

ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT INTENTIONAL RADIATOR CERTIFICATION

Product Name : 5-Key Nano Wireless Mouse
Model Number : 82-010
Trade Name : Earth Trek
FCC ID : WSN82-010
Report Number : EESZE04200003
Date : Apr. 25, 2011

Standards	Results
<input checked="" type="checkbox"/> 47 CFR FCC Part 15 Subpart C 15.249	PASS

Prepared for
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Unit 503, 5/F, Silvercord Tower 2, 30 Canton Road,
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CENTRE TESTING INTERNATIONAL (SHENZHEN) CORPORATION**

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(Note: N/A means not applicable)

1. GENERAL INFORMATION

Applicant: Earth Trek (Hong Kong) Limited
Unit 503, 5/F, Silvercord Tower 2, 30 Canton Road, Tsimshatsui,
Kln., Hong Kong

Manufacturer: Earth Trek (Hong Kong) Limited
Unit 503, 5/F, Silvercord Tower 2, 30 Canton Road, Tsimshatsui,
Kln., Hong Kong

Sample Description: 5-Key Nano Wireless Mouse

Technical Date: DC 3V

Model Name: 82-010

Trade Name: Earth Trek

FCC ID: WSN82-010

Report Number: EESZE04200003

Date of Test: Apr. 20, 2011 to Apr. 25, 2011

The above equipment was tested by CENTRE TESTING INTERNATIONAL (SHENZHEN) CORPORATION for compliance with the requirements set forth in FCC Rules and the measurement procedure according to ANSI C63.4-2009.

The test results of this report relate only to the tested sample identified in this report.

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Date

:

Apr. 25, 2011

2. TEST SUMMARY

The complete list of measurements is given below:

Clause	Test Item	Rule	Result
7	20dB Bandwidth	FCC 15.215(c)	PASS
8	Radiated Emission	FCC 15.209 FCC 15.249(a) (d)	PASS
9	Out of Band Emission	FCC 15.249 (d)	PASS
--	Antenna Requirements *	FCC 15.203	PASS

*: 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. The EUT has a built in antenna which is a short wire solder on the PCB, this is permanently attached antenna and meets the requirements of this section.

3. MEASUREMENT UNCERTAINTY

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Measurement items	Uncertainty
Radiated Emissions / Band edge Emission	4.6 dB
Conducted disturbance	2.6 dB

4. TEST EQUIPMENT LIST

Equipment	Manufacturer	Model Number	Serial Number	Due Date
3M Chamber & Accessory Equipment	ETS-LINDGREN	FACT-3	3510	07/09/2012
Spectrum Analyzer	Agilent	E4440A	MY46185649	04/08/2012
Biconilog Antenna	ETS-LINGREN	3142C	00044562	07/31/2011
Multi device Controller	ETS-LINGREN	2090	00057230	N/A
Horn Antenna	ETS-LINGREN	3117	00057407	06/07/2011
Loop Antenna	ETS-LINDGREN	6502	00071730	08/24/2011

5. SUPPORT EQUIPMENT LIST

No.	Device Type	Brand	Model	Series No.	Data Cable	Power Cord
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6. PRODUCT INFORMATION

Items	Description
Rating	DC 3V
Intentional Transceiver	Intentional Transceiver
Modulation	GFSK
Frequency Range	2405 ~ 2476 MHz
Channel Number	64
Type	PCB Antenna
Connector	fixed on board
Gain	1.7dBi

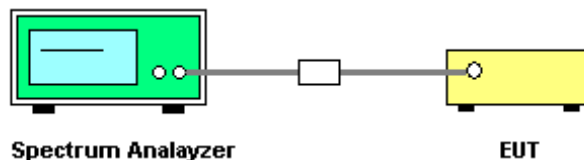
Channels	Frequency (MHz)							
1~64	1	2405	17	2421	33	2442	49	2461
	2	2406	18	2422	34	2443	50	2462
	3	2407	19	2423	35	2444	51	2463
	4	2408	20	2425	36	2446	52	2464
	5	2409	21	2427	37	2447	53	2465
	6	2410	22	2428	38	2448	54	2466
	7	2411	23	2429	39	2449	55	2467
	8	2412	24	2430	40	2451	56	2468
	9	2413	25	2431	41	2452	57	2469
	10	2414	26	2432	42	2453	58	2470
	11	2415	27	2434	43	2455	59	2471
	12	2416	28	2435	44	2456	60	2472
	13	2417	29	2436	45	2457	61	2473
	14	2418	30	2437	46	2458	62	2474
	15	2419	31	2438	47	2459	63	2475
	16	2420	32	2439	48	2460	64	2476

7. 20DB BANDWIDTH MEASUREMENT

7.1 LIMITS

None

7.2 BLOCK DIAGRAM OF TEST SETUP



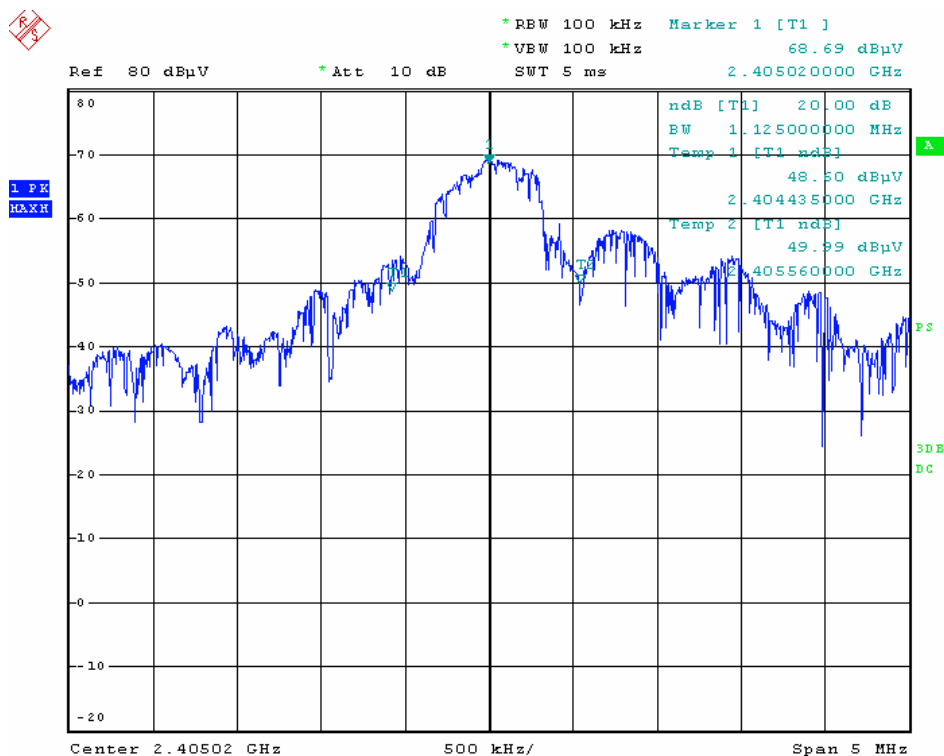
7.3 TEST PROCEDURE

1. The transmitter output (antenna port) was connected to the spectrum analyzer.
2. Set spectrum analyzer's RBW and VBW to applicable value with Peak in Max Hold.
3. A PEAK output reading was taken, a DISPLAY line was drawn 20 dB lower than PEAK level.
4. The 20dB bandwidth was determined from where the channel output spectrum intersected the display line.

7.4 TEST RESULT

Worst case-- Modulation Type: GFSK

Channel	Frequency (MHz)	20 dB BW (MHz)	Result
CH1	2405	1.125	1.235MHz
CH32	2439	1.220	
CH64	2476	1.235	



Channel 1



Channel 32



Channel 64

9. RADIATED EMISSIONS MEASUREMENT

9.1 LIMITS

(1) 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

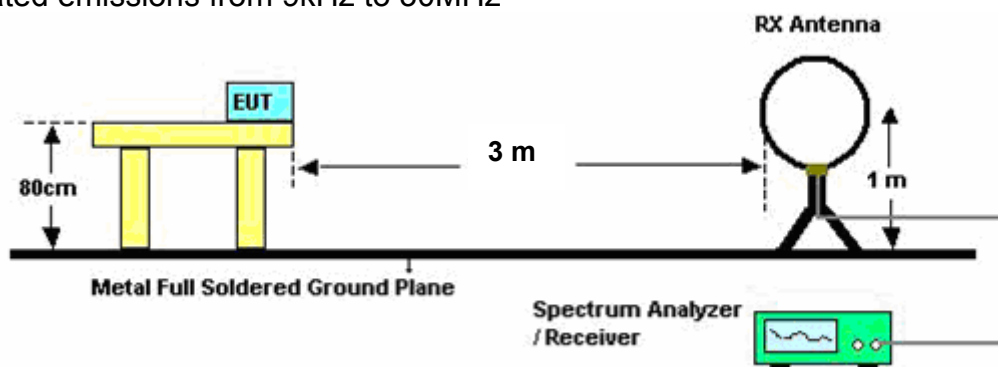
(2) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in § 15.209 as the following , whichever is the lesser attenuation.

Frequency (MHz)	Field strength (mV/m)	Distance (m)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

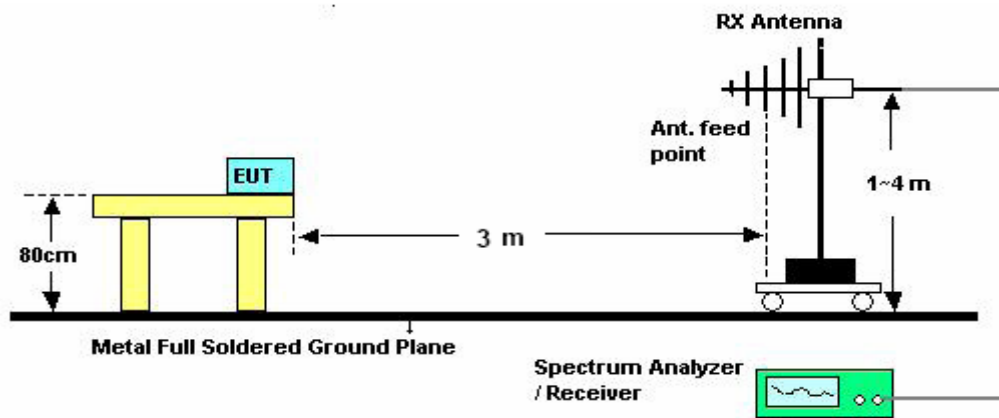
Note: the tighter limit applies at the band edges.

9.2 BLOCK DIAGRAM OF TEST SETUP

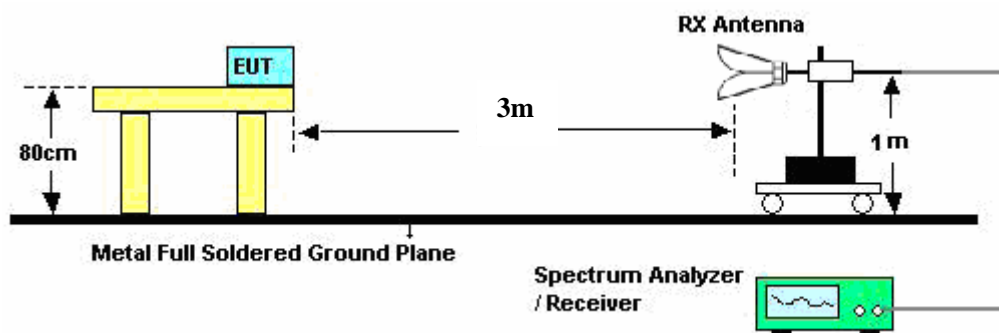
For radiated emissions from 9kHz to 30MHz



For radiated emissions from 30 - 1000MHz



For radiated emissions from 1GHz to 25GHz



9.3 TEST PROCEDURE

Below 30MHz

- The EUT is placed on a turntable 0.8 meters above the ground in the chamber, 1 meter away from the antenna (loop antenna). The maximum values of the field strength are recorded by adjusting the polarizations of the test antenna and rotating the turntable.
- For each suspected emission, the EUT was arranged to its worst case and then turn table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test frequency analyzer system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

30MHz ~ 1GHz:

- The EUT was placed on the non-conductive turntable 0.8 m above the ground at a chamber.
- Set the spectrum analyzer/receiver in Peak detector, Max Hold mode, and 120 kHz RBW. Record the maximum field strength of all the pre-scan process in the full band when the antenna is varied between 1~4 m in both horizontal and vertical, and the turntable is rotated from 0 to 360 degrees.

c. For each frequency whose maximum record was higher or close to limit, measure its QP value: vary the antenna's height and rotate the turntable from 0 to 360 degrees to find the height and degree where EUT radiated the maximum emission, then set the test frequency analyzer/receiver to QP Detector and specified bandwidth with Maximum Hold Mode, and record the maximum value.

Above 1GHz:

a. The EUT was placed on the non-conductive turntable 0.8 m above the ground at a chamber.

b. Set the spectrum analyzer/receiver in Peak detector, Max Hold mode, and 1MHz RBW. Record the maximum field strength of all the pre-scan process in the full band when the antenna is varied in both horizontal and vertical, and the turntable is rotated from 0 to 360 degrees.

c. For each frequency whose maximum record was higher or close to limit, measure its AV value: rotate the turntable from 0 to 360 degrees to find the degree where EUT radiated the maximum emission, then set the test frequency analyzer/receiver to AV value and specified bandwidth with Maximum Hold Mode, and record the maximum value.

9.4 TEST RESULT

Note: Limit dB μ V/m @3m = Limit dB μ V/m @300m+ 80
Limit dB μ V/m @3m = Limit dB μ V/m @30m + 40

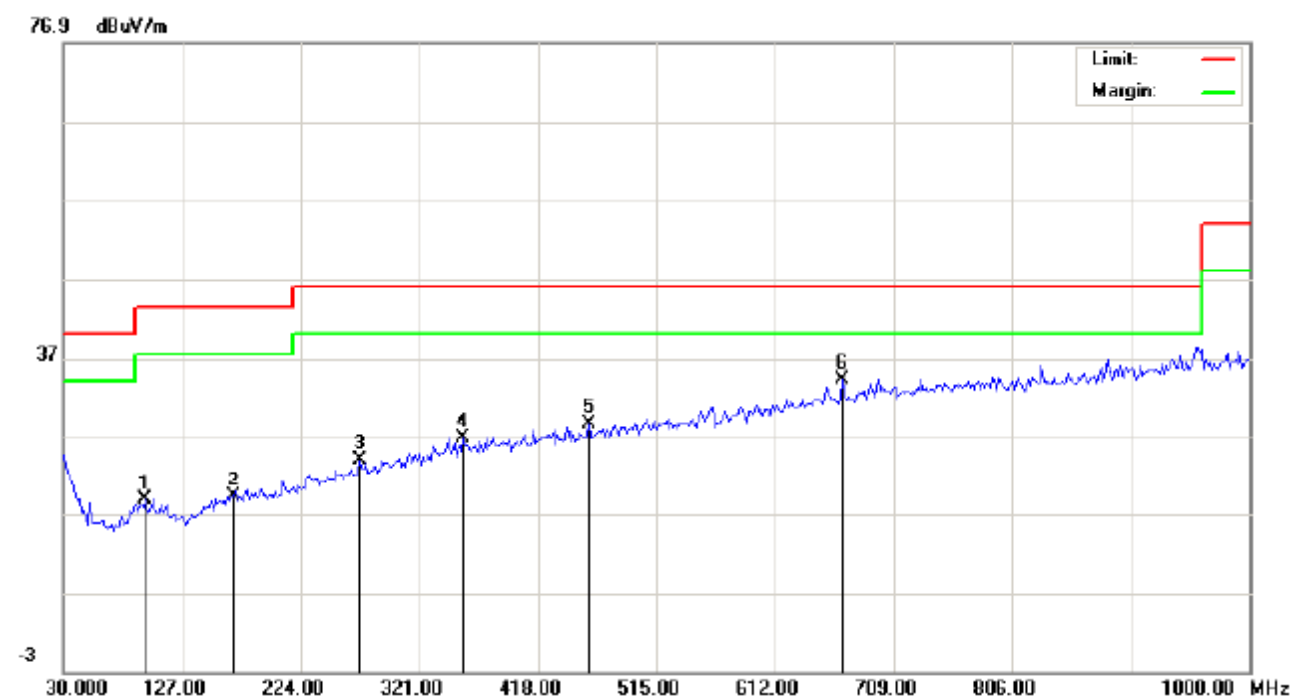
A. Below 30MHz:

The test data below 30MHz are very low, so they are not recorded.

B. 30MHz ~ 1GHz:

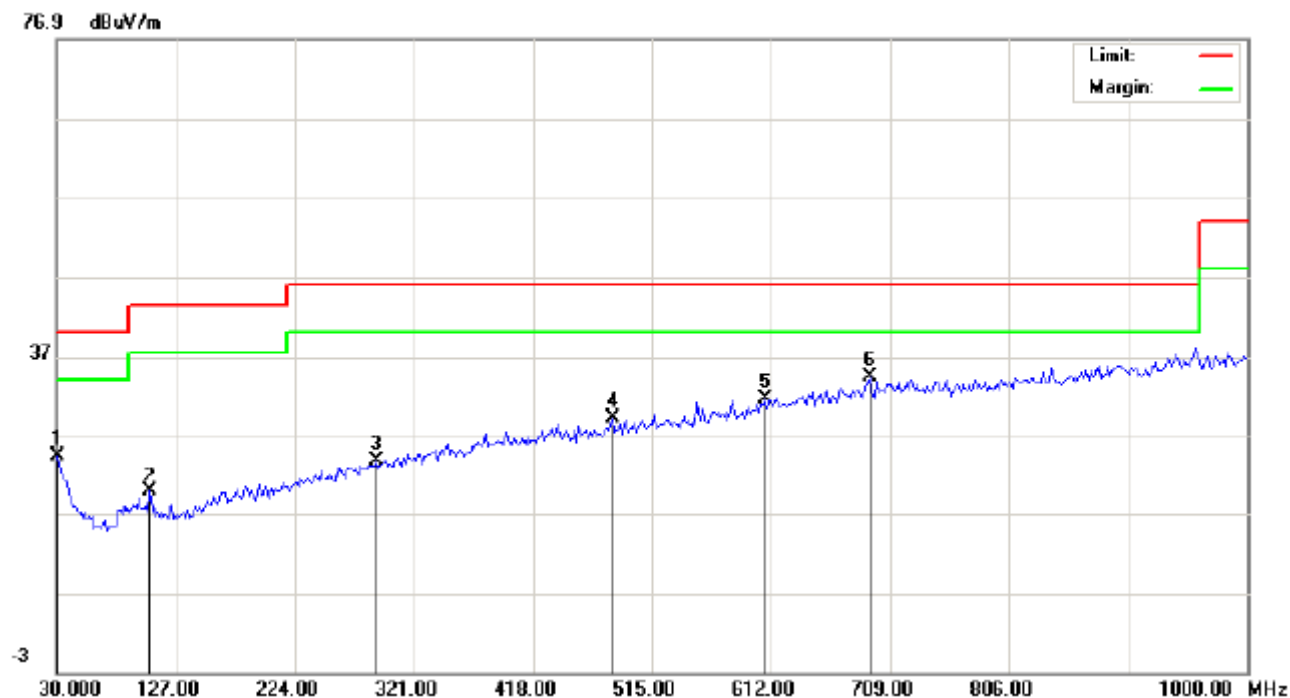
The test data of low channel, middle channel and high channel are almost same in frequency bands 30MHz to 1GHz, and the data of middle channel are chosen as representative in below:

H:



No.	Freq. MHz	Reading_Level (dBuV)			Correct Factor dB	Measurement (dBuV/m)			Limit (dBuV/m)		Margin (dB)		P/F	Comment
		Peak	QP	AVG		peak	QP	AVG	QP	AVG	QP	AVG		
1	96.2833	8.50			10.26	18.76			43.50		-24.74		P	
2	169.0333	7.85			11.27	19.12			43.50		-24.38		P	
3	272.5000	9.23			14.73	23.96			46.00		-22.04		P	
4	356.5667	9.53			17.28	26.81			46.00		-19.19		P	
5	460.0333	9.31			19.32	28.63			46.00		-17.37		P	
6	666.9667	10.22			23.90	34.12			46.00		-11.88		P	

V:



No.	Freq. MHz	Reading_Level (dBuV)			Correct Factor			Measurement (dBuV/m)			Limit (dBuV/m)		Margin (dB)		P/F	Comment
		Peak	QP	AVG	dB	peak	QP	AVG	QP	AVG	QP	AVG	QP	AVG		
1	30.0000	6.74			17.63			24.37			40.00		-15.63		P	
2	105.9833	9.85			10.03			19.88			43.50		-23.62		P	
3	290.2833	8.42			15.44			23.86			46.00		-22.14		P	
4	482.6667	9.54			19.67			29.21			46.00		-16.79		P	
5	607.1500	9.14			22.37			31.51			46.00		-14.49		P	
6	692.8333	9.93			24.56			34.49			46.00		-11.51		P	

C. Above 1GHz:

Test Results-(Measurement Distance: 3m)_Channel 1								
Frequency (MHz)	Measurement value			Limit			Antenna	Result
	PK (dB μ V/m)	QP (dB μ V/m)	AV (dB μ V/m)	PK (dB μ V/m)	QP (dB μ V/m)	AV (dB μ V/m)	(H/V)	(P/F)
*2405.000	78.30	---	---	114	---	94	H	P
7715.000	39.70	---	---	74	---	54	H	P
11511.660	40.85	---	---	74	---	54	H	P
13608.330	41.90	---	---	74	---	54	H	P
16555.000	46.23	---	---	74	---	54	H	P
*2405.000	68.01	---	---	114	---	94	V	P
7516.667	40.65	---	---	74	---	54	V	P
11511.660	40.65	---	---	74	---	54	V	P
13211.660	41.96	---	---	74	---	54	V	P

*: fundamental frequency

Test Results-(Measurement Distance: 3m)_Channel 32								
Frequency (MHz)	Measurement value			Limit			Antenna	Result
	PK (dB μ V/m)	QP (dB μ V/m)	AV (dB μ V/m)	PK (dB μ V/m)	QP (dB μ V/m)	AV (dB μ V/m)	(H/V)	(P/F)
*2439.000	73.64	---	---	114	---	94	H	P
5136.667	39.02	---	---	74	---	54	H	P
7970.000	40.73	---	---	74	---	54	H	P
11483.330	40.20	---	---	74	---	54	H	P
*2439.000	80.38	---	---	114	---	94	V	P
7431.667	40.39	---	---	74	---	54	V	P
11483.330	41.20	---	---	74	---	54	V	P
13580.000	41.66	---	---	74	---	54	V	P
16016.660	46.83	---	---	74	---	54	V	P

*: fundamental frequency

Test Results-(Measurement Distance: 3m)_Channel 64								
Frequency (MHz)	Measurement value			Limit			Antenna	Result
	PK (dB μ V/m)	QP (dB μ V/m)	AV (dB μ V/m)	PK (dB μ V/m)	QP (dB μ V/m)	AV (dB μ V/m)	(H/V)	(P/F)
*2476.000	67.97	---	---	114	---	94	H	P
7743.333	40.86	---	---	74	---	54	H	P
11426.660	41.03	---	---	74	---	54	H	P
13863.330	41.99	---	---	74	---	54	H	P
16583.330	45.96	---	---	74	---	54	H	P
17915.000	47.59	---	---	74	---	54	H	P
*2476.000	77.52	---	---	114	---	94	V	P
7743.333	40.34	---	---	74	---	54	V	P
9160.000	41.02	---	---	74	---	54	V	P
13835.000	41.91	---	---	74	---	54	V	P
16555.000	46.02	---	---	74	---	54	V	P
17886.660	47.21	---	---	74	---	54	V	P

*: fundamental frequency

Remark:

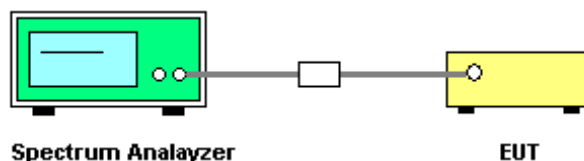
According to the emissions below 18GHz, the data curve is lower than the limit, and the data between 18GHz to 25GHz will be lower than the limit, so they are not recorded in the report.

10. BAND EDGE EMISSION MEASUREMENT

10.1 LIMITS

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.

10.2 BLOCK DIAGRAM OF TEST SETUP



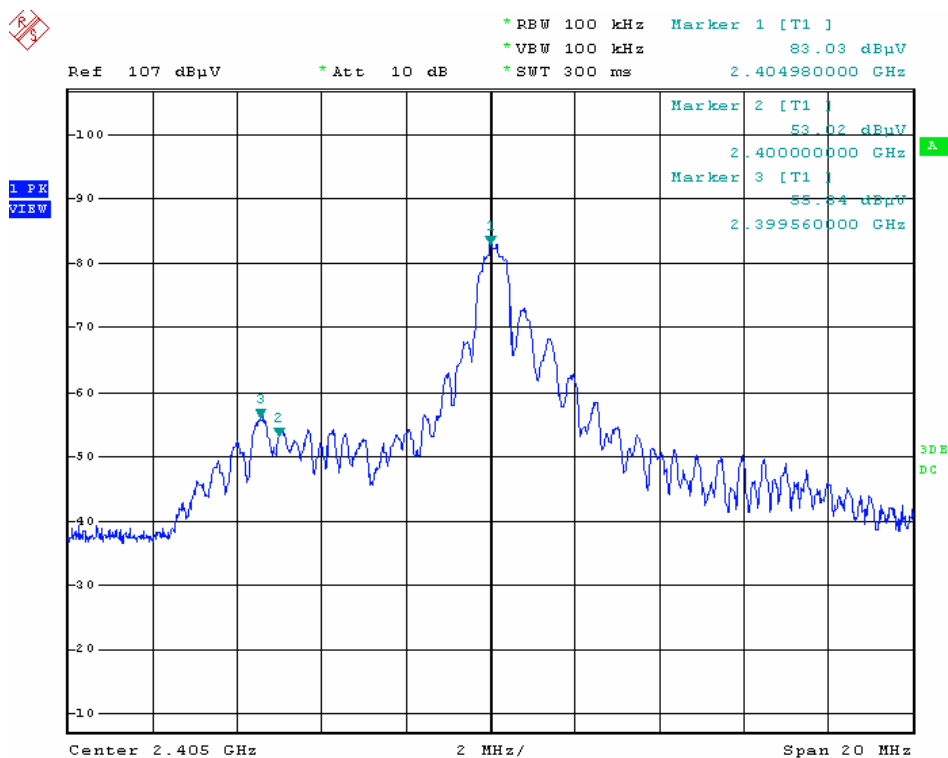
10.3 TEST PROCEDURE

1. The transmitter output (antenna port) was connected to the spectrum analyzer.
2. Set spectrum analyzer's RBW and VBW to applicable value with Peak in Max Hold.
3. Record the emission drops at the band-edge relative to the highest fundamental emission level.
4. Use the marker-delta method to determine band-edge compliance as required.

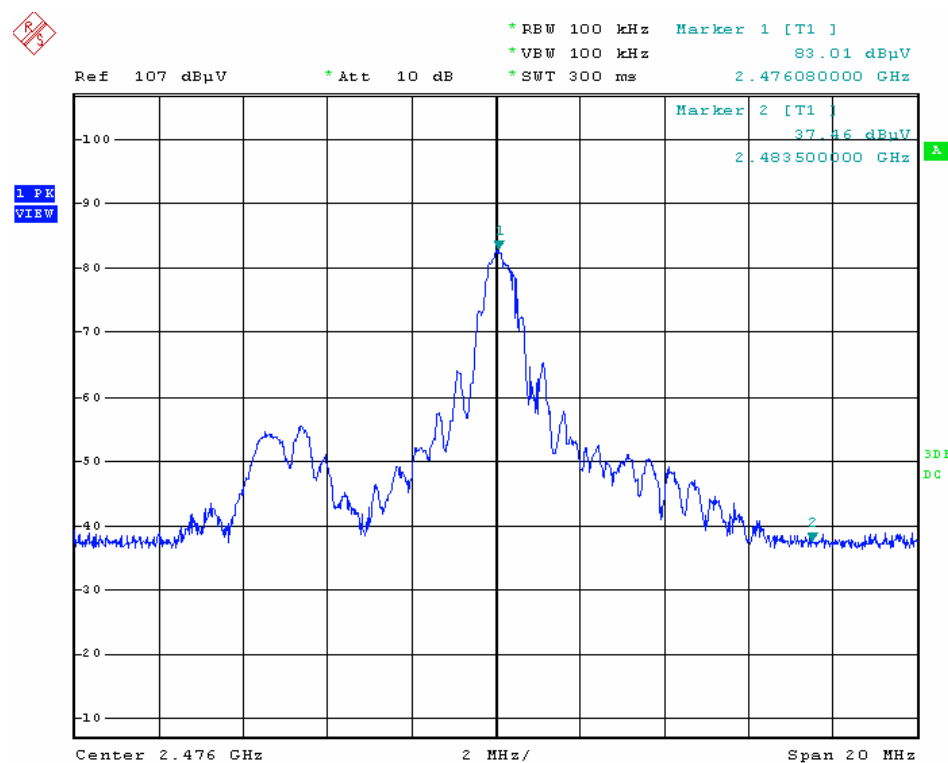
10.4 TEST RESULT

Worst case-- Modulation Type: GFSK

Channel Frequency (MHz)	Fundamental Emission (dBμV/m)	Delta (dB)	Final Emission (dBμV/m)	Limit (dBμV/m)		Result (Pass / Fail)
	PK		PK	PK	AV	
CH1_2405	78.30	---	---	---	---	---
2400.0	---	30.01	48.29	74	54	Pass
2399.6	---	27.19	51.11	74	54	Pass
CH64_2476	77.52	---	---	---	---	---
2483.5	---	55.55	21.97	74	54	Pass



CH1_2405MHz



CH64_2476MHz

APPENDIX 1 PHOTOGRAPHS OF TEST SETUP

TEST SETUP OF RADIATED EMISSION (Below 30MHz)



TEST SETUP OF RADIATED EMISSION (30MHz~1GHz)



TEST SETUP OF RADIATED EMISSION (Above 1GHz)



APPENDIX 2 PHOTOGRAPHS OF EUT



View of external EUT-1



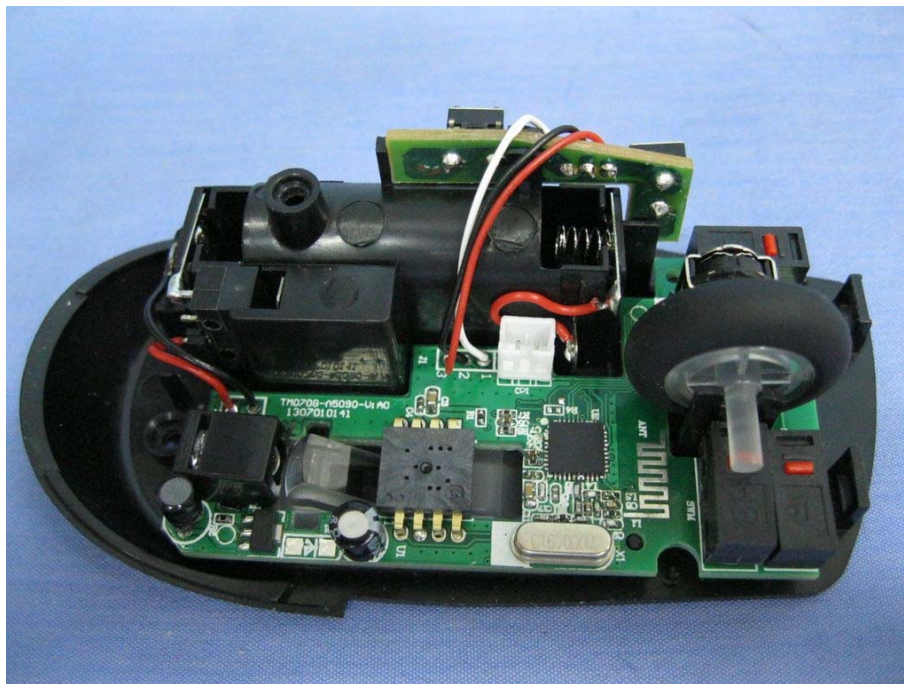
View of external EUT-2



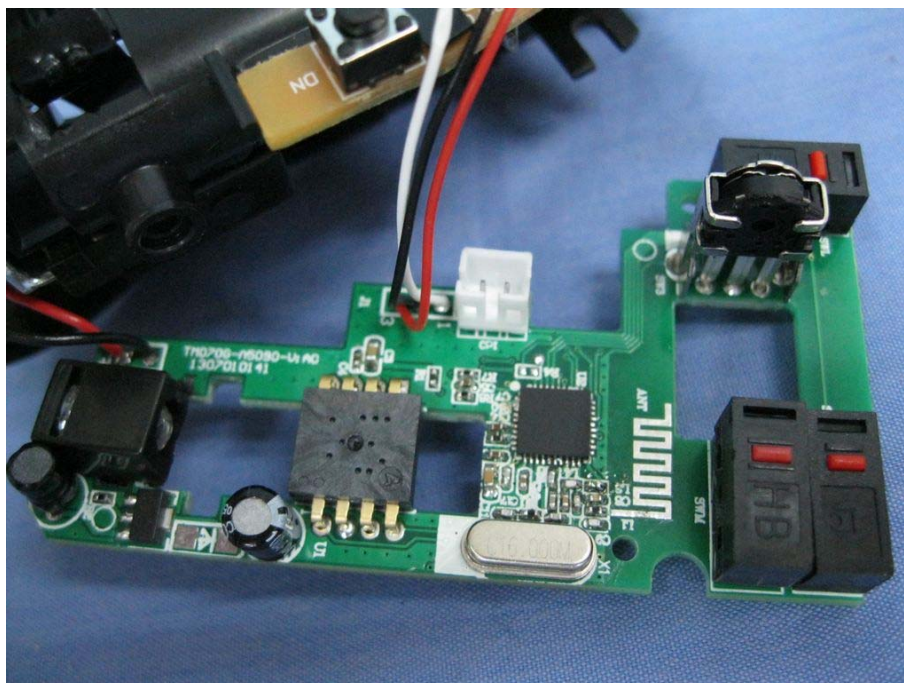
View of internal EUT-1



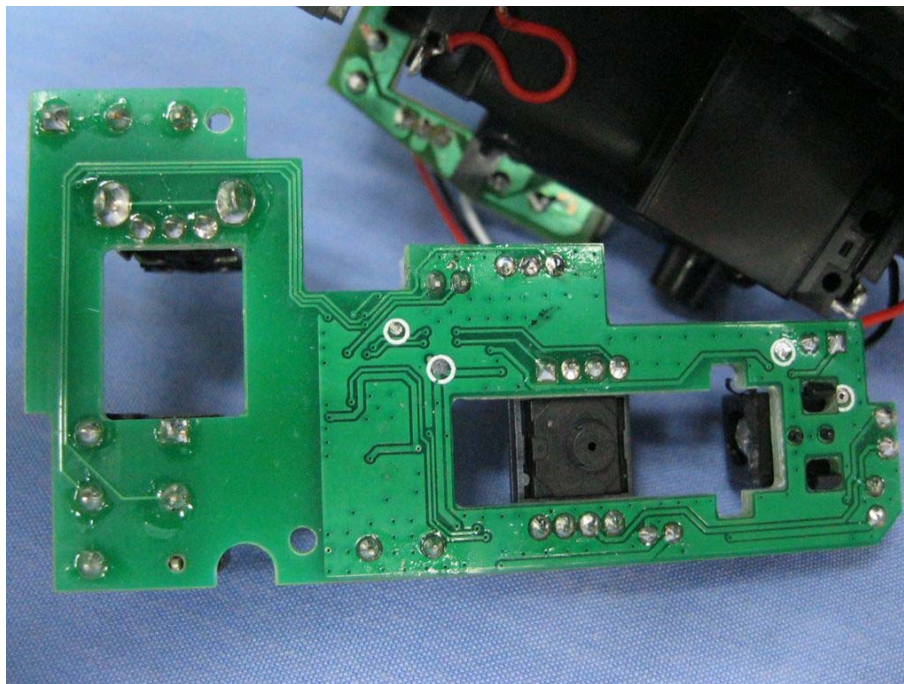
View of internal EUT-2



View of internal EUT-3



View of internal EUT-4



View of internal EUT-5

----- End of report -----