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

Test Report No.	**: E07NR-016**
AGR No.	**: A07OA-154**
Applicant	**: FUJITSU TEN LIMITED**
Address	**: 2-28, GOSHO-DORI 1-CHOME, HYOGO-KU, KOBE 652-8510**
Manufacturer	**: FUJITSU TEN LIMITED**
Address	**: 2-28, GOSHO-DORI 1-CHOME, HYOGO-KU, KOBE 652-8510**
Type of Equipment	**: CAR AUDIO**
FCC ID.	**: BABBT019A**
Model Name	**: CD3200**
Serial number	**: N/A**
Total page of Report	**: 40 pages (including this page)**
Date of Incoming	**: November 02, 2007**
Date of issue	**: November 13, 2007**

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, Gwangju-si, Gyeonggi-do, 464-860, Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

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1. VERIFICATION OF COMPLIANCE

APPLICANT	: FUJITSU TEN LIMITED
ADDRESS	: 2-28, GOSHO-DORI 1-CHOME, HYOGO-KU, KOBE 652-8510
CONTACT PERSON	: Mr. MIYOSHI KAZUHIDE / GENERAL MANAGER
TELEPHONE NO	: +81-78-682-0423
FCC ID	: BABBT019A
MODEL NAME	: CD3200
SERIAL NUMBER	: N/A
DATE	: November 13, 2007

EQUIPMENT CLASS	***DSS – PART 15 SPREAD SPECTRUM TRANSMITTER***
KIND OF EQUIPMENT	CAR AUDIO
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) (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 (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	Met the Limit / PASS
15.207 and 15.107	Conducted Emission Limits	N/A (See Note 1)
15.203	Antenna Requirement	Met requirement / PASS

Note 1: This test is not performed because the EUT is operated by Car battery and is not connected to public low-voltage distribution system.

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 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, Gwangju-si, Gyeonggi-do 464-080 Korea. Description details of test facilities were submitted to the Federal Communications Commission on August 30, 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 FUJITSU TEN LIMITED, Model CD3200 (referred to as the EUT in this report) is a CAR AUDIO. This report is for covering Bluetooth function and other digital function will be covered by another test report. The product specification described herein was obtained from product data sheet or user's manual.

DEVICE TYPE	CAR AUDIO
TEMPERATURE RANGE	-20 ~ 65°C
OPERATING FREQUENCY	2402~2480 MHz
RF OUTPUT POWER	0.50 dBm
OCCUPIED BANDWIDTH	1 Mbps
NUMBER OF CHANNEL	79 Channels
EMISSION CLASS	F1D
MODULATION TYPE	GFSK
DATA SPEED	723Kbps (Max.)
COMMUNICATION SYSTEM	FH-SS
ANTENNA MFG / MODEL NAME	MURATA / LDA313G3313F-243
ANTENNA TYPE	Chip Multilayer Antenna
ANTENNA GAIN	-2.6dBi
LIST OF EACH OSC. OR CRYSTAL. FREQ.(FREQ.>=1MHz)	4 MHz, 33.868 MHz, 11.2896 MHz, 12 MHz, 12.6 MHz, 4.9 MHz, 4.19430 MHz and 26.45 MHz
NUMBER OF LAYER	2 Layers: Front Board and Deck Board, 6 Layers: Main Board
POWER REQUIREMENT	DC 14.4V
EXTERNAL CONNECTOR	DC-Jack, Speaker Jack, Line In/Out, Antenna, CD Changer Control Cable

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

-. None

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	N/A	CD3200.1G	N/A
Front Board	N/A	CD7200MkII/3200 FRT	N/A
Deck Main Board	N/A	CD5100/CD7100 DECK	N/A
Deck Connecting Board	N/A	N/A	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
CD3200	FUJITSU TEN LIMITED	BABBT019A	CAR AUDIO (EUT)	-
KK	LG Electronics	DoC	PC	EUT
E176FPb	Dell Computer	DoC	Monitor	PC
5211	BTC Taiwan	DoC	Keyboard	PC
M-UV70a	Logitech Electronics	DoC	Mouse	PC
PNB 12800	Newmax	N/A	Battery	EUT
N/A	N/A	N/A	AM Antenna	EUT
N/A	N/A	N/A	Test Jig	EUT & PC

5.3 Cable Description

Ports Name	Shielded	Ferrite Bead	Metal Hood	Length (m)	Connected to
DC-Jack	N	N	N	3.0	Battery
Speaker Jack	N	N	N	3.0	-
Line In/Out	N	N	N	3.0	-
Antenna	Y	N	N	3.0	AM Antenna
Jig Connector	N	N	N	0.2	PC

5.4 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 (2402MHz), Middle Channel (2441MHz), and High Channel (2480MHz). To get a maximum emission levels from the EUT, the EUT was moved throughout the XY, XZ, and YZ planes.

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5.5 Configuration of Test System

Line Conducted Test: This test is not performed because the EUT is operated by Car battery and is not connected to public low-voltage distribution system.

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.

5.6 Antenna Requirement

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)
This test is not performed because the EUT is operated by Car battery and is not connected to public low-voltage distribution system.	

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. 20dB BANDWIDTH

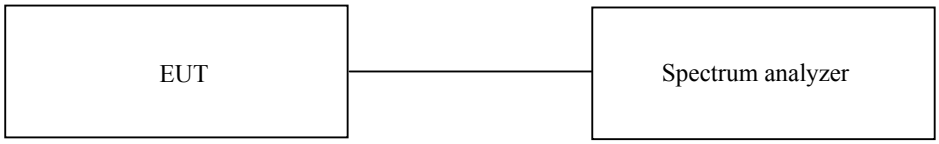
7.1 Operating environment

Temperature : 25 °C

Relative humidity : 48 %

7.2 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 20dB bandwidth is defined as the total spectrum over which the power is higher than the peak power minus 20 dB.



7.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal.
■ -	8564E	HP	Spectrum Analyzer	3650A00756	June 19, 2007

All test equipment used is calibrated on a regular basis.

7.4 Test data

-. Test Date : November 08, 2007

-. Test Result : Pass

CHANNEL	FREQUENCY(MHz)	MEASURED VLAUE (kHz)	LIMIT (kHz)	MARGIN (kHz)
Low	2402	833	1000	-167
Middle	2441	833	1000	-167
High	2480	825	1000	-175

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

Tested by: Ki-Hong, Nam / Test Engineer

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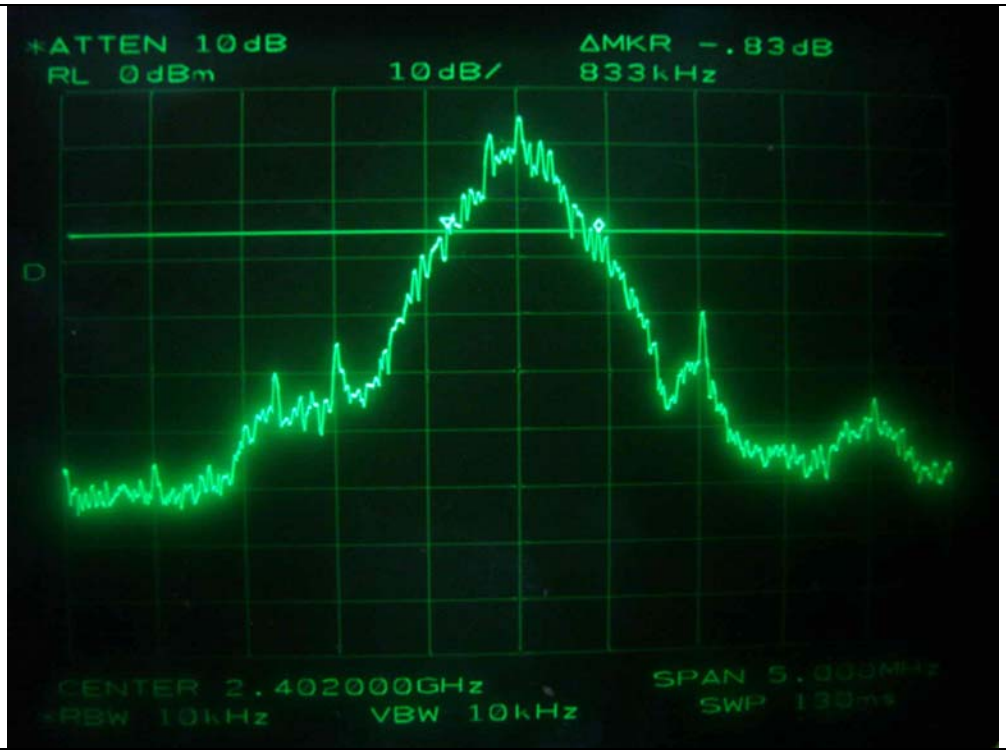
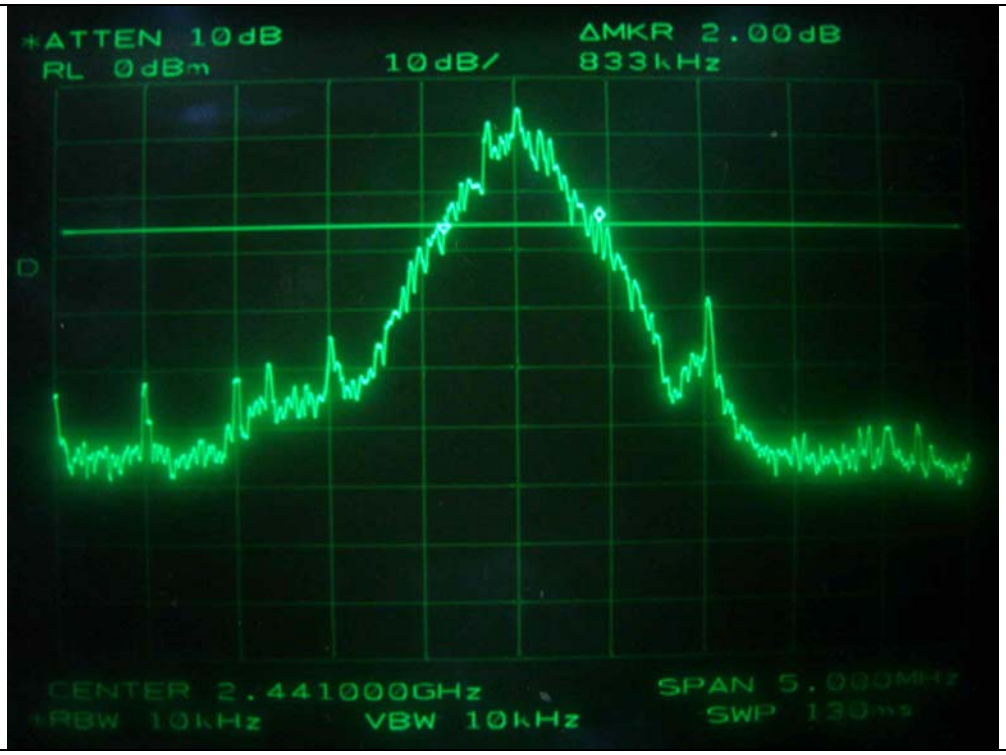


Low Channel



Middle Channel

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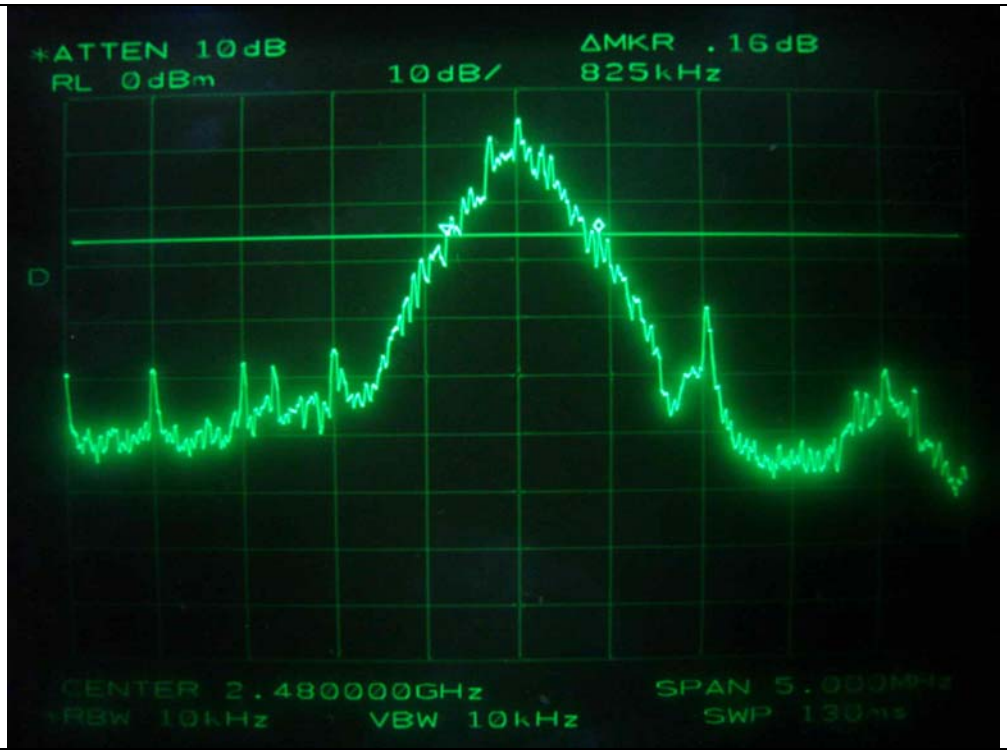

High Channel

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8. HOPPING FREQUENCY SEPARATION

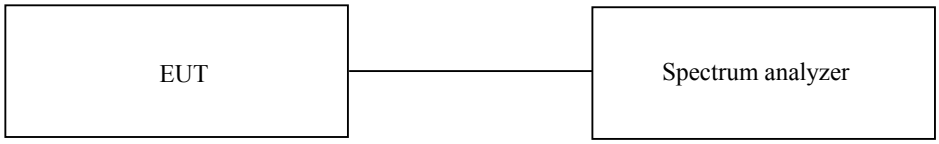
8.1 Operating environment

Temperature : 25 °C

Relative humidity : 48 %

8.2 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 and 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.



8.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal.
■ -	8564E	HP	Spectrum Analyzer	3650A00756	June 19, 2007

All test equipment used is calibrated on a regular basis.

8.4 Test data

-. Test Date : November 08, 2007

-. Test Result : Pass

MEASURED VLAUE (kHz)	LIMIT, 20dB Bandwidth (kHz)	MARGIN (kHz)
1020	833	-187

Tested by: Ki-Hong, Nam / Test Engineer

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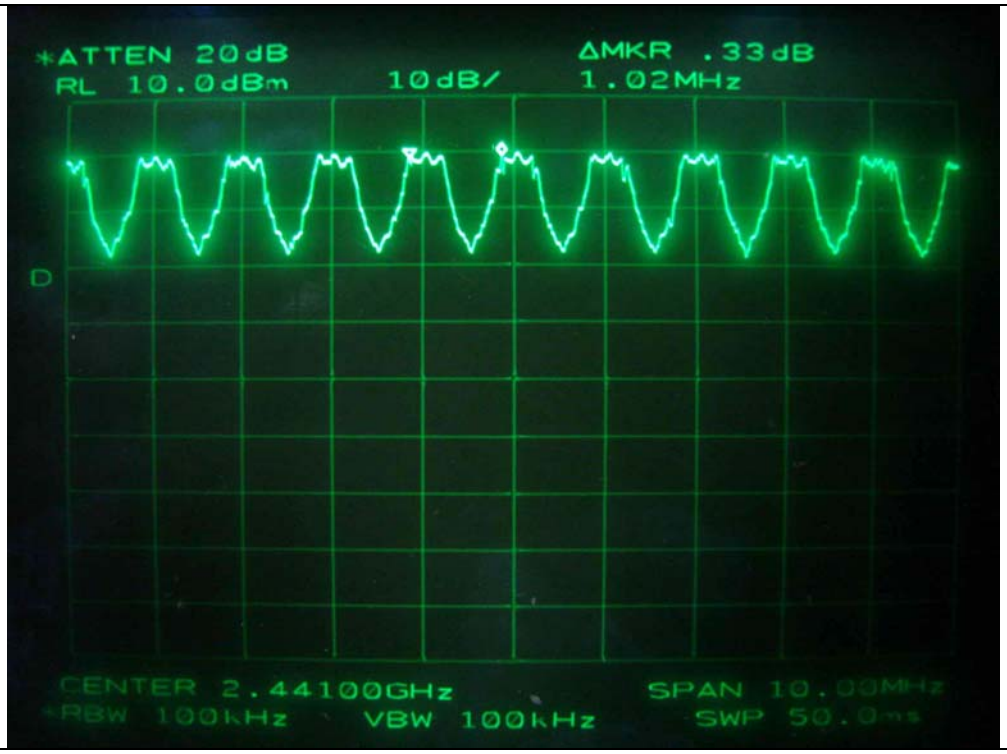

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9. NUMBER OF HOPPING CHANNELS

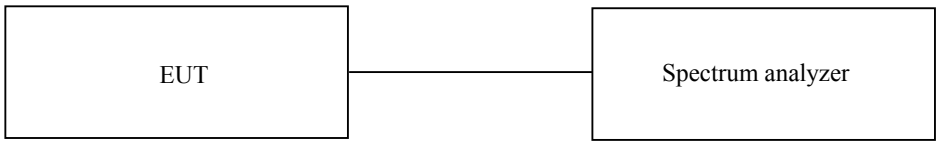
9.1 Operating environment

Temperature : 25 °C

Relative humidity : 48 %

9.2 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.



9.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal.
■ -	8564E	HP	Spectrum Analyzer	3650A00756	June 19, 2007

All test equipment used is calibrated on a regular basis.

9.4 Test data

-. Test Date : November 08, 2007

-. Test Result : Pass

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

Tested by: Ki-Hong, Nam / Test Engineer

HEAD OFFICE : #505 SK APT. Factory 223-28, Sangdaewon 1 dong, Jungwon-gu, Seongnam-si, Gyeonggi-do, 462-705, Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)
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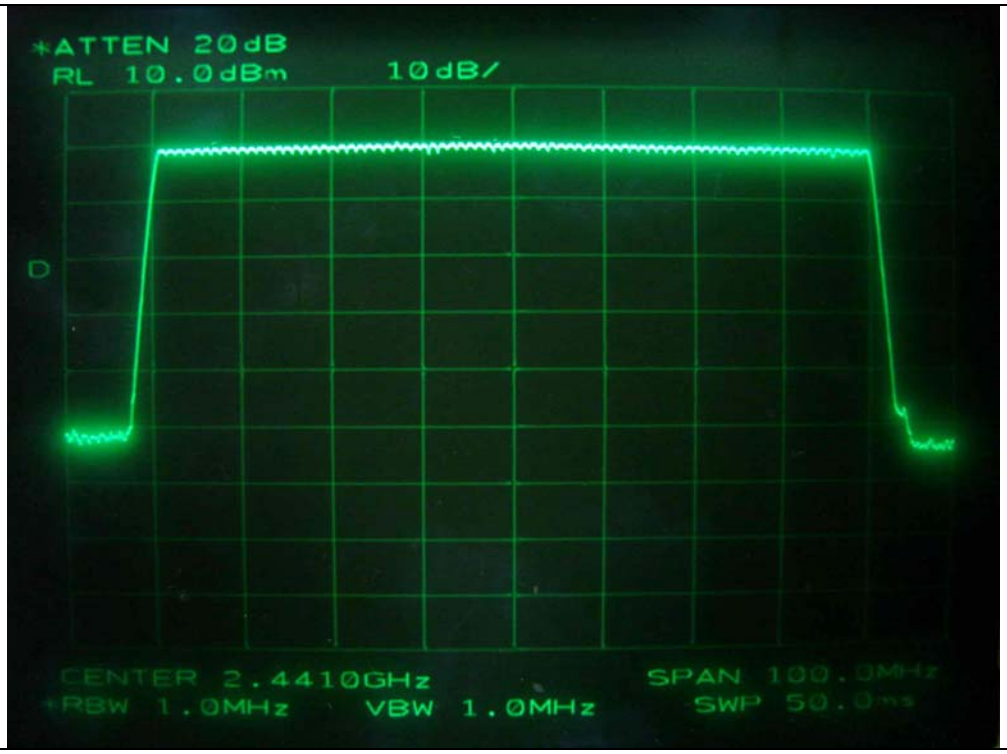

Total number of hopping channel: 28+30+21 = 79

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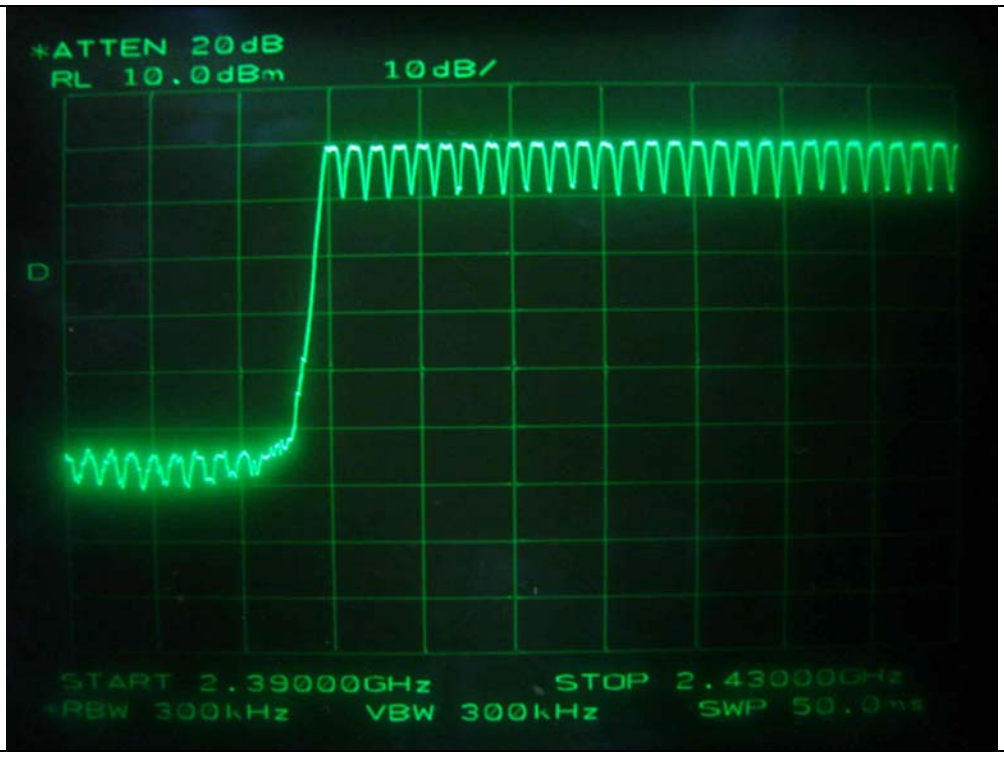
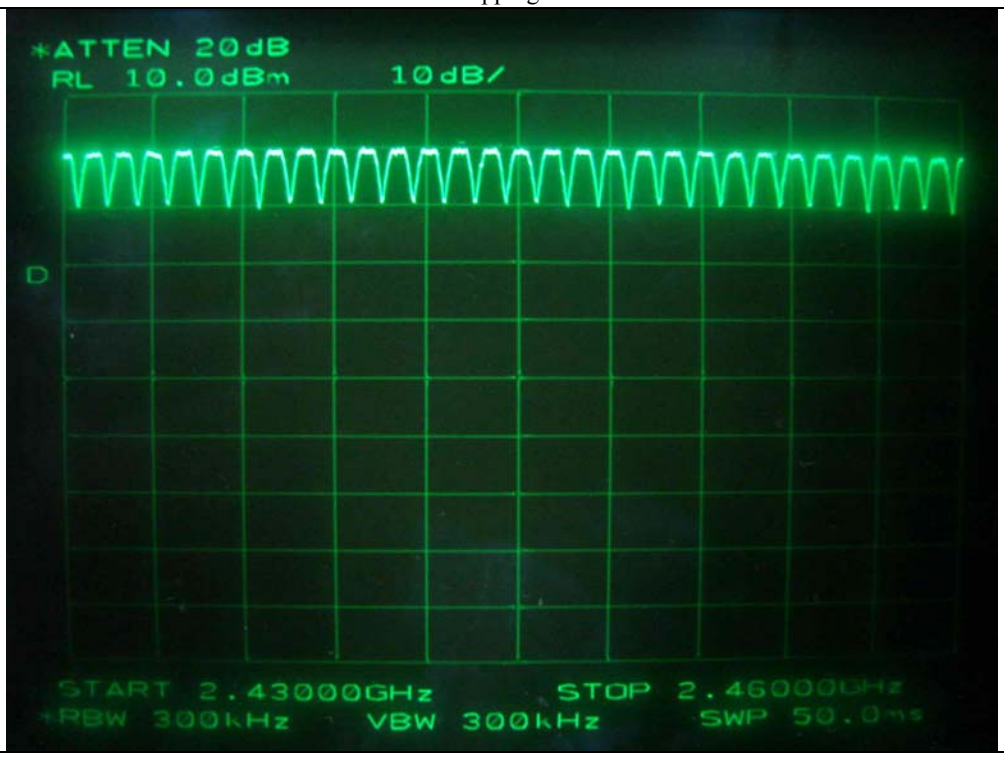


Number of hopping channel: 28



Number of hopping channel: 30

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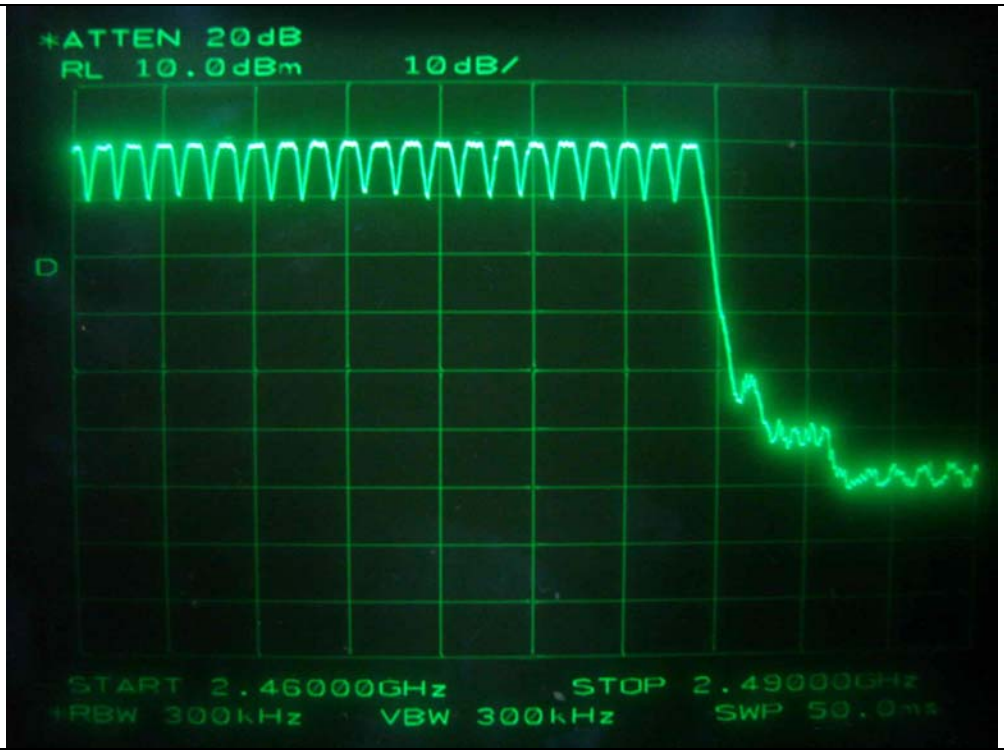

Number of hopping channel: 21

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10. TIME OF OCCUPANCY

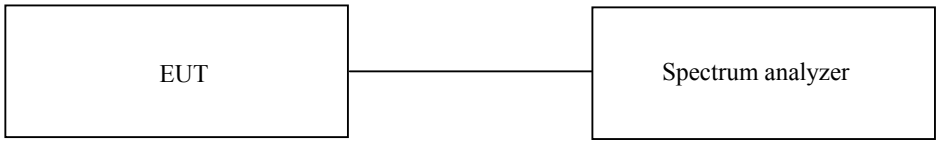
10.1 Operating environment

Temperature : 25 °C

Relative humidity : 48 %

10.2 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.



10.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal.
■ -	8564E	HP	Spectrum Analyzer	3650A00756	June 19, 2007

All test equipment used is calibrated on a regular basis.

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10.4 Test data

-. Test Date : November 08, 2007

The system makes worst case 1600 hops per second or 1 time slot has a length of 625us 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 5times slots for transmitting and 1 time slot for receiving. So The EUT has each channel for 10.13 times per second (=1600/2/79) for DH1, and 5.06 times (=1600/4/79) for DH3, and 3.38 times (= 1600/6/79) for DH5.

Packet Type	Pulse Time (ms)	Hops per second with channels	Period Time (ms)	Total Dwell Time (ms)	Limit (ms)	Test Result
DH1	0.4167	10.13	31.6	133.39	400	PASS
DH3	1.6670	5.06	31.6	265.55	400	PASS
DH5	2.9000	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 / Test Engineer

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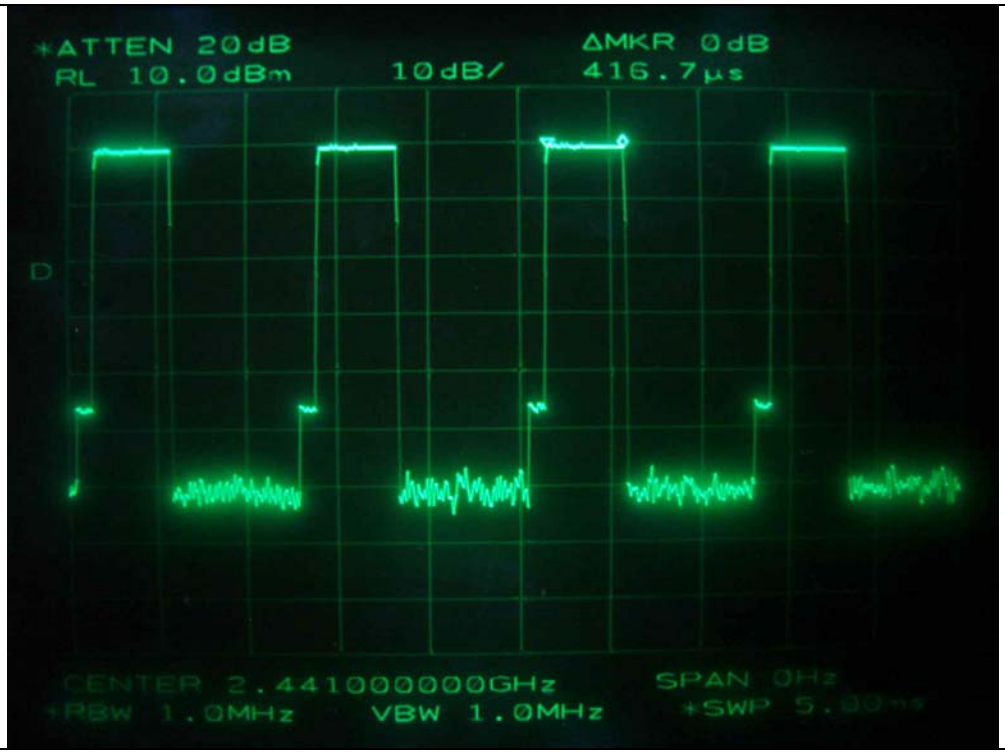
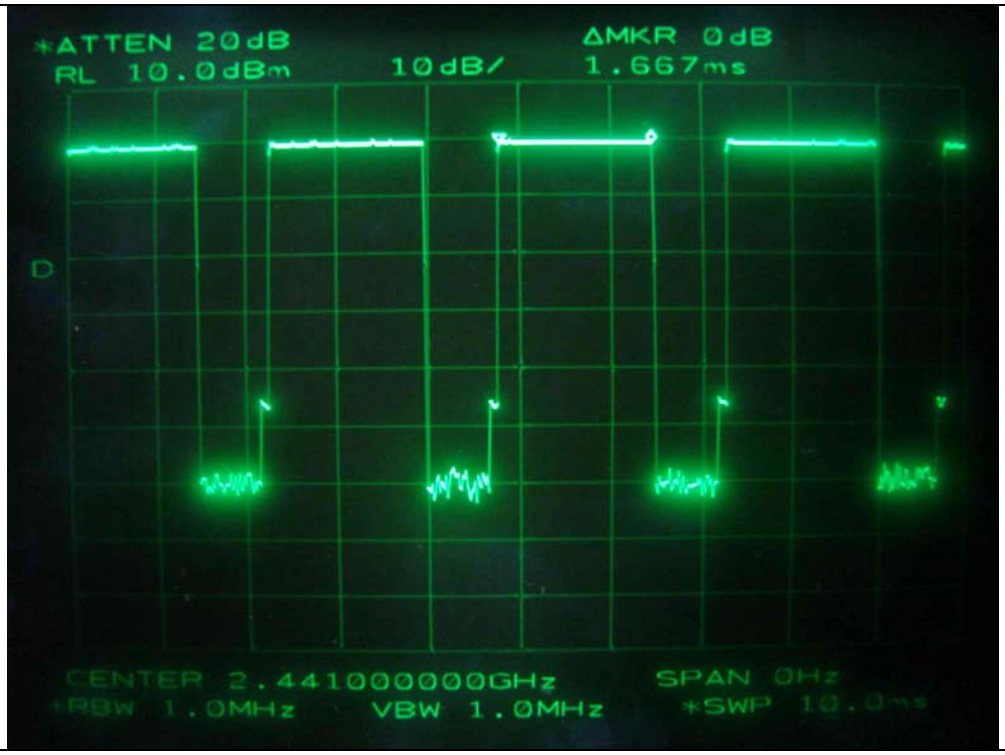


DH1



DH3

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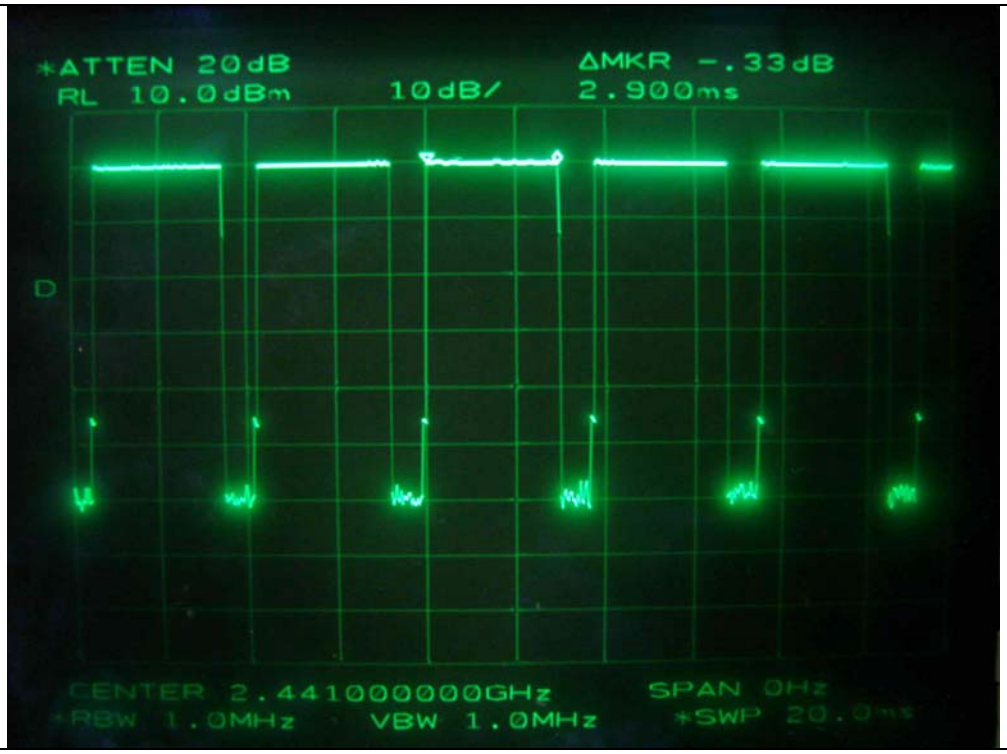

DH5

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11. MAXIMUM PEAK OUTPUT POWER

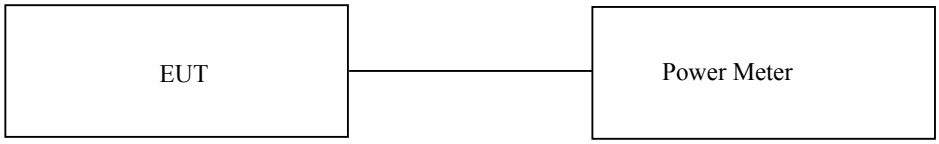
11.1 Operating environment

Temperature : 25 °C

Relative humidity : 48 %

11.2 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.



11.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal.
■ -	8564E	HP	Spectrum Analyzer	3650A00756	June 19, 2007

All test equipment used is calibrated on a regular basis.

11.4 Test data

-. Test Date : November 08, 2007

-. Test Result : Pass

CHANNEL	FREQUENCY(MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2402	0.17	30.0	-29.83
Middle	2441	0.50	30.0	-29.50
High	2480	0.33	30.0	-29.67

Tested by: Ki-Hong, Nam / Test Engineer

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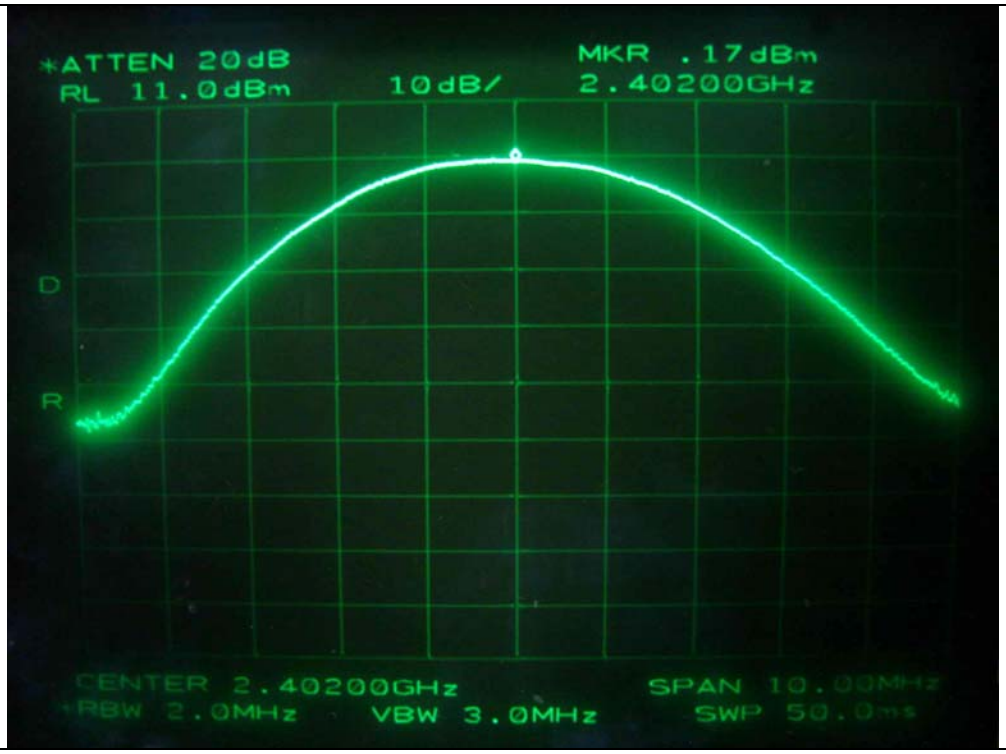
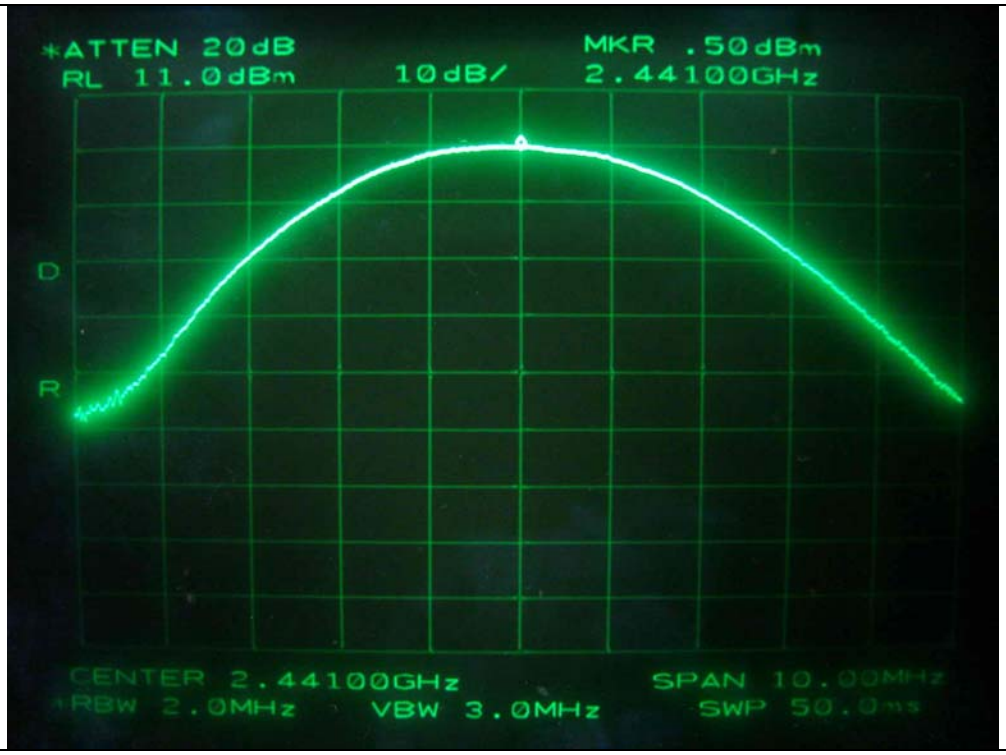


Low Channel



Middle Channel

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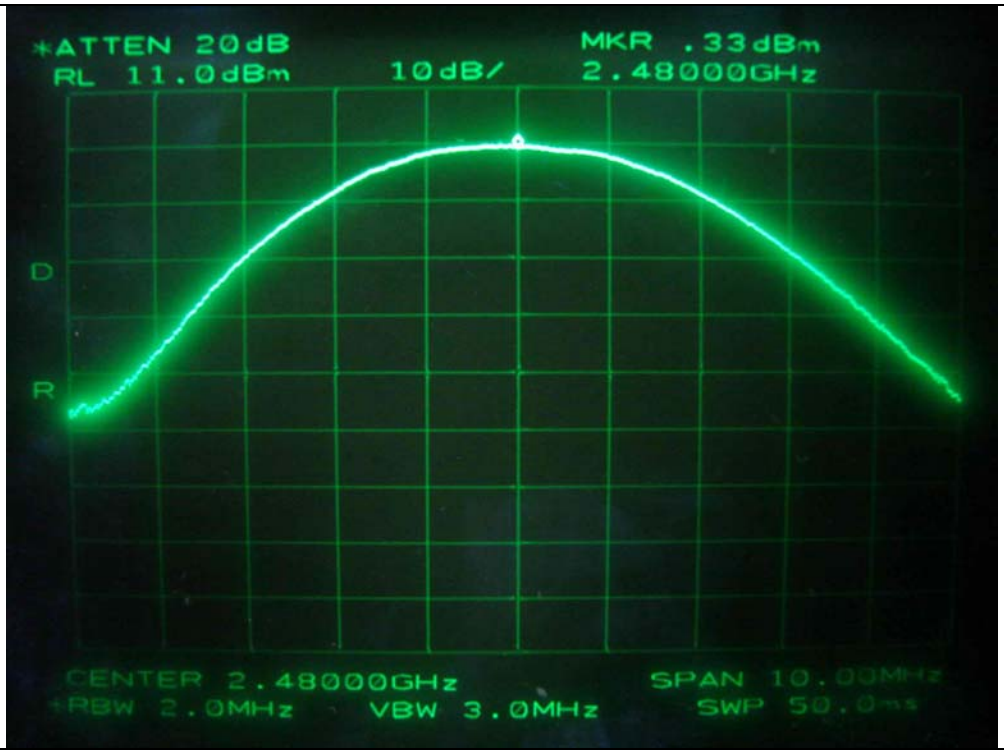

High Channel

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12. 100 kHz BANDWIDTH OUTSIDE THE FREQUENCY BAND

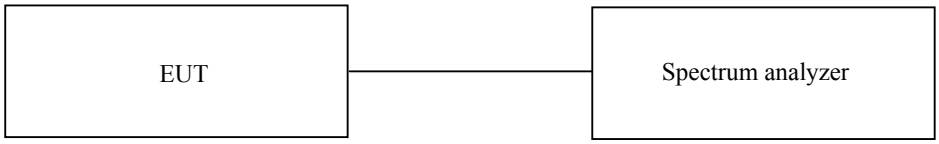
12.1 Operating environment

Temperature : 18 °C

Relative humidity : 40 %

12.2 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.



12.3 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.

12.4 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal.
■ -	8564E	Hewlett-Packard	Spectrum Analyzer	3650A00756	June 19, 2007
■ -	8447D	Hewlett-Packard	Amplifier	2727A04987	June 19, 2007
□ -	83051A	Agilent	Preamplifier	3950M00201	June 20, 2007
■ -	F-40-5000-RF	RLC Electronics	Highpass Filter	0425	July 15, 2007
■ -	MA220	HD	Turn Table	N/A	N/A
■ -	HD240	HD	Antenna Mast	N/A	N/A
■ -	BBHA9120D	Schwarzbeck	Horn Antenna	BBHA9120D294	July 03, 2006(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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12.5. Test data

12.5.1. Test data for conducted emission

Low Channel

High Channel

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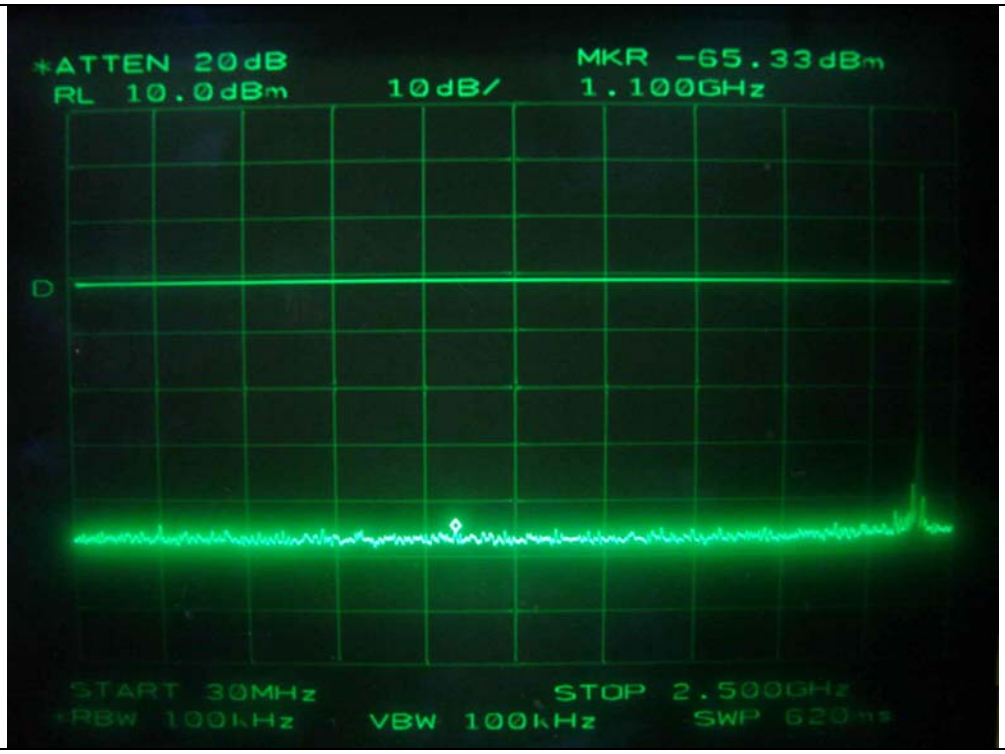
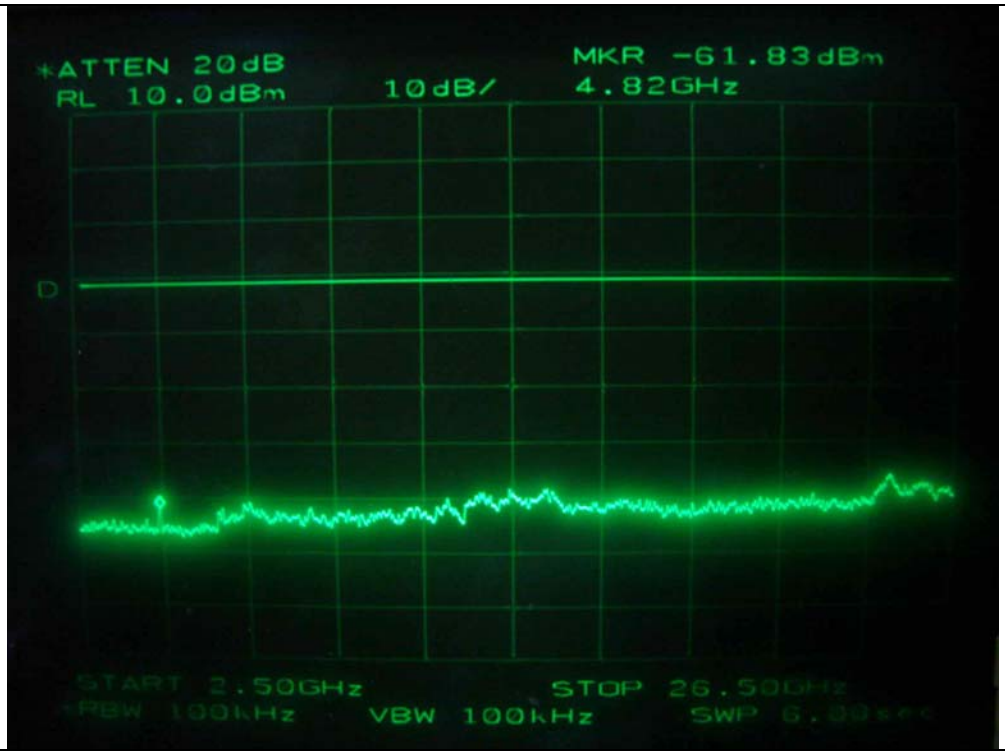


Low Channel



Low Channel

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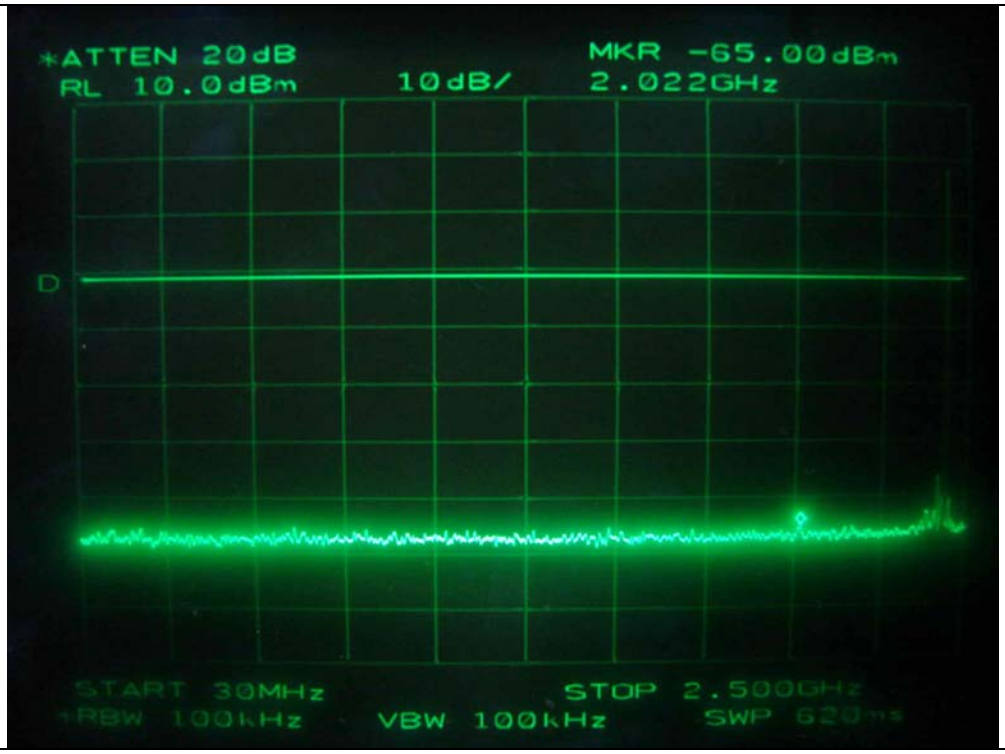
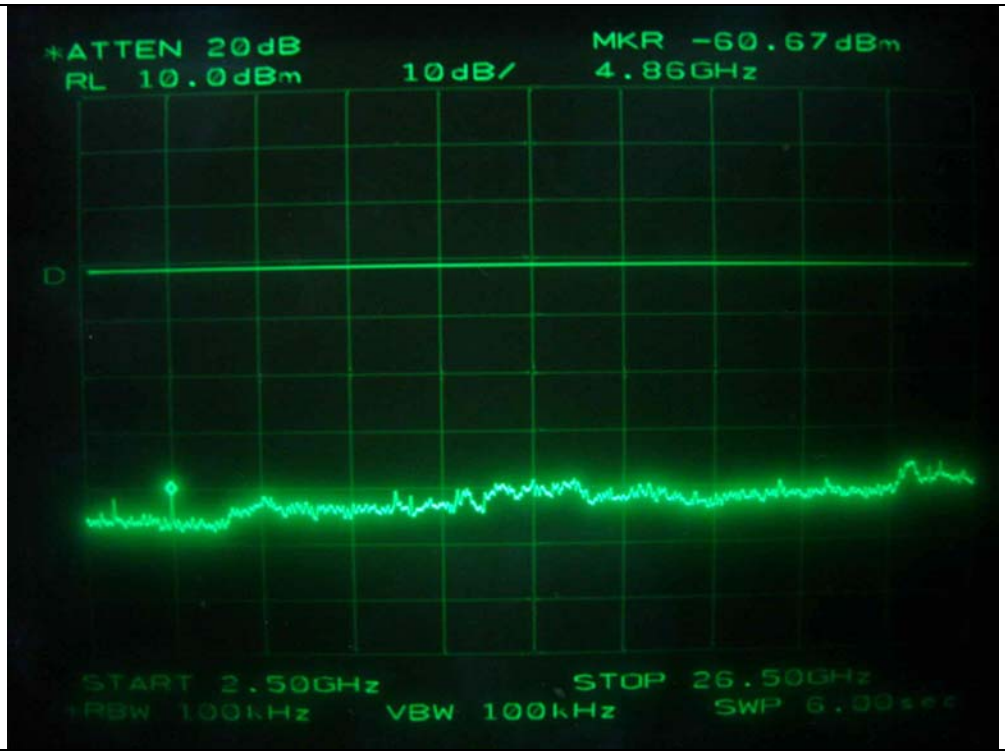


Middle Channel



Middle Channel

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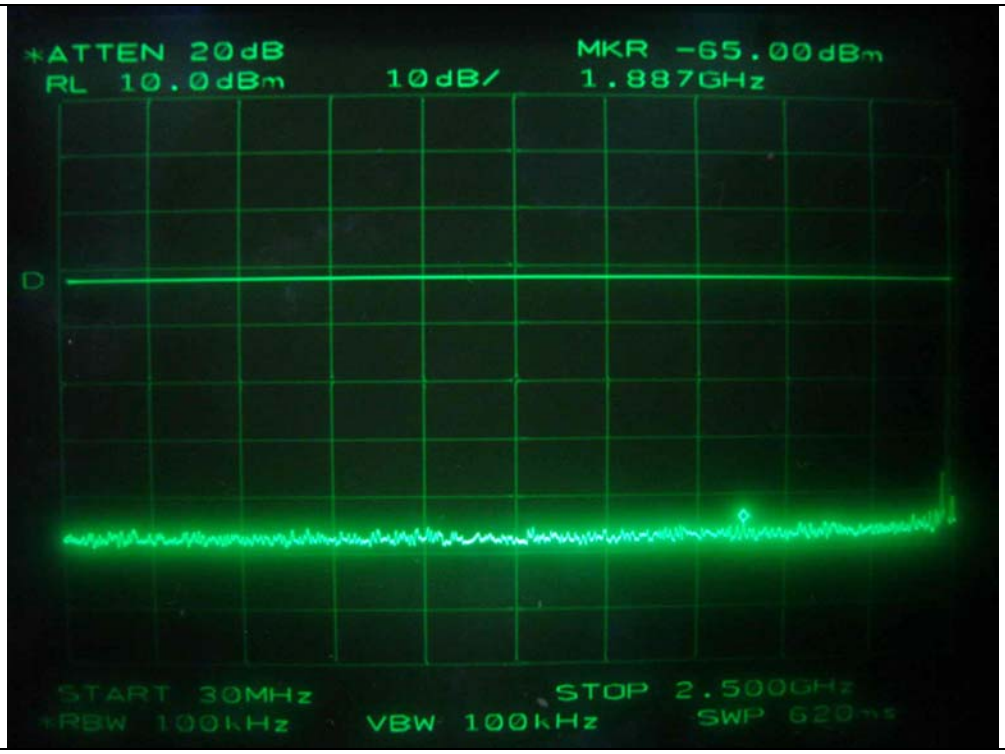
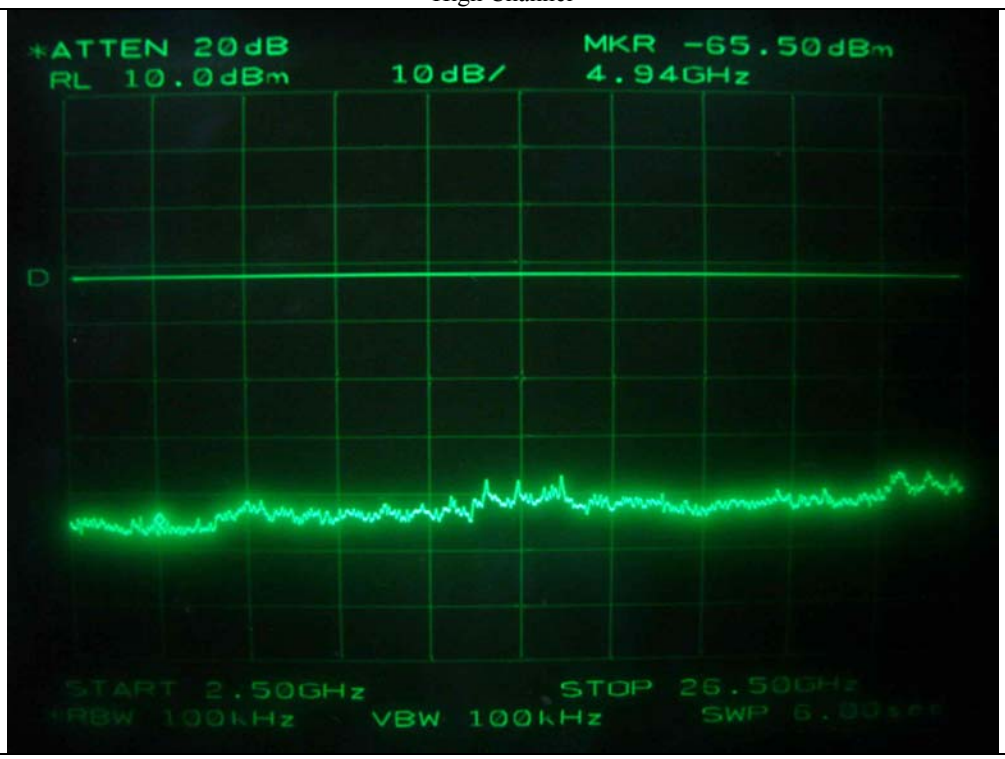


High Channel



High Channel

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12.5.2. Test data for radiated emission

12.5.2.1. Radiated Emission which fall in the Restricted Band

-. Test Date : November 13, 2007
-. 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

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										
2390.00	35.17	Peak	H	27.26	3.83	26.10		40.16	74.00	-33.84
	24.50	Average	H					29.49	54.00	-24.51
	35.83	Peak	V					40.82	74.00	-33.18
	25.00	Average	V					29.99	54.00	-24.01
Test Data for High Channel										
2483.50	35.92	Peak	H	27.55	3.83	26.10		41.20	74.00	-32.81
	25.17	Average	H					30.45	54.00	-23.56
	35.67	Peak	V					40.95	74.00	-33.06
	24.83	Average	V					30.11	54.00	-23.90

Tabulated test data for Restricted Band

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

Tested by: Ki-Hong, Nam / Test Engineer

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12.5.2.2. Spurious & Harmonic Radiated Emission

-. Test Date : November 13, 2007
-. 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

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										
2402.00	67.83	Peak	H	27.30	3.83			98.96	-	
	62.33	Peak	V					93.46	-	
4804.00*	36.25	Peak	H	31.60	6.54	26.10		48.29	74.00	-25.71
	24.83	Average	H					36.87	54.00	-17.13
	37.17	Peak	V					49.21	74.00	-24.79
	25.00	Average	V					37.04	54.00	-16.96
Test Data for Middle Channel										
2441.00	69.17	Peak	H	27.42	3.83			100.42	-	
	63.50	Peak	V					94.75	-	
4882.00*	36.50	Peak	H	31.74	6.59	26.10		48.73	74.00	-25.27
	24.67	Average	H					36.90	54.00	-17.10
	37.50	Peak	V					49.73	74.00	-24.27
	25.10	Average	V					37.33	54.00	-16.67

Tabulated test data for Restricted Band

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

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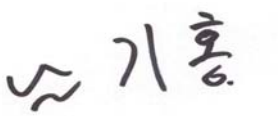
-Continued

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										
2480.00	68.50	Peak	H	27.53	3.83			99.86	-	
	63.00	Peak	V					94.36	-	
4960.00*	36.33	Peak	H	31.87	6.64	26.10		48.74	74.00	-25.26
	24.83	Average	H					37.24	54.00	-16.76
	37.33	Peak	V					49.74	74.00	-24.26
	25.00	Average	V					37.41	54.00	-16.59

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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13. PEAK POWER SPECTRUL DENSITY

13.1 Operating environment

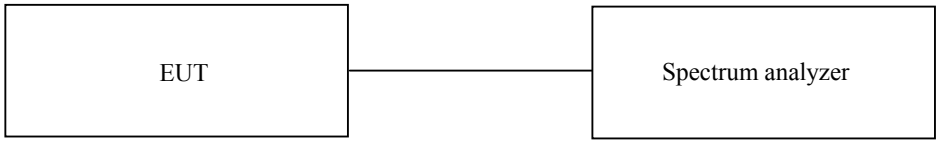
Temperature : 25 °C

Relative humidity : 48 %

13.2 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.



13.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal.
■ -	8564E	HP	Spectrum Analyzer	3650A00756	June 19, 2007

All test equipment used is calibrated on a regular basis.

13.4 Test data

-. Test Date : November 08, 2007

-. Result : PASSED

CHANNEL	FREQUENCY(MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2402	-11.17	8.0	-19.17
Middle	2441	-10.33	8.0	-18.33
High	2480	-11.00	8.0	-19.00

Tabulated test data for Peak Power Spectral Density.

Remark: See next page for measurement data.

Tested by: Ki-Hong, Nam / Test Engineer

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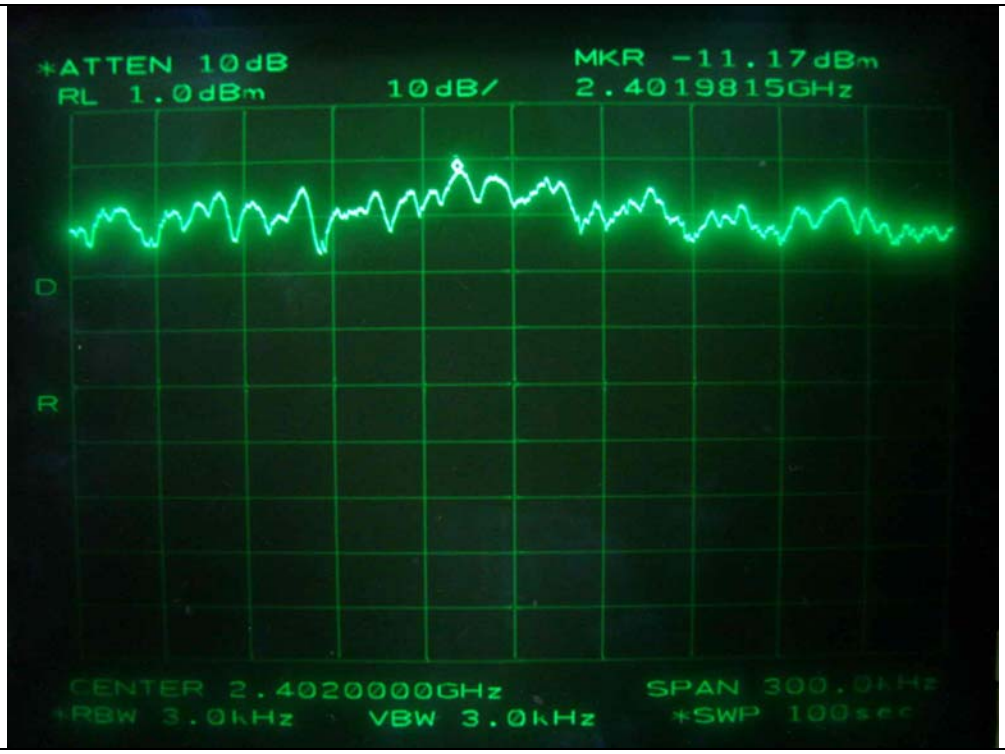
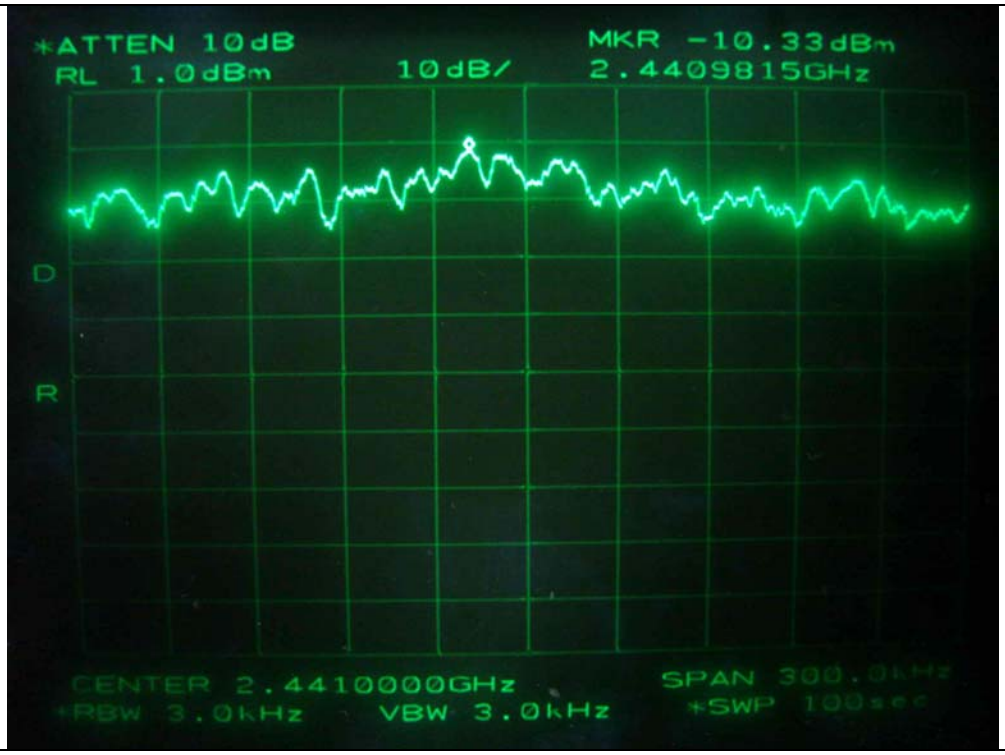


Low Channel



Middle Channel

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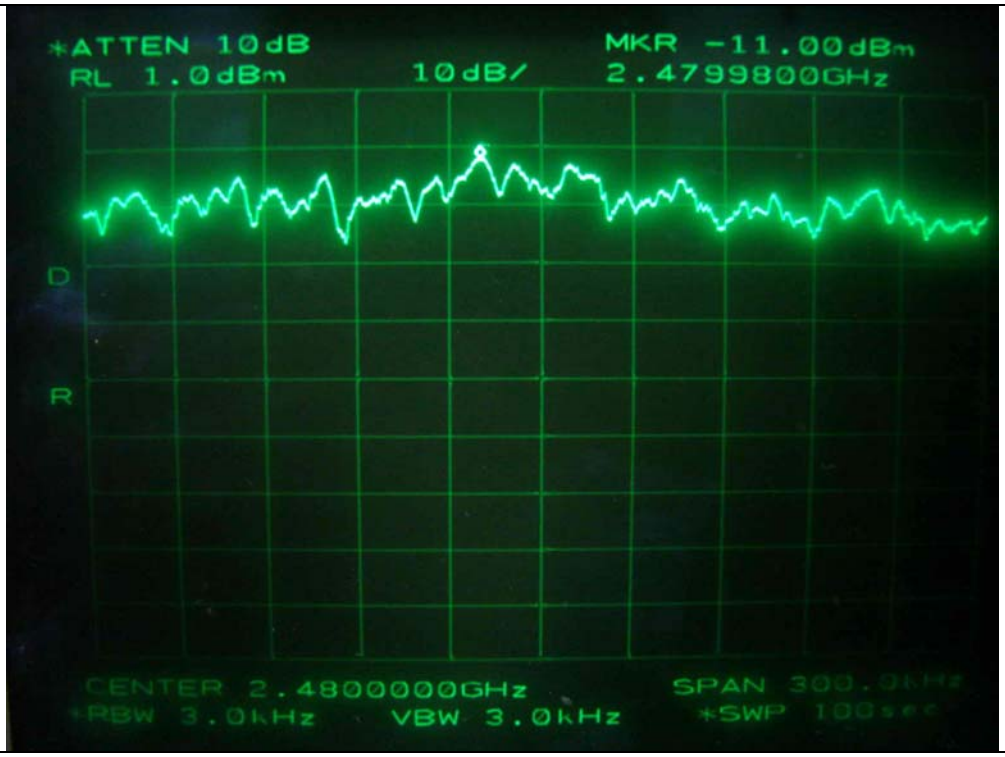

High Channel

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14. RADIO FREQUENCY EXPOSURE

14.1 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.

14.2 EUT Description

Kind of EUT	CAR AUDIO with Bluetooth
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	0.50dBm(0.001122W) at 2441MHz
Used Antenna	MFR.: MURATA (Chip Multilayer Antenna)
Used Antenna Gain	-2.6 dBi
Exposure Evaluation Applied	☐ MPE ☐ SAR ■ N/A

14.3 Test Result

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

Also, SAR evaluation is not required for the PORTABLE Device while its maximum output power is lower than threshold: 60/f(GHz) = 60/2.441 = 24.58mW.

So, the device meets the RF exposure requirement.

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15. RADIATED EMISSION TEST

15.1 Operating environment

Temperature : 18 °C

Relative humidity : 40 %

15.2 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.

15.3 Measurement uncertainty

Radiated emission electric field intensity, 30 MHz ~ 300 MHz : ± 4.43 dB

Radiated emission electric field intensity, 300 MHz ~ 1000 MHz : ± 3.80 dB

Measurement uncertainty is calculated in accordance with WECC 19-1990. The measurement uncertainty is given with a confidence of 95% with the coverage factor, k=2.

15.4 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal.
■ -	ESVS10	Rohde & Schwarz	EMI Test Receiver	827864/005	Dec 20, 2006
■ -	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 08, 2007
■ -	9108-A(494)	Schwarzbeck	Log Periodic Antenna	62281001	Feb 08, 2007

All test equipment used is calibrated on a regular basis.

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15.5 Test data

-. Test Date : November 13, 2007

-. Resolution bandwidth : 120 kHz

-. Frequency range : 30MHz ~ 1000MHz

-. Measurement distance : 3m

-. Channel : Low

Frequency (MHz)	Reading (dBuV)	Ant. Pol. (H/V)	Ant. Factor (dB/m)	Cable Loss	Emission Level(dBuV/m)	Limits (dBuV/m)	Margin (dB)
113.05	14.30	H	12.07	2.17	28.54	43.52	-14.98
146.99	20.00	V	14.73	2.64	37.37	43.52	-6.15
261.34	10.50	H	17.79	3.05	31.34	46.02	-14.68
269.51	12.80	H	17.95	3.08	33.83	46.02	-12.19
588.00	14.40	V	19.45	5.40	39.25	46.02	-6.77
685.99	11.50	V	21.96	5.32	38.78	46.02	-7.24

Tabulated test data for Radiated Electromagnetic Field

-. Channel : Middle

Frequency (MHz)	Reading (dBuV)	Ant. Pol. (H/V)	Ant. Factor (dB/m)	Cable Loss	Emission Level(dBuV/m)	Limits (dBuV/m)	Margin (dB)
113.05	14.50	H	12.07	2.17	28.74	43.52	-14.78
146.99	20.33	V	14.73	2.64	37.70	43.52	-5.82
261.34	10.17	H	17.79	3.05	31.01	46.02	-15.01
269.51	12.50	H	17.95	3.08	33.53	46.02	-12.49
588.00	14.40	V	19.45	5.40	39.25	46.02	-6.77
685.99	11.00	V	21.96	5.32	38.28	46.02	-7.74

Tabulated test data for Radiated Electromagnetic Field

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-. Channel : High

Frequency (MHz)	Reading (dBuV)	Ant. Pol. (H/V)	Ant. Factor (dB/m)	Cable Loss	Emission Level(dBuV/m)	Limits (dBuV/m)	Margin (dB)
113.05	14.00	H	12.07	2.17	28.24	43.52	-15.28
146.99	19.67	V	14.73	2.64	37.04	43.52	-6.48
261.34	10.00	H	17.79	3.05	30.84	46.02	-15.18
269.51	13.00	H	17.95	3.08	34.03	46.02	-11.99
588.00	14.50	V	19.45	5.40	39.35	46.02	-6.67
685.99	12.00	V	21.96	5.32	39.28	46.02	-6.74

Tabulated test data for Radiated Electromagnetic Field

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

Tested by: Ki-Hong, Nam / Test Engineer

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