



# FCC TEST REPORT (15.247)

**REPORT NO.:** RF120604E06

**MODEL NO.:** DVW324

**FCC ID:** XCNDVW324

**RECEIVED:** June 04, 2012

**TESTED:** June 08 to July 02, 2012

**ISSUED:** July 11, 2012

**APPLICANT:** Ubee Interactive Corp.

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

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## Table of Contents

RELEASE CONTROL RECORD .....	5
1. CERTIFICATION .....	6
2. SUMMARY OF TEST RESULTS .....	7
2.1 MEASUREMENT UNCERTAINTY .....	8
3. GENERAL INFORMATION .....	9
3.1 GENERAL DESCRIPTION OF EUT(WLAN).....	9
3.2 DESCRIPTION OF TEST MODES .....	11
3.2.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL .....	12
3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS .....	15
3.4 DESCRIPTION OF SUPPORT UNITS.....	16
3.5 CONFIGURATION OF SYSTEM UNDER TEST .....	19
4. TEST TYPES AND RESULTS (For 2.4GHz, 2412 ~ 2462MHz Band).....	21
4.1 CONDUCTED EMISSION MEASUREMENT .....	21
4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT .....	21
4.1.2 TEST INSTRUMENTS.....	21
4.1.3 TEST PROCEDURES .....	22
4.1.4 DEVIATION FROM TEST STANDARD .....	22
4.1.5 TEST SETUP .....	23
4.1.6 EUT OPERATING CONDITIONS .....	23
4.1.7 TEST RESULTS .....	24
4.2 RADIATED EMISSION AND BANDEDGE MEASUREMENT .....	26
4.2.1 LIMITS OF RADIATED EMISSION AND BANDEDGE MEASUREMENT .....	26
4.2.2 TEST INSTRUMENTS.....	27
4.2.3 TEST PROCEDURES .....	29
4.2.4 DEVIATION FROM TEST STANDARD .....	29
4.2.5 TEST SETUP .....	30
4.2.6 EUT OPERATING CONDITIONS .....	30
4.2.7 TEST RESULTS .....	31
4.3 6dB BANDWIDTH MEASUREMENT .....	44
4.3.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT .....	44
4.3.2 TEST INSTRUMENTS.....	44
4.3.3 TEST PROCEDURE.....	44
4.3.4 DEVIATION FROM TEST STANDARD .....	44
4.3.5 TEST SETUP .....	44
4.3.6 EUT OPERATING CONDITIONS .....	44
4.3.7 TEST RESULTS .....	45
4.4 CONDUCTED OUTPUT POWER MEASUREMENT .....	46
4.4.1 LIMITS OF MAXIMUM PEAK OUTPUT POWER MEASUREMENT .....	46
4.4.2 INSTRUMENTS.....	46
4.4.3 TEST PROCEDURES .....	46



A D T

4.4.4	DEVIATION FROM TEST STANDARD .....	46
4.4.5	TEST SETUP .....	46
4.4.6	EUT OPERATING CONDITIONS .....	46
4.4.7	TEST RESULTS .....	47
4.5	POWER SPECTRAL DENSITY MEASUREMENT .....	48
4.5.1	LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT .....	48
4.5.2	TEST INSTRUMENTS.....	48
4.5.3	TEST PROCEDURE.....	48
4.5.4	DEVIATION FROM TEST STANDARD .....	48
4.5.5	TEST SETUP .....	48
4.5.6	EUT OPERATING CONDITION.....	48
4.5.7	TEST RESULTS .....	49
4.6	CONDUCTED OUT-BAND EMISSION MEASUREMENT .....	50
4.6.1	LIMITS OF CONDUCTED OUT-BAND EMISSION MEASUREMENT.....	50
4.6.2	TEST INSTRUMENTS.....	50
4.6.3	TEST PROCEDURE.....	50
4.6.4	DEVIATION FROM TEST STANDARD .....	51
4.6.5	TEST SETUP .....	51
4.6.6	EUT OPERATING CONDITION.....	51
4.6.7	TEST RESULTS .....	51
5.	TEST TYPES AND RESULTS (For 5Ghz, 5725~5850MHz Band) .....	56
5.1	CONDUCTED EMISSION MEASUREMENT .....	56
5.1.1	LIMITS OF CONDUCTED EMISSION MEASUREMENT .....	56
5.1.2	TEST INSTRUMENTS.....	56
5.1.3	TEST PROCEDURES .....	57
5.1.4	DEVIATION FROM TEST STANDARD .....	57
5.1.5	TEST SETUP .....	58
5.1.6	EUT OPERATING CONDITIONS .....	58
5.1.7	TEST RESULTS .....	59
5.2	RADIATED AND BANDEDGE EMISSION MEASUREMENT .....	61
5.2.1	LIMITS OF RADIATED AND BANDEDGE EMISSION MEASUREMENT.....	61
5.2.2	TEST INSTRUMENTS.....	62
5.2.3	TEST PROCEDURES .....	64
5.2.4	DEVIATION FROM TEST STANDARD .....	64
5.2.5	TEST SETUP .....	65
5.2.6	EUT OPERATING CONDITIONS .....	65
5.2.7	TEST RESULTS .....	66
5.3	6dB BANDWIDTH MEASUREMENT .....	75
5.3.1	LIMITS OF 6dB BANDWIDTH MEASUREMENT .....	75
5.3.2	TEST INSTRUMENTS.....	75
5.3.3	TEST PROCEDURE.....	75
5.3.4	DEVIATION FROM TEST STANDARD .....	75



A D T

5.3.5	TEST SETUP .....	75
5.3.6	EUT OPERATING CONDITIONS .....	75
5.3.7	TEST RESULTS .....	76
5.4	CONDUCTED OUTPUT POWER.....	77
5.4.1	LIMITS OF CONDUCTED OUTPUT POWER MEASUREMENT .....	77
5.4.2	INSTRUMENTS.....	77
5.4.3	TEST PROCEDURES .....	77
5.4.4	DEVIATION FROM TEST STANDARD .....	77
5.4.5	TEST SETUP .....	77
5.4.6	EUT OPERATING CONDITIONS .....	77
5.4.7	TEST RESULTS .....	78
5.5	POWER SPECTRAL DENSITY MEASUREMENT.....	79
5.5.1	LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT .....	79
5.5.2	TEST INSTRUMENTS.....	79
5.5.3	TEST PROCEDURE.....	79
5.5.4	DEVIATION FROM TEST STANDARD .....	79
5.5.5	TEST SETUP .....	79
5.5.6	EUT OPERATING CONDITION.....	79
5.5.7	TEST RESULTS .....	80
5.6	CONDUCTED OUT-BAND EMISSION MEASUREMENT.....	81
5.6.1	LIMITS OF CONDUCTED OUT-BAND EMISSION MEASUREMENT.....	81
5.6.2	TEST INSTRUMENTS.....	81
5.6.3	TEST PROCEDURE.....	81
5.6.4	DEVIATION FROM TEST STANDARD .....	82
5.6.5	TEST SETUP .....	82
5.6.6	EUT OPERATING CONDITION.....	82
5.6.7	TEST RESULTS .....	82
6.	PHOTOGRAPHS OF THE TEST CONFIGURATION.....	86
7.	INFORMATION ON THE TESTING LABORATORIES .....	87
8.	APPENDIX A - MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB.....	88



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## RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF120604E06	Original release	July 11, 2012



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## 1. CERTIFICATION

**PRODUCT:** Broadcom 3383Z Wireless eMTA  
**BRAND NAME:** UBEE  
**MODEL NO.:** DVW324  
**TEST SAMPLE:** R&D SAMPLE  
**APPLICANT:** Ubee Interactive Corp.  
**TESTED:** June 08 to July 02, 2012  
**STANDARDS:** FCC Part 15, Subpart C (Section 15.247)  
ANSI C63.10-2009

The above equipment (Model: DVW324) 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:** July 11, 2012  
( Elsie Hsu, Specialist )

**APPROVED BY** :  , **DATE:** July 11, 2012  
( May Chen, Deputy Manager )



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## 2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

### For 2.4GHz, 2412~2462MHz Band

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 -12.51dB at 0.15255MHz.
15.247(d) 15.209	Radiated Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -0.5dB at 2390.00MHz & 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 HRS not a standard connector.

### For 5GHz, 5745~5825MHz Band

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 -10.47dB at 0.4289MHz.
15.247(d) 15.209	Radiated Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -2.90dB at 11570.00MHz & 11650.00MHz.
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 HRS not a standard connector.

**NOTE:** The EUT was operating in 2.400 ~ 2.4835GHz, 5.15~5.25GHz and 5.725~5.850GHz frequencies band. This report was recorded the RF parameters including 2.400 ~ 2.4835GHz and 5.725~5.850GHz. For the 5.15~5.25GHz RF parameters was recorded in another test report.



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## 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:

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

Measurement	Value
Conducted emissions	2.98 dB
Radiated emissions (30MHz-1GHz)	5.59 dB
Radiated emissions (1GHz -6GHz)	3.84 dB
Radiated emissions (6GHz -18GHz)	4.09 dB
Radiated emissions (18GHz -40GHz)	4.24 dB





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### 3. GENERAL INFORMATION

#### 3.1 GENERAL DESCRIPTION OF EUT(WLAN)

<b>PRODUCT</b>	Broadcom 3383Z Wireless eMTA
<b>MODEL NO.</b>	DVW324
<b>POWER SUPPLY</b>	DC 12V from power adapter
<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: up to 11Mbps 802.11g / a: up to 54Mbps 802.11n (20MHz, 800ns GI): up to 130Mbps 802.11n (20MHz, 400ns GI): up to 144.444Mbps 802.11n (40MHz, 800ns GI): up to 270Mbps 802.11n (40MHz, 400ns GI): up to 300Mbps
<b>OPERATING FREQUENCY</b>	<b>For 15.407</b> 5.18 ~ 5.24GHz
	<b>For 15.247</b> 2.4GHz: 2.412 ~ 2.462GHz 5GHz: 5.745 ~ 5.825GHz
<b>NUMBER OF CHANNEL</b>	<b>For 15.407</b> 4 for 802.11a, 802.11n (20MHz) 2 for 802.11n (40MHz)
	<b>For 15.247 (2.4GHz)</b> 11 for 802.11b, 802.11g, 802.11n (20MHz) 7 for 802.11n (40MHz)
	<b>For 15.247 (5GHz)</b> 5 for 802.11a, 802.11n (20MHz) 2 for 802.11n (40MHz)
<b>MAXIMUM OUTPUT POWER</b>	<b>For 15.407</b> 802.11a: 25.704mW 802.11n (20MHz): 25.793mW 802.11n (40MHz): 48.613mW
	<b>For 15.247(2.4GHz)</b> 802.11b: 173.780mW 802.11g: 363.078mW 802.11n (20MHz): 597.116mW 802.11n (40MHz): 310.503mW
	<b>For 15.247(5GHz)</b> 802.11a: 151.356mW 802.11n (20MHz): 289.165mW 802.11n (40MHz): 276.370mW

<b>ANTENNA TYPE</b>	Please see NOTE
<b>DATA CABLE</b>	NA
<b>I/O PORTS</b>	Refer to user's manual
<b>ASSOCIATED DEVICES</b>	Adapter x 1

**NOTE:**

- There are 2.4GHz and 5GHz WLAN technology used for the EUT. The test report of EUT listed as below table:

Function	Report No.
WLAN	RF120604E06 (15.247) RF120604E06-1(15.407)

- The EUT must be supplied with a power adapter as following table:

Brand	Model No.	Spec.
APD	WA-24R12FU	Input: 100~240V, 0.8A, 50-60Hz Output: 12V, 2A

- The antennas provided to the EUT, please refer to the following table:

Antenna	Brand	Model No.	Gain (dBi)		Cable Loss (dB)		Antenna Type	Connect or Type	Cable Length	Frequency range (GHz ~ GHz)
			Include cable loss		2.4GHz	5GHz				
			2.4GHz	5GHz						
1	WHA YU	C107-510924-A (SSR-20858)	3.6	3.5	0.87	1.41	PIFA	HRS	300mm+/- 5	2.4~ 2.5 4.9~ 5.85
2	WHA YU	C107-510925-A (SSR-21076)	3.3	3.5	0.14	0.23	PIFA	HRS	50mm +/- 3	2.4~ 2.5 4.9~ 5.85

- The EUT incorporates a MIMO function.

MODULATION MODE	Tx/Rx FUNCTION
802.11b	1Tx/1Rx
802.11g	1Tx/1Rx
802.11a	1Tx/1Rx
802.11n (20MHz)	2Tx/2Rx
802.11n (40MHz)	2Tx/2Rx

- 2.4GHz and 5GHz technology cannot transmit at same time.
- When the EUT operating in 802.11n, the software operation, which is defined by manufacturer, MCS (Modulation and Coding Schemes) from 0 to 15.
- The above EUT information was declared by the manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.



### 3.2 DESCRIPTION OF TEST MODES

#### Operated in 2400 ~ 2483.5MHz band:

11 channels are provided for 802.11b, 802.11g, 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		

#### Operated in 5725 ~ 5850MHz band:

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

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

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

CHANNEL	FREQUENCY
151	5755 MHz
159	5795 MHz





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

- 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.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1
802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6
For 2.4 GHz 802.11n (20MHz)	1 to 11	1, 6, 11	OFDM	BPSK	6.5
For 2.4 GHz 802.11n (40MHz)	3 to 9	3, 6, 9	OFDM	BPSK	13.5
802.11a	149 to 161	149, 157, 161	OFDM	BPSK	6
For 5 GHz 802.11n (20MHz)	149 to 161	149, 157, 161	OFDM	BPSK	6.5
For 5 GHz 802.11n (40MHz)	151 to 159	151, 159	OFDM	BPSK	13.5

**ANTENNA PORT CONDUCTED 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.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1
802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6
For 2.4 GHz 802.11n (20MHz)	1 to 11	1, 6, 11	OFDM	BPSK	6.5
For 2.4 GHz 802.11n (40MHz)	3 to 9	3, 6, 9	OFDM	BPSK	13.5
802.11a	149 to 161	149, 157, 161	OFDM	BPSK	6
For 5 GHz 802.11n (20MHz)	149 to 161	149, 157, 161	OFDM	BPSK	6.5
For 5 GHz 802.11n (40MHz)	151 to 159	151, 159	OFDM	BPSK	13.5



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**CONDUCTED OUT-BAND EMISSION 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.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1
802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6
For 2.4 GHz 802.11n (20MHz)	1 to 11	1, 6, 11	OFDM	BPSK	6.5
For 2.4 GHz 802.11n (40MHz)	3 to 9	3, 6, 9	OFDM	BPSK	13.5
802.11a	149 to 161	149, 157, 161	OFDM	BPSK	6
For 5 GHz 802.11n (20MHz)	149 to 161	149, 157, 161	OFDM	BPSK	6.5
For 5 GHz 802.11n (40MHz)	151 to 159	151, 159	OFDM	BPSK	13.5

**TEST CONDITION:**

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
PLC	27deg. C, 64%RH	120Vac, 60Hz	Scott Chen
RE<1G	21deg. C, 65%RH	120Vac, 60Hz	Robert Cheng
RE <sup>3</sup> 1G	22deg. C, 63%RH	120Vac, 60Hz	Robert Cheng
APCM	25deg. C, 60%RH	120Vac, 60Hz	Rex Huang
OB	25deg. C, 60%RH	120Vac, 60Hz	Rex Huang

### **3.3 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 v01**

**ANSI C63.10-2009**

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

**Note:** The EUT has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (DoC). The test report has been issued separately.



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### 3.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

For Conduction Emission test					
No.	Product	Brand	Model No.	Serial No.	FCC ID
1	PERSONAL COMPUTER	acer	VT7200D-116SN053	NA	NA
2	NOTEBOOK COMPUTER	DELL	PP32LA	HSLB32S	FCC DoC
3	MONITOR	DELL	E2210Hc	CN-OG337R-64180-97S-OQFS	FCC DoC
4	KEYBOARD	DELL	SK-8115	MY-0DJ325-71619-99B-0479	FCC DoC
5	MOUSE	DELL	MOC5UO	I1401ML5	FCC DoC
6	TELEPHONE	WONDER	WD-303	7C17KA04011	NA
7	TELEPHONE	WONDER	WD-303	7C17KA05211	NA
8	iPod	Apple	MC749TA/A	CC4DMFJUDFDM	NA
9	iPod	Apple	MC749TA/A	CC4DMFKUDFDM	NA
10	Switch	TREND MICRO	TREND MICRO Network VirusWal	NA	NA
11	Switch	hp	NA	NA	NA
12	Coaxial cable simulator	ARRIS	CMTS1500	NA	NA





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For Conduction Emission test	
NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	NA
2	UTP cable (10m)
3	VGA cable (1.8m), with 2 cores
4	USB cable (1.8m)
5	USB cable (1.8m)
6	RJ-11 cable (1m)
7	RJ-11 cable (1m)
8	USB cable (0.1m)
9	USB cable (0.1m)
10	UTP cable (10m)
11	UTP cable (1.2m)
12	Coaxial cable (1m)

**NOTE:** All power cords of the above support units are non shielded (1.8m).



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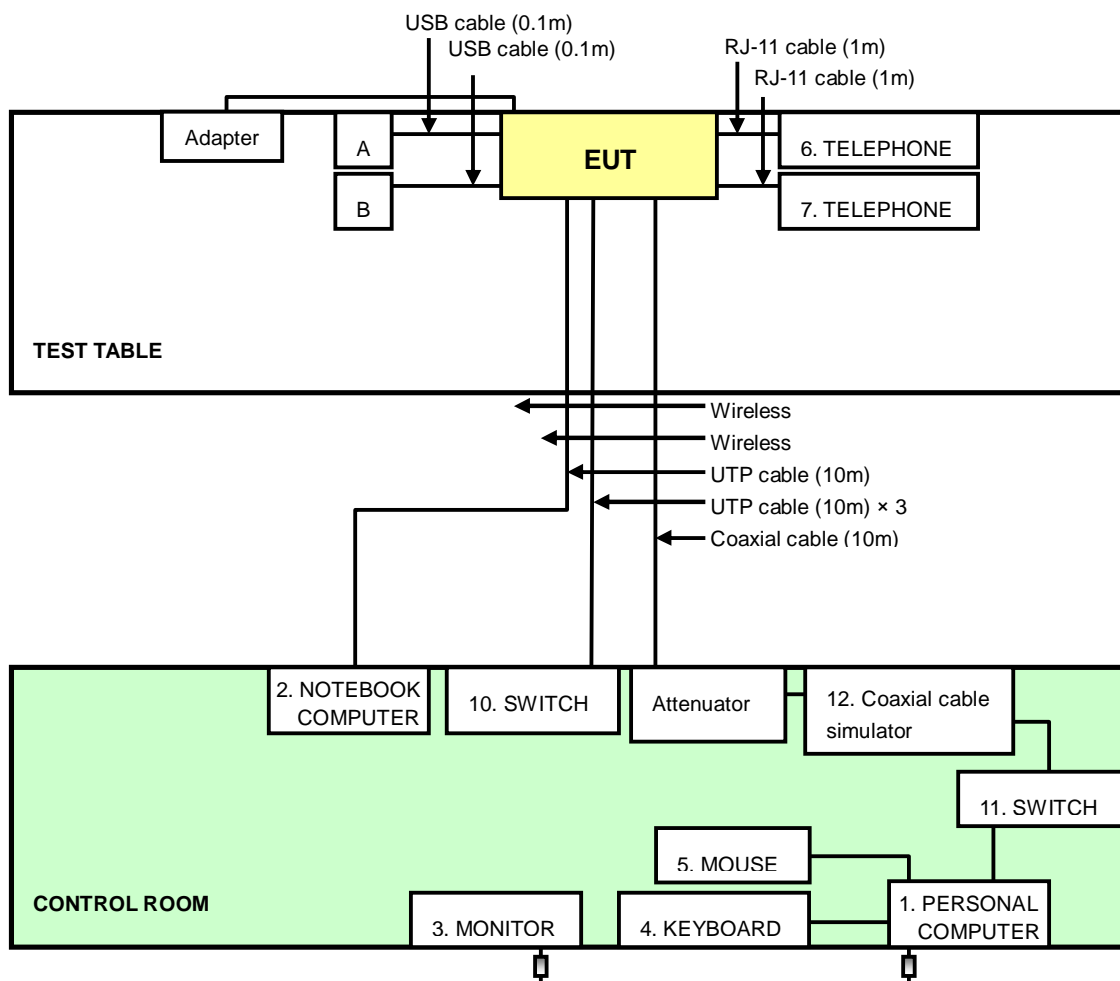
For other test					
NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	NOTEBOOK COMPUTER	DELL	PP32LA	FSLB32S	FCC DoC
2	HUB	ZyXEL	ES-116P	S060H0200021 5	FCC DoC
3	iPod	Apple	MC749TA/A	CC4DMFJUDFD M	NA
4	iPod	Apple	MC749TA/A	CC4DN25WDF DM	NA
5	TELEPHONE	WONDER	WD-303	7C17KA04011	NA
6	TELEPHONE	WONDER	WD-303	8C17DA02825	NA

For other test	
NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	UTP cable, 10m
2	UTP cable, 10m
3	USB cable (0.1m)
4	USB cable (0.1m)
5	RJ-11 cable (10m)
6	RJ-11 cable (10m)

**NOTE:** All power cords of the above support units are non shielded (1.8m).

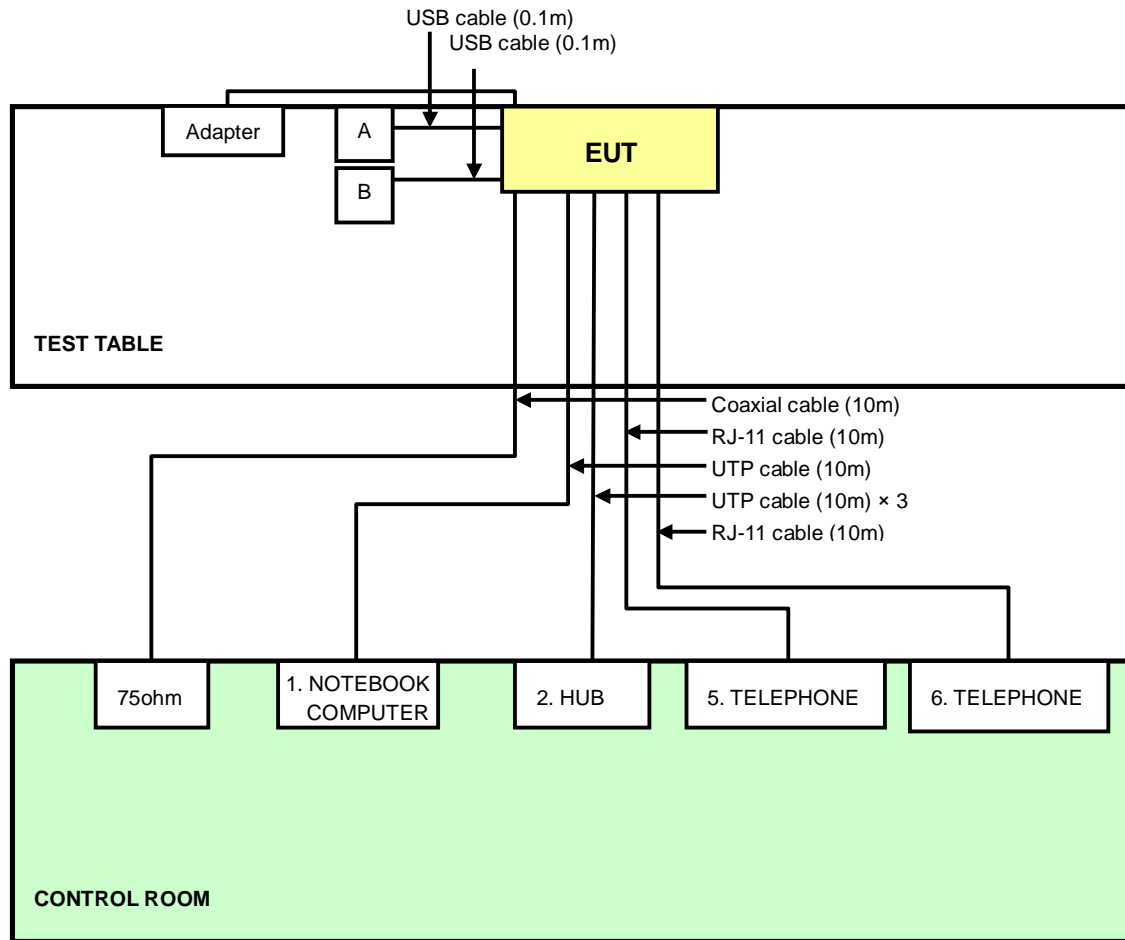
### 3.5 CONFIGURATION OF SYSTEM UNDER TEST

For Conducted Emission test:



**Note:** The item A & B are support units 8 & 9 (iPod).

**For other test:**



**Note:** The item A & B are support units 3 & 4 (iPod).



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## 4. TEST TYPES AND RESULTS (FOR 2.4GHz, 2412 ~ 2462MHz Band)

### 4.1 CONDUCTED EMISSION MEASUREMENT

#### 4.1.1 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 0.50 MHz.

#### 4.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver	ESCS 30	100375	Mar. 08, 2012	Mar. 07, 2013
Line-Impedance Stabilization Network (for EUT) SCHWARZBECK	NSLK8127	8127-522	Sep. 07, 2011	Sep. 06, 2012
Line-Impedance Stabilization Network (for Peripheral)	ESH3-Z5	848773/004	Nov. 02, 2011	Nov. 01, 2012
RF Cable (JYEBAO)	5DFB	COCCAB-001	Aug. 29, 2011	Aug. 28, 2012
50 ohms Terminator	50	3	Nov. 02, 2011	Nov. 01, 2012
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 Shielded Room No. C.
- 3 The VCCI Con C Registration No. is C-3611.
- 4 Tested Date: June 08, 2012

#### 4.1.3 TEST PROCEDURES

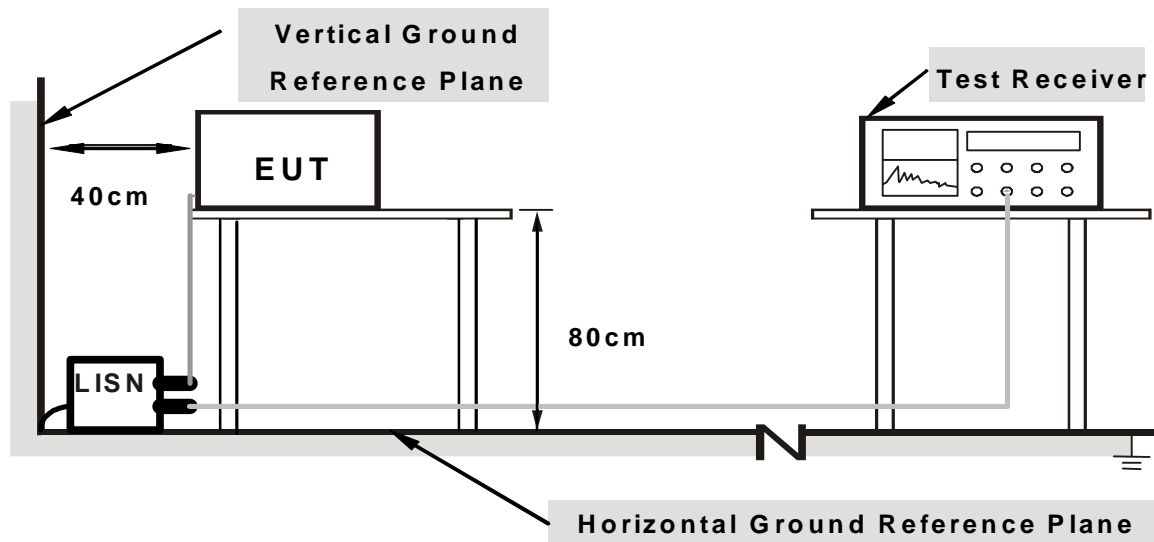
- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling 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) were not recorded.

**Note:** 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



**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 related item – Photographs of the Test Configuration.

#### 4.1.6 EUT OPERATING CONDITIONS

1. Turn on the power of all equipment.
2. Support unit 1 (NOTEBOOK COMPUTER) runs “Ping.exe” program to enable all functions of EUT via UTP cable.
3. Support units 1 (NOTEBOOK COMPUTER) and support unit 12 (Coaxial cable simulator) run “Ping.exe” program to enable all functions of support unit 2 (PERSONAL COMPUTER) via EUT.
4. Support unit 6 (TELEPHONE) communicated to support unit 7 (TELEPHONE) via EUT by RJ-11 cables.

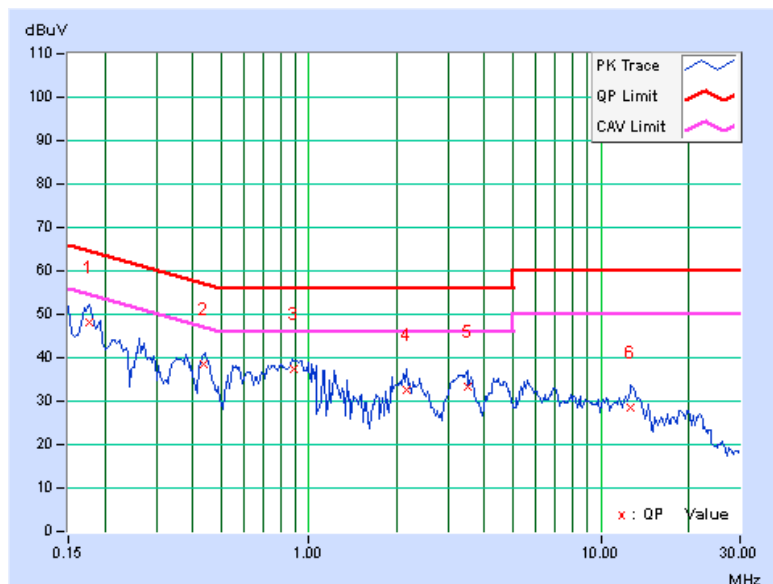
### 4.1.7 TEST RESULTS

<b>PHASE</b>	Line (L)	<b>6dB BANDWIDTH</b>	9 kHz
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No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
	1	0.17682	0.08	47.98	39.78	48.06	39.86	64.63	54.63	-16.58
2	0.43841	0.11	38.58	32.52	38.69	32.63	57.09	47.09	-18.40	-14.46
3	0.88338	0.14	37.28	26.99	37.42	27.13	56.00	46.00	-18.58	-18.87
4	2.17570	0.28	32.28	25.37	32.56	25.65	56.00	46.00	-23.44	-20.35
5	3.49712	0.37	32.82	26.46	33.19	26.83	56.00	46.00	-22.81	-19.17
6	12.67221	0.83	27.55	24.37	28.38	25.20	60.00	50.00	-31.62	-24.80

#### 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.



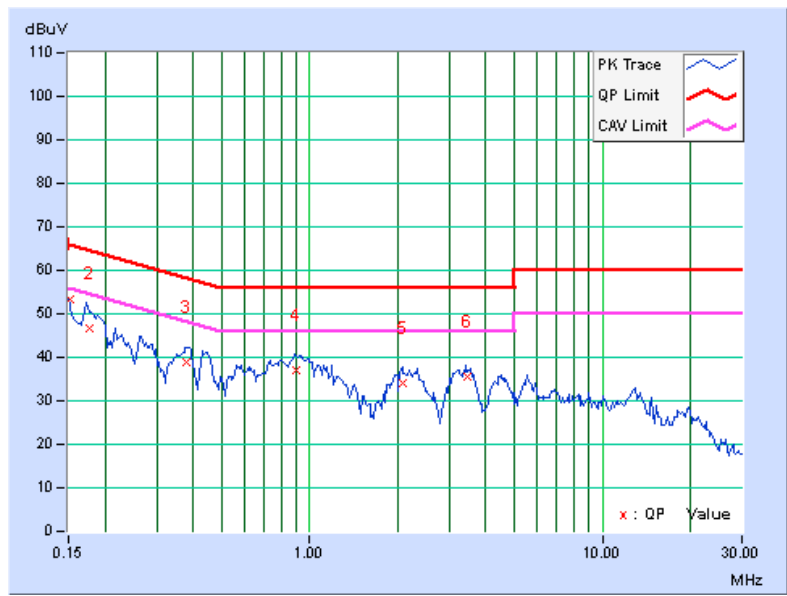


<b>PHASE</b>	Neutral (N)	<b>6dB BANDWIDTH</b>	9 kHz
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No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
	1	0.15255	0.06	53.29	34.33	53.35	34.39	65.86	55.86	-12.51
2	0.17697	0.07	46.66	37.36	46.73	37.43	64.63	54.63	-17.90	-17.20
3	0.37823	0.10	38.69	28.52	38.79	28.62	58.32	48.32	-19.53	-19.70
4	0.89668	0.11	36.92	27.77	37.03	27.88	56.00	46.00	-18.97	-18.12
5	2.07233	0.19	33.90	26.69	34.09	26.88	56.00	46.00	-21.91	-19.12
6	3.45529	0.28	35.43	28.86	35.71	29.14	56.00	46.00	-20.29	-16.86

**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.



## 4.2 RADIATED EMISSION AND BANDEDGE MEASUREMENT

### 4.2.1 LIMITS OF RADIATED EMISSION AND BANDEDGE MEASUREMENT

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 20dB below the highest level of the desired power:

Frequencies (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

**NOTE:**

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



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## 4.2.2 TEST INSTRUMENTS

### For below 1GHz test

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer Agilent	E4446A	MY48250254	July 12, 2011	July 11, 2012
Pre-Selector Agilent	N9039A	MY46520311	July 12, 2011	July 11, 2012
Signal Generator Agilent	N5181A	MY49060517	July 12, 2011	July 11, 2012
Pre-Amplifier Mini-Circuits	ZFL-1000VH2 B	AMP-ZFL-03	Nov. 15, 2011	Nov. 14, 2012
Pre-Amplifier Agilent	8449B	3008A02578	July 04, 2011	July 03, 2012
Pre-Amplifier SPACEK LABS	SLKKa-48-6	9K16	Nov. 15, 2011	Nov. 14, 2012
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-360	Apr. 09, 2012	Apr. 08, 2013
Horn_Antenna AISI	AIH.8018	0000320091110	Nov. 14, 2011	Nov. 13, 2012
Horn_Antenna SCHWARZBECK	BBHA 9170	9170-424	Oct. 07, 2011	Oct. 06, 2012
Loop Antenna <sup>(*)</sup> R&S	HFH2-Z2	100070	Jan. 31, 2012	Jan. 30, 2014
RF Cable	NA	RF104-201 RF104-203 RF104-204	Dec. 26, 2011	Dec. 25, 2012
RF Cable	NA	CHGCAB_001	Oct. 07, 2011	Oct. 06, 2012
Software	ADT_Radiated _V8.7.05	NA	NA	NA
Antenna Tower & Turn Table CT	NA	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 calibration interval of the above test instruments is 24 months and the calibrations are traceable to NML/ROC and NIST/USA.
- 3 The horn antenna, preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
4. The test was performed in 966 Chamber No. G.
- 5 The FCC Site Registration No. is 966073.
- 6 The VCCI Site Registration No. is G-137.
- 7 The CANADA Site Registration No. is IC 7450H-2.
- 8 Tested Date: June 13, 2012



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**For above 1GHz test**

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer Agilent	E4446A	MY48250253	Aug. 29, 2011	Aug. 28, 2012
Pre-Selector Agilent	N9039A	MY46520310	Aug. 29, 2011	Aug. 28, 2012
Signal Generator Agilent	N5181A	MY49060347	July 25, 2011	July 24, 2012
Pre-Amplifier Mini-Circuits	ZFL-1000VH2 B	AMP-ZFL-04	Nov. 15, 2011	Nov. 14, 2012
Pre-Amplifier Agilent	8449B	3008A02465	Feb. 27, 2012	Feb. 26, 2013
SPACEK LABS	SLKKa-48-6	9K16	Nov. 15, 2011	Nov. 14, 2012
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-361	Apr. 06, 2012	Apr. 05, 2013
Horn_Antenna AISL	AIH.8018	0000220091110	Nov. 23, 2011	Nov. 22, 2012
Horn_Antenna SCHWARZBECK	BBHA 9170	9170-424	Oct. 07, 2011	Oct. 06, 2012
Loop Antenna <sup>(*)</sup> R&S	HFH2-Z2	100070	Jan. 31, 2012	Jan. 30, 2014
RF Cable	NA	RF104-205 RF104-207 RF104-202	Dec. 27, 2011	Dec. 26, 2012
RF Cable	NA	CHHCAB_001	Oct. 08, 2011	Oct. 07, 2012
Software	ADT_Radiated _V8.7.05	NA	NA	NA
Antenna Tower & Turn Table CT	NA	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 calibration interval of the above test instruments is 24 months and the calibrations are traceable to NML/ROC and NIST/USA.
3. The horn antenna, preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
4. The test was performed in 966 Chamber No. H.
5. The FCC Site Registration No. is 797305.
6. The CANADA Site Registration No. is IC 7450H-3.
7. Tested Date: June 30, 2012



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#### 4.2.3 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f. The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

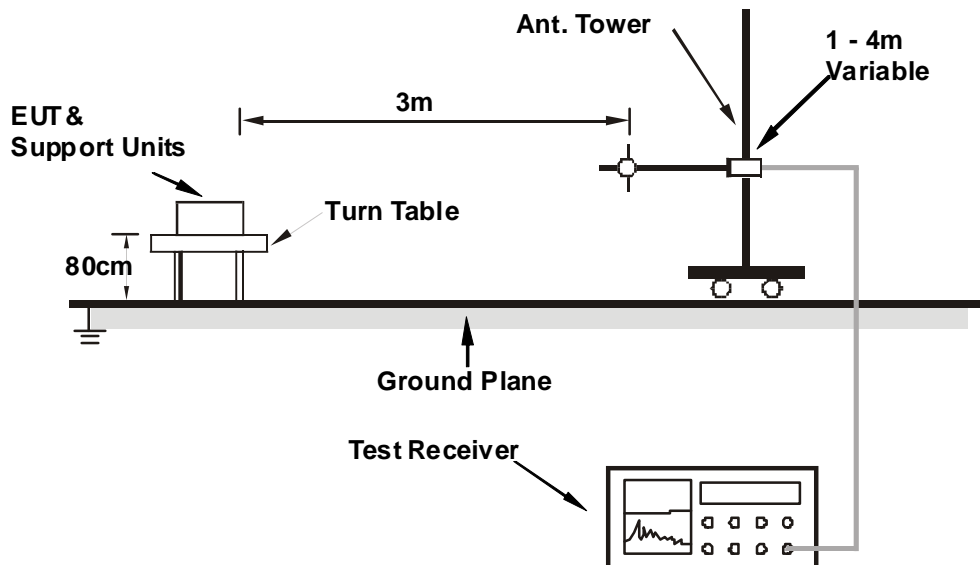
#### NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 10 Hz for Average detection (AV) at frequency above 1GHz.
4. 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



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

#### 4.2.6 EUT OPERATING CONDITIONS

1. Turn on the power of EUT.
2. The communication partner run test program “console w/ Command” to enable EUT under transmission/receiving condition continuously at specific channel frequency.

## 4.2.7 TEST RESULTS

### BELOW 1GHz WORST-CASE DATA

#### 802.11n (20MHz)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	71.21	35.0 QP	40.0	-5.0	1.75 H	154	22.75	12.28
2	129.83	33.8 QP	43.5	-9.7	1.50 H	360	20.57	13.24
3	166.42	36.7 QP	43.5	-6.8	2.00 H	266	22.76	13.93
4	374.97	35.8 QP	46.0	-10.2	1.00 H	251	18.55	17.22
5	624.96	35.0 QP	46.0	-11.0	1.75 H	277	12.00	22.97
6	750.01	38.7 QP	46.0	-7.3	1.25 H	58	13.79	24.91
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	166.43	33.8 QP	43.5	-9.7	1.00 V	148	19.91	13.93
2	332.81	38.6 QP	46.0	-7.4	1.00 V	134	22.46	16.14
3	421.51	38.0 QP	46.0	-8.0	1.00 V	3	19.58	18.41
4	470.77	40.0 QP	46.0	-6.0	1.00 V	3	20.30	19.66
5	624.96	39.1 QP	46.0	-7.0	1.00 V	0	16.08	22.97
6	687.01	39.5 QP	46.0	-6.5	1.50 V	356	15.69	23.79

#### REMARKS:

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



## ABOVE 1GHz DATA

### 802.11b

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

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

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	58.2 PK	74.0	-15.8	1.25 H	264	25.82	32.38
2	2390.00	47.9 AV	54.0	-6.1	1.25 H	264	15.52	32.38
3	*2412.00	105.6 PK			1.25 H	264	73.16	32.44
4	*2412.00	103.2 AV			1.25 H	264	70.76	32.44
5	4824.00	50.2 PK	74.0	-23.8	1.00 H	123	8.26	41.94
6	4824.00	44.1 AV	54.0	-9.9	1.00 H	123	2.16	41.94

#### 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	61.5 PK	74.0	-12.5	1.23 V	356	29.12	32.38
2	2390.00	53.4 AV	54.0	-0.6	1.23 V	356	21.02	32.38
3	*2412.00	109.9 PK			1.23 V	356	77.46	32.44
4	*2412.00	107.6 AV			1.23 V	356	75.16	32.44
5	4824.00	54.3 PK	74.0	-19.7	1.10 V	355	12.36	41.94
6	4824.00	49.6 AV	54.0	-4.4	1.10 V	355	7.66	41.94

#### REMARKS:

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





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

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

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	105.9 PK			1.25 H	240	73.39	32.51
2	*2437.00	103.5 AV			1.25 H	240	70.99	32.51
3	4874.00	49.8 PK	74.0	-24.2	1.00 H	110	7.81	41.99
4	4874.00	43.6 AV	54.0	-10.4	1.00 H	110	1.61	41.99
5	7311.00	53.3 PK	74.0	-20.7	1.53 H	354	6.77	46.53
6	7311.00	42.5 AV	54.0	-11.5	1.53 H	354	-4.03	46.53

**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	*2437.00	109.3 PK			1.20 V	356	76.79	32.51
2	*2437.00	107.0 AV			1.20 V	356	74.49	32.51
3	4874.00	50.2 PK	74.0	-23.8	1.10 V	2	8.21	41.99
4	4874.00	40.6 AV	54.0	-13.4	1.10 V	2	-1.39	41.99
5	7311.00	59.4 PK	74.0	-14.6	1.61 V	176	12.87	46.53
6	7311.00	53.2 AV	54.0	-0.8	1.61 V	176	6.67	46.53

**REMARKS:**

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



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

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

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	105.2 PK			1.25 H	236	72.63	32.57
2	*2462.00	102.9 AV			1.25 H	236	70.33	32.57
3	2483.50	58.8 PK	74.0	-15.2	1.25 H	236	26.17	32.63
4	2483.50	49.9 AV	54.0	-4.1	1.25 H	236	17.27	32.63
5	4924.00	50.0 PK	74.0	-24.0	1.00 H	114	7.99	42.01
6	4924.00	44.0 AV	54.0	-10.0	1.00 H	114	1.99	42.01
7	7386.00	52.9 PK	74.0	-21.1	1.59 H	341	6.17	46.73
8	7386.00	42.2 AV	54.0	-11.8	1.59 H	341	-4.53	46.73

**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	108.7 PK			1.20 V	356	76.13	32.57
2	*2462.00	106.4 AV			1.20 V	356	73.83	32.57
3	2483.50	61.6 PK	74.0	-12.4	1.20 V	356	28.97	32.63
4	2483.50	53.2 AV	54.0	-0.8	1.20 V	356	20.57	32.63
5	4924.00	52.3 PK	74.0	-21.7	1.07 V	2	10.29	42.01
6	4924.00	49.6 AV	54.0	-4.4	1.07 V	2	7.59	42.01
7	7386.00	57.9 PK	74.0	-16.1	1.01 V	178	11.17	46.73
8	7386.00	50.8 AV	54.0	-3.2	1.01 V	178	4.07	46.73

**REMARKS:**

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



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802.11g

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

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

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	65.3 PK	74.0	-8.7	1.26 H	233	32.92	32.38
2	2390.00	51.7 AV	54.0	-2.3	1.26 H	233	19.32	32.38
3	*2412.00	106.2 PK			1.26 H	233	73.76	32.44
4	*2412.00	96.8 AV			1.26 H	233	64.36	32.44
5	4824.00	48.1 PK	74.0	-25.9	1.00 H	231	6.16	41.94
6	4824.00	36.0 AV	54.0	-18.0	1.00 H	231	-5.94	41.94

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

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	66.9 PK	74.0	-7.1	1.00 V	352	34.52	32.38
2	<b>2390.00</b>	<b>53.5 AV</b>	<b>54.0</b>	<b>-0.5</b>	<b>1.00 V</b>	<b>352</b>	<b>21.12</b>	<b>32.38</b>
3	*2412.00	107.5 PK			1.00 V	352	75.06	32.44
4	*2412.00	97.4 AV			1.00 V	352	64.96	32.44
5	4824.00	48.4 PK	74.0	-25.6	1.00 V	125	6.46	41.94
6	4824.00	36.1 AV	54.0	-17.9	1.00 V	125	-5.84	41.94

**REMARKS:**

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



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

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

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	70.8 PK	74.0	-3.2	1.23 H	240	38.42	32.38
2	2390.00	52.8 AV	54.0	-1.2	1.23 H	240	20.42	32.38
3	*2437.00	112.8 PK			1.23 H	240	80.29	32.51
4	*2437.00	102.5 AV			1.23 H	240	69.99	32.51
5	2483.50	66.2 PK	74.0	-7.8	1.23 H	240	33.57	32.63
6	2483.50	50.3 AV	54.0	-3.7	1.23 H	240	17.67	32.63
7	4874.00	47.3 PK	74.0	-26.7	1.00 H	261	5.31	41.99
8	4874.00	35.6 AV	54.0	-18.4	1.00 H	261	-6.39	41.99
9	7311.00	54.0 PK	74.0	-20.0	1.20 H	98	7.47	46.53
10	7311.00	43.6 AV	54.0	-10.4	1.20 H	98	-2.93	46.53

**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	71.1 PK	74.0	-2.9	1.00 V	185	38.72	32.38
2	2390.00	53.3 AV	54.0	-0.7	1.00 V	185	20.92	32.38
3	*2437.00	113.5 PK			1.00 V	185	80.99	32.51
4	*2437.00	103.1 AV			1.00 V	185	70.59	32.51
5	2483.50	66.8 PK	74.0	-7.2	1.00 V	185	34.17	32.63
6	2483.50	51.1 AV	54.0	-2.9	1.00 V	185	18.47	32.63
7	4874.00	49.9 PK	74.0	-24.1	1.00 V	126	7.91	41.99
8	4874.00	37.5 AV	54.0	-16.5	1.00 V	126	-4.49	41.99
9	7311.00	60.2 PK	74.0	-13.8	1.47 V	177	13.67	46.53
10	7311.00	48.2 AV	54.0	-5.8	1.47 V	177	1.67	46.53

**REMARKS:**

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	105.2 PK			1.24 H	240	72.63	32.57
2	*2462.00	95.2 AV			1.24 H	240	62.63	32.57
3	2483.50	67.2 PK	74.0	-6.8	1.23 H	240	34.57	32.63
4	2483.50	52.5 AV	54.0	-1.5	1.23 H	240	19.87	32.63
5	4924.00	47.0 PK	74.0	-27.0	1.00 H	276	4.99	42.01
6	4924.00	35.3 AV	54.0	-18.7	1.00 H	276	-6.71	42.01
7	7386.00	52.9 PK	74.0	-21.1	1.24 H	97	6.17	46.73
8	7386.00	42.6 AV	54.0	-11.4	1.24 H	97	-4.13	46.73

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	107.3 PK			1.00 V	352	74.73	32.57
2	*2462.00	97.2 AV			1.00 V	352	64.63	32.57
3	2483.50	68.8 PK	74.0	-5.2	1.00 V	352	36.17	32.63
4	2483.50	53.0 AV	54.0	-1.0	1.00 V	352	20.37	32.63
5	4924.00	50.1 PK	74.0	-23.9	1.00 V	132	8.09	42.01
6	4924.00	38.1 AV	54.0	-15.9	1.00 V	132	-3.91	42.01
7	7386.00	60.1 PK	74.0	-13.9	1.46 V	178	13.37	46.73
8	7386.00	48.1 AV	54.0	-5.9	1.46 V	178	1.37	46.73

**REMARKS:**

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

802.11n (20MHz)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	62.1 PK	74.0	-11.9	1.28 H	233	29.72	32.38
2	2390.00	50.1 AV	54.0	-3.9	1.28 H	233	17.72	32.38
3	*2412.00	104.5 PK			1.28 H	233	72.06	32.44
4	*2412.00	95.3 AV			1.28 H	233	62.86	32.44
5	4824.00	48.1 PK	74.0	-25.9	1.00 H	311	6.16	41.94
6	4824.00	35.1 AV	54.0	-18.9	1.00 H	311	-6.84	41.94
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	66.5 PK	74.0	-7.5	1.21 V	355	34.12	32.38
2	2390.00	53.1 AV	54.0	-0.9	1.21 V	355	20.72	32.38
3	*2412.00	110.5 PK			1.22 V	352	78.06	32.44
4	*2412.00	99.7 AV			1.22 V	352	67.26	32.44
5	4824.00	48.0 PK	74.0	-26.0	1.11 V	345	6.06	41.94
6	4824.00	35.2 AV	54.0	-18.8	1.11 V	345	-6.74	41.94

**REMARKS:**

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

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

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

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	64.4 PK	74.0	-9.6	1.28 H	233	32.02	32.38
2	2390.00	49.7 AV	54.0	-4.3	1.28 H	233	17.32	32.38
3	*2437.00	111.8 PK			1.28 H	233	79.29	32.51
4	*2437.00	101.9 AV			1.28 H	233	69.39	32.51
5	2483.50	61.2 PK	74.0	-12.8	1.28 H	233	28.57	32.63
6	2483.50	47.5 AV	54.0	-6.5	1.28 H	233	14.87	32.63
7	4874.00	47.1 PK	74.0	-26.9	1.00 H	261	5.11	41.99
8	4874.00	35.4 AV	54.0	-18.6	1.00 H	261	-6.59	41.99
9	7311.00	53.1 PK	74.0	-20.9	1.20 H	98	6.57	46.53
10	7311.00	42.7 AV	54.0	-11.3	1.20 H	98	-3.83	46.53

**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	69.1 PK	74.0	-4.9	1.22 V	357	36.72	32.38
2	<b>2390.00</b>	<b>53.5 AV</b>	<b>54.0</b>	<b>-0.5</b>	<b>1.22 V</b>	<b>357</b>	<b>21.12</b>	<b>32.38</b>
3	*2437.00	116.7 PK			1.22 V	357	84.19	32.51
4	*2437.00	106.4 AV			1.22 V	357	73.89	32.51
5	2483.50	66.0 PK	74.0	-8.0	1.22 V	357	33.37	32.63
6	2483.50	52.6 AV	54.0	-1.4	1.22 V	357	19.97	32.63
7	4874.00	57.8 PK	74.0	-16.2	1.12 V	355	15.81	41.99
8	4874.00	45.6 AV	54.0	-8.4	1.12 V	355	3.61	41.99
9	7311.00	64.7 PK	74.0	-9.3	1.68 V	15	18.17	46.53
10	7311.00	53.0 AV	54.0	-1.0	1.68 V	15	6.47	46.53

**REMARKS:**

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



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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	105.3 PK			1.24 H	235	72.73	32.57
2	*2462.00	95.9 AV			1.24 H	235	63.33	32.57
3	2483.50	63.5 PK	74.0	-10.5	1.24 H	235	30.87	32.63
4	2483.50	49.7 AV	54.0	-4.3	1.24 H	235	17.07	32.63
5	4924.00	48.4 PK	74.0	-25.6	1.00 H	312	6.39	42.01
6	4924.00	35.6 AV	54.0	-18.4	1.00 H	312	-6.41	42.01
7	7386.00	51.9 PK	74.0	-22.1	1.00 H	135	5.17	46.73
8	7386.00	40.5 AV	54.0	-13.5	1.00 H	135	-6.23	46.73

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	111.2 PK			1.20 V	257	78.63	32.57
2	*2462.00	101.0 AV			1.20 V	257	68.43	32.57
3	2483.50	69.8 PK	74.0	-4.2	1.19 V	357	37.17	32.63
4	2483.50	53.1 AV	54.0	-0.9	1.19 V	357	20.47	32.63
5	4924.00	49.7 PK	74.0	-24.3	1.12 V	355	7.69	42.01
6	4924.00	36.7 AV	54.0	-17.3	1.12 V	355	-5.31	42.01
7	7386.00	53.1 PK	74.0	-20.9	1.68 V	15	6.37	46.73
8	7386.00	42.1 AV	54.0	-11.9	1.68 V	15	-4.63	46.73

**REMARKS:**

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





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802.11n (40MHz)

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

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

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	61.9 PK	74.0	-12.1	1.27 H	235	29.52	32.38
2	2390.00	49.9 AV	54.0	-4.1	1.27 H	235	17.52	32.38
3	*2422.00	99.2 PK			1.27 H	235	66.73	32.47
4	*2422.00	87.1 AV			1.27 H	235	54.63	32.47
5	4844.00	48.3 PK	74.0	-25.7	1.00 H	311	6.34	41.96
6	4844.00	35.4 AV	54.0	-18.6	1.00 H	311	-6.56	41.96
7	7266.00	51.0 PK	74.0	-23.0	1.00 H	134	4.60	46.40
8	7266.00	40.1 AV	54.0	-13.9	1.00 H	134	-6.30	46.40

**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	2390.00	67.9 PK	74.0	-6.1	1.22 V	356	35.52	32.38
2	<b>2390.00</b>	<b>53.5 AV</b>	<b>54.0</b>	<b>-0.5</b>	<b>1.22 V</b>	<b>356</b>	<b>21.12</b>	<b>32.38</b>
3	*2422.00	104.3 PK			1.22 V	356	71.83	32.47
4	*2422.00	94.0 AV			1.22 V	356	61.53	32.47
5	4844.00	48.8 PK	74.0	-25.2	1.12 V	354	6.84	41.96
6	4844.00	35.8 AV	54.0	-18.2	1.12 V	354	-6.16	41.96
7	7266.00	53.0 PK	74.0	-21.0	1.67 V	14	6.60	46.40
8	7266.00	42.1 AV	54.0	-11.9	1.67 V	14	-4.30	46.40

**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).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " \* ": Fundamental frequency.



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

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

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	63.8 PK	74.0	-10.2	1.29 H	236	31.42	32.38
2	2390.00	50.6 AV	54.0	-3.4	1.29 H	236	18.22	32.38
3	*2437.00	102.4 PK			1.29 H	236	69.89	32.51
4	*2437.00	92.1 AV			1.29 H	236	59.59	32.51
5	2483.50	62.2 PK	74.0	-11.8	1.29 H	236	29.57	32.63
6	2483.50	49.5 AV	54.0	-4.5	1.29 H	236	16.87	32.63
7	4874.00	48.2 PK	74.0	-25.8	1.00 H	310	6.21	41.99
8	4874.00	35.8 AV	54.0	-18.2	1.00 H	310	-6.19	41.99
9	7311.00	51.1 PK	74.0	-22.9	1.00 H	137	4.57	46.53
10	7311.00	40.2 AV	54.0	-13.8	1.00 H	137	-6.33	46.53

**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	69.1 PK	74.0	-4.9	1.21 V	355	36.72	32.38
2	2390.00	53.1 AV	54.0	-0.9	1.21 V	355	20.72	32.38
3	*2437.00	107.3 PK			1.21 V	355	74.79	32.51
4	*2437.00	96.7 AV			1.21 V	355	64.19	32.51
5	2483.50	67.9 PK	74.0	-6.1	1.21 V	355	35.27	32.63
<b>6</b>	<b>2483.50</b>	<b>53.5 AV</b>	<b>54.0</b>	<b>-0.5</b>	<b>1.21 V</b>	<b>355</b>	<b>20.87</b>	<b>32.63</b>
7	4874.00	48.6 PK	74.0	-25.4	1.12 V	347	6.61	41.99
8	4874.00	35.7 AV	54.0	-18.3	1.12 V	347	-6.29	41.99
9	7311.00	53.0 PK	74.0	-21.0	1.66 V	15	6.47	46.53
10	7311.00	42.0 AV	54.0	-12.0	1.66 V	15	-4.53	46.53

**REMARKS:**

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



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

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

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2452.00	98.8 PK			1.28 H	234	66.25	32.55
2	*2452.00	88.9 AV			1.28 H	234	56.35	32.55
3	2483.50	56.7 PK	74.0	-17.3	1.28 H	234	24.07	32.63
4	2483.50	44.8 AV	54.0	-9.2	1.28 H	234	12.17	32.63
5	4904.00	48.1 PK	74.0	-25.9	1.00 H	300	6.08	42.02
6	4904.00	36.0 AV	54.0	-18.0	1.00 H	300	-6.02	42.02
7	7356.00	51.1 PK	74.0	-22.9	1.00 H	138	4.45	46.65
8	7356.00	40.3 AV	54.0	-13.7	1.00 H	138	-6.35	46.65

**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	105.3 PK			1.22 V	348	72.75	32.55
2	*2452.00	94.6 AV			1.22 V	348	62.05	32.55
3	2483.50	67.8 PK	74.0	-6.2	1.22 V	348	35.17	32.63
4	2483.50	53.2 AV	54.0	-0.8	1.22 V	348	20.57	32.63
5	4904.00	48.9 PK	74.0	-25.1	1.10 V	345	6.88	42.02
6	4904.00	36.0 AV	54.0	-18.0	1.10 V	345	-6.02	42.02
7	7356.00	52.8 PK	74.0	-21.2	1.65 V	14	6.15	46.65
8	7356.00	41.8 AV	54.0	-12.2	1.65 V	14	-4.85	46.65

**REMARKS:**

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

### 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 INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S SPECTRUM ANALYZER	FSP40	100036	Dec. 14, 2011	Dec. 13, 2012

**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. Tested date : July 02, 2012

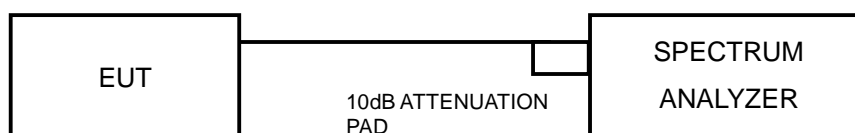
#### 4.3.3 TEST PROCEDURE

1. Set resolution bandwidth (RBW) = approximately 1% of the emission bandwidth
2. Set the video bandwidth (VBW)  $\geq 3 \times$  RBW, Detector = Peak.
3. Trace mode = max hold.
4. Sweep = auto couple.
5. 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

#### 4.3.4 DEVIATION FROM TEST STANDARD

No deviation

#### 4.3.5 TEST SETUP



#### 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.



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### 4.3.7 TEST RESULTS

#### 802.11b

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	8.17	0.5	PASS
6	2437	8.59	0.5	PASS
11	2462	8.48	0.5	PASS

#### 802.11g

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	15.79	0.5	PASS
6	2437	16.18	0.5	PASS
11	2462	15.99	0.5	PASS

#### 802.11n (20MHz)

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1		
1	2412	13.55	16.62	0.5	PASS
6	2437	17.38	17.34	0.5	PASS
11	2462	17.44	17.09	0.5	PASS

#### 802.11n (40MHz)

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1		
3	2422	36.63	36.72	0.5	PASS
6	2437	36.82	36.63	0.5	PASS
9	2452	36.70	36.08	0.5	PASS



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#### 4.4 CONDUCTED OUTPUT POWER MEASUREMENT

##### 4.4.1 LIMITS OF MAXIMUM PEAK OUTPUT POWER MEASUREMENT

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

##### 4.4.2 INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Power Meter	ML2495A	0824006	May 10, 2012	May 09, 2013
Peak Power Sensor	MA2411B	0738172	May 10, 2012	May 09, 2013

**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. Tested date : July 02, 2012

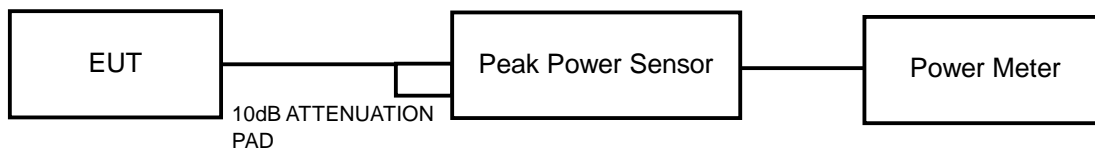
##### 4.4.3 TEST PROCEDURES

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

##### 4.4.4 DEVIATION FROM TEST STANDARD

No deviation

##### 4.4.5 TEST SETUP



##### 4.4.6 EUT OPERATING CONDITIONS

Same as Item 4.3.6

#### 4.4.7 TEST RESULTS

##### 802.11b

CHANNEL	FREQUENCY (MHz)	PEAK POWER (mW)	PEAK POWER (dBm)	LIMIT (dBm)	PASS/FAIL
1	2412	173.780	22.4	30	PASS
6	2437	169.824	22.3	30	PASS
11	2462	169.824	22.3	30	PASS

##### 802.11g

CHANNEL	FREQUENCY (MHz)	PEAK POWER (mW)	PEAK POWER (dBm)	LIMIT (dBm)	PASS/FAIL
1	2412	229.087	23.6	30	PASS
6	2437	363.078	25.6	30	PASS
11	2462	239.883	23.8	30	PASS

##### 802.11n (20MHz)

CHAN.	FREQUENCY (MHz)	PEAK POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
1	2412	22.3	22.2	335.783	25.26	30	PASS
6	2437	24.8	24.7	597.116	27.76	30	PASS
11	2462	22.4	22.5	351.608	25.46	30	PASS

##### 802.11n (40MHz)

CHAN.	FREQUENCY (MHz)	PEAK POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
3	2422	19.2	19.7	176.501	22.47	30	PASS
6	2437	21.6	22.2	310.503	24.92	30	PASS
9	2452	19.3	20.1	187.443	22.73	30	PASS

## 4.5 POWER SPECTRAL DENSITY MEASUREMENT

### 4.5.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

The Maximum of Power Spectral Density Measurement is 8dBm.

### 4.5.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S Spectrum Analyzer	FSP40	100036	Dec. 14, 2011	Dec. 13, 2012

**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. Tested date : July 02, 2012

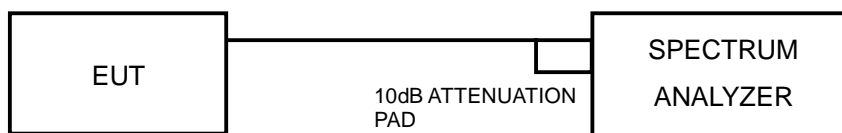
### 4.5.3 TEST PROCEDURE

1. Set the RBW = 100 kHz, VBW =300 kHz, Detector = peak.
2. Sweep time = auto couple, Trace mode = max hold, allow trace to fully stabilize.
3. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.
4. Scale the observed power level to an equivalent value in 3 kHz by adjusting (reducing) the measured power by a bandwidth correction factor (BWCF) where  $BWCF = 10\log(3\text{ kHz}/100\text{kHz})$

### 4.5.4 DEVIATION FROM TEST STANDARD

No deviation

### 4.5.5 TEST SETUP



### 4.5.6 EUT OPERATING CONDITION

Same as Item 4.3.6





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## 4.5.7 TEST RESULTS

### 802.11b

Channel	FREQUENCY (MHz)	PSD (dBm/100kHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
1	2412	9.24	-5.99	8	PASS
6	2437	9.34	-5.89	8	PASS
11	2462	9.62	-5.61	8	PASS

### 802.11g

Channel	FREQUENCY (MHz)	PSD (dBm/100kHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
1	2412	4.23	-11.00	8	PASS
6	2437	10.45	-4.78	8	PASS
11	2462	5.33	-9.90	8	PASS

### 802.11n (20MHz)

TX chain	Channel	FREQ. (MHz)	PSD (dBm/100kHz)	PSD (dBm/3kHz)	10 log (N=2) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	1	2412	2.43	-12.80	3.01	-9.79	8	PASS
	6	2437	8.24	-6.99	3.01	-3.98	8	PASS
	11	2462	1.99	-13.24	3.01	-10.23	8	PASS
1	1	2412	1.42	-13.81	3.01	-10.80	8	PASS
	6	2437	8.55	-6.68	3.01	-3.67	8	PASS
	11	2462	1.56	-13.67	3.01	-10.66	8	PASS

### 802.11n (40MHz)

TX chain	Channel	FREQ. (MHz)	PSD (dBm/100kHz)	PSD (dBm/3kHz)	10 log (N=2) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	3	2422	-3.44	-18.67	3.01	-15.66	8	PASS
	6	2437	-0.96	-16.19	3.01	-13.18	8	PASS
	9	2452	-3.82	-19.05	3.01	-16.04	8	PASS
1	3	2422	-2.86	-18.09	3.01	-15.08	8	PASS
	6	2437	-1.11	-16.34	3.01	-13.33	8	PASS
	9	2452	-4.10	-19.33	3.01	-16.32	8	PASS

## 4.6 CONDUCTED OUT-BAND EMISSION MEASUREMENT

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

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

### 4.6.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S Spectrum Analyzer	FSP40	100036	Dec. 14, 2011	Dec. 13, 2012

**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. Tested date : July 02, 2012

### 4.6.3 TEST PROCEDURE

#### MEASUREMENT PROCEDURE REF

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

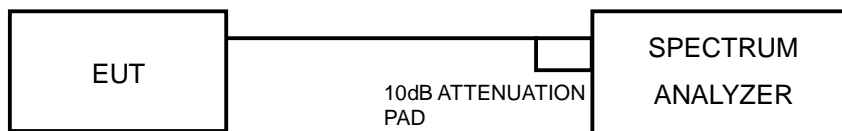
## MEASUREMENT PROCEDURE OOB

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

### 4.6.4 DEVIATION FROM TEST STANDARD

No deviation

### 4.6.5 TEST SETUP



### 4.6.6 EUT OPERATING CONDITION

Same as Item 4.3.6

### 4.6.7 TEST RESULTS

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

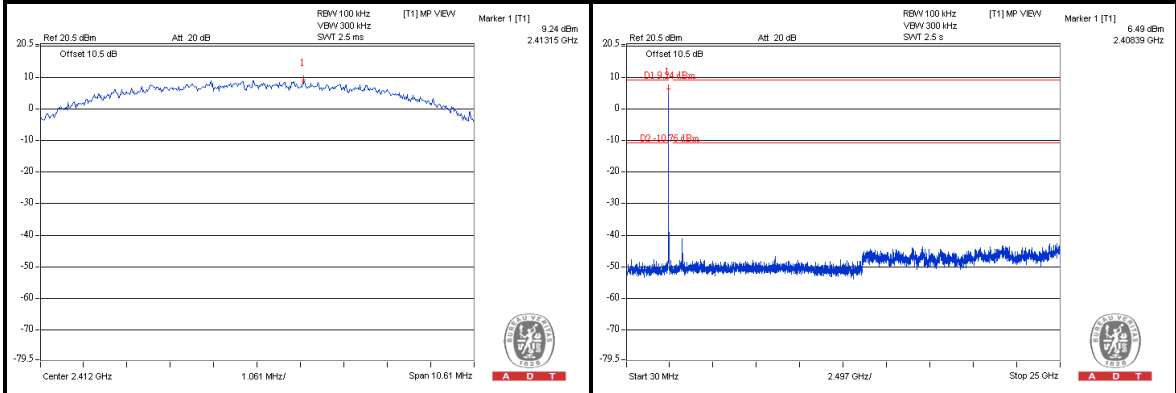
The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement.



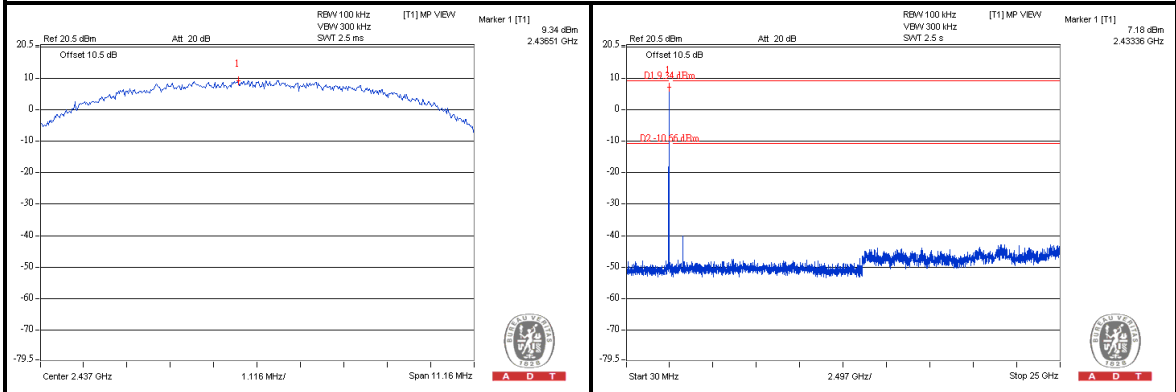
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### 802.11b

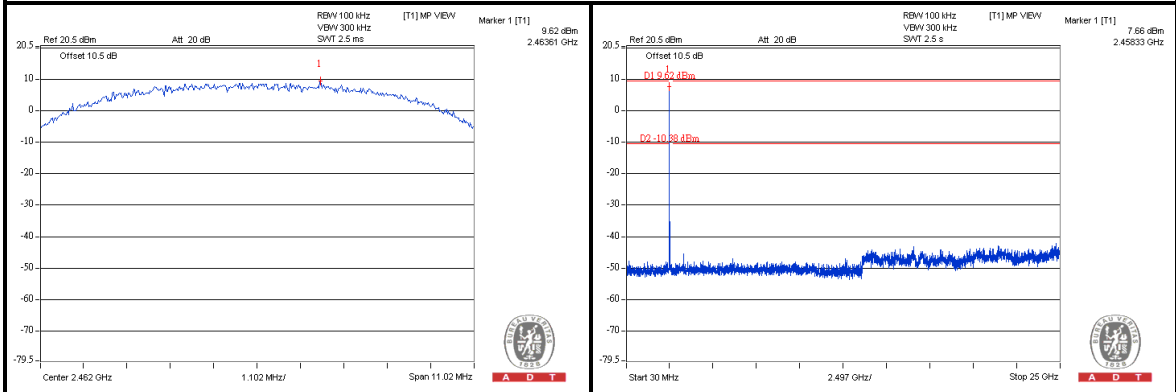
#### CH 1



#### CH 6



#### CH 11

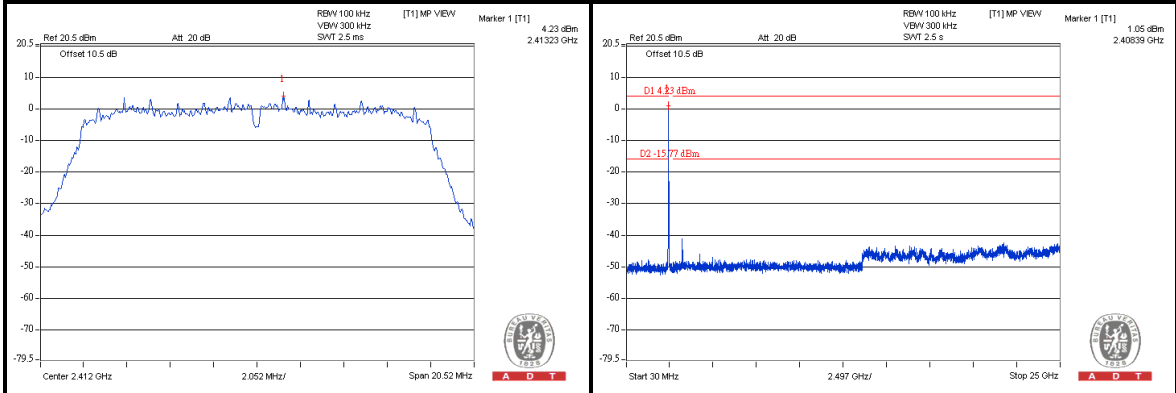




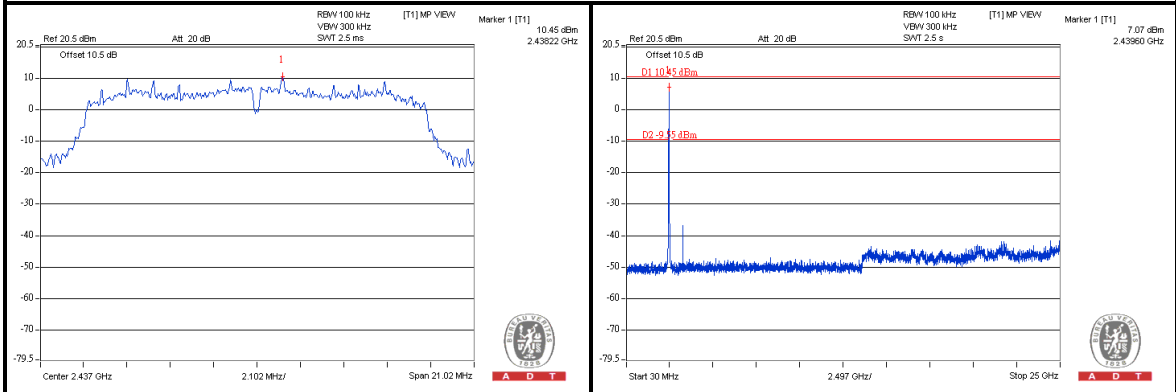
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### 802.11g

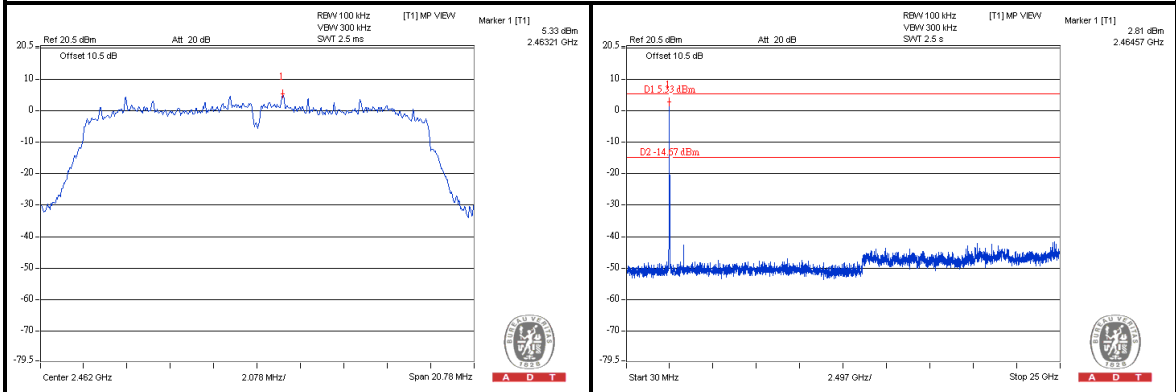
#### CH 1



#### CH 6



#### CH 11

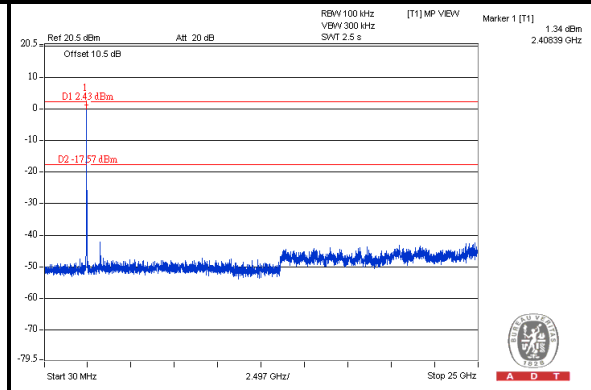
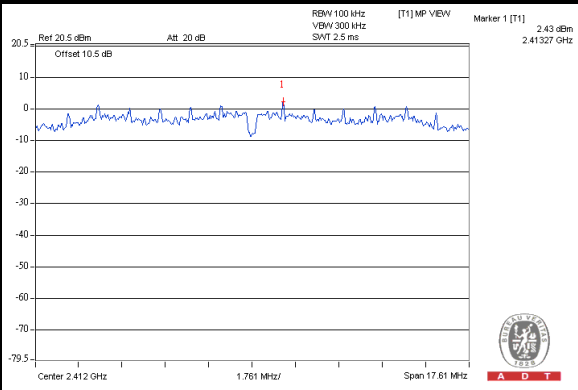




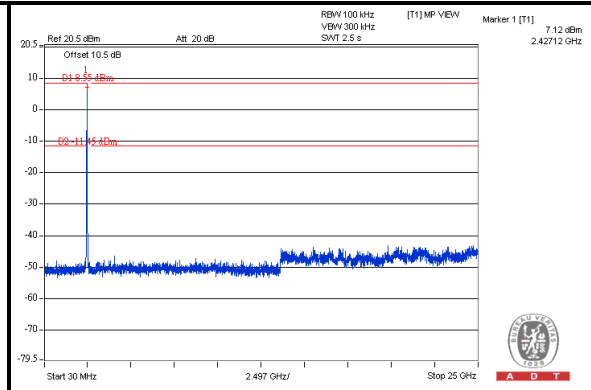
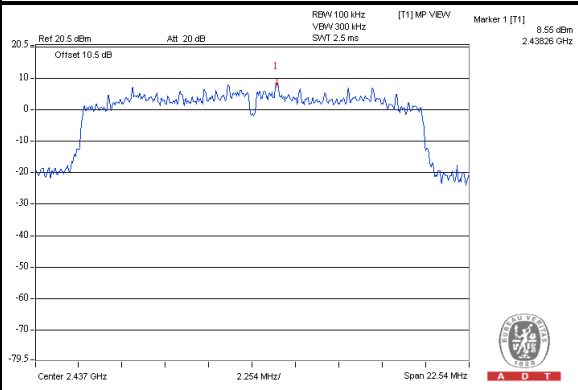
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# 802.11n (20MHz)

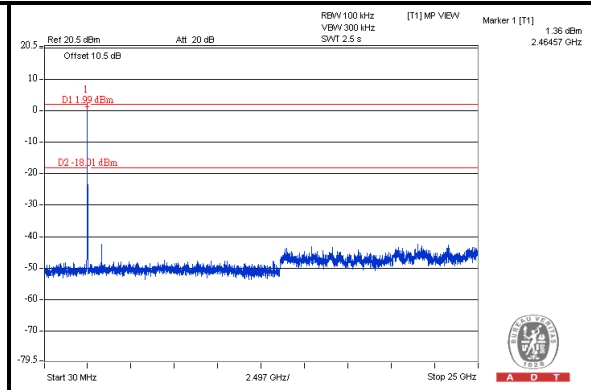
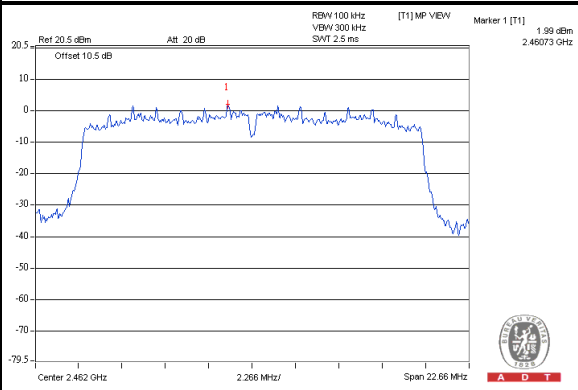
## CH 1



## CH 6



## CH 11

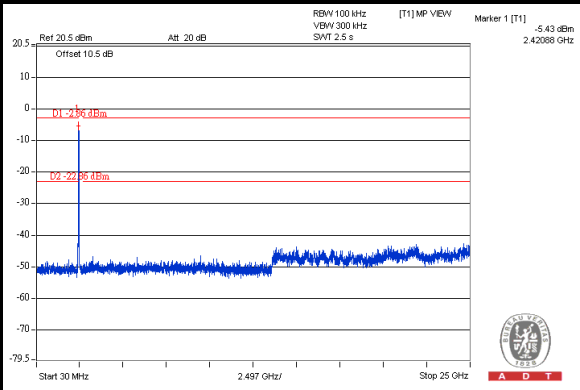
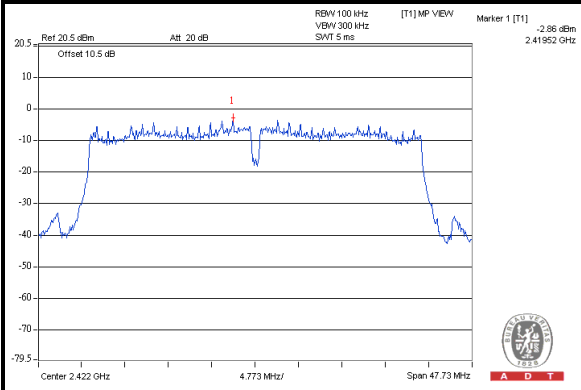




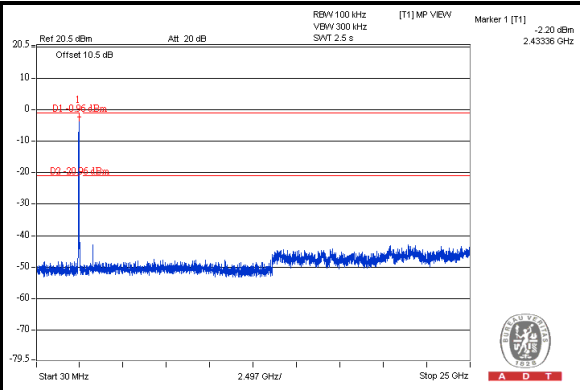
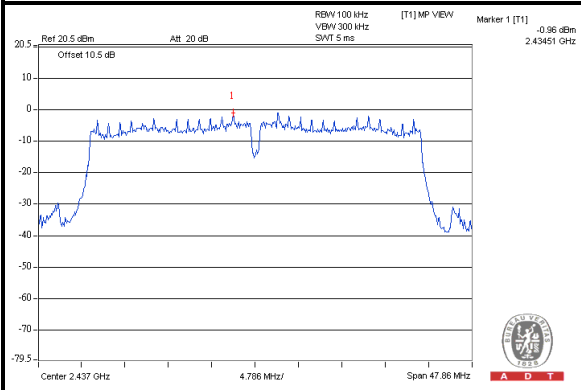
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### 802.11n (40MHz)

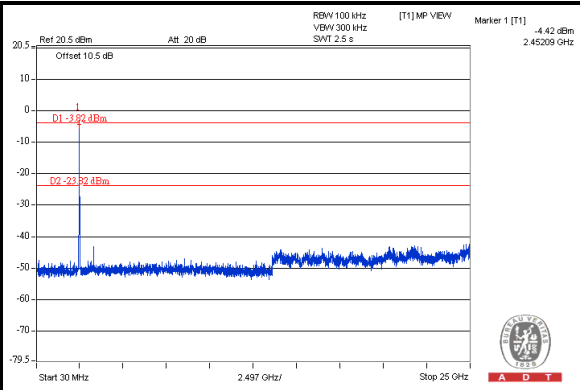
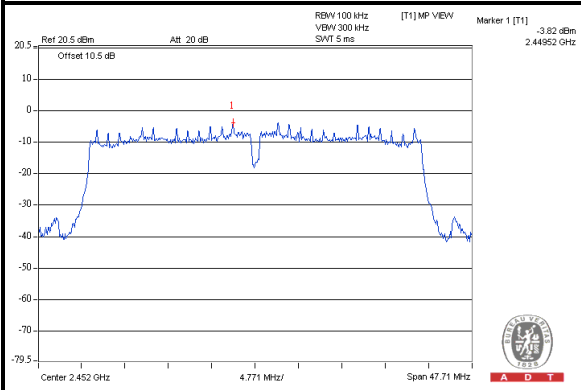
#### CH 3



#### CH 6



#### CH 9





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## 5. TEST TYPES AND RESULTS (FOR 5GHz, 5725~5850MHz Band)

### 5.1 CONDUCTED EMISSION MEASUREMENT

#### 5.1.1 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 0.50 MHz.

#### 5.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver	ESCS 30	100375	Mar. 08, 2012	Mar. 07, 2013
Line-Impedance Stabilization Network (for EUT) SCHWARZBECK	NSLK8127	8127-522	Sep. 07, 2011	Sep. 06, 2012
Line-Impedance Stabilization Network (for Peripheral)	ESH3-Z5	848773/004	Nov. 02, 2011	Nov. 01, 2012
RF Cable (JYEBAO)	5DFB	COCCAB-001	Aug. 29, 2011	Aug. 28, 2012
50 ohms Terminator	50	3	Nov. 02, 2011	Nov. 01, 2012
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 Shielded Room No. C.
3. The VCCI Con C Registration No. is C-3611.
4. Tested Date: June 08, 2012





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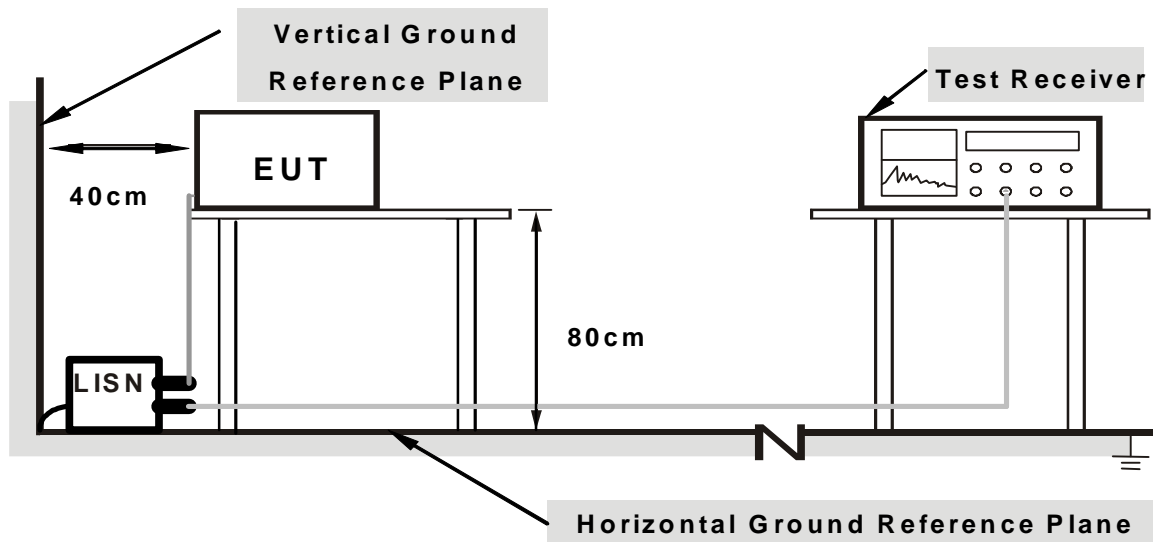
### 5.1.3 TEST PROCEDURES

- 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) were not recorded.

### 5.1.4 DEVIATION FROM TEST STANDARD

No deviation

### 5.1.5 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 related item – Photographs of the Test Configuration.

### 5.1.6 EUT OPERATING CONDITIONS

Same as the 4.1.6

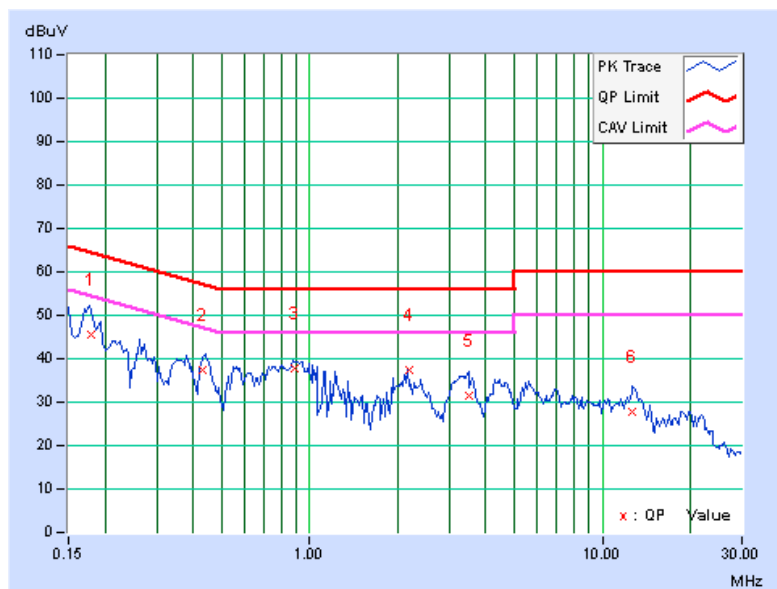
### 5.1.7 TEST RESULTS

<b>PHASE</b>	Line (L)	<b>6dB BANDWIDTH</b>	9 kHz
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No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
	1	0.17822	0.08	45.33	39.25	45.41	39.33	64.57	54.57	-19.16
<b>2</b>	<b>0.42890</b>	<b>0.11</b>	<b>37.45</b>	<b>36.69</b>	<b>37.56</b>	<b>36.80</b>	<b>57.27</b>	<b>47.27</b>	<b>-19.71</b>	<b>-10.47</b>
3	0.88772	0.14	37.82	28.05	37.96	28.19	56.00	46.00	-18.04	-17.81
4	2.17729	0.28	37.28	27.17	37.56	27.45	56.00	46.00	-18.44	-18.55
5	3.49350	0.37	31.28	27.23	31.65	27.60	56.00	46.00	-24.35	-18.40
6	12.67580	0.83	26.96	26.30	27.79	27.13	60.00	50.00	-32.21	-22.87

#### 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.

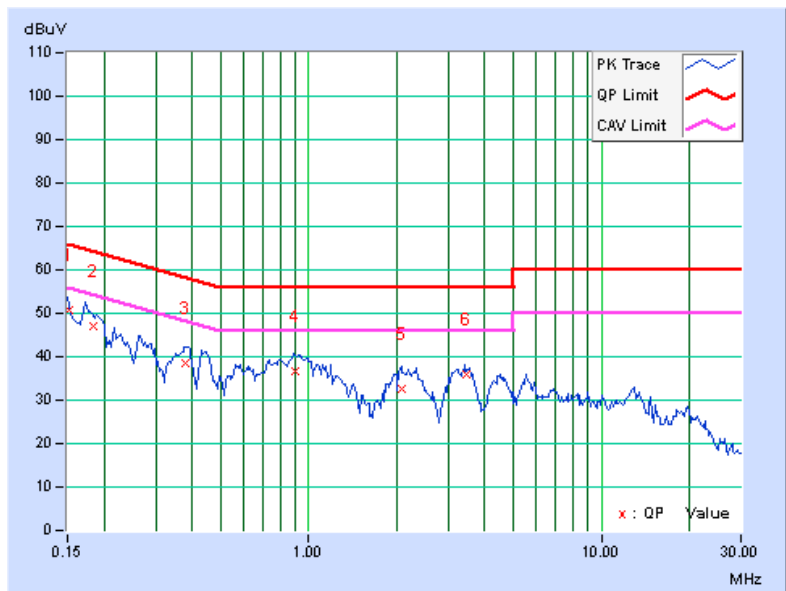


PHASE	Neutral (N)	6dB BANDWIDTH	9 kHz
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No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
	1	0.15123	0.06	50.67	38.67	50.73	38.73	65.93	55.93	-15.20
2	0.18280	0.07	47.12	35.06	47.19	35.13	64.36	54.36	-17.17	-19.23
3	0.37874	0.10	38.33	24.52	38.43	24.62	58.31	48.31	-19.88	-23.69
4	0.89879	0.11	36.52	27.36	36.63	27.47	56.00	46.00	-19.37	-18.53
5	2.07339	0.19	32.57	27.11	32.76	27.30	56.00	46.00	-23.24	-18.70
6	3.45443	0.28	35.58	29.16	35.86	29.44	56.00	46.00	-20.14	-16.56

**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.



## 5.2 RADIATED AND BANDEDGE EMISSION MEASUREMENT

### 5.2.1 LIMITS OF RADIATED AND BANDEDGE 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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## 5.2.2 TEST INSTRUMENTS

### For below 1GHz test

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer Agilent	E4446A	MY48250254	July 12, 2011	July 11, 2012
Pre-Selector Agilent	N9039A	MY46520311	July 12, 2011	July 11, 2012
Signal Generator Agilent	N5181A	MY49060517	July 12, 2011	July 11, 2012
Pre-Amplifier Mini-Circuits	ZFL-1000VH2 B	AMP-ZFL-03	Nov. 15, 2011	Nov. 14, 2012
Pre-Amplifier Agilent	8449B	3008A02578	July 04, 2011	July 03, 2012
Pre-Amplifier SPACEK LABS	SLKKa-48-6	9K16	Nov. 15, 2011	Nov. 14, 2012
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-360	Apr. 09, 2012	Apr. 08, 2013
Horn_Antenna AISI	AIH.8018	0000320091110	Nov. 14, 2011	Nov. 13, 2012
Horn_Antenna SCHWARZBECK	BBHA 9170	9170-424	Oct. 07, 2011	Oct. 06, 2012
Loop Antenna <sup>(*)</sup> R&S	HFH2-Z2	100070	Jan. 31, 2012	Jan. 30, 2014
RF Cable	NA	RF104-201 RF104-203 RF104-204	Dec. 26, 2011	Dec. 25, 2012
RF Cable	NA	CHGCAB_001	Oct. 07, 2011	Oct. 06, 2012
Software	ADT_Radiated _V8.7.05	NA	NA	NA
Antenna Tower & Turn Table CT	NA	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 calibration interval of the above test instruments is 24 months and the calibrations are traceable to NML/ROC and NIST/USA.
- 3 The horn antenna, preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
4. The test was performed in 966 Chamber No. G.
- 5 The FCC Site Registration No. is 966073.
- 6 The VCCI Site Registration No. is G-137.
- 7 The CANADA Site Registration No. is IC 7450H-2.
- 8 Tested Date: June 13, 2012



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**For above 1GHz test**

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer Agilent	E4446A	MY48250253	Aug. 29, 2011	Aug. 28, 2012
Pre-Selector Agilent	N9039A	MY46520310	Aug. 29, 2011	Aug. 28, 2012
Signal Generator Agilent	N5181A	MY49060347	July 25, 2011	July 24, 2012
Pre-Amplifier Mini-Circuits	ZFL-1000VH2 B	AMP-ZFL-04	Nov. 15, 2011	Nov. 14, 2012
Pre-Amplifier Agilent	8449B	3008A02465	Feb. 27, 2012	Feb. 26, 2013
SPACEK LABS	SLKKa-48-6	9K16	Nov. 15, 2011	Nov. 14, 2012
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-361	Apr. 06, 2012	Apr. 05, 2013
Horn_Antenna AISL	AIH.8018	0000220091110	Nov. 23, 2011	Nov. 22, 2012
Horn_Antenna SCHWARZBECK	BBHA 9170	9170-424	Oct. 07, 2011	Oct. 06, 2012
Loop Antenna <sup>(*)</sup> R&S	HFH2-Z2	100070	Jan. 31, 2012	Jan. 30, 2014
RF Cable	NA	RF104-205 RF104-207 RF104-202	Dec. 27, 2011	Dec. 26, 2012
RF Cable	NA	CHHCAB_001	Oct. 08, 2011	Oct. 07, 2012
Software	ADT_Radiated _V8.7.05	NA	NA	NA
Antenna Tower & Turn Table CT	NA	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 calibration interval of the above test instruments is 24 months and the calibrations are traceable to NML/ROC and NIST/USA.
- 3 The horn antenna, preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
4. The test was performed in 966 Chamber No. H.
- 5 The FCC Site Registration No. is 797305.
- 6 The CANADA Site Registration No. is IC 7450H-3.
- 7 Tested Date: June 30, 2012

### 5.2.3 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f. The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

#### **NOTE:**

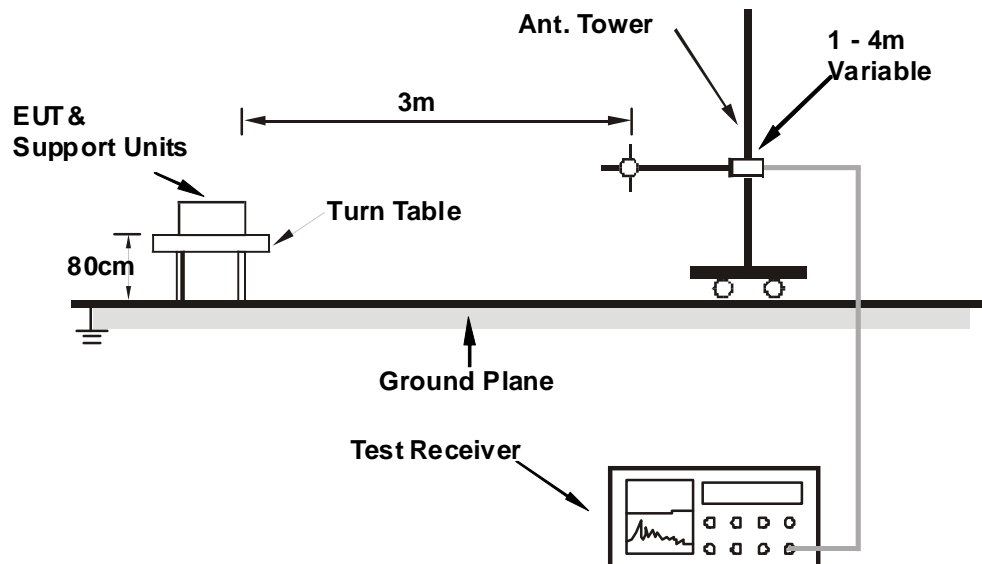
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

### 5.2.4 DEVIATION FROM TEST STANDARD

No deviation



### 5.2.5 TEST SETUP



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

### 5.2.6 EUT OPERATING CONDITIONS

Same as 4.2.6

## 5.2.7 TEST RESULTS

### BELOW 1GHz WORST-CASE DATA

#### 802.11n (20MHz)

<b>CHANNEL</b>	TX Channel 165	<b>DETECTOR FUNCTION</b>	Quasi-Peak (QP)
<b>FREQUENCY RANGE</b>	Below 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	57.00	34.7 QP	40.0	-5.3	1.75 H	154	20.90	13.78
2	68.50	33.1 QP	40.0	-6.9	1.50 H	360	20.34	12.78
3	176.00	35.9 QP	43.5	-7.6	2.00 H	266	22.56	13.31
4	375.01	35.0 QP	46.0	-11.0	1.00 H	251	17.79	17.22
5	461.00	38.0 QP	46.0	-8.0	1.25 H	58	18.60	19.41
6	624.21	34.3 QP	46.0	-11.7	1.75 H	277	11.34	22.97
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	185.02	35.7 QP	43.5	-7.8	1.50 V	4	23.20	12.51
2	421.51	38.0 QP	46.0	-8.0	1.00 V	3	19.58	18.41
3	470.77	40.0 QP	46.0	-6.0	1.00 V	3	20.30	19.66
4	624.96	39.1 QP	46.0	-7.0	1.00 V	0	16.08	22.97
5	750.01	38.7 QP	46.0	-7.3	1.25 V	341	13.79	24.91
6	874.95	37.1 QP	46.0	-8.9	1.50 V	186	9.97	27.12

#### REMARKS:

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



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ABOVE 1GHz DATA

802.11a

<b>CHANNEL</b>	TX Channel 149	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 40GHz		Average (AV)

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

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5745.00	103.5 PK			1.00 H	275	60.18	43.32
2	*5745.00	93.8 AV			1.00 H	275	50.48	43.32
3	11490.00	60.7 PK	74.0	-13.3	1.51 H	114	10.91	49.79
4	11490.00	50.4 AV	54.0	-3.6	1.51 H	114	0.61	49.79

**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	*5745.00	110.4 PK			1.00 V	263	67.08	43.32
2	*5745.00	101.3 AV			1.00 V	263	57.98	43.32
3	11490.00	61.2 PK	74.0	-12.8	1.00 V	90	11.41	49.79
4	11490.00	49.2 AV	54.0	-4.8	1.00 V	90	-0.59	49.79

**REMARKS:**

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " \* ": Fundamental frequency.
6. The limit value is defined as per 15.247.



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<b>CHANNEL</b>	TX Channel 157	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 40GHz		Average (AV)

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

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5785.00	104.1 PK			1.00 H	282	60.73	43.37
2	*5785.00	94.2 AV			1.00 H	282	50.83	43.37
3	11570.00	61.0 PK	74.0	-13.0	1.45 H	33	11.17	49.83
4	11570.00	50.4 AV	54.0	-3.6	1.45 H	33	0.57	49.83

**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	111.0 PK			1.01 V	267	67.63	43.37
2	*5785.00	101.4 AV			1.01 V	267	58.03	43.37
3	11570.00	62.8 PK	74.0	-11.2	1.04 V	95	12.97	49.83
4	11570.00	51.1 AV	54.0	-2.9	1.04 V	95	1.27	49.83

**REMARKS:**

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " \* ": Fundamental frequency.
6. The limit value is defined as per 15.247.



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<b>CHANNEL</b>	TX Channel 165	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 40GHz		Average (AV)

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

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5825.00	104.7 PK			1.00 H	283	61.23	43.47
2	*5825.00	94.5 AV			1.00 H	283	51.03	43.47
3	11650.00	60.6 PK	74.0	-13.4	1.54 H	115	10.49	50.11
4	11650.00	50.4 AV	54.0	-3.6	1.54 H	115	0.29	50.11

**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	110.4 PK			1.00 V	252	66.93	43.47
2	*5825.00	101.1 AV			1.00 V	252	57.63	43.47
3	11650.00	62.9 PK	74.0	-11.1	1.06 V	80	12.79	50.11
4	11650.00	51.1 AV	54.0	-2.9	1.06 V	80	0.99	50.11

**REMARKS:**

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " \* ": Fundamental frequency.
6. The limit value is defined as per 15.247.



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802.11n (20MHz)

<b>CHANNEL</b>	TX Channel 149	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 40GHz		Average (AV)

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

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5745.00	104.3 PK			1.00 H	286	60.98	43.32
2	*5745.00	94.4 AV			1.00 H	286	51.08	43.32
3	11490.00	60.5 PK	74.0	-13.5	1.50 H	117	10.71	49.79
4	11490.00	50.4 AV	54.0	-3.6	1.50 H	117	0.61	49.79

**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	*5745.00	110.8 PK			1.06 V	283	67.48	43.32
2	*5745.00	101.1 AV			1.06 V	283	57.78	43.32
3	11490.00	61.7 PK	74.0	-12.3	1.00 V	90	11.91	49.79
4	11490.00	49.6 AV	54.0	-4.4	1.00 V	90	-0.19	49.79

**REMARKS:**

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " \* ": Fundamental frequency.
6. The limit value is defined as per 15.247.



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<b>CHANNEL</b>	TX Channel 157	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 40GHz		Average (AV)

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

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5785.00	104.2 PK			1.02 H	288	60.83	43.37
2	*5785.00	94.2 AV			1.02 H	288	50.83	43.37
3	11570.00	60.8 PK	74.0	-13.2	1.54 H	117	10.97	49.83
4	11570.00	50.1 AV	54.0	-3.9	1.54 H	117	0.27	49.83

**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	110.1 PK			1.04 V	242	66.73	43.37
2	*5785.00	100.4 AV			1.04 V	242	57.03	43.37
3	11570.00	61.4 PK	74.0	-12.6	1.02 V	79	11.57	49.83
4	11570.00	49.6 AV	54.0	-4.4	1.02 V	79	-0.23	49.83

**REMARKS:**

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " \* ": Fundamental frequency.
6. The limit value is defined as per 15.247.



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<b>CHANNEL</b>	TX Channel 165	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 40GHz		Average (AV)

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

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5825.00	104.9 PK			1.00 H	298	61.43	43.47
2	*5825.00	94.3 AV			1.00 H	298	50.83	43.47
3	11650.00	60.9 PK	74.0	-13.1	1.16 H	274	10.79	50.11
4	11650.00	50.2 AV	54.0	-3.8	1.16 H	274	0.09	50.11

**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	110.1 PK			1.01 V	231	66.63	43.47
2	*5825.00	100.5 AV			1.01 V	231	57.03	43.47
3	11650.00	61.5 PK	74.0	-12.5	1.04 V	79	11.39	50.11
4	11650.00	50.0 AV	54.0	-4.0	1.04 V	79	-0.11	50.11

**REMARKS:**

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " \* ": Fundamental frequency.
6. The limit value is defined as per 15.247.



**802.11n (40MHz)**

<b>CHANNEL</b>	TX Channel 151	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 40GHz		Average (AV)

<b>ANTENNA POLARITY &amp; TEST DISTANCE: HORIZONTAL AT 3 M</b>								
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	*5755.00	103.7 PK			1.05 H	297	60.36	43.34
2	*5755.00	94.2 AV			1.05 H	297	50.86	43.34
3	11510.00	60.8 PK	74.0	-13.2	1.46 H	113	11.02	49.78
4	11510.00	49.5 AV	54.0	-4.5	1.46 H	113	-0.28	49.78
<b>ANTENNA POLARITY &amp; TEST DISTANCE: VERTICAL AT 3 M</b>								
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	*5755.00	108.8 PK			1.01 V	219	65.46	43.34
2	*5755.00	98.7 AV			1.01 V	219	55.36	43.34
3	11510.00	61.6 PK	74.0	-12.4	1.10 V	72	11.82	49.78
4	11510.00	49.8 AV	54.0	-4.2	1.10 V	72	0.02	49.78

**REMARKS:**

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " \* ": Fundamental frequency.
6. The limit value is defined as per 15.247.



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<b>CHANNEL</b>	TX Channel 159	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 40GHz		Average (AV)

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

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5795.00	103.7 PK			1.06 H	292	60.32	43.38
2	*5795.00	94.3 AV			1.06 H	292	50.92	43.38
3	11590.00	59.9 PK	74.0	-14.1	1.45 H	117	10.06	49.84
4	11590.00	49.3 AV	54.0	-4.7	1.45 H	117	-0.54	49.84

**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	108.5 PK			1.03 V	208	65.12	43.38
2	*5795.00	98.2 AV			1.03 V	208	54.82	43.38
3	11590.00	61.1 PK	74.0	-12.9	1.15 V	66	11.26	49.84
4	11590.00	49.4 AV	54.0	-4.6	1.15 V	66	-0.44	49.84

**REMARKS:**

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " \* ": Fundamental frequency.
6. The limit value is defined as per 15.247.

### 5.3 6dB BANDWIDTH MEASUREMENT

#### 5.3.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

#### 5.3.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S Spectrum Analyzer	FSP40	100036	Dec. 14, 2011	Dec. 13, 2012

**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. Tested date : July 02, 2012

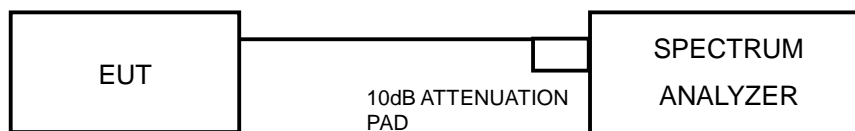
#### 5.3.3 TEST PROCEDURE

1. Set resolution bandwidth (RBW) = approximately 1% of the emission bandwidth
2. Set the video bandwidth (VBW)  $\geq 3 \times$  RBW, Detector = Peak.
3. Trace mode = max hold.
4. Sweep = auto couple.
5. 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

#### 5.3.4 DEVIATION FROM TEST STANDARD

No deviation

#### 5.3.5 TEST SETUP



#### 5.3.6 EUT OPERATING CONDITIONS

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



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### 5.3.7 TEST RESULTS

#### 802.11a

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
149	5745	16.35	0.5	PASS
157	5785	16.22	0.5	PASS
165	5825	16.25	0.5	PASS

#### 802.11n (20MHz)

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1		
149	5745	17.28	17.34	0.5	PASS
157	5785	17.13	17.23	0.5	PASS
165	5825	17.20	17.45	0.5	PASS

#### 802.11n (40MHz)

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1		
151	5755	35.63	36.21	0.5	PASS
159	5795	36.73	36.35	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 band: 1 Watt (30dBm)

### 5.4.2 INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Power Meter	ML2495A	0824006	May 10, 2012	May 09, 2013
Peak Power Sensor	MA2411B	0738172	May 10, 2012	May 09, 2013

**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. Tested date : July 02, 2012

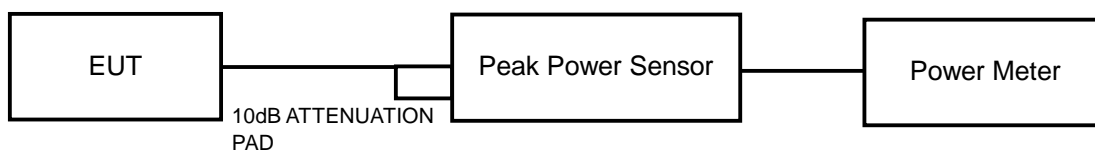
### 5.4.3 TEST PROCEDURES

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

### 5.4.4 DEVIATION FROM TEST STANDARD

No deviation

### 5.4.5 TEST SETUP



### 5.4.6 EUT OPERATING CONDITIONS

Same as Item 4.3.6



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### 5.4.7 TEST RESULTS

#### 802.11a

CHANNEL	FREQUENCY (MHz)	PEAK POWER (mW)	PEAK POWER (dBm)	LIMIT (dBm)	PASS/FAIL
149	5745	141.254	21.5	30	PASS
157	5785	144.544	21.6	30	PASS
165	5825	151.356	21.80	30	PASS

#### 802.11n (20MHz)

CHAN.	FREQUENCY (MHz)	PEAK POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
149	5745	21.3	21.5	276.150	24.41	30	PASS
157	5785	21.3	21.6	279.440	24.46	30	PASS
165	5825	21.5	21.7	289.165	24.61	30	PASS

#### 802.11n (40MHz)

CHAN.	FREQUENCY (MHz)	PEAK POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
151	5755	20.7	20.8	237.716	23.76	30	PASS
159	5795	21.2	21.6	276.370	24.41	30	PASS

## 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 INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S Spectrum Analyzer	FSP40	100036	Dec. 14, 2011	Dec. 13, 2012

**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. Tested date : July 02, 2012

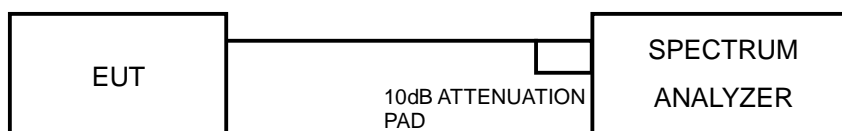
### 5.5.3 TEST PROCEDURE

1. Set the RBW = 100 kHz, VBW =300 kHz, Detector = peak.
2. Sweep time = auto couple, Trace mode = max hold, allow trace to fully stabilize.
3. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.
4. Scale the observed power level to an equivalent value in 3 kHz by adjusting (reducing) the measured power by a bandwidth correction factor (BWCF) where  $BWCF = 10\log(3 \text{ kHz}/100\text{kHz})$

### 5.5.4 DEVIATION FROM TEST STANDARD

No deviation

### 5.5.5 TEST SETUP



### 5.5.6 EUT OPERATING CONDITION

Same as Item 4.3.6



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### 5.5.7 TEST RESULTS

#### 802.11a

Channel	FREQUENCY (MHz)	PSD (dBm/100kHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
149	5745	9.81	-5.42	8	PASS
157	5785	9.63	-5.60	8	PASS
165	5825	9.73	-5.50	8	PASS

#### 802.11n (20MHz)

TX chain	Channel	FREQ. (MHz)	PSD (dBm/100kHz)	PSD (dBm/3kHz)	10 log (N=2) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	149	5745	8.59	-6.64	3.01	-3.63	8	PASS
	157	5785	8.49	-6.74	3.01	-3.73	8	PASS
	165	5825	8.82	-6.41	3.01	-3.40	8	PASS
1	149	5745	9.08	-6.15	3.01	-3.14	8	PASS
	157	5785	8.99	-6.24	3.01	-3.23	8	PASS
	165	5825	8.82	-6.41	3.01	-3.40	8	PASS

#### 802.11n (40MHz)

TX chain	Channel	FREQ. (MHz)	PSD (dBm/100kHz)	PSD (dBm/3kHz)	10 log (N=2) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	151	5755	2.28	-12.95	3.01	-9.94	8	PASS
	159	5795	5.24	-9.99	3.01	-6.98	8	PASS
1	151	5755	2.00	-13.23	3.01	-10.22	8	PASS
	159	5795	5.76	-9.47	3.01	-6.46	8	PASS



## 5.6 CONDUCTED OUT-BAND EMISSION MEASUREMENT

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

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

### 5.6.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S Spectrum Analyzer	FSP40	100036	Dec. 14, 2011	Dec. 13, 2012

**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. Tested date : July 02, 2012

### 5.6.3 TEST PROCEDURE

#### MEASUREMENT PROCEDURE REF

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

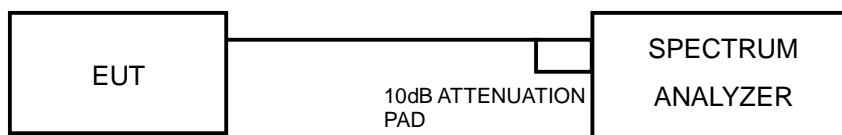
## MEASUREMENT PROCEDURE OOB

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

### 5.6.4 DEVIATION FROM TEST STANDARD

No deviation

### 5.6.5 TEST SETUP



### 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. Only worst data of each operating mode is presented.

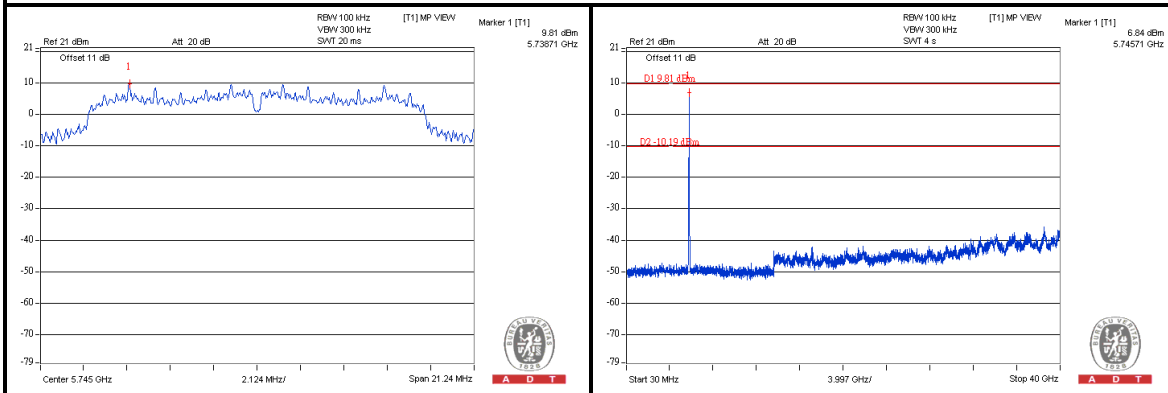
The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement.



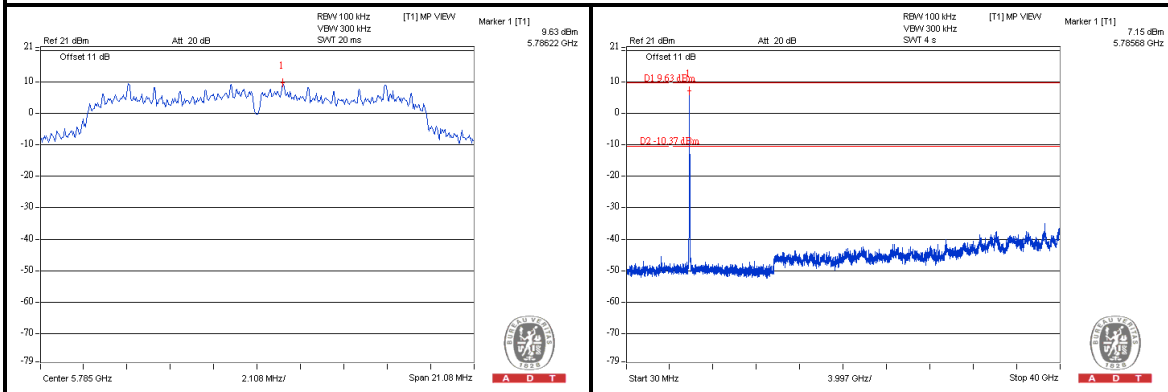
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### 802.11a

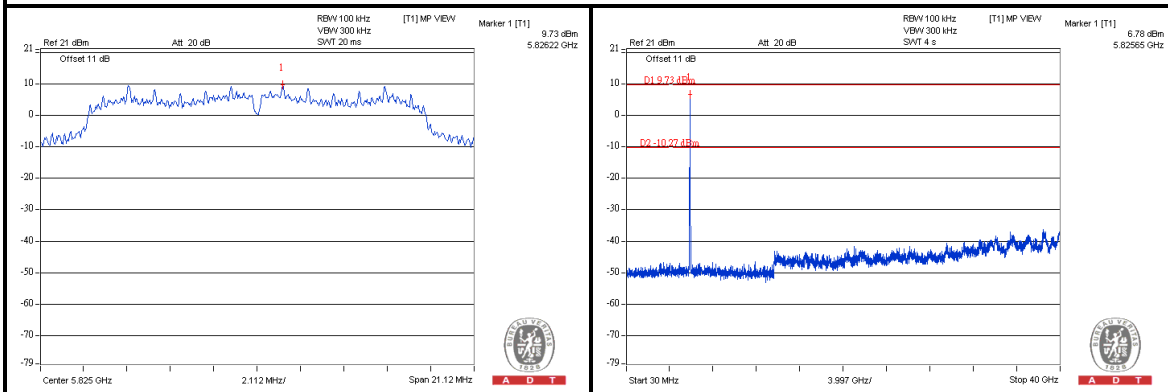
#### CH 149



#### CH 157



#### CH 165

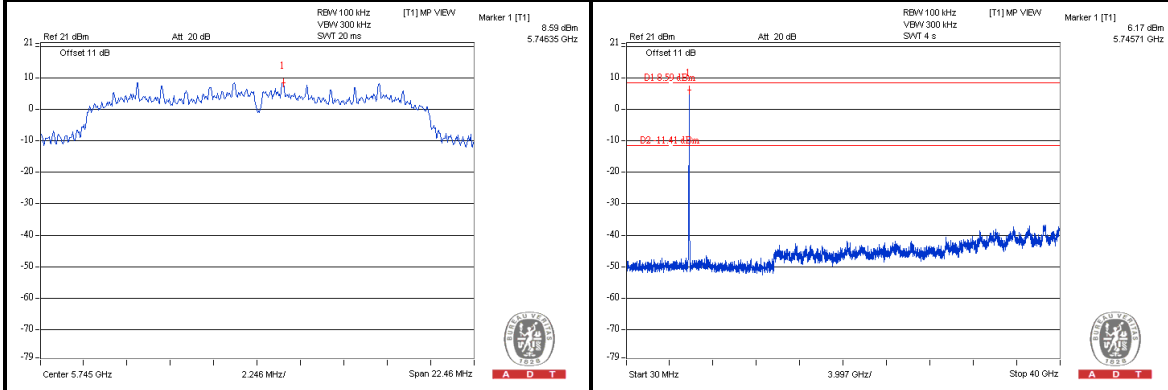




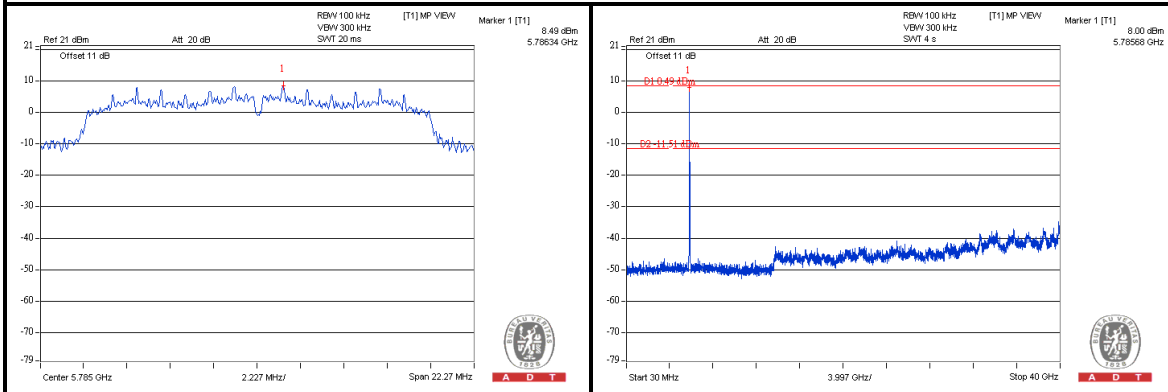
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### 802.11n (20MHz)

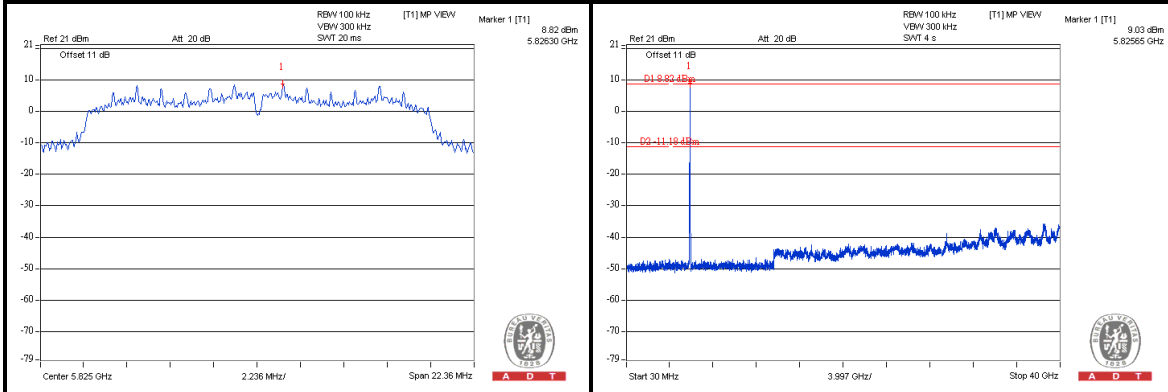
#### CH 149



#### CH 157



#### CH 165

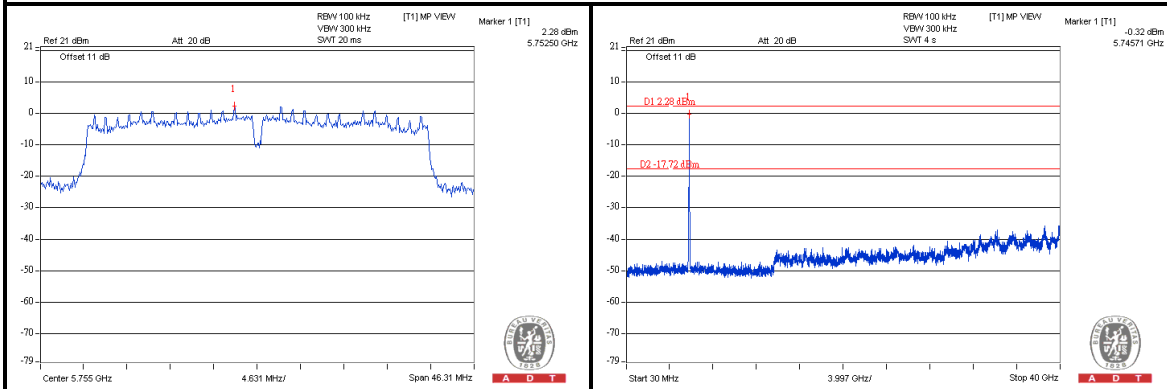




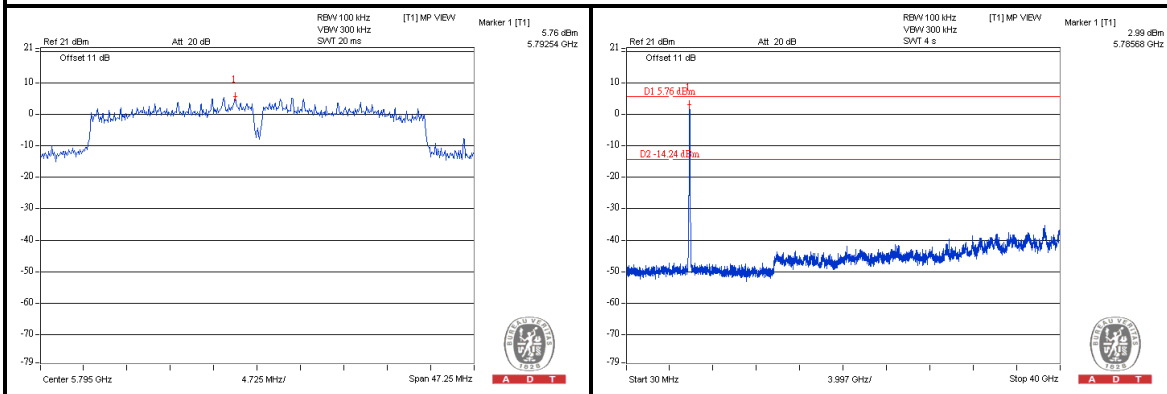
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### 802.11n (40MHz)

#### CH 151



#### CH 159





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## 6. PHOTOGRAPHS OF THE TEST CONFIGURATION

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





## 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:

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

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



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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.

**--- END ---**