	PASS
2	149	5745	-11.06	4.77	-6.29	2.23	PASS
	157	5785	-11.84	4.77	-7.07	2.23	PASS
	165	5825	-13.98	4.77	-9.21	2.23	PASS

**NOTE:** Directional gain = 7dBi + 10log(3) = 11.77dBi > 6dBi , so the power density limit shall be reduced to 8-(11.77-6) = 2.23dBm.

#### 802.11n (20MHz)

TX chain	Channel	Freq. (MHz)	PSD (dBm/3kHz)	10 log (N=3) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	149	5745	-11.02	4.77	-6.25	7	PASS
	157	5785	-11.82	4.77	-7.05	7	PASS
	165	5825	-14.16	4.77	-9.39	7	PASS
1	149	5745	-11.19	4.77	-6.42	7	PASS
	157	5785	-12.82	4.77	-8.05	7	PASS
	165	5825	-14.10	4.77	-9.33	7	PASS
2	149	5745	-12.19	4.77	-7.42	7	PASS
	157	5785	-13.33	4.77	-8.56	7	PASS
	165	5825	-12.91	4.77	-8.14	7	PASS

**NOTE:** 802.11n (20MHz)(MCS16~23 / Nss=3)

Directional gain = 7dBi + 10log(3/3) = 7dBi > 6dBi , so the power density limit shall be reduced to 8-(7-6) = 7dBm.



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### 802.11n (40MHz)

TX chain	Channel	Freq. (MHz)	PSD (dBm/3kHz)	10 log (N=3) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	151	5755	-14.54	4.77	-9.77	7	PASS
	159	5795	-16.32	4.77	-11.55	7	PASS
1	151	5755	-14.16	4.77	-9.39	7	PASS
	159	5795	-15.19	4.77	-10.42	7	PASS
2	151	5755	-15.24	4.77	-10.47	7	PASS
	159	5795	-15.07	4.77	-10.30	7	PASS

**NOTE:** 802.11n (40MHz)(MCS16~23 / Nss=3)

Directional gain = 7dBi + 10log(3/3) = 7dBi > 6dBi , so the power density limit shall be reduced to 8-(7-6) = 7dBm.



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## **5.6 CONDUCTED OUT OF BAND EMISSION MEASUREMENT**

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

Below  $-20\text{dB}$  of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

### **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**

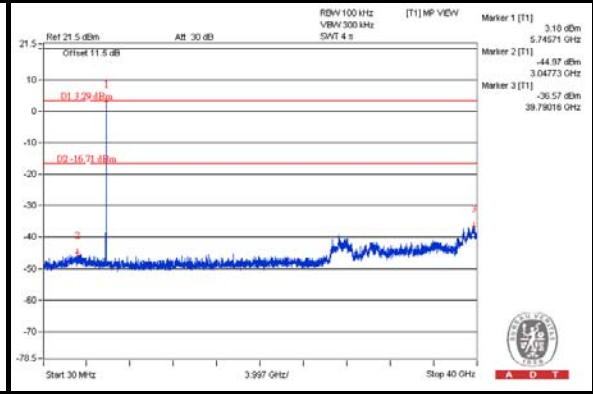
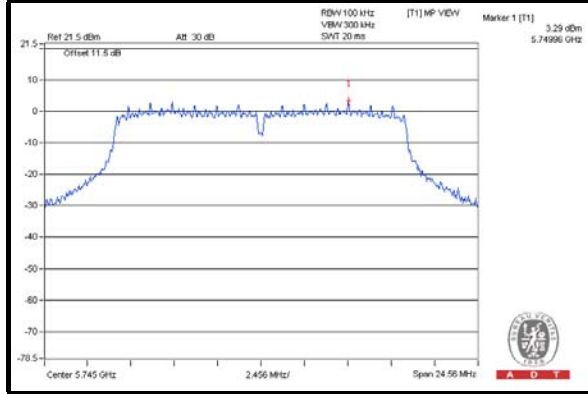
The conducted emission test is performed on each TX port of operating mode without summing or adding  $10\log(N)$  since the limit is relative emission limit.

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

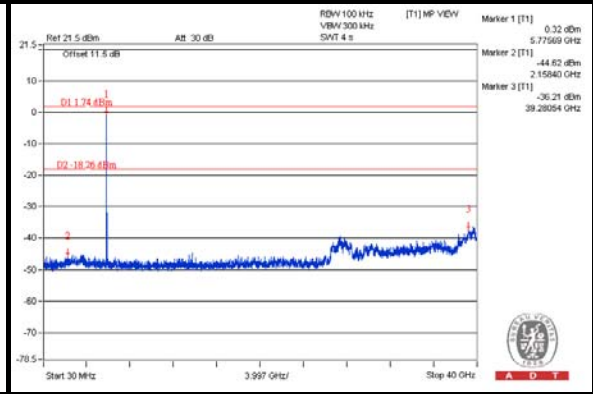
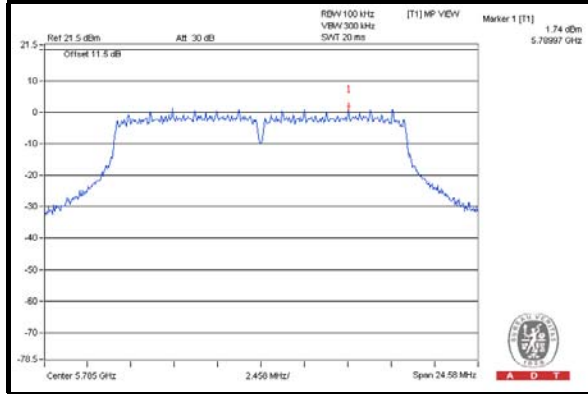


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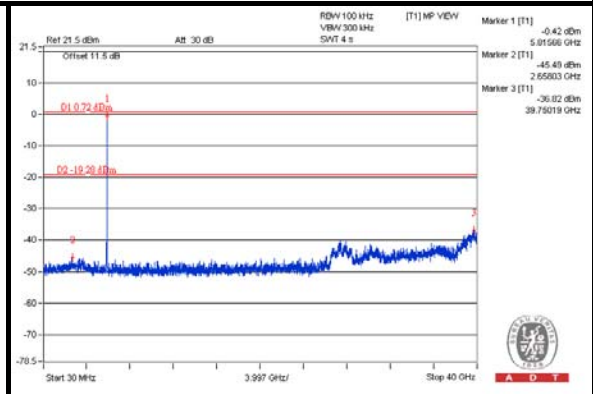
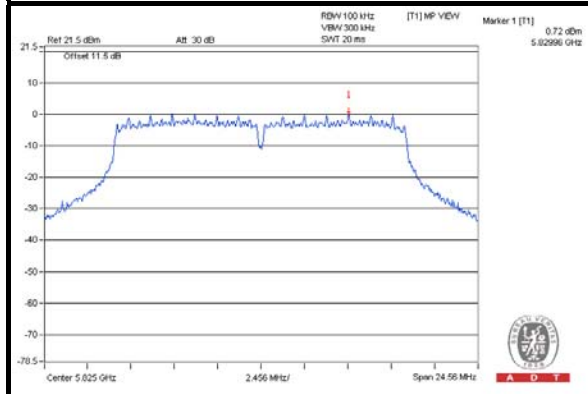
802.11a  
CHAIN 0  
CH 149



CH 157



CH 165

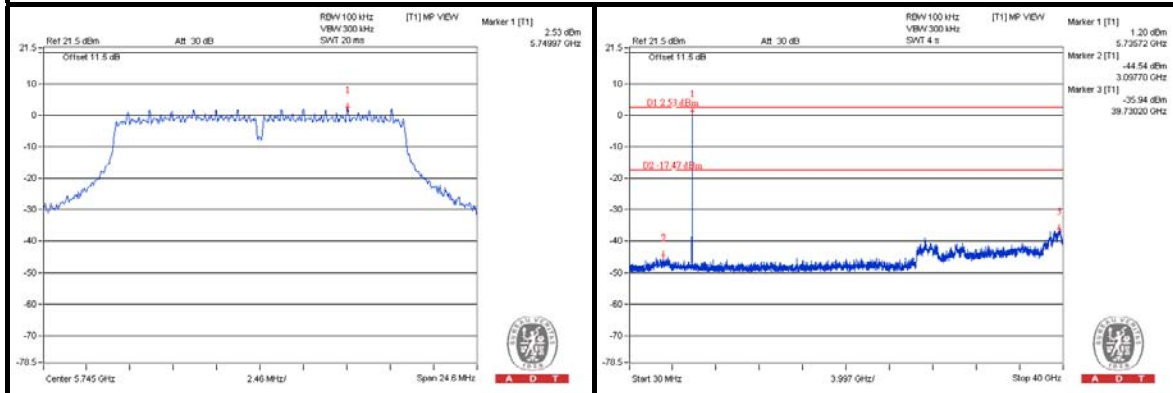




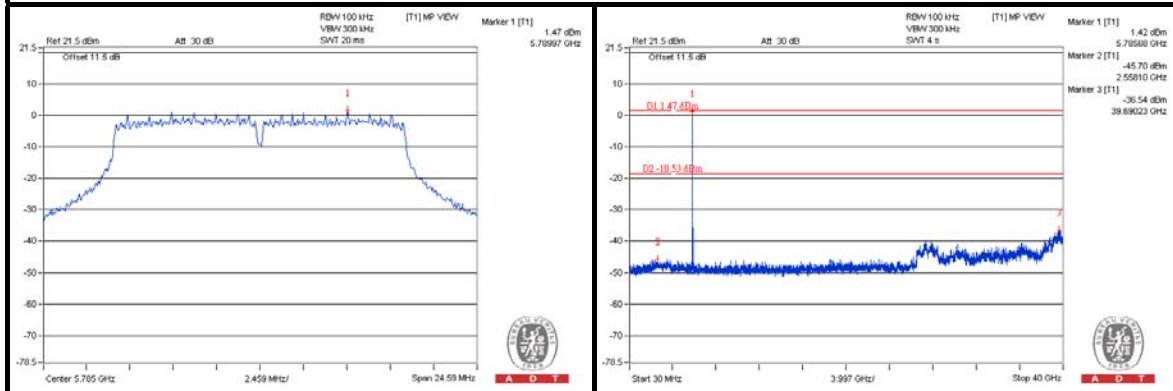
A D T

### CHAIN 1

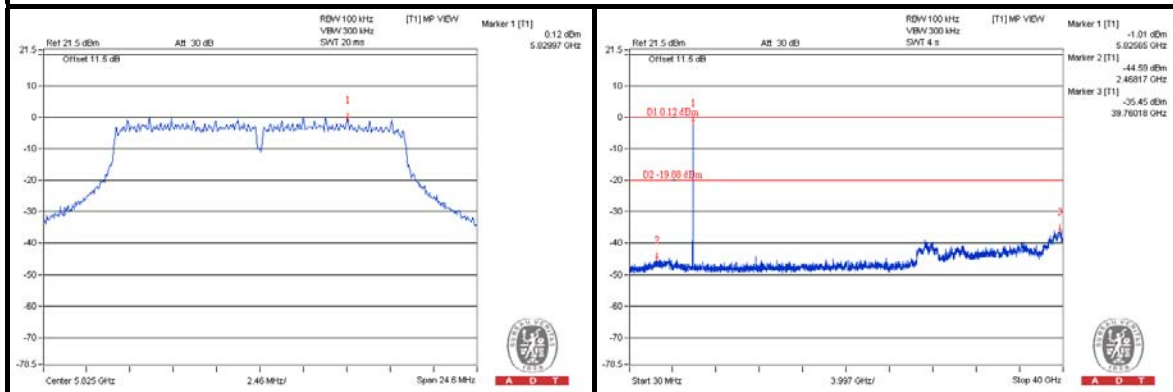
#### CH 149



#### CH 157



#### CH 165



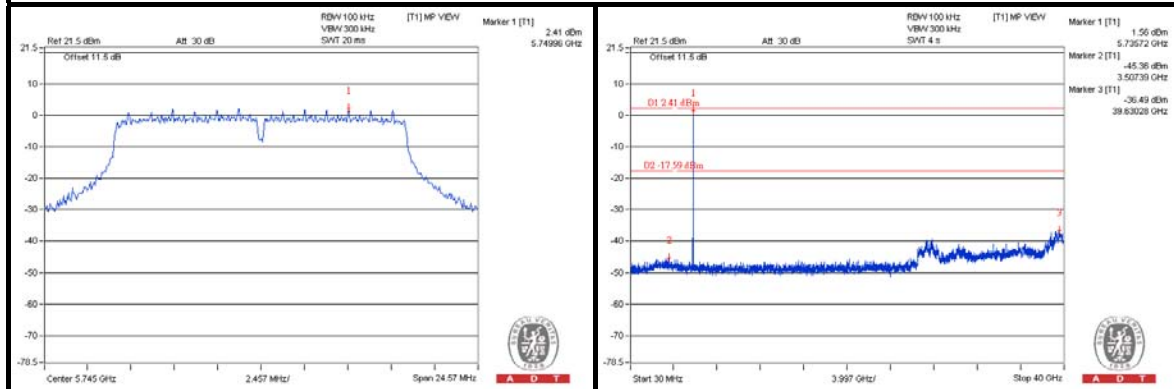




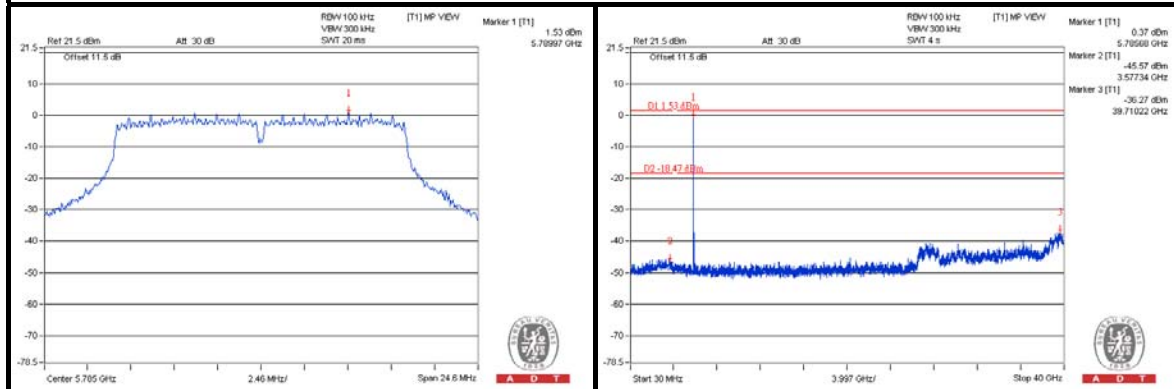
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## CHAIN 2

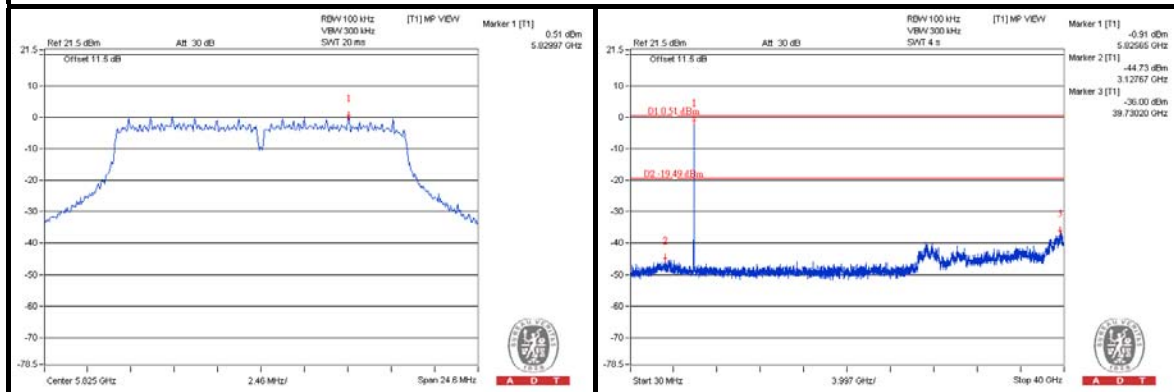
### CH 149



### CH 157



### CH 165

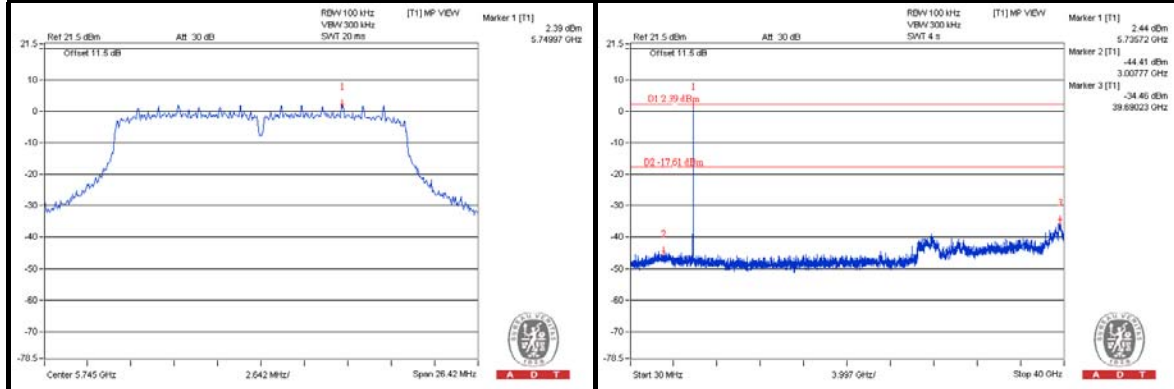




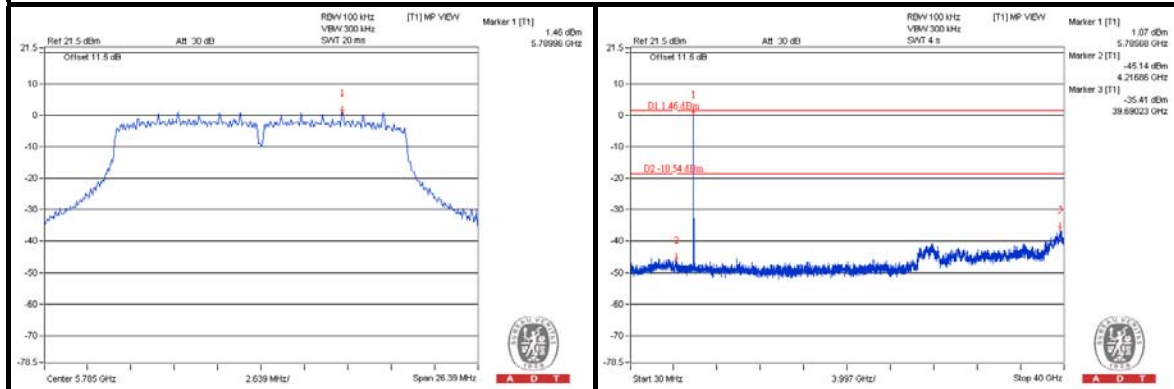
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# 802.11n (20MHz) CHAIN 0

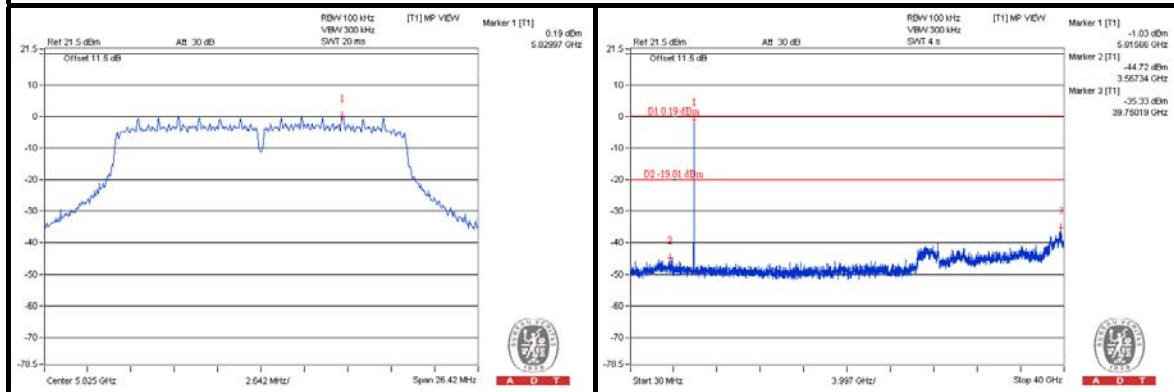
## CH 149



## CH 157



## CH 165

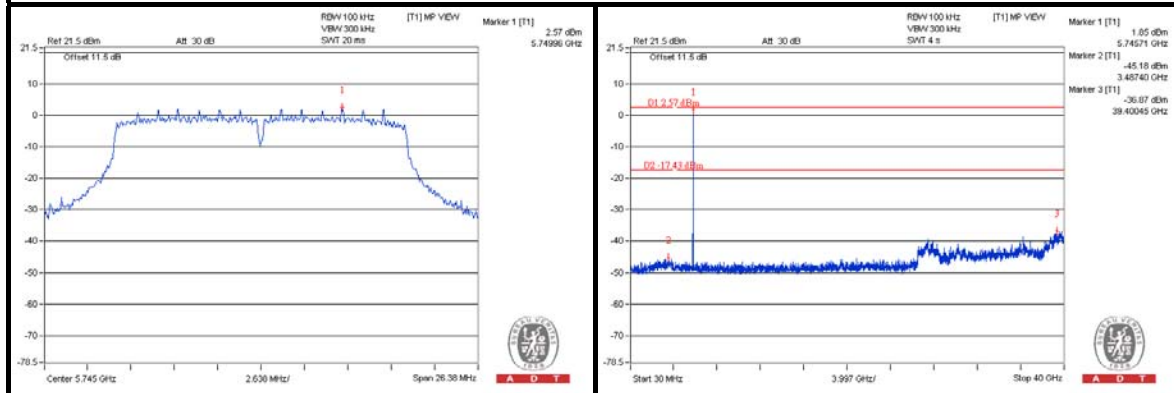




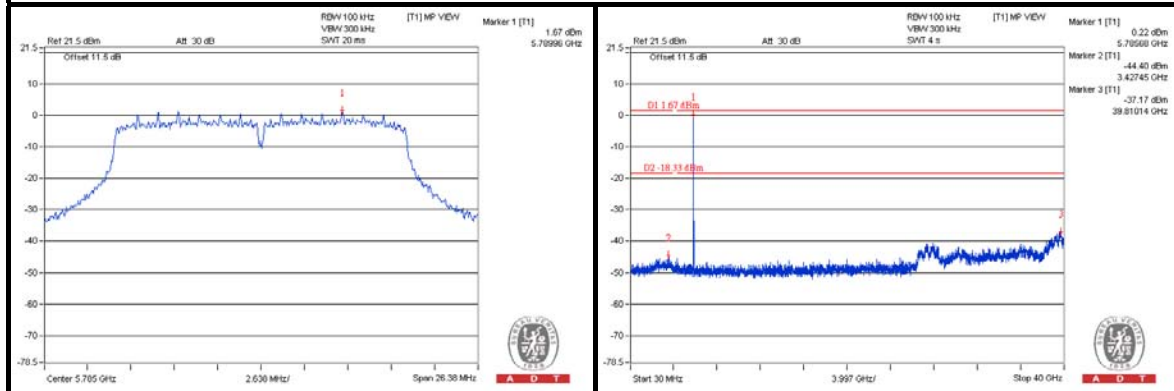
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### CHAIN 1

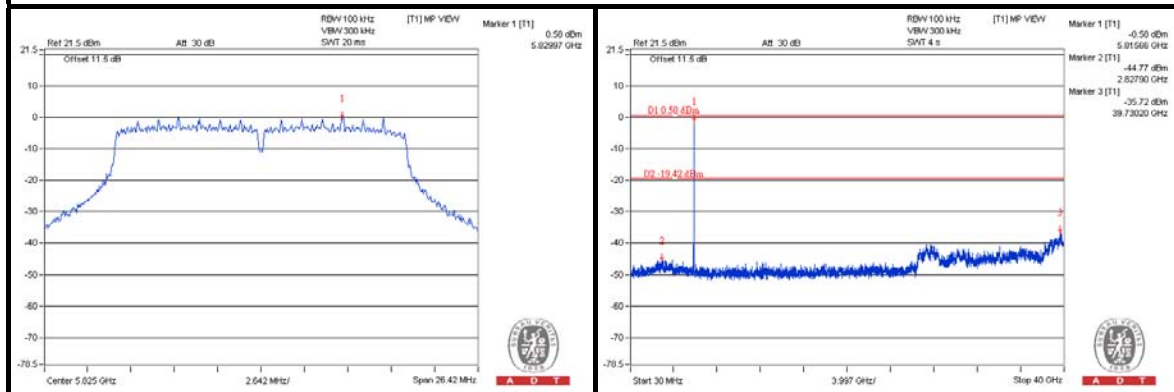
#### CH 149



#### CH 157



#### CH 165

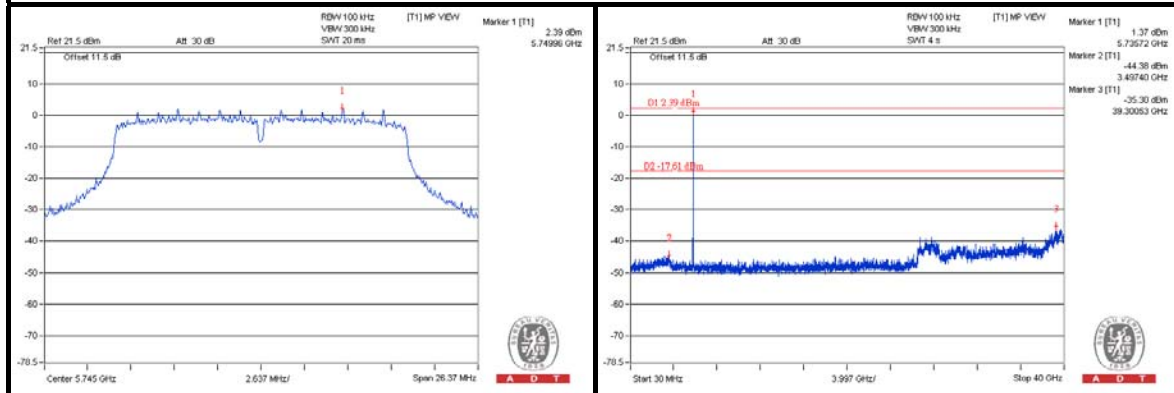




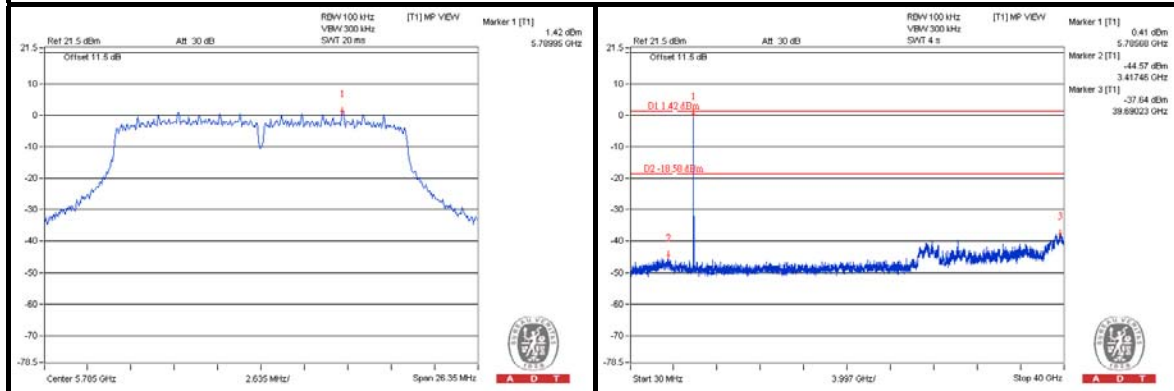
A D T

## CHAIN 2

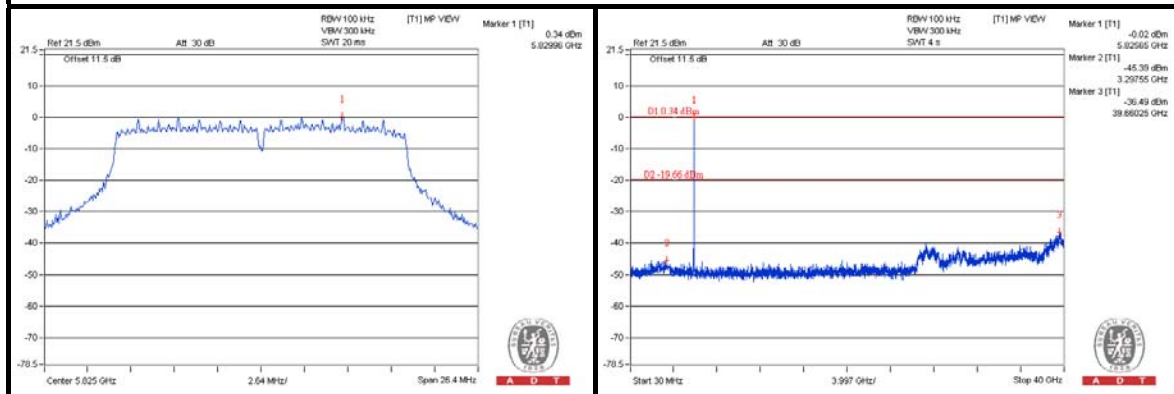
### CH 149



### CH 157



### CH 165

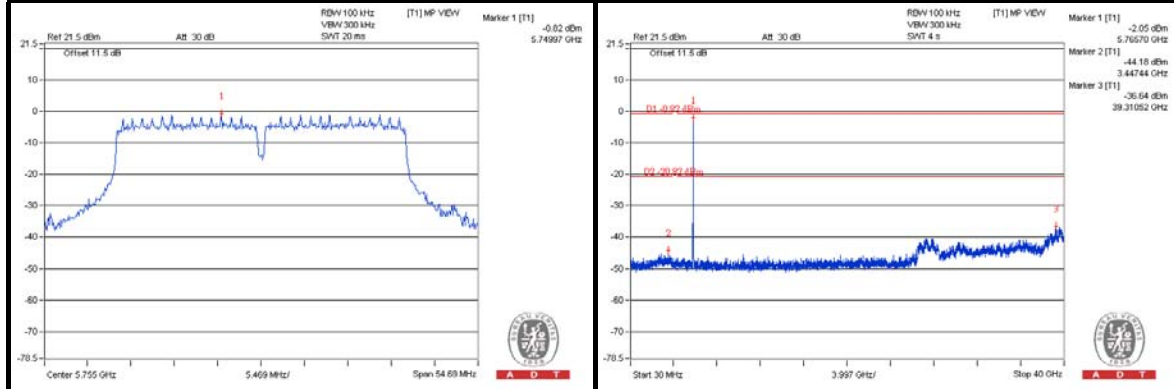




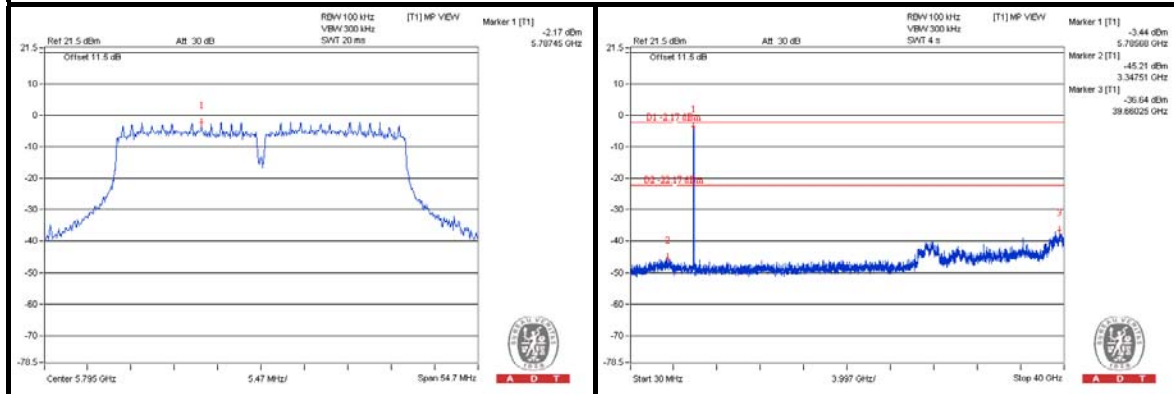
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# 802.11n (40MHz) CHAIN 0

## CH 151



## CH 159

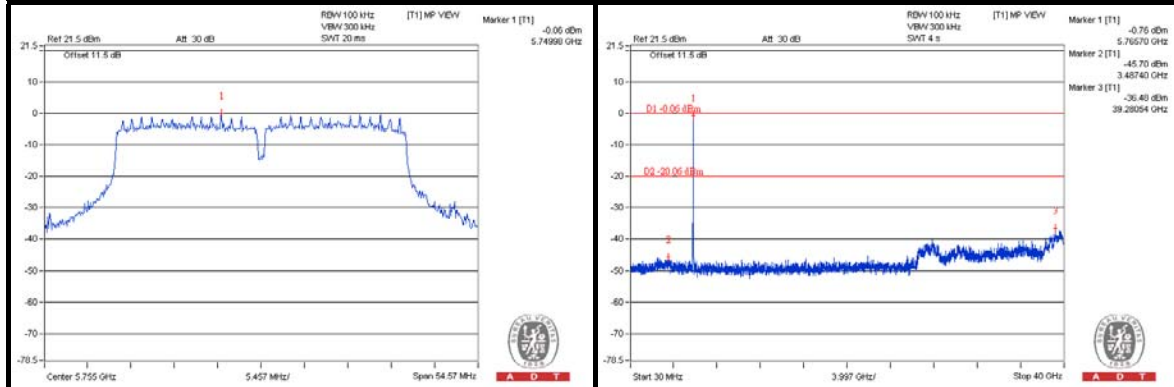




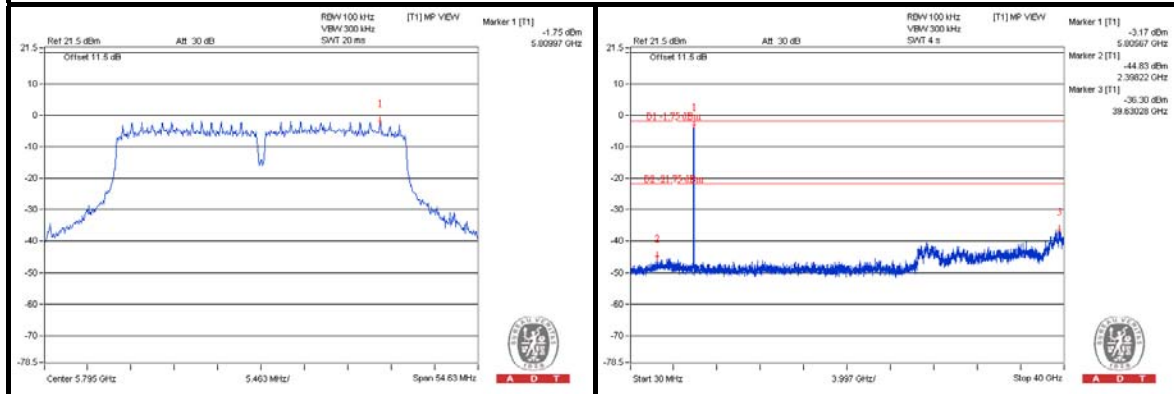
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### CHAIN 1

#### CH 151



#### CH 159

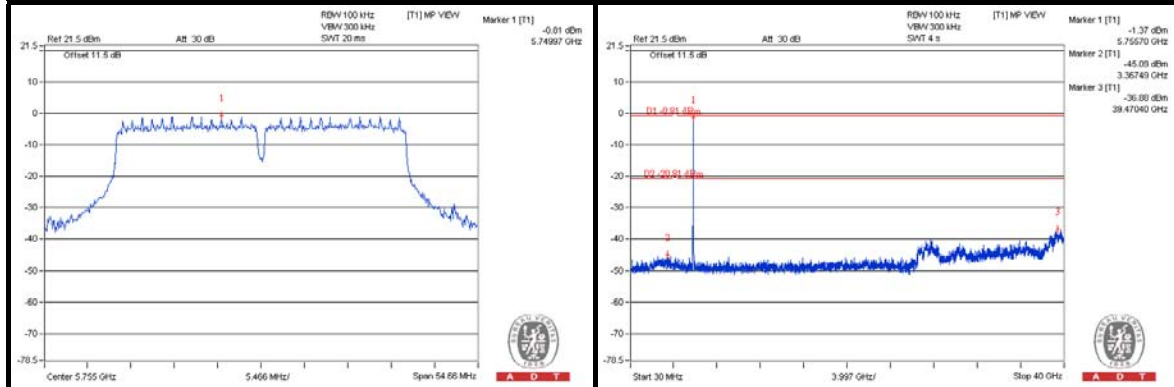




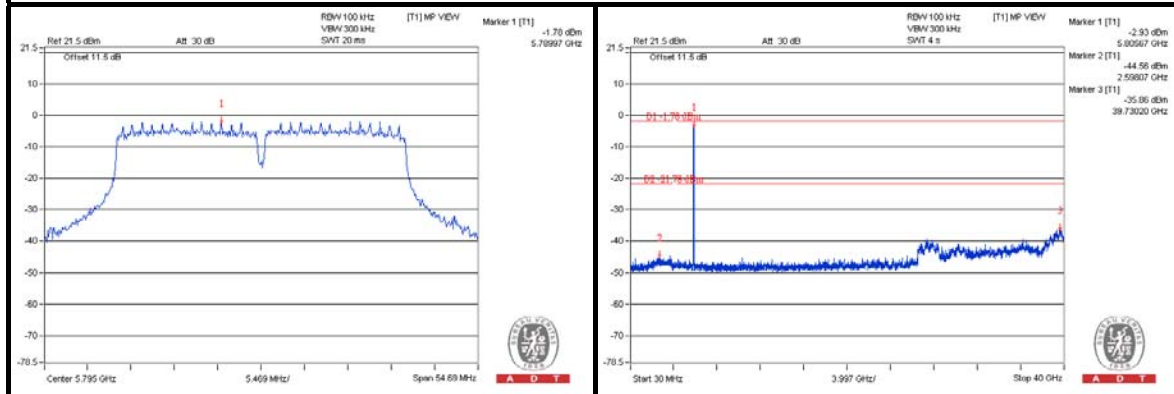
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## CHAIN 2

### CH 151



### CH 159





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## 6. PHOTOGRAPHS OF THE TEST CONFIGURATION

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





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## 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.bureauveritas-adt.com](http://www.bureauveritas-adt.com)

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



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**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.

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