

FCC TEST REPORT
for
Shenzhen Eastech Co., Ltd.

Receiver of 2.4G Wireless Optical Mouse
Model No.: S-100, EM-515B, EM-515W, EM-517, EM-518,
EM-3056W, EM-3069W, EM-3062W, EM-3038W

Prepared for : Shenzhen Eastech Co., Ltd.
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Date of Test : Jun. 16~22, 2011
Date of Report : Jun. 24, 2011

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APPENDIX I (Photos of EUT) (2 Pages)

TEST REPORT

Applicant : Shenzhen Eastech Co., Ltd.
Manufacturer : Shenzhen Eastech Co., Ltd.
EUT : Receiver of 2.4G Wireless Optical Mouse
Model No. : S-100, EM-515B, EM-515W, EM-517, EM-518, EM-3056W,
EM-3069W, EM-3062W, EM-3038W
Serial No. : N/A
Rating : DC 5V via USB Port
Trade Mark : N.A.


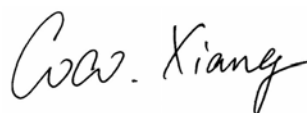
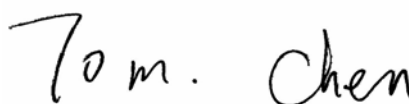
Measurement Procedure Used:

FCC Part15 Subpart C, Paragraph 15.207, 15.249 & 15.209

The device described above is tested by Anbotek Compliance Laboratory Limited to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The measurement results are contained in this test report and Anbotek Compliance Laboratory Limited is assumed full of responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT (Equipment Under Test) is technically compliant with the FCC Part 15 Subpart C requirements.

This report applies to above tested sample only and shall not be reproduced in part without written approval of Anbotek Compliance Laboratory Limited

Date of Test : Jun. 16~22, 2011

Prepared by :
(Engineer / Rock Zeng)Reviewer :
(Project Manager / Coco Xiang)Approved & Authorized Signer :
(Manager / Tom Chen)

1. GENERAL INFORMATION

1.1. Description of Device (EUT)

EUT	: Receiver of 2.4G Wireless Optical Mouse
Model Number	: S-100, EM-515B, EM-515W, EM-517, EM-518, EM-3056W, EM-3069W, EM-3062W, EM-3038W (Note: The above samples are same except the model number & Shape of appliances, so we prepare “EM-515B (S-100)” for EMC test only.)
Test Power Supply	: DC 5V via USB Port
Frequency	: 2408~2474MHz
Channel	: 67 Channels, 1MHz Spacing
Antenna Gain	: 1dBi (The device uses an integral PCB antenna which is not intended and easy to modify.)
PC	: Manufacturer: DELL M/N: OPTIPLEX 380 S/N: 1J63X2X CE , FCC: DOC
MONITOR	: Manufacturer: DELL M/N: E170Sc S/N: CN-00V539-64180-055-0UPS CE , FCC: DOC
KEYBOARD	: Manufacturer: DELL M/N: SK-8115 S/N: CN-0DJ313-71616-06C-02XN CE , FCC: DOC
MOUSE	: Manufacturer: DELL M/N: M-UARDEL7 S/N: N/A CE , FCC: DOC
Applicant	: Shenzhen Eastech Co., Ltd.
Address	: Block A, Baizhushan Industrial Park, Shajing Street, Bao'an District, Shenzhen City, Guangdong Province, China
Manufacturer	: Shenzhen Eastech Co., Ltd.
Address	: 262 Shidan Rd., the 3rd Industrial Area, Juzhou, Shijie Town, Dongguan, Guangdong 523290, P.R.C.
Date of receiver	: Jun. 16, 2011
Date of Test	: Jun. 16~22, 2011

1.2. Description of Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

CNAS - LAB Code: L3503

Anbotek Compliance Laboratory Limited., Laboratory has been assessed and in compliance with CNAS/CL01: 2006 accreditation criteria for testing laboratories (identical to ISO/IEC 17025:2005 General Requirements) for the Competence of Testing Laboratories.

FCC-Registration No.: 752021

Anbotek Compliance Laboratory Limited, EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 752021, August 20, 2010.

IC-Registration No.: 8058A-1

Anbotek Compliance Laboratory Limited., EMC Laboratory has been registered and fully described in a report filed with the (IC) Industry Canada. The acceptance letter from the IC is maintained in our files. Registration 8058A-1, August 30, 2010.

Test Location

All Emissions tests were performed at
Anbotek Compliance Laboratory Limited. at 1/F, 1 /Building, SEC Industrial Park,
No. 4 Qianhai Road, Nanshan District, Shenzhen, 518054, China

1.3. Measurement Uncertainty

Radiation Uncertainty : Ur = 4.3dB

Conduction Uncertainty : Uc = 3.4dB

2. MEASURING DEVICE AND TEST EQUIPMENT

Equipment	Manufacturer	Model #	Serial #	Data of Cal.	Due Data
EMI Test Receiver	Rohde & Schwarz	ESCI	100119	Mar.03, 2011	Mar.02, 2012
EMI Test Receiver	Rohde & Schwarz	ESPI	1101604	Jun.21, 2010	Jun.20, 2011
EMI Test Receiver	Rohde & Schwarz	ESIB26	100249	Sep.22, 2010	Sep.21, 2011
EMI Test Software	SHURPLE	ESK1	N/A	N/A	N/A
Spectrum Analyzer	Agilent	E7405A	MY45114970	Jun.21, 2010	Jun.20, 2011
Signal Generator	Rohde & Schwarz	SMR27	100124	Jul.06, 2010	Jul.05, 2012
Signal Generator	Rohde & Schwarz	SML03	102319	Aug.01, 2010	Aug.01, 2012
AC Power Source	Secpial power system	YF650	N/A	N/A	N/A
Absorbing Clamp	Rohde & Schwarz	MDS21	100218	Apr.30, 2010	Apr.29, 2012
Power Meter	Rohde & Schwarz	NRVD	101287	Jul.19, 2009	Jul.18, 2011
Coaxial Cable	N/A	N/A	N/A	May.31, 2011	May.30, 2012
Coaxial Cable	N/A	N/A	N/A	May.31, 2011	May.30, 2012
Coaxial Cable	N/A	N/A	N/A	May.31, 2011	May.30, 2012
Universal radio Communication tester	Rohde & Schwarz	CMU200	101724	Sep.08, 2009	Sep.07, 2011
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	N/A	N/A	N/A
Loop Antenna	ETS-LINGREN	6502	00071730	Mar.03, 2011	Mar.02, 2012
BiConilog Antenna	ETS-LINDGREN	3142C	00042670	Mar.03, 2011	Mar.02, 2012
BiConilog Antenna	ETS-LINDGREN	3142C	00042673	Mar.03, 2011	Mar.02, 2012
Double-ridged Waveguide horn	ETS-LINDGREN	3117	00035926	Dec.30, 2009	Dec.29, 2011
Double-ridged Waveguide horn	ETS-LINDGREN	3117	00041545	Dec.30, 2009	Dec.29, 2011
Pre-amplifier	CD	PAM0203	804203	Jun.21, 2010	Jun.20, 2011
RF Switch	CD	RSU-M3	706543	Jun.21, 2010	Jun.20, 2011
Thermo-/Hygrometer	N/A	TH01	N/A	May.03, 2011	May.02, 2012
Shielding Room	Zhong Yu Electronic	N/A	N/A	N/A	N/A
3m Semi-Anechoic Chamber	Zhong Yu Electronic	N/A	N/A	Apr.28, 2010	Apr.27, 2012

3. Test Procedure

GENERAL: This report shall NOT be reproduced except in full without the written approval of Anbotek Compliance Laboratory Limited. The EUT was transmitting a test signal during the testing.

RADIATION INTERFERENCE: The test procedure used was ANSI STANDARD C63.4-2003 using a spectrum analyzer with a pre-selector. The analyzer was calibrated in dB above a microvolt at the output of the antenna. The resolution bandwidth was 100KHz and the video bandwidth was 300KHz up to 1.0GHz and 1.0MHz with a video BW of 3.0MHz above 1.0GHz. The ambient temperature of the EUT was 74.3oF with a humidity of 69%.

FORMULA OF CONVERSION FACTORS: The Field Strength at 3m was established by adding the meter reading of the spectrum analyzer (which is set to read in units of dBuV) to the antenna correction factor supplied by the antenna manufacturer. The antenna correction factors are stated in terms of dB. The gain of the Preselector was accounted for in the Spectrum Analyzer Meter Reading.

Example:

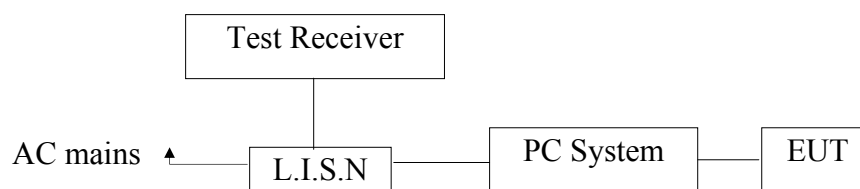
Freq (MHz) METER READING + ACF = FS
33 20 dBuV + 10.36 dB = 30.36 dBuV/m @ 3m

ANSI STANDARD C63.4-2003 10.1.7 MEASUREMENT PROCEDURES: The EUT was placed on a table 80 cm high and with dimensions of 1m by 1.5m. The EUT was placed in the center of the table (1.5m side). The table used for radiated measurements is capable of continuous rotation. When an emission was found, the table was rotated to produce the maximum signal strength. At this point, the antenna was raised and lowered from 1m to 4m. The antenna was placed in both the horizontal and vertical planes.

4. Conducted Limits

4.1. Block Diagram of Test Setup

4.1.1. Block diagram of connection between the EUT and simulators



(EUT: Receiver of 2.4G Wireless Optical Mouse)

4.2. Power Line Conducted Emission Measurement Limits (15.207)

Frequency MHz	Limits dB(μV)	
	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.

4.3. 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 : Receiver of 2.4G Wireless Optical Mouse
 Model Number : S-100
 Applicant : Shenzhen Eastech Co., Ltd.

4.4. Operating Condition of EUT

4.4.1. Setup the EUT and simulator as shown as Section 4.1.

4.4.2. Turn on the power of all equipment.

4.4.3. Let the EUT work in test mode (ON) and measure it.

4.5. 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 (ESCI) set at 9KHz.

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

The test results are reported on Section 4.6.

4.6. Power Line Conducted Emission Measurement Results

PASS.

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

Please refer the following pages.

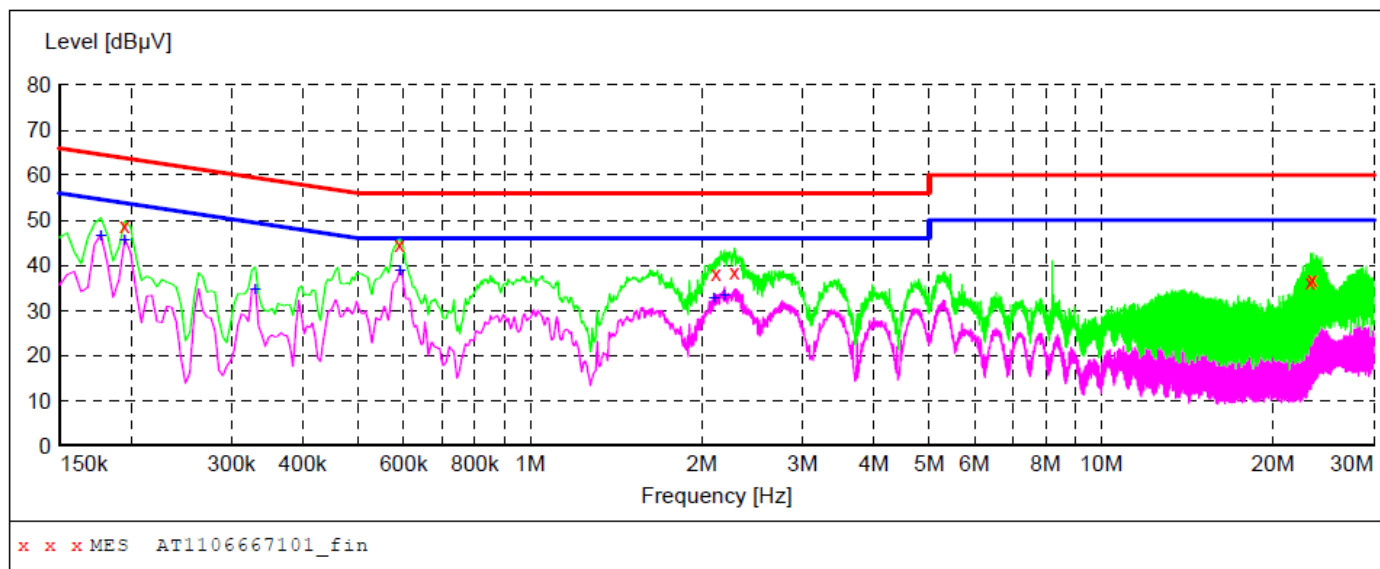
FCC ID: ZPF515R

CONDUCTED EMISSION TEST DATA

EUT: Receiver of 2.4G Wireless Optical Mouse M/N: S-100
 Operating Condition: On
 Test Site: 1# Shielded Room
 Operator: Rock Zeng
 Test Specification: AC 120V/60Hz for PC
 Comment: Live Line
 Tem:25°C Hum:50%

SCAN TABLE: "Voltage(150K~30M)FIN"

Short Description: 150K-30M Disturbance Voltages

**MEASUREMENT RESULT: "AT1106667101_fin"**

06/20/2011 1:35PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.195000	48.70	10.7	64	15.1	QP	L1	GND
0.591000	44.70	9.9	56	11.3	QP	L1	GND
2.116500	38.30	9.8	56	17.7	QP	L1	GND
2.278500	38.60	9.8	56	17.4	QP	L1	GND
23.257500	36.30	10.8	60	23.7	QP	L1	GND
23.446500	37.00	10.9	60	23.0	QP	L1	GND

MEASUREMENT RESULT: "AT1106667101_fin2"

06/20/2011 1:35PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.177000	46.70	10.8	55	7.9	AV	L1	GND
0.195000	45.50	10.7	54	8.3	AV	L1	GND
0.330000	34.70	10.2	50	14.8	AV	L1	GND
0.591000	38.90	9.9	46	7.1	AV	L1	GND
2.098500	32.80	9.8	46	13.2	AV	L1	GND
2.188500	33.40	9.8	46	12.6	AV	L1	GND

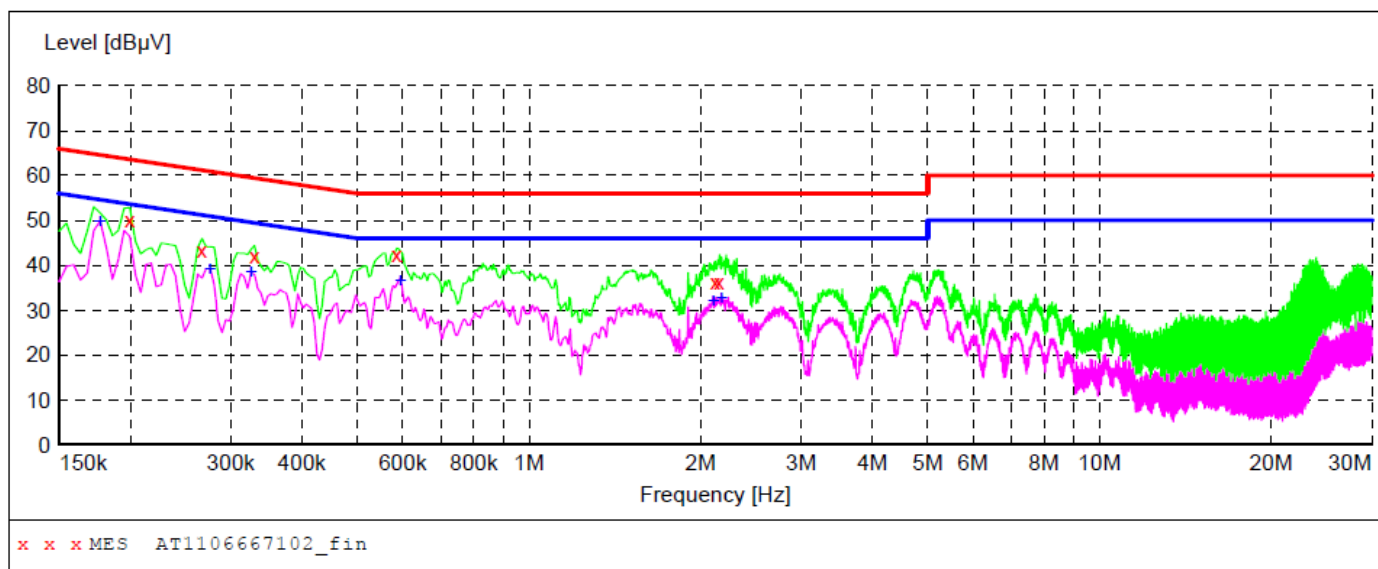
FCC ID: ZPF515R

CONDUCTED EMISSION TEST DATA

EUT: Receiver of 2.4G Wireless Optical Mouse M/N: S-100
 Operating Condition: On
 Test Site: 1# Shielded Room
 Operator: Rock Zeng
 Test Specification: AC 120V/60Hz for PC
 Comment: Neutral Line
 Tem:25°C Hum:50%

SCAN TABLE: "Voltage(150K~30M)FIN"

Short Description: 150K-30M Disturbance Voltages

**MEASUREMENT RESULT: "AT1106667102_fin"**

06/20/2011 1:39PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.199500	50.20	10.7	64	13.4	QP	N	GND
0.267000	43.20	10.3	61	18.0	QP	N	GND
0.330000	42.20	10.2	60	17.3	QP	N	GND
0.586500	42.40	9.9	56	13.6	QP	N	GND
2.121000	36.20	9.8	56	19.8	QP	N	GND
2.157000	36.40	9.8	56	19.6	QP	N	GND

MEASUREMENT RESULT: "AT1106667102_fin2"

06/20/2011 1:39PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.177000	49.80	10.8	55	4.8	AV	N	GND
0.276000	39.20	10.8	51	11.7	AV	N	GND
0.325500	38.50	10.2	50	11.1	AV	N	GND
0.595500	36.60	9.9	46	9.4	AV	N	GND
2.103000	32.20	9.8	46	13.8	AV	N	GND
2.175000	32.60	9.8	46	13.4	AV	N	GND

5. Radiation Interference

5.1. Requirements (15.249, 15.209):

5.1.1. Test Limits (< 30 MHz)

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30

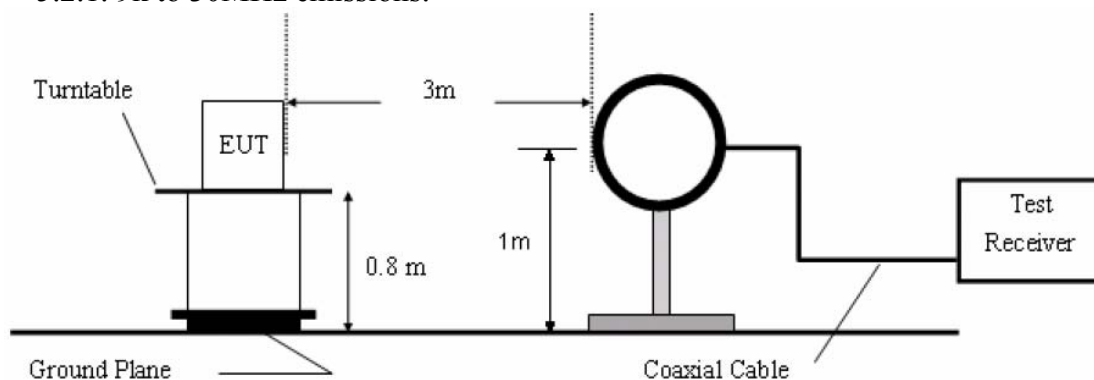
5.1.2. Test Limits (\geq 30 MHz)

FIELD STRENGTH of Fundamental:	FIELD STRENGTH of Harmonics	S15.209	
902-928 MHz		30 - 88 MHz	40 dBuV/m @3M
2.4-2.4835 GHz		88 - 216 MHz	43.5
94 dBuV/m @3m	54 dBuV/m @3m	216 - 960 MHz	46
		ABOVE 960 MHz	54dBuV/m

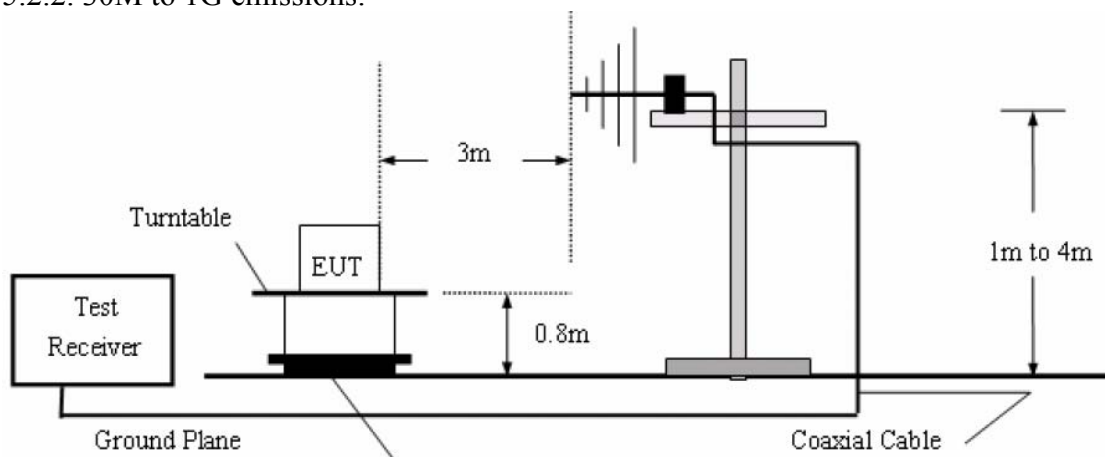
Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in 15.209, whichever is the lesser attenuation.

5.2. Test Configuration:

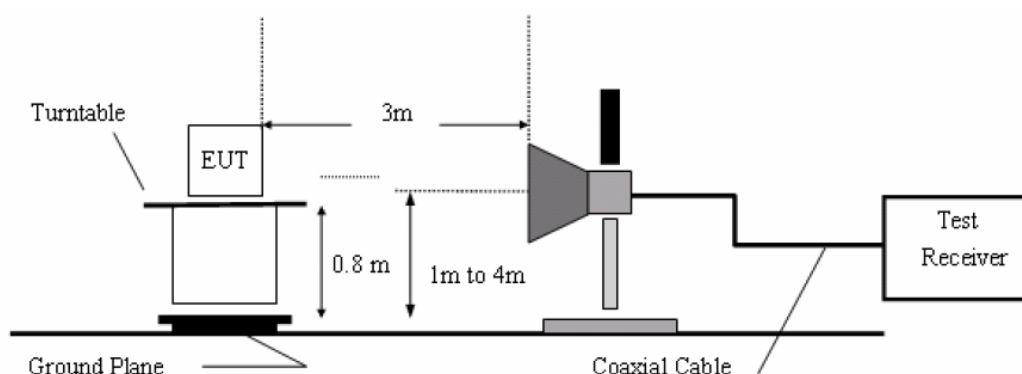
5.2.1. 9k to 30MHz emissions:



5.2.2. 30M to 1G emissions:



5.2.3. 1G to 40G emissions:



5.3. Test Procedure

The EUT is placed on a turn table which is 0.8 meter high above the ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT is set 3 meters away from the receiving antenna which is mounted on a antenna tower. The antenna can be moved up and down from 1 to 4 meters to find out the maximum emission level. Both horizontal and vertical polarization of the antenna are set on test.

All readings from 30MHz to 1GHz are quasi-peak values with a resolution bandwidth of 120kHz. All reading are above 1GHz, peak & average values with a resolution bandwidth of 1MHz. The EUT is tested in 9*6*6 Chamber.

The test results are listed in Section 5.4.

5.4. Test Results

PASS.

Please refer the following pages.

FCC ID: ZPF515R

Data:

Horizontal CH Low(2408MHz)								
Frequency MHz	Cable Loss dB	Ant Factor dB/m	Preamp Factor dB	Read Level dBμV	Level dBμV/m	Limit dBμV/m	Over Limit dB	Remark
36.00	0.5	12.3	40.06	50.82	23.56	40.00	-16.44	QP
726.80	2.65	18.90	39.48	48.88	30.95	46.00	-15.05	QP
2408.00	3.11	31.24	35.30	80.52	79.57	94.0	-14.43	Peak
4816.00	3.11	31.62	34.71	32.40	32.42	54.0	-21.58	Peak
7224.00	3.12	32.15	35.15	31.11	31.23	54.0	-22.77	Peak
9632.00	---	---	---	---	---	---	---	---
12040.00	---	---	---	---	---	---	---	---
14448.00	---	---	---	---	---	---	---	---
16856.00	---	---	---	---	---	---	---	---
19264.00	---	---	---	---	---	---	---	---
21672.00	---	---	---	---	---	---	---	---
24080.00	---	---	---	---	---	---	---	---

Remark: There is no emissions were detected below 30MHz

CH Middle(2440MHz)								
Frequency MHz	Cable Loss dB	Ant Factor dB/m	Preamp Factor dB	Read Level dBμV	Level dBμV/m	Limit dBμV/m	Over Limit dB	Remark
207.12	1.3	10.57	41.24	50.65	21.28	43.50	-22.22	QP
682.34	2.55	18.78	39.42	47.71	29.62	46.00	-16.38	QP
2440.00	3.11	31.25	35.90	81.21	79.67	94.0	-14.33	Peak
4880.00	3.11	31.61	34.73	33.45	33.44	54.0	-20.56	Peak
7320.00	3.12	32.16	35.17	31.10	31.21	54.0	-22.79	Peak
9760.00	---	---	---	---	---	---	---	---
12200.00	---	---	---	---	---	---	---	---
14640.00	---	---	---	---	---	---	---	---
17080.00	---	---	---	---	---	---	---	---
19520.00	---	---	---	---	---	---	---	---
21960.00	---	---	---	---	---	---	---	---
24410.00	---	---	---	---	---	---	---	---

Remark: There is no emissions were detected below 30MHz

FCC ID: ZPF515R

CH High(2474MHz)								
Frequency	Cable	Ant	Preampl	Read	Level	Limit	Over	Remark
MHz	Loss	Factor	Factor	Level	dBμV/m	dBμV/m	Limit	
	dB	dB/m	dB	dBμV			dB	
207.12	1.3	10.57	41.24	51.10	21.73	43.50	-21.77	QP
916.07	3.0	21.11	38.50	45.28	30.89	46.00	-15.11	QP
2474.00	3.11	31.32	36.00	82.40	80.83	94.0	-13.17	Peak
4948.00	3.11	31.63	34.80	33.32	33.26	54.0	-20.74	Peak
7422.00	3.12	32.16	35.20	32.80	32.88	54.0	-21.12	Peak
9896.00	---	---	---	---	---	---	---	---
12370.00	---	---	---	---	---	---	---	---
14844.00	---	---	---	---	---	---	---	---
17318.00	---	---	---	---	---	---	---	---
19792.00	---	---	---	---	---	---	---	---
22266.00	---	---	---	---	---	---	---	---
24740.00	---	---	---	---	---	---	---	---

Remark: There is no emissions were detected below 30MHz

Vertical CH Low(2408MHz)								
Frequency	Cable	Ant	Preampl	Read	Level	Limit	Over	Remark
MHz	Loss	Factor	Factor	Level	dBμV/m	dBμV/m	Limit	
	dB	dB/m	dB	dBμV			dB	
2408.00	3.11	31.24	36.00	81.44	79.79	94.0	-14.21	Peak
4816.00	3.11	31.60	34.70	33.80	33.81	54.0	-20.19	Peak
7224.00	3.12	32.16	35.17	33.11	33.22	54.0	-21.58	Peak
9632.00	---	---	---	---	---	---	---	---
12040.00	---	---	---	---	---	---	---	---
14448.00	---	---	---	---	---	---	---	---
16856.00	---	---	---	---	---	---	---	---
19264.00	---	---	---	---	---	---	---	---
21672.00	---	---	---	---	---	---	---	---
24080.00	---	---	---	---	---	---	---	---

Remark: There is no emissions were detected below 30MHz

FCC ID: ZPF515R

CH Middle(2440MHz)								Remark
Frequency	Cable	Ant	Preamp	Read	Level	Limit	Over	
MHz	Loss	Factor	Factor	Level	dBμV/m	dBμV/m	Limit	
	dB	dB/m	dB	dBμV			dB	
2440.00	3.11	31.25	35.90	81.74	80.20	94.0	-13.80	Peak
4880.00	3.11	31.61	34.72	33.92	33.92	54.0	-20.08	Peak
7320.00	3.12	32.16	35.17	31.84	31.95	54.0	-22.05	Peak
9760.00	---	---	---	---	---	---	---	---
12200.00	---	---	---	---	---	---	---	---
14640.00	---	---	---	---	---	---	---	---
17080.00	---	---	---	---	---	---	---	---
19520.00	---	---	---	---	---	---	---	---
21960.00	---	---	---	---	---	---	---	---
24410.00	---	---	---	---	---	---	---	---

Remark: There is no emissions were detected below 30MHz

CH High(2478MHz)								Remark
Frequency	Cable	Ant	Preamp	Read	Level	Limit	Over	
MHz	Loss	Factor	Factor	Level	dBμV/m	dBμV/m	Limit	
	dB	dB/m	dB	dBμV			dB	
2474.00	3.11	31.32	36.00	81.60	80.03	94.0	-13.97	Peak
4948.00	3.11	31.63	34.80	33.51	33.45	54.0	-20.55	Peak
7422.00	3.12	32.16	35.20	32.10	32.18	54.0	-21.82	Peak
9896.00	---	---	---	---	---	---	---	---
12370.00	---	---	---	---	---	---	---	---
14844.00	---	---	---	---	---	---	---	---
17318.00	---	---	---	---	---	---	---	---
19792.00	---	---	---	---	---	---	---	---
22266.00	---	---	---	---	---	---	---	---
24740.00	---	---	---	---	---	---	---	---

Remark: There is no emissions were detected below 30MHz

NOTE: “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

6. Occupied Bandwidth

6.1. Requirements (15.249):

The field strength of any emissions appearing outside the band edges and up to 10 kHz above and below the band edges shall be attenuated at least 50 dB below the level of the carrier or to the general limits of 15.249.

6.2 Test Results

Pass.

Please refer the following plot.

