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

Test Report No.	**: E107R-015**
AGR No.	**: A103A-255**
Applicant	**: eZEX Corporation**
Address	**: Rm508 Ssangyong IT Twin-tower 2, 442-5, Sangdaewon-dong, Jungwon-gu, Seongnam-si, Gyeonggi-do, 462-120, Korea**
Manufacturer	**: SEP. Co., Ltd.**
Address	**: 2B-19LOT, 930, Gosaek-dong, Gwonseon-gu, Suwon-si, Gyenonggi-do, 441-813, Korea**
Type of Equipment	**: Home Energy Gateway with WLAN 802.11 b/g and Zigbee SPI/UART Modules**
FCC ID.	**: Y17HES1N00R0WW**
Model Name	**: HES1N000R0WW**
Multiple Model Name	**: HES1E000R0WW**
Serial number	**: N/A**
Total page of Report	**: 114 pages (including this page)**
Date of Incoming	**: May 20, 2010**
Date of issue	**: July 06, 2010**

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.

Prepared by:

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EMC/RF Center
ONETECH Corp.

Reviewed by:

Y. K. Kwon / Managing Director
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ONETECH Corp.

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Revision History

Issued Report No.	Issued Date	Revisions	Effect Section
E107R-015	July 06, 2010	Initial Issue	All

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1. VERIFICATION OF COMPLIANCE

Applicant	: eZEX Corporation
Address	: Rm508 Ssangyong IT Twin-tower 2, 442-5, Sangdaewon-dong, Jungwon-gu, Seongnam-si, Gyeonggi-do, 462-120, Korea
Contact Person	: Mr. Suk-Bom, Mok / Manager
Telephone No.	: +82-31-608-4720
FCC ID	: Y17HES1N00R0WW
Model Name	: HES1N000R0WW
Serial Number	: N/A
Dare	: July 06, 2010

Equipment Class	***DTS – DIGITAL TRNSMISSION SYSTEM***
Kind of Equipment	Home Energy Gateway with WLAN 802.11b/g Module
This Report Concerns	Original Grant
Measurement Procedures	ANSI C63.4: 2003
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	None
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.

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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	Met the Limit / PASS
15.203	Antenna Requirement	Met requirement / PASS

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

Both conducted and radiated testing was performed according to the procedures in ANSI C63.4: 2003. Radiated testing was performed 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 Daessangnyeong-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)

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3. GENERAL INFORMATION

3.1 Product Description

The eZEX Corporation, Model HES1N000R0WW (referred to as the EUT in this report) is a Home Energy Gateway which has a function of WLAN / Zigbee modules and has ports for LAN. The port for computing peripheral device shall be subject to DoC procedure and issued by another test report no. E107R-021. This report is for WLAN / Zigbee functions. The product specification described herein was obtained from product data sheet or user's manual.

Device Type		Home Energy Gateway with WLAN 802.11 b/g and Zigbee SPI/UART
Temperature Range		-10 °C ~ +50 °C
Operating Frequency		WLAN: 2 412 MHz ~ 2 462 MHz, Zigbee: 2 405 MHz ~ 2 480 MHz
RF Output Power		14.80 dBm(802.11b), 15.60 dBm(802.11g), 12.5 dBm(SPI), 12.0 dBm(UART)
Number of Channel		11 Channels
Data Rate	WLAN	802.11b: 1 Mbps ~ 11 Mbps, 802.11g: 1 Mbps ~ 54 Mbps
	Zigbee	250 kbps
Modulation Type		WLAN:OFDM/CCK/DQPSK/DBPSK, ZIGBEE : OQPSK
Antenna		Manufacturer: RadiAnt, Model No.: IA203
Antenna Connector Type		Internal Chip Antenna
Antenna Gain		2.0 dBi
List of each Osc. or crystal Freq.(Freq. >= 1 MHz)		16.384 MHz, 24 MHz and 25 MHz
External Connector		AC In, LAN port

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
HES1N000R0WW	Basic model	☑
HES1E000R0WW	This model is identical to basic model except for internal used software	☐

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

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

4. EUT MODIFICATIONS

-. None

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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	eZEX	HEG Rev0.7	N/A
Power Board	eZEX	100615	N/A
Connector Board	eZEX	HEGLAN Rev0.6	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
HES1N000R0WW	SEP. Co., Ltd.	Y17HES1N00R0WW	Home Energy Gateway (EUT)	Notebook PC
PP04X	Dell Computer	DoC	Notebook PC	-
M-UV69a	Logitech	DoC	Mouse	Notebook PC
3453C	U.S. Robotics	CJE-0263	Modem	Notebook PC

5.3 Mode of operation during the test

For the testing, software used to control the EUT for staying in continuous transmitting mode is programmed.

For final testing, WLAN was set at Low Channel (2 412 MHz), Middle Channel (2 437 MHz) and High Channel (2 462 MHz) with 11 Mbps(802.11b) and Low Channel (2 412 MHz), Middle Channel (2 437 MHz) and High Channel (2 462 MHz) with 54 Mbps(802.11g) data rate. The conducted emission test was performed all transfer rate but worst case data (11 Mbps (802.11b) and 54 Mbps(802.11g)) were recorded in this report.

And Zigbee was set at Low Channel (2 405 MHz), Middle Channel (2 440 MHz) and High Channel (2 480 MHz) with SPI and Low Channel (2 405 MHz), Middle Channel (2 440 MHz) and High Channel (2 480 MHz) with UART.

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5.4 Configuration of Test System

Line Conducted Test: The EUT was connected to LISN. All supporting equipments were connected to another LISN. Preliminary Power line Conducted Emission test was performed by using the procedure in ANSI C63.4: 2003 7.2.3 to determine the worse operating conditions.

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 transmitter antenna of the EUT is installed inside of 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)
TX mode	X

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

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7. TEST DATA FOR 802.11b WLAN MODE

7.1 MIMIMUM 6 dB BANDWIDTH

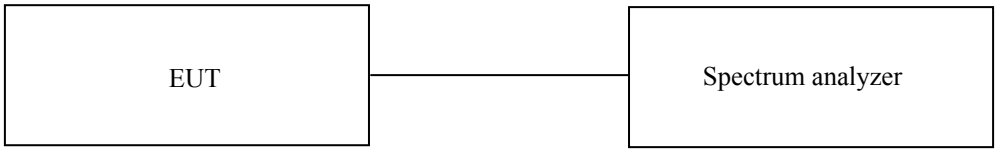
7.1.1 Operating environment

Temperature : 23 °C

Relative humidity : 47 % 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.
■ -	8564E	HP	Spectrum Analyzer	3650A00756	June 10, 2010

All test equipment used is calibrated on a regular basis.

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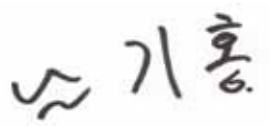
7.1.4 Test data

-. Test Date : May 24, 2010

-. Test Result : Pass

CHANNEL	FREQUENCY(MHz)	MEASURED VLAUE (kHz)	LIMIT (kHz)	MARGIN (kHz)
Low	2 412	12 300	500	-11 800
Middle	2 437	12 300	500	-11 800
High	2 462	12 300	500	-11 800

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



Tested by: Ki-Hong, Nam / Senior Engineer

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Low Channel

Middle Channel

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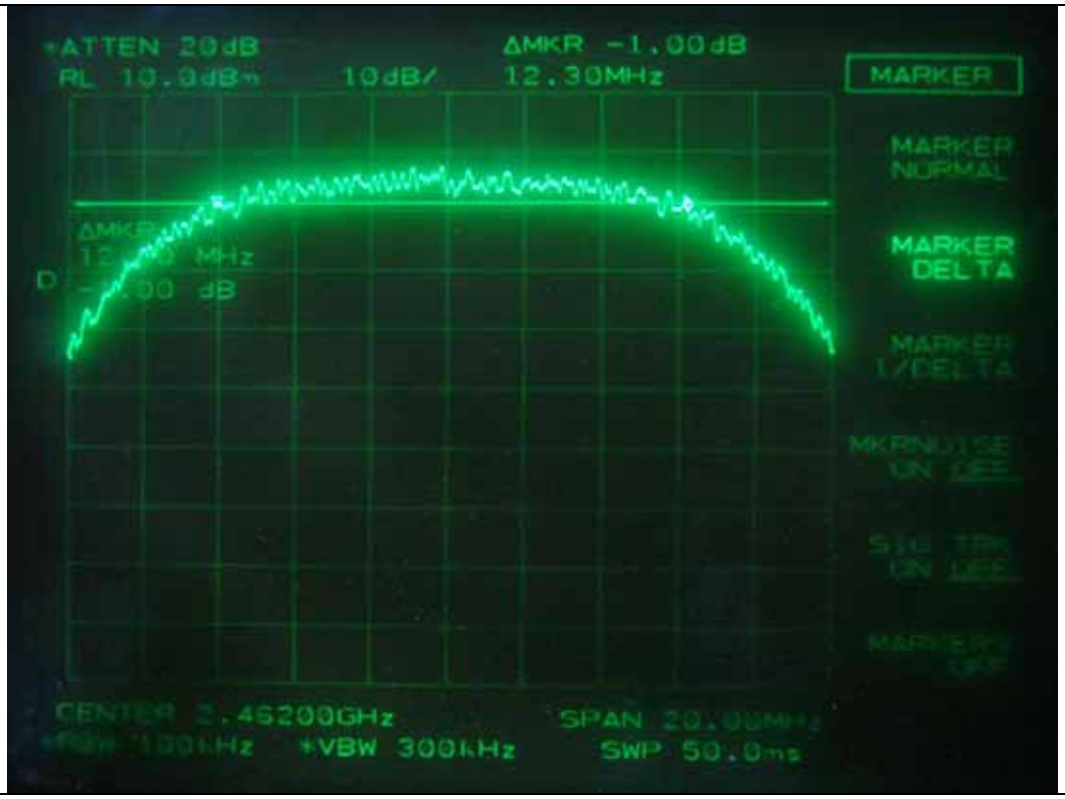

High Channel

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7.2 MAXIMUM PEAK OUTPUT POWER

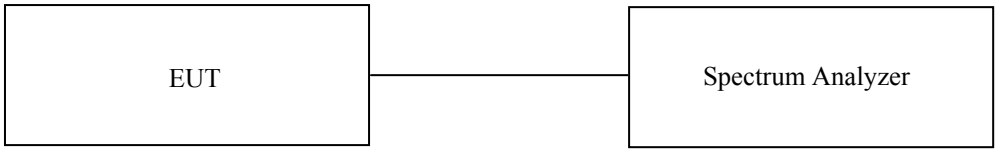
7.2.1 Operating environment

Temperature : 23 °C

Relative humidity : 47 % 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.
■ -	8564E	HP	Spectrum Analyzer	3650A00756	June 10, 2010

All test equipment used is calibrated on a regular basis.

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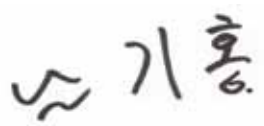
7.2.4 Test data

-. Test Date : May 24, 2010

-. Test Result : Pass

CHANNEL	FREQUENCY (MHz)	99 % Occupied Bandwidth (MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2 412	15.83	14.20	30.00	-15.80
Middle	2 437	15.83	14.80	30.00	-15.20
High	2 462	15.83	14.20	30.00	-15.80

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



Tested by: Ki-Hong, Nam / Senior Engineer

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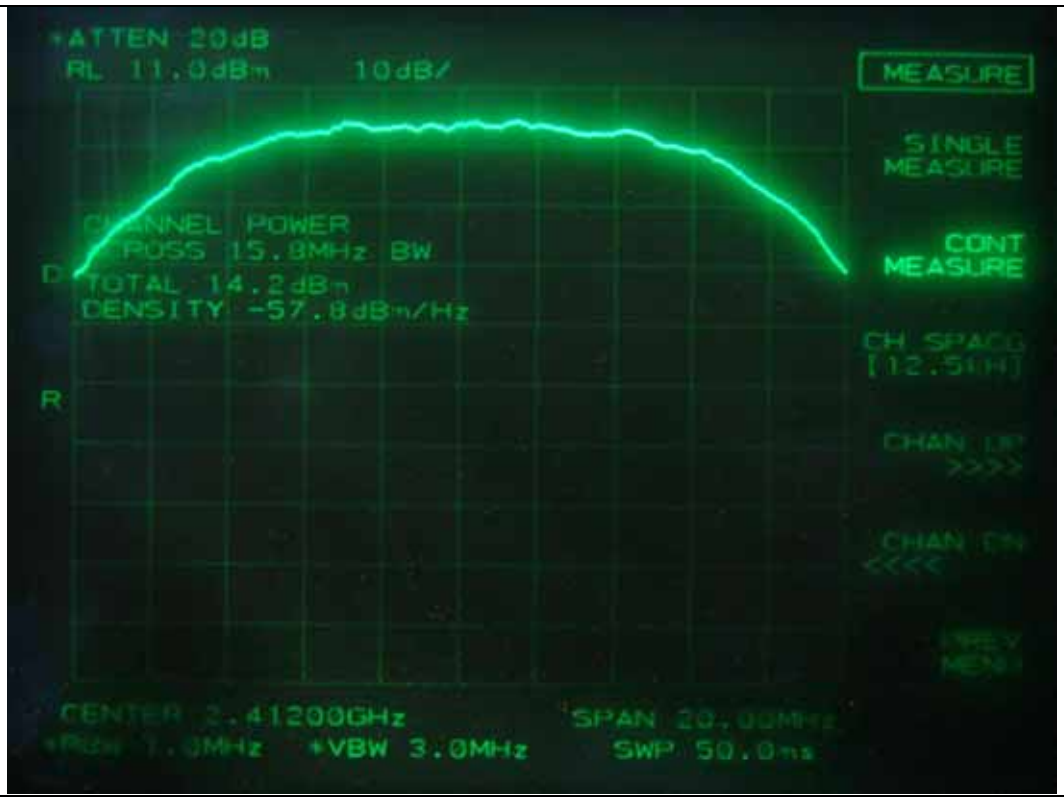
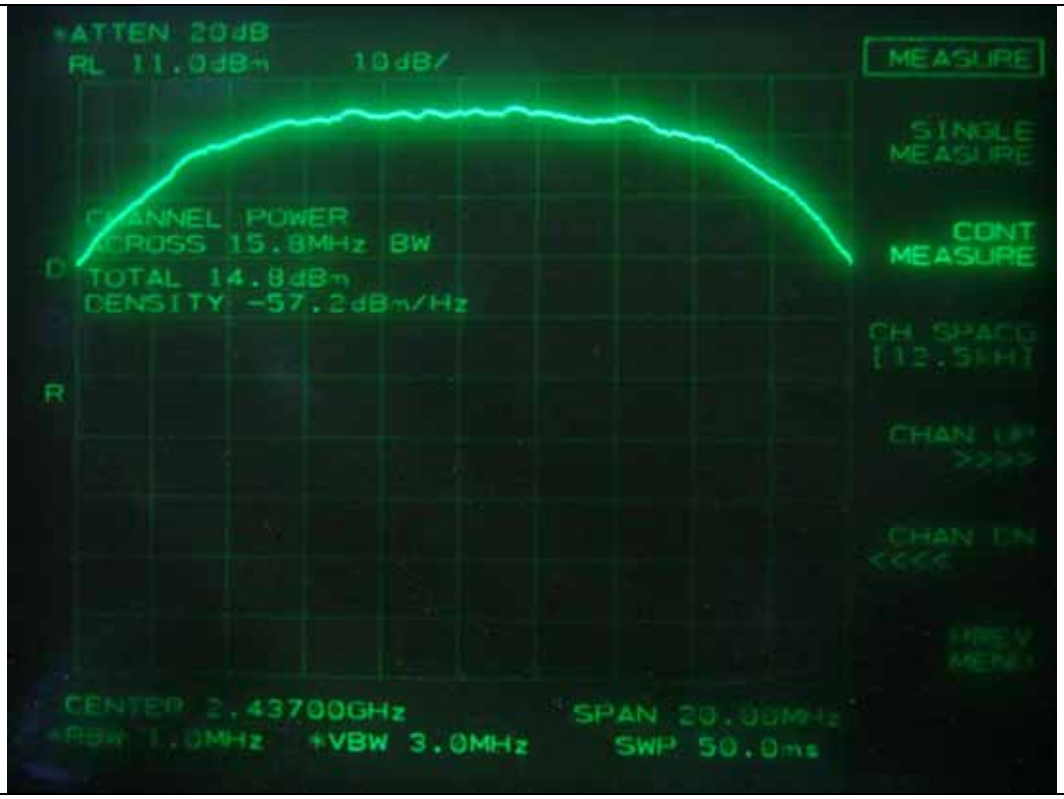


Low Channel



Middle Channel

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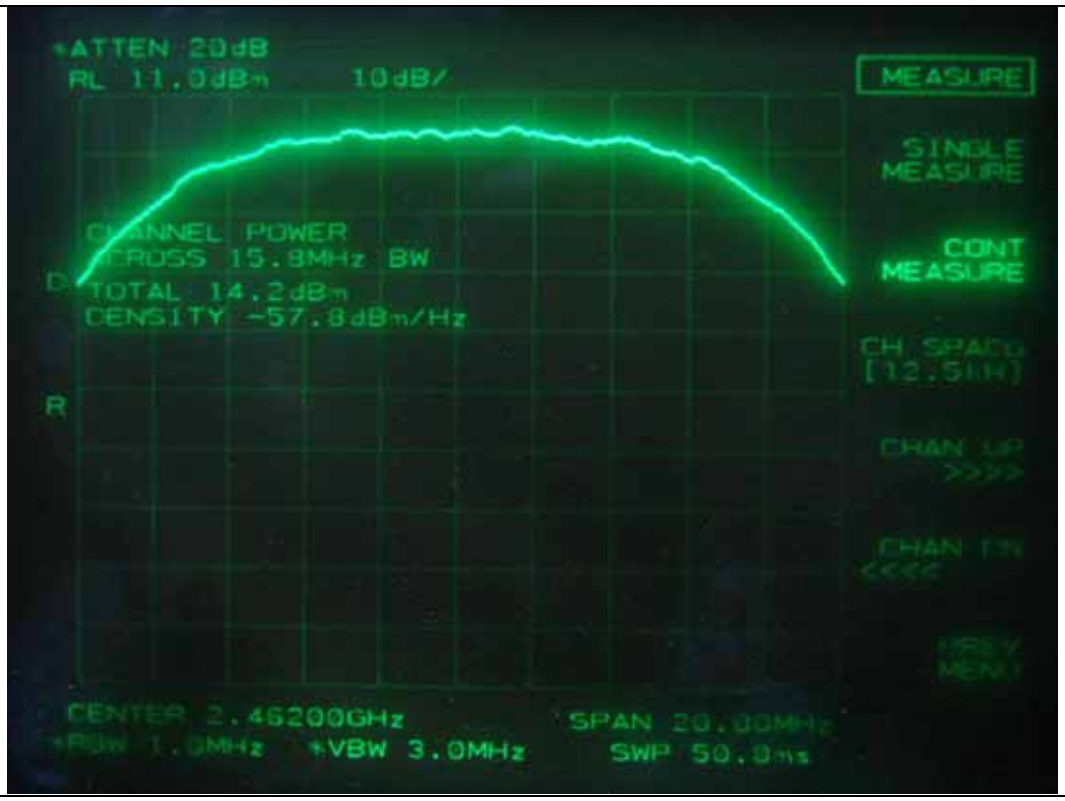

High Channel

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7.3 100 kHz BANDWIDTH OUTSIDE THE FREQUENCY BAND

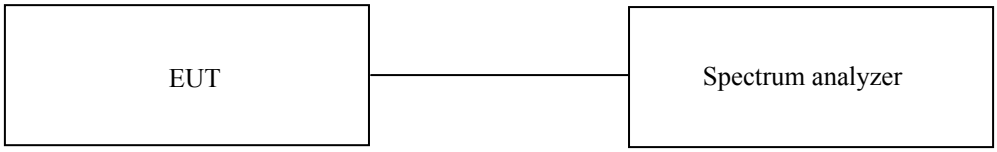
7.3.1 Operating environment

Temperature : 28 °C

Relative humidity : 49 % 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.
■ -	8564E	Hewlett-Packard	Spectrum Analyzer	3650A00756	June 10, 2010
■ -	8447D	Hewlett-Packard	Amplifier	2727A04987	June 11, 2010
■ -	83051A	Agilent	Preamplifier	3950M00201	June 11, 2010
■ -	F-40-5000-RF	RLC Electronics	Highpass Filter	0425	July 10, 2009
■ -	MA220	HD	Turn Table	N/A	N/A
■ -	HD240	HD	Antenna Mast	N/A	N/A
■ -	BBHA9120D	Schwarzbeck	Horn Antenna	BBHA9120D294	June 17, 2009(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.

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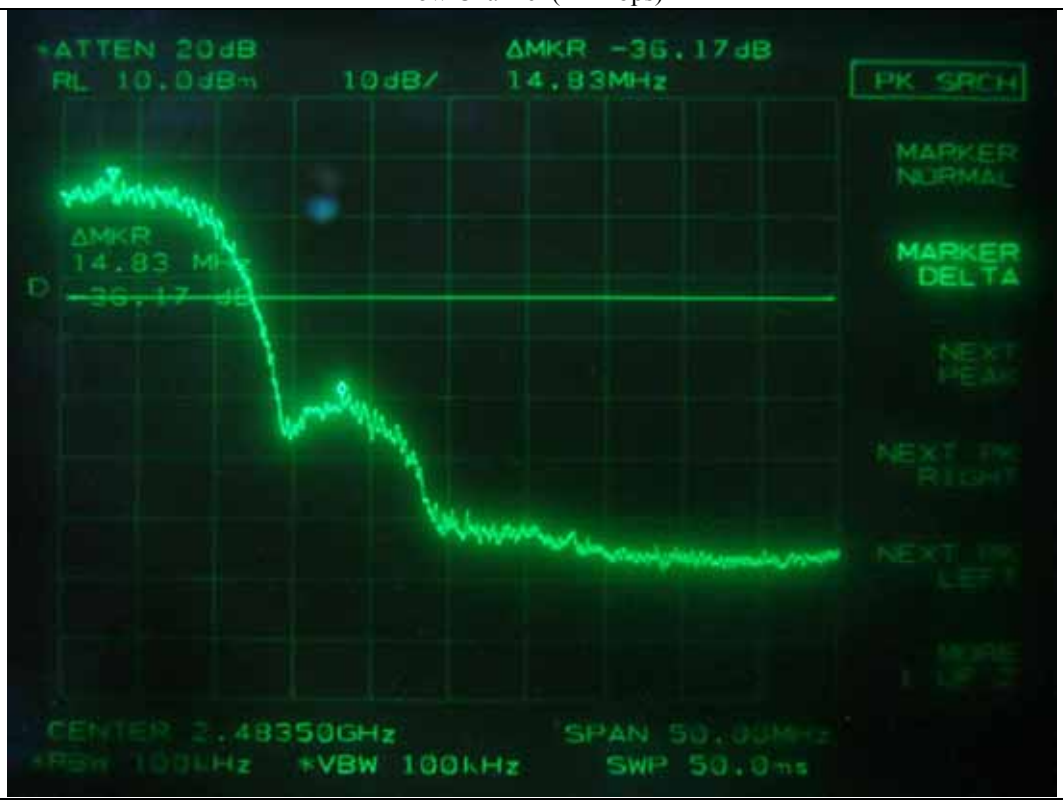
7.3.5. Test data for conducted emission

Low Channel (11 Mbps)



High Channel (11 Mbps)

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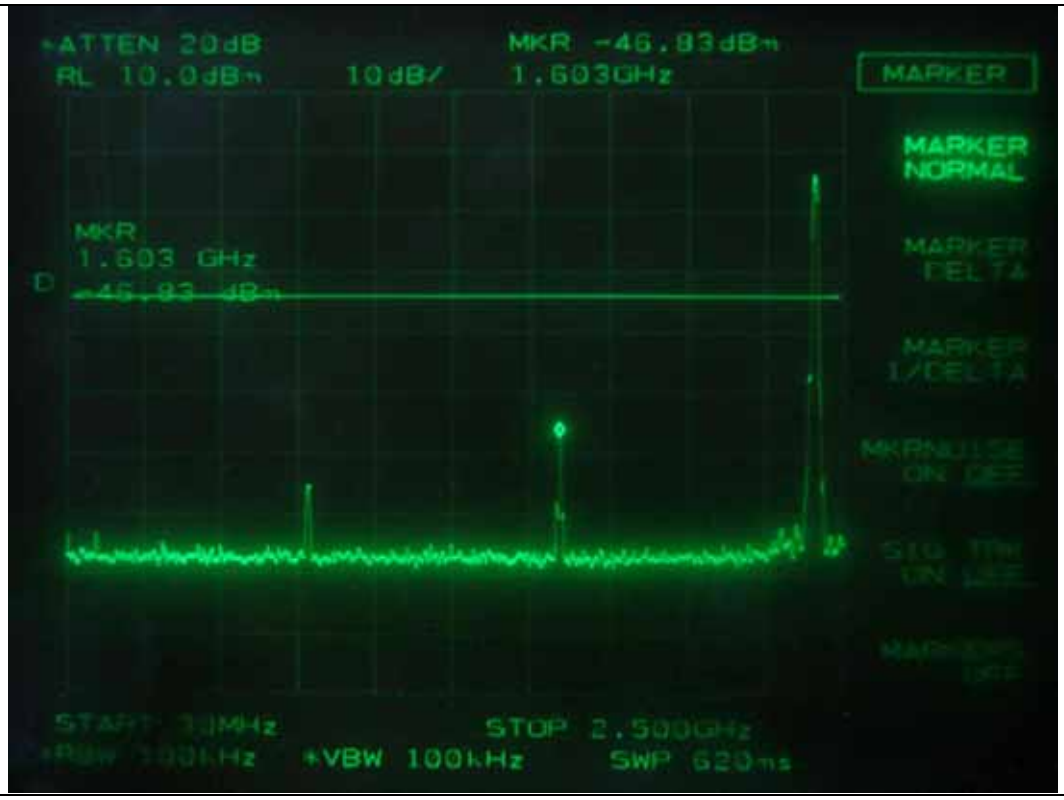
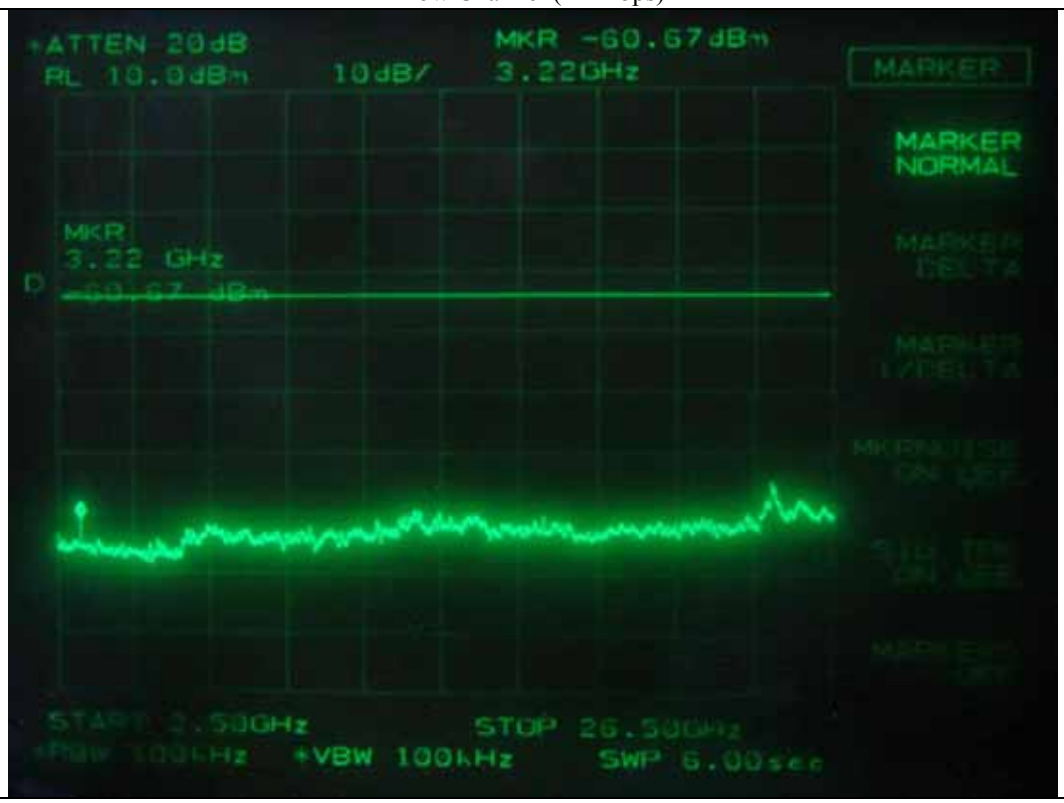


Low Channel (11 Mbps)



Low Channel (11 Mbps)

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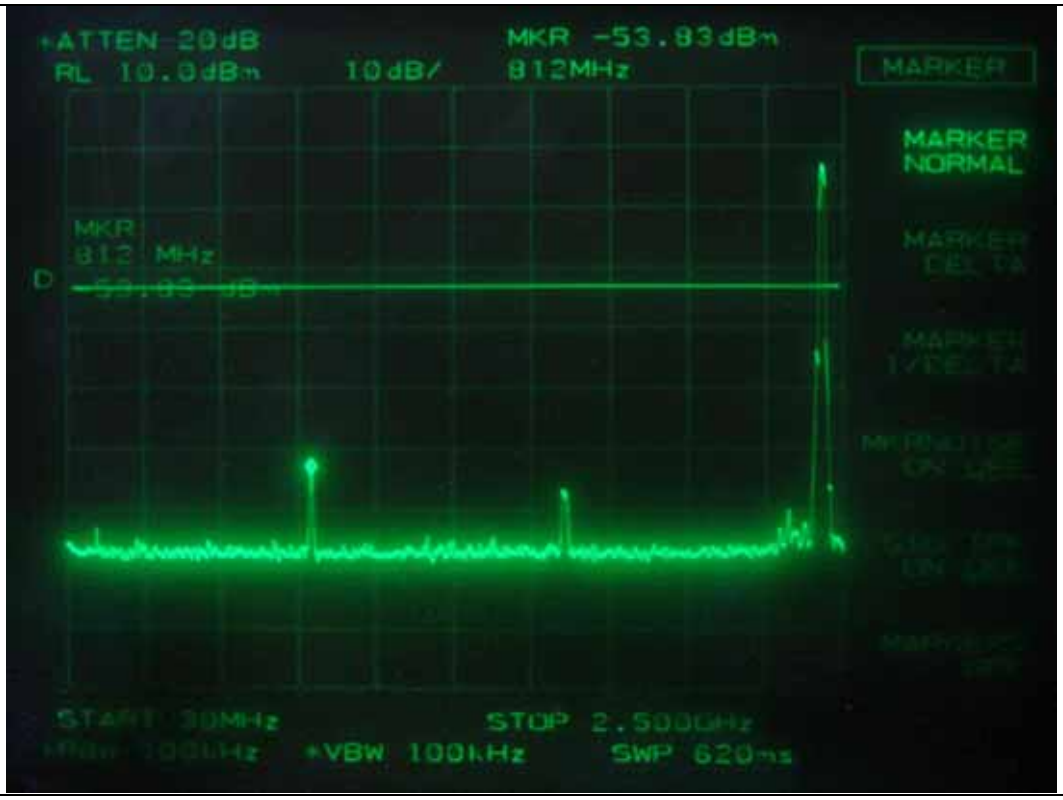
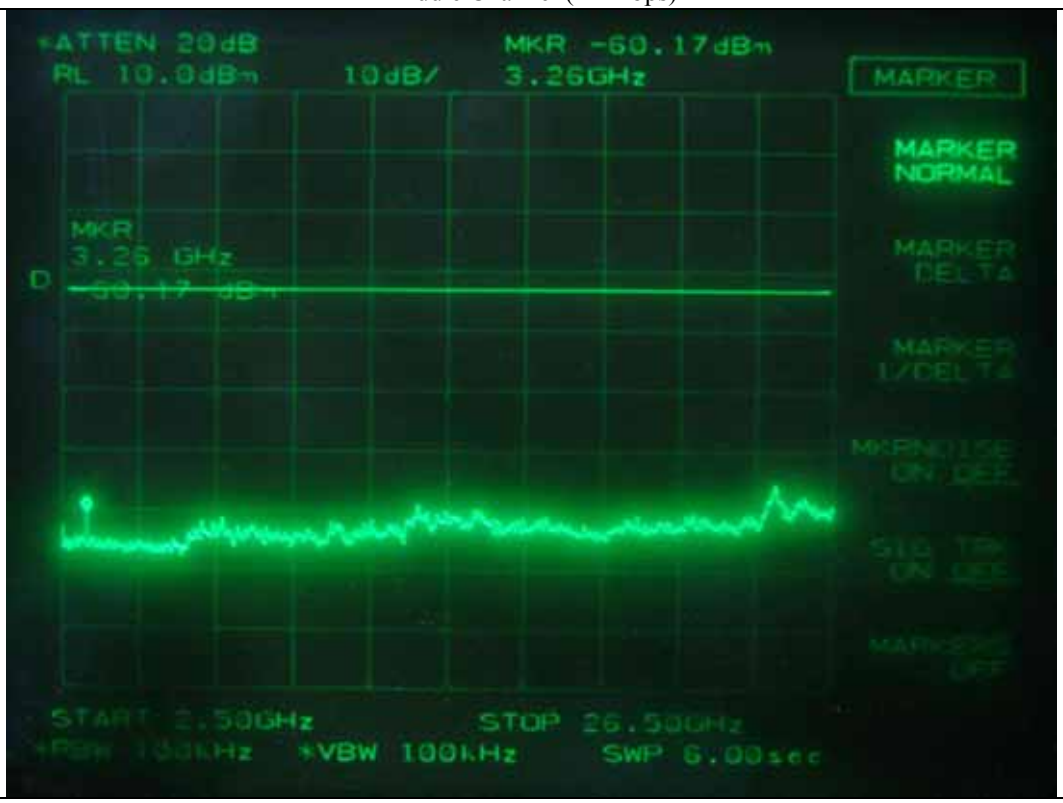


Middle Channel (11 Mbps)



Middle Channel (11 Mbps)

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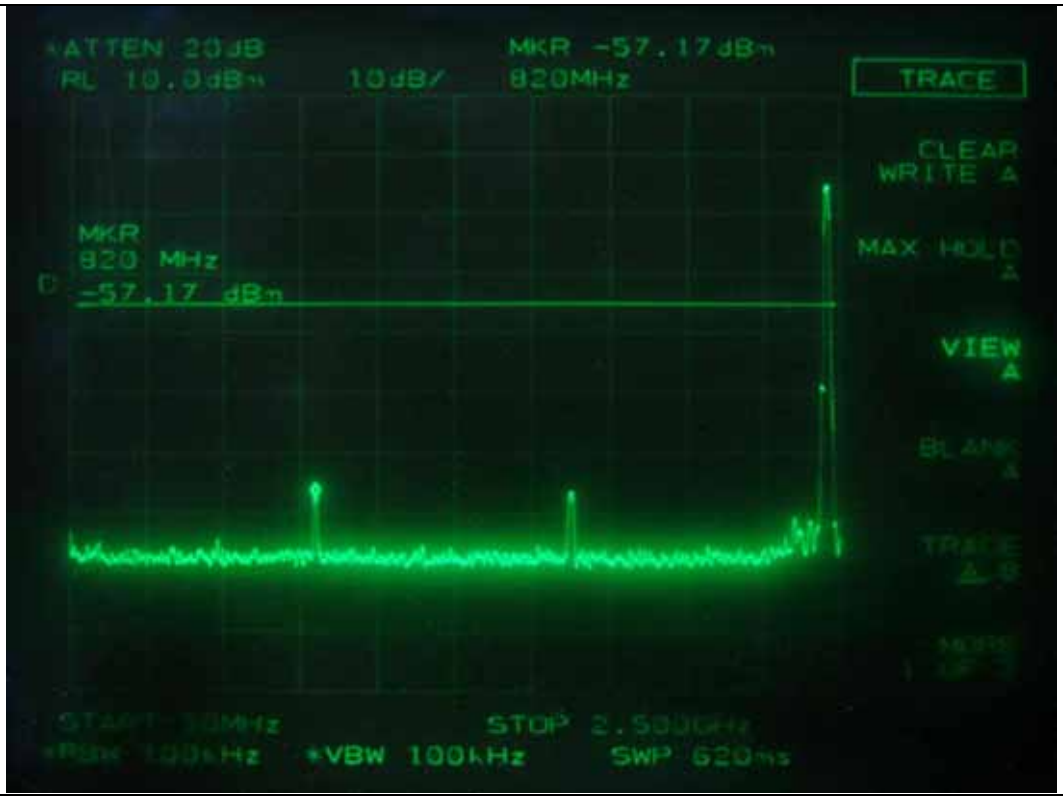
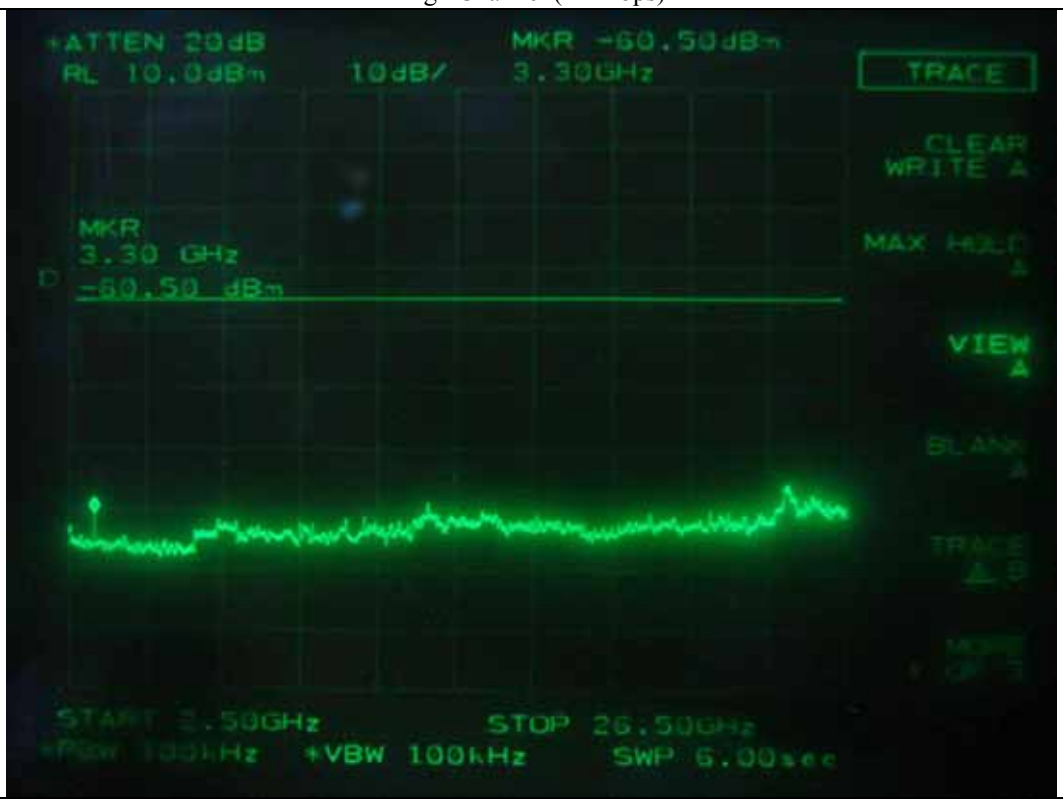


High Channel (11 Mbps)



High Channel (11 Mbps)

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7.3.6. Test data for radiated emission

7.3.6.1 Radiated Emission which fall in the Restricted Band

-. Test Date : June 01, 2010

-. 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 –16.84 dB at High Channel (1 Mbps and 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	40.17	Peak	H	27.05	3.13	28.98	41.37	74.00	-32.63
	33.50	Average	H				34.70	54.00	-19.30
	42.00	Peak	V				43.20	74.00	-30.80
	35.50	Average	V				36.70	54.00	-17.30
Test Data for Low Channel (2 Mbps)									
2 390.00	40.67	Peak	H	27.05	3.13	28.98	41.87	74.00	-32.13
	33.50	Average	H				34.70	54.00	-19.30
	42.33	Peak	V				43.53	74.00	-30.47
	35.67	Average	V				36.87	54.00	-17.13
Test Data for Low Channel (5.5 Mbps)									
2 390.00	40.17	Peak	H	27.05	3.13	28.98	41.37	74.00	-32.63
	33.50	Average	H				34.70	54.00	-19.30
	42.33	Peak	V				43.53	74.00	-30.47
	35.00	Average	V				36.20	54.00	-17.80
Test Data for Low Channel (11 Mbps)									
2 390.00	40.33	Peak	H	27.05	3.13	28.98	41.53	74.00	-32.47
	33.67	Average	H				34.87	54.00	-19.13
	42.50	Peak	V				43.70	74.00	-30.30
	35.00	Average	V				36.20	54.00	-17.80

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 (1 Mbps)									
2 483.50	40.50	Peak	H	27.31	3.16	28.82	42.16	74.00	-31.84
	33.33	Average	H				34.99	54.00	-19.01
	42.67	Peak	V				44.33	74.00	-29.67
	35.50	Average	V				37.16	54.00	-16.84
Test Data for High Channel (2 Mbps)									
2 483.50	40.17	Peak	H	27.31	3.16	28.82	41.83	74.00	-32.17
	33.50	Average	H				35.16	54.00	-18.84
	42.40	Peak	V				44.06	74.00	-29.94
	35.17	Average	V				36.83	54.00	-17.17
Test Data for High Channel (5.5 Mbps)									
2 483.50	40.67	Peak	H	27.31	3.16	28.82	42.33	74.00	-31.67
	33.50	Average	H				35.16	54.00	-18.84
	42.33	Peak	V				43.99	74.00	-30.01
	35.50	Average	V				37.16	54.00	-16.84
Test Data for High Channel (11 Mbps)									
2 483.50	40.25	Peak	H	27.31	3.16	28.82	41.91	74.00	-32.09
	33.25	Average	H				34.91	54.00	-19.09
	42.50	Peak	V				44.16	74.00	-29.84
	35.17	Average	V				36.83	54.00	-17.17

Tested by: Ki-Hong, Nam / Senior Engineer

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7.3.6.2 Spurious & Harmonic Radiated Emission

-. Test Date : June 01, 2010

-. 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 –19.47 dB at High 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	64.25	Peak	H	27.11	3.16		94.52	-	
	67.67	Peak	V				97.94	-	
4 824.00	40.17	Peak	H	31.30	4.10	28.78	46.79	74.00	-27.21
	27.33	Average	H				33.95	54.00	-20.05
	35.83	Peak	V				42.45	74.00	-31.55
	25.33	Average	V				31.95	54.00	-22.05
Test Data for Low Channel (2 Mbps)									
2 412.00	63.83	Peak	H	27.11	3.16		94.10	-	
	67.50	Peak	V				97.77	-	
4 824.00	40.33	Peak	H	31.30	4.10	28.78	46.95	74.00	-27.05
	27.50	Average	H				34.12	54.00	-19.88
	35.33	Peak	V				41.95	74.00	-32.05
	25.17	Average	V				31.79	54.00	-22.21
Test Data for Low Channel (5.5 Mbps)									
2 412.00	63.25	Peak	H	27.11	3.16		93.52	-	
	67.67	Peak	V				97.94	-	
4 824.00	40.10	Peak	H	31.30	4.10	28.78	46.72	74.00	-27.28
	27.67	Average	H				34.29	54.00	-19.71
	35.92	Peak	V				42.54	74.00	-31.46
	25.00	Average	V				31.62	54.00	-22.38

Tabulated test data for Restricted Band

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-Continued

Test Data for Low Channel (11 Mbps)									
2 412.00	64.33	Peak	H	27.11	3.16		94.60	-	
	67.25	Peak	V				97.52	-	
4 824.00	40.83	Peak	H	31.30	4.10	28.78	47.45	74.00	-26.55
	27.33	Average	H				33.95	54.00	-20.05
	35.67	Peak	V				42.29	74.00	-31.71
	25.17	Average	V				31.79	54.00	-22.21

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)									
2 437.00	64.72	Peak	H	27.18	3.16		95.06	-	
	67.45	Peak	V				97.79	-	
4 874.00	40.50	Peak	H	31.18	4.12	28.74	47.06	74.00	-26.94
	27.78	Average	H				34.34	54.00	-19.66
	35.33	Peak	V				41.89	74.00	-32.11
	25.83	Average	V				32.39	54.00	-21.61
Test Data for Middle Channel (2 Mbps)									
2 437.00	64.33	Peak	H	27.18	3.16		94.67	-	
	67.50	Peak	V				97.84	-	
4 874.00	40.40	Peak	H	31.18	4.12	28.74	46.96	74.00	-27.04
	27.20	Average	H				33.76	54.00	-20.24
	35.83	Peak	V				42.39	74.00	-31.61
	25.25	Average	V				31.81	54.00	-22.19

Tabulated test data for Restricted Band

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Test Data for Middle Channel (5.5 Mbps)									
2 437.00	64.83	Peak	H	27.18	3.16		95.17	-	
	67.17	Peak	V				97.51	-	
4 874.00	40.78	Peak	H	31.18	4.12	28.74	47.34	74.00	-26.66
	27.33	Average	H				33.89	54.00	-20.11
	35.75	Peak	V				42.31	74.00	-31.69
	25.17	Average	V				31.73	54.00	-22.27
Test Data for Middle Channel (11 Mbps)									
2 437.00	64.67	Peak	H	27.18	3.16		95.01	-	
	67.25	Peak	V				97.59	-	
4 874.00	40.50	Peak	H	31.18	4.12	28.74	47.06	74.00	-26.94
	27.42	Average	H				33.98	54.00	-20.02
	35.83	Peak	V				42.39	74.00	-31.61
	25.33	Average	V				31.89	54.00	-22.11

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)									
2 462.00	65.42	Peak	H	27.25	3.16		95.83	-	
	68.50	Peak	V				98.91	-	
4 924.00	40.83	Peak	H	31.26	4.14	28.70	47.53	74.00	-26.47
	27.83	Average	H				34.53	54.00	-19.47
	35.17	Peak	V				41.87	74.00	-32.13
	25.67	Average	V				32.37	54.00	-21.63
Test Data for High Channel (2 Mbps)									
2 462.00	62.17	Peak	H	27.25	3.16		92.58	-	
	68.33	Peak	V				98.74	-	
4 924.00	40.33	Peak	H	31.26	4.14	28.70	47.03	74.00	-26.97
	27.50	Average	H				34.20	54.00	-19.80
	35.83	Peak	V				42.53	74.00	-31.47
	25.10	Average	V				31.80	54.00	-22.20

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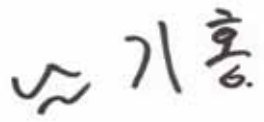
Test Data for High Channel (5.5 Mbps)									
2 462.00	65.83	Peak	H	27.25	3.16		96.24	-	
	68.50	Peak	V				98.91	-	
4 924.00	40.00	Peak	H	31.26	4.14	28.70	46.70	74.00	-27.30
	27.33	Average	H				34.03	54.00	-19.97
	35.67	Peak	V				42.37	74.00	-31.63
	25.25	Average	V				31.95	54.00	-22.05
Test Data for High Channel (11 Mbps)									
2 462.00	65.25	Peak	H	27.25	3.16		95.66	-	
	68.92	Peak	V				99.33	-	
4 924.00	40.83	Peak	H	31.26	4.14	28.70	47.53	74.00	-26.47
	27.50	Average	H				34.20	54.00	-19.80
	35.92	Peak	V				42.62	74.00	-31.38
	25.67	Average	V				32.92	54.00	-21.08

Tabulated test data for Restricted Band

Remark: “H”: Horizontal, “V”: Vertical



Tested by: Ki-Hong, Nam / Senior Engineer

7.4 PEAK POWER SPECTRUL DENSITY

7.4.1 Operating environment

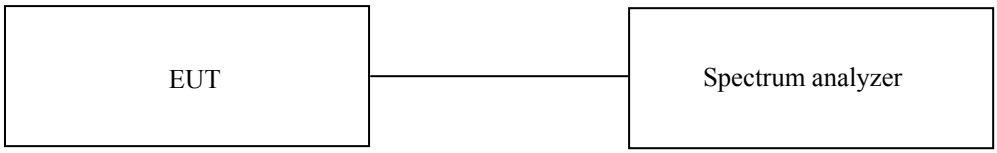
Temperature : 23 °C

Relative humidity : 47 % 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.
■ -	8564E	HP	Spectrum Analyzer	3650A00756	June 10, 2010

All test equipment used is calibrated on a regular basis.

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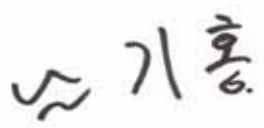
7.4.4 Test data

-. Test Date : May 24, 2010

-. Test Result : Pass

CHANNEL	FREQUENCY(MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2 412	-16.67	8.00	-24.67
Middle	2 437	-15.67	8.00	-23.67
High	2 462	-16.17	8.00	-24.17

Remark: See next page for measurement data.



Tested by: Ki-Hong, Nam / Senior Engineer

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Low Channel

Middle Channel

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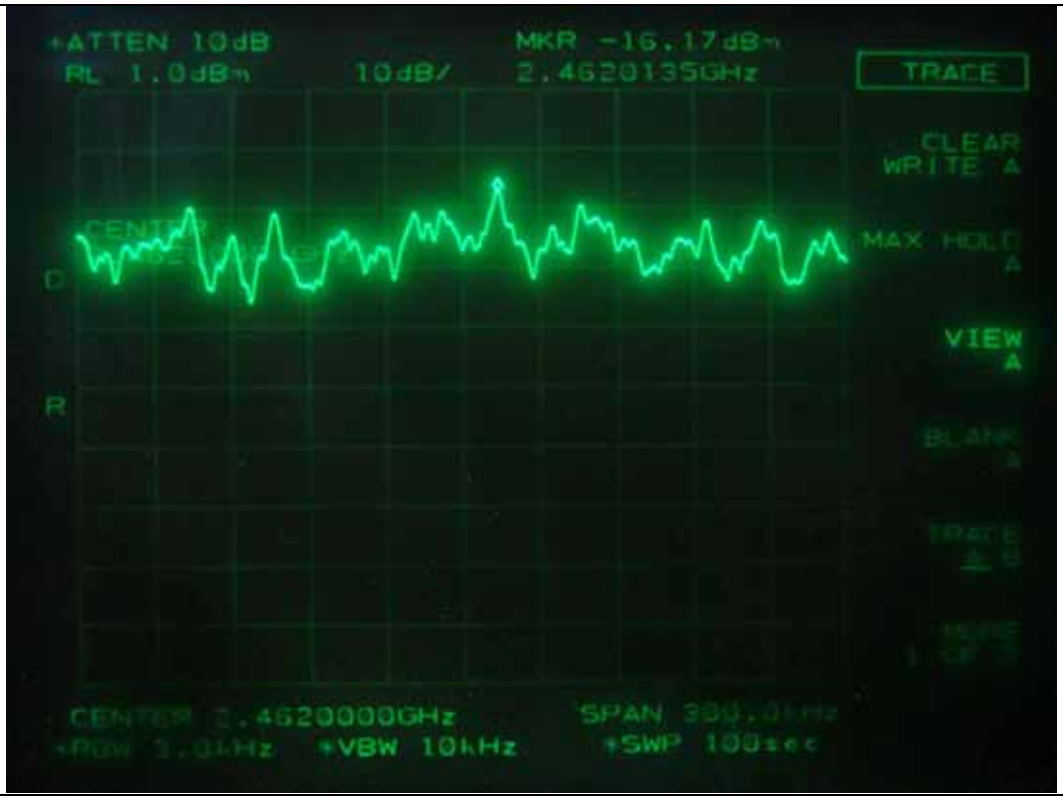

High Channel

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8. TEST DATA FOR 802.11g WLAN MODE

8.1 MIMIMUM 6 dB BANDWIDTH

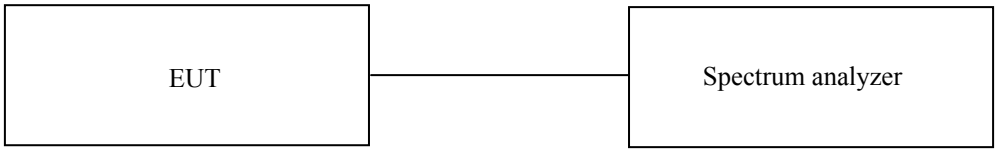
8.1.1 Operating environment

Temperature : 23 °C

Relative humidity : 47 % 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.
■ -	8564E	HP	Spectrum Analyzer	3650A00756	June 10, 2010

All test equipment used is calibrated on a regular basis.

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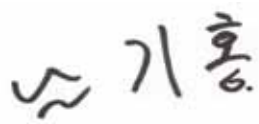
8.1.4 Test data

-. Test Date : May 24, 2010

-. Test Result : Pass

CHANNEL	FREQUENCY(MHz)	MEASURED VLAUE (kHz)	LIMIT (kHz)	MARGIN (kHz)
Low	2 412	16 600	500	-16 100
Middle	2 437	16 600	500	-16 100
High	2 462	16 600	500	-16 100

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



Tested by: Ki-Hong, Nam / Senior Engineer

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Low Channel

Middle Channel

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High Channel

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8.2 MAXIMUM PEAK OUTPUT POWER

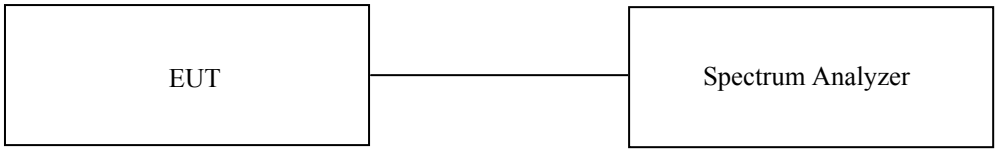
8.2.1 Operating environment

Temperature : 23 °C

Relative humidity : 47 % 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.
■ -	8564E	HP	Spectrum Analyzer	3650A00756	June 10, 2010

All test equipment used is calibrated on a regular basis.

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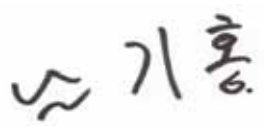
8.2.4 Test data

-. Test Date : May 24, 2010

-. Test Result : Pass

CHANNEL	FREQUENCY (MHz)	99 % Occupied Bandwidth (MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2 412	18.00	14.90	30.00	-15.10
Middle	2 437	18.00	15.60	30.00	-14.40
High	2 462	18.00	14.70	30.00	-15.30

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



Tested by: Ki-Hong, Nam / Senior Engineer

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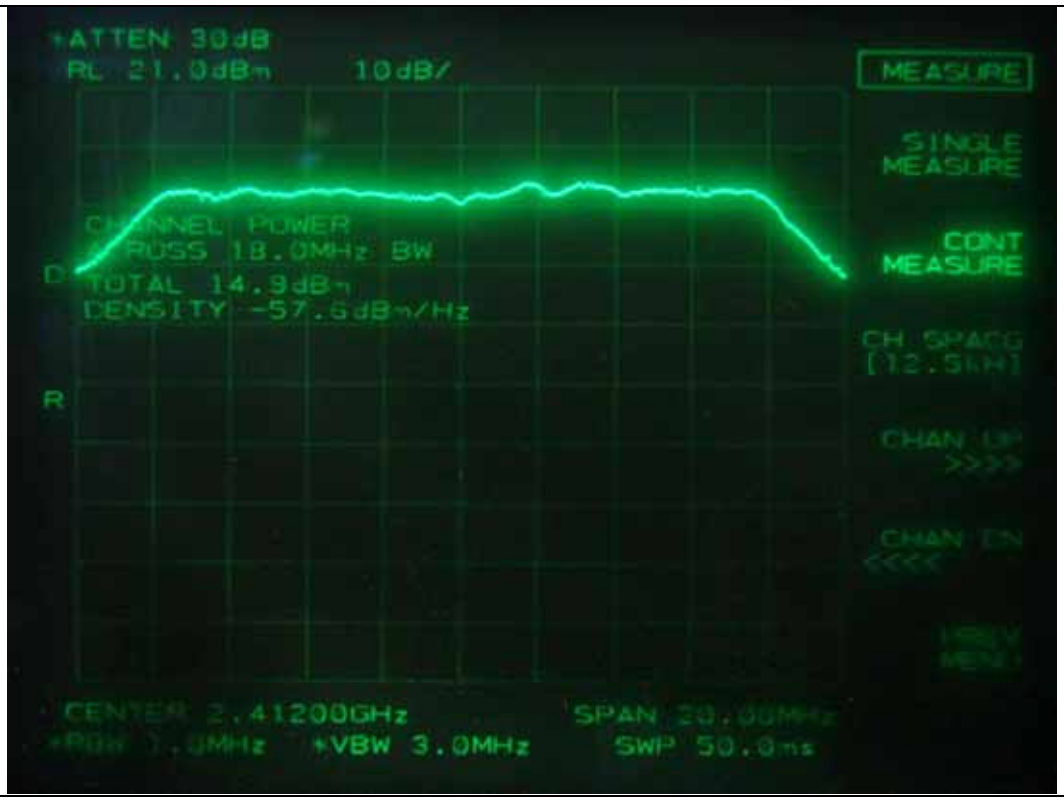
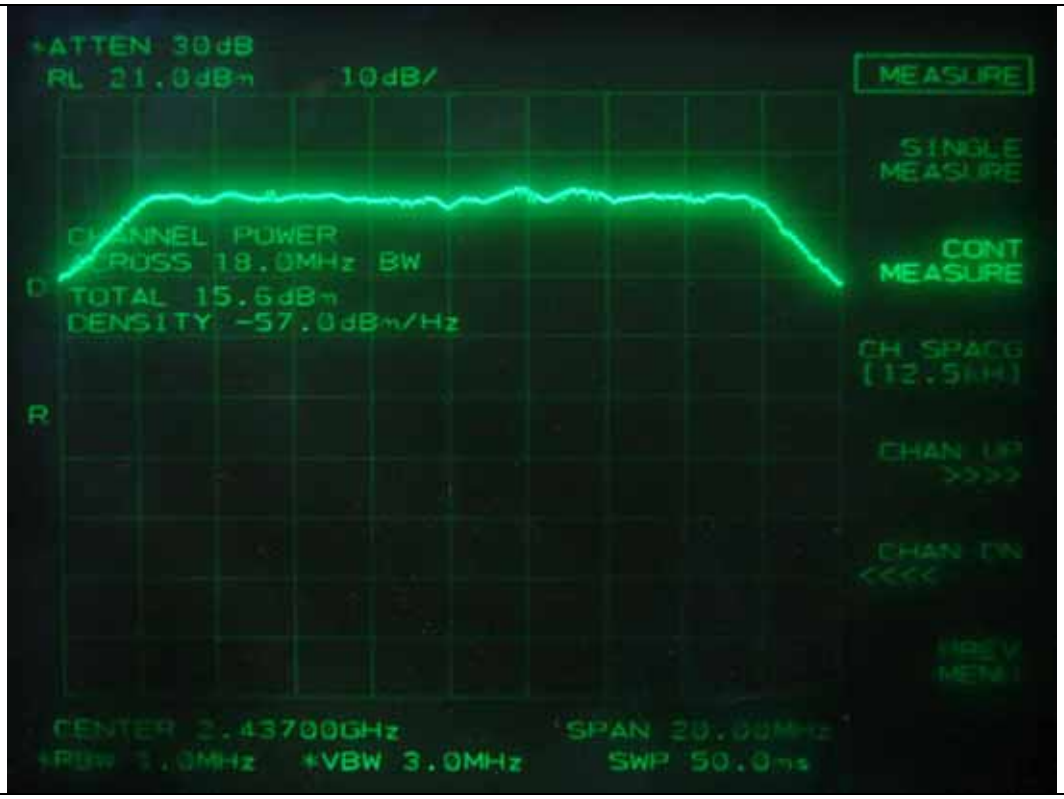


Low Channel



Middle Channel

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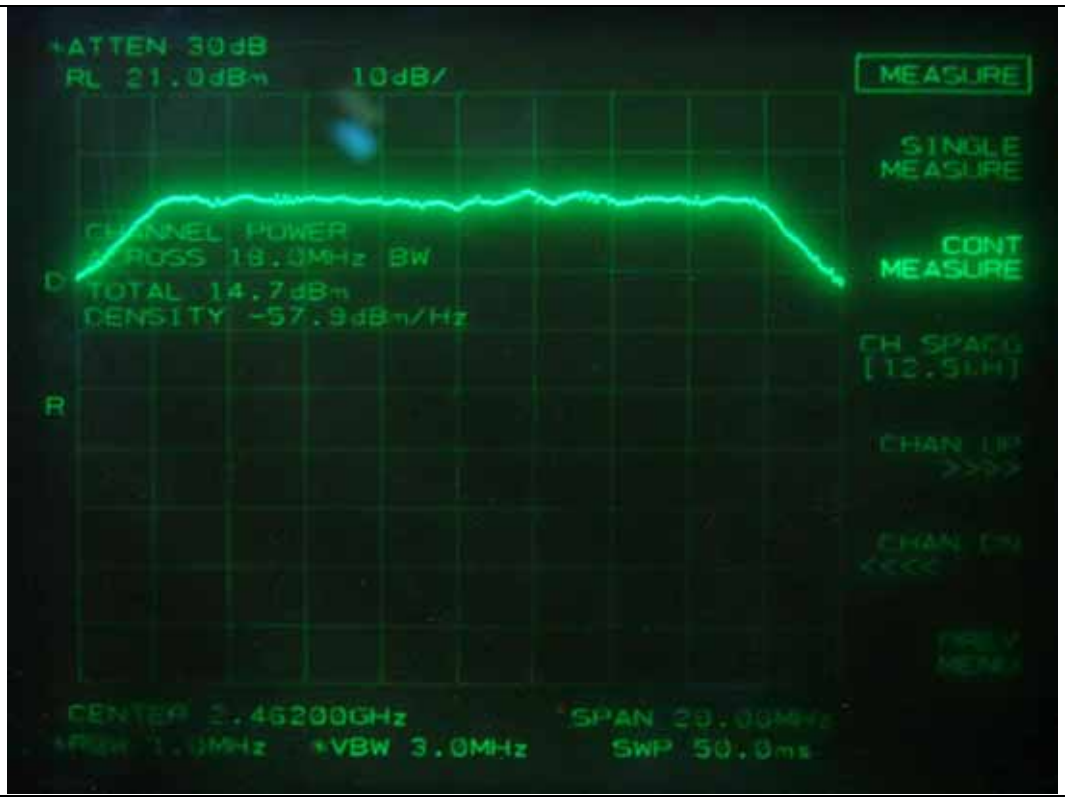

High Channel

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8.3 100 kHz BANDWIDTH OUTSIDE THE FREQUENCY BAND

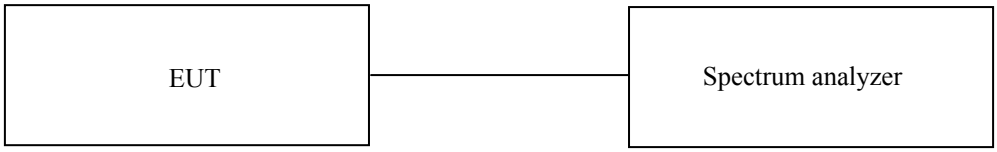
8.3.1 Operating environment

Temperature : 28 °C

Relative humidity : 49 % 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 3 m, open-field test site. The EUT was placed on a non-conductive turntable approximately 0.8 m above the ground plane.

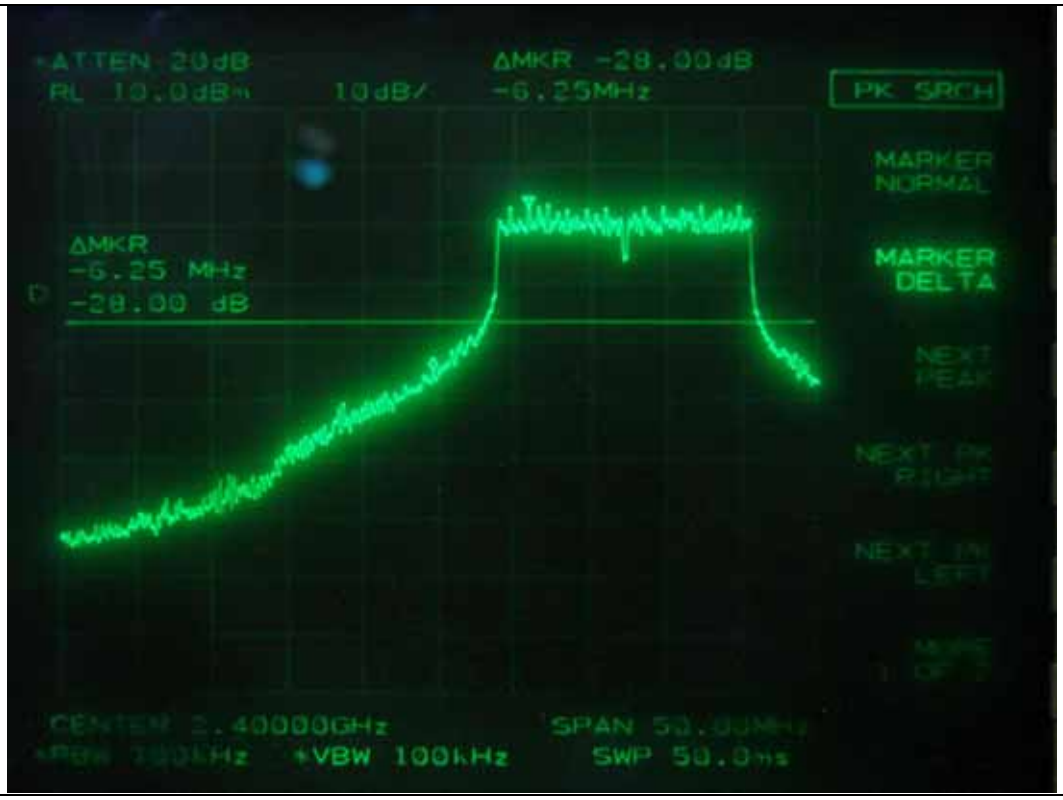
The frequency spectrum from 30 MHz to 25 GHz was scanned and maximum emission levels at each frequency recorded. The system was rotated 360°, and the antenna was varied in the height between 1.0 m and 4.0 m in order to determine the maximum emission levels. This procedure was performed for horizontal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

8.3.4 Test equipment used

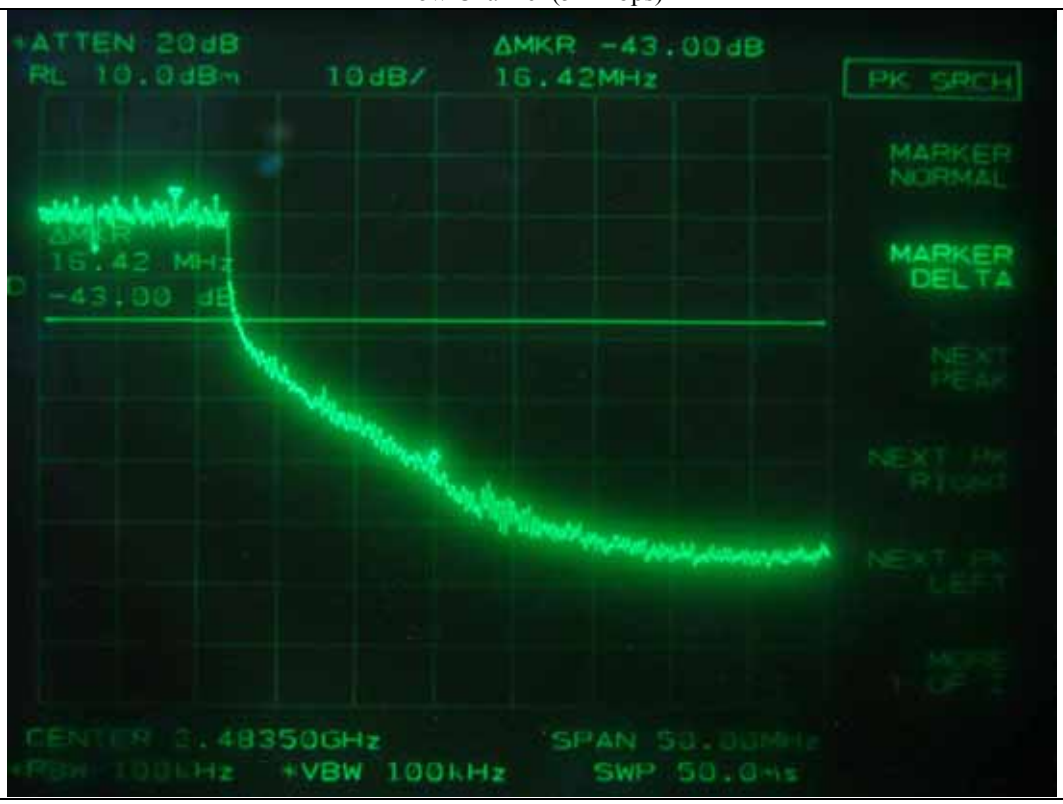
	Model Number	Manufacturer	Description	Serial Number	Last Cal.
■ -	8564E	Hewlett-Packard	Spectrum Analyzer	3650A00756	June 10, 2010
■ -	8447D	Hewlett-Packard	Amplifier	2727A04987	June 11, 2010
■ -	83051A	Agilent	Preamplifier	3950M00201	June 11, 2010
■ -	F-40-5000-RF	RLC Electronics	Highpass Filter	0425	July 10, 2009
■ -	MA220	HD	Turn Table	N/A	N/A
■ -	HD240	HD	Antenna Mast	N/A	N/A
■ -	BBHA9120D	Schwarzbeck	Horn Antenna	BBHA9120D294	June 17, 2009(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



Low Channel (54 Mbps)



High Channel (54 Mbps)

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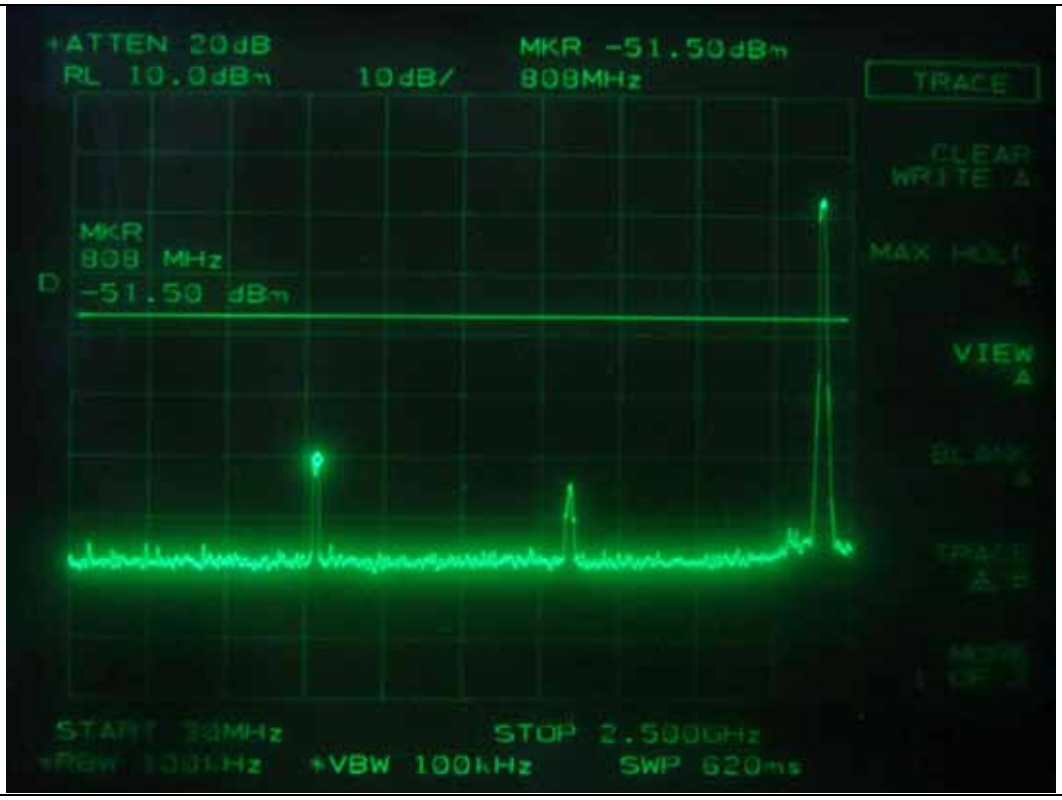
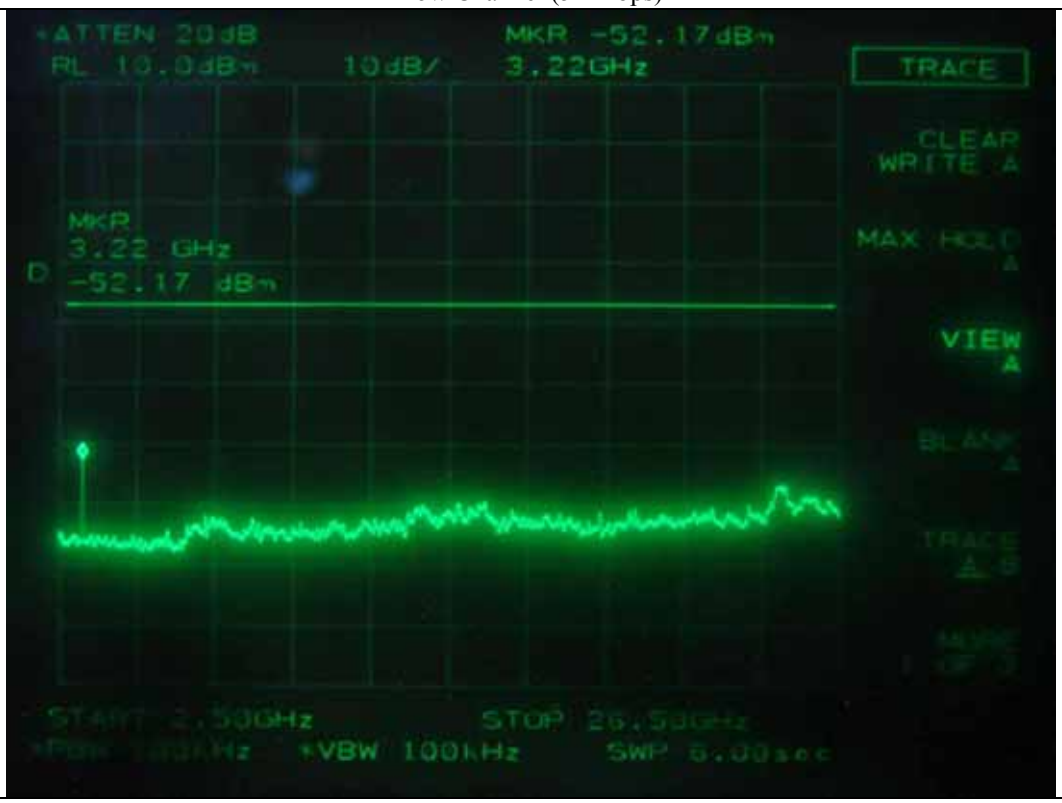


Low Channel (54 Mbps)



Low Channel (54 Mbps)

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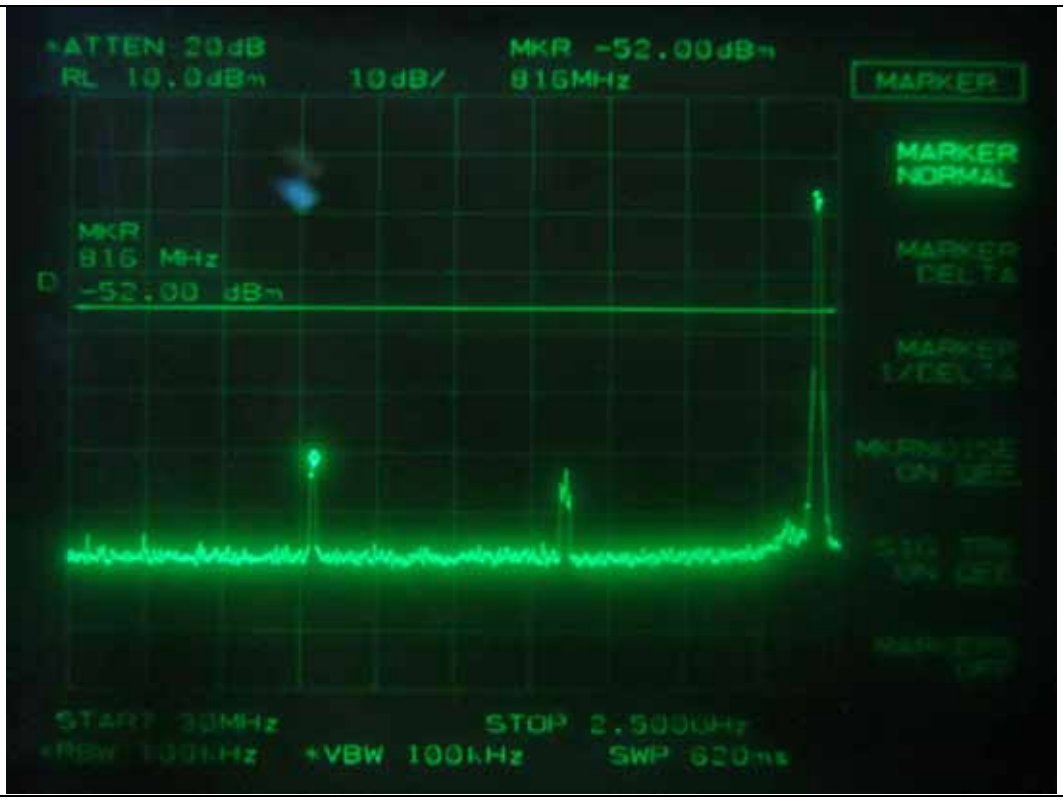
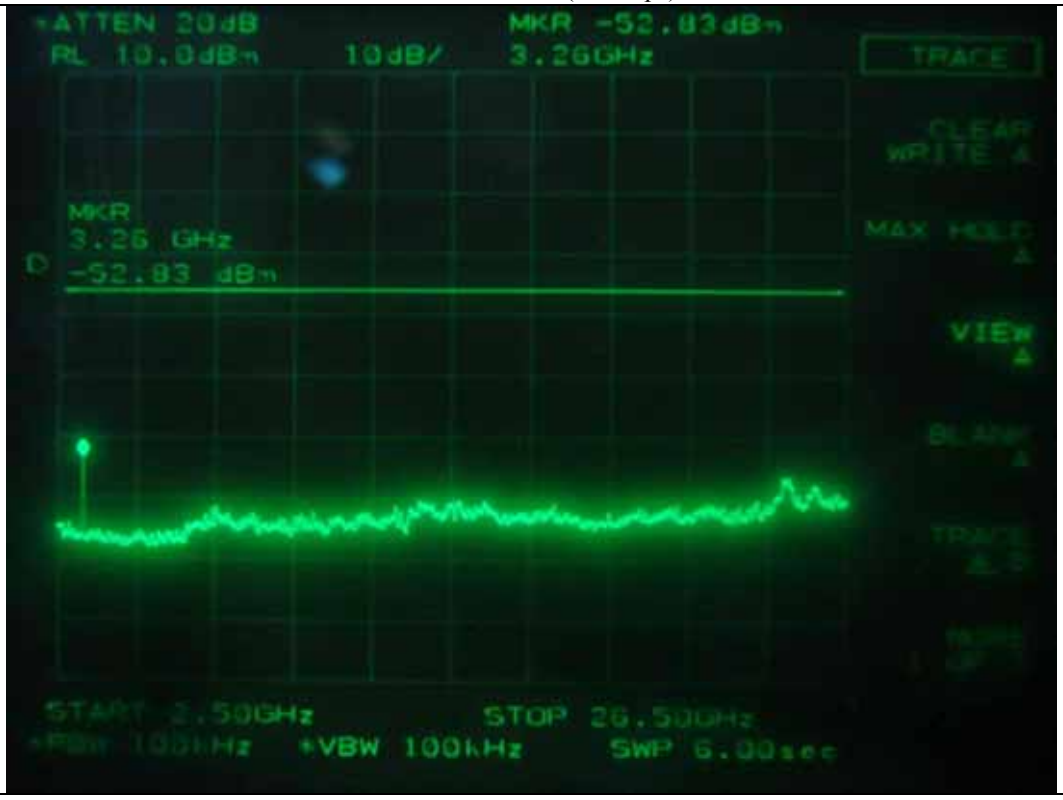


Middle Channel (54 Mbps)



Middle Channel (54 Mbps)

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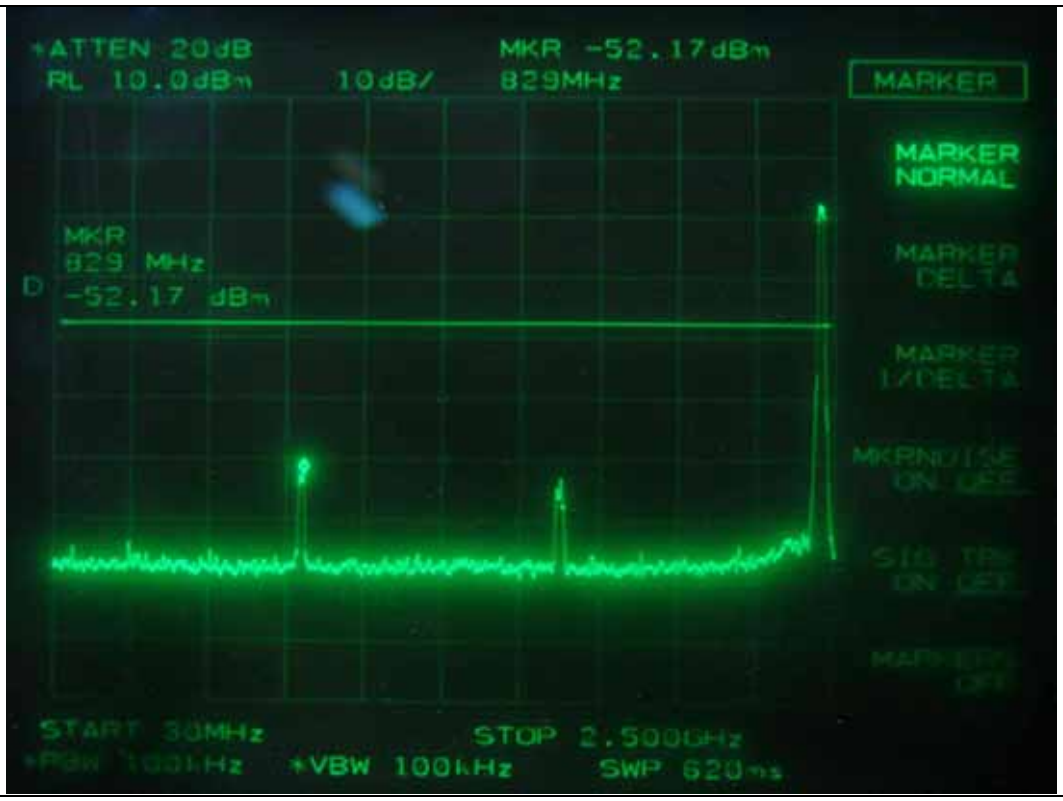
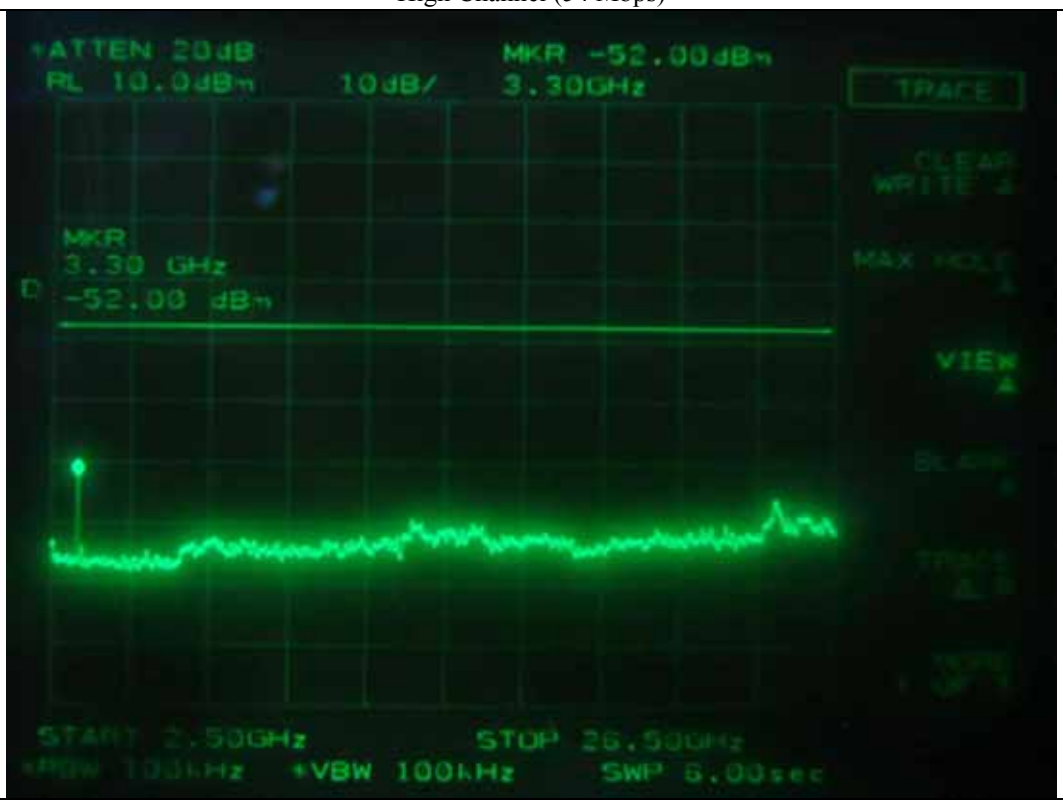


High Channel (54 Mbps)



High Channel (54 Mbps)

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8.3.6. Test data for radiated emission

8.3.6.1 Radiated Emission which fall in the Restricted Band

-. Test Date : June 01, 2010

-. 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 –12.78 dB at High Channel (18Mbps)

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	40.67	Peak	H	27.26	3.83	26.10	45.66	74.00	-28.34
	33.50	Average	H				38.49	54.00	-15.51
	43.33	Peak	V				48.32	74.00	-25.68
	35.83	Average	V				40.82	54.00	-13.18
Test Data for Low Channel (18 Mbps)									
2 390.00	40.17	Peak	H	27.26	3.83	26.10	45.16	74.00	-28.84
	33.83	Average	H				38.82	54.00	-15.18
	43.25	Peak	V				48.24	74.00	-25.76
	35.00	Average	V				39.99	54.00	-14.01
Test Data for Low Channel (24 Mbps)									
2 390.00	40.72	Peak	H	27.26	3.83	26.10	45.71	74.00	-28.29
	33.50	Average	H				38.49	54.00	-15.51
	43.17	Peak	V				48.16	74.00	-25.84
	35.33	Average	V				40.32	54.00	-13.68
Test Data for Low Channel (54 Mbps)									
2 390.00	40.25	Peak	H	27.26	3.83	26.10	45.24	74.00	-28.76
	33.83	Average	H				38.82	54.00	-15.18
	43.17	Peak	V				48.16	74.00	-25.84
	35.33	Average	V				40.32	54.00	-13.68

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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 (6 Mbps)									
2 483.50	40.67	Peak	H	27.55	3.83	26.10	45.95	74.00	-28.06
	33.33	Average	H				38.61	54.00	-15.40
	43.83	Peak	V				49.11	74.00	-24.90
	35.25	Average	V				40.53	54.00	-13.48
Test Data for High Channel (18 Mbps)									
2 483.50	40.75	Peak	H	27.55	3.83	26.10	46.03	74.00	-27.98
	33.43	Average	H				38.71	54.00	-15.30
	43.78	Peak	V				49.06	74.00	-24.95
	35.95	Average	V				41.23	54.00	-12.78
Test Data for High Channel (24 Mbps)									
2 483.50	40.45	Peak	H	27.55	3.83	26.10	45.73	74.00	-28.28
	33.27	Average	H				38.55	54.00	-15.46
	43.85	Peak	V				49.13	74.00	-24.88
	35.44	Average	V				40.72	54.00	-13.29
Test Data for High Channel (54 Mbps)									
2 390.00	40.83	Peak	H	27.26	3.83	26.10	46.11	74.00	-27.90
	33.50	Average	H				38.78	54.00	-15.23
	43.17	Peak	V				48.45	74.00	-25.56
	35.83	Average	V				41.11	54.00	-12.90

Tabulated test data for Restricted Band

Remark: “H”: Horizontal, “V”: Vertical

Tested by: Ki-Hong, Nam / Senior Engineer

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8.3.6.2 Spurious & Harmonic Radiated Emission

-. Test Date : June 01, 2010

-. 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 –19.63 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	64.83	Peak	H	27.11	3.16		95.10	-	
	61.45	Peak	V				91.72	-	
4 824.00*	40.33	Peak	H	31.10	4.10	28.78	46.75	74.00	-27.25
	27.83	Average	H				34.25	54.00	-19.75
	35.25	Peak	V				41.67	74.00	-32.33
	25.33	Average	V				31.75	54.00	-22.25
Test Data for Low Channel (18 Mbps)									
2 412.00	64.83	Peak	H	27.11	3.16		95.10	-	
	61.92	Peak	V				92.19	-	
4 824.00*	40.33	Peak	H	31.10	4.10	28.78	46.75	74.00	-27.25
	27.17	Average	H				33.59	54.00	-20.41
	35.83	Peak	V				42.25	74.00	-31.75
	25.00	Average	V				31.42	54.00	-22.58
Test Data for Low Channel (24 Mbps)									
2 412.00	64.25	Peak	H	27.11	3.16		94.52	-	
	61.17	Peak	V				91.44	-	
4 824.00*	40.92	Peak	H	31.10	4.10	28.78	47.34	74.00	-26.66
	27.50	Average	H				33.92	54.00	-20.08
	35.67	Peak	V				42.09	74.00	-31.91
	25.33	Average	V				31.75	54.00	-22.25

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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 Low Channel (54 Mbps)									
2 412.00	64.95	Peak	H	27.11	3.16		95.22	-	
	61.40	Peak	V				91.67	-	
4 824.00*	40.78	Peak	H	31.10	4.10	28.78	47.20	74.00	-26.80
	27.42	Average	H				33.84	54.00	-20.16
	35.33	Peak	V				41.75	74.00	-32.25
	25.17	Average	V				31.59	54.00	-22.41

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)									
2 437.00	64.50	Peak	H	27.18	3.16		94.84	-	
	61.83	Peak	V				92.17	-	
4 874.00*	40.44	Peak	H	31.18	4.12	28.74	47.00	74.00	-27.00
	27.20	Average	H				33.76	54.00	-20.24
	35.78	Peak	V				42.34	74.00	-31.66
	25.33	Average	V				31.89	54.00	-22.11
Test Data for Middle Channel (18 Mbps)									
2 437.00	64.83	Peak	H	27.18	3.16		95.17	-	
	61.17	Peak	V				91.51	-	
4 874.00*	40.66	Peak	H	31.18	4.12	28.74	47.22	74.00	-26.78
	27.25	Average	H				33.81	54.00	-20.19
	35.83	Peak	V				42.39	74.00	-31.61
	25.20	Average	V				31.76	54.00	-22.24
Test Data for Middle Channel (24 Mbps)									
2 437.00	64.92	Peak	H	27.18	3.16		95.26	-	
	61.25	Peak	V				91.59	-	
4 874.00*	40.92	Peak	H	31.18	4.12	28.74	47.48	74.00	-26.52
	27.33	Average	H				33.89	54.00	-20.11
	35.67	Peak	V				42.23	74.00	-31.77
	25.50	Average	V				32.06	54.00	-21.94

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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 (54 Mbps)									
2 437.00	64.66	Peak	H	27.18	3.16		95.00	-	
	61.00	Peak	V				91.34	-	
4 874.00*	40.67	Peak	H	31.18	4.12	28.74	47.23	74.00	-26.77
	27.17	Average	H				33.73	54.00	-20.27
	35.50	Peak	V				42.06	74.00	-31.94
	25.25	Average	V				31.81	54.00	-22.19

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)									
2 462.00	64.78	Peak	H	27.25	3.16		95.19	-	
	61.25	Peak	V				91.66	-	
4 924.00*	40.78	Peak	H	31.26	4.14	28.70	47.48	74.00	-26.52
	27.33	Average	H				34.03	54.00	-19.97
	35.17	Peak	V				41.87	74.00	-32.13
	25.67	Average	V				32.37	54.00	-21.63
Test Data for High Channel (18 Mbps)									
2 462.00	64.10	Peak	H	27.25	3.16		94.51	-	
	61.78	Peak	V				92.19	-	
4 924.00*	40.33	Peak	H	31.26	4.14	28.70	47.03	74.00	-26.97
	27.17	Average	H				33.87	54.00	-20.13
	35.92	Peak	V				42.62	74.00	-31.38
	25.33	Average	V				32.03	54.00	-21.97
Test Data for High Channel (24 Mbps)									
2 462.00	64.50	Peak	H	27.25	3.16		94.91	-	
	61.67	Peak	V				92.08	-	
4 924.00*	40.83	Peak	H	31.26	4.14	28.70	47.53	74.00	-26.47
	27.50	Average	H				34.20	54.00	-19.80
	35.25	Peak	V				41.95	74.00	-32.05
	25.40	Average	V				32.10	54.00	-21.90

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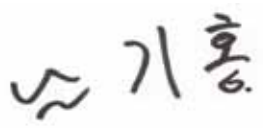
Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Test Data for High Channel (54 Mbps)									
2 462.00	64.25	Peak	H	27.25	3.16		94.66	-	
	61.90	Peak	V				92.31	-	
4 924.00*	40.33	Peak	H	31.26	4.14	28.70	47.03	74.00	-26.97
	27.67	Average	H				34.37	54.00	-19.63
	35.33	Peak	V				42.03	74.00	-31.97
	25.50	Average	V				32.20	54.00	-21.80

Tabulated test data for Restricted Band

Remark: “H”: Horizontal, “V”: Vertical, “*” Frequency fall in restricted band



Tested by: Ki-Hong, Nam / Senior Engineer

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8.4 PEAK POWER SPECTRUL DENSITY

8.4.1 Operating environment

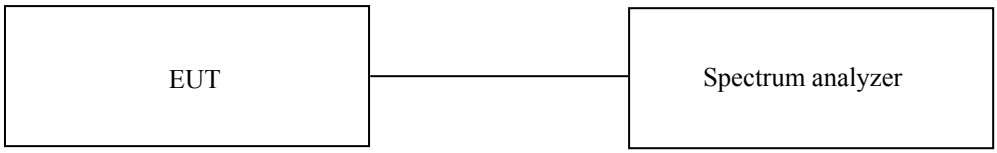
Temperature : 23 °C

Relative humidity : 47 % 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.
■ -	8564E	HP	Spectrum Analyzer	3650A00756	June 10, 2010

All test equipment used is calibrated on a regular basis.

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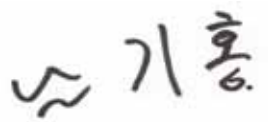
8.4.4 Test data

-. Test Date : May 24, 2010

-. Test Result : Pass

CHANNEL	FREQUENCY(MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2 412	-23.83	8.00	-30.83
Middle	2 437	-22.00	8.00	-30.00
High	2 462	-24.17	8.00	-32.17

Remark: See next page for measurement data.



Tested by: Ki-Hong, Nam / Senior Engineer

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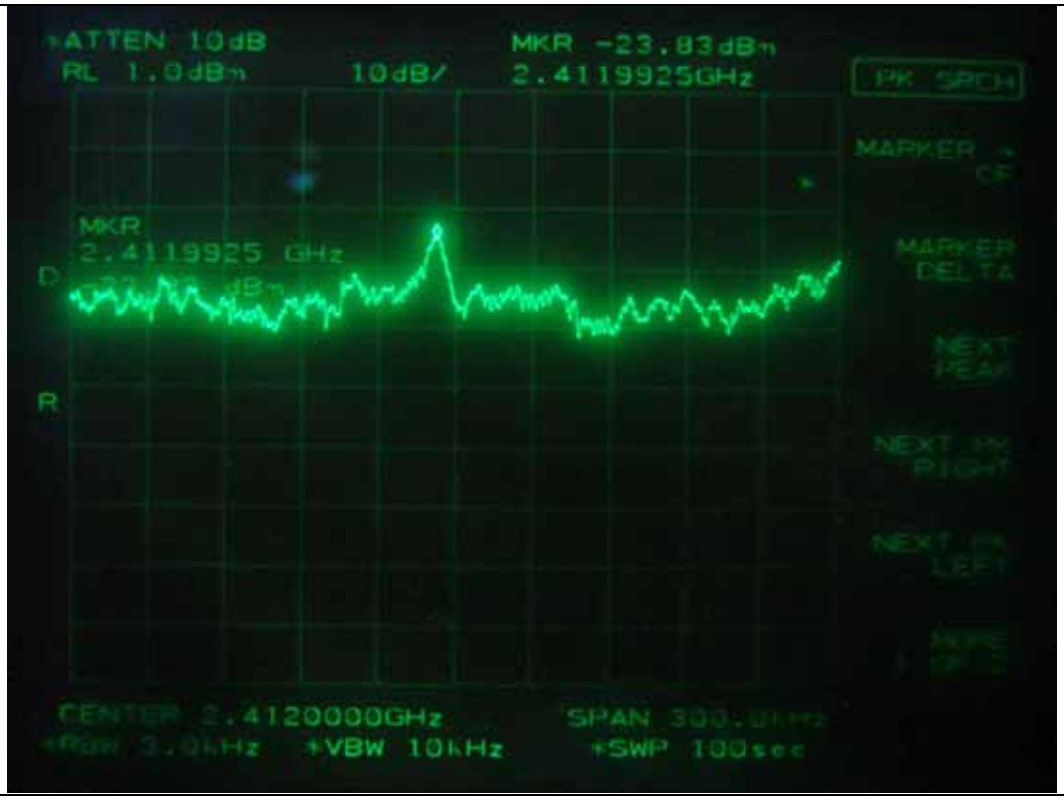

Low Channel

Middle Channel

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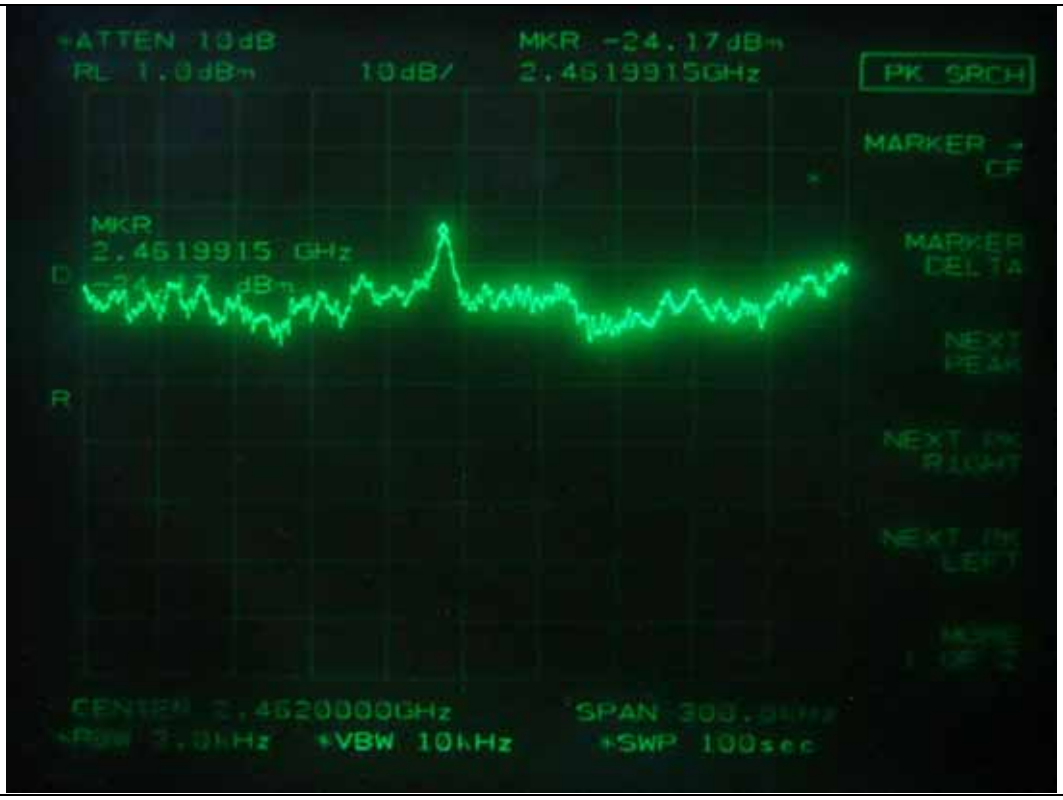

High Channel

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9. TEST DATA FOR SPI ZIGBEE MODE

9.1 MIMIMUM 6 dB BANDWIDTH

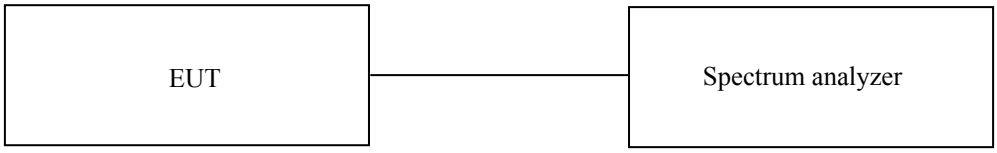
9.1.1 Operating environment

Temperature : 25 °C

Relative humidity : 46 % R.H.

9.1.2 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.



9.1.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal.
■ -	8564E	HP	Spectrum Analyzer	3650A00756	June 10, 2010

All test equipment used is calibrated on a regular basis.

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EMC Testing Dept : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

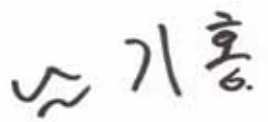
9.1.4 Test data

-. Test Date : May 20, 2010

-. Test Result : Pass

CHANNEL	FREQUENCY(MHz)	MEASURED VLAUE (kHz)	LIMIT (kHz)	MARGIN (kHz)
Low	2 405	1 575	500	-1 075
Middle	2 440	1 580	500	-1 080
High	2 480	1 580	500	-1 080

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



Tested by: Ki-Hong, Nam / Senior Engineer

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Low Channel

Middle Channel

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High Channel

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9.2 MAXIMUM PEAK OUTPUT POWER

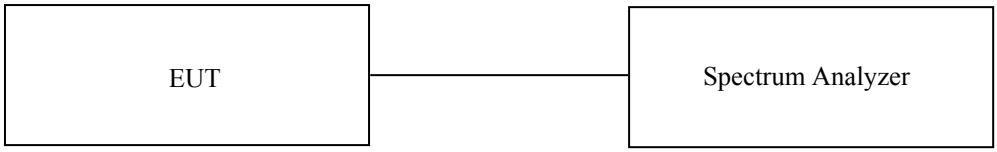
9.2.1 Operating environment

Temperature : 25 °C

Relative humidity : 46 % R.H.

9.2.2 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.



9.2.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal.
■ -	8564E	HP	Spectrum Analyzer	3650A00756	June 10, 2010

All test equipment used is calibrated on a regular basis.

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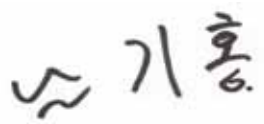
9.2.4 Test data

-. Test Date : May 20, 2010

-. Test Result : Pass

CHANNEL	FREQUENCY (MHz)	99 % Occupied Bandwidth (MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2 405	3.958	11.00	30.00	-19.00
Middle	2 440	3.958	12.10	30.00	-17.90
High	2 480	3.958	12.50	30.00	-17.50

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



Tested by: Ki-Hong, Nam / Senior Engineer

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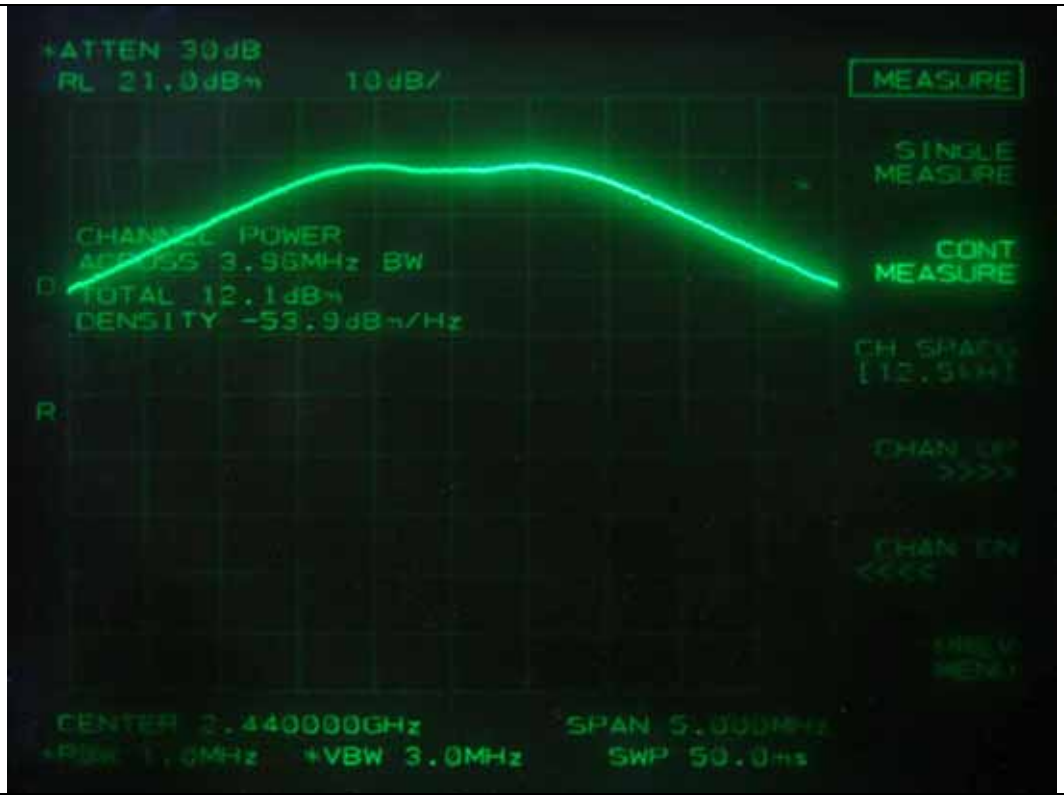
Low Channel



Middle Channel

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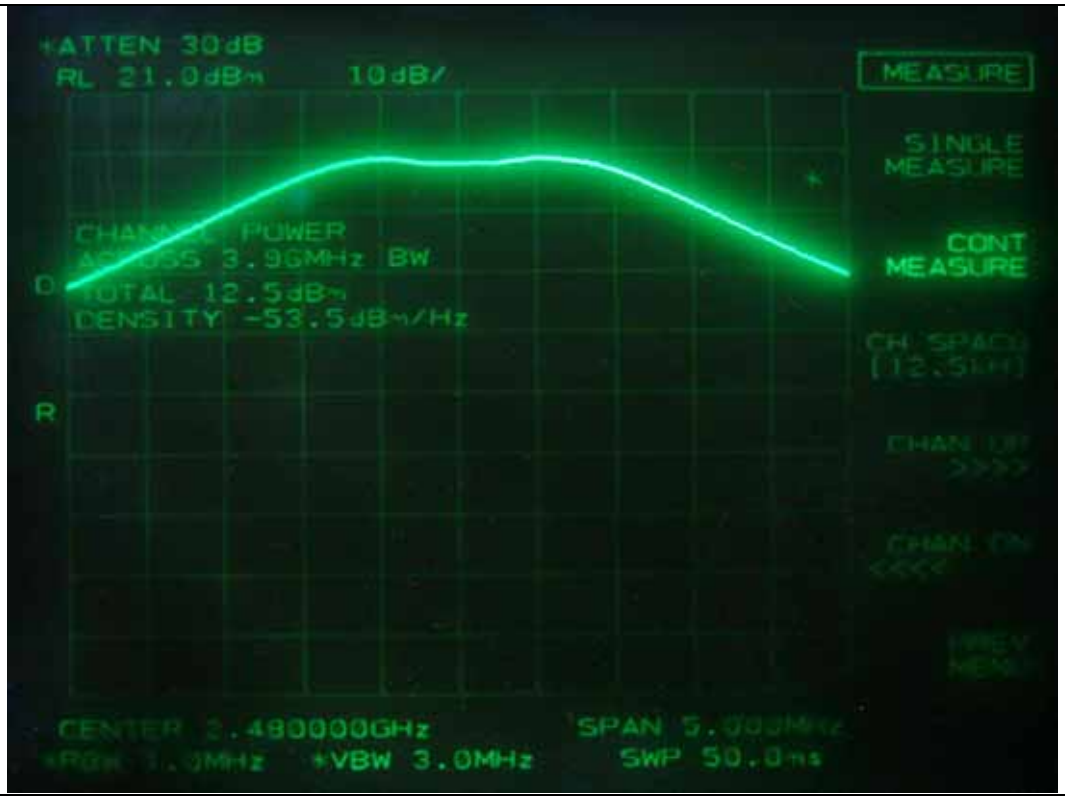

High Channel

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9.3 100 kHz BANDWIDTH OUTSIDE THE FREQUENCY BAND

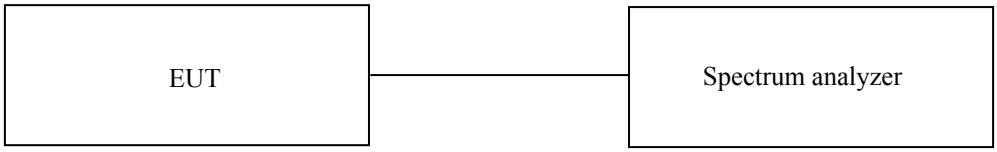
9.3.1 Operating environment

Temperature : 28 °C

Relative humidity : 49 % R.H.

9.3.2 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.



9.3.3 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.

9.3.4 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal.
■ -	8564E	Hewlett-Packard	Spectrum Analyzer	3650A00756	June 10, 2010
■ -	8447D	Hewlett-Packard	Amplifier	2727A04987	June 11, 2010
■ -	83051A	Agilent	Preamplifier	3950M00201	June 11, 2010
■ -	F-40-5000-RF	RLC Electronics	Highpass Filter	0425	July 10, 2009
■ -	MA220	HD	Turn Table	N/A	N/A
■ -	HD240	HD	Antenna Mast	N/A	N/A
■ -	BBHA9120D	Schwarzbeck	Horn Antenna	BBHA9120D294	June 17, 2009(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.

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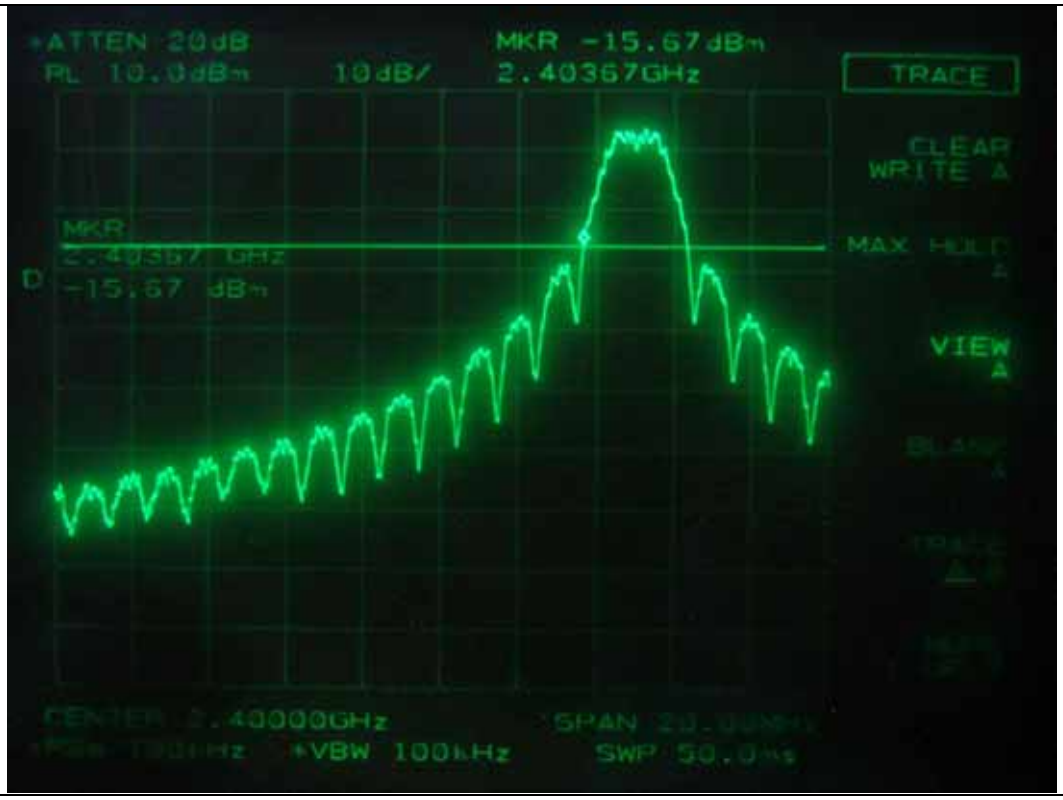
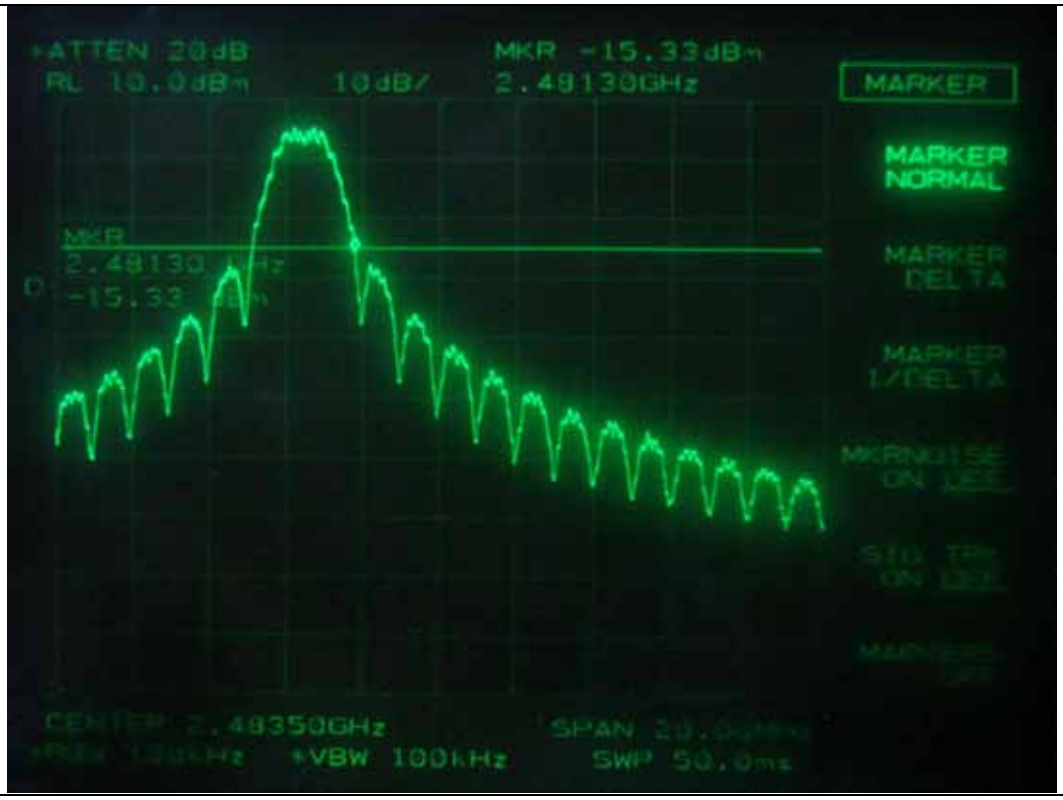
9.3.5. Test data for conducted emission



Low Channel



High Channel

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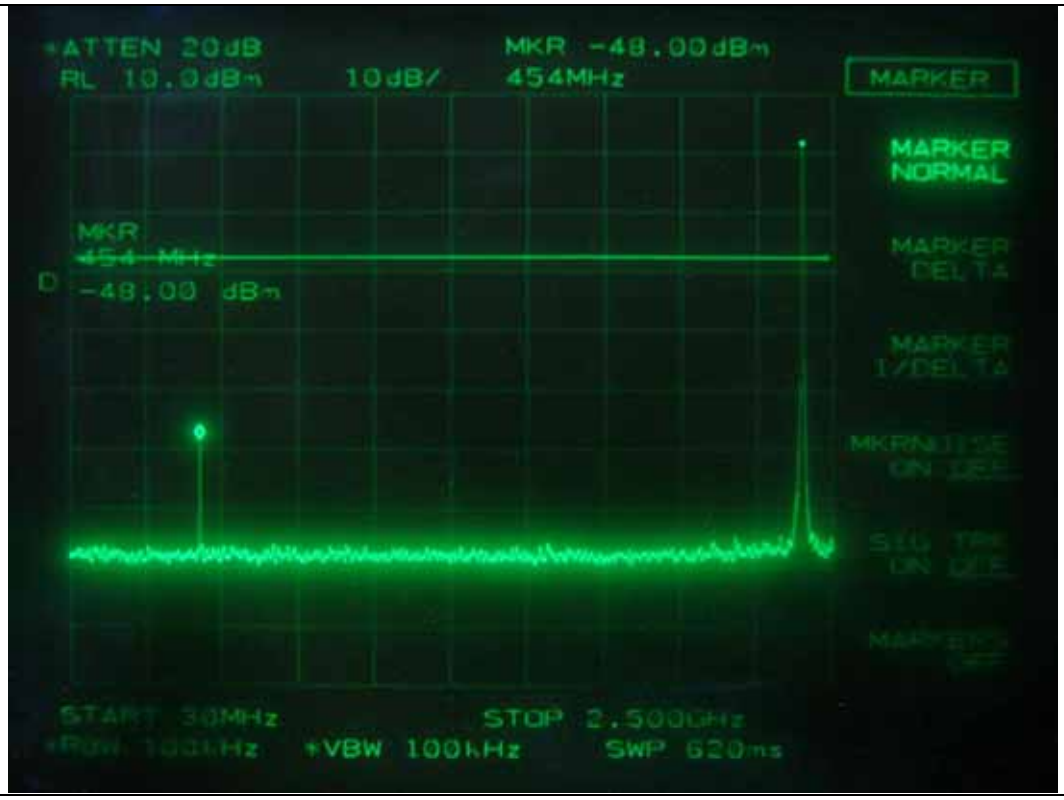
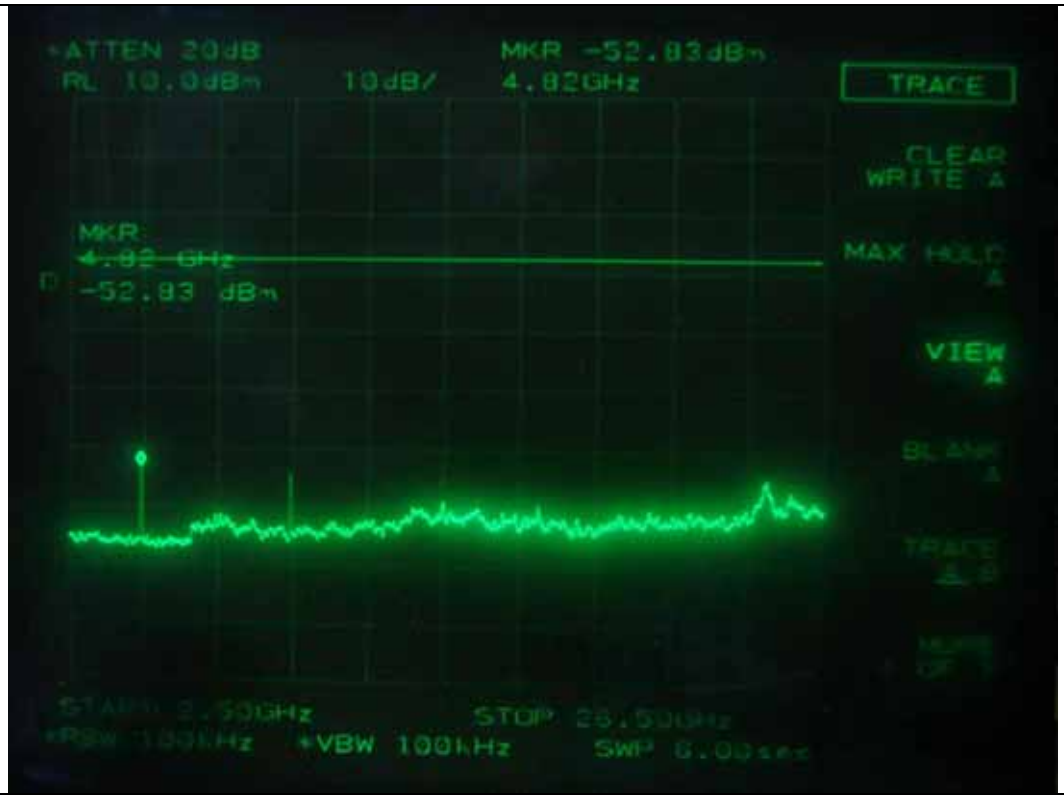


Low Channel



Low Channel

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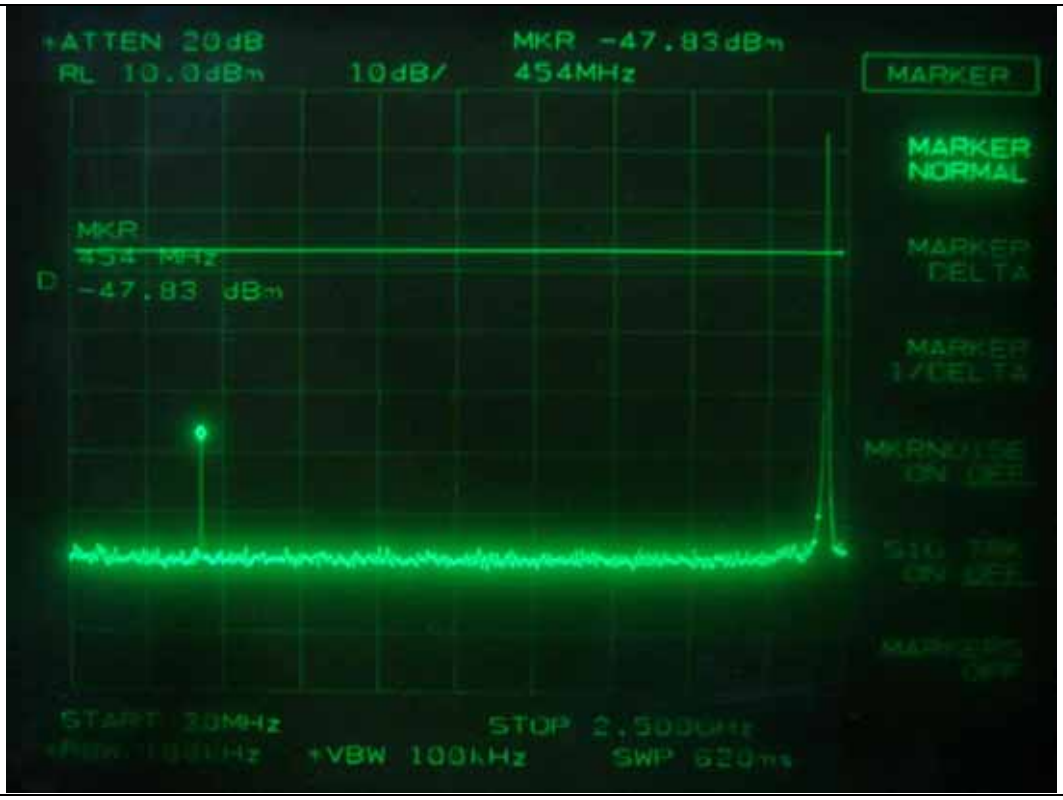
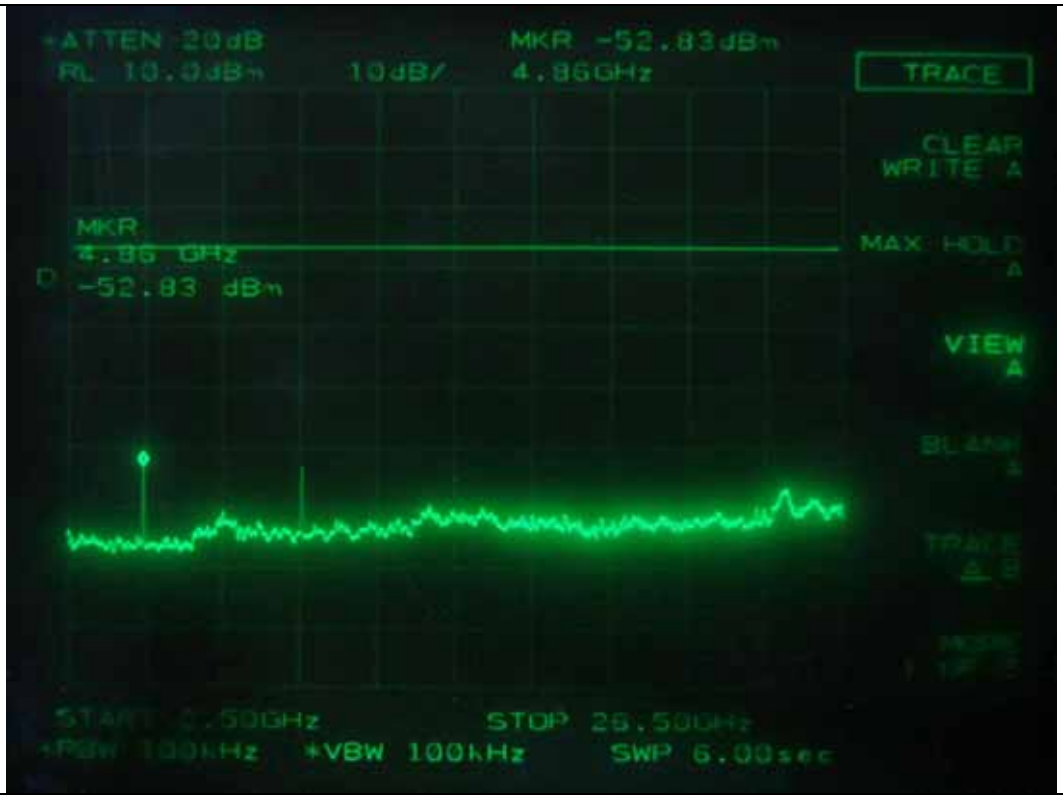


Middle Channel



Middle Channel

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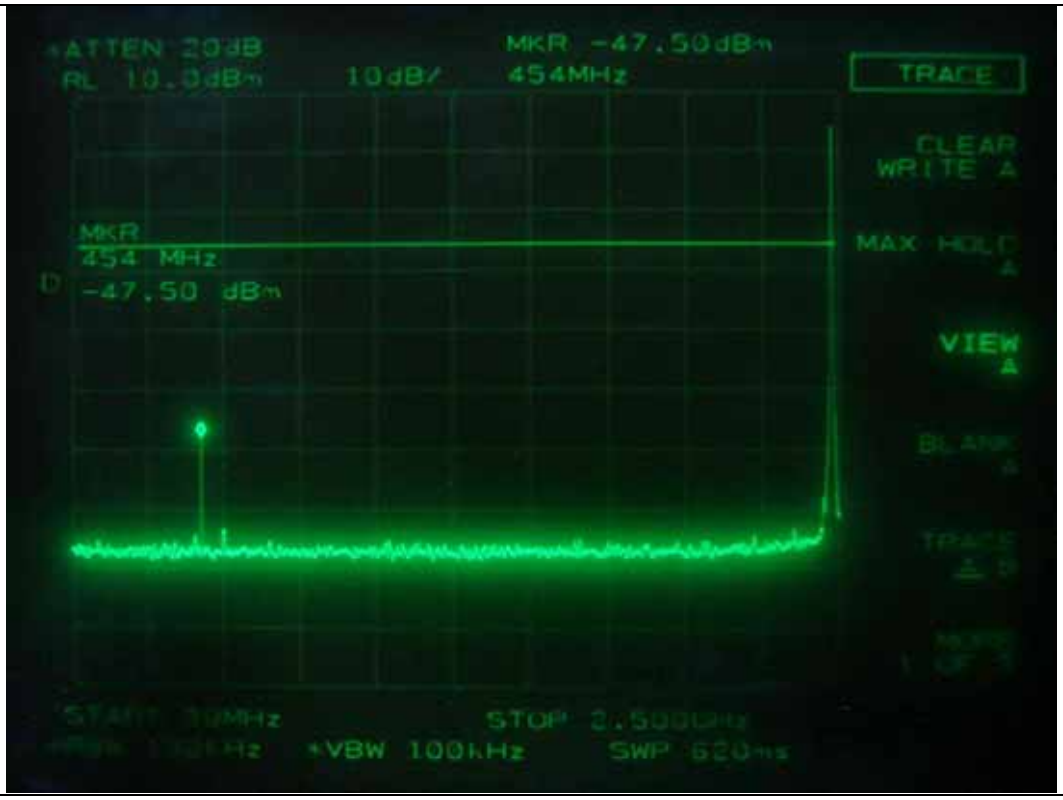

High Channel

High Channel

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9.3.6. Test data for radiated emission

9.3.6.1 Radiated Emission which fall in the Restricted Band

-. Test Date : June 01, 2010

-. 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 –10.19 dB at High Channel

Frequency (MHz)	Reading (dBµV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Total (dBµV/m)	Limits (dBµV/m)	Margin (dB)
Test Data for Low Channel								
2 390.00	21.33	Peak	H	27.05	3.13	51.51	74.00	-22.49
	10.50	Average	H			40.68	54.00	-13.32
	23.50	Peak	V			53.68	74.00	-20.32
	10.83	Average	V			41.01	54.00	-12.99
Test Data for High Channel								
2 483.50	22.67	Peak	H	27.31	3.17	53.15	74.00	-20.85
	11.33	Average	H			41.81	54.00	-12.19
	25.00	Peak	V			55.48	74.00	-18.52
	13.33	Average	V			43.81	54.00	-10.19

Tabulated test data for Restricted Band

Remark: “H”: Horizontal, “V”: Vertical

Tested by: Ki-Hong, Nam / Senior Engineer

9.3.6.2 Spurious & Harmonic Radiated Emission

-. Test Date : June 01, 2010

-. 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 –16.70 dB at High Channel

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									
2 405.00	64.50	Peak	H	27.09	3.16		94.75	-	
	82.00	Peak	V				112.25	-	
4 810.00	37.33	Peak	H	31.08	4.13	28.80	43.74	74.00	-30.26
	29.00	Average	H				35.41	54.00	-18.59
	39.17	Peak	V				45.58	74.00	-28.42
	30.42	Average	V				36.83	54.00	-17.17
Test Data for Middle Channel									
2 440.00	64.00	Peak	H	27.19	3.17		94.36	-	
	82.17	Peak	V				112.53	-	
4 880.00	36.33	Peak	H	31.19	4.14	28.73	42.93	74.00	-31.07
	29.00	Average	H				35.60	54.00	-18.40
	39.17	Peak	V				45.77	74.00	-28.23
	29.50	Average	V				36.10	54.00	-17.90
Test Data for High Channel									
2 480.00	65.33	Peak	H	27.30	3.67		96.30	-	
	82.50	Peak	V				113.47	-	
4 960.00	38.33	Peak	H	31.32	4.15	28.67	45.13	74.00	-28.87
	30.50	Average	H				37.30	54.00	-16.70
	39.67	Peak	V				46.47	74.00	-27.53
	30.33	Average	V				37.13	54.00	-16.87

Tabulated test data for Restricted Band

Remark: “H”: Horizontal, “V”: Vertical

Tested by: Ki-Hong, Nam / Senior Engineer

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9.4 PEAK POWER SPECTRUL DENSITY

9.4.1 Operating environment

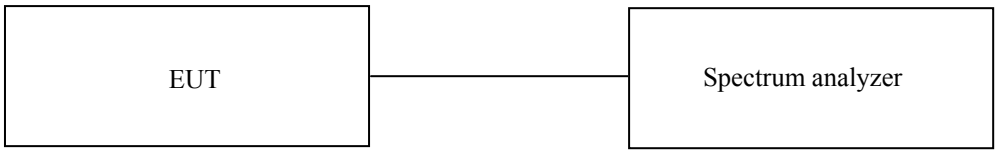
Temperature : 25 °C

Relative humidity : 46 % R.H.

9.4.2 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.



9.4.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal.
■ -	8564E	HP	Spectrum Analyzer	3650A00756	June 10, 2010

All test equipment used is calibrated on a regular basis.

HEAD OFFICE : #505 SK Apt. Factory 223-28, Sangdaewon1-dong, Jungwon-gu, Seongnam-si, Gyeonggi-do 462-705 Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)
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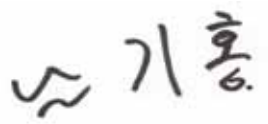
9.4.4 Test data

-. Test Date : May 20, 2010

-. Test Result : Pass

CHANNEL	FREQUENCY(MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2 405	-7.33	8.00	-15.33
Middle	2 440	-6.50	8.00	-14.50
High	2 480	-6.17	8.00	-14.17

Remark: See next page for measurement data.



Tested by: Ki-Hong, Nam / Senior Engineer

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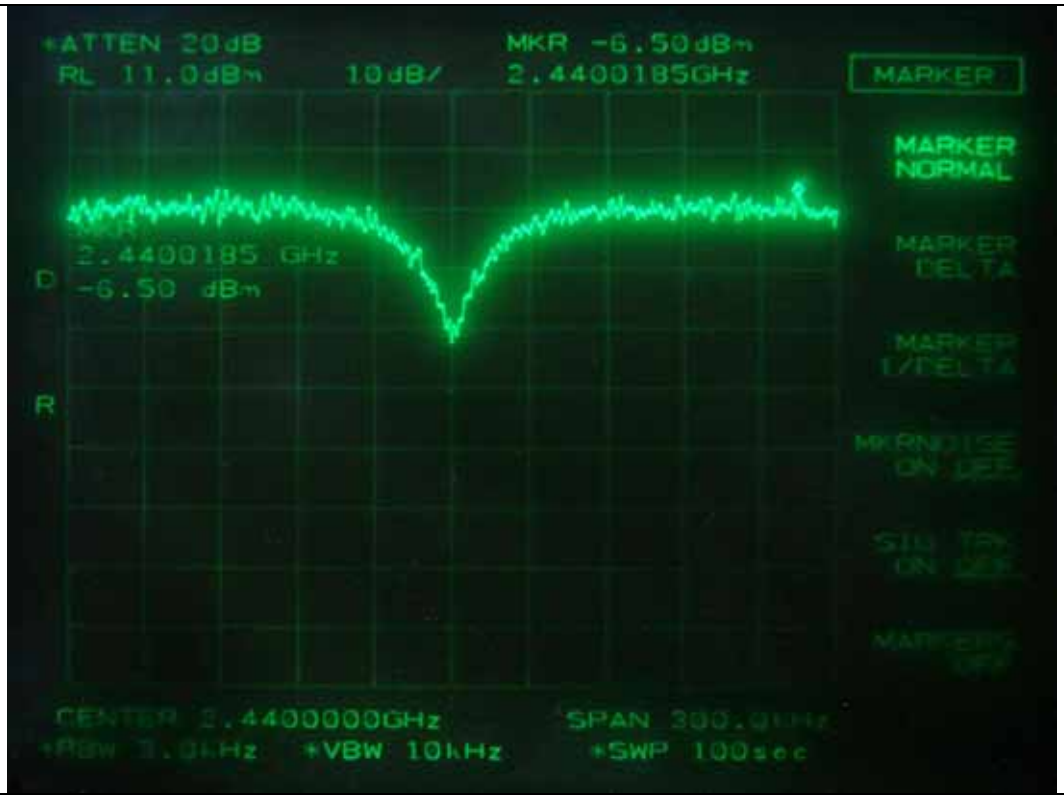
Low Channel



Middle Channel

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High Channel

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10. TEST DATA FOR UART ZIGBEE MODE

10.1 MIMIMUM 6 dB BANDWIDTH

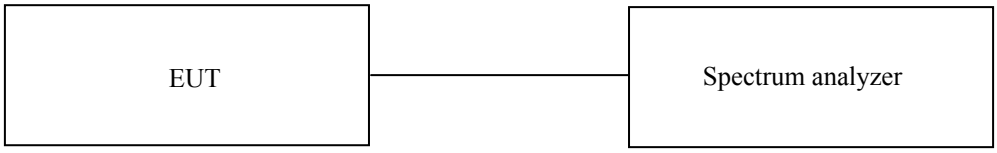
10.1.1 Operating environment

Temperature : 25 °C

Relative humidity : 46 % R.H.

10.1.2 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.



10.1.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal.
■ -	8564E	HP	Spectrum Analyzer	3650A00756	June 10, 2010

All test equipment used is calibrated on a regular basis.

HEAD OFFICE : #505 SK Apt. Factory 223-28, Sangdaewon1-dong, Jungwon-gu, Seongnam-si, Gyeonggi-do 462-705 Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)
EMC Testing Dept : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

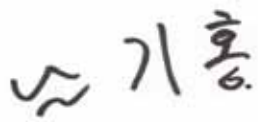
10.1.4 Test data

-. Test Date : May 20, 2010

-. Test Result : Pass

CHANNEL	FREQUENCY(MHz)	MEASURED VLAUE (kHz)	LIMIT (kHz)	MARGIN (kHz)
Low	2 405	1 575	500	-1 075
Middle	2 440	1 575	500	-1 075
High	2 480	1 575	500	-1 075

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



Tested by: Ki-Hong, Nam / Senior Engineer

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Low Channel

Middle Channel

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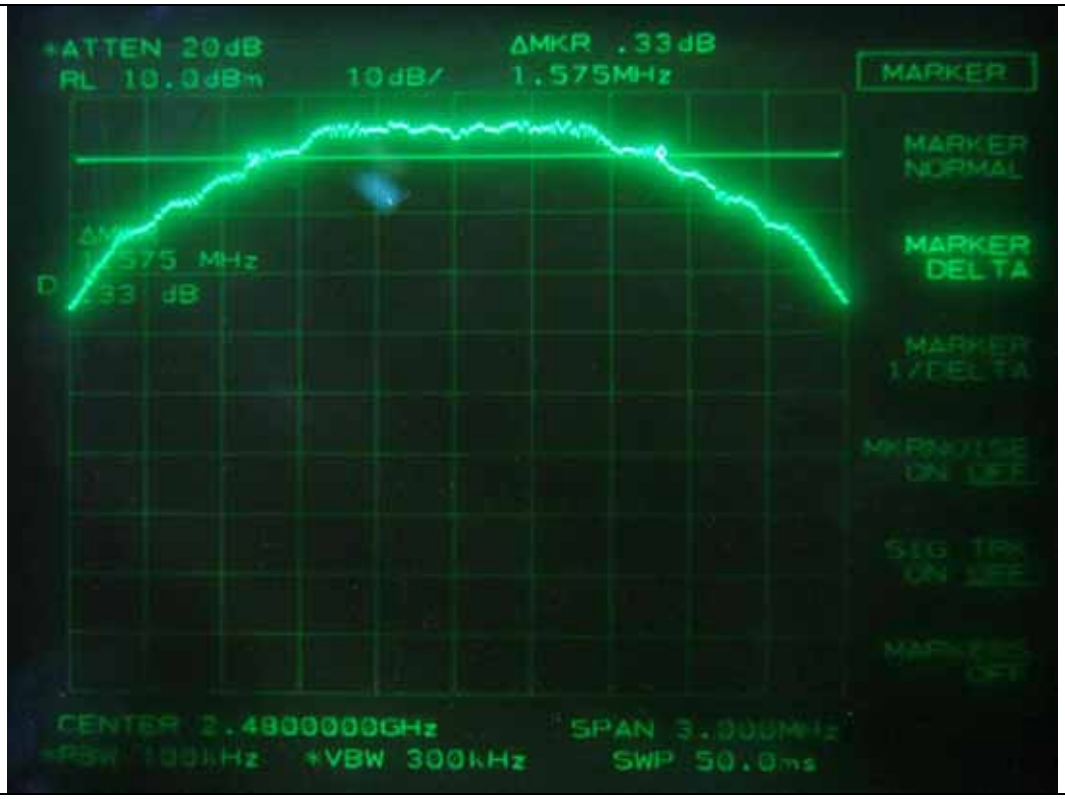

High Channel

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10.2 MAXIMUM PEAK OUTPUT POWER

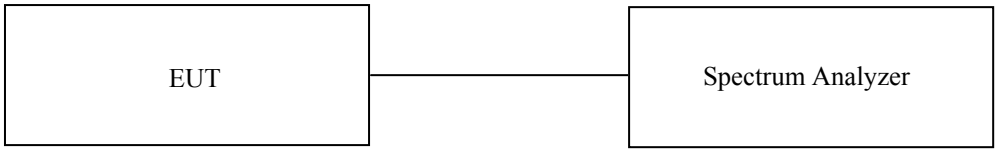
10.2.1 Operating environment

Temperature : 25 °C

Relative humidity : 46 % R.H.

10.2.2 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.



10.2.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal.
■ -	8564E	HP	Spectrum Analyzer	3650A00756	June 10, 2010

All test equipment used is calibrated on a regular basis.

HEAD OFFICE : #505 SK Apt. Factory 223-28, Sangdaewon1-dong, Jungwon-gu, Seongnam-si, Gyeonggi-do 462-705 Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)
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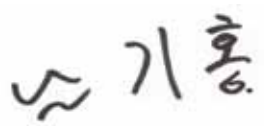
10.2.4 Test data

-. Test Date : May 20, 2010

-. Test Result : Pass

CHANNEL	FREQUENCY (MHz)	99 % Occupied Bandwidth (MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2 405	3.950	12.00	30.00	-18.00
Middle	2 440	3.958	11.70	30.00	-18.30
High	2 480	3.950	11.40	30.00	-18.60

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



Tested by: Ki-Hong, Nam / Senior Engineer

HEAD OFFICE : #505 SK Apt. Factory 223-28, Sangdaewon1-dong, Jungwon-gu, Seongnam-si, Gyeonggi-do 462-705 Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)
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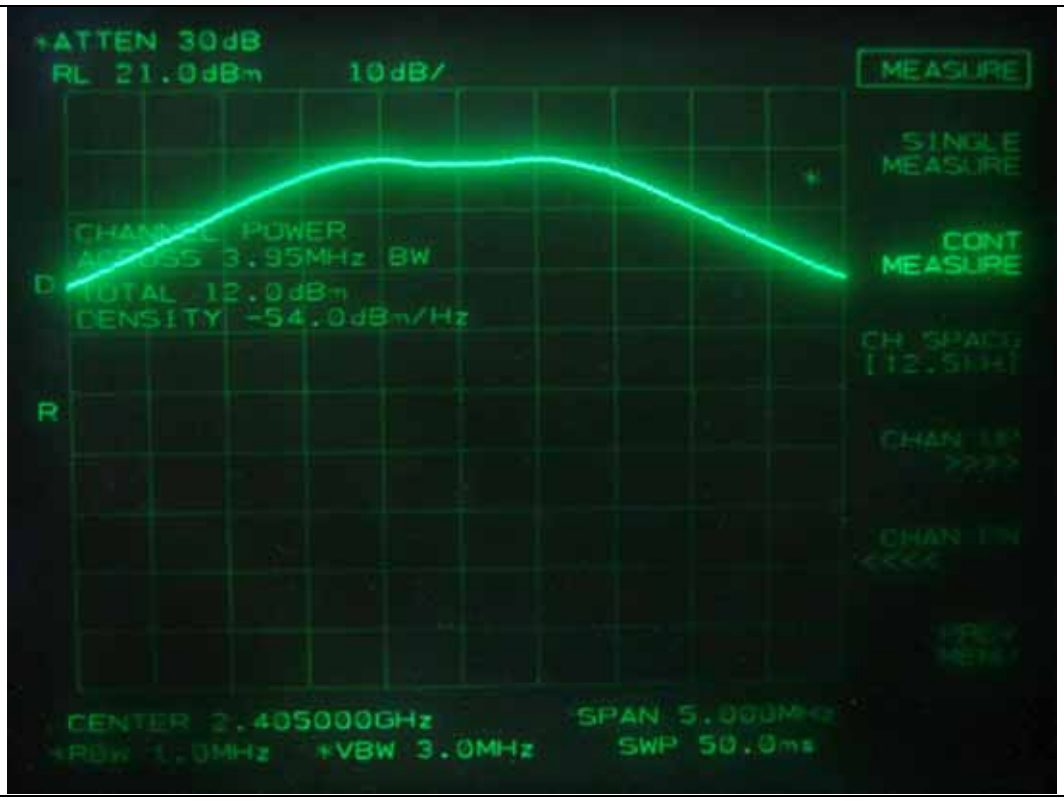
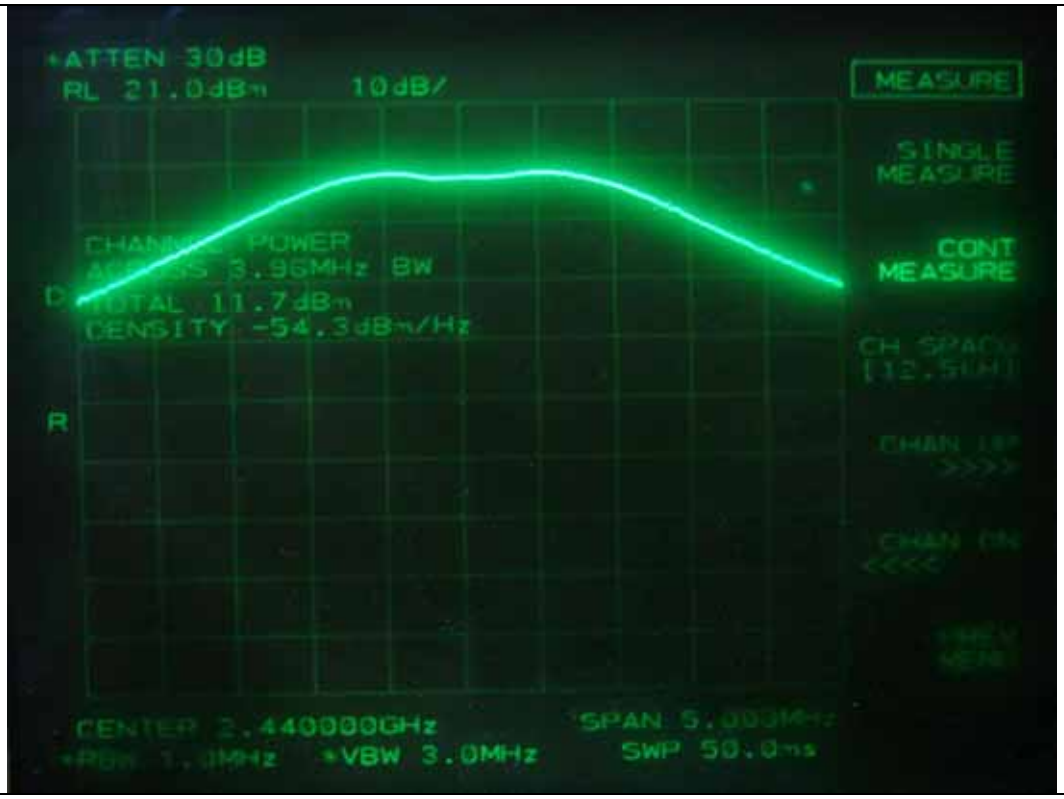


Low Channel



Middle Channel

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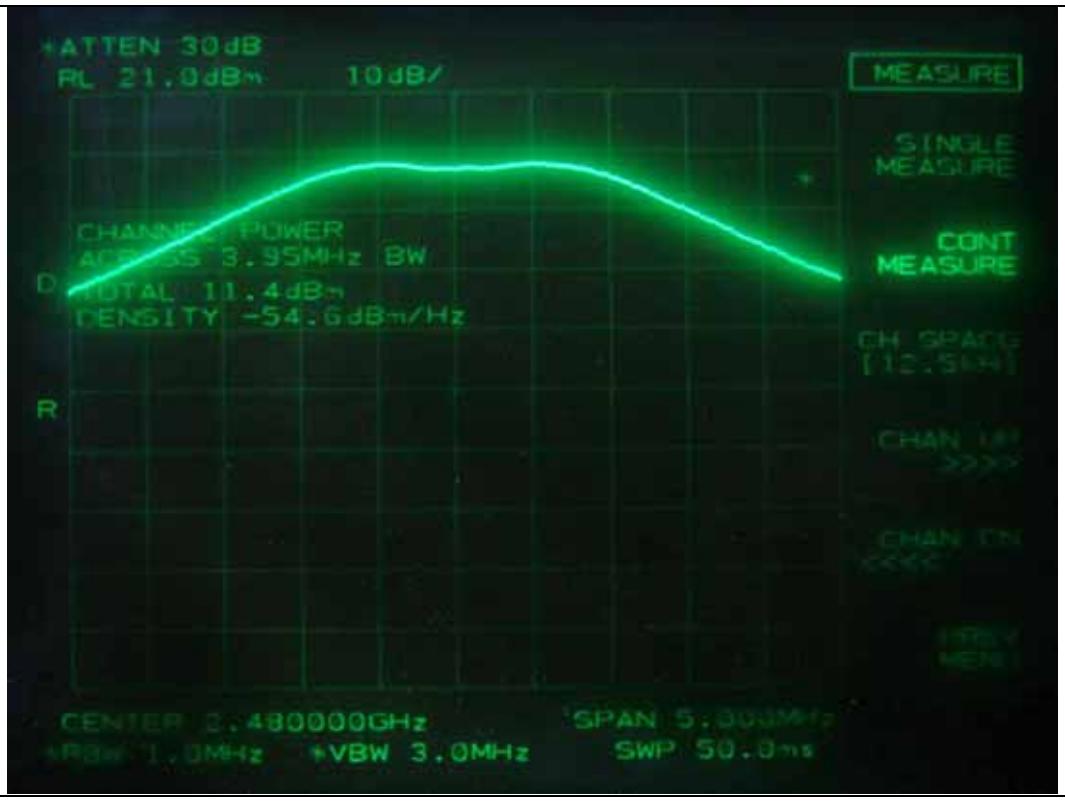

High Channel

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10.3 100 kHz BANDWIDTH OUTSIDE THE FREQUENCY BAND

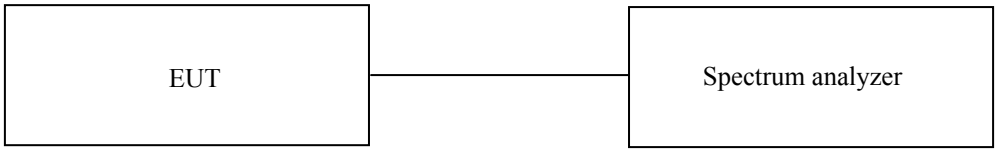
10.3.1 Operating environment

Temperature : 28 °C

Relative humidity : 49 % R.H.

10.3.2 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.



10.3.3 Test set-up for radiated measurement

The radiated emissions measurements were performed on the 3 me, 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.

10.3.4 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal.
■ -	8564E	Hewlett-Packard	Spectrum Analyzer	3650A00756	June 10, 2010
■ -	8447D	Hewlett-Packard	Amplifier	2727A04987	June 11, 2010
■ -	83051A	Agilent	Preamplifier	3950M00201	June 11, 2010
■ -	F-40-5000-RF	RLC Electronics	Highpass Filter	0425	July 10, 2009
■ -	MA220	HD	Turn Table	N/A	N/A
■ -	HD240	HD	Antenna Mast	N/A	N/A
■ -	BBHA9120D	Schwarzbeck	Horn Antenna	BBHA9120D294	June 17, 2009(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.

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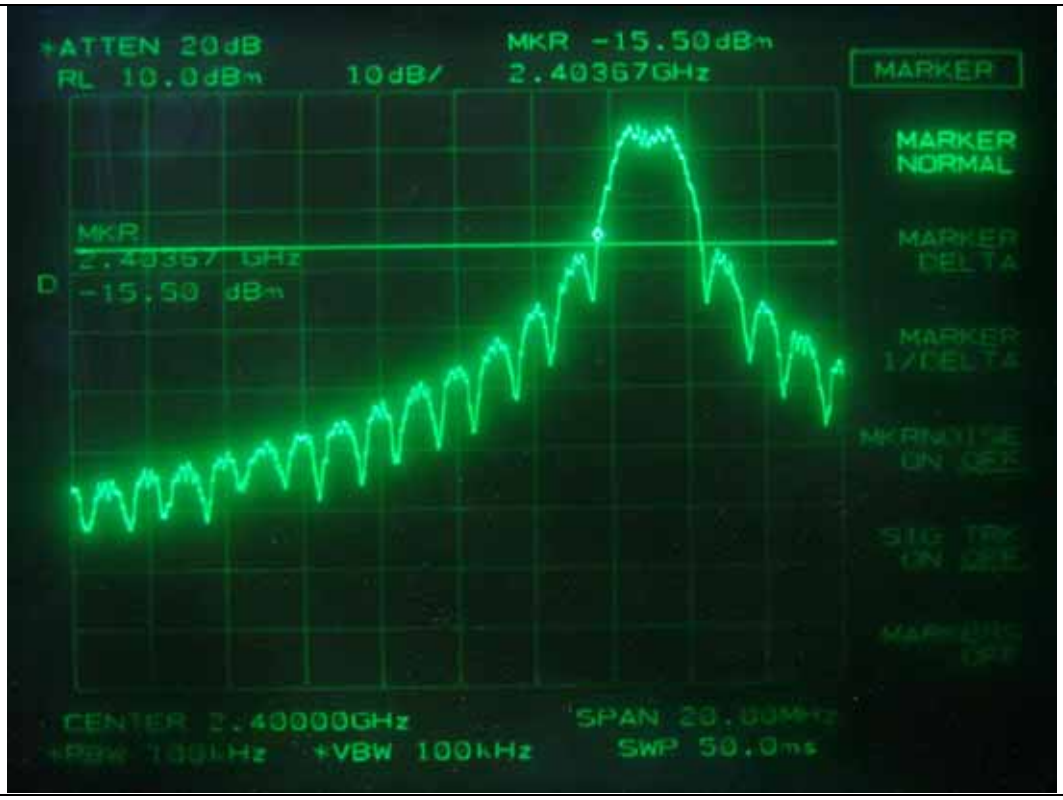
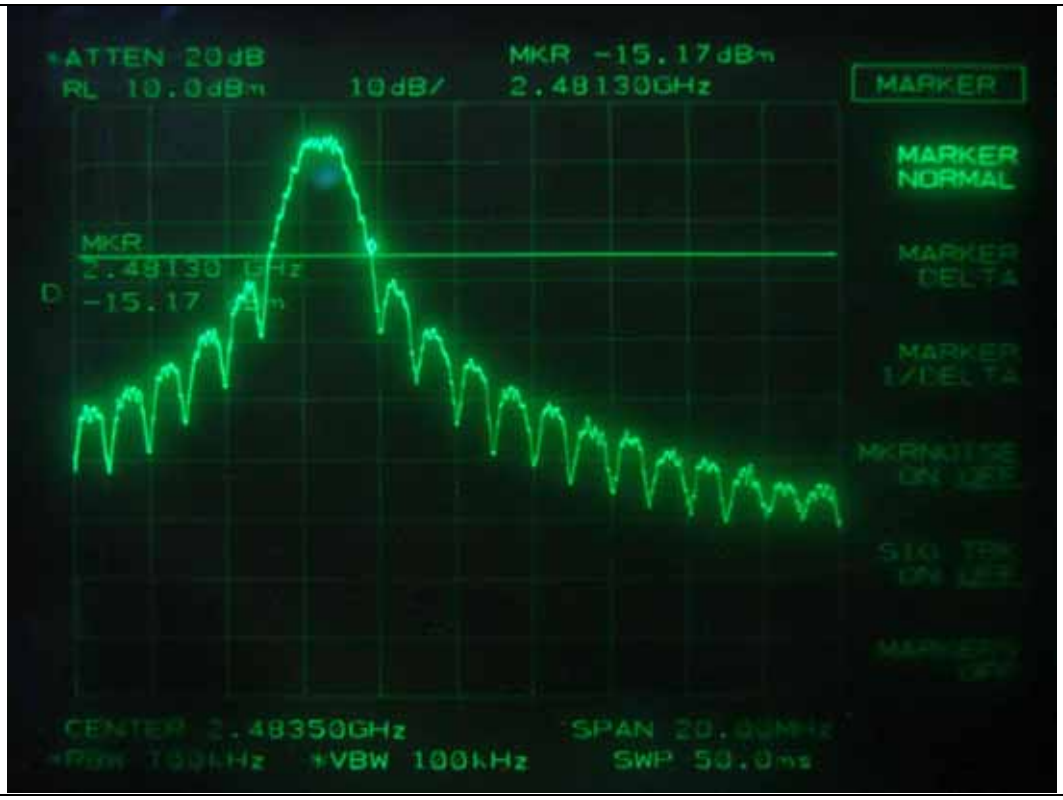
10.3.5. Test data for conducted emission



Low Channel



High Channel

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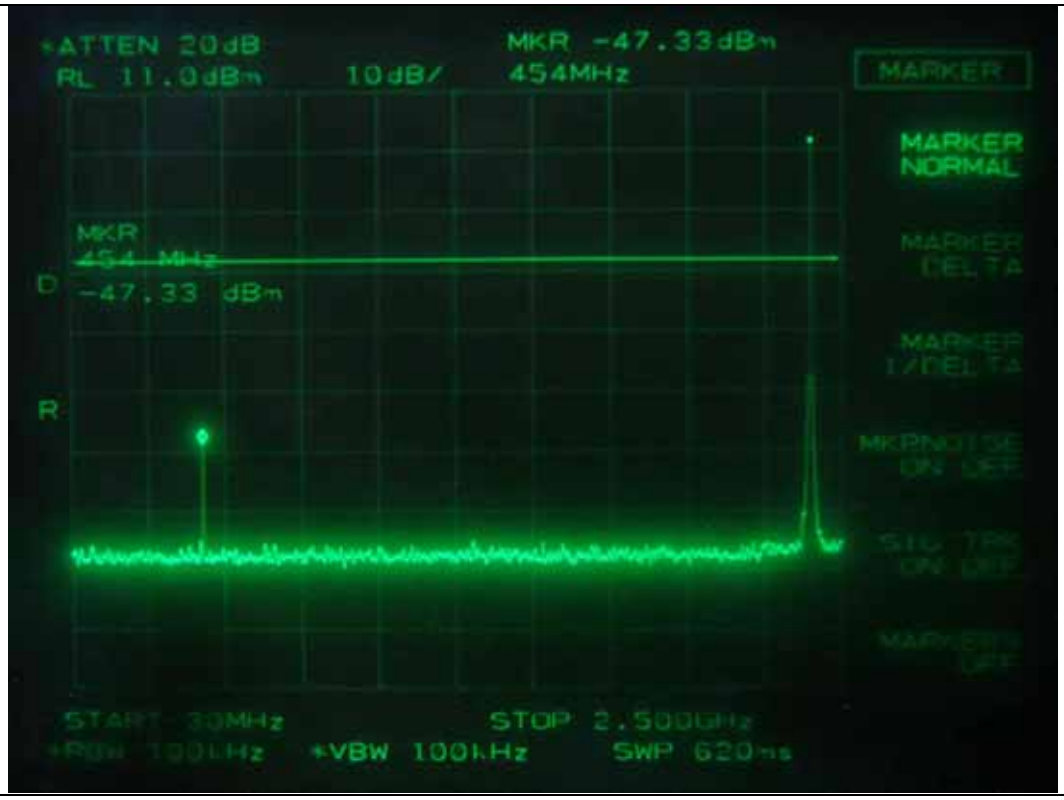
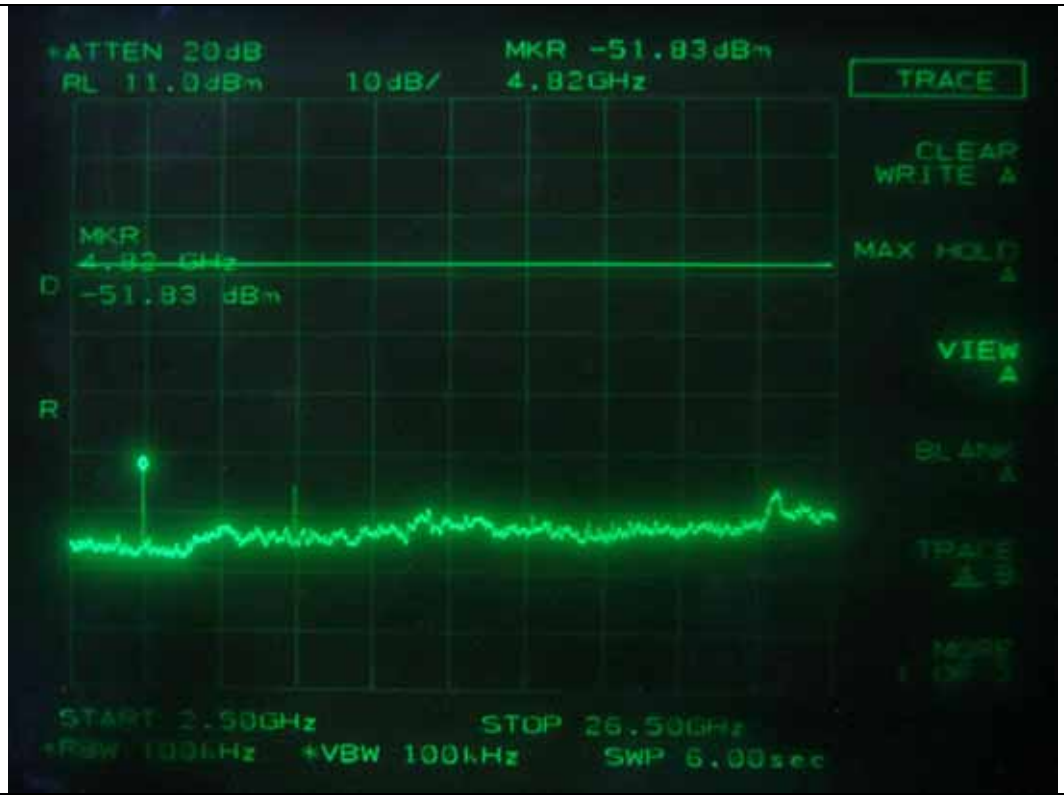


Low Channel



Low Channel

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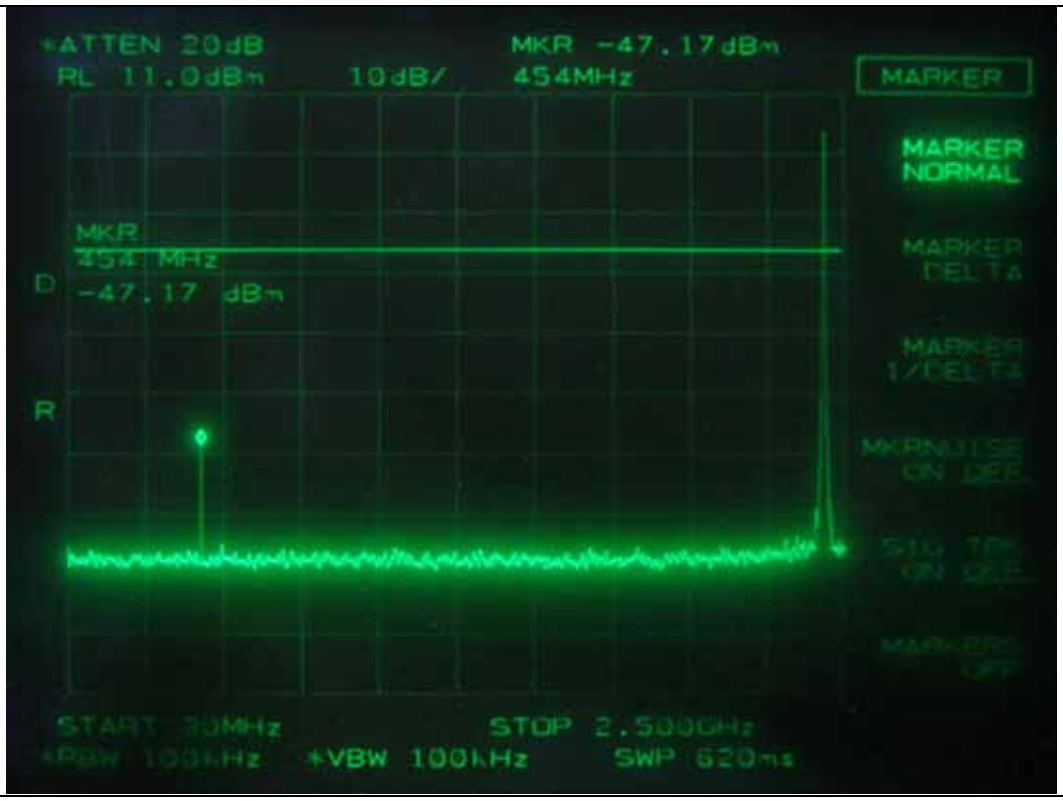
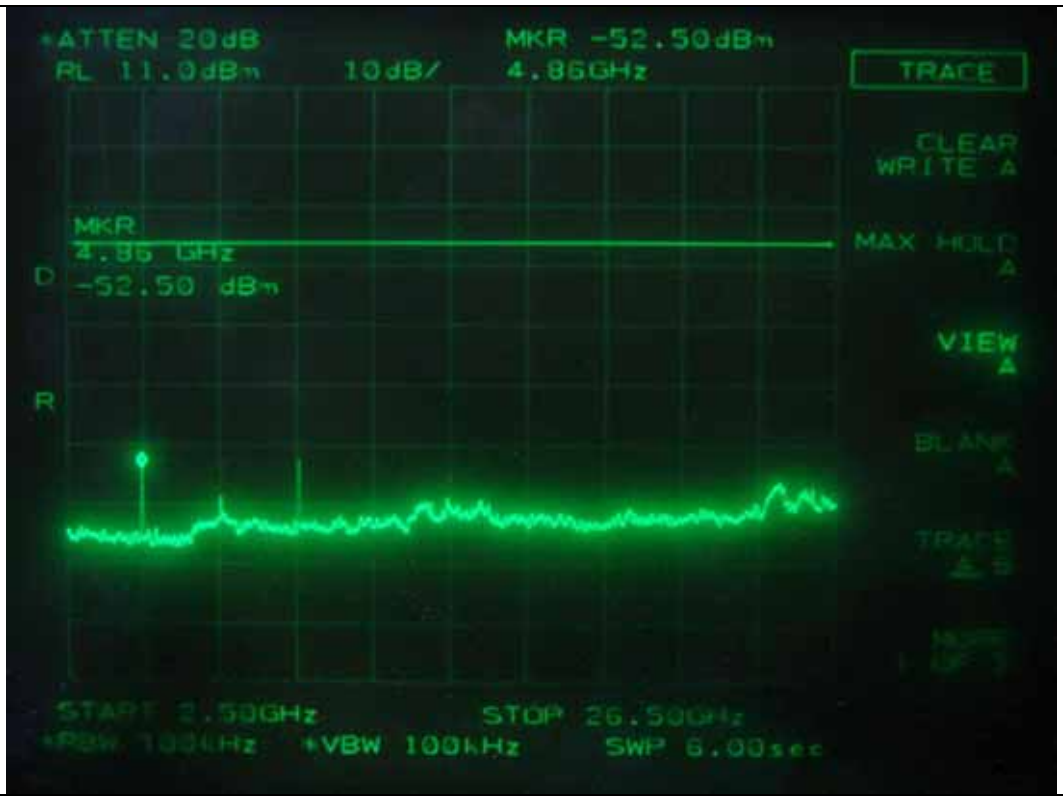


Middle Channel



Middle Channel

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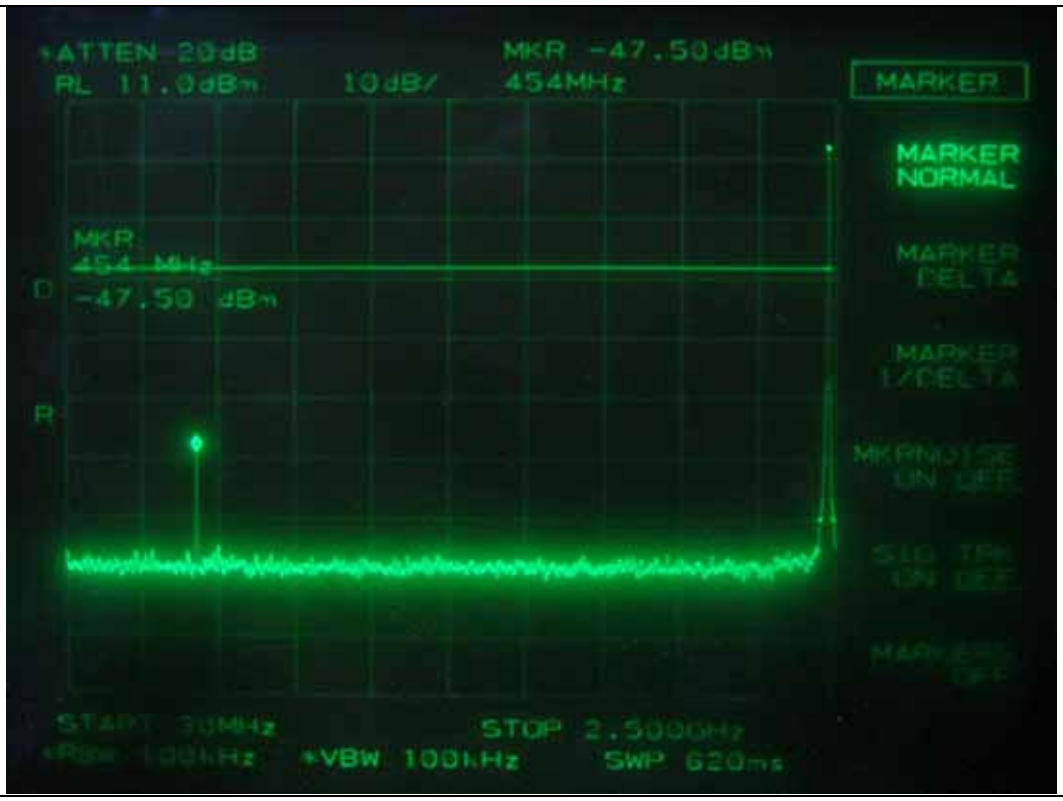

High Channel

High Channel

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10.3.6. Test data for radiated emission

10.3.6.1 Radiated Emission which fall in the Restricted Band

-. Test Date : June 01, 2010

-. 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 –10.02 dB at High Channel

Frequency (MHz)	Reading (dBµV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Total (dBµV/m)	Limits (dBµV/m)	Margin (dB)
Test Data for Low Channel								
2 390.00	21.50	Peak	H	27.05	3.13	51.68	74.00	-22.32
	10.67	Average	H			40.85	54.00	-13.15
	23.83	Peak	V			54.01	74.00	-19.99
	11.00	Average	V			41.18	54.00	-12.82
Test Data for High Channel								
2 483.50	22.83	Peak	H	27.31	3.17	53.31	74.00	-20.69
	11.67	Average	H			42.15	54.00	-11.85
	25.33	Peak	V			55.81	74.00	-18.19
	13.50	Average	V			43.98	54.00	-10.02

Tabulated test data for Restricted Band

Remark: “H”: Horizontal, “V”: Vertical

Tested by: Ki-Hong, Nam / Senior Engineer

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EMC Testing Dept : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

10.3.6.2 Spurious & Harmonic Radiated Emission

-. Test Date : June 01, 2010

-. 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 –16.48 dB at High Channel

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									
2 405.00	64.83	Peak	H	27.09	3.16		95.08	-	
	82.22	Peak	V				112.47	-	
4 810.00	37.50	Peak	H	31.08	4.13	28.80	43.91	74.00	-30.09
	29.33	Average	H				35.74	54.00	-18.26
	39.42	Peak	V				45.83	74.00	-28.17
	30.50	Average	V				36.91	54.00	-17.09
Test Data for Middle Channel									
2 440.00	64.17	Peak	H	27.19	3.17		94.53	-	
	82.00	Peak	V				112.36	-	
4 880.00	36.50	Peak	H	31.19	4.14	28.73	43.10	74.00	-30.90
	29.17	Average	H				35.77	54.00	-18.23
	39.00	Peak	V				45.60	74.00	-28.40
	29.83	Average	V				36.43	54.00	-17.57
Test Data for High Channel									
2 480.00	65.00	Peak	H	27.30	3.67		95.47	-	
	82.67	Peak	V				113.14	-	
4 960.00	38.00	Peak	H	31.32	4.15	28.67	44.80	74.00	-29.20
	30.00	Average	H				36.80	54.00	-17.20
	39.83	Peak	V				46.63	74.00	-27.37
	30.72	Average	V				37.52	54.00	-16.48

Tabulated test data for Restricted Band

Remark: “H”: Horizontal, “V”: Vertical

Tested by: Ki-Hong, Nam / Senior Engineer

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10.4 PEAK POWER SPECTRUL DENSITY

10.4.1 Operating environment

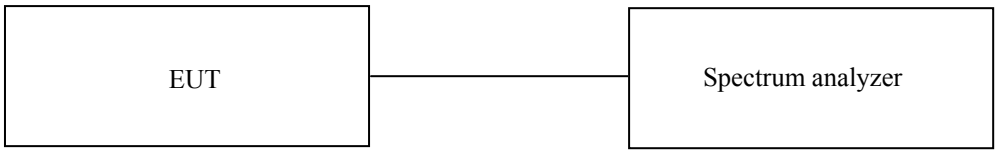
Temperature : 25 °C

Relative humidity : 46 % R.H.

10.4.2 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.



10.4.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal.
■ -	8564E	HP	Spectrum Analyzer	3650A00756	June 10, 2010

All test equipment used is calibrated on a regular basis.

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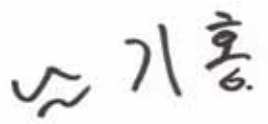
10.4.4 Test data

-. Test Date : May 20, 2010

-. Test Result : Pass

CHANNEL	FREQUENCY(MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2 405	-6.50	8.00	-14.50
Middle	2 440	-6.83	8.00	-14.83
High	2 480	-7.00	8.00	-15.00

Remark: See next page for measurement data.



Tested by: Ki-Hong, Nam / Senior Engineer

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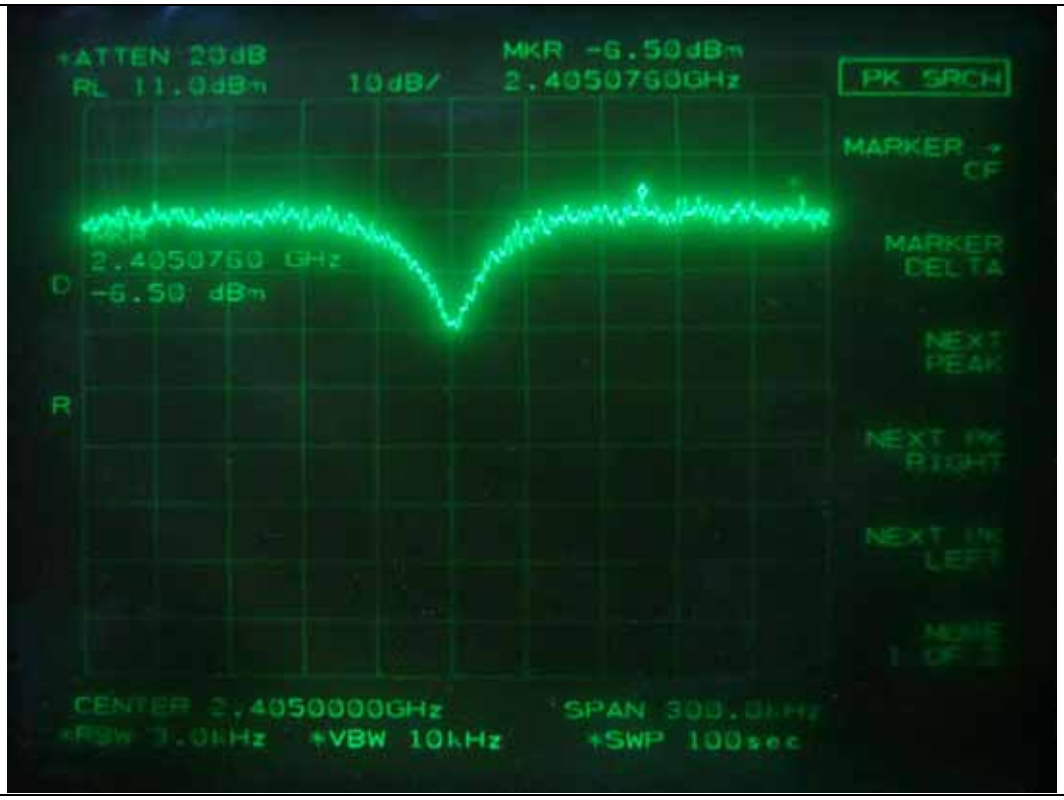

Low Channel

Middle Channel

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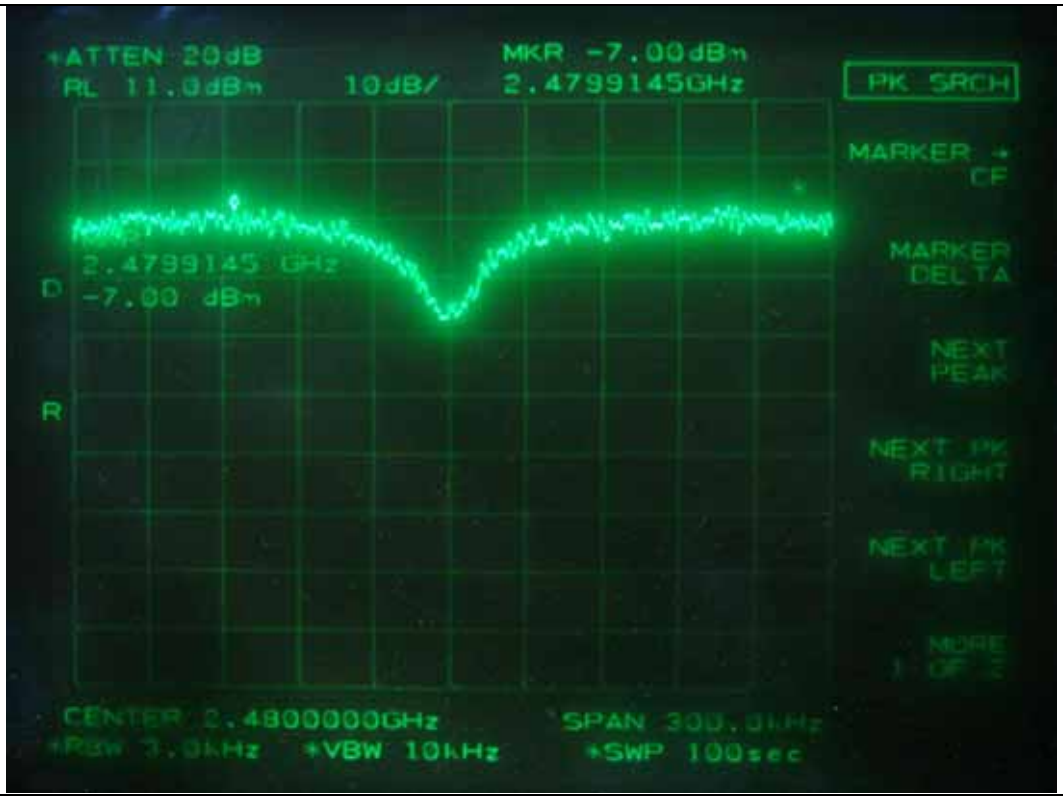

High Channel

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11. RADIATED EMISSION TEST

11.1 Operating environment

Temperature : 24 °C

Relative humidity : 42 % R.H.

11.2 Test set-up

The radiated emissions measurements were on the 3 m, 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 m and 4.0 m in order to determine the maximum emission levels. This procedure was performed for both horizontal and vertical polarization of the receiving antenna.

11.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal.
■ -	ESVD	Rohde & Schwarz	Test Receiver	838453/018	Nov. 20, 2009
■ -	8566B	HP	Spectrum Analyzer	3407A08547	June 11, 2010
■ -	8447D	Hewlett Packard	Amplifier	2727A04987	June 11, 2010
■ -	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
■ -	VHA9104	Schwarzbeck	Biconical Antenna	148533554	Mar. 30, 2010(2Y)
■ -	9108-A(495)	Schwarzbeck	Log Periodic Antenna	119782703	Mar. 30, 2010(2Y)

All test equipment used is calibrated on a regular basis.

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11.4 Test data

11.4.1 Operating Mode: 802.11b WLAN Mode

-. Test Date : May 28, 2010

-. Resolution bandwidth : 120 kHz

-. Frequency range : 30 MHz ~ 1 000 MHz

-. Measurement distance : 3 m

-. 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)
125.01	22.50	V	1.30	150.00	13.89	2.45	38.84	43.52	-4.68
249.98	18.10	V	1.40	180.00	17.39	3.40	38.89	46.02	-7.13
362.00	17.60	H	1.30	140.00	16.14	3.70	37.44	46.02	-8.58
399.99	18.10	H	1.00	210.00	17.45	4.00	39.55	46.02	-6.47
462.29	17.50	H	1.40	230.00	18.66	4.37	40.53	46.02	-5.49
522.87	16.30	H	1.00	140.00	19.48	4.92	40.70	46.02	-5.32

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)
125.01	22.17	V	1.30	150.00	13.89	2.45	38.51	43.52	-5.01
249.98	18.00	V	1.40	180.00	17.39	3.40	38.79	46.02	-7.23
362.00	17.83	H	1.30	140.00	16.14	3.70	37.67	46.02	-8.35
399.99	18.33	H	1.00	210.00	17.45	4.00	39.78	46.02	-6.24
462.29	17.67	H	1.40	230.00	18.66	4.37	40.70	46.02	-5.32
522.87	16.00	H	1.00	140.00	19.48	4.92	40.40	46.02	-5.62

Tabulated test data for Radiated Electromagnetic Field

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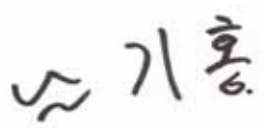
-. Channel : High

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)
125.01	22.67	V	1.30	150.00	13.89	2.45	39.01	43.52	-4.51
249.98	18.33	V	1.40	180.00	17.39	3.40	39.12	46.02	-6.90
362.00	17.50	H	1.30	140.00	16.14	3.70	37.34	46.02	-8.68
399.99	18.00	H	1.00	210.00	17.45	4.00	39.45	46.02	-6.57
462.29	17.67	H	1.40	230.00	18.66	4.37	40.70	46.02	-5.32
522.87	16.50	H	1.00	140.00	19.48	4.92	40.90	46.02	-5.12

Tabulated test data for Radiated Electromagnetic Field

Remark: “H”: Horizontal, “V”: Vertical



Tested by: Ki-Hong, Nam / Senior Engineer

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11.4.2 Operating Mode: 802.11g WLAN Mode

-. Test Date : May 28, 2010

-. Resolution bandwidth : 120 kHz

-. Frequency range : 30 MHz ~ 1 000 MHz

-. Measurement distance : 3 m

-. 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)
125.01	22.60	V	1.40	180.00	13.89	2.45	38.94	43.52	-4.58
249.99	18.00	V	1.50	200.00	17.39	3.40	38.79	46.02	-7.23
362.01	17.30	H	1.00	160.00	16.14	3.70	37.14	46.02	-8.88
399.98	17.70	H	1.50	220.00	17.45	4.00	39.15	46.02	-6.87
462.30	17.30	H	1.00	250.00	18.66	4.37	40.33	46.02	-5.69
522.90	16.40	H	1.00	170.00	19.48	4.92	40.80	46.02	-5.22

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)
125.01	22.50	V	1.40	180.00	13.89	2.45	38.84	43.52	-4.68
249.99	18.33	V	1.50	200.00	17.39	3.40	39.12	46.02	-6.90
362.01	17.50	H	1.00	160.00	16.14	3.70	37.34	46.02	-8.68
399.98	17.42	H	1.50	220.00	17.45	4.00	38.87	46.02	-7.15
462.30	17.75	H	1.00	250.00	18.66	4.37	40.78	46.02	-5.24
522.90	16.33	H	1.00	170.00	19.48	4.92	40.73	46.02	-5.29

Tabulated test data for Radiated Electromagnetic Field

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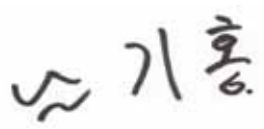
-. Channel : High

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)
125.01	22.83	V	1.40	180.00	13.89	2.45	39.17	43.52	-4.35
249.99	18.17	V	1.50	200.00	17.39	3.40	38.96	46.02	-7.06
362.01	17.50	H	1.00	160.00	16.14	3.70	37.34	46.02	-8.68
399.98	17.45	H	1.50	220.00	17.45	4.00	38.90	46.02	-7.12
462.30	17.50	H	1.00	250.00	18.66	4.37	40.53	46.02	-5.49
522.90	16.50	H	1.00	170.00	19.48	4.92	40.90	46.02	-5.12

Tabulated test data for Radiated Electromagnetic Field

Remark: “H”: Horizontal, “V”: Vertical



Tested by: Ki-Hong, Nam / Senior Engineer

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11.4.3 Operating Mode: SPI ZIGBEE Mode

-. Test Date : May 28, 2010

-. Resolution bandwidth : 120 kHz

-. Frequency range : 30 MHz ~ 1 000 MHz

-. Measurement distance : 3 m

-. 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)
125.00	21.80	V	1.00	150.00	13.89	2.45	38.14	43.52	-5.38
249.99	18.00	V	1.30	170.00	17.39	3.40	38.79	46.02	-7.23
362.01	17.40	H	1.40	150.00	16.14	3.70	37.24	46.02	-8.78
400.12	18.30	H	1.00	190.00	17.45	4.00	39.75	46.02	-6.27
462.31	17.30	H	1.20	210.00	18.66	4.37	40.33	46.02	-5.69
499.98	16.40	H	1.50	130.00	19.38	4.60	40.38	46.02	-5.64

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)
125.00	21.67	V	1.00	150.00	13.89	2.45	38.01	43.52	-5.51
249.99	18.17	V	1.30	170.00	17.39	3.40	38.96	46.02	-7.06
362.01	17.40	H	1.40	150.00	16.14	3.70	37.24	46.02	-8.78
400.12	18.50	H	1.00	190.00	17.45	4.00	39.95	46.02	-6.07
462.31	17.10	H	1.20	210.00	18.66	4.37	40.13	46.02	-5.89
499.98	16.67	H	1.50	130.00	19.38	4.60	40.65	46.02	-5.37

Tabulated test data for Radiated Electromagnetic Field

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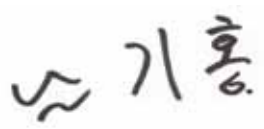
-. Channel : High

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)
125.00	21.50	V	1.00	150.00	13.89	2.45	37.84	43.52	-5.68
249.99	18.17	V	1.30	170.00	17.39	3.40	38.96	46.02	-7.06
362.01	17.83	H	1.40	150.00	16.14	3.70	37.67	46.02	-8.35
400.12	18.50	H	1.00	190.00	17.45	4.00	39.95	46.02	-6.07
462.31	17.10	H	1.20	210.00	18.66	4.37	40.13	46.02	-5.89
499.98	16.50	H	1.50	130.00	19.38	4.60	40.48	46.02	-5.54

Tabulated test data for Radiated Electromagnetic Field

Remark: “H”: Horizontal, “V”: Vertical



Tested by: Ki-Hong, Nam / Senior Engineer

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11.4.4 Operating Mode: UART ZIGBEE Mode

-. Test Date : May 28, 2010

-. Resolution bandwidth : 120 kHz

-. Frequency range : 30 MHz ~ 1 000 MHz

-. Measurement distance : 3 m

-. 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)
124.99	21.60	V	1.00	130.00	13.89	2.45	37.94	43.52	-5.58
249.99	18.70	V	1.40	200.00	17.39	3.40	39.49	46.02	-6.53
361.90	17.00	H	1.30	130.00	16.14	3.70	36.84	46.02	-9.18
399.99	18.50	H	1.00	200.00	17.45	4.00	39.95	46.02	-6.07
462.30	17.80	H	1.00	220.00	18.66	4.37	40.83	46.02	-5.19
522.88	16.00	H	1.00	110.00	19.48	4.92	40.40	46.02	-5.62

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)
124.99	21.83	V	1.00	130.00	13.89	2.45	38.17	43.52	-5.35
249.99	18.50	V	1.40	200.00	17.39	3.40	39.29	46.02	-6.73
361.90	17.33	H	1.30	130.00	16.14	3.70	37.17	46.02	-8.85
399.99	18.67	H	1.00	200.00	17.45	4.00	40.12	46.02	-5.90
462.30	17.42	H	1.00	220.00	18.66	4.37	40.45	46.02	-5.57
522.88	16.10	H	1.00	110.00	19.48	4.92	40.50	46.02	-5.52

Tabulated test data for Radiated Electromagnetic Field

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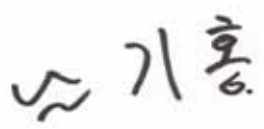
-. Channel : High

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)
124.99	21.50	V	1.00	130.00	13.89	2.45	37.84	43.52	-5.68
249.99	18.44	V	1.40	200.00	17.39	3.40	39.23	46.02	-6.79
361.90	17.17	H	1.30	130.00	16.14	3.70	37.01	46.02	-9.01
399.99	18.67	H	1.00	200.00	17.45	4.00	40.12	46.02	-5.90
462.30	17.33	H	1.00	220.00	18.66	4.37	40.36	46.02	-5.66
522.88	16.00	H	1.00	110.00	19.48	4.92	40.40	46.02	-5.62

Tabulated test data for Radiated Electromagnetic Field

Remark: “H”: Horizontal, “V”: Vertical



Tested by: Ki-Hong, Nam / Senior Engineer

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12. CONDUCTED EMISSION TEST

12.1 Operating environment

Temperature : 23 °C

Relative humidity : 40 % R.H.

12.2 Test set-up

The EUT was placed on a wooden table, 0.8 m height above the floor. Power was fed to the EUT through a 50 Ω / 50 μH + 5 Ω Artificial Mains Network (AMN). The ground plane was electrically bonded to the reference ground system and all power lines were filtered from ambient.

12.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal.
■ -	ESiB26	Rohde & Schwarz	EMI Test Receiver	100296	Apr. 14, 2010
■ -	NSLK 8126	Schwarzbeck	AMN	8126-404	June 10, 2010
□ -	3825/2	EMCO	AMN	9109-1867	June 10, 2010

All test equipment used is calibrated on a regular basis.

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12.4 Test data

12.4.1 Operating Mode: 802.11b WLAN Mode

-. Test Date : May 27, 2010

-. Resolution bandwidth : 9 kHz

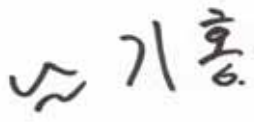
-. Frequency range : 0.15 MHz ~ 30 MHz

Frequency (MHz)	Line	Quasi-Peak (dBµV)		Margin (dB)
		Emission level	Q.P Limits	
0.29	H	46.50	60.50	-14.00
0.44	N	45.70	57.10	-11.40
0.63	N	44.90	56.00	-11.10
0.69	H	44.40	56.00	-11.60
1.12	H	44.80	56.00	-11.20
1.31	N	42.30	56.00	-13.70
Frequency (MHz)	**Line**	**Average (dBµV)**		**Margin (dB)**
		Emission level	**Limits**	
0.44	N	40.20	47.10	-6.90
0.63	N	38.80	46.00	-7.20
0.69	H	35.60	46.00	-10.40
1.13	H	33.30	46.00	-12.70

Line Conducted Emissions Tabulated Data

Remark : "H": Hot Line, "N": Neutral Line

See next page for an overview sweep performed with quasi-peak and average detector modes.



Tested by: Ki-Hong, Nam / Senior Engineer

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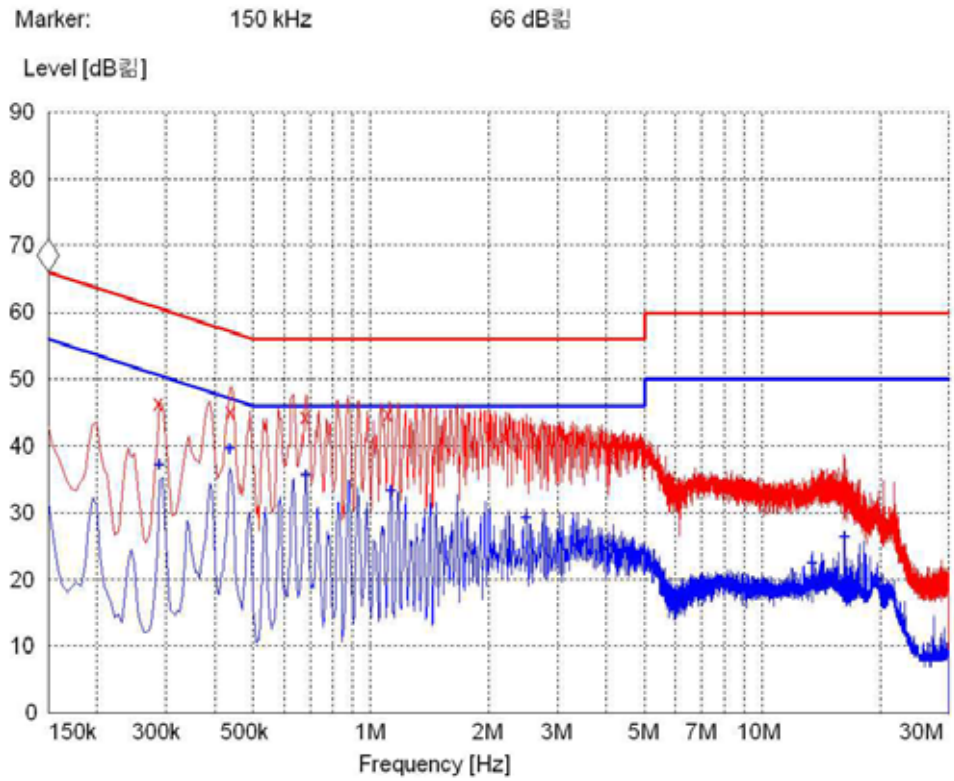
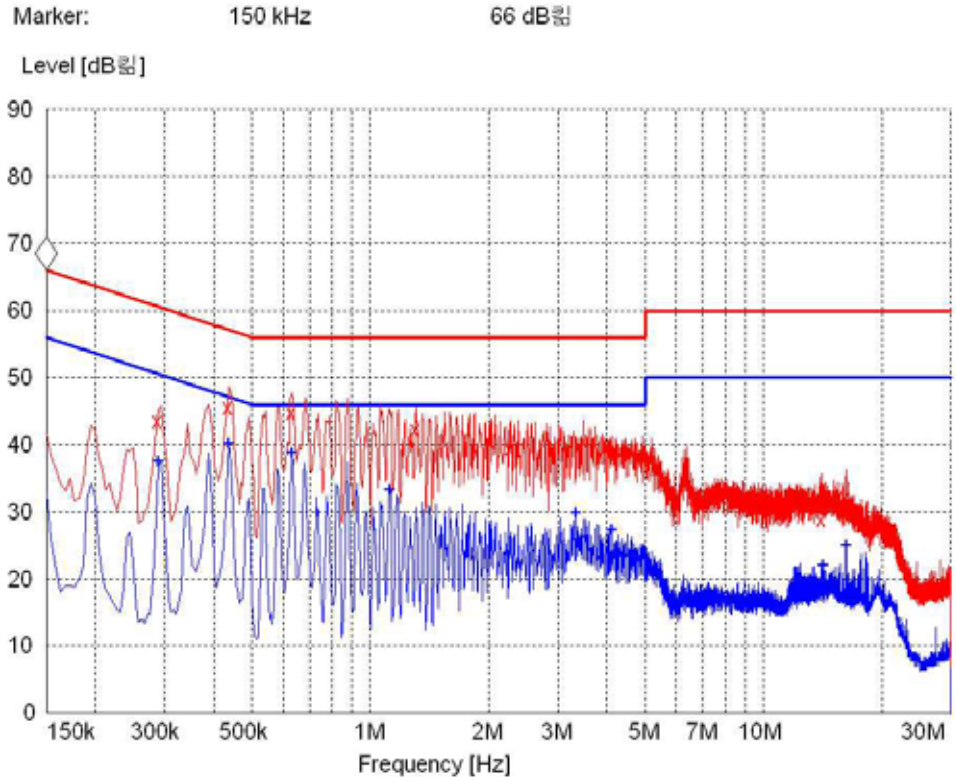


HOT LINE



NEUTRAL LINE

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12.4.2 Operating Mode: 802.11g WLAN Mode

-. Test Date : May 27, 2010

-. Resolution bandwidth : 9 kHz

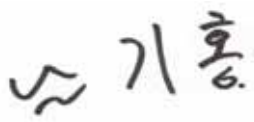
-. Frequency range : 0.15 MHz ~ 30 MHz

Frequency (MHz)	Line	Quasi-Peak (dBµV)		Margin (dB)
		Emission level	Q.P Limits	
0.44	H	45.80	57.00	-11.20
0.63	N	45.60	56.00	-10.40
0.69	H	45.20	56.00	-10.80
1.18	H	44.40	56.00	-11.60
1.36	N	42.60	56.00	-13.40
2.14	H	40.60	56.00	-15.40
Frequency (MHz)	**Line**	**Average (dBµV)**		**Margin (dB)**
		Emission level	**Limits**	
0.39	N	37.10	48.10	-11.00
0.44	H	38.30	47.10	-8.80
0.63	N	37.30	46.00	-8.70
0.69	H	36.20	46.00	-9.80

Line Conducted Emissions Tabulated Data

Remark : "H": Hot Line, "N": Neutral Line

See next page for an overview sweep performed with quasi-peak and average detector modes.



Tested by: Ki-Hong, Nam / Senior Engineer

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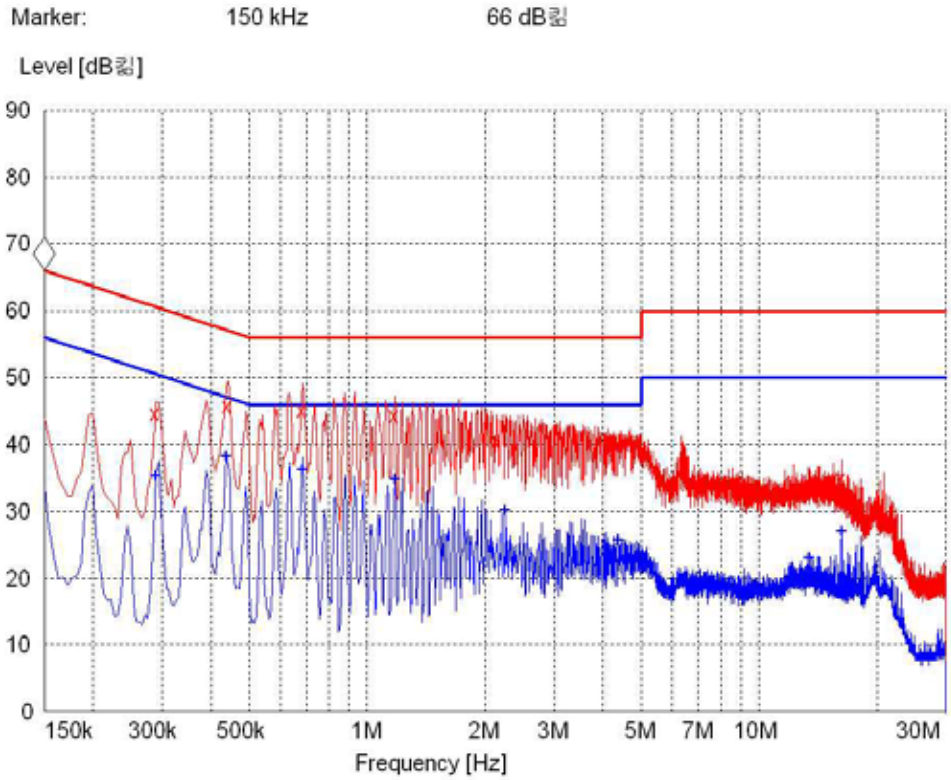
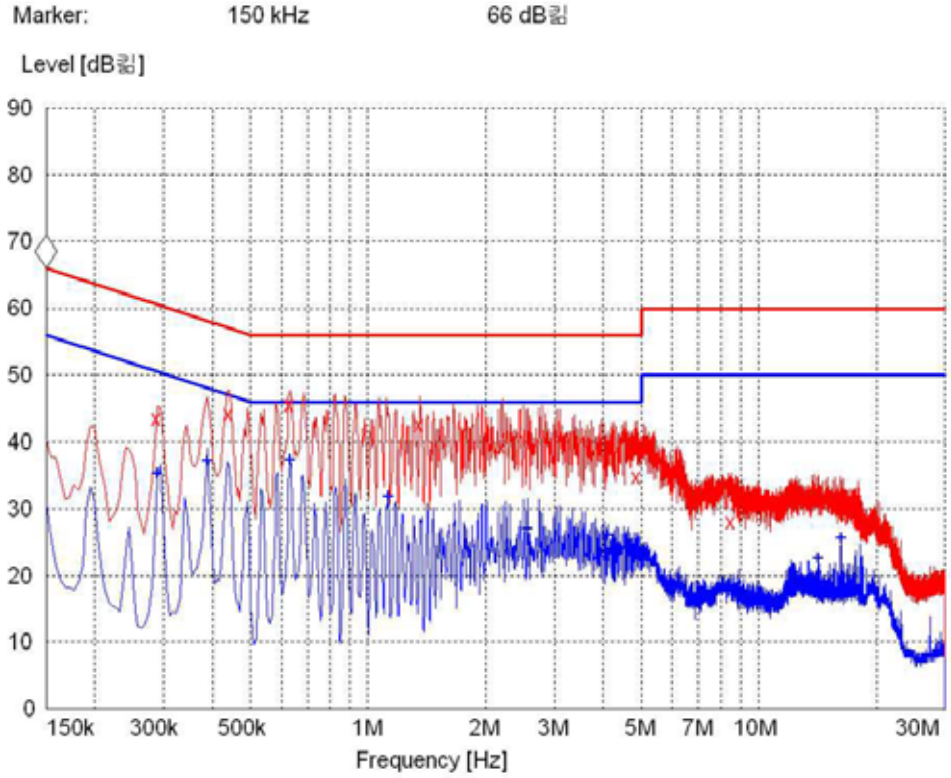


HOT LINE



NEUTRAL LINE

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12.4.3 Operating Mode: SPI ZIGBEE Mode

-. Test Date : May 27, 2010

-. Resolution bandwidth : 9 kHz

-. Frequency range : 0.15 MHz ~ 30 MHz

Frequency (MHz)	Line	Quasi-Peak (dBµV)		Margin (dB)
		Emission level	Q.P Limits	
0.41	H	48.30	57.60	-9.30
0.42	N	45.90	57.40	-11.50
0.61	N	46.30	56.00	-9.70
0.68	H	45.80	56.00	-10.20
1.14	N	43.00	56.00	-13.00
1.23	H	39.80	56.00	-16.20
Frequency (MHz)	**Line**	**Average (dBµV)**		**Margin (dB)**
		Emission level	**Limits**	
0.26	H	36.90	51.50	-14.60
0.41	N	40.30	47.70	-7.40
0.61	H	36.30	46.00	-9.70
1.14	H	32.60	46.00	-13.40

Line Conducted Emissions Tabulated Data

Remark : "H": Hot Line, "N": Neutral Line

See next page for an overview sweep performed with quasi-peak and average detector modes.

Tested by: Ki-Hong, Nam / Senior Engineer

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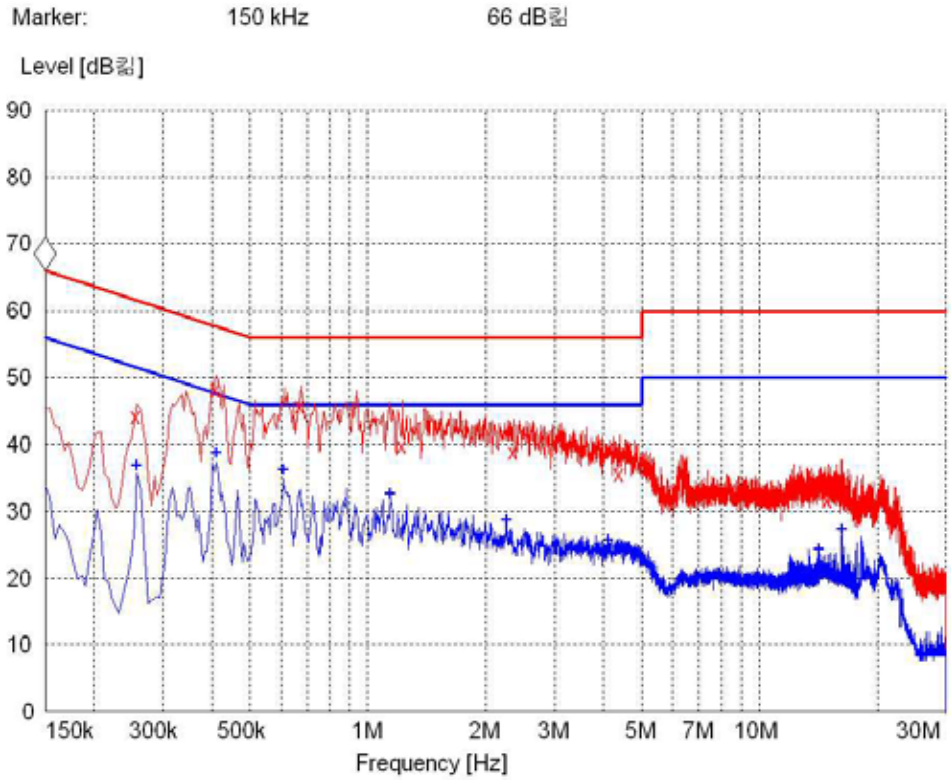
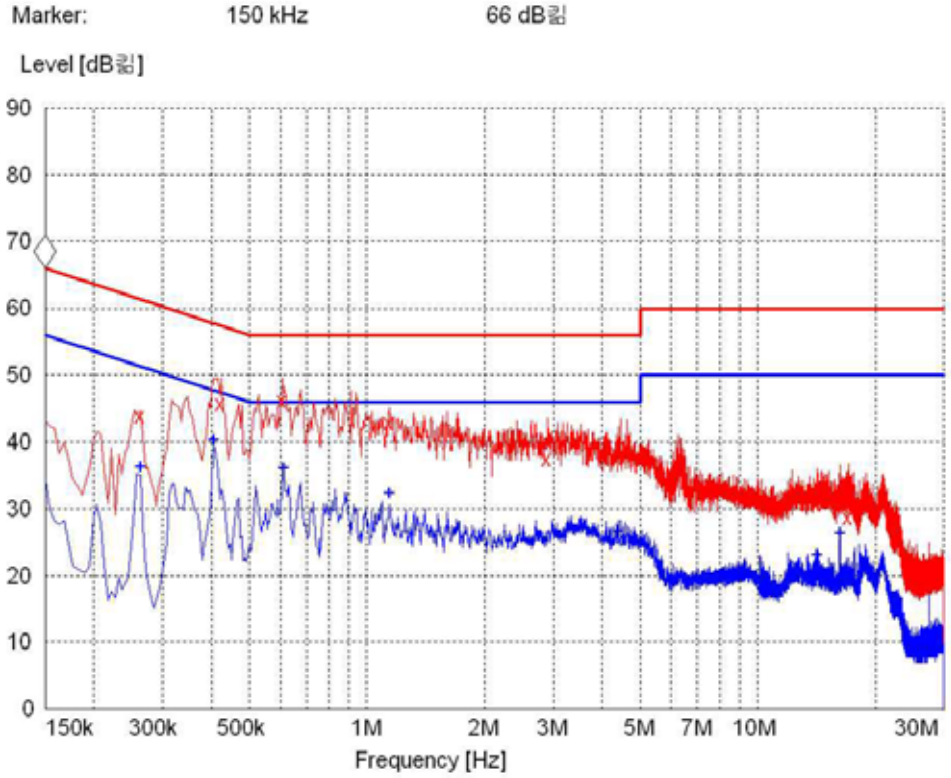


HOT LINE



NEUTRAL LINE

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12.4.4 Operating Mode: UART ZIGBEE Mode

-. Test Date : May 27, 2010

-. Resolution bandwidth : 9 kHz

-. Frequency range : 0.15 MHz ~ 30 MHz

Frequency (MHz)	Line	Quasi-Peak (dBµV)		Margin (dB)
		Emission level	Q.P Limits	
0.34	N	50.90	59.20	-8.30
0.59	H	37.70	56.00	-18.30
0.68	N	43.50	56.00	-12.50
1.17	H	37.00	56.00	-19.00
2.13	H	37.80	56.00	-18.20
3.43	N	35.50	56.00	-20.50
Frequency (MHz)	**Line**	**Average (dBµV)**		**Margin (dB)**
		Emission level	**Limits**	
0.27	N	32.60	51.10	-18.50
0.34	N	44.30	49.20	-4.90
0.61	N	36.10	46.00	-9.90
3.45	N	27.60	46.00	-18.40

Line Conducted Emissions Tabulated Data

Remark : "H": Hot Line, "N": Neutral Line

See next page for an overview sweep performed with quasi-peak and average detector modes.

Tested by: Ki-Hong, Nam / Senior Engineer

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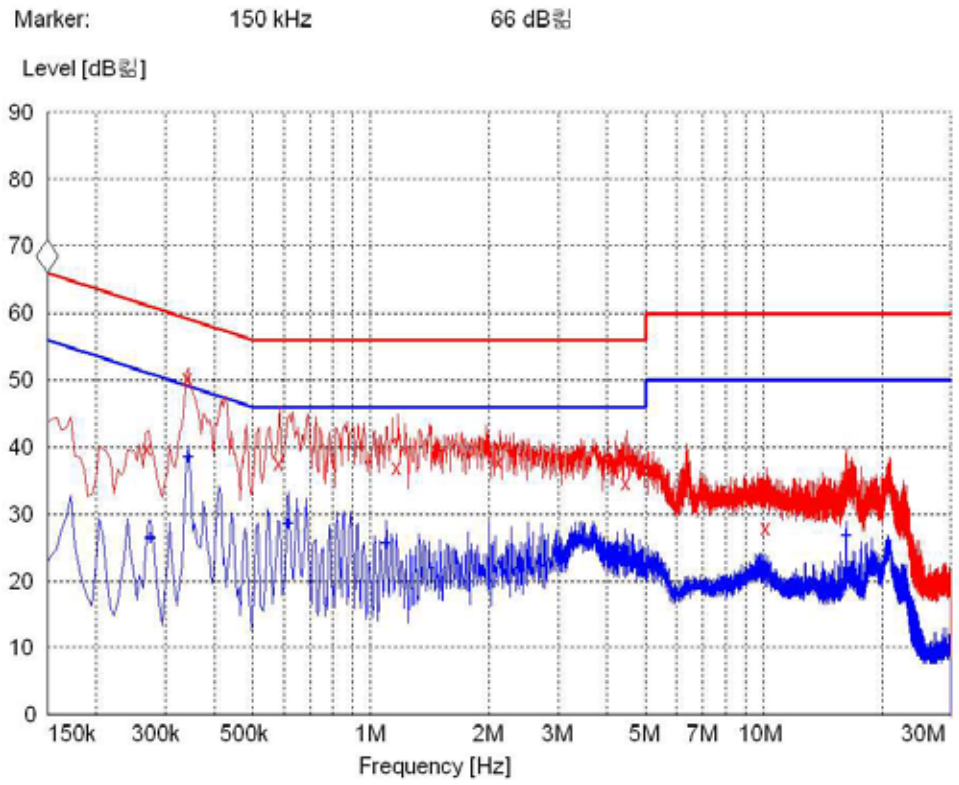
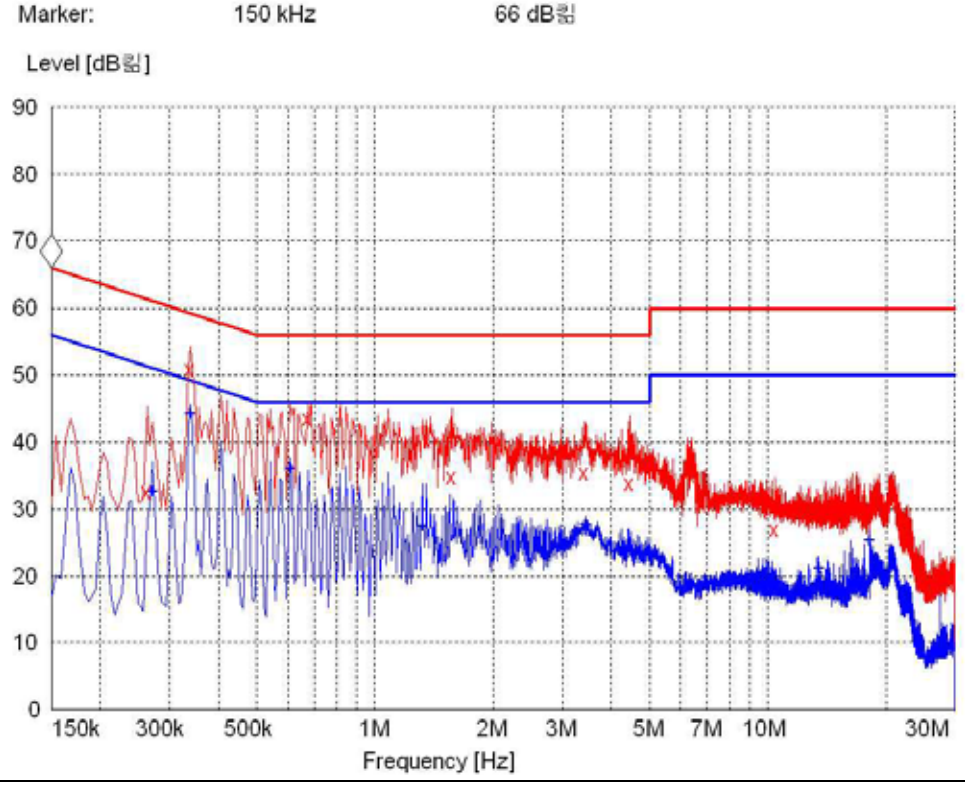


HOT LINE



NEUTRAL LINE

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