Website:
www.cblueasia.com
Tel: +86-755-23059481
Email:
marketing@cblueasia.com

Test Report

Applicant	:	Dongguan Hele Electronics Co.,Ltd
Address	:	No.325 Yuehui Rd. Daojiao Town Dongguan City Guangdong Province China
Product Name	:	TWS bluetooth earbuds
Brand Mark	:	QCY
Model	:	BH24QT33A
FCC ID	:	RDR-BH24QT33A
Report Number	:	BLA-EMC-202408-A1803
Date of Receipt	:	2024.08.07
Date of Test	:	2024.08.07 to 2024.08.27
Test Standard	:	47 CFR Part 15, Subpart C 15.247
Test Result	:	Pass

Compiled by: Hugh **Review by:** Sweet **Approved by:** Blue Zheng

Issued Date: 2024.08.27

BlueAsia of Technical Services(Shenzhen) Co.,Ltd.
Address: Building C, No. 107, Shihuan Road, Shiyan Sub-District, Baoan District, Shenzhen, Guangdong Province, China

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Table of Contents

BlueAsia

Revise Record

Version No.	Date	Description
01	2024.08.27	Original

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1 General information

1.1 General information

Applicant	Dongguan Hele Electronics Co.,Ltd
Address	No.325 Yuehui Rd. Daojiao Town Dongguan City Guangdong Province China
Manufacturer	Dongguan Hele Electronics Co.,Ltd
Address	No.325 Yuehui Rd. Daojiao Town Dongguan City Guangdong Province China
Factory	N/A
Address	N/A

1.2 General description of EUT

Product name	TWS bluetooth earbuds
Model no.	BH24QT33A
Series model	N/A
Operation Frequency:	2402MHz-2480MHz
Modulation Type:	GFSK, pi/4DQPSK, 8DPSK
Channel Spacing:	1MHz
Number of Channels:	79
Antenna Type:	Chip antenna
Antenna Gain:	2.7 dBi (Provided by customer)
Power supply or adapter information	Earphone: DC3.85V Base: DC3.7V
Hardware Version	V1
Software Version	V1
Note: For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.	

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2 Test summary

No.	Test item	Result	Remark
1	Antenna Requirement	Pass	
2	Conducted Emissions at AC Power Line (150kHz-30MHz)	Pass	
3	Conducted Peak Output Power	Pass	
4	Minimum 6dB Bandwidth	Pass	
5	Power Spectrum Density	Pass	
6	Conducted Band Edges Measurement	Pass	
7	Conducted Spurious Emissions	Pass	
8	Radiated Spurious Emissions	Pass	
9	Radiated Emissions which fall in the restricted bands	Pass	

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3 Test Configuration

3.1 Test mode

Test Mode Note 1	Description
TX	Keep the EUT in continuously transmitting with modulation mode.
RX	Keep the EUT in receiving mode
TX Low channel	Keep the EUT in continuously transmitting mode in low channel
TX middle channel	Keep the EUT in continuously transmitting mode in middle channel
TX high channel	Keep the EUT in continuously transmitting mode in high channel

Note 1: The EUT was configured to measure its highest possible emission and/or immunity level. The test modes were adapted according to the operation manual for use; the EUT was operated in the engineering mode Note 2 to fix the TX or Rx frequency that was for the purpose of the measurements.

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3.2 Operation Frequency each of channel

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
0	2402MHz	10	2422MHz	20	2442MHz	30	2462MHz
1	2404MHz	11	2424MHz	21	2444MHz	31	2464MHz
…	…	…	…	…	…	…	…
8	2418MHz	18	2438MHz	28	2458MHz	38	2478MHz
9	2420MHz	19	2440MHz	29	2460MHz	39	2480MHz

3.3 Test channel

Channel	Frequency
The lowest channel	2402MHz
The middle channel	2442MHz
The Highest channel	2480MHz

3.4 Auxiliary equipment

Device Type	Manufacturer	Model Name	Serial No.	Remark
PC	Lenovo	E460C	N/A	From lab (No.BLA-ZC-BS-2022005)
Note: "--" mean no any auxiliary device during testing.				

3.5 Test environment

Environment	Temperature	Voltage
Normal	25℃	DC 3.85V

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4 Laboratory information

4.1 Laboratory and accreditations

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

Company name:	BlueAsia of Technical Services(Shenzhen) Co., Ltd.
Address:	Building C, No. 107, Shihuan Road, Shiyan Sub-District, Baoan District, Shenzhen, Guangdong Province, China
CNAS accredited No.:	L9788
A2LA Cert. No.:	5071.01
FCC Designation No.:	CN1252
ISED CAB identifier No.:	CN0028
Telephone:	+86-755-28682673
FAX:	+86-755-28682673

4.2 Measurement uncertainty

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=1.96.

Parameter	Expanded Uncertainty
Radiated Emission(9kHz-30MHz)	±4.34dB
Radiated Emission(30Mz-1000MHz)	±4.24dB
Radiated Emission(1GHz-18GHz)	±4.68dB
AC Power Line Conducted Emission(150kHz-30MHz)	±3.45dB
Occupied Channel Bandwidth	±5 %
RF output power, conducted	±1.5 dB
Power Spectral Density, conducted	±3.0 dB
Unwanted Emissions, conducted	±3.0 dB
Temperature	±3 °C
Supply voltages	±3 %
Time	±5 %

5 Test equipment

Equipment No.	Equipment Name	Model No.	Manufacture	S/N	Cal. Date	Next Cal. Date
BLA-EMC-008	Spectrum	FSP40	R&S	100817	2023/08/30	2024/08/29
BLA-EMC-009	EMI Receiver	ESR7	R&S	101199	2023/08/30	2024/08/29
BLA-EMC-011	LISN	ENV216	R&S	101372	2023/08/30	2024/08/29
BLA-EMC-012	broad band Antenna	VULB9168	Schwarz beck	00836 P:00227	2022/10/12	2025/10/11
BLA-EMC-013	Horn Antenna	BBHA9120D	Schwarz beck	01892	2022/09/13	2025/09/12
BLA-EMC-014	Amplifier	PA_000318G-45	SKET	PA2018043003	2023/08/30	2024/08/29
BLA-EMC-016	Signal Generator	N5182A	Agilent	MY52420567	2023/11/16	2024/11/15
BLA-EMC-028	Spectrum	N9020A	Agilent	MY53420839	2023/11/16	2024/11/15
BLA-EMC-038	Spectrum	N9020A	Agilent	MY49100060	2023/08/30	2024/08/29
BLA-EMC-041	LISN	AT166-2	ATTEN	AKK1806000003	2023/08/30	2024/08/29
BLA-EMC-042	Power sensor	RPR3006W	DARE	14I00889SN042	2023/09/01	2024/08/31
BLA-EMC-043	Loop antenna	FMZB1519B	SCHNARZBECK	00102	2022/09/14	2025/09/13
BLA-EMC-044	Wideband radio communication tester	CMW500	R&S	132429	2023/08/30	2024/08/29
BLA-EMC-045	Impedance stable network	ISNT8-cat6	TESEQ	53580	2023/08/30	2024/08/29
BLA-EMC-046	Filter bank	2.4G/5G Filter bank	SKET	N/A	2024/07/07	2025/07/06
BLA-EMC-061	Receiver	ESPI7	R&S	101477	2024/07/07	2025/07/06
BLA-EMC-062	Signal Generator	N5181A	Agilent	MY46240904	2024/07/07	2025/07/06
BLA-EMC-064	Signal Generator	N5182B	KEYSIGHT	MY58108892	2024/07/07	2025/07/06
BLA-EMC-065	broadband Antenna	VULB9168	Schwarz beck	01065P	2022/12/12	2025/12/11
BLA-EMC-066	Amplifier	LNPA_30M01G-30	SKET	SK2021060801	2024/07/07	2025/07/06
BLA-EMC-079	Spectrum	N9020A	Agilent	MY54420161	2023/08/30	2024/08/29
BLA-EMC-080	Signal Generator	N5182A	Agilent	MY47420955	2023/08/30	2024/08/29
BLA-EMC-086	Amplifier	LNPA_18G40G-50dB	SKET	SK2022071301	2023/08/14	2024/08/13
					2024/08/14	2025/08/13

6 Test result

6.1 Antenna requirement

Test Standard	47 CFR Part 15, Subpart C 15.247
Test Method	N/A

6.1.1 Requirement

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

EUT antenna:
The antenna is integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is 2.7 dBi.

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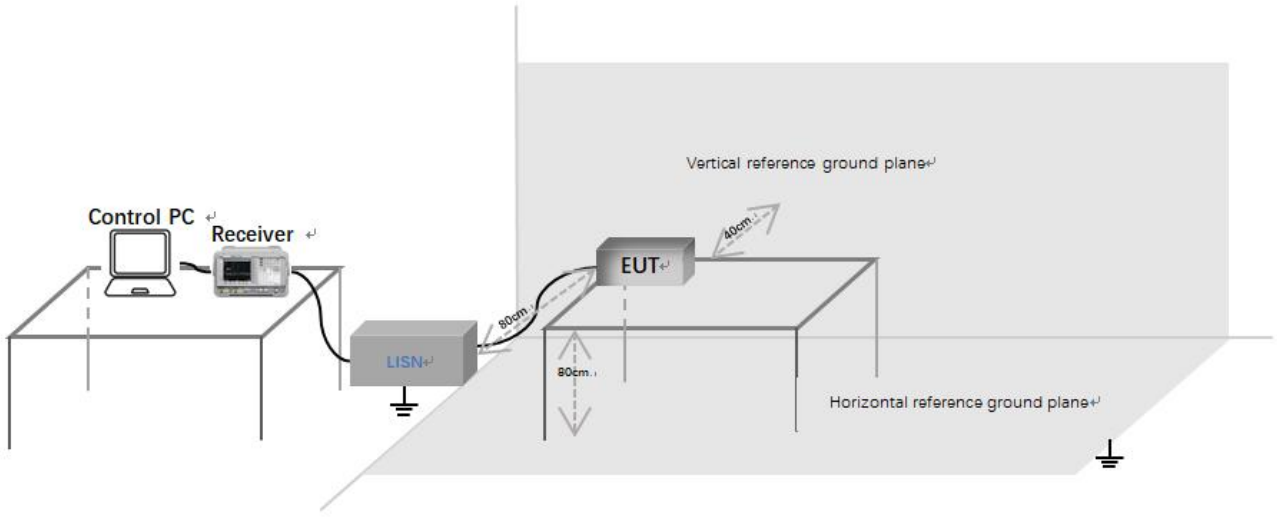
6.2 Conducted emissions at AC power line (150 kHz-30 MHz)

Test Standard	47 CFR Part 15, Subpart C 15.247
Test Method	ANSI C63.10 (2013) Section 6.2
Test Mode (Pre-Scan)	TX
Test Mode (Final Test)	TX

6.2.1 Limit

Frequency of emission(MHz)	**Conducted limit(dBμV)**	
	Quasi-peak	**Average**
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50
*Decreases with the logarithm of the frequency.		

6.2.2 Test setup



Description of test setup connection:

a) Connect the control PC to the receiver through a USB to GPIB cable;

b) The receiver is connected to the LISN through a coaxial line;

c) Connect the power port of LISN to the EUT.

6.2.3 Procedure

1) The mains terminal disturbance voltage test was conducted in a shielded room.

2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50ohm/50H + 5ohm linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.

3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane,

4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.

5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10 on conducted measurement.

LISN=Read Level+ Cable Loss+ LISN Factor

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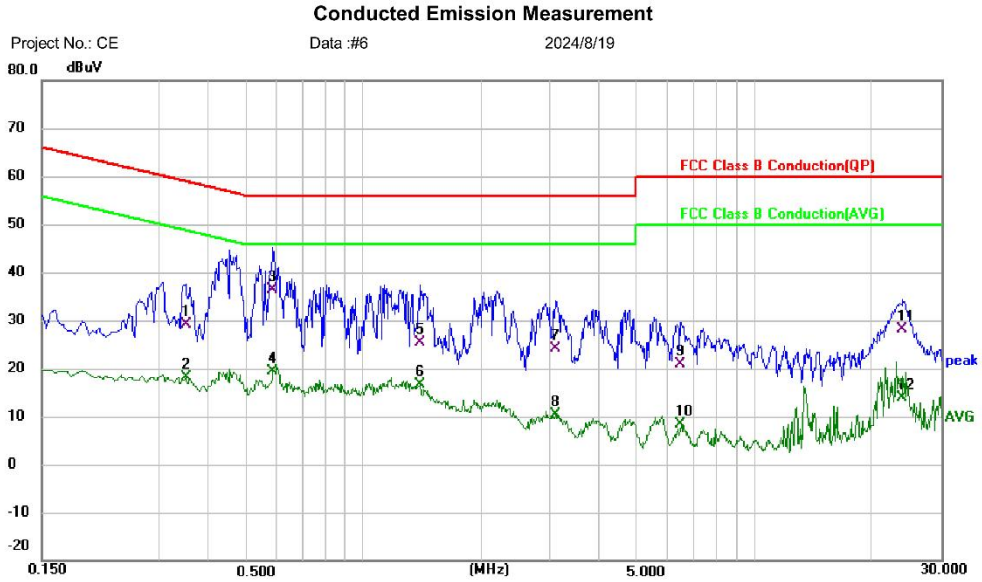
6.2.4 Test data

[Test mode: TX]; [Line: Line];[Power:AC120V/60Hz]



Site
Limit: FCC Class B Conduction(QP)
EUT: TWS bluetooth earbuds
M/N: BH24QT33A
Mode: BLE-TX
Note:

Phase: L1
Power:
Distance:
RBW: 9 KHz
VBW: 30 KHz

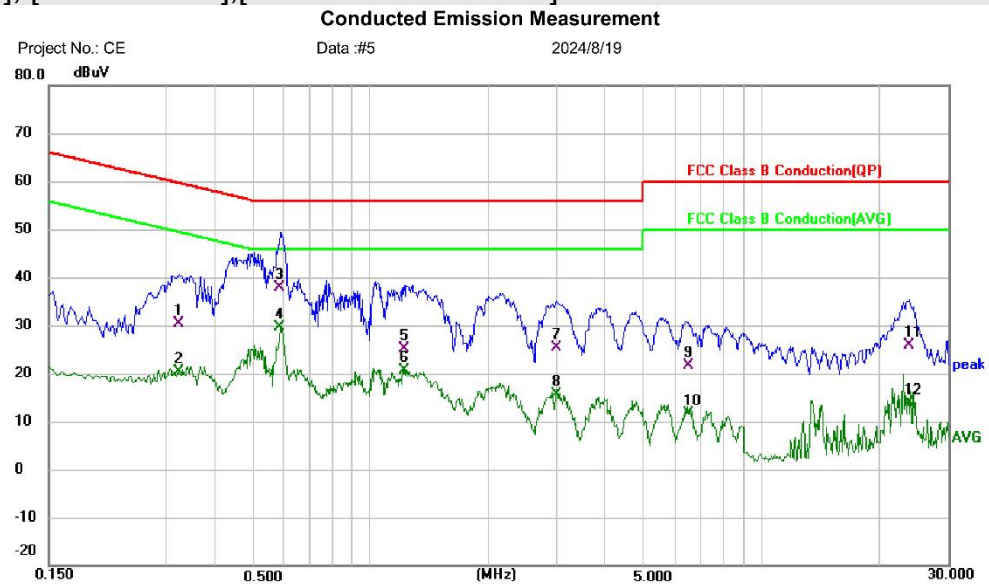
Temperature: (C)
Humidity: %RH
Sweep Time: 10 ms

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	cm	degree	Comment
1		0.3500	19.07	9.94	29.01	58.96	-29.95	QP			
2		0.3500	8.21	9.94	18.15	48.96	-30.81	AVG			
3	*	0.5860	26.38	9.91	36.29	56.00	-19.71	QP			
4		0.5860	9.49	9.91	19.40	46.00	-26.60	AVG			
5		1.3980	15.52	9.93	25.45	56.00	-30.55	QP			
6		1.3980	6.82	9.93	16.75	46.00	-29.25	AVG			
7		3.0980	14.18	10.06	24.24	56.00	-31.76	QP			
8		3.0980	0.24	10.06	10.30	46.00	-35.70	AVG			
9		6.4899	10.13	10.73	20.86	60.00	-39.14	QP			
10		6.4899	-2.44	10.73	8.29	50.00	-41.71	AVG			
11		23.9700	13.14	14.97	28.11	60.00	-31.89	QP			
12		23.9700	-1.20	14.97	13.77	50.00	-36.23	AVG			

*:Maximum data x:Over limit !:over margin 〈Reference Only
Receiver: ESPI_1 Spectrum Analyzer: ESPI

Test Result: Pass

[Test mode: TX]; [Line: Neutral];[Power:AC120V/60Hz]



Site
Limit: FCC Class B Conduction(QP)
EUT: TWS bluetooth earbuds
M/N: BH24QT33A
Mode: BLE-TX
Note:

Phase: N
Power:
Distance:
RBW: 9 KHz
VBW: 30 KHz

Temperature: (C)
Humidity: %RH
Sweep Time: 10 ms

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	cm	degree	Comment
1		0.3220	20.42	9.89	30.31	59.66	-29.35	QP			
2		0.3220	10.54	9.89	20.43	49.66	-29.23	AVG			
3		0.5899	28.01	9.85	37.86	56.00	-18.14	QP			
4	*	0.5899	19.66	9.85	29.51	46.00	-16.49	AVG			
5		1.2220	15.16	9.90	25.06	56.00	-30.94	QP			
6		1.2220	10.62	9.90	20.52	46.00	-25.48	AVG			
7		2.9860	15.31	10.05	25.36	56.00	-30.64	QP			
8		2.9860	5.65	10.05	15.70	46.00	-30.30	AVG			
9		6.5020	10.75	10.84	21.59	60.00	-38.41	QP			
10		6.5020	0.83	10.84	11.67	50.00	-38.33	AVG			
11		23.8620	11.14	14.85	25.99	60.00	-34.01	QP			
12		23.8620	-0.85	14.85	14.00	50.00	-36.00	AVG			

*:Maximum data x:Over limit !:over margin 〈Reference Only

Receiver: ESPI_1 Spectrum Analyzer: ESPI

Test Result: Pass

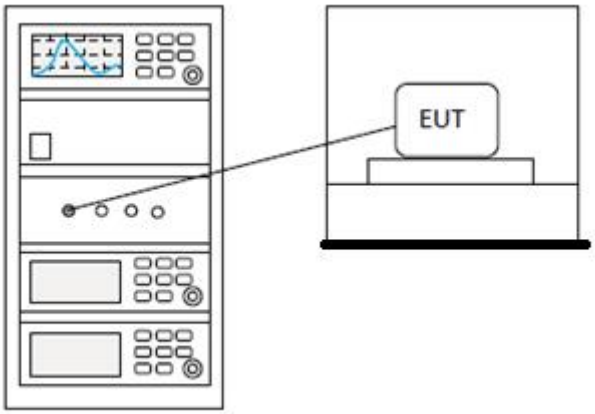
6.3 Conducted peak output Power

Test Standard	47 CFR Part 15, Subpart C 15.247
Test Method	ANSI C63.10 (2013) Section 7.8.5
Test Mode (Pre-Scan)	TX
Test Mode (Final Test)	TX

6.3.1 Limit

Frequency range(MHz)	Output power of the intentional radiator(watt)
902-928	1 for ≥50 hopping channels
	0.25 for 25≤ hopping channels <50
	1 for digital modulation
2400-2483.5	1 for ≥75 non-overlapping hopping channels
	0.125 for all other frequency hopping systems
	1 for digital modulation
5725-5850	1 for frequency hopping systems and digital modulation

6.3.2 Test setup



6.3.3 Test data

Pass: Please refer to appendix A for details

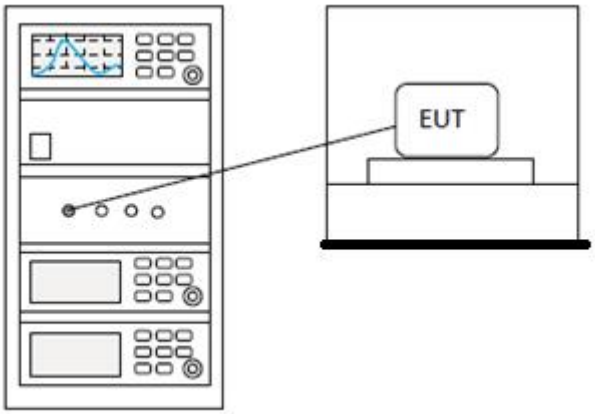
6.4 Minimum 6dB bandwidth

Test Standard	47 CFR Part 15, Subpart C 15.247
Test Method	ANSI C63.10 (2013) Section 11.8.1
Test Mode (Pre-Scan)	TX
Test Mode (Final Test)	TX

6.4.1 Limit

≥500 kHz

6.4.2 Test setup



6.4.3 Test data

Pass: Please refer to appendix A for details

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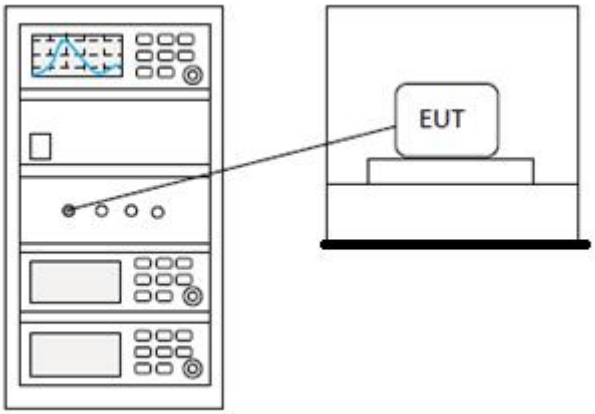
6.5 Power spectrum density

Test Standard	47 CFR Part 15, Subpart C 15.247
Test Method	ANSI C63.10 (2013) Section 11.10.2
Test Mode (Pre-Scan)	TX
Test Mode (Final Test)	TX

6.5.1 Limit

≤8dBm in any 3 kHz band during any time interval of continuous transmission

6.5.2 Test setup



6.5.3 Test data

Pass: Please refer to appendix A for details

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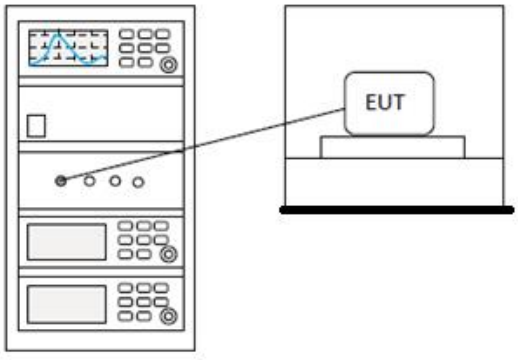
6.6 Conducted Band Edges Measurement

Test Standard	47 CFR Part 15, Subpart C 15.247
Test Method	ANSI C63.10 (2013) Section 7.8.8 & Section 11.13.3.2
Test Mode (Pre-Scan)	TX
Test Mode (Final Test)	TX

6.6.1 Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.
If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20dB.
Attenuation below the general limits specified in §15.209(a) is not required.
In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

6.6.2 Test setup



6.6.3 Test data

Pass: Please refer to appendix A for details

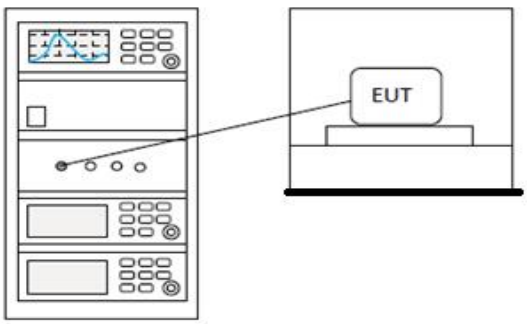
6.7 Conducted spurious emissions

Test Standard	47 CFR Part 15, Subpart C 15.247
Test Method	ANSI C63.10 (2013) Section 7.8.6 & Section 11.11
Test Mode (Pre-Scan)	TX
Test Mode (Final Test)	TX

6.7.1 Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.
If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20dB.
Attenuation below the general limits specified in §15.209(a) is not required.
In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

6.7.2 Test setup



6.7.3 Test data

Pass: Please refer to appendix A for details

6.8 Radiated spurious emissions

Test Standard	47 CFR Part 15, Subpart C 15.247
Test Method	ANSI C63.10 (2013) Section 6.4,6.5,6.6
Test Mode (Pre-Scan)	TX
Test Mode (Final Test)	TX

6.8.1 Limit

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

Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

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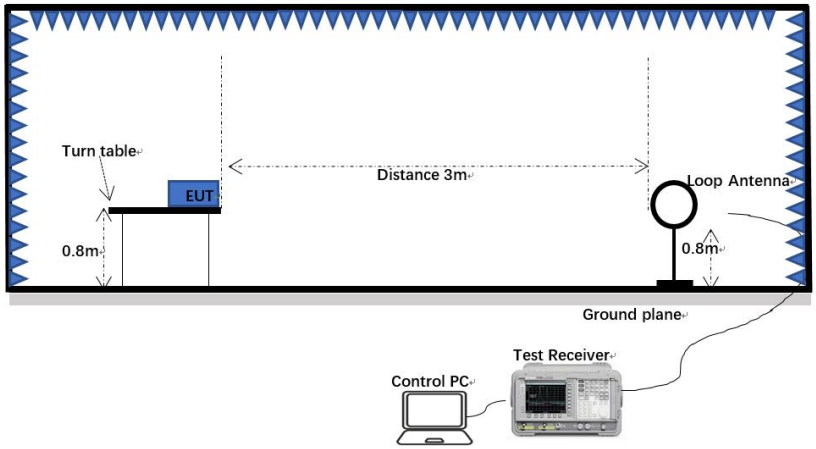
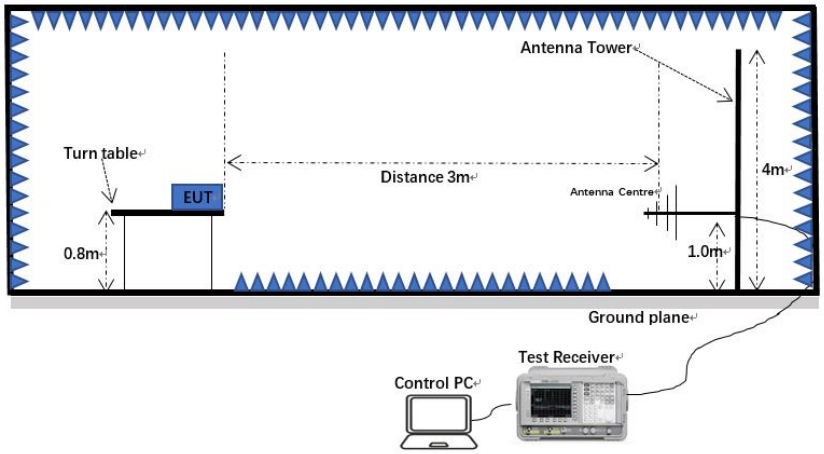
6.8.2 Test setup

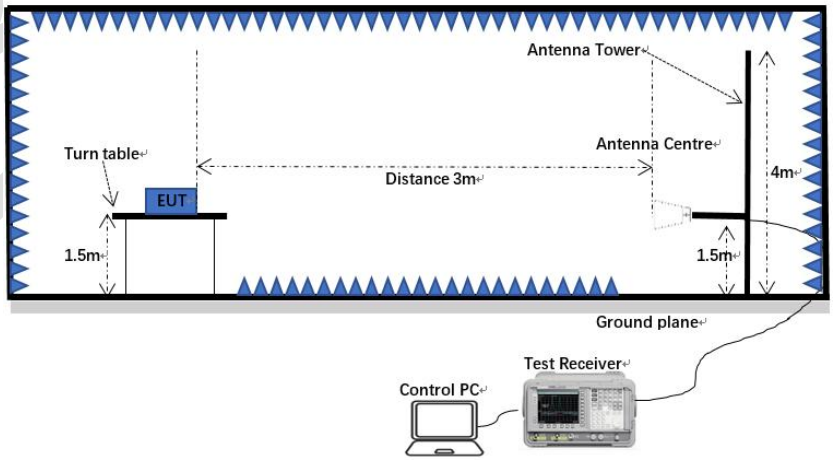
Below 1GHz：



30MHz-1GHz：



Above 1GHz：



6.8.3 Procedure

a) For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

b) For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

c) The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

d) The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

e) For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

f) The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

g) If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

h) Test the EUT in the lowest channel, the middle channel, the highest channel.

i) The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.

j) Repeat above procedures until all frequencies measured was complete.

Note 1: Scan from 9 kHz to 25GHz, the disturbance above 12.75GHz and below 30MHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported. Fundamental frequency is blocked by filter, and only spurious emission is shown.

Note 2: For frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.

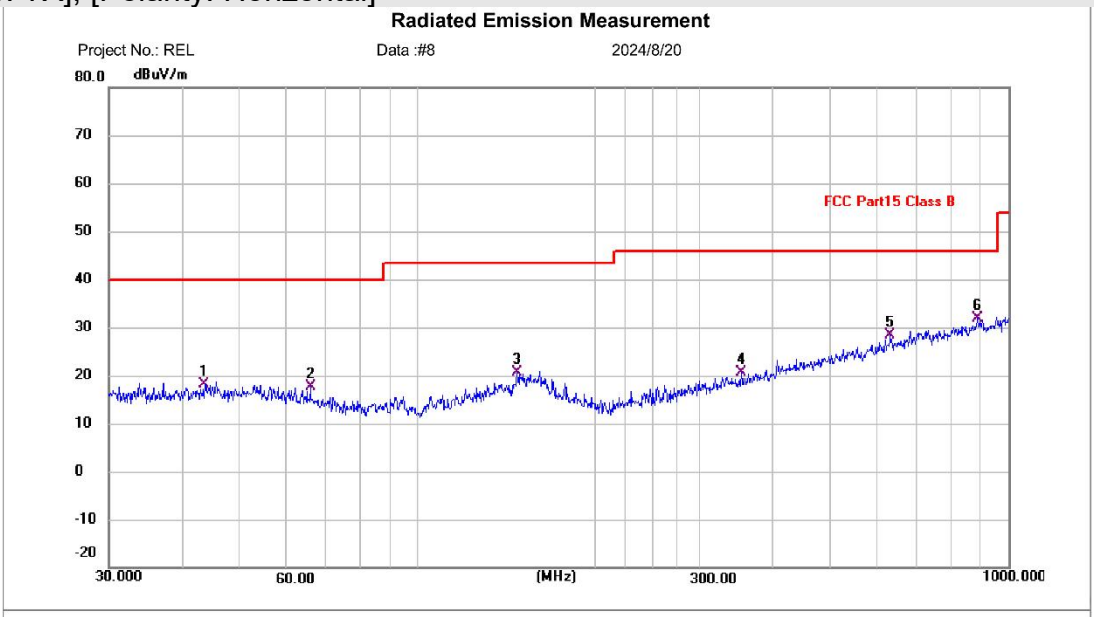
Note 3: The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

Level (dBuV) = Reading (dBuV) + Factor (dB/m)

6.8.4 Test data

Below 1GHz

[Test mode: TX]; [Polarity: Horizontal]



Site
Limit: FCC Part15 Class B
EUT: TWS bluetooth earbuds
M/N: BH24QT33A
Mode: BLE-TX
Note:

Polarization: *Horizontal*
Power:

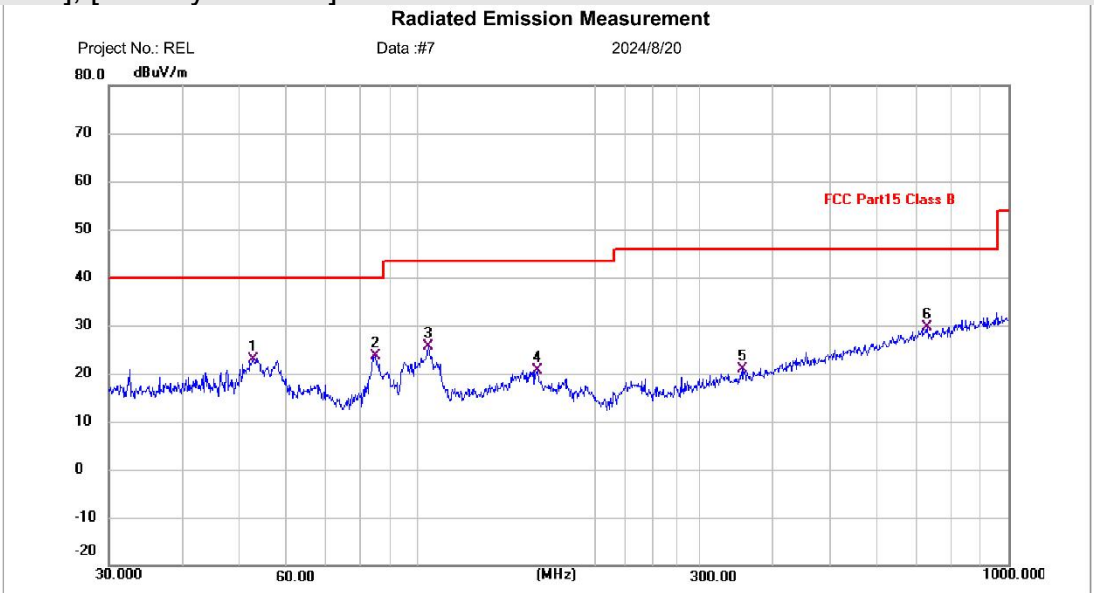
Temperature: (C)
Humidity: %RH

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F	Remark
1	43.6584	-1.75	19.77	18.02	40.00	-21.98	QP	P	
2	65.8031	0.04	17.71	17.75	40.00	-22.25	QP	P	
3	147.4036	0.02	20.58	20.60	43.50	-22.90	QP	P	
4	352.9433	-0.74	21.42	20.68	46.00	-25.32	QP	P	
5	631.6884	0.72	27.65	28.37	46.00	-17.63	QP	P	
6 *	887.6099	1.21	30.78	31.99	46.00	-14.01	QP	P	

*Maximum data x:Over limit l:over margin

Test Result: Pass

[Test mode: TX]; [Polarity: Vertical]



Site
Limit: FCC Part15 Class B
EUT: TWS bluetooth earbuds
M/N: BH24QT33A
Mode: BLE-TX
Note:

Polarization: *Vertical*
Power:

Temperature: (C)
Humidity: %RH

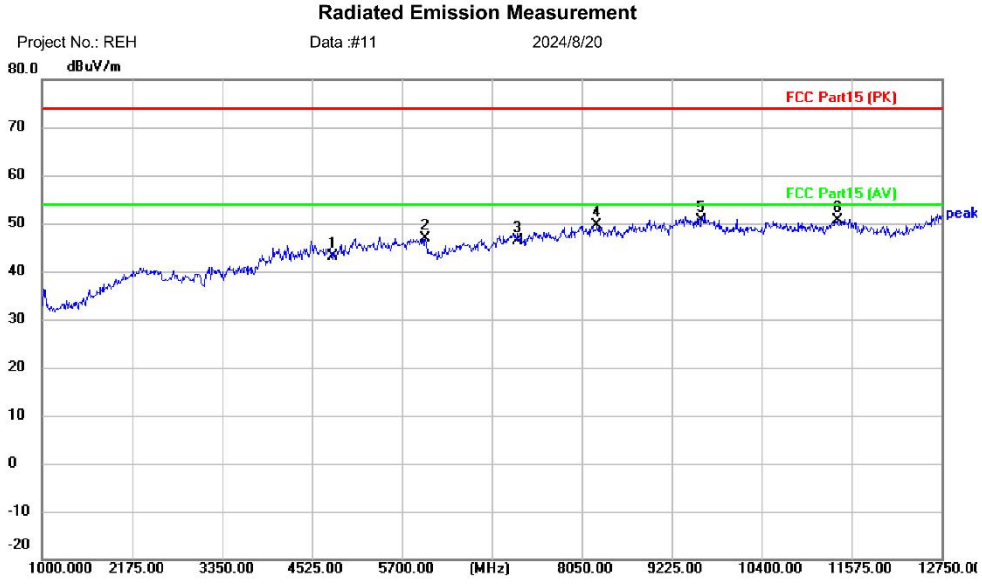
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F	Remark
1	52.5753	3.05	19.87	22.92	40.00	-17.08	QP	P	
2	84.7019	8.17	15.43	23.60	40.00	-16.40	QP	P	
3	104.1701	9.26	16.39	25.65	43.50	-17.85	QP	P	
4	159.7844	0.28	20.41	20.69	43.50	-22.81	QP	P	
5	355.4273	-0.50	21.46	20.96	46.00	-25.04	QP	P	
6 *	729.3583	0.68	29.00	29.68	46.00	-16.32	QP	P	

Test Result: Pass

Above 1GHz:

Remark: During the test, pre-scan the BLE1M/BLE2M mode, and found the BLE1M mode which it is worse case.

[Test mode: TX low channel]; [Polarity: Horizontal]



Site
Limit: FCC Part15 (PK)
EUT: TWS bluetooth earbuds
M/N: BH24QT33A
Mode: BLE-2402
Note:

Polarization: *Horizontal*
Power:

Temperature: (C)
Humidity: %RH

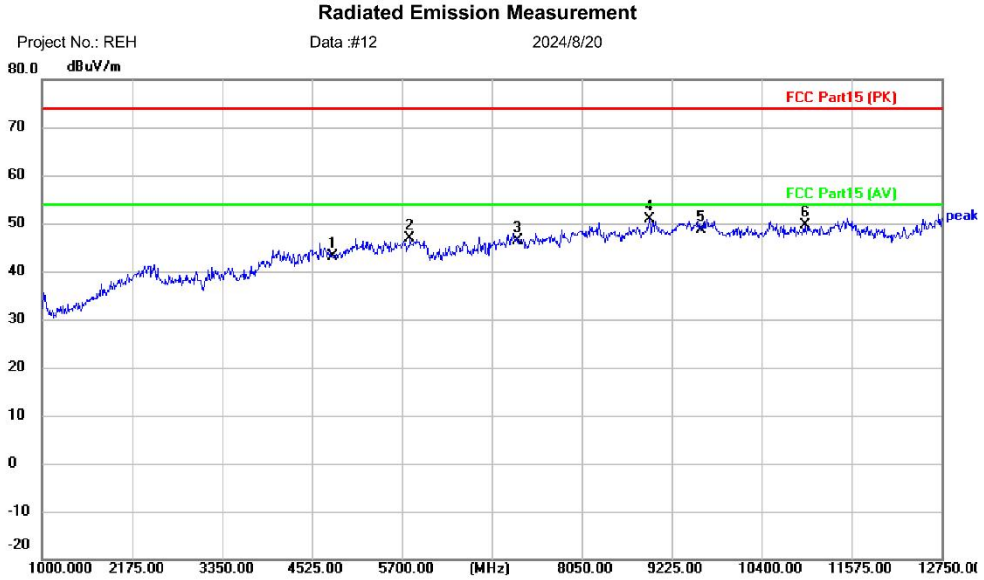
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4804.000	37.12	6.03	43.15	74.00	-30.85	peak	
2		6005.500	41.02	5.84	46.86	74.00	-27.14	peak	
3		7206.000	36.92	9.45	46.37	74.00	-27.63	peak	
4		8249.750	39.09	10.56	49.65	74.00	-24.35	peak	
5	*	9608.000	37.43	13.21	50.64	74.00	-23.36	peak	
6		11387.00	36.98	13.60	50.58	74.00	-23.42	peak	

*:Maximum data x:Over limit !:over margin 〈Reference Only

Receiver: ESR_1 Spectrum Analyzer: FSP40

Test Result: Pass

[Test mode: TX low channel]; [Polarity: Vertical]



Site
Limit: FCC Part15 (PK)
EUT: TWS bluetooth earbuds
M/N: BH24QT33A
Mode: BLE-2402
Note:

Polarization: *Vertical*
Power:

Temperature: (C)
Humidity: %RH

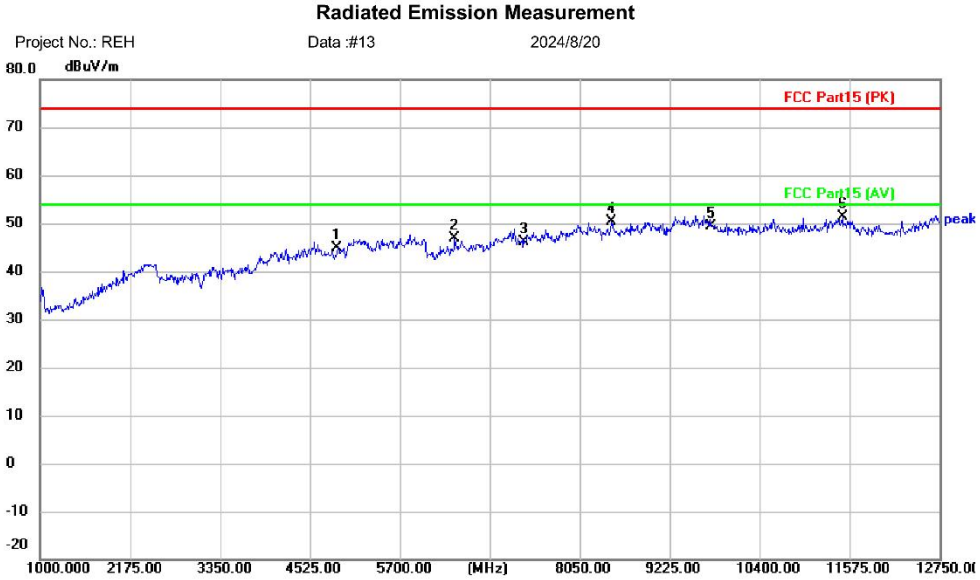
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4804.000	37.04	6.03	43.07	74.00	-30.93	peak	
2		5805.750	37.85	8.92	46.77	74.00	-27.23	peak	
3		7206.000	36.81	9.45	46.26	74.00	-27.74	peak	
4	*	8931.250	38.01	12.83	50.84	74.00	-23.16	peak	
5		9608.000	35.44	13.21	48.65	74.00	-25.35	peak	
6		10964.00	36.38	13.26	49.64	74.00	-24.36	peak	

*:Maximum data x:Over limit !:over margin 〈Reference Only

Receiver: ESR_1 Spectrum Analyzer: FSP40

Test Result: Pass

[Test mode: TX middle channel]; [Polarity: Horizontal]



Site
Limit: FCC Part15 (PK)
EUT: TWS bluetooth earbuds
M/N: BH24QT33A
Mode: BLE-2442
Note:

Polarization: *Horizontal*
Power:

Temperature: (C)
Humidity: %RH

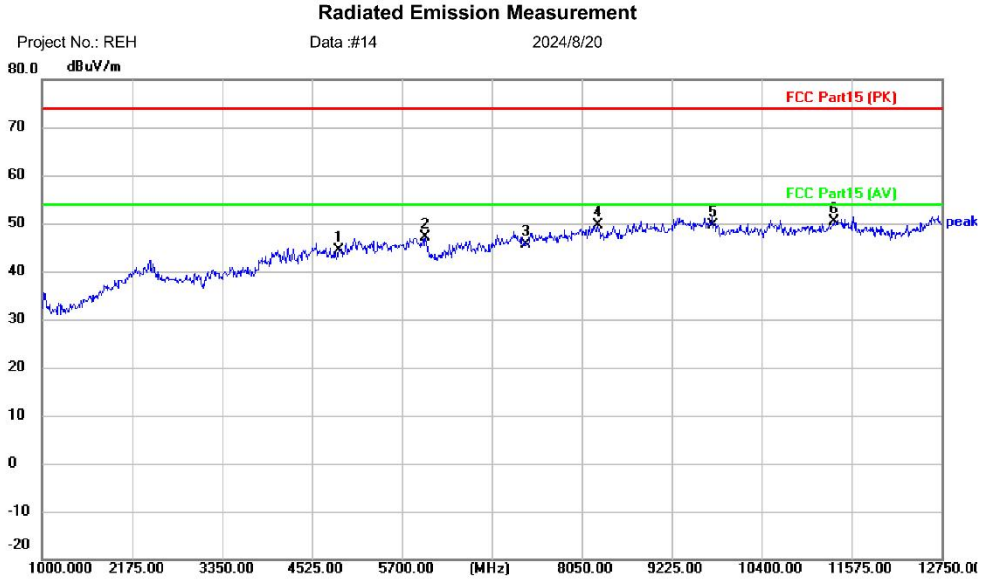
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4884.000	38.73	6.12	44.85	74.00	-29.15	peak	
2		6416.750	39.23	7.76	46.99	74.00	-27.01	peak	
3		7326.000	36.84	9.25	46.09	74.00	-27.91	peak	
4		8461.250	39.06	11.23	50.29	74.00	-23.71	peak	
5		9768.000	35.66	13.81	49.47	74.00	-24.53	peak	
6	*	11481.00	37.27	14.05	51.32	74.00	-22.68	peak	

*:Maximum data x:Over limit !:over margin 〈Reference Only

Receiver: ESR_1 Spectrum Analyzer: FSP40

Test Result: Pass

[Test mode: TX middle channel]; [Polarity: Vertical]



Site
Limit: FCC Part15 (PK)
EUT: TWS bluetooth earbuds
M/N: BH24QT33A
Mode: BLE-2442
Note:

Polarization: *Vertical*
Power:

Temperature: (C)
Humidity: %RH

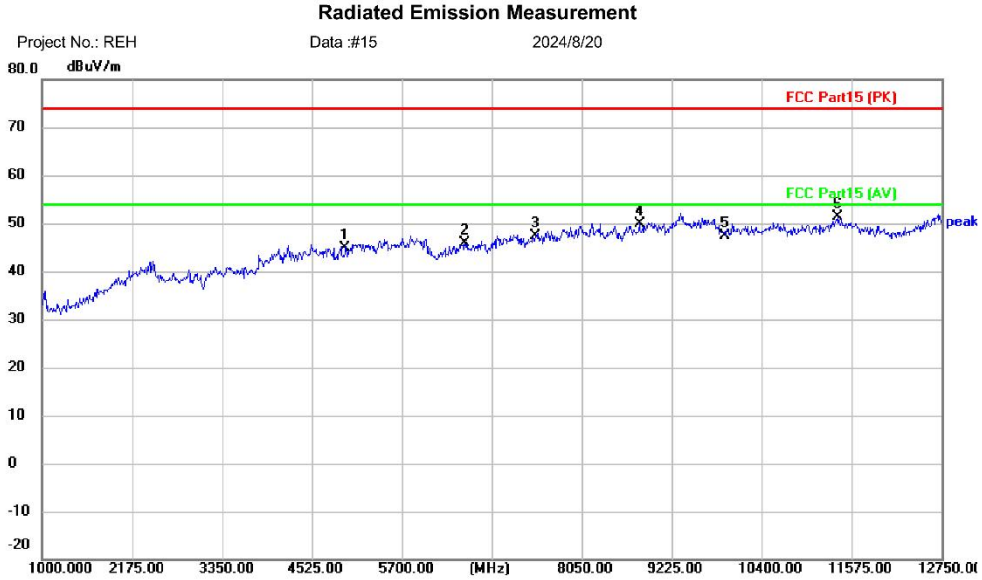
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4884.000	38.37	6.12	44.49	74.00	-29.51	peak	
2		6005.500	41.25	5.84	47.09	74.00	-26.91	peak	
3		7326.000	36.47	9.25	45.72	74.00	-28.28	peak	
4		8261.500	39.20	10.53	49.73	74.00	-24.27	peak	
5		9768.000	35.85	13.81	49.66	74.00	-24.34	peak	
6	*	11340.00	37.10	13.17	50.27	74.00	-23.73	peak	

*:Maximum data x:Over limit !:over margin 〈Reference Only

Receiver: ESR_1 Spectrum Analyzer: FSP40

Test Result: Pass

[Test mode: TX High channel]; [Polarity: Horizontal]



Site
Limit: FCC Part15 (PK)
EUT: TWS bluetooth earbuds
M/N: BH24QT33A
Mode: BLE-2480
Note:

Polarization: *Horizontal*
Power:

Temperature: (C)
Humidity: %RH

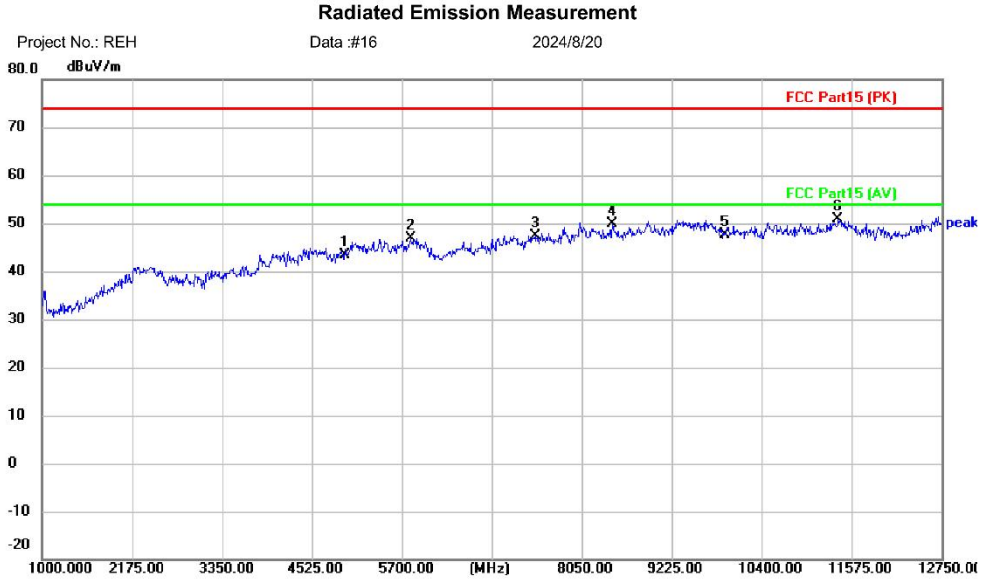
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4960.000	37.72	7.04	44.76	74.00	-29.24	peak	
2		6522.500	37.86	7.98	45.84	74.00	-28.16	peak	
3		7440.000	37.26	10.04	47.30	74.00	-26.70	peak	
4		8802.000	37.27	12.66	49.93	74.00	-24.07	peak	
5		9920.000	34.38	13.08	47.46	74.00	-26.54	peak	
6	*	11387.00	37.70	13.60	51.30	74.00	-22.70	peak	

*:Maximum data x:Over limit !:over margin 〈Reference Only

Receiver: ESR_1 Spectrum Analyzer: FSP40

Test Result: Pass

[Test mode: TX High channel]; [Polarity: Vertical]



Site
Limit: FCC Part15 (PK)
EUT: TWS bluetooth earbuds
M/N: BH24QT33A
Mode: BLE-2480
Note:

Polarization: *Vertical*
Power:

Temperature: (C)
Humidity: %RH

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4960.000	36.33	7.04	43.37	74.00	-30.63	peak	
2		5817.500	37.96	8.90	46.86	74.00	-27.14	peak	
3		7440.000	37.41	10.04	47.45	74.00	-26.55	peak	
4		8449.500	38.55	11.23	49.78	74.00	-24.22	peak	
5		9920.000	34.63	13.08	47.71	74.00	-26.29	peak	
6	*	11398.75	37.25	13.70	50.95	74.00	-23.05	peak	

*:Maximum data x:Over limit !:over margin 〈Reference Only

Receiver: ESR_1 Spectrum Analyzer: FSP40

Test Result: Pass

6.9 Radiated emissions which fall in the restricted bands

Test Standard	47 CFR Part 15, Subpart C 15.247
Test Method	ANSI C63.10 (2013) Section 6.10.5
Test Mode (Pre-Scan)	TX
Test Mode (Final Test)	TX

6.9.1 Limit

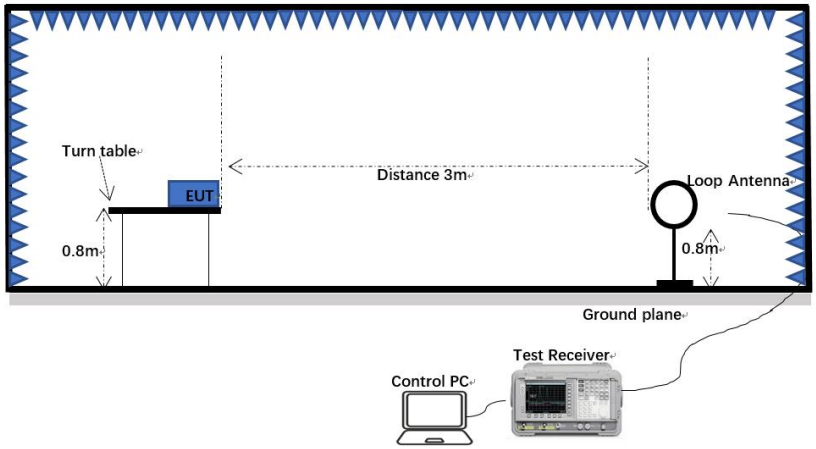
Frequency(MHz)	Field strength(microvolts/meter)	Measurement distance(meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

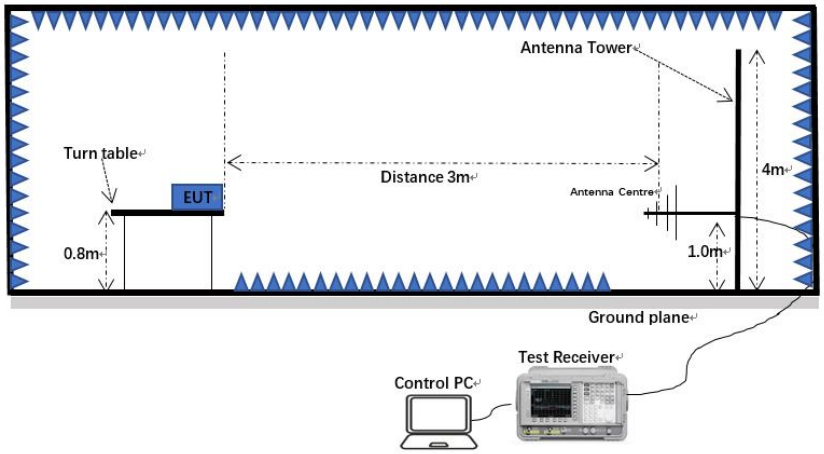
BlueAsia

6.9.2 Test setup

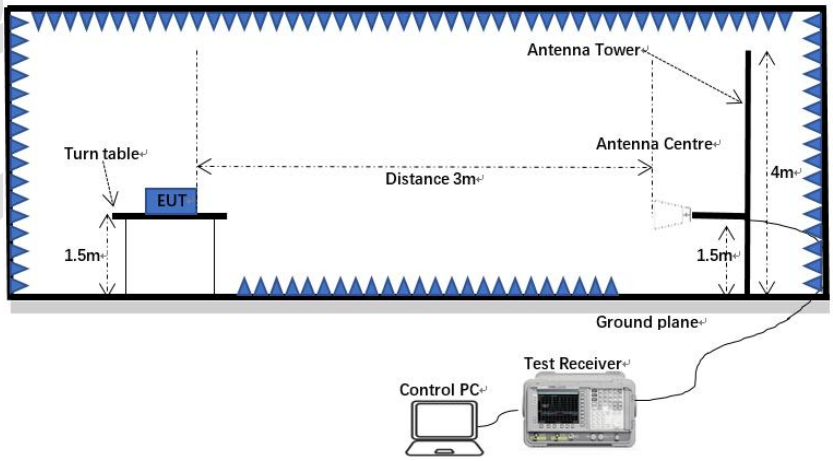
Below 1GHz：



30MHz-1GHz：



Above 1GHz：



6.9.3 Procedure

a) For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

b) For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

c) The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

d) The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

e) For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

f) The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

g) If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

h) Test the EUT in the lowest channel, the middle channel, the highest channel.

i) The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.

j) Repeat above procedures until all frequencies measured was complete.

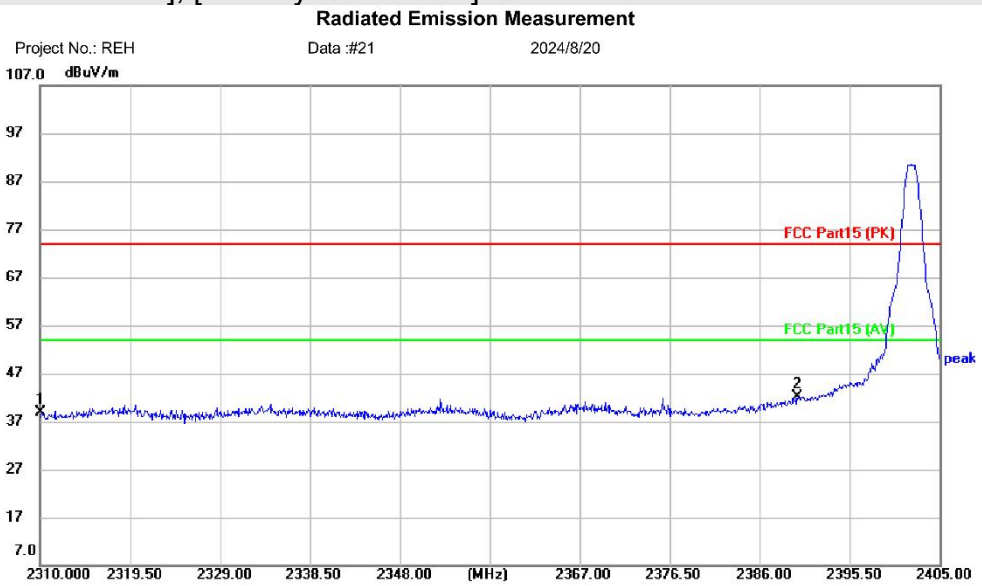
Note 1: Level (dBuV) = Reading (dBuV) + Factor (dB/m)
Note 2: For frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.

BlueAsia

6.9.4 Test data

Remark: During the test, pre-scan the BLE1M/BLE2M mode, and found the BLE1M mode which it is worse case.

[Test mode: TX low channel]; [Polarity: Horizontal]



Site
Limit: FCC Part15 (PK)
EUT: TWS bluetooth earbuds
M/N: BH24QT33A
Mode: BLE1M-TX-2402
Note:

Polarization: ***Horizontal***
Power:

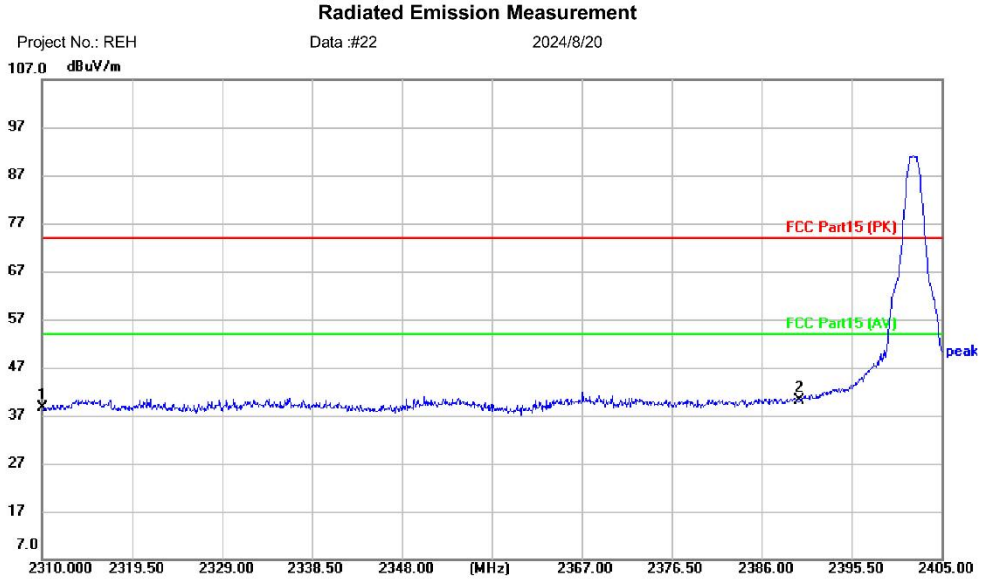
Temperature: (C)
Humidity: %RH

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2310.000	41.65	-2.67	38.98	74.00	-35.02	peak	
2	*	2390.000	44.44	-2.24	42.20	74.00	-31.80	peak	

*:Maximum data x:Over limit !:over margin 〈Reference Only
Receiver: ESR_1 Spectrum Analyzer: FSP40

Test Result: Pass

[Test mode:TX low channel]; [Polarity: Vertical]



Site
Limit: FCC Part15 (PK)
EUT: TWS bluetooth earbuds
M/N: BH24QT33A
Mode: BLE1M-TX-2402
Note:

Polarization: *Vertical*
Power:

Temperature: (C)
Humidity: %RH

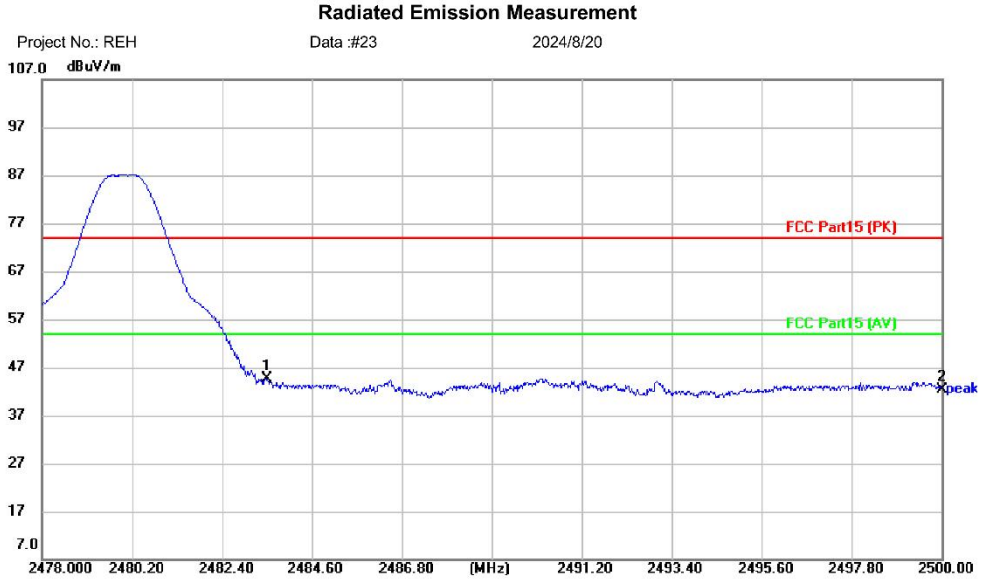
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2310.000	41.24	-2.67	38.57	74.00	-35.43	peak	
2	*	2390.000	42.27	-2.24	40.03	74.00	-33.97	peak	

*:Maximum data x:Over limit !:over margin 〈Reference Only

Receiver: ESR_1 Spectrum Analyzer: FSP40

Test Result: Pass

[Test mode: TX High channel]; [Polarity: Horizontal]



Site
Limit: FCC Part15 (PK)
EUT: TWS bluetooth earbuds
M/N: BH24QT33A
Mode: BLE1M-TX-2480
Note:

Polarization: ***Horizontal***
Power:

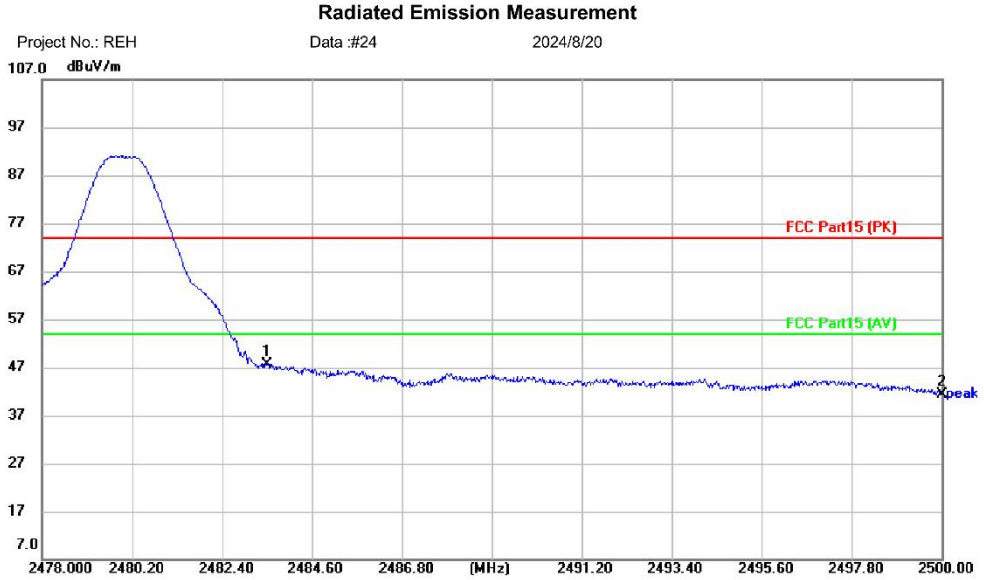
Temperature: (C)
Humidity: %RH

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	2483.500	47.37	-2.71	44.66	74.00	-29.34	peak	
2		2500.000	45.25	-2.80	42.45	74.00	-31.55	peak	

*:Maximum data x:Over limit !:over margin 〈Reference Only
Receiver: ESR_1 Spectrum Analyzer: FSP40

Test Result: Pass

[Test mode:TX High channel]; [Polarity: Vertical]



Site
Limit: FCC Part15 (PK)
EUT: TWS bluetooth earbuds
M/N: BH24QT33A
Mode: BLE1M-TX-2480
Note:

Polarization: *Vertical*
Power:

Temperature: (C)
Humidity: %RH

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	2483.500	50.24	-2.71	47.53	74.00	-26.47	peak	
2		2500.000	44.24	-2.80	41.44	74.00	-32.56	peak	

*:Maximum data x:Over limit !:over margin 〈Reference Only
Receiver: ESR_1 Spectrum Analyzer: FSP40

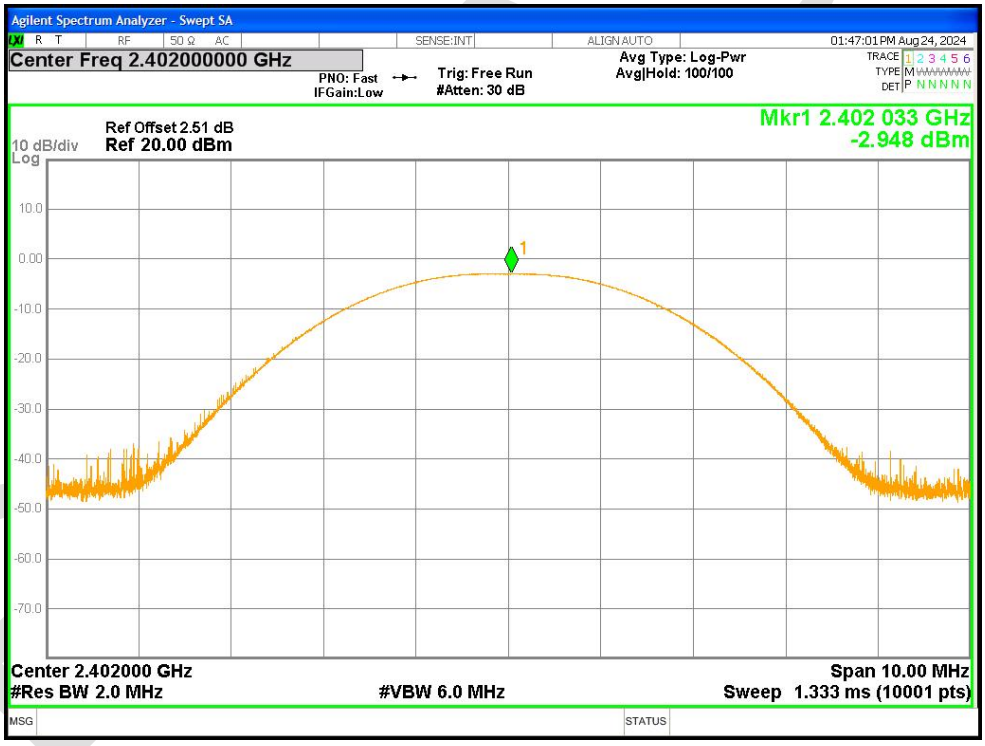
Test Result: Pass

7 Appendix A

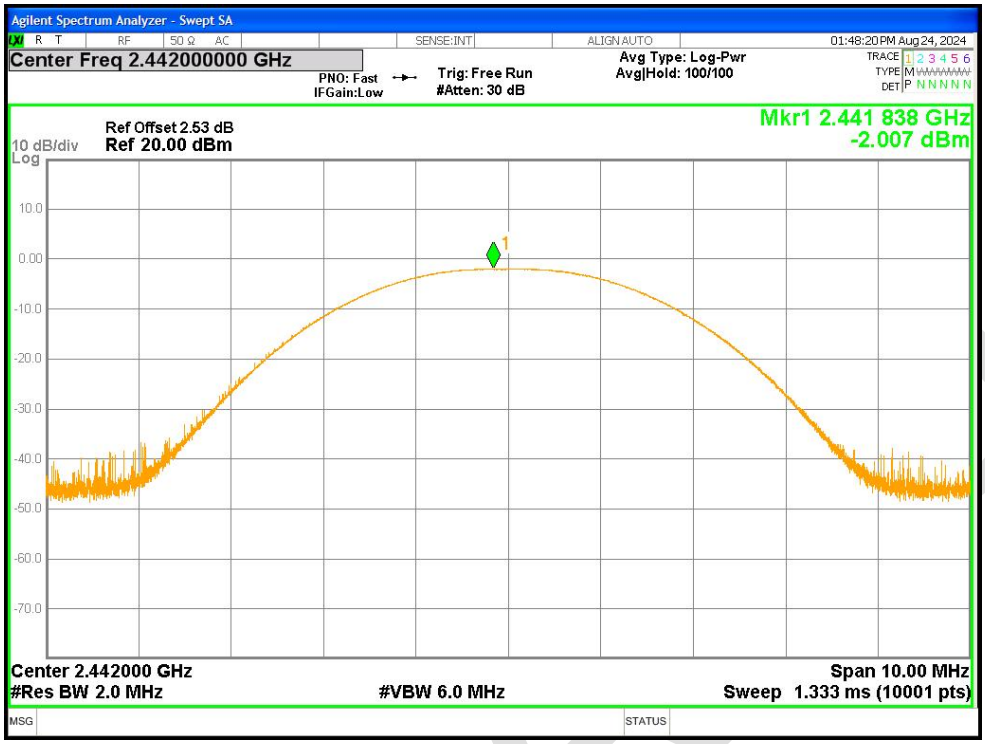
Maximum Conducted Output Power

Condition	Mode	Frequency (MHz)	Antenna	Conducted Power (dBm)	Limit (dBm)	Verdict
NVNT	BLE 1M	2402	Ant1	-2.948	30	Pass
NVNT	BLE 1M	2442	Ant1	-2.007	30	Pass
NVNT	BLE 1M	2480	Ant1	-1.159	30	Pass
NVNT	BLE 2M	2402	Ant1	-2.979	30	Pass
NVNT	BLE 2M	2442	Ant1	-2.004	30	Pass
NVNT	BLE 2M	2480	Ant1	-1.137	30	Pass

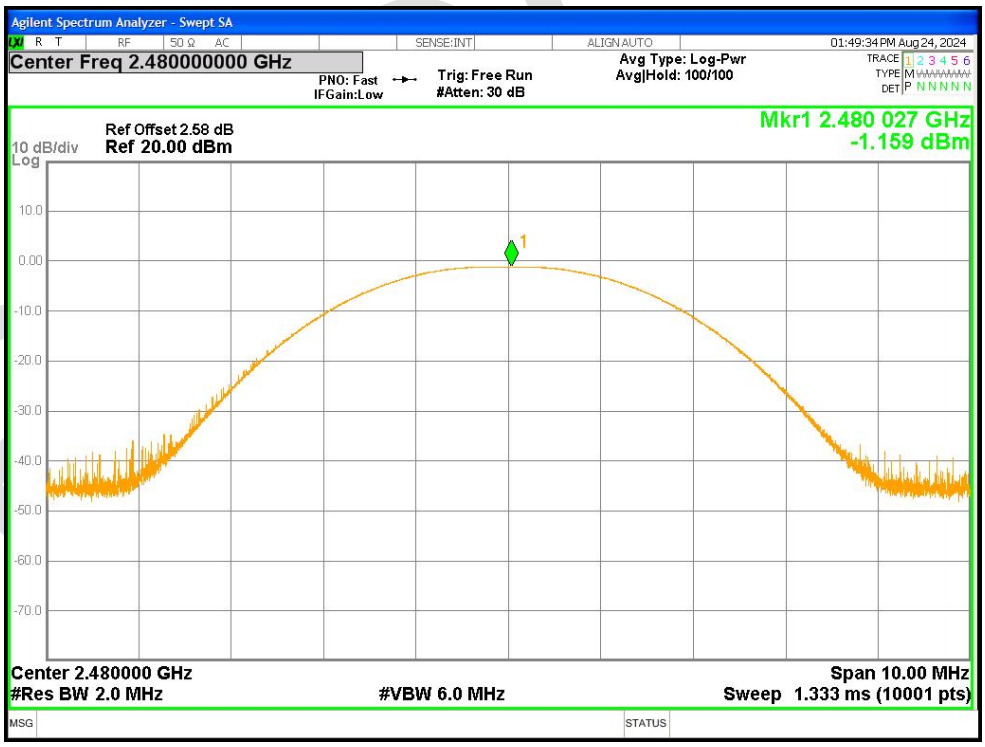
Power NVNT BLE 1M 2402MHz Ant1



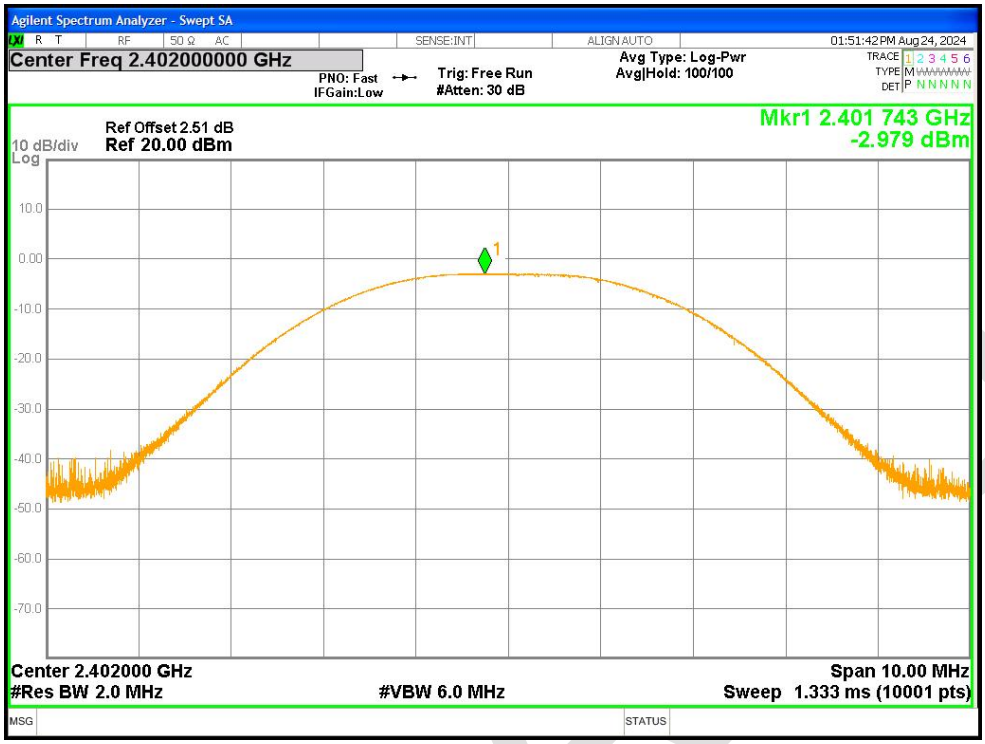
Power NVNT BLE 1M 2442MHz Ant1



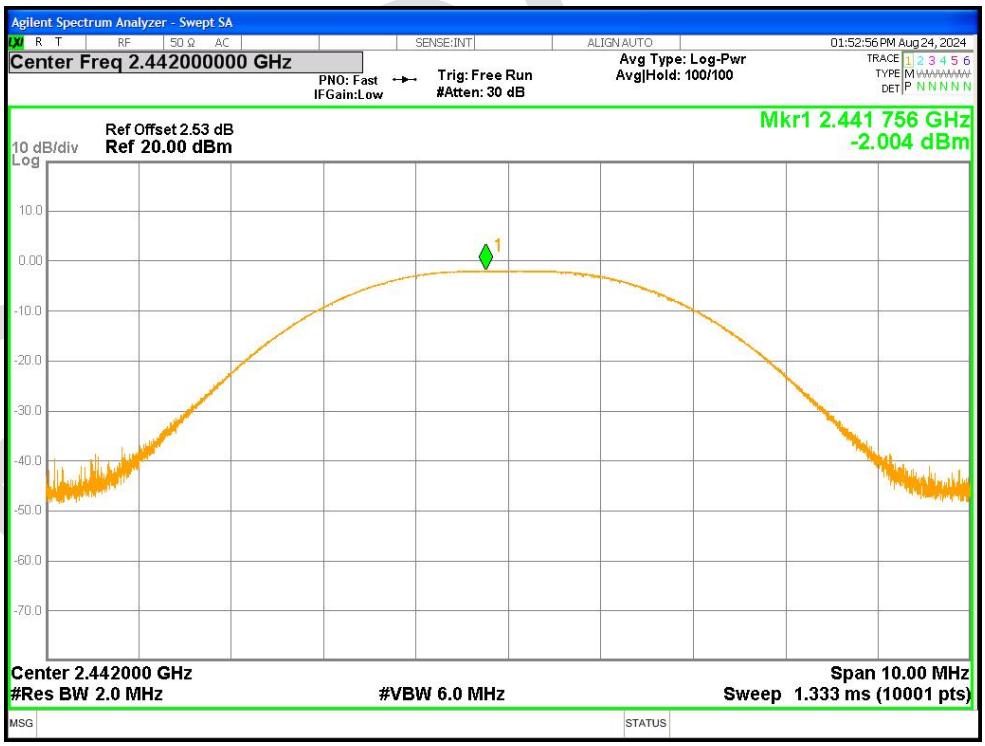
Power NVNT BLE 1M 2480MHz Ant1



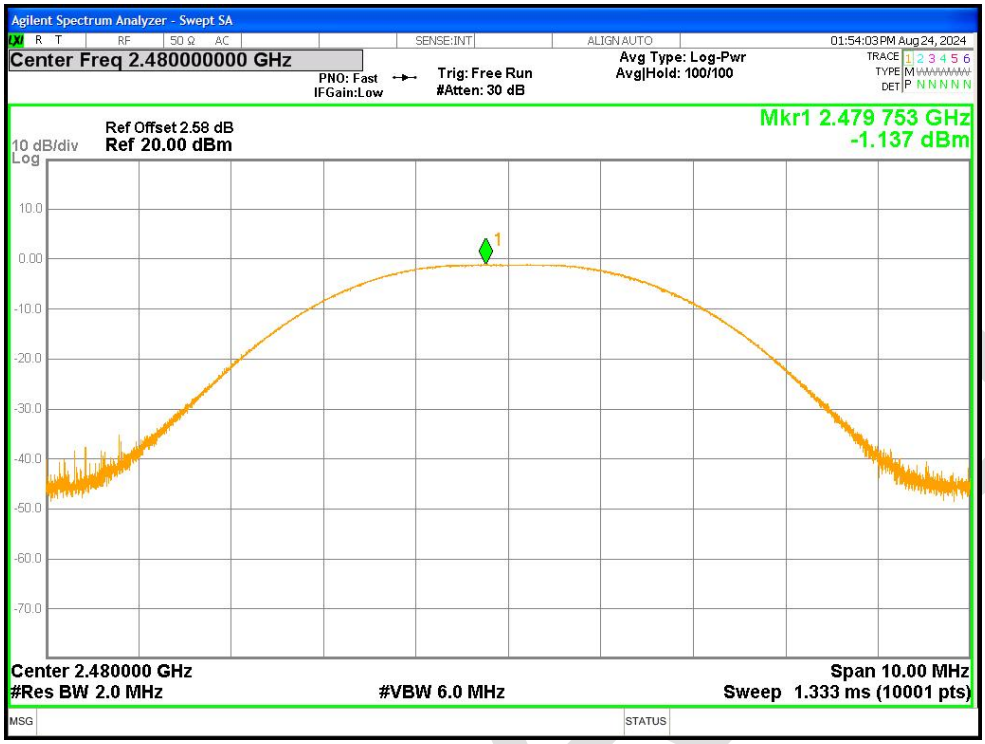
Power NVNT BLE 2M 2402MHz Ant1



Power NVNT BLE 2M 2442MHz Ant1



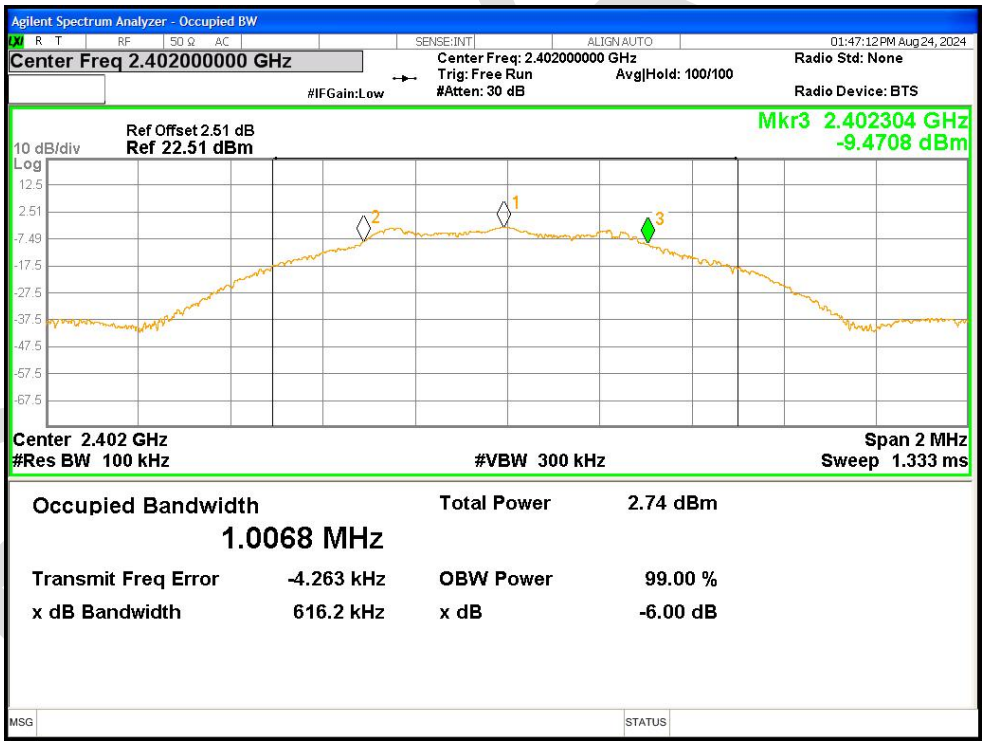
Power NVNT BLE 2M 2480MHz Ant1


Agilent Spectrum Analyzer - Swept SA
Center Freq 2.480000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold: 100/100
01:54:03 PM Aug 24, 2024
Ref Offset 2.58 dB
10 dB/div
Log
Ref 20.00 dBm
Mkr1 2.479 753 GHz
-1.137 dBm
Center 2.480000 GHz
#Res BW 2.0 MHz
#VBW 6.0 MHz
Span 10.00 MHz
Sweep 1.333 ms (10001 pts)

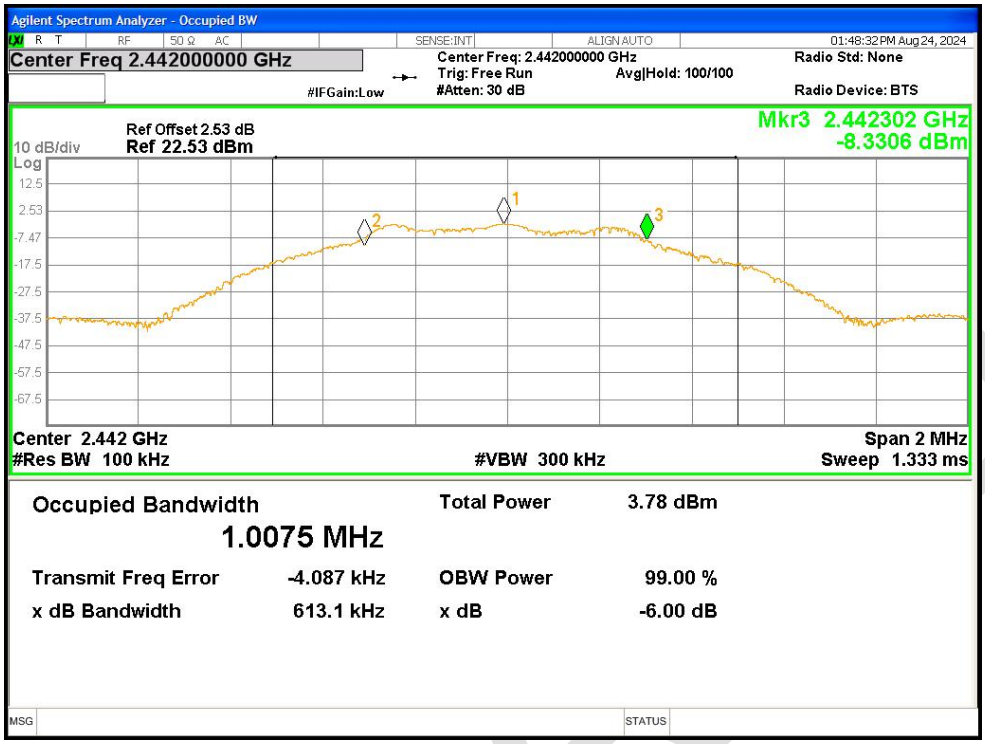
-6dB Bandwidth

Condition	Mode	Frequency (MHz)	Antenna	-6 dB Bandwidth (MHz)	Limit -6 dB Bandwidth (MHz)	Verdict
NVNT	BLE 1M	2402	Ant1	0.616	0.5	Pass
NVNT	BLE 1M	2442	Ant1	0.613	0.5	Pass
NVNT	BLE 1M	2480	Ant1	0.617	0.5	Pass
NVNT	BLE 2M	2402	Ant1	1.051	0.5	Pass
NVNT	BLE 2M	2442	Ant1	1.063	0.5	Pass
NVNT	BLE 2M	2480	Ant1	1.067	0.5	Pass

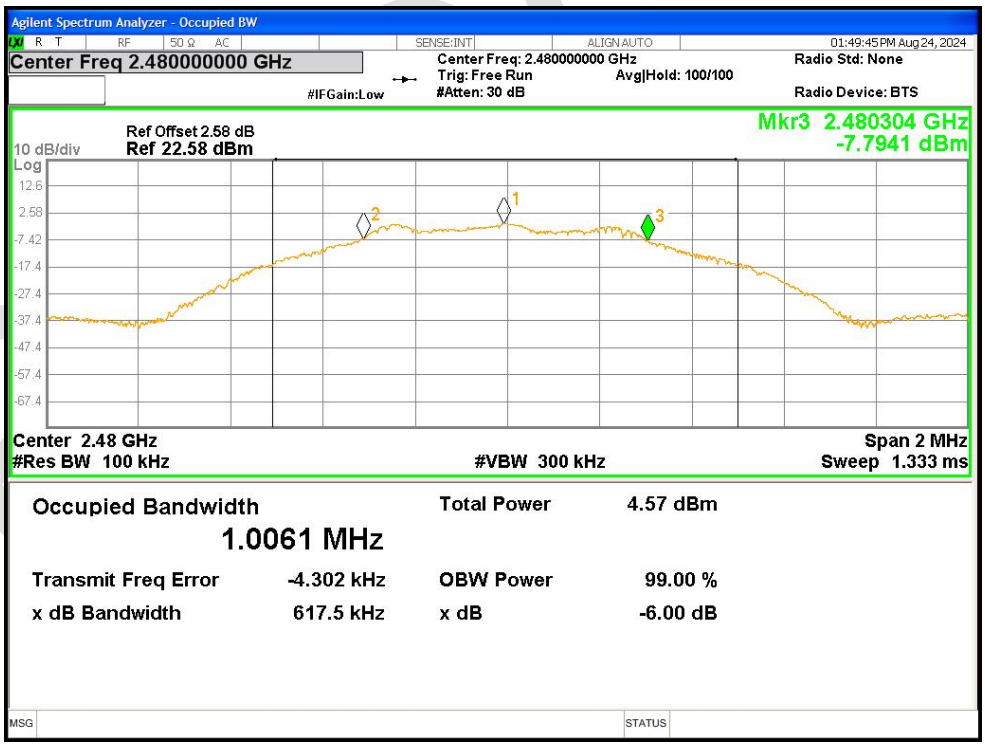
-6dB Bandwidth NVNT BLE 1M 2402MHz Ant1



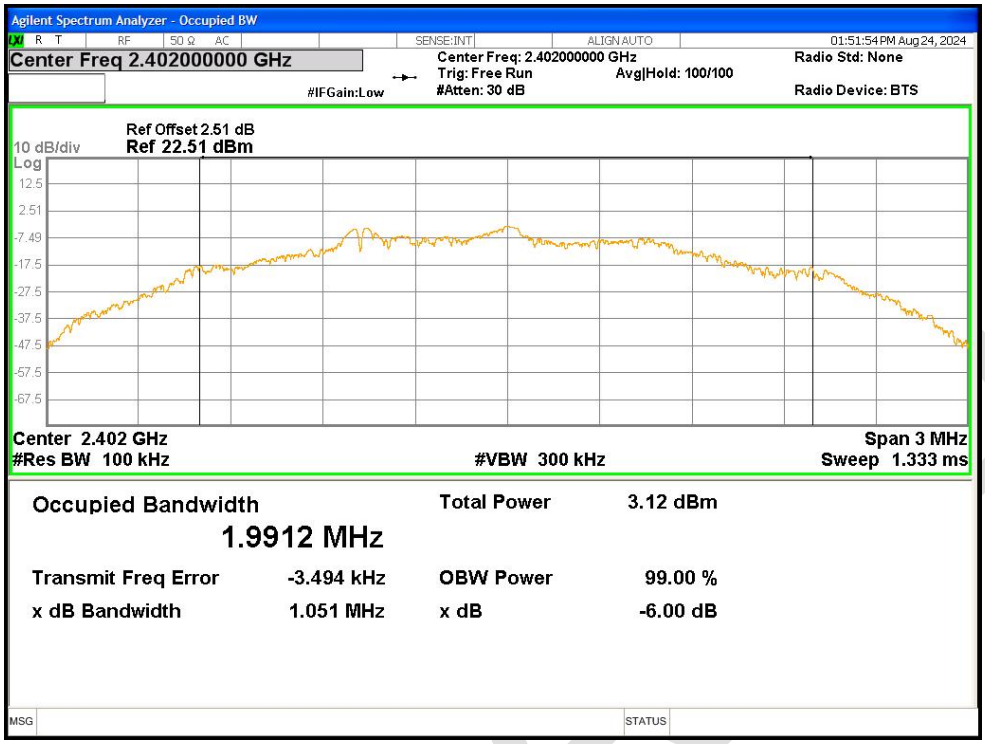
-6dB Bandwidth NVNT BLE 1M 2442MHz Ant1



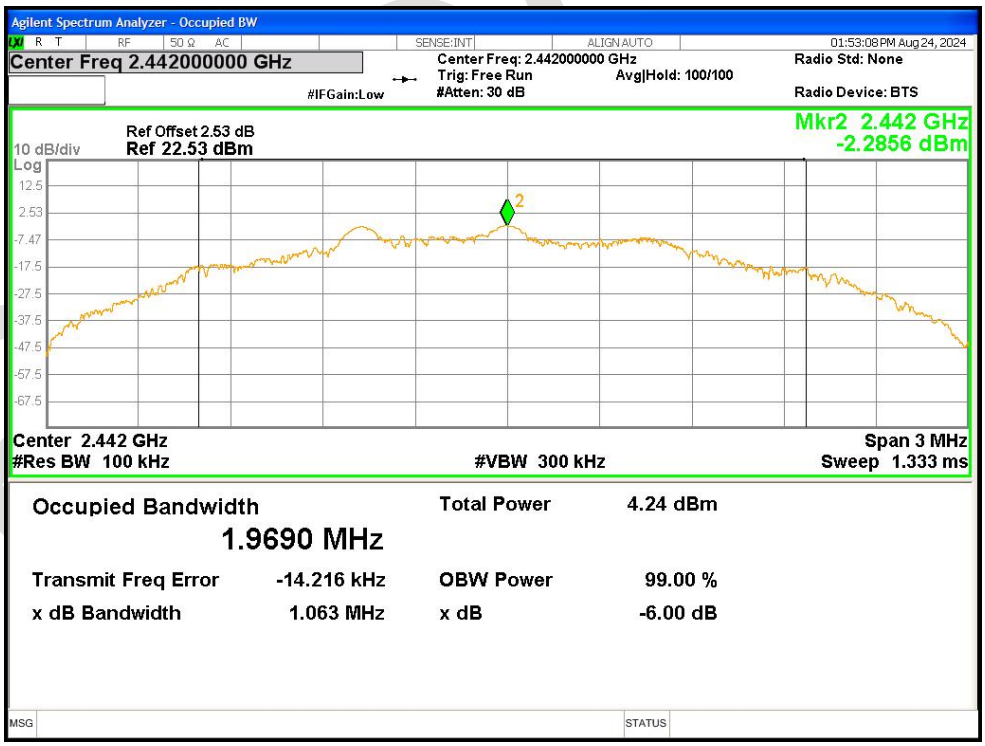
-6dB Bandwidth NVNT BLE 1M 2480MHz Ant1



-6dB Bandwidth NVNT BLE 2M 2402MHz Ant1



-6dB Bandwidth NVNT BLE 2M 2442MHz Ant1



-6dB Bandwidth NVNT BLE 2M 2480MHz Ant1