

FCC TEST REPORT

REPORT NO.: RF960927A02

MODEL NO.: 1142

RECEIVED: Sep. 27, 2007

TESTED: Sep. 27 ~ Oct. 9, 2007

ISSUED: Nov. 7, 2007

APPLICANT: MICROSOFT CORPORATION

ADDRESS: ONE MICROSOFT WAY REDMOND, WA
98052-6399, U.S.A

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.

This test report consists of 26 pages in total. It may be duplicated completely for legal use with the approval of the applicant. It should not be reproduced except in full, without the written approval of our laboratory. The client should not use it to claim product endorsement by TAF, A2LA or any government agencies. The test results in the report only apply to the tested sample.



Table of Contents

1.	CERTIFICATION	3
2.	SUMMARY OF TEST RESULTS	4
2.1	MEASUREMENT UNCERTAINTY	4
3.	GENERAL INFORMATION	5
3.1	GENERAL DESCRIPTION OF EUT	5
3.2	DESCRIPTION OF TEST MODES	6
3.2.1	CONFIGURATION OF SYSTEM UNDER TEST	6
3.2.2	TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL:	7
3.3	GENERAL DESCRIPTION OF APPLIED STANDARDS	8
3.4	DESCRIPTION OF SUPPORT UNITS	8
4.	TEST TYPES AND RESULTS	9
4.1	CONDUCTED EMISSION MEASUREMENT	9
4.2	RADIATED EMISSION MEASUREMENT	9
4.2.1	LIMITS OF RADIATED EMISSION MEASUREMENT	9
4.2.2	TEST INSTRUMENTS	10
4.2.3	TEST PROCEDURES	11
4.2.4	DEVIATION FROM TEST STANDARD	11
4.2.5	TEST SETUP	12
4.2.6	EUT OPERATING CONDITIONS	12
4.2.7	TEST RESULTS	13
4.3	FREQUENCY TOLERANCE MEASUREMENT	19
4.3.1	LIMITS OF FREQUENCY TOLERANCE MEASUREMENT	19
4.3.2	TEST INSTRUMENTS	19
4.3.3	TEST PROCEDURE	19
4.3.4	DEVIATION FROM TEST STANDARD	19
4.3.5	EUT OPERATING CONDITION	19
4.3.6	TEST RESULTS	20
4.4	BAND EDGES MEASUREMENT	21
4.4.1	LIMITS OF BAND EDGES MEASUREMENT	21
4.4.2	TEST INSTRUMENTS	21
4.4.3	TEST PROCEDURE	21
4.4.4	DEVIATION FROM TEST STANDARD	21
4.4.5	EUT OPERATING CONDITION	21
4.4.6	TEST RESULTS	21
5.	PHOTOGRAPHS OF THE TEST CONFIGURATION	24
6.	INFORMATION ON THE TESTING LABORATORIES	25
7	APPENDIX A – MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB	26

1. CERTIFICATION

PRODUCT: Microsoft® Wireless Laser Mouse 7000
BRAND NAME: Microsoft®
MODEL NO.: 1142
APPLICANT: MICROSOFT CORPORATION
TESTED: Sep. 27 ~ Oct. 9, 2007
TEST SAMPLE: ENGINEERING SAMPLE
STANDARDS: FCC Part 15, Subpart C (Section 15.249),
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:** Nov. 7, 2007
(Annie Chang / Senior Specialist)

TECHNICAL
ACCEPTANCE : Jamison Chan , **DATE:** Nov. 7, 2007
Responsible for RF (Jamison Chan / Senior Engineer)

APPROVED BY : Ken Liu , **DATE:** Nov. 7, 2007
(Ken Liu / Deputy Manager)

2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC Part 15, Subpart C (Section 15.249)			
STANDARD SECTION	TEST TYPE AND LIMIT	RESULT	REMARK
15.207	Conducted Emission Test	N/A	The EUT power from battery
15.209 15.249 15.249 (d)	Radiated Emission Test Band Edge Measurement Limit: 50dB less than the peak value of fundamental frequency or meet radiated emission limit in section 12.209	PASS	Minimum passing margin is -4.40dB at 2483.500MHz
15.249 (b)(2)	Frequency Tolerance Limit: $\pm 0.001\%$	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 16-4-2:

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

MEASUREMENT	FREQUENCY	UNCERTAINTY
Radiated emissions	30MHz ~ 1GHz	3.75 dB
	1GHz ~ 40GHz	2.89 dB

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

EUT	Microsoft® Wireless Laser Mouse 7000
MODEL NO.	1142
FCC ID	C3K1142
POWER SUPPLY	1.5Vdc from battery
MODULATION TYPE	GFSK
TRANSFER RATE	2Mbps
FREQUENCY RANGE	2402MHz ~2479MHz
NUMBER OF CHANNEL	78
ANTENNA TYPE	Strip antenna with -3.10dBi gain
DATA CABLE	N/A
I/O PORTS	N/A
ASSOCIATED DEVICES	N/A

NOTE:

1. The EUT is a Microsoft® Wireless Laser Mouse 7000, which is a transceiver.
2. The EUT has three samples, which are defined as their serial no. as follows:

Product	Model No.	Serial no.
Wireless Mouse	1142	T0720-EV1-FA231
		T0720-EV1-FA142
		T0720-EV1-FA132

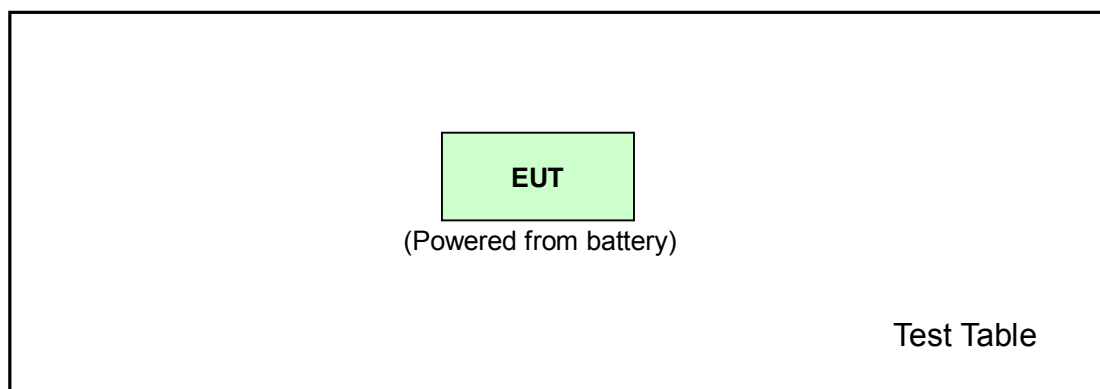
3. The above EUT information was declared by the manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.

3.2 DESCRIPTION OF TEST MODES

78 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	2432	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 AND TESTED CHANNEL DETAIL:

EUT configure mode	Applicable to				Description
	PLC	RE<1G	RE≥1G	APCM	
A	Note	√	-	-	Serial No.: T0720-EV1-FA231
B	Note	√	√	√	Serial No.: T0720-EV1-FA142
C	Note	√	-	-	Serial No.: T0720-EV1-FA132

Where PLC: Power Line Conducted Emission

RE<1G RE: Radiated Emission below 1GHz

RE≥1G: Radiated Emission above 1GHz

APCM: Antenna Port Conducted Measurement

Note: No need to concern of Conducted Emission due to the EUT is powered by batteries.

RADIATED EMISSION TEST (BELOW 1 GHz):

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE
A	0 to 77	77	GFSK
B	0 to 77	77	GFSK
C	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, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE
B	0 to 77	0, 38, 77	GFSK

FREQUENCY TOLERANCE:

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE
B	0 to 77	0, 38, 77	GFSK

BANDEDGE MEASUREMENT:

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE
B	0 to 77	0, 77	GFSK

3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

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

FCC Part 15, Subpart C. (15.249)

ANSI C63.4-2003

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

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:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

4.2.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
HP Preamplifier	8447D	2432A03504	May 09, 2008
HP Preamplifier	8449B	3008A01201	Oct. 08, 2008
HP Preamplifier	8449B	3008A01292	Aug. 05, 2008
ROHDE & SCHWARZ TEST RECEIVER	ESI7	836697/012	Oct. 24, 2007
Schwarzbeck Antenna	VULB 9168	137	Sep. 13, 2008
Schwarzbeck Antenna	VHBA 9123	480	Apr. 18, 2008
EMCO Horn Antenna	3115	6714	Oct. 24, 2007
EMCO Horn Antenna	3115	9312-4192	Apr. 19, 2008
ADT. Turn Table	TT100	0306	NA
ADT. Tower	AT100	0306	NA
Software	ADT_Radiated_V 7.6.15	NA	NA
SUHNER RF cable	SF104-26.5	CABLE-CH6-17m-01	Dec. 11, 2007
ROHDE & SCHWARZ Spectrum Analyzer	FSP 40	100036	Mar. 13, 2008

- 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. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
 3. The test was performed in ADT Chamber No. 6.
 4. 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. 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 lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions would be re-tested one by one using peak, quasi-peak method or average method as specified and then reported in data sheet.

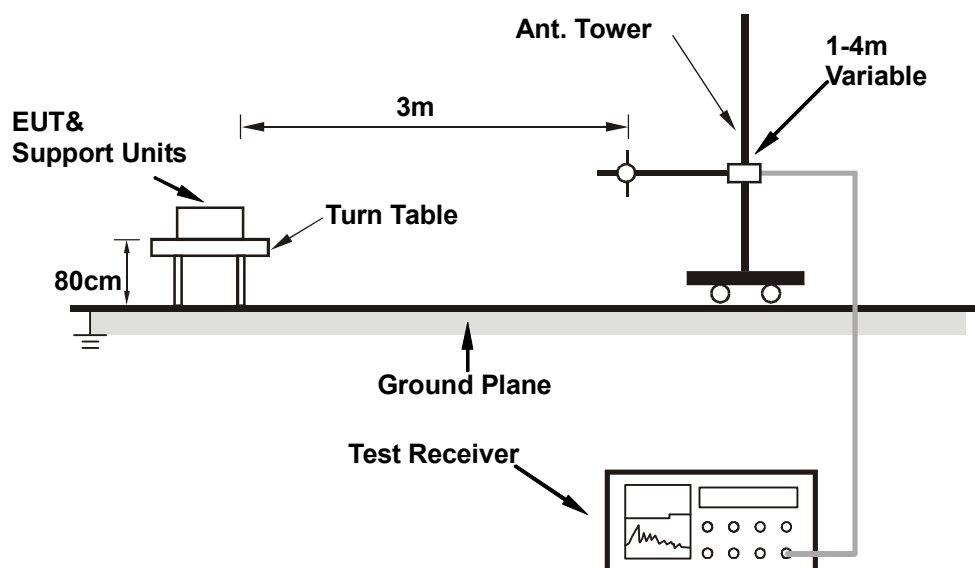
NOTE:

1. The resolution bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth is 1MHz and video bandwidth of test receiver/spectrum analyzer is 3MHz for Peak detection at frequency above 1GHz. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz for Average detection (AV) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 10 Hz for Average detection (AV) 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 EUT under transmission condition continuously at specific channel frequency.

4.2.7 TEST RESULTS

RADIATED WORST CASE DATA: BELOW 1GHz

TEST MODE	A		
MODULATION TYPE	GFSK	CHANNEL	77
INPUT POWER	1.5Vdc	FREQUENCY RANGE	Below 1000MHz
ENVIRONMENTAL CONDITIONS	24deg. C, 65%RH, 1000Pa	DETECTOR FUNCTION	Quasi-Peak
TESTED BY	Jun Wu		

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	33.888	28.17 QP	40.00	-11.83	1.42 H	226	14.02	14.15
2	123.307	24.50 QP	43.50	-19.00	1.39 H	4	11.22	13.28
3	747.295	29.99 QP	46.00	-16.01	1.23 H	160	2.88	27.11
4	774.509	32.87 QP	46.00	-13.13	1.20 H	163	5.18	27.69
5	801.723	29.81 QP	46.00	-16.19	1.16 H	157	1.56	28.25
6	865.872	27.14 QP	46.00	-18.86	1.10 H	10	-1.79	28.93
7	910.581	27.61 QP	46.00	-18.39	1.08 H	94	-1.68	29.29
8	959.178	27.89 QP	46.00	-18.11	1.03 H	193	-1.86	29.75

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	31.944	22.74 QP	40.00	-17.26	1.00 V	148	9.65	13.09
2	103.868	26.29 QP	43.50	-17.21	1.00 V	79	14.30	11.99
3	774.509	29.36 QP	46.00	-16.64	1.02 V	241	1.67	27.69
4	801.723	27.97 QP	46.00	-18.03	1.15 V	1	-0.28	28.25
5	875.591	27.80 QP	46.00	-18.20	1.19 V	238	-1.21	29.01
6	893.086	27.47 QP	46.00	-18.53	1.22 V	160	-1.68	29.15
7	920.301	27.56 QP	46.00	-18.44	1.30 V	142	-1.80	29.36
8	959.178	27.78 QP	46.00	-18.22	1.38 V	244	-1.97	29.75

- 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.

TEST MODE	B		
MODULATION TYPE	GFSK	CHANNEL	77
INPUT POWER	1.5Vdc	FREQUENCY RANGE	Below 1000MHz
ENVIRONMENTAL CONDITIONS	24deg. C, 65%RH, 1000Pa	DETECTOR FUNCTION	Quasi-Peak
TESTED BY	Jun Wu		

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	31.944	22.17 QP	40.00	-17.83	1.42 H	253	9.08	13.09
2	383.788	29.18 QP	46.00	-16.82	1.36 H	325	10.59	18.59
3	552.906	31.75 QP	46.00	-14.25	1.30 H	145	8.24	23.51
4	630.661	29.33 QP	46.00	-16.67	1.25 H	217	4.42	24.91
5	788.116	28.36 QP	46.00	-17.64	1.22 H	298	0.38	27.98
6	819.218	29.46 QP	46.00	-16.54	1.16 H	271	1.01	28.45
7	928.076	28.04 QP	46.00	-17.96	1.10 H	205	-1.37	29.41
8	959.178	28.09 QP	46.00	-17.91	1.04 H	22	-1.66	29.75

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	47.495	23.67 QP	40.00	-16.33	1.00 V	322	10.30	13.37
2	101.924	29.60 QP	43.50	-13.90	1.00 V	85	17.77	11.83
3	786.172	29.26 QP	46.00	-16.74	1.12 V	25	1.32	27.94
4	821.162	30.99 QP	46.00	-15.01	1.24 V	202	2.52	28.47
5	898.918	27.69 QP	46.00	-18.31	1.28 V	28	-1.51	29.20
6	918.357	27.29 QP	46.00	-18.71	1.32 V	58	-2.05	29.34
7	943.627	28.10 QP	46.00	-17.90	1.42 V	139	-1.42	29.52

- 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.

TEST MODE	C		
MODULATION TYPE	GFSK	CHANNEL	77
INPUT POWER	1.5Vdc	FREQUENCY RANGE	Below 1000MHz
ENVIRONMENTAL CONDITIONS	24deg. C, 65%RH, 1000Pa	DETECTOR FUNCTION	Quasi-Peak
TESTED BY	Jun Wu		

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	33.888	31.80 QP	40.00	-8.20	1.44 H	202	17.65	14.15
2	99.980	27.54 QP	43.50	-15.96	1.38 H	238	15.88	11.66
3	768.677	26.42 QP	46.00	-19.58	1.29 H	10	-1.15	27.57
4	792.004	26.11 QP	46.00	-19.89	1.24 H	10	-1.95	28.06
5	830.882	26.38 QP	46.00	-19.62	1.15 H	238	-2.21	28.59
6	873.647	26.80 QP	46.00	-19.20	1.02 H	124	-2.20	29.00
7	935.852	27.44 QP	46.00	-18.56	1.10 H	217	-2.03	29.47
8	951.403	28.08 QP	46.00	-17.92	1.03 H	166	-1.52	29.60

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	43.607	25.87 QP	40.00	-14.13	1.00 V	178	12.07	13.79
2	117.475	29.95 QP	43.50	-13.55	1.00 V	301	16.83	13.12
3	383.788	26.03 QP	46.00	-19.97	1.00 V	262	7.44	18.59
4	628.717	26.18 QP	46.00	-19.82	1.12 V	16	1.30	24.88
5	774.509	29.61 QP	46.00	-16.39	1.15 V	163	1.92	27.69
6	871.703	26.78 QP	46.00	-19.22	1.21 V	10	-2.20	28.98
7	898.918	26.90 QP	46.00	-19.10	1.35 V	229	-2.30	29.20

- 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.

RADIATED WORST CASE DATA: ABOVE 1GHz

TEST MODE	B		
MODULATION TYPE	GFSK	CHANNEL	0
INPUT POWER	1.5Vdc	FREQUENCY RANGE	1 ~ 25GHz
ENVIRONMENTAL CONDITIONS	25deg. C, 70%RH, 1002Pa	DETECTOR FUNCTION	Peak(PK) Average (AV)
TESTED BY	Jun Wu		

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	2390.000	60.28 PK	74.00	-13.72	1.34 H	20	25.86	34.42
2	2390.000	49.22 AV	54.00	-4.78	1.34 H	20	14.80	34.42
3	*2402.000	92.26 PK	114.00	-21.74	1.34 H	20	57.82	34.44
4	*2402.000	71.19 AV	94.00	-22.81	1.34 H	20	36.75	34.44
5	2747.000	50.09 PK	74.00	-23.91	1.15 H	12	14.15	35.94
6	2747.000	41.58 AV	54.00	-12.42	1.15 H	12	5.64	35.94
7	4804.000	51.65 PK	74.00	-22.35	1.06 H	154	10.26	41.39
8	4804.000	38.21 AV	54.00	-15.79	1.06 H	154	-3.18	41.39

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	2390.000	60.94 PK	74.00	-13.06	1.08 V	351	26.52	34.42
2	2390.000	49.19 AV	54.00	-4.81	1.08 V	351	14.77	34.42
3	*2402.000	90.60 PK	114.00	-23.40	1.08 V	351	56.16	34.44
4	*2402.000	69.75 AV	94.00	-24.25	1.08 V	351	35.31	34.44
5	2747.000	48.55 PK	74.00	-25.45	1.00 V	17	12.61	35.94
6	2747.000	41.10 AV	54.00	-12.90	1.00 V	17	5.16	35.94
7	4804.000	49.71 PK	74.00	-24.29	1.14 V	238	8.32	41.39
8	4804.000	37.46 AV	54.00	-16.54	1.14 V	238	-3.93	41.39

- 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.
 5. “ * ” : Fundamental frequency

TEST MODE	B		
MODULATION TYPE	GFSK	CHANNEL	38
INPUT POWER	1.5Vdc	FREQUENCY RANGE	1 ~ 25GHz
ENVIRONMENTAL CONDITIONS	25deg. C, 70%RH, 1002Pa	DETECTOR FUNCTION	Peak(PK) Average (AV)
TESTED BY	Jun Wu		

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	*2440.000	92.48 PK	114.00	-21.52	1.28 H	22	57.96	34.52
2	*2440.000	71.29 AV	94.00	-22.71	1.28 H	22	36.77	34.52
3	2790.000	49.90 PK	74.00	-24.10	1.15 H	17	13.73	36.17
4	2790.000	41.11 AV	54.00	-12.89	1.15 H	17	4.94	36.17
5	4880.000	52.40 PK	74.00	-21.60	1.15 H	162	10.81	41.59
6	4880.000	38.21 AV	54.00	-15.79	1.15 H	162	-3.38	41.59

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	*2440.000	90.20 PK	114.00	-23.80	1.28 V	135	55.68	34.52
2	*2440.000	69.55 AV	94.00	-24.45	1.28 V	135	35.03	34.52
3	2790.000	49.71 PK	74.00	-24.29	1.17 V	23	13.54	36.17
4	2790.000	40.43 AV	54.00	-13.57	1.17 V	23	4.26	36.17
5	4880.000	52.45 PK	74.00	-21.55	1.26 V	186	10.86	41.59
6	4880.000	39.33 AV	54.00	-14.67	1.26 V	186	-2.26	41.59

- 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.
 5. “ * ” : Fundamental frequency

TEST MODE	B		
MODULATION TYPE	GFSK	CHANNEL	77
INPUT POWER	1.5Vdc	FREQUENCY RANGE	1 ~ 25GHz
ENVIRONMENTAL CONDITIONS	25deg. C, 70%RH, 1002Pa	DETECTOR FUNCTION	Peak(PK) Average (AV)
TESTED BY	Jun Wu		

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	*2479.000	91.94 PK	114.00	-22.06	1.28 H	24	57.34	34.60
2	*2479.000	70.07 AV	94.00	-23.93	1.28 H	24	35.47	34.60
3	2483.500	66.26 PK	74.00	-7.74	1.28 H	24	31.65	34.61
4	2483.500	49.55 AV	54.00	-4.45	1.28 H	24	14.94	34.61
5	2835.000	50.49 PK	74.00	-23.51	1.13 H	22	14.09	36.40
6	2835.000	41.76 AV	54.00	-12.24	1.13 H	22	5.36	36.40
7	4958.000	51.70 PK	74.00	-22.30	1.08 H	265	9.91	41.79
8	4958.000	38.83 AV	54.00	-15.17	1.08 H	265	-2.96	41.79

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	*2479.000	90.17 PK	114.00	-23.83	1.26 V	123	55.57	34.60
2	*2479.000	70.16 AV	94.00	-23.84	1.26 V	123	35.56	34.60
3	2483.500	65.26 PK	74.00	-8.74	1.26 V	123	30.65	34.61
4	2483.500	49.60 AV	54.00	-4.40	1.26 V	123	14.99	34.61
5	2835.000	48.04 PK	74.00	-25.96	1.15 V	169	11.64	36.40
6	2835.000	39.02 AV	54.00	-14.98	1.15 V	169	2.62	36.40
7	4958.000	52.70 PK	74.00	-21.30	1.17 V	201	10.91	41.79
8	4958.000	38.86 AV	54.00	-15.14	1.17 V	201	-2.93	41.79

- 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.
 5. “ * ” : Fundamental frequency

4.3 FREQUENCY TOLERANCE MEASUREMENT

4.3.1 LIMITS OF FREQUENCY TOLERANCE MEASUREMENT

Limit : $\pm 0.001\%$

4.3.2 TEST INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
SPECTRUM ANALYZER	FSP 40	100036	Mar. 13, 2008

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 frequency tolerance of the carrier signal shall be maintained within $\pm 0.001\%$ of the operating frequency over a temperature variation of -20 degrees to $+50$ degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

4.3.4 DEVIATION FROM TEST STANDARD

No deviation

4.3.5 EUT OPERATING CONDITION

Same as Item 4.2.6

4.3.6 TEST RESULTS

TEST MODE	B		
MODULATION TYPE	GFSK	CHANNEL	0, 38, 77
INPUT POWER	1.5Vdc	ENVIRONMENTAL CONDITIONS	25deg. C, 70%RH, 992Pa
TESTED BY	Jun Wu		

CH 0

TEST CONDITION				Carrier Frequency (MHz)	Frequency Drift (kHz)	Frequency error (%)
Tnom(℃)	20	Vnom(V)	1.5	2402.0239	0	0
Tmin(℃)	-20	Vmin(V)	1.275	2402.0248	0.9	0.00004
		Vmax(V)	1.725	2402.0251	1.2	0.00005
Tmax(℃)	50	Vmin(V)	1.275	2402.0146	-9.3	-0.00039
		Vmax(V)	1.725	2402.0152	-8.7	-0.00036
Limit : ±0.001%						

CH 38

TEST CONDITION				Carrier Frequency (MHz)	Frequency Drift (kHz)	Frequency error (%)
Tnom(°C)	20	Vnom(V)	1.5	2440.0249	0	0
Tmin(°C)	-20	Vmin(V)	1.275	2440.0257	0.8	0.00003
		Vmax(V)	1.725	2440.0265	1.6	0.00007
Tmax(°C)	50	Vmin(V)	1.275	2440.0145	-10.4	-0.00043
		Vmax(V)	1.725	2440.0153	-9.6	-0.00039
Limit : ±0.001%						

CH 77

TEST CONDITION				Carrier Frequency (MHz)	Frequency Drift (kHz)	Frequency error (%)
Tnom(°C)	20	Vnom(V)	1.5	2479.0252	0	0
Tmin(°C)	-20	Vmin(V)	1.275	2479.0259	0.7	0.00003
		Vmax(V)	1.725	2479.0266	1.4	0.00006
Tmax(°C)	50	Vmin(V)	1.275	2479.0156	-9.6	-0.00039
		Vmax(V)	1.725	2479.0168	-8.4	-0.00034
Limit : ±0.001%						

4.4 BAND EDGES MEASUREMENT

4.4.1 LIMITS OF BAND EDGES MEASUREMENT

Below –50dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

4.4.2 TEST INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
SPECTRUM ANALYZER	FSP 40	100036	Mar. 13, 2008

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 PROCEDURE

The transmitter output was connected to the spectrum analyzer via a low loss cable. Set both RBW and VBW of spectrum analyzer to 100kHz and 300kHz with suitable frequency span including 100MHz bandwidth from band edge. The band edges were measured and recorded.

The spectrum plots (Peak RBW=100kHz, VBW=300kHz; Average RBW=1MHz, VBW= 10Hz) are attached on the following pages.

4.4.4 DEVIATION FROM TEST STANDARD

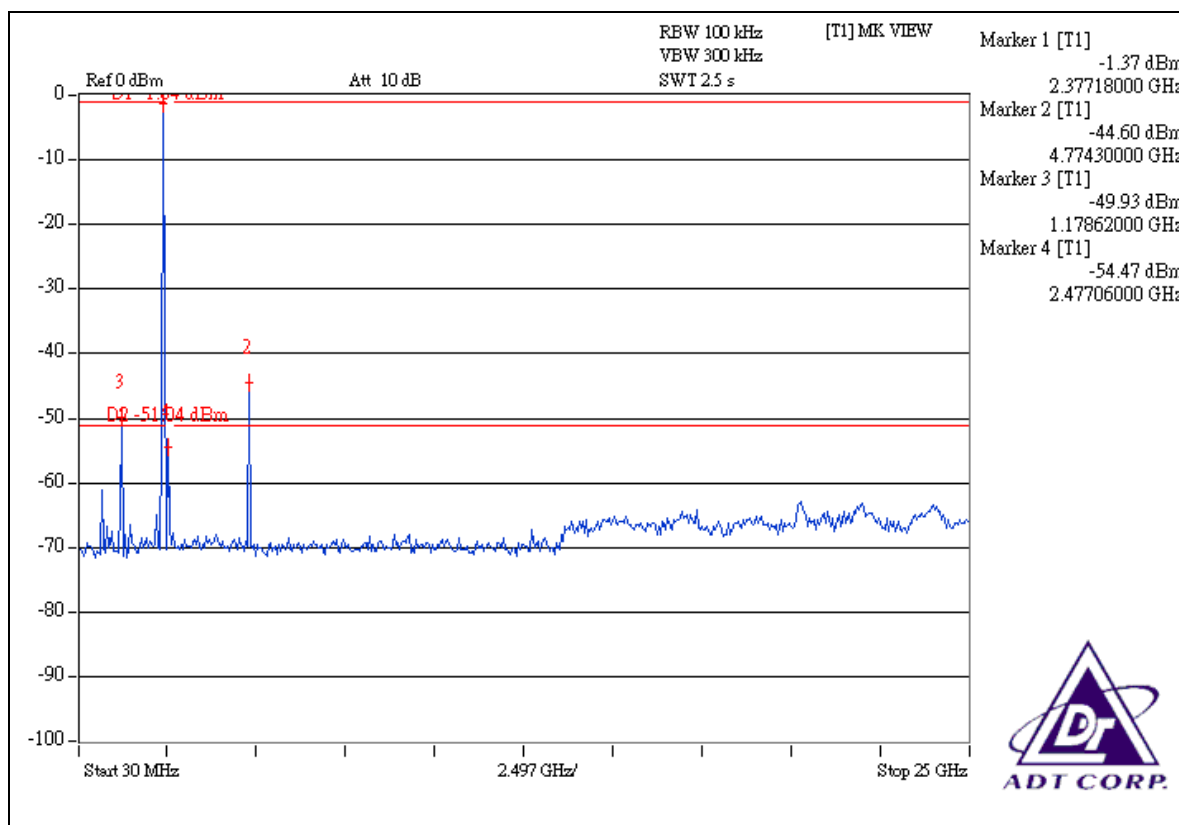
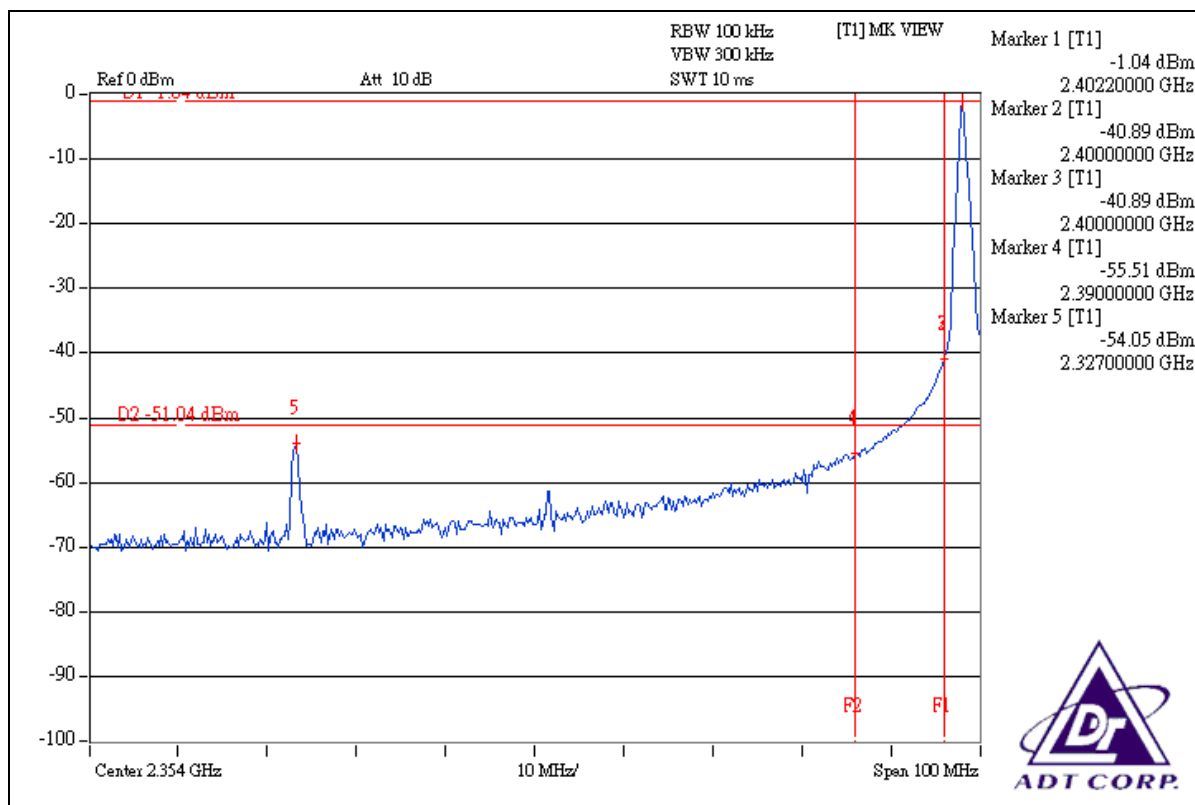
No deviation

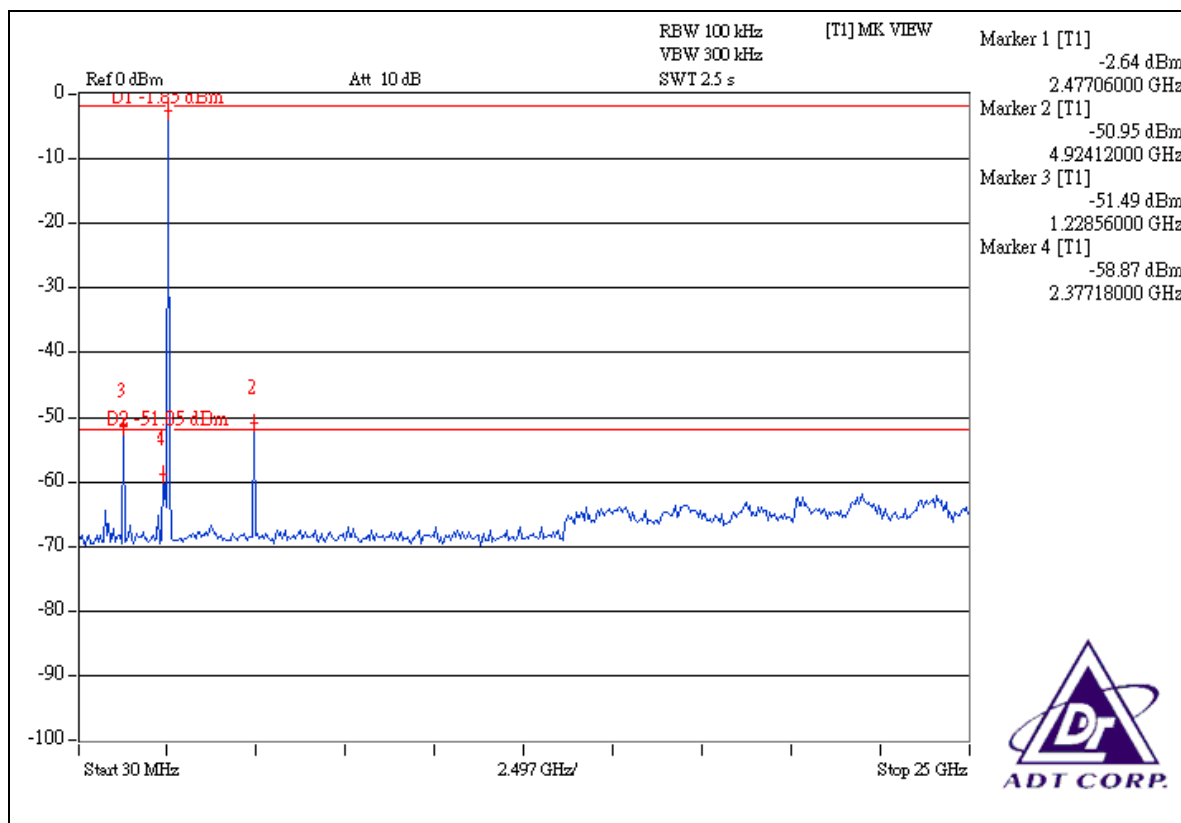
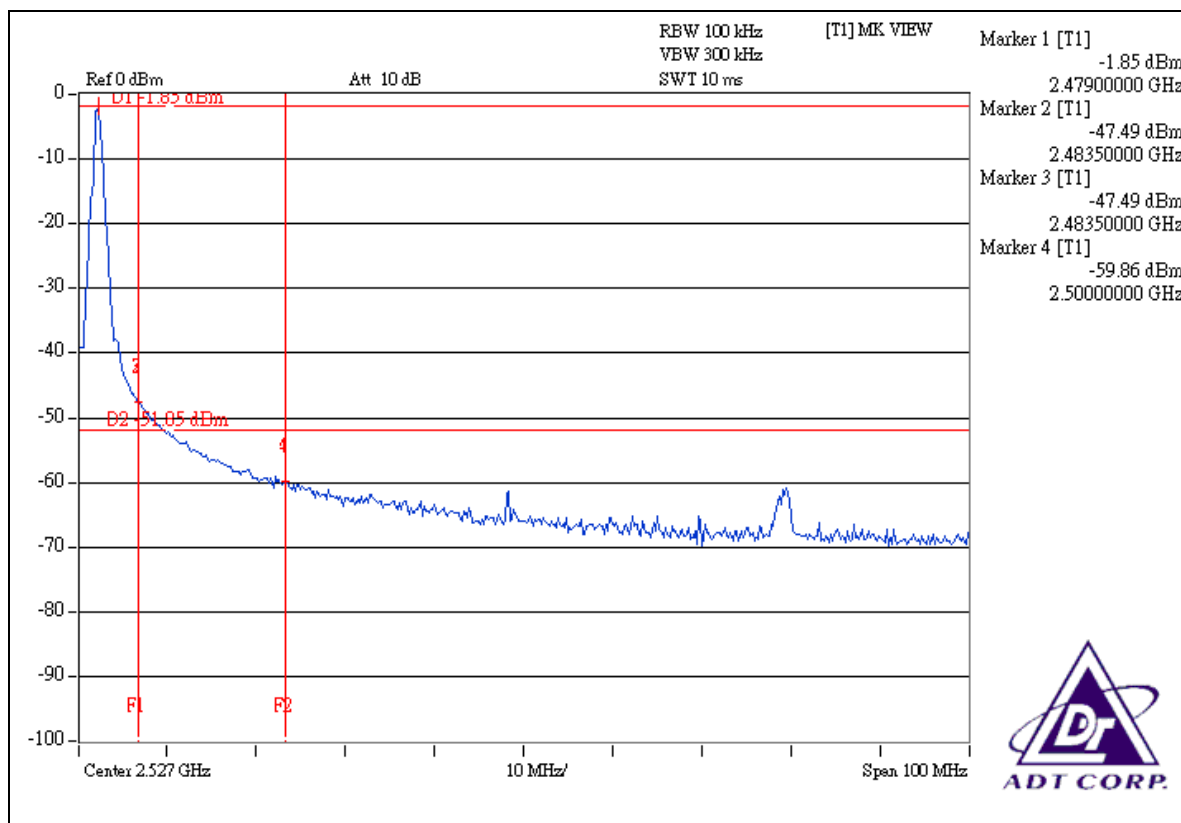
4.4.5 EUT OPERATING CONDITION

Same as Item 4.2.6

4.4.6 TEST RESULTS

The spectrum plots are attached on the following 4 images. D1 line indicates the highest level, and D2 line indicates the 50dB offset below D1. It shows compliance with the requirement in part 15.249(d).





5. PHOTOGRAPHS OF THE TEST CONFIGURATION

Please refer to the attached file (Test Setup Photo).

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, UL, A2LA
Germany	TUV Rheinland
Japan	VCCI
Norway	NEMKO
Canada	INDUSTRY CANADA , CSA
R.O.C.	TAF, BSMI, NCC
Netherlands	Telefication
Singapore	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: 886-2-26051924

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

7.APPENDIX A – MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB

No any modifications are made to the EUT by the lab during the test.