

FCC TEST REPORT

REPORT NO.: RF940221A02

MODEL NO.: CP239216

RECEIVED: Feb. 21, 2005

TESTED: Feb. 23 ~ March 1, 2005

ISSUED: March 7, 2005

APPLICANT: NMB Technologies Corporation

ADDRESS: 9730 Independence Avenue Chatsworth,
CA91311

ISSUED BY: Advance Data Technology Corporation

LAB LOCATION: No. 47, 14th Ling, Chia Pau Tsuen, Lin Kou
Hsiang 244, Taipei Hsien, Taiwan, R.O.C.

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No. 2177-01



0528
ILAC MRA

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1 CERTIFICATION

PRODUCT : 2.4GHz Mouse
BRAND NAME : Minebea
MODEL NO. : CP239216
APPLICANT : NMB Technologies Corporation
TESTED : Feb. 23 ~ March 1, 2005
TEST SAMPLE : ENGINEERING SAMPLE
STANDARDS : FCC Part 15, Subpart C (Section 15.247)
ANSI C63.4-2003

The above equipment has been tested by **Advance Data Technology Corporation**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

PREPARED BY : Annie Chang, **DATE:** March 7, 2005
(Annie Chang)

TECHNICAL ACCEPTANCE : Jun Wu, **DATE:** March 7, 2005
Responsible for EMI (Jun Wu)

APPROVED BY : Cody Chang, **DATE:** March 7, 2005
(Cody Chang, Deputy Manager)

2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC Part 15, Subpart C			
Standard Section	Test Type and Limit	Result	REMARK
15.207	AC Power Conducted Emission	N/A	DC power from batteries
15.247(a)(2)	Spectrum Bandwidth of a Direct Sequence Spread Spectrum System Limit : min. 500kHz	PASS	Meet the requirement of limit.
15.247(b)	Maximum Peak Output Power Limit: max. 30dBm	PASS	Meet the requirement of limit.
15.247(d)	Transmitter Radiated Emissions Limit: Table 15.209	PASS	Meet the requirement of limit. Minimum passing margin is -4.27dB at 648.16MHz
15.247(e)	Power Spectral Density Limit: max. 8dBm	PASS	Meet the requirement of limit.
15.247(d)	Band Edge Measurement Limit: 20 dB less than the peak value of fundamental frequency	PASS	Meet the requirement of limit.

2.1 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4:

Measurement	Uncertainty
Radiated emissions	3.86 dB

3 GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	2.4GHz Mouse
MODEL NO.	CP239216
POWER SUPPLY	3Vdc from batteries
MODULATION TYPE	GFSK
FREQUENCY RANGE	2402MHz ~ 2479MHz
NUMBER OF CHANNEL	78
MAXIMUM OUTPUT POWER	0.733mW
ANTENNA TYPE	Wiggle antenna with 2dBi gain
DATA CABLE	NA
I/O PORTS	NA
ASSOCIATED DEVICES	NA

NOTE:

1. The EUT is a transceiver of a wireless Mouse.
2. The above EUT information was declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.

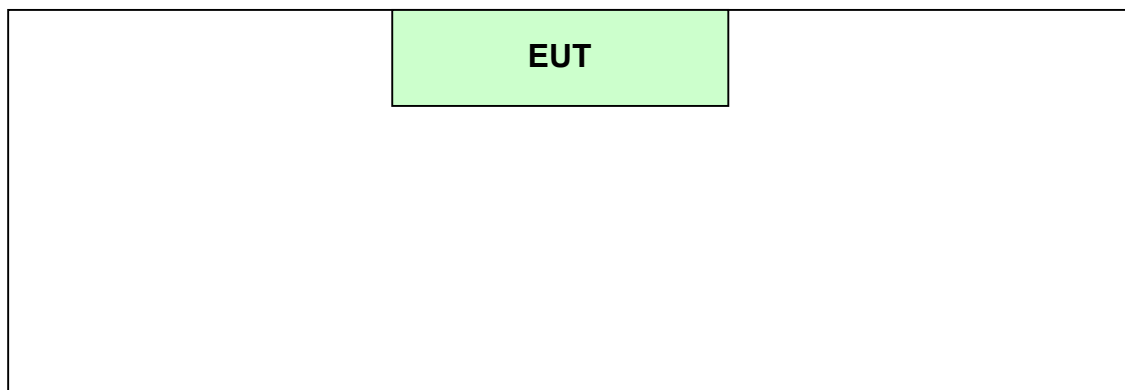
3.2 DESCRIPTION OF TEST MODES

Operated in frequency range 2400 ~ 2483.5MHz:

Seventy-eight channels are provided to this EUT.

Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)
0	2402	20	2422	40	2442	60	2462
1	2403	21	2423	41	2443	61	2463
2	2404	22	2424	42	2444	62	2464
3	2405	23	2425	43	2445	63	2465
4	2406	24	2426	44	2446	64	2466
5	2407	25	2427	45	2447	65	2467
6	2408	26	2428	46	2448	66	2468
7	2409	27	2429	47	2449	67	2469
8	2410	28	2430	48	2450	68	2470
9	2411	29	2431	49	2451	69	2471
10	2412	30	2431	50	2452	70	2472
11	2413	31	2433	51	2453	71	2473
12	2414	32	2434	52	2454	72	2474
13	2415	33	2435	53	2455	73	2475
14	2416	34	2436	54	2456	74	2476
15	2417	35	2437	55	2457	75	2477
16	2418	36	2438	56	2458	76	2478
17	2419	37	2439	57	2459	77	2479
18	2420	38	2440	58	2460		
19	2421	39	2441	59	2461		

3.2.1 CONFIGURATION OF SYSTEM UNDER TEST



3.2.2 TEST MODE APPLICABILITY

EUT configure mode	Applicable to				Description
	PLC	RE<1G	RE≥1G	APCM	
-	-	X	X	X	EUT only (transmission mode)

Where PLC: Power Line Conducted Emission
RE≥1G: Radiated Emission above 1GHz

RE<1G RE: Radiated Emission below 1GHz
APCM: Antenna Port Conducted Measurement

Radiated Emission Test (Below 1 GHz):

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and packet types.
- ☒ Following channel(s) was (were) selected for the final test as listed below.

Available Channel	Tested Channel	Modulation Type
0 to 77	77	GFSK

Radiated Emission Test (Above 1 GHz):

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and packet types,.
- ☒ Following channel(s) was (were) selected for the final test as listed below.

Available Channel	Tested Channel	Modulation Type
0 to 77	0, 39, 77	GFSK

Bandedge Measurement:

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and packet types.
- ☒ Following channel(s) was (were) selected for the final test as listed below.

Available Channel	Tested Channel	Modulation Type
0 to 77	0, 77	GFSK

Antenna Port Conducted Measurement:

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and packet types.
- ☒ Following channel(s) was (were) selected for the final test as listed below.

Available Channel	Tested Channel	Modulation Type
0 to 77	0, 39, 77	GFSK

3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a 2.4GHz Mouse. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC Part 15, Subpart C. (15.247)
ANSI C63.4-2003

All test items have been performed and recorded as per the above standards.

NOTE: The EUT is also considered as a kind of computer peripheral, because the connection to computer is necessary for typical use. It has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (DoC). The test report has been issued separately.

3.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit

4 TEST TYPES AND RESULTS

4.1 CONDUCTED EMISSION MEASUREMENT

N/A

4.2 RADIATED EMISSION MEASUREMENT

4.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT

Emissions radiated outside of the specified bands, shall be according to the general radiated limits in 15.209 as following:

Frequencies (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
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

NOTE: The limit for radiated test was performed according to CISPR 22: 1997, which was specified in FCC PART 15B 15.109(g). Also the limits of ICES-003: 2004 and CISPR 22: 1997 are same.

4.2.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
* HP Preamplifier	8447D	2432A03504	Jun. 3, 2005
* HP Preamplifier	8449B	3008A01924	Sep. 19, 2005
* HP Preamplifier	8449B	3008A01638	Sep. 30, 2005
SCHWARZBECK Tunable Dipole Antenna	VHA 9103	NA	Oct. 29, 2005
SCHWARZBECK Tunable Dipole Antenna	UHA 9105	977	
* ROHDE & SCHWARZ TEST RECEIVER	ESI7	836697/012	Nov. 05, 2005
Schwarzbeck Antenna	VULB 9168	137	Feb. 27, 2006
Schwarzbeck Antenna	VHBA 9123	480	Feb. 18, 2006
* EMCO Horn Antenna	3115	6714	Oct. 28, 2005
* EMCO Horn Antenna	3115	9312-4192	Feb. 28, 2006
ADT. Turn Table	TT100	0306	NA
ADT. Tower	AT100	0306	NA
Software	ADT_Radiated_V 6	NA	NA
TIMES RF cable	LL142	CABLE-CH6-01	Dec. 19, 2005

- NOTE:** 1. The calibration interval of the above test instruments is 12 months. And the calibrations are traceable to NML/ROC and NIST/USA.
2. "*" = These equipment are used for the final measurement.
3. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
4. The test was performed in ADT Chamber No. 6.
5. The Industry Canada Reference No. IC 3789-6.

4.2.3 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was 10 dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10 dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

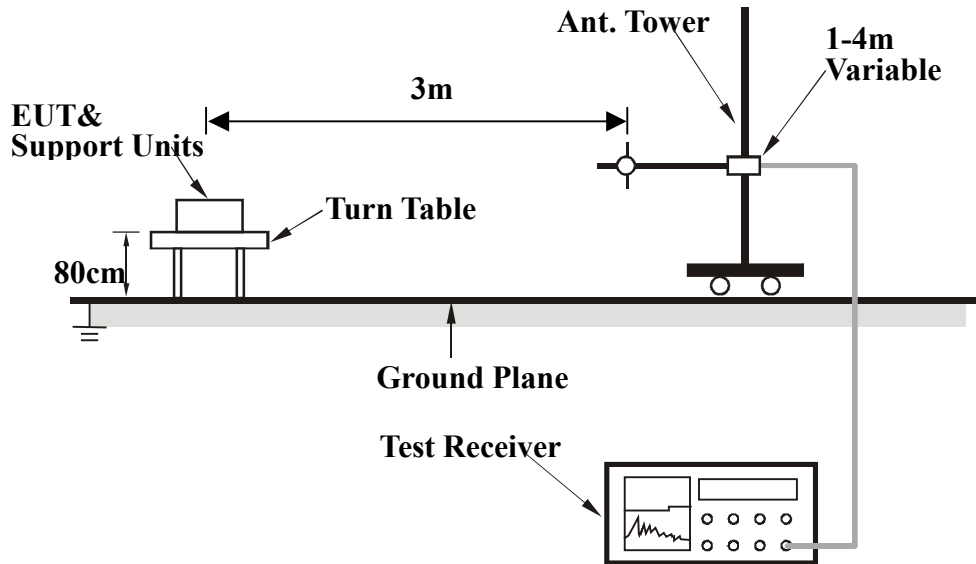
NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Peak detection (PK) and Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 MHz for Peak detection at frequency above 1GHz.

4.2.4 DEVIATION FROM TEST STANDARD

No deviation

4.2.5 TEST SETUP



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

4.2.6 EUT OPERATING CONDITIONS

Set the transmitter part of EUT under transmission condition continuously at specific channel frequency.

4.2.7 TEST RESULTS

Below 1GHz Worst-Case Data

EUT	2.4GHz Mouse	MODEL NO.	CP239216
CHANNEL	77	FREQUENCY RANGE	Below 1000 MHz
INPUT POWER	3Vdc from battery	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	20 deg. C, 80 % RH, 1001 hPa	TESTED BY	Jamison Chan

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	663.71	22.60 QP	46.00	-23.40	2.50 H	70	0.10	22.50
2	706.47	24.20 QP	46.00	-21.80	3.00 H	43	0.80	23.40
3	770.62	25.48 QP	46.00	-20.52	1.00 H	148	0.68	24.81
4	823.11	25.92 QP	46.00	-20.08	3.00 H	346	0.72	25.20
5	863.93	25.77 QP	46.00	-20.23	3.00 H	241	0.14	25.63
6	955.29	27.34 QP	46.00	-18.66	2.00 H	1	0.68	26.66

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	43.61	20.29 QP	40.00	-19.71	1.00 V	25	6.60	13.70
2	82.48	21.65 QP	40.00	-18.35	1.25 V	277	12.52	9.13
3	374.07	37.03 QP	46.00	-8.97	1.00 V	145	20.15	16.88
4	469.32	38.97 QP	46.00	-7.03	1.00 V	145	19.88	19.08
5	648.16	41.73 QP	46.00	-4.27	1.00 V	145	19.50	22.23
6	850.32	30.89 QP	46.00	-15.11	1.75 V	142	5.30	25.59

- REMARKS:**
1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
 2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
 3. The other emission levels were very low against the limit.
 4. Margin value = Emission level – Limit value.

1 ~ 25GHz Worst-Case Data

EUT	2.4GHz Mouse	MODEL NO.	CP239216
CHANNEL	0	FREQUENCY RANGE	1~25 GHz
INPUT POWER	3Vdc from battery	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	20 deg. C, 80 % RH, 1001 hPa	TESTED BY	Jamison Chan

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	19.73 PK	74.00	-54.27	1.65 H	89	-11.02	30.75
1	2390.00	18.55 AV	54.00	-35.45	1.65 H	89	-12.20	30.75
2	*2402.00	85.32 PK			1.65 H	89	54.52	30.80
2	*2402.00	70.14 AV			1.65 H	89	39.34	30.80
3	4804.00	47.51 PK	74.00	-26.49	1.12 H	303	11.28	36.23
3	4804.00	34.37 AV	54.00	-19.63	1.12 H	303	-1.86	36.23

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	20.74 PK	74.00	-53.26	1.00 V	316	-10.01	30.75
1	2390.00	19.01 AV	54.00	-34.99	1.00 V	316	-11.74	30.75
2	*2402.00	86.33 PK			1.00 V	316	55.53	30.80
2	*2402.00	71.15 AV			1.00 V	316	40.35	30.80
3	4804.00	47.18 PK	74.00	-26.82	1.00 V	320	10.95	36.23
3	4804.00	34.78 AV	54.00	-19.22	1.00 V	320	-1.45	36.23

- REMARKS:**
1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB)
 2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
 3. The other emission levels were very low against the limit.
 4. Margin value = Emission level – Limit value.
 5. “ * ” : Fundamental frequency.

EUT	2.4GHz Mouse	MODEL NO.	CP239216
CHANNEL	39	FREQUENCY RANGE	1~25 GHz
INPUT POWER	3Vdc from battery	DETECTOR FUNCTION	Peak(PK) Average (AV)
ENVIRONMENTAL CONDITIONS	20 deg. C, 80 % RH, 1001 hPa	TESTED BY	Jamison Chan

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2441.00	86.24 PK			1.61 H	88	55.27	30.97
1	*2441.00	71.06 AV			1.61 H	88	40.09	30.97
2	4882.00	46.40 PK	74.00	-27.60	1.71 H	120	10.05	36.35
2	4882.00	36.48 AV	54.00	-17.52	1.71 H	120	0.13	36.35

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2441.00	86.62 PK			1.00 V	42	55.65	30.97
1	*2441.00	71.44 AV			1.00 V	42	40.47	30.97
2	4882.00	47.22 PK	74.00	-26.78	1.02 V	322	10.86	36.35
2	4882.00	37.11 AV	54.00	-16.89	1.02 V	322	0.75	36.35

- REMARKS:**
1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB)
 2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
 3. The other emission levels were very low against the limit.
 4. Margin value = Emission level – Limit value.
 5. “ * ” : Fundamental frequency.

EUT	2.4GHz Mouse	MODEL NO.	CP239216
CHANNEL	77	FREQUENCY RANGE	1~25 GHz
INPUT POWER	3Vdc from battery	DETECTOR FUNCTION	Peak(PK) Average (AV)
ENVIRONMENTAL CONDITIONS	20 deg. C, 80 % RH, 1001 hPa	TESTED BY	Jamison Chan

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2479.00	82.77 PK			2.96 H	0	51.64	31.13
1	*2479.00	67.59 AV			2.96 H	0	36.46	31.13
2	2483.50	34.13 PK	74.00	-39.87	2.96 H	0	2.98	31.15
2	2483.50	32.47 AV	54.00	-21.53	2.96 H	0	1.32	31.15
3	4958.00	46.14 PK	74.00	-27.86	1.55 H	233	9.67	36.47
3	4958.00	36.00 AV	54.00	-18.00	1.55 H	233	-0.47	36.47

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2479.00	85.82 PK			1.00 V	43	54.69	31.13
1	*2479.00	70.64 AV			1.00 V	43	39.51	31.13
2	2483.50	37.18 PK	74.00	-36.82	1.00 V	43	6.03	31.15
2	2483.50	35.83 AV	54.00	-18.17	1.00 V	43	4.68	31.15
3	4958.00	46.73 PK	74.00	-27.27	1.00 V	55	10.26	36.47
3	4958.00	36.85 AV	54.00	-17.15	1.00 V	55	0.38	36.47

- REMARKS:**
1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB)
 2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
 3. The other emission levels were very low against the limit.
 4. Margin value = Emission level – Limit value.
 5. “ * “ : Fundamental frequency.

4.3 6dB BANDWIDTH MEASUREMENT

4.3.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

4.3.2 TEST INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
SPECTRUM ANALYZER	FSP 40	100036	Mar 18. 2005

NOTE: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

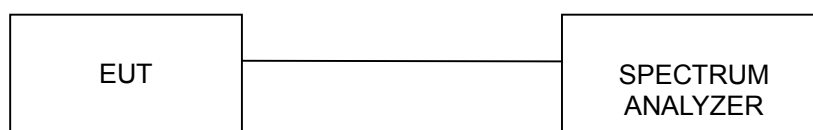
4.3.3 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 100 kHz RBW and 100kHz VBW. The 6dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6dB.

4.3.4 DEVIATION FROM TEST STANDARD

No deviation

4.3.5 TEST SETUP



For the actual test configuration, please refer to the related Item – Photographs of the Test Configuration.

4.3.6 EUT OPERATING CONDITIONS

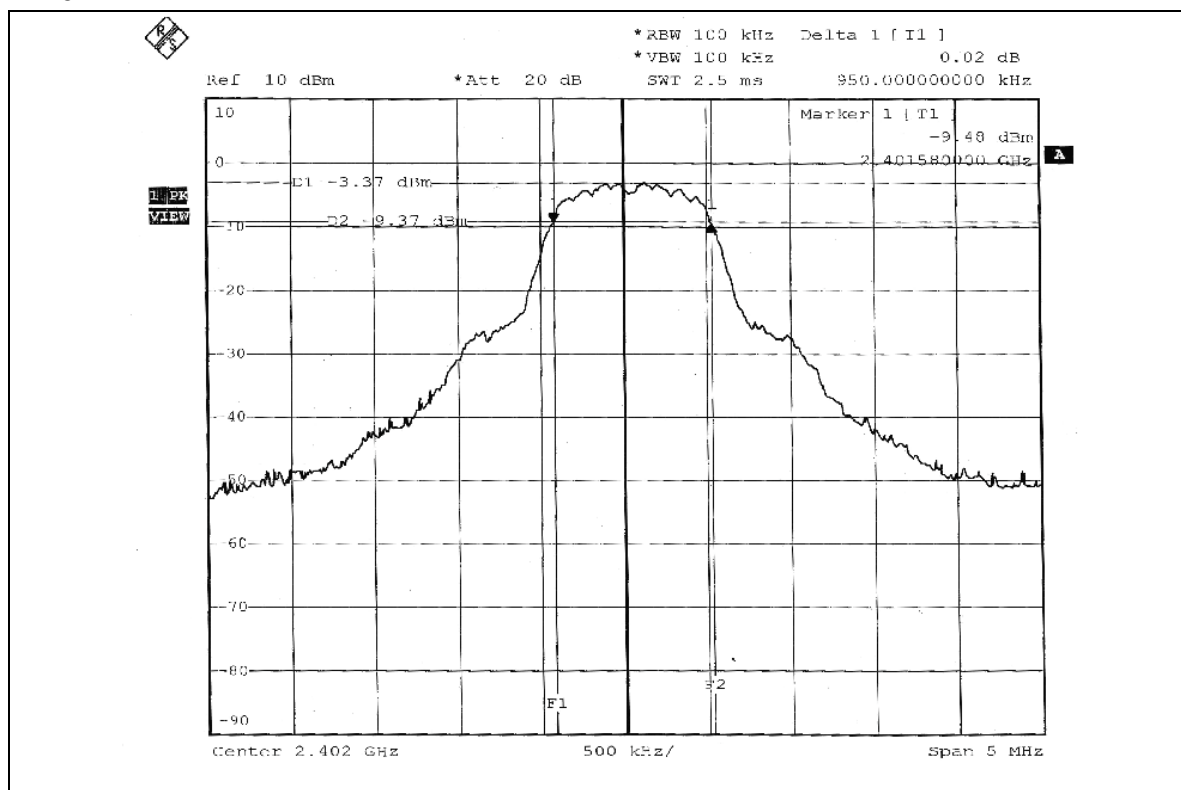
The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

4.3.7 TEST RESULTS

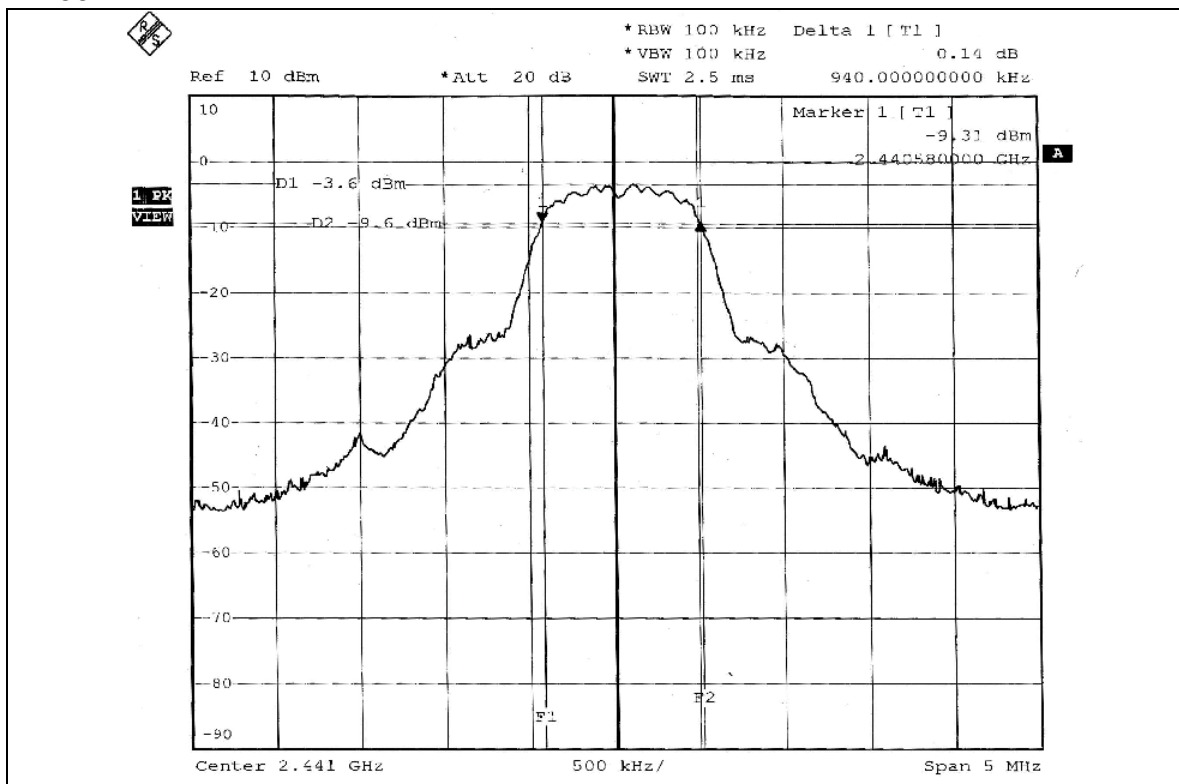
EUT	2.4GHz Mouse	MODEL NO.	CP239216
ENVIRONMENTAL CONDITIONS	20 deg. C, 80 % RH, 1001 hPa	INPUT POWER (SYSTEM)	120 Vac, 60 Hz
TESTED BY	Jamison Chan		

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS/FAIL
0	2402	0.95	0.5	PASS
39	2441	0.94	0.5	PASS
77	2479	0.94	0.5	PASS

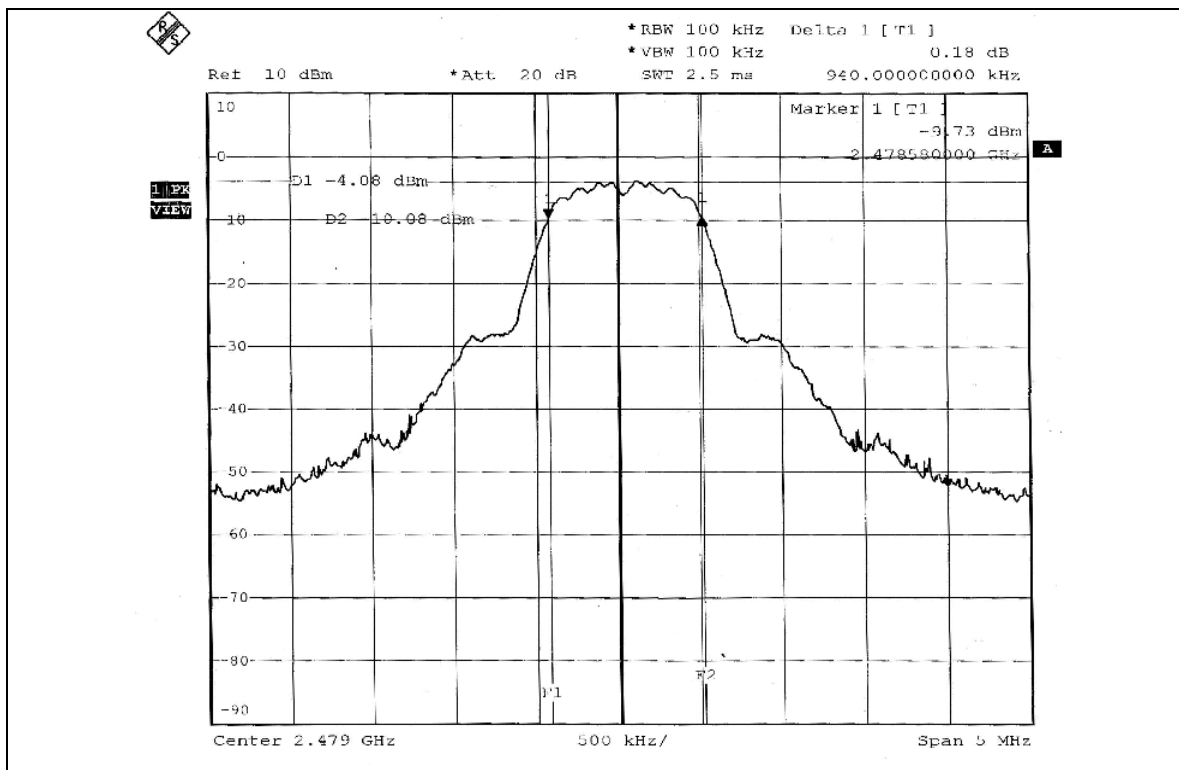
CH0



CH39



CH77



4.4 MAXIMUM PEAK OUTPUT POWER

4.4.1 LIMITS OF MAXIMUM PEAK OUTPUT POWER MEASUREMENT

The Maximum Peak Output Power Measurement is 30dBm.

4.4.2 TEST INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
SPECTRUM ANALYZER	FSP 40	100036	Mar 18. 2005

NOTE: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

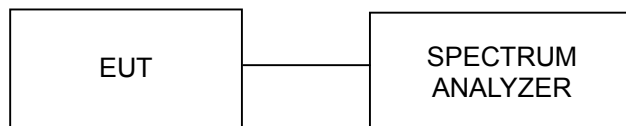
4.4.3 TEST PROCEDURES

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. The center frequency of the spectrum analyzer is set to the fundamental frequency and using 1 MHz RBW and 3 MHz VBW.
4. Measure the frequency difference of two frequencies that were attenuated 20dB from the reference level. Record the frequency difference as the emission bandwidth.
5. Repeat above procedures until all frequencies measured were complete.

4.4.4 DEVIATION FROM TEST STANDARD

No deviation

4.4.5 TEST SETUP



For the actual test configuration, please refer to the related Item – Photographs of the Test Configuration.

4.4.6 EUT OPERATING CONDITIONS

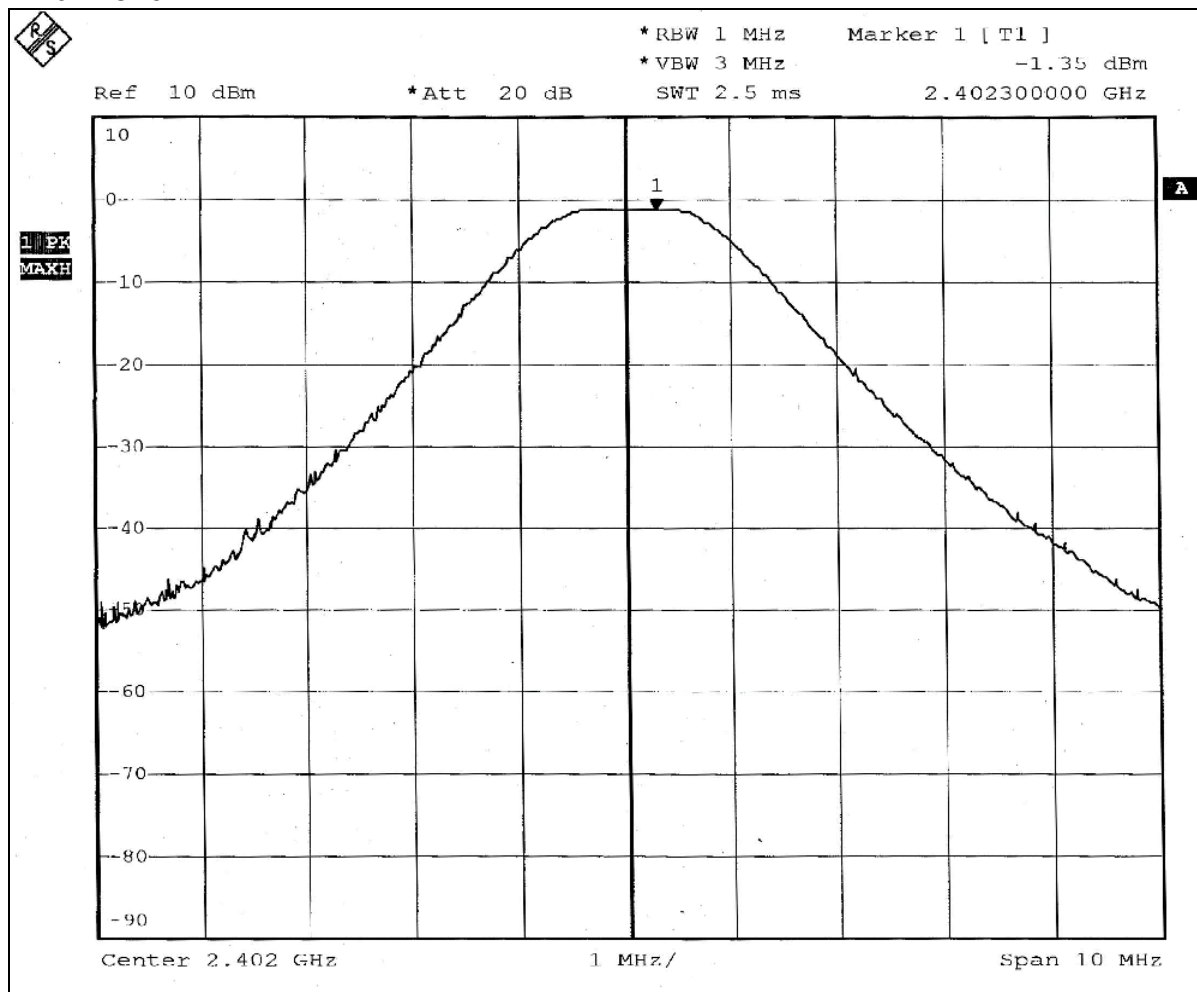
Same as Item 4.3.6

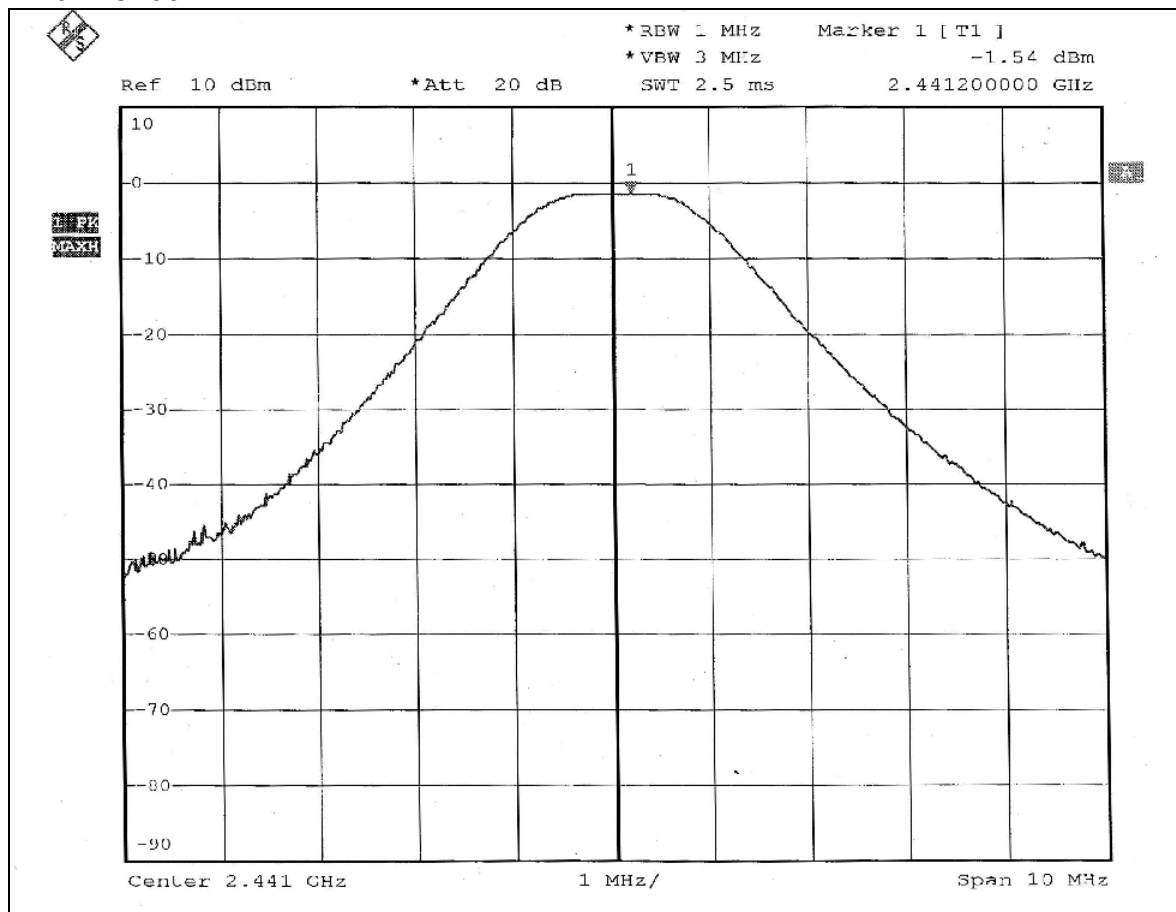
4.4.8 TEST RESULTS

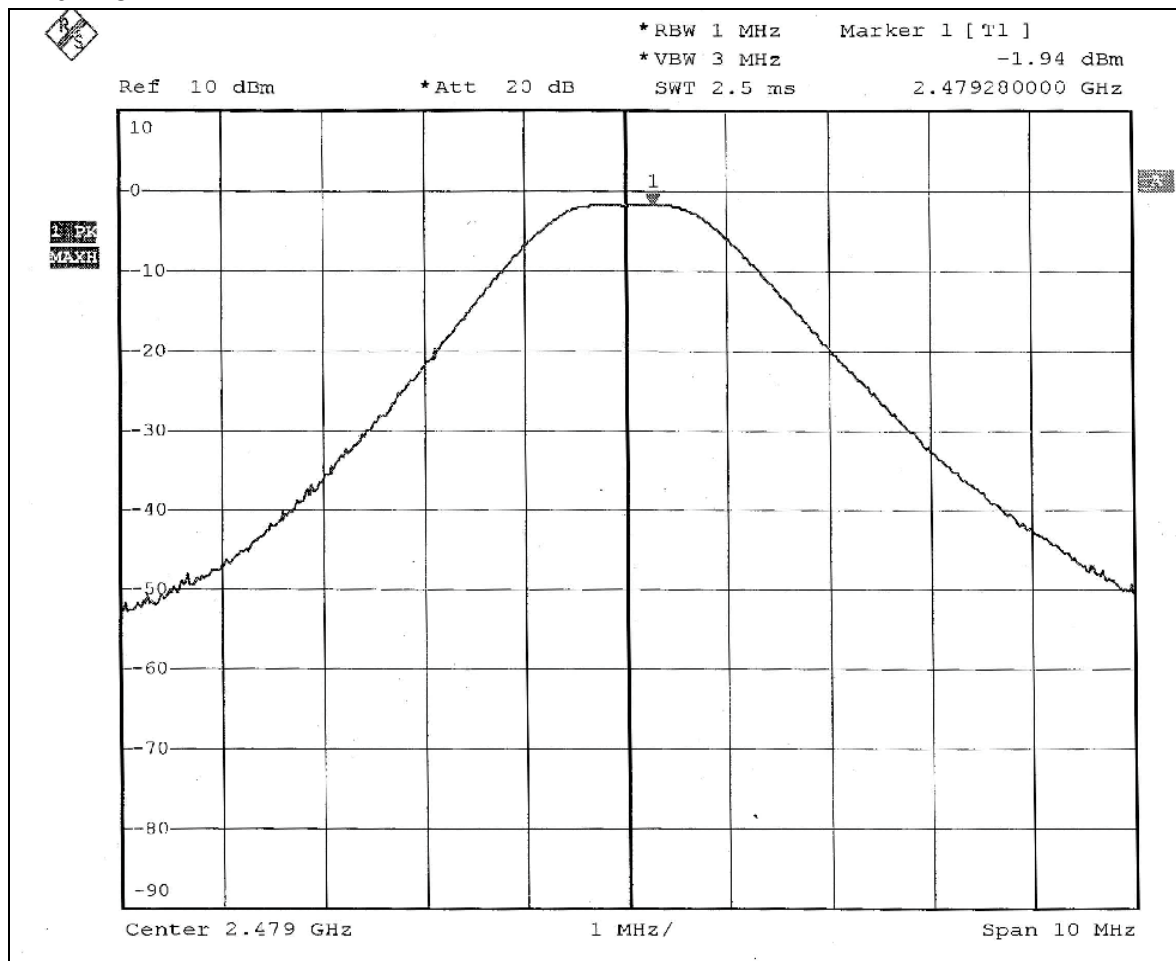
EUT	2.4GHz Mouse	MODEL NO.	CP239216
INPUT POWER (SYSTEM)	120 Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	20 deg. C, 80 % RH, 1001 hPa
TESTED BY	Jamison Chan		

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (dBm)	PASS/FAIL
0	2402	0.733	-1.35	30	PASS
39	2441	0.701	-1.54	30	PASS
77	2479	0.640	-1.94	30	PASS

Channel 0



Channel 39

Channel 77

4.5 POWER SPECTRAL DENSITY MEASUREMENT

4.5.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

The Maximum of Power Spectral Density Measurement is 8dBm.

4.5.2 TEST INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
SPECTRUM ANALYZER	FSP 40	100036	Mar 18. 2005

NOTE: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

4.5.3 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer through an attenuator, the bandwidth of the fundamental frequency was measured with the spectrum analyzer using 3kHz RBW and 30kHz VBW, set sweep time=span/3kHz.

The power spectral density was measured and recorded.

The sweep time is allowed to be longer than span/3kHz for a full response of the mixer in the spectrum analyzer.

4.5.4 DEVIATION FROM TEST STANDARD

No deviation

4.5.5 TEST SETUP



4.5.6 EUT OPERATING CONDITIONS

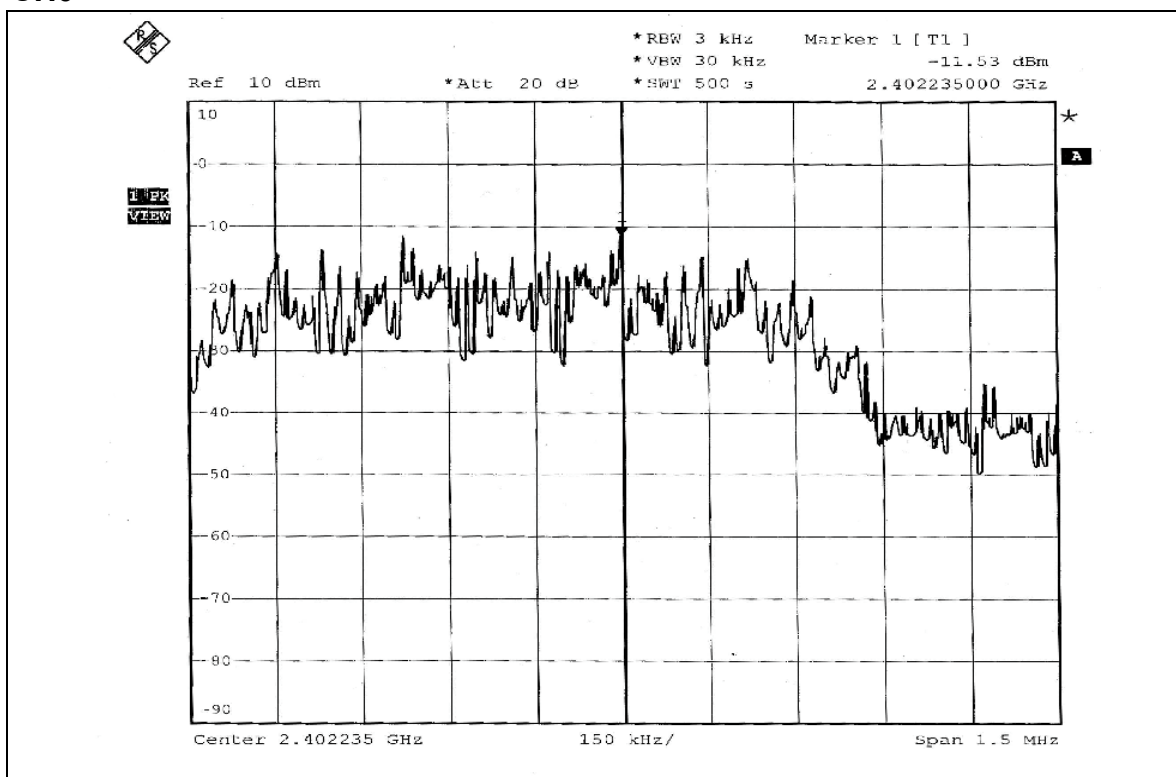
Same as 4.3.6

4.5.7 TEST RESULTS

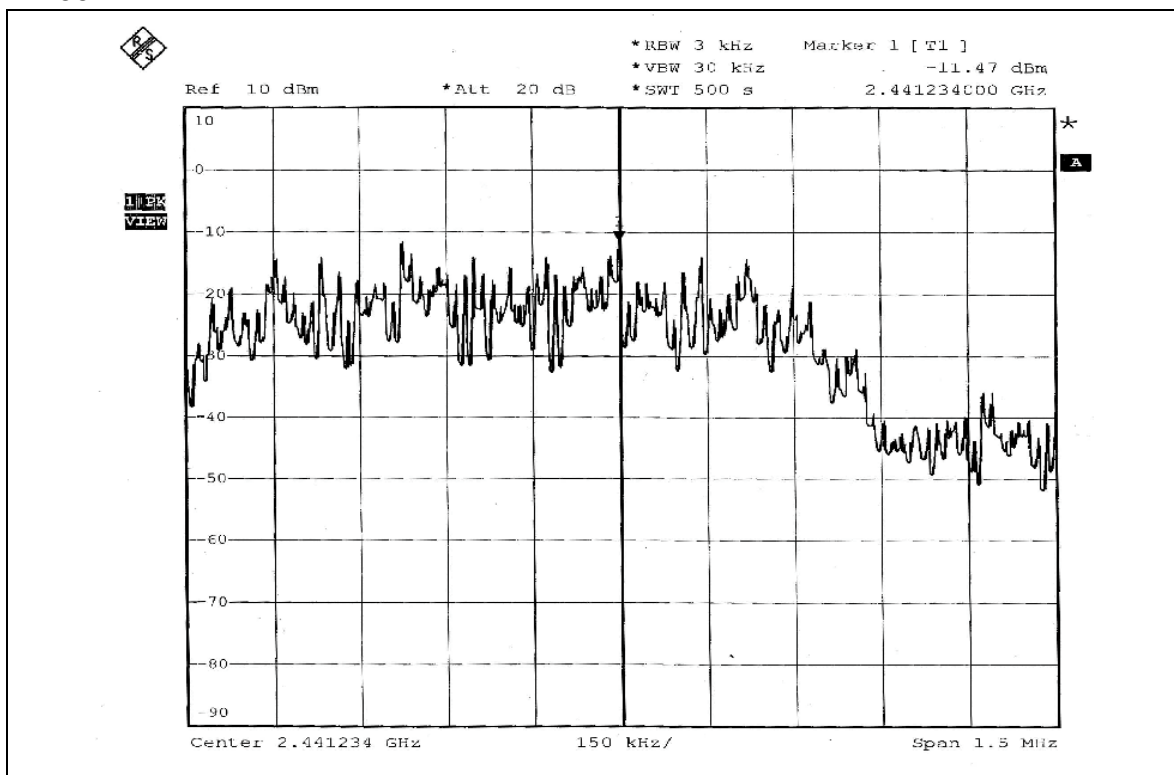
EUT	2.4GHz Mouse	MODEL NO.	CP239216
INPUT POWER (SYSTEM)	120 Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	20 deg. C, 80 % RH, 1001 hPa
TESTED BY	Jamison Chan		

CHANNEL NUMBER	CHANNEL FREQUENCY (MHz)	RF POWER LEVEL IN 3KHz BW (dBm)	MAXIMUM LIMIT (dBm)	PASS/FAIL
0	2402	-11.53	8	PASS
39	2441	-11.47	8	PASS
77	2479	-11.84	8	PASS

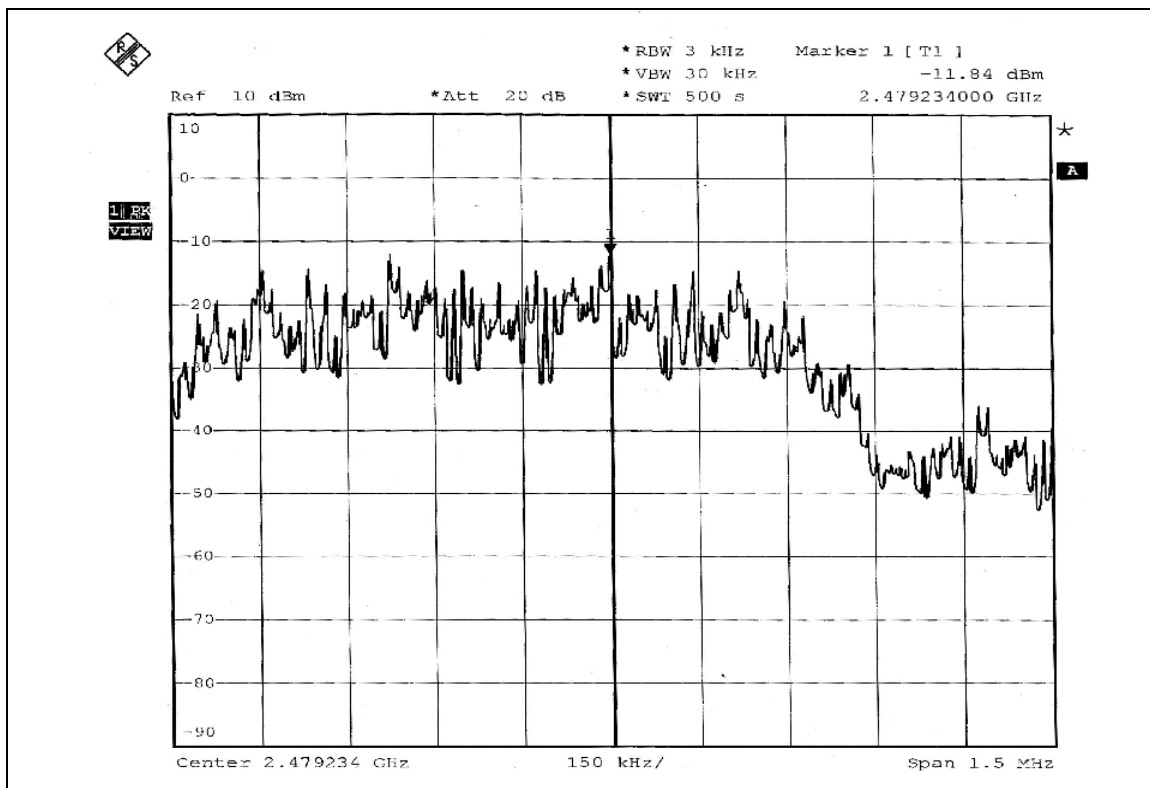
CH0



CH39



CH77



4.6 BAND EDGES MEASUREMENT

4.6.1 LIMITS OF BAND EDGES MEASUREMENT

Below -20dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

4.6.2 TEST INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
SPECTRUM ANALYZER	FSP 40	100036	Mar 18. 2005

NOTE: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

4.6.3 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer via a low lose cable. Set both RBW and VBW of spectrum analyzer to 100kHz and 100kHz with suitable frequency span including 100MHz bandwidth from band edge. The band edges was measured and recorded.

4.6.4 DEVIATION FROM TEST STANDARD

No deviation

4.6.5 EUT OPERATING CONDITION

Same as Item 4.3.6

4.6.6 TEST RESULTS

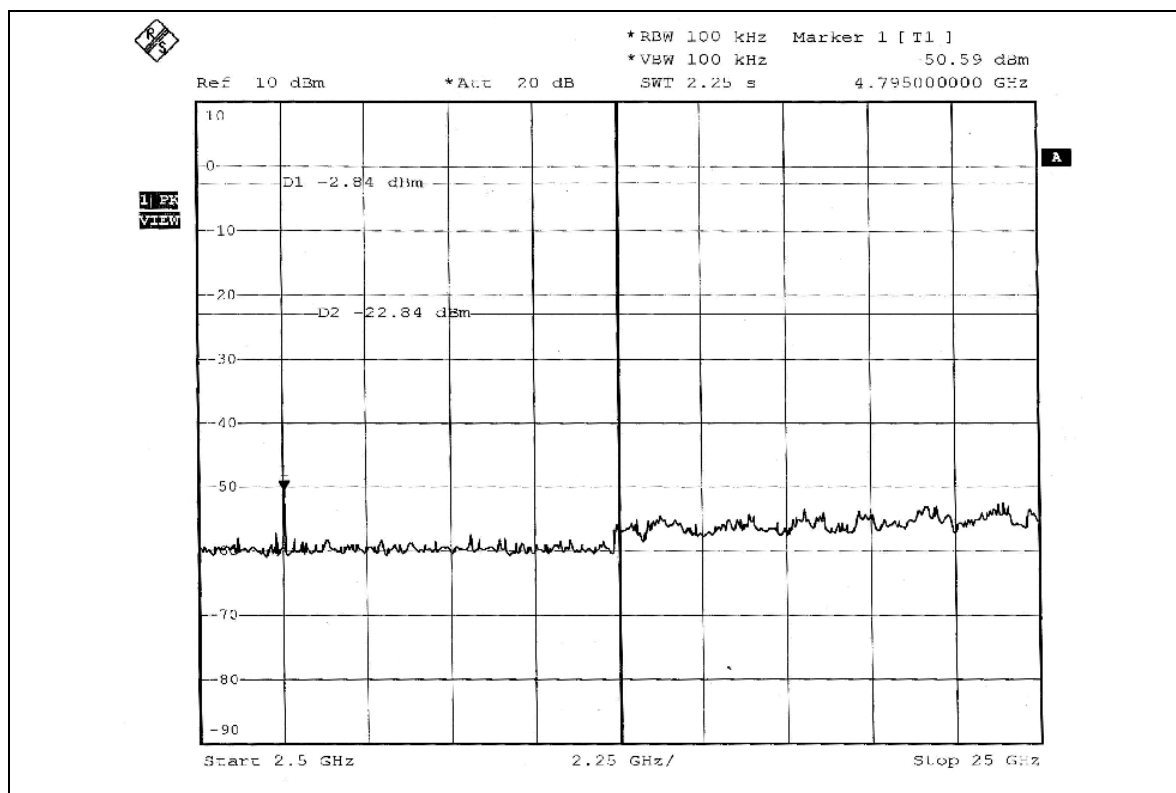
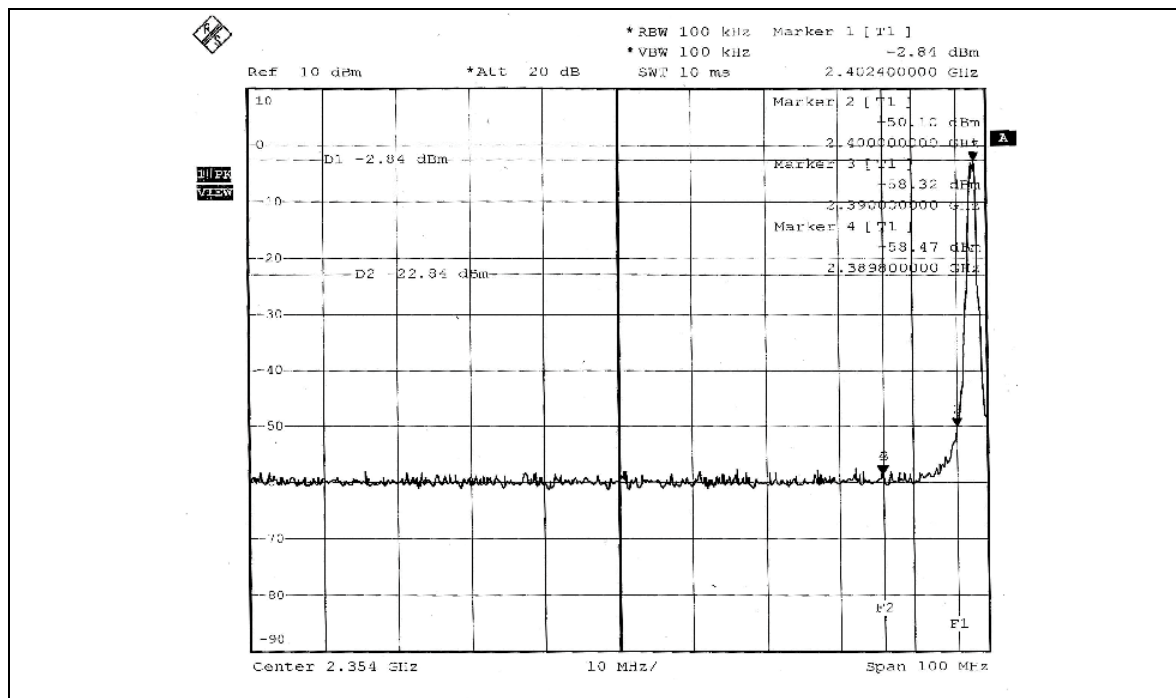
The spectrum plots are attached on the following 4 pages. D2 line indicates the highest level, D1 line indicates the 20dB offset below D2. It shows compliance with the requirement in part 15.247(d).

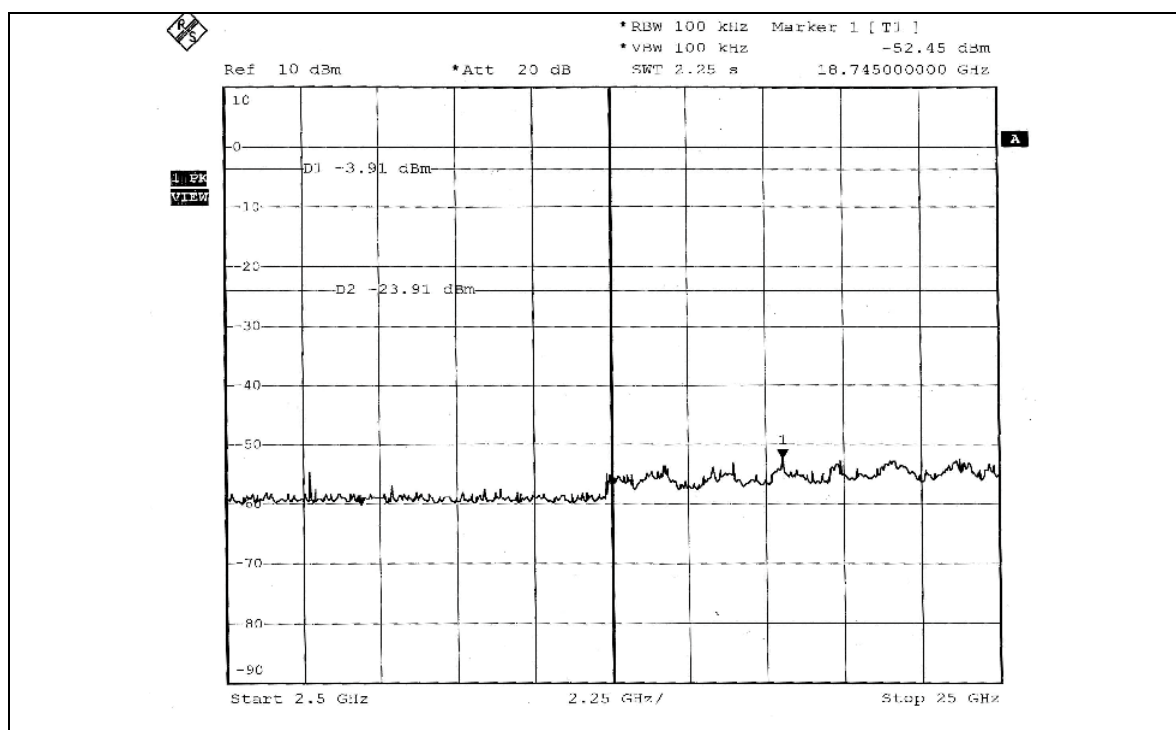
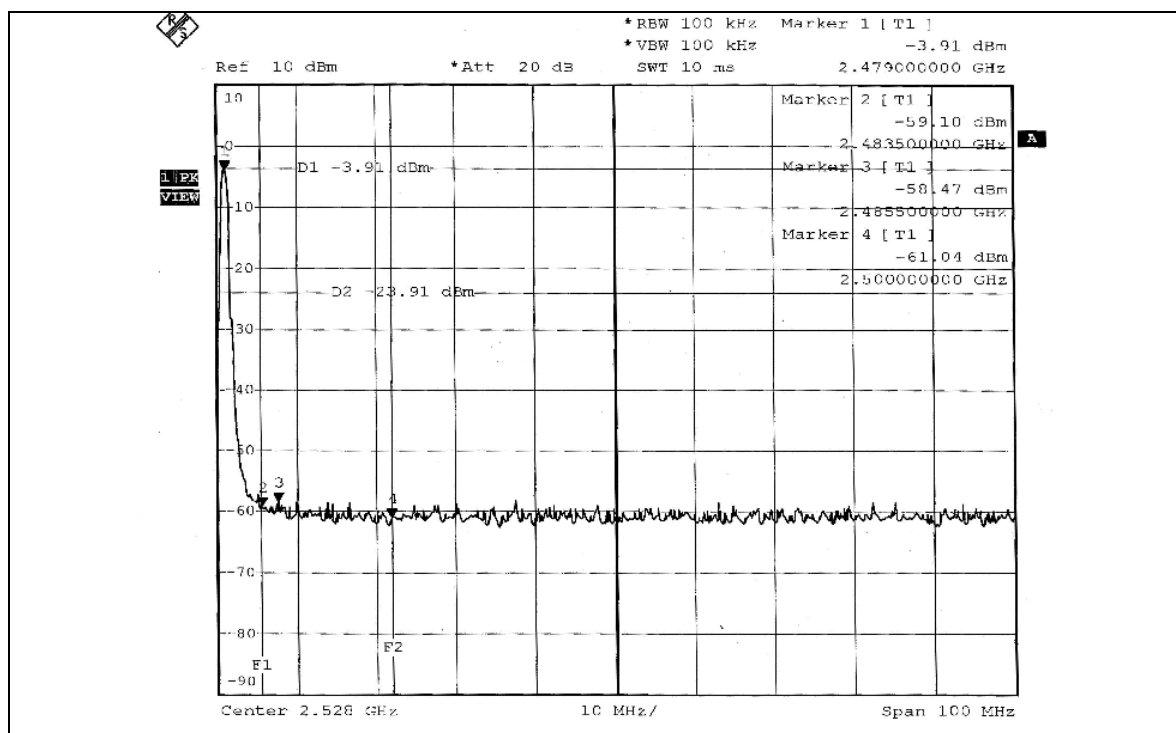
NOTE 1: The band edge emission plot on page 30 shows 55.48dBc between carrier maximum power and local maximum emission in restrict band (2.3900GHz). The emission of carrier strength list in the test result of channel 0 at the item 4.2.7 is 86.33dBuV/m (Peak), so the maximum field strength in restrict band is $86.33 - 55.48 = 30.85$ dBuV/m which is under 74dBuV/m limit.

The band edge emission plot on page 30 shows 55.48dBc between carrier maximum power and local maximum emission in restrict band (2.3900GHz). The emission of carrier strength list in the test result of channel 0 at the item 4.2.7 is 71.15dBuV/m (Average), so the maximum field strength in restrict band is $71.15 - 55.48 = 15.67$ dBuV/m which is under 54dBuV/m limit.

NOTE 2: The band edge emission plot on page 31 shows 54.56dBc between carrier maximum power and local maximum emission in restrict band (2.4855GHz). The emission of carrier strength list in the test result of channel 77 at the item 4.2.7 is 85.82dBuV/m (Peak), so the maximum field strength in restrict band is $85.82 - 54.56 = 31.26$ dBuV/m which is under 74dBuV/m limit.

The band edge emission plot on page 31 shows 54.56dBc between carrier maximum power and local maximum emission in restrict band (2.4855GHz). The emission of carrier strength list in the test result of channel 77 at the item 4.2.7 is 70.67dBuV/m (Average), so the maximum field strength in restrict band is $70.67 - 54.56 = 16.08$ dBuV/m which is under 54dBuV/m limit.







4.7 ANTENNA REQUIREMENT

4.7.1 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.

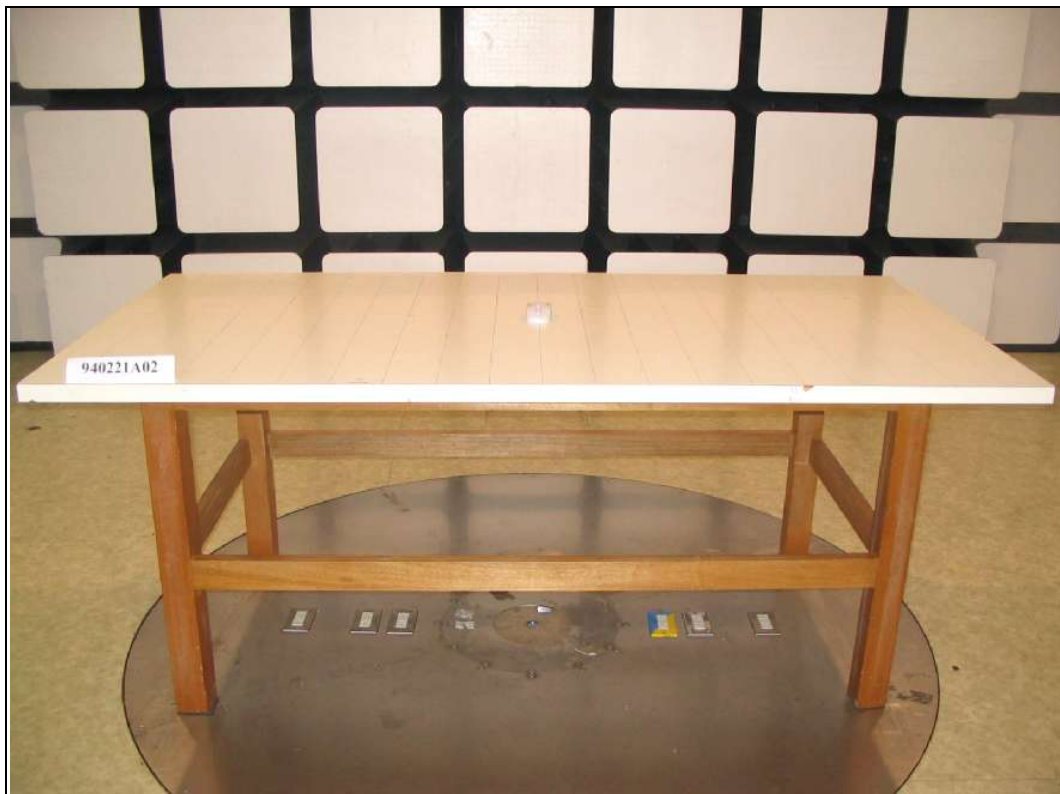
And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

4.7.2 ANTENNA CONNECTED CONSTRUCTION

The antenna used in this product is Wiggle antenna. And the maximum Gain of this antenna is 2dBi.

5 PHOTOGRAPHS OF THE TEST CONFIGURATION

RADIATED EMISSION TEST



6 INFORMATION ON THE TESTING LABORATORIES

We, ADT Corp., were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025:

USA	FCC, NVLAP, UL, A2LA
Germany	TUV Rheinland
Japan	VCCI
Norway	NEMKO
Canada	INDUSTRY CANADA , CSA
R.O.C.	CNLA, BSMI, DGT
Netherlands	Telefication
Singapore	PSB , GOST-ASIA(MOU)
Russia	CERTIS(MOU)

Copies of accreditation certificates of our laboratories obtained from approval agencies can be downloaded from our web site:

www.adt.com.tw/index.5/phtml. If you have any comments, please feel free to contact us at the following:

Linko EMC/RF Lab:

Tel: 886-2-26052180

Fax: 886-2-26052943

Hsin Chu EMC/RF Lab:

Tel: 886-3-5935343

Fax: 886-3-5935342

Hwa Ya EMC/RF/Safety/Telecom Lab:

Tel: 886-3-3183232

Fax: 886-3-3185050

Web Site: www.adt.com.tw

The address and road map of all our labs can be found in our web site also.