
FCC Test Report

Report No.: AGC04246150301FE01

PRODUCT DESIGNATION : Hearing Assistive Device
BRAND NAME : ICLEAR DIGITAL
MODEL NAME : HAD1000
CLIENT : Bitwave Private Limited
DATE OF ISSUE : Apr.28,2015
STANDARD(S) : FCC Part 15 Rules
REPORT VERSION : V1.0

Attestation of **Global Compliance** (Shenzhen) Co., Ltd

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Report Revise Record

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Apr.28,2015	Valid	Original Report

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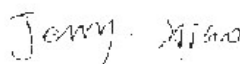
1. VERIFICATION OF CONFORMITY

Applicant	Bitwave Private Limited
Address	11, Serangoon North Ave 5 , #05-03 Singapore 554809
Manufacturer	Bitwave Private Limited
Address	11, Serangoon North Ave 5 , #05-03 Singapore 554809
Product Designation	Hearing Assistive Device
Brand Name	ICLEAR DIGITAL
Test Model	HAD1000
Measurement Procedure	ANSI C63.4: 2009
Date of test	Apr.28,2015
Deviation	None
Condition of Test Sample	Normal
Report Template	AGCRT-US-IT/AC(2013-03-01)

The above equipment was tested by Shenzhen STS Test Services Co., Ltd. for compliance with the requirements set forth in the FCC Rules and Regulations Part 15, the measurement procedure according to ANSI C63.4:2009. This said equipment in the configuration described in this report shows the maximum emission levels emanating from equipment are within the compliance requirements.

The test results of this report relate only to the tested sample identified in this report.

Prepared By



Jerry Xiao

Apr.28,2015

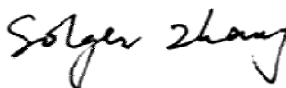
Checked By



Forrest Lei

Apr.28,2015

Authorized By



Solger Zhang

Apr.28,2015

2. SYSTEM DESCRIPTION

TEST MODE DESCRIPTION		
NO.	TEST MODE DESCRIPTION	WORST
1	USB	V
Note: 1. V means EMI worst mode 2. Only worst mode data recorded in the test report		

3. MEASUREMENT UNCERTAINTY

Conducted measurement: +/- 2.75dB

Radiated measurement: +/- 3.2dB

4. PRODUCT INFORMATION

Housing Type	Plastic and metal
EUT Input Rating	DC3.7V
Note: The highest working frequency of EUT less than 500MHz	

I/O Port Information (☒Applicable ☐Not Applicable)

I/O Port of EUT			
I/O Port Type	Number	Cable Description	Tested With
USB Port	1	1.1m, unshielded	1

Note: All the cables were provided by STS Lab.

5. SUPPORT EQUIPMENT

Device Type	Manufacturer	Model Name	Serial No.	Data Cable	Power Cable
Ipod	Apple	A1367	--	--	--

Note: All the above equipment/cables were placed in worse case positions to maximize emission signals during emission test.

6. TEST FACILITY

Site	Shenzhen STS Test Services Co., Ltd.
Location	1/F, Building 2, Zhuoke Science Park, Chongqing Road, Fuyong, Baoan District, Shenzhen, China.

TEST EQUIPMENT OF LINE CONDUCTED EMISSION TEST

Description	Manufacturer	Model	S/N	Cal. Date	Cal. Due
TEST RECEIVER	R&S	ESCI	100694	04/01/2015	03/31/2016
LISN	R&S	ESH3-Z5	8389791009	07/16/2014	07/15/2015
Conduction Cable	Sat	CE1	C001	06/04/2014	06/03/2015

TEST EQUIPMENT OF RADIATED EMISSION

Description	Manufacturer	Model	S/N	Cal. Date	Cal. Due
SPECTRUM ANALYZER	AGILENT	E4440A	US41421290	07/15/2014	07/16/2015
ANTENNA	A.H.	SAS-521-4	128	06/06/2014	06/05/2015
HORN ANTENNA	EM	EM-AH-10180	N/A	04/20/2015	04/19/2016
AMPLIFIER	EM	EM30180	0607030	02/26/2015	02/25/2016
POSITIONING CONTROLLER	MF	MF-7802	MF780208147	--	--
Radiation Cable 1	Sat	RE1	R003	06/04/2014	06/03/2015
Radiation Cable 2	Sat	RE2	R002	06/04/2014	06/03/2015

Note: "--" means it's not applicable.

7. FCCLINE CONDUCTED EMISSION TEST

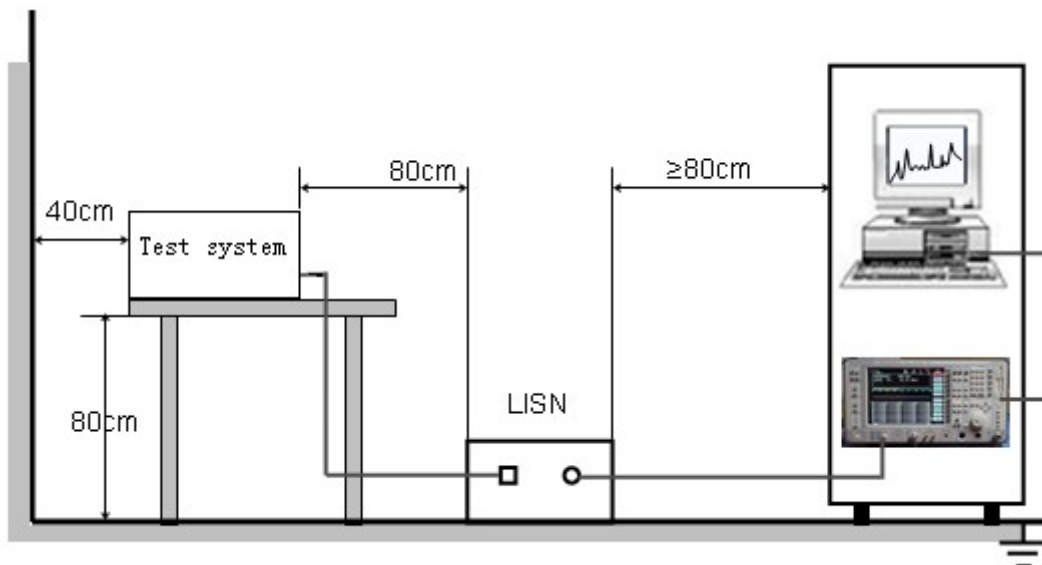
7.1. LIMITS OF LINE CONDUCTED EMISSION TEST

Frequency	Maximum RF Line Voltage	
	Q.P.(dBuV)	Average(dBuV)
150kHz-500kHz	66-56	56-46
500kHz-5MHz	56	46
5MHz-30MHz	60	50

Note:

1. The lower limit shall apply at the transition frequency.
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50MHz.

7.2. BLOCK DIAGRAM OF TEST SETUP



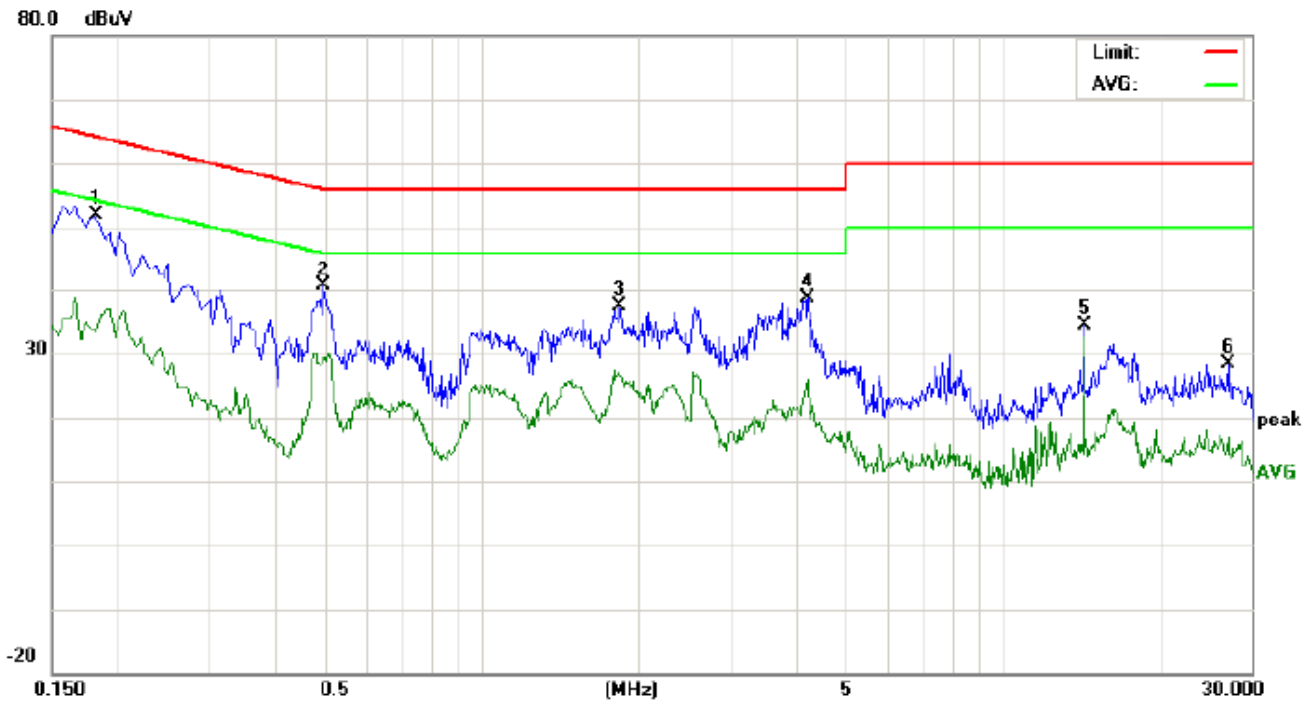
7.3. PROCEDURE OF LINE CONDUCTED EMISSION TEST

- (1) The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.4 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
- (2) Support equipment, if needed, was placed as per ANSI C63.4.
- (3) All I/O cables were positioned to simulate typical actual usage as per ANSI C63.4.
- (4) The EUT received DC5V power from PC with receive 120V/60Hz power from a LISN.
- (5) The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
- (6) Analyzer / Receiver scanned from 150 kHz to 30MHz for emissions in each of the test modes.
- (7) During the above scans, the emissions were maximized by cable manipulation.
- (8) A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions.
- (9) Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. If EUT emission level was less -2dB to the A.V. limit in Peak mode, then the emission signal was re-checked using Q.P and Average detector.

The test data of the worst case condition (mode 1) was reported on the Summary Data page.

7.4. TEST RESULT OF LINE CONDUCTED EMISSION TEST

LINE CONDUCTED EMISSION TEST-L



Site: Conduction

Phase: **L1**

Temperature: 26

Limit: FCC Class B Conduction(QP)

Power:

Humidity: 60 %

EUT:Hearing Assistive Device

M/N:HAD1000

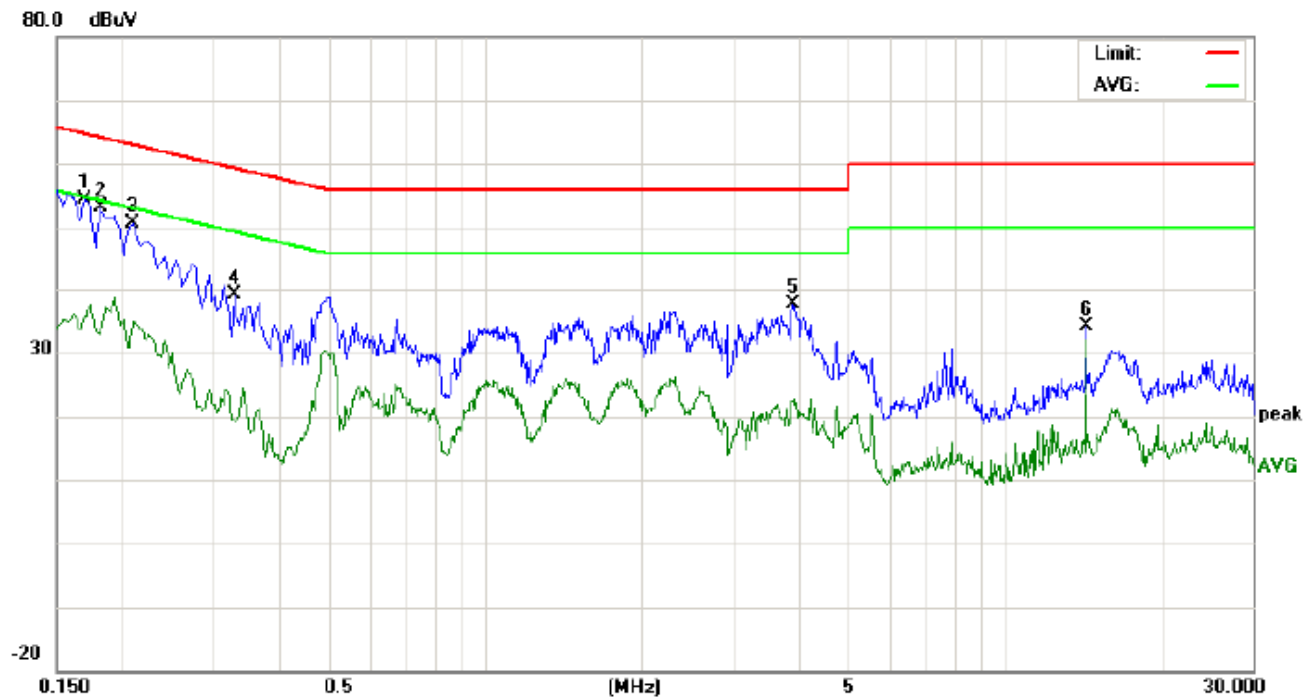
Mode:USB

Note:

No.	Freq. (MHz)	Reading_Level (dBuV)			Correct Factor	Measurement (dBuV)			Limit (dBuV)		Margin (dB)		P/F	Comment
		Peak	QP	AVG		Peak	QP	AVG	QP	AVG	QP	AVG		
1	0.1819	41.56		23.19	10.20	51.76		33.39	64.39	54.39	-12.63	-21.00	P	
2	0.4980	30.22		19.09	10.40	40.62		29.49	56.03	46.03	-15.41	-16.54	P	
3	1.8420	27.18		16.61	10.27	37.45		26.88	56.00	46.00	-18.55	-19.12	P	
4	4.2260	28.31		15.44	10.33	38.64		25.77	56.00	46.00	-17.36	-20.23	P	
5	14.3180	24.19		22.48	10.12	34.31		32.60	60.00	50.00	-25.69	-17.40	P	
6	27.0300	18.30		6.72	10.12	28.42		16.84	60.00	50.00	-31.58	-33.16	P	

RESULT: PASS

LINE CONDUCTED EMISSION TEST-N



Site: Conduction

Phase: N

Temperature: 26

Limit: FCC Class B Conduction(QP)

Power:

Humidity: 60 %

EUT:Hearing Assistive Device

M/N:HAD1000

Mode:USB

Note:

No.	Freq. (MHz)	Reading_Level (dBuV)			Correct Factor	Measurement (dBuV)			Limit (dBuV)		Margin (dB)		P/F	Comment
		Peak	QP	AVG		Peak	QP	AVG	QP	AVG	QP	AVG		
1	0.1700	44.29		25.65	10.18	54.47		35.83	64.96	54.96	-10.49	-19.13	P	
2	0.1819	42.97		22.67	10.20	53.17		32.87	64.39	54.39	-11.22	-21.52	P	
3	0.2100	40.46		24.67	10.23	50.69		34.90	63.20	53.20	-12.51	-18.30	P	
4	0.3300	28.89		8.91	10.30	39.19		19.21	59.45	49.45	-20.26	-30.24	P	
5	3.9220	27.25		12.05	10.44	37.69		22.49	56.00	46.00	-18.31	-23.51	P	
6	14.3180	23.89		22.01	10.12	34.01		32.13	60.00	50.00	-25.99	-17.87	P	

RESULT: PASS

8. FCC RADIATED EMISSION TEST

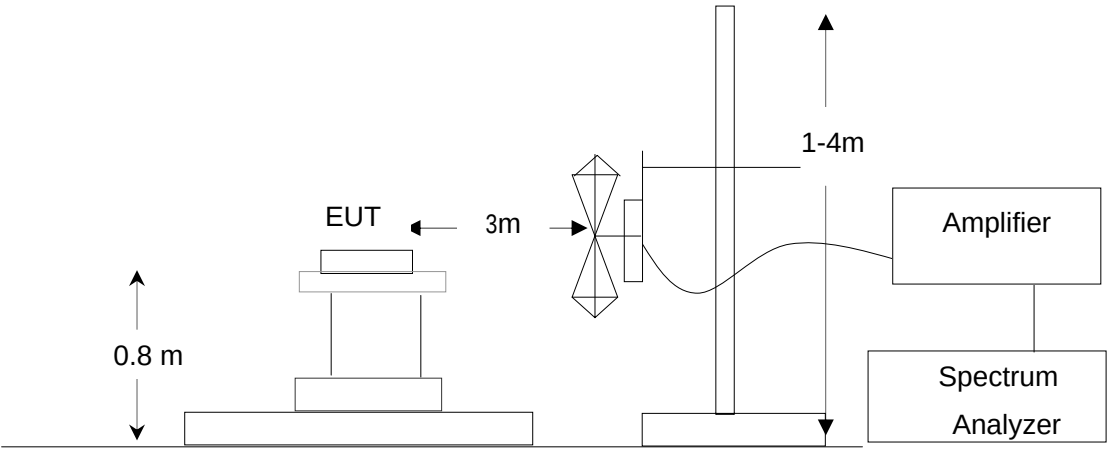
8.1. LIMITS OF RADIATED EMISSION TEST

Frequency (MHz)	Distance (m)	Maximum Field Strength Limit (dBuV/m/ Q.P.)
30~88	3	40.0
88~216	3	43.5
216~960	3	46.0
Above 960	3	54.0

Note: The lower limit shall apply at the transition frequency.

8.2. BLOCK DIAGRAM OF TEST SETUP

System Diagram of Connections between EUT and Simulators



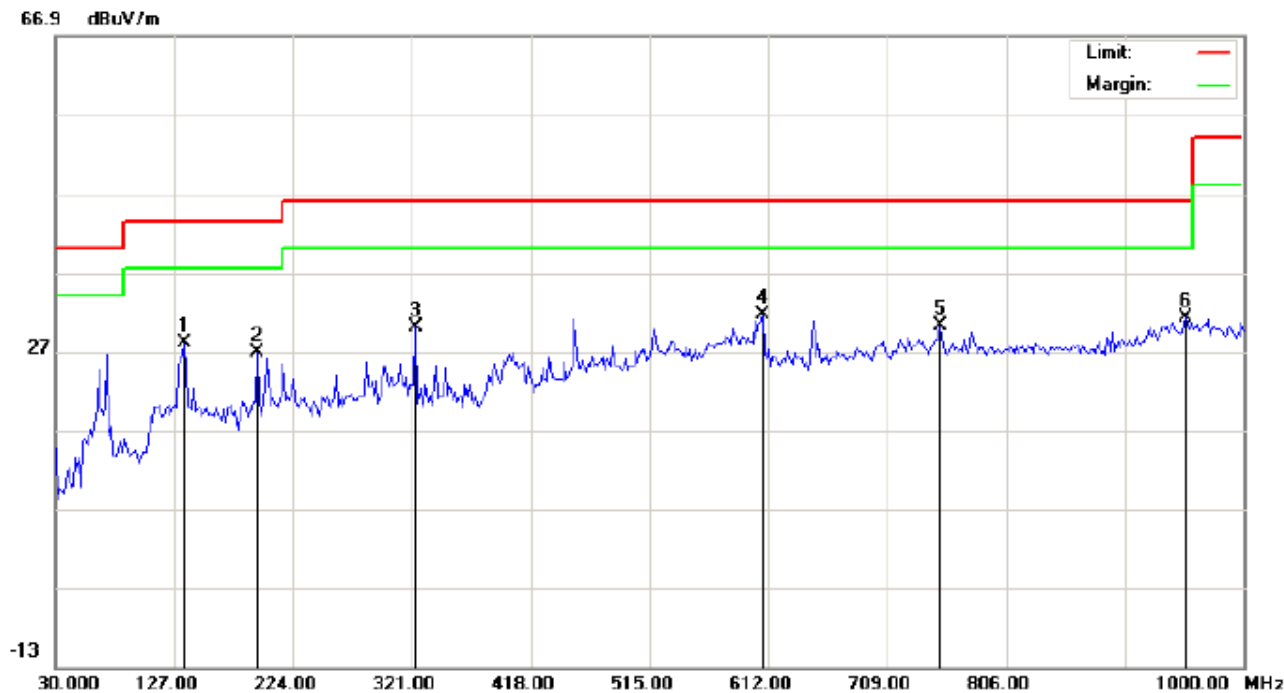
8.3. PROCEDURE OF RADIATED EMISSION TEST

- (1) The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, a wooden turntable with a height of 0.8 meters is used which is placed on the ground plane as per ANSI C63.4 (see Test Facility for the dimensions of the ground plane used). When the EUT is floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
- (2) Support equipment, if needed, was placed as per ANSI C63.4.
- (3) All I/O cables were positioned to simulate typical actual usage as per ANSI C63.4.
- (4) The EUT received DC 5V power from PC with receive 120V/60Hz power from socket under the turntable through a LISN.
- (5) The antenna was placed at 3 meter away from the EUT as stated in FCC Part 15. The antenna connected to the Analyzer via a cable and at times a pre-amplifier would be used.
- (6) The Analyzer / Receiver quickly scanned from 30MHz to 1000MHz. The EUT test program was started. Emissions were scanned and measured rotating the EUT to 360 degrees and positioning the antenna 1 to 4 meters above the ground plane, in both the vertical and the horizontal polarization, to maximize the emission reading level.
- (7) The test mode(s) were scanned during the test:
- (8) Recorded at least the six highest emissions. Emission frequency, amplitude, antenna position, polarization and turntable position were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit and Q.P./Peak reading is presented.

The test data of the worst case condition (mode 1) was reported on the Summary Data page.

8.4. TEST RESULT OF RADIATED EMISSION TEST

Radiated Emission Test at 3m Distance-Horizontal

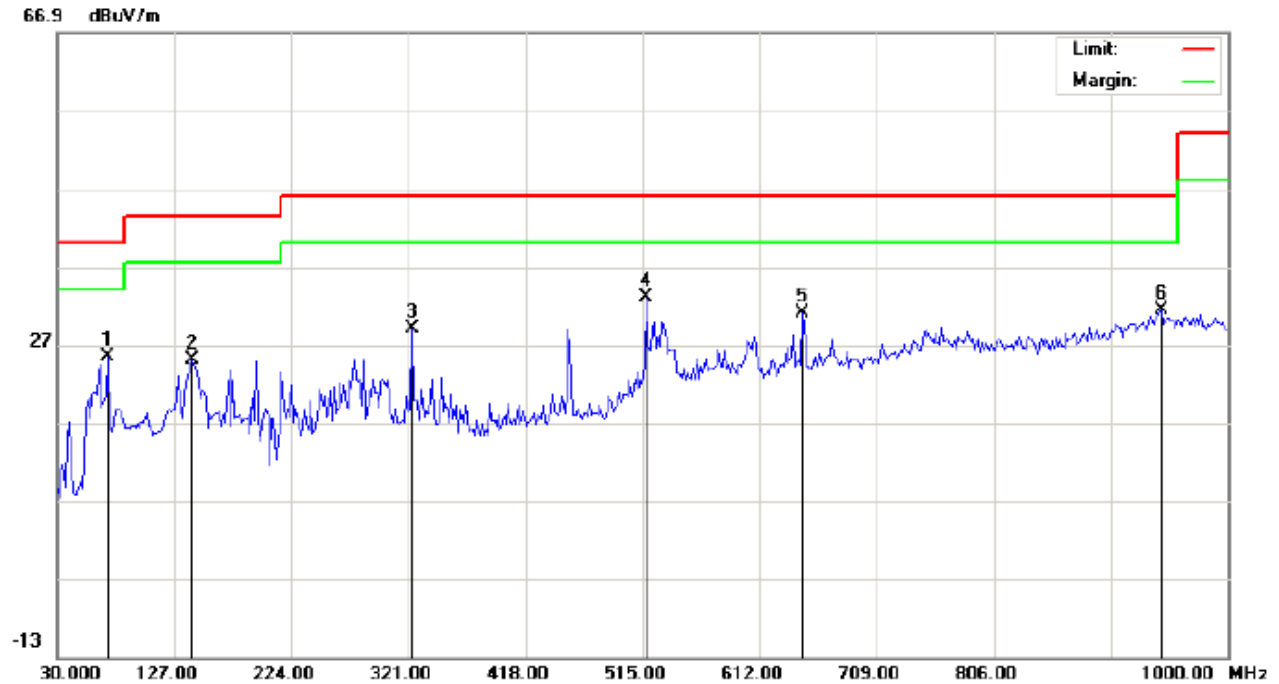


Site: site #1	Polarization: <i>Horizontal</i>	Temperature: 26
Limit: FCC Class B 3M Radiation	Power:	Humidity: 60 %
EUT:Hearing Assistive Device	Distance: 3m	
M/N:HAD1000		
Mode: USB		
Note:		

No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		135.0833	13.67	14.38	28.05	43.50	-15.45	peak			
2		194.9000	15.00	11.76	26.76	43.50	-16.74	peak			
3		324.2333	13.08	17.02	30.10	46.00	-15.90	peak			
4	*	607.1500	7.81	23.75	31.56	46.00	-14.44	peak			
5		752.6500	3.47	26.67	30.14	46.00	-15.86	peak			
6		953.1167	1.17	29.97	31.14	46.00	-14.86	peak			

RESULT: PASS

Radiated Emission Test at 3m Distance-Vertical



Site: site #1
 Limit: FCC Class B 3M Radiation
 EUT:Hearing Assistive Device
 M/N:HAD1000
 Mode:USB
 Note:

Polarization: **Vertical**
 Power:
 Distance: 3m

Temperature: 26
 Humidity: 60 %

No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		72.0333	21.63	3.76	25.39	40.00	-14.61	peak			
2		141.5500	9.85	15.21	25.06	43.50	-18.44	peak			
3		324.2333	11.97	17.02	28.99	46.00	-17.01	peak			
4	*	518.2333	11.42	21.62	33.04	46.00	-12.96	peak			
5		647.5667	7.16	23.80	30.96	46.00	-15.04	peak			
6		945.0333	1.56	29.86	31.42	46.00	-14.58	peak			

RESULT: PASS

Note: All Other modes above 1GHz have more than 20db margin, no recording in the report

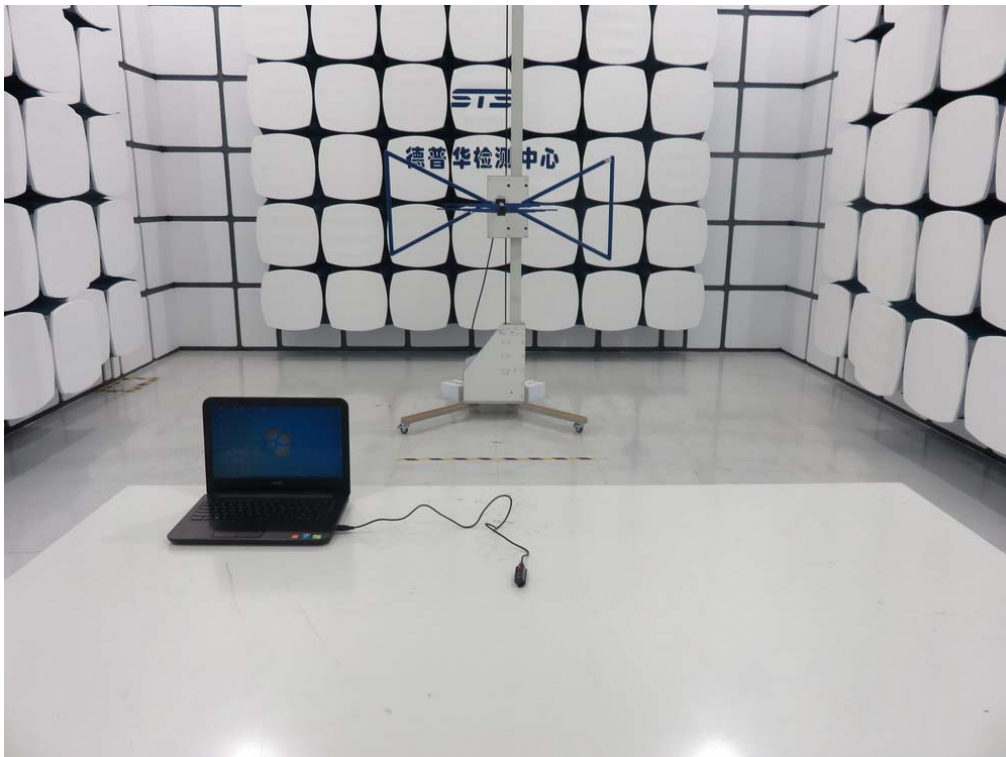
Measurement = Reading + Factor, Over = Measurement – Limit.

APPENDIX A: PHOTOGRAPHS OF TEST SETUP

FCC LINE CONDUCTED EMISSION TEST SETUP



FCC RADIATED EMISSION TEST SETUP



APPENDIX B: PHOTOGRAPHS OF EUT

TOTAL VIEW OF EUT



TOP VIEW OF EUT



BOTTOM VIEW OF EUT



FRONT VIEW OF EUT



BACK VIEW OF EUT



LEFT VIEW OF EUT



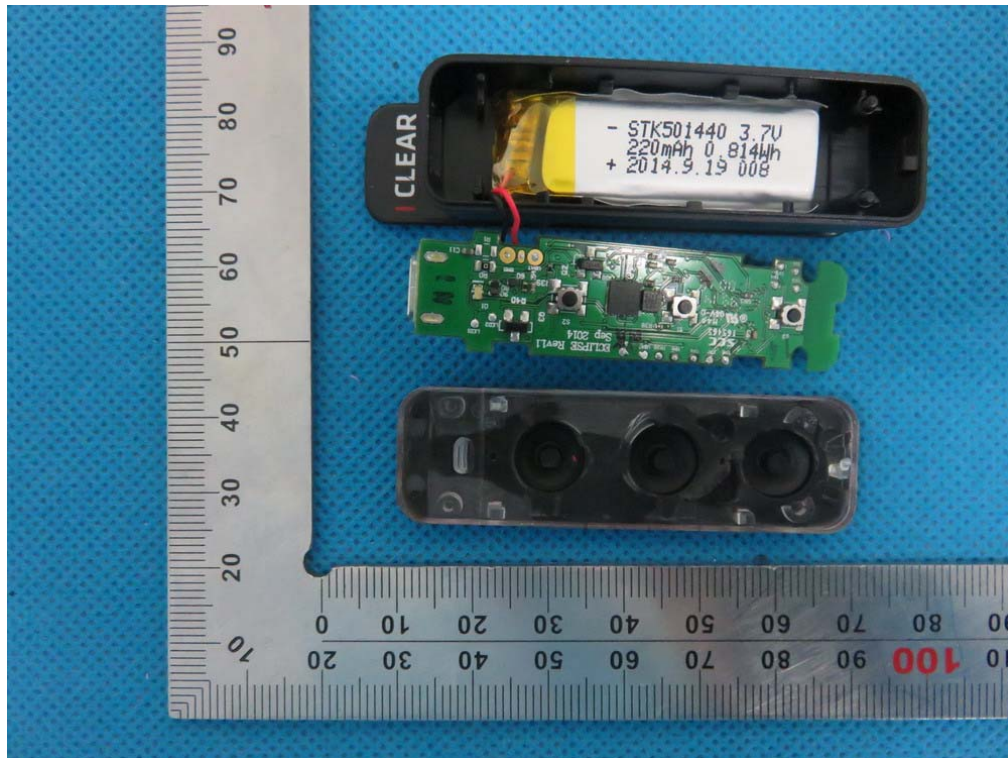
RIGHT VIEW OF EUT



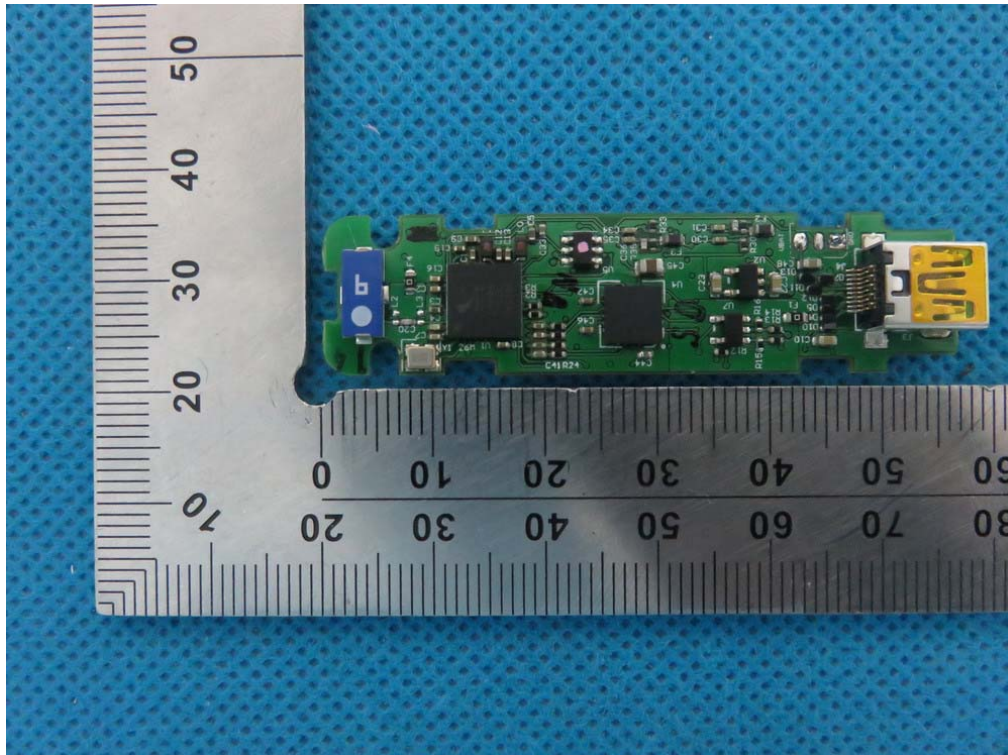
VIEW OF EUT (Port)



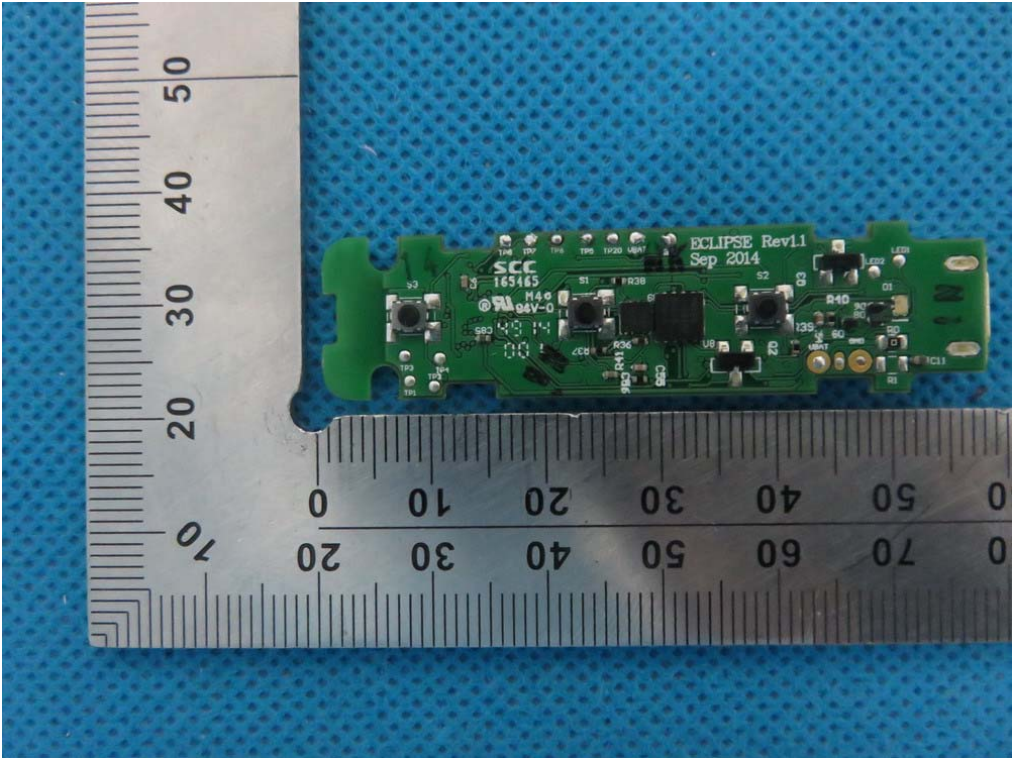
OPEN VIEW OF EUT



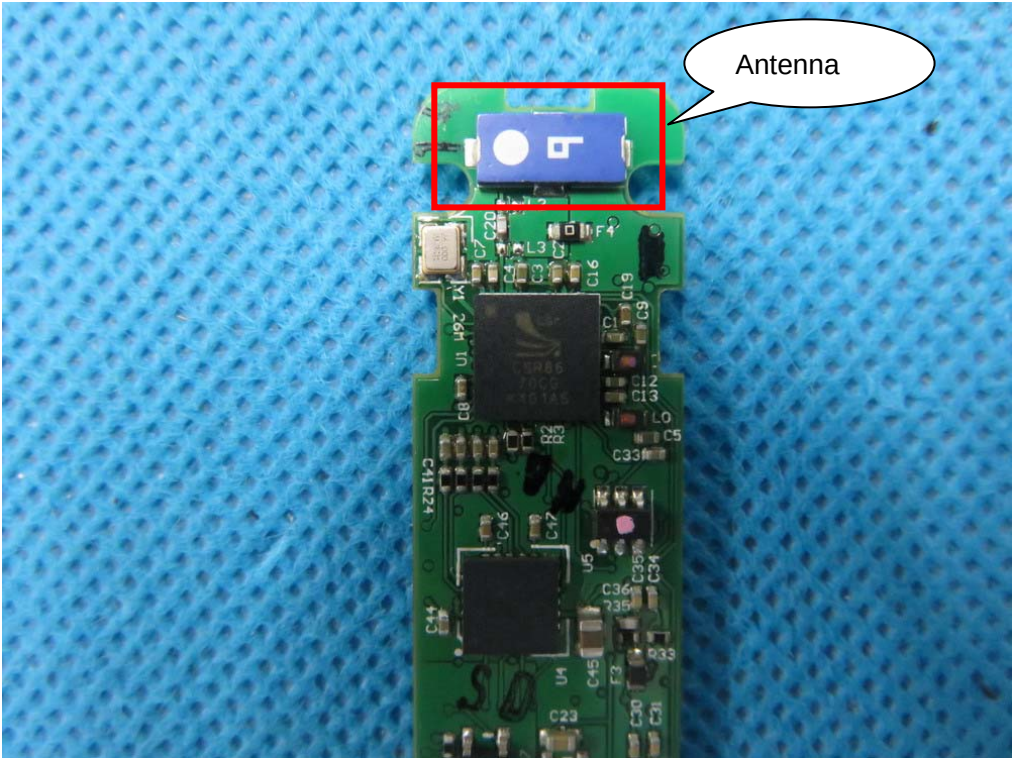
INTERNAL VIEW OF EUT-1



INTERNAL VIEW OF EUT-2



INTERNAL VIEW OF EUT-3



----END OF REPORT----