

FCC TEST REPORT

REPORT NO.: RF930626H03

MODEL NO.: C-UN10b

RECEIVED: Jun. 04, 2004

TESTED: Jun. 10 to 15, 2004

APPLICANT: LOGITECH INC.

ADDRESS: 6505 Kaiser Drive Fremont, CA 94555-3615

ISSUED BY: Advance Data Technology Corporation

LAB LOCATION: No. 81-1, Lu Liao Keng, 9 Ling, Wu Lung
Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien,
Taiwan, R.O.C.

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0536
ILAC MRA



No. 2177-01

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1 CERTIFICATION

PRODUCT : Logitech Freedom 2.4 Cordless Joystick
BRAND NAME : Logitech
MODEL NO : C-UN10b
TESTED: Jun. 10 to 15, 2004
APPLICANT : LOGITECH INC.
TEST ITEM: ENGINEERING SAMPLE
STANDARDS : 47 CFR Part 15, Subpart C (Section 15.249),
ANSI C63.4-2001

The above equipment (Model: C-UN10b) 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 : Midoli Peng, **DATE:** Jul. 24, 2004
(Midoli Peng)

TECHNICAL
ACCEPTANCE : Hank Chung, **DATE:** Jul. 24, 2004
Responsible for RF (Hank Chung)

APPROVED BY : Eric Lin, **DATE:** Jul. 24, 2004
(Eric Lin, Manager)

2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: 47 CFR Part 15, Subpart C			
Standard Paragraph	Test Type	Result	Remark
15.207	Conducted Emission Test	PASS	Minimum passing margin is -15.49dB at 0.173MHz
15.249	Radiated Emission Test	PASS	Minimum passing margin is -8.0dB at 2373.40MHz
15.249	Band Edge Measurement	PASS	Meet the requirement of limit

NOTE: The information of measurement uncertainty is available upon the customer's request.

3 GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	Logitech Freedom 2.4 Cordless Joystick
MODEL NO.	C-UN10b
POWER SUPPLY	5.0VDC from host equipment
MODULATION TYPE	FSK
MODULATION TECHNOLOGY	FHSS
CARRIER FREQUENCY OF EACH CHANNEL	2402MHz ~ 2480MHz
BANDWIDTH OF EACH CHANNEL	1MHz
NUMBER OF CHANNEL	79
ANTENNA TYPE	Sheet metal inverted-F antenna.
DATA CABLE	USB Cable (Unshielded, 1.2m)
I/O PORTS	NA
ASSOCIATED DEVICES	NA

NOTE:

1. 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

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	78	2480
19	2421	39	2441	59	2461		

NOTE:

1. Below 1 GHz, the channel 0, 39, and 78 were pre-tested in chamber. The channel 78, worst case one, was chosen for final test.
2. Above 1 GHz, the channel 0, 39, and 78 were tested individually.

3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a Logitech Freedom 2.4 Cordless Joystick. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC 47 CFR Part 15, Subpart C. (15.249)

ANSI C63.4 : 2001

All tests 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 47 CFR Part 15, Subpart B, Class B (DoC). The test report has been issued separately.

3.4 DESCRIPTION OF SUPPORT UNITS

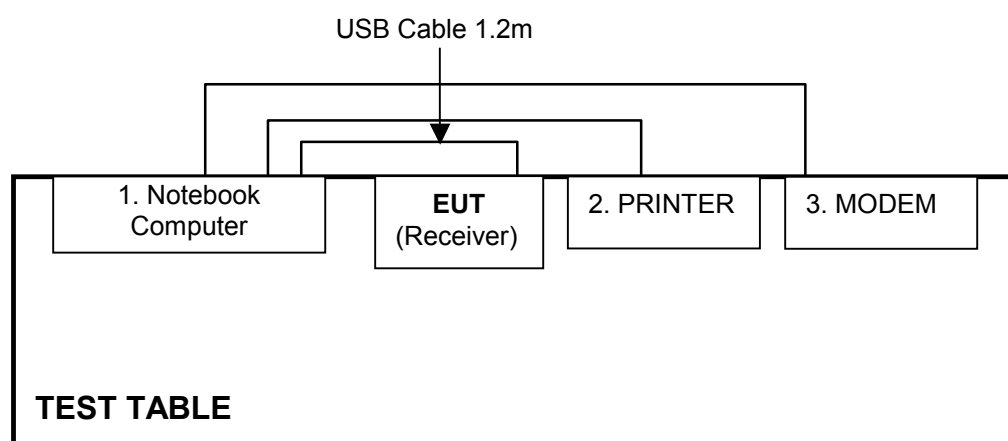
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	Notebook Computer	DELL	PP01L	TW-09C748-1280 0-1A3-1999	FCC DoC
2	PRINTER	HP	C2642A	MY79F1C3MZ	B94C2642X
3	MODEM	ACEEX	1414	0206026776	IFAXDM1414

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	NA
2	1.8m braid shielded wire, terminated with DB25 and Centronics connector via metallic frame, w/o core
3	1.2 m braid shielded wire, terminated with DB25 and DB9 connector via metallic frame, w/o core.

NOTE: All power cords of the above support units are non-shielded (1.8m).

3.5 CONFIGURATION OF SYSTEM UNDER TEST



NOTE: 1. Please refer to the photos of test configuration in Item 5 also.

4 TEST PROCEDURES AND RESULTS

4.1 CONDUCTED EMISSION MEASUREMENT

FREQUENCY (MHz)	Class A (dBuV)		Class B (dBuV)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 - 0.5	79	66	66 - 56	56 - 46
0.50 - 5.0	73	60	56	46
5.0 - 30.0	73	60	60	50

- NOTES:** (1) The lower limit shall apply at the transition frequencies.
- (2) The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.
- (3) All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

4.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
ROHDE & SCHWARZ Test Receiver	ESCS 30	847124/029	Dec. 04, 2004
ROHDE & SCHWARZ LISN (for EUT)	ESHS-Z5	848773/004	Nov. 04, 2004
KYORITSU LISN (for peripheral)	KNW-407	8/1395/12	Jul. 27, 2004
RF Cable (JETBAO)	RG233/U	Cable_CA_01	Jul. 02, 2005
Terminator(for KYORITSU)	50	3	May 10, 2005
Software	Cond-V2e	NA	NA

- 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 test was performed in ADT Shielded Room No. A.
3. The VCCI Con A Registration No. is C-817.

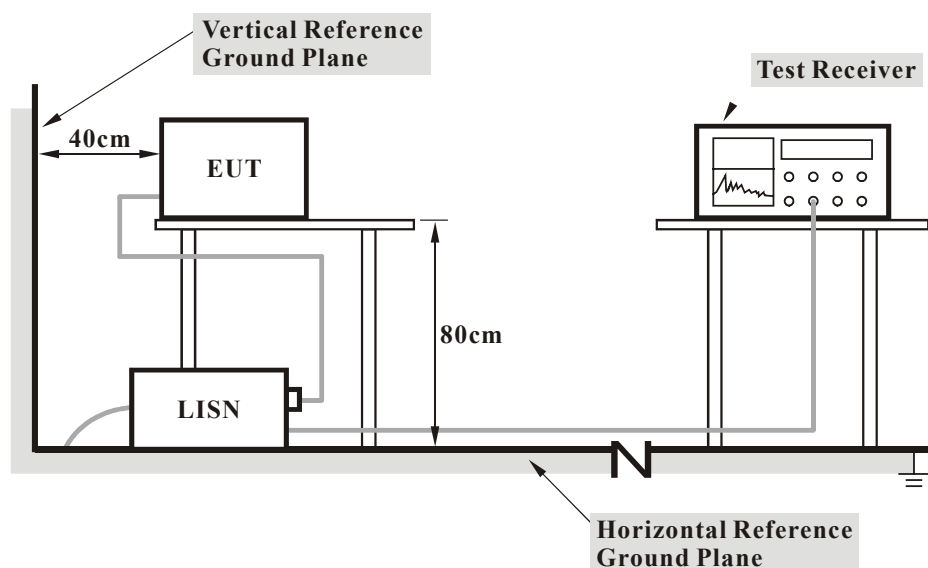
4.3 TEST PROCEDURE

- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- c. The frequency range from 150 kHz to 30 MHz was searched. Emission levels over 20dB under the prescribed limits could not be reported.

4.4 DEVIATION FROM TEST STANDARD

No deviation

4.5 TEST SETUP



- Note:**
1. Support units were connected to second LISN.
 2. Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes support units.

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



4.6 EUT OPERATING CONDITIONS

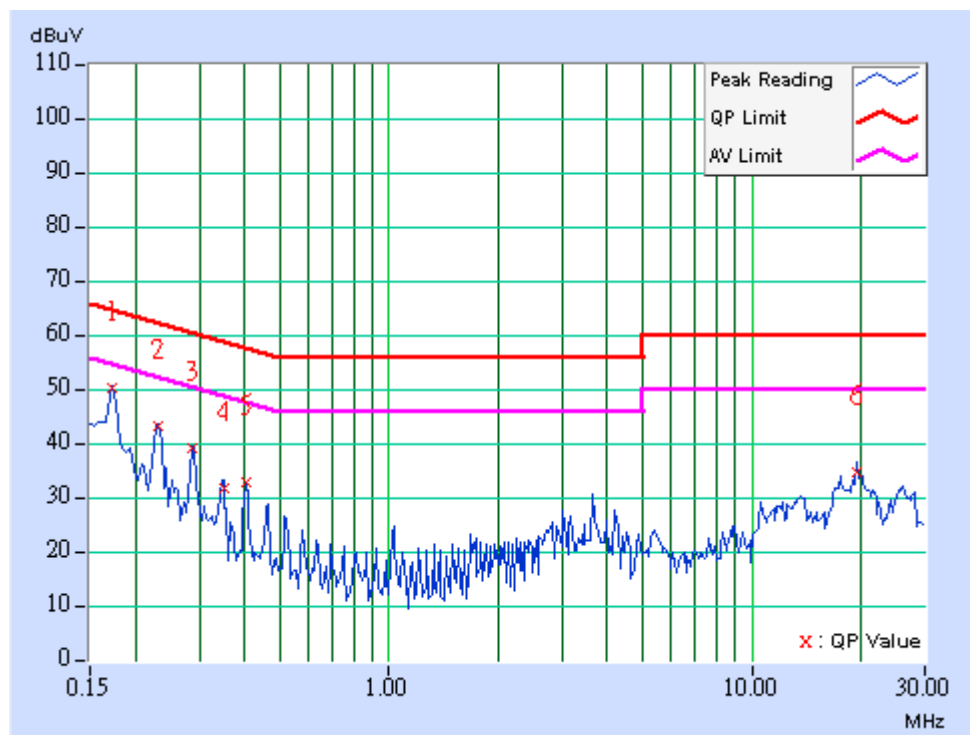
- a. Connect the EUT with support unit 1 (Notebook computer) which placed on a testing table.
- b. The support unit 1 (Notebook computer) ran a test program to enable EUT under transmission condition continuously at specific channel frequency.
- c. Notebook computer sends "H" messages to modem.
- d. Notebook computer sends "H" messages to printer, and the printer prints them on paper.

4.7 TEST RESULTS

EUT	Logitech Freedom 2.4 Cordless Joystick	MODEL	C-UN10b
MODE	Channel 78	6dB BANDWIDTH	9 kHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	PHASE	Line (L)
ENVIRONMENTAL CONDITIONS	27 deg. C, 59%RH, 975 hPa	TESTED BY	Tony Chen

No	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.173	0.25	49.06	-	49.31	-	64.79	54.79	-15.49	-
2	0.232	0.28	41.85	-	42.13	-	62.38	52.38	-20.24	-
3	0.287	0.26	37.90	-	38.16	-	60.62	50.62	-22.46	-
4	0.349	0.23	30.47	-	30.70	-	58.98	48.98	-28.29	-
5	0.404	0.20	31.42	-	31.62	-	57.77	47.77	-26.15	-
6	19.543	1.38	33.29	-	34.67	-	60.00	50.00	-25.33	-

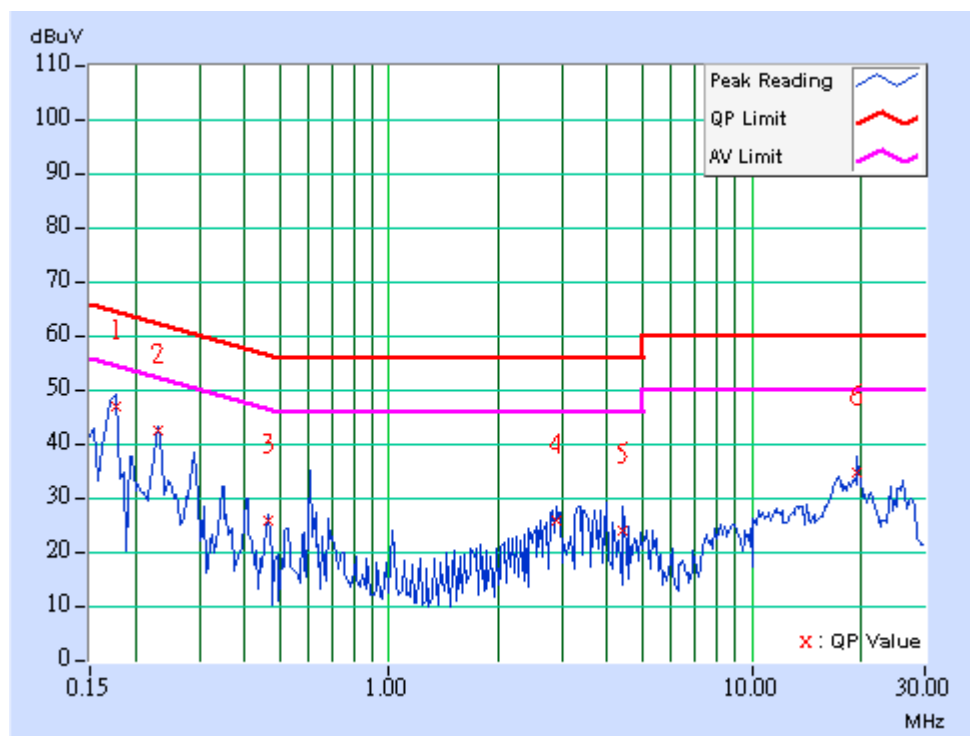
- NOTES:** (1) "-": Undetectable
(2) Q.P. and AV. are abbreviations of quasi-peak and average.
(3) "-": The Quasi-peak reading value also meets an average limit, thus measurement with the average detector is unnecessary.
(4) The emission levels of other frequencies were very low against the limit.
(5) Correction Factor = Insertion loss + Cable loss
(6) Margin value = Emission level - Limit value



EUT	Logitech Freedom 2.4 Cordless Joystick	MODEL	C-UN10b
MODE	Channel 78	6dB BANDWIDTH	9 kHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	PHASE	Neurral (N)
ENVIRONMENTAL CONDITIONS	27 deg. C, 59%RH, 975 hPa	TESTED BY	Tony Chen

No	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.177	0.25	45.70	-	45.95	-	64.61	54.61	-18.65	-
2	0.232	0.28	41.58	-	41.86	-	62.38	52.38	-20.51	-
3	0.466	0.21	24.90	-	25.11	-	56.58	46.58	-31.47	-
4	2.896	0.34	24.88	-	25.22	-	56.00	46.00	-30.78	-
5	4.402	0.42	22.76	-	23.18	-	56.00	46.00	-32.82	-
6	19.543	1.19	33.62	-	34.81	-	60.00	50.00	-25.19	-

- NOTES:** (1) "-": Undetectable
(2) Q.P. and AV. are abbreviations of quasi-peak and average.
(3) "-": The Quasi-peak reading value also meets an average limit, thus measurement with the average detector is unnecessary.
(4) The emission levels of other frequencies were very low against the limit.
(5) Correction Factor = Insertion loss + Cable loss
(6) Margin value = Emission level - Limit value



4.8 RADIATED EMISSION MEASUREMENT

4.8.1 LIMITS OF RADIATED EMISSION MEASUREMENT

According to 15.249 the field strength of emissions from intentional radiators operated under these frequencies bands shall not exceed the following:

Fundamental Frequency (MHz)	Field Strength of Fundamental (dBuV/m)	
	Peak	Average
2400 ~ 2483.5	114	94

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

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.

4.8.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
HP Spectrum Analyzer	8594ER	3829U04676	Aug. 30, 2004
ADVANTEST Spectrum Analyzer	R3271A	85060311	Jun. 16, 2005
CHASE RF Pre_Amplifier	CPA9232	1057	May. 10, 2005
HP Pre_Amplifier	8449B	3008A01922	Oct. 13, 2004
ROHDE & SCHWARZ Test Receiver	ESVS 10	849231 /019	Sep. 30, 2004
CHASE Broadband Antenna	CBL6111c	2730	Jul. 30, 2004
Schwarzbeck Horn_Antenna	3115	5619	Jul. 16, 2005
Schwarzbeck Horn_Antenna	BBHA 9170	BBHA9170192	Feb. 16, 2005
SCHWARZBECK Tunable Dipole Antenna	UHAP	897	Mar. 07, 2005
SCHWARZBECK Tunable Dipole Antenna	VHAP	880	Mar. 07, 2005
RF Switches (ARNITSU)	CS-201	1565157	Dec. 01, 2004
RF CABLE (Chaintek) 1GHz-20GHz	SF102	22054-2	Feb. 10, 2005
RF Cable(RICHTEC)	9913-30M	STCCAB-30M-1GH z-021	Dec. 01, 2004
Software	AS60P8	NA	NA
CHANCE MOST Antenna Tower	AT-100	0203	NA
CHANCE MOST Turn Table	TT-100	0203	NA

Note: 1. The calibration interval of the above test instruments is 12 months (36 months for Tunable Dipole Antenna) 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 Open Site No. C.
5. The FCC Site Registration No. is 656396.
6. The VCCI Site Registration No. is R-1626.
7. The CANADA Site Registration No. is IC 4824-3.

4.8.3 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter open area test site. 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.

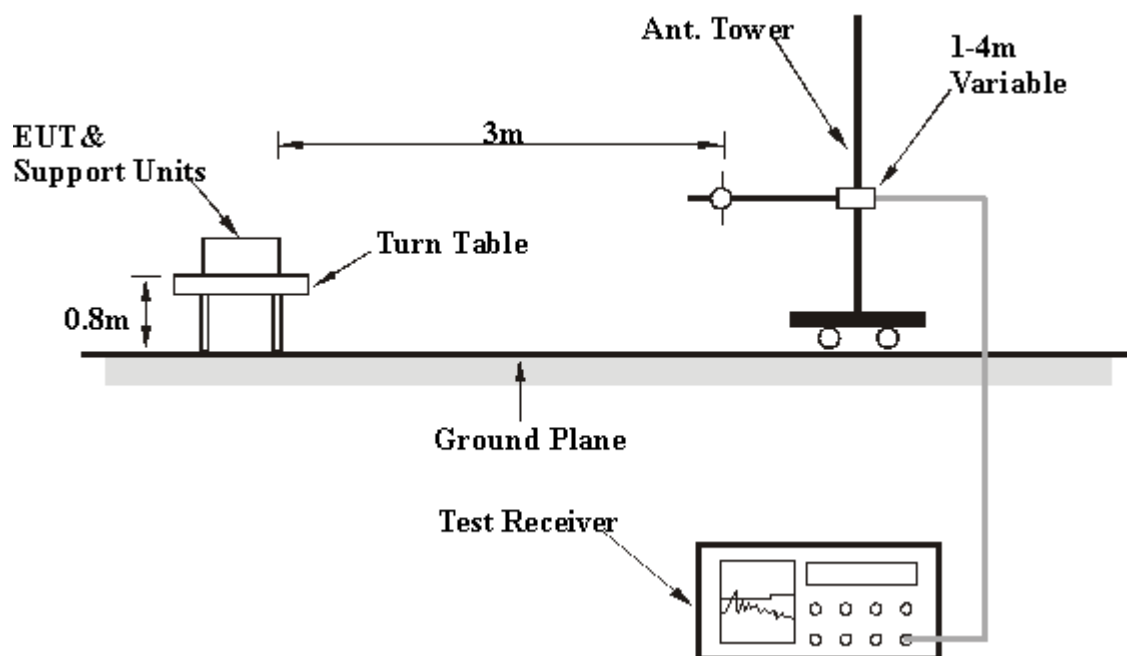
NOTE:

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.
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.

4.8.4 DEVIATION FROM TEST STANDARD

No deviation

4.8.5 TEST SETUP



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

4.8.6 TEST RESULTS

EUT	Logitech Freedom 2.4 Cordless Joystick	MODEL	C-UN10b
MODE	Channel 78	FREQUENCY RANGE	30 ~1000 MHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION & BANDWIDTH	Quasi-Peak, 120kHz
ENVIRONMENTAL CONDITIONS	27 deg. C, 59%RH, 975 hPa	TESTED BY	Tony Chen

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	67.25	15.50 QP	40.00	-24.50	1.07 H	23	9.50	6.00
2	73.11	25.70 QP	40.00	-14.30	1.71 H	195	18.70	7.00
3	114.42	17.00 QP	43.50	-26.50	1.68 H	184	4.90	12.10
4	144.02	21.10 QP	43.50	-22.40	2.06 H	272	8.60	12.50
5	158.03	16.90 QP	43.50	-26.60	2.08 H	297	5.30	11.60
6	209.77	18.90 QP	43.50	-24.60	1.97 H	199	8.90	10.00
7	233.04	23.50 QP	46.00	-22.50	2.21 H	10	11.50	12.00
8	240.02	25.40 QP	46.00	-20.60	1.74 H	23	12.40	12.90
9	245.76	26.60 QP	46.00	-19.40	1.60 H	347	12.90	13.70
10	258.05	27.50 QP	46.00	-18.50	1.15 H	78	12.20	15.30
11	304.72	26.20 QP	46.00	-19.80	1.21 H	17	10.60	15.60
12	336.04	28.30 QP	46.00	-17.70	1.40 H	241	11.80	16.50
13	344.06	29.90 QP	46.00	-16.10	1.19 H	207	13.10	16.80
14	914.17	34.20 QP	46.00	-11.80	1.30 H	292	5.40	28.80

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	67.52	21.80 QP	40.00	-18.20	1.10 V	238	15.70	6.00
2	144.02	17.80 QP	43.50	-25.70	1.80 V	66	5.30	12.50
3	158.02	18.00 QP	43.50	-25.50	1.79 V	122	6.40	11.60
4	210.00	20.00 QP	43.50	-23.50	1.72 V	235	10.00	10.00
5	233.49	20.40 QP	46.00	-25.60	1.61 V	103	8.30	12.10
6	240.03	20.40 QP	46.00	-25.60	1.61 V	237	7.50	12.90
7	257.72	20.50 QP	46.00	-25.50	1.72 V	86	5.30	15.20
8	337.50	23.60 QP	46.00	-22.40	1.37 V	126	7.10	16.60
9	344.06	24.90 QP	46.00	-21.10	1.55 V	70	8.10	16.80
10	379.62	30.80 QP	46.00	-15.20	1.02 V	195	12.80	18.00
11	914.17	35.00 QP	46.00	-11.00	1.37 V	42	6.20	28.80

- 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.

4.8.7 TEST RESULTS

EUT	Logitech Freedom 2.4 Cordless Joystick	MODEL	C-UN10b
MODE	Channel 0	FREQUENCY RANGE	1000~25000 MHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION & BANDWIDTH	Peak (PK) Average (AV) 1 MHz
ENVIRONMENTAL CONDITIONS	30 deg. C, 60%RH, 975 hPa	TESTED BY	Sky Liao

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	2319.90	63.70 PK	74.00	-10.30	1.30 H	95	33.30	30.40
1	2319.90	38.10 AV	54.00	-15.90	1.30 H	95	7.70	30.40
2	2373.40	66.00 PK	74.00	-8.00	1.68 H	100	35.30	30.70
2	2373.40	40.40 AV	54.00	-13.60	1.68 H	100	9.70	30.70
3	*2402.00	95.30 PK			1.62 H	104	65.40	29.90
3	*2402.00	69.70 AV			1.62 H	104	39.80	29.90
4	4804.00	62.20 PK	74.00	-11.80	1.00 H	120	26.10	36.10
4	4804.00	36.60 AV	54.00	-17.40	1.00 H	120	0.50	36.10
5	7206.00	56.90 PK	74.00	-17.10	1.92 H	9	15.20	41.60
5	7206.00	31.30 AV	54.00	-22.70	1.92 H	9	-10.30	41.60
6	9608.00	54.50 PK	74.00	-19.50	1.84 H	106	9.50	45.00
6	9608.00	28.90 AV	54.00	-25.10	1.84 H	106	-16.10	45.00

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	2319.70	60.80 PK	74.00	-13.20	1.15 V	71	30.40	30.40
1	2319.70	35.80 AV	54.00	-18.20	1.15 V	71	5.40	30.40
2	2373.30	63.00 PK	74.00	-11.00	1.43 V	65	32.30	30.70
2	2373.30	37.40 AV	54.00	-16.60	1.43 V	65	6.70	30.70
3	*2402.00	89.20 PK			1.74 V	358	59.30	29.90
3	*2402.00	63.60 AV			1.74 V	358	33.70	29.90
4	4804.00	63.60 PK	74.00	-10.40	1.72 V	84	27.50	36.10
4	4804.00	38.00 AV	54.00	-16.00	1.72 V	84	1.90	36.10
5	7206.00	56.00 PK	74.00	-18.00	1.88 V	99	14.30	41.60
5	7206.00	30.40 AV	54.00	-23.60	1.88 V	99	-11.30	41.60
6	9608.00	53.60 PK	74.00	-20.40	1.96 V	96	8.60	45.00
6	9608.00	28.00 AV	54.00	-26.00	1.96 V	96	-17.00	45.00

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. Margin value = Emission level - Limit value
4. “ * ” : Fundamental frequency
5. The other emission levels were very low against the limit.

EUT	Logitech Freedom 2.4 Cordless Joystick	MODEL	C-UN10b
MODE	Channel 39	FREQUENCY RANGE	1000~25000 MHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION & BANDWIDTH	Peak (PK) Average (AV) 1 MHz
ENVIRONMENTAL CONDITIONS	30 deg. C, 60%RH, 975 hPa	TESTED BY	Sky Liao

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	94.90 PK			1.59 H	103	64.90	30.00
1	*2441.00	69.30 AV			1.59 H	103	39.30	30.00
2	2487.40	52.40 PK	74.00	-21.60	1.24 H	339	22.30	30.10
2	2487.40	26.80 AV	54.00	-27.20	1.24 H	339	-3.30	30.10
3	2552.40	61.20 PK	74.00	-12.80	1.38 H	108	30.60	30.60
3	2552.40	35.60 AV	54.00	-18.40	1.38 H	108	5.00	30.60
4	4882.00	63.40 PK	74.00	-10.60	1.00 H	108	26.90	36.50
4	4882.00	37.80 AV	54.00	-16.20	1.00 H	108	1.30	36.50
5	7323.00	58.30 PK	74.00	-15.70	1.90 H	180	16.50	41.80
5	7323.00	32.70 AV	54.00	-21.30	1.90 H	180	-9.10	41.80
6	9764.00	52.40 PK	74.00	-21.60	1.46 H	319	7.80	44.60
6	9764.00	26.80 AV	54.00	-27.20	1.46 H	319	-17.80	44.60

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	*2441.00	89.80 PK			1.46 V	241	59.80	30.00
1	*2441.00	63.20 AV			1.46 V	241	33.20	30.00
2	2487.40	50.30 PK	74.00	-23.70	1.35 V	73	20.20	30.10
3	2552.40	56.00 PK	74.00	-18.00	1.01 V	66	25.30	30.60
3	2552.40	30.40 AV	54.00	-23.60	1.01 V	66	-0.30	30.60
4	4882.00	60.10 PK	74.00	-13.90	1.76 V	246	23.60	36.50
4	4882.00	34.50 AV	54.00	-19.50	1.76 V	246	-2.00	36.50
5	7323.00	59.70 PK	74.00	-14.30	1.23 V	317	17.90	41.80
5	7323.00	34.70 AV	54.00	-19.30	1.23 V	317	-7.10	41.80
6	9764.00	54.40 PK	74.00	-19.60	1.01 V	305	9.80	44.60
6	9764.00	28.80 AV	54.00	-25.20	1.01 V	305	-15.80	44.60

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. Margin value = Emission level - Limit value
4. " * " : Fundamental frequency
5. The other emission levels were very low against the limit.

EUT	Logitech Freedom 2.4 Cordless Joystick	MODEL	C-UN10b
MODE	Channel 78	FREQUENCY RANGE	1000~25000 MHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION & BANDWIDTH	Peak (PK) Average (AV) 1 MHz
ENVIRONMENTAL CONDITIONS	30 deg. C, 60%RH, 975 hPa	TESTED BY	Sky Liao

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	*2480.00	93.50 PK			1.48 H	107	63.40	30.10
1	*2480.00	67.90 AV			1.48 H	107	37.80	30.10
2	2490.00	57.00 PK	74.00	-17.00	1.30 H	346	20.90	36.20
2	2490.00	31.40 AV	54.00	-22.60	1.30 H	346	-4.70	36.20
3	2552.00	60.60 PK	74.00	-13.40	1.36 H	132	30.00	30.60
3	2552.00	32.00 AV	54.00	-22.00	1.36 H	132	1.40	30.60
4	4960.00	63.70 PK	74.00	-10.30	1.00 H	128	26.90	36.80
4	4960.00	38.10 AV	54.00	-15.90	1.00 H	128	1.30	36.80
5	7440.00	60.00 PK	74.00	-14.00	1.92 H	24	18.10	41.90
5	7440.00	34.40 AV	54.00	-19.60	1.92 H	24	-7.50	41.90
6	9920.00	52.40 PK	74.00	-21.60	1.61 H	214	8.20	44.20
6	9920.00	26.80 AV	54.00	-27.20	1.61 H	214	-17.40	44.20

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	*2480.00	90.10 PK			1.37 V	105	60.00	30.10
1	*2480.00	64.50 AV			1.37 V	105	34.40	30.10
2	2490.00	57.00 PK	74.00	-17.00	1.30 V	346	20.90	36.20
2	2490.00	31.40 AV	54.00	-22.60	1.30 V	346	-4.70	36.20
3	2552.00	56.60 PK	74.00	-17.40	1.57 V	72	25.90	30.60
3	2552.00	31.00 AV	54.00	-23.00	1.57 V	72	0.30	30.60
4	4960.00	61.00 PK	74.00	-13.00	1.08 V	222	24.20	36.80
4	4960.00	35.40 AV	54.00	-18.60	1.08 V	222	-1.40	36.80
5	7440.00	59.00 PK	74.00	-15.00	1.52 V	332	17.10	41.90
5	7440.00	33.40 AV	54.00	-20.60	1.52 V	332	-8.50	41.90
6	9920.00	54.00 PK	74.00	-20.00	1.90 V	283	9.80	44.20
6	9920.00	28.40 AV	54.00	-25.60	1.90 V	283	-15.80	44.20

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. Margin value = Emission level - Limit value
4. " * " : Fundamental frequency
5. The other emission levels were very low against the limit.

4.9 BAND EDGES MEASUREMENT

4.9.1 LIMITS OF BAND EDGES MEASUREMENT

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.

4.9.2 TEST INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
R&S SPECTRUM ANALYZER	FSP40	100036	Nov. 27, 2004

NOTE:

- 1.The measurement uncertainty is less than +/- 2.6dB, which is calculated as per the NAMAS document NIS81.
- 2.The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

4.9.3 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 100 kHz with suitable frequency span including 100 MHz bandwidth from band edge. The band edges was measured and recorded.

4.9.4 DEVIATION FROM TEST STANDARD

No deviation

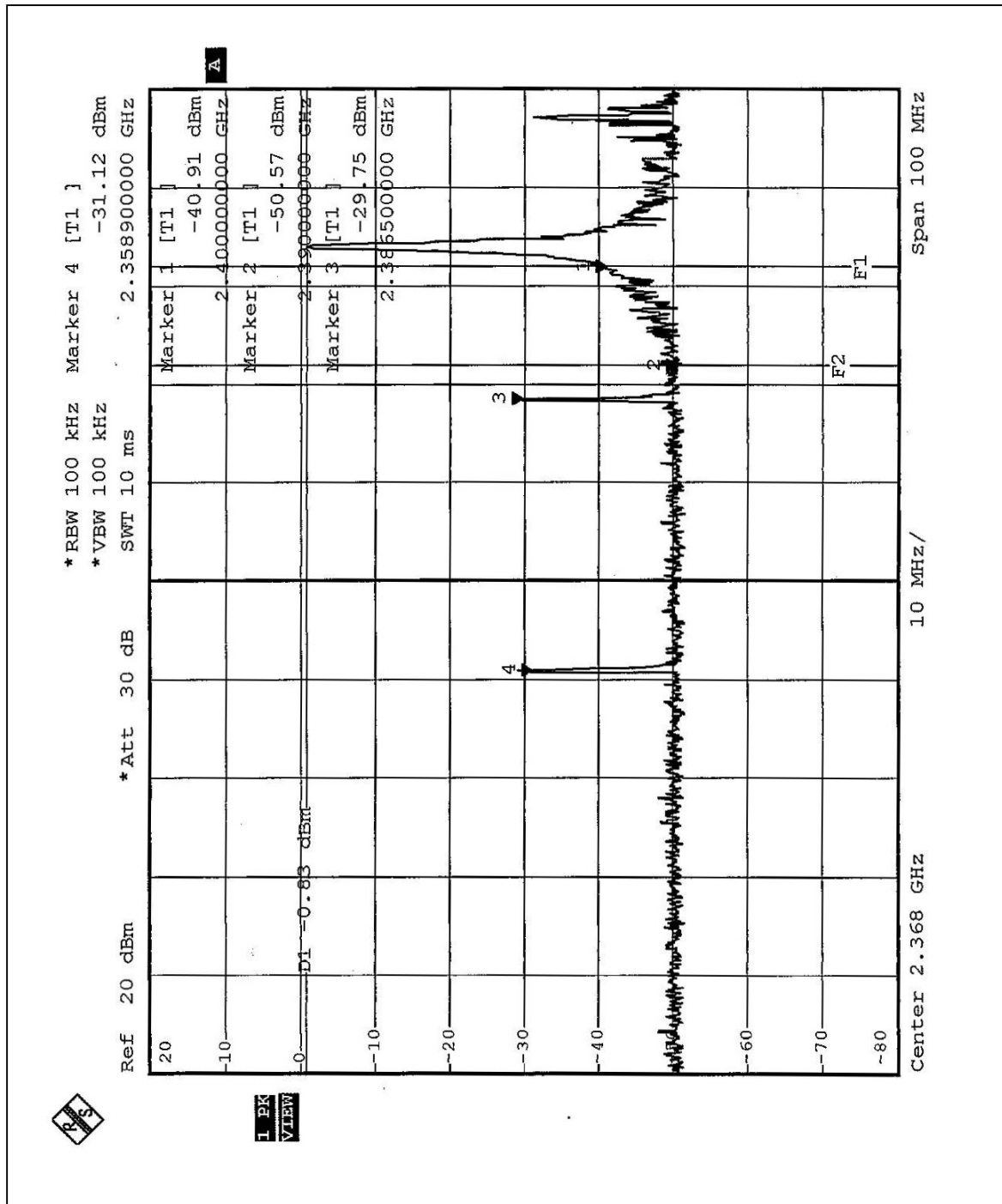
4.9.5 EUT OPERATING CONDITION

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

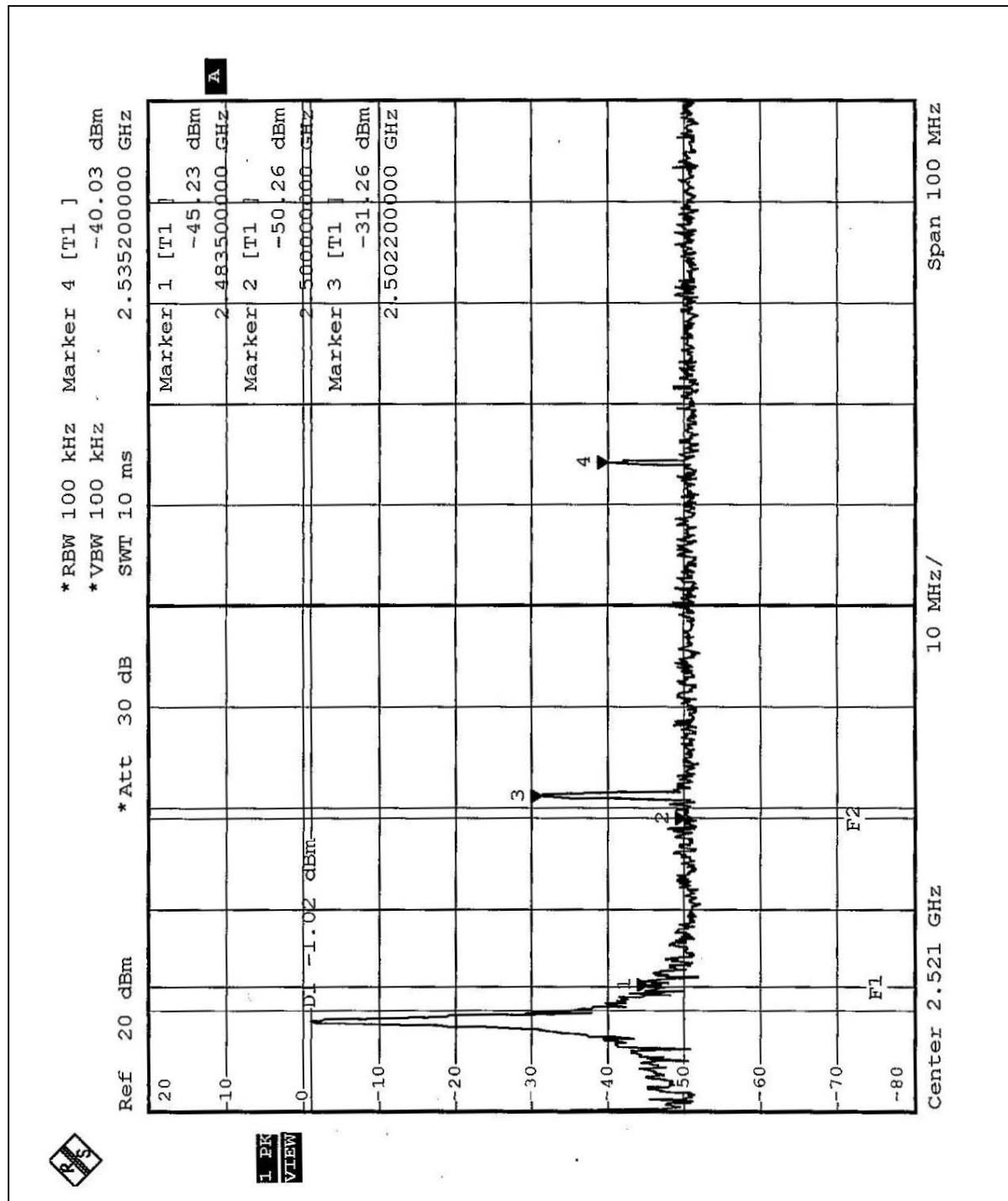
4.9.6 TEST RESULTS

Emissions radiated outside of the specified frequency bands, please refer pages form 13 to 21 for met the requirement of the general radiated emission limits in § 15.209.

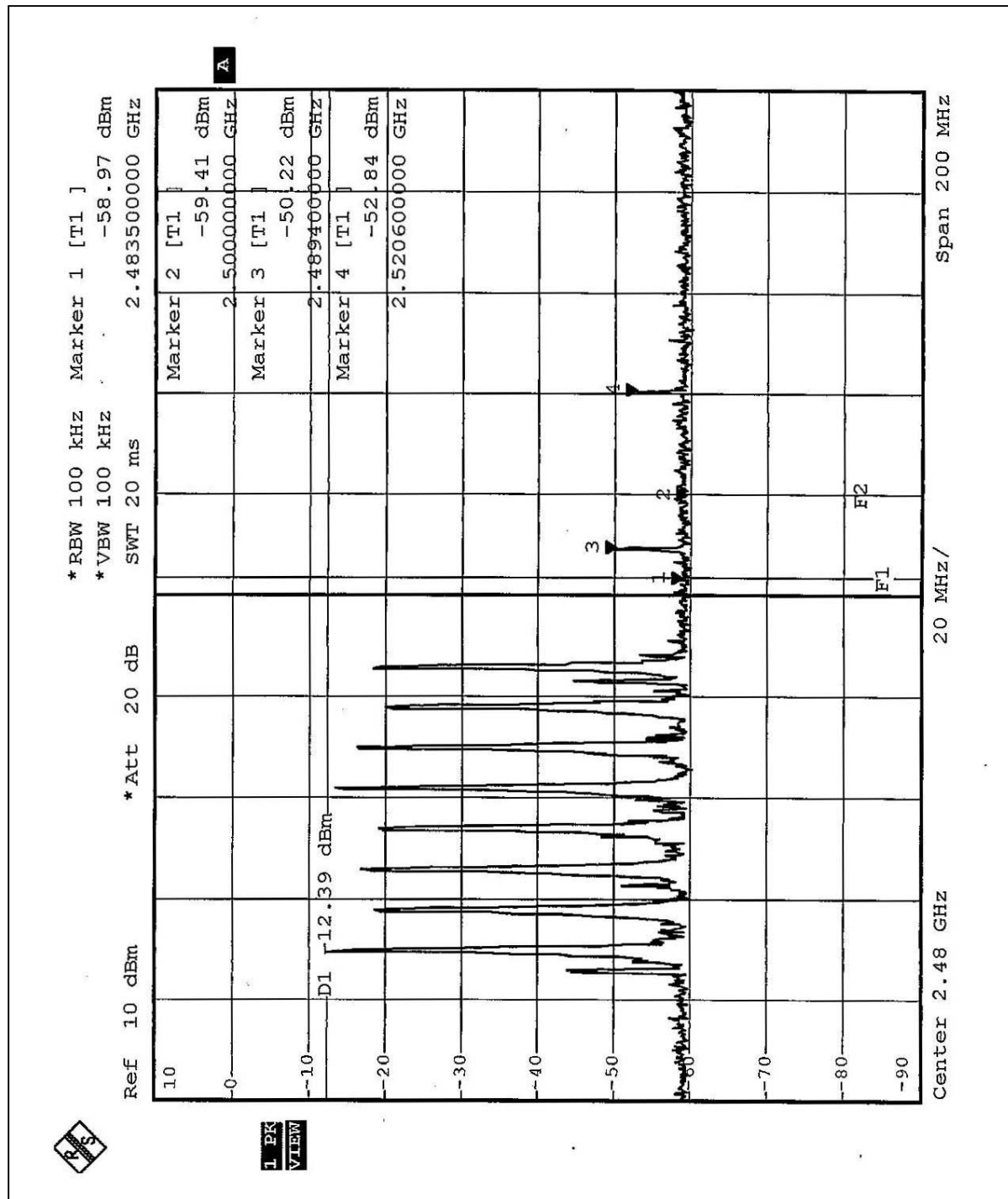
Static-CH 0



Static-CH 78



Dynamic -CH 78



5 PHOTOGRAPHS OF THE TEST CONFIGURATION CONDUCTED EMISSION TEST



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, Guide 25 or EN 45001:

USA	FCC, NVLAP, UL
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
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Hwa Ya EMC/RF/Safety/Telecom Lab:
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The address and road map of all our labs can be found in our web site also.