

Test Report

Applicant : POC SWEDEN AB
Address : Nackagatan 4, 11649 Stockholm, Sweden
Product Name : OBEX CONNECT
Brand Mark : POC
Model : OBEX CONNECT HEADSET
FCC ID : 2BFFJ-PC70204
Series model : N/A
Report Number : BLA-EMC-202404-A6101
Date of Receipt : 2024/2/22
Date of Test : 2024/5/8 to 2024/5/22
Test Standard : 47 CFR Part 15, Subpart C 15.249
Test Result : Pass

Compiled by:

Lucas

Review by:

Sueels

Approved by:

Blue Zheng

Issued Date:

2024/5/22



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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Revise Record

Version No.	Date	Description
01	2024/5/22	Original

1 General information

1.1 General information

Applicant	POC SWEDEN AB
Address	Nackagatan 4, 11649 Stockholm, Sweden
Manufacturer	Guoguang Electric Co., Ltd.
Address	No.8 Jinghu Road, Xinya Street, Huadu Reg, Guangzhou, Guangdong, P.R. China
Factory	Onward Helmet Company Limited
Address	No.268 Yinhe North Road, South-West Industry Zone, Shijie Town, Dongguan City, Guangdong Province

1.2 General description of EUT

Product Name	OBEX CONNECT
Model No.	OBEX CONNECT HEADSET
Series model	N/A
Differences of Series model	N/A
Operation Frequency:	2402MHz~2480MHz
Modulation Type:	GFSK
Antenna Type:	Dipole antenna
Antenna Gain:	2.64dBi(Provided by customer)
Power supply or adapter information	Power Rating: DC 3.8V form battery, DC 5V from USB Port.
Hardware Version	V1.3
Software Version	POC_DVT_01.00.77

Note: For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.

2 Test summary

No.	Test item	Result	Remark
1	Antenna Requirement	Pass	
2	Conducted Emissions at AC Power Line (150kHz-30MHz)	Pass	
3	Field Strength of the Fundamental Signal (15.249(a))	Pass	
4	20dB Bandwidth	Pass	
5	Radiated Emissions	Pass	
6	Restricted Band Around Fundamental Frequency	Pass	

3 Test Configuration

3.1 Test mode

Test Mode ^{Note 1}	Description
TX	Keep the EUT in continuously transmitting with modulation 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;

3.2 Operation Frequency each of channel

Operation Frequency each of channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2402MHz	11	2444MHz	-	-	-	-
2	2406MHz	12	2448MHz	-	-	-	-
3	2410MHz	13	2452MHz	-	-	-	-
4	2414MHz	14	2456MHz	-	-	-	-
5	2418MHz	15	2460MHz	-	-	-	-
6	2422MHz	16	2464MHz	-	-	-	-
7	2426MHz	17	2468MHz	-	-	-	-
8	2432MHz	18	2472MHz	-	-	-	-
9	2436MHz	19	2476MHz	-	-	-	-
10	2440MHz	20	2480MHz	-	-	-	-

3.3 Test channel

Channel	Frequency
The lowest channel	2402MHz
The middle channel	2440MHz
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°C	DC 3.8V

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)	$\pm 4.34\text{dB}$
Radiated Emission(30Mz-1000MHz)	$\pm 4.24\text{dB}$
Radiated Emission(1GHz-18GHz)	$\pm 4.68\text{dB}$
AC Power Line Conducted Emission(150kHz-30MHz)	$\pm 3.45\text{dB}$
Occupied Channel Bandwidth	$\pm 5\%$
RF output power, conducted	$\pm 1.5\text{ dB}$
Power Spectral Density, conducted	$\pm 3.0\text{ dB}$
Unwanted Emissions, conducted	$\pm 3.0\text{ dB}$
Temperature	$\pm 3\text{ }^{\circ}\text{C}$
Supply voltages	$\pm 3\%$
Time	$\pm 5\%$

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-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-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-046	Filter bank	2.4G/5G Filter bank	SKET	N/A	2023/07/07	2024/07/06
BLA-EMC-061	Receiver	ESPI7	R&S	101477	2023/07/07	2024/07/06
BLA-EMC-062	Signal Generator	N5181A	Agilent	MY46240904	2023/07/07	2024/07/06
BLA-EMC-064	Signal Generator	N5182B	KEYSIGHT	MY58108892	2023/07/07	2024/07/06
BLA-EMC-065	broadband Antenna	VULB9168	Schwarz beck	01065P	2022/12/12	2025/12/11
BLA-EMC-066	Amplifier	LNPA_30M01G-30	SKET	SK2021060801	2023/07/07	2024/07/06
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

6 Test result

6.1 Antenna requirement

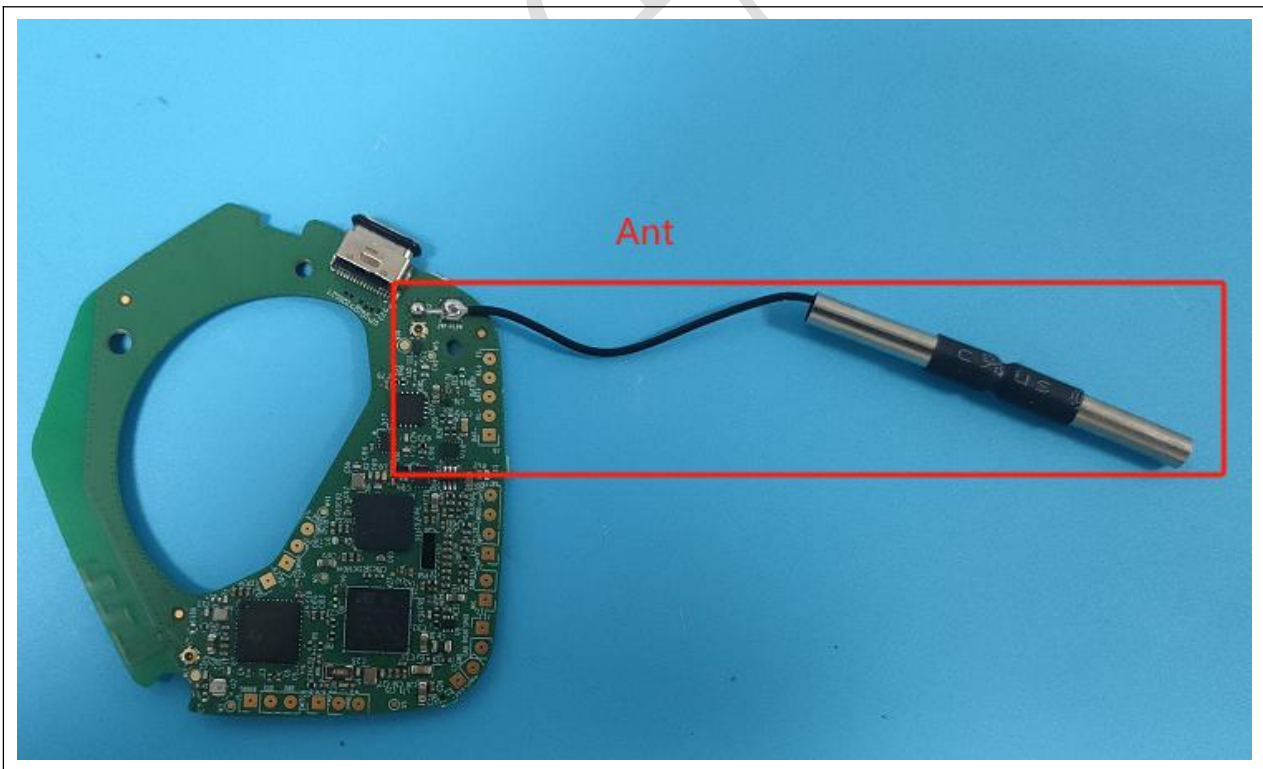
Test Standard	47 CFR Part 15, Subpart C 15.249
Test Method	N/A

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 2.64 dBi.



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

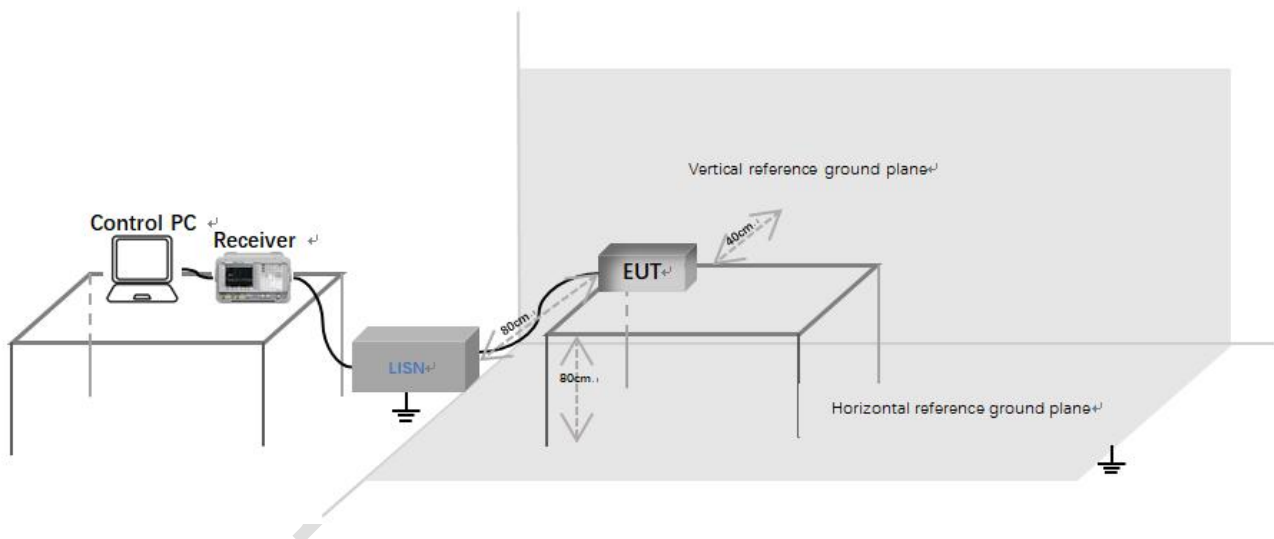
Test Standard	47 CFR Part 15, Subpart C 15.249
Test Method	ANSI C63.10 (2013) Section 6.2
Test Mode (Pre-Scan)	TX
Test Mode (Final Test)	TX

6.2.1 Limit

Frequency of emission(MHz)	Conducted limit(dB μ V)	
	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:

- Connect the control PC to the receiver through a USB to GPIB cable;
- The receiver is connected to the LISN through a coaxial line;
- Connect the power port of LISN to the EUT.

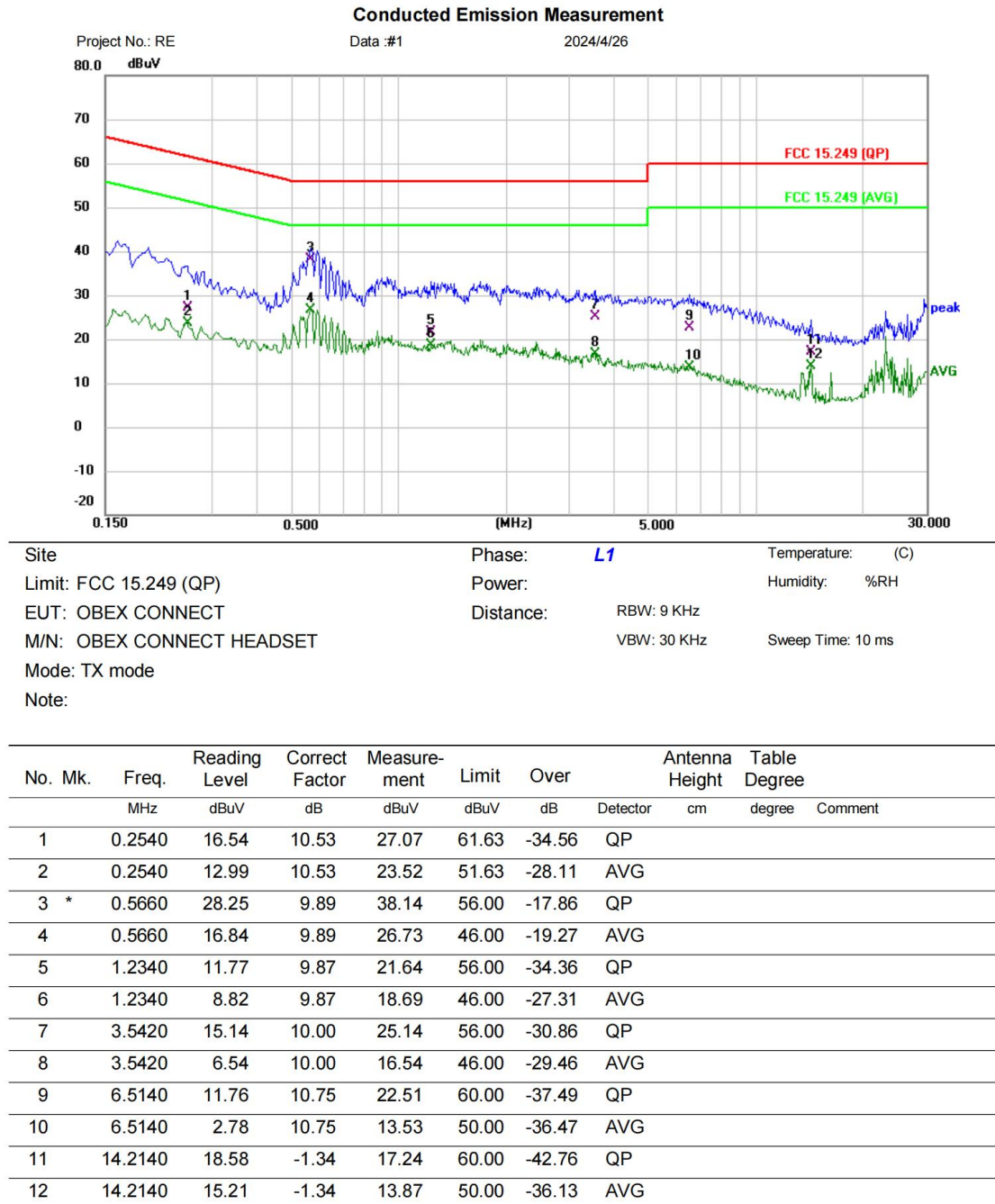
6.2.3 Procedure

- 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

6.2.4 Test data

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



Test Result: Pass

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

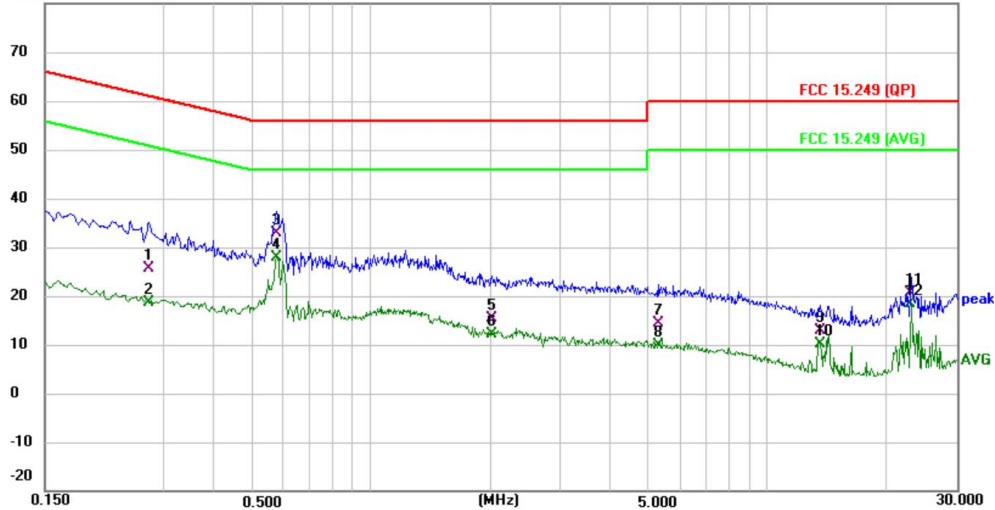
Conducted Emission Measurement

Project No.: RE

Data :#2

2024/4/26

80.0 dBuV



Site

Phase: **N**

Temperature: (C)

Limit: FCC 15.249 (QP)

Power:

Humidity: %RH

EUT: OBEX CONNECT

Distance:

RBW: 9 KHz

Sweep Time: 10 ms

M/N: OBEX CONNECT HEADSET

VBW: 30 KHz

Mode: TX mode

Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Antenna Height cm	Table Degree degree	Comment
1		0.2740	15.60	9.91	25.51	61.00	-35.49	QP		
2		0.2740	8.73	9.91	18.64	51.00	-32.36	AVG		
3		0.5780	23.09	9.85	32.94	56.00	-23.06	QP		
4	*	0.5780	17.96	9.85	27.81	46.00	-18.19	AVG		
5		2.0180	5.41	10.02	15.43	56.00	-40.57	QP		
6		2.0180	2.18	10.02	12.20	46.00	-33.80	AVG		
7		5.2780	3.93	10.45	14.38	60.00	-45.62	QP		
8		5.2780	-0.60	10.45	9.85	50.00	-40.15	AVG		
9		13.6020	13.92	-1.00	12.92	60.00	-47.08	QP		
10		13.6020	11.14	-1.00	10.14	50.00	-39.86	AVG		
11		23.1299	5.80	14.84	20.64	60.00	-39.36	QP		
12		23.1299	3.50	14.84	18.34	50.00	-31.66	AVG		

Test Result: Pass

6.3 Field strength of the fundamental signal (15.249(A))

Test Standard	47 CFR Part 15, Subpart C 15.249
Test Method	ANSI C63.10 (2013) Section 6.5&6.6
Test Mode (Pre-Scan)	TX
Test Mode (Final Test)	TX

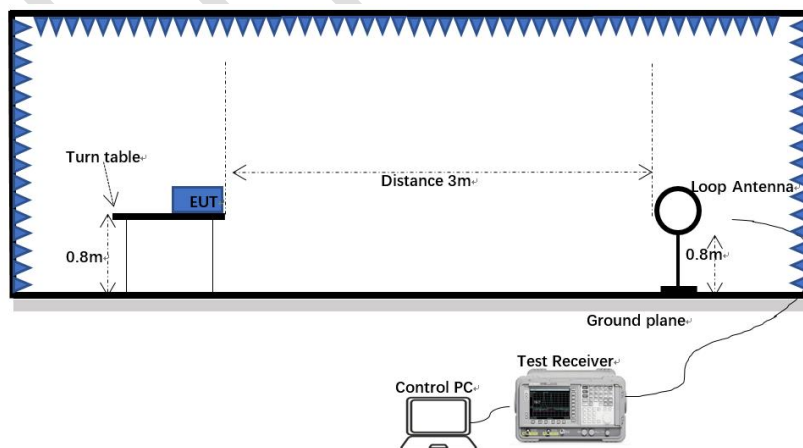
6.3.1 Limit

Fundamental frequency(MHz)	Field strength of fundamental(microvolts/meter)	Field strength of harmonics(microvolts/meter)
902-928	50	500
2400-2483.5	50	500
5725-5875	50	500
24000-24250	250	2500

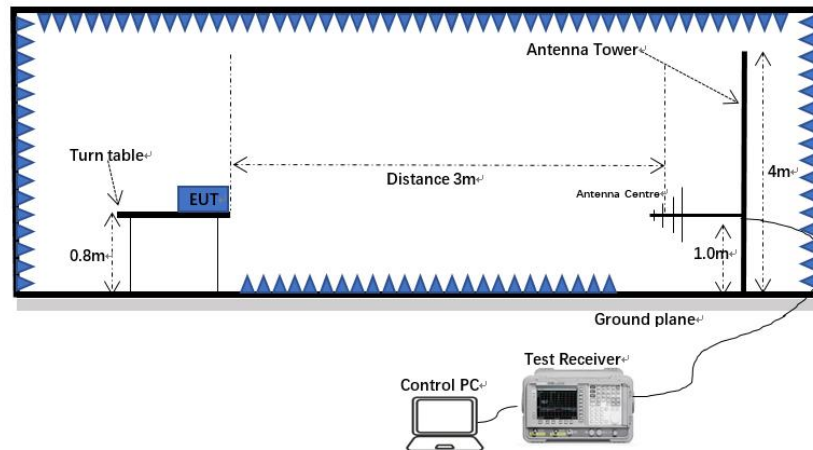
Remark: The frequencies above 1000MHz are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

6.3.2 Test setup

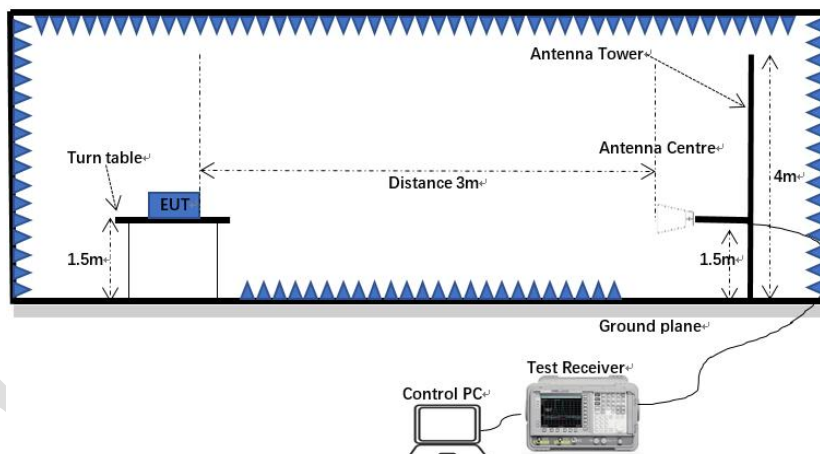
Below 1GHz:



30MHz-1GHz:



Above 1GHz:



6.3.3 Procedure

- 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.
- 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.
- 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.
- 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.
- 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.
- k) $\text{Level (dB}\mu\text{V/m)} = \text{Reading Level(dBuV)} + \text{Correct Factor (dB)}$
- l) SA setting: RBW=3MHz, VBW=10MHz , PK detector is for PK value ,RMS detector is for AV value.

6.3.4 Test data

Peak value

Frequency (MHz)	Reading Level (dBuV)	Correct Factor (dB)	Level (dBμV/m)	Limit (dBμV/m)	Over Limit (dB)	Antenna Polaxis
2402	104.02	-2.68	101.34	114.00	-12.66	H
2402	97.99	-2.68	95.31	114.00	-18.69	V
2440	103.18	-2.72	100.46	114.00	-12.54	H
2440	96.66	-2.72	93.94	114.00	-20.06	V
2480	96.99	-2.90	94.09	114.00	-19.91	H
2480	87.96	-2.90	85.06	114.00	-28.94	V

Average value

Frequency (MHz)	Reading Level (dBuV)	Correct Factor (dB)	Level (dB μ V/m)	Limit (dB μ V/m)	Over Limit (dB)	Antenna Polaxis
2402	86.30	-2.68	83.62	94.00	-10.38	H
2402	95.16	-2.68	92.48	94.00	-1.52	V
2440	95.89	-2.72	93.17	94.00	-0.83	H
2440	86.21	-2.72	83.49	94.00	-10.51	V
2480	95.45	-2.90	92.55	94.00	-1.45	H
2480	81.41	-2.90	78.51	94.00	-15.48	V

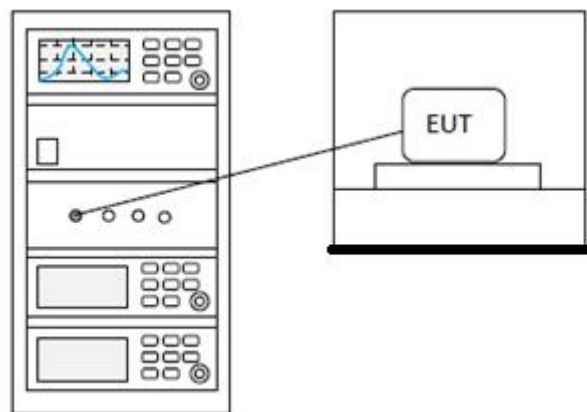
6.4 20dB bandwidth

Test Standard	47 CFR Part 15, Subpart C 15.249
Test Method	ANSI C63.10 (2013) Section 6.9
Test Mode (Pre-Scan)	TX
Test Mode (Final Test)	TX

6.4.1 Limit

N/A

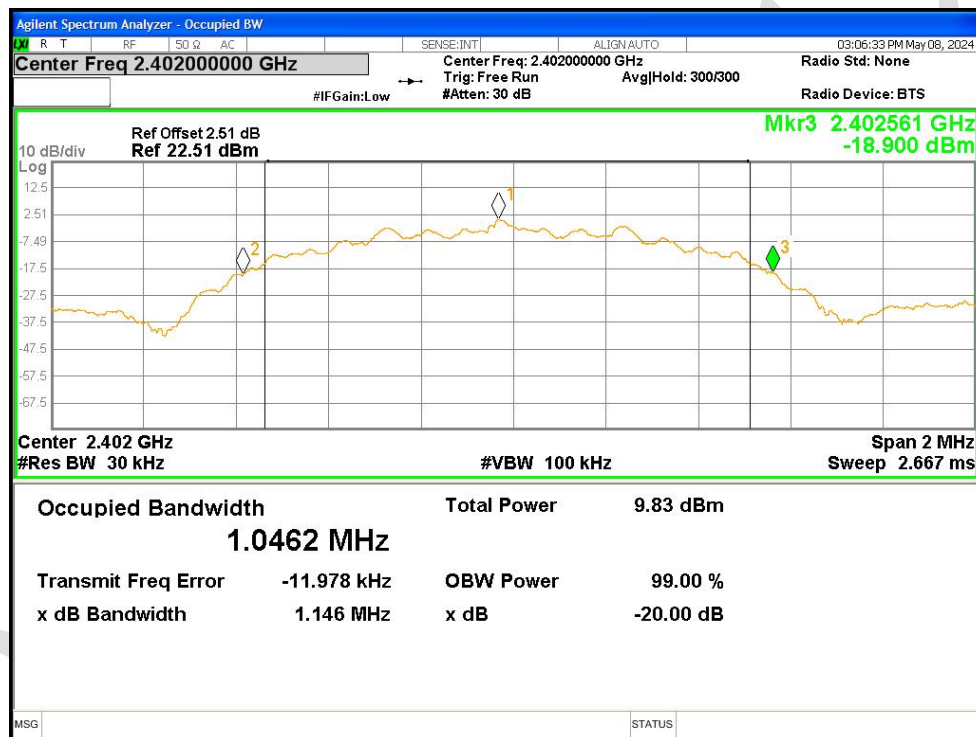
6.4.2 Test setup



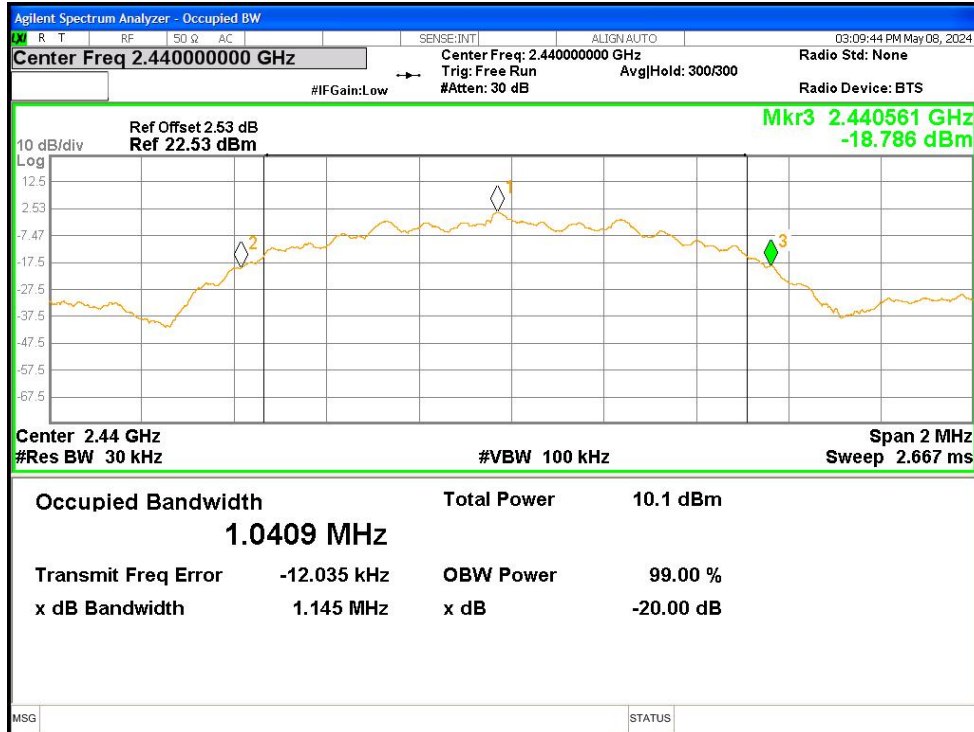
6.4.3 Test data

Test Frequency MHz	20dB Bandwidth MHz	Result
2402	1.146	Pass
2440	1.145	Pass
2480	1.170	Pass

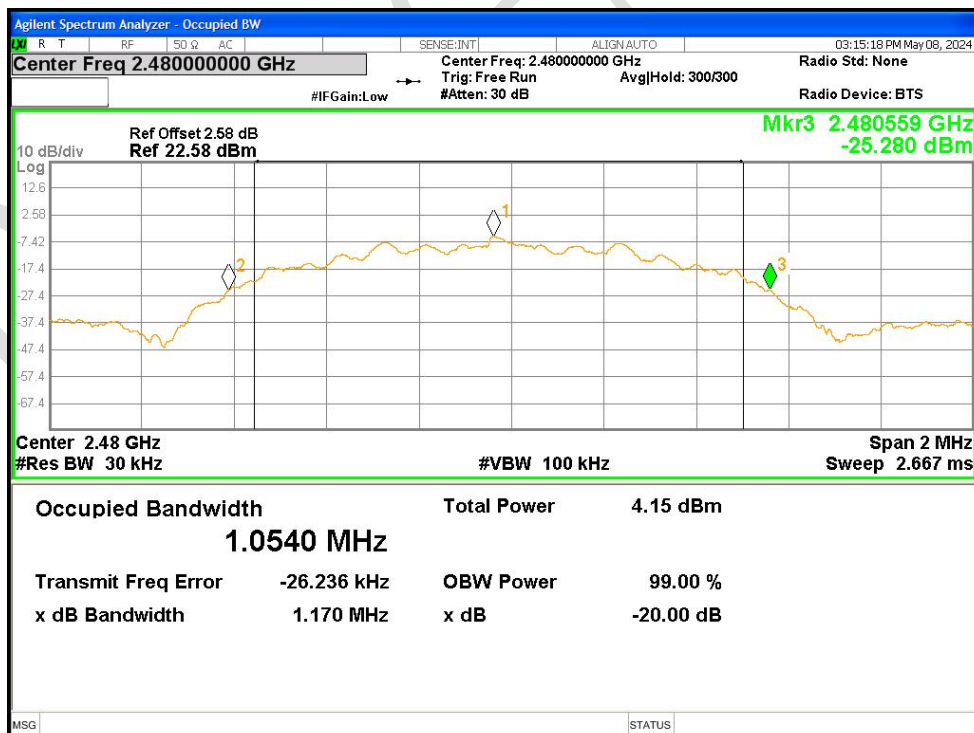
-20dB Bandwidth 2402MHz Ant1



-20dB Bandwidth 2440MHz Ant1



-20dB Bandwidth 2480MHz Ant1



6.5 Radiated spurious emissions

Test Standard	47 CFR Part 15, Subpart C 15.249
Test Method	ANSI C63.10 (2013) Section 6.4,6.5,6.6
Test Mode (Pre-Scan)	TX
Test Mode (Final Test)	TX

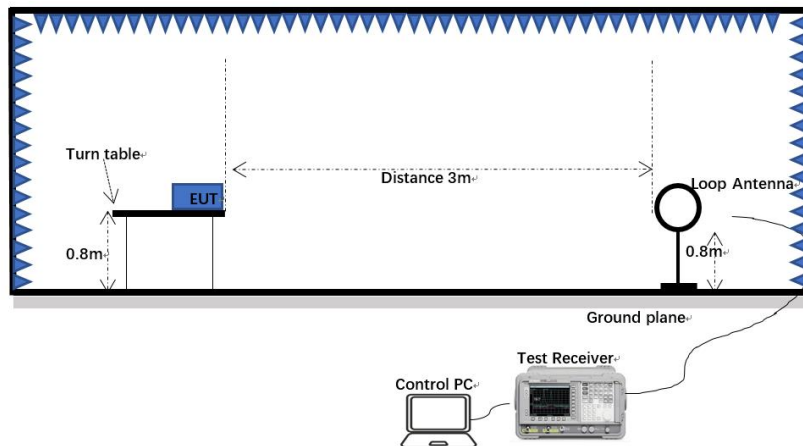
6.5.1 Limit

Frequency(MHz)	Field strength (microvolts/meter)	Limit (dBuV/m)	Detector	Measurement Distance (meters)
0.009-0.490	2400/F(kHz)	-	-	300
0.490-1.705	24000/F(kHz)	-	-	30
1.705-30	30	-	-	30
30-88	100	40.0	QP	3
88-216	150	43.5	QP	3
216-960	200	46.0	QP	3
960-1000	500	54.0	QP	3
Above 1000	500	54.0	AV	3

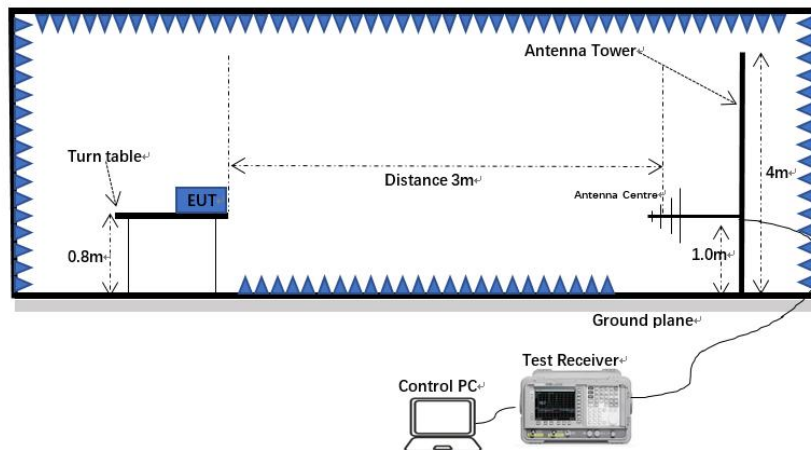
Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, the peak field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

6.5.2 Test setup

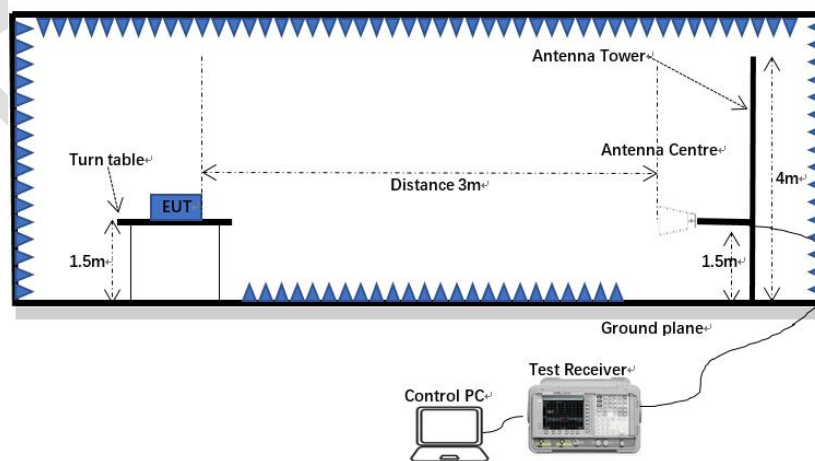
Below 1GHz:



30MHz-1GHz:



Above 1GHz:



6.5.3 Procedure

For testing performed with the loop antenna, the center of the loop was positioned 1 m above the ground and positioned with its plane vertical at the specified distance from the EUT. During testing the loop was rotated about its vertical axis for maximum response at each azimuth and also investigated with the loop positioned in the horizontal plane. Only the worst position of vertical was shown in the report.

Remark:

1) For emission below 1GHz, through pre-scan found the worst case is the lowest channel. Only the worst case is recorded in the report.

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

Final Test Level = Receiver Reading + Antenna Factor + Cable Factor - Preamplifier Factor

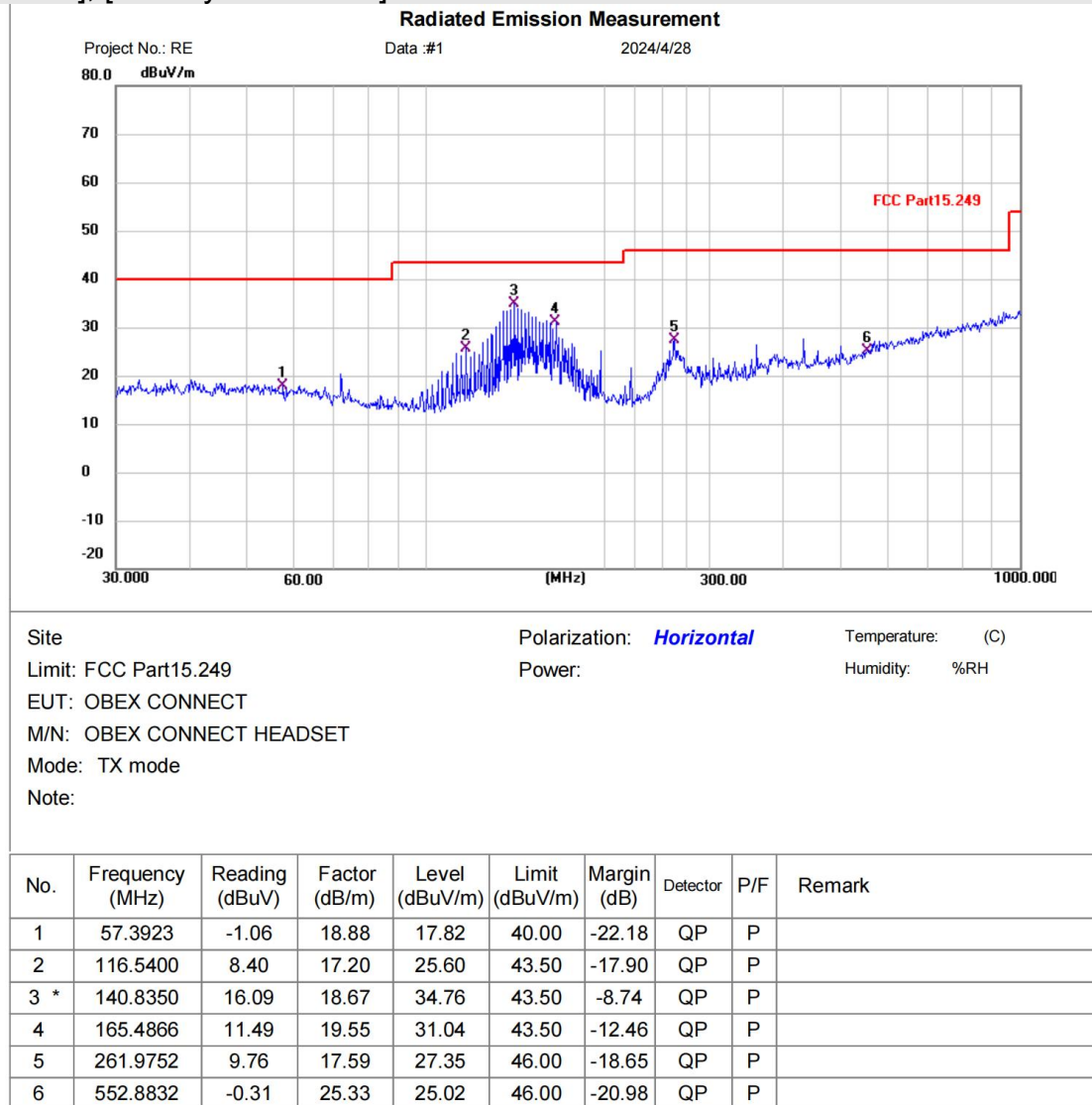
3) Scan from 9kHz to 25GHz, the disturbance above 12.75GHz and below 30MHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than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

4) 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.

6.5.4 Test data

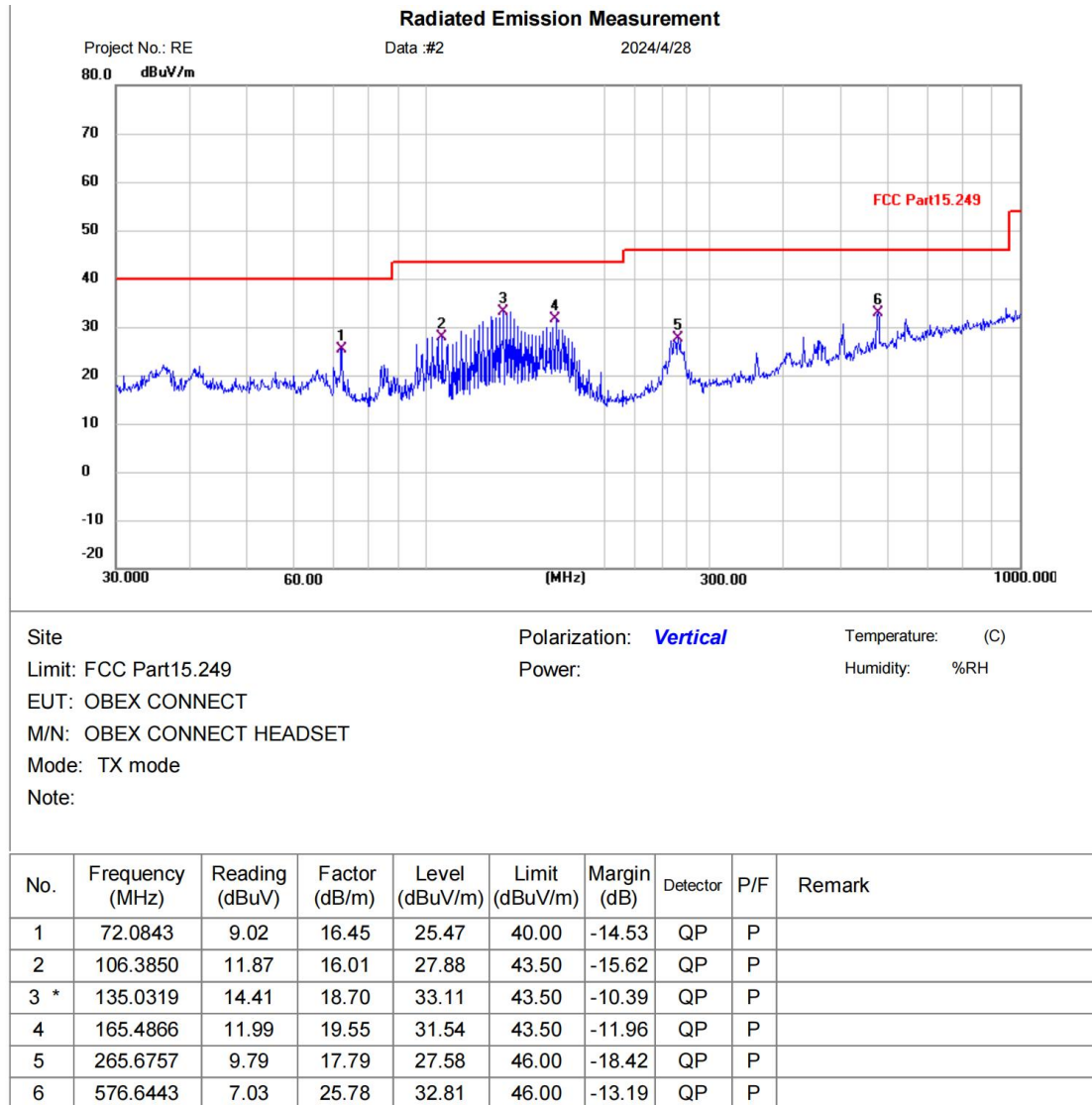
Below 1GHz

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



Test Result: Pass

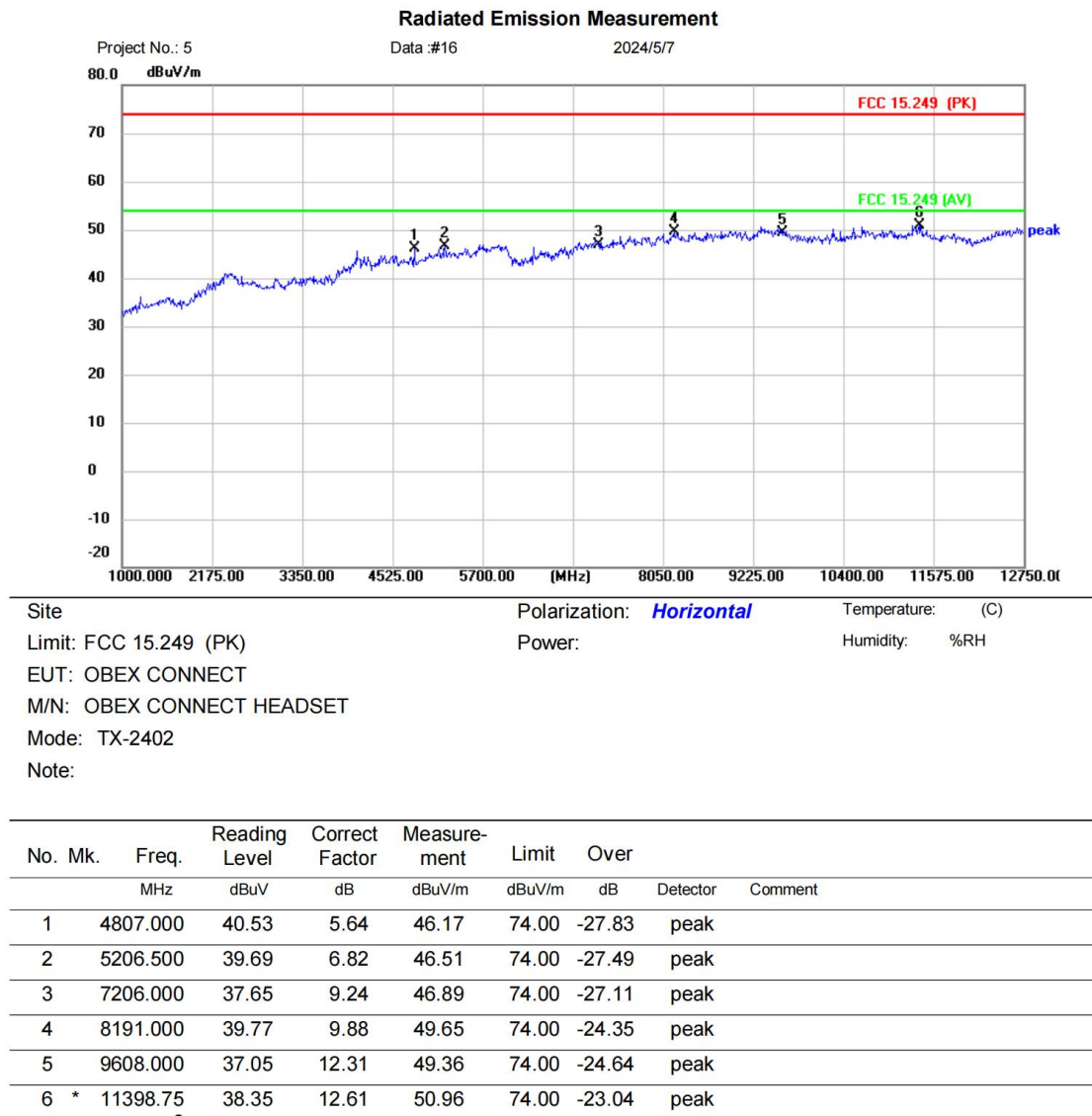
[Test mode: TX]; [Polarity: Vertical]



Test Result: Pass

Above 1GHz:

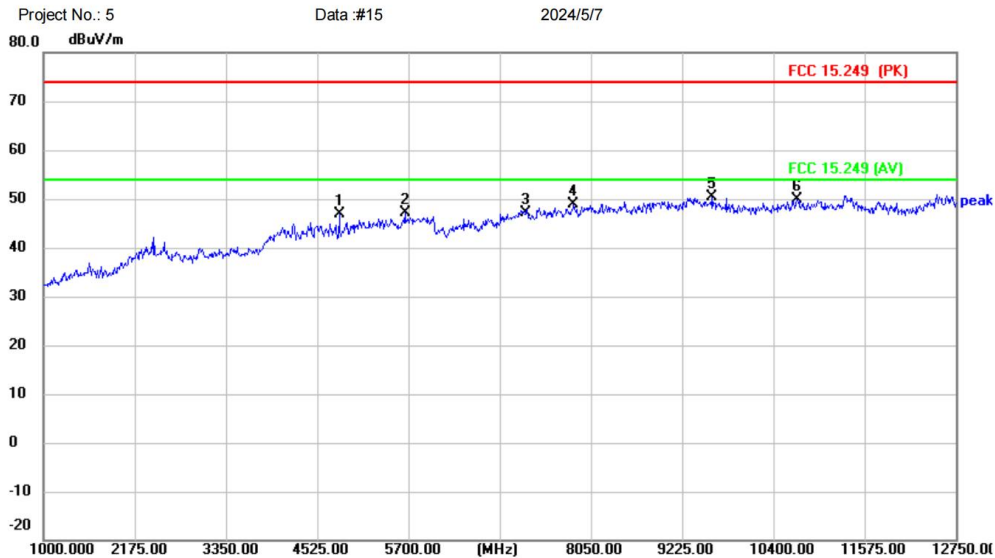
[Test mode: TX low channel]; [Polarity: Horizontal]



Test Result: Pass

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

Radiated Emission Measurement



Site: Polarization: **Vertical** Temperature: (C)
Limit: FCC 15.249 (PK) Power: Humidity: %RH
EUT: OBEX CONNECT
M/N: OBEX CONNECT HEADSET
Mode: TX-2402
Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1		4807.000	41.34	5.64	46.98	74.00	-27.02	peak	
2		5653.000	39.33	7.76	47.09	74.00	-26.91	peak	
3		7206.000	37.82	9.24	47.06	74.00	-26.94	peak	
4		7826.750	39.20	9.73	48.93	74.00	-25.07	peak	
5	*	9608.000	37.98	12.31	50.29	74.00	-23.71	peak	
6		10705.50	36.85	13.12	49.97	74.00	-24.03	peak	

Test Result: Pass

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

Radiated Emission Measurement



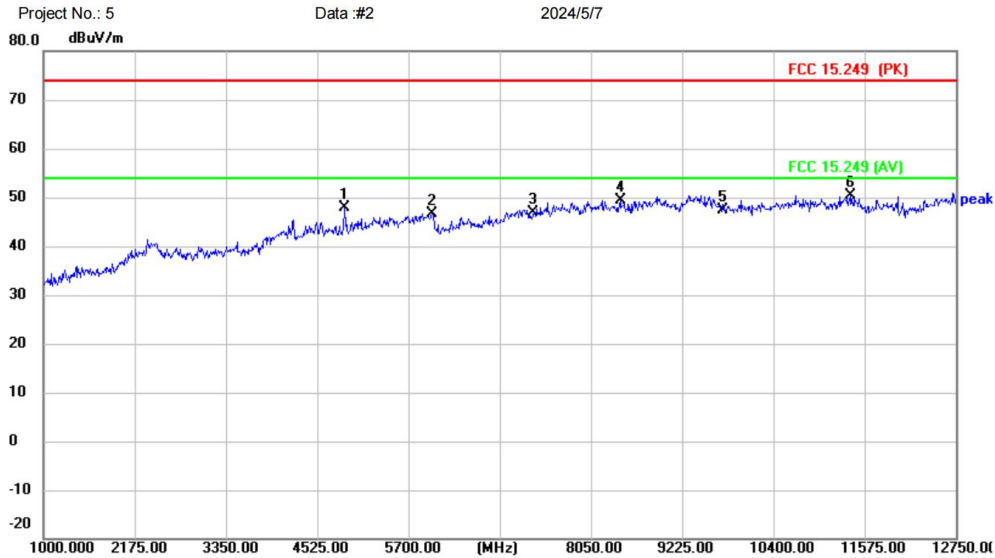
Site: Polarization: **Horizontal** Temperature: (C)
Limit: FCC 15.249 (PK) Power: Humidity: %RH
EUT: OBEX CONNECT
M/N: OBEX CONNECT HEADSET
Mode: TX-2440
Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1		4877.500	43.55	5.72	49.27	74.00	-24.73	peak	
2	*	4877.500	40.44	5.72	46.16	54.00	-7.84	AVG	
3		5982.000	38.07	8.74	46.81	74.00	-27.19	peak	
4		7320.000	37.81	9.43	47.24	74.00	-26.76	peak	
5		8872.500	38.54	11.91	50.45	74.00	-23.55	peak	
6		9760.000	35.60	12.21	47.81	74.00	-26.19	peak	
7		10646.75	38.20	12.88	51.08	74.00	-22.92	peak	

Test Result: Pass

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

Radiated Emission Measurement



Site: Polarization: **Vertical** Temperature: (C)
Limit: FCC 15.249 (PK) Power: Humidity: %RH
EUT: OBEX CONNECT
M/N: OBEX CONNECT HEADSET
Mode: TX-2440
Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1		4877.500	42.06	5.72	47.78	74.00	-26.22	peak	
2		6005.500	40.95	5.61	46.56	74.00	-27.44	peak	
3		7320.000	37.38	9.43	46.81	74.00	-27.19	peak	
4		8426.000	38.91	10.45	49.36	74.00	-24.64	peak	
5		9760.000	35.24	12.21	47.45	74.00	-26.55	peak	
6	*	11398.75	37.69	12.61	50.30	74.00	-23.70	peak	

Test Result: Pass