



FCC RF Test Report

APPLICANT : FoxInsights GmbH
EQUIPMENT : FoxRadar
BRAND NAME : FoxInsights
MODEL NAME : FoxRadar-V1
FCC ID : 2BKML-FOXRADAR
STANDARD : FCC Part 15 Subpart C §15.247
CLASSIFICATION : (DTS) Digital Transmission System
TEST DATE(S) : Oct. 20, 2024

This product installed a RF module (Brand Name: WROOM, Model Name: ESP-WROOM-32D, FCC ID: 2AC7Z-ESPWROOM32D) during the test, only the RSE worst mode and Co-location mode were verified in this report, all the other test results are leveraged from module RF report.

We, Sporton International Inc. (Kunshan), would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International Inc. (Kunshan), the test report shall not be reproduced except in full.

Jason Jia

Approved by: Jason Jia



Sporton International Inc. (Kunshan)

**No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300
People's Republic of China**



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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR492504B	Rev. 01	Initial issue of report	Nov. 20, 2024



SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
-	15.247(a)(2)	6dB Bandwidth	$\geq 0.5\text{MHz}$	Pass	1
-	-	99% Bandwidth	-	Report only	1
-	15.247(b)(3)	Peak Output Power	$\leq 30\text{dBm}$	Pass	1
-	15.247(e)	Power Spectral Density	$\leq 8\text{dBm}/3\text{kHz}$	Pass	1
-	15.247(d)	Conducted Band Edges and Spurious Emission	$\leq 20\text{dBc}$	Pass	1
3.1	15.247(d)	Radiated Band Edges and Spurious Emission	15.209(a) & 15.247(d)	Pass	Under limit 7.01 dB at 480.080 MHz
-	15.207	AC Conducted Emission	15.207(a)	Not Applicable	EUT not connect to AC Mains
3.2	15.203 & 15.247(b)	Antenna Requirement	15.203 & 15.247(b)	Pass	-

Remark 1:

Verify the maximum conducted power of the host is lower than and very close to the module, all the conducted test results were leveraged from module RF report which can refer to Report No. RXA1710-0352RF01R1.

Conformity Assessment Condition:

1. The test results (PASS/FAIL) with all measurement uncertainty excluded are presented against the regulation limits or in accordance with the requirements stipulated by the applicant/manufacturer who shall bear all the risks of non-compliance that may potentially occur if measurement uncertainty is taken into account.
2. The measurement uncertainty please refer to each test result in the section "Measurement Uncertainty"

Disclaimer:

The product specifications of the EUT presented in the test report that may affect the test assessments are declared by the manufacturer who shall take full responsibility for the authenticity.



1 General Description

1.1 Applicant

FoxInsights GmbH
Ridlerstr. 57 80339 Munich Germany

1.2 Manufacturer

FoxInsights GmbH
Ridlerstr. 57 80339 Munich Germany

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	FoxRadar
Brand Name	FoxInsights
Model Name	FoxRadar-V1
FCC ID	2BKML-FOXRADAR
SN Code	Radiation: ONP417602655
HW Version	1.0
SW Version	1.0.0
EUT Stage	Identical Prototype

Remark: The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

1.4 Product Specification of Equipment Under Test

Standards-related Product Specification	
Tx/Rx Frequency Range	2402 MHz ~ 2480 MHz
Number of Channels	40
Carrier Frequency of Each Channel	40 Channel(37 hopping + 3 advertising channel)
Antenna Type / Gain	PCB Antenna type with gain 3.7 dBi
Type of Modulation	Bluetooth LE : GFSK

Note: The device supports BLE 1Mbps only.

1.5 Modification of EUT

No modifications are made to the EUT during all test items.



1.6 Testing Location

Sporton International Inc. (Kunshan) is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.02.

Test Firm	Sporton International Inc. (Kunshan)		
Test Site Location	No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300 People's Republic of China TEL : +86-512-57900158		
Test Site No.	Sporton Site No.	FCC Designation No.	FCC Test Firm Registration No.
	03CH05-KS	CN1257	314309

1.7 Test Software

Item	Site	Manufacturer	Name	Version
1.	03CH05-KS	AUDIX	E3	210616

1.8 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- ♦ 47 CFR Part 15 Subpart C §15.247
- ♦ FCC KDB 558074 D01 15.247 Meas Guidance v05r02
- ♦ ANSI C63.10-2013

Remark: All test items were verified and recorded according to the standards and without any deviation during the test.



2 Test Configuration of Equipment Under Test

2.1 Carrier Frequency Channel

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
2400-2483.5 MHz	0	2402	21	2444
	1	2404	22	2446
	2	2406	23	2448
	3	2408	24	2450
	4	2410	25	2452
	5	2412	26	2454
	6	2414	27	2456
	7	2416	28	2458
	8	2418	29	2460
	9	2420	30	2462
	10	2422	31	2464
	11	2424	32	2466
	12	2426	33	2468
	13	2428	34	2470
	14	2430	35	2472
	15	2432	36	2474
	16	2434	37	2476
	17	2436	38	2478
	18	2438	39	2480
	19	2440	-	-
	20	2442	-	-

2.2 Test Mode

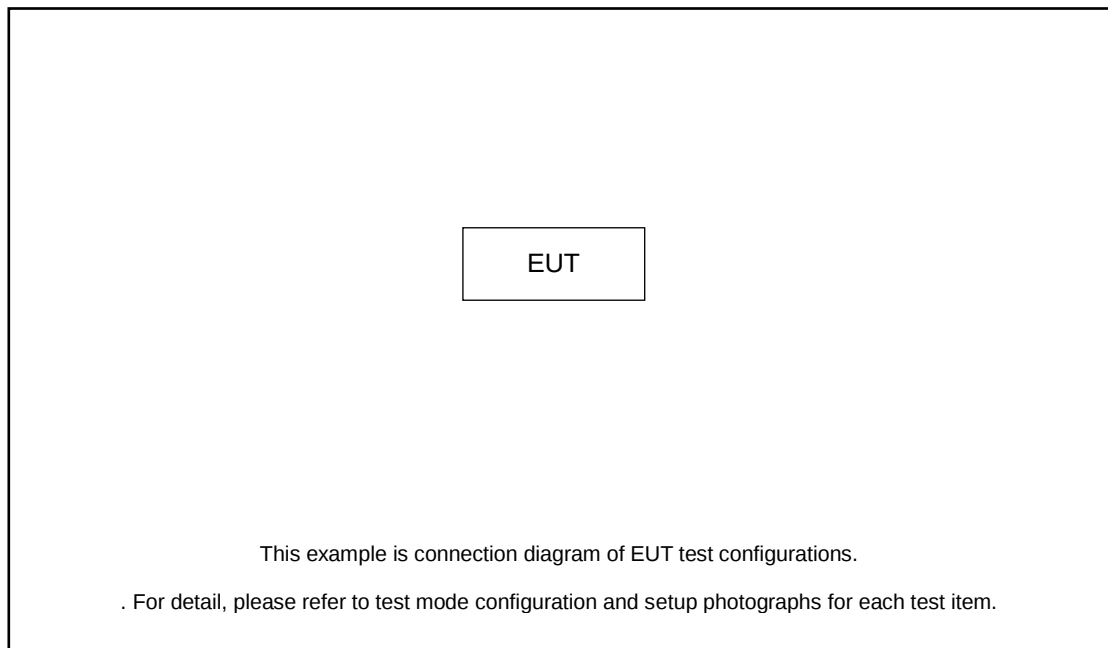
- a. The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: radiation emission (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower). For radiated measurement, pre-scanned in three orthogonal panels, X, Y, Z. The worst cases (X plane) were recorded in this report.

The following summary table is showing all test modes to demonstrate in compliance with the standard.

Summary table of Test Cases	
Test Item	Data Rate / Modulation
	Bluetooth – LE / GFSK
Radiated TCS	Mode 1: Bluetooth LE Tx CH00_2402 MHz_BLE 1Mbps

The Host installed the module without any change include Power setting and Antenna path and so on, so we evaluate all test items could refer to RF module report and the RSE worst mode from module report and Co-location mode were verified in this report. Test data of Co-location refer to FR492504C.

2.3 Connection Diagram of Test System



2.4 EUT Operation Test Setup

For BLE function, the engineering test program was provided and enabled to make EUT continuous transmit.

3 Test Result

3.1 Radiated Band Edges and Spurious Emission Measurement

3.1.1 Limit of Radiated Band Edges and Spurious Emission

In any 100 kHz bandwidth outside the intentional radiator frequency band, all harmonics/spurious must be at least 20 dB below the highest emission level within the authorized band. If the output power of this device was measured by spectrum analyzer, the attenuation under this paragraph shall be 30 dB instead of 20 dB. In addition, radiated emissions which fall in the restricted bands must also comply with the limits as below.

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

3.1.2 Measuring Instruments

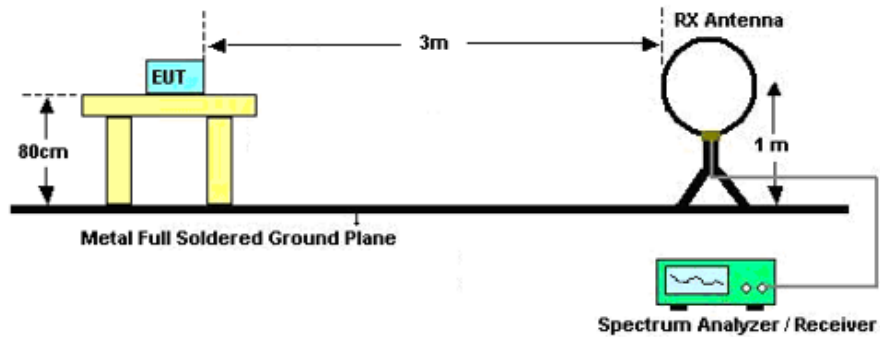
The section 4.0 of List of Measuring Equipment of this test report is used for test.

3.1.3 Test Procedures

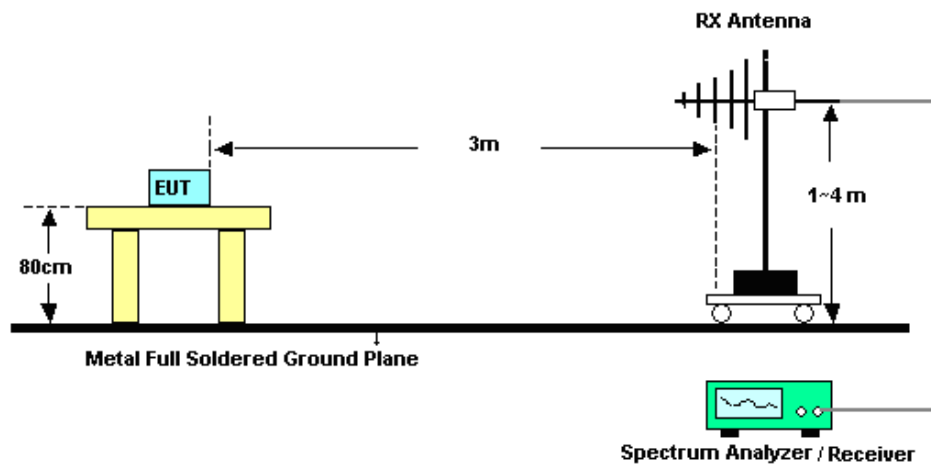
1. The testing follows ANSI C63.10-2013 clause 11.11 & 11.12
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level.
3. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
6. For testing below 1GHz, if the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then peak values of EUT will be reported, otherwise, the emissions will be repeated one by one using the CISPR quasi-peak method and reported.
7. For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than peak limit (that means the emission level in average mode also complies with the limit in average mode), then peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
8. Use the following spectrum analyzer settings:
 - (1) Span shall wide enough to fully capture the emission being measured;
 - (2) Set RBW=100 kHz for $f < 1$ GHz; $VBW \geq RBW$; Sweep = auto; Detector function = peak; Trace = max hold;
 - (3) Set RBW = 1 MHz, VBW= 3MHz for $f \geq 1$ GHz for peak measurement.
For average measurement:
 - $VBW = 10$ Hz, when duty cycle is no less than 98 percent.
 - $VBW \geq 1/T$, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

3.1.4 Test Setup

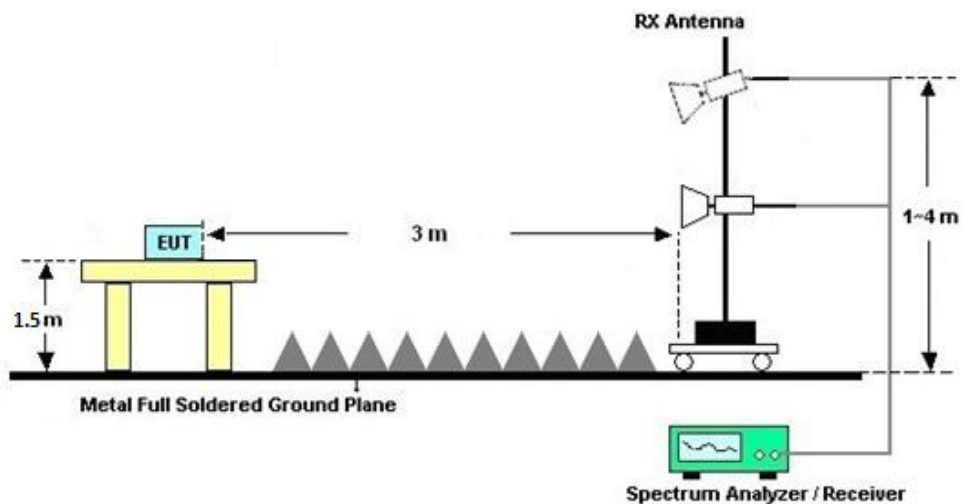
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz





3.1.5 Test Results of Radiated Spurious Emissions (9 kHz ~ 30 MHz)

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line was not reported.

There is a comparison data of both open-field test site and semi-Anechoic chamber, and the result came out very similar.

3.1.6 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix A.

3.1.7 Duty Cycle

Please refer to Appendix B.

3.1.8 Test Result of Radiated Spurious Emission (30MHz ~ 10th Harmonic or 40GHz, whichever is lower)

Please refer to Appendix A.



3.2 Antenna Requirements

3.2.1 Standard Applicable

If directional gain of transmitting antennas is greater than 6dBi, the power shall be reduced by the same level in dB comparing to gain minus 6dBi. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the rule.

3.2.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

3.2.3 Antenna Gain

The antenna peak gain of EUT is less than 6 dBi. Therefore, it is not necessary to reduce maximum peak output power limit.



4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
EMI Test Receiver	Keysight	N9038A	MY57290151	3Hz~8.5GHz;Max 30dBm	Jul. 04, 2024	Oct. 20, 2024	Jul. 03, 2025	Radiation (03CH05-KS)
EXA Spectrum Analyzer	Keysight	N9010B	MY60242126	10Hz~44G,MAX 30dB	Oct. 10, 2024	Oct. 20, 2024	Oct. 09, 2025	Radiation (03CH05-KS)
Loop Antenna	R&S	HFH2-Z2E	101125	9kHz~30MHz	Sep. 08, 2024	Oct. 20, 2024	Sep. 07, 2025	Radiation (03CH05-KS)
Bilog Antenna	TeseQ	CBL6111D	49921	30MHz~1GHz	Apr. 18, 2024	Oct. 20, 2024	Apr. 17, 2025	Radiation (03CH05-KS)
Double Ridge Horn Antenna	ETS-Lindgren	3117	00218642	1GHz~18GHz	Apr. 11, 2024	Oct. 20, 2024	Apr. 10, 2025	Radiation (03CH05-KS)
SHF-EHF Horn	Com-power	AH-840	101093	18GHz~40GHz	Jan. 06, 2024	Oct. 20, 2024	Jan. 05, 2025	Radiation (03CH05-KS)
Amplifier	SONOMA	310N	381512	9KHz~1GHz	Jan. 02, 2024	Oct. 20, 2024	Jan. 01, 2025	Radiation (03CH05-KS)
Amplifier	EM	EM18G40GA	060852	18~40GHz	Jan. 02, 2024	Oct. 20, 2024	Jan. 01, 2025	Radiation (03CH05-KS)
high gain Amplifier	EM	EM01G18GA	060843	1Ghz~18Ghz	Jan. 03, 2024	Oct. 20, 2024	Jan. 02, 2025	Radiation (03CH05-KS)
Amplifier	EM	EM01G18GA	060833	1Ghz~18Ghz	Jan. 03, 2024	Oct. 20, 2024	Jan. 02, 2025	Radiation (03CH05-KS)
AC Power Source	Chroma	61601	F104090004	N/A	NCR	Oct. 20, 2024	NCR	Radiation (03CH05-KS)
Turn Table	ChamPro	EM 1000-T	060762-T	0~360 degree	NCR	Oct. 20, 2024	NCR	Radiation (03CH05-KS)
Antenna Mast	ChamPro	EM 1000-A	060762-A	1 m~4 m	NCR	Oct. 20, 2024	NCR	Radiation (03CH05-KS)

NCR: No Calibration Required

5 Measurement Uncertainty

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI 63.10-2013. All the measurement uncertainty value were shown with a coverage $K=2$ to indicate 95% level of confidence. The measurement data show herein meets or exceeds the CISPR measurement uncertainty values specified in CISPR 16-4-2 and can be compared directly to specified limit to determine compliance.

Uncertainty of Radiated Emission Measurement (9 KHz ~ 30 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	3.30dB
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Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	6.02dB
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Uncertainty of Radiated Emission Measurement (1 GHz ~ 18 GHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	5.22dB
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Uncertainty of Radiated Emission Measurement (18 GHz ~ 40 GHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	5.34dB
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----- THE END -----



Appendix A. Radiated Spurious Emission Test Data

Test Engineer :	Jake	Relative Humidity :	41 ~ 42 %
		Temperature :	22 ~ 23 °C

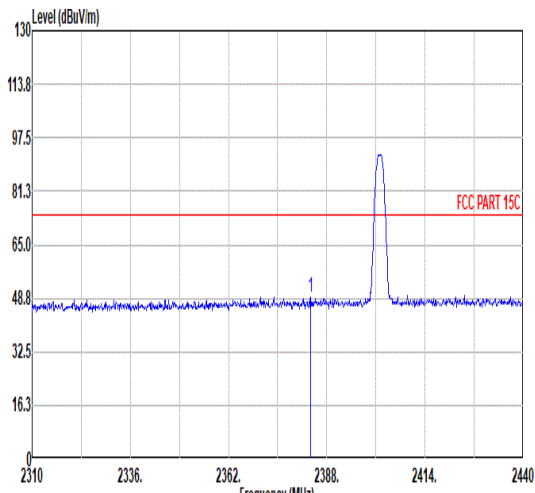
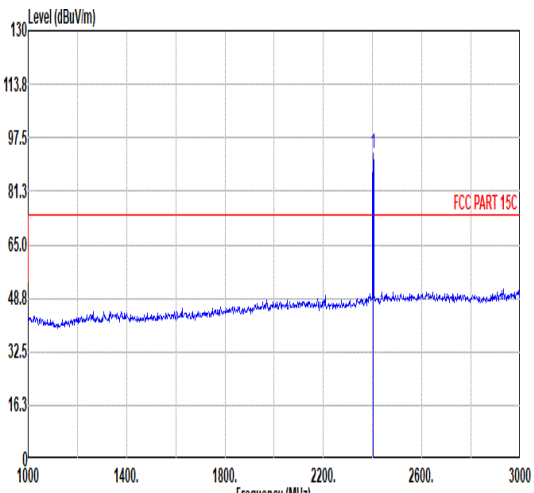
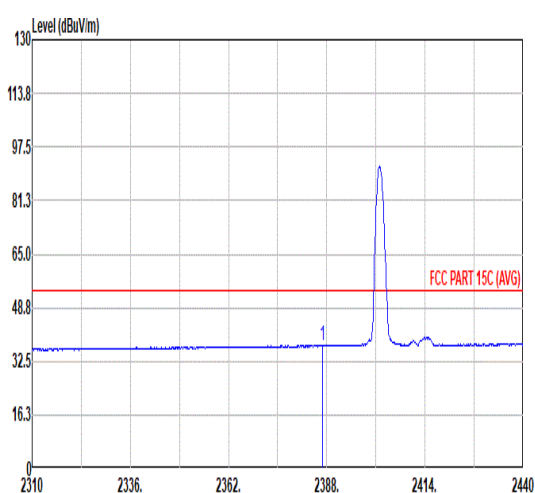
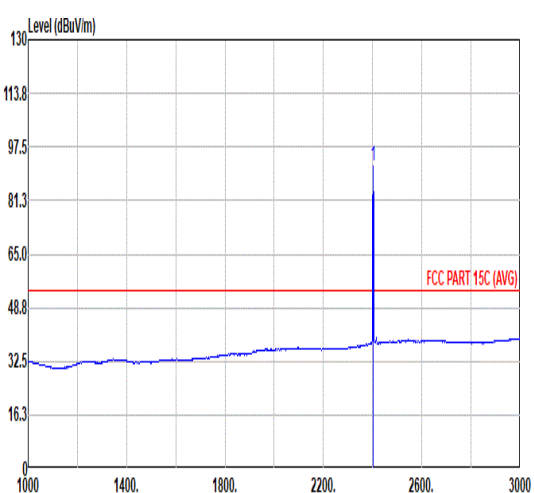
Radiated Spurious Emission Test Modes

Mode	Band (MHz)	Modulation	Channel	Frequency	Data Rate	RU	Remark
Mode 1	2400-2483.5	Bluetooth-LE_GSKF	0	2402	1Mbps	-	-

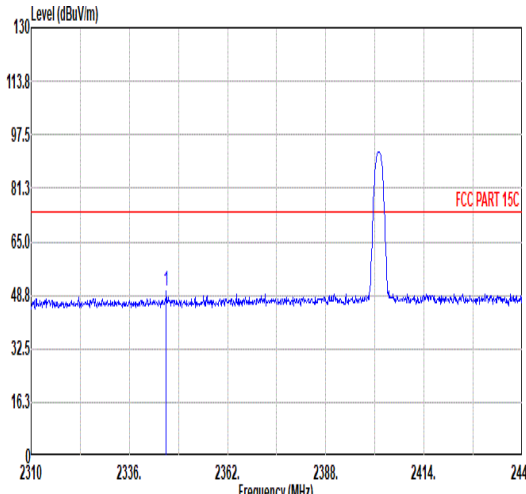
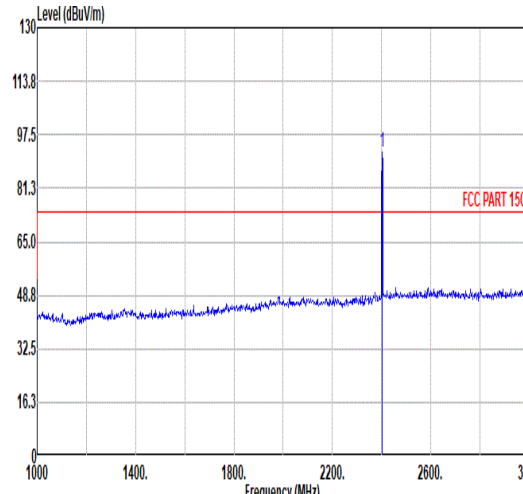
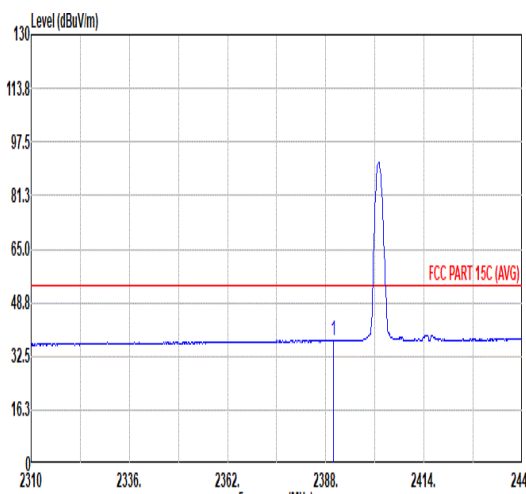
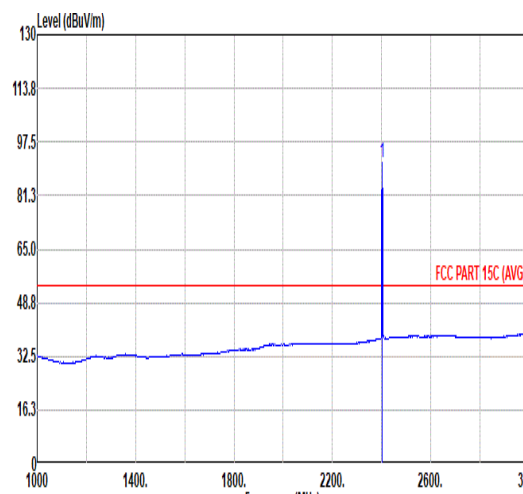
Summary of each worse mode

Mode	Modulation	Ch.	Freq. (MHz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Pol.	Peak Avg.	Result	Remark
1	Bluetooth-LE_GSKF	0	2389.95	37.36	54.00	-16.64	V	AVERAGE	Pass	Band Edge
1	Bluetooth-LE_GSKF	0	4804.00	41.58	74.00	-32.42	H	PEAK	Pass	Harmonic

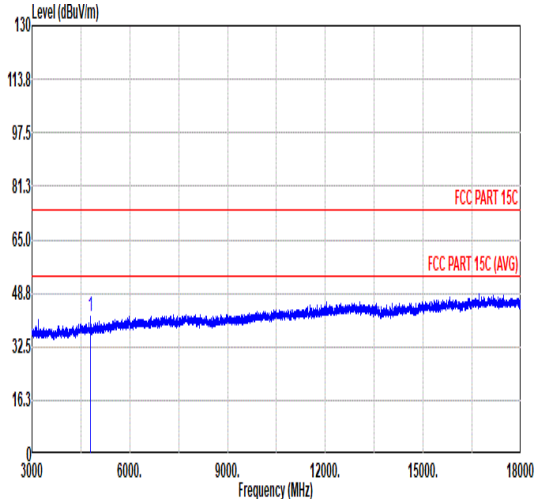
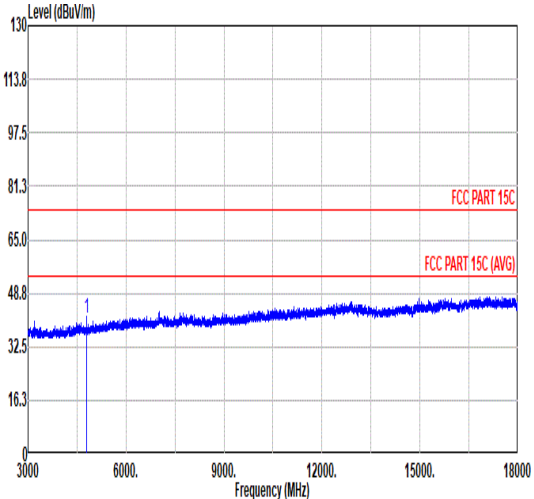


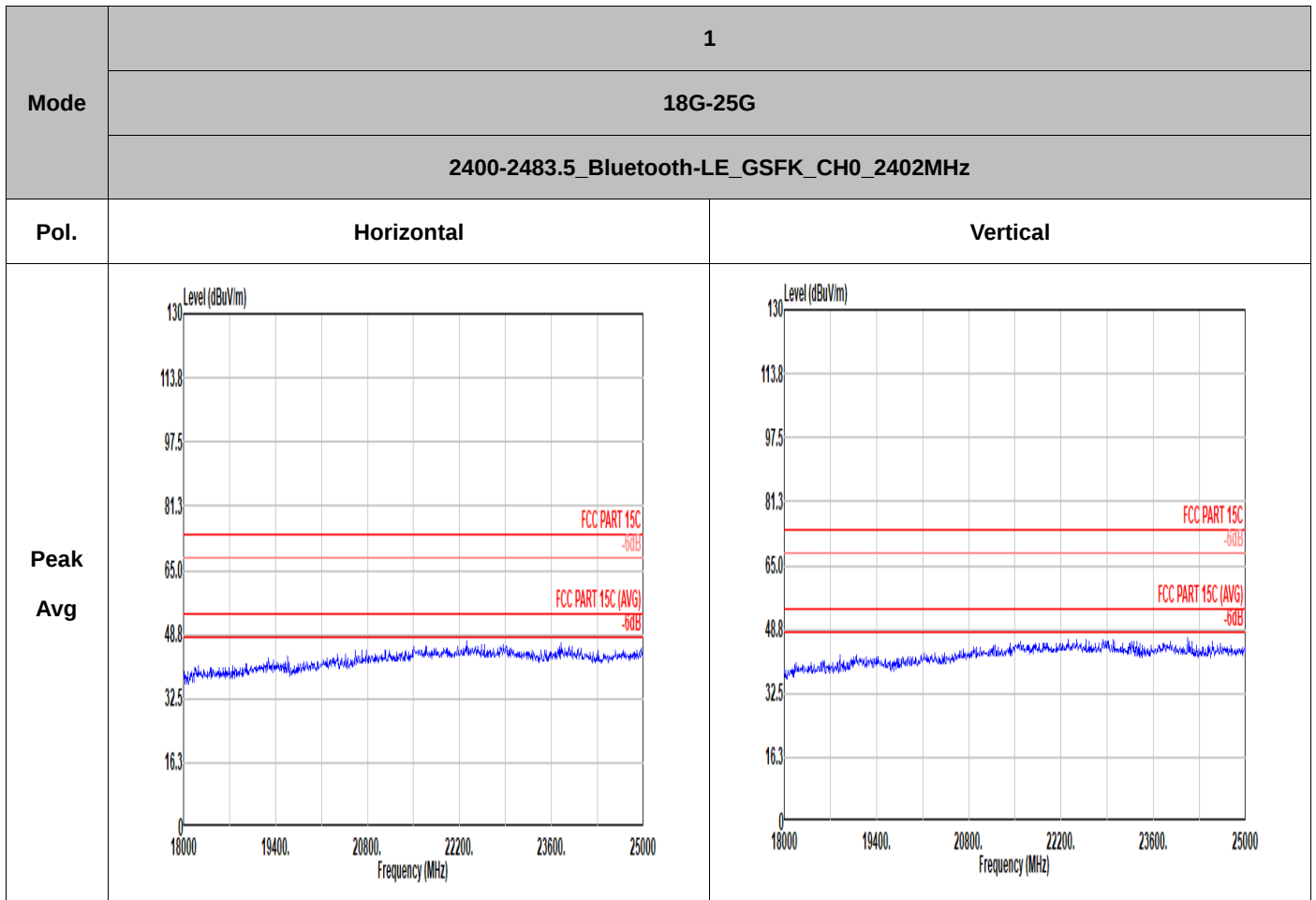
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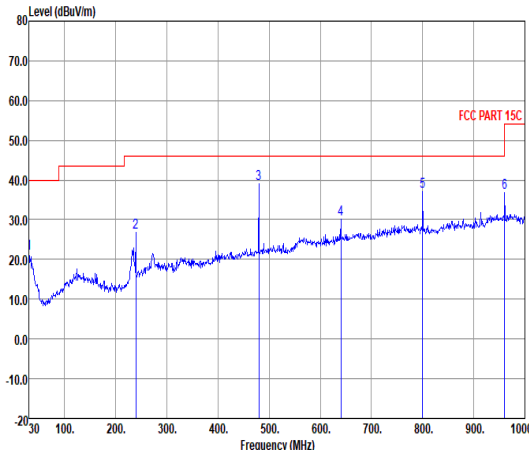
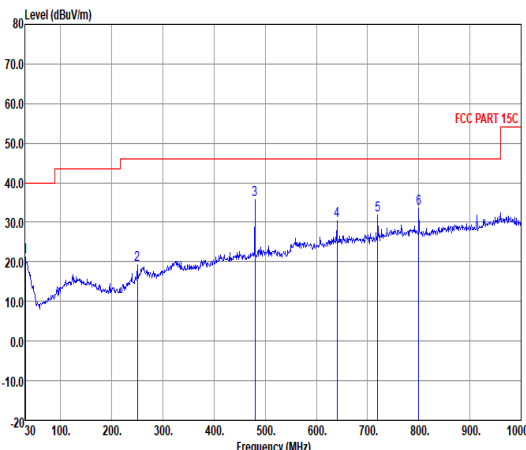
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2	239.52	26.78	46.00	-19.22	39.42	17.78	2.36	32.78	0.00	---	Peak																																																																																																																																																																																																												
3	480.08	38.99	46.00	-7.01	45.45	23.17	3.35	32.98	0.00	---	Peak																																																																																																																																																																																																												
4	640.13	30.23	46.00	-15.77	34.17	25.17	3.86	32.97	0.00	---	Peak																																																																																																																																																																																																												
5	800.18	37.03	46.00	-8.97	39.19	26.26	4.32	32.74	0.00	---	Peak																																																																																																																																																																																																												
6	960.23	36.74	54.00	-17.26	35.99	27.51	4.74	31.50	0.00	---	Peak																																																																																																																																																																																																												
	Freq	Level	Limit	Over	ReadAntenna	Cable	Preamp	Aux	A/Pos	T/Pos	Remark																																																																																																																																																																																																												
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	dB	dB	dB	cm	deg																																																																																																																																																																																																												
1	30.97	21.16	40.00	-18.84	29.35	24.07	0.73	32.99	0.00	---	Peak																																																																																																																																																																																																												
2	250.19	19.39	46.00	-26.61	31.32	18.42	2.42	32.77	0.00	---	Peak																																																																																																																																																																																																												
3	480.08	35.72	46.00	-10.28	42.18	23.17	3.35	32.98	0.00	---	Peak																																																																																																																																																																																																												
4	640.13	30.29	46.00	-15.71	34.23	25.17	3.86	32.97	0.00	---	Peak																																																																																																																																																																																																												
5	719.67	31.70	46.00	-14.30	35.10	25.47	4.10	32.97	0.00	---	Peak																																																																																																																																																																																																												
6	800.18	33.42	46.00	-12.58	35.58	26.26	4.32	32.74	0.00	---	Peak																																																																																																																																																																																																												

Appendix B. Duty Cycle Plots

Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
Bluetooth LE 1Mbps	83.65	2.088	0.479	0.51KHz

