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

Test Report No.	**: E09NR-013**
AGR No.	**: A096A-181R**
Applicant	**: Creative Marketing Solutions Ltd.**
Address	**: 901 Kranz-techno Bldg., 5442-1 Sangdaewon-dong, Jungwon-gu, Sungnam-city, Kyounggi-do, 462-729, Korea**
Manufacturer	**: Creative Marketing Solutions Ltd.**
Address	**: 901 Kranz-techno Bldg., 5442-1 Sangdaewon-dong, Jungwon-gu, Sungnam-city, Kyounggi-do, 462-729, Korea**
Type of Equipment	**: 23" LCD TV with Bluetooth Module**
FCC ID.	**: XTV-PDI-P23LCDD**
Model Name	**: 3SD-23ALA**
Multiple Model Name	**: PDI-P23LCDD**
Serial number	**: N/A**
Total page of Report	**: 44 pages (including this page)**
Date of Incoming	**: October 09, 2009**
Date of issue	**: November 06, 2009**

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: Young-Min, Choi / Asst. Chief Engineer
EMC/RF Center
ONETECH Corp.

Reviewed by: Y. K. Kwon / Managing Director
EMC/RF Center
ONETECH Corp.

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Revision History

Issued Report No.	Issued Date	Revisions	Effect Section
E09NR-013	November 06, 2009	Initial Issue	All

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1. VERIFICATION OF COMPLIANCE

APPLICANT	: Creative Marketing Solutions Ltd.
ADDRESS	: 901 Kranz-techno Bldg., 5442-1 Sangdaewon-dong, Jungwon-gu, Sungnam-city, Kyounggi-do, 462-729, Korea
CONTACT PERSON	: Mr. Seungsek, Park / Chief Engineer
TELEPHONE NO	: +82-31-777-8123
FCC ID	: XTV-PDI-P23LCDD
MODEL NAME	: 3SD-23ALA
SERIAL NUMBER	: N/A
DATE	: November 06, 2009

EQUIPMENT CLASS	***DSS – PART 15 SPREAD SPECTRUM TRANSMITTER***
KIND OF EQUIPMENT	23" LCD TV
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) (1)	Carrier Frequency Separation	Met the Limit / PASS
15.247 (a) (1) (iii)	Minimum Number of Hopping Channels	Met the Limit / PASS
15.247 (a) (1) (iii)	Average Time of Occupancy	Met the Limit / PASS
15.247 (b) (1)	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 ANCI 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 Daessangryung-ri, Chowol-eup, Gwangju-si, Gyeonggi-do, 464-862, Korea. Description details of test facilities were submitted to the Commission on August 21, 2008. (Registration Number: 340658)

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3. GENERAL INFORMATION

3.1 Product Description

The Creative Marketing Solutions Ltd., Model 3SD-23ALA (referred to as the EUT in this report) is a 23" LCD TV which has a function of Bluetooth module and has ports for PC In. The ports for computing peripheral device shall be subject to DoC procedure and issued by another test report. This report is for Bluetooth function. The product specification described herein was obtained from product data sheet or user's manual.

DEVICE TYPE	23" LCD TV with Bluetooth
TEMPERATURE RANGE	-20 °C ~ +50 °C
OPERATING FREQUENCY	2 402 MHz ~ 2 480 MHz
RF OUTPUT POWER	12.50 dBm
NUMBER OF CHANNEL	79 Channels
MODULATION TYPE	GFSK
ANTENNA	MFR.: WINiZEN, Model No.: W5I-BF-LS09
ANTENNA CONNECTOR TYPE	Internal Chip Antenna
ANTENNA GAIN	0.70 dBi
LIST OF EACH OSC. OR CRYSTAL. FREQ.(FREQ.>= 1 MHz)	25 MHz, 27 MHz, 24.69 MHz, 18.432 MHz and 8 MHz on main board
NUMBER OF LAYER	1 Layer: SMPS Board, 2 Layers: A/V, Front and Pillow Boards, 4 Layers: Bluetooth and Main board
EXRERNAL CONNECTOR	RF In, Pillow, MTI, CCI, USB, PC In(Video, Audio), Component In 1/2, A/V In, S-VHS Video In, HDMI In 1/2

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
3SD-23ALA	Basic Model	☑
PDI-P23L	This model is identical to basic model, except for model designation only.	☐

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	CMS	P23 PJT MAIN Ver0.9	N/A
Bluetooth Board	CMS	N/A	N/A
Inverter Board	DS-Plus	DS-1308EC	N/A
Interface Board	CMS	P23 PILLOW Ver0.9	N/A
Tuner Board	FV674011	N/A	N/A
AV Board	3S Digital	A-PJT-AV V2.0	N/A
Function Board	N/A	N/A	N/A
LCD Panel	LG Display	LM230WF1(TL)(A3) LM230WF2(SL)(A1)	N/A
SMPS Board	FiNEL TECH	TSL-23LP	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
3SD-23ALA	Creative Marketing Solutions Ltd.	XTV-PDI-P23LCDD	LCD Television (EUT)	-
PD108-420	Creative Marketing Solutions Ltd.	N/A	Remote Controller	-
Optiplex 330	Dell Computer	DoC	PC	EUT
SK-8115	Dell Computer	DoC	Keyboard	PC
MO56UOA	Dell Computer	DoC	Mouse	PC
BR-015B+	LANSTROY	DoC	Router	EUT
DVP-NS92V	Sony	N/A	DVD Player	EUT

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, Bluetooth was set at Low Channel (2 402 MHz), Middle Channel (2 441 MHz), and High Channel (2 480 MHz).

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5.4 Configuration of Test System

Line Conducted Test: The power of EUT was connected to LISN. All supporting equipments were connected to another LISN. Preliminary Power line 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 3 m 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)
Bluetooth 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)
Bluetooth Mode	X

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7. TEST DATA FOR BLUETOOTH MODE

7.1. 20 dB BANDWIDTH

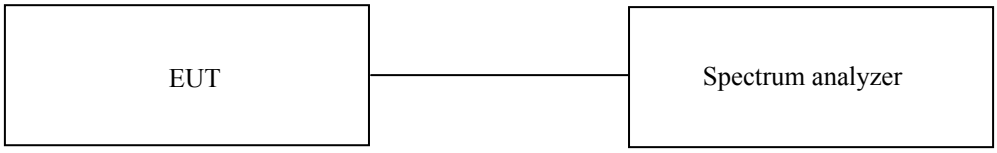
7.1.1 Operating environment

Temperature : 24 °C

Relative humidity : 45 % 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 10 kHz, and peak detection was used. The 20 dB bandwidth is defined as the total spectrum over which the power is higher than the peak power minus 20 dB.



7.1.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal.
■ -	8564E	HP	Spectrum Analyzer	3650A00756	June 15, 2009

All test equipment used is calibrated on a regular basis.

7.1.4 Test data

-. Test Date : October 14, 2009

-. Test Result : Pass

CHANNEL	FREQUENCY(MHz)	MEASURED VLAUE (kHz)	LIMIT (kHz)	MARGIN (kHz)
Low	2 402	833	1 000	-167
Middle	2 441	842	1 000	-158
High	2 480	833	1 000	-167

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

Tested by: Ki-Hong, Nam / Senior Engineer

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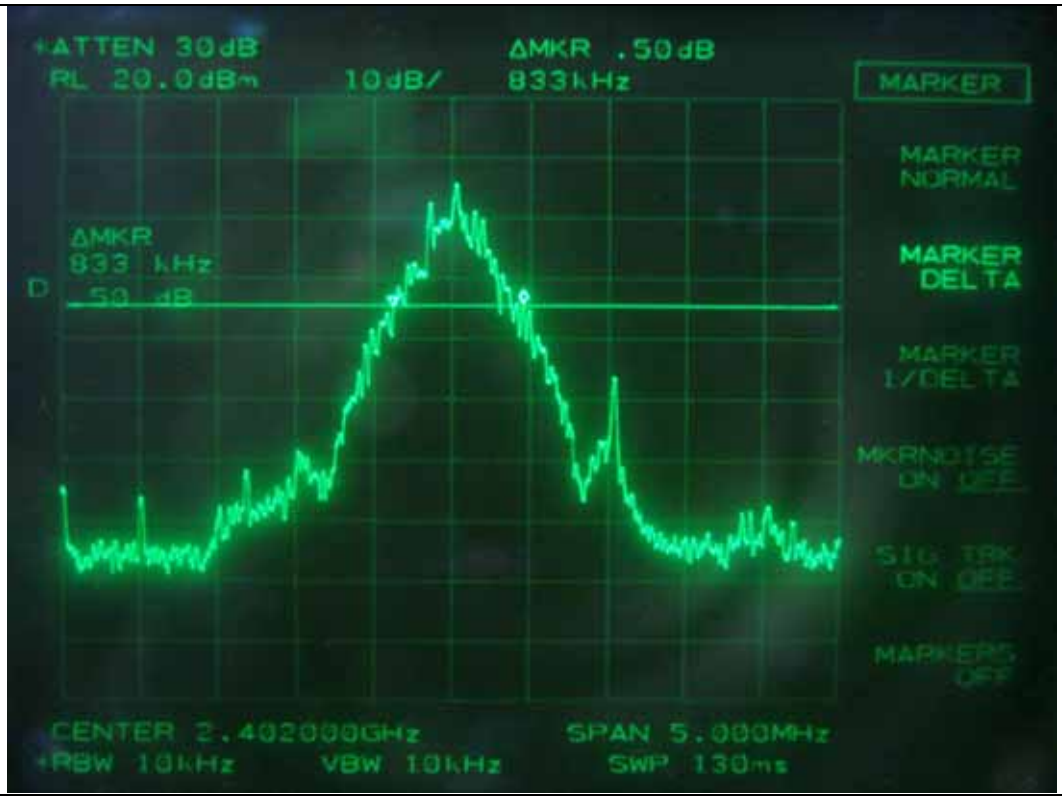
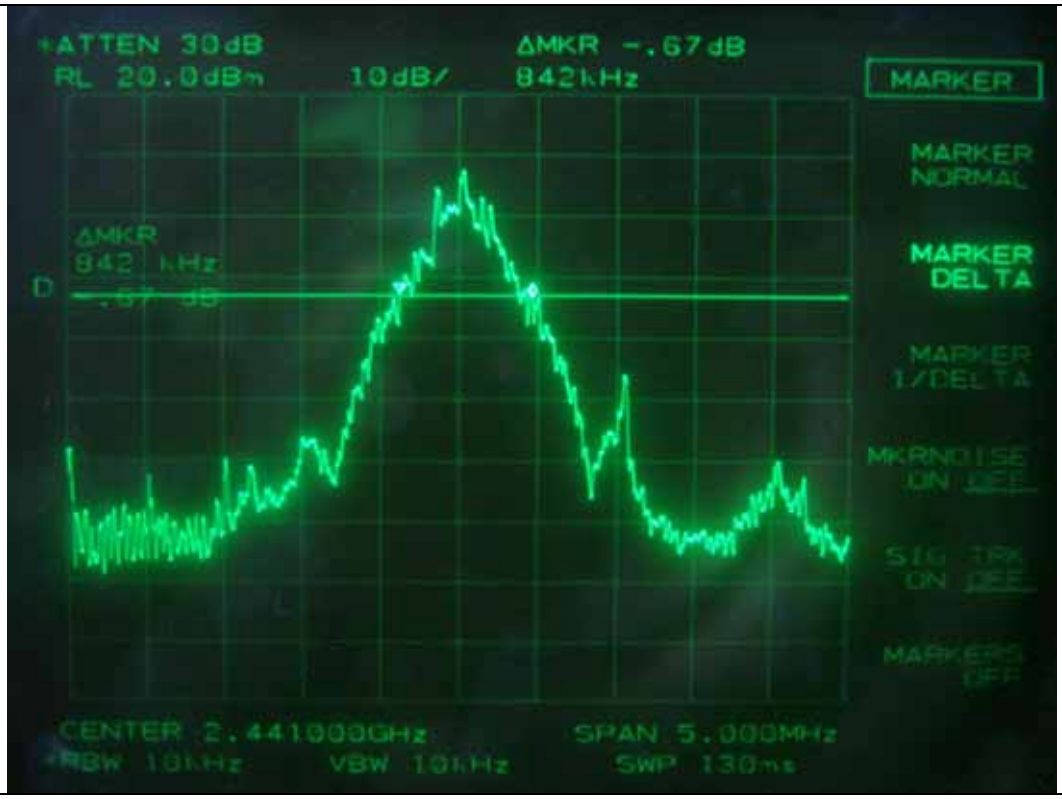


Low Channel



Middle Channel

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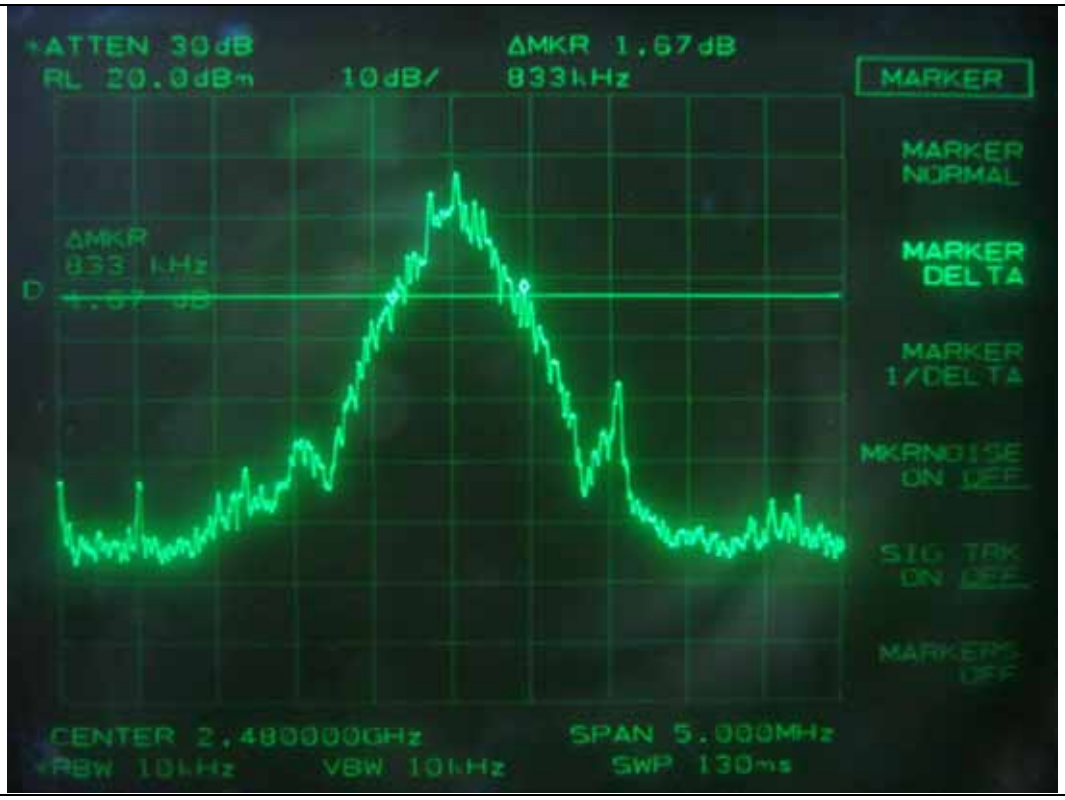

High Channel

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7.2. HOPPING FREQUENCY SEPARATION

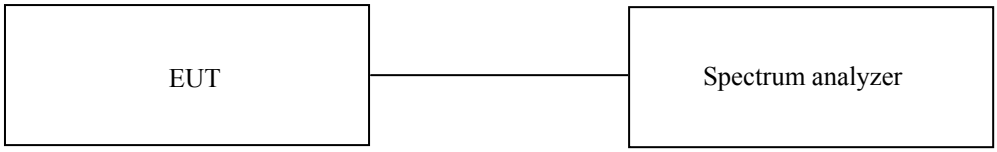
7.2.1 Operating environment

Temperature : 24 °C

Relative humidity : 45 % R.H.

7.2.2 Test set-up

The antenna output of the EUT was connected to the spectrum analyzer. The frequency span is set to 10 MHz. The analyzer is set to peak hold then a pseudo-random hopping sequence of the transmitter is captured. The mark delta function was used to measure the frequency separation between two adjacent hopping channels.



7.2.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal.
■ -	8564E	HP	Spectrum Analyzer	3650A00756	June 15, 2009

All test equipment used is calibrated on a regular basis.

7.2.4 Test data

-. Test Date : October 14, 2009

-. Test Result : Pass

MEASURED VLAUE (kHz)	LIMIT, 20 dB Bandwidth (kHz)	MARGIN (kHz)
1 000	842	-158

Tested by: Ki-Hong, Nam / Senior Engineer

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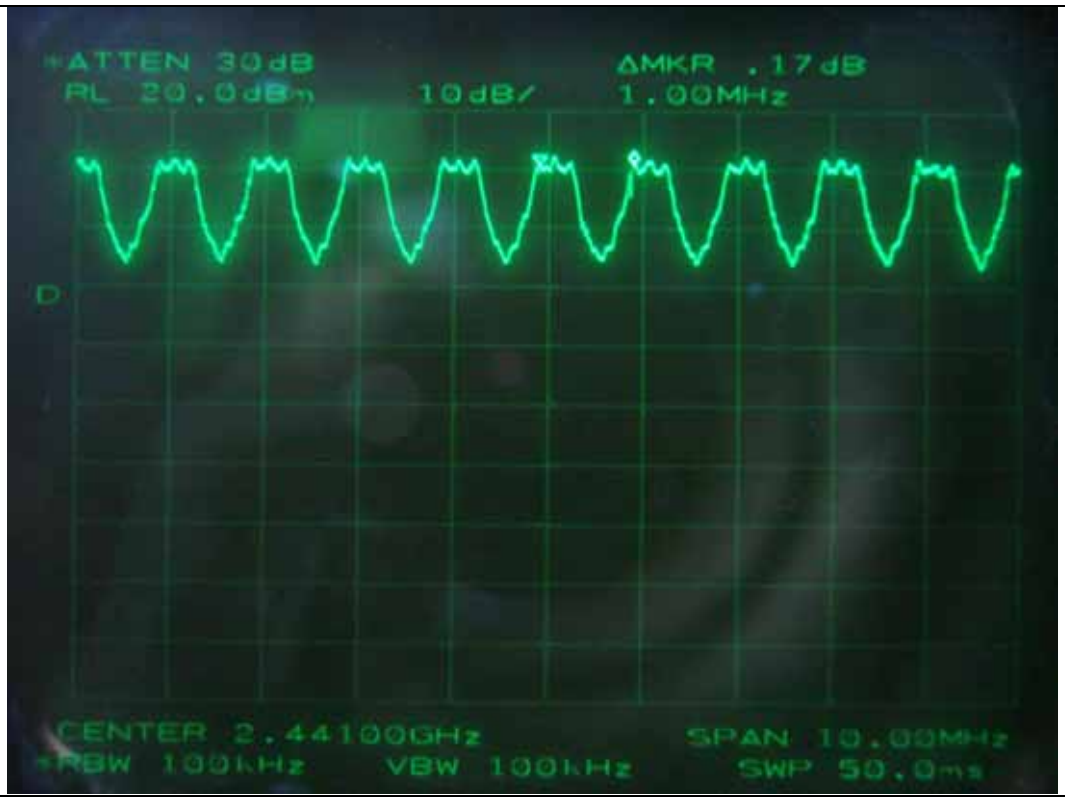

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7.3. NUMBER OF HOPPING CHANNELS

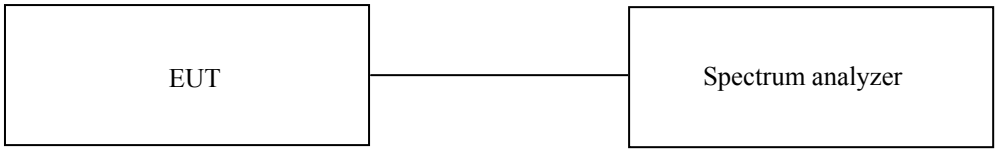
7.3.1 Operating environment

Temperature : 24 °C

Relative humidity : 45 % R.H.

7.3.2 Test set-up

The antenna output of the EUT was connected to the spectrum analyzer. The frequency span is set to 100 MHz and the resolution bandwidth is set to 1 MHz. The analyzer is set to peak hold and then complete pseudo-random hopping sequence of the transmitter is captured.



7.3.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal.
■ -	8564E	HP	Spectrum Analyzer	3650A00756	June 15, 2009

All test equipment used is calibrated on a regular basis.

7.3.4 Test data

-. Test Date : October 14, 2009

-. Test Result : Pass

MEASURED VLAUE (Number)	LIMIT (Number)	MARGIN (Number)
79	Minimum of 15	64

Tested by: Ki-Hong, Nam / Senior Engineer

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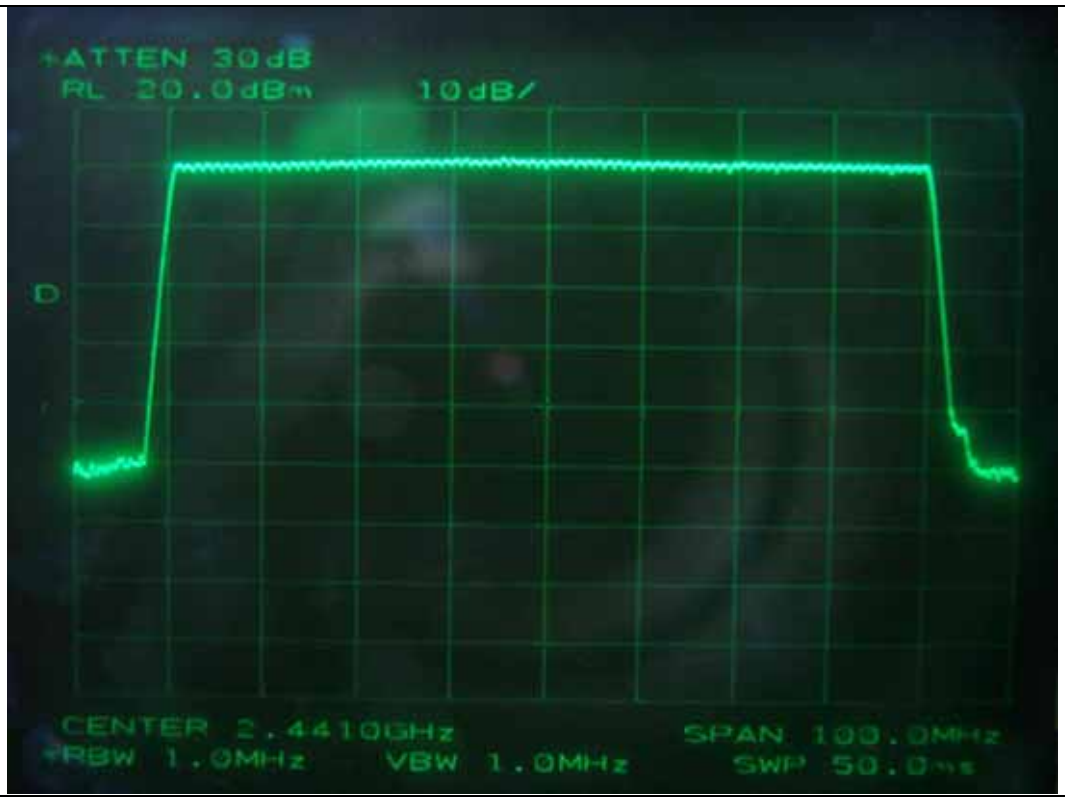

Total number of hopping channel: 28+30+21 = 79

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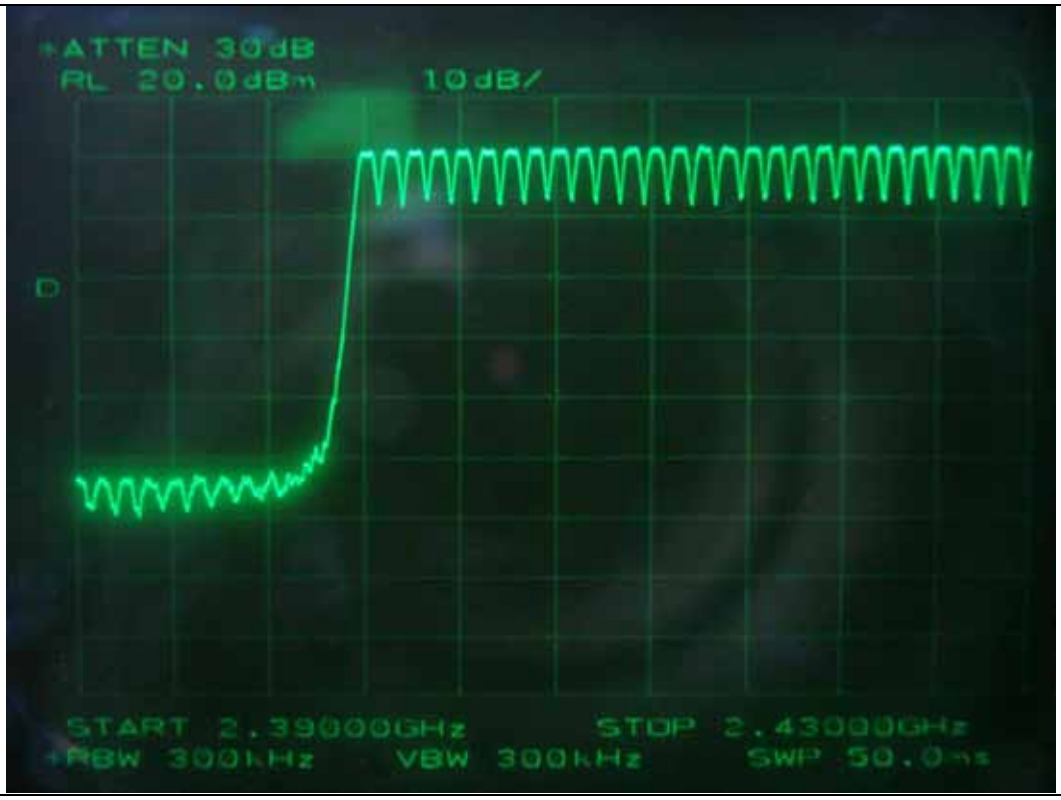
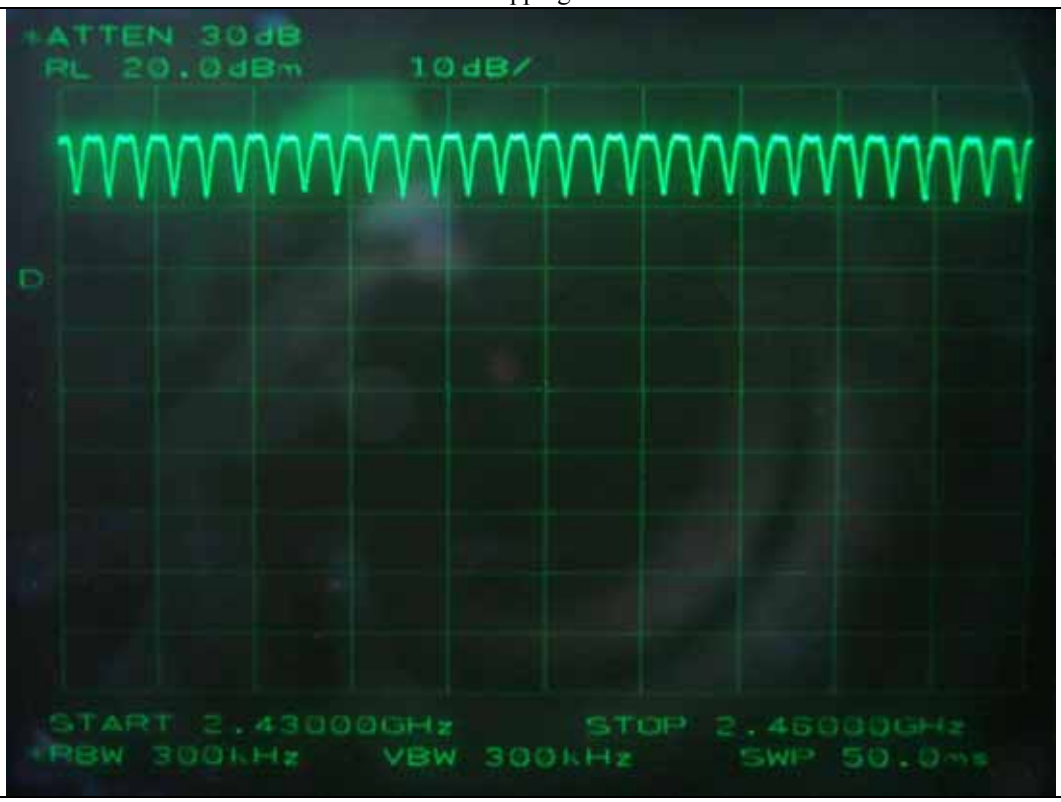


Number of hopping channel: 28



Number of hopping channel: 30

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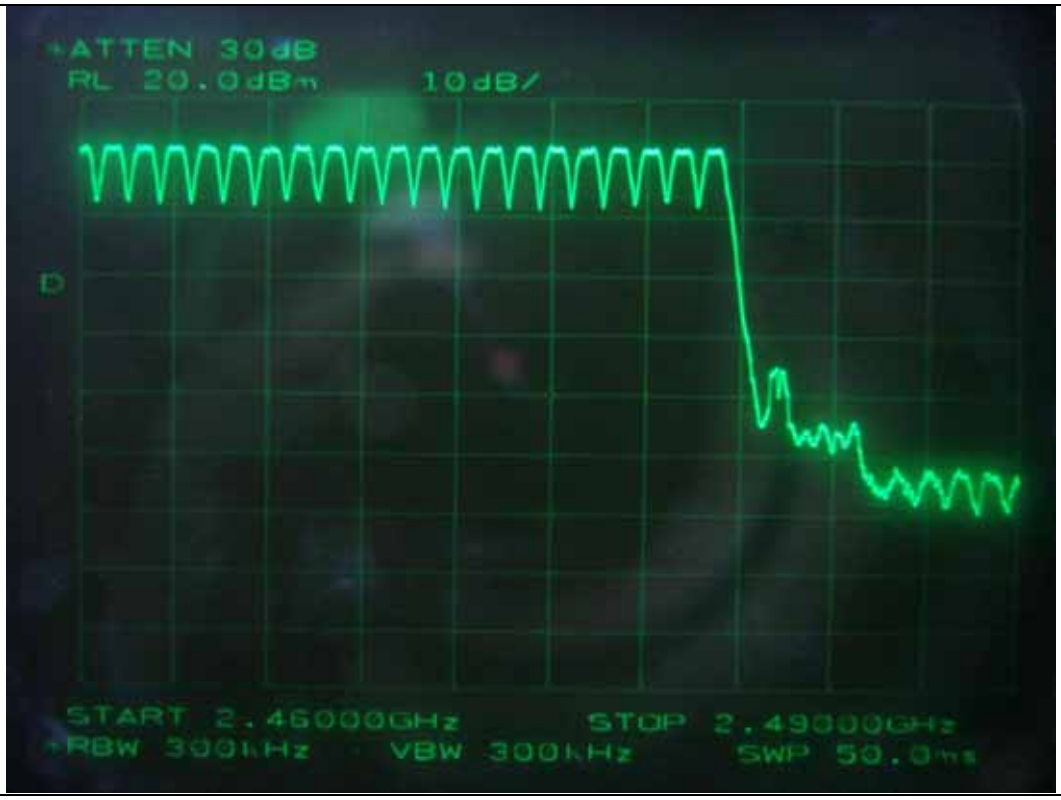

Number of hopping channel: 21

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7.4 TIME OF OCCUPANCY

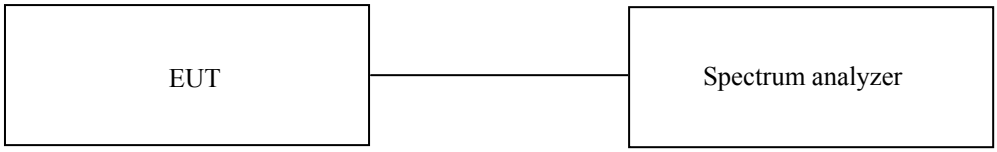
7.4.1 Operating environment

Temperature : 24 °C

Relative humidity : 45 % R.H.

7.4.2 Test set-up

The antenna output of the EUT was connected to the spectrum analyzer. The transmitter is set to operate in its normal frequency hopping mode. The center frequency of the spectrum analyzer is set to one of hopping channels near the center of the operating band and span is set to zero Hz. The sweep time is set to display one complete pulse. The mark delta function is used to measure the duration of the pulses.



7.4.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal.
■ -	8564E	HP	Spectrum Analyzer	3650A00756	June 15, 2009

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)

7.4.4 Test data

-. Test Date : October 14, 2009

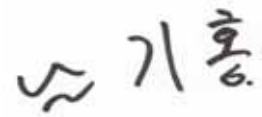
The system makes worst case 1 600 hops per second or 1 time slot has a length of 625 μs with 79 channels.

For DH1 packet type, the EUT needs 1 time slot for transmitting and 1 time slot for receiving and DH3 packet type, the EUT needs 3 times slots for transmitting and 1 time slot for receiving, and DH5 packet needs 5 times slots for transmitting and 1 time slot for receiving. So The EUT has each channel for 10.13 times per second (= 1 600/2/79) for DH1, and 5.06 times (= 1 600/4/79) for DH3, and 3.38 times (= 1 600/6/79) for DH5.

Packet Type	Pulse Time (ms)	Hops per second with channels	Period Time (ms)	Total Dwell Time (ms)	Limit (ms)	Test Result
DH1	0.416 7	10.13	31.6	133.39	400	PASS
DH3	1.683 0	5.06	31.6	269.10	400	PASS
DH5	2.900 0	3.38	31.6	309.74	400	PASS

Total dwell time is calculated as following.

Total Dwell Time = Pulse time * Hops per second with channels * period time



Tested by: Ki-Hong, Nam / Senior Engineer

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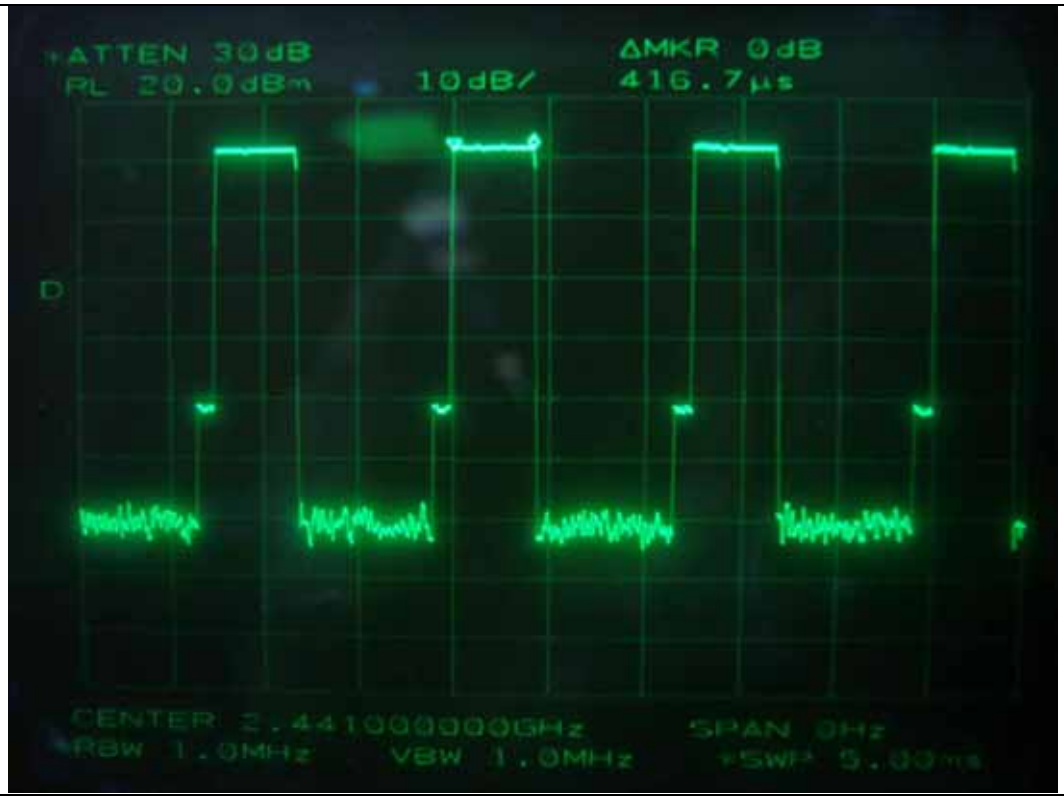
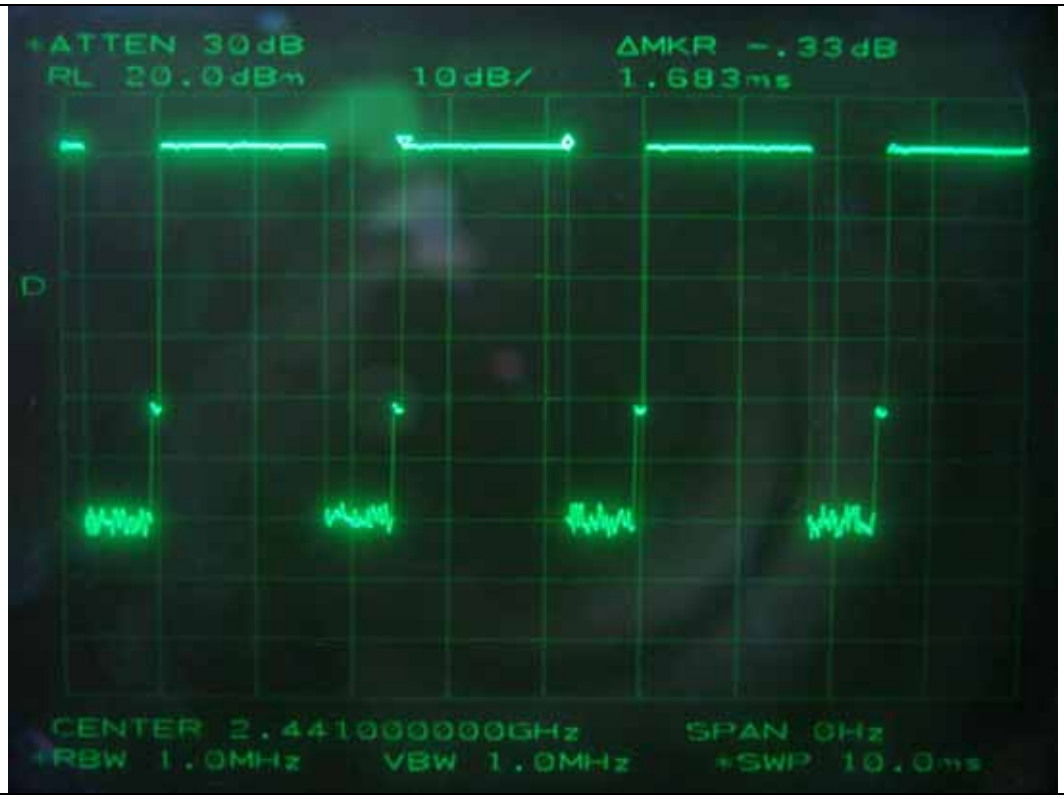


DH1



DH3

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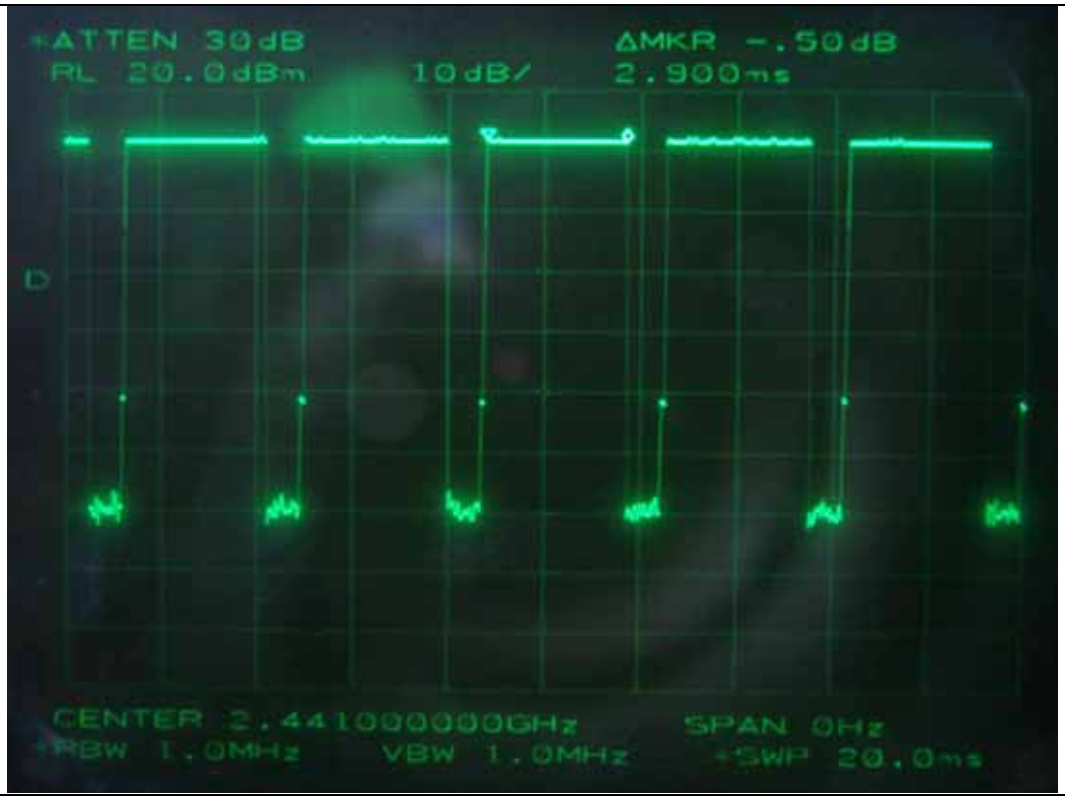

DH5

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7.5 MAXIMUM PEAK OUTPUT POWER

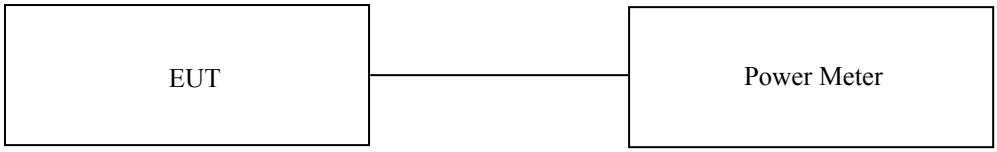
7.5.1 Operating environment

Temperature : 24 °C

Relative humidity : 45 % R.H.

7.5.2 Test set-up

The maximum peak output power was measured with the power meter connected to the antenna output of the EUT. The EUT was operating in transmit mode at the appropriate center frequency.



7.5.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal.
■ -	8564E	HP	Spectrum Analyzer	3650A00756	June 15, 2009

All test equipment used is calibrated on a regular basis.

7.5.4 Test data

-. Test Date : October 14, 2009

-. Test Result : Pass

CHANNEL	FREQUENCY(MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2 402	11.50	30.0	-18.50
Middle	2 441	12.50	30.0	-17.50
High	2 480	12.17	30.0	-17.83

Tested by: Ki-Hong, Nam / Senior Engineer

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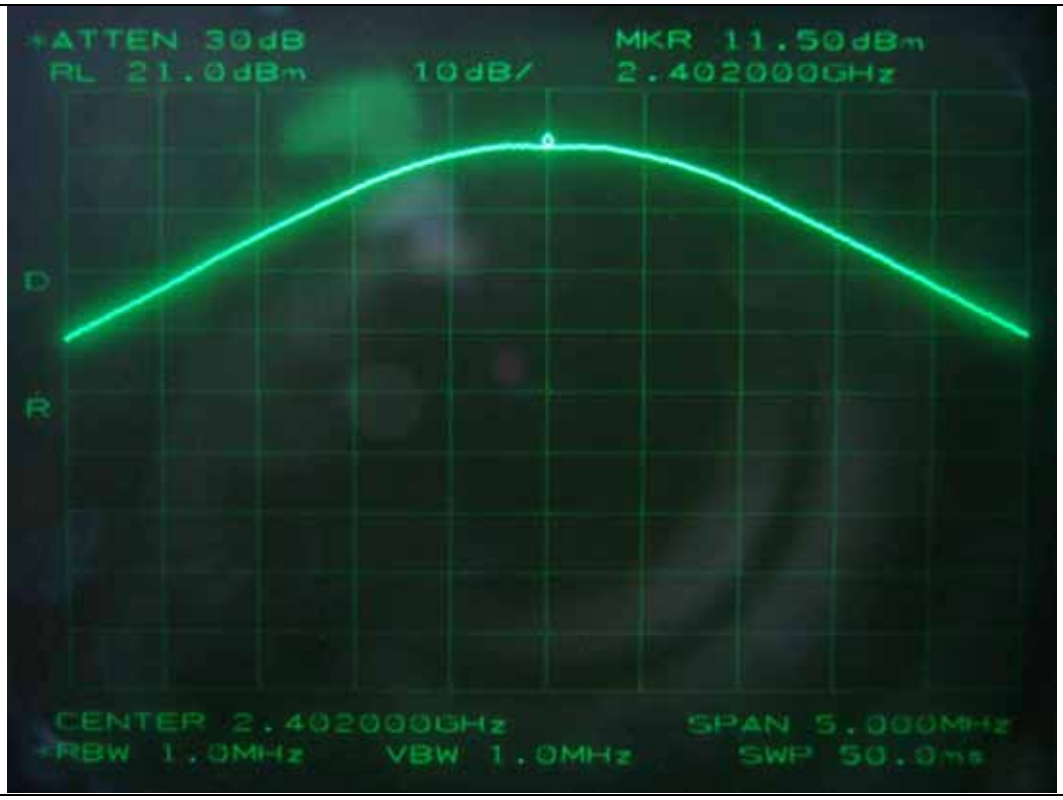
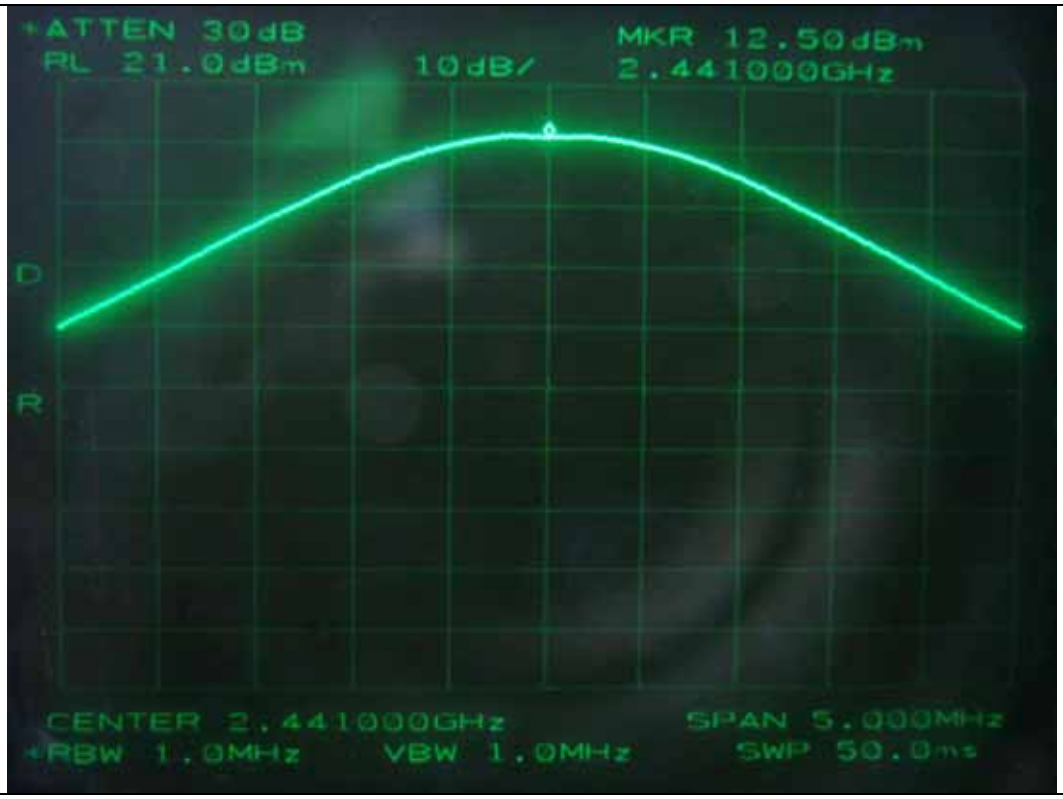


Low Channel



Middle Channel

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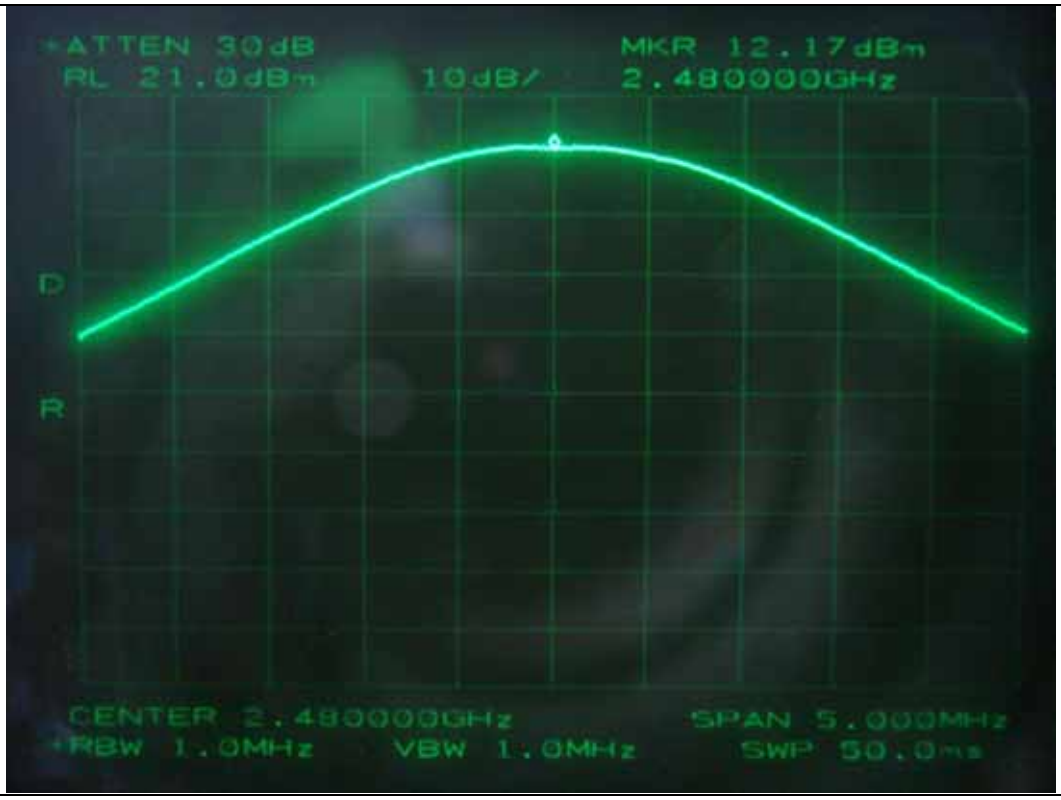

High Channel

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7.6 100 kHz BANDWIDTH OUTSIDE THE FREQUENCY BAND

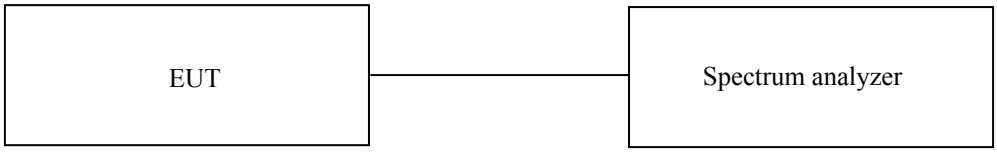
7.6.1 Operating environment

Temperature : 26 °C

Relative humidity : 48 % R.H.

7.6.2 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.



7.6.3 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.

7.6.4 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal.
■ -	8564E	Hewlett-Packard	Spectrum Analyzer	3650A00756	June 15, 2009
■ -	FSP	Rohde-Schwarz	Spectrum Analyzer	100123	Mar 18, 2009
■ -	8447D	Hewlett-Packard	Amplifier	2727A04987	June 15, 2009
■ -	83051A	Agilent	Preamplifier	3950M00201	June 15, 2009
■ -	F-40-5000-RF	RLC Electronics	Highpass Filter	0425	July 11, 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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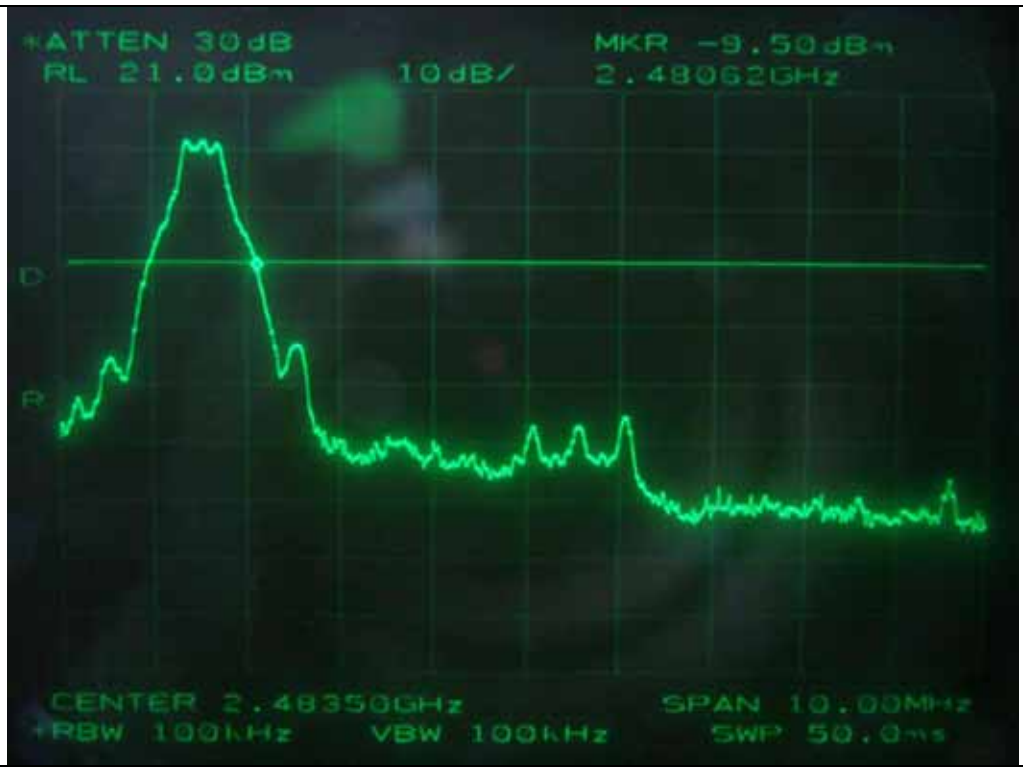
7.6.5. Test data

7.6.5.1. Test data for conducted emission

Low Channel



High Channel

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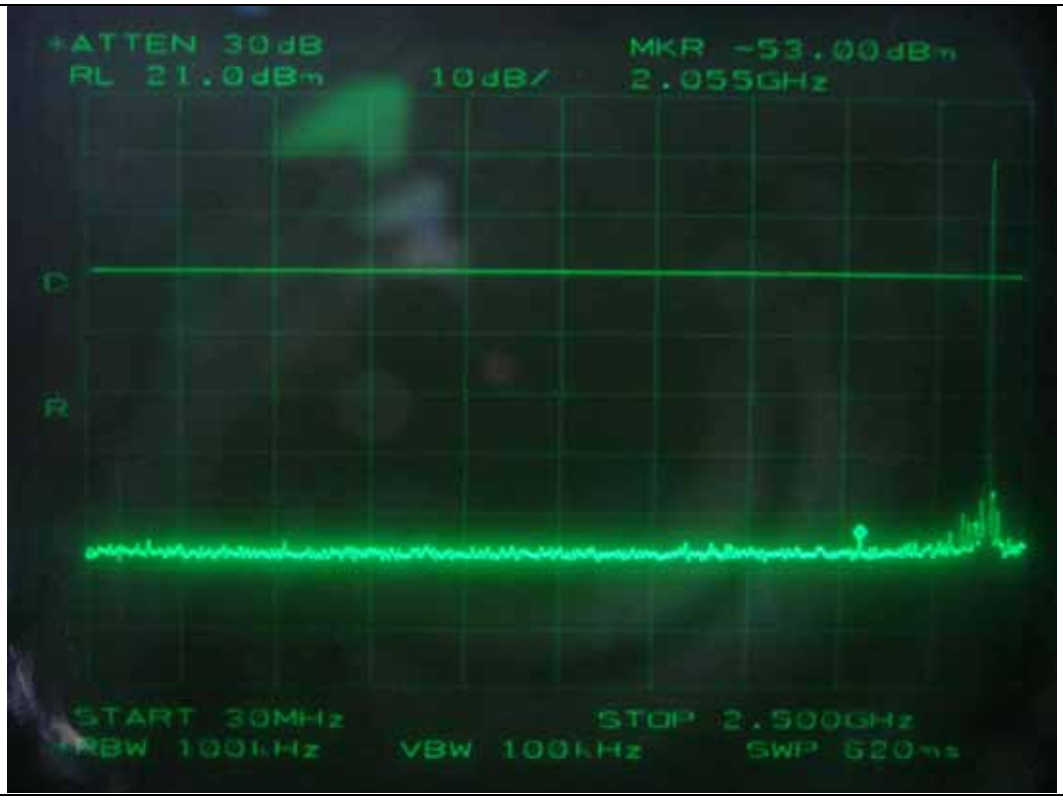
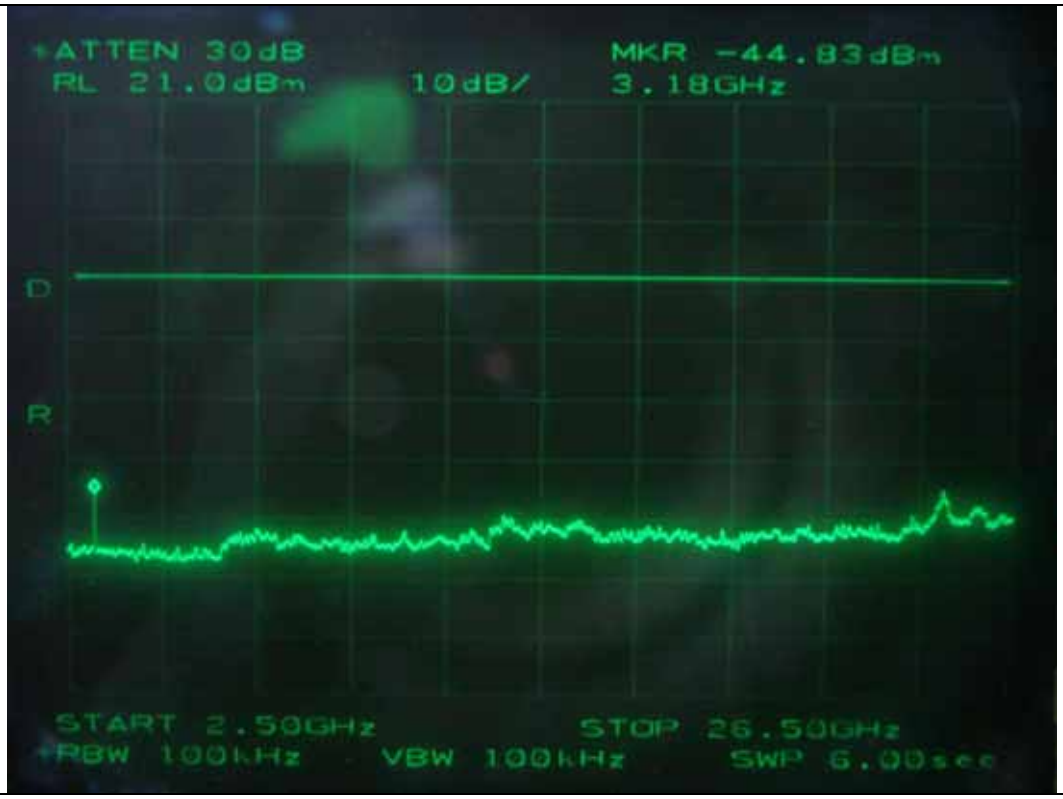


Low Channel



Low Channel

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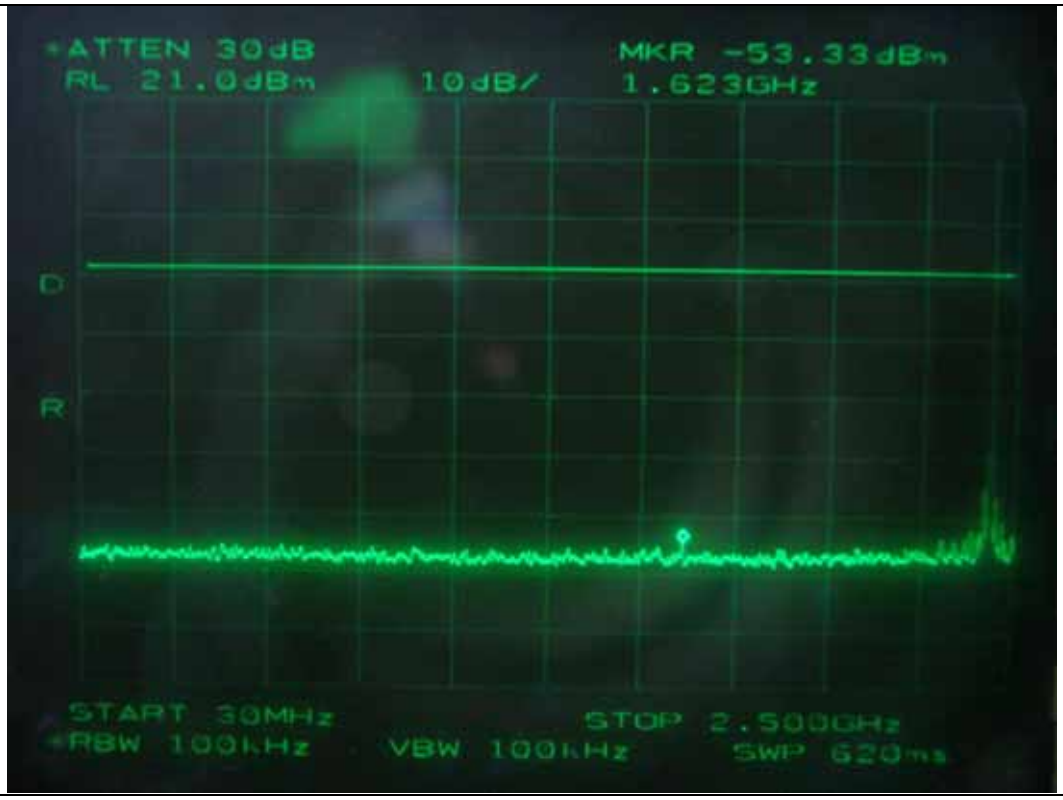
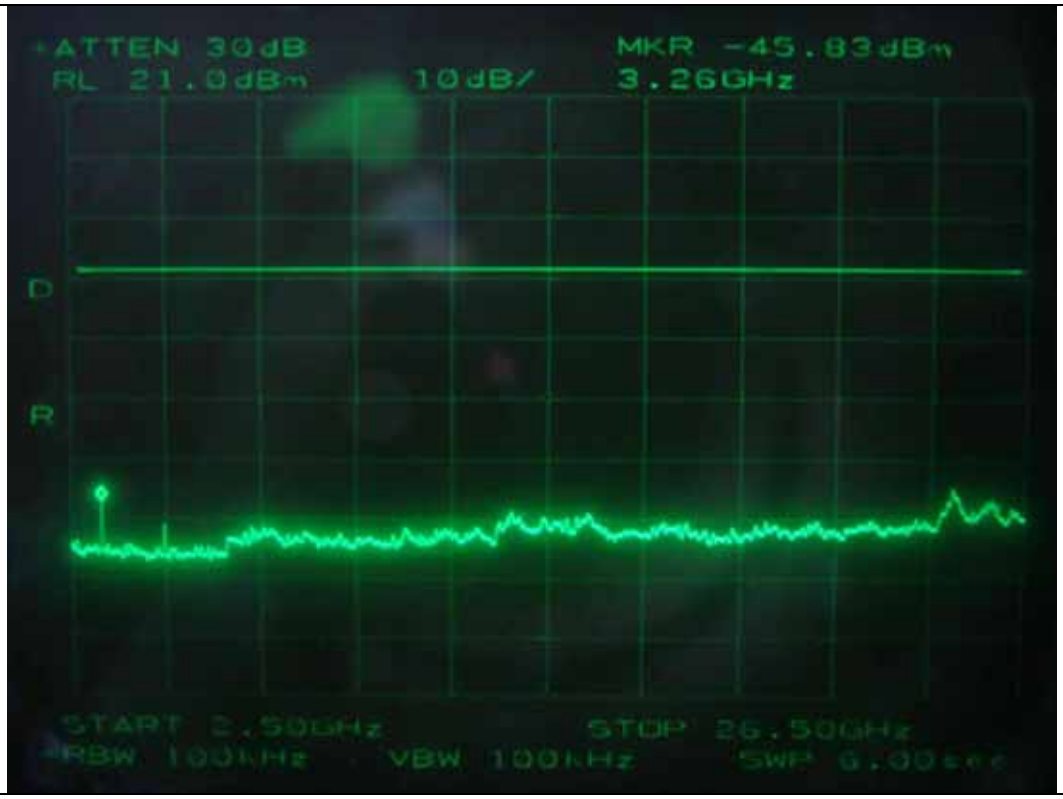


Middle Channel



Middle Channel

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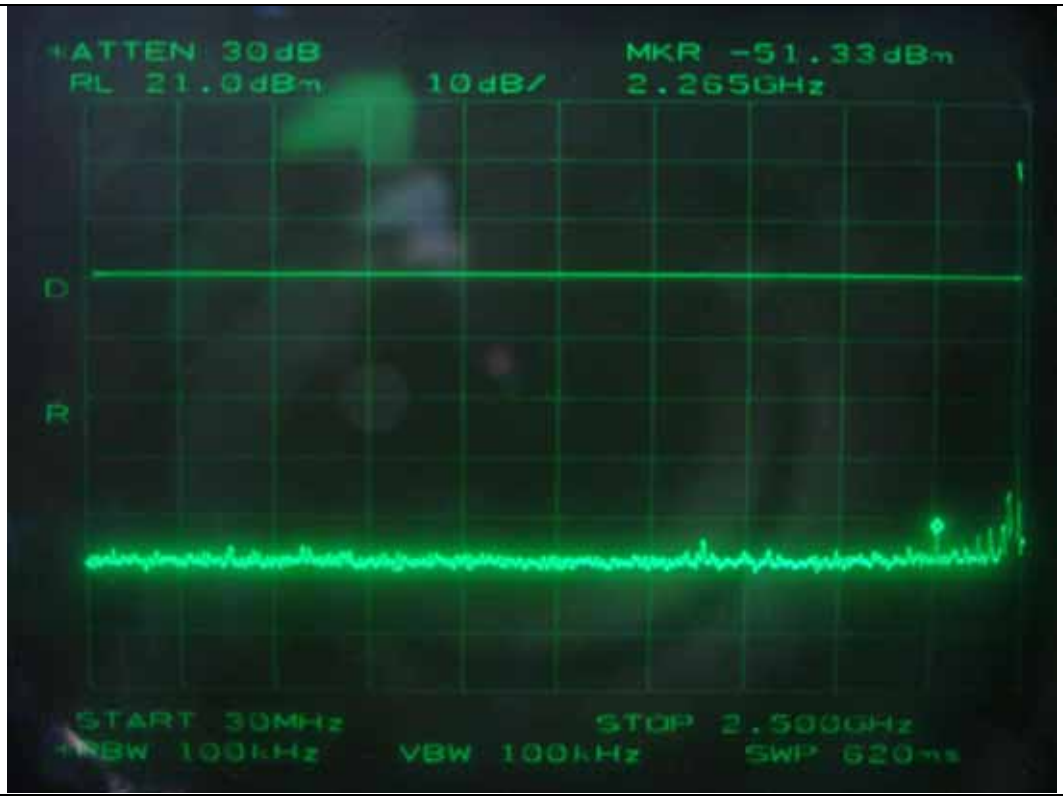

High Channel

High Channel

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7.6.5.2. Test data for radiated emission

7.6.5.2.1. Radiated Emission which fall in the Restricted Band

-. Test Date : October 16, 2009

-. 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 : 1 m

-. Operating Condition : Low / High Channel

-. Result : PASSED

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									
2 390.00	44.62	Peak	H	27.13	3.83	28.98	46.60	74.0	-27.40
	33.99	Average	H				35.97	54.0	-18.03
	44.92	Peak	V				46.90	74.0	-27.10
	34.02	Average	V				36.00	54.0	-18.00
Test Data for High Channel									
2 483.50	61.62	Peak	H	27.37	3.83	28.82	64.00	74.0	-10.00
	42.81	Average	H				45.19	54.0	-8.81
	58.20	Peak	V				60.58	74.0	-13.42
	39.25	Average	V				41.63	54.0	-12.37

Tabulated test data for Restricted Band

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

Tested by: Ki-Hong, Nam / Senior Engineer

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7.6.5.2.2. Spurious & Harmonic Radiated Emission

-. Test Date : October 16, 2009

-. 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 : 1 m

-. Result : PASSED

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									
2 402.00	70.88	Peak	H	27.16	3.83		101.87	-	
	68.17	Peak	V				99.16	-	
3 204.03	44.17	Peak	H	28.94	5.88	29.87	49.12	74.00	-24.88
	33.50	Average	H				38.45	54.00	-15.55
	44.33	Peak	V				49.28	74.00	-24.72
	33.17	Average	V				38.12	54.00	-15.88
4 804.00*	44.83	Peak	H	31.13	7.13	28.80	54.29	74.00	-19.71
	33.67	Average	H				43.13	54.00	-10.87
	44.55	Peak	V				54.01	74.00	-19.99
	33.25	Average	V				42.71	54.00	-11.29
Test Data for Middle Channel									
2 441.00	72.00	Peak	H	27.26	3.83		103.09	-	
	69.83	Peak	V				100.92	-	
3 256.00	44.67	Peak	H	29.00	5.93	29.85	49.75	74.00	-24.25
	33.83	Average	H				38.91	54.00	-15.09
	44.17	Peak	V				49.25	74.00	-24.75
	33.33	Average	V				38.41	54.00	-15.59
4 882.00*	44.92	Peak	H	31.26	7.21	28.73	54.66	74.00	-19.34
	33.50	Average	H				43.24	54.00	-10.76
	44.25	Peak	V				53.99	74.00	-20.01
	33.17	Average	V				42.91	54.00	-11.09

Tabulated test data for Restricted Band

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

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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									
2 480.00	71.46	Peak	H	27.36	3.83		102.65	-	
	69.05	Peak	V				100.24	-	
3 307.97	44.27	Peak	H	29.06	5.98	29.82	49.49	74.00	-24.51
	33.10	Average	H				38.32	54.00	-15.68
	44.50	Peak	V				49.72	74.00	-24.28
	33.50	Average	V				38.72	54.00	-15.28
4 960.00*	44.67	Peak	H	30.84	7.29	28.67	54.13	74.00	-19.87
	33.72	Average	H				43.18	54.00	-10.82
	44.83	Peak	V				54.29	74.00	-19.71
	33.25	Average	V				42.71	54.00	-11.29

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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7.7 PEAK POWER SPECTRUL DENSITY

7.7.1 Operating environment

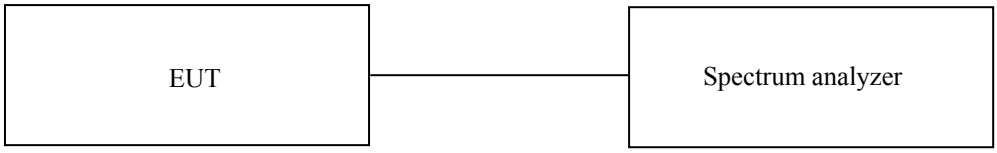
Temperature : 24 °C

Relative humidity : 45 % R.H.

7.7.2 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 same as above resolution, 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.



7.7.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal.
■ -	8564E	HP	Spectrum Analyzer	3650A00756	June 15, 2009

All test equipment used is calibrated on a regular basis.

7.7.4 Test data

-. Test Date : July 06, 2009

-. Result : PASSED BY -7.17 dB at Middle Channel

CHANNEL	FREQUENCY(MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2 402	-0.33	8.00	-8.33
Middle	2 441	0.83	8.00	-7.17
High	2 480	0.67	8.00	-7.33

Tabulated test data for Peak Power Spectral Density.

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. RADIO FREQUENCY EXPOSURE

8.1 RF Exposure Limit

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

8.2 EUT Description

Kind of EUT	23” LCD TV with Bluetooth
Operating Frequency Band	☐ WLAN: 2 400 MHz ~ 2 483.5 MHz ☐ WLAN: 5 180 MHz ~ 5 320 MHz / 5 500 MHz ~ 5 700 MHz ☐ WLAN: 5 745 MHz ~ 5 825 MHz ■ Bluetooth: 2 400 MHz ~ 2 483.5 MHz
Device Category	☐Portable (< 20 cm separation) ☐ Mobile (> 20 cm separation) ■ Others
Max. Output Power	12.50 dBm (17.78 mW)
Used Antenna	Internal Chip Antenna
Used Antenna Gain	0.70 dBi
Exposure Evaluation Applied	☐ MPE ☐ SAR ■ N/A

8.3 Test Result

SAR evaluation is not required for the maximum output power is lower than threshold according to Section 15.247 device: 60/f (GHz) = 60/2.480 = 24.19 mW.

So, the device meets the RF exposure requirement.

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9. RADIATED EMISSION TEST

9.1 Operating environment

Temperature : 26 °C

Relative humidity : 48 % R.H.

9.2 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.

9.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal.
■ -	ESVD	Rohde & Schwarz	Test Receiver	838453/018	Nov. 06, 2008
■ -	8566B	HP	Spectrum Analyzer	3407A08547	June 16, 2009
■ -	8447D	Hewlett Packard	Amplifier	2727A04987	June 15, 2009
■ -	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, 2008(2Y)
■ -	9108-A(494)	Schwarzbeck	Log Periodic Antenna	62281001	Feb. 13, 2008(2Y)

All test equipment used is calibrated on a regular basis.

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9.4 Test data

-. Test Date : October 20, 2009

-. Resolution bandwidth : 120 kHz

-. Frequency range : 30 MHz ~ 1 000 MHz

-. Measurement distance : 3 m

-. Result : PASSED

-. Channel : Low

Frequency (MHz)	Reading (dBµV)	Ant. Pol. (H/V)	Ant. Height (m)	Angle (°)	Ant. Factor (dB/m)	Cable Loss	Emission Level(dBµV/m)	Limits (dBµV/m)	Margin (dB)
108.00	18.90	H	1.20	230.00	11.47	2.26	32.63	43.52	-10.89
146.80	16.30	V	1.30	350.00	14.82	2.57	33.69	43.52	-9.83
240.00	13.50	H	1.00	300.00	17.27	3.40	34.17	46.02	-11.85
289.90	16.00	H	1.00	90.00	19.11	3.44	38.55	46.02	-7.47
385.50	17.80	H	1.00	140.00	16.82	3.88	38.50	46.02	-7.52
510.00	15.00	V	1.00	180.00	19.35	4.74	39.09	46.02	-6.93

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)
108.00	19.00	H	1.20	230.00	11.47	2.26	32.73	43.52	-10.79
146.80	16.50	V	1.30	350.00	14.82	2.57	33.89	43.52	-9.63
240.00	13.00	H	1.00	300.00	17.27	3.40	33.67	46.02	-12.35
289.90	16.33	H	1.00	90.00	19.11	3.44	38.88	46.02	-7.14
385.50	17.50	H	1.00	140.00	16.82	3.88	38.20	46.02	-7.82
510.00	15.17	V	1.00	180.00	19.35	4.74	39.26	46.02	-6.76

Tabulated test data for Radiated Electromagnetic Field

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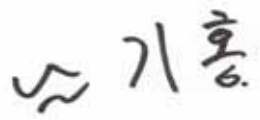
-. Channel : High

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)
108.00	18.75	H	1.20	230.00	11.47	2.26	32.48	43.52	-11.04
146.80	16.50	V	1.30	350.00	14.82	2.57	33.89	43.52	-9.63
240.00	13.33	H	1.00	300.00	17.27	3.40	34.00	46.02	-12.02
289.90	16.17	H	1.00	90.00	19.11	3.44	38.72	46.02	-7.30
385.50	17.50	H	1.00	140.00	16.82	3.88	38.20	46.02	-7.82
510.00	15.33	V	1.00	180.00	19.35	4.74	39.42	46.02	-6.60

Tabulated test data for Radiated Electromagnetic Field

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



Tested by: Ki-Hong, Nam / Senior Engineer

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10. CONDUCTED EMISSION TEST

10.1 Operating environment

Temperature : 21 °C

Relative humidity : 43 % R.H.

10.2 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.

10.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal.
■ -	ESiB26	Rohde & Schwarz	EMI Test Receiver	100296	Apr. 03, 2009
■ -	NSLK 8126	Schwarzbeck	AMN	8126-404	June 15, 2009
■ -	3825/2	EMCO	AMN	9109-1867	June 15, 2009

All test equipment used is calibrated on a regular basis.

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10.4 Test data

-. Test Date : October 20, 2009

-. Resolution bandwidth : 9 kHz

-. Frequency range : 0.15 MHz ~ 30 MHz

-. Test Result : PASSED BY -10.00 dB at 1.17 MHz under average detector mode

Frequency (MHz)	Line	Quasi-Peak (dBμV)		Margin (dB)
		Emission level	Q.P Limits	
0.33	N	37.70	59.60	-21.80
0.72	N	36.70	56.00	-19.30
1.17	N	37.30	56.00	-18.70
1.43	N	37.90	56.00	-18.10
2.28	N	37.10	56.00	-18.90
25.14	H	38.60	60.00	-21.40
Frequency (MHz)	**Line**	**Average (dBμV)**		**Margin (dB)**
		Emission level	**Limits**	
0.33	N	36.70	49.60	-12.90
0.52	N	34.80	46.00	-11.20
1.17	N	36.00	46.00	-10.00
2.02	N	34.50	46.00	-11.50

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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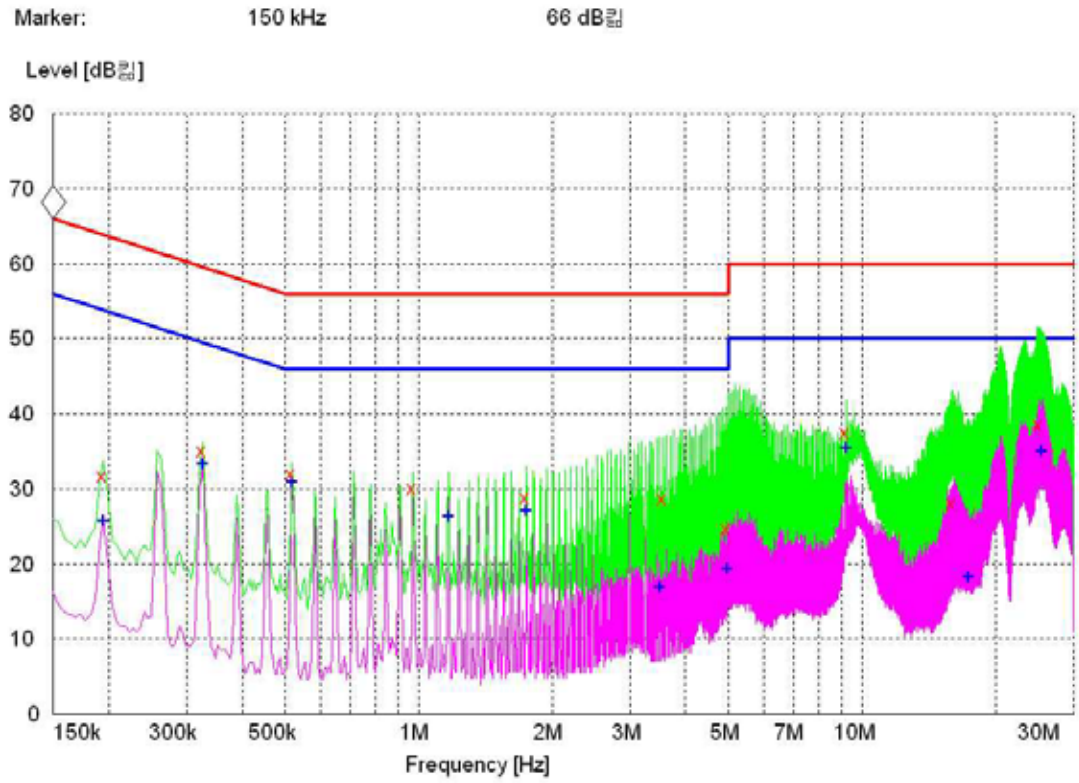
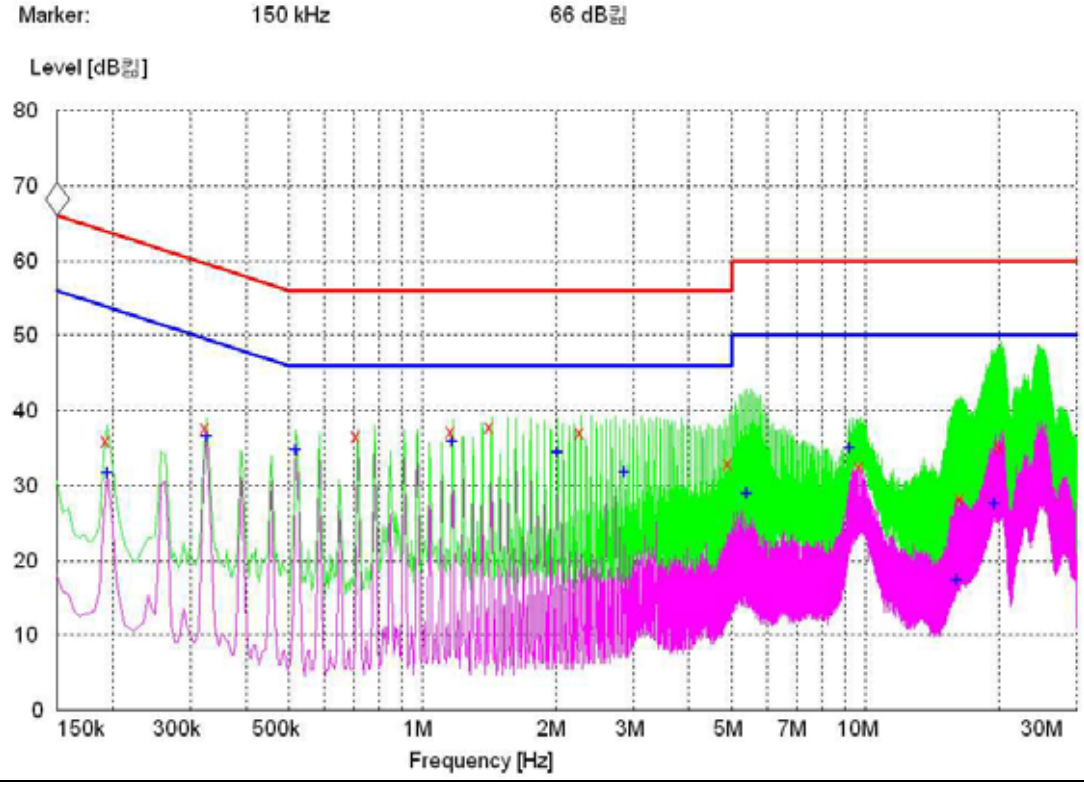


HOT LINE



NEUTRAL LINE

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