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ENUSTECH

Dates of Tests: Jan 14~18, 2011

Test Report S/N: LR500111101G

Test Site : LTA CO., LTD.

CERTIFICATION OF COMPLIANCE

FCC ID.

IC

APPLICANT

TT2BHF2000S
6329A-BHF2000S
ENUSTECH.,INC.

FCC Classification	:	Low Power Communication Device Transmitter
Manufacturing Description	:	Wireless Bluetooth Carkit
Manufacturer	:	ENUSTECH.,INC.
Model name	:	BHF2000S
Variant Model name	:	BHF2000
Test Device Serial No.:	:	Identical prototype
Rule Part(s)	:	FCC Part 15.239 Subpart C; ANSI C-63.4-2003 RSS-210 and ISSUE No.:7 Date:2007
Frequency Range	:	88.1 ~ 107.9MHz
Data of issue	:	January 19, 2011

This test report is issued under the authority of:

The test was supervised by:

Hyun-Chae You, Manager

Il-Shin kim, 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 LAB Code.: 200723-0

TABLE OF CONTENTS

1. GENERAL INFORMATION'S	3
2. INFORMATION'S ABOUT TEST ITEM	4
3. TEST REPORT	6
3.1 SUMMARY OF TESTS	6
3.2 TECHNICAL CHARACTERISTICS TEST	7
3.2.1 Field Strength of Fundamental and Emissions within Permitted Band	7
3.2.2 Radiated Emissions	8
3.2.3 AC Conducted Emissions	15
3.2.4 20dB Bandwidth	18
 APPENDIX	
APPENDIX TEST EQUIPMENT USED FOR TESTS	20

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 : <http://www.ltalab.com>
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Quality control in the testing laboratory is implemented as per ISO/IEC 17025 which is the “General requirements for the competent 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	2011-09-30	ECT accredited Lab.
RRL	KOREA	KR0049	2011-06-20	EMC accredited Lab.
FCC	U.S.A	610755	2011-04-22	FCC filing
VCCI	JAPAN	R2133, C2307	2011-06-21	VCCI registration
IC	CANADA	IC5799	2012-05-14	IC filing

2. Information's about test item

2-1 Client

Company name : ENUSTECH.,INC.
 Address : Dui Bldg., 6F, 1196-2 Gaepo-4dong, Gangnam-gu, Seoul 135-240,Korea
 Telephone / Facsimile : +82-2-565-0785 / +82-2-3452-3603

2-2 Manufacturer

Company name : E-TECH
 Address : 111, Yeochon-Li, Ochang-Eup, Cheongwon-Gun,
 Chungcheongbuk-do, Korea
 Telephone / Facsimile : +82- 43-219-2265 / +82- 43-219-2235

2-3 Equipment Under Test (EUT)

Trade name : Wireless Bluetooth Carkit
 FCC ID : TT2BHF2000S
 Model name : BHF2000S
 Variant Model name : BHF2000
 Serial number : Identical prototype
 Date of receipt : January 13, 2011
 EUT condition : Pre-production, not damaged
 Frequency Range : 88.1 ~ 107.9MHz
 Operator Selection of : Manual Switch
 Operating Frequency
 Power Source : Battery Pack: 3.7V (Li-Ion Polymer Battery)
 Cigar jack adapter : Input: 12VDC Output : 5VDC

2-4 Tested frequency & signal

	LOW	MID	HIGH
Frequency (MHz)	88.1	98.0	107.9
Audio signal:	We tested only under the module of audio input. The device audio input source from maximum audio input for the tested. Test report is recorded the worst mode data.		

2-5 Ancillary Equipment

Equipment	Model No.	Serial No.	Manufacturer
Note PC	PP37L	G4YRDNI	DELL
Car Battery	BX40R	N/A	ATLASBX
PRINTER	STYLUS C65	N/A	EPSON

2-6 Model Description

Model Name	Solarcell	Note
BHF2000S	O	Tested
BHF2000	X	-

2-7 Description of Test modes

EUT configure mode	Applicable to				Description
	PWR	OBW	RE	ACE	Frequency (MHZ)
BT+FMT(LOW)	√	√	√	-	88.1
BT+FMT(MID)	√	√	√	-	98.0
BT+FMT(HIGH)	√	√	√	√	107.9

Where **PWR**: Field Strength of Fundamental and Emissions within permitted band.

OBW: Occupied channel bandwidth

RE: Radiated Emission

ACE: AC Conducted Emissions

NOTE: Bluetooth and FMT are only operated in the same time, FMT is not operated in the stand-alone

3. Test Report

3.1 Summary of tests

FCC Part Section(s)	Parameter	Limit	Status (note 1)
15.239	Field Strength of Fundamental and Emissions within permitted band.	< 250 uV @ 3m	C
15.239	Occupied channel bandwidth	< 200kHz	C
15.209	Radiated Emission	< FCC 15.209 limits	C
15.207	AC Conducted Emissions	< FCC 15.207 limits	C
15.203	Antenna Requirement	-	C

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.

Note 1: Antenna Requirement

→ The ENUSTECH.,INC. BHF2000S unit complies with the requirement of §15.203.

The antenna is Wire antenna.

Note 2: The sample was tested according to the following specification:

FCC Parts 15.239; ANSI C-63.4-2003

RSS-210 and ISSUE No.: 8 Date: 2010

3.2 Transmitter requirements

3.2.1 Field Strength of Fundamental and Emissions within permitted band.

Procedure:

The field strength of emissions from intentional radiators operated within the bands 88 ~108MHz was measured in accordance with FCC Part § 15.239. The test set-up was made according to ANSI C 63.4:2003.

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 an OATS. Measurements were performed with the EUT oriented in 3 orthogonal axis and rotated 360 degrees to determine worst-case orientation for maximum emissions. In case of the air temperature of the test site is out of the range is 10 to 40°C before the testing proceeds the warm-up time of EUT maintain adequately

The spectrum analyzer is set to:

Span = 1 MHz

RBW = 120 kHz

VBW = 300 kHz

Trace = max hold

Sweep = auto

Detector function = Peak & Average

Measurement Data: Complies

→ The warm-up time of the EUT is 20min

→ For Spurious emission of the fundamental, refer to the item '3.2.2 radiated emission'

Operating Condition: Transmit the audio signal (modulated signal)

Frequency (MHz)	Pol. (H/V)	Read Level (dBuV/m)		C.F (dB)	Result Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)	
		PK	AV		PK	AV	PK	AV	PK	AV
88.1	H	61.25	60.34	-14.78	46.47	45.56	68.00	48.00	21.53	2.44
88.1	V	57.54	56.35	-14.78	42.76	41.57	68.00	48.00	25.24	6.43
98	H	59.38	58.25	-13.64	45.74	44.61	68.00	48.00	22.26	3.39
98	V	55.25	54.15	-13.64	41.61	40.51	68.00	48.00	26.39	7.49
107.9	H	57.43	56.85	-12.60	44.83	44.25	68.00	48.00	23.17	3.75
107.9	V	53.75	52.64	-12.60	41.15	40.04	68.00	48.00	26.85	7.96

Note 1: Field Strength Calculation

C.F = Antenna Factor + Cable Loss - Preamp Factor

Margin = Limit - Level

Minimum Standard: FCC Part 15.239

The maximum Field Strength authorized within 200kHz is 250 uV/m@3m

3.2.2 Radiated Emissions

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. In case of the air temperature of the test site is out of the range is 10 to 40°C before the testing proceeds the warm-up time of EUT maintain adequately

The spectrum analyzer is set to:

Center frequency = the worst channel

Frequency Range = 30 MHz ~ 10th harmonic.

RBW = 100 kHz (30MHz ~ 1 GHz)

VBW ≥ RBW

= 1 MHz (1 GHz ~ 10th harmonic)

Span = 100 MHz

Detector function = peak

Trace = max hold

Sweep = auto

Measurement Data: **Complies**

- Refer to the next page.
- The warm-up time of the EUT is 20min.
- 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

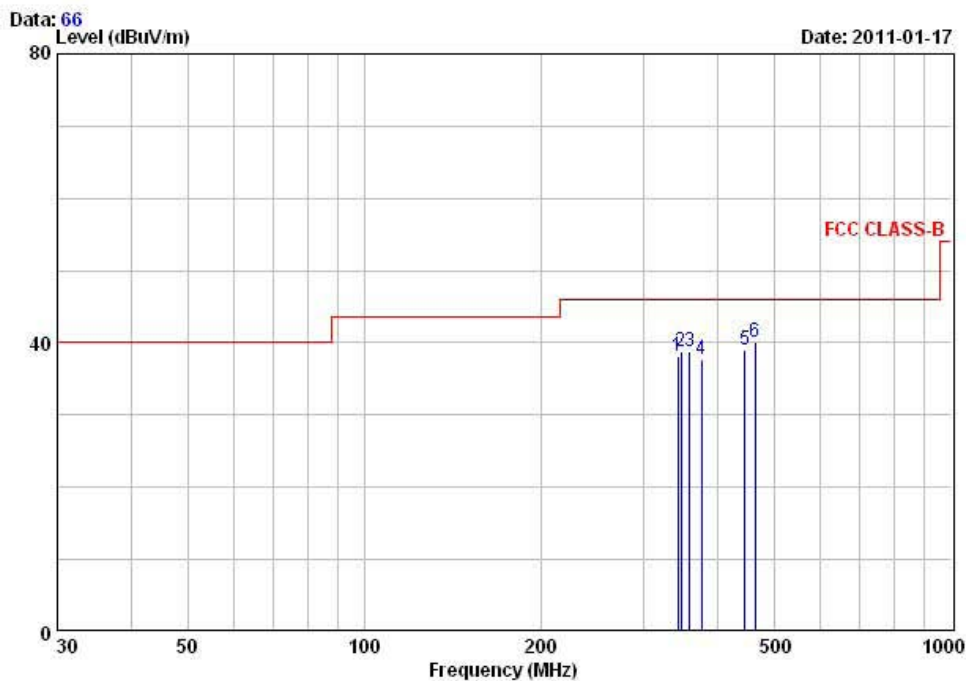
** Except as provided in 15.209(g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88MHz, 174-216MHz or 470-806MHz. However, operation within these frequency bands is permitted under other sections of this Part,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

Fundamental Frequency: 88.1MHz at Car adapter



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EUT/Model No.: BHF2000S TEST MODE: Car adap. Charging+BT+FM-T(Low) mode
Temp Humi : 2 / 33 Tested by: PARK.H.W



Freq	Reading	C.F	Result	Limit	Margin	Height	Angle	Polarity
MHz	dBuV/m	dB/m	dBuV/m	dBuV/m	dB	cm	deg	
1 342.14	43.80	-5.68	38.12	46.00	7.88	103	279	HORIZONTAL
2 346.34	44.50	-5.60	38.90	46.00	7.10	106	252	VERTICAL
3 358.26	44.20	-5.39	38.81	46.00	7.19	106	252	VERTICAL
4 375.62	42.90	-5.15	37.75	46.00	8.25	103	97	HORIZONTAL
5 444.92	43.30	-4.28	39.02	46.00	6.98	100	86	HORIZONTAL
6 464.25	44.10	-4.02	40.08	46.00	5.92	101	312	HORIZONTAL

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

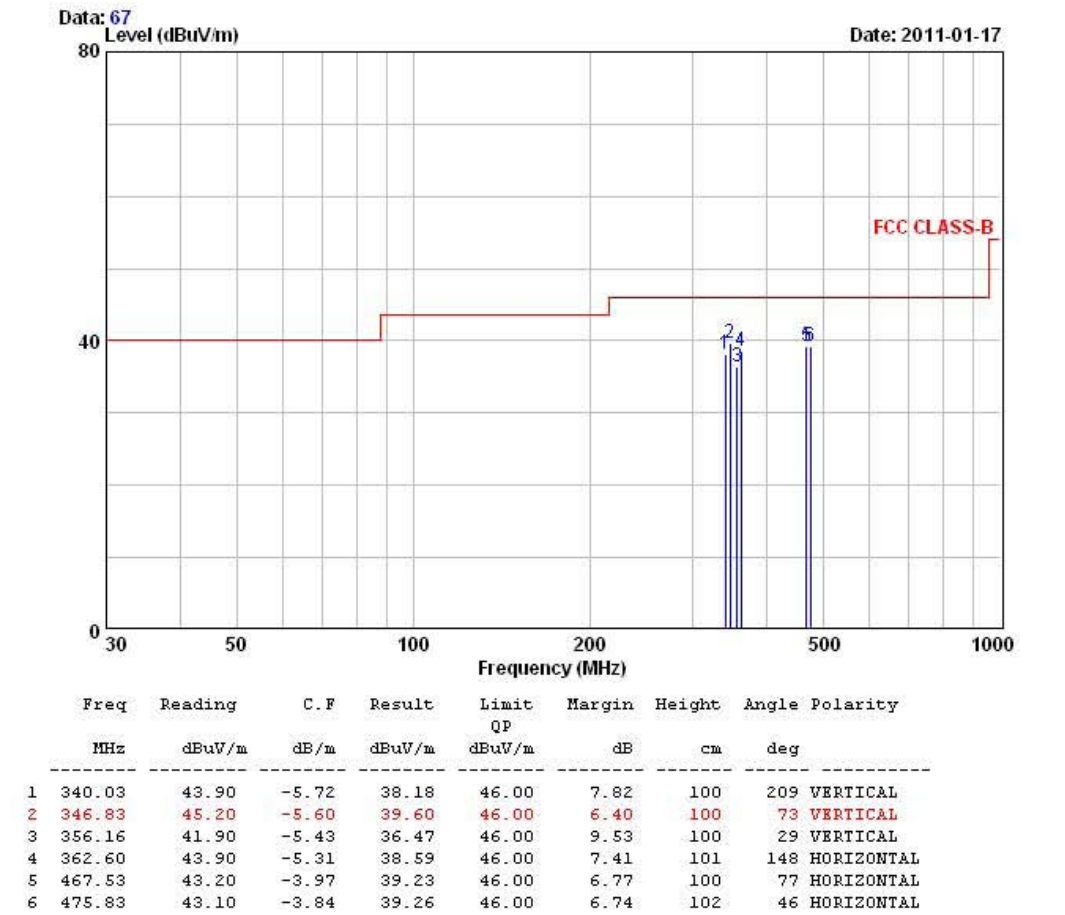
→ No other emissions were detected at a level greater than 20dB below limit.

Fundamental Frequency: 98.0MHz at Car adapter



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EUT/Model No.: BHF2000S TEST MODE: Car adap. Charging+BT+FM-T(Middle) mode
Temp Humi : 2 / 33 Tested by: PARK.H.W



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

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

Fundamental Frequency: 107.9MHz at Car adapter



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EUT/Model No.: BHF2000S TEST MODE: Car adap. Charging+BT+FM-T(High) mode

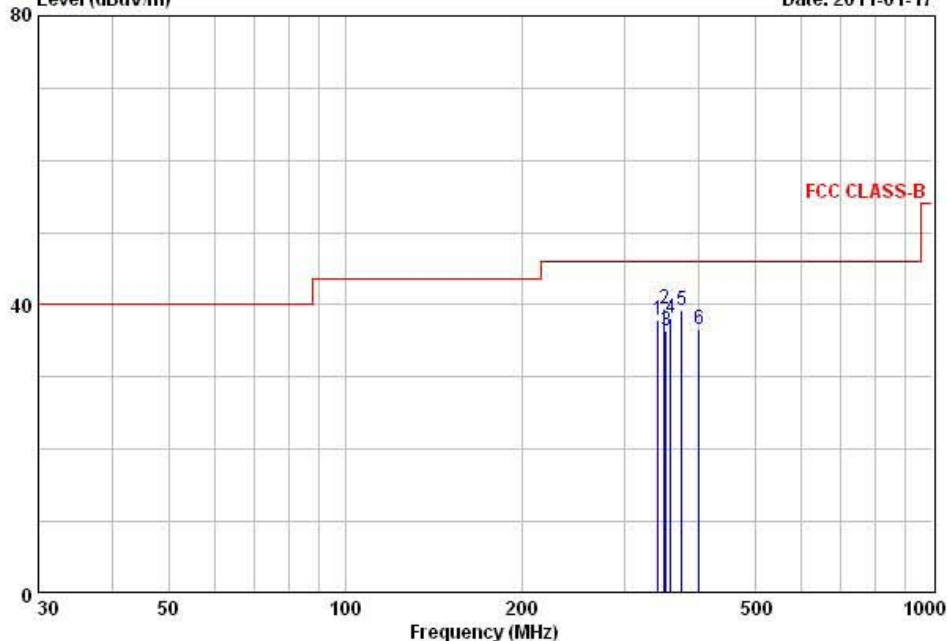
Temp Humi : 2 / 33

Tested by: PARK.H.W

Data: 68

Level (dBuV/m)

Date: 2011-01-17



	Freq	Reading	C.F	Result	Limit	Margin	Height	Angle	Polarity
	MHz	dBuV/m	dB/m	dBuV/m	dBuV/m	dB	cm	deg	
1	341.67	43.60	-5.69	37.91	46.00	8.09	100	25	VERTICAL
2	349.76	45.00	-5.54	39.46	46.00	6.54	100	322	VERTICAL
3	352.67	41.80	-5.49	36.31	46.00	9.69	102	208	HORIZONTAL
4	359.21	43.50	-5.37	38.13	46.00	7.87	100	17	VERTICAL
5	374.54	44.30	-5.16	39.14	46.00	6.86	100	253	HORIZONTAL
6	400.55	41.60	-4.88	36.72	46.00	9.28	101	113	HORIZONTAL

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

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

Fundamental Frequency: 88.1MHz at USB



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EUT/Model No.: BHF2000S

TEST MODE: PC Charging+BT+FM-T(Low) mode

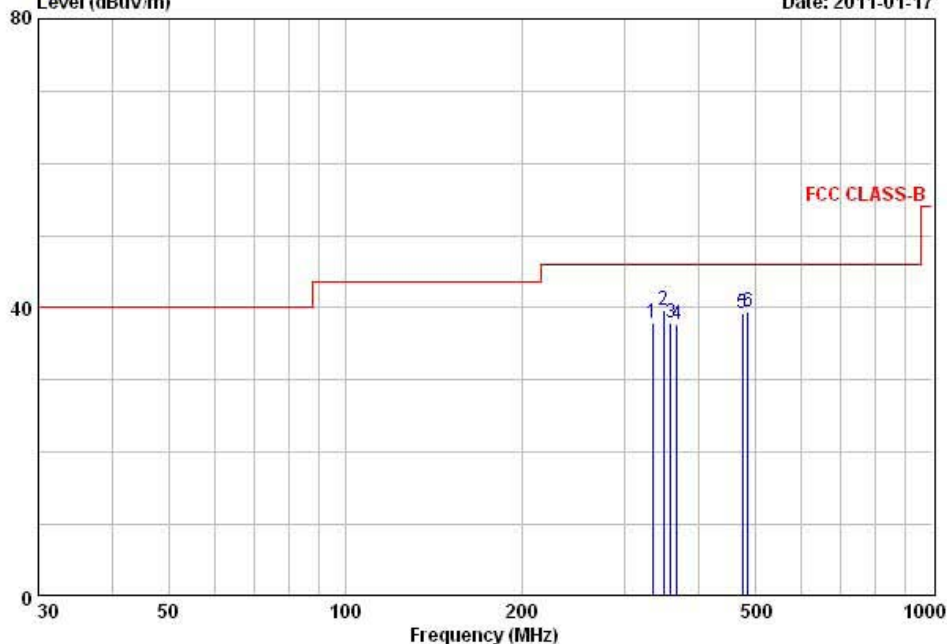
Temp Humi : 2 / 33

Tested by: PARK.H.W

Data: 65

Level (dBuV/m)

Date: 2011-01-17



	Freq	Reading	C.F	Result	Limit	Margin	Height	Angle	Polarity
	MHz	dBuV/m	dB/m	dBuV/m	dBuV/m	dB	cm	deg	
1	334.25	43.70	-5.83	37.87	46.00	8.13	100	137	VERTICAL
2	348.98	45.20	-5.56	39.64	46.00	6.36	101	187	VERTICAL
3	358.33	43.30	-5.39	37.91	46.00	8.09	100	99	VERTICAL
4	367.32	42.90	-5.25	37.65	46.00	8.35	101	141	HORIZONTAL
5	475.90	43.10	-3.84	39.26	46.00	6.74	100	149	HORIZONTAL
6	486.21	43.10	-3.67	39.43	46.00	6.57	103	252	HORIZONTAL

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

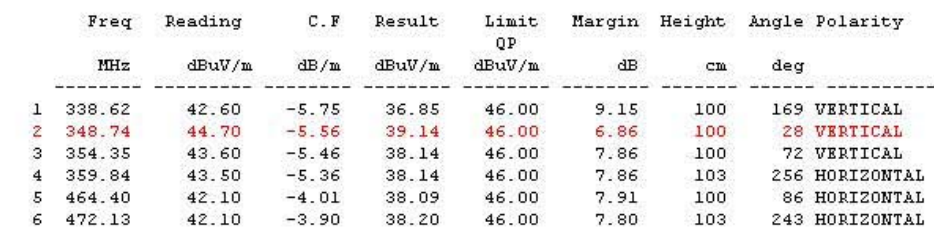
- 1 -

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



TEST MODE: PC Charging+BT+FM-T(Middle) mode

Tested by: PARK.H.W



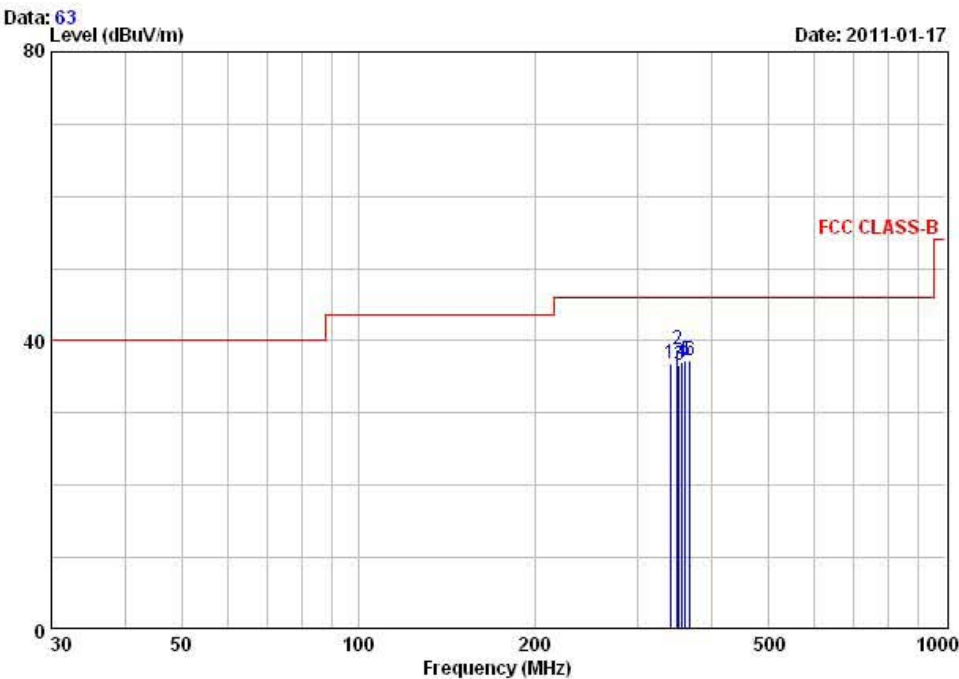
Remarks: C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain

Fundamental Frequency: 107.9MHz at USB



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EUT/Model No.: BHF2000S TEST MODE: PC Charging+BT+FM-T(High) mode
Temp Humi : 2 / 33 Tested by: PARK.H.W



Freq	Reading	C.F	Result	Limit	Margin	Height	Angle	Polarity
MHz	dBuV/m	dB/m	dBuV/m	dBuV/m	dB	cm	deg	
1 340.58	42.60	-5.71	36.89	46.00	9.11	100	99	VERTICAL
2 349.71	44.30	-5.54	38.76	46.00	7.24	102	144	VERTICAL
3 351.75	42.10	-5.51	36.59	46.00	9.41	111	136	HORIZONTAL
4 356.65	42.40	-5.42	36.98	46.00	9.02	100	49	VERTICAL
5 361.33	42.60	-5.33	37.27	46.00	8.73	104	61	HORIZONTAL
6 368.13	42.60	-5.24	37.36	46.00	8.64	109	214	HORIZONTAL

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

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

3.2.3 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**

- Refer to the next page.
- The used FMT Freq is “107.9MHz (High ch)” and it gave the worse case emissions.

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

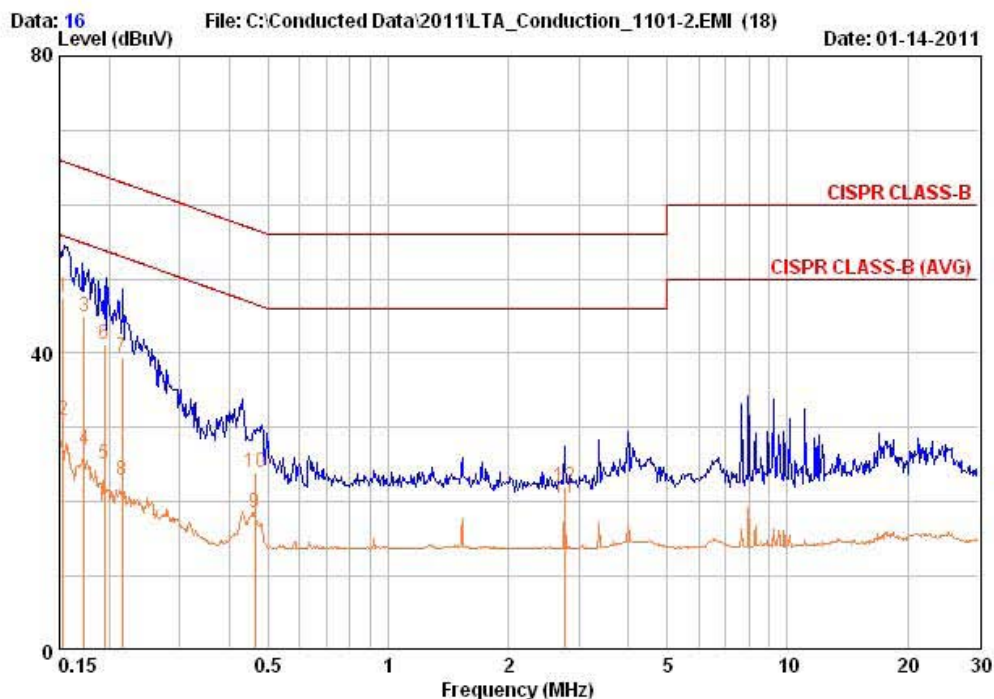
Frequency Range (MHz)	Conducted Limit (dBuV)	
	Quasi-Peak	Average
0.15 ~ 0.5	66 to 56 *	56 to 46 *
0.5 ~ 5	56	46
5 ~ 30	60	50

* Decreases with the logarithm of the frequency

USB Charging+BT+FM-T(High) – Line

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EUT / Model No. : BHF2000S	Phase : LINE
Test Mode : PC Charging+BT+FM-T(High) mode	Test Power : 120 / 60
Temp./Humi. : 20 / 43	Test Engineer : PARK.H.W



Freq	PD	PD	C.F	Result	Result	Limit	Limit	Margin	Margin
MHz	QP	AV	dB	QP	AV	QP	AV	QP	AV
	dBuV	dBuV		dBuV	dBuV	dBuV	dBuV	dB	dB
0.153	37.95	21.35	9.66	47.61	31.01	65.84	55.84	18.23	24.83
0.173	35.15	17.35	9.65	44.81	27.01	64.82	54.82	20.01	27.81
0.194	31.66	15.36	9.64	41.30	25.00	63.86	53.86	22.56	28.86
0.215	29.76	13.36	9.64	39.40	23.00	63.01	53.01	23.61	30.01
0.463	14.35	8.85	9.67	24.02	18.52	56.64	46.64	32.62	28.12
2.768	12.36	10.86	9.69	22.05	20.55	56.00	46.00	33.95	25.45

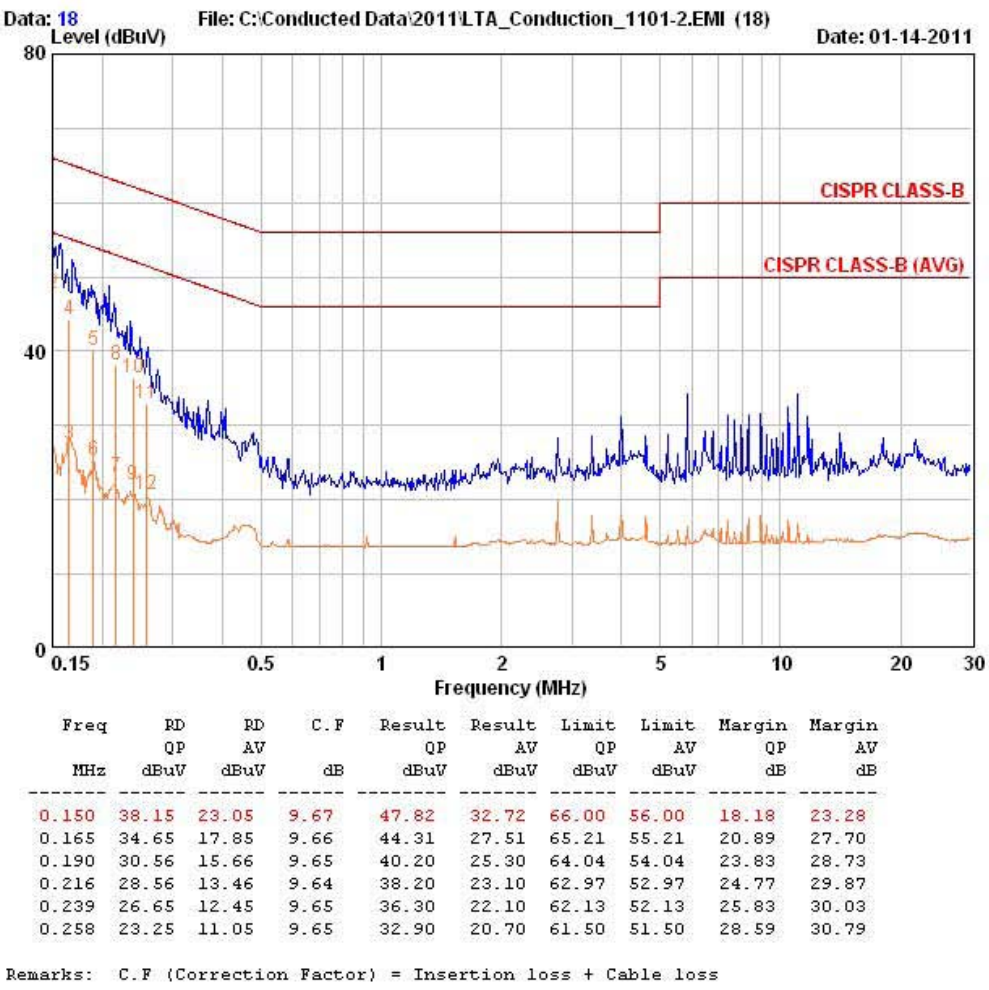
Remarks: C.F (Correction Factor) = Insertion loss + Cable loss

USB Charging+BT+FM-T(High) – Neutral



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EUT / Model No. : BHF2000S	Phase : NEUTRAL
Test Mode : PC Charging+BT+FM-T(High) mode	Test Power : 120 / 60
Temp./Humi. : 20 / 43	Test Engineer : PARK.H.W



3.2.4 20dB Bandwidth

Procedure:

The channel Bandwidth is defined as the minimum declared bandwidth within which the transmitter's necessary bandwidth can be contained. The transmitter was adjusted to work at the selected channels. The Channel BW was measured at an amplitude level reduced from the reference level by the 20dB.

Occupied Bandwidth was measured as shown in the below.

The EUT was placed on a 0.8m high wooden table. An antenna was placed near the EUT and measurements of frequencies were recorded for reference during final measurements. Measurements were performed with the EUT rotated 360 degrees to determine worst-case orientation for maximum emissions.

→

The spectrum analyzer is set to:

Frequency Range = 88 ~ 108MHz

RBW = 10 kHz

VBW = 30 kHz

Trace = max hold

Detector function = Peak

Sweep = auto

Span = 300 kHz

Operating Condition: Transmit the maximum audio signal (modulation)

we played a song from the “V9M LE” with the maximum audio input.

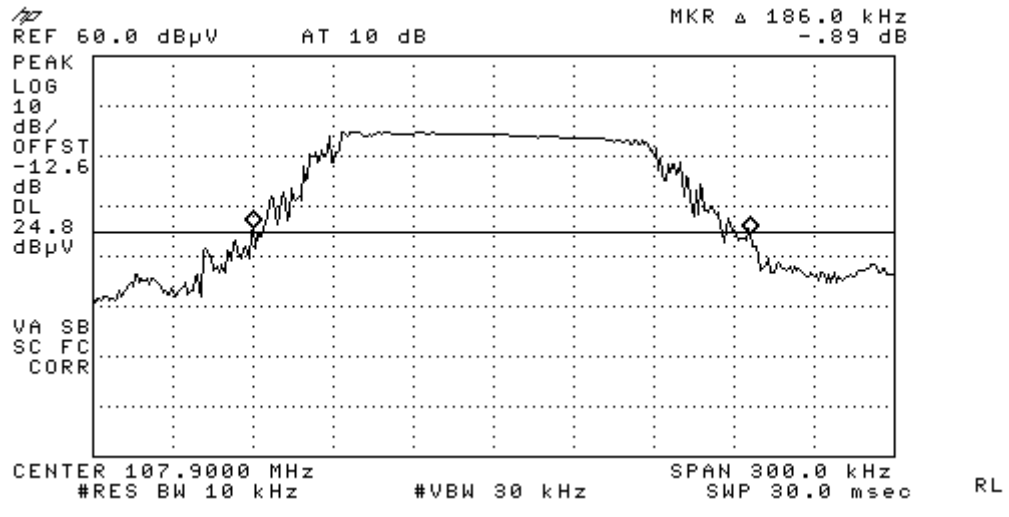
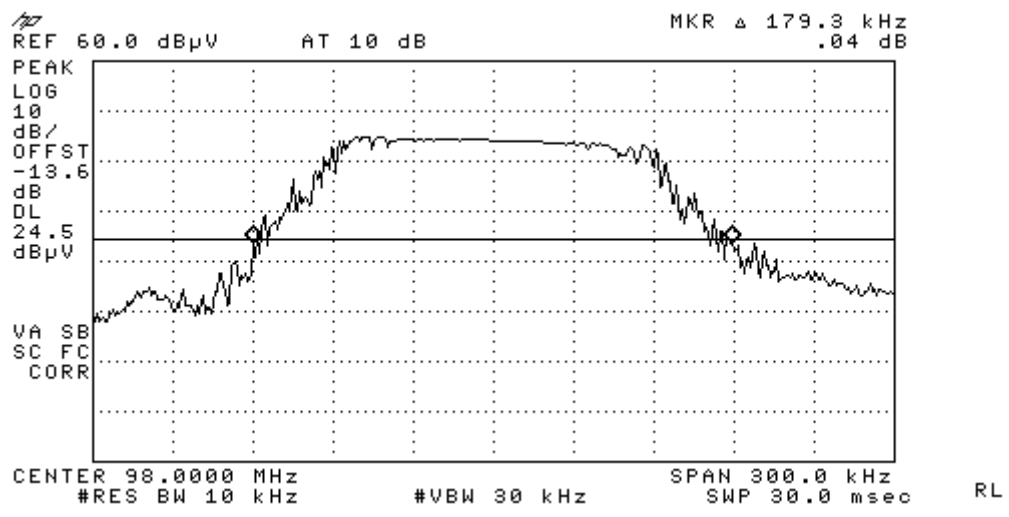
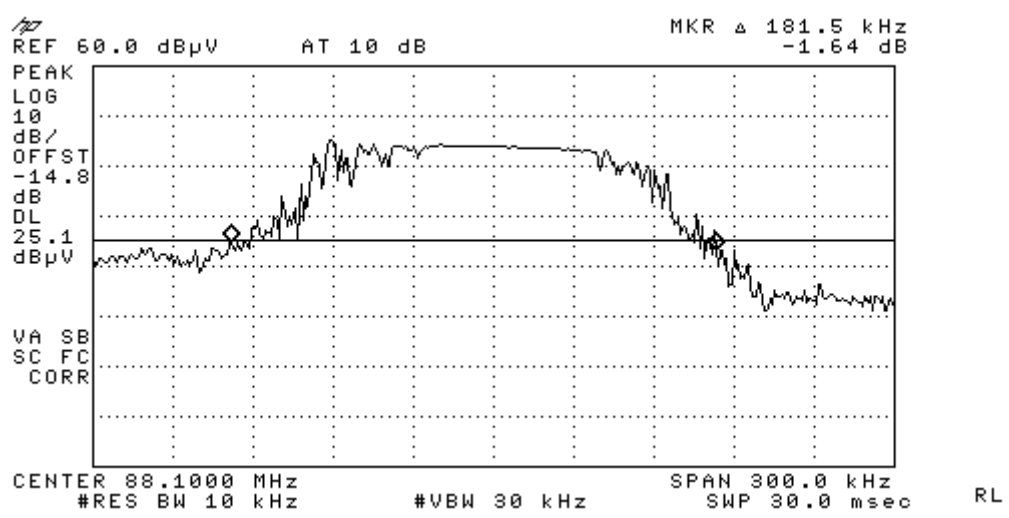
Measurement Data: **Complies**

Refer to the next page.

Minimum Standard:

Occupied Bandwidth < 200kHz.

20 dB Occupied Bandwidth



APPENDIX

TEST EQUIPMENT USED FOR TESTS

	Description	Model No.	Serial No.	Manufacturer	Interval	Last Cal. Date
1	Spectrum Analyzer	FSV-30	100757	R&S	1 year	2010-02-01
2	Spectrum Analyzer	8563E	3425A02505	HP	1 year	2010-03-29
3	Spectrum Analyzer	8594E	3710A04074	HP	2 year	2009-10-12
4	Signal Generator	8648C	3623A02597	HP	1 year	2010-03-30
5	Signal Generator	83711B	US34490456	HP	1 year	2010-03-30
6	Attenuator (3dB)	8491A	37822	HP	1 year	2010-10-08
7	Attenuator (10dB)	8491A	63196	HP	1 year	2010-10-08
8	EMI Test Receiver	ESCI7	100722	R&S	1 year	2010-10-08
9	Horn Antenna(18 ~ 40GHz)	SAS-574	154	Schwarzbeck	2 year	2010-11-25
10	Horn Antenna(18 ~ 40GHz)	SAS-574	155	Schwarzbeck	2 year	2010-11-25
11	RF Amplifier	8447D	2949A02670	HP	2 year	2009-10-12
12	RF Amplifier	8449B	3008A02126	HP	1 year	2010-03-29
13	Test Receiver	ESHS10	828404/009	R&S	1 year	2010-03-29
14	TRILOG Antenna	VULB 9160	9160-3212	SCHWARZBECK	2 year	2009-04-02
15	Log Periodic Antenna	VULP 9118	9118 A 401	SCHWARZBECK	2 year	2009-04-13
16	Biconical Antenna	BBA 9106	VHA 9103-2315	SCHWARZBECK	2 year	2009-04-13
17	Horn Antenna	3115	00055005	ETS LINDGREN	2 year	2009-03-16
18	Horn Antenna	BBHA 9120D	9120D122	SCHWARZBECK	2 year	2010-12-24
19	Dipole Antenna	VHA9103	2116	SCHWARZBECK	2 year	2010-11-25
20	Dipole Antenna	VHA9103	2117	SCHWARZBECK	2 year	2010-11-25
21	Dipole Antenna	VHA9105	2261	SCHWARZBECK	2 year	2010-11-25
22	Dipole Antenna	VHA9105	2262	SCHWARZBECK	2 year	2010-11-25
23	Hygro-Thermograph	THB-36	0041557-01	ISUZU	1 year	2010-04-12
24	Splitter (SMA)	ZFSC-2-2500	SF617800326	Mini-Circuits	-	-
25	Power Divider	11636A	6243	HP	1 year	2010-10-08
26	DC Power Supply	6622A	3448A03079	HP	1 year	2010-10-08
27	Frequency Counter	5342A	2826A12411	HP	1 year	2010-03-30
28	Power Meter	EPM-441A	GB32481702	HP	1 year	2010-03-29
29	Power Sensor	8481A	US41030291	HP	1 year	2010-10-08
30	Audio Analyzer	8903B	3729A18901	HP	1 year	2010-10-08
31	Modulation Analyzer	8901B	3749A05878	HP	1 year	2010-10-08
32	TEMP & HUMIDITY Chamber	YJ-500	LTAS06041	JinYoung Tech	1 year	2010-10-08
33	LOOP-ANTENNA	FMZB 1516	151602/94	SCHWARZBECK	2 year	2009-03-02
34	Stop Watch	HS-3	601Q09R	CASIO	2 year	2010-03-31
35	LISN	ENV216	100408	R&S	1 year	2010-10-08
36	UNIVERSAL RADIO COMMUNICATION TESTER	CMU200	106243	R&S	2 year	2010-05-13
37	Attenuator (30dB)	8498A	3318A10929	HP	1 year	2011-01-05