

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

Test Report No. : E077R-063

AGR No. : A076A-048

Applicant : SAMSUNG ELECTRONICS CO., LTD.

Address : 645, Maetan3-dong, Yeongtong-gu, Suwon-city, Gyeonggi-do, 443-742, Korea

Manufacturer : Refer to Page 5

Type of Equipment : DIGITAL AUDIO PLAYER

FCC ID. : A3LYPP2

Model Name : YP-P2

Multiple Model Name : YP-P2**, YP-P2J** (Refer to Page 7)

Serial number : N/A

Total page of Report : 40 pages (including this page)

Date of Incoming : June 05, 2007

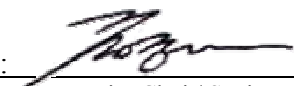
Date of issue : July 24, 2007

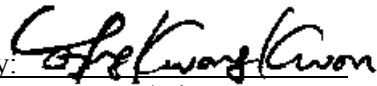
SUMMARY

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.

Prepared by: 
Young-Min, Choi / Senior Engineer
EMC Div.
ONETECH Corp.

Reviewed by: 
Y. K. Kwon / Director
EMC Div.
ONETECH Corp.

CONTENTS

	PAGE
1. VERIFICATION OF COMPLIANCE.....	5
2. TEST SUMMARY.....	6
2.1 TEST ITEMS AND RESULTS.....	6
2.2 ADDITIONS, DEVIATIONS, EXCLUSIONS FROM STANDARDS.....	6
2.3 RELATED SUBMITTAL(S) / GRANT(S)	6
2.4 PURPOSE OF THE TEST	6
2.5 TEST METHODOLOGY	6
2.6 TEST FACILITY	6
3. GENERAL INFORMATION.....	7
3.1 PRODUCT DESCRIPTION.....	7
3.2 ALTERNATIVE TYPE(S)/MODEL(S); ALSO COVERED BY THIS TEST REPORT.	7
4. EUT MODIFICATIONS	7
5. SYSTEM TEST CONFIGURATION.....	8
5.1 JUSTIFICATION	8
5.2 PERIPHERAL EQUIPMENT.....	8
5.3 CABLE DESCRIPTION	8
5.4 MODE OF OPERATION DURING THE TEST.....	8
5.5 CONFIGURATION OF TEST SYSTEM	9
5.6 ANTENNA REQUIREMENT	9
6. PRELIMINARY TEST.....	9
6.1 AC POWER LINE CONDUCTED EMISSIONS TESTS.....	9
6.2 GENERAL RADIATED EMISSIONS TESTS.....	9
7. 20DB BANDWIDTH	10
7.1 OPERATING ENVIRONMENT	10
7.2 TEST SET-UP	10
7.3 TEST EQUIPMENT USED	10
7.4 TEST DATA	10
8. HOPPING FREQUENCY SEPARATION	13
8.1 OPERATING ENVIRONMENT	13
8.2 TEST SET-UP	13

8.3 TEST EQUIPMENT USED	13
8.4 TEST DATA	13
9. NUMBER OF HOPPING CHANNELS	15
9.1 OPERATING ENVIRONMENT	15
9.2 TEST SET-UP	15
9.3 TEST EQUIPMENT USED	15
9.4 TEST DATA	15
10. TIME OF OCCUPANCY	19
10.1 OPERATING ENVIRONMENT	19
10.2 TEST SET-UP	19
10.3 TEST EQUIPMENT USED	19
10.4 TEST DATA	20
11. MAXIMUM PEAK OUTPUT POWER.....	23
11.1 OPERATING ENVIRONMENT	23
11.2 TEST SET-UP	23
11.3 TEST EQUIPMENT USED	23
11.4 TEST DATA	23
12. 100 KHZ BANDWIDTH OUTSIDE THE FREQUENCY BAND.....	26
12.1 OPERATING ENVIRONMENT	26
12.2 TEST SET-UP FOR CONDUCTED MEASUREMENT	26
12.3 TEST SET-UP FOR RADIATED MEASUREMENT	26
12.4 TEST EQUIPMENT USED	26
12.5. TEST DATA	27
12.5.1. Test data for conducted emission.....	27
12.5.2. Test data for radiated emission	31
13. PEAK POWER SPECTRUL DENSITY	34
13.1 OPERATING ENVIRONMENT	34
13.2 TEST SET-UP	34
13.3 TEST EQUIPMENT USED	34
13.4 TEST DATA	34
14. RADIO FREQUENCY EXPOSURE.....	37
14.1 RF EXPOSURE LIMIT	37
14.2 EUT DESCRIPTION	37
14.3 TEST RESULT.....	37

15. RADIATED EMISSION TEST.....	38
15.1 TEST SET-UP	38
15.2 MEASUREMENT UNCERTAINTY	38
15.3 TEST EQUIPMENT USED	38
15.4 TEST DATA	39

1. VERIFICATION OF COMPLIANCE

APPLICANT : SAMSUNG ELECTRONICS CO., LTD.
ADDRESS : 645, Maetan3-dong, Yeongtong-gu, Suwon-city, Gyeonggi-do, 443-742, Korea
MANUFACTURER 1 : Tianjin Samsung Electronics Company
300457, TSEC12, 4th Avenue, TEDA, Tianjin, China
MANUFACTURER 2 : Samsung Electronics Huizhou Co., Ltd.
Industrial Complex, Chenjiang Town, Huizhou City, Guangdong Province, China
MANUFACTURER 3 : Samsung Electronics Slovakia s.r.o
Hviezdoslavova 807, 924 27 Galanta, Slovakia
MANUFACTURER 4 : P.T. Samsung Electronics Indonesia Co
Cikarang Industrial Estate II, Jababeka Raya Blok F 29-33 Cikarang. Bekasi 17530,
INDONESIA
CONTACT PERSON : Mr. Brian Youn / Senior Engineer
TELEPHONE NO : +82-31-277-6778
FCC ID : A3LYPP2
MODEL NAME : YP-P2
SERIAL NUMBER : N/A
DATE : July 24, 2007

EQUIPMENT CLASS	<i>DSS – PART 15 SPREAD SPECTRUM TRANSMITTER</i>
KIND OF EQUIPMENT	DIGITAL AUDIO PLAYER
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.

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)
15.203	Antenna Requirement	Met requirement / PASS

Remark: This test is not performed because the EUT is operated by internal rechargeable 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.

It should not be reproduced except in full, without the written approval of ONETECH.

EMC-003 (Rev.0)

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)

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)

3. GENERAL INFORMATION

3.1 Product Description

The SAMSUNG ELECTRONICS CO., LTD., Model YP-P2 (referred to as the EUT in this report) is a DIGITAL AUDIO PLAYER. This report is for covering Bluetooth function only and the report for the peripheral device for Class B computing device will be issued by Declaration of Conformity report. The product specification described herein was obtained from product data sheet or user's manual.

DEVICE TYPE	DIGITAL AUDIO PLAYER
TEMPERATURE RANGE	-20 ~ 55°C
OPERATING FREQUENCY	2402~2480 MHz
RF OUTPUT POWER	-3.00 dBm
NUMBER OF CHANNEL	79 Channels
MODULATION TYPE	GFSK
DATA SPEED	1200 bps
COMMUNICATION SYSTEM	Duplex
ANTENNA MFG / MODEL NAME	Partron / AISABRINAPA
ANTENNA TYPE	Internal Antenna
ANTENNA GAIN	1.1 dBi
LIST OF EACH OSC. OR CRYSTAL. FREQ.(FREQ.>=1MHz)	24 MHz and 12 MHz
NUMBER OF LAYER	8 Layers
POWER REQUIREMENT	DC 3.7V from a Li-Polymer Battery
EXTERNAL CONNECTOR	USB, Earphone Jack

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	Model Differences
Basic Model	YP-P2	-
Multiple Models	YP-P2**, YP-P2J**	Only type designation, except for the color and memory capacity. First “*”: Memory Capacity (Q=2GB, A=4GB, C=8GB, E=16GB) Second “*”: Color (B=Black, W=White, R=Red, U=Purple, G=Yellow) “J”: Media Play Software

4. EUT MODIFICATIONS

-. None

It should not be reproduced except in full, without the written approval of ONETECH.

EMC-003 (Rev.0)

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)

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)

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	YP-P2 PV Rev 0.3	N/A
Rechargeable Battery	N/A	N/A	N/A
LCD	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
YP-P2	SAMSUNG ELECTRONICS CO., LTD.	A3LYPP2	DIGITAL AUDIO PLAYER (EUT)	-
N/A	N/A	N/A	Earphone	EUT
CMN 200	ROHDE & SCHWARZ	N/A	Universal Radio Communication Tester	-

5.3 Cable Description

Ports Name	Shielded	Ferrite Bead	Metal Hood	Length (m)	Connected to
Earphone-Jack	N	N	EUT END	1.2	Earphone

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.

5.5 Configuration of Test System

Line Conducted Test: It is not need to test this requirement, because the EUT shall be operated by internal rechargeable battery.

Radiated Emission Test: Preliminary radiated emissions test were conducted using the procedure in ANSI C63.4: 2003 8.3.1.1 and 13.1.4.1 to determine the worse operating conditions. Final radiated emission tests were conducted at 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 internal rechargeable 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

7. 20dB BANDWIDTH

7.1 Operating environment

Temperature : 24 °C

Relative humidity : 45 %

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 22, 2006

All test equipment used is calibrated on a regular basis.

7.4 Test data

- Test Date : June 13, 2007

- Test Result : Pass

CHANNEL	FREQUENCY(MHz)	MEASURED VLAUE (kHz)	LIMIT (kHz)	MARGIN (kHz)
Low	2402	917	1000	-83
Middle	2441	925	1000	-75
High	2480	925	1000	-75

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

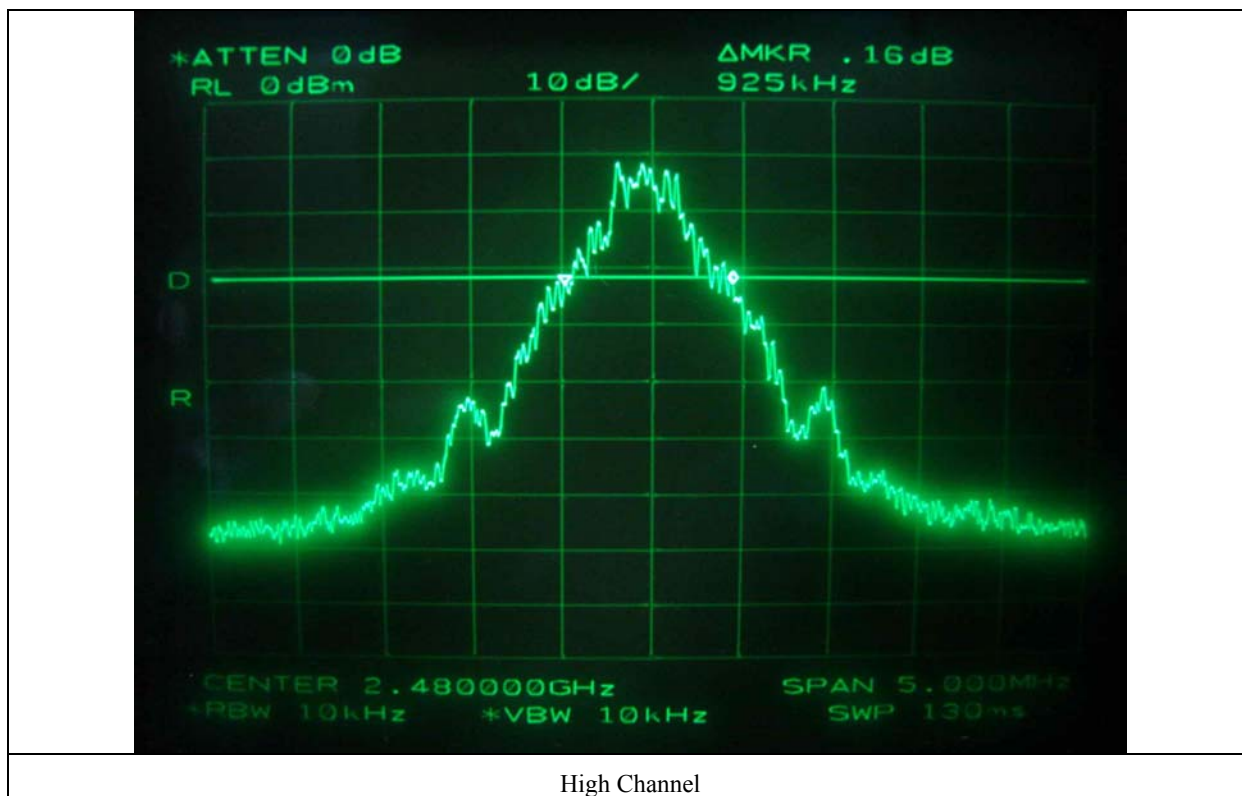
Tested by: Ki-Hong, Nam / Test Engineer



Low Channel



Middle Channel



8. HOPPING FREQUENCY SEPARATION

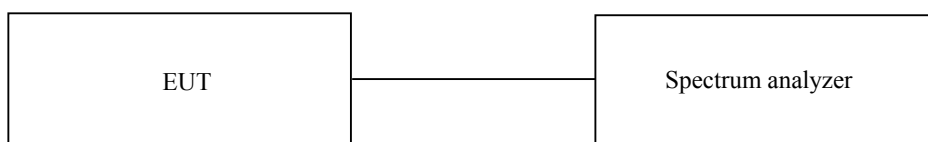
8.1 Operating environment

Temperature : 24 °C

Relative humidity : 45 %

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 , 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 22, 2006

All test equipment used is calibrated on a regular basis.

8.4 Test data

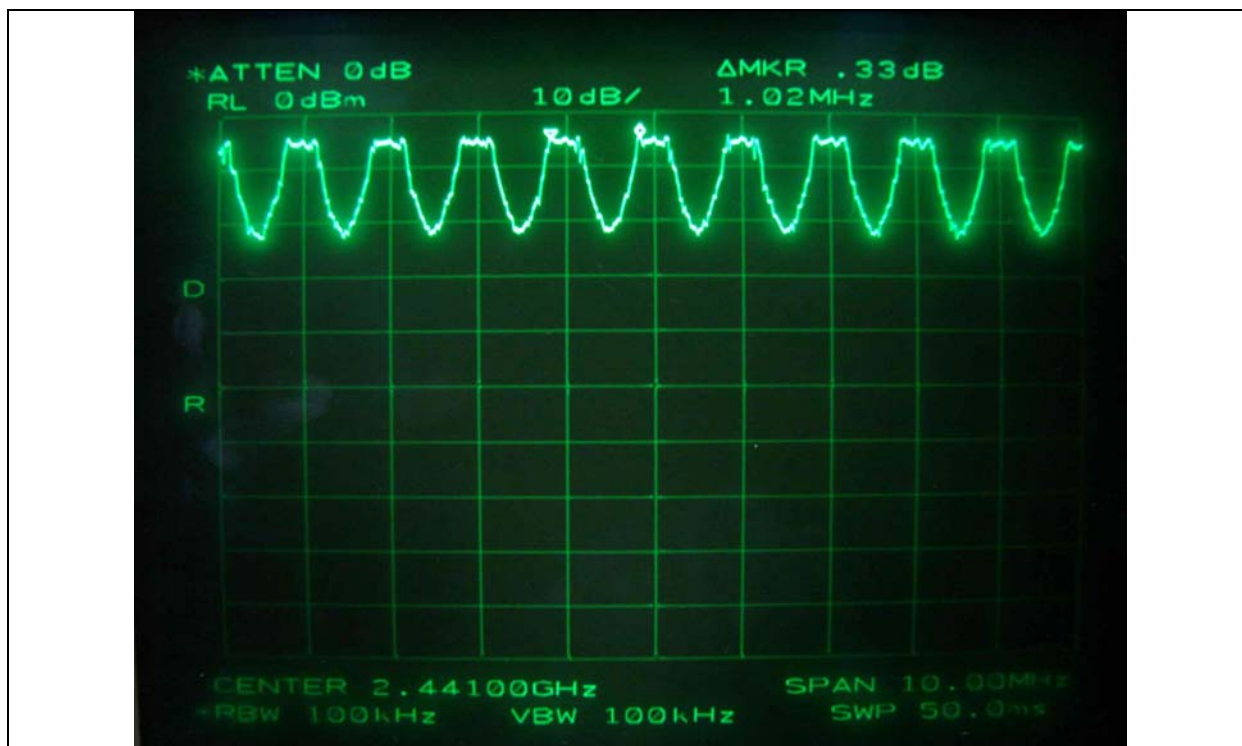
- Test Date : June 13, 2007

- Test Result : Pass

MEASURED VLAUE (kHz)	LIMIT, 20dB Bandwidth (kHz)	MARGIN (kHz)
1020	925	-95

기홍

Tested by: Ki-Hong, Nam / Test Engineer



9. NUMBER OF HOPPING CHANNELS

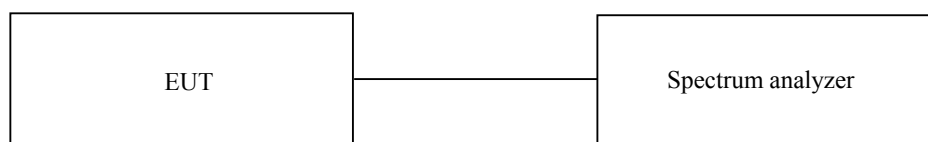
9.1 Operating environment

Temperature : 24 °C

Relative humidity : 45 %

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 22, 2006

All test equipment used is calibrated on a regular basis.

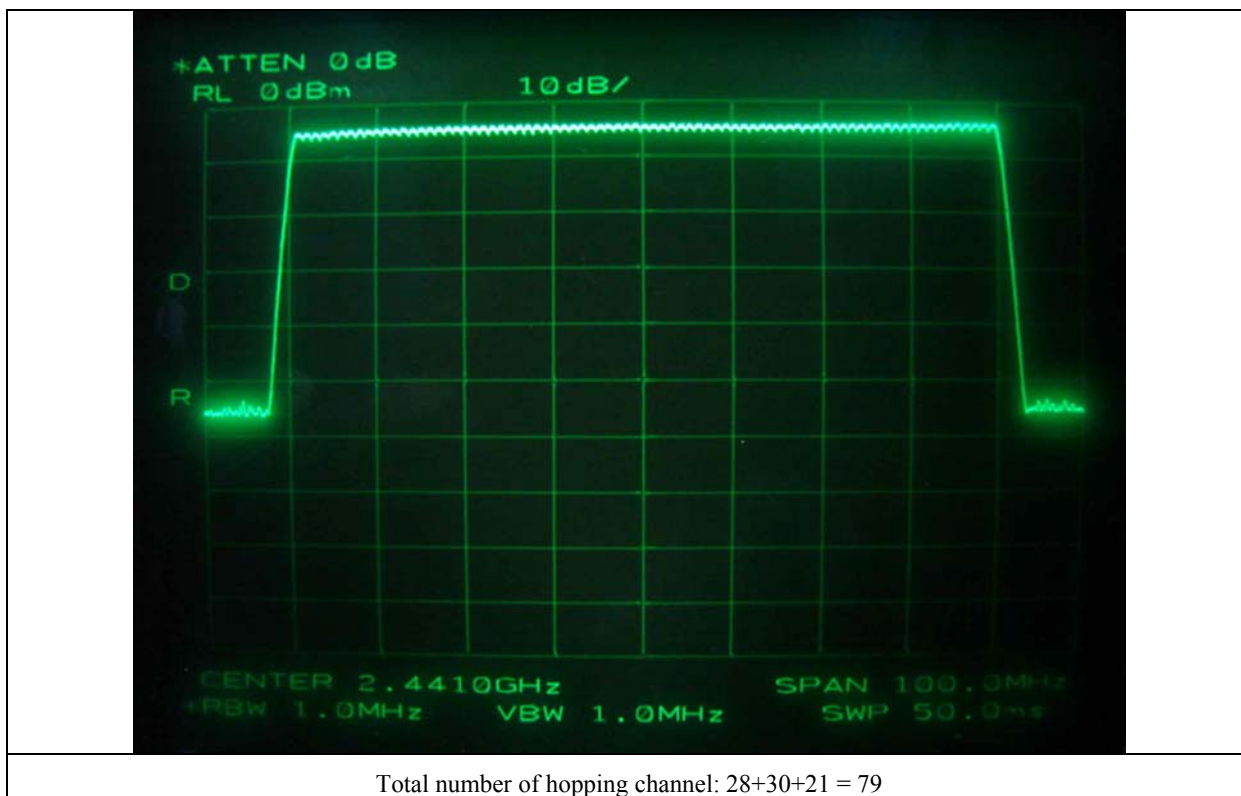
9.4 Test data

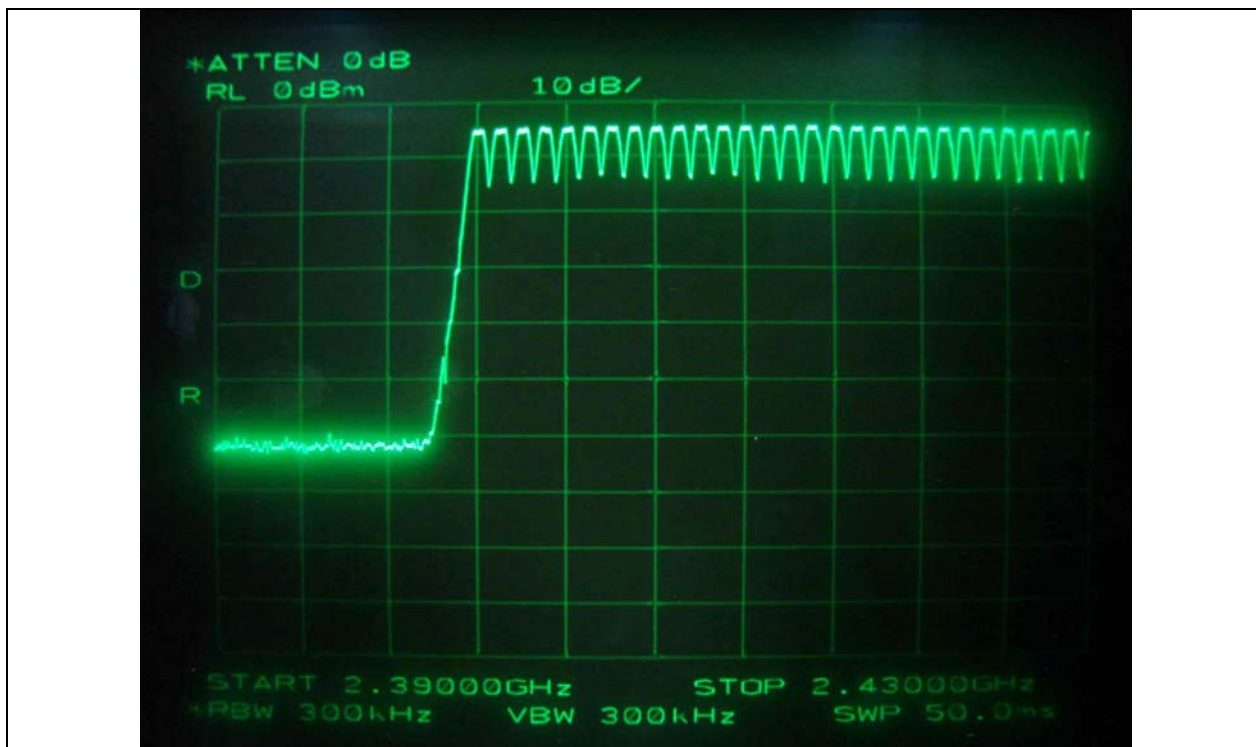
-. Test Date : June 13, 2007

-. Test Result : Pass

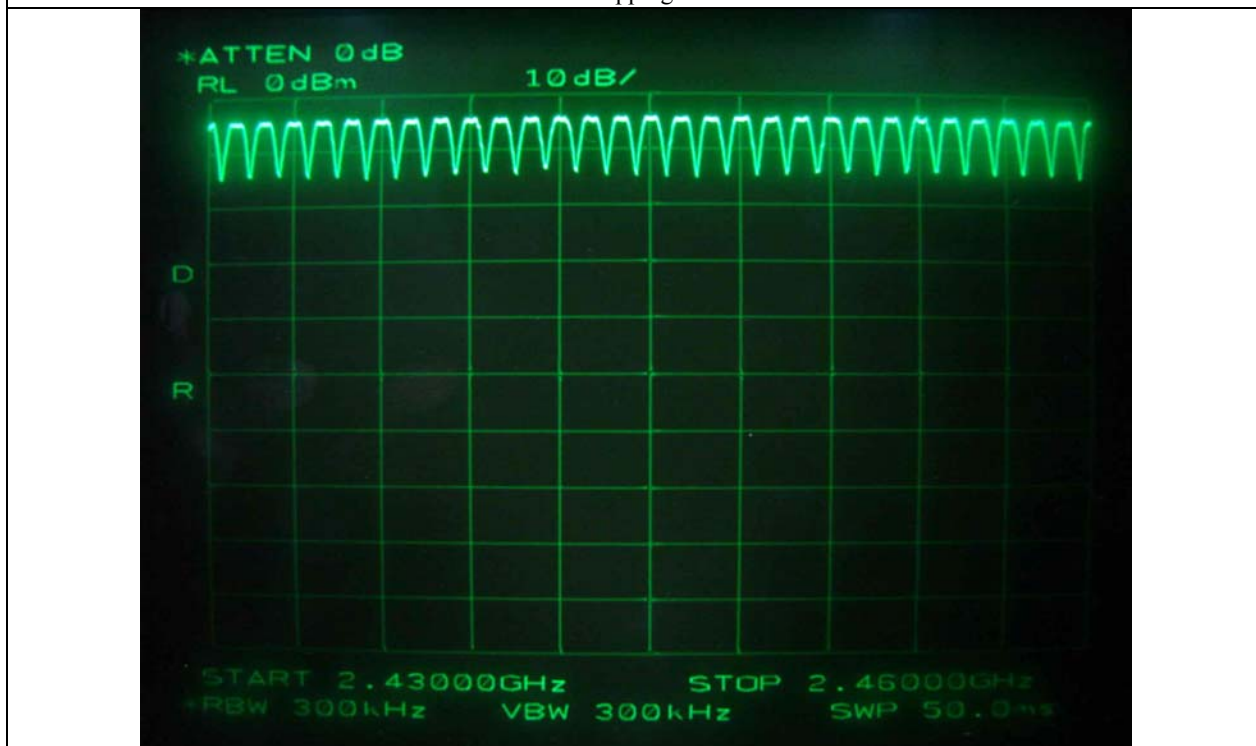
MEASURED VLAUE (Number)	LIMIT (Number)	MARGIN (Number)
79	Minimum of 75	4

Tested by: Ki-Hong, Nam / Test Engineer

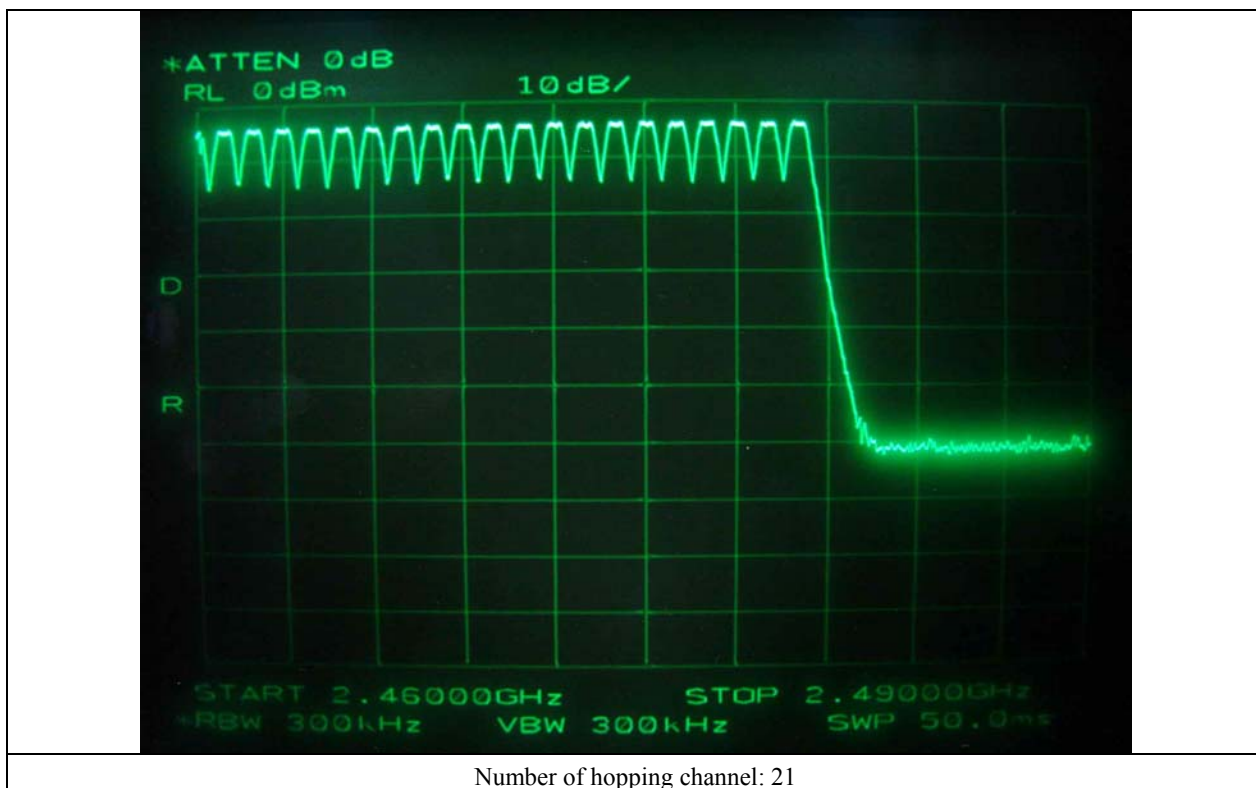




Number of hopping channel: 28



Number of hopping channel: 30



10. TIME OF OCCUPANCY

10.1 Operating environment

Temperature : 24 °C

Relative humidity : 45 %

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 22, 2006

All test equipment used is calibrated on a regular basis.

10.4 Test data

-. Test Date : June 13, 2007

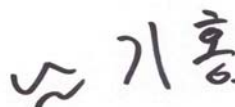
The system makes worst case 1600 hops per second or 1 time slot has a length of 625us with 79 channels.

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.

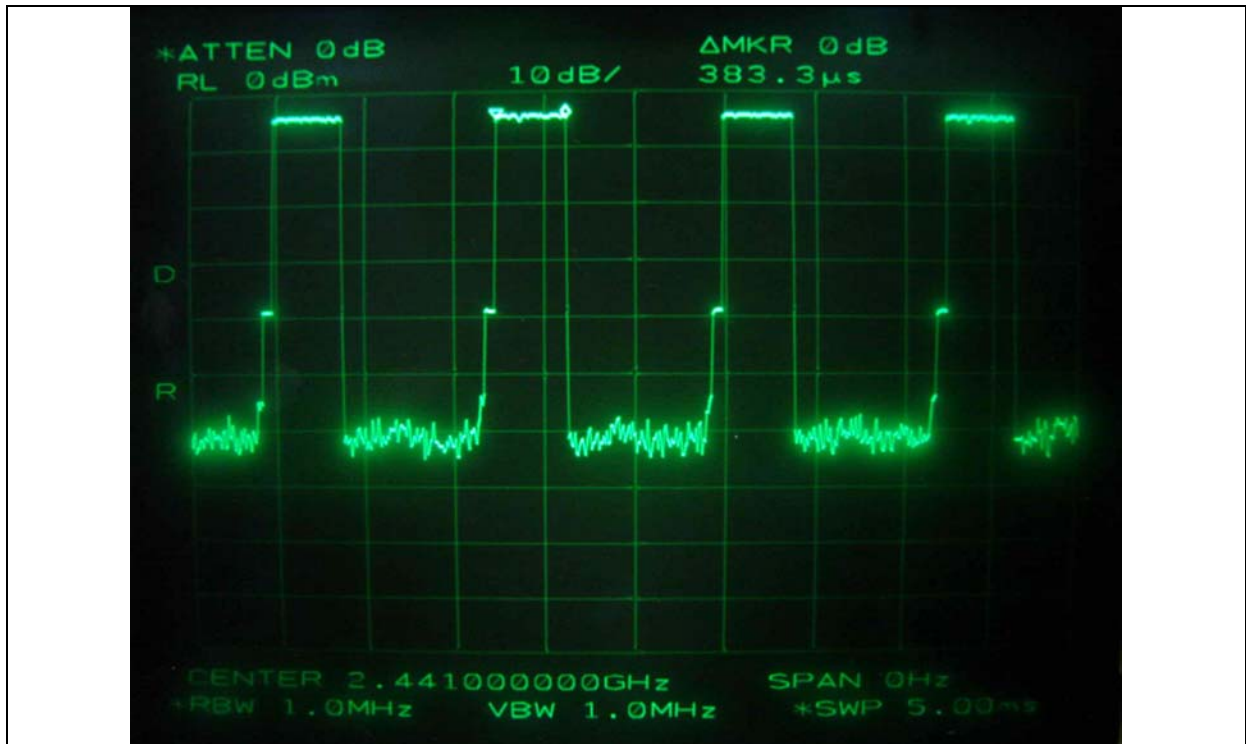
Packet Type	Pulse Time (ms)	Hops per second with channels	Period Time (ms)	Total Dwell Time (ms)	Limit (ms)	Test Result
DH1	0.3833	10.13	31.6	122.70	400	PASS
DH3	1.6330	5.06	31.6	261.11	400	PASS
DH5	2.8670	3.38	31.6	306.22	400	PASS

Total dwell time is calculated as following.

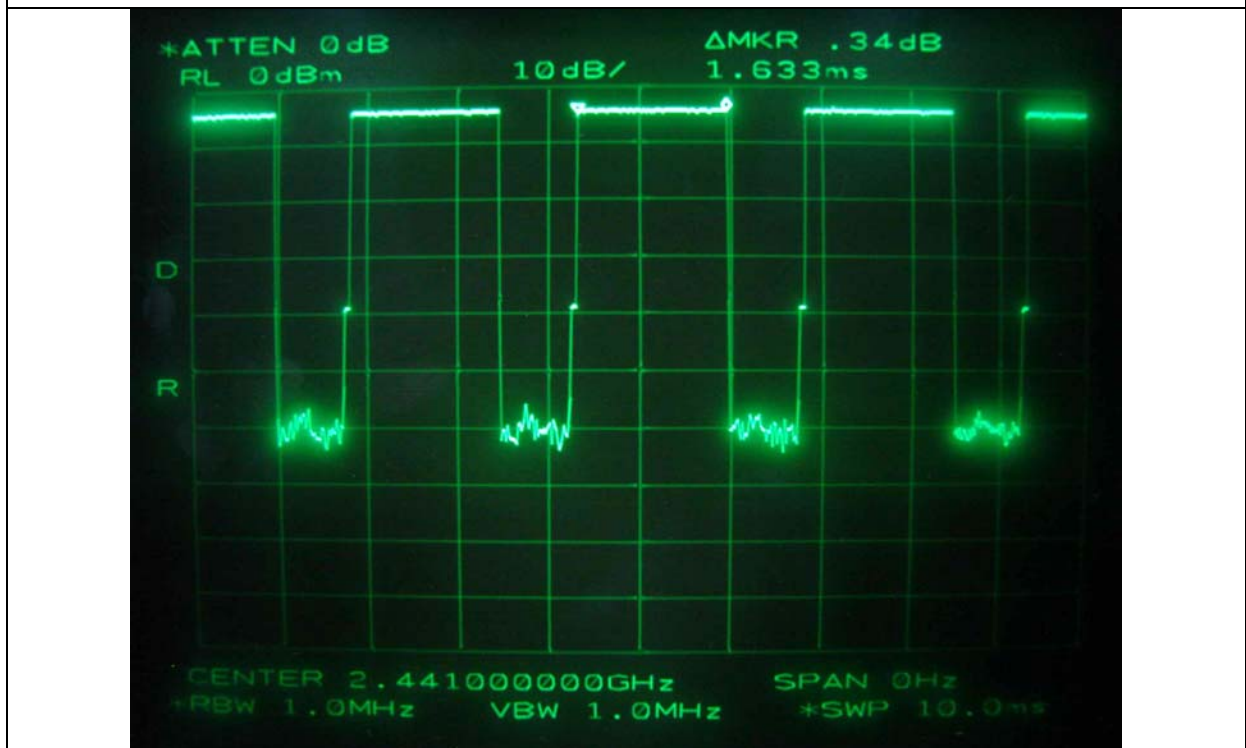
Total Dwell Time = Pulse time * Hops per second with channels * period time



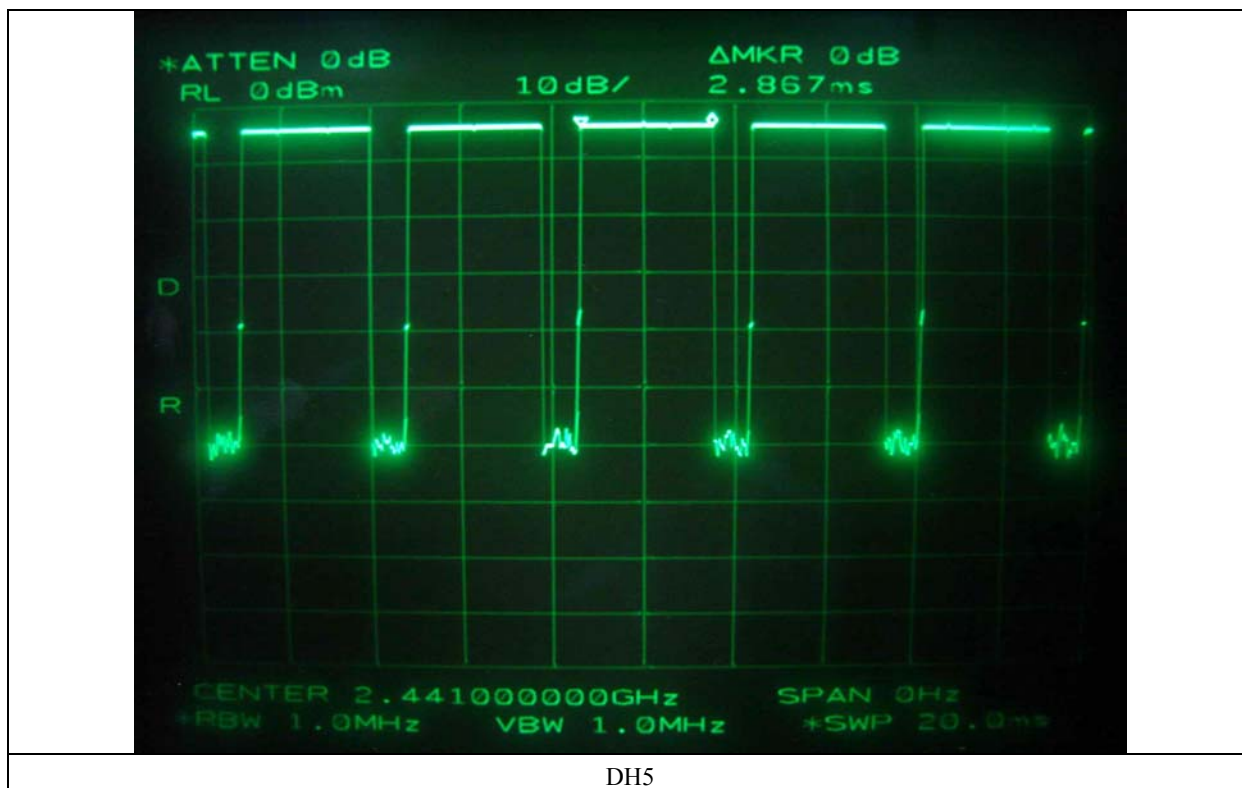
Tested by: Ki-Hong, Nam / Test Engineer



DH1



DH3



11. MAXIMUM PEAK OUTPUT POWER

11.1 Operating environment

Temperature : 24 °C

Relative humidity : 45 %

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 22, 2006

All test equipment used is calibrated on a regular basis.

11.4 Test data

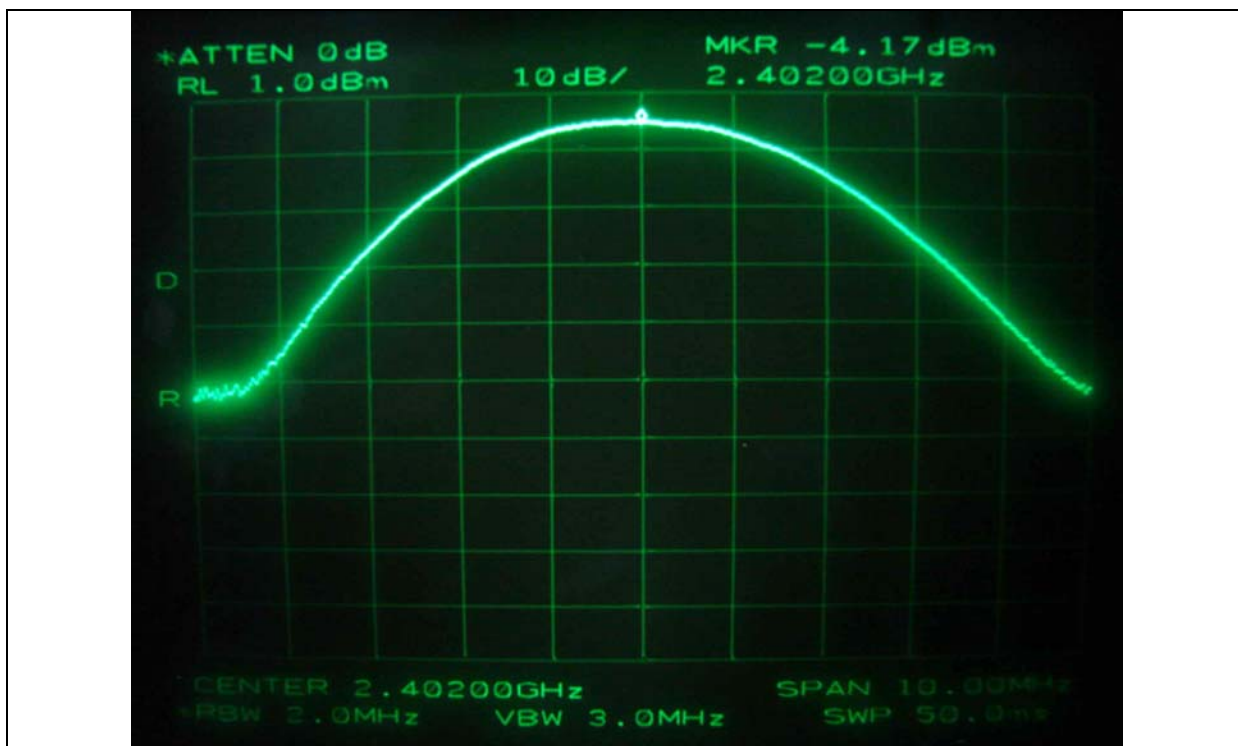
-. Test Date : June 13, 2007

-. Test Result : Pass

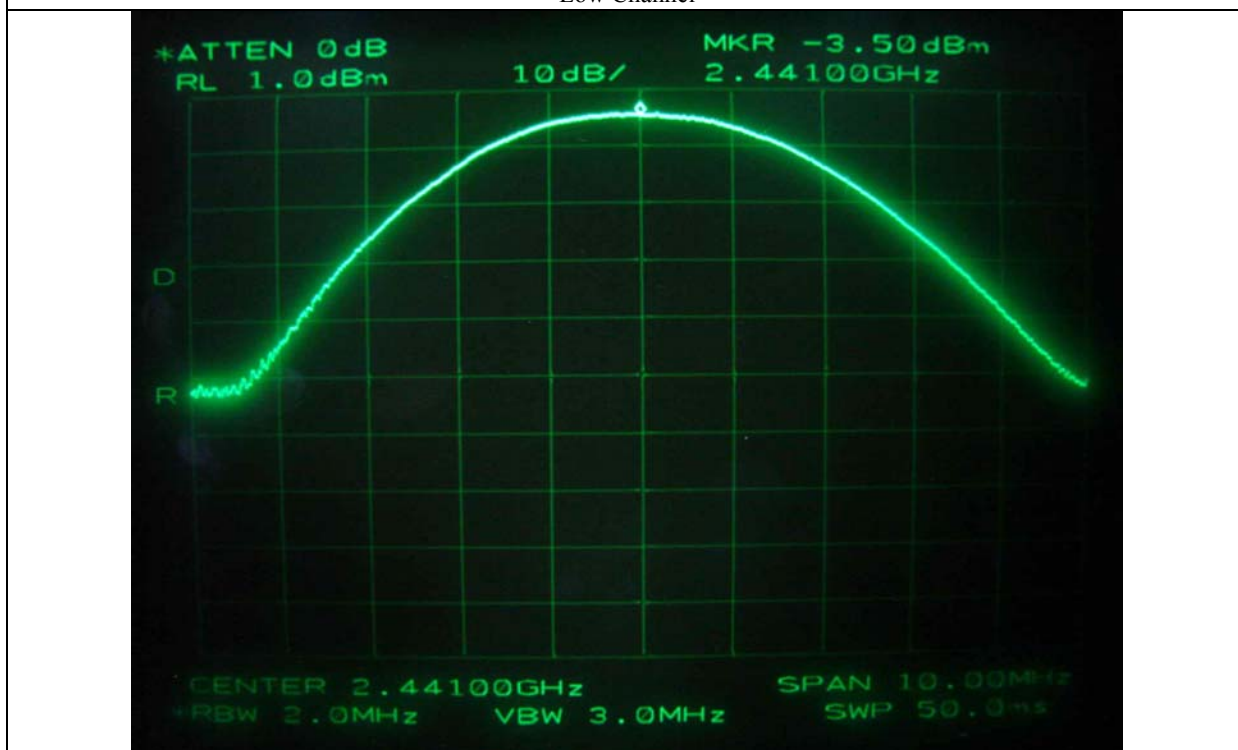
CHANNEL	FREQUENCY(MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2402	-4.17	30.0	-34.17
Middle	2441	-3.50	30.0	-33.50
High	2480	-3.00	30.0	-33.00

기홍

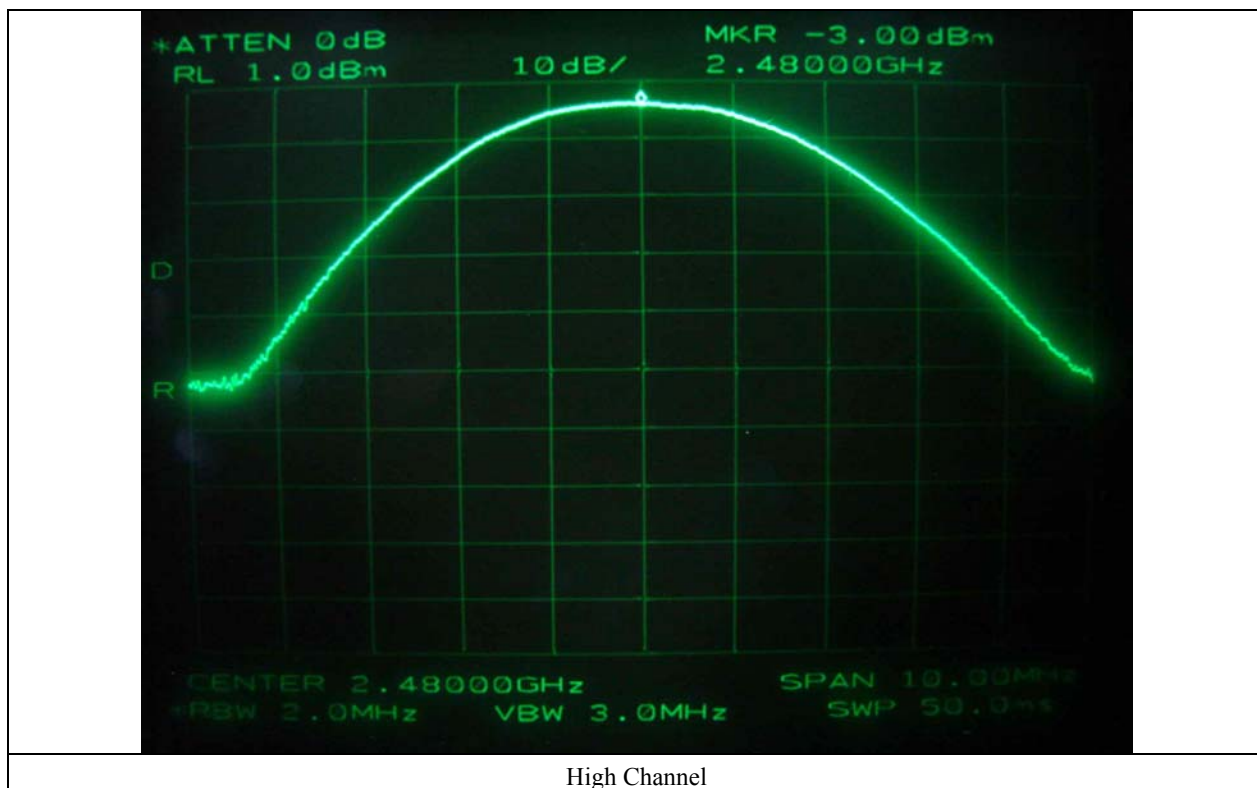
Tested by: Ki-Hong, Nam / Test Engineer



Low Channel



Middle Channel



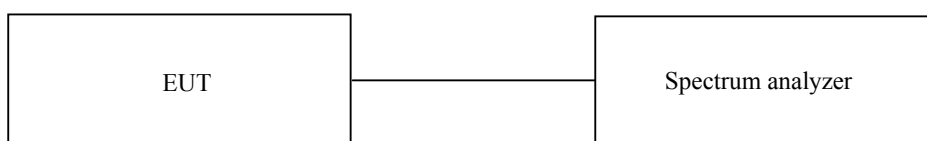
12. 100 kHz BANDWIDTH OUTSIDE THE FREQUENCY BAND

12.1 Operating environment

Temperature : 26 °C
Relative humidity : 38 %

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.

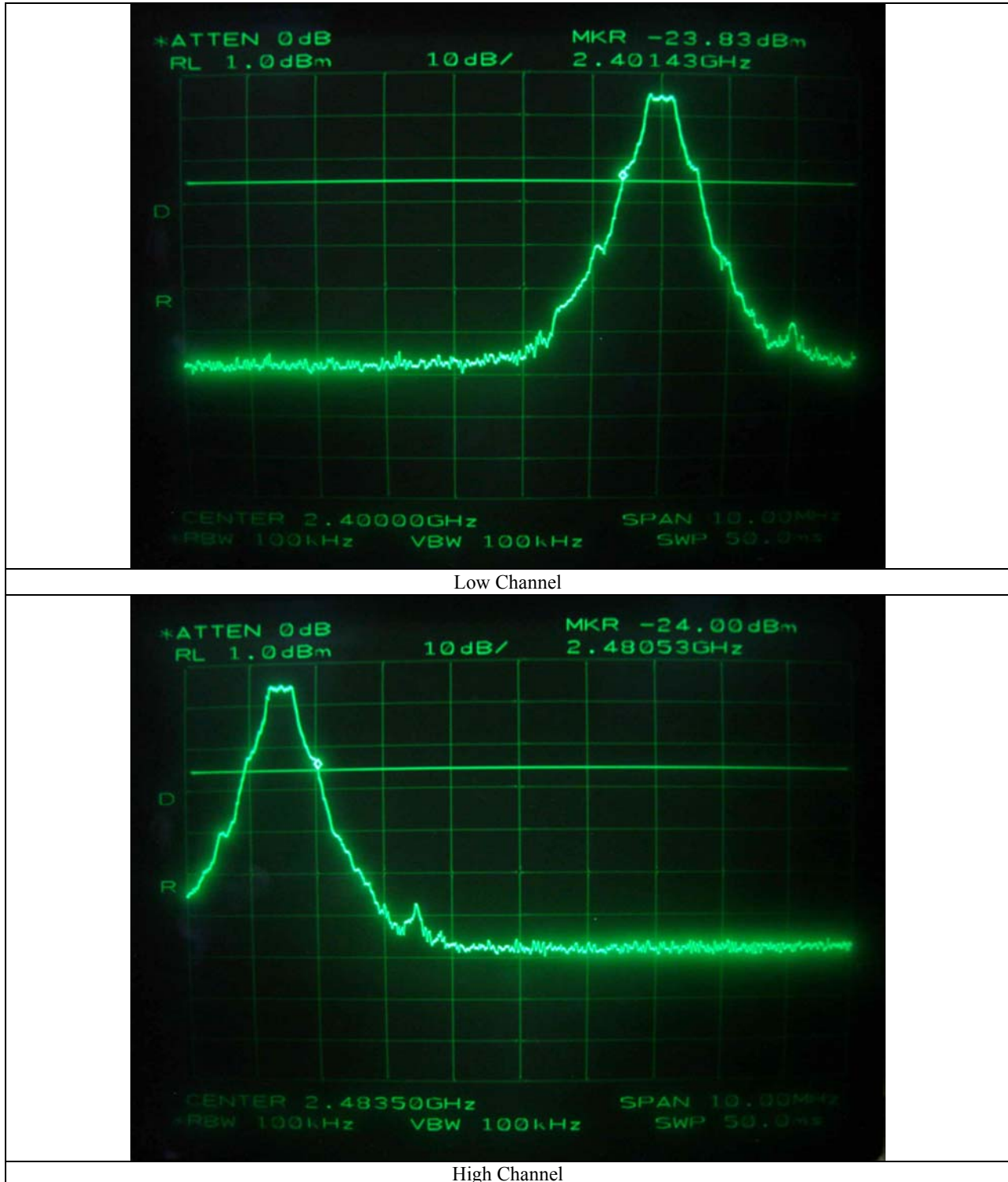
12.4 Test equipment used

Model Number	Manufacturer	Description	Serial Number	Last Cal.
■ - 8564E	Hewlett-Packard	Spectrum Analyzer	3650A00756	June 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.

12.5. Test data

12.5.1. Test data for conducted emission

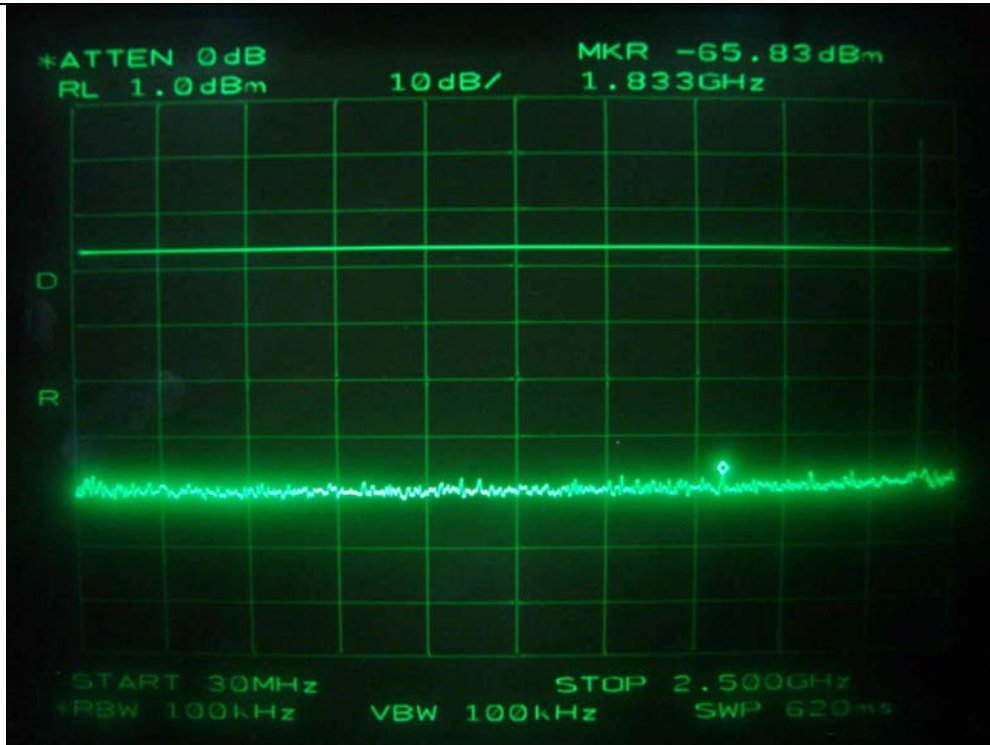


It should not be reproduced except in full, without the written approval of ONETECH.

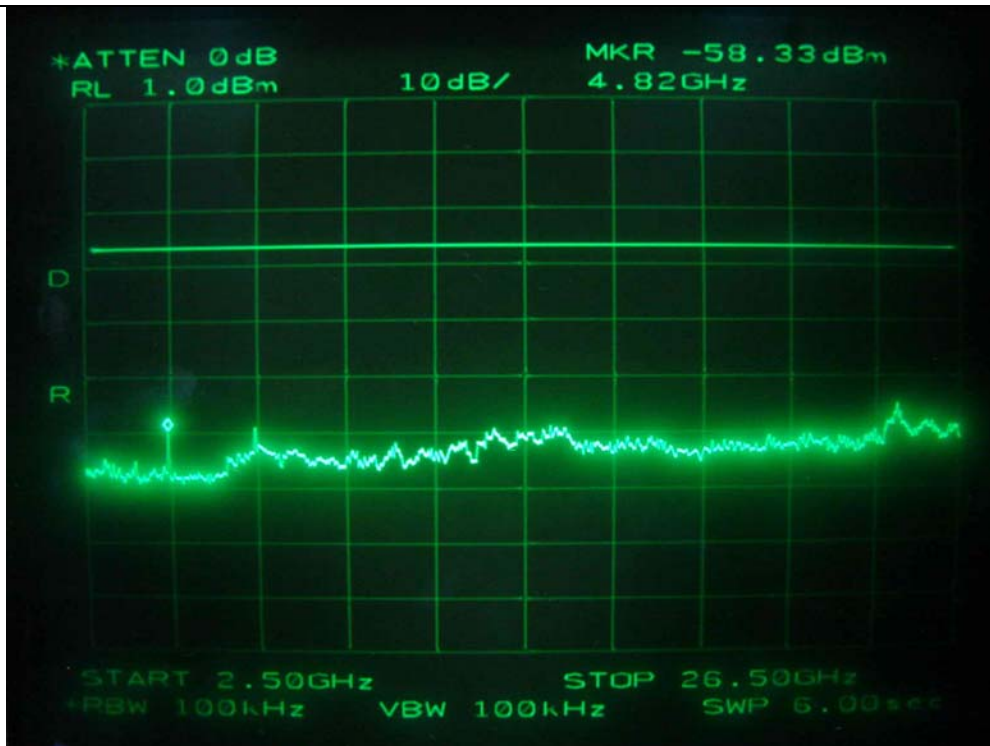
EMC-003 (Rev.0)

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)

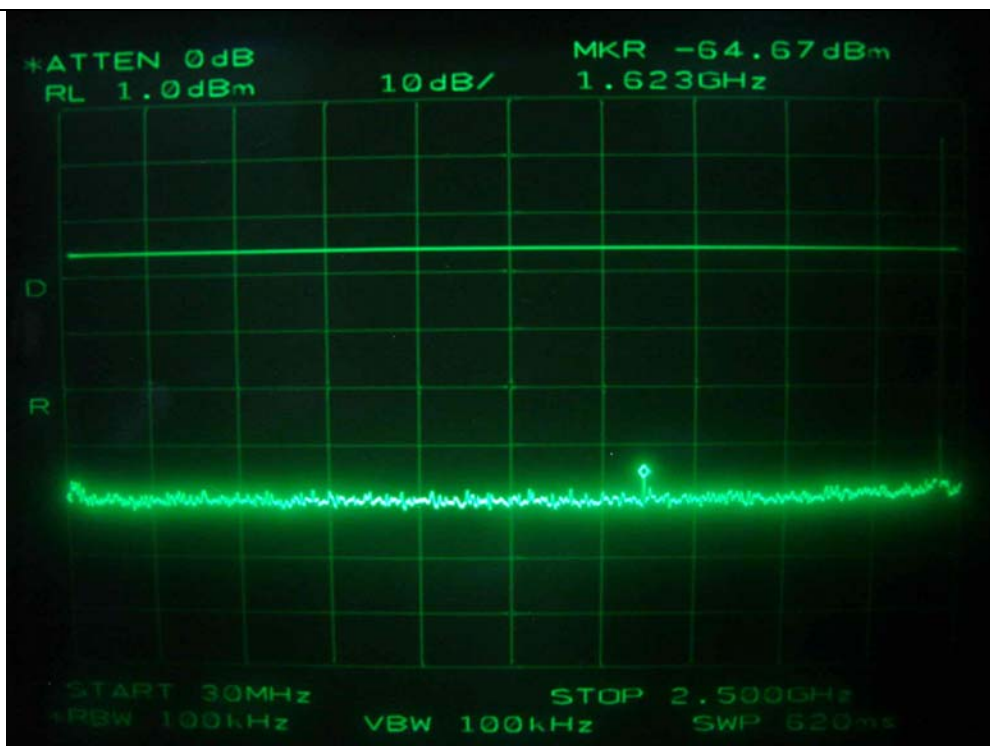
EMC Testing Dept : 307-51 Daessangryung-ri, Chowol-eup, Gwangju-si, Gyeonggi-do, 464-860, Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)



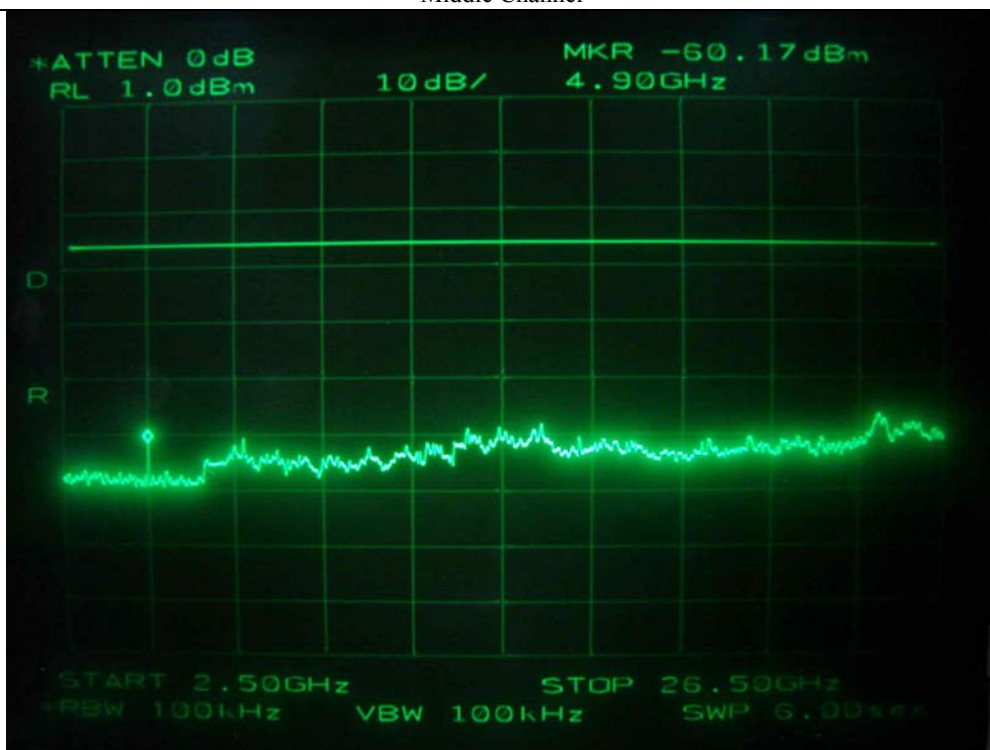
Low Channel



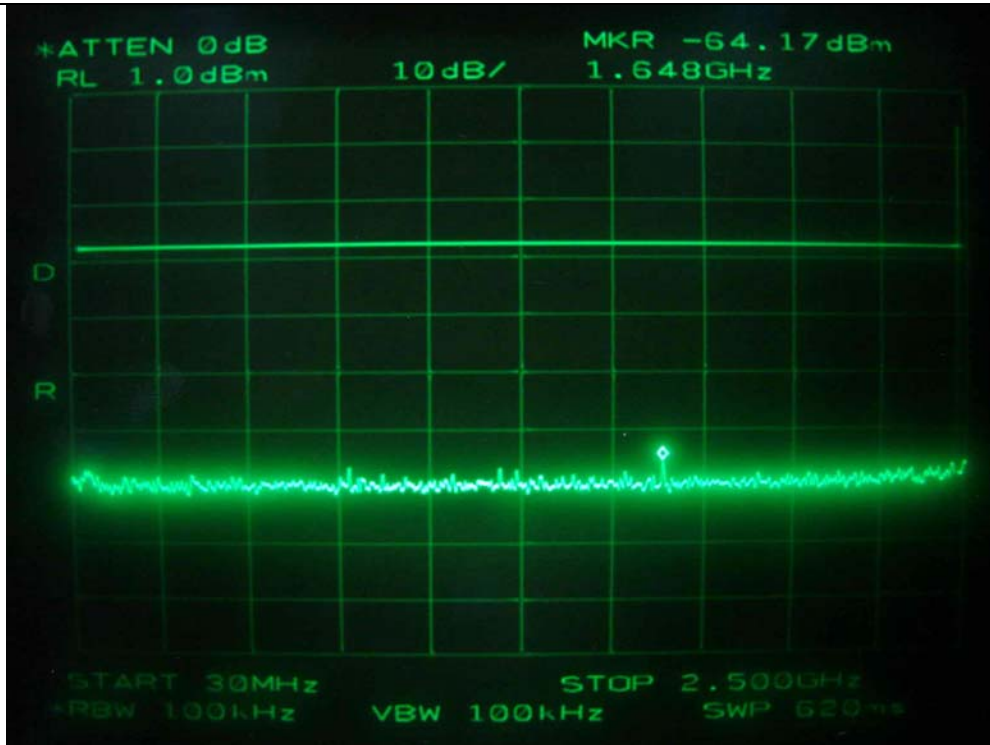
Low Channel



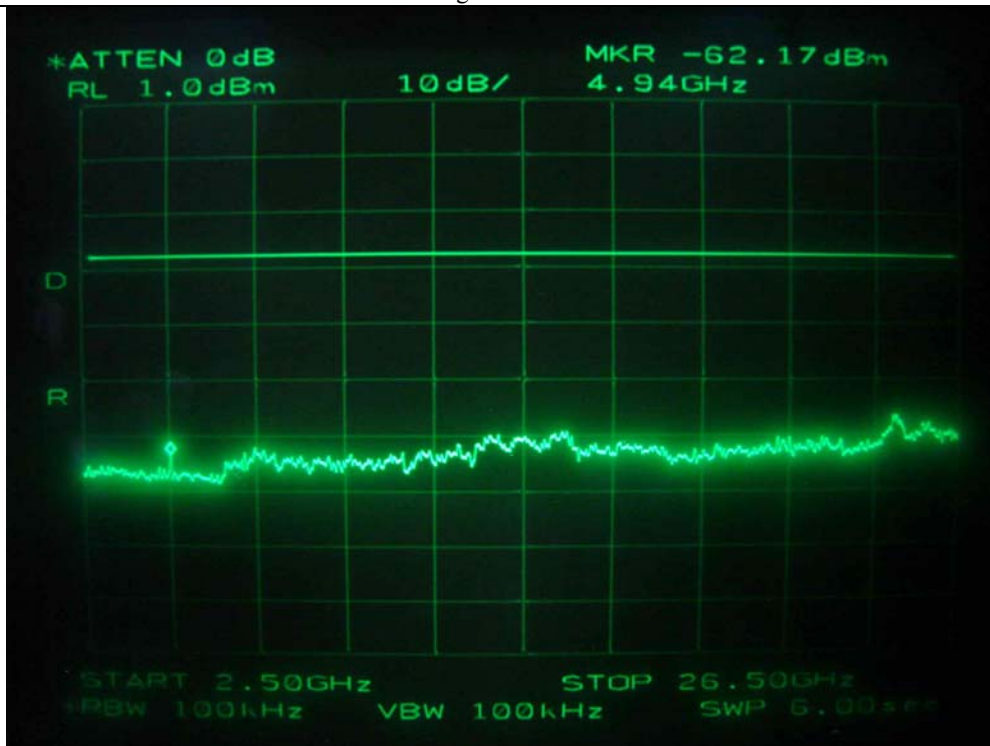
Middle Channel



Middle Channel



High Channel



High Channel

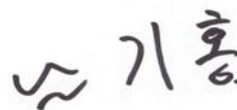
12.5.2. Test data for radiated emission**12.5.2.1. Radiated Emission which fall in the Restricted Band**

- Test Date : June 14, 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	38.67	Peak	H	27.64	1.33	26.10		41.54	74.00	-32.46
	26.50	Average	H					29.37	54.00	-24.63
	39.33	Peak	V					42.20	74.00	-31.80
	26.17	Average	V					29.04	54.00	-24.96
Test Data for High Channel										
2483.50	39.00	Peak	H	27.59	1.33	26.10		41.82	74.00	-32.19
	26.10	Average	H					28.92	54.00	-25.09
	38.50	Peak	V					41.32	74.00	-32.69
	26.33	Average	V					29.15	54.00	-24.86

Tabulated test data for Restricted Band

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



Tested by: Ki-Hong, Nam / Test Engineer

12.5.2.2. Spurious & Harmonic Radiated Emission

- Test Date : June 14, 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	60.33	Peak	H	27.30	1.50			89.13	-	
	58.17	Peak	V					86.97	-	
4804.00*	42.17	Peak	H	31.60	3.30	26.10		50.97	74.00	-23.03
	28.33	Average	H					37.13	54.00	-16.87
	39.50	Peak	V					48.30	74.00	-25.70
	28.17	Average	V					36.97	54.00	-17.03
	Test Data for Middle Channel									
2441.00	60.50	Peak	H	27.42	1.50			89.42	-	
	58.50	Peak	V					87.42	-	
4882.00*	42.00	Peak	H	31.74	3.38	26.10		51.02	74.00	-22.98
	28.50	Average	H					37.52	54.00	-16.48
	39.33	Peak	V					48.35	74.00	-25.65
	28.33	Average	V					37.35	54.00	-16.65

Tabulated test data for Restricted Band

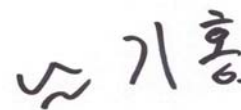
Remark: "H": Horizontal, "V": Vertical, "*" Frequency fall in restricted band

-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	61.27	Peak	H	27.53	1.50			90.30	-	
	59.00	Peak	V					88.03	-	
4960.00*	41.83	Peak	H	31.87	3.46	26.10		51.06	74.00	-22.94
	28.67	Average	H					37.90	54.00	-16.10
	39.50	Peak	V					48.73	74.00	-25.27
	27.83	Average	V					37.06	54.00	-16.94

Tabulated test data for Restricted Band

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



Tested by: Ki-Hong, Nam / Test Engineer

13. PEAK POWER SPECTRUL DENSITY

13.1 Operating environment

Temperature : 24 °C
Relative humidity : 45 %

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 22, 2006

All test equipment used is calibrated on a regular basis.

13.4 Test data

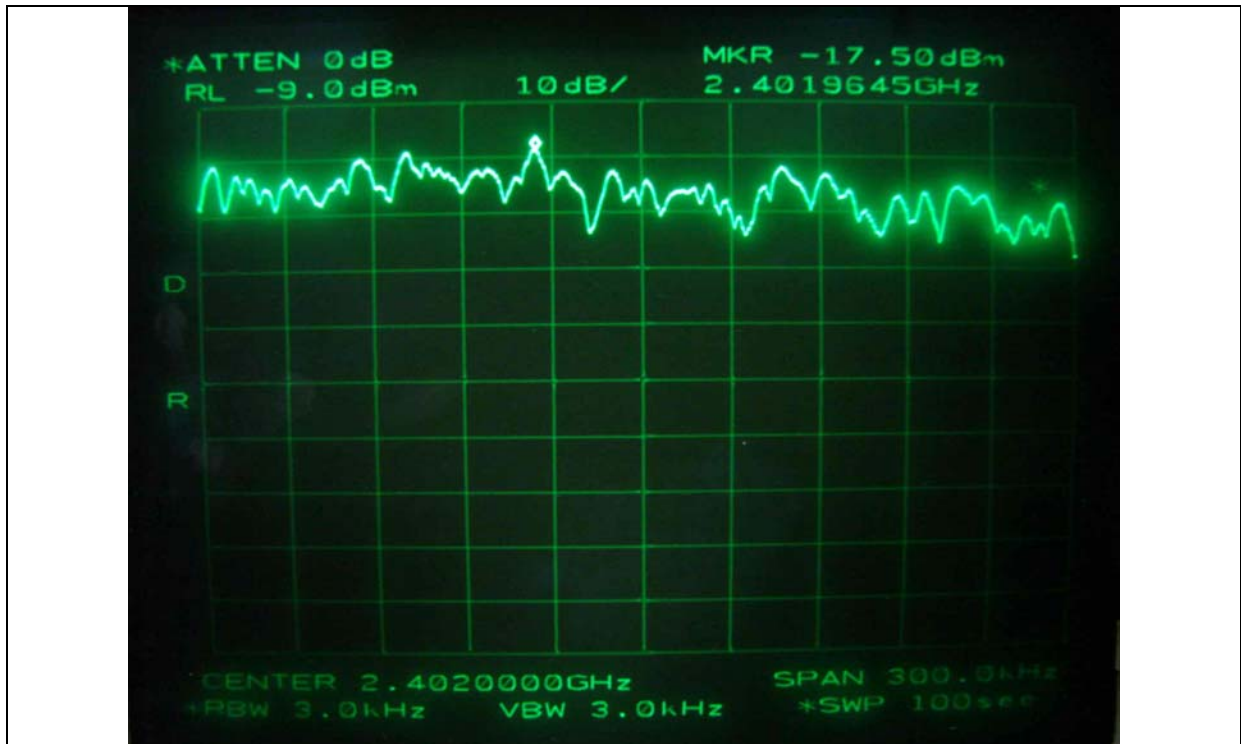
- Test Date : June 13, 2007
- Result : PASSED

CHANNEL	FREQUENCY(MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2402	-17.50	8.0	-25.50
Middle	2441	-16.50	8.0	-24.50
High	2480	-16.33	8.0	-24.33

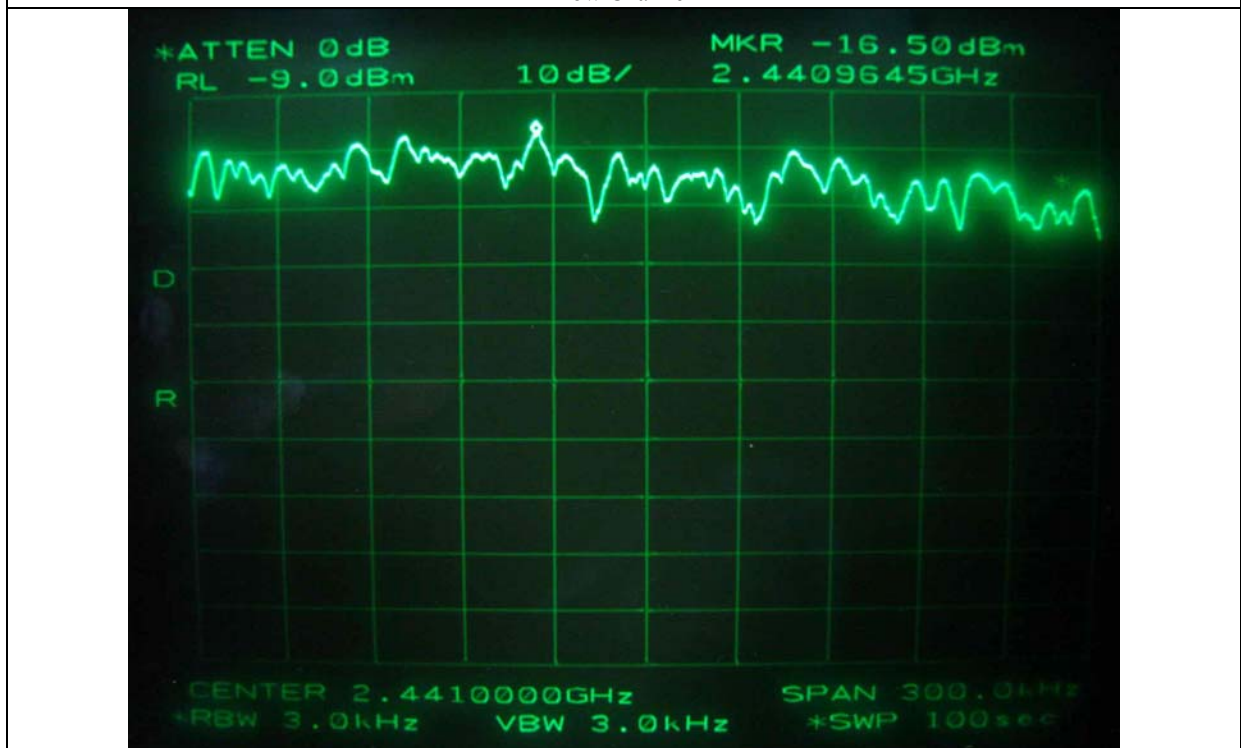
Tabulated test data for Peak Power Spectral Density.

Remark: See next page for measurement data.

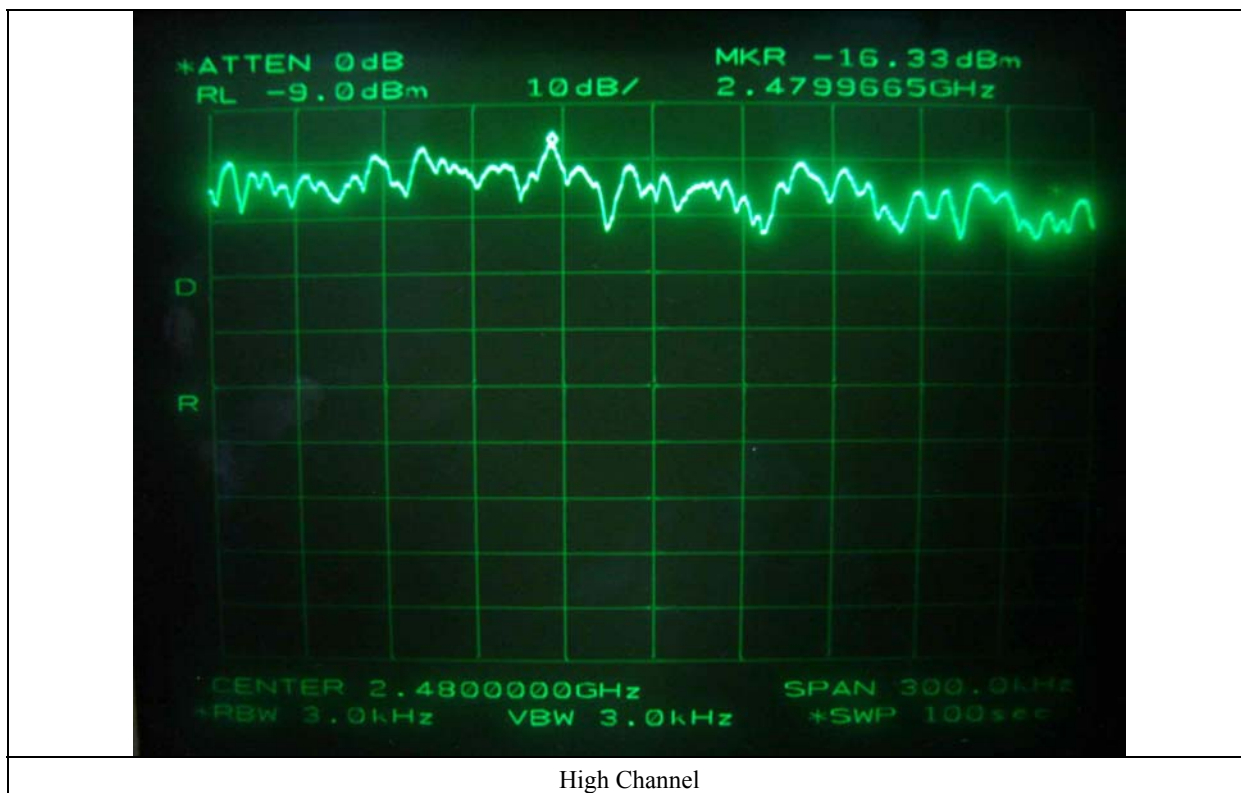
Tested by: Ki-Hong, Nam / Test Engineer



Low Channel



Middle Channel



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	DIGITAL AUDIO PLAYER 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	-3.00 dBm(0.501mW) at 2480MHz
Used Antenna	MFR.: Partron (Internal Antenna)
Used Antenna Gain	1.1 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:

$$60/f(\text{GHz}) = 60/2.480 = 24.19\text{mW}.$$

So, the device meets the RF exposure requirement.

15. RADIATED EMISSION TEST

15.1 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.

15.2 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.

15.3 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.

15.4 Test data

- Test Date : June 15, 2007
- Temperature : 25 °C
- Relative humidity : 30 %
- 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)
112.99	15.00	H	12.06	2.56	29.62	43.52	-13.90
166.99	15.50	H	15.40	2.87	33.77	43.52	-9.75
169.27	10.00	V	15.46	2.89	28.35	43.52	-15.17
250.01	12.83	H	17.56	3.30	33.69	46.02	-12.33
360.00	16.50	H	16.35	4.46	37.31	46.02	-8.71
720.80	11.50	H	21.67	6.48	39.65	46.02	-6.37

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)
112.99	15.17	H	12.06	2.56	29.79	43.52	-13.73
166.99	15.67	H	15.40	2.87	33.94	43.52	-9.58
169.27	9.83	V	15.46	2.89	28.18	43.52	-15.34
250.01	13.00	H	17.56	3.30	33.86	46.02	-12.16
360.00	16.67	H	16.35	4.46	37.48	46.02	-8.54
720.80	11.83	H	21.67	6.48	39.98	46.02	-6.04

Tabulated test data for Radiated Electromagnetic Field

-. 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)
112.99	14.95	H	12.06	2.56	29.57	43.52	-13.95
166.99	15.33	H	15.40	2.87	33.60	43.52	-9.92
169.27	10.67	V	15.46	2.89	29.02	43.52	-14.50
250.01	13.33	H	17.56	3.30	34.19	46.02	-11.83
360.00	16.50	H	16.35	4.46	37.31	46.02	-8.71
720.80	11.50	H	21.67	6.48	39.65	46.02	-6.37

Tabulated test data for Radiated Electromagnetic Field

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

기홍

Tested by: Ki-Hong, Nam / Test Engineer