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http://www.ltalab.com



Dates of Tests: August 06 ~ 10, 2007 Test Report S/N: LR500190708A Test Site: LTA CO., LTD.

# **CERTIFICATION OF COMPLIANCE**

FCC ID. / IC

# ASIJ7V003 / 2320A-HAW700BT

**APPLICANT** 

**Victor Company of Japan Ltd** 

FCC Classification : FHSS Sequence Spread Spectrum (FHSS)

Manufacturing Description : WIRESESS STEREO HEADSET

Manufacturer : SAMBON PRECISION & ELECTRONICS CO., LTD

Model name : HA-W700BT

Test Device Serial No.: : Identical prototype

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

RSS-210, Issue 7: 2007

Frequency Range : 2402 ~ 2480MHz

RF power Class : 0.0021 W - Conducted

Emission designator : 885KF1D

Data of issue : August 28, 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

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# 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

Company name : Victor Company of Japan Ltd

Address : 12,3-chome, Moriya-cho, Kanagawa-ku, Yokohama, Kanagawa, 221-8528, Japan

Tel / Fax : +81-46-278-1804 / +81-46-278-1807

# 2-2 Manufacturer List

Company name : SAMBON PRECISION & ELECTRONICS CO., LTD

Address : 204, Samjeong-dong, Ojeong-gu, Bucheon-City, Kyeonggi-Do, Korea

Tel / Fax : +82-32-683-7300 / +82-32-672-7300

# 2-3 Equipment Under Test (EUT)

Trade name : WIRESESS STEREO HEADSET

FCC ID : ASIJ7V003

IC : 2320A-HAW700BT

Model name : HA-W700BT

Serial number : Identical prototype

Date of receipt : August 06, 2007

EUT condition : Pre-production, not damaged
Antenna type : Chip antenna, Gain 0dBi typ.

Frequency Range : 2402 ~ 2480MHz

RF output power Range : 0.0021 W - Conducted

Number of channels : 79

Channel spacing : 1MHz

Channel Access Protocol : Frequency Hopping

Type of Modulation : GFSK

Power Source : 3.7V (Li-Polymer Rechargeable)

# 2-4 Tested frequency

	LOW	MID	HIGH
Frequency (MHz) 2402		2441	2480

# 2-5 Ancillary Equipment

Equipment	Model No.	Serial No.	Manufacturer
-	-	-	-
	-	-	-

# 3. Test Report

# 3.1 Summary of tests

FCC Part Section(s)	RSS-210 Section	Parameter Limit		Test Condition	Status (note 1)
15.247(a)	A8.1 (2)	Carrier Frequency Separation	> 25 kHz		С
15.247(a)	A8.1 (4)	Number of Hopping Frequencies	Number of Hopping Frequencies > 75 hops		С
15.247(a)	A8.1 (1)	20 dB Bandwidth	< 1 MHz		С
15.247	A8.1 (4)	Dwell Time	< 0.4 seconds	Conducted	С
15.247(b)	A8.4 (2)	Transmitter Output Power	ransmitter Output Power < 1Watt		С
15.247(d)	A8.5	Conducted Spurious emission > 20 dBc			С
15.247(d)	A8.5	Band Edge	> 20 dBc		С
15.249 / 15.209	A8.5	Field Strength of Harmonics	< 54 dBuV (at 3m)	D !! 1	С
15.109	-	Field Strength	-	Radiated	С
15.207 /15.107	-	AC Conducted Emissions EN 5502		Line Conducted	С
-	2.6	Spurious Emission of the Receiver	RSS-210 Table2	Radiated	С

 $\underline{\textit{Note 1}}$ : C=Complies NC=Not Complies NT=Not Tested NA=Not Applicable

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

The sample was tested according to the following specification:

FCC Parts 15.247; ANSI C-63.4-2003

RSS-210, Issue 7:2007

# 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		
1.005	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**

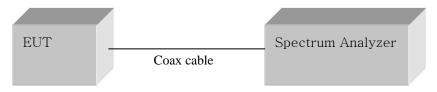
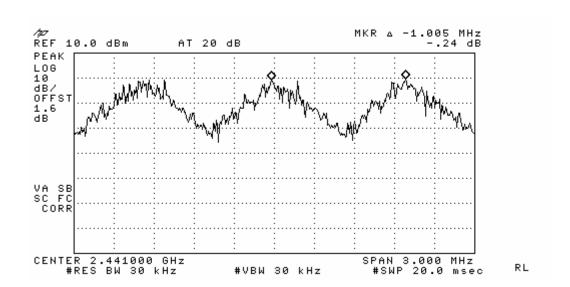


Figure 1: Measurement setup for the carrier frequency separation

# **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**

<b>Total number of Hopping Channels</b>	79
---	----

- See next pages for actual measured spectrum plots.

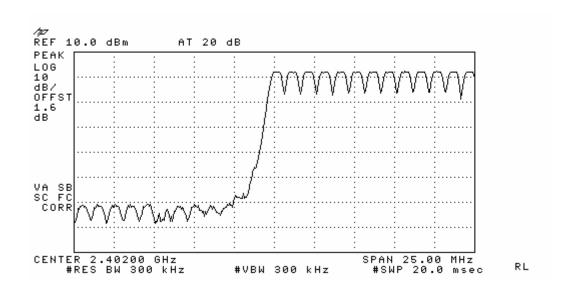
# **Minimum Standard:**

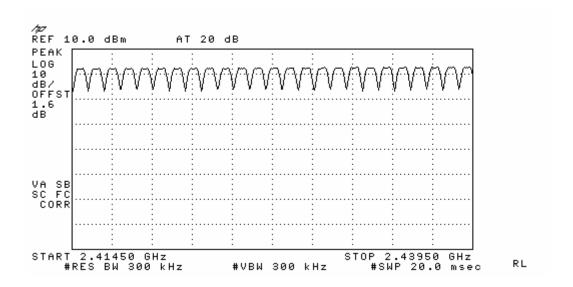
At least 15 hopes

## **Measurement Setup**

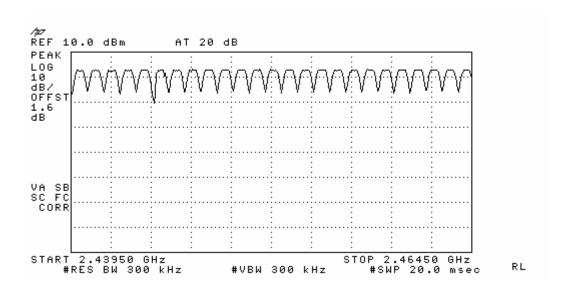
Same as the Chapter 3.2.1 (Figure 1)

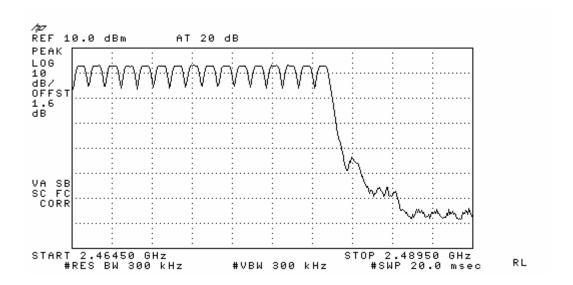
# **Number of Hopping Frequencies**





# **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.	Measured Bandwidth (MHz)	
		20dB Bandwidth	99% Bandwidth
2402	0	0.935	0.885
2441	39	0.925	0.885
2480	78	0.925	0.885

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

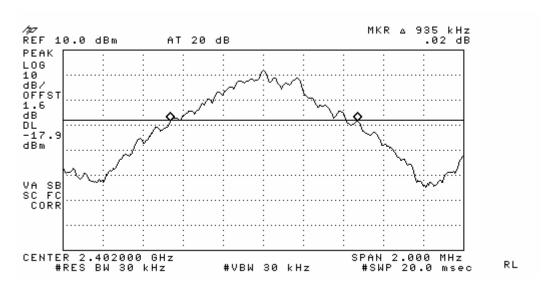
# **Minimum Standard:**

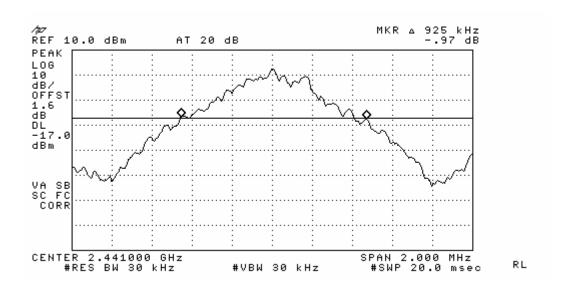
The transmitter shall have a maximum 20dB bandwidth of 1 MHz.

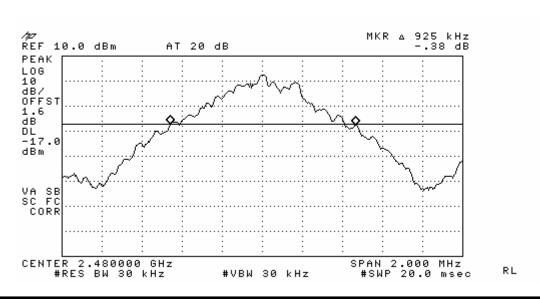
# **Measurement Setup**

Same as the Chapter 3.2.1 (Figure 1)

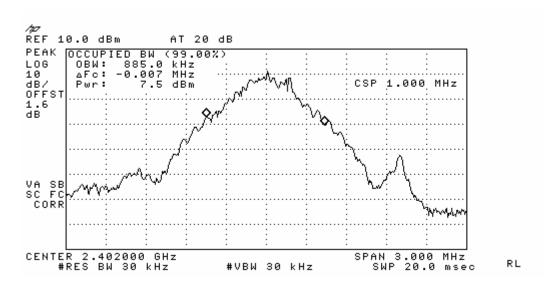
## 20 dB Bandwidth

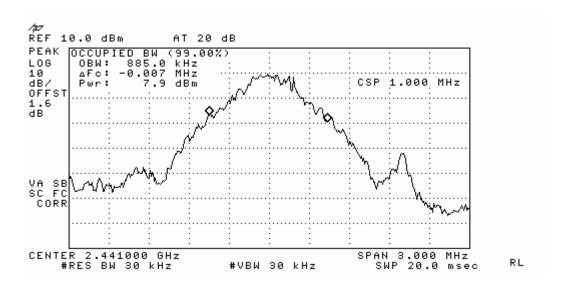


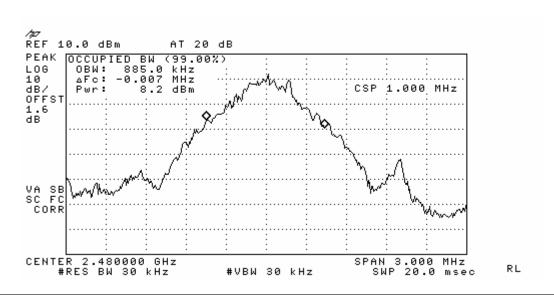




## 99% Bandwidth







# 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	Channel	Packet Type	Test 1	Results
Number Frequency (MHz)	Packet Type	Dwell Time (ms)	Result	
	39 2441	DH 1	140.05	Complies
39		DH 3	269.94	Complies
		DH 5	314.15	Complies

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

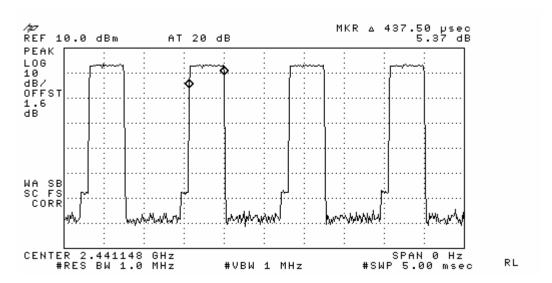
## **Minimum Standard:**

0.4 seconds within a 30 second period per any frequency

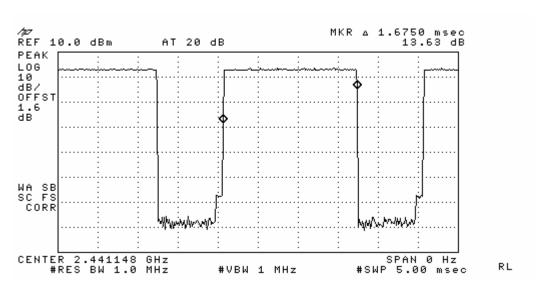
# **Measurement Setup**

Same as the Chapter 3.2.1 (Figure 1)

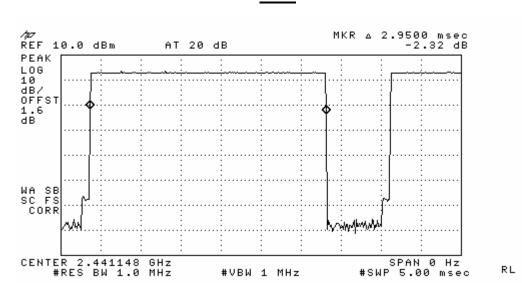
# **DH** 1



# **DH 3**



# **DH 5**



# 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 =  $\max$  hold Sweep = auto

## **Measurement Data:**

Frequency (MHz)	Ch.		Test Results	
	CII.	dBm	W	Result
2402	0	2.29	0.001694	Complies
2441	39	3.00	0.001995	Complies
2480	78	3.18	0.002080	Complies

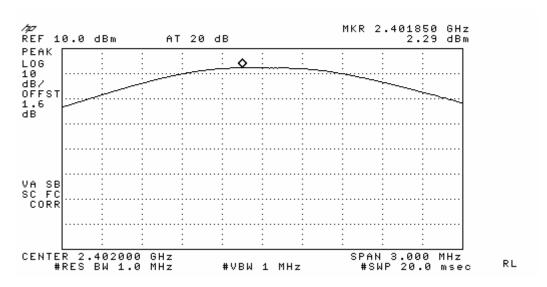
<sup>-</sup> See next pages for actual measured spectrum plots.

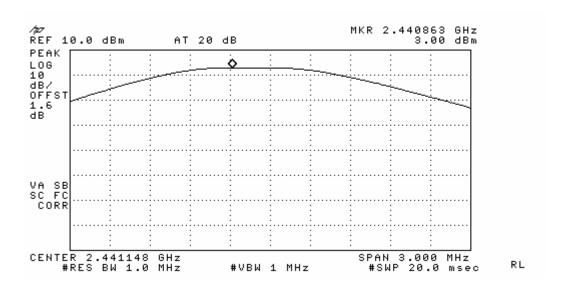
Minimum Standard:	< 1W

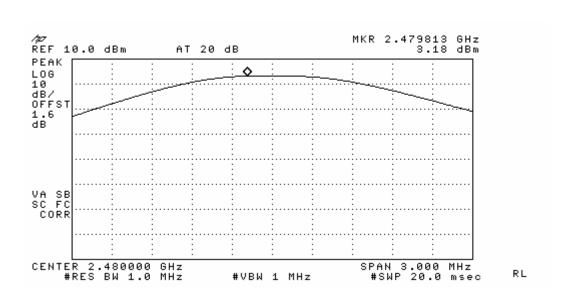
# **Measurement Setup**

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**

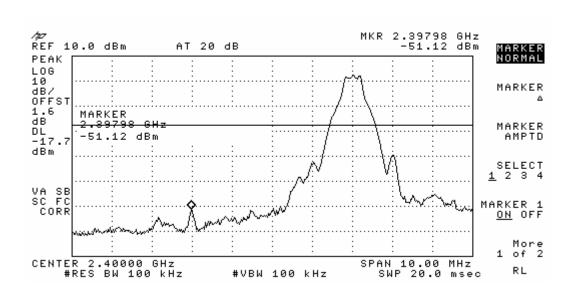
- All conducted emission in any 100kHz bandwidth outside of the spread spectrum band was at least 20dB lower than the highest inband spectral density. Therefore the applying equipment meets the requirement.
- See next pages for actual measured spectrum plots.

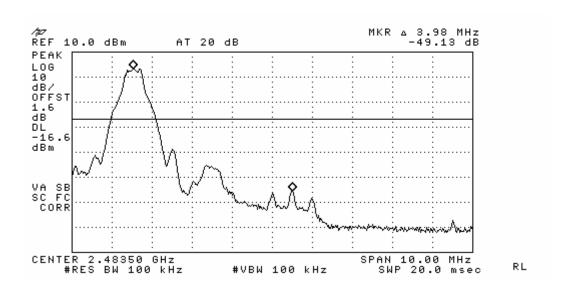
Minimum Standard:	> 20 dBc
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## **Measurement Setup**

Same as the Chapter 3.2.1 (Figure 1)

Band - edge





Band-edges in the restricted band 2483.5 ~ 2500 MHz measurement

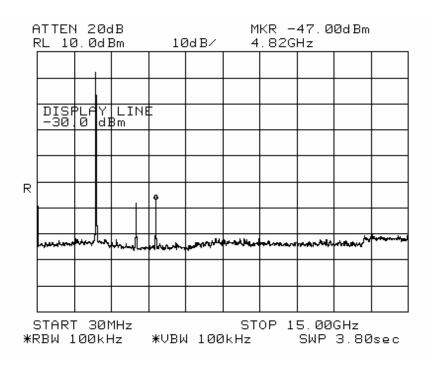
## - Document DA 00-705 Marker Delta Method

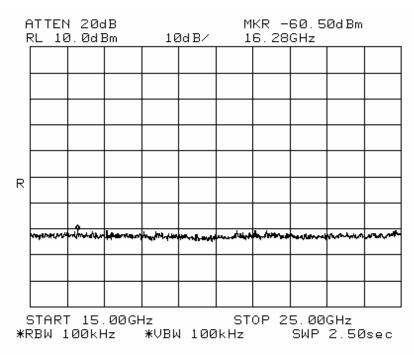
Frequency (MHz)	Detect mode	Pol.	Reading (dBuV/m)	T.F (dB)	Step 1 Data	delta	Step 3 Data	Limit
2480	PK	Н	65.79	34.6	100.39	49.13	51.26	74
	AV	Н	53.35	34.6	87.95	49.13	38.82	54

Note) Step 1 = Reading + T.F

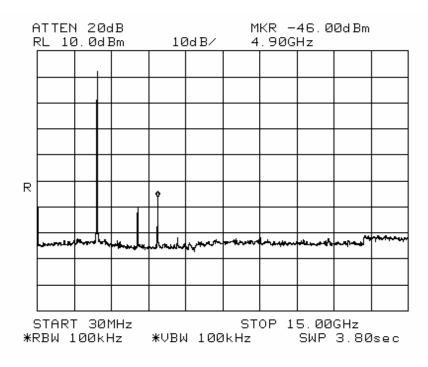
T.F = Ant.F + Cable loss Step 3 = Step 1 – Delta Value

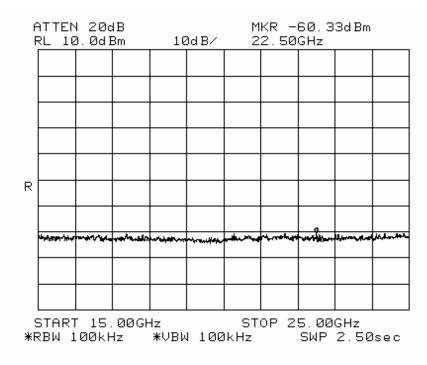
# Band - edge (at 20 dB blow) – Low channel Frequency Range = $30 \text{ MHz} \sim 10^{\text{th}}$ harmonic.



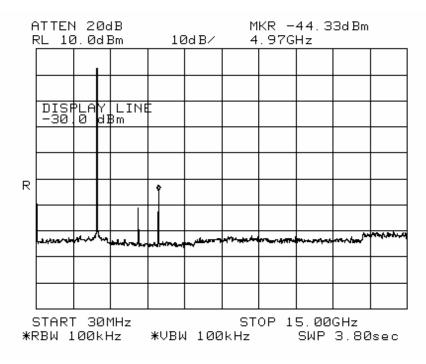


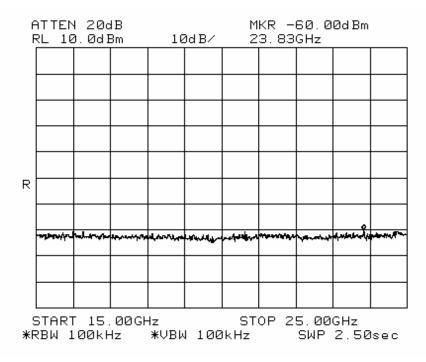
# Band - edge (at 20 dB blow) – Mid channel Frequency Range = $30 \text{ MHz} \sim 10^{\text{th}}$ harmonic.





# 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 =  $30 \text{ MHz} \sim 10^{\text{th}}$  harmonic.

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

= 1 MHz  $(1 \text{ GHz} \sim 10^{\text{th}} \text{ harmonic})$ 

Span = 100 MHz Detector function = Average

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

## **Measurement Data: Complies**

Low c	hannel	Mid c	hannel	High channel	
Frequency (MHz)	Level (dBuV/m)	Frequency (MHz)	Level (dBuV/m)	Frequency (MHz)	Level (dBuV/m)
1602	1602 47.03		47.7	1654	50.87
4804	4804 47.03		52.37	4960	48.4
-	-	-	-	-	-
Measurement uncertainty		± 6 dB			l

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.

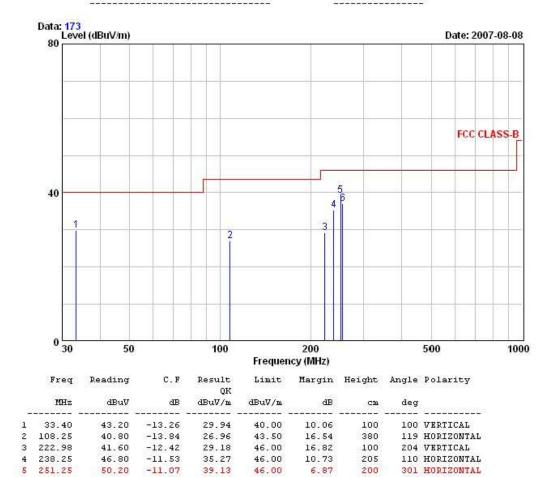


6 255.25

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

EUT/Model No.: HA-W700BT TEST MODE: BT mode

Temp Humi : 30 / 74 Tested by: KIM.B.S



8.84 182

191 HORIZONTAL

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

46.00

37.16

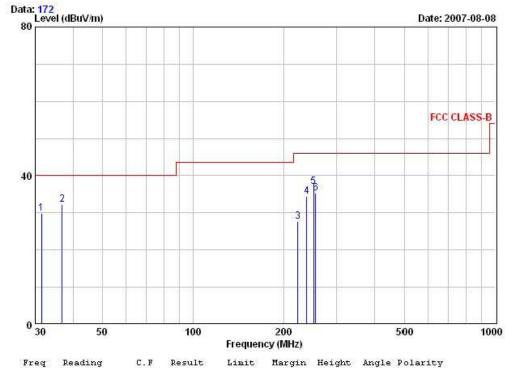
48.10 -10.94



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EUT/Model No.: HA-W700BT TEST MODE: CHARGING + BT mode

Temp Humi : 30 / 74 Tested by: KIM.B.S



	Freq	Reading	C.F	Result QK	Limit	Margin	Height	Angle	Polarity
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	deg	
1	31.50	43.20	-13.35	29.85	40.00	10.15	100	100	VERTICAL
2	36.82	45.20	-13.02	32.18	40.00	7.82	100	350	VERTICAL
3	222.98	40.20	-12.42	27.78	46.00	18.22	100	204	VERTICAL
4	238.25	45.90	-11.53	34.37	46.00	11.63	205	110	HORIZONTAL
5	251.25	48.20	-11.07	37.13	46.00	8.87	200	301	HORIZONTAL
6	255 25	46 20	-10 94	35 26	46 00	10 74	182	191	HORTZONTAL

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**

- No other emissions were detected at a level greater than 20dB 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

## **Conducted emissions / Line**

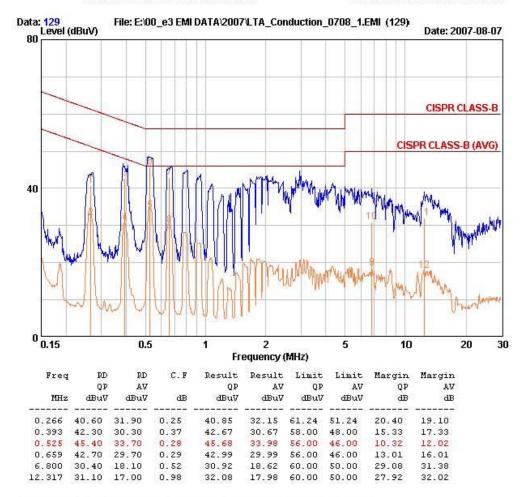


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EUT / Model No. : HA-W700BT Phase : LINE

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

Temp./Humi. : 23 / 68 Test Engineer : B.S.KIM



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

## **Conducted emissions / Neutral**

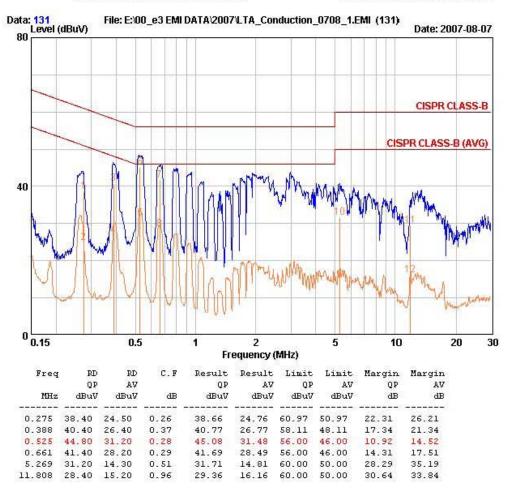


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EUT / Model No. : HA-W700BT Phase : NEUTRAL

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

Temp./Humi: : 23 / 68 Test Engineer : B.S.KIM



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

# 3.2.9 Receiver Spurious Emissions

## **Definition:**

Receiver spurious emissions are emissions at any frequency when the equipment is in received mode.

Test method : RSS-210

Assigned Frequency band :  $2400 \sim 2483.5 \text{ MHz}$ Test mode : Receiving mode

Detect mode : Peak

Result : Complies

## **Measurement Data: Complies**

]	Lowest frequency		Highest frequency			
Frequency (MHz)			Frequency Band-width (MHz) (kHz)		Level (dBuV/m)	
1600	1600 1000		1652.4	1000	50.41	
-			-	-	-	
-			-	-	-	
Measurement	uncertainty	± 6 dB				

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

#### **Minimum Standard:**

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

Note: Transmitting devices are not permitted in Table 1 bands or in TV bands (54-72 MHz, 76-88MHz, 174-216MHz, 470-608MHz, and 614-806MHz). Prohibition of operation in TV bands does not apply to momentary devices, or to medical telemetry devices in the band 174-216 MHz, and to perimeter protection systems in the bands 54-72 and 76-88MHz. The perimeter protection devices are to meet Table 3 field strengths limits.

# **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	НР	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