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Registration number: 556682

Report No.: SZEMO09070424001
Page: 1 of 19

TEST REPORT

Application No.: SZEMO090704240RF
Applicant: Shenzhen Fuyeda Industry Development Corp.
Manufacturer/ Factory: Shenzhen Fuyeda Industry Development Corp.
Address of Applicant: No.1 NEWMEN ROAD. TONGSHENG VILLAGE, DALANG STREET,
BAO'AN, SHENZHEN, CHINA
FCC ID: V4P-MS148OR-1
Fundamental Carrier 2.402GHz to 2.480GHz
Equipment Under Test (EUT):
 Name: MOUSE
 Model: MS-148OR
Standards: FCC PART 15: 2008
Date of Receipt: 24 July 2009
Date of Test: 24 July to 05 August 2009
Date of Issue: 06 August 2009

Test Result :	PASS *
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* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:

Robinson Lo
Manager

The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS International Electrical Approvals or testing done by SGS International Electrical Approvals in connection with, distribution or use of the product described in this report must be approved by SGS International Electrical Approvals in writing.

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government. All test results in this report can be traceable to National or International Standards.

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2 Test Summary

Test	Test Requirement	Standard Paragraph	Result
Flid Strength of Fundamental	FCC PART 15 : 2008	Section 15.249 (a)	PASS
Flid Strength of Harmonics or other Frequency Emission	FCC PART 15 : 2008	Section 15.249 (a) Section 15.209/15.205	PASS
Occupied Bandwidth	FCC PART 15 : 2008	Section 15.215/15.249	PASS

Remark:

This report was an additional report copied from the report SZEMO09070423801. It just changed the Model No.. The electrical circuit design, layout, components used and internal wiring for the Items "MS-148OR" in this report was exactly the same as the Items "MS-150OR" in the report SZEMO09070423801.



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4 General Information

4.1 General Description of E.U.T

Product Name:	MOUSE
Model:	MS-148OR
Operation Frequency	2402MHz to 2480MHz
Modulated Type	FHSS (Frequency Hopping Spread Spectrum)
Channel Number	125 Channels
Channel Spacing	0.629MHz
Power Supply:	DC 3.0V(2*1.5V"AAA"Size Batteries)
Power Cord:	N/A-

4.2 Description of Support Units

The EUT was tested with associated equipment below:

Description	Manufacturer	Model No.
PC	DELL	OPTIPLEX 755
LCD-displaying	DELL	E1909WF
KEYBOARD	DELL	SK-8115

4.3 Standards Applicable for Testing

The customer requested FCC tests for a 2.4G wireless mouse

The standard used was FCC PART 15, SUBPART C: 2008 section 15.249.

4.4 Test Location

All tests were performed at:

No. 1 Workshop, M-10, Middle Section, Science & Technology Park, District Shenzhen, China 518057

Telephone: +86 (0) 755 2601 2053 Fax: +86 (0) 755 2671 0594

No tests were sub-contracted.

4.5 Other Information Requested by the Customer

None.



4.6 Test Facility

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

- **CNAS (No. CNAS L2929)**
CNAS has accredited SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.
- **VCCI**
The 3m Semi-anechoic chamber and Shielded Room (7.5m x 4.0m x 3.0m) of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-2197 and C-2383 respectively.
Date of Registration: September 29, 2008. Valid until September 28, 2011.
- **FCC – Registration No.: 556682**
SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen 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 556682, June 27, 2008.
- **Industry Canada (IC)**
The 3m Semi-anechoic chamber of SGS-CSTC Standards Technical Services Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 4620C-1.

5 Test Results

5.1 Test Instruments

RE in Chamber						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (dd-mm-yy)	Cal.Due date (dd-mm-yy)
1	3m Semi-Anechoic Chamber	ETS-LINDGREN	N/A	SEL0017	16-06-2009	15-06-2010
2	EMI Test Receiver	Rohde & Schwarz	ESIB26	SEL0023	12-12-2008	11-12-2009
3	EMI Test software	AUDIX	E3	SEL0050	N/A	N/A
4	Coaxial cable	SGS	N/A	SEL0028	18-06-2009	17-06-2010
5	BiConiLog Antenna (26-3000MHz)	ETS-LINDGREN	3142C	SEL0014	12-08-2009	11-08-2010
6	Pre-amplifier (0.1-1300MHz)	Agilent Technologies	8447D	SEL0053	18-06-2009	17-06-2010
7	Double-ridged horn (1-18GHz)	ETS-LINDGREN	3117	SEL0005	12-08-2009	11-08-2010
8	Horn Antenna (18-26GHz)	ETS-LINDGREN	3160	SEL0076	12-08-2009	11-08-2010
9	Pre-amplifier (1-18GHz)	Rohde & Schwarz	AFS42-00101 800-25-S-42	SEL0081	18-06-2009	17-06-2010
10	Pre-amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	SEL0080	18-06-2009	17-06-2010
11	Band filter	Amindeon	82346	SEL0094	18-06-2009	17-06-2010
12	Active Loop Antenna	Beijing Daze	ZN30900A	SEL0097	15-06-2009	14-06-2010



5.2 E.U.T. Operation

Input voltage:	DC3.0V(2*1.5V"AAA"Size Batteries)
Operating Environment:	
Temperature:	24°C
Humidity:	50 % RH
Atmospheric Pressure:	1010 mbar
EUT Operation:	Test in transmitting with modulation. Lowest channel: channel 1=2402MHz, Middle channel: channel 63=2441MHz, Highest channel: channel 125=2480MHz.

The EUT is a mouse and was configured by using an external test program. This program allowed the unit to transmit /receive on one of 3 channels (Low: 2402MHz, Middle: 2441MHz, High: 2480MHz). The unit was also programmed to hop on 125 channels with its normal pseudorandom rate. Worst case emission levels are provided in the test results data.

5.3 Test Procedure & Measurement Data

5.3.1 Radiated Emissions

5.3.1.1 Test in transmitting mode

Test Requirement: FCC Part15.249,15.209 and 15.205

Test Method: ANSI C63.4: 2003

Measurement Distance: 3m (Semi-Anechoic Chamber)

Frequency range 30 MHz – 25GHz

Test instrumentation resolution bandwidth

Frequency Range	Detector	RBW/VBW
30MHz to 1000MHz	Quasi-Peak	120KHz/300KHz
1GHz to 25GHz	Peak	1MHz/3MHz for Peak
		1MHz/10Hz for Average

Operation: Receive antenna scan height 1 - 4 m, polarization Vertical/ Horizontal

Fundamental Frequency (MHz)	Field Strength of Fundamental (dBuV/m @ 3m)	Field Strength of Harmonics and Spurious Emissions (dBuV/m @ 3m)
902 to 928	94.0	54.0
2400 to 2483.5	94.0	54.0
5725 to 5875	94.0	54.0
24000 to 24250	108.0	68.0

The fundamental frequency of the EUT is 2.402GHz to 2.480GHz

The limit for average field strength for the fundamental frequency = 94.0 dB μ V/m.

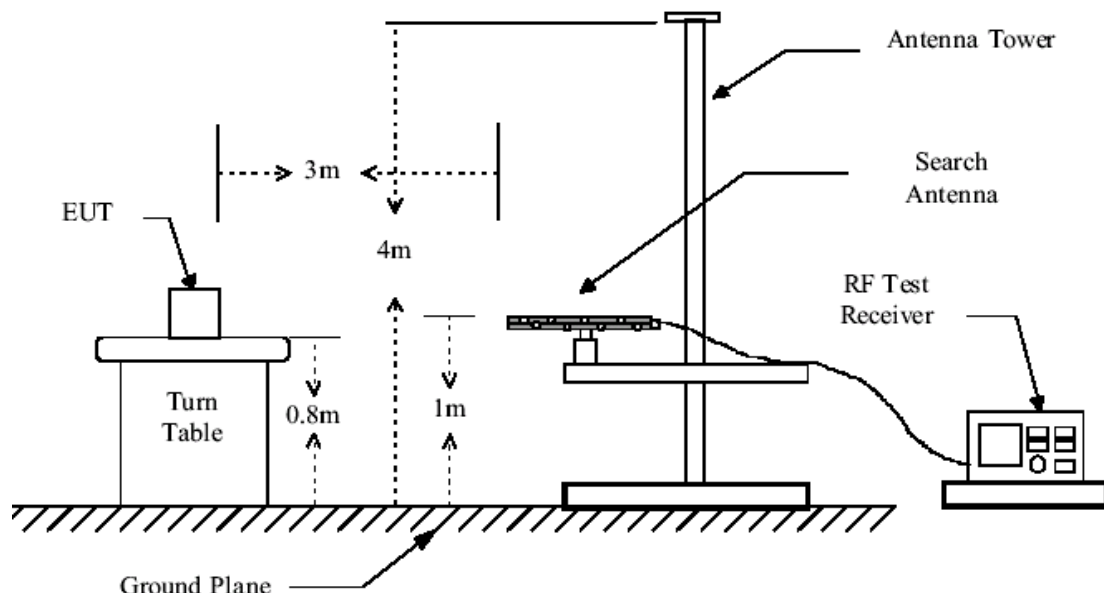
No fundamental is allowed in the restricted bands.

Test Procedure:

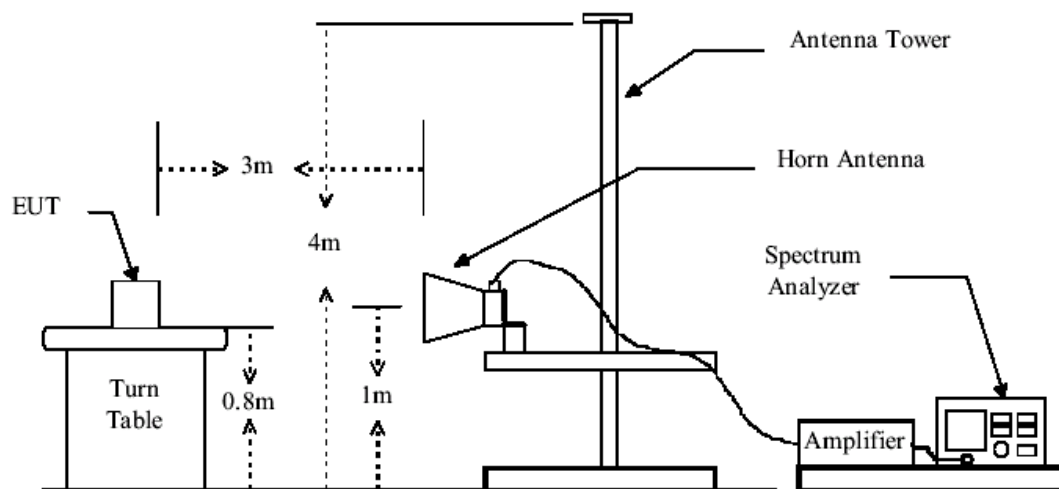
1. The EUT is placed on a turntable, which is 0.8m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.
- 7 The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case is shown in the report.

Test Configuration:

Below 1GHz



Above 1GHz





The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

Final Test Level = Receiver Reading + Antenna Factor + Cable Factor – Preamplifier Factor

The following test results were performed on the EUT:

1. The following test results were performed at 30MHz—1GHz

Vertical:

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Preamp Factor (dB)	Read Level (dBuV)	Quasi-peak Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)
32.910	0.60	13.91	28.16	37.36	23.71	40.00	-16.29
66.860	0.80	6.99	28.01	39.52	19.30	40.00	-20.70
126.030	1.27	7.77	27.63	36.10	17.51	43.50	-25.99
749.740	3.06	21.70	27.11	34.06	31.71	46.00	-14.29
797.270	3.19	22.09	26.95	37.75	36.08	46.00	-9.92
854.500	3.42	22.48	26.65	35.45	34.70	46.00	-11.30

Horizontal

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Preamp Factor (dB)	Read Level (dBuV)	Quasi-peak Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)
32.910	0.60	13.84	28.16	30.38	16.66	40.00	-23.34
126.030	1.27	7.77	27.63	34.37	15.78	43.50	-27.72
183.260	1.37	9.97	27.24	34.47	18.57	43.50	-24.93
210.420	1.46	10.73	27.10	34.92	20.01	43.50	-23.49
710.940	2.94	21.60	27.24	40.38	37.68	46.00	-8.32
749.740	3.06	21.70	27.11	38.56	36.21	46.00	-9.79



2. The following test results were performed at above 1GHz

For 2402MHz:

Harmonics & Spurious Emissions

Peak Measurement

Frequency (MHz)	Cable loss (dB)	Antenna factors (dB/m)	Preamplifier factor (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limit (dBμV/m)	Over limit	polarization
2402.10	4.97	32.25	0	55.31	92.53	114	-21.47	Vertical
2198.50	4.71	32.13	44.71	47.17	39.30	74.00	-34.70	Vertical
2386.50	4.97	32.24	44.75	47.14	39.60	74.00	-34.40	Vertical
2400.00	4.97	32.25	44.75	45.54	38.01	74.00	-35.99	Vertical
2562.80	5.10	32.46	44.80	46.71	39.47	74.00	-34.53	Vertical
3749.50	5.86	33.30	45.08	49.25	43.33	74.00	-30.67	Vertical
6099.50	7.24	35.45	45.66	48.48	45.51	74.00	-28.49	Vertical
2402.10	4.97	32.25	0	45.31	82.53	114	-31.47	Horizontal
2245.50	4.77	32.16	44.72	51.77	43.98	74.00	-30.02	Horizontal
2386.50	4.97	32.24	44.75	48.57	41.03	74.00	-32.97	Horizontal
2400.00	4.97	32.25	44.75	46.68	39.15	74.00	-34.85	Horizontal
2997.50	5.09	33.40	44.90	48.27	41.86	74.00	-32.14	Horizontal
3749.50	5.86	33.30	45.08	51.92	46.00	74.00	-28.00	Horizontal
6616.50	7.42	36.17	45.13	49.24	47.70	74.00	-26.30	Horizontal

Average Measurement

Frequency (MHz)	Cable loss (dB)	Antenna factors (dB/m)	Preamplifier factor (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limit (dBμV/m)	Over limit	polarization
2402.10	4.97	32.25	0	45.65	82.87	94	-11.13	Vertical
2257.35	4.80	32.16	44.72	37.32	29.56	54.00	-24.44	Vertical
2386.50	4.97	32.24	44.75	37.29	29.75	54.00	-24.25	Vertical
2400.00	4.97	32.25	44.75	37.28	29.75	54.00	-24.25	Vertical
2457.00	5.06	32.28	44.77	37.15	29.72	54.00	-24.28	Vertical
3679.00	5.80	33.28	45.07	37.16	31.17	54.00	-22.83	Vertical
6945.50	7.70	36.64	44.78	38.29	37.85	54.00	-16.15	Vertical
2402.10	4.97	32.25	0	40.26	77.48	94	-16.52	Horizontal
2257.25	4.80	32.16	44.72	38.45	30.69	54.00	-23.31	Horizontal
2398.25	4.97	32.25	44.75	38.04	30.51	54.00	-23.49	Horizontal
2400.00	4.97	32.25	44.75	37.99	30.46	54.00	-23.54	Horizontal
3256.00	5.38	33.29	44.96	37.04	30.75	54.00	-23.25	Horizontal
4830.50	6.62	34.03	45.40	37.74	32.99	54.00	-21.01	Horizontal
6957.25	7.70	36.64	44.78	38.19	37.75	54.00	-16.25	Horizontal

For 2441MHz:

. Harmonics & Spurious Emissions

Peak Measurement

Frequency (MHz)	Cable loss (dB)	Antenna factors (dB/m)	Preamplifier factor (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limit (dBμV/m)	Over limit	polarization
2441.00	5.03	32.27	0	56.66	93.96	114	-20.04	Vertical
2327.75	4.88	32.20	44.74	46.65	38.99	74.00	-35.01	Vertical
2468.75	5.06	32.28	44.77	45.89	38.46	74.00	-35.54	Vertical
2609.75	5.10	32.56	44.81	46.43	39.28	74.00	-34.72	Vertical
3491.00	5.65	33.20	45.02	46.39	40.22	74.00	-33.78	Vertical
4995.00	6.69	34.00	45.46	46.89	42.12	74.00	-31.88	Vertical
6452.00	7.33	35.92	45.29	46.73	44.69	74.00	-29.31	Vertical
2441.00	5.03	32.27	0	45.28	82.58	114	-31.42	Horizontal
2386.50	4.97	32.24	44.75	45.63	38.09	74.00	-35.91	Horizontal
2445.25	5.03	32.27	44.77	45.39	37.92	74.00	-36.08	Horizontal
2750.75	5.10	32.88	44.84	47.41	40.55	74.00	-33.45	Horizontal
3749.50	5.86	33.30	45.08	50.40	44.48	74.00	-29.52	Horizontal
5183.00	6.80	34.25	45.51	46.52	42.06	74.00	-31.94	Horizontal
6522.50	7.35	36.03	45.22	47.35	45.51	74.00	-28.49	Horizontal

Average Measurement

Frequency (MHz)	Cable loss (dB)	Antenna factors (dB/m)	Preamplifier factor (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limit (dBμV/m)	Over limit	polarization
2441.00	5.03	32.27	0	46.08	83.38	94	-10.62	Vertical
2292.50	4.84	32.18	44.73	33.00	25.29	54.00	-28.71	Vertical
2410.00	4.99	32.25	44.76	32.96	25.44	54.00	-28.56	Vertical
3126.75	5.23	33.35	44.93	32.72	26.37	54.00	-27.63	Vertical
5465.00	6.98	34.66	45.60	33.85	29.89	54.00	-24.11	Vertical
7180.50	7.65	36.36	44.53	32.79	32.27	54.00	-21.73	Vertical
9272.00	8.30	36.62	42.51	31.40	33.81	54.00	-20.19	Vertical
2441.00	5.03	32.27	0	43.55	80.85	94	-13.15	Horizontal
2280.75	4.82	32.18	44.73	39.34	31.61	54.00	-22.39	Horizontal
2527.50	5.10	32.37	44.79	38.47	31.15	54.00	-22.85	Horizontal
3162.00	5.26	33.33	44.94	37.90	31.55	54.00	-22.45	Horizontal
4290.00	6.31	33.82	45.24	38.33	33.22	54.00	-20.78	Horizontal
6099.50	7.24	35.45	45.66	39.17	36.20	54.00	-17.80	Horizontal
7180.50	7.65	36.36	44.53	37.83	37.31	54.00	-16.69	Horizontal



For 2480MHz:

Harmonics & Spurious Emissions

Peak Measurement

Frequency (MHz)	Cable loss (dB)	Antenna factors (dB/m)	Preamplifier factor (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limit (dBμV/m)	Over limit	polarization
2480.00	5.08	32.29	0	63.58	100.95	114	-13.05	Vertical
2280.75	4.82	32.18	44.73	45.13	37.40	74.00	-36.60	Vertical
2483.50	5.08	32.29	44.77	44.97	37.57	74.00	-36.43	Vertical
2492.25	5.10	32.30	44.78	45.71	38.33	74.00	-35.67	Vertical
3749.50	5.86	33.30	45.08	49.93	44.01	74.00	-29.99	Vertical
4689.50	6.56	34.06	45.36	46.98	42.24	74.00	-31.76	Vertical
6111.25	7.25	35.45	45.65	47.68	44.73	74.00	-29.27	Vertical
2480.00	5.08	32.29	0	50.14	87.51	114	-26.49	Horizontal
2292.50	4.84	32.18	44.73	45.05	37.34	74.00	-36.66	Horizontal
2483.50	5.08	32.29	44.77	46.99	39.59	74.00	-34.41	Horizontal
2504.00	5.10	32.32	44.78	45.11	37.75	74.00	-36.25	Horizontal
2786.00	5.09	32.95	44.85	44.92	38.11	74.00	-35.89	Horizontal
3749.50	5.86	33.30	45.08	49.56	43.64	74.00	-30.36	Horizontal
6123.00	7.25	35.47	45.65	47.23	44.30	74.00	-29.70	Horizontal



Average Measurement

Frequency (MHz)	Cable loss (dB)	Antenna factors (dB/m)	Preamp factor (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limit (dBμV/m)	Over limit	polarization
2480.00	5.08	32.29	0	53.28	90.65	94	-3.35	Vertical
2292.50	4.84	32.18	44.73	37.05	29.34	54.00	-24.66	Vertical
2483.50	5.08	32.29	44.77	36.75	29.35	54.00	-24.65	Vertical
2492.25	5.10	32.30	44.78	36.73	29.35	54.00	-24.65	Vertical
3432.25	5.57	33.22	45.00	36.79	30.58	54.00	-23.42	Vertical
5465.00	6.98	34.66	45.60	37.69	33.73	54.00	-20.27	Vertical
7709.25	7.69	35.89	43.98	36.50	36.10	54.00	-17.90	Vertical
2480.00	5.08	32.29	0	45.28	82.65	94	-11.35	Horizontal
2280.75	4.82	32.18	44.73	36.96	29.23	54.00	-24.77	Horizontal
2483.50	5.08	32.29	44.77	36.66	29.26	54.00	-24.74	Horizontal
2492.25	5.10	32.30	44.78	36.64	29.26	54.00	-24.74	Horizontal
3608.50	5.73	33.25	45.05	36.84	30.77	54.00	-23.23	Horizontal
5159.50	6.79	34.23	45.51	37.65	33.16	54.00	-20.84	Horizontal
7709.25	7.69	35.89	43.98	36.48	36.08	54.00	-17.92	Horizontal



N/A: refer to remark 1).

Remark:

- 1). For this intentional radiator operates below 10 GHz, the spectrum shall be investigated to the tenth harmonic of the highest fundamental frequency. And above the fifth harmonic of this intentional radiator, the disturbance is very low. So the test result only displays to 4th harmonic.
- 2). According to 15.249 (e) As shown in Section 15.35(b), for frequencies above 1000 MHz, the above field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

TEST RESULTS: The unit does meet the FCC requirements.

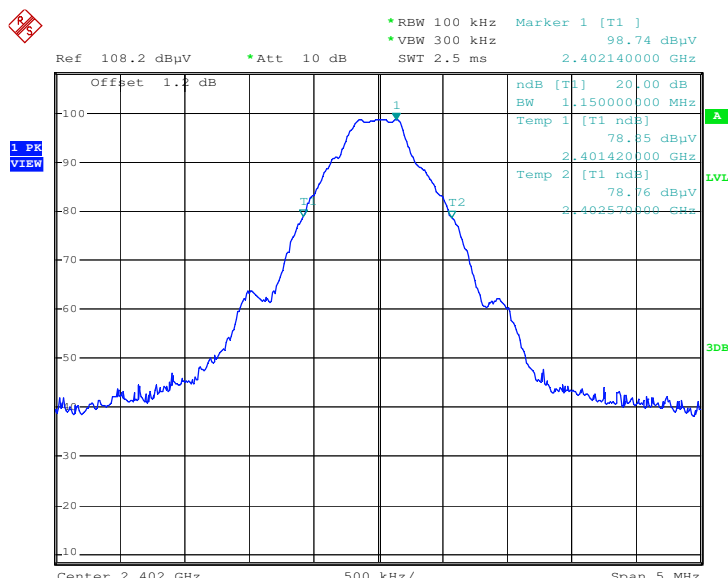
5.3.2 Occupy Bandwidth

Test Requirement: FCC Part 15.215 and part 15.249
Test Method: ANSI C63.4: 2003
Requirement: Operation within the band 2402 – 2480MHz
Results:

Channel	Frequency (MHz)	Occupy bandwidth(MHz)	Results
Lowest	2402	1.15	Pass
Middle	2441	1.17	Pass
Highest	2480	1.21	Pass

The occupied bandwidth as below:

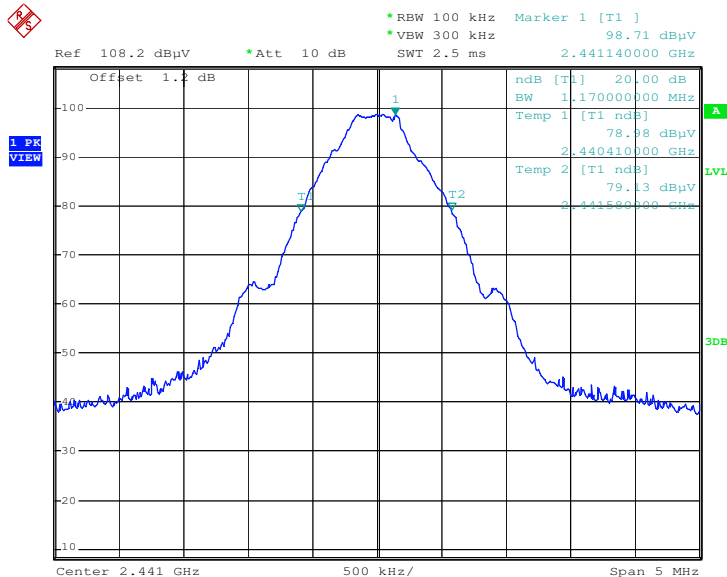
1. For 2402MHz:



Date: 31.JUL.2009 22:08:19

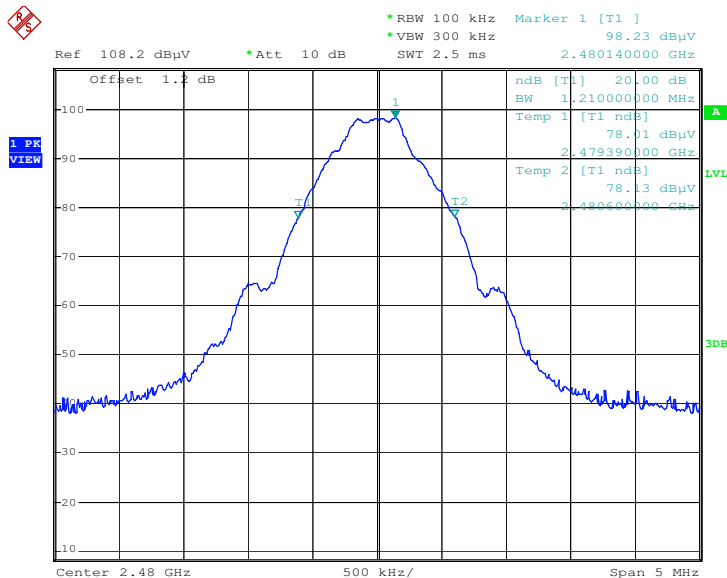


2. For 2441MHz:



Date: 31.JUL.2009 22:07:29

3. For 2480MHz:



Date: 31.JUL.2009 22:09:30

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