

243 Jubug-Ri, Yangji-Myeon, Yongin-Si, Gyeonggi-Do, Korea 449-822 Tel: +82-31-323-6008 Fax: +82-31-323-6010 <a href="http://www.ltalab.com">http://www.ltalab.com</a>



Dates of Tests: July 24 ~ 31, 2007 Test Report S/N: LR500190707E Test Site: LTA CO., LTD.

# **CERTIFICATIO OF COMPLIANCE**

FCC ID.

**APPLICANT** 

**UG9UBHS-PH1** 

Ubixon Co., Ltd.

FCC Classification : FHSS Sequence Spread Spectrum (FHSS)

Manufacturing Description : Bluetooth Stereo Headset

Manufacturer List : Ubixon Co., Ltd.

Model name : UBHS-PH1

Test Device Serial No.: : Identical prototype

**Rule Part(s)** : FCC Part 15.247 Subpart C; ANSI C-63.4-2003

Frequency Range :  $2402 \sim 2480 \text{MHz}$ RF power Class :  $2 (-6dBm \sim +4dBm)$ 

Data of issue : July 31, 2007

This test report is issued under the authority of:

The test was supervised by:

Dong -Min JUNG, Technical Manager

Kyung-Taek LEE, Test Engineer

This test result only responds to the tested sample. It is not allowed to copy this report even partly without the allowance of the test laboratory. This report must not be used by the applicant to claim product endorsement by any agency.

NVLAP

NVLAP LAB Code.: 200723-0

# TABLE OF CONTENTS

3. TEST REPORT	5
3.1 SUMMARY OF TESTS	5
3.2 TECHNICAL CHARACTERISTICS TEST	6
3.2.1 CARRIER FREQUENCY SEPARATION	6
3.2.2 NUMBER OF HOPPING FREQUENCIES	8
3.2.3 20 dB BANDWIDTH	11
3.2.4 TIME OF OCCUPANCY (Dwell Time)	13
3.2.5 TTANSMITTER OUTPUT POWER	15
3.2.6 BAND – EDGE	17
3.2.7 FIELD STRENGTH OF HARMONICS	23
3.2.8 AC CONDUCTED EMISSIONS	26
APPENDIX	
APPENDIX TEST EQUIPMENT USED FOR TESTS	29

# 1. General information's

# 1-1 Test Performed

Company name : LTA Co., Ltd.

Address : 243, Jubug-ri, Yangji-Myeon, Youngin-Si, Kyunggi-Do, Korea. 449-822

Web site : <a href="http://www.ltalab.com">http://www.ltalab.com</a>
E-mail : <a href="mailto:chahn@ltalab.com">chahn@ltalab.com</a>
Telephone : +82-31-323-6008
Facsimile +82-31-323-6010

Quality control in the testing laboratory is implemented as per ISO/IEC 17025 which is the "General requirements for the competents of calibration and testing laboratory".

# 1-2 Accredited agencies

LTA Co., Ltd. is approved to perform EMC testing by the following agencies:

Agency	Country	Accreditation No.	Validity	Reference
NVLAP	U.S.A	200723-0	2007-09-30	ECT accredited Lab.
RRL	KOREA	KR0049	2009-06-20	EMC accredited Lab.
FCC	U.S.A	610755	2008-03-28	FCC filing
VCCI	JAPAN	R2133, C2307	2008-06-22	VCCI registration
IC	CANADA	IC5799	2008-04-23	IC filing

# 2. Information's about test item

# 2-1 Applicant & Manufacturer

Company name : Ubixon Co., Ltd.

Address : 801, Ssanglim Bldg, 151-11, Ssanglim-dong, Chung-gu

Seoul, Korea 100-400

Tel / Fax : +82-2-6320-0190 / +82-2-6320-0198

# **2-2 Equipment Under Test (EUT)**

Trade name : Digital Audio Player

FCC ID : UG9UBHS-PH1

Model name : UBHS-PH1

Serial number : Identical prototype

Date of receipt : July 23, 2007

EUT condition : Pre-production, not damaged

Antenna type : PCB Pattern antenna Max. Gain: 0.65dBi

Frequency Range : 2402 ~ 2480MHz

RF output power Range : -6dBm~+4dBm (Class 2)

Number of channels : 79

Channel spacing : 1MHz

Channel Access Protocol : Frequency Hopping

Type of Modulation : GFSK

Power Source : 3.7V (Li-Polymer Rechargeable) (Recharging – by USB Cable)

### **2-3 Tested frequency**

	LOW	MID	HIGH
Frequency (MHz)	Frequency (MHz) 2402		2480

# <u>2-4 Ancillary Equipment – Bluetooth</u>

Equipment	Model No.	Serial No.	Manufacturer
earphone	N/A	N/A	N/A
-	-	-	-

# <u>2-5 Ancillary Equipment – Bluetooth + Charging mode</u>

Equipment	Model No.	Serial No.	Manufacturer
PC	dx2200Microtower	CNG6500RX9	НР
Monitor	VS11353	E060T4021/1-1	View Sonic
Keyboard	SK-8115	641-OEWW	DELL
Mouse	MO56UO	510022473	DELL
Print	Deskjet 600K	SG7631B1XX	НР
earphone	N/A	N/A	N/A
	-	-	-

# 3. Test Report

# 3.1 Summary of tests

FCC Part Section(s)	Parameter	Limit	Test Condition	Status (note 1)	
15.247(a)	Carrier Frequency Separation	> 25 kHz		С	
15.247(a)	Number of Hopping Frequencies	> 75 hops		С	
15.247(a)	20 dB Bandwidth	< 1 MHz		С	
15.247	Dwell Time	< 0.4 seconds	Conducted	С	
15.247(b)	Transmitter Output Power	< 1Watt		С	
15.247(d)	Conducted Spurious emission	> 20 dBc		С	
15.247(d)	Band Edge	> 20 dBc		С	
15.249 / 15.209	Field Strength of Harmonics	< 54 dBuV (at 3m)	D. 11	С	
15.109	Field Strength	-	Radiated	С	
15.207 /15.107	AC Conducted Emissions	EN 55022	Line Conducted	С	
15.203	Antenna requirement	-	-	С	
Note 1: C=Complies NC=Not Complies NT=Not Tested NA=Not Applicable					

The sample was tested according to the following specification:

FCC Parts 15.247; ANSI C-63.4-2003

# → Antenna Requirement

The Ubixon co.,ltd. UBHS-PH1 unit complies with the requirement of §15.203.

*Note 2*: The data in this test report are traceable to the national or international standards.

The antenna is PCB Pattern antenna.

# 3.2 Transmitter requirements

#### 3.2.1 Carrier Frequency Separation

#### **Procedure:**

The carrier frequency separation was measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function enabled.

After the trace being stable, the reading value between the peaks of the adjacent channels using the marker-delta function was recorded as the measurement results.

#### The spectrum analyzer is set to:

Span = 3 MHz (wide enough to capture the peaks of two adjacent channels)

RBW = 30 kHz (1% of the span or more) Sweep = auto

VBW = 30 kHz Detector function = peak

Trace = max hold

#### **Measurement Data:**

Test Results		
Carrier Frequency Separation (MHz) Result		
0.997	Complies	

- See next pages for actual measured spectrum plots.

#### **Minimum Standard:**

The EUT shall have hopping channel carrier frequencies separated by a minimum of 25kHz or the 20dB bandwidth of the hopping channel, whichever is greater.

#### **Measurement Setup**

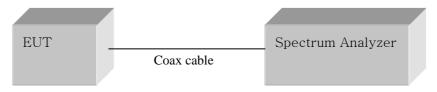
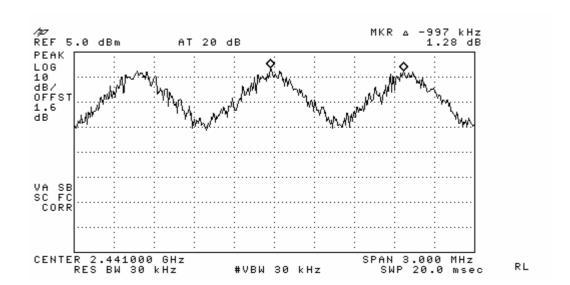


Figure 1: Measurement setup for the carrier frequency separation

# **Carrier Frequency Separation**



# 3.2.2 Number of Hopping Frequencies

#### **Procedure:**

The number of hopping frequencies was measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function enabled.

To get higher resolution, four frequency ranges within the 2400 ~ 2483.5 MHz FH band were examined.

#### The spectrum analyzer is set to:

Frequency range 1: Start = 2389.5MHz, Stop = 2414.5 MHz

2: Start = 2414.5MHz, Stop = 2439.5 MHz

3: Start = 2439.5MHz, Stop = 2464.5 MHz

4: Start = 2464.5MHz, Stop = 2489.5 MHz

RBW = 300 kHz (1% of the span or more) Sweep = auto

 $VBW = 300 \text{ kHz} (VBW \ge RBW)$  Detector function = peak

Trace =  $\max \text{ hold}$  Span = 25MHz

#### **Measurement Data: Complies**

Total number of Hopping Channels	79
----------------------------------	----

<sup>-</sup> See next pages for actual measured spectrum plots.

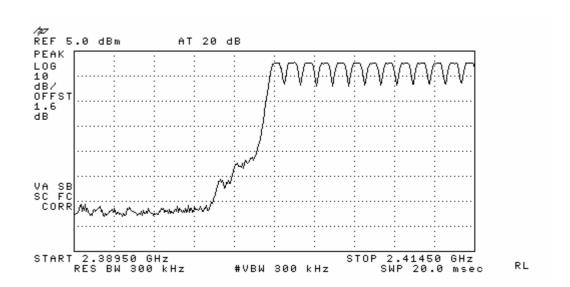
#### **Minimum Standard:**

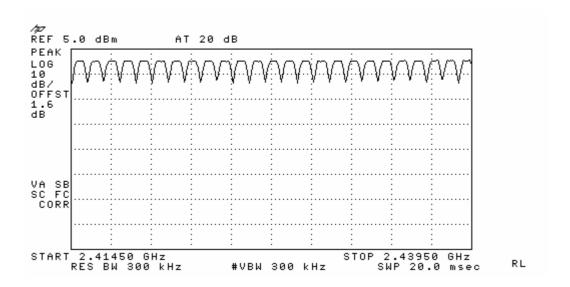
At least 15 hopes

# **Measurement Setup**

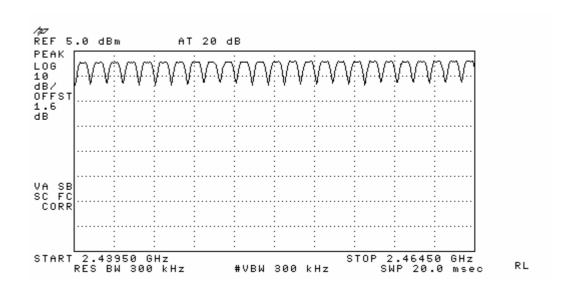
Same as the Chapter 3.2.1 (Figure 1)

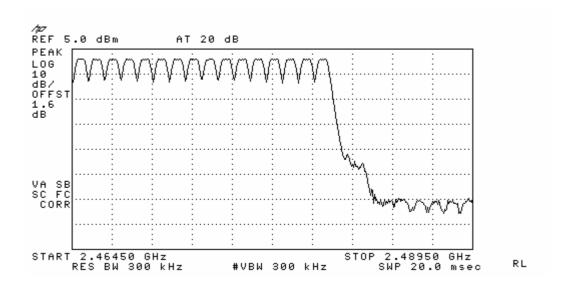
# **Number of Hopping Frequencies**





# **Number of Hopping Frequencies**





#### 3.2.3 20 dB Bandwidth

#### **Procedure:**

The bandwidth at 20 dB below the highest inband spectral density was measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function disabled at the highest, middle and the lowest available channels...

After the trace being stable, Use the marker-to-peak function to set the marker to the peak of the emission. Use the marker-delta function to measure 20dB down one side of the emission. Reset the marker-delta function, and move the marker to the other side of the emission, until it is ( as close as possible to ) even with the reference marker level. The marker-delta reading at this point is the 20 dB bandwidth of the emission.

#### The spectrum analyzer is set to:

Center frequency = the highest, middle and the lowest channels

Span = 2 MHz (approximately 2 or 3 times of the 20 dB bandwidth)

RBW = 30 kHz Sweep = auto

 $VBW = 30 \text{ kHz} (VBW \ge RBW)$  Detector function = peak

Trace = max hold

#### **Measurement Data:**

Frequency (MHz)	Channel No.	Test Results	
	Channel No.	Measured Bandwidth (MHz)	Result
2402	0	0.945	Complies
2441	39	0.930	Complies
2480	78	0.937	Complies

<sup>-</sup> See next pages for actual measured spectrum plots.

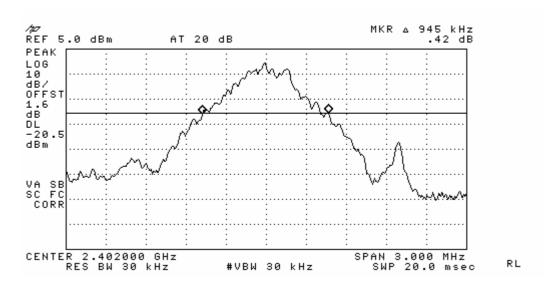
#### **Minimum Standard:**

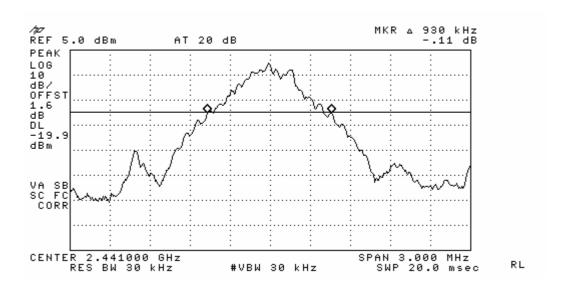
N/A

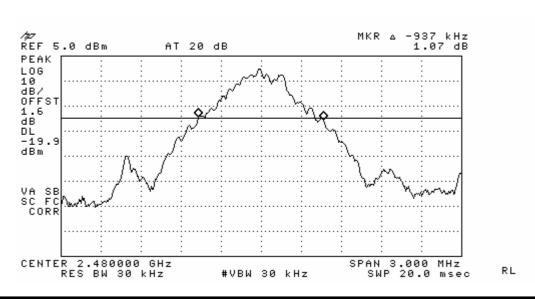
#### **Measurement Setup**

Same as the Chapter 3.2.1 (Figure 1)

#### 20 dB Bandwidth







# 3.2.4 Time of Occupancy (Dwell Time)

#### **Procedure:**

The dwell time was measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function enabled.

The spectrum analyzer is set to:

Center frequency = 2441 MHz Span = zero

RBW = 1 MHz  $VBW = 1 MHz (VBW \ge RBW)$ 

Trace = max hold Detector function = peak

#### **Measurement Data:**

Channel Number  Channel Frequency (MHz)		Daakat Tyna	Test 1	Results
	Packet Type	Dwell Time (ms)	Result	
	39 2441	DH 1	140.05	Complies
39		DH 3	265.91	Complies
		DH 5	311.48	Complies

<sup>-</sup> See next pages for actual measured spectrum plots.

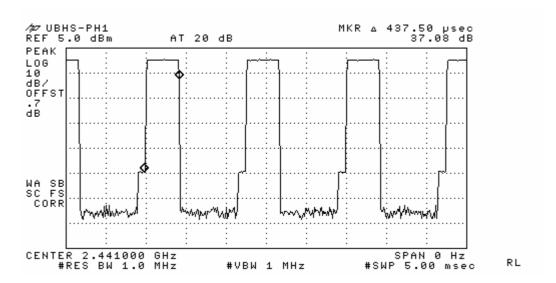
#### **Minimum Standard:**

0.4 seconds within a 30 second period per any frequency

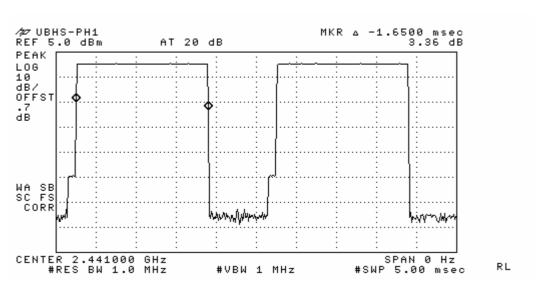
# **Measurement Setup**

Same as the Chapter 3.2.1 (Figure 1)

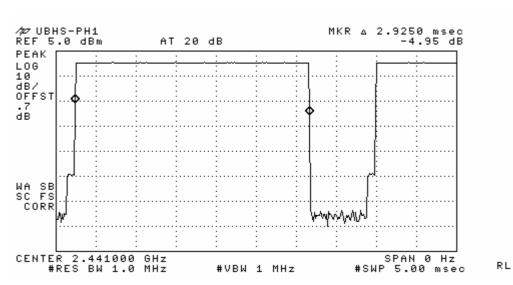
#### **DH** 1



# **DH 3**



# <u>DH 5</u>



# 3.2.5 Transmitter Output Power

#### **Procedure:**

The peak output power was measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function disabled at the highest, middle and the lowest available channels..

After the trace being stable, Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power.

### The spectrum analyzer is set to:

Center frequency = the highest, middle and the lowest channels

Span = 3 MHz (approximately 5 times of the 20 dB bandwidth)

RBW = 1 MHz (greater than the 20dB bandwidth of the emission being measured)

 $VBW = 1 MHz (VBW \ge RBW)$  Detector function = peak

Trace =  $\max \text{ hold}$  Sweep = auto

#### **Measurement Data:**

Frequency (MHz)	Ch.		Test Results	
	CII.	dBm	W	Result
2402	0	0.04	0.001009	Complies
2441	39	0.25	0.001059	Complies
2480	78	0.98	0.001253	Complies

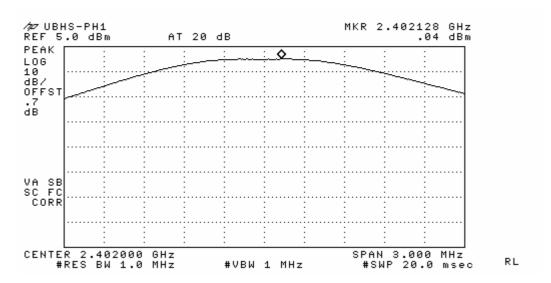
<sup>-</sup> See next pages for actual measured spectrum plots.

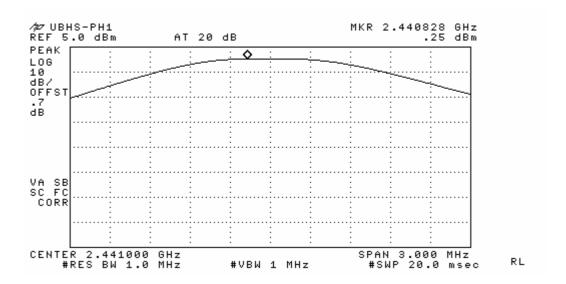
Minimum Standard:	< 1W

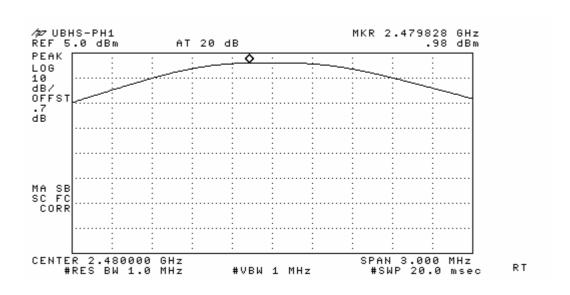
#### **Measurement Setup**

Same as the Chapter 3.2.1 (Figure 1)

# **Peak Output Power**







# 3.2.6 Band Edge

#### **Procedure:**

The bandwidth at 20dB down from the highest inband spectral density is measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function disabled at the highest, middle and the lowest available channels.

After the trace being stable, Use the marker-to-peak function to measure 20 dB down both sides of the intentional emission.

The spectrum analyzer is set to:

Center frequency = the highest, middle and the lowest channels

RBW = 100 kHz VBW = 100 kHz

Span = 10 MHz Detector function = peak

Trace =  $\max$  hold Sweep = auto

#### **Measurement Data: Complies**

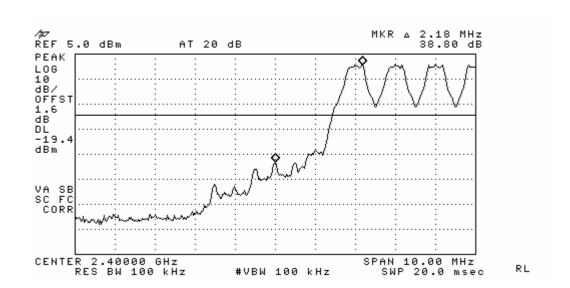
- All conducted emission in any 100kHz bandwidth outside of the spread spectrum band was at least 20dB lower than the highest inband spectral density. Therefore the applying equipment meets the requirement.
- See next pages for actual measured spectrum plots.

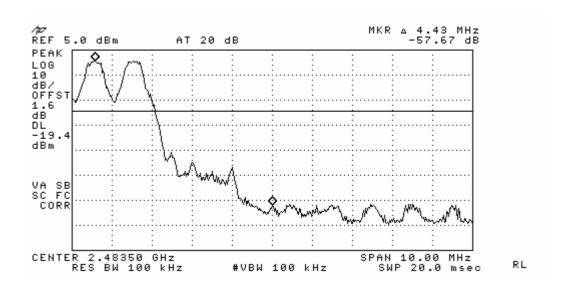
Minimum Standard:
-------------------

#### **Measurement Setup**

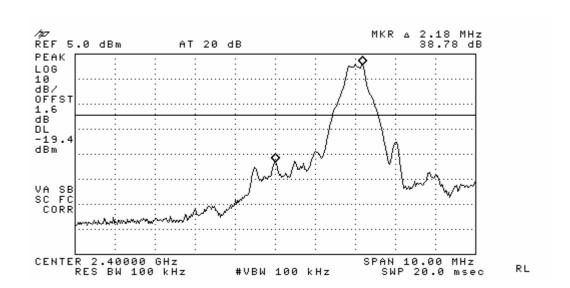
Same as the Chapter 3.2.1 (Figure 1)

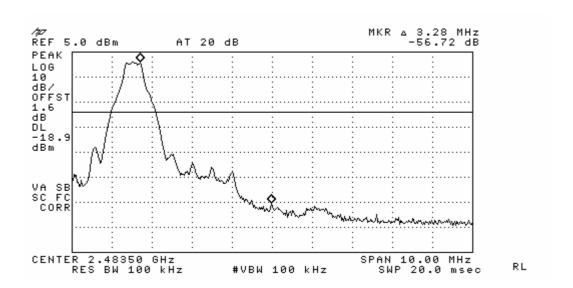
# **Band - edge (with Hopping)**



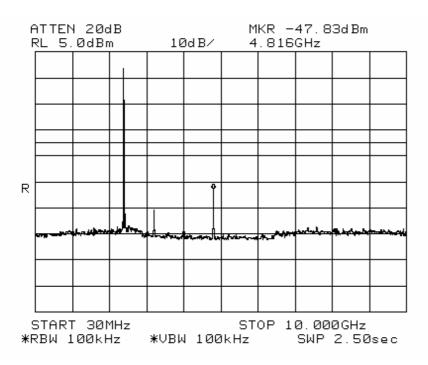


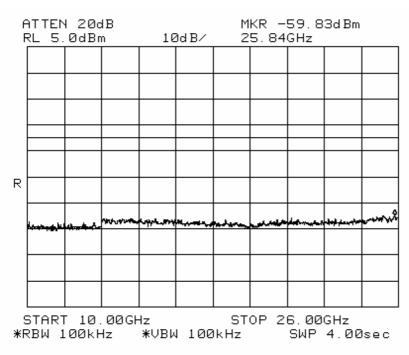
# **Band - edge (without Hopping)**



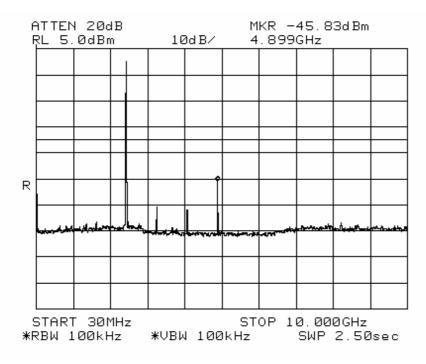


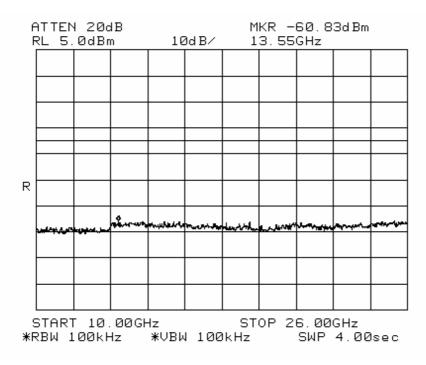
# Band - edge (at 20 dB blow) – Low channel Frequency Range = $30 \text{ MHz} \sim 10^{\text{th}}$ harmonic.



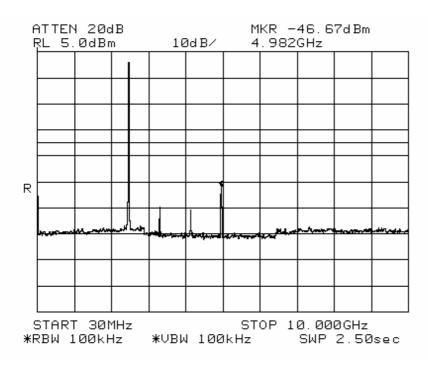


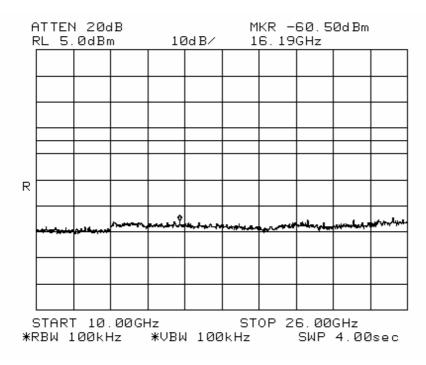
# Band - edge (at 20 dB blow) – Mid channel Frequency Range = $30 \text{ MHz} \sim 10^{\text{th}}$ harmonic.





# Band - edge (at 20 dB blow) – High channel Frequency Range = $30 \text{ MHz} \sim 10^{\text{th}}$ harmonic.





# 3.2.7 Field Strength of Harmonics

#### **Procedure:**

The EUT was placed on a 0.8m high wooden table inside a shielded enclosure. An antenna was placed near the EUT and measurements of frequencies and amplitudes of field strengths were recorded for reference during final measurements. For final radiated testing, measurements were performed in OATS. Measurements were performed with the EUT oriented in 3 orthogonal axis and rotated 360 degrees to determine worst-case orientation for maximum emissions.

#### The spectrum analyzer is set to:

Center frequency = the worst channel

Frequency Range = 30 MHz ~ 10<sup>th</sup> harmonic.

 $RBW = 100 \text{ kHz} (30 \text{MHz} \sim 1 \text{ GHz})$  Peak:  $VBW \geq RBW$ 

= 1 MHz (1 GHz ~ 10<sup>th</sup> harmonic) Average:VBW=10Hz

Span = 100 MHz Detector function = Average

Trace =  $\max$  hold Sweep = auto

#### **Measurement Data: Complies**

Low channel		Mid channel		High channel	
Frequency (MHz)	Level (dBuV)	Frequency (MHz)	Level (dBuV)	Frequency (MHz)	Level (dBuV)
3204.0	36.1	3253.3	35.8	3305.3	35.7
4005.8	35.3	4065.6	36.2	4130.6	36.4
4804.3	44.7	4882.0	45.3	4960.3	45.4
-	-	-	-	-	-
Measurement uncertainty		± 6 dB			

No other emissions were detected at a level greater than 20dB below limit.

### Minimum Standard: FCC Part 15.209(a)

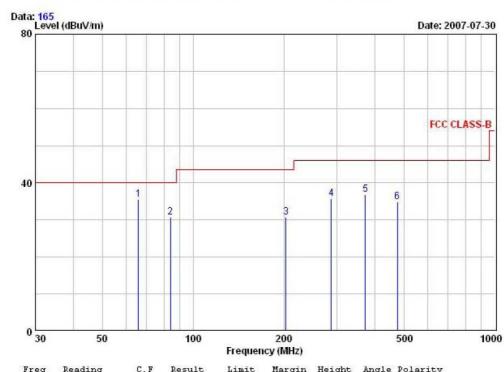
Frequency (MHz)	Limit (uV/m) @ 3m	
30 ~ 88	100 **	
88 ~ 216	150 **	
216 ~ 960	200 **	
Above 960	500	

<sup>\*\*</sup> Except as provided in 15.209(g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88MHz, 174-216MHz or 470-806MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g. 15.231 and 15.241.



243 Jubug-ri, yangji-Myeon, Youngin-si, Gyeonggi-do 449-822 Korea Tel:+82-31-3236008,9 Fax:+82-31-3236010

EUT/Model No.: UBHS-PH1 TEST MODE: BT mode
Temp Humi : 34 / 53 Tested by: KIM.I.S



	Freq	Reading	C.F	Result QK	Limit	Margin	Height	Angle	Polarity
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	CW	deg	
1	65.90	48.70	-13.18	35.52	40.00	4.48	100	340	VERTICAL
2	84.25	47.20	-16.38	30.82	40.00	9.18	385	99	HORIZONTAL
3	202.85	43.80	-13.13	30.67	43.50	12.83	208	109	HORIZONTAL
4	287.25	45.50	-9.68	35.82	46.00	10.18	251	300	HORIZONTAL
5	371.85	44.80	-8.04	36.76	46.00	9.24	380	119	HORIZONTAL
6	474.85	40.70	-5.93	34.77	46.00	11.23	380	208	HORIZONTAL

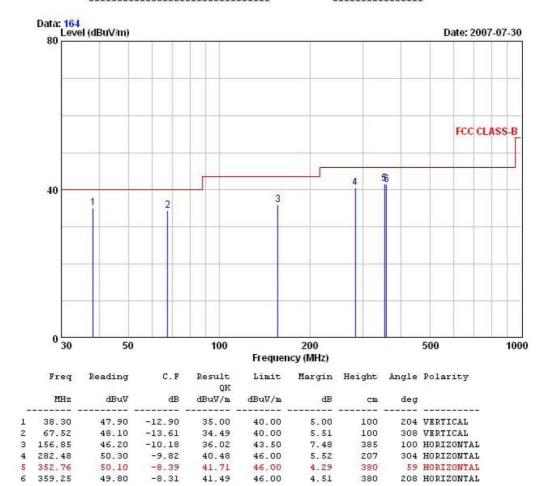
Remarks: C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain



243 Jubug-ri, yangji-Myeon, Youngin-si, Gyeonggi-do 449-822 Korea Tel:+82-31-3236008,9 Fax:+82-31-3236010

EUT/Model No.: UBHS-PH1 TEST MODE: CHARGING + BT mode

Temp Humi : 34 / 53 Tested by: KIM.I.S



Remarks: C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain

#### 3.2.8 AC Conducted Emissions

#### **Procedure:**

The conducted emissions are measured in the shielded room with a spectrum analyzer in peak hold. While the measurement, EUT had its hopping function disabled at the middle channels in line with Section 15.31(m). Emissions closest to the limit are measured in the quasi-peak mode (QP) with the tuned receiver using a bandwidth of 9 kHz. The emissions are maximized further by cable manipulation and Exerciser operation. The highest emissions relative to the limit are listed.

#### **Measurement Data: Complies**

- See next pages for actual measured spectrum plots.
- No emissions were detected at a level greater than 10dB below limit.

#### Minimum Standard: FCC Part 15.207(a)/EN 55022

Frequency Range	Conducted Limit (dBuV)		
(MHz)	Quasi-Peak	Average	
0.15 ~ 0.5	66 to 56 *	56 to 46 *	
0.5 ~ 5	56	46	
5 ~ 30	60	50	

<sup>\*</sup> Decreases with the logarithm of the frequency

#### **AC Conducted Emissions –Line**

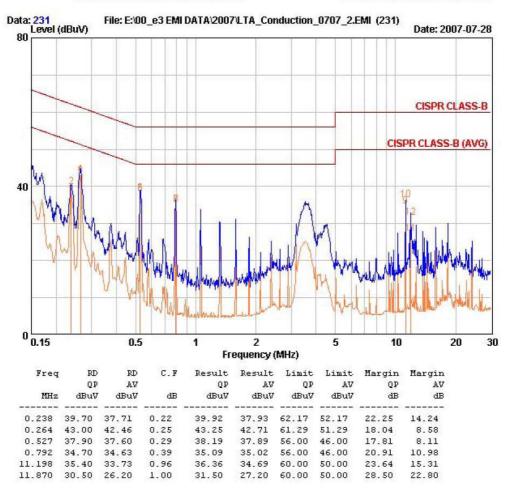


243 Jubug-ri, yangji-Myeon, Youngin-si, Gyeonggi-do 449-822 Korea Tel:+82-31-323-6008 Fax:+82-31-323-6010

EUT / Model No. : UBHS-PH1 Phase : LINE

Test Mode : CHARGING + BT mode Test Power : 120 / 60

Temp./Humi. : 25 / 55 Test Engineer : B.S.KIM



Remarks: C.F (Correction Factor) = Insertion loss + Cable loss

#### **AC Conducted Emissions -Neutral**

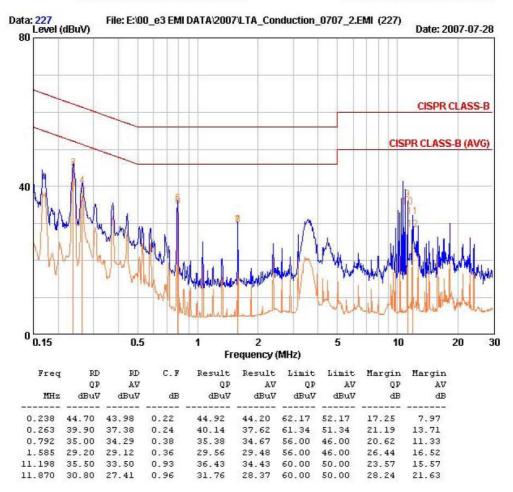


243 Jubug-ri, yangji-Myeon, Youngin-si, Gyeonggi-do 449-822 Korea Tel:+82-31-323-6008 Fax:+82-31-323-6010

EUT / Model No. : UBHS-PH1 Phase : NEUTRAL

Test Mode : CHARGING + BT mode Test Power : 120 / 60

Temp./Humi. : 25 / 55 Test Engineer : B.S.KIM



Remarks: C.F (Correction Factor) = Insertion loss + Cable loss

# **APPENDIX**

# TEST EQUIPMENT USED FOR TESTS

	Description	Model No.	Serial No.	Manufacturer	Next Cal. Date
1	Spectrum Analyzer	8594E	3649A03649	НР	Apr-08
2	Signal Generator	8648C	3623A02597	НР	Apr-08
3	Attenuator (3dB)	8491A	37822	НР	Nov-07
4	Attenuator (10dB)	8491A	63196	НР	Nov-07
5	EMI Test Receiver	ESVD	843748/001	R&S	Jan-08
6	LISN	KNW-407	8-1430-1	Kyoritsu	Jan-08
7	Two-Line V-Network	ESH3-Z5	893045/017	R&S	Jan-08
8	RF Amplifier	8447D	2949A02670	НР	Jan-08
9	RF Amplifier	8447D	2439A09058	НР	Jan-08
10	RF Amplifier	8449B	3008A02126	НР	Apr-09
11	Test Receiver	ESHS10	828404009	R&S	Jan-08
12	TRILOG Antenna	VULB 9160	9160-3212	SCHWARZBECK	Jul-08
13	LogPer. Antenna	VULP 9118	9118 A 401	SCHWARZBECK	Apr-09
14	Biconical Antenna	BBA 9106	VHA 9103-2315	SCHWARZBECK	Apr-09
15	Horn Antenna	3115	00055005	ETS LINDGREN	Mar-09
16	Dipole Antenna	VHA9103	2116	Schwarzbeck	Nov-07
17	Dipole Antenna	VHA9103	2117	Schwarzbeck	Nov-07
18	Dipole Antenna	UHA9105	2261	Schwarzbeck	Nov-07
19	Dipole Antenna	UHA9105	2262	Schwarzbeck	Nov-07
20	Spectrum Analyzer	8591E	3649A05888	НР	Jan-08
21	Spectrum Analyzer	8563E	3425A02505	HP	Apr-08
22	Hygro-Thermograph	THB-36	0041557-01	ISUZU	Feb-08
23	Splitter (SMA)	ZFSC-2-2500	SF617800326	Mini-Circuits	Jun-08
24	RF Switch	MP59B	6200414971	ANRITSU	Jun-08
25	RF Switch	MP59B	6200438565	ANRITSU	Jun-08
26	Power Divider	11636A	6243	НР	Nov-07
27	DC Power Supply	6622A	3448A03079	HP	Oct-07
28	Attenuator (30dB)	11636A	6243	НР	Nov-07
29	Frequency Counter	5342A	2826A12411	НР	Apr-08
30	Power Meter	EPM-441A	GB32481702	НР	Apr-08
31	Power Sensor	8481A	2702A64048	НР	Apr-08
32	Audio Analyzer	8903B	3729A18901	НР	Nov-07
33	Modulation Analyzer	8901B	3749A05878	НР	Nov-07
34	TEMP & HUMIDITY Chamber	YJ-500	L05022	JinYoung Tech	Oct-07
35	LOOP-ANTENNA	FMZB 1516	151602/94	SCHWARZBECK	Mar-09