
FCC Test Report

Report No.: AGC04246150301FE03

FCC ID : NMCHAD1000
APPLICATION PURPOSE : Original Equipment
PRODUCT DESIGNATION : Hearing Assistive Device
BRAND NAME : ICLEAR DIGITAL
MODEL NAME : HAD1000
CLIENT : Bitwave Private Limited
DATE OF ISSUE : Apr.08,2015
STANDARD(S)
TEST PROCEDURE(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.08,2015	Valid	Original Report

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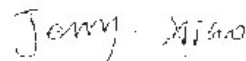
1. VERIFICATION OF CONFORMITY

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
Date of test	Apr.07,2015
Deviation	None
Condition of Test Sample	Normal
Report Template	AGCRT-US-BR/RF

We hereby certify that:

The above equipment was tested by Shenzhen STS Test Services Co., Ltd. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4 (2009) and the energy emitted by the sample EUT tested as described in this report is in compliance with radiated emission limits of FCC Rules Part 15.249.

Prepared By



Jerry Xiao

Apr.08,2015

Checked By



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Apr.08,2015

Authorized By



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Apr.08,2015

2. GENERAL INFORMATION

2.1. PRODUCT DESCRIPTION

A major technical description of EUT is described as following

Operation Frequency	2.402 GHz to 2.480GHz
RF Output Power	-1.61dBm(Max)
Bluetooth Version	V4.0
Modulation	GFSK, $\pi/4$ -DQPSK, 8DPSK
Number of channels	79 for traditional BT,40 for BLE
Hardware Version	1.1
Software Version	4.1
Antenna Designation	Ceramic Antenna (Met 15.203 Antenna requirement)
Antenna Gain	4.1dBi
Power Supply	DC3.7V

2.2. TABLE OF CARRIER FREQUENCIES

Traditional Bluetooth channel List

Frequency Band	Channel Number	Frequency
2400~2483.5MHZ	0	2402MHZ
	1	2403MHZ
	:	:
	38	2440 MHZ
	39	2441 MHZ
	40	2442 MHZ
	:	:
	77	2479 MHZ
	78	2480 MHZ

BLE Channel List

Frequency Band	Channel Number	Frequency
2400~2483.5MHZ	0	2402MHZ
	1	2404MHZ
	:	:
	38	2478 MHZ
	39	2480 MHZ

3. MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement $y \pm U$, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95 %.

No.	Item	Uncertainty
1	Conducted Emission Test	$\pm 3.18\text{dB}$
2	All emissions, radiated	$\pm 3.91\text{dB}$
3	Temperature	$\pm 0.5^\circ\text{C}$
4	Humidity	$\pm 2\%$

4. DESCRIPTION OF TEST MODES

NO.	TEST MODE DESCRIPTION
1	Low channel GFSK
2	Middle channel GFSK
3	High channel GFSK
4	Low channel $\pi/4$ -DQPSK
5	Middle channel $\pi/4$ -DQPSK
6	High channel $\pi/4$ -DQPSK
7	Low channel 8DPSK
8	Middle channel 8DPSK
9	High channel 8DPSK
10	Normal operation (BT)

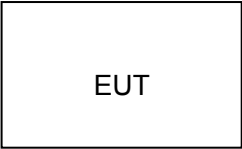
Note:

1. All the test modes can be supply by battery, only the result of the worst case was recorded in the report, if no other cases.
2. For Radiated Emission, 3axis were chosen for testing for each applicable mode.

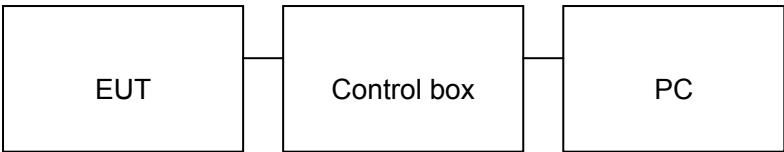
5. SYSTEM TEST CONFIGURATION

5.1. CONFIGURATION OF EUT SYSTEM

Configure 1: (Normal hopping)



Configure 2: (Control continuous TX)



5.2. EQUIPMENT USED IN EUT SYSTEM

Item	Equipment	Model No.	ID or Specification	Remark
1	Hearing Assistive Device	ICLEAR	HAD1000	EUT
2	Control box	N/A	N/A	A.E
3	PC	Dell	INSPIRON	A.E

5.3. SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
§15.249	Radiated Emission	Compliant
§15.249	Band Edges	Compliant
§15.207	Conduction Emission	Compliant

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.
FCC Registration No.	842334
Description	The test site is constructed and calibrated to meet the FCC requirements in documents ANSI C63.4:2009.

7 ALL TEST EQUIPMENT LIST

Radiation Test equipment

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
Spectrum Analyzer	Agilent	E4407B	MY50140340	2014.10.25	2015.10.24
Test Receiver	R&S	ESCI	101427	2014.10.25	2015.10.24
Bilog Antenna	TESEQ	CBL6111D	34678	2014.10.27	2015.10.26
50Ω Coaxial Switch	Anritsu	MP59B	6200264416	2014.06.06	2015.06.06
Horn Antenna	R&S	9120D	152265	2014.10.27	2015.10.26
Horn Ant	Schwarzbeck	BBHA 9170	9170-181	2014.07.06	2015.07.05
Amplifier	EM	EM-30180	060538	2014.12.22	2015.12.21
Loop Antenna	ARA	PLA-1030/B	1029	2014.06.08	2015.06.07
Power Meter	Anritsu	ML2495A	1204003	2014.10.25	2015.10.24
Power Sensor	Anritsu	MA2411B	100309	2014.10.25	2015.10.24

Conduction Test equipment

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
Test Receiver	R&S	102086	102086	2014.10.25	2015.10.24
LISN	R&S	ENV216	101242	2014.10.25	2015.10.24
LISN	EMCO	3810/2NM	000-23625	2014.10.25	2015.10.24
50Ω Coaxial Switch	Anritsu	MP59B	6200264417	2014.06.06	2015.06.06
Passive Voltage Probe	R&S	ESH2-Z3	100196	2014.06.06	2015.06.06
Absorbing clamp	R&S	MDS-21	100668	2014.10.27	2015.10.26

8. RADIATED EMISSION

8.1 TEST LIMIT

Standard FCC15.249

Fundamental Frequency	Field Strength of Fundamental (millivolts/meter)	Field Strength of Harmonics (microvolts/meter)
900-928MHz	50	500
2400-2483.5MHz	50	500
5725-5875MHz	50	500
24.0-24.25GHz	250	2500

Standard FCC 15.209

Frequency (MHz)	Distance Meters	Field Strengths Limit	
		μ V/m	dB(μ V)/m
0.009 ~ 0.490	300	2400/F(kHz)	---
0.490 ~ 1.705	30	24000/F(kHz)	---
1.705 ~ 30	30	30	---
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
960 ~ 1000	3	500	54.0
Above 1000	3	Other:74.0 dB(μ V)/m (Peak) 54.0 dB(μ V)/m (Average)	

Remark: (1) Emission level $\text{dB } \mu \text{ V} = 20 \log \text{ Emission level } \mu \text{ V/m}$
 (2) The smaller limit shall apply at the cross point between two frequency bands.
 (3) Distance is the distance in meters between the measuring instrument, antenna and the closest point of any part of the device or system.

8.2. MEASUREMENT PROCEDURE

1. Configure the EUT according to ANSI C63.4. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions above 1GHz, use 1MHz VBW and RBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer.
7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum values.
8. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High - Low scan is not required in this case.

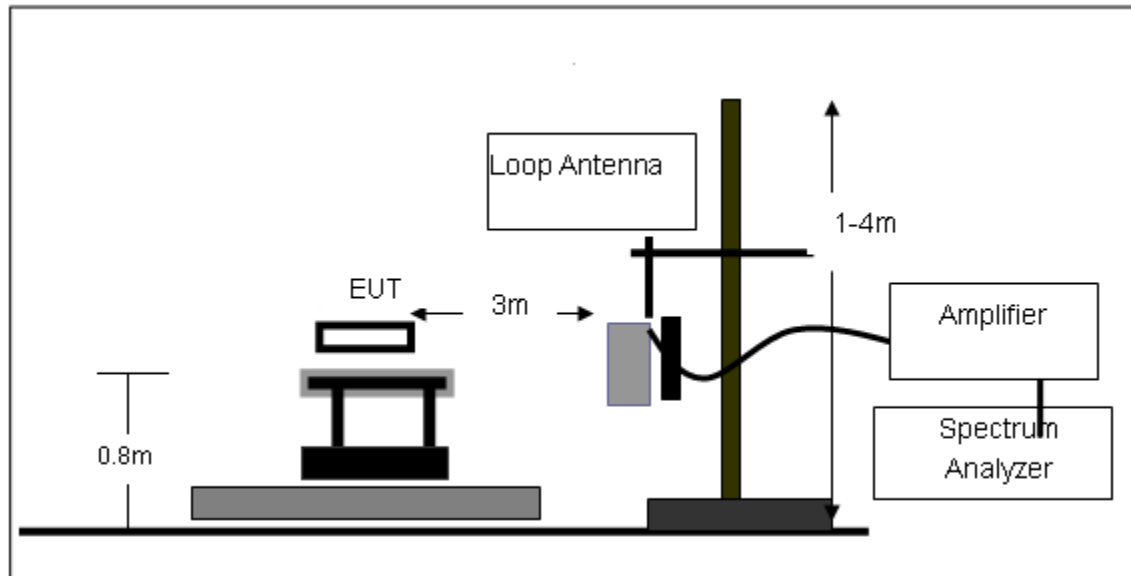
The following table is the setting of spectrum analyzer and receiver.

Spectrum Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP
Start ~Stop Frequency	1GHz~26.5GHz 1MHz/1MHz for Peak, 1MHz/10Hz for Average

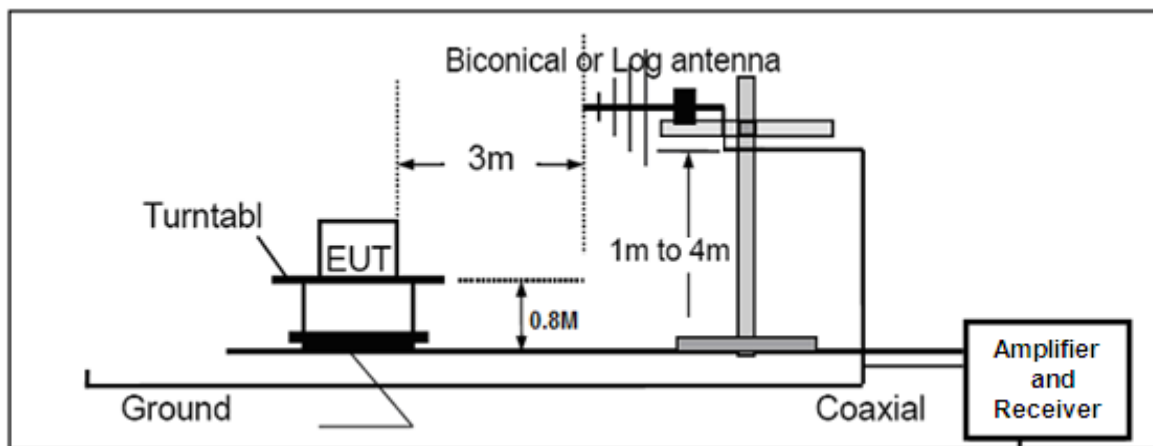
Receiver Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP

8.3. TEST SETUP

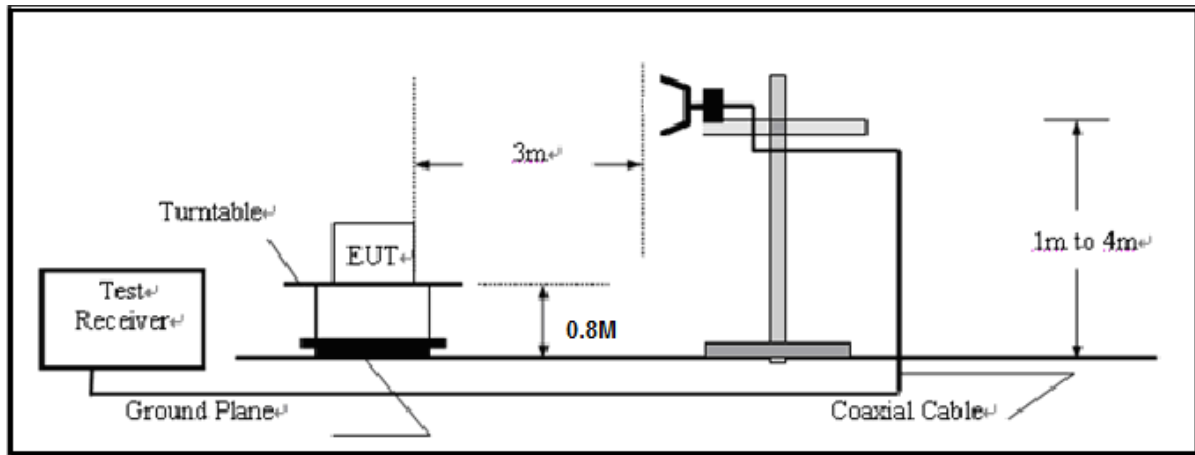
Radiated Emission Test-Setup Frequency Below 30MHz



RADIATED EMISSION TEST SETUP 30MHz-1000MHz



RADIATED EMISSION TEST SETUP ABOVE 1000MHz



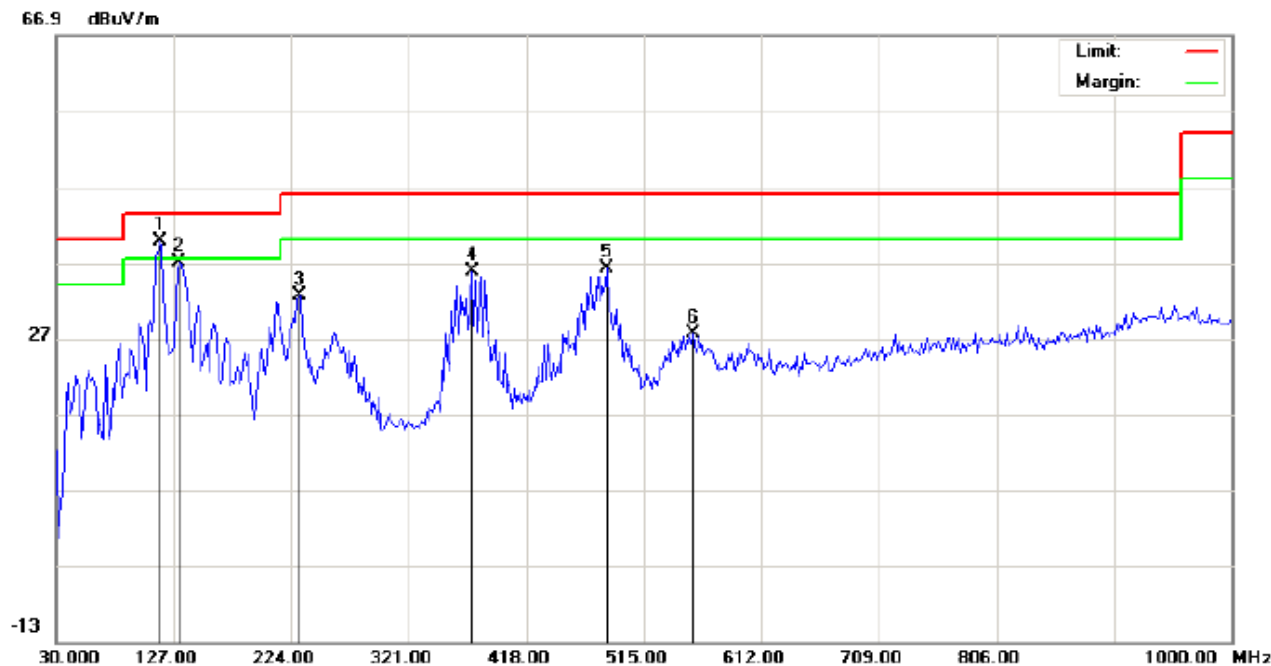
8.4. TEST RESULT(Worst modulation:GFSK)
FOR TRADITIONAL BLUETOOTH

RADIATED EMISSION BELOW 30MHZ

No emission found between lowest internal used/generated frequencies to 30MHz.

RADIATED EMISSION BELOW 1GHZ

RADIATED EMISSION TEST- (30MHZ-1GHZ)-LOW CHANNEL-HORIZONTAL



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

Polarization: *Horizontal*
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	*	115.6833	28.30	11.56	39.86	43.50	-3.64	peak			
2		131.8500	23.21	13.84	37.05	43.50	-6.45	peak			
3		230.4667	19.38	13.16	32.54	46.00	-13.46	peak			
4		372.7333	16.88	18.89	35.77	46.00	-10.23	peak			
5		484.2833	15.18	20.96	36.14	46.00	-9.86	peak			
6		555.4167	4.91	22.62	27.53	46.00	-18.47	peak			

RESULT: PASS

RADIATED EMISSION TEST- (30MHZ-1GHZ)-LOW CHANNEL -VERTICAL



Site: site #1

Polarization: *Vertical*

Temperature: 26

Limit: FCC Class B 3M Radiation

Power:

Humidity: 60 %

EUT: Hearing Assistive Device

Distance: 3m

M/N: HAD1000

Mode: Low Channel TX

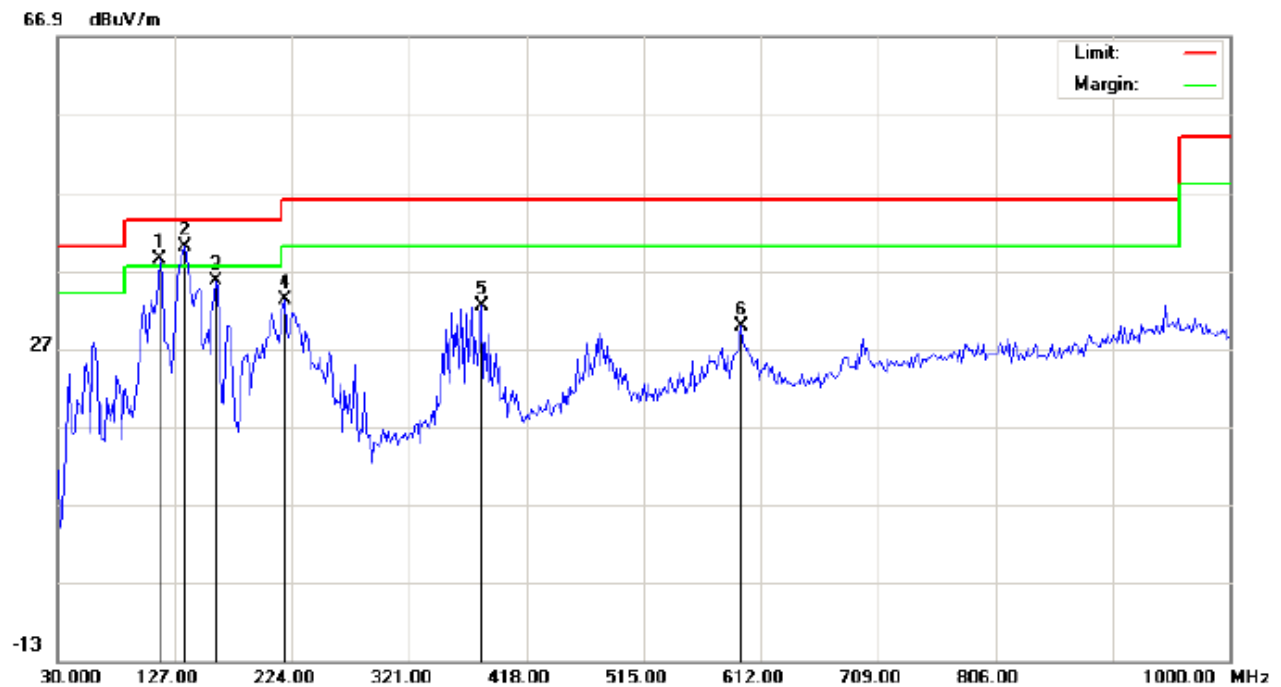
Note:

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		131.8500	22.80	11.80	34.60	43.50	-8.90	peak			
2	*	149.6333	19.51	15.26	34.77	43.50	-8.73	peak			
3		215.9167	24.09	10.56	34.65	43.50	-8.85	peak			
4		259.5667	15.94	14.19	30.13	46.00	-15.87	peak			
5		384.0500	16.01	18.96	34.97	46.00	-11.03	peak			
6		476.2000	10.56	20.87	31.43	46.00	-14.57	peak			

RESULT: PASS**Note:** 1. Factor=Antenna Factor + Cable loss, Margin=Measurement-Limit.

2. The "Factor" value can be calculated automatically by software of measurement system.

RADIATED EMISSION TEST- (30MHZ-1GHZ)-MIDDLE CHANNEL-HORIZONTAL



Site: site #1

Polarization: *Horizontal*

Temperature: 26

Limit: FCC Class B 3M Radiation

Power:

Humidity: 60 %

EUT: Hearing Assistive Device

Distance: 3m

M/N: HAD1000

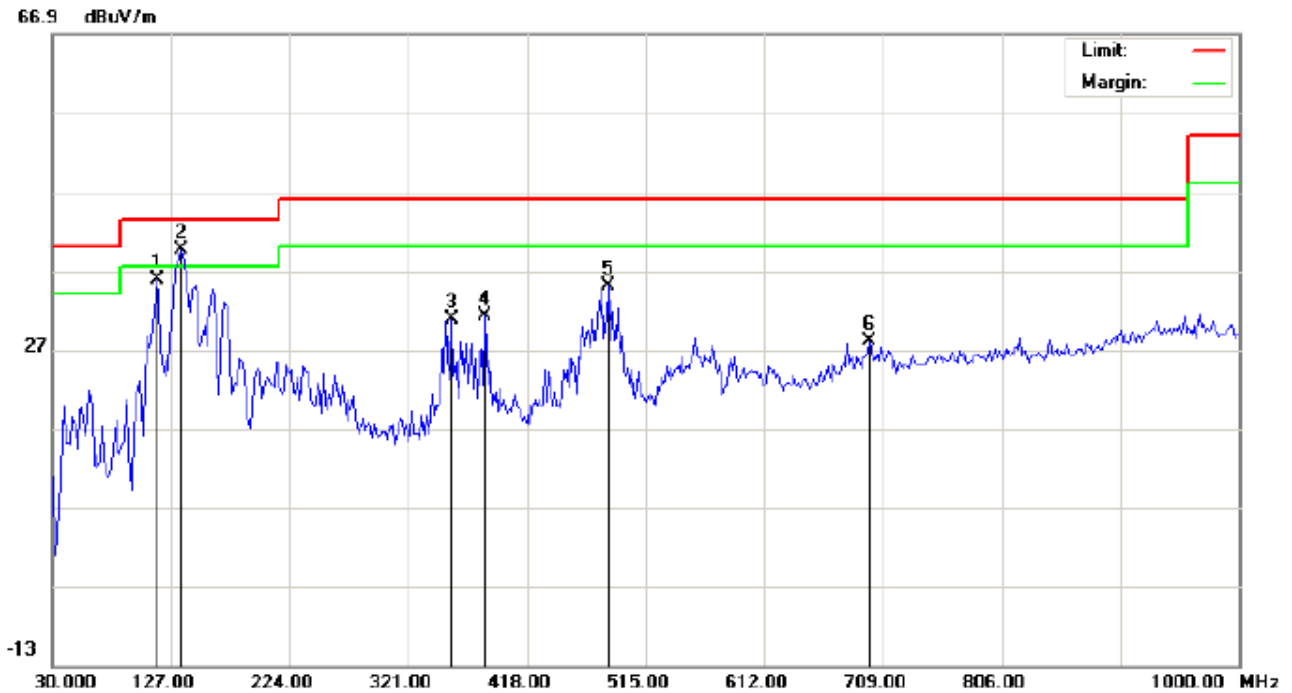
Mode: Middle Channel TX

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	!	114.0667	26.96	11.45	38.41	43.50	-5.09	peak			
2	*	135.0833	25.70	14.38	40.08	43.50	-3.42	peak			
3		160.9500	20.43	15.13	35.56	43.50	-7.94	peak			
4		217.5333	20.54	12.67	33.21	46.00	-12.79	peak			
5		380.8167	13.45	18.94	32.39	46.00	-13.61	peak			
6		595.8333	6.09	23.63	29.72	46.00	-16.28	peak			

RESULT: PASS

RADIATED EMISSION TEST- (30MHZ-1GHZ)- MIDDLE CHANNEL -VERTICAL



Site: site #1

Polarization: **Vertical**

Temperature: 26

Limit: FCC Class B 3M Radiation

Power:

Humidity: 60 %

EUT: Hearing Assistive Device

Distance: 3m

M/N: HAD1000

Mode: Middle Channel TX

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		115.6833	31.16	4.71	35.87	43.50	-7.63	peak			
2	*	135.0833	26.51	13.15	39.66	43.50	-3.84	peak			
3		356.5667	11.95	18.78	30.73	46.00	-15.27	peak			
4		384.0500	12.21	18.96	31.17	46.00	-14.83	peak			
5		484.2833	14.03	20.96	34.99	46.00	-11.01	peak			
6		697.6833	2.78	25.13	27.91	46.00	-18.09	peak			

RESULT: PASS**Note:** 1. Factor=Antenna Factor + Cable loss, Margin=Measurement-Limit.

2. The "Factor" value can be calculated automatically by software of measurement system.

RADIATED EMISSION TEST- (30MHZ-1GHZ)-HIGH CHANNEL-HORIZONTAL



Site: site #1

Polarization: *Horizontal*

Temperature: 26

Limit: FCC Class B 3M Radiation

Power:

Humidity: 60 %

EUT: Hearing Assistive Device

Distance: 3m

M/N: HAD1000

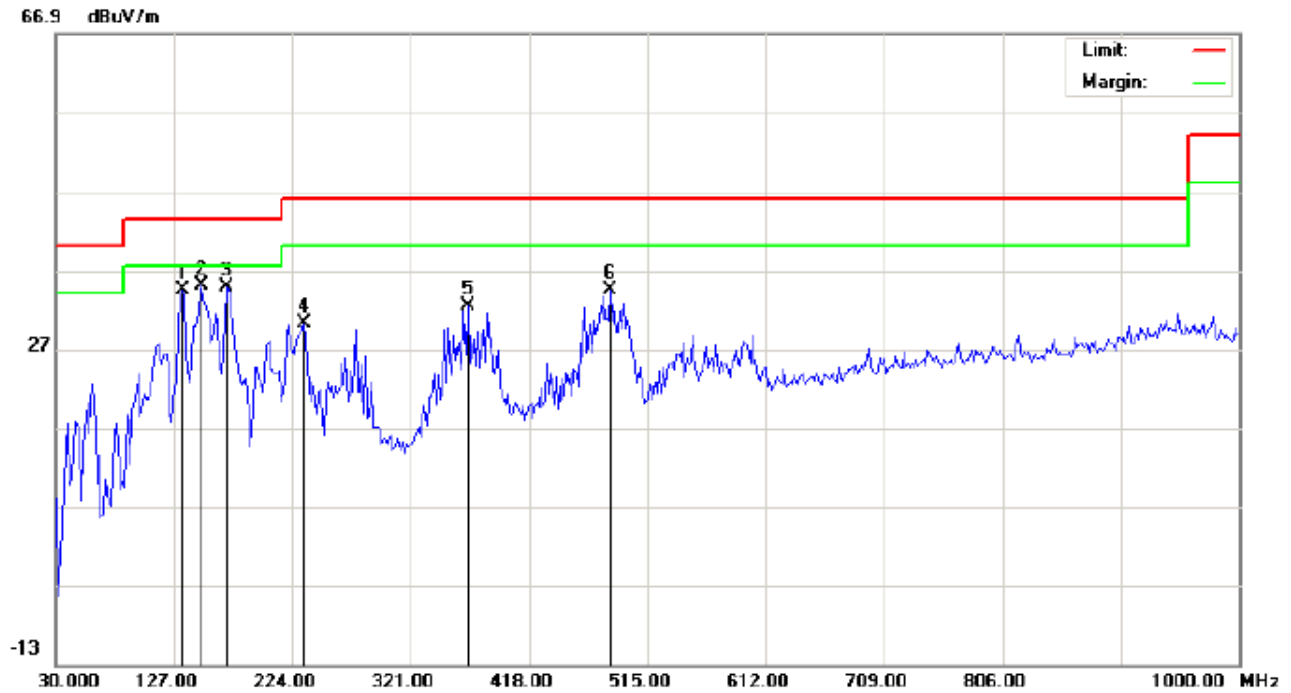
Mode: High Channel TX

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	*	112.4500	28.77	11.34	40.11	43.50	-3.39	peak			
2	!	131.8500	24.35	13.84	38.19	43.50	-5.31	peak			
3		212.6833	20.81	12.48	33.29	43.50	-10.21	peak			
4		351.7167	10.60	18.75	29.35	46.00	-16.65	peak			
5		479.4333	14.54	20.91	35.45	46.00	-10.55	peak			
6		700.9167	4.96	25.22	30.18	46.00	-15.82	peak			

RESULT: PASS

RADIATED EMISSION TEST- (30MHZ-1GHZ)-HIGH CHANNEL -VERTICAL



Site: site #1

Polarization: **Vertical**

Temperature: 26

Limit: FCC Class B 3M Radiation

Power:

Humidity: 60 %

EUT: Hearing Assistive Device

Distance: 3m

M/N: HAD1000

Mode: High Channel TX

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		133.4667	21.98	12.48	34.46	43.50	-9.04	peak			
2	*	149.6333	19.78	15.26	35.04	43.50	-8.46	peak			
3		170.6500	20.12	14.66	34.78	43.50	-8.72	peak			
4		233.7000	17.94	12.30	30.24	46.00	-15.76	peak			
5		367.8833	13.59	18.86	32.45	46.00	-13.55	peak			
6		484.2833	13.51	20.96	34.47	46.00	-11.53	peak			

RESULT: PASS**Note:** 1. Factor=Antenna Factor + Cable loss, Margin=Measurement-Limit.

2. The "Factor" value can be calculated automatically by software of measurement system.

FOR BLE

RADIATED EMISSION BELOW 30MHZ

No emission found between lowest internal used/generated frequencies to 30MHz.

RADIATED EMISSION BELOW 1GHZ

RADIATED EMISSION TEST- (30MHZ-1GHZ)-LOW CHANNEL-HORIZONTAL



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

Polarization: *Horizontal*
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	*	102.7500	26.76	10.67	37.43	43.50	-6.07	peak			
2		160.9500	17.07	15.13	32.20	43.50	-11.30	peak			
3		232.0833	18.87	13.22	32.09	46.00	-13.91	peak			
4		384.0500	15.86	18.96	34.82	46.00	-11.18	peak			
5		476.2000	11.60	20.87	32.47	46.00	-13.53	peak			
6		595.8333	2.83	23.63	26.46	46.00	-19.54	peak			

RESULT: PASS

RADIATED EMISSION TEST- (30MHZ-1GHZ)-LOW CHANNEL -VERTICAL



Site: site #1

Polarization: **Vertical**

Temperature: 26

Limit: FCC Class B 3M Radiation

Power:

Humidity: 60 %

EUT:Hearing Assistive Device

Distance: 3m

M/N: HAD1000

Mode: Low Channel TX

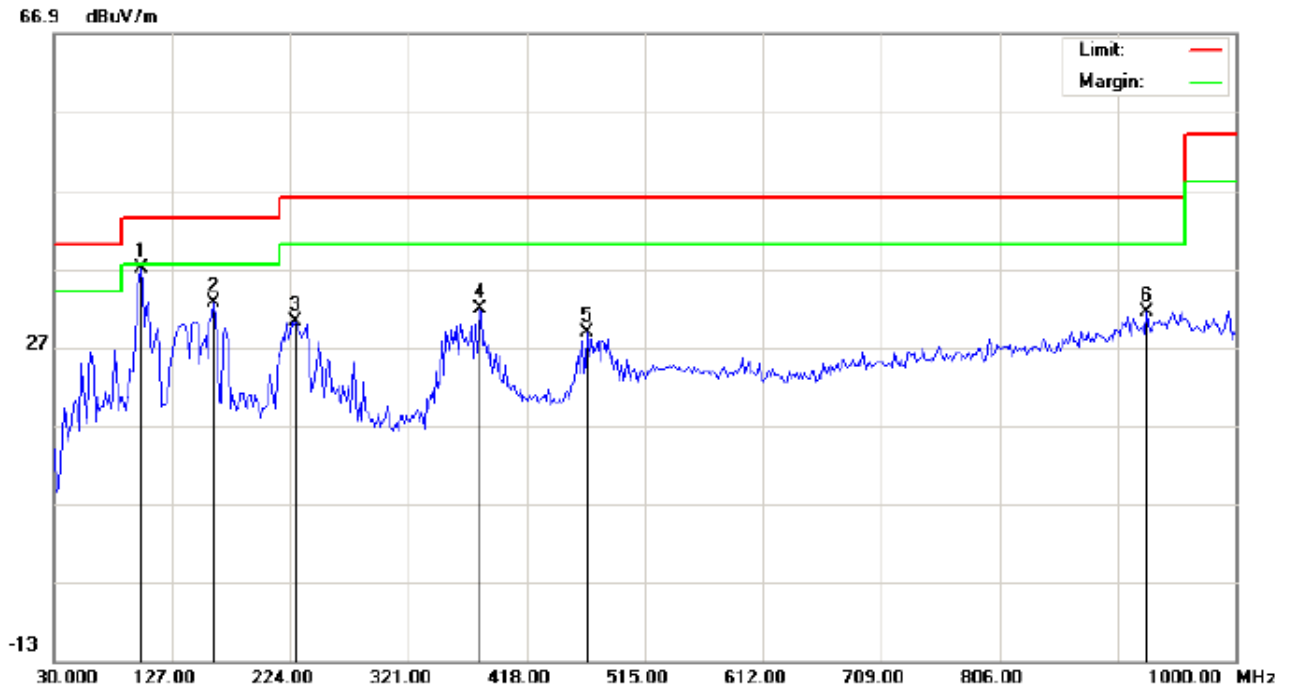
Note:

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	*	114.0667	27.51	3.91	31.42	43.50	-12.08	peak			
2		214.3000	20.19	10.40	30.59	43.50	-12.91	peak			
3		272.5000	14.83	14.58	29.41	46.00	-16.59	peak			
4		351.7167	13.97	18.75	32.72	46.00	-13.28	peak			
5		484.2833	11.10	20.96	32.06	46.00	-13.94	peak			
6		704.1500	2.50	25.31	27.81	46.00	-18.19	peak			

RESULT: PASS**Note:** 1. Factor=Antenna Factor + Cable loss, Margin=Measurement-Limit.

2. The "Factor" value can be calculated automatically by software of measurement system.

RADIATED EMISSION TEST- (30MHZ-1GHZ)-MIDDLE CHANNEL-HORIZONTAL



Site: site #1

Polarization: *Horizontal*

Temperature: 26

Limit: FCC Class B 3M Radiation

Power:

Humidity: 60 %

EUT:Hearing Assistive Device

Distance: 3m

M/N: HAD1000

Mode: Middle Channel TX

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	*	101.1333	26.51	10.56	37.07	43.50	-6.43	peak			
2		160.9500	17.45	15.13	32.58	43.50	-10.92	peak			
3		228.8500	17.11	13.10	30.21	46.00	-15.79	peak			
4		379.2000	12.80	18.93	31.73	46.00	-14.27	peak			
5		468.1167	8.00	20.79	28.79	46.00	-17.21	peak			
6		927.2500	2.11	29.37	31.48	46.00	-14.52	peak			

RESULT: PASS

RADIATED EMISSION TEST- (30MHZ-1GHZ)- MIDDLE CHANNEL -VERTICAL



Site: site #1

Polarization: **Vertical**

Temperature: 26

Limit: FCC Class B 3M Radiation

Power:

Humidity: 60 %

EUT:Hearing Assistive Device

Distance: 3m

M/N: HAD1000

Mode: Middle Channel TX

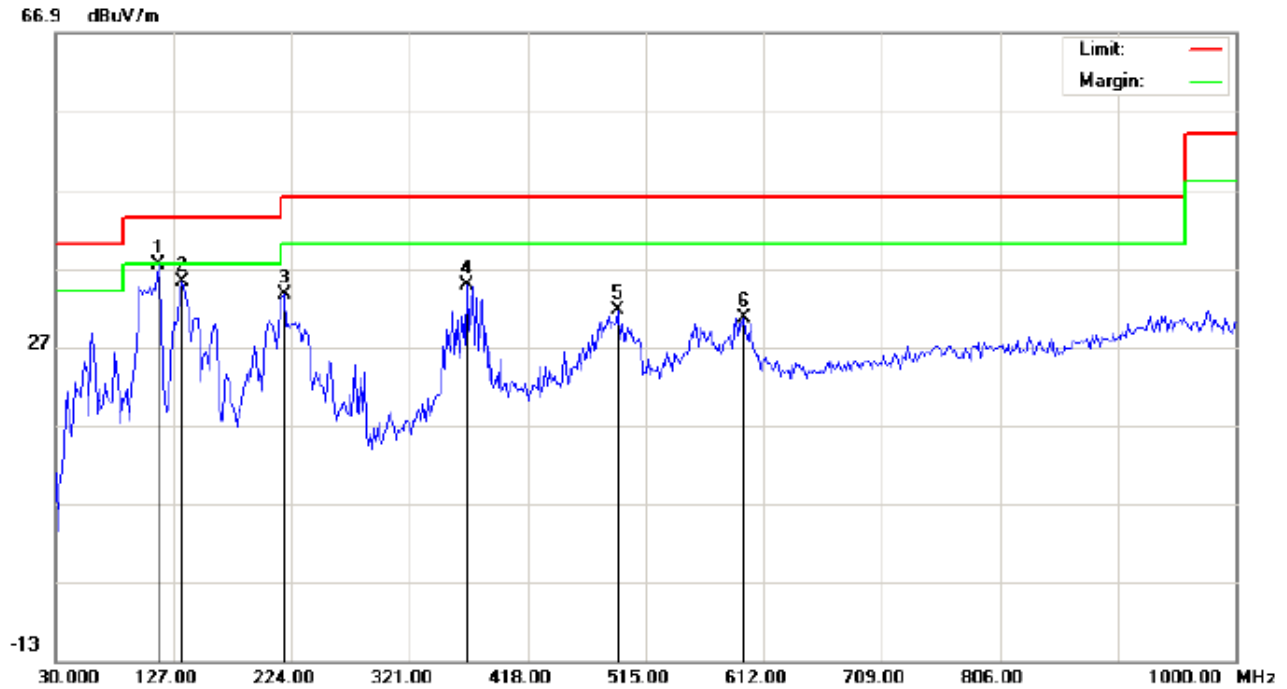
Note:

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		114.0667	25.85	3.91	29.76	43.50	-13.74	peak			
2		170.6500	13.29	14.66	27.95	43.50	-15.55	peak			
3		230.4667	17.10	11.99	29.09	46.00	-16.91	peak			
4	*	372.7333	16.11	18.89	35.00	46.00	-11.00	peak			
5		484.2833	12.79	20.96	33.75	46.00	-12.25	peak			
6		555.4167	8.49	22.51	31.00	46.00	-15.00	peak			

RESULT: PASS**Note:** 1. Factor=Antenna Factor + Cable loss, Margin=Measurement-Limit.

2. The "Factor" value can be calculated automatically by software of measurement system.

RADIATED EMISSION TEST- (30MHZ-1GHZ)-HIGH CHANNEL-HORIZONTAL



Site: site #1

Limit: FCC Class B 3M Radiation

EUT:Hearing Assistive Device

M/N: HAD1000

Mode: High Channel TX

Note:

Polarization: *Horizontal*

Power:

Distance: 3m

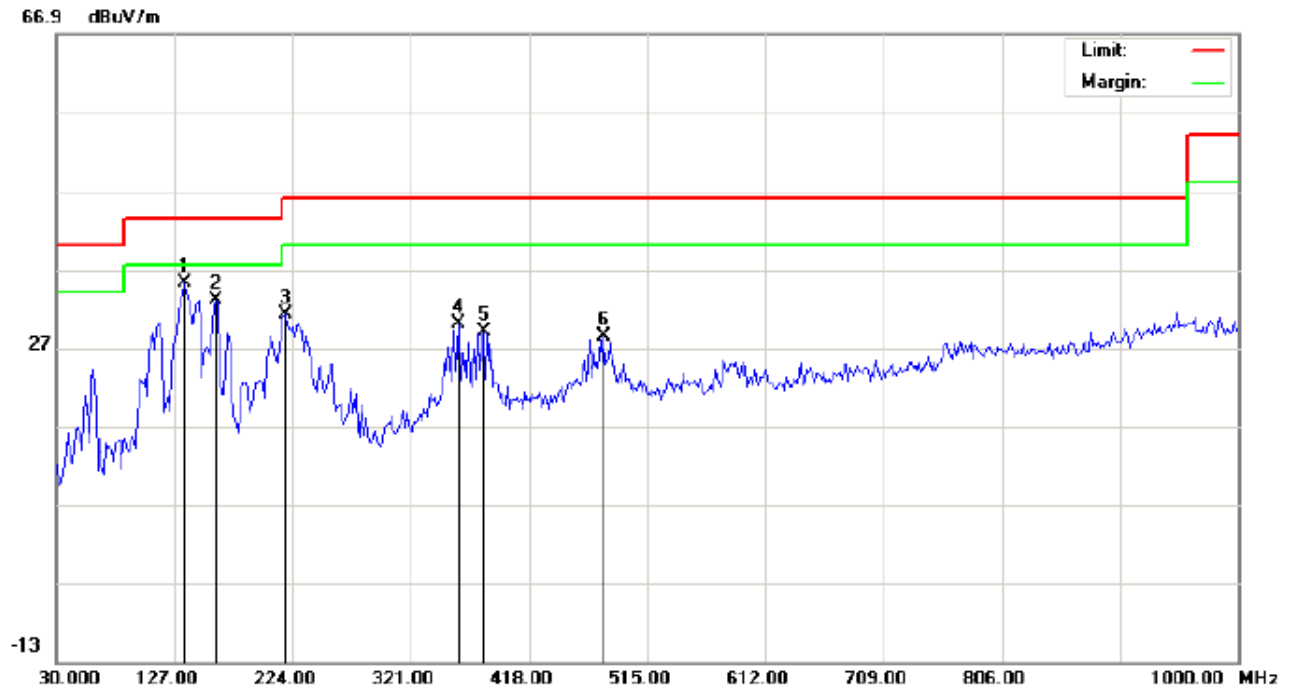
Temperature: 26

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	*	114.0667	25.87	11.45	37.32	43.50	-6.18	peak			
2		133.4667	21.10	14.11	35.21	43.50	-8.29	peak			
3		217.5333	20.99	12.67	33.66	46.00	-12.34	peak			
4		367.8833	15.85	18.86	34.71	46.00	-11.29	peak			
5		492.3667	10.65	21.05	31.70	46.00	-14.30	peak			
6		595.8333	7.07	23.63	30.70	46.00	-15.30	peak			

RESULT: PASS

RADIATED EMISSION TEST- (30MHZ-1GHZ)-HIGH CHANNEL -VERTICAL



Site: site #1

Polarization: **Vertical**

Temperature: 26

Limit: FCC Class B 3M Radiation

Power:

Humidity: 60 %

EUT:Hearing Assistive Device

Distance: 3m

M/N: HAD1000

Mode: High Channel TX

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	21.99	13.15	35.14	43.50	-8.36	peak			
2		160.9500	17.68	15.27	32.95	43.50	-10.55	peak			
3		217.5333	20.56	10.72	31.28	46.00	-14.72	peak			
4		359.8000	11.23	18.80	30.03	46.00	-15.97	peak			
5		380.8167	10.04	18.94	28.98	46.00	-17.02	peak			
6		479.4333	7.53	20.91	28.44	46.00	-17.56	peak			

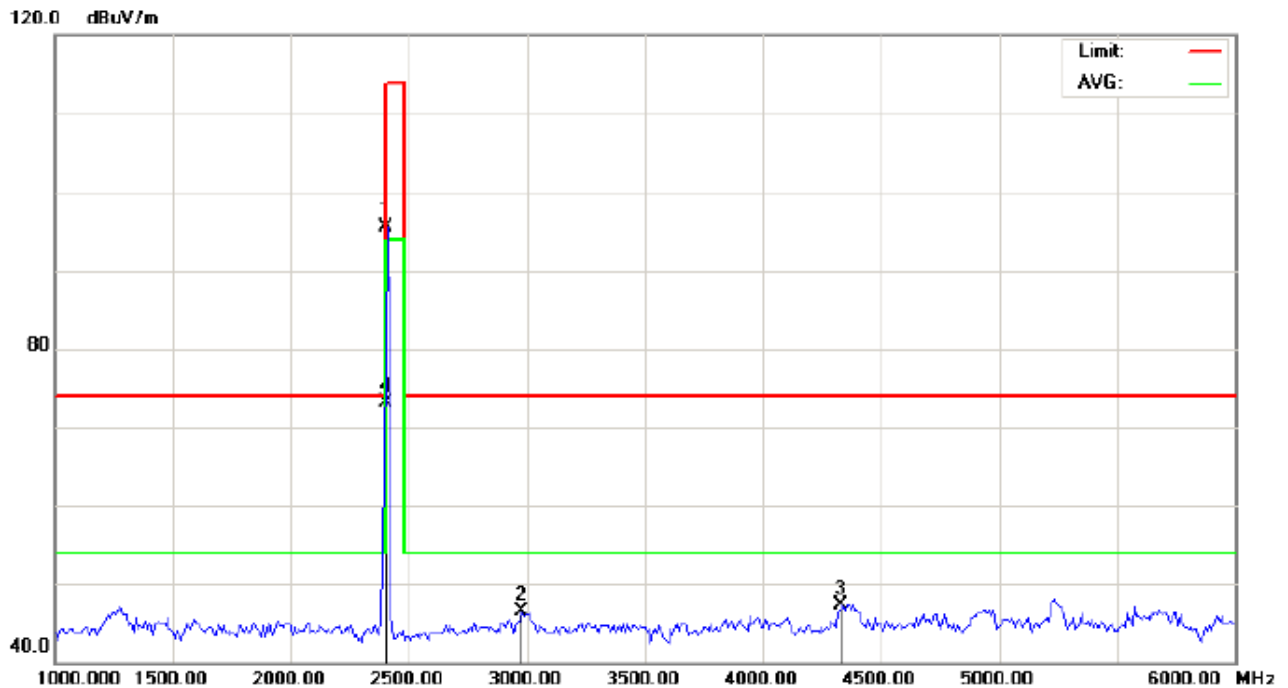
RESULT: PASS**Note:** 1. Factor=Antenna Factor + Cable loss, Margin=Measurement-Limit.

2. The "Factor" value can be calculated automatically by software of measurement system.

RADIATED EMISSION ABOVE 1GHZ

FOR TRADITIONAL BLUETOOTH

RADIATED EMISSION TEST- (ABOVE 1GHZ)-LOW CHANNEL-HORIZONTAL

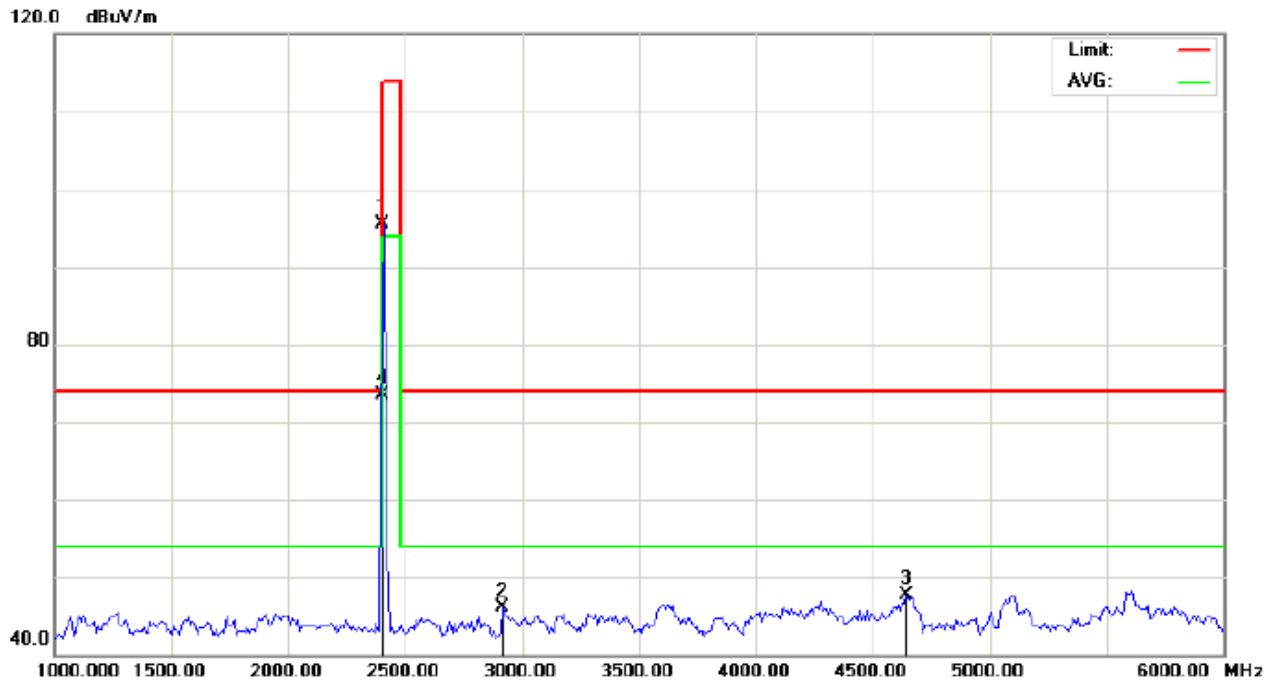


Site: site #1 Polarization: *Horizontal* Temperature: 26
Limit: FCC Class B 3M Radiation above 1GHZ(PK)- Power: Humidity: 60 %
EUT: Hearing Assistive Device Distance: 3m
M/N: HAD1000
Mode: Low Channel TX
Note:

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	*	2402.000	105.26	-9.68	95.58	114.00	-18.42	peak			
2		2975.000	54.83	-8.42	46.41	74.00	-27.59	peak			
3		4333.333	51.04	-3.68	47.36	74.00	-26.64	peak			
4		2402.000	82.86	-9.68	73.18	94.00	-20.82	AVG	100	192	

RESULT: PASS

RADIATED EMISSION TEST- (ABOVE 1GHZ)-LOW CHANNEL- VERTICAL



Site: site #1

Polarization: **Vertical**

Temperature: 26

Limit: FCC Class B 3M Radiation above 1GHZ(PK)-

Power:

Humidity: 60 %

EUT: Hearing Assistive Device

Distance: 3m

M/N: HAD1000

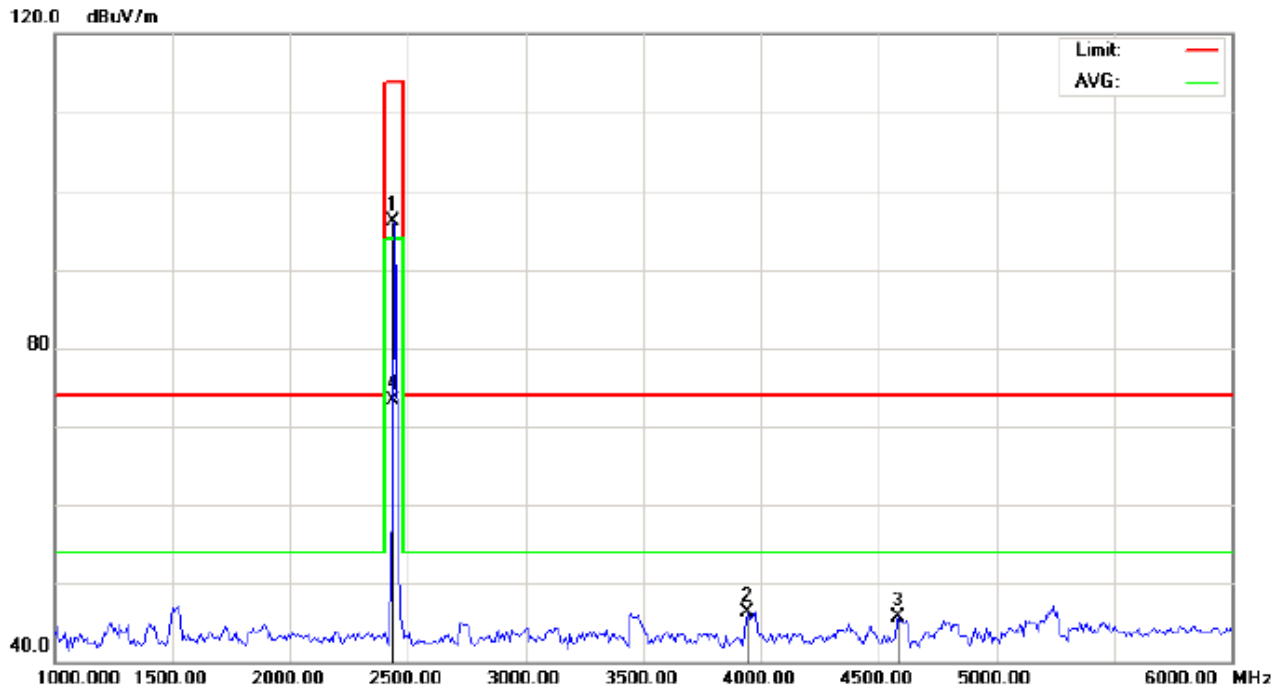
Mode: Low Channel TX

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	*	2402.000	105.23	-9.68	95.55	114.00	-18.45	peak			
2		2916.667	54.58	-8.56	46.02	74.00	-27.98	peak			
3		4641.667	50.45	-2.74	47.71	74.00	-26.29	peak			
4		2402.000	83.27	-9.68	73.59	94.00	-20.41	AVG	100	164	

RESULT: PASS

RADIATED EMISSION TEST- (ABOVE 1GHZ)-MIDDLE CHANNEL-HORIZONTAL



Site: site #1

Polarization: *Horizontal*

Temperature: 26

Limit: FCC Class B 3M Radiation above 1GHZ(PK)-

Power:

Humidity: 60 %

EUT: Hearing Assistive Device

Distance: 3m

M/N: HAD1000

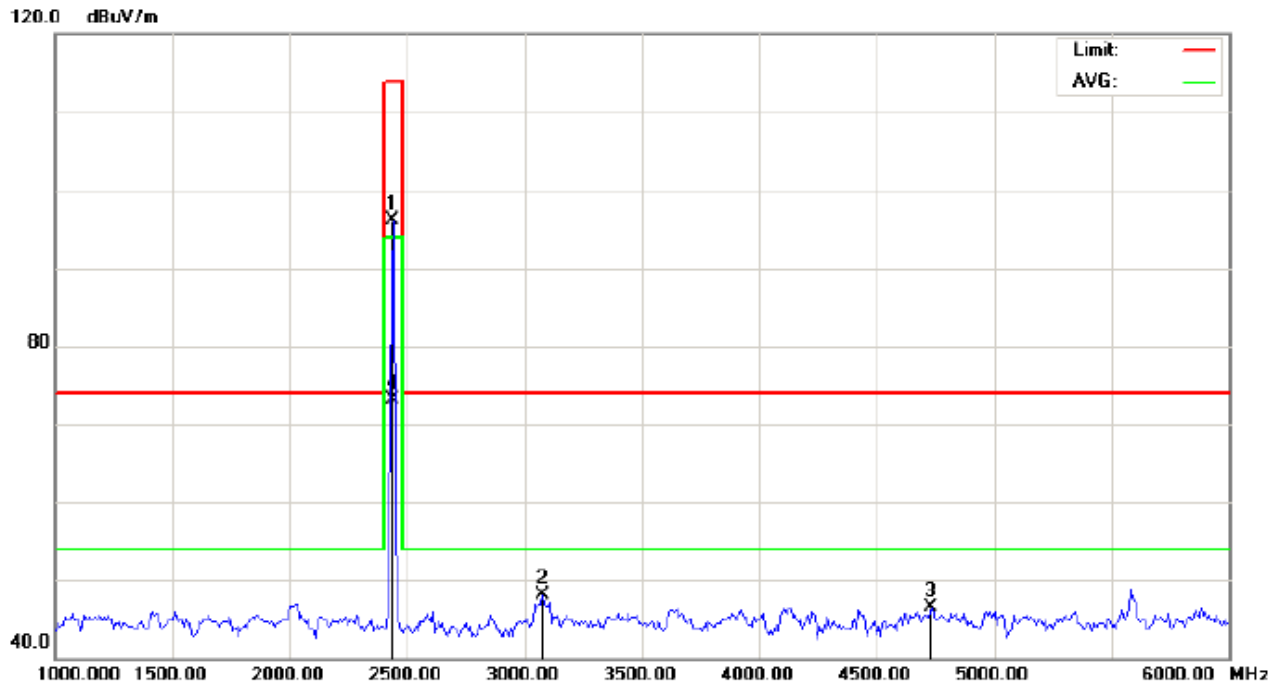
Mode: Middle Channel TX

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	*	2440.000	105.80	-9.64	96.16	114.00	-17.84	peak			
2		3941.667	51.50	-5.17	46.33	74.00	-27.67	peak			
3		4583.333	48.69	-2.89	45.80	74.00	-28.20	peak			
4		2440.000	82.96	-9.64	73.32	94.00	-20.68	AVG	150	129	

RESULT: PASS

RADIATED EMISSION TEST- (ABOVE 1GHZ)-MIDDLE CHANNEL- VERTICAL

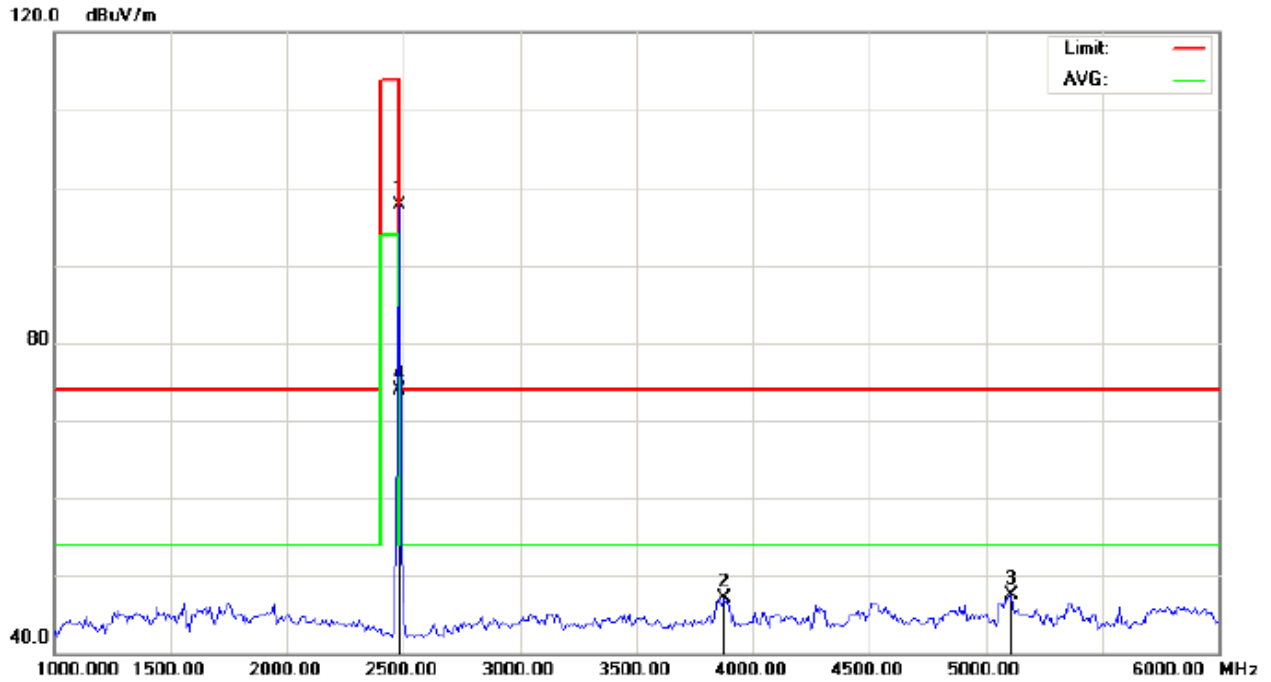


Site: site #1 Polarization: **Vertical** Temperature: 26
Limit: FCC Class B 3M Radiation above 1GHZ(PK)- Power: Humidity: 60 %
EUT: Hearing Assistive Device Distance: 3m
M/N: HAD1000
Mode: Middle Channel TX
Note:

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	*	2440.000	105.74	-9.64	96.10	114.00	-17.90	peak			
2		3075.000	56.36	-8.29	48.07	74.00	-25.93	peak			
3		4733.333	48.94	-2.50	46.44	74.00	-27.56	peak			
4		2440.000	82.68	-9.64	73.04	94.00	-20.96	AVG	100	129	

RESULT: PASS

RADIATED EMISSION TEST- (ABOVE 1GHZ)-HIGH CHANNEL-HORIZONTAL

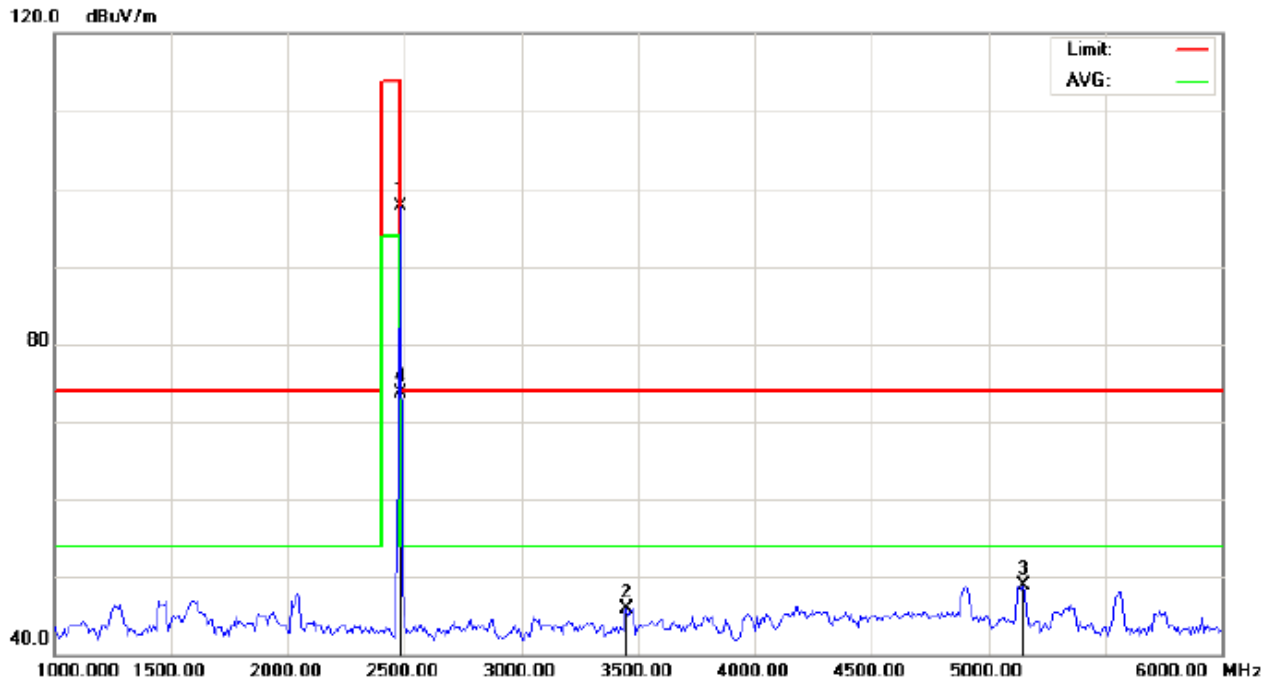


Site: site #1 Polarization: *Horizontal* Temperature: 26
Limit: FCC Class B 3M Radiation above 1GHZ(PK)- Power: Humidity: 60 %
EUT: Hearing Assistive Device Distance: 3m
M/N: HAD1000
Mode: High Channel TX
Note:

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	*	2480.000	107.37	-9.59	97.78	114.00	-16.22	peak			
2		3875.000	52.62	-5.58	47.04	74.00	-26.96	peak			
3		5108.333	49.39	-1.80	47.59	74.00	-26.41	peak			
4		2480.000	83.51	-9.59	73.92	94.00	-20.08	AVG	150	67	

RESULT: PASS

RADIATED EMISSION TEST- (ABOVE 1GHZ)-HIGH CHANNEL- VERTICAL



Site: site #1

Polarization: *Vertical*

Temperature: 26

Limit: FCC Class B 3M Radiation above 1GHZ(PK)-

Power:

Humidity: 60 %

EUT: Hearing Assistive Device

Distance: 3m

M/N: HAD1000

Mode: High Channel TX

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	*	2480.000	107.37	-9.59	97.78	114.00	-16.22	peak			
2		3450.000	53.94	-7.94	46.00	74.00	-28.00	peak			
3		5150.000	50.65	-1.80	48.85	74.00	-25.15	peak			
4		2480.000	83.21	-9.59	73.62	94.00	-20.38	AVG	150	0	

RESULT: PASS**Note:** 6~25GHz at least have 20dB margin. No recording in the test report.

Factor=Antenna Factor + Cable loss - Amplifier gain, Margin=Measurement-Limit.

The "Factor" value can be calculated automatically by software of measurement system.

Field strength of the fundamental signal

Peak value

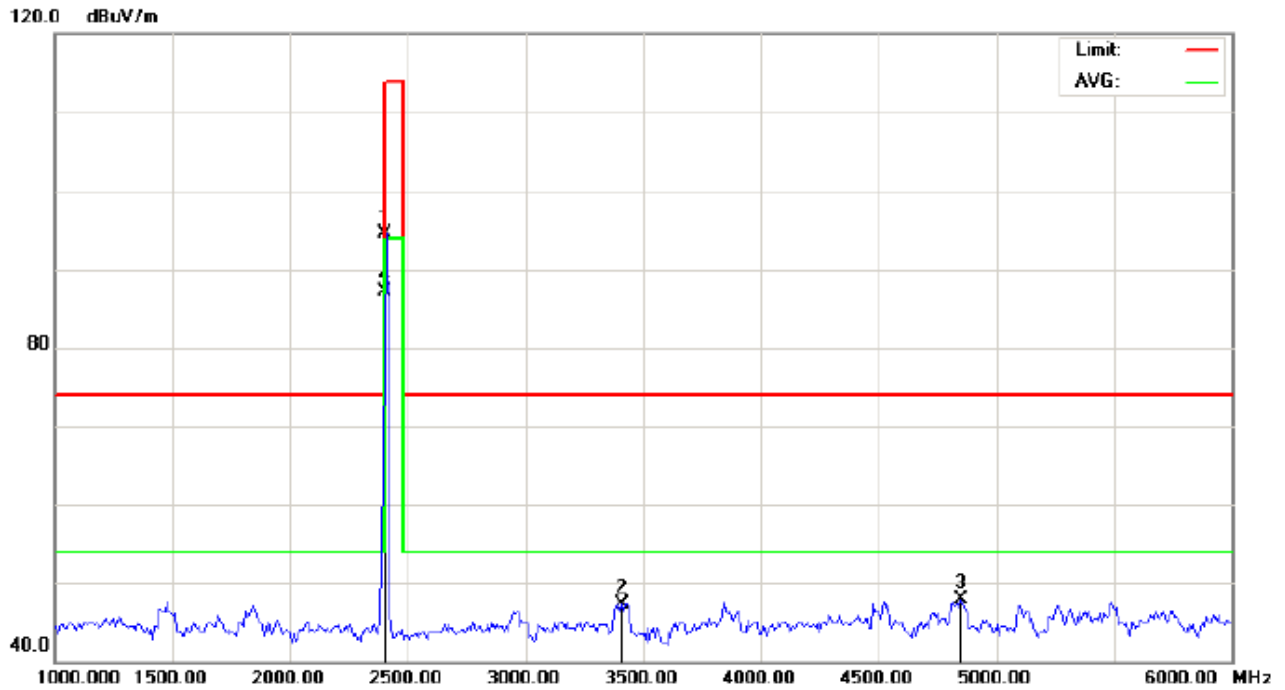
Frequency	Reading Level	Factor	Measurement	Limit	Over	Antenna
(MHz)	(dBuv)	(dB/m)	(dBuv/m)	(dBuv/m)	(dB)	Polarization
2402	105.26	-9.68	95.58	114	-18.42	Horizontal
2402	105.23	-9.68	95.55	114	-18.45	Vertical
2440	105.80	-9.64	96.16	114	-17.84	Horizontal
2440	105.74	-9.64	96.10	114	-17.90	Vertical
2480	107.37	-9.59	97.78	114	-16.22	Horizontal
2480	107.37	-9.59	97.78	114	-16.22	Vertical

Average value

Frequency	Reading Level	Factor	Measurement	Limit	Over	Antenna
(MHz)	(dBuv)	(dB/m)	(dBuv/m)	(dBuv/m)	(dB)	Polarization
2402	82.86	-9.68	73.18	94	-20.82	Horizontal
2402	83.27	-9.68	73.59	94	-20.41	Vertical
2440	82.96	-9.64	73.32	94	-20.68	Horizontal
2440	82.68	-9.64	73.04	94	-20.96	Vertical
2480	83.51	-9.59	73.92	94	-20.08	Horizontal
2480	83.21	-9.59	73.62	94	-20.38	Vertical

FOR BLE

RADIATED EMISSION TEST- (ABOVE 1GHZ)-LOW CHANNEL-HORIZONTAL

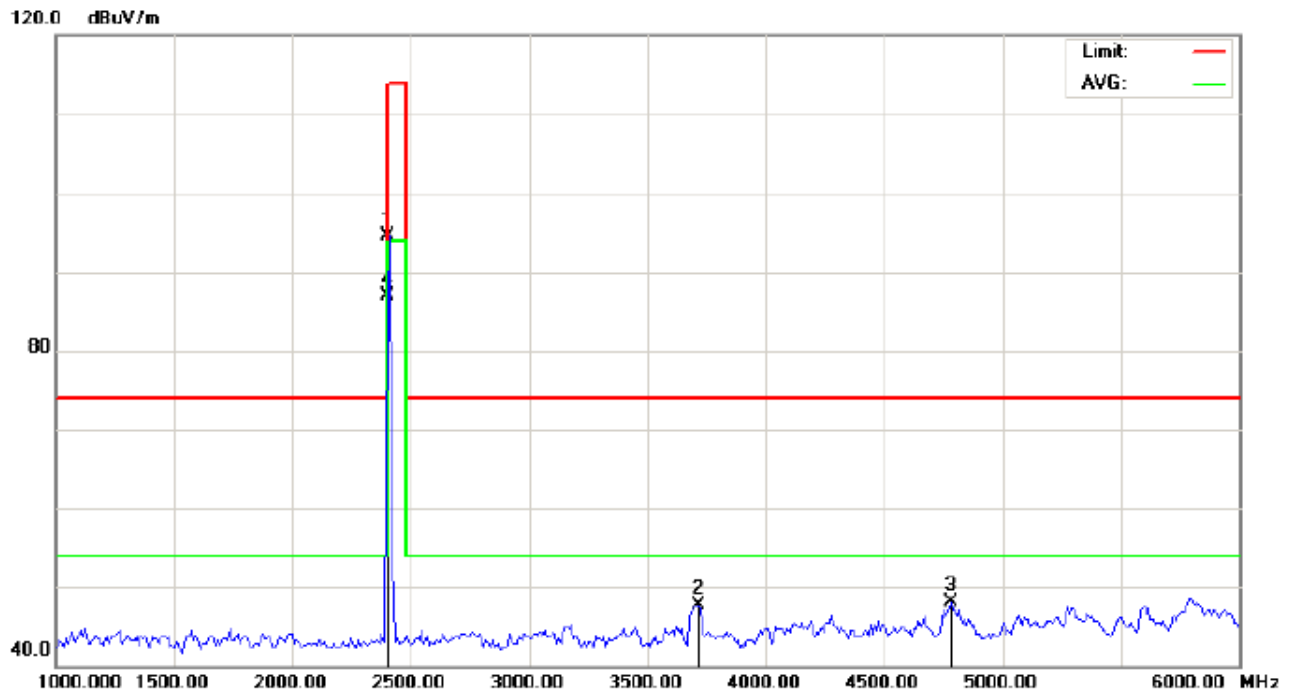


Site: site #1 Polarization: *Horizontal* Temperature: 26
Limit: FCC Class B 3M Radiation above 1GHZ(PK)- Power: Humidity: 60 %
EUT: Hearing Assistive Device Distance: 3m
M/N: HAD1000
Mode: Low Channel TX
Note:

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		2402.000	104.20	-9.68	94.52	114.00	-19.48	peak			
2		3408.333	55.36	-7.98	47.38	74.00	-26.62	peak			
3		4850.000	50.18	-2.19	47.99	74.00	-26.01	peak			
4	*	2402.000	96.82	-9.68	87.14	94.00	-6.86	AVG	100	360	

RESULT: PASS

RADIATED EMISSION TEST- (ABOVE 1GHZ)-LOW CHANNEL- VERTICAL



Site: site #1

Polarization: **Vertical**

Temperature: 26

Limit: FCC Class B 3M Radiation above 1GHZ(PK)-

Power:

Humidity: 60 %

EUT: Hearing Assistive Device

Distance: 3m

M/N: HAD1000

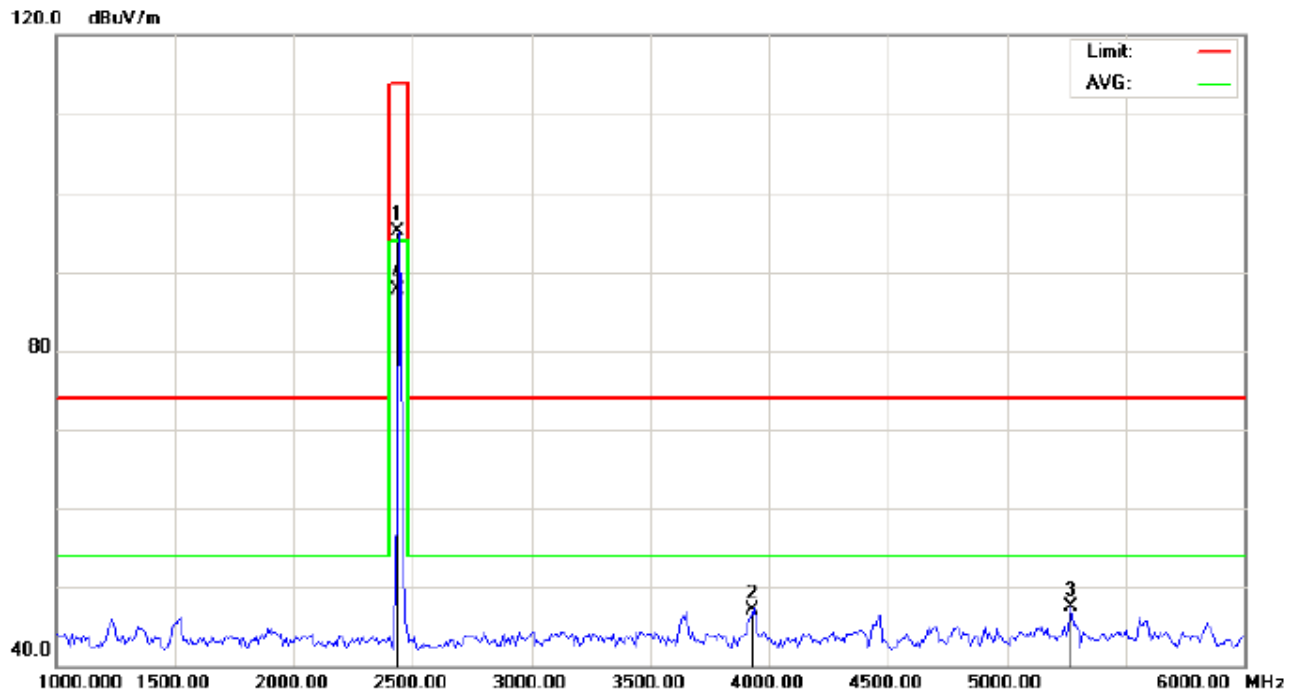
Mode: Low Channel TX

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		2402.000	104.25	-9.68	94.57	114.00	-19.43	peak			
2		3716.667	54.28	-6.56	47.72	74.00	-26.28	peak			
3		4783.333	50.53	-2.37	48.16	74.00	-25.84	peak			
4	*	2402.000	96.59	-9.68	86.91	94.00	-7.09	AVG	100	275	

RESULT: PASS

RADIATED EMISSION TEST- (ABOVE 1GHZ)-MIDDLE CHANNEL-HORIZONTAL



Site: site #1

Polarization: *Horizontal*

Temperature: 26

Limit: FCC Class B 3M Radiation above 1GHZ(PK)-

Power:

Humidity: 60 %

EUT: Hearing Assistive Device

Distance: 3m

M/N: HAD1000

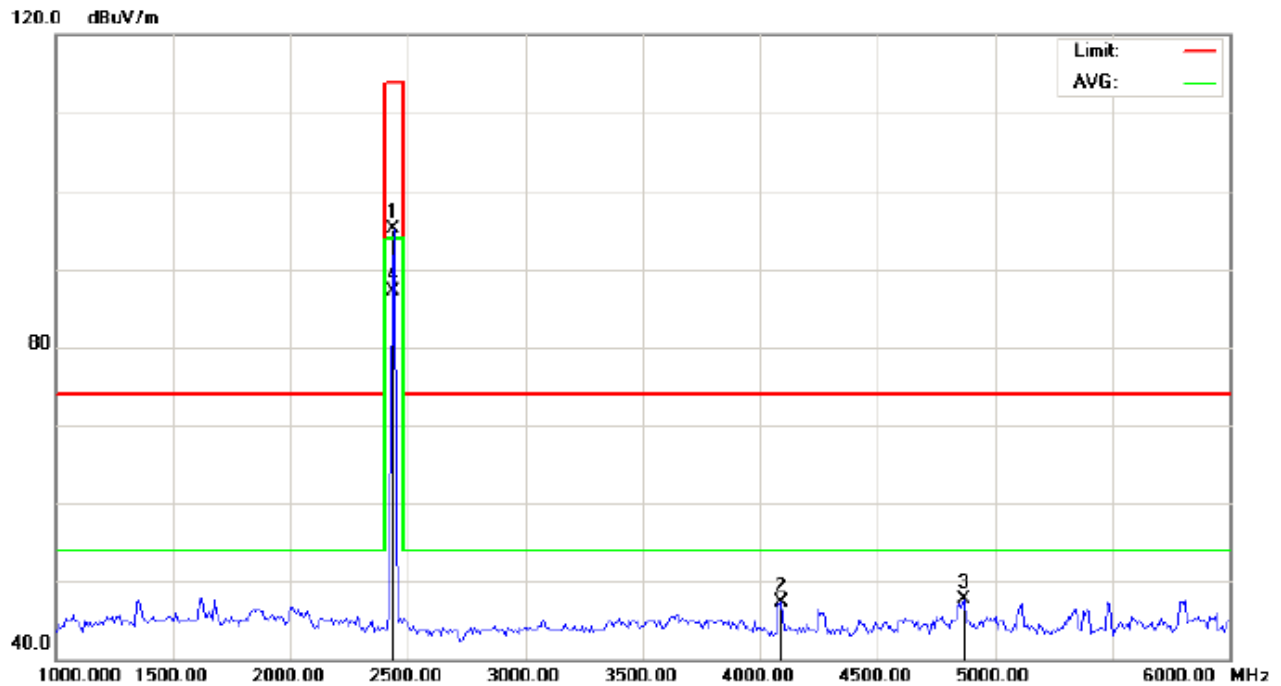
Mode: Middle Channel TX

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		2440.000	104.80	-9.64	95.16	114.00	-18.84	peak			
2		3933.333	52.42	-5.22	47.20	74.00	-26.80	peak			
3		5266.667	49.33	-1.81	47.52	74.00	-26.48	peak			
4	*	2440.000	97.25	-9.64	87.61	94.00	-6.39	AVG	100	115	

RESULT: PASS

RADIATED EMISSION TEST- (ABOVE 1GHZ)-MIDDLE CHANNEL- VERTICAL



Site: site #1

Polarization: **Vertical**

Temperature: 26

Limit: FCC Class B 3M Radiation above 1GHZ(PK)-

Power:

Humidity: 60 %

EUT: Hearing Assistive Device

Distance: 3m

M/N: HAD1000

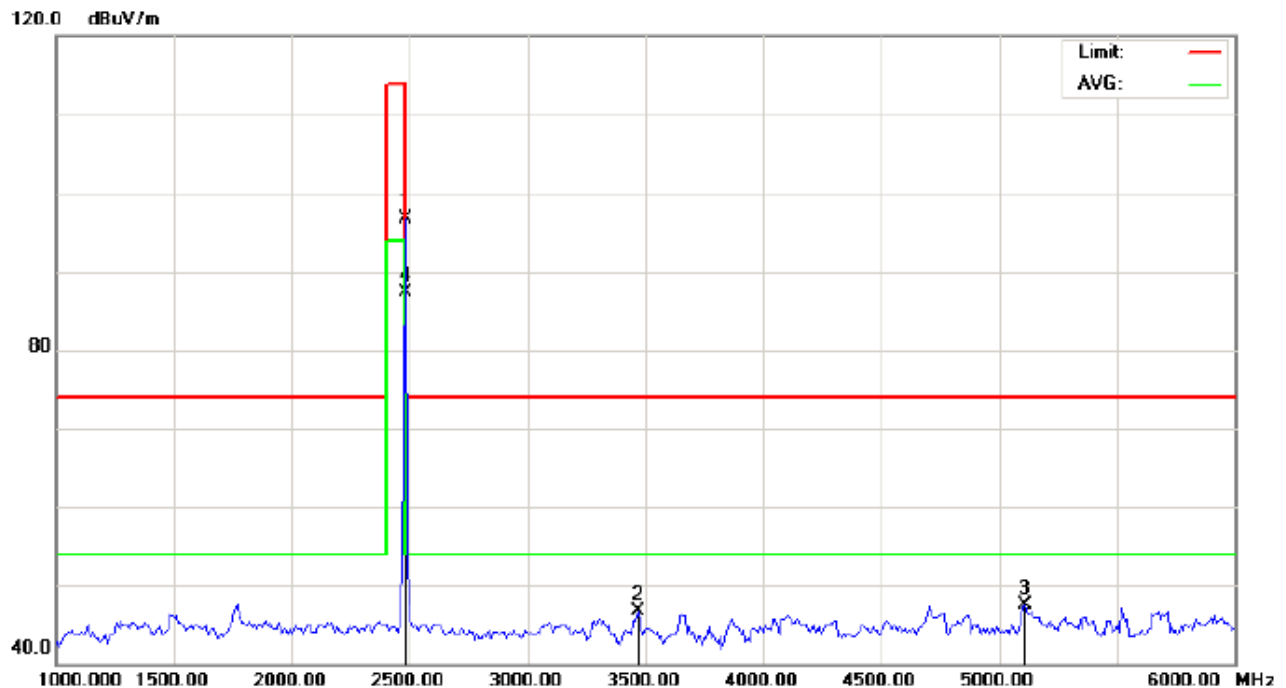
Mode: Middle Channel TX

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		2440.000	104.74	-9.64	95.10	114.00	-18.90	peak			
2		4091.667	51.77	-4.50	47.27	74.00	-26.73	peak			
3		4866.667	49.80	-2.15	47.65	74.00	-26.35	peak			
4	*	2440.000	96.75	-9.64	87.11	94.00	-6.89	AVG	100	187	

RESULT: PASS

RADIATED EMISSION TEST- (ABOVE 1GHZ)-HIGH CHANNEL-HORIZONTAL



Site: site #1

Polarization: *Horizontal*

Temperature: 26

Limit: FCC Class B 3M Radiation above 1GHZ(PK)-

Power:

Humidity: 60 %

EUT: Hearing Assistive Device

Distance: 3m

M/N: HAD1000

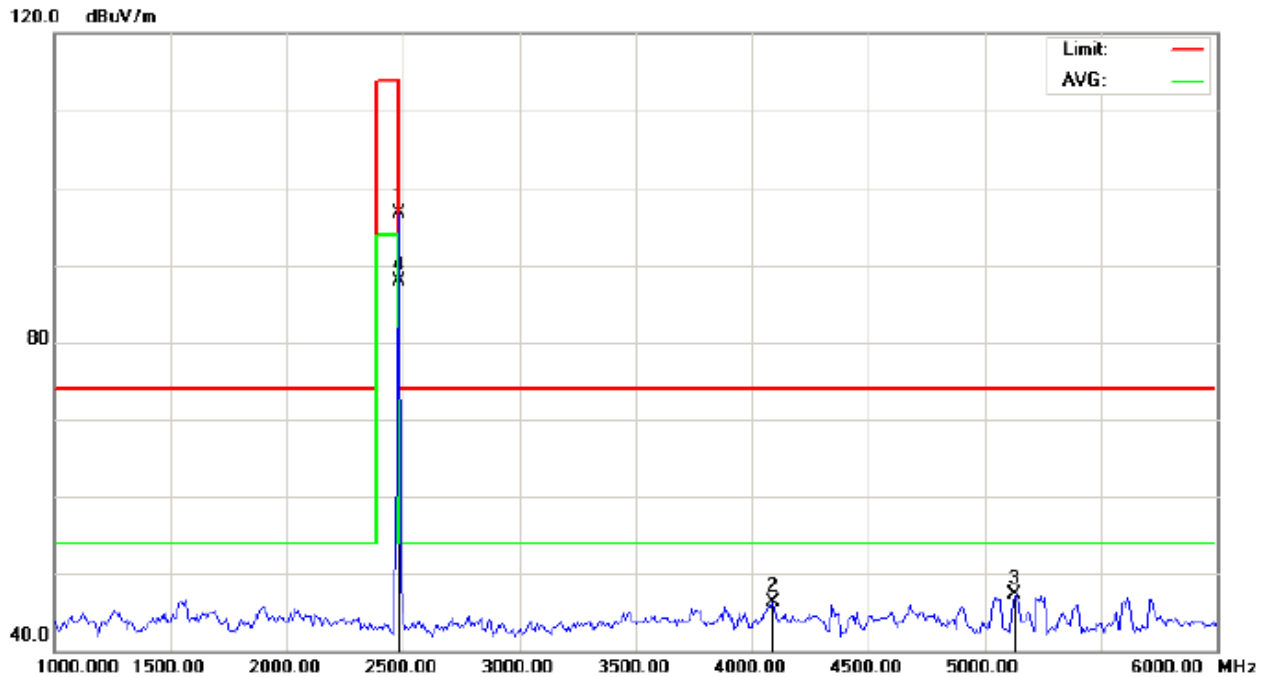
Mode: High Channel TX

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		2480.000	106.32	-9.59	96.73	114.00	-17.27	peak			
2		3466.667	54.55	-7.92	46.63	74.00	-27.37	peak			
3		5108.333	49.39	-1.80	47.59	74.00	-26.41	peak			
4	*	2480.000	96.89	-9.59	87.30	94.00	-6.70	AVG	100	57	

RESULT: PASS

RADIATED EMISSION TEST- (ABOVE 1GHZ)-HIGH CHANNEL- VERTICAL



Site: site #1

Polarization: **Vertical**

Temperature: 26

Limit: FCC Class B 3M Radiation above 1GHZ(PK)-

Power:

Humidity: 60 %

EUT: Hearing Assistive Device

Distance: 3m

M/N: HAD1000

Mode: High Channel TX

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		2480.000	106.36	-9.59	96.77	114.00	-17.23	peak			
2		4091.667	50.78	-4.50	46.28	74.00	-27.72	peak			
3		5133.333	49.05	-1.80	47.25	74.00	-26.75	peak			
4	*	2480.000	97.58	-9.59	87.99	94.00	-6.01	AVG	100	0	

RESULT: PASS

Note: 6~25GHz at least have 20dB margin. No recording in the test report.

Factor=Antenna Factor + Cable loss - Amplifier gain, Margin=Measurement-Limit.

The "Factor" value can be calculated automatically by software of measurement system.

Field strength of the fundamental signal

Peak value

Frequency	Reading Level	Factor	Measurement	Limit	Over	Antenna
(MHz)	(dBuv)	(dB/m)	(dBuv/m)	(dBuv/m)	(dB)	Polarization
2402	104.21	-9.68	94.52	114	-19.48	Horizontal
2402	104.25	-9.68	94.57	114	-19.43	Vertical
2440	104.80	-9.64	95.16	114	-18.84	Horizontal
2440	104.74	-9.64	95.10	114	-18.90	Vertical
2480	106.32	-9.59	96.73	114	-17.27	Horizontal
2480	106.36	-9.59	96.77	114	-17.23	Vertical

Average value

Frequency	Reading Level	Factor	Measurement	Limit	Over	Antenna
(MHz)	(dBuv)	(dB/m)	(dBuv/m)	(dBuv/m)	(dB)	Polarization
2402	96.82	-9.68	87.14	94	-6.86	Horizontal
2402	96.59	-9.68	86.91	94	-7.09	Vertical
2440	97.25	-9.64	87.61	94	-6.39	Horizontal
2440	96.75	-9.64	87.11	94	-6.89	Vertical
2480	96.89	-9.59	87.30	94	-6.70	Horizontal
2480	97.58	-9.59	87.99	94	-6.01	Vertical

9. BAND EDGE EMISSION

9.1. MEASUREMENT PROCEDURE

1The EUT operates at hopping-off test mode. The lowest or highest channels are tested to verify the largest transmission and spurious emissions power at the continuous transmission mode.

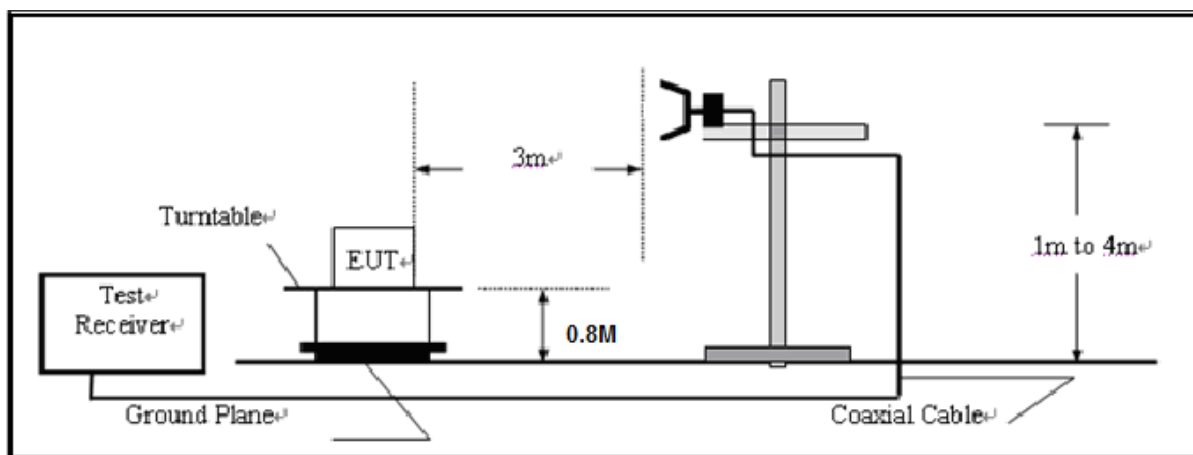
2Max hold the trace of the setp 1,and the EUT operates at hopping-on test mode to verify the largest spurious emissions power.

3Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission: (a) PEAK: RBW=VBW=1MHz / Sweep=AUTO

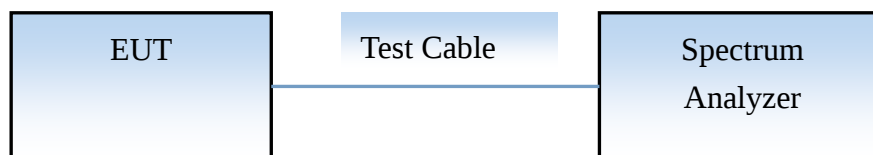
(b) AVERAGE: RBW=1MHz ; VBW=1/on time(1KHz) / Sweep=AUTO

9.2 TEST SETUP

RADIATED EMISSION TEST SETUP

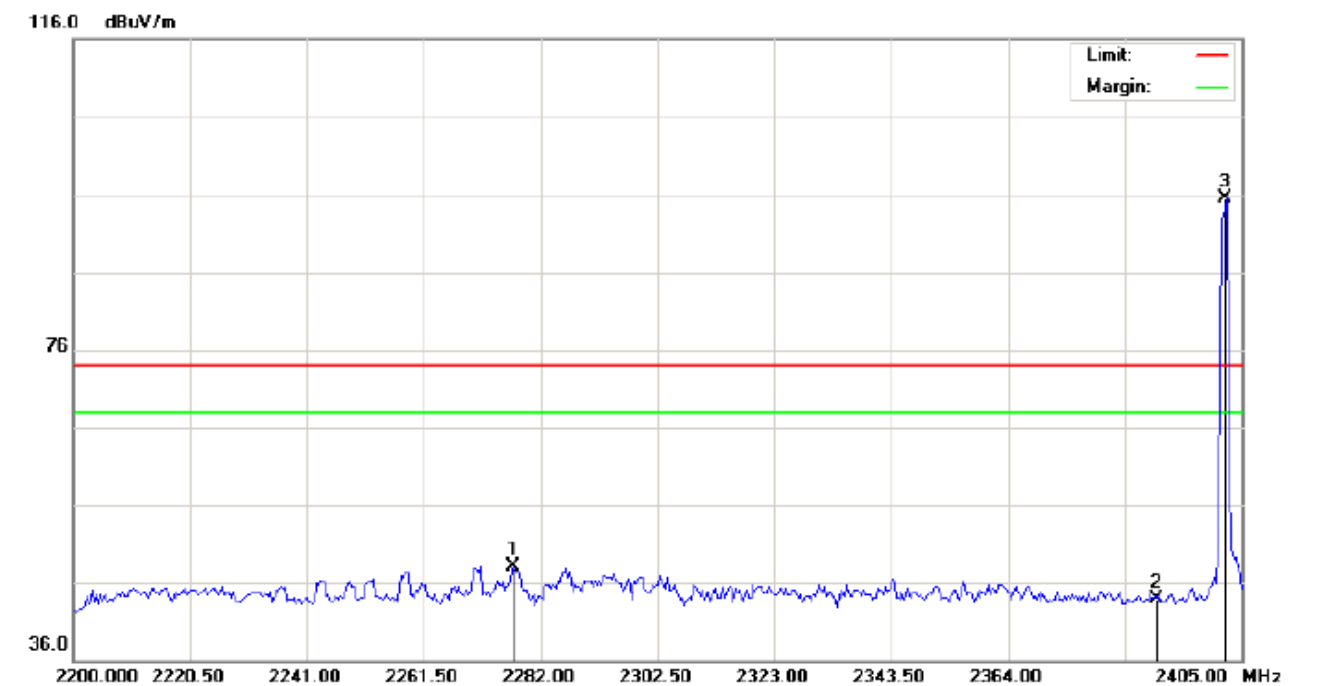


CONDUCTED TEST SETUP



9.3 RADIATED TEST RESULT(Worst modulation:GFSK)
FOR TRADITIONAL BLEUTOOTH

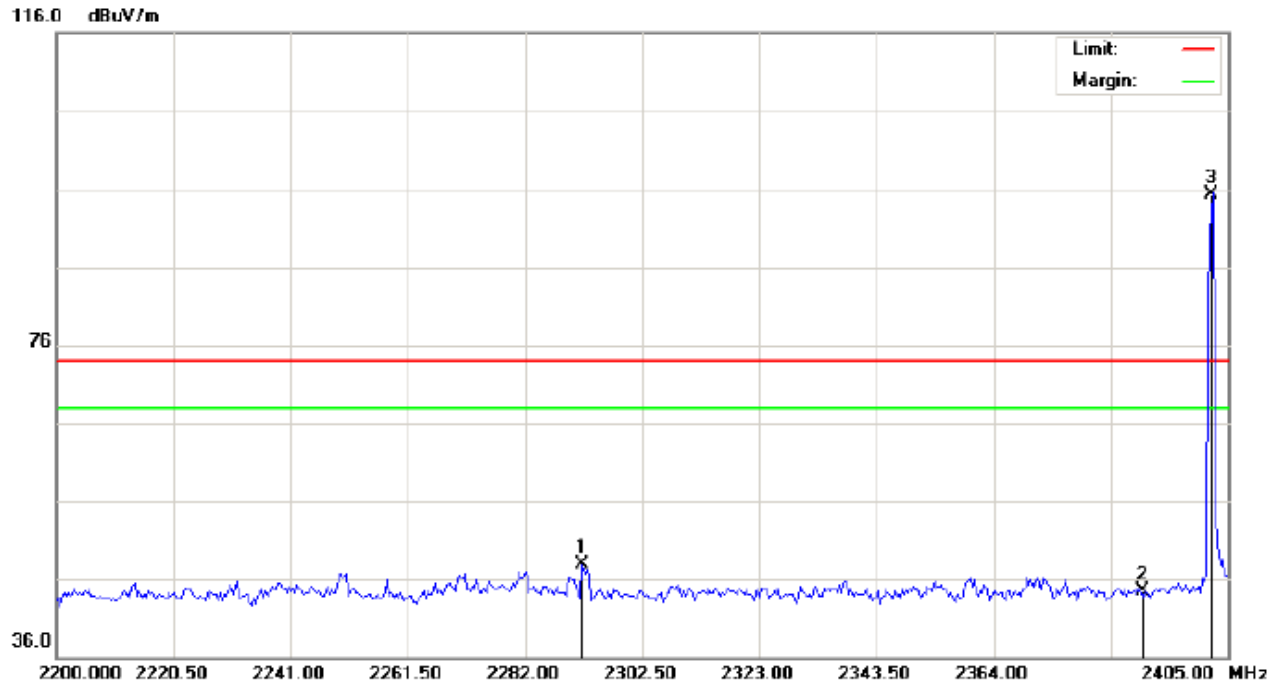
TEST PLOT OF BAND EDGE FOR LOW CHANNEL-Horizontal



Site: site #1	Polarization: <i>Horizontal</i>	Temperature: 26
Limit: FCC Class B 3M Radiation above 1GHZ(PK)	Power:	Humidity: 60 %
EUT: Hearing Assistive Device	Distance:	
M/N: HAD1000		
Mode: Low Channel TX		
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		2277.217	37.98	10.18	48.16	74.00	-25.84	peak			
2		2390.000	33.50	10.31	43.81	74.00	-30.19	peak			
3	*	2402.000	85.22	10.32	95.54	74.00	21.54	peak			

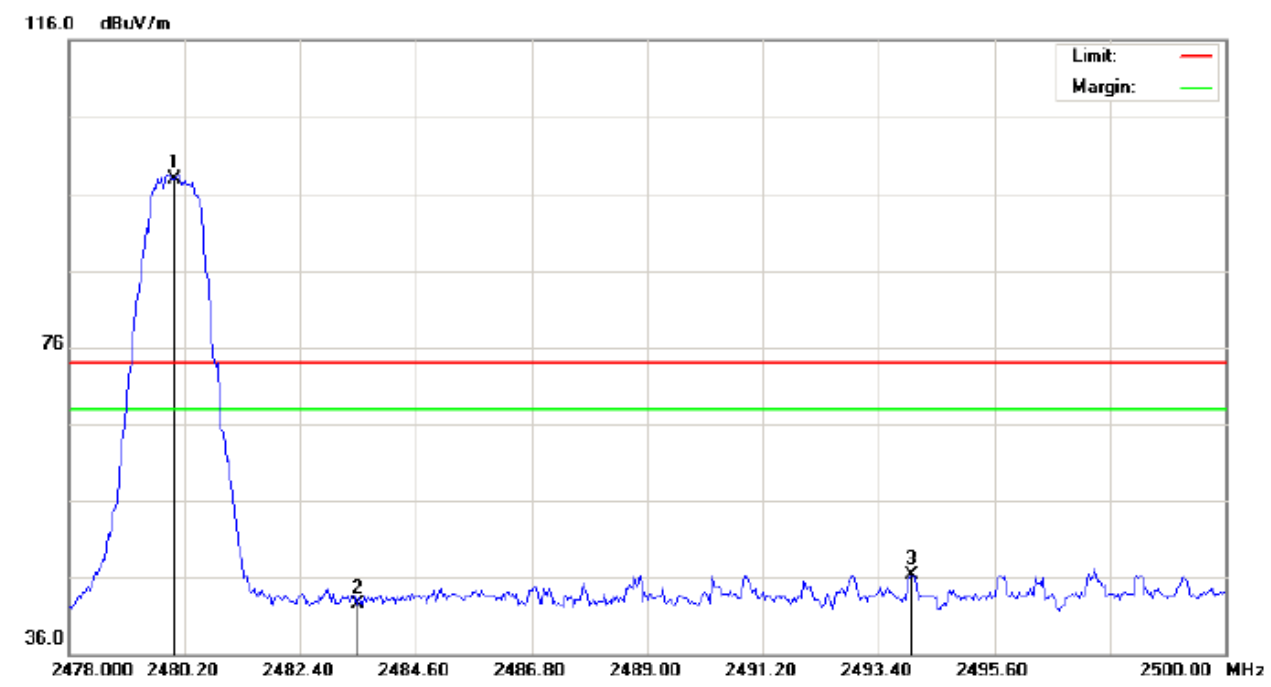
TEST PLOT OF BAND EDGE FOR LOW CHANNEL -Vertical



Site: site #1	Polarization: Vertical	Temperature: 26
Limit: FCC Class B 3M Radiation above 1GHZ(PK)	Power:	Humidity: 60 %
EUT: Hearing Assistive Device	Distance:	
M/N: HAD1000		
Mode: Low Channel TX		
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		2291.908	37.64	10.20	47.84	74.00	-26.16	peak			
2		2390.000	34.21	10.31	44.52	74.00	-29.48	peak			
3	*	2402.000	85.07	10.32	95.39	74.00	21.39	peak			

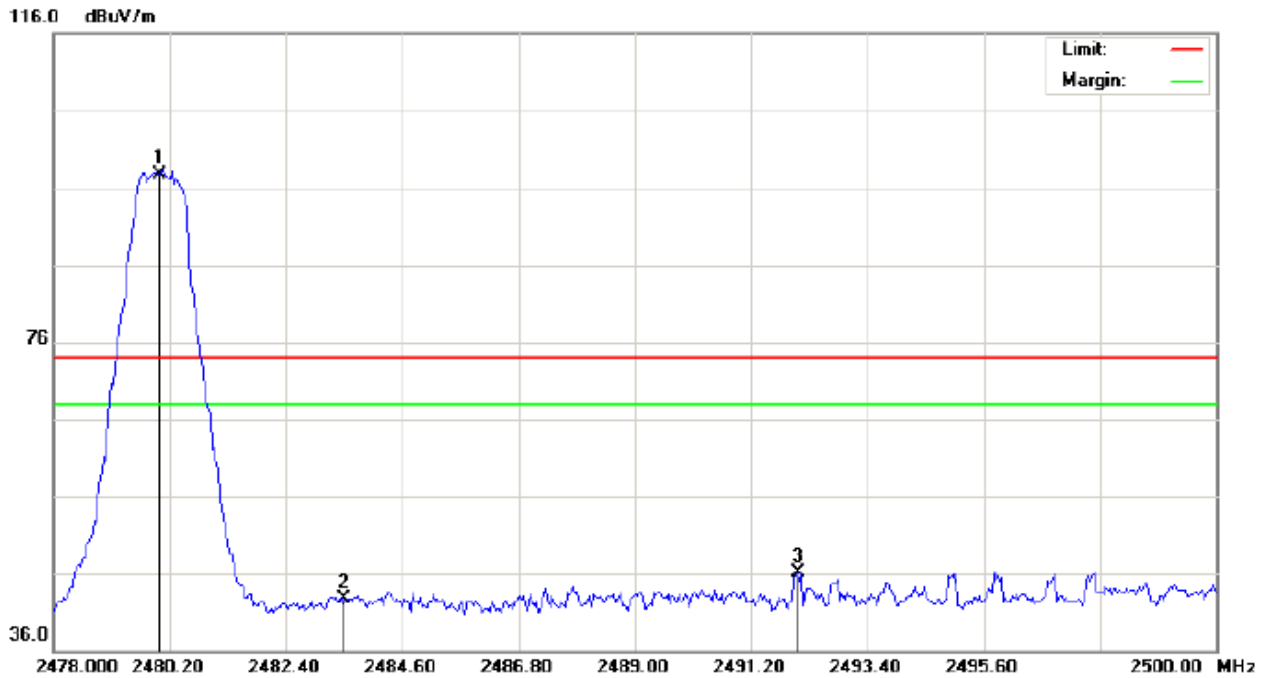
TEST PLOT OF BAND EDGE FOR HIGH CHANNEL -Horizontal



Site: site #1	Polarization: Horizontal	Temperature: 26
Limit: FCC Class B 3M Radiation above 1GHZ(PK)	Power:	Humidity: 60 %
EUT: Hearing Assistive Device	Distance:	
M/N: HAD1000		
Mode: High Channel TX		
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	*	2480.000	87.55	10.41	97.96	74.00	23.96	peak			
2		2483.500	32.19	10.41	42.60	74.00	-31.40	peak			
3		2494.023	35.85	10.42	46.27	74.00	-27.73	peak			

TEST PLOT OF BAND EDGE FOR HIGH CHANNEL-Vertical



Site: site #1

Polarization: **Vertical**

Temperature: 26

Limit: FCC Class B 3M Radiation above 1GHZ(PK)

Power:

Humidity: 60 %

EUT: Hearing Assistive Device

Distance:

M/N: HAD1000

Mode: High Channel TX

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	*	2480.000	87.32	10.41	97.73	74.00	23.73	peak			
2		2483.500	32.26	10.41	42.67	74.00	-31.33	peak			
3		2492.080	35.61	10.42	46.03	74.00	-27.97	peak			

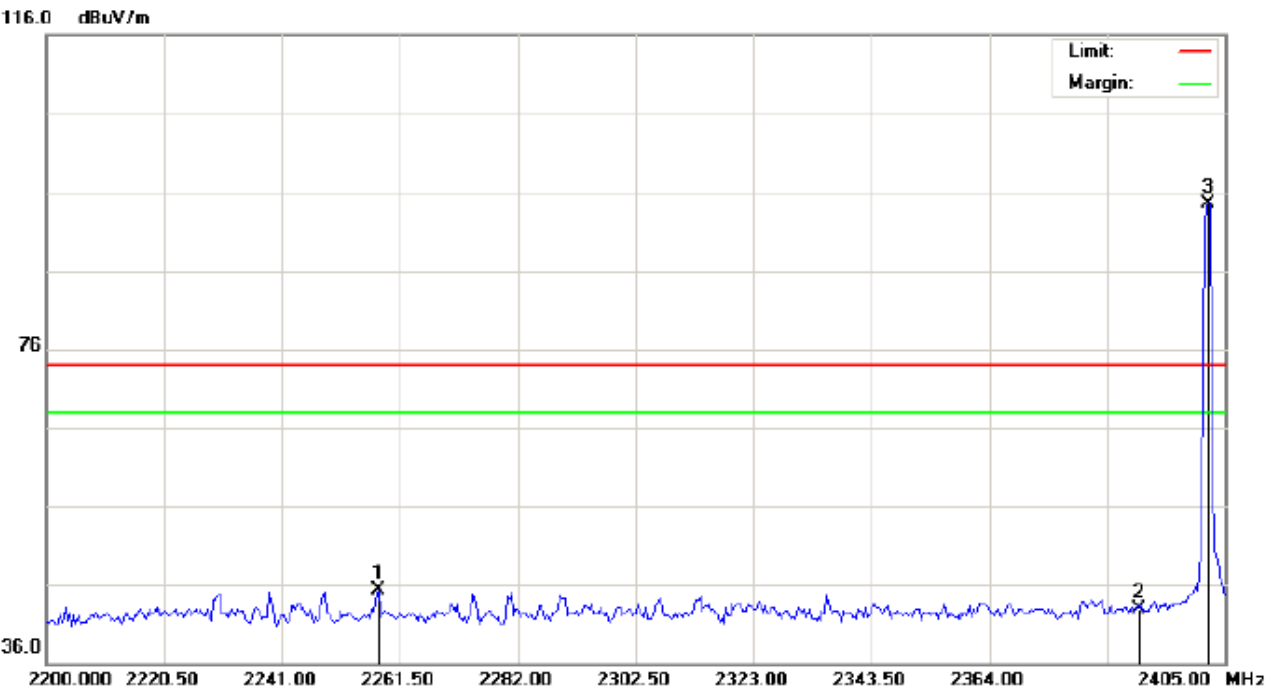
RESULT: PASS**Note:** The other modes radiation emission have enough 20dB margin.

Factor=Antenna Factor + Cable loss - Amplifier gain, Over=Measure-Limit.

The "Factor" value can be calculated automatically by software of measurement system.

FOR BLE

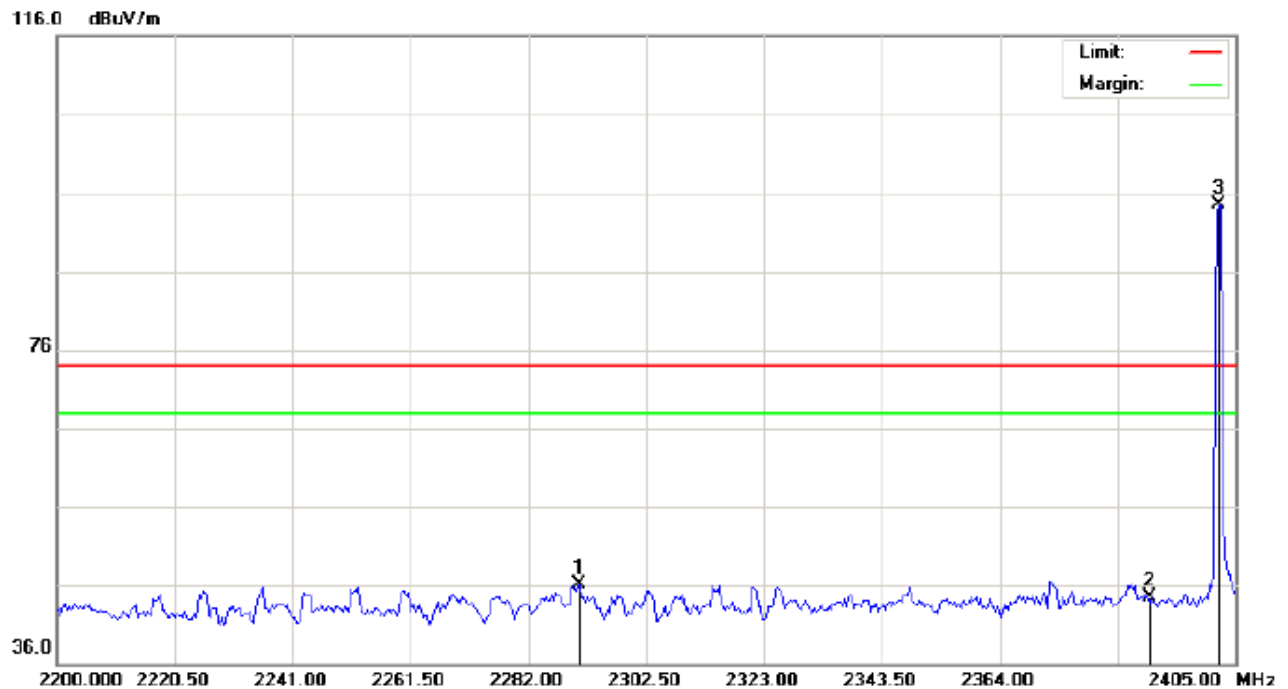
TEST PLOT OF BAND EDGE FOR LOW CHANNEL-Horizontal



Site: site #1	Polarization: <i>Horizontal</i>	Temperature: 26
Limit: FCC Class B 3M Radiation above 1GHZ(PK)	Power:	Humidity: 60 %
EUT: Hearing Assistive Device	Distance:	
M/N: HAD1000		
Mode: Low Channel TX		
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		2257.742	35.06	10.16	45.22	74.00	-28.78	peak			
2		2390.000	32.50	10.31	42.81	74.00	-31.19	peak			
3	*	2402.000	84.19	10.32	94.51	74.00	20.51	peak			

TEST PLOT OF BAND EDGE FOR LOW CHANNEL -Vertical



Site: site #1

Polarization: **Vertical**

Temperature: 26

Limit: FCC Class B 3M Radiation above 1GHZ(PK)

Power:

Humidity: 60 %

EUT: Hearing Assistive Device

Distance:

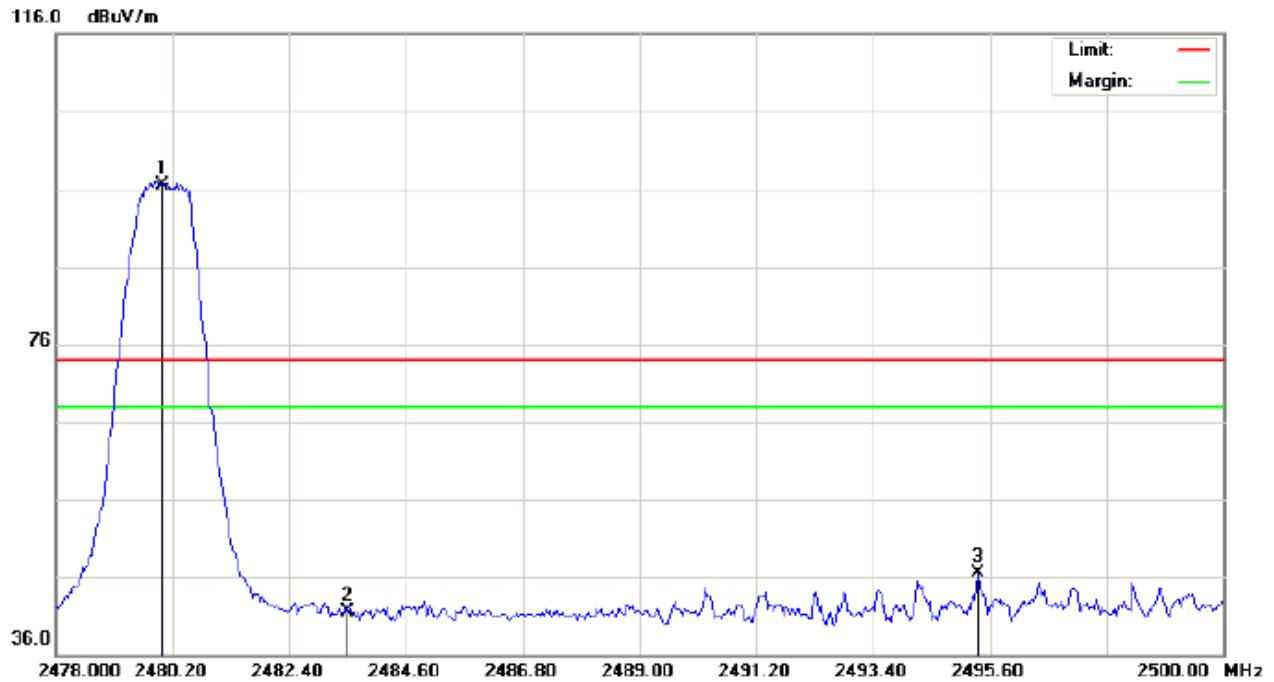
M/N: HAD1000

Mode: Low Channel TX

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		2290.883	35.97	10.20	46.17	74.00	-27.83	peak			
2		2390.000	34.21	10.31	44.52	74.00	-29.48	peak			
3	*	2402.000	84.11	10.32	94.43	74.00	20.43	peak			

TEST PLOT OF BAND EDGE FOR HIGH CHANNEL -Horizontal



Site: site #1

Limit: FCC Class B 3M Radiation above 1GHZ(PK)

EUT: Hearing Assistive Device

M/N: HAD1000

Mode: High Channel TX

Note:

Polarization: *Horizontal*

Power:

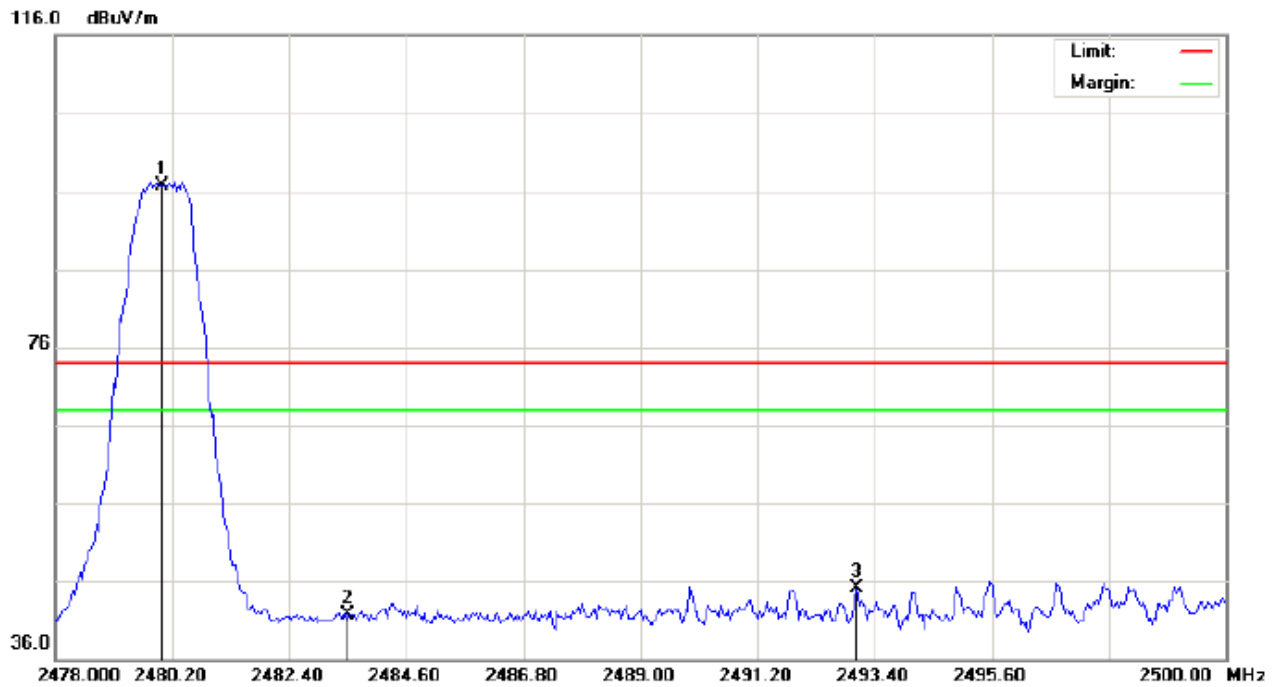
Distance:

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	*	2480.000	86.09	10.41	96.50	74.00	22.50	peak			
2		2483.500	31.19	10.41	41.60	74.00	-32.40	peak			
3		2495.380	36.03	10.42	46.45	74.00	-27.55	peak			

TEST PLOT OF BAND EDGE FOR HIGH CHANNEL-Vertical



Site: site #1

Polarization: **Vertical**

Temperature: 26

Limit: FCC Class B 3M Radiation above 1GHZ(PK)

Power:

Humidity: 60 %

EUT: Hearing Assistive Device

Distance:

M/N: HAD1000

Mode: High Channel TX

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	*	2480.000	86.34	10.41	96.75	74.00	22.75	peak			
2		2483.500	31.26	10.41	41.67	74.00	-32.33	peak			
3		2493.070	34.62	10.42	45.04	74.00	-28.96	peak			

RESULT: PASS**Note:** The other modes radiation emission have enough 20dB margin.

Factor=Antenna Factor + Cable loss - Amplifier gain, Over=Measure-Limit.

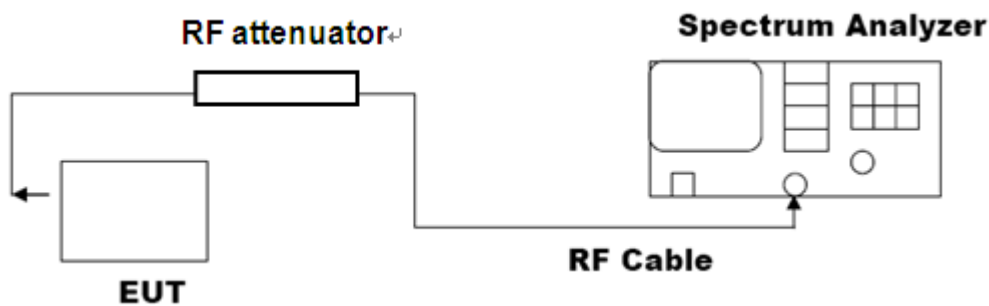
The "Factor" value can be calculated automatically by software of measurement system.

10. 20DB BANDWIDTH

10.1. MEASUREMENT PROCEDURE

1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
2. Set the EUT Work on the top, the middle and the bottom operation frequency individually.
3. Set Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel
RBW $\geq$ 1% of the 20 dB bandwidth, VBW $\geq$ RBW; Sweep = auto; Detector function = peak
4. Set SPA Trace 1 Max hold, then View.

10.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

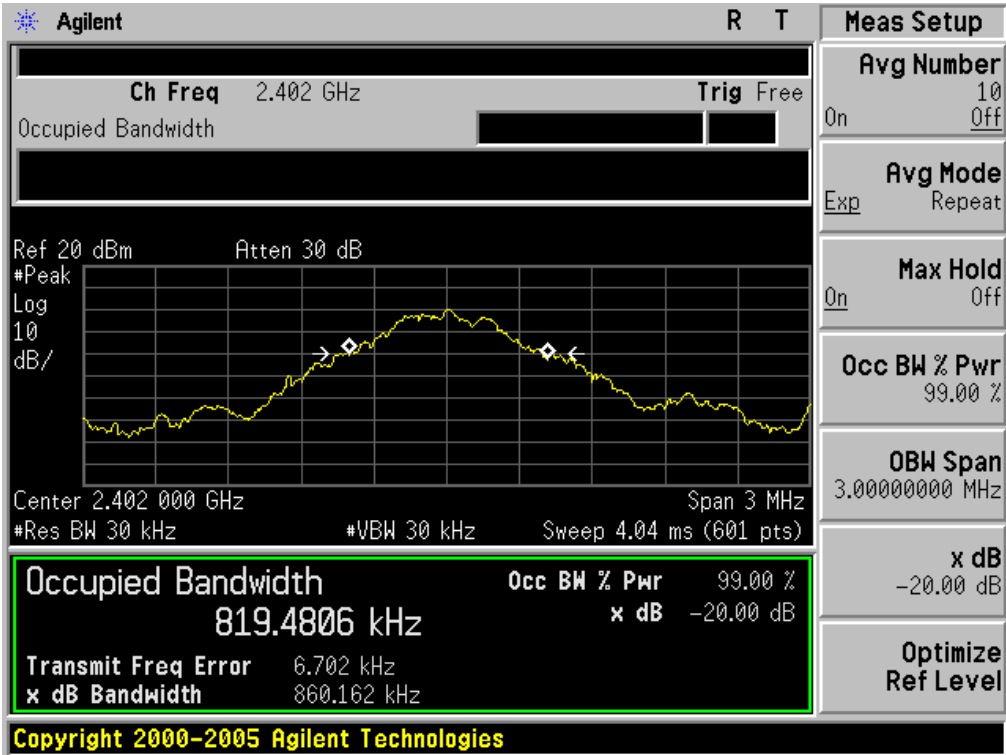


10.3. LIMITS AND MEASUREMENT RESULTS

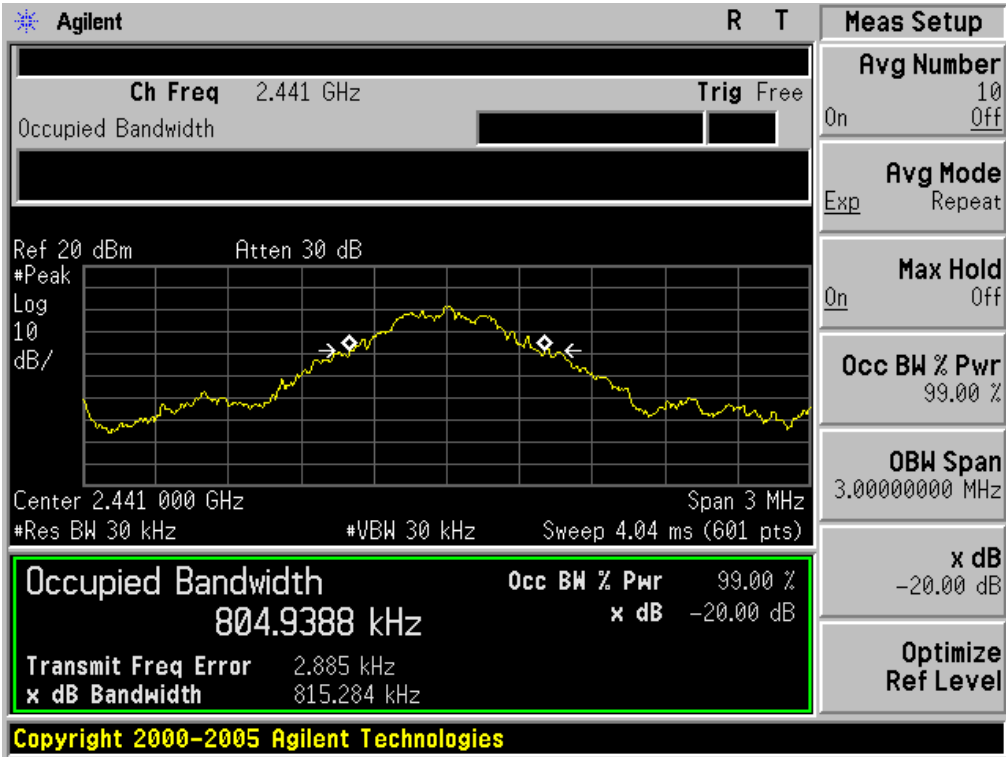
FOR TRADITIONAL BLUETOOTH

BLUETOOTH 1MBPS LIMITS AND MEASUREMENT RESULT			
Applicable Limits	Measurement Result		
	Test Data (MHz)		Criteria
N/A	Low Channel	0.860	PASS
	Middle Channel	0.815	PASS
	High Channel	0.785	PASS

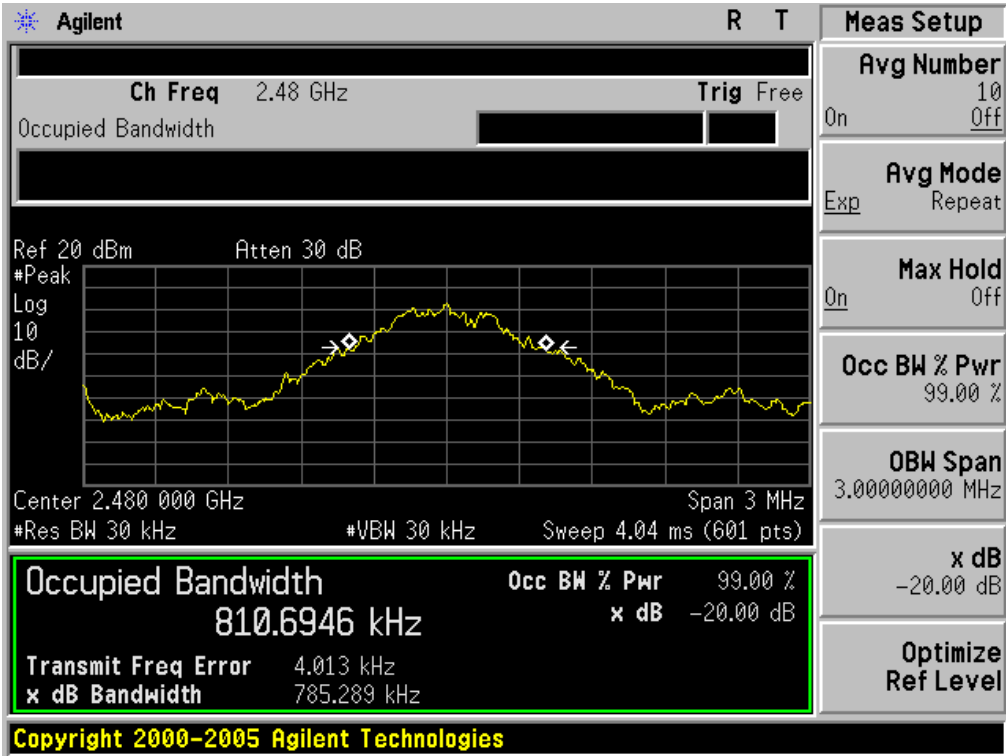
TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL

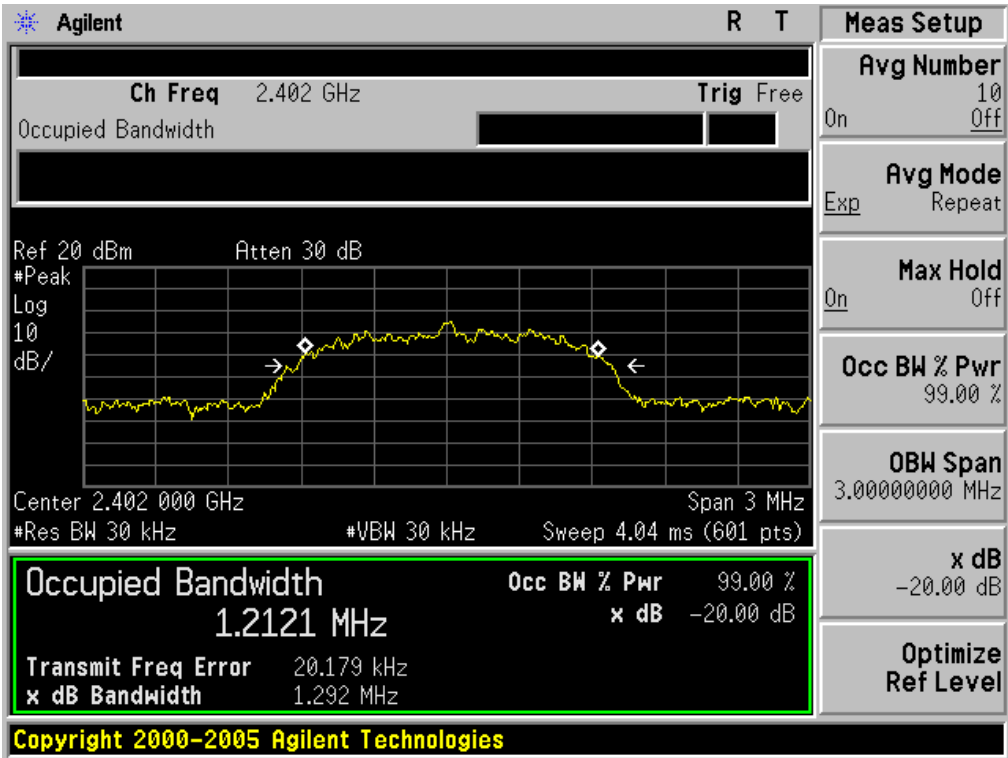


TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL

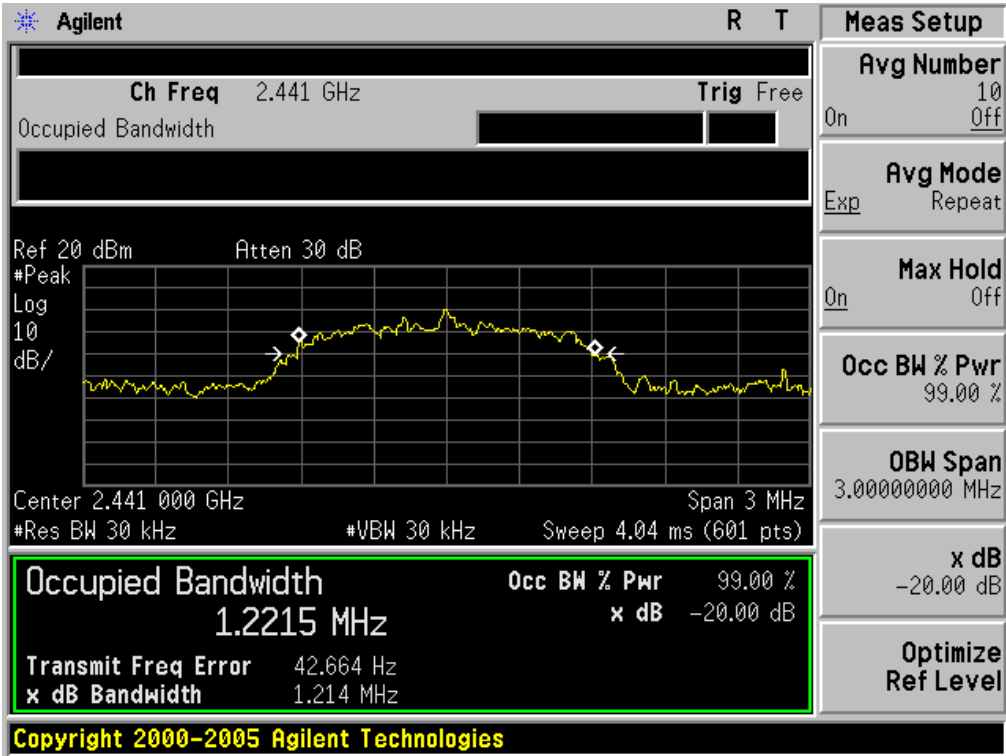


BLUETOOTH 2Mbps LIMITS AND MEASUREMENT RESUL			
Applicable Limits	Measurement Result		
	Test Data (MHz)		Criteria
N/A	Low Channel	1.292	PASS
	Middle Channel	1.214	PASS
	High Channel	1.312	PASS

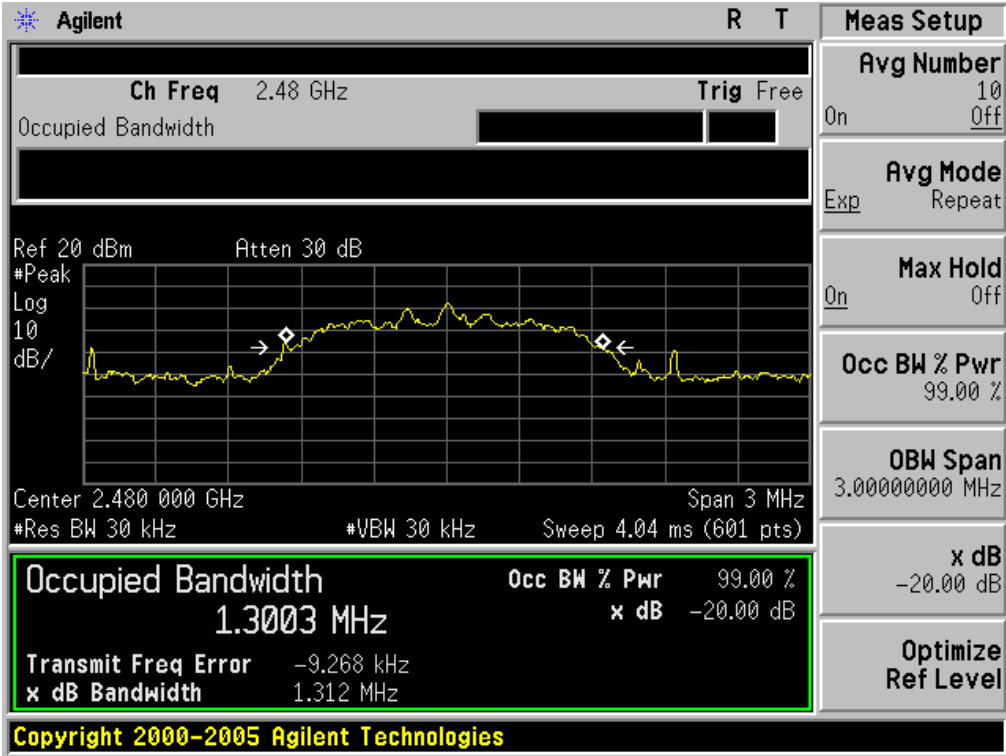
TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL

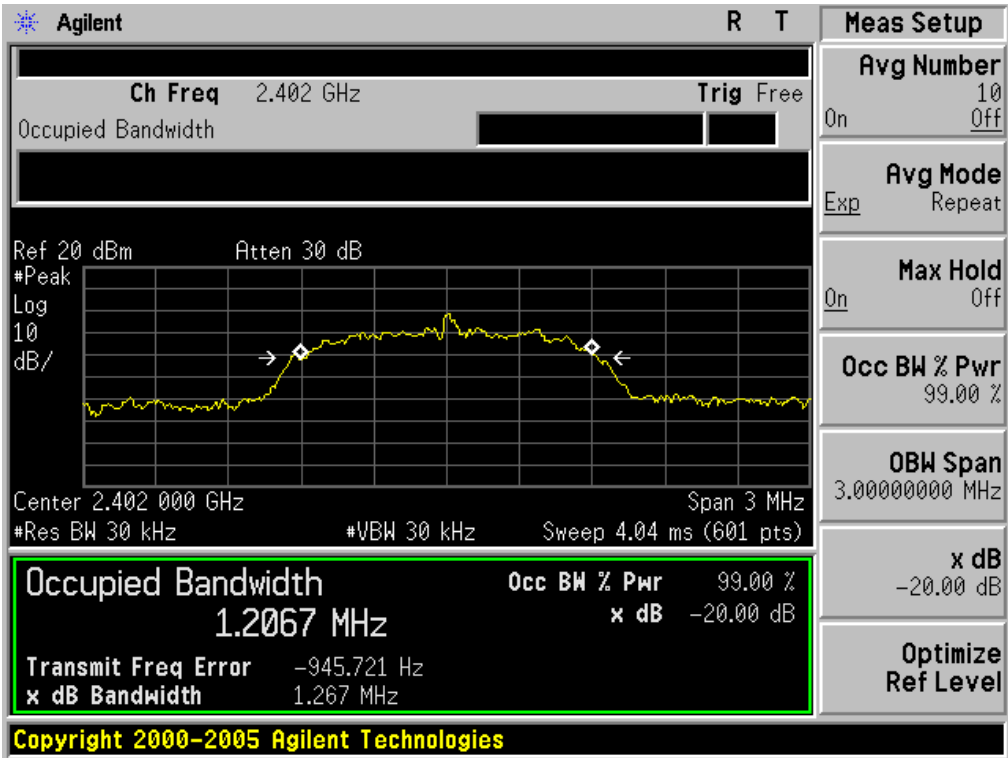


TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL

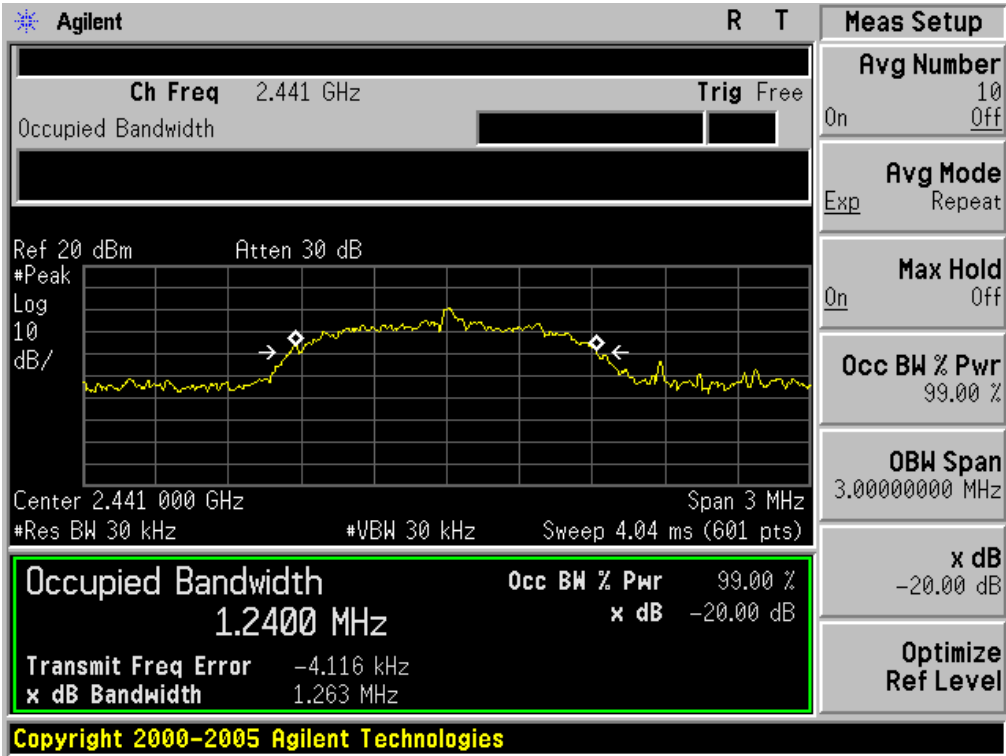


BLUETOOTH 3MBPS LIMITS AND MEASUREMENT RESUL			
Applicable Limits	Measurement Result		
	Test Data (MHz)		Criteria
N/A	Low Channel	1.267	PASS
	Middle Channel	1.263	PASS
	High Channel	1.273	PASS

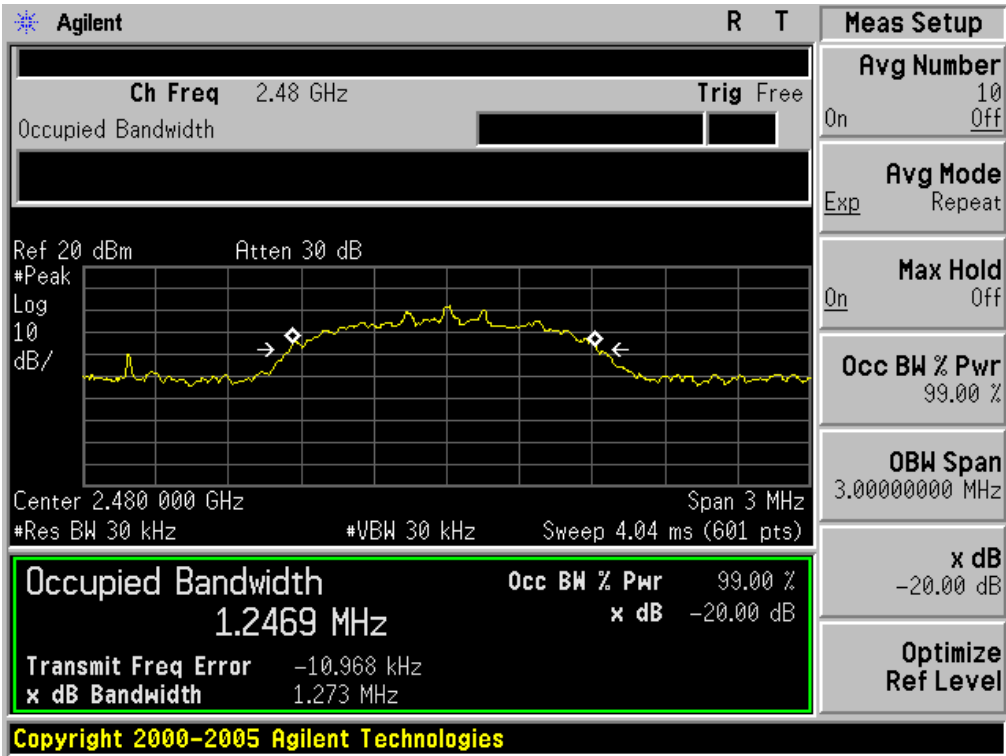
TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL



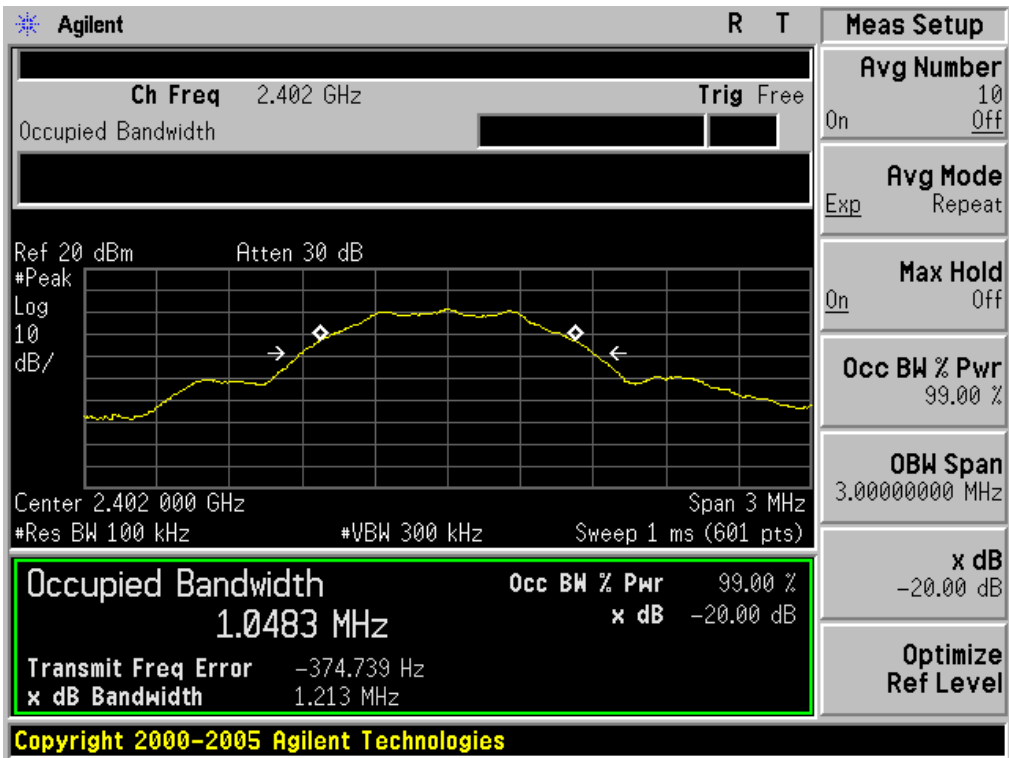
TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL



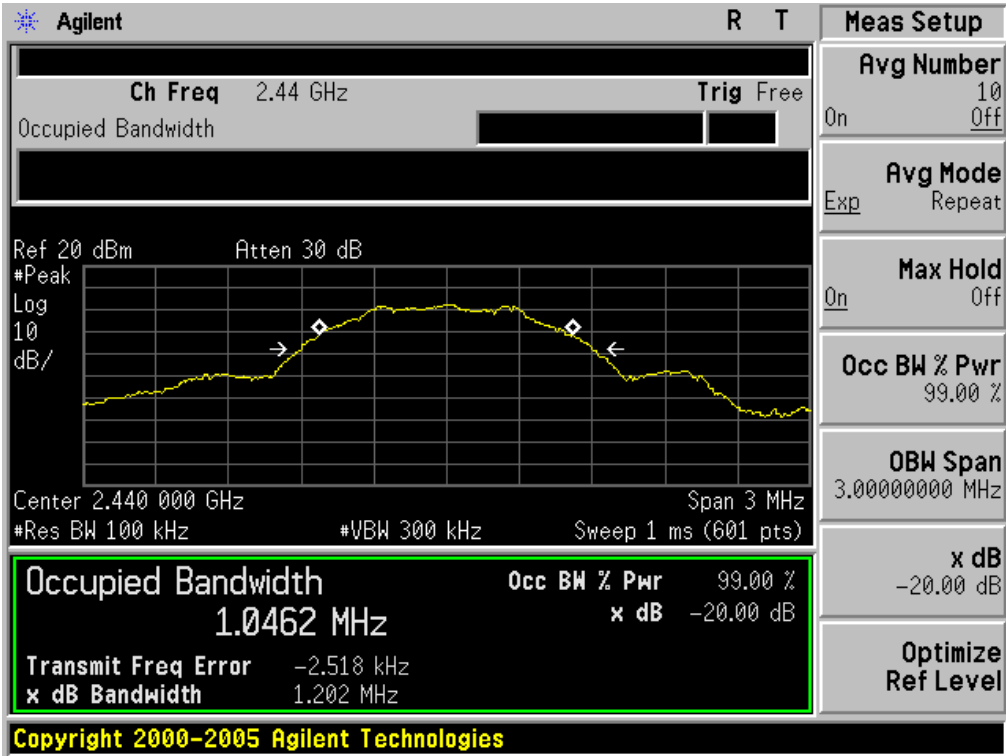
FOR BLE

BLUETOOTH 1Mbps LIMITS AND MEASUREMENT RESUL			
Applicable Limits	Measurement Result		
	Test Data (MHz)		Criteria
N/A	Low Channel	1.213	PASS
	Middle Channel	1.202	PASS
	High Channel	1.194	PASS

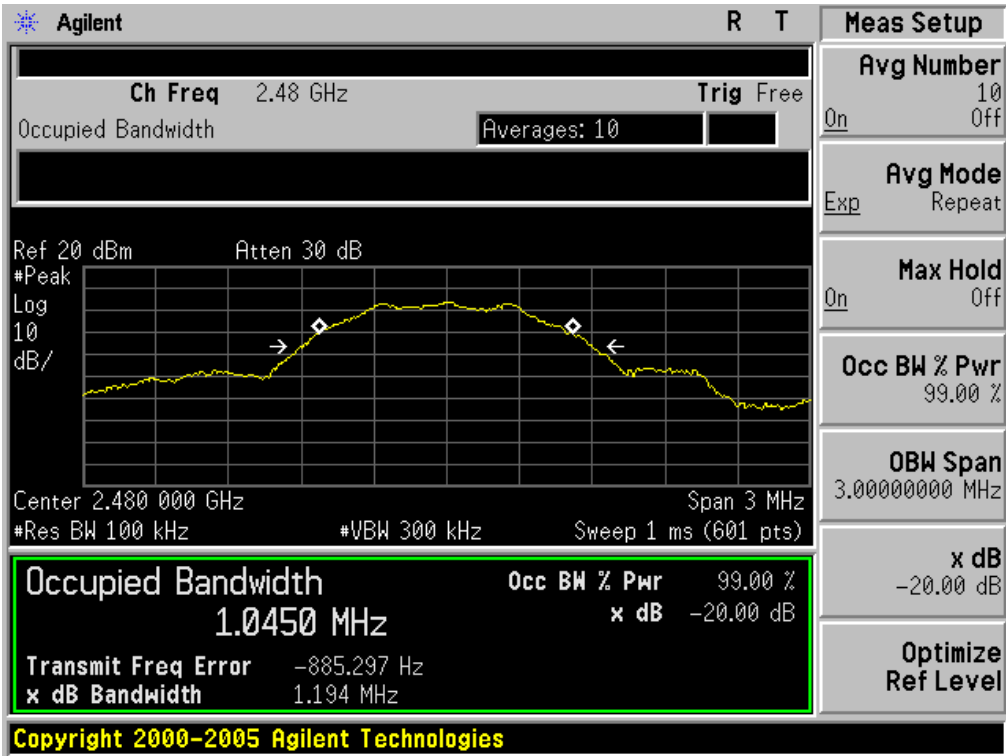
TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL



TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL



11. FCC LINE CONDUCTED EMISSION TEST

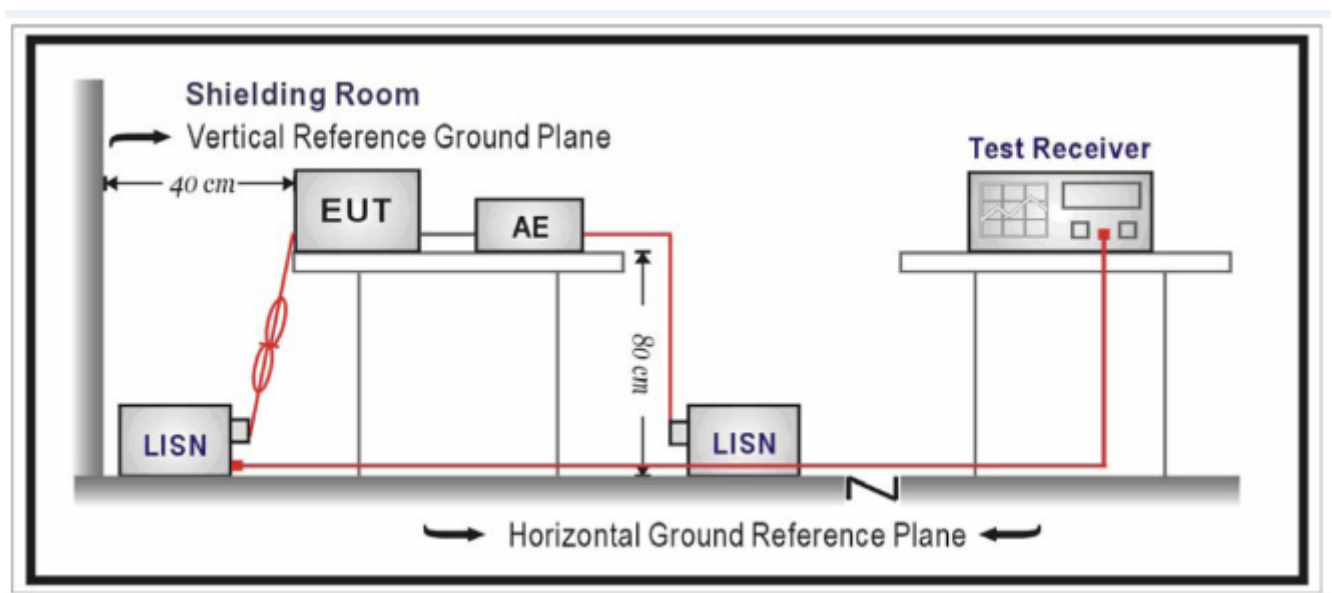
11.1. LIMITS OF LINE CONDUCTED EMISSION TEST

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 0.50 MHz.

11.2. BLOCK DIAGRAM OF LINE CONDUCTED EMISSION TEST



11.3. PRELIMINARY 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. All support equipments received AC120V/60Hz power from a LISN, if any.
5. The EUT received DC charging voltage by PC which received 120V/60Hz power by a LISN..
6. The 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.
7. Analyzer / Receiver scanned from 150 kHz to 30MHz for emissions in each of the test modes.
8. During the above scans, the emissions were maximized by cable manipulation.
9. The test mode(s) were scanned during the preliminary test.

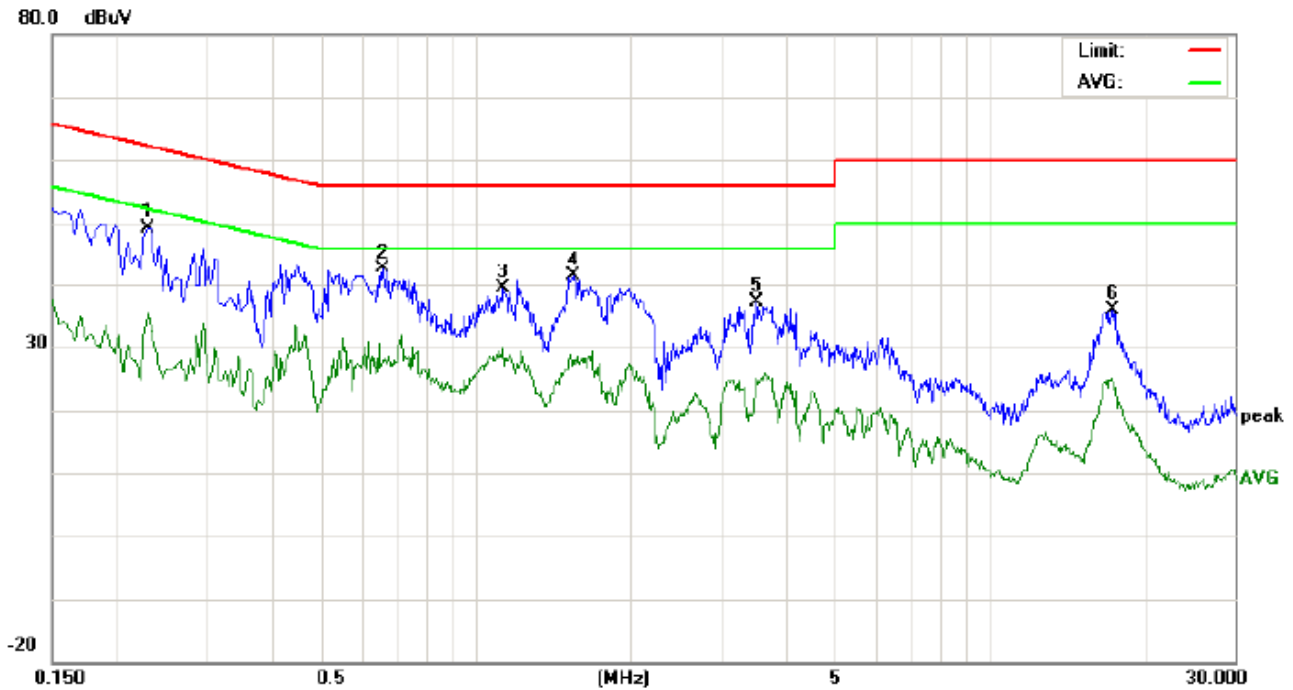
Then, the EUT configuration and cable configuration of the above highest emission level were recorded for reference of final testing.

11.4. FINAL PROCEDURE OF LINE CONDUCTED EMISSION TEST

- EUT and support equipment was set up on the test bench as per step 2 of the preliminary test.
2. A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions. 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.
3. The test data of the worst case condition(s) was reported on the Summary Data page.

11.5. TEST RESULT OF LINE CONDUCTED EMISSION TEST FOR TRADITIONAL BLUETOOTH

Line Conducted Emission Test Line 1-L



Site: Conduction

Phase: **L1**

Temperature: 26

Limit: FCC Class B Conduction(QP)

Power:

Humidity: 60 %

EUT: Hearing Assistive Device

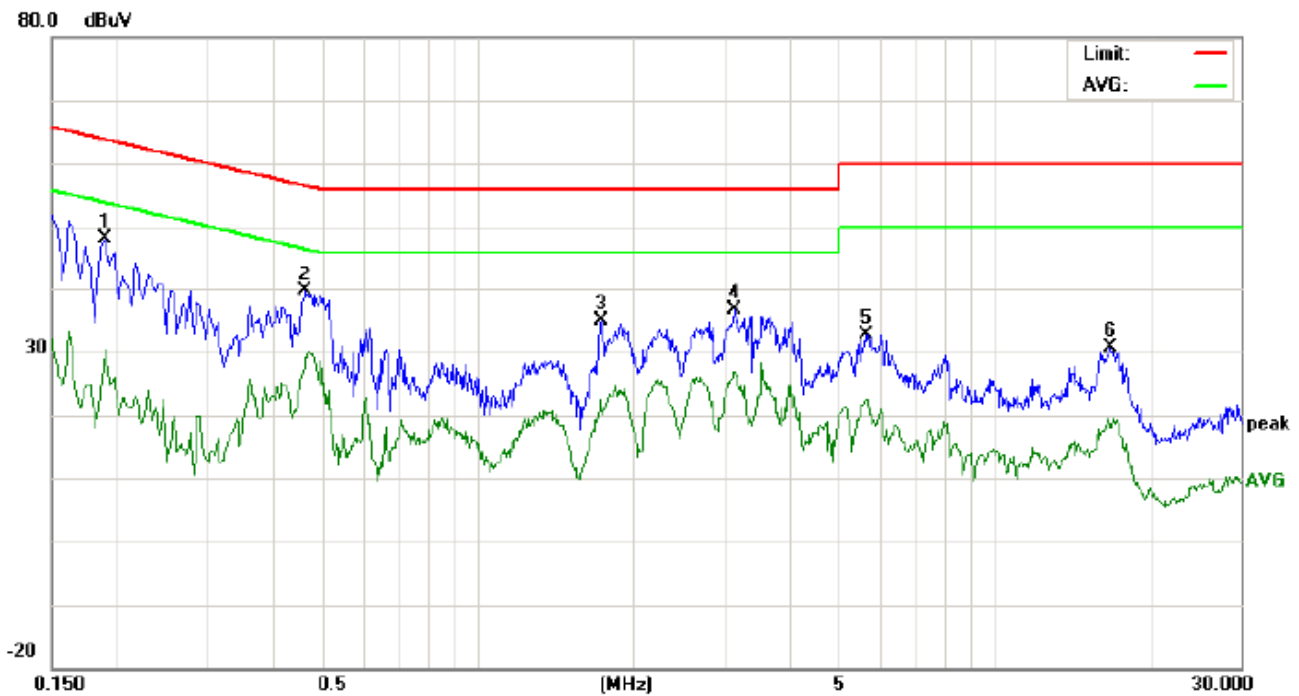
M/N: HAD1000

Mode: Normal operation

Note:

No.	Freq. (MHz)	Reading_Level (dBuV)			Correct Factor (dB)	Measurement (dBuV)			Limit (dBuV)		Margin (dB)		P/F	Comment
		Peak	QP	AVG		Peak	QP	AVG	QP	AVG	QP	AVG		
1	0.2300	38.96		25.09	10.25	49.21		35.34	62.45	52.45	-13.24	-17.11	P	
2	0.6580	32.32		17.47	10.33	42.65		27.80	56.00	46.00	-13.35	-18.20	P	
3	1.1340	29.09		19.40	10.37	39.46		29.77	56.00	46.00	-16.54	-16.23	P	
4	1.5500	30.90		16.94	10.36	41.26		27.30	56.00	46.00	-14.74	-18.70	P	
5	3.5260	26.53		14.68	10.51	37.04		25.19	56.00	46.00	-18.96	-20.81	P	
6	17.3020	25.85		13.71	10.13	35.98		23.84	60.00	50.00	-24.02	-26.16	P	

Line Conducted Emission Test Line 2-N



Site: Conduction

Phase: **N**

Temperature: 26

Limit: FCC Class B Conduction(QP)

Power:

Humidity: 60 %

EUT: Hearing Assistive Device

M/N: HAD1000

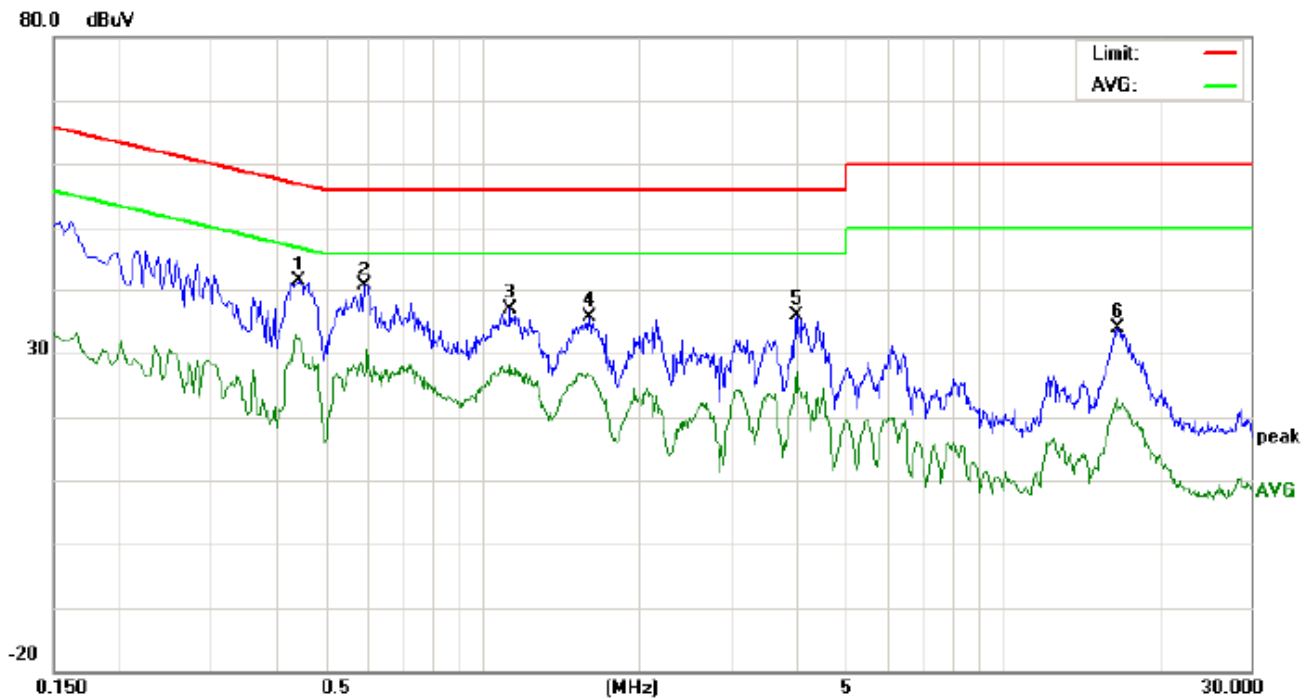
Mode: Normal operation

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	0.1900	37.93		20.19	10.20	48.13		30.39	64.03	54.03	-15.90	-23.64	P	
2	0.4660	29.20		18.77	10.38	39.58		29.15	56.58	46.58	-17.00	-17.43	P	
3	1.7380	24.65		9.79	10.30	34.95		20.09	56.00	46.00	-21.05	-25.91	P	
4	3.1540	26.18		16.23	10.54	36.72		26.77	56.00	46.00	-19.28	-19.23	P	
5	5.6820	22.40		12.15	10.26	32.66		22.41	60.00	50.00	-27.34	-27.59	P	
6	16.7900	20.59		8.05	10.13	30.72		18.18	60.00	50.00	-29.28	-31.82	P	

FOR BLE

Line Conducted Emission Test Line 1-L



Site: Conduction

Phase: **L1**

Temperature: 26

Limit: FCC Class B Conduction(QP)

Power:

Humidity: 60 %

EUT:Hearing Assistive Device

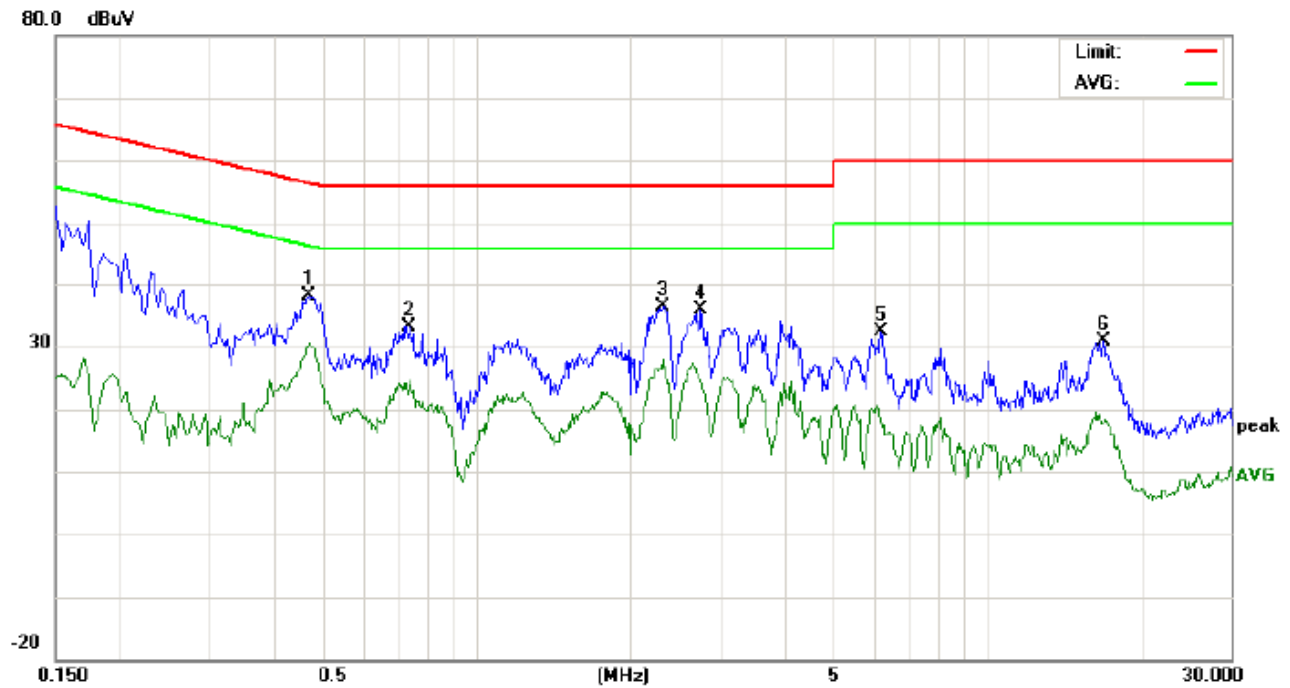
M/N: HAD1000

Mode: Normal operation

Note:

No.	Freq. (MHz)	Reading_Level (dBuV)			Correct Factor dB	Measurement (dBuV)			Limit (dBuV)		Margin (dB)		P/F	Comment
		Peak	QP	AVG		Peak	QP	AVG	QP	AVG	QP	AVG		
1	0.4460	31.02		21.93	10.36	41.38		32.29	56.95	46.95	-15.57	-14.66	P	
2	0.5940	30.30		16.09	10.32	40.62		26.41	56.00	46.00	-15.38	-19.59	P	
3	1.1300	26.50		17.72	10.37	36.87		28.09	56.00	46.00	-19.13	-17.91	P	
4	1.6100	25.32		16.30	10.34	35.66		26.64	56.00	46.00	-20.34	-19.36	P	
5	4.0100	25.34		16.79	10.43	35.77		27.22	56.00	46.00	-20.23	-18.78	P	
6	16.5780	23.85		13.00	10.12	33.97		23.12	60.00	50.00	-26.03	-26.88	P	

Line Conducted Emission Test Line 2-N



Site: Conduction

Phase: **N**

Temperature: 26

Limit: FCC Class B Conduction(QP)

Power:

Humidity: 60 %

EUT:Hearing Assistive Device

M/N: HAD1000

Mode: Normal operation

Note:

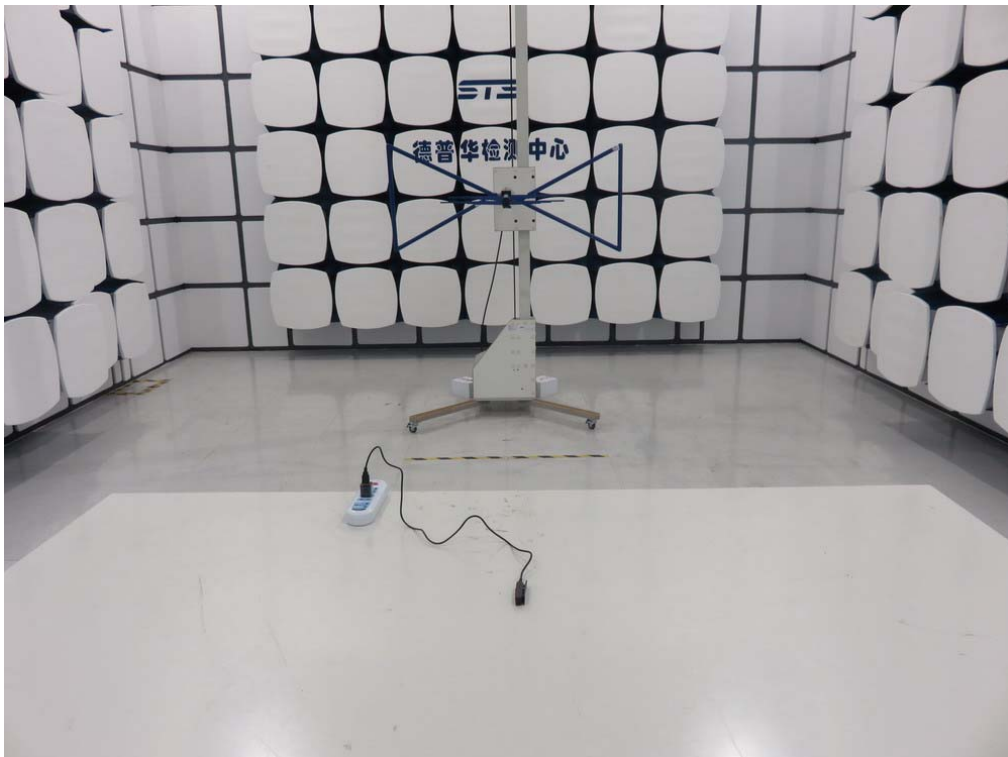
No.	Freq. (MHz)	Reading_Level (dBuV)			Correct Factor	Measurement (dBuV)			Limit (dBuV)		Margin (dB)		P/F	Comment
		Peak	QP	AVG		Peak	QP	AVG	QP	AVG	QP	AVG		
1	0.4700	27.77		20.20	10.38	38.15		30.58	56.51	46.51	-18.36	-15.93	P	
2	0.7420	22.91		14.29	10.32	33.23		24.61	56.00	46.00	-22.77	-21.39	P	
3	2.3220	26.13		16.24	10.36	36.49		26.60	56.00	46.00	-19.51	-19.40	P	
4	2.7620	25.27		14.35	10.49	35.76		24.84	56.00	46.00	-20.24	-21.16	P	
5	6.1940	22.01		7.98	10.29	32.30		18.27	60.00	50.00	-27.70	-31.73	P	
6	16.8500	20.72		7.73	10.13	30.85		17.86	60.00	50.00	-29.15	-32.14	P	

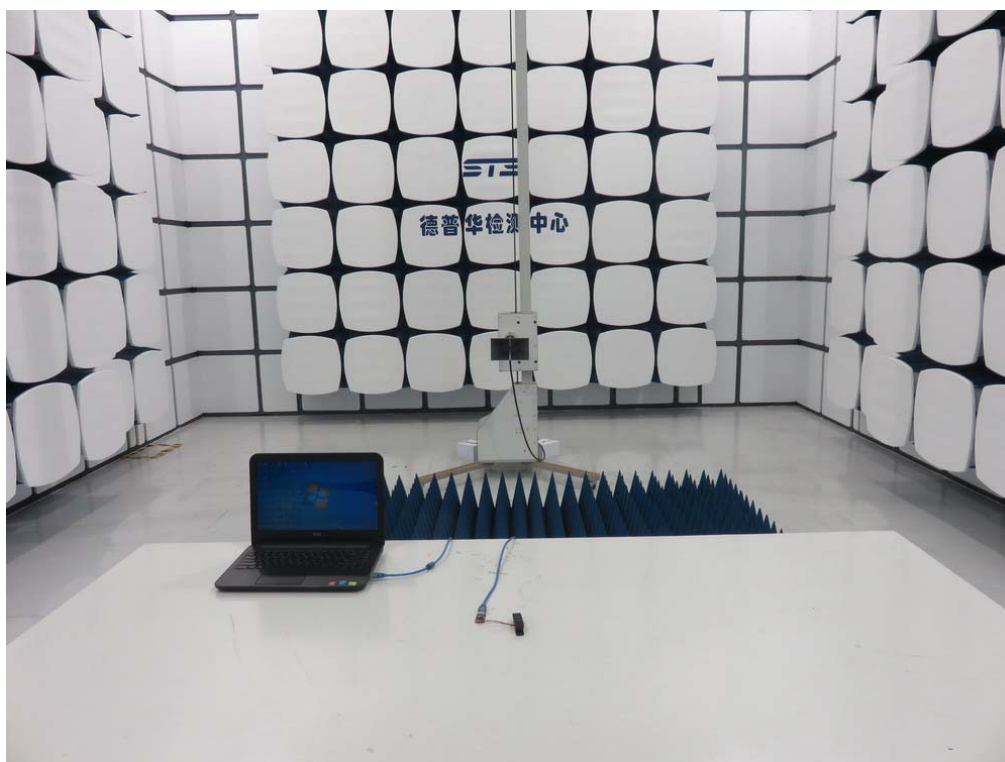
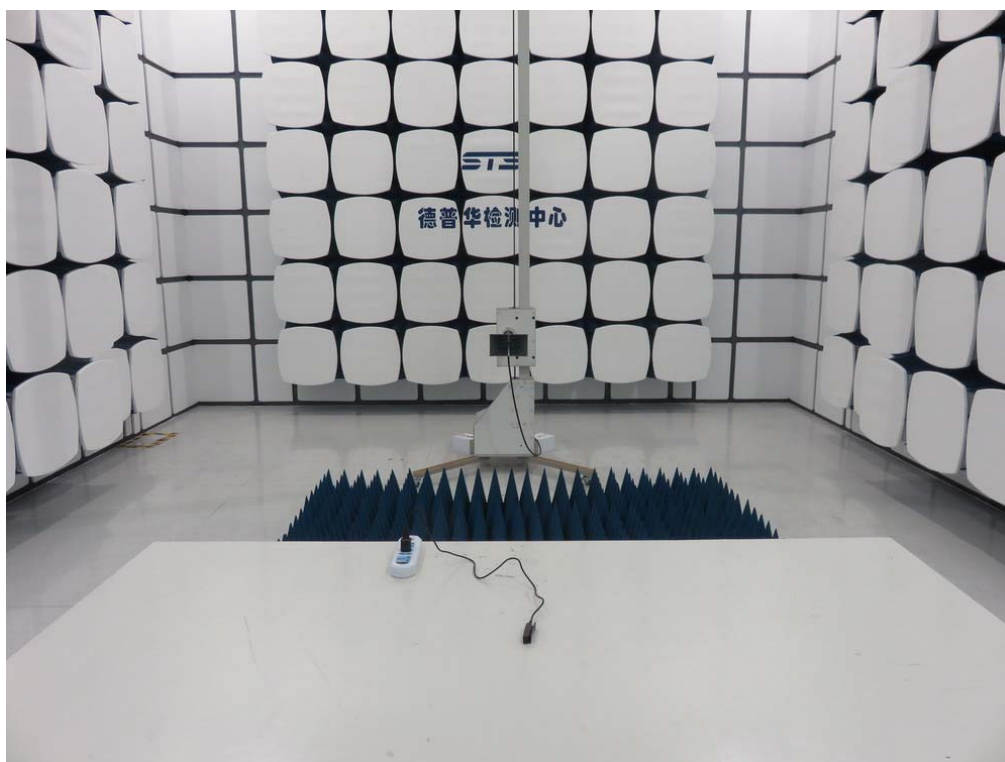
APPENDIX A: PHOTOGRAPHS OF TEST SETUP

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



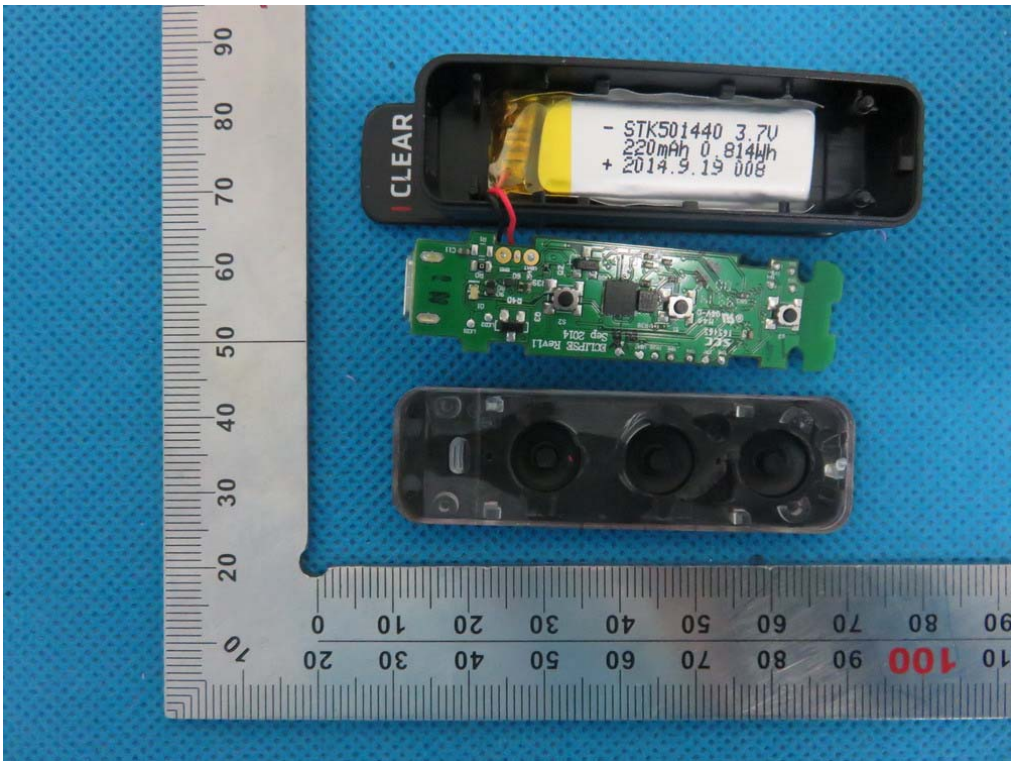
RIGHT VIEW OF EUT



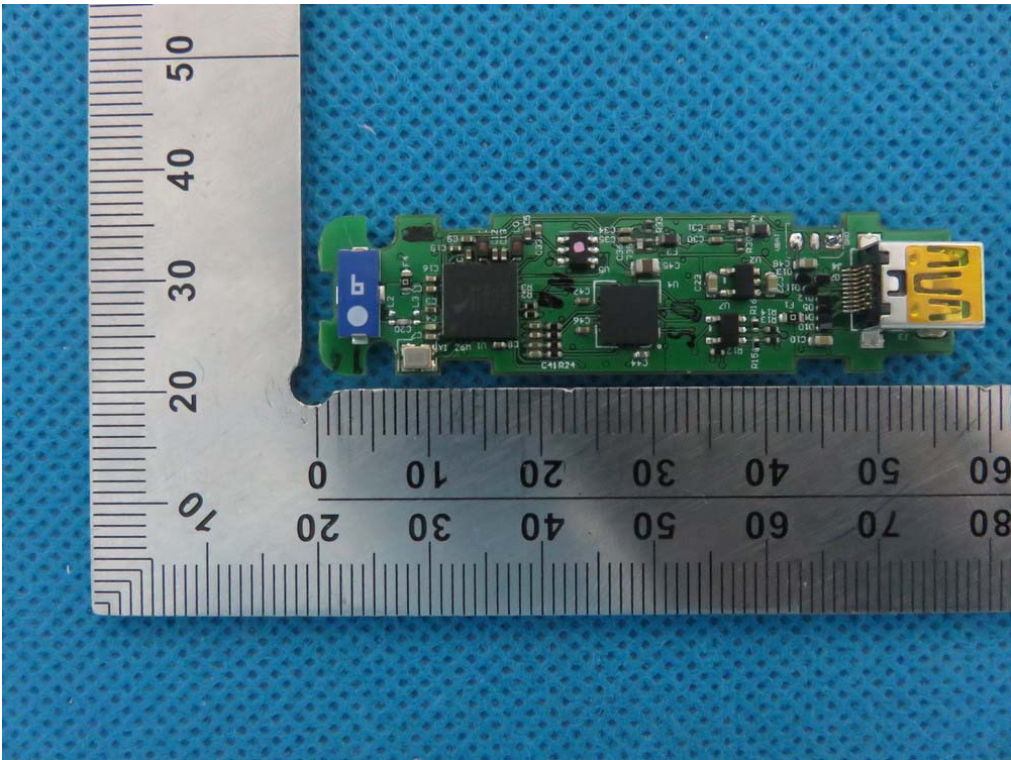
VIEW OF EUT (Port)



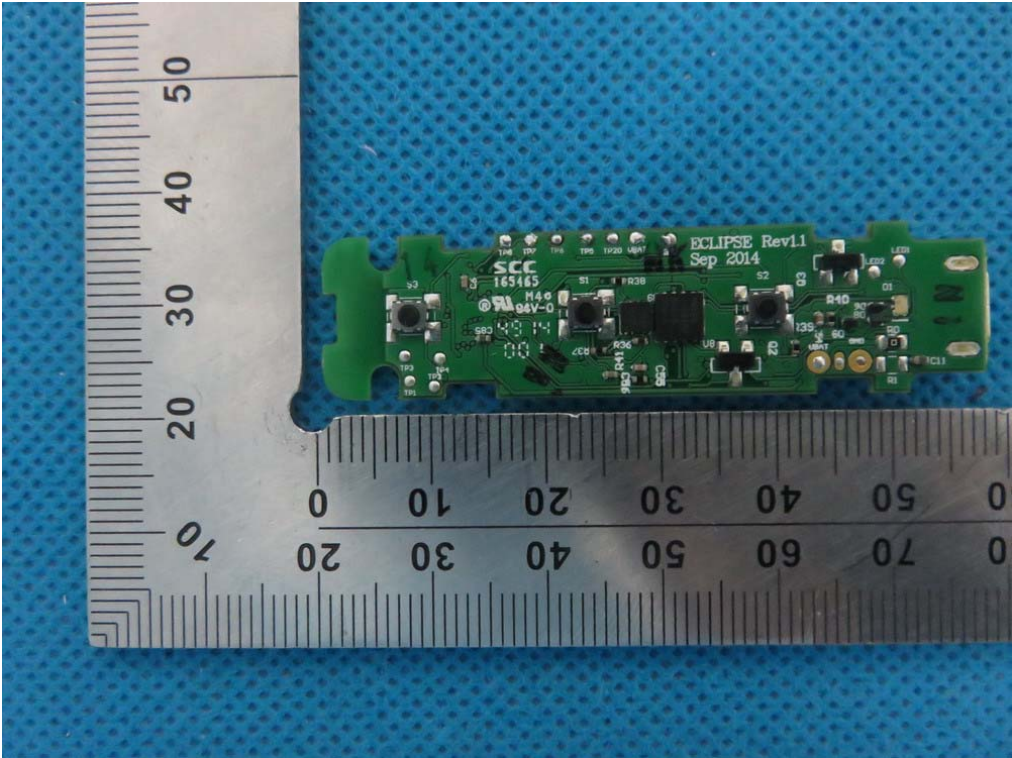
OPEN VIEW OF EUT



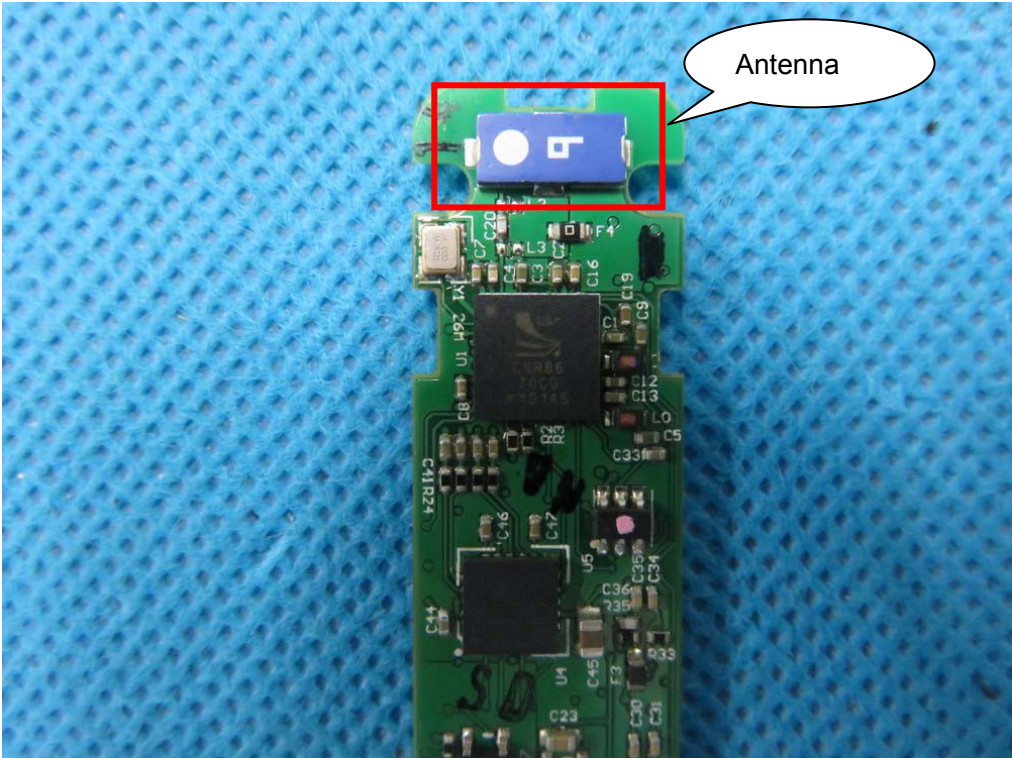
INTERNAL VIEW OF EUT-1



INTERNAL VIEW OF EUT-2



INTERNAL VIEW OF EUT-3



----END OF REPORT----