APPLICATION FOR CERTIFICATION

On Behalf of GoodWe Technologies Co., Ltd. Smart DataLogger

Model No. : EzLogger3000C

Brand : GOODWE

FCC ID : 2AU7J-EZLOGGER3C

Prepared for

GoodWe Technologies Co., Ltd.

No.90 Zijin Rd., New District, Suzhou, 215011, China

Prepared by

Audix Technology (Wujiang) Co., Ltd. EMC Dept.

No. 1289 Jiangxing East Road, the Part of Wujiang Economic Development Zone Jiangsu China 215200

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Report Number ACWE-F2305019 Date of Test

May 19~Aug.09, 2023

Date of Report Aug.14, 2023

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TEST REPORT CERTIFICATION

Applicant GoodWe Technologies Co., Ltd. Manufacturer GoodWe Technologies Co., Ltd.

EUT Description Smart DataLogger

FCC ID 2AU7J-EZLOGGER3C

(A) Model No. EzLogger3000C

GOODWE (B) Brand

(C) Test Voltage AC 120V/60Hz

Applicable Standards:

Title 47 CFR FCC Part 15 Subpart C ANSI C63.10:2020 KDB 558074 D01 DTS Meas Guidance v05r02

The device described above was tested by Audix Technology (Wujiang) Co., Ltd. EMC Dept.to determine the maximum emission levels emanating from the device. The maximum emission levels were compared to the FCC Part 15 subpart C section 15.247 limits.

The measurement results are contained in this test report and Audix Technology (Wujiang) Co., Ltd. EMC Dept. is assumed full responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT to be technically compliant with the FCC limits.

This report applies to above tested sample only. This report shall not be reproduced in part without written approval of Audix Technology (Wujiang) Co., Ltd. EMC Dept.

Date of Test: May 19~Aug.09, 2023 Date of Report: Aug.14, 2023

Prepared by

(Emma Hu/Assistant Administrator)

Approved & Authorized Signer (Ken Lu/Vice General Manager)

AP LAR CODE 20078

1. DESCRIPTION OF VERSION

Edition No.	Date of Rev.	Summary	Report No.	
0	Aug.14, 2023	Original Report.	ACWE-F2305019	

2. SUMMARY OF MEASUREMENTS AND RESULTS

The EUT have been tested according to the applicable standards as referenced below.

Rule	Description	Results
15.207	Conducted Emission	PASS
15.247(d)/ 15.205	Radiated Band Edge and Radiated Spurious Emission	PASS
15.247(a)(2)	6dB Bandwidth	PASS
15.247(b)(3)	Maximum Output Power	PASS
15.247(d)	Conducted Band Edges and Conducted Spurious Emission	PASS
15.247 (e)	Peak Power Spectral Density	PASS
15.203	Antenna Requirement	Compliance

3. GENERAL INFORMATION

3.1. Description of Device (EUT)

Description : Smart DataLogger

Model No. : EzLogger3000C

FCC ID : 2AU7J-EZLOGGER3000C

Brand : GOODWE

Applicant : GoodWe Technologies Co., Ltd.

No.90 Zijin Rd., New District, Suzhou, 215011, China

Manufacturer : GoodWe Technologies Co., Ltd.

No.90 Zijin Rd., New District, Suzhou, 215011, China

Date of Receipt of Sample : Mar.28, 2023

3.2. Antenna Information

Туре	Frequency (MHz)	Gain(dBi)	
External PIFA	2400-2500	3.5	

3.3. EUT Specification Assessed in Current Report

Mode	Fundamental Range (MHz)	Channel Number	Modulation
802.11b	2412-2462	11	DSSS (DBPSK/DQPSK/CCK)
802.11g 802.11n-HT20	2412-2462	11	OFDM (BPSK/QPSK/16QAM/64QAM)
BLE-1M	2402-2480	40	GFSK

Remark: The information of test software, fixture and antenna gain is provided by customer.

3.4. Duty Cycle

Mode	Duty Cycle	Duty Cycle Factor
2402	0.63	2.04
2440	0.62	2.07
2480	0.62	2.05

3.5. Tested Supporting System Details (AE)

3.5.1. Notebook

Manufacturer/Brand : DELL

Model Number : Vostro 14-5459 Serial Number : 8P9C4K2

3.6. Description of Test Facility

Name of Firm : Audix Technology (Wujiang) Co., Ltd. EMC Dept.

Site Location : No. 1289 Jiangxing East Road, the Eastern Part of

Wujiang Economic Development Zone Jiangsu China

215200

Test Facilities : No.2 Conducted Shielding Enclosure

No.2 3m Semi-anechoic Chamber

RF Fully Chamber

NVLAP Lab Code : 200786-0

Valid until on Sep.30, 2023

(NVLAP is a signatory member of ILAC MRA) Remark: This report shall not be imply endorsement, certification or approval by NVLAP, NIST, or any agency

of the U.S. Federal Government.

3.7. Measurement Uncertainty

Test Item	Range Frequency	Uncertainty	
No.2 Conducted Disturbance Measurement	0.15MHz ~ 30MHz	± 3.32dB	
Radiated Disturbance Measurement	30MHz ∼ 1GHz	± 4.89dB	
(At 3m Chamber)	1GHz ~ 6GHz	± 4.85dB	
,	6GHz ∼ 18GHz	± 4.94dB	

Test items	Uncertainty		
Unwanted Emission(Conducted measurement)	y(dBm/Hz) ±U=y(dBm/Hz) ±0.33dB		
RF Output Power	$y(dBm) \pm U = y(dBm) \pm 0.98$		
RF Frequency	$y(Volt) \pm U = y(Volt) \pm 10.84 \times 10(-3) Hz$		
Temperature and Humidity	$y()\pm U=y()\pm 0.424$		
Temperature and Trummurty	y(%)±U=y(%) ±2.00%		
RF DC Voltage	$y(Volt) \pm U = y(Volt) \pm 0.026$		
Power Density	$y(dBm/Hz) \pm U=y(dBm/Hz) \pm 1.956dB$		
Radiated Spurious Emission(30MHz~1GHz)	$y(dBm) \pm U = y(dBm) \pm 4.42dB$		
Radiated Spurious Emission(1GHz~26.5GHz)	$y(dBm) \pm U = y(dBm) \pm 3.46dB$		

Remark: Uncertainty = $ku_c(y)$

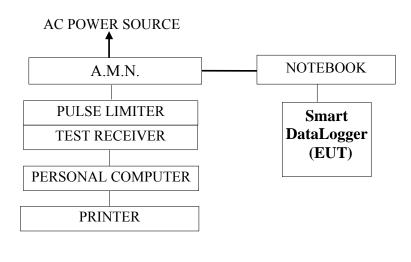
The standards listed in this report only require the uncertainty to be listed, and the measurement uncertainty is not required to be calculated in the measurement results. Therefore, the conformity judgment results are in accordance with the quality document TMC-205, and the test results in this report meet the requirements of the standards listed in this report.

4. CONDUCTED EMISSION MEASUREMET

4.1. Test Equipment

Item	Туре	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Period
1.	Test Receiver	R & S	ESCI	100839	2023-03-25	1 Year
2.	A.M.N.	Schwarzbeck	NNLK 8129	8129-164	2022-12-14	1 Year
3.	L.I.S.N.	Kyoritsu	KNW-407	8-1793-4	2023-03-25	1 Year
4.	I.S.N.	TESEQ	T800	58414	2023-03-25	1 Year
5.	Pulse Limiter	R&S	ESH3-Z2	101832	2022-12-14	1 Year
6.	50Ω Terminator	Tektronis	MS4630B	001-CON	2022-12-14	1 Year
7.	RF Cable	Shengxuan	ROS400	59/3	2022-12-14	1 Year
8.	Software	Audix /e3 (210616)				

4.2. Block Diagram of Test Setup



-: POWER LINE

-: SIGNAL LINE

4.3. Power line Conducted Emission Limit

Frequency	Maximum RF Line Voltage		
	Quasi-Peak Level	Average Level	
150kHz ~ 500kHz	$66\sim 56~dB\mu V$	$56 \sim 46 \text{ dB}\mu\text{V}$	
500kHz ~ 5MHz	56 dBμV	46 dBμV	
5MHz ~ 30MHz	60 dBμV	50 dBμV	

Remark1: If the average limit is met when using a Quasi-Peak detector, the EUT shall be deemed to meet both limits and measurement with the average detector is unnecessary.

2: The lower limit applies at the band edges.

4.4. Test Procedure

The measuring process is according to ANSI C63.10-2020 and laboratory internal procedure TKC-301-004. (For FCC Part15 Subpart C)

In the conducted emission measurement, the EUT and all peripheral devices were set up on a non-metallic table which was 0.8 meter height above the ground plane, and 0.4 meter far away from the vertical plane. The mains cable of the EUT connected to one Artificial Main Network(AMN). All other unit of the EUT and AE connected to a second Line Impedance Stabilization Network(L.I.S.N.). The telecommunication cable connected to the AE through a Impedance Stabilization Network(ISN) which terminated a 50Ω resistor. For the measurement, the A.M.N measuring port was terminated by a 50Ω measuring equipment and the second L.I.S.N measuring port was terminated by a 50Ω terminator. All measurements were done between the phase lead and the reference ground, and between the neutral lead and the reference ground. All cables or wires placement were verified to find out the maximum emission.

The bandwidth of measuring receiver was set at 9 kHz.

The required frequency band (0.15 MHz \sim 30 MHz) was pre-scanned with peak detector; the final measurement was measured with quasi-peak detector and average detector. (If the average limit is met when using a quasi-peak detector, the average detector is unnecessary).

The emission level is calculated automatically by the test system which uses the following equation:

Emission level ($dB\mu V$) = Reading ($dB\mu V$) + A.M.N factor (dB) + Cable loss (dB). (Cable loss includes Pulse Att+Cable+Switch)

4.5. Conducted Emission Measurement Results

For FCC Part15 Subpart C

PASSED.

EUT was performed during this section testing and all the test results are attached in next pages.

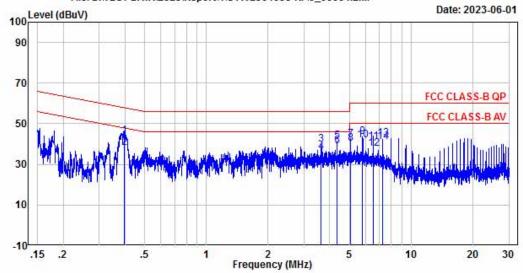
Test Date: Jun.01, 2023 Temperature: 19.2 Humidity: 43%

N 1	T. (C. 17)	Reference Test Data No.		
Mode	Test Condition	Neutral	Line	
1	BLE Mode	# 4	# 3	



Audix Technology (Wu Jiang) Co.,Ltd
No.1289,Jiang Xing East Road,The Eastern Part of WuJiang
Economic Development Zone,JiangSu,China
Tel: (0512)63403993 Fax: (0512)63403339

File: D:\TEST DATA\2023\Report\4\C1W2304038-RF\0_00004.EMI



Site NO. : NO.2 shielded Room Ant. pol.: Neutral Data NO.:4

Instrument 1 : Receiver ESCI (839)
Instrument 2 : NNLK 8129(164)|59/3|ESH3-Z2 (832)

Dis. / Ant. : NNLK8129-2212 Engineer : Shenyueqi Limit : FCC CLASS-B QP

Limit : FCC CLASS-B QP
Env. / Ins. : 19.2°C& 43 %
EUT : smart dataloggger
M/N : Ezlogger3000C
Power Rating : 120Vac/60Hz
Test Mode : BLE Mode

Memo :

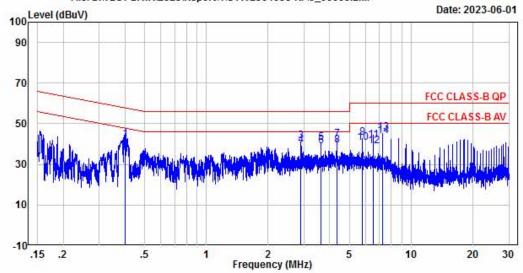
Freq.	LISN Factor	Cable Loss	Reading	Emission Level	Limits	Margin	Remark
MHz	dB	dB	dBuV	dBuV	dBuV	dB	remar re
0.397	0.10	9.88	33.95	43.93	57.92	13.99	QP
0.397	0.10	9.88	27.99	37.97	47.92	9.95	Average
3.620	0.10	9.97	29.60	39.67	56.00	16.33	QP
3.620	0.10	9.97	26.20	36.27	46.00	9.73	Average
4.343	0.10	9.98	31.30	41.38	56.00	14.62	QP
4.343	0.10	9.98	29.06	39.14	46.00	6.86	Average
5.068	0.10	9.98	32.13	42.21	60.00	17.79	QP
5.068	0.10	9.98	30.02	40.10	50.00	9.90	Average
5.790	0.14	9.99	33.25	43.38	60.00	16.62	QP
5.790	0.14	9.99	31.55	41.68	50.00	8.32	Average
6.518	0.18	10.00	31.05	41.23	60.00	18.77	QP
6.518	0.18	10.00	27.62	37.80	50.00	12.20	Average
7.237	0.21	10.01	32.54	42.76	60.00	17.24	QP
7.237	0.21	10.01	31.04	41.26	50.00	8.74	Average

Remarks: Emisson Level = LISN factor+Cable loss(Cable+Pulse Att+Switch)+Reading



Audix Technology (Wu Jiang) Co.,Ltd No.1289, Jiang Xing East Road, The Eastern Part of WuJiang Economic Development Zone, JiangSu, China Tel: (0512)63403993 Fax: (0512)63403339

File: D:\TEST DATA\2023\Report\4\C1W2304038-RF\0_00003.EMI



Site NO. : NO.2 shielded Room Ant. pol.: Line1 Data No.:3

Instrument 1 : Receiver ESCI (839)
Instrument 2 : NNLK 8129(164)|59/3|ESH3-Z2 (832)

Dis. / Ant. : NNLK8129-2212 Limit : FCC CLASS-B QP Engineer : Shenyueqi

Env. / Ins. : 19.2°C& 43 % : smart dataloggger : Ezlogger3000C Power Rating : 120Vac/60Hz Test Mode : BLE Mode

Memo

Freq.	LISN Factor	Cable Loss	Reading	Emission Level	Limits	Margin	Remark
MHz	dB	dB	dBuV	dBuV	dBuV	dB	
0.403	0.10	9.89	32.11	42.10	57.79	15.69	QP
0.403	0.10	9.89	25.59	35.58	47.79	12.21	Average
2.896	0.10	9.97	31.20	41.27	56.00	14.73	QP
2.896	0.10	9.97	29.43	39.50	46.00	6.50	Average
3.623	0.10	9.97	30.47	40.54	56.00	15.46	QP
3.623	0.10	9.97	28.72	38.79	46.00	7.21	Average
4.343	0.10	9.98	32.19	42.27	56.00	13.73	QP
4.343	0.10	9.98	29.23	39.31	46.00	6.69	Average
5.790	0.14	9.99	33.03	43.16	60.00	16.84	QP
5.790	0.14	9.99	30.35	40.48	50.00	9.52	Average
6.512	0.18	10.00	31.73	41.91	60.00	18.09	QP
6.512	0.18	10.00	28.74	38.92	50.00	11.08	Average
7.242	0.21	10.01	35.49	45.71	60.00	14.29	QP
7.242	0.21	10.01	33.77	43.99	50.00	6.01	Average

Remarks: Emisson Level = LISN factor+Cable loss(Cable+Pulse Att+Switch)+Reading

5. RADIATED EMISSION MEASUREMENT

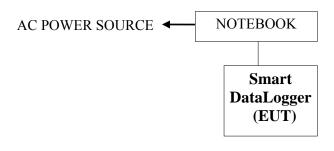
5.1. Test Equipment

The following test equipment was used during the radiated emission measurement: At 3m Semi-Anechoic Chamber

Item	Туре	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Period
1.	Preamplifier	Agilent	8447D	2944A10922	2023-03-25	1 Year
2.	PXA signal analyzer	Agilent	N9030A	MY53120367	2022-07-25	1 Year
3.	Bi-log Antenna	SCHWARZBECK	VULB 9168	706	2023-03-12	1 Year
4.	Horn Antenna	ETS	3117	00218586	2023-03-13	1 Year
5.	Microwave Preamplifier	Agilent	8449B	3008A02234	2023-03-25	1 Year
6.	EMI Test Receiver	R&S	ESR7	101956	2023-03-25	1 Year
7.	RF Cable	Chengyi+Shengxu an	NM500+RO S400	190945+6000+3 000	2022-08-12	1 Year
8.	RF Cable	Chengyi	EMC104-SF- SM-8000/N M-1000	190938+190942	2022-08-12	1 Year
9.	Software		Au	dix /e3 (210616)		

5.2. Block Diagram of Test Setup

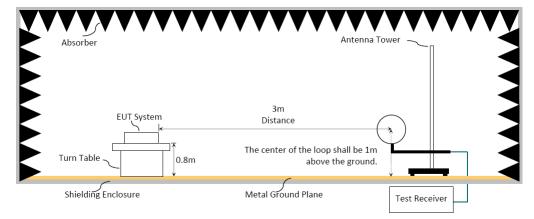
5.2.1. Block Diagram of Test Setup between EUT and simulators



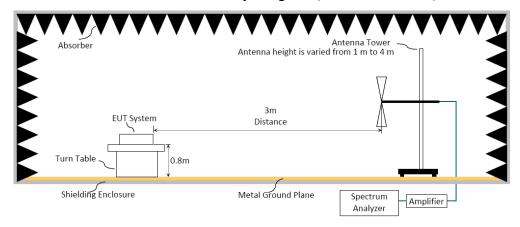
---: POWER LINE

-: SIGNAL LINE

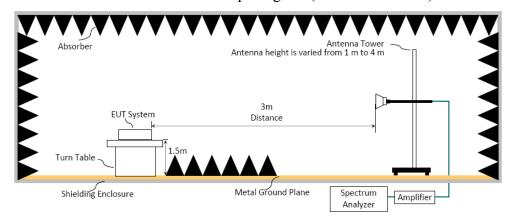
5.2.2. No. 2 3m Semi-Anechoic Chamber Setup Diagram (Test distance: 3m) for 9kHz-30MHz



5.2.3. No. 2 3m Semi-Anechoic Chamber Setup Diagram (Test distance: 3m) for 30MHz-1GHz



5.2.4. No. 2 3m Semi-Anechoic Chamber Setup Diagram (Test distance: 3m) for Above 1GHz



5.3. Radiated Emission Limits

In any 100kHz bandwidth outside the frequency band, the radio frequency power produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level. In addition, radiated emissions which fall in restricted bands, as defined in Section 15.205, must also comply with the radiated emission limits specified as below.

2.01	D : ()	Limits		
Frequency (MHz)	Distance (m)	dBμV/m	μV/m	
0.009 - 0.490	300	67.6-20 log f(kHz)	2400/f kHz	
0.490 - 1.705	30	87.6-20 log f(kHz)	24000/f kHz	
1.705 - 30	30	29.5	30	
30 - 88	3	40.0	100	
88- 216	3	43.5	150	
216- 960	3	46.0	200	
Above 960	3	54.0	500	
Above 1000	3	74.0 dBμV/m (P 54.0 dBμV/m (′	

Remark: (1) $dB\mu V/m = 20 \log (\mu V/m)$

- (2) The tighter limit applies to the edge between two frequency bands.
- (3)Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.
- (4)Fundamental and emission fall within operation band are exempted from this section.
- (5) Pursuant to ANSI C63.10: 6.6.4.3, if the maximized peak measured value complies with the average limit, then it is unnecessary to perform an average measurement.

Frequency Range 9kHz~30MHz:

The EUT setup on the turn table which has 0.8 m height to the ground. The turn table rotated 360 degrees and antenna fixed to 1 m to find the maximum emission level.

In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10-2013 regulation.

- (1) RBW = 9kHz with peak and average detector.
- (2) Detector: average and peak (9kHz-490kHz)

Q.P. (490kHz-30MHz)

Frequency Range 30MHz ~ 25GHz:

The EUT setup on the turn table which has 80 cm (for 30-1000 MHz) and 1.5m (for above 1GHz) height to the ground. The turn table rotated 360 degrees and antenna varied from 1 m to 4 m to find the maximum emission level. Both horizontal and vertical polarization are required. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10-2013 regulation.

Frequency below 1 GHz:

Spectrum Analyzer is used for pre-testing with following setting:

- (1)RBW = 120KHz
- $(2)VBW \ge 3 \times RBW$.
- (3)Detector = Peak.
- (4)Sweep time = auto.
- (5)Trace mode = max hold.
- (6) Allow sweeps to continue until the trace stabilizes.
- (7) When peak-detected value is lower than limit that the measurement using the Q.P. detector is not required, otherwise using Q.P. for final measurement.

Frequency above 1GHz to 10th harmonic (up to 25 GHz):

Peak Dector:

- (1)RBW = 1MHz
- (2)VBW $\geq 3 \times RBW$.
- (3)Detector = Peak.
- (4)Sweep time = auto.
- (5)Trace mode = max hold.
- (6) Allow sweeps to continue until the trace stabilizes.
- (7)When peak-detected value is lower than limit that the measurement using the average detector is not required, otherwise using average detector for final measurement.

5.5. Measurement Results

PASSED

The EUT was tested in restricted bands and all the test results are listed in next page. The frequency range from 9kHz to 10th harmonic(25GHz) are checked, and the emission (9kHz~30MHz,18GHz~25GHz)not reported for there is no emission be found.

5.5.1. Emission Measurement Results (For Below 1GHz)

Ant. pol.: Horizontal Data NO.:72

Site NO. : NO.2 3M Chamber Instrument 1 : Receiver ESR7 (956)

Engineer : Xuweifei

Instrument 1 : Kecelver ESR7 (956)
Instrument 2 : Preamplifier 8447D(922)|400
Dis. / Ant. : 9168-706-2304-3M
Limit : FCC PART 158 QP
Env. / Ins. : 21.3°C/54% : Smart DataLogger : EzLogger3000C Power Rating : 120Vac/60Hz Test Mode : BLE 2402MHz

Memo

Freq. MHz	Ant. Factor dB/m	Cable Loss dB	Reading dBuV	Preamp Factor dB	Emission Level dBuV/m	Limits dBuV/m	Margin dB	Remark
174.240 199.652 251.684 299.541 318.548	18.30 16.13 17.85 19.29 19.71	0.96 1.03 1.16 1.29 1.32	32.58 35.78 37.97 44.98 35.48	28.08 28.00 27.90 27.80 27.87	23.76 24.94 29.08 37.76 28.64	43.50 43.50 46.00 46.00 46.00	19.74 18.56 16.92 8.24 17.36	QP QP QP QP OP
350.570	20.41	1.38	32.97	28.00	26.76	46.00	19.24	QP

Ant. pol.: Vertical Data NO.:71

Site NO. : NO.2 3M Chamber
Instrument 1 : Receiver ESR7 (956)
Instrument 2 : Preamplifier 8447D(922)|400
Dis. / Ant. : 9168-706-2304-3M
Limit : FCC PART 15B QP
Env. / Ins. : 21.3°C/54%
EUT : Smart DataLogger
M/N : EZLogger3000C
POWNER Rating : 120Vac/60Hz Power Rating : 120Vac/60Hz Test Mode : BLE 2402MHz Memo :

Engineer : Xuweifei

Freq. MHz	Ant. Factor dB/m	Cable Loss dB	Reading dBuV	Preamp Factor dB	Emission Level dBuV/m	Limits dBuV/m	Margin dB	Remark
40.210	19.21	0.48	27.54	28.65	18.58	40.00	21.42	QP
251.210	17.84	1.16	40.22	27.90	31.32	46.00	14.68	QP
262.254	18.17	1.19	36.88	27.88	28.36	46.00	17.64	QP
299.470	19.28	1.29	42.70	27.80	35.47	46.00	10.53	QP
451.781	22.64	1.58	31.62	28.46	27.38	46.00	18.62	QP
549.781	24.60	1.76	27.49	28.85	25.00	46.00	21.00	QP

5.5.2. Emission Measurement Results (For Above 1GHz)

Mode **BLE** 2402MHz Frequency

Engineer : Xuweifei

Ant. pol.: Horizontal Data NO.:74

Site NO. : NO.2 3M Chamber
Instrument 1 : Spectrum N9030A(367)
Instrument 2 : Preamplifier 8449B(231)|000

Dis. / Ant. : 3117-586-2304 Limit : FCC Part15 C PK Env. / Ins. : 21.3°C/54% : Smart DataLogger : EzLogger3000C Power Rating : 120Vac/60Hz Test Mode : BLE 2402MHZ

Memo

Freq. MHz	Ant. Factor dB/m	Cable Loss dB	Reading dBuV	Preamp Factor dB	Emission Level dBuV/m	Limits dBuV/m	Margin dB	Remark
1119.000	29.12	2.76	53.99	33.86	52.01	74.00	21.99	Peak
1119.960	29.12	2.76	36.52	33.86	34.54	54.00	19.46	Average
1593.290	28.40	3.05	31.60	33.29	29.76	54.00	24.24	Average
1595.000	28.42	3.05	46.28	33.29	44.46	74.00	29.54	Peak
10333.000	37.37	8.85	35.92	32.60	49.54	74.00	24.46	Peak
10333.160	37.37	8.85	28.17	32.60	41.79	54.00	12.21	Average

Site NO. : NO.2 3M Chamber Instrument 1 : Spectrum N9030A(367) Ant. pol.: Vertical Data NO.:75

Engineer : Xuweifei

Instrument 2 : Preamplifier 8449B(231)|000

Dis. / Ant. : 3117-586-2304 Limit : FCC Part15 C PK Env. / Ins. : 21.3°C/54% EUT : Smart DataLogger M/N : EzLogger3000C Power Rating : 120Vac/60Hz Test Mode : BLE 2402MHZ

Memo

Freq. MHz	Ant. Factor dB/m	Cable Loss dB	Reading dBuV	Preamp Factor dB	Emission Level dBuV/m	Limits dBuV/m	Margin dB	Remark
4808.000	33.92	5.79	38.43	32.24	45.90	74.00	28.10	Peak
4809.150	33.92	5.79	30.47	32.24	37.94	54.00	16.06	Average
8140.000	35.80	7.53	37.23	32.46	48.10	74.00	25.90	Peak
8141.430	35.80	7.53	30.68	32.46	41.55	54.00	12.45	Average
12356.000	38.77	8.85	34.26	31.72	50.16	74.00	23.84	Peak
12358.260	38.77	8.85	27.47	31.71	43.38	54.00	10.62	Average

Mode BLE Frequency 2440MHz

Site NO. : NO.2 3M Chamber Ant. pol.: Horizontal Data NO.:77 Instrument 1 : Spectrum N9030A(367)

Instrument 1 : Spectrum N9030A(367)
Instrument 2 : Preamplifier 8449B(231)|000

Instrument 2 : Preamplifier 8449B(231)|000 Dis. / Ant. : 3117-586-2304

Limit : FCC Part15 C PK
Env. / Ins. : 21.3°C/54%
EUT : Smart DataLogger
M/N : EzLogger3000C
Power Rating : 120Vac/60Hz
Test Mode : BLE 2440MHZ
Memo :

Engineer : Xuweifei

Freq. MHz	Ant. Factor dB/m	Cable Loss dB	Reading dBuV	Preamp Factor dB	Emission Level dBuV/m	Limits dBuV/m	Margin dB	Remark
1000.000	29.60	2.70	52.35	34.00	50.65	74.00	23.35	Peak
1000.120	29.60	2.70	38.71	34.00	37.01	54.00	16.99	Average
1119.000	29.12	2.76	52.19	33.86	50.21	74.00	23.79	Peak
1120.370	29.12	2.76	38.62	33.86	36.64	54.00	17.36	Average
12407.000	38.78	8.88	34.81	31.67	50.80	74.00	23.20	Peak
12409.450	38.78	8.88	28.43	31.67	44.42	54.00	9.58	Average

Site NO. : NO.2 3M Chamber Instrument 1 : Spectrum N9030A(367) Ant. pol.: Vertical Data NO.:76

Engineer : Xuweifei

Instrument 2 : Preamplifier 8449B(231)|000

Instrument 2 : Preamplifier 844:
Dis. / Ant. : 3117-586-2304
Limit : FCC Part15 C PK
Env. / Ins. : 21.3°C/54%
EUT : Smart DataLogger
M/N : EzLogger3000C
Power Rating : 120Vac/60Hz
Test Mode : BLE 2440MHZ
Memo :

Freq. MHz	Ant. Factor dB/m	Cable Loss dB	Reading dBuV	Preamp Factor dB	Emission Level dBuV/m	Limits dBuV/m	Margin dB	Remark
1119.000	29.12	2.76	46.43	33.86	44.45	74.00	29.55	Peak
1120.160	29.12	2.76	36.52	33.86	34.54	54.00	19.46	Average
10384.000	37.41	8.91	36.28	32.60	50.00	74.00	24.00	Peak
10386.240	37.41	8.92	28.54	32.60	42.27	54.00	11.73	Average
13954.000	38.61	9.14	34.38	31.01	51.12	74.00	22.88	Peak
13958.130	38.61	9.14	27.19	31.01	43.93	54.00	10.07	Average

23.93 Peak

11.82 Average

74.00

54.00

Mode BLE Frequency 2480MHz

Site NO. : NO.2 3M Chamber Ant. pol.: Horizontal Data NO.:78

Instrument 1 : Spectrum N9030A(367)
Instrument 2 : Preamplifier 8449B(231)|000

Dis. / Ant. : 3117-586-2304

Limit : FCC Part15 C PK
Env. / Ins. : 21.3°C/54%
EUT : Smart DataLogger
M/N : EzLogger3000C
Power Rating : 120Vac/60Hz
Test Mode : BLE 2480MHZ
Memo :

38.39

38.40

11744.000

11747.530

8.46 8.46 Engineer : Xuweifei

Freq. MHz	Ant. Factor dB/m	Cable Loss dB	Reading dBuV	Preamp Factor dB	Emission Level dBuV/m	Limits dBuV/m	Margin dB	Remark
1000.000	29.60	2.70	50.44	34.00	48.74	74.00	25.26	Peak
1000.015	29.60	2.70	37.49	34.00	35.79	54.00	18.21	Average
1119.000	29.12	2.76	52.29	33.86	50.31	74.00	23.69	Peak
1121.031	29.12	2.76	38.71	33.85	36.74	54.00	17.26	Average

32.15 32.15 50.07 42.18

Remarks:Emission Level = Antenna factor+Cable loss+Reading-Preamp Factor

35.37 27.47 Site NO. : NO.2 3M Chamber Instrument 1 : Spectrum N9030A(367) Ant. pol.: Vertical Data NO.:79

Engineer : Xuweifei

Instrument 2 : Preamplifier 8449B(231) | 000

Dis. / Ant. : 3117-586-2304
Limit : FCC Part15 C PK
Env. / Ins. : 21.3°C/54%
EUT : Smart DataLogger
M/N : EZLogger3000C Power Rating : 120Vac/60Hz Test Mode : BLE 2480MHZ Memo :

Freq. MHz	Ant. Factor dB/m	Cable Loss dB	Reading dBuV	Preamp Factor dB	Emission Level dBuV/m	Limits dBuV/m	Margin dB	Remark
1765.000	29.88	3.24	46.85	33.08	46.89	74.00	27.11	Peak
1767.260	29.90	3.24	37.46	33.08	37.52	54.00	16.48	Average
10452.000	37.46	9.01	36.10	32.60	49.97	74.00	24.03	Peak
10455.130	37.46	9.01	28.49	32.60	42.36	54.00	11.64	Average
13699.000	38.66	8.85	35.08	31.06	51.53	74.00	22.47	Peak
13702.280	38.66	8.86	27.51	31.06	43.97	54.00	10.03	Average

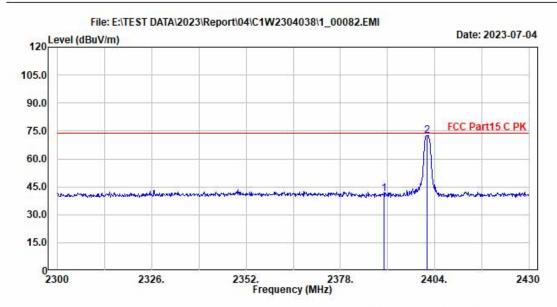
5.5.3. Spurious Emission Measurement Results in Band Edge Emission

Mode	BLE	Frequency	2402MHz	
	1	• •		



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Engineer : Xuweifei



Site NO. : NO.2 3M Chamber Ant. pol.: Horizontal Data NO.:82

Instrument 1 : Spectrum N9030A(367)

Instrument 2 : Preamplifier 8449B(234)|000

Dis. / Ant. : 3117-586-2304 Limit : FCC Part15 C PK Env. / Ins. : 21.3°C/54% EUT : Smart DataLogger M/N : EzLogger3000C

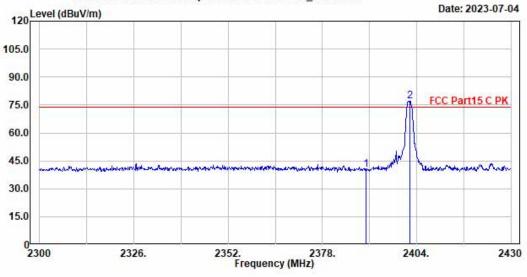
Power Rating : 120Vac/60Hz Test Mode : TX BLE 2402MHz Memo :

Freq.	Ant.	Cable		Preamp	Emission			
MHz	Factor dB/m	Loss dB	Reading dBuV	Factor dB	Level dBuV/m	Limits dBuV/m	Margin dB	Remark
		3175577755		2777777777				**********
2390.000	32.13	3.00	40.00	34.11	41.02	74.00	32.98	Peak
2401.790	32.14	3.00	71.46	34.11	72.49	74.00	1.51	Peak



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File: E:\TEST DATA\2023\Report\04\C1W2304038\1_00081.EMI



Ant. pol.: Vertical Site NO. : NO.2 3M Chamber Data No.:81

Instrument 1 : Spectrum N9030A(367)
Instrument 2 : Preamplifier 8449B(234)|000

Engineer : Xuweifei

Dis. / Ant. : 3117-586-2304 Limit : FCC Part15 C PK Env. / Ins. : 21.3°C/54% : Smart DataLogger : EzLogger3000C Power Rating : 120Vac/60Hz Test Mode : TX BLE 2402MHz

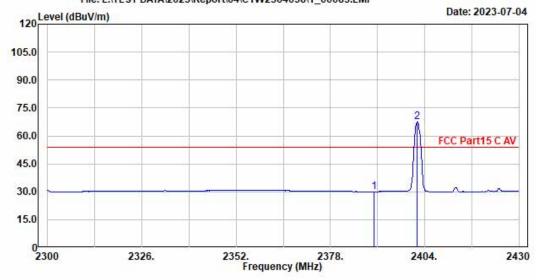
Memo

Freq.	Ant.	Cable		Preamp	Emission				
MHz	Factor dB/m	Loss dB	Reading dBuV	Factor dB	Level dBuV/m	Limits dBuV/m	Margin dB	Remark	
				27777777777				********	
2390.000	32.13	3.00	39.35	34.11	40.37	74.00	33.63	Peak	
2402.180	32.14	3.00	76.05	34.11	77.08	74.00	-3.08	Peak	



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File: E:\TEST DATA\2023\Report\04\C1W2304038\1_00083.EMI



Site NO. : NO.2 3M Chamber Ant. pol.: Horizontal Data NO.:83

Instrument 1 : Spectrum N9030A(367)
Instrument 2 : Preamplifier 8449B(234)|000

Dis. / Ant. : 3117-586-2304 Engineer : Xuweifei

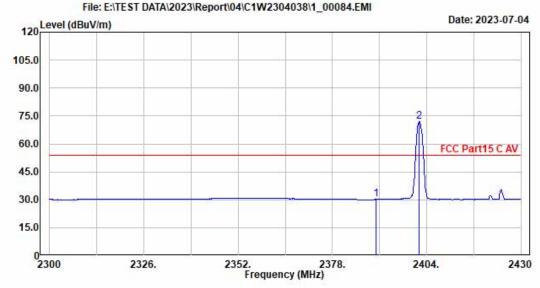
Dis. / Ant. : 3117-586-2304
Limit : FCC Part15 C AV
Env. / Ins. : 21.3°C/54%
EUT : Smart DataLogger
M/N : EzLogger3000C
Power Rating : 120Vac/60Hz
Test Mode : TX BLE 2402MHz

Memo :

Freq.	Ant.	Cable		Preamp	Emission			
MHz	Factor dB/m	Loss dB	Reading dBuV	Factor dB	Level dBuV/m	Limits dBuV/m	Margin dB	Remark
(7,7,7,5,7,7,5,0,7,		377557775		27777777777				
2390.000	32.13	3.00	29.05	34.11	30.07	54.00	23.93	Average
2401.920	32.14	3.00	66.56	34.11	67.59	54.00	-13.59	Average



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Site NO. : NO.2 3M Chamber Ant. pol.: Vertical Data NO.:84

Instrument 1 : Spectrum N9030A(367)
Instrument 2 : Preamplifier 8449B(234)|000

Dis. / Ant. : 3117-586-2304 Engineer : Xuweifei

Dis. / Ant. : 3117-586-2304 Limit : FCC Part15 C AV Env. / Ins. : 21.3°C/54% EUT : Smart DataLogger M/N : EzLogger3000C

Power Rating : 120Vac/60Hz Test Mode : TX BLE 2402MHz

Memo :

Freq.	Ant.	Cable	20.45 PAP	Preamp	Emission	1202 1200	8.51	
MHz	Factor dB/m	Loss dB	Reading dBuV	Factor dB	Level dBuV/m	Limits dBuV/m	Margin dB	Remark
		area (17.00)						************
2390.000	32.13	3.00	29.12	34.11	30.14	54.00	23.86	Average
2401.920	32.14	3.00	71.03	34.11	72.06	54.00	-18.06	Average

Mode **BLE** Frequency 2480MHz



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File: E:\TEST DATA\2023\Report\04\C1W2304038\1_00086.EMI 120 Level (dBuV/m) Date: 2023-07-04 105.0 90.0 FCC Part15 C PK 75.0 60.0 45.0 30.0 15.0 2450 2470. 2490. 2510. 2530. 2550 Frequency (MHz)

Site NO. : NO.2 3M Chamber Ant. pol.: Horizontal Data NO.:86

Engineer : Xuweifei

Instrument 1 : Spectrum N9030A(367)

Instrument 2 : Preamplifier 8449B(234) 000

Dis. / Ant. : 3117-586-2304 Limit : FCC Part15 C PK Env. / Ins. : 21.3°C/54% : Smart DataLogger EUT M/N : EzLogger3000C Power Rating : 120Vac/60Hz Test Mode : TX BLE 2480MHz

Memo

Freq.	Ant.	Cable	D4:	Preamp	Emission		**	
MHz	Factor dB/m	Loss dB	Reading dBuV	Factor dB	Level dBuV/m	Limits dBuV/m	Margin dB	Remark
(7,70,50,7) 70,50,7	551755155	3175577775		CATHODOTFC	2001700120		175077055	*********
2480.200	32.19	3.06	71.22	34.12	72.35	74.00	1.65	Peak
2483.500	32.19	3.06	47.62	34.12	48.75	74.00	25.25	Peak



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File: E:\TEST DATA\2023\Report\04\C1W2304038\1_00085.EMI Date: 2023-07-04 120 Level (dBuV/m) 105.0 90.0 FCC Part15 C PK 75.0 60.0 45.0 30.0 15.0 2450 2490. Frequency (MHz) 2530. 2550 2470. 2510.

Ant. pol.: Vertical Site NO. : NO.2 3M Chamber Data No.:85

Instrument 1 : Spectrum N9030A(367)
Instrument 2 : Preamplifier 8449B(234)|000

Dis. / Ant. : 3117-586-2304 Limit : FCC Part15 C PK Engineer : Xuweifei

Env. / Ins. : 21.3°C/54% : Smart DataLogger : EzLogger3000C Power Rating : 120Vac/60Hz Test Mode : TX BLE 2480MHz

Memo

Freq.	Ant.	Cable	20.45 PAP	Preamp	Emission	1202 1200	8.51	
MHz	Factor dB/m	Loss dB	Reading dBuV	Factor dB	Level dBuV/m	Limits dBuV/m	Margin dB	Remark
		ar-e						*********
2480.100	32.19	3.06	77.00	34.12	78.13	74.00	-4.13	Peak
2483.500	32.19	3.06	38.84	34.12	39.97	74.00	34.03	Peak



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2530.

2550

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120 Level (dBuV/m) 105.0 90.0 75.0 60.0 45.0 30.0

2490. Frequency (MHz)

2510.

File: E:\TEST DATA\2023\Report\04\C1W2304038\1_00087.EMI

Site NO. : NO.2 3M Chamber Ant. pol.: Horizontal Data NO.:87

Instrument 1 : Spectrum N9030A(367)
Instrument 2 : Preamplifier 8449B(234)|000

2470.

Dis. / Ant. : 3117-586-2304 Engineer : Xuweifei

Dis. / Ant. : 3117-586-2304 Limit : FCC Part15 C AV Env. / Ins. : 21.3°C/54% EUT : Smart DataLogger M/N : EzLogger3000C Power Rating : 120Vac/60Hz Test Mode : TX BLE 2480MHz

Memo :

15.0

2450

Freq.	Ant.	Cable		Preamp	Emission			
MHz	Factor dB/m	Loss dB	Reading dBuV	Factor dB	Level dBuV/m	Limits dBuV/m	Margin dB	Remark
17.757.7757.7				27727677765				********
2480.000	32.19	3.06	64.80	34.12	65.93	54.00	-11.93	Average
2483.500	32.19	3.06	37.33	34.12	38.46	54.00	15.54	Average



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File: E:\TEST DATA\2023\Report\04\C1W2304038\1_00088.EMI Date: 2023-07-04 120 Level (dBuV/m) 105.0 90.0 75.0 60.0 FCC Part15 C AV 45.0 30.0 15.0 2450 2490. Frequency (MHz) 2530. 2550 2470. 2510.

Ant. pol.: Vertical Site NO. : NO.2 3M Chamber Data No.:88

Instrument 1 : Spectrum N9030A(367)
Instrument 2 : Preamplifier 8449B(234)|000

Engineer : Xuweifei

Dis. / Ant. : 3117-586-2304 Limit : FCC Part15 C AV Env. / Ins. : 21.3°C/54% : Smart DataLogger : EzLogger3000C Power Rating : 120Vac/60Hz Test Mode : TX BLE 2480MHz

Memo

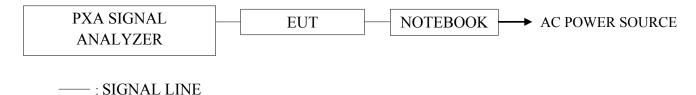
Freq.	Ant.	Cable	120 14	Preamp	Emission			2 4
MHz	Factor dB/m	Loss dB	Reading dBuV	Factor dB	Level dBuV/m	Limits dBuV/m	Margin dB	Remark
(2,000,000,000,000,000,000,000,000,000,0	551752753			UNTEREST F-00	200017501750			
2480.000	32.19	3.06	71.56	34.12	72.69	54.00	-18.69	Average
2483.500	32.19	3.06	37.32	34.12	38.45	54.00	15.55	Average

6. 6dB BANDWIDTH MEASUREMENT

6.1. Test Equipment

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Period
1.	PXA signal analyzer	Agilent	N9030A	MY53120217	2023-03-25	1 Year

6.2. Block Diagram of Test Setup



6.3. Specification Limits

The minimum 6dB bandwidth shall be at least 500kHz.

6.4. Test Procedure

Following measurement procedure is reference to KDB 558074 D01 DTS Meas Guidance v05:

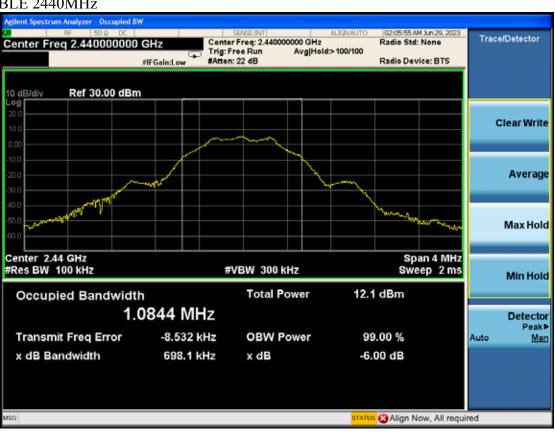
- (1) Set RBW = 100 kHz.
- (2) Set the video bandwidth $(VBW) \ge 3 \times RBW$.
- (3) Detector = Peak.
- (4) Trace mode = \max hold.
- (5) Sweep = auto couple.
- (6) Allow the trace to stabilize.
- (7) Setting channel bandwidth function x dB to -6 dB to record the final bandwidth.

6.5. Test Results

PASSED. All the test results are attached in next pages.

Item	Test Frequency (MHz)	6dB Bandwidth (kHz)		
BLE	2402	685.3		
	2440	698.1		
	2480	682.3		





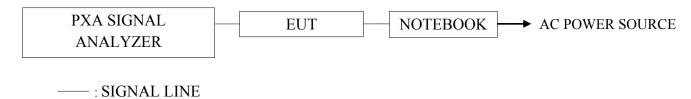


7. OUTPUT POWER MEASUREMENT

7.1. Test Equipment

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Period
1.	PXA signal analyzer	Agilent	N9030A	MY53120217	2023-03-25	1 Year

7.2. Block Diagram of Test Setup



7.3. Specification Limits (§15.247(b)(3))

The Limits of maximum Peak Output Power for digital modulation in 2400-2483.5MHz is: 1Watt. (30dBm), and E.I.R.P.: 4Watt (36dBm)

7.4. Test Procedure

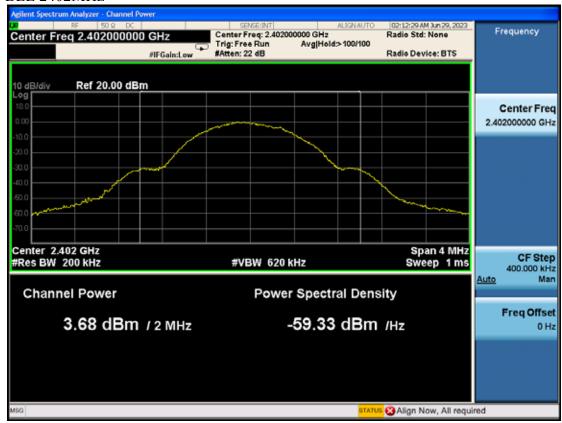
Following measurement procedure is reference to KDB 558074 D01 DTS Meas Guidance v05: **Method AVGSA-2 (Spectrum channel power)**

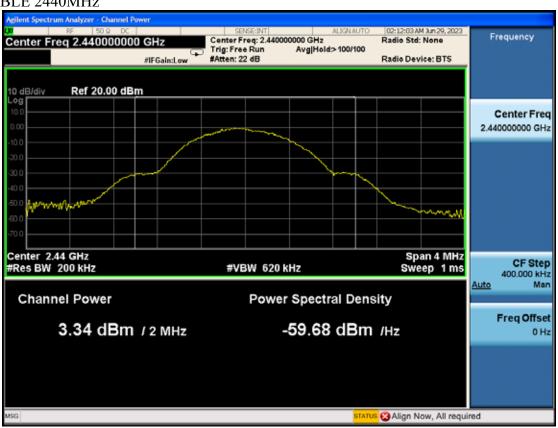
- (1) Set span to at least 1.5 times the OBW
- (2) Set RBW = 1 5% of OBW
- (3) Set the video bandwidth (VBW) \geq 3 × RBW.
- (4) Detector = RMS.
- (5) Trace mode = trace average at least 100 traces
- (6) Sweep = auto couple.
- (7) Compute power by integrating the spectrum across the OBW of the signal using the instrument's band power measurement function with band limits set equal to the OBW band edges.
- (8) Duty cycle factor is added when duty cycle presented in chapter 3.5 is < 98%.

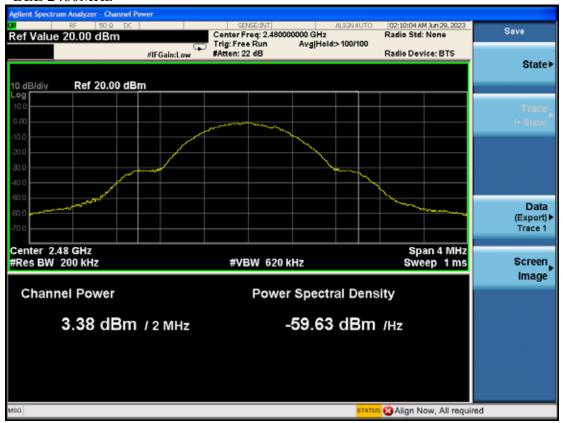
7.5. Test Results

PASSED.

Mode	Frequency (MHz)	Duty Cycle Factor	Reading (dBm)	Average Output Power (dBm)	Limit (dBm)
	2402	2.04	3.68	5.72	
BLE	2440	2.07	3.34	5.41	30
	2480	2.05	3.38	5.43	







8. POWER SPECTRAL DENSITY MEASUREMENT

8.1. Test Equipment

Item	Туре	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Period
1.	PXA signal analyzer	Agilent	N9030A	MY53120217	2023-03-25	1 Year

8.2. Block Diagram of Test Setup

The same as section 6.2.

8.3. Specification Limits

The peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3kHz band.

8.4. Test Procedure

- (1) Set analyzer center frequency to DTS channel center frequency.
- (2) Set the span to 1.5 times the DTS bandwidth.
- (3) Set the RBW to: 3 kHz RBW 100 kHz.
- (4) Set the VBW $3 \times RBW$.
- (5) Detector = peak.
- (6) Sweep time = auto couple.
- (7) Trace mode = \max hold.
- (8) Allow trace to fully stabilize.
- (9) Use the peak marker function to determine the maximum amplitude level.

8.5. Test Results

PASSED. All the test results are attached in next page.

Mode	Frequency (MHz)	Duty Crycle Factor	Reading (dBm)	Result (dBm)	Limit (dBm/3kHz)
	2402	2.04	-8.430	-6.39	
BLE	2440	2.07	-8.306	-6.236	8
	2480	2.05	-9.944	-7.894	







9. EMISSION LIMITATIONS MEASUREMENT

9.1. Test Equipment

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Period
1.	PXA signal analyzer	Agilent	N9030A	MY53120217	2023-03-25	1 Year

9.2. Block Diagram of Test Setup

The same as section 6.2.

9.3. Specification Limits

In any 100kHz 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 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, that the required attenuation shall be 30 dB instead of 20 dB.

9.4. Test Procedure

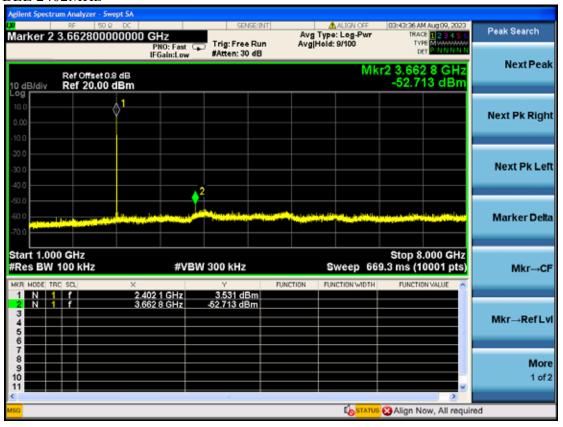
Following measurement procedure is reference to KDB 558074 D01 DTS Meas Guidance v05r02:

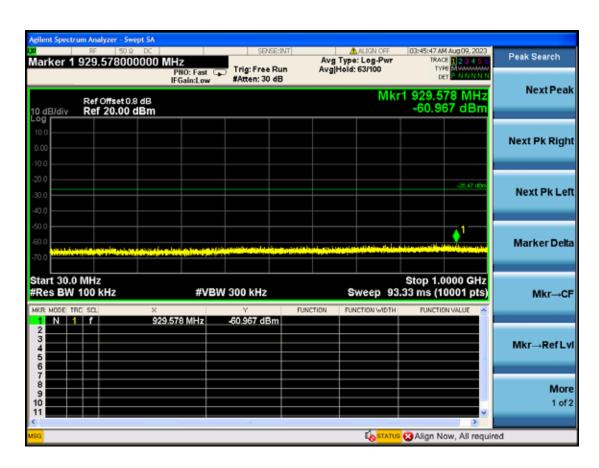
- (1) Set analyzer center frequency to DTS channel center frequency.
- (2) Set the span to 1.5 times the DTS bandwidth.
- (3) Set the RBW to: 100 kHz.
- (4) Set the VBW $3 \times RBW$.
- (5) Detector = peak.
- (6) Sweep time = auto couple.
- (7) Trace mode = \max hold.
- (8) Allow trace to fully stabilize to find the max level.

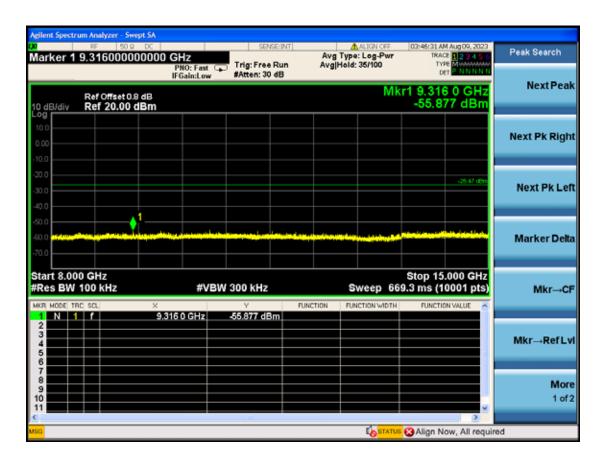
9.5. Test Results

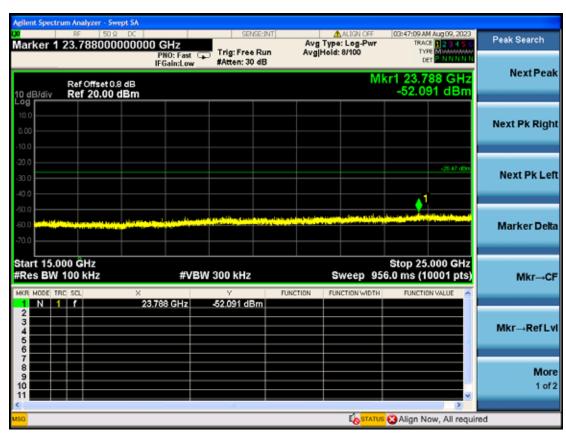
PASSED. All the test results are attached in next pages.

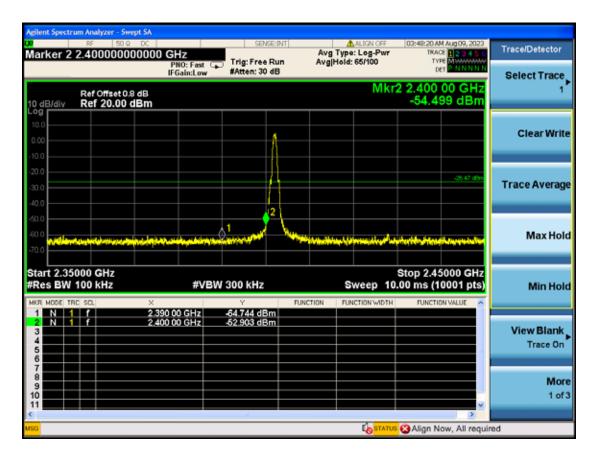
Item	Frequency	Frequency (MHz)	Amplitude (dBm)
	(MHz)	2402.1	3.531
		3662.8	-52.713
		929.578	-60.967
	2402	9316	-55.877
		23788	-52.091
		2390	-64.744
		2400	-52.903
	2440	2439.9	3.785
BLE		3632.7	-53.670
BLE		804.736	-60.381
		11103.1	-55.365
		23.876	-50.563
		2479.8	4.555
		3618	-54.595
	2480	803.187	-60.150
		13888.4	-54.888
		24256	-51.884
		2483.5	-60.650



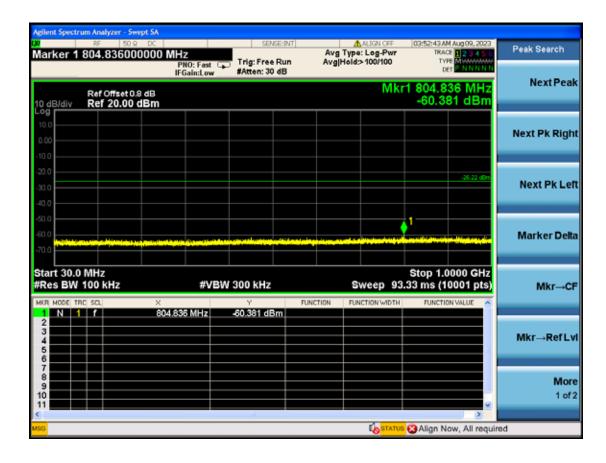


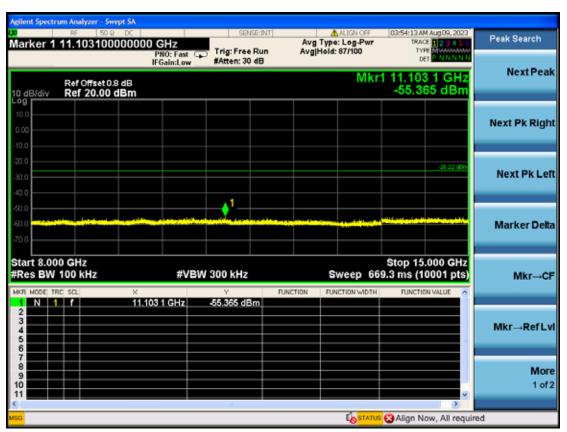




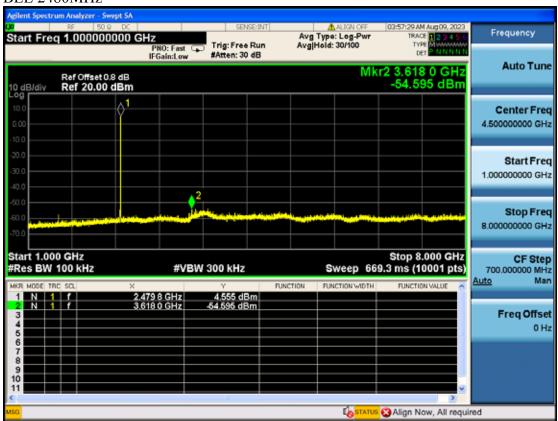


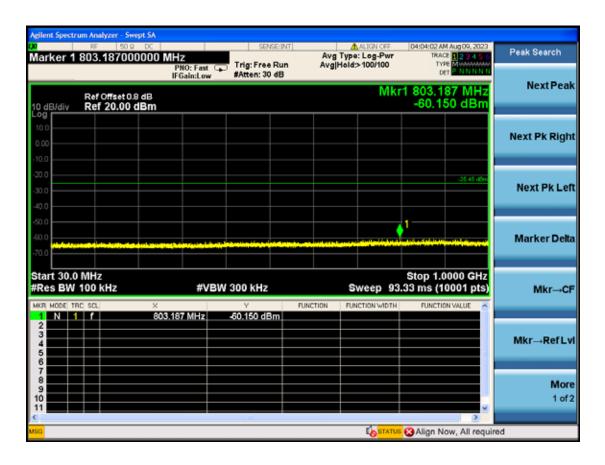


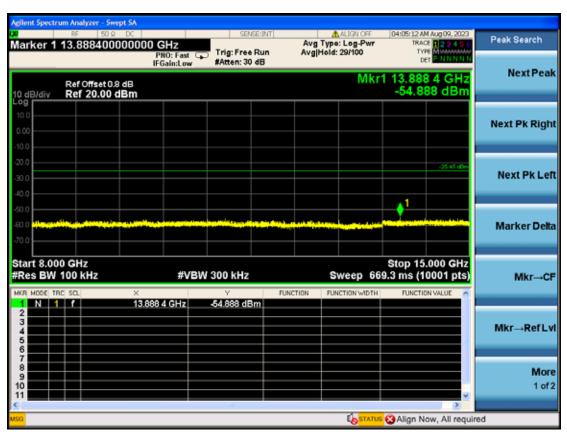


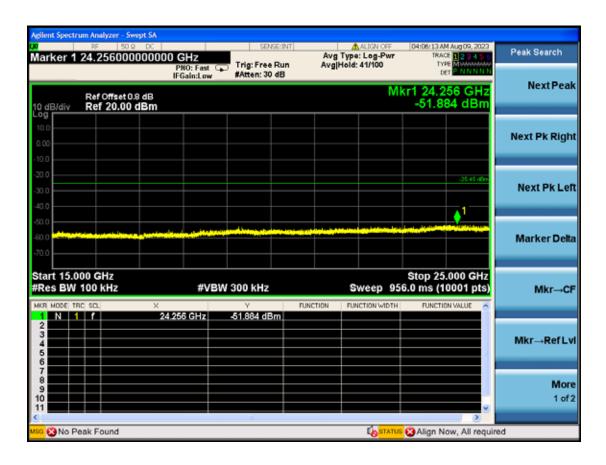


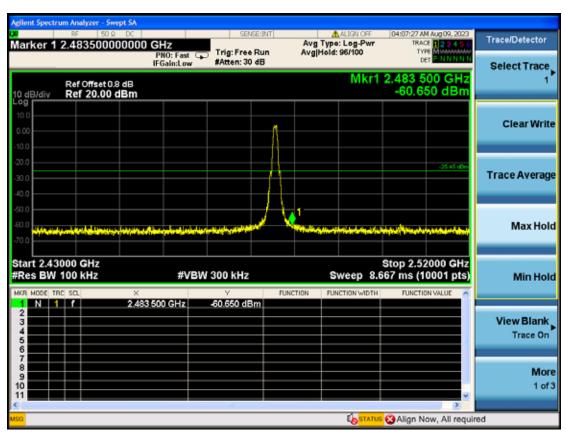












10.DEVIATION TO TEST SPECIFICATIONS [NONE]

INONE			
	 The End	 	