

Test Report

FCC ID: R56-FCIDAB

Date of issue: Jul. 08, 2017

Report Number:	MTi170821E148
Sample Description:	Bluetooth Hearphone Amp
Model(s):	FB1121, FB3121, FB5121, FE1121, FE3121, FE5121, FB1, FB3, FB5, FS1121
Applicant:	Guangzhou FiiO Electronics Technology Co.,Ltd
Address:	2/F, F Building, Hougang Industrial Zone, Shigang Village, Huangshi West Road, Baiyun District, Guangzhou City, China.
Date of Test:	June. 21, 2017 to Jul. 08, 2017

Shenzhen Microtest Co., Ltd.
<http://www.mtitest.com>



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TEST RESULT CERTIFICATION	
Applicant's name	Guangzhou FiiO Electronics Technology Co.,Ltd
Address	2/F, F Building, Hougang Industrial Zone, Shigang Village, Huangshi West Road, Baiyun District, Guangzhou City, China.
Manufacture's Name	Guangzhou FiiO Electronics Technology Co., Ltd
Address	2/F, F Building, Hougang Industrial Zone, Shigang Village, Huangshi West Road, Baiyun District, Guangzhou City, China.
Product name	Bluetooth Hearphone Amp
Model and/or type reference :	FB1121
Serial Model	FB3121, FB5121, FE1121, FE3121, FE5121, FB1, FB3, FB5, FS1121
Standards	FCC Part15.247
Test procedure	ANSI C63.10-2014

This device described above has been tested by Shenzhen Toby Technology Co., Ltd. and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

Tested by:



Demi Mu

Jul. 07, 2017

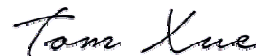
Reviewed by:



Smith Chen

Jul. 08, 2017

Approved by:



Tom Xue

Jul. 08, 2017

Table of Contents		Page
1 . SUMMARY OF TEST RESULTS		5
1.1 TEST FACILITY		6
1.2 MEASUREMENT UNCERTAINTY		6
2 . GENERAL INFORMATION		7
2.1 GENERAL DESCRIPTION OF EUT		7
2.2 DESCRIPTION OF TEST MODES		9
2.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED		10
2.4 DESCRIPTION OF SUPPORT UNITS(CONDUCTED MODE)		11
2.5 EQUIPMENTS LIST FOR ALL TEST ITEMS		12
3 . EMC EMISSION TEST		13
3.1 CONDUCTED EMISSION MEASUREMENT		13
3.1.1 POWER LINE CONDUCTED EMISSION LIMITS		13
3.1.2 TEST PROCEDURE		14
3.1.3 DEVIATION FROM TEST STANDARD		14
3.1.4 TEST SETUP		14
3.1.5 EUT OPERATING CONDITIONS		14
3.1.6 TEST RESULTS		15
3.2 RADIATED EMISSION MEASUREMENT		17
3.2.1 RADIATED EMISSION LIMITS		17
3.2.2 TEST PROCEDURE		17
3.2.3 DEVIATION FROM TEST STANDARD		18
3.2.4 TEST SETUP		19
3.2.5 EUT OPERATING CONDITIONS		20
3.2.6 TEST RESULTS (BETWEEN 9KHZ – 30 MHZ)		21
3.2.7 TEST RESULTS (BETWEEN 30MHZ – 1GHZ)		22
3.2.8 TEST RESULTS (1G-25GHZ)		23
4 . 20 DB OCCUPY BANDWIDTH		28
4.1 APPLIED PROCEDURES / LIMIT		28
4.1.1 TEST PROCEDURE		28
4.1.2 DEVIATION FROM STANDARD		28
4.1.3 TEST SETUP		28
4.1.4 EUT OPERATION CONDITIONS		28
4.1.5 TEST RESULTS		29
5 . CARRIER FREQUENCY SEPARATION TEST		35

Table of Contents

	Page
5.1 APPLIED PROCEDURES / LIMIT	35
5.1.1 TEST PROCEDURE	35
5.1.2 DEVIATION FROM STANDARD	35
5.1.3 TEST SETUP	35
5.1.4 EUT OPERATION CONDITIONS	35
5.1.5 TEST RESULTS	36
6 . NUMBER OF HOPPING CHANNEL	38
6.1 APPLIED PROCEDURES / LIMIT	38
6.1.2 DEVIATION FROM STANDARD	38
6.1.3 TEST SETUP	38
6.1.4 EUT OPERATION CONDITIONS	38
6.1.5 TEST RESULTS	38
7 . DWELL TIME	41
7.1 APPLIED PROCEDURES / LIMIT	41
7.1.2 DEVIATION FROM STANDARD	41
7.1.3 TEST SETUP	41
7.1.4 EUT OPERATION CONDITIONS	41
7.1.5 TEST RESULTS	41
8 . PEAK OUTPUT POWER TEST	49
8.1 APPLIED PROCEDURES / LIMIT	49
8.1.1 TEST PROCEDURE	49
8.1.2 DEVIATION FROM STANDARD	49
8.1.3 TEST SETUP	49
8.1.4 EUT OPERATION CONDITIONS	49
8.1.5 TEST RESULTS	50
9 . 100 KHZ BANDWIDTH OF FREQUENCY BAND EDGE	51
9.1 DEVIATION FROM STANDARD	51
9.2 TEST SETUP	51
9.3 EUT OPERATION CONDITIONS	51
9.4 TEST RESULTS	52
10 . ANTENNA REQUIREMENT	60
10.1 STANDARD REQUIREMENT	60
10.2 EUT ANTENNA	60

1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

FCC Part15 (15.247) , Subpart C			
Standard Section	Test Item	Judgment	Remark
15.203/15.247(c)	Antenna Requirement	PASSED	
15.207	Conducted Emission	PASSED	
15.247(b)(1)	Conducted Peak Output Power	PASSED	
15.247(a)(1)	20dB Occupied Bandwidth	PASSED	
15.247(a)(1)	Carrier Frequencies Separation	PASSED	
15.247(a)(1)	Hopping Channel Number	PASSED	
15.247(a)(1)	Dwell Time	PASSED	
15.205/15.209	Spurious Emission	PASSED	
15.247(d)	Band Edge	PASSED	

NOTE:

(1) "N/A" denotes test is not applicable in this Test Report

1.1 TEST FACILITY

Shenzhen Toby Technology Co., Ltd.
Add.: 10/F.,A Block, Jiada R&D Bldg., No.5 Songpingshan, Road, Science&Technology Park,
Shenzhen, 518057
FCC Registration No.:811562

1.2 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	±1.38dB
2	RF power,conducted	±0.16dB
3	Spurious emissions,conducted	±0.21dB
4	All emissions,radiated(<1G)	±4.68dB
5	All emissions,radiated(>1G)	±4.89dB
6	Temperature	±0.5°C
7	Humidity	±2%

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Equipment	Bluetooth Hearphone Amp	
Trade Name	FiiO	
Model Name	FB1121	
Serial Model	FB3121, FB5121, FE1121, FE3121, FE5121, FB1, FB3, FB5, FS1121	
Model Difference	The wireless module used in the product is the same, but the model is named differently	
Product Description	The EUT is a Bluetooth Hearphone Amp	
	Operation Frequency:	2402-2480MHz
	Modulation Type:	GFSK, $\pi/4$ -DQPSK, 8-DPSK
	Bit Rate of Transmitter	1,2,3Mbps
	Number Of Channel	79CH
	Antenna Designation:	Please see Note 3.
	Output Power(Conducted):	-0.46 dBm
	Antenna Gain (dBi)	2.5dbi
Based on the application, features, or specification exhibited in User's Manual, the EUT is considered as an ITE/Computing Device. More details of EUT technical specification, please refer to the User's Manual.		
Channel List	Please refer to the Note 2.	
Battery	DC 3.7V by battery	
Connecting I/O Port(s)	Please refer to the User's Manual	

Note:

- For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.
- 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		
Remark: Channel 0, 39 & 78 selected for GFSK, $\pi/4$ -DQPSK and 8DPSK.					

3. Table for Filed Antenna

Ant	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	NOTE
A	FiiO	FB1121	Chip antenna	/	2.5	Chip Antenna

2.2 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Pretest Mode	Description
Mode 1	GFSK CH1/CH40/CH79
Mode 2	$\pi/4$ -DQPSK CH1/CH40/CH79
Mode 3	8-DPSK CH1/CH40/CH79
Mode 4	Link Mode

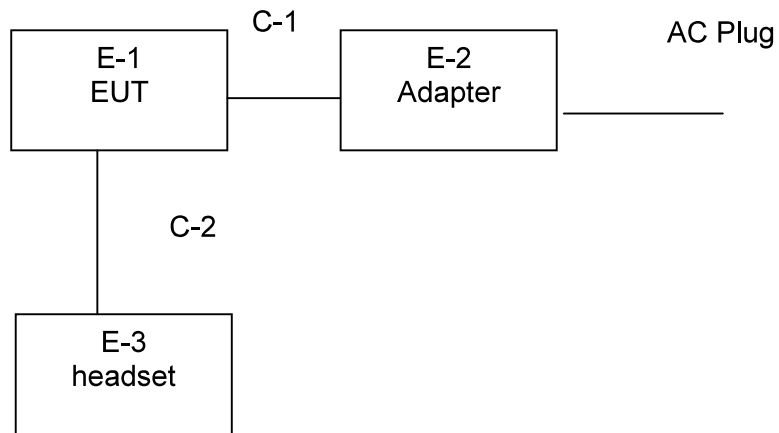
For Conducted Emission	
Final Test Mode	Description
Mode 4	Link Mode

For Radiated Emission	
Final Test Mode	Description
Mode 1	GFSK CH1/CH40/CH79
Mode 2	$\pi/4$ -DQPSK CH1/CH40/CH79
Mode 3	8-DPSK CH1/CH40/CH79

Note:

- (1) The measurements are performed at the highest, middle, lowest available channels.
- (2) The measurements are performed at all Bit Rate of Transmitter, the worst data was reported

2.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED



2.4 DESCRIPTION OF SUPPORT UNITS(CONDUCTED MODE)

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Brand	Model/Type No.	Series No.	Note
E-1	Bluetooth Hearphone Amp	FiiO	FB1121	N/A	EUT
E-2	Adapter	N/A	HW-050100E01	N/A	
E-3	headset	N/A	N/A	N/A	

Item	Shielded Type	Ferrite Core	Length	Note
C-1	NO	NO	1.0m	
C-2	NO	NO	0.8m	

Note:

- (1) The support equipment was authorized by Declaration of Confirmation.
- (2) For detachable type I/O cable should be specified the length in cm in 『Length』 column.

2.5 EQUIPMENTS LIST FOR ALL TEST ITEMS

For RF conducted test:

Equipment	Manufacturer	Model	Serial No.	Calibration Due
Universal Radio Communication Tester	Rohde&schwarz	CMU200	114587	2017/11/4
Spectrum analyzer	Agilent	E4407B	MY41441082	2017/11/4
Dc Power Supply	GW	GPR-6030D	/	2017/11/4
Temperature & Humidity Chamber	GIANT FORCE	GTH-056P	GF-94454-1	2017/11/14
Broadband TRILOG Antenna	Schwarabeck	VULB9163	9163-872	2017/11/14
Horn Antenna	Schwarzbeck	BBHA 9120 D	9120D-1145	2017/11/14
Amplifier	HP	8447D	3113A06150	2017/11/4
Amplifier	Agilent	8449B	3008A02400	2018/7/4
Test Receiver	Schwarabeck	ESPI7	100314	2017/11/4
Spectrum analyzer	Agilent	E4407B	MY41441082	2017/11/4
Signal Generator	R&S	SMT 06	832080/007	2017/11/4
Broadband TRILOG Antenna	Schwarabeck	VULB9163	9163-872	2017/11/14
Horn Antenna	Schwarzbeck	BBHA 9120 D	9120D-1145	2017/11/14
Amplifier	HP	8447D	3113A06150	2017/11/4
Amplifier	Agilent	8449B	3008A02400	2018/7/4
Test Receiver	Schwarabeck	ESPI	100314	2017/11/4
Spectrum analyzer	Agilent	E4407B	MY41441082	2017/11/4
LISN	R&S	ENV216	1001131	2017/9/25
Test Cable	United Microwave	57793	1m	2017/12/05
Test Cable	United Microwave	A30A30-5006	10m	2017/12/05

Note: the calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).

3. EMC EMISSION TEST

3.1 CONDUCTED EMISSION MEASUREMENT

3.1.1 POWER LINE CONDUCTED EMISSION Limits (Frequency Range 150KHz-30MHz)

FREQUENCY (MHz)	Class A (dBuV)		Class B (dBuV)		Standard
	Quasi-peak	Average	Quasi-peak	Average	
0.15 -0.5	79.00	66.00	66 - 56 *	56 - 46 *	CISPR
0.50 -5.0	73.00	60.00	56.00	46.00	CISPR
5.0 -30.0	73.00	60.00	60.00	50.00	CISPR

0.15 -0.5	79.00	66.00	66 - 56 *	56 - 46 *	FCC
0.50 -5.0	73.00	60.00	56.00	46.00	FCC
5.0 -30.0	73.00	60.00	60.00	50.00	FCC

Note:

- (1) The tighter limit applies at the band edges.
- (2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

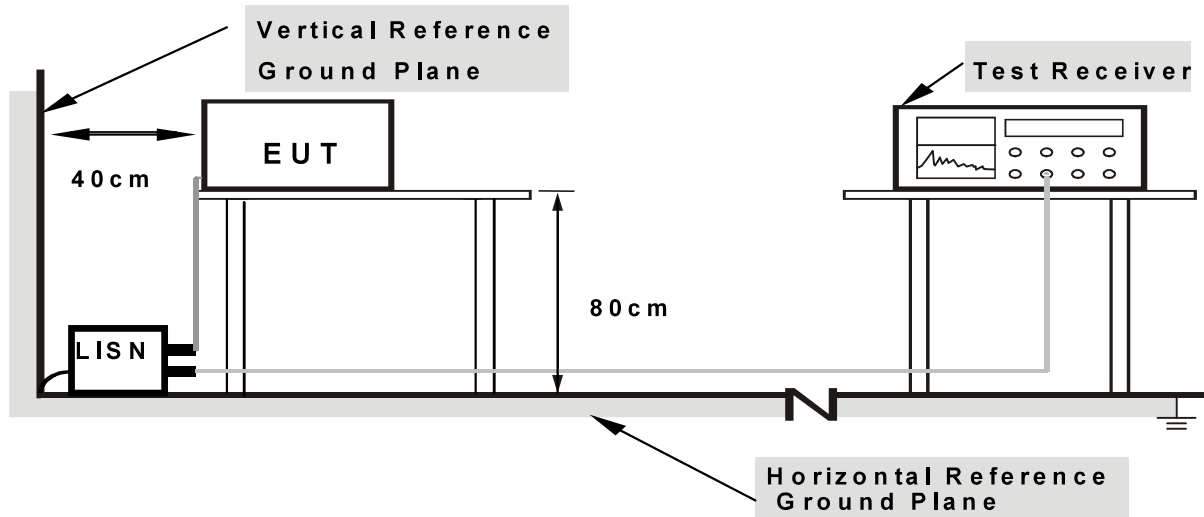
3.1.2 TEST PROCEDURE

- a. The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- c. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- d. LISN at least 80 cm from nearest part of EUT chassis.
- e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

3.1.3 DEVIATION FROM TEST STANDARD

No deviation

3.1.4 TEST SETUP



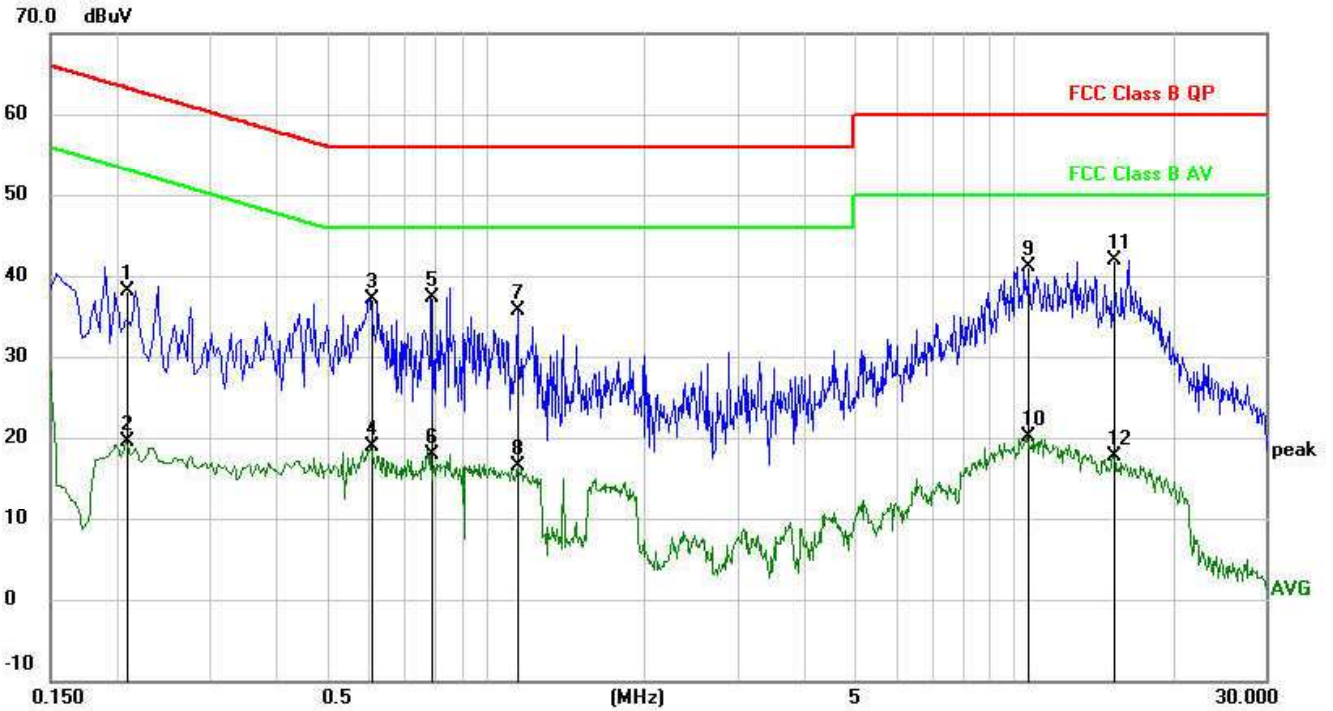
- Note:**
- 1. Support units were connected to second LISN.
 - 2. Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

3.1.5 EUT OPERATING CONDITIONS

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

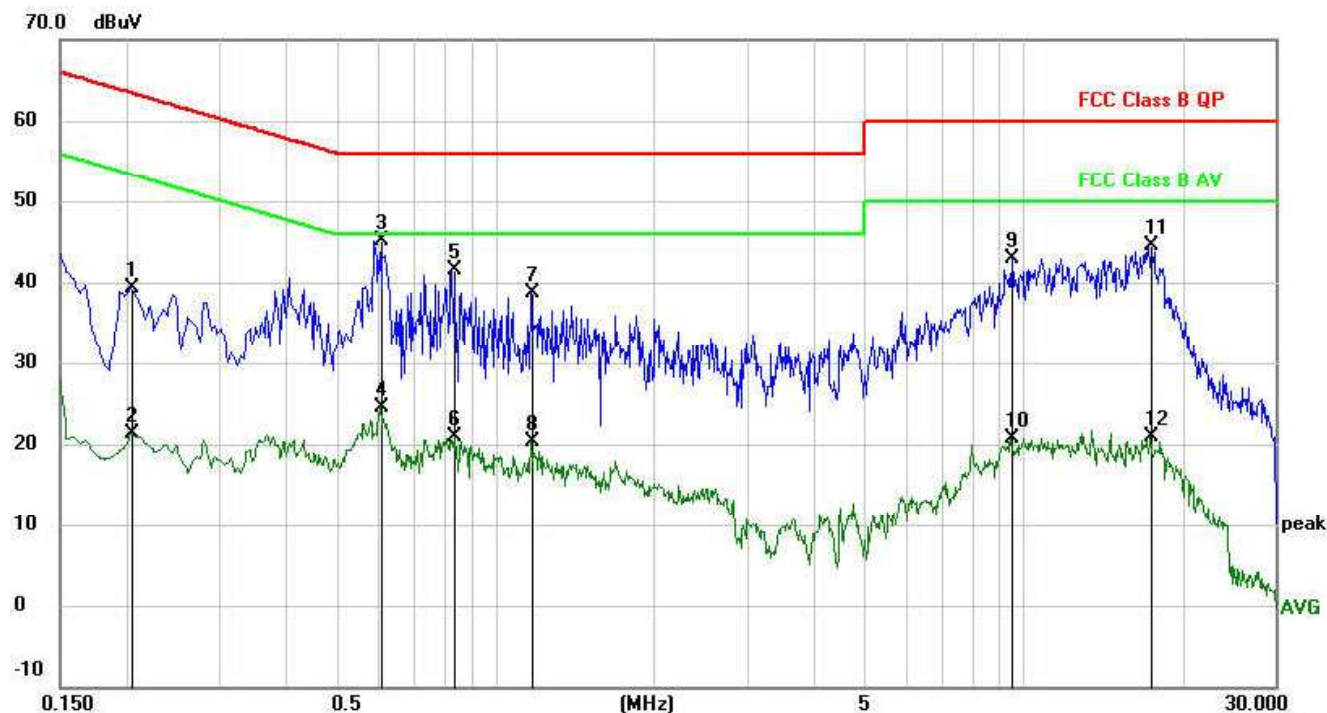
3.1.6 TEST RESULTS

EUT :	Bluetooth Hearphone Amp	Model Name. :	FB1121
Temperature :	26 °C	Relative Humidity :	54%
Pressure :	1010hPa	Phase :	L
Test Voltage :	DC 5V from adapter AC 120V/60Hz	Test Mode :	Mode 4



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.2085	38.12	-0.03	38.09	63.26	-25.17	QP	
2		0.2085	19.44	-0.03	19.41	53.26	-33.85	AVG	
3		0.6045	37.09	-0.03	37.06	56.00	-18.94	QP	
4		0.6045	18.85	-0.03	18.82	46.00	-27.18	AVG	
5		0.7890	37.40	-0.03	37.37	56.00	-18.63	QP	
6		0.7890	18.01	-0.03	17.98	46.00	-28.02	AVG	
7		1.1490	35.79	-0.04	35.75	56.00	-20.25	QP	
8		1.1490	16.54	-0.04	16.50	46.00	-29.50	AVG	
9		10.6125	41.28	-0.10	41.18	60.00	-18.82	QP	
10		10.6125	20.26	-0.10	20.16	50.00	-29.84	AVG	
11	*	15.4005	42.11	-0.18	41.93	60.00	-18.07	QP	
12		15.4005	17.79	-0.18	17.61	50.00	-32.39	AVG	

EUT :	Bluetooth Hearphone Amp	Model Name. :	FB1121
Temperature :	26 °C	Relative Humidity :	54%
Pressure :	1010hPa	Phase :	N
Test Voltage :	DC 5Vfrom adapter AC 120V/60Hz	Test Mode :	Mode 4



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.2040	39.41	-0.03	39.38	63.45	-24.07	QP	
2		0.2040	21.33	-0.03	21.30	53.45	-32.15	AVG	
3	*	0.6045	45.05	-0.03	45.02	56.00	-10.98	QP	
4		0.6045	24.63	-0.03	24.60	46.00	-21.40	AVG	
5		0.8385	41.60	-0.03	41.57	56.00	-14.43	QP	
6		0.8385	20.88	-0.03	20.85	46.00	-25.15	AVG	
7		1.1715	38.76	-0.04	38.72	56.00	-17.28	QP	
8		1.1715	20.26	-0.04	20.22	46.00	-25.78	AVG	
9		9.4830	42.91	-0.08	42.83	60.00	-17.17	QP	
10		9.4830	20.87	-0.08	20.79	50.00	-29.21	AVG	
11		17.4705	44.63	-0.21	44.42	60.00	-15.58	QP	
12		17.4705	21.10	-0.21	20.89	50.00	-29.11	AVG	

3.2 RADIATED EMISSION MEASUREMENT

3.2.1 RADIATED EMISSION LIMITS (Frequency Range 9kHz-1000MHz)

20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Frequencies (MHz)	Field Strength (microrvolts/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

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB / VB (emission in restricted band)	1 MHz / 1 MHz for Peak, 1 MHz / 10Hz for Average

Receiver Parameter	Setting
Attenuation	Auto
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

3.2.2 TEST PROCEDURE

- The measuring distance of at 3 m shall be used for measurements at frequency up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
- The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter open area test site. The table was rotated 360 degrees to determine the position of the highest radiation.
- The height of the equipment or of the substitution antenna shall be 0.8 m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.

- e. If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
- f. For the actual test configuration, please refer to the related Item –EUT Test Photos.

Note:

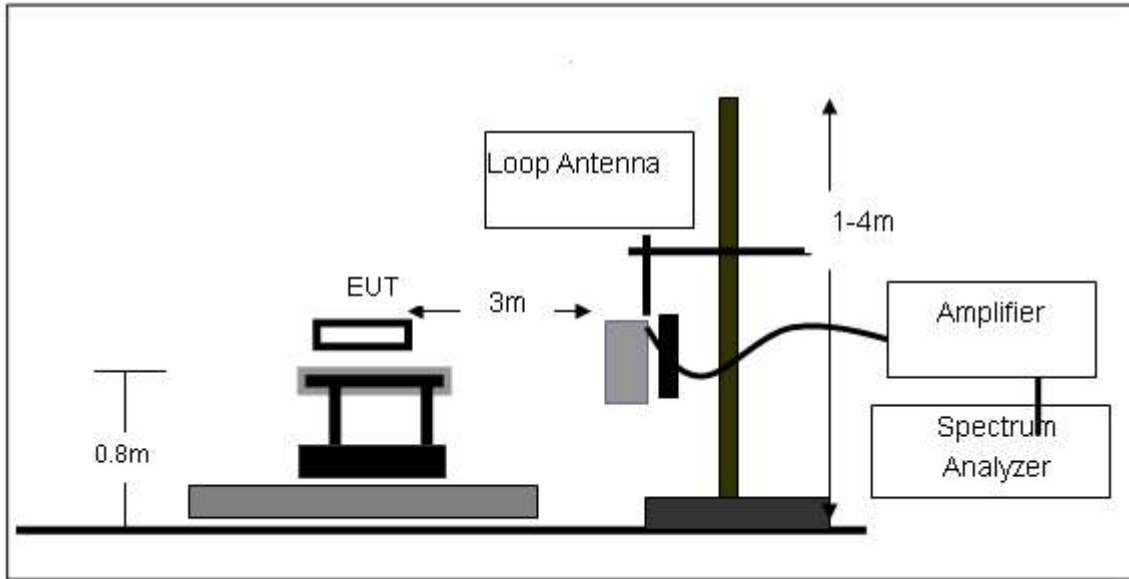
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported

3.2.3 DEVIATION FROM TEST STANDARD

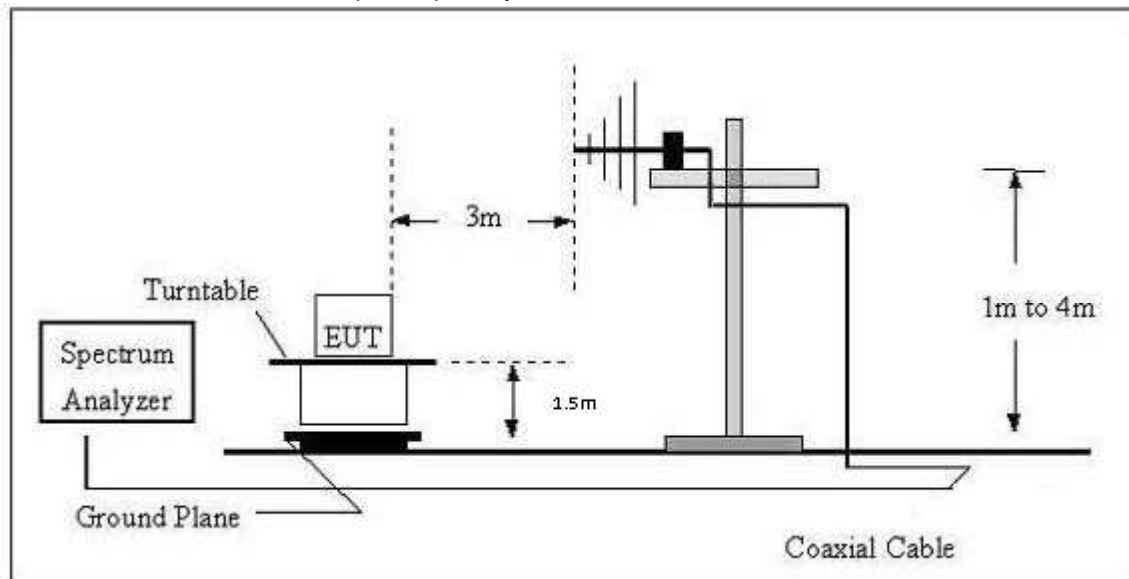
No deviation

3.2.4 TEST SETUP

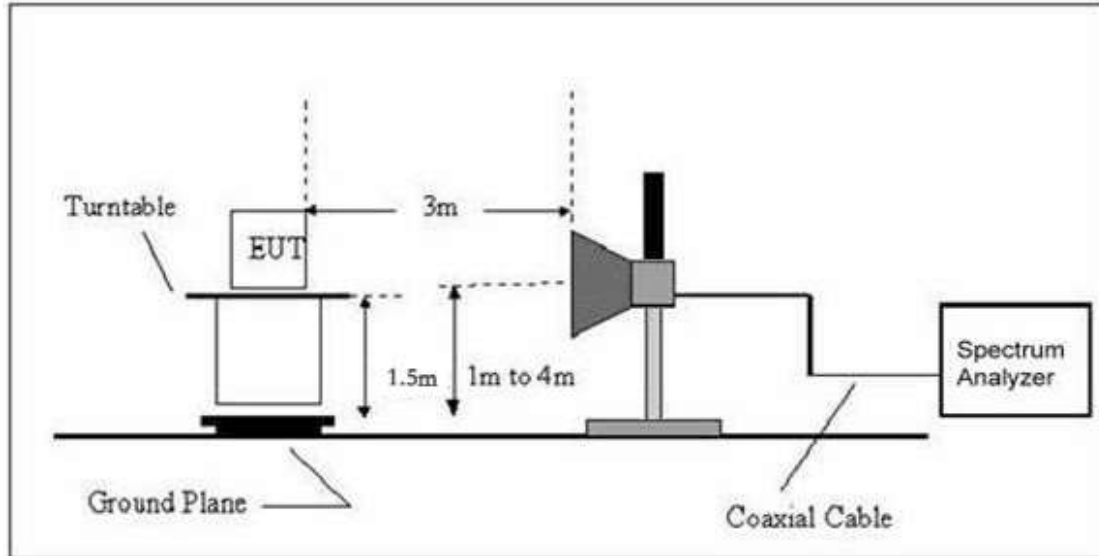
(A) Radiated Emission Test-Up Frequency Below 30MHz



(B) Radiated Emission Test-Up Frequency 30MHz~1GHz



(C) Radiated Emission Test-Up Frequency Above 1GHz



3.2.5 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

3.2.6 TEST RESULTS (BETWEEN 9KHZ – 30 MHZ)

EUT:	Bluetooth Hearphone Amp	Model Name. :	FB1121
Temperature:	20 °C	Relative Humidity:	48%
Pressure:	1010 hPa	Test Voltage :	DC 5Vfrom adapter AC 120V/60Hz
Test Mode :	TX	Polarization :	--

Freq.	Reading	Limit	Margin	State
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F
–	--	--	--	PASS
–	--	--	--	PASS

NOTE:

The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Distance extrapolation factor = $40 \log(\text{specific distance}/\text{test distance})(\text{dB})$;

Limit line = specific limits(dBuv) + distance extrapolation factor.

3.2.7 TEST RESULTS (BETWEEN 30MHZ – 1GHZ)

EUT :	Bluetooth Hearphone Amp	Model Name :	FB1121
Temperature :	20 °C	Relative Humidity :	48%
Pressure:	1010 hPa	Test Voltage :	DC 5Vfrom adapter
Test Mode :	TX		

Polar (H/V)	Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
	(MHz)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
V	119.4360	16.39	12.08	28.47	43.5	15.03	QP
V	128.1129	16.32	12.2	28.52	43.5	14.98	QP
V	170.7926	20.01	10.35	30.36	43.5	13.14	QP
V	341.9786	12.71	16.19	28.9	46	17.1	QP
V	468.8761	17.08	19.69	36.77	46	9.23	QP
V	935.5462	10.41	29.42	39.83	46	6.17	QP
H	170.7923	26.99	10.35	37.34	43.5	6.16	QP
H	341.9786	23.74	16.19	39.93	46	6.07	QP
H	468.8761	21.44	19.69	41.13	46	4.87	QP
H	726.8052	14.52	26	40.52	46	5.48	QP
H	813.1114	15.5	26.35	41.85	46	4.15	QP
H	854.0247	12.62	27.51	40.13	46	5.87	QP

Remark:

Absolute Level= ReadingLevel+ Factor, Margin= Absolute Level- Limit

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Factor added by measurement software automatically