

Prüfbericht-Nr.: Test report no.:	CN231UKT 002	Auftrags-Nr.: Order no.:	168422487	Seite 1 von 22 Page 1 of 22
Kunden-Referenz-Nr.: Client reference no.:	N/A	Auftragsdatum: Order date:	2023-03-14	
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.:	SOUNDGEAR SENSE (Trademark: JBL)			
Auftrags-Inhalt: Order content:	Type test			
Prüfgrundlage: Test specification:	CFR47 FCC Part 15: Subpart C Section 15.247 CFR47 FCC Part 15: Subpart C Section 15.207 CFR47 FCC Part 15: Subpart C Section 15.209		RSS-247 Issue 2 February 2017 RSS-Gen Issue 5 March 2019	
Wareneingangsdatum: Date of sample receipt:	2023-04-12	Refer to photos document		
Prüfmuster-Nr.: Test sample no.:	A003454679			
Prüfzeitraum: Testing period:	2023-04-14 – 2023-05-23			
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:			genehmigt von: authorized by:	
Datum: Date:	2023-06-02 Signed by: Harry W. C. Wu		Ausstellungsdatum: Issue date:	2023-06-02 Signed by: Alex Lan
Stellung / Position:	Project Manager		Stellung / Position:	Reviewer
Sonstiges / Other:	FCC ID: APIJBLSGSENSE IC: 6132A-JBLSGSENSE HVIN: SOUNDGEAR SENSE			
Zustand des Prüfgegenstandes bei Anlieferung: Condition of the test item at delivery:	Prüfmuster vollständig und unbeschädigt 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
Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. <i>This test report only relates to the above mentioned test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.</i>				

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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. <i>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.</i> <i>Detaillierte Informationen bezüglich Prüfkonditionen, Prüfequipment und Messunsicherheiten sind im Prüflabor vorhanden und können auf Wunsch bereitgestellt werden.</i>
2	As contractually agreed, this document has been signed digitally only. TÜV 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, TÜV 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. <i>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.</i>
3	Test clauses with remark of * are subcontracted to qualified subcontractors and described 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. <i>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.</i>
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. <i>Die Entscheidungsregel für Konformitätserklärungen basierend auf numerischen Messergebnissen 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 bezüglich des Risikos durch diese Entscheidungsregel siehe ILAC G8:2019.</i>

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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

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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 basis 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	SOUNDGEAR SENSE
Trademark	JBL
FCC ID	APIJBLSGSENSE
IC	6132A-JBLSGSENSE
HVIN	SOUNDGEAR SENSE
Extreme Temperature Range	0°C to +45°C
Operating Voltage	DC 3.85V, 70mAh via built-in Li-ion cell battery DC 5V, 180mA 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, $\pi/4$ DQPSK, 8DPSK
Antenna Type	FPC Antenna
Antenna Gain	-1.05 dBi for left earbud -0.98 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, 2Mbps
Modulation	GFSK
Antenna Type	FPC Antenna
Antenna Gain	-1.05 dBi for left earbud -0.98 dBi for right earbud

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

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 SOUNDGEAR SENSE 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)

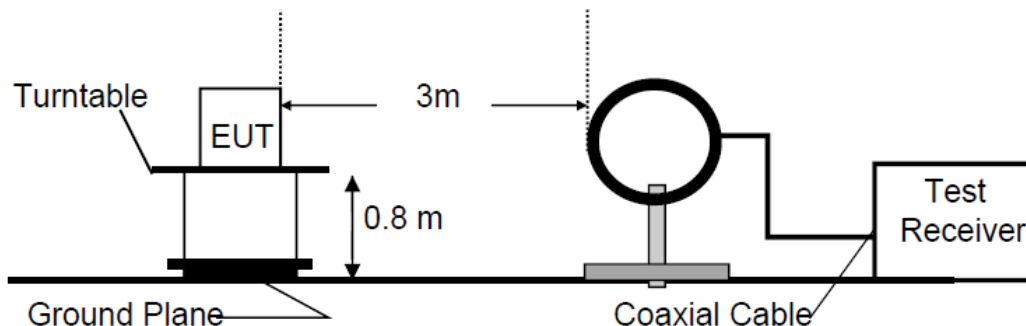


Diagram of Measurement Configuration for Radiation Test (Below 1GHz)

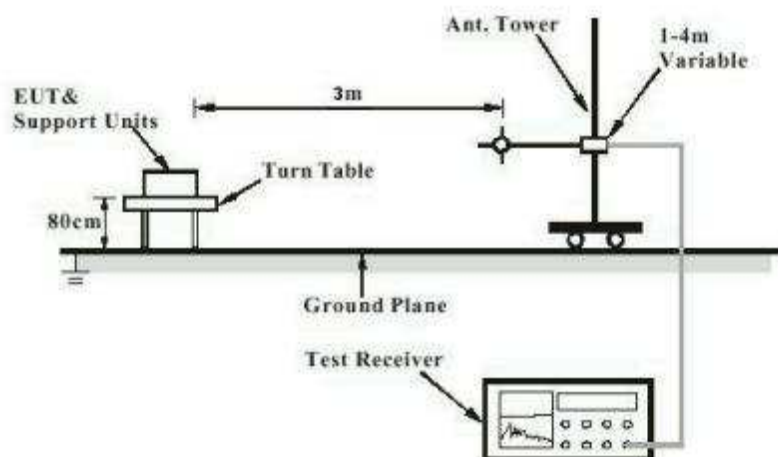


Diagram of Measurement Configuration for Radiation Test (Above 1GHz)

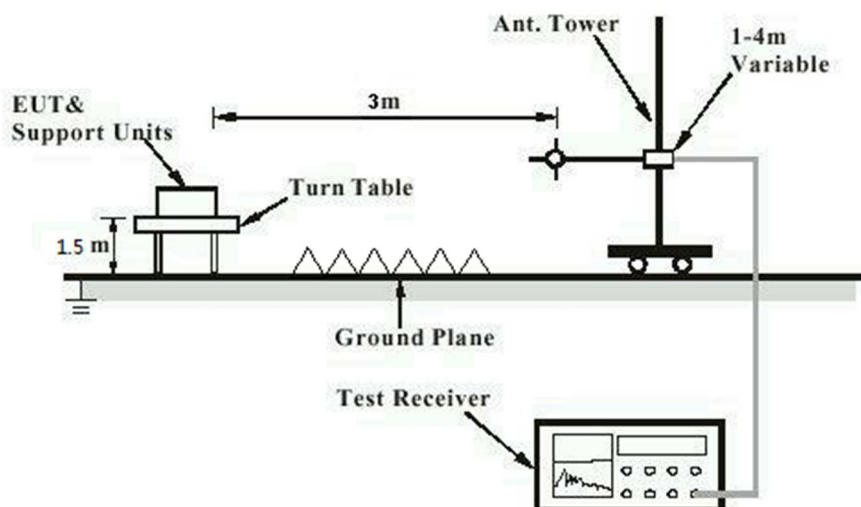
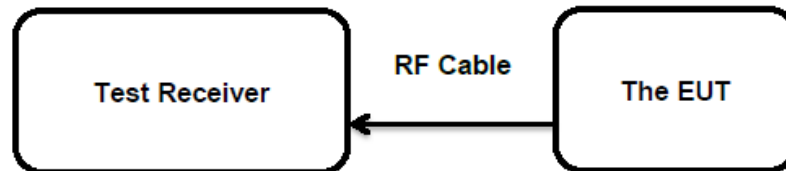


Diagram of Measurement Configuration for Conducted Transmitter Measurement



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 -1.05 dBi for left earbud & -0.98 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.

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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 : 2023-04-14 to 2023-05-23
Input voltage : DC 3.85V
Operation mode : A
Test channel : Low / Middle / High
Ambient temperature : 24.5 °C
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	7.96	0.0063	< 1.0
	2440	7.96	0.0063	
	2480	7.55	0.0057	
2 Mbps	2402	7.87	0.0061	
	2440	7.80	0.0060	
	2480	7.47	0.0056	
Maximum Measured Value		7.96	0.0063	

Note: The cable loss is taken into account in results and the maximum e.i.r.p. is 6.74 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	8.10	0.0065	< 1.0
	2440	8.13	0.0065	
	2480	7.79	0.0060	
2 Mbps	2402	7.98	0.0063	
	2440	7.98	0.0063	
	2480	7.74	0.0059	
Maximum Measured Value		8.13	0.0065	

Note: The cable loss is taken into account in results and the maximum e.i.r.p. is 7.2 dBm less than 4W (36 dBm).

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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	:	2023-04-14 to 2023-04-28
Input voltage	:	DC 3.85V
Operation mode	:	A
Test channel	:	Low / Middle / High
Ambient temperature	:	24.5 °C
Relative humidity	:	55 %
Atmospheric pressure	:	101 kPa

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

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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 : 2023-04-14 to 2023-04-28
Input voltage : DC 3.85V
Operation mode : A
Test channel : Low / Middle / High
Ambient temperature : 24.5 °C
Relative humidity : 55 %
Atmospheric pressure : 101 kPa

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

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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	:	2023-04-14 to 2023-04-28
Input voltage	:	DC 3.85V
Operation mode	:	A
Test channel	:	Low / Middle / High
Ambient temperature	:	24.5 °C
Relative humidity	:	55 %
Atmospheric pressure	:	101 kPa

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

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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	: 2023-04-14 to 2023-04-28
Input voltage	: DC 3.85V
Operation mode	: B
Ambient temperature	: 24.5 °C
Relative humidity	: 55 %
Atmospheric pressure	: 101 kPa

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

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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	: 2023-04-14 to 2023-04-28
Input voltage	: DC 3.85V
Operation mode	: A
Test channel	: Low / Middle / High
Ambient temperature	: 24.5 °C
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.

Prüfbericht-Nr.: **CN231UKT 002**
Test report no.:

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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	:	2023-04-14 to 2023-04-28
Input voltage	:	DC 3.85V
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.

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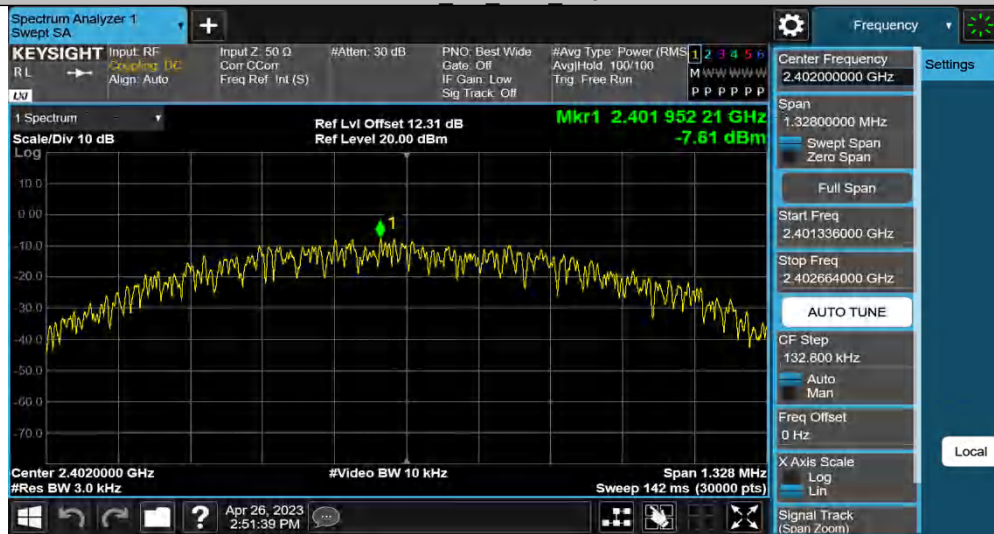
Appendix B: Test Results of Left earbud

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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	-7.81	≤8.00	PASS
		2440	-7.64	≤8.00	PASS
		2480	-8	≤8.00	PASS
BLE_2M	Ant1	2402	-10.58	≤8.00	PASS
		2440	-10.29	≤8.00	PASS
		2480	-10.68	≤8.00	PASS

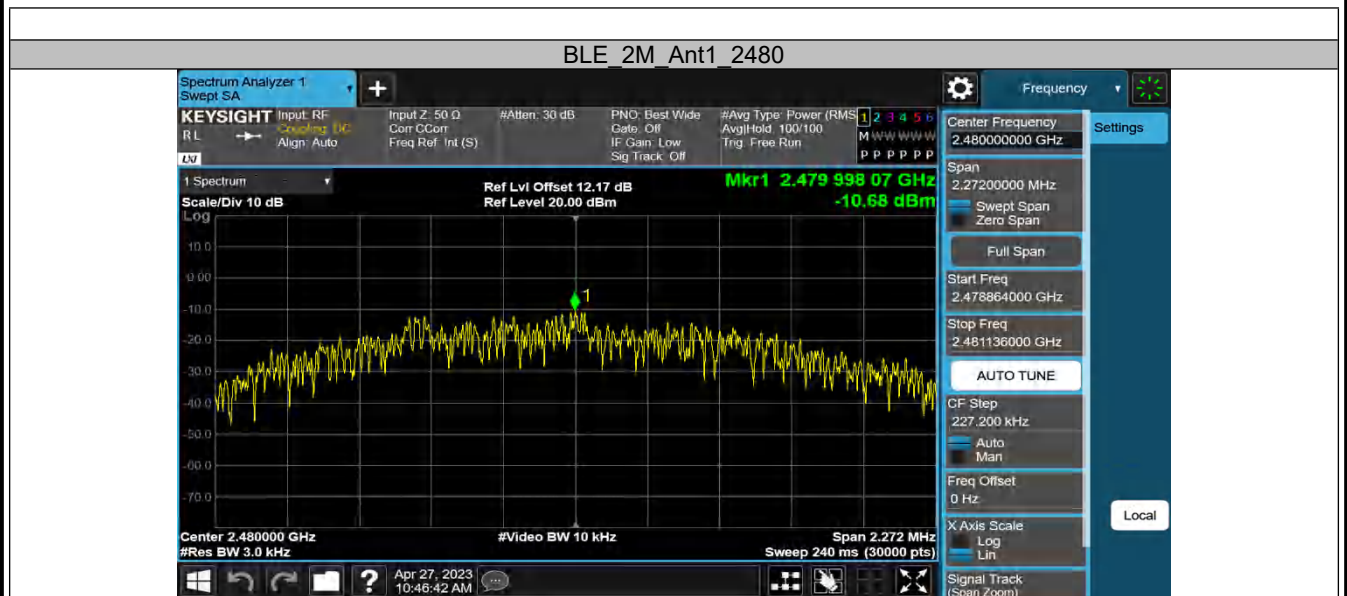
BLE 1M Ant1 2402



BLE 1M Ant1 2440







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	0.664	2401.664	2402.328	0.5	PASS
		2440	0.656	2439.672	2440.328	0.5	PASS
		2480	0.640	2479.676	2480.316	0.5	PASS
BLE_2M	Ant1	2402	1.136	2401.420	2402.556	0.5	PASS
		2440	1.132	2439.436	2440.568	0.5	PASS
		2480	1.136	2479.424	2480.560	0.5	PASS

BLE_1M Ant1 2402



BLE_1M Ant1 2440



BLE 1M Ant1 2480



BLE 2M Ant1 2402



BLE 2M Ant1 2440





Appendix B.3: Test Results of 99% Bandwidth

TestMode	Antenna	Channel	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
BLE_1M	Ant1	2402	1.0112	2401.4997	2402.5109	---	---
		2440	1.0154	2439.4967	2440.5121	---	---
		2480	1.0114	2479.4983	2480.5097	---	---
BLE_2M	Ant1	2402	1.9810	2401.0330	2403.0140	---	---
		2440	1.9873	2439.0236	2441.0109	---	---
		2480	1.9939	2479.0190	2481.0129	---	---

BLE_1M Ant1 2402



BLE_1M Ant1 2440



BLE 1M Ant1 2480



BLE 2M Ant1 2402



BLE 2M Ant1 2440





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 3.465V	2401.992	8	3.33	10
DC 3.85V	2401.987	13	5.41	
DC 4.235V	2401.986	14	5.83	

Test result of frequency tolerance of temperature variation

Temperature (°C)	Test result (MHz)	Deviation Frequency (KHz)	Test result (ppm)	Limit (ppm)
-30	2401.987	13	5.41	10
-20	2401.985	15	6.24	
-10	2401.984	16	6.66	
0	2401.989	13	5.41	
10	2401.991	9	3.75	
20	2401.987	13	5.41	
30	2401.988	12	5.00	
40	2401.984	16	6.66	
50	2401.985	15	6.24	
55	2401.981	19	7.91	

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 3.465V	2439.992	-8	-3.27869	10
DC 3.85V	2439.995	-5	-2.04918	
DC 4.235V	2439.993	-7	-2.86885	

Test result of frequency tolerance of temperature variation

Temperature (°C)	Test result (MHz)	Deviation Frequency (KHz)	Test result (ppm)	Limit (ppm)
-30	2439.993	-7	-2.86885	10
-20	2439.996	-4	-1.63934	
-10	2439.995	-5	-2.04918	
0	2439.992	-8	-3.27869	
10	2439.993	-7	-2.86885	
20	2439.991	-9	-3.68852	
30	2439.994	-6	-2.45902	
40	2439.996	-4	-1.63934	
50	2439.997	-3	-1.22951	
55	2439.994	-6	-2.45902	

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 3.465V	2479.997	-3	-1.21	10
DC 3.85V	2479.995	-5	-2.02	
DC 4.235V	2479.996	-4	-1.61	

Test result of frequency tolerance of temperature variation

Temperature (°C)	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	2479.994	-6	-2.42	
10	2479.993	-7	-2.82	
20	2479.995	-5	-2.02	
30	2479.996	-4	-1.61	
40	2479.996	-4	-1.61	
50	2479.993	-7	-2.82	
55	2479.995	-5	-2.02	

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

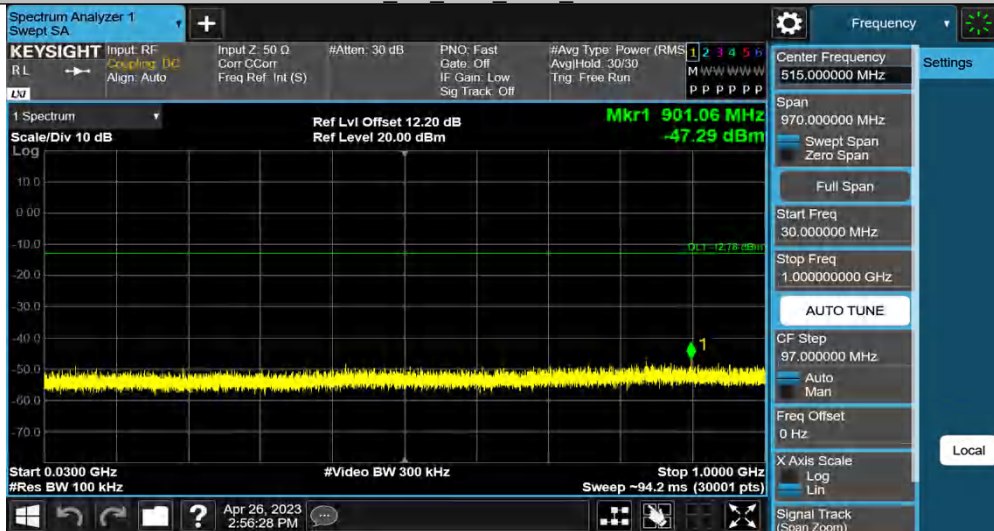
Conducted measurements

TestMode	Antenna	Channel	FreqRange [MHz]	RefLevel [dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	2402	Reference	6.60	6.60	---	PASS
			30~1000	6.60	-47.43	≤-13.4	PASS
			1000~26500	6.60	-38.83	≤-13.4	PASS
		2440	Reference	7.22	7.22	---	PASS
			30~1000	7.22	-47.29	≤-12.78	PASS
			1000~26500	7.22	-38.8	≤-12.78	PASS
		2480	Reference	7.08	7.08	---	PASS
			30~1000	7.08	-47.89	≤-12.92	PASS
			1000~26500	7.08	-38.73	≤-12.92	PASS
BLE_2M	Ant1	2402	Reference	3.22	3.22	---	PASS
			30~1000	3.22	-48.22	≤-16.78	PASS
			1000~26500	3.22	-38	≤-16.78	PASS
		2440	Reference	5.56	5.56	---	PASS
			30~1000	5.56	-48.49	≤-14.44	PASS
			1000~26500	5.56	-38.83	≤-14.44	PASS
		2480	Reference	6.27	6.27	---	PASS
			30~1000	6.27	-47.87	≤-13.73	PASS
			1000~26500	6.27	-38.41	≤-13.73	PASS

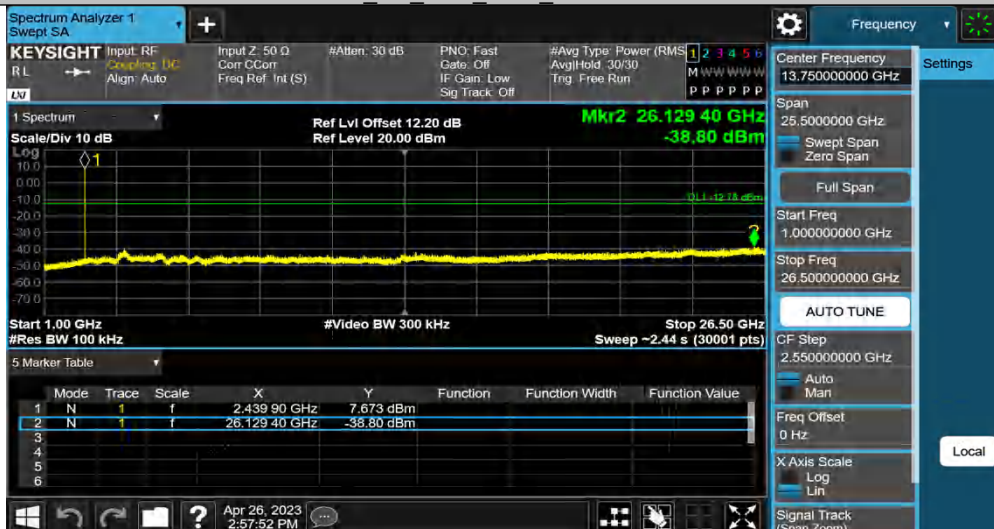




BLE_1M_Ant1_2440_30~1000

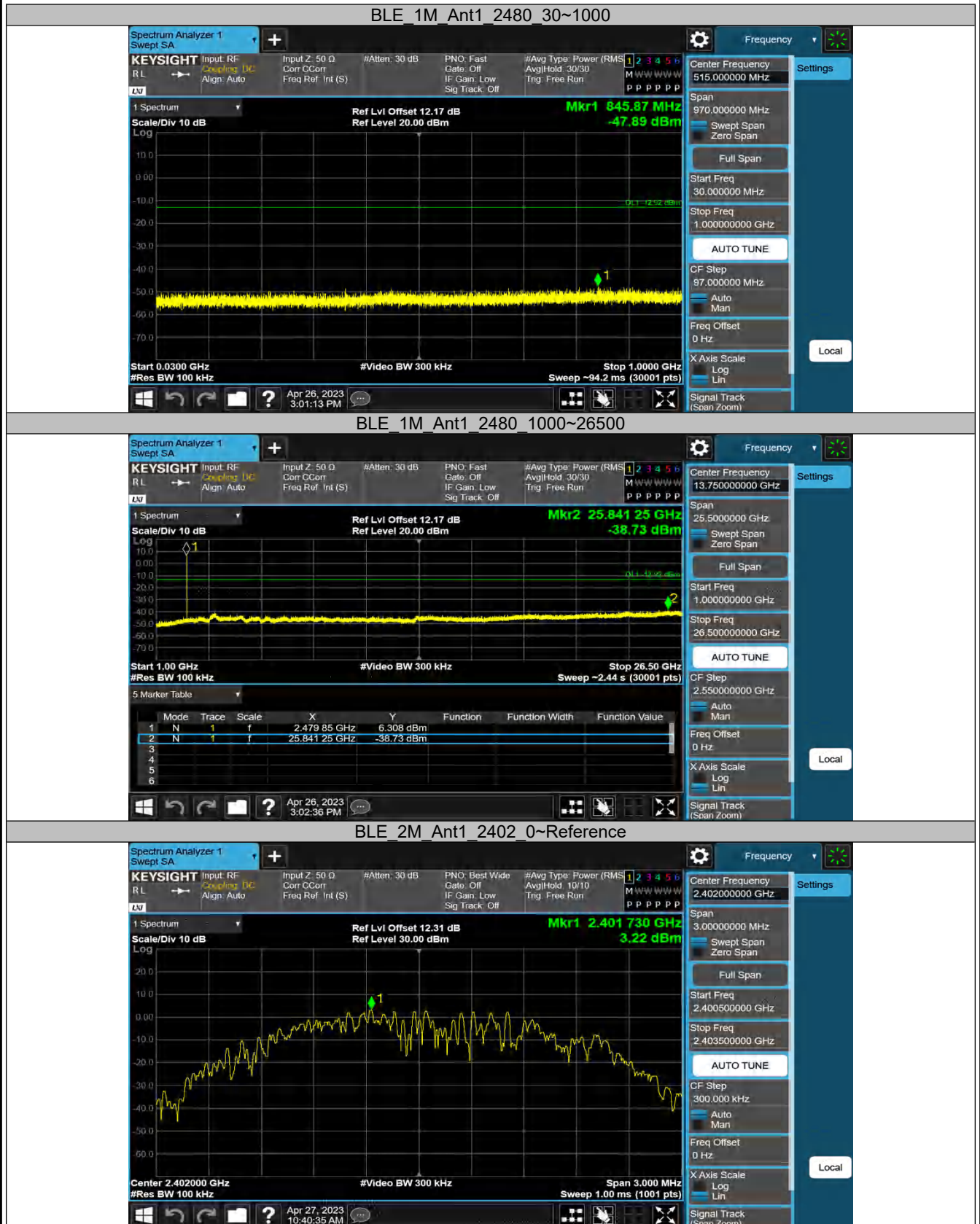


BLE_1M_Ant1_2440_1000~26500

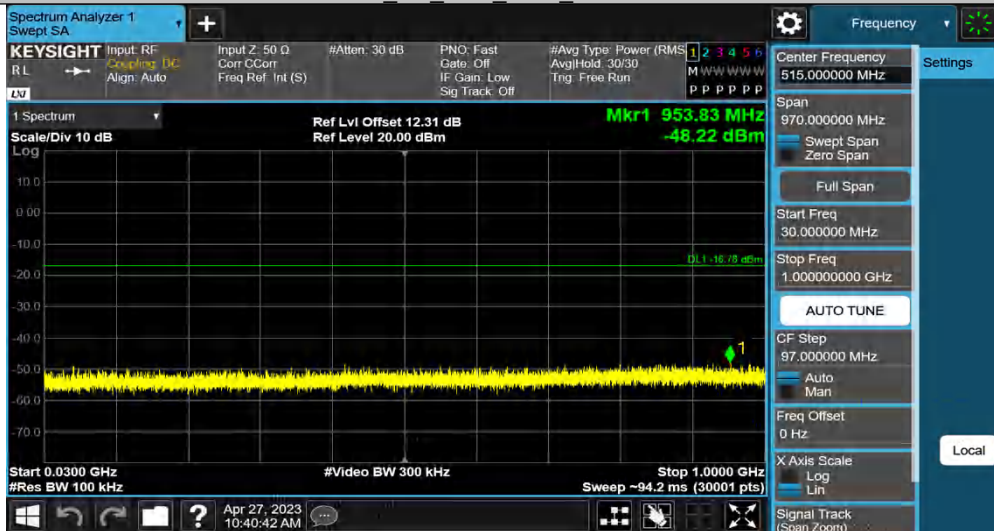


BLE_1M_Ant1_2480_0~Reference

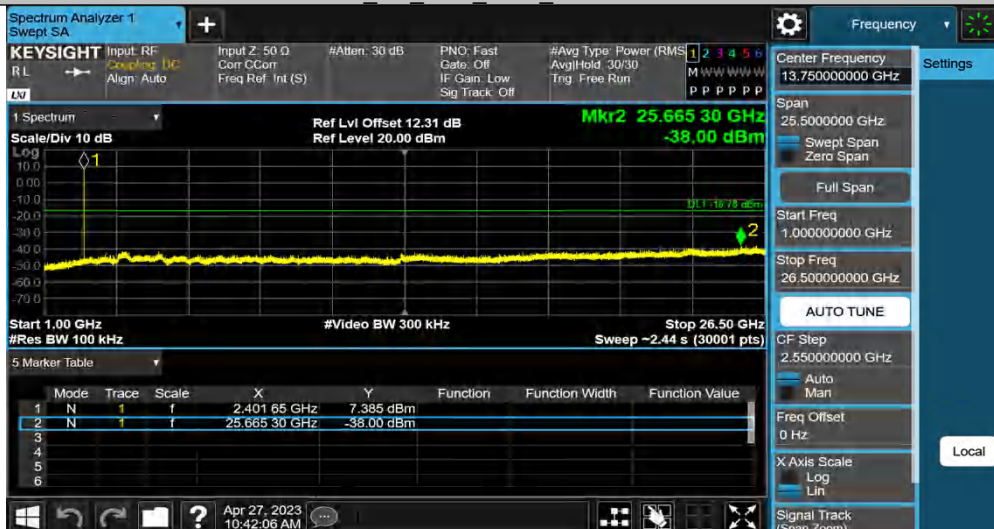




BLE_2M_Ant1_2402_30~1000



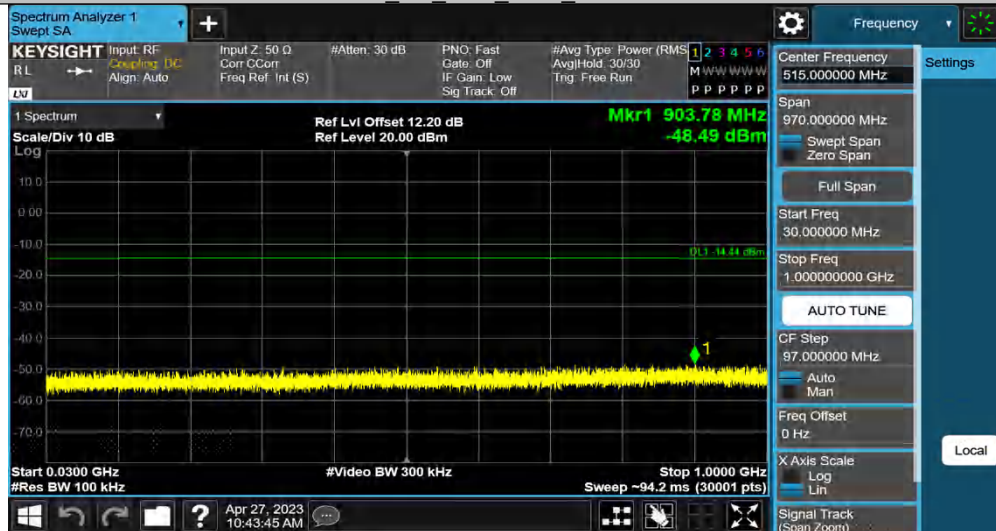
BLE_2M_Ant1_2402_1000~26500



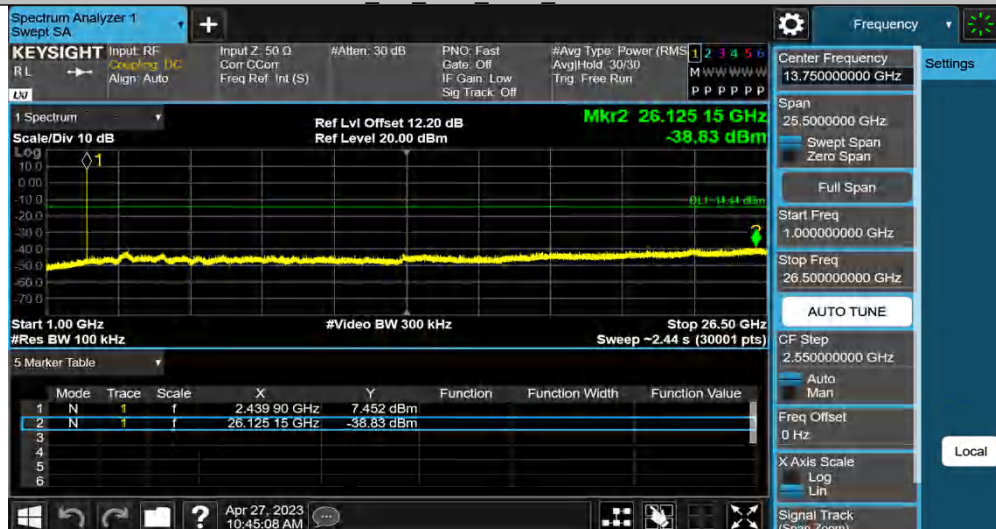
BLE_2M_Ant1_2440_0~Reference



BLE_2M_Ant1_2440_30~1000



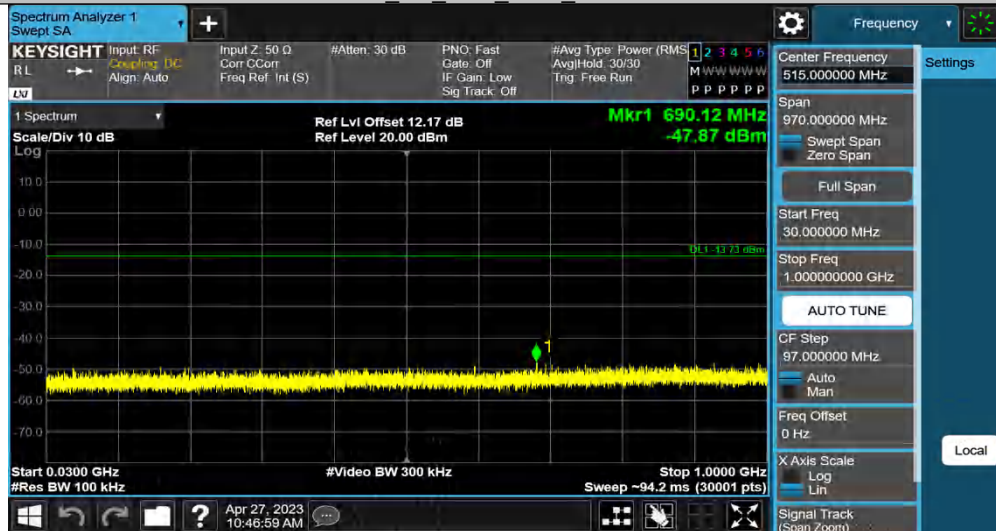
BLE_2M_Ant1_2440_1000~26500



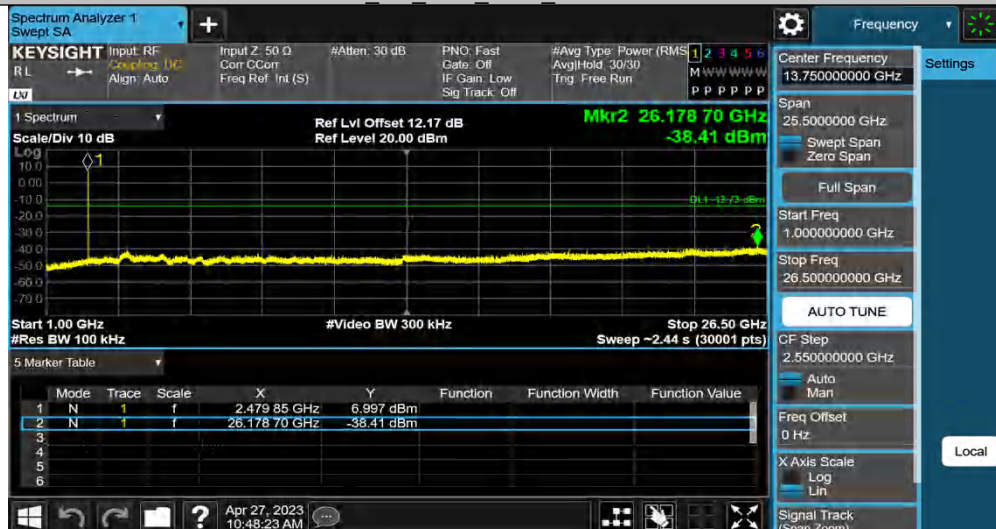
BLE_2M_Ant1_2480_0~Reference



BLE_2M_Ant1_2480_30~1000



BLE_2M_Ant1_2480_1000~26500



Band edge measurements

TestMode	Antenna	ChName	Channel	RefLevel[dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	Low	2402	7.55	-49.63	≤-12.45	PASS
		High	2480	7.21	-49.95	≤-12.79	PASS
BLE_2M	Ant1	Low	2402	7.37	-38.13	≤-12.63	PASS
		High	2480	7.16	-51.00	≤-12.84	PASS

BLE 1M Ant1 Low 2402



BLE 1M Ant1 High 2480



BLE 2M Ant1 Low 2402



BLE 2M Ant1 High 2480



Appendix B.6: Test Results of Radiated Spurious Emissions

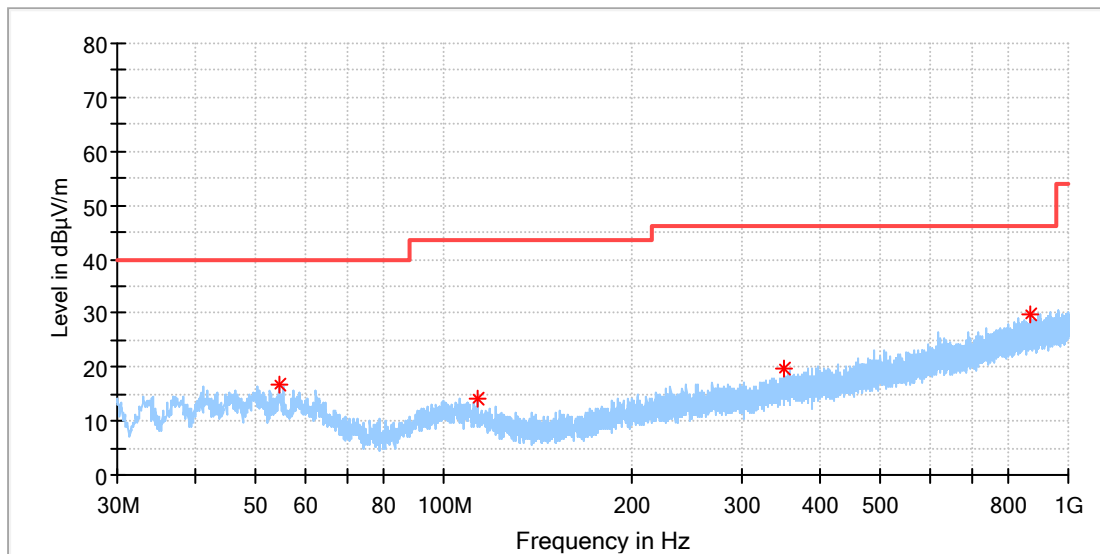
Note:

- 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:	SOUNDGEAR SENSE
Test Mode:	BLE 1M_Mid channel
Order No/Sample No:	168422487/A003454679-009
Test Voltage::	Battery
Remark:	Temp 22 Humi:55%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

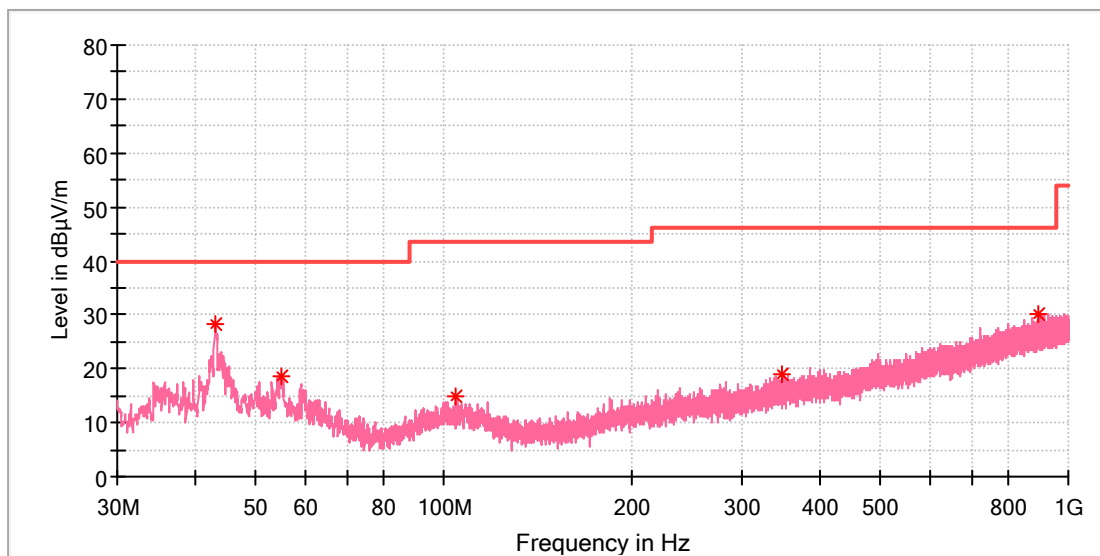


Critical Freqs

Frequency (MHz)	MaxPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
54.492500	16.68	40.00	23.32	100.0	H	321.0	-18.4
112.935000	14.06	43.50	29.44	100.0	H	216.0	-19.5
350.051500	19.55	46.00	26.45	100.0	H	122.0	-14.8
867.837500	29.88	46.00	16.12	100.0	H	345.0	-5.3

EUT Information

EUT Name:	BLUETOOTH HEADSET
Model:	SOUNDGEAR SENSE
Test Mode:	BLE 1M_Mid channel
Order No/Sample No:	168422487/A003454679-009
Test Voltage::	Battery
Remark:	Temp 22 Humi:55%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin



Critical_Freqs

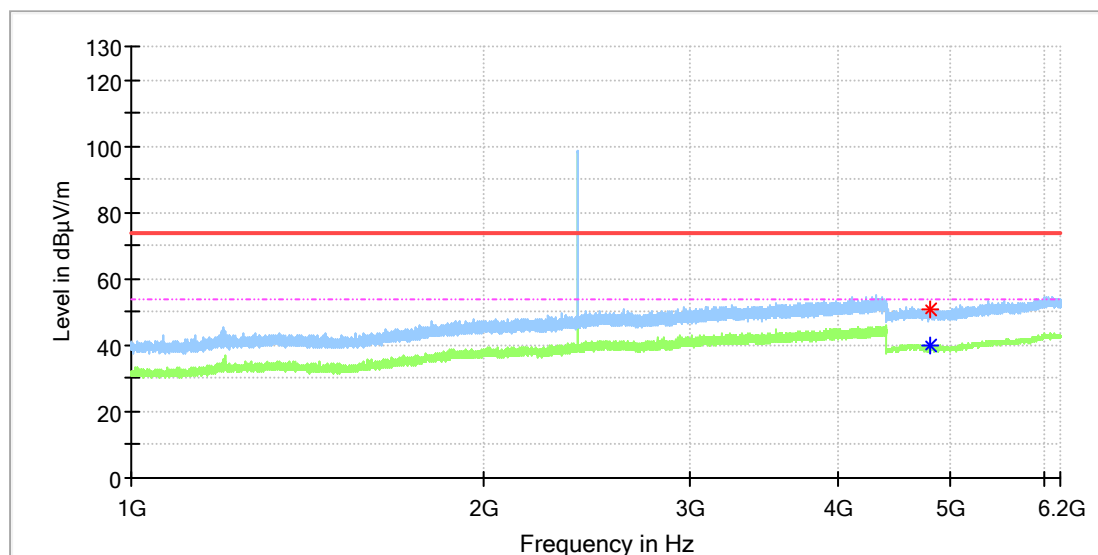
Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
42.998000	28.12	40.00	11.88	100.0	V	123.0	-19.3
54.929000	18.68	40.00	21.32	100.0	V	294.0	-18.4
104.835500	14.89	43.50	28.61	100.0	V	109.0	-18.8
347.044500	18.94	46.00	27.06	100.0	V	188.0	-14.8
891.942000	30.18	46.00	15.82	100.0	V	342.0	-5.0

1GHz - 18GHz

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

EUT Information

EUT Name:	BLUETOOTH HEADSET
Model:	SOUNDGEAR SENSE
Test Mode:	BLE 1M_Low channel
Order No/Sample No:	168422487/A003454679-009
Test Voltage::	Battery
Remark:	Temp 22 Humi:55%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

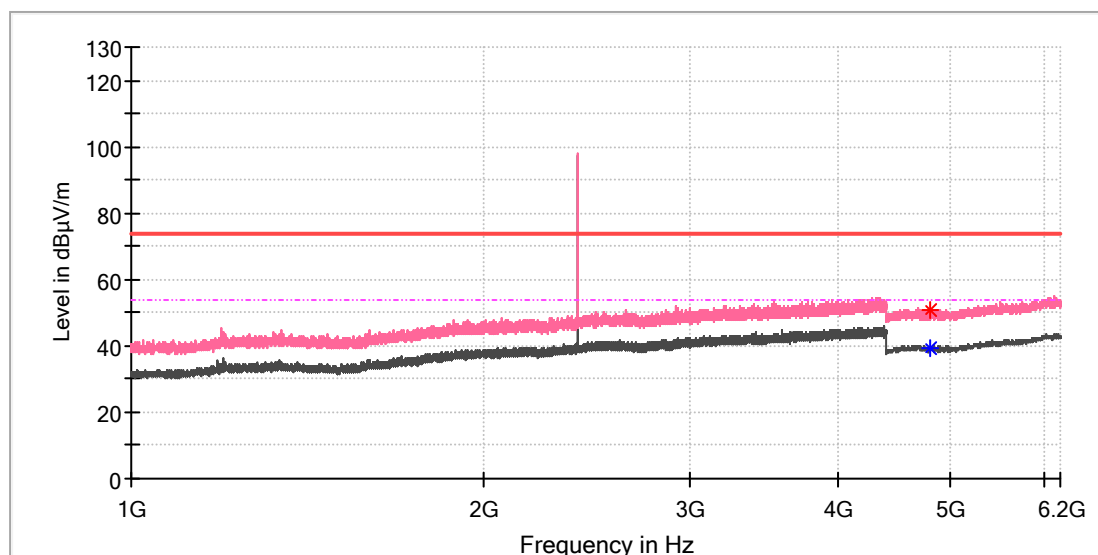


Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
4801.000000	50.59	---	74.00	23.41	100.0	H	99.0	11.8
4804.000000	---	39.97	54.00	14.03	100.0	H	235.0	11.8

EUT Information

EUT Name:	BLUETOOTH HEADSET
Model:	SOUNDGEAR SENSE
Test Mode:	BLE 1M_Low channel
Order No/Sample No:	168422487/A003454679-009
Test Voltage::	Battery
Remark:	Temp 22 Humi:55%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

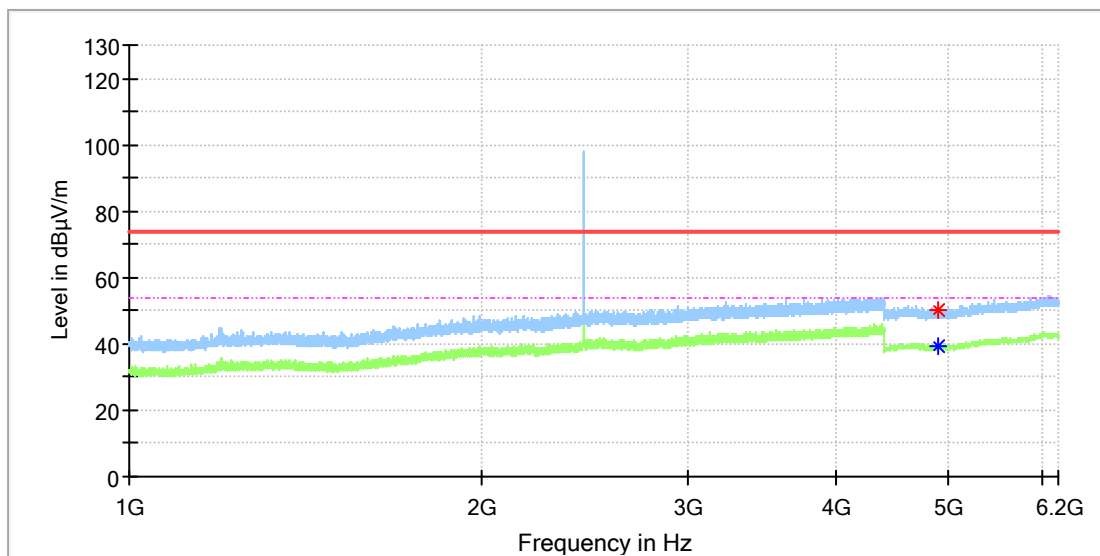


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
4800.000000	50.87	---	74.00	23.13	100.0	V	225.0	11.8
4803.000000	---	39.53	54.00	14.47	100.0	V	92.0	11.8

EUT Information

EUT Name:	BLUETOOTH HEADSET
Model:	SOUNDGEAR SENSE
Test Mode:	BLE 1M_Mid channel
Order No/Sample No:	168422487/A003454679-009
Test Voltage::	Battery
Remark:	Temp 22 Humi:55%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

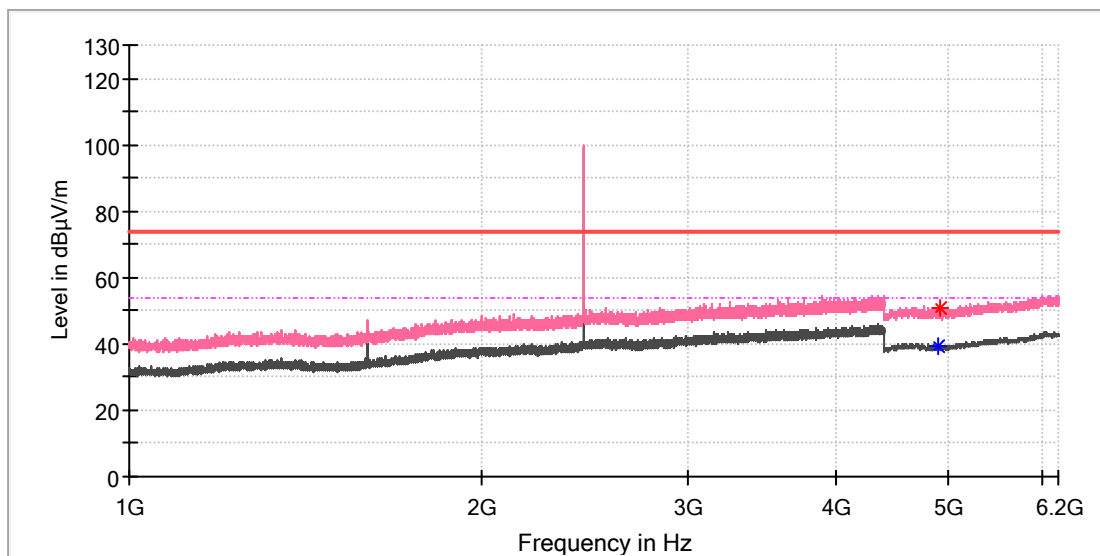


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
4898.000000	---	39.40	54.00	14.60	100.0	H	263.0	11.8
4899.000000	50.42	---	74.00	23.58	100.0	H	169.0	11.8

EUT Information

EUT Name:	BLUETOOTH HEADSET
Model:	SOUNDGEAR SENSE
Test Mode:	BLE 1M_Mid channel
Order No/Sample No:	168422487/A003454679-009
Test Voltage::	Battery
Remark:	Temp 22 Humi:55%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

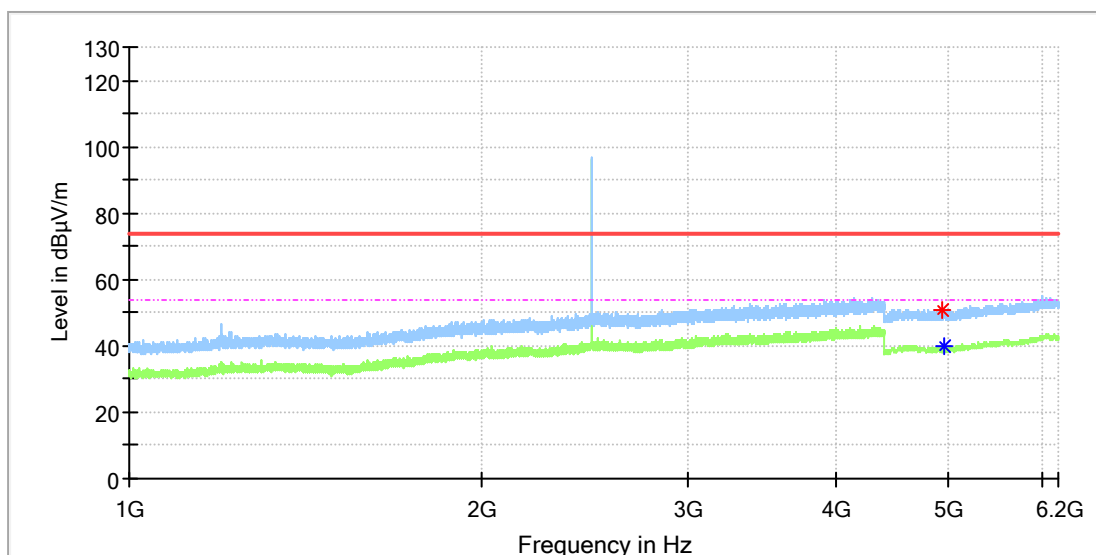


Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
4905.500000	---	39.40	54.00	14.60	100.0	V	51.0	11.8
4911.500000	50.69	---	74.00	23.31	100.0	V	64.0	11.8

EUT Information

EUT Name:	BLUETOOTH HEADSET
Model:	SOUNDGEAR SENSE
Test Mode:	BLE 1M_High channel
Order No/Sample No:	168422487/A003454679-009
Test Voltage::	Battery
Remark:	Temp 22 Humi:55%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

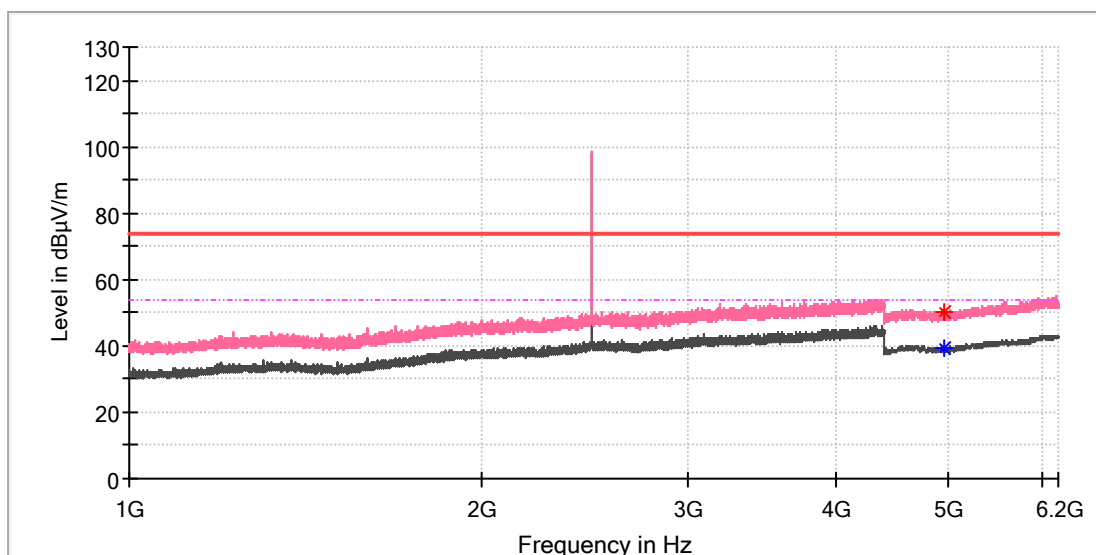


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
4936.000000	51.03	---	74.00	22.97	100.0	H	1.0	11.8
4960.000000	---	39.86	54.00	14.14	100.0	H	225.0	11.8

EUT Information

EUT Name:	BLUETOOTH HEADSET
Model:	SOUNDGEAR SENSE
Test Mode:	BLE 1M_High channel
Order No/Sample No:	168422487/A003454679-009
Test Voltage::	Battery
Remark:	Temp 22 Humi:55%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

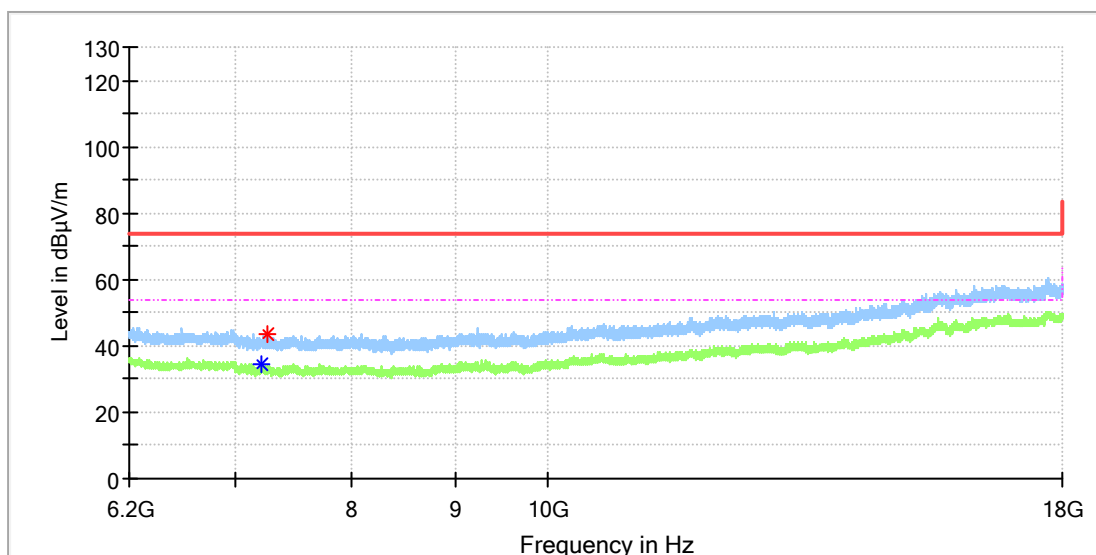


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
4962.000000	50.48	---	74.00	23.52	100.0	V	84.0	11.8
4964.000000	---	39.60	54.00	14.40	100.0	V	84.0	11.8

EUT Information

EUT Name:	BLUETOOTH HEADSET
Model:	SOUNDGEAR SENSE
Test Mode:	BLE 1M_Low channel
Order No/Sample No:	168422487/A003454679-009
Test Voltage::	Battery
Remark:	Temp 22 Humi:55%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

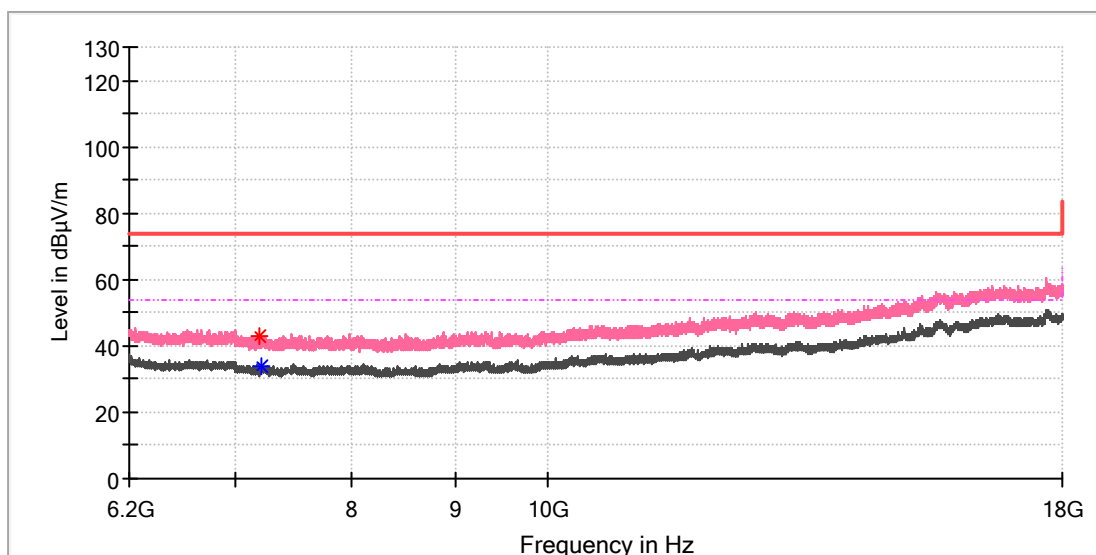


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
7204.966667	---	34.28	54.00	19.72	100.0	H	326.0	8.8
7252.166667	43.63	---	74.00	30.37	100.0	H	89.0	8.5

EUT Information

EUT Name:	BLUETOOTH HEADSET
Model:	SOUNDGEAR SENSE
Test Mode:	BLE 1M_Low channel
Order No/Sample No:	168422487/A003454679-009
Test Voltage::	Battery
Remark:	Temp 22 Humi:55%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

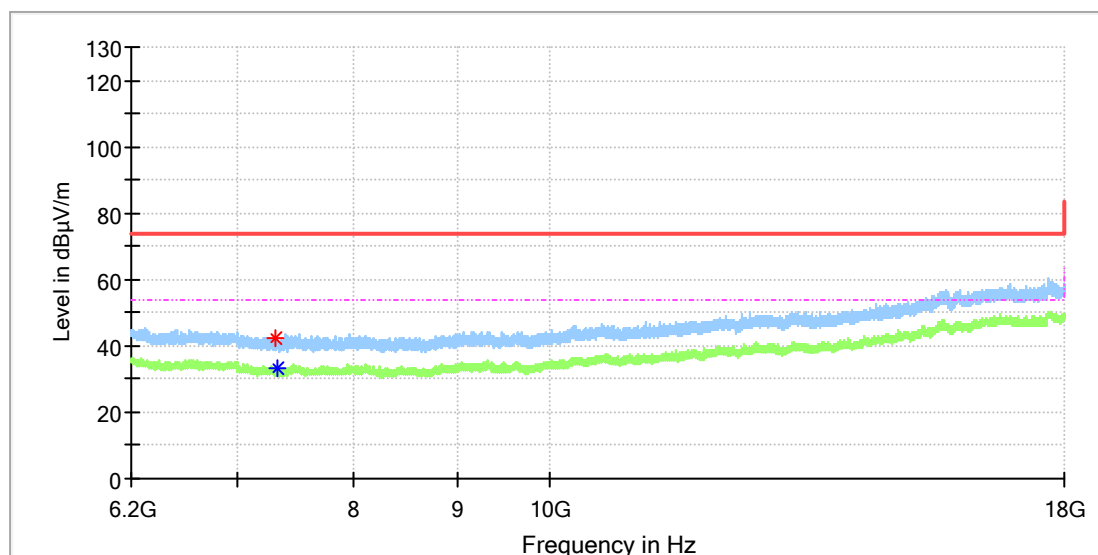


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
7198.575000	42.97	---	74.00	31.03	100.0	V	169.0	8.8
7212.833333	---	34.01	54.00	19.99	100.0	V	169.0	8.7

EUT Information

EUT Name:	BLUETOOTH HEADSET
Model:	SOUNDGEAR SENSE
Test Mode:	BLE 1M_Mid channel
Order No/Sample No:	168422487/A003454679-009
Test Voltage::	Battery
Remark:	Temp 22 Humi:55%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

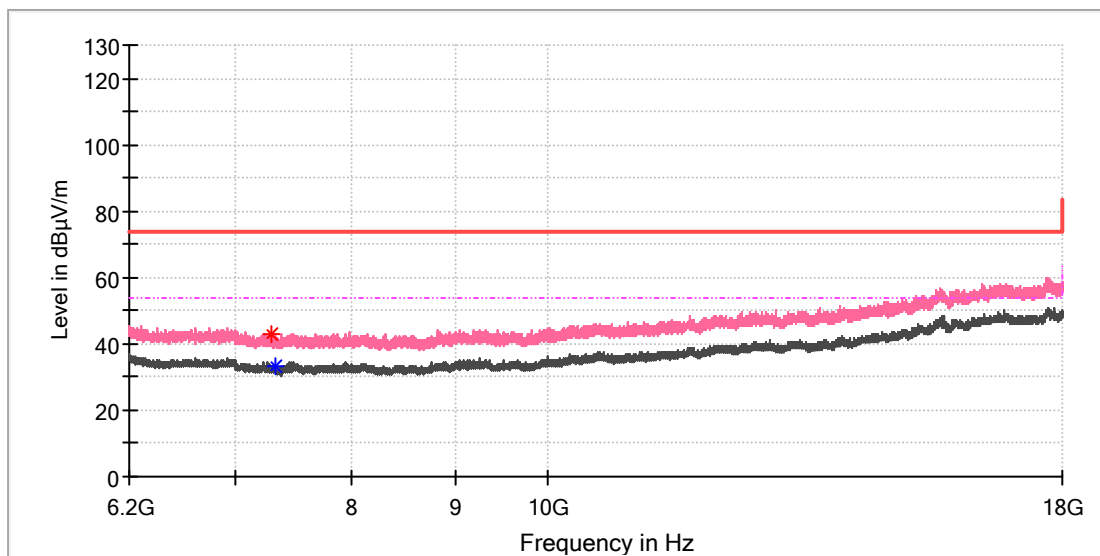


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
7307.233333	42.17	---	74.00	31.83	100.0	H	0.0	8.3
7328.375000	---	33.11	54.00	20.89	100.0	H	90.0	8.1

EUT Information

EUT Name:	BLUETOOTH HEADSET
Model:	SOUNDGEAR SENSE
Test Mode:	BLE 1M_Mid channel
Order No/Sample No:	168422487/A003454679-009
Test Voltage::	Battery
Remark:	Temp 22 Humi:55%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

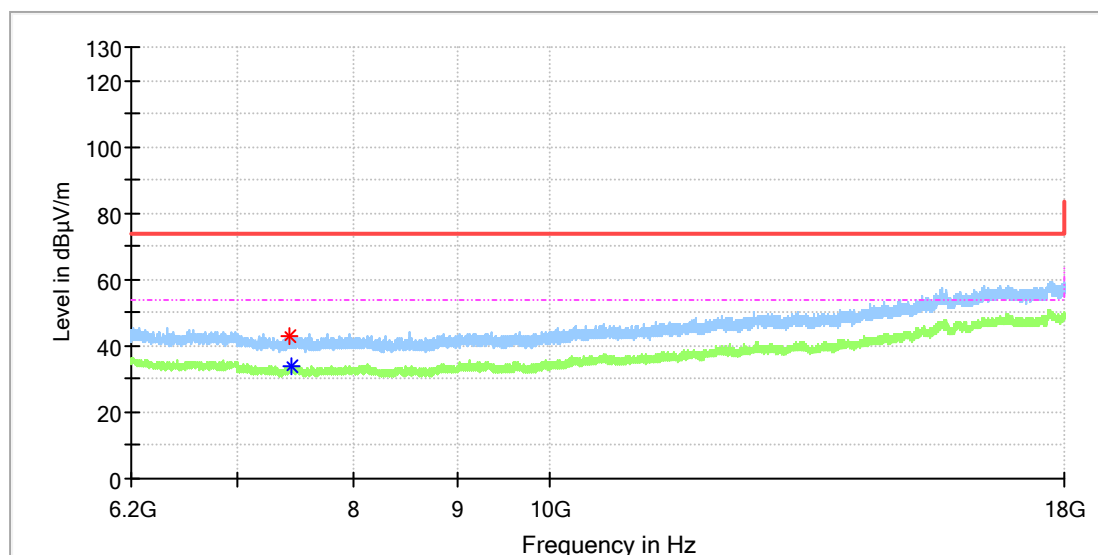


Critical_Freqs

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
7298.383333	42.85	---	74.00	31.15	100.0	V	289.0	8.3
7332.800000	---	33.08	54.00	20.92	100.0	V	202.0	8.1

EUT Information

EUT Name:	BLUETOOTH HEADSET
Model:	SOUNDGEAR SENSE
Test Mode:	BLE 1M_High channel
Order No/Sample No:	168422487/A003454679-009
Test Voltage::	Battery
Remark:	Temp 22 Humi:55%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

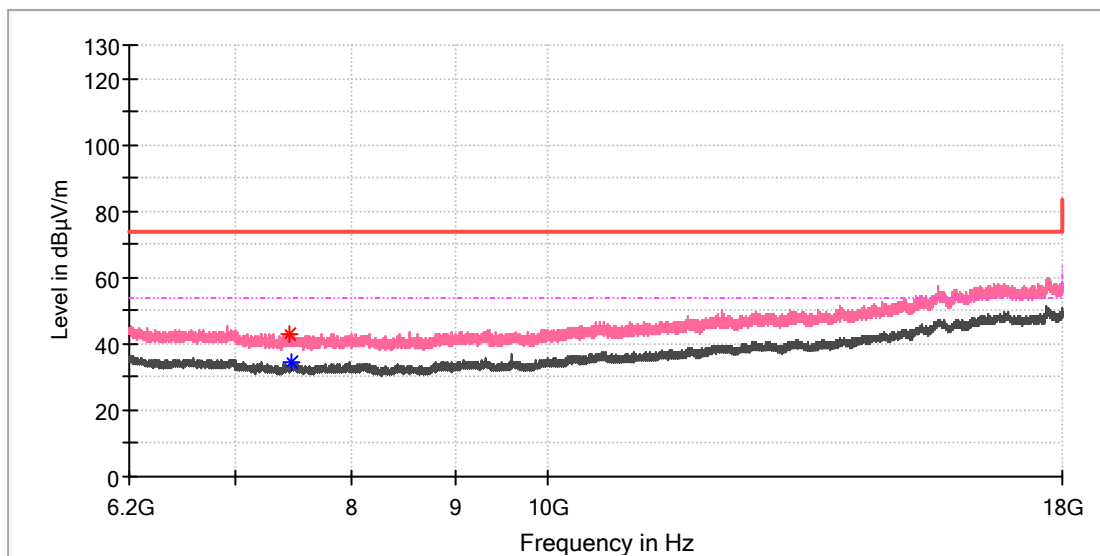


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
7428.675000	42.67	---	74.00	31.33	100.0	H	357.0	8.4
7438.508333	---	33.82	54.00	20.18	100.0	H	222.0	8.4

EUT Information

EUT Name:	BLUETOOTH HEADSET
Model:	SOUNDGEAR SENSE
Test Mode:	BLE 1M_High channel
Order No/Sample No:	168422487/A003454679-009
Test Voltage::	Battery
Remark:	Temp 22 Humi:55%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin



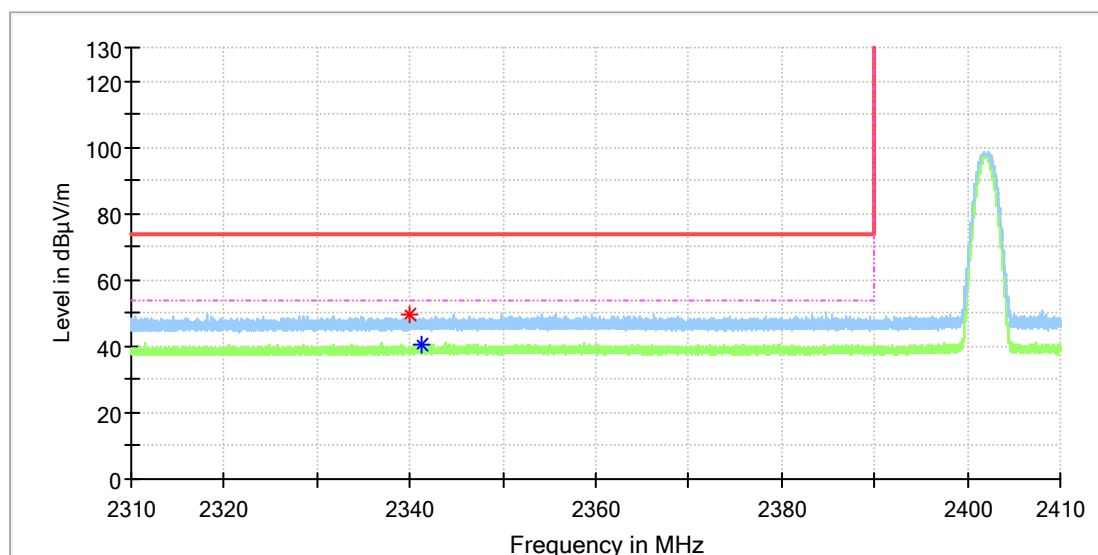
Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
7443.425000	42.87	---	74.00	31.13	100.0	V	175.0	8.5
7468.500000	---	34.26	54.00	19.74	100.0	V	198.0	8.6

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

EUT Information

EUT Name:	BLUETOOTH HEADSET
Model:	SOUNDGEAR SENSE
Test Mode:	BLE 1M_Low channel
Order No/Sample No:	168422487/A003454679-009
Test Voltage::	Battery
Remark:	Temp 22 Humi:55%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

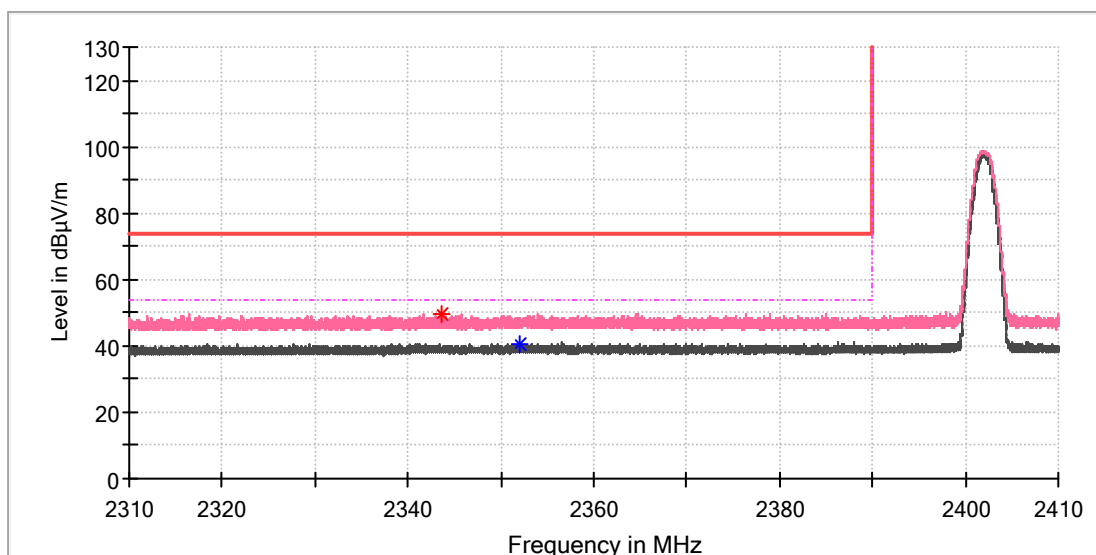


Critical Freqs

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2339.885000	49.68	---	74.00	24.32	100.0	H	109.0	6.8
2341.155000	---	40.48	54.00	13.52	100.0	H	99.0	6.8

EUT Information

EUT Name:	BLUETOOTH HEADSET
Model:	SOUNDGEAR SENSE
Test Mode:	BLE 1M_Low channel
Order No/Sample No:	168422487/A003454679-009
Test Voltage::	Battery
Remark:	Temp 22 Humi:55%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

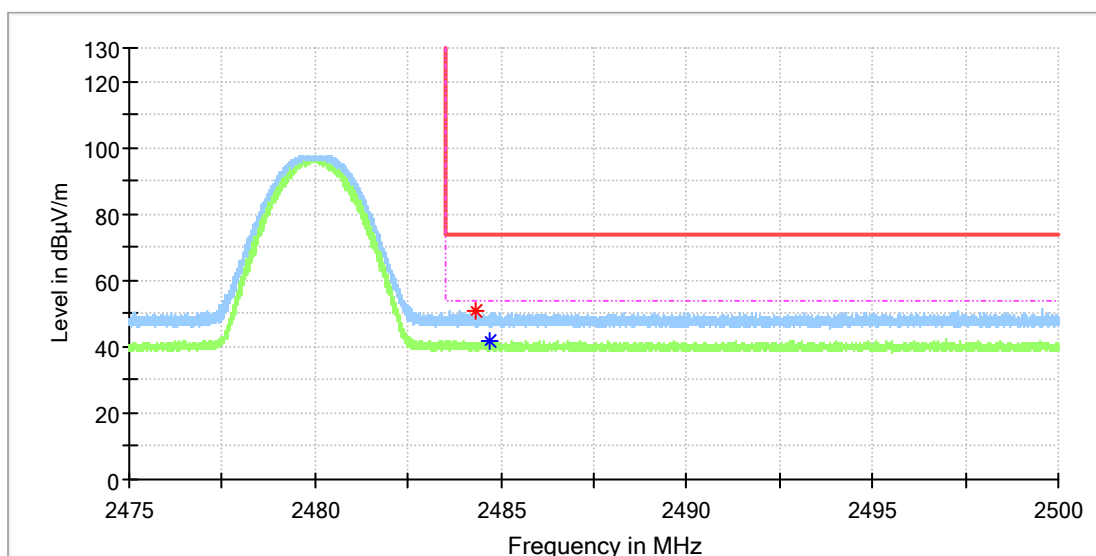


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2343.660000	49.46	---	74.00	24.54	100.0	V	0.0	6.9
2351.925000	---	40.63	54.00	13.37	100.0	V	30.0	6.9

EUT Information

EUT Name:	BLUETOOTH HEADSET
Model:	SOUNDGEAR SENSE
Test Mode:	BLE 1M_High channel
Order No/Sample No:	168422487/A003454679-009
Test Voltage::	Battery
Remark:	Temp 22 Humi:55%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

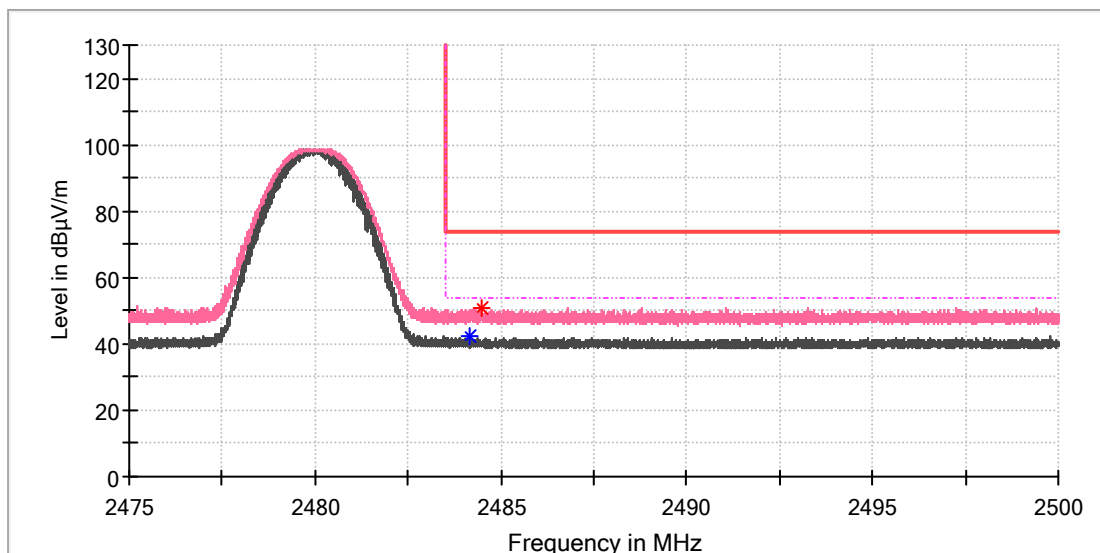


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2484.347500	50.94	---	74.00	23.06	100.0	H	302.0	7.4
2484.687500	---	41.63	54.00	12.37	100.0	H	192.0	7.4

EUT Information

EUT Name:	BLUETOOTH HEADSET
Model:	SOUNDGEAR SENSE
Test Mode:	BLE 1M_High channel
Order No/Sample No:	168422487/A003454679-009
Test Voltage::	Battery
Remark:	Temp 22 Humi:55%
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)
2484.158750	---	42.35	54.00	11.65	100.0	V	18.0	7.4
2484.486250	50.90	---	74.00	23.10	100.0	V	200.0	7.4

Appendix C: Test Results of Right earbud

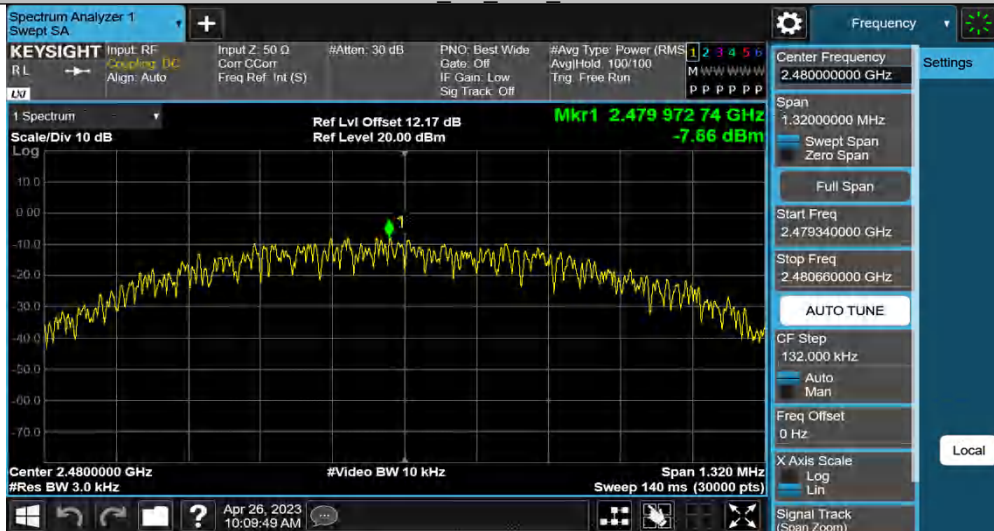
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Appendix C.1: Test Results of Conducted Power Spectral Density

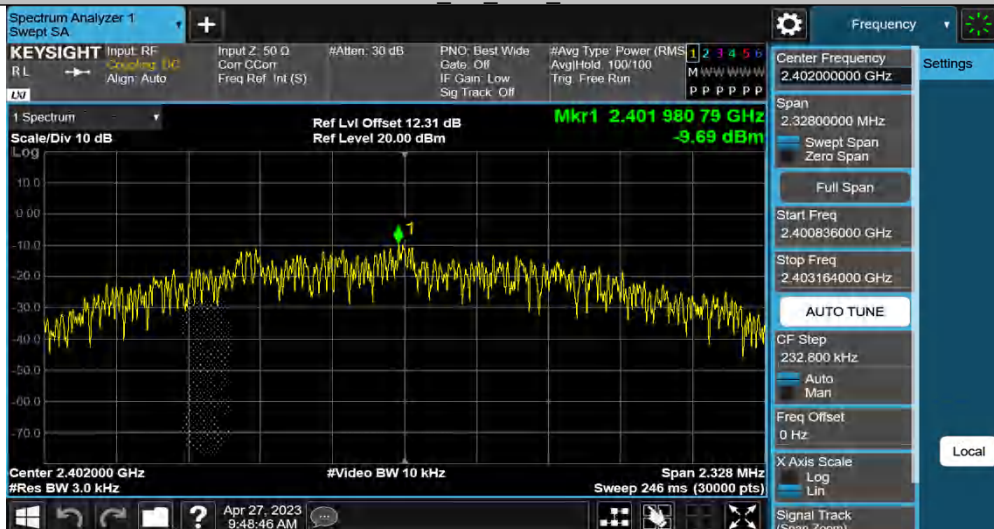
TestMode	Antenna	Channel	Result[dBm/3-100kHz]	Limit[dBm/3kHz]	Verdict
BLE_1M	Ant1	2402	-7.06	≤8.00	PASS
		2440	-7.2	≤8.00	PASS
		2480	-7.87	≤8.00	PASS
BLE_2M	Ant1	2402	-9.69	≤8.00	PASS
		2440	-9.94	≤8.00	PASS
		2480	-10.39	≤8.00	PASS



BLE 1M Ant1 2480

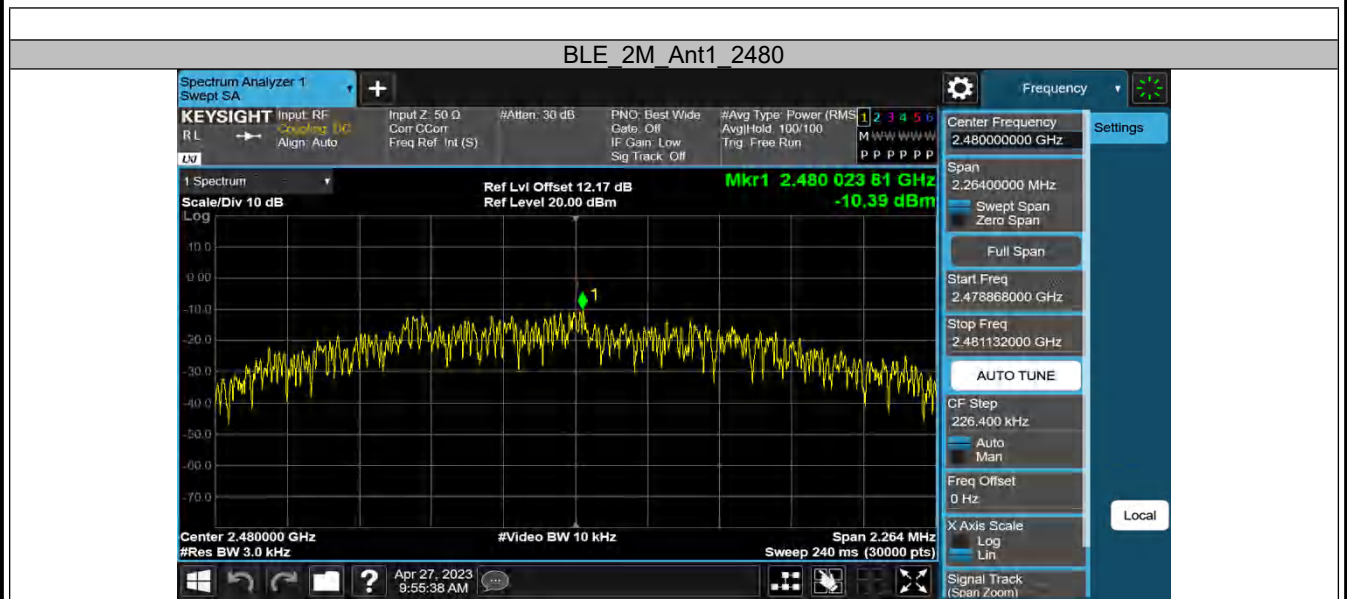


BLE 2M Ant1 2402



BLE 2M Ant1 2440





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	0.648	2401.668	2402.316	0.5	PASS
		2440	0.652	2439.664	2440.316	0.5	PASS
		2480	0.660	2479.664	2480.324	0.5	PASS
BLE_2M	Ant1	2402	1.164	2401.412	2402.576	0.5	PASS
		2440	1.116	2439.448	2440.564	0.5	PASS
		2480	1.132	2479.424	2480.556	0.5	PASS

BLE_1M Ant1 2402



BLE_1M Ant1 2440



BLE 1M Ant1 2480



BLE 2M Ant1 2402



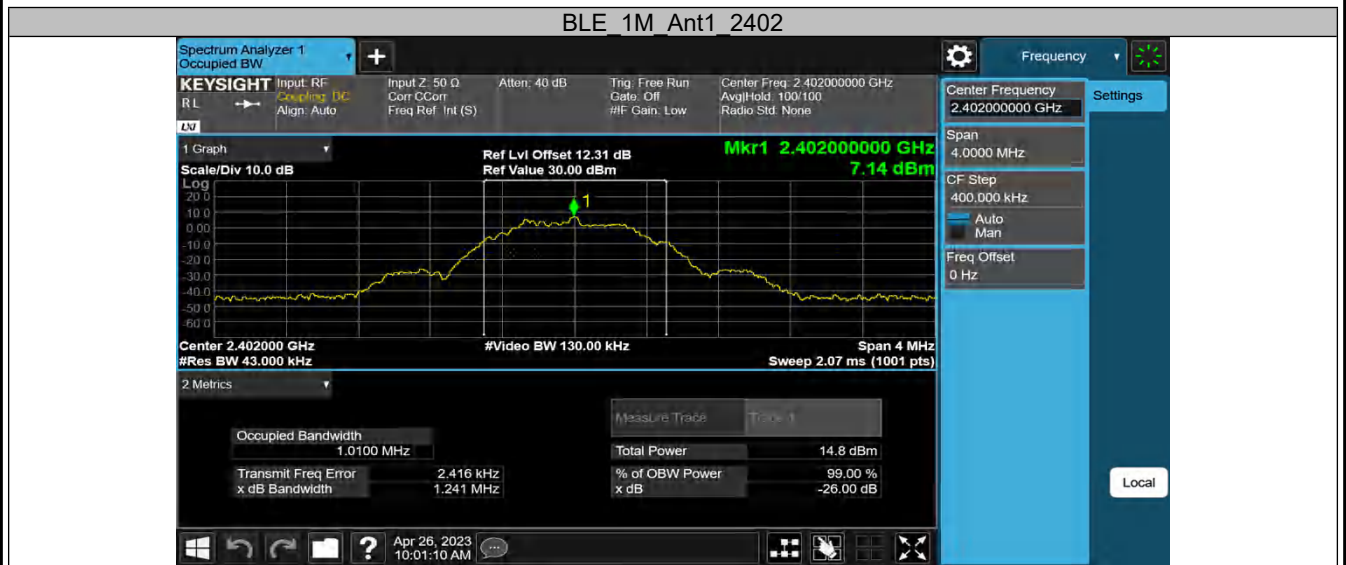
BLE 2M Ant1 2440





Appendix C.3: Test Results of 99% Bandwidth

TestMode	Antenna	Channel	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
BLE_1M	Ant1	2402	1.0100	2401.4974	2402.5074	---	---
		2440	1.0107	2439.4970	2440.5077	---	---
		2480	1.0114	2479.4954	2480.5068	---	---
BLE_2M	Ant1	2402	1.9879	2401.0202	2403.0081	---	---
		2440	1.9640	2439.0216	2440.9856	---	---
		2480	1.9827	2479.0239	2481.0066	---	---



BLE 1M Ant1 2480



BLE 2M Ant1 2402



BLE 2M Ant1 2440





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 3.465V	2401.990	10	4.16	10
DC 3.85V	2401.989	11	4.58	
DC 4.235V	2401.987	13	5.41	

Test result of frequency tolerance of temperature variation

Temperature (°C)	Test result (MHz)	Deviation Frequency (KHz)	Test result (ppm)	Limit (ppm)
-30	2401.987	13	5.41	10
-20	2401.985	15	6.24	
-10	2401.984	16	6.66	
0	2401.989	13	5.41	
10	2401.988	12	5.00	
20	2401.987	13	5.41	
30	2401.988	12	5.00	
40	2401.984	16	6.66	
50	2401.985	15	6.24	
55	2401.983	17	7.08	

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 3.465V	2439.992	-8	-3.27869	10
DC 3.85V	2439.995	-5	-2.04918	
DC 4.235V	2439.993	-7	-2.86885	

Test result of frequency tolerance of temperature variation

Temperature (°C)	Test result (MHz)	Deviation Frequency (KHz)	Test result (ppm)	Limit (ppm)
-30	2439.993	-7	-2.86885	10
-20	2439.992	-8	-3.27869	
-10	2439.995	-5	-2.04918	
0	2439.992	-8	-3.27869	
10	2439.993	-7	-2.86885	
20	2439.991	-9	-3.68852	
30	2439.994	-6	-2.45902	
40	2439.988	-12	-4.91803	
50	2439.987	-13	-5.32787	
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 3.465V	2479.995	-5	-2.02	10
DC 3.85V	2479.992	-8	-3.23	
DC 4.235V	2479.994	-6	-2.42	

Test result of frequency tolerance of temperature variation

Temperature (°C)	Test result (MHz)	Deviation Frequency (KHz)	Test result (ppm)	Limit (ppm)
-30	2479.991	-9	-3.63	10
-20	2479.992	-8	-3.23	
-10	2479.989	-11	-4.44	
0	2479.991	-9	-3.63	
10	2479.990	-10	-4.03	
20	2479.988	-12	-4.84	
30	2479.986	-14	-5.65	
40	2479.986	-14	-5.65	
50	2479.988	-12	-4.84	
55	2479.985	-15	-6.05	

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

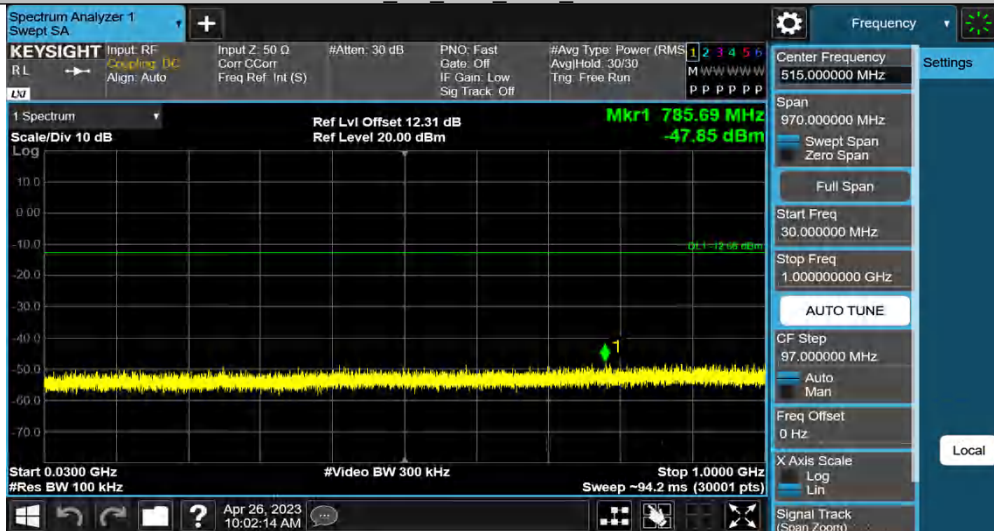
Conducted measurements

TestMode	Antenna	Channel	FreqRange [MHz]	RefLevel [dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	2402	Reference	7.34	7.34	---	PASS
			30~1000	7.34	-47.85	≤-12.66	PASS
			1000~26500	7.34	-39.01	≤-12.66	PASS
		2440	Reference	7.97	7.97	---	PASS
			30~1000	7.97	-47.08	≤-12.03	PASS
			1000~26500	7.97	-39.12	≤-12.03	PASS
		2480	Reference	7.43	7.43	---	PASS
			30~1000	7.43	-47.99	≤-12.57	PASS
			1000~26500	7.43	-37.98	≤-12.57	PASS
BLE_2M	Ant1	2402	Reference	4.57	4.57	---	PASS
			30~1000	4.57	-47.66	≤-15.43	PASS
			1000~26500	4.57	-38.44	≤-15.43	PASS
		2440	Reference	4.81	4.81	---	PASS
			30~1000	4.81	-47.4	≤-15.19	PASS
			1000~26500	4.81	-38.55	≤-15.19	PASS
		2480	Reference	6.52	6.52	---	PASS
			30~1000	6.52	-47.96	≤-13.48	PASS
			1000~26500	6.52	-38.89	≤-13.48	PASS

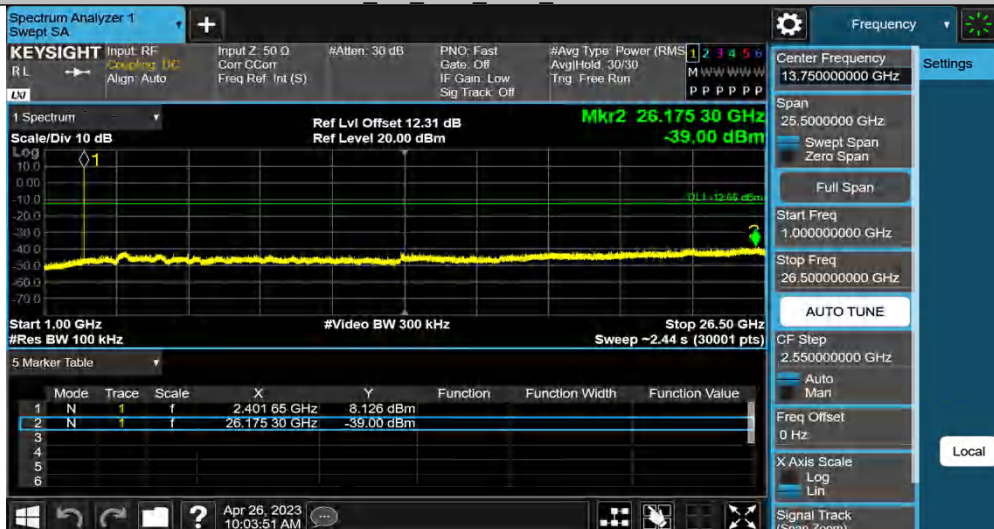
BLE_1M_Ant1_2402_0~Reference



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



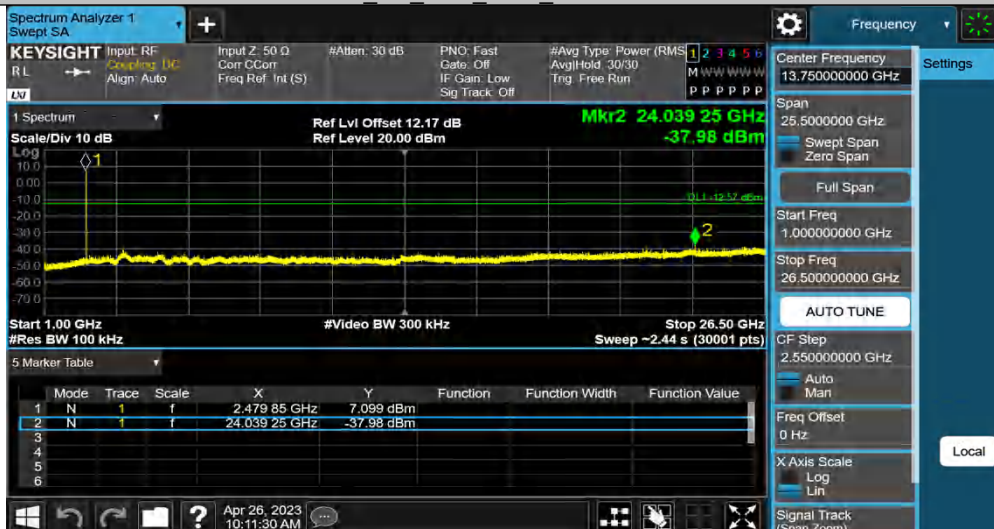
BLE_1M_Ant1_2480_0~Reference



BLE 1M Ant1 2480 30~1000



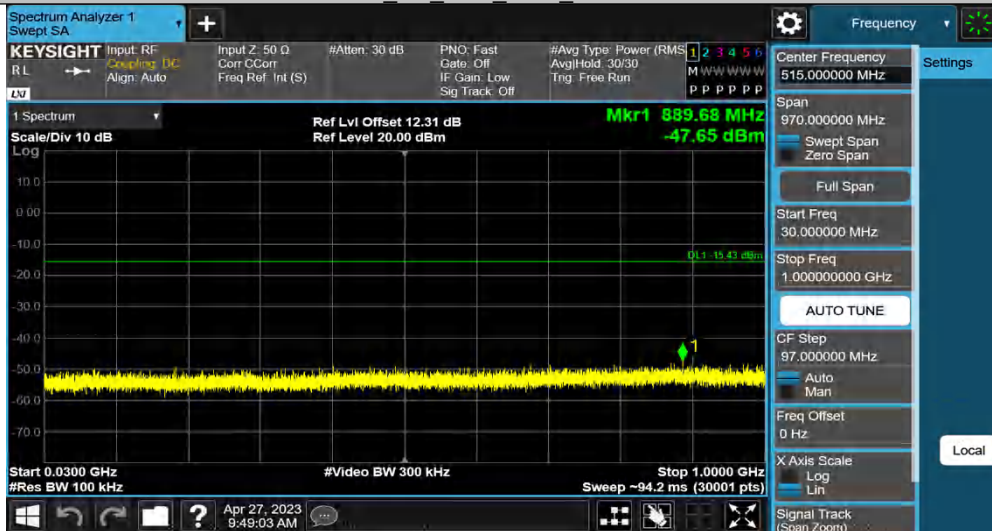
BLE 1M Ant1 2480 1000~26500



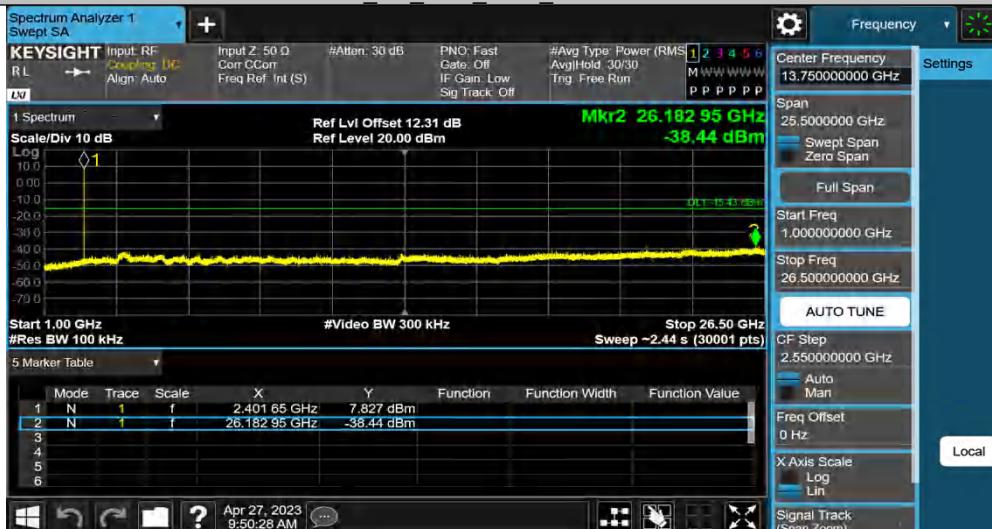
BLE 2M Ant1 2402 0~Reference



BLE 2M Ant1 2402 30~1000



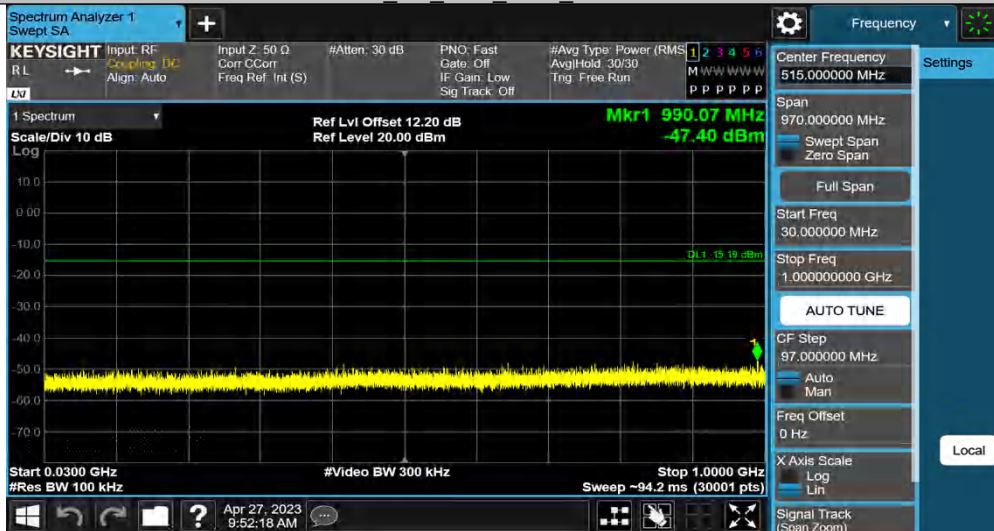
BLE 2M Ant1 2402 1000~26500



BLE 2M Ant1 2440 0~Reference



BLE_2M_Ant1_2440_30~1000

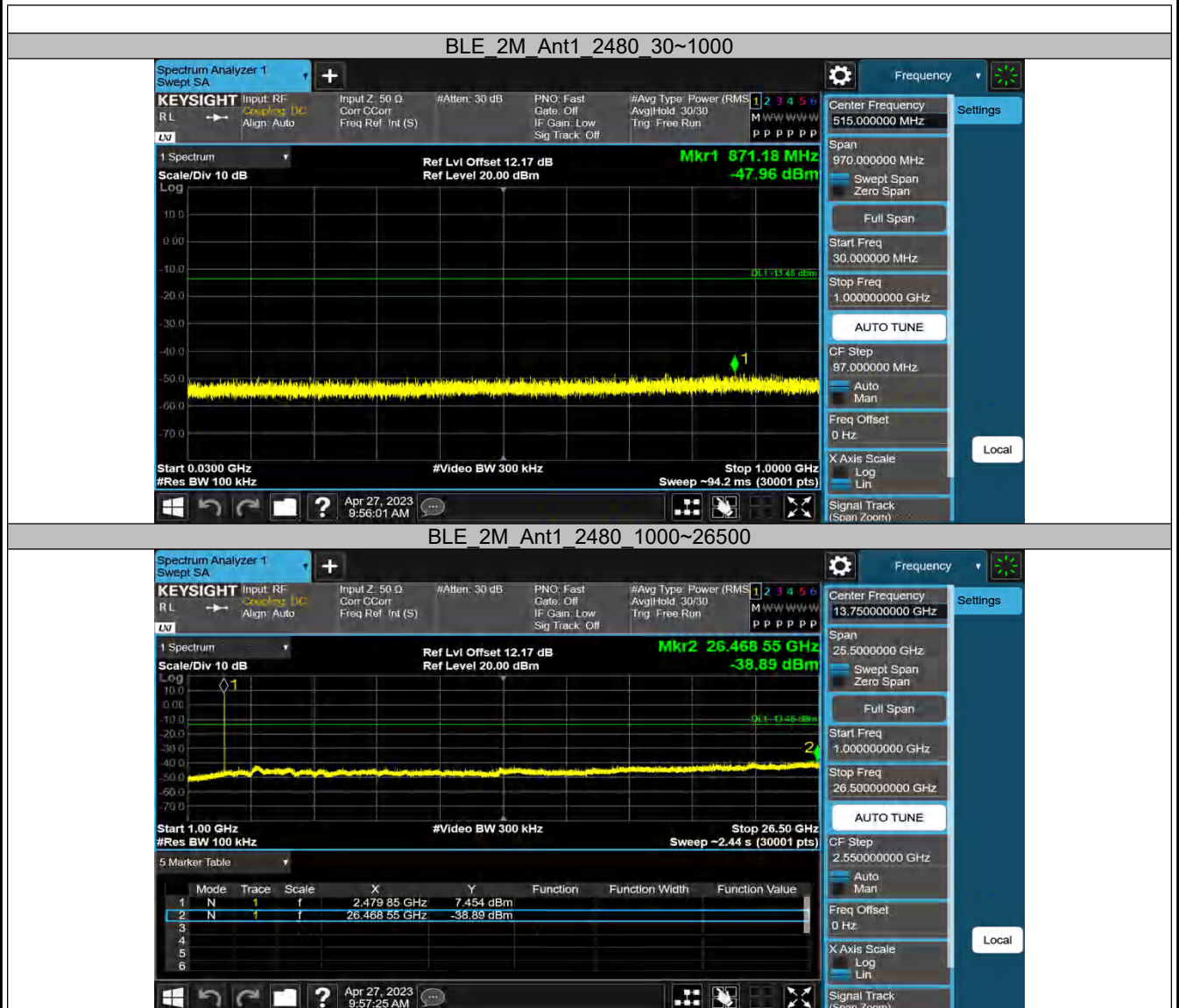


BLE_2M_Ant1_2440_1000~26500



BLE_2M_Ant1_2480_0~Reference





Band edge measurements

TestMode	Antenna	ChName	Channel	RefLevel[dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	Low	2402	8.04	-49.85	≤-11.97	PASS
		High	2480	7.60	-51.76	≤-12.40	PASS
BLE_2M	Ant1	Low	2402	7.98	-32.18	≤-12.02	PASS
		High	2480	7.29	-52.10	≤-12.72	PASS

BLE_1M_Ant1_Low_2402



BLE_1M_Ant1_High_2480



BLE 2M Ant1 Low 2402



BLE 2M Ant1 High 2480



Appendix C.6: Test Results of Radiated Spurious Emissions

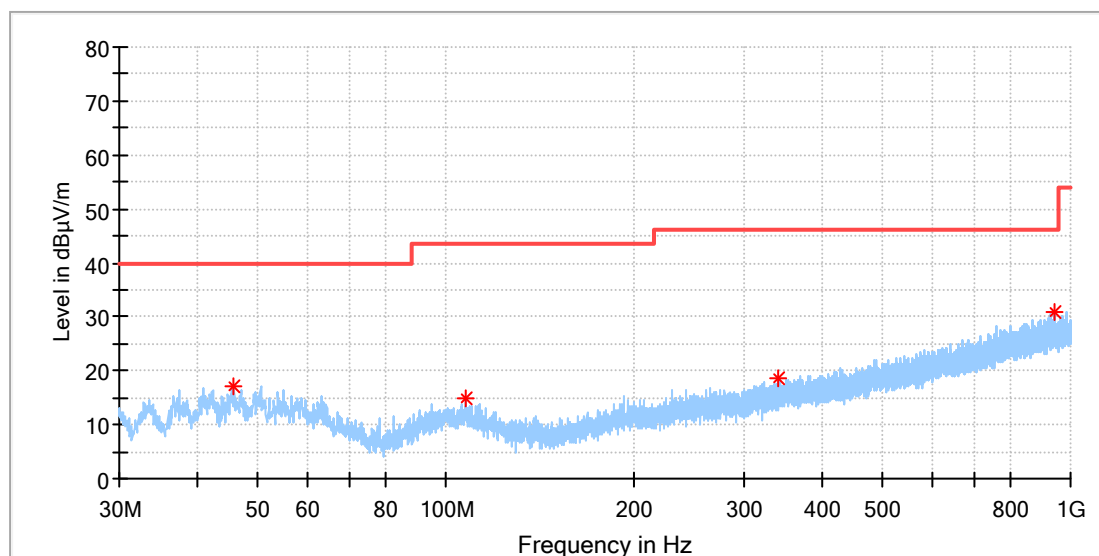
Note:

- 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:	SOUNDGEAR SENSE
Test Mode:	BLE 1M_Mid channel
Order No/Sample No:	168422487/A003454679-009
Test Voltage::	Battery
Remark:	Temp 22 Humi:55%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

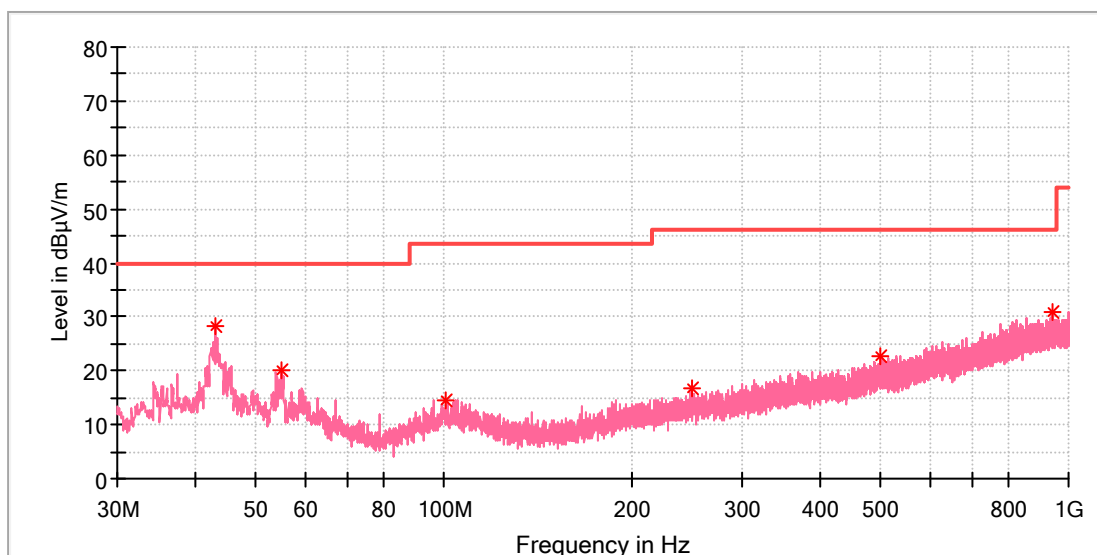


Critical Freqs

Frequency (MHz)	MaxPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
45.811000	17.14	40.00	22.86	100.0	H	342.0	-18.7
107.551500	14.78	43.50	28.72	100.0	H	295.0	-18.9
339.139000	18.68	46.00	27.32	100.0	H	301.0	-15.0
945.292000	30.92	46.00	15.08	100.0	H	142.0	-4.5

EUT Information

EUT Name:	BLUETOOTH HEADSET
Model:	SOUNDGEAR SENSE
Test Mode:	BLE 1M_Mid channel
Order No/Sample No:	168422487/A003454679-009
Test Voltage::	Battery
Remark:	Temp 22 Humi:55%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin



Critical_Freqs

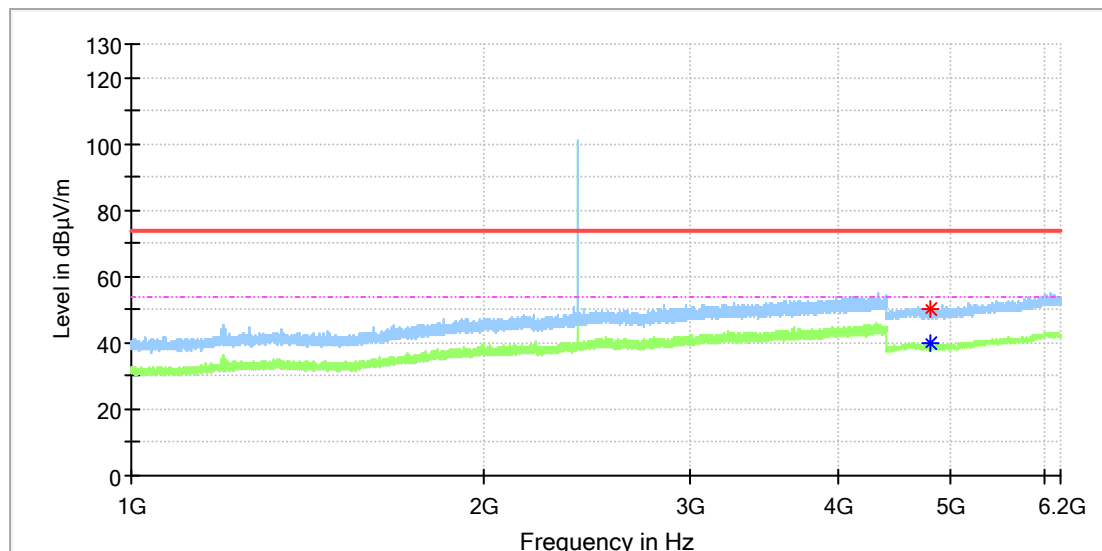
Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
43.095000	28.19	40.00	11.81	100.0	V	142.0	-19.3
55.026000	19.94	40.00	20.06	100.0	V	55.0	-18.4
100.955500	14.54	43.50	28.96	100.0	V	55.0	-18.9
249.850500	16.58	46.00	29.42	100.0	V	359.0	-17.4
501.032000	22.79	46.00	23.21	100.0	V	6.0	-11.8
940.054000	30.93	46.00	15.07	100.0	V	353.0	-4.5

1GHz-18GHz

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

EUT Information

EUT Name:	BLUETOOTH HEADSET
Model:	SOUNDGEAR SENSE
Test Mode:	BLE 1M_Low channel
Order No/Sample No:	168422487/A003454679-009
Test Voltage::	Battery
Remark:	Temp 22 Humi:55%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

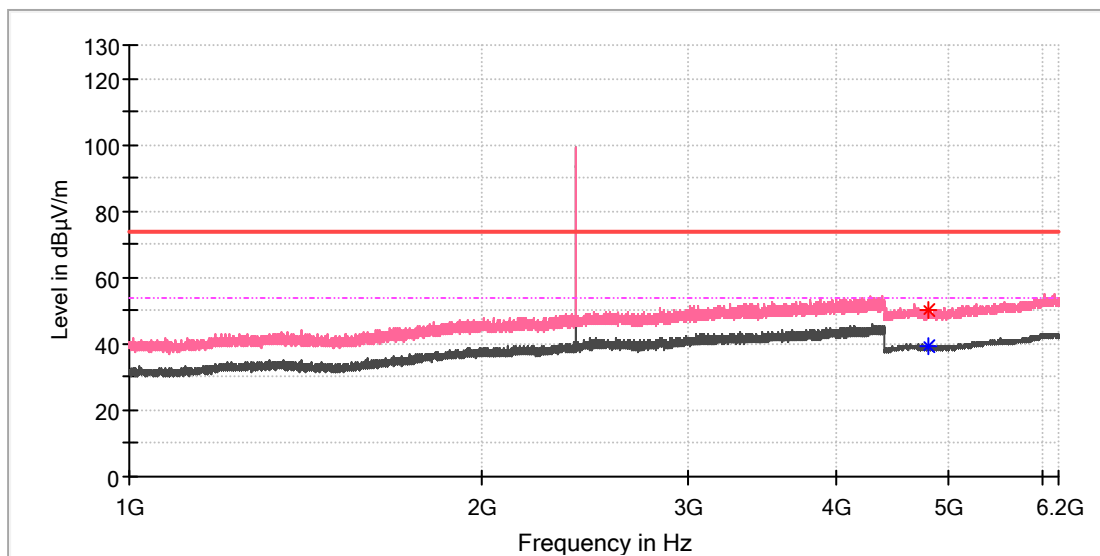


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
4804.000000	---	40.01	54.00	13.99	100.0	H	85.0	11.8
4809.000000	49.92	---	74.00	24.08	100.0	H	28.0	11.8

EUT Information

EUT Name:	BLUETOOTH HEADSET
Model:	SOUNDGEAR SENSE
Test Mode:	BLE 1M_Low channel
Order No/Sample No:	168422487/A003454679-009
Test Voltage::	Battery
Remark:	Temp 22 Humi:55%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

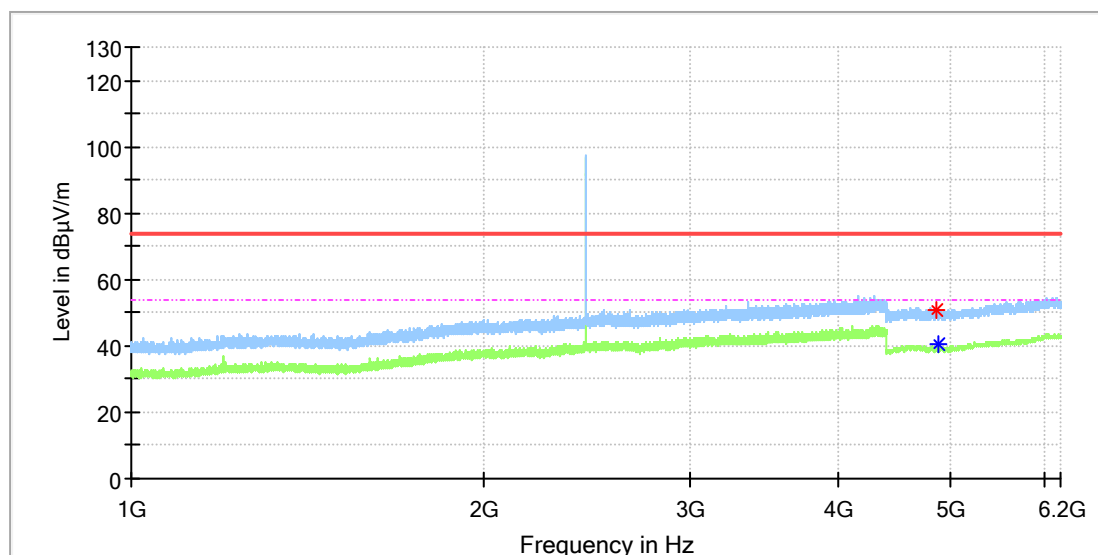


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
4805.000000	49.96	---	74.00	24.04	100.0	V	249.0	11.8
4807.500000	---	39.44	54.00	14.56	100.0	V	153.0	11.8

EUT Information

EUT Name:	BLUETOOTH HEADSET
Model:	SOUNDGEAR SENSE
Test Mode:	BLE 1M_Mid channel
Order No/Sample No:	168422487/A003454679-009
Test Voltage::	Battery
Remark:	Temp 22 Humi:55%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

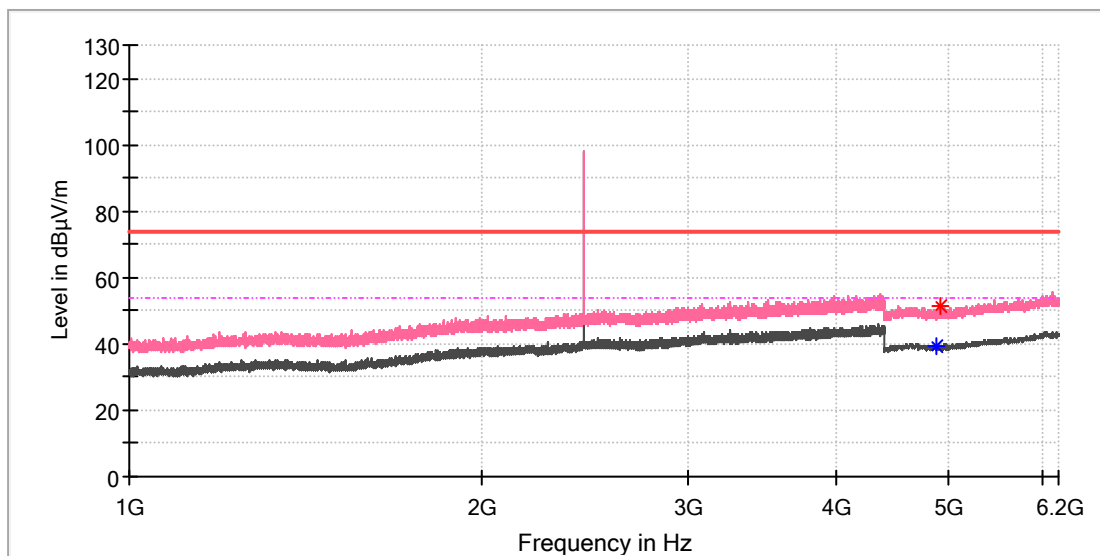


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
4850.500000	51.07	---	74.00	22.94	100.0	H	48.0	11.8
4880.000000	---	40.26	54.00	13.74	100.0	H	60.0	11.8

EUT Information

EUT Name:	BLUETOOTH HEADSET
Model:	SOUNDGEAR SENSE
Test Mode:	BLE 1M_Mid channel
Order No/Sample No:	168422487/A003454679-009
Test Voltage::	Battery
Remark:	Temp 22 Humi:55%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

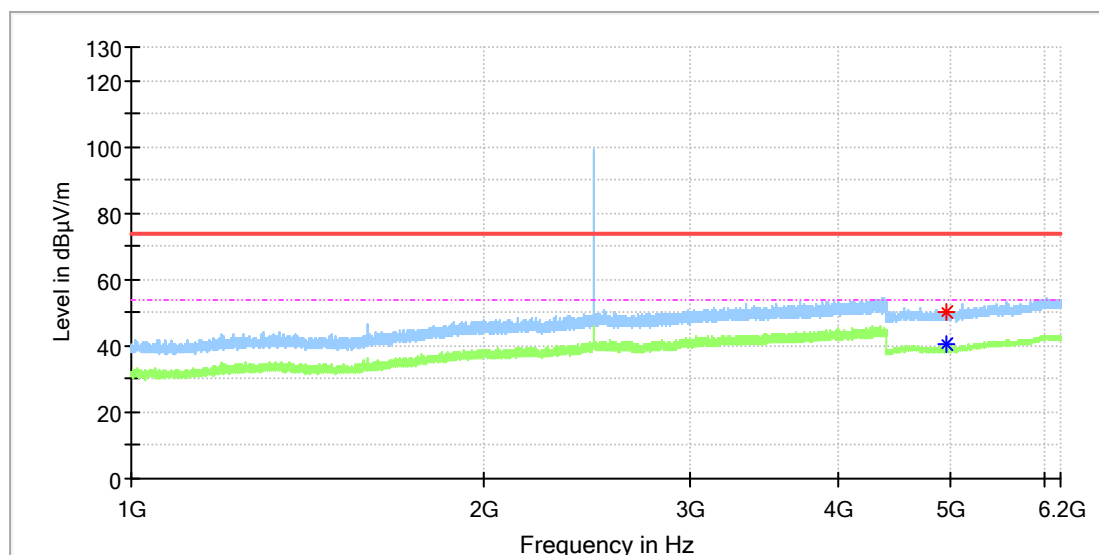


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
4872.500000	---	39.21	54.00	14.79	100.0	V	19.0	11.8
4914.500000	51.25	---	74.00	22.75	100.0	V	182.0	11.8

EUT Information

EUT Name:	BLUETOOTH HEADSET
Model:	SOUNDGEAR SENSE
Test Mode:	BLE 1M_High channel
Order No/Sample No:	168422487/A003454679-009
Test Voltage::	Battery
Remark:	Temp 22 Humi:55%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

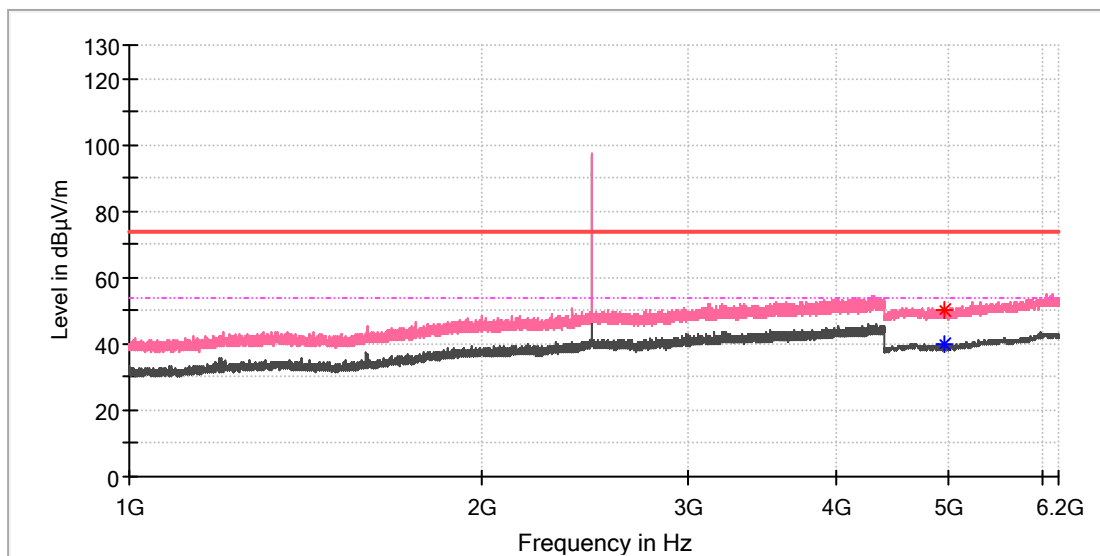


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
4960.000000	---	40.35	54.00	13.65	100.0	H	330.0	11.8
4961.500000	50.07	---	74.00	23.93	100.0	H	204.0	11.8

EUT Information

EUT Name:	BLUETOOTH HEADSET
Model:	SOUNDGEAR SENSE
Test Mode:	BLE 1M_High channel
Order No/Sample No:	168422487/A003454679-009
Test Voltage::	Battery
Remark:	Temp 22 Humi:55%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

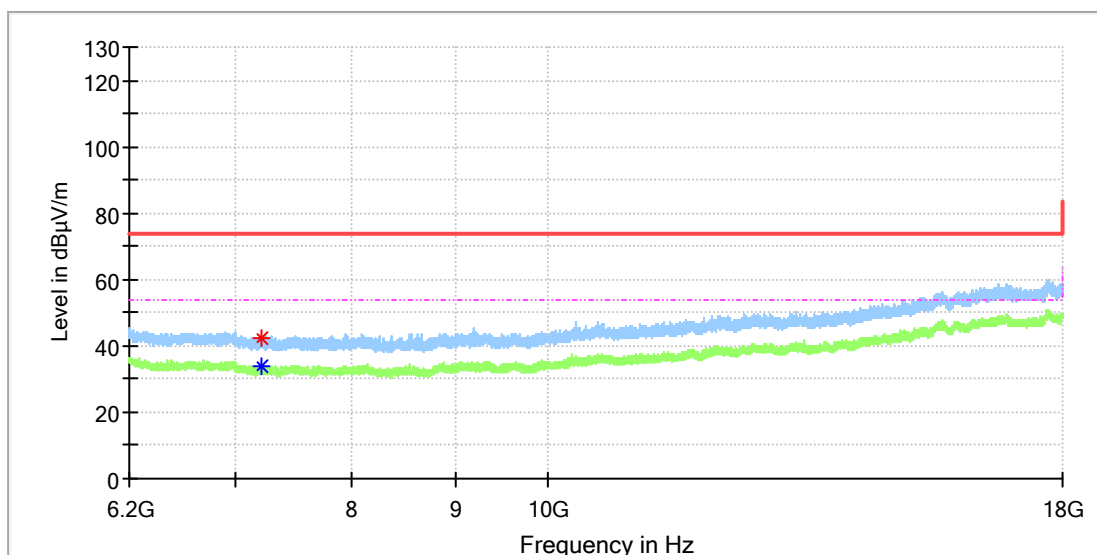


Critical_Freqs

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
4958.000000	---	39.81	54.00	14.19	100.0	V	237.0	11.8
4963.500000	49.95	---	74.00	24.05	100.0	V	207.0	11.8

EUT Information

EUT Name:	BLUETOOTH HEADSET
Model:	SOUNDGEAR SENSE
Test Mode:	BLE 1M_Low channel
Order No/Sample No:	168422487/A003454679-009
Test Voltage::	Battery
Remark:	Temp 22 Humi:55%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

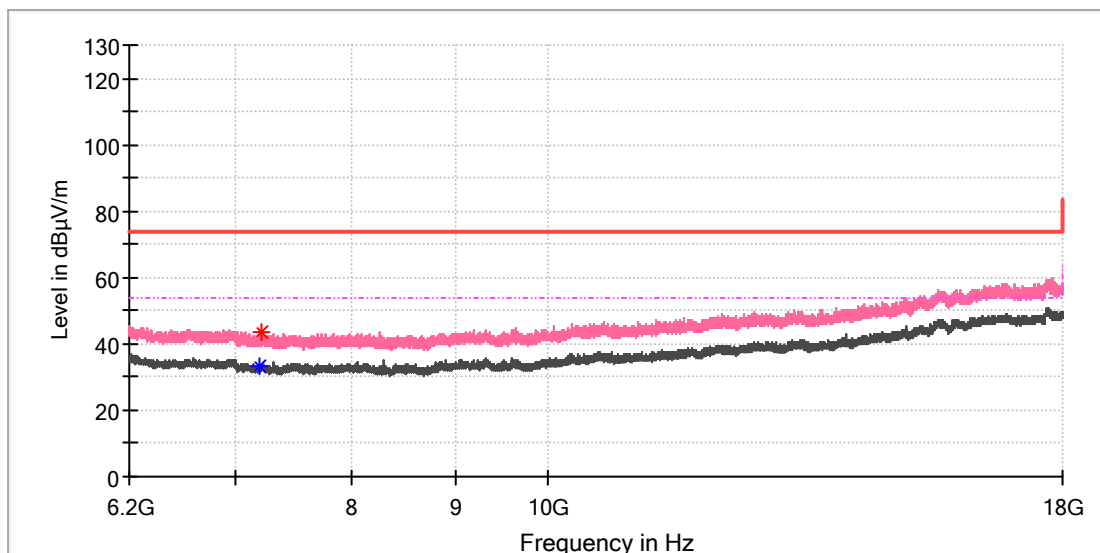


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
7206.441667	---	33.74	54.00	20.26	100.0	H	14.0	8.8
7214.308333	42.30	---	74.00	31.70	100.0	H	25.0	8.7

EUT Information

EUT Name:	BLUETOOTH HEADSET
Model:	SOUNDGEAR SENSE
Test Mode:	BLE 1M_Low channel
Order No/Sample No:	168422487/A003454679-009
Test Voltage::	Battery
Remark:	Temp 22 Humi:55%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

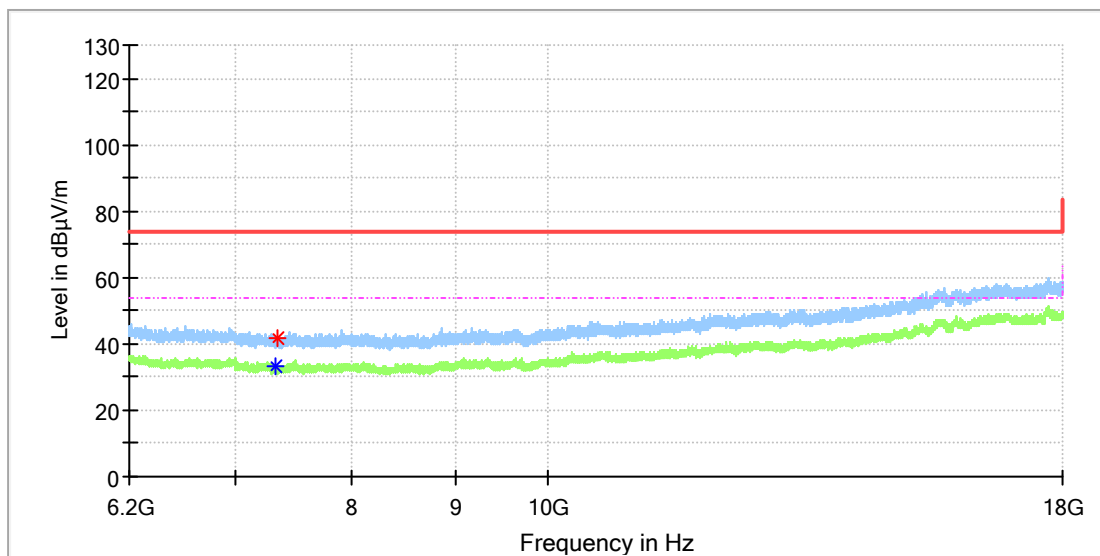


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
7201.033333	---	33.55	54.00	20.45	100.0	V	216.0	8.8
7209.391667	43.25	---	74.00	30.75	100.0	V	326.0	8.8

EUT Information

EUT Name:	BLUETOOTH HEADSET
Model:	SOUNDGEAR SENSE
Test Mode:	BLE 1M_Mid channel
Order No/Sample No:	168422487/A003454679-009
Test Voltage::	Battery
Remark:	Temp 22 Humi:55%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

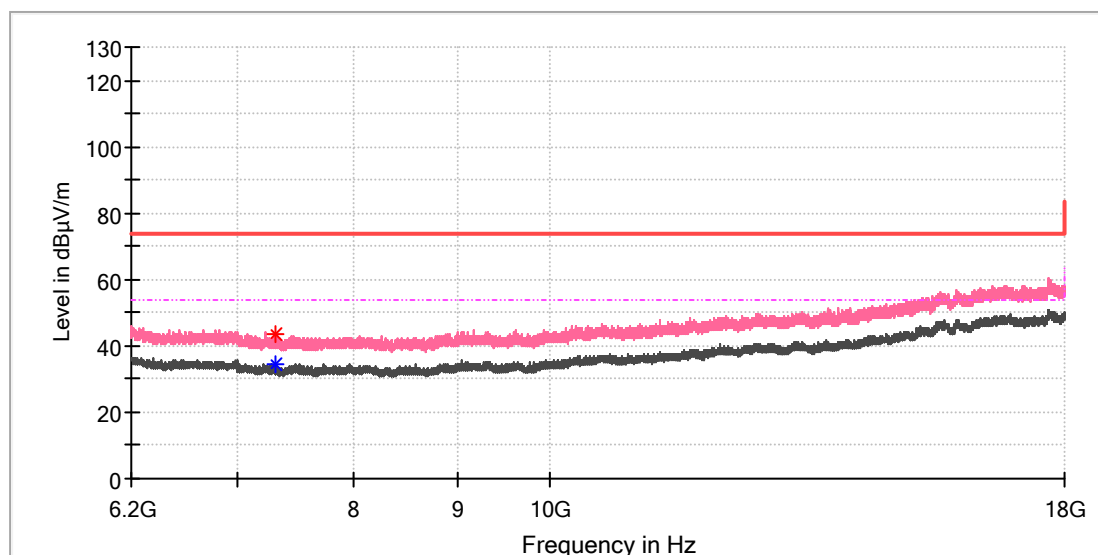


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
7320.508333	---	33.48	54.00	20.52	100.0	H	330.0	8.2
7344.108333	41.54	---	74.00	32.46	100.0	H	330.0	8.1

EUT Information

EUT Name:	BLUETOOTH HEADSET
Model:	SOUNDGEAR SENSE
Test Mode:	BLE 1M_Mid channel
Order No/Sample No:	168422487/A003454679-009
Test Voltage::	Battery
Remark:	Temp 22 Humi:55%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

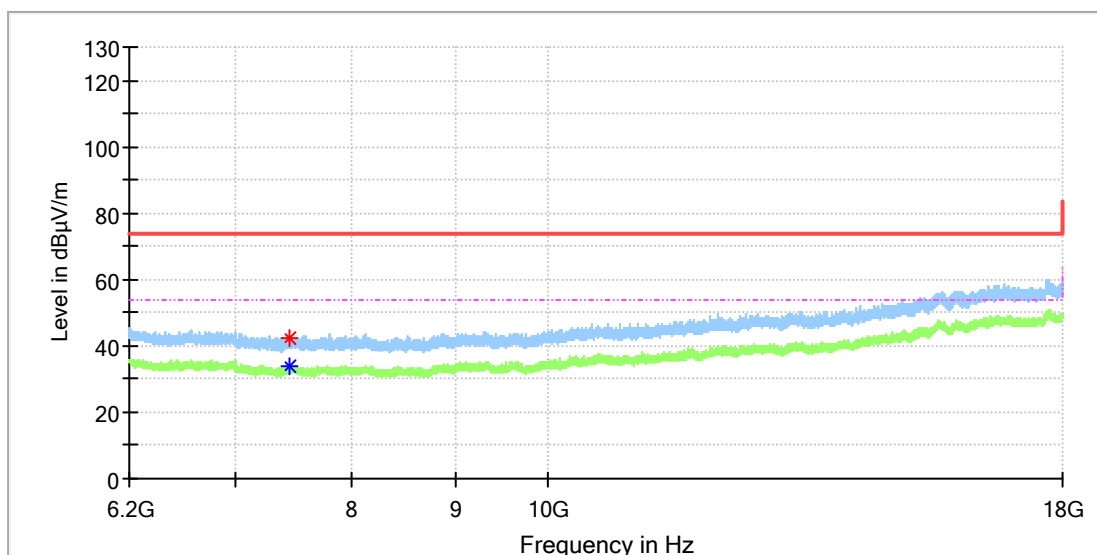


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
7306.250000	---	34.20	54.00	19.80	100.0	V	192.0	8.3
7309.691667	43.28	---	74.00	30.72	100.0	V	316.0	8.2

EUT Information

EUT Name:	BLUETOOTH HEADSET
Model:	SOUNDGEAR SENSE
Test Mode:	BLE 1M_High channel
Order No/Sample No:	168422487/A003454679-009
Test Voltage::	Battery
Remark:	Temp 22 Humi:55%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

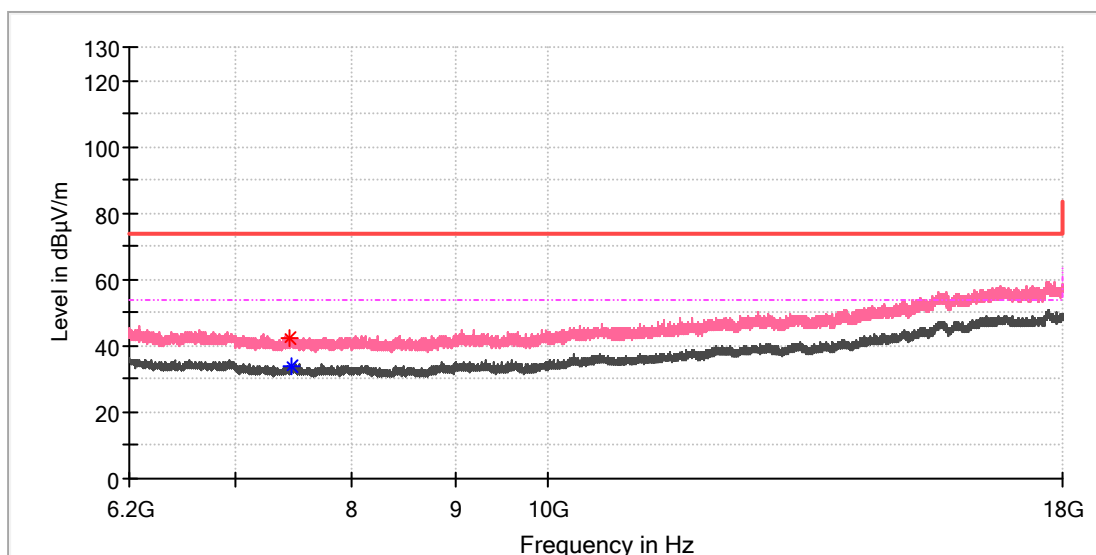


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
7447.358333	---	33.61	54.00	20.39	100.0	H	97.0	8.5
7449.816667	42.19	---	74.00	31.81	100.0	H	268.0	8.5

EUT Information

EUT Name:	BLUETOOTH HEADSET
Model:	SOUNDGEAR SENSE
Test Mode:	BLE 1M_High channel
Order No/Sample No:	168422487/A003454679-009
Test Voltage::	Battery
Remark:	Temp 22 Humi:55%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin



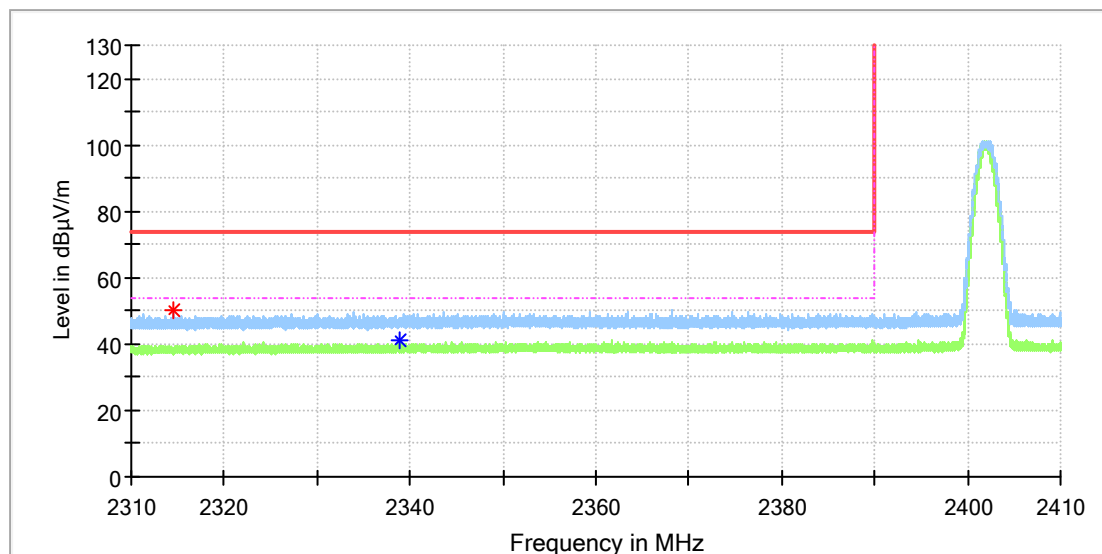
Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
7445.883333	42.15	---	74.00	31.85	100.0	V	222.0	8.5
7464.075000	---	33.88	54.00	20.12	100.0	V	59.0	8.6

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

EUT Information

EUT Name:	BLUETOOTH HEADSET
Model:	SOUNDGEAR SENSE
Test Mode:	BLE 1M_Low channel
Order No/Sample No:	168422487/A003454679-009
Test Voltage::	Battery
Remark:	Temp 22 Humi:55%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

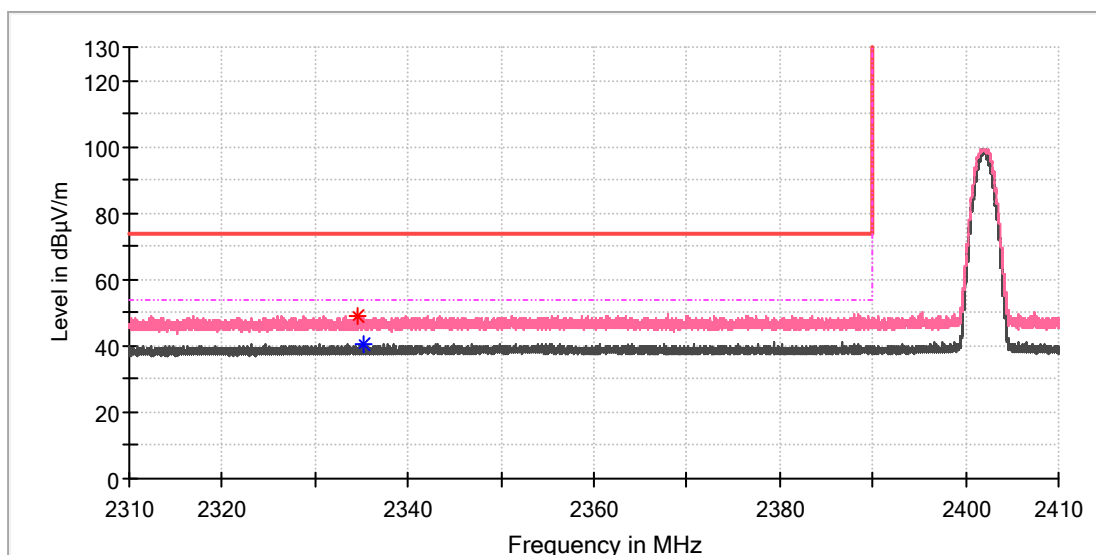


Critical_Freqs

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2314.440000	50.12	---	74.00	23.88	100.0	H	124.0	6.5
2338.825000	---	40.97	54.00	13.04	100.0	H	165.0	6.8

EUT Information

EUT Name:	BLUETOOTH HEADSET
Model:	SOUNDGEAR SENSE
Test Mode:	BLE 1M_Low channel
Order No/Sample No:	168422487/A003454679-009
Test Voltage::	Battery
Remark:	Temp 22 Humi:55%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

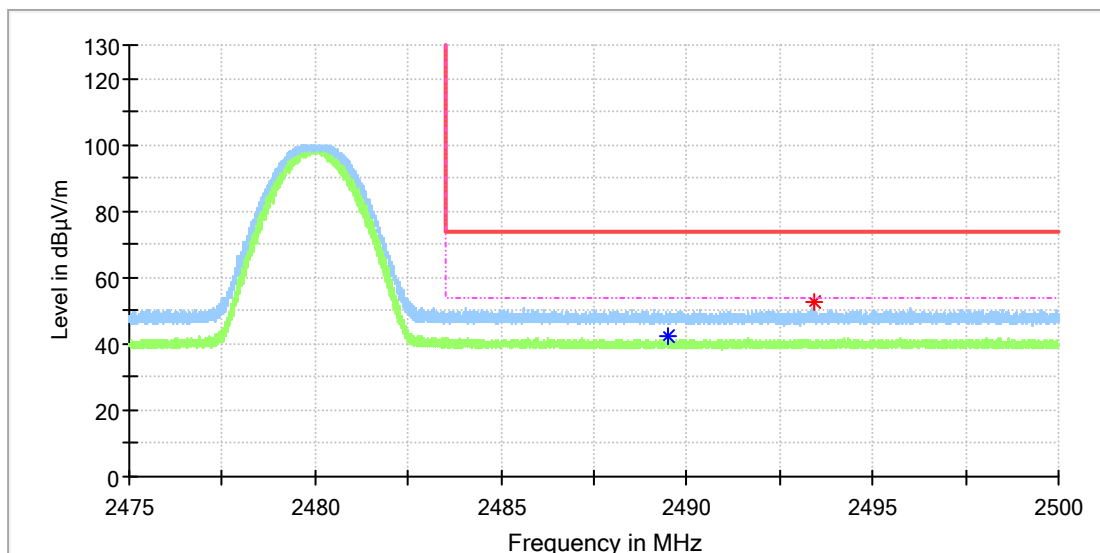


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2334.570000	49.25	---	74.00	24.75	100.0	V	206.0	6.8
2335.295000	---	40.61	54.00	13.39	100.0	V	7.0	6.8

EUT Information

EUT Name:	BLUETOOTH HEADSET
Model:	SOUNDGEAR SENSE
Test Mode:	BLE 1M_High channel
Order No/Sample No:	168422487/A003454679-009
Test Voltage::	Battery
Remark:	Temp 22 Humi:55%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

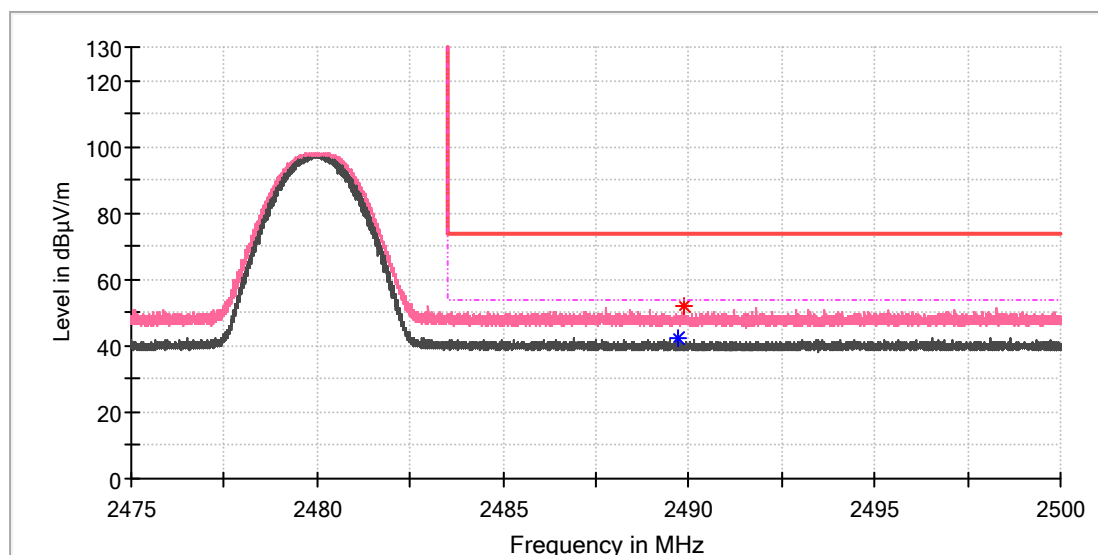


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2489.492500	---	42.14	54.00	11.86	100.0	H	65.0	7.4
2493.412500	52.62	---	74.00	21.38	100.0	H	82.0	7.4

EUT Information

EUT Name:	BLUETOOTH HEADSET
Model:	SOUNDGEAR SENSE
Test Mode:	BLE 1M_High channel
Order No/Sample No:	168422487/A003454679-009
Test Voltage::	Battery
Remark:	Temp 22 Humi:55%
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)
2489.715000	---	42.33	54.00	11.67	100.0	V	191.0	7.4
2489.870000	51.71	---	74.00	22.29	100.0	V	359.0	7.4