

# TEST REPORT

of

FCC Part 15 Subpart C §15.247  
(Class II Permissive Change)  
FCC ID : TX2-RTL8187SE

Equipment Under Test : Notebook PC  
Model Name : LGX11  
Serial No. : 20090114\_LJD1  
Applicant : LG Electronics Inc.  
Manufacturer : MICRO-STAR INT'L Co., Ltd.  
Date of Test(s) : 2009-01-15 ~ 2009-01-19  
Date of Issue : 2009-01-20

In the configuration tested, the EUT complied with the standards specified above.

Tested By:



Date

2009-01-20

\_\_\_\_\_  
Geoffrey Do

Approved By



Date

2009-01-20

\_\_\_\_\_  
Charles Kim

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## 1. General information

### 1.1. Testing laboratory

SGS Testing Korea Co., Ltd.

Wireless Div. 2FL, 18-34, Sanbon-dong, Gunpo-si, Gyeonggi-do, Korea 435-040

[www.electrolab.kr.sgs.com](http://www.electrolab.kr.sgs.com)

Telephone : +82 +31 428 5700

FAX : +82 +31 427 2371

### 1.2. Details of applicant

Applicant : LG Electronics Inc.

Address : 19-1, Chenongho-ri, Jinwi-myeon, Pyeongtaek-si, Gyeonggi-do, 451-713, Korea

Contact Person : Jong-dae Lee

Phone No. : +82 +31 610 5338

Fax No. : +82 +31 610 5355

### 1.3. Description of EUT

<b>Kind of Product</b>	Notebook PC
<b>Model Name</b>	LGX11
<b>Serial Number</b>	20090114_LJD1
<b>2G/3G Module FCC ID</b>	VV7-MBMF3507G-2
<b>WLAN Module FCC ID</b>	TX2-RTL8187SE
<b>Bluetooth Module FCC ID</b>	I4L-MS6837D1
<b>Power Supply</b>	AC 110 V(Battery : DC 11.1 V)
<b>Frequency Range</b>	GSM : 824.2 MHz ~ 848.8 MHz and 1850.2 MHz ~ 1909.8 MHz
	WCDMA : 826.4 MHz ~ 846.6 MHz and 1825.4 MHz ~ 1907.6 MHz
	2412 MHz ~ 2462 MHz (11b/g)
	2402 MHz ~ 2480 MHz (Bluetooth)
<b>Modulation Technique</b>	GSM/WCDMA : GMSK, 8DPSK, QPSK
	11b : DSSS (CCK, BPSK, QPSK), 11g : OFDM (BPSK, QPSK, 16QAM, 64QAM)
	Bluetooth : GFSK, $\pi/4$ DQPSK, 8DPSK
<b>Number of Channels</b>	GSM 850(125), GSM 1900(300), WCDMA 850(103), WCDMA 1900 (103)
	11b(11), 11g(11), Bluetooth(79)

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#### 1.4. Description of test mode

11 b mode :

We found out the test mode with the highest power level after we analyze all the data rates. So we chosen 1 Mbps data rate(worst case) as a representative.

11g mode :

We found out the test mode with the highest power level after we analyze all the data rates. So we chosen 6 Mbps data rate(worst case) as a representative.

#### 1.5. Test equipment list

Equipment	Manufacturer	Model	Cal Due.
Signal Generator	Agilent	E4438C	May 09, 2009
Spectrum Analyzer	H.P.	8565E	Oct. 01, 2009
Spectrum Analyzer	Agilent	E4440A	May 09, 2009
Attenuator	Agilent	8498A	May 09, 2009
Preamplifier	H.P	8447F	Jul. 03, 2009
Preamplifier	R&S	SCU_F0118_G35_AFS42_SCC(F)	Aug. 25, 2009
High Pass Filter	Wainwright Instrument GmbH	WHK3.0/18G-11SS	Dec. 01, 2009
Test Receiver	Rohde & Schwarz	ESHS10	Jun. 21, 2009
Ultra-Broadband Antenna	Rohde & Schwarz	HL562	Oct. 02, 2009
Horn Antenna	Electro-Metrics	HF906	Nov. 13, 2009
Anechoic Chamber	SY Corporation	L x W x H (6.5 m x 3.5 m x 3.5 m)	Feb. 15, 2009

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### 1.6. Summary of test results

The EUT has been tested according to the following specifications:

Applied standard : FCC Part15 Subpart C		
Standard section	Test item	Result
15.205(a) 15.209 15.247(d)	Peak power Transmitter radiated spurious emissions	Complied

### 1.7. Test report revision

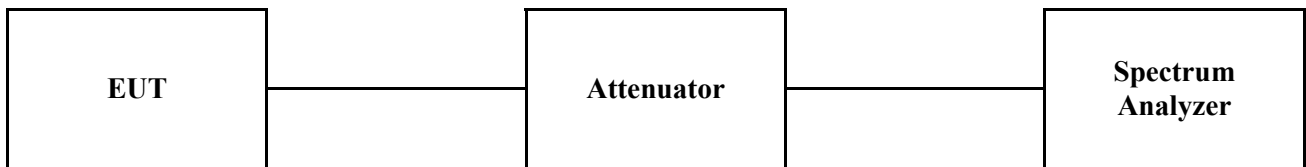
Revision	Report number	Description
0	F690501/RF-RTL002873	Initial

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## 2. FCC Part 15.247 requirements

### 2.1. Peak power

#### 2.1.1. Test setup



#### 2.1.2. Limit

According to §15.247(b)(3), for systems using digital modulation in the 902 ~ 928 MHz, 2400 ~2483.5 MHz, and 5725 ~ 5850 MHz band: 1 Watt.

According to §15.247(b)(4), the conducted output power limit specified in paragraph(b) of this section is based on the use of antenna with directional gains that do not exceed 6 dBi. Except as shown in paragraph(c) of this section, if transmitting antenna of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraph (b)(1), (b)(2), and (b)(3) of this section , as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6dBi.

#### 2.1.3. Test procedure

1. Place the EUT on the table and set it in the transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the Spectrum analyzer as RBW = 1 MHz, VBW = 3 MHz, Span = Auto, Channel BW = 99%.

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### 2.1.4. Test results

Ambient temperature : 23 °C  
 Relative humidity : 45 % R.H.

Test mode : 11b

Channel	Frequency (MHz)	Output power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	20.83	30	9.17
Middle	2437	20.93		9.07
High	2462	21.06		8.94

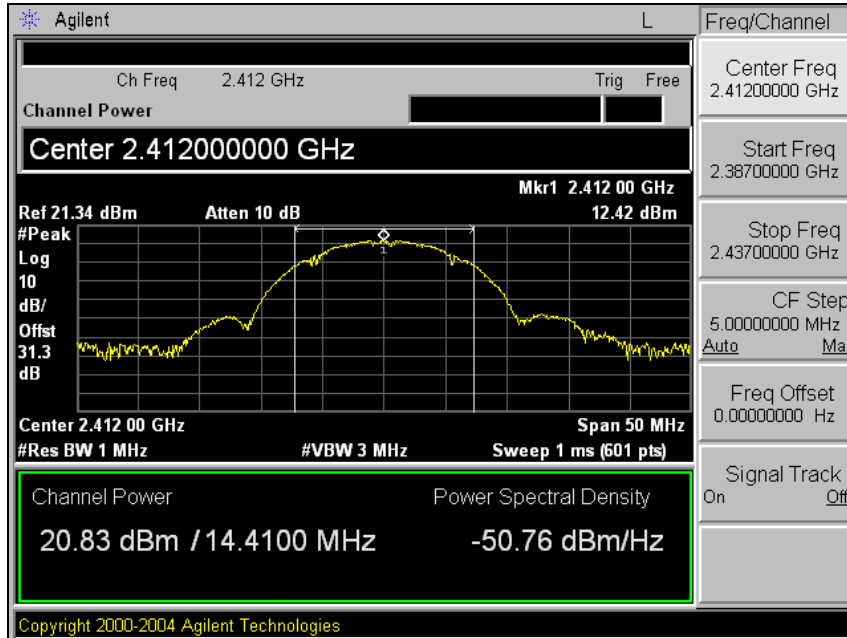
Test mode : 11g

Channel	Frequency (MHz)	Output power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	22.37	30	7.63
Middle	2437	22.26		7.74
High	2462	22.42		7.58

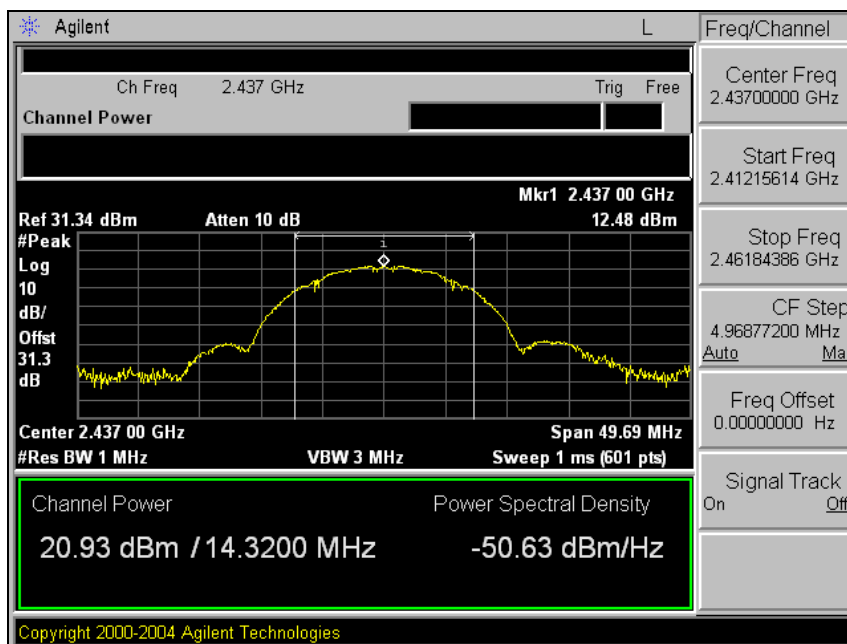
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**Test mode: 11b**

Low channel



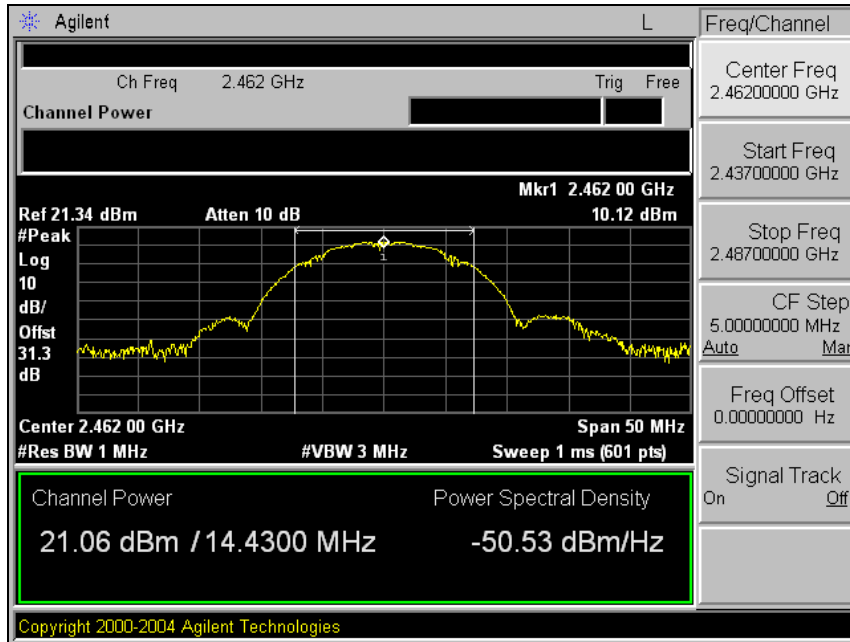
Middle channel



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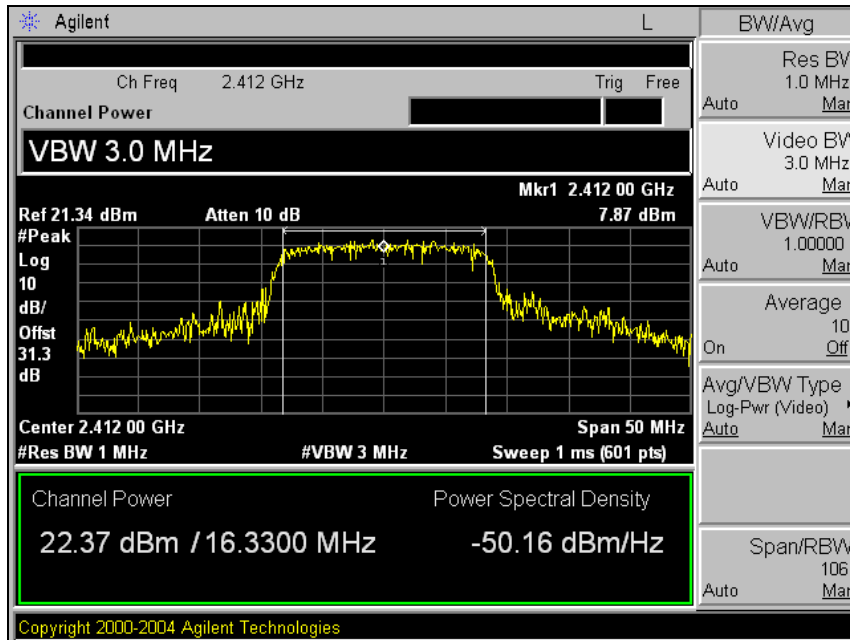
High channel



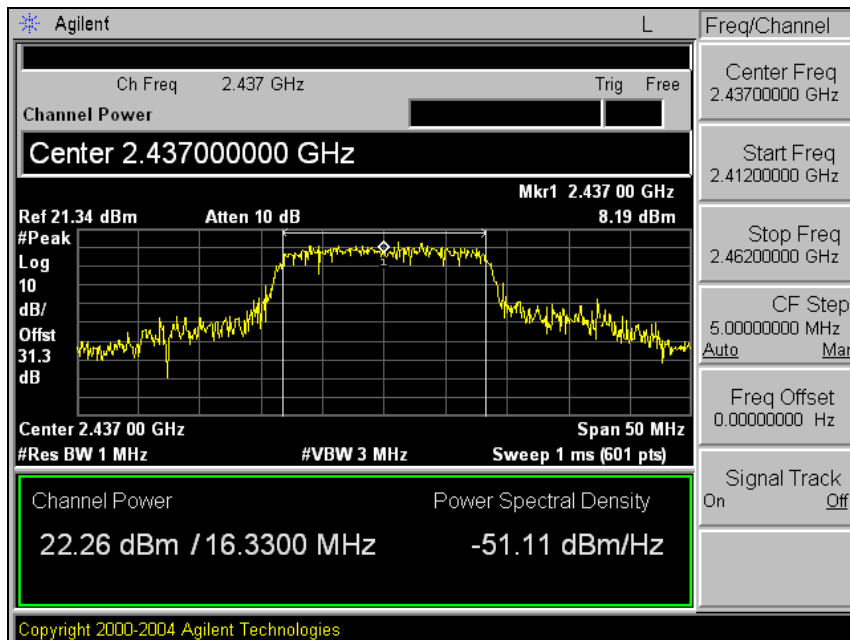
The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This test report cannot be reproduced, except in full, without prior written permission of the Company.

**Test mode: 11g**

Low channel

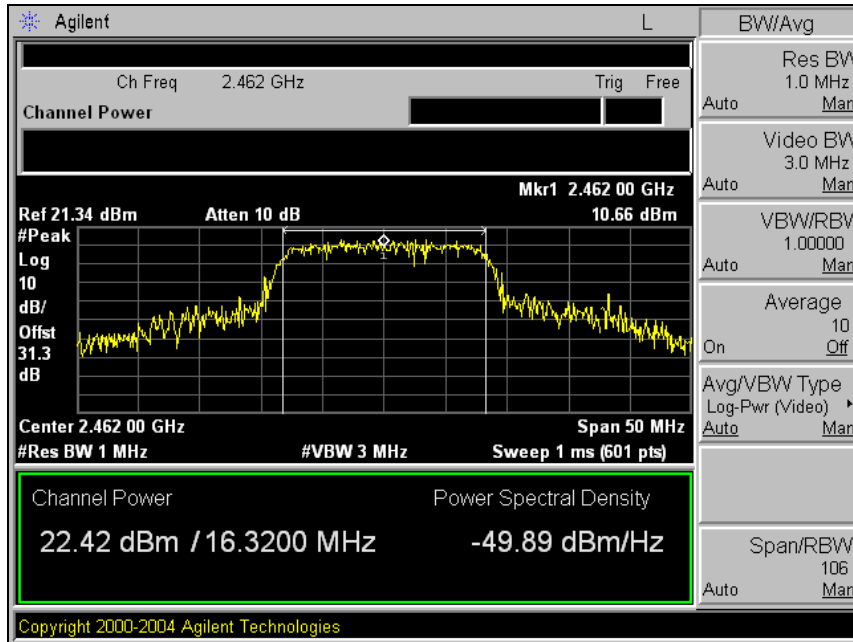


Middle channel



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High channel

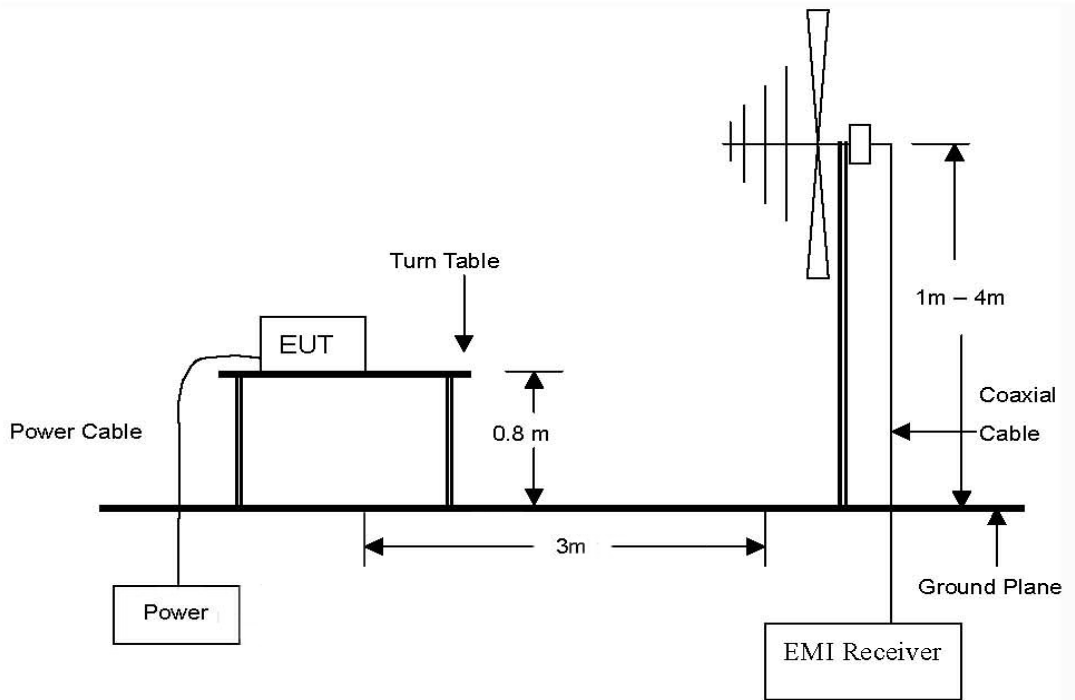


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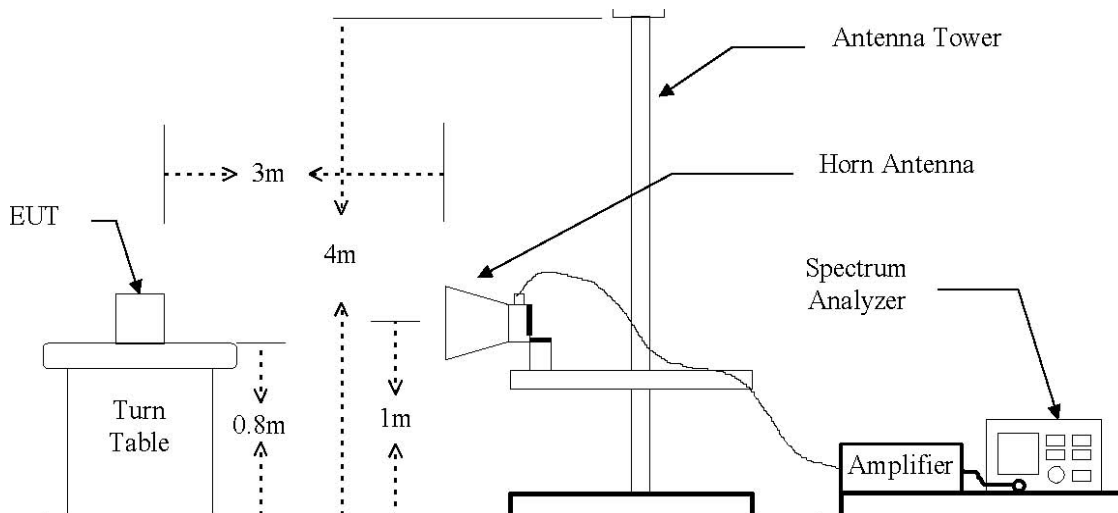
## 2.2. Transmitter radiated spurious emissions

### 2.2.1. Setup

The diagram below shows the test setup that is utilized to make the measurements for emission from 30 MHz to 1 GHz Emissions.



The diagram below shows the test setup that is utilized to make the measurements for emission from 1 GHz to 24 GHz Emissions.



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### 2.2.2. Limit

According to §15.247(d), in any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement , provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval , as permitted under paragraph(b)(3) of this section , the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in section §15.209(a) is not required. In addition, radiated emission which in the restricted band, as define in section §15.205(a), must also comply the radiated emission limits specified in section §15.209(a) (see section §15.205(c))

According to § 15.109(a), for an intentional radiator devices, the general required of field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values :

Frequency (MHz)	Distance (Meters)	Radiated (dB $\mu$ V/m)	Radiated ( $\mu$ V/m)
30 - 88	3	40.0	100
88 – 216	3	43.5	150
216 – 960	3	46.0	200
Above 960	3	54.0	500

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### 2.2.3. Test procedures

Radiated emissions from the EUT were measured according to the dictates of ANSI C63.4:2003

#### 2.2.3.1. Test procedures for radiated spurious emissions

1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter anechoic chamber test site. The table was rotated 360 degrees to determine the position of the highest radiation.
2. During performing radiated emission below 1 GHz, the EUT was set 3 meters away from the interference receiving antenna, which was mounted on the top of a variable-height antenna tower. During performing radiated emission above 1 GHz, the EUT was set 3 meter away from the interference-receiving antenna.
3. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
4. 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 table was turned from 0 degrees to 360 degrees to find the maximum reading.
5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
6. If the emission level of the EUT in peak mode was 10 dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10 dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

▣ Note

1. *The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Peak detection (PK) or Quasi-peak detection (QP) at frequency below 1 GHz.*
2. *The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1MHz for Peak detection and frequency above 1 GHz.*
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 1 GHz.*

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## 2.2.4. Test results

Ambient temperature : 22 °C  
 Relative humidity : 43 % R.H.

### 2.2.4.1. Spurious radiated emission for below 1GHz

#### Test mode : 11b

Radiated Emissions			Ant	Correction Factors		Total	Limit	
Frequency (MHz)	Reading (dBuV)	Detect Mode	Pol.	AF (dB/m)	Amp Gain+CL (dB)	Actual (dBuV/m)	Limit (dBuV/m)	Margin (dB)
243.40	47.6	Peak	H	9.25	-25.49	31.36	46.00	14.64
318.57	45.5	Peak	H	11.44	-25.25	31.68	46.00	14.32
405.87	41.2	Peak	V	13.55	-25.59	29.17	46.00	16.83
548.95	41.6	Peak	V	16.24	-25.84	32.00	46.00	14.00
675.05	40.4	Peak	V	18.17	-25.53	33.04	46.00	12.96
Above 676	Not detected							

#### Test mode : 11g

Radiated Emissions			Ant	Correction Factors		Total	Limit	
Frequency (MHz)	Reading (dBuV)	Detect Mode	Pol.	AF (dB/m)	Amp Gain+CL (dB)	Actual (dBuV/m)	Limit (dBuV/m)	Margin (dB)
243.40	47.5	Peak	H	9.25	-25.49	31.26	46.00	14.74
270.07	45.1	Peak	H	10.07	-25.36	29.81	46.00	16.19
296.75	43.5	Peak	V	10.79	-25.26	29.03	46.00	16.97
498.02	41.0	Peak	V	16.19	-25.88	31.31	46.00	14.69
667.77	45.0	Peak	V	18.12	-25.58	37.54	46.00	8.46
Above 668	Not detected							

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**■ Remark:**

1. *Measuring frequencies from 30 MHz to the 1GHz.*
2. *All spurious emission at low, middle and high channel are almost the same below 1 GHz, so the spurious emission test result of the high channel was chosen as representative in final test.*
3. *Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made an instrument Using peak/quasi-peak detector mode.*
4. *Quasi-peak test would be performed if the peak result were greater than the quasi-peak limit or as required by the applicant.*

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### 2.2.4.2. Spurious radiated emission for above 1 GHz

**Test mode : 11b**

A. Low Channel (2412 MHz)

Radiated Emissions			Ant	Correction Factors		Total	Limit	
Frequency (MHz)	Reading (dBuV)	Detect Mode	Pol.	AF (dB/m)	Cable loss (dB)	Actual (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2390.0*	20.62	Peak	V	28.05	5.32	53.99	74.00	20.02
2390.0*	8.76	Average	V	28.05	5.32	42.13	54.00	11.88
Above 2400	Not detected							

B. Middle Channel (2437 MHz)

Radiated Emissions			Ant	Correction Factors		Total	Limit	
Frequency (MHz)	Reading (dBuV)	Detect Mode	Pol.	AF (dB/m)	Amp Gain+CL (dB)	Actual (dBuV/m)	Limit (dBuV/m)	Margin (dB)
Above 1000	Not detected							

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## C. High Channel (2462 MHz)

Radiated Emissions			Ant	Correction Factors		Total	Limit	
Frequency (MHz)	Reading (dBuV)	Detect Mode	Pol.	AF (dB/m)	Cable loss (dB)	Actual (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2483.5*	20.08	Peak	V	28.18	5.34	53.60	74.00	20.40
2483.5*	8.07	Average	V	28.18	5.34	41.59	54.00	12.41
Radiated Emissions			Ant	Correction Factors		Total	Limit	
Frequency (MHz)	Reading (dBuV)	Detect Mode	Pol.	AF (dB/m)	Amp Gain+CL (dB)	Actual (dBuV/m)	Limit (dBuV/m)	Margin (dB)
4924	45.78	Peak	V	33.29	31.84	47.23	74.00	26.77
7386	49.77	Peak	V	35.96	-27.38	58.35	74.00	15.65
7386	42.80	Average	V	35.96	-27.38	51.38	54.00	2.62
Above 7400	Not detected							

## ■ Remarks

1. "\*" means the restricted band.
2. Measuring frequencies from 1 GHz to the 10<sup>th</sup> harmonic of highest fundamental Frequency.
3. Radiated emissions measured in frequency above 1000 MHz were made with an instrument using peak/average detector mode.
4. Average test would be performed if the peak result were greater than the average limit.

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**Test mode : 11g**
**A. Low Channel (2412 MHz)**

Radiated Emissions			Ant	Correction Factors		Total	Limit	
Frequency (MHz)	Reading (dBuV)	Detect Mode	Pol.	AF (dB/m)	Cable loss (dB)	Actual (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2390.0*	23.52	Peak	V	28.05	5.32	56.89	74.00	17.12
2390.0*	11.70	Average	V	28.05	5.32	45.07	54.00	8.94
Radiated Emissions			Ant	Correction Factors		Total	Limit	
Frequency (MHz)	Reading (dBuV)	Detect Mode	Pol.	AF (dB/m)	Amp Gain+CL (dB)	Actual (dBuV/m)	Limit (dBuV/m)	Margin (dB)
7236	49.19	Peak	V	35.78	-27.30	57.67	74.00	16.33
7236	33.58	Average	V	35.78	-27.30	42.06	54.00	11.94
Above 7300	Not detected							

**B. Middle Channel (2437 MHz)**

Radiated Emissions			Ant	Correction Factors		Total	Limit	
Frequency (MHz)	Reading (dBuV)	Detect Mode	Pol.	AF (dB/m)	Amp Gain+CL (dB)	Actual (dBuV/m)	Limit (dBuV/m)	Margin (dB)
7311	48.85	Peak	H	35.87	-27.28	57.44	74.00	16.56
7311	33.60	Average	H	35.87	-27.28	42.19	54.00	11.81
Above 7400	Not detected							

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## C. High Channel (2462 MHz)

Radiated Emissions			Ant	Correction Factors		Total	Limit	
Frequency (MHz)	Reading (dBuV)	Detect Mode	Pol.	AF (dB/m)	Cable loss (dB)	Actual (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2483.5*	28.85	Peak	V	28.18	5.34	62.37	74.00	11.63
2483.5*	11.60	Average	V	28.18	5.34	45.12	54.00	8.88
Radiated Emissions			Ant	Correction Factors		Total	Limit	
Frequency (MHz)	Reading (dBuV)	Detect Mode	Pol.	AF (dB/m)	Amp Gain+CL (dB)	Actual (dBuV/m)	Limit (dBuV/m)	Margin (dB)
7386	48.62	Peak	V	35.96	-27.38	57.20	74.00	16.80
7386	34.25	Average	V	35.96	-27.38	42.83	54.00	11.17
Above 7400	Not detected							

**▣** Remarks

1. "\*" means the restricted band.
2. Measuring frequencies from 1 GHz to the 10<sup>th</sup> harmonic of highest fundamental Frequency.
3. Radiated emissions measured in frequency above 1000 MHz were made with an instrument using peak/average detector mode.
4. Average test would be performed if the peak result were greater than the average limit.

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# ***Test setup photo of EUT***

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***Photo of spurious emission***

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