
FCC Test Report

Report No.: AGC01885160301FE03

FCC ID : XX8-F5

APPLICATION PURPOSE : Original Equipment

PRODUCT DESIGNATION : Jaybird Freedom

BRAND NAME : Jaybird

MODEL NAME : F5

CLIENT : Jaybird LLC

DATE OF ISSUE : May 11, 2016

STANDARD(S) : FCC Part 15 Rules

TEST PROCEDURE(S)

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	/	May 11, 2016	Valid	Original Report

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1. VERIFICATION OF CONFORMITY

Applicant	Jaybird LLC
Address	3676 California Ave, Suite A111, Salt Lake City, UT 84104, Utah, USA
Manufacturer	Salutica Allied Solutions Sdn. Bhd. (206341-H)
Address	3 Jalan Zarib 6, Kawasan Perindustrian Zarib, 31500 Lahat Ipoh Perak Malaysia
Product Designation	Jaybird Freedom
Brand Name	Jaybird
Test Model	F5
Date of test	Apr.19,2016 to May 04,2016
Deviation	None
Condition of Test Sample	Normal
Report Template	AGCRT-US-BR/RF

We hereby certify that:

The above equipment was tested by Dongguan Precise Testing Service Co., Ltd. The test data, the energy emitted by the sample tested as described in this report is in compliance with the requirements of FCC Rules Part 15.249.

Tested By Water Zuo
Water Zuo(Zuo Yingying) May 11, 2016

Reviewed By Forrest Lei
Forrest Lei(Lei Yonggang) May 11, 2016

Approved By Solger Zhang
Solger Zhang(Zhang Hongyi)
Authorized Officer May 11, 2016

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	-3.42dBm(Max)
Bluetooth Version	V 4.1
Modulation	GFSK ,π /4-DQPSK, 8DPSK
Number of channels	79 for BR/EDR
Hardware Version	Rev03
Software Version	1.0
Antenna Designation	Fixed Antenna
Antenna Gain	-2dBi
Power Supply	DC 3.7V
Note: Battery-1 and Battery-2 are in the same capacity and are used for the EUT itself. They are different in manufacturer and the worst model was recorded in the report.	

2.2. TABLE OF CARRIER FREQUENCYS

BR/EDR 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

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	BT Link with charging
11	BT Link

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 .
3. The EUT used fully-charged battery when tested.

Software Setting

The screenshot displays the BlueTest3 software window. The 'Test Mode' list on the left includes PAUSE, RADIO STATUS, RADIO STATUS FULL, TXSTART, TXDATA1 (highlighted), TXDATA2, TXDATA3, TXDATA4, RXSTART1, RXSTART2, and RXDATA1. The 'Test Arguments' section on the right shows 'LO Freq. (MHz)' set to 2402 and 'Power (Ext, Int)' set to 255 and 50. On the far right, there are buttons for 'Close', 'Execute', 'Cold Reset', and 'Warm Reset'. Below these, the 'Test Results' section contains a 'Save to file' checkbox, a 'Browse for file' button, and a 'Display' section with 'Standard' selected. A text field shows the file path '.\logfile.txt'. The bottom section of the window displays a log of operations: 'Opening USB SPI (602250).', 'Transport active.', 'dal (Hardware ID 0x332) firmware version 8648.', 'Sent Command Varid 5004, parameters: 0004 0962 FF32 0000 0000 0000', and 'Radio Test TXDATA1 successful' (highlighted in blue).

BlueTest3

Test Mode

- PAUSE
- RADIO STATUS
- RADIO STATUS FULL
-
- TXSTART
- TXDATA1**
- TXDATA2
- TXDATA3
- TXDATA4
-
- RXSTART1
- RXSTART2
- RXDATA1

Test Arguments

LO Freq. (MHz) 2402

Power (Ext, Int) 255 50

Close

Execute

Cold Reset

Warm Reset

Test Results

☐ Save to file Browse for file Display : ☒ Standard ☐ Bit Error

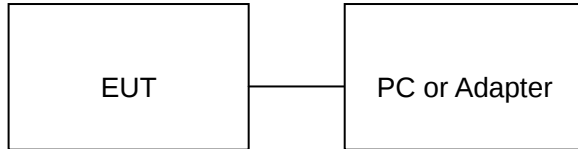
.\logfile.txt

Opening USB SPI (602250).
Transport active.
dal (Hardware ID 0x332) firmware version 8648.
Sent Command Varid 5004, parameters: 0004 0962 FF32 0000 0000 0000
Radio Test TXDATA1 successful

5. SYSTEM TEST CONFIGURATION

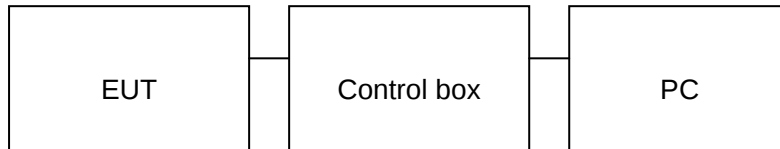
5.1. CONFIGURATION OF EUT SYSTEM

Configure 1: (Normal hopping)



Note: Owing to the EUT has own battery, Testing will be performed while PC or adapter remove.

Configure 2: (Control continuous TX)



5.2. EQUIPMENT USED IN EUT SYSTEM

Item	Equipment	Model No.	ID or Specification	Remark
1	Jaybird	F5	FCC ID: XX8-F5	EUT
2	Battery1	LSSP350834	DC3.7V/ 60mAh	Accessory
3	Battery2	AEC350834	DC3.7V/ 60mAh	Accessory
4	PC	E1412AYCW	Sony	A.E
5	Control box	N/A	N/A	A.E
6	Adapter	ETPCA-050100U3VW	N/A	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
§15.215	BANDWIDTH	Compliant

6. TEST FACILITY

Site	Dongguan Precise Testing Service Co., Ltd.
Location	Building D,Baoding Technology Park,Guangming Road2,Dongcheng District, Dongguan, Guangdong, China,
FCC Registration No.	371540
Description	The test site is constructed and calibrated to meet the FCC requirements in documents ANSI C63.4:2014.

TEST METHODOLOGY

All measurements contained in this report were conducted with ANSI C63.10-2013

7. ALL TEST EQUIPMENT LIST

FOR RADIATED EMISSION TEST (BELOW 1GHZ)

Radiated Emission Test Site					
Name of Equipment	Manufacturer	Model Number	Serial Number	Last Calibration	Due Calibration
EMI Test Receiver	Rohde & Schwarz	ESCI	101417	July 4, 2015	July 3, 2016
Trilog Broadband Antenna (25M-1GHz)	SCHWARZBECK	VULB9160	9160-3355	July 4, 2015	July 3, 2016
Signal Amplifier	SCHWARZBECK	BBV 9475	9745-0013	July 4, 2015	July 3, 2016
RF Cable	SCHWARZBECK	AK9515E	96221	July 4, 2015	July 3, 2016
3m Anechoic Chamber	CHENGYU	966	PTS-001	June 6, 2015	June 5, 2016
MULTI-DEVICE Positioning Controller	Max-Full	MF-7802	MF780208339	N/A	N/A
Active loop antenna (9K-30MHz)	Schwarzbeck	FMZB1519	1519-038	June 6, 2015	June 5, 2016
Spectrum analyzer	Agilent	E4407B	MY46185649	June 6, 2015	June 5, 2016
Radiation Cable 1	MXT	RS1	R005	June 6, 2015	June 5, 2016
Radiation Cable 2	MXT	RS1	R006	June 6, 2015	June 5, 2016

FOR RADIATED EMISSION TEST (1GHZ ABOVE)

Radiated Emission Test Site					
Name of Equipment	Manufacturer	Model Number	Serial Number	Last Calibration	Due Calibration
EMI Test Receiver	Rohde & Schwarz	ESCI	101417	July 4, 2015	July 3, 2016
Horn Antenna (1G-18GHz)	SCHWARZBECK	BBHA9120D	9120D-1246	July 11, 2015	July 10, 2016
Spectrum Analyzer	Agilent	E4411B	MY4511453	July 4, 2015	July 3, 2016
Signal Amplifier	SCHWARZBECK	BBV 9718	9718-269	July 7, 2015	July 6, 2016
RF Cable	SCHWARZBECK	AK9515H	96220	July 8, 2015	July 7, 2016
3m Anechoic Chamber	CHENGYU	966	PTS-001	June 6, 2015	June 5, 2016
MULTI-DEVICE Positioning Controller	Max-Full	MF-7802	MF780208339	N/A	N/A
Horn Ant (18G-40GHz)	Schwarzbeck	BBHA 9170	9170-181	June 6, 2015	June 5, 2016
Radiation Cable 1	MXT	RS1	R005	June 6, 2015	June 5, 2016
Radiation Cable 2	MXT	RS1	R006	June 6, 2015	June 5, 2016

Conducted Emission Test Site					
Name of Equipment	Manufacturer	Model Number	Serial Number	Last Calibration	Due Calibration
EMI Test Receiver	- Rohde & Schwarz	ESCI	101417	July 4, 2015	July 3, 2016
Artificial Mains Network	Narda	L2-16B	000WX31025	July 8, 2015	July 7, 2016
Artificial Mains Network (AUX)	Narda	L2-16B	000WX31026	July 8, 2015	July 7, 2016
RF Cable	SCHWARZBECK	AK9515E	96222	July 4, 2015	July 3, 2016
Shielded Room	CHENGYU	843	PTS-002	June 6,2015	June 5,2016
Conduction Cable	MXT	SE1	S003	June 6,2015	June 5,2016

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 dB μ V = 20 log Emission level μ 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

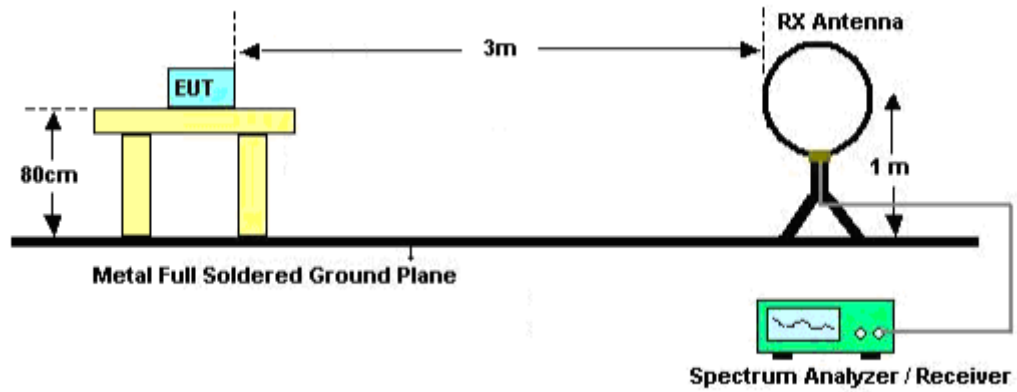
1. The measuring distance of 3m shall be used for measurements. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation(below 1GHz)
2. The measuring distance of 3m shall used for measurements. The EUT was placed on the top of a rotating table 1.5 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation(above 1GHz)
3. The height of the test antenna shall vary between 1m to 4m.Both horizontal and vertical polarization Of the antenna are set to make the measurement.
4. The initial step in collecting radiated emission data is a receive peak detector mode. Pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
5. All readings are peak unless otherwise stated QP in column of Note. Peak denoted that the Peak reading compliance with the QP limits and then QP Mode measurement didn't perform(Below 1GHz)
6. All readings are Peak mode value unless otherwise stated AVG in column of Note. If the Peak mode measured value compliance with the Peak limits and lower than AVG Limits, the EUT shall be deemed to meet Peak&AVG limits and then only Peak mode was measured, but AVG mode didn't perform.(above 1GHz)

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

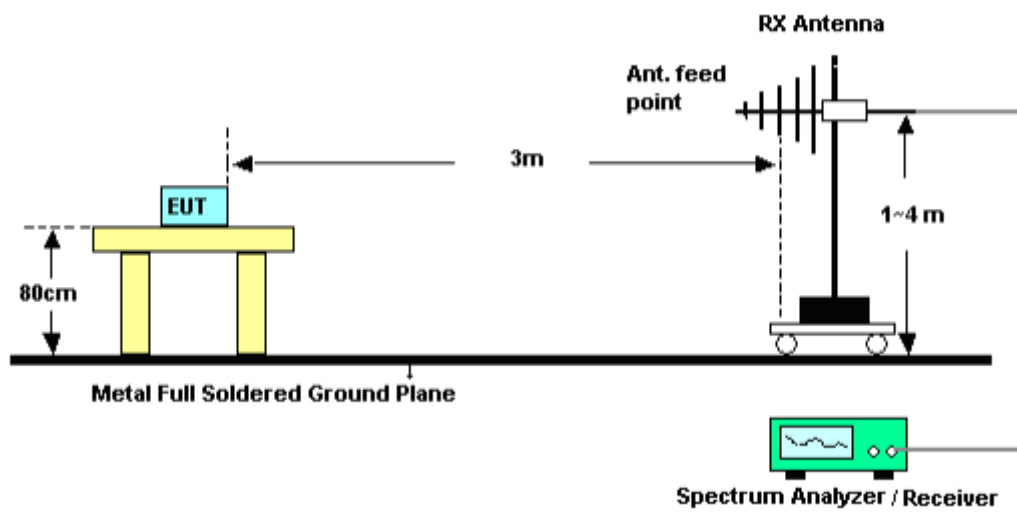
Spectrum Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP
Start ~Stop Frequency	1GHz~26.5GHz 1MHz/3MHz for Peak, 1MHz/10Hz for Average
Receiver Parameter	Setting
Start ~Stop Frequency	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

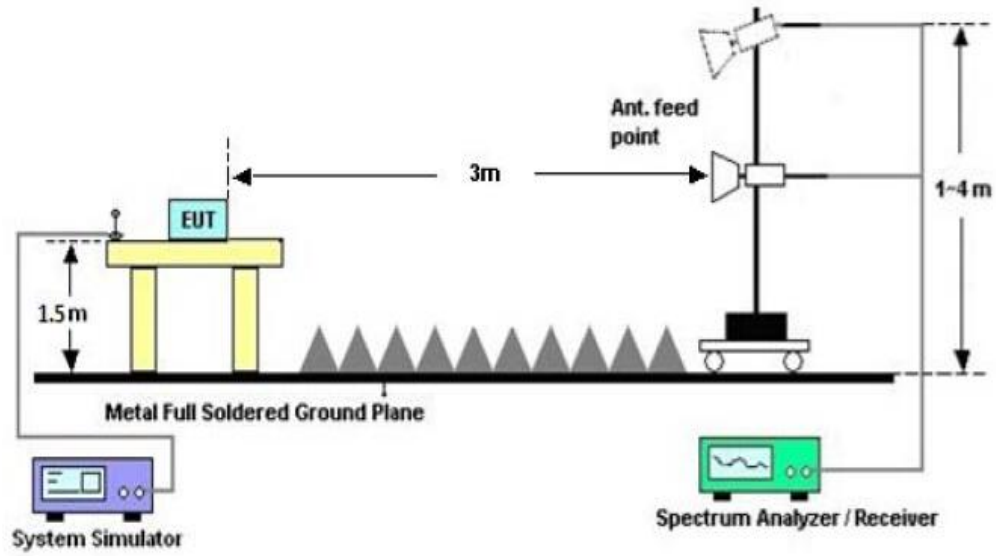
Radiated Emission Test-Setup Frequency Below 30MHz



RADIATED EMISSION TEST SETUP 30MHz-1000MHz



RADIATED EMISSION TEST SETUP ABOVE 1000MHz



8.4. TEST RESULT

(Worst modulation:GFSK)

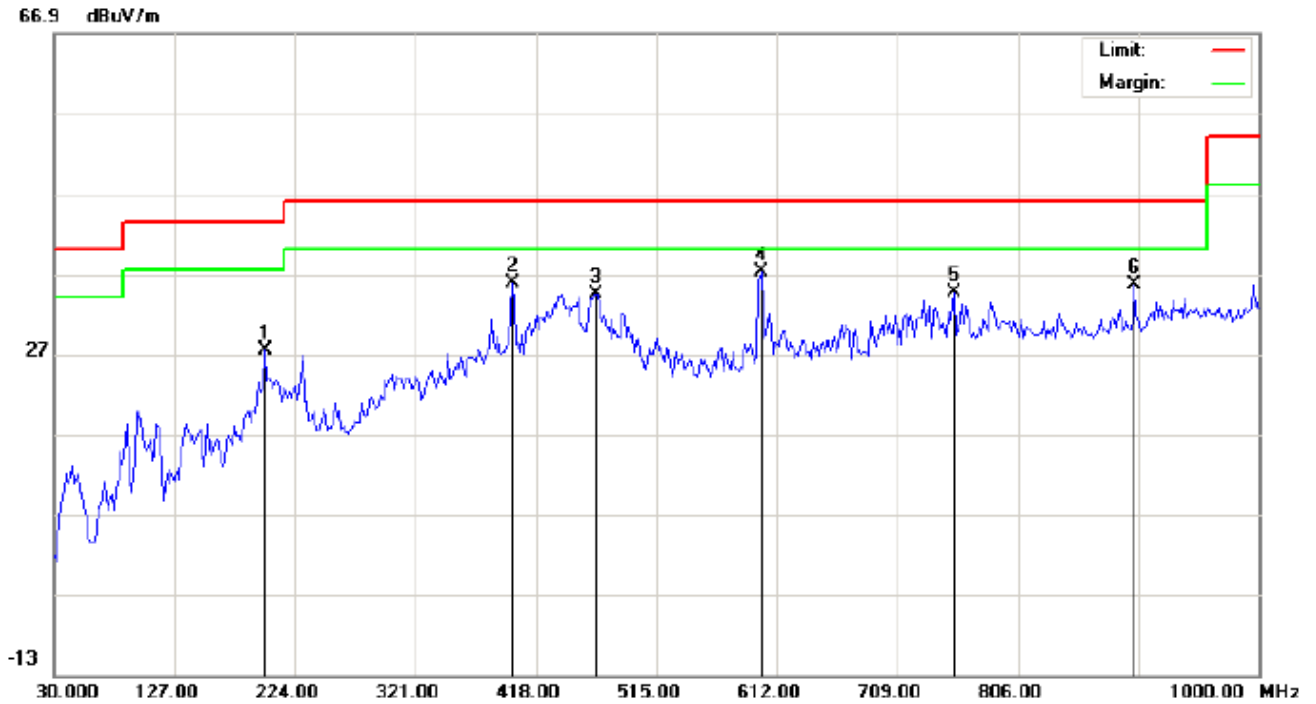
FOR BR/EDR

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

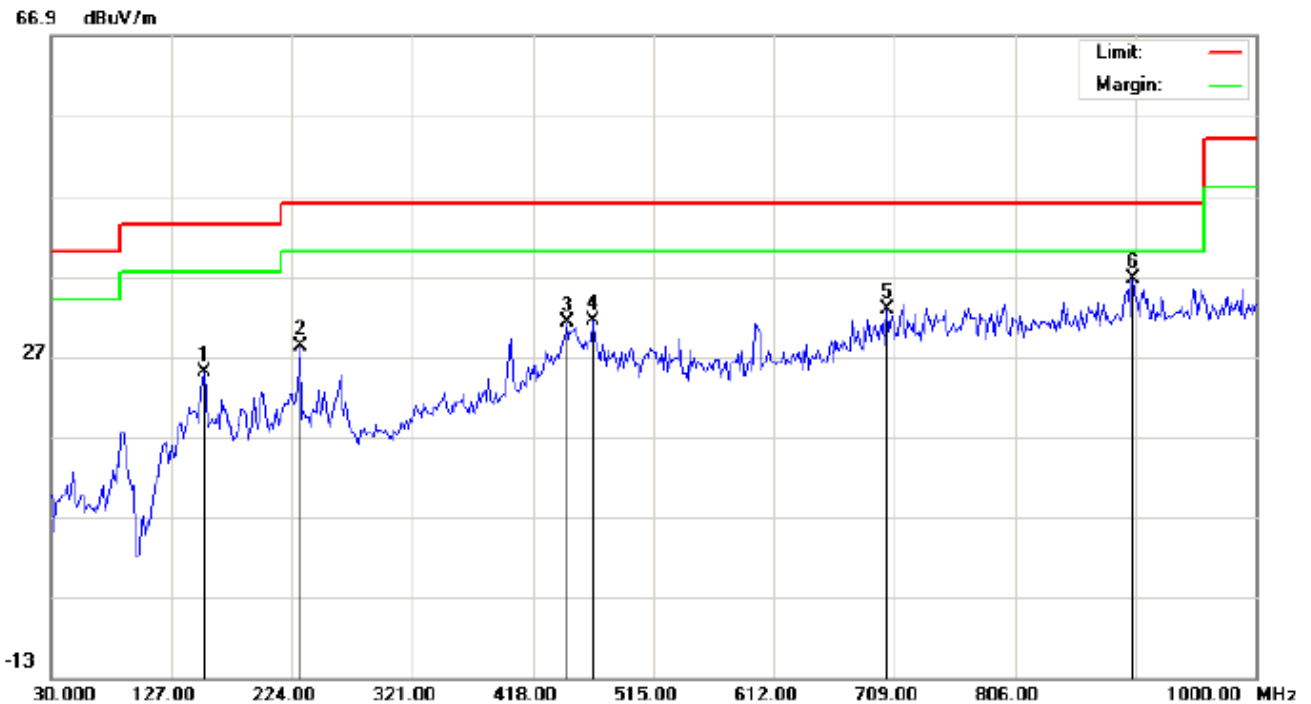


Site: site #1	Polarization: <i>Horizontal</i>	Temperature: 23.9
Limit: FCC Class B 3M Radiation	Power:	Humidity: 52.2 %
EUT:Jaybird Freedom	Distance:	
M/N:F5		
Mode:Low Channel TX		
Note:		

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		199.7500	15.39	11.99	27.38	43.50	-16.12	peak			
2		398.6000	16.81	19.06	35.87	46.00	-10.13	peak			
3		466.5000	13.69	20.77	34.46	46.00	-11.54	peak			
4	*	599.0667	13.53	23.71	37.24	46.00	-8.76	peak			
5		754.2667	7.91	26.69	34.60	46.00	-11.40	peak			
6		899.7667	7.04	28.60	35.64	46.00	-10.36	peak			

RESULT: PASS

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



Site: site #1

Limit: FCC Class B 3M Radiation

EUT: Jaybird Freedom

M/N: F5

Mode: Low Channel TX

Note:

Polarization: **Vertical**

Power:

Distance:

Temperature: 23.9

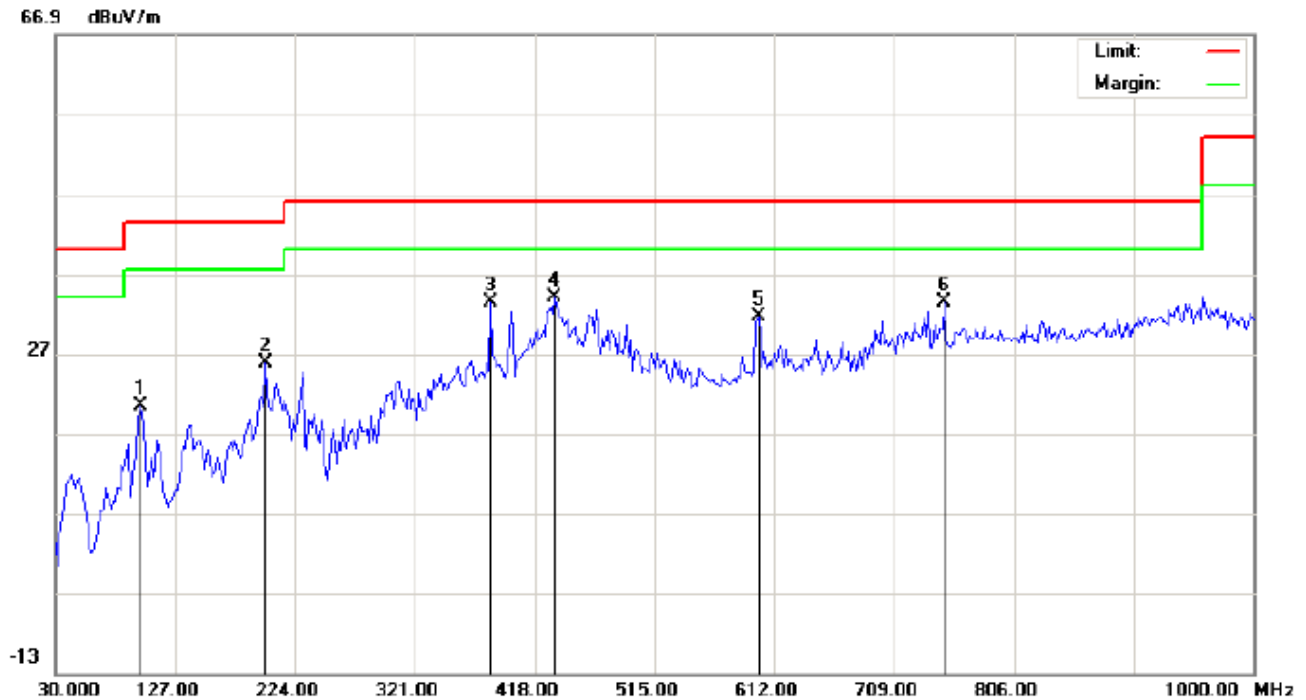
Humidity: 52.2 %

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		152.8667	9.77	15.28	25.05	43.50	-18.45	peak			
2		230.4667	16.25	11.99	28.24	46.00	-17.76	peak			
3		445.4833	10.77	20.45	31.22	46.00	-14.78	peak			
4		466.5000	10.60	20.77	31.37	46.00	-14.63	peak			
5		702.5333	7.59	25.26	32.85	46.00	-13.15	peak			
6	*	901.3833	7.95	28.65	36.60	46.00	-9.40	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
Limit: FCC Class B 3M Radiation
EUT: Jaybird Freedom
M/N: F5
Mode: Middle Channel TX
Note:

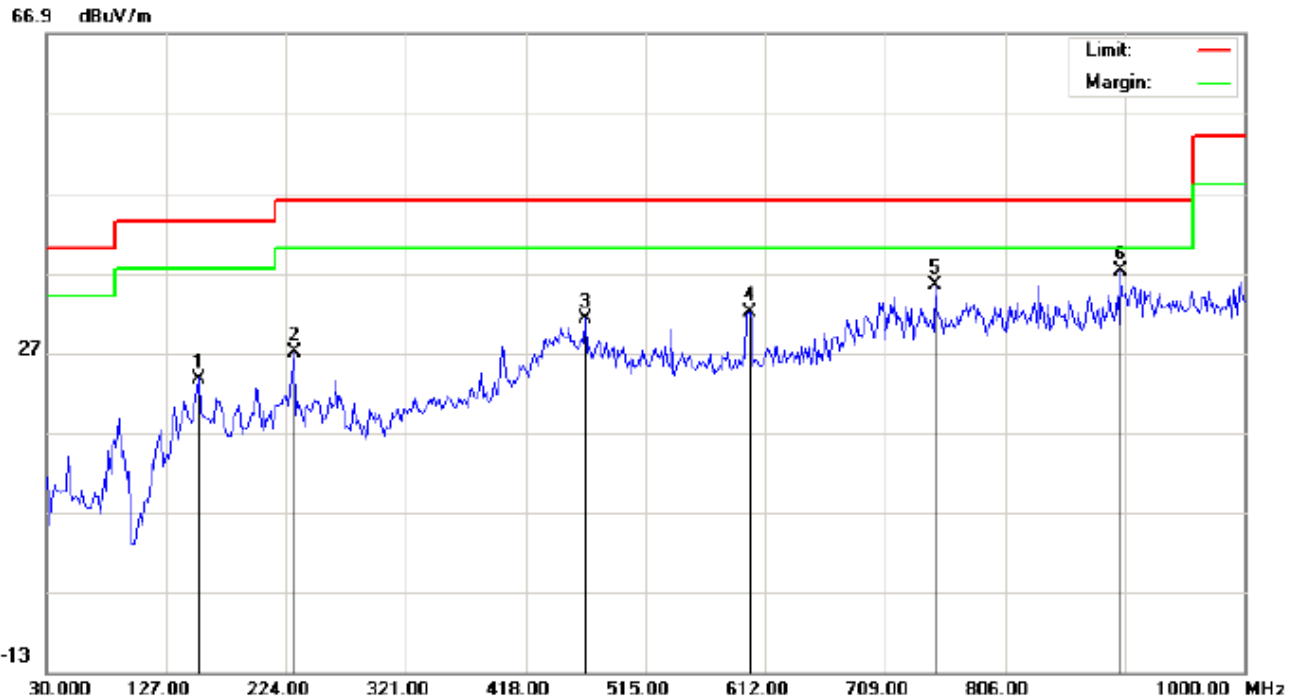
Polarization: **Horizontal**
Power:
Distance:

Temperature: 23.9
Humidity: 52.2 %

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		99.5167	10.48	10.00	20.48	43.50	-23.02	peak			
2		199.7500	13.81	11.99	25.80	43.50	-17.70	peak			
3		382.4333	14.40	18.95	33.35	46.00	-12.65	peak			
4	*	434.1667	13.94	20.11	34.05	46.00	-11.95	peak			
5		599.0667	7.92	23.71	31.63	46.00	-14.37	peak			
6		749.4167	6.76	26.61	33.37	46.00	-12.63	peak			

RESULT: PASS

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



Site: site #1	Polarization: Vertical	Temperature: 23.9
Limit: FCC Class B 3M Radiation	Power:	Humidity: 52.2 %
EUT:Jaybird Freedom	Distance:	
M/N:F5		
Mode:Middle Channel TX		
Note:		

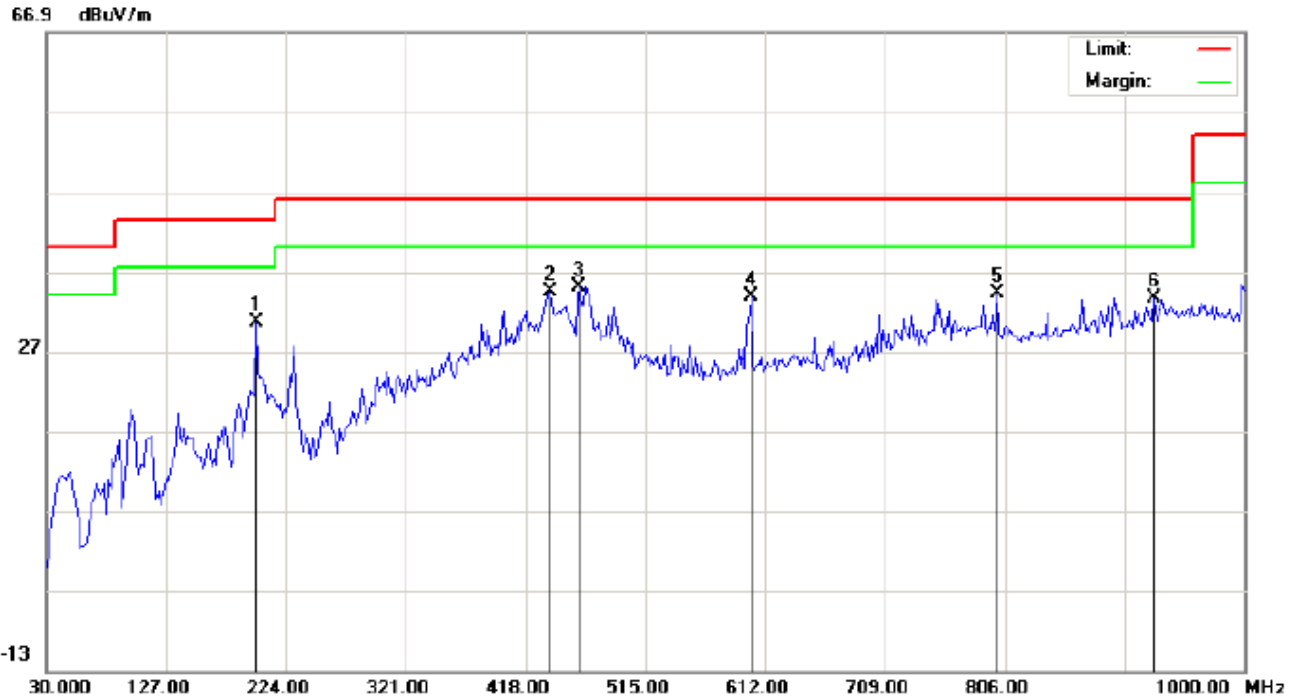
No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		152.8667	8.42	15.28	23.70	43.50	-19.80	peak			
2		230.4667	15.06	11.99	27.05	46.00	-18.95	peak			
3		466.5000	10.45	20.77	31.22	46.00	-14.78	peak			
4		599.0667	9.34	22.73	32.07	46.00	-13.93	peak			
5		749.4167	8.86	26.61	35.47	46.00	-10.53	peak			
6	*	899.7667	8.70	28.60	37.30	46.00	-8.70	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:Jaybird Freedom
M/N:F5
Mode:High Channel TX
Note:

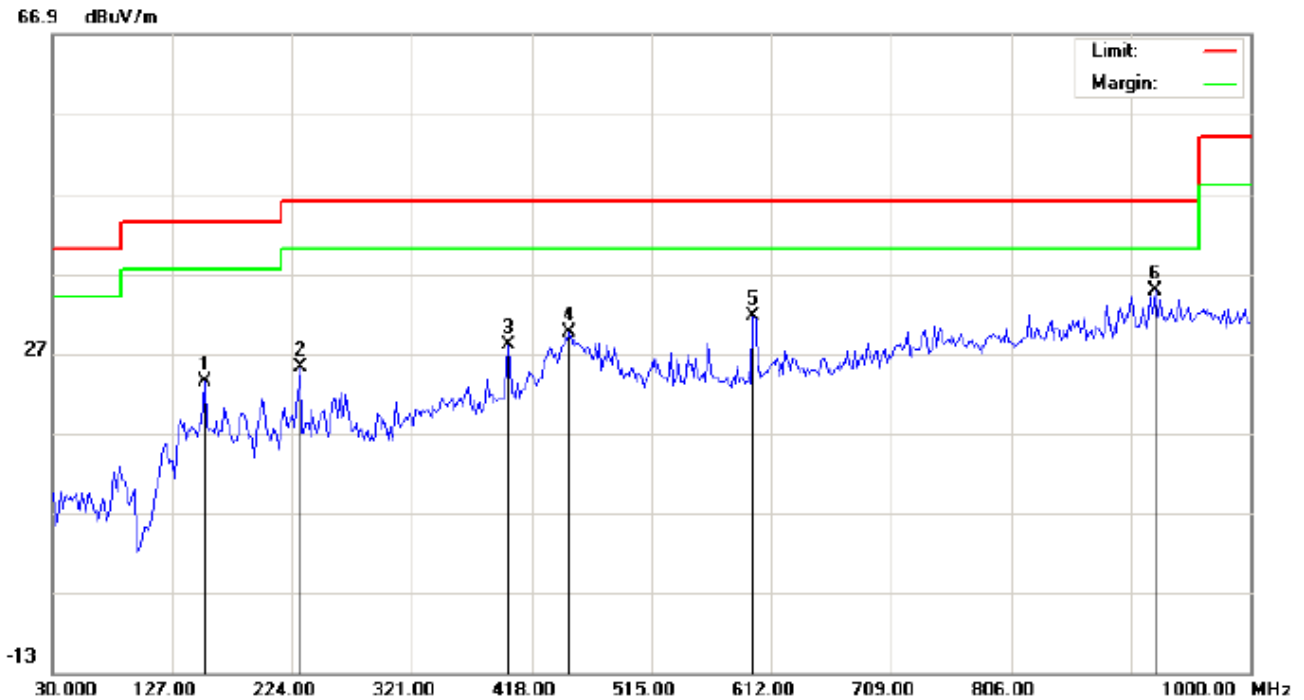
Polarization: *Horizontal*
Power:
Distance:

Temperature: 23.9
Humidity: 52.2 %

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		199.7500	18.55	11.99	30.54	43.50	-12.96	peak			
2		437.4000	14.21	20.21	34.42	46.00	-11.58	peak			
3	*	461.6500	14.38	20.72	35.10	46.00	-10.90	peak			
4		600.6833	10.01	23.73	33.74	46.00	-12.26	peak			
5		799.5333	6.91	27.31	34.22	46.00	-11.78	peak			
6		927.2500	4.31	29.37	33.68	46.00	-12.32	peak			

RESULT: PASS

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



Site: site #1	Polarization: Vertical	Temperature: 23.9
Limit: FCC Class B 3M Radiation	Power:	Humidity: 52.2 %
EUT:Jaybird Freedom	Distance:	
M/N:F5		
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		152.8667	8.16	15.28	23.44	43.50	-20.06	peak			
2		230.4667	13.16	11.99	25.15	46.00	-20.85	peak			
3		398.6000	8.85	19.06	27.91	46.00	-18.09	peak			
4		448.7167	9.05	20.55	29.60	46.00	-16.40	peak			
5		597.4500	8.88	22.72	31.60	46.00	-14.40	peak			
6	*	922.4000	5.63	29.23	34.86	46.00	-11.14	peak			

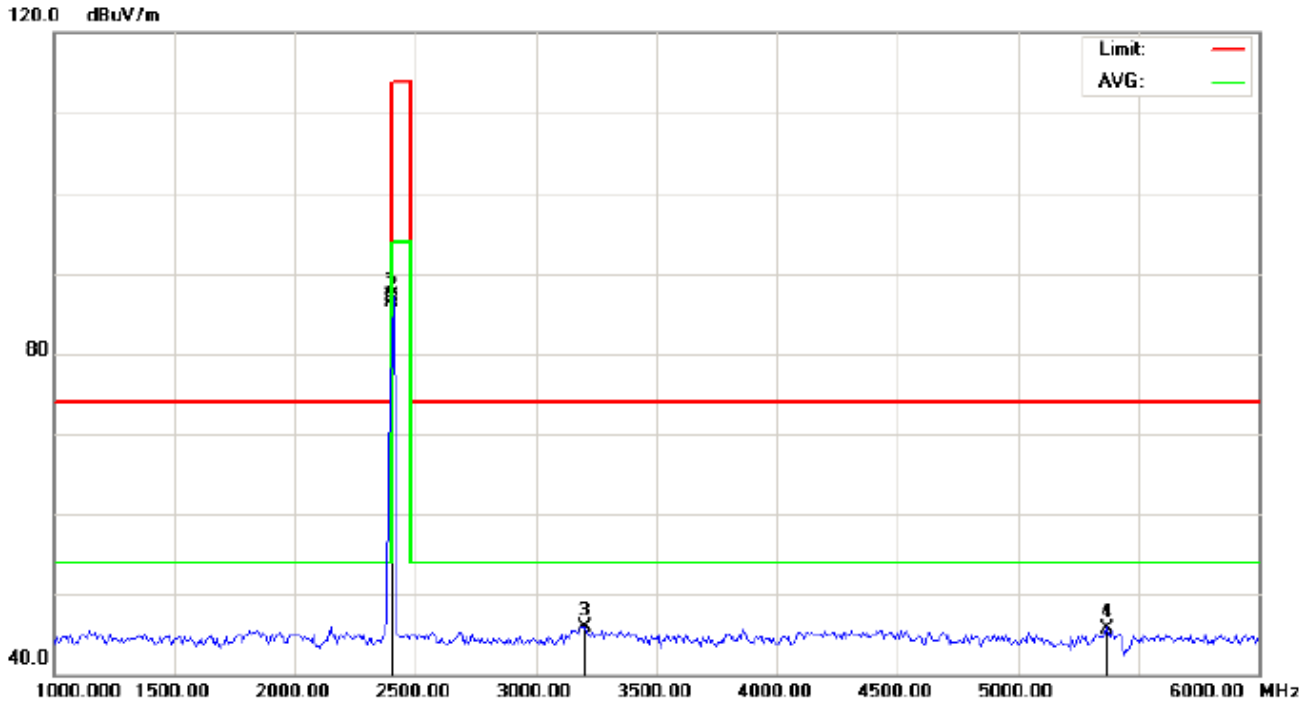
RESULT: PASS

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
(Worst modulation: GFSK)
FOR BR/EDR

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

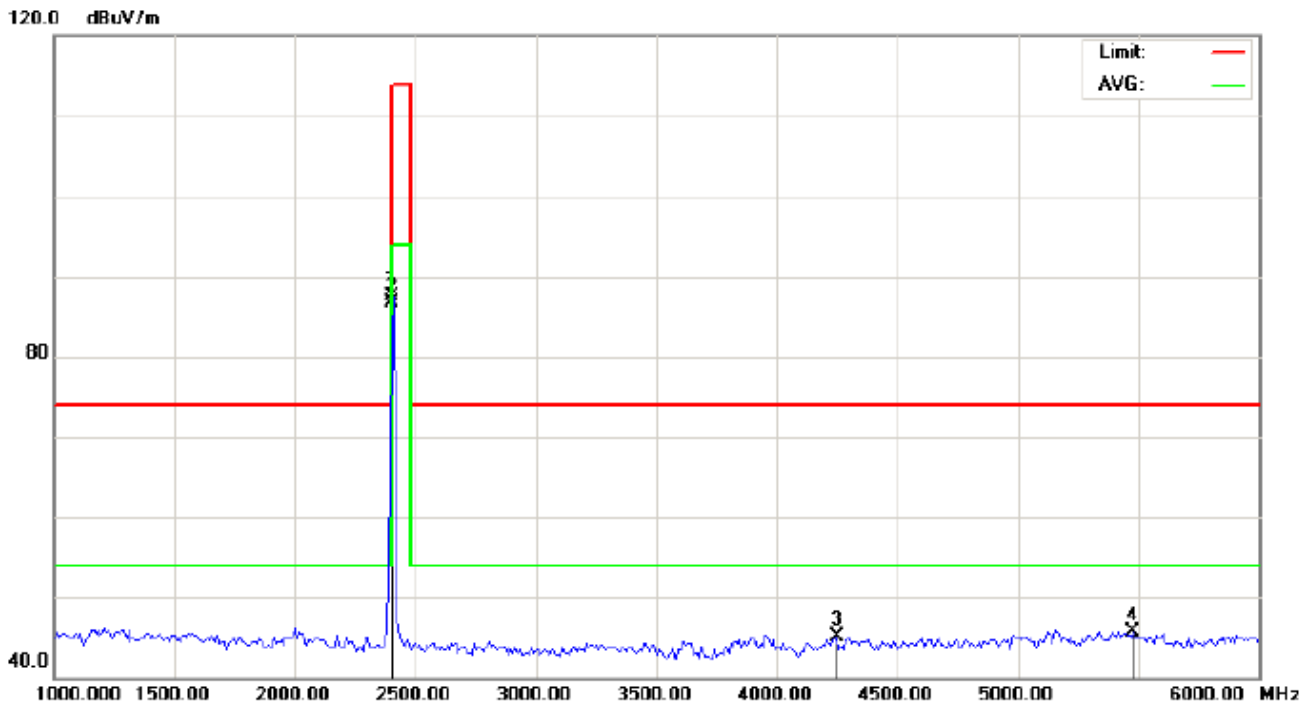


Site: site #1 Polarization: *Horizontal* Temperature: 26
Limit: FCC Class B 3M Radiation above 1GHZ(PK)- Power: Humidity: 60 %
EUT: Jaybird Freedom Distance: 3m
M/N: F5
Mode: Low Channel TX
Note:

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	96.73	-9.68	87.05	114.00	-26.95	peak			
2	*	2402.000	96.19	-9.68	86.51	94.00	-7.49	AVG			
3		3200.000	54.00	-8.17	45.83	74.00	-28.17	peak			
4		5366.667	47.61	-1.81	45.80	74.00	-28.20	peak			

RESULT: PASS

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

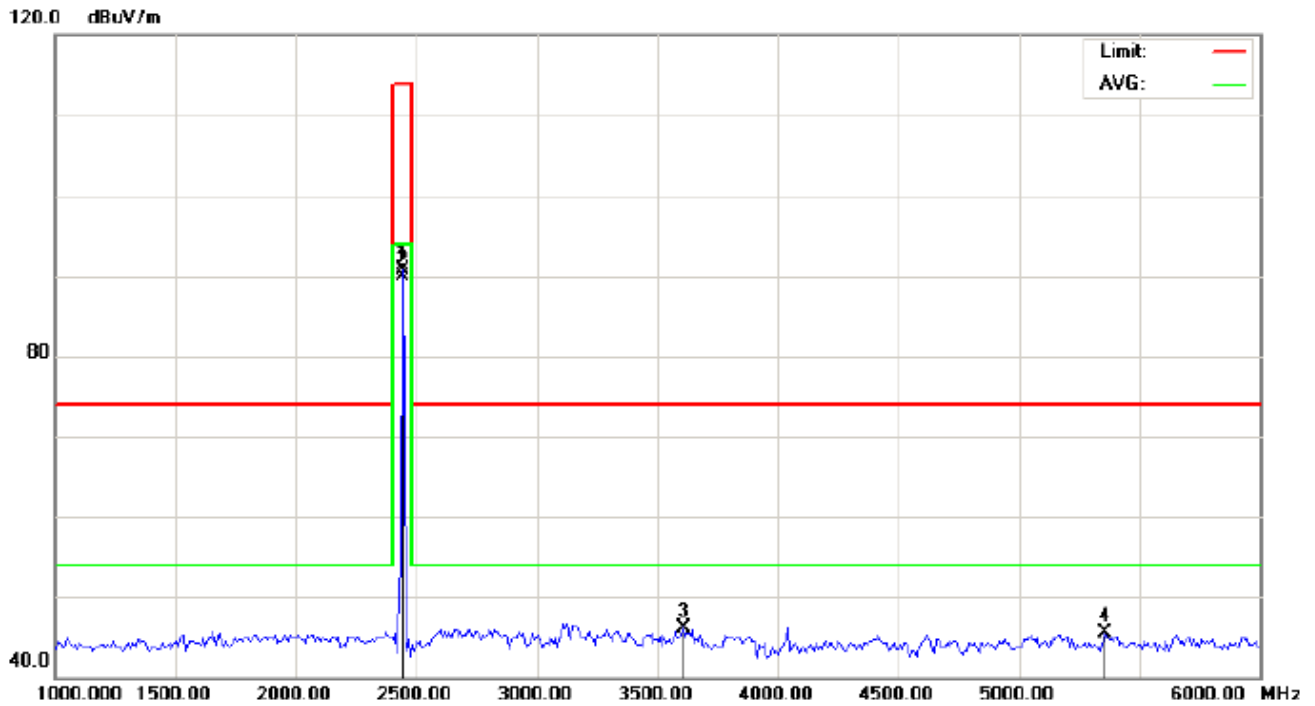


Site: site #1 Polarization: **Vertical** Temperature: 26
Limit: FCC Class B 3M Radiation above 1GHZ(PK)- Power: Humidity: 60 %
EUT: Jaybird Freedom Distance: 3m
M/N: F5
Mode: Low Channel TX
Note:

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	97.23	-9.68	87.55	114.00	-26.45	peak			
2	*	2402.000	96.35	-9.68	86.67	94.00	-7.33	AVG			
3		4250.000	49.11	-3.96	45.15	74.00	-28.85	peak			
4		5475.000	47.47	-1.81	45.66	74.00	-28.34	peak			

RESULT: PASS

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

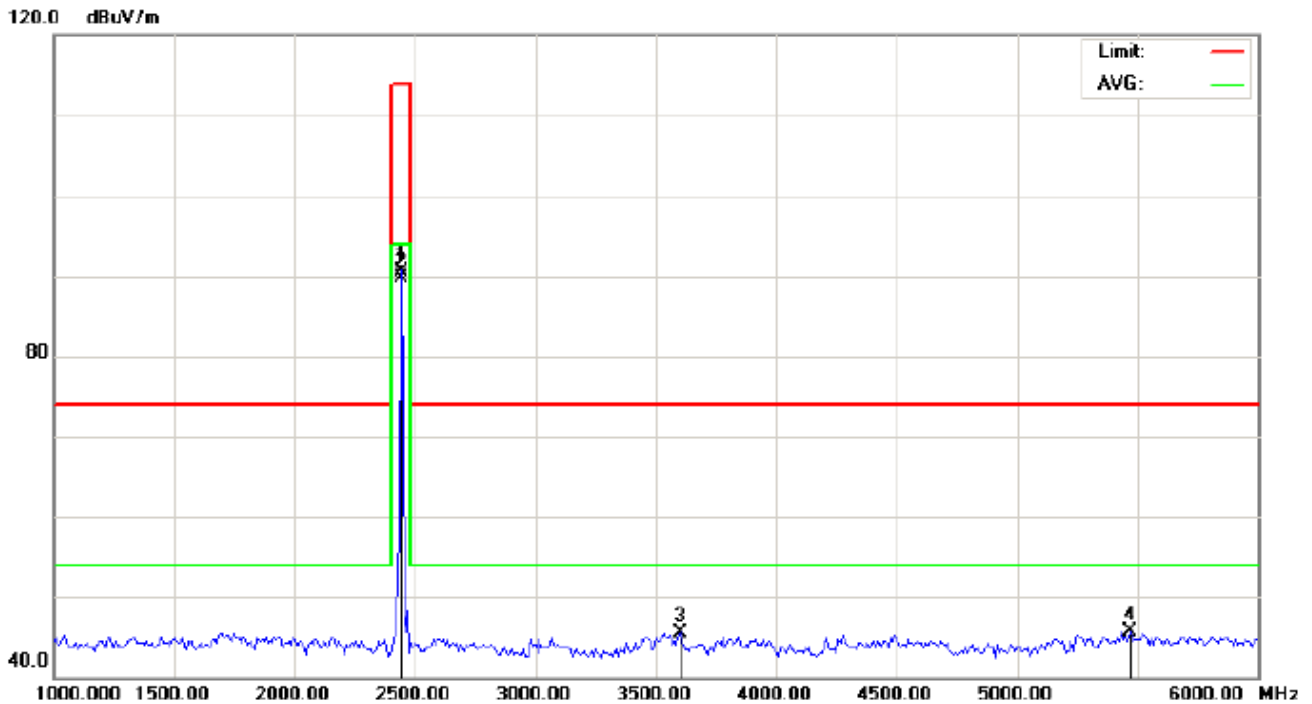


Site: site #1 Polarization: *Horizontal* Temperature: 26
 Limit: FCC Class B 3M Radiation above 1GHZ(PK)- Power: Humidity: 60 %
 EUT: Jaybird Freedom Distance: 3m
 M/N: F5
 Mode: Middle Channel TX
 Note:

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		2441.000	100.29	-9.63	90.66	114.00	-23.34	peak			
2	*	2441.000	99.50	-9.63	89.87	94.00	-4.13	AVG			
3		3608.333	53.42	-7.22	46.20	74.00	-27.80	peak			
4		5358.333	47.37	-1.81	45.56	74.00	-28.44	peak			

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: Jaybird Freedom

Distance: 3m

M/N: F5

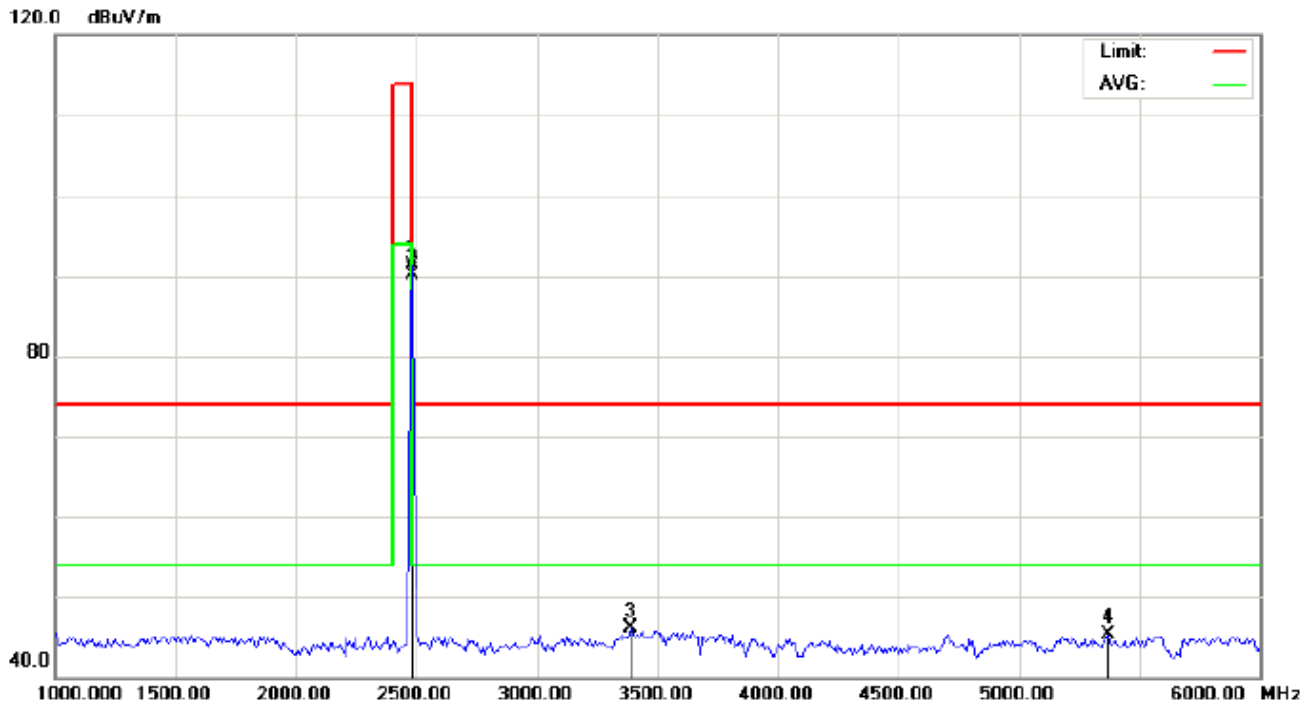
Mode: Middle Channel TX

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		2441.000	100.23	-9.63	90.60	114.00	-23.40	peak			
2	*	2441.000	99.42	-9.63	89.79	94.00	-4.21	AVG			
3		3600.000	52.87	-7.27	45.60	74.00	-28.40	peak			
4		5466.667	47.53	-1.81	45.72	74.00	-28.28	peak			

RESULT: PASS

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

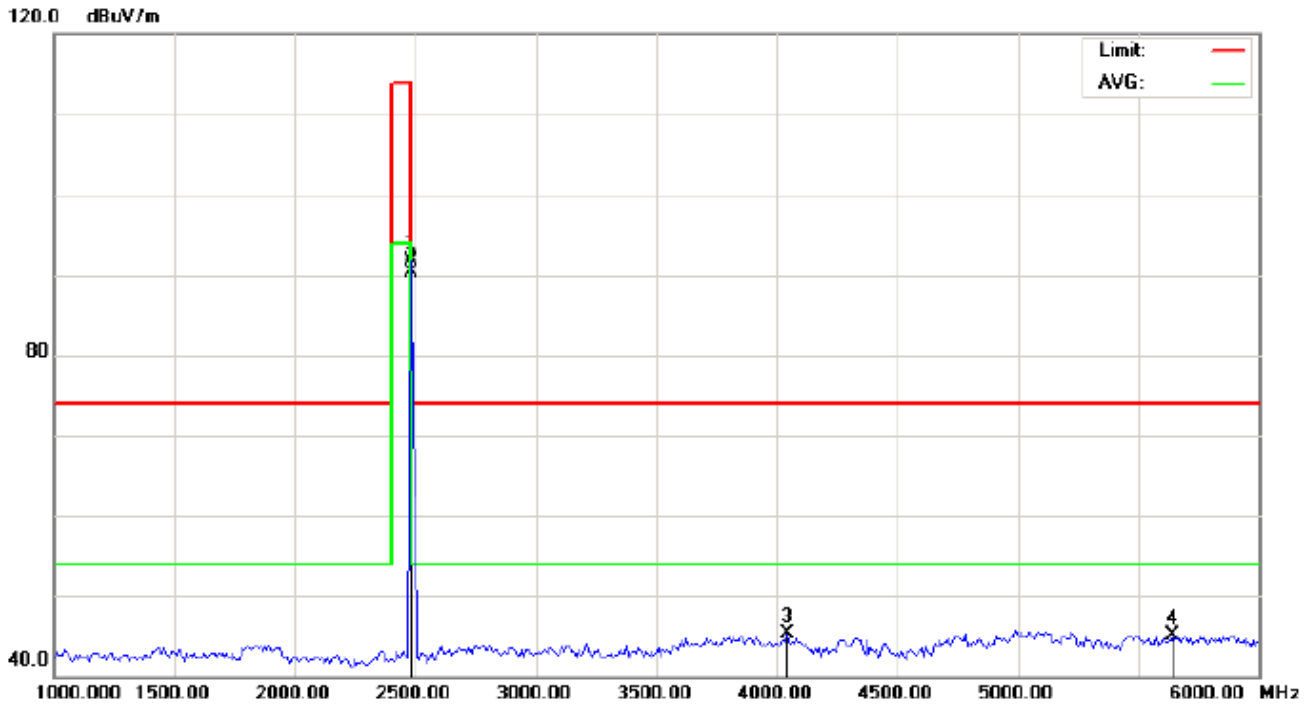


Site: site #1 Polarization: *Horizontal* Temperature: 26
Limit: FCC Class B 3M Radiation above 1GHZ(PK)- Power: Humidity: 60 %
EUT: Jaybird Freedom Distance: 3m
M/N: F5
Mode: High Channel TX
Note:

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	100.87	-9.59	91.28	114.00	-22.72	peak			
2	*	2480.000	99.74	-9.59	90.15	94.00	-3.85	AVG			
3		3391.667	54.07	-7.99	46.08	74.00	-27.92	peak			
4		5366.667	47.14	-1.81	45.33	74.00	-28.67	peak			

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: Jaybird Freedom

Distance: 3m

M/N: F5

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	101.37	-9.59	91.78	114.00	-22.22	peak			
2	*	2480.000	99.94	-9.59	90.35	94.00	-3.65	AVG			
3		4041.667	49.91	-4.67	45.24	74.00	-28.76	peak			
4		5641.667	46.78	-1.74	45.04	74.00	-28.96	peak			

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

1Mbps Result:

Peak value

Frequency	Reading Level	Factor	Measurement	Limit	Over	Antenna
(MHz)	(dBuv)	(dB/m)	(dBuv/m)	(dBuv/m)	(dB)	Polarization
2402	96.73	-9.68	87.05	114	-26.95	Horizontal
2402	97.23	-9.68	87.55	114	-26.45	Vertical
2441	100.29	-9.63	90.66	114	-23.34	Horizontal
2441	100.23	-9.63	90.60	114	-23.40	Vertical
2480	100.87	-9.59	91.28	114	-22.72	Horizontal
2480	101.37	-9.59	91.78	114	-22.22	Vertical

Average value

Frequency	Reading Level	Factor	Measurement	Limit	Over	Antenna
(MHz)	(dBuv)	(dB/m)	(dBuv/m)	(dBuv/m)	(dB)	Polarization
2402	96.19	-9.68	86.51	94	-7.49	Horizontal
2402	96.35	-9.68	86.67	94	-7.33	Vertical
2441	99.50	-9.63	89.87	94	-4.13	Horizontal
2441	99.42	-9.63	89.79	94	-4.21	Vertical
2480	99.74	-9.59	90.15	94	-3.85	Horizontal
2480	99.94	-9.59	90.35	94	-3.65	Vertical

2Mbps Result:

Peak value

Frequency	Reading Level	Factor	Measurement	Limit	Over	Antenna
(MHz)	(dBuv)	(dB/m)	(dBuv/m)	(dBuv/m)	(dB)	Polarization
2402	95.66	-9.68	85.98	114	-28.02	Horizontal
2402	95.54	-9.68	85.86	114	-28.14	Vertical
2441	98.78	-9.63	89.15	114	-24.85	Horizontal
2441	98.68	-9.63	89.05	114	-24.95	Vertical
2480	100	-9.59	90.41	114	-23.59	Horizontal
2480	99.98	-9.59	90.39	114	-23.61	Vertical

Average value

Frequency	Reading Level	Factor	Measurement	Limit	Over	Antenna
(MHz)	(dBuv)	(dB/m)	(dBuv/m)	(dBuv/m)	(dB)	Polarization
2402	94.03	-9.68	84.35	94	-9.65	Horizontal
2402	93.73	-9.68	84.05	94	-9.95	Vertical
2441	98.09	-9.63	88.46	94	-5.54	Horizontal
2441	97.79	-9.63	88.16	94	-5.84	Vertical
2480	98.64	-9.59	89.05	94	-4.95	Horizontal
2480	98.51	-9.59	88.92	94	-5.08	Vertical

3Mbps Result:

Peak value

Frequency	Reading Level	Factor	Measurement	Limit	Over	Antenna
(MHz)	(dBuv)	(dB/m)	(dBuv/m)	(dBuv/m)	(dB)	Polarization
2402	96.17	-9.68	86.49	114	-27.51	Horizontal
2402	95.83	-9.68	86.15	114	-27.85	Vertical
2441	99.27	-9.63	89.64	114	-24.36	Horizontal
2441	98.78	-9.63	89.15	114	-24.85	Vertical
2480	100.5	-9.59	90.91	114	-23.09	Horizontal
2480	100.04	-9.59	90.45	114	-23.55	Vertical

Average value

Frequency	Reading Level	Factor	Measurement	Limit	Over	Antenna
(MHz)	(dBuv)	(dB/m)	(dBuv/m)	(dBuv/m)	(dB)	Polarization
2402	95.06	-9.68	85.38	94	-8.62	Horizontal
2402	94.83	-9.68	85.15	94	-8.85	Vertical
2441	98.61	-9.63	88.98	94	-5.02	Horizontal
2441	97.78	-9.63	88.15	94	-5.85	Vertical
2480	99.04	-9.59	89.45	94	-4.55	Horizontal
2480	98.64	-9.59	89.05	94	-4.95	Vertical

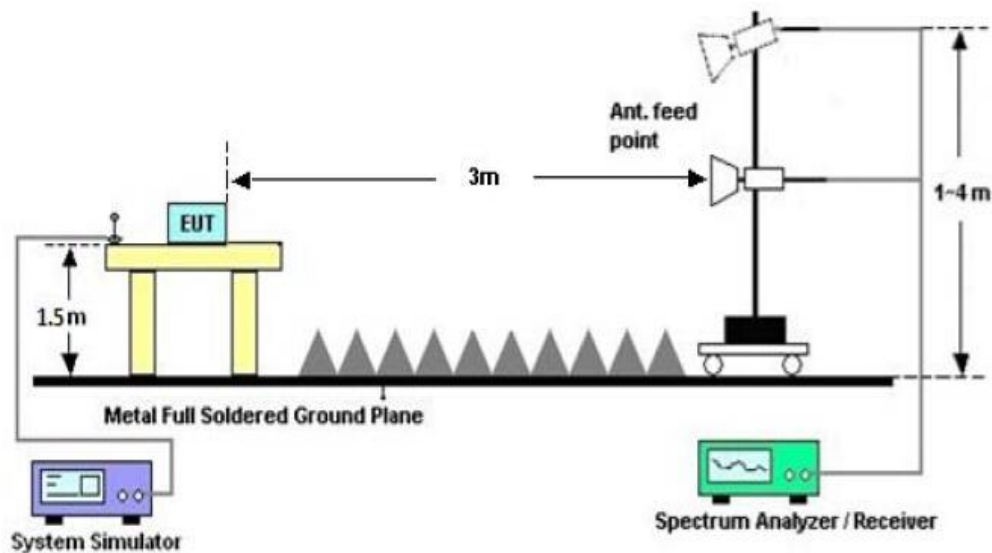
9. BAND EDGE EMISSION

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

9.2 TEST SETUP

RADIATED EMISSION TEST SETUP

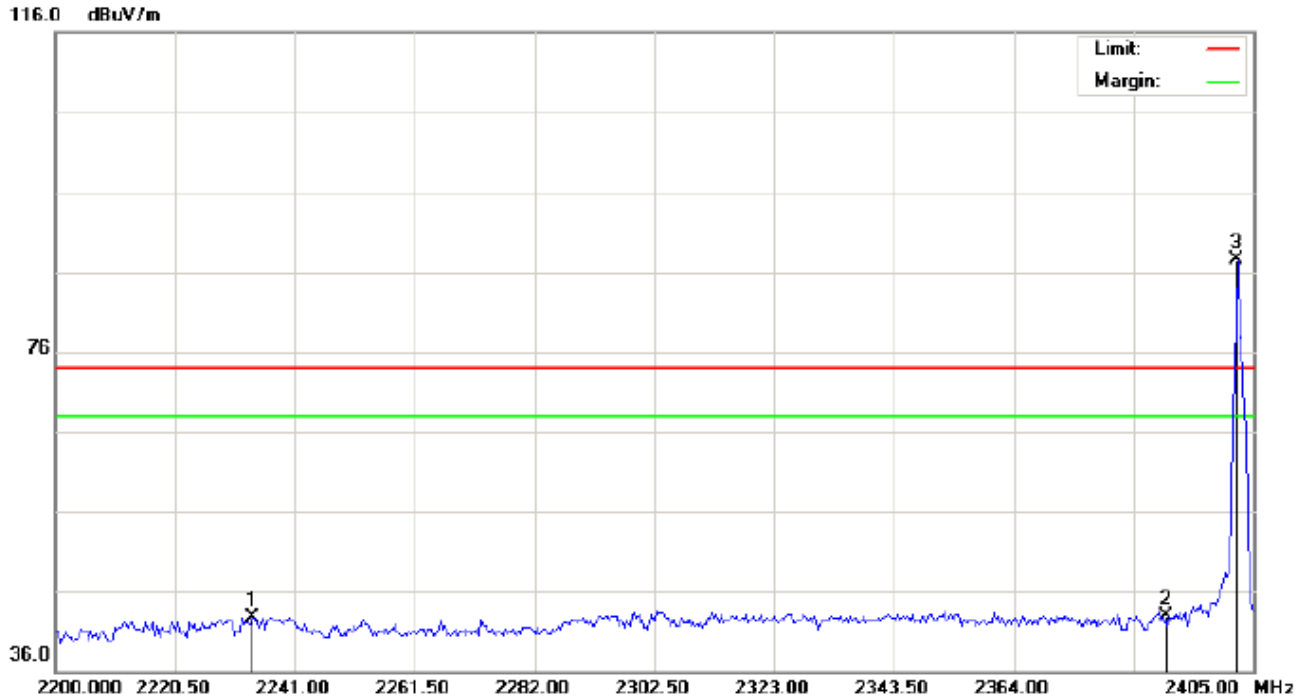


9.3 RADIATED TEST RESULT

(Worst modulation: GFSK)

FOR BR/EDR

TEST PLOT OF BAND EDGE FOR LOW CHANNEL-Horizontal



Site: site #1

Polarization: *Horizontal*

Temperature: 26

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

Power:

Humidity: 60 %

EUT: Jaybird Freedom

Distance:

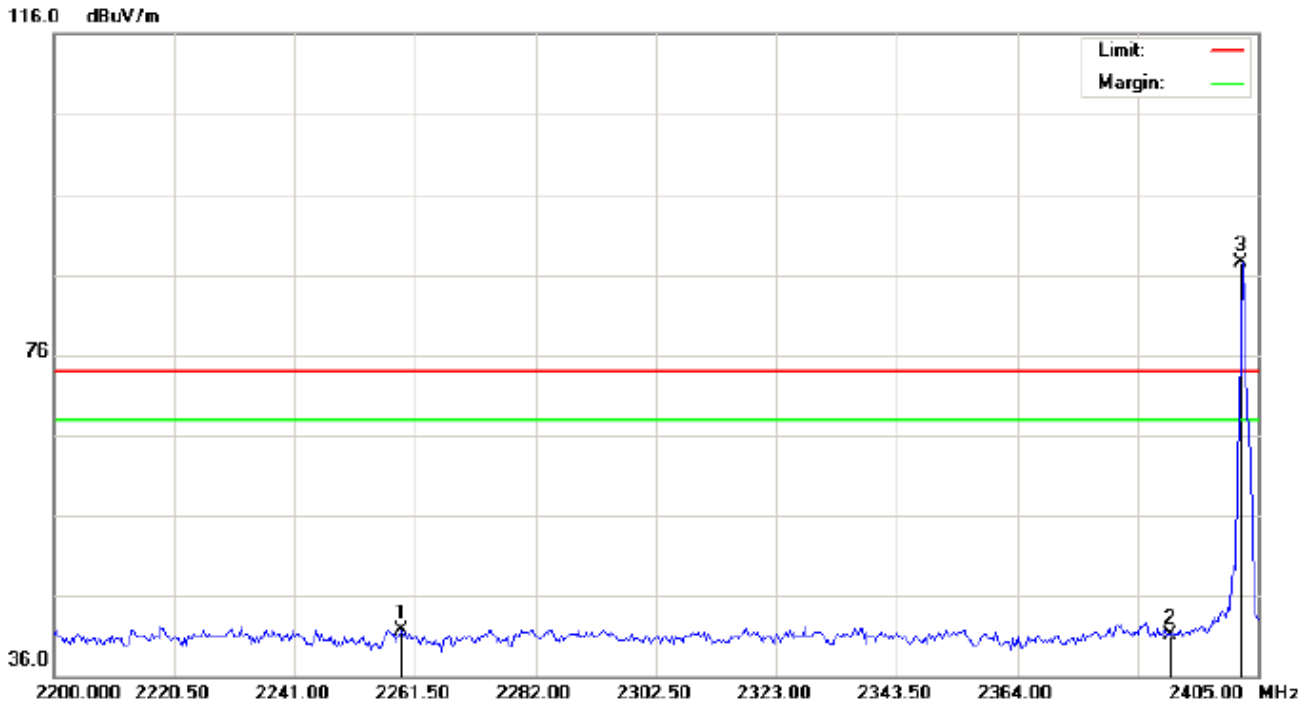
M/N: F5

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		2233.825	32.64	10.14	42.78	74.00	-31.22	peak			
2		2390.000	32.50	10.31	42.81	74.00	-31.19	peak			
3	*	2402.000	77.22	10.32	87.54	74.00	13.54	peak			

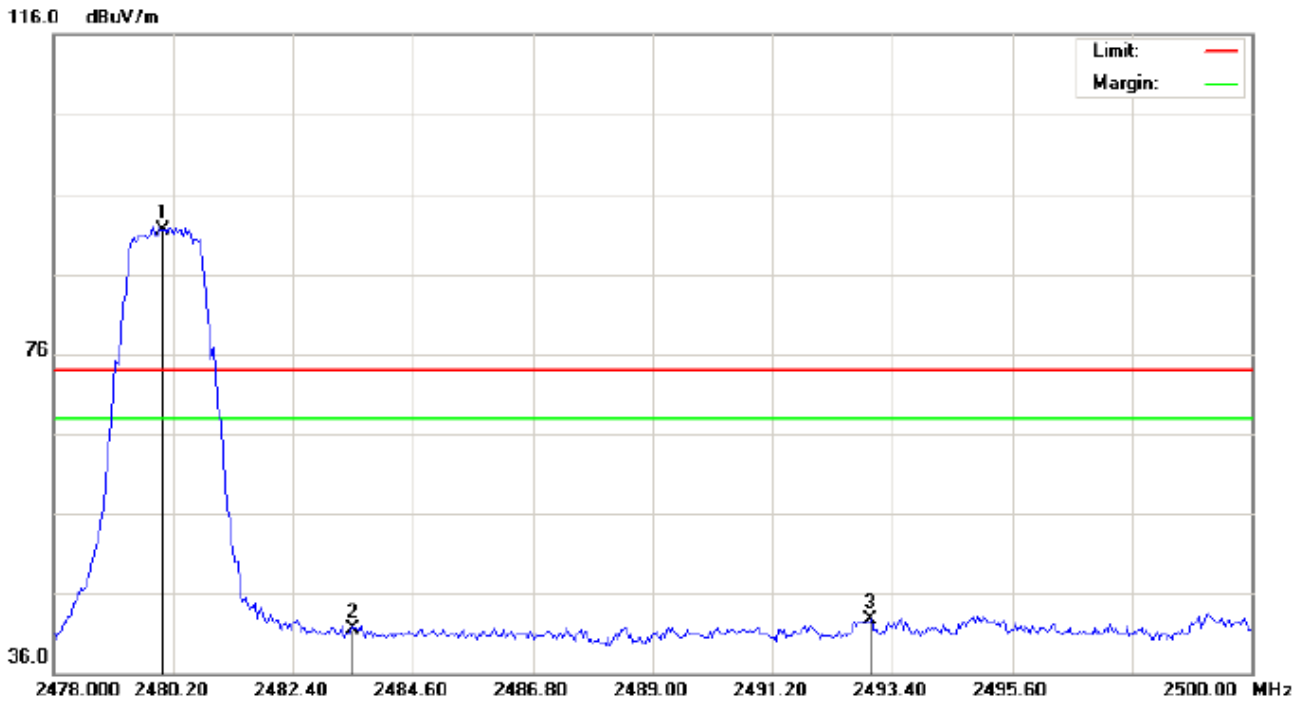
TEST PLOT OF BAND EDGE FOR LOW CHANNEL -Vertical



Site: site #1 Polarization: *Vertical* Temperature: 26
Limit: FCC Class B 3M Radiation above 1GHZ(PK) Power: Humidity: 60 %
EUT: Jaybird Freedom Distance:
M/N: F5
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		2259.108	31.54	10.16	41.70	74.00	-32.30	peak			
2		2390.000	30.71	10.31	41.02	74.00	-32.98	peak			
3	*	2402.000	77.09	10.32	87.41	74.00	13.41	peak			

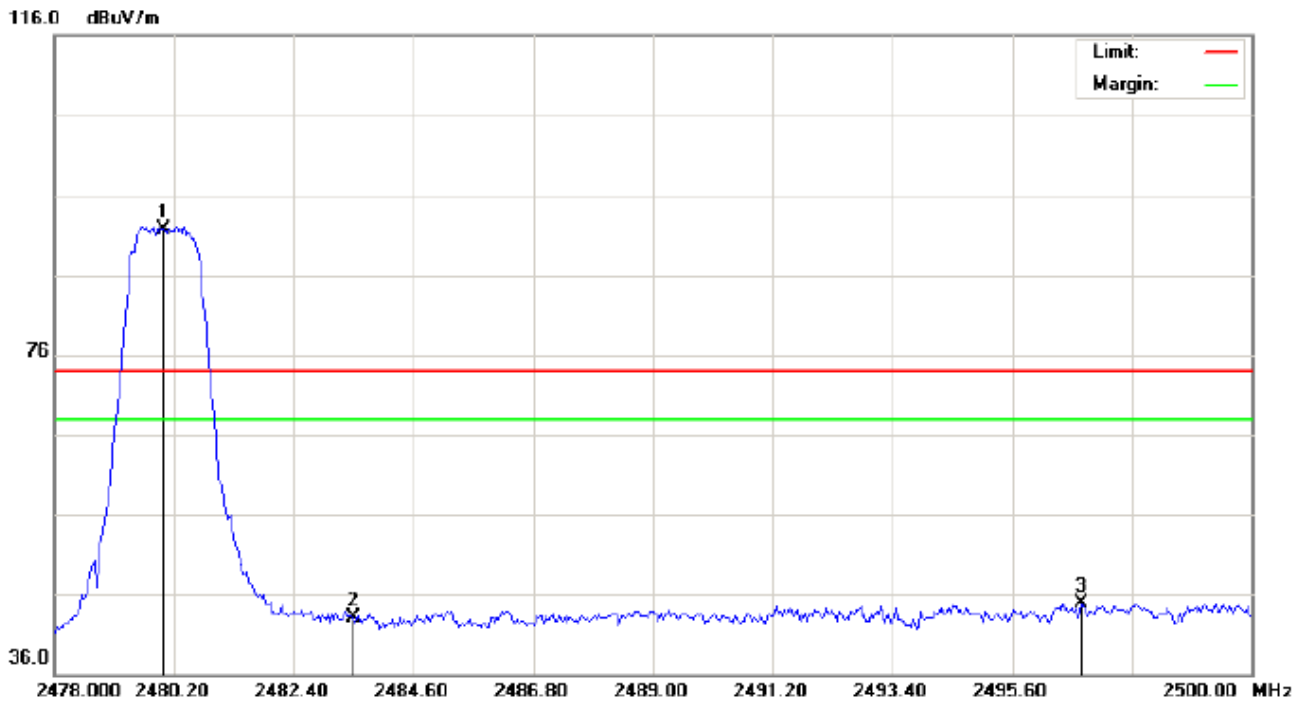
TEST PLOT OF BAND EDGE FOR HIGH CHANNEL -Horizontal



Site: site #1 Polarization: *Horizontal* Temperature: 26
Limit: FCC Class B 3M Radiation above 1GHZ(PK) Power: Humidity: 60 %
EUT: Jaybird Freedom Distance:
M/N: F5
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	81.05	10.41	91.46	74.00	17.46	peak			
2		2483.500	31.19	10.41	41.60	74.00	-32.40	peak			
3		2492.997	32.25	10.42	42.67	74.00	-31.33	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: Jaybird Freedom

Distance:

M/N: F5

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	81.32	10.41	91.73	74.00	17.73	peak			
2		2483.500	32.76	10.41	43.17	74.00	-30.83	peak			
3		2496.883	34.41	10.43	44.84	74.00	-29.16	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.

Hopping on mode and Hopping off mode have been tested, but only worst case reported.

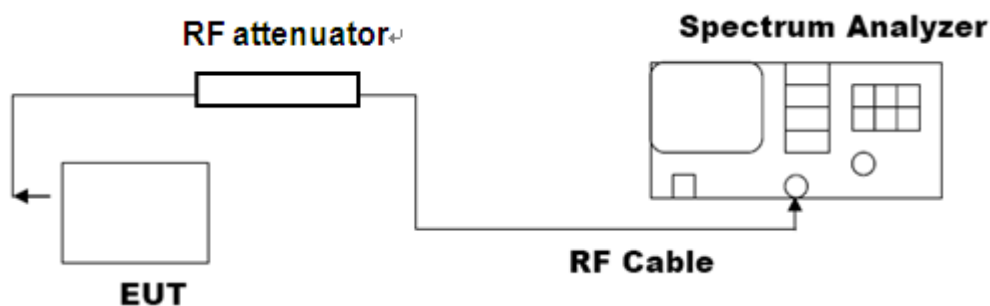
10. 20DB BANDWIDTH

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)



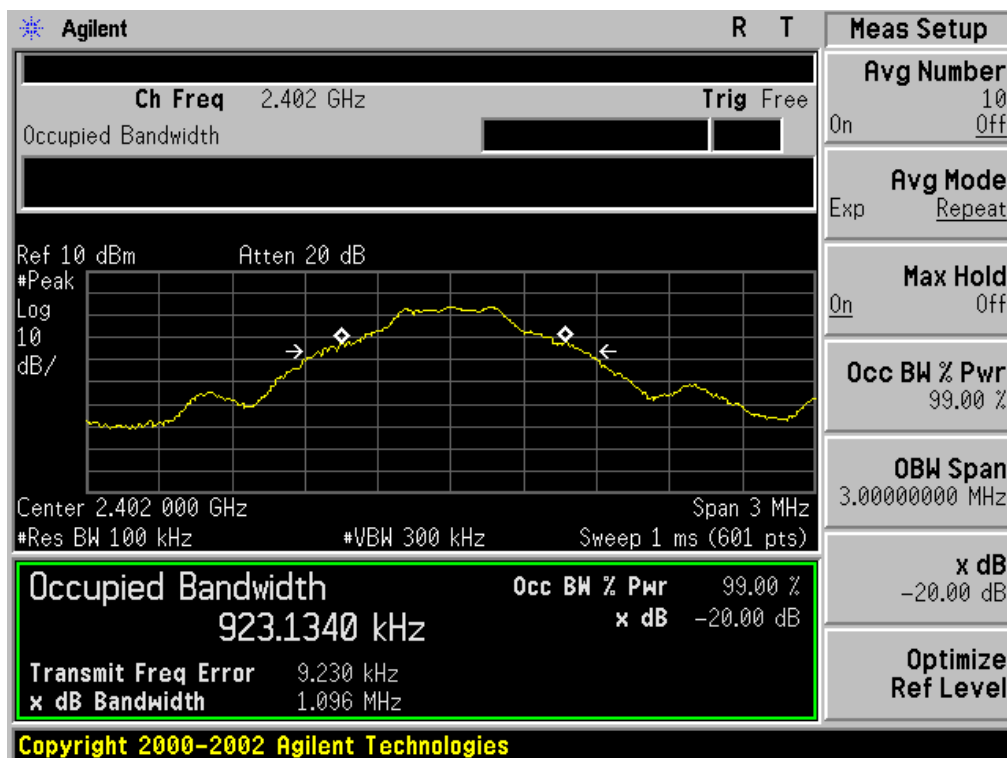
Note: The EUT has been used temporary antenna connector for testing.

10.3. LIMITS AND MEASUREMENT RESULTS

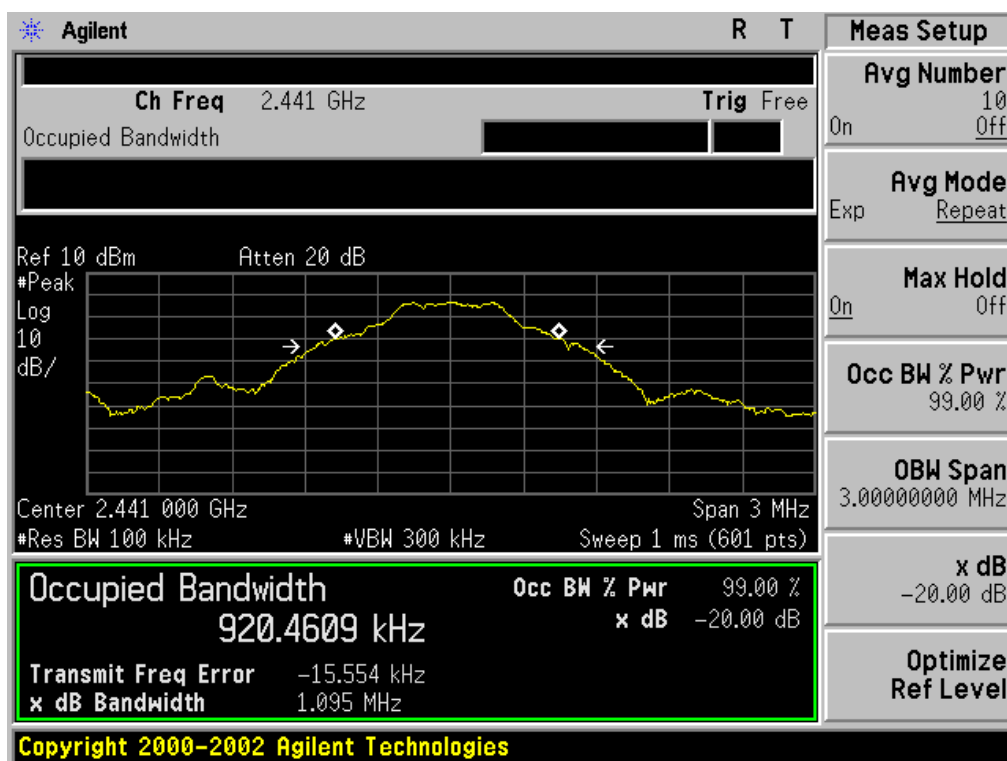
FOR BR/EDR

BLUETOOTH 1MBPS LIMITS AND MEASUREMENT RESULT				
Applicable Limits	Measurement Result			
	Test Data (MHz)			Result
		99%OBW (MHz)	-20dB BW(MHZ)	
N/A	Low Channel	0.923	1.096	PASS
	Middle Channel	0.920	1.095	PASS
	High Channel	0.919	1.085	PASS

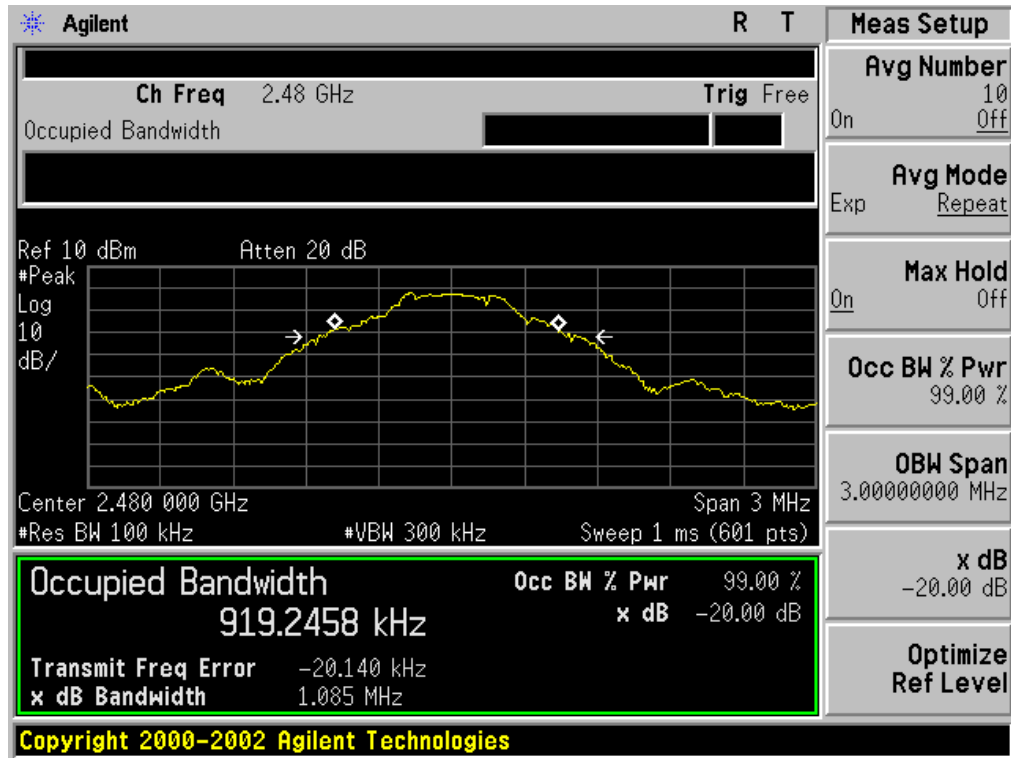
TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL

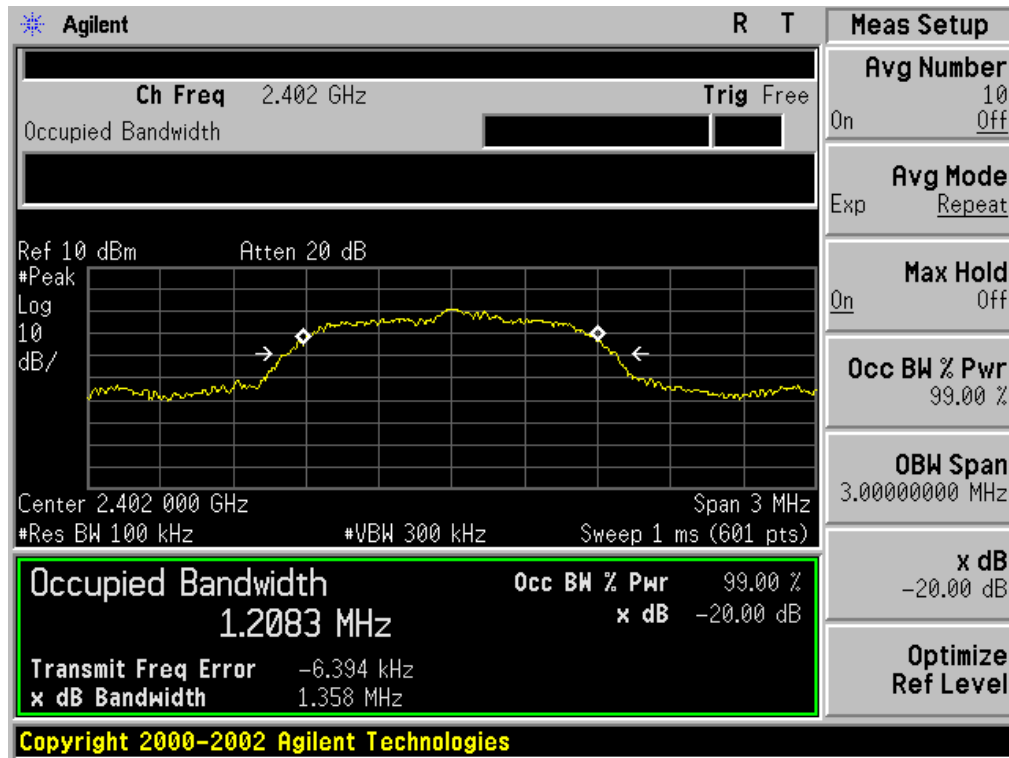


TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL

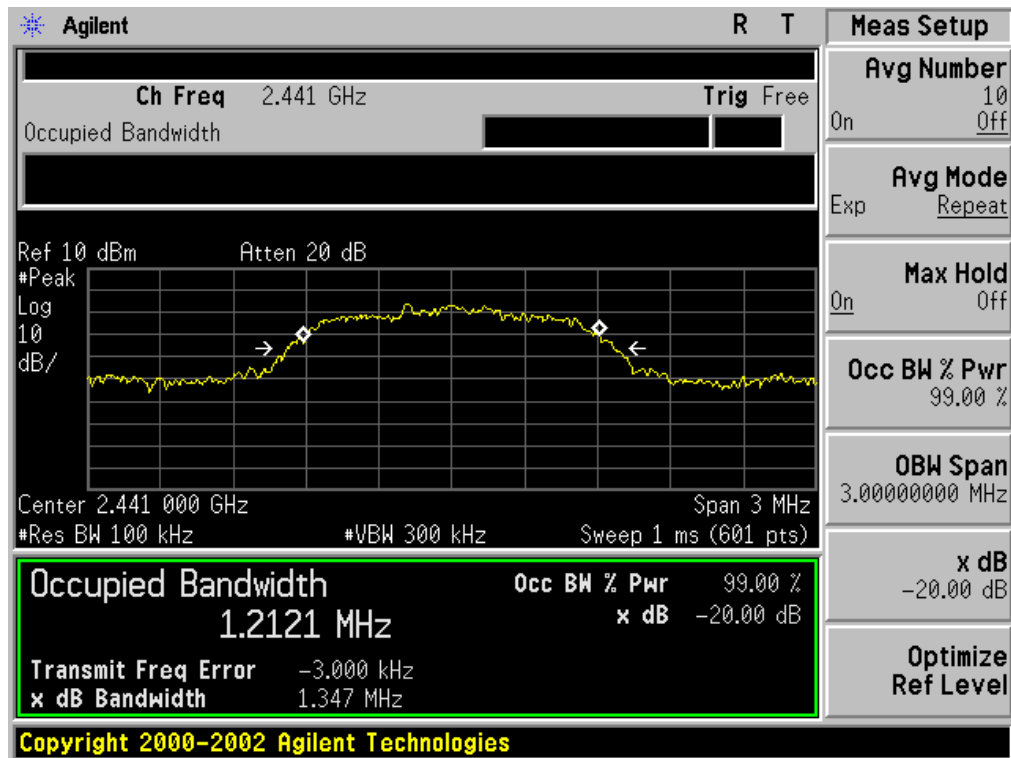


BLUETOOTH 2MBPS LIMITS AND MEASUREMENT RESULT				
Applicable Limits	Measurement Result			
	Test Data (MHz)			Result
		99%OBW (MHz)	-20dB BW(MHz)	
N/A	Low Channel	1.208	1.358	PASS
	Middle Channel	1.212	1.347	PASS
	High Channel	1.220	1.371	PASS

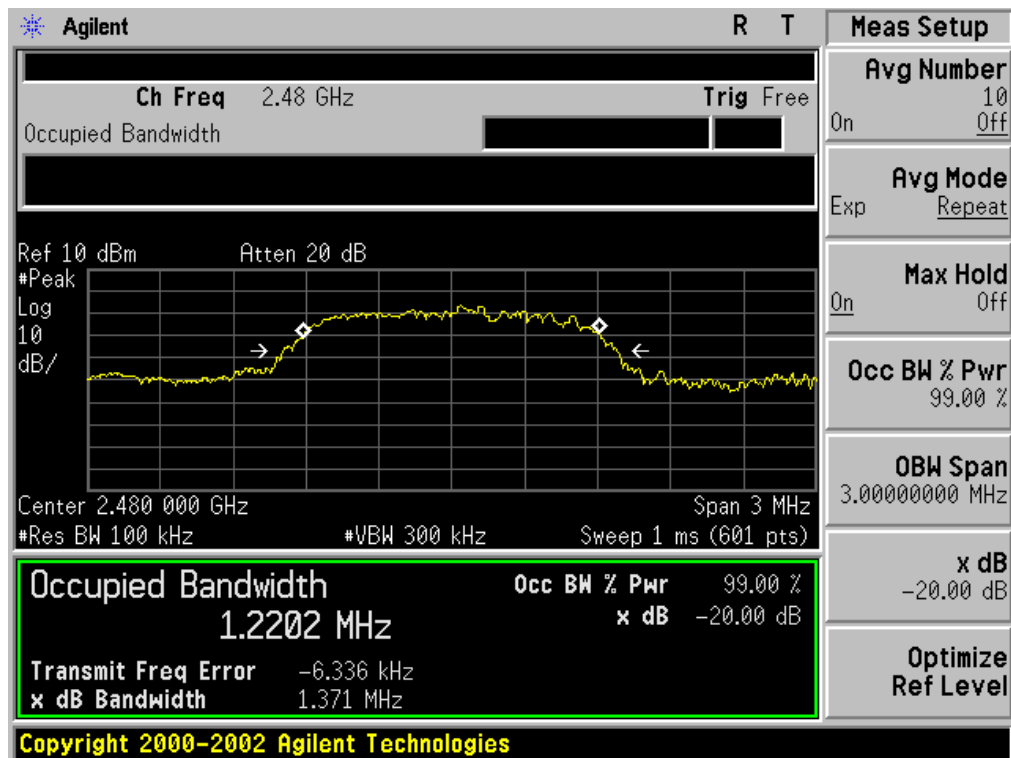
TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL

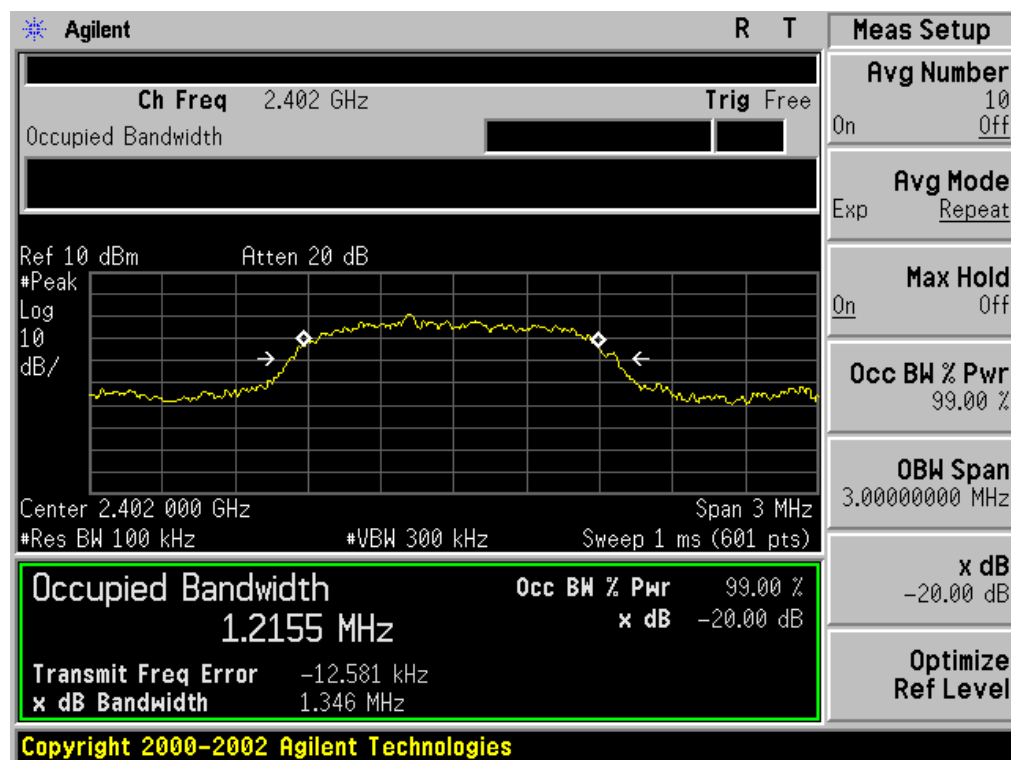


TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL

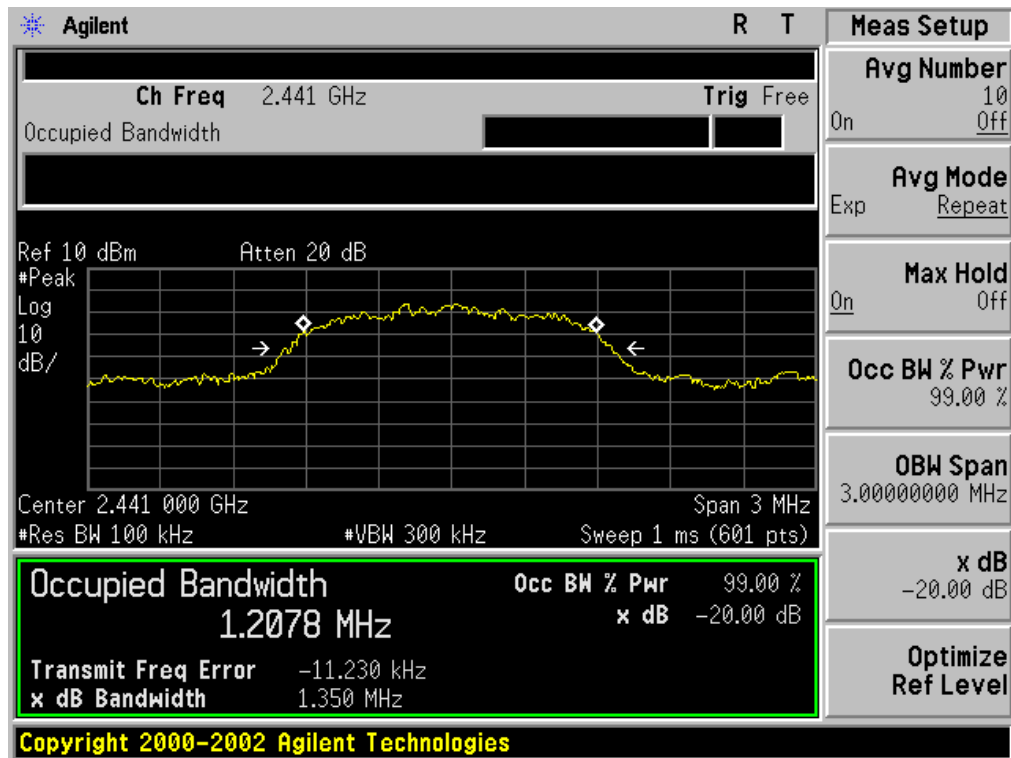


BLUETOOTH 3MBPS LIMITS AND MEASUREMENT RESULT				
Applicable Limits	Measurement Result			
	Test Data (MHz)			Result
		99%OBW (MHz)	-20dB BW(MHz)	
N/A	Low Channel	1.216	1.346	PASS
	Middle Channel	1.208	1.350	PASS
	High Channel	1.240	1.406	PASS

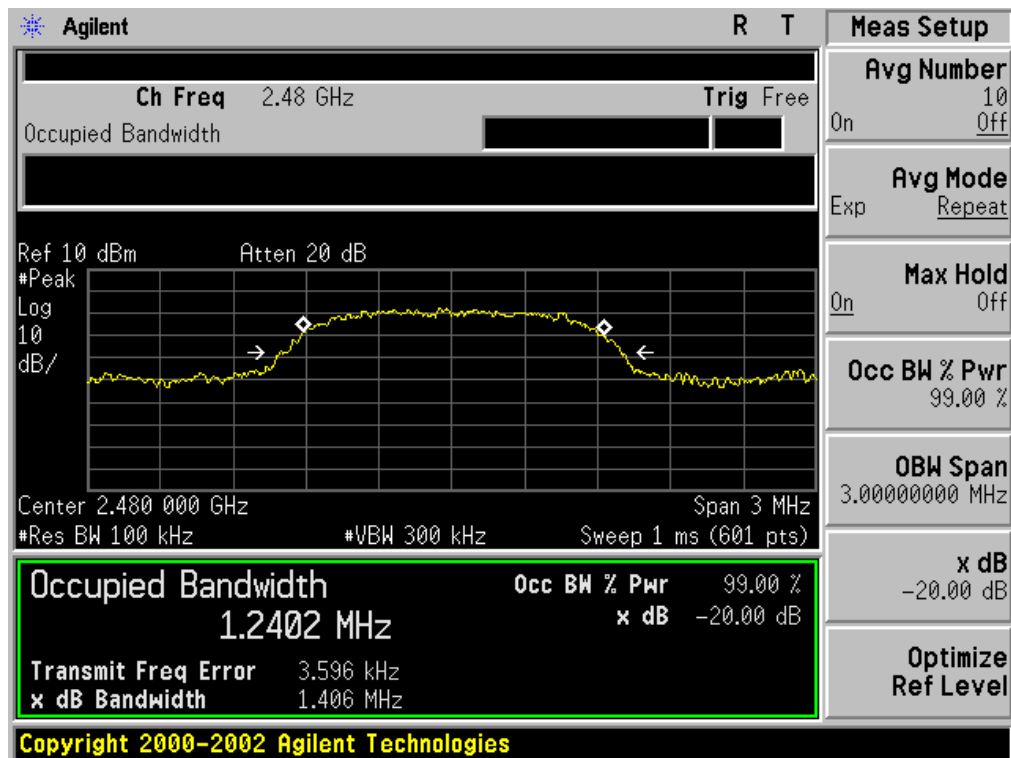
TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL



TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL



11. FCC LINE CONDUCTED EMISSION TEST

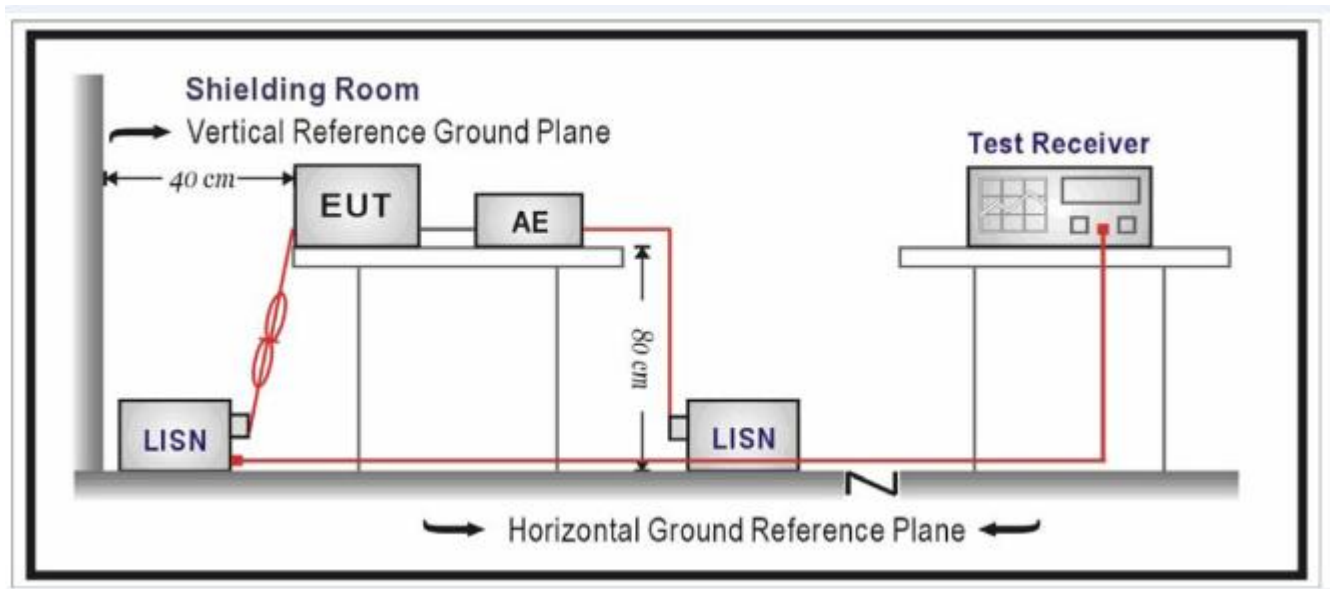
11.1. LIMITS OF LINE CONDUCTED EMISSION TEST

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 C63.10 (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 C63.10.
3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10.
4. All support equipments received AC120V/60Hz power from a LISN, if any.
5. The EUT received DC charging voltage by adapter or 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

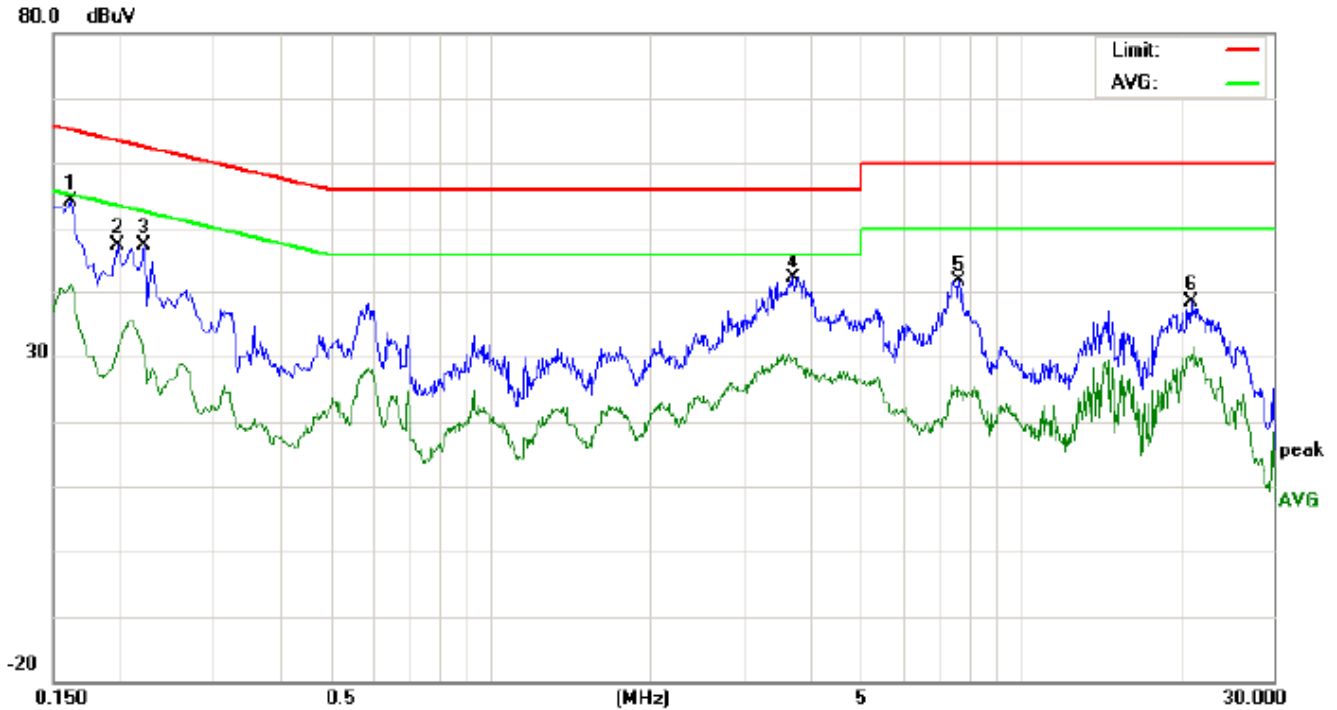
1. EUT and support equipment was set up on the test bench as per step 2 of the preliminary test.
2. A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used 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

By adapter(worst case)

FOR BR/EDR

Line Conducted Emission Test Line 1-L



Site: Conduction

Phase: L1

Temperature: 22.5

Limit: FCC Class B Conduction(QP)

Power:

Humidity: 55.1 %

EUT:Jaybird Freedom

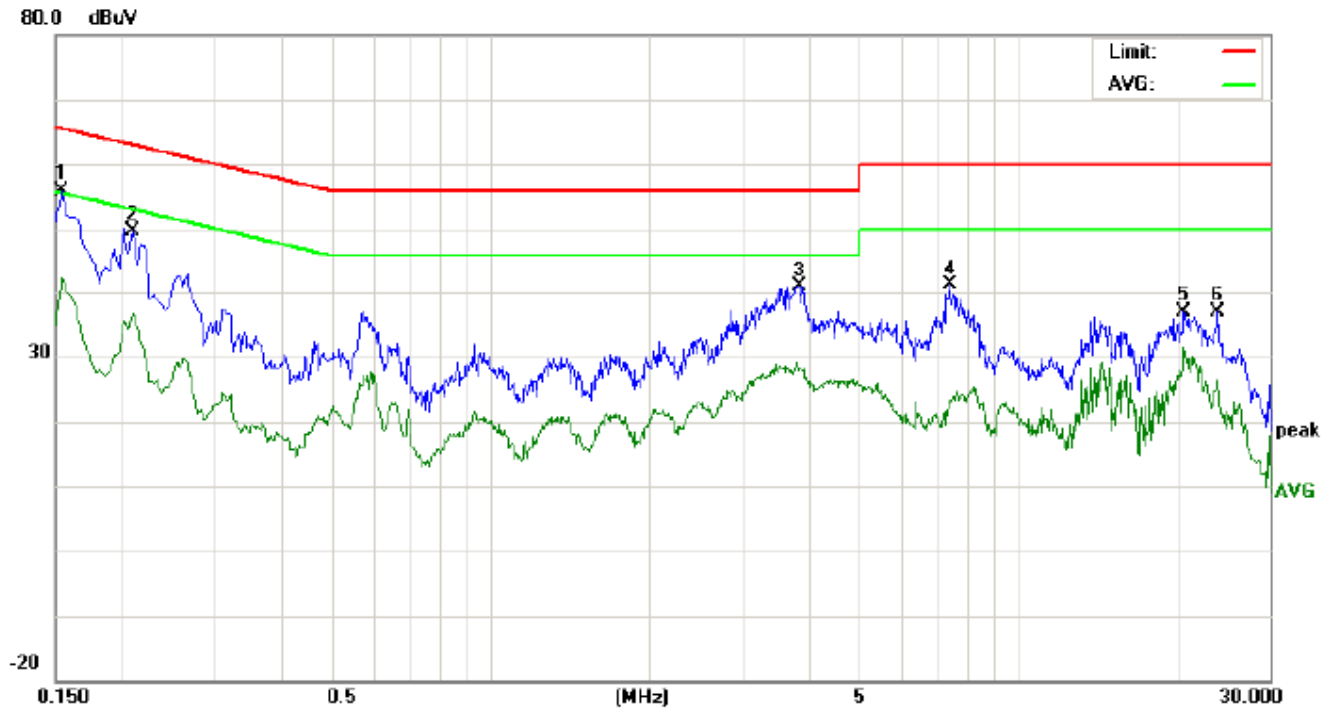
M/N:F5

Mode:BT link with charging

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	0.1620	43.93		30.91	10.17	54.10		41.08	65.36	55.36	-11.26	-14.28	P	
2	0.1980	37.28		20.92	10.21	47.49		31.13	63.69	53.69	-16.20	-22.56	P	
3	0.2220	37.16		19.92	10.24	47.40		30.16	62.74	52.74	-15.34	-22.58	P	
4	3.7299	31.56		18.83	10.47	42.03		29.30	56.00	46.00	-13.97	-16.70	P	
5	7.6578	31.36		14.43	10.34	41.70		24.77	60.00	50.00	-18.30	-25.23	P	
6	21.0339	28.13		20.22	10.13	38.26		30.35	60.00	50.00	-21.74	-19.65	P	

Line Conducted Emission Test Line 2-N



Site: Conduction Phase: **N** Temperature: 22.5
Limit: FCC Class B Conduction(QP) Power: Humidity: 55.1 %
EUT:Jaybird Freedom
M/N:F5
Mode:BT link with charging
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	0.1539	45.64		32.08	10.16	55.80		42.24	65.78	55.78	-9.98	-13.54	P	
2	0.2100	39.29		26.40	10.23	49.52		36.63	63.20	53.20	-13.68	-16.57	P	
3	3.8660	30.52		17.60	10.45	40.97		28.05	56.00	46.00	-15.03	-17.95	P	
4	7.4299	30.70		13.16	10.33	41.03		23.49	60.00	50.00	-18.97	-26.51	P	
5	20.6900	26.70		21.18	10.12	36.82		31.30	60.00	50.00	-23.18	-18.70	P	
6	24.0020	26.65		16.35	10.11	36.76		26.46	60.00	50.00	-23.24	-23.54	P	

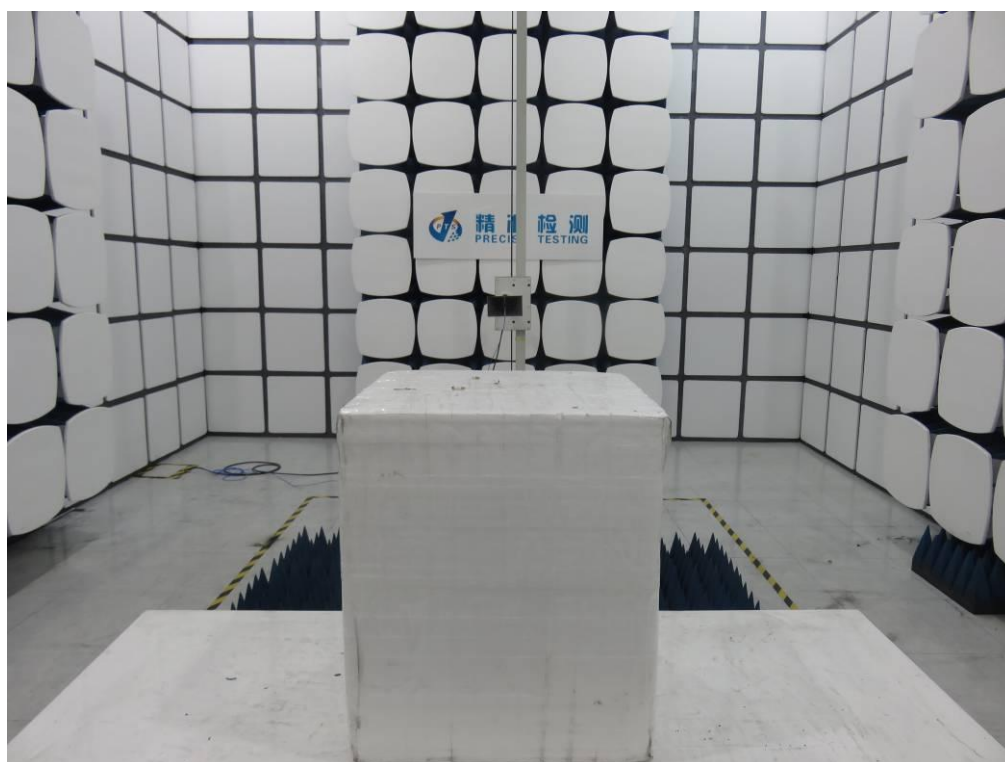
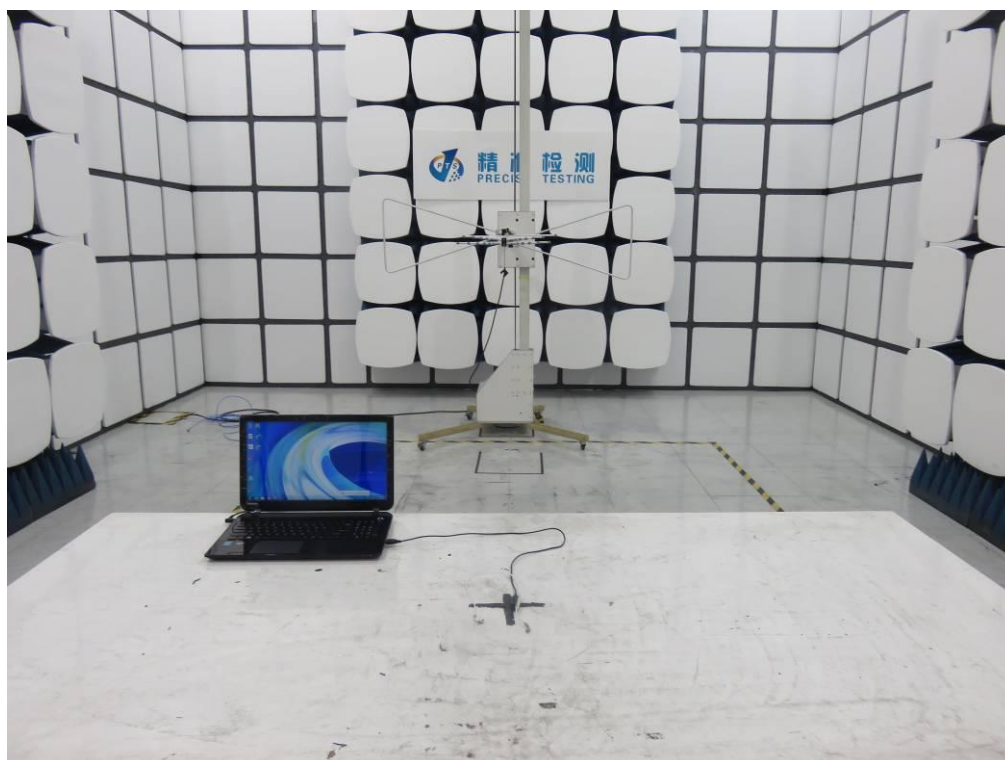
APPENDIX A: PHOTOGRAPHS OF TEST SETUP

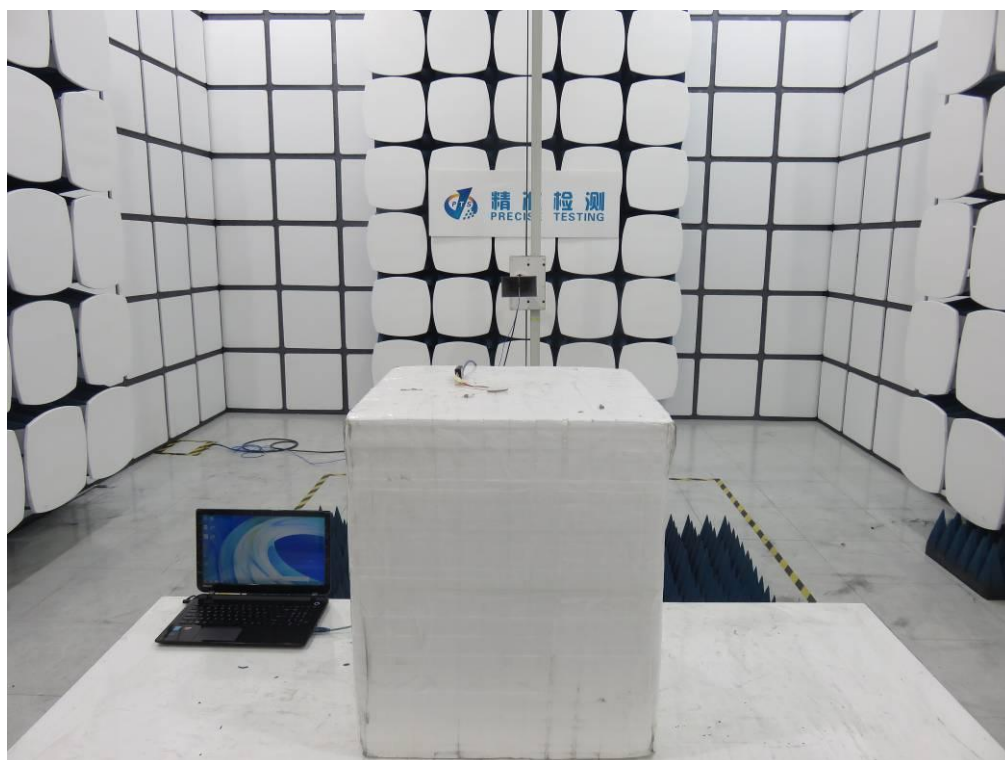
FCC LINE CONDUCTED EMISSION TEST SETUP



FCC RADIATED EMISSION TEST SETUP

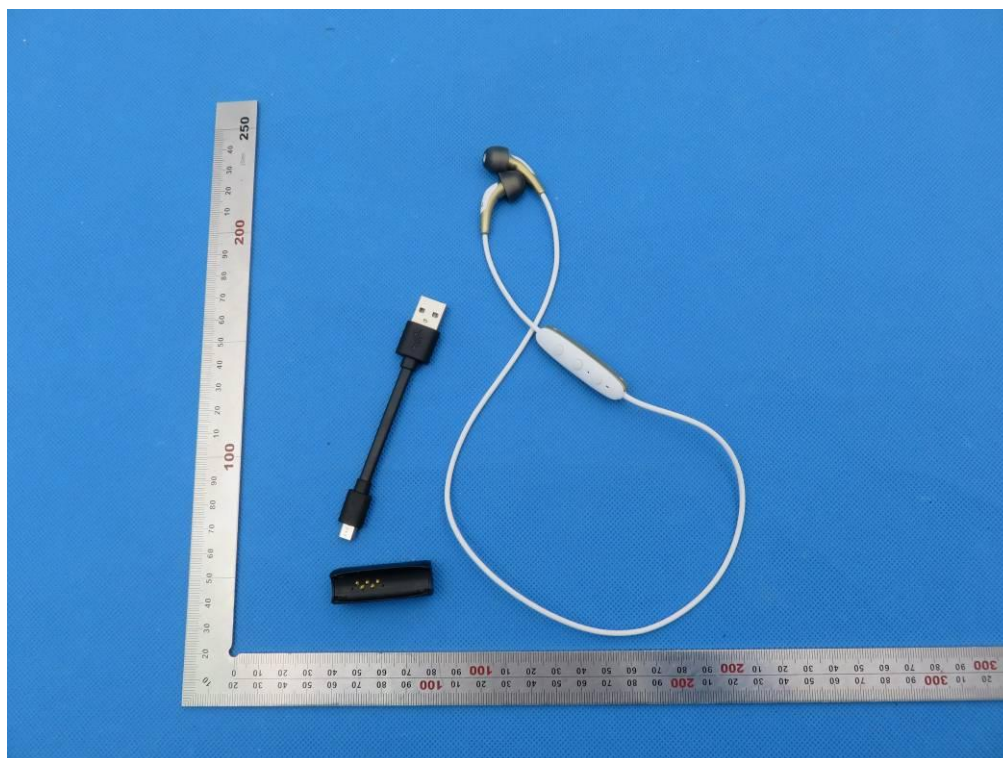






APPENDIX B: PHOTOGRAPHS OF EUT

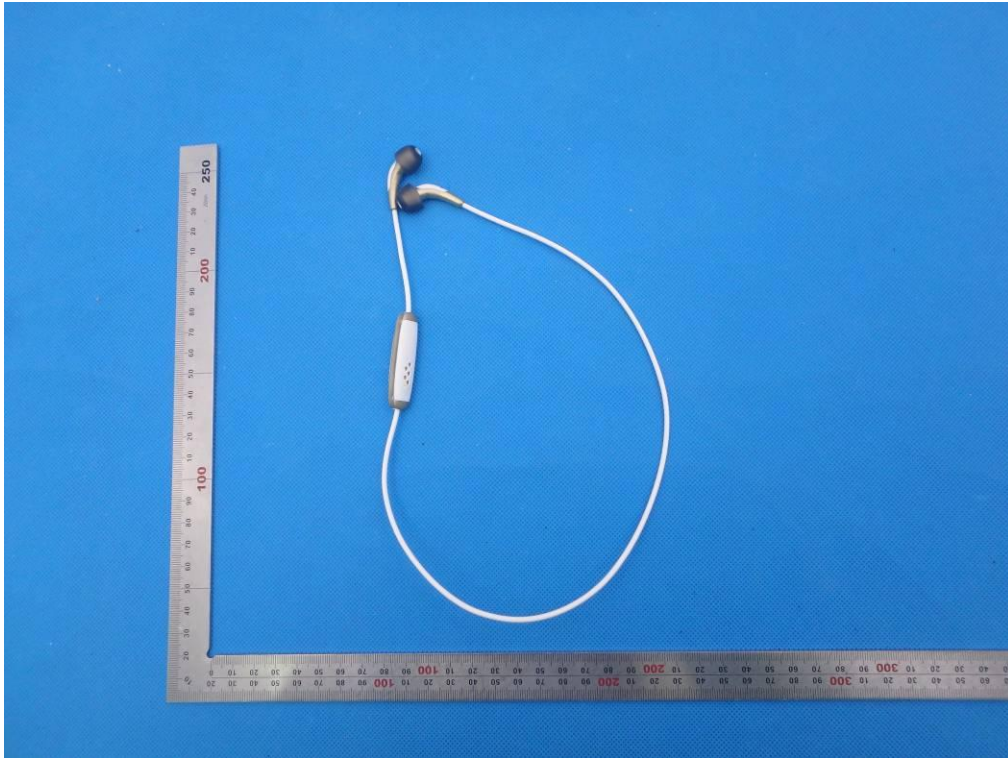
All VIEW OF EUT



TOP VIEW OF EUT



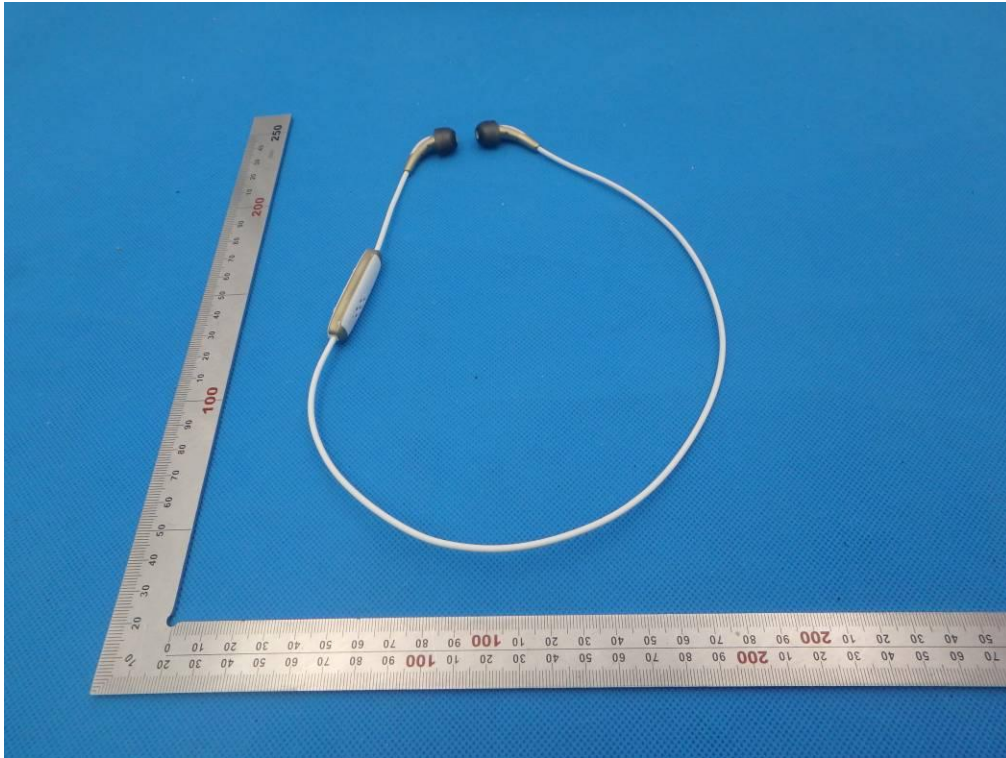
BOTTOM VIEW OF EUT



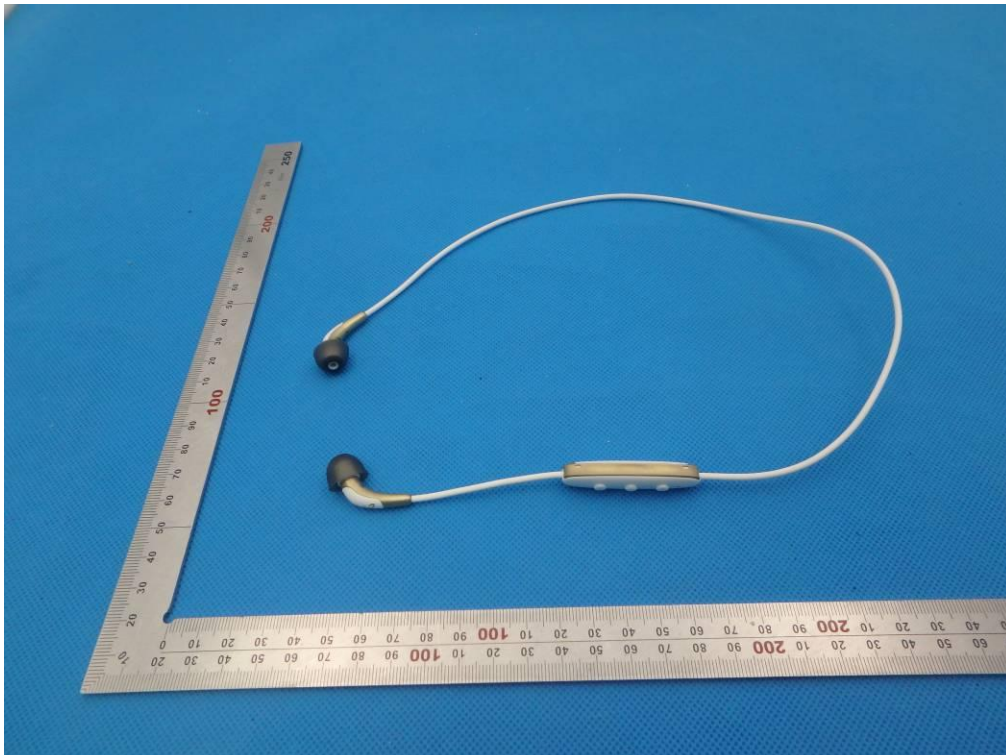
FRONT VIEW OF EUT



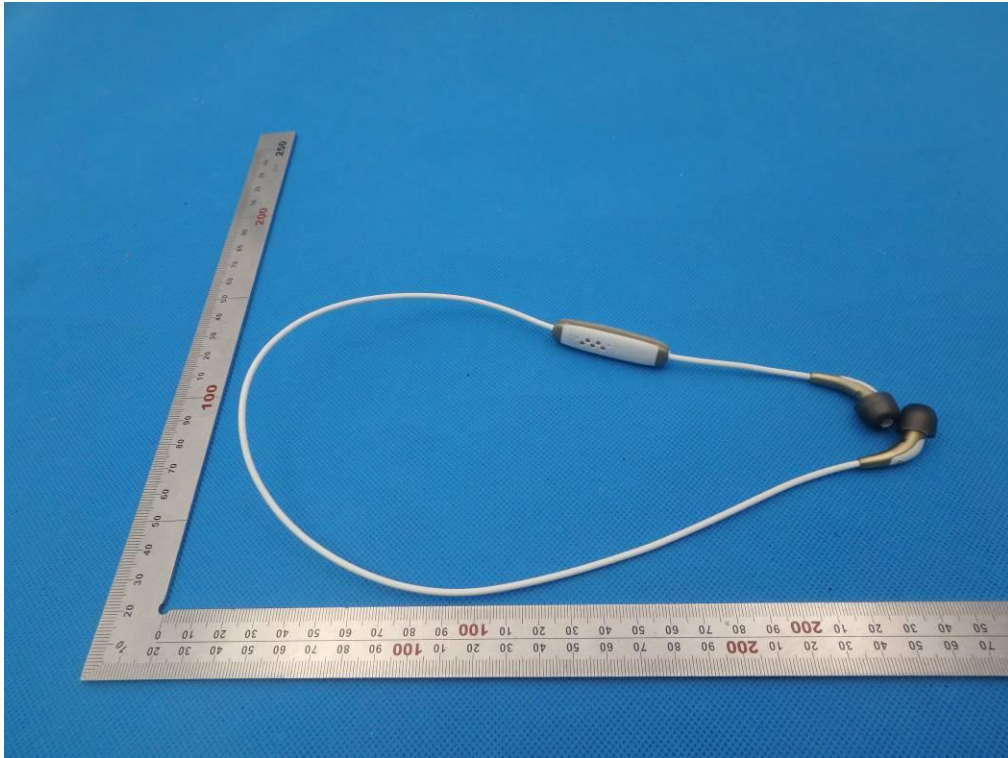
BACK VIEW OF EUT



LEFT VIEW OF EUT



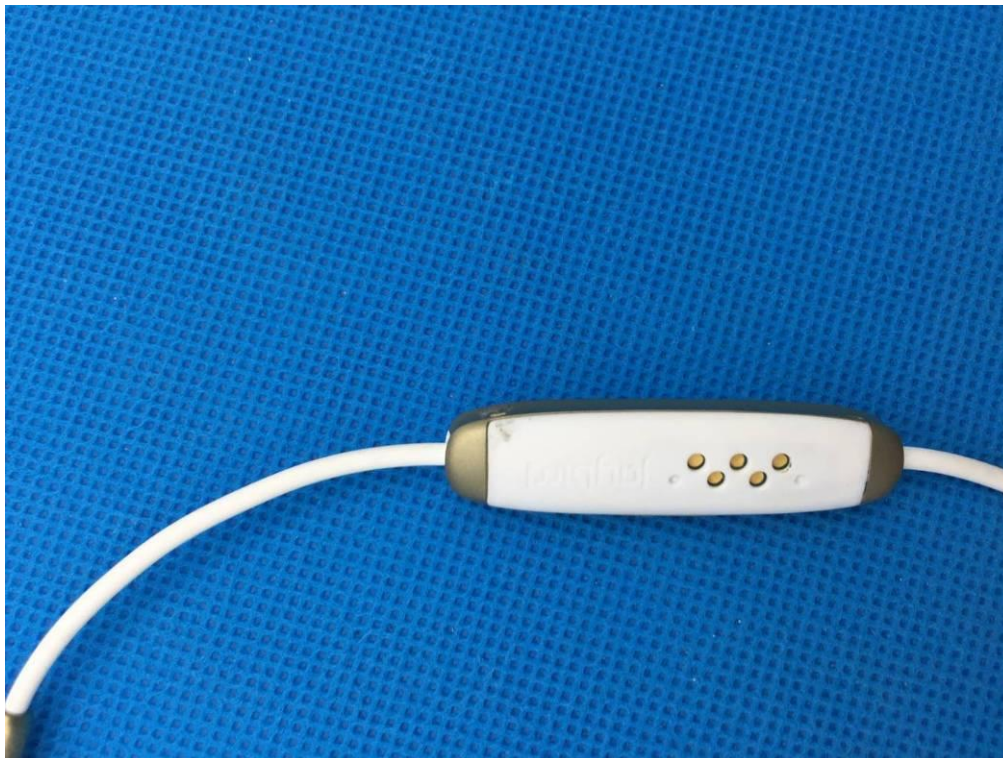
RIGHT VIEW OF EUT



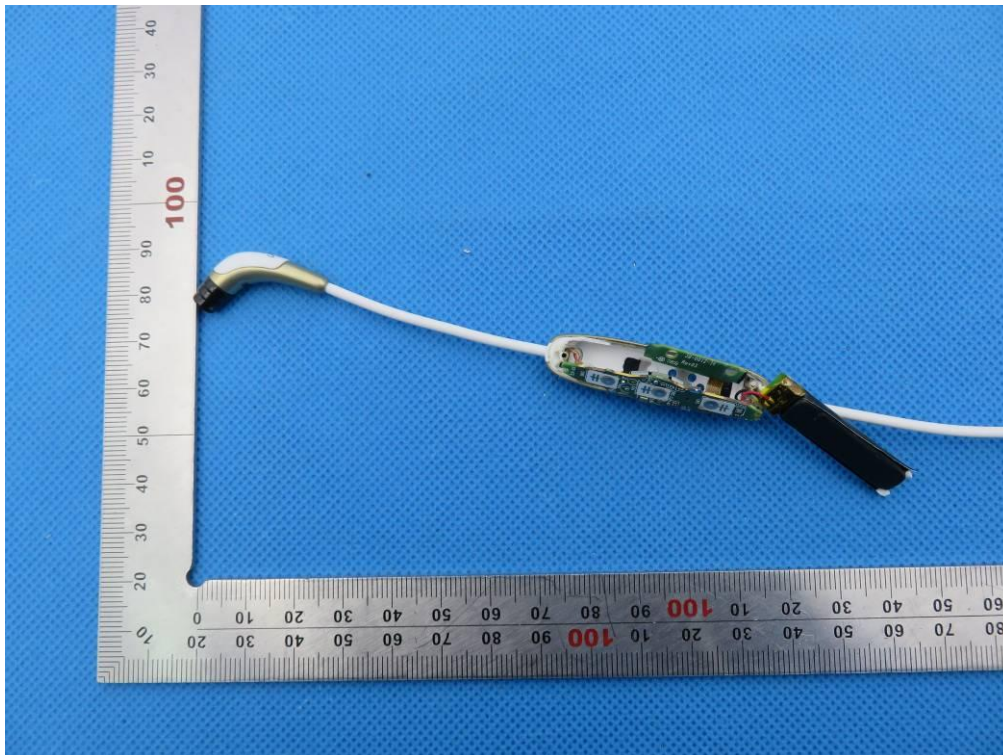
VIEW OF EUT (LOCAL)



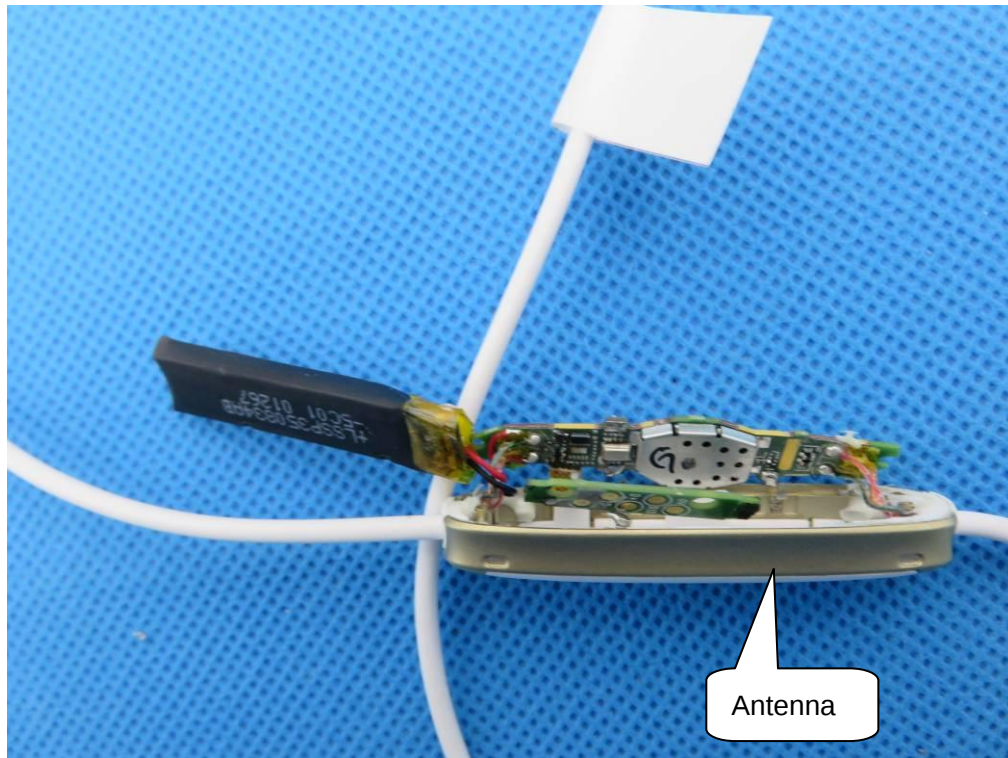
VIEW OF EUT (LOCAL)



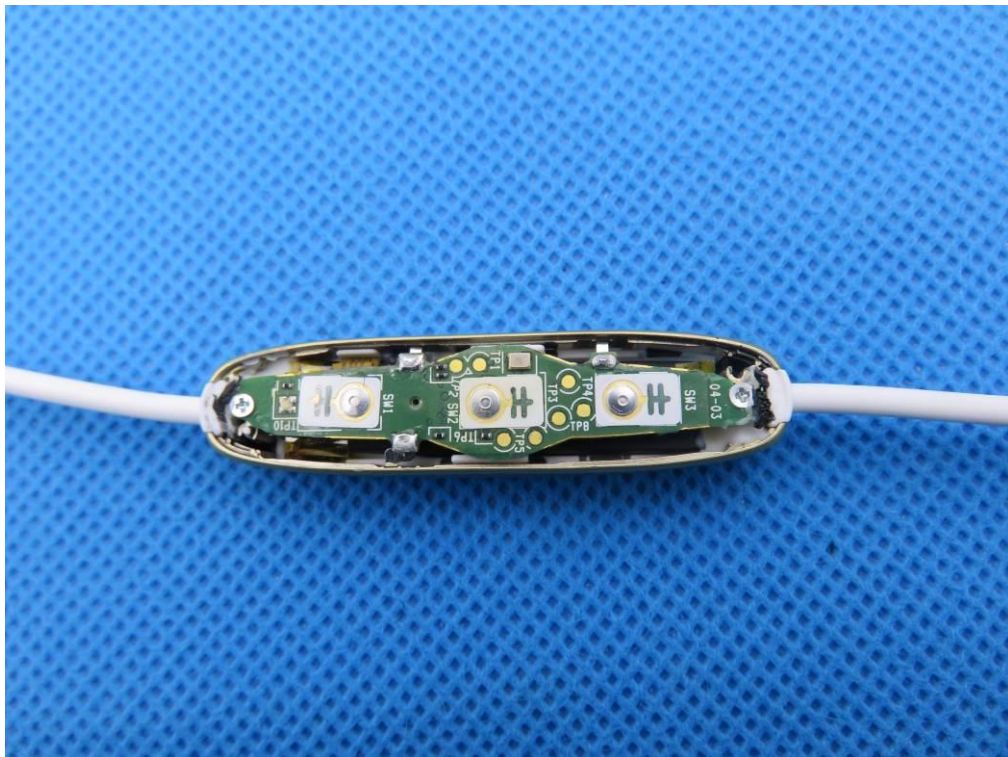
OPEN VIEW OF EUT-1



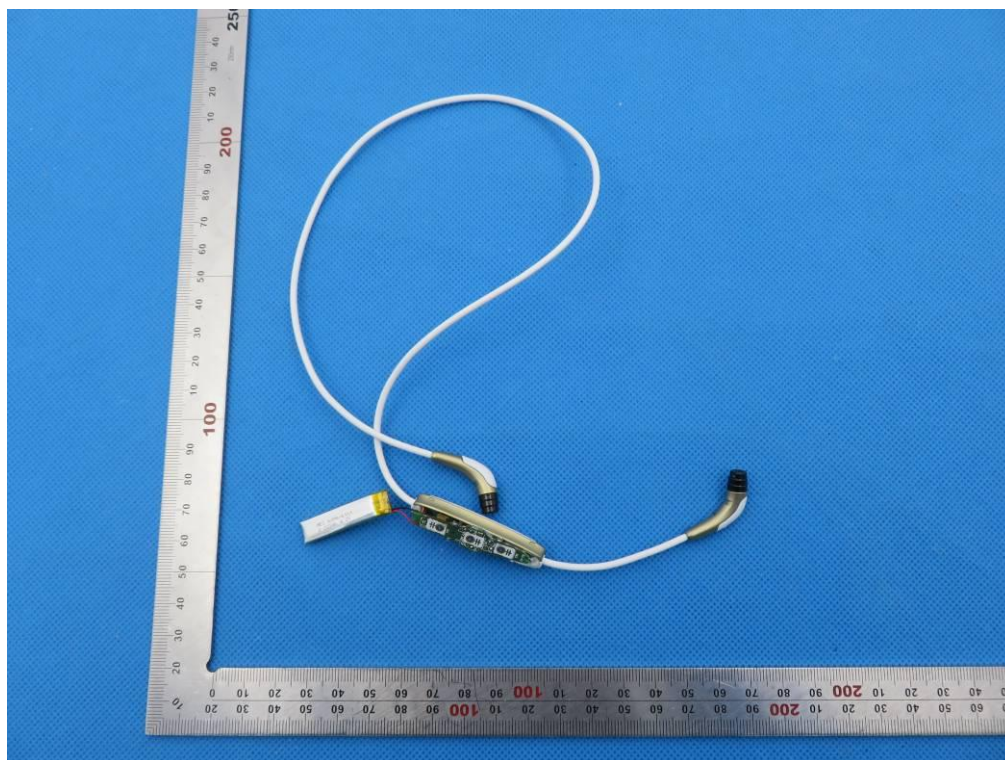
OPEN VIEW OF EUT-1



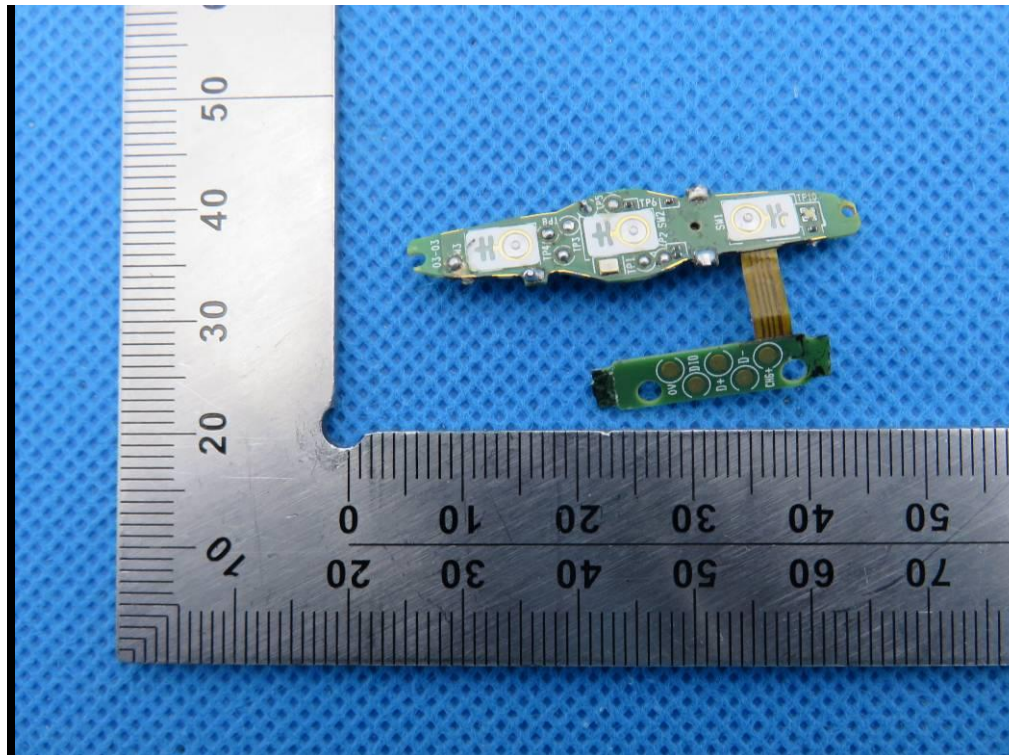
OPEN VIEW OF EUT-1



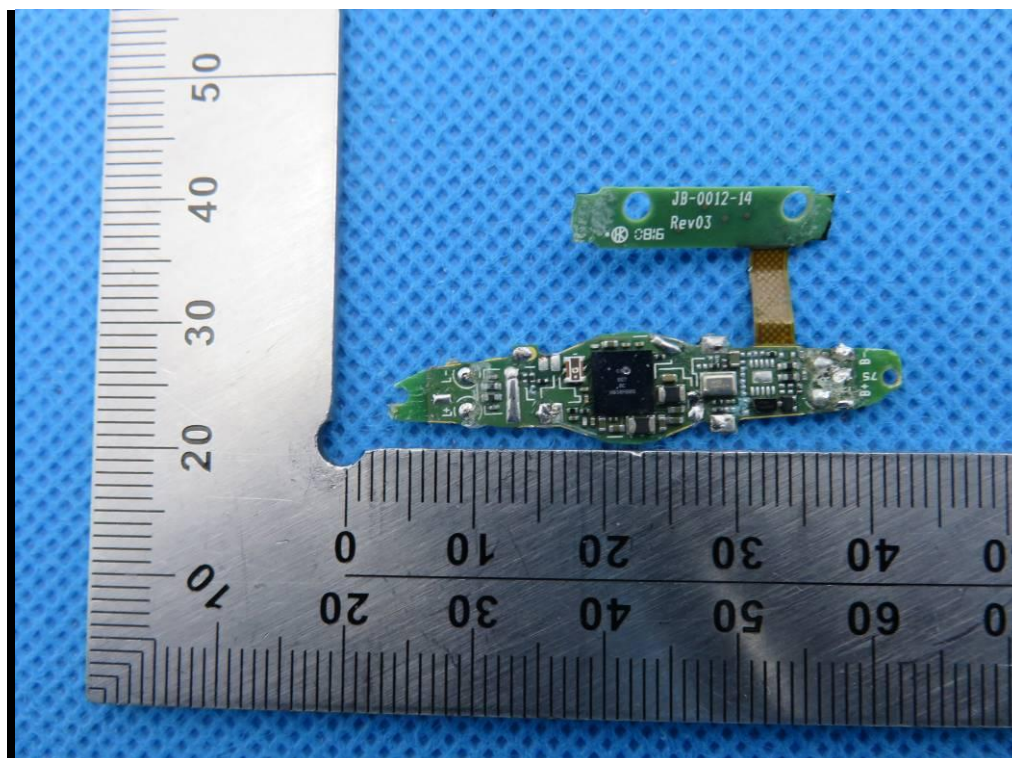
OPEN VIEW OF EUT-2



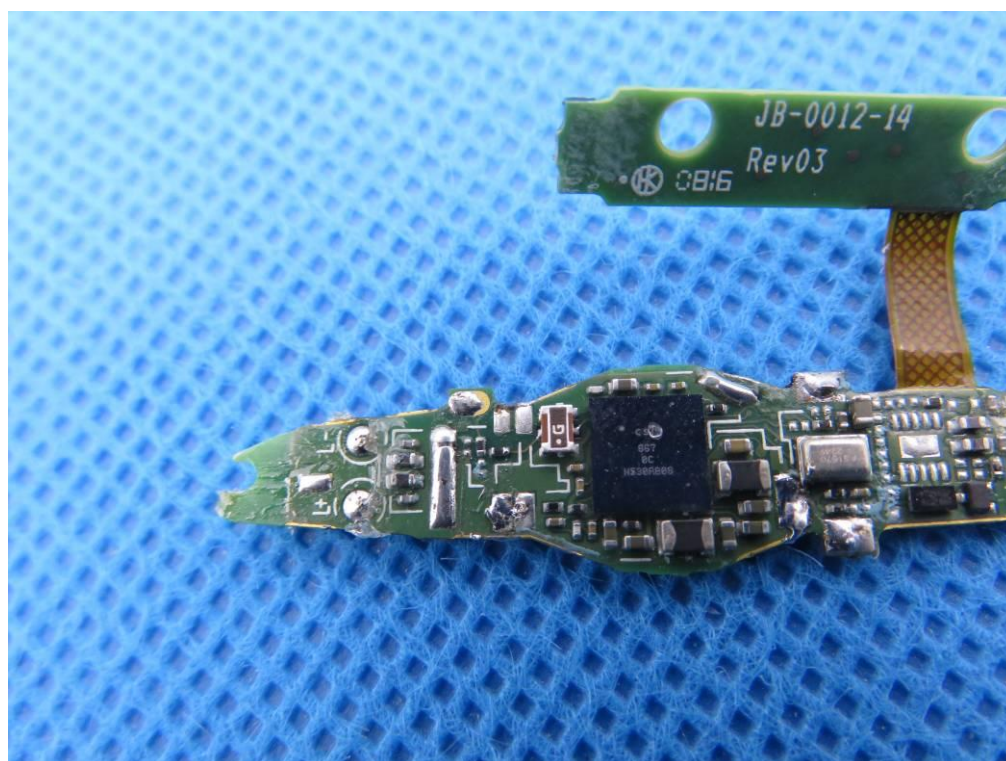
INTERNAL VIEW OF EUT-1



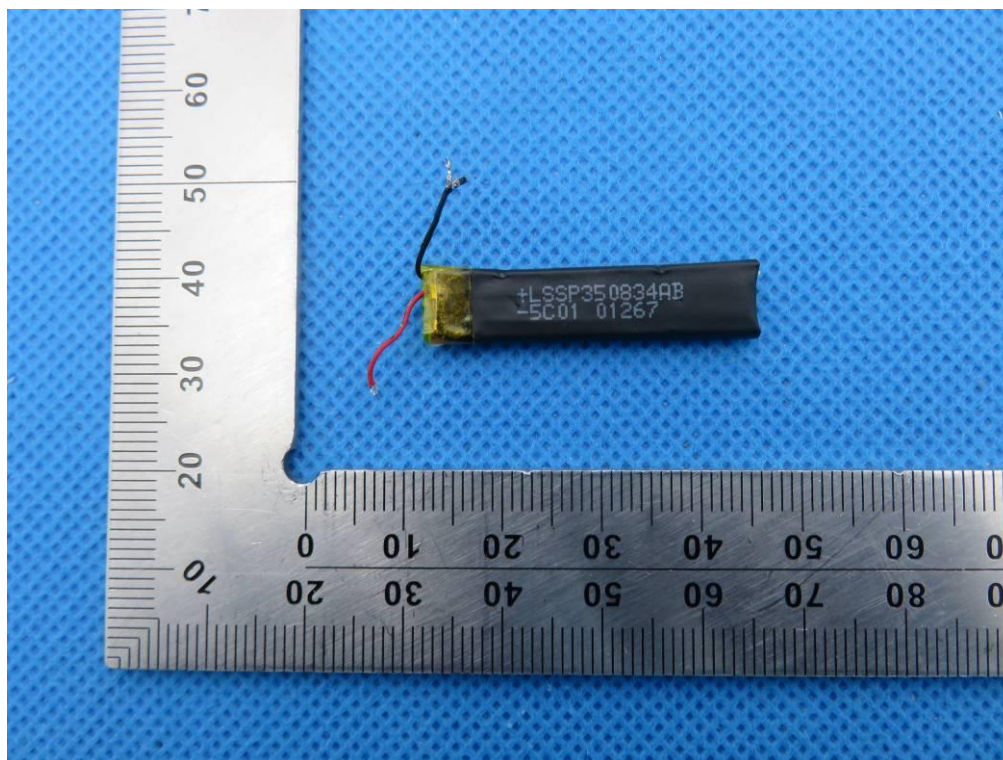
INTERNAL VIEW OF EUT-2



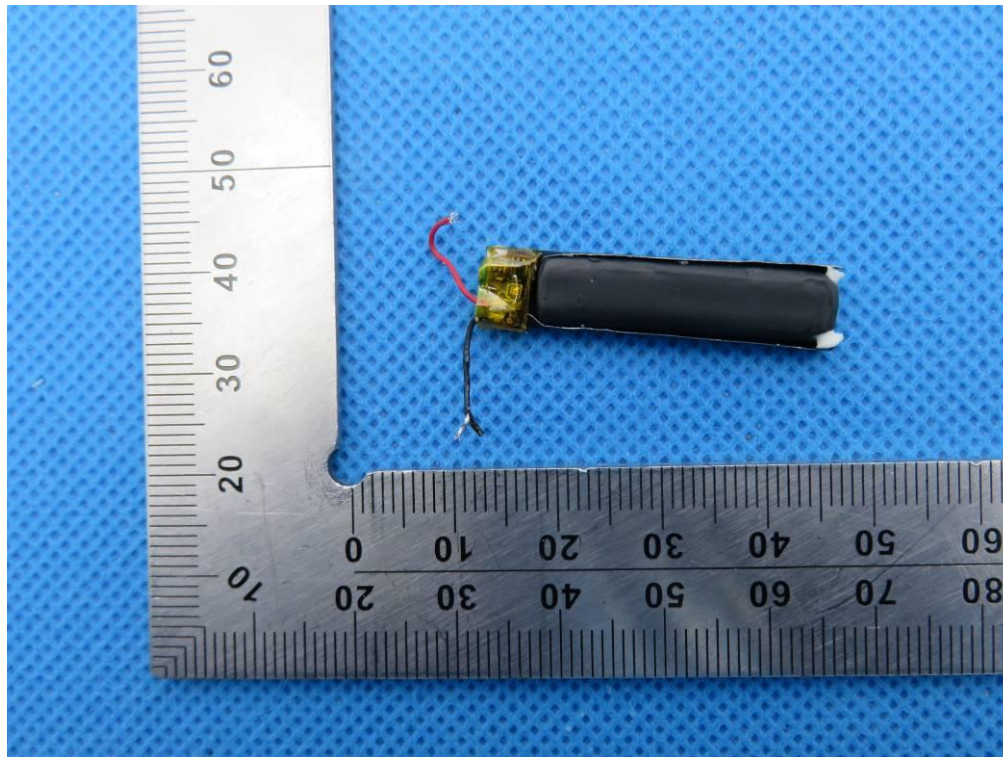
INTERNAL VIEW OF EUT-3



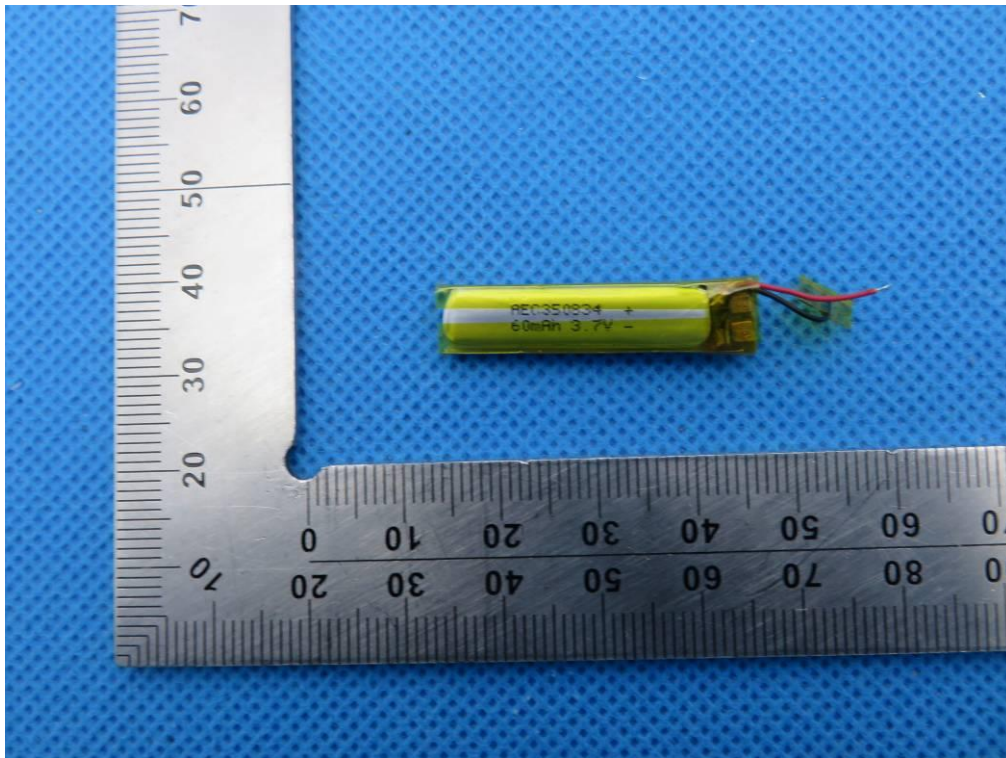
TOP VIEW OF BATTERY-1



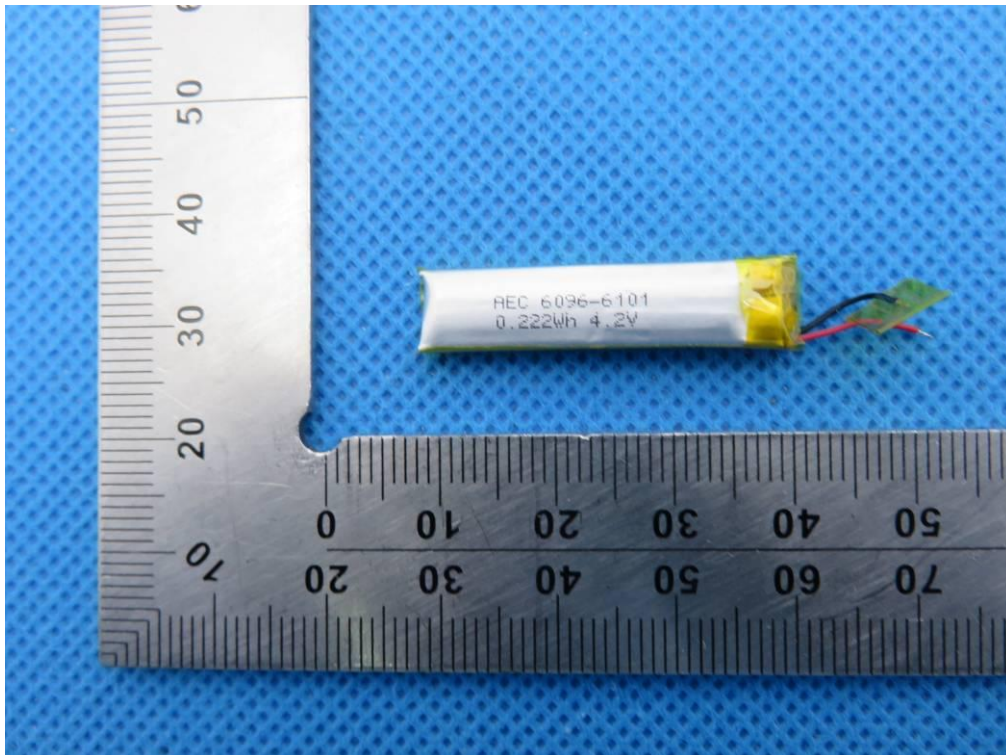
BOTTOM VIEW OF BATTERY-1



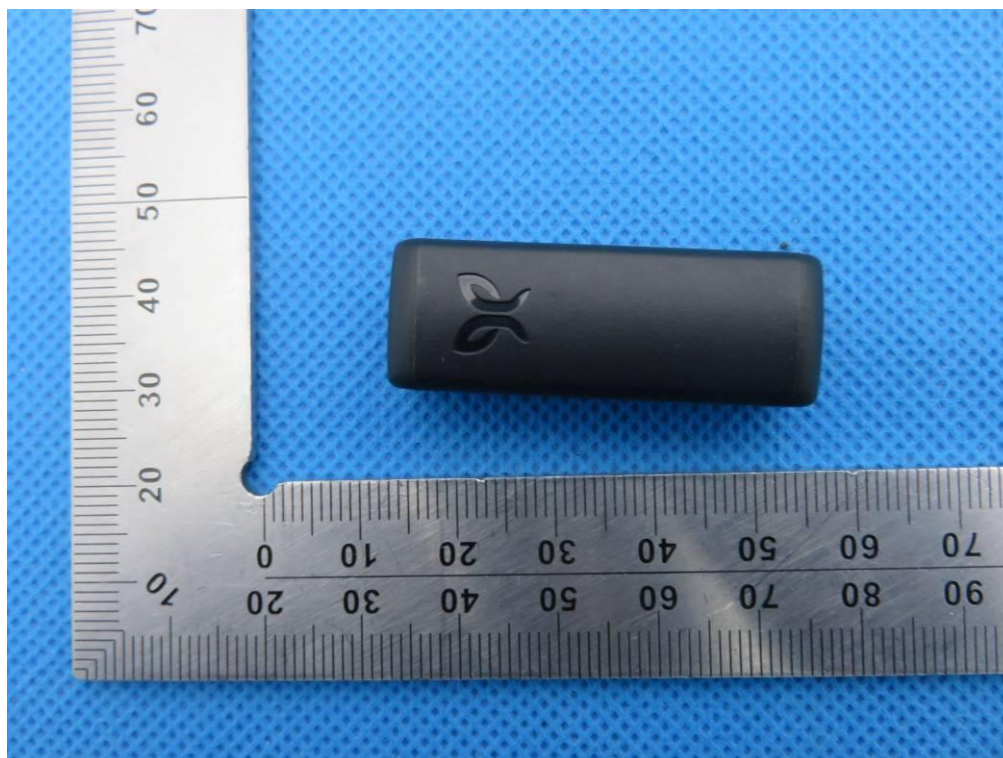
TOP VIEW OF BATTERY-2



BOTTOM VIEW OF BATTERY-2



TOP VIEW OF CHARGING DOCK



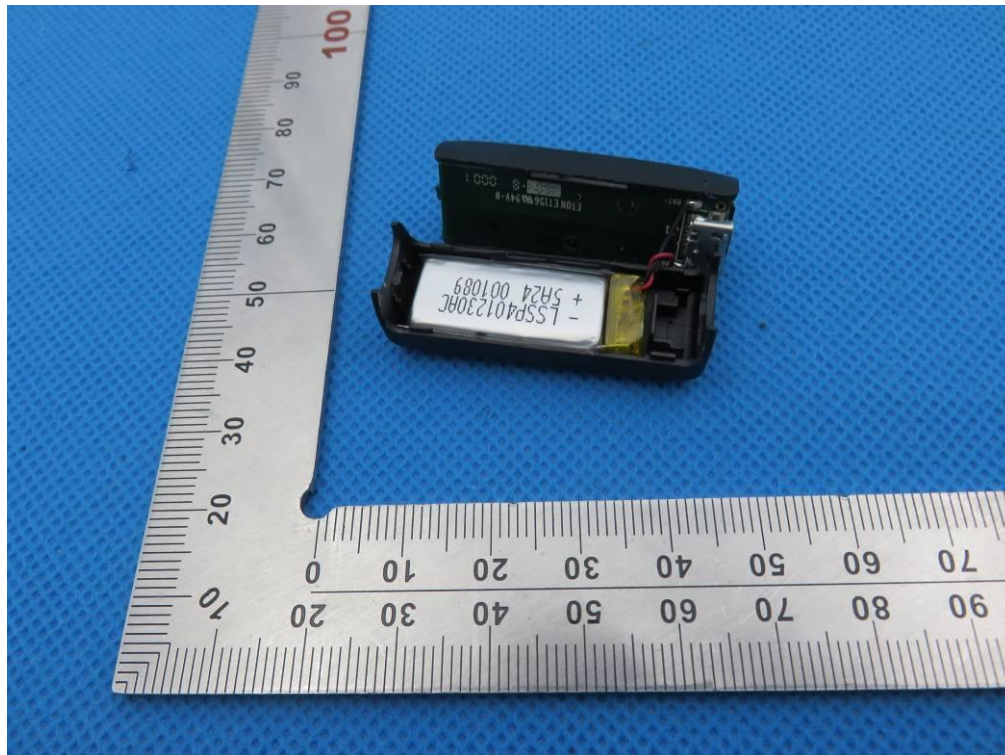
BOTTOM VIEW OF CHARGING DOCK



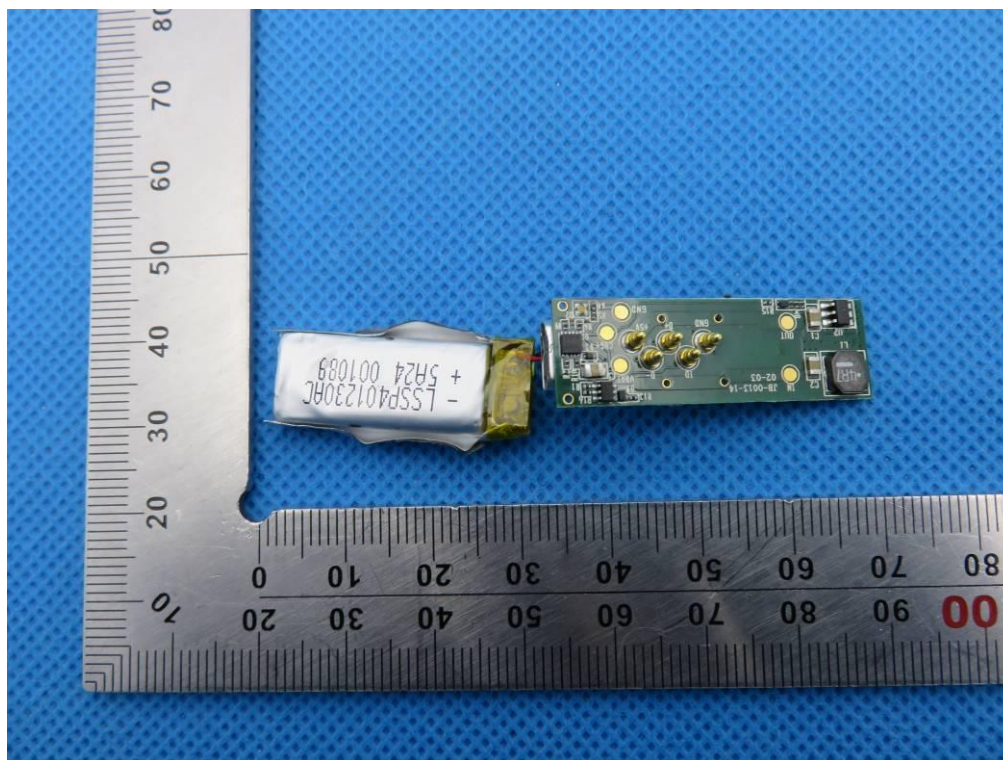
VIEW OF CHARGING DOCK (PORT)



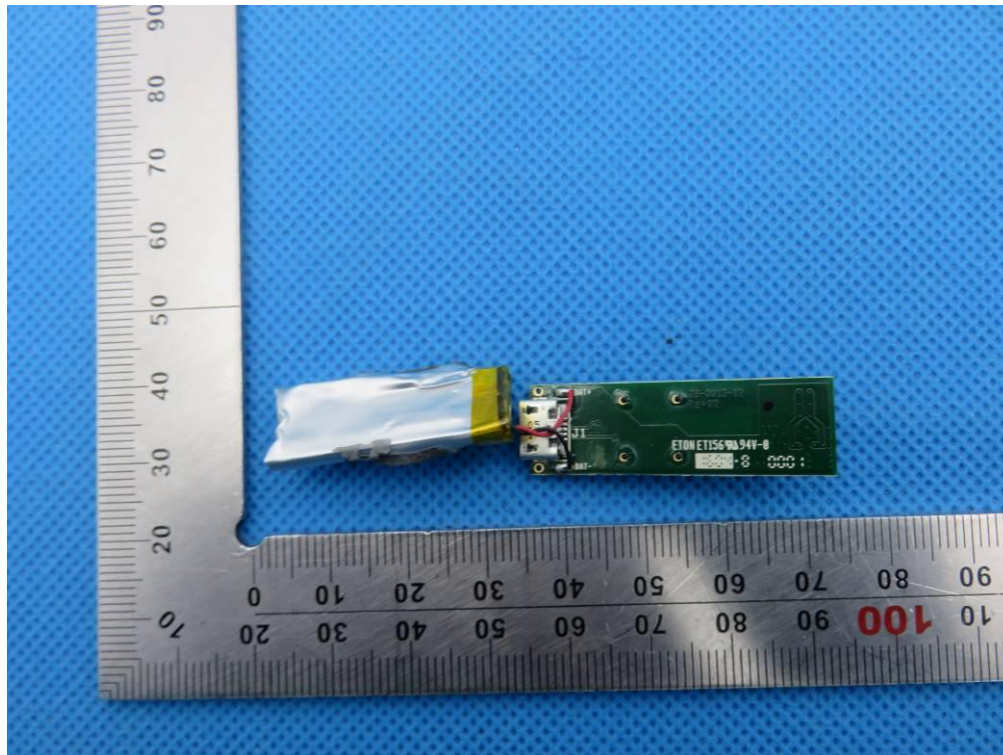
OPEN VIEW OF CHARGING DOCK



INTERNAL VIEW OF CHARGING DOCK



INTERNAL VIEW OF CHARGING DOCK



VIEW OF EUT (CHARGING DOCK)



VIEW OF ADAPTER(AE)



The adapter was provided by AGC

----END OF REPORT----