

Test Report

Verified code: 572071

Report No.: E20230117700901-2

Customer: Lumi United Technology Co., Ltd

Address: B1, Chongwen Park, Nanshan iPark, Liuxian Avenue, Taoyuan Residential District,
Nanshan District, Shenzhen, China

Sample Name: Smart Lock U100

Sample Model: SDL-D01

Receive Sample Date: Jan.18,2023

Test Date: Jan.30,2023 ~ Feb.17,2023

Reference Document: CFR 47, FCC Part 15 Subpart C
RADIO FREQUENCY DEVICES:Subpart C—Intentional Radiators

Test Result: Pass

Prepared by: Chen Xiaolong

Reviewed by: Wu Haoting

Approved by: Zhao Zetian

GUANGZHOU GRG METROLOGY & TEST CO., LTD

Issued Date: 2023-03-03

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TABLE OF CONTENTS

1.	TEST RESULT SUMMARY	6
2.	GENERAL DESCRIPTION OF EUT.....	7
2.1	APPLICANT	7
2.2	MANUFACTURER.....	7
2.3	BASIC DESCRIPTION OF EQUIPMENT UNDER TEST	7
2.4	CHANNELLIST	8
2.5	TEST OPERATION MODE	8
2.6	LOCAL SUPPORTIVE	8
2.7	CONFIGURATION OF SYSTEM UNDER TEST	9
2.8	DUTY CYCLE.....	10
3.	LABORATORY AND ACCREDITATIONS	12
3.1	LABORATORY.....	12
3.2	ACCREDITATIONS	12
4.	MEASUREMENT UNCERTAINTY	13
5.	LIST OF USED TEST EQUIPMENT AT GRGT	14
6.	CONDUCTED EMISSION MEASUREMENT	15
6.1	LIMITS.....	15
6.2	TEST PROCEDURES	15
6.3	TEST SETUP	16
6.4	DATA SAMPLE	16
6.5	TEST RESULTS	17
7.	RADIATED SPURIOUS EMISSIONS	19
7.1	LIMITS.....	19
7.2	TEST PROCEDURES	19
7.3	TEST SETUP	22
7.4	DATA SAMPLE	24
7.5	TEST RESULTS	25
8.	6dB BANDWIDTH.....	38
8.1	LIMITS.....	38
8.2	TEST PROCEDURES	38
8.3	TEST SETUP	38
8.4	TEST RESULTS	38
9.	MAXIMUM PEAK OUTPUT POWER	42
9.1	LIMITS.....	42
9.2	TEST PROCEDURES	42
9.3	TEST SETUP	42
9.4	TEST RESULTS	42
10.	POWER SPECTRAL DENSITY	43
10.1	LIMITS.....	43
10.2	TEST PROCEDURES	43
10.3	TEST SETUP	43

10.4 TEST RESULTS 43

11. CONDUCTED BAND EDGES AND SPURIOUS EMISSIONS 47

11.1 LIMITS..... 47

11.2 TEST PROCEDURES 47

11.3 TEST SETUP 47

11.4 TEST RESULTS 48

12. RESTRICTED BANDS OF OPERATION..... 60

12.1 LIMITS..... 60

12.2 TEST PROCEDURES 61

12.3 TEST SETUP 61

12.4 TEST RESULTS 62

APPENDIX A. PHOTOGRAPH OF THE TEST CONNECTION DIAGRAM 72

APPENDIX B. PHOTOGRAPH OF THE EUT 72

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REPORT ISSUED HISTORY

Report Version	Report No.	Description	Compile Date
1.0	E20230117700901-2	Original Issue	2023-02-22

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1. TEST RESULT SUMMARY

Technical Requirements		
FCC 47 CFR Part 15 Subpart C 15.247 ANSI C63.10-2013 KDB 558074 D01 15.247 measurement guidance v05r02		
Limit / Severity	Item	Result
§15.203	Antenna Requirement	Pass
§15.207(a)	Conducted Emission	Pass
§15.247(d)&15.205& 15.209	Radiated Spurious Emission	Pass
§15.247(b)(3)	Maximum Peak Output Power	Pass
§15.247(e)	Power Spectral Density	Pass
§15.247(a)(2)	6dB bandwidth	Pass
§15.247(d)	Conducted band edges and Spurious Emission	Pass
§15.247(d)&15.205& 15.209	Restricted bands of operation	Pass

Note: The antenna is FPC antenna. The max gain of antenna is 2dBi, which accordance 15.203, is considered sufficient to comply with the provisions of this section.

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2. GENERAL DESCRIPTION OF EUT

2.1 APPLICANT

Name: Lumi United Technology Co., Ltd

Address: B1, Chongwen Park, Nanshan iPark, Liuxian Avenue, Taoyuan Residential District, Nanshan District, Shenzhen, China

2.2 MANUFACTURER

Name: Lumi United Technology Co., Ltd

Address: B1, Chongwen Park, Nanshan iPark, Liuxian Avenue, Taoyuan Residential District, Nanshan District, Shenzhen, China

2.3 BASIC DESCRIPTION OF EQUIPMENT UNDER TEST

Equipment: Smart Lock U100

Model No.: SDL-D01

Adding Model: DL-D01D

Models Difference: That EUT (Smart Lock U100) Model Numbers SDL-D01 and DL-D01D have the same technical construction including circuit diagram PCB layout, hardware version and software version identical, except sales area, packaging and accessories are different, and all the tests were performed on the model SDL-D01.

Trade Name: Aqara

FCC ID: 2AKIT-SDLD01

Power supply: DC 6V power supplied by 4 AA batteries, DC 5V supplied by USB-C emergency port

Frequency Band: 2402MHz-2480MHz

Transmit Power: GFSK for 1Mbps: 7.75dBm
GFSK for 2Mbps: 7.75dBm

Modulation type: GFSK for 1Mbps
GFSK for 2Mbps

Channel space: 2MHz

Antenna Specification: FPC antenna with 2dBi gain (Max.)

Temperature Range: -35°C~66°C

Hardware Version: V2.1

Software Version: 1.0.4_0007

Sample No: E20230117700901-0005, E20230117700901-0006

Note: /

2.4 CHANNELIST

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
*00	2402	10	2422	20	2442	30	2462
01	2404	11	2424	21	2444	31	2464
02	2406	12	2426	22	2446	32	2466
03	2408	13	2428	23	2448	33	2468
04	2410	14	2430	24	2450	34	2470
05	2412	15	2432	25	2452	35	2472
06	2414	16	2434	26	2454	36	2474
07	2416	17	2436	27	2456	37	2476
08	2418	18	2438	28	2458	38	2478
09	2420	*19	2440	29	2460	*39	2480

* is the test frequency

2.5 TEST OPERATION MODE

Mode No.	Description of the modes
1	Bluetooth (BLE) fixed frequency transmitting

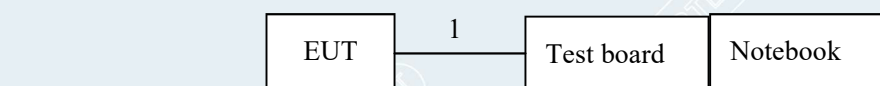
2.6 LOCAL SUPPORTIVE

Name of equipment	Manufacturer	Model	Serial number	Note
Notebook	LENOVO	TianYi 310-14ISK	MP18DLC6	/
Test board	/	/	/	/
Adapter	/	/	/	/

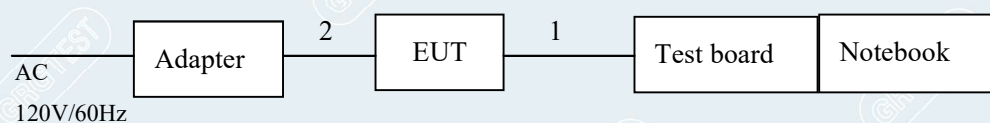
No.	Cable Type	Qty.	Shielded Type	Ferrite Core(Qty.)	Length
1	DC cable	1	No	0	0.5m
2	DC cable	1	No	0	1.5m

2.7 CONFIGURATION OF SYSTEM UNDER TEST

For Radiated Spurious Emission, 6dB Bandwidth, Maximum Peak Output Power, Power Spectral Density, Conducted band edges and Spurious Emission, Restricted bands of operation



For Conducted Emissions



Test software:

Software version	Test level
nRF connect	8

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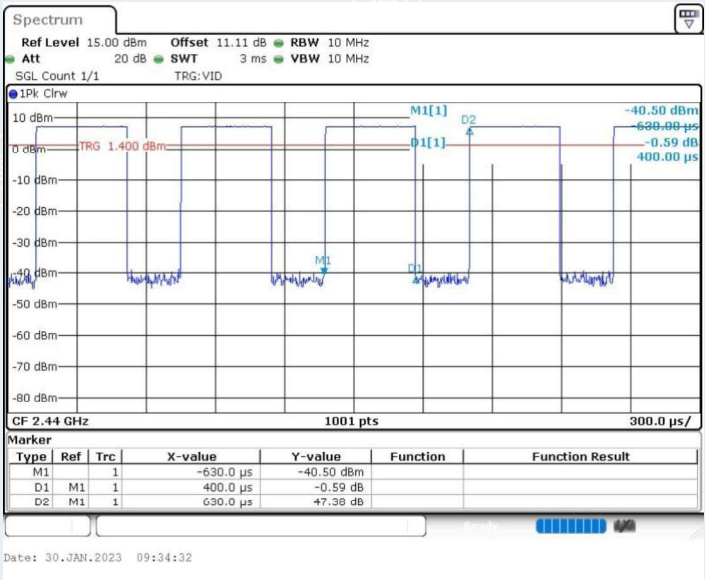
2.8 DUTY CYCLE

Environment: 21.3℃/59%RH/101.0kPa
Tested By: Yang Zhaoyun

Voltage: DC 6V
Date: 2023-01-30

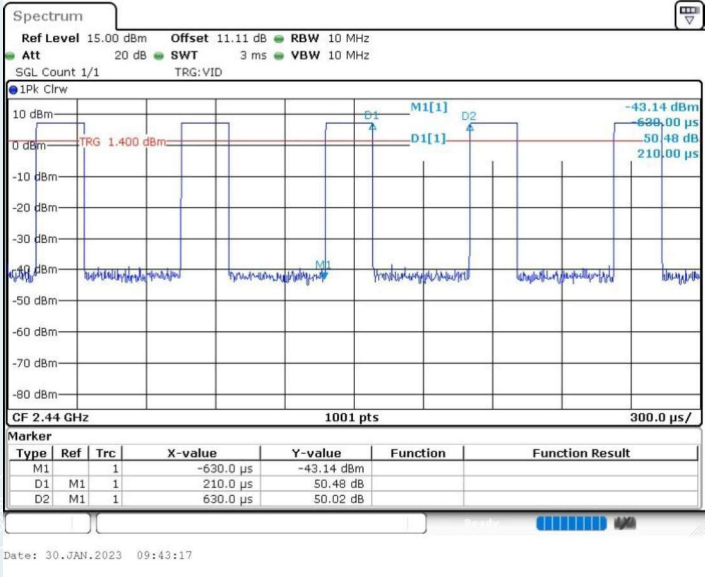
Test Mode	Antenna	Frequency [MHz]	ON Time [ms]	Period [ms]	DC [%]	T [s]
BLE_1M	Ant1	2440	0.40	0.63	63.49	0.00040
BLE_2M	Ant1	2440	0.21	0.63	33.33	0.00021

BLE_1M_2440MHz



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BLE_2M_2440MHz



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3. LABORATORY AND ACCREDITATIONS

3.1 LABORATORY

The tests & measurements refer to this report were performed by Shenzhen EMC Laboratory of Guangzhou GRG Metrology & Test Co., Ltd.

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3.2 ACCREDITATIONS

Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025.

USA A2LA(Certificate #2861.01)

The measuring facility of laboratories has been authorized or registered by the following approval agencies.

Canada ISED (Company Number: 24897, CAB identifier:CN0069)

USA FCC (Registration Number: 759402, Designation Number:CN1198)

Copies of granted accreditation certificates are available for downloading from our web site,
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4. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement		Frequency	Uncertainty
Radiated Emission	Horizontal	9kHz~30MHz	5.1dB ¹⁾
		30MHz~200MHz	4.5dB ¹⁾
		200MHz~1000MHz	4.4dB ¹⁾
		1GHz~18GHz	5.6dB ¹⁾
		18GHz~26.5GHz	3.7dB ¹⁾
	Vertical	9kHz~30MHz	5.1dB ¹⁾
		30MHz~200MHz	4.4dB ¹⁾
		200MHz~1000MHz	4.5dB ¹⁾
		1GHz~18GHz	5.6dB ¹⁾
		18GHz~26.5GHz	3.7dB ¹⁾
Conduction Emission		150kHz~30MHz	3.4dB ¹⁾

Measurement	Uncertainty
RF frequency	6.0×10^{-6}
RF power conducted	0.8dB
Power spectral density conducted	0.8dB
Occupied channel bandwidth	0.4dB
Unwanted emission, conducted	0.7dB
Humidity	6%
Temperature	2°C

Note:

¹⁾ This uncertainty represents an expanded uncertainty expressed at approximately the 95%.
This uncertainty represents an expanded uncertainty factor of $k=2$.

5. LIST OF USED TEST EQUIPMENT AT GRGT

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Conducted Emissions				
EMI TEST RECEIVER	R&S	ESCI	100783	2023-08-28
LISN(EUT)	R&S	ENV216	101543	2023-09-13
Test S/W	EZ	CCS-3A1-CE		
Radiated Spurious Emission&Restricted bands of operation				
Test S/W	EZ	CCS-03A1		
Test Receiver	R&S	ESR7	102444	2023-09-02
Preamplifier	EMEC	EM330	I00426	2023-03-05
Bi-log Antenna	Schwarzbeck	CBL6143A	26039	2024-10-23
Loop Antenna	TESEQ	HLA6121	52599	2023-04-02
Spectrum Analyzer	KEYSIGHT	N9010A	MY52221469	2023-06-29
Horn Antenna	Schwarzbeck	BBHA9120D	02143	2023-10-15
Board-Band Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170-497	2023-10-14
Amplifier	Tonscend	TAP01018048	AP20E8060075	2023-05-05
Amplifier	Tonscend	TAP184050	AP20E806071	2023-05-05
Amplifier	SHIRONG ELECTRONIC	DLNA-1G18G-G40	20200928005	2023-05-08
Test S/W	Tonscend	JS36-RE/2.5.1.5		
6dB Bandwidth&Conducted band edges and Spurious Emission&Power Spectral Density				
Spectrum Analyzer	R&S	FSV30	1321.3008K30-104381-rH	2023-11-17
BT/WIFI System	Tonscend	JS0806		
Maximum Peak Output Power				
Pulse power sensor	Anritsu	MA2411B	1126150	2023-03-01
Power meter	Anritsu	ML2495A	1204003	2023-02-28

Note: The calibration cycle of the above instruments is 12 months except for the Bi-log Antenna which is 24 months.

6. CONDUCTED EMISSION MEASUREMENT

6.1 LIMITS

Frequency range	Limits (dBμV)	
	Quasi-peak	Average
150kHz~0.5MHz	66~56	56~46
0.5MHz~5MHz	56	46
5MHz~30MHz	60	50

NOTE: (1) The lower limit shall apply at the transition frequencies.

(2) The limit decreases in line with the logarithm of the frequency in the range of 150kHz to 0.5MHz.

6.2 TEST PROCEDURES

Procedure of Preliminary Test

Test procedures follow ANSI C63.10:2013.

For measurement of the disturbance voltage the equipment under test (EUT) is connected to the power supply mains and any other extended network via one or more artificial network(s). An EUT, whether intended to be grounded or not, and which is to be used on a table is configured as follows:

– Either the bottom or the rear of the EUT shall be at a controlled distance of 40 cm from a reference ground plane. This ground plane is normally the wall or floor of a shielded room. It may also be a grounded metal plane of at least 2 m by 2 m. This is physically accomplished as follows:

1) place the EUT on a table of non-conducting material which is at least 80 cm high. Place the EUT so that it is 40 cm from the wall of the shielded room, or

2) place the EUT on a table of non-conducting material which is 40 cm high so that the bottom of the EUT is 40 cm above the ground plane;

– All other conductive surfaces of the EUT shall be at least 80 cm from the reference ground plane;

– The EUT are placed on the floor that one side of the housings is 40 cm from the vertical reference ground plane and other metallic parts;

– Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth forming a bundle 30 cm to 40 cm long, hanging approximately in the middle between the ground plane and the table.

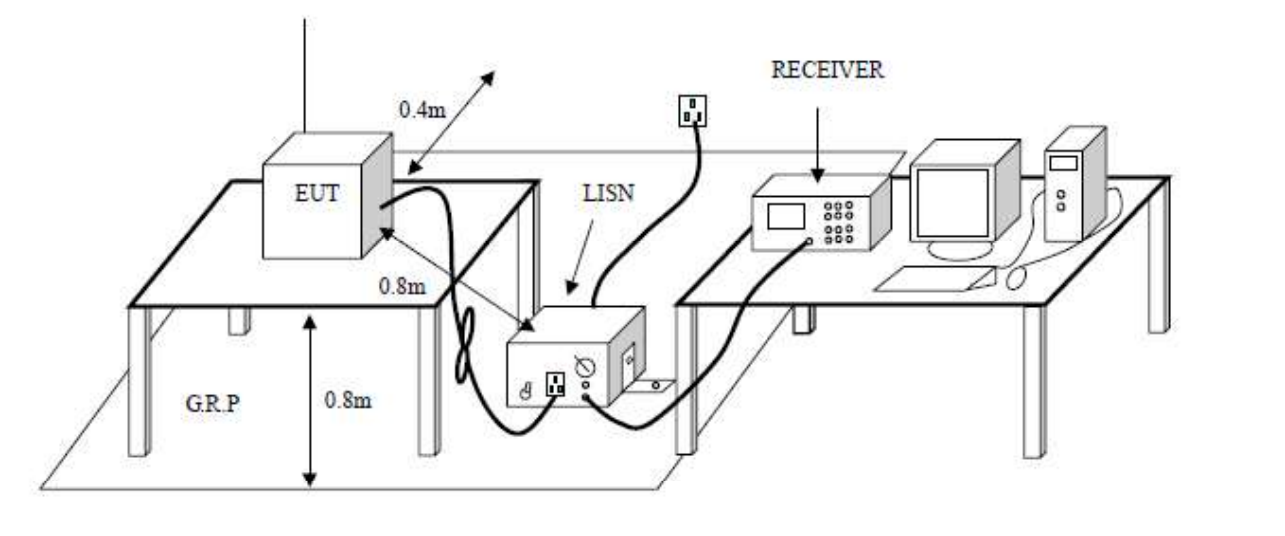
– I/O cables that are connected to a peripheral shall be bundled in the centre. The end of the cable may be terminated if required using correct terminating impedance. The total length shall not exceed 1 m.

The test mode(s) described in Item 2.5 were scanned during the preliminary test. After the preliminary scan, we found the test mode described in Item 2.5 producing the highest emission level. The EUT configuration and cable configuration of the above highest emission levels were recorded for reference of the final test.

Procedure of Final Test

EUT and support equipment were set up on the test bench as per the configuration with highest emission level in the preliminary test. A scan was taken on both power lines, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. The test data of the worst-case condition(s) was recorded.

6.3 TEST SETUP



6.4 DATA SAMPLE

Frequency (MHz)	QuasiPeak Reading (dBuV)	Average Reading (dBuV)	Correction Factor (dB)	QuasiPeak Result (dBuV)	Average Result (dBuV)	QuasiPeak Limit (dBuV)	Average Limit (dBuV)	QuasiPeak Margin (dB)	Average Margin (dB)	Remark (Pass/Fail)
X.XXXX	32.69	25.65	11.52	44.21	37.17	65.78	55.79	-21.57	-18.62	Pass

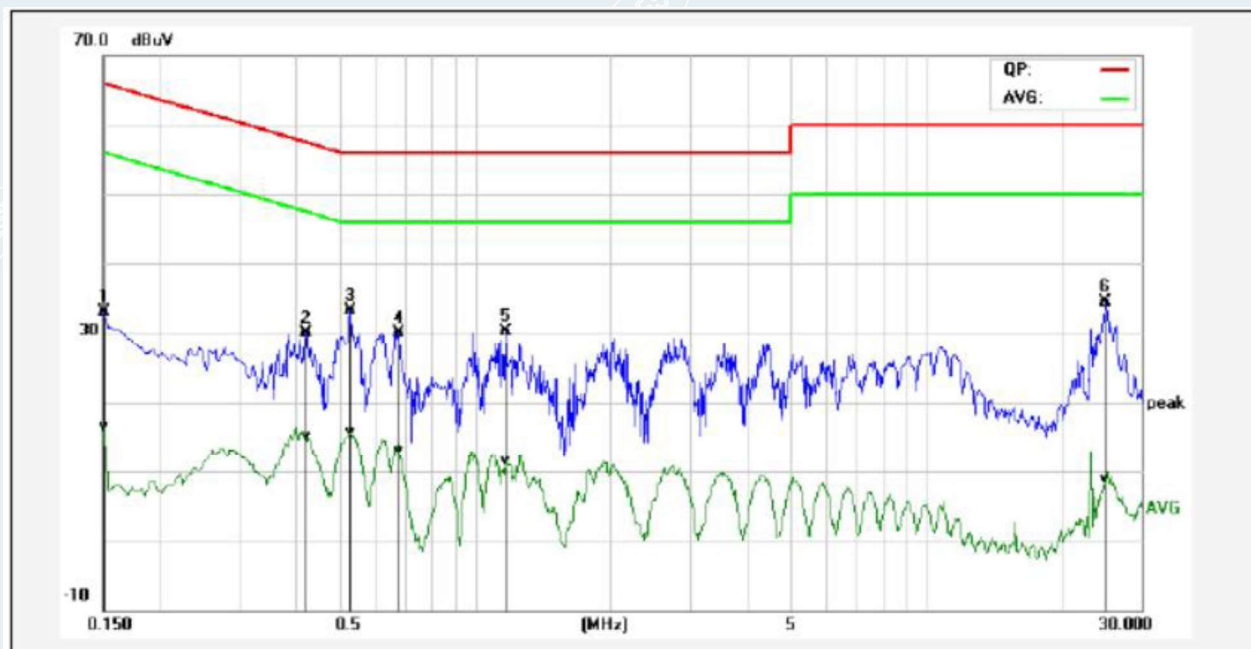
Factor = Insertion loss of LISN + Cable Loss
Result = Quasi-peak Reading/ Average Reading + Factor
Limit =Limit stated in standard
Margin = Result (dBuV) – Limit (dBuV)

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6.5 TEST RESULTS

For Adapter power supply:

EUT Name:	Smart Lock U100	Test Mode:	Mode 1
Model:	SDL-D01	Sample No:	E20230117700901-0005
Power supply:	AC 120V/60Hz	Environmental Conditions:	24.1°C/51%RH/101.0kPa
Test Engineer:	Wang Xinyuan	Test Date:	2023-02-11
Channel	BLE_2M_2402MHz	Line:	L

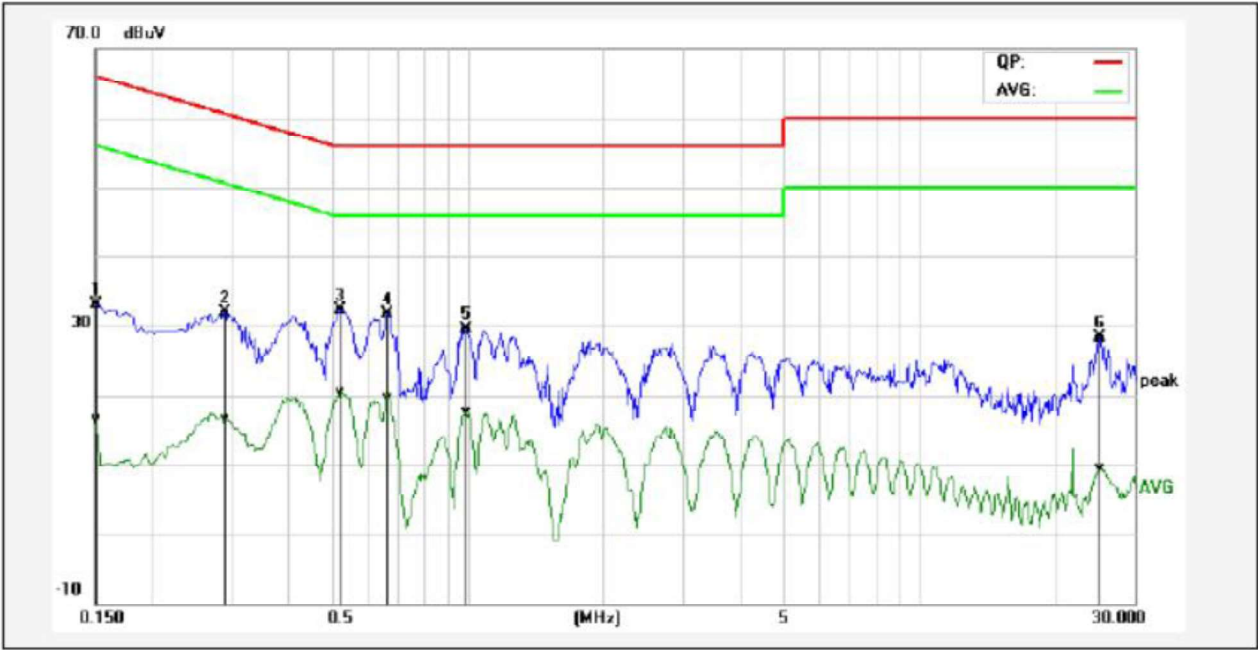


No.	Frequency (MHz)	QuasiPeak reading (dBuV)	Average reading (dBuV)	Correction factor (dB)	QuasiPeak result (dBuV)	Average result (dBuV)	QuasiPeak limit (dBuV)	Average limit (dBuV)	QuasiPeak margin (dB)	Average margin (dB)	Remark
1	0.1500	23.40	6.97	9.61	33.01	16.58	65.99	56.00	-32.98	-39.42	Pass
2	0.4220	20.57	5.54	9.61	30.18	15.15	57.41	47.41	-27.23	-32.26	Pass
3*	0.5299	23.66	6.17	9.61	33.27	15.78	56.00	46.00	-22.73	-30.22	Pass
4	0.6820	20.53	3.54	9.62	30.15	13.16	56.00	46.00	-25.85	-32.84	Pass
5	1.1660	20.61	1.94	9.63	30.24	11.57	56.00	46.00	-25.76	-34.43	Pass
6	25.0540	24.47	-1.02	9.94	34.41	8.92	60.00	50.00	-25.59	-41.08	Pass

REMARKS: L = Live Line

Pre-scan all mode and recorded the worst case results in this report (TX- Low Channel(2Mbps))

EUT Name:	Smart Lock U100	Test Mode:	Mode 1
Model:	SDL-D01	Sample No:	E20230117700901-0005
Power supply:	AC 120V/60Hz	Environmental Conditions:	24.1℃/51%RH/101.0kPa
Test Engineer:	Wang Xinyuan	Test Date:	2023-02-11
Channel	BLE_2M_2402MHz	Line:	N



No.	Frequency (MHz)	QuasiPeak reading (dBuV)	Average reading (dBuV)	Correction factor (dB)	QuasiPeak result (dBuV)	Average result (dBuV)	QuasiPeak limit (dBuV)	Average limit (dBuV)	QuasiPeak margin (dB)	Average margin (dB)	Remark
1	0.1500	23.43	6.95	9.60	33.03	16.55	65.99	56.00	-32.96	-39.45	Pass
2	0.2900	22.27	6.95	9.60	31.87	16.55	60.52	50.52	-28.65	-33.97	Pass
3*	0.5220	22.71	10.85	9.60	32.31	20.45	56.00	46.00	-23.69	-25.55	Pass
4	0.6620	22.03	10.17	9.61	31.64	19.78	56.00	46.00	-24.36	-26.22	Pass
5	0.9900	19.95	7.98	9.63	29.58	17.61	56.00	46.00	-26.42	-28.39	Pass
6	25.1660	18.30	-0.58	10.08	28.38	9.50	60.00	50.00	-31.62	-40.50	Pass

REMARKS: N = Neutral Line.
Pre-scan all mode and recorded the worst case results in this report (TX-Low Channel(2Mbps))

7. RADIATED SPURIOUS EMISSIONS

7.1 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, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30dB instead of 20dB. Attenuation below the general limits specified in §15.209(a) is not required.

Frequency (MHz)	Quasi-peak($\mu\text{V/m}$)	Measurement distance(m)	Quasi-peak(dB $\mu\text{V/m}$)@distance 3m
0.009-0.490	2400/F(kHz)	300	128.5~93.8
0.490-1.705	24000/F(kHz)	30	73.8~63
1.705-30.0	30	30	69.5
30 ~ 88	100	3	40
88~216	150	3	43.5
216 ~ 960	200	3	46
Above 960	500	3	54

NOTE:

- (1) The emission limits for the ranges 9-90kHz and 110-490kHz are based on measurements employing a linear average detector.
- (2) The lower limit shall apply at the transition frequencies.
- (3) Above 18GHz test distance is 1m, so the Peak Limit=74+20*log(3/1)=83.54 (dB $\mu\text{V/m}$).
The Avg Limit=54+20*log(3/1)=63.54 (dB $\mu\text{V/m}$).

7.2 TEST PROCEDURES

1) Sequence of testing 9kHz to 30MHz

Setup:

- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.
- If the EUT is a tabletop system, a rotatable table with 0.8m height is used.
- If the EUT is a floor standing device, it is placed on the ground.
- Auxiliary equipment and cables were positioned to simulate fixed frequency transmitting conditions.
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- The measurement distance is 3meter.
- The EUT was set into operation.

Pre measurement:

- The turntable rotates from 0° to 360°.
- The antenna height is 1.0 meter.
- The antenna is polarized X,Y and Z.
- At each turntable position the analyzer sweeps with peak detection to find the maximum of all emissions

Final measurement:

- Identified emissions during the pre measurement the software maximizes by rotating the turntable

position (0° to 360°) and by rotating the elevation axes (0° to 360°).

--- The final measurement will be done in the position (turntable and elevation) causing the highest emissions with QP detector.

--- The final levels, frequency, measuring time, bandwidth, turntable position, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the pre measurement and the limit will be stored.

2) Sequence of testing 30MHz to 1GHz

Setup:

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

--- If the EUT is a tabletop system, a table with 0.8m height is used, which is placed on the ground plane.

--- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.

--- Auxiliary equipment and cables were positioned to simulate fixed frequency transmitting conditions.

--- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.

--- The measurement distance is 3 meter.

--- The EUT was set into operation.

Pre measurement:

--- The turntable rotates from 0° to 360° .

--- The antenna is polarized vertical and horizontal.

--- The antenna height changes from 1 to 4 meter.

--- At each turntable position, antenna polarization and height the analyzer sweeps three times in peak to find the maximum of all emissions.

Final measurement:

--- The final measurement will be performed with minimum the six highest peaks.

--- According to the maximum antenna and turntable positions of pre measurement the software maximize the peaks by changing turntable rotates from 0° to 360° and antenna movement between 1 and 4 meter.

--- The final measurement will be done with QP detector with an EMI receiver.

--- The final levels, frequency, measuring time, bandwidth, antenna height, antenna polarization, turntable angle, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the pre measurement with marked maximum final measurements and the limit will be stored.

3) Sequence of testing 1GHz to 18GHz

Setup:

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

--- If the EUT is a tabletop system, a rotatable table with 1.5m height is used.

--- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.

--- Auxiliary equipment and cables were positioned to simulate fixed frequency transmitting conditions.

--- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.

--- The measurement distance is 3 meter.

--- The EUT was set into operation.

Pre measurement:

- The turntable rotates from 0° to 360°.
- The antenna is polarized vertical and horizontal.
- The antenna height scan range is 1 meter to 4 meter.
- At each turntable position and antenna polarization the analyzer sweeps with peak detection to find the maximum of all emissions.

Final measurement:

- The final measurement will be performed with minimum the six highest peaks.
- According to the maximum antenna and turntable positions of pre measurement the software maximize the peaks by changing turntable rotates from 0° to 360° and antenna movement between 1 and 4 meter. This procedure is repeated for both antenna polarizations.
- The final measurement will be done in the position (turntable, EUT-table and antenna polarization) causing the highest emissions with Peak and Average detector.
- The final levels, frequency, measuring time, bandwidth, turntable position, EUT-table position, antenna polarization, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the pre measurement with marked maximum final measurements and the limit will be stored.

4) Sequence of testing above 18GHz**Setup:**

- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.
- If the EUT is a tabletop system, a rotatable table with 1.5 m height is used.
- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.
- Auxiliary equipment and cables were positioned to simulate fixed frequency transmitting conditions.
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- The measurement distance is 1 meter.
- The EUT was set into operation.

Pre measurement:

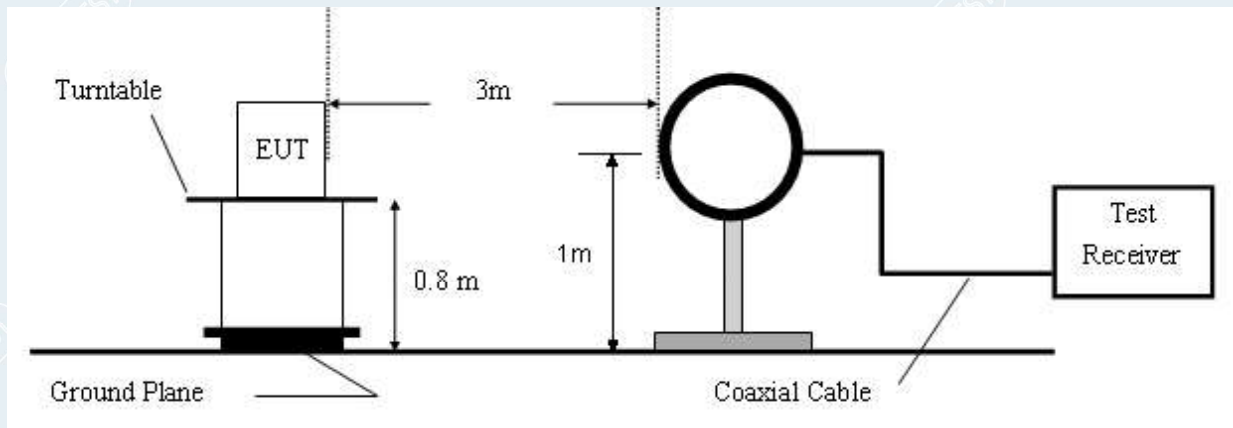
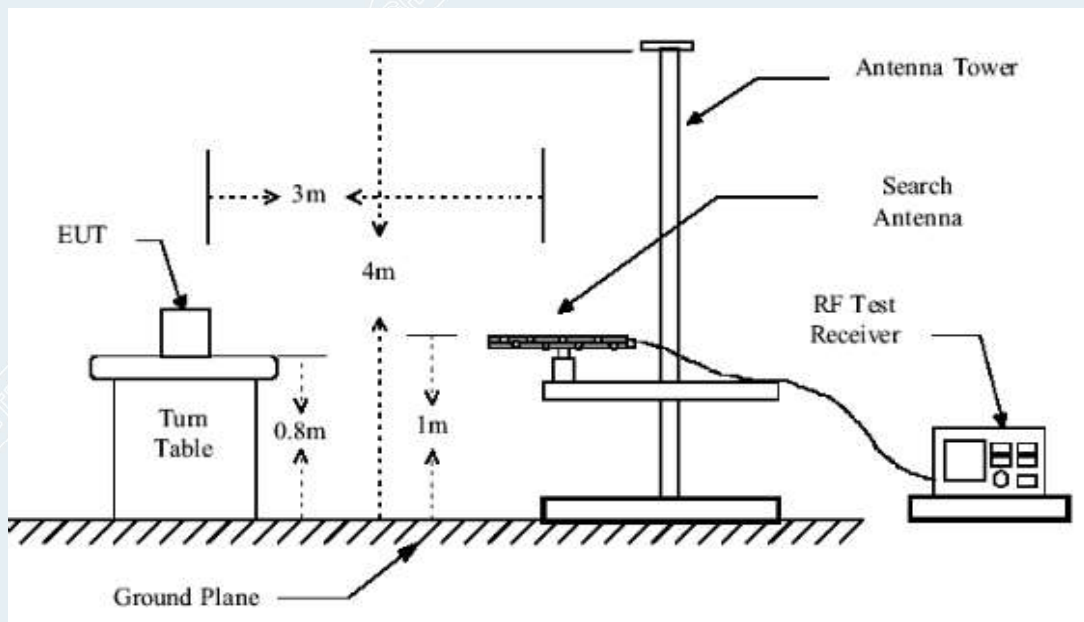
- The turntable rotates from 0° to 360°.
- The antenna is polarized vertical and horizontal.
- The antenna height scan range is 1 meter to 4 meter.
- At each turntable position and antenna polarization the analyzer sweeps with peak detection to find the maximum of all emissions.

Final measurement:

- The final measurement will be performed with minimum the six highest peaks.
- According to the maximum antenna and turntable positions of pre measurement the software maximize the peaks by changing turntable rotates from 0° to 360° and antenna movement between 1 and 4 meter. This procedure is repeated for both antenna polarizations.
- The final measurement will be done in the position (turntable, EUT-table and antenna polarization) causing the highest emissions with Peak and Average detector.
- The final levels, frequency, measuring time, bandwidth, turntable position, EUT-table position, antenna polarization, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the pre measurement with marked maximum final measurements and the limit will be stored.

NOTE:

- (a). The frequency from 9kHz to 150kHz, Set RBW=300Hz (for Peak&AVG), VBW=300Hz (for Peak&AVG). The frequency from 150kHz to 30MHz, Set RBW=9kHz, VBW=9kHz, (for QP Detector).
- (b). The frequency from 30MHz to 1GHz, Set RBW=120kHz, VBW=300kHz, (for QP Detector).
- (c). The frequency above 1GHz, for Peak detector: Set RBW=1MHz, VBW=3MHz.
- (d). The frequency above 1GHz, for Avg detector: Set RBW=1MHz, if the EUT is configured to transmit with duty cycle $\geq 98\%$, set $VBW \leq RBW/100$ (i.e., 10kHz) but not less than 10 Hz. If the EUT duty cycle is $< 98\%$, set $VBW \geq 1/T$, Where T is defined in section 2.8.

7.3 TEST SETUP**Figure 1. 9kHz to 30MHz radiated emissions test configuration****Figure 2. 30MHz to 1GHz radiated emissions test configuration**

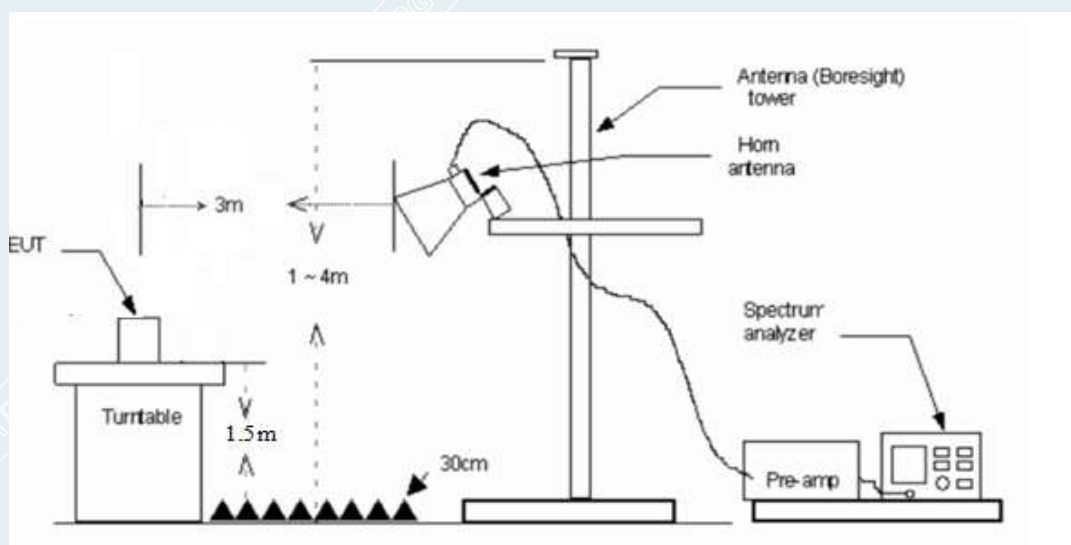


Figure 3. 1GHz to 18GHz radiated emissions test configuration

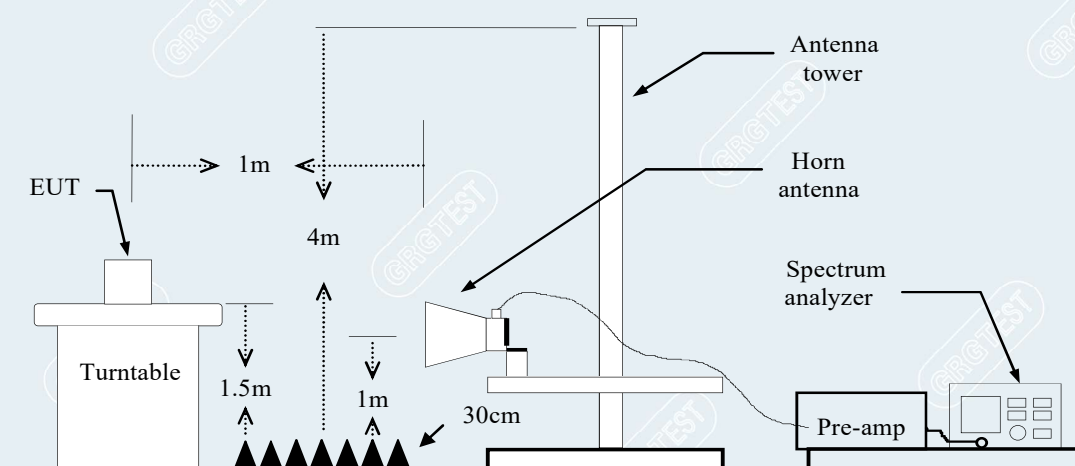


Figure 4. 18GHz to 26.5GHz radiated emissions test configuration

7.4 DATA SAMPLE**30MHz to 1GHz**

No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Pole
xxx	xxx	37.06	-15.48	21.58	40.00	-18.42	QP	Vertical

1GHz to 18GHz

No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Pole
xxx	xxx	65.45	-11.12	54.33	74.00	-19.67	Peak	Vertical
xxx	xxx	63.00	-11.12	51.88	54.00	-2.12	AVG	Vertical

Above 18GHz

No.	Frequency (MHz)	Reading (dBuV/m)	Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Pole
xxx	xxx	68.86	57.66	-11.20	83.54	25.88	peak	Vertical
xxx	xxx	68.89	-11.20	57.69	63.54	5.85	AVG	Vertical

Frequency (MHz)

= Emission frequency in MHz

Ant.Pol. (H/V)

= Antenna polarization

Reading (dBuV)

= Uncorrected Analyzer / Receiver reading

Correction Factor (dB/m)

= Antenna factor + Cable loss – Amplifier gain

Result (dBuV/m)

= Reading (dBuV) + Correction Factor (dB/m)

Limit (dBuV/m)

= Limit stated in standard

Margin (dB)

= Remark Result (dBuV/m) – Limit (dBuV/m)

Peak

= Peak Reading

QP

= Quasi-peak Reading

AVG

= Average Reading

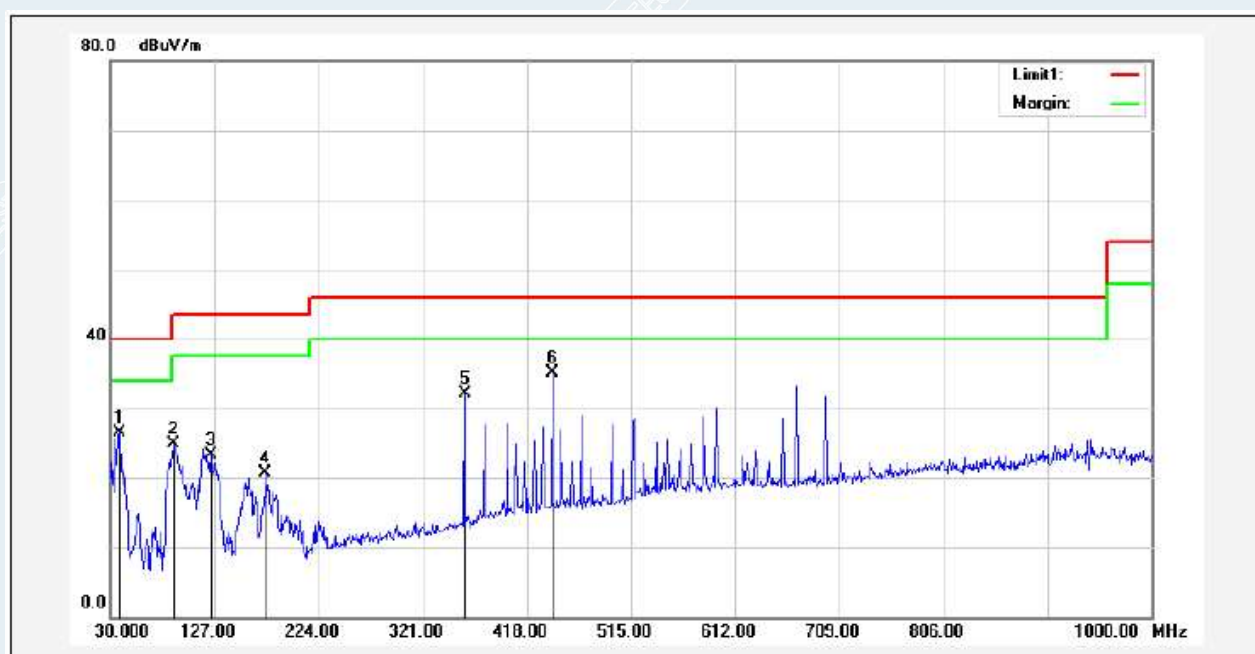
----- The following blanks -----

7.5 TEST RESULTS

Below 1GHz

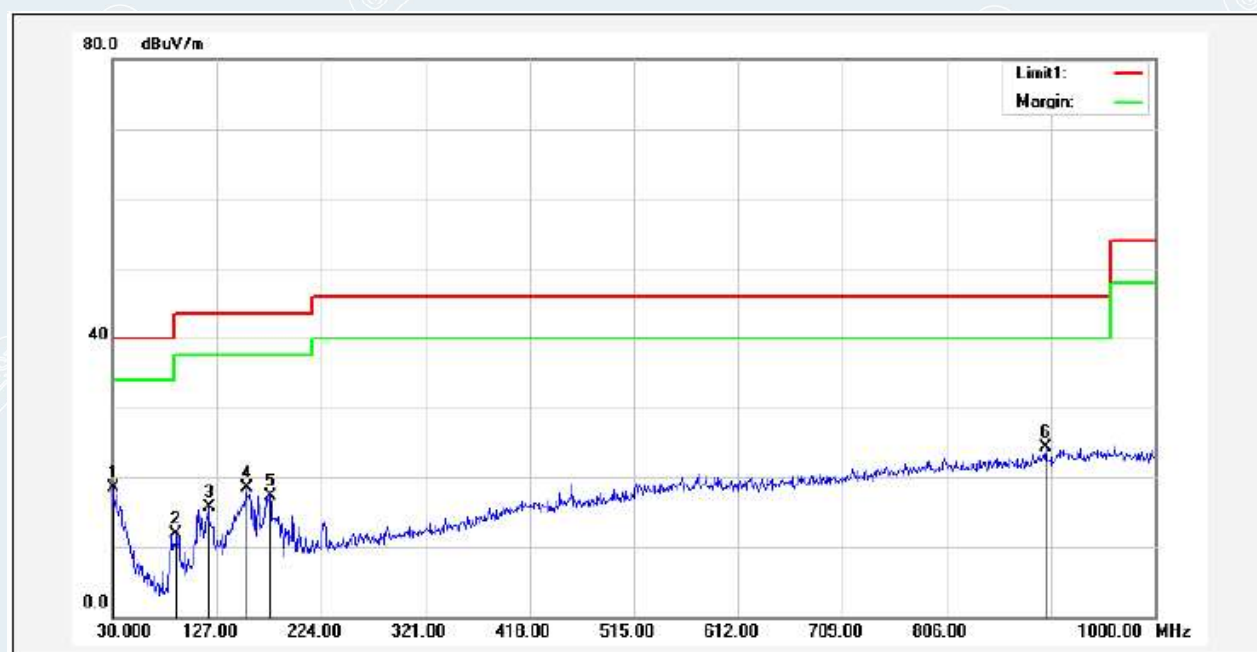
For adapter power supply, only the worst mode and channel were recorded in this report. (BLE_1M_2480MHz)

EUT Name:	Smart Lock U100	Test Mode:	Mode 1
Model:	SDL-D01	Sample No:	E20230117700901-0005
Power supply:	AC 120V/60Hz	Environmental Conditions:	21.2°C/43%RH/101.0kPa
Test Engineer:	Huang Xinlong	Test Date:	2023-02-17
Channel	BLE_1M_2480MHz	Polarity:	Vertical



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Height (cm)	Detector type
1	37.7600	46.97	-20.41	26.56	40.00	-13.44	153	100	QP
2	89.1700	55.47	-30.60	24.87	43.50	-18.63	320	100	QP
3	123.1200	49.23	-26.02	23.21	43.50	-20.29	56	100	QP
4	174.5300	48.20	-27.54	20.66	43.50	-22.84	262	300	QP
5	359.8000	53.92	-21.91	32.01	46.00	-13.99	47	300	QP
6*	441.2800	54.43	-19.30	35.13	46.00	-10.87	355	300	QP

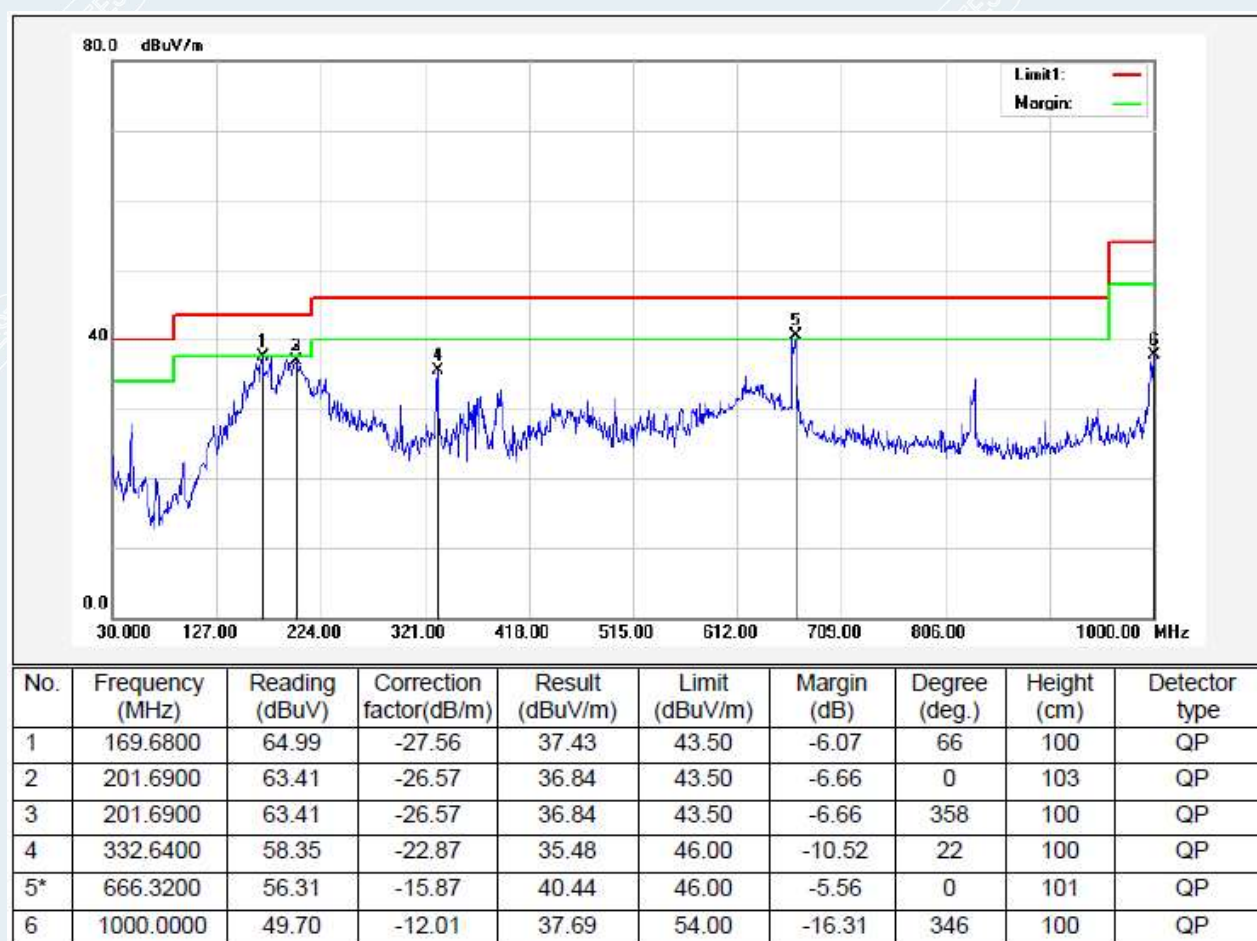
EUT Name:	Smart Lock U100	Test Mode:	Mode 1
Model:	SDL-D01	Sample No:	E20230117700901-0005
Power supply:	AC 120V/60Hz	Environmental Conditions:	21.2°C/43%RH/101.0kPa
Test Engineer:	Huang Xinlong	Test Date:	2023-02-17
Channel	BLE_1M_2480MHz	Polarity:	Horizontal



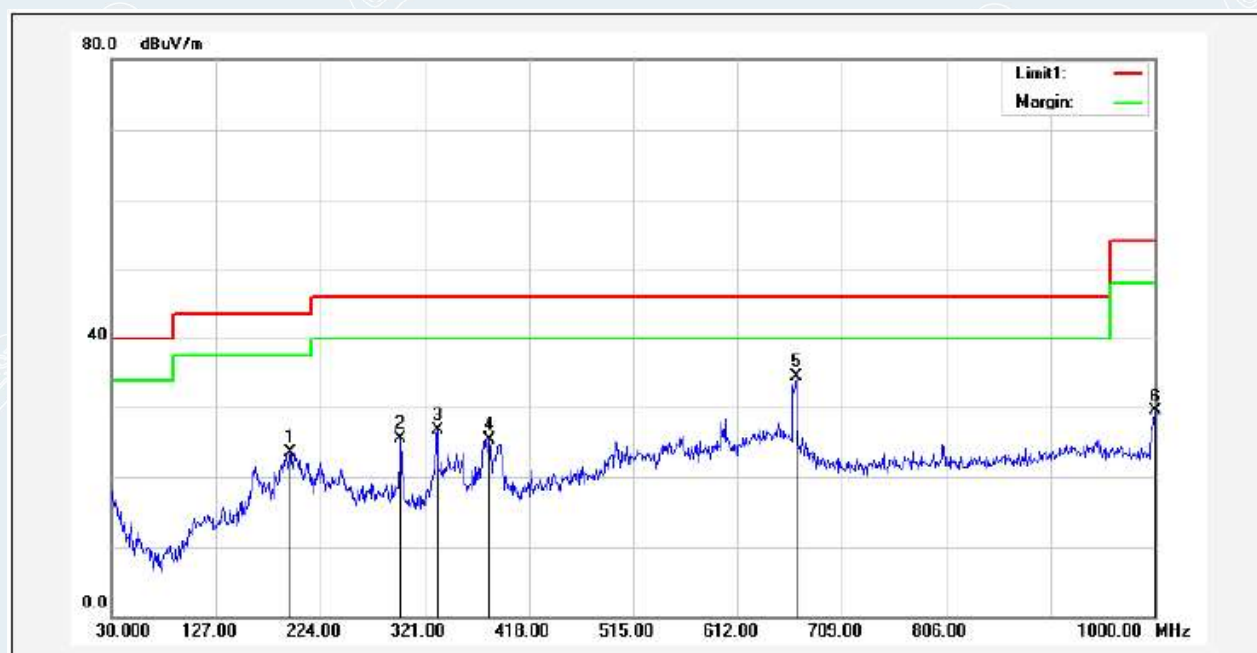
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Height (cm)	Detector type
1*	30.0000	35.11	-16.65	18.46	40.00	-21.54	152	100	QP
2	89.1700	42.41	-30.60	11.81	43.50	-31.69	223	400	QP
3	119.2400	41.98	-26.27	15.71	43.50	-27.79	0	245	QP
4	154.1600	45.42	-26.95	18.47	43.50	-25.03	208	200	QP
5	176.4700	44.78	-27.52	17.26	43.50	-26.24	0	266	QP
6	898.1500	37.29	-12.98	24.31	46.00	-21.69	228	100	QP

For battery power supply, only the worst mode and channel were recorded in this report. (BLE_2M_2402MHz)

EUT Name:	Smart Lock U100	Test Mode:	Mode 1
Model:	SDL-D01	Sample No:	E20230117700901-0005
Power supply:	DC 6V	Environmental Conditions:	23.4°C/55%RH/101.0kPa
Test Engineer:	Huang Xinlong	Test Date:	2023-02-02
Channel	BLE_2M_2402MHz	Polarity:	Vertical



EUT Name:	Smart Lock U100	Test Mode:	Mode 1
Model:	SDL-D01	Sample No:	E20230117700901-0005
Power supply:	DC 6V	Environmental Conditions:	23.4°C/55%RH/101.0kPa
Test Engineer:	Huang Xinlong	Test Date:	2023-02-02
Channel	BLE_2M_2402MHz	Polarity:	Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Height (cm)	Detector type
1	195.8700	50.44	-26.85	23.59	43.50	-19.91	360	207	QP
2	298.6900	49.17	-23.69	25.48	46.00	-20.52	173	300	QP
3	332.6400	49.63	-22.87	26.76	46.00	-19.24	124	300	QP
4	381.1400	46.26	-20.92	25.34	46.00	-20.66	360	204	QP
5*	666.3200	50.42	-15.87	34.55	46.00	-11.45	118	200	QP
6	1000.0000	41.45	-12.01	29.44	54.00	-24.56	328	200	QP

Remark:

- 1 No emission found between lowest internal used/generated frequency to 30MHz.
- 2 Radiated emissions measured in frequency range from 9kHz to 1GHz were made with an instrument using Quasi-peak detector mode.
- 3 The IF bandwidth of Receiver between 30MHz to 1GHz was 120kHz.

1GHz-18GHz:

According to C63.10, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement, so AV emission value did not show in below table if the peak value complies with average limit.

Mode: TX/ BLE_1M

Lowest Frequency (2402MHz)

Environment: 25.0°C/60%RH/101.0kPa

Tested By:Zhang Zishan

Voltage: DC 6V

Date: 2023-01-31

Suspected Data List									
NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1997.8747	76.52	55.35	-21.17	74.00	18.65	100	84	Horizontal
2	2307.9135	69.37	50.35	-19.02	74.00	23.65	100	103	Horizontal
3	2661.4577	65.23	46.80	-18.43	74.00	27.20	100	74	Horizontal
4	3328.166	64.19	47.05	-17.14	74.00	26.95	100	32	Horizontal
5	4807.726	63.73	51.14	-12.59	74.00	22.86	200	344	Horizontal
6	7211.7765	61.22	58.06	-3.16	74.00	15.94	200	51	Horizontal

AV Final Data List									
NO.	Freq. [MHz]	Factor [dB]	AV Reading [dBμV/m]	AV Value [dBμV/m]	AV Limit [dBμV/m]	AV Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1991.7873	-21.17	53.65	32.48	54.00	21.52	114	96.6	Horizontal
2	2307.9135	-19.02	54.15	35.13	54.00	18.87	100	103	Horizontal
3	4807.9184	-12.59	57.42	44.83	54.00	9.17	194	350.2	Horizontal
4	7211.9926	-3.16	52.45	49.29	54.00	4.71	198	47.2	Horizontal

Suspected Data List									
NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1164.5206	76.33	52.08	-24.25	74.00	21.92	100	104	Vertical
2	1662.8329	74.59	52.12	-22.47	74.00	21.88	100	104	Vertical
3	2665.4582	69.60	51.93	-17.67	74.00	22.07	100	123	Vertical
4	3328.166	70.05	53.69	-16.36	74.00	20.31	100	70	Vertical
5	4807.726	61.84	48.96	-12.88	74.00	25.04	200	285	Vertical
6	7211.7765	57.33	55.02	-2.31	74.00	18.98	200	61	Vertical

AV Final Data List									
NO.	Freq. [MHz]	Factor [dB]	AV Reading [dBμV/m]	AV Value [dBμV/m]	AV Limit [dBμV/m]	AV Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1164.358	-24.25	61.61	37.36	54.00	16.64	101	108.9	Vertical
2	1660.7727	-22.47	58.60	36.13	54.00	17.87	162	103	Vertical
3	2660.7719	-17.67	53.34	35.67	54.00	18.33	128	131.8	Vertical
4	3325.4392	-16.36	51.34	34.98	54.00	19.02	100	63.6	Vertical

5	4807.9664	-12.88	54.28	41.40	54.00	12.60	199	310	Vertical
6	7211.7766	-2.31	48.08	45.77	54.00	8.23	200	55.9	Vertical

----- The following blanks -----

Mode: TX/ BLE_1M
 Middle Frequency (2440MHz)
 Environment: 25.0°C/60%RH/101.0kPa
 Tested By:Zhang Zishan

Voltage: DC 6V
 Date: 2023-01-31

Suspected Data List									
NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1163.2704	69.39	44.73	-24.66	74.00	29.27	100	73	Horizontal
2	1744.8431	73.27	50.33	-22.94	74.00	23.67	100	210	Horizontal
3	2315.6645	69.75	50.50	-19.25	74.00	23.50	100	84	Horizontal
4	2664.4581	66.73	48.30	-18.43	74.00	25.70	100	132	Horizontal
5	3401.3002	72.11	54.86	-17.25	74.00	19.14	200	23	Horizontal
6	7331.7915	61.43	58.28	-3.15	74.00	15.72	200	335	Horizontal

AV Final Data List									
NO.	Freq. [MHz]	Factor [dB]	AV Reading [dBμV/m]	AV Value [dBμV/m]	AV Limit [dBμV/m]	AV Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1737.9409	-22.94	48.63	25.69	54.00	28.31	120	111.1	Horizontal
2	2315.0402	-19.25	56.55	37.30	54.00	16.70	100	86.4	Horizontal
3	2654.7958	-18.43	49.99	31.56	54.00	22.44	100	140.8	Horizontal
4	3390.3587	-17.25	47.89	30.64	54.00	23.36	139	86.6	Horizontal
5	7331.8645	-3.15	52.21	49.06	54.00	4.94	200	342.4	Horizontal

Suspected Data List									
NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1162.2703	77.54	53.34	-24.20	74.00	20.66	100	104	Vertical
2	1665.0831	73.45	51.05	-22.40	74.00	22.95	100	104	Vertical
3	2663.958	67.04	49.35	-17.69	74.00	24.65	100	123	Vertical
4	3328.166	63.66	47.30	-16.36	74.00	26.70	100	60	Vertical
5	5987.2484	61.73	52.95	-8.78	74.00	21.05	100	130	Vertical
6	7331.7915	57.72	54.43	-3.29	74.00	19.57	200	41	Vertical

AV Final Data List									
NO.	Freq. [MHz]	Factor [dB]	AV Reading [dBμV/m]	AV Value [dBμV/m]	AV Limit [dBμV/m]	AV Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1163.9419	-24.20	61.22	37.02	54.00	16.98	100	110.6	Vertical
2	1663.1037	-22.40	57.32	34.92	54.00	19.08	100	117.6	Vertical
3	2663.5852	-17.69	51.39	33.70	54.00	20.30	149	132.6	Vertical
4	5983.1212	-8.78	43.64	34.86	54.00	19.14	114	108.9	Vertical
5	7331.0595	-3.29	50.06	46.77	54.00	7.23	200	49.1	Vertical

Mode: TX/ BLE_1M

Highest Frequency (2480MHz)

Environment: 25.0°C/60%RH/101.0kPa

Tested By:Zhang Zishan

Voltage: DC 6V

Date: 2023-01-31

Suspected Data List									
NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1164.0205	70.30	45.65	-24.65	74.00	28.35	100	74	Horizontal
2	1331.0414	68.91	45.83	-23.08	74.00	28.17	100	162	Horizontal
3	1666.0833	67.26	44.17	-23.09	74.00	29.83	100	15	Horizontal
4	2352.4191	69.93	49.66	-20.27	74.00	24.34	100	84	Horizontal
5	2997.2497	65.49	48.34	-17.15	74.00	25.66	100	212	Horizontal
6	7438.6798	62.17	59.16	-3.01	74.00	14.84	200	336	Horizontal

AV Final Data List									
NO.	Freq. [MHz]	Factor [dB]	AV Reading [dBμV/m]	AV Value [dBμV/m]	AV Limit [dBμV/m]	AV Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2351.926	-20.27	54.43	34.16	54.00	19.84	100	55.7	Horizontal
2	2997.2497	-17.15	53.14	35.99	54.00	18.01	100	212	Horizontal
3	7440.0174	-3.01	51.92	48.91	54.00	5.09	199	47.2	Horizontal

Suspected Data List									
NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1163.2704	76.80	52.58	-24.22	74.00	21.42	100	111	Vertical
2	1332.5416	70.70	48.17	-22.53	74.00	25.83	100	102	Vertical
3	1666.0833	74.12	51.75	-22.37	74.00	22.25	100	102	Vertical
4	2663.708	67.53	49.84	-17.69	74.00	24.16	100	132	Vertical
5	3988.2485	65.68	50.62	-15.06	74.00	23.38	100	116	Vertical
6	7440.5551	59.35	56.47	-2.88	74.00	17.53	200	49	Vertical

AV Final Data List									
NO.	Freq. [MHz]	Factor [dB]	AV Reading [dBμV/m]	AV Value [dBμV/m]	AV Limit [dBμV/m]	AV Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1161.911	-24.22	60.47	36.25	54.00	17.75	102	118.4	Vertical
2	1327.3499	-22.53	54.53	32.00	54.00	22.00	100	102.6	Vertical
3	1664.8849	-22.37	59.09	36.72	54.00	17.28	106	110.6	Vertical
4	2654.0215	-17.69	49.93	32.24	54.00	21.76	108	295.3	Vertical
5	3994.4643	-15.06	47.12	32.06	54.00	21.94	101	109.1	Vertical
6	7439.8863	-2.88	49.73	46.85	54.00	7.15	200	55.6	Vertical

Mode: TX/ BLE_2M

Lowest Frequency (2402MHz)

Environment: 25.0°C/60%RH/101.0kPa

Tested By:Zhang Zishan

Voltage: DC 6V

Date: 2023-01-31

Suspected Data List									
NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1161.5202	71.44	46.74	-24.70	74.00	27.26	100	65	Horizontal
2	1196.2745	75.56	51.56	-24.00	74.00	22.44	200	84	Horizontal
3	1662.5828	68.78	45.66	-23.12	74.00	28.34	100	75	Horizontal
4	2300.6626	65.72	46.91	-18.81	74.00	27.09	100	75	Horizontal
5	4805.8507	59.73	47.13	-12.60	74.00	26.87	200	334	Horizontal
6	7209.9012	60.64	57.48	-3.16	74.00	16.52	200	344	Horizontal

AV Final Data List									
NO.	Freq. [MHz]	Factor [dB]	AV Reading [dBμV/m]	AV Value [dBμV/m]	AV Limit [dBμV/m]	AV Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1196.2745	-24.00	58.14	34.14	54.00	19.86	200	84	Horizontal
2	7210.9097	-3.16	46.77	43.61	54.00	10.39	193	48.8	Horizontal

Suspected Data List									
NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1198.0248	75.43	50.44	-24.99	74.00	23.56	200	93	Vertical
2	1664.333	72.61	50.19	-22.42	74.00	23.81	200	161	Vertical
3	2666.4583	68.99	51.34	-17.65	74.00	22.66	200	142	Vertical
4	3324.4156	65.48	49.12	-16.36	74.00	24.88	100	62	Vertical
5	4792.7241	65.92	53.09	-12.83	74.00	20.91	100	100	Vertical
6	7211.7765	56.25	53.94	-2.31	74.00	20.06	100	80	Vertical

AV Final Data List									
NO.	Freq. [MHz]	Factor [dB]	AV Reading [dBμV/m]	AV Value [dBμV/m]	AV Limit [dBμV/m]	AV Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1198.0250	-24.99	53.17	28.18	54.00	25.82	200	113	Vertical
2	1664.3510	-22.42	57.15	34.73	54.00	19.27	200	161	Vertical
3	2666.4630	-17.65	60.32	42.67	54.00	11.33	200	142	Vertical
4	3324.4214	-16.35	55.11	38.76	54.00	15.24	100	80	Vertical
5	4792.7601	-12.85	55.03	42.20	54.00	11.80	100	100	Vertical
6	7211.7565	-2.31	45.01	42.70	54.00	11.30	100	80	Vertical

Mode: TX/ BLE_2M
 Middle Frequency (2440MHz)
 Environment: 25.0°C/60%RH/101.0kPa
 Tested By:Zhang Zishan

Voltage: DC 6V
 Date: 2023-01-31

Suspected Data List									
NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1165.2707	72.49	47.87	-24.62	74.00	26.13	100	63	Horizontal
2	1196.0245	75.82	51.81	-24.01	74.00	22.19	200	73	Horizontal
3	1665.3332	68.71	45.62	-23.09	74.00	28.38	100	83	Horizontal
4	2315.4144	69.82	50.57	-19.25	74.00	23.43	100	53	Horizontal
5	2658.2073	64.91	46.48	-18.43	74.00	27.52	100	121	Horizontal
6	7329.9162	61.06	57.93	-3.13	74.00	16.07	200	345	Horizontal

AV Final Data List									
NO.	Freq. [MHz]	Factor [dB]	AV Reading [dBμV/m]	AV Value [dBμV/m]	AV Limit [dBμV/m]	AV Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1199.9794	-24.01	58.51	34.50	54.00	19.50	200	86.3	Horizontal
2	2315.7843	-19.25	53.13	33.88	54.00	20.12	100	94.3	Horizontal
3	7330.7946	-3.13	46.20	43.07	54.00	10.93	199	340.7	Horizontal

Suspected Data List									
NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1195.2744	76.46	51.53	-24.93	74.00	22.47	200	201	Vertical
2	1749.3437	73.88	52.12	-21.76	74.00	21.88	200	17	Vertical
3	2666.7083	68.72	51.07	-17.65	74.00	22.93	100	309	Vertical
4	3328.166	65.35	48.99	-16.36	74.00	25.01	100	277	Vertical
5	4788.9736	64.70	51.91	-12.79	74.00	22.09	100	101	Vertical
6	7333.6667	58.32	54.99	-3.33	74.00	19.01	200	59	Vertical

AV Final Data List									
NO.	Freq. [MHz]	Factor [dB]	AV Reading [dBμV/m]	AV Value [dBμV/m]	AV Limit [dBμV/m]	AV Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1198.725	-24.93	57.00	32.07	54.00	21.93	199	110.2	Vertical
2	1751.056	-21.76	49.01	27.25	54.00	26.75	200	162.5	Vertical
3	2661.5398	-17.65	49.73	32.08	54.00	21.92	100	305.7	Vertical
4	3327.5672	-16.36	47.67	31.31	54.00	22.69	100	95.7	Vertical
5	4789.2607	-12.79	44.98	32.19	54.00	21.81	108	164.6	Vertical
6	7330.9564	-3.33	44.87	41.54	54.00	12.46	200	48.8	Vertical

Mode: TX/ BLE_2M

Highest Frequency (2480MHz)

Environment: 25.0°C/60%RH/101.0kPa

Tested By:Zhang Zishan

Voltage: DC 6V

Date: 2023-01-31

Suspected Data List									
NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1164.7706	73.50	48.87	-24.63	74.00	25.13	100	71	Horizontal
2	1198.7748	77.11	53.16	-23.95	74.00	20.84	200	80	Horizontal
3	1333.0416	69.90	46.80	-23.10	74.00	27.20	100	169	Horizontal
4	2351.4189	69.13	48.86	-20.27	74.00	25.14	100	90	Horizontal
5	3330.0413	63.46	46.33	-17.13	74.00	27.67	100	74	Horizontal
6	7440.5551	61.11	58.08	-3.03	74.00	15.92	200	35	Horizontal

AV Final Data List									
NO.	Freq. [MHz]	Factor [dB]	AV Reading [dBμV/m]	AV Value [dBμV/m]	AV Limit [dBμV/m]	AV Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1162.4897	-24.63	57.19	32.56	54.00	21.44	100	79.4	Horizontal
2	1199.5289	-23.95	59.87	35.92	54.00	18.08	198	86.3	Horizontal
3	2351.2548	-20.27	50.50	30.23	54.00	23.77	101	54.9	Horizontal
4	7438.7713	-3.03	45.68	42.65	54.00	11.35	199	48	Horizontal

Suspected Data List									
NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1198.2748	76.90	51.91	-24.99	74.00	22.09	200	199	Vertical
2	1666.3333	72.22	49.86	-22.36	74.00	24.14	200	159	Vertical
3	3594.4493	65.28	49.47	-15.81	74.00	24.53	100	320	Vertical
4	4785.2232	66.39	53.65	-12.74	74.00	20.35	100	291	Vertical
5	5992.8741	61.91	53.08	-8.83	74.00	20.92	100	85	Vertical
6	7440.5551	58.83	55.95	-2.88	74.00	18.05	200	56	Vertical

AV Final Data List									
NO.	Freq. [MHz]	Factor [dB]	AV Reading [dBμV/m]	AV Value [dBμV/m]	AV Limit [dBμV/m]	AV Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1196.8744	-24.99	61.61	36.62	54.00	17.38	200	197.2	Vertical
2	1666.1996	-22.36	57.02	34.66	54.00	19.34	158	164.6	Vertical
3	3599.6201	-15.81	47.10	31.29	54.00	22.71	100	303	Vertical
4	4796.6481	-12.74	46.52	33.78	54.00	20.22	100	49	Vertical
5	5991.9757	-8.83	43.38	34.55	54.00	19.45	102	110.8	Vertical
6	7438.6963	-2.88	44.60	41.72	54.00	12.28	199	55.6	Vertical

Remark:

- 1 Measuring frequencies from 1GHz to 18GHz.
- 2 Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
- 3 Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
- 4 Measurements above show only up to 6 maximum emissions noted, or would be lesser, with “ N/A ” remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.

----- The following blanks -----

18GHz to 26.5GHz

According to C63.10, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement, so AV emission value did not show in below table if the peak value complies with average limit.

Only the worst mode and channel were recorded in this report. (BLE_1M 2480MHz)

Mode: TX/ BLE_1M

Lowest Frequency (2480MHz)

Environment: 25.0°C/60%RH/101.0kPa

Tested By: Zhang Zishan

Voltage: DC 6V

Date: 2023-01-31

Suspected Data List									
NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	18863.6	52.76	40.87	-11.89	83.54	42.67	PK	100	Horizontal
2	19803.7	55.11	43.93	-11.18	83.54	39.61	PK	100	Horizontal
3	20822	51.05	40.83	-10.22	83.54	42.71	PK	100	Horizontal
4	21915.95	50.05	40.28	-9.77	83.54	43.26	PK	100	Horizontal
5	25406.9	47.61	40.32	-7.29	83.54	43.22	PK	100	Horizontal
6	26368.25	46.44	39.23	-7.21	83.54	44.31	PK	100	Horizontal

Suspected Data List									
NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	19065.9	53.77	42.02	-11.75	83.54	41.52	PK	100	Vertical
2	19795.625	54.30	43.21	-11.09	83.54	40.33	PK	100	Vertical
3	21990.325	50.74	41.07	-9.67	83.54	42.47	PK	100	Vertical
4	23900.7	48.76	40.34	-8.42	83.54	43.20	PK	100	Vertical
5	25259.85	47.89	40.84	-7.05	83.54	42.70	PK	100	Vertical
6	26201.225	47.12	39.64	-7.48	83.54	43.90	PK	100	Vertical

Remark:

- Measuring frequencies from 18GHz to 26.5GHz.
- Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
- Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
- Above 18G test distance is 1m, so the Peak Limit=74+20*log(3/1)=83.54 (dBμV/m), The limits are relaxed.

8. 6dB BANDWIDTH

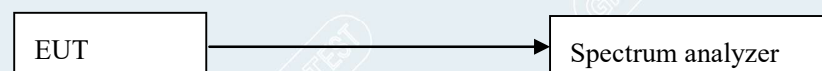
8.1 LIMITS

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

8.2 TEST PROCEDURES

- 1) Remove the antenna from the EUT, and then connect a low loss RF cable from antenna port to the spectrum analyzer.
- 2) Set resolution bandwidth (RBW) = 100kHz. Set the video bandwidth (VBW) $\geq 3 \times$ RBW. Detector = Peak. Trace mode = max hold. Sweep = auto couple. Allow the trace to stabilize, record 6dB bandwidth value.
- 3) Repeat above procedures until all frequencies measured were complete.

8.3 TEST SETUP



8.4 TEST RESULTS

Environment: 21.3°C/59%RH/101.0kPa
 Tested By: Yang Zhaoyun

Voltage: DC 6V
 Date: 2023-01-30

BLE 1M

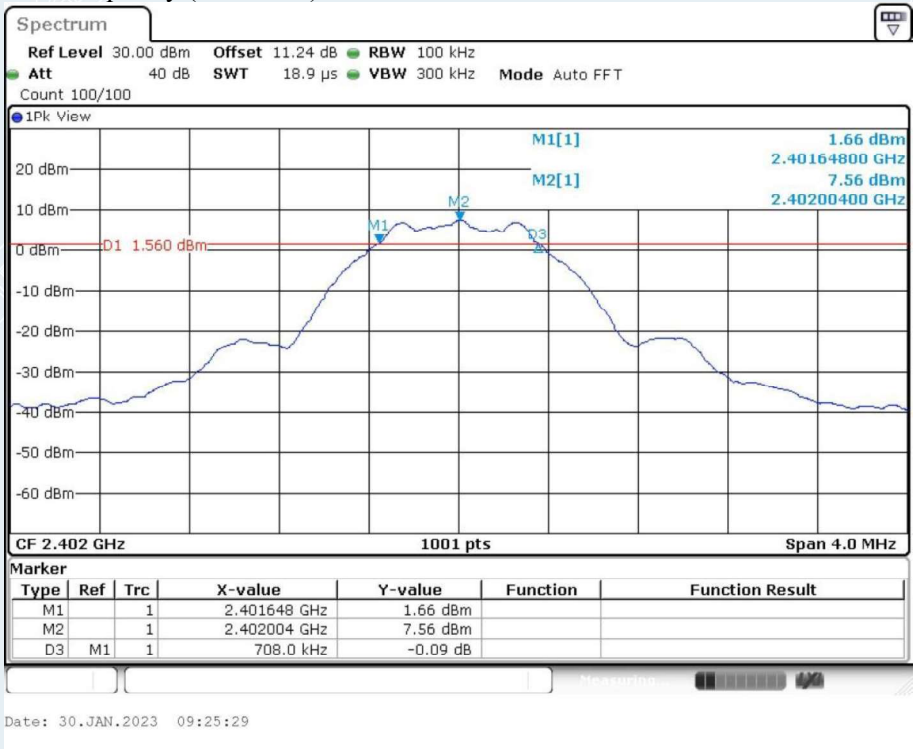
Channel	Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Test Result
Lowest	2402	708	≥ 500	PASS
Middle	2440	708		PASS
Highest	2480	716		PASS

BLE 2M

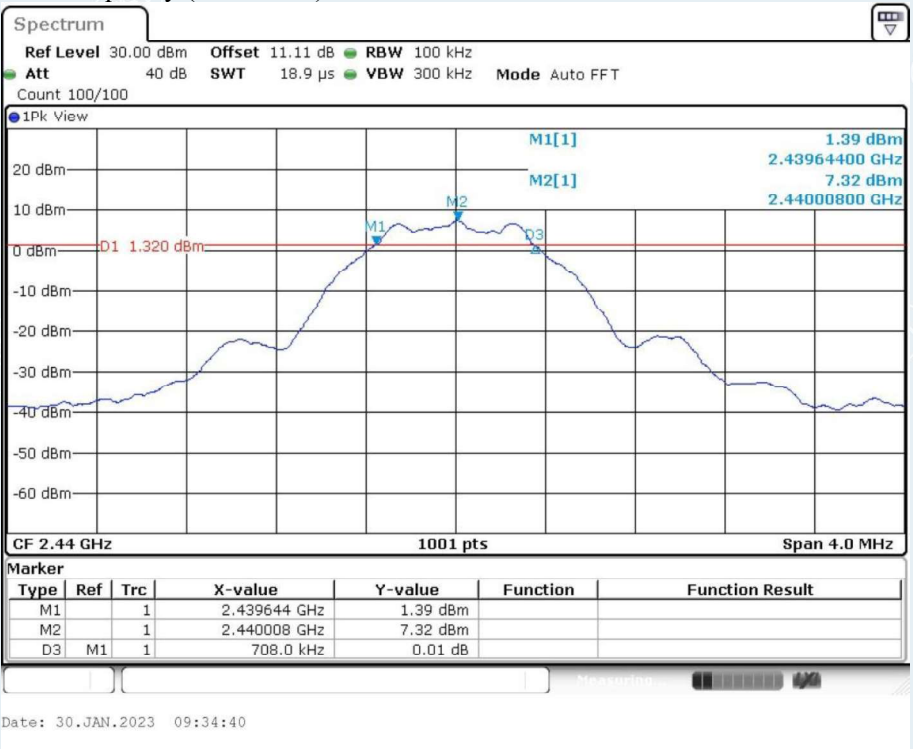
Channel	Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Test Result
Lowest	2402	1148	≥ 500	PASS
Middle	2440	1128		PASS
Highest	2480	1132		PASS

BLE_1M

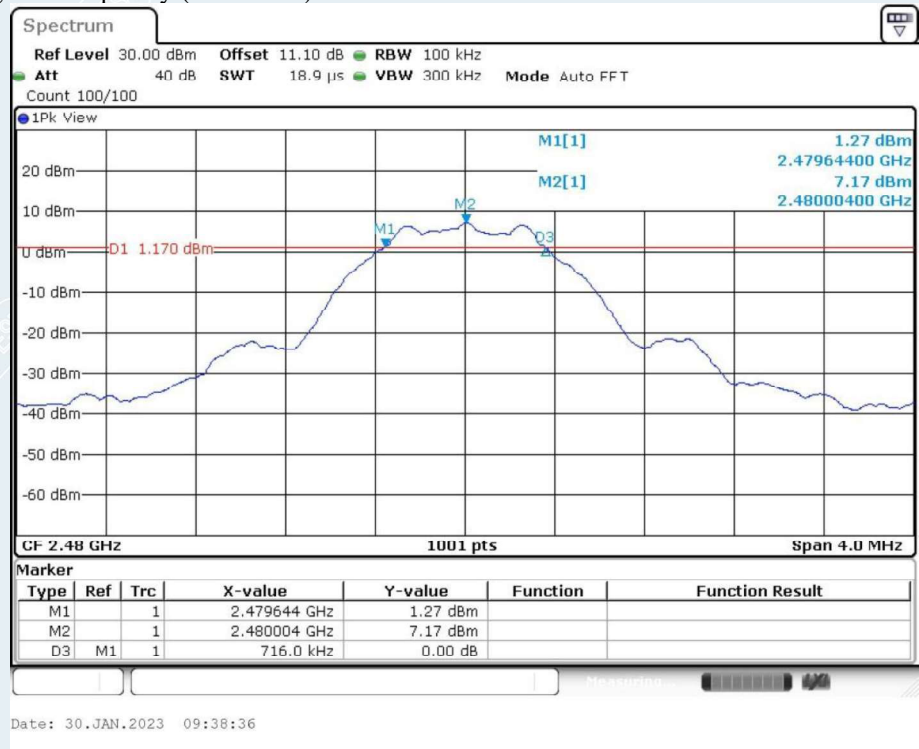
Lowest Frequency (2402MHz)



Middle Frequency (2440 MHz)

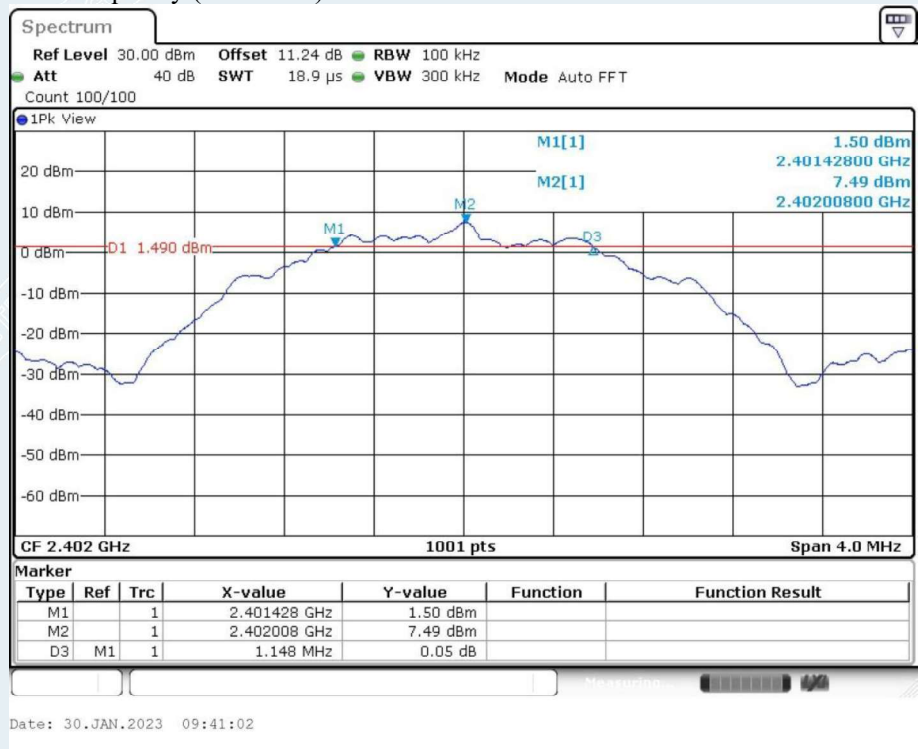


Highest Frequency (2480MHz)

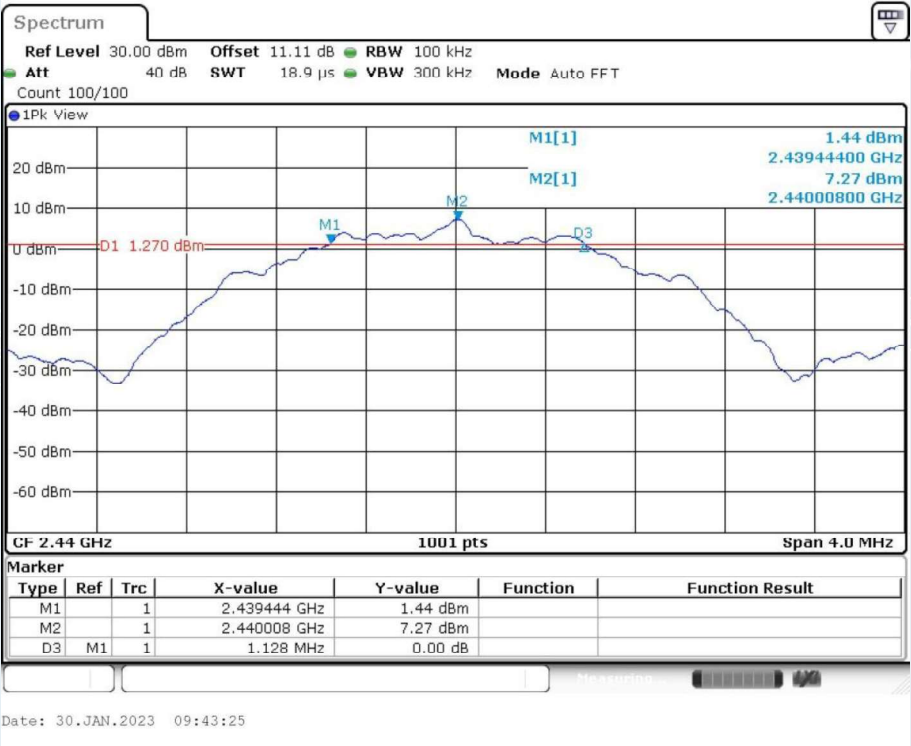


BLE_2M

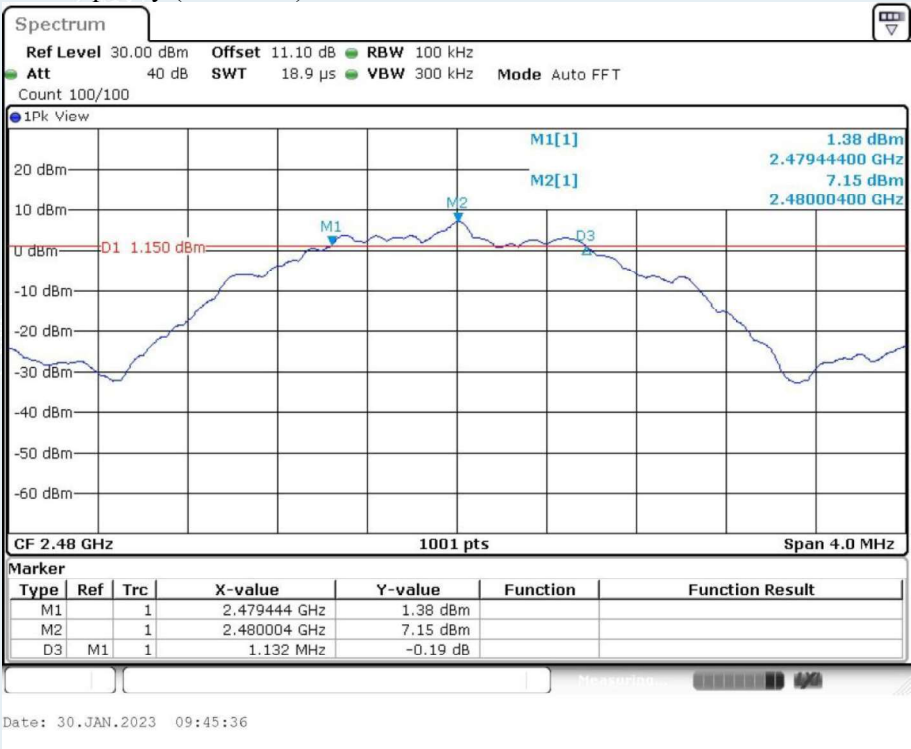
Lowest Frequency (2402MHz)



Middle Frequency (2440 MHz)



Highest Frequency (2480MHz)



9. MAXIMUM PEAK OUTPUT POWER

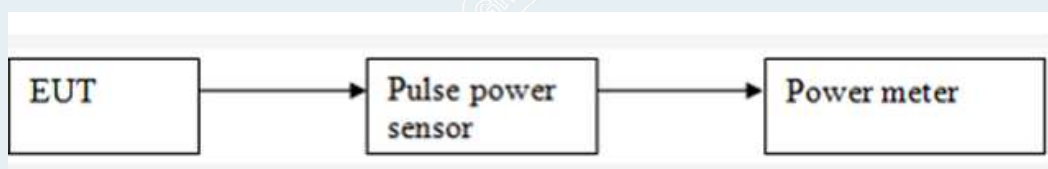
9.1 LIMITS

The maximum Peak output power measurement is 1W

9.2 TEST PROCEDURES

- 1) RF output of EUT was connected to the broadband peak RF power meter by RF cable. The path loss was compensated to the results for each measurement.
- 2) Set to the maximum power setting and enable the EUT transmit continuously.
- 3) Measure the conducted output power and record the results in the test report.

9.3 TEST SETUP



9.4 TEST RESULTS

Environment: 21.3°C/59%RH/101.0kPa
 Tested By: Yang Zhaoyun

Voltage: DC 6V
 Date: 2023-01-30

BLE 1M

Channel	Frequency (MHz)	Measured Channel Power (dBm)	Limit	Peak/Average	Result
Lowest	2402	7.61	1W (30dBm)	Peak	Pass
Middle	2440	7.73			Pass
Highest	2480	7.75			Pass

BLE 2M

Channel	Frequency (MHz)	Measured Channel Power (dBm)	Limit	Peak/Average	Result
Lowest	2402	7.60	1W (30dBm)	Peak	Pass
Middle	2440	7.71			Pass
Highest	2480	7.75			Pass

10. POWER SPECTRAL DENSITY

10.1 LIMITS

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

10.2 TEST PROCEDURES

- 1) Remove the antenna from the EUT, and then connect a low loss RF cable from antenna port to the spectrum analyzer.
- 2) Position the EUT was set without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
- 3) Set the analyzer span to 1.5 times the DTS bandwidth. Set the RBW to $3\text{ kHz} \leq \text{RBW} \leq 100\text{ kHz}$. Set the VBW $\geq [3 \times \text{RBW}]$. Detector = peak. Sweep time = auto couple. Trace mode = max hold. Allow trace to fully stabilize. Use the peak marker function to determine the maximum amplitude level within the RBW. If measured value exceeds requirement, then reduce RBW (but no less than 3kHz) and repeat.
- 4) Repeat above procedures until all frequencies measured were complete.

10.3 TEST SETUP



10.4 TEST RESULTS

Environment: 21.3°C/59%RH/101.0kPa
 Tested By: Yang Zhaoyun

Voltage: DC 6V
 Date: 2023-01-30

BLE_1M

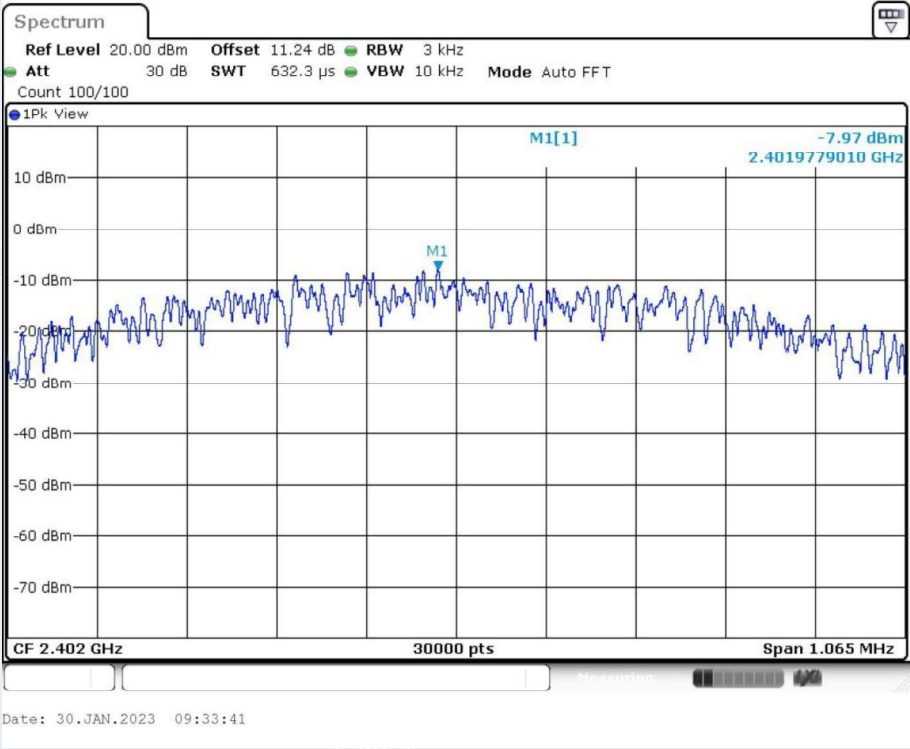
Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Test Result
Lowest	2402	-7.97	8.00	PASS
Middle	2440	-8.12		PASS
Highest	2480	-8.38		PASS

BLE_2M

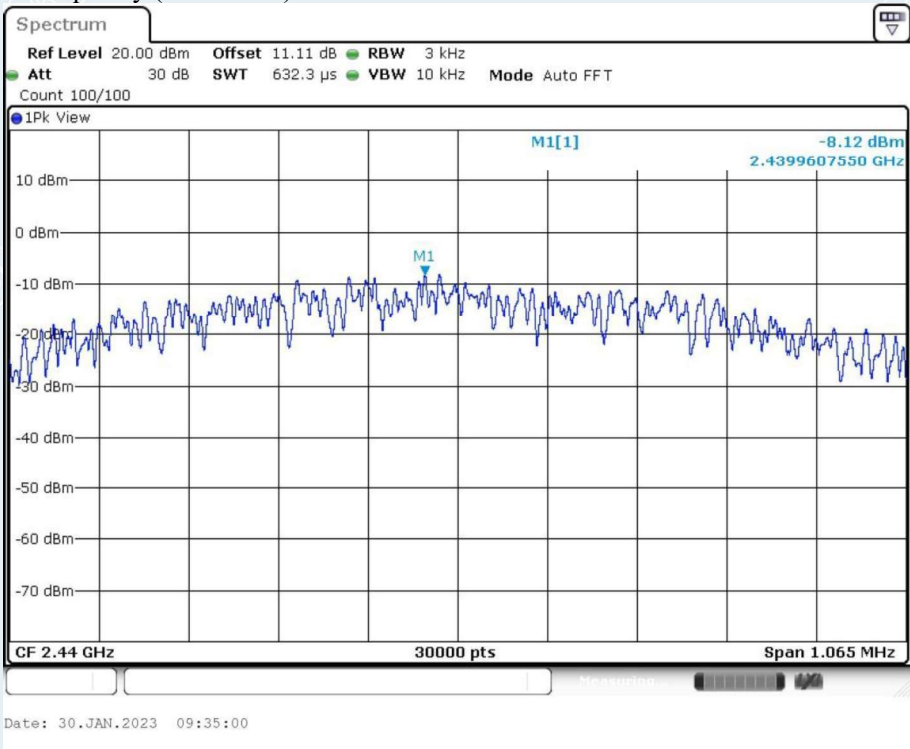
Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Test Result
Lowest	2402	-10.34	8.00	PASS
Middle	2440	-10.71		PASS
Highest	2480	-10.87		PASS

BLE_1M

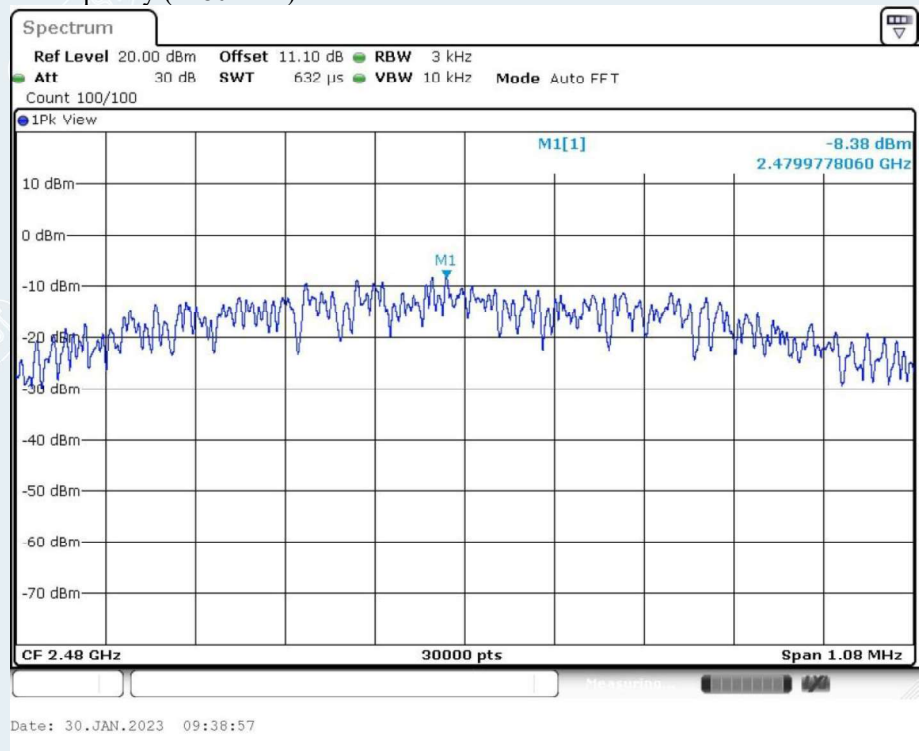
Lowest Frequency (2402MHz)



Middle Frequency (2440 MHz)



Highest Frequency (2480MHz)



BLE_2M

Lowest Frequency (2402MHz)

