

APPLICATION CERTIFICATION FCC Part 15C
On Behalf of
SUN HEI (WORLDWIDE) ELECTRONIC CO., LTD.

2.4G WIRELESS MOUSE(USB Dongle)

Model No.: MPK02, SKU#386337

FCC ID: VAC-MPK02-02

Prepared for : SUN HEI (WORLDWIDE) ELECTRONIC CO., LTD.
Address : UNIT B, 15/F., WING CHEUNG IND. BLDG.,
58-70, KWAI CHEONG RD., KWAI CHUNG, N.T.
HONG KONG.

Prepared by : Shenzhen Accurate Technology Co., Ltd.
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Report Number : ATE20190170
Date of Test : Feb. 17, 2019-Feb. 27, 2019
Date of Report : Feb. 28, 2019

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Test Report Certification

Applicant : SUN HEI (WORLDWIDE) ELECTRONIC CO., LTD.
Address : UNIT B, 15/F., WING CHEUNG IND. BLDG.,
58-70, KWAI CHEONG RD., KWAI CHUNG, N.T. HONG KONG.
Manufacturer : XIANGSHUN ELECTRONIC PRODUCTS CO., LTD.
Address : The Third Industry District, Xiaobian, Changan Town, Dongguan City,
Guangdong, China.
Product : 2.4G WIRELESS MOUSE(USB Dongle)
Model No. : MPK02, SKU#386337
Trade name : N/A

Measurement Procedure Used:



FCC Rules and Regulations Part 15 Subpart C Section 15.249 ANSI C63.10: 2013


The EUT was tested according to FCC 47CFR 15.249 for compliance to FCC 47CFR 15.249 requirements

The device described above is tested by SHENZHEN ACCURATE TECHNOLOGY CO. LTD to determine the maximum emission levels emanating from the device. The maximum emission levels are compared to the FCC Part 15 Subpart C Section 15.249 limits. The measurement results are contained in this test report and Shenzhen ACCURATE TECHNOLOGY CO. LTD is assumed full responsibility for the accuracy and completeness of these measurements. Also, this report shows that the Equipment Under Test (EUT) is to be technically compliant with the FCC requirements.

This report applies to above tested sample only. This report shall not be reproduced in part without written approval of SHENZHEN ACCURATE TECHNOLOGY CO. LTD.

Date of Test : Feb. 17, 2019-Feb. 27, 2019
Date of Report : Feb. 28, 2019

Prepared by : 
(Tim  Eng & er)

Approved & Authorized Signer : 
(Sean Liu, Manager)

1. GENERAL INFORMATION

1.1. Description of Device (EUT)

EUT	:	2.4G WIRELESS MOUSE(USB Dongle)
Model No.	:	MPK02, SKU#386337
Trade Name	:	N/A
Power Supply	:	DC 5V(Powered by USB port)
Operate Frequency	:	2402-2480MHz
Number of channel	:	40
Modulation mode	:	GFSK
Antenna Gain	:	0dBi
Antenna type	:	PCB Antenna
Applicant Address	:	SUN HEI (WORLDWIDE) ELECTRONIC CO., LTD. UNIT B, 15/F., WING CHEUNG IND. BLDG., 58-70, KWAI CHEONG RD., KWAI CHUNG, N.T. HONG KONG.
Manufacturer Address	:	XIANGSHUN ELECTRONIC PRODUCTS CO., LTD. The Third Industry District, Xiaobian, Changan Town, Dongguan City, Guangdong, China
Date of sample received	:	Feb. 16, 2019
Date of Test	:	Feb. 17, 2019-Feb. 27, 2019

1.2. Special Accessory and Auxiliary Equipment

PC	Manufacturer: LENOVO
	M/N: ThinkPad X240
	S/N: N/A

1.3.Model difference declaration

MPK02, SKU#386337 are identical in interior structure, electrical circuits and components, and just model number is different for the marketing requirement.

1.4.Channel frequency

1CH	2402 MHz	21CH	2442 MHz
2CH	2404 MHz	22CH	2444 MHz
3CH	2406 MHz	23CH	2446 MHz
4CH	2408 MHz	24CH	2448 MHz
5CH	2410 MHz	25CH	2450 MHz
6CH	2412 MHz	26CH	2452 MHz
7CH	2414 MHz	27CH	2454 MHz
8CH	2416 MHz	28CH	2456 MHz
9CH	2418 MHz	29CH	2458 MHz
10CH	2420 MHz	30CH	2460 MHz
11CH	2422 MHz	31CH	2462 MHz
12CH	2424 MHz	32CH	2464 MHz
13CH	2426 MHz	33CH	2466 MHz
14CH	2428 MHz	34CH	2468 MHz
15CH	2430 MHz	35CH	2470 MHz
16CH	2432 MHz	36CH	2472 MHz
17CH	2434 MHz	37CH	2474 MHz
18CH	2436 MHz	38CH	2476 MHz
19CH	2438 MHz	39CH	2478 MHz
20CH	2440 MHz	40CH	2480 MHz

1.5. Description of Test Facility

EMC Lab	: Recognition of accreditation by Federal Communications Commission (FCC) The Designation Number is CN1189 The Registration Number is 708358
	Listed by Innovation, Science and Economic Development Canada (ISED) The Registration Number is 5077A-2
	Accredited by China National Accreditation Service for Conformity Assessment (CNAS) The Registration Number is CNAS L3193
	Accredited by American Association for Laboratory Accreditation (A2LA) The Certificate Number is 4297.01
Name of Firm	: Shenzhen Accurate Technology Co., Ltd.
Site Location	: 1/F., Building A, Changyuan New Material Port, Science & Industry Park, Nanshan District, Shenzhen, Guangdong, P.R. China

1.6. Measurement Uncertainty

Conducted Emission Expanded Uncertainty	=	2.23dB, k=2
Radiated emission expanded uncertainty (9kHz-30MHz)	=	3.08dB, k=2
Radiated emission expanded uncertainty (30MHz-1000MHz)	=	4.42dB, k=2
Radiated emission expanded uncertainty (Above 1GHz)	=	4.06dB, k=2

2. MEASURING DEVICE AND TEST EQUIPMENT

Table 1: List of Test and Measurement Equipment

Kind of equipment	Manufacturer	Type	S/N	Calibrated dates	Calibrated until
EMI Test Receiver	Rohde&Schwarz	ESCS30	100307	Jan. 05, 2019	1 Year
EMI Test Receiver	Rohde&Schwarz	ESPI3	101526/003	Jan. 05, 2019	1 Year
Spectrum Analyzer	Rohde&Schwarz	FSV-40	101495	Jan. 05, 2019	1 Year
Spectrum Analyzer	Agilent	E7405A	MY45115511	Jan. 05, 2019	1 Year
Pre-Amplifier	Rohde&Schwarz	CBLU118354 0-01	3791	Jan. 05, 2019	1 Year
Loop Antenna	Schwarzbeck	FMZB1516	1516131	Jan. 05, 2019	1 Year
Bilog Antenna	Schwarzbeck	VULB9163	9163-323	Jan. 05, 2019	1 Year
Horn Antenna	Schwarzbeck	BBHA9120D	9120D-655	Jan. 05, 2019	1 Year
Horn Antenna	Schwarzbeck	BBHA9170	9170-359	Jan. 05, 2019	1 Year
Open Switch and Control Unit	Rohde&Schwarz	OSP120 + OSP-B157	101244 + 100866	Jan. 05, 2019	1 Year
LISN	Rohde&Schwarz	ESH3-Z5	100305	Jan. 05, 2019	1 Year
LISN	Schwarzbeck	NSLK8126	8126431	Jan. 05, 2019	1 Year
Highpass Filter	Wainwright Instruments	WHKX3.6/18 G-10SS	N/A	Jan. 05, 2019	1 Year
Band Reject Filter	Wainwright Instruments	WRCG2400/2 485-2375/2510 -60/11SS	N/A	Jan. 05, 2019	1 Year
RF Coaxial Cable (Conducted Emission)	SUHNER	N-2m	No.2	Jan. 05, 2019	1 Year
RF Coaxial Cable (Radiated Emission)	SUHNER	N-5m	NO.3	Jan. 05, 2019	1 Year
RF Coaxial Cable (Radiated Emission)	SUHNER	N-5m	NO.4	Jan. 05, 2019	1 Year
RF Coaxial Cable (Radiated Emission)	SUHNER	N-1m	NO.5	Jan. 05, 2019	1 Year
RF Coaxial Cable (Radiated Emission)	SUHNER	N-1m	NO.6	Jan. 05, 2019	1 Year
Conducted Emission Measurement Software: ES-K1 V1.71					
Radiated Emission Measurement Software: EZ_EMV V1.1.4.2					

3. OPERATION OF EUT DURING TESTING

3.1. Operating Mode

The mode is used: **Transmitting mode**

Low Channel: 2402 MHz

Middle Channel: 2440 MHz

High Channel: 2480 MHz

3.2. Configuration and peripherals

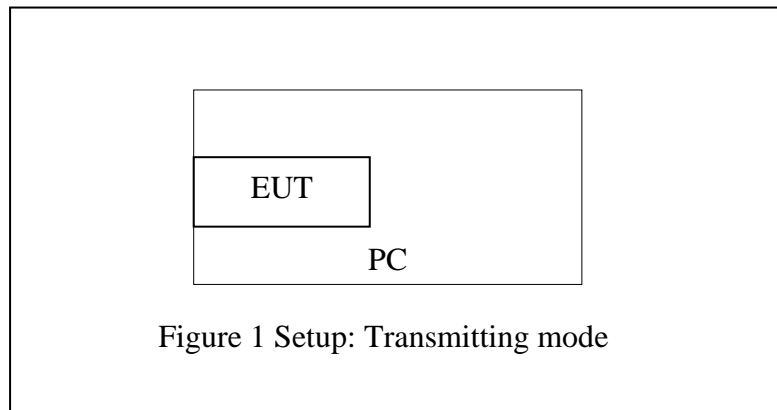


Figure 1 Setup: Transmitting mode

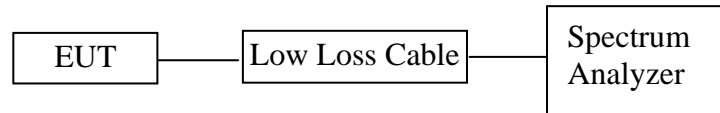
Note: The power was switched from 85% to 115%, and the worse case data was recorded.

4. TEST PROCEDURES AND RESULTS

FCC Rules	Description of Test	Result
Section 15.215(c)	20dB Bandwidth	Compliant
Section 15.249(d)	Band Edge Compliance Test	Compliant
Section 15.205(a), Section 15.209(a), Section 15.249, Section 15.35	Radiated Spurious Emission Test	Compliant
Section 15.207	AC Power Line Conducted Emission Test	Compliant
Section 15.203	Antenna Requirement	Compliant

5. 20DB BANDWIDTH MEASUREMENT

5.1. Block Diagram of Test Setup



5.2. The Requirement For Section 15.215(c)

The bandwidth of a frequency hopping channel is the 20 dB emission bandwidth, measured with the hopping stopped. The system RF bandwidth is equal to the channel bandwidth multiplied by the number of channels in the hopset. The hopset shall be such that the near-term distribution of frequencies appears random, with sequential hops randomly distributed in both direction and magnitude of change in the hopset while the long-term distribution appears evenly distributed.

5.3. Operating Condition of EUT

5.3.1. Setup the EUT and simulator as shown as Section 5.1.

5.3.2. Turn on the power of all equipment.

5.3.3. Let the EUT work in TX modes measure it. The transmit frequency are 2402, 2440, 2480MHz.

5.4. Test Procedure

5.4.1. Place the EUT on the table and set it in transmitting mode.

5.4.2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

5.4.3. Set RBW of spectrum analyzer to 100 kHz and VBW to 300 kHz, Detector function=peak, Trace=max hold, Sweep=auto.

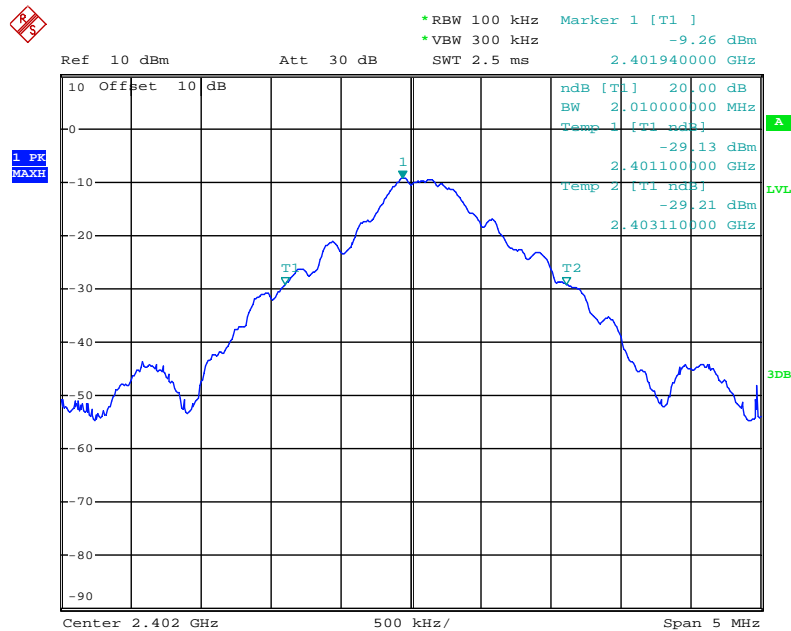
5.4.4. Set the measured low, middle and high frequency and test 20dB bandwidth with spectrum analyzer.

5.5. Test Result

Channel	Frequency (MHz)	20dB Bandwidth (MHz)
Low	2402	2.01
Middle	2440	2.10
High	2480	2.15

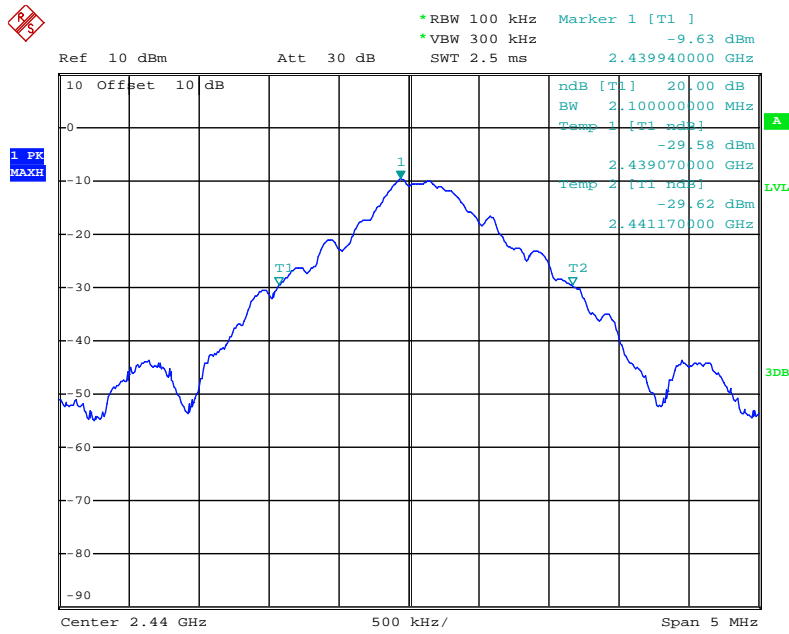
The spectrum analyzer plots are attached as below.

Low channel



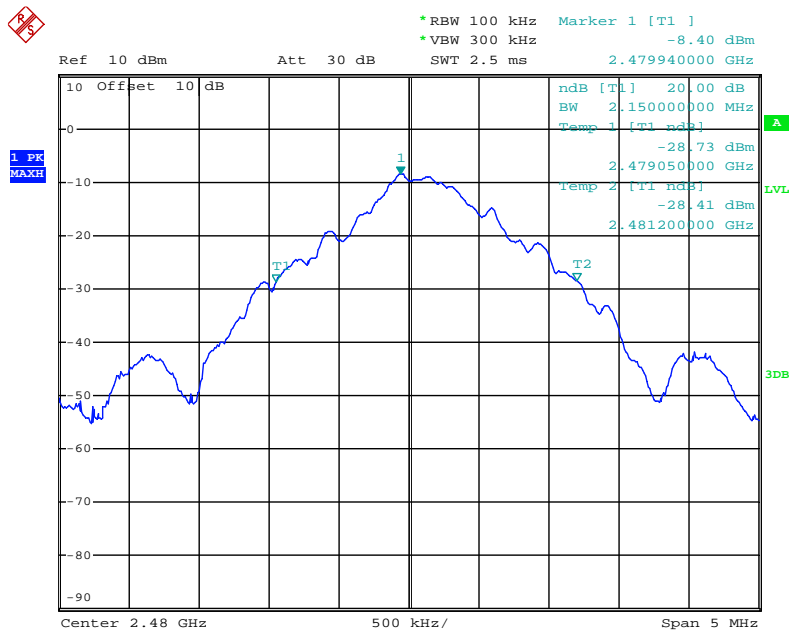
Date: 20.FEB.2019 14:33:21

Middle channel



Date: 20.FEB.2019 14:32:33

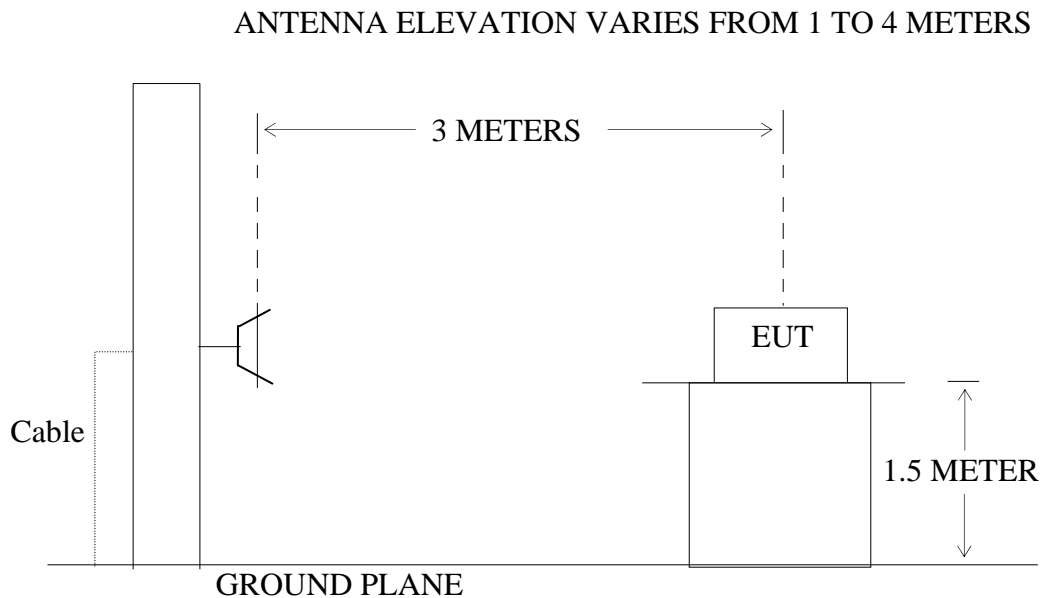
High channel



Date: 20.FEB.2019 14:31:24

6. BAND EDGE COMPLIANCE TEST

6.1. Block Diagram of Test Setup



6.2. The Requirement For Section 15.249

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph A8.4(4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a).

6.3. EUT Configuration on Measurement

The equipment are installed on the emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

6.4. Operating Condition of EUT

6.4.1. Setup the EUT and simulator as shown as Section 6.1.

6.4.2. Turn on the power of all equipment.

6.4.3. Let the EUT work in TX modes measure it. The transmit frequency are 2402, 2480MHz.

6.5. Test Procedure

Radiate Band Edge:

6.5.1. The EUT is placed on a turntable, which is 1.5m above the ground plane and worked at highest radiated power.

6.5.2. The turntable was rotated for 360 degrees to determine the position of maximum emission level.

6.5.3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission.

6.5.4. Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission:

RBW=1MHz, VBW=1MHz

6.5.5. The band edges was measured and recorded.

6.6. Test Result

Job No.: FRANK2019 #446

Standard: FCC PK

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: 2.4G WIRELESS MOUSE(USB Dongle)

Mode: TX 2402MHz

Model: MPK02

Manufacturer: XIANGSHUN ELECTRONIC PRODUCTS CO., LTD

Polarization: Horizontal

Power Source: DC 5V

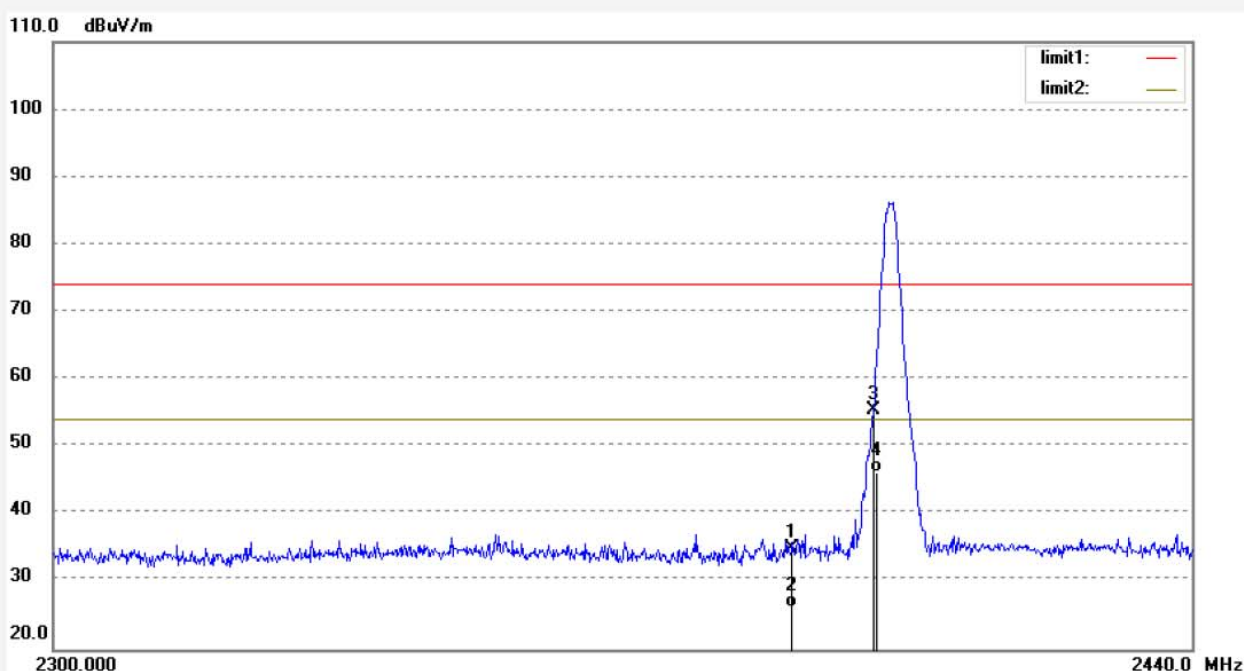
Date: 19/02/21/

Time: 10/09/05

Engineer Signature:

Distance: 3m

Note: Report NO.:ATE20190170



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2390.000	41.35	-6.32	35.03	74.00	-38.97	peak	200	311	
2	2390.000	32.45	-6.32	26.13	54.00	-27.87	AVG	250	96	
3	2400.000	61.82	-6.27	55.55	74.00	-18.45	peak	200	221	
4	2400.000	52.45	-6.27	46.18	54.00	-7.82	AVG	250	103	

Job No.: FRANK2019 #445

Standard: FCC PK

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: 2.4G WIRELESS MOUSE(USB Dongle)

Mode: TX 2402MHz

Model: MPK02

Manufacturer: XIANGSHUN ELECTRONIC PRODUCTS CO., LTD

Polarization: Vertical

Power Source: DC 5V

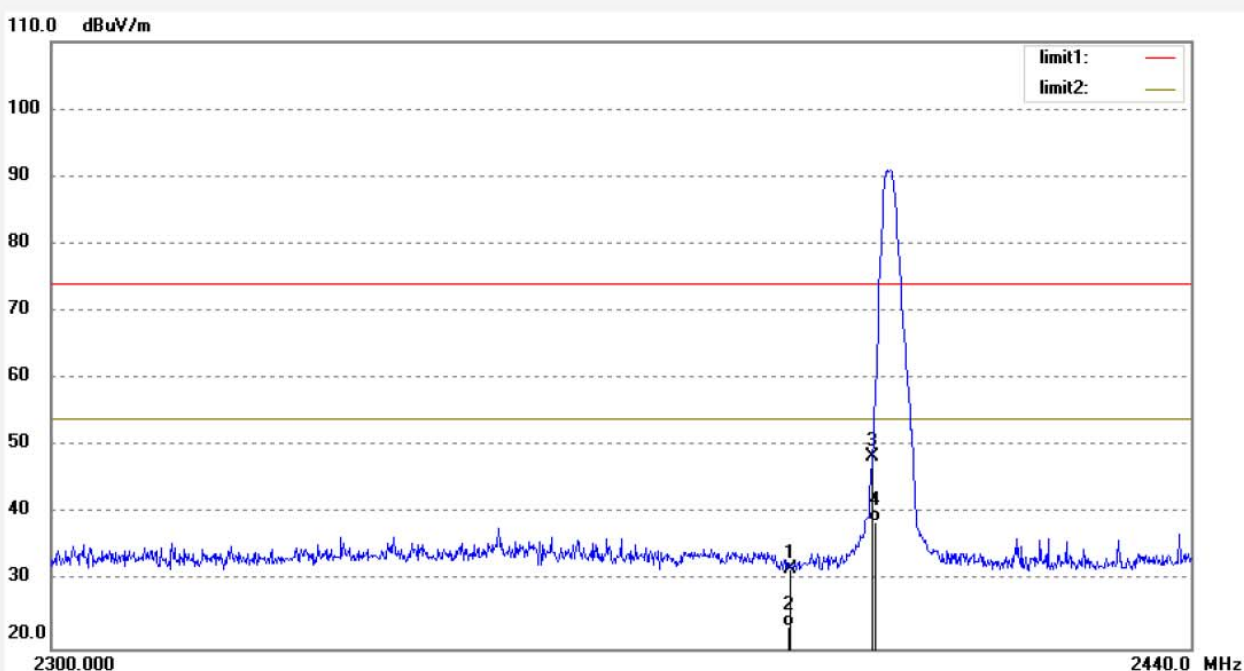
Date: 19/02/21/

Time: 10/07/52

Engineer Signature:

Distance: 3m

Note: Report NO.:ATE20190170



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2390.000	38.22	-6.32	31.90	74.00	-42.10	peak	150	165	
2	2390.000	29.65	-6.32	23.33	54.00	-30.67	AVG	150	92	
3	2400.000	54.69	-6.27	48.42	74.00	-25.58	peak	150	221	
4	2400.000	45.12	-6.27	38.85	54.00	-15.15	AVG	150	103	

Job No.: FRANK2019 #447

Polarization: Horizontal

Standard: FCC PK

Power Source: DC 5V

Test item: Radiation Test

Date: 19/02/21/

Temp.(C)/Hum.(%) 25 C / 55 %

Time: 10/11/15

EUT: 2.4G WIRELESS MOUSE(USB Dongle)

Engineer Signature:

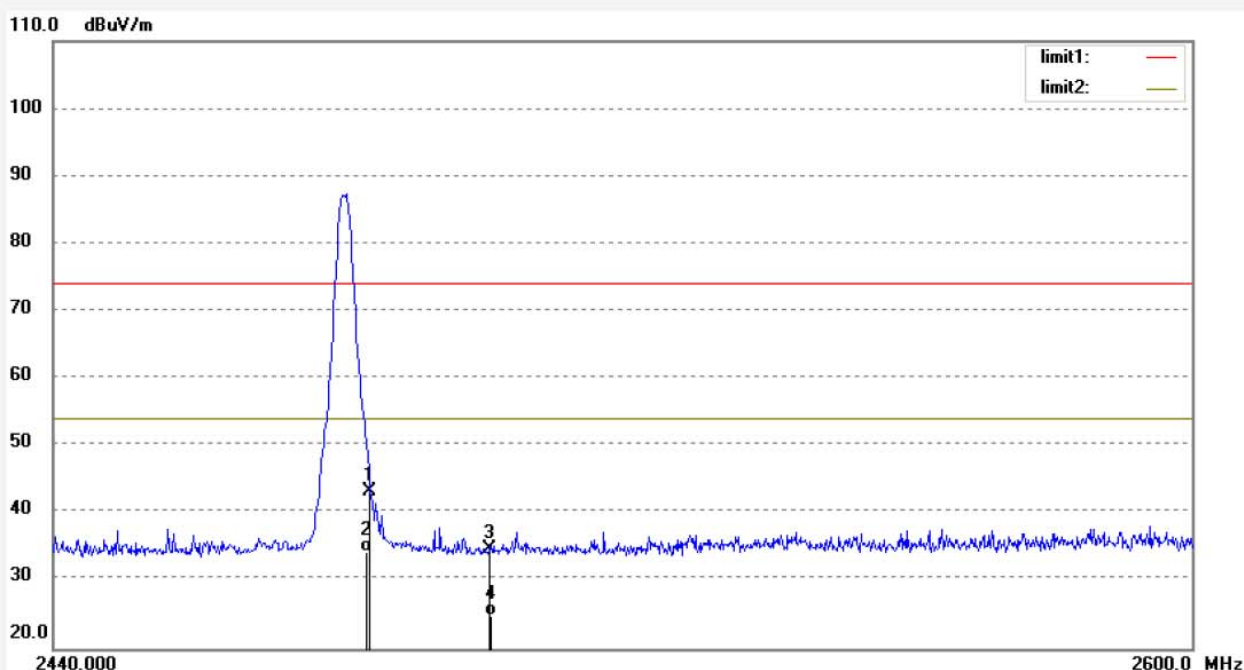
Mode: TX 2480MHz

Distance: 3m

Model: MPK02

Manufacturer: XIANGSHUN ELECTRONIC PRODUCTS CO., LTD

Note: Report NO.:ATE20190170



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2483.500	49.21	-5.89	43.32	74.00	-30.68	peak	200	305	
2	2483.500	40.12	-5.89	34.23	54.00	-19.77	AVG	200	93	
3	2500.000	40.47	-5.81	34.66	74.00	-39.34	peak	200	221	
4	2500.000	30.54	-5.81	24.73	54.00	-29.27	AVG	200	103	

Job No.: FRANK2019 #448

Standard: FCC PK

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: 2.4G WIRELESS MOUSE(USB Dongle)

Mode: TX 2480MHz

Model: MPK02

Manufacturer: XIANGSHUN ELECTRONIC PRODUCTS CO., LTD

Polarization: Vertical

Power Source: DC 5V

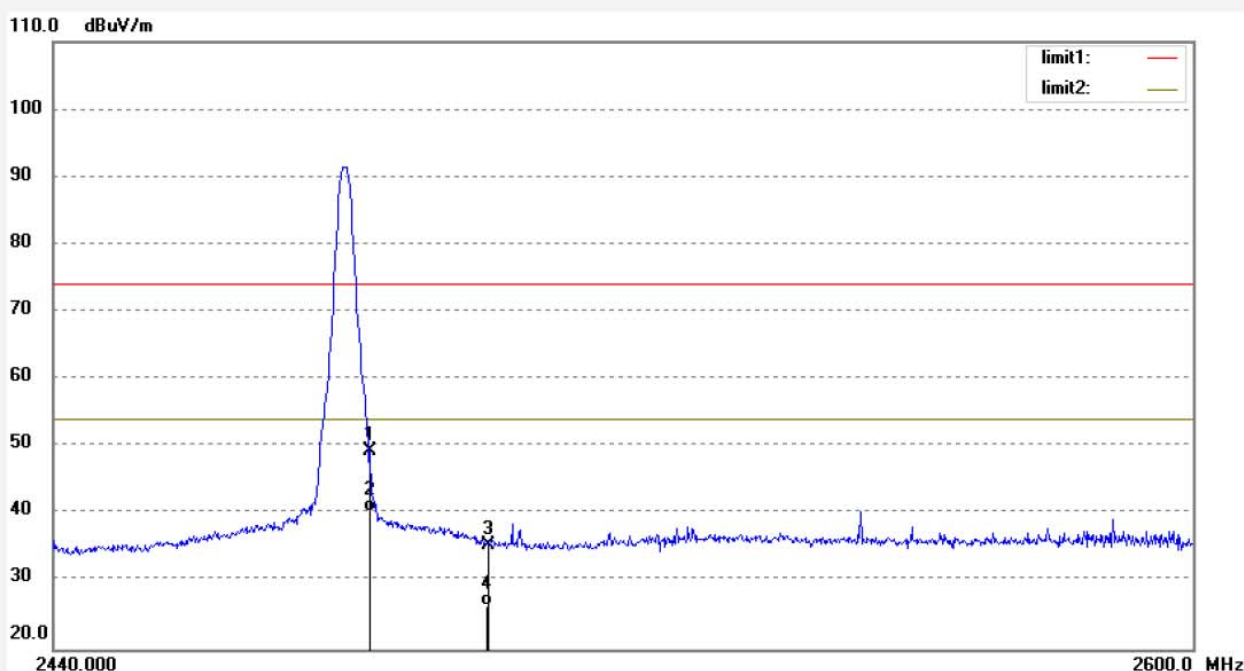
Date: 19/02/21/

Time: 10/12/30

Engineer Signature:

Distance: 3m

Note: Report NO.:ATE20190170



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2483.500	55.17	-5.89	49.28	74.00	-24.72	peak	150	267	
2	2483.500	46.15	-5.89	40.26	54.00	-13.74	AVG	150	96	
3	2500.000	41.12	-5.81	35.31	74.00	-38.69	peak	150	219	
4	2500.000	32.15	-5.81	26.34	54.00	-27.66	AVG	150	103	

Note:

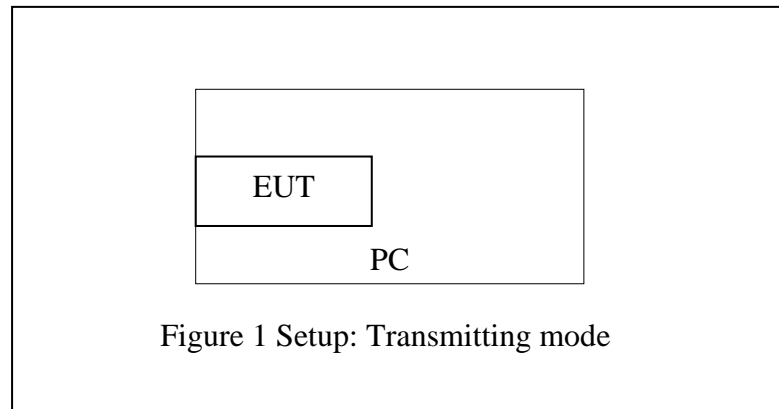
1. Emissions attenuated more than 20 dB below the permissible value are not reported.
2. The field strength is calculated by adding the antenna factor, high pass filter loss(if used) and cable loss, and subtracting the amplifier gain(if any)from the measured reading. The basic equation calculation is as follows:

$$\text{Result} = \text{Reading} + \text{Corrected Factor}$$
3. Display the measurement of peak values.
4. The average measurement was not performed when peak measured data under the limit of average detection.

7. RADIATED SPURIOUS EMISSION TEST

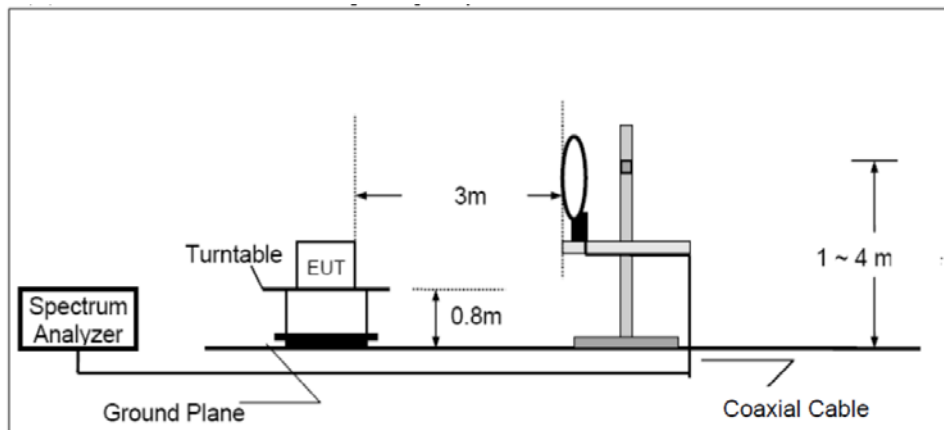
7.1. Block Diagram of Test Setup

7.1.1. Block diagram of connection between the EUT and peripherals

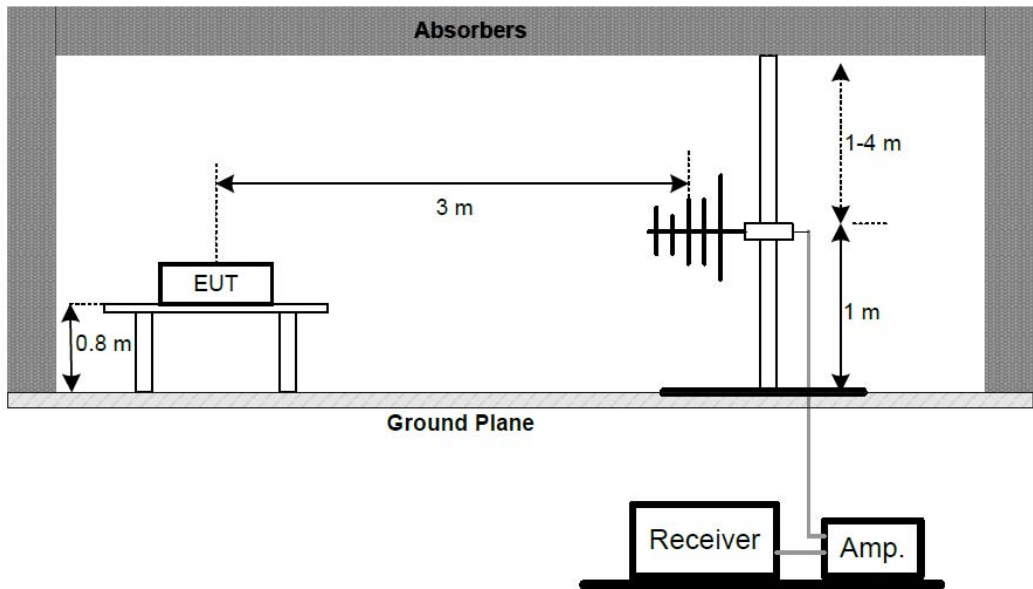


7.1.2. Semi-Anechoic Chamber Test Setup Diagram

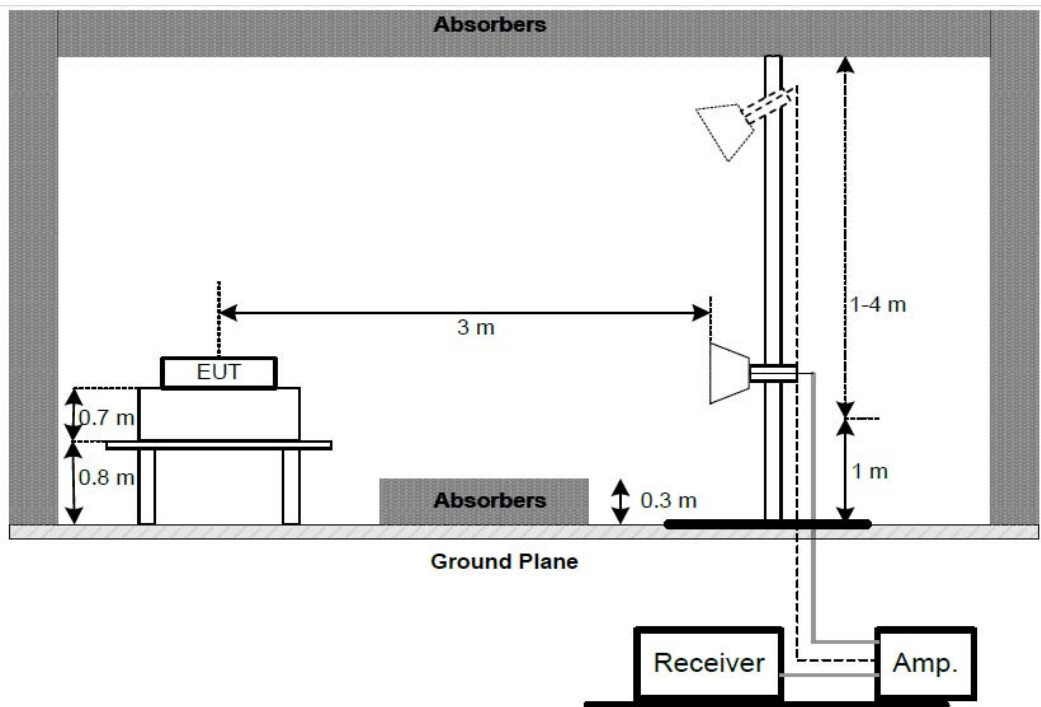
(A) Radiated Emission Test Set-Up, Frequency below 30MHz



(B) Radiated Emission Test Set-Up, Frequency below 1GHz



(C) Radiated Emission Test Set-Up, Frequency above 1GHz



7.2.The Limit For Section 15.249

Except as provided in paragraph (b) of this section of FCC part C 15.249, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental frequency	Field strength of fundamental (millivolts/ meter)	Field strength of harmonics (microvolts/ meter)
902–928 MHz	50	500
2400–2483.5 MHz	50	500
5725–5875 MHz	50	500
24.0–24.25 GHz	250	2500

For products working in the 2400-2483.5MHz band, According to 15.249(a) the Avg limit of fundamental frequency is 94.00dBuV/m. The corresponding peak limit is 114.00dBuV/m. Field strength limits are specified at a distance of 3 meters.

7.3.Restricted bands of operation

7.3.1.FCC Part 15.205 Restricted bands of operation

(a) Except as shown in paragraph (d) of this section, Only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
¹ 0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	(²)
13.36-13.41			

¹Until February 1, 1999, this restricted band shall be 0.490-0.510

- (b) Except as provided in paragraphs (d) and (e), the field strength of emission appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000MHz, Compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

7.4. Configuration of EUT on Measurement

The equipment are installed on Radiated Emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

7.5. Operating Condition of EUT

7.5.1. Setup the EUT and simulator as shown as Section 7.1.

7.5.2. Turn on the power of all equipment.

7.5.3. Let the EUT work in TX modes and measure it. The transmit frequency are 2402, 2440, 2480MHz.

7.6. Test Procedure

The EUT and its simulators are placed on a turntable, which is 0.8 meter (Below 1GHz) and 1.5m (above 1GHz) high above ground. The turntable can rotate 360 degrees to determine the position of the maximum emission level. EUT is set 3.0 meters away from the receiving antenna, which is mounted on an antenna tower. The antenna can be moved up and down between 1.0 meter and 4 meters to find out the maximum emission level. Broadband antenna (calibrated bilog antenna) is used as receiving antenna. Both horizontal and vertical polarizations of the antenna are set on measurement. In order to find the maximum emission levels, all of the interface cables must be manipulated according to ANSI C63.10: 2013 on radiated emission measurement. The EUT was tested in 3 orthogonal planes.

The bandwidth of test receiver is set at 9 kHz in below 30MHz. and set at 120 kHz in 30-1000MHz, and 1MHz in above 1000MHz.

The frequency range from 9 kHz to 25GHz is checked.

The final measurement in band 9-90 kHz, 110-490 kHz and above 1000MHz is performed with Average detector. Except those frequency bands mention above, the final measurement for frequencies below 1000MHz is performed with Quasi Peak detector.

RBW (120 kHz), VBW (300 kHz) for QP detector below 1GHz

For fundamental frequency,
 RBW= 3MHz, VBW = 10MHz PK detector for PK value, RMS detector for AV value
 For spurious emission
 RBW= 1MHz, VBW = 3MHz PK detector for PK value, RBW= 1MHz, VBW = 10Hz
 PK detector for AV value

The field strength is calculated by adding the antenna factor, and cable loss, and subtracting the amplifier gain from the measured reading. The basic equation calculation is as follows:

Result = Reading + Corrected Factor

Where Corrected Factor = Antenna Factor + Cable Loss – Amplifier Gain

7.7.DATA SAMPLE

Frequency (MHz)	Reading (dB μ v)	Factor (dB/m)	Result (dB μ v/m)	Limit (dB μ v/m)	Margin (dB)	Remark
X.XX	49.83	-22.03	27.80	43.50	-15.70	QP

Frequency(MHz) = Emission frequency in MHz

Reading(dB μ v) = Uncorrected Analyzer/Receiver reading

Factor (dB/m)= Antenna factor + Cable Loss – Amplifier gain

Result(dB μ v/m) = Reading + Factor

Limit (dB μ v/m)= Limit stated in standard

Margin (dB) = Result(dB μ v/m) - Limit (dB μ v/m)

Calculation Formula:

Margin(dB) = Result (dB μ v/m)–Limit(dB μ v/m)

Result(dB μ v/m)= Reading(dB μ v)+ Factor(dB/m)

The “Margin” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dB means the emission is 7dB below the limit.

7.8.The Field Strength of Radiation Emission Measurement Results

PASS.

Note: 1. Emissions attenuated more than 20 dB below the permissible value are not reported.

2. *: Denotes restricted band of operation.

3. The EUT is tested radiation emission in three axes. The worst emissions are reported in all channels.

4. The radiation emissions from 9KHz-30MHz and 18GHz-25GHz are not reported, because the test values lower than the limits of 20dB.

5. The average measurement was not performed when peak measured data under the limit of average detection.

30MHz-1GHz

Job No.: FRANK2019 #456

Standard: FCC Class B 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: 2.4G WIRELESS MOUSE(USB Dongle)

Mode: TX 2402MHz

Model: MPK02

Manufacturer: XIANGSHUN ELECTRONIC PRODUCTS CO., LTD

Polarization: Horizontal

Power Source: DC 5V

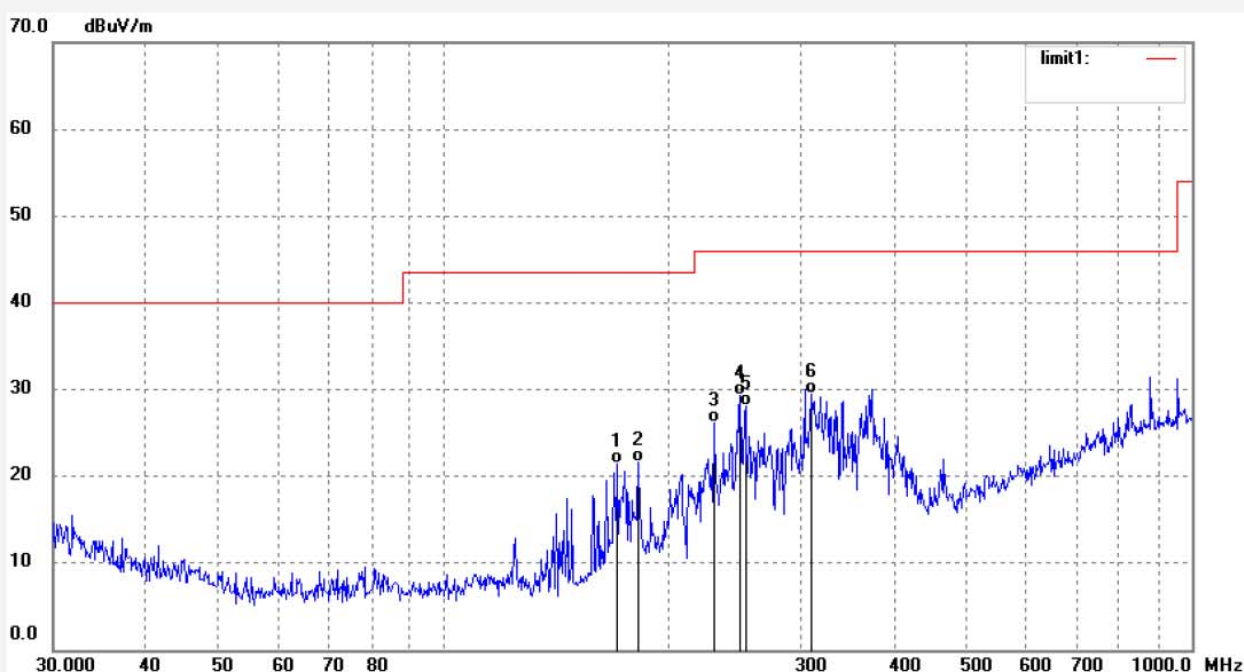
Date: 19/02/21/

Time: 10/38/34

Engineer Signature:

Distance: 3m

Note: Report NO.:ATE20190170



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	170.7878	47.45	-26.08	21.37	43.50	-22.13	QP	200	201	
2	181.9380	47.51	-25.84	21.67	43.50	-21.83	QP	200	324	
3	230.2295	50.08	-23.86	26.22	46.00	-19.78	QP	200	196	
4	248.7318	52.92	-23.65	29.27	46.00	-16.73	QP	200	321	
5	253.1401	51.56	-23.46	28.10	46.00	-17.90	QP	200	75	
6	310.3594	50.51	-20.95	29.56	46.00	-16.44	QP	200	103	

Job No.: FRANK2019 #455

Standard: FCC Class B 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: 2.4G WIRELESS MOUSE(USB Dongle)

Mode: TX 2402MHz

Model: MPK02

Manufacturer: XIANGSHUN ELECTRONIC PRODUCTS CO., LTD

Polarization: Vertical

Power Source: DC 5V

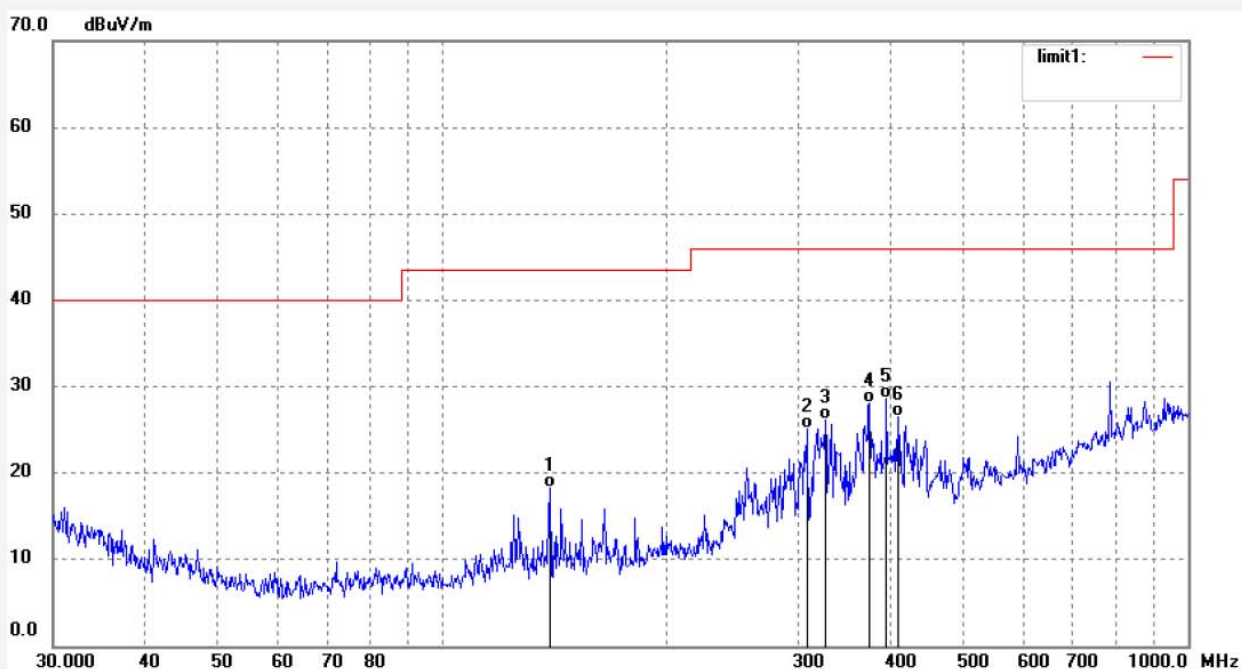
Date: 19/02/21/

Time: 10/37/40

Engineer Signature:

Distance: 3m

Note: Report NO.:ATE20190170



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	139.3006	46.23	-27.94	18.29	43.50	-25.21	QP	150	331	
2	308.1860	46.18	-21.00	25.18	46.00	-20.82	QP	150	201	
3	326.0079	46.59	-20.35	26.24	46.00	-19.76	QP	150	191	
4	373.8861	46.83	-18.71	28.12	46.00	-17.88	QP	150	92	
5	394.1198	47.02	-18.41	28.61	46.00	-17.39	QP	150	221	
6	408.2137	44.74	-18.16	26.58	46.00	-19.42	QP	150	103	

Job No.: FRANK2019 #457

Standard: FCC Class B 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: 2.4G WIRELESS MOUSE(USB Dongle)

Mode: TX 2440MHz

Model: MPK02

Manufacturer: XIANGSHUN ELECTRONIC PRODUCTS CO., LTD

Polarization: Horizontal

Power Source: DC 5V

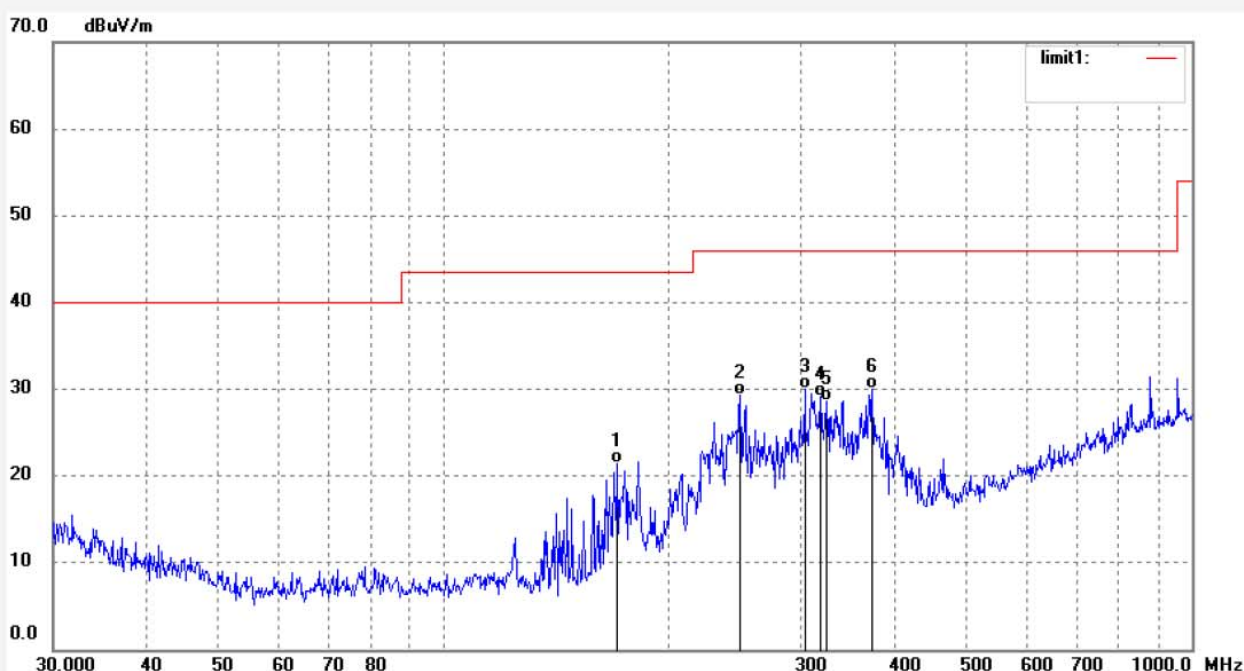
Date: 19/02/21/

Time: 10/38/46

Engineer Signature:

Distance: 3m

Note: Report NO.:ATE20190170



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	170.7878	47.45	-26.08	21.37	43.50	-22.13	QP	200	295	
2	248.7318	52.92	-23.65	29.27	46.00	-16.73	QP	200	210	
3	303.8851	51.17	-21.11	30.06	46.00	-15.94	QP	200	323	
4	318.0874	49.82	-20.68	29.14	46.00	-16.86	QP	200	66	
5	324.8645	49.08	-20.40	28.68	46.00	-17.32	QP	200	221	
6	373.8861	48.66	-18.71	29.95	46.00	-16.05	QP	200	103	

Job No.: FRANK2019 #458

Standard: FCC Class B 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: 2.4G WIRELESS MOUSE(USB Dongle)

Mode: TX 2440MHz

Model: MPK02

Manufacturer: XIANGSHUN ELECTRONIC PRODUCTS CO., LTD

Polarization: Vertical

Power Source: DC 5V

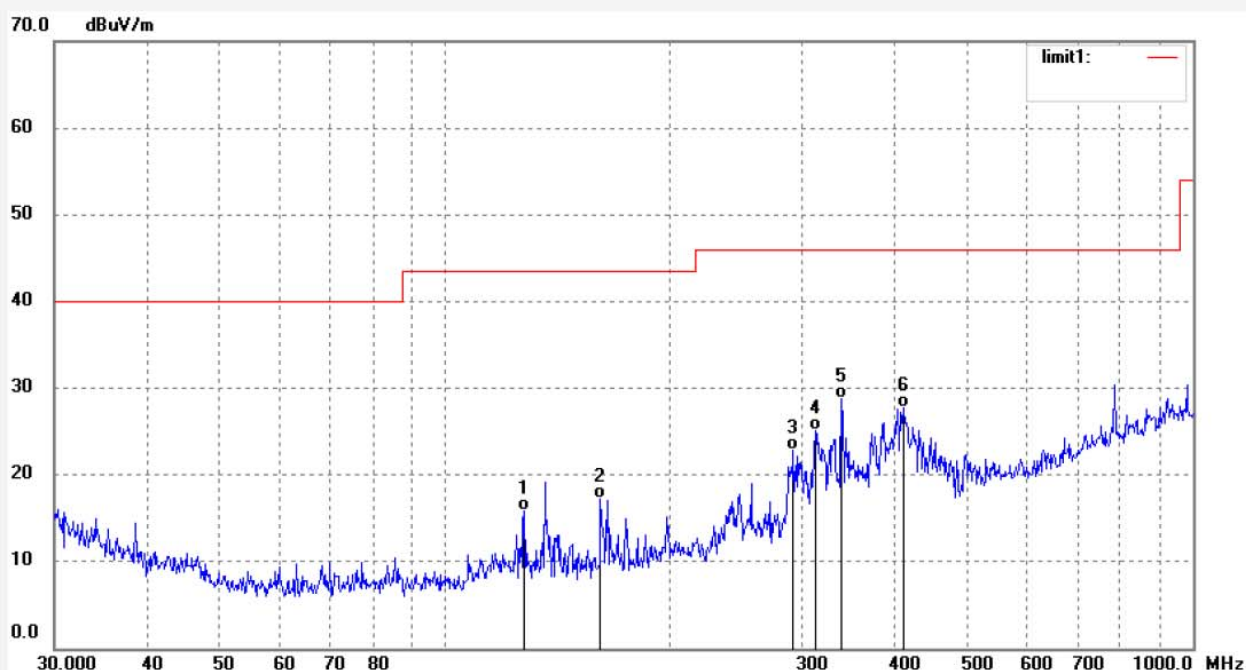
Date: 19/02/21/

Time: 10/39/44

Engineer Signature:

Distance: 3m

Note: Report NO.:ATE20190170



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	127.5865	43.56	-27.65	15.91	43.50	-27.59	QP	150	211	
2	161.4515	44.10	-26.91	17.19	43.50	-26.31	QP	150	330	
3	292.3643	44.38	-21.56	22.82	46.00	-23.18	QP	150	213	
4	312.5482	45.93	-20.86	25.07	46.00	-20.93	QP	150	52	
5	338.8546	48.57	-19.79	28.78	46.00	-17.22	QP	150	331	
6	409.6505	45.92	-18.12	27.80	46.00	-18.20	QP	150	196	

Job No.: FRANK2019 #460

Standard: FCC Class B 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: 2.4G WIRELESS MOUSE(USB Dongle)

Mode: TX 2480MHz

Model: MPK02

Manufacturer: XIANGSHUN ELECTRONIC PRODUCTS CO., LTD

Polarization: Horizontal

Power Source: DC 5V

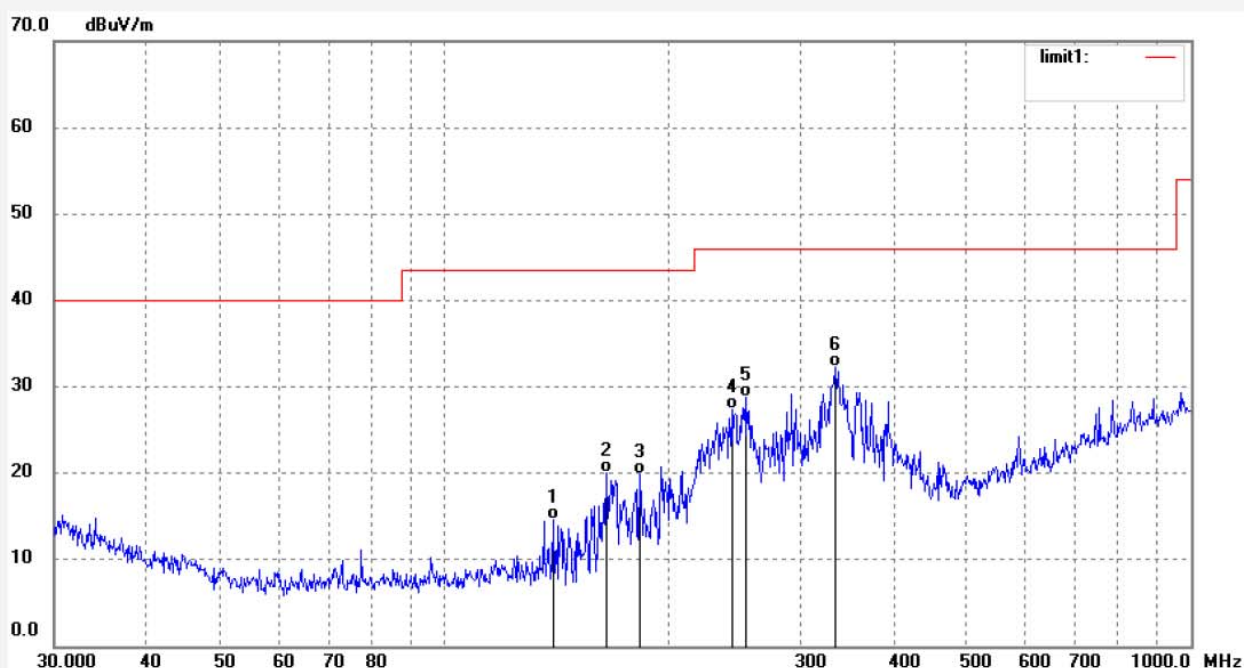
Date: 19/02/21/

Time: 10/41/20

Engineer Signature:

Distance: 3m

Note: Report NO.:ATE20190170



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	139.7908	42.52	-27.94	14.58	43.50	-28.92	QP	200	103	
2	164.8911	46.54	-26.55	19.99	43.50	-23.51	QP	200	221	
3	182.5784	45.67	-25.78	19.89	43.50	-23.61	QP	200	96	
4	242.6888	51.12	-23.70	27.42	46.00	-18.58	QP	200	332	
5	253.1401	52.28	-23.46	28.82	46.00	-17.18	QP	200	201	
6	334.1254	52.15	-19.94	32.21	46.00	-13.79	QP	200	119	

Job No.: FRANK2019 #459

Standard: FCC Class B 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: 2.4G WIRELESS MOUSE(USB Dongle)

Mode: TX 2480MHz

Model: MPK02

Manufacturer: XIANGSHUN ELECTRONIC PRODUCTS CO., LTD

Polarization: Vertical

Power Source: DC 5V

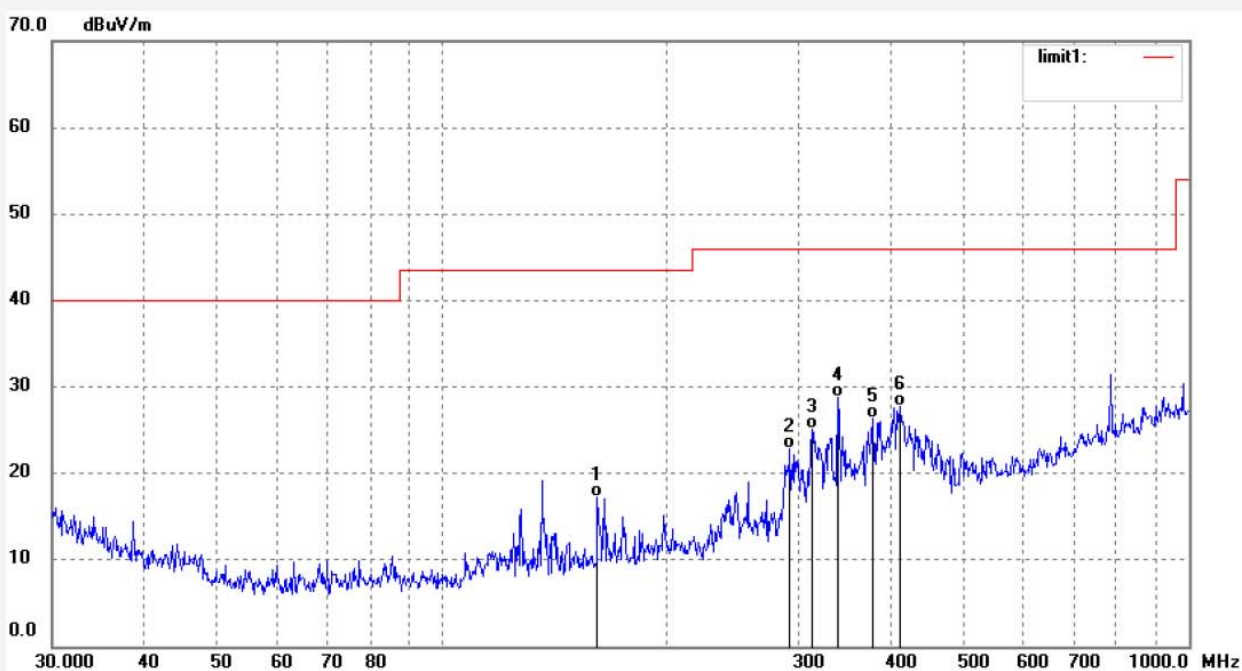
Date: 19/02/21/

Time: 10/39/57

Engineer Signature:

Distance: 3m

Note: Report NO.:ATE20190170



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	161.4515	44.10	-26.91	17.19	43.50	-26.31	QP	150	95	
2	292.3643	44.38	-21.56	22.82	46.00	-23.18	QP	150	214	
3	312.5482	45.93	-20.86	25.07	46.00	-20.93	QP	150	321	
4	338.8546	48.57	-19.79	28.78	46.00	-17.22	QP	150	66	
5	376.5227	45.09	-18.67	26.42	46.00	-19.58	QP	150	229	
6	409.6505	45.92	-18.12	27.80	46.00	-18.20	QP	150	103	

1GHz-18GHz


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Job No.: FRANK2019 #454

Standard: FCC PK

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: 2.4G WIRELESS MOUSE(USB Dongle)

Mode: TX 2402MHz

Model: MPK02

Manufacturer: XIANGSHUN ELECTRONIC PRODUCTS CO., LTD

Polarization: Horizontal

Power Source: DC 5V

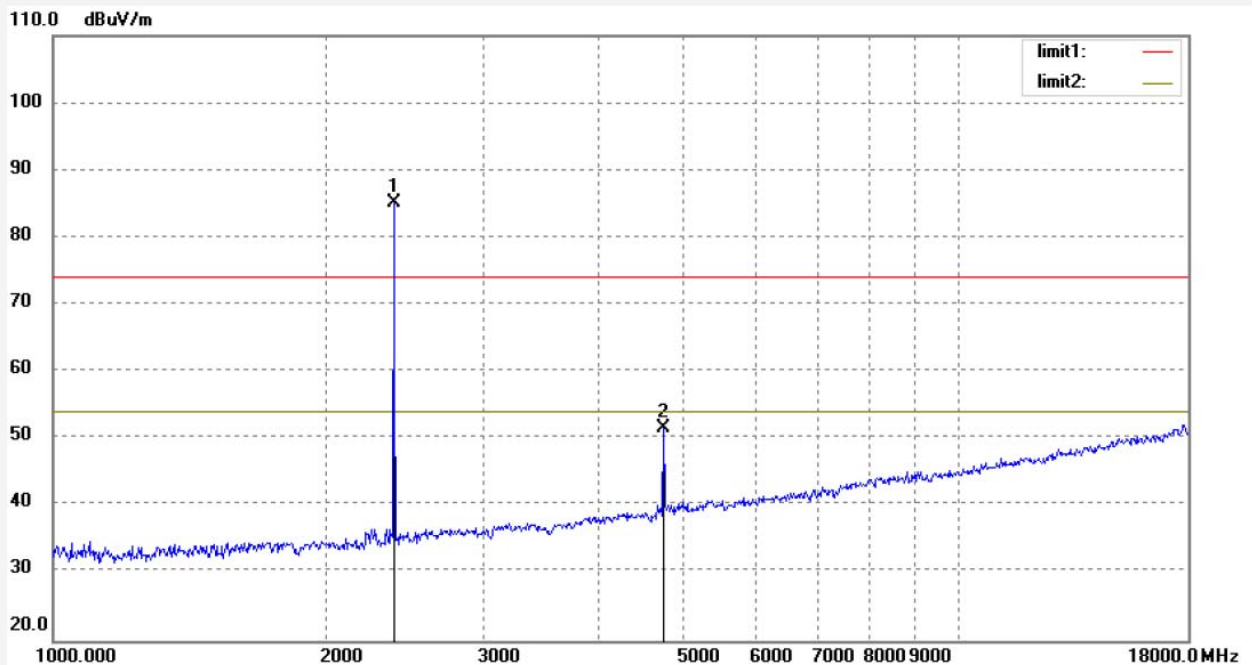
Date: 19/02/21/

Time: 10/34/46

Engineer Signature:

Distance: 3m

Note: Report NO.:ATE20190170



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2402.419	92.61	-6.37	86.24	114.00	-27.76	peak	200	221	
2	4804.857	50.92	0.70	51.62	74.00	-22.38	peak	200	106	

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Http://www.atc-lab.com

Job No.: FRANK2019 #453

Standard: FCC PK

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: 2.4G WIRELESS MOUSE(USB Dongle)

Mode: TX 2402MHz

Model: MPK02

Manufacturer: XIANGSHUN ELECTRONIC PRODUCTS CO., LTD

Polarization: Vertical

Power Source: DC 5V

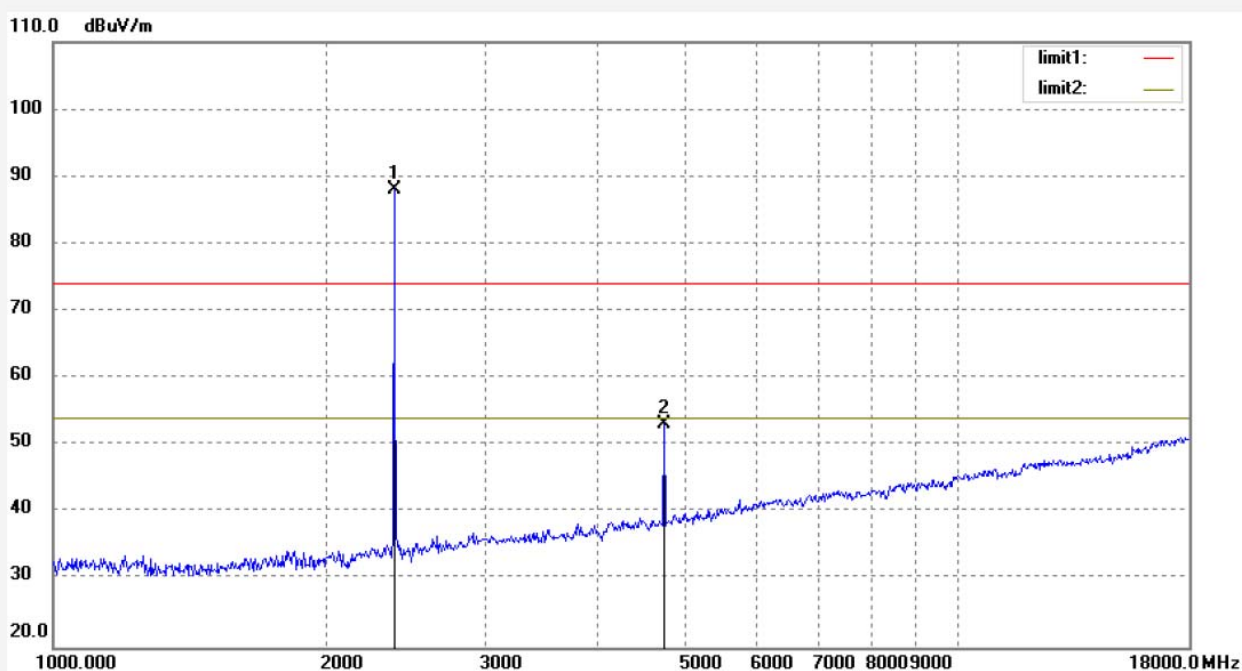
Date: 19/02/21/

Time: 10/32/26

Engineer Signature:

Distance: 3m

Note: Report NO.:ATE20190170



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2402.419	95.46	-6.37	89.09	114.00	-24.91	peak	150	239	
2	4804.857	52.50	0.70	53.20	74.00	-20.80	peak	150	100	

Job No.: FRANK2019 #451

Standard: FCC PK

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: 2.4G WIRELESS MOUSE(USB Dongle)

Mode: TX 2440MHz

Model: MPK02

Manufacturer: XIANGSHUN ELECTRONIC PRODUCTS CO., LTD

Polarization: Horizontal

Power Source: DC 5V

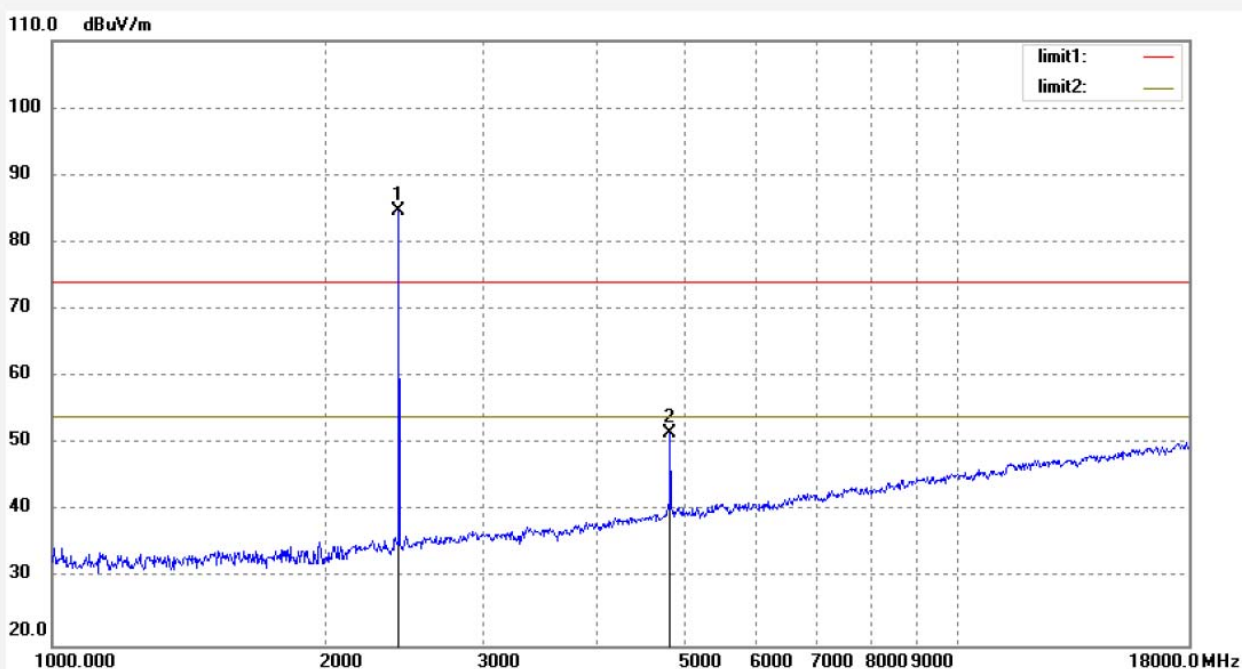
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Time: 10/30/01

Engineer Signature:

Distance: 3m

Note: Report NO.:ATE20190170



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2440.121	91.88	-6.20	85.68	114.00	-28.32	peak	200	221	
2	4880.224	50.48	1.07	51.55	74.00	-22.45	peak	200	103	

Job No.: FRANK2019 #452

Standard: FCC PK

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: 2.4G WIRELESS MOUSE(USB Dongle)

Mode: TX 2440MHz

Model: MPK02

Manufacturer: XIANGSHUN ELECTRONIC PRODUCTS CO., LTD

Polarization: Vertical

Power Source: DC 5V

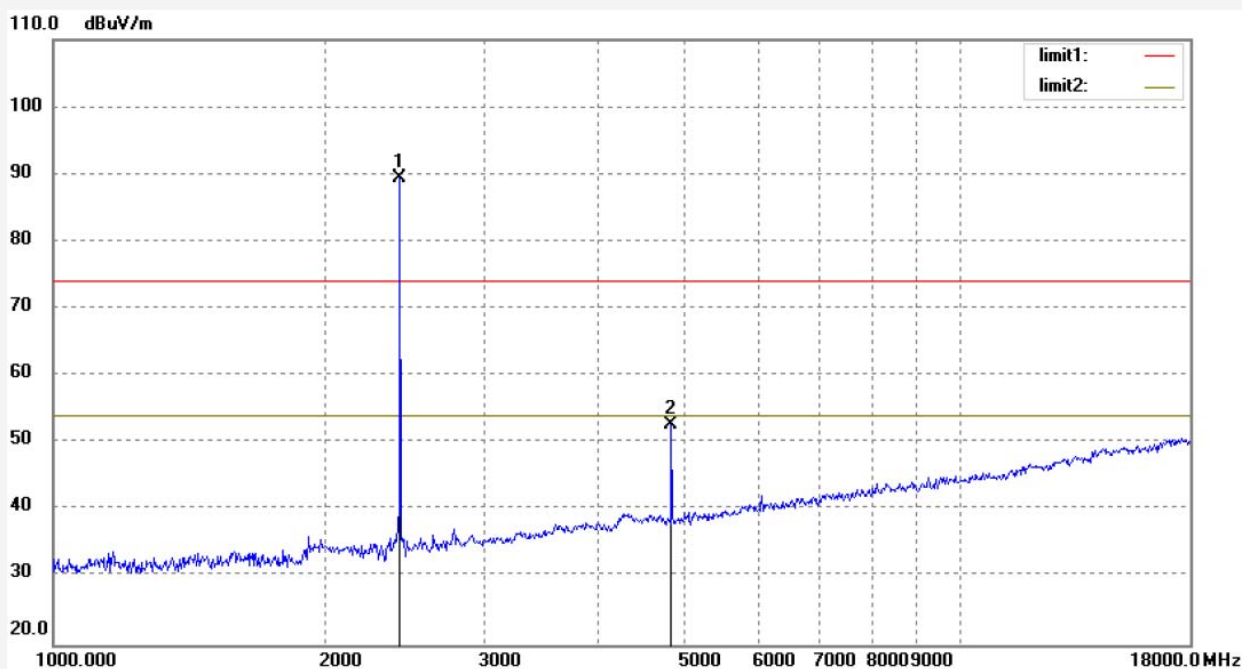
Date: 19/02/21/

Time: 10/31/11

Engineer Signature:

Distance: 3m

Note: Report NO.:ATE20190170



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2440.121	96.67	-6.20	90.47	114.00	-23.53	peak	150	106	
2	4880.224	51.56	1.07	52.63	74.00	-21.37	peak	150	51	

Job No.: FRANK2019 #450

Standard: FCC PK

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: 2.4G WIRELESS MOUSE(USB Dongle)

Mode: TX 2480MHz

Model: MPK02

Manufacturer: XIANGSHUN ELECTRONIC PRODUCTS CO LTD

Polarization: Horizontal

Power Source: DC 5V

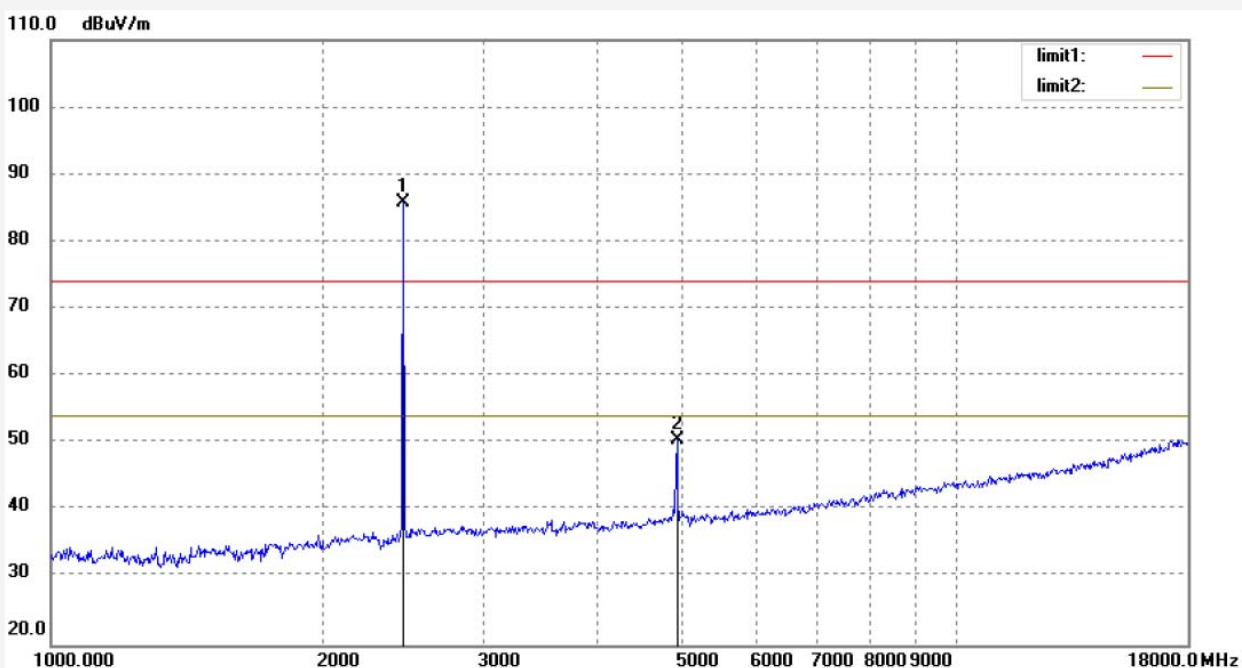
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Time: 10/28/38

Engineer Signature:

Distance: 3m

Note: Report NO.:ATE20190170



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2480.234	92.90	-6.04	86.86	114.00	-27.14	peak	200	32	
2	4960.444	48.96	1.50	50.46	74.00	-23.54	peak	200	119	

Job No.: FRANK2019 #449

Standard: FCC PK

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: 2.4G WIRELESS MOUSE(USB Dongle)

Mode: TX 2480MHz

Model: MPK02

Manufacturer: XIANGSHUN ELECTRONIC PRODUCTS CO., LTD

Polarization: Vertical

Power Source: DC 5V

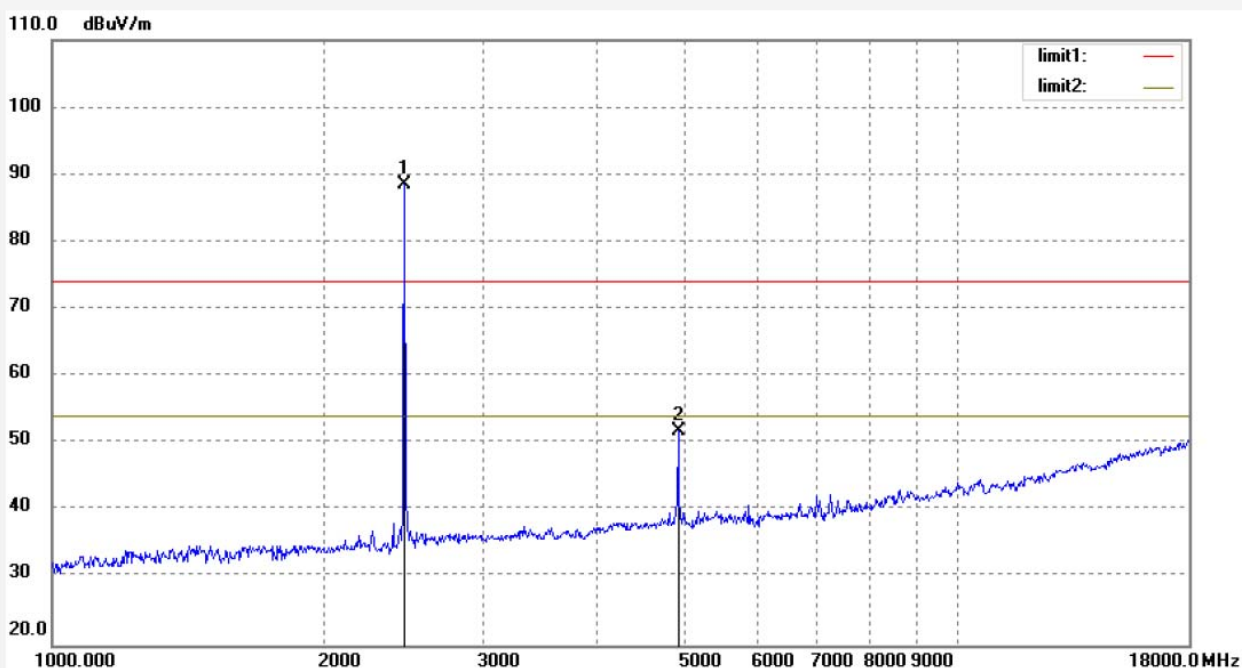
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Time: 10/15/17

Engineer Signature:

Distance: 3m

Note: Report NO.:ATE20190170

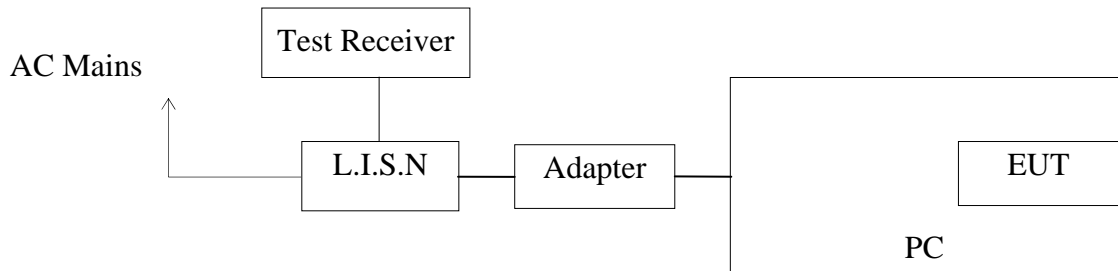


No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2480.234	95.65	-6.04	89.61	114.00	-24.39	peak	150	320	
2	4960.444	50.27	1.50	51.77	74.00	-22.23	peak	150	201	

8. AC POWER LINE CONDUCTED EMISSION FOR FCC PART

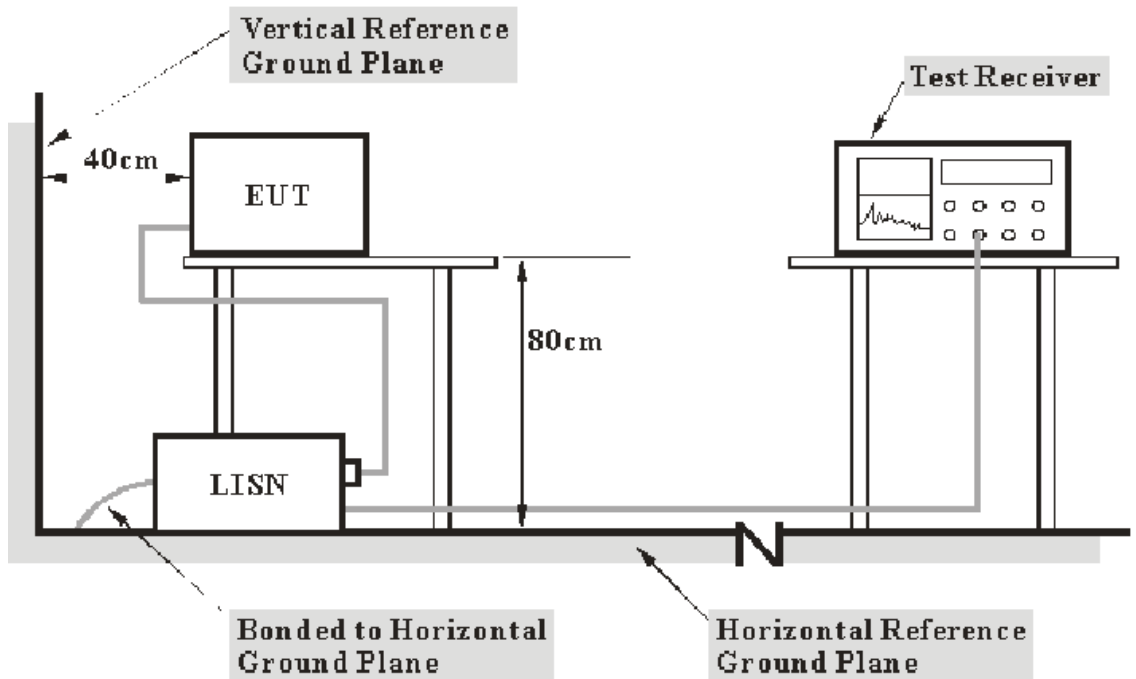
15 SECTION 15.207(A)

8.1. Block Diagram of Test Setup



{EUT: 2.4G WIRELESS MOUSE(USB Dongle)}

8.2. Test System Setup



- Note:**
1. Support units were connected to second LISN.
 2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

8.3. Power Line Conducted Emission Measurement Limits

Frequency (MHz)	Limit dB(μ V)	
	Quasi-peak Level	Average Level
0.15 - 0.50	66.0 – 56.0 *	56.0 – 46.0 *
0.50 - 5.00	56.0	46.0
5.00 - 30.00	60.0	50.0

NOTE1: The lower limit shall apply at the transition frequencies.
 NOTE2: The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.50MHz.

8.4. Configuration of EUT on Measurement

The equipments are installed on Power Line Conducted Emission Measurement to meet the commission requirement and operating regulations in a manner, which tends to maximize its emission characteristics in a normal application.

8.5. Operating Condition of EUT

8.5.1. Setup the EUT and simulator as shown as Section 8.1.

8.5.2. Turn on the power of all equipment.

8.5.3. Let the EUT work in test mode and measure it.

8.6. Test Procedure

The EUT is put on the plane 0.8m high above the ground by insulating support and is connected to the power mains through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm coupling impedance for the EUT system. Please refer the block diagram of the test setup and photographs. Both sides of AC lines are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to ANSI C63.4: 2014 on Conducted Emission Measurement.

The bandwidth of test receiver (R & S ESCS30) is set at 9kHz.

The frequency range from 150kHz to 30MHz is checked.

8.7.Data Sample

Frequency (MHz)	Transducer value (dB)	QuasiPeak Level (dB μ V)	Average Level (dB μ V)	QuasiPeak Limit (dB μ V)	Average Limit (dB μ V)	QuasiPeak Margin (dB)	Average Margin (dB)	Remark (Pass/Fail)
X.XX	10.5	51.1	34.2	56.0	46.0	4.9	11.8	Pass

Frequency(MHz) = Emission frequency in MHz

Transducer value(dB) = Insertion loss of LISN + Cable Loss

Level(dB μ V) = Quasi-peak Reading/Average Reading + Transducer value

Limit (dB μ V) = Limit stated in standard

Margin = Limit (dB μ V) - Level (dB μ V)

Calculation Formula:

Margin = Limit (dB μ V) - Level (dB μ V)

8.8.Power Line Conducted Emission Measurement Results

PASS.

The frequency range from 150kHz to 30MHz is checked.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

Emissions attenuated more than 20 dB below the permissible value are not reported.

We tested the conducted emission of high and low voltage mode and recorded the worst mode data. All data was recorded in the Quasi-peak and average detection mode.

Test mode : 2.4G Communication (AC 120V/60Hz)

MEASUREMENT RESULT: "F-0070-2_fin"

2019-1-24 9:35

Frequency MHz	Level dB μ V	Transd dB	Limit dB μ V	Margin dB	Detector	Line	PE
0.361500	26.50	10.9	59	32.2	QP	N	GND
0.487500	30.90	11.0	56	25.3	QP	N	GND
0.982500	23.80	11.1	56	32.2	QP	N	GND
2.175000	23.90	11.3	56	32.1	QP	N	GND
5.437500	18.50	11.5	60	41.5	QP	N	GND
19.540500	13.80	11.7	60	46.2	QP	N	GND

MEASUREMENT RESULT: "F-0070-2_fin2"

2019-1-24 9:35

Frequency MHz	Level dB μ V	Transd dB	Limit dB μ V	Margin dB	Detector	Line	PE
0.352500	22.60	10.9	49	26.3	AV	N	GND
0.505500	27.10	11.0	46	18.9	AV	N	GND
1.666500	20.70	11.2	46	25.3	AV	N	GND
2.134500	18.90	11.3	46	27.1	AV	N	GND
5.460000	13.50	11.5	50	36.5	AV	N	GND
20.625000	9.40	11.7	50	40.6	AV	N	GND

MEASUREMENT RESULT: "F-0070-1_fin"								
2019-1-24 9:32								
Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE	
0.357000	25.50	10.9	59	33.3	QP	L1	GND	
0.492000	32.90	11.0	56	23.2	QP	L1	GND	
1.086000	26.20	11.1	56	29.8	QP	L1	GND	
2.989500	22.90	11.3	56	33.1	QP	L1	GND	
5.640000	18.10	11.5	60	41.9	QP	L1	GND	
19.905000	19.50	11.7	60	40.5	QP	L1	GND	

MEASUREMENT RESULT: "F-0070-1_fin2"								
2019-1-24 9:32								
Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE	
0.361500	18.40	10.9	49	30.3	AV	L1	GND	
0.492000	26.50	11.0	46	19.6	AV	L1	GND	
1.518000	19.90	11.2	46	26.1	AV	L1	GND	
2.454000	14.90	11.3	46	31.1	AV	L1	GND	
5.680500	9.90	11.5	50	40.1	AV	L1	GND	
13.168500	12.60	11.6	50	37.4	AV	L1	GND	

Emissions attenuated more than 20 dB below the permissible value are not reported.

The spectral diagrams are attached as below.

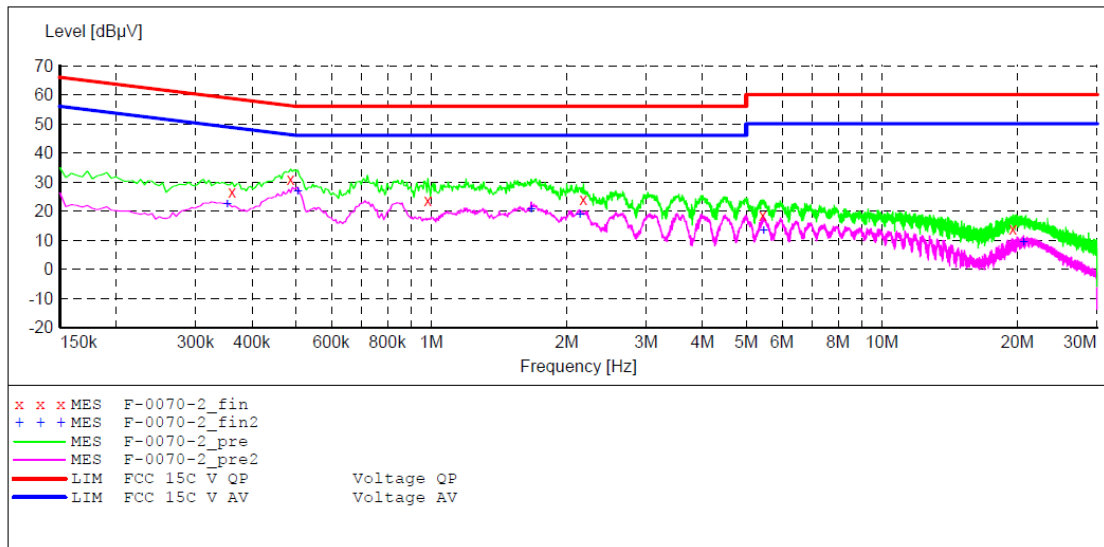
ACCURATE TECHNOLOGY CO., LTD

CONDUCTED EMISSION STANDARD FCC PART 15 C

EUT: 2.4G WIRELESS MOUSE (USB DONGLE) M/N:MPK02
 Manufacturer: XIANGSHUN ELECTRONIC PRODUCTS CO., LTD.
 Operating Condition: 2.4G Communication
 Test Site: 1#Shielding Room
 Operator: Frank
 Test Specification: N 120V/60Hz
 Comment: Report NO.:ATE20190170
 Start of Test: 2019-1-24 / 9:32:54

SCAN TABLE: "V 150K-30MHz fin"

Short Description: SUB STD VTERM2 1.70
 Start Stop Step Detector Meas. IF Transducer
 Frequency Frequency Width Time Bandw.
 150.0 kHz 30.0 MHz 4.5 kHz QuasiPeak 1.0 s 9 kHz NSLK8126 2008
 Average



MEASUREMENT RESULT: "F-0070-2_fin"

2019-1-24 9:35

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.361500	26.50	10.9	59	32.2	QP	N	GND
0.487500	30.90	11.0	56	25.3	QP	N	GND
0.982500	23.80	11.1	56	32.2	QP	N	GND
2.175000	23.90	11.3	56	32.1	QP	N	GND
5.437500	18.50	11.5	60	41.5	QP	N	GND
19.540500	13.80	11.7	60	46.2	QP	N	GND

MEASUREMENT RESULT: "F-0070-2_fin2"

2019-1-24 9:35

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.352500	22.60	10.9	49	26.3	AV	N	GND
0.505500	27.10	11.0	46	18.9	AV	N	GND
1.666500	20.70	11.2	46	25.3	AV	N	GND
2.134500	18.90	11.3	46	27.1	AV	N	GND
5.460000	13.50	11.5	50	36.5	AV	N	GND
20.625000	9.40	11.7	50	40.6	AV	N	GND

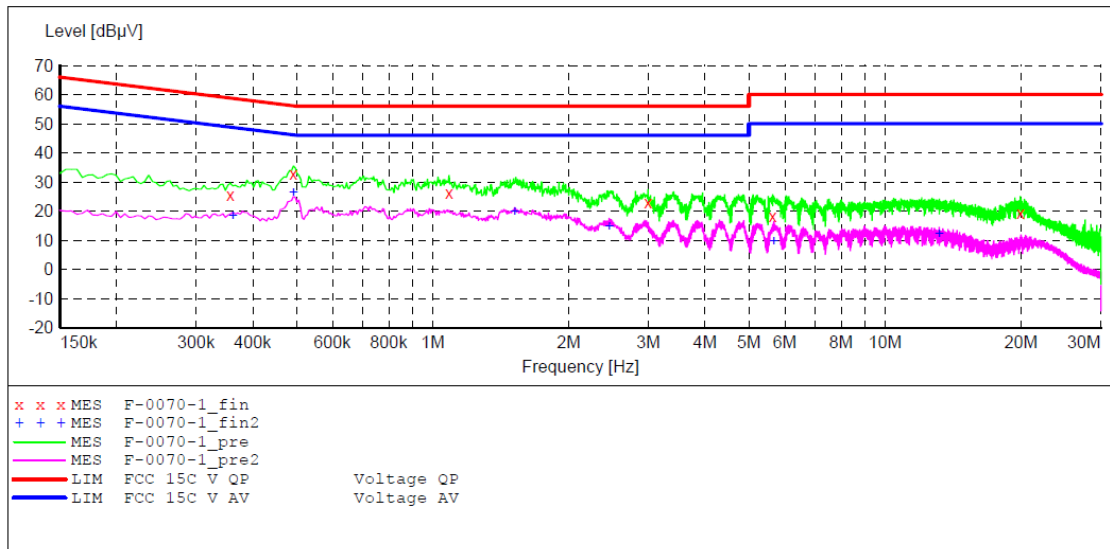
ACCURATE TECHNOLOGY CO., LTD

CONDUCTED EMISSION STANDARD FCC PART 15 C

EUT: 2.4G WIRELESS MOUSE(USB DONGLE) M/N:MPK02
 Manufacturer: XIANGSHUN ELECTRONIC PRODUCTS CO., LTD.
 Operating Condition: 2.4G Communication
 Test Site: 1#Shielding Room
 Operator: Frank
 Test Specification: L 120V/60Hz
 Comment: Report NO.:ATE20190170
 Start of Test: 2019-1-24 / 9:28:58

SCAN TABLE: "V 150K-30MHz fin"

Short Description: SUB STD VTERM2 1.70
 Start Stop Step Detector Meas. IF Transducer
 Frequency Frequency Width Time Bandw.
 150.0 kHz 30.0 MHz 4.5 kHz QuasiPeak 1.0 s 9 kHz NSLK8126 2008
 Average



MEASUREMENT RESULT: "F-0070-1_fin"

2019-1-24 9:32

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.357000	25.50	10.9	59	33.3	QP	L1	GND
0.492000	32.90	11.0	56	23.2	QP	L1	GND
1.086000	26.20	11.1	56	29.8	QP	L1	GND
2.989500	22.90	11.3	56	33.1	QP	L1	GND
5.640000	18.10	11.5	60	41.9	QP	L1	GND
19.905000	19.50	11.7	60	40.5	QP	L1	GND

MEASUREMENT RESULT: "F-0070-1_fin2"

2019-1-24 9:32

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.361500	18.40	10.9	49	30.3	AV	L1	GND
0.492000	26.50	11.0	46	19.6	AV	L1	GND
1.518000	19.90	11.2	46	26.1	AV	L1	GND
2.454000	14.90	11.3	46	31.1	AV	L1	GND
5.680500	9.90	11.5	50	40.1	AV	L1	GND
13.168500	12.60	11.6	50	37.4	AV	L1	GND

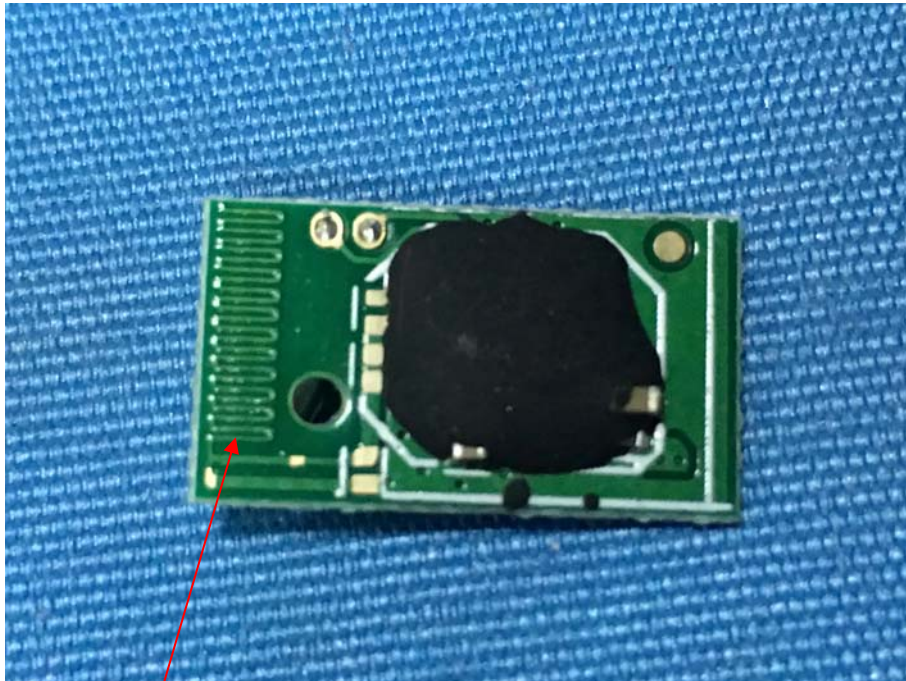
9. ANTENNA REQUIREMENT

9.1.The Requirement

According to Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

9.2.Antenna Construction

Device is equipped with permanent attached antenna, which isn't displaced by other antenna. The Antenna gain of EUT is 0dBi. Therefore, the equipment complies with the antenna requirement of Section 15.203.



Antenna