

APPLICATION FOR CERTIFICATION

On Behalf of

Futaba Corporation

2.4GHz Embedded Type Wireless Modem

Model No. : FDP02

FCC ID : AZP-FDP02

Brand: Futaba

Prepared for : Futaba Corporation
1080 Yabutsuka Chosei-son Chosei-gun
Chiba, 299-4395 Japan.

Prepared by : AUDIX Technology Corporation
EMC Department
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TEST REPORT CERTIFICATION

Applicant : Futaba Corporation
 Manufacturer : Futaba Corporation
 EUT Description : 2.4GHz Embedded Type Wireless Modem
 FCC ID : AZP-FDP02
 (A) Model No. : FDP02
 (B) Serial No. : N/A
 (C) Brand : Futaba
 (D) Power Supply : DC 2.5-5.5V
 (E) Test Voltage : AC 120V, 60Hz
 (through interface board)

Measurement Procedure Used:

FCC RULES AND REGULATIONS PART 15 SUBPART C, July. 2008
AND ANSI C63.4/2003

(FCC CFR 47 Part 15C, §15.207 and §15.209 and §15.247)

The device described above was tested by AUDIX Technology Corporation to determine the maximum emission levels emanating from the device. The maximum emission levels were compared to the FCC Part 15 subpart B & C limits.

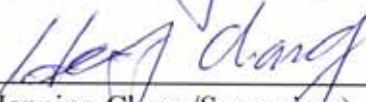
The measurement results are contained in this test report and AUDIX Technology Corporation is assumed full responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT to be technically compliant with the FCC official limits.

This report applies to above tested sample only. This report shall not be reproduced in part without written approval of AUDIX Technology Corporation.

Date of Test : May 14 ~ 28, 2010

Date of Report : Jun. 01, 2010

Producer : 
 (Kitty Ni/Administrator)

Review : 
 (Henning Chang/Supervisor)

Signatory : 
 (Ben Cheng/Manager)

1. GENERAL INFORMATION

1.1. Description of Device (EUT)

Description	:	2.4GHz Embedded Type Wireless Modem
Model Number	:	FDP02
Serial Number	:	N/A
FCC ID	:	AZP-FDP02
Applicant	:	Futaba Corporation 1080 Yabutsuka Chosei-son Chosei-gun Chiba, 299-4395 Japan.
Manufacturer	:	Futaba Corporation 1080 Yabutsuka Chosei-son Chosei-gun Chiba, 299-4395 Japan.
Radio Technology	:	FSK Modulation
Frequency Band	:	2402MHz - 2481MHz
Tested Frequency	:	2402MHz 2441MHz 2481MHz
Frequency Channel	:	80 channels
Antenna (Internal Antenna)	:	Antenna Gain: 0dBi
Date of Receipt of Sample	:	May 11, 2010
Date of Test	:	May 14 ~ 28, 2010

1.2. Tested Supporting System Details

1.2.1. INTERFACE CARD (LINK TO EUT)

Model Number : N/A
 Serial Number : N/A
 Manufacturer : Futaba

1.2.2. NOTEBOOK PC

Model Number : PP2130
 Serial Number : 5Y32KSQZ40ME
 FCC ID : By DoC
 BSMI ID : 3912A556
 Manufacturer : LG (Brand: Compaq)
 RS232 Cable : Shielded, Detachable, 1.8m
 AC Adapter : COMPAQ, M/N:PA-1650-02C
 FCC By DoC
 DC Cord: Non-Shielded, Undetachable, 1.8m
 Power Cord : Non-Shielded, Detachable, 1.8m

1.2.3. DC POWER SUPPLY

Model Number : 3303A
 Serial Number : 721773
 Manufacturer : TOP WARD
 Power Cable*2 : Non-Shielded, Detachable, 0.7m
 Power Cord : Non-Shielded, Detachable, 1.8m

1.3. Description of Test Facility

Name of Firm : **AUDIX Technology Corporation**
EMC Department
 No. 53-11, Tin-Fu Tsun, Lin-Kou Hsiang,
 Taipei Hsien, Taiwan

Test Location & Facility : **No. 2 Shielded Room &**
Semi-Anechoic Chamber
 No. 53-11, Tin-Fu Tsun, Lin-Kou Hsiang,
 Taipei Hsien, Taiwan.
 May 14, 2009 Renewal on
 Federal Communication Commission
 Registration Number: 90993

NVLAP Lab. Code : 200077-0

TAF Accreditation No : 1724

1.4. Measurement Uncertainty

Test Item	Frequency Range	Uncertainty (dB)
Conduction Test	150kHz~30MHz	±1.73dB
Radiation Test (Distance: 3m)	30MHz~300MHz	±2.91dB
	300MHz~1000MHz	±2.94dB
	Above 1GHz	± 5.02dB

Remark : Uncertainty = $ku_c(y)$

Test Item	Uncertainty
6dB Bandwidth	± 0.05kHz
Emission Limitations	± 0.13dB
Maximum peak output power	± 0.33dBm
Band edges	± 0.13dB
Power spectral density	± 0.13dB

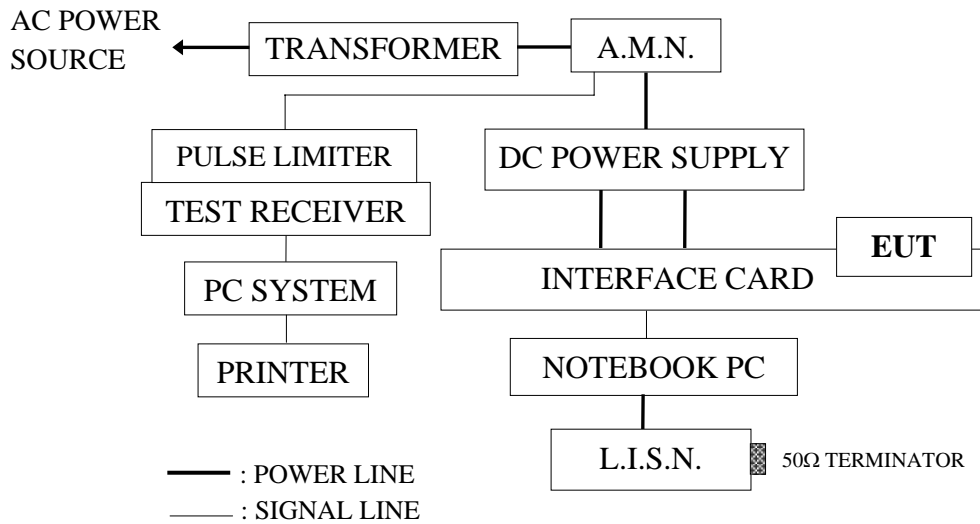
2. POWERLINE CONDUCTED EMISSION MEASUREMENT

2.1. Test Equipment

The following test equipment were used during the powerline conducted emission measurement: (No. 2 Shielded Room)

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Test Receiver	R & S	ESCS30	100339	Mar. 10, 10'	Mar. 09, 11'
2.	A.M.N.	R & S	ESH2-Z5	890485/023	Jan. 15, 10'	Jan. 14, 11'
3.	L.I.S.N.	Kyoritsu	KNW-407	8-855-9	Mar. 10, 10'	Mar. 09, 11'
4.	Pulse Limiter	R & S	ESH3-Z2	001	Feb. 08, 10'	Feb. 07, 11'

2.2. Block Diagram of Test Setup



EUT: 2.4GHZ EMBEDDED TYPE WIRELESS MODEM

2.3. Powerline Conducted Emission Limit

Frequency	Maximum RF Line Voltage	
	Quasi-Peak Level	Average Level
150kHz ~ 500kHz	66 ~ 56 dB μ V	56 ~ 46 dB μ V
500kHz ~ 5MHz	56 dB μ V	46 dB μ V
5MHz ~ 30MHz	60 dB μ V	50 dB μ V

Remark1.: If the average limit is met when using a Quasi-Peak detector, the EUT shall be deemed to meet both limits and measurement with the average detector is unnecessary.

2.: The lower limit applies at the band edges.

2.4. Operating Condition of EUT

- 2.4.1. Set up the EUT (2.4GHz Embedded Type Wireless Modem) and simulator as shown on 2.2.
- 2.4.2. To turn on the power of all equipments.
- 2.4.3. The EUT was set the Notebook PC using test program “Futaba Term”.
- 2.4.4. The EUT was set to continuously transmit signals during the testing.

2.5. Test Procedure

The EUT (via interface board) was put on table which was above the ground by 80cm and interface board's switching power supply connected to the AC mains through an Artificial Mains Network (A.M.N.). The other peripheral devices power cord connected to the power mains through a line impedance stabilization network (L.I.S.N.). This provided a 50 ohm coupling impedance for the measuring equipment. (Please refer to the block diagram of the test setup and photographs.)

Both sides of A.C. line were checked for maximum conducted interference. In order to find the maximum emission, the relative positions simulators of the interface cables should be manipulated according to FCC ANSI C63.4-2003 during conducted measurement.

The bandwidth of the R&S Test Receiver ESCS30 was set at 9kHz.

The frequency range from 150kHz to 30MHz was checked.

All the final readings from Test Receiver were measured with the Quasi-Peak detector and Average detector. (Remark: If the Average limit is met when using a Quasi-Peak detector, the Average detector is unnecessary)

2.6. Powerline Conducted Emission Measurement Results

PASSED.

(All the emissions not reported below are too low against the prescribed limits.)

EUT (via interface board) was performed during this section testing and all the test results are attached in next pages.

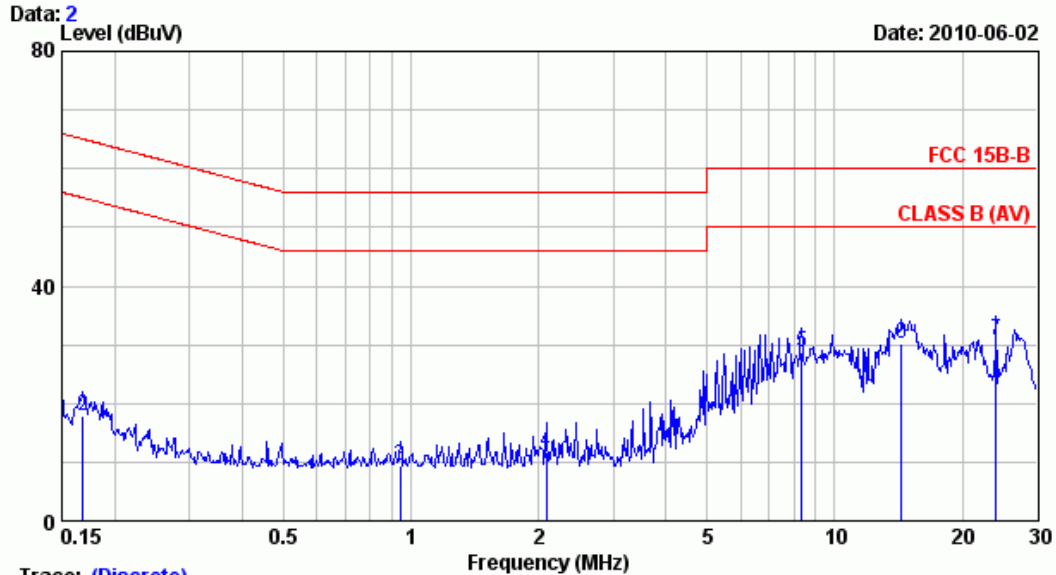
EUT : 2.4GHz Embedded Type Wireless Modem M/N : FDP02

Test Date : Jun. 02, 2010 Temperature : 24 Humidity : 65%

Reference Test Data No.: Neutral: # 2 ; Line: # 1



AUDIX TECHNOLOGY Corp. EMC Laboratory
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Trace: (Discrete)

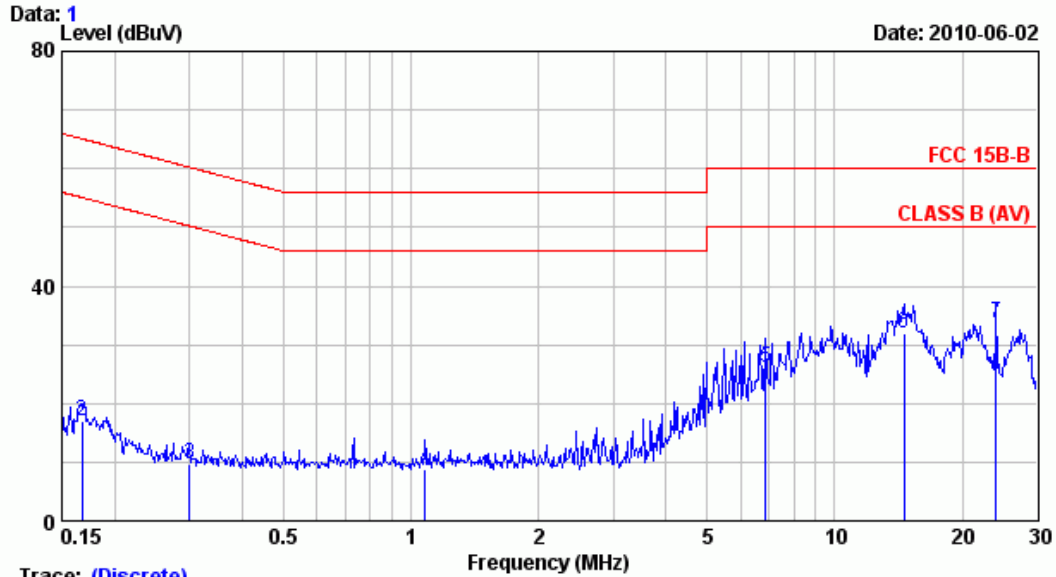
Site	: No.2 Shielded room	Data	: 2
Condition	: ESH2-Z5	Phase	: NEUTRAL
Limit	: FCC 15B-B		
Env. / Ins.	: 24*C,65% / ESCS 30 (339)	Engineer:	Charles_Yuan
EUT	: 2.4GHz Embedded Type Wireless Module		
Power Rating	: 120Vac/60Hz M/N:FDP02		
Test Mode	: OPERATING		

	Freq. (MHz)	AMN Factor (dB)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV)	Limits (dBuV)	Margin (dB)	Remark
1	0.150	0.10	0.24	18.88	19.22	66.00	46.78	QP
2	0.169	0.10	0.25	17.59	17.94	65.03	47.10	QP
3	0.943	0.19	0.39	8.88	9.47	56.00	46.53	QP
4	2.088	0.20	0.40	11.02	11.62	56.00	44.38	QP
5	8.367	0.28	0.64	27.91	28.83	60.00	31.17	QP
6	14.364	0.39	0.70	29.21	30.30	60.00	29.70	QP
7	24.015	0.50	0.70	29.67	30.87	60.00	29.13	QP

Remarks: 1.Emission Level= AMN Factor + Cable Loss + Reading.
 2.If the average limit is met when using a quasi-peak detector ,the EUT shall be deemed to meet both limits and measurement with average detector is unnecessary.



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Trace: (Discrete)

Site : No.2 Shielded room Data : 1
 Condition : ESH2-Z5 Phase : LINE
 Limit : FCC 15B-B
 Env. / Ins. : 24*C,65% / ESCS 30 (339) Engineer: Charles_Yuan
 EUT : 2.4GHz Embedded Type Wireless Module
 Power Rating : 120Vac/60Hz M/N:FDP02
 Test Mode : OPERATING

	Freq. (MHz)	AMN Factor (dB)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV)	Limits (dBμV)	Margin (dB)	Remark
1	0.150	0.10	0.24	19.36	19.70	66.00	46.30	QP
2	0.168	0.10	0.25	16.65	17.00	65.08	48.08	QP
3	0.300	0.10	0.30	9.39	9.79	60.24	50.45	QP
4	1.082	0.20	0.40	8.31	8.91	56.00	47.09	QP
5	6.878	0.26	0.58	25.11	25.95	60.00	34.05	QP
6	14.594	0.39	0.70	30.83	31.92	60.00	28.08	QP
7	24.015	0.86	0.70	32.22	33.78	60.00	26.22	QP

Remarks: 1.Emission Level= AMN Factor + Cable Loss + Reading.
 2.If the average limit is met when using a quasi-peak detector
 ,the EUT shall be deemed to meet both limits and measurement
 with average detector is unnecessary.

3. RADIATED EMISSION MEASUREMENT

3.1. Test Equipment

The following test equipment was used during the radiated emission measurement:

3.1.1. For Frequency Range 30MHz~1000MHz (at Semi-Anechoic Chamber)

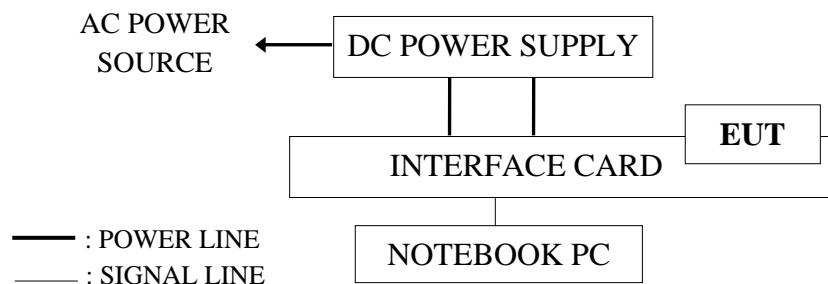
Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Test Receiver	R & S	ESCS30	100339	Mar. 10, 10'	Mar. 09, 11'
2.	Spectrum Analyzer	HP	8593EM	3826A00272	Jun. 26, 09'	Jun. 25, 10'
3.	Pre-Amplifier	HP	8447D	2944A06305	Feb. 03, 10'	Feb. 02, 11'
4.	Biconical Antenna	CHASE	VBA6106A	1264	Mar. 13, 10'	Mar. 12, 11'
5.	Log Periodic Antenna	Schwarzbeck	UHALP 9108-A	0810	Mar. 13, 10'	Mar. 12, 11'

3.1.2. For Frequency Above 1GHz (at Semi-Anechoic Chamber)

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Spectrum Analyzer	Agilent	E7405A	MY42000134	Aug. 31, 09'	Aug. 30, 10'
2.	Pre-Amplifier	HP	8449B	3008A00529	Dec. 15, 09'	Dec. 14, 10'
3.	3.5G High Pass Filter	HP	84300- 80038	005	Jan. 06, 10'	Jan. 05, 11'
4.	2.4G Notch Filter	EWT	ETW14-00 70-R1	G2	Dec. 05, 09'	Dec. 04, 10'
5.	Horn Antenna	EMCO	3115	9112-3775	May 10, 10'	May 09, 11'
6.	Horn Antenna	EMCO	3116	2653	Oct. 02, 09'	Oct. 01, 10'

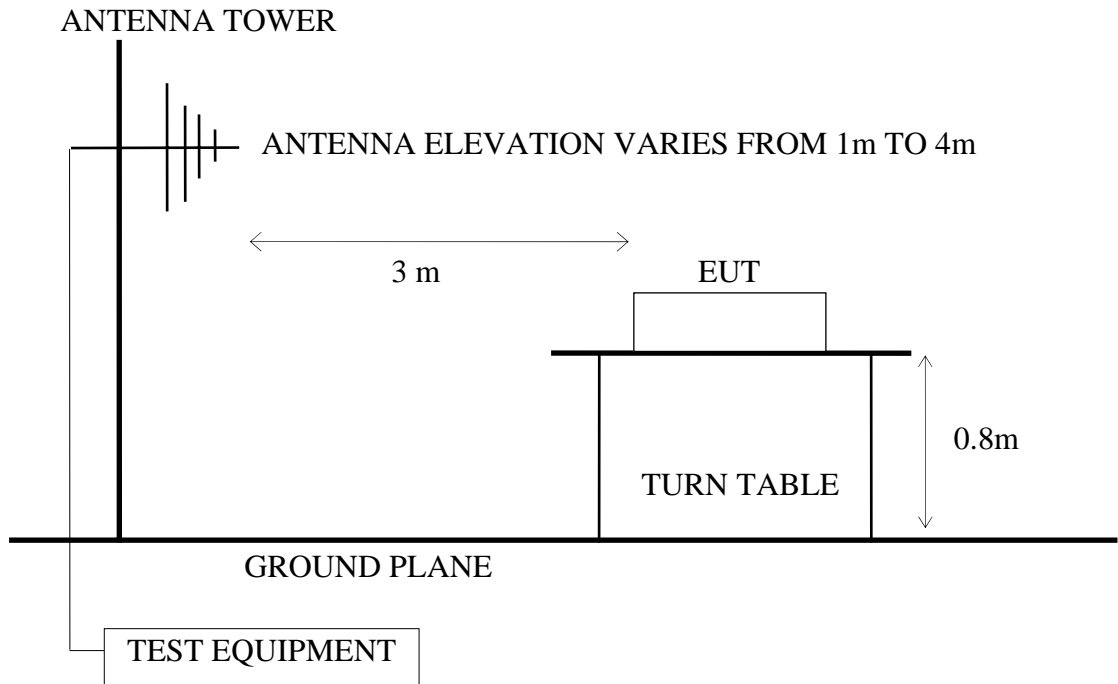
3.2. Test Setup

3.2.1. Block Diagram of connection between EUT and simulators

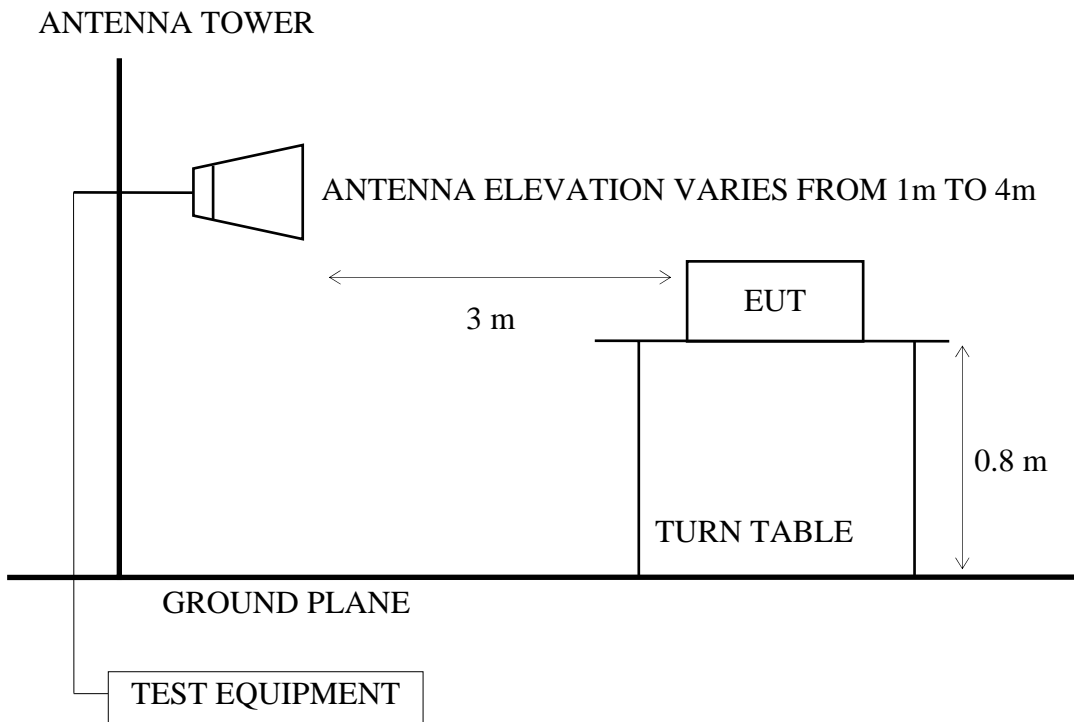


EUT: 2.4GHZ EMBEDDED TYPE WIRELESS MODEM

3.2.2. Semi-Anechoic Chamber (3m) Setup Diagram for 30-1000MHz



3.2.3. Semi-Anechoic Chamber (3m) Setup Diagram for above 1GHz



3.3. Radiated Emission Limits (§15.209)

FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMITS	
		$\mu\text{V/m}$	$\text{dB}\mu\text{V/m}$
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
Above 960	3	500	54.0
Above 1000	3	74.0 $\text{dB}\mu\text{V/m}$ (Peak) 54.0 $\text{dB}\mu\text{V/m}$ (Average)	

- Remark :
- (1) Emission level ($\text{dB}\mu\text{V/m}$) = 20 log Emission level ($\mu\text{V/m}$)
 - (2) The tighter limit applies at the edge between two frequency bands.
 - (3) Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.
 - (4) The limits in this table are based on CFR 47 Part 15.205(a)(b) and Part 15.209 (a).
 - (5) The over 1GHz limit, FCC limit is used based on CFR 47 Part 15.35 (b) and Part 15.205(b) & Part 15.209(e) and Part 15.207(c).

3.4. Operating Condition of EUT

- 3.4.1. Set up the EUT (2.4GHz Embedded Type Wireless Modem) as shown on 3.2.
- 3.4.2. To turn on the power of all equipment.
- 3.4.3. The EUT was set the Notebook PC using test program “Futaba Term”.
- 3.4.4. Transmit Mode: The EUT was set to continuously transmit signals at 2402MHz、 2441MHz and 2481MHz during testing.
- 3.4.5. Receive Mode: The EUT was set to continuously receive signals at 2441MHz during testing.

3.5. Test Procedure

The EUT and its simulators were placed on a turn table which was 0.8 meter above the ground. The turn table rotated 360 degrees to determine the position of the maximum emission level. EUT was set 3 meters away from the receiving antenna which was mounted on an antenna tower. The antenna could be moved up and down between 1 to 4 meters to find out the maximum emission level. Broadband antenna such as calibrated biconical and log-periodical antenna or horn antenna were used as a receiving antenna. Both horizontal and vertical polarization of the antenna were set on measurement. In order to find the maximum emission, all of the interface cables were manipulated according to FCC ANSI C63.4-2003 regulation.

The bandwidth of the R&S Test Receiver ESCS30 was set at 120kHz. (For 30MHz to 1000MHz)

The resolution bandwidth and video bandwidth of test spectrum analyzer is 1MHz for peak detection (PK) at frequency above 1GHz.

The resolution bandwidth of test spectrum analyzer is 1MHz and the video bandwidth is 10Hz for average detection (AV) at frequency above 1GHz.

The frequency range from 30MHz to 25GHz (Up to 10th harmonics from fundamental frequency) was checked. 30MHz to 1000MHz was measured with Quasi-Peak detector. Above 1GHz was measured with peak and average detector. For average reading in frequency from 5.5G to 25GHz, we checked it in 1 meter distance and with a shorter cable 2 meter instead of original's. There is no signal exist.

3.6. Radiated Emission Measurement Results

PASSED.

(All emissions not reported below are too low against the prescribed limits.)

EUT : 2.4GHz Embedded Type Wireless Modem M/N : FDP02

Test Date : May 26, 2010 Temperature : 27 Humidity : 65%

For Frequency Range 30MHz~1000MHz:

The EUT with following test modes was performed during this section testing and all the test results are listed in section 3.6.1.

Mode	Frequency	Test Mode	Reference Test Data	
			Horizontal	Vertical
1.	2402MHz	Transmit	# 14	# 13
2.	2441MHz		# 14	# 13
3.	2481MHz		# 14	# 13
4.	2441MHz	Receive	# 13	# 14

Remark 1 : Type of modulation: FSK.

Remark 2 : All above final readings were measured with Quasi-Peak detector.

For Frequency above 1GHz:

*** All emissions level is too low to be measured, therefore, the reading values not reported.**

For Restricted Bands:

The EUT was tested in restricted bands and all the test results are listed in section 3.6.2. (The restricted bands defined in part 15.205(a))

Mode	Frequency	Test Mode	Reference Test Data	
			Horizontal	Vertical
1.	2402MHz	Transmit	# 2, # 3	# 1, # 4
2.	2481MHz	Transmit	# 6, # 7	# 5, # 8

Remark : Type of modulation: FSK.

3.6.1. 30MHz ~ 1000MHz Frequency Range Measurement ResultDate of Test : May 26, 2010 Temperature : 27EUT : 2.4GHz Embedded Type Wireless Modem Humidity : 65%Test Mode : Transmitting Mode, Frequency:
2402MHz
Type of Modulation: FSK

Emission Frequency MHz	Antenna Factor dB/m	Cable Loss dB μ V	Meter Reading Horizontal dB μ V/m	Emission Level Horizontal dB μ V/m	Limits dB	Margin
42.690	19.86	1.30	0.95	22.11	40.00	17.89
65.640	11.78	1.70	9.85	23.33	40.00	16.67
91.290	15.90	2.00	5.91	23.82	43.50	19.68
96.690	16.75	2.05	5.10	23.90	43.50	19.60
102.090	17.29	2.10	1.41	20.80	43.50	22.70
400.800	17.66	4.80	3.33	25.79	46.00	20.21
535.900	19.47	7.07	0.52	27.06	46.00	18.94
603.800	21.42	6.30	0.64	28.35	46.00	17.65
630.400	20.96	6.40	1.01	28.37	46.00	17.63
798.400	24.09	6.90	0.03	31.02	46.00	14.98

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
2. The emission levels that are 20dB below the official limit are not reported.

Emission Frequency MHz	Antenna Factor dB/m	Cable Loss dB μ V	Meter Reading Vertical dB μ V/m	Emission Level Vertical dB μ V/m	Limits dB	Margin
39.990	20.71	1.20	0.36	22.27	40.00	17.73
60.240	12.80	1.60	2.59	16.99	40.00	23.01
68.340	11.93	1.70	1.23	14.86	40.00	25.14
287.580	25.85	3.80	0.28	29.93	46.00	16.07
400.800	17.66	4.80	3.96	26.42	46.00	19.58
861.400	26.09	7.20	0.08	33.37	46.00	12.63
969.900	26.83	7.69	1.07	35.60	54.00	18.40

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
2. The emission levels that are 20dB below the official limit are not reported.

Date of Test : May 26, 2010 Temperature : 27

EUT : 2.4GHz Embedded Type Wireless Modem Humidity : 65%

Test Mode : Transmitting Mode, Frequency:
2441MHz
Type of Modulation: FSK

Emission Frequency MHz	Antenna Factor dB/m	Cable Loss dBμV	Meter Reading Horizontal dBμV/m	Emission Level Horizontal dBμV/m	Limits dB	Margin
64.290	11.90	1.67	7.24	20.81	40.00	19.19
91.290	15.90	2.00	5.13	23.04	43.50	20.46
97.230	16.75	2.05	4.67	23.47	43.50	20.03
101.280	17.17	2.10	1.77	21.04	43.50	22.46
107.490	17.87	2.20	0.13	20.21	43.50	23.29
126.930	19.56	2.40	0.44	22.40	43.50	21.10
400.800	17.66	4.80	1.56	24.02	46.00	21.98

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
 2. The emission levels that are 20dB below the official limit are not reported.

Emission Frequency MHz	Antenna Factor dB/m	Cable Loss dBμV	Meter Reading Vertical dBμV/m	Emission Level Vertical dBμV/m	Limits dB	Margin
44.040	19.42	1.30	0.21	20.93	40.00	19.07
56.190	14.11	1.60	5.01	20.73	40.00	19.27
58.080	13.43	1.60	3.00	18.03	40.00	21.97
247.890	23.66	3.50	0.98	28.15	46.00	17.85
298.380	26.72	3.98	-0.47	30.23	46.00	15.77
400.800	17.66	4.80	2.96	25.42	46.00	20.58

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
 2. The emission levels that are 20dB below the official limit are not reported.

Date of Test : May 26, 2010 Temperature : 27

EUT : 2.4GHz Embedded Type Wireless Modem Humidity : 65%

Test Mode : Transmitting Mode, Frequency:
2481MHz
Type of Modulation: FSK

Emission Frequency MHz	Antenna Factor dB/m	Cable Loss dBμV	Meter Reading Horizontal dBμV/m	Emission Level Horizontal dBμV/m	Limits dB	Margin
44.040	19.42	1.30	4.35	25.07	40.00	14.93
66.990	11.80	1.70	9.86	23.36	40.00	16.64
91.290	15.90	2.00	5.82	23.73	43.50	19.77
97.230	16.75	2.05	4.83	23.63	43.50	19.87
101.280	17.17	2.10	1.07	20.34	43.50	23.16
107.490	17.87	2.20	0.45	20.53	43.50	22.97
162.030	20.85	2.70	0.36	23.91	43.50	19.59
400.800	17.66	4.80	1.30	23.76	46.00	22.24
486.900	18.67	6.20	1.26	26.13	46.00	19.87
516.300	19.98	6.80	0.74	27.52	46.00	18.48

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
 2. The emission levels that are 20dB below the official limit are not reported.

Emission Frequency MHz	Antenna Factor dB/m	Cable Loss dBμV	Meter Reading Vertical dBμV/m	Emission Level Vertical dBμV/m	Limits dB	Margin
56.190	14.11	1.60	4.36	20.08	40.00	19.92
69.690	12.03	1.70	4.85	18.58	40.00	21.42
91.290	15.90	2.00	1.00	18.91	43.50	24.59
147.180	20.53	2.58	0.57	23.69	43.50	19.81
166.080	20.93	2.70	1.54	25.17	43.50	18.33
400.800	17.66	4.80	2.11	24.57	46.00	21.43
484.800	18.80	6.20	1.85	26.85	46.00	19.15
507.900	19.14	6.80	1.26	27.20	46.00	18.80

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
 2. The emission levels that are 20dB below the official limit are not reported.

Date of Test : May 26, 2010 Temperature : 27

EUT : 2.4GHz Embedded Type Wireless Modem Humidity : 65%

Test Mode : Receiving Mode, Frequency:
2441MHz
Type of Modulation: FSK

Emission Frequency MHz	Antenna Factor dB/m	Cable Loss dBμV	Meter Reading Horizontal dBμV/m	Emission Level Horizontal dBμV/m	Limits dB	Margin
91.290	15.90	2.00	5.61	23.52	43.50	19.98
97.230	16.75	2.05	5.09	23.89	43.50	19.61
102.090	17.29	2.10	1.97	21.36	43.50	22.14
142.590	20.26	2.50	0.34	23.11	43.50	20.39
274.890	25.19	3.70	0.58	29.47	46.00	16.53
400.800	17.66	4.80	2.07	24.53	46.00	21.47
703.900	23.56	6.60	0.39	30.55	46.00	15.45
770.400	23.93	6.80	0.17	30.91	46.00	15.09

- Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
2. The emission levels that are 20dB below the official limit are not reported.

Emission Frequency MHz	Antenna Factor dB/m	Cable Loss dBμV	Meter Reading Vertical dBμV/m	Emission Level Vertical dBμV/m	Limits dB	Margin
39.990	20.71	1.20	1.08	22.99	40.00	17.01
55.380	14.39	1.50	7.06	22.95	40.00	17.05
60.780	12.55	1.60	3.99	18.14	40.00	21.86
68.340	11.93	1.70	3.23	16.86	40.00	23.14
130.440	19.79	2.40	0.74	22.93	43.50	20.57
400.800	17.66	4.80	1.90	24.36	46.00	21.64
860.000	26.03	7.20	0.40	33.63	46.00	12.37

- Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
2. The emission levels that are 20dB below the official limit are not reported.

3.6.2. Restricted Bands Measurement Results

Date of Test : May 26, 2010 Temperature : 27

EUT : 2.4GHz Embedded Type Wireless Modem Humidity : 65%

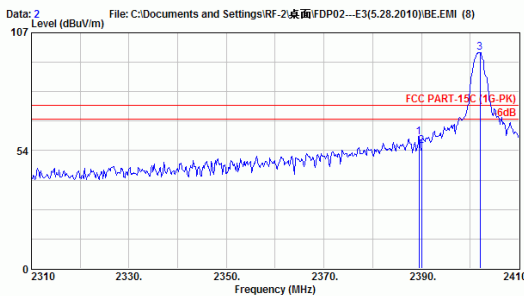
Test Mode : Transmitting Mode, Frequency:
2402MHz
Type of Modulation: FSK

	Emission Frequency MHz	Antenna Factor dB/m	Cable Loss dB μ V	Meter Reading Horizontal dB μ V/m	Emission Level Horizontal dB μ V/m	Limits dB	Margin
Fundamental	2402.000	28.47	6.36	63.23	98.06		
Peak *	2389.500	28.47	6.34	24.67	59.48	74.00	14.52
Fundamental	2402.300	28.47	6.36	62.98	97.81		
Average *	2386.200	28.47	6.33	0.05	34.85	54.00	19.15

- Remark : 1. Emission Level = Antenna Factor + Cable Loss + Meter Reading.
 2. Low frequency section (spurious in the restricted band 2310-2410MHz).
 3. '*' The field strength of emission appearing within Part 15.205(a) shall not exceed the limits shown in section 15.209.



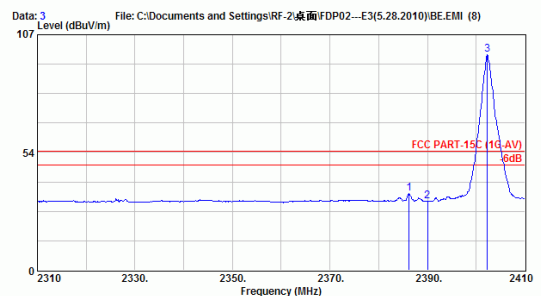
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 County, Taiwan R.O.C. Post Code:24443
 Tel:+886-2-26092133 Fax:+886-2-26099303
 Email:ttmc@ttmc.com.tw



Site no. : site Data no. : 2
 Dis. / Ant. : 3m 3115(4927) Ant. pol. : HORIZONTAL
 Limit : FCC PART-15C (1G-PK)
 Env. / Ins. : 8593EM 27°C/65% Engineer : Henning Chang
 EUT : 2.4GHz Embedded Type Wireless Modem
 Power Rating : 120V/60Hz M/N:FDP02
 Test Mode : CH-L



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 Email:ttmc@ttmc.com.tw



Site no. : site Data no. : 3
 Dis. / Ant. : 3m 3115(4927) Ant. pol. : HORIZONTAL
 Limit : FCC PART-15C (1G-AV)
 Env. / Ins. : 8593EM 27°C/65% Engineer : Henning Chang
 EUT : 2.4GHz Embedded Type Wireless Modem
 Power Rating : 120V/60Hz M/N:FDP02
 Test Mode : CH-L

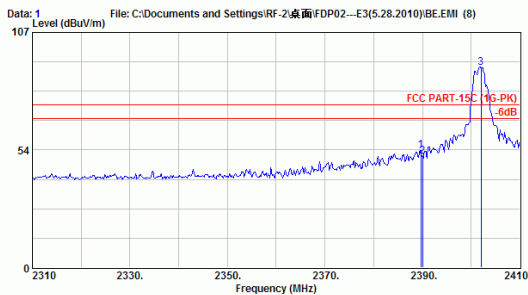
Date of Test : May 26, 2010 Temperature : 27
 EUT : 2.4GHz Embedded Type Wireless Modem Humidity : 65%
 Test Mode : Transmitting Mode, Frequency:
2402MHz
Type of Modulation: FSK

	Emission Frequency MHz	Antenna Factor dB/m	Cable Loss dB μ V	Meter Reading Vertical dB μ V/m	Emission Level Vertical dB μ V/m	Limits dB	Margin
Fundamental	2402.000	28.47	6.36	56.22	91.05		
Peak *	2389.700	28.47	6.34	18.59	53.40	74.00	20.60
Fundamental	2402.300	28.47	6.36	54.38	89.21		
Average *	2326.800	28.32	6.26	-2.68	31.90	54.00	22.10

- Remark : 1. Emission Level = Antenna Factor + Cable Loss + Meter Reading.
 2. Low frequency section (spurious in the restricted band 2310-2410MHz).
 3. '*' The field strength of emission appearing within Part 15.205(a) shall not exceed the limits shown in section 15.209.



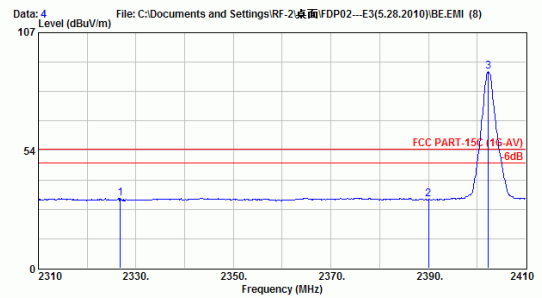
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 Email:ttenc@ttenc.com.tw



Site no. : site Data no. : 1
 Dis. / Ant. : 3m 3115 (4927) Ant. pol. : VERTICAL
 Limit : FCC PART-15C (1G-PK)
 Env. / Ins. : 8593EM 27°C/65% Engineer : Henning Chang
 EUT : 2.4GHz Embedded Type Wireless Modem
 Power Rating : 120V/60Hz M/N:FDP02
 Test Mode : CH-L



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 Email:ttenc@ttenc.com.tw



Site no. : site Data no. : 4
 Dis. / Ant. : 3m 3115 (4927) Ant. pol. : VERTICAL
 Limit : FCC PART-15C (1G-AV)
 Env. / Ins. : 8593EM 27°C/65% Engineer : Henning Chang
 EUT : 2.4GHz Embedded Type Wireless Modem
 Power Rating : 120V/60Hz M/N:FDP02
 Test Mode : CH-L

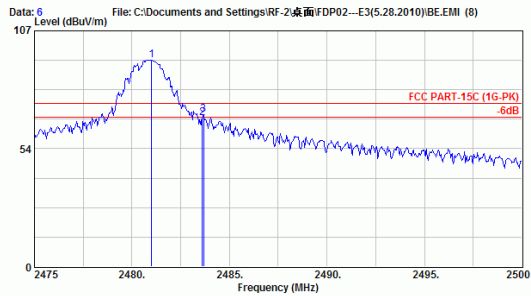
Date of Test : May 26, 2010 Temperature : 27
 EUT : 2.4GHz Embedded Type Wireless Modem Humidity : 65%
 Test Mode : Transmitting Mode, Frequency:
2481MHz
Type of Modulation: FSK

	Emission Frequency MHz	Antenna Factor dB/m	Cable Loss dB μ V	Meter Reading Horizontal dB μ V/m	Emission Level Horizontal dB μ V/m	Limits dB	Margin
Fundamental	2481.000	28.66	6.44	58.55	93.65		
Peak *	2483.675	28.66	6.45	33.77	68.88	74.00	5.12
Fundamental	2481.075	28.66	6.44	58.18	93.28		
Average *	2483.600	28.66	6.45	16.67	51.78	54.00	2.22

- Remark : 1. Emission Level = Antenna Factor + Cable Loss + Meter Reading.
 2. High frequency section (spurious in the restricted band 2475-2500MHz).
 3. '*' The field strength of emission appearing within Part 15.205(a) shall not exceed the limits shown in section 15.209.



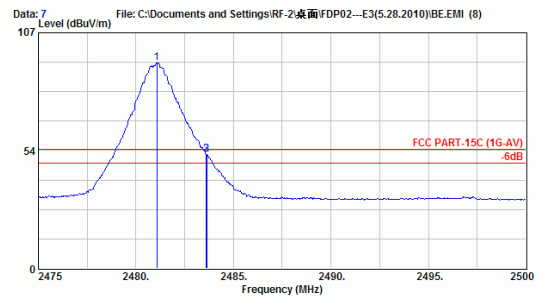
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 Email:ttenc@ttenc.com.tw



Site no. : site Data no. : 6
 Dis. / Ant. : 3m 3115(4927) Ant. pol. : HORIZONTAL
 Limit : FCC PART-15C (1G-PK)
 Env. / Ins. : 8593EM 27°C/65% Engineer : Henning Chang
 EUT : 2.4GHz Embedded Type Wireless Modem
 Power Rating : 120V/60Hz M/N:FDP02
 Test Mode : CH-H



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 Email:ttenc@ttenc.com.tw



Site no. : site Data no. : 7
 Dis. / Ant. : 3m 3115(4927) Ant. pol. : HORIZONTAL
 Limit : FCC PART-15C (1G-AV)
 Env. / Ins. : 8593EM 27°C/65% Engineer : Henning Chang
 EUT : 2.4GHz Embedded Type Wireless Modem
 Power Rating : 120V/60Hz M/N:FDP02
 Test Mode : CH-H

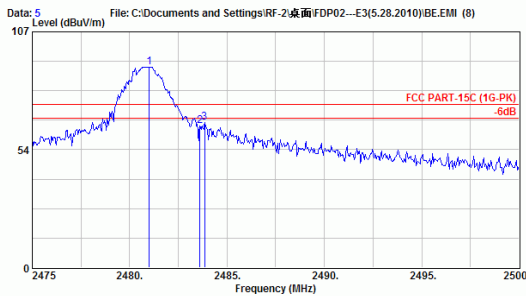
Date of Test : May 26, 2010 Temperature : 27
 EUT : 2.4GHz Embedded Type Wireless Modem Humidity : 65%
 Test Mode : Transmitting Mode, Frequency:
2481MHz
Type of Modulation: FSK

	Emission Frequency MHz	Antenna Factor dB/m	Cable Loss dB μ V	Meter Reading Vertical dB μ V/m	Emission Level Vertical dB μ V/m	Limits dB	Margin
Fundamental	2481.000	28.66	6.44	55.85	90.95		
Peak *	2483.850	28.66	6.45	30.72	65.83	74.00	8.17
Fundamental	2481.025	28.66	6.44	55.57	90.67		
Average *	2483.600	28.66	6.45	15.29	50.40	54.00	3.60

- Remark : 1. Emission Level = Antenna Factor + Cable Loss + Meter Reading.
 2. High frequency section (spurious in the restricted band 2475-2500MHz).
 3. '*' The field strength of emission appearing within Part 15.205(a) shall not exceed the limits shown in section 15.209.



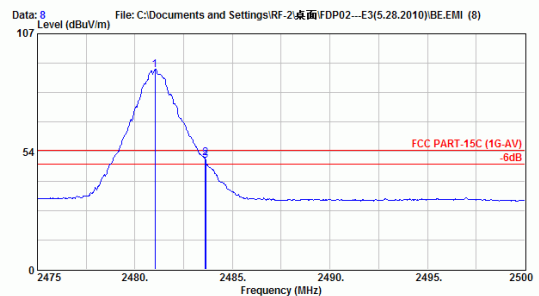
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 Email:ttenc@ttenc.com.tw



Site no. : site Data no. : 5
 Dis. / Ant. : 3m 3115(4927) Ant. pol. : VERTICAL
 Limit : FCC PART-15C (1G-PK)
 Env. / Ins. : 8593EM 27°C/65% Engineer : Henning Chang
 EUT : 2.4GHz Embedded Type Wireless Modem
 Power Rating : 120V/60Hz M/N:FDP02
 Test Mode : CH-H



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Site no. : site Data no. : 8
 Dis. / Ant. : 3m 3115(4927) Ant. pol. : VERTICAL
 Limit : FCC PART-15C (1G-AV)
 Env. / Ins. : 8593EM 27°C/65% Engineer : Henning Chang
 EUT : 2.4GHz Embedded Type Wireless Modem
 Power Rating : 120V/60Hz M/N:FDP02
 Test Mode : CH-H

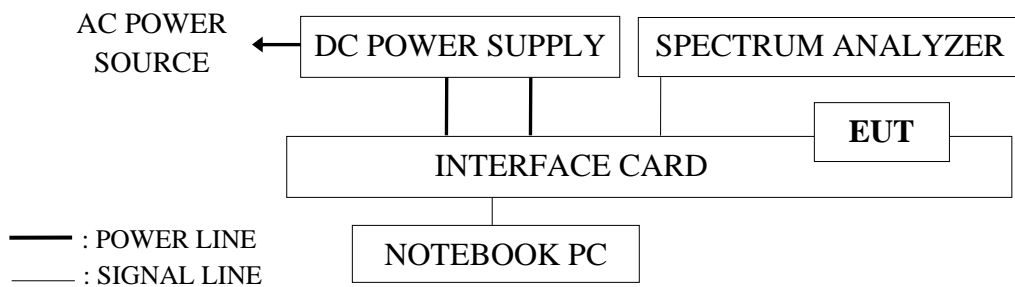
4. 6dB BANDWIDTH MEASUREMENT

4.1. Test Equipment

The following test equipment was used during the 6dB bandwidth measurement:

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Spectrum Analyzer	Agilent	E4446A	US44300366	Jul. 23, 09'	Jul. 22, 10'

4.2. Block Diagram of Test Setup



EUT: 2.4GHZ EMBEDDED TYPE WIRELESS MODEM

4.3. Specification Limits (§15.247(a)(2))

The minimum 6dB bandwidth shall be at least 500kHz.

4.4. Operating Condition of EUT

- 4.4.1. Set up the EUT (2.4GHz Embedded Type Wireless Modem) as shown on 4.2.
- 4.4.2. To turn on the power of all equipment.
- 4.4.3. The EUT was set the Notebook PC using test program “Futaba Term”.
- 4.4.4. The EUT was set to continuously transmit signals at 2402MHz, 2441MHz and 2481MHz during testing.

4.5. Test Procedure

The transmitter output was connected to the spectrum analyzer. The bandwidth of the fundamental frequency was measure 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.

The measurement guideline was according to KDB 558074.

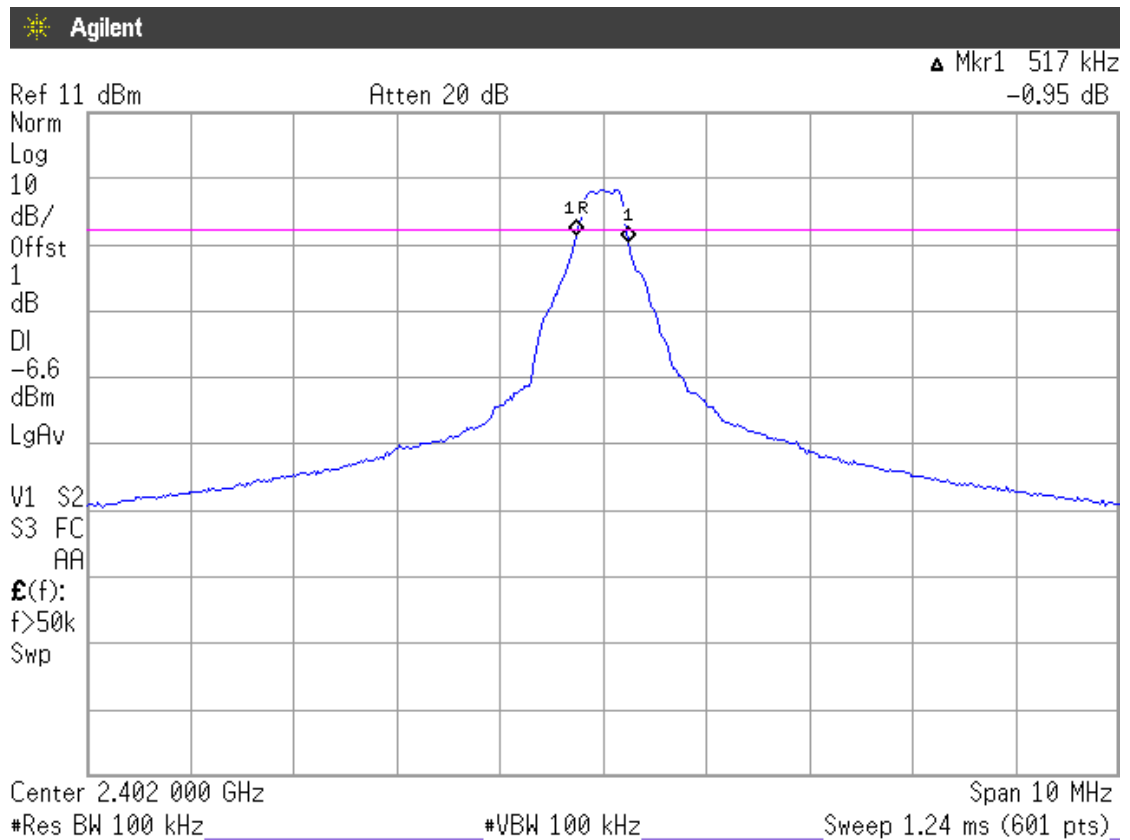
4.6. Test Results

PASSED. All the test results are attached in next pages.

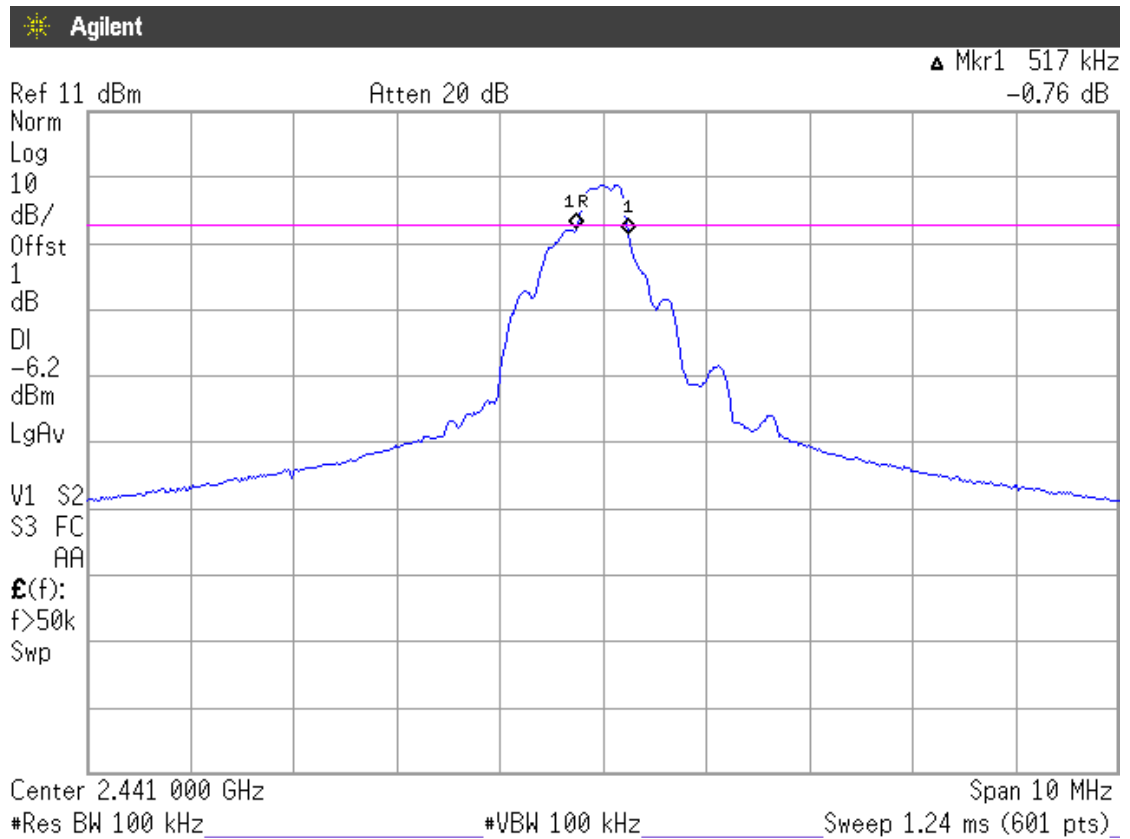
Test Date : May 14, 2010 Temperature : 26 Humidity : 71%

No.	Test Frequency	6dB Bandwidth
1.	2402MHz	517kHz
2.	2441MHz	517kHz
3.	2481MHz	517kHz

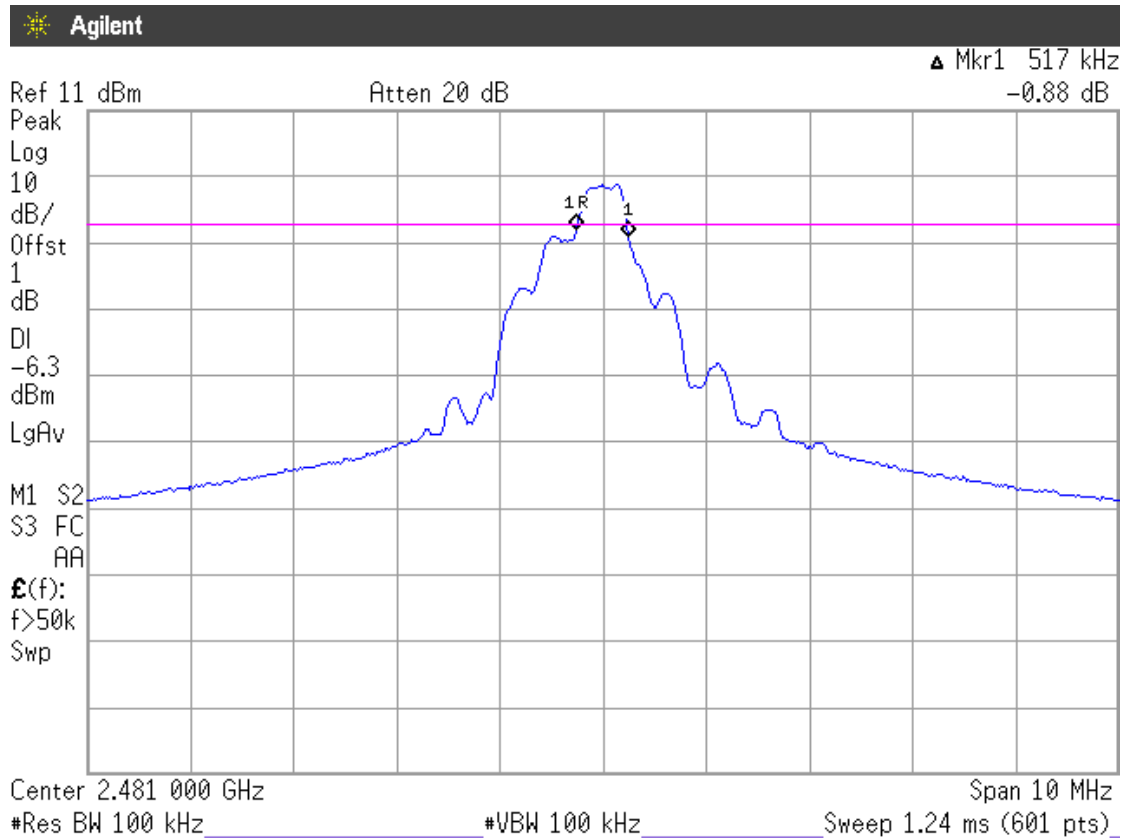
4.6.1. Frequency: 2402MHz



4.6.2. Frequency: 2441MHz



4.6.3. Frequency: 2481MHz



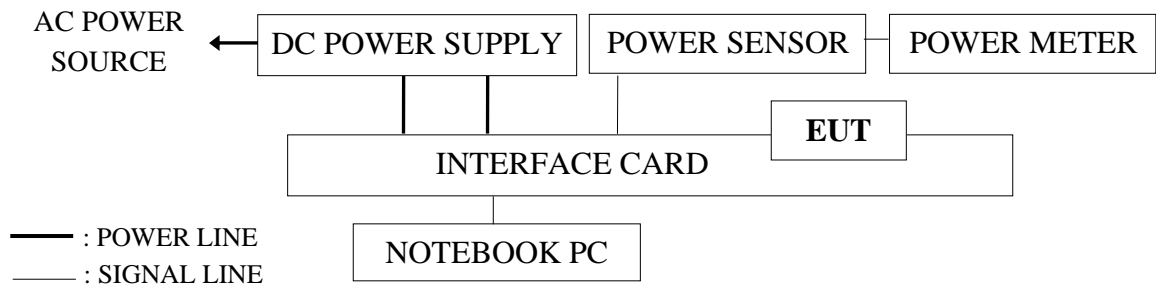
5. MAXIMUM PEAK OUTPUT POWER MEASUREMENT

5.1. Test Equipment

The following test equipment was used during the maximum peak output power measurement:

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Power Meter	Anritsu	ML2487A	6K00005406	Feb. 11, 10'	Feb. 10, 11'
2.	Power Sensor	Anritsu	MA2491A	030873	Feb. 11, 10'	Feb. 10, 11'

5.2. Block Diagram of Test Setup



EUT: 2.4GHZ EMBEDDED TYPE WIRELESS MODEM

5.3. Specification Limits (§15.247(b)-(3))

The Limits of maximum Peak Output Power for digital modulation in 2400-2483.5MHz is : 1Watt. (30dBm)

5.4. Operating Condition of EUT

- 5.4.1. Set up the EUT (2.4GHz Embedded Type Wireless Modem) as shown on 4.2.
- 5.4.2. To turn on the power of all equipment.
- 5.4.3. The EUT was set the Notebook PC using test program “Futaba Term”.
- 5.4.4. The EUT was set to continuously transmit signals at 2402MHz、 2441MHz and 2481MHz during testing.

5.5. Test Procedure

The transmitter output was connected to the power meter that was designed to detect peak value automatically.

The measurement guideline was according to KDB 558074.

5.6. Test Results

PASSED. All the test results are listed below.

Test Date : May 14, 2010 Temperature : 26 Humidity : 71%

No.	Test Frequency	Peak Output Power	Limit
1.	2402MHz	-0.35dBm	30dBm
2.	2441MHz	-0.27dBm	30dBm
3.	2481MHz	-0.24dBm	30dBm

6. EMISSION LIMITATIONS MEASUREMENT

6.1. Test Equipment

The following test equipment was used during the emission limitations test :

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Spectrum Analyzer	Agilent	E4446A	US44300366	Jul. 23, 09'	Jul. 22, 10'

6.2. Block Diagram of Test Setup

The same as section.4.2.

6.3. Specification Limits (§15.247(c))

In any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (See Section 15.205(c)).(This test result attaching to §3.6.3)

6.4. Operating Condition of EUT

The test program “Futaba Term” was used to enable the EUT to transmit data at different channel frequency individually.

6.5. Test Procedure

The transmitter output was connected to the spectrum analyzer. The bandwidth of the fundamental frequency was measure by spectrum analyzer with 100kHz RBW and 100kHz VBW.

The measurement guideline was according to KDB 558074.

6.6. Test Results

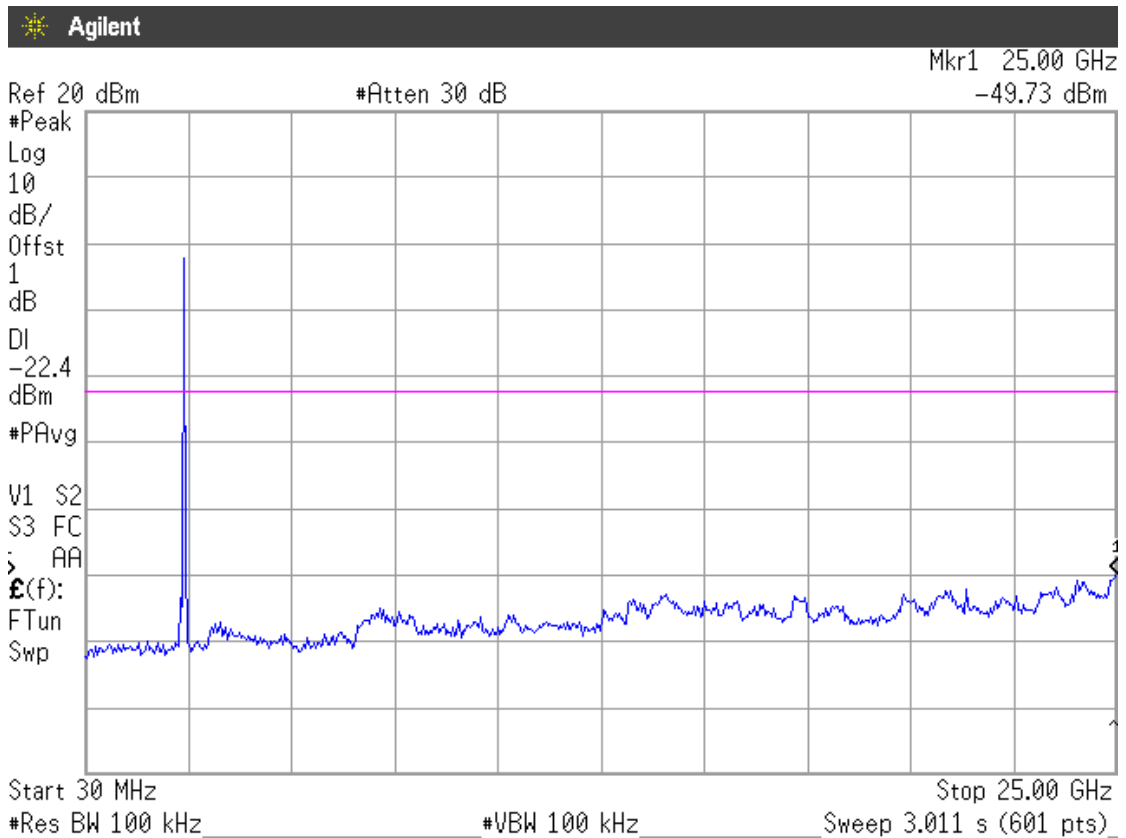
PASSED. The testing data was attached in the next pages.

Test Date : May 14, 2010 Temperature : 26 Humidity : 71%

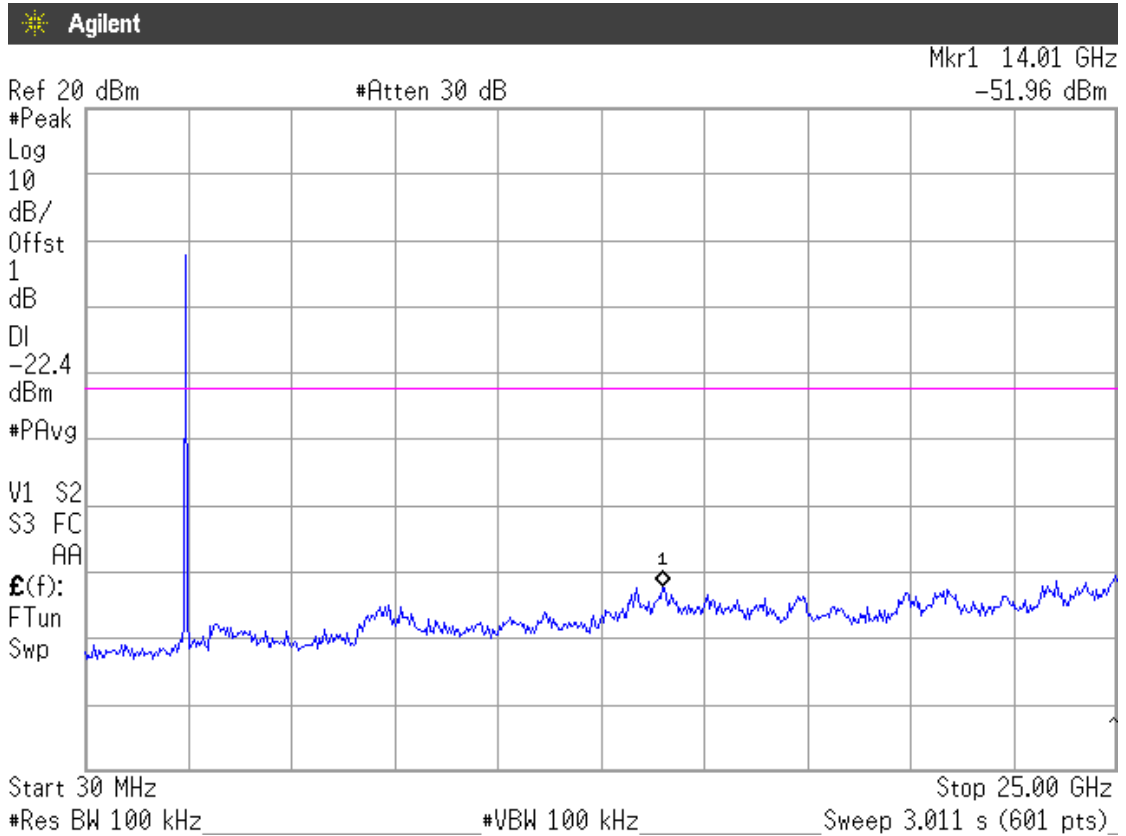
1. 2402MHz: During 30MHz~25GHz bandwidth. In the 25.00GHz, the -49.73dBm is max value that is lower than 20dB of primary channel.
2. 2441MHz: During 30MHz~25GHz bandwidth. In the 14.01GHz, the -51.96dBm is max value that is lower than 20dB of primary channel.
3. 2481MHz: During 30MHz~25GHz bandwidth. In the 25.00GHz, the -50.24dBm is max value that is lower than 20dB of primary channel.

Note: The peak above the limit line is the carrier frequency.

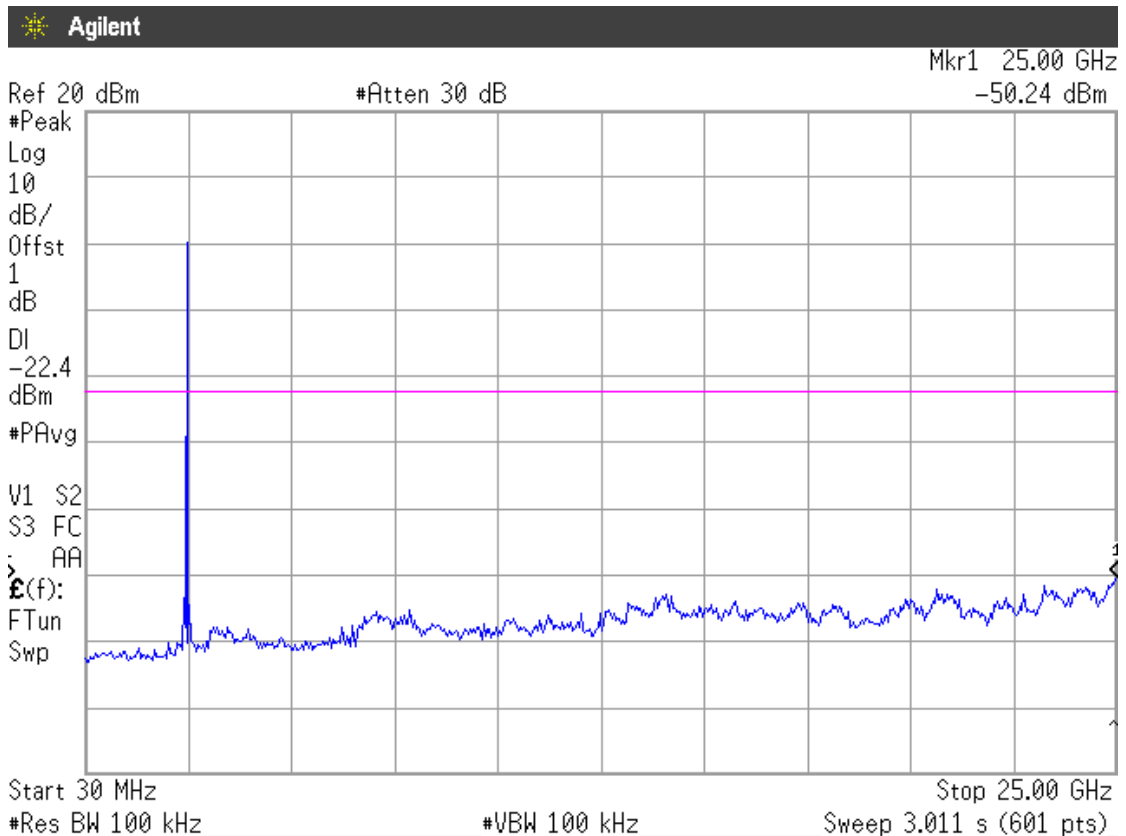
6.6.1. Frequency: 2402MHz



6.6.2. Frequency: 2441MHz



6.6.3. Frequency: 2481MHz



7. BAND EDGES MEASUREMENT

7.1. Test Equipment

The following test equipment was used during the band edges measurement:

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Spectrum Analyzer	Agilent	E4446A	US44300366	Jul. 23, 09'	Jul. 22, 10'

7.2. Block Diagram of Test Setup

The same as section.4.2.

7.3. Specification Limits (§15.247(c))

The highest level should be at least 20 dB below that in the 100kHz bandwidth.

7.4. Operating Condition of EUT

The test program “Futaba Term” was used to enable the EUT to transmit data at different channel frequency individually.

7.5. Test Procedure

The transmitter output was connected to the spectrum analyzer. Set both RBW and VBW of spectrum analyzer to 100kHz with suitable frequency span including 100kHz bandwidth from band edge.

The measurement guideline was according to KDB 558074.

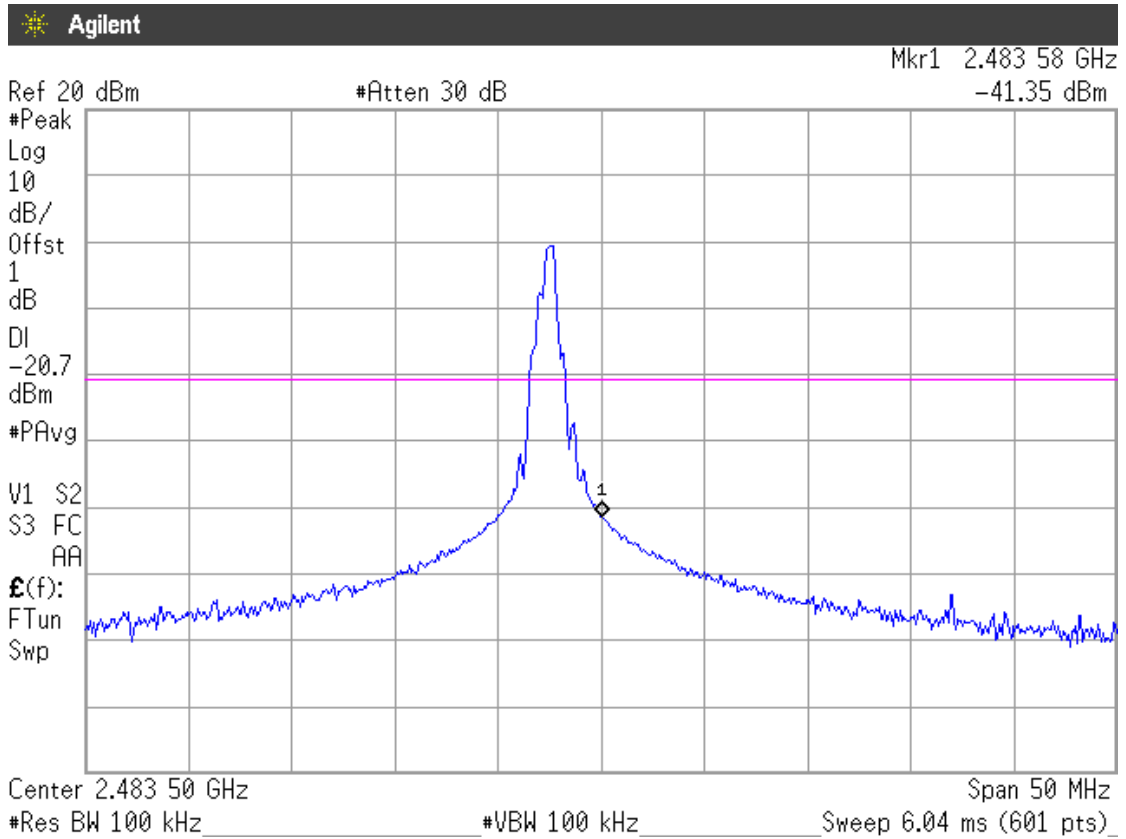
7.6. Test Results

PASSED. All the test results are attached in next pages.

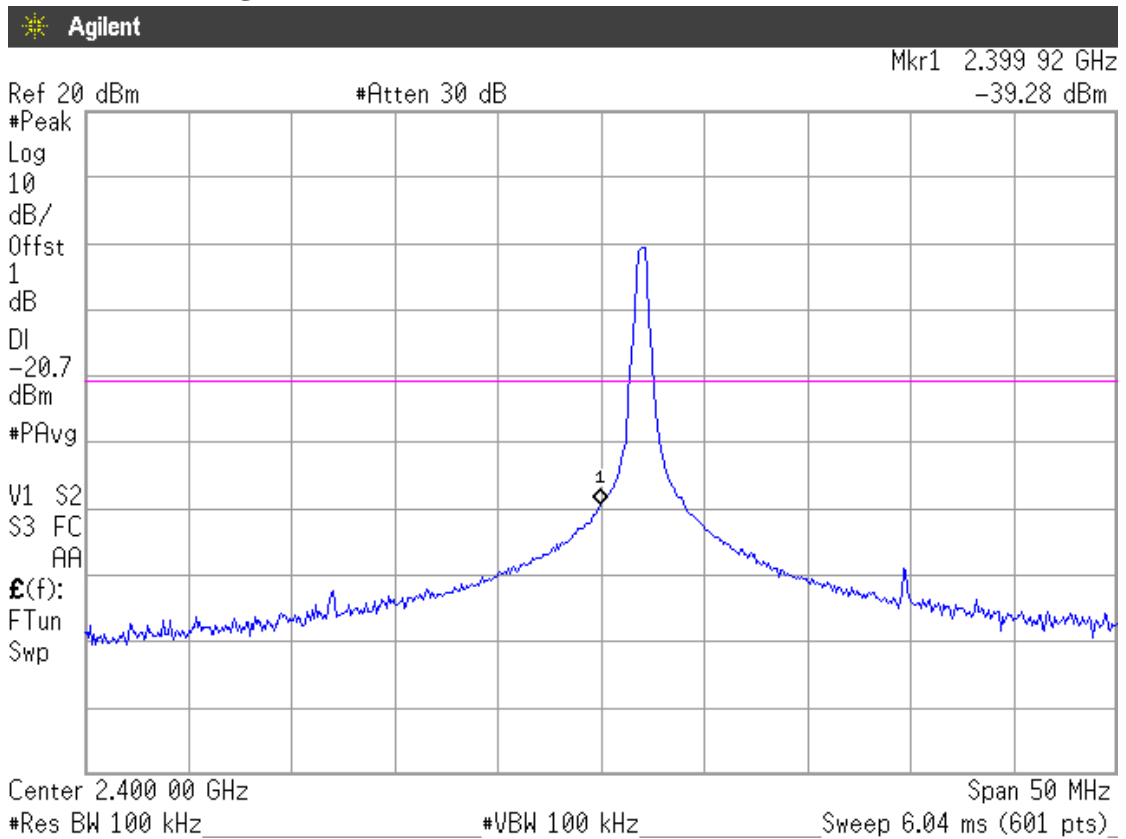
Test Date : May 14, 2010 Temperature : 26 Humidity : 71%

1. Upper Band edge: The highest emission level is -41.35dBm on 2.48358GHz .
2. Below Band edge : The highest emission level is -39.28dBm on 2.39992GHz .

Upper Band edge



Below Band edge



8. POWER SPECTRAL DENSITY MEASUREMENT

8.1. Test Equipment

The following test equipment was used during the power spectral density measurement:

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Spectrum Analyzer	Agilent	E4446A	US44300366	Jul. 23, 09'	Jul. 22, 10'

8.2. Block Diagram of Test Setup

The same as section.4.2.

8.3. Specification Limits (§15.247(d))

The peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3kHz band.

8.4. Operating Condition of EUT

The test program “Futaba Term” was used to enable the EUT to transmit data at different channel frequency individually.

8.5. Test Procedure

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

The measurement guideline was according to KDB 558074.

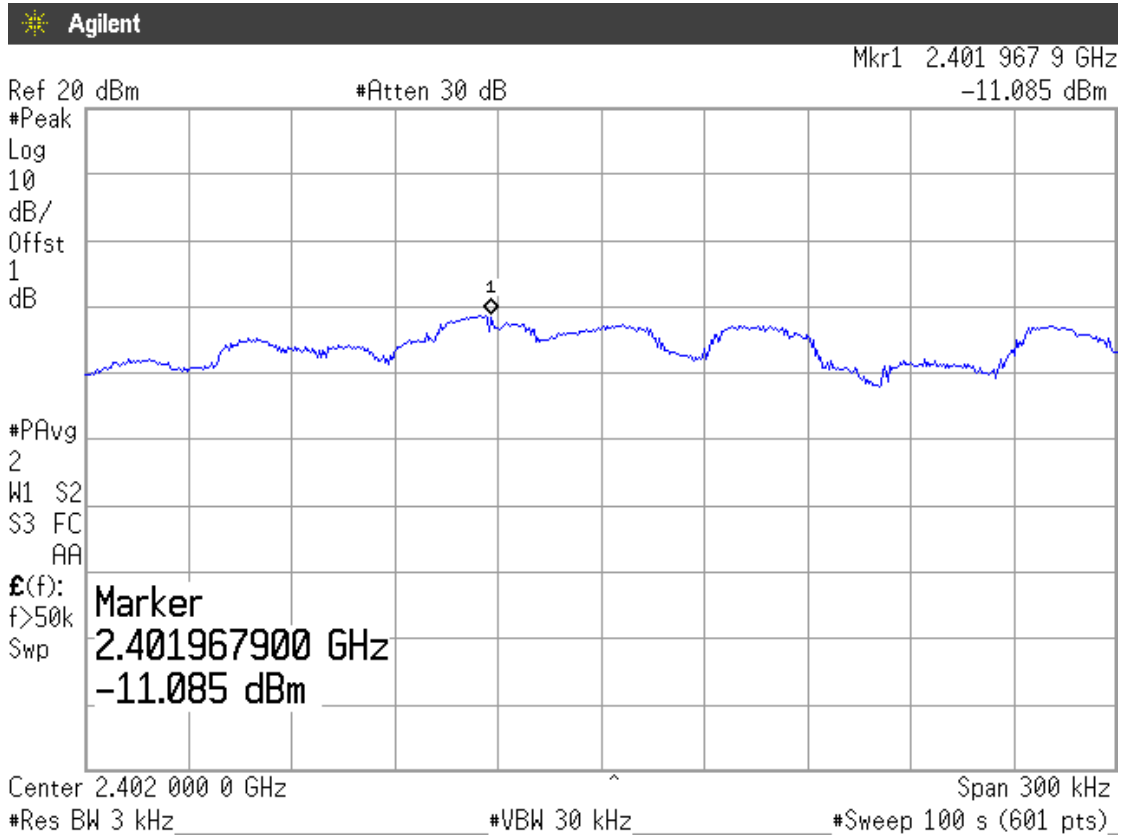
8.6. Test Results

PASSED. All the test results are attached in next pages.

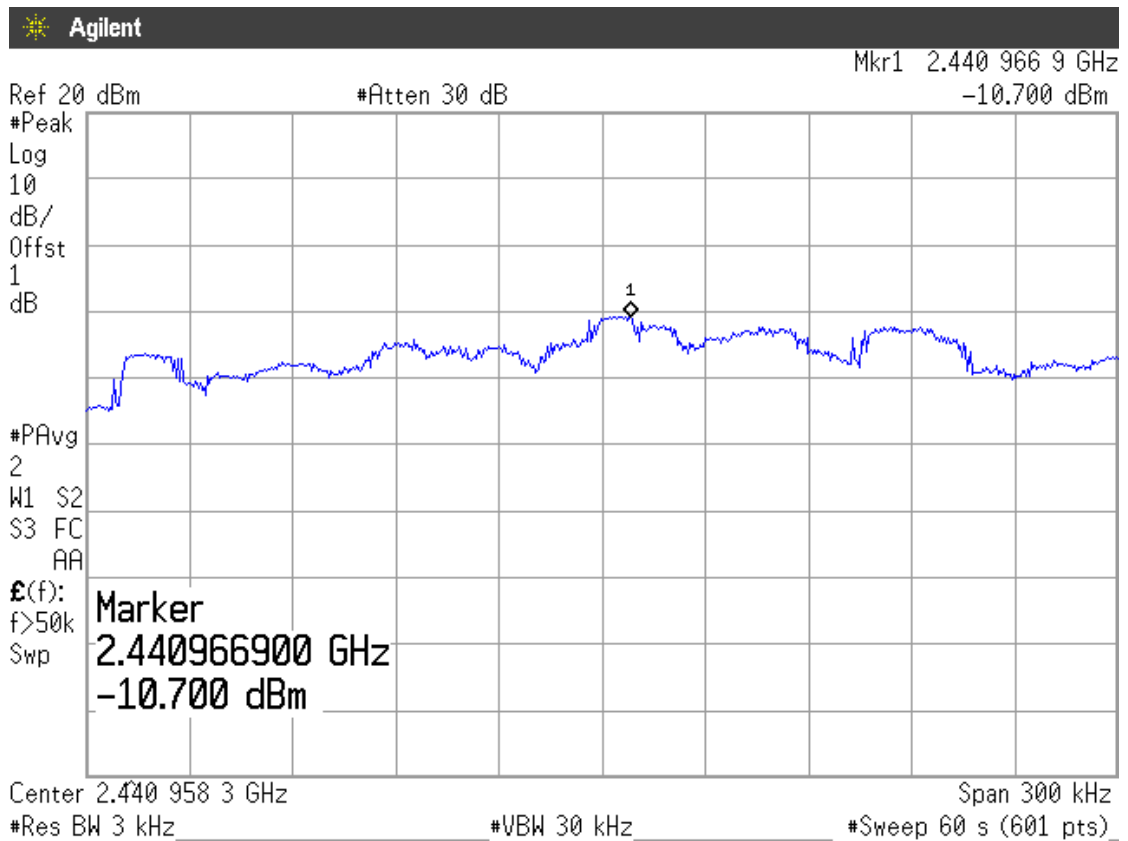
Test Date : May 14, 2010 Temperature : 26 Humidity : 71%

No.	Test Frequency	Power Spectral Density	Limit
1.	2402MHz	-11.085dBm	8dBm
2.	2441MHz	-10.700dBm	8dBm
3.	2481MHz	-11.114dBm	8dBm

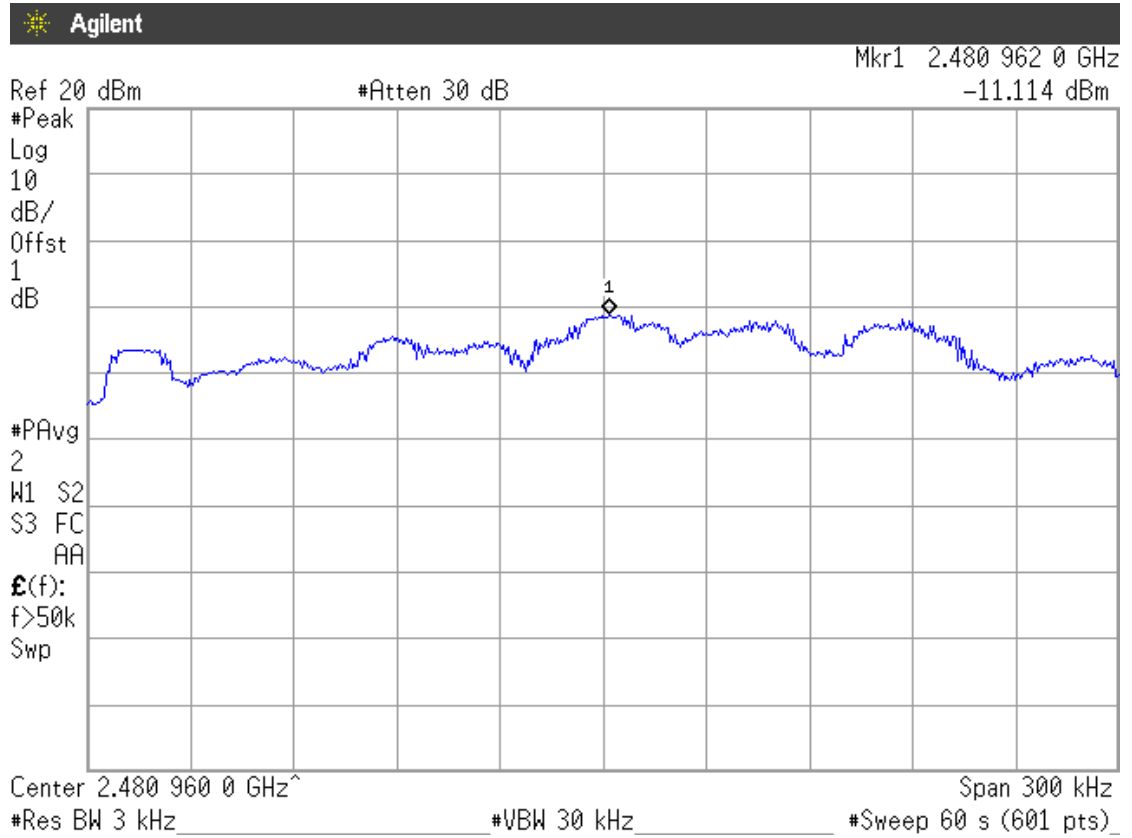
8.6.1. Frequency: 2402MHz



8.6.2. Frequency: 2441MHz



8.6.3. Frequency: 2481MHz



9. DEVIATION TO TEST SPECIFICATIONS

【NONE】