

APPLICATION FOR CERTIFICATION

On Behalf of

LG Electronics Inc.

Wireless Adapter Card

Model No. : RS4

FCC ID : BEJ9QK-DMRS4

IC: 2703H-DMRS4

Brand : LG

Prepared for : LG Electronics Inc.

222, LG-ro, Jinwi-myeon, Pyeongtaek-si,
Gyeonggi-do, 451-713, Korea

Prepared by : AUDIX Technology Corporation

EMC Department

No. 53-11, Dingfu, Linkou Dist.,
New Taipei City 244, Taiwan, R.O.C.

Tel : (02) 2609-9301, 2609-2133

Fax: (02) 2609-9303

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TEST REPORT CERTIFICATION

Applicant : LG Electronics Inc.
Manufacturer : LG Electronics Inc.
Factory : NAMUGA (SUZHOU) TECHNOLOGIES CO., LTD.
EUT Description : Wireless Adapter Card
FCC ID : **BEJ9QK-DMRS4**
IC : **2703H-DMRS4**
(A) Model No. : RS4
(B) Serial No. : N/A
(C) Brand : LG
(D) Power Supply : DC 3.3V (transferred from USB DC 5V)

Measurement Procedure Used:

FCC Rules and Regulations Part 15 Subpart C, Oct. 2013
Industry Canada Rules and Regulations RSS-Gen (Issue 3), December 2010 and
RSS-210 (Issue 8), December 2010
(Canada RSS-210 §Annex 8)
And ANSI C63.4:2003

(FCC CFR 47 Part 15C, §15.205 and §15.207 and §15.209 and §15.247)

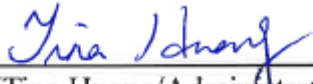
The device described above was tested by AUDIX Technology Corporation to determine the maximum emission levels emanating from the device. The maximum emission levels were compared to the FCC Part 15 subpart B and C and Canada RSS-Gen, RSS-210 limits.

The measurement results are contained in this test report and AUDIX Technology Corporation is assumed full responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT to be technically compliant with the requirements of FCC and Industry Canada RSS-Gen, RSS-210 standards.

This report applies to above tested sample only. This report shall not be reproduced in part without written approval of AUDIX Technology Corporation.

Date of Test: 2014. 06. 06 ~ 13

Date of Report: 2014. 06. 13

Producer : 
(Tina Huang/Administrator)

Signatory: 
(Ben Cheng/Manager)

1. DESCRIPTION OF REVISION HISTORY

Edition No.	Date of Revision	Revision Summary	Report Number
0	2014. 06. 13	Original Report.	EM-F140355

2. GENERAL INFORMATION

2.1. Description of Device (EUT)

Description	:	Wireless Adapter Card
Model Number	:	RS4
Serial Number	:	N/A
Brand	:	LG
FCC ID	:	BEJ9QK-DMRS4
IC	:	2703H-DMRS4
Applicant	:	LG Electronics Inc. 222, LG-ro, Jinwi-myeon, Pyeongtaek-si, Gyeonggi-do, 451-713, Korea
Manufacturer	:	LG Electronics Inc. 222, LG-ro, Jinwi-myeon, Pyeongtaek-si, Gyeonggi-do, 451-713, Korea
Factory	:	NAMUGA (SUZHOU) TECHNOLOGIES CO., LTD. 445, SUHONG MIDDLE ROAD, SUZHOU INDUSTRIAL PARK, SUZHOU, JIANGSU, CHINA.
Fundamental Range	:	2403MHz ~ 2478MHz
Channel Number	:	39 Channels
Radio Technology	:	GFSK Modulation
Data Transfer Rate	:	2Mbps
Antenna Gain	:	4.2dBi (Peak)
Antenna Transmit Type	:	1T1R
Antenna Type	:	Pattern ANT
Date of Receipt of Sample	:	2014. 05. 19

2.2. Tested Supporting System Details

2.2.1. NOTEBOOK PC

Model Number	:	MS2362
Serial Number	:	N/A
FCC ID	:	PPD-AAR5B22
BSMI ID	:	R33142
Manufacturer	:	acer
USB Cable	:	Non-Shielded, Detachable, 1.8m
AC Adapter	:	Chicony, M/N CPA09-A065N1,
Power Cord	:	I/P: Non-Shielded, Detachable, 1.8m O/P: Shielded, Undetachable, 1.8m, Bonded a ferrite core

2.2.2. JIG BOARD

Model Number	:	N/A
Serial Number	:	N/A
Brand	:	N/A
Bus Cable	:	Non-Shielded, Detachable, 0.3m

2.3. Description of Test Facility

Name of Firm	:	AUDIX Technology Corporation EMC Department No. 53-11, Dingfu, Linkou Dist., New Taipei City 244, Taiwan, R.O.C.
Test Site (C7/Semi-AC)	:	No. 7 Shielded Room & Semi-Anechoic Chamber No. 53-11, Dingfu, Linkou Dist., New Taipei City 244, Taiwan, R.O.C. May 11, 2012 Renewal on Federal Communication Commission Registration Number: 90993
NVLAP Lab. Code	:	200077-0
TAF Accreditation No	:	1724

2.4. Measurement Uncertainty

Test Item	Frequency Range	Uncertainty
Conduction Test	150kHz~30MHz	$\pm 3.43\text{dB}$
Radiation Test (Distance: 3m)	30MHz~300MHz	$\pm 2.91\text{dB}$
	300MHz~1000MHz	$\pm 2.74\text{dB}$
	Above 1GHz	$\pm 5.02\text{dB}$

Remark : Uncertainty = $k u_c(y)$

Test Item	Uncertainty
6dB Bandwidth	$\pm 0.05\text{kHz}$
Maximum peak output power	$\pm 0.33\text{dBm}$
Band edges	$\pm 0.13\text{dB}$
Power spectral density	$\pm 0.13\text{dB}$
Emission Limitations	$\pm 0.13\text{dB}$

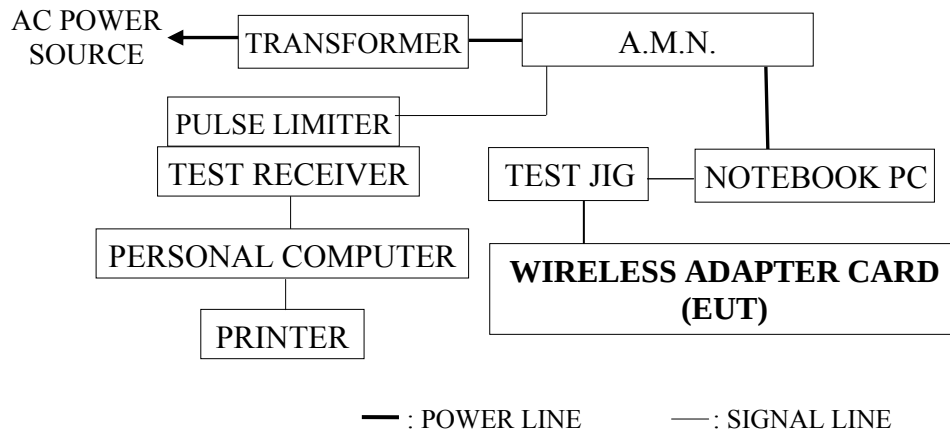
3. CONDUCTED EMISSION MEASUREMENT

3.1. Test Equipment

The following test equipment was used during the conducted emission measurement :
 (No. 7 Shielded Room)

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Due Date
1.	Test Receiver	R&S	ESCI	101276	2015. 04. 13
2.	A.M.N.	R&S	ENV4200	100169	2015. 05. 05
3.	Pulse Limiter	R&S	ESH3-Z2	101495	2015. 01. 17

3.2. Block Diagram of Test Setup



3.3. Powerline Conducted Emission Limit §15.207, Class B, RSS-Gen §7.2.2/Table 2]

Frequency	Maximum RF Line Voltage	
	Quasi-Peak Level	Average Level
150kHz ~ 500kHz	66 ~ 56 dB μ V	56 ~ 46 dB μ V
500kHz ~ 5MHz	56 dB μ V	46 dB μ V
5MHz ~ 30MHz	60 dB μ V	50 dB μ V

Remark 1.: If the average limit is met when using a Quasi-Peak detector, the EUT shall be deemed to meet both limits and measurement with the average detector is unnecessary.

2.: The lower limit applies at the band edges.

3.4. Operating Condition of EUT

- 3.4.1. Setup the EUT and simulator as shown on 3.2.
- 3.4.2. Turn on the power of all equipment.
- 3.4.3. The Notebook PC was running test software
“IA3_EMI_Setting_Tool_V100E05_EEPROM” to set EUT (Wireless Adapter Card) on transmitting and receiving during all testing.

3.5. Test Procedure

The EUT (link Notebook PC) was placed on the table which was above the ground by 80cm and Notebook PC's adapter's power cord connected to the AC mains through an Artificial Mains Network (A.M.N.). This provided a 50 ohm coupling impedance for the measuring equipment. (Please refer to the block diagram of the test setup and photographs.)

Both sides of A.C. line were checked for maximum conducted interference. In order to find the maximum emission, the relative positions simulators of the interface cables should be manipulated according to ANSI C63.4-2003, RSS-Gen and RSS-210 regulation during conducted measurement.

The bandwidth of the R&S Test Receiver ESCI was set at 10kHz.

The frequency range from 150kHz to 30MHz was checked.

All the final readings from Test Receiver were measured with the Quasi-Peak detector and Average detector. Remark: If the Average limit is met when using a Quasi-Peak detector, the Average detector is unnecessary)

3.6. Conducted Emission Measurement Results

PASSED.

(All the emissions not reported below are too low against the prescribed limits.)

EUT was performed during this section testing and all the test results are attached in next pages.

EUT : Wireless Adapter Card M/N : RS4

Test Date : 2014. 05. 23 Temperature : 25°C Humidity : 52%

Reference Test Data : Neutral # 4; Line # 3

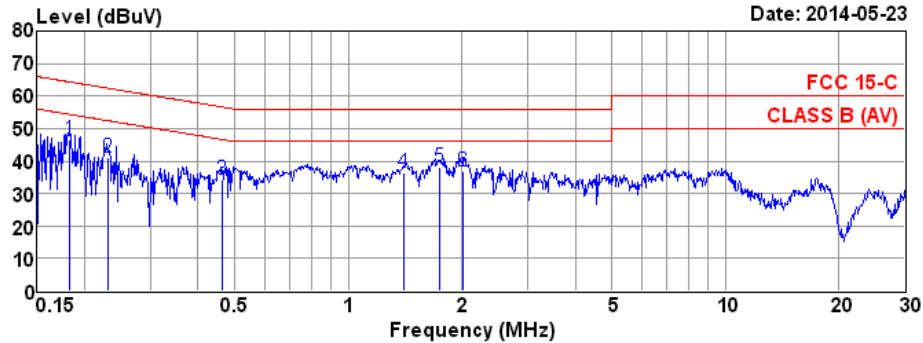


AUDIX TECHNOLOGY Corp. EMC Department
No.53-11, Dingfu, Linkou Dist., New Taipei City
24442, Taiwan R.O.C.
Tel: +886-2-26092133 Fax: +886-2-26099303
Email: emc@audixtech.com

Data: 4

File: D:\test data\REPORT\2014\IC1M1405XXX\IC1M1405140-C-D(RF).EM6 (4)

Date: 2014-05-23



Site no. : No.7 Shielded Room Data no. : 4
Condition : ENV4200 358/003 LISN Phase : NEUTRAL
Limit : FCC 15-C
Env. / Ins. : 25°C / 52% ESCI (1276) Engineer : Fate
EUT : RS4
Power Rating : 120Vac/60Hz
Test Mode : OPERATING

	Freq. (MHz)	AMN Factor (dB)	Cable Loss (dB)	Pulse Att. (dB)	Reading (dBμV)	Emission Level (dBμV)	Limits (dBμV)	Margin (dB)	Remark
1	0.182	10.28	0.03	9.85	26.39	46.55	64.37	17.82	QP
2	0.230	10.28	0.03	9.85	21.02	41.18	62.44	21.26	QP
3	0.464	10.23	0.03	9.87	14.20	34.33	56.63	22.30	QP
4	1.403	10.20	0.05	9.85	16.12	36.22	56.00	19.78	QP
5	1.753	10.21	0.06	9.86	17.99	38.12	56.00	17.88	QP
6	2.012	10.21	0.06	9.86	16.70	36.83	56.00	19.17	QP

Remarks: 1. Emission Level= AMN Factor + Cable Loss + Pulse Att. + Reading.
2. If the average limit is met when using a quasi-peak detector,
the EUT shall be deemed to meet both limits and measurement
with average detector is unnecessary.

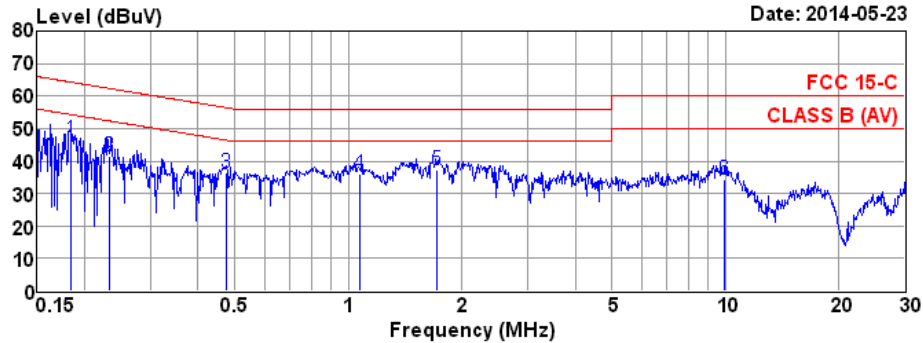


AUDIX TECHNOLOGY Corp. EMC Department
No.53-11, Dingfu, Linkou Dist., New Taipei City
24442, Taiwan R.O.C.
Tel: +886-2-26092133 Fax: +886-2-26099303
Email: emc@audixtech.com

Data: 3

File: D:\test data\REPORT\2014\IC1M1405XXX\IC1M1405140-C-D(RF).EM6 (4)

Date: 2014-05-23



Site no. : No.7 Shielded Room Data no. : 3
Condition : ENV4200 358/003 LISN Phase : LINE
Limit : FCC 15-C
Env. / Ins. : 25°C / 52% ESCI (1276) Engineer : Fate
EUT : RS4
Power Rating : 120Vac/60Hz
Test Mode : OPERATING

	Freq. (MHz)	AMN Factor (dB)	Cable Loss (dB)	Pulse Att. (dB)	Reading (dBμV)	Emission Level (dBμV)	Limits (dBμV)	Margin (dB)	Remark
1	0.183	10.26	0.03	9.85	26.24	46.38	64.33	17.95	QP
2	0.233	10.26	0.03	9.85	21.23	41.37	62.35	20.98	QP
3	0.474	10.24	0.03	9.87	16.48	36.62	56.45	19.83	QP
4	1.071	10.22	0.04	9.85	15.78	35.89	56.00	20.11	QP
5	1.716	10.22	0.06	9.86	17.26	37.40	56.00	18.60	QP
6	9.913	10.19	0.14	9.90	14.18	34.41	60.00	25.59	QP

Remarks: 1. Emission Level= AMN Factor + Cable Loss + Pulse Att. + Reading.
2. If the average limit is met when using a quasi-peak detector, the EUT shall be deemed to meet both limits and measurement with average detector is unnecessary.

4. RADIATED EMISSION MEASUREMENT

4.1. Test Equipment

The following test equipment was used during the radiated emission measurement:

4.1.1. For Frequency Range 30MHz~1000MHz (at Semi-Anechoic Chamber)

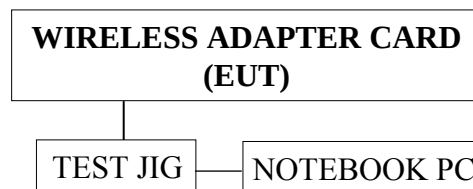
Item	Type	Manufacturer	Model No.	Serial No.	Cal. Due Date
1.	Spectrum Analyzer	Agilent	N9030A-544	US51350140	2014. 07. 29
2.	Test Receiver	R & S	ESCS30	100338	2014. 06. 30
3.	Amplifier	HP	8447D	2944A06305	2015. 02. 17
4.	Bilog Antenna	TESEQ	CBL6112D	33821	2014. 08. 07

4.1.2. For Frequency Above 1GHz (at Semi-Anechoic Chamber)

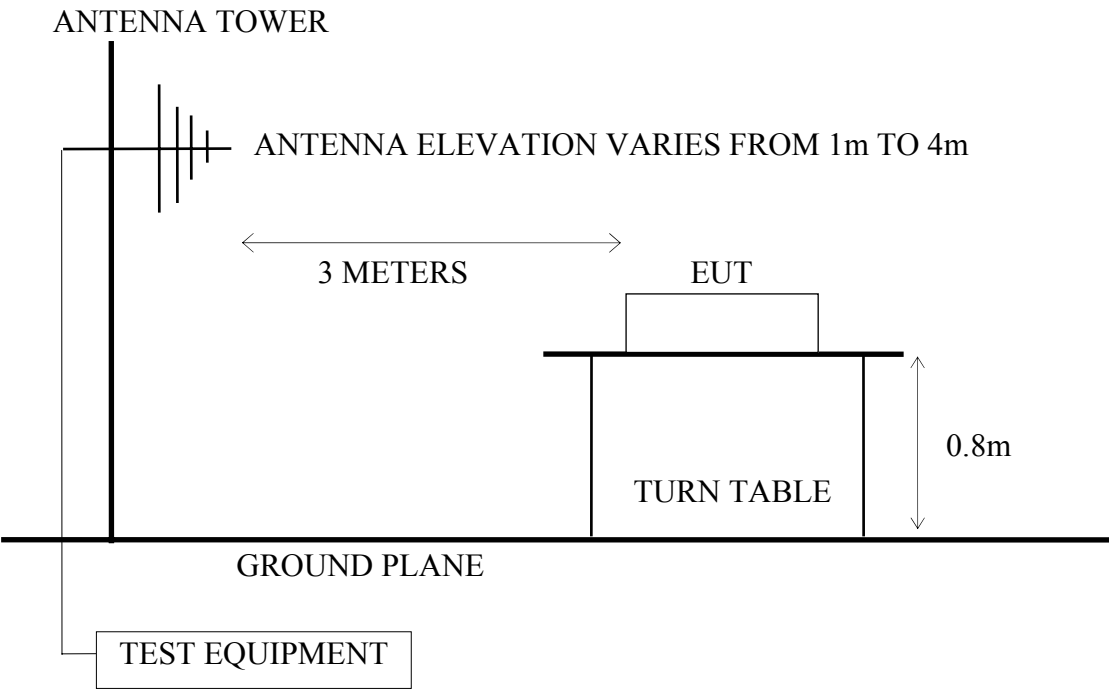
Item	Type	Manufacturer	Model No.	Serial No.	Cal. Due Date
1.	Spectrum Analyzer	Agilent	N9030A-544	US51350140	2014. 07. 29
2.	Test Receiver	R & S	ESCS30	100338	2014. 06. 30
3.	Pre-Amplifier	HP	8449B	3008A00529	2015. 01. 23
4.	2.4GHz Notch Filter	K&L	7NSL10-2441.5E 130.5-00	1	2014. 06. 12
5.	3G High Pass Filter	Microwave Circuits	H3G018G1	484796	2014. 06. 12
6.	Horn Antenna	EMCO	3115	9609-4927	2014. 06. 16
7.	Horn Antenna	EMCO	3116	2653	2014. 10. 10

4.2. Test Setup

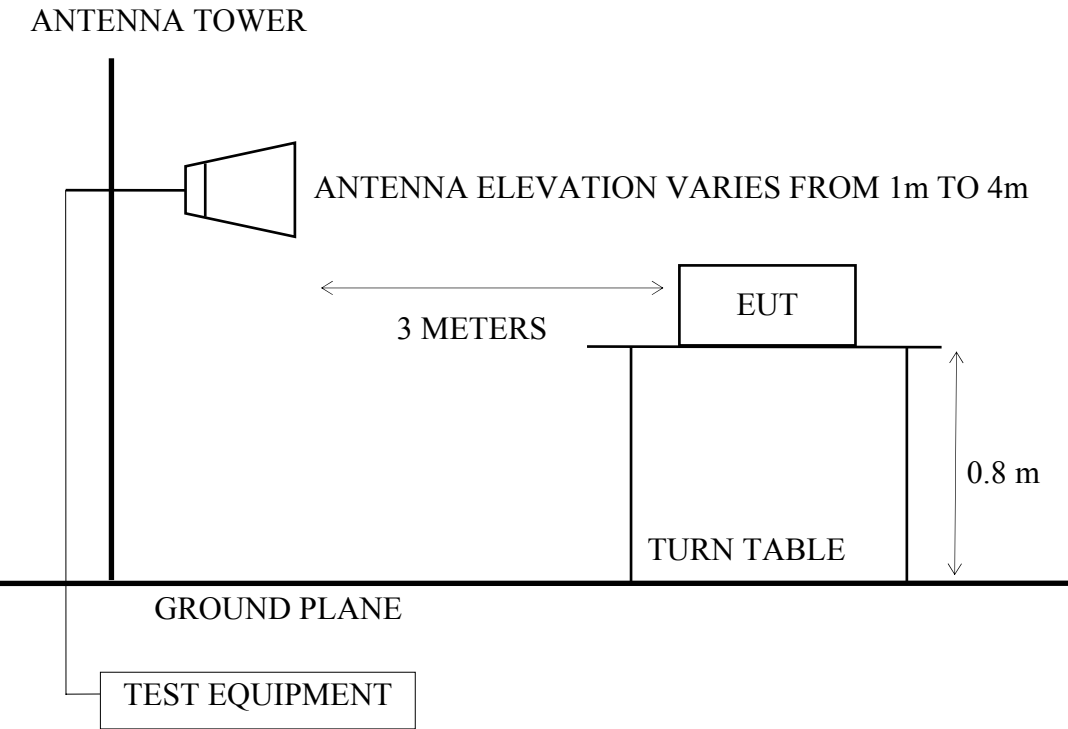
4.2.1. Block Diagram of connection between EUT and simulators



4.2.2. Semi-Anechoic Chamber (3m) Setup Diagram for 30-1000MHz



4.2.3. Semi-Anechoic Chamber (3m) Setup Diagram for above 1GHz



4.3. Radiated Emission Limits (§15.209, RSS-210 §2.7/Table 2)

FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMITS	
		$\mu\text{V/m}$	$\text{dB}\mu\text{V/m}$
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
Above 960	3	500	54.0
Above 1000	3	74.0 $\text{dB}\mu\text{V/m}$ (Peak) 54.0 $\text{dB}\mu\text{V/m}$ (Average)	

- Remark :
- (1) Emission level ($\text{dB}\mu\text{V/m}$) = 20 log Emission level ($\mu\text{V/m}$)
 - (2) The tighter limit applies at the edge between two frequency bands.
 - (3) Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.
 - (4) The limits in this table are based on CFR 47 Part 15.205(a)(b) and Part 15.209 (a).
 - (5) The over 1GHz limit, FCC limit is used based on CFR 47 Part 15.35(b) and Part 15.205(b) & Part 15.209(e) and Part 15.207(c).

4.4. Operating Condition of EUT

- 4.4.1. Set up the EUT (Wireless Adapter Card) via Notebook PC and simulator as shown on 3.2.
- 4.4.2. To turn on the power of all equipments.
- 4.4.3. The EUT was set the Notebook PC using test program "IA3_EMI_Setting_Tool_V100E05_EEPROM".
- 4.4.4. The EUT set to continuously transmit signals at 2403MHz, 2443MHz and 2478MHz and receiving signal at 2443MHz during all test time.

4.5. Test Procedure

The EUT and its simulators were placed on a turn table which was 0.8 meter above the ground. The turn table rotated 360 degrees to determine the position of the maximum emission level. EUT was set 3 meters away from the receiving antenna which was mounted on an antenna tower. The antenna moved up and down between 1 to 4 meters to find out the maximum emission level. Broadband antenna such as calibrated biconical and log-periodical antenna or horn antenna were used as a receiving antenna. Both horizontal and vertical polarization of the antenna were set on measurement. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.4-2003, RSS-Gen and RSS-210 regulation.

The bandwidth of the R&S Test Receiver was set at 120kHz. (For 30MHz to 1000MHz)

The resolution bandwidth and video bandwidth of test spectrum analyzer is 1MHz for peak detection (PK) at frequency above 1GHz.

The resolution bandwidth of test spectrum analyzer is 1MHz and the video bandwidth is 10Hz for average detection (AV) at frequency above 1GHz.

The frequency range from 30MHz to 25GHz (Up to 10th harmonics from fundamental frequency) was checked. 30MHz to 1000MHz was measured with Quasi-Peak detector. Pursuant to ANSI 4.2.2, peak detector is an alternate option for frequency from 30MHz to 1000MHz.

Above 1GHz was measured with peak and average detector. For frequency from 1GHz to 2.68GHz and 5.5GHz to 25GHz, we checked it in 1 meter distance and with a shorter cable 2 meter instead of original's. There is no signal exist.

Pursuant to ANSI C63.4 8.3.1.2, when peak value complies with the average limit, we didn't perform measurement in average detector.

4.6. Test Results

PASSED.

(All emissions not reported for there is no emission be found.)

EUT : Wireless Adapter Card M/N : RS4

Test Date : 2014. 06. 06 Temperature : 25°C Humidity : 32%

For Frequency Range 30MHz~1000MHz:

The EUT emitted the fundamental frequency with data code at the stand, side and lying conditions.

The EUT select **worst position “lying”** and with following test modes was performed during this section testing and all the test results are listed in section 4.6.1.

Mode	Channel	Frequency	Test Mode	Reference Test Data	
				Horizontal	Vertical
1.	Lowest	2403MHz	Transmit	# 1	# 2
2.	Middle	2443MHz		# 1	# 2
3.	Highest	2478MHz		# 1	# 2

* Above all final readings were measured with Peak detector.

For Frequency above 1GHz:

The EUT select **worst position “lying”** and with following test modes was performed during this section testing and all the test results are listed in section 4.6.2.

Mode	Chnnel	Frequency	Test Mode	Test Frequency Range
1.	Lowest	2403MHz	Transmit	1000-2680MHz
2.				2680-4000MHz
3.				4000-5500MHz*
4.				5500-7500MHz
5.				7500-18000MHz
6.				18000-25000MHz
7.	Middle	2443MHz	Transmit	1000-2680MHz
8.				2680-4000MHz
9.				4000-5500MHz*
10.				5500-7500MHz
11.				7500-18000MHz
12.				18000-25000MHz
13.	Highest	2478MHz	Transmit	1000-2680MHz
14.				2680-4000MHz
15.				4000-5500MHz*
16.				5500-7500MHz
17.				7500-18000MHz
18.				18000-25000MHz

Note: 1. Above all final readings were measured with Peak and Average detector.
 2. The emissions (up to 25GHz) not reported are too low to be measured.
 3.”*” means there is spurious emission falling the frequency band and be measures.

For Restricted Bands:

The EUT select **worst position “lying”** and tested in restricted bands and all the test results are listed in section 4.6.3. (The restricted bands defined in part 15.205(a))

Mode	Channel	Frequency	Test Mode	Reference Test Data	
				Horizontal	Vertical
1.	Lowest	2403MHz	Transmit	# 1	# 3
2.	Highest	2478MHz		# 5	# 7

4.6.1. For 30-1000MHz Frequency Range Measurement Results

Transmit, Lowest Channel, Frequency: 2403MHz

Site no. : Audix NO.1 Chamber
 Dis. / Ant. : 3m CBL6112D 33821
 Limit : 30W-1G
 Env. / Ins. : 25°C/32% N9030A(140)
 EUT : RS4
 Power Rating : DC 5V
 Test Mode : Tx 2403MHz

Data no. : 1
 Ant. pol. : HORIZONTAL
 Engineer : An

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dB μ V)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Remark
1	72.68	6.85	2.92	28.84	38.61	40.00	1.39	Peak
2	253.10	12.44	4.35	26.92	43.71	46.00	2.29	Peak
3	398.60	15.53	5.65	22.06	43.24	46.00	2.76	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
 2. The emission levels that are 20dB below the official limit are not reported.

Site no. : Audix NO.1 Chamber
 Dis. / Ant. : 3m CBL6112D 33821
 Limit : 30W-1G
 Env. / Ins. : 25°C/32% N9030A(140)
 EUT : RS4
 Power Rating : DC 5V
 Test Mode : Tx 2403MHz

Data no. : 2
 Ant. pol. : VERTICAL
 Engineer : An

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dB μ V)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Remark
1	30.00	18.62	2.92	18.10	39.04	40.00	0.96	Peak
2	73.65	6.93	2.93	28.60	38.46	40.00	1.54	Peak
3	239.52	11.76	4.26	24.22	40.24	46.00	5.76	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
 2. The emission levels that are 20dB below the official limit are not reported.

Transmit, Middle Channel, Frequency: 2443MHz

Site no. : Audix NO.1 Chamber
 Dis. / Ant. : 3m CBL6112D 33821
 Limit : 30W-1G
 Env. / Ins. : 25°C/32% N9030A(140)
 EUT : RS4
 Power Rating : DC 5V
 Test Mode : Tx 2443MHz

Data no. : 1
 Ant. pol. : HORIZONTAL
 Engineer : An

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dB μ V)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Remark
1	75.59	7.10	2.95	29.07	39.12	40.00	0.88	Peak
2	95.96	10.23	3.19	26.50	39.92	43.50	3.58	Peak
3	216.24	10.35	4.10	27.29	41.74	46.00	4.26	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
 2. The emission levels that are 20dB below the official limit are not reported.

Site no. : Audix NO.1 Chamber
 Dis. / Ant. : 3m CBL6112D 33821
 Limit : 30W-1G
 Env. / Ins. : 25°C/32% N9030A(140)
 EUT : RS4
 Power Rating : DC 5V
 Test Mode : Tx 2443MHz

Data no. : 2
 Ant. pol. : VERTICAL
 Engineer : An

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dB μ V)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Remark
1	30.00	18.62	2.32	17.81	38.75	40.00	1.25	Peak
2	73.65	6.93	2.93	29.19	39.05	40.00	0.95	Peak
3	216.24	10.35	4.10	25.63	40.08	46.00	5.92	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
 2. The emission levels that are 20dB below the official limit are not reported.

Transmit, Highest Channel, Frequency: 2478MHz

Site no. : Audix NO.1 Chamber
 Dis. / Ant. : 3m CBL6112D 33821
 Limit : 30W-1G
 Env. / Ins. : 25°C/32% N9030A(140)
 EUT : RS4
 Power Rating : DC 5V
 Test Mode : Tx 2478MHz

Data no. : 1
 Ant. pol. : HORIZONTAL
 Engineer : An

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dB μ V)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Remark
1	72.68	6.85	2.92	28.75	38.52	40.00	1.48	Peak
2	229.03	10.79	4.15	28.02	42.96	46.00	3.04	Peak
3	359.80	14.64	5.28	18.94	38.86	46.00	7.14	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
 2. The emission levels that are 20dB below the official limit are not reported.

Site no. : Audix NO.1 Chamber
 Dis. / Ant. : 3m CBL6112D 33821
 Limit : 30W-1G
 Env. / Ins. : 25°C/32% N9030A(140)
 EUT : RS4
 Power Rating : DC 5V
 Test Mode : Tx 2478MHz

Data no. : 2
 Ant. pol. : VERTICAL
 Engineer : An

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dB μ V)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Remark
1	30.00	18.62	2.32	17.93	38.87	40.00	1.13	Peak
2	71.71	6.79	2.91	28.86	38.56	40.00	1.44	Peak
3	216.24	10.35	4.10	26.86	41.31	46.00	4.69	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
 2. The emission levels that are 20dB below the official limit are not reported.

4.6.2. Above 1GHz Frequency Range Measurement Results

Date of Test : 2014. 06. 06 Temperature : 25°C

EUT : Wireless Adapter Card Humidity : 32%

Test Mode : Transmit, Lowest Channel, Frequency: 2403MHz

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading Horizontal (dBμV)	Emission Level Horizontal (dBμV/m)	Limits (dBμV/m)	Margin (dB)
4805.50	32.76	8.09	47.69	54.18	74.00	19.82

Remarks: 1. Emission level=Antenna Factor + Cable Loss + Reading.
 2. The emission levels that are 20dB below the official limit are not reported.

Emission Frequency (MHz)	Peak Value (dB/m)	Duty Cycle Correction Factor (dB)	Average Value Horizontal (dBμV/m)	Limit (dBμV/m)	Margin (dB)
4808.500	54.18	-8.33	45.85	54.00	8.15

Remarks: 1. Duty Cycle Correction Factor = $20\log(\text{cumulative on}/T) = (1.91\text{ms}/4.983\text{ms}) = -8.33$
 “T” means the period of the pulse train or 100ms if the pulse train length is greater than 100ms
 2. Average value=Peak value+ Duty Cycle Correction Factor

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading Vertical (dBμV)	Emission Level Vertical (dBμV/m)	Limits (dBμV/m)	Margin (dB)
4805.50	32.76	8.09	50.59	57.08	74.00	16.92

Remarks: 1. Emission level=Antenna Factor + Cable Loss + Reading.
 2. The emission levels that are 20dB below the official limit are not reported.

Emission Frequency (MHz)	Peak Value (dB/m)	Duty Cycle Correction Factor (dB)	Average Value Vertical (dBμV/m)	Limit (dBμV/m)	Margin (dB)
4805.500	57.08	-8.33	48.75	54.00	5.25

Remarks: 1. Duty Cycle Correction Factor = $20\log(\text{cumulative on}/T) = (1.91\text{ms}/4.983\text{ms}) = -8.33$
 “T” means the period of the pulse train or 100ms if the pulse train length is greater than 100ms
 2. Average value=Peak value+ Duty Cycle Correction Factor

Date of Test : 2014. 06. 06 Temperature : 25°C

EUT : Wireless Adapter Card Humidity : 32%

Test Mode : Transmit, Middle Channel, Frequency: 2443MHz

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading Horizontal (dBμV)	Emission Level Horizontal (dBμV/m)	Limits (dBμV/m)	Margin (dB)
4885.00	32.91	8.17	10.32	51.40	74.00	22.60

Remarks: 1. Emission level=Antenna Factor + Cable Loss + Reading.
 2. The emission levels that are 20dB below the official limit are not reported.

Emission Frequency (MHz)	Peak Value (dB/m)	Duty Cycle Correction Factor (dB)	Average Value Horizontal (dBμV/m)	Limit (dBμV/m)	Margin (dB)
4885.00	51.40	-8.33	43.07	54.00	10.93

Remarks: 1. Duty Cycle Correction Factor = $20\log(\text{cumulative on/T}) = (1.91\text{ms}/4.983\text{ms}) = -8.33$
 "T" means the period of the pulse train or 100ms if the pulse train length is greater than 100ms
 2. Average value=Peak value+ Duty Cycle Correction Factor

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading Vertical (dBμV)	Emission Level Vertical (dBμV/m)	Limits (dBμV/m)	Margin (dB)
4886.50	32.91	8.18	14.88	55.97	74.00	18.03

Remarks: 1. Emission level=Antenna Factor + Cable Loss + Reading.
 2. The emission levels that are 20dB below the official limit are not reported.

Emission Frequency (MHz)	Peak Value (dB/m)	Duty Cycle Correction Factor (dB)	Average Value Vertical (dBμV/m)	Limit (dBμV/m)	Margin (dB)
4886.50	55.97	-8.33	47.64	54.00	6.36

Remarks: 1. Duty Cycle Correction Factor = $20\log(\text{cumulative on/T}) = (1.91\text{ms}/4.983\text{ms}) = -8.33$
 "T" means the period of the pulse train or 100ms if the pulse train length is greater than 100ms
 2. Average value=Peak value+ Duty Cycle Correction Factor

Date of Test : 2014. 06. 06 Temperature : 25°C

EUT : Wireless Adapter Card Humidity : 32%

Test Mode : Transmit, Middle Channel, Frequency: 2478MHz

Emission Frequency	Antenna Factor	Cable Loss	Meter Reading Horizontal	Emission Level Horizontal	Limits	Margin
(MHz)	(dB/m)	(dB)	(dBμV)	(dBμV/m)	(dBμV/m)	(dB)
4955.50	33.03	8.24	11.67	52.94	74.00	21.06

Remarks: 1. Emission level=Antenna Factor + Cable Loss + Reading.
 2. The emission levels that are 20dB below the official limit are not reported.

Emission Frequency	Peak Value	Duty Cycle Correction Factor	Average Value Horizontal	Limit	Margin
(MHz)	(dB/m)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
4955.50	52.94	-8.33	44.61	54.00	9.39

Remarks: 1. Duty Cycle Correction Factor = $20\log(\text{cumulative on}/T) = (1.91\text{ms}/4.983\text{ms}) = -8.33$
 "T" means the period of the pulse train or 100ms if the pulse train length is greater than 100ms
 2. Average value=Peak value+ Duty Cycle Correction Factor

Emission Frequency	Antenna Factor	Cable Loss	Meter Reading Vertical	Emission Level Vertical	Limits	Margin
(MHz)	(dB/m)	(dB)	(dBμV)	(dBμV/m)	(dBμV/m)	(dB)
4955.50	33.03	8.24	15.40	56.67	74.00	17.33

Remarks: 1. Emission level=Antenna Factor + Cable Loss + Reading.
 2. The emission levels that are 20dB below the official limit are not reported.

Emission Frequency	Peak Value	Duty Cycle Correction Factor	Average Value Vertical	Limit	Margin
(MHz)	(dB/m)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
4955.50	56.67	-8.33	48.34	54.00	5.66

Remarks: 1. Duty Cycle Correction Factor = $20\log(\text{cumulative on}/T) = (1.91\text{ms}/4.983\text{ms}) = -8.33$
 "T" means the period of the pulse train or 100ms if the pulse train length is greater than 100ms
 2. Average value=Peak value+ Duty Cycle Correction Factor

4.6.3. Restricted Bands Measurement Results

Date of Test : 2014. 06. 06 Temperature : 25°C

EUT : Wireless Adapter Card Humidity : 32%

Test Mode : Transmit, Lowest Channel, Frequency: 2403MHz

	Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading Horizontal (dBμV)	Emission Level Horizontal (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Peak*	2371.68	28.18	5.21	20.80	54.19	74.00	19.81

Remark: 1.Emission Level = Antenna Factor + Cable Loss + Meter Reading.

2. Low frequency section (spurious in the restricted band 2310-2430MHz).

3. ‘*’ The field strength of emission appearing within Part 15.205(a) shall not exceed the limits shown in section 15.209.

	Emission Frequency (MHz)	Peak Value (dB/m)	Duty Cycle Correction Factor (dB)	Average Value Horizontal (dBμV/m)	Limit (dBμV/m)	Margin (dB)
Average*	2371.68	54.19	-8.33	45.86	54.00	8.14

Remarks: 1. Duty Cycle Correction Factor = $20\log(\text{cumulative on}/100\text{ms}) = (1.91\text{ms}/4.983\text{ms}) = -8.33$

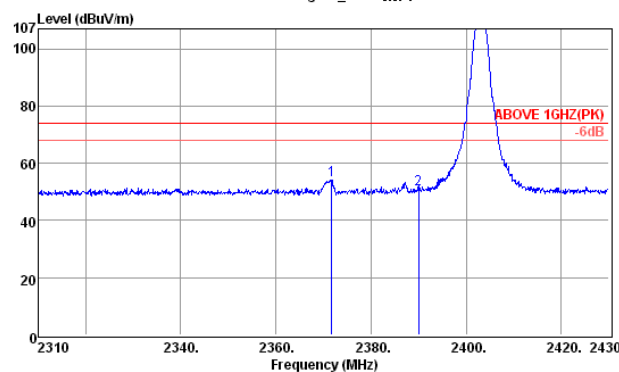
“T” means the period of the pulse train or 100ms if the pulse train length is greater than 100ms

2. Average value=Peak value+ Duty Cycle Correction Factor

3. Low frequency section (spurious in the restricted band 2310-2430MHz).

4. ‘*’ The field strength of emission appearing within Part 15.205(a) shall not exceed the limits shown in section 15.209.

Data: 1 File: C:\Documents and Settings\rf_room\桌面\C1M1405140 FCC LG\FCC Radiated\0605\



Site no. : Audix NO.1 Chamber Data no. : 1
 Dis. / Ant. : 3m 3115(4927) Ant. pol. : HORIZONTAL
 Limit : ABOVE 1GHZ(PK)
 Env. / Ins. : 25°C/32% N8030A(140) Engineer : An
 EUT : RS4
 Power Rating : DC 5V
 Test Mode : Tx 2403MHz

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
1	2371.68	28.18	5.21	20.80	54.19	74.00	19.81	Peak
2	2390.04	28.20	5.24	17.58	51.02	74.00	22.98	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.

2. The emission levels that are 20dB below the official limit are not reported.

Date of Test : 2014. 06. 06 Temperature : 25°C

EUT : Wireless Adapter Card Humidity : 32%

Test Mode : Transmit, Lowest Channel, Frequency: 2403MHz

	Emission Frequency	Antenna Factor	Cable Loss	Meter Reading Vertical	Emission Level Vertical	Limits	Margin
	(MHz)	(dB/m)	(dB)	(dBμV)	(dBμV/m)	(dBμV/m)	(dB)
Peak*	2361.12	28.17	5.20	18.48	51.85	74.00	22.15

Remark: 1.Emission Level = Antenna Factor + Cable Loss + Meter Reading.

2. Low frequency section (spurious in the restricted band 2310-2430MHz).

3. ‘*’ The field strength of emission appearing within Part 15.205(a) shall not exceed the limits shown in section 15.209.

	Emission Frequency	Peak Value	Duty Cycle Correction Factor	Average Value Vertical	Limit	Margin
	(MHz)	(dB/m)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
Average*	2361.12	51.85	-8.33	43.52	54.00	10.48

Remarks: 1. Duty Cycle Correction Factor = $20\log(\text{cumulative on}/100\text{ms}) = (1.91\text{ms}/4.983\text{ms}) = -8.33$

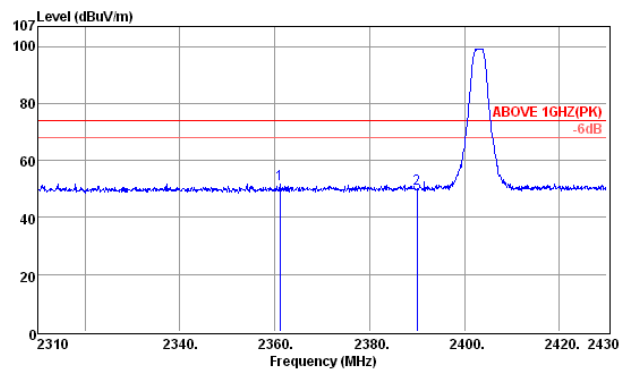
“T” means the period of the pulse train or 100ms if the pulse train length is greater than 100ms

2. Average value=Peak value+ Duty Cycle Correction Factor

3. Low frequency section (spurious in the restricted band 2310-2430MHz).

4. ‘*’ The field strength of emission appearing within Part 15.205(a) shall not exceed the limits shown in section 15.209.

Data: 3 File: C:\Documents and Settings\rf_room\桌面\1M1405140 FCC LG\FCC Radiated\0605\



Site no. : Audix NO.1 Chamber Data no. : 3
 Dis. / Ant. : 3m 3115(4927) Ant. pol. : VERTICAL
 Limit : ABOVE 1GHZ(PK)
 Env. / Ins. : 25°C/32% N9030A(140) Engineer : An
 EUT : RS4
 Power Rating : DC 5V
 Test Mode : Tx 2403MHz

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
1	2361.12	28.17	5.20	18.48	51.85	74.00	22.15	Peak
2	2390.04	28.20	5.24	16.70	50.14	74.00	23.86	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.

2. The emission levels that are 20dB below the official limit are not reported.

Date of Test : 2014. 06. 06 Temperature : 25°C

EUT : Wireless Adapter Card Humidity : 32%

Test Mode : Transmit, Highest Channel, Frequency: 2478MHz

	Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading Horizontal (dBμV)	Emission Level Horizontal (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Peak*	2483.52	28.29	5.37	25.34	59.00	74.00	15.00

Remark: 1.Emission Level = Antenna Factor + Cable Loss + Meter Reading.

2. Low frequency section (spurious in the restricted band 2310-2430MHz).

3. ‘*’ The field strength of emission appearing within Part 15.205(a) shall not exceed the limits shown in section 15.209.

	Emission Frequency (MHz)	Peak Value (dB/m)	Duty Cycle Correction Factor (dB)	Average Value Horizontal (dBμV/m)	Limit (dBμV/m)	Margin (dB)
Average*	2483.52	59.00	-8.33	50.67	54.00	3.33

Remarks: 1. Duty Cycle Correction Factor = $20\log(\text{cumulative on}/100\text{ms}) = (1.91\text{ms}/4.983\text{ms}) = -8.33$

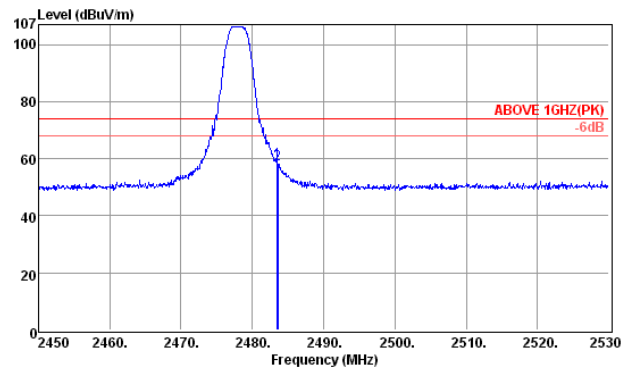
“T” means the period of the pulse train or 100ms if the pulse train length is greater than 100ms

2. Average value=Peak value+ Duty Cycle Correction Factor

3. Low frequency section (spurious in the restricted band 2310-2430MHz).

4. ‘*’ The field strength of emission appearing within Part 15.205(a) shall not exceed the limits shown in section 15.209.

Data: 5 File: C:\Documents and Settings\rf_room\桌面\1M1405140 FCC LG\FCC Radiated\0605\



Site no. : Audix NO.1 Chamber Data no. : 5
 Dis. / Ant. : 3m 3115(4927) Ant. pol. : HORIZONTAL
 Limit : ABOVE 1GHZ(PK)
 Env. / Ins. : 25°C/32% N9030A(140) Engineer : An
 EUT : RS4
 Power Rating : DC 5V
 Test Mode : Tx 2478MHz

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
1	2483.52	28.29	5.37	25.34	59.00	74.00	15.00	Peak
2	2483.80	28.29	5.37	24.33	57.99	74.00	16.01	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.

2. The emission levels that are 20dB below the official limit are not reported.

Date of Test : 2014. 06. 06 Temperature : 25°C

EUT : Wireless Adapter Card Humidity : 32%

Test Mode : Transmit, Highest Channel, Frequency: 2478MHz

	Emission Frequency	Antenna Factor	Cable Loss	Meter Reading Vertical	Emission Level Vertical	Limits	Margin
	(MHz)	(dB/m)	(dB)	(dBμV)	(dBμV/m)	(dBμV/m)	(dB)
Peak*	2483.60	28.29	5.37	19.73	53.39	74.00	20.61

Remark: 1.Emission Level = Antenna Factor + Cable Loss + Meter Reading.

2. Low frequency section (spurious in the restricted band 2310-2430MHz).

3. ‘*’ The field strength of emission appearing within Part 15.205(a) shall not exceed the limits shown in section 15.209.

	Emission Frequency	Peak Value	Duty Cycle Correction Factor	Average Value Vertical	Limit	Margin
	(MHz)	(dB/m)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
Average*	2483.60	53.39	-8.33	45.06	54.00	8.94

Remarks: 1. Duty Cycle Correction Factor = $20\log(\text{cumulative on}/100\text{ms}) = (1.91\text{ms}/4.983\text{ms}) = -8.33$

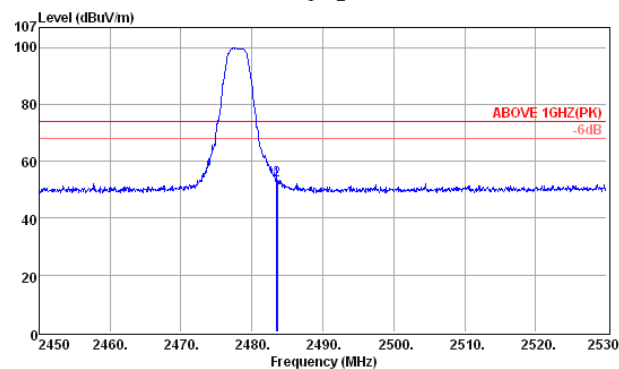
“T” means the period of the pulse train or 100ms if the pulse train length is greater than 100ms

2. Average value=Peak value+ Duty Cycle Correction Factor

3. Low frequency section (spurious in the restricted band 2310-2430MHz).

4. ‘*’ The field strength of emission appearing within Part 15.205(a) shall not exceed the limits shown in section 15.209.

Data: 7 File: C:\Documents and Settings\rf_room\桌面\C1M1405140 FCC LG\FCC Radiated\0605\



Site no. : Audix NO.1 Chamber Data no. : 7
 Dis. / Ant. : 3m 3115(4927) Ant. pol. : VERTICAL
 Limit : ABOVE 1GHZ(PK)
 Env. / Ins. : 25°C/32% N9030A(140) Engineer : An
 EUT : RS4
 Power Rating : DC 5V
 Test Mode : Tx 2478MHz

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
1	2483.52	28.29	5.37	19.26	52.92	74.00	21.08	Peak
2	2483.60	28.29	5.37	19.73	53.39	74.00	20.61	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.

2. The emission levels that are 20dB below the official limit are not reported.

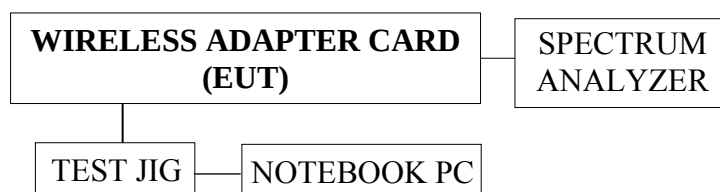
5. DUTY CYCLE CORRECTION FACTOR

5.1. Test Equipment

The following test equipment was used during the duty cycle factor measurement:

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Due Date
1.	Spectrum Analyzer	R&S	FSV30	101181	2015. 03. 03

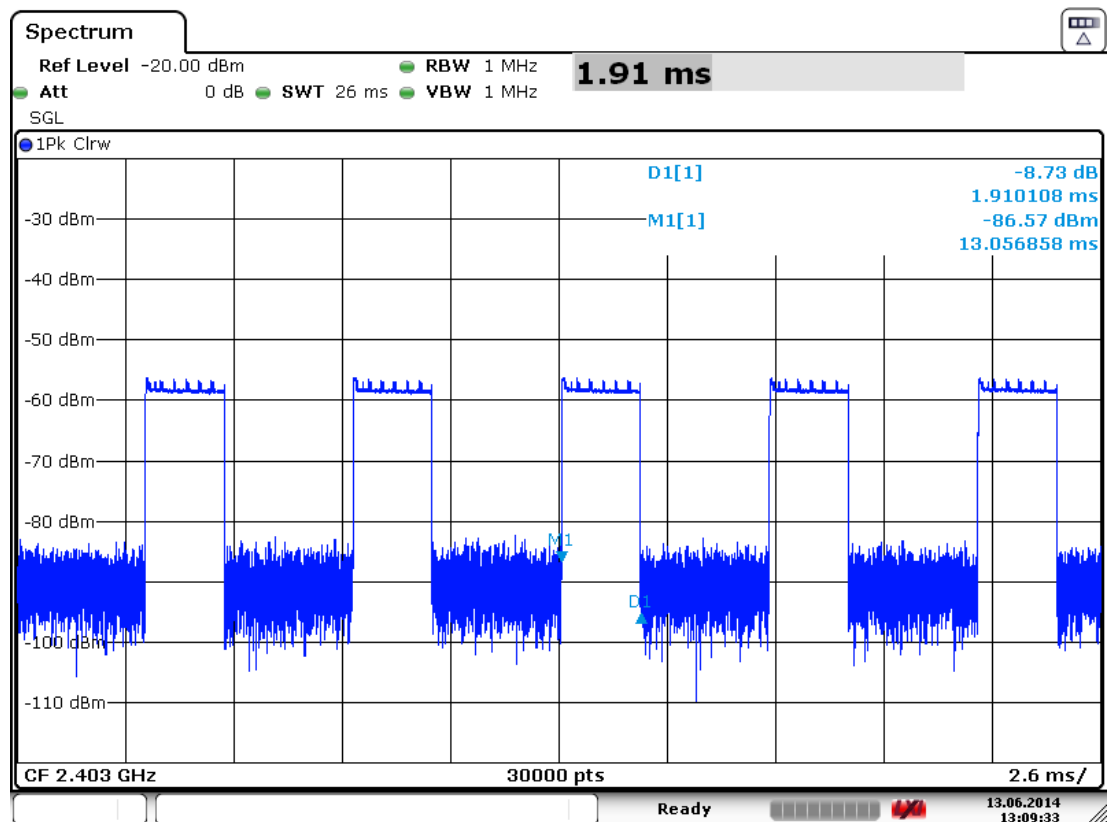
5.2. Block Diagram of Test Setup



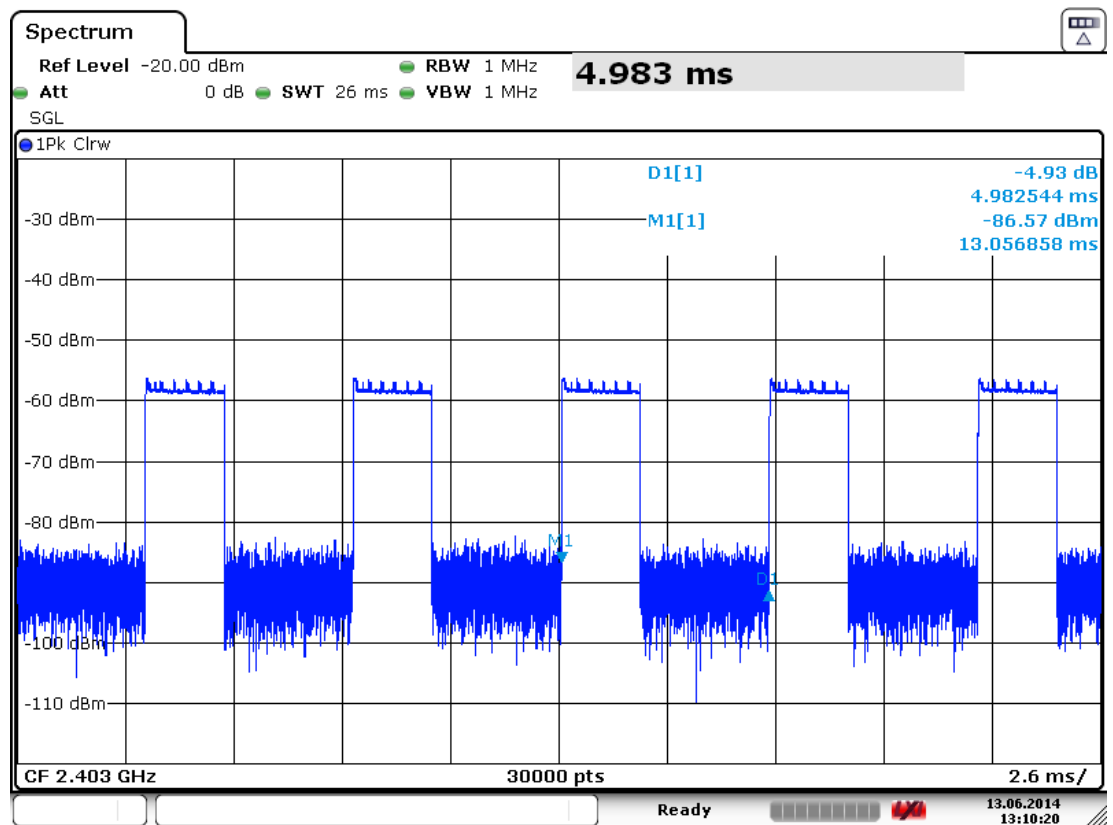
5.3. Test Results

PASSED.

Test Date: 2014. 06. 13 Temperature : 23°C Humidity : 45%



Date: 13. JUN. 2014 13:09:33



Duty Cycle Factor= $20\log(\text{cumulative on}/T)=20\log (1.91/4.983)= -8.33$

T: The period of the pulse train or 100ms if the pulse train length is greater than 100ms

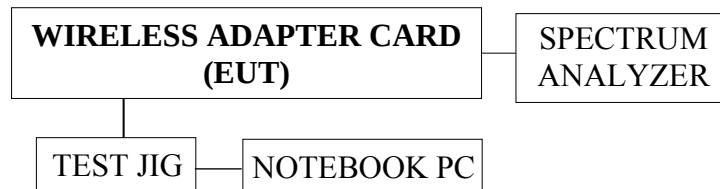
6. 6dB BANDWIDTH MEASUREMENT

6.1. Test Equipment

The following test equipment was used during the Emission Bandwidth measurement:

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Due Date
1.	Spectrum Analyzer	Agilent	N9030A-526	MY53310269	2014. 09. 21

6.2. Block Diagram of Test Setup



6.3. Specification Limits [§15.247(a)(2), RSS-210 §A8.2 (a)]

The minimum 6dB bandwidth shall be at least 500kHz.

6.4. Operating Condition of EUT

Test program “IA3_EMI_Setting_Tool_V100E05_EEPROM” is used for enabling the EUT transmitting continuing.

6.5. Test Procedure

The transmitter output was connected to the spectrum analyzer. The bandwidth of the fundamental frequency was measure by spectrum analyzer using 100kHz RBW and ≥ 300 kHz VBW. The 6dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6dB.

The measurement guideline was according to 558074 D01 DTS Meas Guidance v03r01

6.6. Test Results

PASSED. All the test results are attached in next pages.

Test Date : 2014. 06. 06 Temperature : 25°C Humidity : 35%

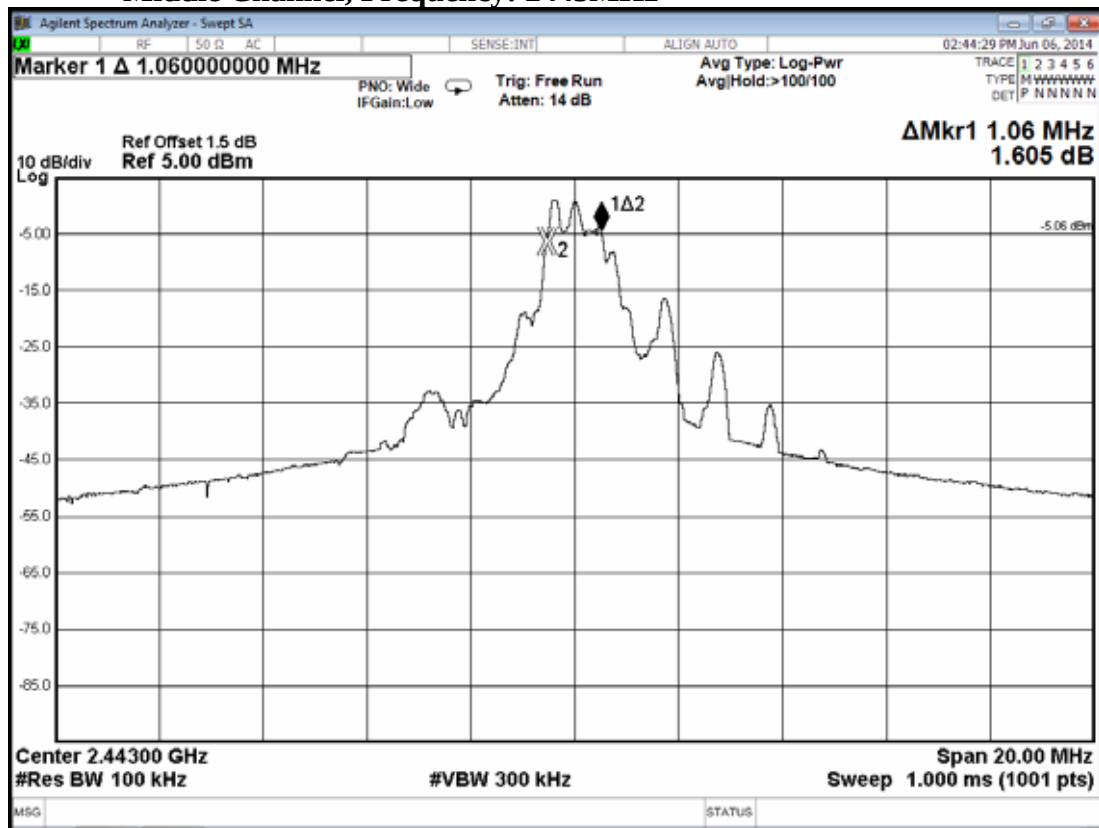
Mode	Channel	Frequency	6dB Bandwidth
1.	Highest	2403MHz	1.02MHz
2.	Middle	2443MHz	1.06MHz
3.	Lowest	2478MHz	1.08MHz

[Limit: least 500kHz]

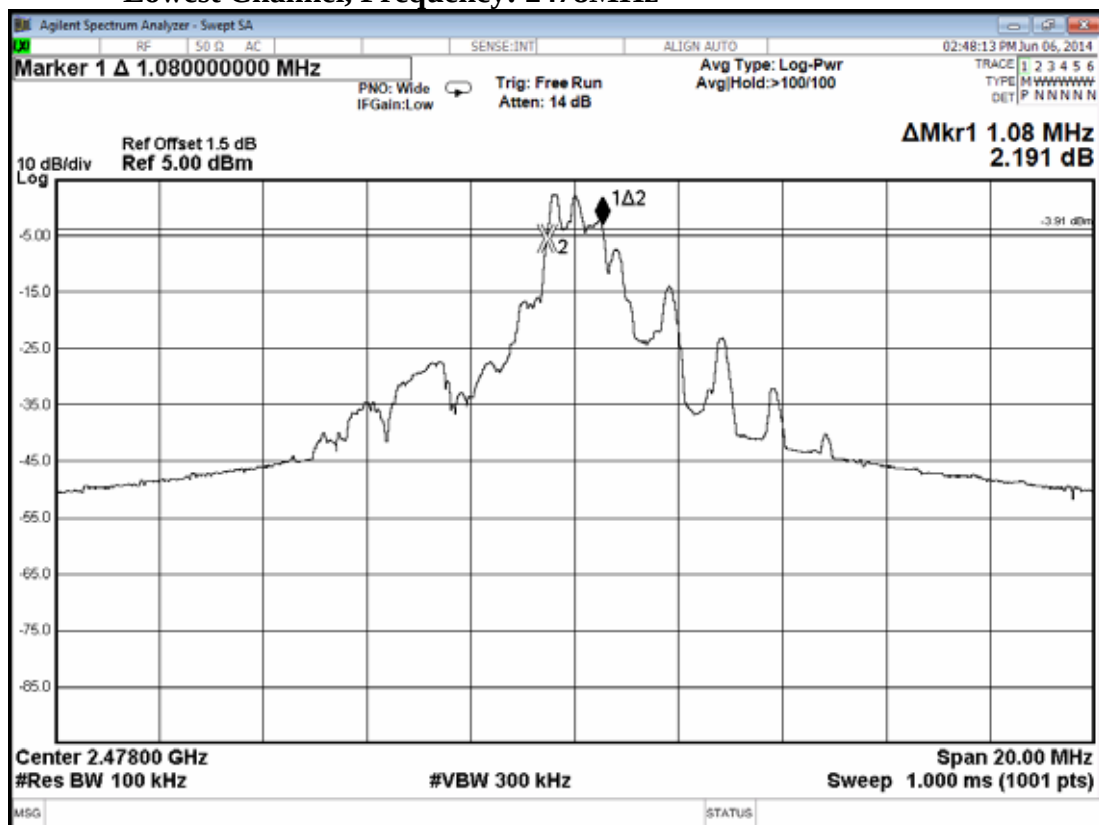
Highest Channel, Frequency: 2403MHz



Middle Channel, Frequency: 2443MHz



Lowest Channel, Frequency: 2478MHz



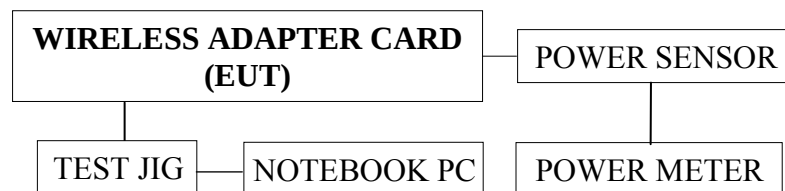
7. MAXIMUM PEAK OUTPUT POWER MEASUREMENT

7.1. Test Equipment

The following test equipment was used during the maximum peak output power measurement:

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Due Date
1.	Power Meter	Anritsu	ML2495A	1145008	2014. 10. 22
2.	Power Sensor	Anritsu	MA2411B	1126096	2014. 10. 22

7.2. Block Diagram of Test Setup



7.3. Specification Limits [§15.247(b)-(3), RSS-210 §A8.4 (4)]

The Limits of maximum Peak Output Power for digital modulation in 2400-2483.5MHz is : 1Watt. (30dBm)

7.4. Operating Condition of EUT

Test program “IA3_EMI_Setting_Tool_V100E05_EEPROM” is used for enabling the EUT transmitting continuing.

7.5. Test Procedure

The transmitter output was connected to the power sensor and record the reading of power meter.

The measurement guideline was according to 558074 D01 DTS Meas Guidance v03r01

7.6. Test Results

PASSED. All the test results are listed below.

Test Date : 2014. 06. 06 Temperature : 25°C Humidity : 35%

Mode	Channel	Frequency	Peak Output Power
1.	Highest	2403MHz	0.60dBm
2.	Middle	2443MHz	2.56dBm
3.	Lowest	2478MHz	3.70dBm

[Limit: 1Watt. (30dBm)]

8. EMISSION LIMITATIONS MEASUREMENT

Pursuant to 558074 D01 DTS Meas Guidance v03r01 that emission levels below limits specified in 15.209 would not be required.

9. BAND EDGES MEASUREMENT

9.1. Test Equipment

The following test equipment was used during the band edges measurement:

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Due Date
1.	Spectrum Analyzer	Agilent	N9030A-526	MY53310269	2014. 09. 21

9.2. Block Diagram of Test Setup

The same as section.4.2.

9.3. Specification Limits [§15.247(c), RSS-210 §A8.5]

9.3.1. The highest level should be at least 20 dB below that in the 100kHz bandwidth.

9.3.2. The reference level for determining limit of emission limitations is according to the value measured indicated in plots at section 8.6.

9.4. Operating Condition of EUT

Test program “IA3_EMI_Setting_Tool_V100E05_EEPROM” is used for enabling the EUT transmitting continuing.

9.5. Test Procedure

The transmitter output was connected to the spectrum analyzer. Set both RBW=100 kHz and VBW to 300kHz with suitable frequency span including 100kHz bandwidth from band edge.

The measurement guideline was according to 558074 D01 DTS Meas Guidance v03r01

9.6. Test Results

PASSED. All the test results are attached in next pages.

Test Date : 2014. 06. 06 Temperature : 25°C Humidity : 35%

Below Band edge: The highest emission level is -43.292dBm on 2.39990GHz.

Upper Band edge : The highest emission level is -45.702dBm on 2.48360GHz.

Below Band edge**Upper Band edge**

10. POWER SPECTRAL DENSITY MEASUREMENT

10.1. Test Equipment

The following test equipment was used during the power spectral density measurement:

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Due Date
1.	Spectrum Analyzer	Agilent	N9030A-526	MY53310269	2014. 09. 21

10.2. Block Diagram of Test Setup

The same as section.5.2.

10.3. Specification Limits [§15.247(d), RSS-210 §A8.2 (b)]

The peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3kHz band.

10.4. Operating Condition of EUT

Test program “IA3_EMI_Setting_Tool_V100E05_EEPROM” is used for enabling the EUT transmitting continuing.

10.5. Test Procedure

The transmitter output was connected to the spectrum analyzer. The bandwidth of the fundamental frequency was measured with the spectrum analyzer using 100kHz RBW and ≥ 300 kHz VBW, set sweep time = Auto.

The measurement guideline was according to 558074 D01 DTS Meas Guidance v03r01

10.6. Test Results

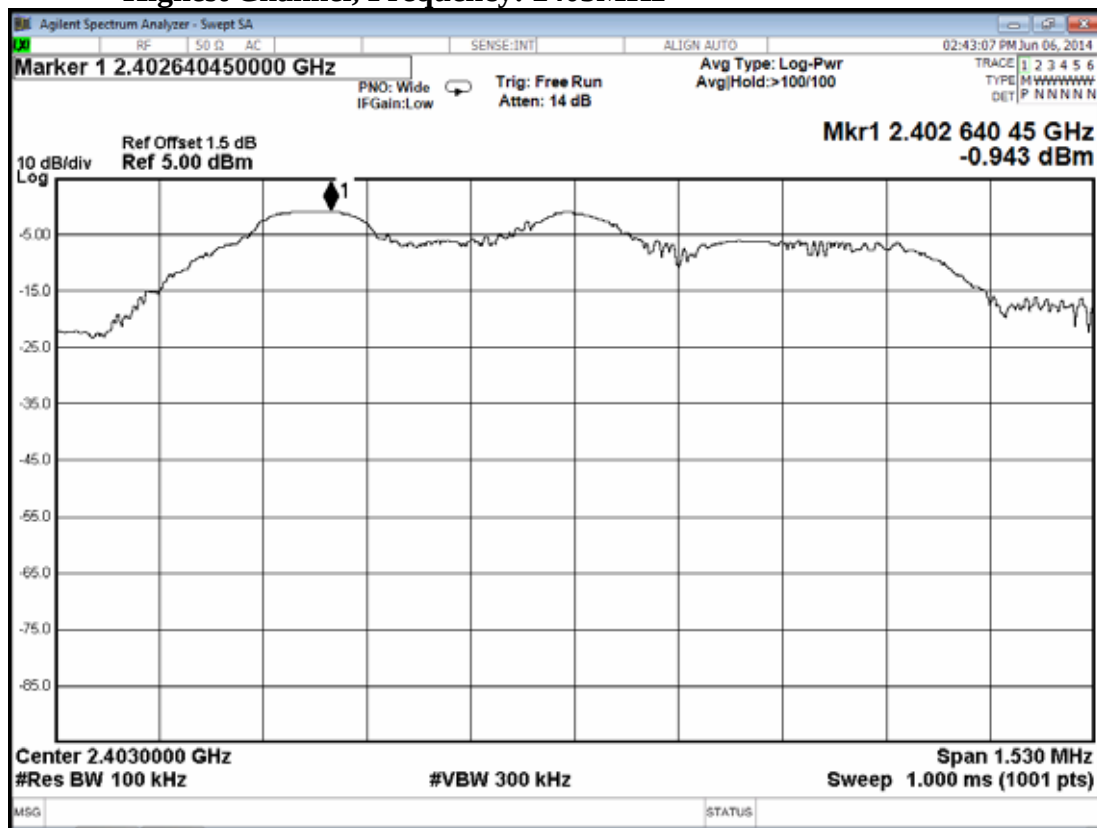
PASSED. All the test results are attached in next pages.

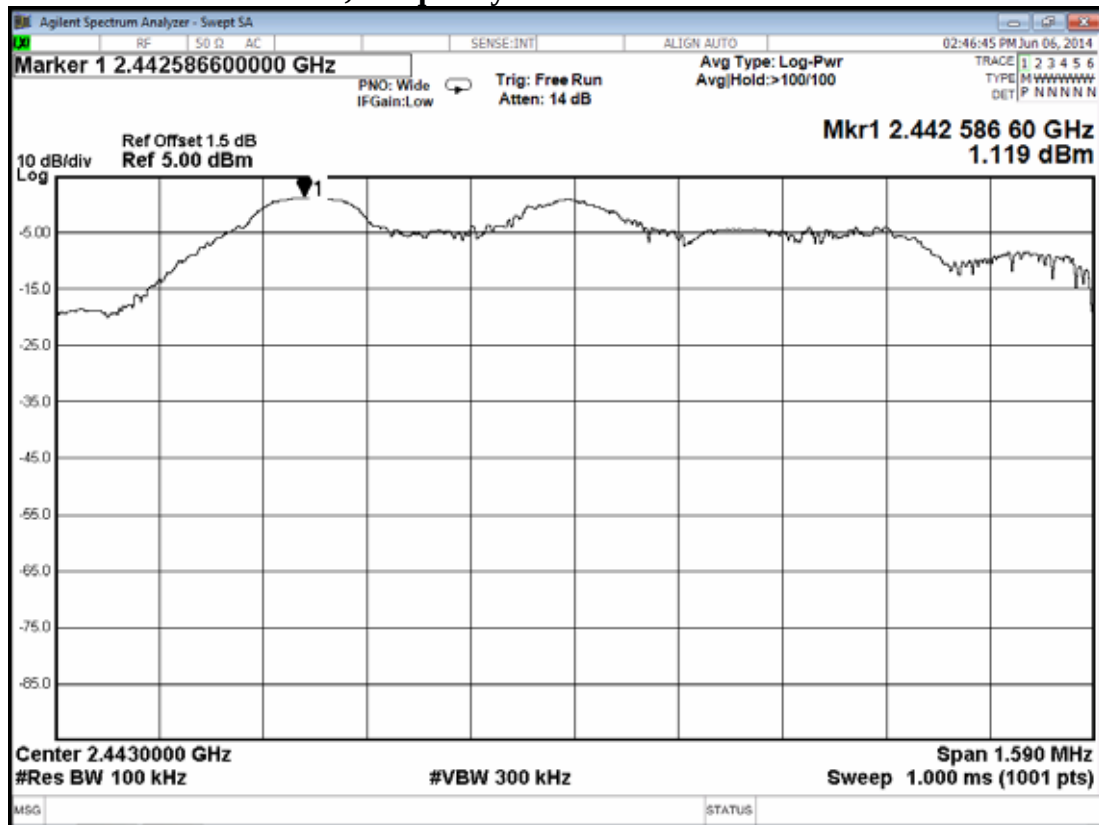
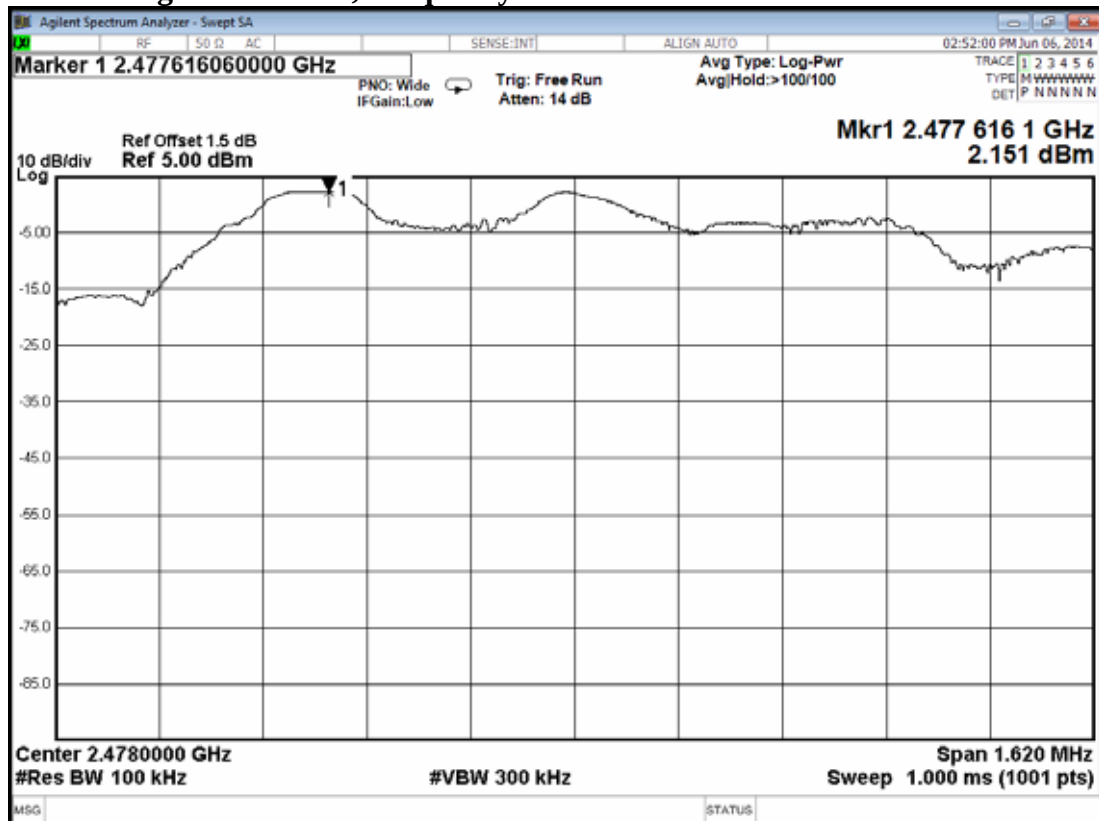
Test Date : 2014. 06. 06 Temperature : 25°C Humidity : 35%

Mode	Channel	Frequency	Power Spectral Density
1.	Highest	2403MHz	-0.943dBm
2.	Middle	2443MHz	1.119dBm
3.	Lowest	2478MHz	2.151dBm

[Limit: 8dBm]

Highest Channel, Frequency: 2403MHz



Middle Channel, Frequency: 2443MHz**Highest Channel, Frequency: 2478MHz**

11.DEVIATION TO TEST SPECIFICATIONS

【NONE】