

# NINGBO SHARKWARD ELECTRONICS CO., LTD.

**Report Type:** FCC Part 15.247 RF report

Model: BRI619-BLE-SR

**REPORT NUMBER:** 2311A0587SHA-007

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TEST REPORT

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Report no.: 2311A0587SHA-007

Applicant:	NINGBO SHARKWARD ELECTRONICS CO.,LTD. #88 GONGMAO ROAD NO.3,JISHIGANG INDUSTRIAL ZONE,HAISHU DISTRICT,NINGBO 315171,CHINA
Manufacturer:	NINGBO SHARKWARD ELECTRONICS CO.,LTD. #88 GONGMAO ROAD NO.3,JISHIGANG INDUSTRIAL ZONE,HAISHU DISTRICT,NINGBO 315171,CHINA
Manufacturing site:	NINGBO SHARKWARD ELECTRONICS CO.,LTD. #88 GONGMAO ROAD NO.3,JISHIGANG INDUSTRIAL ZONE,HAISHU DISTRICT,NINGBO 315171,CHINA

FCC ID: 2AVMOBRI619-BLE

#### SUMMARY:

The equipment complies with the requirements according to the following standard(s) or Specification:

47CFR Part 15 (2021): Radio Frequency Devices (Subpart C)

**ANSI C63.10 (2020):** American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

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## **Revision History**

Report No.	Version	Description	Issued Date
2311A0587SHA-007	Rev. 01	Initial issue of report	March 15, 2024



## **Measurement result summary**

TEST ITEM	FCC REFERANCE	RESULT
Minimum 6dB Bandwidth	15.247(a)(2)	Pass
Maximum conducted output power and e.i.r.p.	15.247(b)(3)	Pass
Power spectrum density	15.247(e)	Pass
Emission outside the frequency band	15.247(d)	Pass
Radiated Emissions in restricted frequency bands	15.247(d), 15.205&15.209	Pass
Power line conducted emission	15.207(a)	Pass
Antenna requirement	15.203	Pass

*Notes: 1: NA =Not Applicable* 

2: Determination of the test conclusion is based on IEC Guide 115 in consideration of measurement uncertainty.

3: Additions, Deviations and Exclusions from Standards: None.

**TEST REPORT** 

#### **1 GENERAL INFORMATION**

#### **1.1** Description of Equipment Under Test (EUT)

Product name:	PIR Motion Sensor	
	BRI619-BLE-SR(may be followed by - ; may be followed 1 or 3	
	characters, means the housing color; may be followed by -; may be	
	followed 1 or 3 characters, means the different Program(Bluetooth i	
	not involved); may be followed by - ;may be followed 1 or 3 characters,	
Type/Model:	means the different customer)	
	EUT is an infrared sensor that dims lighting from high to low based on	
Description of EUT:	movement. It's a transceiver with BLE function.	
Rating:	Input: 12-24V DC Output: 0-10V DC	
EUT type:	Table top 🔲 Floor standing	
Software Version:	/	
Hardware Version:	/	
Sample received date:	2023.11.08	
Date of test:	2023.11.08 ~ 2023.12.12	

#### **1.2** Technical Specification

Frequency Range:	2400MHz ~ 2483.5MHz
Bluetooth Version:	Bluetooth LE
Type of Modulation:	GFSK
Channel Number:	40
Data Rate:	1 Mbps, 2Mbps
Channel Separation:	2 MHz

#### **1.3** Antenna information

Antenna No.	Model	Antenna type	Antenna Gain	Note
1	-	PCB Antenna	2.0 dBi	-



#### **1.4** Description of Test Facility

Name:	Intertek Testing Services Shanghai
Address:	Building 86, No. 1198 Qinzhou Road (North), Shanghai 200233, P.R. China
Telephone:	86 21 61278200
Telefax:	86 21 54262353
The test facility is recognized,	CNAS Accreditation Lab Registration No. CNAS L0139
certified, or accredited by these	FCC Accredited Lab Designation Number: CN0175
organizations:	IC Registration Lab CAB identifier.: CN0014
	VCCI Registration Lab Registration No.: R-14243, G-10845, C-14723, T-12252
	A2LA Accreditation Lab Certificate Number: 3309.02

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#### **2 TEST SPECIFICATIONS**

#### 2.1 Standards or specification

47CFR Part 15 (2021) ANSI C63.10 (2020) KDB 558074(v05r02)

#### 2.2 Mode of operation during the test

Within this test report, EUT was tested under all available operation modes and tested under its rating voltage and frequency. Other voltage and frequency is specified if used.

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

The lowest, middle and highest channel were tested as representatives.

#### Data rate VS Power:

The test setting software is offered by the manufactory. The pre-scan for the conducted power with all rates in each modulation and bands was used, and the worst case was found and used in all test cases.

Test software and Power Setting parameter					
Test Software	nRF_DTM				
Test Channel	2402MHz 2440MHz 2480MHz				
Power Setting	0dBm 0dBm 0dBm				

While testing transmitting mode of EUT, the internal modulation and continuously transmission was applied.

Radiated test mode: EUT transmitted signal with BT antenna;

Conducted test mode: EUT transmitted signal from BT RF port connected to SPA directly;



#### 2.3 Test software list

Test Items	Software	Manufacturer	Version
Conducted emission	e3	Audix	9.160323
Radiated emission	e3	Audix	9.160323

#### 2.4 Test peripherals list

Item No.	Name	Band and Model	Description
1	Laptop computer	DELL 5480	-
2	LED driver	/	/
3	DC regulated power supply	QJ3003H	/

#### 2.5 Test environment condition:

Test items	Temperature	Humidity
Radiated Emissions in restricted frequency bands	22.6°C	46% RH
Power line conducted emission	21.9°C	45% RH

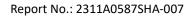
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#### 2.6 Instrument list

Conducted	Emission/Disturbance	Power/Tri-loop Te	st/CDN method		
Used	Equipment	Manufacturer	Туре	Internal no.	Due date
$\boxtimes$	Test Receiver	R&S	ESCS 30	EC 2107	2024-07-13
$\boxtimes$	A.M.N.	R&S	ESH2-Z5	EC 3119	2024-12-07
	A.M.N.	R&S	ENV 216	EC 3393	2024-07-03
	A.M.N.	R&S	ENV4200	EC 3558	2024-06-09
	Absorbing clamp	R&S	MDS 21	EC 2108	2024-06-18
	CDN	Frankonia	CDN M2M316	EC 5969	2024-03-15
	CDN	Schaffner	CDN M316	EC 2113-1	2024-07-15
$\boxtimes$	Attenuator	Weinschel	68-6-44	EC 3043-9	2024-02-05
	Tri-loop	Schwarzbeck	HXYZ 9170	EC 3384	2024-10-10
	Voltage Probe	Schwarzbeck	TK9420	EC 4888	2024-09-10
	Current probe	R&S	EZ-17	EC 3221	2024-03-15
	I.S.N.	FCC	FCC-TLISN -T2-02	EC 3754	2024-02-05
	I.S.N.	FCC	FCC-TLISN -T4-02	EC 3755	2024-02-05
	I.S.N.	FCC	FCC-TLISN -T8-02	EC 3756	2024-02-05
Radiated E	mission				
Used	Equipment	Manufacturer	Туре	Internal no.	Due date
$\boxtimes$	Test Receiver	R&S	ESIB 26	EC 3045	2024-09-11
$\boxtimes$	Bilog Antenna	TESEQ	CBL 6112D	EC 4206	2024-06-09
$\boxtimes$	Pre-amplifier	R&S	AFS42- 00101800-25-S- 42	EC5262	2024-06-09
	Horn antenna	R&S	HF 906	EC 3049	2024-11-16
$\boxtimes$	Horn antenna	ETS	3117	EC 4792-1	2024-01-09
$\boxtimes$	Horn antenna	ΤΟΥΟ	HAP18-26W	EC 4792-3	2024-07-08
$\boxtimes$	Active loop antenna	Schwarzbeck	FMZB1519	EC 5345	2024-03-07
	Horn antenna	ETS	3116c	EC 5955	2024-06-11
RF test					
Used	Equipment	Manufacturer	Туре	Internal no.	Due date
$\boxtimes$	PXA Signal Analyzer	Keysight	N9030A	EC 5338	2024-03-05
	Power sensor	Agilent	U2021XA	EC 5338-1	2024-03-05

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			r		
	MXG Analog Signal Generator	Agilent	N5181A	EC 5338-2	2024-03-05
	Vector Signal Generator	Agilent	N5182B	EC 5175	2024-03-05
	Power meter	Keysight	N1911A	EC 4318	2024-05-11
	Wideband Radio Communication Tester	R&S	CMW500	EC 5944	2024-12-07
	Mobile Test System	LitePoint	IQxel	EC 5176	2024-01-09
	Test Receiver	R&S	ESCI 7	EC 4501	2024-09-11
	Spectrum analyzer	Agilent	E7402A	EC 2254	2024-09-11
Tet Site					
Used	Equipment	Manufacturer	Туре	Internal no.	Due date
$\boxtimes$	Shielded room	Zhongyu	-	EC 2838	2024-01-07
	Shielded room	Zhongyu	-	EC 2839	2024-01-14
$\boxtimes$	Semi-anechoic chamber	Albatross project	-	EC 3048	2024-07-30
	Fully-anechoic chamber	Albatross project	-	EC 3047	2024-07-30
Additional	instrument				
Used	Equipment	Manufacturer	Туре	Internal no.	Due date
	Spectrum analyzer	Agilent	E7402A	EC 2254	2024-07-14
$\boxtimes$	Therom- Hygrograph	ZJ1-2A	S.M.I.F.	EC 3783	2024-02-28
	Therom- Hygrograph	ZJ1-2A	S.M.I.F.	EC 2122	2024-03-11
$\boxtimes$	Therom- Hygrograph	ZJ1-2A	S.M.I.F.	EC 5198	2024-01-18
	Therom- Hygrograph	ZJ1-2A	S.M.I.F.	EC 3326	2024-03-28
			Shanghai		



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#### 2.7 Measurement uncertainty

The measurement uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Test item	Measurement uncertainty
Maximum peak output power	$\pm 0.74$ dB
Radiated Emissions in restricted frequency bands below 1GHz	$\pm$ 4.90dB
Radiated Emissions in restricted frequency bands above 1GHz	± 5.02dB
Emission outside the frequency band	± 2.89dB
Power line conducted emission	± 3.19dB

TEST REPORT

#### 3 Minimum 6dB bandwidth

Test result: Pass

#### 3.1 Limit

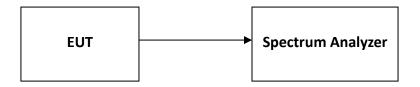
For systems using digital modulation techniques that may operate in the 902 - 928 MHz, 2400 - 2483.5 MHz and 5725 - 5850 MHz bands, the minimum 6 dB bandwidth shall be at least 500 kHz.

#### 3.2 Measurement Procedure

The minimum 6dB bandwidth is measured using the Spectrum Analyzer according to DTS test procedure of "KDB558074 D01 DTS Meas Guidance" (clause 8.2) for compliance requirements.

- a) Set RBW = 100 kHz.
- b) Set the video bandwidth (VBW)  $\ge$  3 × RBW.
- c) Detector = Peak.
- d) Trace mode = max hold.
- e) Sweep = auto couple.
- f) Allow the trace to stabilize.
- g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

#### 3.3 Test Configuration



#### 3.4 Test Results of Minimum 6dB bandwidth

Please refer to Appendix A

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#### 4 Maximum conducted output power and e.i.r.p.

#### Test result: Pass

#### 4.1 Limit

For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 W. (The e.i.r.p. shall not exceed 4 W)

If the transmitting antenna of directional gain greater than 6dBi is used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi. If there have a beam forming type, the limit should be the minimum of 30dBm and 30+ (6 –antenna gain-beam forming gain).

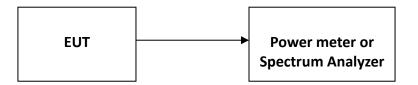
#### 4.2 Measurement Procedure

The EUT was tested according to DTS test procedure of "KDB558074 D01 DTS Meas Guidance" (clause 9.2.2.4) for compliance requirements.

- a) Measure the duty cycle, x, of the transmitter output signal as described in Section 6.0.
- b) Set span to at least 1.5 x OBW.
- c) Set RBW = 1 % to 5 % of the OBW, not to exceed 1 MHz.
- d) Set VBW  $\geq$  3 x RBW.
- e) Number of points in sweep  $\ge 2 \times \text{span} / \text{RBW}$ . (This gives bin-to-bin spacing  $\le \text{RBW}/2$ , so that narrowband signals are not lost between frequency bins.)
- f) Sweep time = auto.
- g) Detector = RMS (i.e., power averaging), if available. Otherwise, use sample detector mode.
- h) Do not use sweep triggering. Allow the sweep to "free run".
- i) Trace average at least 100 traces in power averaging (i.e., RMS) mode; however, the number of traces to be averaged shall be increased above 100 as needed such that the average accurately represents the true average over the on and off periods of the transmitter.
- j) 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. If the instrument does not have a band power function, sum the spectrum levels (in power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.
- k) Add 10 log (1/x), where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times (because the measurement represents an average over both the on- and off-times of the transmission). For example, add 10 log (1/0.25) = 6 dB if the duty cycle is 25 %.



4.3 Test Configuration



#### 4.4 Test Results of Maximum conducted output power

Please refer to Appendix A

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#### 5 Power spectrum density

Test result: Pass

#### 5.1 Limit

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3 kHz band during any time interval of continuous transmission.

If the transmitting antenna of directional gain greater than 6dBi is used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi. If there have a beam forming type, the limit should be the minimum of 8dBm/MHz and 8+ (6 –antenna gain-beam forming gain).

#### 5.2 Measurement Procedure

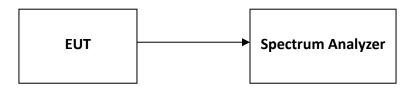
The power output was tested according to DTS test procedure of "KDB558074 D01 DTS Meas Guidance" (clause 10.5) for compliance requirements.

This procedure is applicable when the EUT cannot be configured to transmit continuously (i.e., duty cycle < 98 %), and when sweep triggering/signal gating cannot be used to measure only when the EUT is transmitting at its maximum power control level, and when the transmission duty cycle is constant (i.e., duty cycle variations are less than  $\pm 2$  %):

- a) Measure the duty cycle (x) of the transmitter output signal as described in Section 6.0.
- b) Set instrument center frequency to DTS channel center frequency.
- c) Set span to at least 1.5 x OBW.
- d) Set RBW to:  $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$ .
- e) Set VBW  $\geq 3 \times RBW$ .
- f) Detector = power averaging (RMS) or sample detector (when RMS not available).
- g) Ensure that the number of measurement points in the sweep  $\ge 2 \times \text{span/RBW}$ .
- h) Sweep time = auto couple.
- i) Do not use sweep triggering. Allow sweep to "free run".
- j) Employ trace averaging (RMS) mode over a minimum of 100 traces.
- k) Use the peak marker function to determine the maximum amplitude level.
- I) Add 10 log (1/x), where x is the duty cycle measured in step (a, to the measured PSD to compute the average PSD during the actual transmission time.
- m) If resultant value exceeds the limit, then reduce RBW (no less than 3 kHz) and repeat (note that this may require zooming in on the emission of interest and reducing the span in order to meet the minimum measurement point requirement as the RBW is reduced).



5.3 Test Configuration



### 5.4 Test Results of Power spectrum density

Please refer to Appendix A

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#### 6 Emission outside the frequency band

Test result: Pass

#### 6.1 Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 30 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

#### 6.2 Measurement Procedure

The EUT was tested according to DTS test procedure of "KDB558074 D01 DTS Meas Guidance" (clause 11.0) for compliance requirements.

#### **Reference level measurement**

Establish a reference level by using the following procedure:

- a) Set instrument center frequency to DTS channel center frequency.
- b) Set the span to  $\geq$  1.5 times the DTS bandwidth.
- c) Set the RBW = 100 kHz.
- d) Set the VBW  $\geq$  3 x RBW.
- e) Detector = peak.
- f) Sweep time = auto couple.
- g) Trace mode = max hold.
- h) Allow trace to fully stabilize.
- i) Use the peak marker function to determine the maximum PSD level.

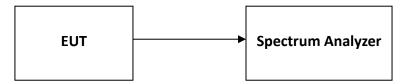
#### **Emission level measurement**

- a) Set the center frequency and span to encompass frequency range to be measured.
- b) Set the RBW = 100 kHz.
- c) Set the VBW  $\geq$  3 x RBW.
- d) Detector = peak.
- e) Sweep time = auto couple.
- f) Trace mode = max hold.
- g) Allow trace to fully stabilize.
- h) Use the peak marker function to determine the maximum amplitude level.

Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) are attenuated by at least the minimum requirements specified in 11.1 a) or 11.1 b). Report the three highest emissions relative to the limit.



#### 6.3 Test Configuration



### 6.4 The results of Emission outside the frequency band

Please refer to Appendix A

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## 7 Radiated Emissions in restricted frequency bands

#### Test result: Pass

#### 7.1 Limit

The radiated emissions which fall in the restricted bands, must also comply with the radiated emission limits specified showed as below:

Frequencies (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

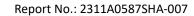
#### 7.2 Measurement Procedure

#### For Radiated emission below 30MHz:

- a) The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- b) The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c) Both X and Y axes of the antenna are set to make the measurement.
- d) For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e) The test-receiver system was set to Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

#### NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9kHz at frequency below 30MHz.



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#### For Radiated emission above 30MHz:

- a) The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b) The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c) The height of antenna 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.
- d) 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 and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e) The test-receiver system was set to guasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- The test-receiver system was set to peak and average detect function and specified bandwidth with f) maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

#### Note:

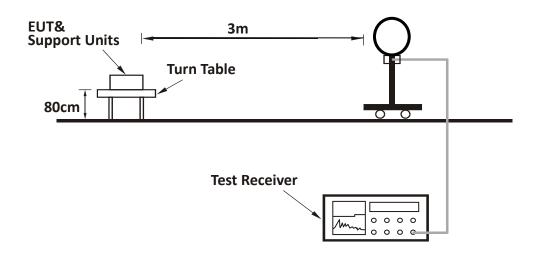
- The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for 1. Quasi-peak detection (QP) at frequency below 1GHz.
- The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 2. MHz for Peak detection (PK) at frequency above 1GHz.
- The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is  $\geq$ 3. 1/T (Duty cycle < 98%) or 3 x RBW (Duty cycle  $\ge$  98%) for Average detection (AV) at frequency above 1GHz.
- 4. All modes of operation were investigated and the worst-case emissions are reported

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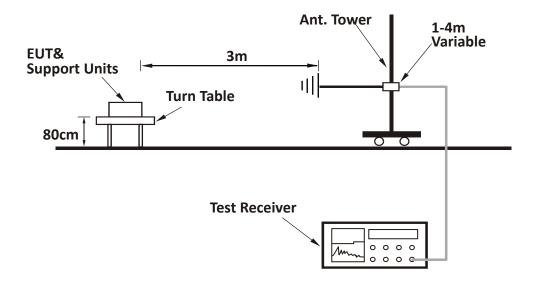
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#### 7.3 Test Configuration

For Radiated emission below 30MHz:

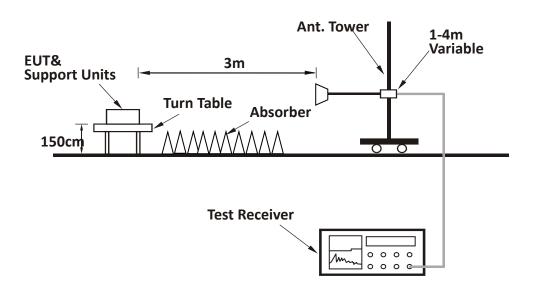


For Radiated emission 30MHz to 1GHz:



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#### For Radiated emission above 1GHz:

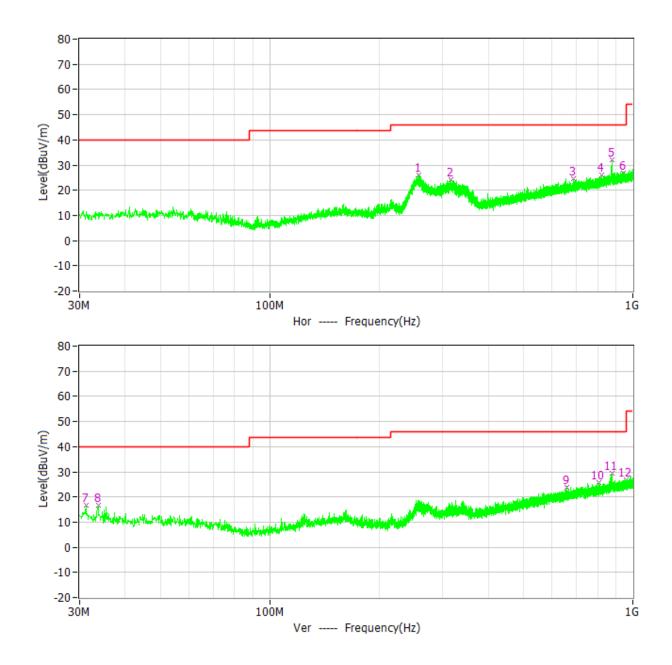


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#### 7.4 Test Results of Radiated Emissions

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

The worst test data from 30MHz to 1000MHz is listed as below:



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No.	Frequency	Limit dBuV/m	Level dBuV/m	Delta dB	Reading dBuV	Factor dB/m	Detector	Polar
1*	257.174MHz	46.0	25.9	-20.1	12.3	13.6	РК	Hor
2*	315.374MHz	46.0	24.2	-21.8	8.8	15.4	РК	Hor
3*	685.623MHz	46.0	24.7	-21.3	1.3	23.4	PK	Hor
4*	820.065MHz	46.0	26.0	-20.0	0.9	25.1	PK	Hor
5*	875.258MHz	46.0	32.2	-13.8	6.3	25.9	РК	Hor
6*	943.740MHz	46.0	27.0	-19.0	0.3	26.7	РК	Hor
7*	31.261MHz	40.0	16.7	-23.3	4.5	12.2	РК	Ver
8*	33.783MHz	40.0	16.8	-23.2	4.1	12.7	РК	Ver
9*	657.202MHz	46.0	24.0	-22.0	1.0	23.0	РК	Ver
10*	807.261MHz	46.0	25.6	-20.4	0.6	25.0	РК	Ver
11*	875.549MHz	46.0	29.4	-16.6	3.5	25.9	РК	Ver
12*	957.708MHz	46.0	27.0	-19.0	0.2	26.8	РК	Ver

Remark: 1. Factor = LISN Factor + Cable Loss, the value was added to Original Receiver Reading by the software automatically.

- 2. Level = Original Receiver Reading + Factor
- 3. Delta= Level Limit
- 4. If the PK Level is lower than AV limit, the AV test can be elided.

Example: Assuming LISN Factor = 10.00dB, Cable Loss = 2.00dB,

Original Receiver Reading = 10.00dBuV, Limit = 66.00dBuV.

Then Factor = 10.00 + 2.00 = 12.00dB;

Level = 10dBuV + 12.00dB = 22.00dBuV;

Delta = 22.00dBuV - 66.00dBuV = -44.00dB.

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## Test result above 1GHz:

СН	Antenna	Frequency (MHz)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
	Н	2390	43.10	74.00	30.90	РК
	V	2390	43.00	74.00	31.00	РК
L	Н	4804	43.80	74.00	30.20	РК
	V	4804	44.70	74.00	29.30	РК
	Н	4880	43.20	74.00	30.80	РК
M	V	4880	43.70	74.00	30.30	РК
	Н	2483.5	43.50	74.00	30.50	РК
	V	2483.5	43.60	74.00	30.40	РК
Н	Н	4960	44.00	74.00	30.00	РК
	V	4960	43.90	74.00	30.10	РК

Both 1Mbps and 2Mbps data rate has been tested, and only the worst result(1Mbps) list as below:

Remark: 1. Correct Factor = Antenna Factor + Cable Loss (- Amplifier, for higher than 1GHz), the value was added to Original Receiver Reading by the software automatically.

2. Corrected Reading = Original Receiver Reading + Correct Factor

3. Margin = Limit - Corrected Reading

4. If the PK Corrected Reading is lower than AV limit, the AV test can be elided.

Example: Assuming Antenna Factor = 30.20dB/m, Cable Loss = 2.00dB,

Gain of Preamplifier = 32.00dB, Original Receiver Reading = 10.00dBuV, Limit = 40.00dBuV/m. Then Correct Factor = 30.20 + 2.00 - 32.00 = 0.20dB/m; Corrected Reading = 10dBuV + 0.20dB/m = 10.20dBuV/m; Margin = 40.00dBuV/m - 10.20dBuV/m = 29.80dB.

**TEST REPORT** 

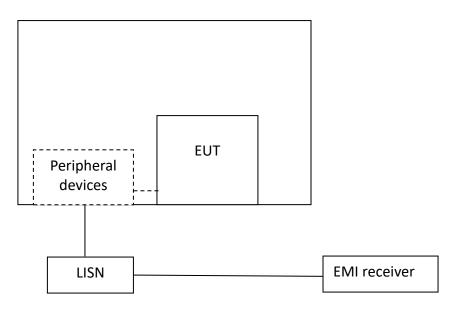
#### 8 Power line conducted emission

Test result: Pass

#### 8.1 Limit

Frequency of Emission (MHz)	Conducted Limit (dBuV)			
	QP	AV		
0.15-0.5	66 to 56*	56 to 46 *		
0.5-5	56	46		
5-30	60	50		

#### 8.2 Test Configuration





TEST REPORT

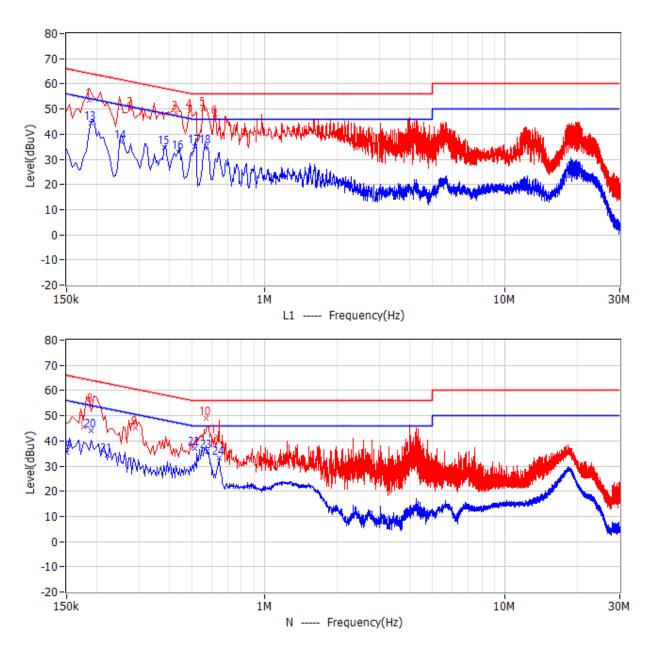
#### 8.3 Measurement Procedure

Measured levels of ac power-line conducted emission shall be the emission voltages from the voltage probe, where permitted, or across the 50  $\Omega$  LISN port (to which the EUT is connected), where permitted, terminated into a 50  $\Omega$  measuring instrument. All emission voltage and current measurements shall be made on each current-carrying conductor at the plug end of the EUT power cord by the use of mating plugs and receptacles on the LISN, if used. Equipment shall be tested with power cords that are normally supplied or recommended by the manufacturer and that have electrical and shielding characteristics that are the same as those cords normally supplied or recommended by the manufacturer. For those measurements using a LISN, the 50  $\Omega$  measuring port is terminated by a measuring instrument having 50  $\Omega$  input impedance. All other ports are terminated in 50  $\Omega$  loads.

Tabletop devices shall be placed on a platform of nominal size 1 m by 1.5 m, raised 80 cm above the reference ground plane. The vertical conducting plane or wall of an RF-shielded (screened) room shall be located 40 cm to the rear of the EUT. Floor-standing devices shall be placed either directly on the reference ground-plane or on insulating material as described in ANSI C63.4. All other surfaces of tabletop or floor-standing EUTs shall be at least 80 cm from any other grounded conducting surface, including the case or cases of one or more LISNs.

The bandwidth of the test receiver is set at 9 kHz.

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#### 8.4 Test Results of Power line conducted emission

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EST	REPORT	

No.	Frequency	Limit	Level	Delta	Reading	Factor	Detector	Phase
NO.	riequency	dBuV	dBuV	dB	dBuV	dB	Delector	rnase
1	186.000kHz	64.2	53.5	-10.7	47.3	6.2	QP	L1
2	276.000kHz	60.9	50.1	-10.8	43.9	6.2	QP	L1
3	429.000kHz	57.3	48.4	-8.9	42.2	6.2	QP	L1
4	487.500kHz	56.2	49.2	-7.0	43.0	6.2	QP	L1
5	555.000kHz	56.0	49.9	-6.1	43.7	6.2	QP	L1
6	622.500kHz	56.0	46.6	-9.4	40.4	6.2	QP	L1
7	177.000kHz	64.6	45.7	-18.9	39.6	6.1	QP	Ν
8	190.500kHz	64.0	54.0	-10.0	47.9	6.1	QP	Ν
9	289.500kHz	60.5	45.2	-15.3	39.1	6.1	QP	Ν
10	573.000kHz	56.0	48.8	-7.2	42.6	6.2	QP	Ν
11	636.000kHz	56.0	41.9	-14.1	35.7	6.2	QP	Ν
12	4.029MHz	56.0	34.7	-21.3	28.4	6.3	QP	Ν
13	190.500kHz	54.0	44.3	-9.8	38.1	6.2	CAV	L1
14	253.500kHz	51.6	36.8	-14.8	30.6	6.2	CAV	L1
15	384.000kHz	48.2	34.8	-13.4	28.6	6.2	CAV	L1
16	438.000kHz	47.1	32.9	-14.2	26.7	6.2	CAV	L1
17	510.000kHz	46.0	35.0	-11.0	28.8	6.2	CAV	L1
18	573.000kHz	46.0	35.0	-11.0	28.8	6.2	CAV	L1
19	150.000kHz	56.0	35.5	-20.5	29.3	6.2	CAV	Ν
20	190.500kHz	54.0	43.9	-10.1	37.8	6.1	CAV	Ν
21	222.000kHz	52.7	34.2	-18.6	28.0	6.2	CAV	Ν
22	510.000kHz	46.0	36.9	-9.1	30.7	6.2	CAV	Ν
23	577.500kHz	46.0	35.8	-10.2	29.6	6.2	CAV	Ν
24	645.000kHz	46.0	33.2	-12.8	27.0	6.2	CAV	Ν

Remark: 1. Factor = LISN Factor + Cable Loss, the value was added to Original Receiver Reading by the software automatically.

- 2. Level = Original Receiver Reading + Factor
- 3. Delta = Level Limit
- 4. If the PK Level is lower than AV limit, the AV test can be elided.

Example: Assuming LISN Factor = 10.00dB, Cable Loss = 2.00dB,

Original Receiver Reading = 10.00dBuV, Limit = 66.00dBuV.

Then Factor = 10.00 + 2.00 = 12.00dB;

Level = 10dBuV + 12.00dB = 22.00dBuV;

Delta = 22.00dBuV - 66.00dBuV = -44.00dB.



Report No.: 2311A0587SHA-007

**TEST REPORT** 

#### 9 Antenna requirement

#### **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 permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

#### **Result:**

EUT uses a unique coupling to the intentional radiator, so it can comply with the provisions of this section.



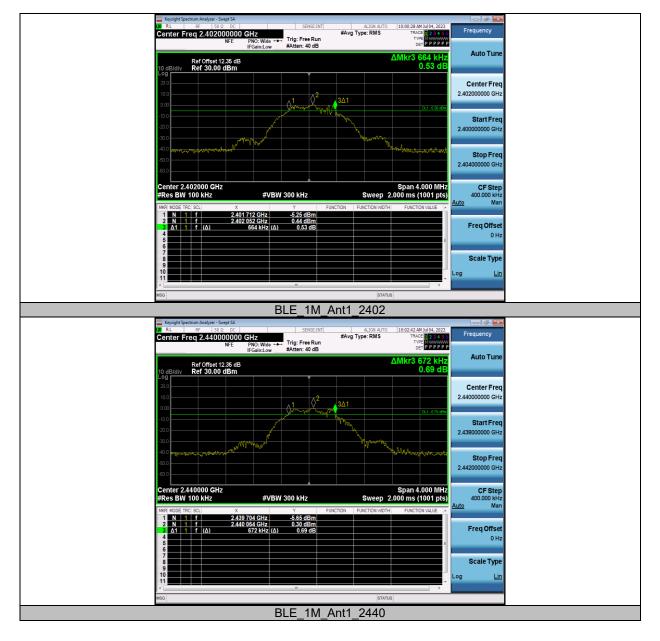
## **10** Appendix A: DTS Bandwidth

10.1.1 Test Result

TestMode	Antenna	Frequency[MHz]	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
		2402	0.664	2401.712	2402.376	0.5	PASS
BLE_1M	Ant1	2440	0.672	2439.704	2440.376	0.5	PASS
		2480	0.668	2479.712	2480.380	0.5	PASS
		2402	0.844	2401.472	2402.316	0.5	PASS
BLE_2M	Ant1	2440	0.844	2439.472	2440.316	0.5	PASS
_		2480	0.820	2479.476	2480.296	0.5	PASS

**TEST REPORT** 

#### 10.1.2 Test Graphs



#### TEST REPORT



#### TEST REPORT



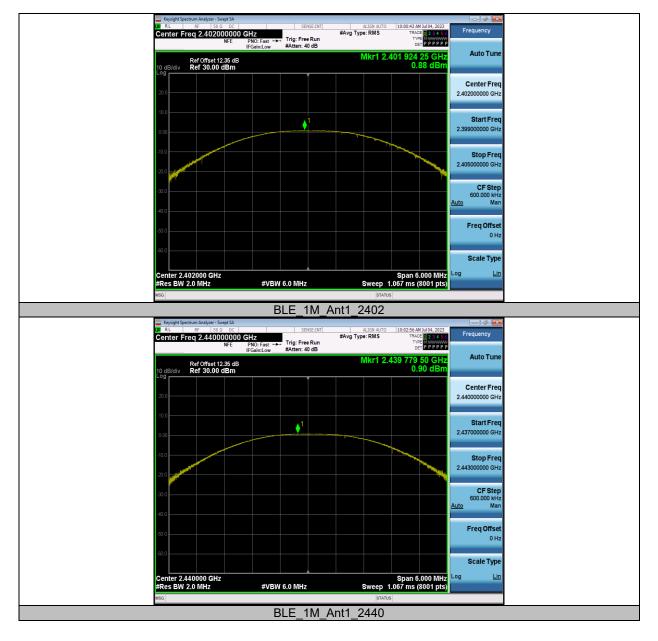
intertek Total Quality. Assured. **TEST REPORT** 

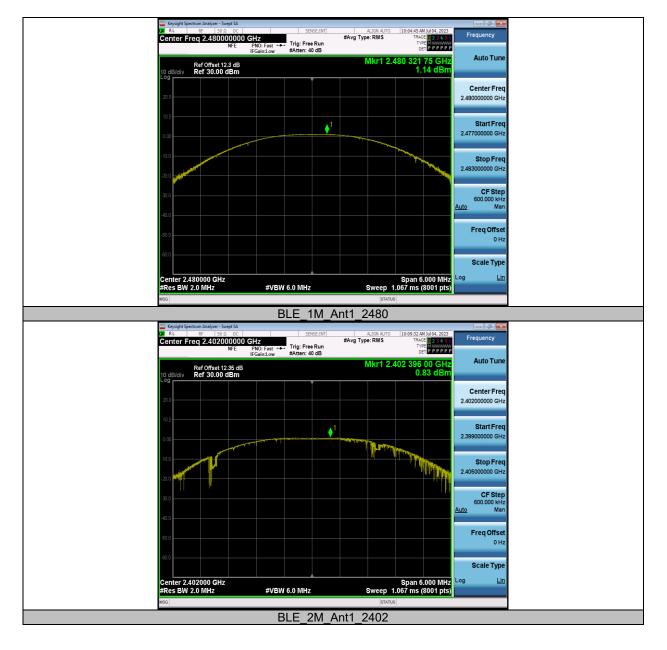
## **11** Appendix C: Maximum conducted output power 11.1.1 Test Result Peak

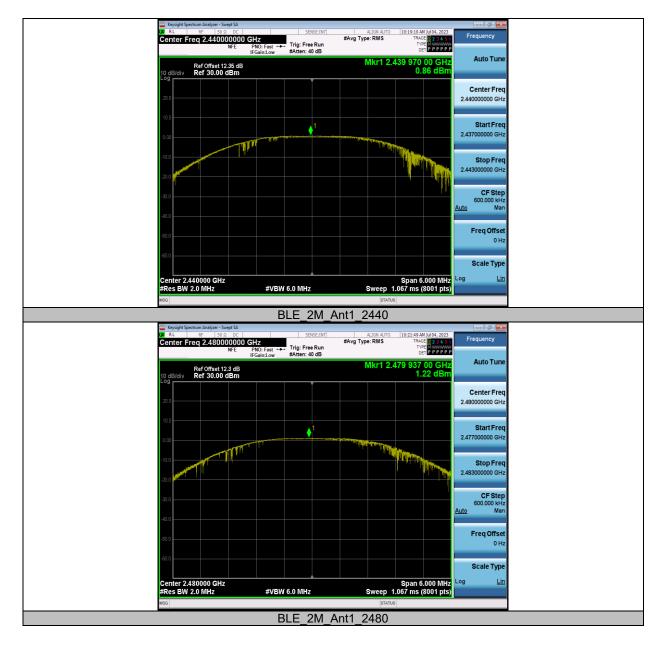
TestMode	Antenna	Frequency[MHz]	Conducted Peak Powert[dBm]	Conducted Limit[dBm]	Antenna Gain(dBi)	EIRP[dBm]	EIRP Limit[dBm]	Verdict
		2402	0.88	≤30	2.0	2.88	≤36	PASS
BLE_1M	Ant1	2440	0.90	≤30	2.0	2.90	≤36	PASS
		2480	1.14	≤30	2.0	3.14	≤36	PASS
		2402	0.83	≤30	2.0	2.83	≤36	PASS
BLE_2M	Ant1	2440	0.86	≤30	2.0	2.86	≤36	PASS
		2480	1.22	≤30	2.0	3.22	≤36	PASS

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#### 11.1.2 Test Graphs Peak







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## 12 Appendix D: Maximum power spectral density

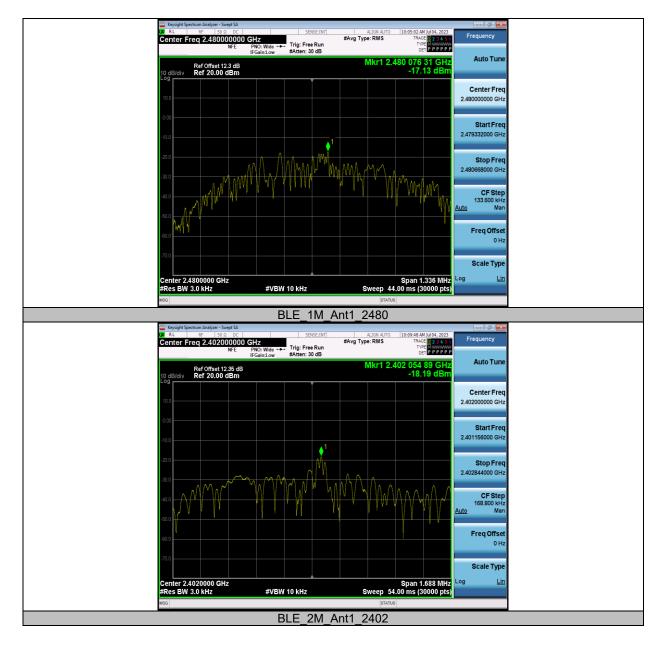
### 12.1.1 Test Result

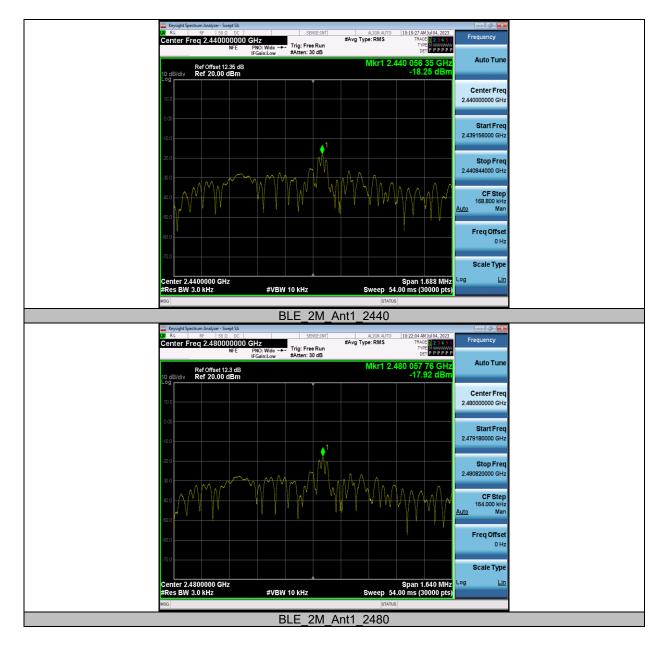
TestMode	Antenna	Frequency[MHz]	Result[dBm/3kHz]	Limit[dBm/3kHz]	Verdict
		2402	-17.77	≤8.00	PASS
BLE_1M	Ant1	2440	-17.71	≤8.00	PASS
_		2480	-17.13	≤8.00	PASS
		2402	-18.19	≤8.00	PASS
BLE_2M	Ant1	2440	-18.25	≤8.00	PASS
		2480	-17.92	≤8.00	PASS

#### **TEST REPORT**

#### 12.1.2 Test Graphs







#### **TEST REPORT**

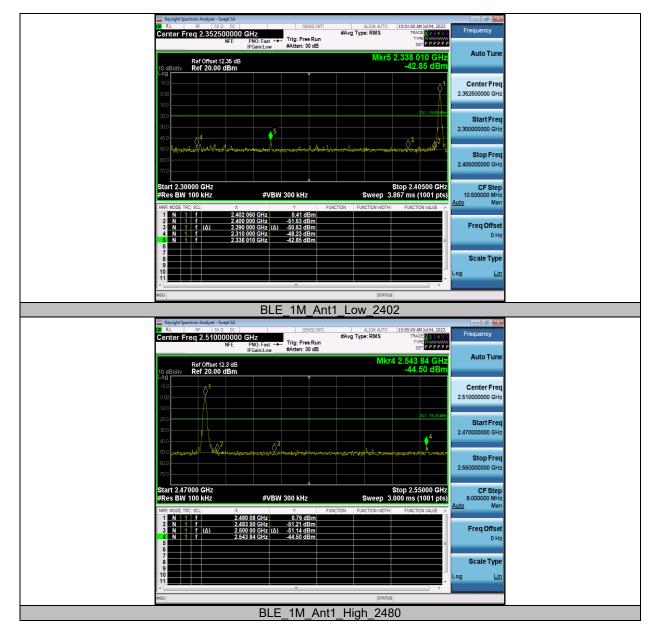
## 13 Appendix E: Band edge measurements

13.1.1 Test Result

TestMode	Antenna	ChName	Frequency[MHz]	RefLevel[dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE 1M	Ant1	Low	2402	0.41	-42.85	≤-19.59	PASS
DLC_IM	Anti	High	2480	0.76	-44.5	≤-19.24	PASS
BLE 2M	Ant1	Low	2402	0.03	-32.5	≤-19.97	PASS
	AILI	High	2480	0.79	-45.72	≤-19.21	PASS

**TEST REPORT** 

#### 13.1.2 Test Graphs



#### TEST REPORT

.

The second secon	Keysight Spectrum Analyzer	- Swept SA			
Auto Ture Ref 2100 Con- Start Z 3000 Con- Start Z 2000 Con- Start			ALIGN AUTO 10:09:55 AM Jul 04, 2023 #Avg Type: RMS TRACE 1 2 3 4 5 6	Frequency	
Ref Origin 17:25:48       Mixt 5 2:399 960 GHz       Auto Ture         Sign 2:3000 00m       Sign 2:3000 00 Hz       Sign 2:300000 Hz         Sign 2:30000 0 Hz       Sign 2:30000 0 Hz       Sign 2:300000 Hz         Sign 2:30000 0 Hz       Sign 2:30000 0 Hz       Sign 2:30000 0 Hz         Sign 2:30000 0 Hz       Sign 2:30000 0 Hz       Sign 2:30000 0 Hz         Sign 2:30000 0 Hz       Sign 2:30000 0 Hz       Sign 2:30000 0 Hz         Sign 2:30000 0 Hz       Sign 2:30000 0 Hz       Sign 2:30000 0 Hz         Sign 2:30000 0 Hz       Sign 2:30000 0 Hz       Sign 2:30000 0 Hz         Sign 2:30000 0 Hz       Sign 2:30000 0 Hz       Sign 2:30000 0 Hz         Sign 2:30000 0 Hz       Sign 2:30000 0 Hz       Sign 2:30000 0 Hz         Sign 2:30000 0 Hz       Sign 2:30000 0 Hz       Sign 2:30000 0 Hz         Sign 2:30000 0 Hz       Sign 2:30000 0 Hz       Sign 2:30000 0 Hz         Sign 2:30000 0 Hz       Sign 2:30000 0 Hz       Sign 2:30000 0 Hz         Sign 2:30000 0 Hz       Sign 2:30000 0 Hz       Sign 2:30000 0 Hz         Sign 2:30000 0 Hz       Sign 2:30000 0 Hz       Sign 2:30000 0 Hz       Sign 2:300000 0 Hz         Sign 2:30000 0 Hz       Sign 2:30000 0 Hz       Sign 2:300000 0 Hz       Sign 2:300000 0 Hz         Sign 2:300 0 Hz       Sign 2:300000 0 Hz		NFE PNO: Fast +++ Trig: Free Run IFGain:Low #Atten: 30 dB			
Center Freq 2.5500000 GHz Start 7.20000 CHz Freq BW 100 Hz Bistrat 2.30000 CHz Start 2.30000 CHz Bistrat 2.300000 CHz Bistrat 2.300000 CHz Bistrat 2.300000 CHz Bistra	Ref Office			Auto Tune	
Center Freq 2.3550000 GHz Stop Freq 2.355000 GHz Stop Freq 0 Hz Stop Freq 2.355000 GHz Stop Freq 2.355000 GHz Stop Freq 2.355000 GHz Stop Freq 2.355000 GHz Stop Freq 0 Hz Stop Freq 2.355000 GHz Stop Freq 3.35700 GHz Stop Freq 3.357000 GHz Stop Fr	10 dB/div Ref 20.6	00 dBm	-32.50 dBm		
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Start 2.30000 GHz Start 1.00000	-20.0			Start Freq	
Stop 2.40500 OH: Start 2.30000 OH: Start 1.100 OH: Start	-30.0			2.30000000 GHz	
Stop 2.40500 OH: Start 2.30000 OH: Start 1.100 OH: Start	-40.0	. J	$\wedge$		
240500000 GHz     Stop 2.40500 GHz     Stop 2.		H-WE get - well for the well the transformer of the state	http://www.velandel.log.ottp://www.cales.com/alabapy/alaba		
FRes BW 100 kHz       #VBW 300 kHz       Sweep 3.867 ms (1001 pts)       10.50000 MHz         Mart MODE TFC SCI       -2.402 660 GHz       0.93 dBm       Factorial wolds       Factorial wold	-70.0			2.405000000 GHz	
FRes BW 100 kHz       #VBW 300 kHz       Sweep 3.867 ms (1001 pts)       10.50000 MHz         Mart MODE TFC SCI       -2.402 660 GHz       0.93 dBm       Factorial wolds       Factorial wold					
INCE TOOL IN VICION POINT PLACTION VICION PERCENTION VICION VICION PERCENTION VICION PERCENTION VICION PERCENTION	Start 2.30000 GHz #Res BW 100 kHz	#VBW 300 kHz	Stop 2.40500 GHz Sweep 3.867 ms (1001 nts)		
Freq Offset		Y Y EI			
Scale Type Lin NS Scale Type Lin Start Freq Sole Conter Freq 2.5100.000 GHz NE 200 000 GHz NE 200 000 GHz Trig: Free Nm Free PNC: Fast NE 200 000 GHz Trig: Free Nm Start Freq Sole Conter Freq 2.5100.000 GHz Sole Fr		2.402 060 GHz 0.03 dBm 2.400 000 GHz -32 50 dBm			
Scale Type Lin NS Scale Type Lin Start Freq Sole Conter Freq 2.5100.000 GHz NE 200 000 GHz NE 200 000 GHz Trig: Free Nm Free PNC: Fast NE 200 000 GHz Trig: Free Nm Start Freq Sole Conter Freq 2.5100.000 GHz Sole Fr	3 N 1 f (Δ)	2.390 000 GHz (Δ) -49.94 dBm 2.310 000 GHz (Δ) -49.94 dBm			
Scale Type Lin NS Scale Type Lin Start Freq Sole Conter Freq 2.5100.000 GHz NE 200 000 GHz NE 200 000 GHz Trig: Free Nm Free PNC: Fast NE 200 000 GHz Trig: Free Nm Start Freq Sole Conter Freq 2.5100.000 GHz Sole Fr		2.399 960 GHz -32.50 dBm	=	0 Hz	
BLE 2M Ant1 Low 2402 BLE 2SI AND 102212 AV MIN 2023 Frequency Auto Tune Ref Offset 123 dB Mkr 4 2.544 08 GHz 45.72 dBm Genter Freq 2.51000000 GHz Selection attent 30 dB Mkr 4 2.544 08 GHz 45.72 dBm Center Freq 251000000 GHz 500 dBm 45.72 dBm Center Freq 251000000 GHz 500 dBm 500 dB	7				
ELE_2M_Ant1_Low_2402 BLE_2M_Ant1_Low_2402 BLE_2M_Ant1_Low_2402 Center Freq 2.5100000 CHz Frequency Frequency Frequency Frequency Frequency Center Freq 2.51000 dBm Center Freq 2.5100 dBm Center Freq 2.51000 dBm Center Freq 2.51000 dBm Center Freq 2.5100000 CHz Start Freq Start Fr	9				
BLE_2M_Ant1_Low_2402			-	Log <u>Lin</u>	
BLE_2M_Ant1_Low_2402	A MSG		STATUS		
Keydpht Spectrum Analyzer - Swept SA       SENCE:INT       ALLON AUTO       10:22:22:24M Ad (4:2023)         Center Freq 2.5100:00:000       GR       Trig: Free Run status       Trig: Free Run sta					
W       RL       RF       S10.0       DC       Stocket.NT       ALLON AUTO       102.21.24M.34M, 2023       Frequency         V       RF       PXO. Fast       Trig: Free Run #Atten: 30 dB       Trig: Free Run #Atten: 30 dB       Mkr4 2.544.08 GHz       ALLO Tune         Ref Offset 12.3 dB       Mkr4 2.544.08 GHz       Center Freq 2.510000000 GHz       Center Freq 2.510000000 GHz       Center Freq 2.510000000 GHz         00       0			1_LOW_2402		
Center Freq 2.5100000 GHz Frequence for the former of the	(X) RL RF S	50 Ω DC SENSE:INT	ALIGN AUTO 10:22:12 AM Jul 04, 2023		
Ref Offset 12.3 dB     Mkr4 2.544 08 GHz     Auto Tune       10 dB/dv     Ref 20.00 dBm     -45.72 dBm     Center Freq       2.51000000 GHz     2.51000000 GHz     2.51000000 GHz       30 0     2.51000000 GHz     2.51000000 GHz       30 0     2.51000000 GHz     2.51000000 GHz       30 0     2.51000000 GHz     2.51000000 GHz	Center Freq 2.510	NEE PNO East +++ Trig: Free Run	#Avg Type: RMS TRACE 1 2 3 4 5 6 TYPE	Frequency	
Ref Offset 12.3 dB     Mikr4 2.344 08 GR2       10 dB/dv     Ref 20.00 dBm     -45.72 dBm       10 dB/dv     1     -2.51000000 GH2       10 dB/dv     20.112746     Start Freq       2.00 dB/dv     2.47000000 GH2		IFGain:Low #Atten: 30 dB		Auto Tune	
Log       1       Center Freq         100       2.51000000 GHz         200       2.112700000 GHz         200       2.1127000000 GHz         200       2.1127000000 GHz         200       2.1127000000 GHz	Ref Offse	t 12.3 dB			
Certifier Freq 2.51000000 GHz 2.51000000 GHz	Log				
100 201 201 201 201 201 201 201					
Constraint     Description       Constraint     Constraint       Constraint </td <td>10.0</td> <td></td> <td></td> <td>2.51000000 GHZ</td> <td></td>	10.0			2.51000000 GHZ	
30.0 40.0 50.0 50.0 50.0 50.0 50.0 50.0 5			DL1 -19 21 dBm		
40.0 50.0 support MV M <sup>2</sup> - had the standard and th	-30.0				
Stop Freq	-40.0	+2 +3	<b></b>	2.47000000 GHz	
	-50.0 pagentproves, this	Mar and a start and the start	manuna and an and a second	Stop From	
	-60.0				
	-70.0				
Start 2.47000 GHz Stop 2.55000 GHz CF Step					
#Res BW 100 kHz #VBW 300 kHz Sweep 3.000 ms (1001 pts) 8.000000 MHz					
MKR MODE TRC SCL X Y FUNCTION FUNCTION VALUE A	MKR MODE TRC SCL	X Y FU 2.480 08 GHz 0.79 dBm	NCTION FUNCTION WIDTH FUNCTION VALUE		
1         N         1         f         2.480.08 GHz         0.79 dBm           2         N         1         f         2.483.50 GHz         -51.23 dBm         51.03 dBm           3         N         1         f         (Δ)         2500.00 GHz (Δ)         -51.30 dBm         Freq Offset           4         N         1         f         2.534.08 GHz         -45.72 dBm         0 Hz		2.483 50 GHz -51.23 dBm 2.500 00 GHz (Δ) -51.30 dBm		Freq Offset	
4 N 1 f 2.544 08 GHz 45.72 dBm 0 Hz	4 N 1 f	2.544 08 GHz -45.72 dBm		0 Hz	
	6				
8 Scale Type	8			Scale Type	
	10			Log <u>Lin</u>	
		Π.			
MSG STATUS	MSG		STATUS		
BLE 2M Ant1 High 2480					

**TEST REPORT** 

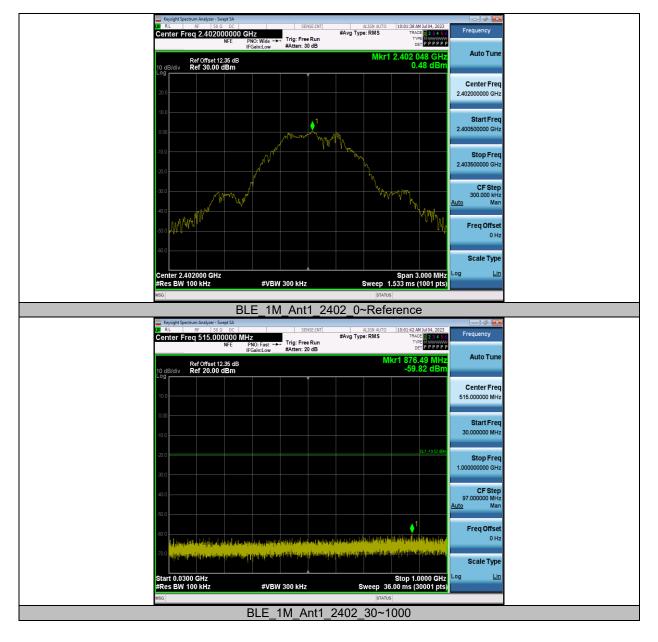
## **14** Appendix F: Conducted Spurious Emission

## 14.1.1 Test Result

TestMode	Antenna	Frequency[MHz]	FreqRange [MHz]	RefLevel [dBm]	Result[dBm]	Limit[dBm]	Verdict
			Reference	0.48	0.48		PASS
		2402	30~1000	0.48	-59.82	≤-19.52	PASS
			1000~26500	0.48	-43.26	≤-19.52	PASS
			Reference	0.40	0.40		PASS
BLE_1M	Ant1 2440	2440	30~1000	0.40	-59.82	≤-19.6	PASS
		2480	1000~26500	0.40	-43.68	≤-19.6	PASS
			Reference	0.71	0.71		PASS
			30~1000	0.71	-60.48	≤-19.29	PASS
			1000~26500	0.71	-40.98	≤-19.29	PASS
			Reference	0.50	0.50		PASS
		2402	30~1000	0.50	-60.21	≤-19.5	PASS
	/ Ant1 2440		1000~26500	0.50	-44.37	≤-19.5	PASS
			Reference	0.50	0.50		PASS
BLE_2M		2440	30~1000	0.50	-59.66	≤-19.5	PASS
			1000~26500	0.50	-39.67	≤-19.5	PASS
			Reference	0.75	0.75		PASS
		2480	30~1000	0.75	-59.48	≤-19.25	PASS
			1000~26500	0.75	-40.99	≤-19.25	PASS

**TEST REPORT** 

#### 14.1.2 Test Graphs



#### TEST REPORT

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Exception of the second of	Keysight Spectrum Analyzer - Swept SA	
Hun During Hard Du	Contor Frog 12 75000000 GHz #Avg Type BMS TRACE 12 34 5	Frequency
All of the state of the stat	iPoliticow writer 200	Turke Turke
Center Freq Stop 26.500 Test Stop 26.500 Test	Ref Offset 12.35 dB Mkr2 2.530 00 GHz	
Star Freq Star F F F F F F F F F F F F F F F F F F F	Log	
Start Freq Story ESG Story		
Star Freq Stop Freq		
Stop Freq Stop Stop Freq Offset Stop Test Stop	-20.0	Start Freq
Stop Freq Store 100 GHz Store		1.00000000 GHz
Start 10 /00 //z Start 10 //z Start		
Stor 1.00 OH2 steres EW 100 Hz steres EW 100 Hz steres EW 100 Hz stores Extended to the store of the stor		
Prequestions with the set of the		28.50000000 GH2
V Prector Parcing P	Start 1.00 GHz Stop 26.50 GHz	Z CF Step
Frequency of the second of the		2.55000000 GHz Auto Man
BLE_1M_Ant1_2402_1000~26500 BLE_1M_Ant1_2402_1000~26500 Center Freq 2.440000 OHz Freq 2.440000 OHz Freq 2.440000 OHz Freq 2.440000 OHz Freq 2.440000 OHz Freq 2.440000 OHz Freq 50 or 10 DEC Center Freq 2.440000 OHz Freq 50 or 10 DEC Freq 50 OF DE	MMM MUDE INC SAL X Y FUNCTION WIDTH FUNCTION WALLE 1 N f 2.403 35 GHz -36.36 dBm 2 N 4 f 2.50 00 CV 4.2 9 dBm	
BLE_IN_ACID_USUB_CONCEPTION BLE_INFORMACIONA	3	
Log Log State Tree State Tre		= 0 HZ
Log Log State BLE_1M_Ant1_2402_1000~26500 BLE_1M_CONT_CONT_CONT_CONT_CONT_CONT_CONT_CONT		Scale Type
BLE_IM_Ant_2402_1000~26500 The second secon		
BLE_1M_Ant1_2402_1000-265000		
Everypti System analyse: Strengt System and Sy		
Off RL       RF       90 G IDC       Section       ALCIG AUTO 100022 Att Med, 3227       Fraquency         Center Frag 2.4400000000 GHz       NTG       Pick Num       Trig: Free Run       WTG       Pick Num       Trig: Free Run       Run of		
Ref offset 12.35 dB       Mkr1 2.440 063 GHz       Auto Tune         10 dB/dv       Ref 30.00 dBm       0.40 dBm       2.4400000 GHz         20       1       1       2.4400000 GHz       2.4400000 GHz         20       1       1       1       1       2.43500000 GHz         2.41500000 GHz       2.4350000 GHz       2.43500000 GHz       2.43500000 GHz         2.416 0000 GHz       300 0       0       0       0       0         00       0       0       0       0       0       0         00       0       0       0       0       0       0       0         00       0       0       0       0       0       0       0       0         00       0       0       0       0       0       0       0       0         00       0		
Ref offset 12.35 dB       Mkr1 2.440 063 GHz       Auto Tune         10 dBladv       Ref 30.00 dBm       0.40 dBm       2.4400000 GHz         20       1       1       2.4400000 GHz       2.4400000 GHz         20       1       1       1       2.4400000 GHz       2.4450000 GHz         20       1       1       1       1       2.44500000 GHz       2.44500000 GHz         2.4150000 GHz       2.4450000 GHz       2.4450000 GHz       2.4450000 GHz       2.4450000 GHz       2.4450000 GHz         2.00       1	Center Freq 2.441000000 CHz #Avg type: Kins three 123 35	P
Center Freq 2.43050000 GHz 2.43550000 GHz 2.43550000 GHz 2.43550000 GHz 2.43550000 GHz 2.44150000 GHz 2.44150000 GHz 2.44150000 GHz 2.44150000 GHz 2.44150000 GHz 2.4150000 GHz	Miret 2 440 052 CU	Auto Tune
200       Center Freq         2.44000000 GHz         2.430500000 GHz         2.43050000 GHz         2.43050000 GHz         2.410000 GHz         2.410000 GHz         2.410000 GHz         2.410000 GHz         2.410000 GHz         2.410000 GHz         2.41000 GHz         3.00 MHz         3.00 MHz         3.00 MHz	10 dB/div Ref 30.00 dBm 0.40 dBn	
100       1       1       1       1       1       1       2.439600000 GHz         200       0		Center Freq
2.435500000 GHz 2.431500000 GHz 2.441500000 GHz 2.441500000 GHz 2.441500000 GHz 300 400 400 400 400 400 400 400	20.0	2.44000000 GHz
2.435500000 GHz 2.431500000 GHz 2.441500000 GHz 2.441500000 GHz 2.441500000 GHz 300 400 400 400 400 400 400 400	10.0	
Stop Freq 2.441500000 GHz 300 00 KHz 400 0 GHz #Res BW 100 KHz 400 KHz 500 KHZ		
300       2.441500000 GHz         300       400         400	Jan Martin	
2.441500000 GHz 300 00 KHz 400 0 KHz 400 0 KHz 400 0 KHz 500		Stop Freq
CF Step 300 00 kHz 400 0 kHz #Res BW 100 kHz #VBW 300 kHz Sweep 1.533 ms (1001 pts)		2.441500000 GHz
300       1		CE Step
Center 2.440000 GHz #VBW 300 kHz Sweep 1.533 ms (1001 pts)	300 Marshing Marshing	300.000 kHz
Center 2.440000 GHz     State     State       #Res BW 100 kHz     #VBW 300 kHz     Sweep 1.533 ms (1001 pts)	400 1/0/04	Auto Man
600     0 Hz       600     Scale Type       Center 2.440000 GHz     Span 3.000 MHz       #Res BW 100 kHz     #VBW 300 kHz		
Center 2.440000 GHz #Res BW 100 kHz #VBW 300 kHz Sweep 1.533 ms (1001 pts)		0 Hz
Center 2.440000 GHz Span 3.000 MHz Log Lin #Res BW 100 kHz #VBW 300 kHz Sweep 1.533 ms (1001 pts)		Scale Time
#Res BW 100 kHz #VBW 300 kHz Sweep 1.533 ms (1001 pts)		
	Center 2.440000 GHz Span 3.000 MH #Res BW 100 kHz #VBW 300 kHz Sweep 1.533 ms (1001 pts	
BLE 1M Ant1 2440 0~Reference	BLE 1M Ant1 2440 0~Reference	

#### TEST REPORT

Keyüğli Spectrum Analyzer - Singt SA         Center Freq 415:000000 MHz         Allön Auf 0         10:03:24 AV Jul (9, 2033)         Frequency           Ref Offset 12:35 dB         Mkr 1 867.76 MHz         -59:82 dBm         -59:82 dBm         Auto Tune           10 dBldiv         Ref 20:000 dBm         -59:82 dBm         -59:82 dBm         Center Freq 30.00000 MHz         -59:82 dBm         Start Freq 30.00000 MHz         -59:82 dBm         30.000000 MHz         -59:82 dBm         -59:82 dBm         -59:82 dBm         Center Freq 30.00000 MHz         -59:82 dBm
NPE     Operation     Extent 20 dB     Operation     Auto Tune       10 dBidly     Ref 00%set 12.35 dB     64     659.82 dBm     Center Freq       10 0     0     0     515.000000 MHz     515.000000 MHz
Ref offset 12.35 dB 10 dB/div Ref 20.00 dBm 0 00 Center Freq 515.00000 MHz Start Freq
Center Freq 515.00000 MHz Start Freq
10.0 515.000000 MHz
000 StartFreq
Start Freq
100.0 Stop Freq
1.00000000 GHz
400 CF Step 97.000000 MHz
Auto Man
600 Freq Offset
Laderti di den si in ale di de di de a destanza de a de la se a rece de la de serie de la
700 Inforder de sole forste ben en biske de de de la sole de sole de sole de la sole de la sole de la sole de sole de la sole de
Start 0.0300 GHz Stop 1.0000 GHz Log
#Res BW 100 kHz #VBW 300 kHz Sweep 36.00 m (3000 kHz
ISS STATUS
BLE 1M Ant1 2440 30~1000
Keysight Spectrum Analyzer - Swept SA     Key Set S = Set
Center Freq 13.750000000 GHz #Avg Type: RMS TROCE 12.3.4.5.6 Frequency
NFL PHUCHAST #Atten: 20 dB DET PPPP P
Ref Offset 12.35 dB WIKF2 2.368 23 GH2
10.0 Center Freq 13.750000000 GHz
0.00 Y 13.750000000 GHz
20.0 EL1-19.60 dBm
300 Start Freq 1.00000000 GHz
500 Stop Freq
Start 1.00 GHz         Stop 26.50 GHz         CF Step           #Res BW 100 kHz         #VBW 300 kHz         Sweep 938.0 ms (30001 pts)         2.550000000 GHz
INRY MODE TRC I SCI. X Y FUNCTION FUNCTION WOTH FUNCTION VALUE ALLO
<b>1</b> N <b>1</b> f <b>2</b> ,439 90 GHz <b>3</b> ,37 dBm
2 <b>N 1 2200225112 →500000</b> 3 <b>1 1 2000255112 →500000</b> 4 <b>1 2000255112 →500000</b> 0 Hz
7 Scale Type
asg

#### **TEST REPORT**

	10:05:36 AM Jul 04, 2023
Center Freq 2.480000000 GHz #Avg Type: RMS	TRACE 123456 Frequency
IFGain:Low #Atten: 30 dB	DETPPPPP
Ref Offset 12.3 dB Mkr1 10 dB/div Ref 30.00 dBm	0.71 dBm
20.0	Center Freq 2.48000000 GHz
10.0	Start Freq
	2.478500000 GHz
10.0	Stop Freq
20.0	2.481500000 GHz
	CF Step
-300 NTMM	300.000 kHz Auto Man
40.0	
so When the second s	FreqOffset
	0 Hz
-60.0	Coole Time
	Scale Type
Center 2.480000 GHz #Res BW 100 kHz #VBW 300 kHz Sweep 1	Span 3.000 MHz Log Lin 1.533 ms (1001 pts)
MSG STATUS	
BLE 1M Ant1 2480 0~Refe	Prence
	- 8 <mark>- 1</mark>
RL RF 50 Ω DC SENSE:INT ALIGN AUTO Center Freq 515.000000 MHz #Avg Type: RMS	10:05:40 AM 3/4 04, 2023 TRACE 2 2 3 4 5 1 TYPE
Center Freq 515:000000 MHZ #Avg Type: RMS NFE PNO: fast	DETPPPPP
Ref Offset 12.3 dB M	Kr1 891.36 MHz Auto Tune -60.48 dBm
10 dB/div Ref 20.00 dBm	-60.48 0.611
190	Center Freq
	515.000000 MHz
0.00	Start Freq
10.0	30.00000 MHz
-20.0	Stop Freq
-30.0	1.00000000 GHz
	CE Stan
-40.0	CF Step 97.000000 MHz
-60.0	Auto Man
	Freq Offset
0.00- المعالية من المراجعة المراجعة المراجعة ومن المراجعة المراجعة والمراجع المراجع من المراجعة المراجعة المراجعة الم	
	dar <u>na de la dal pa kit padri par dia any</u>
	Scale Type
Start 0.0300 GHz	Stop 1.0000 GHz
	6.00 ms (30001 pts)
 #Res BW 100 kHz #VBW 300 kHz Sweep 36 status BLE_1M_Ant1_2480_30~1	6.00 ms (30001 pts) s

#### TEST REPORT

Cepter Freq 13 75000000 GHz #Avg Type: RMS TRACE 1234	s 6 Frequency
IFGain:Low #Atten: 20 dB DET PPP	
Ref Offset 12.3 dB         Mkr2 2.608 20 GF           10 dB/div         Ref 20.00 dBm         -40.98 dB	
	Center Freq 13.75000000 GHz
	13.76000000 GHz
-100 pc1-1929 d	
300	Start Freq 1.00000000 GHz
-40.0	
	Stop Freq
	26.50000000 GHz
Start 1.00 GHz Stop 26.50 GF #Res BW 100 kHz #VBW 300 kHz Sweep 938.0 ms (30001 p	12 CF Step (S) 2.55000000 GHz
MKR MODE TRCI SCL X Y FUNCTION VIDTH FUNCTION VALUE	Auto Man
1 N 1 f 2.479 85 GHz -18.04 dBm 2 N 1 f 2.608 20 GHz -40.98 dBm	
	Freq Offset 0 Hz
	F
	Scale Type
9 10 10 10 10 10 10 10 10 10 10 10 10 10	Log Lin
MSG STATUS	
BLE 1M Ant1 2480 1000~26500	
Keysight Spectrum Analyzer - Swept SA	
RL RF 150 Ω DC SPEEINT ALLON AUTO 10:10:27 APA JOA 2: Center Freq 2.402000000 CHz Trig: Free Run NFE PRO: Wide → Trig: Free Run IFGaint.com #Atten: 30 dB 00 PPP	Frequency
Ref Offset 12.35 dB         Mkr1 2.402 048 GF           10 dB/div         Ref 30.00 dBm         0.50 dB	
10 dB/div Ref 30.00 dBm 0.50 dB	
	Center Freq
	2.402000000 GHz
	Start Freq
	2.400500000 GHz
	Stop Freq
	2.403500000 GHz
	CF Step 300.000 kHz
	Auto Man
	F 0#+
	Freq Offset
500	
	Scale Type
Center 2.402000 GHz Span 3.000 M	Hz Log Lin
#Res BW 100 kHz #VBW 300 kHz Sweep 1.533 ms (1001 p	ts)
MSG STATUS	
BLE 2M Ant1 2402 0~Reference	

#### TEST REPORT

Keysight Spectrum Analyzer - Swept S					- 8 💌	
Center Freq 515.0000		SENSE:INT	ALIGN AUTO #Avg Type: RMS	10:10:32 AM Jul 04, 2023 TRACE 1 2 3 4 5 6 TYPE	Frequency	
NFE	E PNO: Fast ↔→ IFGain:Low	Trig: Free Run #Atten: 20 dB	• //	TYPE M WWWWWW DET P P P P P P		
			М	kr1 723.42 MHz	Auto Tune	
Ref Offset 12.35 10 dB/div Ref 20.00 dB	dB m			-60.21 dBm		
Log		Ĭ				
10.0					Center Freq 515.000000 MHz	
10.0					515.000000 MHz	
0.00						
					Start Freq	
-10.0					30.000000 MHz	
				DL1 -19.50 dBm		
-20.0					Stop Freq	
30.0					1.00000000 GHz	
-30.0						
-40.0					CF Step 97.000000 MHz	
					Auto Man	
-50.0						
			<b>↓</b> <sup>1</sup>		Freq Offset	
-60.0	مر القريمة مرابعه الم	. Nikhal kana ka ka shi	all train holes of the part of	and a second second second	0 Hz	
70.0	and the second	I address of the		stances foliging to first all compa		
Aladi A Malaki Makata Ma			In the second		Scale Type	
					Log <u>Lin</u>	
Start 0.0300 GHz #Res BW 100 kHz	#VBW	300 kHz	Sween 36	Stop 1.0000 GHz .00 ms (30001 pts)		
MSG		ooo kiil	STATUS			
			0400 00 4	000		
_			2402_30~1	000		
Keysight Spectrum Analyzer - Swept S     K     RL     RF     S0 Ω     D		SENSE:INT	ALIGN AUTO	10:10:50 AM Jul 04, 2023	- 2 💌	
Center Freq 13.75000	0000 GHz	Trig: Free Run	#Avg Type: RMS	TRACE 1 2 3 4 5 6 TYPE M DET P P P P P P	Frequency	
	IFGain:Low	Trig: Free Run #Atten: 20 dB		DET PPPPP		
					Auto Tuno	
Ref Offset 12.35	dB		Mkr	2 2.295 40 GHz	Auto Tune	
Ref Offset 12.35 10 dB/div Ref 20.00 dB	dB m	*	Mkr	2 2.295 40 GHz -44.36 dBm	Auto Tune	
Ref Offset 12.35 10 dB/div Ref 20.00 dB/ Log	dB m		Mkr	2 2.295 40 GHz -44.36 dBm	Auto Tune Center Freq	
Ref Offset 12.35 10 dB/div Ref 20.00 dB/ 10.0 0.00	dB m		Mkr	2 2.295 40 GHz -44.36 dBm		
10.0	dB m		Mkr	-44.36 dBm	Center Freq	
Log 10.0 0.00 -10.0 -20.0	· dB m		Mkr	2 2.295 40 GHz -44.36 dBm	Center Freq 13.75000000 GHz	
100 000 -100 -200 -300	dB m		Mkr	-44.36 dBm	Center Freq	
Log 10.0 0.00 -10.0 -20.0	dB m		Mkr.	-44.36 dBm	Center Freq 13.75000000 GHz Start Freq	
100 000 -100 -200 -300			Mkr.	-44.36 dBm	Center Freq 13.75000000 GHz Start Freq 1.00000000 GHz	
100 000 -100 -200 -300			Mkr	-44.36 dBm	Center Freq 13.75000000 GHz Start Freq	
			Mkr.	-44.36 dBm	Center Freq 13.75000000 GHz Start Freq 1.00000000 GHz Stop Freq	
Log 100 100 100 200 300 400 700 700 Start 1.00 GHz				-44.36 dBm	Center Freq 13.75000000 GHz Start Freq 1.00000000 GHz 26.50000000 GHz CF Step	
Log 100 100 -200 -300 -300 -400 -600 -700		300 kHz		-44.36 dBm	Center Freq 13.75000000 GHz Start Freq 1.00000000 GHz Stop Freq 26.50000000 GHz CF Step 2.550000000 GHz	
Log 100 100 200 300 400 400 400 400 400 400 4	<pre>#VEW X</pre>	Y F		-44.36 dBm	Center Freq 13.75000000 GHz Start Freq 1.00000000 GHz 26.50000000 GHz CF Step	
Log 100 100 200 300 400 400 400 400 400 400 4	<pre>#VEW X</pre>		Sweep 93	-44.36 dBm	Center Freq 13.75000000 GHz Start Freq 1.00000000 GHz 26.50000000 GHz 2.55000000 GHz 2.55000000 GHz Man	
Log 100 100 200 300 400 400 400 400 400 400 4	#VBW	Y F	Sweep 93	-44.36 dBm	Center Freq 13.75000000 GHz Start Freq 1.00000000 GHz Stop Freq 26.50000000 GHz 2.55000000 GHz Auto Man Freq Offset	
Log 100 100 200 300 400 400 400 400 400 400 4	<pre>#VEW X</pre>	Y F	Sweep 93	-44.36 dBm	Center Freq 13.75000000 GHz Start Freq 1.00000000 GHz 26.50000000 GHz 2.55000000 GHz 2.55000000 GHz Man	
Log 100 100 200 300 400 400 400 400 400 400 4	<pre>#VEW X</pre>	Y F	Sweep 93	-44.36 dBm	Center Freq 13.75000000 GHz Start Freq 1.00000000 GHz 2550000000 GHz 2.550000000 GHz Auto Man Freq Offset 0 Hz	
Log 100 100 200 200 200 200 200 200	<pre>#VEW X</pre>	Y F	Sweep 93	-44.36 dBm	Center Freq 13.75000000 GHz Start Freq 1.00000000 GHz Stop Freq 26.50000000 GHz 2.55000000 GHz Auto Man Freq Offset	
Log	<pre>#VEW X</pre>	Y F	Sweep 93	-44.36 dBm	Center Freq 13.75000000 GHz Start Freq 1.00000000 GHz 2550000000 GHz 2.550000000 GHz Auto Man Freq Offset 0 Hz	
Log 100 100 200 200 200 200 200 200	<pre>#VEW X</pre>	Y F	Sweep 93	-44.36 dBm 20.1950 dbm 20.1950 dbm Stop 26.50 GHz 8.0 ms (30001 pts) Function VALUE	Center Freq 13.75000000 GHz Start Freq 1.00000000 GHz 2550000000 GHz 2.55000000 GHz Auto Man Freq Offset 0 Hz Scale Type	
Log 100 100 200 200 400 400 22 500 500 500 500 500 500 50	#VBW *2399 95 GHz 2 295 40 GHz	Y F -36.31 dBm -44.36 dBm -	Sweep 93	-44.36 dBm	Center Freq 13.75000000 GHz Start Freq 1.00000000 GHz 2550000000 GHz 2.55000000 GHz Auto Man Freq Offset 0 Hz Scale Type	



#### TEST REPORT

.

🔤 Keysight Spectrum Analyzer - Sw	ept SA			
Center Freq 13.7500	DC SENSE:INT	ALIGN AUTO 10:19:56 AM Jul 04, 2023 #Avg Type: RMS TRACE 1 2 3 4 5 0		
<b>Solitor</b> 164 13.7500	NFE PNO: Fast +++ Trig: Free Run IFGain:Low #Atten: 20 dB	#Avg Type: RMS TRACE 2 3 4 5 TYPE MUNICIPAL OF PPPP		
	il Guinicon	Mkr2 2.312 40 GHz	Auto Tuno	
Ref Offset 12 10 dB/div Ref 20.00 d	l.35 dB dBm	-39.67 dBm		
Log			Constan Franc	
0.00			Center Freq 13.750000000 GHz	
-10.0				
-20.0		DL1 -19.50 dBm	Start Freq	
-30.0 42			1.000000000 GHz	
-40.0				
-50.0		فالتلافات الحرف والمتعرب ومعرور لترجل وحرب المراجل والمراج	Stop Freq	
-60.0			26.50000000 GHz	
-70.0				
Start 1.00 GHz		Stop 26.50 GHz	CF Step	
#Res BW 100 kHz	#VBW 300 kHz	Sweep 938.0 ms (30001 pts)	2.550000000 GHz Auto Man	
MKR MODE TRC SCL	X Y FUN 2.441 60 GHz -36.19 dBm	CTION FUNCTION WIDTH FUNCTION VALUE		
	2.441 60 GHz -36.19 dBm 2.312 40 GHz -39.67 dBm		FreqOffset	
4			0 Hz	
6				
8			Scale Type	
10			Log <u>Lin</u>	
	Π	· · · · · · · · · · · · · · · · · · ·		
MSG		STATUS		
	BLE 2M Ant1 24	40 1000~26500		
Keysight Spectrum Analyzer - Sw				
Center Freq 2.48000		ALIGN AUTO 10:22:45 AM Jul 04, 2023 #Avg Type: RMS TRACE 1 2 3 4 5 6 TYPE	Frequency	
	NFE PNO: Wide Trig: Free Run IFGain:Low #Atten: 30 dB	DET P P P P P		
Ref Offset 12		Mkr1 2.480 054 GHz	Auto Tune	
Ref Offset 12 10 dB/div Ref 30.00 o Log	iBm	0.75 dBm		
			Center Freq	
20.0			2.480000000 GHz	
10.0				
	<b>1</b>		Start Freq	
0.00			2.478500000 GHz	
	1 Marmin Vy	M <sub>IN</sub>		
-10.0	Min	1 mg Man willing m	Stop Freq	
-20.0	Million .	T white work the work of the w	2.481500000 GHz	
ind		· · · ·	05.01	
-30.0		MA	CF Step 300.000 kHz	
-40.0		- V	Auto Man	
alger and a second s				
-50.0			Freq Offset 0 Hz	
			0 HZ	
-60.0			Scale Type	
Center 2.480000 GHz #Res BW 100 kHz	#VBW 300 kHz	Span 3.000 MHz Sweep 1.533 ms (1001 pts)	Log <u>Lin</u>	
	#4044 300 RHZ			
MSG	BLE 2M Ant1 24	STATUS		

#### TEST REPORT

Keysight Spectrum Analyzer - Swep	2 SA				- 2 ×	
KE RF 50 Ω     Center Freq 515.0000	DC MHz	SENSE:INT	#Avg Type: RMS	10:22:48 AM Jul 04, 2023 TRACE 1 2 3 4 5 6 TYPE	Frequency	
N	FE PNO: Fast +++ IFGain:Low	<ul> <li>Trig: Free Run #Atten: 20 dB</li> </ul>		DET P P P P P P		
Ref Offect 12 3			M	kr1 869.63 MHz	Auto Tune	
Ref Offset 12.3 10 dB/div Ref 20.00 dB	Bm			-59.48 dBm		
209					Center Freq	
10.0					515.000000 MHz	
0.00					Start Freq	
-10.0		كالكم			30.000000 MHz	
-20.0				DL1 -19.25 dBm	Stop Freq	
					1.00000000 GHz	
-30.0						
-40.0		كالكم			CF Step	
					97.000000 MHz <u>Auto</u> Man	
-50.0						
				<b>♦</b> <sup>1</sup>	Freq Offset	
ارىيا يە ئۆلىلەرلىرىغانغان يەۋرىيۇ يالغا	والفتوريد وليار وتتناع وتتقاله		an dan Patranja Juda (na Juda) a	and political and percent	0 Hz	
-70.0	. มีสมัญหาง ความใหม่งสามาร์เหล่า	the state of the s	a a di se persenti transmi a dela	ورواه وكرعته فالمالية المرافقة والمعاد		
a transformer of the table		all a sea channer			Scale Type	
Start 0.0300 GHz				Stop 1.0000 GHz	Log <u>Lin</u>	
#Res BW 100 kHz	#VBW	300 kHz	Sweep 36	.00 ms (30001 pts)		
MSG			STATUS			
	BLE 2	2M Ant1	2480 30~1	000		
🔤 Keysight Spectrum Analyzer - Swep					- 2 🔀	
RL ■ RF 50 Ω     Center Freq 13.75000		SENSE:INT	#Avg Type: RMS	10:23:05 AM Jul 04, 2023 TRACE 1 2 3 4 5 6 TYPE	Frequency	
N	FE PNO: Fast +++ IFGain:Low	Trig: Free Run #Atten: 20 dB		DET PPPPP		
Rof Offeet 12.2			Mkr	2 2.351 50 GHz	Auto Tune	
Ref Offset 12.3 10 dB/div Ref 20.00 dl	Bm			-40.99 dBm		
10.0			<u>ا ا ا ا ا ا ا</u>		Center Freq	
nm						
0.00					13.750000000 GHz	
-10.0					13.750000000 GHz	
				DL1 -19 25 dBm		
				DL1 -19 25 dBm	13.75000000 GHz Start Freq 1.00000000 GHz	
-10.0				DL1-19,25 (Bh	Start Freq	
-10.0 -20.0 -30.0 -40.0 -50.0					Start Freq	
-10.0					Start Freq 1.00000000 GHz	
100 100 300 400 500 500 700					Start Freq 1.00000000 GHz Stop Freq	
100 100 100 100 100 100 100 100			Sugar 44	Stop 26.50 GHz	Start Freq 1.00000000 GHz Stop Freq 26.50000000 GHz CF Step	
100 100 100 100 100 100 100 100		1 300 kHz		Stop 26.50 GHz 8.0 ms (30001 pts)	Start Freq 1.00000000 GHz Stop Freq 26.50000000 GHz	
100         1           200         1           300         1           400         2           400         1           500         1           700         1           Start 1.00 GHz         #Res BW 100 kHz	х	Y FUN	Sweep 931	Stop 26.50 GHz 8.0 ms (30001 pts)	Start Freq 1.00000000 GHz Stop Freq 26.50000000 GHz CF Step 2.550000000 GHz	
100 100 100 100 100 100 100 100				Stop 26.50 GHz 8.0 ms (30001 pts)	Start Freq 1.00000000 GHz Stop Freq 2650000000 GHz <u>CF Step</u> 2.55000000 GHz <u>Auto</u> Man Freq Offset	
100         1           200         1           300         1           400         2           400         2           500         3           700         3           Start 1.00 GHz         #Res BW 100 kHz           INFR MODE TRC SCL         3	х	Y FUN		Stop 26.50 GHz 8.0 ms (30001 pts)	Start Freq 1.00000000 GHz Stop Freq 26.50000000 GHz CF Step 2.55000000 GHz Auto Man	
100         1           200         1           300         1           400         2           400         2           500         3           700         3           Start 1.00 GHz         #Res BW 100 kHz           INFR MODE TRC SCL         3	х	Y FUN		Stop 26.50 GHz 8.0 ms (30001 pts)	Start Freq           1.00000000 GHz           Stop Freq           26.50000000 GHz           2.55000000 GHz           Auto           Man           Freq Offset           0 Hz	
100         1           200         1           300         1           400         2           400         2           500         3           700         3           Start 1.00 GHz         #Res BW 100 kHz           INFR MODE TRC SCL         3	х	Y FUN		Stop 26.50 GHz 8.0 ms (30001 pts)	Start Freq 1.00000000 GHz Stop Freq 2650000000 GHz <u>CF Step</u> 2.55000000 GHz <u>Auto</u> Man Freq Offset	
100         1           200         1           300         1           400         2           400         2           500         3           700         3           Start 1.00 GHz         #Res BW 100 kHz           INFR MODE TRC SCL         3	х	Y FUN		Stop 26.50 GHz 8.0 ms (30001 pts)	Start Freq           1.00000000 GHz           Stop Freq           26.50000000 GHz           2.55000000 GHz           Auto           Man           Freq Offset           0 Hz	
100         1           300         1           400         2           400         2           500         1           500         1           700         1           1         1	х	Y FUN	NCTION FUNCTION WIDTH	Stop 26.50 CHz 8.0 ms (30001 pts) Function VALUE	Start Freq 1.00000000 GHz 2650000000 GHz 2.550000000 GHz <u>Auto</u> Man Freq Offset 0 Hz Scale Type	
100         1           300         2           400         2           500         4           500         4           7 <t< td=""><td>X 2.492.40 GHz 2.351 50 GHz</td><td>Y FUN -30.36 dBm -40.99 dBm -</td><td></td><td>Stop 26.50 CHz 8.0 ms (30001 pts) FUNCTION VALUE</td><td>Start Freq 1.00000000 GHz 2650000000 GHz 2.550000000 GHz <u>Auto</u> Man Freq Offset 0 Hz Scale Type</td><td></td></t<>	X 2.492.40 GHz 2.351 50 GHz	Y FUN -30.36 dBm -40.99 dBm -		Stop 26.50 CHz 8.0 ms (30001 pts) FUNCTION VALUE	Start Freq 1.00000000 GHz 2650000000 GHz 2.550000000 GHz <u>Auto</u> Man Freq Offset 0 Hz Scale Type	

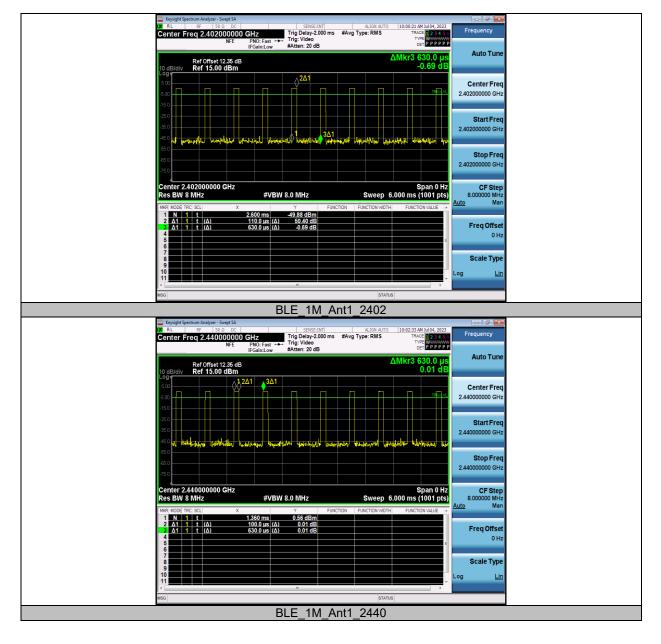
**TEST REPORT** 

# **15** Appendix G: Duty Cycle 15.1.1 Test Result

TestMode	Antenna	Frequency[MHz]	ON Time [ms]	Period [ms]	Duty Cycle [%]	Duty Cycle Factor[dB]
		2402	0.11	0.63	17.46	7.58
BLE_1M	Ant1	2440	0.10	0.63	15.87	7.99
		2480	0.10	0.62	16.13	7.92
		2402	0.06	0.63	9.52	10.21
BLE_2M	Ant1	2440	0.06	0.63	9.52	10.21
		2480	0.06	0.63	9.52	10.21

**TEST REPORT** 

#### 15.1.2 Test Graphs



#### TEST REPORT

Keysight Spectrum Analyzer - Swej  Keysight Spect	R SA	10:04:17 AM Jul 04, 2023	
Center Freq 2.48000	0000 GHz Trig Delay-2.000 ms #Avg Type: RMS	TRACE 2 2 3 4 5 6 TYPE DET P P P P P P	
······································	IFE PNO: Fast →→ Trig: Video IFGain:Low #Atten: 20 dB	Auto Tuno	
Ref Offset 12: 10 dB/div Ref 15.00 d	3 dB	ΔMkr3 620.0 μs -48.56 dB	
Logy	Bmλ2Δ1		
5.00		Center Freq 2.480000000 GHz	
-5.00		2.48000000 GH2	
-25.0		Start Freq	
-36.0	301	2.48000000 GHz	
-45.0 to utrational your w		interest attaction to	
-55.0		Stop Freq	
-66.0		2.48000000 GHz	
Center 2.48000000 G Res BW 8 MHz		Span 0 Hz CF Step 6.000 ms (1001 pts) 8.000000 MHz	
MKR MODE TRC SCL	X Y FUNCTION FUNCTION WIDT	Auto Man	
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	2.610 ms 0.82 dBm 100.0 μs (Δ) -0.01 dB		
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	620.0 μs (Δ) -48.56 dB	Freq Offset	
5 6		E 0 H2	
7 8		Scale Type	
9 10		Log Lin	
	m		
MSG	STAT	บร	
	BLE 1M Ant1 2480		
Keysight Spectrum Analyzer - Swep	et SA	- 2 -	
RL RF 50 Ω     Center Freq 2.40200	Trig Delay-2.000 ms #Avg Type: RMS	10:09:07 AM Jul 04, 2023 TRACE 2 3 4 5 6 TYPE THE TRACE 2 3 4 5 6	
	IFE PNC: Fast →→ Trig: Video IFGain:Low #Atten: 20 dB	DET PPPPP	
Ref Offset 12:	35 dB	ΔMkr3 630.0 μs	
10 dB/div Ref 15.00 d		4.36 dB	
5.00		Center Freq	
-5.00		2.402000000 GHz	
-15.0			
-35.0		2.402000000 GHz	
-45.0 of the state	ea municipation tetrational antimation and attractional antipations and	reflection to the set	
-55.0	لللنان انصبح وتكنا ويحمد ومصر عدده	Stop Freq	
-66.0		2.402000000 GHz	
145.0			
Center 2.40200000 G Res BW 8 MHz		Span 0 Hz CF Step 6.000 ms (1001 pts) 8.000000 MHz	
MKR MODE TRC SCL	X Y FUNCTION FUNCTION WIDT	Auto Man	
1 N 1 t 2 $\Delta 1 1 t (\Delta)$	4.480 ms -3.79 dBm 60.00 μs (Δ) 4.40 dB 630.0 μs (Δ) 4.36 dB		
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	630.0 μs (Δ) 4.36 dB	Freq Offset	
5 6		E CH2	
7		Scale Type	
9		Log Lin	
11		· · · · · · · · · · · · · · · · · · ·	
<	"		
*	III STAT		

