

# ELECTROMAGNETIC EMISSION COMPLIANCE REPORT FOR LOW-POWER, NON-LICENSED TRANSMITTER

Test Report No. : E117R-013

AGR No. : A114A-182R

Applicant : JASTEC CO., LTD.  
Address : JASTEC BLDG., 92-7, Kumgok-dong, Boondang-gu, Seongnam-si, Gyeonggi-do, 463-804, Korea

Manufacturer : JASTEC CO., LTD.  
Address : JASTEC BLDG., 92-7, Kumgok-dong, Boondang-gu, Seongnam-si, Gyeonggi-do, 463-804, Korea

Type of Equipment : von-STD with WLAN 802.11 b/g Module

FCC ID. : UK4JTWf1100

Model Name : JTWf1100

Multiple Model Name : JTUB1101

Serial number : N/A

Total page of Report : 75 pages (including this page)

Date of Incoming : May 11, 2011

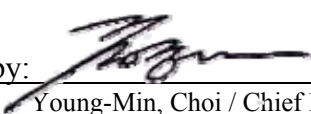
Date of issue : July 06, 2011


## SUMMARY

The equipment complies with the regulation; **FCC Part 15 Subpart C Section 15.247.**

This test report only contains the result of a single test of the sample supplied for the examination.

It is not a generally valid assessment of the features of the respective products of the mass-production.

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### Revision History

Issued Report No.	Issued Date	Revisions	Effect Section
E117R-013	July 06, 2011	Initial Issue	All

## 1. VERIFICATION OF COMPLIANCE

APPLICANT : JASTEC CO., LTD.  
 ADDRESS : JASTEC BLDG., 92-7, Kumgok-dong, Boondang-gu, Seongnam-si, Gyeonggi-do,  
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 CONTACT PERSON : Mr. C.H, Park / Senior Manager  
 TELEPHONE NO : +82-31-719-5170  
 FCC ID : UK4JTWf1100  
 MODEL NAME : JTWf1100  
 SERIAL NUMBER : N/A  
 DATE : July 06, 2011

EQUIPMENT CLASS	<b><i>DTS – DIGITAL TRNSMISSION SYSTEM</i></b>
KIND OF EQUIPMENT	von-STD with WLAN 802.11b/g Module
THIS REPORT CONCERNS	Original Grant
MEASUREMENT PROCEDURES	ANSI C63.4: 2009
TYPE OF EQUIPMENT TESTED	Pre-Production
KIND OF EQUIPMENT AUTHORIZATION REQUESTED	Certification
EQUIPMENT WILL BE OPERATED UNDER FCC RULES PART(S)	FCC PART 15 SUBPART C Section 15.247
MODIFICATIONS ON THE EQUIPMENT TO ACHIEVE COMPLIANCE	No
FINAL TEST WAS CONDUCTED ON	3 m open area test site

-. The above equipment was tested by ONETECH Corp. for compliance with the requirement set forth in the FCC Rules and Regulations. This said equipment in the configuration described in this report, shows the maximum emission levels emanating from equipment are within the compliance requirements.

## 2. TEST SUMMARY

### 2.1 Test items and results

SECTION	TEST ITEMS	RESULTS
15.247 (a) (2)	Minimum 6 dB Bandwidth	Met the Limit / PASS
15.247 (b) (3)	Maximum Peak Conducted Output Power	Met the Limit / PASS
15.247 (d)	100 kHz Bandwidth Outside the Frequency Band	Met the Limit / PASS
15.247 (d)	Radiated Emission which fall in the Restricted Band	Met the Limit / PASS
15.247 (e)	Peak Power Spectral Density	Met the Limit / PASS
15.247 (i)	Radio Frequency Exposure Level	Met the Limit / PASS
15.209	Radiated Emission Limits	Met the Limit / PASS
15.207	Conducted Limits	N/A (See Note)
15.203	Antenna Requirement	Met requirement / PASS

Note: This test is not performed because the power of the EUT supplies from a car battery.

### 2.2 Additions, deviations, exclusions from standards

No additions, deviations or exclusions have been made from standard.

### 2.3 Related Submittal(s) / Grant(s)

Original submittal only

### 2.4 Purpose of the test

To determine whether the equipment under test fulfills the requirements of the regulation stated in section 2.1.

### 2.5 Test Methodology

Radiated testing was performed according to the procedures in ANSI C63.4: 2009 at a distance of 3 m from EUT to the antenna.

### 2.6 Test Facility

The open area test site and conducted measurement facilities are located on at 307-51 Daessangryung-ri, Chowol-eup, Gwangju-si, Gyeonggi-do, 464-862, Korea. Description details of test facilities were submitted to the Commission on August 21, 2008. (Registration Number: 340658)

### 3. GENERAL INFORMATION

#### 3.1 Product Description

The JASTEC CO., LTD., Model JTWf1100 (referred to as the EUT in this report) is a von-STD that is wireless data communication system with WLAN 802.11b/g. Von-STD as vehicle driving logs tracker designed to collect a vehicle driving information from ECU(Electronic Control Unit) and can be saved a driving logs by connecting to PC. The ports for computing peripheral device shall be subject to DoC procedure and issued by another test report. This report is for WLAN function. The product specification described herein was obtained from product data sheet or user's manual.

DEVICE TYPE	von-STD with WLAN 802.11b/g
TEMPERATURE RANGE	-30 °C ~ +80 °C
OPERATING FREQUENCY	2 412 MHz ~ 2 472 MHz
RF OUTPUT POWER	16.20 dBm(802.11b), 17.80 dBm(802.11g)
DATA TRANSFER RATE	Max. 54 Mbps
MODULATION TYPE	OFDM/CCK
ANTENNA	MFR.: AMOTECH, Model No.: ALA131C3
ANTENNA CONNECTOR TYPE	Internal Chip Antenna
ANTENNA GAIN	2.41 dBi
LIST OF EACH OSC. OR CRYSTAL.	16 MHz on main board
FREQ.(FREQ. >= 1 MHz)	40 MHz on the WLAN Board.
NUMBER OF LAYER	4 Layers
EXRERNAL CONNECTOR	DLC(Diagnosis Link Connector), USB

#### 3.2 Alternative type(s)/model(s); also covered by this test report.

-. The following lists consist of the added model and their differences.

Model Name	Differences	Tested
JTWf1100	Basic Model	<input checked="" type="checkbox"/>
JTUB1101	This model is identical to basic model except for the model designation only.	<input type="checkbox"/>

Note: 1. Applicant consigns only basic model to test, therefore this test report just guarantees the units which have been tested.

2. The Applicant/manufacture is responsible for the compliance of all variants.

### 4. EUT MODIFICATIONS

-. None



## 5. SYSTEM TEST CONFIGURATION

### 5.1 Justification

This device was configured for testing in a typical way as a normal customer is supposed to be used. During the test, the following components were installed inside of the EUT.

DEVICE TYPE	MANUFACTURER	MODEL/PART NUMBER	FCC ID
Main Board	N/A	N/A	N/A
OBD Board	N/A	085-A0001	N/A
WLAN Board	N/A	VON-S V1.2(WiFi)	N/A

### 5.2 Peripheral equipment

Defined as equipment needed for correct operation of the EUT, but not considered as tested:

Model	Manufacturer	FCC ID	Description	Connected to
JTWf1100	JASTEC CO., LTD.	UK4JTWf1100	von-STD (EUT)	Test Jig
N/A	N/A	N/A	Test Jig	EUT and Notebook PC
PP10L	DELL Computer Corp	DoC	Notebook PC	Test Jig
MO56UOA	Dell Computer	DoC	Mouse	Notebook PC

### 5.3 Mode of operation during the test

For the testing, software used to control the EUT for staying in continuous transmitting and receiving mode is programmed. For final testing, WLAN was set at Low Channel (2 412 MHz), Middle Channel (2 442 MHz), and High Channel (2 472 MHz) with 11 Mbps(802.11b) and 6 Mbps(802.11g), 54 Mbps(802.11g) data rates. To get a maximum emission levels from the EUT, the EUT was moved throughout the XY, XZ, and YZ planes.

### 5.4 Configuration of Test System

**Line Conducted Test:** This test is not performed because the power of the EUT supplies from a car battery.

**Radiated Emission Test:** Preliminary radiated emissions test were conducted using the procedure in ANSI C63.4: 2003 8.3.1.1 and 13.1.4.1 to determine the worse operating conditions. Final radiated emission tests were conducted at 3 meter open area test site.

The turntable was rotated through 360 degrees and the EUT was tested by positioned three orthogonal planes to obtain the highest reading on the field strength meter. Once maximum reading was determined, the search antenna was raised and lowered in both vertical and horizontal polarization.

## 5.5 Antenna Requirement

For intentional device, according to section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

### Antenna Construction:

The antenna of the EUT is a chip antenna on the main board in the EUT, so no consideration of replacement by the user.

## 6. PRELIMINARY TEST

### 6.1 AC Power line Conducted Emissions Tests

During Preliminary Tests, the following operating mode was investigated

Operation Mode	The Worse operating condition (Please check one only)
This test is not performed because the power of the EUT supplies from a car battery.	

### 6.2 General Radiated Emissions Tests

During Preliminary Tests, the following operating modes were investigated

Operation Mode	The Worse operating condition (Please check one only)
TX mode	X

## 7. TEST DATA FOR 802.11b WLAN MODE

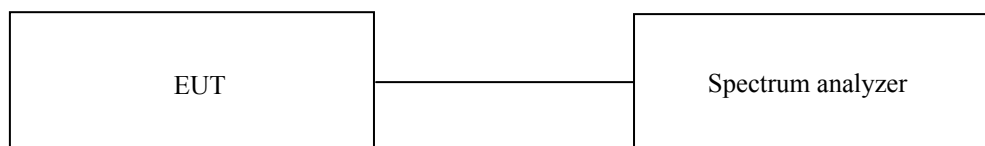
### 7.1 MINIMUM 6 dB BANDWIDTH

#### 7.1.1 Operating environment

Temperature : 26 °C  
Relative humidity : 49 % R.H.

#### 7.1.2 Test set-up

The antenna output of the EUT was connected to the spectrum analyzer. The resolution bandwidth is set to 100 kHz, and peak detection was used. The 6 dB bandwidth is defined as the total spectrum over which the power is higher than the peak power minus 6 dB.



#### 7.1.3 Test equipment used

Model Number	Manufacturer	Description	Serial Number	Last Cal. (Interval)
■ - 8564E	HP	Spectrum Analyzer	3650A00756	Jun. 10, 2011(1Y)

All test equipment used is calibrated on a regular basis.

#### 7.1.4 Test data

-. Test Date : June 20, 2011

-. Test Result : Pass

CHANNEL	FREQUENCY(MHz)	MEASURED VLAUE (kHz)	LIMIT (kHz)	MARGIN (kHz)
Low	2 412	10 630	500	-10 130
Middle	2 442	10 170	500	-9 670
High	2 472	10 070	500	-9 570

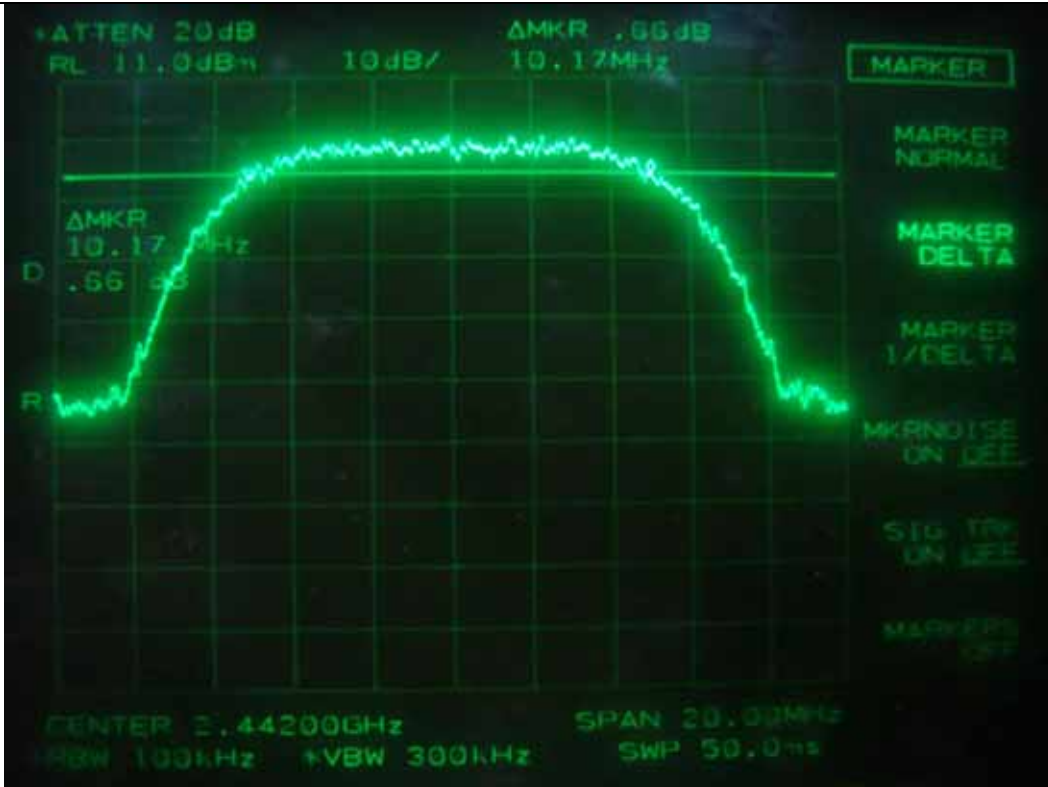
Remark: See next page for an overview sweep performed with peak detector.



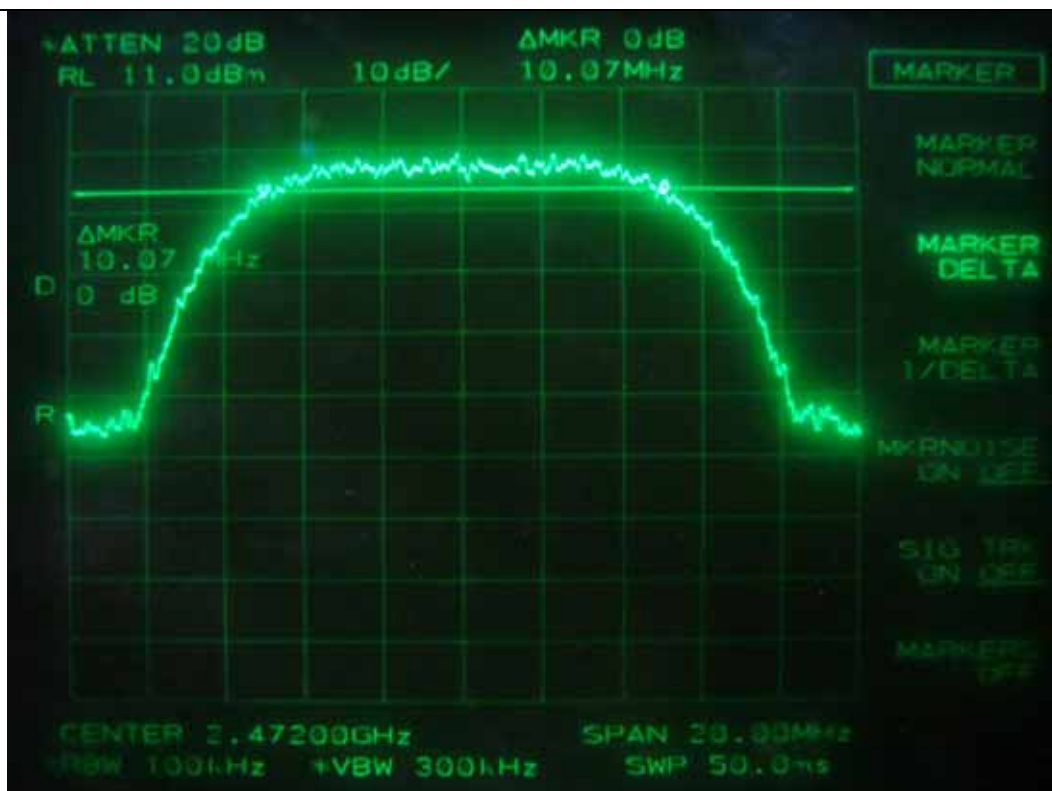
Tested by: Seung-Sik, Kim / Project Engineer



Low Channel



Middle Channel



High Channel

## 7.2 MAXIMUM PEAK OUTPUT POWER

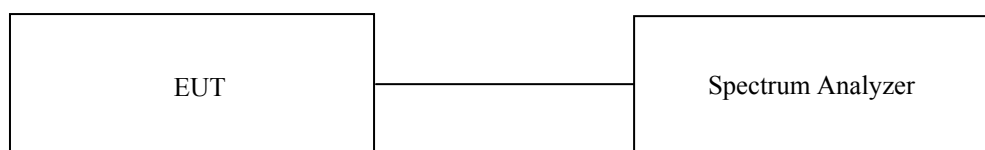
### 7.2.1 Operating environment

Temperature : 26 °C

Relative humidity : 49 % R.H.

### 7.2.2 Test set-up

The maximum peak output power was measured with the spectrum analyzer connected to the antenna output of the EUT. The spectrum analyzer's internal channel power integration function is used to integrate the power over a bandwidth greater than or equal to the 99 % bandwidth. The EUT was operating in transmit mode at the appropriate center frequency.



### 7.2.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal. (Interval)
■ -	8564E	HP	Spectrum Analyzer	3650A00756	Jun. 10, 2011(1Y)

All test equipment used is calibrated on a regular basis.

#### 7.2.4 Test data

- Test Date : June 20, 2011

- Test Result : Pass

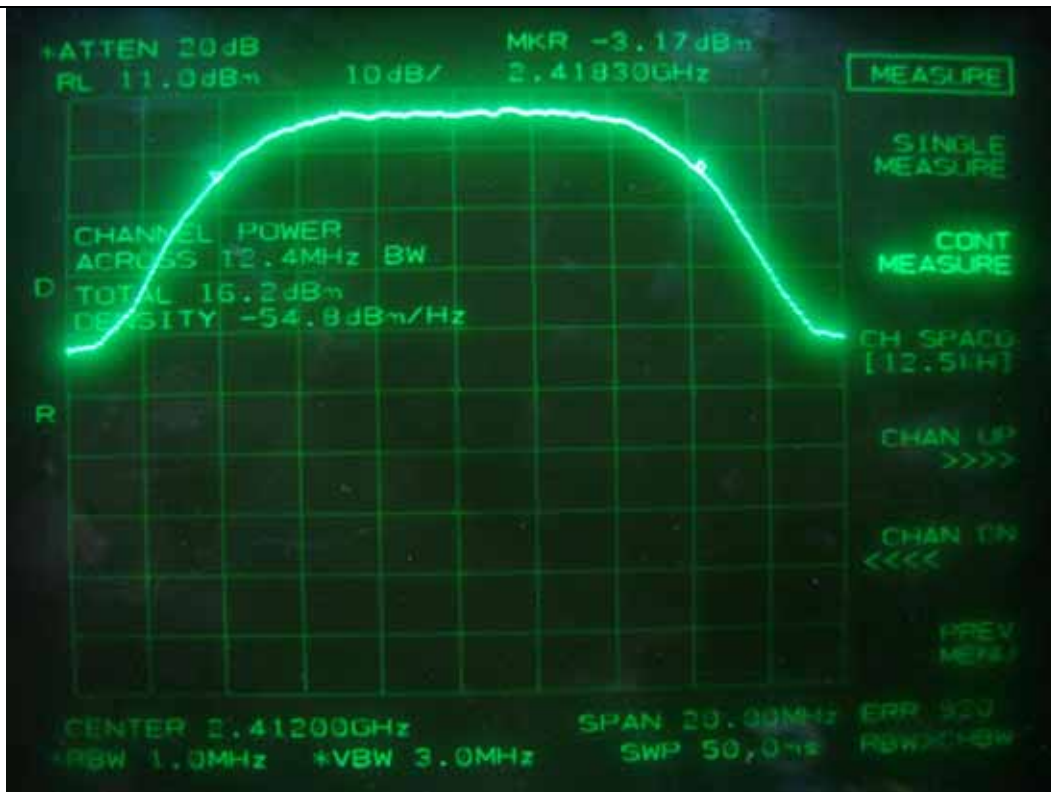
CHANNEL	FREQUENCY (MHz)	99 % Occupied Bandwidth (MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2 412	12.47	16.20	30.00	-13.80
Middle	2 442	12.47	16.10	30.00	-13.90
High	2 472	12.47	15.10	30.00	-14.90

Remark: See next page for an overview sweep performed with peak detector.

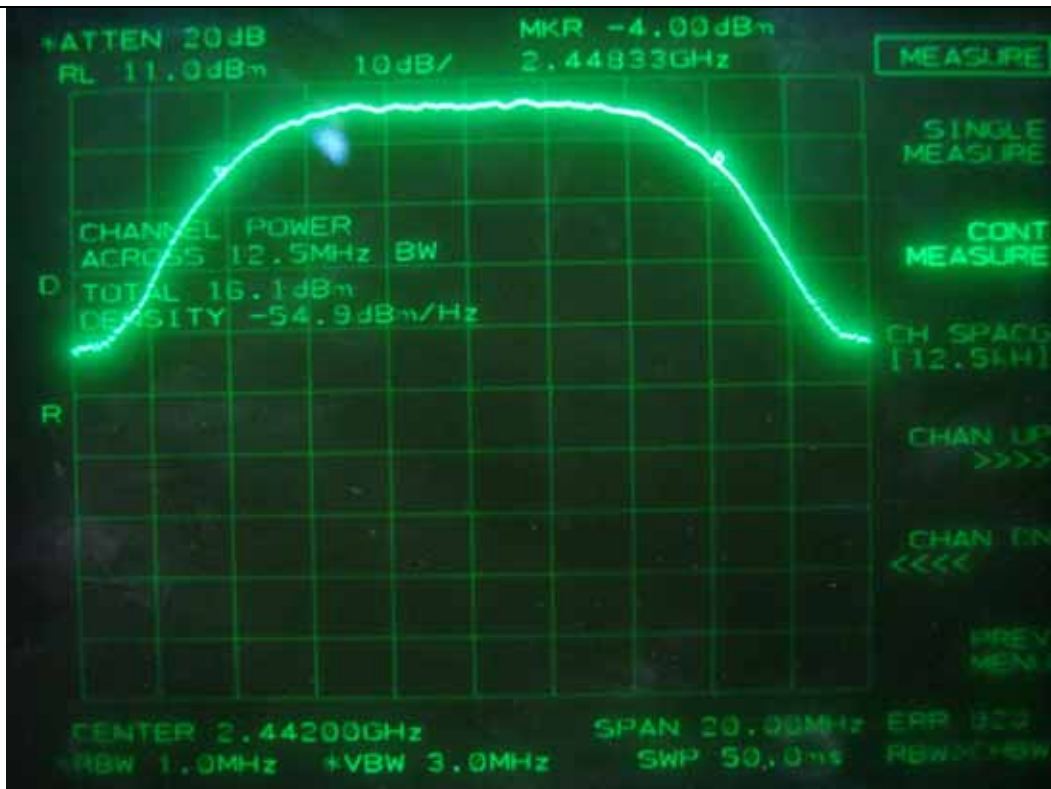


Tested by: Seung-Sik, Kim / Project Engineer





Low Channel



Middle Channel



High Channel

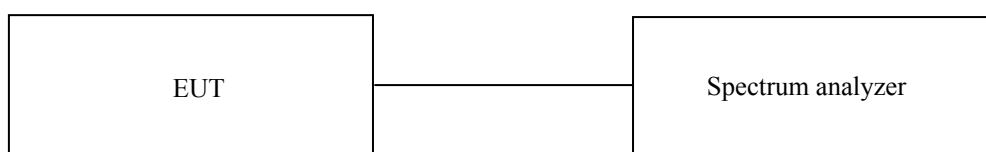
## 7.3 100 kHz BANDWIDTH OUTSIDE THE FREQUENCY BAND

### 7.3.1 Operating environment

Temperature : 26 °C  
Relative humidity : 46 % R.H.

### 7.3.2 Test set-up for conducted measurement

The antenna output of the EUT was connected to the spectrum analyzer. The resolution and video bandwidth is set to 100 kHz, and peak detection was used.



### 7.3.3 Test set-up for radiated measurement

The radiated emissions measurements were performed on the 3 m, open-field test site. The EUT was placed on a non-conductive turntable approximately 0.8 m above the ground plane.

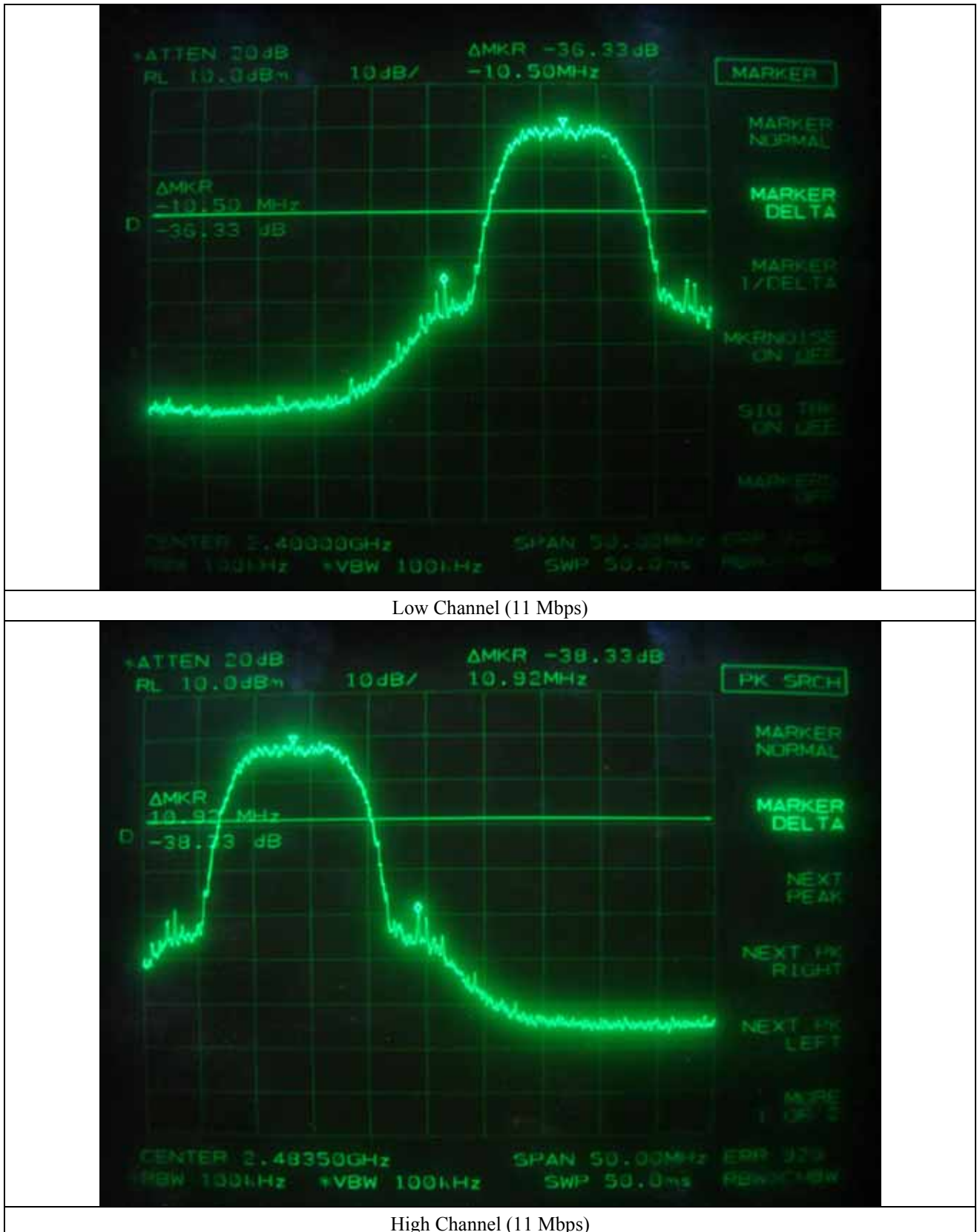
The frequency spectrum from 30 MHz to 25 GHz was scanned and maximum emission levels at each frequency recorded. The system was rotated 360°, and the antenna was varied in the height between 1.0 m and 4.0 m in order to determine the maximum emission levels. This procedure was performed for horizontal and vertical polarization of the receiving antenna.

### 7.3.4 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal.(Interval)
■ -	8564E	Hewlett-Packard	Spectrum Analyzer	3650A00756	Jun. 10, 2011(1Y)
■ -	8447D	Hewlett-Packard	Amplifier	2727A04987	Jun. 11, 2011(1Y)
■ -	83051A	Agilent	Preamplifier	3950M00201	Jun. 11, 2011(1Y)
■ -	F-40-5000-RF	RLC Electronics	Highpass Filter	0425	Jul. 09, 2010(1Y)
■ -	MA220	HD	Turn Table	N/A	N/A
■ -	HD240	HD	Antenna Mast	N/A	N/A
■ -	BBHA9120D	Schwarzbeck	Horn Antenna	BBHA9120D294	Jun. 17, 2011(2Y)
■ -	YSE 500B	YoungShin Eng.	Frequency Converter	950413001	N/A
■ -	ETCR-10	DaeHa	Automatic Voltage Com.	N/A	N/A

All test equipment used is calibrated on a regular basis.

### 7.3.5. Test data for conducted emission



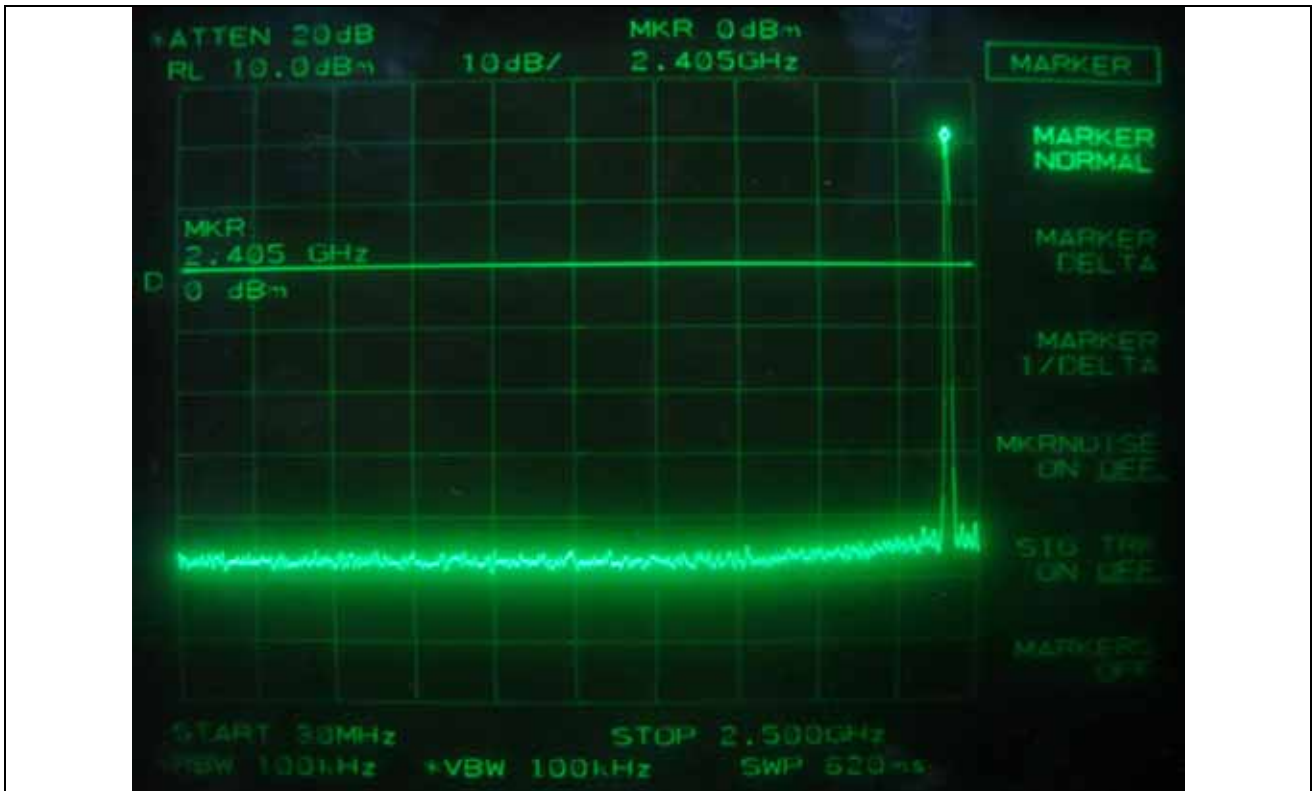
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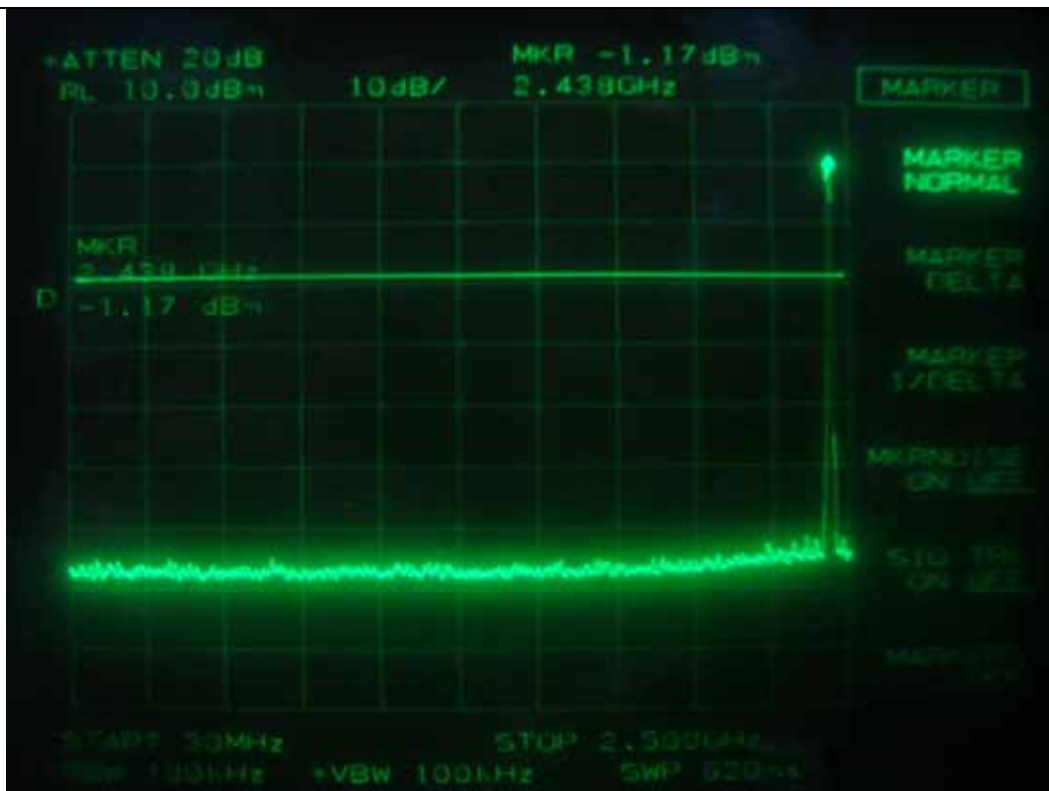




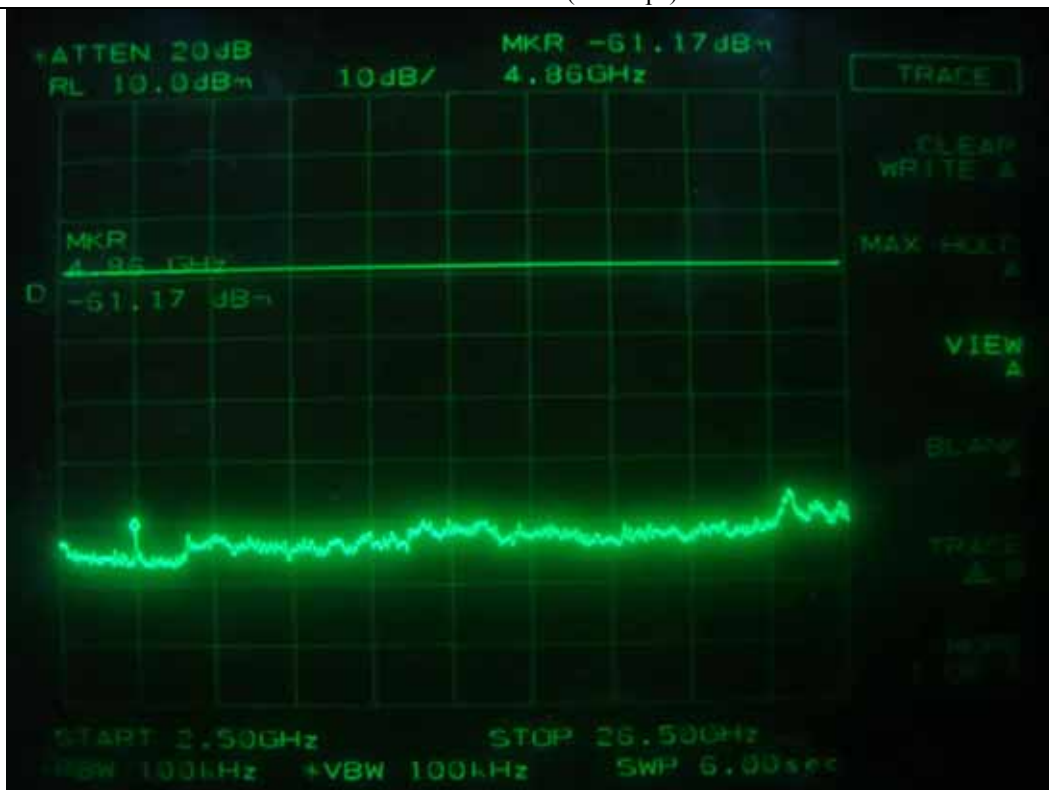
Low Channel (11 Mbps)



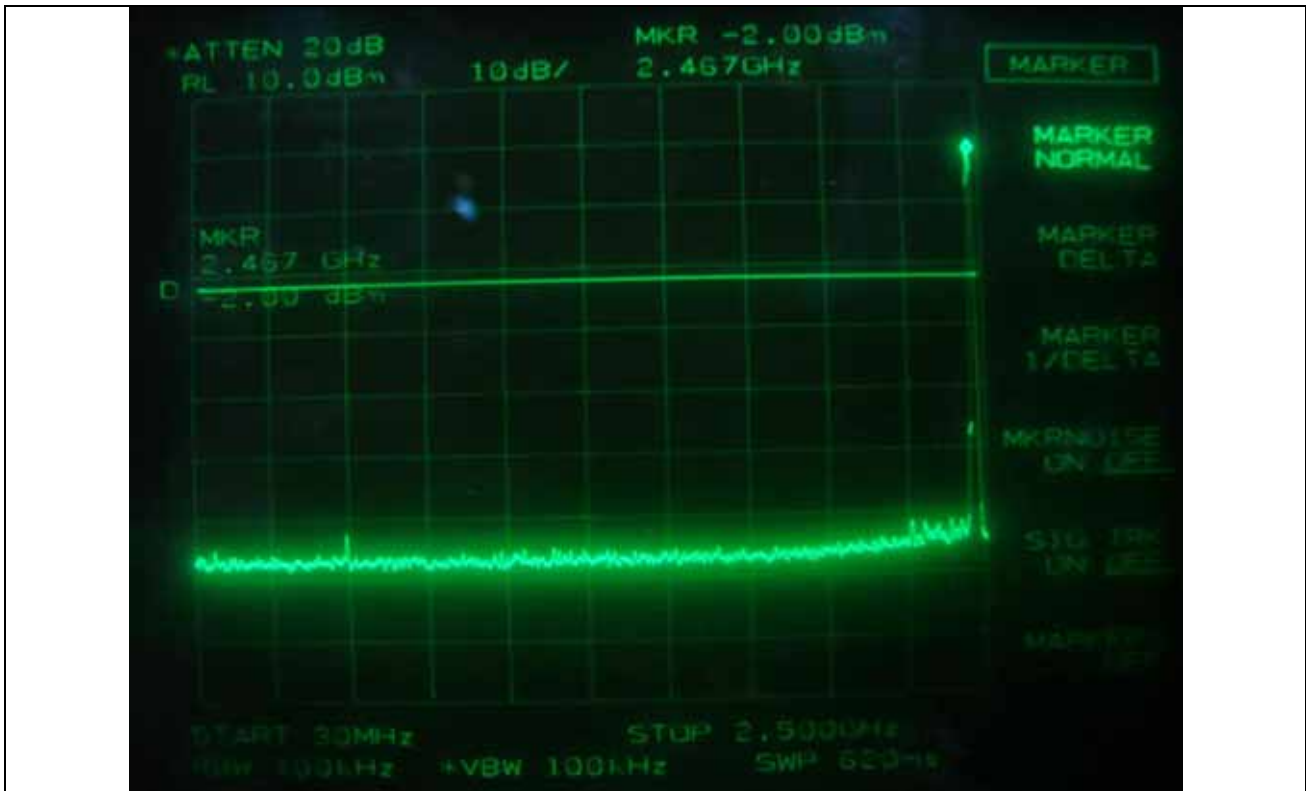
Low Channel (11 Mbps)



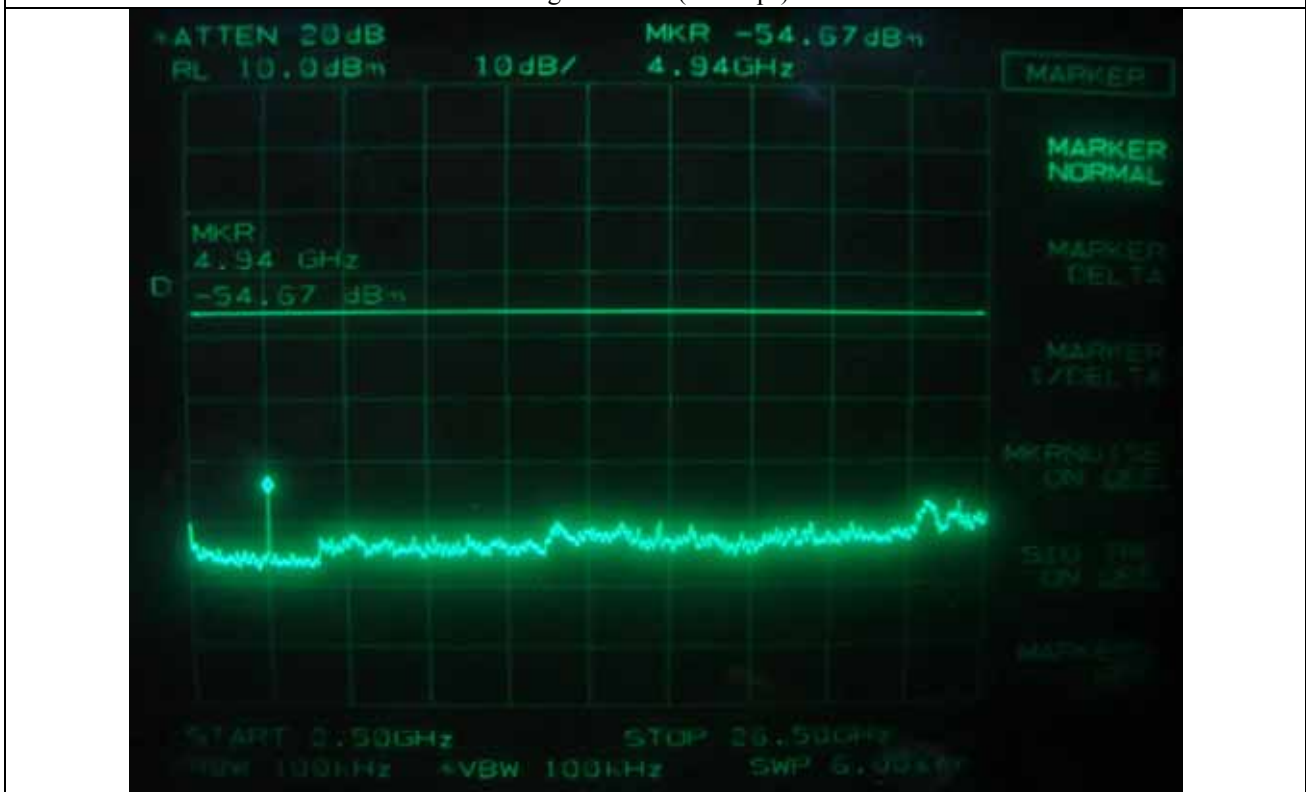
Middle Channel (11 Mbps)



Middle Channel (11 Mbps)



High Channel (11 Mbps)



High Channel (11 Mbps)

### 7.3.6. Test data for radiated emission

#### 7.3.6.1 Radiated Emission which fall in the Restricted Band

- Test Date : June 22, 2011
- Resolution bandwidth : 1 MHz for Peak and Average Mode
- Video bandwidth : 1 MHz for Peak Mode, 10 Hz for Average Mode
- Frequency range : 1 GHz ~ 25 GHz
- Measurement distance : 3 m
- Operating Condition : Low / High Channel
- Result : PASSED BY -19.16 dB at High Channel (5.5 Mbps)

Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Test Data for Low Channel (1 Mbps)									
2 390.00	38.50	Peak	H	26.66	3.13	28.98	39.31	74.00	-34.69
	31.50	Average	H				32.31	54.00	-21.69
	40.24	Peak	V				41.05	74.00	-32.95
	32.87	Average	V				33.68	54.00	-20.32
Test Data for Low Channel (2 Mbps)									
2 390.00	38.67	Peak	H	26.66	3.13	28.98	39.48	74.00	-34.52
	31.33	Average	H				32.14	54.00	-21.86
	39.98	Peak	V				40.79	74.00	-33.21
	33.34	Average	V				34.15	54.00	-19.85
Test Data for Low Channel (5.5 Mbps)									
2 390.00	38.17	Peak	H	26.66	3.13	28.98	38.98	74.00	-35.02
	31.00	Average	H				31.81	54.00	-22.19
	40.12	Peak	V				40.93	74.00	-33.07
	33.17	Average	V				33.98	54.00	-20.02
Test Data for Low Channel (11 Mbps)									
2 390.00	38.50	Peak	H	26.66	3.13	28.98	39.31	74.00	-34.69
	31.67	Average	H				32.48	54.00	-21.52
	40.33	Peak	V				41.14	74.00	-32.86
	33.50	Average	V				34.31	54.00	-19.69

Tabulated test data for Restricted Band

Remark: "H": Horizontal, "V": Vertical

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-Continued

Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Test Data for High Channel (1 Mbps)									
2 483.50	38.83	Peak	H	26.82	3.17	28.82	40.00	74.00	-34.00
	31.45	Average	H				32.62	54.00	-21.38
	40.15	Peak	V				41.32	74.00	-32.68
	33.33	Average	V				34.50	54.00	-19.50
Test Data for High Channel (2 Mbps)									
2 483.50	38.67	Peak	H	26.82	3.17	28.82	39.84	74.00	-34.16
	31.33	Average	H				32.50	54.00	-21.50
	40.90	Peak	V				42.07	74.00	-31.93
	32.70	Average	V				33.87	54.00	-20.13
Test Data for High Channel (5.5 Mbps)									
2 483.50	38.50	Peak	H	26.82	3.17	28.82	39.67	74.00	-34.33
	31.67	Average	H				32.84	54.00	-21.16
	40.33	Peak	V				41.50	74.00	-32.50
	33.67	Average	V				34.84	54.00	-19.16
Test Data for High Channel (11 Mbps)									
2 483.50	38.67	Peak	H	26.82	3.17	28.82	39.84	74.00	-34.16
	31.33	Average	H				32.50	54.00	-21.50
	40.67	Peak	V				41.84	74.00	-32.16
	33.50	Average	V				34.67	54.00	-19.33



Tested by: Seung-Sik, Kim / Project Engineer

### 7.3.6.2 Spurious & Harmonic Radiated Emission

- Test Date : June 22, 2011
- Resolution bandwidth : 1 MHz for Peak and Average Mode for the emissions fall in restricted band,  
100 kHz for Peak Mode for the emissions outside restricted band
- Video bandwidth : 1 MHz for Peak Mode, 10 Hz for Average Mode
- Frequency range : 1 GHz ~ 25 GHz
- Measurement distance : 3 m
- Result : PASSED BY -22.25 dB at Low Channel(1 Mbps)

Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Test Data for Low Channel (1 Mbps)									
2 412.00	60.37	Peak	H	27.11	3.16		90.64	-	
	59.90	Peak	V				90.17	-	
4 824.00	35.45	Peak	H	31.09	4.10	28.78	41.86	74.00	-32.14
	24.13	Average	H				30.54	54.00	-23.46
	35.70	Peak	V				42.11	74.00	-31.89
	25.34	Average	V				31.75	54.00	-22.25
Test Data for Low Channel (2 Mbps)									
2 412.00	60.31	Peak	H	27.11	3.16		90.58	-	
	60.23	Peak	V				90.50	-	
4 824.00	36.47	Peak	H	31.09	4.10	28.78	42.88	74.00	-31.12
	24.36	Average	H				30.77	54.00	-23.23
	35.60	Peak	V				42.01	74.00	-31.99
	24.50	Average	V				30.91	54.00	-23.09
Test Data for Low Channel (5.5 Mbps)									
2 412.00	60.42	Peak	H	27.11	3.16		90.69	-	
	60.38	Peak	V				90.65	-	
4 824.00	35.16	Peak	H	31.09	4.10	28.78	41.57	74.00	-32.43
	24.68	Average	H				31.09	54.00	-22.91
	35.17	Peak	V				41.58	74.00	-32.42
	25.00	Average	V				31.41	54.00	-22.59

Tabulated test data for Restricted Band

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-Continued

Test Data for Low Channel (11 Mbps)									
2 412.00	60.14	Peak	H	27.11	3.16		90.41	-	
	60.45	Peak	V				90.72	-	
4 824.00	35.64	Peak	H	31.09	4.10	28.78	42.05	74.00	-31.95
	24.17	Average	H				30.58	54.00	-23.42
	35.60	Peak	V				42.01	74.00	-31.99
	24.33	Average	V				30.74	54.00	-23.26

Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Test Data for Middle Channel (1 Mbps)									
2 442.00	61.50	Peak	H	27.19	3.16		91.85	-	
	61.60	Peak	V				91.95	-	
4 884.00	35.73	Peak	H	31.19	4.12	28.74	42.30	74.00	-31.70
	24.33	Average	H				30.90	54.00	-23.10
	38.54	Peak	V				45.11	74.00	-28.89
	24.34	Average	V				30.91	54.00	-23.09
Test Data for Middle Channel (2 Mbps)									
2 442.00	60.65	Peak	H	27.19	3.16		91.00	-	
	60.80	Peak	V				91.15	-	
4 884.00	35.90	Peak	H	31.19	4.12	28.74	42.47	74.00	-31.53
	24.30	Average	H				30.87	54.00	-23.13
	38.50	Peak	V				45.07	74.00	-28.93
	24.10	Average	V				30.67	54.00	-23.33

Tabulated test data for Restricted Band

Test Data for Middle Channel (5.5 Mbps)									
2 442.00	60.16	Peak	H	27.19	3.16		90.51	-	
	60.33	Peak	V				90.68	-	
4 884.00	35.83	Peak	H	31.19	4.12	28.74	42.40	74.00	-31.60
	24.36	Average	H				30.93	54.00	-23.07
	35.97	Peak	V				42.54	74.00	-31.46
	24.30	Average	V				30.87	54.00	-23.13
Test Data for Middle Channel (11 Mbps)									
2 442.00	60.67	Peak	H	27.19	3.16		91.02	-	
	61.67	Peak	V				92.02	-	
4 884.00	35.24	Peak	H	31.19	4.12	28.74	41.81	74.00	-32.19
	24.36	Average	H				30.93	54.00	-23.07
	35.67	Peak	V				42.24	74.00	-31.76
	24.16	Average	V				30.73	54.00	-23.27

Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Test Data for High Channel (1 Mbps)									
2 472.00	60.51	Peak	H	27.27	3.16		90.94	-	
	61.31	Peak	V				91.74	-	
4 944.00	35.67	Peak	H	31.29	4.14	28.70	42.40	74.00	-31.60
	24.50	Average	H				31.23	54.00	-22.77
	35.10	Peak	V				41.83	74.00	-32.17
	24.17	Average	V				30.90	54.00	-23.10
Test Data for High Channel (2 Mbps)									
2 472.00	60.24	Peak	H	27.27	3.16		90.67	-	
	60.84	Peak	V				91.27	-	
4 944.00	35.49	Peak	H	31.29	4.14	28.70	42.22	74.00	-31.78
	24.13	Average	H				30.86	54.00	-23.14
	35.81	Peak	V				42.54	74.00	-31.46
	24.36	Average	V				31.09	54.00	-22.91

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Test Data for High Channel (5.5 Mbps)									
2 472.00	60.24	Peak	H	27.27	3.16		90.67	-	
	60.64	Peak	V				91.07	-	
4 944.00	35.39	Peak	H	31.29	4.14	28.70	42.12	74.00	-31.88
	24.33	Average	H				31.06	54.00	-22.94
	35.67	Peak	V				42.40	74.00	-31.60
	24.18	Average	V				30.91	54.00	-23.09
Test Data for High Channel (11 Mbps)									
2 472.00	60.50	Peak	H	27.27	3.16		90.93	-	
	61.20	Peak	V				91.63	-	
4 944.00	35.76	Peak	H	31.29	4.14	28.70	42.49	74.00	-31.51
	24.33	Average	H				31.06	54.00	-22.94
	35.31	Peak	V				42.04	74.00	-31.96
	24.40	Average	V				31.13	54.00	-22.87

Tabulated test data for Restricted Band

Remark: "H": Horizontal, "V": Vertical



Tested by: Seung-Sik, Kim / Project Engineer

## 7.4 PEAK POWER SPECTRUL DENSITY

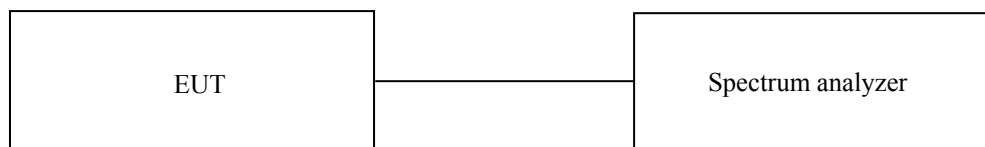
### 7.4.1 Operating environment

Temperature : 25 °C  
Relative humidity : 48 % R.H.

### 7.4.2 Test set-up

The antenna output of the EUT was connected to the spectrum analyzer. The resolution bandwidth is set to 3 kHz, the video bandwidth is set to 3 times the resolution bandwidth, and sweep time was set to span / 3 kHz. The sweep time was allowed to be longer than span / 3 kHz for a full response of the mixer in the spectrum analyzer.

The maximum level from the EUT in a 3 kHz bandwidth was measured with above condition.



### 7.4.3 Test equipment used

Model Number	Manufacturer	Description	Serial Number	Last Cal.(Interval)
■ - 8564E	HP	Spectrum Analyzer	3650A00756	Jun. 10, 2011(1Y)

All test equipment used is calibrated on a regular basis.

#### 7.4.4 Test data

-. Test Date : June 21, 2011

-. Test Result : Pass

CHANNEL	FREQUENCY(MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2 412	-12.67	8.00	-20.67
Middle	2 442	-14.50	8.00	-22.50
High	2 472	-16.17	8.00	-24.17

Remark: See next page for measurement data.



Tested by: Seung-Sik, Kim / Project Engineer



Low Channel



Middle Channel





High Channel

## 8. TEST DATA FOR 802.11g WLAN MODE

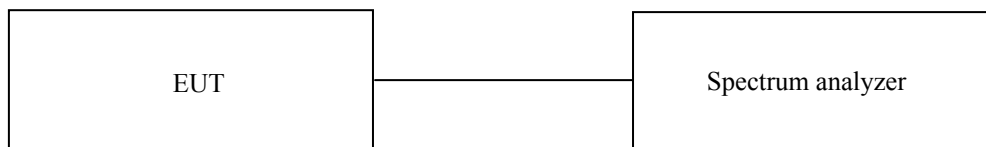
### 8.1 MINIMUM 6 dB BANDWIDTH

#### 8.1.1 Operating environment

Temperature : 26 °C  
Relative humidity : 49 %R.H.

#### 8.1.2 Test set-up

The antenna output of the EUT was connected to the spectrum analyzer. The resolution bandwidth is set to 100 kHz, and peak detection was used. The 6 dB bandwidth is defined as the total spectrum over which the power is higher than the peak power minus 6 dB.



#### 8.1.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal. (Interval)
■ -	8564E	HP	Spectrum Analyzer	3650A00756	Jun. 10, 2011(1Y)

All test equipment used is calibrated on a regular basis.

#### 8.1.4 Test data for 6 Mbps

-. Test Date : June 20, 2011

-. Test Result : Pass

CHANNEL	FREQUENCY(MHz)	MEASURED VLAUE (kHz)	LIMIT (kHz)	MARGIN (kHz)
Low	2 412	16 630	500	-16 130
Middle	2 442	16 670	500	-16 170
High	2 472	16 670	500	-16 170

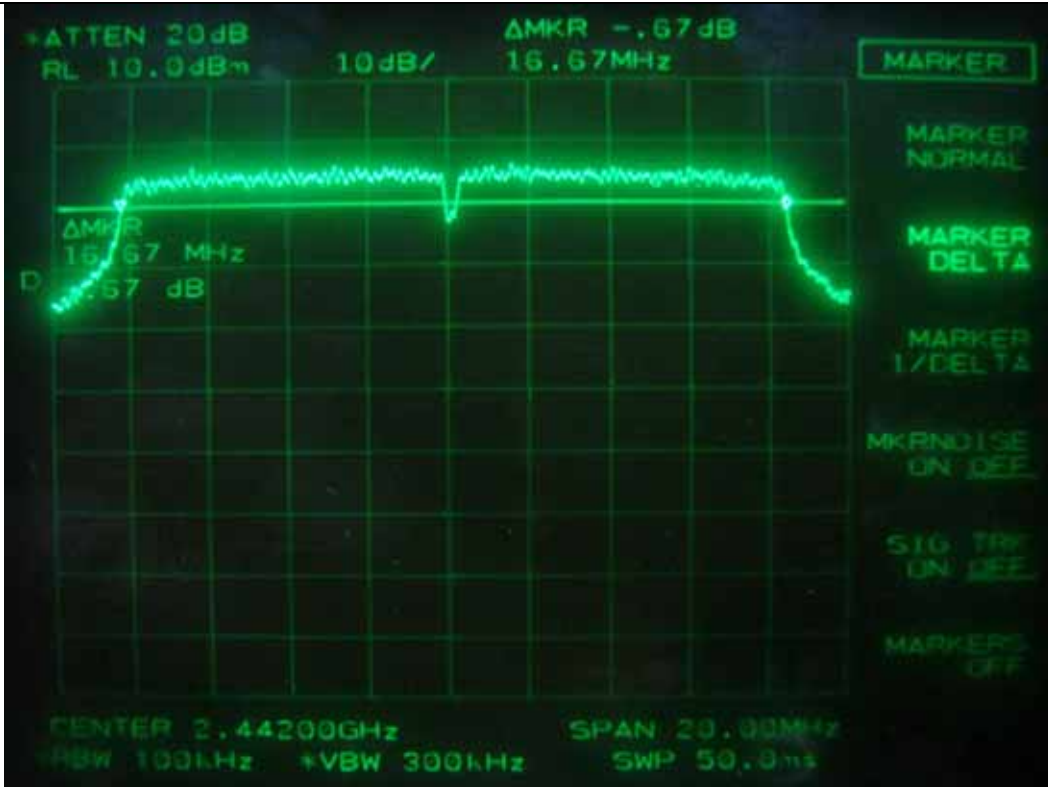
Remark: See next page for an overview sweep performed with peak detector.



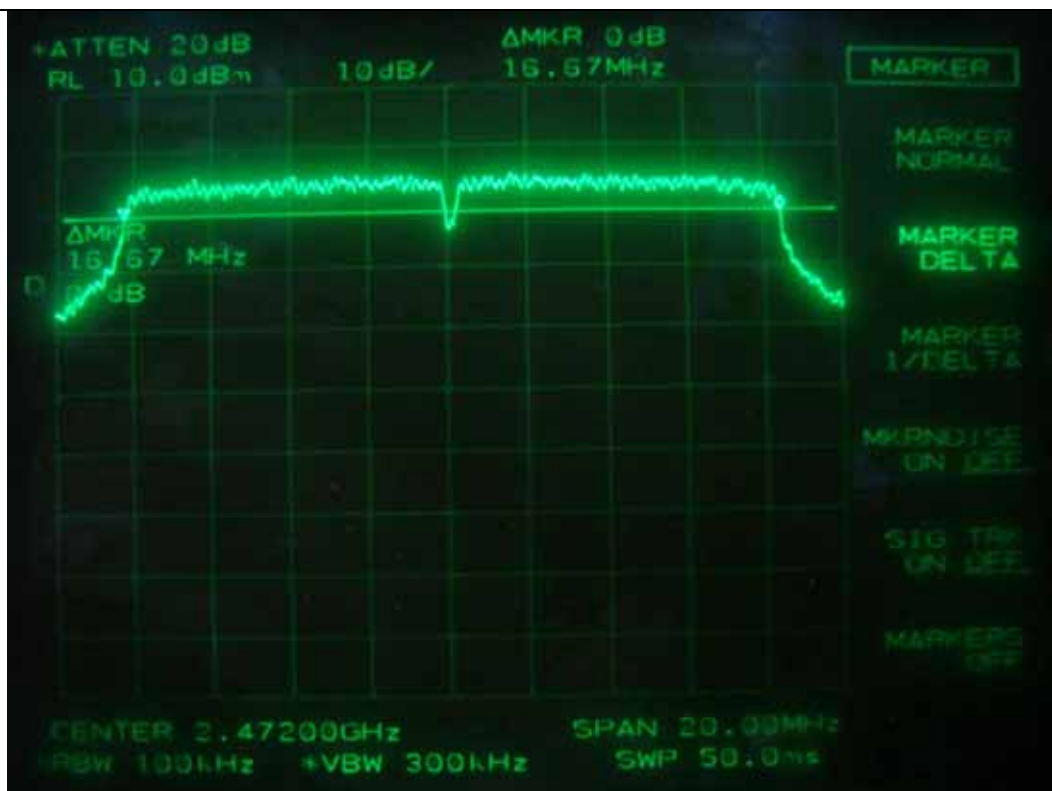
Tested by: Seung-Sik, Kim / Project Engineer



Low Channel



Middle Channel



High Channel

### 8.1.5 Test data for 54 Mbps

-. Test Date : June 20, 2011

-. Test Result : Pass

CHANNEL	FREQUENCY(MHz)	MEASURED VLAUE (kHz)	LIMIT (kHz)	MARGIN (kHz)
Low	2 412	16 600	500	-16 100
Middle	2 442	16 630	500	-16 130
High	2 472	16 670	500	-16 170

Remark: See next page for an overview sweep performed with peak detector.



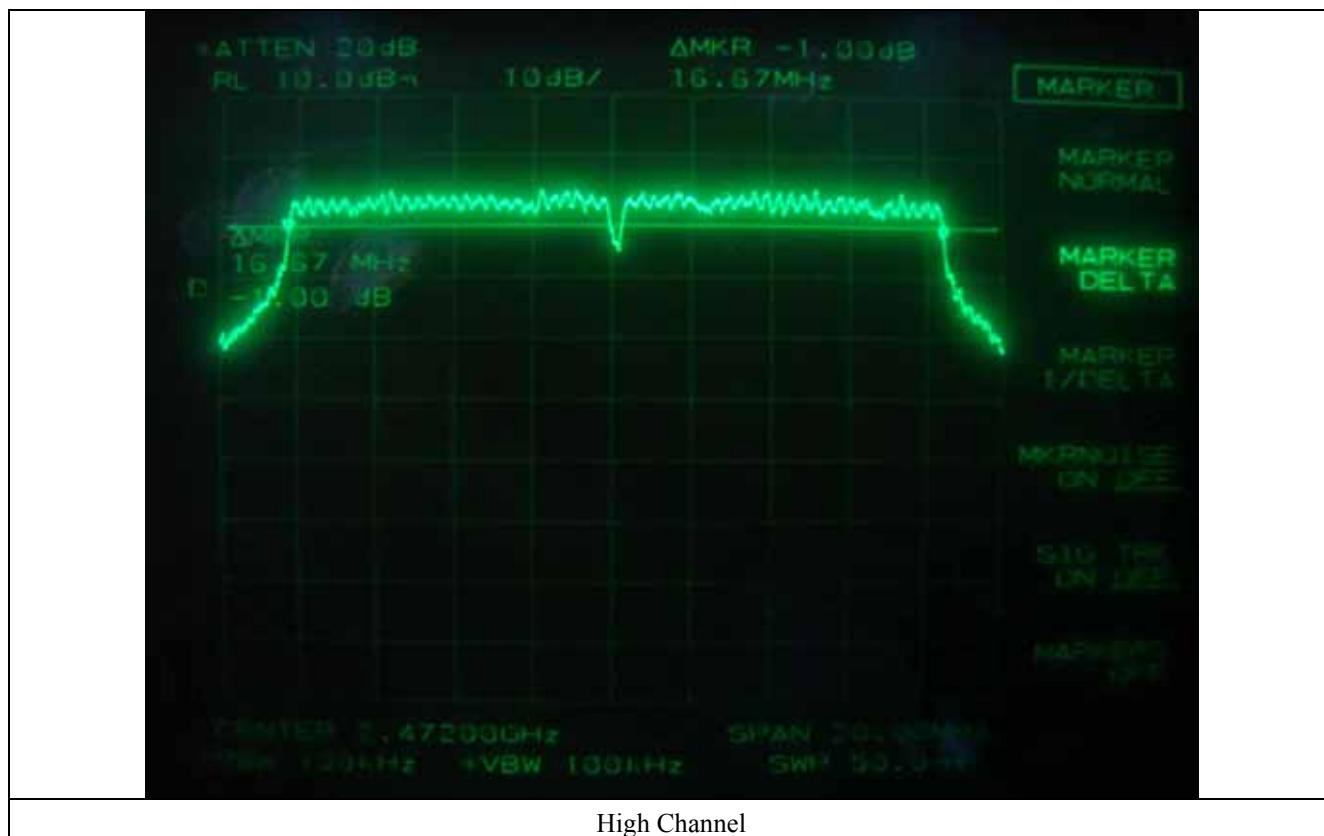
Tested by: Seung-Sik, Kim / Project Engineer



Low Channel



Middle Channel





## 8.2 MAXIMUM PEAK OUTPUT POWER

### 8.2.1 Operating environment

Temperature : 26 °C

Relative humidity : 49 % R.H.

### 8.2.2 Test set-up

The maximum peak output power was measured with the spectrum analyzer connected to the antenna output of the EUT. The spectrum analyzer's internal channel power integration function is used to integrate the power over a bandwidth greater than or equal to the 99 % bandwidth. The EUT was operating in transmit mode at the appropriate center frequency.



### 8.2.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal. (Interval)
■ -	8564E	HP	Spectrum Analyzer	3650A00756	Jun. 10, 2011(1Y)

All test equipment used is calibrated on a regular basis.

#### 8.2.4 Test data for 6 Mbps

-. Test Date : June 20, 2011

-. Test Result : Pass

CHANNEL	FREQUENCY (MHz)	99 % Occupied Bandwidth (MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2 412	16.58	17.80	30.00	-12.20
Middle	2 442	16.58	17.20	30.00	-12.80
High	2 472	16.67	16.30	30.00	-13.70

Remark: See next page for an overview sweep performed with peak detector.



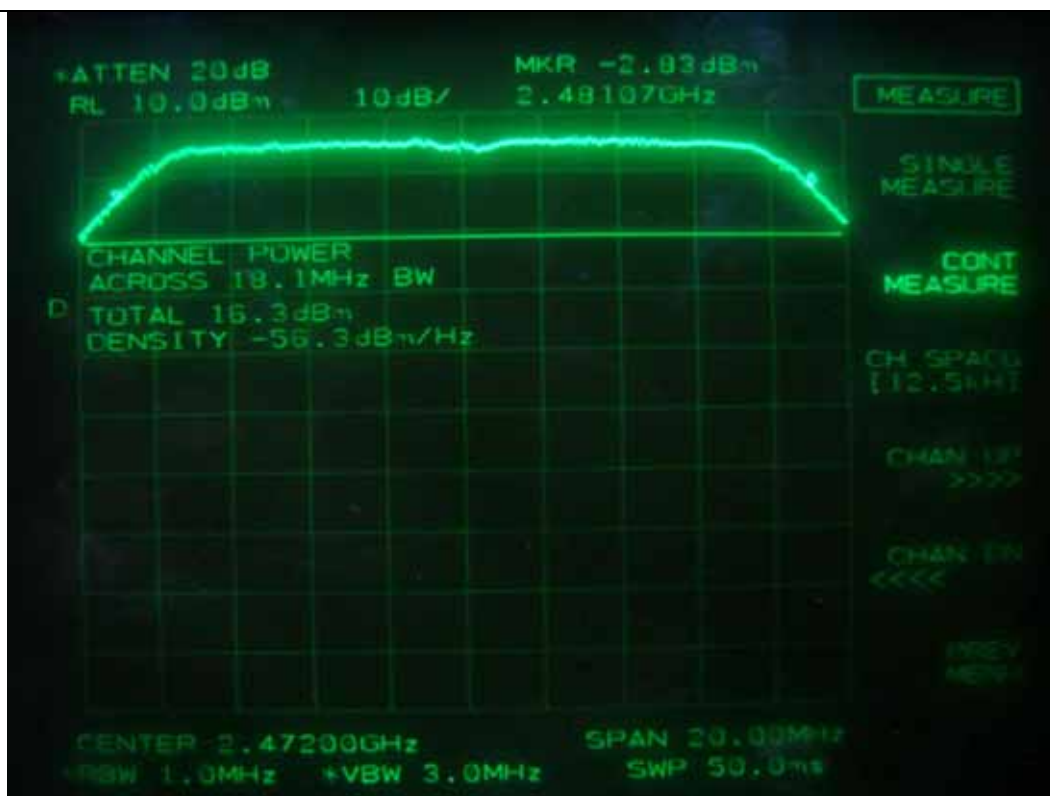
Tested by: Seung-Sik, Kim / Project Engineer



Low Channel



Middle Channel



High Channel

### 8.2.5 Test data for 54 Mbps

-. Test Date : June 20, 2011

-. Test Result : Pass

CHANNEL	FREQUENCY (MHz)	99 % Occupied Bandwidth (MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2 412	16.50	15.60	30.00	-14.40
Middle	2 442	16.58	15.70	30.00	-14.30
High	2 472	16.67	14.80	30.00	-15.20

Remark: See next page for an overview sweep performed with peak detector.



Tested by: Seung-Sik, Kim / Project Engineer



Low Channel



Middle Channel



High Channel

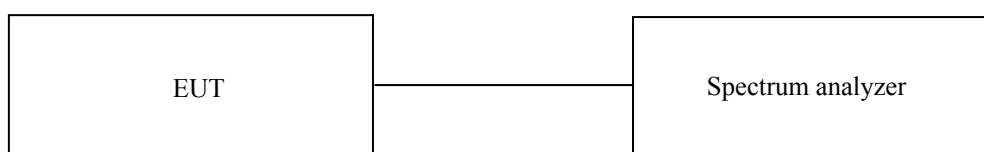
### 8.3 100 kHz BANDWIDTH OUTSIDE THE FREQUENCY BAND

#### 8.3.1 Operating environment

Temperature : 24 °C  
Relative humidity : 48 % R.H.

#### 8.3.2 Test set-up for conducted measurement

The antenna output of the EUT was connected to the spectrum analyzer. The resolution and video bandwidth is set to 100 kHz, and peak detection was used.



#### 8.3.3 Test set-up for radiated measurement

The radiated emissions measurements were performed on the 3m, open-field test site. The EUT was placed on a non-conductive turntable approximately 0.8 m above the ground plane.

The frequency spectrum from 30 MHz to 25 GHz was scanned and maximum emission levels at each frequency recorded. The system was rotated 360°, and the antenna was varied in the height between 1.0 m and 4.0 m in order to determine the maximum emission levels. This procedure was performed for horizontal and vertical polarization of the receiving antenna.

#### 8.3.4 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal.(Interval)
■ -	8564E	Hewlett-Packard	Spectrum Analyzer	3650A00756	Jun. 10, 2011(1Y)
■ -	8447D	Hewlett-Packard	Amplifier	2727A04987	Jun. 11, 2011(1Y)
■ -	83051A	Agilent	Preamplifier	3950M00201	Jun. 11, 2011(1Y)
■ -	F-40-5000-RF	RLC Electronics	Highpass Filter	0425	Jul. 09, 2010(1Y)
■ -	MA220	HD	Turn Table	N/A	N/A
■ -	HD240	HD	Antenna Mast	N/A	N/A
■ -	BBHA9120D	Schwarzbeck	Horn Antenna	BBHA9120D294	Jun. 17, 2011(2Y)
■ -	YSE 500B	YoungShin Eng.	Frequency Converter	950413001	N/A
■ -	ETCR-10	DaeHa	Automatic Voltage Com.	N/A	N/A

All test equipment used is calibrated on a regular basis.



### 8.3.5 Test data for conducted emission of 6 Mbps

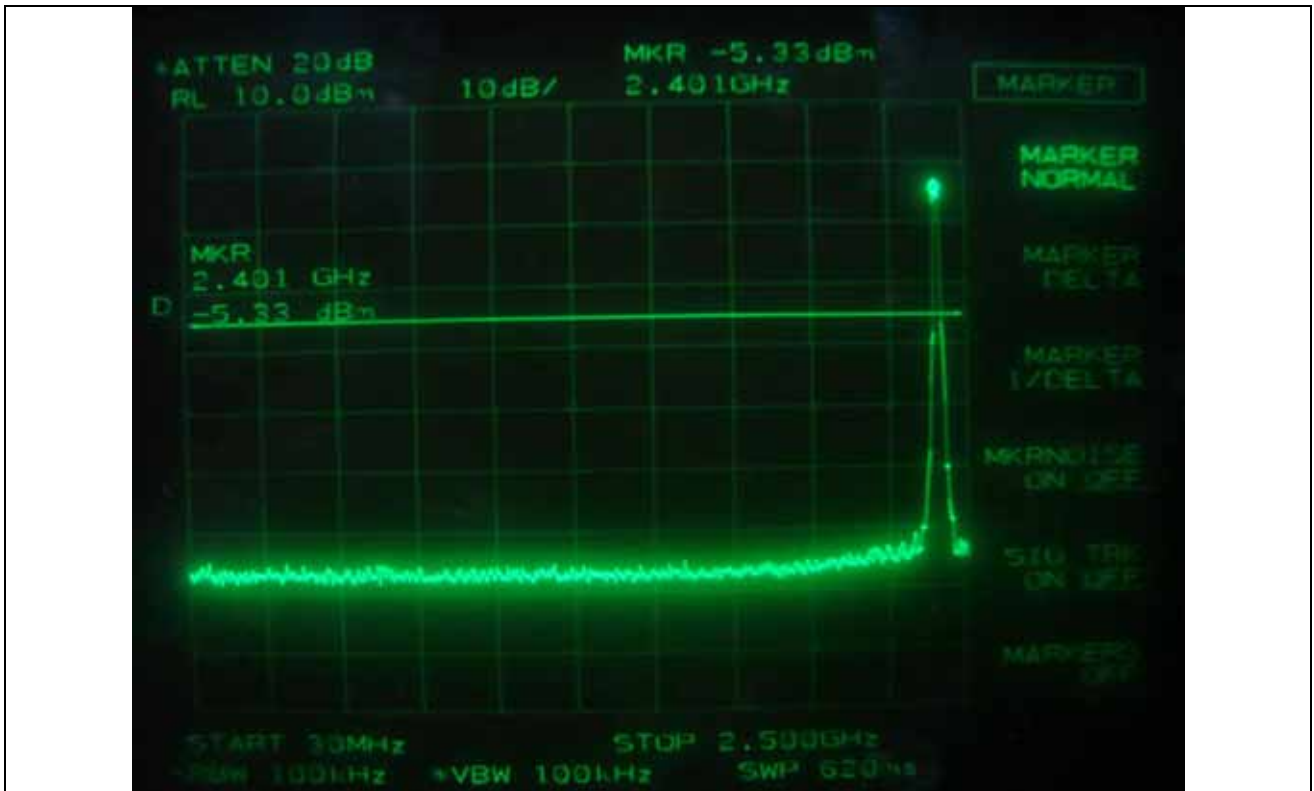


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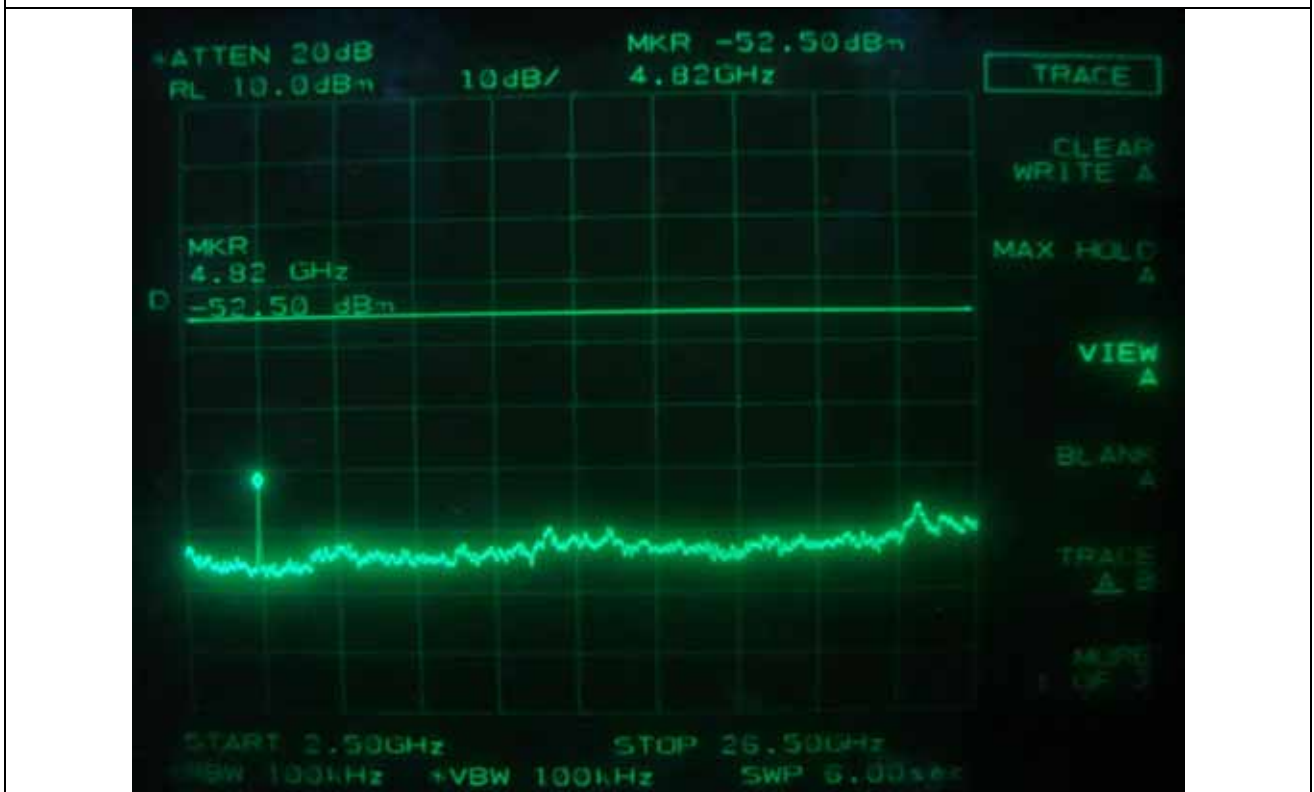
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Low Channel



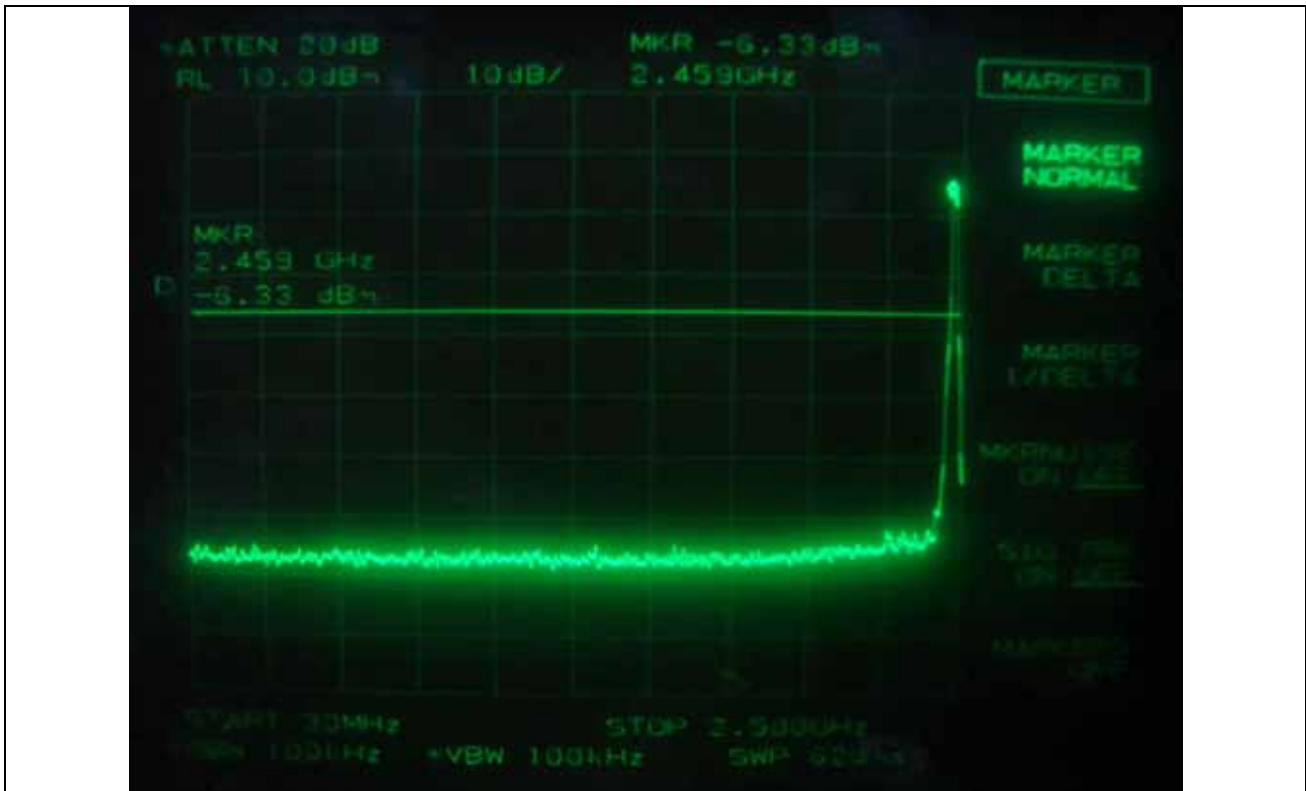
Low Channel



Middle Channel



Middle Channel



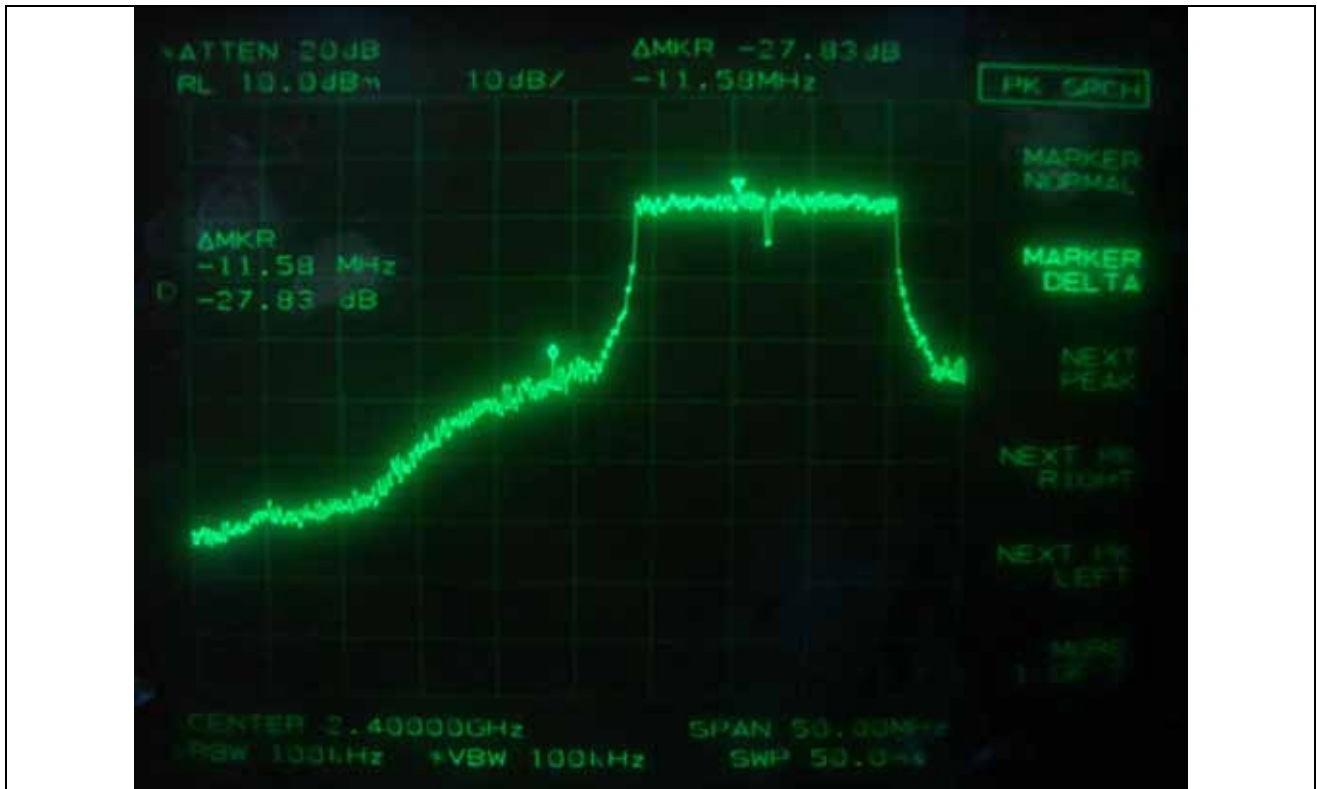
High Channel



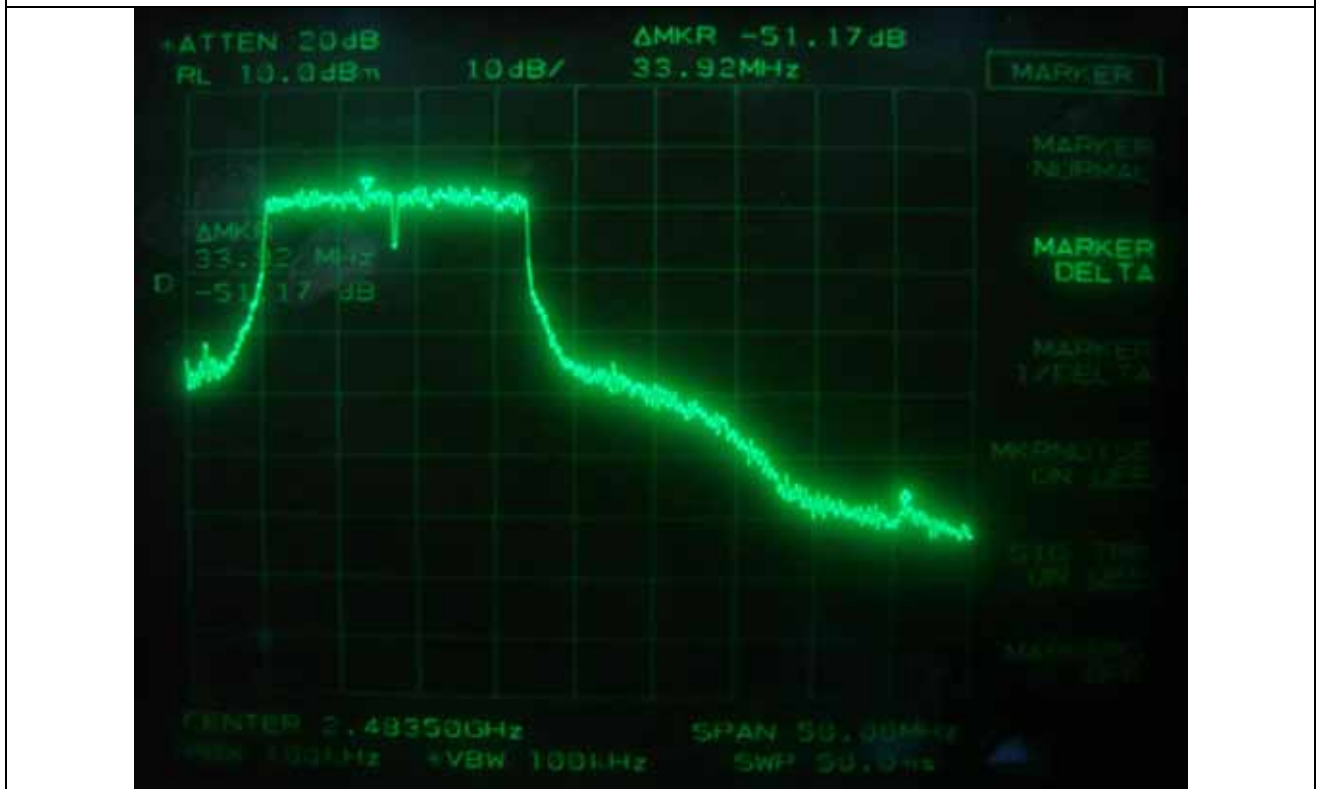
High Channel



### 8.3.6 Test data for conducted emission of 54 Mbps



Low Channel



High Channel

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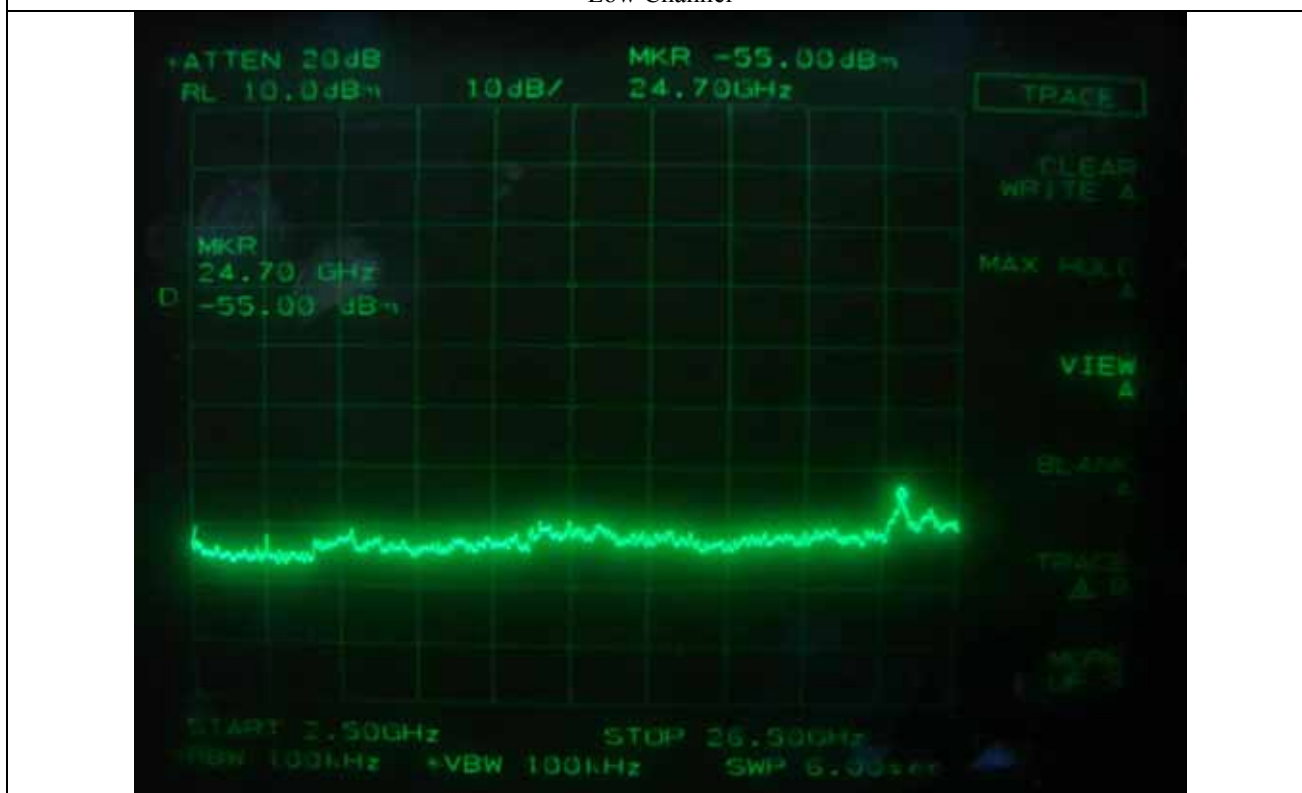
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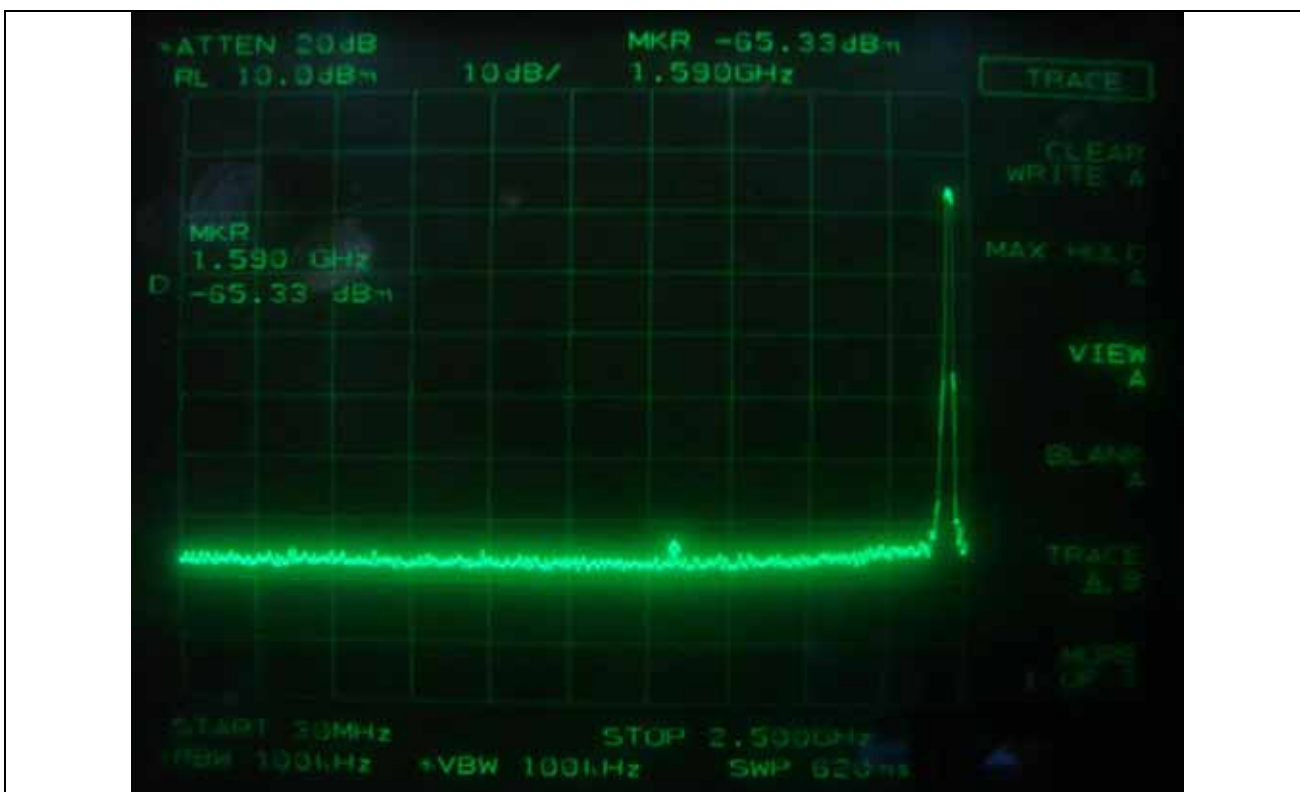
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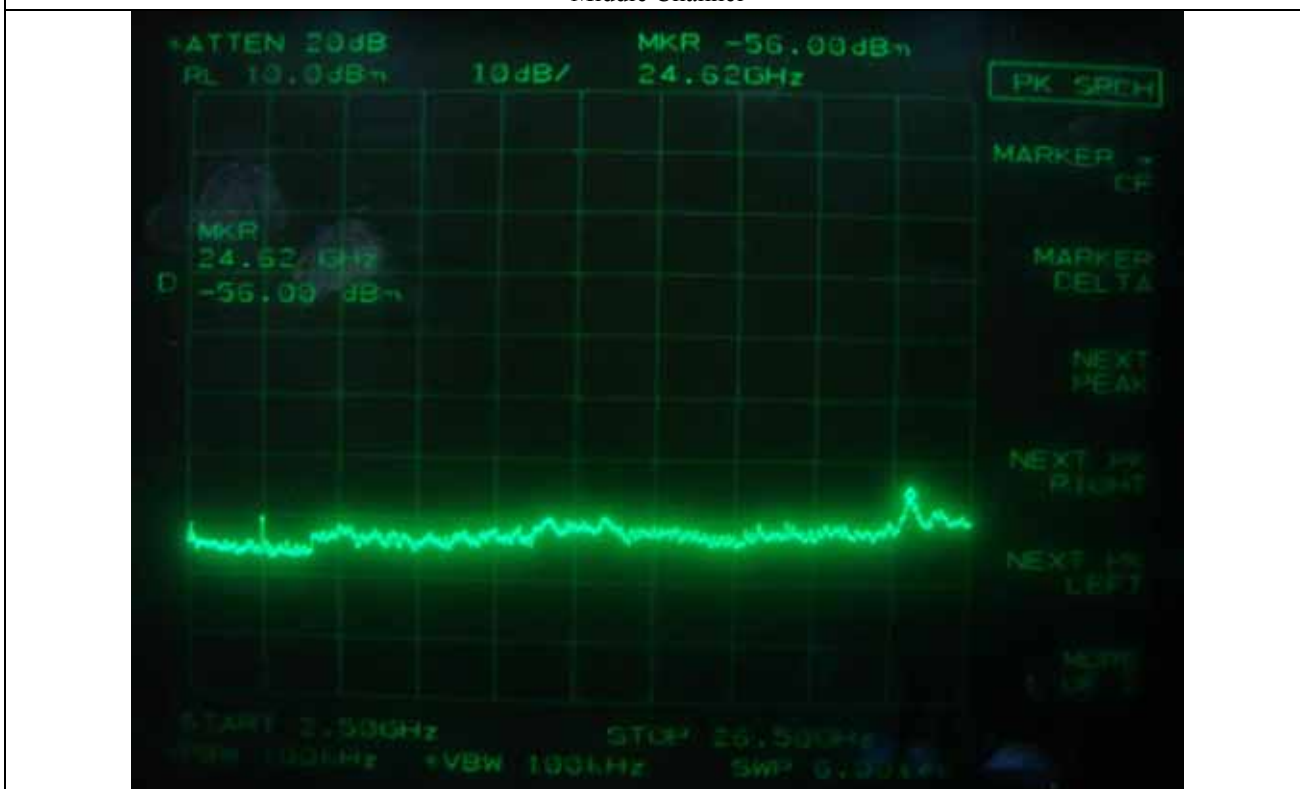
Low Channel



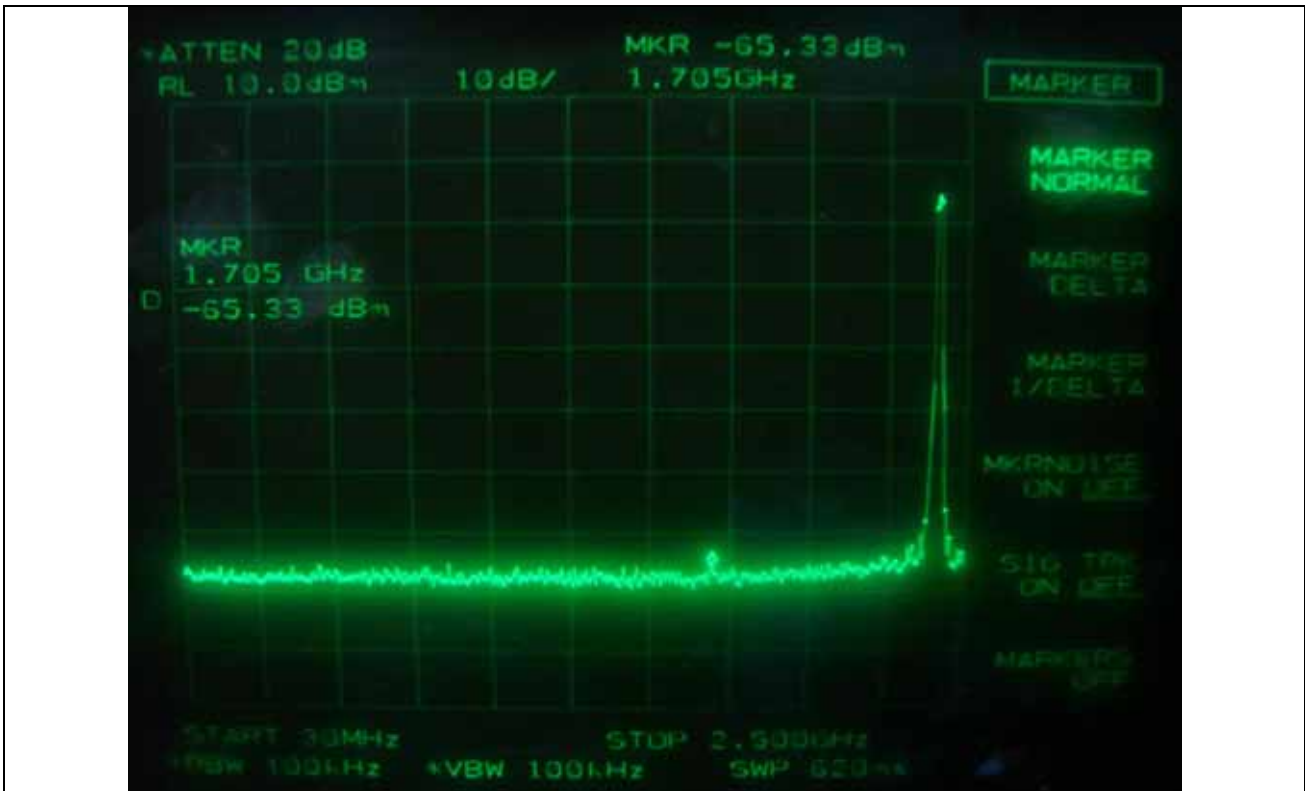
Low Channel



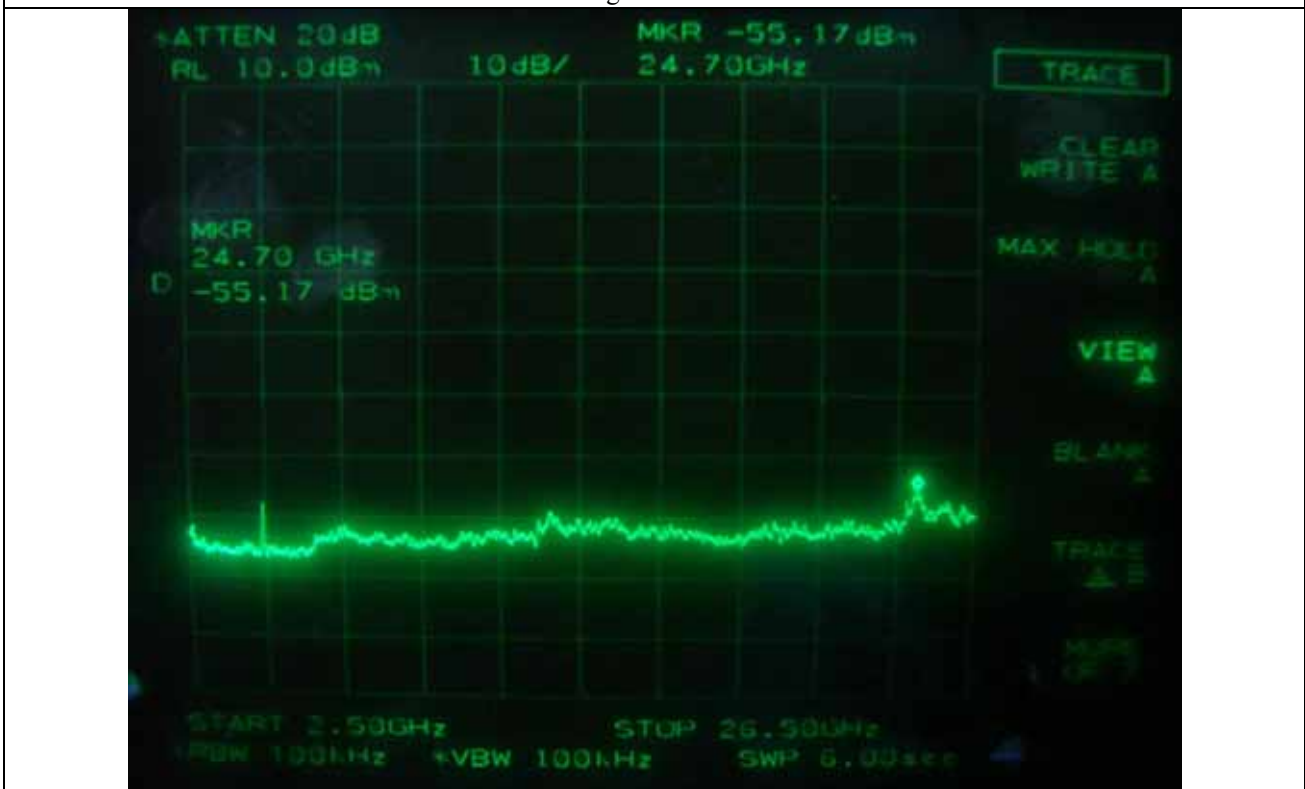
Middle Channel



Middle Channel



High Channel



High Channel



### 8.3.7 Test data for radiated emission

#### 8.3.7.1 Radiated Emission which fall in the Restricted Band

- . Test Date : June 22, 2011
- . Resolution bandwidth : 1 MHz for Peak and Average Mode
- . Video bandwidth : 1 MHz for Peak Mode, 10 Hz for Average Mode
- . Frequency range : 1 GHz ~ 25 GHz
- . Measurement distance : 3 m
- . Operating Condition : Low / High Channel
- . Result : PASSED BY -16.62 dB at High Channel (18 Mbps)

Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Test Data for Low Channel (6 Mbps)									
2 390.00	37.50	Peak	H	26.66	3.83	26.10	41.89	74.00	-32.11
	31.33	Average	H				35.72	54.00	-18.28
	40.16	Peak	V				44.55	74.00	-29.45
	32.50	Average	V				36.89	54.00	-17.11
Test Data for Low Channel (18 Mbps)									
2 390.00	37.50	Peak	H	26.66	3.83	26.10	41.89	74.00	-32.11
	31.33	Average	H				35.72	54.00	-18.28
	40.38	Peak	V				44.77	74.00	-29.23
	32.00	Average	V				36.39	54.00	-17.61
Test Data for Low Channel (54 Mbps)									
2 390.00	37.50	Peak	H	26.66	3.83	26.10	41.89	74.00	-32.11
	31.33	Average	H				35.72	54.00	-18.28
	40.24	Peak	V				44.63	74.00	-29.37
	32.10	Average	V				36.49	54.00	-17.51

Tabulated test data for Restricted Band

Remark: "H": Horizontal, "V": Vertical

-Continued

Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Test Data for High Channel (6 Mbps)									
2 483.50	37.83	Peak	H	26.82	3.83	26.10	42.38	74.00	-31.62
	31.50	Average	H				36.05	54.00	-17.95
	40.15	Peak	V				44.70	74.00	-29.30
	32.67	Average	V				37.22	54.00	-16.78
Test Data for High Channel (18 Mbps)									
2 483.50	37.67	Peak	H	26.82	3.83	26.10	42.22	74.00	-31.78
	31.67	Average	H				36.22	54.00	-17.78
	40.34	Peak	V				44.89	74.00	-29.11
	32.83	Average	V				37.38	54.00	-16.62
Test Data for High Channel (54 Mbps)									
2 483.50	37.67	Peak	H	26.82	3.83	26.10	42.22	74.00	-31.78
	31.33	Average	H				35.88	54.00	-18.12
	40.34	Peak	V				44.89	74.00	-29.11
	32.50	Average	V				37.05	54.00	-16.95

Tabulated test data for Restricted Band

Remark: "H": Horizontal, "V": Vertical



Tested by: Seung-Sik, Kim / Project Engineer

### 8.3.6.2 Spurious & Harmonic Radiated Emission

- Test Date : June 22, 2011
- Resolution bandwidth : 1 MHz for Peak and Average Mode for the emissions fall in restricted band,  
100 kHz for Peak Mode for the emissions outside restricted band
- Video bandwidth : 1 MHz for Peak Mode, 10 Hz for Average Mode
- Frequency range : 1 GHz ~ 25 GHz
- Measurement distance : 3 m
- Result : PASSED BY -22.27 dB at High Channel (54 Mbps)

Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Test Data for Low Channel (6 Mbps)									
2 412.00	60.63	Peak	H	27.11	3.16		90.90	-	
	60.40	Peak	V				90.67	-	
4 824.00*	35.50	Peak	H	31.09	4.10	28.78	41.91	74.00	-32.09
	24.76	Average	H				31.17	54.00	-22.83
	35.60	Peak	V				42.01	74.00	-31.99
	24.42	Average	V				30.83	54.00	-23.17
Test Data for Low Channel (18 Mbps)									
2 412.00	61.50	Peak	H	27.11	3.16		91.77	-	
	59.97	Peak	V				90.24	-	
4 824.00*	35.83	Peak	H	31.09	4.10	28.78	42.24	74.00	-31.76
	24.76	Average	H				31.17	54.00	-22.83
	35.63	Peak	V				42.04	74.00	-31.96
	24.18	Average	V				30.59	54.00	-23.41
Test Data for Low Channel (54 Mbps)									
2 412.00	60.17	Peak	H	27.11	3.16		90.44	-	
	60.33	Peak	V				90.60	-	
4 824.00*	35.16	Peak	H	31.09	4.10	28.78	41.57	74.00	-32.43
	23.98	Average	H				30.39	54.00	-23.61
	35.19	Peak	V				41.60	74.00	-32.40
	24.33	Average	V				30.74	54.00	-23.26

Tabulated test data for Restricted Band

Remark: "H": Horizontal, "V": Vertical, "\*" Frequency fall in restricted band

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EMC-003 (Rev.1)

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Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Test Data for Middle Channel (6 Mbps)									
2 442.00	60.50	Peak	H	27.19	3.16		90.85	-	
	59.97	Peak	V				90.32	-	
4 884.00*	35.67	Peak	H	31.19	4.12	28.74	42.24	74.00	-31.76
	24.50	Average	H				31.07	54.00	-22.93
	35.31	Peak	V				41.88	74.00	-32.12
	24.19	Average	V				30.76	54.00	-23.24
Test Data for Middle Channel (18 Mbps)									
2 442.00	60.83	Peak	H	27.19	3.16		91.18	-	
	60.51	Peak	V				90.86	-	
4 884.00*	35.67	Peak	H	31.19	4.12	28.74	42.24	74.00	-31.76
	24.33	Average	H				30.90	54.00	-23.10
	35.47	Peak	V				42.04	74.00	-31.96
	24.18	Average	V				30.75	54.00	-23.25
Test Data for Middle Channel (54 Mbps)									
2 442.00	60.17	Peak	H	27.19	3.16		90.52	-	
	59.97	Peak	V				90.32	-	
4 884.00*	35.37	Peak	H	31.19	4.12	28.74	41.94	74.00	-32.06
	24.89	Average	H				31.46	54.00	-22.54
	35.33	Peak	V				41.90	74.00	-32.10
	24.50	Average	V				31.07	54.00	-22.93

Tabulated test data for Restricted Band

Remark: "H": Horizontal, "V": Vertical, "\*" Frequency fall in restricted band

Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Test Data for High Channel (6 Mbps)									
2 472.00	60.83	Peak	H	27.27	3.16		91.26	-	
	59.87	Peak	V				90.30	-	
4 944.00*	35.40	Peak	H	31.29	4.14	28.70	42.13	74.00	-31.87
	24.30	Average	H				31.03	54.00	-22.97
	35.80	Peak	V				42.53	74.00	-31.47
	24.17	Average	V				30.90	54.00	-23.10
Test Data for High Channel (18 Mbps)									
2 472.00	60.33	Peak	H	27.27	3.16		90.76	-	
	59.98	Peak	V				90.41	-	
4 944.00*	35.67	Peak	H	31.29	4.14	28.70	42.40	74.00	-31.60
	24.11	Average	H				30.84	54.00	-23.16
	35.62	Peak	V				42.35	74.00	-31.65
	24.33	Average	V				31.06	54.00	-22.94
Test Data for High Channel (54 Mbps)									
2 472.00	60.92	Peak	H	27.27	3.16		91.35	-	
	59.67	Peak	V				90.10	-	
4 944.00*	35.94	Peak	H	31.29	4.14	28.70	42.67	74.00	-31.33
	24.84	Average	H				31.57	54.00	-22.43
	35.96	Peak	V				42.69	74.00	-31.31
	25.00	Average	V				31.73	54.00	-22.27

Tabulated test data for Restricted Band

Remark: "H": Horizontal, "V": Vertical, "\*" Frequency fall in restricted band



Tested by: Seung-Sik, Kim / Project Engineer

## 8.4 PEAK POWER SPECTRUL DENSITY

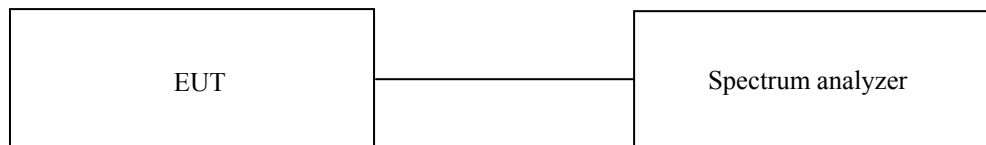
### 8.4.1 Operating environment

Temperature : 24 °C  
Relative humidity : 48 % R.H.

### 8.4.2 Test set-up

The antenna output of the EUT was connected to the spectrum analyzer. The resolution bandwidth is set to 3 kHz, the video bandwidth is set to 3 times the resolution bandwidth, and sweep time was set to span / 3 kHz. The sweep time was allowed to be longer than span / 3 kHz for a full response of the mixer in the spectrum analyzer.

The maximum level from the EUT in a 3 kHz bandwidth was measured with above condition.



### 8.4.3 Test equipment used

Model Number	Manufacturer	Description	Serial Number	Last Cal. (Interval)
■ - 8564E	HP	Spectrum Analyzer	3650A00756	Jun. 10, 2011(1Y)

All test equipment used is calibrated on a regular basis.

**8.4.4 Test data for 6 Mbps**

-. Test Date : June 21, 2011

-. Test Result : Pass

CHANNEL	FREQUENCY(MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2 412	-20.33	8.00	-28.33
Middle	2 442	-22.83	8.00	-30.83
High	2 472	-25.00	8.00	-33.00

Remark: See next page for measurement data.



---

Tested by: Seung-Sik, Kim / Project Engineer



Low Channel



Middle Channel





High Channel

#### 8.4.4 Test data for 54 Mbps

-. Test Date : June 21, 2011

-. Test Result : Pass

CHANNEL	FREQUENCY(MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2 412	-23.67	8.00	-31.67
Middle	2 442	-25.67	8.00	-33.67
High	2 472	-28.17	8.00	-36.17

Remark: See next page for measurement data.



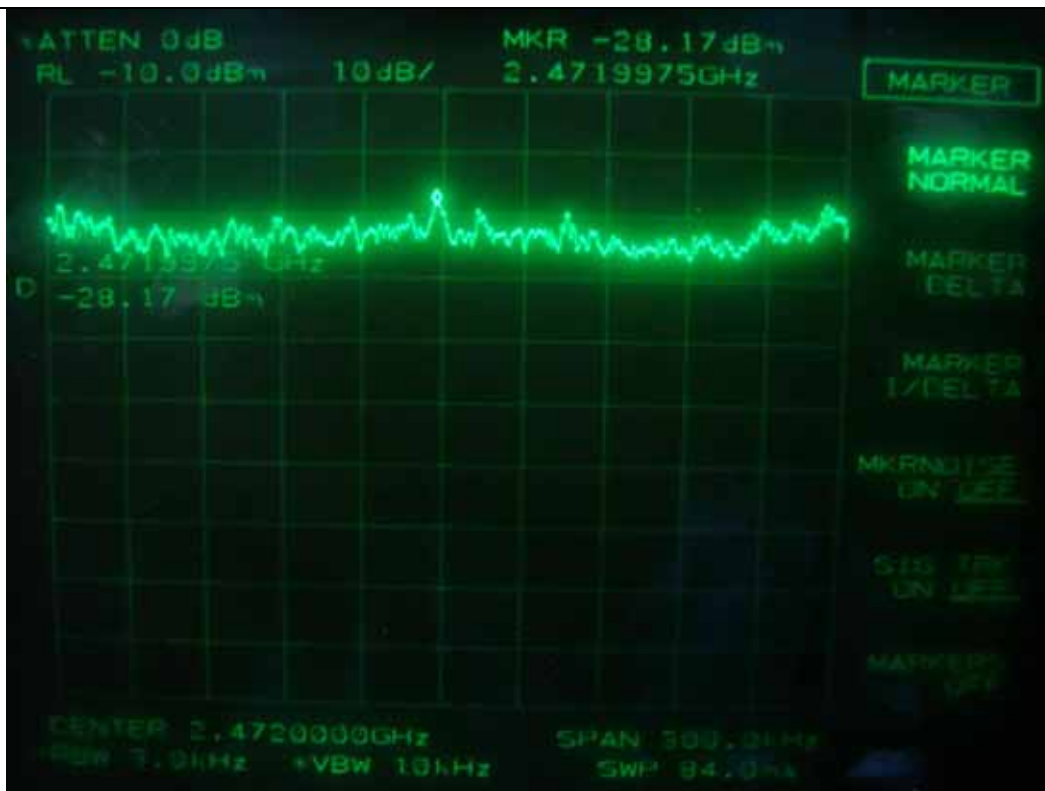
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Low Channel



Middle Channel



High Channel

## 9. MAXIMUM PERMISSIBLE EXPOSURE

### 9.1 RF Exposure Calculation

According to the FCC rule 1.1310 table 1B, the limit for the maximum permissible RF exposure for an uncontrolled environment is 1 mW/cm<sup>2</sup>

The electric field generated for a 1 mW/cm<sup>2</sup> exposure is calculated as follows:

$$E = \sqrt{(30 * P * G) / d}, \text{ and } S = E^2 / Z = E^2 / 377, \text{ because } 1 \text{ mW/cm}^2 = 10 \text{ W/m}^2$$

Where

S = Power density in mW/cm<sup>2</sup>, Z = Impedance of free space, 377 Ω

E = Electric field strength in V/m, G = Numeric antenna gain, and d = distance in meter

Combining equations and rearranging the terms to express the distance as a function of the remaining variable

$$d = \sqrt{(30 * P * G) / (377 * S)}$$

Changing to units of mW and cm, using P (mW) = P (W) / 1 000, d (cm) = 100 \* d (m)

$$d = 0.282 * \sqrt{(P * G) / S}$$

Where

d = distance in cm, P = Power in mW, G = Numeric antenna gain, and S = Power density in mW/cm<sup>2</sup>

### 9.2 Calculated MPE Safe Distance

#### 9.2.1 FOR 802.11b WLAN MODE

According to above equation, the following result was obtained.

Peak Output Power		Antenna Gain		Safe Distance	Power Density (mW/cm <sup>2</sup> )	FCC Limit
(dBm)	(mW)	Log	Linear	(cm)	@ 20 cm Separation	(mW/cm <sup>2</sup> )
16.20	41.69	2.41	1.74	2.40	0.014 4	1

According to above table, safe distance,  $D = 0.282 * \sqrt{(41.69 * 1.74)} = 2.40 \text{ cm}$ .

For getting power density at 20 cm separation in above table, following formula was used.

$$S = P * G / (4\pi * R^2) = 41.69 * 1.74 / (4 * 3.14 * 20^2) = 0.014 4$$

Where:

S = Power Density,

P = Power input to the external antenna (Output power from the EUT antenna port (dBm) – cable loss (dB)),

G = Gain of Transmit Antenna (linear gain), R = Distance from Transmitting Antenna

### 9.2.2 FOR 802.11g WLAN MODE

According to above equation, the following result was obtained.

Peak Output Power		Antenna Gain		Safe Distance	Power Density (mW/cm <sup>2</sup> )	FCC Limit
(dBm)	(mW)	Log	Linear	(cm)	@ 20 cm Separation	(mW/cm <sup>2</sup> )
17.80	60.26	2.41	1.74	2.888	0.020 9	1

According to above table, safe distance,  $D = 0.282 * \sqrt{(60.26 * 1.74)} = 2.888$  cm.

For getting power density at 20 cm separation in above table, following formula was used.

$$S = P * G / (4\pi * R^2) = 60.26 * 1.74 / (4 * 3.14 * 20^2) = 0.020 9$$

Where:

S = Power Density,

P = Power input to the external antenna (Output power from the EUT antenna port (dBm) – cable loss (dB)),

G = Gain of Transmit Antenna (linear gain), R = Distance from Transmitting Antenna

## 10. RADIATED EMISSION TEST

### 10.1 Operating environment

Temperature : 26 °C  
Relative humidity : 46 %R.H.

### 10.2 Test set-up

The radiated emissions measurements were on the 3 meters, open-field test site. The EUT and other support equipment were placed on a non-conductive turntable above the ground plane. The interconnecting cables from outside test site were inserted into ferrite clamps at the point where the cables reach the turntable.

The frequency spectrum from 30 MHz to 1 000 MHz was scanned and emission levels maximized at each frequency recorded. The system was rotated 360°, and the antenna was varied in height between 1.0 and 4.0 meters in order to determine the maximum emission levels. This procedure was performed for both horizontal and vertical polarization of the receiving antenna.

### 10.3 Test equipment used

Model Number	Manufacturer	Description	Serial Number	Last Cal.
■ - ESVD	Rohde & Schwarz	Test Receiver	838453/018	Oct. 05, 2010 (1Y)
■ - 8566B	HP	Spectrum Analyzer	3407A08547	Jun. 11, 2011 (1Y)
■ - 8447D	Hewlett Packard	Amplifier	2727A04987	Jun. 11, 2011 (1Y)
■ - MA240	HD GmbH	Antenna Master	N/A	N/A
■ - HD100	HD GmbH	Position Controller	N/A	N/A
■ - DS420S	HD GmbH	Turn Table	N/A	N/A
■ - VHA9103	Schwarzbeck	Biconical Antenna	91031852	Mar. 30, 2010 (2Y)
■ - 9108-A(494)	Schwarzbeck	Log Periodic Antenna	62281001	Mar. 30, 2010 (2Y)

All test equipment used is calibrated on a regular basis.

## 10.4 Test data

### 10.4.1 Operating Mode: 802.11b WLAN Mode

- Test Date : June 23, 2011
- Resolution bandwidth : 120 kHz
- Frequency range : 30 MHz ~ 1 000 MHz
- Measurement distance : 3 m
- Result : PASSED
- Channel : Low

Frequency (MHz)	Reading (dBμV)	Ant. Pol. (H/V)	Ant. Height (m)	Angle (°)	Ant. Factor (dB/m)	Cable Loss	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)
140.2	17.80	H	1.30	250.0	14.65	2.60	35.05	43.52	-8.47
149.9	16.00	H	1.00	200.0	14.98	2.70	33.68	43.52	-9.84
166.3	15.30	V	1.50	200.0	15.63	2.87	33.80	43.52	-9.72
399.9	16.40	H	1.00	220.0	17.45	4.10	37.95	46.02	-8.07
440.1	15.50	H	1.50	130.0	18.23	4.42	38.15	46.02	-7.87
493.3	15.70	V	1.00	160.0	19.25	4.59	39.54	46.02	-6.48

Tabulated test data for Radiated Electromagnetic Field

- Channel : Middle

Frequency (MHz)	Reading (dBμV)	Ant. Pol. (H/V)	Ant. Height (m)	Angle (°)	Ant. Factor (dB/m)	Cable Loss	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)
140.1	17.70	H	1.40	270.0	14.64	2.60	34.94	43.52	-8.58
150.1	16.30	H	1.00	230.0	14.98	2.70	33.98	43.52	-9.54
166.2	15.10	V	1.60	180.0	15.63	2.88	33.61	43.52	-9.91
399.9	16.30	H	1.00	230.0	17.45	4.10	37.85	46.02	-8.17
440.2	15.30	H	1.40	100.0	18.23	4.42	37.95	46.02	-8.07
493.2	16.00	V	1.00	190.0	19.25	4.59	39.84	46.02	-6.18

Tabulated test data for Radiated Electromagnetic Field



-. Channel : High

Frequency (MHz)	Reading (dBμV)	Ant. Pol. (H/V)	Ant. Height (m)	Angle (°)	Ant. Factor (dB/m)	Cable Loss	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)
140.2	17.80	H	1.50	260.0	14.65	2.60	35.05	43.52	-8.47
149.9	16.40	H	1.00	230.0	14.98	2.70	34.08	43.52	-9.44
166.3	15.20	V	1.30	210.0	15.63	2.87	33.70	43.52	-9.82
399.9	16.40	H	1.00	240.0	17.45	4.10	37.95	46.02	-8.07
440	15.50	H	1.50	110.0	18.23	4.42	38.15	46.02	-7.87
493.3	16.00	H	1.00	180.0	19.25	4.59	39.84	46.02	-6.18

Tabulated test data for Radiated Electromagnetic Field

Remark: "H": Horizontal, "V": Vertical



Tested by: Seung-Sik, Kim / Project Engineer

#### 10.4.2 Operating Mode: 802.11g WLAN Mode

- Test Date : June 23, 2011
- Resolution bandwidth : 120 kHz
- Frequency range : 30 MHz ~ 1 000 MHz
- Measurement distance : 3 m
- Result : PASSED
- Channel : Low

Frequency (MHz)	Reading (dBμV)	Ant. Pol. (H/V)	Ant. Height (m)	Angle (°)	Ant. Factor (dB/m)	Cable Loss	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)
140.1	17.50	H	1.40	240.0	14.64	2.60	34.74	43.52	-8.78
150.2	15.90	H	1.00	220.0	14.99	2.71	33.60	43.52	-9.92
166.2	15.40	V	1.30	230.0	15.63	2.88	33.91	43.52	-9.61
399.9	16.20	H	1.00	250.0	17.45	4.10	37.75	46.02	-8.27
440.2	15.40	H	1.60	150.0	18.23	4.42	38.05	46.02	-7.97
493.2	15.50	V	1.00	170.0	19.25	4.59	39.34	46.02	-6.68

Tabulated test data for Radiated Electromagnetic Field

- Channel : Middle

Frequency (MHz)	Reading (dBμV)	Ant. Pol. (H/V)	Ant. Height (m)	Angle (°)	Ant. Factor (dB/m)	Cable Loss	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)
140.1	17.60	H	1.50	260.0	14.64	2.60	34.84	43.52	-8.68
150.1	16.10	H	1.00	240.0	14.98	2.70	33.78	43.52	-9.74
166.3	15.20	V	1.50	210.0	15.63	2.87	33.70	43.52	-9.82
399.9	16.40	H	1.00	240.0	17.45	4.10	37.95	46.02	-8.07
440.1	15.20	H	1.50	160.0	18.23	4.42	37.85	46.02	-8.17
493.1	15.60	V	1.00	200.0	19.25	4.59	39.44	46.02	-6.58

Tabulated test data for Radiated Electromagnetic Field

-. Channel : High

Frequency (MHz)	Reading (dBμV)	Ant. Pol. (H/V)	Ant. Height (m)	Angle (°)	Ant. Factor (dB/m)	Cable Loss	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)
140.2	17.70	H	1.50	250.0	14.65	2.60	34.95	43.52	-8.57
149.9	16.00	H	1.00	230.0	14.98	2.70	33.68	43.52	-9.84
166.1	15.30	V	1.40	220.0	15.62	2.88	33.80	43.52	-9.72
399.9	16.20	H	1.00	250.0	17.45	4.10	37.75	46.02	-8.27
399.9	15.40	H	1.60	120.0	17.45	4.10	36.95	46.02	-9.07
493.2	16.00	H	1.00	180.0	19.25	4.59	39.84	46.02	-6.18

Tabulated test data for Radiated Electromagnetic Field

Remark: "H": Horizontal, "V": Vertical



Tested by: Seung-Sik, Kim / Project Engineer