

FCC ID TEST REPORT

for

Wireless Optical Mouse

Model: DS-2509

FCC ID: TUVDS-2509

Prepared for: Eastern Times Technology Co., Ltd.
Building D, Nan An Industry Area, Youganpu Village, Fenggang Town,
Dongguan City, Guangdong, China.

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Report Number: TCT141113E001

Date of Test: Nov. 13~Nov. 14, 2014

Date of Report: Nov. 14, 2014

The results detailed in this test report relate only to the specific sample(s) tested. It is the Application's responsibility to ensure that all production units are manufactured with equivalent EMC characteristics. This report is not to be reproduced except in full, without written approval from TCT Testing Technology.

Table of Contents

1.0 General Details	3
1.1 Test Lab Details	3
1.2 Applicant Details	3
1.3 Description of EUT.....	4
1.4 Statement	4
1.5 Test Engineer	4
2.0 Test equipments and Associated Equipment used during the test.	5
2.1 Test Equipments.....	5
2.2 AE used during the test.....	5
3.0 Technical Details	6
3.1 Summary of test results	6
3.2 Test Standards	6
4.0 EUT Modification	6
5.0 Measurement Uncertainty	6
6.0 Power Line Conducted Emission Test	7
6.1 Schematics of the test	7
6.2 Test Method and test Procedure.....	7
6.3 EUT Operating Condition.....	7
6.4 Test Equipment	7
6.5 Conducted Emission Limit	8
6.7 Test result.....	8
7.0 Radiated Emission Test	10
7.1 Test Method and test Procedure:.....	10
7.2 Block diagram of Test setup	10
7.3 Limit	12
7.4 Test Equipment	13
7.5 Test specification:	13
8. Band Edge	18
8.1 Band Edge Limit.....	18
8.2 Test Equipment	18
9.0 Occupied Bandwidth	20
9.1 Test Equipment	20
9.2 Test Specification:.....	20
9.3 Limit	20
9.4 Test Result:	20
10.0 Antenna Requirement	22
10.1 Standard Applicable.....	22
10.2 Antenna Specification.....	22

1.0 General Details

1.1 Test Lab Details

Name :	Shenzhen Tongce Testing Lab
Address:	1F, Leinuo Watch Building, Fuyong Town, Baoan Dist, Shenzhen, China
Telephone:	13410377511
Fax:	--

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

FCC Registration Number: 572331

Shenzhen TCT Testing Technology Co., Ltd., Shenzhen EMC Laboratory: Shenzhen Tongce Testing Lab
The 3m Semi-anechoic chamber has been registered and fully described in a report with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files.
Registration Number: 572331

Industry Canada (IC)

The 3m Semi-anechoic chamber of Shenzhen TCT Testing Technology Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing
Registration Number IC: 10668A-1

1.2 Applicant Details

Applicant:	Eastern Times Technology Co., Ltd.
Address:	Building D, Nan An Industry Area, Youganpu Village, Fenggang Town, Dongguan City, Guangdong, China.
Telephone:	0769-86800666
Fax:	0769-868002368

Manufacturer:	Eastern Times Technology Co., Ltd.
Address:	Building D, Nan An Industry Area, Youganpu Village, Fenggang Town, Dongguan City, Guangdong, China.
Telephone:	0769-86800666
Fax:	0769-868002368


1.3 Description of EUT

Product:	Wireless Optical Mouse
Model No.:	DS-2509
Additional Model No.:	N.A.
Brand Name:	N.A.
Rating:	DC 1.5V Via an AA Battery
Operation Frequency:	2408-2474MHz
Modulation Type:	FSK
Channel spacing:	2 MHz
Channel number:	34
Antenna Designation:	A PCB antenna, and the maximum antenna gain is 0dBi.

1.4 Statement:

All models above are identical in interior structure, electrical circuits and components, and just model names are different for the marketing requirement.

1.5 Test Engineer

The sample tested by 

Printed name: SKY

2.0 Test equipments and Associated Equipment used during the test.

2.1 Test Equipments

Instrument Type	Manufacturer	Model	Serial No.	Date of Cal.	Due Date
ESPI Test Receiver	ROHDE&SCHWARZ	ESPI 3	100379	July 03, 2014	July 02, 2015
Spectrum Analyzer	ROHDE&SCHWARZ	FSEM	848597/001	July 03, 2014	July 02, 2015
Pre-amplifier	Teseq	LAN6900	--	July 02, 2014	July 01, 2015
Pre-amplifier	Agilent	8447D	83153007374	July 02, 2014	July 01, 2015
Pre-amplifier	Agilent	8449B	3008A01738	July 02, 2014	July 01, 2015
Triple-loop antenna	ROHDE&SCHWARZ	HM020	843885/002	July 02, 2014	July 01, 2015
Ultra Broadband ANT	ROHDE&SCHWARZ	HL562	100157	July 02, 2014	July 01, 2015
Horn Antenna	ETS LINDGREN	3117	--	July 02, 2014	July 01, 2015
Horn Antenna	ETS LINDGREN	3160	--	July 02, 2014	July 01, 2015
Coaxial Cable	TCT	N/A	N/A	July 2, 2014	July 1, 2015
Coaxial Cable	TCT	N/A	N/A	July 2, 2014	July 1, 2015
Coaxial cable	TCT	N/A	N/A	July 2, 2014	July 1, 2015
Coaxial Cable	TCT	N/A	N/A	July 2, 2014	July 1, 2015

2.2 AE used during the test

Equipment type	Manufacturer	Model
N.A.		
N.A.		
N.A.		

3.0 Technical Details

3.1 Summary of test results

The EUT has been tested according to the following specifications

Requirement	CFR 47 Section	Result
Conduction Emission, 0.15MHz to 30MHz	15.207(a)	N.A.
Radiated Emission Test	Section 15.209, 15.35 Section 15.249(a)(d)	PASS
Band Edge Test	15.249(d)	PASS
Occupied Bandwidth	Section 15.215(c)	PASS
Antenna Requirement	Section 15.203	PASS

Note: This EUT is power by battery only, the conducted emission is not applicable

3.2 Test Standards

FCC Rules and Regulations Part 15 Subpart C: 2013

4.0 EUT Modification

No modification by Shenzhen TCT Testing Technology Co., Ltd

5.0 Measurement Uncertainty

(95% confidence levels, k=2)

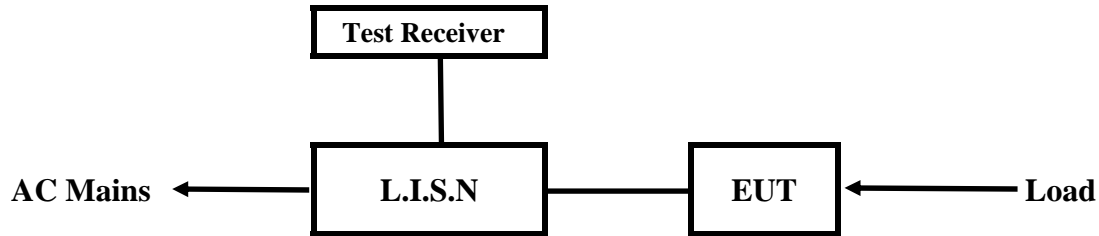
No.	Item	MU
1.	Radio Frequency	$\pm 1 \times 10^{-9}$
2.	Temperature	$\pm 0.1^\circ\text{C}$
3.	Humidity	$\pm 1.0\%$
4.	RF power, conducted	$\pm 0.34\text{dB}$
5.	RF power density, conducted	$\pm 1.45\text{dB}$
6.	Spurious emissions, conducted	$\pm 3.70\text{dB}$
7.	All emissions, radiated	$\pm 4.50\text{dB}$

Note: 1) The EUT is a 2.4G RF Wireless Optical mouse transmitter.

2) Working transmission frequency: 2408-2474MHz, Low channel: 2408MHz, Middle channel: 2440MHz, High channel: 2474MHz

6.0 Power Line Conducted Emission Test

6.1 Schematics of the test



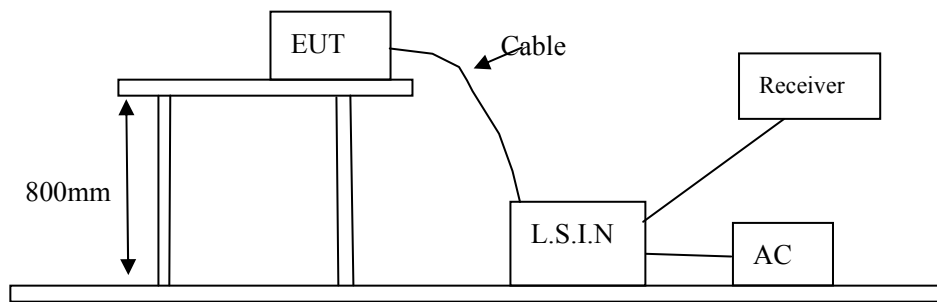
EUT: Equipment Under Test

6.2 Test Method and test Procedure

The EUT was tested according to RSS-Gen Issue 3-2010 The Frequency spectrum From 0.15MHz to 30MHz was investigated.

Test Voltage: 120V~, 60Hz

Block diagram of Test setup



6.3 EUT Operating Condition

Operating condition is according to RSS-Gen Issue 3-2010

- 1) Setup the EUT and simulators as shown on the following
- 2) Enable AF signal and confirm EUT active to normal condition

6.4 Test Equipment

Please refer to the Section 2

6.5 Conducted Emission Limit

Frequency(MHz)	Class A Limits (dBμV)		Class B Limits (dBμV)	
	Quasi-peak Level	Average Level	Quasi-peak Level	Average Level
0.15 ~ 0.50	79.0	66.0	66.0~56.0*	56.0~46.0*
0.50 ~ 5.00	73.0	60.0	56.0	46.0
5.00 ~ 30.00	73.0	60.0	60.0	50.0

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

6.6 Test specification:

Environmental conditions: Temperature: 22° C Humidity: 52% Atmospheric pressure: 103kPa

Frequency range: 0.15 MHz – 30 MHz

The test was carried out in the following operation mode(s):

- --

6.7 Test result

--

The requirements are FULFILLED

Remarks: The EUT is powered by batteries, so this test is not applicable.

A Conducted Emission on Line Terminal of the power line (150kHz to 30MHz)

EUT Description: --
 Operation Mode: --
 Tested By: --
 Test date: --

Start Frequency Stop Frequency Step IF BW Detector Final M-Time
 0.15MHz 30MHz 4.5KHz 10KHz QP+AV 1s

Frequency (MHz)	Reading(dBμV)				Limit (dBμV)	
	Live		Neutral		Quasi-peak	Average
	Quasi-peak	Average	Quasi-peak	Average		
			--	--		
			--	--		
			--	--		

B Conducted Emission on Neutral Terminal of the power line (150kHz to 30MHz)

EUT Description: --
 Operation Mode: --
 Tested By: --
 Test Data: --

Start Frequency Stop Frequency Step IF BW Detector Final M-Time
 0.15MHz 30MHz 4.5KHz 10KHz QP+AV 1s

Frequency (MHz)	Reading(dBμV)				Limit (dBμV)	
	Live		Neutral		Quasi-peak	Average
	Quasi-peak	Average	Quasi-peak	Average		
	--	--				
	--	--				
	--	--				

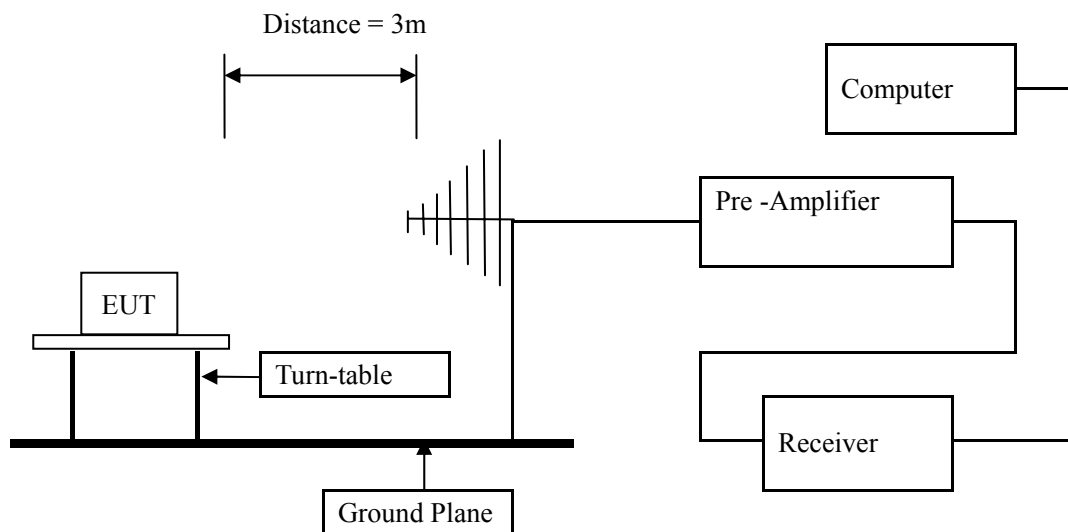
7.0 Radiated Emission Test

7.1 Test Method and test Procedure:

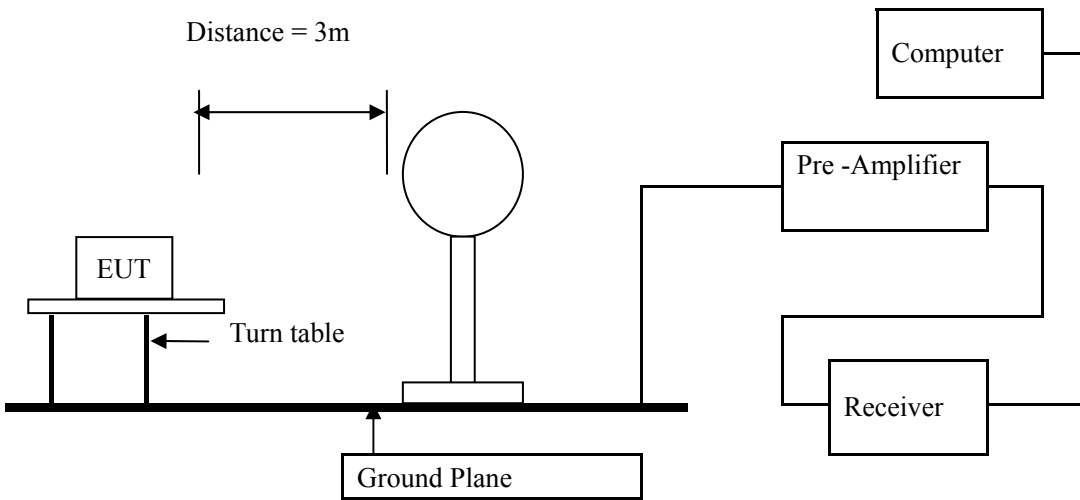
- 1) The EUT was tested according to ANSI C63.10 –2009
- 2) The EUT, peripherals were put on the turntable which table size is 1m x 1.5 m, table high 0.8 m. All set up is according to ANSI C63.10 –2009.
- 3) The frequency spectrum from 9 kHz to 25GHz was investigated. All readings from 9kHz to 30MHz are quasi-peak values with a resolution bandwidth of 9 kHz, measured with loop antenna.
All readings from 30MHz to 1 GHz are quasi-peak values with a resolution bandwidth of 120 kHz, measured with Bi-log antenna.
All readings above 1 GHz are peak values with a resolution bandwidth of 1 MHz, measured with horn antenna.
- 4) The antenna high is varied from 1 m to 4 m high to find the maximum emission for above 30MHz each frequency .
The antenna high is 1 m to find the maximum emission for each frequency below 30MHz
- 5) Tested distance: 3 meters
- 6) The antenna polarization: Vertical polarization and Horizontal polarization.
- 7) Each azimuth of E.U.T will be tested.

7.2 Block diagram of Test setup

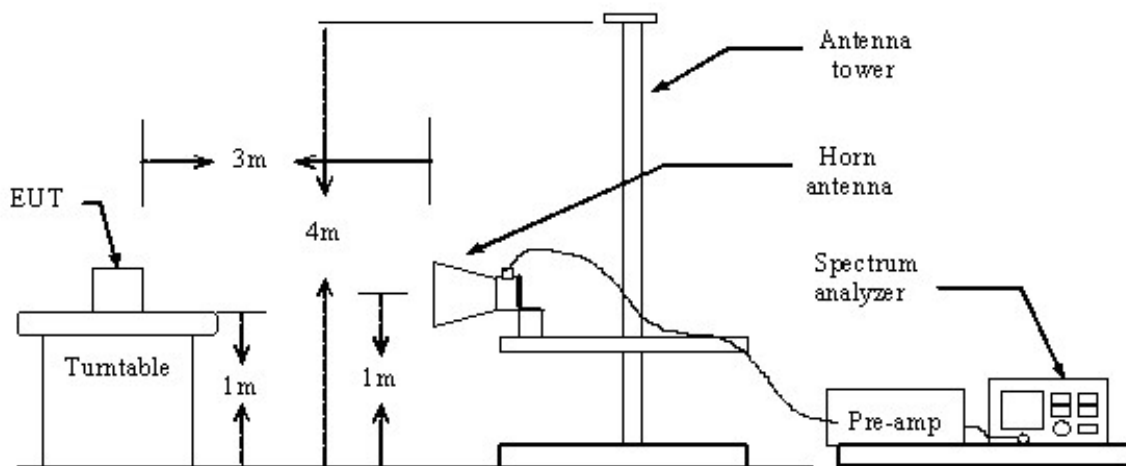
Block diagram of Test setup for frequency 30-1000MHz



Block diagram of Test setup for frequency below 30MHz



Block diagram of Test setup for frequency above 1GHz



7.3 Limit

According to 15.249(a) requirements:

Fundamental Frequency (MHz)	Filed Strength of(mi1 livolts/meter)	
	Fundamental	Harmonics
902-928	50	0.5
2400-2483.5	50	0.5
5725-5875	50	0.5
24000-24250	250	2.5

For this E.U.T

Fundamental Frequency (MHz)	Field Strength of Fundamental (3m)		Field Strength of Harmonics (3m)		
	mV/m	dBuV/m	mV/m	dBuV/m	
2400-2483.5	50	94 (Average) 114 (Peak)	0.5	54 (Average)	74 (Peak)

- Note:
- 1) RF Field Strength (dBuV) = 20 log RF Voltage (uV)
 - 2) Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.
 - 3) The emission limit in this paragraph is based on measurement instrumentation employing an average detector.

According to 15.249(d) requirements: 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.

Frequencies in restricted band are complied to limit

Frequency Range (MHz)	Distance (m)	Field strength (dBμV/m)
0.009-0.490	3	20log 2400/F (kHz) + 80
0.490-1.705	3	20log 24000/F (kHz) + 40
1.705-30	3	20log 30 + 40
30-88	3	40.0
88-216	3	43.5
216-960	3	46.0
Above 960	3	54.0

- Note:
- 1) RF Voltage (dBuV) = 20 log RF Voltage (uV)
 - 2) In the Above Table, the tighter limit applies at the band edges.
 - 3) Distance refers to the distance in meters between the measuring instrument antenna and the EUT
 - 4)The radiated emissions should be tested under 3-axes position (Lying, Side, and Stand), After pre-test. It was found that the worse radiated emission was get at the lying position.
 - 5) If measurement is made at 3m distance, then F.S Limitation at 3m distance is adjusted by using the formula $Ld1 = Ld2 * (d2/d1)$

7.4 Test Equipment

Please refer to the Section 2

7.5 Test specification:

Environmental conditions: Temperature 23° C Humidity: 50% Atmospheric pressure: 103kPa

7.6 Test result

Result: Pass

A Radiated Emission (9 kHz----30 MHz)

Note: 1) Emission Level=Reading+ Cable loss-Antenna factor-Amp factor
2) The emission levels are 20 dB below the limit value, which are not reported. It is deemed to comply with the requirement

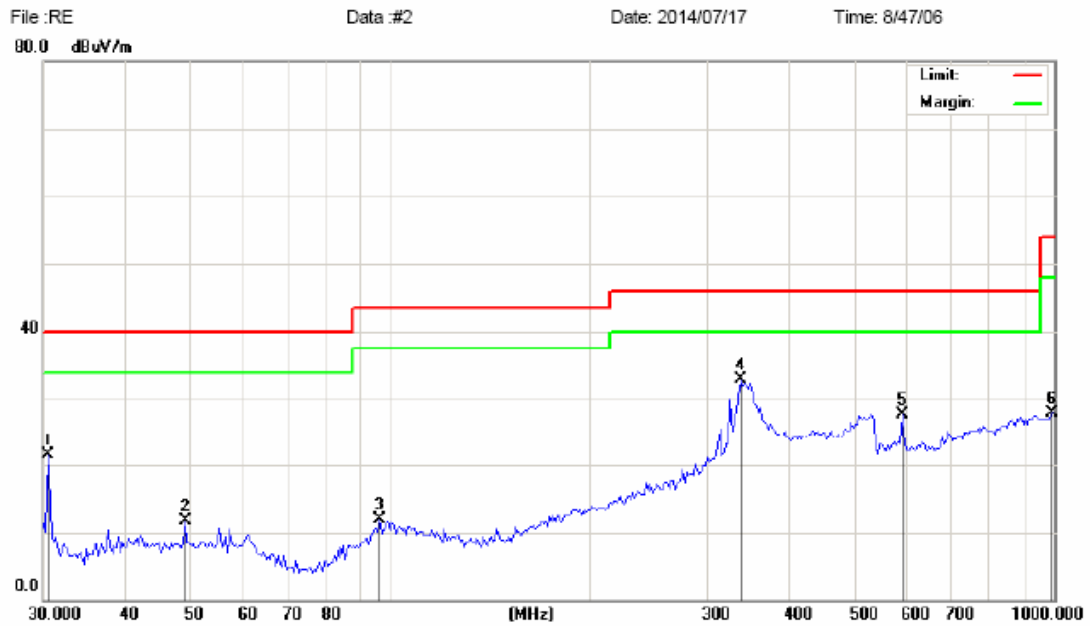
Result: Pass

Frequency (MHz)	Level@3m (dBμV/m)	Limit@3m (dBμV/m)
--	--	--
--	--	--
--	--	--
--	--	--

B General Radiated Emissions Data Radiated Emission (30MHz----1000MHz)

In Horizontal

Please refer to following diagram for individual
Low channel: 2408 MHz

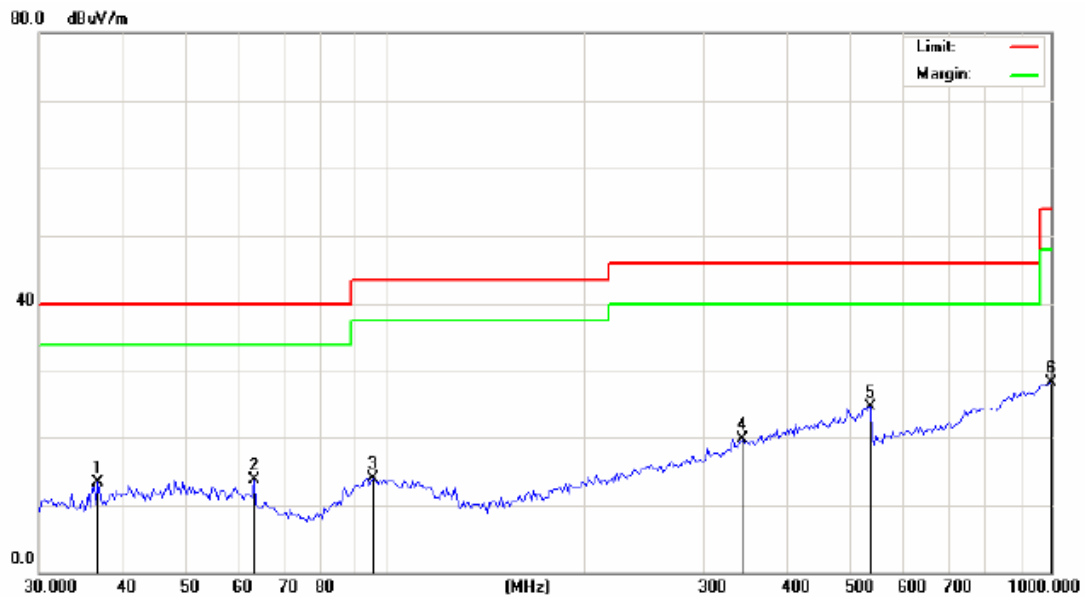


No. Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measurement dBuV/m	Limit dBuV/m	Over dB	Detector	Antenna Height cm	Table Degree	Comment
1	30.4246	33.93	-12.50	21.43	40.00	-18.57	peak		0	
2	49.0626	23.06	-11.40	11.66	40.00	-28.34	peak		0	
3	96.3230	22.97	-11.16	11.81	43.50	-31.69	peak		0	
4 *	336.4816	39.17	-6.19	32.98	46.00	-13.02	peak		0	
5	590.3510	32.73	-5.08	27.65	46.00	-18.35	peak		0	
6	992.9974	27.17	0.82	27.99	54.00	-26.01	peak		0	

In Vertical

Please refer to following diagram for individual

Low channel: 2408 MHz



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		36.7811	25.41	-12.10	13.31	40.00	-26.69	peak	0	
2		63.1856	26.57	-12.96	13.61	40.00	-26.39	peak	0	
3		95.6484	25.22	-11.23	13.99	43.50	-29.51	peak	0	
4		343.6505	25.68	-5.91	19.77	46.00	-26.23	peak	0	
5	*	535.0376	26.43	-1.66	24.77	46.00	-21.23	peak	0	
6		1000.000	27.39	0.84	28.23	54.00	-25.77	peak	0	

Note: Measurements were conducted in all channels (high, middle, low), and the worst case (low channel) was submitted only.

C Fundamental & Harmonics and Spurious Radiated Emission Data (1000MHz-25000MHz)

Low channel: 2408 MHz				
Frequency (MHz)	Emission PK/AV (dBuV/m)	Horizontal / Vertical	Limits PK/AV (dBuV/m)	Margin (dB)
2408	75.18(PK)	H	114/94	18.82
2408	76.31(PK)	V	114/94	17.69
4816	38.21 (PK)	H	74/54	15.79
4816	37.43(PK)	V	74/54	16.57
16856	42.45(PK)	H	74/54	11.55
16856	43.62(PK)	V	74/54	10.38

Middle channel: 2440 MHz				
Frequency (MHz)	Emission PK/AV (dBuV/m)	Horizontal / Vertical	Limits PK/AV (dBuV/m)	Margin (dB)
2440	74.25(PK)	H	114/94	19.75
2440	74.32(PK)	V	114/94	19.68
4880	38.29 (PK)	H	74/54	15.71
4880	31.35(PK)	V	74/54	22.65
17080	37.57 (PK)	H	74/54	16.43
17080	42.84 (PK)	V	74/54	11.16

High channel: 2474 MHz				
Frequency (MHz)	Emission PK/AV (dBuV/m)	Horizontal/ Vertical	Limits PK/AV (dBuV/m)	Margin (dB)
2474	72.35 (PK)	H	114/94	21.65
2474	73.64(PK)	V	114/94	20.36
4948	34.33 (PK)	H	74/54	19.67
4948	31.38(PK)	V	74/54	22.62
17318	34.56(PK)	H	74/54	19.44
17318	33.21(PK)	V	74/54	20.79

- Note:
- 1) PK= Peak, AV= Average
 - 2) Emission Level = Reading Level + Antenna Factor + Cable Loss.
 - 3) Margin= Limit(AV) – Emission Level
 - 4) If the peak measured value complies with the average limit, it is unnecessary to perform an average measurement.
 - 5) The other emission levels are too small, which are not reported. It is deemed to comply with the requirement of the rule.

8. Band Edge

8.1 Band Edge Limit

1) According to 15.249(d) requirements: 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.

2) For Emissions in Restricted band, the limit is below the general radiated emission limits in 15.209

8.2 Test Equipment

Please refer to the Section 2

8.3 Test Result

Pass

Low channel

Frequency (MHz)	Level@3m (dB μ V/m)	Detector	Limit@3m (dB μ V/m)	Polarization
2403	27.34	Peak	74.00	H
2403	28.43	Peak	74.00	V

High channel

Frequency (MHz)	Level@3m (dB μ V/m)	Detector	Limit@3m (dB μ V/m)	Polarization
2483.5	29.32	Peak	74.00	H
2483.5	28.50	Peak	74.00	V

9.0 Occupied Bandwidth

9.1 Test Equipment

Please refer to the Section 2

9.2 Test Specification:

Environmental conditions: Temperature 22° C Humidity: 50% Atmospheric pressure: 103kPa

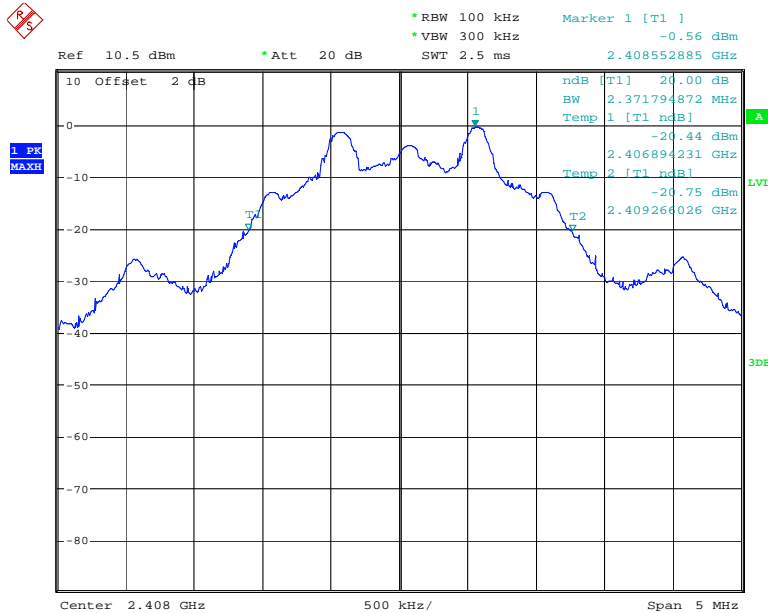
9.3 Limit

According to 15.215(c), 20dB Bandwidth should be test

9.4 Test Result:

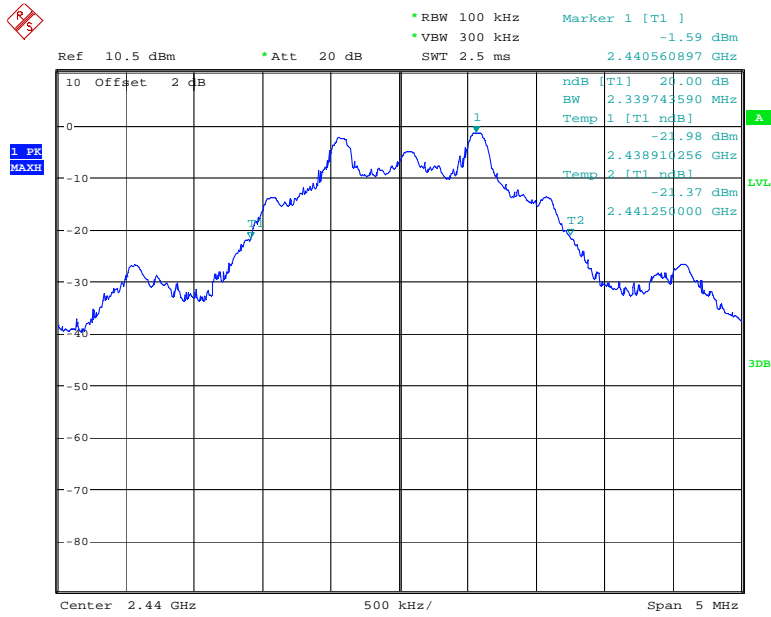
Channel	20dB Bandwidth (kHz)	Limit (kHz)	Conclusion
Low	2372	--	PASS
Middle	2340	--	PASS
High	2340	--	PASS

Test Data as follows:



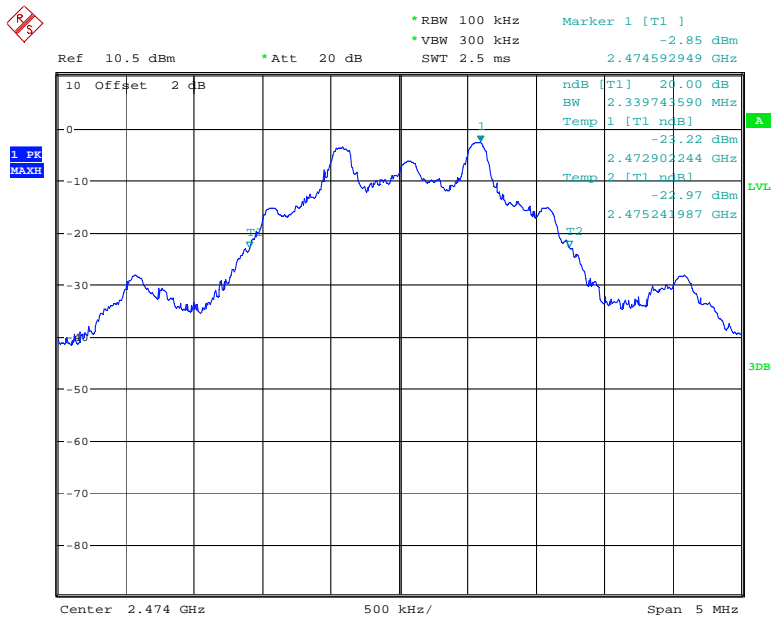
Date: 13.NOV.2014 19:40:45

Low CH



Date: 13.NOV.2014 19:41:47

Middle CH



Date: 13.NOV.2014 19:42:21

High CH

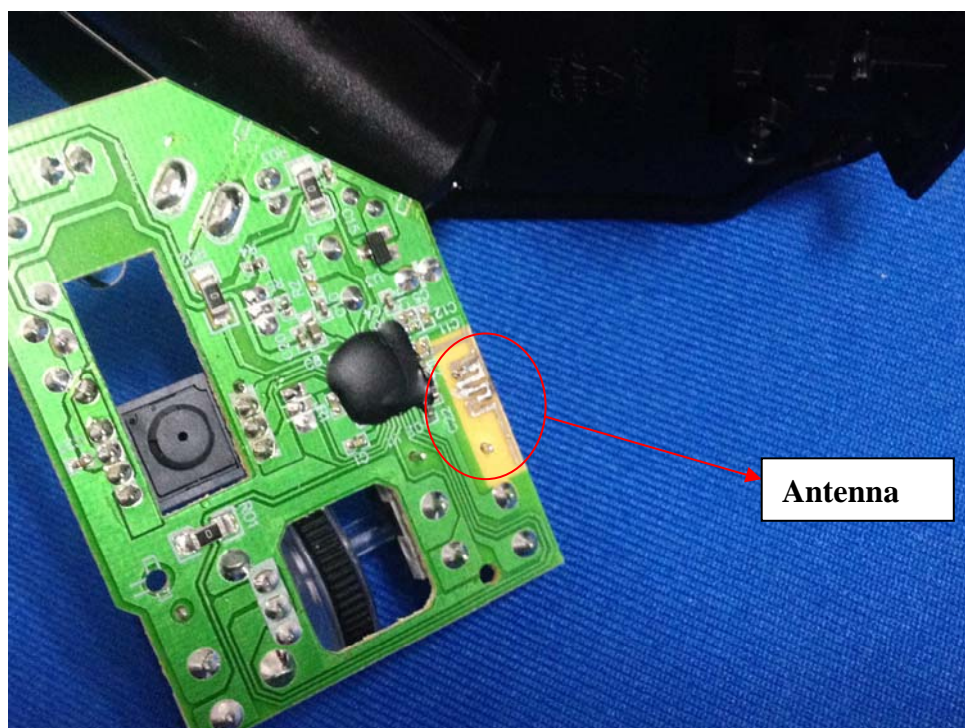
10.0 Antenna Requirement

10.1 Standard Applicable

For intentional device, according to FCC 47 CFR 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.

10.2 Antenna Specification

According to the manufacturer declared, PCB antennas; the maximum gain of antennas is 0 dBi. and no consideration of replacement. Therefore the EUT is considered sufficient to comply with the provision.



--End of the report--