Prüfbericht-Nr.: *Test report no.*:	**CN23C9SQ 002**	**Auftrags-Nr.:** *Order no.*:	168427200	**Page 1 of 22** *Seite 1 von 22*
Kunden-Referenz-Nr.: *Client reference no.*:	N/A	**Auftragsdatum:** *Order date:*	2023-04-11	

Auftraggeber: *Client*:	Harman International Industries, Inc 8500 Balboa Blvd, Northridge, California, 91329, United States
Prüfgegenstand: *Test item*:	BLUETOOTH HEADSET
Bezeichnung / Typ-Nr.: *Identification / Type no.*:	JBL VIBE BUDS (Trademark: JBL)
Auftrags-Inhalt: *Order content*:	Type test
Prüfgrundlage: *Test specification*:	CFR47 FCC Part 15: Subpart C Section 15.247 RSS-247 Issue 2 February 2017 CFR47 FCC Part 15: Subpart C Section 15.207 RSS-Gen Issue 5 March 2019 CFR47 FCC Part 15: Subpart C Section 15.209

Wareneingangsdatum: *Date of sample receipt*:	2023-04-12	Refer to photos document
Prüfmuster-Nr.: *Test sample no:*	A003478029	
Prüfzeitraum: *Testing period*:	2023-05-18 – 2023-06-05	
Ort der Prüfung: *Place of testing*:	TÜV Rheinland (Shenzhen) Co., Ltd.	
Prüflaboratorium: *Testing laboratory:*	TÜV Rheinland (Shenzhen) Co., Ltd.	
Prüfergebnis*: *Test result**:	Pass	

geprüft von: tested by:	x Signed by: Harry W. C. Wu	**genehmigt von:** *authorized by*:	x Signed by: Alex Lan
Datum: *Date:* 2023-07-10		**Ausstellungsdatum:** *Issue date:* 2023-07-11	
Stellung / Position:	Project Manager	**Stellung** / Position:	Reviewer

Sonstiges / *Other*: FCC ID: APIVIBEBUDSD
IC: 6132A-VIBEBUDSD HVIN: JBL VIBE BUDS

Zustand des Prüfgegenstandes bei Anlieferung: Prüfmuster vollständig und unbeschädigt
Condition of the test item at delivery: *Test item complete and undamaged*

* Legende:	P(ass) = entspricht o.g. Prüfgrundlage(n)	F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	N/A = nicht anwendbar	N/T = nicht getestet
** Legend:*	*P(ass) = passed a.m. test specification(s)*	*F(ail) = failed a.m. test specification(s)*	*N/A = not applicable*	*N/T = not tested*

Remarks
Anmerkungen

1	The equipment used during the specified testing period was calibrated according to our test laboratory calibration program. The equipment fulfils the requirements included in the relevant standards. The traceability of the test equipment used is ensured by compliance with the regulations of our management system. Detailed information regarding test conditions, equipment and measurement uncertainty is available in the test laboratory and could be provided on request. *Alle eingesetzten Prüfmittel waren zum angegebenen Prüfzeitraum gemäß eines festgelegten Kalibrierungsprogramms unseres Prüfhauses kalibriert. Sie entsprechen den in den Prüfprogrammen hinterlegten Anforderungen. Die Rückverfolgbarkeit der eingesetzten Prüfmittel ist durch die Einhaltung der Regelungen unseres Managementsystems gegeben.* *Detaillierte Informationen bezüglich Prüfkonditionen, Prüfequipment und Messunsicherheiten sind im Prüflabor vorhanden und können auf Wunsch bereitgestellt werden.*
2	As contractually agreed, this document has been signed digitally only. TUV Rheinland has not verified and unable to verify which legal or other pertaining requirements are applicable for this document. Such verification is within the responsibility of the user of this document. Upon request by its client, TUV Rheinland can confirm the validity of the digital signature by a separate document. Such request shall be addressed to our Sales department. An environmental fee for such additional service will be charged. *Wie vertraglich vereinbart, wurde dieses Dokument nur digital unterzeichnet. Der TÜV Rheinland hat nicht überprüft, welche rechtlichen oder sonstigen diesbezüglichen Anforderungen für dieses Dokument gelten. Diese Überprüfung liegt in der Verantwortung des Benutzers dieses Dokuments. Auf Verlangen des Kunden kann der TÜV Rheinland die Gültigkeit der digitalen Signatur durch ein gesondertes Dokument bestätigen. Diese Anfrage ist an unseren Vertrieb zu richten. Eine Umweltgebühr für einen solchen zusätzlichen Service wird erhoben.*
3	Test clauses with remark of * are subcontracted to qualified subcontractors and descripted under the respective test clause in the report. Deviations of testing specification(s) or customer requirements are listed in specific test clause in the report. *Prüfklausel mit der Note * wurden an qualifizierte Unterauftragnehmer vergeben und sind unter der jeweiligen Prüfklausel des Berichts beschrieben. Abweichungen von Prüfspezifikation(en) oder Kundenanforderungen sind in der jeweiligen Prüfklausel im Bericht aufgeführt.*
4	The decision rule for statements of conformity, based on numerical measurement results, in this test report is based on the “Zero Guard Band Rule” and “Simple Acceptance” in accordance with ILAC G8:2019 and IEC Guide 115:2021, unless otherwise specified in the applied standard mentioned on Page 1 of this report or requested by the customer. This means that measurement uncertainty is not taken in account and hence also not declared in the test report. For additional information to the resulting risk based of this decision rule please refer to ILAC G8:2019. *Die Entscheidungsregel für Konformitätserklärungen basierend auf numerischen Messergebnisen in diesem Prüfbericht basiert auf der "Null-Grenzwert-Regel" und der "Einfachen Akzeptanz" gemäß ILAC G8:2019 und IEC Guide 115:2021, es sei denn, in der auf Seite 1 dieses Berichts genannten angewandten Norm ist etwas anderes festgelegt oder vom Kunden gewünscht. Dies bedeutet, dass die Messunsicherheit nicht berücksichtigt wird und daher auch nicht im Prüfbericht angegeben wird. Zu weiteren Informationen bezueglich des Risikos durch diese Entscheidungsregel siehe ILAC G8:2019.*

Test Summary

5.1.1 ANTENNA REQUIREMENT
RESULT: Pass

5.1.2 MAXIMUM PEAK CONDUCTED OUTPUT POWER
RESULT: Pass

5.1.3 CONDUCTED POWER SPECTRAL DENSITY
RESULT: Pass

5.1.4 99%DB BANDWIDTH
RESULT: Pass

5.1.5 6DB BANDWIDTH
RESULT: Pass

5.1.6 FREQUENCY STABILITY
RESULT: Pass

5.1.7 CONDUCTED SPURIOUS EMISSIONS MEASURED IN 100 KHZ BANDWIDTH
RESULT: Pass

5.1.8 RADIATED SPURIOUS EMISSION
RESULT: Pass

Contents

1 General Remarks

1.1 Complementary Materials

All attachments are integral parts of this test report. This applies especially to the following appendix:

Appendix A: Photographs of the Test Set-up

Appendix B: Test Results of left earbud.

Appendix C: Test Results of right earbud.

2 Test Sites

2.1 Test Facilities

TÜV Rheinland (Shenzhen) Co., Ltd.
No.362, Huanguan Middle Road, Songyuansha Community, Guanhu Subdistrict, Longhua District, Shenzhen, Guangdong, China/518110

FCC Registration No.: 694916

IC Registration No.: 25069 and the CAB identifier is CN0078.

2.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment

Radio Spectrum Testing (TS8997)				
Equipment	**Manufacturer**	**Model**	**Serial No.**	**Cal. until**
EXA Signal Analyzer, Multi-touch	Keysight	N9010B	MY60241175	2023-10-10
MXG X-Series RF Vector Signal Generator	Keysight	N5182B	MY61250137	2023-10-10
EXG X-Series Microwave Analog Signal Generator	Keysight	N5173B	MY61250141	2023-10-10
DC Power Supply	Keysight	E3642A	MY61276100	2023-10-10
Wireless Connectivity Tester	R&S	CMW270	102505	2023-10-10
Power Control Unit	Tonscend	JS0806-4ADC	N/A	2023-10-10
Automation Control Unit	Tonscend	JS0806-2	21C8060396	2023-10-10
Test Software	Tonscend	JS1120-3	N/A	N/A
Control PC	Lenovo	TianYi510S-071MB	YLX23JMF	N/A
Humid & Temp Programmable Tester	BOST	NTH090-60	19040801	2024-03-15
Shielding Room 8#	Albatross	SR8	APC17151-SR8	2024-06-22
Unwanted Emission Testing (TS9975)				
Equipment	**Manufacturer**	**Model**	**Serial No.**	**Cal. until**
EMI Test Receiver	R&S	ESR 7	102021	2023-08-02
Signal Analyzer	R&S	FSV 40	101439	2023-08-01
System Controller Interface	R&S	SCI-100	S10010038	N/A
Filterbank	R&S	Wlan	100759	2023-08-01
OSP	R&S	OSP 120	102040	N/A
Pre-amplifier	R&S	SCU08F1	08320031	2023-08-02
Amplifier	R&S	SCU-18F	180070	2023-08-02
Amplifier	R&S	SCU40A	100475	2023-08-02
Trilog Broadband Antenna (30 MHz - 7 GHz)	Schwarzbeck	VULB 9162	193	2024-08-06
Double-Ridged Antenna (1 -18 GHz)	ETS-LINDGREN	3117	00218717	2024-08-06
Wideband Ridged Horn Antenna (18-40 GHz)	Steatite	QMS-00880	19067	2024-08-27
Active Loop Antenna	Schwarzbeck	FMZB 1513	302	2023-08-06
Test software	R&S	EMC32 (V10.60.10)	N/A	N/A
Control PC	Dell	OptiPlex 7050	36NV9P2	N/A
3m Semi-Anechoic Chamber	Albatross	SAC-3m	APC17151-SAC	2024-06-22

2.3 Traceability

All measurement equipment calibrations are traceable to NIM (National Institute of Metrology) or where calibration is performed in other countries, to equivalent nationally recognized standards organizations.

2.4 Calibration

Equipment requiring calibration is calibrated periodically by the manufacturer or according to manufacturer's specifications. Additionally all equipment is verified for proper performance on a regular basics using in house standards or comparisons.

2.5 Measurement Uncertainty

The estimated combined standard uncertainty for radiated emissions and conducted emissions measurements as below table.

Parameter	Uncertainty (k=2)
Occupied Channel Bandwidth	± 2.08 %
RF output power, conducted	± 0.99 dB
RF power density, conducted	± 0.99 dB
Unwanted Emissions, conducted	± 0.89 dB
All emissions, radiated	± 4.17 dB

2.6 Location of Original Data

The original copies of all test data taken during actual testing were attached at Appendix A & B & C of this report and delivered to the applicant. A copy has been retained in the TÜV Rheinland (Shenzhen) file for certification follow-up purposes.

2.7 Status of Facility Used for Testing

The TÜV Rheinland (Shenzhen) Co., Ltd. Test facility located at No.362, Huanguan Middle Road, Songyuansha Community, Guanhu Subdistrict, Longhua District, Shenzhen, Guangdong, China/518110 is listed on the US Federal Communications Commission list of facilities approved to perform measurements.

3 General Product Information

3.1 Product Function and Intended Use

The EUTs are Bluetooth earbuds, which supports Bluetooth dual mode technology.

There is no difference except the PCB layout of left and right earbuds.

For details refer to the User Manual and Circuit Diagram.

3.2 Ratings and System Details

Table 2: Technical Specification of EUT

General Information of EUT	Value
Kind of Equipment	BLUETOOTH HEADSET
Type Designation	JBL VIBE BUDS
Trademark	JBL
FCC ID	APIVIBEBUDSD
IC	6132A-VIBEBUDSD
HVIN	JBL VIBE BUDS
Extreme Temperature Range	0ºC to +45ºC
Operating Voltage	DC 3.8V, 47mAh via built-in Li-ion cell battery DC 5V, 100mA via charging case for charging
Technical Specification of Classical Bluetooth	
Bluetooth Core Version	Bluetooth 5.3
Operating Frequency band	2402 ~ 2480 MHz
Channel Number	79 channels
Channel separation	1MHz
Modulation	GFSK, π/4DQPSK, 8DPSK
Antenna Type	FPC Antenna
Antenna Gain	-1.6 dBi for left earbud -1.6 dBi for right earbud
Technical Specification of Bluetooth Low Energy	
Bluetooth Core Version	Bluetooth 5.3
Operating Frequency band	2402 ~ 2480 MHz
Channel Number	40 channels
Channel separation	2MHz
Data rate	1Mbps
Modulation	GFSK
Antenna Type	FPC Antenna
Antenna Gain	-1.6 dBi for left earbud -1.6 dBi for right earbud

Table 3: RF Channel and Frequency of Classic Bluetooth

RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)
00	**2402.00**	20	2422.00	40	2442.00	60	2462.00
01	2403.00	21	2423.00	41	2443.00	61	2463.00
02	2404.00	22	2424.00	42	2444.00	62	2464.00
03	2405.00	23	2425.00	43	2445.00	63	2465.00
04	2406.00	24	2426.00	44	2446.00	64	2466.00
05	2407.00	25	2427.00	45	2447.00	65	2467.00
06	2408.00	26	2428.00	46	2448.00	66	2468.00
07	2409.00	27	2429.00	47	2449.00	67	2469.00
08	2410.00	28	2430.00	48	2450.00	68	2470.00
09	2411.00	29	2431.00	49	2451.00	69	2471.00
10	2412.00	30	2432.00	50	2452.00	70	2472.00
11	2413.00	31	2433.00	51	2453.00	71	2473.00
12	2414.00	32	2434.00	52	2454.00	72	2474.00
13	2415.00	33	2435.00	53	2455.00	73	2475.00
14	2416.00	34	2436.00	54	2456.00	74	2476.00
15	2417.00	35	2437.00	55	2457.00	75	2477.00
16	2418.00	36	2438.00	56	2458.00	76	2478.00
17	2419.00	37	2439.00	57	2459.00	77	2479.00
18	2420.00	38	2440.00	58	2460.00	**78**	**2480.00**
19	2421.00	**39**	**2441.00**	59	2461.00	--	--

Table 4: RF Channel and Frequency of Bluetooth Low Energy

RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)
00	**2402.00**	10	2422.00	20	2442.00	30	2462.00
01	2404.00	11	2424.00	21	2444.00	31	2464.00
02	2406.00	12	2426.00	22	2446.00	32	2466.00
03	2408.00	13	2428.00	23	2448.00	33	2468.00
04	2410.00	14	2430.00	24	2450.00	34	2470.00
05	2412.00	15	2432.00	25	2452.00	35	2472.00
06	2414.00	16	2434.00	26	2454.00	36	2474.00
07	2416.00	17	2436.00	27	2456.00	37	2476.00
08	2418.00	18	2438.00	28	2458.00	38	2478.00
09	2420.00	**19**	**2440.00**	29	2460.00	**39**	**2480.00**

3.3 Independent Operation Modes

The basic operation modes are:

A. On, Bluetooth LE transmitting mode
    1. Low channel
    2. Middle channel
    3. High channel
B. On, Bluetooth connecting mode
C. Off

3.4 Noise Generating and Noise Suppressing Parts

Refer to Circuit Diagram for further details.

3.5 Submitted Documents

- Application Form
- Block Diagram
- FCC/IC Label and Location Info
- Operation Description
- Photo Document
- Schematics
- User Manual

4 Test Set-up and Operation Modes

4.1 Principle of Configuration Selection

Radio Spectrum: The equipment under test (EUT) was configured at its highest power output in order to measure its highest possible radiation and conducted level. The test modes were adapted accordingly in reference to the instructions for use.

Emission: The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the instructions for use.

4.2 Test Operation and Test Software

Test operation refers to test setup in chapter 5. All testing were performed according to the procedures in ANSI C63.10: 2013.

According to clause 3.1, all test items were applied on model JBL VIBE BUDS with left & right earbuds.

4.3 Special Accessories and Auxiliary Equipment

Table 5: List of Accessories and Auxiliary Equipment

Description	Manufacturer	Model	S/N
Laptop	Lenovo	T480	PF-16A6N8

4.4 Countermeasures to Achieve EMC Compliance

The test sample which has been tested contained the noise suppression parts as described in the Technical Construction File (TCF).

No additional measures were employed to achieve compliance.

4.5 Test Setup Diagram

Diagram of Measurement Configuration for Radiation Test (Below 30MHz)

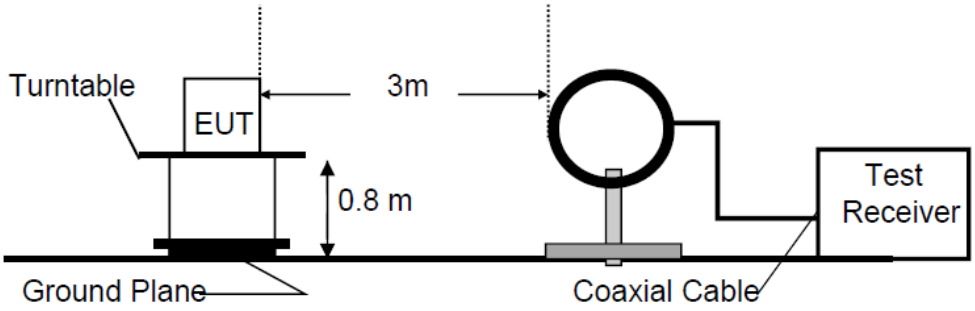


Diagram of Measurement Configuration for Radiation Test (Below 1GHz)

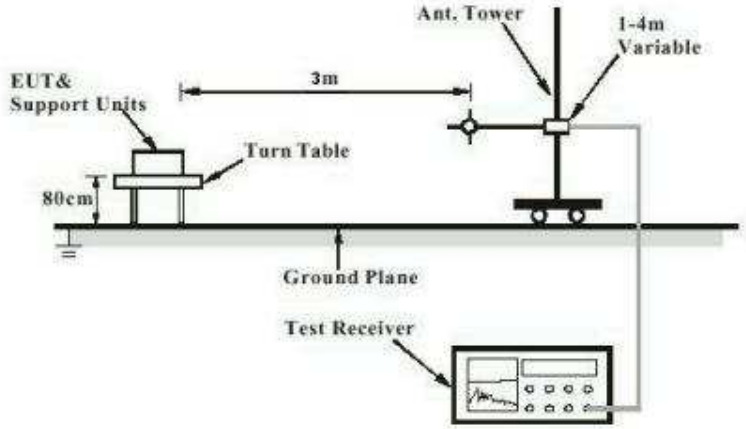


Diagram of Measurement Configuration for Radiation Test (Above 1GHz)

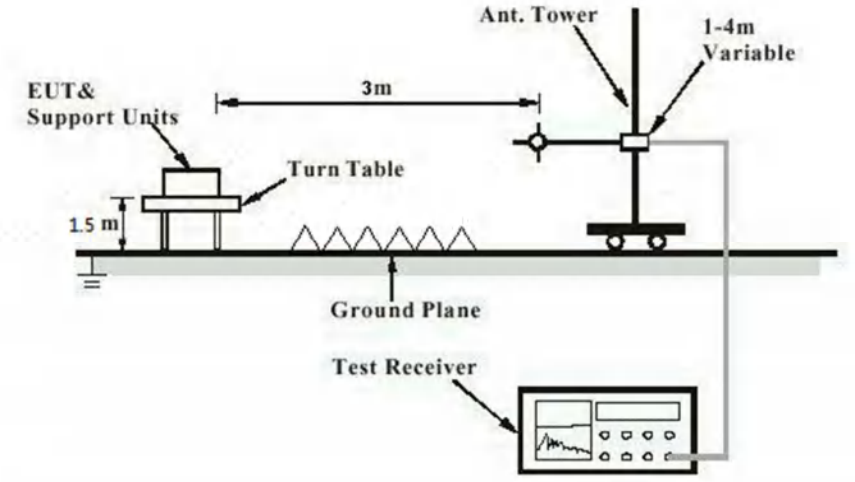
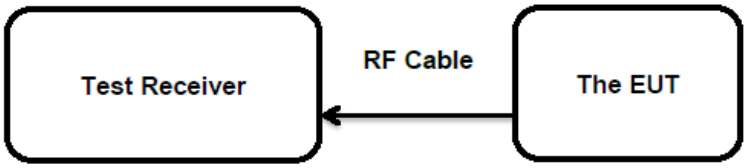


Diagram of Measurement Configuration for Conducted Transmitter Measurement



5 Test Results

5.1 Transmitter Requirement & Test Suites

5.1.1 Antenna Requirement

RESULT: **Pass**

Test Specification

Test standard	:	FCC Part 15.247(b)(4) and Part 15.203 RSS-Gen Clause 6.7
Limit	:	the use of antennas with directional gains that do not exceed 6 dBi

According to the manufacturer declared, the EUT has one FPC antenna , the directional gain of antennas are -1.6 dBi for left earbud & -1.6 dBi for right earbud , and the antenna connector is designed with permanent attachment and no consideration of replacement. Therefore the EUT is considered sufficient to comply with the provision.

Refer to EUT Photo for further details.

5.1.2 Maximum Peak Conducted Output Power

RESULT: **Pass**

Test Specification

Test standard	:	FCC Part 15.247(b)(3) RSS-247 Clause 5.4(d)
Basic standard	:	ANSI C63.10: 2013
Limits	:	< 1 Watt (Maximum Conducted Peak Power) e.i.r.p. <4W
Kind of test site	:	Shielded Room

Test Setup

Date of testing	:	2023-05-18 to 2023-06-05
Input voltage	:	DC 3.8V
Operation mode	:	A
Test channel	:	Low / Middle / High
Ambient temperature	:	24.8 ℃
Relative humidity	:	55 %
Atmospheric pressure	:	101 kPa

For details refer to following test result.

Table 6: Test Result of Maximum Peak Conducted Output Power, Left earbud

Data Rate	Test Channel (MHz)	Measured Peak Power		Limit (W)
		(dBm)	(W)	
1 Mbps	2402	7.48	0.0056	< 1.0
	2440	8.05	0.0064	
	2480	8.48	0.0070	
Maximum Measured Value		8.48	0.0070	

Note: The cable loss is taken into account in results and the maximum e.i.r.p. is 6.88 dBm less than 4W (36 dBm).

Table 7: Test Result of Maximum Peak Conducted Output Power, Right earbud

Data Rate	Test Channel (MHz)	Measured Peak Power		Limit (W)
		(dBm)	(W)	
1 Mbps	2402	6.58	0.0045	< 1.0
	2440	7.18	0.0052	
	2480	7.67	0.0058	
Maximum Measured Value		7.67	0.0058	

Note: The cable loss is taken into account in results and the maximum e.i.r.p. is 6.07 dBm less than 4W (36 dBm).

5.1.3 Conducted Power Spectral Density

RESULT: **Pass**

Test Specification

Test standard	:	FCC Part 15.247(e) RSS-247 Clause 5.2(b)
Basic standard	:	ANSI C63.10: 2013
Limits	:	8 dBm / 3kHz
Kind of test site	:	Shielded Room

Test Setup

Date of testing	:	2023-05-18 to 2023-06-05
Input voltage	:	DC 3.8V
Operation mode	:	A
Test channel	:	Low / Middle / High
Ambient temperature	:	24.8 ℃
Relative humidity	:	55 %
Atmospheric pressure	:	101 kPa

For the measurement records, refer to the appendix B&C.

5.1.4 99%dB Bandwidth

RESULT: **Pass**

Test Specification

Test standard	:	RSS-Gen clause 6.7
Basic standard	:	ANSI C63.10: 2013
Kind of test site	:	Shielded Room

Test Setup

Date of testing	:	2023-05-18 to 2023-06-05
Input voltage	:	DC 3.8V
Operation mode	:	A
Test channel	:	Low / Middle / High
Ambient temperature	:	24.8 ℃
Relative humidity	:	55 %
Atmospheric pressure	:	101 kPa

For the measurement records, refer to the appendix B&C.

5.1.5 6dB Bandwidth

RESULT: **Pass**

Test Specification

Test standard	:	FCC Part 15.247(a)(2) RSS-247 Clause 5.2(a)
Basic standard	:	ANSI C63.10: 2013
Kind of test site	:	Shielded Room

Test Setup

Date of testing	:	2023-05-18 to 2023-06-05
Input voltage	:	DC 3.8V
Operation mode	:	A
Test channel	:	Low / Middle / High
Ambient temperature	:	24.8 ℃
Relative humidity	:	55 %
Atmospheric pressure	:	101 kPa

For the measurement records, refer to the appendix B&C.

5.1.6 Frequency stability

RESULT: **Pass**

Test Specification

Test standard	:	RSS-247 Clause 8.11
Basic standard	:	ANSI C63.10: 2013
Limits	:	within at least the central 80% of its permitted operating frequency band (2400-2483.5MHz)
Kind of test site	:	Shielded Room

Test Setup

Date of testing	:	2023-05-18 to 2023-06-05
Input voltage	:	DC 3.8V
Operation mode	:	B
Ambient temperature	:	24.8 ℃
Relative humidity	:	55 %
Atmospheric pressure	:	101 kPa

For the measurement records, refer to the appendix B & C

5.1.7 Conducted Spurious Emissions Measured in 100 kHz Bandwidth

RESULT: **Pass**

Test Specification

Test standard	:	FCC Part 15.247(d) RSS-247 Clause 5.5
Basic standard	:	ANSI C63.10: 2013
Limits	:	20dB (below that in the 100kHz bandwidth within the band that contains the highest level of the desired power); In addition, radiated emissions which fall in the restricted bands, must also comply with the radiated emission limits specified in 15.209(a)
Kind of test site	:	Shielded Room

Test Setup

Date of testing	:	2023-05-18 to 2023-06-05
Input voltage	:	DC 3.8V
Operation mode	:	A
Test channel	:	Low / Middle / High
Ambient temperature	:	24.8 ℃
Relative humidity	:	55 %
Atmospheric pressure	:	101 kPa

Test results of 100kHz Bandwidth of Frequency Band Edge by Conducted method refer to test plots, and compliance is achieved as well.

For the measurement records, refer to the appendix B&C.

5.1.8 Radiated Spurious Emission

RESULT: **Pass**

Test Specification

Test standard	:	FCC Part 15.247(d) & FCC Part 15.205 RSS-247 Clause 3.3 & 5.5
Basic standard	:	ANSI C63.10: 2013
Limits	:	Refer to 15.209(a) of FCC part 15.247(d) RSS-Gen Table 4 & Table 5
Kind of test site	:	3m Semi-anechoic Chamber

Test Setup

Date of testing	:	2023-05-18 to 2023-06-05
Input voltage	:	DC 3.8V
Operation mode	:	A
Test channel	:	Low / Middle / High
Ambient temperature	:	Refer to test result
Relative humidity	:	Refer to test result
Atmospheric pressure	:	101 kPa

Remark:
Testing was carried out within frequency range 9kHz to the tenth harmonics. Only the worst case spurious emissions configuration of the each mode were reported.

For the measurement records, refer to the appendix B&C.

6 Photographs of the Test Set-Up

For photographs of the test set-up, refer to the appendix A.

7 List of Tables

Appendix B: Test Results of Left earbud

Appendix B.1: Test Results of Conducted Power Spectral Density

TestMode	Antenna	Channel	Result[dBm/3-100kHz]	Limit[dBm/3kHz]	Verdict
BLE_1M	Ant1	2402	-8.23	≤8.00	PASS
		2440	-7.62	≤8.00	PASS
		2480	-7.25	≤8.00	PASS

BLE_1M_Ant1_2402

BLE_1M_Ant1_2440

BLE_1M_Ant1_2480

Appendix B.2: Test Results of 6dB Bandwidth

TestMode	Antenna	Channel	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
BLE_1M	Ant1	2402	0.620	2401.692	2402.312	0.5	PASS
		2440	0.664	2439.656	2440.320	0.5	PASS
		2480	0.664	2479.656	2480.320	0.5	PASS

BLE_1M_Ant1_2402

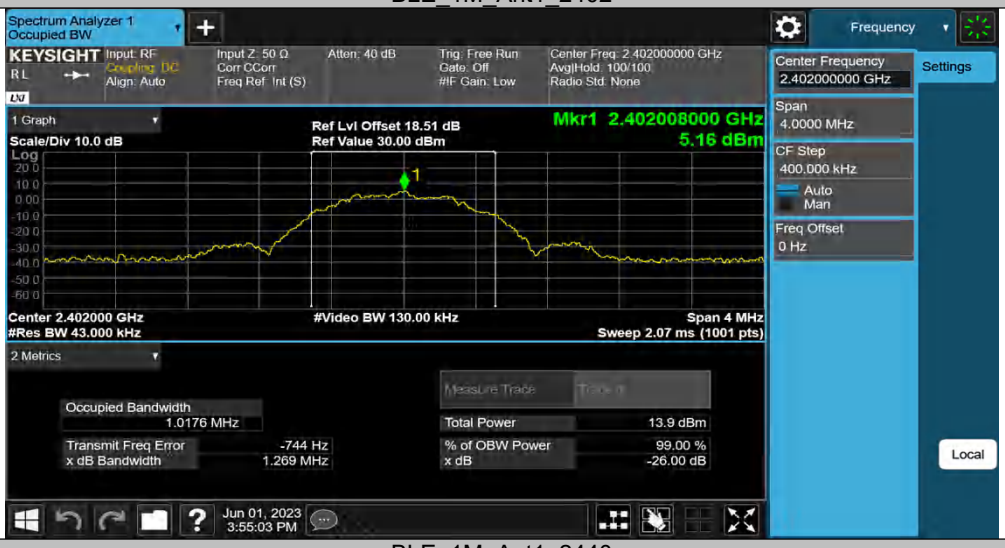
BLE_1M_Ant1_2440

BLE_1M_Ant1_2480

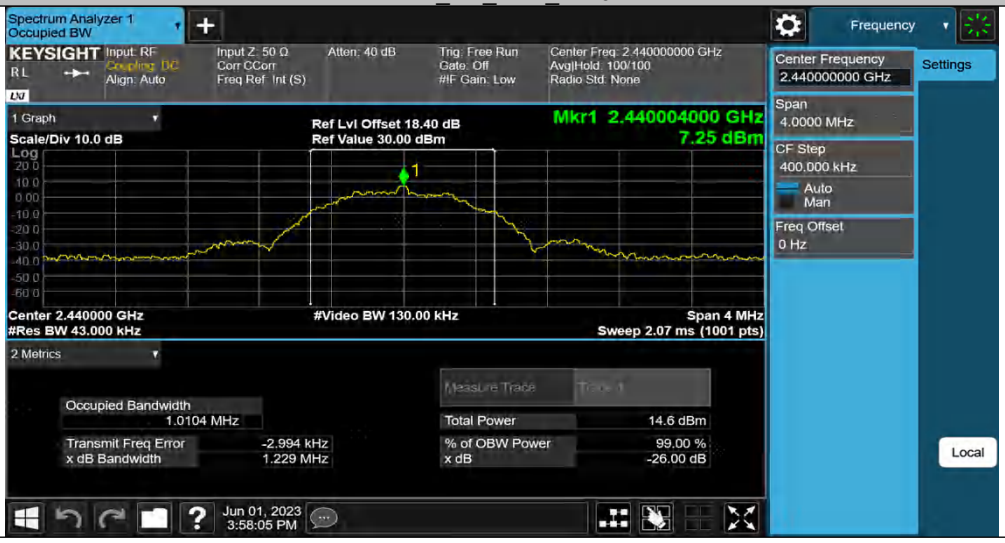
Appendix B.3: Test Results of 99% Bandwidth

TestMode	Antenna	Channel	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
BLE_1M	Ant1	2402	1.0176	2401.4905	2402.5081	---	---
		2440	1.0104	2439.4918	2440.5022	---	---
		2480	1.0214	2479.4877	2480.5091	---	---

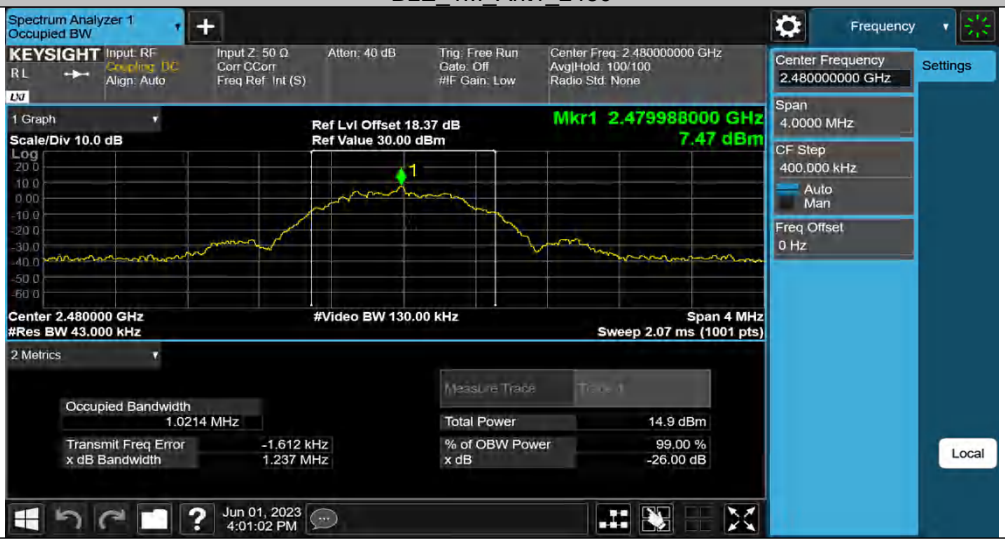
BLE_1M_Ant1_2402



BLE_1M_Ant1_2440



BLE_1M_Ant1_2480



Appendix B.4: Test Results of Frequency stability

Test Channel (MHz)	2402

Test result of frequency tolerance of voltage variation

Voltage	Test result (MHz)	Deviation Frequency (KHz)	Test result (ppm)	Limit (ppm)
DC 3.8V	2401.995	5	2.08	10
DC 4.18V	2401.996	4	1.67	
DC 3.42V	2401.995	5	2.08	

Test result of frequency tolerance of temperature variation

Temperature (℃)	Test result (MHz)	Deviation Frequency (KHz)	Test result (ppm)	Limit (ppm)
-30	2401.989	11	4.58	10
-20	2401.989	11	4.58	
-10	2401.990	10	4.16	
0	2401.992	5	2.08	
10	2401.995	5	2.08	
20	2401.995	5	2.08	
30	2401.995	5	2.08	
40	2401.994	6	2.50	
50	2401.994	6	2.50	
55	2401.995	5	2.08	

Test Channel (MHz)	2440

Test result of frequency tolerance of voltage variation

Voltage	Test result (MHz)	Deviation Frequency (KHz)	Test result (ppm)	Limit (ppm)
DC 3.8V	2439.994	-6	-2.45902	10
DC 4.18V	2439.995	-5	-2.04918	
DC 3.42V	2439.994	-6	-2.45902	

Test result of frequency tolerance of temperature variation

Temperature (℃)	Test result (MHz)	Deviation Frequency (KHz)	Test result (ppm)	Limit (ppm)
-30	2439.994	-6	-2.45902	10
-20	2439.996	-4	-1.63934	
-10	2439.995	-5	-2.04918	
0	2439.998	-2	-0.81967	
10	2439.996	-4	-1.63934	
20	2439.995	-5	-2.04918	
30	2439.996	-4	-1.63934	
40	2439.996	-4	-1.63934	
50	2439.997	-3	-1.22951	
55	2439.995	-5	-2.04918	

Test Channel (MHz)	2480

Test result of frequency tolerance of voltage variation

Voltage	Test result (MHz)	Deviation Frequency (KHz)	Test result (ppm)	Limit (ppm)
DC 3.8V	2479.997	-3	-1.21	10
DC 4.18V	2479.998	-2	-0.81	
DC 3.42V	2479.997	-3	-1.21	

Test result of frequency tolerance of temperature variation

Temperature (℃)	Test result (MHz)	Deviation Frequency (KHz)	Test result (ppm)	Limit (ppm)
-30	2479.995	-5	-2.02	10
-20	2479.995	-5	-2.02	
-10	2479.993	-7	-2.82	
0	2479.996	-4	-1.61	
10	2479.997	-3	-1.21	
20	2479.995	-5	-2.02	
30	2479.996	-4	-1.61	
40	2479.996	-4	-1.61	
50	2479.995	-5	-2.02	
55	2479.994	-6	-2.42	

Appendix B.5: Test Results of Conducted Spurious Emissions Measured in 100 kHz Bandwidth

Conducted measurements

TestMode	Antenna	Channel	FreqRange [MHz]	RefLevel [dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	2402	Reference	5.92	5.92	---	PASS
			30~1000	5.92	-41.19	≤-14.08	PASS
			1000~26500	5.92	-31.98	≤-14.08	PASS
		2440	Reference	6.39	6.39	---	PASS
			30~1000	6.39	-41.63	≤-13.61	PASS
			1000~26500	6.39	-32.66	≤-13.61	PASS
		2480	Reference	7.16	7.16	---	PASS
			30~1000	7.16	-42.02	≤-12.84	PASS
			1000~26500	7.16	-32.22	≤-12.84	PASS
BLE_2M	Ant1	2402	Reference	5.92	5.92	---	PASS
			30~1000	5.92	-41.19	≤-14.08	PASS
			1000~26500	5.92	-31.98	≤-14.08	PASS
		2440	Reference	6.39	6.39	---	PASS
			30~1000	6.39	-41.63	≤-13.61	PASS
			1000~26500	6.39	-32.66	≤-13.61	PASS
		2480	Reference	7.16	7.16	---	PASS
			30~1000	7.16	-42.02	≤-12.84	PASS
			1000~26500	7.16	-32.22	≤-12.84	PASS

BLE_1M_Ant1_2402_0~Reference

BLE_1M_Ant1_2402_30~1000

BLE_1M_Ant1_2402_1000~26500

BLE_1M_Ant1_2440_0~Reference

BLE_1M_Ant1_2440_30~1000

BLE_1M_Ant1_2440_1000~26500

BLE_1M_Ant1_2480_0~Reference

BLE_1M_Ant1_2480_30~1000

BLE_1M_Ant1_2480_1000~26500

Band edge measurements

TestMode	Antenna	ChName	Channel	RefLevel[dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	Low	2402	6.334	-46.73	≤-13.67	PASS
		High	2480	7.272	-43.71	≤-12.73	PASS

BLE_1M_Ant1_Low_2402

BLE_1M_Ant1_High_2480

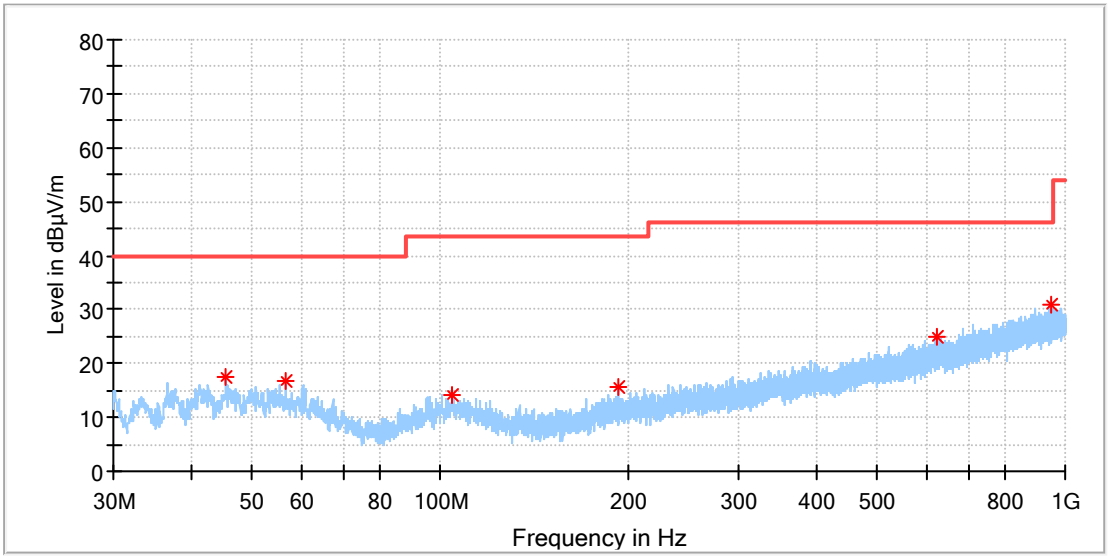
Appendix B.6: Test Results of Radiated Spurious Emissions

Note:
1) This testing was carried out on different modulations, but only the worst case was presented in this report.
2) Testing was carried out within frequency range 9kHz to the tenth harmonics. The measurement results below 30MHz and 18GHz - 26.5GHz were greater than 20dB below the limit, so only the radiated spurious emissions from 30MHz to 18GHz were reported.

30 MHz - 1GHz

EUT Information

EUT Name:	Bluetooth Headset
Model:	JBL WAVE BUDS
Test Mode:	BLE 1M_Mid channel
Order No/Sample No:	168427200/A003478029-002
Test Voltage::	Battery
Remark:	Temp 23 Humi:56%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

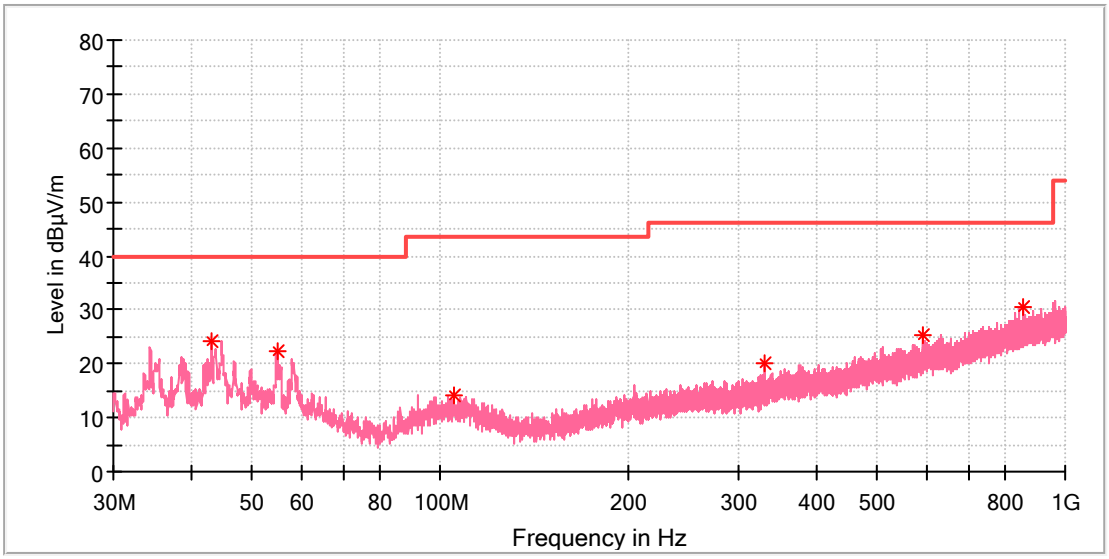


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
45.423000	17.59	40.00	22.41	100.0	H	56.0	-18.8
56.626500	16.65	40.00	23.35	100.0	H	230.0	-18.6
104.253500	14.05	43.50	29.45	100.0	H	345.0	-18.8
193.251000	15.79	43.50	27.71	100.0	H	79.0	-19.3
623.591500	25.11	46.00	20.89	100.0	H	93.0	-9.5
949.269000	30.78	46.00	15.22	100.0	H	64.0	-4.4

EUT Information

EUT Name:	Bluetooth Headset
Model:	JBL WAVE BUDS
Test Mode:	BLE 1M_Mid channel
Order No/Sample No:	168427200/A003478029-002
Test Voltage::	Battery
Remark:	Temp 23 Humi:56%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin



Critical_Freqs

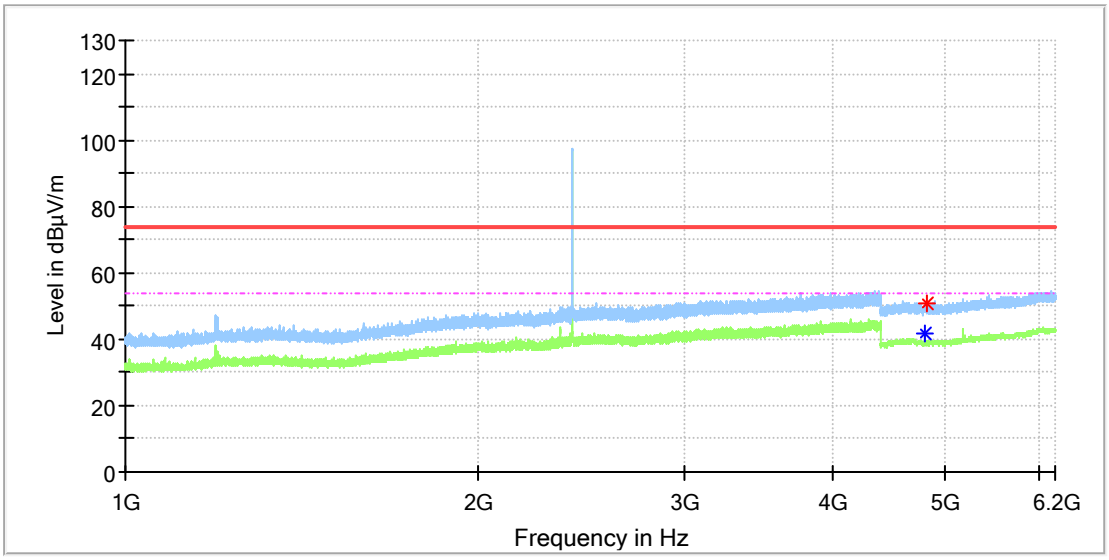
Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
43.046500	24.31	40.00	15.69	100.0	V	126.0	-19.3
54.929000	22.37	40.00	17.63	100.0	V	206.0	-18.4
105.029500	14.15	43.50	29.35	100.0	V	43.0	-18.7
330.845500	20.00	46.00	26.00	100.0	V	297.0	-15.4
592.939500	25.39	46.00	20.61	100.0	V	305.0	-10.0
857.555500	30.39	46.00	15.61	100.0	V	313.0	-5.4

1GHz - 18GHz

Note: The highest waveform in the figure is Bluetooth Fundamental.

EUT Information

EUT Name:	Bluetooth Headset
Model:	JBL WAVE BUDS
Test Mode:	BLE 1M_Low channel
Order No/Sample No:	168427200/A003478029-002
Test Voltage::	Battery
Remark:	Temp 23 Humi:56%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

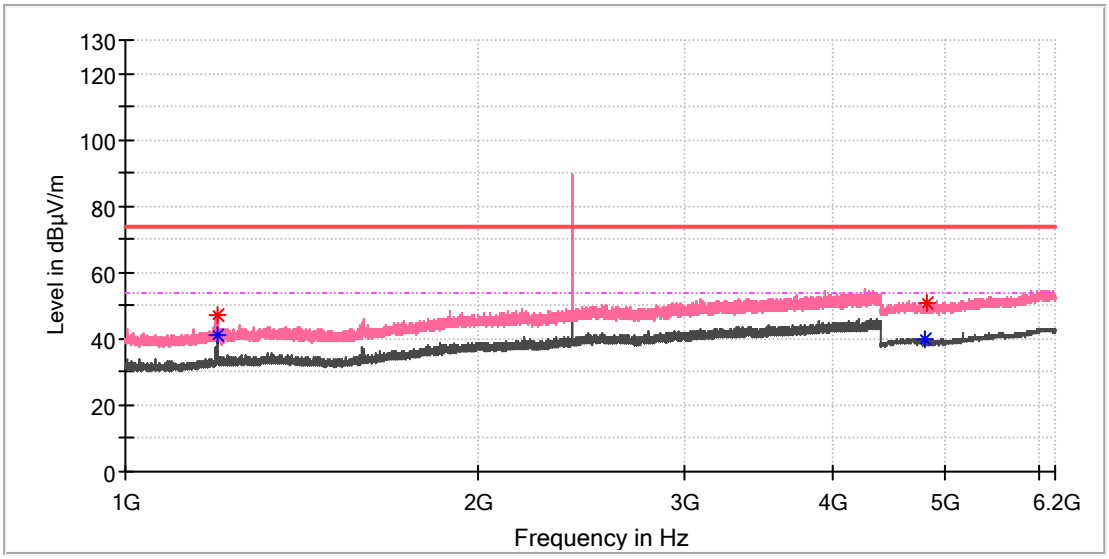


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
4804.000000	---	41.51	54.00	12.49	150.0	H	340.0	11.8
4820.000000	50.50	---	74.00	23.50	150.0	H	334.0	11.8

EUT Information

EUT Name:	Bluetooth Headset
Model:	JBL WAVE BUDS
Test Mode:	BLE 1M_Low channel
Order No/Sample No:	168427200/A003478029-002
Test Voltage::	Battery
Remark:	Temp 23 Humi:56%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

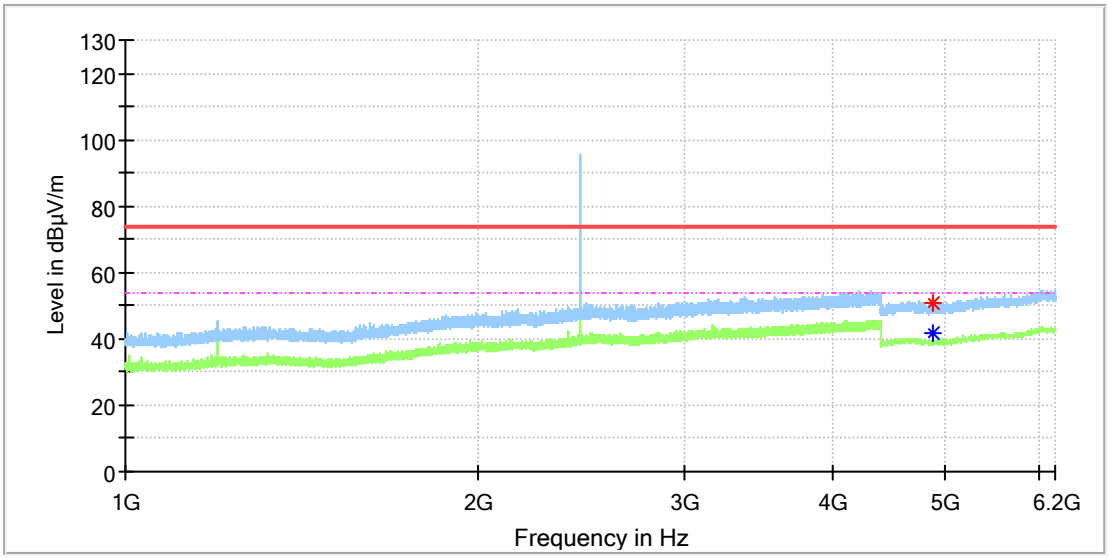


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1196.690000	47.45	---	74.00	26.55	150.0	V	125.0	1.1
1197.710000	---	41.27	54.00	12.73	150.0	V	135.0	1.1
4804.000000	---	40.12	54.00	13.88	150.0	V	241.0	11.8
4822.000000	50.51	---	74.00	23.49	150.0	V	359.0	11.8

EUT Information

EUT Name:	Bluetooth Headset
Model:	JBL WAVE BUDS
Test Mode:	BLE 1M_Mid channel
Order No/Sample No:	168427200/A003478029-002
Test Voltage::	Battery
Remark:	Temp 23 Humi:56%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

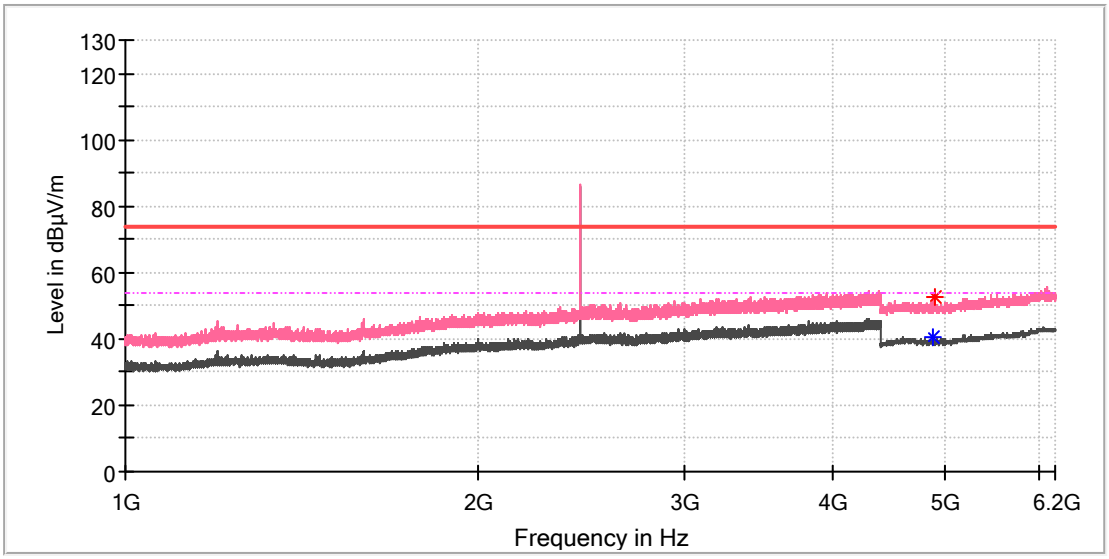


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
4879.500000	---	41.94	54.00	12.06	150.0	H	21.0	11.8
4880.000000	50.61	---	74.00	23.39	150.0	H	69.0	11.8

EUT Information

EUT Name:	Bluetooth Headset
Model:	JBL WAVE BUDS
Test Mode:	BLE 1M_Mid channel
Order No/Sample No:	168427200/A003478029-002
Test Voltage::	Battery
Remark:	Temp 23 Humi:56%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

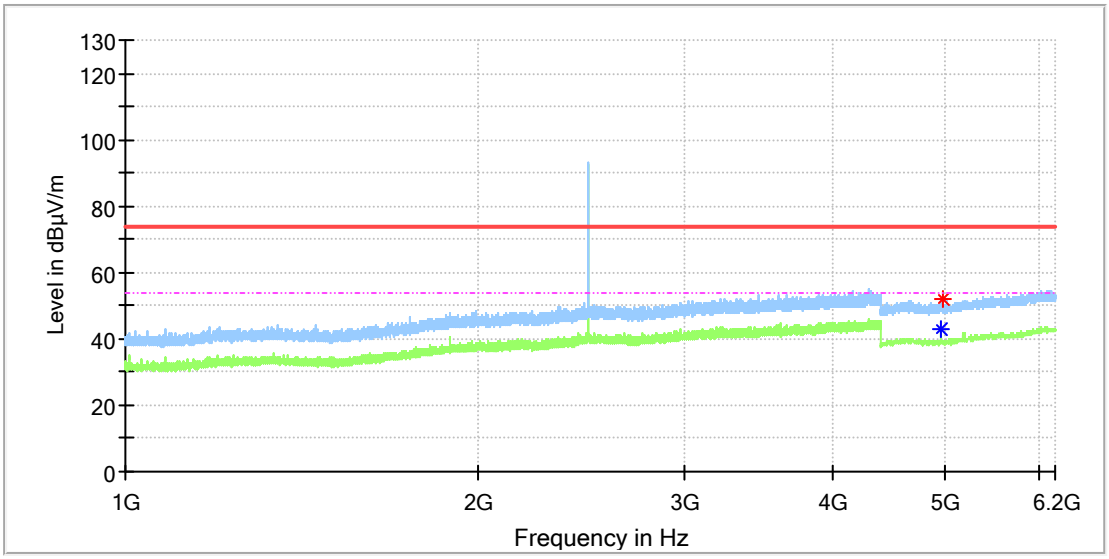


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
4880.000000	---	40.23	54.00	13.77	150.0	V	332.0	11.8
4904.500000	52.33	---	74.00	21.67	150.0	V	359.0	11.8

EUT Information

EUT Name:	Bluetooth Headset
Model:	JBL WAVE BUDS
Test Mode:	BLE 1M_High channel
Order No/Sample No:	168427200/A003478029-002
Test Voltage::	Battery
Remark:	Temp 23 Humi:56%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

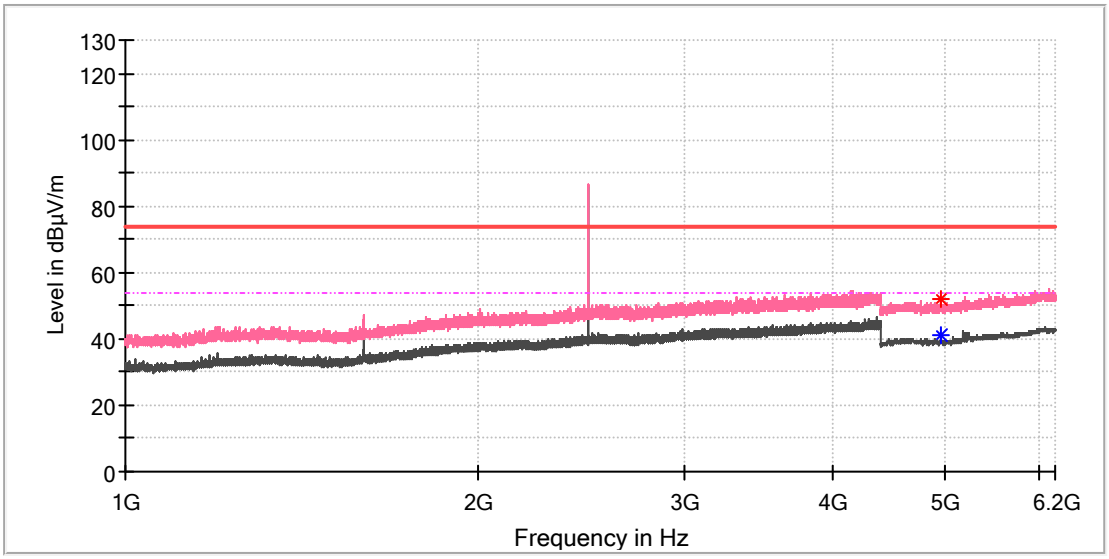


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
4960.000000	---	43.22	54.00	10.78	150.0	H	338.0	11.8
4969.500000	51.86	---	74.00	22.14	150.0	H	238.0	11.8

EUT Information

EUT Name:	Bluetooth Headset
Model:	JBL WAVE BUDS
Test Mode:	BLE 1M_High channel
Order No/Sample No:	168427200/A003478029-002
Test Voltage::	Battery
Remark:	Temp 23 Humi:56%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

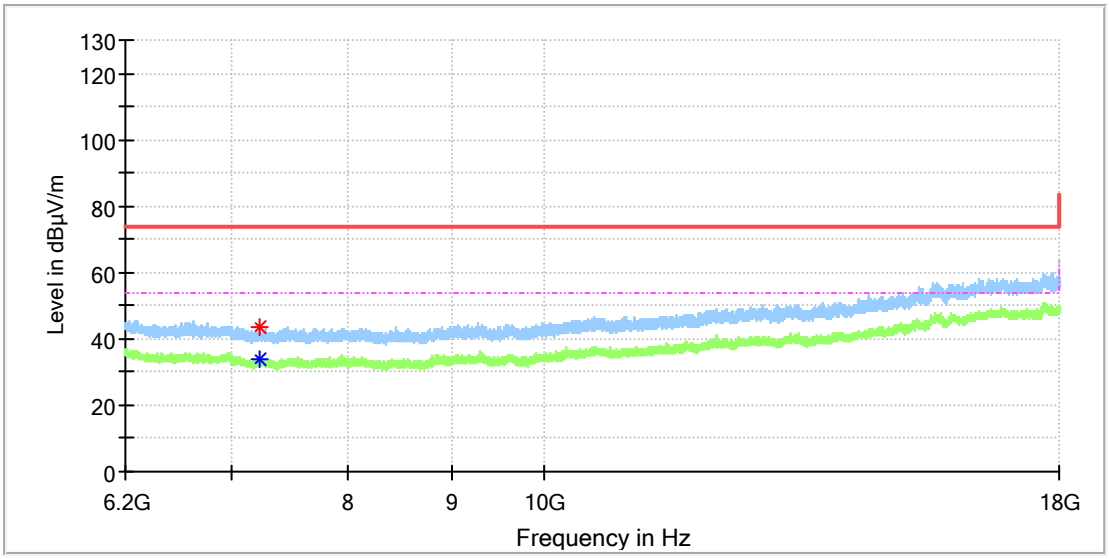


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
4959.000000	51.70	---	74.00	22.30	150.0	V	312.0	11.8
4959.500000	---	41.31	54.00	12.69	150.0	V	116.0	11.8

EUT Information

EUT Name:	Bluetooth Headset
Model:	JBL WAVE BUDS
Test Mode:	BLE 1M_Low channel
Order No/Sample No:	168427200/A003478029-002
Test Voltage::	Battery
Remark:	Temp 23 Humi:56%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

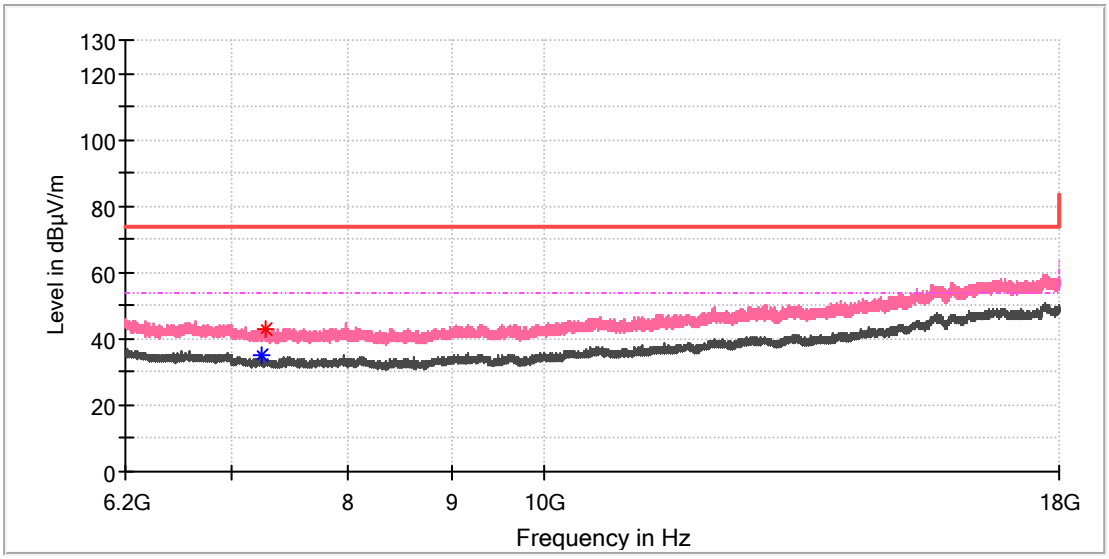


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
7229.550000	43.43	---	74.00	30.57	150.0	H	173.0	8.6
7232.008333	---	33.82	54.00	20.18	150.0	H	310.0	8.6

EUT Information

EUT Name:	Bluetooth Headset
Model:	JBL WAVE BUDS
Test Mode:	BLE 1M_Low channel
Order No/Sample No:	168427200/A003478029-002
Test Voltage::	Battery
Remark:	Temp 23 Humi:56%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

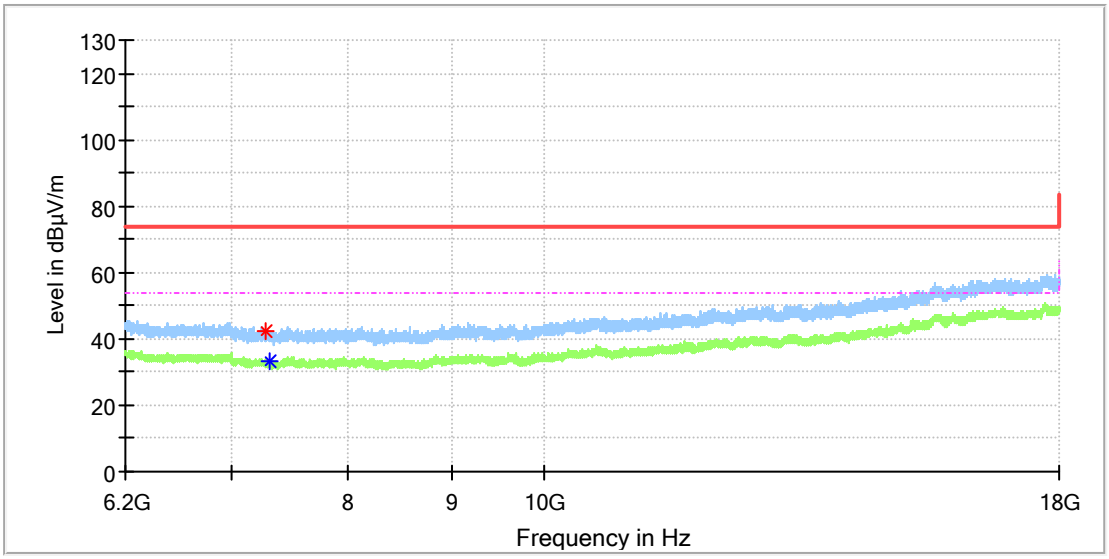


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
7249.708333	---	34.83	54.00	19.17	150.0	V	258.0	8.5
7282.650000	43.06	---	74.00	30.94	150.0	V	0.0	8.4

EUT Information

EUT Name:	Bluetooth Headset
Model:	JBL WAVE BUDS
Test Mode:	BLE 1M_Mid channel
Order No/Sample No:	168427200/A003478029-002
Test Voltage::	Battery
Remark:	Temp 23 Humi:56%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

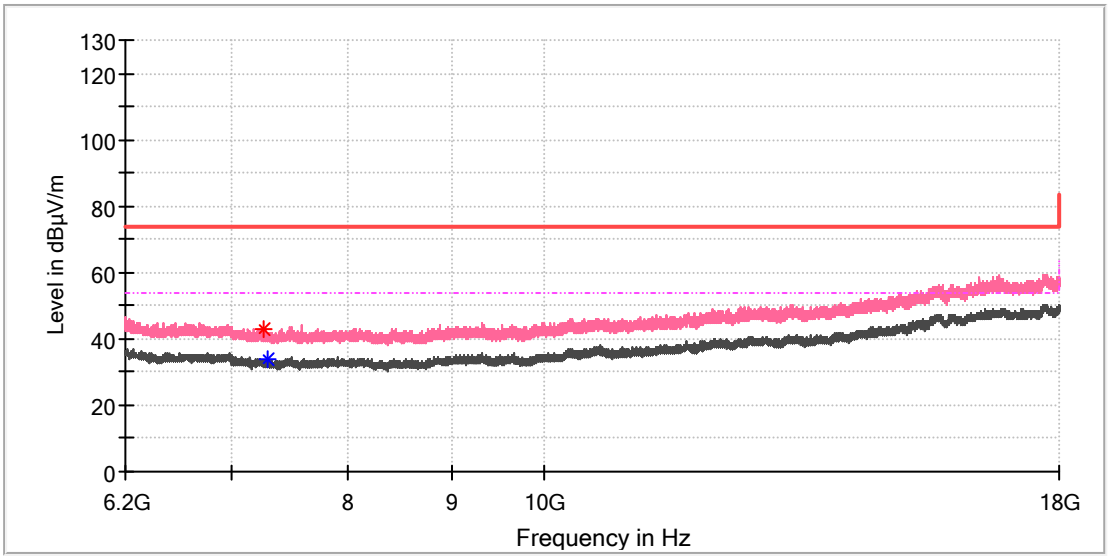


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
7284.616667	42.57	---	74.00	31.43	150.0	H	0.0	8.4
7305.758333	---	33.40	54.00	20.60	150.0	H	174.0	8.3

EUT Information

EUT Name:	Bluetooth Headset
Model:	JBL WAVE BUDS
Test Mode:	BLE 1M_Mid channel
Order No/Sample No:	168427200/A003478029-002
Test Voltage::	Battery
Remark:	Temp 23 Humi:56%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

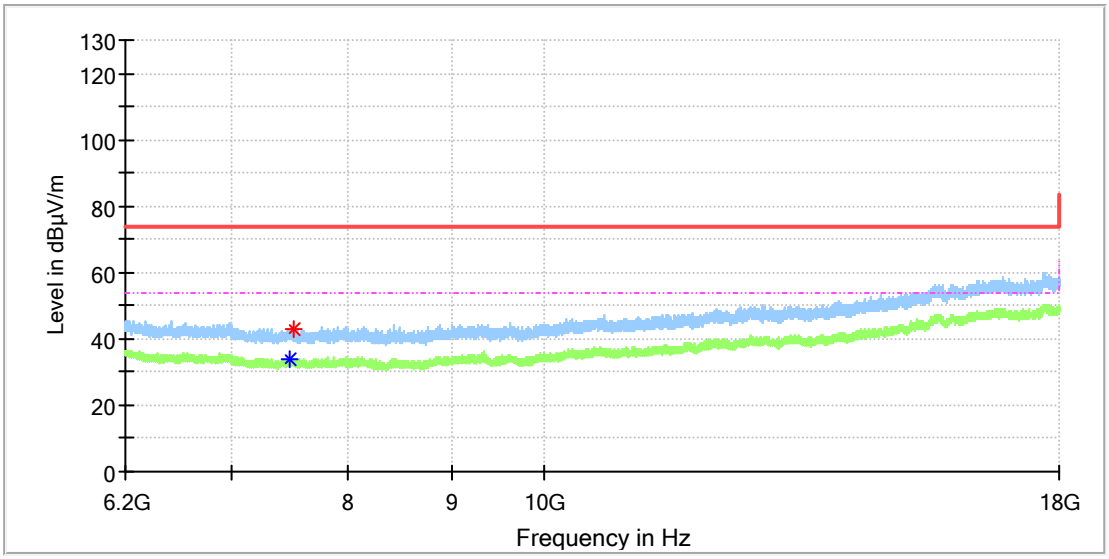


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
7259.541667	42.99	---	74.00	31.01	150.0	V	353.0	8.5
7290.516667	---	33.92	54.00	20.08	150.0	V	33.0	8.3

EUT Information

EUT Name:	Bluetooth Headset
Model:	JBL WAVE BUDS
Test Mode:	BLE 1M_High channel
Order No/Sample No:	168427200/A003478029-002
Test Voltage::	Battery
Remark:	Temp 23 Humi:56%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

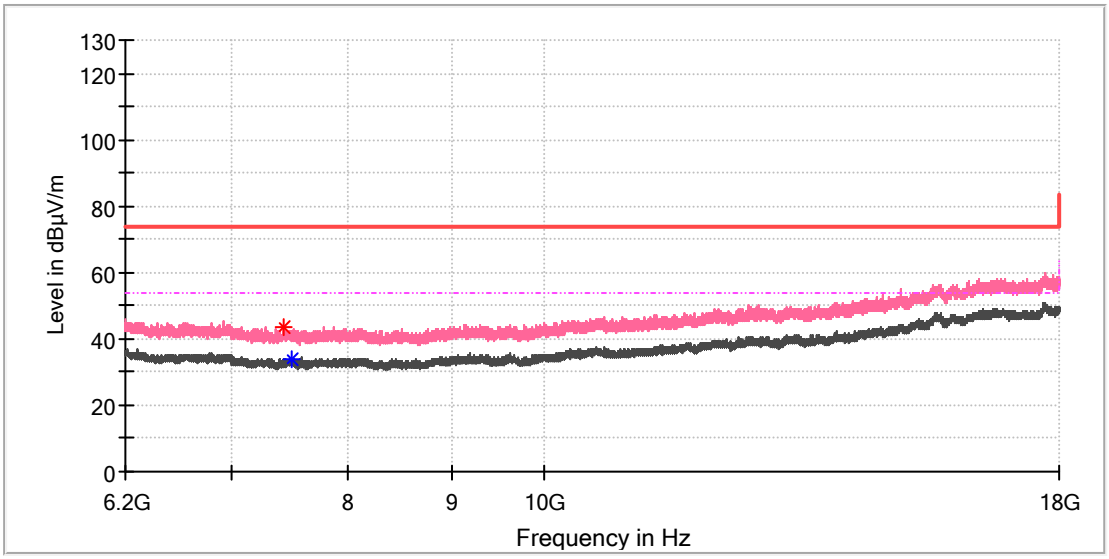


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
7477.350000	---	33.61	54.00	20.39	150.0	H	287.0	8.6
7507.341667	42.82	---	74.00	31.18	150.0	H	142.0	8.7

EUT Information

EUT Name:	Bluetooth Headset
Model:	JBL WAVE BUDS
Test Mode:	BLE 1M_High channel
Order No/Sample No:	168427200/A003478029-002
Test Voltage::	Battery
Remark:	Temp 23 Humi:56%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin



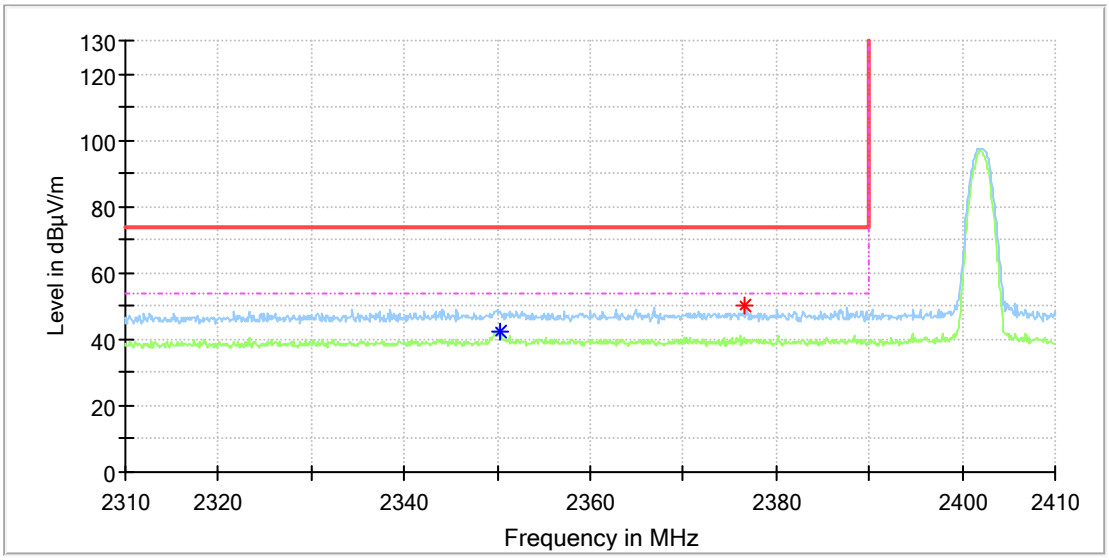
Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
7435.066667	43.48	---	74.00	30.52	150.0	V	317.0	8.4
7488.166667	---	34.13	54.00	19.87	150.0	V	267.0	8.7

Appendix B.7: Test Results of Radiated Emissions in Restricted Bands

EUT Information

EUT Name:	Bluetooth Headset
Model:	JBL WAVE BUDS
Test Mode:	BLE 1M_Low channel
Order No/Sample No:	168427200/A003478029-002
Test Voltage::	Battery
Remark:	Temp 23 Humi:56%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

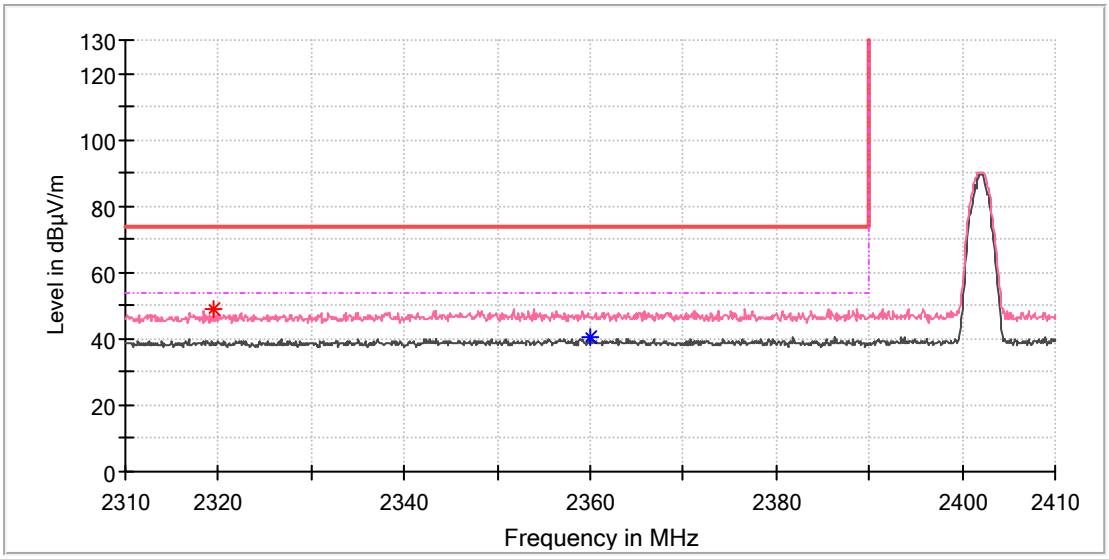


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2350.200000	---	42.42	54.00	11.58	150.0	H	58.0	6.9
2376.600000	50.34	---	74.00	23.66	150.0	H	67.0	6.9

EUT Information

EUT Name:	Bluetooth Headset
Model:	JBL WAVE BUDS
Test Mode:	BLE 1M_Low channel
Order No/Sample No:	168427200/A003478029-002
Test Voltage::	Battery
Remark:	Temp 23 Humi:56%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

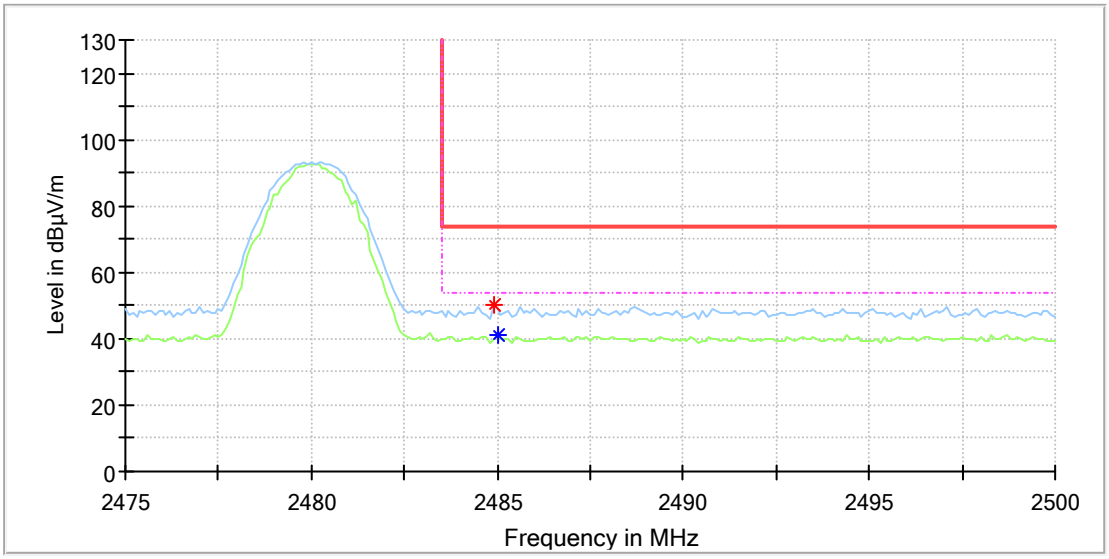


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2319.500000	49.25	---	74.00	24.75	150.0	V	185.0	6.6
2360.100000	---	40.73	54.00	13.27	150.0	V	233.0	6.9

EUT Information

EUT Name:	Bluetooth Headset
Model:	JBL WAVE BUDS
Test Mode:	BLE 1M_High channel
Order No/Sample No:	168427200/A003478029-002
Test Voltage::	Battery
Remark:	Temp 23 Humi:56%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

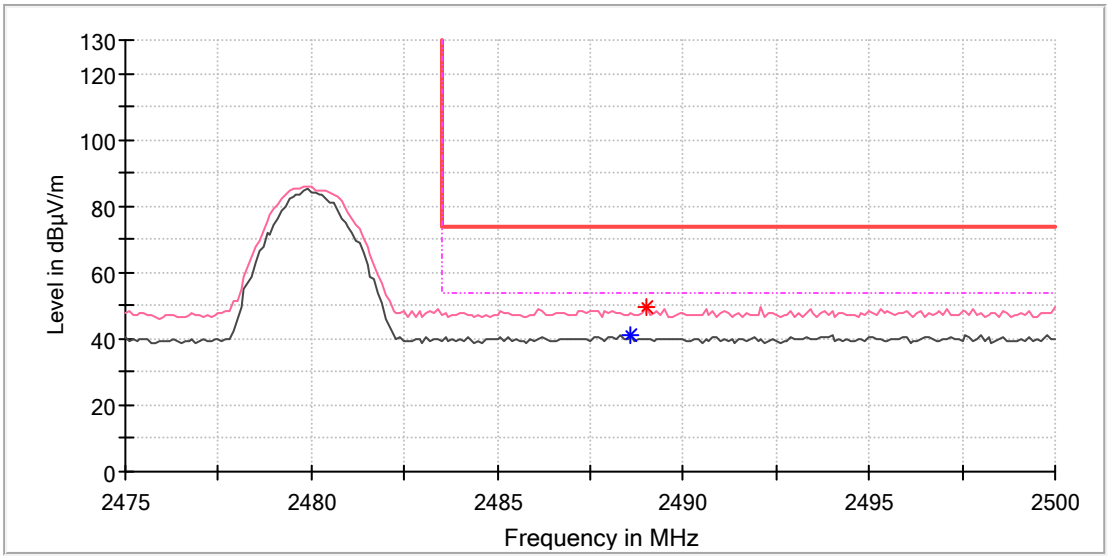


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2484.900000	50.13	---	74.00	23.87	150.0	H	168.0	7.4
2485.000000	---	41.33	54.00	12.67	150.0	H	178.0	7.4

EUT Information

EUT Name:	Bluetooth Headset
Model:	JBL WAVE BUDS
Test Mode:	BLE 1M_High channel
Order No/Sample No:	168427200/A003478029-002
Test Voltage::	Battery
Remark:	Temp 23 Humi:56%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin



Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2488.600000	---	41.19	54.00	12.81	150.0	V	45.0	7.4
2489.000000	49.64	---	74.00	24.36	150.0	V	71.0	7.4

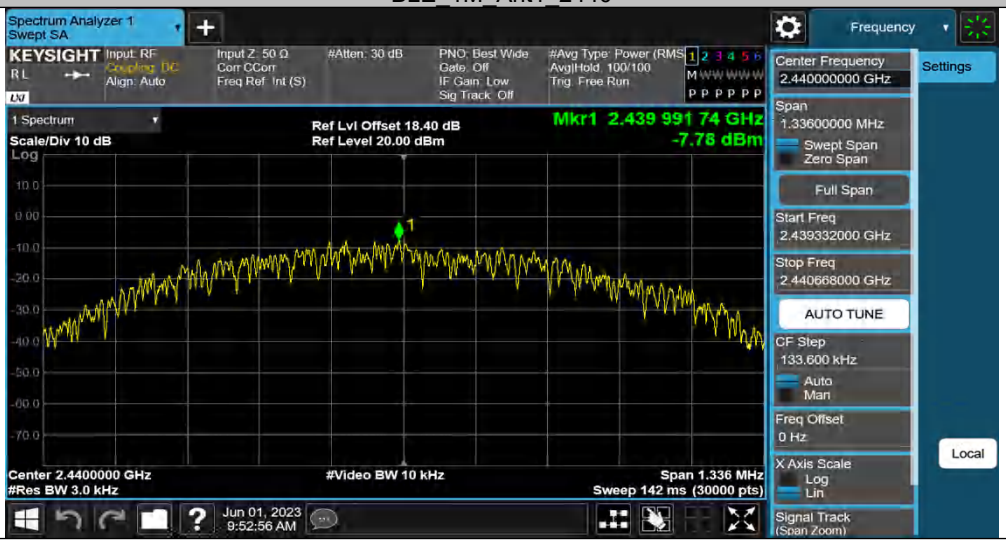
Appendix C: Test Results of Right earbud

Appendix C.1: Test Results of Conducted Power Spectral Density

TestMode	Antenna	Channel	Result[dBm/3-100kHz]	Limit[dBm/3kHz]	Verdict
BLE_1M	Ant1	2402	-8.5	≤8.00	PASS
		2440	-7.78	≤8.00	PASS
		2480	-8.18	≤8.00	PASS

BLE_1M_Ant1_2402

BLE_1M_Ant1_2440



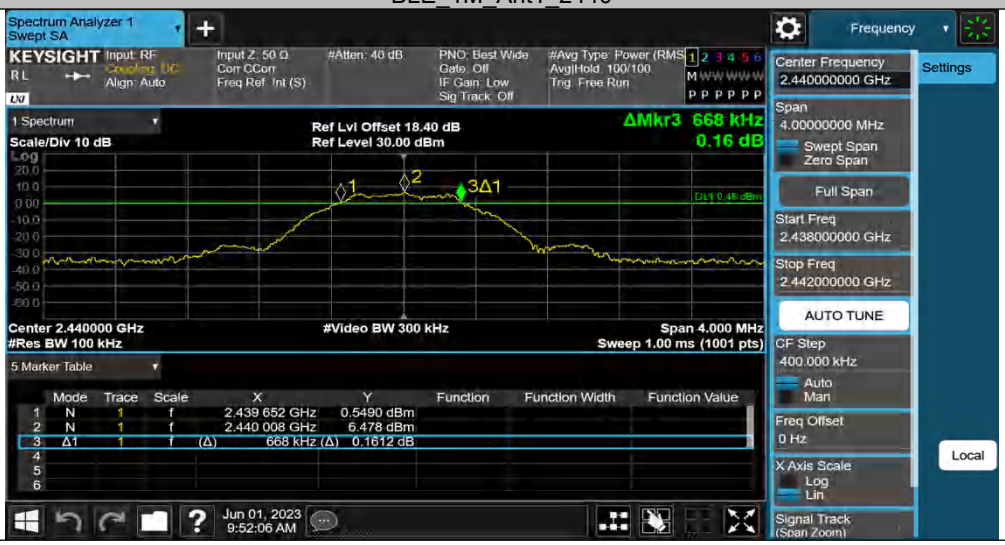
BLE_1M_Ant1_2480

Appendix C.2: Test Results of 6dB Bandwidth

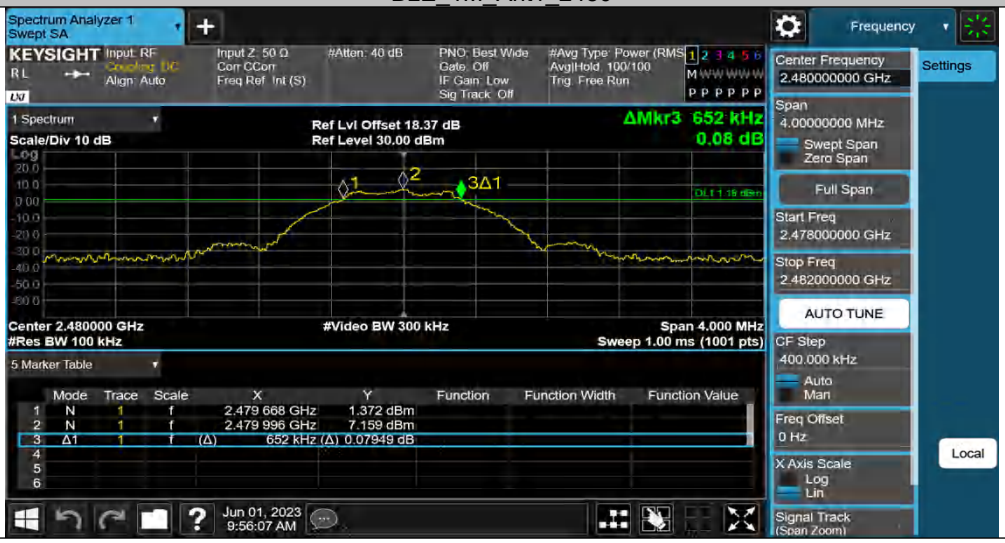
TestMode	Antenna	Channel	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
BLE_1M	Ant1	2402	0.676	2401.652	2402.328	0.5	PASS
		2440	0.668	2439.652	2440.320	0.5	PASS
		2480	0.652	2479.668	2480.320	0.5	PASS

BLE_1M_Ant1_2402

BLE_1M_Ant1_2440



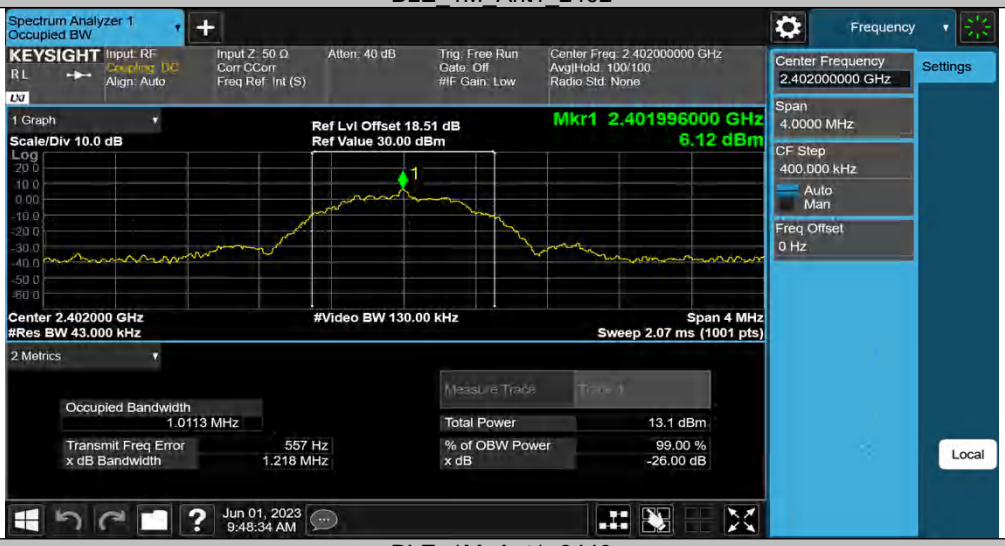
BLE_1M_Ant1_2480



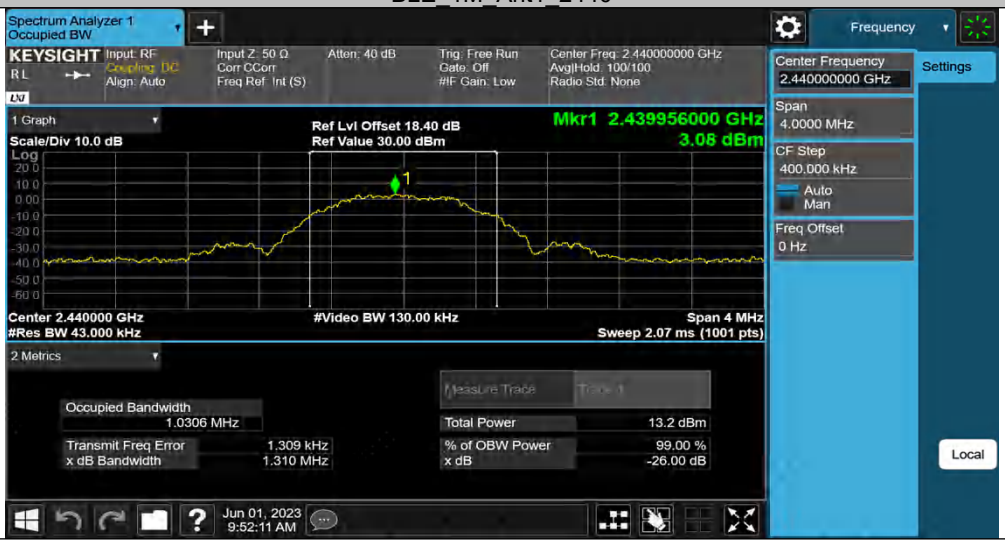
Appendix C.3: Test Results of 99% Bandwidth

TestMode	Antenna	Channel	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
BLE_1M	Ant1	2402	1.0113	2401.4949	2402.5062	---	---
		2440	1.0306	2439.4860	2440.5166	---	---
		2480	1.0165	2479.4942	2480.5107	---	---

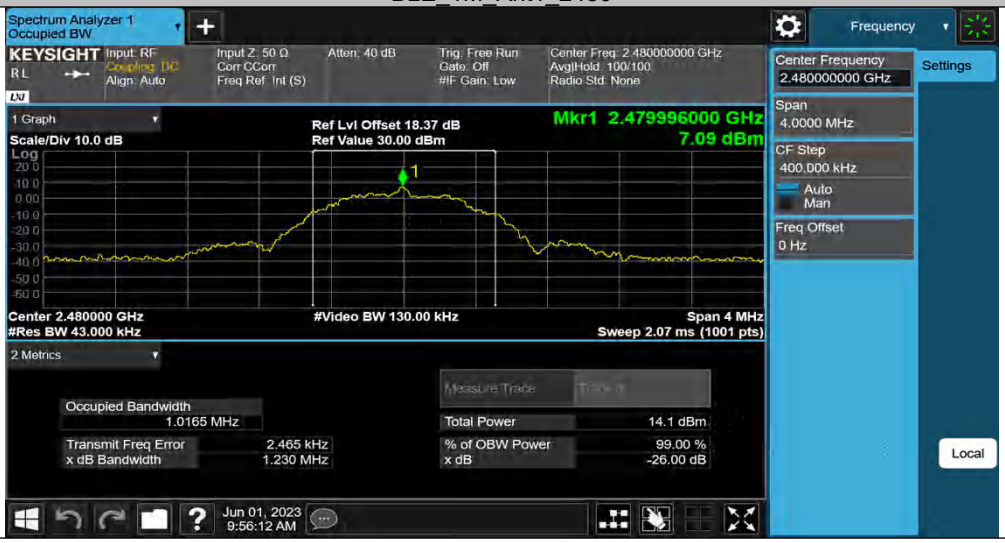
BLE_1M_Ant1_2402



BLE_1M_Ant1_2440



BLE_1M_Ant1_2480



Appendix C.4: Test Results of Frequency stability

Test Channel (MHz)	2402

Test result of frequency tolerance of voltage variation

Voltage	Test result (MHz)	Deviation Frequency (KHz)	Test result (ppm)	Limit (ppm)
DC 3.8V	2401.996	4	1.67	10
DC 4.18V	2401.995	5	2.08	
DC 3.42V	2401.996	4	1.67	

Test result of frequency tolerance of temperature variation

Temperature (℃)	Test result (MHz)	Deviation Frequency (KHz)	Test result (ppm)	Limit (ppm)
-30	2401.988	12	5.00	10
-20	2401.988	12	5.00	
-10	2401.989	11	4.58	
0	2401.993	4	1.67	
10	2401.996	4	1.67	
20	2401.996	4	1.67	
30	2401.996	4	1.67	
40	2401.995	5	2.08	
50	2401.993	7	2.91	
55	2401.994	6	2.50	

Test Channel (MHz)	2440

Test result of frequency tolerance of voltage variation

Voltage	Test result (MHz)	Deviation Frequency (KHz)	Test result (ppm)	Limit (ppm)
DC 3.8V	2439.995	-5	-2.04918	10
DC 4.18V	2439.995	-5	-2.04918	
DC 3.42V	2439.994	-6	-2.45902	

Test result of frequency tolerance of temperature variation

Temperature (℃)	Test result (MHz)	Deviation Frequency (KHz)	Test result (ppm)	Limit (ppm)
-30	2439.988	-12	-4.91803	10
-20	2439.989	-11	-4.5082	
-10	2439.990	-10	-4.09836	
0	2439.994	-6	-2.45902	
10	2439.994	-6	-2.45902	
20	2439.995	-5	-2.04918	
30	2439.994	-6	-2.45902	
40	2439.993	-7	-2.86885	
50	2439.991	-9	-3.68852	
55	2439.990	-10	-4.09836	

Test Channel (MHz)	2480

Test result of frequency tolerance of voltage variation

Voltage	Test result (MHz)	Deviation Frequency (KHz)	Test result (ppm)	Limit (ppm)
DC 3.8V	2479.994	-6	-2.42	10
DC 4.18V	2479.994	-6	-2.42	
DC 3.42V	2479.992	-8	-3.23	

Test result of frequency tolerance of temperature variation

Temperature (℃)	Test result (MHz)	Deviation Frequency (KHz)	Test result (ppm)	Limit (ppm)
-30	2479.992	-8	-3.23	10
-20	2479.991	-9	-3.63	
-10	2479.992	-8	-3.23	
0	2479.992	-8	-3.23	
10	2479.994	-6	-2.42	
20	2479.994	-6	-2.42	
30	2479.993	-7	-2.82	
40	2479.992	-8	-3.23	
50	2479.991	-9	-3.63	
55	2479.992	-8	-3.23	

Appendix C.5: Test Results of Conducted Spurious Emissions Measured in 100 kHz Bandwidth

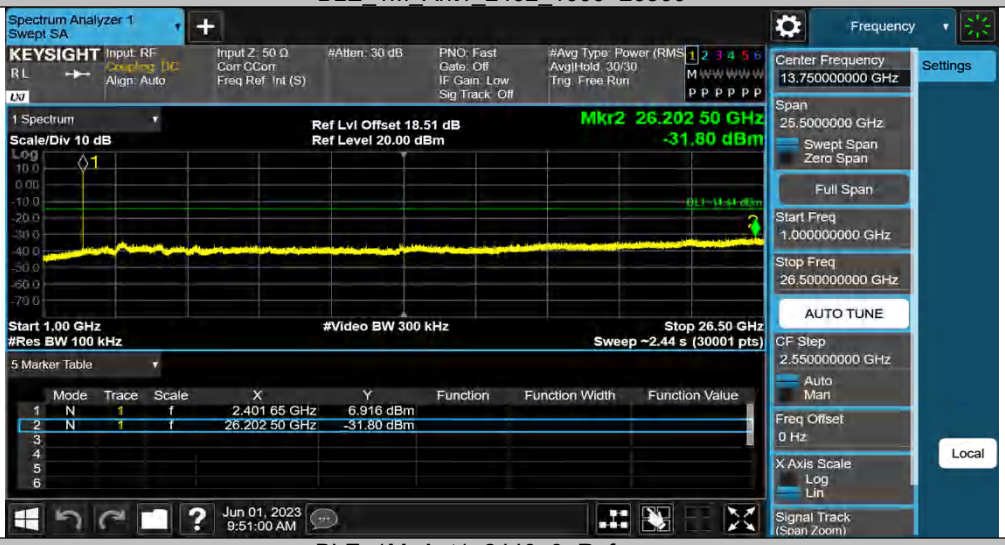
Conducted measurements

TestMode	Antenna	Channel	FreqRange [MHz]	RefLevel [dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	2402	Reference	5.56	5.56	---	PASS
			30~1000	5.56	-40.05	≤-14.44	PASS
			1000~26500	5.56	-31.8	≤-14.44	PASS
		2440	Reference	7.22	7.22	---	PASS
			30~1000	7.22	-41.17	≤-12.78	PASS
			1000~26500	7.22	-31.9	≤-12.78	PASS
		2480	Reference	4.97	4.97	---	PASS
			30~1000	4.97	-41.36	≤-15.03	PASS
			1000~26500	4.97	-32.78	≤-15.03	PASS

BLE_1M_Ant1_2402_0~Reference

BLE_1M_Ant1_2402_30~1000

BLE_1M_Ant1_2402_1000~26500



BLE_1M_Ant1_2440_0~Reference

BLE_1M_Ant1_2440_30~1000

BLE_1M_Ant1_2440_1000~26500

BLE_1M_Ant1_2480_0~Reference

BLE_1M_Ant1_2480_30~1000

BLE_1M_Ant1_2480_1000~26500

Band edge measurements

TestMode	Antenna	ChName	Channel	RefLevel[dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	Low	2402	6.579	-43.29	≤-13.42	PASS
		High	2480	7.638	-45.89	≤-12.36	PASS

BLE_1M_Ant1_Low_2402

BLE_1M_Ant1_High_2480

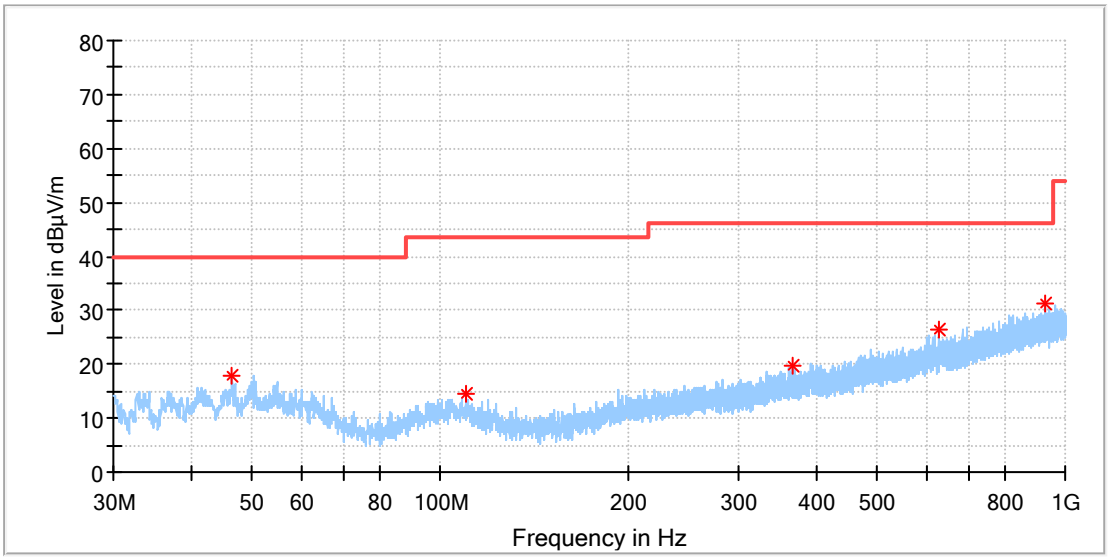
Appendix C.6: Test Results of Radiated Spurious Emissions

Note:
1) This testing was carried out on different modulations, but only the worst case was presented in this report.
2) Testing was carried out within frequency range 9kHz to the tenth harmonics. The measurement results below 30MHz and 18GHz - 26.5GHz were greater than 20dB below the limit, so only the radiated spurious emissions from 30MHz to 18GHz were reported.

30 MHz to 1GHz

EUT Information

EUT Name:	Bluetooth Headset
Model:	JBL WAVE BUDS
Test Mode:	BLE 1M_Mid channel
Order No/Sample No:	168427200/A003478029-002
Test Voltage::	Battery
Remark:	Temp 23 Humi:56%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

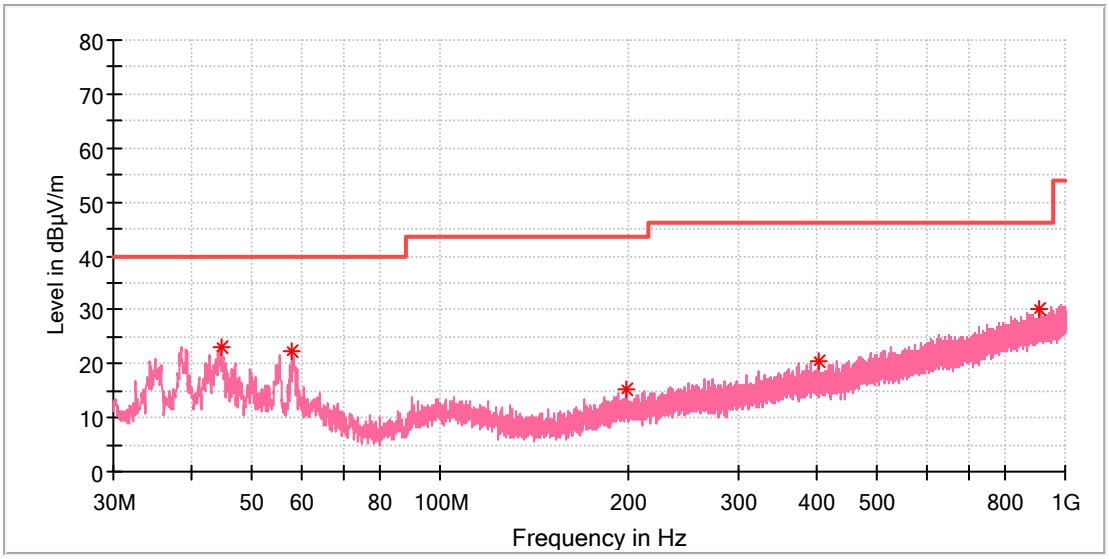


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
46.490000	17.73	40.00	22.27	100.0	H	118.0	-18.6
110.316000	14.40	43.50	29.10	100.0	H	83.0	-19.1
367.123500	19.71	46.00	26.29	100.0	H	268.0	-14.5
630.139000	26.33	46.00	19.67	100.0	H	268.0	-9.4
931.130000	31.15	46.00	14.86	100.0	H	31.0	-4.7

EUT Information

EUT Name:	Bluetooth Headset
Model:	JBL WAVE BUDS
Test Mode:	BLE 1M_Mid channel
Order No/Sample No:	168427200/A003478029-002
Test Voltage::	Battery
Remark:	Temp 23 Humi:56%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin



Critical_Freqs

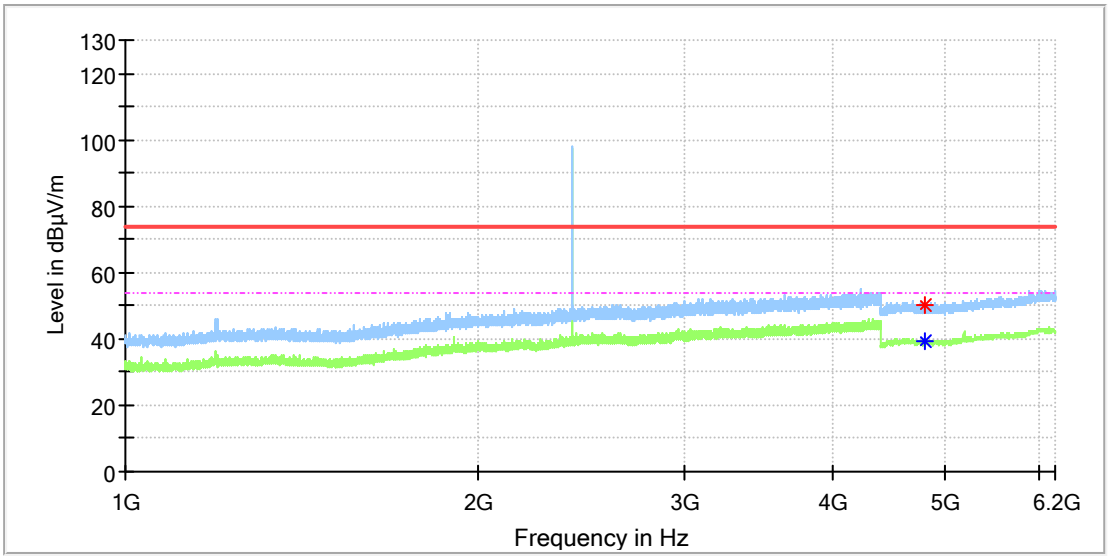
Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
44.598500	23.16	40.00	16.84	100.0	V	342.0	-18.9
58.033000	22.36	40.00	17.64	100.0	V	231.0	-18.8
198.198000	15.11	43.50	28.39	100.0	V	231.0	-19.0
402.237500	20.64	46.00	25.36	100.0	V	0.0	-13.6
908.432000	30.22	46.00	15.78	100.0	V	111.0	-4.9

1GHz-18GHz

Note: The highest waveform in the figure is Bluetooth Fundamental.

EUT Information

EUT Name:	Bluetooth Headset
Model:	JBL WAVE BUDS
Test Mode:	BLE 1M_Low channel
Order No/Sample No:	168427200/A003478029-002
Test Voltage::	Battery
Remark:	Temp 23 Humi:56%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

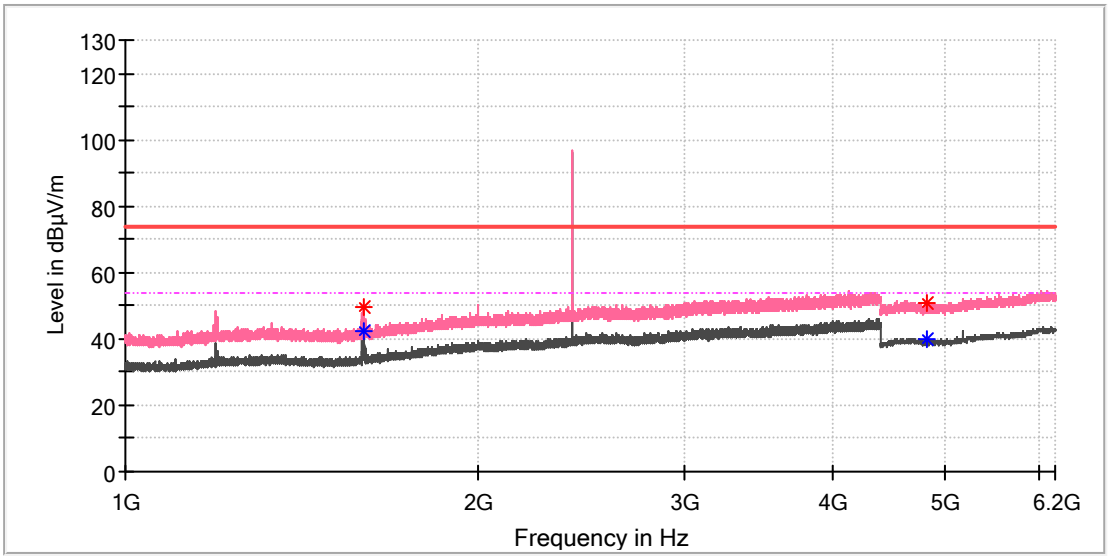


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
4803.500000	50.14	---	74.00	23.86	150.0	H	216.0	11.8
4808.500000	---	39.55	54.00	14.45	150.0	H	189.0	11.8

EUT Information

EUT Name:	Bluetooth Headset
Model:	JBL WAVE BUDS
Test Mode:	BLE 1M_Low channel
Order No/Sample No:	168427200/A003478029-002
Test Voltage::	Battery
Remark:	Temp 23 Humi:56%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

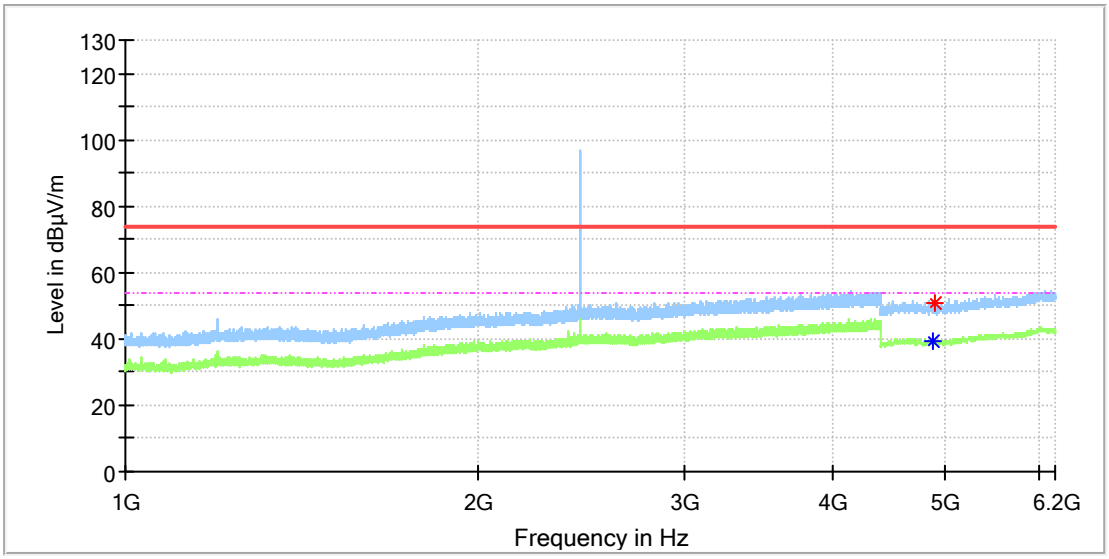


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1595.850000	49.85	---	74.00	24.15	150.0	V	166.0	2.0
1598.740000	---	42.44	54.00	11.56	150.0	V	166.0	2.1
4820.500000	---	39.63	54.00	14.37	150.0	V	249.0	11.8
4821.000000	50.93	---	74.00	23.07	150.0	V	255.0	11.8

EUT Information

EUT Name:	Bluetooth Headset
Model:	JBL WAVE BUDS
Test Mode:	BLE 1M_Mid channel
Order No/Sample No:	168427200/A003478029-002
Test Voltage::	Battery
Remark:	Temp 23 Humi:56%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

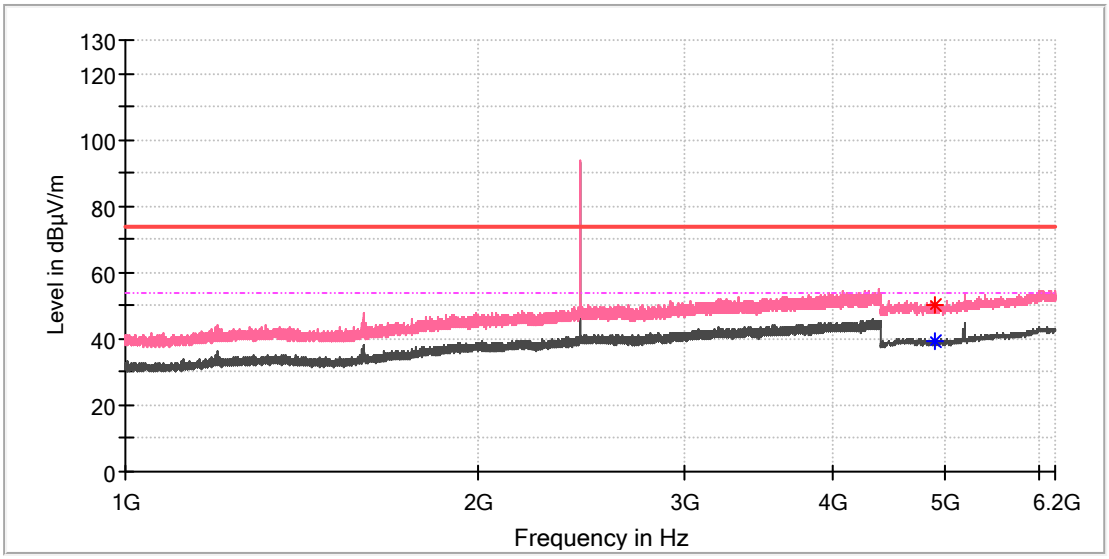


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
4875.500000	---	39.24	54.00	14.76	150.0	H	248.0	11.8
4894.500000	50.95	---	74.00	23.05	150.0	H	348.0	11.8

EUT Information

EUT Name:	Bluetooth Headset
Model:	JBL WAVE BUDS
Test Mode:	BLE 1M_Mid channel
Order No/Sample No:	168427200/A003478029-002
Test Voltage::	Battery
Remark:	Temp 23 Humi:56%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

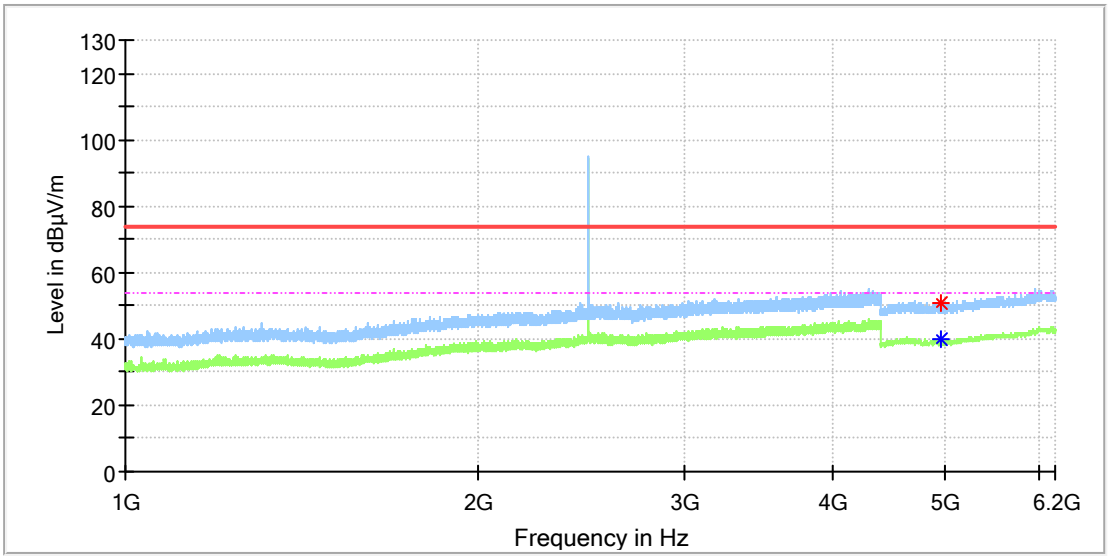


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
4901.000000	50.36	---	74.00	23.64	150.0	V	64.0	11.8
4904.000000	---	39.30	54.00	14.70	150.0	V	318.0	11.8

EUT Information

EUT Name:	Bluetooth Headset
Model:	JBL WAVE BUDS
Test Mode:	BLE 1M_High channel
Order No/Sample No:	168427200/A003478029-002
Test Voltage::	Battery
Remark:	Temp 23 Humi:56%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

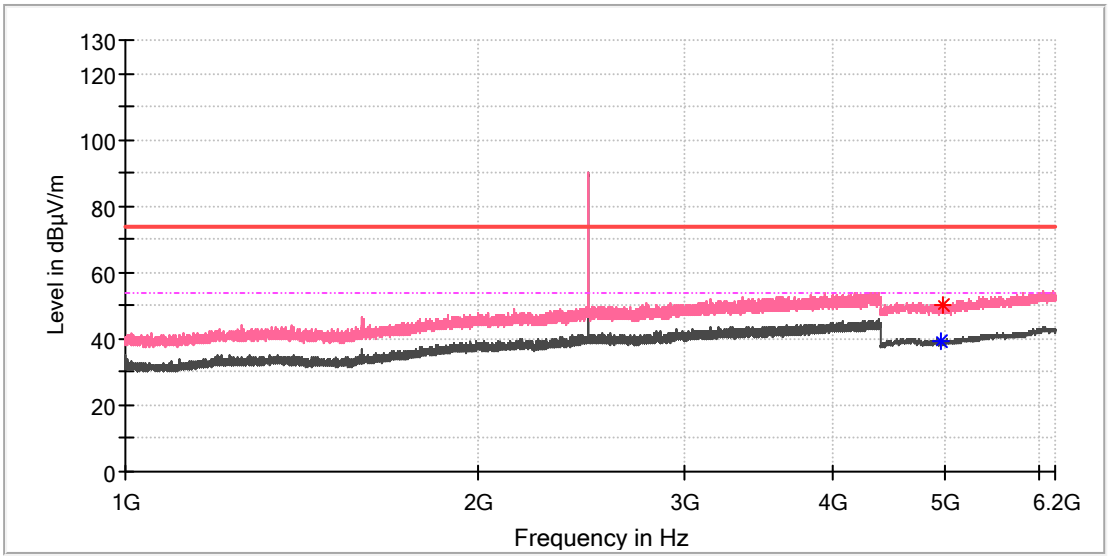


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
4958.500000	50.74	---	74.00	23.26	150.0	H	359.0	11.8
4959.000000	---	39.70	54.00	14.30	150.0	H	99.0	11.8

EUT Information

EUT Name:	Bluetooth Headset
Model:	JBL WAVE BUDS
Test Mode:	BLE 1M_High channel
Order No/Sample No:	168427200/A003478029-002
Test Voltage::	Battery
Remark:	Temp 23 Humi:56%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

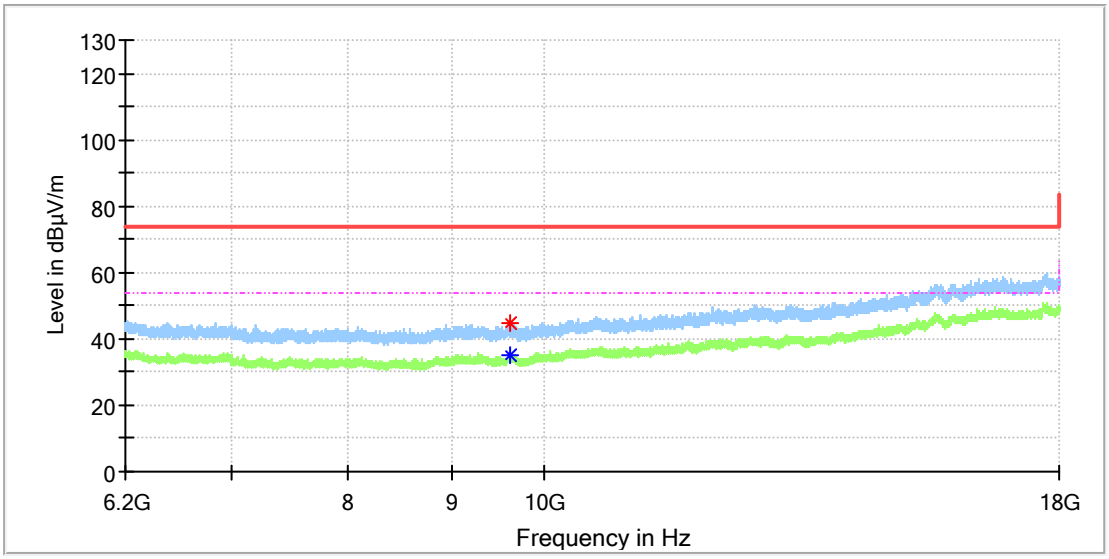


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
4956.000000	---	39.39	54.00	14.61	150.0	V	282.0	11.8
4972.500000	50.25	---	74.00	23.75	150.0	V	224.0	11.8

EUT Information

EUT Name:	Bluetooth Headset
Model:	JBL WAVE BUDS
Test Mode:	BLE 1M_Low channel
Order No/Sample No:	168427200/A003478029-002
Test Voltage::	Battery
Remark:	Temp 23 Humi:56%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

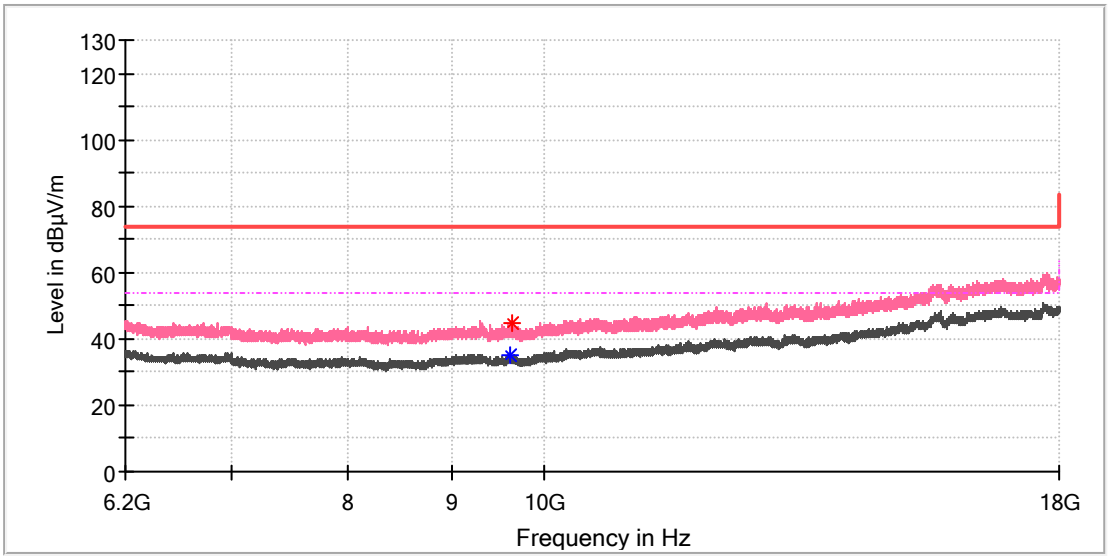


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
9620.525000	---	35.13	54.00	18.87	150.0	H	199.0	10.4
9624.458333	44.90	---	74.00	29.10	150.0	H	235.0	10.4

EUT Information

EUT Name:	Bluetooth Headset
Model:	JBL WAVE BUDS
Test Mode:	BLE 1M_Low channel
Order No/Sample No:	168427200/A003478029-002
Test Voltage::	Battery
Remark:	Temp 23 Humi:56%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

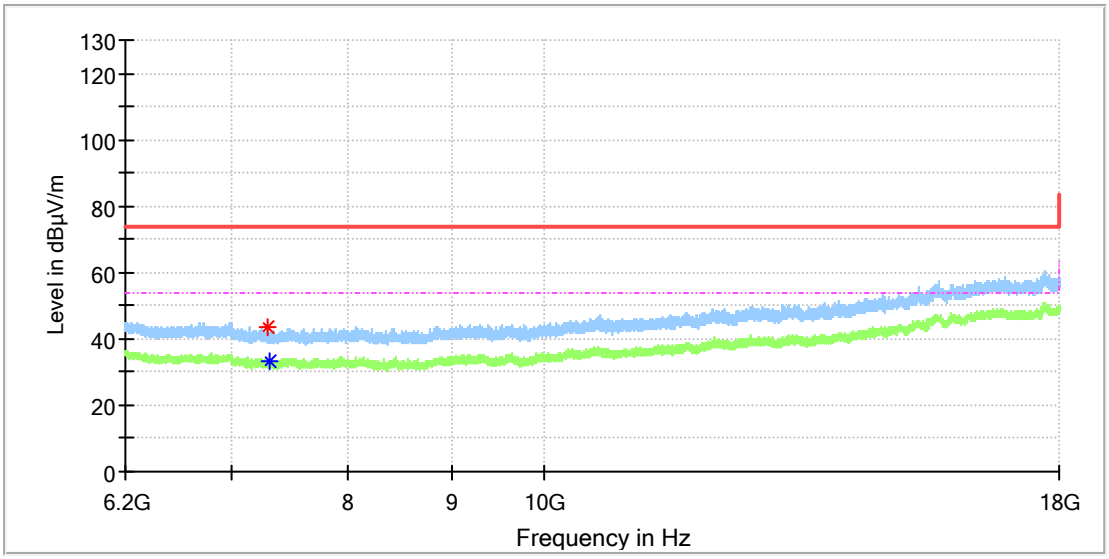


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
9609.708333	---	35.02	54.00	18.98	150.0	V	134.0	10.4
9636.258333	44.46	---	74.00	29.54	150.0	V	121.0	10.4

EUT Information

EUT Name:	Bluetooth Headset
Model:	JBL WAVE BUDS
Test Mode:	BLE 1M_Mid channel
Order No/Sample No:	168427200/A003478029-002
Test Voltage::	Battery
Remark:	Temp 23 Humi:56%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

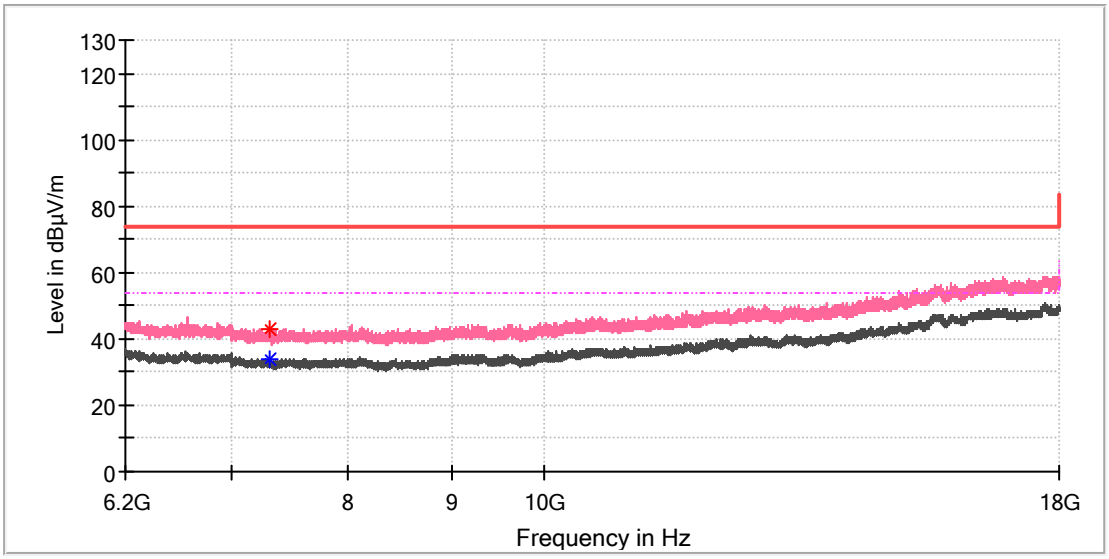


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
7288.058333	43.39	---	74.00	30.61	150.0	H	187.0	8.4
7310.675000	---	33.52	54.00	20.48	150.0	H	278.0	8.2

EUT Information

EUT Name:	Bluetooth Headset
Model:	JBL WAVE BUDS
Test Mode:	BLE 1M_Mid channel
Order No/Sample No:	168427200/A003478029-002
Test Voltage::	Battery
Remark:	Temp 23 Humi:56%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

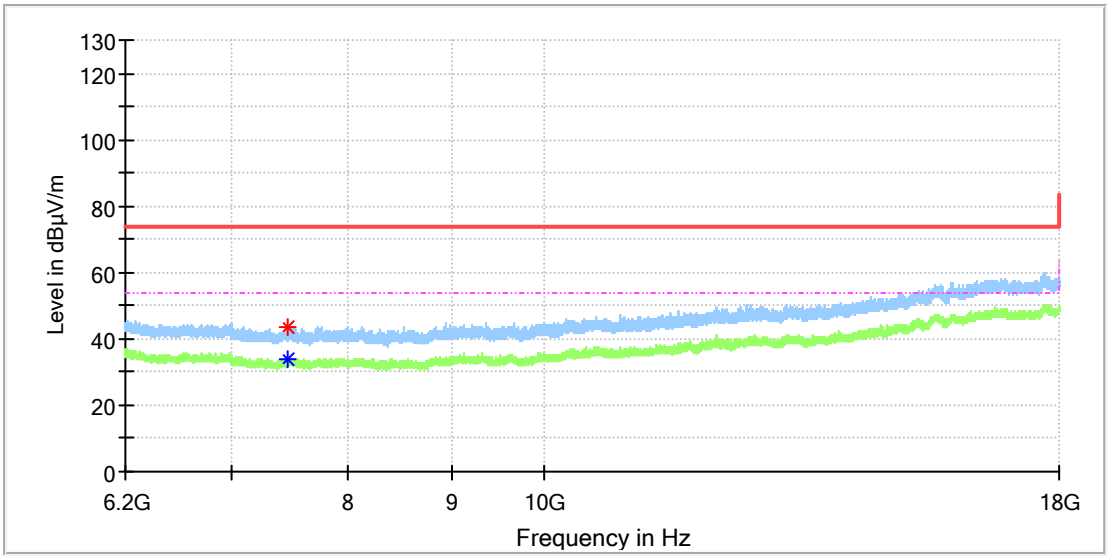


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
7308.216667	42.99	---	74.00	31.01	150.0	V	307.0	8.2
7314.608333	---	33.58	54.00	20.42	150.0	V	307.0	8.2

EUT Information

EUT Name:	Bluetooth Headset
Model:	JBL WAVE BUDS
Test Mode:	BLE 1M_High channel
Order No/Sample No:	168427200/A003478029-002
Test Voltage::	Battery
Remark:	Temp 23 Humi:56%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

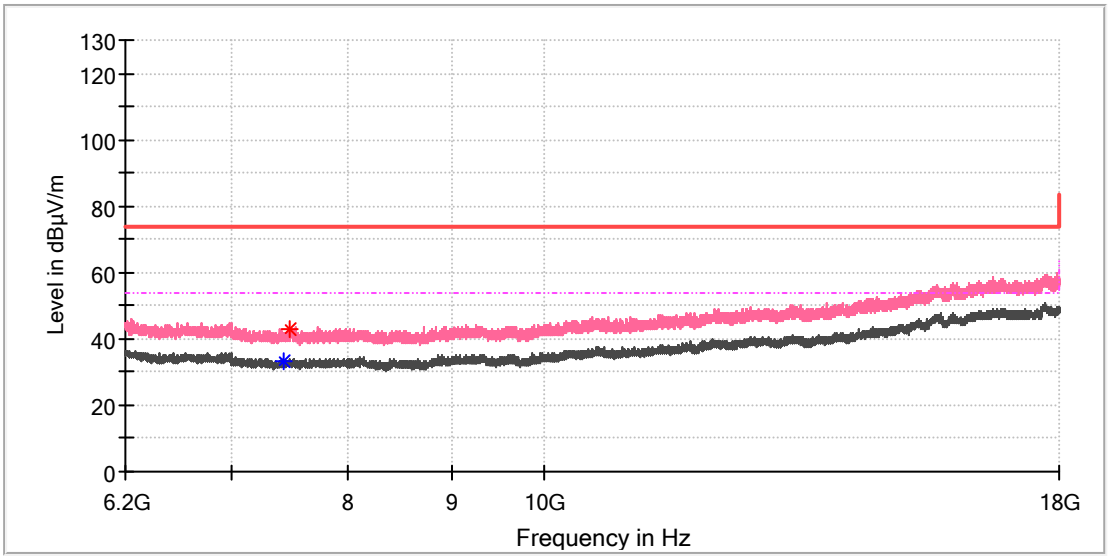


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
7462.108333	43.45	---	74.00	30.55	150.0	H	93.0	8.6
7466.041667	---	34.07	54.00	19.93	150.0	H	0.0	8.6

EUT Information

EUT Name:	Bluetooth Headset
Model:	JBL WAVE BUDS
Test Mode:	BLE 1M_High channel
Order No/Sample No:	168427200/A003478029-002
Test Voltage::	Battery
Remark:	Temp 23 Humi:56%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin



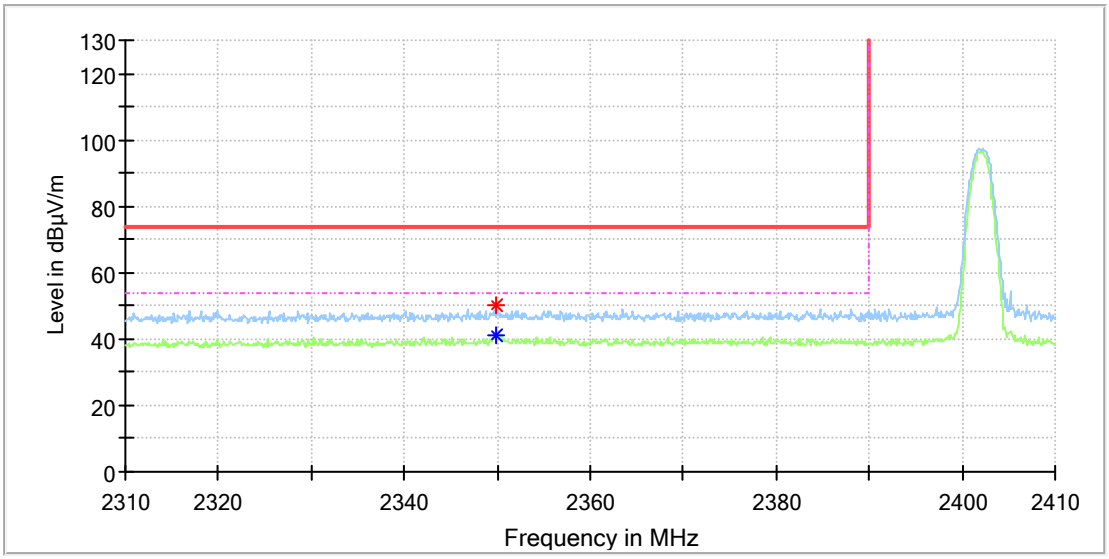
Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
7428.183333	---	33.52	54.00	20.48	150.0	V	63.0	8.4
7470.958333	42.87	---	74.00	31.13	150.0	V	136.0	8.6

Appendix C.7: Test Results of Radiated Emissions in Restricted Bands

EUT Information

EUT Name:	Bluetooth Headset
Model:	JBL WAVE BUDS
Test Mode:	BLE 1M_Low channel
Order No/Sample No:	168427200/A003478029-002
Test Voltage::	Battery
Remark:	Temp 23 Humi:56%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

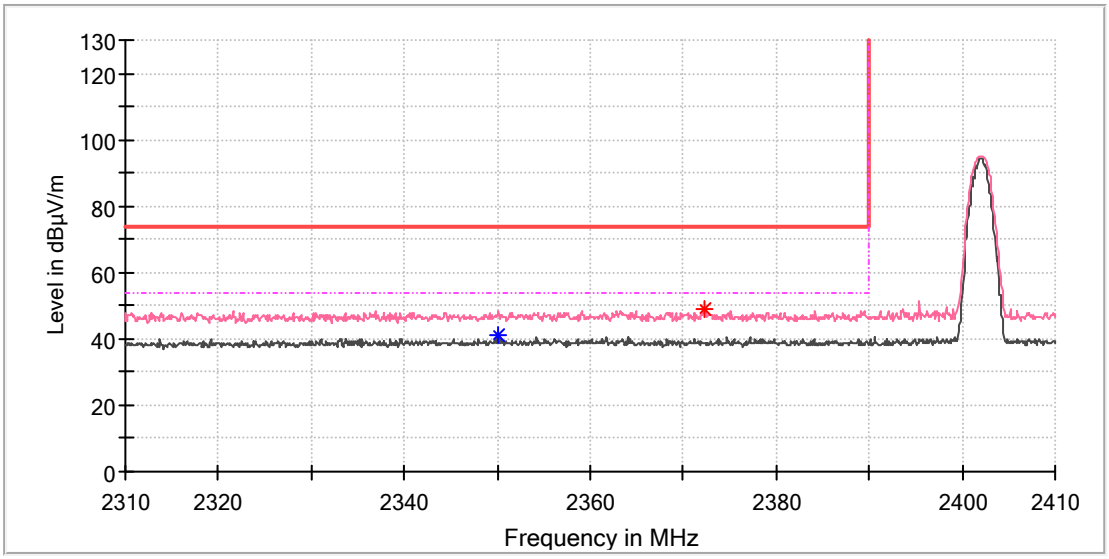


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2349.800000	50.03	---	74.00	23.97	150.0	H	2.0	6.9
2349.900000	---	41.04	54.00	12.96	150.0	H	26.0	6.9

EUT Information

EUT Name:	Bluetooth Headset
Model:	JBL WAVE BUDS
Test Mode:	BLE 1M_Low channel
Order No/Sample No:	168427200/A003478029-002
Test Voltage::	Battery
Remark:	Temp 23 Humi:56%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

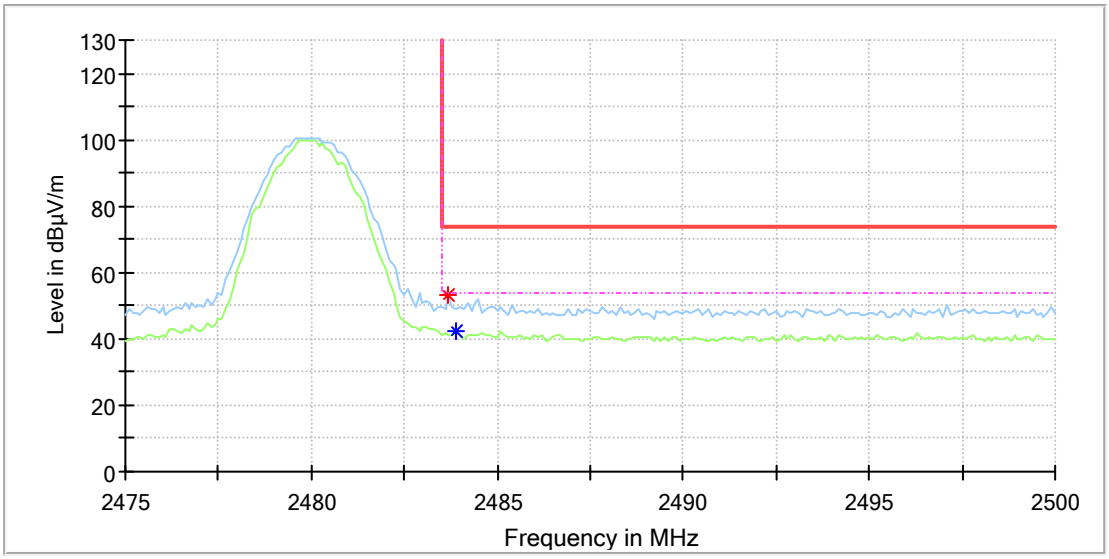


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2350.000000	---	41.12	54.00	12.88	150.0	V	0.0	6.9
2372.300000	49.21	---	74.00	24.79	150.0	V	255.0	6.9

EUT Information

EUT Name:	Bluetooth Headset
Model:	JBL WAVE BUDS
Test Mode:	BLE 1M_High channel
Order No/Sample No:	168427200/A003478029-002
Test Voltage::	Battery
Remark:	Temp 23 Humi:56%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

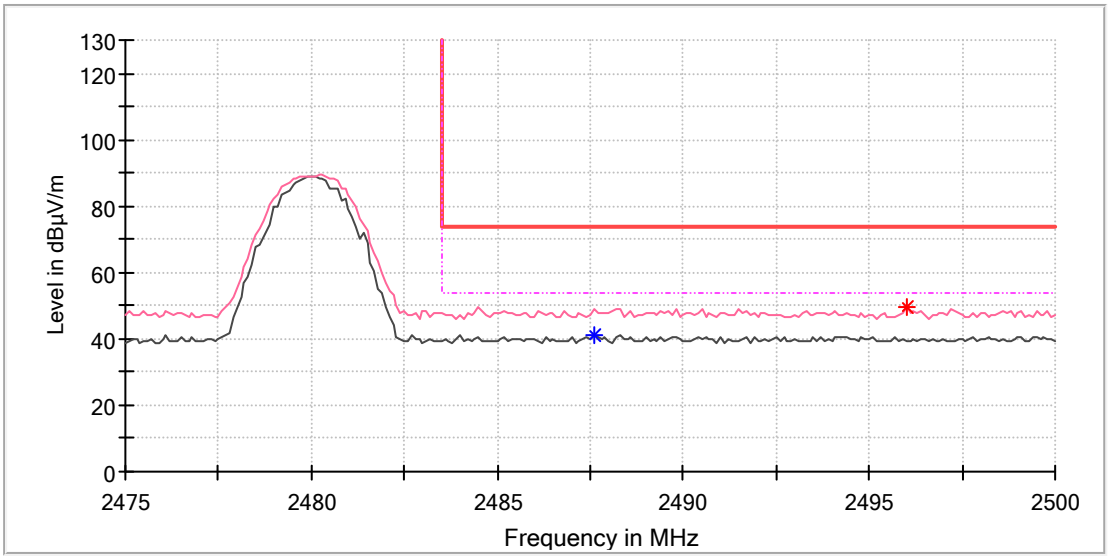


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2483.700000	53.06	---	74.00	20.94	150.0	H	14.0	7.4
2483.900000	---	42.23	54.00	11.77	150.0	H	87.0	7.4

EUT Information

EUT Name:	Bluetooth Headset
Model:	JBL WAVE BUDS
Test Mode:	BLE 1M_High channel
Order No/Sample No:	168427200/A003478029-002
Test Voltage::	Battery
Remark:	Temp 23 Humi:56%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin



Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2487.600000	---	41.13	54.00	12.87	150.0	V	236.0	7.4
2496.000000	49.77	---	74.00	24.23	150.0	V	27.0	7.4