

Test Report

Verified code: 036415

Report No.: E20240129370001-9

Customer: Lumi United Technology Co., Ltd

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

Sample Name: Aqara Keypad

Sample Model: KP-X01D

Receive Sample Date: Feb.01,2024

Test Date: Feb.02,2024 ~ Mar.29,2024

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

Test Result: Pass

Prepared by: Chen Xiaocong
Chen Xiaocong

Reviewed by: Jiang Tao
Jiang Tao

Approved by: Xiao Liang
Xiao Liang

GRG METROLOGY & TEST GROUP CO., LTD.

Issued Date: 2024-04-11

GRG METROLOGY & TEST GROUP CO., LTD.

Address: No.163, Pingyun Road, West of Huangpu Avenue, Guangzhou, Guangdong, China
Tel: (+86) 400-602-0999 FAX: (+86) 020-38698685 Web: <http://www.grgtest.com>



Statement

1. The report is invalid without "special seal for inspection and testing"; some copies are invalid; The report is invalid if it is altered or missing; The report is invalid without the signature of the person who prepared, reviewed and approved it.
2. The sample information is provided by the client and responsible for its authenticity; The content of the report is only valid for the samples sent this time.
3. When there are reports in both Chinese and English, the Chinese version will prevail when the language problems are inconsistent.
4. If there is any objection concerning the report, please inform us within 15 days from the date of receiving the report.
5. Without the agreement of the laboratory, the client is not authorized to use the test results for unapproved propaganda.

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

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	8
2.8	DUTY CYCLE.....	9
3.	LABORATORY AND ACCREDITATIONS	10
3.1	LABORATORY	10
3.2	ACCREDITATIONS	10
4.	MEASUREMENT UNCERTAINTY	11
5.	LIST OF USED TEST EQUIPMENT AT GRGT	12
6.	CONDUCTED EMISSION MEASUREMENT	13
6.1	LIMITS.....	13
6.2	TEST PROCEDURES	13
6.3	TEST SETUP	14
6.4	DATA SAMPLE	14
6.5	TEST RESULTS	15
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	39
9.	MAXIMUM PEAK OUTPUT POWER	43
9.1	LIMITS.....	43
9.2	TEST PROCEDURES	43
9.3	TEST SETUP	43
9.4	TEST RESULTS	43
10.	POWER SPECTRAL DENSITY	44
10.1	LIMITS.....	44
10.2	TEST PROCEDURES	44
10.3	TEST SETUP	44

10.4 TEST RESULTS 45

11. CONDUCTED BAND EDGES AND SPURIOUS EMISSIONS 49

11.1 LIMITS..... 49

11.2 TEST PROCEDURES 49

11.3 TEST SETUP 49

11.4 TEST RESULTS 50

12. RESTRICTED BANDS OF OPERATION..... 63

12.1 LIMITS..... 63

12.2 TEST PROCEDURES 64

12.3 TEST SETUP 64

12.4 TEST RESULTS 65

APPENDIX A. PHOTOGRAPH OF THE TEST CONNECTION DIAGRAM 75

APPENDIX B. PHOTOGRAPH OF THE EUT 75

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

REPORT ISSUED HISTORY

Report Version	Report No.	Description	Compile Date
1.0	E20240129370001-9	Original Issue	2024-04-08

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

1. TEST RESULT SUMMARY

Technical Requirements		
47 CFR, FCC Part 15 Subpart C 15.247 ANSI C63.10-2020 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:

1)The antenna is PIFA antenna. The max gain of antenna is 0.82dBi.which accordance 15.203.is considered sufficient to comply with the provisions of this section.

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

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: Aqara Keypad
Model No.: KP-X01D
Adding Model: /
Models Difference: /
Trade Name: Aqara
FCC ID: 2AKIT-KPX01D
4 LR3 AAA 1.5V Batteries(DC 6V)
Power supply: DC 12-24V,0.5A
AC 12-24V,0.2A
Frequency Band: 2402MHz-2480MHz
Transmit Power: GFSK for 1Mbps:8.52dBm
GFSK for 2Mbps:8.56dBm
Modulation type: GFSK for 1Mbps
GFSK for 2Mbps
Channel space: 2MHz
Antenna Specification: PIFA antenna with 0.82dBi gain (Max.)
Temperature Range: -15 ℃ ~ 66 ℃
Hardware Version: V2.1
Software Version: V0019
Sample No: E20240129370001-0010, E20240129370001-0011

Note 1:

The EUT antenna gain is provided by the applicant. This report is made solely on the basis of such data and/or information. We accept no responsibility for the authenticity and completeness of the above data and information and the validity of the results and/or conclusions.

2.4 CHANNELLIST

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	DELL	Latitude3300	2C6CFW2	/
Test board	/	/	/	/

No.	Cable Type	Qty.	Shielded Type	Ferrite Core(Qty.)	Length
1	Serial cable	1	No	0	0.3m

2.7 CONFIGURATION OF SYSTEM UNDER TEST



Test software:

Software version	Test level
BLDevCube	2402MHz: 8 2440MHz: 8 2480MHz: 8

2.8 DUTY CYCLE

Environment: 23.1℃/68%RH/101.0kPa

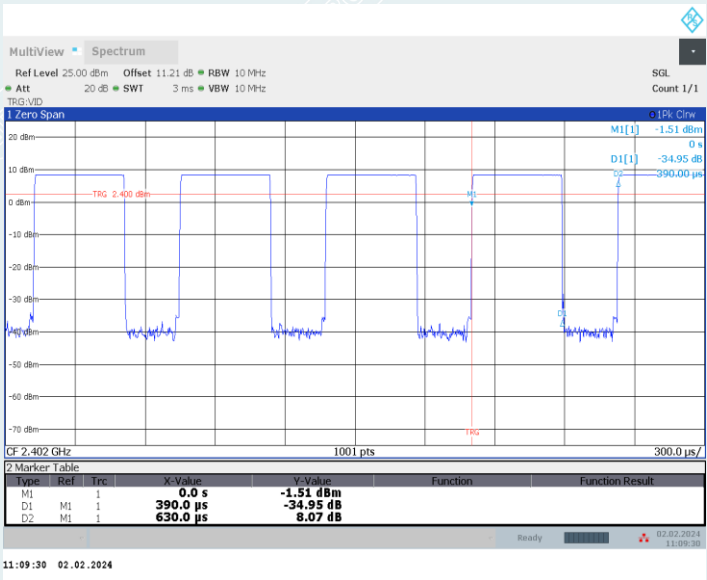
Tested By: Huang Tianmei

Voltage: DC 6V

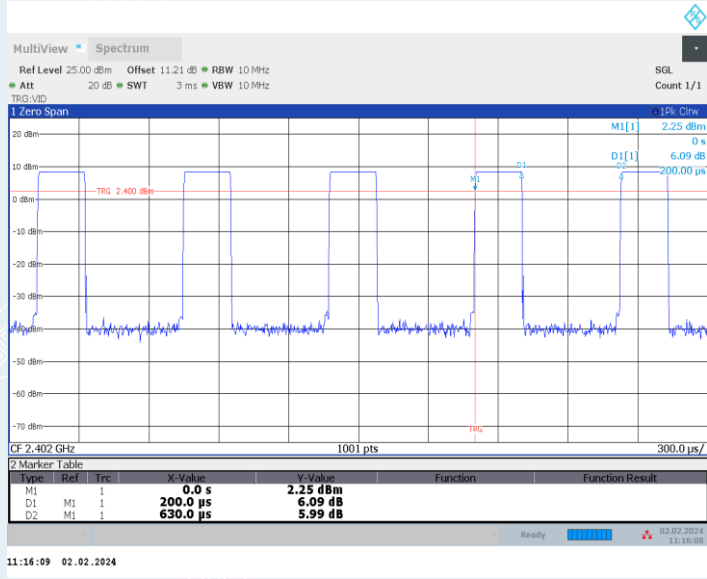
Date: 2024-02-02

Test Mode	Antenna	Frequency [MHz]	ON Time [ms]	Period [ms]	DC [%]	T [s]
BLE_1M	Ant1	2402	0.39	0.63	61.90	0.00039
BLE_2M	Ant1	2402	0.20	0.63	31.75	0.00020

BLE_1M_2402MHz



BLE_2M_2402MHz



3. LABORATORY AND ACCREDITATIONS

3.1 LABORATORY

The tests & measurements refer to this report were performed by Shenzhen EMC Laboratory of GRG METROLOGY & TEST GROUP CO., LTD.

Add.: No.1301 Guangang Road Xinlan Community, Guanlan Street, Longhua District
Shenzhen, 518110, People's Republic of China

P.C.: 518110

Tel : 0755-61180008

Fax: 0755-61180008

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,
<http://www.grgtest.com>

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

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	X	9kHz~30MHz	4.4dB ¹⁾
	Y	9kHz~30MHz	4.4dB ¹⁾
	Z	9kHz~30MHz	4.4dB ¹⁾
	Horizontal	30MHz~200MHz	4.6dB ¹⁾
		200MHz~1000MHz	4.8dB ¹⁾
		1GHz~18GHz	5.0dB ¹⁾
		18GHz~26.5GHz	5.2dB ¹⁾
	Vertical	30MHz~200MHz	4.7dB ¹⁾
		200MHz~1000MHz	4.7dB ¹⁾
		1GHz~18GHz	5.1dB ¹⁾
		18GHz~26.5GHz	5.4dB ¹⁾
Conduction Emission		150kHz~30MHz	3.3dB ¹⁾

Measurement	Uncertainty
RF frequency	6.0×10^{-6}
RF power conducted	0.80dB
Power spectral density conducted	0.80dB
Occupied channel bandwidth	0.40dB
Unwanted emission, conducted	0.70dB
Humidity	6.0%
Temperature	2.0°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
Radiated Spurious Emission&Restricted bands of operation				
Test S/W	EZ	CCS-03A1		
Loop Antenna	Schwarzbeck	FMZB 1513-60	1513-60-56	2024-07-15
Bi-log Antenna	Schwarzbeck	VULB9160	VULB9160-3402	2024-10-06
Horn Antenna	Schwarzbeck	BBHA 9120D	02143	2024-09-23
Test Receiver	R&S	ESR26	101758	2024-09-22
Board-Band Horn Antenna	Schwarzbeck	BBHA 9170	BBHA 9170-497	2024-09-18
Amplifier	SHIRONG ELECTRONIC	DLNA-30M1G-G40	20200928001	2025-01-30
Amplifier	Tonscend	TAP01018048	AP20E8060075	2024-04-11
Amplifier	Tonscend	TAP184050	AP20E806071	2024-04-16
Amplifier	SHIRONG ELECTRONIC	DLNA-1G18G-G40	20200928005	2024-08-17
Test S/W	Tonscend	JS32-RE/5.0.0		
6dB Bandwidth&Conducted band edges and Spurious Emission&Power Spectral Density				
Spectrum Analyzer	R&S	FSW43	102072	2024-07-09
Automatic power test unit	TONSCEND	JS0806-2	21B8060365	2024-11-07
BT/WIFI System	Tonscend	JS1120-3		
Maximum peak output power				
Pulse power sensor	Anristu	MA2411B	1126150	2025-01-11
Power meter	Anristu	ML2495A	1204003	2025-01-11
Conducted Emissions				
EZ-EMC	EZ	CCS-3A1-CE	/	/
EMI Receiver	R&S	ESCI	100783	2024-08-11
LISN(EUT)	R&S	ENV216	101543	2024-09-10

Note:

1. The calibration cycle of the above instruments is 12 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 C63.10:2020.

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:

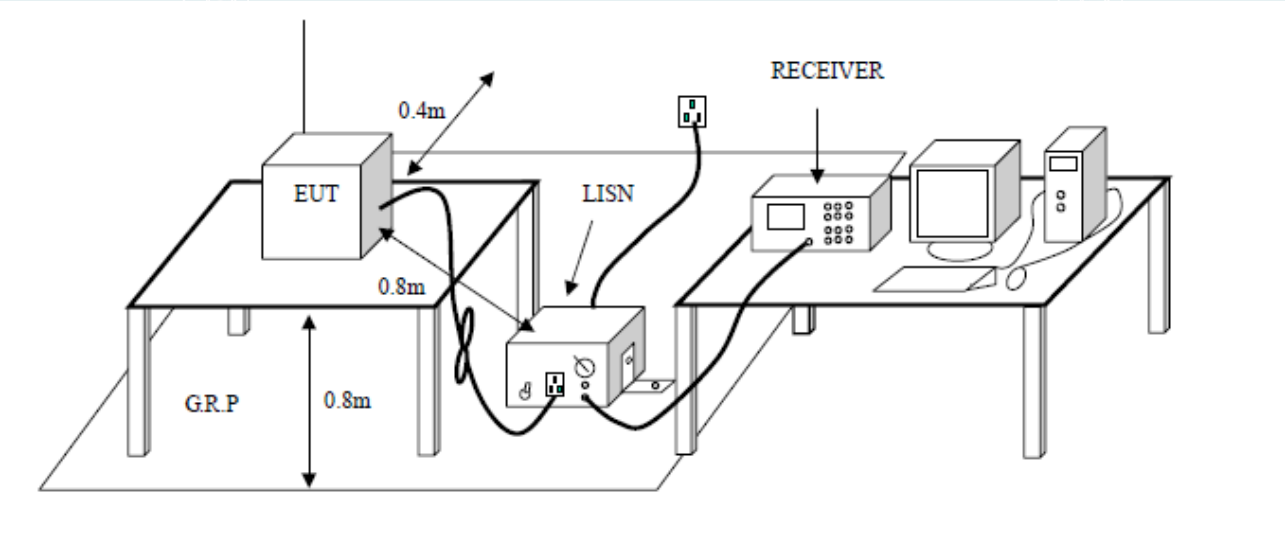
- Either the bottom or the rear of the EUT shall be at a controlled distance of 40 cm from a reference ground plane. This ground plane is normally the wall or floor of a shielded room. It may also be a grounded metal plane of at least 2 m by 2 m. This is physically accomplished as follows:
 - place the 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
 - 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.
- Use serial board or connecting line to make EUT and notebook to communicate, according to the actual need to make EUT send constant frequency signal continuously.

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)

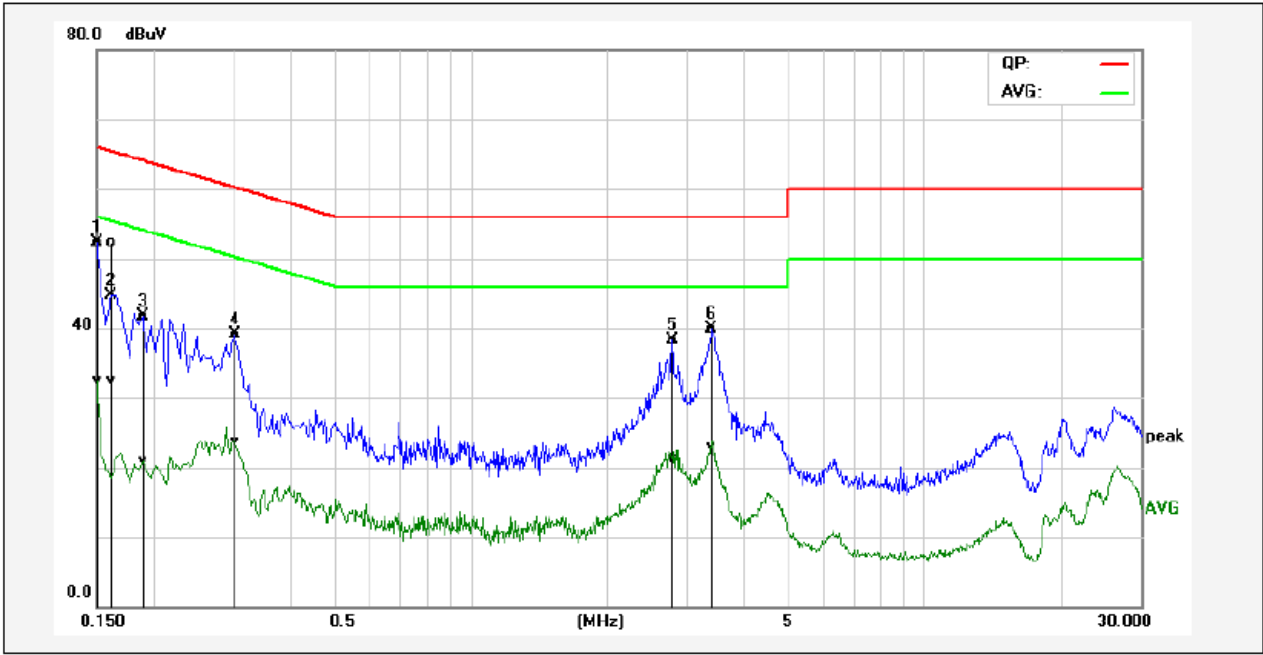
----- The following blanks -----

6.5 TEST RESULTS

Power supply: DC 24V power by Adapter

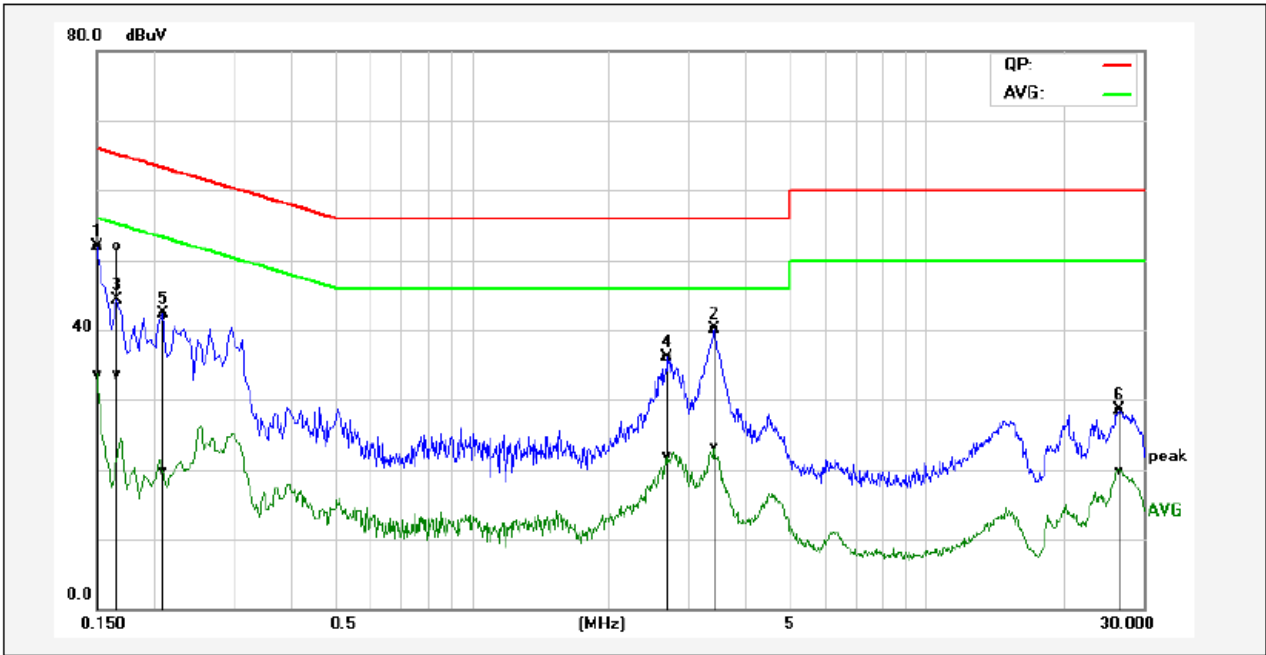
Note: Pre-scan all modes , only the worst case(TX_BLE_2M_2480MHz) is recorded, in this report.

Project No	Aqara Keypad	Test Mode:	Mode 1
Model:	KP-X01D	Sample No:	E20240129370001-0011
Mode:	BLE 2M_2480MHz	Voltage:	AC 120V/60Hz
Environment:	23.2°C/59%RH/101.0kPa	Engineer:	Chen Zexin
Test Date:	2024-03-26	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	42.47	22.67	9.75	52.22	32.42	65.99	56.00	-13.77	-23.58	Pass
2*	0.1620	42.51	22.71	9.71	52.22	32.42	65.36	55.36	-13.14	-22.94	Pass
3	0.1900	31.93	11.30	9.69	41.62	20.99	64.03	54.04	-22.41	-33.05	Pass
4	0.3020	29.40	14.12	9.68	39.08	23.80	60.19	50.19	-21.11	-26.39	Pass
5	2.7900	28.32	11.37	9.95	38.27	21.32	56.00	46.00	-17.73	-24.68	Pass
6	3.4020	29.95	12.90	9.91	39.86	22.81	56.00	46.00	-16.14	-23.19	Pass

Project No	Aqara Keypad	Test Mode:	Mode 1
Model:	KP-X01D	Sample No:	E20240129370001-0011
Mode:	BLE 2M_2480MHz	Voltage:	AC 120V/60Hz
Environment:	23.2°C/59%RH/101.0kPa	Engineer:	Chen Zexin
Test Date:	2024-03-26	Line	N

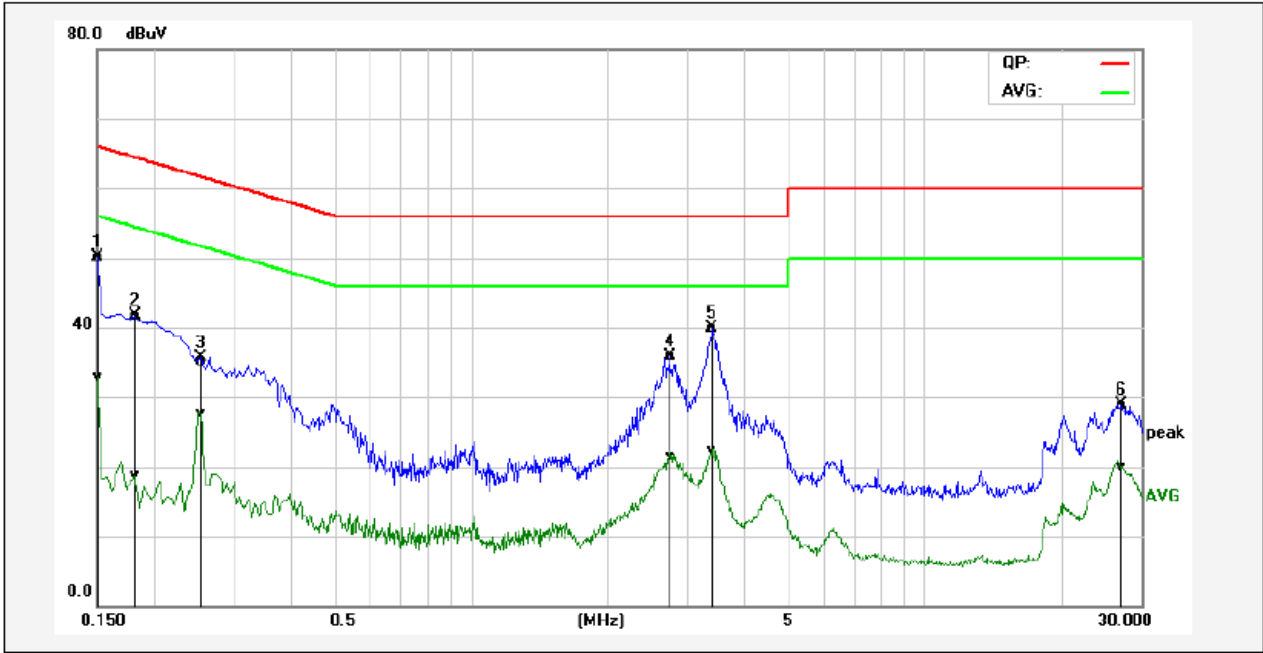


No.	Frequency (MHz)	QuasiPeak reading (dBuV)	Average reading (dBuV)	Correction factor (dB)	QuasiPeak result (dBuV)	Average result (dBuV)	QuasiPeak limit (dBuV)	Average limit (dBuV)	QuasiPeak margin (dB)	Average margin (dB)	Remark
1	0.1516	42.11	23.90	9.70	51.81	33.60	65.91	55.91	-14.10	-22.31	Pass
2	3.4220	30.24	13.30	9.88	40.12	23.18	56.00	46.00	-15.88	-22.82	Pass
3*	0.1660	42.14	23.93	9.67	51.81	33.60	65.15	55.16	-13.34	-21.56	Pass
4	2.7060	26.13	12.03	9.89	36.02	21.92	56.00	46.00	-19.98	-24.08	Pass
5	0.2100	32.53	9.99	9.67	42.20	19.66	63.20	53.21	-21.00	-33.55	Pass
6	26.6660	18.14	9.46	10.29	28.43	19.75	60.00	50.00	-31.57	-30.25	Pass

Power supply: AC 24V power by AC power converter

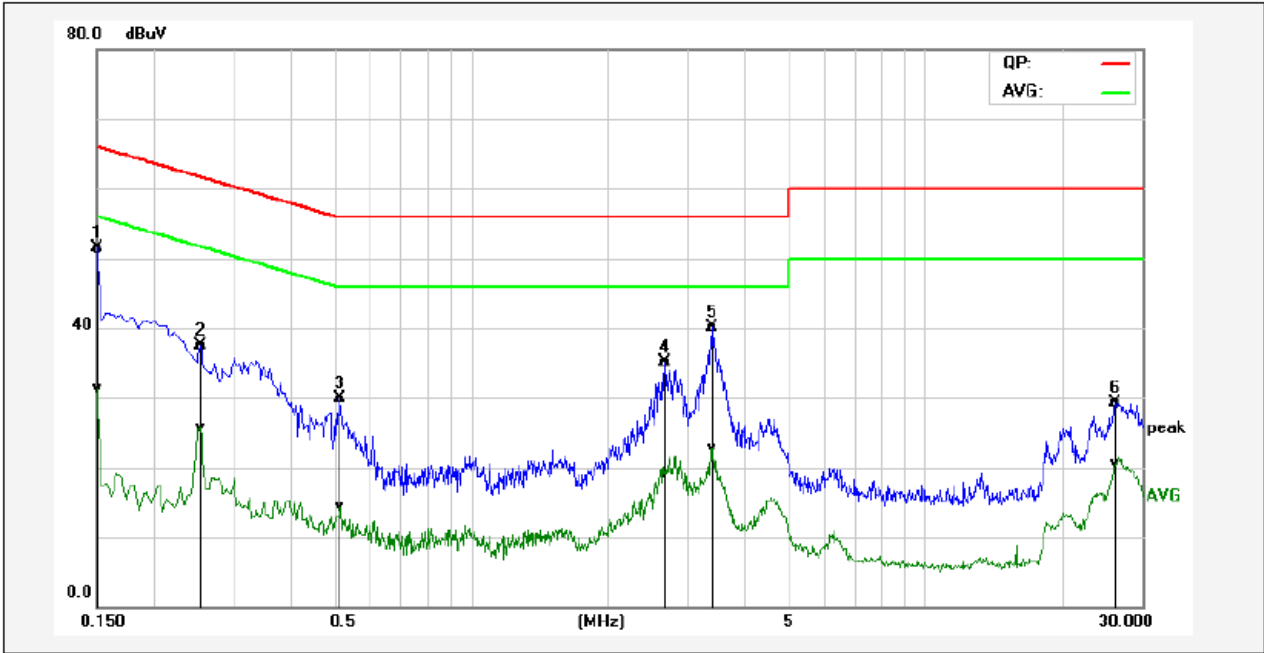
Note: Pre-scan all modes , only the worst case(TX_BLE_2M_2402MHz) is recorded, in this report.

Project No	Aqara Keypad	Test Mode:	Mode 1
Model:	KP-X01D	Sample No:	E20240129370001-0011
Mode:	BLE 2M_2402MHz	Voltage:	AC 120V/60Hz
Environment:	23.2℃/59%RH/101.0kPa	Engineer:	Chen Zexin
Test Date:	2024-03-26	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	40.43	23.23	9.75	50.18	32.98	65.99	56.00	-15.81	-23.02	Pass
2	0.1819	31.96	8.93	9.69	41.65	18.62	64.39	54.40	-22.74	-35.78	Pass
3	0.2500	25.51	18.02	9.69	35.20	27.71	61.75	51.76	-26.55	-24.05	Pass
4	2.7420	25.92	11.57	9.92	35.84	21.49	56.00	46.00	-20.16	-24.51	Pass
5	3.4140	29.96	12.33	9.91	39.87	22.24	56.00	46.00	-16.13	-23.76	Pass
6	27.1700	18.67	9.76	10.22	28.89	19.98	60.00	50.00	-31.11	-30.02	Pass

Project No	Aqara Keypad	Test Mode:	Mode 1
Model:	KP-X01D	Sample No:	E20240129370001-0011
Mode:	BLE 2M_2402MHz	Voltage:	AC 120V/60Hz
Environment:	23.2°C/59%RH/101.0kPa	Engineer:	Chen Zexin
Test Date:	2024-03-26	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	41.70	21.69	9.70	51.40	31.39	65.99	56.00	-14.59	-24.61	Pass
2	0.2540	27.80	15.96	9.67	37.47	25.63	61.62	51.63	-24.15	-26.00	Pass
3	0.5180	20.31	4.69	9.68	29.99	14.37	56.00	46.00	-26.01	-31.63	Pass
4	2.6700	25.19	9.22	9.87	35.06	19.09	56.00	46.00	-20.94	-26.91	Pass
5	3.4140	30.29	12.84	9.88	40.17	22.72	56.00	46.00	-15.83	-23.28	Pass
6	26.2620	19.05	10.29	10.29	29.34	20.58	60.00	50.00	-30.66	-29.42	Pass

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

a) 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.

b) 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.

c) 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.

d) 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:

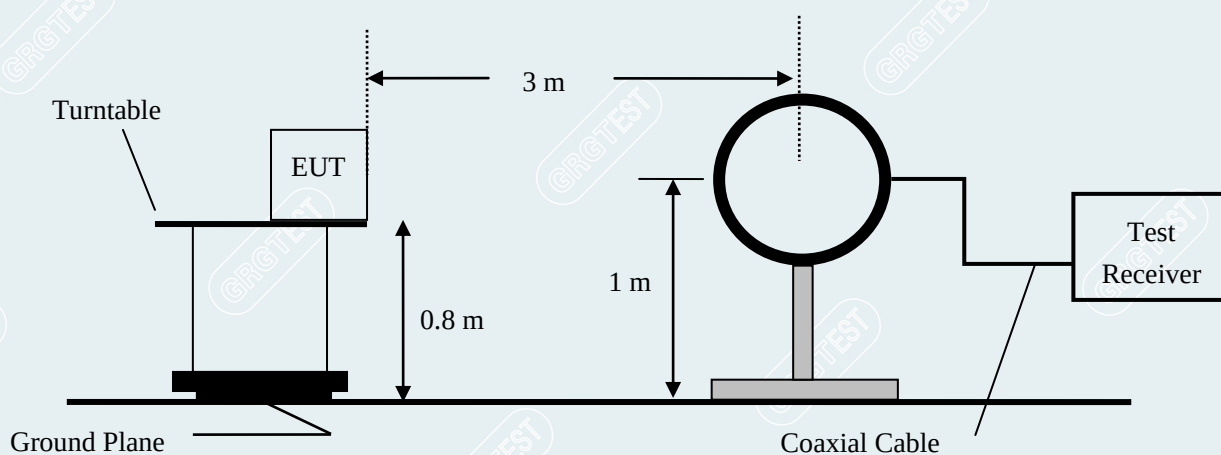
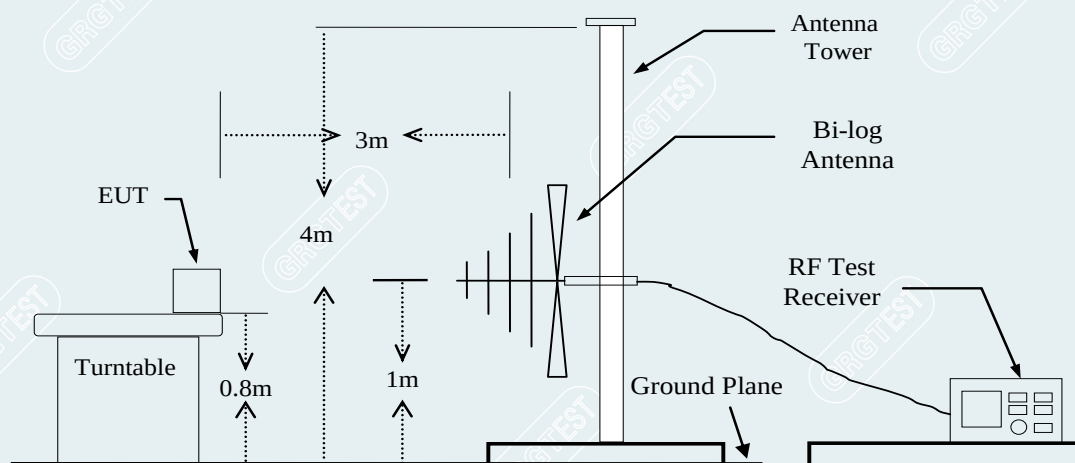
- The turntable rotates from 0 °to 360 °.
- The antenna is polarized vertical and horizontal.
- The antenna height scan range is 1 meter to 4 meter.
- At each turntable position and antenna polarization the analyzer sweeps with peak detection to find the maximum of all emissions.

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:

- (1).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).
- (2).The frequency from 30MHz to 1GHz, Set RBW=120kHz, VBW=300kHz, (for QP Detector).
- (3).The frequency above 1GHz, for Peak detector: Set RBW=1MHz,VBW=3MHz.
- (4). 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**

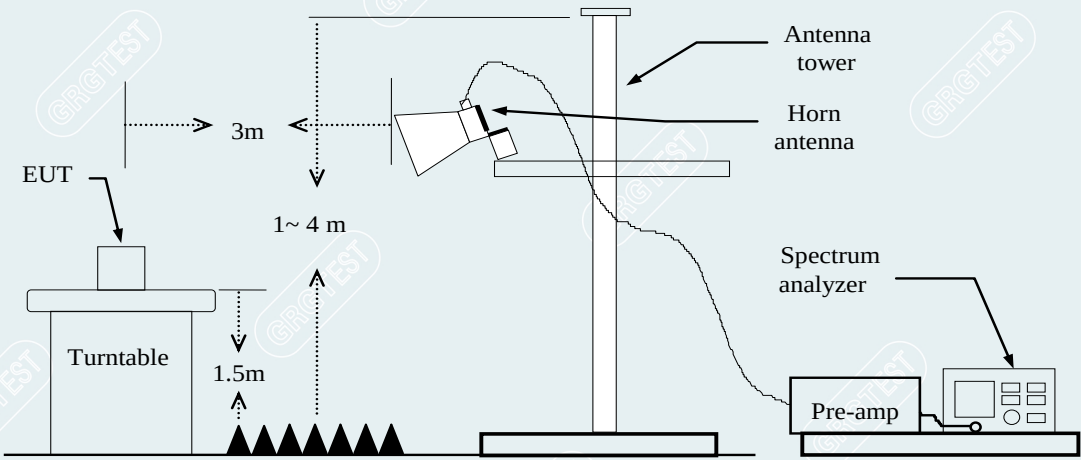


Figure 3. 1GHz to 18GHz radiated emissions test configuration

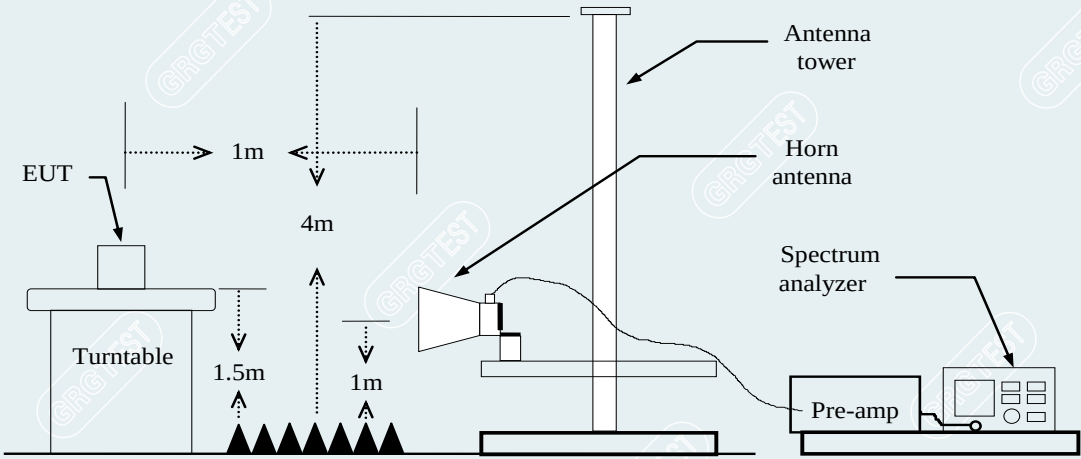


Figure 4. 18GHz to 26.5GHz radiated emissions test configuration

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

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

Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Heigh (cm)	Detectortype
XXX.XXXX	48.49	-9.91	38.58	47.00	-8.42	100	108	QP

Frequency (MHz)	= Emission frequency in MHz
Reading (dBuV)	= Uncorrected Analyzer / Receiver reading
Correct Factor (dB/m)	= Antenna factor + Cable loss – Amplifier gain
Result (dBuV/m)	= Reading (dBuV) + Correct Factor (dB/m)
Limit (dBuV/m)	= Limit stated in standard
Margin (dB)	= Result (dBuV/m)-Limit (dBuV/m)
Peak	= Peak Reading
QP	= Quasi-peak Reading

1GHz-18GHz

No.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity	Remark
xxx	xxxx	78.01	55.30	-22.71	74.00	18.70	100	50	Horizontal	Peak
xxx	xxxx	66.37	43.66	-22.71	54.00	10.34	100	50	Horizontal	AVG

Above 18GHz

NO.	Freq. [MHz]	Reading [dBμV/m]	Level for 1m [dBμV/m]	Level for 3m [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity	Remark
xxx	xxxx	54.49	42.38	32.84	-12.11	74	41.16	100	211	Horizontal	Peak
xxx	xxxx	43.99	31.88	22.34	-12.11	54	31.66	100	211	Horizontal	AVG

Frequency (MHz)	= Emission frequency in MHz
Reading (dBuV/m)	= Uncorrected Analyzer / Receiver reading
Factor (dB)	= Antenna factor + Cable loss – Amplifier gain
Level for 1m (dBuV/m)	= Reading (dBuV/m) + Factor (dB)
Level for 3m (dBuV/m)	= Level for 1m (dBuV/m) + 20*log(1/3)
Limit (dBuV/m)	= Limit stated in standard
Margin (dB)	= Limit (dBuV/m) – Level (dBuV/m)
Polarity	= Antenna polarization
Peak	= Peak Reading
AVG	= Average Reading

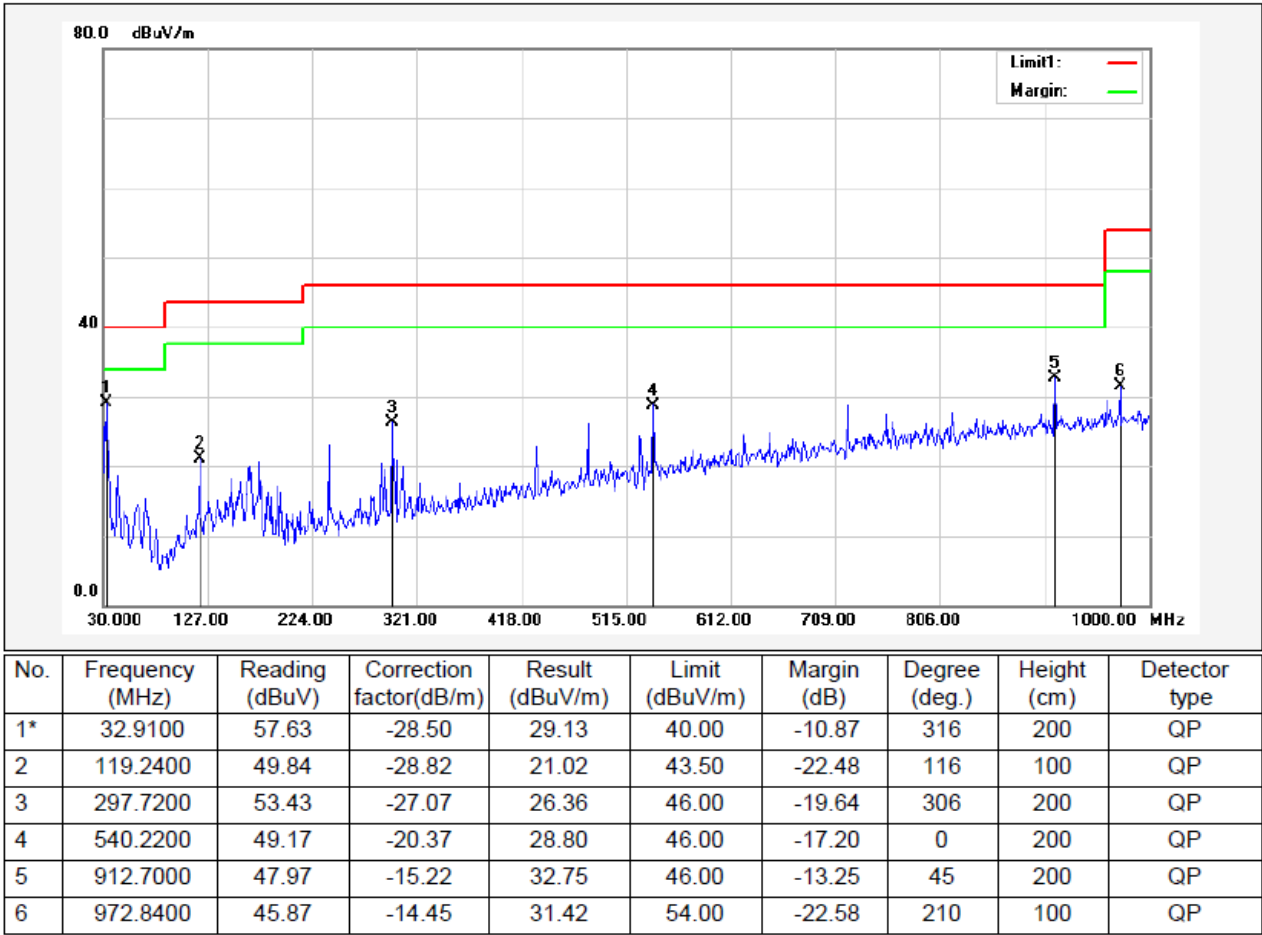
7.5 TEST RESULTS

Below 1GHz

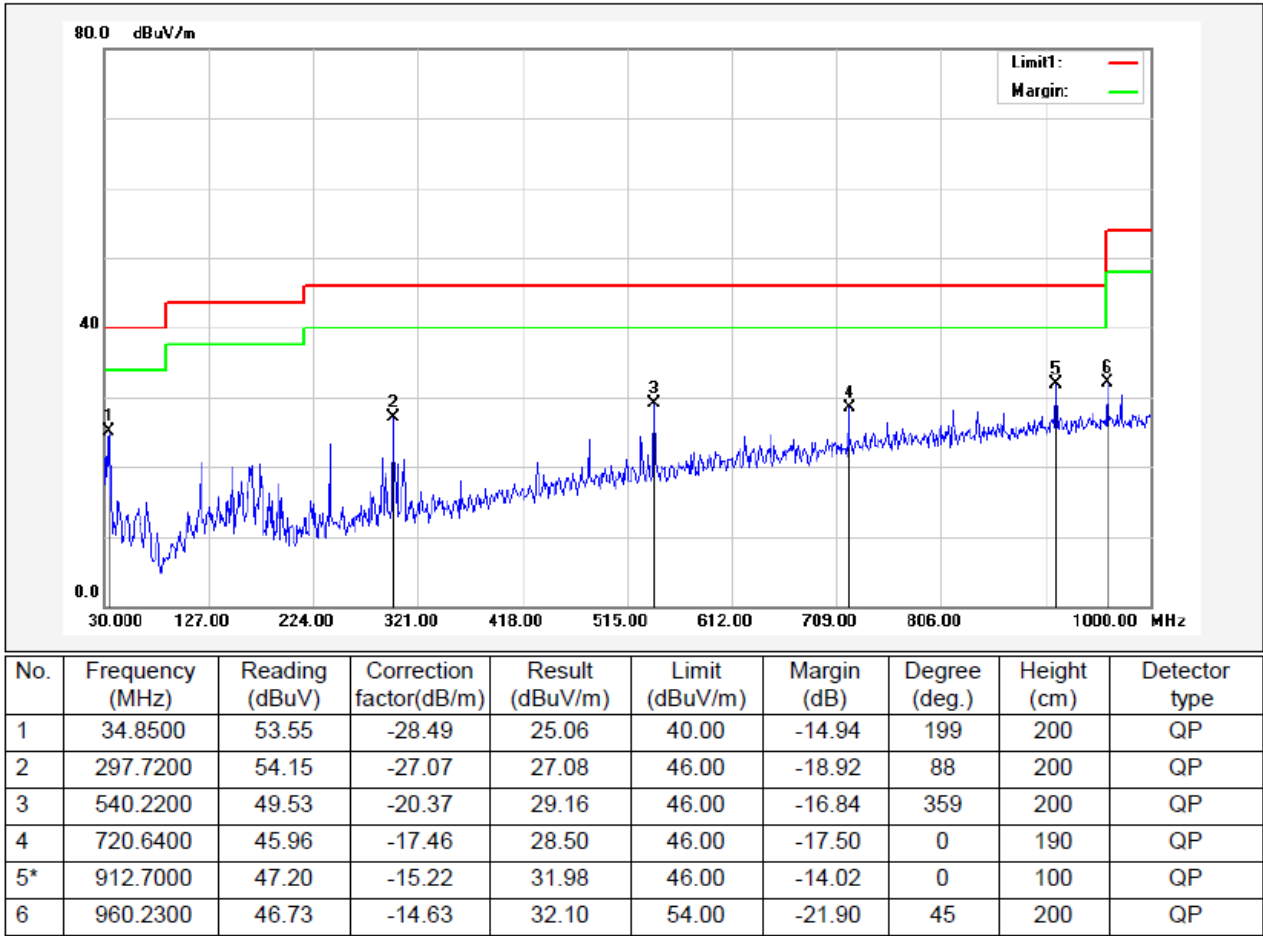
Power supply: 4 LR3 AAA 1.5V Batteries

Note: Pre-scan all modes, only the worst case(TX_BLE_1M_2480MHz) is recorded in this report.

EUT Name:	Aqara Keypad	Test Mode:	Mode 1
Model:	KP-X01D	Sample No:	E20240129370001-0011
Power supply:	DC 6V	Environmental Conditions:	23.2℃/47%RH/101.0kPa
Test Engineer:	Zhang Zishan	Test Date:	2024-02-23
Frequency	2480MHz(TX_BLE_1M)	Polarity:	Horizontal



EUT Name:	Aqara Keypad	Test Mode:	Mode 1
Model:	KP-X01D	Sample No:	E20240129370001-0011
Power supply:	DC 6V	Environmental Conditions:	23.2°C/47%RH/101.0kPa
Test Engineer:	Zhang Zishan	Test Date:	2024-02-23
Frequency	2480MHz(TX/ BLE_1M)	Polarity:	Vertical

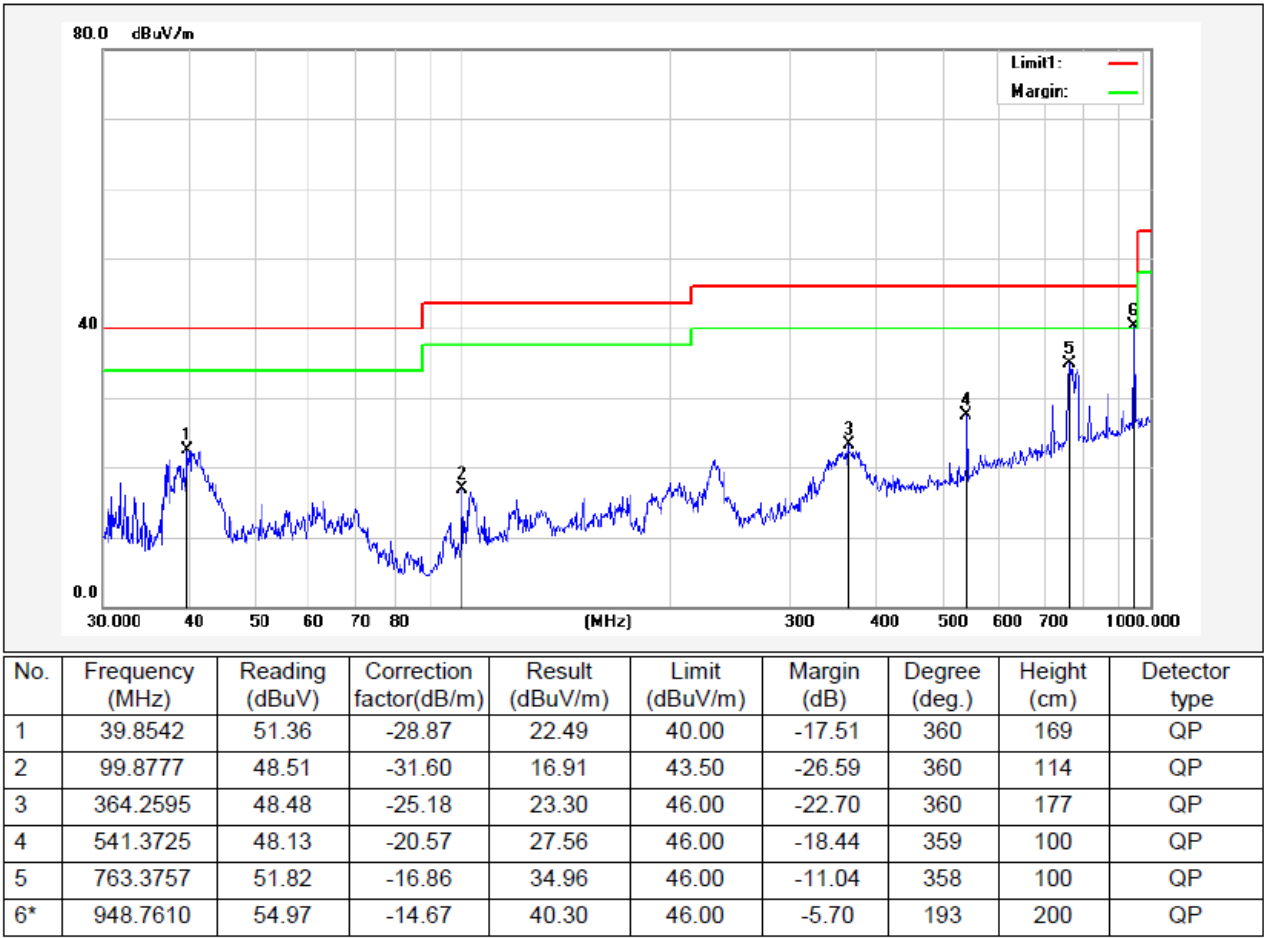


Remark:

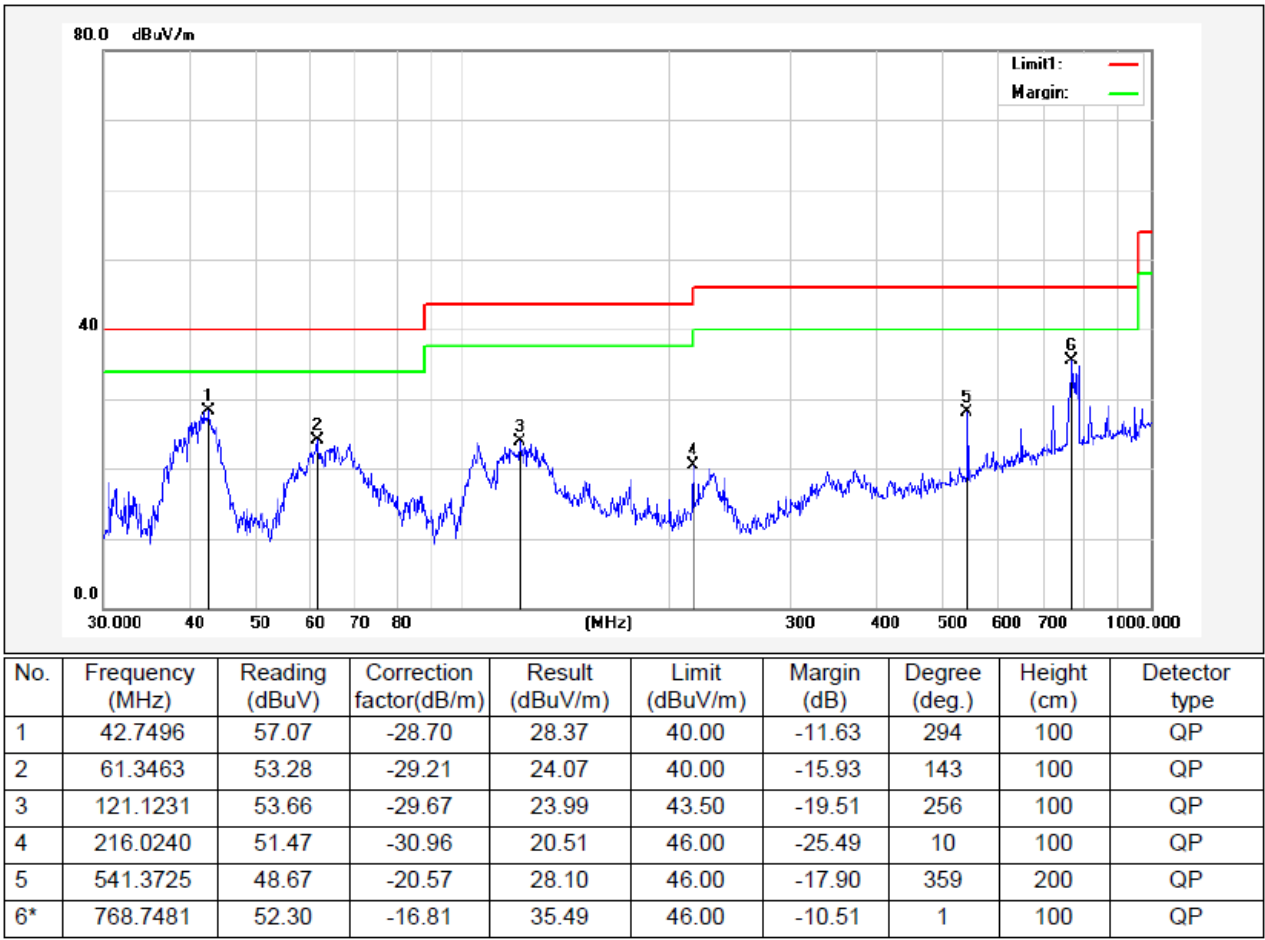
- 1 No emission found between lowest internal used/generated frequency to 30MHz.
- 2 Radiated emissions measured in frequency range from 9kHz to 1GHz were made with an instrument using Quasi-peak detector mode.
- 3 The IF bandwidth of Receiver between 30MHz to 1GHz was 120kHz.

Power supply: DC 24V power by Adapter
Note: Pre-scan all modes, only the worst case(TX_BLE_2M_2440MHz) is recorded in this report.

EUT Name:	Aqara Keypad	Test Mode:	Mode 1
Model:	KP-X01D	Sample No:	E20240129370001-0011
Power supply:	DC 24V	Environmental Conditions:	21.4℃/53%RH/101.0kPa
Test Engineer:	Zhang Zishan	Test Date:	2024-03-29
Frequency	2440MHz(TX_BLE_2M)	Polarity:	Horizontal



EUT Name:	Aqara Keypad	Test Mode:	Mode 1
Model:	KP-X01D	Sample No:	E20240129370001-0011
Power supply:	DC 24V	Environmental Conditions:	21.4℃/53%RH/101.0kPa
Test Engineer:	Zhang Zishan	Test Date:	2024-03-29
Frequency	2440MHz(TX_BLE_2M)	Polarity:	Vertical

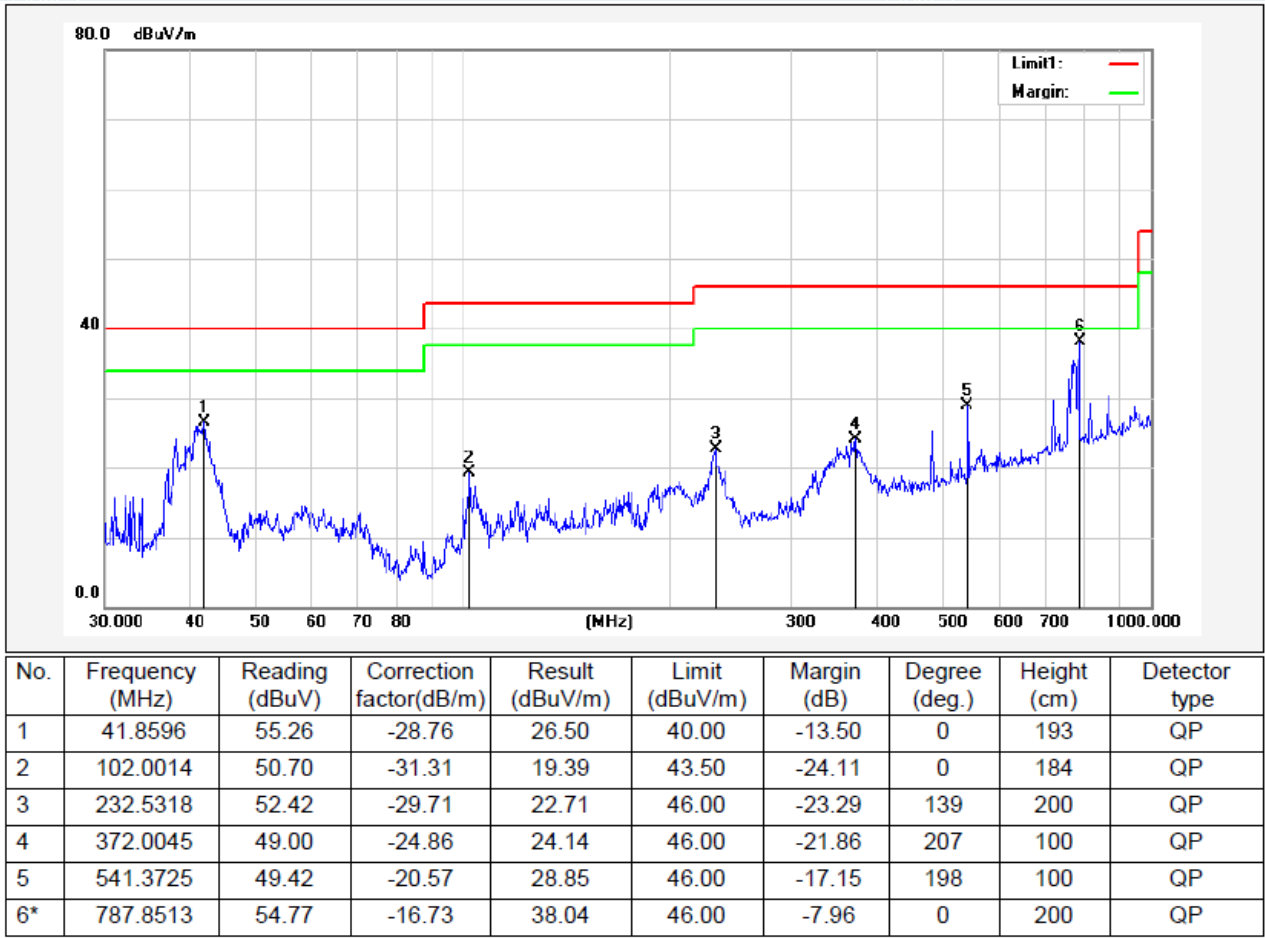


Remark:

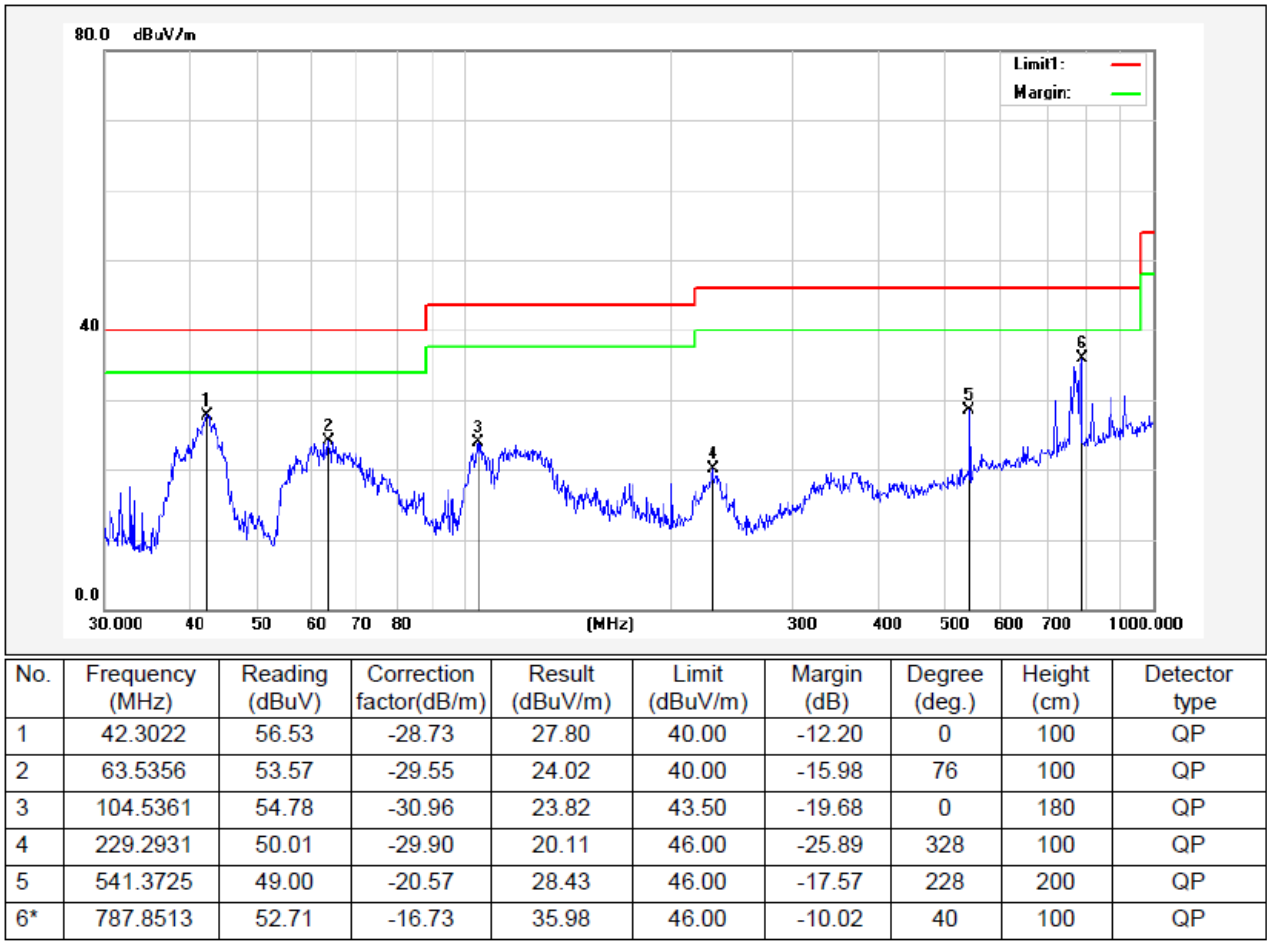
- 1 No emission found between lowest internal used/generated frequency to 30MHz.
- 2 Radiated emissions measured in frequency range from 9kHz to 1GHz were made with an instrument using Quasi-peak detector mode.
- 3 The IF bandwidth of Receiver between 30MHz to 1GHz was 120kHz.

Power supply: AC 24V power by AC power converter
Note: Pre-scan all modes, only the worst case(TX_BLE_1M_2480MHz) is recorded in this report.

EUT Name:	Aqara Keypad	Test Mode:	Mode 1
Model:	KP-X01D	Sample No:	E20240129370001-0011
Power supply:	AC 24V	Environmental Conditions:	21.4℃/53%RH/101.0kPa
Test Engineer:	Zhang Zishan	Test Date:	2024-03-29
Frequency	2480MHz(TX_BLE_1M)	Polarity:	Horizontal



EUT Name:	Aqara Keypad	Test Mode:	Mode 1
Model:	KP-X01D	Sample No:	E20240129370001-0011
Power supply:	AC 24V	Environmental Conditions:	21.4℃/53%RH/101.0kPa
Test Engineer:	Zhang Zishan	Test Date:	2024-03-29
Frequency	2480MHz(TX/ BLE_1M)	Polarity:	Vertical



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.

Pre-scan all modes, the worst power supply is 4 LR3 AAA 1.5V Batteries. In the three power supply modes(4 LR3 AAA 1.5V Batteries, DC 24V power by Adapter and AC 24V power by AC power converter), only the worst power supply mode is recorded in this report.

Mode: TX/ BLE_1M
Lowest Frequency (2402MHz)
Environment: 23.2°C/47%RH/101.0kPa
Tested By:Zhang Zishan

Voltage: DC 6V
Date: 2024-02-23

Suspected Data List									
NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1194.2000	53.30	44.30	-9.00	74.00	29.70	100	164	Horizontal
2	1661.2000	51.75	44.24	-7.51	74.00	29.76	200	284	Horizontal
3	2839.2000	47.72	46.68	-1.04	74.00	27.32	200	28	Horizontal
4	3985.5000	50.11	39.72	-10.39	74.00	34.28	100	236	Horizontal
5	7206.0000	44.81	45.74	0.93	74.00	28.26	200	343	Horizontal
6	12147.0000	35.34	49.49	14.15	74.00	24.51	200	60	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	12147.0000	14.15	30.28	44.43	54.00	9.57	200	60	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	1663.2000	51.73	43.46	-8.27	74.00	30.54	100	193	Vertical
2	1822.8000	50.00	44.81	-5.19	74.00	29.19	100	340	Vertical
3	2852.0000	47.30	46.05	-1.25	74.00	27.95	100	180	Vertical
4	4803.0000	49.33	42.17	-7.16	74.00	31.83	100	19	Vertical
5	7986.0000	41.93	45.45	3.52	74.00	28.55	200	129	Vertical
6	17995.5000	36.95	50.42	13.47	74.00	23.58	200	330	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	17995.5000	13.47	30.57	44.04	54.00	9.96	200	330	Vertical

Mode: TX/ BLE_1M
Middle Frequency (2440MHz)
Environment: 23.2°C/47%RH/101.0kPa
Tested By:Zhang Zishan

Voltage: DC 6V
Date: 2024-02-23

Suspected Data List									
NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1194.6000	55.45	46.45	-9.00	74.00	27.55	100	116	Horizontal
2	1660.0000	52.11	44.60	-7.51	74.00	29.40	100	305	Horizontal
3	1944.4000	49.52	45.39	-4.13	74.00	28.61	200	101	Horizontal
4	2786.4000	47.69	46.31	-1.38	74.00	27.69	200	263	Horizontal
5	4426.5000	49.59	41.00	-8.59	74.00	33.00	100	96	Horizontal
6	11401.5000	38.20	50.06	11.86	74.00	23.94	200	339	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	11401.5000	11.86	30.46	42.32	54.00	11.68	200	339	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	1245.4000	47.74	40.32	-7.42	74.00	33.68	200	20	Vertical
2	1663.0000	50.42	42.15	-8.27	74.00	31.85	100	154	Vertical
3	2923.6000	48.11	46.60	-1.51	74.00	27.40	100	278	Vertical
4	5101.5000	46.14	40.19	-5.95	74.00	33.81	200	96	Vertical
5	6646.5000	45.11	44.07	-1.04	74.00	29.93	200	28	Vertical
6	10956.0000	38.81	49.49	10.68	74.00	24.51	100	230	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	10956.0000	10.68	30.27	40.95	54.00	13.05	100	230	Vertical

Mode: TX/ BLE_1M
Highest Frequency (2480MHz)
Environment: 23.2℃/47%RH/101.0kPa
Tested By:Zhang Zishan

Voltage: DC 6V
Date: 2024-02-23

Suspected Data List									
NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1196.4000	54.43	45.44	-8.99	74.00	28.56	100	100	Horizontal
2	1663.8000	52.13	44.64	-7.49	74.00	29.36	100	317	Horizontal
3	2903.4000	47.63	46.48	-1.15	74.00	27.52	200	74	Horizontal
4	4959.0000	47.15	40.81	-6.34	74.00	33.19	100	71	Horizontal
5	7438.5000	44.24	45.85	1.61	74.00	28.15	100	43	Horizontal
6	11331.0000	38.29	49.30	11.01	74.00	24.70	200	151	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	11331.0000	11.01	30.24	41.25	54.00	12.75	200	151	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	1198.8000	55.04	46.02	-9.02	74.00	27.98	100	197	Vertical
2	1897.0000	48.09	44.74	-3.35	74.00	29.26	100	20	Vertical
3	2844.6000	47.12	45.88	-1.24	74.00	28.12	200	47	Vertical
4	4654.5000	52.24	44.06	-8.18	74.00	29.94	100	259	Vertical
5	5325.0000	48.31	42.69	-5.62	74.00	31.31	100	232	Vertical
6	18000.0000	36.68	50.15	13.47	74.00	23.85	100	299	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	18000.0000	13.47	30.57	44.04	54.00	9.96	100	299	Vertical

Mode: TX/ BLE_2M
Lowest Frequency (2402MHz)
Environment: 23.2°C/47%RH/101.0kPa
Tested By:Zhang Zishan

Voltage: DC 6V
Date: 2024-02-23

Suspected Data List									
NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1196.4000	55.83	46.84	-8.99	74.00	27.16	100	222	Horizontal
2	2782.8000	48.50	47.06	-1.44	74.00	26.94	200	154	Horizontal
3	3988.5000	49.76	39.38	-10.38	74.00	34.62	200	273	Horizontal
4	4920.0000	47.90	41.30	-6.60	74.00	32.70	100	286	Horizontal
5	7206.0000	44.63	45.56	0.93	74.00	28.44	100	232	Horizontal
6	15655.5000	37.08	49.76	12.68	74.00	24.24	100	83	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	15655.5000	12.68	30.54	43.22	54.00	10.78	100	83	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	1200.2000	54.74	45.76	-8.98	74.00	28.24	200	197	Vertical
2	1850.6000	49.06	44.59	-4.47	74.00	29.41	100	253	Vertical
3	2667.2000	48.66	45.98	-2.68	74.00	28.02	100	48	Vertical
4	4785.0000	50.09	42.86	-7.23	74.00	31.14	100	297	Vertical
5	8016.0000	42.37	45.66	3.29	74.00	28.34	200	153	Vertical
6	17997.0000	37.03	50.50	13.47	74.00	23.50	200	260	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	17997.0000	13.47	30.41	43.88	54.00	10.12	200	260	Vertical

Mode: TX/ BLE_2M
Middle Frequency (2440MHz)
Environment: 23.2°C/47%RH/101.0kPa
Tested By:Zhang Zishan

Voltage: DC 6V
Date: 2024-02-23

Suspected Data List									
NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1199.8000	52.21	43.22	-8.99	74.00	30.78	200	262	Horizontal
2	1849.8000	49.69	44.81	-4.88	74.00	29.19	200	141	Horizontal
3	2892.8000	47.26	46.12	-1.14	74.00	27.88	100	129	Horizontal
4	3985.5000	53.54	43.15	-10.39	74.00	30.85	200	4	Horizontal
5	7312.5000	43.15	44.44	1.29	74.00	29.56	200	341	Horizontal
6	15652.5000	36.71	49.54	12.83	74.00	24.46	100	259	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	15652.5000	12.83	30.29	43.12	54.00	10.88	100	259	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	1194.2000	52.26	43.12	-9.14	74.00	30.88	200	21	Vertical
2	1605.8000	51.82	43.99	-7.83	74.00	30.01	200	158	Vertical
3	2980.4000	47.10	45.77	-1.33	74.00	28.23	200	249	Vertical
4	3328.5000	53.61	40.71	-12.90	74.00	33.29	100	165	Vertical
5	3997.5000	51.13	40.32	-10.81	74.00	33.68	100	233	Vertical
6	17953.5000	36.47	49.97	13.50	74.00	24.03	200	135	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	17953.5000	13.50	30.65	44.15	54.00	9.85	200	135	Vertical

Mode: TX/ BLE_2M
Highest Frequency (2480MHz)
Environment: 23.2°C/47%RH/101.0kPa
Tested By:Zhang Zishan

Voltage: DC 6V
Date: 2024-02-23

Suspected Data List									
NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1230.2000	48.08	39.05	-9.03	74.00	34.95	100	76	Horizontal
2	1899.4000	47.65	43.96	-3.69	74.00	30.04	100	76	Horizontal
3	2924.6000	46.91	45.81	-1.10	74.00	28.19	100	253	Horizontal
4	4926.0000	47.12	40.56	-6.56	74.00	33.44	200	312	Horizontal
5	7438.5000	43.86	45.47	1.61	74.00	28.53	100	41	Horizontal
6	15663.0000	37.14	49.43	12.29	74.00	24.57	200	3	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	15663.0000	12.29	30.24	42.53	54.00	11.47	200	3	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	1328.0000	52.41	43.99	-8.42	74.00	30.01	100	129	Vertical
2	1759.0000	50.36	43.64	-6.72	74.00	30.36	100	20	Vertical
3	2760.0000	48.37	46.37	-2.00	74.00	27.63	100	291	Vertical
4	4780.5000	49.78	42.53	-7.25	74.00	31.47	100	205	Vertical
5	7986.0000	42.18	45.70	3.52	74.00	28.30	100	124	Vertical
6	17980.5000	37.00	50.48	13.48	74.00	23.52	200	191	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	17980.5000	13.48	31.28	44.76	54.00	9.24	200	191	Vertical

- Remark:**
- 1 Measuring frequencies from 1GHz to the 10th harmonic of highest fundamental frequency.
 - 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.

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.

Pre-scan all modes, the worst power supply is 4 LR3 AAA 1.5V Batteries. In the three power supply modes(4 LR3 AAA 1.5V Batteries, DC 24V power by Adapter and AC 24V power by AC power converter), only the worst case(TX/BLE_1M_2440MHz) in the worst power supply is recorded, in this report.

Mode: TX/ BLE_1M

Lowest Frequency (2440MHz)

Environment: 23.2°C/47%RH/101.0kPa

Tested By: Zhang Zishan

Voltage: DC 6V

Date: 2024-02-23

Suspected Data List

NO.	Freq. [MHz]	Reading [dBμV/m]	Level for 1m [dBμV/m]	Level for 3m [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	19249.5000	42.92	31.32	21.78	-11.60	74	52.22	100	313	Horizontal
2	20606.5250	41.04	30.64	21.1	-10.40	74	52.90	200	313	Horizontal
3	21047.2500	41.39	31.30	21.76	-10.09	74	52.24	150	266	Horizontal
4	23059.2000	38.81	30.16	20.62	-8.65	74	53.38	100	313	Horizontal
5	24675.9000	37.12	29.52	19.98	-7.60	74	54.02	150	45	Horizontal
6	25166.7750	37.31	30.19	20.65	-7.12	74	53.35	100	266	Horizontal

Suspected Data List

NO.	Freq. [MHz]	Reading [dBμV/m]	Level for 1m [dBμV/m]	Level for 3m [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	18937.5500	42.67	30.83	21.29	-11.84	74	52.71	150	31	Vertical
2	20596.3250	41.12	30.85	21.31	-10.27	74	52.69	100	311	Vertical
3	21638.4250	41.08	31.42	21.88	-9.66	74	52.12	150	233	Vertical
4	22627.8250	39.91	30.94	21.4	-8.97	74	52.60	200	92	Vertical
5	24552.6500	37.13	29.42	19.88	-7.71	74	54.12	300	343	Vertical
6	25114.5000	38.37	31.29	21.75	-7.08	74	52.25	100	139	Vertical

Remark:

- 1 Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
- 2 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.
- 3 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.
- 4 Above 18G test distance is 1m, so the Level for 3m= Level for 1m + 20*log(1/3)

8. 6dB BANDWIDTH

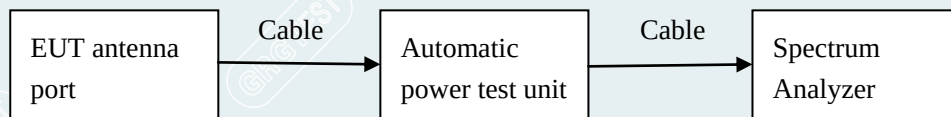
8.1 LIMITS

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

- Remove the antenna from the EUT, and then connect a low loss RF cable from antenna port to the Automatic power measuring unit.
- 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.
- Repeat above procedures until all frequencies measured were complete.

8.3 TEST SETUP



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

8.4 TEST RESULTS

Environment: 23.1℃/68%RH/101.0kPa
Tested By: Huang Tianmei

Voltage: DC 6V
Date: 2024-02-02

BLE_1M

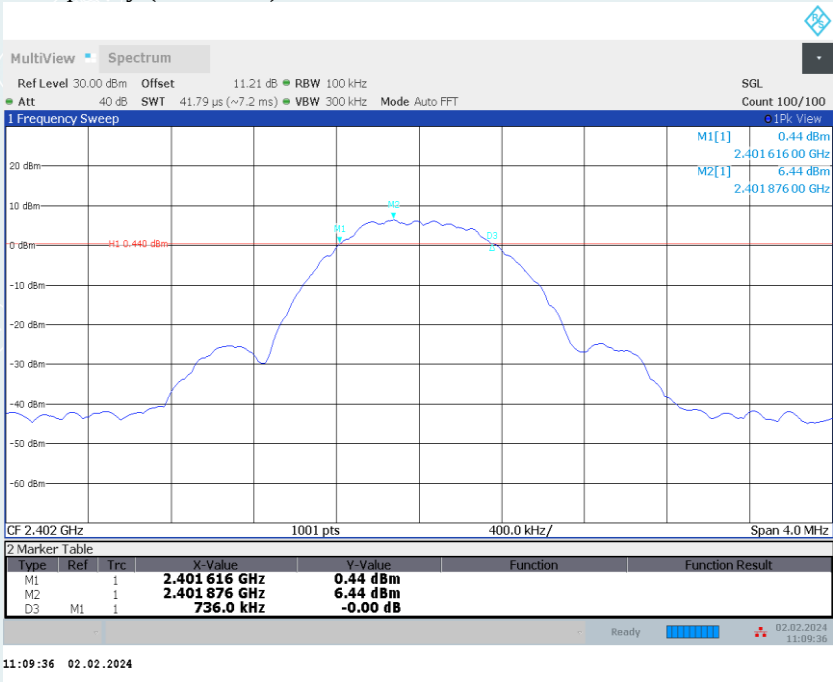
Channel	Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Test Result
Lowest	2402	736	≥500	PASS
Middle	2440	744		PASS
Highest	2480	752		PASS

BLE_2M

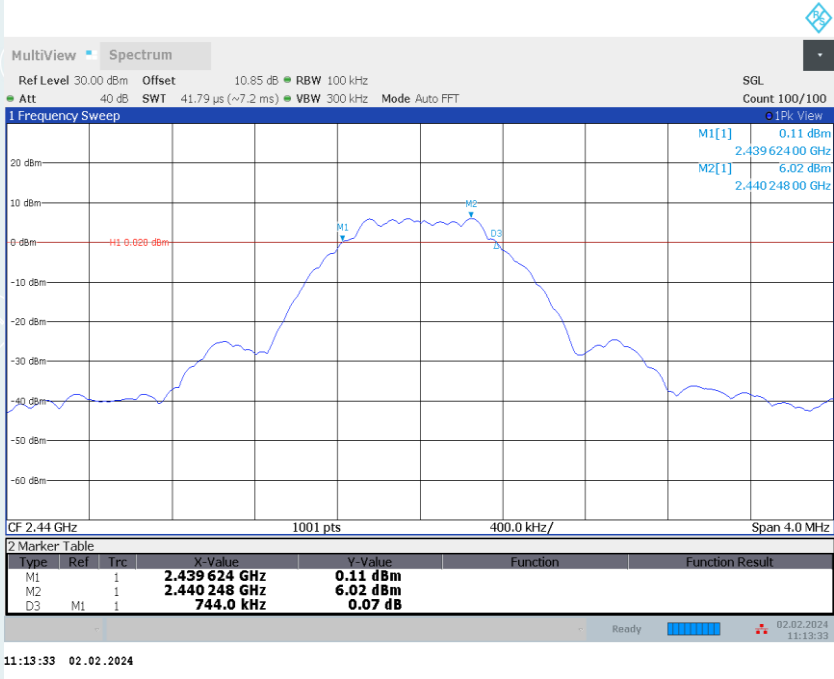
Channel	Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Test Result
Lowest	2402	1368	≥500	PASS
Middle	2440	1204		PASS
Highest	2480	1312		PASS

BLE_1M

Lowest Frequency (2402MHz)



Middle Frequency (2440 MHz)



Highest Frequency (2480MHz)

