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

Test Report No.	**: E06DR-111**
AGR No.	**: A069A-113R**
Applicant	**: Bluebird Soft Inc.**
Address	**: 558-5, Sinsa-dong, Gangnam-gu, Seoul, Korea**
Manufacturer	**: Bluebird Soft Inc.**
Address	**: 558-5, Sinsa-dong, Gangnam-gu, Seoul, Korea**
Type of Equipment	**: Industrial PDA 802.11b, 802.11g**
FCC ID.	**: SS4BIP13X0**
Model Name	**: BIP-1300**
Serial number	**: N/A**
Total page of Report	**: 60 pages (including this page)**
Date of Incoming	**: September 19, 2006**
Date of issue	**: December 28, 2006**

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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EMC Testing Dept : 307-51 Daessangryung-Ri, Chowol-Eup, Kwangju-City, Kyunggi-Do, 464-860, Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

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1. VERIFICATION OF COMPLIANCE

APPLICANT	: Bluebird Soft Inc.
ADDRESS	: 558-5, Sinsa-dong, Gangnam-gu, Seoul, Korea
CONTACT PERSON	: Mr. Young Tai, Ji
TELEPHONE NO	: +82-2-548-0740
FCC ID	: SS4BIP13X0
MODEL NAME	: BIP-1300
SERIAL NUMBER	: N/A
DATE	: December 28, 2006

EQUIPMENT CLASS	***DTS – DIGITAL TRNSMISSION SYSTEM***
KIND OF EQUIPMENT	Industrial PDA with WLAN (802.11b/g)
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 METER(S) 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 6dB Bandwidth	Met the Limit / PASS
15.247 (b) (3)	Maximum Peak Conducted Output Power	Met the Limit / PASS
15.247 (b) (5)	Radio Frequency Exposure Level	Met the Limit / PASS
15.247 (c)	100 kHz Bandwidth Outside the Frequency Band	Met the Limit / PASS
15.247 (c)	Radiated Emission which fall in the Restricted Band	Met the Limit / PASS
15.247 (d)	Peak Power Spectral Density	Met the Limit / PASS
15.209 and 15.109	Radiated Emission Limits	N/A (See Note)
15.207 and 15.107	Conducted Limits	Met the Limit / PASS
15.203	Antenna Requirement	Met requirement / PASS

Note: This test is not applicable, because the EUT is not directly connected to public low-voltage distribution system when it use WLAN mode.

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: 2003 at a distance of 3 meters from EUT to the antenna.

2.6 Test Facility

The Electromagnetic compatibility measurement facilities are located on at 307-51 Daessangryung-Ri, Chowol-Eup, Kwangju-City, Kyunggi-Do 464-080 Korea. Description details of test facilities were submitted to the Federal Communications Commission on August 31, 2005 (Registration Number: 92819 and 340658), accredited by KOLAS (Korea Laboratory Accreditation Scheme, No: 85) and approved by TUV, DNV and MIC (Ministry of Information and Communications in Korea) according to the requirement of ISO17025.

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3. GENERAL INFORMATION

3.1 Product Description

The Bluebird Soft Inc., Model BIP-1300 (referred to as the EUT in this report) is a Industrial PDA which has a function of battery charging and data uploading/downloading by USB cable. This report is for WLAN function. And the report for the Bluetooth mode and Peripheral Device for Class B Computing Device will be issued by other report. The product specification described herein was obtained from product data sheet or user's manual.

DEVICE TYPE	Industrial PDA 8with WLAN (802.11b/g)
OPERATING FREQUENCY	2412-2472 MHz
RF OUTPUT POWER	17.10 dBm
NUMBER OF CHANNEL	14 Channels
MAX. DATA TRANSFER RATE	WLAN: 11 Mbps (802.11b), 54Mbps (802.11g)
MODULATION TYPE	WLAN: DSSS/CCK(802.11b), CCK/OFDM(802.11g)
ANTENNA	MFR.: GIGA ANT., Model No.: COMATA 2.4GHz
ANTENNA CONNECTOR TYPE	SMD Type
ANTENNA GAIN	1.9dBi
USED WLAN MODULE	MFR: Samsung Electro-Mechanics Co., Ltd. Model No: SWL-2460C
LIST OF EACH OSC. OR CRYSTAL. FREQ.(FREQ.>=1MHz)	26 MHz, 14.7456 MHz, 12 MHz and 6 MHz
NUMBER OF LAYER	Main Board: 8 Layers, Key: 4 Layers
EXTERNAL CONNECTOR	Molex 24 Pin
POWER REQUIREMENT	DC 9V, 3A from an AC/DC Adaptor or DC 8.4V Battery Adapter Model Name: JPW128KA0900N01, MFR: Ault Korea Co., Ltd. Rechargeable Lithium Polymer Battery

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

No other model differences have been mentioned.

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	Bluebird Soft Inc.	Bip1300 EVDO	N/A
Key Board	Bluebird Soft Inc.	Bip1300_Key_Rev 0.4	N/A
LCD	N/A	PD0511012	N/A
Main Board for Cradle	N/A	CRA-1300	N/A
SUB Board for Cradle	N/A	N/A	N/A
Camera Module	N/A	N/A	N/A
CDMA Module	C-Motech	CDE-650G	N/A
CDMA Module Board	N/A	N/A	N/A
Barcode Reader	Intermac Technplogies Corp.	EV10	N/A
Smart Card Interface Module	SCSpro Co., Ltd.	SCS-IFM1V0	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
BIP-1300	Bluebird Soft Inc.	SS4BIP13X0	Industrial PDA (EUT)	PC
JPW128KA0900N01	Ault Korea	N/A	AC/DC Adapter	EUT
PP10L	Dell	DoC	PC	-
N/A	ARTec	DoC	Mouse	PC
UP-DP10	Sony	DoC	Printer	PC
3453C	U.S.Robotics	CJE-0263	Modem	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 (2412MHz), Middle Channel (2437MHz), and High Channel (2462MHz) with 11Mbps(802.11b) and Low Channel (2412MHz), Middle Channel (2437MHz), and High Channel (2462MHz) with 54Mbps(802.11g) data rate. To get a maximum emission levels from the EUT, the EUT was moved throughout the XY, XZ, and YZ planes.

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5.4 Configuration of Test System

Line Conducted Test: The power cord of the EUT was connected to LISN. All supporting equipments were connected to another LISN. Preliminary Power lines Conducted Emission tests were 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 3meter 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.

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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)
Stand-by mode	
Charging mode	
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)
Stand-by mode	
Charging mode	
TX mode	X

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7. TEST DATA FOR 802.11b WLAN MODE

7.1 MIMIMUM 6dB BANDWIDTH

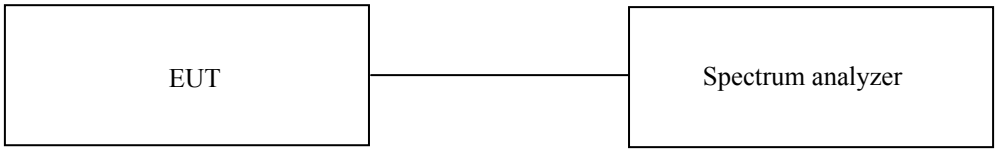
7.1.1 Operating environment

Temperature : 21°C

Relative humidity : 43 %

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 6dB 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 22, 2006

All test equipment used is calibrated on a regular basis.

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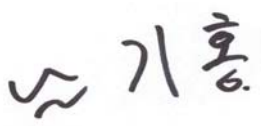
7.1.4 Test data

-. Test Date : November 03, 2006

-. Test Result : Pass

CHANNEL	FREQUENCY(MHz)	MEASURED VLAUE (kHz)	LIMIT (kHz)	MARGIN (kHz)
Low	2412	10130	500	-9630
Middle	2437	10170	500	-9670
High	2462	10170	500	-9670

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



Tested by: Ki-Hong, Nam / Test Engineer

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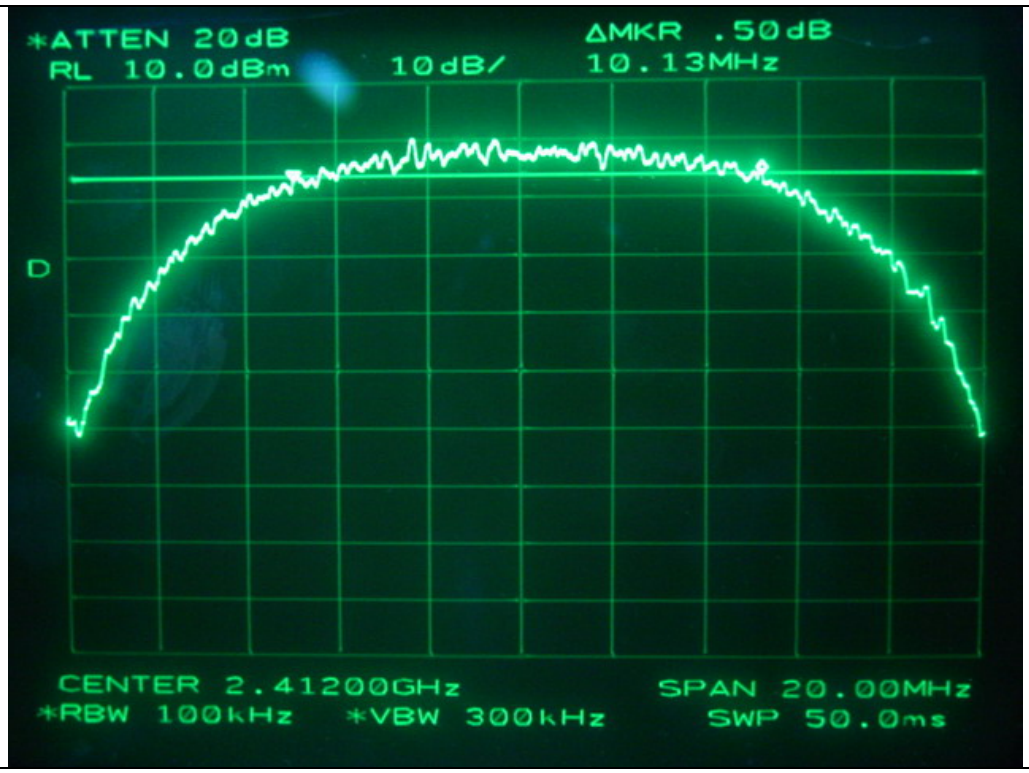
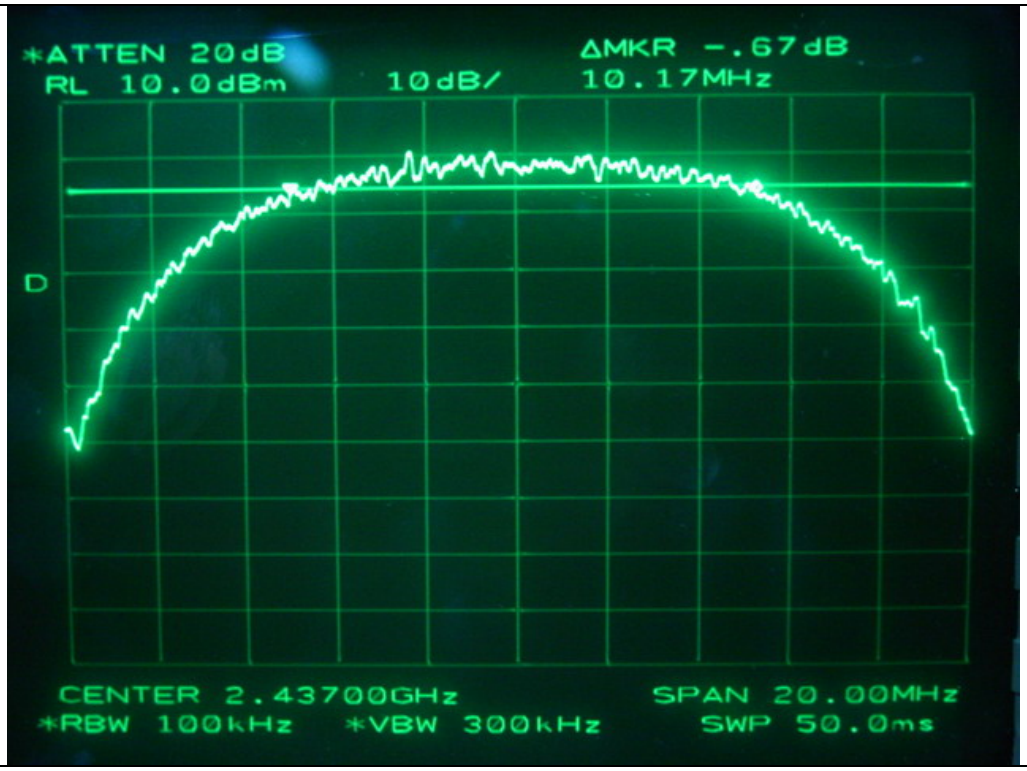


Low Channel



Middle Channel

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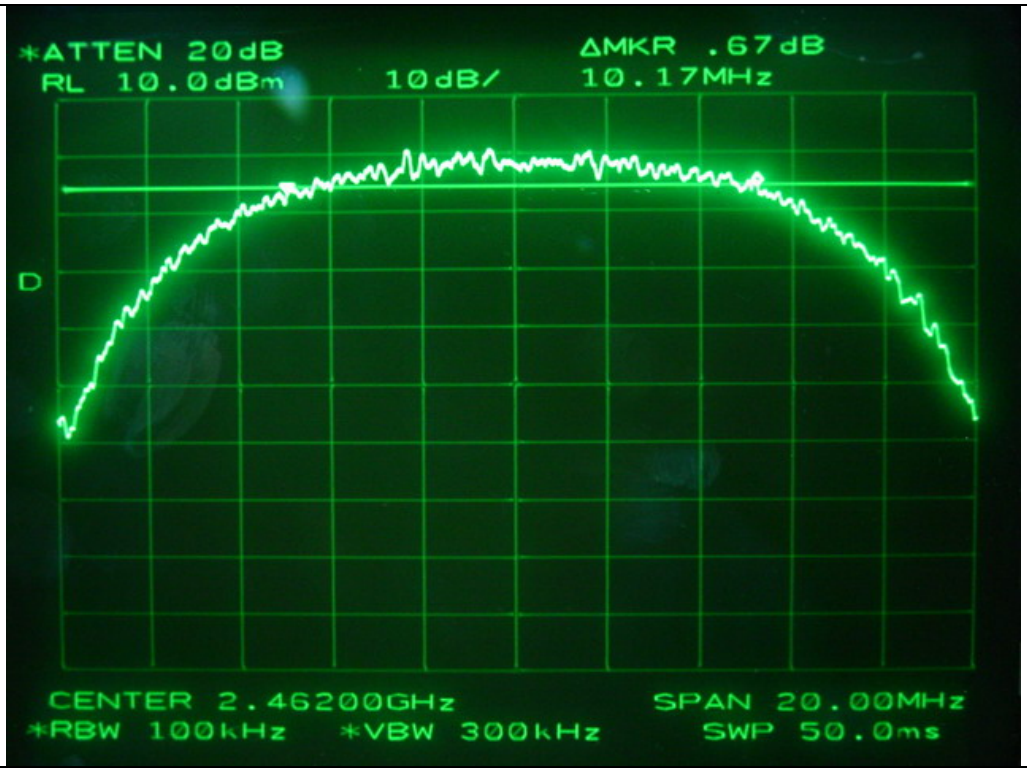

High Channel

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7.2. MAXIMUM PEAK OUTPUT POWER

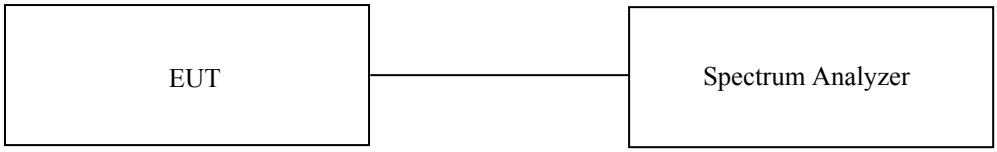
7.2.1 Operating environment

Temperature : 21°C

Relative humidity : 43 %

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 22, 2006

All test equipment used is calibrated on a regular basis.

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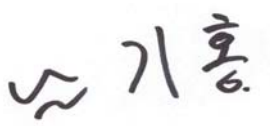
7.2.4 Test data

-. Test Date : November 03, 2006

-. Test Result : Pass

CHANNEL	FREQUENCY (MHz)	99% Occupied Bandwidth (MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2412	13.91	16.40	30.0	-13.60
Middle	2437	13.91	16.80	30.0	-13.20
High	2462	13.95	17.10	30.0	-12.90

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



Tested by: Ki-Hong, Nam / Test Engineer

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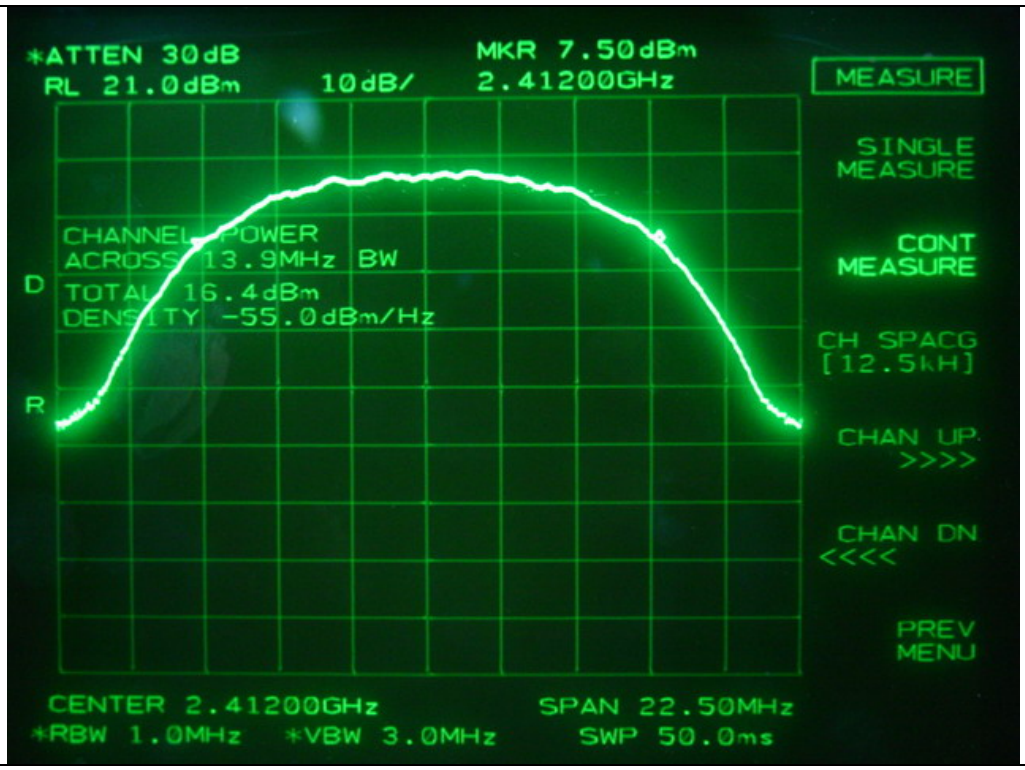
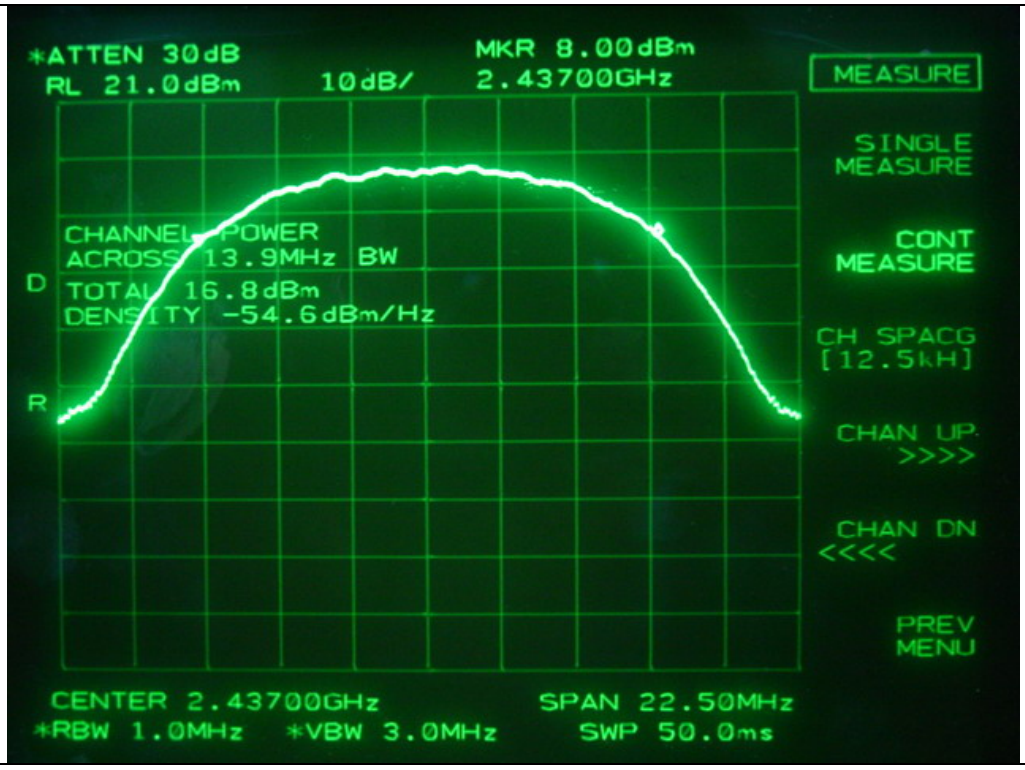


Low Channel



Middle Channel

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EMC Testing Dept : 307-51 Daessangryung-Ri, Chowol-Eup, Kwangju-City, Kyunggi-Do, 464-860, Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

High Channel

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7.3 100 kHz BANDWIDTH OUTSIDE THE FREQUENCY BAND

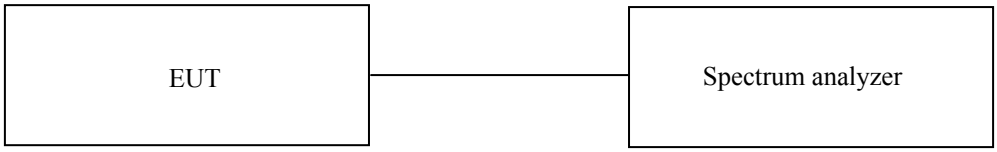
7.3.1 Operating environment

Temperature : 21°C

Relative humidity : 43 %

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 3meters, open-field test site. The EUT was placed on a non-conductive turntable approximately 0.8 meters above the ground plane.

The frequency spectrum from 30MHz to 25GHz 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 and 4.0 meters 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 22, 2006
■ -	8447D	Hewlett-Packard	Amplifier	2727A04987	June 14, 2006
□ -	83051A	Agilent	Preamplifier	3950M00201	June 23, 2006
■ -	F-40-5000-RF	RLC Electronics	Highpass Filter	0425	July 14, 2006
■ -	MA220	HD	Turn Table	N/A	N/A
■ -	HD240	HD	Antenna Mast	N/A	N/A
■ -	BBHA9120D	Schwarzbeck	Horn Antenna	BBHA9120D294	July 03, 2006
■ -	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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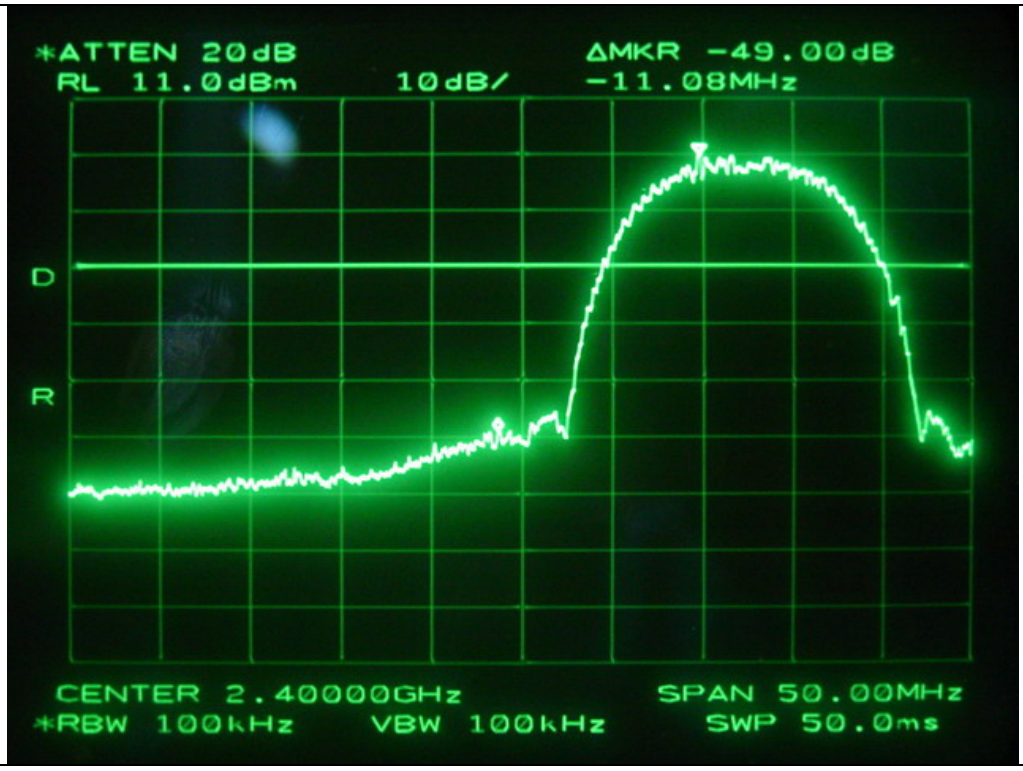
7.3.5. Test data for conducted emission



Low Channel

High Channel

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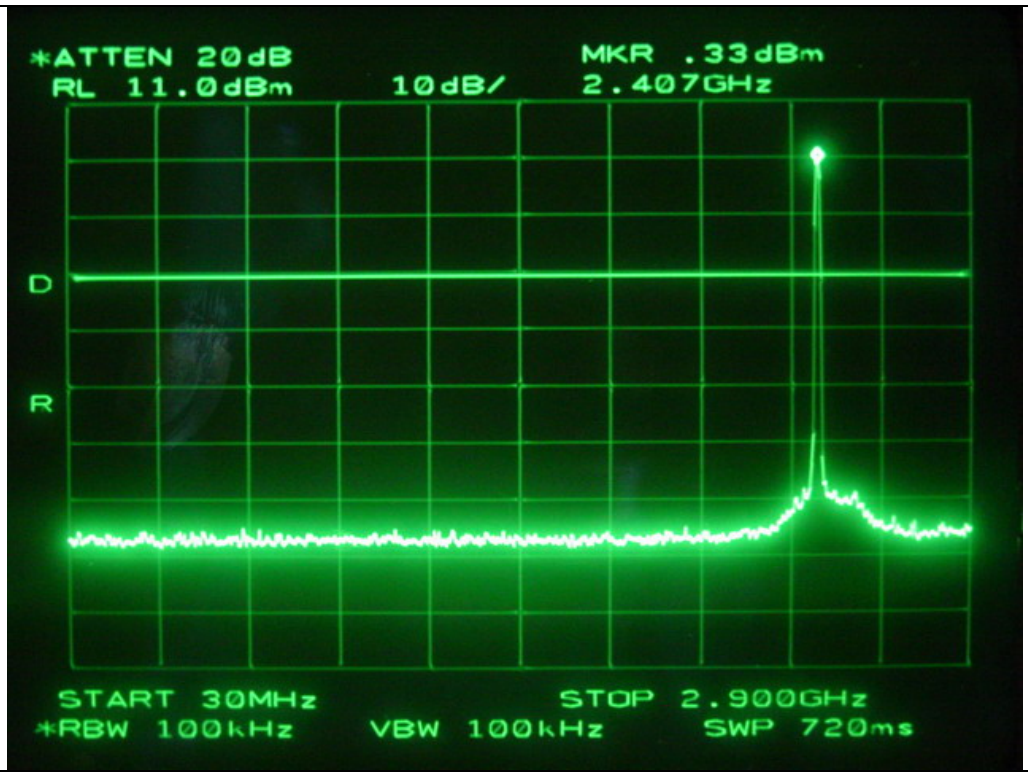
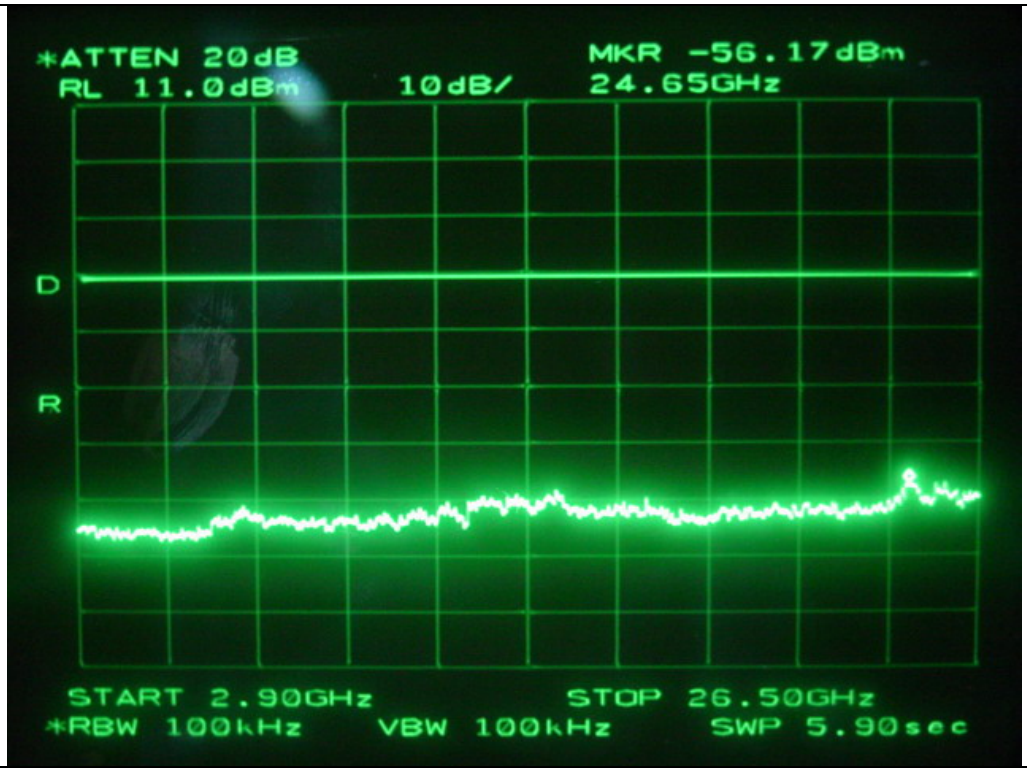


Low Channel



Low Channel

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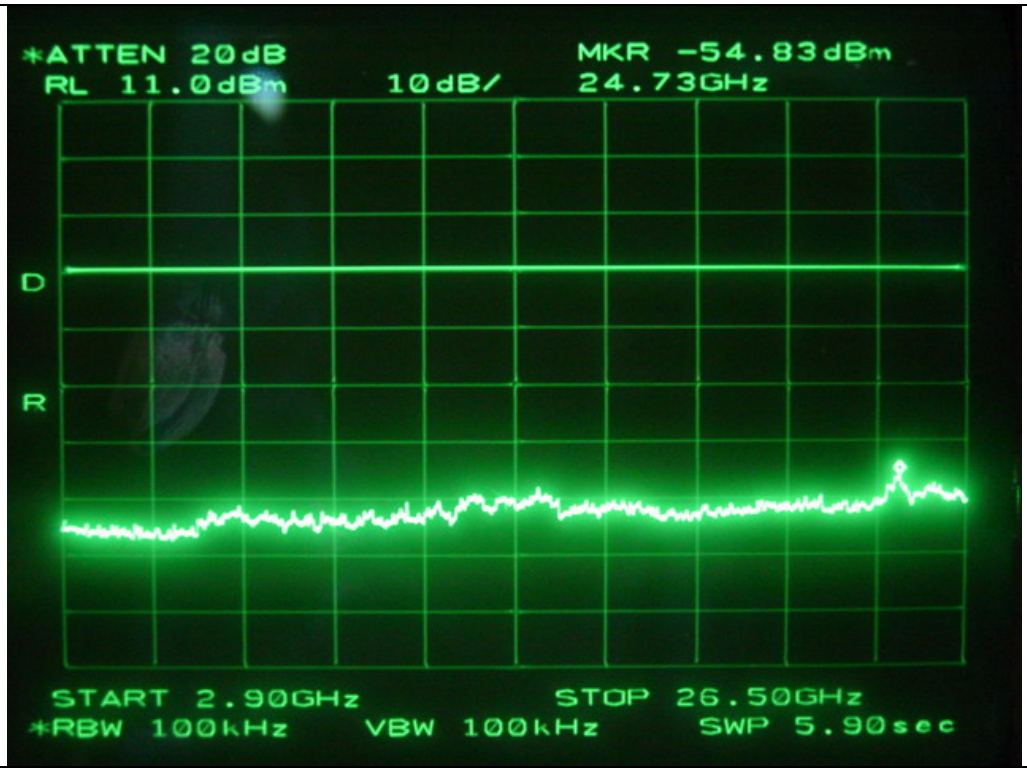
Middle Channel



Middle Channel

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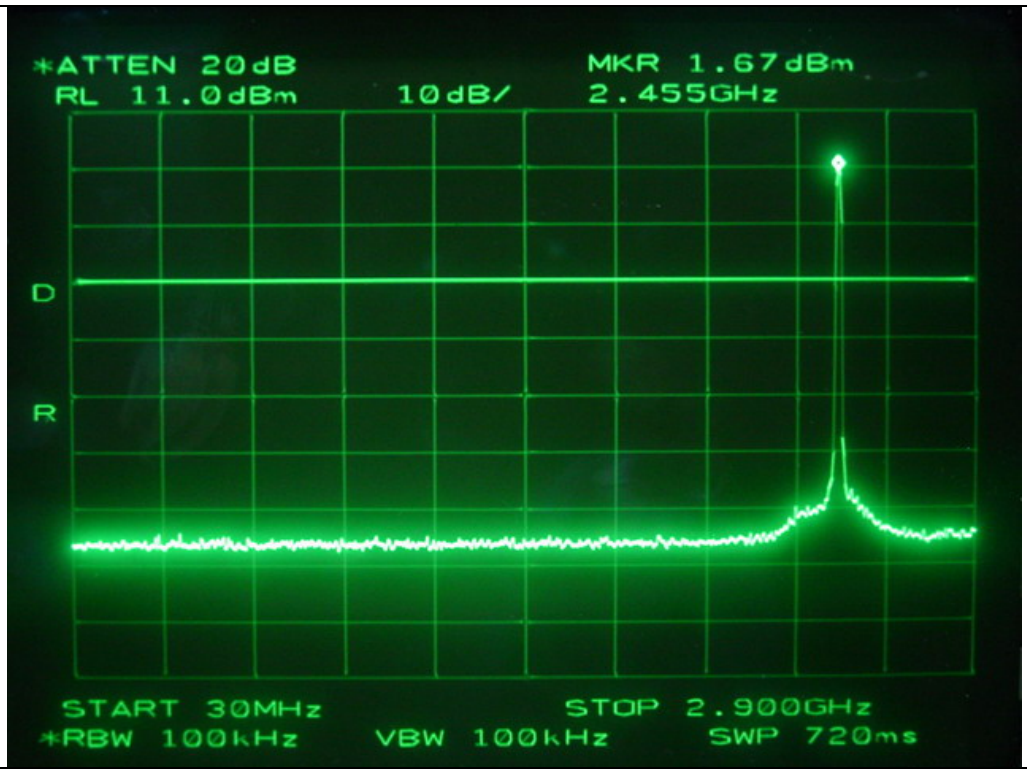

High Channel

High Channel

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7.3.6. Test data for radiated emission

7.3.6.1 Radiated Emission which fall in the Restricted Band

-. Test Date : December 20, 2006

-. Resolution bandwidth : 1 MHz for Peak and Average Mode

-. Video bandwidth : 1 MHz for Peak Mode, 10Hz for Average Mode

-. Frequency range : 1 GHz ~ 25GHz

-. Measurement distance : 3m

-. Operating Condition : Low / High Channel

-. Result : PASSED BY –22.30 dB at Low Channel (11 Mbps)

Frequency (MHz)	Reading (dBuV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Dist. Factor	Total (dBuV/m)	Limits (dBuV/m)	Margin (dB)
Test Data for Low Channel (1 Mbps)										
2389.60	35.00	Peak	H	27.64	1.33	26.1		37.87	74.00	-36.13
	24.17	Average	H					27.04	54.00	-26.96
	38.00	Peak	V					40.87	74.00	-33.13
	28.50	Average	V					31.37	54.00	-22.63
Test Data for Low Channel (5.5 Mbps)										
2389.60	34.67	Peak	H	27.64	1.33	26.1		37.54	74.00	-36.46
	23.83	Average	H					26.70	54.00	-27.30
	38.00	Peak	V					40.87	74.00	-33.13
	28.67	Average	V					31.54	54.00	-22.46
Test Data for Low Channel (11 Mbps)										
2389.60	35.17	Peak	H	27.64	1.33	26.1		38.04	74.00	-35.96
	24.33	Average	H					27.20	54.00	-26.80
	38.17	Peak	V					41.04	74.00	-32.96
	28.83	Average	V					31.70	54.00	-22.30

Tabulated test data for Restricted Band

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

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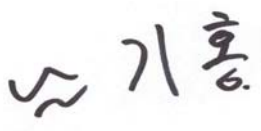
-Continued

Frequency (MHz)	Reading (dBuV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Dist. Factor	Total (dBuV/m)	Limits (dBuV/m)	Margin (dB)
Test Data for High Channel (1 Mbps)										
2483.64	37.67	Peak	H	27.59	1.33	26.1		40.49	74.00	-33.52
	27.17	Average	H					29.99	54.00	-24.02
	38.83	Peak	V					41.65	74.00	-32.36
	27.50	Average	V					30.32	54.00	-23.69
Test Data for High Channel (5.5 Mbps)										
2483.64	37.48	Peak	H	27.59	1.33	26.1		40.30	74.00	-33.71
	27.17	Average	H					29.99	54.00	-24.02
	39.33	Peak	V					42.15	74.00	-31.86
	27.50	Average	V					30.32	54.00	-23.69
Test Data for High Channel (11 Mbps)										
2483.64	37.83	Peak	H	27.59	1.33	26.1		40.65	74.00	-33.36
	27.33	Average	H					30.15	54.00	-23.86
	40.50	Peak	V					43.32	74.00	-30.69
	27.67	Average	V					30.49	54.00	-23.52



Tested by: Ki-Hong, Nam / Test Engineer

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7.3.6.2 Spurious & Harmonic Radiated Emission

-. Test Date : December 20, 2006

-. 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, 10Hz for Average Mode

-. Frequency range : 1 GHz ~ 25 GHz

-. Measurement distance : 3m

-. Result : PASSED BY –22.80 dB at Low Channel

Frequency (MHz)	Reading (dBuV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Dist. Factor	Total (dBuV/m)	Limits (dBuV/m)	Margin (dB)
Test Data for Low Channel (1 Mbps)										
2412.00	62.17	Peak	H	27.33	1.50			91.00	-	
	62.00	Peak	V					90.83	-	
4824.00	31.83	Peak	H	31.30	2.67	26.10		39.70	74.00	-34.30
	22.17	Average	H					30.04	54.00	-23.96
	35.00	Peak	V					42.87	74.00	-31.13
	23.00	Average	V					30.87	54.00	-23.13
Test Data for Low Channel (5.5 Mbps)										
2412.00	64.00	Peak	H	27.33	1.50			92.83	-	
	62.83	Peak	V					91.66	-	
4824.00	31.67	Peak	H	31.30	2.67	26.10		39.54	74.00	-34.46
	22.00	Average	H					29.87	54.00	-24.13
	35.17	Peak	V					43.04	74.00	-30.96
	23.00	Average	V					30.87	54.00	-23.13
Test Data for Low Channel (11 Mbps)										
2412.00	65.50	Peak	H	27.33	1.50			94.33	-	
	63.67	Peak	V					92.50	-	
4824.00	32.00	Peak	H	31.30	2.67	26.10		39.87	74.00	-34.13
	22.50	Average	H					30.37	54.00	-23.63
	35.50	Peak	V					43.37	74.00	-30.63
	23.33	Average	V					31.20	54.00	-22.80

Tabulated test data for Restricted Band

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Frequency (MHz)	Reading (dBuV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Dist. Factor	Total (dBuV/m)	Limits (dBuV/m)	Margin (dB)
Test Data for Middle Channel (1 Mbps)										
2437.00	64.50	Peak	H	27.40	1.50			93.40	-	
	64.33	Peak	V					93.23	-	
4874.00	31.33	Peak	H	31.37	2.67	26.10		39.27	74.00	-34.73
	20.83	Average	H					28.77	54.00	-25.23
	31.83	Peak	V					39.77	74.00	-34.23
	22.00	Average	V					29.94	54.00	-24.06
Test Data for Middle Channel (5.5 Mbps)										
2437.00	65.83	Peak	H	27.40	1.50			94.73	-	
	65.50	Peak	V					94.40	-	
4874.00	31.33	Peak	H	31.37	2.67	26.10		39.27	74.00	-34.73
	21.00	Average	H					28.94	54.00	-25.06
	31.83	Peak	V					39.77	74.00	-34.23
	22.00	Average	V					29.94	54.00	-24.06
Test Data for Middle Channel (11 Mbps)										
2437.00	66.83	Peak	H	27.40	1.50			95.73	-	
	66.00	Peak	V					94.90	-	
4874.00	31.50	Peak	H	31.37	2.67	26.10		39.44	74.00	-34.56
	21.17	Average	H					29.11	54.00	-24.89
	31.83	Peak	V					39.77	74.00	-34.23
	22.50	Average	V					30.44	54.00	-23.56

Tabulated test data for Restricted Band

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Frequency (MHz)	Reading (dBuV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Dist. Factor	Total (dBuV/m)	Limits (dBuV/m)	Margin (dB)
Test Data for High Channel (1 Mbps)										
2462.00	65.50	Peak	H	27.48	1.50			94.48	-	
	65.00	Peak	V					93.98	-	
4924.00	30.33	Peak	H	31.44	2.67	26.10		38.34	74.00	-35.66
	21.00	Average	H					29.01	54.00	-24.99
	33.17	Peak	V					41.18	74.00	-32.82
	22.00	Average	V					30.01	54.00	-23.99
Test Data for High Channel (5.5 Mbps)										
2462.00	66.33	Peak	H	27.48	1.50			95.31	-	
	65.67	Peak	V					94.65	-	
4924.00	30.33	Peak	H	31.44	2.67	26.10		38.34	74.00	-35.66
	21.00	Average	H					29.01	54.00	-24.99
	33.17	Peak	V					41.18	74.00	-32.82
	22.00	Average	V					30.01	54.00	-23.99
Test Data for High Channel (11 Mbps)										
2462.00	67.67	Peak	H	27.48	1.50			96.65	-	
	66.83	Peak	V					95.81	-	
4924.00	30.50	Peak	H	31.44	2.67	26.10		38.51	74.00	-35.49
	21.17	Average	H					29.18	54.00	-24.82
	33.33	Peak	V					41.34	74.00	-32.66
	22.17	Average	V					30.18	54.00	-23.82

Tabulated test data for Restricted Band

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

Tested by: Ki-Hong, Nam / Test Engineer

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7.4 PEAK POWER SPECTRUL DENSITY

7.4.1 Operating environment

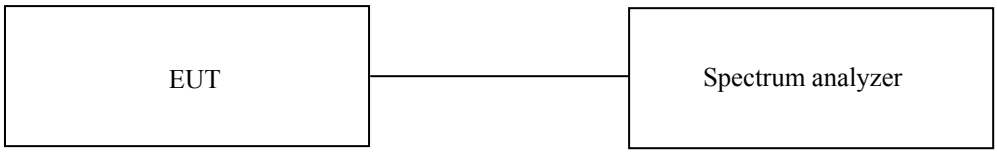
Temperature : 21°C

Relative humidity : 43 %

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 22, 2006

All test equipment used is calibrated on a regular basis.

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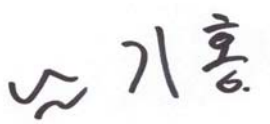
7.4.4 Test data

-. Test Date : November 03, 2006

-. Test Result : Pass

CHANNEL	FREQUENCY(MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2412	-15.33	8	-23.33
Middle	2437	-15.00	8	-23.00
High	2462	-14.83	8	-22.83

Remark: See next page for measurement data.



Tested by: Ki-Hong, Nam / Test Engineer

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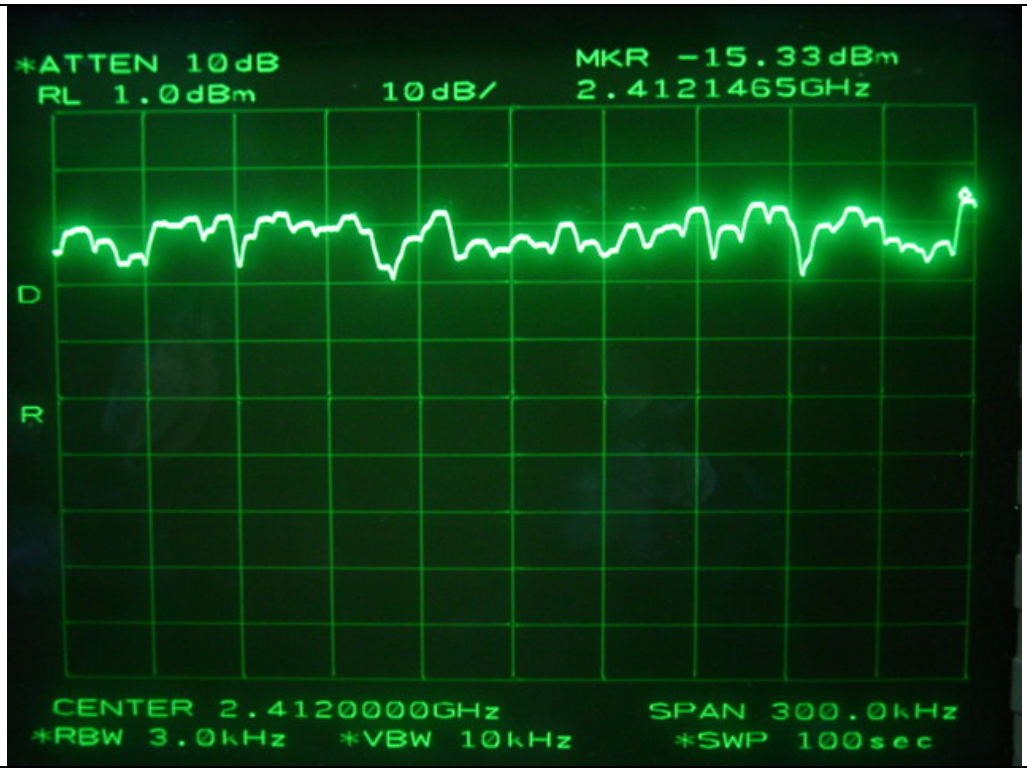

Low Channel

Middle Channel

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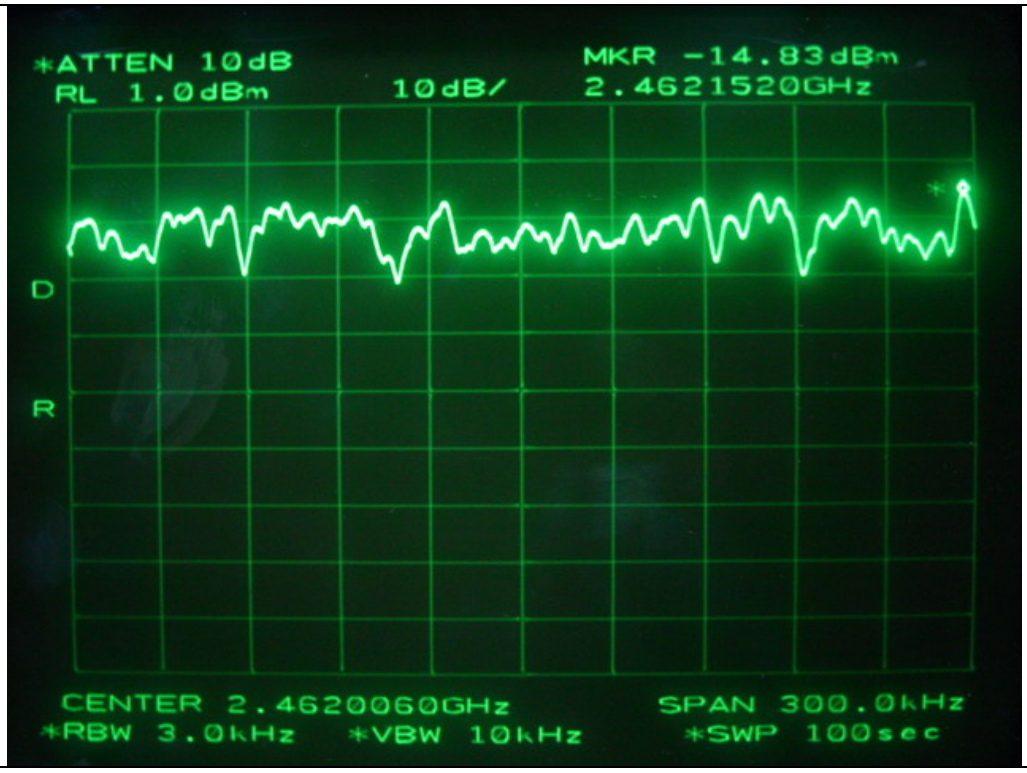

High Channel

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EMC Testing Dept : 307-51 Daessangryung-Ri, Chowol-Eup, Kwangju-City, Kyunggi-Do, 464-860, Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

8. TEST DATA FOR 802.11g WLAN MODE

8.1 MIMIMUM 6dB BANDWIDTH

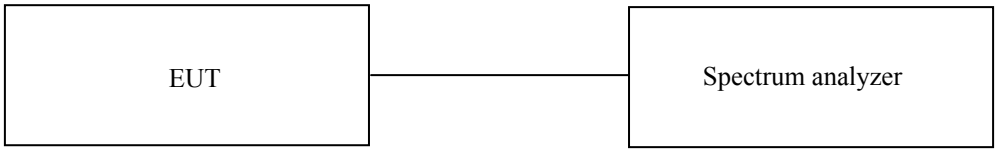
8.1.1 Operating environment

Temperature : 21°C

Relative humidity : 43 %

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 6dB 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 22, 2006

All test equipment used is calibrated on a regular basis.

HEAD OFFICE : #505 SK APT. Factory 223-28, Sangdaewon 1 Dong, Jungwon-Gu, Seongnam-City, Kyunggi-Do, 462-705, Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)
EMC Testing Dept : 307-51 Daessangryung-Ri, Chowol-Eup, Kwangju-City, Kyunggi-Do, 464-860, Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

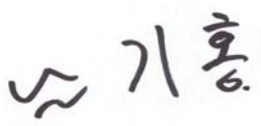
8.1.4 Test data

-. Test Date : November 04, 2006

-. Test Result : Pass

CHANNEL	FREQUENCY(MHz)	MEASURED VLAUE (kHz)	LIMIT (kHz)	MARGIN (kHz)
Low	2412	16630	500	-16130
Middle	2437	16630	500	-16130
High	2462	16630	500	-16130

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



Tested by: Ki-Hong, Nam / Test Engineer

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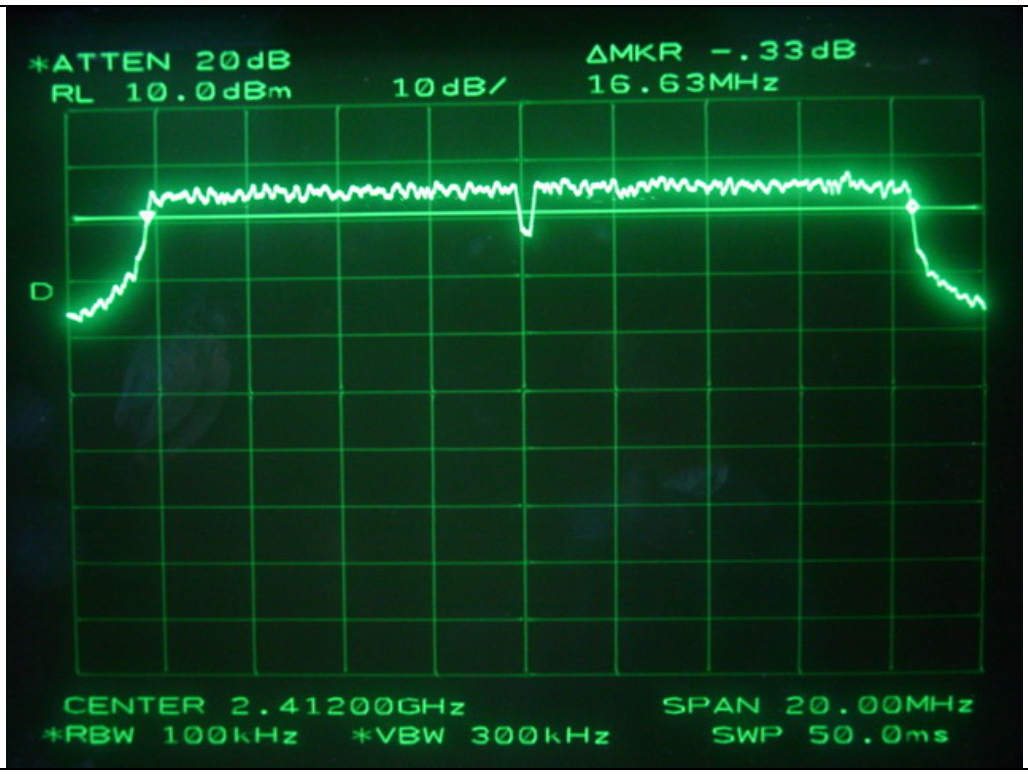
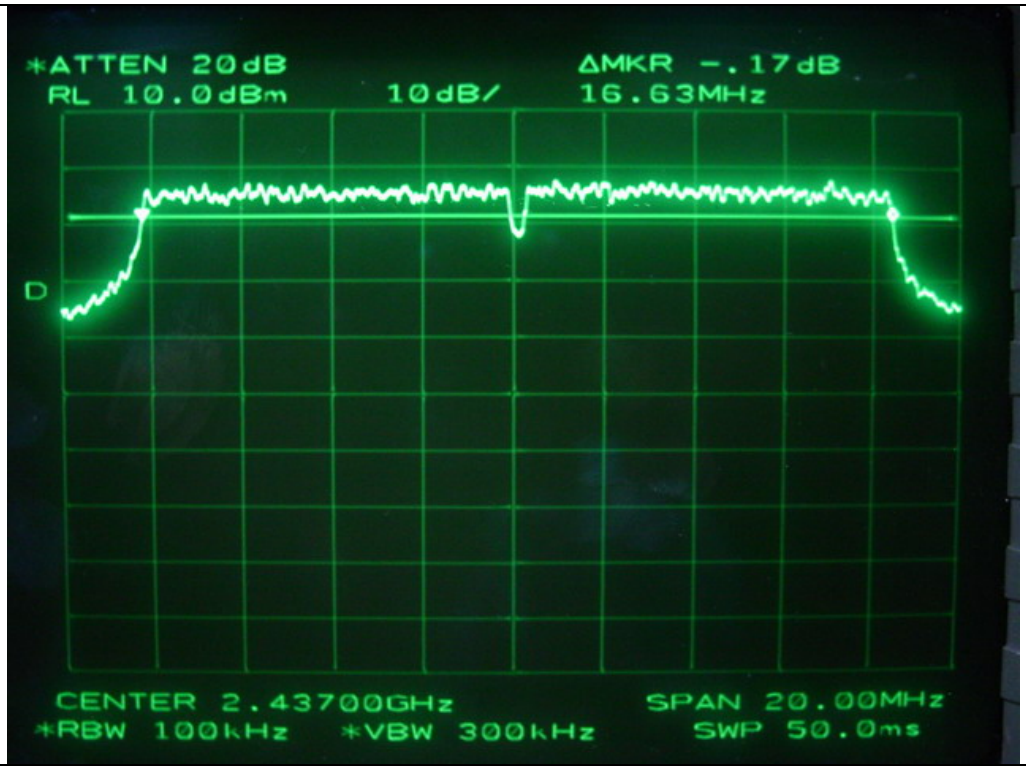
EMC Testing Dept : 307-51 Daessangryung-Ri, Chowol-Eup, Kwangju-City, Kyunggi-Do, 464-860, Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)



Low Channel



Middle Channel

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High Channel

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8.2. MAXIMUM PEAK OUTPUT POWER

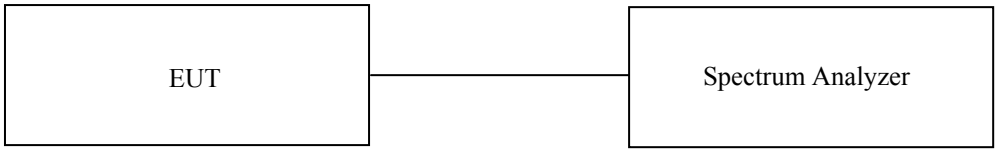
8.2.1 Operating environment

Temperature : 21°C

Relative humidity : 43 %

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 22, 2006

All test equipment used is calibrated on a regular basis.

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EMC Testing Dept : 307-51 Daessangryung-Ri, Chowol-Eup, Kwangju-City, Kyunggi-Do, 464-860, Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

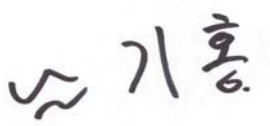
8.2.4 Test data

-. Test Date : November 04, 2006

-. Test Result : Pass

CHANNEL	FREQUENCY (MHz)	99% Occupied Bandwidth (MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2412	18.53	18.70	30.0	-11.30
Middle	2437	18.60	19.00	30.0	-11.00
High	2462	18.56	19.20	30.0	-10.80

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



Tested by: Ki-Hong, Nam / Test Engineer

HEAD OFFICE : #505 SK APT. Factory 223-28, Sangdaewon 1 Dong, Jungwon-Gu, Seongnam-City, Kyunggi-Do, 462-705, Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)

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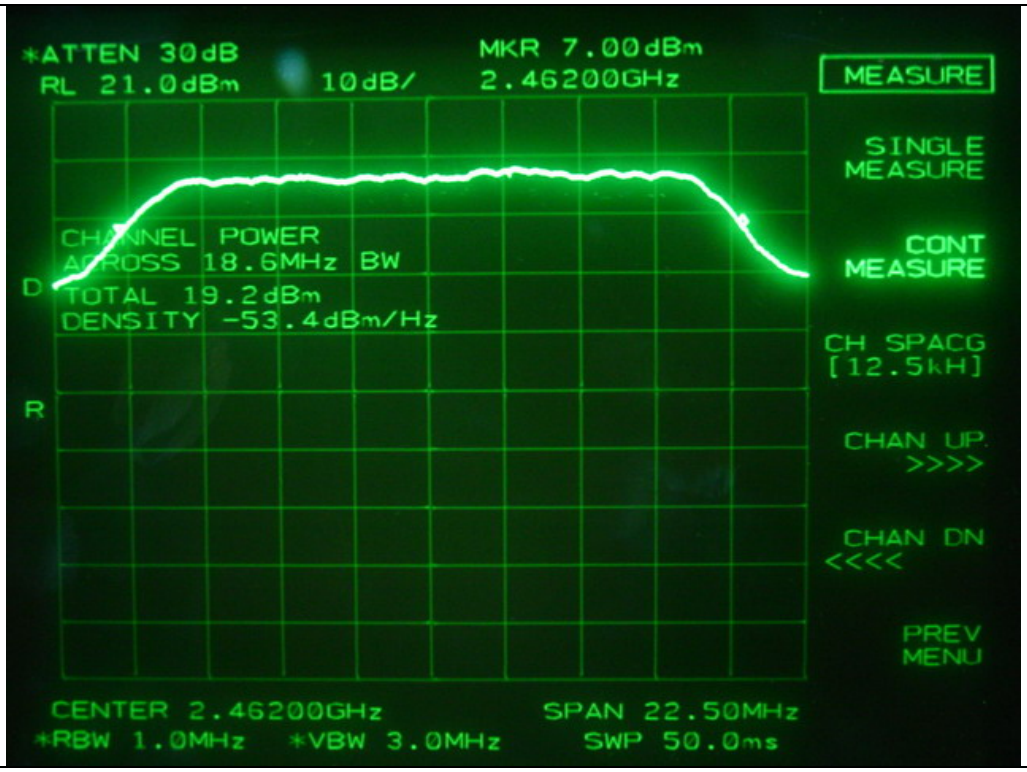
Low Channel

Middle Channel



High Channel

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8.3 100 kHz BANDWIDTH OUTSIDE THE FREQUENCY BAND

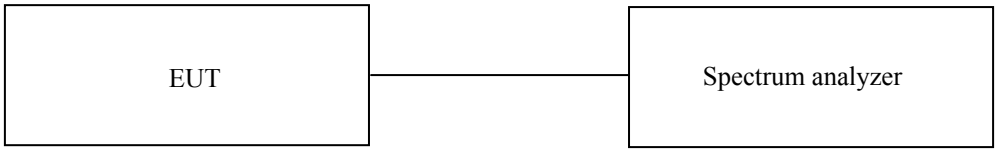
8.3.1 Operating environment

Temperature : 21°C

Relative humidity : 43 %

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 3meters, open-field test site. The EUT was placed on a non-conductive turntable approximately 0.8 meters above the ground plane.

The frequency spectrum from 30MHz to 25GHz 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 and 4.0 meters 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 22, 2006
■ -	8447D	Hewlett-Packard	Amplifier	2727A04987	June 14, 2006
□ -	83051A	Agilent	Preamplifier	3950M00201	June 23, 2006
■ -	F-40-5000-RF	RLC Electronics	Highpass Filter	0425	July 14, 2006
■ -	MA220	HD	Turn Table	N/A	N/A
■ -	HD240	HD	Antenna Mast	N/A	N/A
■ -	BBHA9120D	Schwarzbeck	Horn Antenna	BBHA9120D294	July 03, 2006
■ -	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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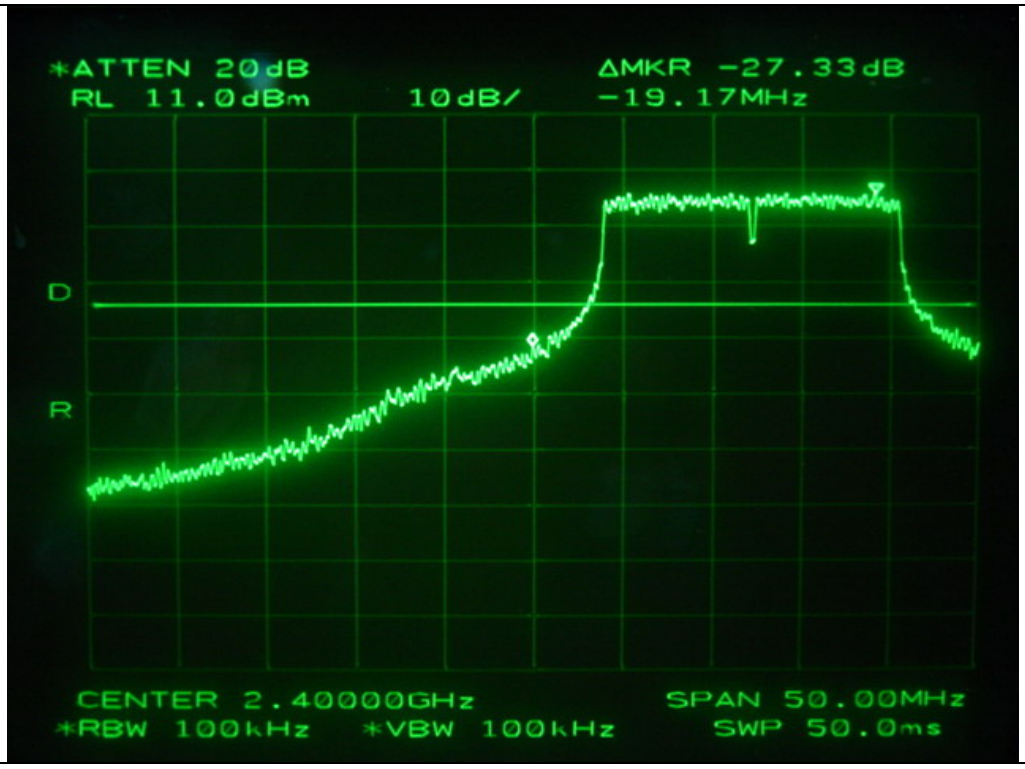
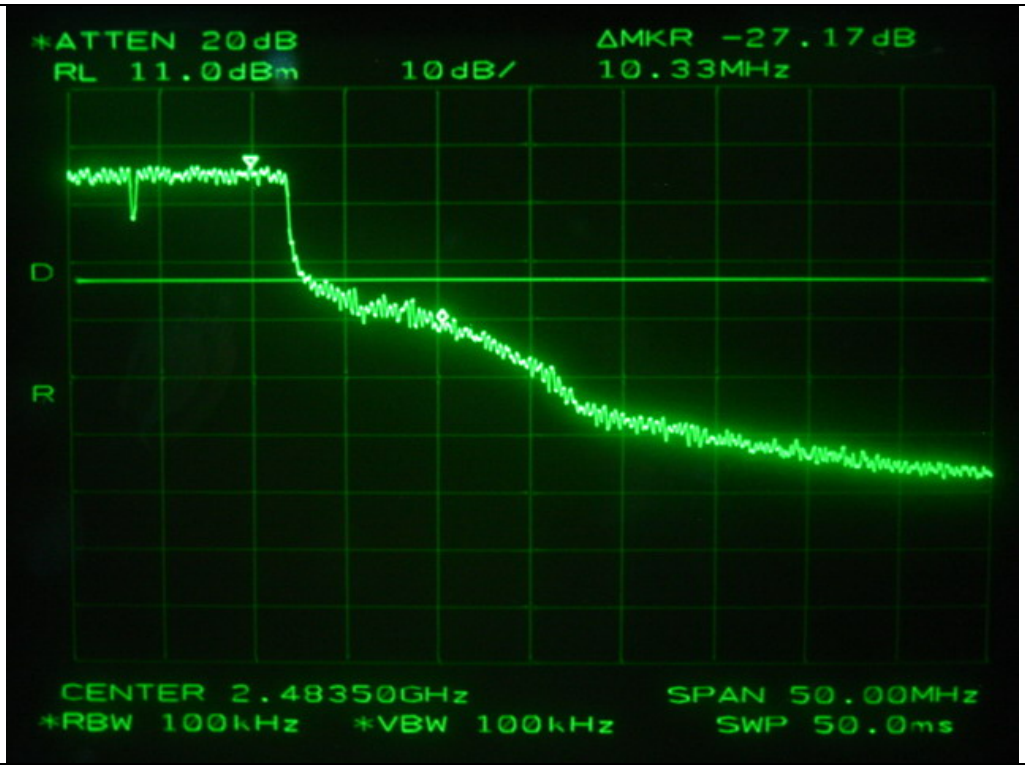
EMC Testing Dept : 307-51 Daessangryung-Ri, Chowol-Eup, Kwangju-City, Kyunggi-Do, 464-860, Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

8.3.5. Test data for conducted emission



Low Channel



High Channel

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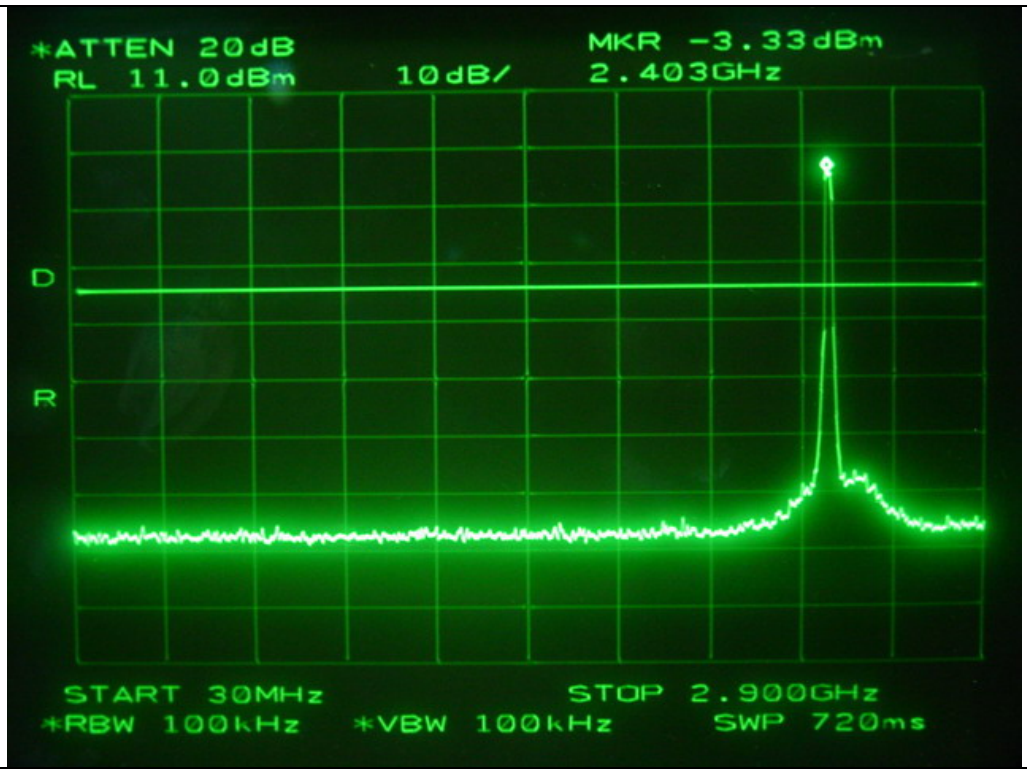
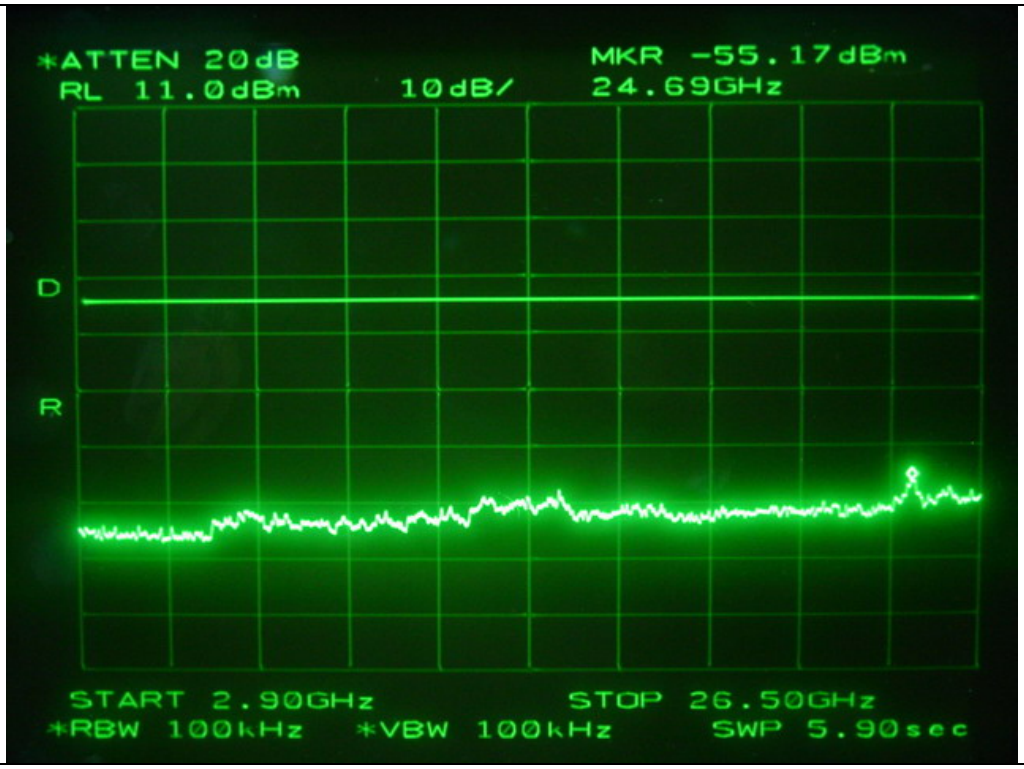


Low Channel



Low Channel

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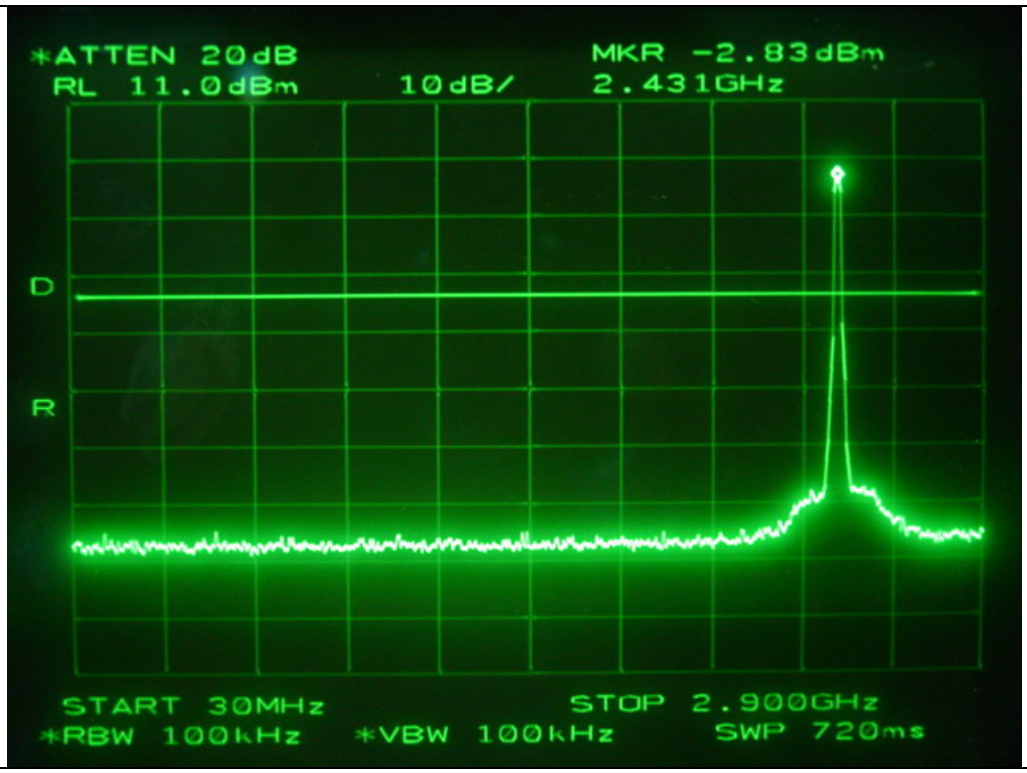

Middle Channel

Middle Channel

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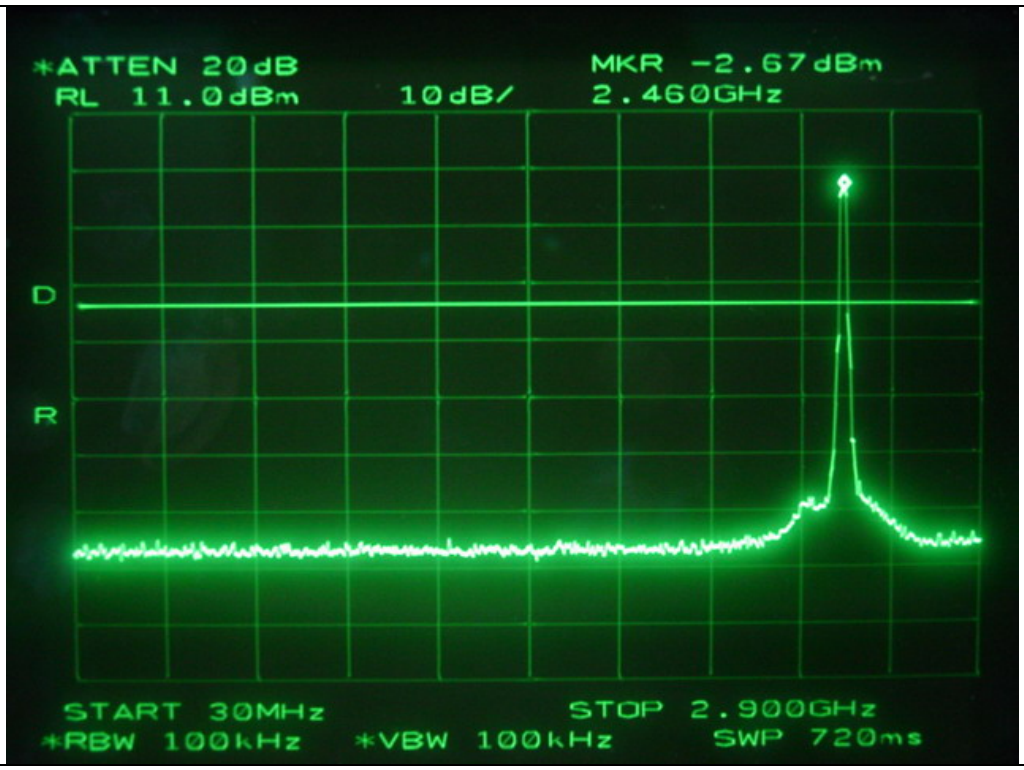
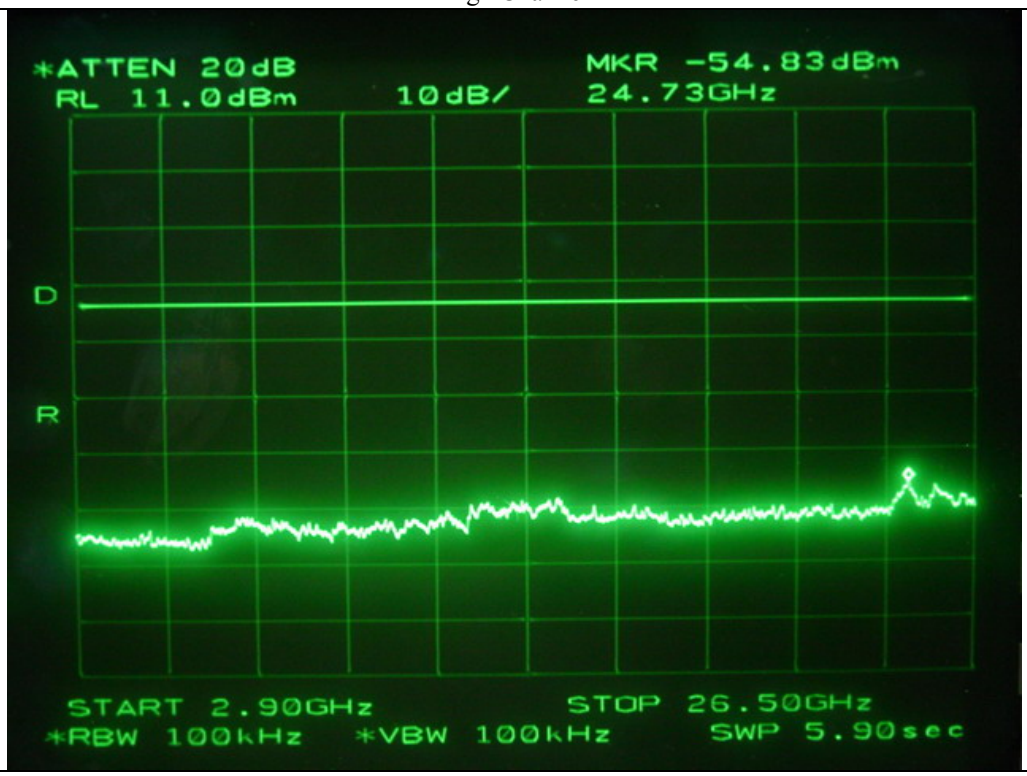
EMC Testing Dept : 307-51 Daessangryung-Ri, Chowol-Eup, Kwangju-City, Kyunggi-Do, 464-860, Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)



High Channel



High Channel

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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 : December 20, 2006

-. Resolution bandwidth : 1 MHz for Peak and Average Mode

-. Video bandwidth : 1 MHz for Peak Mode, 10Hz for Average Mode

-. Frequency range : 1 GHz ~ 25GHz

-. Measurement distance : 3m

-. Operating Condition : Low / High Channel

-. Result : PASSED BY –12.69 dB at High Channel (54 Mbps)

Frequency (MHz)	Reading (dBuV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Dist. Factor	Total (dBuV/m)	Limits (dBuV/m)	Margin (dB)
Test Data for Low Channel (6 Mbps)										
2390.00	38.50	Peak	H	27.64	1.33	26.1		41.37	74.00	-32.63
	25.83	Average	H					28.70	54.00	-25.30
	47.25	Peak	V					50.12	74.00	-23.88
	32.00	Average	V					34.87	54.00	-19.13
Test Data for Low Channel (24 Mbps)										
2390.00	38.33	Peak	H	27.59	1.33	26.1		41.15	74.00	-32.86
	25.67	Average	H					28.49	54.00	-25.52
	47.33	Peak	V					50.15	74.00	-23.86
	32.00	Average	V					34.82	54.00	-19.19
Test Data for Low Channel (54 Mbps)										
2390.00	39.00	Peak	H	27.59	1.33	26.1		41.82	74.00	-32.19
	25.83	Average	H					28.65	54.00	-25.36
	47.83	Peak	V					50.65	74.00	-23.36
	32.50	Average	V					35.32	54.00	-18.69

Tabulated test data for Restricted Band

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

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-Continued

Frequency (MHz)	Reading (dBuV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Dist. Factor	Total (dBuV/m)	Limits (dBuV/m)	Margin (dB)
Test Data for High Channel (6 Mbps)										
2483.50	57.33	Peak	H	27.64	1.33	26.1		60.20	74.00	-13.80
	37.83	Average	H					40.70	54.00	-13.30
	56.33	Peak	V					59.20	74.00	-14.80
	37.83	Average	V					40.70	54.00	-13.30
Test Data for High Channel (24 Mbps)										
2483.53	56.67	Peak	H	27.59	1.33	26.1		59.49	74.00	-14.52
	38.00	Average	H					40.82	54.00	-13.19
	56.33	Peak	V					59.15	74.00	-14.86
	37.50	Average	V					40.32	54.00	-13.69
Test Data for High Channel (54 Mbps)										
2483.53	57.33	Peak	H	27.59	1.33	26.1		60.15	74.00	-13.86
	38.50	Average	H					41.32	54.00	-12.69
	57.50	Peak	V					60.32	74.00	-13.69
	38.50	Average	V					41.32	54.00	-12.69

Tabulated test data for Restricted Band

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

Tested by: Ki-Hong, Nam / Test Engineer

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8.3.6.2 Spurious & Harmonic Radiated Emission

-. Test Date : December 20, 2006

-. 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, 10Hz for Average Mode

-. Frequency range : 1 GHz ~ 25 GHz

-. Measurement distance : 3m

-. Result : PASSED BY –24.13 dB at Middle Channel (54 Mbps)

Frequency (MHz)	Reading (dBuV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Dist. Factor	Total (dBuV/m)	Limits (dBuV/m)	Margin (dB)
Test Data for Low Channel (6 Mbps)										
2412.00	63.83	Peak	H	27.62	1.33			92.78	-	
	62.67	Peak	V					91.62	-	
4824.00*	33.17	Peak	H	31.30	2.67	26.10		41.04	74.00	-32.96
	21.33	Average	H					29.20	54.00	-24.80
	31.00	Peak	V					38.87	74.00	-35.13
	20.83	Average	V					28.70	54.00	-25.30
Test Data for Low Channel (24 Mbps)										
2412.00	64.50	Peak	H	27.61	1.33			93.44	-	
	63.50	Peak	V					92.44	-	
4824.00*	32.83	Peak	H	31.37	2.67	26.10		40.77	74.00	-33.23
	20.67	Average	H					28.61	54.00	-25.39
	32.00	Peak	V					39.94	74.00	-34.06
	20.83	Average	V					28.77	54.00	-25.23
Test Data for Low Channel (54 Mbps)										
2412.00	65.50	Peak	H	27.61	1.33			94.44	-	
	64.00	Peak	V					92.94	-	
4824.00*	33.33	Peak	H	31.37	2.67	26.10		41.27	74.00	-32.73
	21.50	Average	H					29.44	54.00	-24.56
	32.33	Peak	V					40.27	74.00	-33.73
	21.00	Average	V					28.94	54.00	-25.06

Tabulated test data for Restricted Band

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

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Frequency (MHz)	Reading (dBuV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Dist. Factor	Total (dBuV/m)	Limits (dBuV/m)	Margin (dB)
Test Data for Middle Channel (6 Mbps)										
2437.00	64.10	Peak	H	27.62	1.33			93.05	-	
	63.00	Peak	V					91.95	-	
4874.00*	31.50	Peak	H	31.44	2.67	26.10		39.51	74.00	-34.49
	21.67	Average	H					29.68	54.00	-24.32
	31.33	Peak	V					39.34	74.00	-34.66
	19.67	Average	V					27.68	54.00	-26.32
Test Data for Middle Channel (24 Mbps)										
2437.00	65.83	Peak	H	27.61	1.33			94.77	-	
	64.33	Peak	V					93.27	-	
4874.00*	31.33	Peak	H	31.30	2.67	26.10		39.20	74.00	-34.80
	21.50	Average	H					29.37	54.00	-24.63
	31.00	Peak	V					38.87	74.00	-35.13
	19.83	Average	V					27.70	54.00	-26.30
Test Data for Middle Channel (54 Mbps)										
2437.00	66.78	Peak	H	27.61	1.33			95.72	-	
	65.17	Peak	V					94.11	-	
4874.00*	32.00	Peak	H	31.30	2.67	26.10		39.87	74.00	-34.13
	22.00	Average	H					29.87	54.00	-24.13
	31.67	Peak	V					39.54	74.00	-34.46
	20.33	Average	V					28.20	54.00	-25.80

Tabulated test data for Restricted Band

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

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Frequency (MHz)	Reading (dBuV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Dist. Factor	Total (dBuV/m)	Limits (dBuV/m)	Margin (dB)
Test Data for High Channel (6 Mbps)										
2462.00	65.33	Peak	H	27.62	1.33			94.28	-	
	63.17	Peak	V					92.12	-	
4924.00*	32.67	Peak	H	31.37	2.67	26.10		40.61	74.00	-33.39
	20.33	Average	H					28.27	54.00	-25.73
	30.17	Peak	V					38.11	74.00	-35.89
	20.33	Average	V					28.27	54.00	-25.73
Test Data for High Channel (24 Mbps)										
2462.00	66.50	Peak	H	27.61	1.33			95.44	-	
	64.17	Peak	V					93.11	-	
4924.00*	32.50	Peak	H	31.44	2.67	26.10		40.51	74.00	-33.49
	20.67	Average	H					28.68	54.00	-25.32
	29.50	Peak	V					37.51	74.00	-36.49
	19.83	Average	V					27.84	54.00	-26.16
Test Data for High Channel (54 Mbps)										
2462.00	67.50	Peak	H	27.61	1.33			96.44	-	
	65.83	Peak	V					94.77	-	
4924.00*	32.67	Peak	H	31.44	2.67	26.10		40.68	74.00	-33.32
	21.00	Average	H					29.01	54.00	-24.99
	30.17	Peak	V					38.18	74.00	-35.82
	20.33	Average	V					28.34	54.00	-25.66

Tabulated test data for Restricted Band

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

Tested by: Ki-Hong, Nam / Test Engineer

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8.4 PEAK POWER SPECTRUL DENSITY

8.4.1 Operating environment

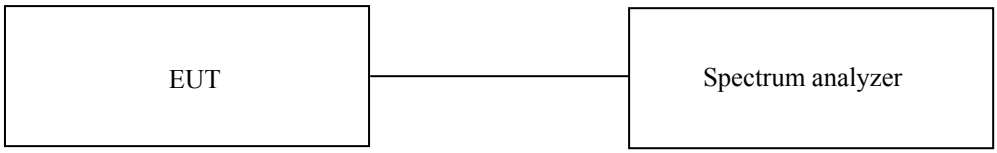
Temperature : 21°C

Relative humidity : 43 %

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 22, 2006

All test equipment used is calibrated on a regular basis.

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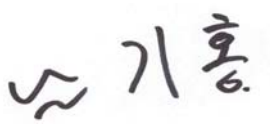
8.4.4 Test data

-. Test Date : November 04, 2006

-. Test Result : Pass

CHANNEL	FREQUENCY(MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2412	-25.67	8	-33.67
Middle	2437	-24.83	8	-32.83
High	2462	-24.50	8	-32.50

Remark: See next page for measurement data.



Tested by: Ki-Hong, Nam / Test Engineer

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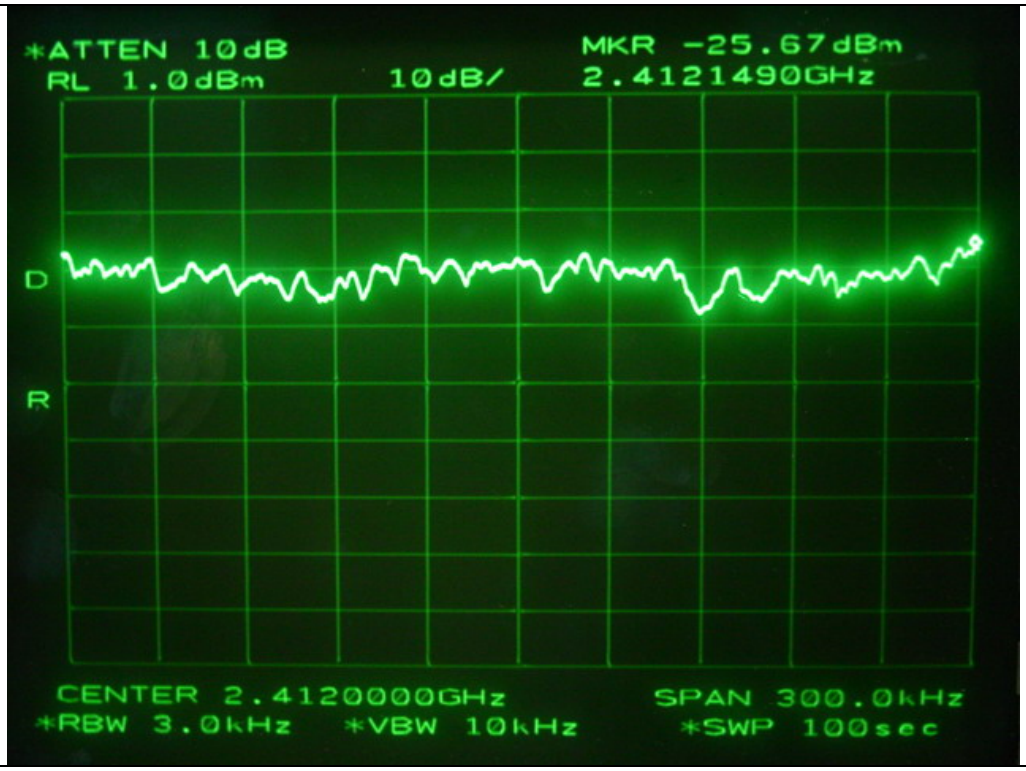
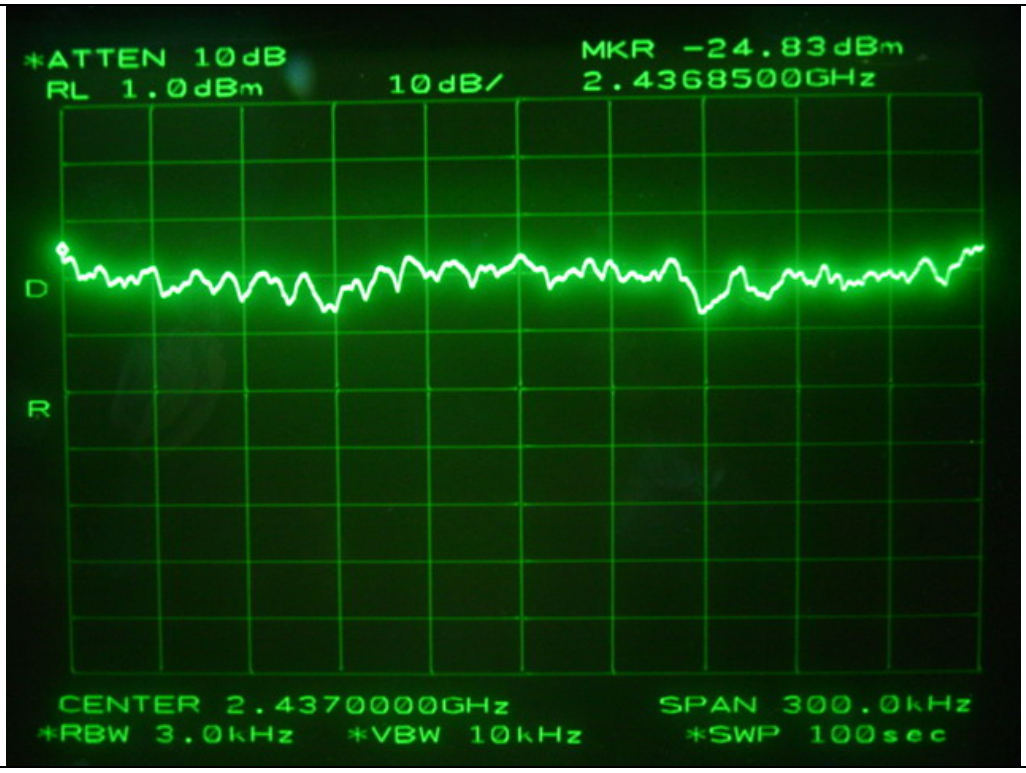


Low Channel



Middle Channel

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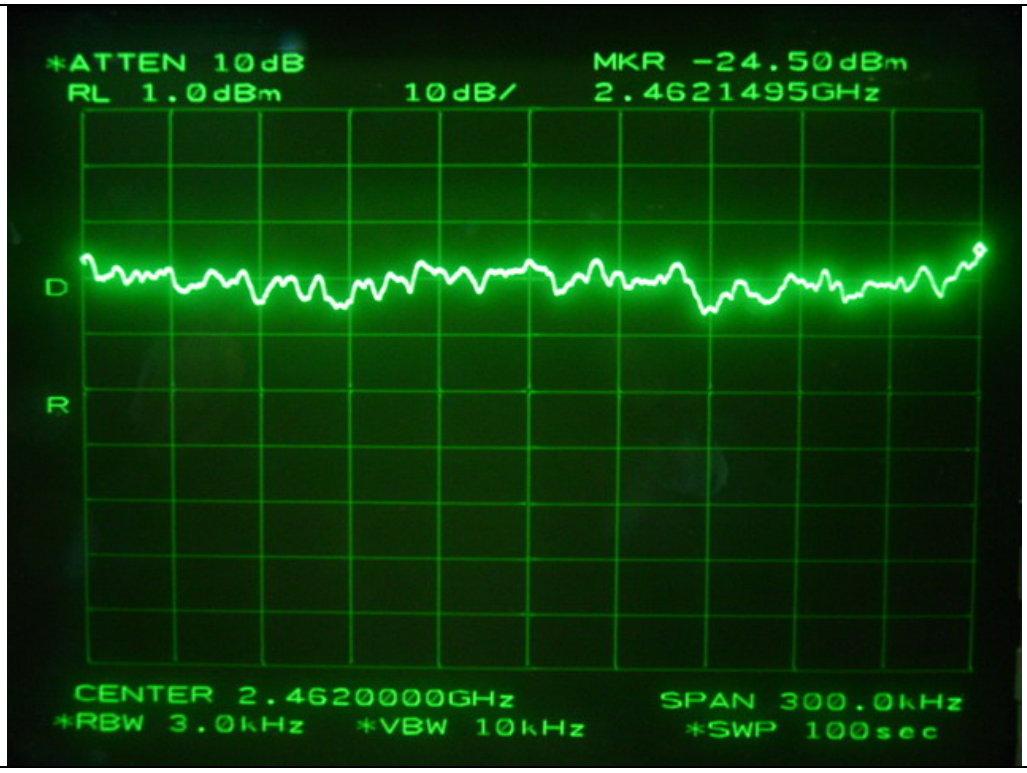

High Channel

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9. RADIO FREQUENCY EXPOSURE

9.1 RF Exposure Limit

According to the FCC rule §1.1310, the limit for General Population/Uncontrolled exposure is 1mW/cm² for the device operating 1,500~100,000 MHz.

9.2 EUT Description

Kind of EUT	Industrial PDA with Bluetooth and WLAN 802.11b, 802.11g
Operating Frequency Band	■ WLAN: 2400 ~ 2483.5 MHz ☐ WLAN: 5180 ~ 5320 MHz / 5500 ~ 5700 MHz ☐ WLAN: 5745 ~ 5825 MHz ■ Bluetooth: 2400 ~ 2483.5 MHz
Device Category	■ Portable (<20cm separation) ☐ Mobile (>20cm separation) ☐ Others
Max. Output Power	WLAN: 17.10 dBm (802.11b), 19.20 dBm (802.11g)
Used Antenna	
Used Antenna Gain	1.9dBi
Exposure Evaluation Applied	☐ MPE ☐ SAR ■ N/A

9.3 Test Result

According to the rule, §1.1307(b) (1) and §2.1093, PORTABLE devices using WLAN and Bluetooth technology according to §15.247 are exempt from the regulation.

So, the device meets the RF exposure requirement.

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10. RADIATED EMISSION TEST FOR DIGITAL DEVICE PART

10.1 Operating environment

Temperature : 11 °C

Relative humidity : 45 %

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 30MHz to 1000MHz 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.

The test set-up photos are included in appendix VI.

10.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal.
■ -	ESVS10	Rohde & Schwarz	EMI Test Receiver	827864/005	Dec 20, 2005
■ -	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	Feb 13, 2006
■ -	9108-A(494)	Schwarzbeck	Log Periodic Antenna	62281001	Feb 13, 2006

All test equipment used is calibrated on a regular basis.

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10.4 Test data

-. Test Date : December 18, 2006

-. Resolution bandwidth : 120 kHz

-. Frequency range : 30MHz ~ 1000MHz

-. Measurement distance : 3m

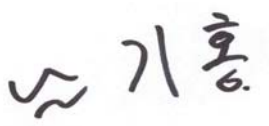
-. Test result : Passed by -7.97 dB at 32.95 MHz

Frequency (MHz)	Reading (dBuV)	Ant. Pol. (H/V)	Ant. Factor (dB/m)	Cable Loss	Emission Level(dBuV/m)	Limits (dBuV/m)	Margin (dB)
32.95	13.10	V	17.51	1.42	32.03	40.00	-7.97
49.50	14.30	V	11.32	1.60	27.22	40.00	-12.78
127.90	11.50	H	13.29	2.62	27.41	43.52	-16.11
185.10	13.83	H	15.70	2.90	32.43	43.52	-11.09
218.96	11.92	H	16.71	3.55	32.18	46.02	-13.84
350.80	14.20	H	16.06	4.40	34.66	46.02	-11.36

Tabulated test data for Radiated Electromagnetic Field

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

Low, Middle and High channels were tested, but the worst emissions levels were recorded in this test report.



Tested by: Ki-Hong, Nam / Test Engineer

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11. CONDUCTED EMISSION TEST

11.1 Operating environment

Temperature : 20°C

Relative humidity : 41 %

11.2 Test set-up

The EUT was placed on a wooden table, 0.8 meters height above the floor. The power of the EUT was connected through a 50 ohm/ 50 uH Artificial Mains Network (AMN). The ground plane was electrically bonded to the reference ground system and all power lines were filtered from ambient.

11.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal.
■ -	ESHS10	Rohde & Schwarz	EMI Test Receiver	834467/007	May 15, 2006
■ -	NSLK 8126	Schwarzbeck	AMN	8126-404	July. 04, 2006
☐ -	3825/2	EMCO	AMN	9109-1867	June 23, 2006

All test equipment used is calibrated on a regular basis.

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11.4 Test data

-. Test Date : December 18, 2006

-. Resolution bandwidth : 9 kHz

-. Frequency range : 0.15MHz ~ 30MHz

-. Test Result : PASSED BY –3.90dB at 7.64 MHz under average mode

Frequency (MHz)	Line	Peak (dBuV)		Margin (dB)	Average (dBuV)		Margin (dB)
		Emission level	Limits		Emission level	Limits	
0.20	H	57.10	63.61	-6.51	45.35	53.61	-8.26
0.265	H	49.65	61.27	-11.62	38.25	51.27	-13.02
0.465	H	40.32	56.60	-16.28	-	-	-
0.665	H	39.70	56.00	-16.30	39.25	46.00	-6.75
7.615	N	48.26	60.00	-11.74	44.62	50.00	-5.38
7.64	H	49.55	60.00	-10.45	46.10	50.00	-3.90

Line Conducted Emissions Tabulated Data

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

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

Tested by: Ki-Hong, Nam / Test Engineer

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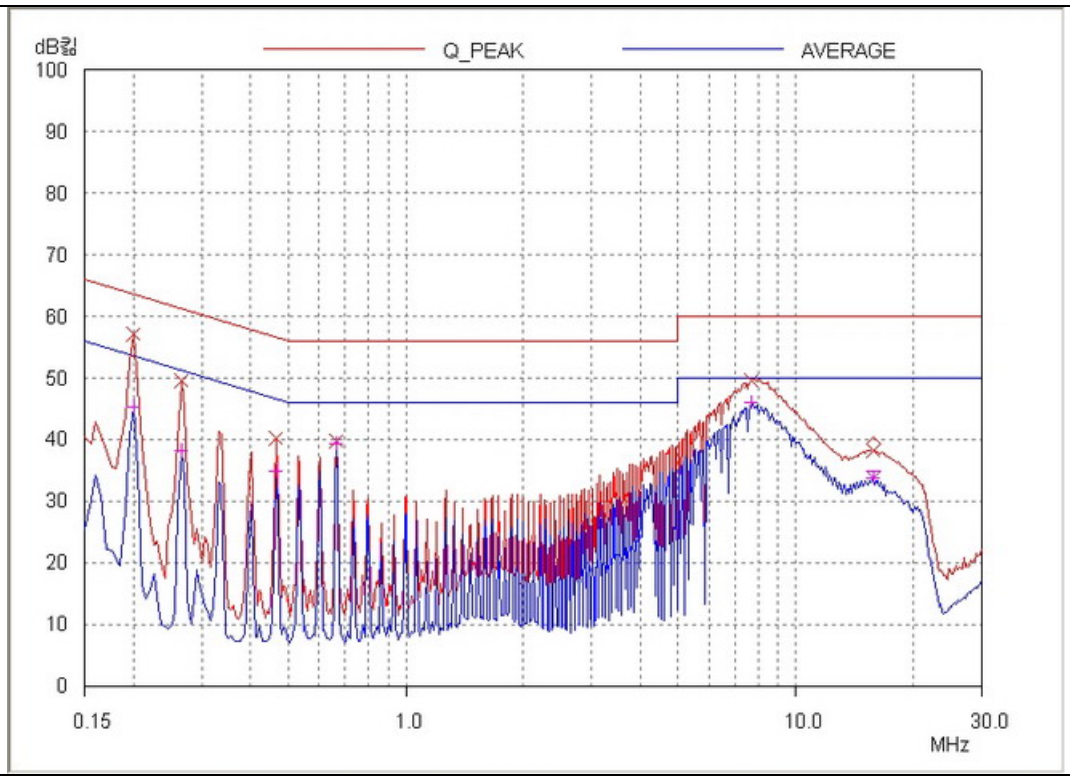
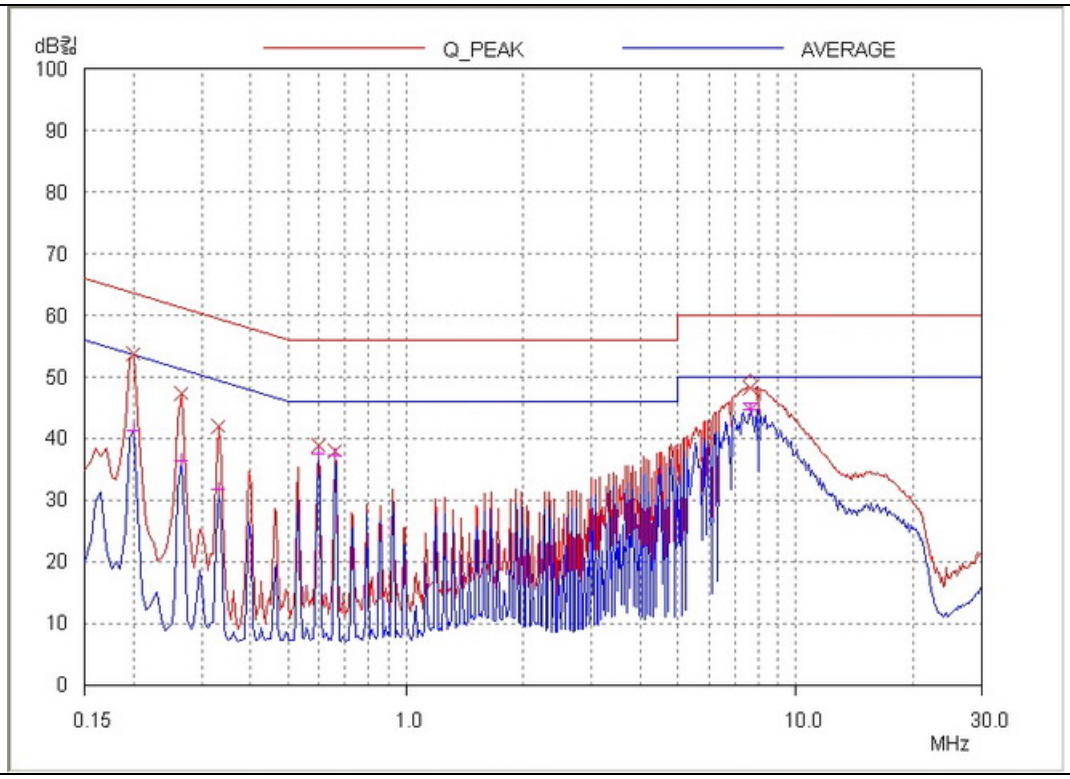


HOT LINE



NEUTRAL LINE

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