



FCC TEST REPORT

REPORT NO.: RF960420A08

MODEL NO.: HP Touch Smart PC IQ700

RECEIVED: April 20, 2007

TESTED: May 2 ~ 3, 2007

ISSUED: Aug. 31, 2007

APPLICANT: ASUSTeK COMPUTER INC.

ADDRESS: NO. 15, LI-TE RD., PEITOU, TAIPEI, TAIWAN,
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ISSUED BY: Advance Data Technology Corporation

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Table of Contents

1.	CERTIFICATION.....	4
2.	SUMMARY OF TEST RESULTS.....	5
2.1	MEASUREMENT UNCERTAINTY.....	5
3.	GENERAL INFORMATION	6
3.1	GENERAL DESCRIPTION OF EUT.....	6
3.2	DESCRIPTION OF TEST MODES.....	7
3.2.1	CONFIGURATION OF SYSTEM UNDER TEST	7
3.2.2	TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL:	8
3.3	GENERAL DESCRIPTION OF APPLIED STANDARDS	9
3.4	DESCRIPTION OF SUPPORT UNITS	9
4.	TEST TYPES AND RESULTS.....	10
4.1	CONDUCTED EMISSION MEASUREMENT	10
4.1.1	TEST INSTRUMENTS	10
4.1.2	TEST PROCEDURES	11
4.1.3	DEVIATION FROM TEST STANDARD	11
4.1.4	TEST SETUP	11
4.1.5	EUT OPERATING CONDITIONS	12
4.1.6	TEST RESULTS.....	13
4.2	RADIATED EMISSION MEASUREMENT	19
4.2.1	LIMITS OF RADIATED EMISSION MEASUREMENT	19
4.2.2	TEST INSTRUMENTS	20
4.2.3	TEST PROCEDURES.....	21
4.2.4	DEVIATION FROM TEST STANDARD	21
4.2.5	TEST SETUP	22
4.2.6	EUT OPERATING CONDITIONS	22
4.2.7	TEST RESULTS.....	23
4.3	6dB BANDWIDTH MEASUREMENT.....	28
4.3.1	LIMITS OF 6dB BANDWIDTH MEASUREMENT	28
4.3.2	TEST INSTRUMENTS	28
4.3.3	TEST PROCEDURE	28
4.3.4	DEVIATION FROM TEST STANDARD	28
4.3.5	TEST SETUP	28
4.3.6	EUT OPERATING CONDITIONS	28
4.3.7	TEST RESULTS.....	29
4.4	MAXIMUM PEAK OUTPUT POWER	31
4.4.1	LIMITS OF MAXIMUM PEAK OUTPUT POWER MEASUREMENT	31
4.4.2	INSTRUMENTS.....	31
4.4.3	TEST PROCEDURES.....	31
4.4.4	DEVIATION FROM TEST STANDARD	31
4.4.5	TEST SETUP	32
4.4.6	EUT OPERATING CONDITIONS	32
4.4.7	TEST RESULTS.....	32
4.5	POWER SPECTRAL DENSITY MEASUREMENT	35
4.5.1	LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT.....	35



4.5.2	TEST INSTRUMENTS	35
4.5.3	TEST PROCEDURE	35
4.5.4	DEVIATION FROM TEST STANDARD	35
4.5.5	TEST SETUP	35
4.5.6	EUT OPERATING CONDITION	35
4.5.7	TEST RESULTS	36
4.6	BAND EDGES MEASUREMENT	38
4.6.1	LIMITS OF BAND EDGES MEASUREMENT	38
4.6.2	TEST INSTRUMENTS	38
4.6.3	TEST PROCEDURE	38
4.6.4	DEVIATION FROM TEST STANDARD	38
4.6.5	EUT OPERATING CONDITION	38
4.6.6	TEST RESULTS	39
4.7	ANTENNA REQUIREMENT	43
4.7.1	STANDARD APPLICABLE	43
4.7.2	ANTENNA CONNECTED CONSTRUCTION	43
5.	PHOTOGRAPHS OF THE TEST CONFIGURATION.....	44
6.	INFORMATION ON THE TESTING LABORATORIES	45
7.	APPENDIX A – MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB	46



1. CERTIFICATION

PRODUCT: HP Touch Smart PC
BRAND NAME: HP
MODEL NO.: HP Touch Smart PC IQ700
APPLICANT: ASUSTeK COMPUTER INC.
TESTED: May 2 ~ 3, 2007
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:** Aug. 31, 2007
(Annie Chang / Senior Specialist)

TECHNICAL ACCEPTANCE : Jamison Chan , **DATE:** Aug. 31, 2007
Responsible for RF (Jamison Chan / Senior Engineer)

APPROVED BY : Ken Liu , **DATE:** Aug. 31, 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 15.247)			
Standard Section	Test Type and Limit	Result	Remark
15.207	AC Power Conducted Emission	PASS	Minimum passing margin is -10.70dB at 0.197MHz
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)	Radiated Emissions Limit: Table 15.209	PASS	Meet the requirement of limit. Minimum passing margin is -2.51dB at 531.523MHz
15.247(e)	Power Spectral Density Limit: max. 8dBm	PASS	Meet the requirement of limit.
15.247(d)	Band Edge Measurement Limit: 20dB 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 16-4-2:

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

Measurement	Frequency	Uncertainty
Conducted emissions	9kHz ~ 30MHz	2.44 dB
Radiated emissions	30MHz ~ 1GHz	3.75 dB
	1GHz ~ 40GHz	2.89 dB

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

EUT	HP Touch Smart PC
MODEL NO.	HP Touch Smart PC IQ700
FCC ID	MSQCFIQ700
POWER SUPPLY	AC I/P: 100-240V, 5-3A, 50/60Hz
MODULATION TYPE	GFSK
OUTPUT POWER	0.292mW
FREQUENCY RANGE	2402MHz ~ 2479MHz
NUMBER OF CHANNEL	78
ANTENNA TYPE	Printed antenna with 4dBi gain
DATA CABLE	N/A
I/O PORTS	Refer to user's manual
ASSOCIATED DEVICES	N/A

NOTE:

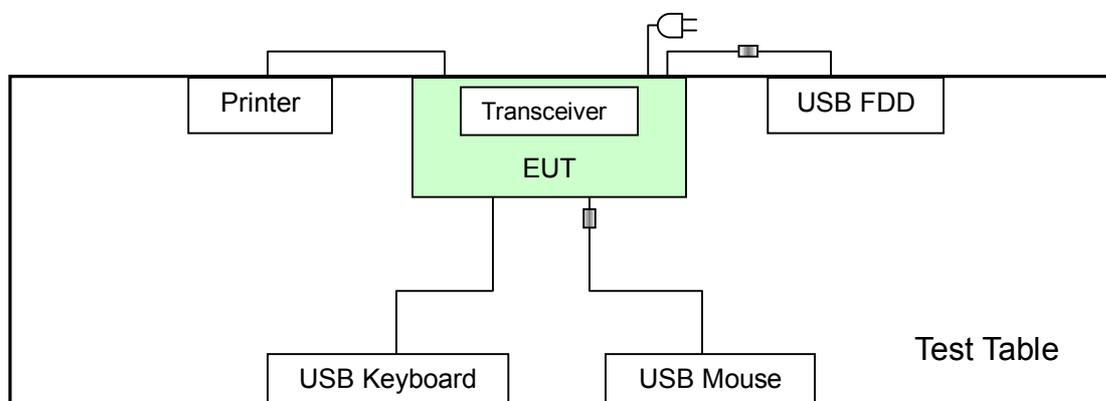
1. The EUT is a PC with built-in a 2.4GHz wireless transceiver.
2. The co-located operation of this product with modules MXF-U950711AG and QDS-BRCM1018 have been investigated in this application and the product continues comply with the relevant rules.
3. The above EUT information was declared by the manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.

3.2 DESCRIPTION OF TEST MODES

Seventy-eight channels are provided to this EUT:

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	
-	√	√	√	√	-

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

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

POWER LINE CONDUCTED EMISSION TEST:

- Following channel(s) was (were) selected for the final test as listed below.

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE
0 to 77	0, 38, 77	GFSK

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.

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, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE
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.

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, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE
0 to 77	0, 38, 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. (15.247)

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 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	PRINTER	LEXMARK	Z33	03331651419	FCC DoC Approved
2	EXTERNAL USB 1.1 FLOPPY	SONY	MPF82E	50042543	FCC DoC Approved
3	USB KEYBOARD	BTC	5200U	G09302046659	E5XKB5122U
4	USB MOUSE	MICROSOFT	X800898	9241804-30608	FCC DoC Approved

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	2.0 m foil shielded wire , terminated with USB connector via metallic frame, w/o core.
2	0.6 m shielded cable, terminated with USB connector, with 1 core.
3	1.5 m braid shielded wire, terminated with USB connector via drain wire, w/o core.
4	1.8 m foil shielded wire, terminated with USB connector via drain wire, with 1 core.

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

4. TEST TYPES AND RESULTS

4.1 CONDUCTED EMISSION MEASUREMENT

FREQUENCY OF EMISSION (MHz)	CONDUCTED LIMIT (dB μ V)	
	Quasi-peak	Average
0.15-0.5	66 to 56	56 to 46
0.5-5	56	46
5-30	60	50

NOTE:

1. The lower limit shall apply at the transition frequencies.
2. 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.

4.1.1 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
ROHDE & SCHWARZ Test Receiver	ESCS 30	838251/021	Nov. 23, 2007
ROHDE & SCHWARZ Artificial Mains Network (for EUT)	ESH3-Z5	100218	Nov. 21, 2007
LISN With Adapter (for EUT)	AD10	C10Ada-001	Nov. 21, 2007
ROHDE & SCHWARZ Artificial Mains Network (for peripherals)	ESH3-Z5	100219	Nov. 07, 2007
ROHDE & SCHWARZ Artificial Mains Network (for peripherals)	ESH3-Z5	100220	Oct. 26, 2007
Software	ADT_Cond_V7.3.2	NA	NA
Software	ADT_ISN_V7.3.2	NA	NA
RF cable (JYEBAO)	5D-FB	Cable-C10.01	Mar. 01, 2008
SUHNTER Terminator (For ROHDE & SCHWARZ LISN)	65BNC-5001	E1-010773	Feb. 11, 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 test was performed in ADT Shielded Room No. 10.
 3. The VCCI Site Registration No. C-1852.

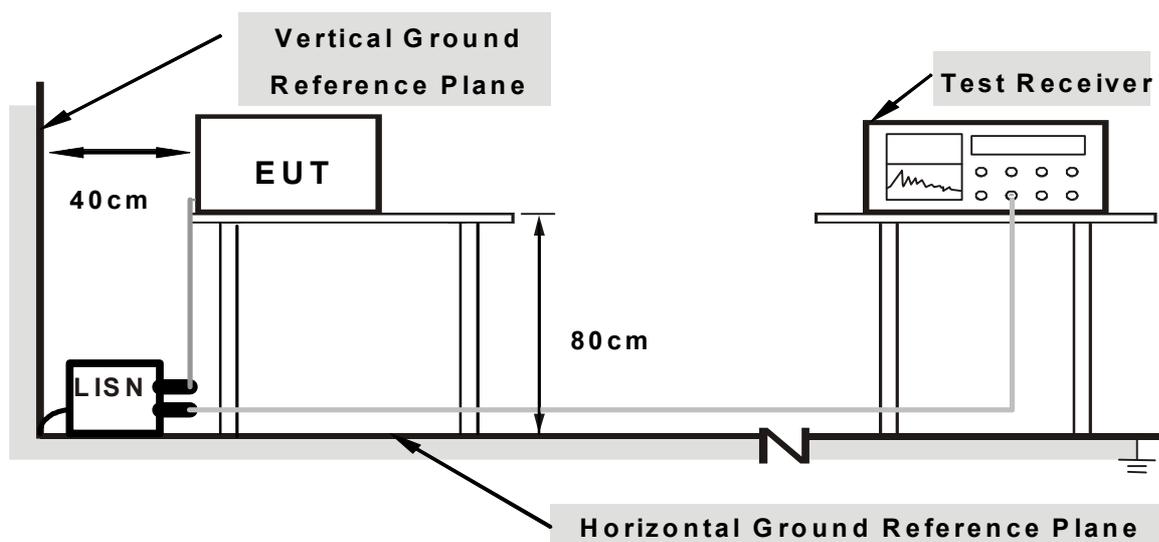
4.1.2 TEST PROCEDURES

- 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 150kHz to 30MHz was searched. Emission levels under Limit - 20dB was not recorded.

4.1.3 DEVIATION FROM TEST STANDARD

No deviation.

4.1.4 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 from other units and other metal planes

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

4.1.5 EUT OPERATING CONDITIONS

- a. Turned on the power of all equipment.
- b. HP Touch Smart PC (EUT) ran a test program (provided by manufacturer) to enable 2.4GHz wireless transceiver (EUT) under transmission/receiving condition continuously at specific channel frequency.
- c. HP Touch Smart PC (EUT) read and wrote messages to/ from ext. FDD
- d. HP Touch Smart PC (EUT) sent "H" messages to its screen.
- e. HP Touch Smart PC (EUT) sent messages to printer and the printer prints them out.
- f. Repeated c ~ f.

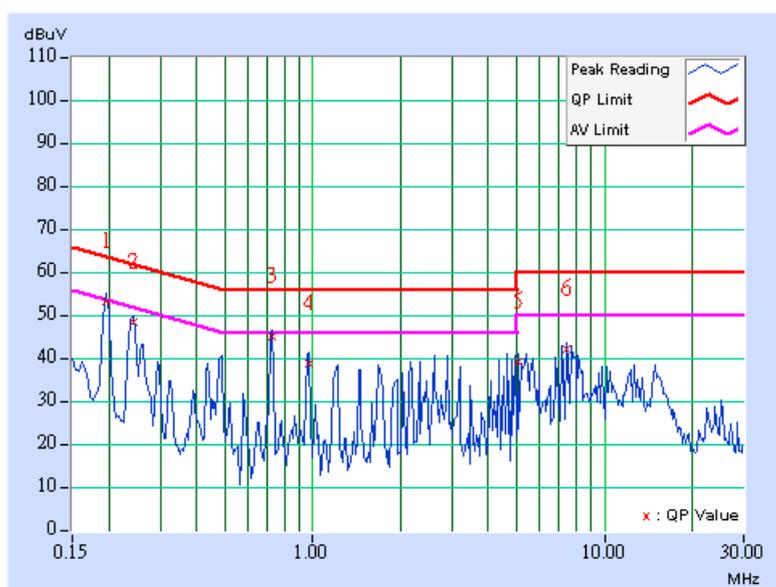
4.1.6 TEST RESULTS

CONDUCTED WORST CASE DATA

MODULATION TYPE	GFSK	CHANNEL	0
INPUT POWER	120Vac, 60 Hz	6dB BANDWIDTH	9 kHz
ENVIRONMENTAL CONDITIONS	24deg. C, 66%RH, 1001hPa	PHASE	Line 1
TESTED BY	Jamison Chan		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.197	0.20	52.84	-	53.04	-	63.74	53.74	-10.70	-
2	0.244	0.20	48.01	-	48.21	-	61.97	51.97	-13.76	-
3	0.724	0.31	44.51	-	44.82	-	56.00	46.00	-11.18	-
4	0.966	0.39	38.33	-	38.72	-	56.00	46.00	-17.28	-
5	5.074	0.54	38.81	-	39.35	-	60.00	50.00	-20.65	-
6	7.396	0.61	41.61	-	42.22	-	60.00	50.00	-17.78	-

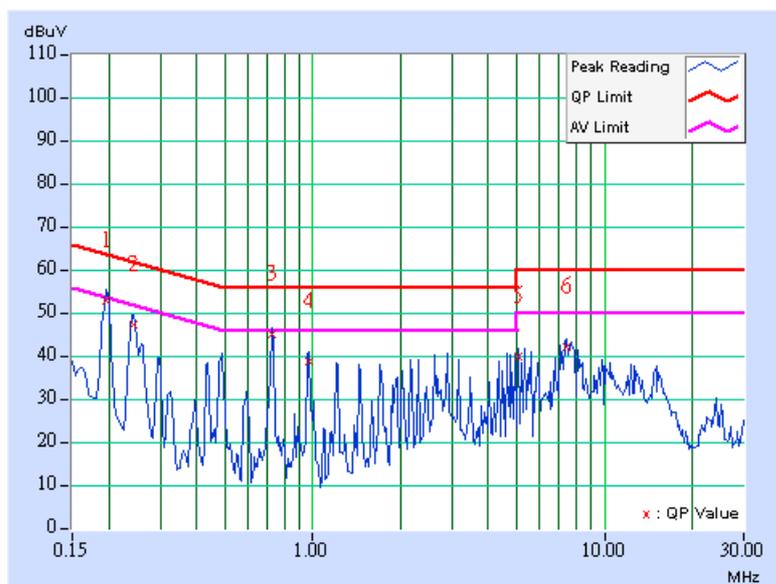
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
 3. The emission levels of other frequencies were very low against the limit.
 4. Margin value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



MODULATION TYPE	GFSK	CHANNEL	0
INPUT POWER	120Vac, 60 Hz	6dB BANDWIDTH	9 kHz
ENVIRONMENTAL CONDITIONS	24deg. C, 66%RH, 1001hPa	PHASE	Line 2
TESTED BY	Jamison Chan		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
	1	0.197	0.20	52.50	-	52.70	-	63.74	53.74	-11.04
2	0.244	0.20	47.04	-	47.24	-	61.97	51.97	-14.73	-
3	0.724	0.25	44.85	-	45.10	-	56.00	46.00	-10.90	-
4	0.970	0.30	38.51	-	38.81	-	56.00	46.00	-17.19	-
5	5.070	0.42	39.39	-	39.81	-	60.00	50.00	-20.19	-
6	7.390	0.46	41.69	-	42.15	-	60.00	50.00	-17.85	-

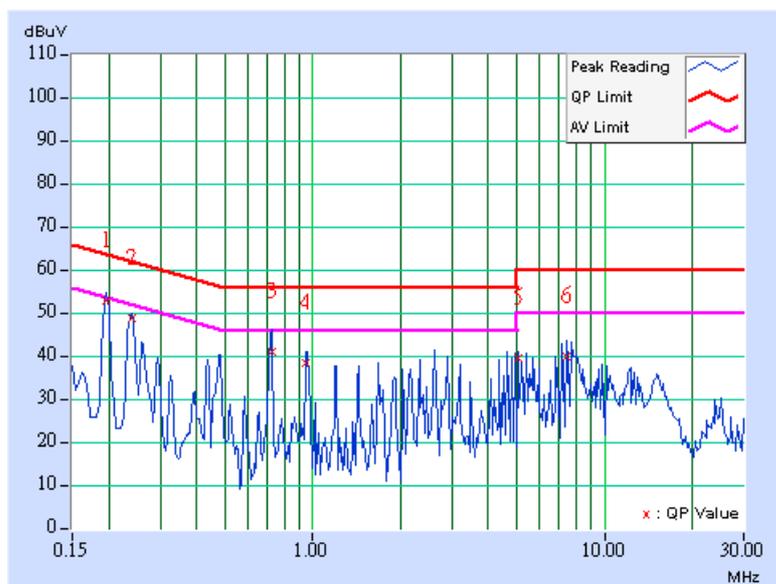
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 3. The emission levels of other frequencies were very low against the limit.
 4. Margin value = Emission level - Limit value
 5. Correction factor = Insertion loss + Cable loss
 6. Emission Level = Correction Factor + Reading Value.



MODULATION TYPE	GFSK	CHANNEL	38
INPUT POWER	120Vac, 60 Hz	6dB BANDWIDTH	9 kHz
ENVIRONMENTAL CONDITIONS	24deg. C, 66%RH, 1001hPa	PHASE	Line 1
TESTED BY	Jamison Chan		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
			1	0.197	0.20	52.43	-	52.63	-	63.74
2	0.240	0.20	48.11	-	48.31	-	62.10	52.10	-13.79	-
3	0.724	0.31	40.53	-	40.84	-	56.00	46.00	-15.16	-
4	0.951	0.38	37.96	-	38.34	-	56.00	46.00	-17.66	-
5	5.078	0.54	39.05	-	39.59	-	60.00	50.00	-20.41	-
6	7.398	0.61	39.27	-	39.88	-	60.00	50.00	-20.12	-

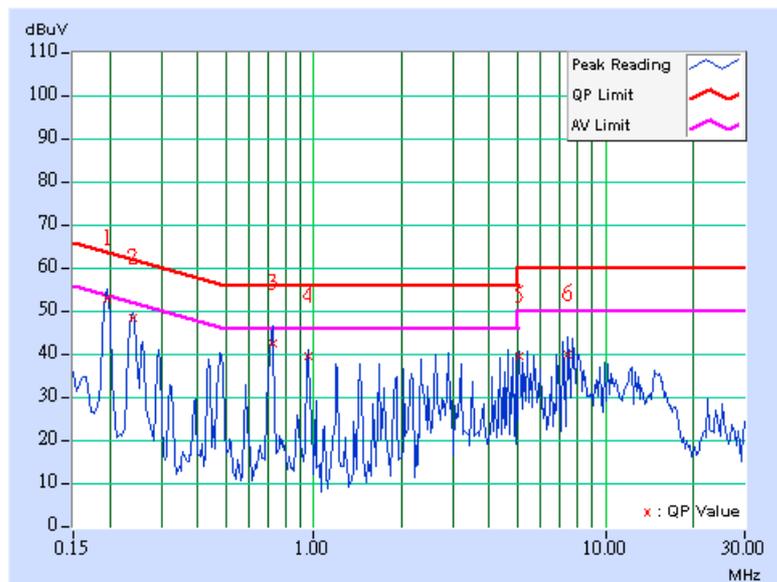
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
 3. The emission levels of other frequencies were very low against the limit.
 4. Margin value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



MODULATION TYPE	GFSK	CHANNEL	38
INPUT POWER	120Vac, 60 Hz	6dB BANDWIDTH	9 kHz
ENVIRONMENTAL CONDITIONS	24deg. C, 66%RH, 1001hPa	PHASE	Line 2
TESTED BY	Jamison Chan		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
	1	0.197	0.20	52.41	-	52.61	-	63.74	53.74	-11.13
2	0.240	0.20	48.11	-	48.31	-	62.10	52.10	-13.79	-
3	0.724	0.25	42.18	-	42.43	-	56.00	46.00	-13.57	-
4	0.955	0.29	39.03	-	39.32	-	56.00	46.00	-16.68	-
5	5.082	0.42	39.13	-	39.55	-	60.00	50.00	-20.45	-
6	7.402	0.46	39.66	-	40.12	-	60.00	50.00	-19.88	-

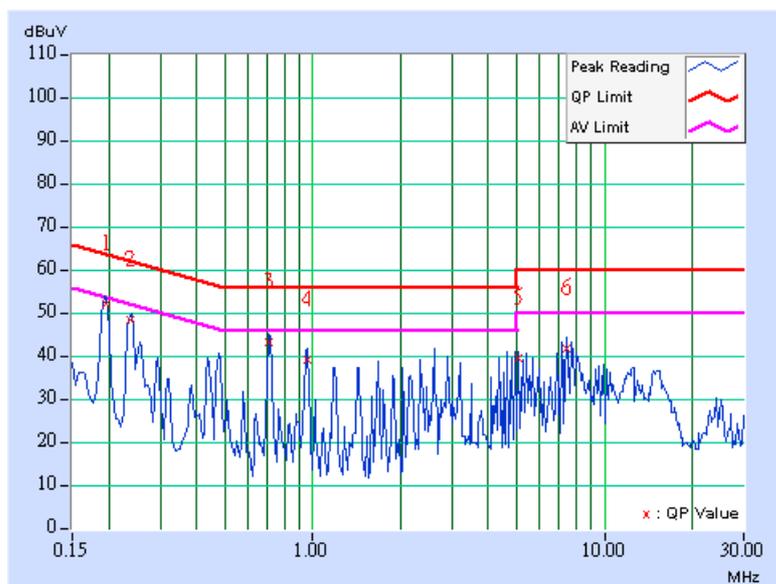
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 3. The emission levels of other frequencies were very low against the limit.
 4. Margin value = Emission level - Limit value
 5. Correction factor = Insertion loss + Cable loss
 6. Emission Level = Correction Factor + Reading Value.



MODULATION TYPE	GFSK	CHANNEL	77
INPUT POWER	120Vac, 60 Hz	6dB BANDWIDTH	9 kHz
ENVIRONMENTAL CONDITIONS	24deg. C, 66%RH, 1001hPa	PHASE	Line 1
TESTED BY	Jamison Chan		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
			1	0.197	0.20	51.43	-	51.63	-	63.74
2	0.236	0.20	47.86	-	48.06	-	62.24	52.24	-14.18	-
3	0.709	0.30	42.61	-	42.91	-	56.00	46.00	-13.09	-
4	0.955	0.38	38.81	-	39.19	-	56.00	46.00	-16.81	-
5	5.086	0.54	39.04	-	39.58	-	60.00	50.00	-20.42	-
6	7.410	0.61	41.33	-	41.94	-	60.00	50.00	-18.06	-

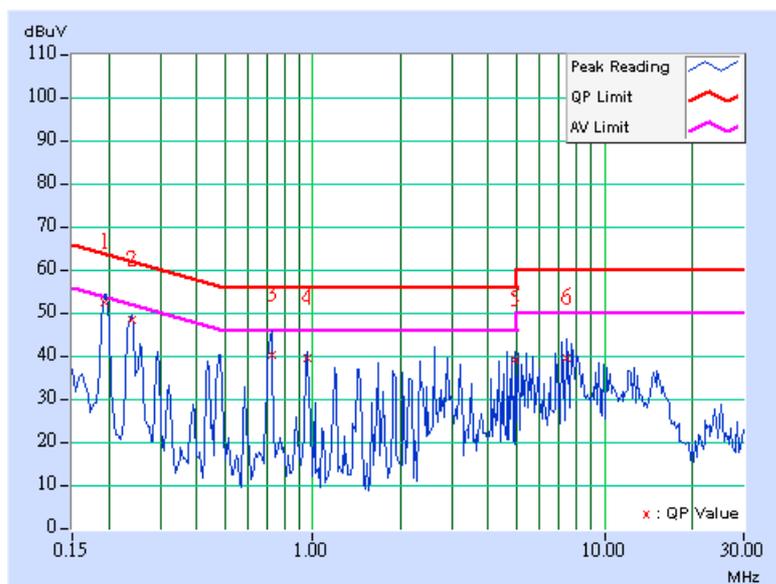
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MODULATION TYPE	GFSK	CHANNEL	77
INPUT POWER	120Vac, 60 Hz	6dB BANDWIDTH	9 kHz
ENVIRONMENTAL CONDITIONS	24deg. C, 66%RH, 1001hPa	PHASE	Line 2
TESTED BY	Jamison Chan		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
	1	0.193	0.20	52.01	-	52.21	-	63.91	53.91	-11.70
2	0.240	0.20	48.09	-	48.29	-	62.10	52.10	-13.81	-
3	0.724	0.25	39.88	-	40.13	-	56.00	46.00	-15.87	-
4	0.955	0.29	39.11	-	39.40	-	56.00	46.00	-16.60	-
5	4.938	0.42	38.75	-	39.17	-	56.00	46.00	-16.83	-
6	7.406	0.46	39.09	-	39.55	-	60.00	50.00	-20.45	-

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



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	8449B	3008A01924	Sep. 05, 2007
HP Preamplifier	8449B	3008A01638	Sep. 17, 2007
ROHDE & SCHWARZ TEST RECEIVER	ESI7	836697/012	Oct. 24, 2007
Schwarzbeck Antenna	VULB 9168	137	Oct. 01, 2007
Schwarzbeck Antenna	VHBA 9123	480	Mar. 30, 2008
EMCO Horn Antenna	3115	6714	Oct. 24, 2007
EMCO Horn Antenna	3115	9312-4192	Mar. 14, 2008
ADT. Turn Table	TT100	0306	NA
ADT. Tower	AT100	0306	NA
Software	ADT_Radiated_V7.6. 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.

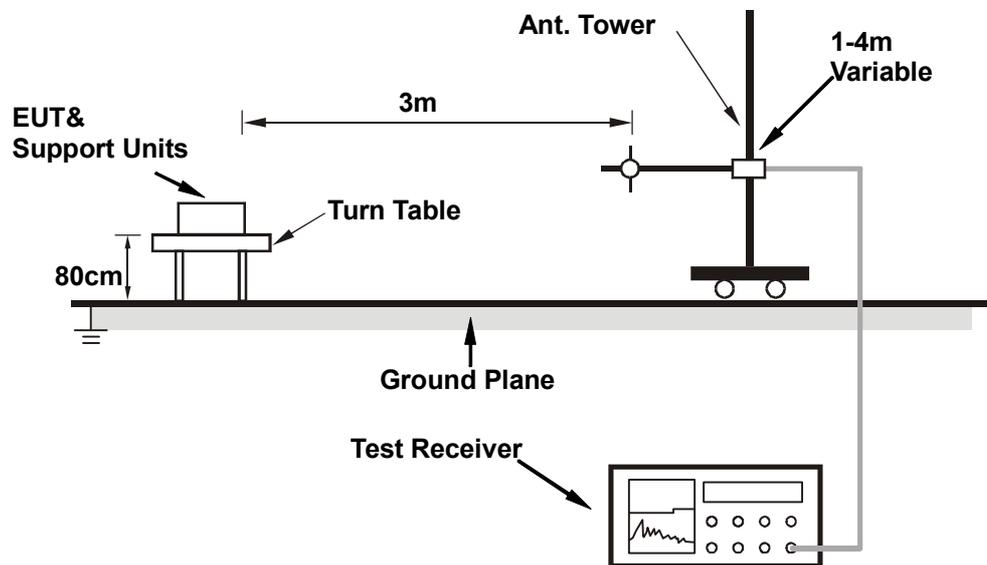
NOTE:

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

Same as item 4.1.6.

4.2.7 TEST RESULTS

RADIATED WORST CASE DATA: BELOW 1GHz

MODULATION TYPE	GFSK	CHANNEL	77
INPUT POWER	120Vac, 60 Hz	FREQUENCY RANGE	Below 1000MHz
ENVIRONMENTAL CONDITIONS	21deg. C, 76%RH, 1003Pa	DETECTOR FUNCTION	Quasi-Peak
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	142.745	36.37 QP	43.50	-7.13	1.49 H	256	22.73	13.64
2	193.287	34.37 QP	43.50	-9.13	1.21 H	280	22.73	11.64
3	533.467	40.15 QP	46.00	-5.85	1.69 H	211	17.59	22.56
4	572.345	37.35 QP	46.00	-8.65	1.58 H	211	13.82	23.53
5	778.397	37.64 QP	46.00	-8.36	2.01 H	40	9.70	27.94
6	875.591	36.88 QP	46.00	-9.12	1.77 H	337	7.87	29.01

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	144.689	38.25 QP	43.50	-5.25	1.00 V	172	24.60	13.65
2	193.287	38.68 QP	43.50	-4.82	1.00 V	325	27.04	11.64
3	302.144	41.54 QP	46.00	-4.46	1.13 V	160	25.13	16.41
4	480.982	41.51 QP	46.00	-4.49	1.27 V	10	20.36	21.15
5	531.523	43.49 QP	46.00	-2.51	1.07 V	40	20.97	22.52
6	572.345	40.65 QP	46.00	-5.35	1.00 V	34	17.12	23.53

- 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)
 - 3The other emission levels were very low against the limit.
 4. Margin value = Emission level – Limit value.



RADIATED WORST CASE DATA: ABOVE 1GHz

MODULATION TYPE	GFSK	CHANNEL	0
INPUT POWER	120Vac, 60 Hz	FREQUENCY RANGE	1 ~ 25GHz
ENVIRONMENTAL CONDITIONS	21deg. C, 76%RH, 1003Pa	DETECTOR FUNCTION	Peak(PK) Average (AV)
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	1602.000	56.34 PK	74.00	-17.66	1.03 H	145	24.25	32.09
2	1602.000	45.26 AV	54.00	-8.70	1.03 H	145	13.21	32.09
3	2390.000	58.10 PK	74.00	-15.90	1.14 H	167	23.68	34.42
4	2390.000	47.02 AV	54.00	-6.94	1.14 H	167	12.64	34.42
5	*2402.000	81.89 PK			1.44 H	167	47.45	34.44
6	*2402.000	70.81 AV			1.44 H	167	36.41	34.44
7	4804.000	50.96 PK	74.00	-23.04	1.14 H	322	9.56	41.39
8	4804.000	39.88 AV	54.00	-14.08	1.14 H	322	-1.48	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	1602.000	60.09 PK	74.00	-13.91	1.28 V	170	28.00	32.09
2	1602.000	49.01 AV	54.00	-4.95	1.28 V	170	16.96	32.09
3	2390.000	57.79 PK	74.00	-16.21	1.32 V	194	23.37	34.42
4	2390.000	46.71 AV	54.00	-7.25	1.32 V	194	12.33	34.42
5	*2402.000	83.87 PK			1.32 V	194	49.43	34.44
6	*2402.000	72.79 AV			1.32 V	194	38.39	34.44
7	4804.000	51.56 PK	74.00	-22.44	1.14 V	161	10.16	41.39
8	4804.000	40.48 AV	54.00	-13.48	1.14 V	161	-0.88	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
6. The average value of fundamental frequency is: Average = Peak value + 20log(Duty cycle) Where the duty factor is calculated from following formula:

$$20\log(\text{Duty cycle}) = 20\log \frac{2.28 \text{ ms}}{8.16 \text{ ms}} = -11.08\text{dB}$$

Please see page 27 for plotted duty.

MODULATION TYPE	GFSK	CHANNEL	38
INPUT POWER	120Vac, 60 Hz	FREQUENCY RANGE	1 ~ 25GHz
ENVIRONMENTAL CONDITIONS	21deg. C, 76%RH, 1003Pa	DETECTOR FUNCTION	Peak(PK) Average (AV)
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	1626.000	56.54 PK	74.00	-17.46	1.73 H	148	24.36	32.18
2	1626.000	45.46 AV	54.00	-8.50	1.73 H	148	13.32	32.18
3	*2440.000	82.35 PK			1.89 H	205	47.83	34.52
4	*2440.000	71.27 AV			1.89 H	205	36.79	34.52
5	4880.000	50.99 PK	74.00	-23.01	1.73 H	20	9.40	41.59
6	4880.000	39.91 AV	54.00	-14.05	1.73 H	20	-1.64	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	1626.000	60.80 PK	74.00	-13.20	1.19 V	190	28.62	32.18
2	1626.000	49.72 AV	54.00	-4.24	1.19 V	190	17.58	32.18
3	*2440.000	83.90 PK			1.21 V	196	49.38	34.52
4	*2440.000	72.82 AV			1.21 V	196	38.34	34.52
5	4880.000	53.12 PK	74.00	-20.88	1.80 V	19	11.53	41.59
6	4880.000	42.04 AV	54.00	-11.92	1.80 V	19	0.49	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
 6. The average value of fundamental frequency is: Average = Peak value + 20log(Duty cycle) Where the duty factor is calculated from following formula:

$$20\log(\text{Duty cycle}) = 20\log \frac{2.28 \text{ ms}}{8.16 \text{ ms}} = -11.08\text{dB}$$

Please see page 27 for plotted duty.

MODULATION TYPE	GFSK	CHANNEL	77
INPUT POWER	120Vac, 60 Hz	FREQUENCY RANGE	1 ~ 25GHz
ENVIRONMENTAL CONDITIONS	21deg. C, 76%RH, 1003Pa	DETECTOR FUNCTION	Peak(PK) Average (AV)
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	1652.000	56.81 PK	74.00	-17.19	1.35 H	112	24.53	32.28
2	1652.000	45.73 AV	54.00	-8.23	1.35 H	112	13.49	32.28
3	*2479.000	80.78 PK			1.96 H	328	46.18	34.60
4	*2479.000	69.70 AV			1.96 H	328	35.14	34.60
5	2483.500	58.43 PK	74.00	-15.57	1.96 H	328	23.82	34.61
6	2483.500	47.35 AV	54.00	-6.61	1.96 H	328	12.78	34.61
7	4958.000	51.41 PK	74.00	-22.59	1.38 H	231	9.61	41.79
8	4958.000	40.33 AV	54.00	-13.63	1.38 H	231	-1.43	41.79

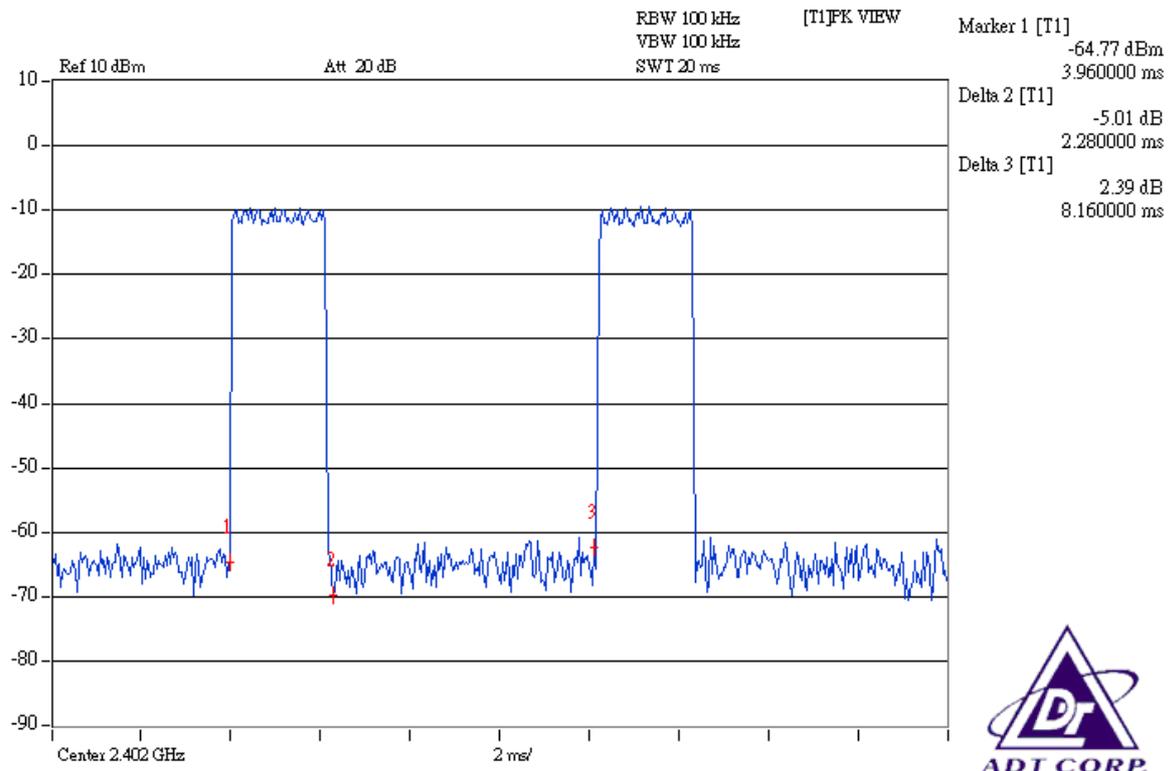
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

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	1652.000	62.09 PK	74.00	-11.91	1.19 V	180	29.81	32.28
2	1652.000	51.01 AV	54.00	-2.95	1.19 V	180	18.77	32.28
3	*2479.000	85.10 PK			1.10 V	196	50.50	34.60
4	*2479.000	74.02 AV			1.10 V	196	39.46	34.60
5	2483.500	58.61 PK	74.00	-15.39	1.10 V	196	24.00	34.61
6	2483.500	47.53 AV	54.00	-6.43	1.10 V	196	12.96	34.61
7	4958.000	51.50 PK	74.00	-22.50	1.00 V	171	9.70	41.79
8	4958.000	40.42 AV	54.00	-13.54	1.00 V	171	-1.34	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
 6. The average value of fundamental frequency is: Average = Peak value + 20log(Duty cycle) Where the duty factor is calculated from following formula:

$$20\log(\text{Duty cycle}) = 20\log \frac{2.28 \text{ ms}}{8.16 \text{ ms}} = -11.08\text{dB}$$

Please see page 27 for plotted duty.



$$20\log(\text{Duty cycle}) = 20\log \frac{2.28 \text{ ms}}{8.16 \text{ ms}} = -11.08\text{dB}$$

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. 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.

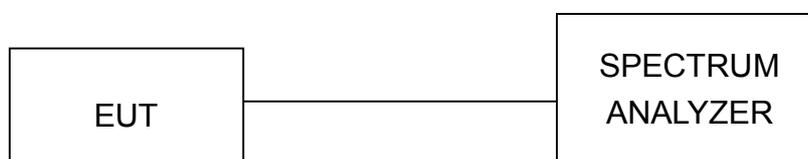
4.3.3 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 100kHz 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



4.3.6 EUT OPERATING CONDITIONS

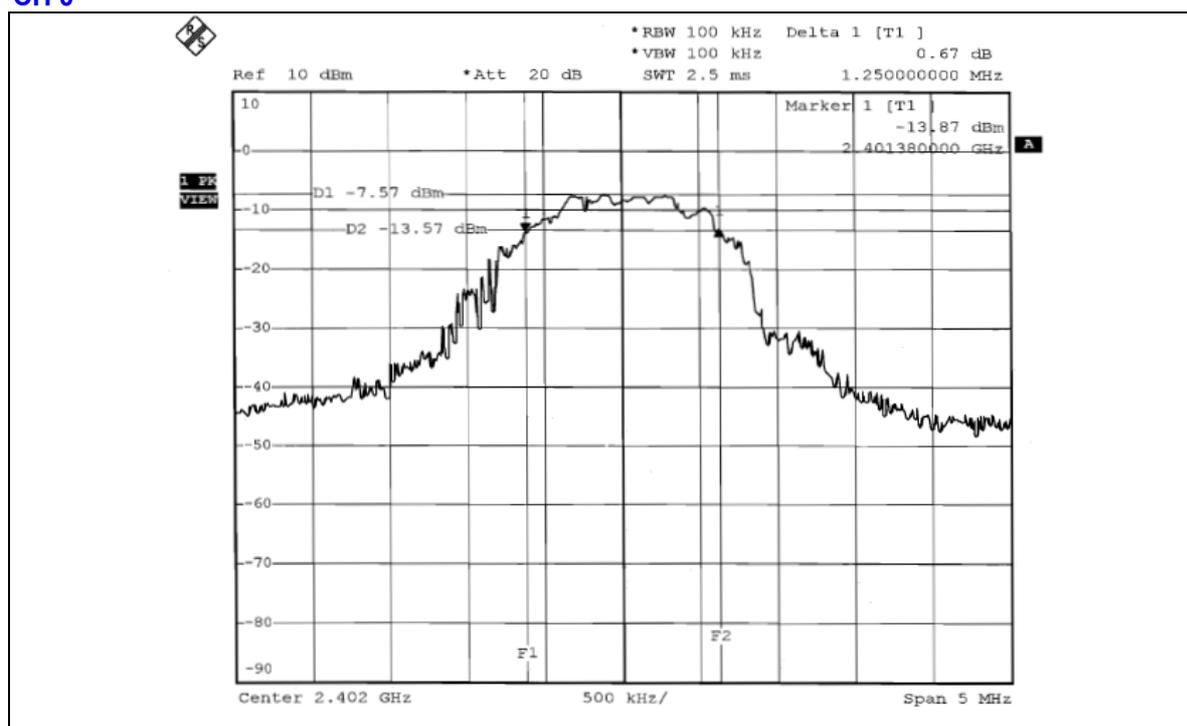
The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

4.3.7 TEST RESULTS

MODULATION TYPE	GFSK	CHANNEL	0, 38, 77
INPUT POWER	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	24deg. C, 66%RH, 1001hPa
TESTED BY	Jamison Chan		

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS/FAIL
0	2402	1.25	0.5	PASS
38	2440	1.23	0.5	PASS
77	2479	1.51	0.5	PASS

CH 0





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 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 PROCEDURES

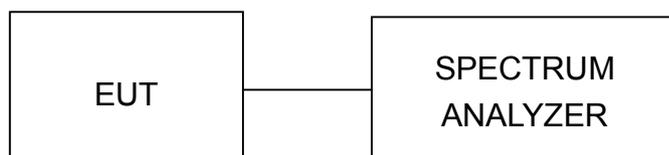
1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. The center frequency of the spectrum analyzer is set to the fundamental frequency and using 3 MHz RBW and 10 MHz VBW, the peak value was measured and recorded.
4. Repeat above procedures until all frequencies measured were complete.

Note: The spectrum plots are attached on following pages.

4.4.4 DEVIATION FROM TEST STANDARD

No deviation

4.4.5 TEST SETUP



4.4.6 EUT OPERATING CONDITIONS

Same as Item 4.3.6

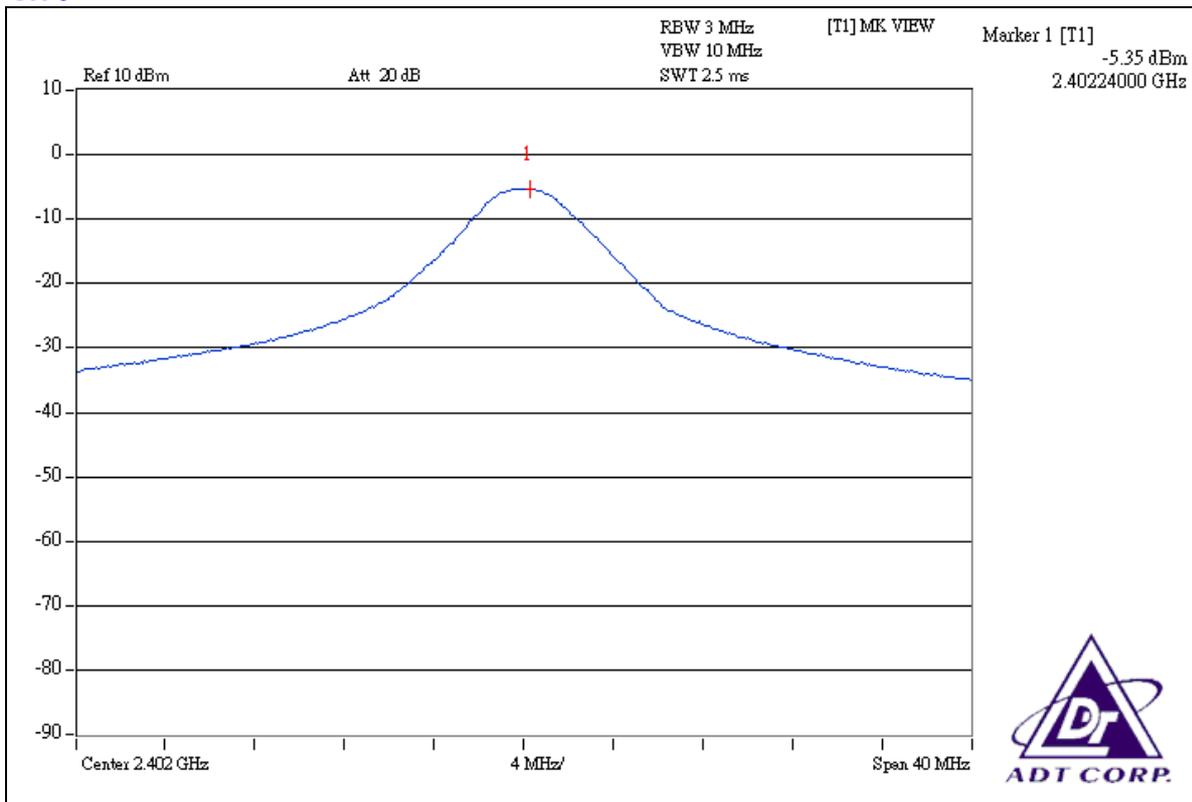
4.4.7 TEST RESULTS

MODULATION TYPE	GFSK	CHANNEL	0, 38, 77
INPUT POWER	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	24deg. C, 66%RH, 1001hPa
TESTED BY	Jamison Chan		

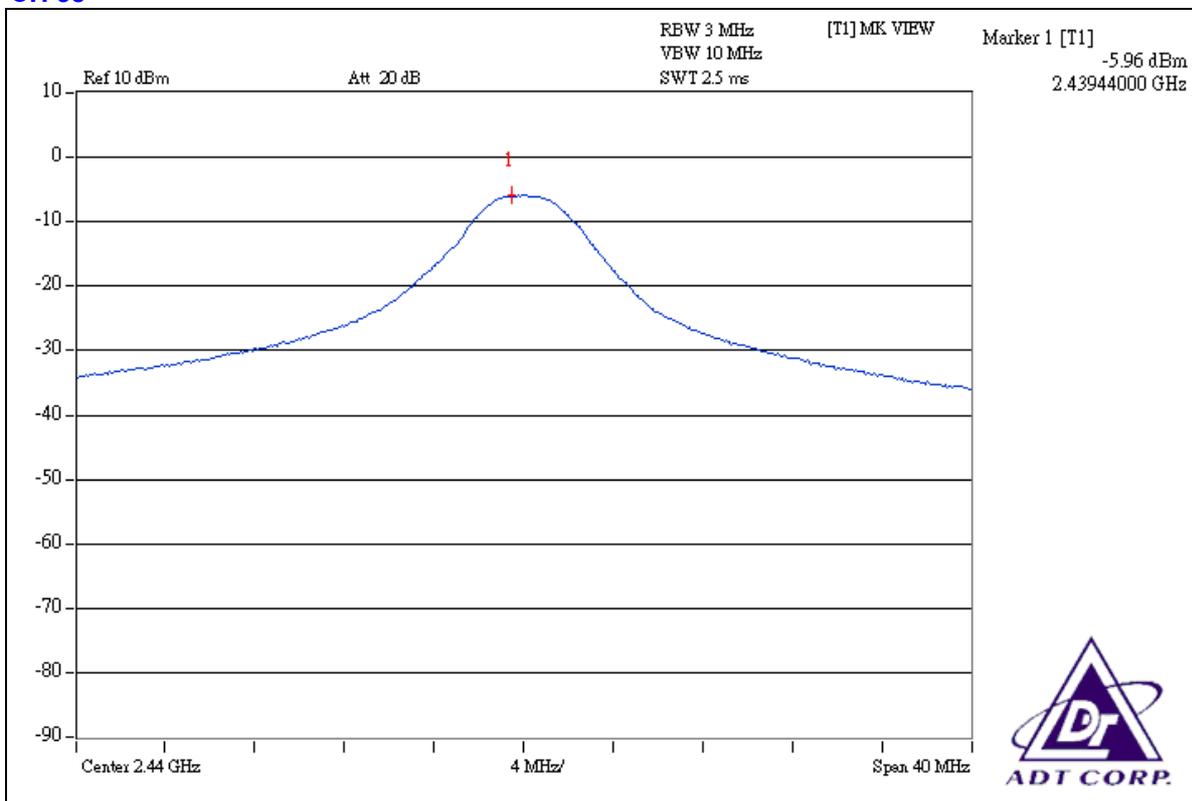
CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (dBm)	PEAK POWER OUTPUT (mW)	PEAK POWER LIMIT (dBm)	PASS/FAIL
0	2402	-5.35	0.292	30	PASS
38	2440	-5.96	0.254	30	PASS
77	2479	-6.76	0.211	30	PASS



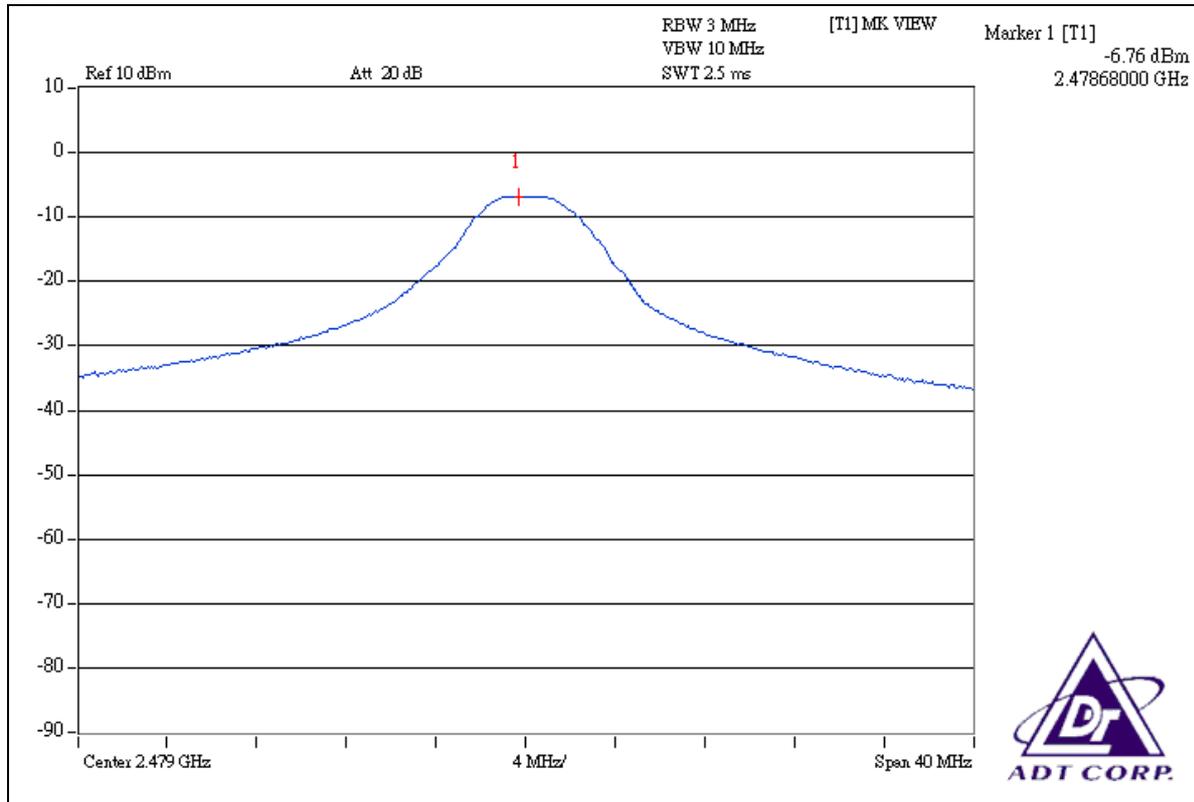
CH 0



CH 38



CH 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. 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.

4.5.3 TEST PROCEDURE

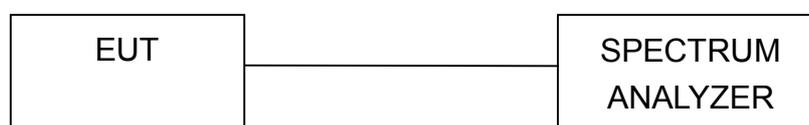
The transmitter output was connected to the spectrum analyzer through an attenuator, the bandwidth of the fundamental frequency was measured with the spectrum analyzer using 3kHz RBW and 30kHz VBW, set sweep time = span/3kHz. The power spectral density was measured and recorded.

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 CONDITION

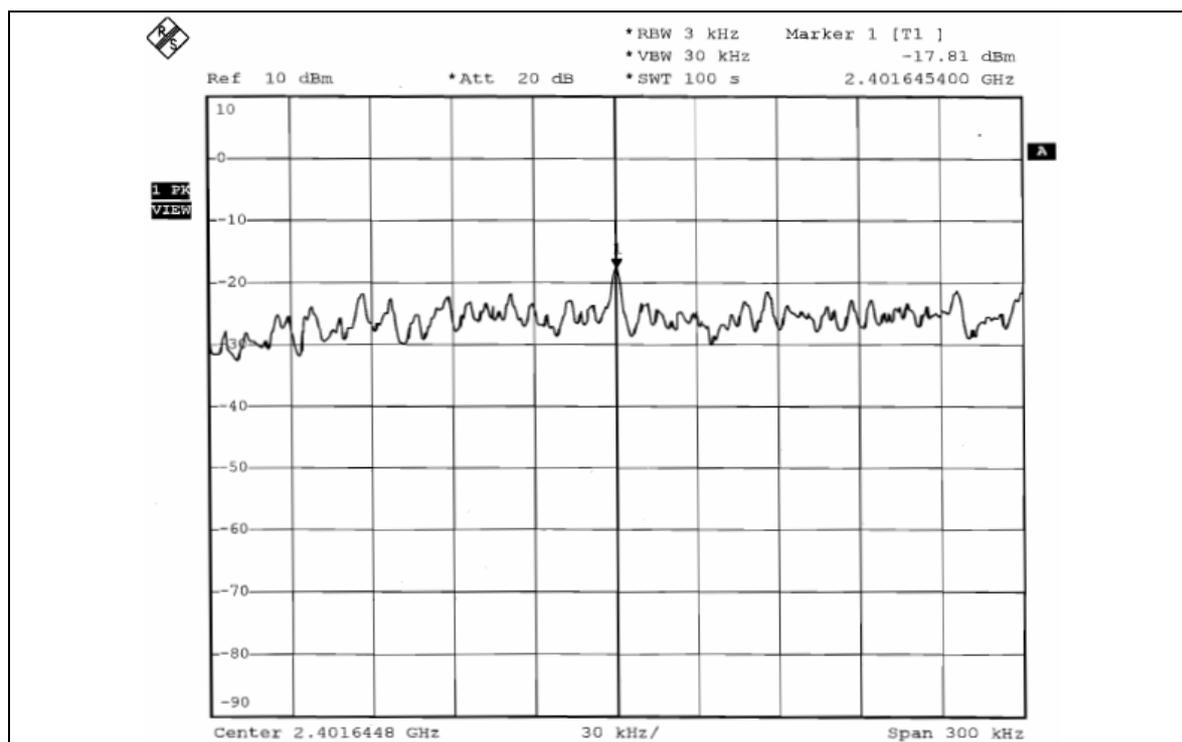
Same as Item 4.3.6

4.5.7 TEST RESULTS

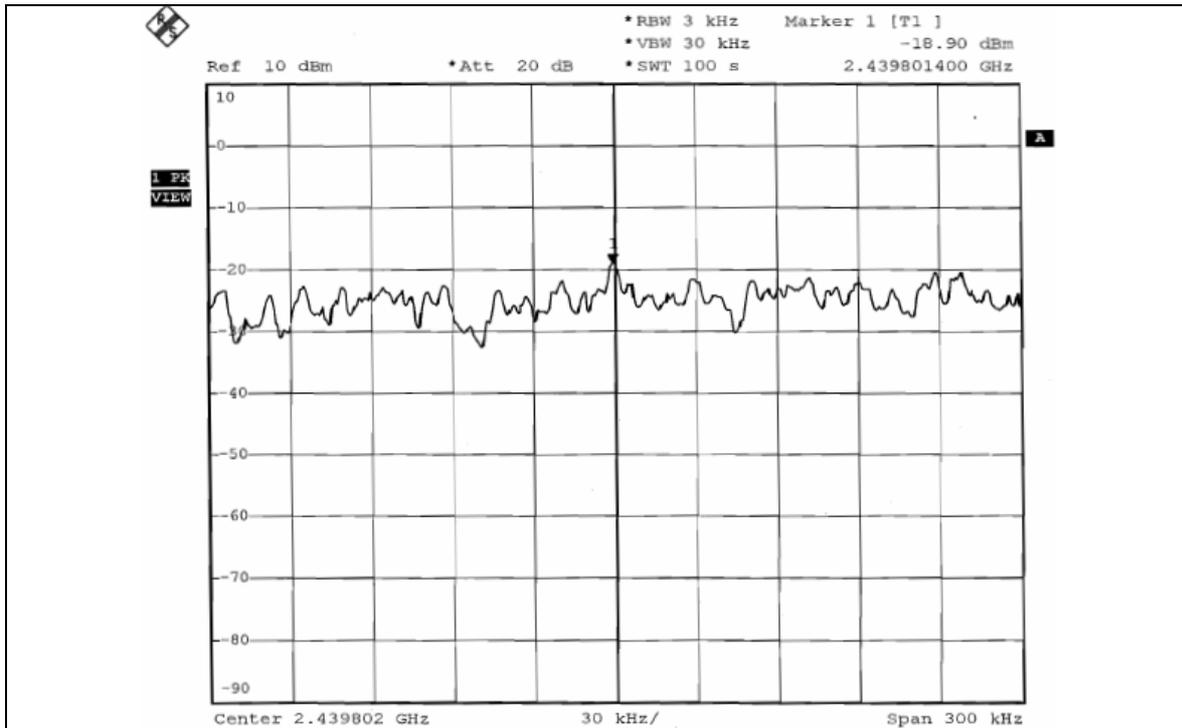
MODULATION TYPE	GFSK	CHANNEL	0, 38, 77
INPUT POWER	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	24deg. C, 66%RH, 1001hPa
TESTED BY	Jamison Chan		

CHANNEL	CHANNEL FREQUENCY (MHz)	RF POWER LEVEL IN 3kHz BW (dBm)	MAXIMUM LIMIT (dBm)	PASS/FAIL
0	2402	-17.81	8	PASS
38	2440	-18.90	8	PASS
77	2479	-20.95	8	PASS

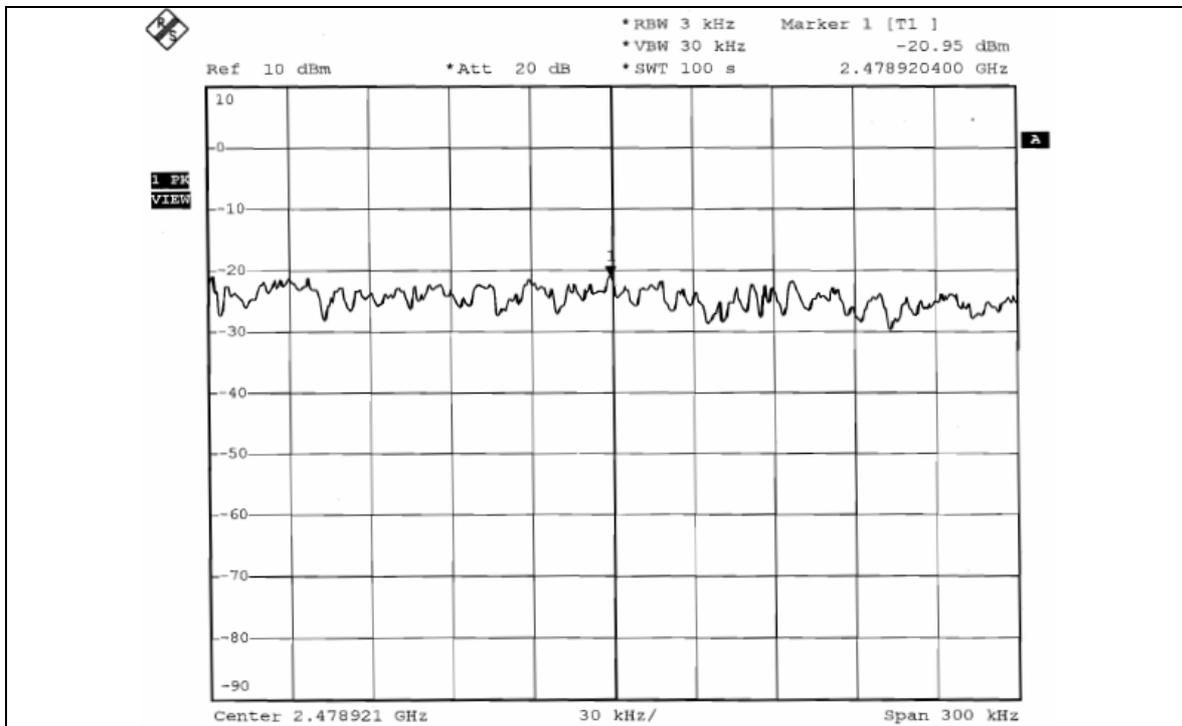
CH 0



CH 38



CH 77





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. 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.

4.6.3 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 100 kHz and 100 kHz suitable frequency span including 100 MHz bandwidth from band edge. The band edges was measured and recorded.

The spectrum plots (Peak RBW=VBW=100kHz) are attached on the following pages.

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 6 images. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement in part 15.247(d).

Note 1:

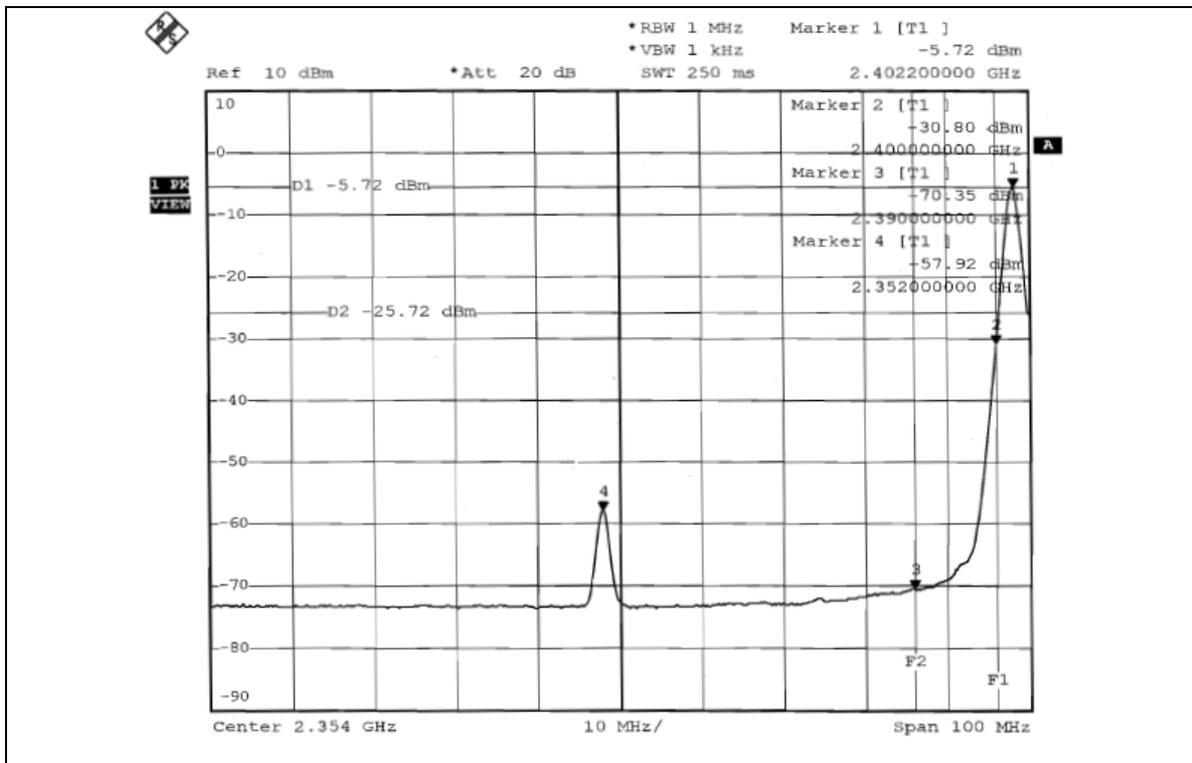
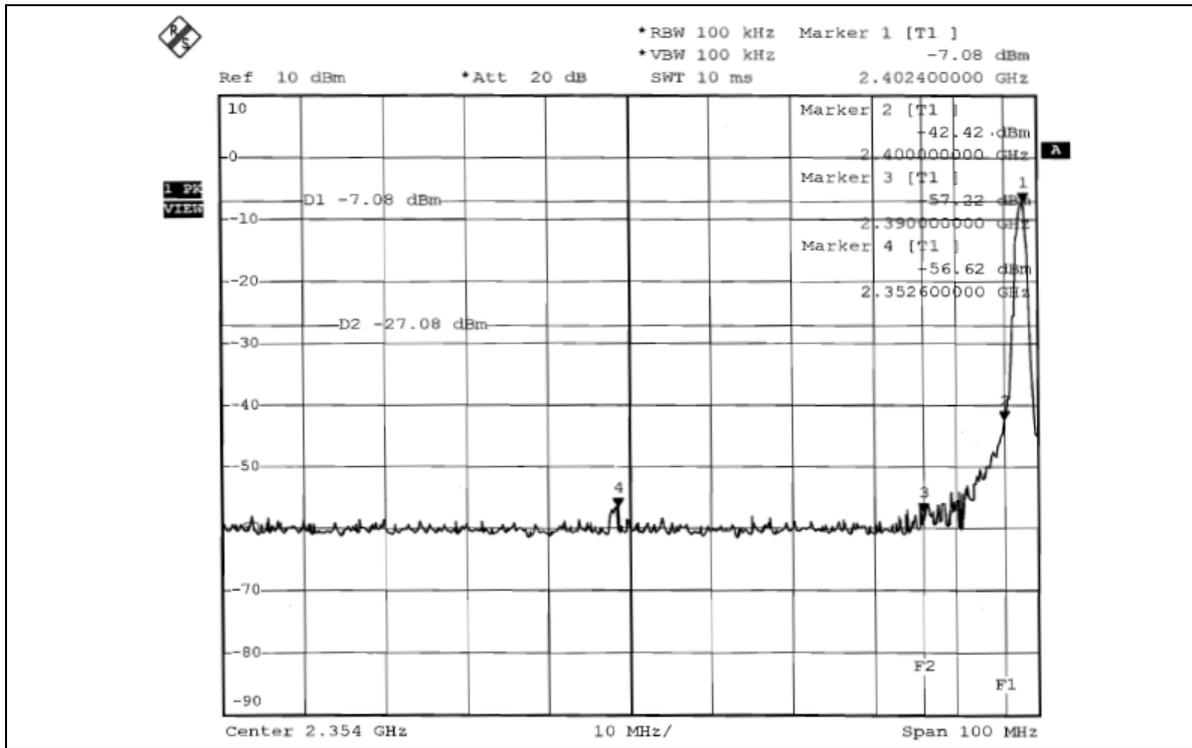
The band edge emission plot on the next page shows 49.54dBc between carrier maximum power and local maximum emission in restrict band (2.3526GHz). The emission of carrier strength list in the test result of channel 0 at the item 4.2.7 is 83.87dBuV/m (Peak), so the maximum field strength in restrict band is $83.87 - 49.54 = 34.33$ dBuV/m which is under 74dBuV/m limit.

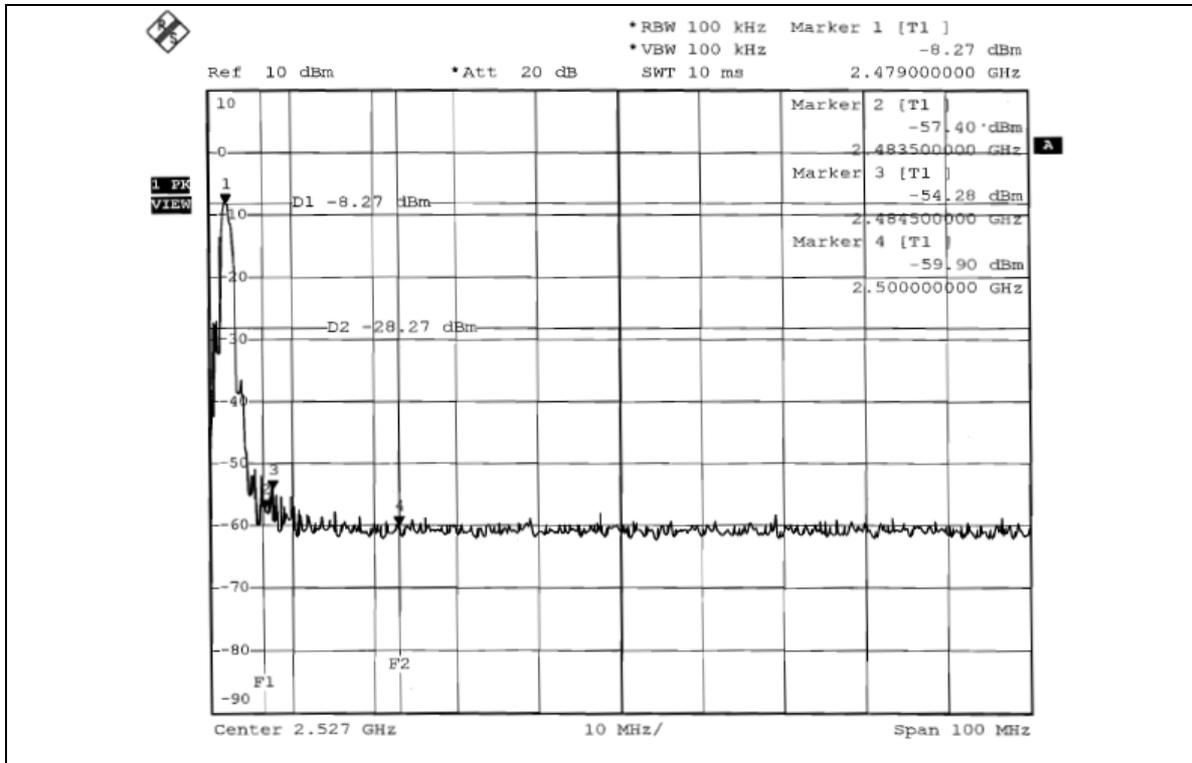
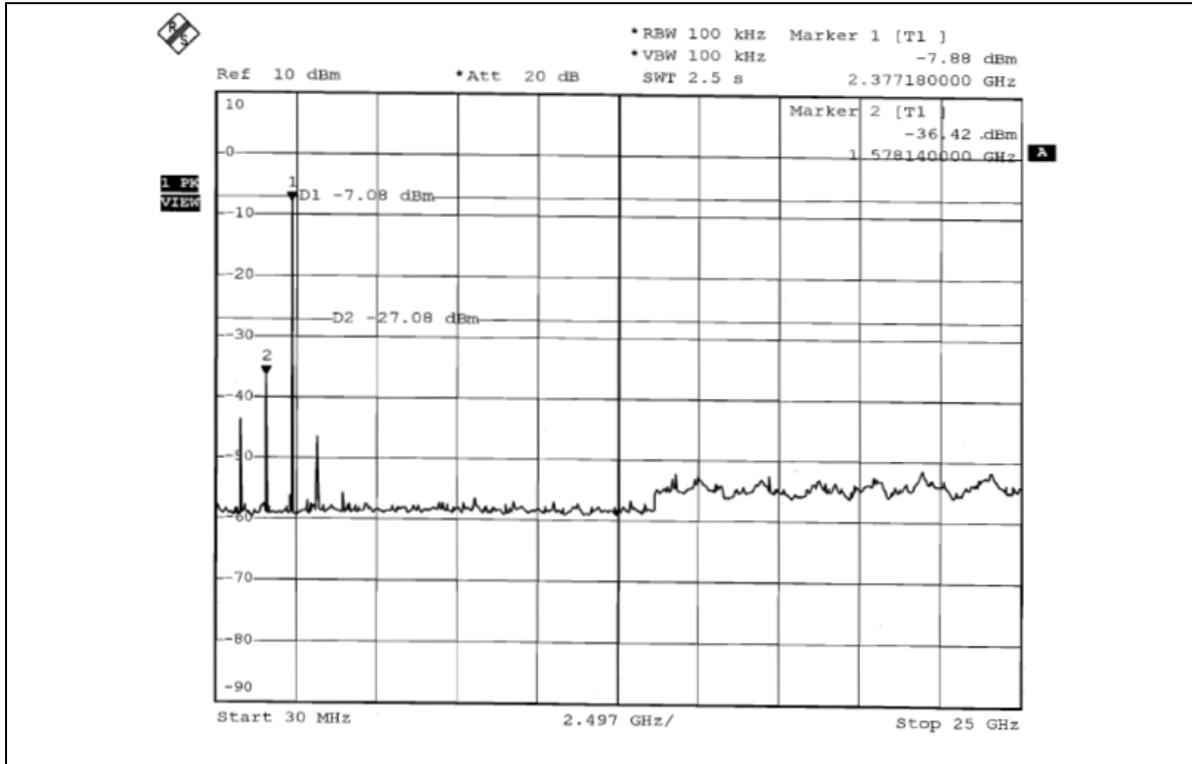
The band edge emission plot on the next page shows 52.20dBc between carrier maximum power and local maximum emission in restrict band (2.3520GHz). The emission of carrier strength list in the test result of channel 0 at the item 4.2.7 is 72.81dBuV/m (Average), so the maximum field strength in restrict band is $72.81 - 52.20 = 20.61$ dBuV/m which is under 54dBuV/m limit.

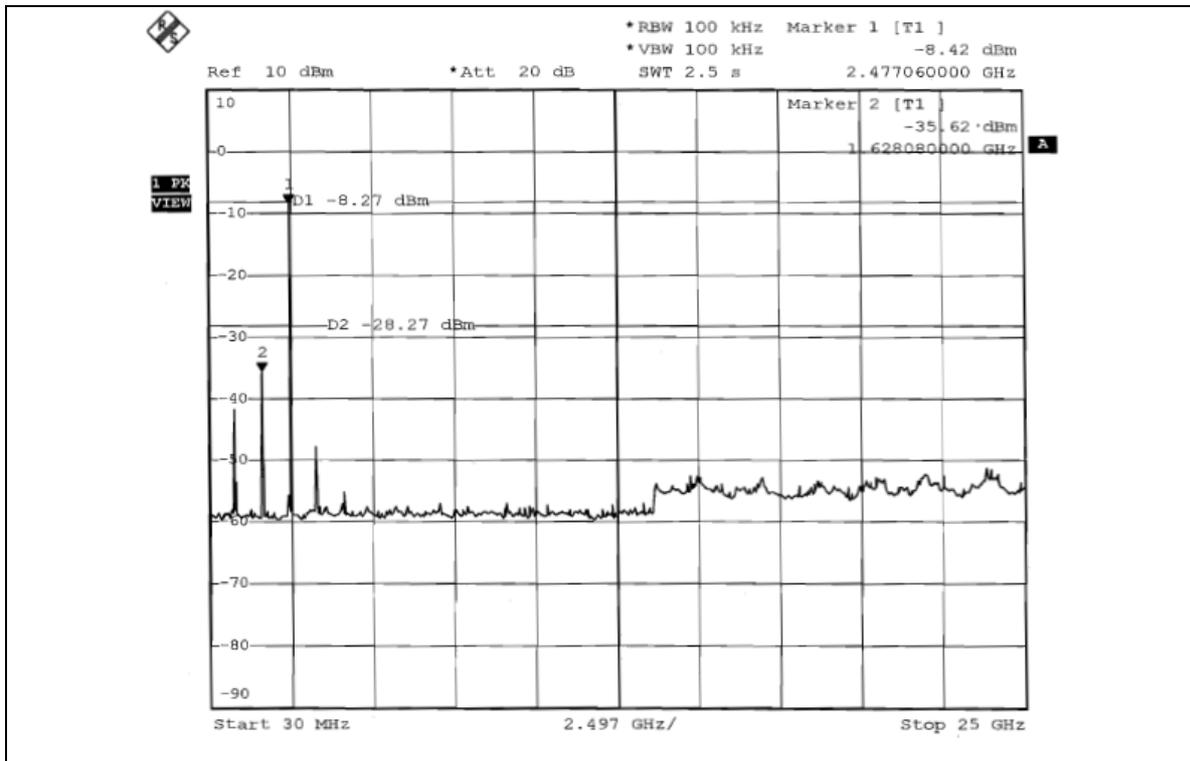
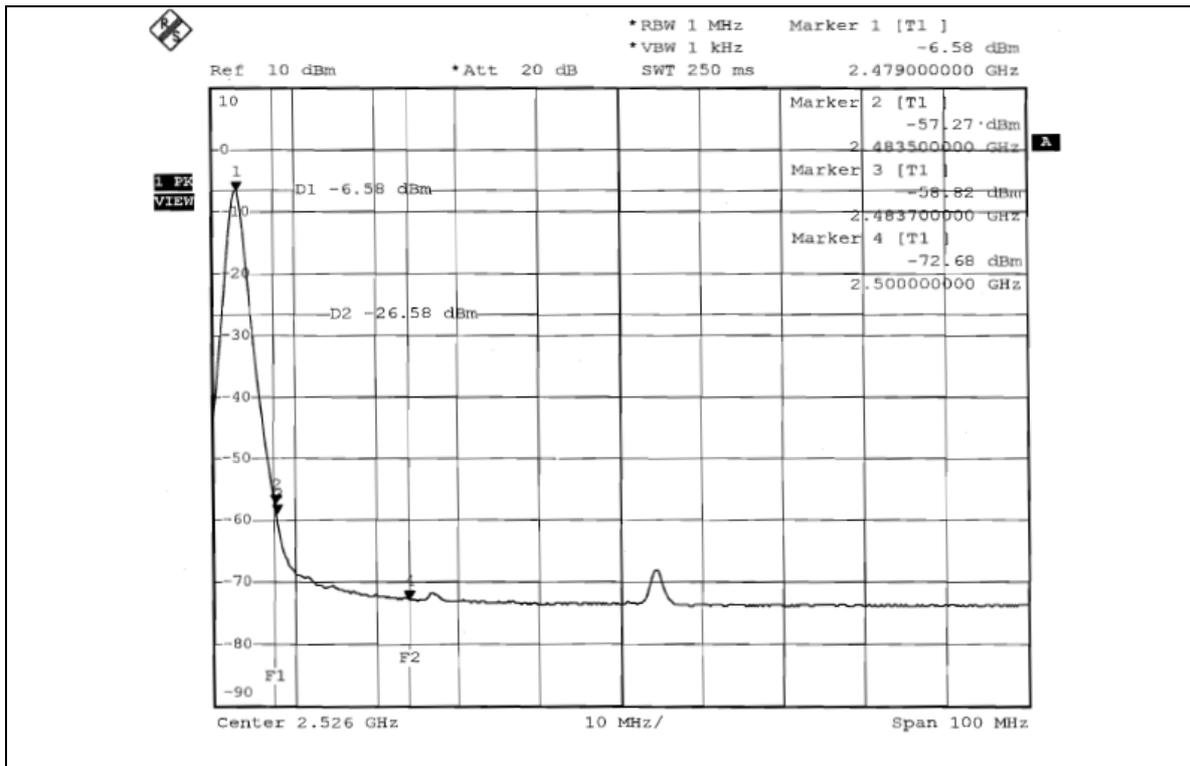
Note 2:

The band edge emission plot on the next second page shows 46.01dBc between carrier maximum power and local maximum emission in restrict band (2.4845GHz). The emission of carrier strength list in the test result of channel 77 at the item 4.2.7 is 85.10dBuV/m (Peak), so the maximum field strength in restrict band is $85.10 - 46.01 = 39.09$ dBuV/m which is under 74dBuV/m limit.

The band edge emission plot on the next third page shows 50.69dBc between carrier maximum power and local maximum emission in restrict band (2.4835GHz). The emission of carrier strength list in the test result of channel 77 at the item 4.2.7 is 74.04dBuV/m (Average), so the maximum field strength in restrict band is $74.04 - 50.69 = 23.35$ 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 Printed antenna without connector. The maximum Gain of the antenna is 4dBi.



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	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: 886-2-26051924

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.