



# FCC TEST REPORT

**REPORT NO.:** RF130822E14

**MODEL NO.:** DCS-825L

**FCC ID:** KA2CS825LA1

**RECEIVED:** Aug. 22, 2013

**TESTED:** Aug. 23 to Sep. 18, 2013

**ISSUED:** Oct. 08, 2013

**APPLICANT:** D-Link Corporation

**ADDRESS:** No.289, Sinhu 3rd Rd., Neihu District, Taipei City 114,  
Taiwan, R.O.C.

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

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R.O.C.

**TEST LOCATION (1):** No. 81-1, Lu Liao Keng, 9th Ling, Wu Lung Tsuen,  
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**TEST LOCATION (2):** No. 49, Ln. 206, Wende Rd., Shangshan Tsuen,  
Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan,  
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## RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF130822E14	Original release	Oct. 08, 2013

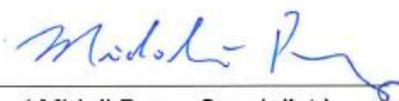


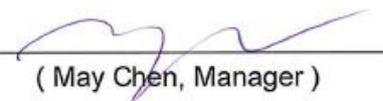
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## 1. CERTIFICATION

**PRODUCT:** Wi-Fi Baby Camera  
**BRAND NAME:** D-Link  
**MODEL NO.:** DCS-825L  
**TEST SAMPLE:** ENGINEERING SAMPLE  
**APPLICANT:** D-Link Corporation  
**TESTED:** Aug. 23 to Sep. 18, 2013  
**STANDARDS:** **FCC Part 15, Subpart C (Section 15.247)**  
**ANSI C63.10-2009**

The above equipment (Model: DCS-825L) has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

**PREPARED BY :** , **DATE:** Oct. 08, 2013  
( Midoli Peng, Specialist )

**APPROVED BY :** , **DATE:** Oct. 08, 2013  
( May Chen, Manager )



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## 2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC PART 15, SUBPART C (SECTION 15.247)			
STANDARD SECTION	TEST TYPE	RESULT	REMARK
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -10.15dB at 0.16953MHz.
15.247(d) 15.209	Radiated Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -0.3dB at 2483.5MHz
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	No antenna connector is used.



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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)	5.46 dB
Radiated emissions (1GHz -6GHz)	3.54 dB
Radiated emissions (6GHz -18GHz)	4.08 dB
Radiated emissions (18GHz -40GHz)	4.11 dB



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### 3. GENERAL INFORMATION

#### 3.1 GENERAL DESCRIPTION OF EUT

<b>PRODUCT</b>	Wi-Fi Baby Camera
<b>MODEL NO.</b>	DCS-825L
<b>POWER SUPPLY</b>	DC 5V 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: up to 54Mbps 802.11n: up to 72.2Mbps
<b>OPERATING FREQUENCY</b>	2.412 ~ 2.462GHz
<b>NUMBER OF CHANNEL</b>	11
<b>MAXIMUM OUTPUT POWER</b>	802.11b: 139.959mW 802.11g: 493.174mW 802.11n (HT20): 502.343mW
<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 x1

**NOTE:**

1. The EUT's appearance has two different colors (blue and pink).
2. The EUT must be supplied with a power adapter as following table:

No	Brand	Model No.	Spec.
1	APD	WA-08C05R	Input: 100-240V, 0.3A, 50-60Hz Output: 5V, 1.5A DC output cable (Unshielded, 3m)
2	APD	WA-08B05R	Input: 100-240V, 0.3A, 50-60Hz Output: 5V, 1.5A DC output cable (Unshielded, 3m)

Note:

1. For radiated emissions test, the EUT was pre-tested with above Adapters, the worst case was found in Adapter 1. Therefore only the test data of the Adapter 1 was recorded in this report.

3. The antenna provided to the EUT, please refer to the following table:

Brand	Model	Gain (Included Cable loss) (dBi)	Antenna Type	Connector Type	Frequency range (GHz to GHz)	Cable Length (mm)
HL	290-20058	2.76	PCB	IPEX	2.4G~2.5G	40

4. The EUT incorporates a SISO function without beam forming.

MODULATION MODE	Tx/Rx FUNCTION
<b>802.11b</b>	1Tx/1Rx
<b>802.11g</b>	1Tx/1Rx
<b>802.11n (HT20)</b>	1Tx/1Rx

5. When the EUT operating in 802.11n, the software operation, which is defined by manufacturer, MCS (Modulation and Coding Schemes) from 0 to 7.
6. 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

11 channels are provided for 802.11b, 802.11g, 802.11n (HT20):

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		

### 3.2.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

EUT CONFIGURE MODE	APPLICABLE TO					DESCRIPTION
	PLC	RE < 1G	RE ≥ 1G	APCM	OB	
1	√	√	√	√	√	With Adapter 1
2	√	-	-	-	-	With Adapter 2

Where **PLC**: Power Line Conducted Emission

**RE < 1G**: Radiated Emission below 1GHz

**RE ≥ 1G**: Radiated Emission above 1GHz

**APCM**: Antenna Port Conducted Measurement

**OB**: Conducted Out-Band Emission Measurement

NOTE: The EUT had been pre-tested on the positioned of each 2 axis. The worst case was found when positioned on Y-plane(below 1GHz) & X-plane(above 1GHz).

#### **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 (HT20)	1 to 11	6	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 (HT20)	1 to 11	6	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)
802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1
802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6
802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	6.5

#### **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
802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	6.5

#### **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
802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	6.5



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**TEST CONDITION:**

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
PLC	27deg. C, 58%RH	120Vac, 60Hz	Eagle Chen
RE<1G	22deg. C, 69%RH	120Vac, 60Hz	Nelson Teng
RE <sup>3</sup> 1G	23deg. C, 66%RH	120Vac, 60Hz	Chilin Lee
APCM	25deg. C, 60%RH	120Vac, 60Hz	Robert Cheng
OB	25deg. C, 60%RH	120Vac, 60Hz	Robert Cheng

### 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 v03r01**

**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.

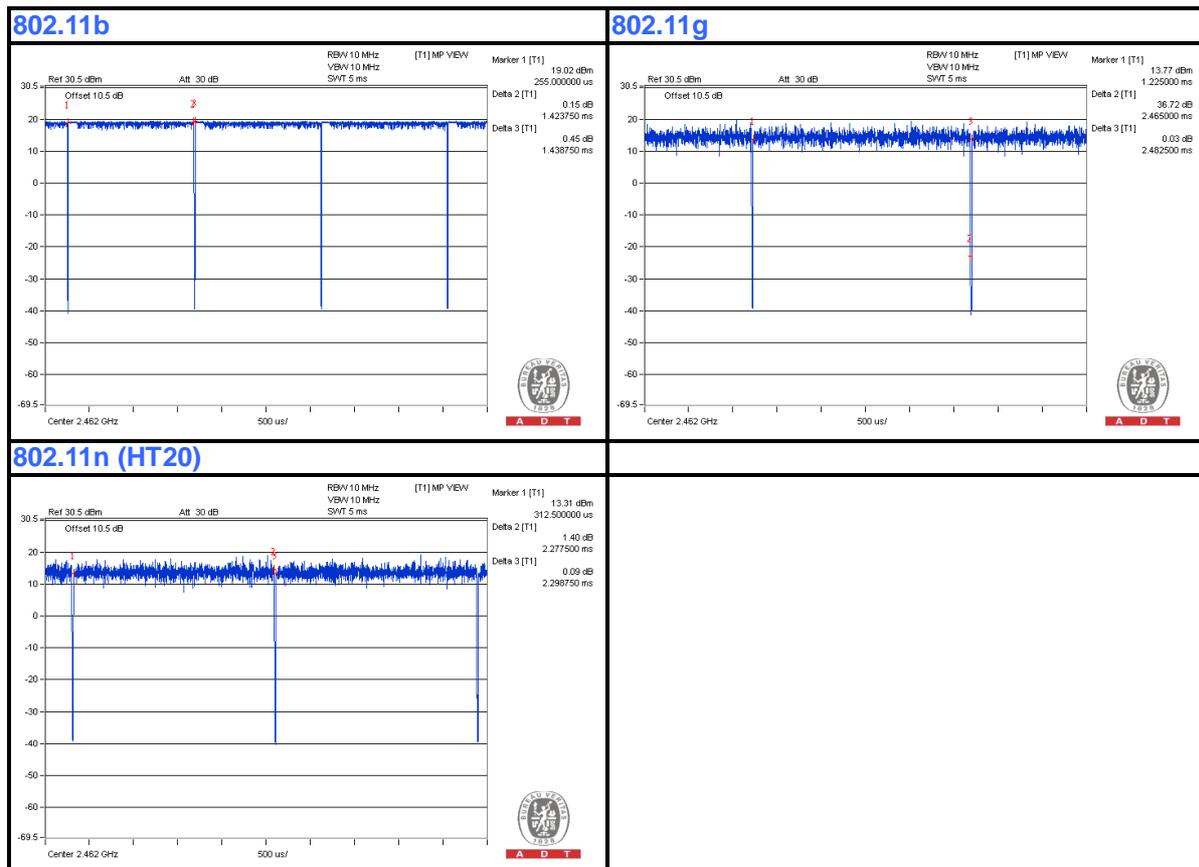
### 3.4 DUTY CYCLE OF TEST SIGNAL

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

**802.11b:** Duty cycle = 0.961 ms/1.167 ms = 0.823, Duty factor =  $10 \cdot \log(1/0.823) = 0.8$

**802.11g:** Duty cycle = 1.436 ms/1.642 ms = 0.875, Duty factor =  $10 \cdot \log(1/0.875) = 0.6$

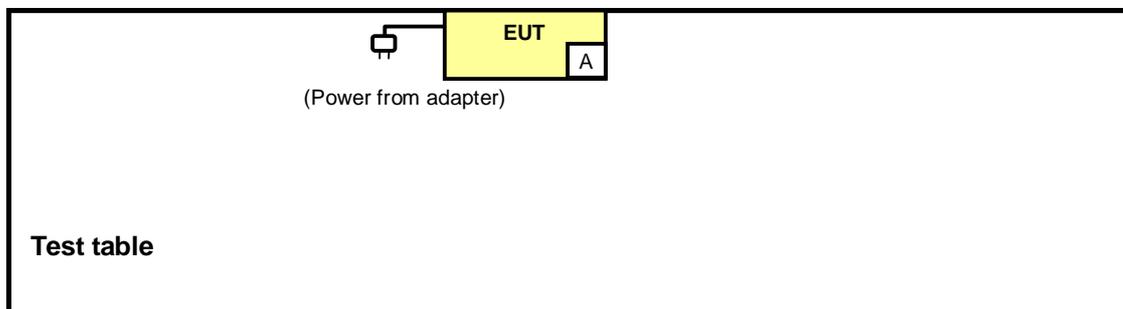
**802.11n (HT20):** Duty cycle = 1.345 ms/1.549 ms = 0.868, Duty factor =  $10 \cdot \log(1/0.868) = 0.6$



### 3.5 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit.

### 3.6 CONFIGURATION OF SYSTEM UNDER TEST



Note: Item A is a micro card(Brand: PNY).



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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 ROHDE & SCHWARZ	ESCS 30	100287	Feb. 28, 2013	Feb. 27, 2014
Line-Impedance Stabilization Network (for EUT) SCHWARZBECK	NSLK 8127	8127-523	Sep. 24, 2012	Sep. 23, 2013
Line-Impedance Stabilization Network (for Peripheral) ROHDE & SCHWARZ	ESH3-Z5	8487731004	Oct. 29, 2012	Oct. 28, 2013
RF Cable (JYEBAO)	5DFB	COACAB-001	May 27, 2013	May 26, 2014
50 ohms Terminator	50	3	Oct. 23, 2012	Oct. 22, 2013
50 ohms Terminator	N/A	EMC-04	Oct. 16, 2012	Oct. 15, 2013
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. A.
3. The VCCI Con A Registration No. is C-817.
4. Tested Date: Aug. 23 to Sep. 18, 2013

#### 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 levels under (Limit – 20dB) were not recorded.

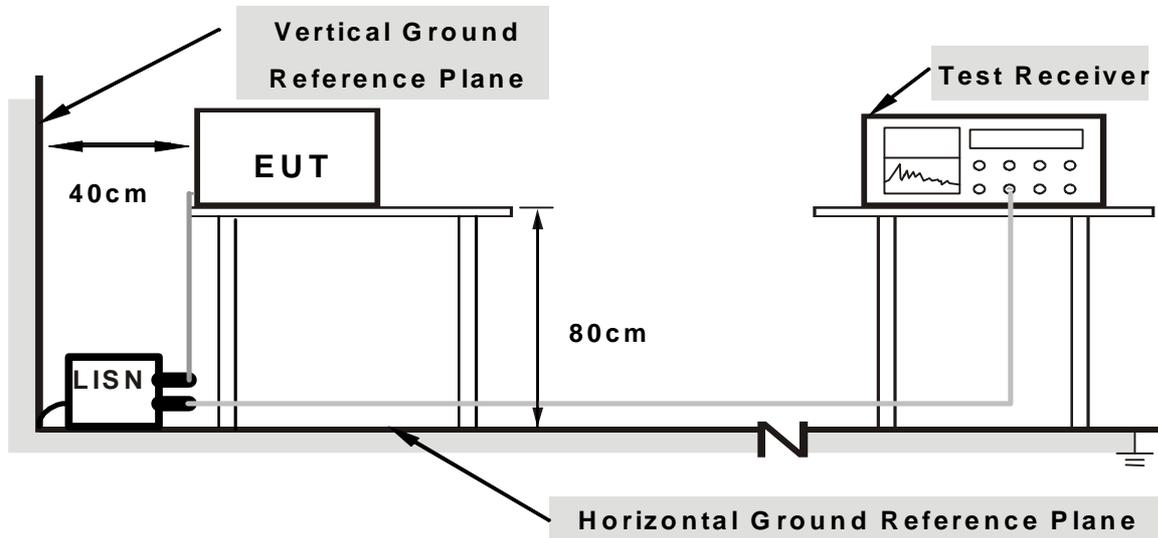
**NOTE:**

1. The resolution bandwidth of test receiver is 9kHz for Quasi-peak detection (QP) & Average detection (AV).

#### 4.1.4 DEVIATION FROM TEST STANDARD

No deviation

#### 4.1.5 TEST SETUP



**Note: 1.Support units were connected to second LISN.**

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

#### 4.1.6 EUT OPERATING CONDITIONS

1. Placed the EUT on testing table.
2. Controlling software (RT5x7xQA.exe) has been activated to set the EUT under transmission/receiving condition continuously.



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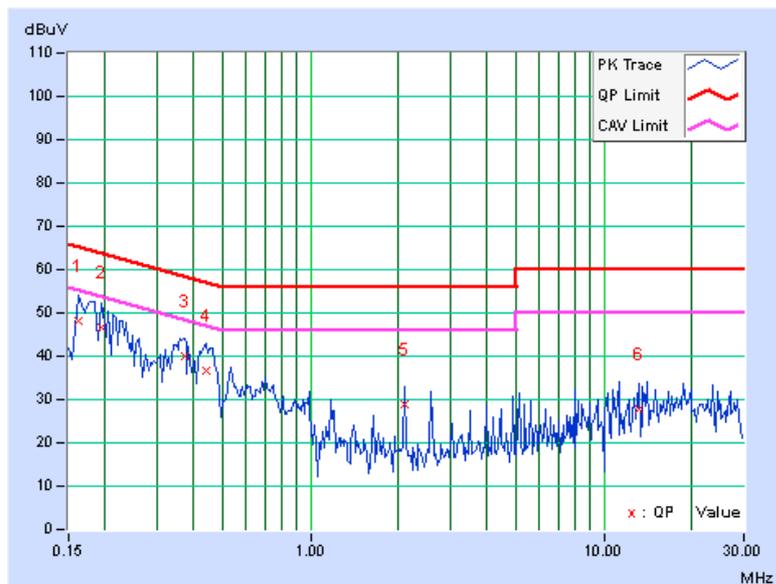
#### 4.1.7 TEST RESULTS(Mode 1)

<b>PHASE</b>	Line (L)	<b>DETECTOR FUNCTION &amp; BANDWIDTH</b>	Quasi-Peak (QP) / Average (AV), 9kHz
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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	0.16172	0.09	48.24	38.67	48.33	38.76	65.38	55.38	-17.04	-16.61
2	0.19297	0.10	46.46	30.28	46.56	30.38	63.91	53.91	-17.35	-23.53
3	0.37266	0.14	39.83	30.15	39.97	30.29	58.44	48.44	-18.47	-18.15
4	0.44297	0.15	36.70	24.07	36.85	24.22	57.01	47.01	-20.15	-22.78
5	2.10547	0.20	28.78	22.55	28.98	22.75	56.00	46.00	-27.02	-23.25
6	13.09375	0.68	27.03	18.86	27.71	19.54	60.00	50.00	-32.29	-30.46

#### 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

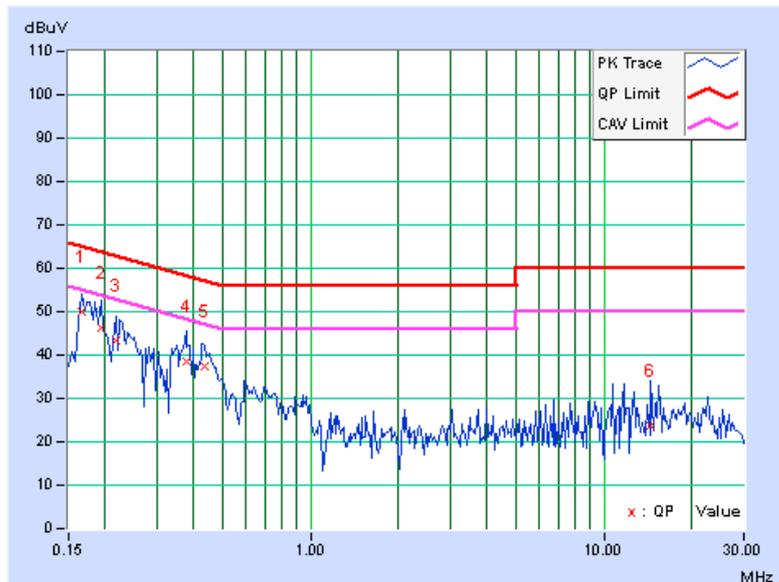


<b>PHASE</b>	Neutral (N)	<b>DETECTOR FUNCTION &amp; BANDWIDTH</b>	Quasi-Peak (QP) / Average (AV), 9kHz
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No	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
	[MHz]	Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
		(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16562	0.14	49.68	40.70	49.82	40.84	65.18	55.18	-15.36	-14.34
2	0.19297	0.14	46.20	30.00	46.34	30.14	63.91	53.91	-17.57	-23.77
3	0.21641	0.14	43.29	25.22	43.43	25.36	62.96	52.96	-19.52	-27.59
4	0.37656	0.18	38.36	30.11	38.54	30.29	58.35	48.35	-19.82	-18.07
5	0.43516	0.18	37.34	25.19	37.52	25.37	57.15	47.15	-19.63	-21.78
6	14.49609	0.64	23.24	13.04	23.88	13.68	60.00	50.00	-36.12	-36.32

**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



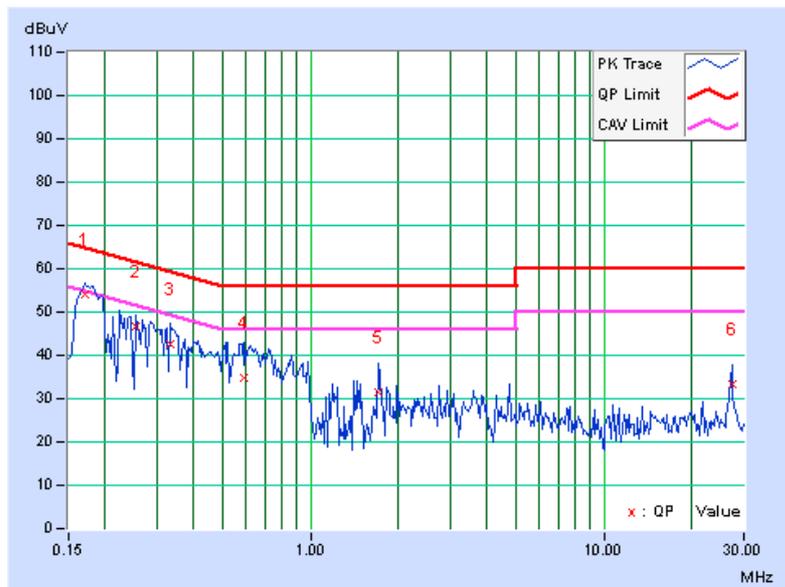
#### 4.1.8 TEST RESULTS (Mode 2)

<b>PHASE</b>	Line (L)	<b>DETECTOR FUNCTION &amp; BANDWIDTH</b>	Quasi-Peak (QP) / Average (AV), 9kHz
--------------	----------	--	--------------------------------------

No	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
	[MHz]	[dB]	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16953	9.75	44.25	33.36	54.00	43.11	64.98	54.98	-10.98	-11.87
2	0.25547	9.77	36.99	14.85	46.76	24.62	61.58	51.58	-14.82	-26.96
3	0.33359	9.79	32.82	18.31	42.61	28.10	59.36	49.36	-16.75	-21.26
4	0.59531	9.81	25.08	10.48	34.89	20.29	56.00	46.00	-21.11	-25.71
5	1.69531	9.84	21.76	10.41	31.60	20.25	56.00	46.00	-24.40	-25.75
6	27.33984	10.17	23.20	10.59	33.37	20.76	60.00	50.00	-26.63	-29.24

#### REMARKS:

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





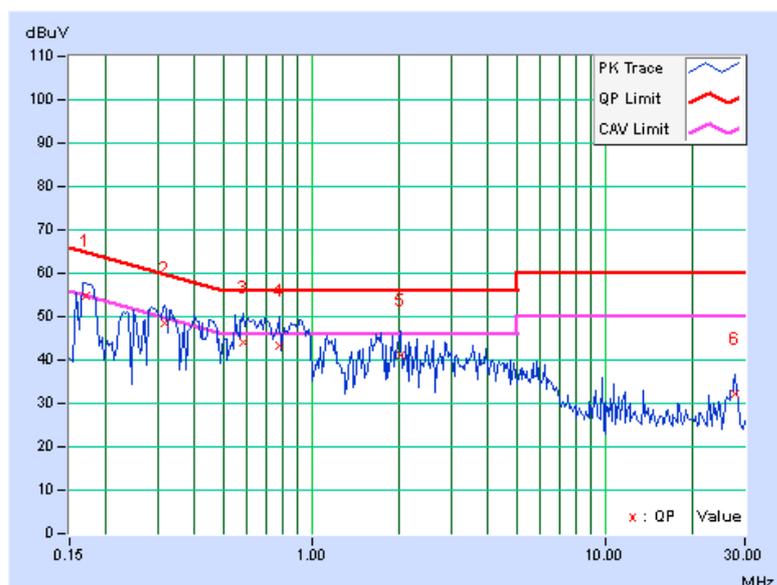
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<b>PHASE</b>	Neutral (N)	<b>DETECTOR FUNCTION &amp; BANDWIDTH</b>	Quasi-Peak (QP) / Average (AV), 9kHz
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No	Freq. [MHz]	Corr. Factor [dB]	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16953	9.75	45.08	33.92	54.83	43.67	64.98	54.98	-10.15	-11.31
2	0.31797	9.78	38.89	23.88	48.67	33.66	59.76	49.76	-11.09	-16.10
3	0.58750	9.81	34.38	22.15	44.19	31.96	56.00	46.00	-11.81	-14.04
4	0.77891	9.81	33.40	19.36	43.21	29.17	56.00	46.00	-12.79	-16.83
5	2.01172	9.85	31.42	20.93	41.27	30.78	56.00	46.00	-14.73	-15.22
6	27.81250	10.39	21.94	11.63	32.33	22.02	60.00	50.00	-27.67	-27.98

**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 BANDEGE MEASUREMENT

### 4.2.1 LIMITS OF RADIATED EMISSION AND BANDEGE 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.



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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	MY48250253	Aug. 28, 2013	Aug. 27, 2014
MXE EMI Receiver Agilent	N9038A	MY50010156	Jan. 16, 2013	Jan. 15, 2014
Pre-Amplifier Mini-Circuits	ZFL-1000VH2 B	AMP-ZFL-04	Nov. 14, 2012	Nov. 13, 2013
Pre-Amplifier Agilent	8449B	3008A01923	Oct. 30, 2012	Oct. 29, 2013
Pre-Amplifier SPACEK LABS	SLKka-48-6	9K16	Nov. 14, 2012	Nov. 13, 2013
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-361	Mar. 25, 2013	Mar. 24, 2014
Horn_Antenna AISl	AIH.8018	0000220091110	Nov. 27, 2012	Nov. 26, 2013
Horn_Antenna SCHWARZBECK	BBHA 9170	9170-424	Oct. 12, 2012	Oct. 11, 2013
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. 26, 2012	Dec. 25, 2013
RF Cable	NA	CHHCAB_001	Oct. 07, 2012	Oct. 06, 2013
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 horn antenna, preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
- 3 The test was performed in 966 Chamber No. H.
4. The FCC Site Registration No. is 797305.
- 5 The CANADA Site Registration No. is IC 7450H-3.
- 6 Tested Date: Sep. 17, 2013



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**For above 1GHz test:**

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer Agilent	E4446A	MY48250253	Aug. 28, 2013	Aug. 27, 2014
MXE EMI Receiver Agilent	N9038A	MY51210105	Jan. 29,2013	Jan. 28,2014
Pre-Amplifier Mini-Circuits	ZFL-1000VH2 B	AMP-ZFL-03	Nov. 14, 2012	Nov. 13, 2013
Pre-Amplifier Agilent	8449B	3008A02578	June 25, 2013	June 24, 2014
Pre-Amplifier SPACEK LABS	SLKKa-48-6	9K16	Nov. 14, 2012	Nov. 13, 2013
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-360	Mar. 19, 2013	Mar. 18, 2014
Horn_Antenna AISI	AIH.8018	0000320091110	Nov. 19, 2012	Nov. 18, 2013
Horn_Antenna SCHWARZBECK	BBHA 9170	9170-424	Oct. 12, 2012	Oct. 11, 2013
RF Cable	NA	RF104-201 RF104-203 RF104-204	Dec. 25, 2012	Dec. 24, 2013
RF Cable	NA	CHGCAB_001	Oct. 06, 2012	Oct. 05, 2013
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 horn antenna, preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
- 3 The test was performed in 966 Chamber No. G.
4. The FCC Site Registration No. is 966073.
- 5 The VCCI Site Registration No. is G-137.
- 6 The CANADA Site Registration No. is IC 7450H-2.
- 7 Tested Date: Sep. 09, 2013

#### 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 meters chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The 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:**

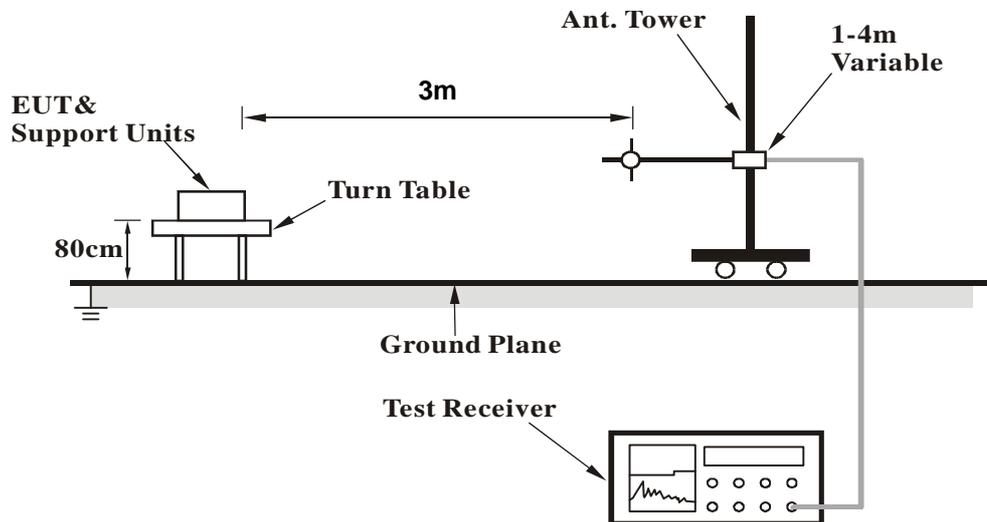
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
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. If the EUT transiting at duty cycle is < 98%, the duty cycle correction is required that emission.
5. All modes of operation were investigated and the worst-case emissions are reported.

#### 4.2.4 DEVIATION FROM TEST STANDARD

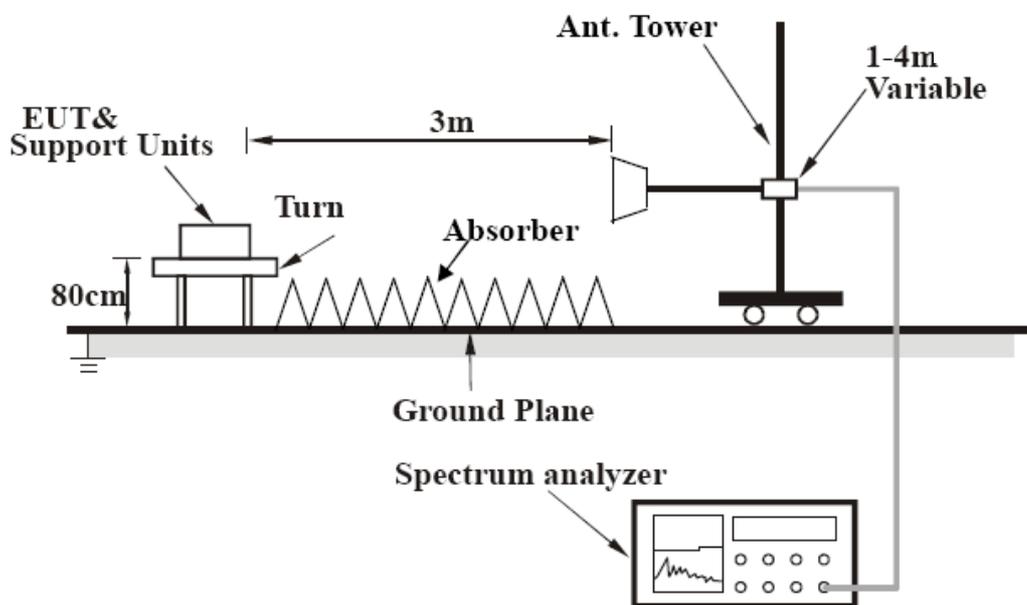
No deviation

#### 4.2.5 TEST SETUP

##### <Frequency Range below 1GHz>



##### <Frequency Range above 1GHz>



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

#### 4.2.6 EUT OPERATING CONDITIONS

Same as 4.1.6

## 4.2.7 TEST RESULTS

### BELOW 1GHz WORST-CASE DATA

#### 802.11n (HT20)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	61.14	35.7 QP	40.0	-4.3	1.50 H	45	49.57	-13.84
2	149.99	31.1 QP	43.5	-12.4	1.50 H	275	44.42	-13.29
3	252.03	33.8 QP	46.0	-12.2	1.00 H	93	47.97	-14.14
4	400.01	34.9 QP	46.0	-11.1	1.00 H	205	44.81	-9.92
5	849.99	41.6 QP	46.0	-4.4	1.50 H	230	42.85	-1.22
6	950.00	41.0 QP	46.0	-5.0	2.00 H	299	40.12	0.85
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	77.24	25.9 QP	40.0	-14.2	1.00 V	76	43.39	-17.54
2	252.03	28.1 QP	46.0	-17.9	1.00 V	259	42.20	-14.14
3	450.01	34.1 QP	46.0	-12.0	1.00 V	82	42.38	-8.33
4	550.02	38.5 QP	46.0	-7.5	1.00 V	79	45.34	-6.81
5	849.99	42.3 QP	46.0	-3.7	1.19 V	320	43.52	-1.22
6	949.99	42.3 QP	46.0	-3.7	1.00 V	115	41.44	0.85

#### REMARKS:

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



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ABOVE 1GHz DATA

802.11b

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

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

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2386.00	48.8 PK	74.0	-25.2	1.27 H	110	50.97	-2.17
2	2386.00	38.9 AV	54.0	-15.1	1.27 H	110	41.07	-2.17
3	*2412.00	97.4 PK			1.27 H	110	99.47	-2.07
4	*2412.00	94.6 AV			1.27 H	110	96.67	-2.07
5	4824.00	56.5 PK	74.0	-17.5	1.76 H	19	50.42	6.08
6	4824.00	53.0 AV	54.0	-1.0	1.76 H	19	46.92	6.08

**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	53.1 PK	74.0	-20.9	1.17 V	147	55.25	-2.15
2	2390.00	40.9 AV	54.0	-13.1	1.17 V	147	43.05	-2.15
3	*2412.00	103.6 PK			1.17 V	147	105.67	-2.07
4	*2412.00	100.7 AV			1.17 V	147	102.77	-2.07
5	4824.00	53.0 PK	74.0	-21.0	1.08 V	132	46.92	6.08
6	4824.00	47.6 AV	54.0	-6.4	1.08 V	132	41.52	6.08

**REMARKS:**

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



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<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	55.4 PK	74.0	-18.6	1.00 H	15	57.55	-2.15
2	2390.00	42.7 AV	54.0	-11.3	1.00 H	15	44.85	-2.15
3	*2437.00	96.5 PK			1.27 H	111	98.49	-1.99
4	*2437.00	93.9 AV			1.27 H	111	95.89	-1.99
5	2483.50	50.4 PK	74.0	-23.6	1.01 H	167	52.22	-1.82
6	2483.50	39.6 AV	54.0	-14.4	1.01 H	167	41.42	-1.82
7	4874.00	56.5 PK	74.0	-17.5	1.72 H	20	50.25	6.25
8	4874.00	53.4 AV	54.0	-0.6	1.72 H	20	47.15	6.25
9	7311.00	55.7 PK	74.0	-18.3	1.00 H	322	41.67	14.03
10	7311.00	42.8 AV	54.0	-11.2	1.00 H	322	28.77	14.03

**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	54.2 PK	74.0	-19.8	1.15 V	148	56.35	-2.15
2	2390.00	42.3 AV	54.0	-11.7	1.15 V	148	44.45	-2.15
3	*2437.00	103.2 PK			1.15 V	148	105.19	-1.99
4	*2437.00	100.3 AV			1.15 V	148	102.29	-1.99
5	2483.50	51.7 PK	74.0	-22.3	1.15 V	148	53.52	-1.82
6	2483.50	40.0 AV	54.0	-14.0	1.15 V	148	41.82	-1.82
7	4874.00	53.0 PK	74.0	-21.0	1.03 V	121	46.75	6.25
8	4874.00	47.6 AV	54.0	-6.4	1.03 V	121	41.35	6.25
9	7311.00	55.8 PK	74.0	-18.2	1.05 V	35	41.77	14.03
10	7311.00	43.1 AV	54.0	-10.9	1.05 V	35	29.07	14.03

**REMARKS:**

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



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<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	102.0 PK			1.06 H	162	103.89	-1.89
2	*2462.00	99.0 AV			1.06 H	162	100.89	-1.89
3	2483.50	50.2 PK	74.0	-23.8	1.00 H	162	52.02	-1.82
4	2483.50	39.5 AV	54.0	-14.5	1.00 H	162	41.32	-1.82
5	4924.00	55.8 PK	74.0	-18.2	1.61 H	20	49.37	6.43
6	4924.00	52.0 AV	54.0	-2.0	1.61 H	20	45.57	6.43
7	7386.00	55.6 PK	74.0	-18.4	1.00 H	31	41.68	13.92
8	7386.00	43.1 AV	54.0	-10.9	1.00 H	31	29.18	13.92

**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	104.3 PK			1.15 V	145	106.19	-1.89
2	*2462.00	101.4 AV			1.15 V	145	103.29	-1.89
3	2483.50	52.4 PK	74.0	-21.6	1.15 V	145	54.22	-1.82
4	2483.50	41.9 AV	54.0	-12.1	1.15 V	145	43.72	-1.82
5	4924.00	52.6 PK	74.0	-21.4	1.00 V	120	46.17	6.43
6	4924.00	47.3 AV	54.0	-6.7	1.00 V	120	40.87	6.43
7	7386.00	55.4 PK	74.0	-18.6	1.00 V	21	41.48	13.92
8	7386.00	42.9 AV	54.0	-11.1	1.00 V	21	28.98	13.92

**REMARKS:**

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



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802.11g

<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	67.7 PK	74.0	-6.3	1.30 H	111	69.85	-2.15
2	2390.00	51.8 AV	54.0	-2.2	1.30 H	111	53.95	-2.15
3	*2412.00	100.2 PK			1.30 H	113	102.27	-2.07
4	*2412.00	91.1 AV			1.30 H	113	93.17	-2.07
5	4824.00	51.2 PK	74.0	-22.8	1.56 H	132	45.12	6.08
6	4824.00	38.3 AV	54.0	-15.7	1.56 H	132	32.22	6.08

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

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	72.4 PK	74.0	-1.6	1.16 V	149	74.55	-2.15
2	2390.00	52.7 AV	54.0	-1.3	1.16 V	149	54.85	-2.15
3	*2412.00	106.8 PK			1.16 V	149	108.87	-2.07
4	*2412.00	94.6 AV			1.16 V	149	96.67	-2.07
5	4824.00	51.1 PK	74.0	-22.9	1.05 V	110	45.02	6.08
6	4824.00	38.3 AV	54.0	-15.7	1.05 V	110	32.22	6.08

**REMARKS:**

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



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<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	2384.00	55.8 PK	74.0	-18.2	1.00 H	25	57.98	-2.18
2	2384.00	43.1 AV	54.0	-10.9	1.00 H	25	45.28	-2.18
3	*2437.00	101.3 PK			1.29 H	108	103.29	-1.99
4	*2437.00	91.7 AV			1.29 H	108	93.69	-1.99
5	2483.50	50.3 PK	74.0	-23.7	1.03 H	170	52.12	-1.82
6	2483.50	39.6 AV	54.0	-14.4	1.03 H	170	41.42	-1.82
7	4874.00	51.0 PK	74.0	-23.0	1.45 H	139	44.75	6.25
8	4874.00	38.3 AV	54.0	-15.7	1.45 H	139	32.05	6.25
9	7311.00	56.3 PK	74.0	-17.7	1.01 H	326	42.27	14.03
10	7311.00	43.3 AV	54.0	-10.7	1.01 H	326	29.27	14.03

**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	2384.00	58.8 PK	74.0	-15.2	1.16 V	147	60.98	-2.18
2	2384.00	46.6 AV	54.0	-7.4	1.16 V	147	48.78	-2.18
3	*2437.00	107.8 PK			1.16 V	147	109.79	-1.99
4	*2437.00	95.6 AV			1.16 V	147	97.59	-1.99
5	2483.50	56.9 PK	74.0	-17.1	1.16 V	147	58.72	-1.82
6	2483.50	45.4 AV	54.0	-8.6	1.16 V	147	47.22	-1.82
7	4874.00	51.1 PK	74.0	-22.9	1.07 V	121	44.85	6.25
8	4874.00	38.1 AV	54.0	-15.9	1.07 V	121	31.85	6.25
9	7311.00	55.8 PK	74.0	-18.2	1.02 V	31	41.77	14.03
10	7311.00	43.4 AV	54.0	-10.6	1.02 V	31	29.37	14.03

**REMARKS:**

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



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<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	98.9 PK			1.29 H	107	100.79	-1.89
2	*2462.00	89.8 AV			1.29 H	107	91.69	-1.89
3	2483.50	64.4 PK	74.0	-9.6	1.29 H	107	66.22	-1.82
4	2483.50	49.5 AV	54.0	-4.5	1.29 H	107	51.32	-1.82
5	4924.00	50.9 PK	74.0	-23.1	1.49 H	142	44.47	6.43
6	4924.00	38.1 AV	54.0	-15.9	1.49 H	142	31.67	6.43
7	7386.00	55.6 PK	74.0	-18.4	1.03 H	323	41.68	13.92
8	7386.00	42.6 AV	54.0	-11.4	1.03 H	323	28.68	13.92

**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	107.0 PK			1.17 V	143	108.89	-1.89
2	*2462.00	95.2 AV			1.17 V	143	97.09	-1.89
3	2483.50	73.2 PK	74.0	-0.8	1.17 V	143	75.02	-1.82
4	<b>2483.50</b>	<b>53.7 AV</b>	<b>54.0</b>	<b>-0.3</b>	<b>1.17 V</b>	<b>143</b>	<b>55.52</b>	<b>-1.82</b>
5	4924.00	51.3 PK	74.0	-22.7	1.10 V	125	44.87	6.43
6	4924.00	38.6 AV	54.0	-15.4	1.10 V	125	32.17	6.43
7	7386.00	55.9 PK	74.0	-18.1	1.00 V	25	41.98	13.92
8	7386.00	43.5 AV	54.0	-10.5	1.00 V	25	29.58	13.92

**REMARKS:**

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



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802.11n (HT20)

<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	67.0 PK	74.0	-7.0	1.28 H	110	69.15	-2.15
2	2390.00	48.0 AV	54.0	-6.0	1.28 H	110	50.15	-2.15
3	*2412.00	98.2 PK			1.28 H	110	100.27	-2.07
4	*2412.00	88.6 AV			1.28 H	110	90.67	-2.07
5	4824.00	50.9 PK	74.0	-23.1	1.49 H	146	44.82	6.08
6	4824.00	38.2 AV	54.0	-15.8	1.49 H	146	32.12	6.08

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

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	72.6 PK	74.0	-1.4	1.17 V	148	74.75	-2.15
2	2390.00	50.4 AV	54.0	-3.6	1.17 V	148	52.55	-2.15
3	*2412.00	105.1 PK			1.17 V	148	107.17	-2.07
4	*2412.00	93.4 AV			1.17 V	148	95.47	-2.07
5	4824.00	51.8 PK	74.0	-22.2	1.15 V	125	45.72	6.08
6	4824.00	38.6 AV	54.0	-15.4	1.15 V	125	32.52	6.08

**REMARKS:**

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



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<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	2384.00	55.1 PK	74.0	-18.9	1.00 H	22	57.28	-2.18
2	2384.00	42.4 AV	54.0	-11.6	1.00 H	22	44.58	-2.18
3	*2437.00	102.4 PK			1.28 H	116	104.39	-1.99
4	*2437.00	92.1 AV			1.28 H	116	94.09	-1.99
5	2483.50	50.4 PK	74.0	-23.6	1.00 H	180	52.22	-1.82
6	2483.50	39.8 AV	54.0	-14.2	1.00 H	180	41.62	-1.82
7	4874.00	51.3 PK	74.0	-22.7	1.51 H	143	45.05	6.25
8	4874.00	38.5 AV	54.0	-15.5	1.51 H	143	32.25	6.25
9	7311.00	55.4 PK	74.0	-18.6	1.01 H	318	41.37	14.03
10	7311.00	42.6 AV	54.0	-11.4	1.01 H	318	28.57	14.03

**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	2384.00	61.5 PK	74.0	-12.5	1.16 V	147	63.68	-2.18
2	2384.00	47.2 AV	54.0	-6.8	1.16 V	147	49.38	-2.18
3	*2437.00	109.7 PK			1.16 V	147	111.69	-1.99
4	*2437.00	96.6 AV			1.16 V	147	98.59	-1.99
5	2483.50	61.6 PK	74.0	-12.4	1.16 V	147	63.42	-1.82
6	2483.50	46.1 AV	54.0	-7.9	1.16 V	147	47.92	-1.82
7	4874.00	51.6 PK	74.0	-22.4	1.11 V	117	45.35	6.25
8	4874.00	38.4 AV	54.0	-15.6	1.11 V	117	32.15	6.25
9	7311.00	56.0 PK	74.0	-18.0	1.01 V	38	41.97	14.03
10	7311.00	43.6 AV	54.0	-10.4	1.01 V	38	29.57	14.03

**REMARKS:**

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



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<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	98.4 PK			1.31 H	109	100.29	-1.89
2	*2462.00	88.7 AV			1.31 H	109	90.59	-1.89
3	2483.50	66.3 PK	74.0	-7.7	1.31 H	109	68.12	-1.82
4	2483.50	47.5 AV	54.0	-6.5	1.31 H	109	49.32	-1.82
5	4924.00	50.9 PK	74.0	-23.1	1.53 H	135	44.47	6.43
6	4924.00	37.9 AV	54.0	-16.1	1.53 H	135	31.47	6.43
7	7386.00	55.9 PK	74.0	-18.1	1.04 H	333	41.98	13.92
8	7386.00	42.9 AV	54.0	-11.1	1.04 H	333	28.98	13.92

**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	105.8 PK			1.15 V	143	107.69	-1.89
2	*2462.00	93.1 AV			1.15 V	143	94.99	-1.89
3	2483.50	72.5 PK	74.0	-1.5	1.15 V	143	74.32	-1.82
4	2483.50	50.3 AV	54.0	-3.7	1.15 V	143	52.12	-1.82
5	4924.00	50.8 PK	74.0	-23.2	1.03 V	134	44.37	6.43
6	4924.00	37.8 AV	54.0	-16.2	1.03 V	134	31.37	6.43
7	7386.00	56.3 PK	74.0	-17.7	1.00 V	28	42.38	13.92
8	7386.00	43.7 AV	54.0	-10.3	1.00 V	28	29.78	13.92

**REMARKS:**

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

### 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	Jan. 21, 2013	Jan. 20, 2014

**Note:**

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. Tested date : Sep. 02, 2013

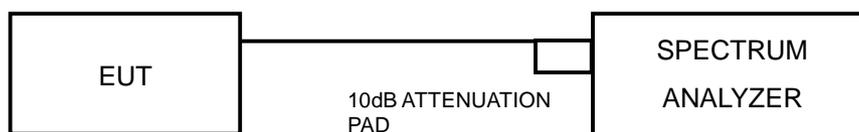
#### 4.3.3 TEST PROCEDURE

1. Set resolution bandwidth (RBW) = 100kHz
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	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	11.60	0.5	PASS
6	2437	10.65	0.5	PASS
11	2462	10.65	0.5	PASS

#### 802.11g

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	15.86	0.5	PASS
6	2437	15.79	0.5	PASS
11	2462	16.07	0.5	PASS

#### 802.11n (HT20)

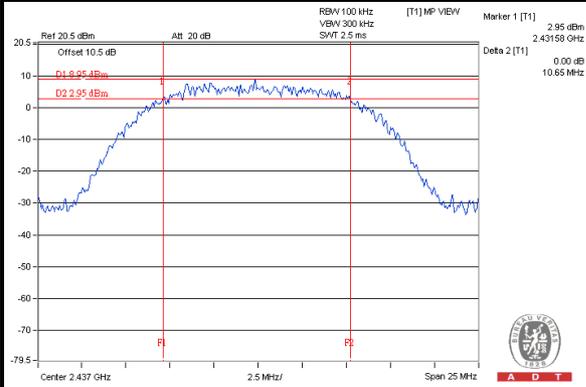
CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	15.51	0.5	PASS
6	2437	16.32	0.5	PASS
11	2462	15.99	0.5	PASS



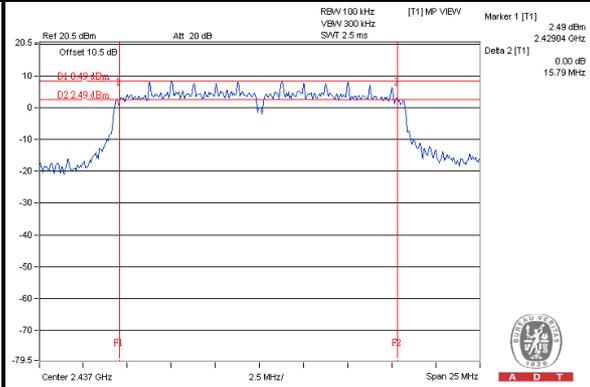
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### SPECTRUM PLOT OF WORST VALUE

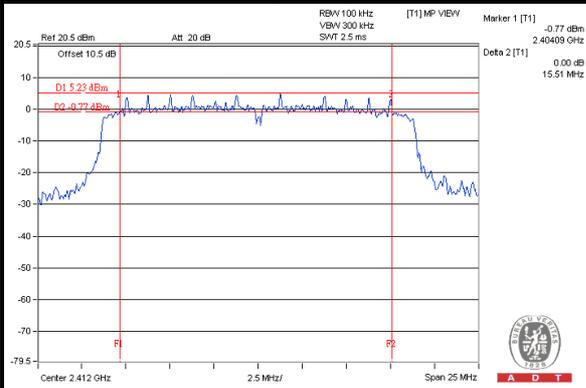
#### 802.11b / CH6



#### 802.11g / CH6



#### 802.11n (HT20) / CH1



## 4.4 OCCUPIED BANDWIDTH MEASUREMENT

### 4.4.1 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S Spectrum Analyzer	FSP40	100037	Nov. 01, 2012	Oct. 31, 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 : Sep. 02, 2013

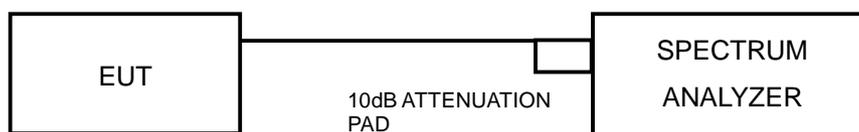
### 4.4.2 TEST PROCEDURE

- 1) Set RBW  $\geq$  1% of the emission bandwidth.
- 2) Set the VBW  $\geq$  3 x RBW.
- 3) Detector = Peak.
- 4) Trace mode = max hold.
- 5) Record the 99% emission bandwidth.

### 4.4.3 DEVIATION FROM TEST STANDARD

No deviation

### 4.4.4 TEST SETUP



### 4.4.5 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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#### 4.4.6 TEST RESULTS

##### 802.11b

CHANNEL	FREQUENCY (MHz)	OCCUPIED BANDWIDTH (MHz)
1	2412	14.52
6	2437	14.64
11	2462	14.64

##### 802.11g

CHANNEL	FREQUENCY (MHz)	OCCUPIED BANDWIDTH (MHz)
1	2412	16.80
6	2437	17.40
11	2462	17.04

##### 802.11n (HT20)

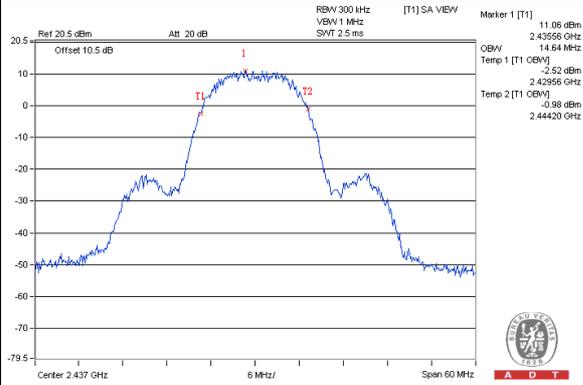
CHANNEL	FREQUENCY (MHz)	OCCUPIED BANDWIDTH (MHz)
1	2412	17.64
6	2437	18.96
11	2462	17.64



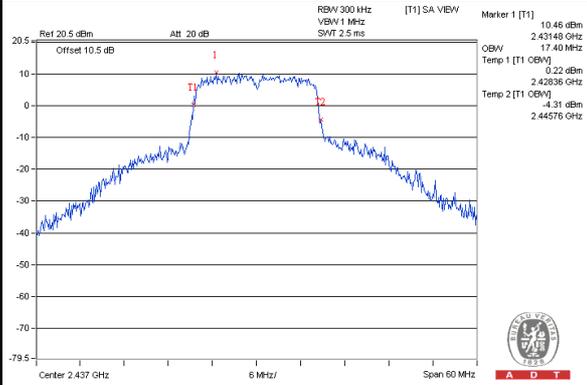
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### SPECTRUM PLOT OF WORST VALUE

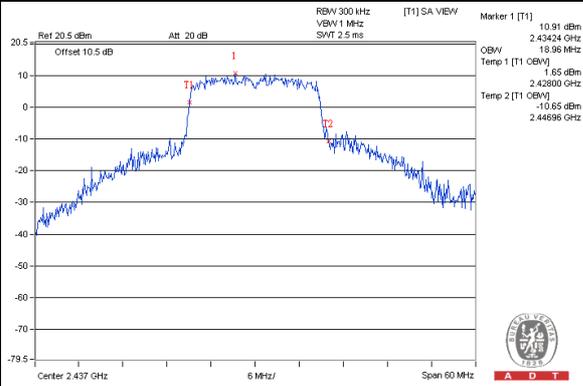
#### 802.11b / CH6



#### 802.11g / CH6



#### 802.11n (HT20) / CH6



## 4.5 CONDUCTED OUTPUT POWER MEASUREMENT

### 4.5.1 LIMITS OF MAXIMUM PEAK OUTPUT POWER MEASUREMENT

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

Per KDB 662911 D01 Multiple Transmitter Output v01r02 Method of conducted output power measurement on IEEE 802.11 devices,

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

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

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

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

### 4.5.2 INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Power Meter Anritsu	ML2495A	0824006	May 20, 2013	May 19, 2014
Power Sensor Anritsu	MA2411B	0738172	May 20, 2013	May 19, 2014

- Note:**
1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
  2. Tested date : Sep. 02, 2013

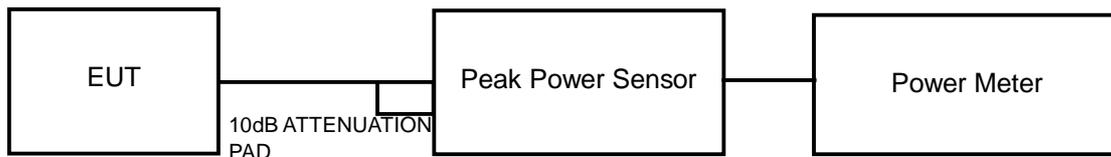
### 4.5.3 TEST PROCEDURES

The 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.

#### 4.5.4 DEVIATION FROM TEST STANDARD

No deviation

#### 4.5.5 TEST SETUP



#### 4.5.6 EUT OPERATING CONDITIONS

Same as Item 4.3.6



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#### 4.5.7 TEST RESULTS

##### 802.11b

CHANNEL	FREQUENCY (MHz)	PEAK POWER (mW)	PEAK POWER (dBm)	PEAK POWER LIMIT (dBm)	PASS/FAIL
1	2412	139.959	21.46	30	PASS
6	2437	133.968	21.27	30	PASS
11	2462	123.310	20.91	30	PASS

##### 802.11g

CHANNEL	FREQUENCY (MHz)	PEAK POWER (mW)	PEAK POWER (dBm)	PEAK POWER LIMIT (dBm)	PASS/FAIL
1	2412	409.261	26.12	30	PASS
6	2437	493.174	26.93	30	PASS
11	2462	400.867	26.03	30	PASS

##### 802.11n (HT20)

CHANNEL	FREQUENCY (MHz)	PEAK POWER (mW)	PEAK POWER (dBm)	PEAK POWER LIMIT (dBm)	PASS/FAIL
1	2412	320.627	25.06	30	PASS
6	2437	502.343	27.01	30	PASS
11	2462	325.837	25.13	30	PASS

## 4.6 AVERAGE OUTPUT POWER

### 4.6.1 FOR REFERENCE.

### 4.6.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Power Meter	ML2495A	0824006	May 20, 2013	May 19, 2014
Power Sensor	MA2411B	0738172	May 20, 2013	May 19, 2014

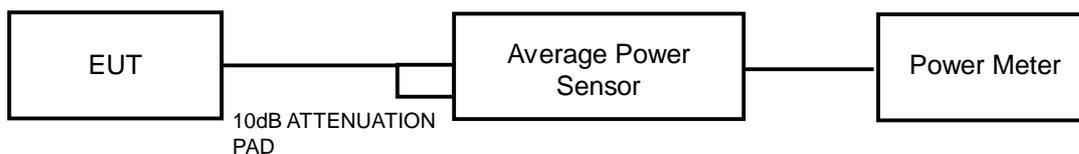
**Note:**

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. Tested date : Sep. 02, 2013

### 4.6.3 TEST PROCEDURES

Method PM is used to perform output power measurement, trigger and gating function of wide band power meter is enabled to measure max output power of TX on burst. Duty factor is not added to measured value.

### 4.6.4 TEST SETUP



### 4.6.5 EUT OPERATING CONDITIONS

Same as Item 4.3.6



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#### 4.6.6 TEST RESULTS

##### 802.11b

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (mW)	AVERAGE POWER (dBm)
1	2412	89.331	19.51
6	2437	83.368	19.21
11	2462	76.033	18.81

##### 802.11g

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (mW)	AVERAGE POWER (dBm)
1	2412	89.743	19.53
6	2437	121.339	20.84
11	2462	96.161	19.83

##### 802.11n (HT20)

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (mW)	AVERAGE POWER (dBm)
1	2412	50.582	17.04
6	2437	118.577	20.74
11	2462	51.761	17.14



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## 4.7 POWER SPECTRAL DENSITY MEASUREMENT

### 4.7.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

The Maximum of Power Spectral Density Measurement is 8dBm.

### 4.7.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S SPECTRUM ANALYZER	FSP40	100036	Jan. 21, 2013	Jan. 20, 2014

**Note:**

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. Tested date : Sep. 02, 2013

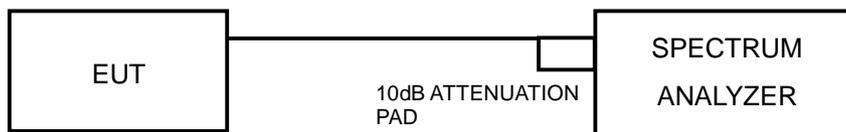
### 4.7.3 TEST PROCEDURE

1. Set the RBW = 3 kHz, VBW =10 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 amplitude level.

### 4.7.4 DEVIATION FROM TEST STANDARD

No deviation

### 4.7.5 TEST SETUP



### 4.7.6 EUT OPERATING CONDITION

Same as Item 4.3.6



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#### 4.7.7 TEST RESULTS

##### 802.11b

CHANNEL	FREQUENCY (MHz)	PSD (dBm/3kHz)	LIMIT (dBm/3kHz)	PASS /FAIL
1	2412	-5.22	8	PASS
6	2437	-5.17	8	PASS
11	2462	-6.49	8	PASS

##### 802.11g

CHANNEL	FREQUENCY (MHz)	PSD (dBm/3kHz)	LIMIT (dBm/3kHz)	PASS /FAIL
1	2412	-7.12	8	PASS
6	2437	-5.77	8	PASS
11	2462	-7.06	8	PASS

##### 802.11n (HT20)

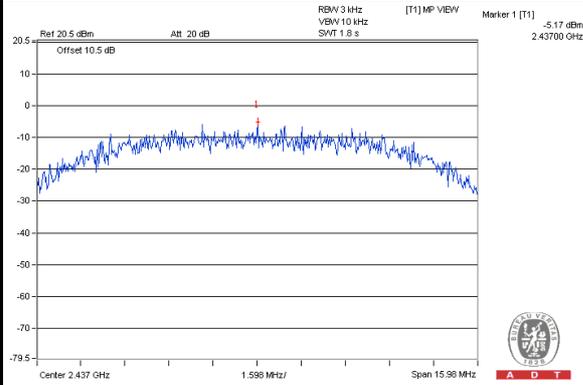
CHANNEL	FREQUENCY (MHz)	PSD (dBm/3kHz)	LIMIT (dBm/3kHz)	PASS /FAIL
1	2412	-7.76	8	PASS
6	2437	-6.18	8	PASS
11	2462	-8.27	8	PASS



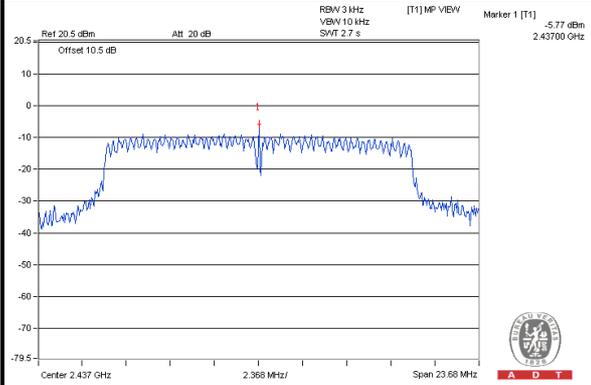
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### SPECTRUM PLOT OF WORST VALUE

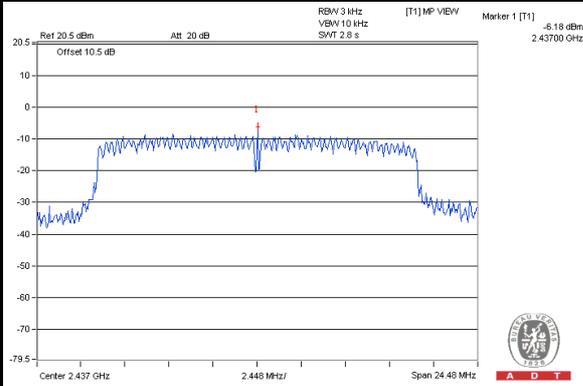
#### 802.11b / CH6



#### 802.11g / CH6



#### 802.11n (HT20) / CH6





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## 4.8 CONDUCTED OUT-BAND EMISSION MEASUREMENT

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

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

### 4.8.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S SPECTRUM ANALYZER	FSP40	100036	Jan. 21, 2013	Jan. 20, 2014

**Note:**

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. Tested date : Sep. 02, 2013

### 4.8.3 TEST PROCEDURE

#### Measurement Procedure - Reference Level

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.

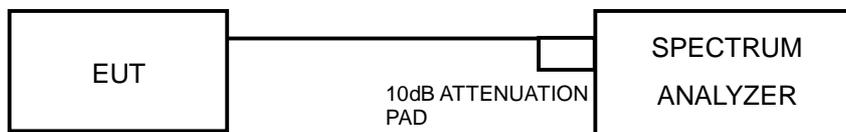
#### Measurement Procedure –Unwanted Emission Level

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.

#### 4.8.4 DEVIATION FROM TEST STANDARD

No deviation

#### 4.8.5 TEST SETUP



#### 4.8.6 EUT OPERATING CONDITION

Same as Item 4.3.6

#### 4.8.7 TEST RESULTS

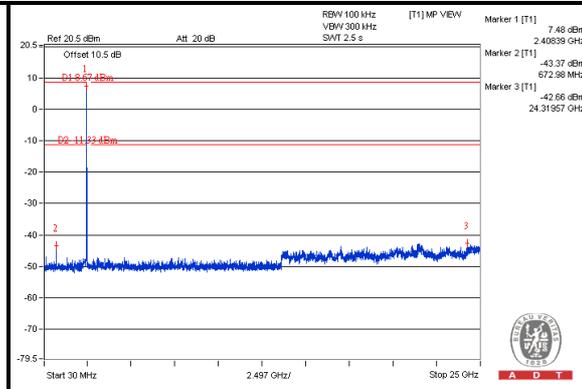
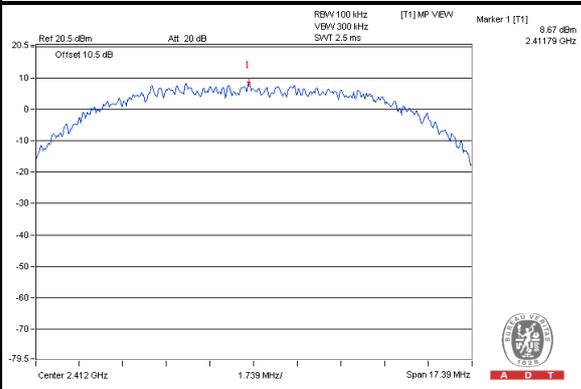
The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement



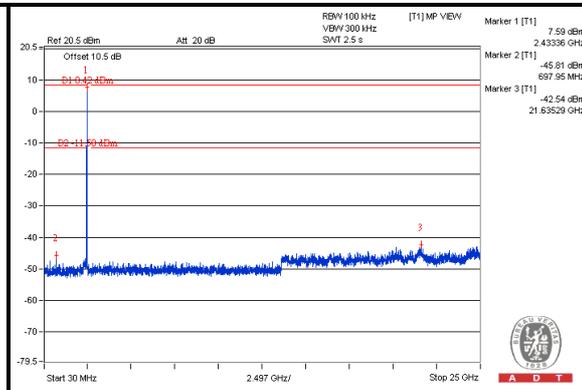
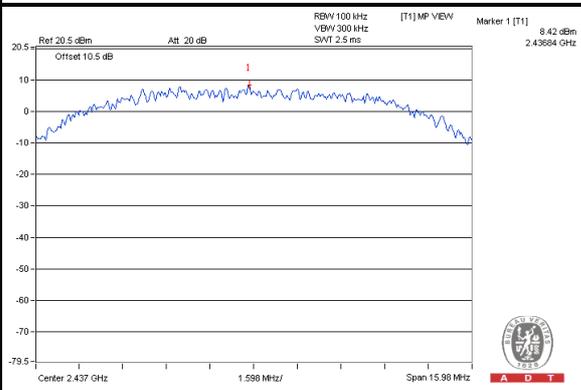
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### 802.11b:

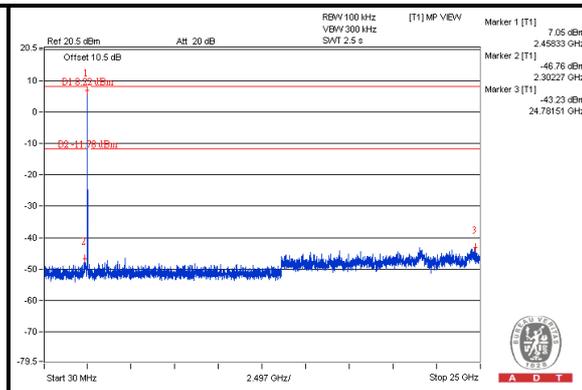
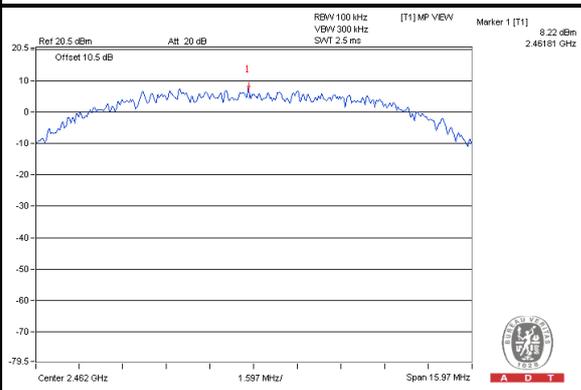
#### CH 1



#### CH 6



#### CH 11

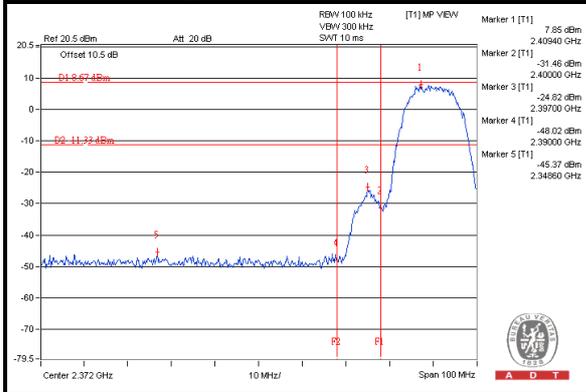




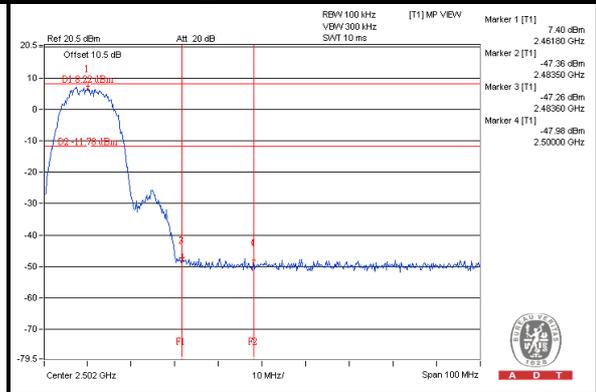
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### 802.11b:

#### CH 1 Band edge



#### CH 11 Band edge

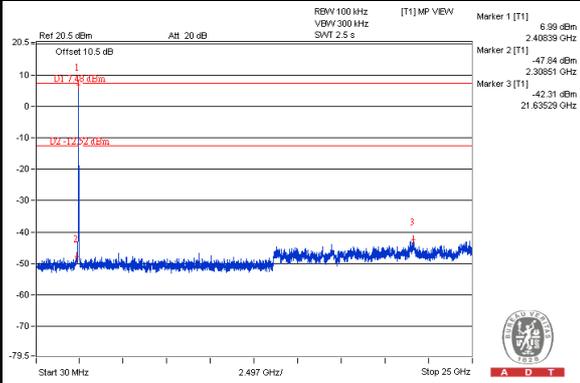
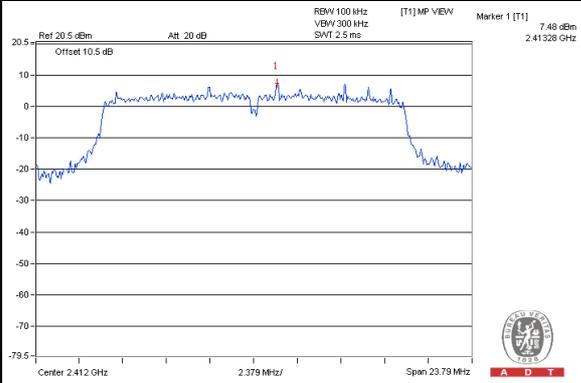




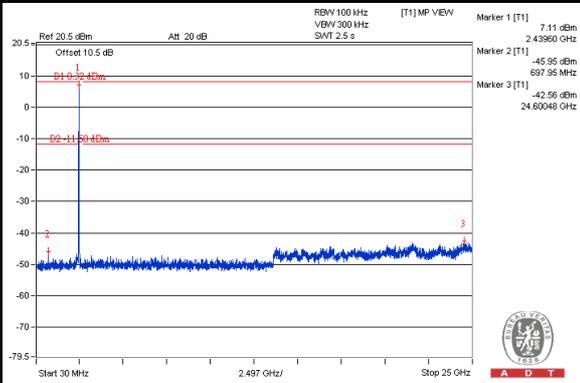
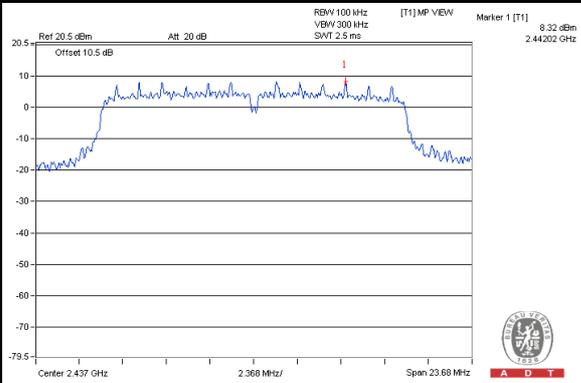
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### 802.11g:

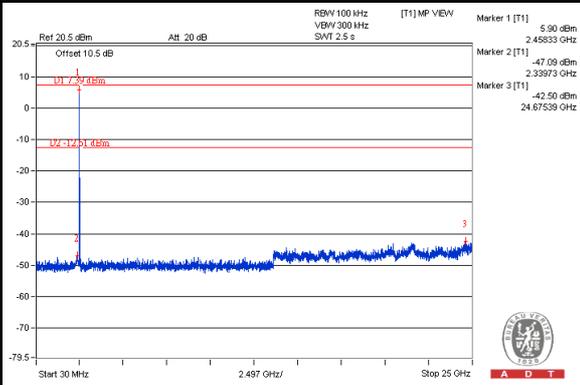
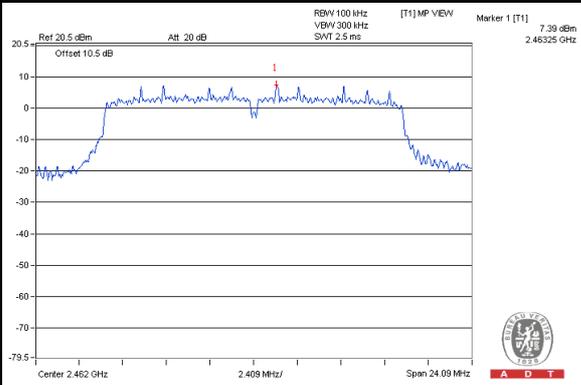
#### CH 1



#### CH 6



#### CH 11

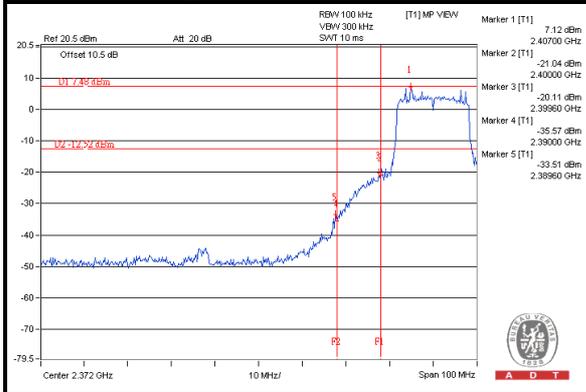




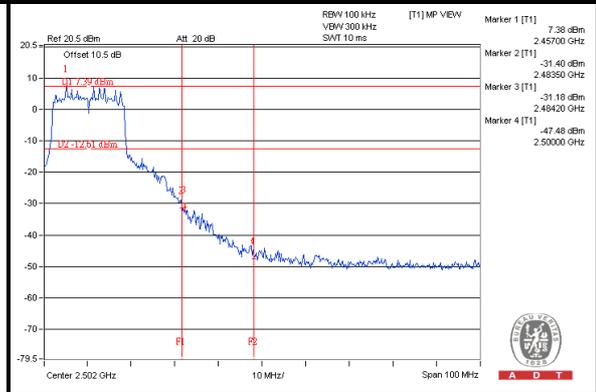
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### 802.11g:

#### CH 1 Band edge



#### CH 11 Band edge

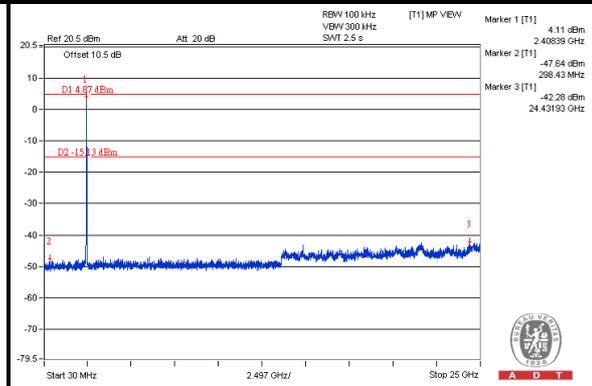
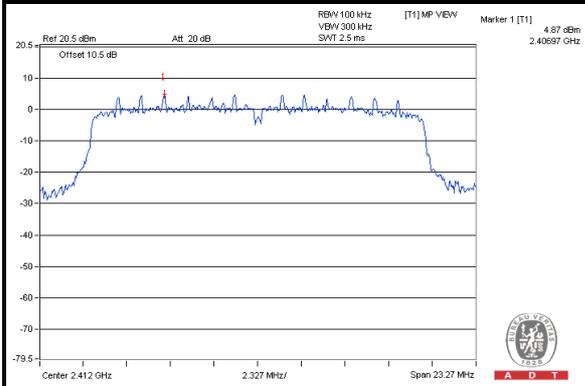




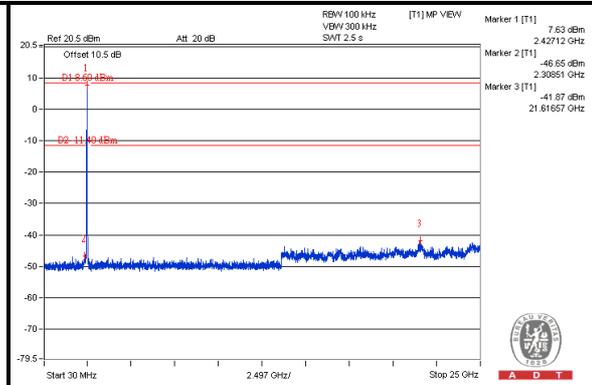
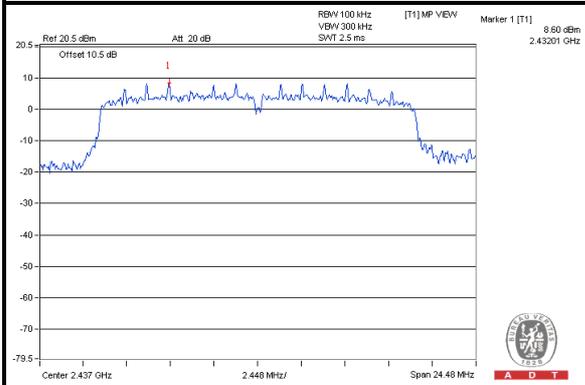
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### 802.11n (HT20):

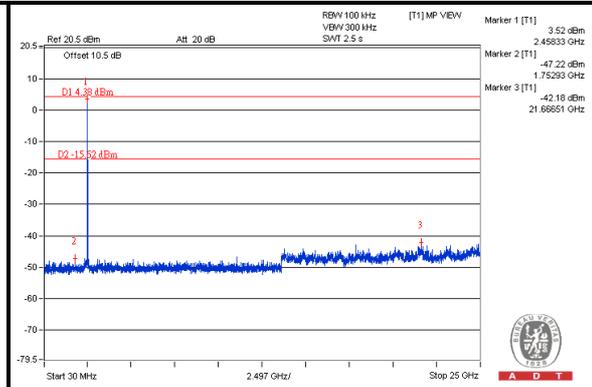
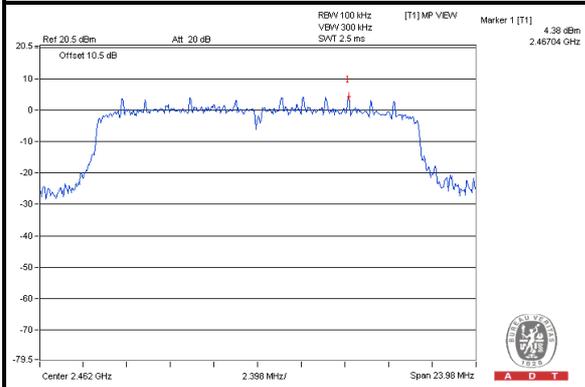
#### CH 1



#### CH 6



#### CH 11

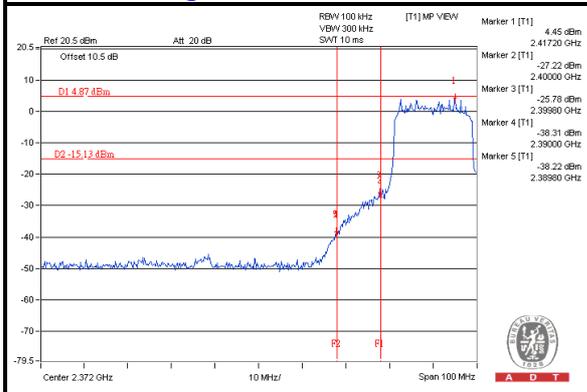




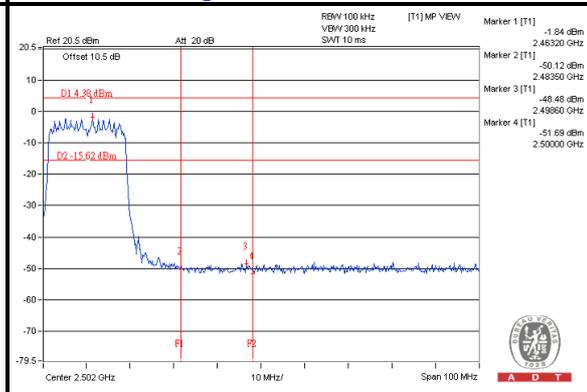
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### 802.11n (HT20):

#### CH 1 Band edge



#### CH 11 Band edge





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## 5. PHOTOGRAPHS OF THE TEST CONFIGURATION

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





## 6. INFORMATION ON THE TESTING LABORATORIES

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

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

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Fax: 886-2-26052943

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

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



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

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

**--- END ---**