

RF TEST REPORT

Report No.: SHATBL2412017W01

Applicant	: Fujian Iselected E-commerce Co., Ltd.
Product Name	: 2.4GHz Wireless Mouse
Brand Name	: N/A
Model Name	: SPK7378
FCC ID	: 2BMNP-SPK7378
Test Standard	: FCC CFR Title 47 Part 15 Subpart C Section 15.249
Date of Receipt	: 2024.12.6
Date of Test	: 2024.12.6~2024.12.24
Issue Date	: 2024.12.24

Report Prepared by

Chris Xu

(Chris Xu)

Report Approved by

henu Guo

(Ghost Li)

Authorized Signatory

(Terry Yang)

"Shanghai ATBL Technology Co., Ltd." hereby certifies that according to actual testing conditions. The test results or observations are provided in accordance with measured value, without taking risks caused by uncertainty into account. Without explicit stipulation in special agreements, standards, or regulations, ATBL shall not assume any responsibility. The test results or observations are applicable only to tested sample. Client shall be responsible for representativeness of the sample and authenticity of the material. This report will be void without authorized signature or special seal for testing report. Do not copied without authorization. Tel:+86(0)21-51298625

Ċ

Quality



TABLE OF CONTENTS

REVISION HISTORY	
DECLARATION OF REPORT	4
SUMMARY OF TEST RESULT	5
1. GENERAL DESCRIPTION	6
1.1. Applicant	6
1.2. Manufacturer	
1.3. Factory	6
1.4. General Information of EUT	
1.5. Equipment Specification	8
1.6. Modification of EUT	8
1.7. Laboratory Information	8
1.8. Applicable Standards	
2. TEST CONFIGURATION OF EUT	9
2.1. Carrier Frequency Channel	9
2.2. Test Modes	
2.3. Block Diagram of Test System	
2.4. Description of Support Units	
2.5. Test Software and Power Level	
2.6. EUT Operating Conditions	
2.7. Equipment List	
2.8. Measurement Uncertainty	
3. TEST RESULT	
3.1. Radiated Emission	
3.2. Band edge Test	
3.3. 20dB Bandwidth	
TEST ITEM	
3.4. AC Power-Line Conducted Emission	
3.5. Antenna Requirement	
4. TEST SETUP PHOTOGRAPHS	
5. EXTERNAL AND INTERNAL PHOTOS OF THE EUT	

F

ŕ



P

A North

K310 K310

A BAR

Kape Kape

Kale Kale

K BE

530

A Star

K35

Kale Kale

4 July

E SP

En al

A BAN

Kale Kale

EL F

The second

E Shi

Kay Kay

K B

E.F.

K.S.

A B

4 AN

2 P

1-

131

K 3h

K SS

nor and a second

Con la contra de l

ş

Y

23N

B

E F

L'B

17

42 F

F 35W

K35

K35

C.S.

42 P

53

AN AN

435

2 Provent

AL AND

A Star

L.L.

K3E K3E

N. C. V.

A CAR

K B

2º

A PAR

F 35

K310

E B

3

7

Kale Kal

E B

EL

P

F35

K3ju

Kate Kate

The second

E B

A North

Kate Kate

A.S.

12 B

4 Bill

A B

Kape R

17

K35

K

A.P.

K

1

REVISION HISTORY

F

N

2

Rev.	Issue Date	Revisions	Revised by
00	2024.12.24	Initial Release	

AN AN

4 Bar

K35

4 AN

K35

A B

2

37

A P

AN CAL

17

1 AN

2 P

E Star

AL AND

L. B

4 B

1 Star

4 Spl



DECLARATION OF REPORT

1. The device has been tested by ATBL, and the test results show that the equipment under test (EUT) is in compliance with the requirements of 47 CFR 15.249. And it is applicable only to the tested sample identified in the report.

2. This report shall not be reproduced except in full, without the written approval of ATBL, this document only be altered or revised by ATBL, personal only, and shall be noted in the revision of the document.

3. The general information of EUT in this report is provided by the customer or manufacture, ATBL is only responsible for the test data but not for the information provided by the customer or manufacture.

4. The results in this report is only apply to the sample as tested under conditions. The customer or manufacturer is responsible for ensuring that the additional production units of this model have the same electrical and mechanical components.

5. In this report, ' \Box ' indicates that EUT does not support content after ' \Box ', and ' \Box ' indicates that it supports content after ' \Box '



2

32

N.

Ř

4

N.N.N.

SUMMARY OF TEST RESULT

Report Section	Standard Section	Test Item	Judgment	Remark
3.1	§15.249&15.209	Radiated Emission	Compliant	25
3.2	§15.249	Band Edges	Compliant	F-2
3.3	§15.215	20dB Bandwidth	Compliant	F
3.4	§15.207	Conducted Emission	Not applicable	s
3.5	§15.203	Antenna Requirement	Compliant	1

XV

RE

F

ĥ

RE

K

R

R

P

F

ATSIA 1. GENERAL DESCRIPTION

1.1. Applicant

Name : Fujian Iselected E-commerce Co., Ltd.

Address : 15th Floor, Building A, Aofeng Plaza, No. 2 Aofeng Road, Taijiang District, Fuzhou City, Fujian Province, China

1.2. Manufacturer

Name : MMD (Shanghai) Electronic Technology Co., Ltd.

Address : Room107, Building 17, No. 525 Yuanjiang Road, Minhang District, Shanghai, China

1.3. Factory

Name	1.	Dongguan Lingjie Electronics Technology Co.,Ltd
------	----	---

Address : No. 23, Tianyuan Revitalization North Road, Dongguan City, Guangdong Province

1.4. General Information of EUT

General Information				
Equipment Name	2.4GHz Wireless Mouse			
Brand Name	N/A			
Model Name	SPK7378			
Series Model	N/A			
Model Difference	N/A			
Antenna Gain	2.34dBi			
Antenna Type	PCB Antenna			
Power Source	DC 1.5V For Battery			
Sample No:	20241200304			
Battery	Rated Voltage: 1.5V			
Hardware version	VER:1.0			
Software version	SVN1079			
Connecting I/O Port(s)	Refer to the remark below.			

Remark:

The above information of EUT was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

1.5. Equipment Specification

Equipment Specification				
Operation Frequency	2402 MHz to 2479 MHz			
Maximum field strength	92.1dBuV/m(PK)@3m			
Modulation	GFSK			
Number of channels	40			
Antenna Designation	Designation PCB antenna (Met 15.203 Antenna requirement)			

1.6. Modification of EUT

No modifications are made to the EUT during all test items.

1.7. Laboratory Information

Company . Name .	Shanghai ATBL Technology Co., Ltd.
Address :	Building 8,No.160 Basheng Road, Waigaoqiao Free Trade Zone, Pudong New Area, Shanghai
Telephone :	+86(0)21-51298625

1.8. Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

47 CFR Part 15 Subpart C §15.249

ANSI C63.10-2020

Remark:

All test items were verified and recorded according to the standards and without any deviation during the test.

АТЗЫ

2. TEST CONFIGURATION OF EUT

2.1. Carrier Frequency Channel

	C		
Channel	Frequency (MHz)	Channel	Frequency (MHz)
CH1	2402MHz	CH21	2442MHz
CH2	2404MHz	CH22	2444MHz
СНЗ	2406MHz	CH23	2446MHz
CH4	2408MHz	CH24	2448MHz
CH5	2410MHz	CH25	2450MHz
CH6	2412MHz	CH26	2452MHz
CH7	2414MHz	CH27	2454MHz
CH8	2416MHz	CH28	2456MHz
CH9	2418MHz	CH29	2458MHz
CH10	2420MHz	CH30	2460MHz
CH11	2422MHz	CH31	2462MHz
CH12	2424MHz	CH32	2464MHz
CH13	2426MHz	CH33	2466MHz
CH14	2428MHz	CH34	2468MHz
CH15	2430MHz	CH35	2470MHz 👘
CH16	2432MHz	CH36	2472MHz
CH17	2434MHz	CH37	2474MHz
CH18	2436MHz	CH38	2476MHz
CH19	2438MHz	CH39	2478MHz
CH20	2440MHz	CH40	2479MHz

Remark:

Low Channel: CH1_2402 MHz; Middle Channel: CH20_2440 MHz; High Channel: CH40_2479 MHz.

1.

2º

3

Report No.:SHATBL2412017W01

1

2

/

P

12.

4

X

4

N

2.2. Test Modes

NO.		TEST MODE DESCRIPTION	
1	D. E.	Low channel GFSK	5 3
2	23	Middle channel GFSK	F 3
3	E all	High channel GFSK	

F

F

N.

RE

F

Y

5?

3. The EUT adjusts the frequency through the button.

R.F.

P

R

F

N.F.

2º

RE

F

P

R

N.N.

P



- 2.3. Block Diagram of Test System
 - 2.3.1. For AC Power-Line Conducted Emission

N/A

2.3.2. For Radiated Spurious Emission



2.3.3. For Conducted Test

SA	RF Cable	EUT	USB Cable	Notebook
SA		EUI	V	NOLEDOOK

2.4. Description of Support Units

NO.	Unit	Brand	Model	Description
1	>> I	1	VI 2	
2		1		3 15 3

2.5. Test Software and Power Level

During the test, the channel and power control software provided by the customer is used to control the operation channel and output power level.

2.6. EUT Operating Conditions

For AC power-line conducted emission, the EUT was connected under the large package sizes transmission.

For radiated spurious emission and conducted test, the engineering test program was provided and make the EUT to continuous transmit/receive.

3

2.7. Equipment List

2.7.1. For AC Power-Line Conducted Emission

Equipment Name	Manufacturer	Model	Serial No.	Equipment No.	Calibration Until	Note
Test Receiver	R&S	ESPI	101679	SHATBL-E012	2025.05.21	25
LISN	R&S	ENV216	100300	SHATBL-E013	2025.05.21	F 2
LISN	R&S	ENV216	100333	SHATBL-E041	2025.05.21	2
Thermometer	DeLi	N/A	N/A	SHATBL-E016	2025.09.19	
Test Software	FALA	EZ-EMC	N/A	SHATBL-E046	N/A	5

2.7.2. For Radiated Spurious Emission

Equipment Name	Manufacturer	Model	Serial No.	Equipmen t No.	Calibration Until	Note
Signal analyzer	Agilent	N9020A	MY50200811	SHATBL- E017	2025.05.21	F
Amplifier	JPT	JPA0118-55-30 3A	1910001800055 000	SHATBL- E006	2025.05.21	
Amplifier	JPT	JPA-10M1G32	2101010003500 1	SHATBL- E005	2025.05.21	5
Antenna/Tu rn table Controller	Brilliant	N/A	N/A	SHATBL- E007	N/A	S
Loop Antenna	Daze	ZN30900C	20077	SHATBL- E042	2025.05.21	1
Bilog Antenna	SCHWARZBEC K	VULB 9168	01174	SHATBL- E008	2025.05.21	1
Broad-band Horn Antenna	SCHWARZBEC K	BBHA 9120D	02334	SHATBL- E009	2025.05.21	3
Horn Antenna	COM-POWER	AH-1840	10100008	SHATBL- E043	2025.05.21	25
Thermomet er	DeLi	N/A	N/A	SHATBL- E015	2025.09.19	E
Test Software	FALA	EMC-RI	N/A	SHATBL- E046	N/A	2

Remark: Calibration duration for above equipments is 1 year.

2.8. Measurement Uncertainty

The reported uncertainty of measurement $y\pm U$, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95 %.

No.	Item	Uncertainty
1	RF output power, conducted	±0.958dB
2	Conducted spurious emissions(9KHz~30MHz)	±2.988dB
2	All emissions, radiated 9KHz~30MHz	±0.89dB
3	All emissions, radiated 30MHz-1GHz	±2.50dB
4	All emissions, radiated Above1GHz	±3.51dB
5	Occupied bandwidth	±23.20Hz

3. TEST RESULT

3.1. Radiated Emission

3.1.1. Radiated Emission Limit

Standard FCC15.249

Fundamental Frequency	Field Strength of Fundamental (millivolts/meter)	Field Strength of Harmonics (microvolts/meter)
900-928MHz	50	500
2400-2483.5MHz	50	500
5725-5875MHz	50	500
24.0-24.25GHz	250	2500

Standard FCC 15.209

Frequency	Distance	Field Str	engths Limit
(MHz)	Meters	μ V/m	dB(µV)/m
0.009 ~ 0.490	300	2400/F(kHz)	
0.490 ~ 1.705	30	24000/F(kHz)	- 12 in
1.705 ~ 30	30	30	- F D
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
960 ~ 1000	3	500	54.0
Above 1000	3	Other:74.0 dB(µV)/m (Average)	(Peak) 54.0 dB(µV)/m

Remark: (1) Emission level dB μ V = 20 log Emission level μ V/m

(2) The smaller limit shall apply at the cross point between two frequency bands.

(3) Distance is the distance in meters between the measuring instrument, antenna and the closest point of any part of the device or system.



3.1.2. Test Procedure

- 1. The EUT was placed on the top of the turntable 0.8 or 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
- 2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
- 3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
- 4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
- 5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
- 6. For emissions above 1GHz, use minimum resolution bandwidth of 1 MHz. Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.
- 7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum values.
- 8.If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
- 9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
- 10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High Low scan is not required in this case.



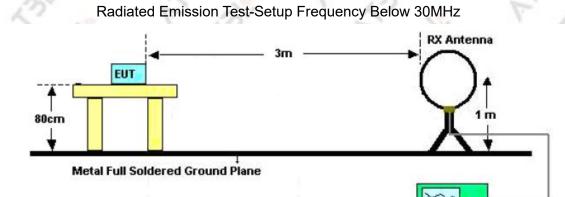
30MHz~1000MHz/RB 120KHz for QP

Spectrum Analyzer / Receiver

Spectrum Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP
Start ~Stop Frequency	1GHz~26.5GHz RBW 2.4MHz/ VBW 8MHz for Peak, RBW 2.4MHz/10Hz for Average
Receiver Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP

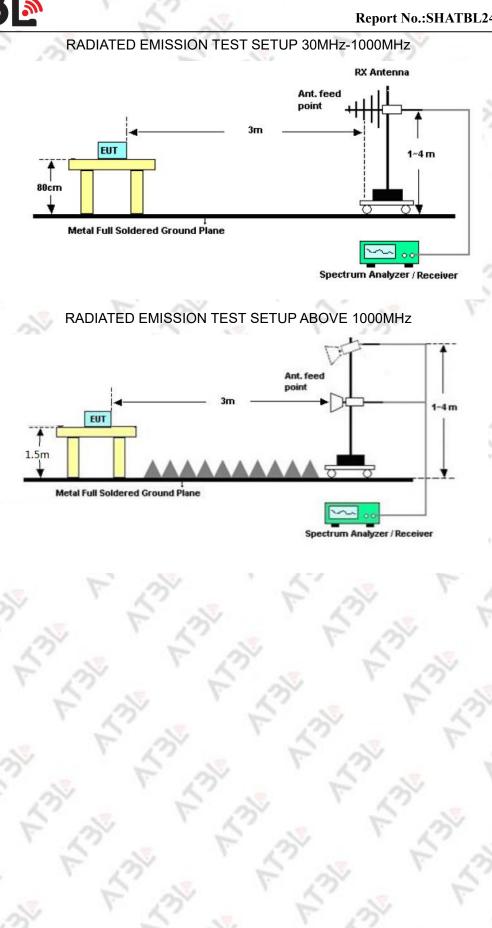
3.1.3. Test Setup

Start ~Stop Frequency











3.1.4. Test Result

For 9 kHz ~ 30 MHz

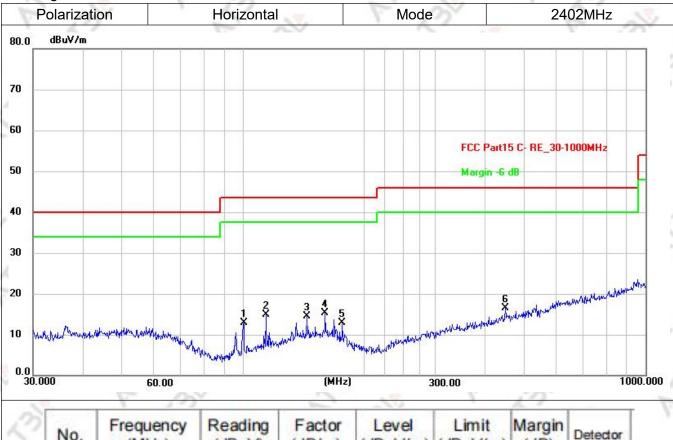
The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line was not reported.

For 30 MHz ~ 1 GHz:

Note:

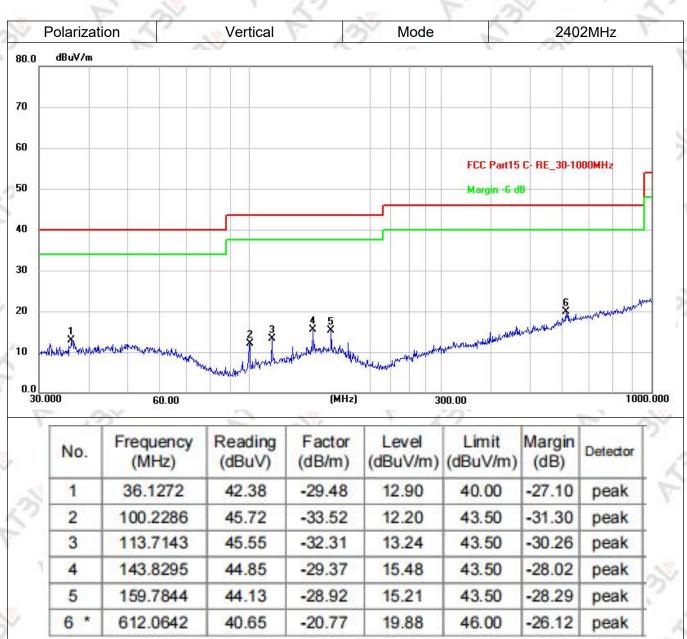
1.All modes have been tested, only worst case(2402MHz)mode was recorded in the test report.

- 2.Emission Level (dBuV/m) = Reading Value (dBuV) + Correction Factor (dB/m).
- 3. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
- 4. The emission levels of other frequencies were less than 20dB margin against the limit.
- 5. Margin value = Emission level-Limit value.



2	No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
	1	100.2286	46.36	-33.52	12.84	43.50	-30.66	peak
	2	113.7143	47.22	-32.31	14.91	43.50	-28.59	peak
	3	143.8295	43.80	-29.37	14.43	43.50	-29.07	peak
	4 *	159.7844	44.29	-28.92	15.37	43.50	-28.13	peak
2	5	176.2686	43.48	-30.59	12.89	43.50	-30.61	peak
	6	447.9822	40.95	-24.37	16.58	46.00	-29.42	peak

Report No.:SHATBL2412017W01





Note:

1. The all data rate modes had been test, but only worse test data was recorded in the test report.

2.In frequency ranges 18 ~25GHz no any other harmonic emissions detected which are tested to compliance with the limit. No recording in the test report. No any other emissions level which are attenuated less than 20dB below the limit. No recording in the test report.

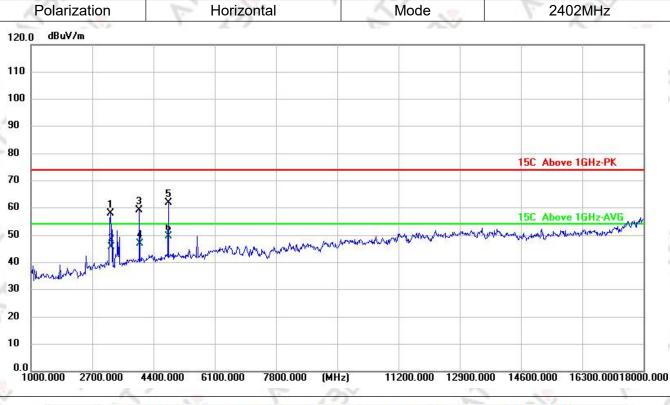
3.We used the filter to test and the main frequency was filtered out.

4.Emission Level (dBuV/m) = Reading Value (dBuV) + Correction Factor (dB/m).

5. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).

6. The emission levels of other frequencies were less than 20dB margin against the limit.

7. Margin value = Emission level-Limit value.



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	3210.000	69.77	-11.76	58.01	74.00	-15.99	peak
2	3227.000	57.62	-11.78	45.84	54.00	-8.16	AVG
3	4009.000	68.08	-8.89	59.19	74.00	-14.81	peak
4	4026.000	55.85	-8.87	46.98	54.00	-7.02	AVG
5	4808.000	67.73	-5.88	61.85	74.00	-12.15	peak
6 *	4825.000	55.61	-5.81	49.80	54.00	-4.20	AVG

Report No.:SHATBL2412017W01

	ation	Vertical	N P	Mode	-	240)2MHz
0 dBu∀/m							
						450 11	1011 014
						15C Above	e 1GHz-PK
	1 5						
	1 X 7 3				In a maken of the	15C Above	a 1GHz-AVG
	1 8 Jun Marinel	Jummann	how when the service of the service	where	hard and a fear she	a Coloradhada an	
Muhillions	Party and a second						
			· · · · · · · · · · · · · · · · · · ·				
	2700.000 4400.000	6100.000 78	00.000 (MHz)	11200.000) 12900.000	14600.000	16300.0001800
	251	2	200	¥ 2	121		16300.0001800
	Frequency (MHz)	6100.000 78 Reading (dBuV)	Factor (dB/m)	Level	Limit (dBuV/m)	Margin (dB)	16300.0001800 Detector
000.000 2	Frequency	Reading	Factor	Level	Limit	Margin	-
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
No.	Frequency (MHz) 3210.000	Reading (dBuV) 64.58	Factor (dB/m) -11.76	Level (dBuV/m) 52.82	Limit (dBuV/m) 74.00	Margin (dB) -21.18	Detector peak
No.	Frequency (MHz) 3210.000 3227.000	Reading (dBuV) 64.58 52.33	Factor (dB/m) -11.76 -11.78	Level (dBuV/m) 52.82 40.55	Limit (dBuV/m) 74.00 54.00	Margin (dB) -21.18 -13.45	Detector peak AVG
No.	Frequency (MHz) 3210.000 3227.000 4009.000	Reading (dBuV) 64.58 52.33 59.19	Factor (dB/m) -11.76 -11.78 -8.89	Level (dBuV/m) 52.82 40.55 50.30	Limit (dBuV/m) 74.00 54.00 74.00	Margin (dB) -21.18 -13.45 -23.70	Detector peak AVG peak

P

4

Report No.:SHATBL2412017W01

	on	1	Horizontal	N 12		Node	-	24	40MHz
0 dBuV/m									
								15C Abov	re 1GHz-PK
	3	5							
	1 3 X X	5 X				1		15C Abov	e 1GHz-AVG
		\$		a manufacture the	an Maria	Winn	Annormatic	when when when when when when when when	a Marshan and
home home way	millinder	plannihistori	man vo vov						
indus days			<u></u>	÷		2			
	00.000 4400	000 0	100 000 70	0000 (411-)	117	000 000	12000.000	14000.000	10200 0001000
	0.000 4400.	.000 6	100.000 780	00.000 (MHz)	112	200.000) 12900.000	14600.000	16300.0001800
	Frequer (MHz	ncy	Reading (dBuV)	Factor (dB/m)		el	Limit (dBuV/m)	14600.000 Margin (dB)	16300.0001800 Detector
	Frequer	ncy :)	Reading	Factor	Lev	el //m)	Limit	Margin	
No.	Frequer (MHz	ncy) 00	Reading (dBuV)	Factor (dB/m)	Lev (dBu\	el //m) 58	Limit (dBuV/m)	Margin (dB)	Detector
No.	Frequer (MHz 3261.0	ncy) 00 00	Reading (dBuV) 69.36	Factor (dB/m) -11.78	Lev (dBu\ 57.5	el //m) 58 26	Limit (dBuV/m) 74.00	Margin (dB) -16.42	Detector peak
No.	Frequer (MHz 3261.0 3278.0	ncy () 00 00 00	Reading (dBuV) 69.36 57.05	Factor (dB/m) -11.78 -11.79	Lev (dBu\ 57.5 45.2	el //m) 58 26)7	Limit (dBuV/m) 74.00 54.00	Margin (dB) -16.42 -8.74	Detector peak AVG

-5.57

47.18

54.00

52.75

4893.000

6 *

AVG

-6.82

4876.000

4893.000

5

6 *

59.66

47.18

-5.64

-5.57

Report No.:SHATBL2412017W01

1.0	olarizatio	on	1	Vertical	8 2	Mod	de	2	244	40MHz
0.0	dBu¥/m			~						
									15C Abov	e 1GHz-PK
-										
		1	5						15C Abov	e 16Hz-AVG "t
-		X X		hann	1 wind have the	www.www	www.	www.www.www.	marken with	to the second
. ILL	Munkow	Munder	Marinha	hannah						
Warks	WUHLE WE	(2017) - 9 3			·					
_										
000.	000 270	D.000 440)0.000	6100.000 780	10.000 (MHz)	11200	.000 1	2900.000	14600.000	16300.000180
17-										
	No.	Freque (MH		Reading (dBuV)	Factor (dB/m)	Level (dBuV/r		Limit BuV/m)	Margin (dB)	Detector
2	No.		z)				n) (d			Detector peak
100	20000	(MH	lz) 000	(dBuV)	(dB/m)	(dBuV/r	n) (d	BuV/m)	(dB)	
100	1	(MH 3244.	lz) 000 000	(dBuV) 64.56	(dB/m) -11.77	(dBuV/r 52.79	n) (d	BuV/m) 74.00	(dB) -21.21	peak

74.00

54.00

-19.98

-12.39

peak

AVG

54.02

41.61

R

N.

ê

9

A

F

F

P

Report No.:SHATBL2412017W01

1

3

No.

X

1

÷

	olarizat	ion		Horizontal	V 12	Mode	2	247	'9MHz
.0 (dBu¥/m								
_									
-								15C Above	1GHz-PK
		1 3 X X	5 X						
-			ę			e de s	A	15C Above	16Hz-AVG
				Junnul	million	monther from	and a subscription	where we want the set	MUPNIC SHIP
how	upunt	man I structure	A Manufacture in	WIN CONTRACTOR					
0.000	Second Second								
	000 27	00 000 44		6100.000 78	10 000 (MHz)	11200 000	12900.000 1	14600 000	16300 0001800
000.0	000 270	00.000 44	00.000	6100.000 780)0.000 (MHz)	11200.000	12900.000 1	14600.000	16300.0001800
000.0	000 270 No.	00.000 44 Freque (MH	ency	6100.000 780 Reading (dBuV)	Factor (dB/m)	Level	Limit (dBuV/m)	Margin	16300.0001800 Detector
000.0	- 4	Freque	ency Iz)	Reading	Factor	Level	Limit	Margin	r f
000.0	No.	Freque (MH	ency Iz) 000	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
000.0	No.	Freque (MH 3329.	ency z) 000 000	Reading (dBuV) 70.28	Factor (dB/m) -11.81	Level (dBuV/m) 58.47	Limit (dBuV/m) 74.00	Margin (dB) -15.53	Detector peak
000.0	No. 1 2	Freque (MH 3329. 3329.	ency (z) 000 000 000	Reading (dBuV) 70.28 56.80	Factor (dB/m) -11.81 -11.81	Level (dBuV/m) 58.47 44.99	Limit (dBuV/m) 74.00 54.00	Margin (dB) -15.53 -9.01	Detector peak AVG
000.0	No. 1 2 3	Freque (MH 3329. 3329. 4128.	ency (z) 000 000 000 000	Reading (dBuV) 70.28 56.80 67.49	Factor (dB/m) -11.81 -11.81 -8.77	Level (dBuV/m) 58.47 44.99 58.72	Limit (dBuV/m) 74.00 54.00 74.00	Margin (dB) -15.53 -9.01 -15.28	Detector peak AVG peak

Y

AT3L

6 *

4978.000

Report No.:SHATBL2412017W01

	tion	Vertical	N 22	Mode	-	247	79MHz
0 dBuV/m							
						_	
			<u>.</u>				
						15C Abov	1CH- PK
						TJC ADOV	
	. 5		-			100 41-0	1011-1070
	1 3 V	mond		un marker Mark	American	W LANA	MANAMAN AND
	uniter and and	monorth	www.thermany.	and the state of the	12. YL		
Wels a far of	XX						
dond Parity, we							
.head.Parity. 199							
	00.000 4400.000	6100.000 78	00.000 (MHz)	11200.000) 12900.000	14600.000	16300.0001800
		6100.000 78 Reading (dBuV)	00.000 (MHz) Factor (dB/m)	Level	12900.000 Limit (dBuV/m)	Margin	16300.0001800 Detector
000.000 27	00.000 4400.000 Frequency	Reading	Factor	Level	Limit	Margin	1
000.000 27 No.	700.000 4400.000 Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
000.000 27 No.	00.000 4400.000 Frequency (MHz) 3312.000	Reading (dBuV) 62.05	Factor (dB/m) -11.80	Level (dBuV/m) 50.25	Limit (dBuV/m) 74.00	Margin (dB) -23.75	Detector peak
000.000 27 No. 1 2	00.000 4400.000 Frequency (MHz) 3312.000 3329.000	Reading (dBuV) 62.05 49.55	Factor (dB/m) -11.80 -11.81	Level (dBuV/m) 50.25 37.74	Limit (dBuV/m) 74.00 54.00	Margin (dB) -23.75 -16.26	Detector peak AVG

-5.28

42.11

54.00

47.39

AVG

-11.89

Report No.:SHATBL2412017W01

Field Strength of Fundamental

Note:

- 1. Level (dBuV/m) = Reading Value (dBuV) + Correction Factor (dB/m).
- 2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).

Freq. (MHz)	Reading (dBuv)	Factor (dB/m)	Level (dBuv/m)	Limit (dBuV/m)	Margin (dB)	Remark	Polarity
2402	105.62	-15.84	89.78	114	-24.22	Peak	Horizontal
2402	73.56	-15.84	57.72	94	-36.28	Average	Horizontal
2402	102.01	-15.84	86.17	114	-27.83	Peak	Vertical
2402	70.15 🌎	-15.84	54.31	94	-39.69	Average	Vertical
2440	98.56	-15.82	82.74	114	-31.26	Peak	Horizontal
2440	68.74	-15.82	52.92	94	-41.08	Average	Horizontal
2440	99.18	-15.82	83.36	114	-30.64	Peak	Vertical
2440	68.55	-15.82	52.73	94	-41.27	Average	Vertical
2479	107.40	-15.30	92.1	114	-21.9	Peak	Horizontal
2479	72.59	-15.30	57.29	94	-36.71	Average	Horizontal
2479	102.43	-15.30	87.13	114	-26.87	Peak	Vertical
2479	72.19	-15.30	56.89	94	-37.11	Average	Vertical

Report No.:SHATBL2412017W01

3.2. Band edge Test

3.2.1. Limit

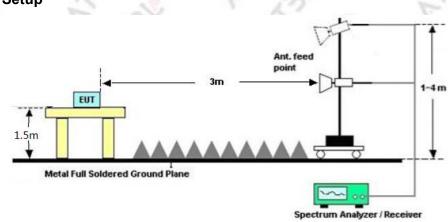
	Limit of the Field Strength (dBµV/m)			
Frequency Band	Peak	Average		
f≪2390MHz	74	54		
f≥2483.5MHz	74	54		

3.2.2. Test Procedure

1. The EUT operates at transmitting mode. The operate channel is tested to verify the largest transmission and spurious emissions power at the continuous transmission mode.

2. Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission: (a) PEAK: RBW=1MHz, VBW=3MHz / Sweep=AUTO

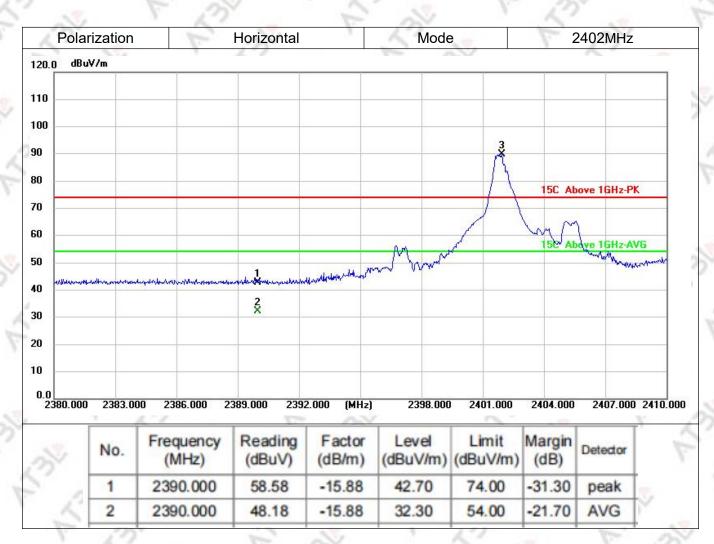
(b) AVERAGE: RBW=1MHz ; VBW=1/on time(1KHz) / Sweep=AUTO



3.2.3. Test Setup

Report No.:SHATBL2412017W01

3.2.4. Test Result



7

3

RE

R

F

124

R

P

シア

2ºF

K.

2h

2ºF

P

Report No.:SHATBL2412017W01

1

2

F

XF

1

4

Pol	arizatior		Vertical	N 2	Mode	0	2	402MHz	1.
0.0 dE	3uV/m	274				100	10		122
)									
-				<u> </u>		3			
_						10	450.41	1011 0	
						-/	15C Ab	ove 1GHz-PI	
-							SC AD	ove 1GHz-A	/G
			1	when in the board	ale My harrow the			ove 1GHz-A	manne
And the case		changes and a second second		And provident of the second second	Comp.				
-			2 X	<u> </u>					_
_									
o									
2380.00	0 2383.0	00 2386.000	2389.000 239	2.000 (MHz)	2398.000	2401.000	2404.000	2407.000	2410.0
Υ.,	10		No.	20				1. m	0
	No.	Frequency (MHz)	(dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	2
3	1	2390.000	58.01	-15.88	42.13	74.00	-31.87	peak	ľ
	2	2390.000	48.12	-15.88	32.24	54.00	-21.76	AVG	Ť

Y

\$2

N.N.

F

KE

Ĥ

RE

N.F.

F

2ºF

R

F

SF.

F



9

Ì

10

7

N.K.

2

SE

ネマ

2

2ºF

K.F.

24

S.F.

RE

5

K.F.

R

E.

Report No.:SHATBL2412017W01

1

2

R

XF

1

KP

Polari	zation	Horizonta	V 22	Mode	-	2479M	Hz
0.0 dBuV	//m	~~~					
o							
o							
		Å					
							DK
					15	iC Above 1GH	z-PK
		\sim m	M				1100
1	man Munin		- WWWWW	aft have a service and the ser	un manua	iC Above 1GH	Z-AVG
and the second	W 3 Y 1		3		Markenelfinen	an dominandronom	downlow whether
0	2473.000 2476.00	0 2479.000 24	182.000 (MHz)	2488.000	2491.000 2494	4.000 2497.	000 2500.0
2410.000	2413.000 2410.00			2400.000	2451.000 245	1.000 2151.	000 2000.0
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
2	2483.500	66.96	-15.30	51.66	74.00	-22.34	peak
1100	2483.500	53.75	-15.30	38.45	54.00	-15.55	AVG
3							

Y

52

F

4

K

K

K

S.F.

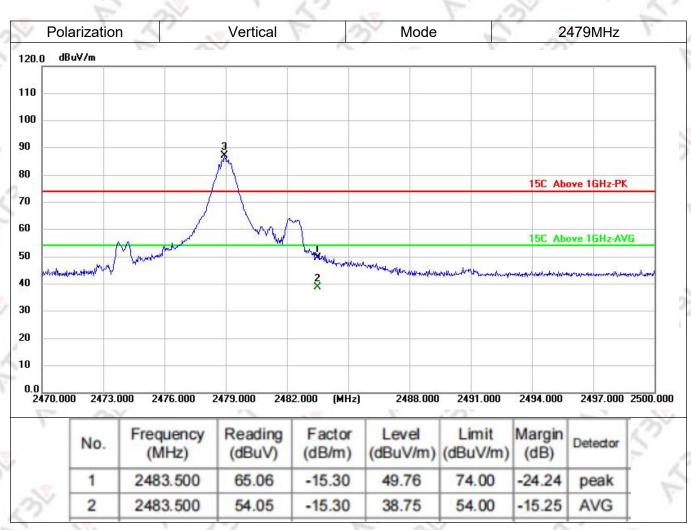
R

F

R.F.

2º

Report No.:SHATBL2412017W01



REMARKS:

1.Emission Level (dBuV/m) = Reading Value (dBuV) + Correction Factor (dB/m).

- 2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
- 3. The emission levels of other frequencies were less than 20dB margin against the limit.
- 4. Margin value = Emission level-Limit value.

AT3

3.3. 20dB Bandwidth

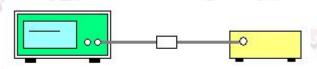
3.3.1. Limit

There is no limit requirement for 20dB Bandwidth.

3.3.2. Test Procedure

- 1. Set the EUT Work on the top, the middle and the bottom operation frequency individually.
- 2. Set SPA Centre Frequency = Operation Frequency, RBW= 30 KHz, VBW \ge 3×RBW.
- 3. Set SPA Trace 1 Max hold, then View.

3.3.3. Test Setup



EUT

Spectrum Analyzer

Report No.:SHATBL2412017W01

3.3.4. Test Result of 20dB Bandwidth

TEST ITEM	20DB BANDWIDTH		F D	1.
TEST MODULATION	GFSK	D	2 2	
Sa S	12	E AV	1	17

Test Data	Criteria	
Low Channel	1.145	PASS
Middle Channel	1.147	PASS
High Channel	1.146	PASS

TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



STATUS

Report No.:SHATBL2412017W01





TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL

STATUS



3.4. AC Power-Line Conducted Emission

3.4.1. Limit

<u>47 CFR 15.207(a)</u>: For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table:

Frequency of omission (MHz)	Conducted limit (dBµV)			
Frequency of emission (MHz)	Quasi-peak	Average		
0.15-0.5	66 to 56*	56 to 46*		
0.5-5	56	46		
5-30	60	50		

*Decreases with the logarithm of the frequency.

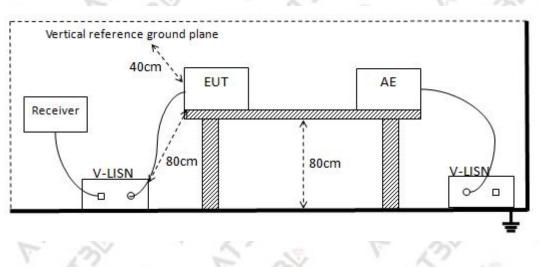
3.4.2. Test Procedure

1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.

- 2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
- 3. All the support units are connecting to the other LISN.
- 4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
- 5. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
- 6. Both sides of AC line were checked for maximum conducted interference.
- 7. The frequency range from 150 kHz to 30 MHz was searched.

8. Set the test-receiver system to Peak Detect Function and specified bandwidth (IF Bandwidth = 9 kHz) with Maximum Hold Mode. Then measurement is also conducted by Average Detector and Quasi-Peak Detector Function respectively.

3.4.3. Test Setup



2

B

32

4

4

4



3.4.4. Test Result of AC Power-Line Conducted Emission

RE

R

P

Note:

N.Y.Y.

F

Ĥ

RE

The product is battery powered and it is not working when charging, this item is not applicable.

N.N.

52



3.5. Antenna Requirement

3.5.1. Standard Requirement

According to <u>47 CFR 15.203</u>, 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.

3.5.2. EUT Antenna

The antenna used for the EUT is PCB antenna, which meets the antenna requirements.



4. TEST SETUP PHOTOGRAPHS

Please refer to the Appendix F.

5. EXTERNAL AND INTERNAL PHOTOS OF THE EUT

Please refer to the Appendix G.

N. P.

*****END OF THE REPORT****

1