



# FCC TEST REPORT(15.407)

**REPORT NO.:** RF120604E06-1  
**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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## RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF120604E06-1	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 E (Section 15.407)**  
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 )

## 2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

For 5GHz, 5180~5240MHz

APPLIED STANDARD: FCC PART 15, SUBPART E (SECTION 15.407)			
STANDARD SECTION	TEST TYPE	RESULT	REMARK
15.407(b)(6)	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -10.67dB at 0.43741MHz
15.407(b/1/2/3) (b)(6)	Spurious Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -0.6dB at 5150.00MHz
15.407(a/1/2)	Transmit Power	PASS	Meet the requirement of limit.
15.407(a)(6)	Peak Power Excursion	PASS	Meet the requirement of limit.
15.407(a/1/2)	Peak Power Spectral Density	PASS	Meet the requirement of limit.
15.407(g)	Frequency Stability	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 5.15~5.25GHz. For the 2.400 ~ 2.4835GHz and 5.725~5.850GHz RF parameters was recorded in another test report.

## 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

<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.



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### 3.2 DESCRIPTION OF TEST MODES

#### Operated in 5180 ~ 5240MHz band:

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

CHANNEL	FREQUENCY
36	5180 MHz
40	5200 MHz
44	5220 MHz
48	5240 MHz

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

CHANNEL	FREQUENCY
38	5190 MHz
46	5230 MHz



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### 3.2.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

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

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

#### **POWER LINE CONDUCTED EMISSION TEST:**

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

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (MBPS)
802.11n (20MHz)	36 to 48	36	OFDM	BPSK	6.5

#### **RADIATED EMISSION TEST (BELOW 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)
802.11n (20MHz)	36 to 48	36	OFDM	BPSK	6.5



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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)
802.11a	36 to 48	36, 40, 48	OFDM	BPSK	6
802.11n (20MHz)	36 to 48	36, 40, 48	OFDM	BPSK	6.5
802.11n (40MHz)	36 to 48	38, 46	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)
802.11a	36 to 48	36, 40, 48	OFDM	BPSK	6
802.11n (20MHz)	36 to 48	36, 40, 48	OFDM	BPSK	6.5
802.11n (40MHz)	36 to 48	38, 46	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

### **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 E (15.407)**

**789033 D01 General UNII Test Procedures v01r01**

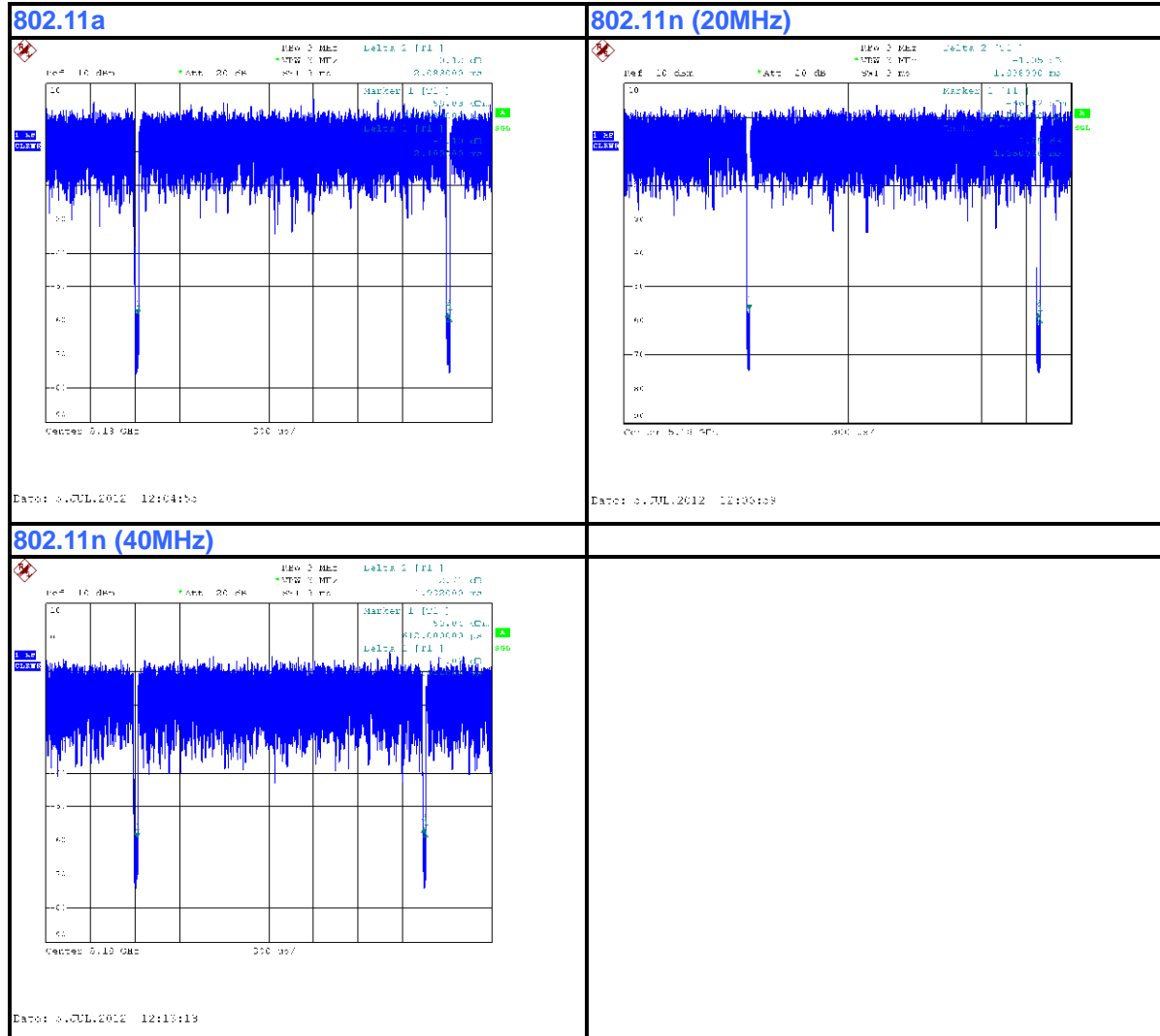
**ANSI C63.10-2009**

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.

### 3.4 Duty cycle of test signal

Duty cycle of test signal is > 98 %, duty factor is not required.





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### 3.5 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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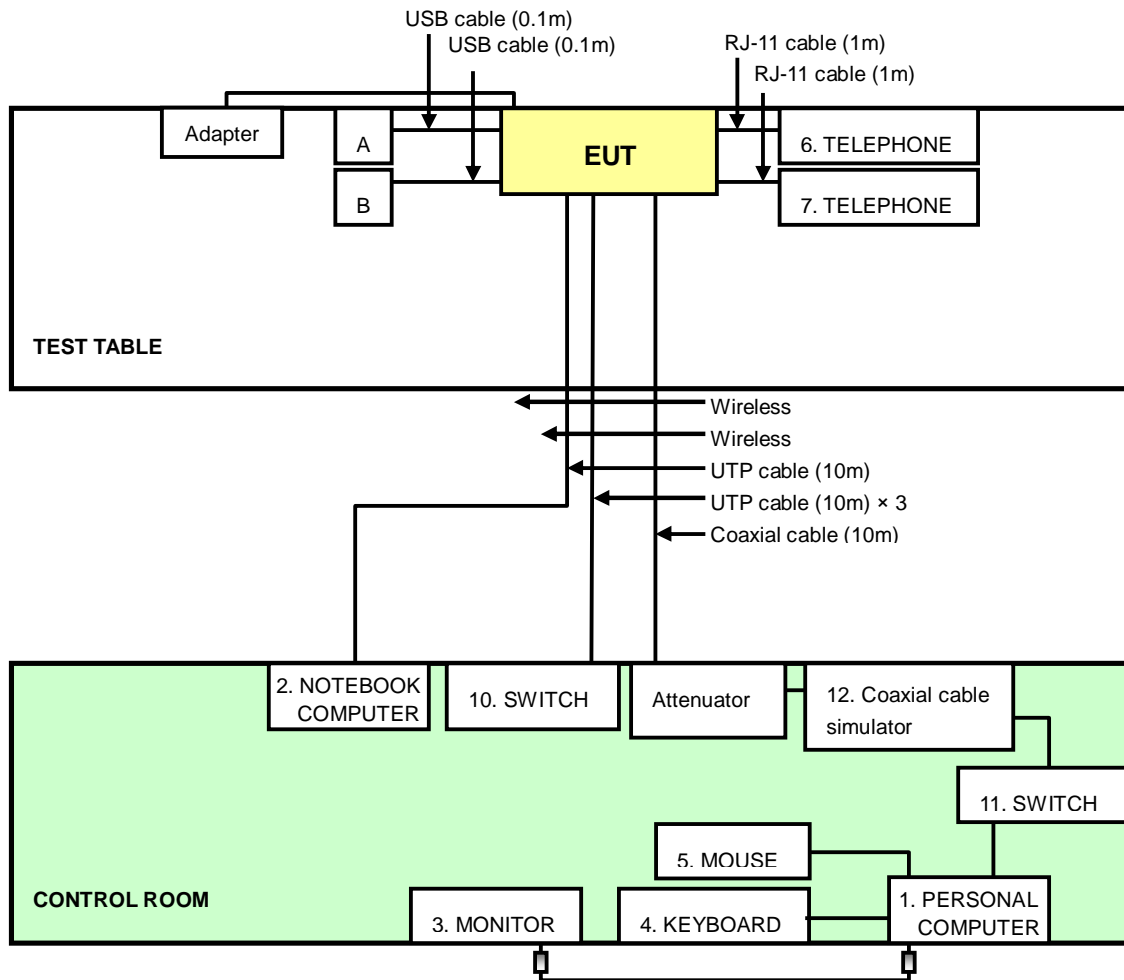
For other test					
NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	NOTEBOOK COMPUTER	DELL	PP32LA	FSLB32S	FCC DoC
2	HUB	ZyXEL	ES-116P	S060H0200021 5	FCC DoC
3	iPod	Apple	MC749TA/A	CC4DMFJUDFD M	NA
4	iPod	Apple	MC749TA/A	CC4DN25WDF DM	NA
5	TELEPHONE	WONDER	WD-303	7C17KA04011	NA
6	TELEPHONE	WONDER	WD-303	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).

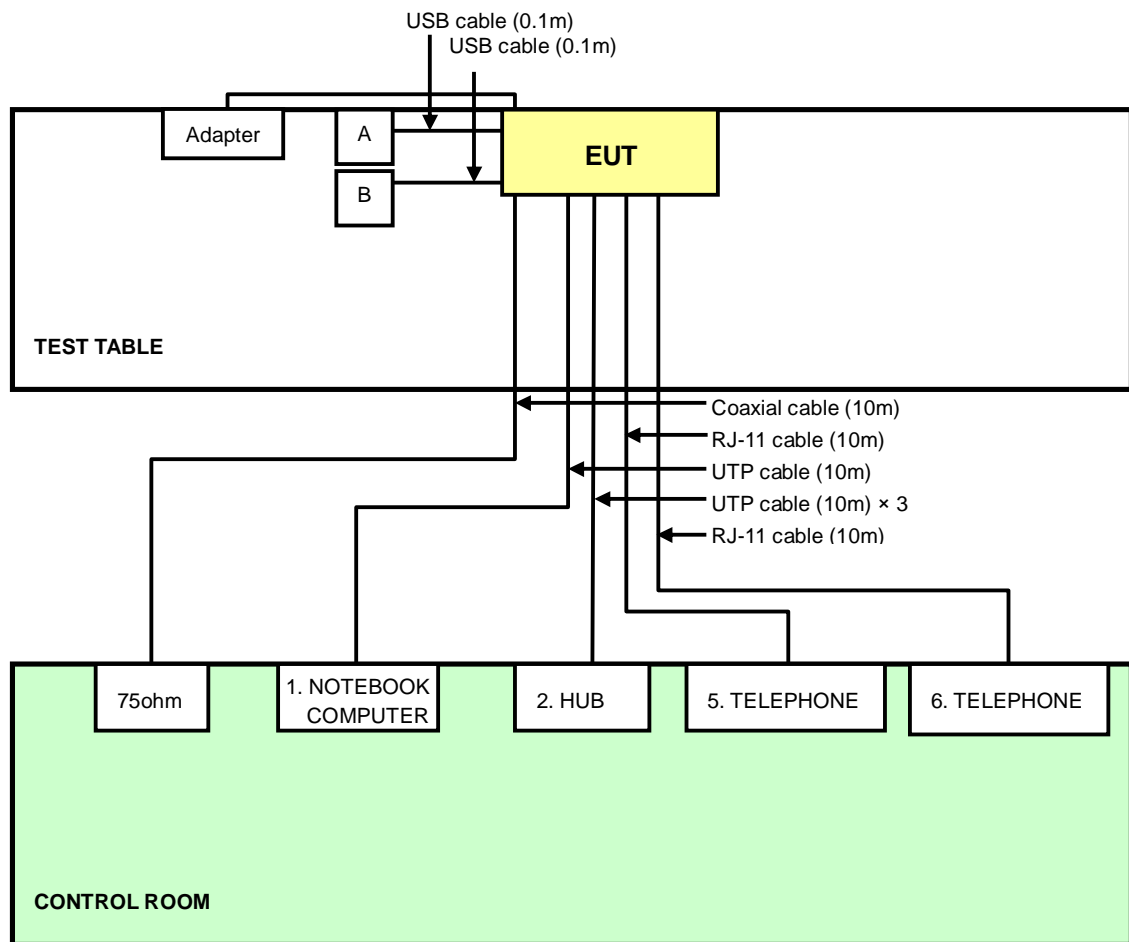
### 3.6 CONFIGURATION OF SYSTEM UNDER TEST

For Conducted 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

### 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



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#### 4.1.3 TEST PROCEDURES

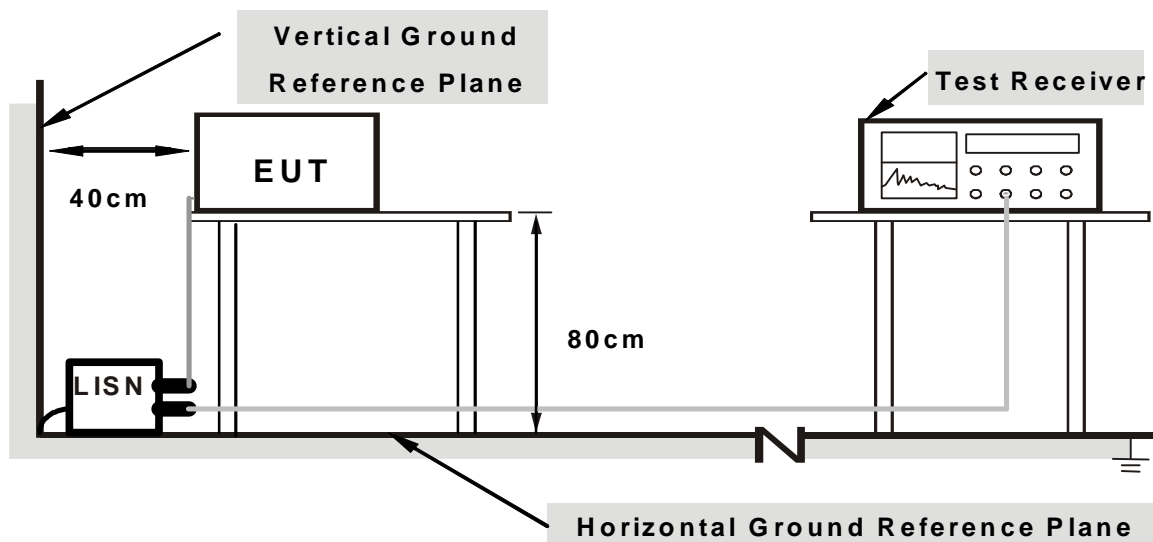
- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN.
- b. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- c. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- d. The frequency range from 150kHz to 30MHz was searched. Emission level under (Limit – 20dB) was 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.

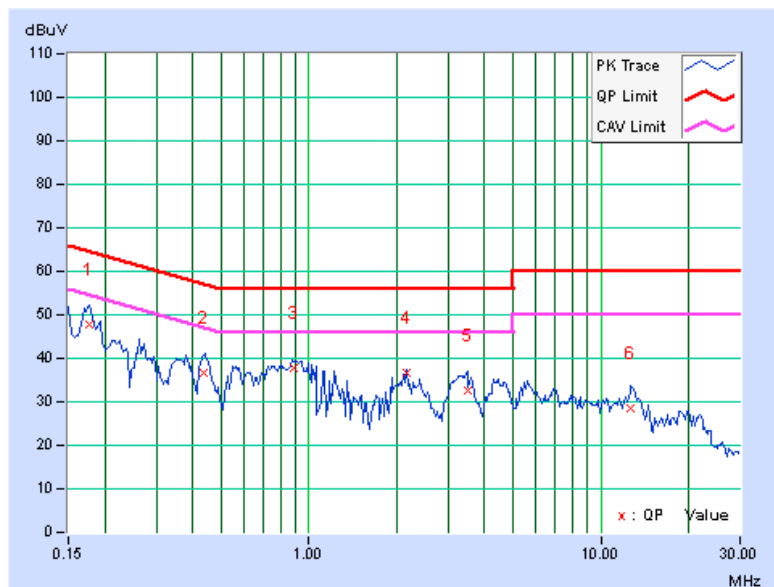
### 4.1.7 TEST RESULTS

<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	0.17669	0.08	47.80	36.25	47.88	36.33	64.64	54.64	-16.76
2	0.43741	0.11	36.50	36.33	36.61	36.44	57.11	47.11	-20.50	-10.67
3	0.88663	0.14	37.78	26.75	37.92	26.89	56.00	46.00	-18.08	-19.11
4	2.17559	0.28	36.28	25.07	36.56	25.35	56.00	46.00	-19.44	-20.65
5	3.49471	0.37	32.39	26.02	32.76	26.39	56.00	46.00	-23.24	-19.61
6	12.67379	0.83	27.67	25.47	28.50	26.30	60.00	50.00	-31.50	-23.70

#### 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.

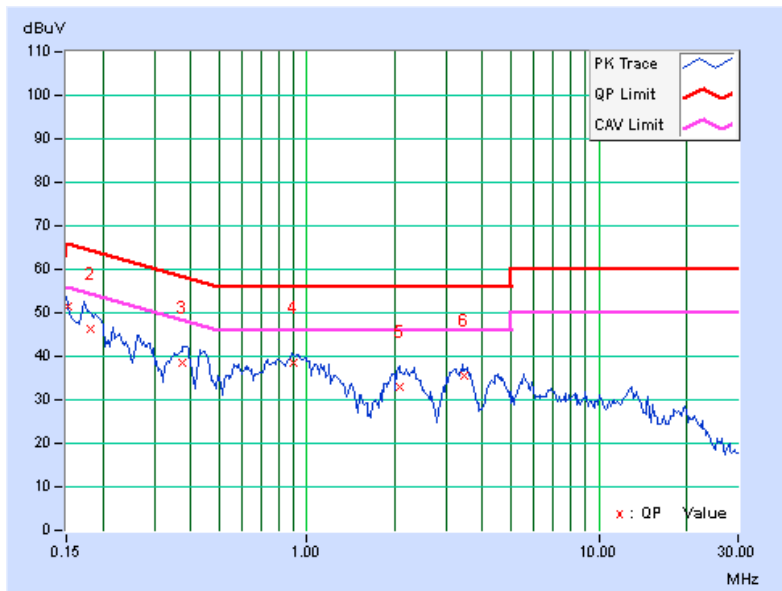


<b>PHASE</b>	Neutral (N)	<b>6dB BANDWIDTH</b>	9 kHz
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No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
	1	0.15199	0.06	51.25	37.33	51.31	37.39	65.89	55.89	-14.58
2	0.18159	0.07	46.12	35.36	46.19	35.43	64.41	54.41	-18.23	-18.99
3	0.37332	0.10	38.52	27.52	38.62	27.62	58.43	48.43	-19.81	-20.81
4	0.89796	0.11	38.52	27.28	38.63	27.39	56.00	46.00	-17.37	-18.61
5	2.07267	0.19	32.87	26.11	33.06	26.30	56.00	46.00	-22.94	-19.70
6	3.45489	0.28	35.39	28.96	35.67	29.24	56.00	46.00	-20.33	-16.76

**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:

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 LIMITS OF UNWANTED EMISSION OUT OF THE RESTRICTED BANDS

Frequencies (MHz)	EIRP Limit (dBm)	Equivalent Field Strength at 3m (dB $\mu$ V/m) *Note 3
5150~5250	-27	68.3
5250~5350	-27	68.3
5470~5725	-27	68.3
5725~5825	-27 *Note 1	68.3
	-17 *Note 2	78.3

**Notes:**

1. For frequencies 10MHz or greater above or below the band edge.
2. All emissions within the frequency range from the band edge to 10MHz above or below the band edge.
3. The following formula is used to convert the equipment isotropic radiated power (eirp) to field strength

$$E = \frac{1000000\sqrt{30P}}{3} \mu\text{V/m, where P is the eirp (Watts)}$$



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## 4.2.3 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 AISI	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

#### 4.2.4 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.

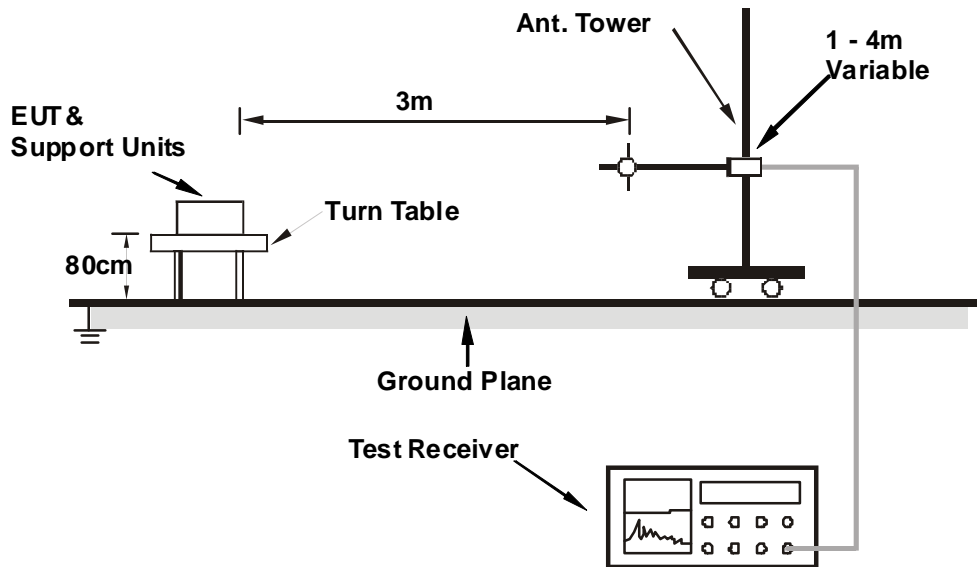
**NOTE:**

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.

#### 4.2.5 DEVIATION FROM TEST STANDARD

No deviation

#### 4.2.6 TEST SETUP



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

#### 4.2.7 EUT OPERATING CONDITION

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.



## 4.2.8 TEST RESULTS

### BELOW 1GHz WORST-CASE DATA

#### 802.11a

<b>CHANNEL</b>	TX Channel 60	<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	68.10	35.1 QP	40.0	-4.9	1.75 H	154	22.28	12.82
2	75.21	33.5 QP	40.0	-6.6	1.50 H	360	22.35	11.10
3	166.34	36.5 QP	43.5	-7.1	2.00 H	266	22.51	13.94
4	374.45	35.3 QP	46.0	-10.7	1.00 H	251	18.13	17.21
5	451.00	38.4 QP	46.0	-7.7	1.25 H	58	19.18	19.17
6	624.45	34.5 QP	46.0	-11.5	1.75 H	277	11.57	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	67.78	35.3 QP	40.0	-4.7	2.00 V	360	22.47	12.86
2	185.02	35.7 QP	43.5	-7.8	1.50 V	4	23.20	12.51
3	332.81	38.6 QP	46.0	-7.4	1.00 V	134	22.46	16.14
4	351.99	38.5 QP	46.0	-7.5	1.50 V	128	21.85	16.63
5	502.74	35.2 QP	46.0	-10.8	1.25 V	346	14.74	20.45
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 36	<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	5150.00	61.5 PK	74.0	-12.5	1.44 H	233	19.20	42.30
2	5150.00	49.7 AV	54.0	-4.3	1.44 H	233	7.40	42.30
3	*5180.00	104.4 PK			1.44 H	233	62.00	42.40
4	*5180.00	94.4 AV			1.44 H	233	52.00	42.40
5	#10360.00	57.1 PK	68.3	-11.2	1.00 H	174	7.89	49.21
6	15540.00	60.1 PK	74.0	-13.9	1.00 H	241	5.00	55.10
7	15540.00	49.5 AV	54.0	-4.5	1.00 H	241	-5.60	55.10

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

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	73.3 PK	74.0	-0.7	1.42 V	320	31.00	42.30
2	5150.00	52.5 AV	54.0	-1.5	1.42 V	320	10.20	42.30
3	*5180.00	109.4 PK			1.42 V	320	67.00	42.40
4	*5180.00	98.2 AV			1.42 V	320	55.80	42.40
5	#10360.00	57.2 PK	68.3	-11.1	1.53 V	246	7.99	49.21
6	15540.00	60.8 PK	74.0	-13.2	1.23 V	219	5.70	55.10
7	15540.00	50.1 AV	54.0	-3.9	1.23 V	219	-5.00	55.10

**REMARKS:**

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





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<b>CHANNEL</b>	TX Channel 40	<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	*5200.00	104.2 PK			1.00 H	110	61.73	42.47
2	*5200.00	93.8 AV			1.00 H	110	51.33	42.47
3	#10400.00	58.1 PK	68.3	-10.2	1.00 H	341	9.27	48.83
4	15600.00	60.4 PK	74.0	-13.6	1.00 H	311	5.43	54.97
5	15600.00	50.1 AV	54.0	-3.9	1.00 H	311	-4.87	54.97

**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	*5200.00	108.6 PK			1.02 V	56	66.13	42.47
2	*5200.00	100.7 AV			1.02 V	56	58.23	42.47
3	#10400.00	57.1 PK	68.3	-11.2	1.46 V	279	8.27	48.83
4	15600.00	60.3 PK	74.0	-13.7	1.23 V	220	5.33	54.97
5	15600.00	49.9 AV	54.0	-4.1	1.23 V	220	-5.07	54.97

**REMARKS:**

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



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<b>CHANNEL</b>	TX Channel 48	<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	*5240.00	104.3 PK			1.00 H	147	61.79	42.51
2	*5240.00	94.1 AV			1.00 H	147	51.59	42.51
3	5350.00	62.1 PK	74.0	-11.9	1.00 H	147	19.51	42.59
4	5350.00	46.1 AV	54.0	-7.9	1.00 H	147	3.51	42.59
5	#10480.00	58.1 PK	68.3	-10.2	1.00 H	174	8.71	49.39
6	15720.00	61.0 PK	74.0	-13.0	1.00 H	341	6.30	54.70
7	15720.00	50.1 AV	54.0	-3.9	1.00 H	341	-4.60	54.70

**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	*5240.00	108.3 PK			1.00 V	42	65.79	42.51
2	*5240.00	100.4 AV			1.00 V	42	57.89	42.51
3	5350.00	65.9 PK	74.0	-8.1	1.00 V	42	23.31	42.59
4	5350.00	48.7 AV	54.0	-5.3	1.00 V	42	6.11	42.59
5	#10480.00	57.3 PK	68.3	-11.0	1.59 V	243	7.91	49.39
6	15720.00	60.9 PK	74.0	-13.1	1.29 V	223	6.20	54.70
7	15720.00	50.3 AV	54.0	-3.7	1.29 V	223	-4.40	54.70

**REMARKS:**

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



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802.11n (20MHz)

CHANNEL	TX Channel 36	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	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	5150.00	65.4 PK	74.0	-8.6	1.18 H	102	23.10	42.30
2	5150.00	52.5 AV	54.0	-1.5	1.18 H	102	10.20	42.30
3	*5180.00	107.9 PK			1.18 H	102	65.50	42.40
4	*5180.00	96.1 AV			1.18 H	102	53.70	42.40
5	#10360.00	58.1 PK	68.3	-10.2	1.00 H	244	8.89	49.21
6	15540.00	60.7 PK	74.0	-13.3	1.00 H	124	5.60	55.10
7	15540.00	50.1 AV	54.0	-3.9	1.00 H	124	-5.00	55.10

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

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	67.8 PK	74.0	-6.2	1.00 V	329	25.50	42.30
2	5150.00	53.4 AV	54.0	-0.6	1.00 V	329	11.10	42.30
3	*5180.00	109.8 PK			1.00 V	329	67.40	42.40
4	*5180.00	100.0 AV			1.00 V	329	57.60	42.40
5	#10360.00	58.1 PK	68.3	-10.2	1.00 V	214	8.89	49.21
6	15540.00	60.3 PK	74.0	-13.7	1.00 V	303	5.20	55.10
7	15540.00	50.8 AV	54.0	-3.2	1.00 V	303	-4.30	55.10

**REMARKS:**

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



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<b>CHANNEL</b>	TX Channel 40	<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	5150.00	60.5 PK	74.0	-13.5	1.00 H	122	18.20	42.30
2	5150.00	45.2 AV	54.0	-8.8	1.00 H	122	2.90	42.30
3	*5200.00	108.4 PK			1.00 H	122	65.93	42.47
4	*5200.00	98.1 AV			1.00 H	122	55.63	42.47
5	#10400.00	56.7 PK	68.3	-11.6	1.00 H	163	7.87	48.83
6	15600.00	62.7 PK	74.0	-11.3	1.00 H	321	7.73	54.97
7	15600.00	50.3 AV	54.0	-3.7	1.00 H	321	-4.67	54.97

**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	5150.00	67.3 PK	74.0	-6.7	1.00 V	331	25.00	42.30
2	5150.00	51.7 AV	54.0	-2.3	1.00 V	331	9.40	42.30
3	*5200.00	112.6 PK			1.00 V	331	70.13	42.47
4	*5200.00	103.1 AV			1.00 V	331	60.63	42.47
5	#10400.00	61.9 PK	68.3	-6.4	1.70 V	182	13.07	48.83
6	15600.00	62.3 PK	74.0	-11.7	1.00 V	125	7.33	54.97
7	15600.00	50.3 AV	54.0	-3.7	1.00 V	125	-4.67	54.97

**REMARKS:**

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



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<b>CHANNEL</b>	TX Channel 48	<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	*5240.00	108.1 PK			1.00 H	102	65.59	42.51
2	*5240.00	98.0 AV			1.00 H	102	55.49	42.51
3	5350.00	63.1 PK	74.0	-10.9	1.00 H	102	20.51	42.59
4	5350.00	46.7 AV	54.0	-7.3	1.00 H	102	4.11	42.59
5	#10480.00	57.5 PK	68.3	-10.8	1.00 H	231	8.11	49.39
6	15720.00	60.2 PK	74.0	-13.8	1.00 H	211	5.50	54.70
7	15720.00	50.4 AV	54.0	-3.6	1.00 H	211	-4.30	54.70

**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	*5240.00	112.4 PK			1.00 V	321	69.89	42.51
2	*5240.00	102.8 AV			1.00 V	321	60.29	42.51
3	5350.00	67.4 PK	74.0	-6.6	1.00 V	321	24.81	42.59
4	5350.00	50.1 AV	54.0	-3.9	1.00 V	321	7.51	42.59
5	#10480.00	58.6 PK	68.3	-9.7	1.76 V	181	9.21	49.39
6	15720.00	60.2 PK	74.0	-13.8	1.00 V	300	5.50	54.70
7	15720.00	50.4 AV	54.0	-3.6	1.00 V	300	-4.30	54.70

**REMARKS:**

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



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802.11n (40MHz)

<b>CHANNEL</b>	TX Channel 38	<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	5150.00	60.1 PK	74.0	-13.9	1.00 H	121	17.80	42.30
2	5150.00	48.9 AV	54.0	-5.1	1.00 H	121	6.60	42.30
3	*5190.00	97.1 PK			1.00 H	121	54.66	42.44
4	*5190.00	86.8 AV			1.00 H	121	44.36	42.44
5	#10380.00	58.2 PK	68.3	-10.1	1.00 H	100	9.18	49.02
6	15570.00	60.4 PK	74.0	-13.6	1.00 H	311	5.36	55.04
7	15570.00	50.1 AV	54.0	-3.9	1.00 H	311	-4.94	55.04

**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	5150.00	66.7 PK	74.0	-7.3	1.00 V	330	24.40	42.30
2	5150.00	52.7 AV	54.0	-1.3	1.00 V	330	10.40	42.30
3	*5190.00	101.5 PK			1.00 V	330	59.06	42.44
4	*5190.00	91.7 AV			1.00 V	330	49.26	42.44
5	#10380.00	57.3 PK	68.3	-11.0	1.00 V	125	8.28	49.02
6	15570.00	60.5 PK	74.0	-13.5	1.00 V	215	5.46	55.04
7	15570.00	51.0 AV	54.0	-3.0	1.00 V	215	-4.04	55.04

**REMARKS:**

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



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<b>CHANNEL</b>	TX Channel 46	<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	*5230.00	105.2 PK			1.00 H	108	62.70	42.50
2	*5230.00	95.1 AV			1.00 H	108	52.60	42.50
3	5350.00	60.1 PK	74.0	-13.9	1.00 H	213	17.51	42.59
4	5350.00	49.1 AV	54.0	-4.9	1.00 H	213	6.51	42.59
5	#10460.00	59.1 PK	68.3	-9.2	1.00 H	211	9.85	49.25
6	15690.00	60.4 PK	74.0	-13.6	1.00 H	121	5.73	54.67
7	15690.00	50.1 AV	54.0	-3.9	1.00 H	121	-4.57	54.67

**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	*5230.00	109.6 PK			1.00 V	213	67.10	42.50
2	*5230.00	100.0 AV			1.00 V	213	57.50	42.50
3	5350.00	68.2 PK	74.0	-5.8	1.00 V	213	25.61	42.59
4	5350.00	50.1 AV	54.0	-3.9	1.00 V	213	7.51	42.59
5	#10460.00	59.1 PK	68.3	-9.2	1.00 V	215	9.85	49.25
6	15690.00	60.1 PK	74.0	-13.9	1.00 V	315	5.43	54.67
7	15690.00	50.2 AV	54.0	-3.8	1.00 V	315	-4.47	54.67

**REMARKS:**

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



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### 4.3 TRANSMIT POWER MEASUREMENT

#### 4.3.1 LIMITS OF TRANSMIT POWER MEASUREMENT

Frequency Band	Limit
5.15 – 5.25GHz	The lesser of 50mW (17dBm) or 4dBm + 10logB
5.25 – 5.35GHz	The lesser of 250mW (24dBm) or 11dBm + 10logB
5.47 – 5.725GHz	The lesser of 250mW (24dBm) or 11dBm + 10logB
5.725 – 5.825GHz	The lesser of 1W (30dBm) or 17dBm + 10logB

**NOTE:** Where B is the 26dB emission bandwidth in MHz.

#### 4.3.2 TEST INSTRUMENTS

##### FOR POWER OUTPUT MEASUREMENT

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

##### FOR 26dB OCCUPIED BANDWIDTH

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer	E4446A	MY48250113	Nov. 30, 2011	Nov. 29, 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

#### FOR AVERAGE POWER MEASUREMENT

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

#### FOR 26dB OCCUPIED BANDWIDTH

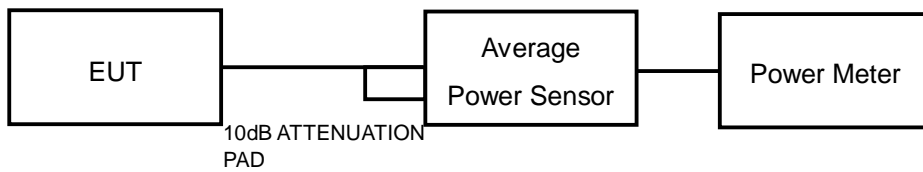
- 1) Set RBW = approximately 1% of the emission bandwidth.
- 2) Set the VBW > RBW.
- 3) Detector = Peak.
- 4) Trace mode = max hold.
- 5) Measure the maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

### 4.3.4 DEVIATION FROM TEST STANDARD

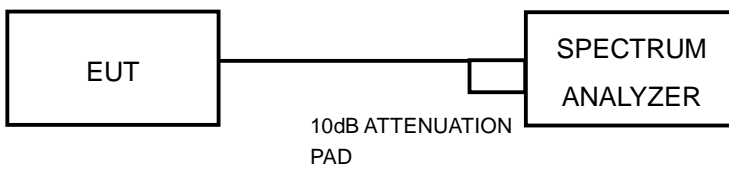
No deviation

#### 4.3.5 TEST SETUP

##### FOR POWER OUTPUT MEASUREMENT



##### FOR 26dB OCCUPIED BANDWIDTH



#### 4.3.6 EUT OPERATING CONDITIONS

The software provided by client to enable the EUT under transmission condition continuously at specific channel frequencies individually.



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### 4.3.7 TEST RESULTS

#### POWER OUTPUT:

##### 802.11a

CHANNEL	CHANNEL FREQUENCY (MHz)	AVERAGE POWER (mW)	AVERAGE POWER (dBm)	POWER LIMIT (dBm)	PASS/FAIL
36	5180	25.704	14.1	17	PASS
40	5200	25.119	14.0	17	PASS
48	5240	25.119	14.0	17	PASS

##### 802.11n (20MHz)

CHAN.	CHAN. FREQ. (MHz)	AVERAGE POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	POWER LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
36	5180	11.2	11.0	25.772	14.11	17	PASS
40	5200	10.9	11.0	24.892	13.96	17	PASS
48	5240	10.9	11.3	25.793	14.12	17	PASS

##### 802.11n (40MHz)

CHAN.	CHAN. FREQ. (MHz)	AVERAGE POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	POWER LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
38	5190	11.0	11.7	27.380	14.37	17	PASS
46	5230	13.6	14.1	48.613	16.87	17	PASS



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## 26dB BANDWIDTH:

### 802.11a

CHANNEL	CHANNEL FREQUENCY (MHz)	26dBc BANDWIDTH (MHz)
36	5180	25.74
40	5200	27.75
48	5240	22.04

### 802.11n (20MHz)

CHANNEL	CHANNEL FREQUENCY (MHz)	26dBc BANDWIDTH (MHz)	
		CHAIN 0	CHAIN 1
36	5180	19.90	19.80
40	5200	19.92	19.76
48	5240	20.04	19.83

### 802.11n (40MHz)

CHANNEL	CHANNEL FREQUENCY (MHz)	26dBc BANDWIDTH (MHz)	
		CHAIN 0	CHAIN 1
38	5190	60.38	62.83
46	5230	72.04	85.44



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#### 4.4 PEAK POWER SPECTRAL DENSITY MEASUREMENT

##### 4.4.1 LIMITS OF PEAK POWER SPECTRAL DENSITY MEASUREMENT

Frequency Band	Limit
5.15 ~ 5.25GHz	4dBm
5.25 ~ 5.35GHz	11dBm
5.47 ~ 5.725GHz	11dBm
5.725 ~ 5.825GHz	17dBm

##### 4.4.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer	E4446A	MY48250113	Nov. 30, 2011	Nov. 29, 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

##### 4.4.3 TEST PROCEDURES

Using method SA-1

- 1) Set span to encompass the entire emission bandwidth (EBW) of the signal.
- 2) Set RBW = 1 MHz, Set VBW  $\geq$  3 MHz, Detector = RMS
- 3) Sweep time = auto, trigger set to "free run".
- 4) Trace average at least 100 traces in power averaging mode.
- 5) Record the max value

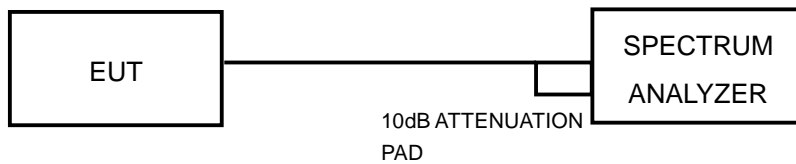
##### 4.4.4 DEVIATION FROM TEST STANDARD

No deviation



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#### 4.4.5 TEST SETUP



#### 4.4.6 EUT OPERATING CONDITIONS

Same as 4.3.6



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#### 4.4.7 TEST RESULTS

##### 802.11a

CHANNEL	FREQUENCY (MHz)	PSD (dBm)	MAXIMUM LIMIT (dBm)	PASS/FAIL
36	5180	3.86	4	PASS
40	5200	3.94	4	PASS
48	5240	3.93	4	PASS

##### 802.11n (20MHz)

CHAN.	CHAN. FREQ. (MHz)	PSD (dBm)		TOTAL POWER DENSITY (dBm)	MAX. LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1			
36	5180	0.98	0.73	3.84	4	PASS
40	5200	0.64	0.71	3.66	4	PASS
48	5240	0.67	1.02	3.86	4	PASS

**Note:** 1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.

##### 802.11n (40MHz)

CHAN.	CHAN. FREQ. (MHz)	PSD (dBm)		TOTAL POWER DENSITY (dBm)	MAX. LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1			
38	5190	-2.30	-1.39	1.10	4	PASS
46	5230	0.26	0.92	3.58	4	PASS

**Note:** 1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.

## 4.5 PEAK POWER EXCURSION MEASUREMENT

### 4.5.1 LIMITS OF PEAK POWER EXCURSION MEASUREMENT

Shall not exceed 13 dB

### 4.5.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer	E4446A	MY48250113	Nov. 30, 2011	Nov. 29, 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

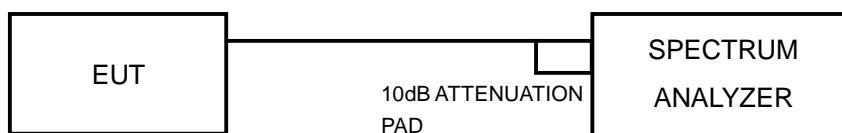
### 4.5.3 TEST PROCEDURE

- 1) Set RBW = 1 MHz, VBW  $\geq$  3 MHz, Detector = peak.
- 2) Trace mode = max-hold. Allow the sweeps to continue until the trace stabilizes.
- 3) Use the peak search function to find the peak of the spectrum.
- 4) Measure the PPSD.
- 5) Compute the ratio of the maximum of the peak-max-hold spectrum to the PPSD.

### 4.5.4 DEVIATION FROM TEST STANDARD

No deviation

### 4.5.5 TEST SETUP



### 4.5.6 EUT OPERATING CONDITIONS

The software provided by client to enable the EUT under transmission condition continuously at specific channel frequencies individually.





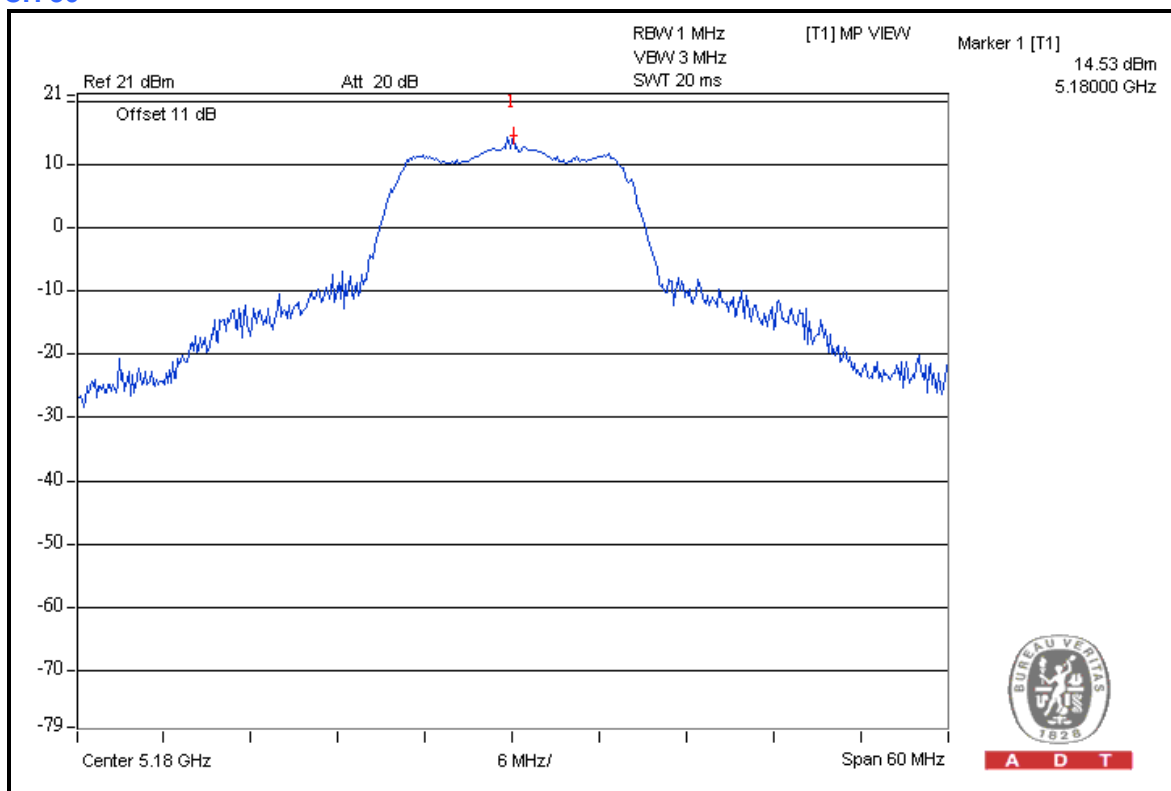
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### 4.5.7 TEST RESULTS

#### 802.11a

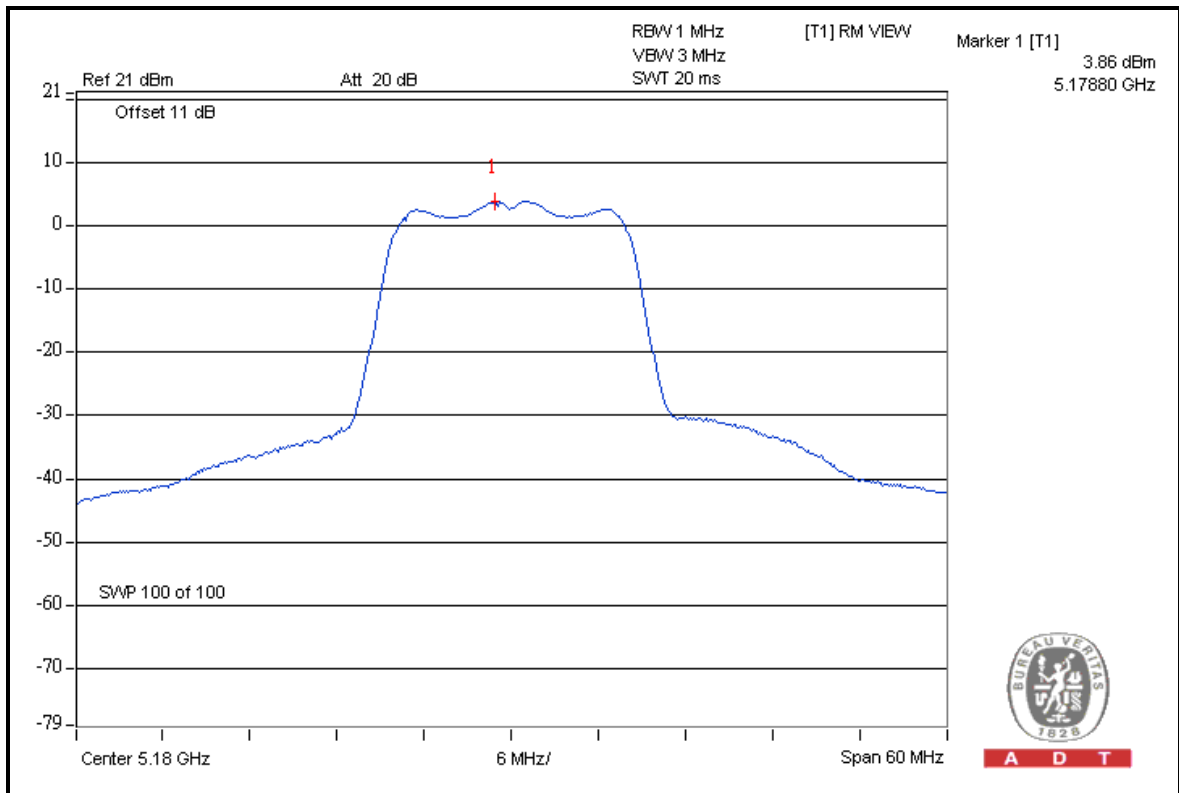
CHANNEL	CHANNEL FREQUENCY (MHZ)	PEAK VALUE (DBM)	PPSD (DBM)	PEAK EXCURSION (DB)	LIMIT (DB)	PASS/FAIL
36	5180	14.53	3.86	10.67	13	PASS
40	5200	13.69	3.94	9.75	13	PASS
48	5240	13.26	3.93	9.33	13	PASS

#### CH 36





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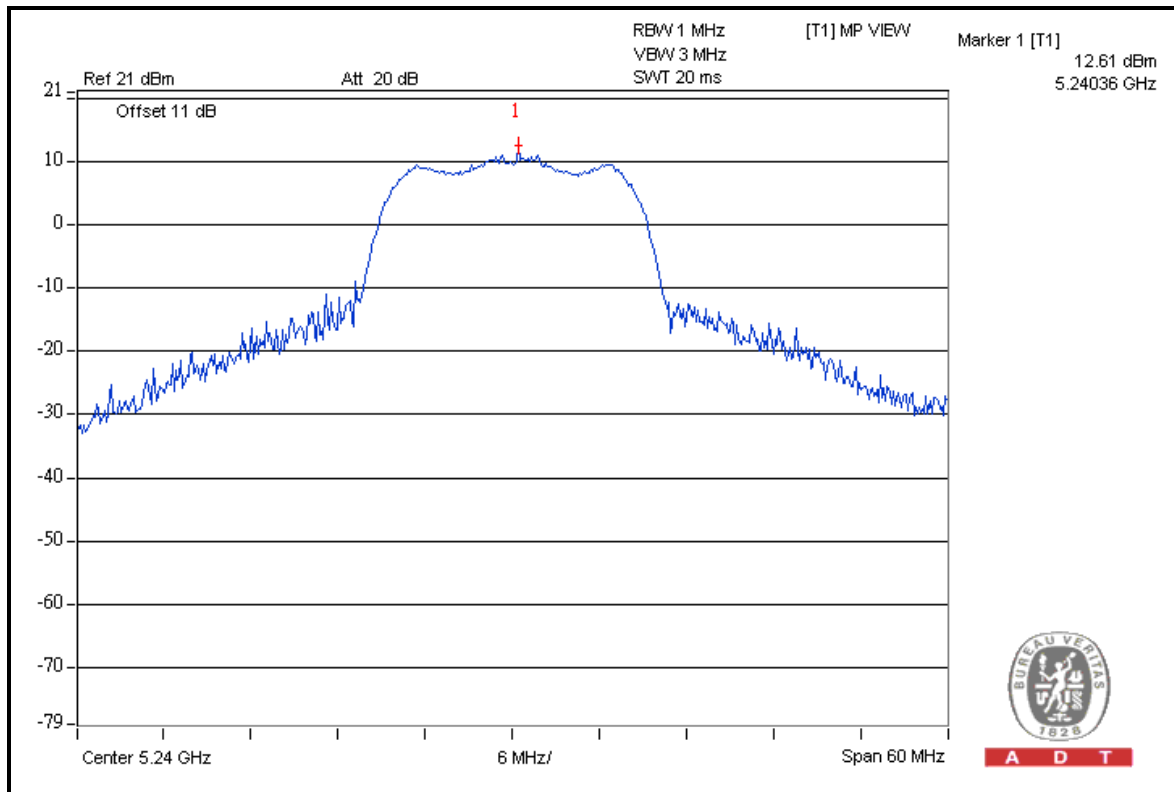


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### 802.11n (20MHz)

CHAN.	CHAN. FREQ. (MHz)	PEAK VALUE (dBm)		PPSD (dBm)		PEAK EXCURSION (dB)		LIMIT (dB)	PASS/FAIL
		CHAIN 0	CHAIN 1	CHAIN 0	CHAIN 1	CHAIN 0	CHAIN 1		
36	5180	10.70	10.87	0.98	0.73	9.72	10.14	13	PASS
40	5200	10.18	11.06	0.64	0.71	9.54	10.35	13	PASS
48	5240	10.67	12.61	0.67	1.02	10.00	11.59	13	PASS

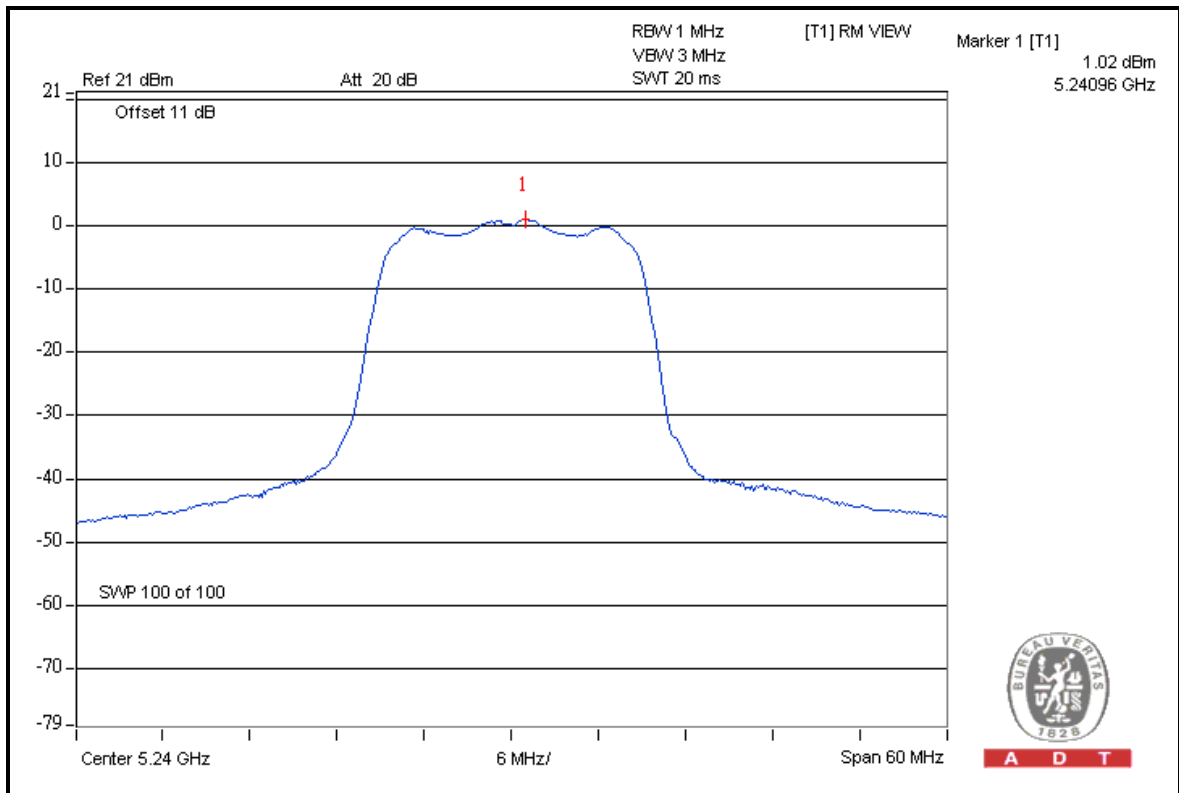
### CH 48



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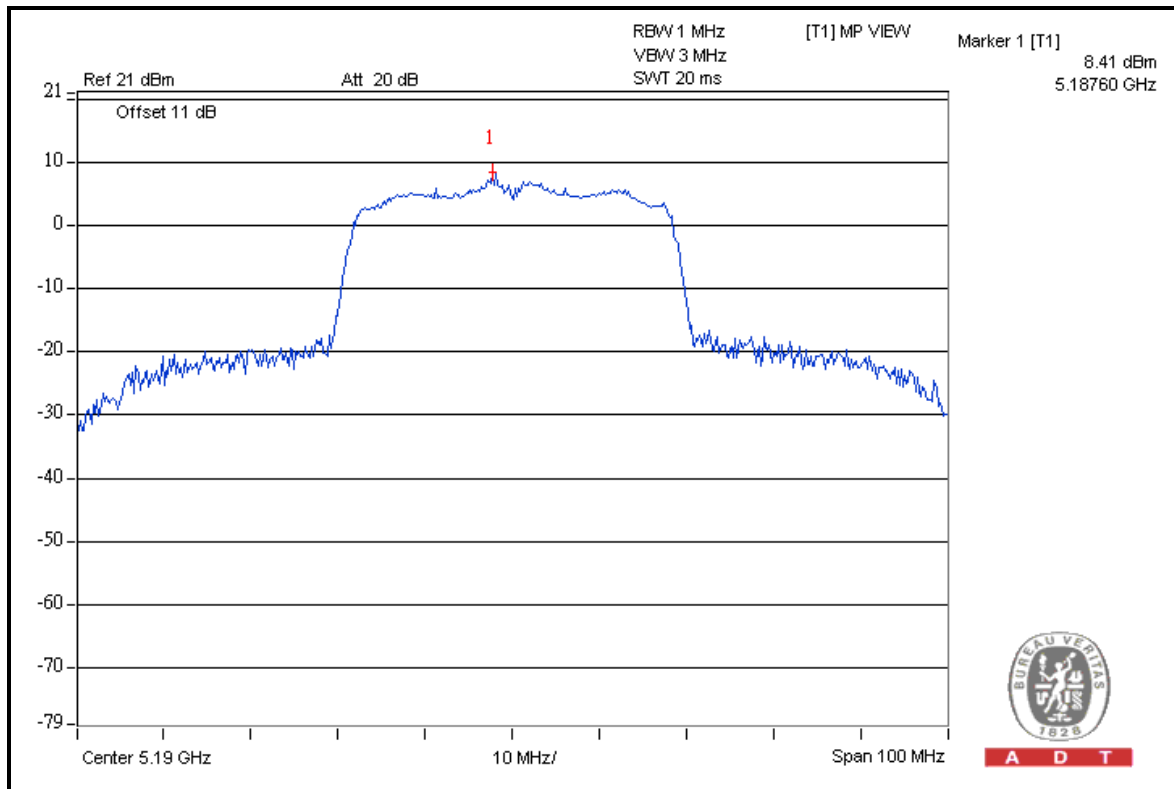


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### 802.11n (40MHz)

CHAN.	CHAN. FREQ. (MHz)	PEAK VALUE (dBm)		PPSD (dBm)		PEAK EXCURSION (dB)		LIMIT (dB)	PASS/FAIL
		CHAIN 0	CHAIN 1	CHAIN 0	CHAIN 1	CHAIN 0	CHAIN 1		
38	5190	8.41	8.68	-2.30	-1.39	10.71	10.07	13	PASS
46	5230	10.72	10.97	0.26	0.92	10.46	10.05	13	PASS

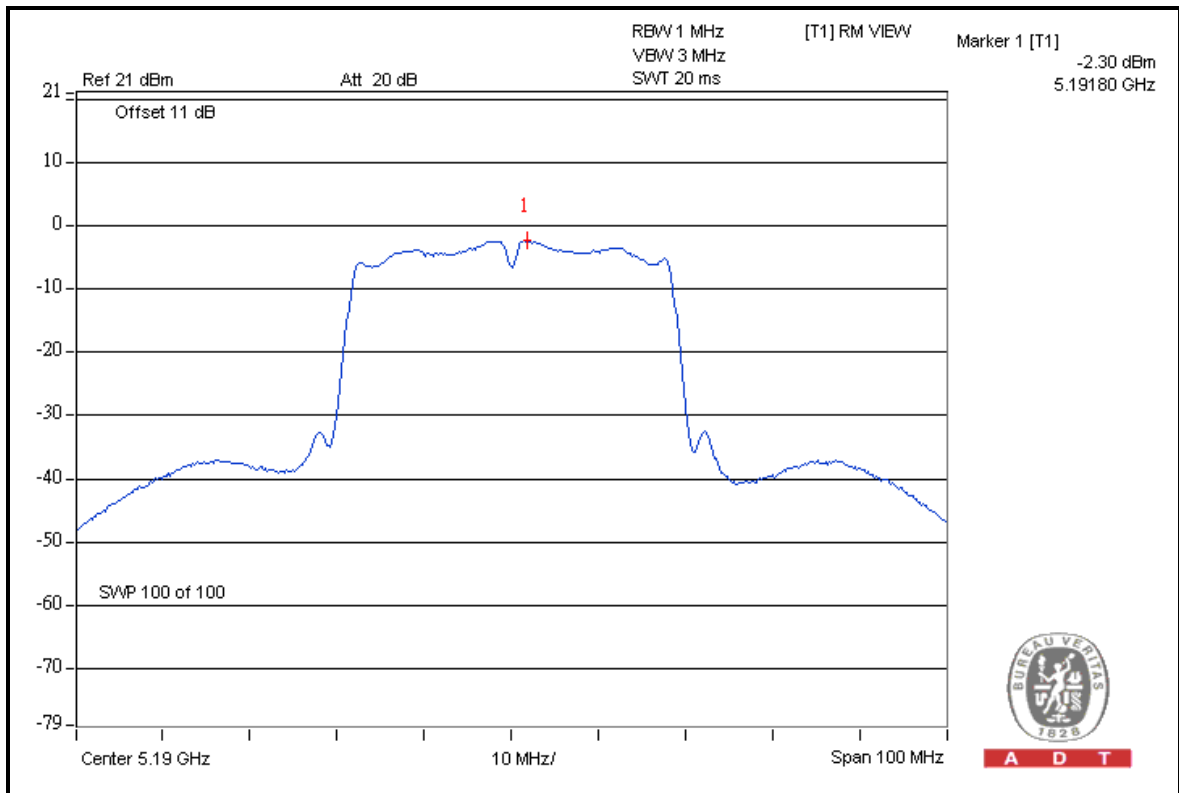
### CH 38



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## 4.6 FREQUENCY STABILITY

### 4.6.1 LIMITS OF FREQUENCY STABILITY MEASUREMENT

The frequency of the carrier signal shall be maintained within band of operation

### 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

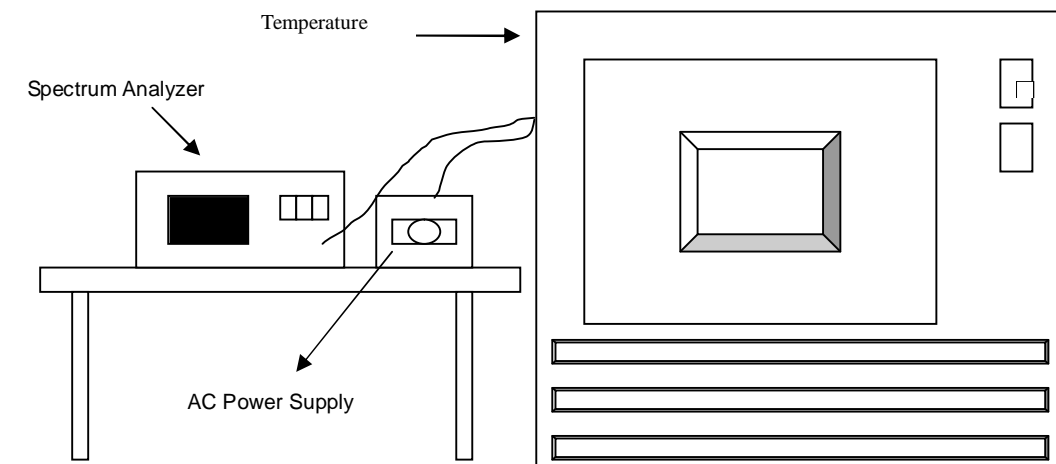
### 4.6.3 TEST PROCEDURE

1. The EUT was placed inside the environmental test chamber and powered by nominal AC voltage.
2. Turn the EUT on and couple its output to a spectrum analyzer.
3. Turn the EUT off and set the chamber to the highest temperature specified.
4. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT on and measure the operating frequency after 2, 5, and 10 minutes.
5. Repeat step 2 and 3 with the temperature chamber set to the lowest temperature.
6. The test chamber was allowed to stabilize at +20 degree C for a minimum of 30 minutes. The supply voltage was then adjusted on the EUT from 85% to 115% and the frequency record.

#### 4.6.4 DEVIATION FROM TEST STANDARD

No deviation

#### 4.6.5 TEST SETUP



#### 4.6.6 EUT OPERATING CONDITION

Set the EUT transmit at un-modulation mode to test frequency stability.





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#### 4.6.7 TEST RESULTS

FREQUENCY STABILITY VERSUS TEMP.									
OPERATING FREQUENCY: 5240MHz									
TEMP. (°C)	POWER SUPPLY (Vac)	0 MINUTE		2 MINUTE		5 MINUTE		10 MINUTE	
		Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift
		(MHz)	ppm	(MHz)	ppm	(MHz)	ppm	(MHz)	ppm
50	120	5239.9872	-2.4427	5239.9844	-2.9771	5239.9835	-3.1489	5239.9868	-2.5191
40	120	5240.0094	1.7939	5240.0044	0.8397	5240.0056	1.0687	5240.0043	0.8206
30	120	5239.9969	-0.5916	5239.9937	-1.2023	5239.9909	-1.7366	5239.9904	-1.8321
20	120	5239.9965	-0.6679	5239.9976	-0.4580	5239.9926	-1.4122	5239.998	-0.3817
10	120	5240.0014	0.2672	5240.004	0.7634	5239.9994	-0.1145	5239.9986	-0.2672
0	120	5239.9886	-2.1756	5239.9859	-2.6908	5239.9832	-3.2061	5239.9857	-2.7290
-10	120	5240	0.0000	5240.004	0.7634	5240.0029	0.5534	5240.0081	1.5458
-20	120	5239.9975	-0.4771	5240.0012	0.2290	5239.9953	-0.8969	5239.9962	-0.7252
-30	120	5240.0097	1.8511	5240.0083	1.5840	5240.0038	0.7252	5240.0058	1.1069

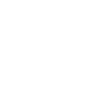
FREQUENCY STABILITY VERSUS VOLTAGE									
OPERATING FREQUENCY: 5240MHz									
TEMP. (°C)	POWER SUPPLY (Vac)	0 MINUTE		2 MINUTE		5 MINUTE		10 MINUTE	
		Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift
		(MHz)	ppm	(MHz)	ppm	(MHz)	ppm	(MHz)	ppm
20	138	5239.9975	-0.4771	5239.9978	-0.4198	5239.9918	-1.5649	5239.9977	-0.4389
	120	5239.9965	-0.6679	5239.9976	-0.4580	5239.9926	-1.4122	5239.998	-0.3817
	102	5239.9968	-0.6107	5239.9976	-0.4580	5239.9935	-1.2405	5239.9983	-0.3244



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## 5. PHOTOGRAPHS OF THE TEST CONFIGURATION

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





## 6. INFORMATION ON THE TESTING LABORATORIES

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

**Linko EMC/RF Lab:**

Tel: 886-2-26052180

Fax: 886-2-26052943

**Hsin Chu EMC/RF Lab:**

Tel: 886-3-5935343

Fax: 886-3-5935342

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

Tel: 886-3-3183232

Fax: 886-3-3270892

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

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

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



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## **7. 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 ---**