



FCC TEST REPORT

REPORT NO.: RF970514A07-1

MODEL NO.: M01024-D

RECEIVED: May 15, 2008

TESTED: May 27 ~ 28, 2008

ISSUED: May 30, 2008

APPLICANT: ACCO Brands, Inc.

ADDRESS: 333 Twin Dolphin Drive, 6th Floor, Redwood Shores, CA, 94065, USA

ISSUED BY: Advance Data Technology Corporation

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

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1. CERTIFICATION

PRODUCT: Ci95m Wireless Mouse With Nano Receiver
BRAND NAME: Kensington
MODEL NO.: M01024-D
APPLICANT: ACCO Brands, Inc.
TESTED: May 27 ~ 28, 2008
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 : Celia Chen , **DATE:** May 30, 2008
(Celia Chen / Specialist)

TECHNICAL ACCEPTANCE : Jamison Chan , **DATE:** May 30, 2008
Responsible for RF (Jamison Chan / Supervisor)

APPROVED BY : Ken Liu , **DATE:** May 30, 2008
(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 -20.08dB at 0.233MHz
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 -5.10dB at 105.812MHz
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	Ci95m Wireless Mouse With Nano Receiver
MODEL NO.	M01024-D
FCC ID	GV3M01024-D
POWER SUPPLY	5Vdc from host equipment
MODULATION TYPE	GFSK
OUTPUT POWER	0.861mW
FREQUENCY RANGE	2402MHz ~ 2479MHz
NUMBER OF CHANNEL	78
ANTENNA TYPE	Printed antenna with 0dBi gain
DATA CABLE	N/A
I/O PORTS	USB port
ASSOCIATED DEVICES	N/A

NOTE:

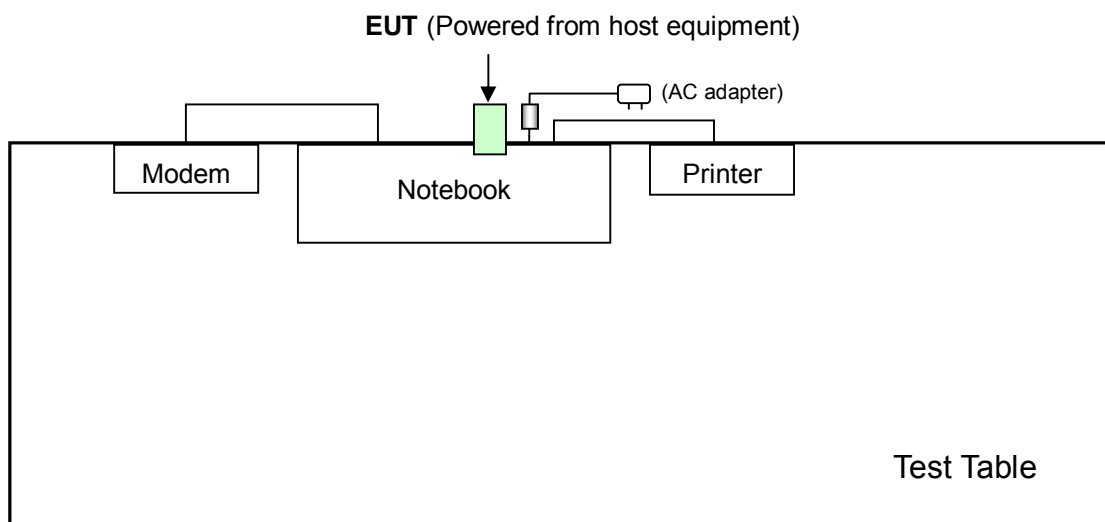
1. The EUT is a transceiver.
2. The above EUT information was declared by the manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.

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	
-	√	√	√	√	-

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	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.

NOTE: The product has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (DoC). The test report has been issued separately.

3.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit 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	PP05L	20375526736	FCC DoC Approved
2	PRINTER	EPSON	LQ-300+	DCGY017054	FCC DoC Approved
3	MODEM	ACEEX	1414	980020520	IFAXDM1414

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	N/A
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).

4. TEST TYPES AND RESULTS

4.1 CONDUCTED EMISSION MEASUREMENT

4.1.1 LIMITS OF 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.

4.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
ROHDE & SCHWARZ Test Receiver	ESCS 30	838251/021	Dec. 19, 2008
ROHDE & SCHWARZ Artificial Mains Network (for EUT)	ESH3-Z5	100218	Nov. 20, 2008
LISN With Adapter (for EUT)	AD10	C10Ada-001	Nov. 21, 2008
ROHDE & SCHWARZ Artificial Mains Network (for peripherals)	ESH3-Z5	100219	Nov. 08, 2008
ROHDE & SCHWARZ Artificial Mains Network (for peripherals)	ESH3-Z5	894785/020	Jun. 27, 2008
Software	ADT_Cond_V7.3.5	NA	NA
Software	ADT_ISN_V7.3.5	NA	NA
RF cable (JYEBAO)	5D-FB	Cable-C10.01	Feb. 26, 2009
SUHNER Terminator (For ROHDE & SCHWARZ LISN)	65BNC-5001	E1-010773	Feb. 13, 2009

- 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.

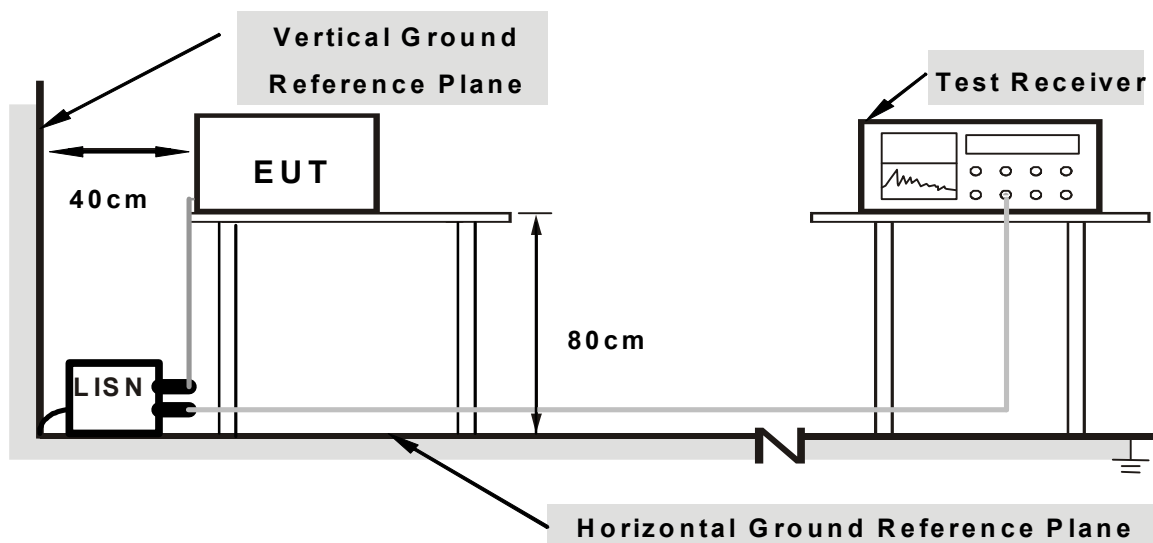
4.1.3 TEST PROCEDURES

- 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.

4.1.4 DEVIATION FROM TEST STANDARD

No deviation.

4.1.5 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 from other units and other metal planes

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

4.1.6 EUT OPERATING CONDITIONS

- a. Connected the EUT to a notebook placed on a testing table.
- b. The notebook ran a test program (provided by manufacturer) to enable EUT under transmission/receiving condition continuously at specific channel frequency.
- c. The notebook sent "H" messages to its screen.
- d. The notebook sent messages to printer and the printer prints them out
- e. The notebook sent messages to modem.
- f. Repeated c ~ f.

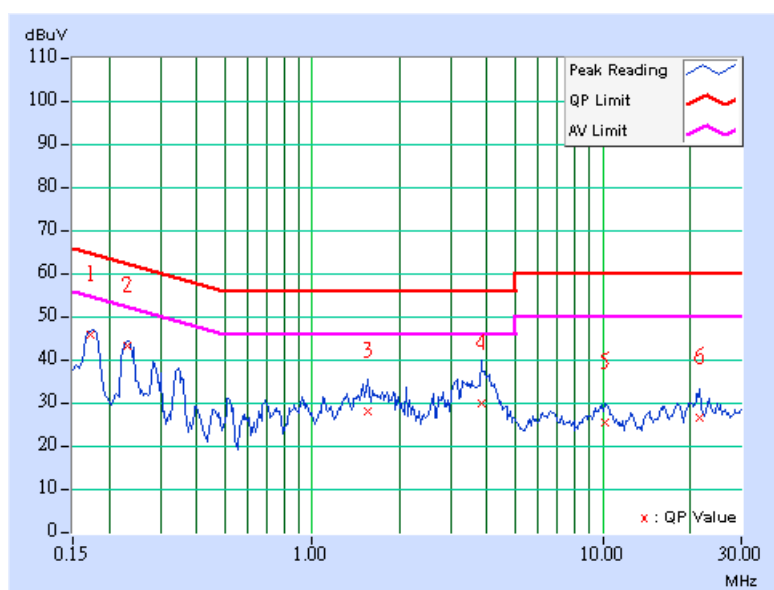
4.1.7 TEST RESULTS

CONDUCTED WORST CASE DATA

MODULATION TYPE	GFSK	CHANNEL	77
INPUT POWER (SYSTEM)	120Vac, 60 Hz	6dB BANDWIDTH	9 kHz
ENVIRONMENTAL CONDITIONS	26deg. C, 72% RH, 993hPa	PHASE	Line 1
TESTED BY	Jun Wu		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.173	0.19	44.46	-	44.65	-	64.80	54.80	-20.15	-
2	0.232	0.22	41.97	-	42.19	-	62.38	52.38	-20.19	-
3	1.559	0.27	26.71	-	26.98	-	56.00	46.00	-29.02	-
4	3.844	0.35	28.64	-	28.99	-	56.00	46.00	-27.01	-
5	10.168	0.77	24.06	-	24.83	-	60.00	50.00	-35.17	-
6	21.555	1.49	25.32	-	26.81	-	60.00	50.00	-33.19	-

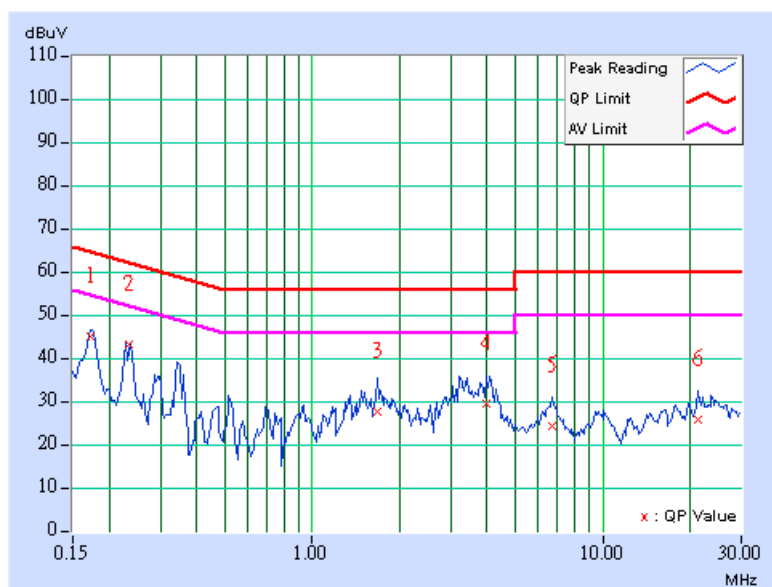
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
 3. The emission levels of other frequencies were very low against the limit.
 4. Margin value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



MODULATION TYPE	GFSK	CHANNEL	77
INPUT POWER (SYSTEM)	120Vac, 60 Hz	6dB BANDWIDTH	9 kHz
ENVIRONMENTAL CONDITIONS	26deg. C, 72% RH, 993hPa	PHASE	Line 2
TESTED BY	Jun Wu		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.173	0.19	44.17	-	44.36	-	64.79	54.79	-20.43	-
2	0.233	0.22	42.06	-	42.28	-	62.36	52.36	-20.08	-
3	1.684	0.26	26.74	-	27.00	-	56.00	46.00	-29.00	-
4	3.977	0.34	28.45	-	28.79	-	56.00	46.00	-27.21	-
5	6.691	0.49	23.27	-	23.76	-	60.00	50.00	-36.24	-
6	21.355	1.18	24.91	-	26.09	-	60.00	50.00	-33.91	-

- 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	8447D	2432A03504	May 08, 2009
HP Preamplifier	8449B	3008A01201	Oct. 01, 2008
HP Preamplifier	8449B	3008A01292	Aug. 05, 2008
ROHDE & SCHWARZ TEST RECEIVER	ES17	836697/012	Dec. 05, 2008
Schwarzbeck Antenna	VULB 9168	137	May 01, 2009
Schwarzbeck Antenna	VHBA 9123	480	Apr. 22, 2009
EMCO Horn Antenna	3115	6714	Oct. 18, 2008
EMCO Horn Antenna	3115	9312-4192	Apr. 20, 2009
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	Nov. 04, 2008
ROHDE & SCHWARZ Spectrum Analyzer	FSP 40	100035	Mar. 25, 2009

- 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 quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- 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.

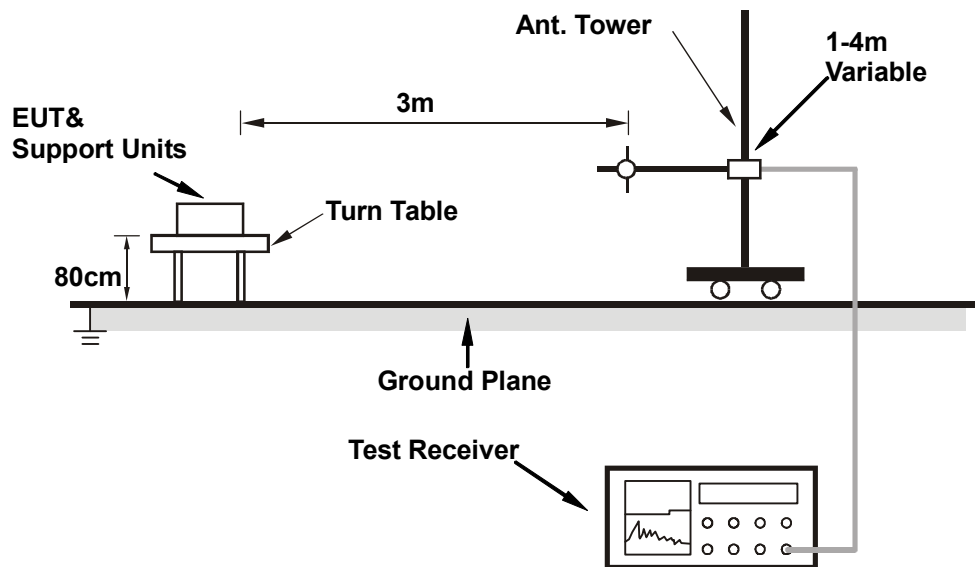
NOTE:

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

MODULATION TYPE	GFSK	CHANNEL	77
INPUT POWER (SYSTEM)	120Vac, 60 Hz	FREQUENCY RANGE	Below 1000MHz
ENVIRONMENTAL CONDITIONS	25deg. C, 73% RH, 997hPa	DETECTOR FUNCTION	Quasi-Peak
TESTED BY	Chad Lee		

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	39.719	30.31 QP	40.00	-9.69	1.00 H	7	15.02	15.29
2	103.868	33.69 QP	43.50	-9.81	1.08 H	109	21.99	11.70
3	133.026	33.70 QP	43.50	-9.80	1.00 H	226	19.82	13.89
4	710.361	36.53 QP	46.00	-9.47	1.00 H	247	11.73	24.80
5	757.014	38.71 QP	46.00	-7.29	1.00 H	262	12.78	25.92
6	797.836	36.23 QP	46.00	-9.77	1.00 H	10	9.24	26.99

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	94.148	34.98 QP	43.50	-8.52	1.42 V	127	24.43	10.55
2	105.812	38.40 QP	43.50	-5.10	1.00 V	139	26.51	11.89
3	220.501	34.78 QP	46.00	-11.22	1.00 V	76	21.67	13.11
4	399.339	34.42 QP	46.00	-11.58	1.00 V	175	15.56	18.86
5	521.804	34.85 QP	46.00	-11.15	1.00 V	31	13.12	21.74
6	799.780	34.26 QP	46.00	-11.74	1.00 V	46	7.21	27.04

- 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 DATA: ABOVE 1GHz

MODULATION TYPE	GFSK	CHANNEL	0
INPUT POWER (SYSTEM)	120Vac, 60 Hz	FREQUENCY RANGE	1 ~ 25GHz
ENVIRONMENTAL CONDITIONS	25deg. C, 73% RH, 997hPa	DETECTOR FUNCTION	Peak(PK) Average (AV)
TESTED BY	Chad Lee		

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	1600.000	47.29 PK	74.00	-26.71	1.06 H	30	14.92	32.37
2	1600.000	37.25 AV	54.00	-16.75	1.06 H	30	4.88	32.37
3	2390.000	60.53 PK	74.00	-13.47	1.09 H	36	25.87	34.66
4	2390.000	45.56 AV	54.00	-8.44	1.09 H	36	10.90	34.66
5	*2402.000	93.71 PK			1.09 H	36	59.02	34.69
6	*2402.000	82.12 AV			1.09 H	36	47.43	34.69
7	4804.000	52.41 PK	74.00	-21.59	1.58 H	195	10.50	41.91
8	4804.000	38.40 AV	54.00	-15.60	1.58 H	195	-3.51	41.91

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	1600.000	43.40 PK	74.00	-30.60	1.00 V	250	11.03	32.37
2	1600.000	30.25 AV	54.00	-23.75	1.00 V	250	-2.12	32.37
3	2390.000	58.07 PK	74.00	-15.93	1.18 V	351	23.41	34.66
4	2390.000	45.54 AV	54.00	-8.46	1.18 V	351	10.88	34.66
5	*2402.000	89.55 PK			1.18 V	351	54.86	34.69
6	*2402.000	79.77 AV			1.18 V	351	45.08	34.69
7	4804.000	51.44 PK	74.00	-22.56	1.13 V	3	9.53	41.91
8	4804.000	36.86 AV	54.00	-17.14	1.13 V	3	-5.05	41.91

- 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

MODULATION TYPE	GFSK	CHANNEL	38
INPUT POWER (SYSTEM)	120Vac, 60 Hz	FREQUENCY RANGE	1 ~ 25GHz
ENVIRONMENTAL CONDITIONS	25deg. C, 73% RH, 997hPa	DETECTOR FUNCTION	Peak(PK) Average (AV)
TESTED BY	Chad Lee		

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	47.95 PK	74.00	-26.05	1.09 H	29	15.48	32.47
2	1626.000	36.39 AV	54.00	-17.61	1.09 H	29	3.92	32.47
3	*2440.000	89.11 PK			1.04 H	85	54.34	34.77
4	*2440.000	79.59 AV			1.04 H	85	44.82	34.77
5	4880.000	52.28 PK	74.00	-21.72	1.09 H	187	10.16	42.12
6	4880.000	38.38 AV	54.00	-15.62	1.09 H	187	-3.74	42.12

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	44.06 PK	74.00	-29.94	1.31 V	78	11.59	32.47
2	1626.000	30.86 AV	54.00	-23.14	1.31 V	78	-1.61	32.47
3	*2440.000	89.89 PK			1.12 V	341	55.12	34.77
4	*2440.000	78.46 AV			1.12 V	341	43.69	34.77
5	4880.000	51.58 PK	74.00	-22.42	1.38 V	189	9.46	42.12
6	4880.000	37.09 AV	54.00	-16.91	1.38 V	189	-5.03	42.12

- 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

MODULATION TYPE	GFSK	CHANNEL	77
INPUT POWER (SYSTEM)	120Vac, 60 Hz	FREQUENCY RANGE	1 ~ 25GHz
ENVIRONMENTAL CONDITIONS	25deg. C, 73% RH, 997hPa	DETECTOR FUNCTION	Peak(PK) Average (AV)
TESTED BY	Chad Lee		

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	44.64 PK	74.00	-29.36	1.12 H	127	12.07	32.57
2	1652.000	33.55 AV	54.00	-20.45	1.12 H	127	0.98	32.57
3	*2479.000	89.18 PK			1.00 H	32	54.33	34.85
4	*2479.000	80.37 AV			1.00 H	32	45.52	34.85
5	2483.500	67.69 PK	74.00	-6.31	1.00 H	32	32.83	34.86
6	2483.500	45.75 AV	54.00	-8.25	1.00 H	32	10.89	34.86
7	4958.000	56.29 PK	74.00	-17.71	1.00 H	225	13.95	42.34
8	4958.000	45.26 AV	54.00	-8.74	1.00 H	225	2.92	42.34

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	44.87 PK	74.00	-29.13	1.29 V	58	12.30	32.57
2	1652.000	32.34 AV	54.00	-21.66	1.29 V	58	-0.23	32.57
3	*2479.000	86.80 PK			1.00 V	99	51.95	34.85
4	*2479.000	74.64 AV			1.00 V	99	39.79	34.85
5	2483.500	63.31 PK	74.00	-10.69	1.00 V	99	28.45	34.86
6	2483.500	46.94 AV	54.00	-7.06	1.00 V	99	12.08	34.86
7	4958.000	55.38 PK	74.00	-18.62	1.00 V	356	13.04	42.34
8	4958.000	43.35 AV	54.00	-10.65	1.00 V	356	1.01	42.34

- 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 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. 25, 2009

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 300kHz 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

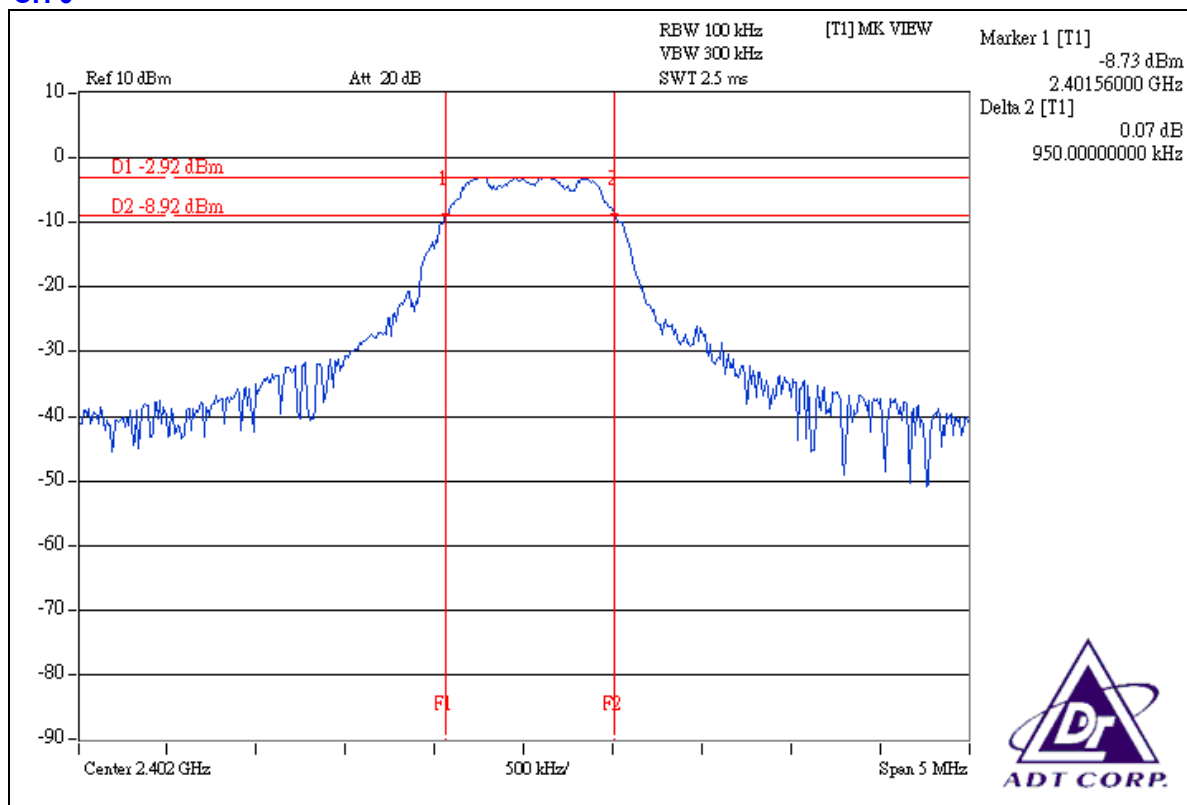
The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

4.3.7 TEST RESULTS

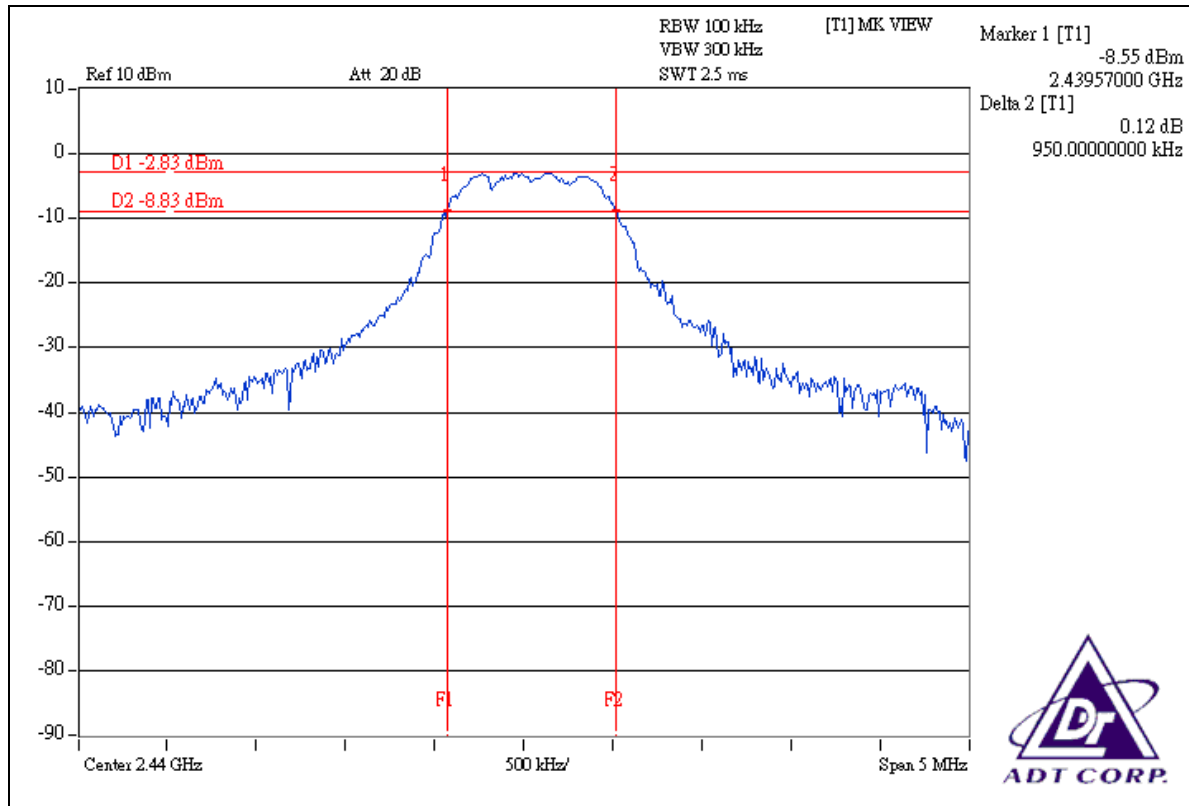
MODULATION TYPE	GFSK	CHANNEL	0, 38, 77
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	23deg. C, 70% RH, 993hPa
TESTED BY	Jun Wu		

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS/FAIL
0	2402	0.95	0.5	PASS
38	2440	0.95	0.5	PASS
77	2479	0.97	0.5	PASS

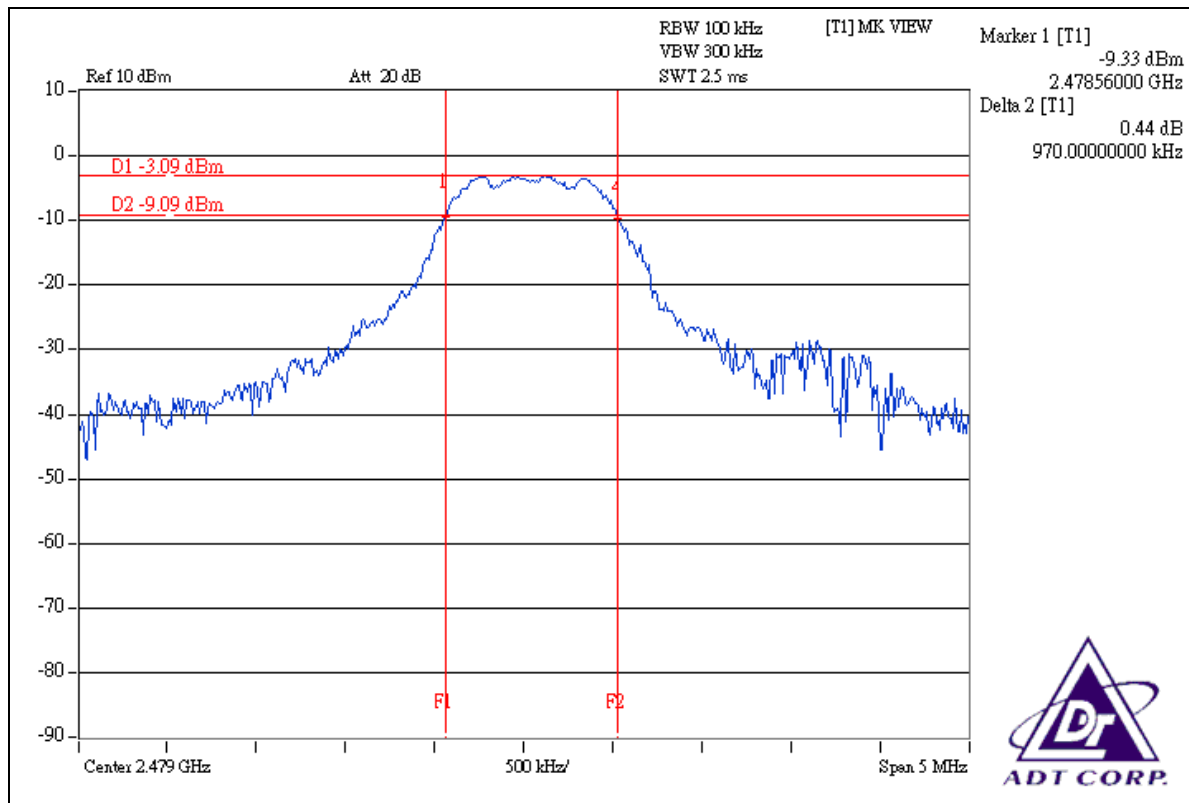
CH 0



CH 38



CH 77





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. 25, 2009

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

4.4.3 TEST PROCEDURES

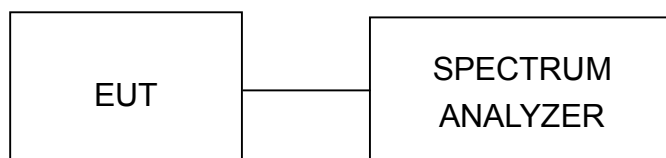
1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring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

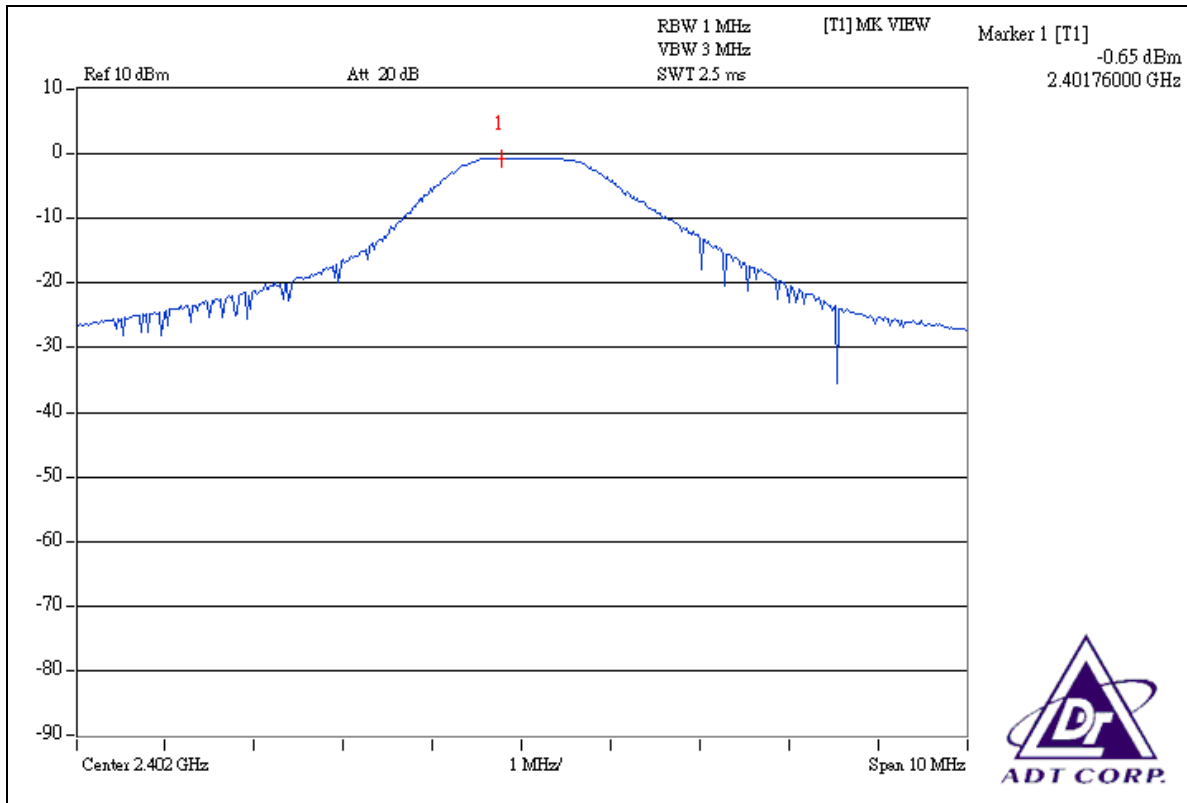
4.4.7 TEST RESULTS

MODULATION TYPE	GFSK	CHANNEL	0, 38, 77
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	23deg. C, 70% RH, 993hPa
TESTED BY	Jun Wu		

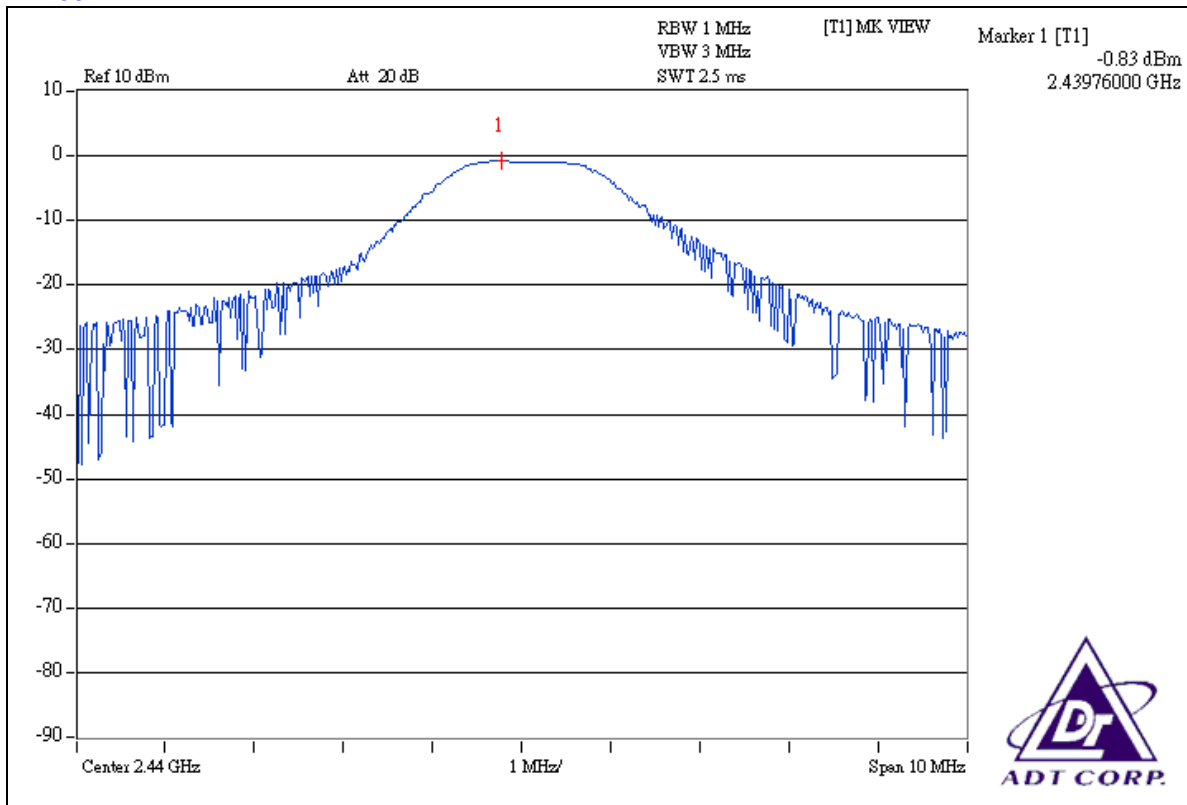
CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (dBm)	PEAK POWER OUTPUT (mW)	PEAK POWER LIMIT (dBm)	PASS/FAIL
0	2402	-0.65	0.861	30	PASS
38	2440	-0.83	0.826	30	PASS
77	2479	-0.93	0.807	30	PASS



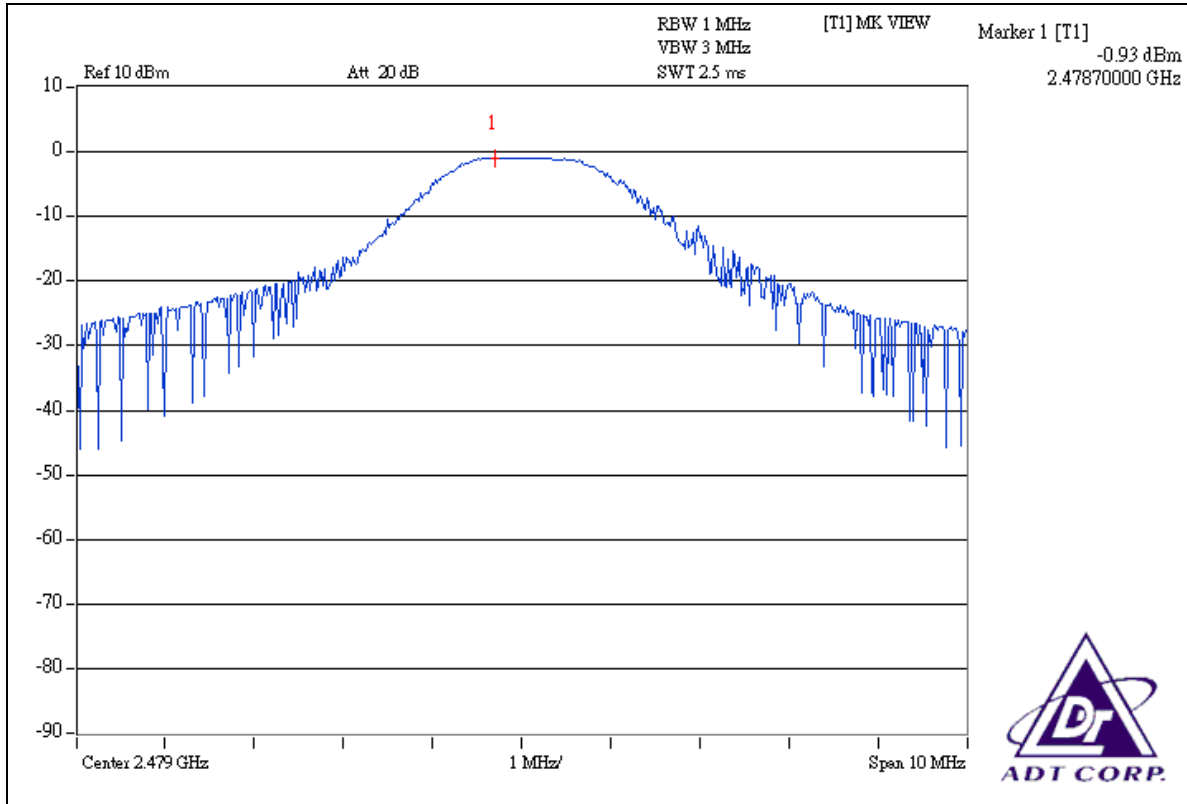
CH 0



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. 25, 2009

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.

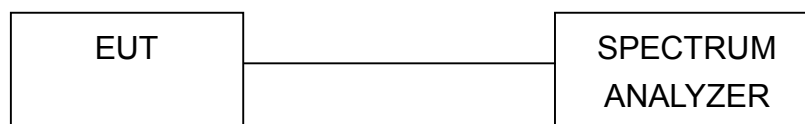
The power spectral density was measured and recorded.

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

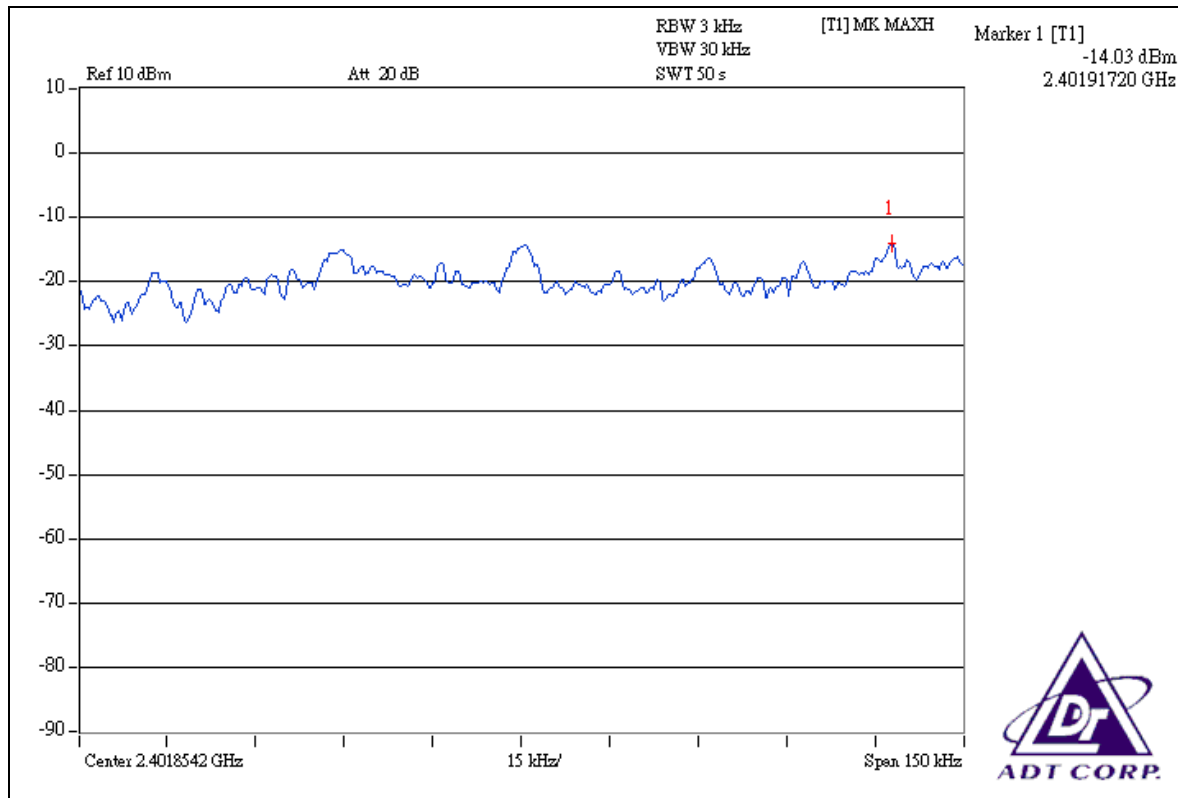
Same as Item 4.3.6

4.5.7 TEST RESULTS

MODULATION TYPE	GFSK	CHANNEL	0, 38, 77
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	23deg. C, 70% RH, 993hPa
TESTED BY	Jun Wu		

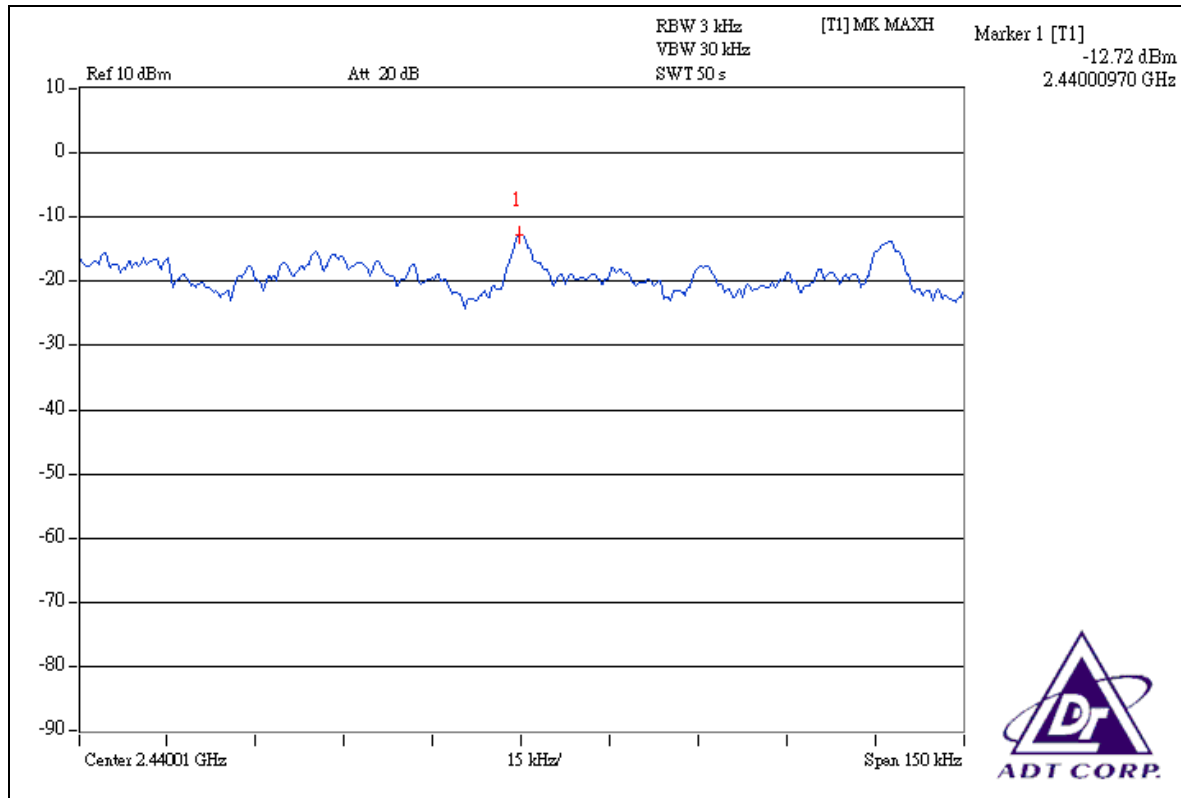
CHANNEL	CHANNEL FREQUENCY (MHz)	RF POWER LEVEL IN 3kHz BW (dBm)	MAXIMUM LIMIT (dBm)	PASS/FAIL
0	2402	-14.03	8	PASS
38	2440	-12.72	8	PASS
77	2479	-12.78	8	PASS

CH 0

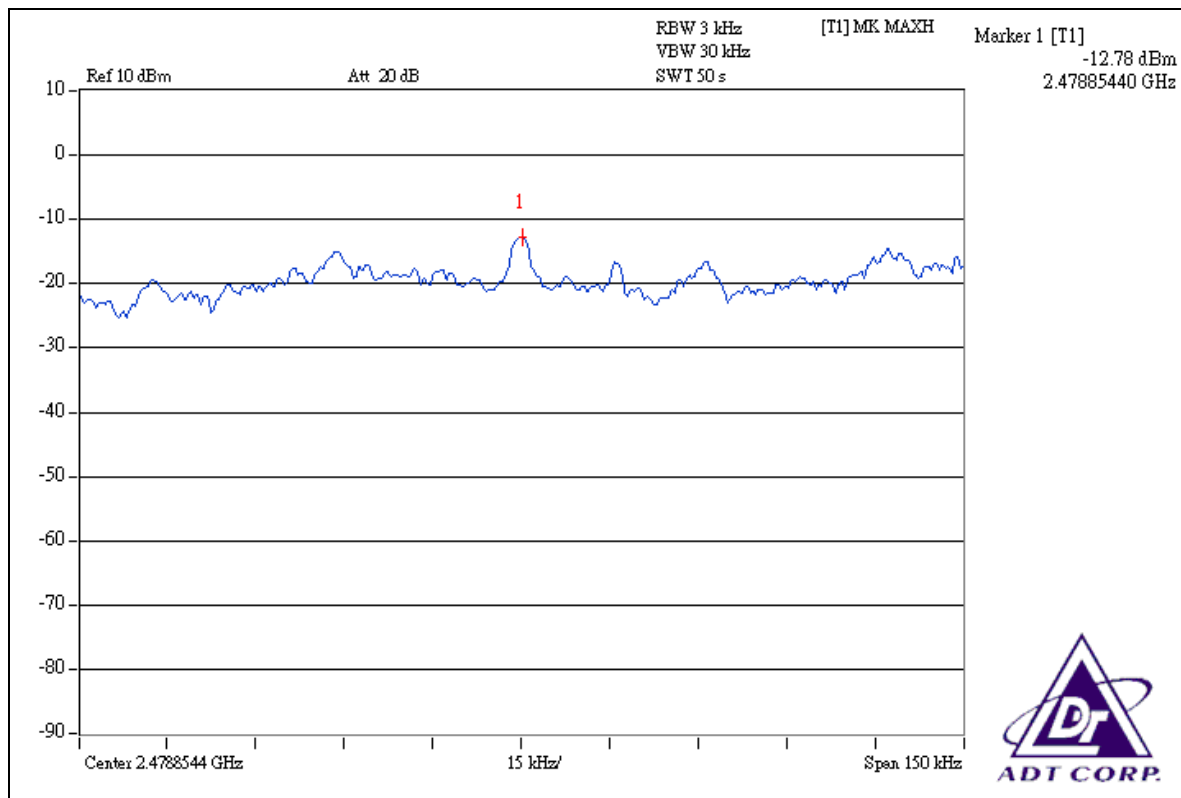




CH 38



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. 25, 2009

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

4.6.3 TEST PROCEDURE

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

The spectrum plots (Peak RBW=100kHz, VBW=300kHz; Average RBW=1MHz, VBW= 10Hz 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:

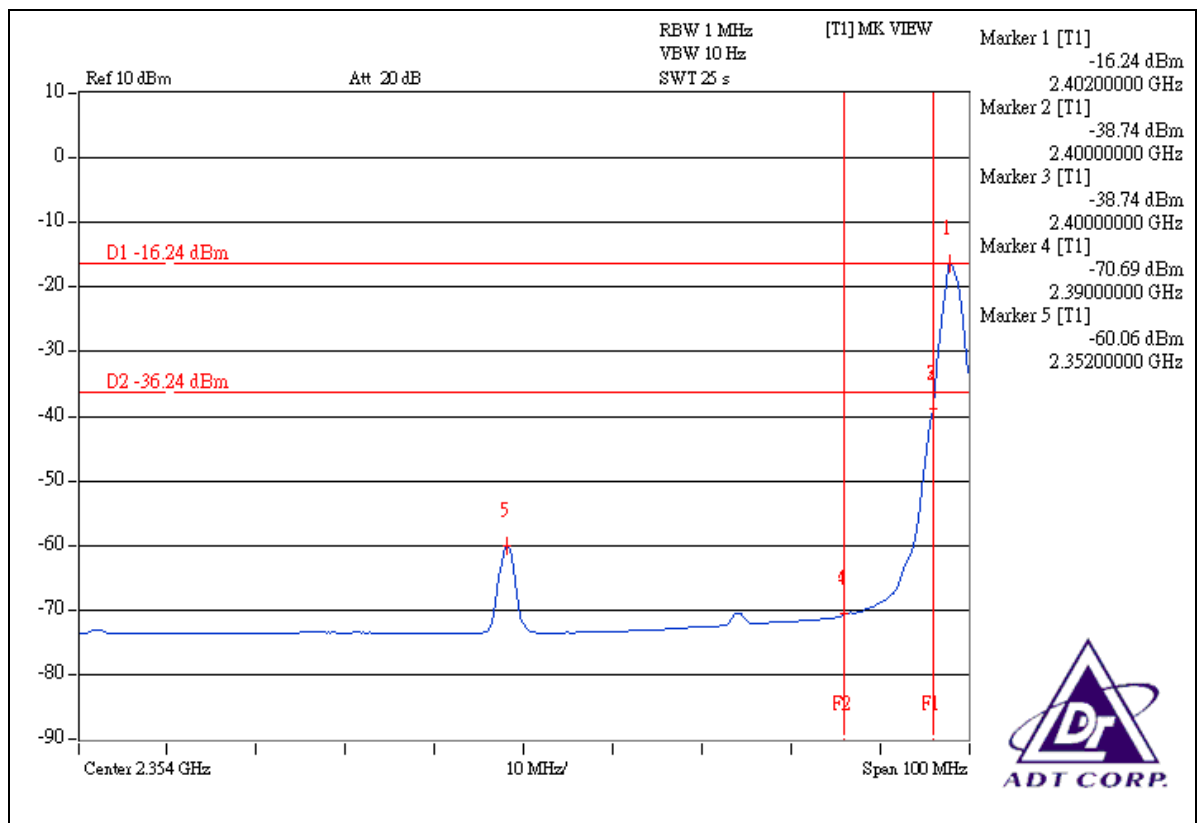
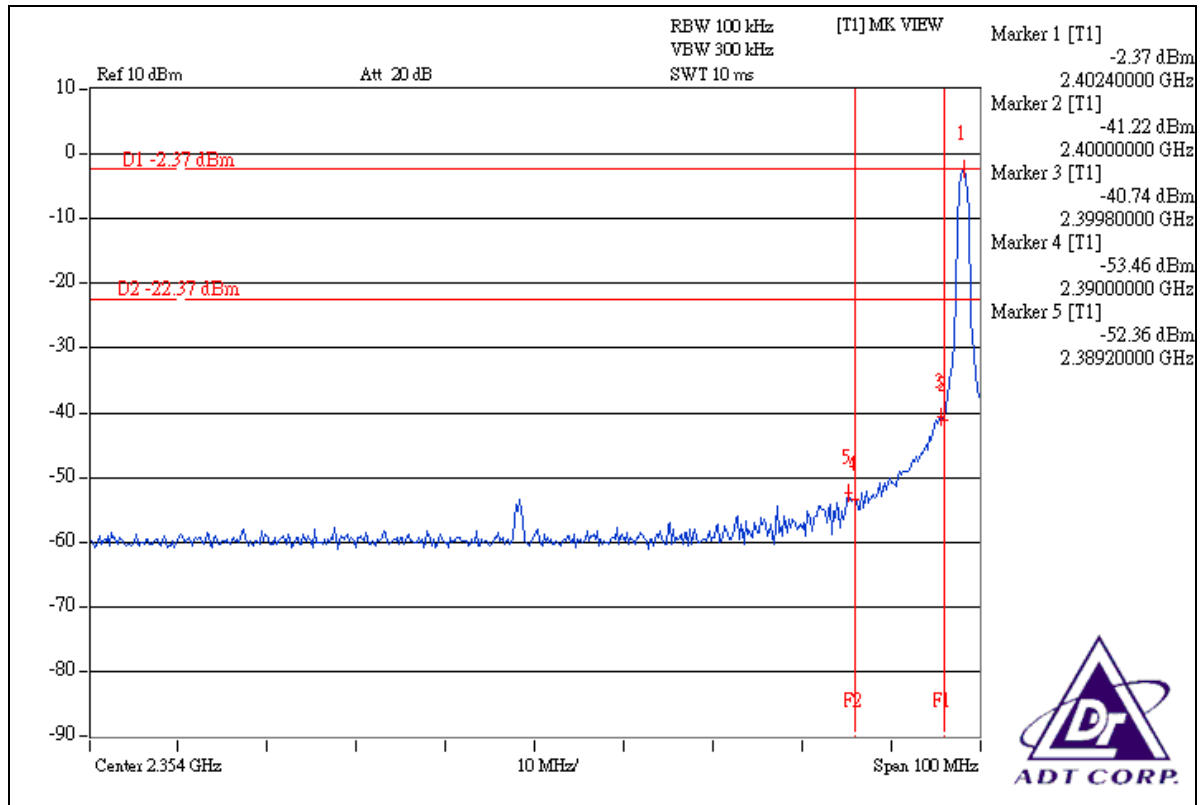
The band edge emission plot on the next page shows 49.99dBc between carrier maximum power and local maximum emission in restrict band (2.38920GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2.7 is 93.71dBuV/m (Peak), so the maximum field strength in restrict band is $93.71 - 49.99 = 43.72$ dBuV/m which is under 74dBuV/m limit.

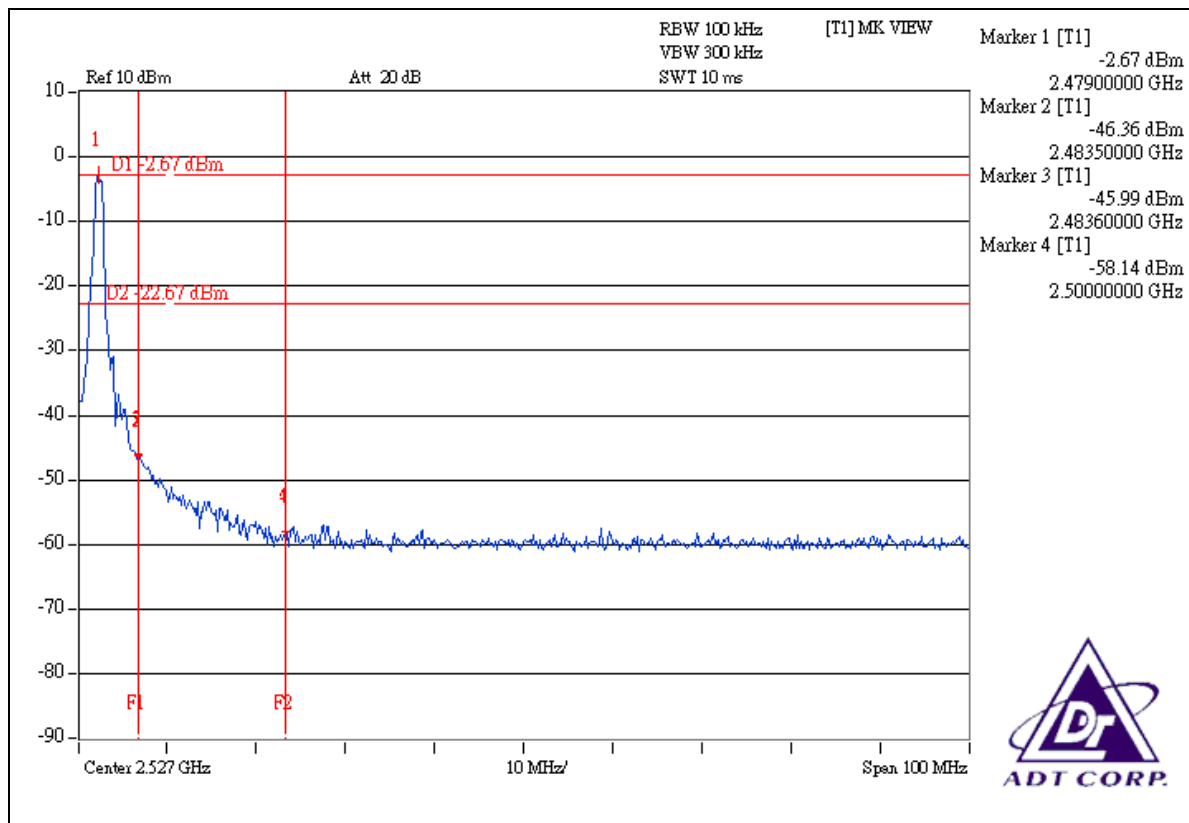
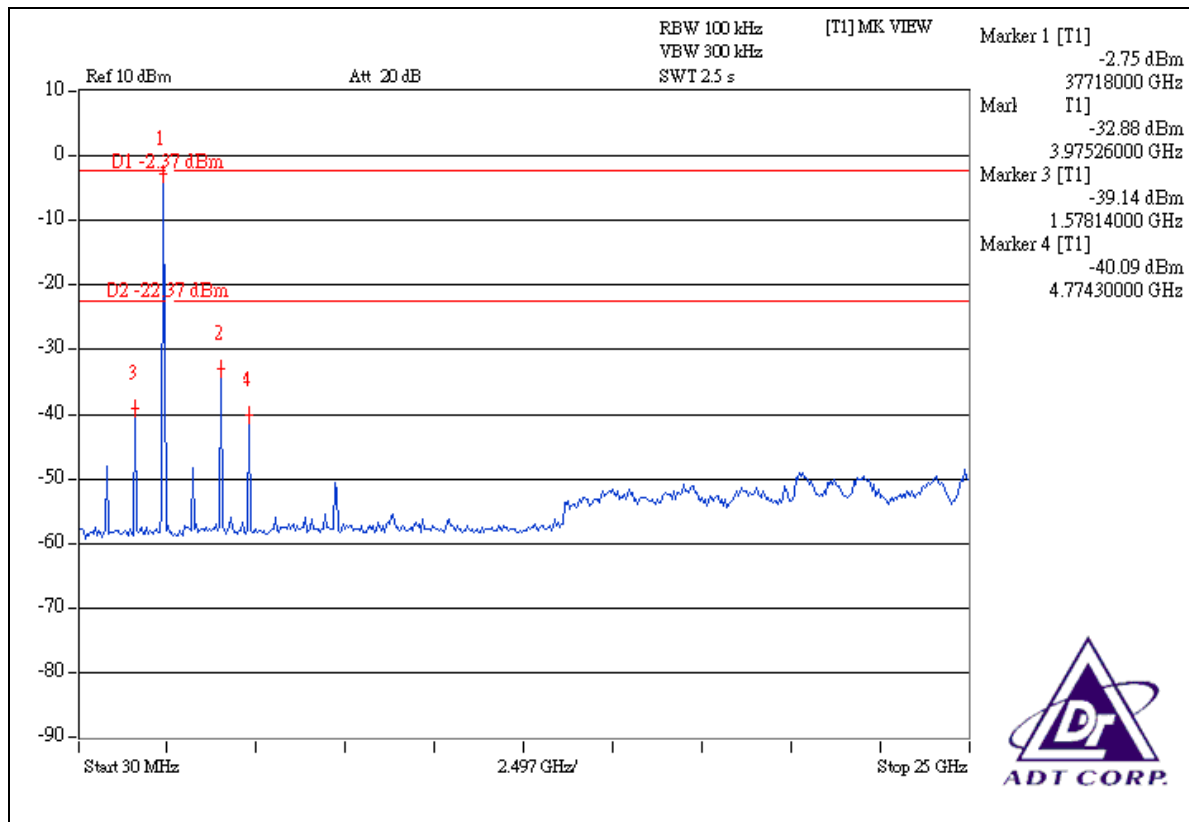
The band edge emission plot the next page shows 43.82dBc between carrier maximum power and local maximum emission in restrict band (2.35200GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2.7 is 82.12dBuV/m (Average), so the maximum field strength in restrict band is $82.12 - 43.82 = 38.30$ dBuV/m which is under 54dBuV/m limit.

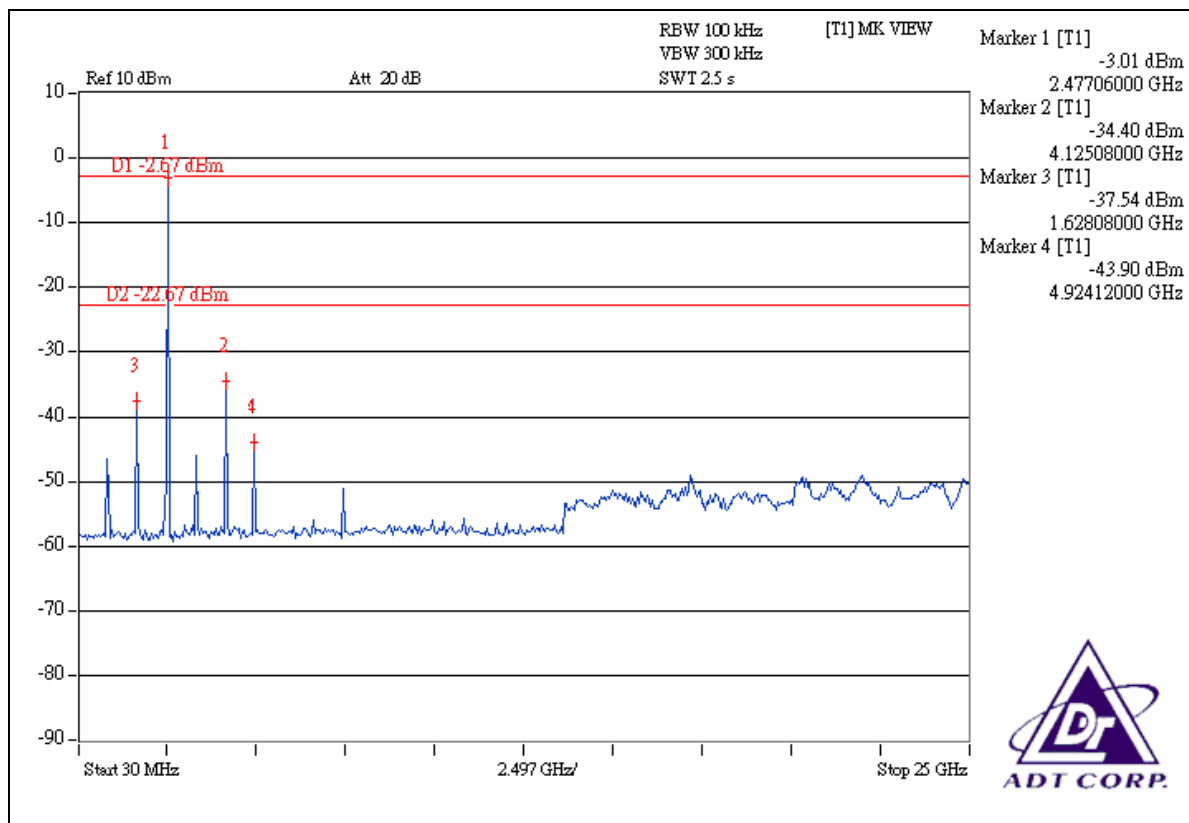
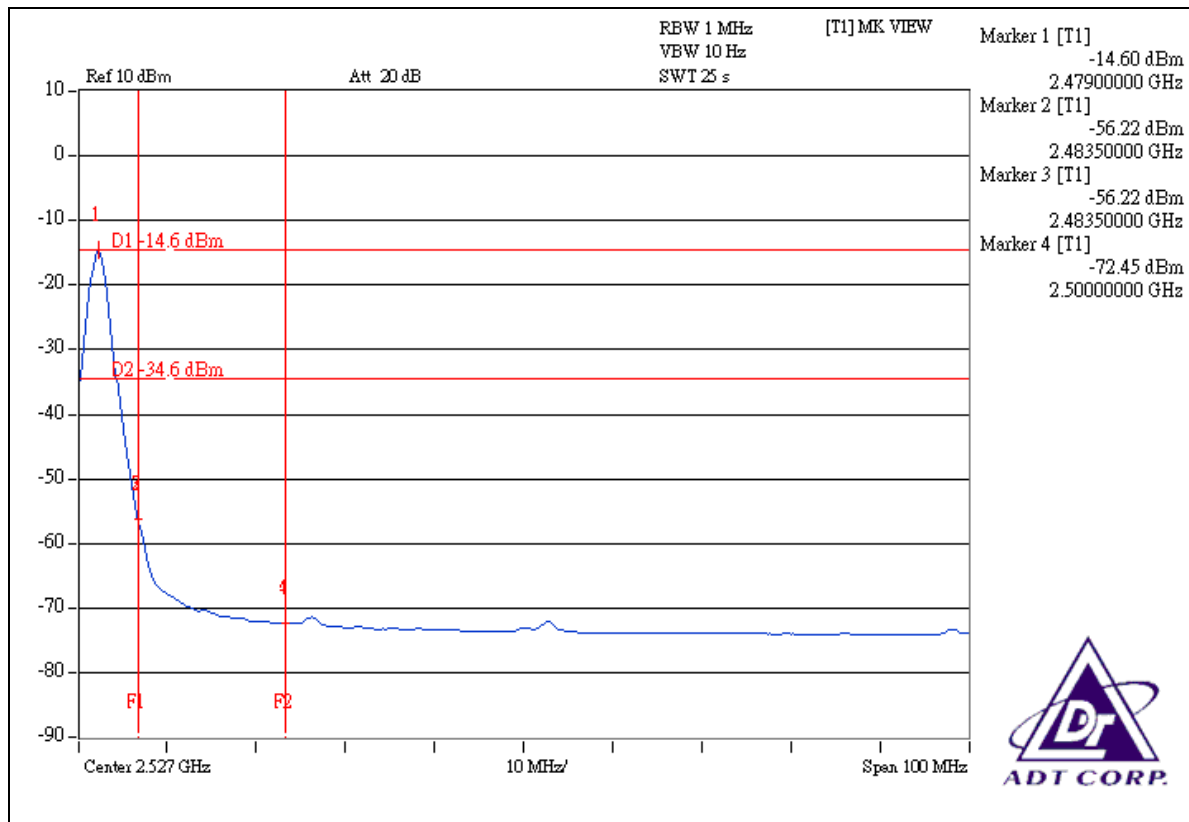
Note 2:

The band edge emission plot on the next second page shows 43.32dBc between carrier maximum power and local maximum emission in restrict band (2.48360GHz). The emission of carrier strength list in the test result of channel 13 at the item 4.2.7 is 89.18dBuV/m (Peak), so the maximum field strength in restrict band is $89.18 - 43.32 = 45.86$ dBuV/m which is under 74dBuV/m limit.

The band edge emission plot on the next third page shows 41.62dBc between carrier maximum power and local maximum emission in restrict band (2.48350GHz). The emission of carrier strength list in the test result of channel 13 at the item 4.2.7 is 80.37dBuV/m (Average), so the maximum field strength in restrict band is $80.37 - 41.62 = 38.75$ 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 0dBi.



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.