

FCC TEST REPORT

For

2.4GHz wireless receiver

MODEL No.: FERFXX-R

Trademark: N/A

FCC ID: WUAFERFXX-R

REPORT NO: ED09120175-5

ISSUE DATE: January 08, 2010

Prepared for

**PAWAS Trading Gmbh
Nordstrasse 223, CH-8037 Zurich, Switzerland**

Prepared by

DONGGUAN EMTEK CO., LTD

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TEST REPORT DESCRIPTION

Applicant : PAWAS TRADING GMBH
Manufacturer : PAWAS TRADING GMBH
EUT : 2.4GHz wireless receiver
FCC ID No. : WUAFERFXX-R
Input Voltage : DC 5V come from PC
File Number : ED09120175-5
Date of Test : December 21, 2009~January 08, 2010

Measurement Procedure Used:

FCC Rules and Regulations Part 15 Subpart B Class B July 2008 & FCC / ANSI C63.4-2003

The device described above is tested by Dongguan EMTEK Co., Ltd. to determine the maximum emission levels emanating from the device. The maximum emission levels are compared to the FCC Part 15 Subpart Class B limits both radiated and conducted emissions. The measurement results are contained in this test report and Dongguan EMTEK 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 Dongguan EMTEK Co., Ltd.

Approved By



Nicol Lee / Q.A. Manager
DONGGUAN EMTEK CO., LTD.

1. GENERAL INFORMATION

1.1. Description of Device (EUT)

EUT	: 2.4GHz wireless receiver
Model Number	: FERFXX-R
FCC ID Number	: WUAFERFXX-R
Trade Mark	: N/A
Power Supply	: DC 5V from PC (PC input AC 120V/60Hz)
Applicant	: PAWAS TRADING GMBH
Address	: Nordstrasse 223, CH-8037 Zurich, Switzerland
Manufacturer	: PAWAS TRADING GMBH
Address	: Nordstrasse 223, CH-8037 Zurich, Switzerland
Date of sample receiver	: December 21, 2009
Date of Test	: December 21, 2009~January 08, 2010

1.2. Description of Support Device

PC	: Manufacturer: DELL M/N: OPTIRLEX 760 S/N: N/A CE, FCC: DOC
LCD Monitor	: Manufacturer: DELL M/N: E1909WF S/N: N/A CE , FCC:DOC
Mouse	: Manufacturer: DELL M/N: M-UAR DEL7 S/N: XN966 CE, FCC: DOC
Keyboard	: Manufacturer: DELL M/N: L30U S/N: ON277F CE, FCC: DOC
Printer	: Manufacturer: HEWLETT PACKARD M/N: Q5911A S/N: CNCK512065 CE, FCC: DOC

1.3 Test Facility

Site Description

EMC Lab. : Accredited by CNAS, 2007.07.27
The certificate is valid until 2012.07.26
The Laboratory has been assessed and proved to be in compliance with CNAS/CL01:2005
The Certificate Registration Number is L3150

Accredited by TUV Rheinland Shenzhen 2008.5
The certificate is valid until 2009.12
The Laboratory has been assessed according to the requirements ISO/IEC 17025:2005

Accredited by FCC, Nov. 05, 2008
The Certificate Number is 247565.

Accredited by Industry Canada, May 24, 2008
The Certificate Registration Number. is 46405-4480

Name of Firm : Dongguan EMTEK Co., Ltd
Site Location : No.281, Guantai Road, Nancheng District, Dongguan, Guangdong, China.

1.4 Measurement Uncertainty

Conducted Emission Uncertainty : $\pm 1.2656\text{dB}$

Radiated Emission Uncertainty : $\pm 1.4118\text{dB}$

Disturbance Power Uncertainty : $\pm 1.6656\text{dB}$

2. POWER LINE CONDUCTED MEASUREMENT

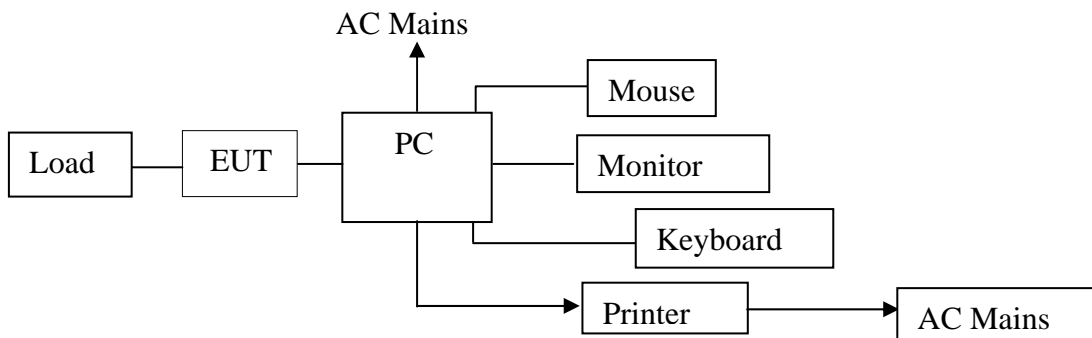
2.1. Test Equipment

The following test equipments are used during the power line conducted measurement:

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Test Receiver	Rohde & Schwarz	ESCI	100137	May 29, 2009	1 Year
2.	L.I.S.N	Rohde & Schwarz	ESH2-Z6	100253	May 29, 2009	1 Year
3.	Pulse Limiter	Rohde & Schwarz	EMV216	100017	May 29, 2009	1 Year
4.	50 Ω Coaxial Switch	Anritsu	MP59B	6100175589	May 29, 2009	1 Year

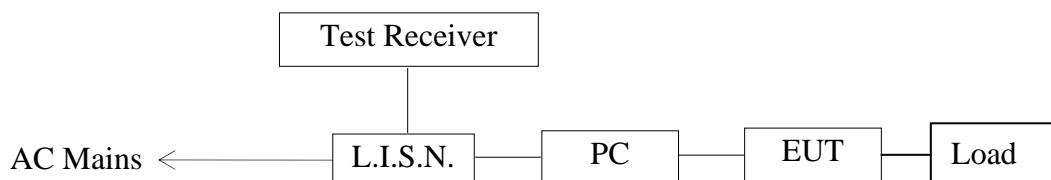
2.2. Block Diagram of Test Setup

2.2.1 Block diagram of connection between the EUT and simulators



(EUT: 2.4GHz wireless receiver)

2.2.2 Block diagram of test setup



(EUT: 2.4GHz wireless receiver)

2.3. Power Line Conducted Emission Measurement Limits

According to section 15.107(a) Conducted Emission Limits is as following.

Frequency MHz	Limits dB(μ V)	
	Quasi-peak Level	Average Level
0.15 ~ 0.50	66 ~ 56*	56 ~ 46*
0.50 ~ 5.00	56	46
5.00 ~ 30.00	60	50

Notes: 1. *Decreasing linearly with logarithm of frequency.
2. The lower limit shall apply at the transition frequencies.

2.4. Configuration of EUT on Measurement

The following 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.

EUT : 2.4GHz wireless receiver
Model Number : WUAFERFXX-R
Manufacturer : PAWAS TRADING GMBH

2.5. Operating Condition of EUT

2.5.1. Setup the EUT and simulator as shown as Section 2.2.

2.5.2. Turn on the power of all equipment.

2.5.3. Let the EUT work in test model (Connect to PC) and measure it.

2.6. Test Procedure

The EUT system 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 line 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 FCC ANSI C63.4-2003 on Conducted Emission Measurement.

The bandwidth of test receiver (R&S ESCI) is set at 9KHz.
The frequency range from 150KHz to 30MHz is checked.

All the scanning waveforms for Conducted Emission Measurement are attached in Appendix I.

2.7. Power Line Conducted Emission Measurement Results

PASS

The frequency range from 150KHz to 30 MHz is investigated.

3. RADIATED EMISSION MEASUREMENT

3.1. Test Equipment

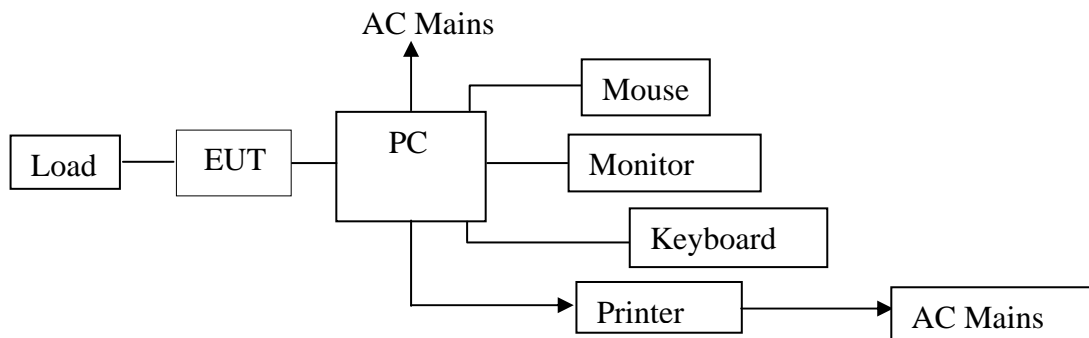
The following test equipments are used during the radiated emission measurement:

3.1.1. For Anechoic Chamber

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Spectrum Analyzer	ANRITSU	MS2661C	6200140915	May 29, 2009	1 Year
2.	Test Receiver	Rohde & Schwarz	ESCS30	828985/018	May 29, 2009	1 Year
3.	Bilog Antenna	Schwarzbeck	VULB9163	142	May 29, 2009	1 Year
4.	50 Coaxial Switch	Anritsu Corp	MP59B	6100237248	May 29, 2009	1 Year
5.	Cable	Schwarzbeck	AK9513(1m)	CR RX2	May 29, 2009	1 Year
6.	Cable	Schwarzbeck	AK9513(10m)	AC RX1	May 29, 2009	1 Year
7.	Cable	Rosenberger	N/A(6m)	CR RX1	May 29, 2009	1 Year
8.	Cable	Rosenberger	N/A(10m)	FP2RX2	May 29, 2009	1 Year
9.	DC Power Filter	MPE	23872C	N/A	May 29, 2009	1 Year
10.	Single Phase Power Line Filter	MPE	23332C	N/A	May 29, 2009	1 Year
11.	3 Phase Power Line Filter	MPE	23333C	N/A	May 29, 2009	1 Year
12.	Signal Generator	HP	8648A	3625U00573	May 29, 2009	1 Year

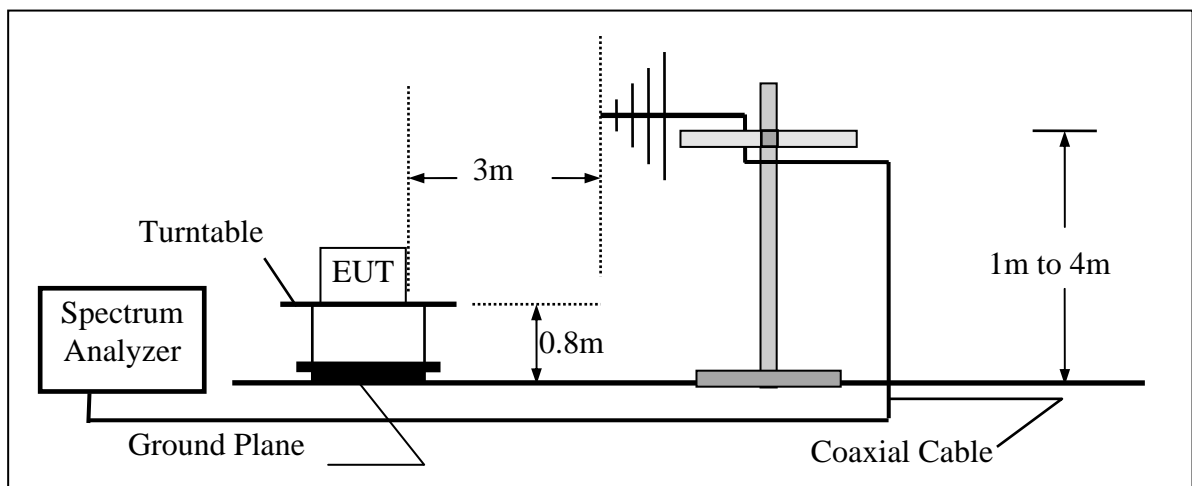
3.2. Block Diagram of Test Setup

3.2.1. Block diagram of connection between the EUT and simulators



(EUT: 2.4GHz wireless receiver)

3.2.2. Anechoic Chamber Test Setup Diagram



(EUT: 2.4GHz wireless receiver)

3.3. Radiated Emission Limit

According to section 15.109(a) Radiated Emission Limits is as following.

FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMIT	
		$\mu\text{V/m}$	$\text{dB}(\mu\text{V})/\text{m}$
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
960 ~ 1000	3	500	54.0

- Remark :
- (1) Emission level $(\text{dB})\mu\text{V} = 20 \log \text{Emission level } \mu\text{V/m}$
 - (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.

3.4.EUT Configuration on Measurement

The following 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.

2.4GHz wireless receiver (EUT)

Model Number : WUAFERFXX-R

Serial Number : N/A

3.5.Operating Condition of EUT

3.5.1 Setup the EUT as shown in Section 3.2.

3.5.2 Turn on the power of all equipment.

3.5.3 Let the EUT work in test mode (Connect to PC) and measure it.

3.6.Test Procedure

EUT and its simulators are placed on a turntable, which is 0.8 meter high above ground. The turn table 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 a 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 polarization of the antenna is set on measurement. In order to find the maximum emission levels, all of the interface cables must be manipulated according to ANSI C63.4-2003 on radiated emission measurement.

The bandwidth of the EMI test receiver (R&S ESCS30) is set at 120KHz.

The frequency range from 30MHz to 1000MHz is checked.

The test mode (Connect to PC) is tested in chamber and all the scanning waveforms are attached in Appendix II.

3.7.Radiated Emission Noise Measurement Results

PASS.

The frequency range from 30MHz to 1000MHz is investigated.

4. PHOTOGRAPH

4.1.Photo of Conducted Emission Measurement



4.2.Photo of Radiated Measurement



APPENDIX I

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Conducted Emission Measurement

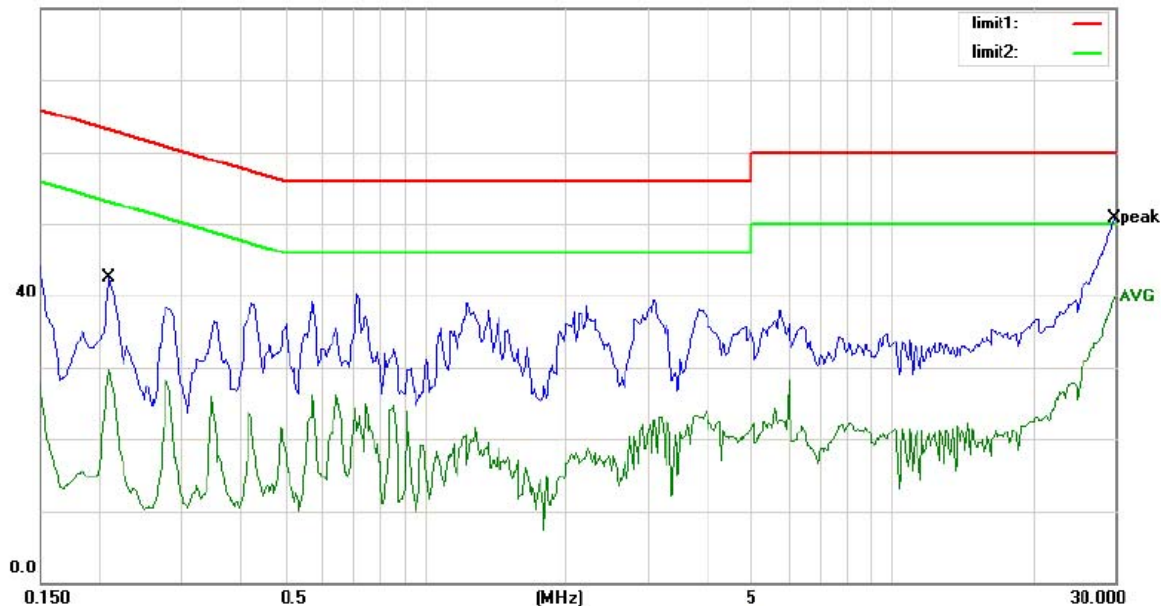
File :KM-1029

Data :#2

Date: 09/12/25/

Time: 11/04/15

80.0 dBuV



Site site #1

Phase: L1

Temperature: 25

Limit: (CE)FCC PART 15 class B_QP

Power: DC 5V (PC Input 120V/60Hz) Humidity: 50 %

EUT: 2.4GHz wireless receiver

M/N: WUAFERFXX-R

Mode: Connect to PC

Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.2100	42.45	0.00	42.45	63.21	-20.76	QP	
2		0.2100	29.76	0.00	29.76	53.21	-23.45	AVG	
3	*	29.9750	50.76	0.00	50.76	60.00	-9.24	QP	
4		29.9750	39.70	0.00	39.70	50.00	-10.30	AVG	

*:Maximum data x:Over limit !:over margin Comment: Factor build in receiver. Operator: Alice

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Conducted Emission Measurement

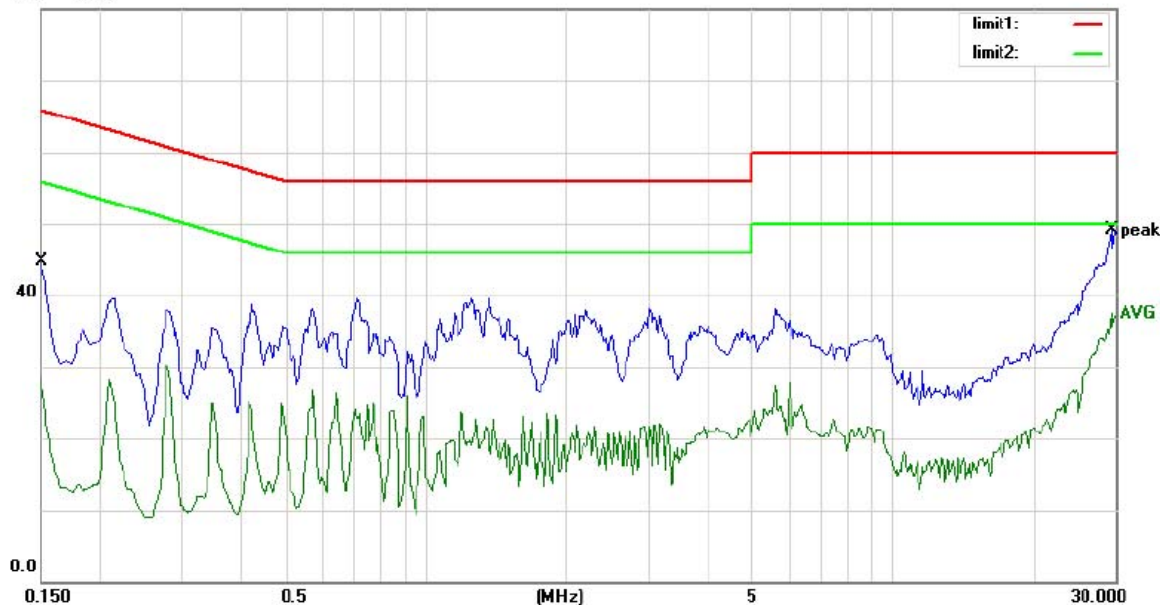
File: KM-1029

Data: #1

Date: 09/12/25/

Time: 10/59/37

80.0 dBuV



Site site #1

Phase: N

Temperature: 25

Limit: (CE)FCC PART 15 class B_QP

Power: DC 5V (PC Input 120V/60Hz) Humidity: 50 %

EUT: 2.4GHz wireless receiver

M/N: WUAFERFXX-R

Mode: Connect to PC

Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.1500	44.79	0.00	44.79	66.00	-21.21	QP	
2		0.1500	28.68	0.00	28.68	56.00	-27.32	AVG	
3	*	29.4750	49.02	0.00	49.02	60.00	-10.98	QP	
4		29.4750	37.55	0.00	37.55	50.00	-12.45	AVG	

*:Maximum data x:Over limit !:over margin Comment: Factor build in receiver. Operator: Alice

APPENDIX II

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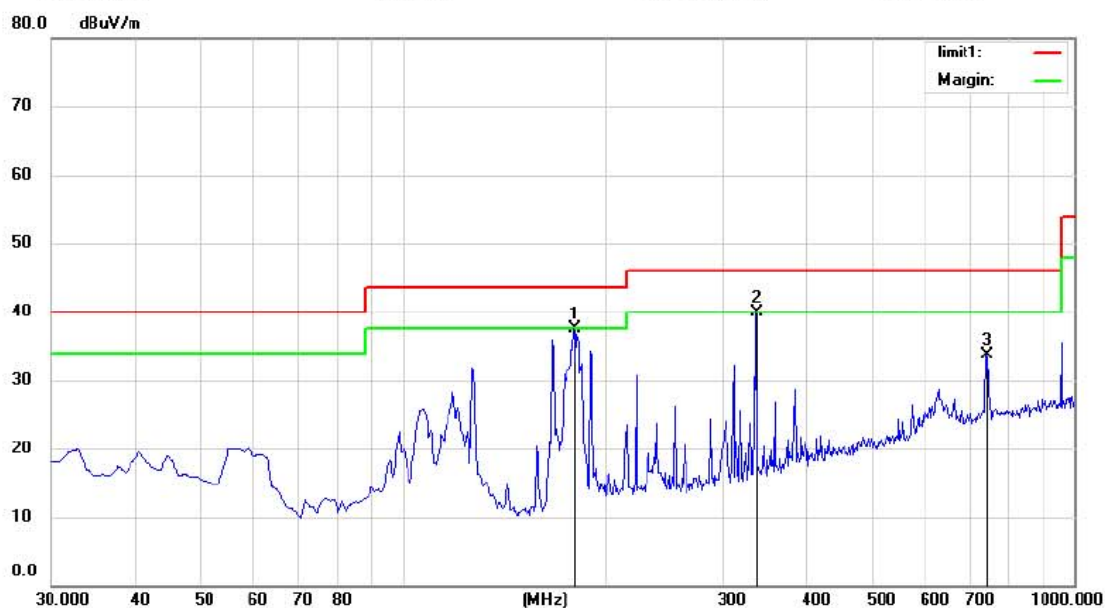
Radiated Emission Measurement

File :KM-1029

Data :#2

Date: 09/12/24/

Time: 15/52/51



Site Chamber #1

Polarization: **Horizontal**

Temperature: 26

Limit: (RE)FCC PART 15 class B 3m

Power: DC 5V (PC Input 120V/60Hz)

Humidity: 55 %

EUT: 2.4GHz wireless receiver

M/N: WUAFERFXX-R

Mode: Connect to PC

Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree
1	*	180.3500	54.52	-16.92	37.60	43.50	-5.90	QP		
2		336.5200	51.51	-11.64	39.87	46.00	-6.13	QP		
3		741.9800	37.12	-3.51	33.61	46.00	-12.39	QP		

*:Maximum data x:Over limit !:over margin

Operator:

File :KM-1029\Data :#2

Page: 1

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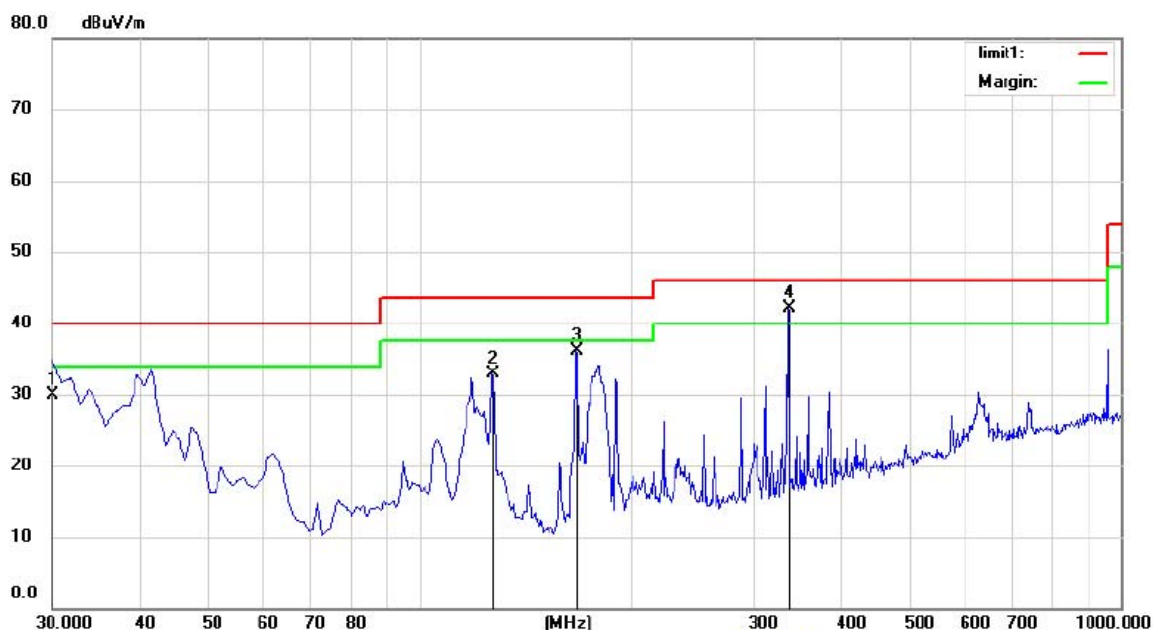
Radiated Emission Measurement

File : KM-1029

Data : #3

Date: 09/12/24/

Time: 15/54/37



Site Chamber #1

Polarization: **Vertical**

Temperature: 26

Limit: (RE)FCC PART 15 class B 3m

Power: DC 5V (PC Input 120V/60Hz)

Humidity: 55 %

EUT: 2.4GHz wireless receiver

M/N: WUAFERFXX-R

Mode: Connect to PC

Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		30.0000	45.13	-15.15	29.98	40.00	-10.02	QP		
2		127.0000	50.85	-17.93	32.92	43.50	-10.58	QP		
3		167.7400	53.92	-17.85	36.07	43.50	-7.43	QP		
4	*	336.5200	53.70	-11.64	42.06	46.00	-3.94	QP		

*:Maximum data x:Over limit !:over margin

Operator:

APPENDIX III

(Photos of EUT)

Figure 1
General Appearance of the EUT



Figure 2
General Appearance of the EUT



Figure 3
General Internal of the EUT



Figure 4
General Appearance of the PCB

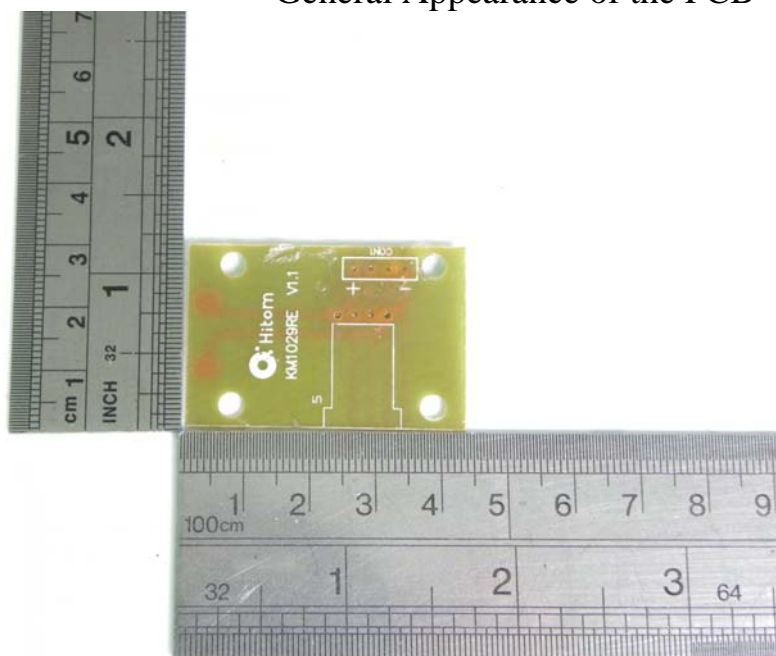


Figure 5
General Appearance of the PCB

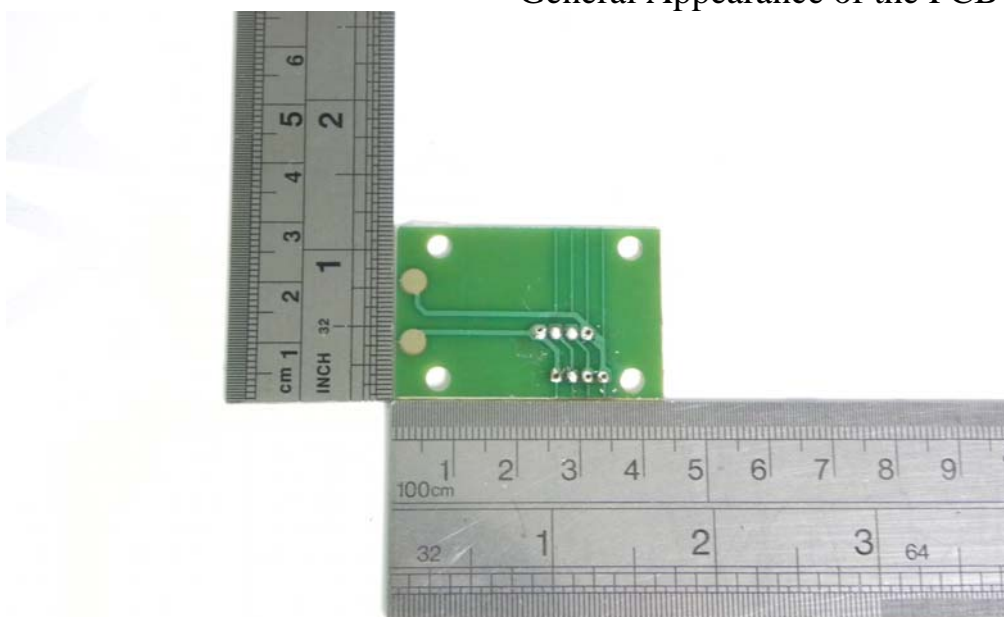


Figure 6
General Appearance of the PCB

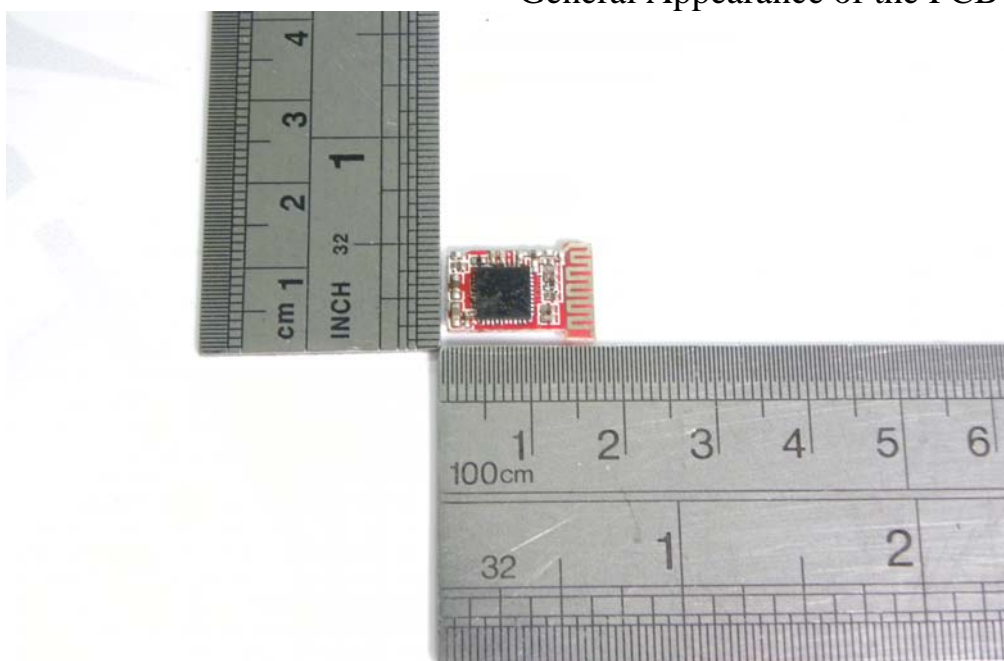


Figure 7
General Appearance of the PCB

