FCC TEST REPORT

REPORT NO.: RF960716A01
MODEL NO.: MORFBZUO
RECEIVED: July 16, 2007
TESTED: July 20 ~ 25, 2007
ISSUED: Aug. 27, 2007

APPLICANT: PRIMAX ELECTRONICS LTD.

ADDRESS: No. 669, Ruey Kuang Road, Neihu, Taipei, Taiwan, R.O.C.

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:	Espresso Presenter Mouse
BRAND NAME:	PRIMAX, Fujitsu Siemens
MODEL NO.:	MORFBZUO
APPLICANT:	PRIMAX ELECTRONICS LTD.
TESTED:	July 20 ~ 25, 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. 27, 2007
(Annie Chang / Senior Specialist)

TECHNICAL ACCEPTANCE : Jamison Chan **, DATE:** Aug. 27, 2007
Responsible for RF
(Jamison Chan / Senior Engineer)

APPROVED BY : Ken Liu **, DATE:** Aug. 27, 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	N/A	Power supply is 1.5Vdc from battery
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 –4.69dB at 2390.000MHz
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
Radiated emissions	30MHz ~ 1GHz	3.75 dB
	1GHz ~ 40GHz	2.89 dB

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

EUT	Espresso Presenter Mouse
MODEL NO.	MORFBZUO
FCC ID	EMJMMORFBZUO
POWER SUPPLY	1.5Vdc from battery
MODULATION TYPE	GFSK
OUTPUT POWER	0.755mW
FREQUENCY RANGE	2402MHz ~ 2474MHz
NUMBER OF CHANNEL	13
ANTENNA TYPE	Printed antenna with -1.15dBi gain
DATA CABLE	N/A
I/O PORTS	N/A
ASSOCIATED DEVICES	N/A

NOTE:

1. The EUT is a wireless mouse, which is a transceiver.

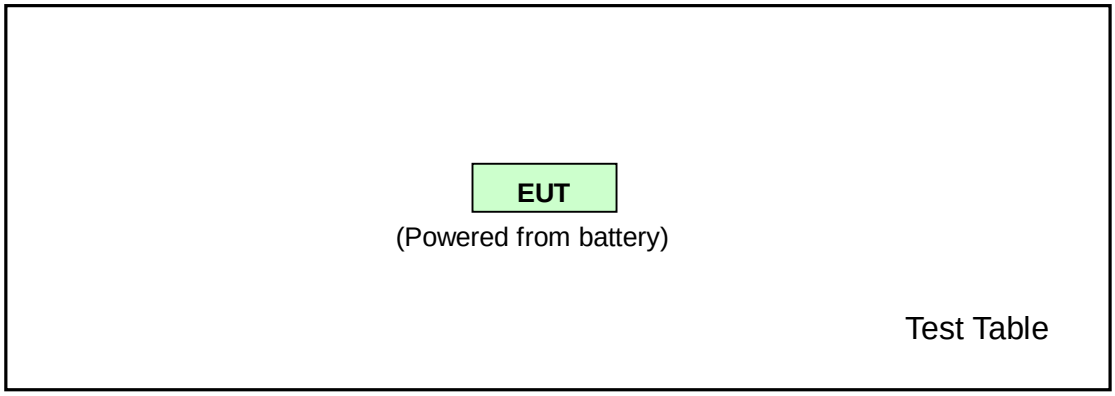
2. The above EUT information was declared by the manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.

3.2 DESCRIPTION OF TEST MODES

Thirteen channels are provided to this EUT.

Channel	Freq. (MHz)	Channel	Freq. (MHz)
1	2402	8	2444
2	2408	9	2450
3	2414	10	2456
4	2420	11	2462
5	2426	12	2468
6	2432	13	2474
7	2438		

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	
-	Note	√	√	√	-

Where PLC: Power Line Conducted Emission RE<1G RE: Radiated Emission below 1GHz
RE≥1G: Radiated Emission above 1GHz APCM: Antenna Port Conducted Measurement

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

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
1 to 13	1	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
1 to 13	1, 7, 13	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
1 to 13	1, 13	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
1 to 13	1, 7, 13	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.

4. TEST TYPES AND RESULTS

4.1 CONDUCTED EMISSION MEASUREMENT

N/A

4.2 RADIATED EMISSION MEASUREMENT

4.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT

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

Frequencies (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

NOTE:

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

4.2.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
HP Preamplifier	8447D	2432A03504	May 09, 2008
HP Preamplifier	8449B	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	Apr. 18, 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
Loop Antenna R & S	HFH2-Z2	100070	Nov. 28, 2007

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

4.2.3 TEST PROCEDURES

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi- anechoic. The table was rotated 360 degrees to determine the position of the highest radiation.

b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

c. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

f. If the emission level of the EUT in peak mode was lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions would be re-tested one by one using peak, quasi-peak method or average method as specified and then reported in data sheet.

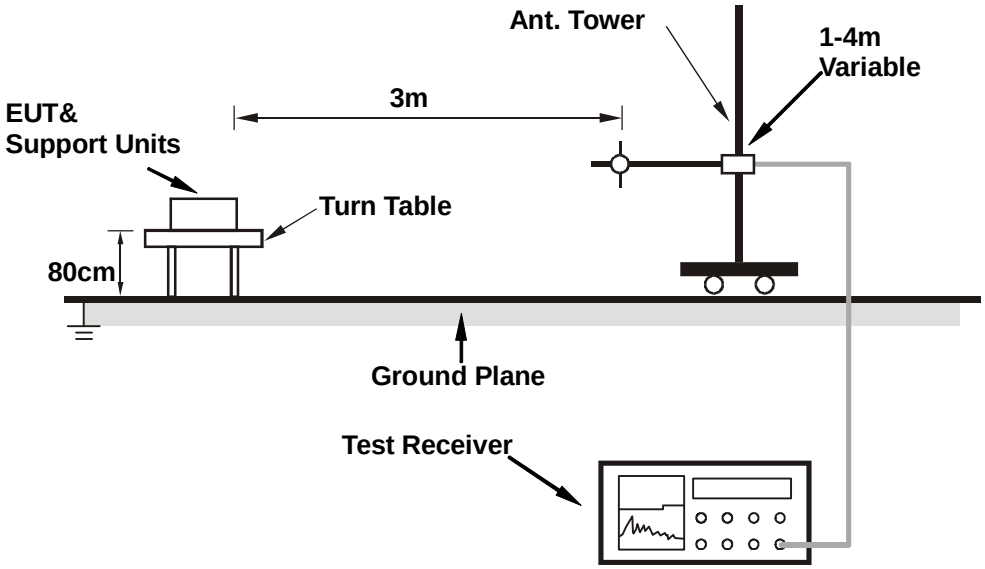
NOTE:

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

4.2.4 DEVIATION FROM TEST STANDARD

No deviation

4.2.5 TEST SETUP



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

4.2.6 EUT OPERATING CONDITIONS

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

4.2.7 TEST RESULTS

RADIATED WORST CASE DATA: BELOW 1GHz

MODULATION TYPE	GFSK	**CHANNEL**	1
INPUT POWER	1.5Vdc	**FREQUENCY RANGE**	Below 1000MHz
ENVIRONMENTAL CONDITIONS	26deg. C, 58%RH, 997Pa	**DETECTOR FUNCTION**	Quasi-Peak
TESTED BY	Jun Wu		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	82.485	30.18 QP	40.00	-9.82	1.47 H	85	19.32	10.86
2	751.182	26.43 QP	46.00	-19.57	1.26 H	124	-1.58	28.01
3	780.341	26.66 QP	46.00	-19.34	1.19 H	268	-1.45	28.11
4	797.836	26.65 QP	46.00	-19.35	1.35 H	253	-1.51	28.16
5	869.760	27.45 QP	46.00	-18.55	1.12 H	10	-1.63	29.08
6	900.862	28.40 QP	46.00	-17.60	1.09 H	1	-1.15	29.55
7	930.020	28.02 QP	46.00	-17.98	1.03 H	43	-1.85	29.87

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	31.944	24.06 QP	40.00	-15.94	1.00 V	124	11.08	12.98
2	66.934	27.30 QP	40.00	-12.70	1.00 V	199	14.08	13.22
3	768.677	26.38 QP	46.00	-19.62	1.08 V	79	-1.69	28.07
4	805.611	26.80 QP	46.00	-19.20	1.13 V	265	-1.44	28.24
5	879.479	28.07 QP	46.00	-17.93	1.20 V	73	-1.16	29.23
6	924.188	28.80 QP	46.00	-17.20	1.32 V	196	-1.01	29.81

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**	1
INPUT POWER	1.5Vdc	**FREQUENCY RANGE**	1 ~ 25GHz
ENVIRONMENTAL CONDITIONS	26deg. C, 58%RH, 997Pa	**DETECTOR FUNCTION**	Peak(PK) Average (AV)
TESTED BY	Jun Wu		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.000	60.46 PK	74.00	-13.54	1.29 H	150	26.04	34.42
2	2390.000	49.00 AV	54.00	-5.00	1.29 H	150	14.58	34.42
3	*2402.000	94.69 PK			1.29 H	150	60.25	34.44
4	*2402.000	70.46 AV			1.29 H	150	36.02	34.44
5	4804.000	50.57 PK	74.00	-23.43	1.13 H	97	9.18	41.39
6	4804.000	37.17 AV	54.00	-16.83	1.13 H	97	-4.22	41.39

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.000	61.30 PK	74.00	-12.70	1.55 V	207	26.88	34.42
2	**2390.000**	**49.31 AV**	**54.00**	**-4.69**	**1.55 V**	**207**	**14.89**	**34.42**
3	*2402.000	85.43 PK			1.55 V	207	50.99	34.44
4	*2402.000	65.33 AV			1.55 V	207	30.89	34.44
5	4804.000	49.40 PK	74.00	-24.60	1.06 V	324	8.01	41.39
6	4804.000	37.71 AV	54.00	-16.29	1.06 V	324	-3.68	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

MODULATION TYPE	GFSK	**CHANNEL**	7
INPUT POWER	1.5Vdc	**FREQUENCY RANGE**	1 ~ 25GHz
ENVIRONMENTAL CONDITIONS	26deg. C, 58%RH, 997Pa	**DETECTOR FUNCTION**	Peak(PK) Average (AV)
TESTED BY	Jun Wu		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2438.000	94.70 PK			1.29 H	144	60.18	34.52
2	*2438.000	70.10 AV			1.29 H	144	35.58	34.52
3	4876.000	51.11 PK	74.00	-22.89	1.00 H	360	9.53	41.58
4	4876.000	37.57 AV	54.00	-16.43	1.00 H	360	-4.01	41.58

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	*2438.000	83.07 PK			1.52 V	206	48.55	34.52
2	*2438.000	64.03 AV			1.52 V	206	29.51	34.52
3	4876.000	50.53 PK	74.00	-23.47	1.13 V	231	8.95	41.58
4	4876.000	37.24 AV	54.00	-16.76	1.13 V	231	-4.34	41.58

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**	13
INPUT POWER	1.5Vdc	**FREQUENCY RANGE**	1 ~ 25GHz
ENVIRONMENTAL CONDITIONS	26deg. C, 58%RH, 997Pa	**DETECTOR FUNCTION**	Peak(PK) Average (AV)
TESTED BY	Jun Wu		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2474.000	94.05 PK			1.25 H	140	59.46	34.59
2	*2474.000	70.02 AV			1.25 H	140	35.43	34.59
3	2483.500	65.42 PK	74.00	-8.58	1.25 H	140	30.81	34.61
4	2483.500	48.85 AV	54.00	-5.15	1.25 H	140	14.24	34.61
5	4948.000	50.37 PK	74.00	-23.63	1.00 H	102	8.60	41.77
6	4948.000	37.03 AV	54.00	-16.97	1.00 H	102	-4.74	41.77

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	*2474.000	83.18 PK			1.50 V	211	48.59	34.59
2	*2474.000	64.01 AV			1.50 V	211	29.42	34.59
3	2483.500	60.78 PK	74.00	-13.22	1.50 V	211	26.17	34.61
4	2483.500	48.75 AV	54.00	-5.25	1.50 V	211	14.14	34.61
5	4948.000	49.45 PK	74.00	-24.55	1.06 V	201	7.68	41.77
6	4948.000	36.86 AV	54.00	-17.14	1.06 V	201	-4.91	41.77

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. 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.

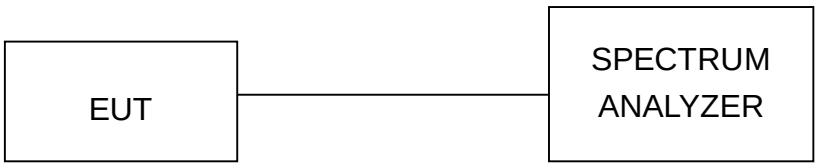
4.3.3 TEST PROCEDURE

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

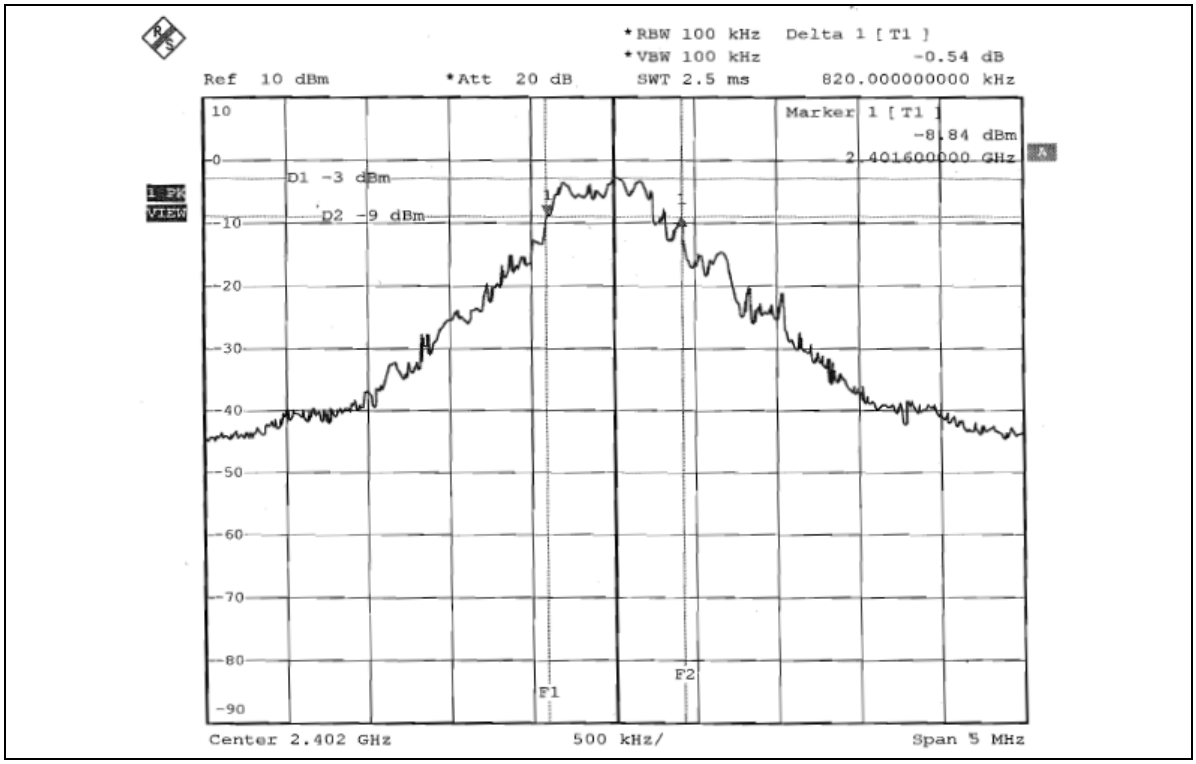
The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

4.3.7 TEST RESULTS

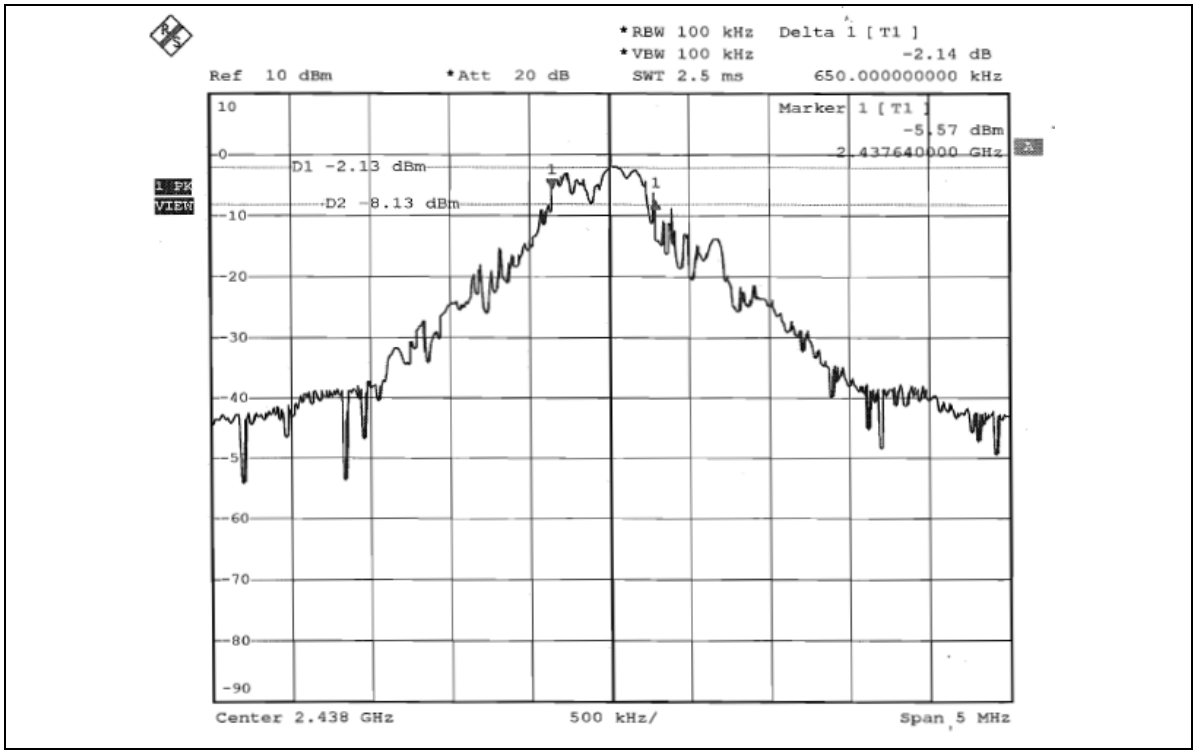
MODULATION TYPE	GFSK	CHANNEL	1, 7, 13
INPUT POWER	1.5Vdc	ENVIRONMENTAL CONDITIONS	25deg. C, 70%RH, 1000hPa
TESTED BY	Jun Wu		

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS/FAIL
1	2402	0.820	0.5	PASS
7	2438	0.650	0.5	PASS
13	2474	0.720	0.5	PASS

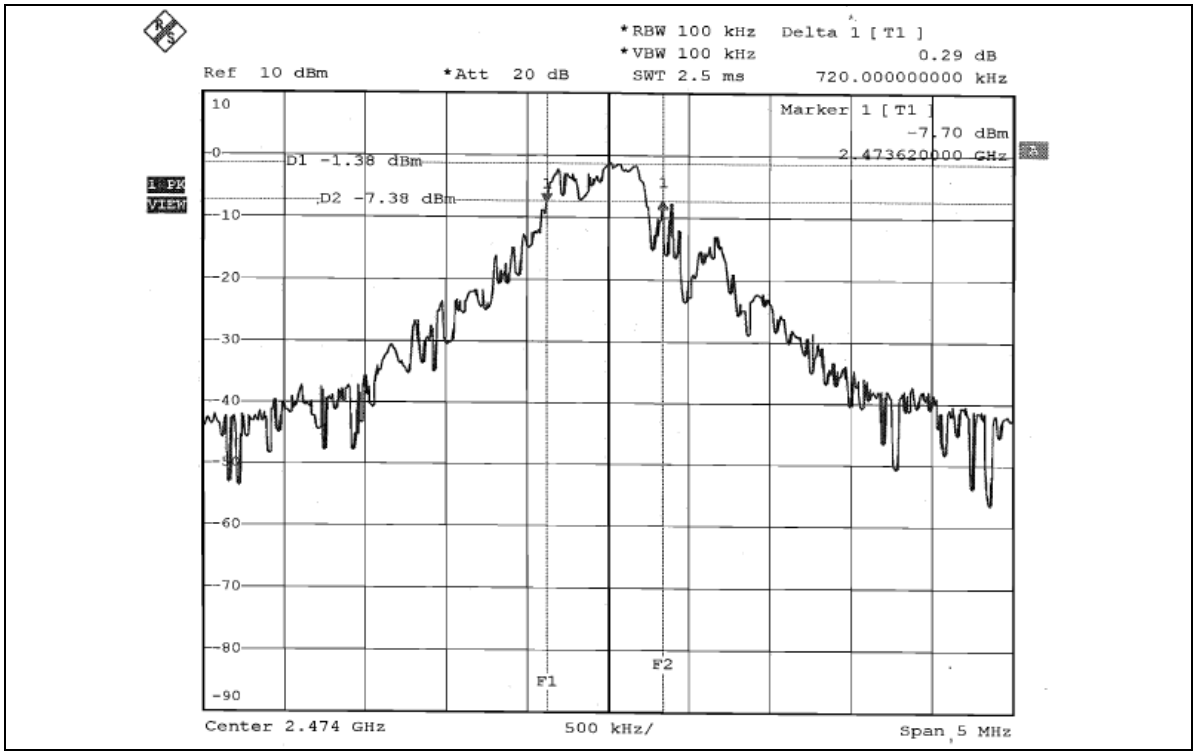
CH 1



CH 7


*RBW 100 kHz
*VBW 100 kHz
SWT 2.5 ms
Delta 1 [T1]
-2.14 dB
650.000000000 kHz
Ref 10 dBm
*Att 20 dB
Marker 1 [T1]
-5.57 dBm
2.437640000 GHz
D1 -2.13 dBm
D2 -8.13 dBm
1 PK
VIEW
Center 2.438 GHz
500 kHz/
Span 5 MHz

CH 13


*RBW 100 kHz
*VBW 100 kHz
SWT 2.5 ms
Delta 1 [T1]
0.29 dB
720.000000000 kHz
Ref 10 dBm
*Att 20 dB
Marker 1 [T1]
-7.70 dBm
2.473620000 GHz
D1 -1.38 dBm
D2 -7.38 dBm
1 PK
VIEW
F1
F2
Center 2.474 GHz
500 kHz/
Span 5 MHz

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

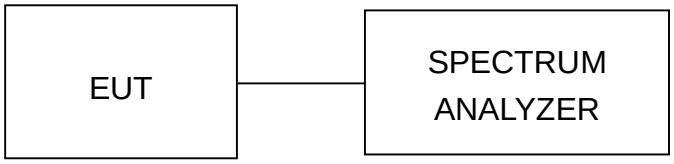
1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring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

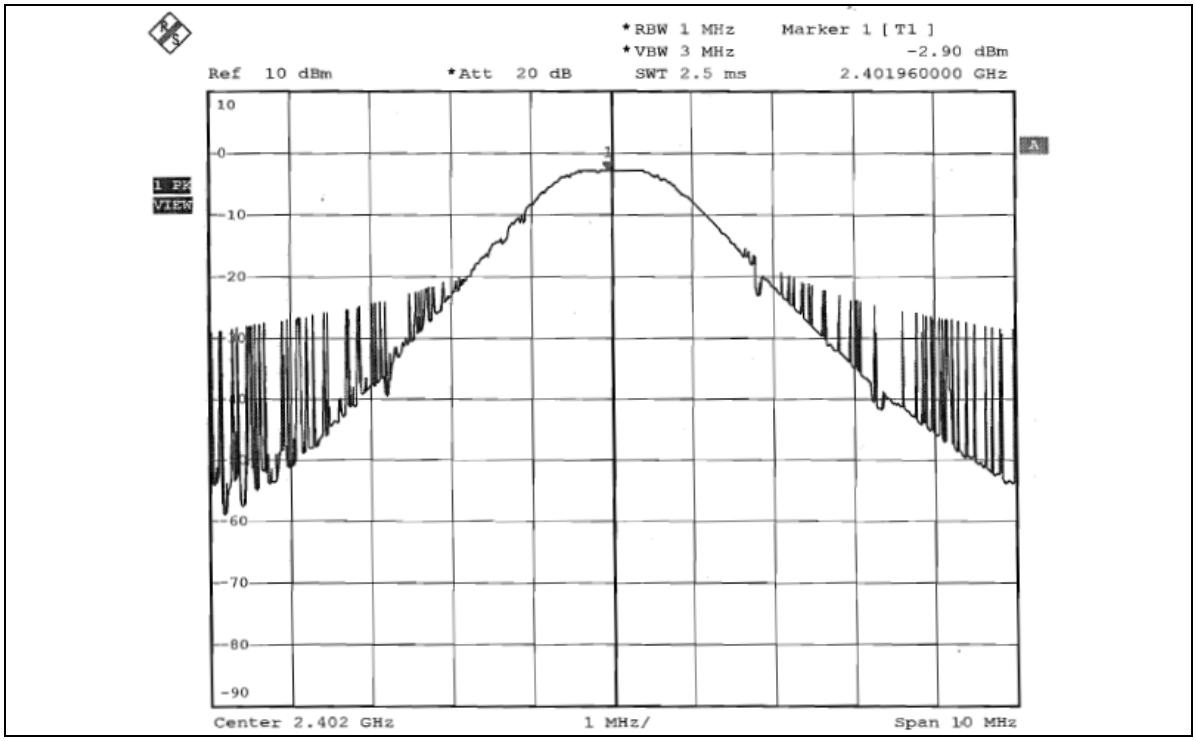
Same as Item 4.3.6

4.4.7 TEST RESULTS

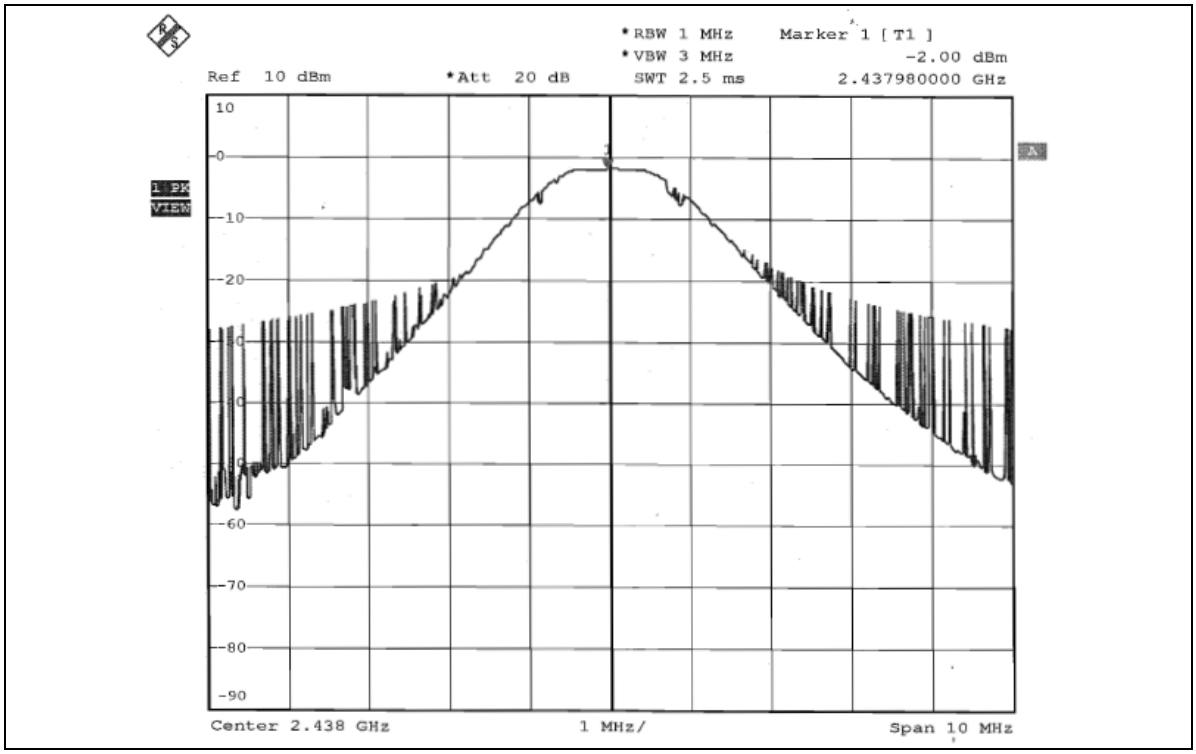
MODULATION TYPE	GFSK	**CHANNEL**	1, 7, 13
INPUT POWER	1.5Vdc	**ENVIRONMENTAL CONDITIONS**	25deg. C, 70%RH, 1000hPa
TESTED BY	Jun Wu		

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (dBm)	PEAK POWER OUTPUT (mW)	PEAK POWER LIMIT (dBm)	PASS/FAIL
1	2402	-2.90	0.513	30	PASS
7	2438	-2.00	0.631	30	PASS
13	2474	-1.22	0.755	30	PASS

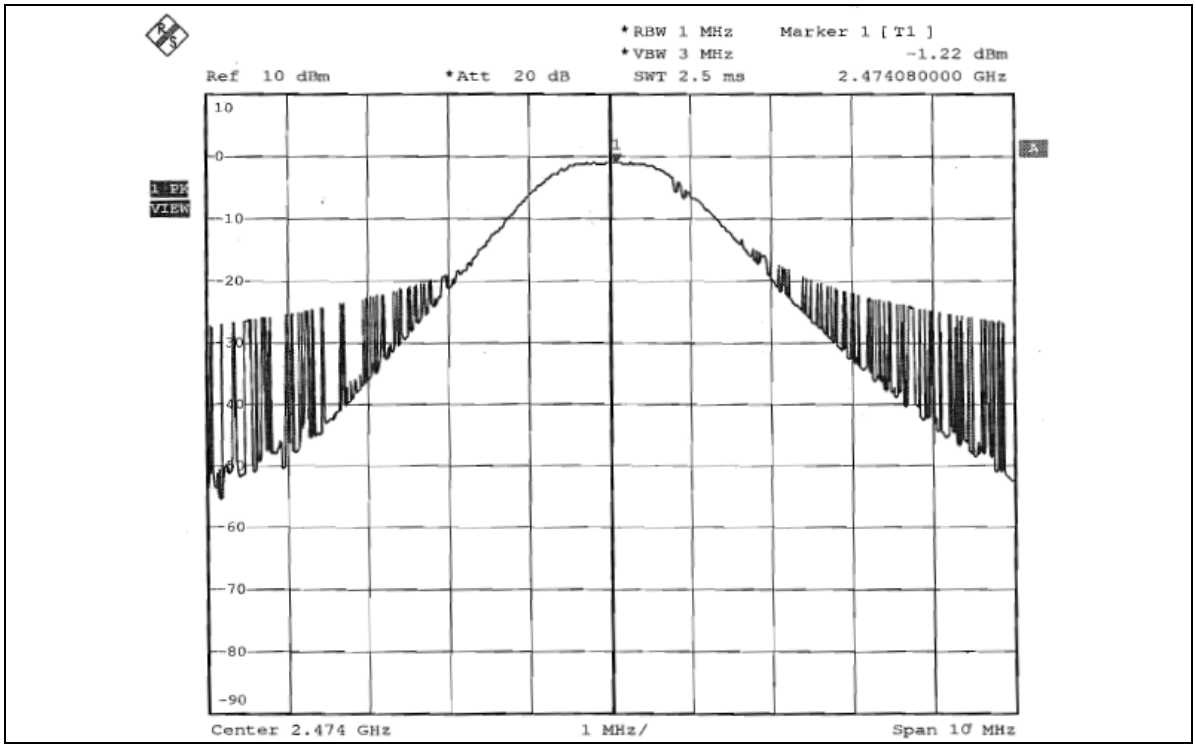
CH 1


*RBW 1 MHz
*VBW 3 MHz
Marker 1 [T1]
-2.90 dBm
Ref 10 dBm
*Att 20 dB
SWT 2.5 ms
2.401960000 GHz
1 PK VIEW
10
0
-10
-20
-60
-70
-80
-90
Center 2.402 GHz
1 MHz/
Span 10 MHz

CH 7


*RBW 1 MHz
*VBW 3 MHz
Marker 1 [T1]
-2.00 dBm
Ref 10 dBm
*Att 20 dB
SWT 2.5 ms
2.437980000 GHz
1 PK VIEW
10
0
-10
-20
-60
-70
-80
-90
Center 2.438 GHz
1 MHz/
Span 10 MHz

CH 13


*RBW 1 MHz
*VBW 3 MHz
SWT 2.5 ms
Marker 1 [T1]
-1.22 dBm
2.474080000 GHz
Ref 10 dBm
*Att 20 dB
1 PK
VIEW
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
Center 2.474 GHz
1 MHz/
Span 10 MHz

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

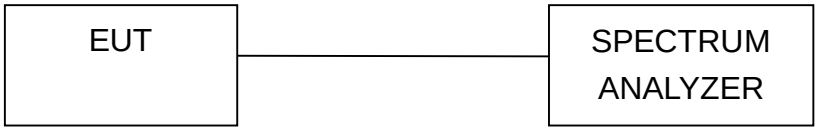
The transmitter output was connected to the spectrum analyzer through an attenuator, the bandwidth of the fundamental frequency was measured with the spectrum analyzer using 3kHz RBW and 30kHz VBW, set sweep time = span/3kHz. The power spectral density was measured and recorded.

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

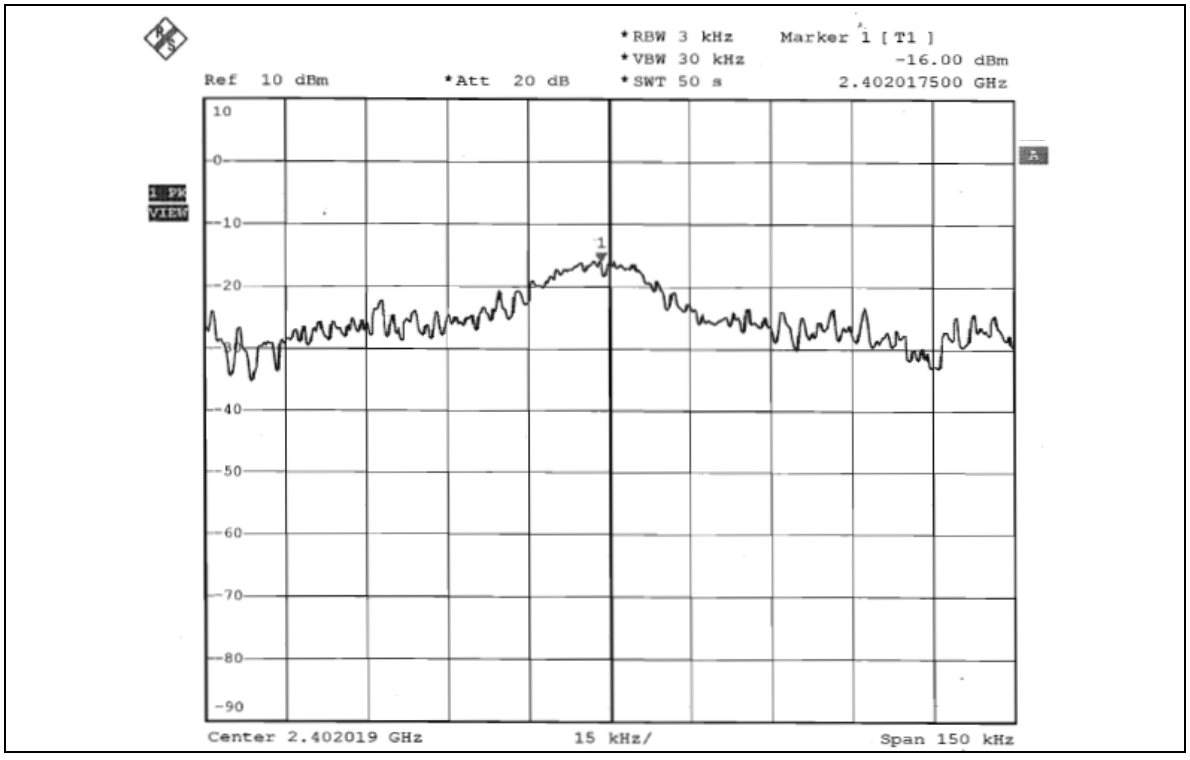
Same as Item 4.3.6

4.5.7 TEST RESULTS

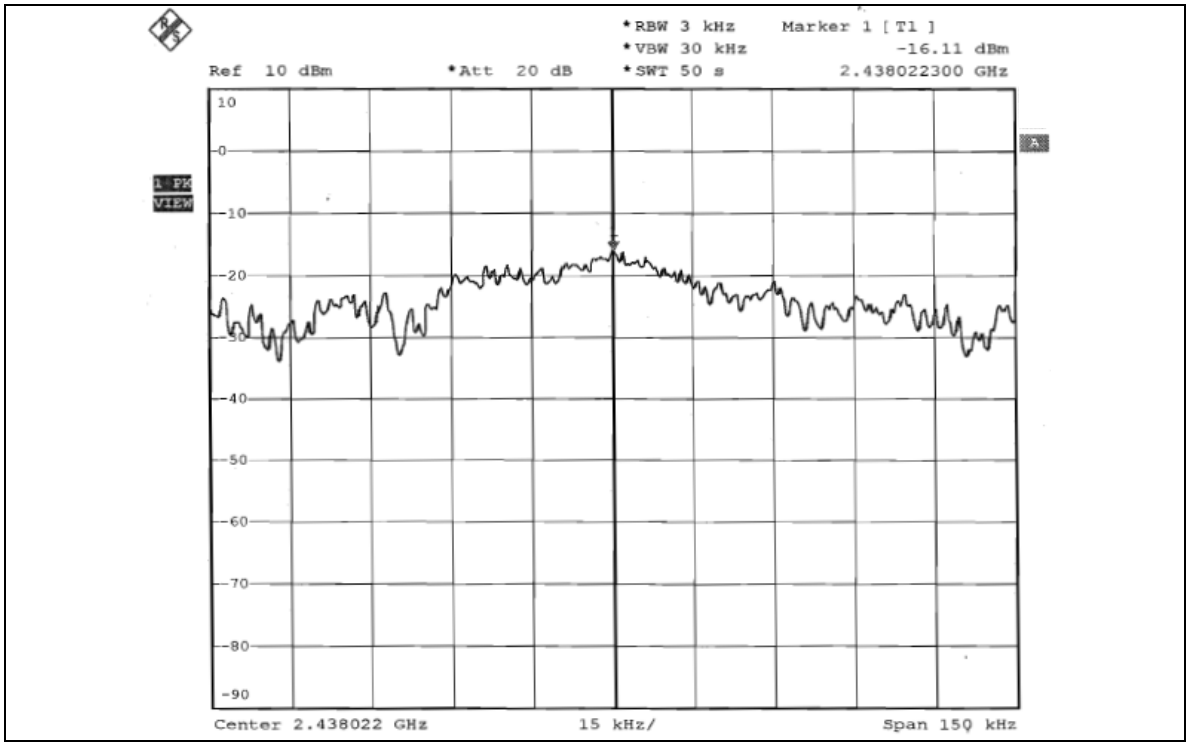
MODULATION TYPE	GFSK	CHANNEL	1, 7, 13
INPUT POWER	1.5Vdc	ENVIRONMENTAL CONDITIONS	25deg. C, 70%RH, 1000hPa
TESTED BY	Jun Wu		

CHANNEL	CHANNEL FREQUENCY (MHz)	RF POWER LEVEL IN 3kHz BW (dBm)	MAXIMUM LIMIT (dBm)	PASS/FAIL
1	2402	-16.00	8	PASS
7	2438	-16.11	8	PASS
13	2474	-16.80	8	PASS

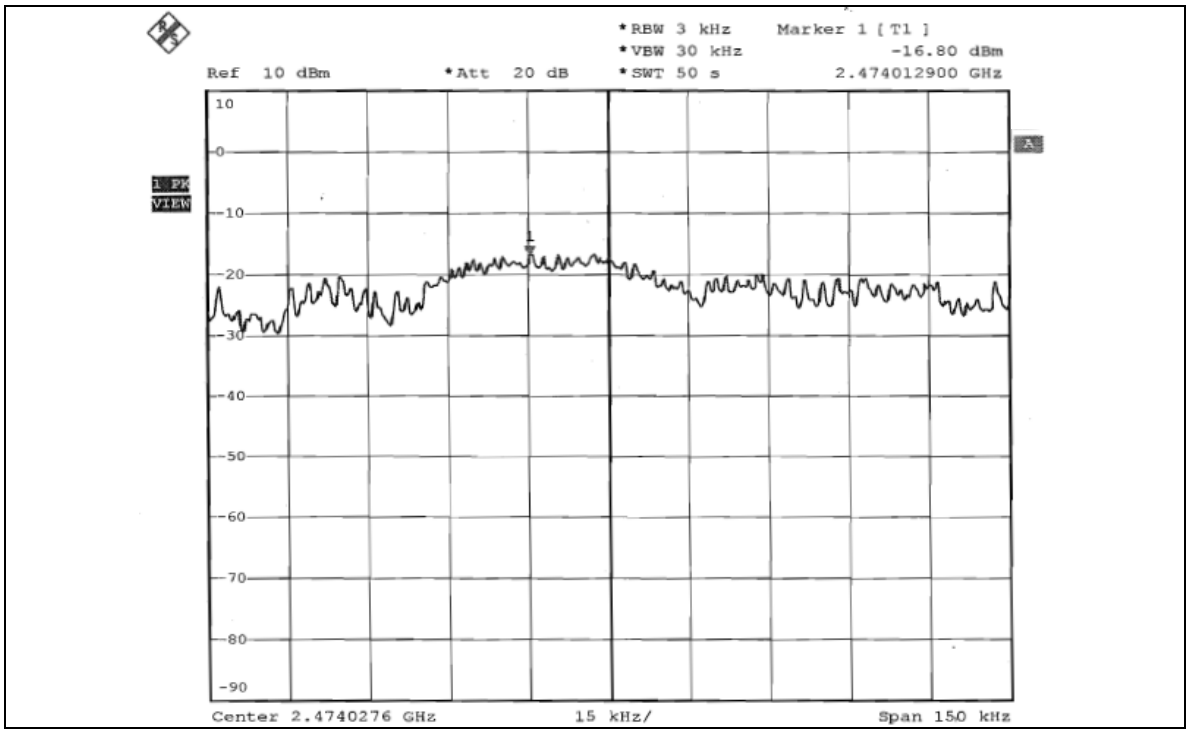
CH 1



CH 7


*RBW 3 kHz
*VBW 30 kHz
*SWT 50 s
Marker 1 [T1]
-16.11 dBm
2.438022300 GHz
Ref 10 dBm
*Att 20 dB
1 PK VIEW
A
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
Center 2.438022 GHz
15 kHz/
Span 150 kHz

CH 13


*RBW 3 kHz
*VBW 30 kHz
*SWT 50 s
Marker 1 [T1]
-16.80 dBm
2.474012900 GHz
Ref 10 dBm
*Att 20 dB
1 PK VIEW
A
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
Center 2.4740276 GHz
15 kHz/
Span 150 kHz

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 lose 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

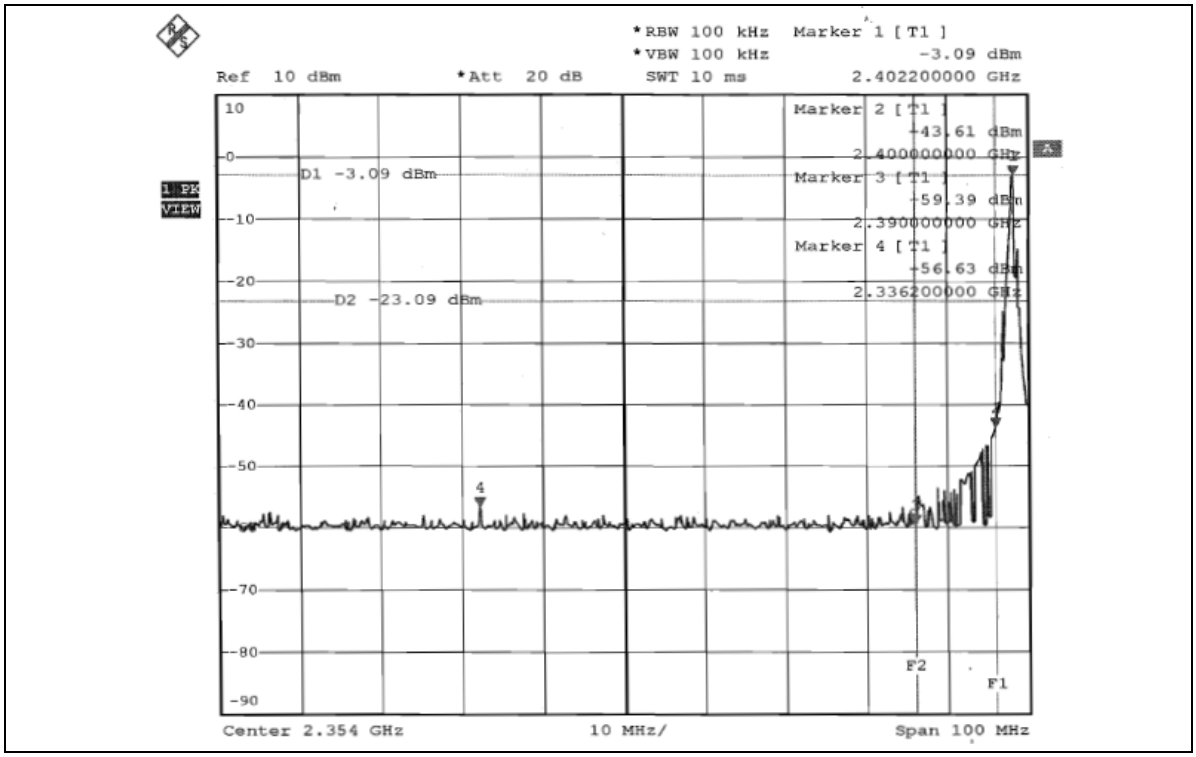
The spectrum plots are attached on the following 6 images. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement in part 15.247(d).

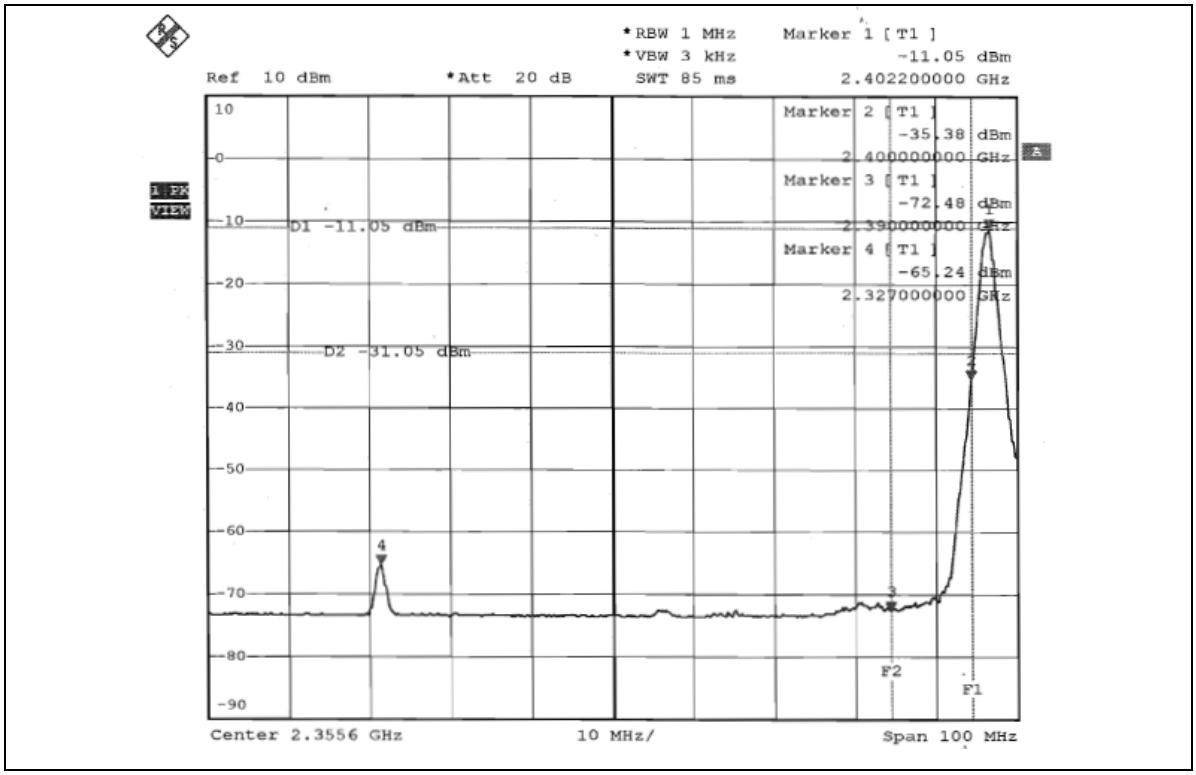
Note 1:
The band edge emission plot on the next page shows 53.54dBc between carrier maximum power and local maximum emission in restrict band (2.3362GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2.7 is 94.69dBuV/m (Peak), so the maximum field strength in restrict band is 94.69-53.54=41.15dBuV/m which is under 74dBuV/m limit.

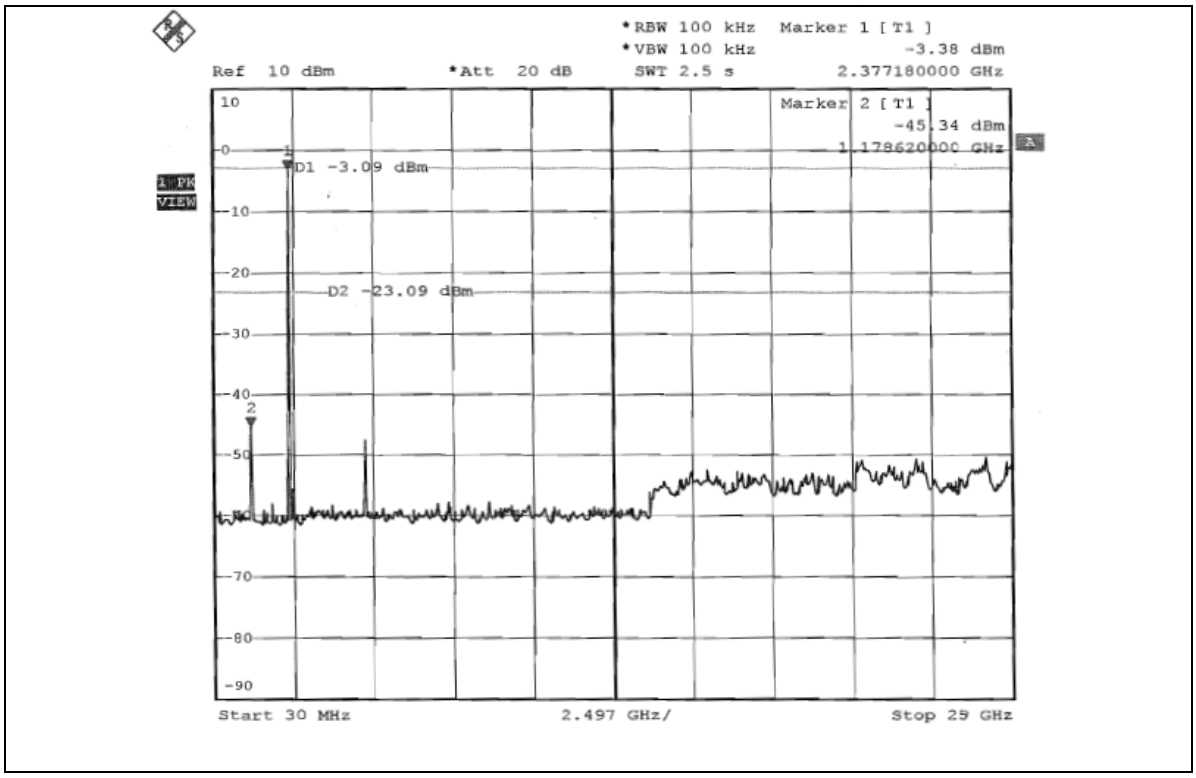
The band edge emission plot the next page shows 54.19dBc between carrier maximum power and local maximum emission in restrict band (2.3270GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2.7 is 70.46dBuV/m (Average), so the maximum field strength in restrict band is 70.46-54.19=16.27dBuV/m which is under 54dBuV/m limit.

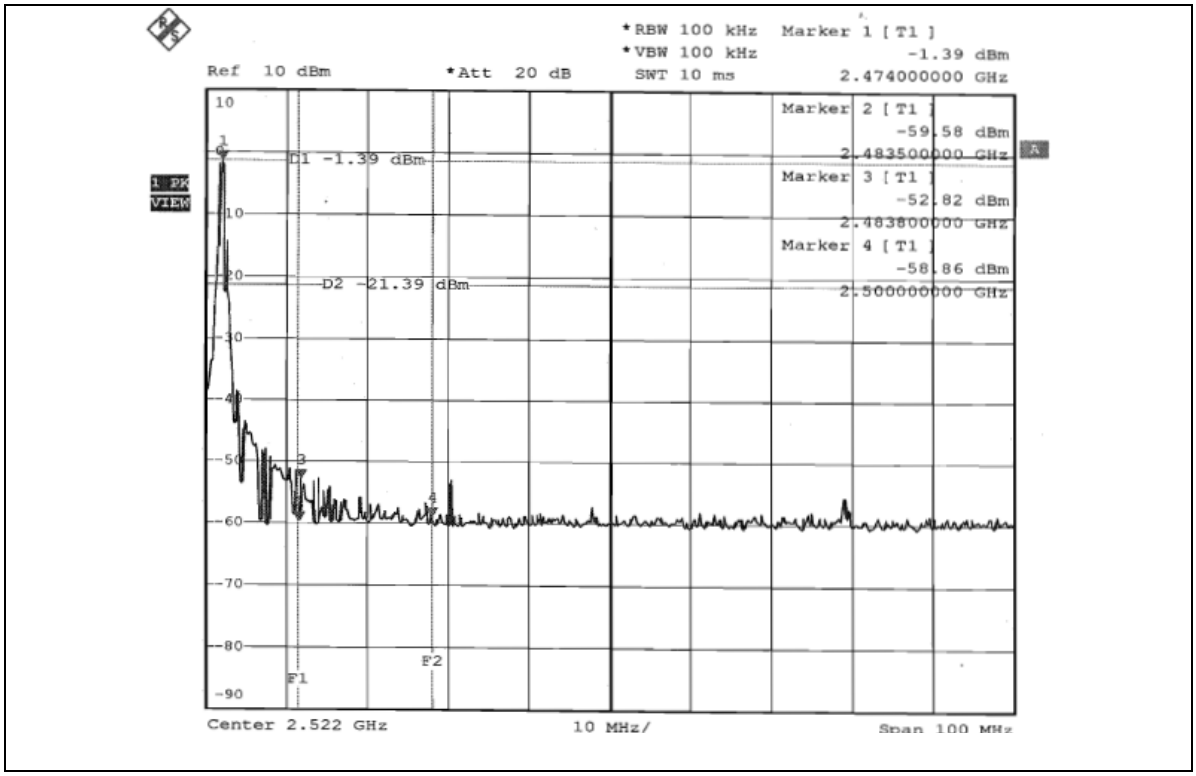
Note 2:
The band edge emission plot on the next second page shows 51.43dBc between carrier maximum power and local maximum emission in restrict band (2.4838GHz). The emission of carrier strength list in the test result of channel 13 at the item 4.2.7 is 94.05dBuV/m (Peak), so the maximum field strength in restrict band is 94.05-51.43=42.62dBuV/m which is under 74dBuV/m limit.

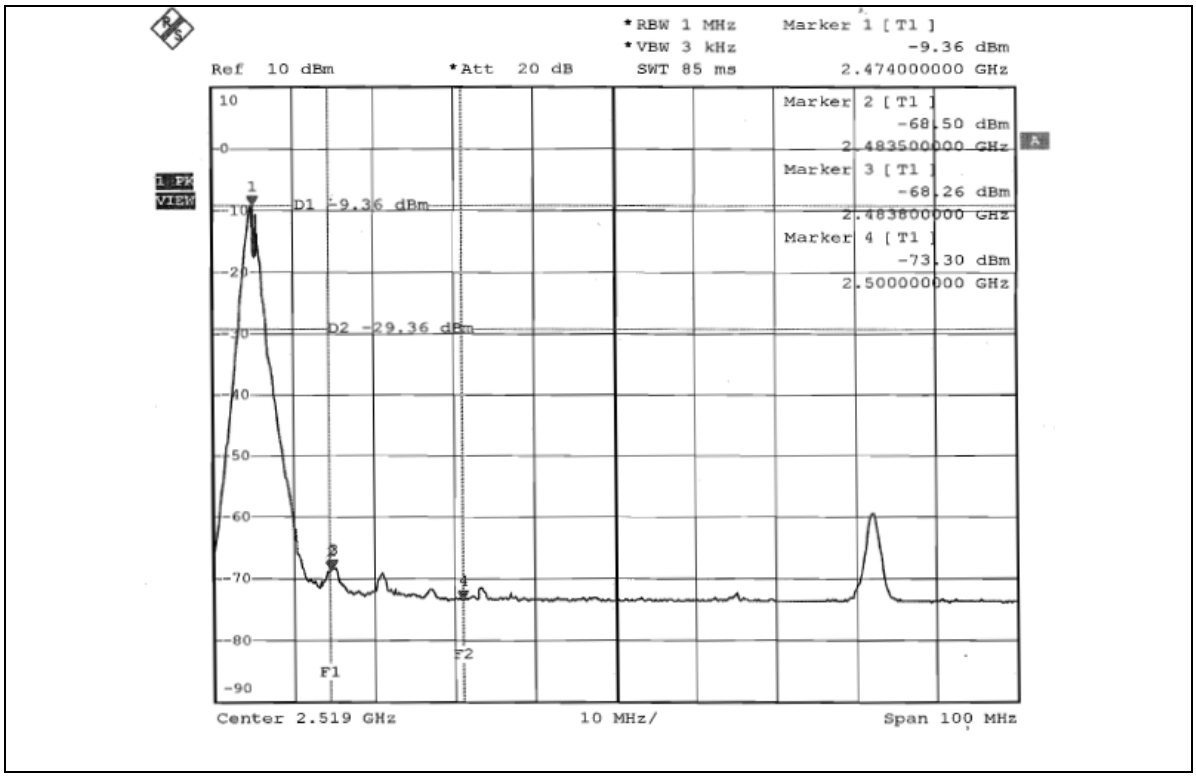
The band edge emission plot on the next third page shows 58.90dBc between carrier maximum power and local maximum emission in restrict band (2.4838GHz). The emission of carrier strength list in the test result of channel 13 at the item 4.2.7 is 70.02dBuV/m (Average), so the maximum field strength in restrict band is 70.02-58.90=11.12dBuV/m which is under 54dBuV/m limit.

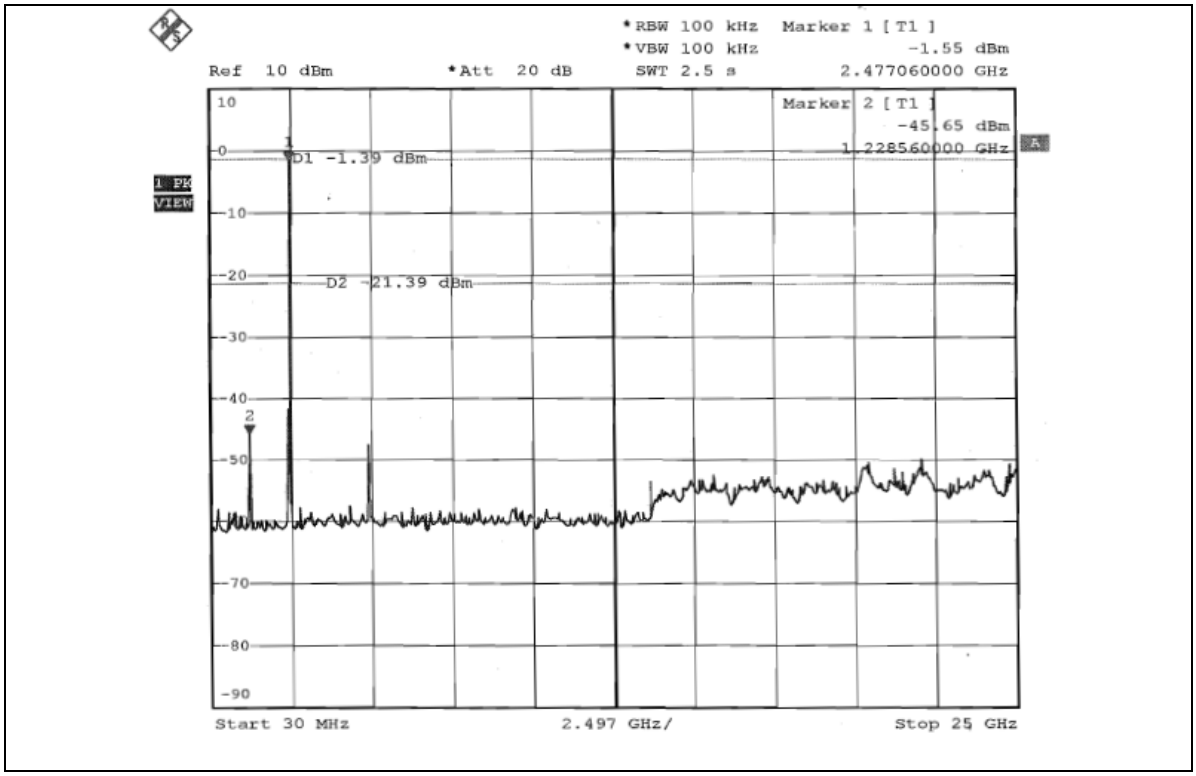

*RBW 100 kHz
*VBW 100 kHz
Ref 10 dBm
*Att 20 dB
SWT 10 ms
Marker 1 [T1]
-3.09 dBm
2.402200000 GHz
Marker 2 [T1]
+43.61 dBm
2.400000000 GHz
Marker 3 [T1]
+59.39 dBm
2.390000000 GHz
Marker 4 [T1]
+56.63 dBm
2.336200000 GHz
D1 -3.09 dBm
D2 -23.09 dBm
1 PK
VIEW
F2
F1
Center 2.354 GHz
10 MHz/
Span 100 MHz


*RBW 1 MHz
*VBW 3 kHz
Ref 10 dBm
*Att 20 dB
SWT 85 ms
Marker 1 [T1]
-11.05 dBm
2.402200000 GHz
Marker 2 [T1]
-35.38 dBm
2.400000000 GHz
Marker 3 [T1]
-72.48 dBm
2.390000000 GHz
Marker 4 [T1]
-65.24 dBm
2.327000000 GHz
D1 -11.05 dBm
D2 -31.05 dBm
1 PK
VIEW
F2
F1
Center 2.3556 GHz
10 MHz/
Span 100 MHz


*RBW 100 kHz
*VBW 100 kHz
SWT 2.5 s
Marker 1 [T1]
-3.38 dBm
2.377180000 GHz
Ref 10 dBm
*Att 20 dB
Marker 2 [T1]
-45.34 dBm
1.178620000 GHz
D1 -3.09 dBm
D2 -23.09 dBm
1 PK
VIEW
Start 30 MHz
2.497 GHz/
Stop 25 GHz


*RBW 100 kHz
*VBW 100 kHz
SWT 10 ms
Marker 1 [T1]
-1.39 dBm
2.474000000 GHz
Ref 10 dBm
*Att 20 dB
Marker 2 [T1]
-59.58 dBm
2.483500000 GHz
Marker 3 [T1]
-52.82 dBm
2.483800000 GHz
Marker 4 [T1]
-58.86 dBm
2.500000000 GHz
D1 -1.39 dBm
D2 -21.39 dBm
1 PK
VIEW
F1
F2
Center 2.522 GHz
10 MHz/
Span 100 MHz


*RBW 1 MHz
*VBW 3 kHz
Ref 10 dBm
*Att 20 dB
SWT 85 ms
Marker 1 [T1]
-9.36 dBm
2.474000000 GHz
Marker 2 [T1]
-68.50 dBm
2.483500000 GHz
Marker 3 [T1]
-68.26 dBm
2.483800000 GHz
Marker 4 [T1]
-73.30 dBm
2.500000000 GHz
1 PK
VIEW
D1 -9.36 dBm
D2 -29.36 dBm
F1
F2
Center 2.519 GHz
10 MHz/
Span 100 MHz


*RBW 100 kHz
*VBW 100 kHz
Ref 10 dBm
*Att 20 dB
SWT 2.5 s
Marker 1 [T1]
-1.55 dBm
2.477060000 GHz
Marker 2 [T1]
-45.65 dBm
1.228560000 GHz
1 PK
VIEW
D1 -1.39 dBm
D2 -21.39 dBm
Start 30 MHz
2.497 GHz/
Stop 25 GHz

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 -1.15dBi.

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.