

FCC TEST REPORT

For

Guangzhou Bluelight Electronic Technology Co., Ltd

Bluetooth Speaker

Model No.: Gearbeast, LG-88, LG-108, LG-380,
LG-606, LG-805, BL-68, BL-350,
BL-730, BL-808

Test Report Number : ESTSZ130501229F



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1 - GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant: Guangzhou Bluelight Electronic Technology Co., Ltd
 Address of applicant: No.9, Meidong Industrial Park, Tieshanhe Road, Huadu District, Guangzhou, China
 Manufacturer: Guangzhou Bluelight Electronic Technology Co., Ltd
 Address of manufacturer: No.9, Meidong Industrial Park, Tieshanhe Road, Huadu District, Guangzhou, China

General Description of E.U.T


EUT Description: Bluetooth Speaker
 Trade Name: N/A
 Model No.: Gearbeast, LG-88, LG-108, LG-380, LG-606, LG-805, BL-68, BL-350, BL-730, BL-808
Note: The models of EUT are identical except appearance of equipment. Unless otherwise specified, all tests were performed on model Gearbeast to represent the other similar models.
 Rating: DC 5V via PC and DC 3.7V via Battery
 Test Power Supply: AC 120V/60Hz and DC 3.7V
 Frequency: 2402~2480 MHz (See the table1)

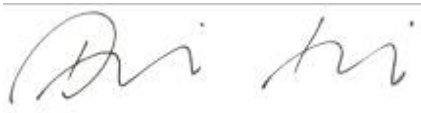
1.2 Test Standards

The following Declaration of Conformity report of EUT is prepared in accordance with FCC Rules and Regulations Part 15 Subpart C 15.249: 2008

The objective of the manufacturer is to demonstrate compliance with the described above standards. Note: This test report is limited to the above client company and the product model only. It may not be duplicated without prior written consent of Shenzhen Exact Standard Testing Technology Co., Ltd..

Date of Test : May.28~Jun.06, 2013

Prepared by : 
 (Engineer: David He)

Reviewer : 
 (Project Manager: Ronnie Liu)


Approved & Authorized Signer : 
 (Manager: Alex Chen)

Table1

Channel List					
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
00	2402	27	2429	54	2456
01	2403	28	2430	55	2457
02	2404	29	2431	56	2458
03	2405	30	2432	57	2459
04	2406	31	2433	58	2460
05	2407	32	2434	59	2461
06	2408	33	2435	60	2462
07	2409	34	2436	61	2463
08	2410	35	2437	62	2464
09	2411	36	2438	63	2465
10	2412	37	2439	64	2466
11	2413	38	2440	65	2467
12	2414	39	2441	66	2468
13	2415	40	2442	67	2469
14	2416	41	2443	68	2470
15	2417	42	2444	69	2471
16	2418	43	2445	70	2472
17	2419	44	2446	71	2473
18	2420	45	2447	72	2474
19	2421	46	2448	73	2475
20	2422	47	2449	74	2476
21	2423	48	2450	75	2477
22	2424	49	2451	76	2478
23	2425	50	2452	77	2479
24	2426	51	2453	78	2480
25	2427	52	2454		
26	2428	53	2455		

BLUETOOTH		
Test Channel	EUT Channel	Test Frequency (MHz)
lowest	CH00	2402
middle	CH39	2441
highest	CH78	2480

1.3 Test Summary

For the EUT described above. The standards used were FCC Part 15 Subpart C for Emissions.

Table 1 : Tests Carried Out Under FCC Part 15 Subpart C

FCC Part 15 Subpart C	Test Items	Status
Section 15.207	Conduction Emission	√
Section 15.249(a), 15.249(d), 15.35(b), 15.209	Radiation Emission	√
Section 15.215	20dB bandwidth	√
Section 15.203	Antenna requirement	√

- √ Indicates that the test is applicable
 × Indicates that the test is not applicable

1.4 Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2003, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the Operating Instructions.

The maximum emission levels emanating from the device are compared to the FCC Part 15 Subpart C limits for radiation emissions and the measurement results contained in this test report show that EUT is to be technically compliant with FCC requirements.

Global United Technology Service Co., Ltd at 2nd Floor, Block No. 2, Laodong Industrial Zone, Xixiang Road Baoan District, Shenzhen, China

1.5 Test Facility

All measurement required was performed at laboratory of Global United Technology Service Co., Ltd at 2nd Floor, Block No. 2, Laodong Industrial Zone, Xixiang Road Baoan District, Shenzhen, China

The test facility is recognized, certified, or accredited by the following organizations:

FCC – Registration No.: 600491

Global United Technology Service Co., Ltd, Shenzhen EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files.

The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2003.

1.6 Test Equipment List and Details

Equipment	Manufacturer	Model#	Serial #	Data of Cal.	Due Data
3m Semi-Anechoic Chamber	ZhongYu Electron	9.2(L)*6.2(W)* 6.4(H)	GTS201	Mar. 30 2013	Mar. 30 2014
Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	GTS202	N/A	N/A
EMI Test Receiver	Rohde & Schwarz	ESU26	GTS203	Mar. 30 2013	Mar. 30 2014
EMI Test Software	AUDIX	E3	N/A	N/A	N/A
Coaxial Cable	GTS	N/A	GTS400	Apr. 01 2013	Apr. 01 2014
Coaxial Cable	GTS	N/A	GTS401	Apr. 01 2013	Apr. 01 2014
Coaxial Cable	GTS	N/A	GTS402	Apr. 01 2013	Apr. 01 2014
Coaxial Cable	GTS	N/A	GTS407	Apr. 01 2013	Apr. 01 2014
Coaxial Cable	GTS	N/A	GTS408	Apr. 01 2013	Apr. 01 2014
BiConiLog Antenna (26-3000MHz)	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	GTS204	Feb. 26 2013	Feb. 26 2014
Pre-amplifier(0.1-3000MHz)	HP	8347A	GTS210	Aug. 03 2012	Aug. 03 2013
Double-ridged horn (1-18GHz)	SCHWARZBECK MESS-ELEKTRONIK	9120D-829	GTS205	Feb. 26 2013	Feb. 26 2014
Pre-amplifier(1-18GHz)	Rohde & Schwarz	8349B	GTS224	Mar. 30 2013	Mar. 30 2014
Humidity/ Temperature Indicator	Shanghai	ZJ1-2B	GTS250	Oct. 28 2012	Oct. 28 2013
Barometer	ChangChun	DYM3	GTS251	Feb. 26 2013	Feb. 26 2014
Shielding Room	ZhongYu Electron	7.0(L)*3.0(W)*3.0(H)	GTS206	Apr. 10 2013	Apr. 10 2014
EMI Test Receiver	Rohde & Schwarz	ESCS30	GTS208	Sept. 14 2011	Sept. 14 2013
10dB Pulse Limiter	Rohde & Schwarz	N/A	GTS209	Sept. 14 2013	Sept. 14 2013
LISN	SCHWARZBECK MESS-ELEKTRONIK	NSLK 8127	GTS207	Apr. 14 2013	Apr. 14 2014
Coaxial Cable	GTS	N/A	GTS406	Apr. 01 2013	Apr. 01 2014
Loop Antenna	ETS-Lindgren	6502	00082431	Apr. 14 2013	Apr. 14 2014
Double-ridged horn (15-26.5GHz)	SCHWARZBECK MESS-ELEKTRONIK	BBHA-9170	GTS211	Apr. 01 2013	Apr. 01 2014

2 - Test Procedure

GENERAL: This report shall NOT be reproduced except in full without the written approval of Shenzhen Exact Standard Testing Technology Co., Ltd.. The EUT was transmitting a test signal during the testing.

RADIATION INTERFERENCE: The test procedure used was ANSI STANDARD C63.4-2003 using a spectrum analyzer with a pre-selector. The analyzer was calibrated in dB above a microvolt at the output of the antenna. The resolution bandwidth was 100KHz and the video bandwidth was 300KHz up to 1.0GHz and 1.0MHz with a video BW of 3.0MHz above 1.0GHz. The ambient temperature of the EUT was 74.3oF with a humidity of 69%.

FORMULA OF CONVERSION FACTORS: The Field Strength at 3m was established by adding the meter reading of the spectrum analyzer (which is set to read in units of dBuV) to the antenna correction factor supplied by the antenna manufacturer. The antenna correction factors are stated in terms of dB. The gain of the Preselector was accounted for in the Spectrum Analyzer Meter Reading.

Example:

Freq (MHz) METER READING + ACF = FS
33 20 dBuV + 10.36 dB = 30.36 dBuV/m @ 3m

ANSI STANDARD C63.4-2003 10.1.7 MEASUREMENT PROCEDURES: The EUT was placed on a table 80 cm high and with dimensions of 1m by 1.5m. The EUT was placed in the center of the table (1.5m side). The table used for radiated measurements is capable of continuous rotation. When an emission was found, the table was rotated to produce the maximum signal strength. At this point, the antenna was raised and lowered from 1m to 4m. The antenna was placed in both the horizontal and vertical planes.

3 - DISTURBANCE VOLTAGE AT THE MAINS TERMINALS

3.1 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, and LISN.

The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement is ± 2.4 dB.

3.2 Requirements (15.207):

Frequency Range (MHz)	Limits (dBuV)	
	Quasi-Peak	Average
0.150~0.500	66~56	56~46
0.500~5.000	56	46
5.000~30.00	60	50

Note: (1)The tighter limit shall apply at the edge between two frequency bands.

3.3 EUT Setup

The setup of EUT is according with ANSI C63.4-2003 measurement procedure. The specification used was the FCC Rules and Regulations Part 15 Subpart C limits.

The EUT was placed center and the back edge of the test table.

The AV cables were draped along the test table and bundled to 30-40cm in the middle.

The spacing between the peripherals was 10 cm.

Maximum emission emitted from EUT was determined by manipulating the EUT, support equipment, interconnecting cables and varying the mode of operation and the levels in the final result of the test were recorded with the EUT running in the operating mode that maximum emission was emitted.

3.4 Instrument Setup

The test receiver was set with the following configurations:

Test Receiver Setting:

Frequency Range.....150 KHz to 30 MHz
 Detector.....Peak & Quasi-Peak & Average
 Sweep Speed.....Auto
 IF Band Width.....9 KHz

FCC ID: 2AAGA-001

3.5 Test Procedure

During the conducted emission test, the EUT power cord was connected to the auxiliary outlet of the first Artificial Mains.

Maximizing procedure was performed on the six (6) highest emissions to ensure EUT compliance using all installation combination.

All data was recorded in the peak detection mode. Quasi-peak and Average readings were only performed when an emission was found to be marginal (within $-10\text{ dB}\mu\text{V}$ of specification limits). Quasi-peak readings are distinguished with a "QP". Average readings are distinguished with a "AV".

3.6 Summary of Test Results

According to the data in section 3.6, the EUT complied with the FCC Part 15 Subpart C Conducted margin, with the *worst* margin reading of:

3.7 Disturbance Voltage Test Data

Temperature (°C)	26
Humidity (%RH)	58
Barometric Pressure (mbar)	1001.1
EUT	Bluetooth Speaker
M/N	Gearbeast
Operating Mode	Charging

Test data see following pages.

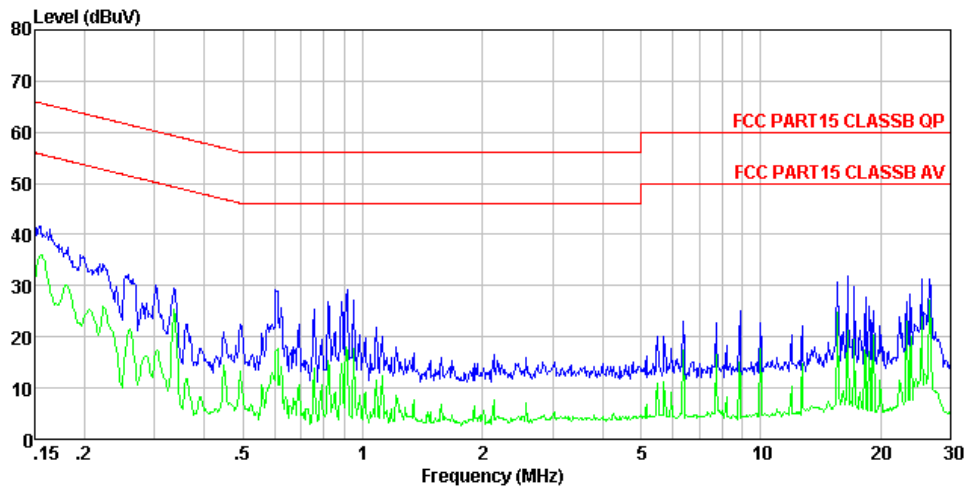
Remark: (1) When PK reading is less than relevant limit 20dB, the QP reading and AV reading will not be recorded.
 (2) Where QP reading is less than relevant AV limit, the AV reading will not be measured

3.8 Test Results

PASS.

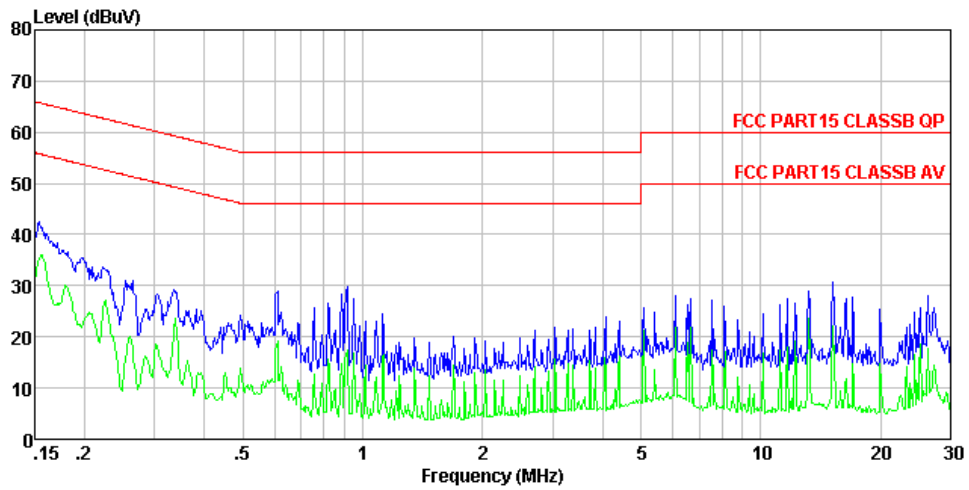
Please refer the following pages.

Conducted Emission Test Data



Condition : FCC PART15 CLASSB QP LISN-2012 LINE
EUT : BLUETOOTH SPEAKER
Model : GEARBEAST
Test Mode : On mode
Power Rating : AC 120V/60Hz
Test Engineer: David

Conducted Emission Test Data



Condition : FCC PART15 CLASSB QP LISN-2012 NEUTRAL
EUT : BLUETOOTH SPEAKER
Model : GEARBEAST
Test Mode : On mode
Power Rating : AC 120V/60Hz
Test Engineer: David

4 - Radiation Interference

4.1 Requirements (15.249, 15.209 & 15.35(b), 15.33(a)):

According to 15.249(a) the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental Frequency	Field Strength of Fundamental (millivolts/meter)	Field Strength of Harmonics (microvolts/meter)
902 - 928 MHz	50	500
2400 - 2483.5 MHz	50	500
5725 - 5875 MHz	50	500
24.0 - 24.25 GHz	250	2500

For this equipment

Fundamental Frequency	Field Strength of fundamental		Field Strength of Harmonic	
	$\mu\text{V/m}$	$\text{dB}\mu\text{V/m}$	$\mu\text{V/m}$	$\text{dB}\mu\text{V/m}$
2400 - 2483.5 MHz	50000	94	500	54

According to 15.249(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.

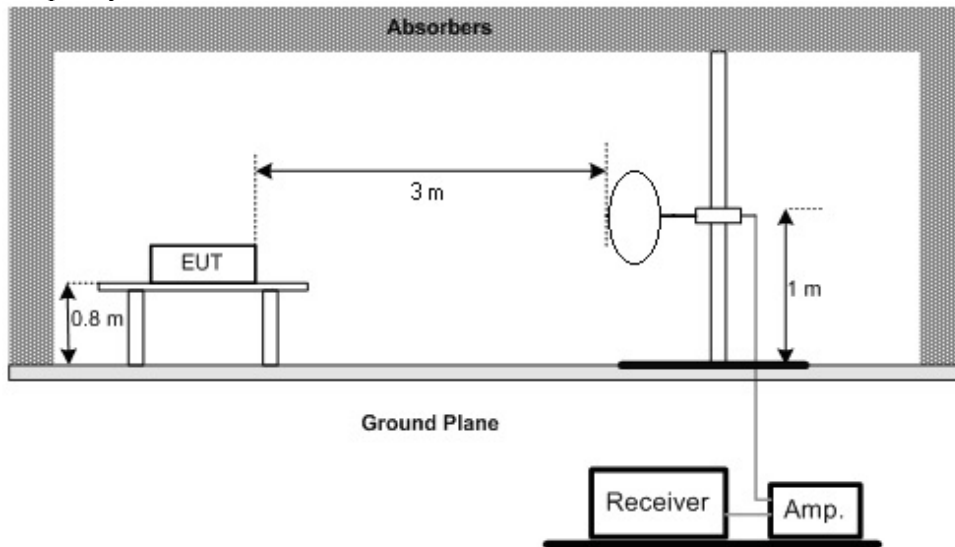
15.209(a) –Radiated emission limits, general requirements.

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100 **	3
88 - 216	150 **	3
216 - 960	200 **	3
Above 960	500	3

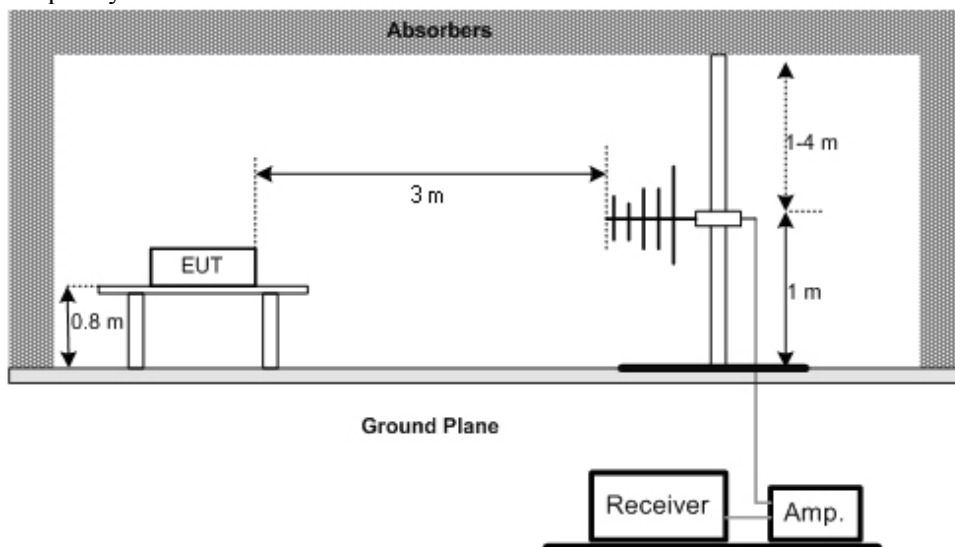
As shown in Section 15.35(b), for frequencies above 1000 MHz, the above field strength limits in paragraphs (a) and (b) of this section are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

4.2 Test Setup

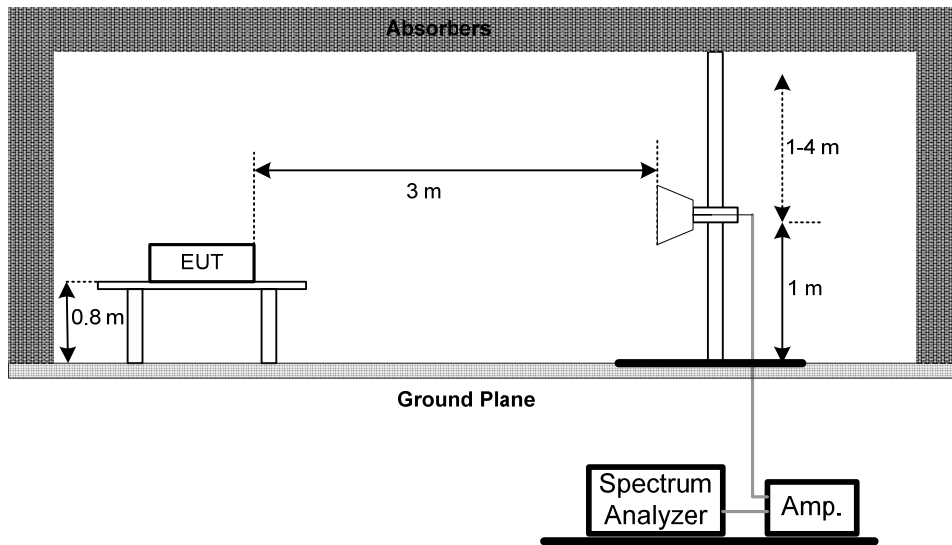
Frequency below 30MHz



Frequency from 30 to 1000MHz



Frequency above 1 GHz



The EUT is located in a 3m Semi-Anechoic Chamber, the antenna factors, cable loss and so on of the site as factors are calculated to correct the reading.

For the Test Antenna: In the frequency range below 30MHz, Loop Antenna is used; from 30-1000MHz, Bi-log Antenna is used, and above 1GHz, Horn Antenna is used. Test Antenna is 3m away from the EUT. Test Antenna height is varied from 1m to 4m above the ground to determine the maximum value of the field strength, the azimuth range of turntable was 0° to 360°, the receive antenna has two polarizations horizontal and vertical. When doing measurements above 1GHz, the EUT was placed within the 3dB beam width range of the horn antenna, and the EUT was tested in orthogonal positions as recommended in ANSI C63.4 for Radiated Emissions and the worst-case data was presented.

4.3 Test Results

PASS.

Please refer the following pages.

FCC ID: 2AAGA-001

4.4 Test Data

Temperature (°C)	26
Humidity (%RH)	58
Barometric Pressure (mbar)	1001.1
EUT	Bluetooth Speaker
M/N	Gearbeast
Operating Mode	TX & Stand alone

Test frequency 9KHz-25GHz

Note: Emissions attenuated more than 20 dB below the permissible value are not reported.**4.4.1 Field Strength of fundamental****Mode: TX**

Frequency (MHz)	Read Peak (dBuV)	Read AV (dBuV)	Total Factor (dB)	Level (dBuV/m)		Limit(dBuV/m)		Direction (H/V)	Result
				Peak	AV	Peak	AV		
2402	85.16	80.12	5.85	91.01	85.97	114	94	H	pass
2441	83.65	79.05	5.33	88.98	84.38	114	94	H	pass
2480	86.19	80.37	5.49	91.68	85.86	114	94	H	pass
2402	86.43	80.51	5.65	92.08	86.16	114	94	V	pass
2441	85.42	79.82	5.30	90.72	85.12	114	94	V	pass
2480	86.94	80.06	5.17	92.11	85.23	114	94	V	pass

Note: Level=Peak or AV+ Total Factor

Total Factor=Antenna Factor + Cable Loss-Preamp Factor

4.4.2 Field Strength of Harmonic**Mode: TX**

CH Low(2402MHz)

Frequency (MHz)	Read Peak (dBuV)	Read AV (dBuV)	Total Factor (dB)	Level (dBuV/m)		Limit(dBuV/m)		Direction (H/V)	Result
				Peak	AV	Peak	AV		
4804	42.15	38.24	6.44	48.59	44.68	74	54	H	pass
7206	42.46	38.06	6.00	48.46	44.06	74	54	H	pass
9608	42.47	37.99	7.20	49.67	45.19	74	54	H	pass
4804	41.97	37.63	6.58	48.55	44.21	74	54	V	pass
7206	43.22	38.94	5.97	49.19	44.91	74	54	V	pass
9608	42.18	38.66	7.41	49.59	46.07	74	54	V	pass

FCC ID: 2AAGA-001

CH Low(2441MHz)

Frequency (MHz)	Read Peak (dBuV)	Read AV (dBuV)	Total Factor (dB)	Level (dBuV/m)		Limit(dBuV/m)		Direction (H/V)	Result
				Peak	AV	Peak	AV		
4882	41.54	38.15	6.48	48.02	44.63	74	54	H	pass
7323	42.19	38.81	5.88	48.07	44.69	74	54	H	pass
9764	40.65	37.76	7.80	48.45	45.56	74	54	H	pass
4882	41.38	38.44	6.38	47.76	44.82	74	54	V	pass
7323	41.49	38.46	5.75	47.24	44.21	74	54	V	pass
9764	41.61	38.73	7.83	49.44	46.56	74	54	V	pass

CH Low(2480MHz)

Frequency (MHz)	Read Peak (dBuV)	Read AV (dBuV)	Total Factor (dB)	Level (dBuV/m)		Limit(dBuV/m)		Direction (H/V)	Remark
				Peak	AV	Peak	AV		
4960	41.09	37.15	6.59	47.68	43.74	74	54	H	pass
7440	40.37	36.78	5.90	46.27	42.68	74	54	H	pass
9920	40.43	36.86	7.99	48.42	44.85	74	54	H	pass
4960	40.49	37.06	6.53	47.02	43.59	74	54	V	pass
7440	40.38	36.12	5.96	46.34	42.08	74	54	V	pass
9920	40.67	36.68	7.91	48.58	44.59	74	54	V	pass

4.4.3 Spurious Radiated Emissions

Mode: Stand Alone

From 9KHz ~ 30MHz and 30MHz-1000MHz:

Frequency (MHz)	Read Level (dBuV)	Total Factor (dB/m)	Level (dBuV/m)	Limit Line (dBuV/m)	Remark	Direction (H/V)	Result
26.00	52.64	-15.26	37.38	49.5	QP	-	pass

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Remark	Direction (H/V)
106.12	43.92	10.88	1.13	26.32	29.61	43.50	-13.89	QP	H
182.11	42.38	9.89	1.68	26.21	27.74	43.50	-15.76	QP	H
41.67	44.51	11.94	0.69	26.45	30.69	40.00	-9.31	QP	V
182.35	40.97	9.77	1.68	26.21	26.21	43.50	-17.29	QP	V

4.4.4 Edge Radiated Emissions

Mode: TX

Frequency (MHz)	Read Peak (dBuV)	Read AV (dBuV)	Total Factor (dB)	Level (dBuV/m)		Limit(dBuV/m)		Direction (H/V)	Remark
				Peak	AV	Peak	AV		
2395.47	30.22	25.34	5.82	36.04	31.16	74	54	H	pass
2400.29	39.43	33.47	5.84	45.27	39.31	74	54	H	pass
2483.06	39.86	33.75	5.61	45.47	39.36	74	54	H	pass
2485.39	30.18	25.50	5.51	35.69	31.01	74	54	H	pass
2395.07	30.57	25.44	5.5	36.07	30.94	74	54	V	pass
2400.88	39.46	32.76	5.61	45.07	38.37	74	54	V	pass
2483.21	38.61	32.94	5.19	43.80	38.13	74	54	V	pass
2485.87	29.77	26.37	5.24	35.01	31.61	74	54	V	pass

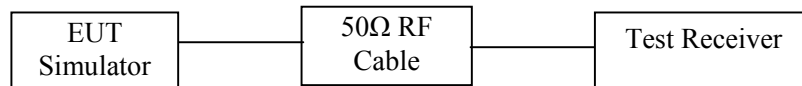
5 - 20 dB Bandwidth

5.1 Requirements

According to 15.215(c):

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission,

5.2 Test Setup



5.3 Test Procedure

- a. Place the EUT on the table and set it in the transmitting mode.
- b. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
- c. Set the spectrum analyzer as RBW = 300 kHz, VBW = 300kHz, Span = 3 MHz, Sweep = auto. Detector function = peak, Trace = max hold
- d. Mark the peak frequency and -20dB (upper and lower) frequency.
- e. Repeat until all the rest channels are investigated.

5.4 Limit

The 20dB Bandwidth Frequency shall be lie on 2400-2483.5MHz.

5.5 Test Results

Pass.

5.6 Test Data

Temperature (°C)	26
Humidity (%RH)	58
Barometric Pressure (mbar)	1001.1
EUT	Bluetooth Speaker
M/N	Gearbeast
Operating Mode	TX

Test data as follows

Channel	Frequency(MHz)	20dB Down BW(kHz)
CH00	2402	711.62
CH39	2441	716.91
CH78	2480	724.15

So the maximum 20dB Bandwidth is 724.15kHz.
And, the 20dB Bandwidth Frequency lies on 2400-2483.5MHz.

6 - Antenna

6.1 Antenna requirement

FCC section 15.203, An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of Part 15C. The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited

6.2 Antenna Type

Antenna is on the PCB.

Table2: The antenna gain

	Antenna gain(dBi)
Antenna	0

7 - RF Exposure Evaluation

7.1 Requirements:

According to §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

This is a portable device.

We test the max power output via conducted method. Please refer test data as below.

7.2 Test Data

Channel No.	Frequency	Max power output to antenna	
	(MHz)	(dBm)	(mW)
CH00	2402	-17.09	0.01955
CH39	2441	-17.17	0.01920
CH78	2480	-17.00	0.01994

The EUT works on the 2.4G ISM band, according to KDB 447498 D01 General RF Exposure Guidance v05, the SAR Test Exclusion Power Thresholds is 10mW. The max power of this device is 0.01994mW < 10mW, so the SAR evaluation is not required.