

TEST REPORT

Product Name : Bluetooth Wireless 2D Barcode Scanner

Brand Mark : N/A : U2-B Model No.

> U1, U2, U3, U4, U5, U6, U7, U8, U9, U10, U11, U12, U13, U14, U15, U16, U17, U18, U19, U20, U21, U22, U23, U24, U25, U26, U27, U28, U29, U30, V1, V2,

: V3, V5, V6, V7, V8, V9, V10, V11, V12, Extension modeo

V13, V14, V15, V16, W1, W2, W3, W4, W5, W6, W7, W8, W9, W10, W11, W12, W13. W14. W15. W16. W17. W18. W19. W20, W21, W22, W23, W25, W26, X10W

: BLA-EMC-202402-A4702 **Report Number**

FCC ID : 2A5HC-U2-B

Date of Sample Receipt : 2024/2/29

Date of Test : 2024/2/29 to 2024/3/26

Date of Issue : 2024/3/26

: 47 CFR Part 15, Subpart C 15.247 Test Standard

Test Result : Pass

Prepared for:

Sycreader Guangzhou Co., Ltd.

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Prepared by:

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Approved by: 13/we. Then

Date:



Page 2 of 60

REPORT REVISE RECORD

Version No.	Date	Description
00	2024/3/26	Original





TABLE OF CONTENTS

1	TE	ST SUMMARY	5
2	GE	ENERAL INFORMATION	6
3	GE	ENERAL DESCRIPTION OF E.U.T	6
4	TE	ST ENVIRONMENT	8
5	TF	ST MODE	9
		EASUREMENT UNCERTAINTY	
6	ME	ESCRIPTION OF SUPPORT UNIT	8
7			
8	TE	ST FACILITY	9
9	LA	ABORATORY LOCATION	9
10	TE	ST INSTRUMENTS LIST	10
11		ONDUCTED EMISSIONS AT AC POWER LINE (150KHZ-30MHZ)	
	11.1	LIMITS	
	11.2	BLOCK DIAGRAM OF TEST SETUP	
	l1.3 l1.4	TEST DATA	
12	CC	ONDUCTED BAND EDGES MEASUREMENT	
1	12.1	LIMITS	
1	12.2	BLOCK DIAGRAM OF TEST SETUP	
1	12.3	TEST DATA	17
13	RA	ADIATED SPURIOUS EMISSIONS	18
1	l3.1	LIMITS	18
1	13.2	BLOCK DIAGRAM OF TEST SETUP	19
1	13.3	PROCEDURE	19
1	L3.4	TEST DATA	21
14	RA	ADIATED EMISSIONS WHICH FALL IN THE RESTRICTED BANDS	30
1	L4.1	LIMITS	30
1	L4.2	BLOCK DIAGRAM OF TEST SETUP	31
1	L4.3	PROCEDURE	
1	L4.4	TEST DATA	33
15	CC	ONDUCTED SPURIOUS EMISSIONS	38



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Page	4	ΟŤ	60

15.1	LIMITS	38
15.2	BLOCK DIAGRAM OF TEST SETUP	38
15.3	TEST DATA	38
16 PO	WER SPECTRUM DENSITY	39
16.1	LIMITS	39
16.2	BLOCK DIAGRAM OF TEST SETUP	39
16.3	TEST DATA	39
17 CO	NDUCTED PEAK OUTPUT POWER	
17.1	LIMITS	40
17.2	BLOCK DIAGRAM OF TEST SETUP	40
17.3	TEST DATA	40
18 MIN	NIMUM 6DB BANDWIDTH	41
18.1	LIMITS	41
18.2	BLOCK DIAGRAM OF TEST SETUP	41
18.3	TEST DATA	41
19 AN	TENNA REQUIREMENT	
19.1	CONCLUSION	42
20 API	PENDIX1	43
APPEND	DIX A: PHOTOGRAPHS OF TEST SETUP	58
	DIX B: PHOTOGRAPHS OF EUT	



Page 5 of 60

1 TEST SUMMARY

Test item	Test Requirement	Test Method	Class/Severity	Result
Conducted Emissions at AC Power Line (150kHz-30MHz)	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 6.2	47 CFR Part 15, Subpart C 15.207	Pass
Conducted Band Edges Measurement	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.8 & Section 11.13.3.2	47 CFR Part 15, Subpart C 15.247(d)	Pass
Radiated Spurious Emissions	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 6.4,6.5,6.6	47 CFR Part 15, Subpart C 15.209 & 15.247(d)	Pass
Radiated Emissions which fall in the restricted bands	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 6.10.5	47 CFR Part 15, Subpart C 15.209 & 15.247(d)	Pass
Conducted Spurious Emissions	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.6 & Section 11.11	47 CFR Part 15, Subpart C 15.247(d)	Pass
Power Spectrum Density	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 11.10.2	47 CFR Part 15, Subpart C 15.247(e)	Pass
Conducted Peak Output Power	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.5	47 CFR Part 15, Subpart C 15.247(b)(3)	Pass
Minimum 6dB Bandwidth	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 11.8.1	47 CFR Part 15, Subpart C 15.247a(2)	Pass
Antenna Requirement	47 CFR Part 15, Subpart C 15.247	N/A	47 CFR Part 15, Subpart C 15.203 & 15.247(c)	Pass



Page 6 of 60

2 GENERAL INFORMATION

Applicant	Sycreader Guangzhou Co.,Ltd.
Address	502#,A15,400 Xincheng Avenue, ZengchengDistrict Guangzhou
Manufacturer	Sycreader Guangzhou Co.,Ltd.
Address	502#,A15,400 Xincheng Avenue, ZengchengDistrict Guangzhou
Factory	N/A
Address	N/A
Product Name	Bluetooth Wireless 2D Barcode Scanner
Test Model No.	U2-B
Extension mode	U1, U2, U3, U4, U5, U6, U7, U8, U9, U10, U11, U12, U13, U14, U15, U16, U17, U18, U19, U20, U21, U22, U23, U24, U25, U26, U27, U28, U29, U30, V1, V2, V3, V5, V6, V7, V8, V9, V10, V11, V12, V13, V14, V15, V16, W1, W2, W3, W4, W5, W6, W7, W8, W9, W10, W11, W12, W13, W14, W15, W16, W17, W18, W19, W20, W21, W22, W23, W25, W26, X10W
Note	That all models are electrically identical, only model no. and color is different.

3 GENERAL DESCRIPTION OF E.U.T.

Hardware Version	N/A	
Software Version	N/A	
Operation Frequency:	2402MHz-2480MHz	
Modulation Type:	GFSK	
Rate data:	1Mbps	
Channel Spacing:	2MHz	
Number of Channels:	40	
Antenna Type:	PCB Antenna	
Antenna Gain:	3dBi (Provided by the applicant)	



Page 7 of 60

Operation	Operation Frequency each of channel						
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2402MHz	11	2422MHz	21	2442MHz	31	2462MHz
2	2404MHz	12	2424MHz	22	2444MHz	32	2464MHz
: :	: :	: :	: :	: :	: :	: :	: :
9	2418MHz	19	2438MHz	29	2458MHz	39	2478MHz
10	2420MHz	20	2440MHz	30	2460MHz	40	2480MHz

Note:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

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



Page 8 of 60

4 TEST ENVIRONMENT

Environment	Temperature	Voltage
Normal	25°C	3.7Vdc

5 TEST MODE

TEST MODE	TEST MODE DESCRIPTION
Transmitting mode	Keep the EUT in continuously transmitting mode with modulation.

6 MEASUREMENT UNCERTAINTY

Parameter	Expanded Uncertainty (Confidence of 95%)
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 %
Unwanted Radiated Emission (30MHz ~ 1000MHz)	±4.35 dB
Unwanted Radiated Emission (1GHz ~ 18GHz)	±4.44 dB
AC Power Line Conducted Emission(150kHz-30MHz)	±3.45dB



Page 9 of 60

7 DESCRIPTION OF SUPPORT UNIT

Device Type	Manufacturer	Model Name	Serial No.	Remark
AC Adapter	UGREEN	CD112	N/A	N/A

8 TEST FACILITY

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

• FCC — Designation No.: CN1252

BlueAsia of Technical Services(Shenzhen) Co., Ltd has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in files. Designation CN1252.

•ISED — CAB identifier No.: CN0028

BlueAsia of Technical Services(Shenzhen) Co., Ltd has been registered by Certification and Engineering

Bureau of ISED for radio equipment testing with CAB identifier CN0028.

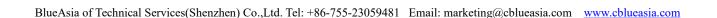
9 LABORATORY LOCATION

All tests were performed at:

BlueAsia of Technical Services(Shenzhen) Co.,Ltd.

Building C, No. 107, Shihuan Road, Shiyan Sub-District, Baoan District, Shenzhen, Guangdong Province, China

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Page 10 of 60

10 TEST INSTRUMENTS LIST

Test Equipment Of Radiated Spurious Emissions									
Equipment	Manufacturer	Model	S/N	Cal.Date	Cal.Due				
Chamber 1	SKET	966	N/A	2023/11/16	2026/11/15				
Chamber 2	SKET	966	N/A	2021/07/20	2024/07/19				
Spectrum	R&S	FSP40	100817	2023/08/30	2024/08/29				
Receiver	R&S	ESR7	101199	2023/08/30	2024/08/29				
Receiver	R&S	ESPI7	101477	2023/07/07	2024/07/06				
broadband Antenna	Schwarzbeck	VULB9168	00836 P:00227	2022/10/12	2025/10/11				
Horn Antenna	Schwarzbeck	BBHA9120D	01892 P:00331	2022/09/13	2025/09/12				
Horn Antenna	Schwarzbeck	BBHA 9170	1106	2022/04/24	2024/04/23				
Amplifier	SKET	LNPA_30M01G-30	SK2021060801	2023/07/07	2024/07/06				
Amplifier	SKET	PA-000318G-45	N/A	2023/08/30	2024/08/29				
Amplifier	SKET	LNPA_18G40G-50	SK2022071301	2023/07/14	2024/07/13				
Filter group	SKET	2.4G/5G Filter group r	N/A	2023/07/07	2024/07/06				
EMI software	EZ	EZ-EMC	EEMC-3A1	N/A	N/A				
Loop antenna	SCHNARZBE CK	FMZB1519B	00102	2022/09/14	2025/09/13				
1kHZ calibration audio source	SKET	MCS-ABT-C35	N/A	2023/09/04	2024/09/03				
Free Field Microphone	SKET	MGS MP 663	0414	2023/09/04	2024/09/03				
Audio shielding box	SKET	SB-ABT-C35	N/A	2023/03/30	2024/03/29				
Controller	SKET	N/A	N/A	N/A	N/A				
Coaxial Cable	BlueAsia	BLA-XC-02	N/A	N/A	N/A				
Coaxial Cable	BlueAsia	BLA-XC-03	N/A	N/A	N/A				
Coaxial Cable	BlueAsia	BLA-XC-01	N/A	N/A	N/A				
Signal Generator DTV	ECREDIX	DSG-1000	N/A	N/A	N/A				



Page 11 of 60

Test Equipment C	Test Equipment Of Conducted Emissions at AC Power Line (150kHz-30MHz)								
Equipment	Manufacturer	Model	S/N	Cal.Date	Cal.Due				
Shield room	SKET	833	N/A	2023/11/16	2025/11/15				
Receiver	R&S	ESPI3	101082	2023/08/30	2024/08/29				
LISN	R&S	ENV216	3560.6550.15	2023/08/30	2024/08/29				
LISN	AT	AT166-2	AKK1806000003	2023/08/30	2024/08/29				
ISN	TESEQ	ISNT8-cat6	53580	2023/08/30	2024/08/29				
Single-channel vehicle artificial power network	Schwarzbeck	NNBM 8124	01045	2023/07/07	2024/07/06				
Single-channel vehicle artificial power network	Schwarzbeck	NNBM 8124	01075	2023/07/07	2024/07/06				
EMI software	EZ	EZ-EMC	EEMC-3A1	N/A	N/A				

Test Equipment	Of RF Conducte	ed Test			
Equipment	Manufacturer	Model	S/N	Cal.Date	Cal.Due
Spectrum	R&S	FSP40	100817	2023/08/30	2024/08/29
Spectrum	Agilent	N9020A	MY49100060	2023/08/30	2024/08/29
Spectrum	Agilent	N9020A	MY54420161	2023/08/30	2024/08/29
Signal Generator	Agilent	N5182A	MY47420955	2023/08/30	2024/08/29
Signal Generator	Agilent	N5181A	MY46240904	2023/07/07	2024/07/06
Signal Generator	R&S	CMW500	132429	2023/08/30	2024/08/29
BluetoothTester	Anritsu	MT8852B	06262047872	2023/08/30	2024/08/29
Power probe	DARE	RPR3006W	14I00889SN042	2023/09/01	2024/08/31
Power detection box	CDKMV	MW100-PSB	MW201020JYT	2023/07/07	2024/07/06
DCPowersupply	zhaoxin	KXN-305D	20K305D1221363	2023/08/30	2024/08/29
DCPowersupply	zhaoxin	RXN-1505D	19R1505D050168	2023/08/30	2024/08/29
2.4GHz/5GHz RF Test software	MTS	MTS 8310	Version 2.0.0.0	N/A	N/A
Audio Analyzer	Audio Precision	ATS-1	ATS141094	2023/07/07	2024/07/06



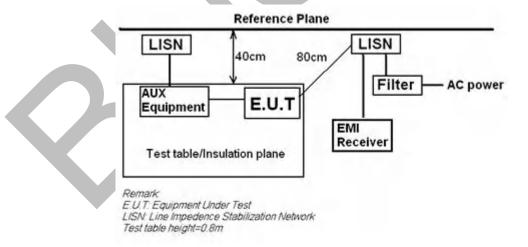
11 CONDUCTED EMISSIONS AT AC POWER LINE (150KHZ-30MHZ)

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			
Tester	Jozu			
Temperature	25℃			
Humidity	60%			

11.1 LIMITS

Frequency of	Conducted limit(dBµV)						
emission(MHz)	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.							

11.2 BLOCK DIAGRAM OF TEST SETUP



11.3 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.



Page 13 of 60

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.

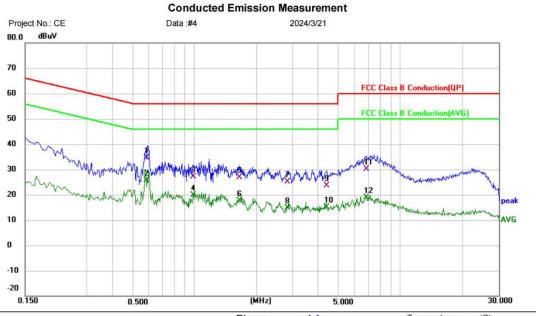
Remark: LISN=Read Level+ Cable Loss+ LISN Factor





11.4 TEST DATA

[TestMode: Tx]; [Line: Line] ;[Power:AC120V/60Hz]



Limit: FCC Class B Conduction(QP)

EUT: Bluetooth Wireless 2D

M/N: U2-B Mode: BLE Note:

Site

Phase:	L1	Temperature:	(C)
Power:		Humidity:	%RH
5: 1	BBM 6 KH		

RBW: 9 KHz Distance:

VBW: 30 KHz Sweep Time: 10 ms

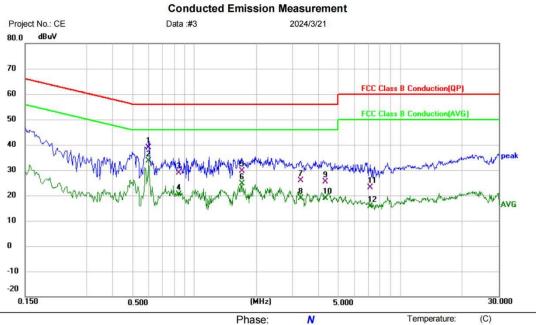
No. I	Иk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	cm	degree	Comment
1		0.5899	24.67	9.92	34.59	56.00	-21.41	QP			
2	*	0.5899	15.75	9.92	25.67	46.00	-20.33	AVG			
3		0.9860	17.30	9.81	27.11	56.00	-28.89	QP			
4		0.9860	10.09	9.81	19.90	46.00	-26.10	AVG			
5		1.6460	16.76	10.02	26.78	56.00	-29.22	QP			
6		1.6460	7.71	10.02	17.73	46.00	-28.27	AVG			
7		2.8380	15.12	10.08	25.20	56.00	-30.80	QP			
8		2.8380	4.84	10.08	14.92	46.00	-31.08	AVG			
9		4.3900	13.46	10.07	23.53	56.00	-32.47	QP			
10		4.3900	5.10	10.07	15.17	46.00	-30.83	AVG			
11		6.8300	19.27	10.85	30.12	60.00	-29.88	QP			
12		6.8300	8.14	10.85	18.99	50.00	-31.01	AVG			

*:Maximum data x:Over limit !:over margin Reference Only Receiver: Spectrum Analyzer: **ESPI** L.I.S.N:

Engineer Signature



[TestMode: Tx]; [Line: Neutral] ;[Power:AC120V/60Hz]



Limit: FCC Class B Conduction(QP)

EUT: Bluetooth Wireless 2D

M/N: U2-B Mode: BLE Note:

Site

Phase: N Temperature: (C)
Power: Humidity: %RH

Distance: RBW: 9 KHz

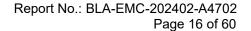
VBW: 30 KHz Sweep Time: 10 ms

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		0.5977	29.14	9.86	39.00	56.00	-17.00	QP			
2	*	0.5977	23.86	9.86	33.72	46.00	-12.28	AVG			
3		0.8417	18.89	9.90	28.79	56.00	-27.21	QP			
4		0.8417	10.46	9.90	20.36	46.00	-25.64	AVG			
5		1.7017	19.56	9.97	29.53	56.00	-26.47	QP			
6		1.7017	14.62	9.97	24.59	46.00	-21.41	AVG			
7		3.2780	15.84	10.05	25.89	56.00	-30.11	QP			
8		3.2780	8.87	10.05	18.92	46.00	-27.08	AVG			
9		4.3258	15.21	10.15	25.36	56.00	-30.64	QP			
10		4.3258	8.74	10.15	18.89	46.00	-27.11	AVG			
11		7.1700	12.11	11.03	23.14	60.00	-36.86	QP			
12		7.1700	4.48	11.03	15.51	50.00	-34.49	AVG			
*:Ma	ximu	m data	x:Over lim	it !:over	margin						(Reference Only
Recei	ver:	ESPI	1			Spectrum	Analyzer:	ES	SPI		

Test Result: Pass

L.I.S.N:

Engineer Signature

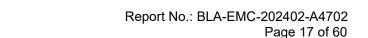




Notes:

- 1. An initial pre-scan was performed on the line and neutral lines with peak detector.
- 2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
- 3. Final Level =Receiver Read level + LISN Factor + Cable Loss.







12 CONDUCTED BAND EDGES MEASUREMENT

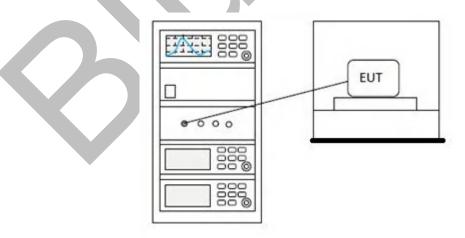
Test Standard	47 CFR Part 15, Subpart C 15.247				
Test Method	ANSI C63.10 (2013) Section 7.8.8 & Section 11.13.3.2				
Test Mode (Pre-Scan)	TX				
Test Mode (Final Test)	TX				
Tester	Jozu				
Temperature	25℃				
Humidity	60%				

12.1 LIMITS

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 20 dB. 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)).

12.2 BLOCK DIAGRAM OF TEST SETUP



12.3 TEST DATA

Pass: Please Refer To Appendix: Appendix1 For Details



Page 18 of 60

13 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			
Tester	Jozu			
Temperature	25℃			
Humidity	60%			

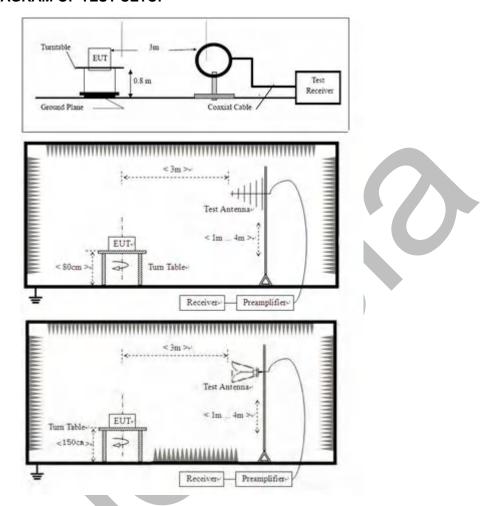
13.1 LIMITS

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.



13.2 BLOCK DIAGRAM OF TEST SETUP



13.3 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.



Page 20 of 60

- 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.

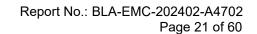
Remark:

- 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.





Temperature:

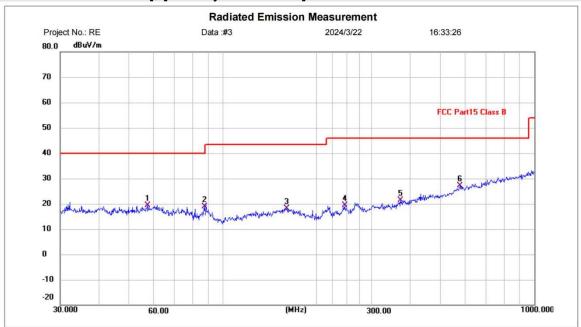
%RH

Humidity:



13.4 TEST DATA

[TestMode: TX below 1G]; [Polarity: Horizontal]



Polarization: Horizontal

Limit: FCC Part15 Class B

EUT: Bluetooth Wireless 2D

M/N: U2-B Mode: BLE Note:

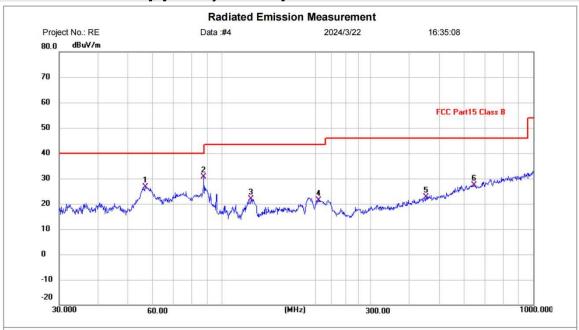
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F	Remark
1	57.1914	0.31	19.08	19.39	40.00	-20.61	QP	Р	
2	87.4176	4.09	14.84	18.93	40.00	-21.07	QP	Р	
3	160.3456	-1.05	19.17	18.12	43.50	-25.38	QP	Р	
4	245.9509	1.93	17.34	19.27	46.00	-26.73	QP	Р	
5	372.0045	0.27	21.07	21.34	46.00	-24.66	QP	Р	
6 *	576.6443	1.25	25.78	27.03	46.00	-18.97	QP	Р	

Power:

^{*:}Maximum data x:Over limit !:over margin



[TestMode: TX below 1G]; [Polarity: Vertical]



Site Limit: FCC Part15 Class B EUT: Bluetooth Wireless 2D

M/N: U2-B Mode: BLE

Note:

Polarization: Vertical Temperature: (C)
Power: Humidity: %RH

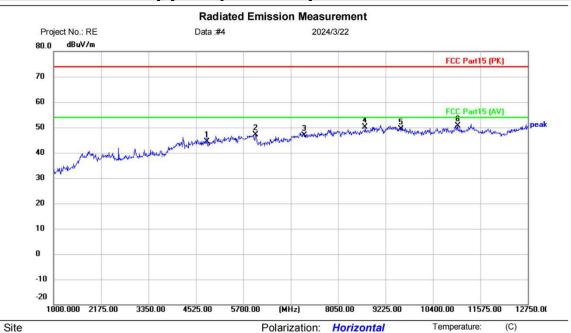
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F	Remark
1	56.7917	7.47	19.11	26.58	40.00	-13.42	QP	Р	
2 *	87.4176	15.72	14.84	30.56	40.00	-9.44	QP	Р	
3	123.6984	3.93	18.05	21.98	43.50	-21.52	QP	Р	
4	204.2377	5.64	15.83	21.47	43.50	-22.03	QP	Р	
5	452.7197	-0.84	23.37	22.53	46.00	-23.47	QP	Р	
6	645.1194	0.07	27.31	27.38	46.00	-18.62	QP	Р	

^{*:}Maximum data x:Over limit !:over margin

%RH



[TestMode: TX low channel]; [Polarity: Horizontal]



Limit: FCC Part15 (PK) EUT: Bluetooth Wireless 2D

M/N: U-2B Mode: BLE-2402

Note:

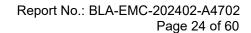
No. M	k. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over		
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	4804.000	38.85	5.64	44.49	74.00	-29.51	peak	
2	6005.500	41.46	5.61	47.07	74.00	-26.93	peak	
3	7206.000	37.70	9.24	46.94	74.00	-27.06	peak	
4	8719.750	38.69	11.53	50.22	74.00	-23.78	peak	
5	9608.000	37.03	12.31	49.34	74.00	-24.66	peak	
6 *	11011.00	37.27	13.40	50.67	74.00	-23.33	peak	

Power:

*:Maximum data x:Over limit !:over margin

Receiver: ESR_1 Spectrum Analyzer: FSP40

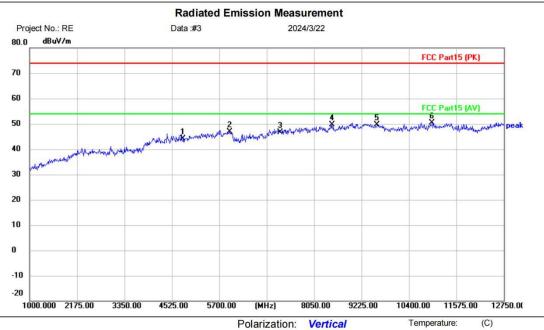
Antenna: EZ 9120D 1G-18G Engineer Signature:



%RH



[TestMode: TX low channel]; [Polarity: Vertical]



Limit: FCC Part15 (PK)

EUT: Bluetooth Wireless 2D

M/N: U-2B Mode: BLE-2402

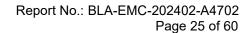
Note:

Site

No. I	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over			
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment	
1		4804.000	38.41	5.64	44.05	74.00	-29.95	peak		
2		5958.500	38.04	8.72	46.76	74.00	-27.24	peak		
3		7206.000	37.49	9.24	46.73	74.00	-27.27	peak		
4		8496.500	38.84	10.90	49.74	74.00	-24.26	peak		
5		9608.000	37.30	12.31	49.61	74.00	-24.39	peak		
6	*	10975.75	37.00	13.38	50.38	74.00	-23.62	peak		

Power:

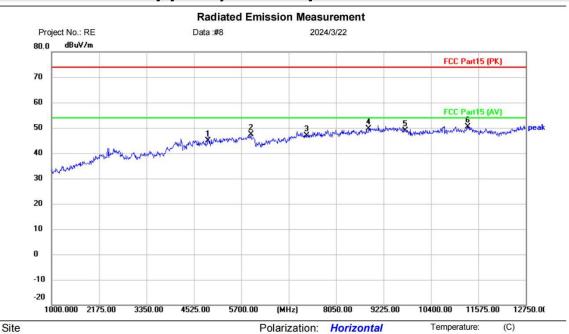
Antenna: EZ 9120D 1G-18G Engineer Signature:



%RH



[TestMode: TX mid channel]; [Polarity: Horizontal]



Limit: FCC Part15 (PK)

EUT: Bluetooth Wireless 2D

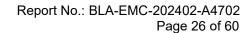
M/N: U-2B Mode: BLE-2442

Note:

No.	Mk	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over			
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment	
1		4884.000	39.16	5.75	44.91	74.00	-29.09	peak		
2		5935.000	38.63	8.70	47.33	74.00	-26.67	peak		
3		7326.000	37.46	9.43	46.89	74.00	-27.11	peak		
4		8860.750	37.92	11.83	49.75	74.00	-24.25	peak		
5		9768.000	36.62	12.22	48.84	74.00	-25.16	peak		
6	*	11316.50	37.78	12.69	50.47	74.00	-23.53	peak		

Power:

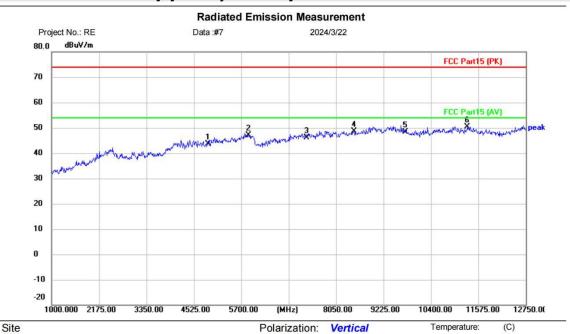
Antenna: EZ 9120D 1G-18G Engineer Signature:



%RH



[TestMode: TX mid channel]; [Polarity: Vertical]



Limit: FCC Part15 (PK)

EUT: Bluetooth Wireless 2D

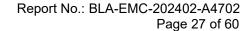
M/N: U-2B Mode: BLE-2442

Note:

No.	Mk	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over			
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment	
1		4884.000	37.82	5.75	43.57	74.00	-30.43	peak		
2		5876.250	38.64	8.54	47.18	74.00	-26.82	peak		
3		7326.000	36.64	9.43	46.07	74.00	-27.93	peak		
4		8496.500	37.81	10.90	48.71	74.00	-25.29	peak		
5		9768.000	36.18	12.22	48.40	74.00	-25.60	peak		
6	*	11304.75	37.68	12.70	50.38	74.00	-23.62	peak		

Power:

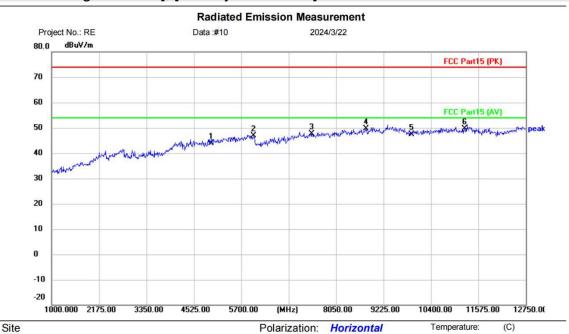
Antenna: EZ 9120D 1G-18G Engineer Signature:



%RH



[TestMode: TX high channel]; [Polarity: Horizontal]



Limit: FCC Part15 (PK)

EUT: Bluetooth Wireless 2D

M/N: U-2B Mode: BLE-2480

Note:

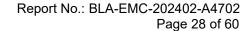
No. M	k. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over			
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment	
1	4960.000	37.28	6.60	43.88	74.00	-30.12	peak		
2	6005.500	41.39	5.61	47.00	74.00	-27.00	peak		
3	7440.000	37.89	9.64	47.53	74.00	-26.47	peak		
4	8790.250	37.85	11.67	49.52	74.00	-24.48	peak		
5	9920.000	35.12	12.14	47.26	74.00	-26.74	peak		
6 *	11234.25	37.01	12.69	49.70	74.00	-24.30	peak		

Power:

*:Maximum data x:Over limit !:over margin

Receiver: ESR_1 Spectrum Analyzer: FSP40

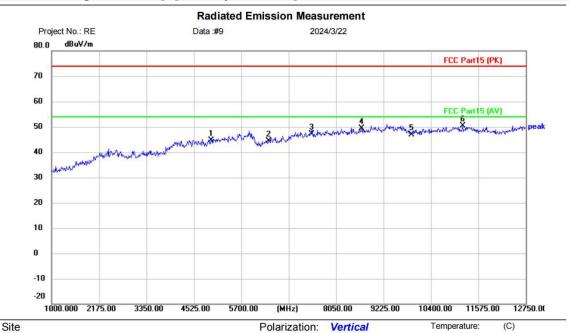
Antenna: EZ 9120D 1G-18G Engineer Signature:



%RH



[TestMode: TX high channel]; [Polarity: Vertical]



Limit: FCC Part15 (PK)

EUT: Bluetooth Wireless 2D

M/N: U-2B Mode: BLE-2480

Note:

No. Mk	c. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over		
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	4960.000	37.93	6.60	44.53	74.00	-29.47	peak	
2	6381.500	37.38	7.10	44.48	74.00	-29.52	peak	
3	7440.000	37.54	9.64	47.18	74.00	-26.82	peak	
4	8684.500	37.92	11.44	49.36	74.00	-24.64	peak	
5	9920.000	34.72	12.14	46.86	74.00	-27.14	peak	
6 *	11187.25	37.63	12.71	50.34	74.00	-23.66	peak	

Power:

*:Maximum	data	x:Over limit	!:over margin			(Reference Only
Receiver:	ESR	_1		Spectrum Analyzer:	FSP40	

ntenna: EZ 9120D 1G-18G Engineer Signature:

Page 29 of 60

Remark:

- 1. Final Level =Receiver Read level + Correct factor
- 2. Correct factor = Antenna Factor + Cable Loss Preamplifier Factor
- 3. The emission levels of other frequencies are very lower than the limit and not show in test report.





Page 30 of 60

14 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
Tester	Jozu
Temperature	25℃
Humidity	60%

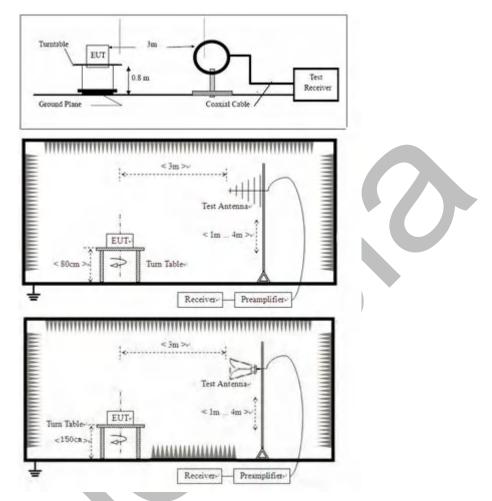
14.1 LIMITS

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.



14.2 BLOCK DIAGRAM OF TEST SETUP



14.3 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.



Page 32 of 60

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.

Remark 1: Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor

Remark 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.





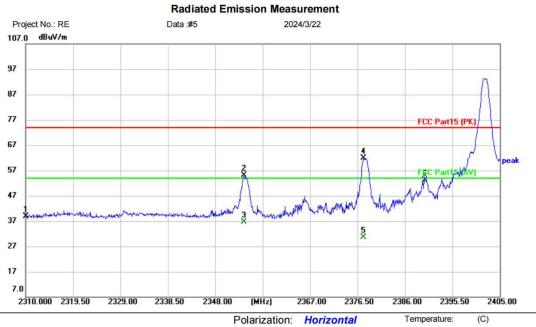
Humidity:

%RH

Page 33 of 60

14.4 TEST DATA

[TestMode: TX low channel]; [Polarity: Horizontal]



Site

Limit: FCC Part15 (PK)

EUT: Bluetooth Wireless 2D

M/N: U-2B Mode: BLE-2402

Note:

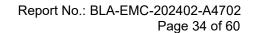
No.	Mk	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over			
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment	
1		2310.000	41.72	-2.89	38.83	74.00	-35.17	peak		
2		2353.700	57.99	-2.78	55.21	74.00	-18.79	peak		
3		2353.700	39.32	-2.78	36.54	54.00	-17.46	AVG		
4	*	2377.735	64.58	-2.73	61.85	74.00	-12.15	peak		
5		2377.735	33.35	-2.73	30.62	54.00	-23.38	AVG		
6		2390.000	55.79	-2.70	53.09	74.00	-20.91	peak		

Power:

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

Engineer Signature

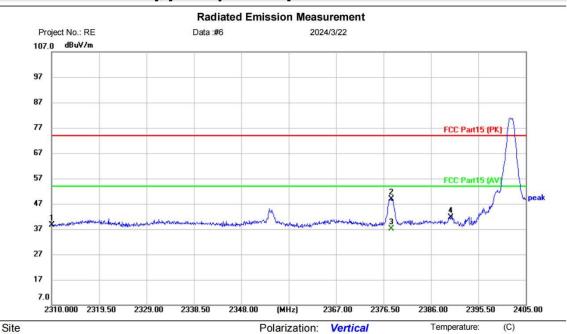
Receiver: ESR_1 Spectrum Analyzer: FSP40 Antenna: EZ 9120D 1G-18G



%RH



[TestMode: TX low channel]; [Polarity: Vertical]



Limit: FCC Part15 (PK)

EUT: Bluetooth Wireless 2D

M/N: U-2B Mode: BLE-2402

Note:

No.	Mk	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2310.000	41.61	-2.89	38.72	74.00	-35.28	peak	
2		2378.020	51.72	-2.73	48.99	74.00	-25.01	peak	
3	*	2378.020	39.91	-2.73	37.18	54.00	-16.82	AVG	
4		2390.000	44.37	-2.70	41.67	74.00	-32.33	peak	

Power:

*:Maximum data x:Over limit !:over margin \(\text{Reference Only}

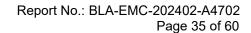
Engineer Signature

Receiver: ESR_1 Spectrum Analyzer: FSP40

Test Result: Pass

EZ 9120D 1G-18G

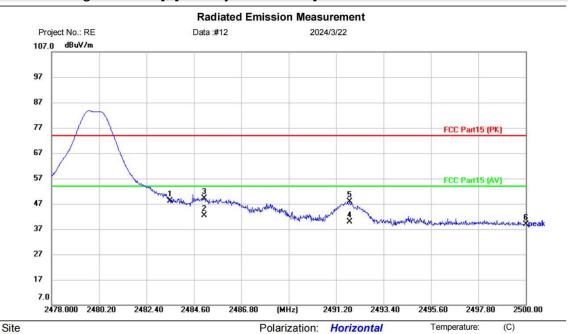
Antenna:



%RH



[TestMode: TX high channel]; [Polarity: Horizontal]



Limit: FCC Part15 (PK)

EUT: Bluetooth Wireless 2D

M/N: U-2B Mode: BLE-2480

Note:

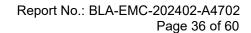
No.	Mk	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2483.500	51.11	-2.91	48.20	74.00	-25.80	peak	
2		2485.084	45.21	-2.92	42.29	74.00	-31.71	peak	
3	*	2485.084	52.01	-2.92	49.09	74.00	-24.91	peak	
4		2491.838	42.92	-2.96	39.96	74.00	-34.04	peak	
5		2491.838	50.86	-2.96	47.90	74.00	-26.10	peak	
6		2500.000	41.99	-3.00	38.99	74.00	-35.01	peak	

Power:

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

Engineer Signature

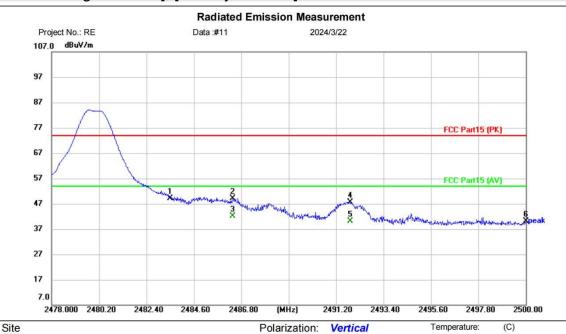
ESR_1 FSP40 Receiver: Spectrum Analyzer: Antenna: EZ 9120D 1G-18G



%RH



[TestMode: TX high channel]; [Polarity: Vertical]



Limit: FCC Part15 (PK)

EUT: Bluetooth Wireless 2D

M/N: U-2B Mode: BLE-2480

Note:

No.	Mk	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over			
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment	
1		2483.500	52.13	-2.91	49.22	74.00	-24.78	peak		
2		2486.404	52.02	-2.92	49.10	74.00	-24.90	peak		
3	*	2486.404	44.97	-2.92	42.05	54.00	-11.95	AVG		
4		2491.882	50.62	-2.96	47.66	74.00	-26.34	peak		
5		2491.882	43.11	-2.96	40.15	54.00	-13.85	AVG		
6		2500.000	43.08	-3.00	40.08	74.00	-33.92	peak		

Power:

*:Maximum data x:Over limit !:over margin \(\text{Reference Only}

Engineer Signature

Receiver: ESR_1 Spectrum Analyzer: FSP40

Test Result: Pass

EZ 9120D 1G-18G

Antenna:

Page 37 of 60

Remark:

- 1. Final Level =Receiver Read level + Correct factor
- 2. Correct factor = Antenna Factor + Cable Loss Preamplifier Factor
- 3. The emission levels of other frequencies are very lower than the limit and not show in test report.





Page 38 of 60

15 CONDUCTED SPURIOUS EMISSIONS

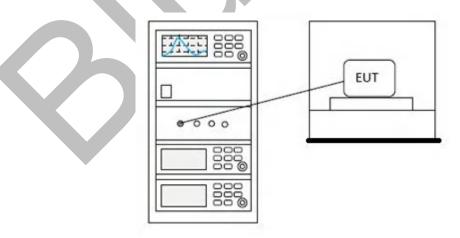
Test Standard	47 CFR Part 15, Subpart C 15.247				
Test Method	ANSI C63.10 (2013) Section 7.8.6 & Section 11.11				
Test Mode (Pre-Scan)	TX				
Test Mode (Final Test)	TX				
Tester	Jozu				
Temperature	25℃				
Humidity	60%				

15.1 LIMITS

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 20 dB. 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)).

15.2 BLOCK DIAGRAM OF TEST SETUP



15.3 TEST DATA

Page 39 of 60

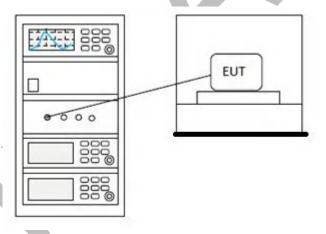
16 POWER SPECTRUM DENSITY

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				
Tester	Jozu				
Temperature	25℃				
Humidity	60%				

16.1 LIMITS

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

16.2 BLOCK DIAGRAM OF TEST SETUP



16.3 TEST DATA



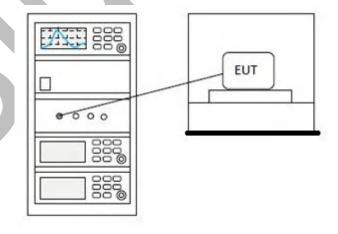
17 CONDUCTED PEAK OUTPUT POWER

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				
Tester	Jozu				
Temperature	25℃				
Humidity	60%				

17.1 LIMITS

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

17.2 BLOCK DIAGRAM OF TEST SETUP



17.3 TEST DATA



Page 41 of 60

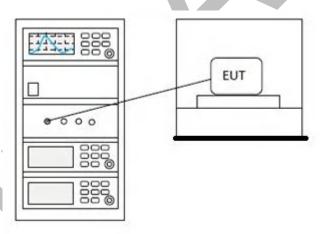
18 MINIMUM 6DB BANDWIDTH

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					
Tester	Jozu					
Temperature	25℃					
Humidity	60%					

18.1 LIMITS

Limit: ≥500 kHz

18.2 BLOCK DIAGRAM OF TEST SETUP



18.3 TEST DATA



Page 42 of 60

19 ANTENNA REQUIREMENT

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

19.1 CONCLUSION

Standard 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 a antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit permanently attached antenna or of an 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 best case gain of the antenna is 3dBi.



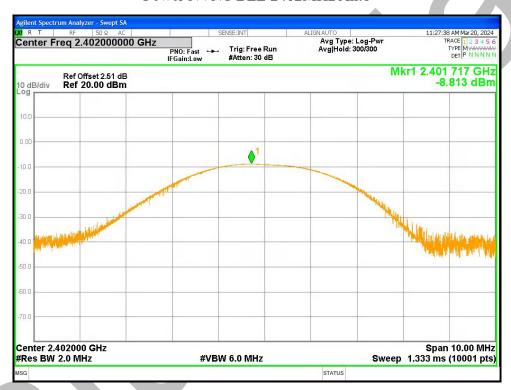
20 APPENDIX1

Report No.: BLA-EMC-202402-A4702 Page 43 of 60

Maximum Conducted Output Power

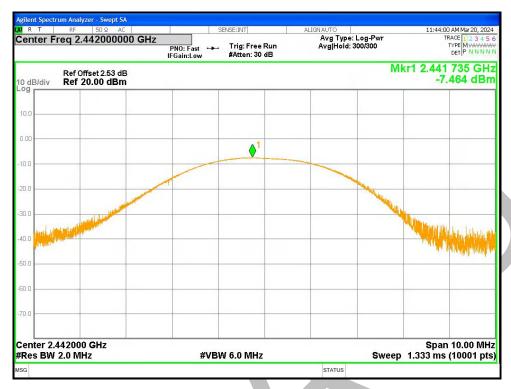
Condition	Mode	Frequency (MHz)	Antenna	Conducted Power (dBm)	Limit (dBm)	Verdict
NVNT	BLE	2402	Ant1	-8.813	30	Pass
NVNT	BLE	2442	Ant1	-7.464	30	Pass
NVNT	BLE	2480	Ant1	-8.625	30	Pass

Power NVNT BLE 2402MHz Ant1



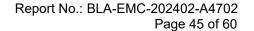
Power NVNT BLE 2442MHz Ant1





Power NVNT BLE 2480MHz Ant1







-6dB Bandwidth

Condition	Mode	Frequency	Antenna	-6 dB Bandwidth	Limit -6 dB	Verdict
		(MHz)		(MHz)	Bandwidth (MHz)	
NVNT	BLE	2402	Ant1	0.5	0.5	Pass
NVNT	BLE	2442	Ant1	0.501	0.5	Pass
NVNT	BLE	2480	Ant1	0.669	0.5	Pass

-6dB Bandwidth NVNT BLE 2402MHz Ant1



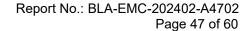
-6dB Bandwidth NVNT BLE 2442MHz Ant1



11:45:53 AM Mar 20, 2024 Center Freq: 2.442000000 GHz Trig: Free Run Avg #Atten: 30 dB Center Freq 2.442000000 GHz Radio Std: None Avg|Hold: 100/100 Radio Device: BTS #IFGain:Low Mkr3 2.442261 GHz Ref Offset 2.53 dB Ref 22.53 dBm -27.513 dBm 10 dB/div Span 2 MHz Sweep 1.333 ms Center 2.442 GHz #Res BW 100 kHz **#VBW 300 kHz Total Power** -14.0 dBm Occupied Bandwidth 1.0525 MHz **Transmit Freq Error** 10.321 kHz **OBW Power** 99.00 % x dB Bandwidth 501.1 kHz x dB -6.00 dB

-6dB Bandwidth NVNT BLE 2480MHz Ant1







Occupied Channel Bandwidth

Condition	Mode	Frequency (MHz)	Antenna	99% OBW (MHz)
NVNT	BLE	2402	Ant1	1.0333
NVNT	BLE	2442	Ant1	1.0313
NVNT	BLE	2480	Ant1	1.0319

OBW NVNT BLE 2402MHz Ant1



OBW NVNT BLE 2442MHz Ant1





OBW NVNT BLE 2480MHz Ant1

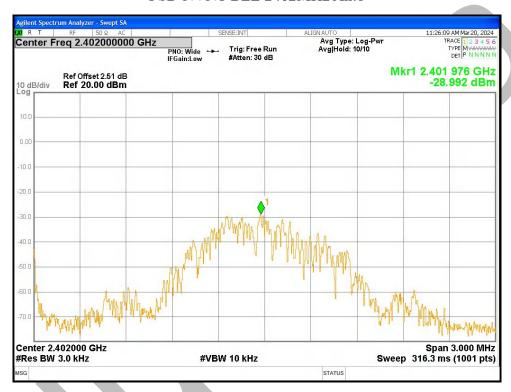




Maximum Power Spectral Density Level

Condition	Mode	Frequency (MHz)	Antenna	Max PSD (dBm)	Limit (dBm)	Verdict
NVNT	BLE	2402	Ant1	-28.992	8	Pass
NVNT	BLE	2442	Ant1	-27.642	8	Pass
NVNT	BLE	2480	Ant1	-28.947	8	Pass

PSD NVNT BLE 2402MHz Ant1



PSD NVNT BLE 2442MHz Ant1





PSD NVNT BLE 2480MHz Ant1

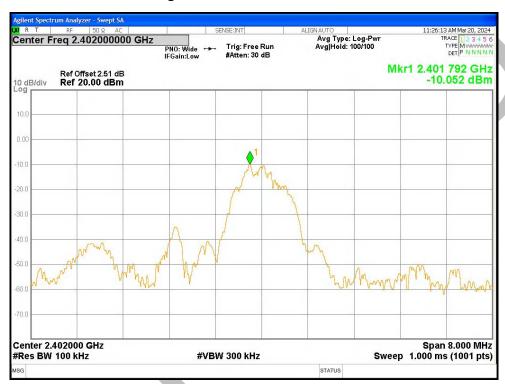




Band Edge

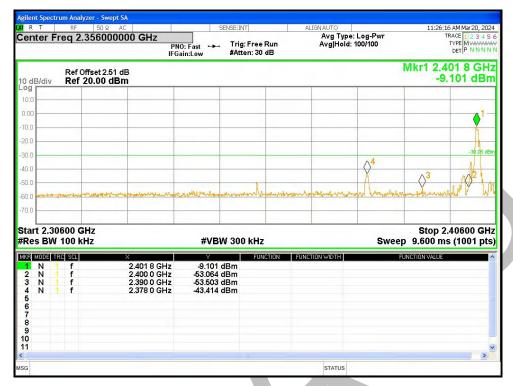
Condition	Mode	Frequency (MHz)	Antenna	Max Value (dBc)	Limit (dBc)	Verdict
NVNT	BLE	2402	Ant1	-33.36	-20	Pass
NVNT	BLE	2480	Ant1	-41.28	-20	Pass

Band Edge NVNT BLE 2402MHz Ant1 Ref



Band Edge NVNT BLE 2402MHz Ant1 Emission



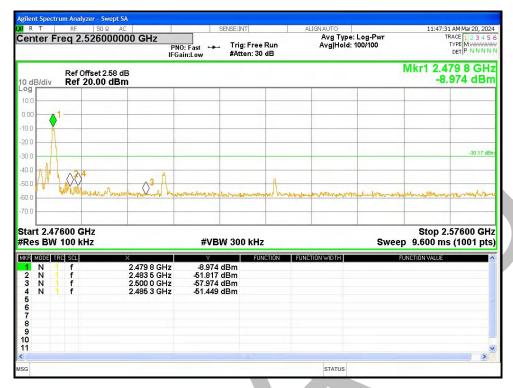


Band Edge NVNT BLE 2480MHz Ant1 Ref



Band Edge NVNT BLE 2480MHz Ant1 Emission







Conducted RF Spurious Emission

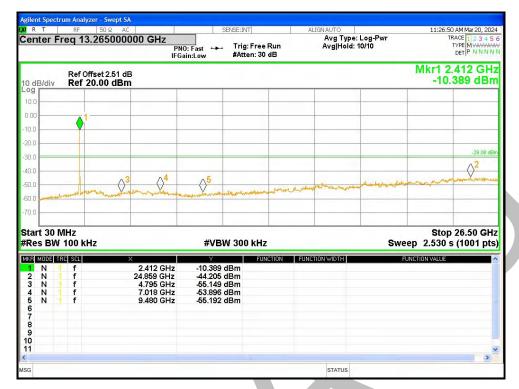
Condition	Mode	Frequency (MHz)	Antenna	Max Value (dBc)	Limit (dBc)	Verdict
NVNT	BLE	2402	Ant1	-35.12	-20	Pass
NVNT	BLE	2442	Ant1	-36.72	-20	Pass
NVNT	BLE	2480	Ant1	-34.62	-20	Pass

Tx. Spurious NVNT BLE 2402MHz Ant1 Ref



Tx. Spurious NVNT BLE 2402MHz Ant1 Emission



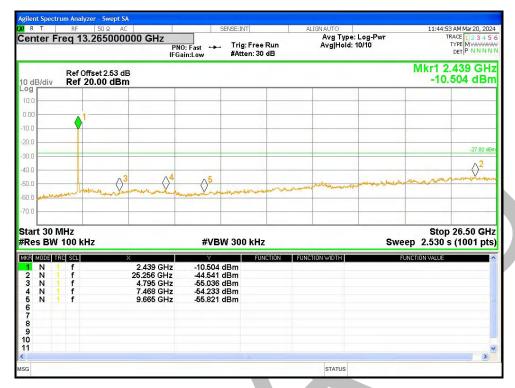


Tx. Spurious NVNT BLE 2442MHz Ant1 Ref



Tx. Spurious NVNT BLE 2442MHz Ant1 Emission



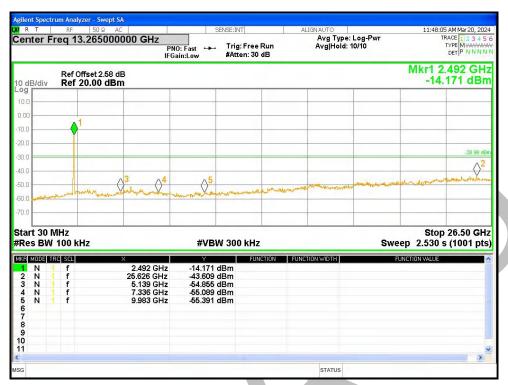


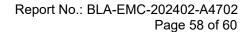
Tx. Spurious NVNT BLE 2480MHz Ant1 Ref



Tx. Spurious NVNT BLE 2480MHz Ant1 Emission

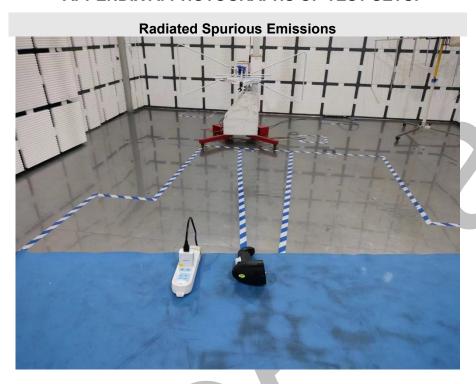




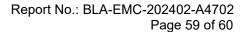




APPENDIX A: PHOTOGRAPHS OF TEST SETUP













Page 60 of 60

APPENDIX B: PHOTOGRAPHS OF EUT

Reference to the test report No. BLA-EMC-202402-A4701

----END OF REPORT----

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