

FCC TEST REPORT (15.247)

for

Aisai Communication Technology Co., Ltd.

Wireless Radio

Model No.: IPLink

FCC ID: YHHIPLKA01

Prepared for : Aisai Communication Technology Co., Ltd.
Address : 6/F, Block 4, Zhongxing Industrial Park, Chuangye Road, Nanshan District, Shenzhen City, China

Prepared by : SHENZHEN LCS CERTIFICATION SERVICES INC.
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1. TEST CERTIFICATION

Applicant	Aisai Communication Technology Co., Ltd. 6/F, Block 4, Zhongxing Industrial Park, Chuangye Road, Nanshan District, Shenzhen City, China
Manufacturer	Aisai Communication Technology Co., Ltd. 6/F, Block 4, Zhongxing Industrial Park, Chuangye Road, Nanshan District, Shenzhen City, China
EUT	Wireless Radio
Model No.	IPLink
Power Adapter	Input: AC100-240V Output: DC 24V

APPLICABLE STANDARDS	
STANDARD	TEST RESULT
FCC PART 15 C	No non-compliance noted

The measurement results are contained in this test report and SHENZHEN EMTEK CO., LTD. is assumed full responsibility for the accuracy and completeness of these measurements. Also, this report shows that the Equipment Under Test (EUT) is to be technically compliant with the FCC part 15C requirements.

This report applies to above tested sample only. This report shall not be reproduced in part without written approval of SHENZHEN LCS CERTIFICATION SERVICES INC.

Date of Test: May 27, 2010–June 22, 2010



Prepared by: _____

(Engineer)



Reviewed by: _____

(Quality Manager)

2. TEST RESULT SUMMARY

Test Items	Result	Remark
AC Power Conducted Emission	Pass	Meet the requirement of limit.
Spectrum Bandwidth of a Direct Sequence Spread Spectrum System Limit: min. 500kHz	Pass	Meet the requirement of limit.
Maximum Peak Output Power Limit: max. 30dBm	Pass	Meet the requirement of limit.
Radiated Emissions Limit: Table 15.209	Pass	Meet the requirement of limit.
Power Spectral Density Limit: max. 8dBm	Pass	Meet the requirement of limit.
Band Edge Measurement Limit: 20dB less than the peak value of fundamental frequency	Pass	Meet the requirement of limit.

Note:

1. The test result judgment is decided by the limit of test standard
2. The information of measurement uncertainty is available upon the customer's request.

3. EUT DESCRIPTION

Product	Wireless Radio
Trade Name	Aisai
Model Number	IPLink
Model Discrepancy	All the above models are identical except the model designation for different market.
Power Supply	Input: AC100-240V Output: DC 24V
Frequency Range	5745.0 ~ 5825.0MHz
Transmit Power	IEEE 802.11a:22.95dBm IEEE 802.11n (20 MHz): 23.00dBm IEEE 802.11n (40 MHz): 22.96dBm
Modulation Technique	64QAM, 16QAM, QPSK, BPSK for OFDM
Transmit Data Rate	802.11a: 54.0/ 48.0/ 36.0/ 24.0/ 18.0/ 12.0/ 9.0/ 6.0Mbps 802.11n: up to 270Mbps
Number of Channels	5 Channels for IEEE 802.11a, IEEE 802.11n (20MHz) 2 Channels for IEEE 802.11a (40MHz)
Antenna Specification	0dBi gain (Max)
Accessory Devices	AC Adapter
I/O Ports	RJ45

NOTE:

1. The EUT is a DUAL-BAND WIRELESS HD INTERNET ROUTER. The functions of EUT listed as below:

	TEST STANDARD	REFERENCE REPORT
WLAN 802.11a, 802.11n (5745~5825 MHz)	FCC Part 15, Subpart C (Section 15.247)	KA100527103FC
WLAN 802.11a, 802.11n (5180~ 5240MHz)	FCC Part 15, Subpart E (Section 15.407)	KA100527107FC

2. The frequency bands used in this EUT are listed as follows:

Frequency Band (MHz)	5180~5240	5745~5825
802.11a	✓	✓
802.11n (20MHz)	✓	✓
802.11n (40MHz)	✓	✓

3. The EUT incorporates a MIMO function. Physically, the EUT provides two completed transmitters and two receivers.

MODULATION MODE	TX FUNCTION
802.11a	2TX
802.11n (20MHz)	2TX
802.11n (40MHz)	2TX

4. The EUT uses following adapter.

Brand	Aisai
Model	ASW-IPLINK POE
Input Power	AC 100-240V
Output Power	DC 24V
Poewr Line	1.5m, Shielded

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

4. DESCRIPTION OF TEST MODES

TRANSMIT CHANNELS

802.11a and 802.11n (20MHz):

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
44	5745MHz	49	5805MHz
46	5765MHz	50	5825MHz
47	5785MHz		

802.11n (40MHz):

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
45	5755MHz	48	5795MHz

TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	RE \geq 1G	RE<1G	PLC	APCM	
--	✓	✓	✓	✓	--

Where RE \geq 1G: Radiated Emission above 1GHz RE<1G: Radiated Emission below 1GHz

PLC: Power Line Conducted Emission

APCM: Antenna Port Conducted Measurement

RADIATED EMISSION TEST (ABOVE 1GHz):

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)	Axis
802.11a	44 to 50	44, 47, 50	OFDM	BPSK	6.0	Z
802.11n (20MHz)	44 to 50	44, 47, 50	OFDM	BPSK	7.2	Z
802.11n (40MHz)	45 to 48	45, 48	OFDM	BPSK	15.0	Z

RADIATED EMISSION TEST (BELOW 1GHz):

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)	Axis
802.11a	44 to 50	50	OFDM	BPSK	6.0	Z

POWER LINE CONDUCTED EMISSION TEST:

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.

Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
802.11a	44 to 50	50	OFDM	BPSK	6.0

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.

Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
802.11a	44 to 50	44, 47, 50	OFDM	BPSK	6.0
802.11n (20MHz)	44 to 50	44, 47, 50	OFDM	BPSK	7.2
802.11n (40MHz)	45 to 48	45, 48	OFDM	BPSK	15.0

ANTENNA PORT CONDUCTED MEASUREMENT:

This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.

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.

Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
802.11a	44 to 50	44, 47, 50	OFDM	BPSK	6.0
802.11n (20MHz)	44 to 50	44, 47, 50	OFDM	BPSK	7.2
802.11n (40MHz)	45 to 48	45, 48	OFDM	BPSK	15.0

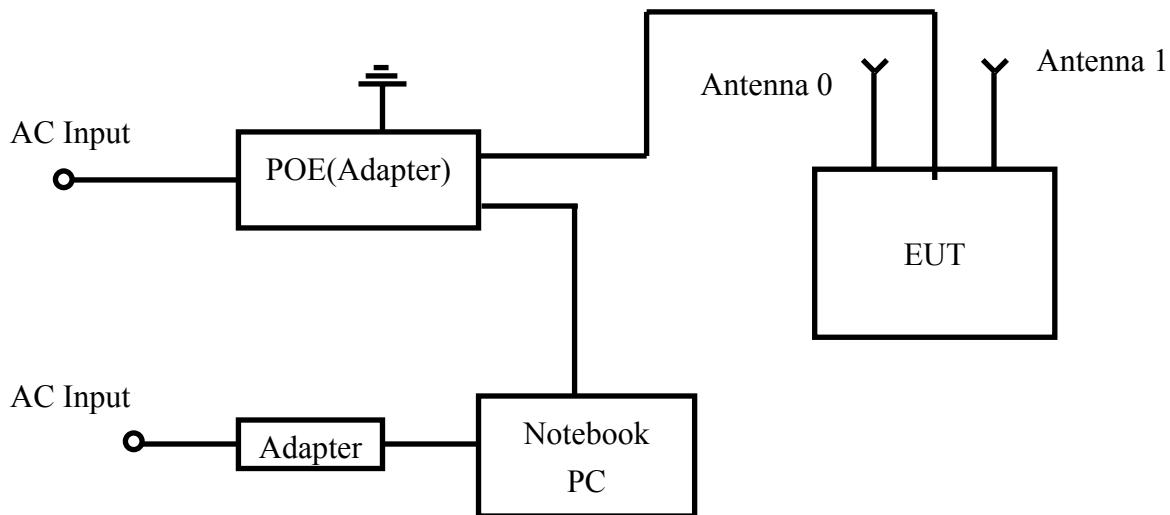
5. SETUP OF EQUIPMENT UNDER TEST

5.1 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.	Equipment	Model No.	Serial No.	FCC ID	Trade Name	Data Cable	Power Cord
1	Notebook PC	D610	DRMTH1S	E2K5HCKT	Dell	LAN shielded, 1.8m	Unshielded, 1.8m

5.2 CONFIGURATION OF SYSTEM UNDER TEST



6 FACILITIES AND UNCERTAINTY

6.1 FACILITIES

Site Description

EMC Lab.

: Accredited by CNAS, 2005.11.02

The certificate is valid until 2010.11

The Laboratory has been assessed and proved to be in compliance with CNAS-CL01: 2006(identical to ISO/IEC17025:2005)

The Certificate Registration Number is L2291.

Accredited by TUV Rheinland Shenzhen, 2008.3 The Laboratory has been assessed according to the requirements ISO/IEC 17025

Accredited by FCC, March 18, 2008 The Certificate Registration Number is 709623.

Accredited by Industry Canada, May 24, 2008 The Certificate Registration Number is 46405-4480.

Name of Firm

: SHENZHEN EMTEK CO., LTD

Site Location

: Bldg 69, Majialong Industry Zone, Nanshan District, Shenzhen, Guangdong, China

6.2 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:

Conduction Uncertainty (9K~30MHz) : $Ur = \pm 2.66\text{dB}$

Radiation Uncertainty (30M~1GHz) : $Ur = \pm 4.26\text{dB}$

Radiation Uncertainty (1G~3GHz) : $Ur = \pm 2.68\text{dB}$

Radiation Uncertainty (3G~18GHz) : $Ur = \pm 2.83\text{dB}$

Radiation Uncertainty (18G~40GHz) : $Ur = \pm 1.96\text{dB}$

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

7. TEST TYPES AND RESULTS

7.1 RADIATED EMISSION MEASUREMENT

7.1.1 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:

Frequency (MHz)	Field Strength (μV/m)	Measurement Distance (m)
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.

7.1.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
Spectrum Analyzer	ANRITSU	MS2661C	6200140915	Mar 30, 2010	1 Year
Test Receiver	Rohde & Schwarz	ESCS30	828985/018	Mar 30, 2010	1 Year
Antenna	Schwarzbeck	VULB9163	142	Mar 30, 2010	1 Year
Horn-antenna	Schwarzbeck	BBHA9120D	9120D-209	Mar 30, 2010	1 Year
Power Line Filter	DUOJI EME	FNF 201 B16	N/A	Mar 30, 2010	1 Year
Power Line Filter	JIANLI	DL-40C	N/A	Mar 30, 2010	1 Year

7.1.3 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meters semi-anechoic chamber. 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.

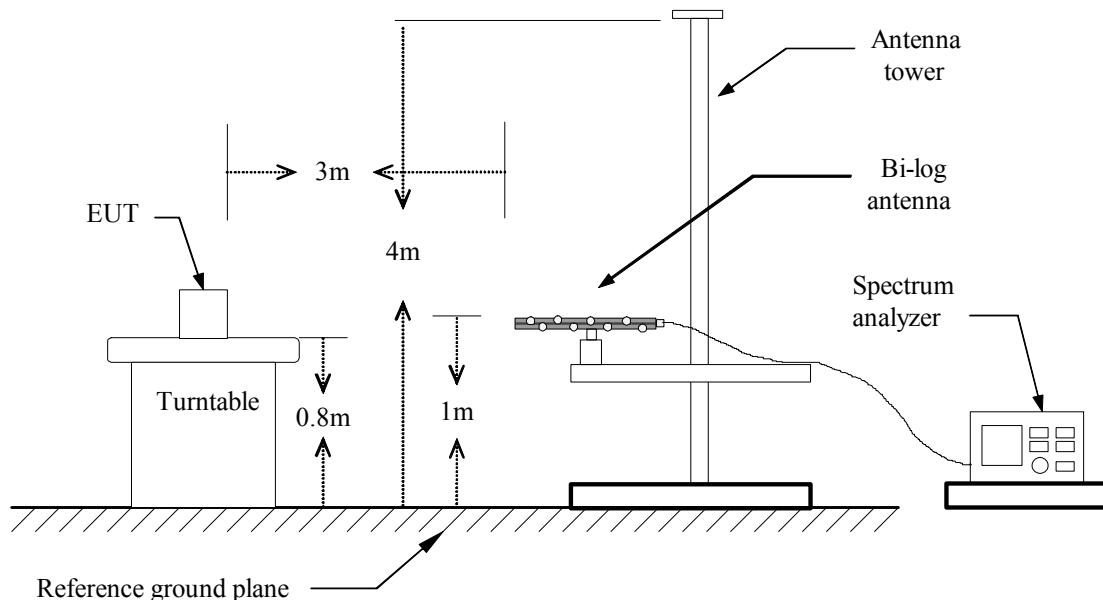
f. If the emission level of the EUT in peak mode was lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data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

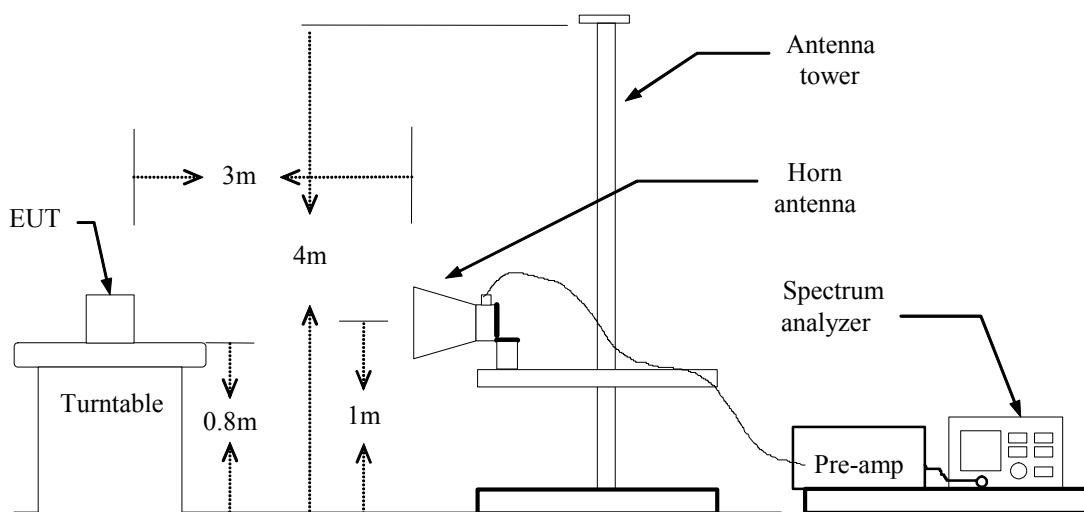
NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 100kHz and video bandwidth is 300kHz for Peak detection at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.

7.1.4 TEST SETUP

Below 1 GHz



Above 1 GHz

For the actual test configuration, please refer to the attached file (Test Setup Photo).

7.1.5 TEST RESULTS

PASS

The test results please refer to the following pages.

Below 1GHzWorst-case: 802.11a**Operation Mode:** 802.11a TX **Test Date:** May 28, 2010**Test Conditions:** 22°C / 51 % RH / 1020hPa**Test By:** Wendy

Freq (MHz)	Emission Level (dBuV/m)	Raw Value (dBuV)	Correction Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Note
198.47	39.13	27.53	11.60	43.50	4.37	100	233	Ver
301.33	41.78	26.18	15.60	46.00	4.22	100	225	Ver
400.21	43.44	25.44	18.00	46.00	2.56	100	259	Ver
450.08	38.42	18.92	19.50	46.00	7.58	100	244	Ver
680.96	41.90	17.60	24.30	46.00	4.10	100	244	Ver
800.52	41.71	15.31	26.40	46.00	4.29	100	351	Ver
43.11	34.29	20.19	14.10	40.00	5.71	225	0	Hor
200.02	41.00	29.40	11.60	43.50	2.50	231	257	Hor
250.07	43.20	30.00	13.20	46.00	2.80	227	231	Hor
300.82	41.00	25.40	15.60	46.00	5.00	312	229	Hor
400.39	41.18	23.18	18.00	46.00	4.82	189	187	Hor
450.48	43.74	24.24	19.50	46.00	2.26	250	160	Hor

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.

Above 1GHz**802.11a**

Operation Mode: 802.11a TX Channel 44 **Test Date:** June 21, 2010
Test Conditions: 22°C / 51 % RH / 1020hPa **Test By:** Wendy

Freq (MHz)	Emission Level (dBuV/m)	Raw Value (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Note
3830.00	54.38	17.18	37.20	74.00	19.62	100	180	Ver/PK
3830.00	48.09	10.89	37.20	54.00	5.91	100	180	Ver/AV
11490.00	66.92	13.62	53.30	74.00	7.08	100	180	Ver/PK
11490.00	47.19	-6.11	53.30	54.00	6.81	100	180	Ver/AV
<hr/>								
3830.00	54.72	17.52	37.20	74.00	19.28	100	180	Hor/PK
3830.00	48.05	10.85	37.20	54.00	5.95	100	180	Hor/AV
11490.00	67.20	13.90	53.30	74.00	6.80	100	180	Hor/PK
11490.00	47.43	-5.87	53.30	54.00	6.57	100	180	Hor/AV

Operation Mode: 802.11a TX Channel 47 **Test Date:** June 21, 2010
Test Conditions: 22°C / 51 % RH / 1020hPa **Test By:** Wendy

Freq (MHz)	Emission Level (dBuV/m)	Raw Value (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Note
3857.00	54.60	17.30	37.30	74.00	19.40	100	180	Ver/PK
3857.00	48.49	11.19	37.30	54.00	5.51	100	180	Ver/AV
11570.00	66.85	13.75	53.10	74.00	7.15	100	180	Ver/PK
11570.00	46.96	-6.14	53.10	54.00	7.04	100	180	Ver/AV
<hr/>								
3857.00	54.27	16.97	37.30	74.00	19.73	100	180	Hor/PK
3857.00	47.76	10.46	37.30	54.00	6.24	100	180	Hor/AV
11570.00	65.47	12.37	53.10	74.00	8.53	100	180	Hor/PK
11570.00	47.26	-5.84	53.10	54.00	6.74	100	180	Hor/AV

Operation Mode:

802.11a TX Channel 50

Test Date:

June 21, 2010

Test Conditions:

22°C / 51 % RH / 1020hPa

Test By:

Wendy

Freq (MHz)	Emission Level (dBuV/m)	Raw Value (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Note
3883.00	54.58	17.18	37.40	74.00	19.42	100	180	Ver/PK
3883.00	47.75	10.35	37.40	54.00	6.25	100	180	Ver/AV
11650.00	65.39	12.29	53.10	74.00	8.61	100	180	Ver/PK
11650.00	47.43	-5.67	53.10	54.00	6.57	100	180	Ver/AV
3883.00	54.62	17.22	37.40	74.00	19.38	100	180	Hor/PK
3883.00	47.48	10.08	37.40	54.00	6.52	100	180	Hor/AV
11650.00	66.34	13.24	53.10	74.00	7.66	100	180	Hor/PK
11650.00	46.69	-6.41	53.10	54.00	7.31	100	180	Hor/AV

REMARKS:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Factor (dB/m).
2. 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. The limit value is defined as per 15.247.

802.11n (20MHz)

Operation Mode: 802.11n TX Channel 44 **Test Date:** June 21, 2010
Test Conditions: 22°C / 51 % RH / 1020hPa **Test By:** Wendy

Freq (MHz)	Emission Level (dBuV/m)	Raw Value (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Note
3830.00	55.08	17.88	37.20	74.00	18.92	100	180	Ver/PK
3830.00	48.16	10.96	37.20	54.00	5.84	100	180	Ver/AV
11490.00	66.42	13.12	53.30	74.00	7.58	100	180	Ver/PK
11490.00	48.19	-5.11	53.30	54.00	5.81	100	180	Ver/AV
3830.00	54.81	17.61	37.20	74.00	19.19	100	180	Hor/PK
3830.00	47.22	10.02	37.20	54.00	6.78	100	180	Hor/AV
11490.00	66.80	13.50	53.30	74.00	7.20	100	180	Hor/PK
11490.00	47.68	-5.62	53.30	54.00	6.32	100	180	Hor/AV

Operation Mode: 802.11n TX Channel 47 **Test Date:** June 21, 2010
Test Conditions: 22°C / 51 % RH / 1020hPa **Test By:** Wendy

Freq (MHz)	Emission Level (dBuV/m)	Raw Value (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Note
3857.00	54.65	17.35	37.30	74.00	19.35	100	180	Ver/PK
3857.00	47.58	10.28	37.30	54.00	6.42	100	180	Ver/AV
11570.00	66.21	13.11	53.10	74.00	7.79	100	180	Ver/PK
11570.00	47.86	-5.24	53.10	54.00	6.14	100	180	Ver/AV
3857.00	54.76	17.46	37.30	74.00	19.24	100	180	Hor/PK
3857.00	47.89	10.59	37.30	54.00	6.11	100	180	Hor/AV
11570.00	65.70	12.60	53.10	74.00	8.30	100	180	Hor/PK
11570.00	47.89	-5.21	53.10	54.00	6.11	100	180	Hor/AV

Operation Mode:

802.11a TX Channel 50

Test Date:

June 21, 2010

Test Conditions:

22°C / 51 % RH / 1020hPa

Test By:

Wendy

Freq (MHz)	Emission Level (dBuV/m)	Raw Value (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Note
3883.00	55.39	17.99	37.40	74.00	18.61	100	180	Ver/PK
3883.00	47.61	10.21	37.40	54.00	6.39	100	180	Ver/AV
11650.00	66.54	13.44	53.10	74.00	7.46	100	180	Ver/PK
11650.00	47.60	-5.50	53.10	54.00	6.40	100	180	Ver/AV
3883.00	54.31	16.91	37.40	74.00	19.69	100	180	Hor/PK
3883.00	47.85	10.45	37.40	54.00	6.15	100	180	Hor/AV
11650.00	65.47	12.37	53.10	74.00	8.53	100	180	Hor/PK
11650.00	47.19	-5.91	53.10	54.00	6.81	100	180	Hor/AV

REMARKS:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Factor (dB/m).
2. 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. The limit value is defined as per 15.247.

802.11n (40MHz)

Operation Mode: 802.11n TX Channel 45 **Test Date:** June 21, 2010
Test Conditions: 22°C / 51 % RH / 1020hPa **Test By:** Wendy

Freq (MHz)	Emission Level (dBuV/m)	Raw Value (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Note
3836.00	53.64	16.34	37.30	74.00	20.36	100	180	Ver/PK
3836.00	47.26	9.96	37.30	54.00	6.74	100	180	Ver/AV
11510.00	64.38	11.08	53.30	74.00	9.62	100	180	Ver/PK
11510.00	47.25	-6.05	53.30	54.00	6.75	100	180	Ver/AV
3836.00	54.44	17.14	37.30	74.00	19.56	100	180	Hor/PK
3836.00	47.33	10.03	37.30	54.00	6.67	100	180	Hor/AV
11510.00	64.66	11.36	53.30	74.00	9.34	100	180	Hor/PK
11510.00	47.46	-5.84	53.30	54.00	6.54	100	180	Hor/AV

Operation Mode: 802.11n TX Channel 47 **Test Date:** June 21, 2010
Test Conditions: 22°C / 51 % RH / 1020hPa **Test By:** Wendy

Freq (MHz)	Emission Level (dBuV/m)	Raw Value (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Note
3863.00	54.35	16.95	37.40	74.00	19.65	100	180	Ver/PK
3863.00	47.21	9.81	37.40	54.00	6.79	100	180	Ver/AV
11590.00	64.70	11.60	53.10	74.00	9.30	100	180	Ver/PK
11590.00	46.52	-6.58	53.10	54.00	7.48	100	180	Ver/AV
3863.00	54.52	17.12	37.40	74.00	19.48	100	180	Hor/PK
3863.00	47.46	10.06	37.40	54.00	6.54	100	180	Hor/AV
11590.00	65.45	12.35	53.10	74.00	8.55	100	180	Hor/PK
11590.00	47.28	-5.82	53.10	54.00	6.72	100	180	Hor/AV

REMARKS:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Factor (dB/m).
2. 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. The limit value is defined as per 15.247.

7.2 POWER LINE CONDUCTED EMISSIONS MEASUREMENT

7.2.1 LIMITS

Frequency Range (MHz)	Limits (dB μ V)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56*	56 to 46*
0.50 to 5	56	46
5 to 30	60	50

Note:

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

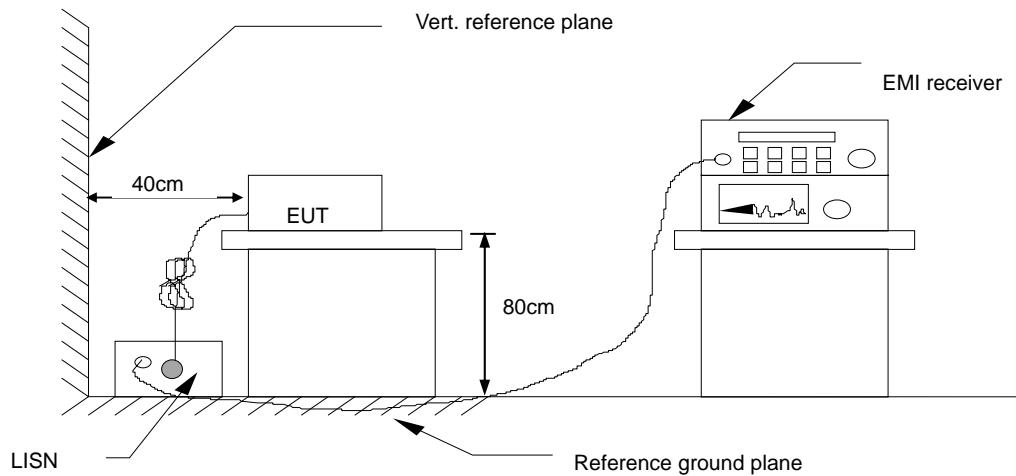
7.2.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
Test Receiver	Rohde & Schwarz	ESCS30	828985/018	Mar 30, 2010	1 Year
L.I.S.N	Rohde & Schwarz	ESH2-Z5	834549/005	Mar 30, 2010	1 Year
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100006	Mar 30, 2010	1 Year
50Coaxial Switch	Anritsu	MP59B	M20531	Mar 30, 2010	1 Year

7.2.3 TEST PROCEDURES

- a) The EUT and Support equipment, if needed, was placed on a non-conducted table, which is 0.8m above the ground plane and 0.4m away from the conducted wall.
- b) The test equipment EUT installed received AC main power, through a Line Impedance Stabilization Network (LISN), which supplied power source and was grounded to the ground plane. All support equipment power received from a second LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- c) The EUT test program was started. Emissions were measured on each current carrying line of the EUT using an EMI Test Receiver connected to the LISN powering the EUT.
- d) The frequency range from 150 kHz to 30 MHz was searched. The test data of the worst-case condition(s) was recorded. Emission levels under limit 20dB were not recorded.

7.2.4 TEST SETUP



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

7.2.5 TEST RESULTS

PASS.

The worst-case mode is 802.11a, The test data please refer to following page.

Operation Mode:

802.11a TX

Test Date:

May 28, 2010

Test Conditions:

22°C / 51 % RH / 1020hPa

Test By:

Wendy

Freq. (M Hz)	Q.P. Amp t.d. (dB uV)	AVG Amp t.d. (dB uV)	Correction factor(dB)	Q.P. Limit (dB uV)	AVG Limit (dB uV)	Q.P. Margin (dB)	AVG Margin (dB)	Line/ Neutral
0.175	53.06	40.21	0.00	64.72	54.72	11.66	14.51	Neutral
0.220	52.72	43.49	0.00	62.82	52.82	10.10	9.33	Neutral
0.265	46.23	35.86	0.00	61.27	51.27	15.04	15.41	Neutral
0.310	41.63	42.19	0.00	59.97	49.97	18.34	7.78	Neutral
0.355	46.37	30.49	0.00	58.84	48.84	12.47	18.35	Neutral
24.350	49.44	44.64	0.00	60.00	50.00	10.56	5.36	Neutral
0.175	57.24	45.19	0.00	64.72	54.72	7.48	9.53	Line
0.220	56.75	50.12	0.00	62.82	52.82	6.07	2.70	Line
0.265	48.37	43.32	0.00	61.27	51.27	12.90	7.95	Line
0.355	44.13	39.67	0.00	58.84	48.84	14.71	9.17	Line
0.440	46.35	45.38	0.00	57.85	47.85	11.50	2.47	Line
18.425	51.33	44.26	0.00	60.00	50.00	8.67	5.74	Line

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 = Limit value - Emission level
5. Correction factor = Insertion loss + Cable loss
6. Emission Level = Correction Factor + Reading Value.

7.3 6dB BANDWIDTH MEASUREMENTS

7.3.1 LIMITS

According to the standard, systems using digital modulation techniques may operate in the 902 - 928 MHz, 2400 - 2483.5 MHz, and 5725 - 5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

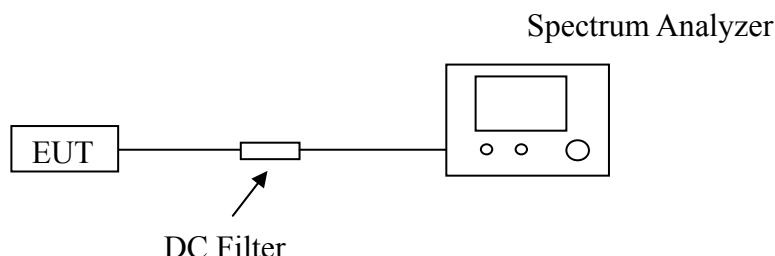
7.3.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
Spectrum Analyzer	R&S	FSP40	100040	Mar 30, 2010	1 Year
RF Cable	Hubersuhne	Sucoflex104	FP2RX2	Mar 30, 2010	1 Year
DC Filter	MPE	23872C	N/A	Mar 30, 2010	1 Year

7.3.3 TEST PROCEDURES

- 1) Place the EUT on the table and set it in the transmitting mode.
- 2) Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
- 3) Set the spectrum analyzer as RBW = 100kHz, VBW = RBW, Span = 20MHz, Sweep = auto.
- 4) Mark the peak frequency and -6dB (upper and lower) frequency.
- 5) Repeat until all the rest channels are investigated.

7.3.4 TEST SETUP



7.3.5 TEST RESULTS

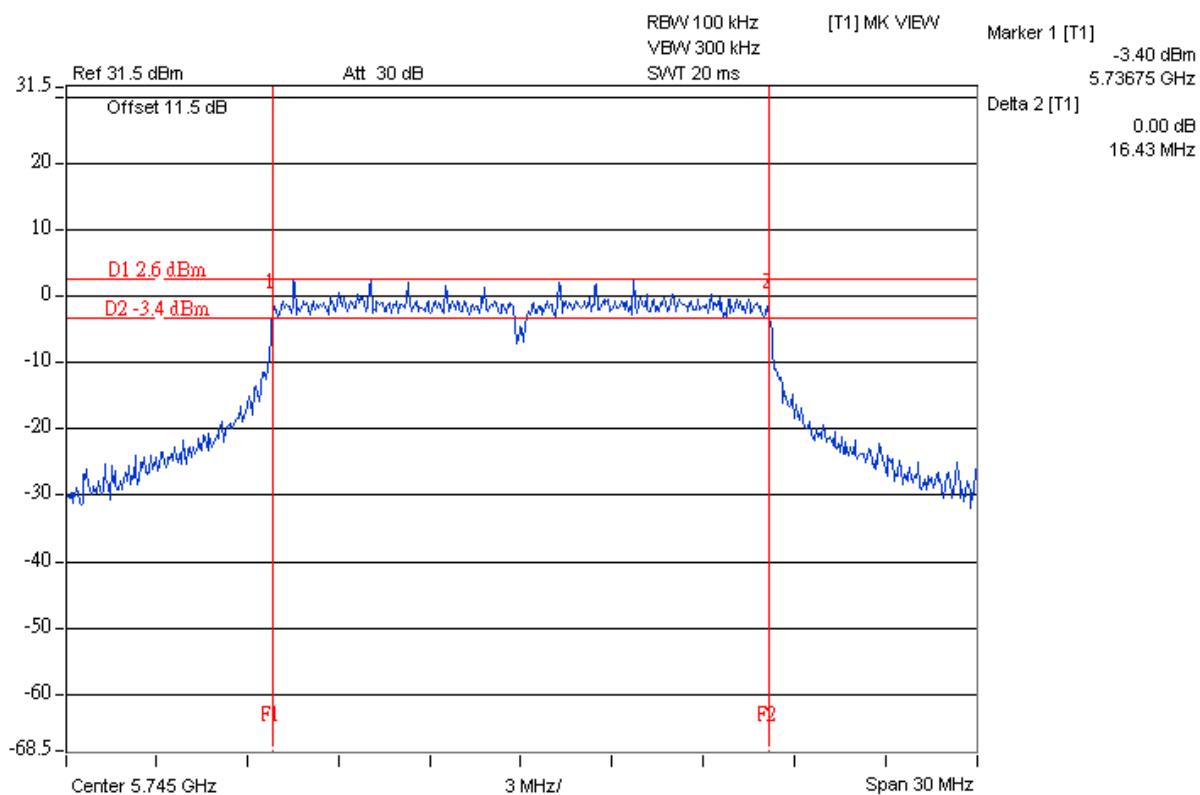
PASS

The test result please refer to the following page.

802.11a

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
44	5745	16.43	16.42	0.5	Pass
47	5785	16.42	16.41	0.5	Pass
50	5825	16.39	16.38	0.5	Pass

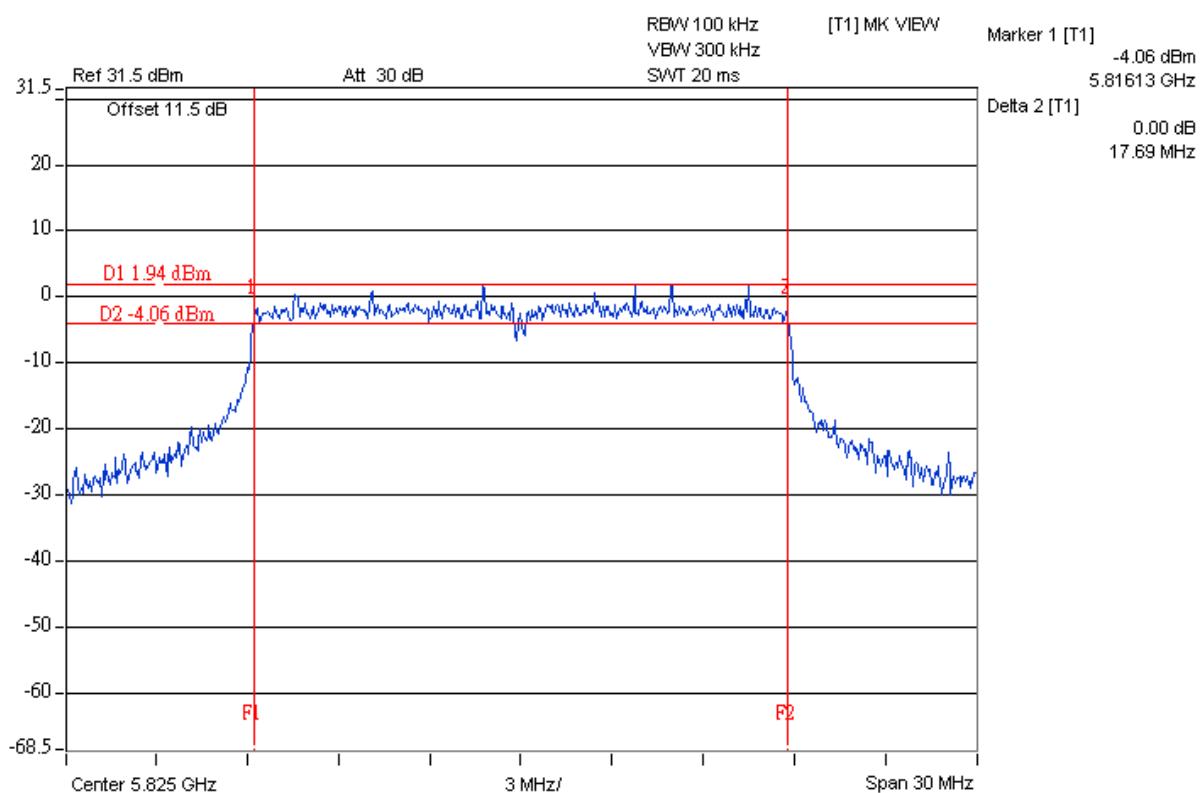
For Chain 0: Channel 44



802.11n (20MHz)

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
44	5745	17.67	17.66	0.5	Pass
47	5785	17.68	17.64	0.5	Pass
50	5825	17.69	17.67	0.5	Pass

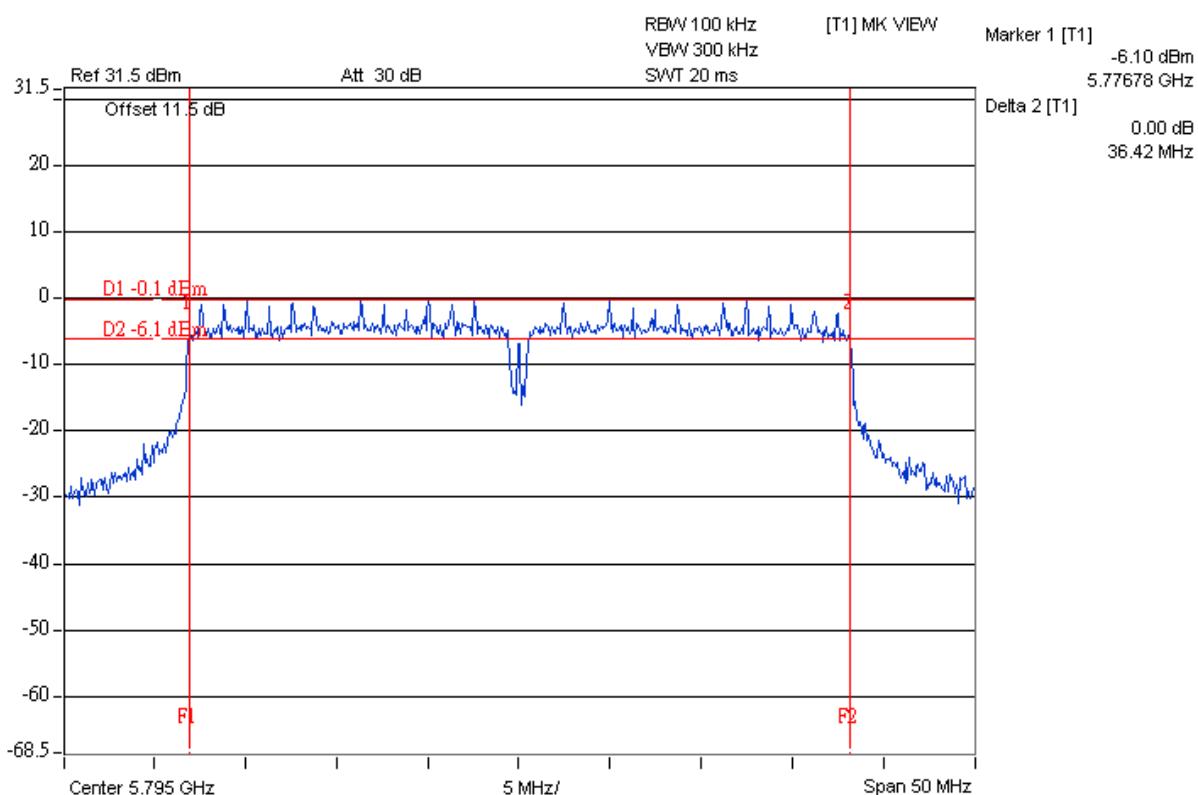
For Chain 0: Channel 50



802.11n (40MHz)

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
45	5755	36.38	36.41	0.5	Pass
48	5795	36.40	36.42	0.5	Pass

For Chain 0: Channel 48



7.4 PEAK OUTPUT POWER

7.4.1 LIMITS

The maximum peak output power of the intentional radiator shall not exceed the following:

- a) For systems using digital modulation in the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz: 1 Watt.
- b) The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

7.4.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
Spectrum Analyzer	R&S	FSP40	100040	Mar 30, 2010	1 Year
Power Meter	Anritsu	ML2495A	0824012	Mar 30, 2010	1 Year
Power Sensor	Anritsu	MA2411B	0738138	Mar 30, 2010	1 Year

7.4.3 TEST PROCEDURES

A power sensor was used on the output port of the EUT. A power meter was used to read the response of the power sensor. Record the power level.

7.4.4 TEST SETUP



7.4.5 TEST RESULTS

The test result please refer to the following page.

Test Data**IEEE 802.11a**

Channel	Frequency (MHz)	Output Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Result
		Chain 0	Chain 1				
44	5745	20.05	19.58	191.94	22.83	30	PASS
47	5780	20.08	19.67	194.54	22.89		PASS
50	5825	20.14	19.73	197.25	22.95		PASS

IEEE 802.11n 20 MHz

Channel	Frequency (MHz)	Output Power (dBm)		Total Power (W)	Total Power (dBm)	Limit (dBm)	Result
		Chain 0	Chain 1				
44	5745	20.09	19.72	195.85	22.92	30	PASS
47	5780	20.14	19.83	199.44	23.00		PASS
50	5825	20.12	19.79	198.08	22.97		PASS

IEEE 802.11n 40 MHz

Channel	Frequency (MHz)	Output Power (dBm)		Total Power (W)	Total Power (dBm)	Limit (dBm)	Result
		Chain 0	Chain 1				
45	5755	20.07	19.83	197.79	22.96	30	PASS
48	5795	20.05	19.76	195.78	22.92		PASS

7.5 PEAK POWER SPECTRAL DENSITY MEASUREMENT

7.5.1 LIMITS

- a) For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.
- b) The digital modulation operation of the hybrid system, with the frequency hopping turned off, shall comply with the power density requirements of paragraph (d) of this section.

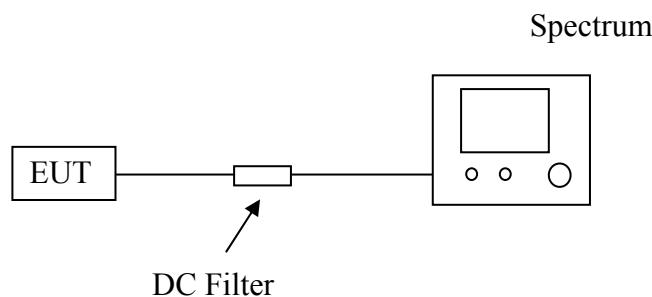
7.5.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
Spectrum Analyzer	Agilent	E4407B	MY41440292	Mar 30, 2010	1 Year
RF Cable	Hubersuhne	Sucoflex104	FP2RX2	Mar 30, 2010	1 Year
DC Filter	MPE	23872C	N/A	Mar 30, 2010	1 Year

7.5.3 TEST PROCEDURES

- a) Place the EUT on the table and set it in transmitting mode. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
- b) Set the spectrum analyzer as RBW = 3kHz, VBW = 10kHz, Span = 300kHz, Sweep=100s
- c) Record the max. reading.
- d) Repeat the above procedure until the measurements for all frequencies are completed.

7.5.4 TEST SETUP



7.5.5 TEST RESULTS

PASS

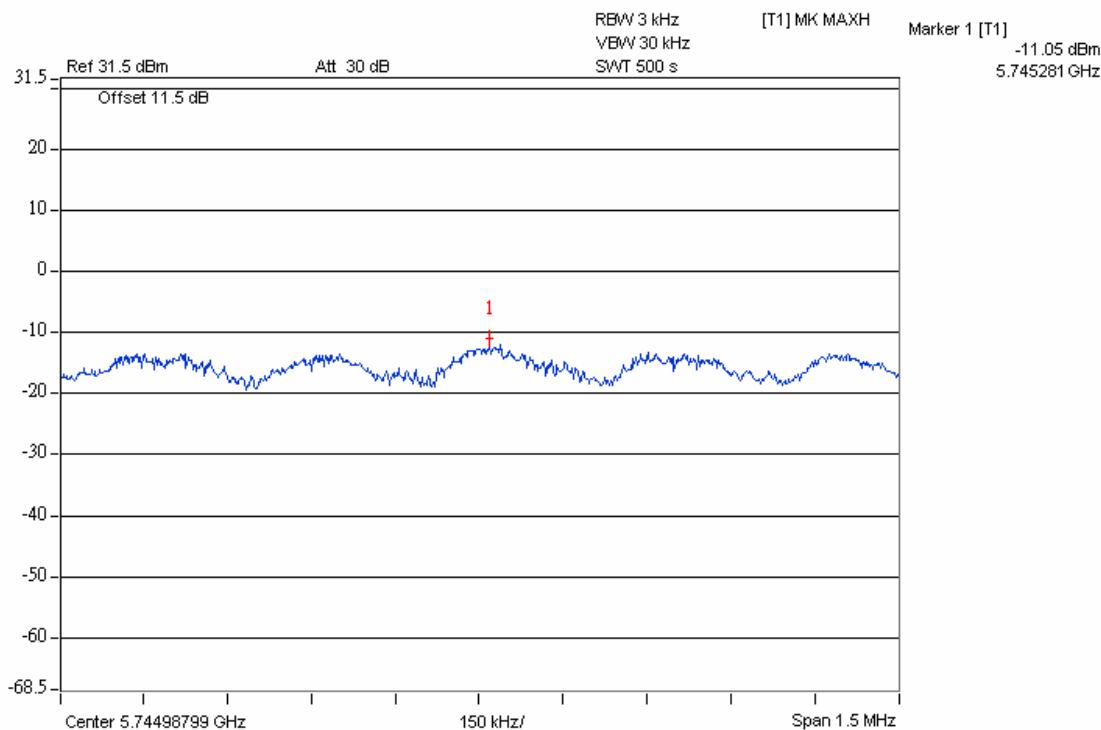
The test result please refer to the following pages.

IEEE 802.11a

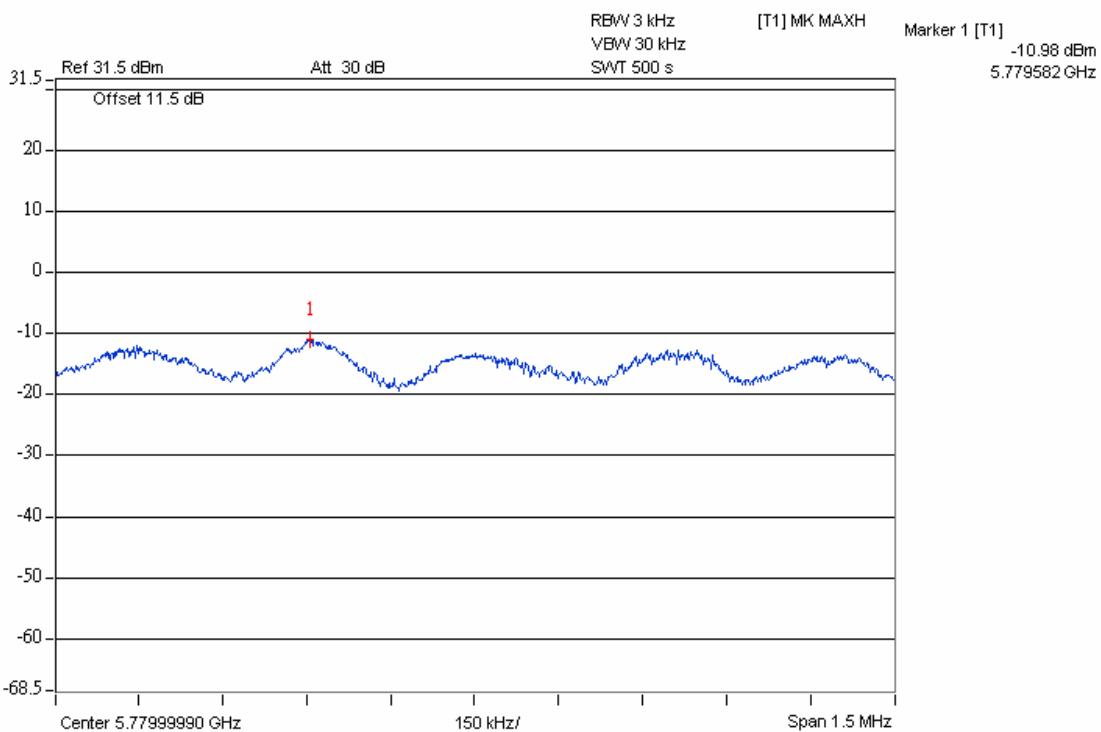
Channel	Frequency (MHz)	PPSD (dBm)		Total PPSD (dBm)	Limit (dBm)	Result
		Chain 0	Chain 1			
44	5745	-11.05	-11.24	-8.13	8	PASS
47	5780	-10.98	-11.05	-8.00		PASS
50	5825	-10.50	-10.75	-7.61		PASS

Chain 0

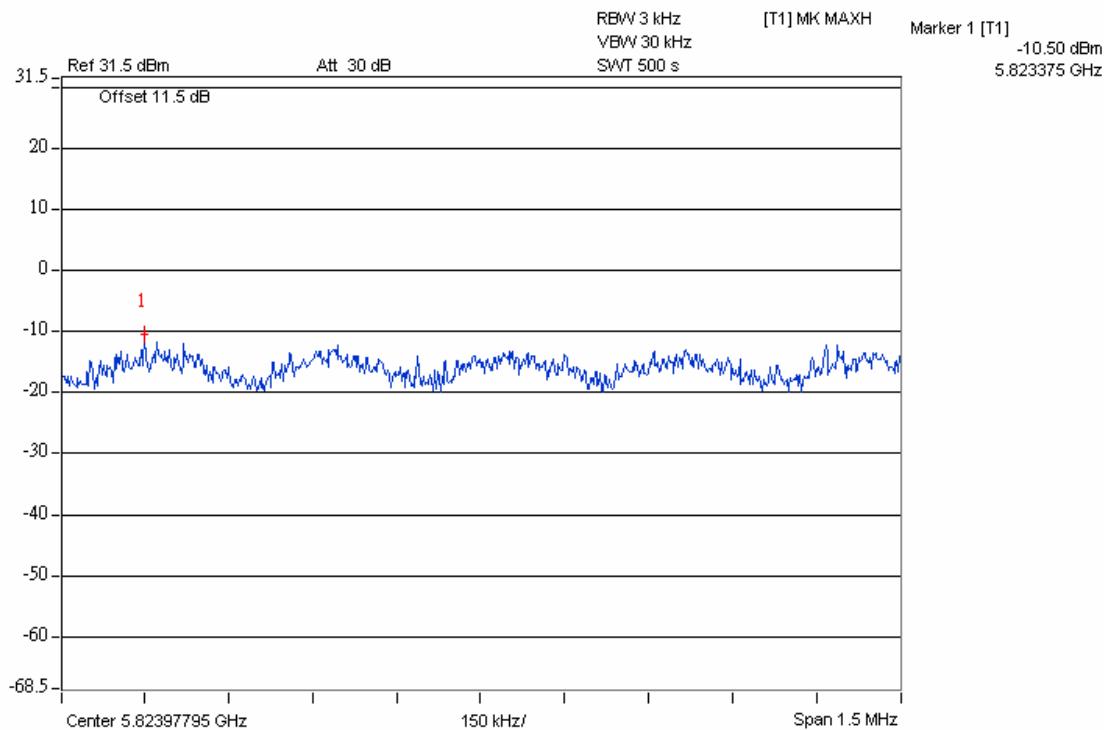
CH 44



CH 47

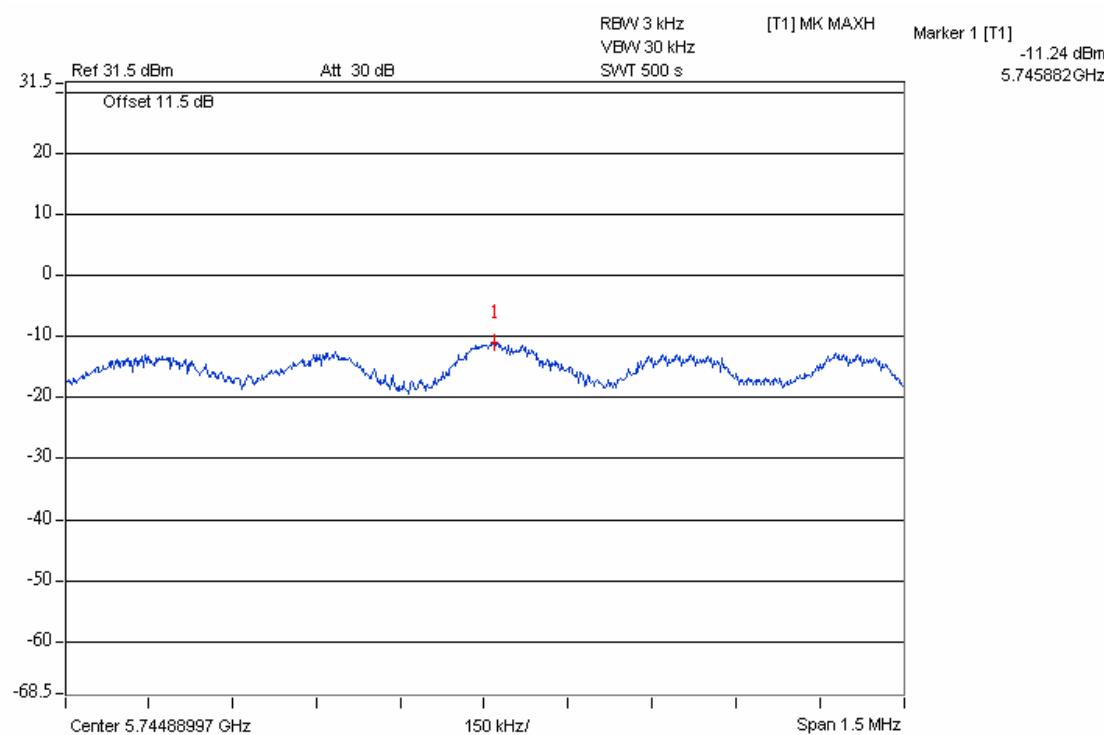


CH 50

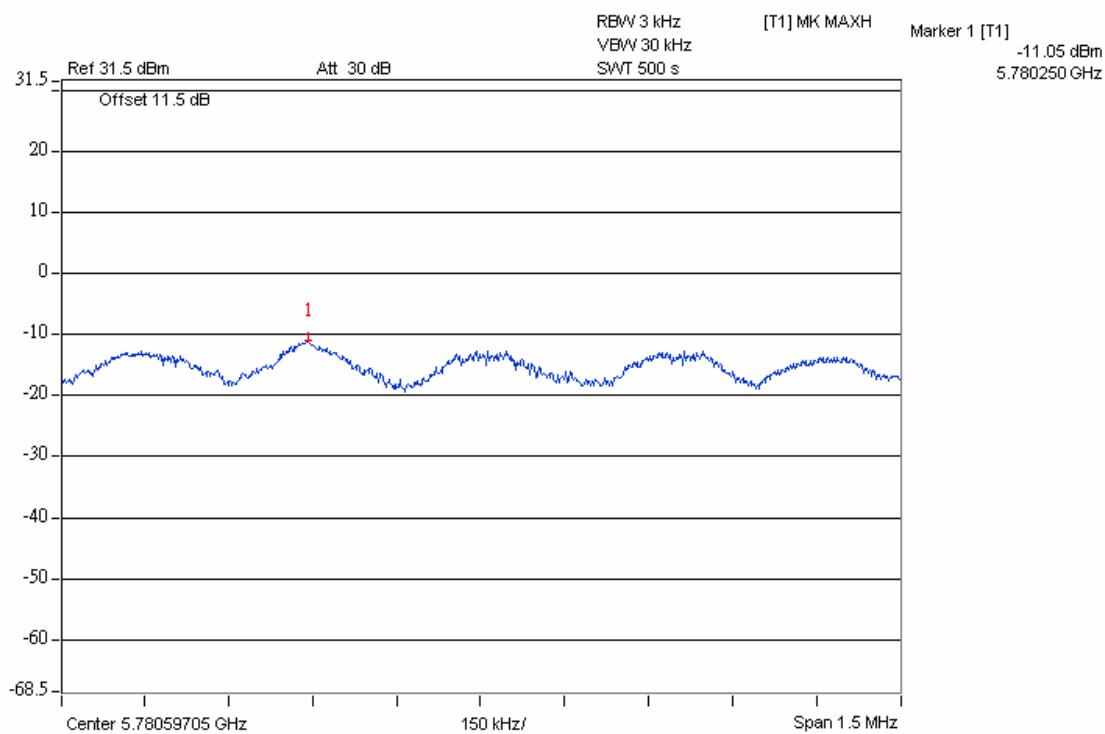


Chain 1

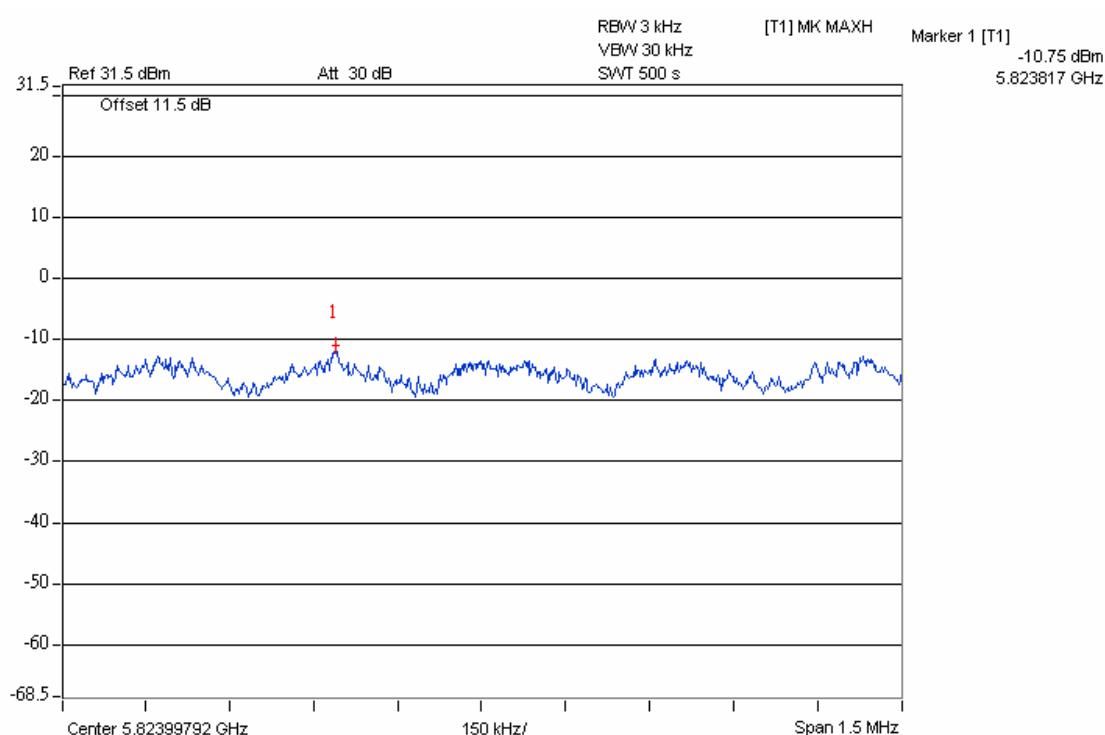
CH 44



CH 47



CH 50

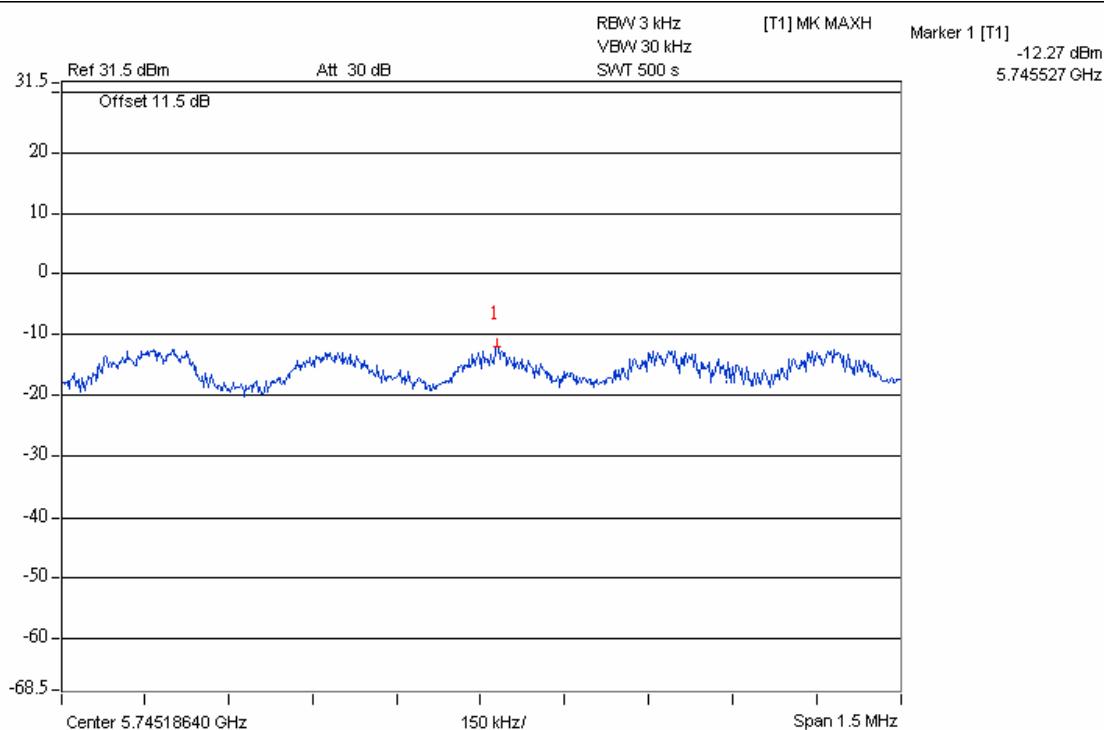


IEEE 802.11n 20MHz

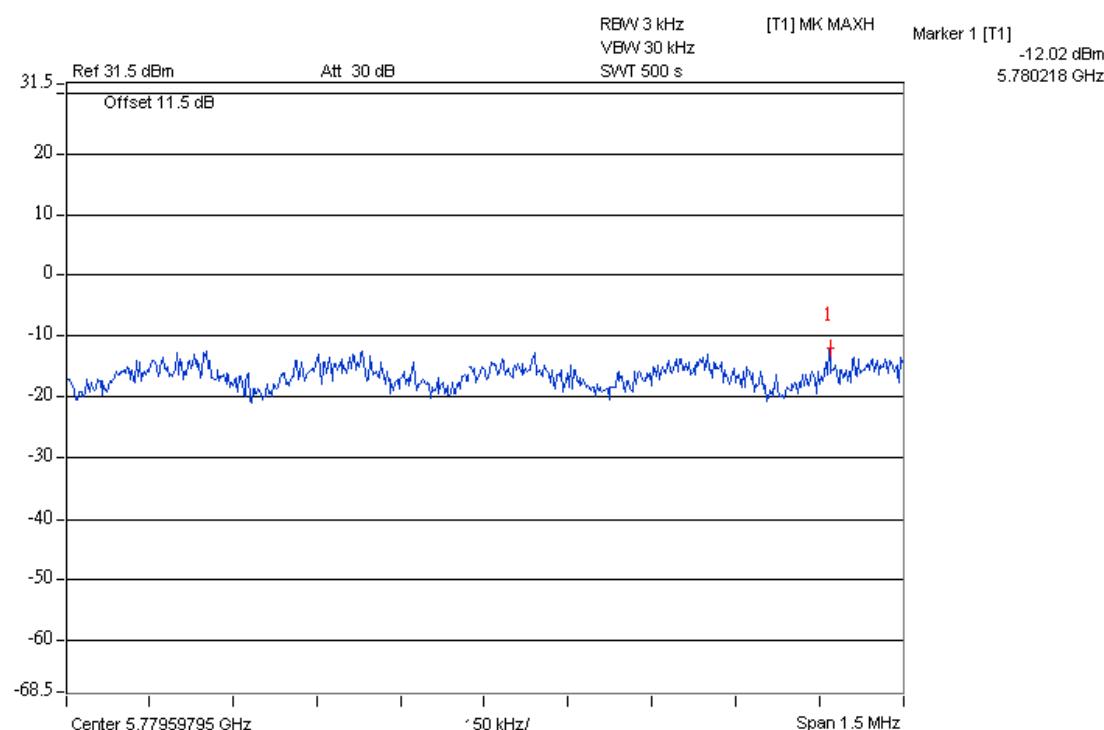
Channel	Frequency (MHz)	PPSD (dBm)		Total PPSD (dBm)	Limit (dBm)	Result
		Chain 0	Chain 1			
44	5745	-12.27	-12.31	-9.28	8	PASS
47	5780	-12.02	-12.10	-9.05		PASS
50	5825	-12.35	-12.51	-9.42		PASS

Chain 0

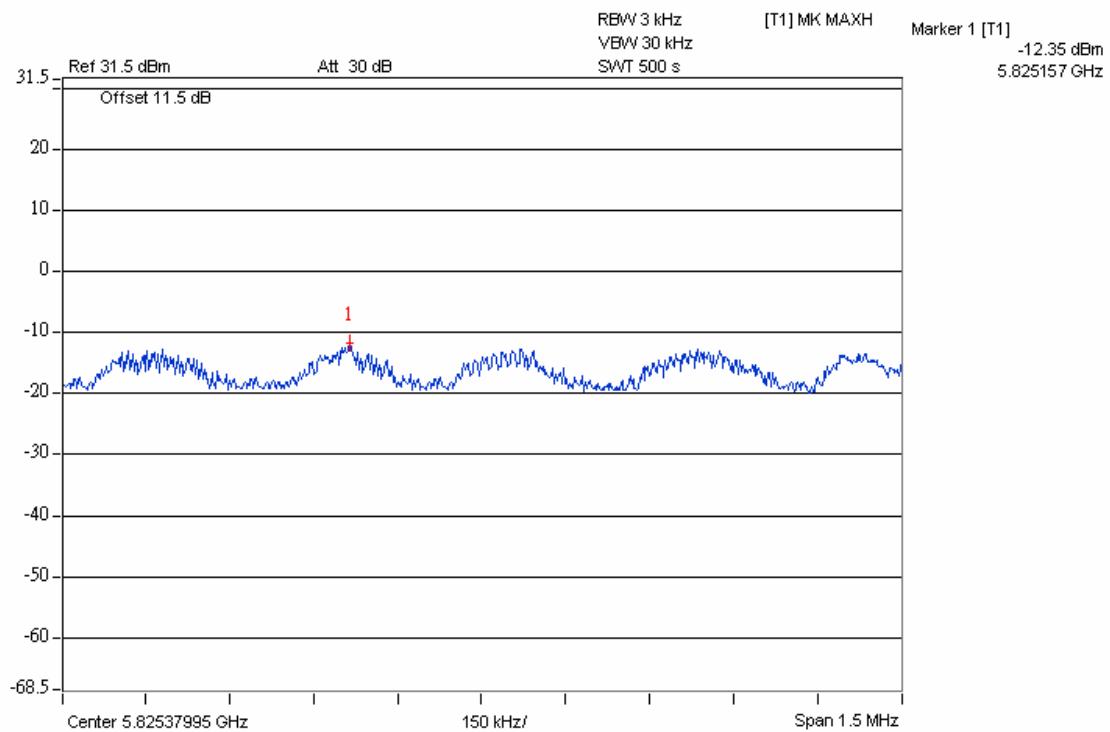
CH 44



CH 47

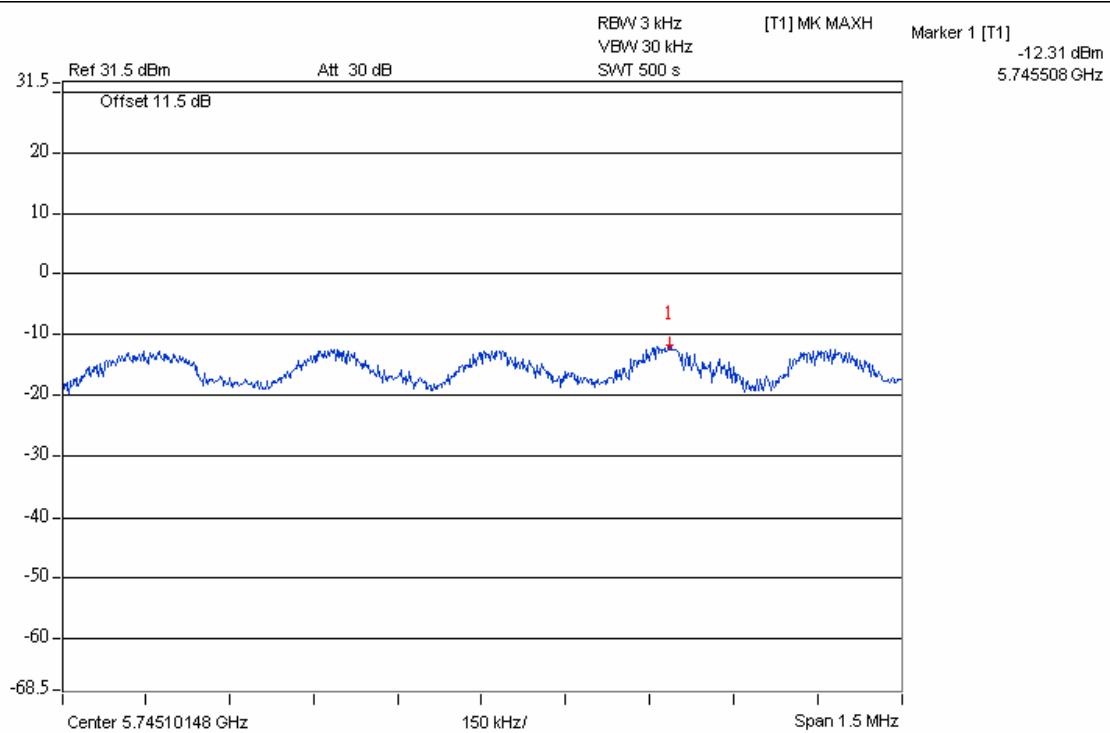


CH 50

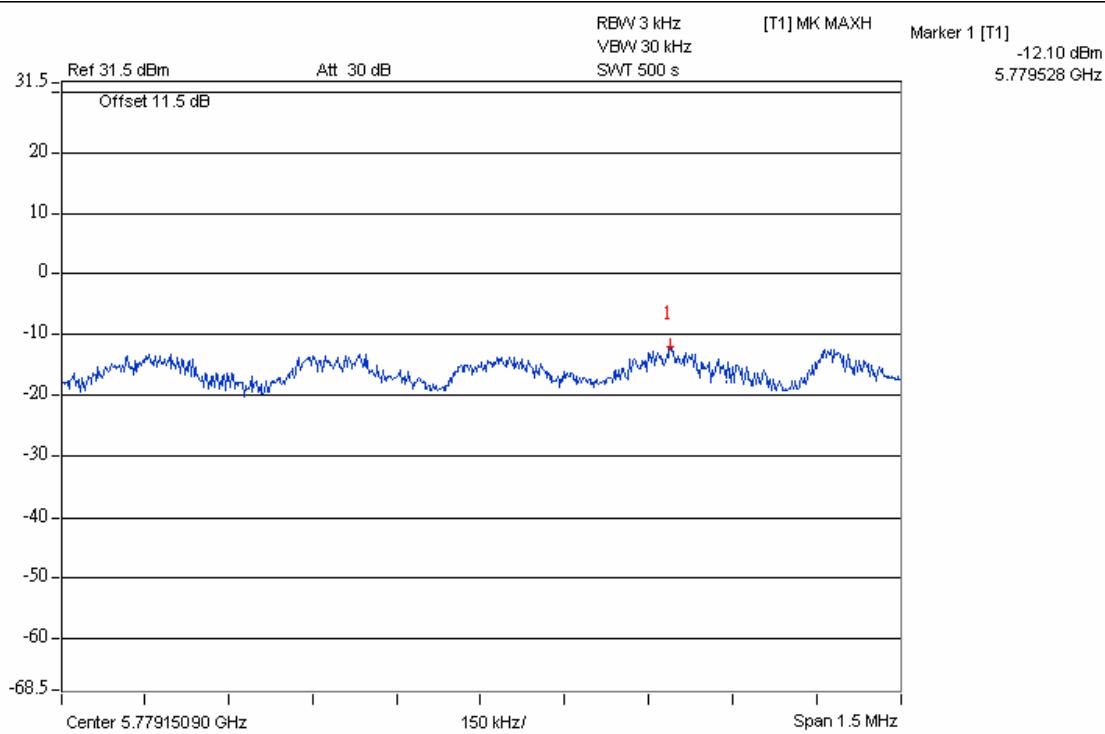


Chain 1

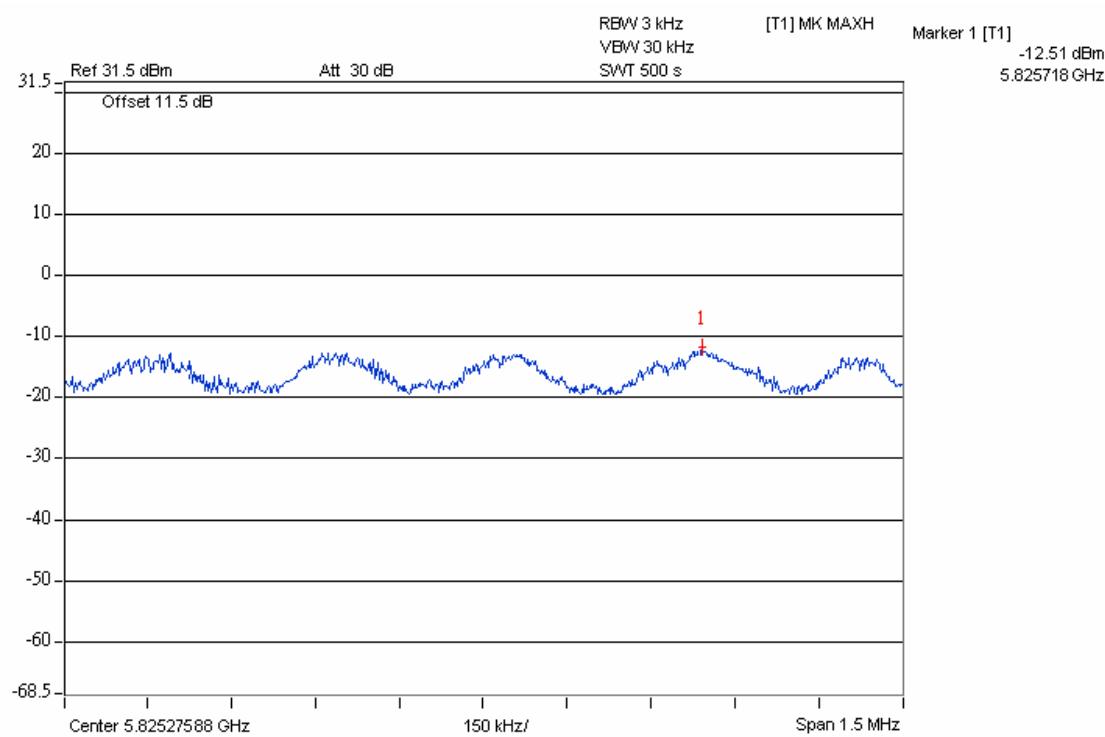
CH 44



CH 47



CH 50

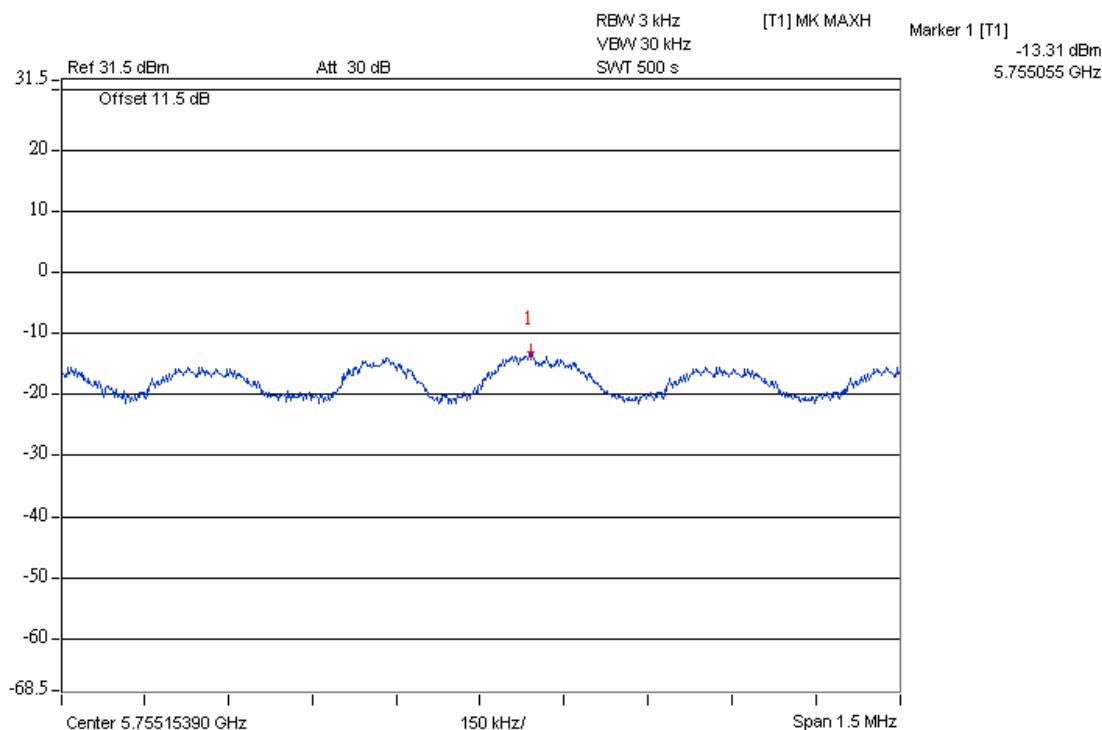


IEEE 802.11n 40MHz

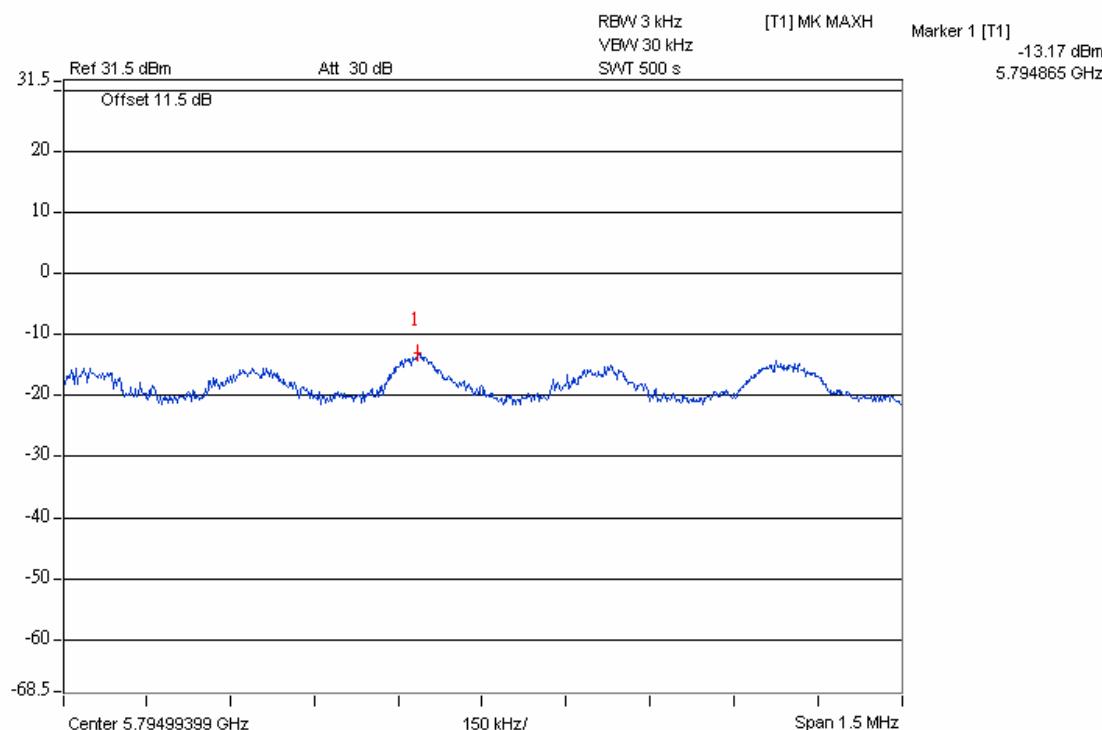
Channel	Frequency (MHz)	PPSD (dBm)		Total PPSD (dBm)	Limit (dBm)	Result
		Chain 0	Chain 1			
45	5755	-13.31	-13.19	-10.24	8	PASS
48	5795	-13.17	-13.04	-10.09		PASS

Chain 0

CH 45

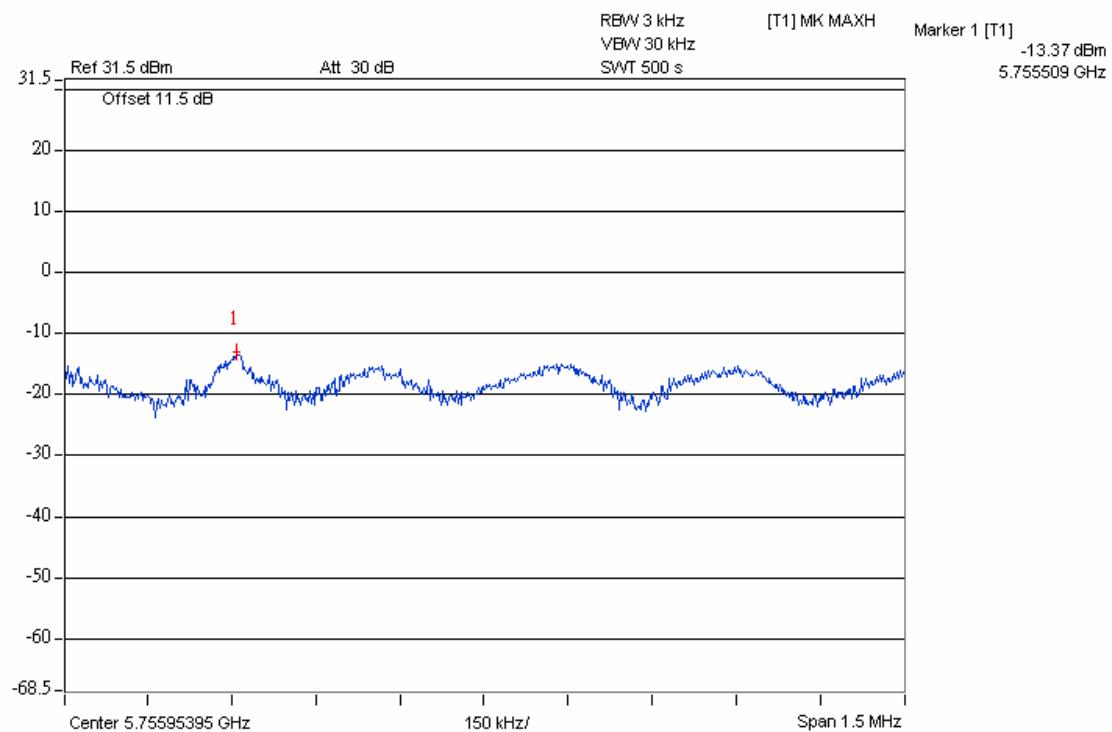


CH 48

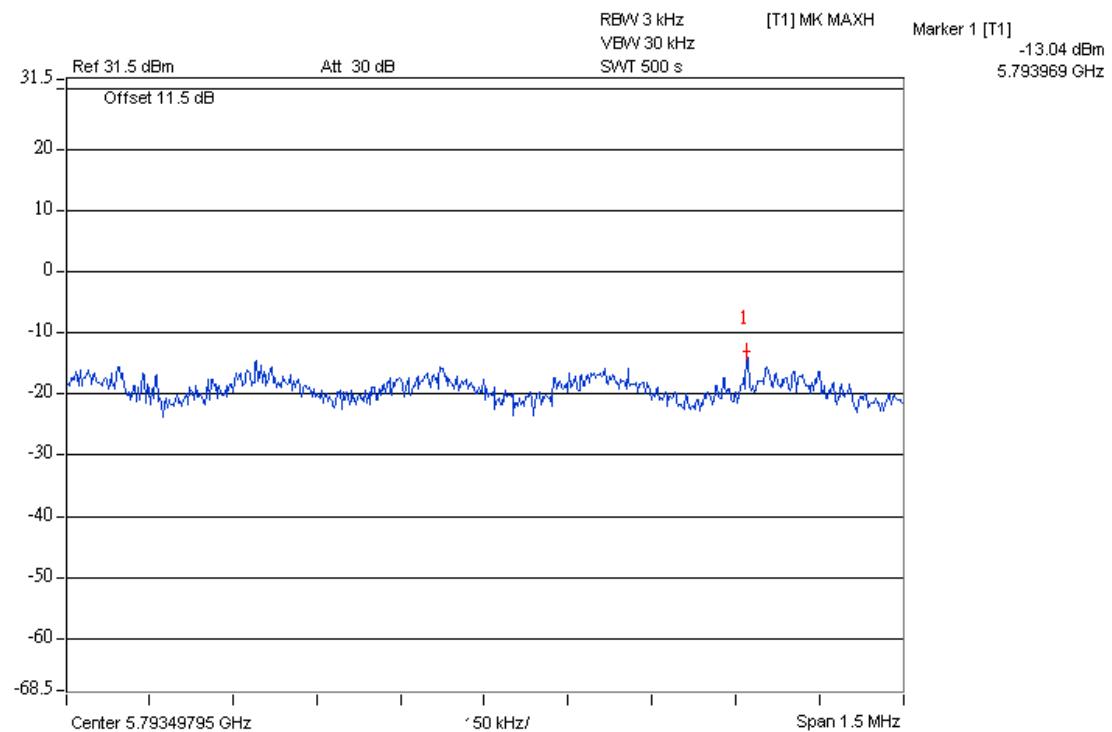


Chain 1

CH 45



CH 48



7.6 BAND EDGES MEASUREMENT

7.6.1.LIMITS

According to standard, in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. In addition, radiated emissions which fall in the restricted bands, as defined in standard, must also comply with the radiated emission limits specified.

7.6.2.TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
Spectrum Analyzer	ANRITSU	MS2661C	6200140915	Mar 30, 2010	1 Year
Test Receiver	Rohde & Schwarz	ESCS30	828985/018	Mar 30, 2010	1 Year
Antenna	Schwarzbeck	VULB9163	142	Mar 30, 2010	1 Year
Horn-antenna	Schwarzbeck	BBHA9120D	9120D-209	Mar 30, 2010	1 Year
Power Line Filter	DUOJI EME	FNF 201 B16	N/A	Mar 30, 2010	1 Year
Power Line Filter	JIANLI	DL-40C	N/A	Mar 30, 2010	1 Year

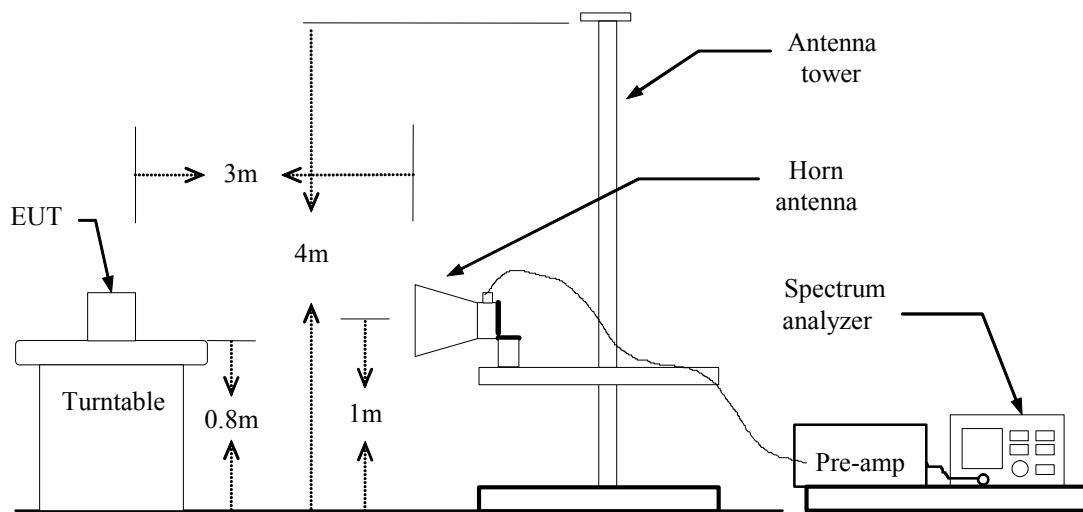
7.6.3. TEST PROCEDURES

- The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- 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.
- 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.
- Set both RBW and VBW of spectrum analyzer to 100kHz and 300kHz with suitable frequency span including 100MHz bandwidth from band edge. The band edges was measured and recorded.

NOTE:

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

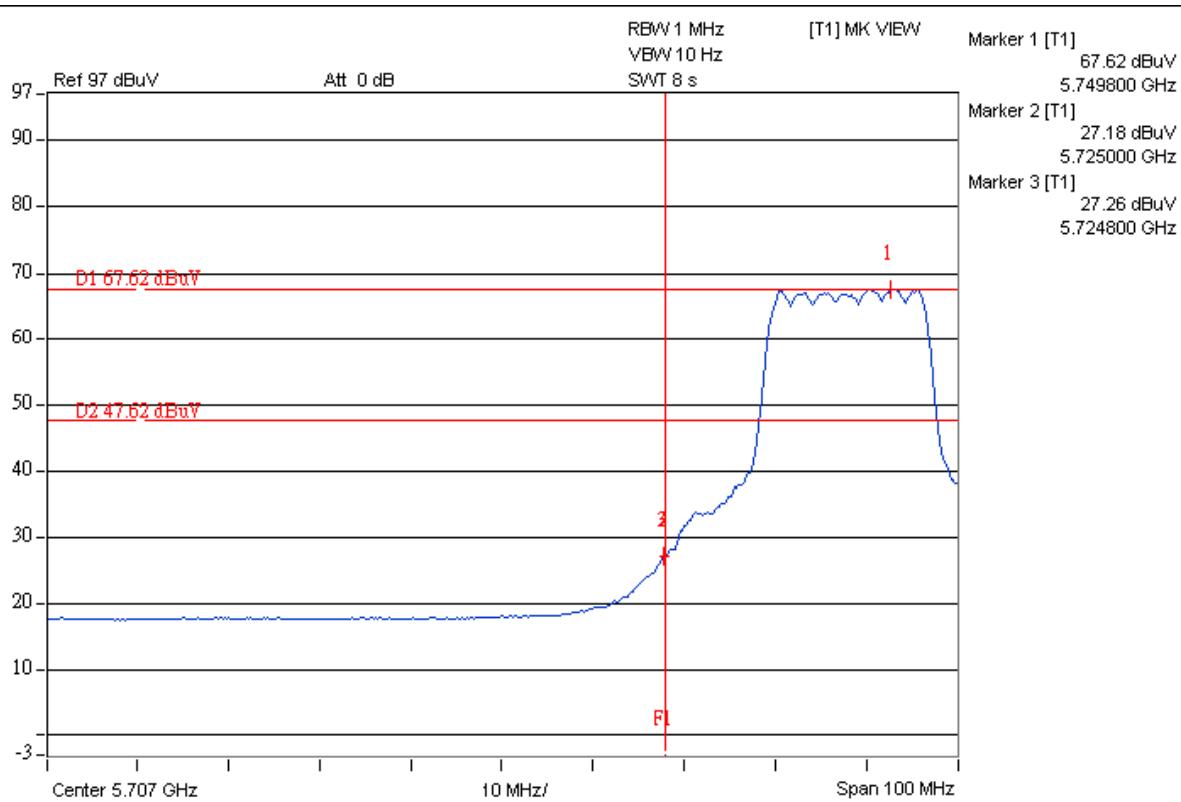
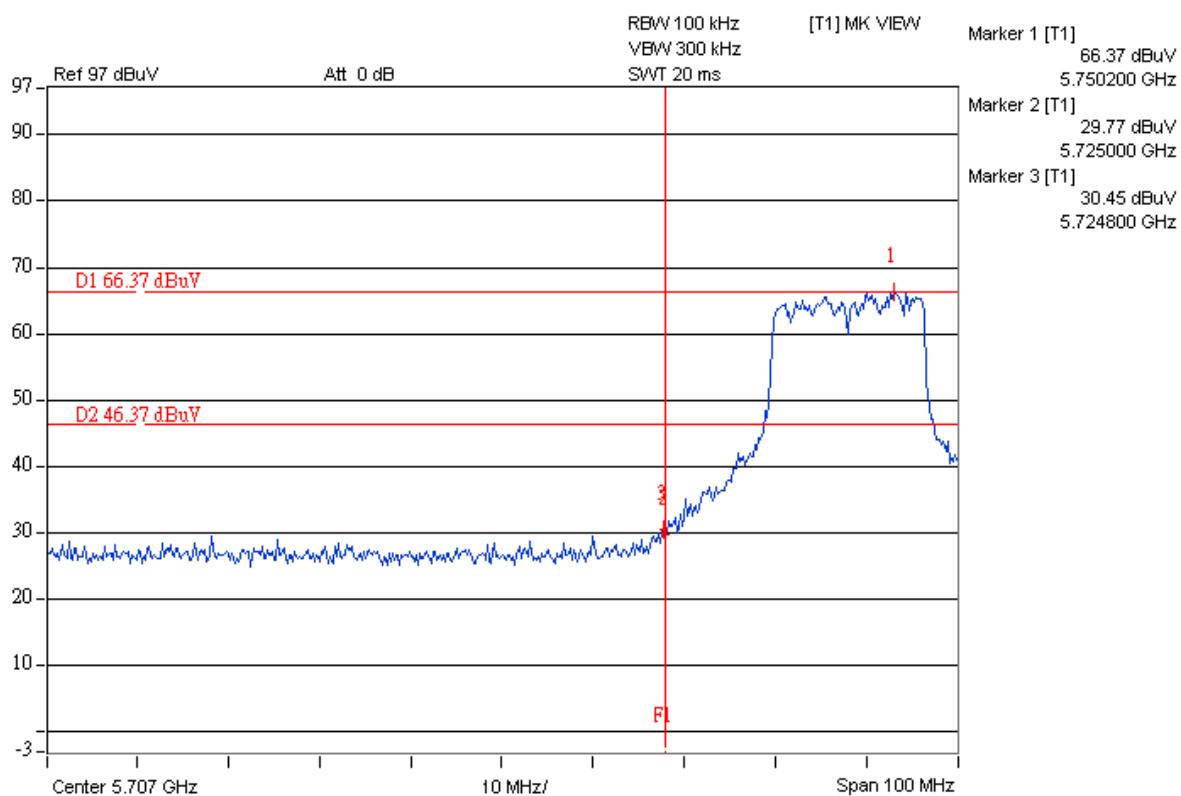
7.6.4. TEST SETUP

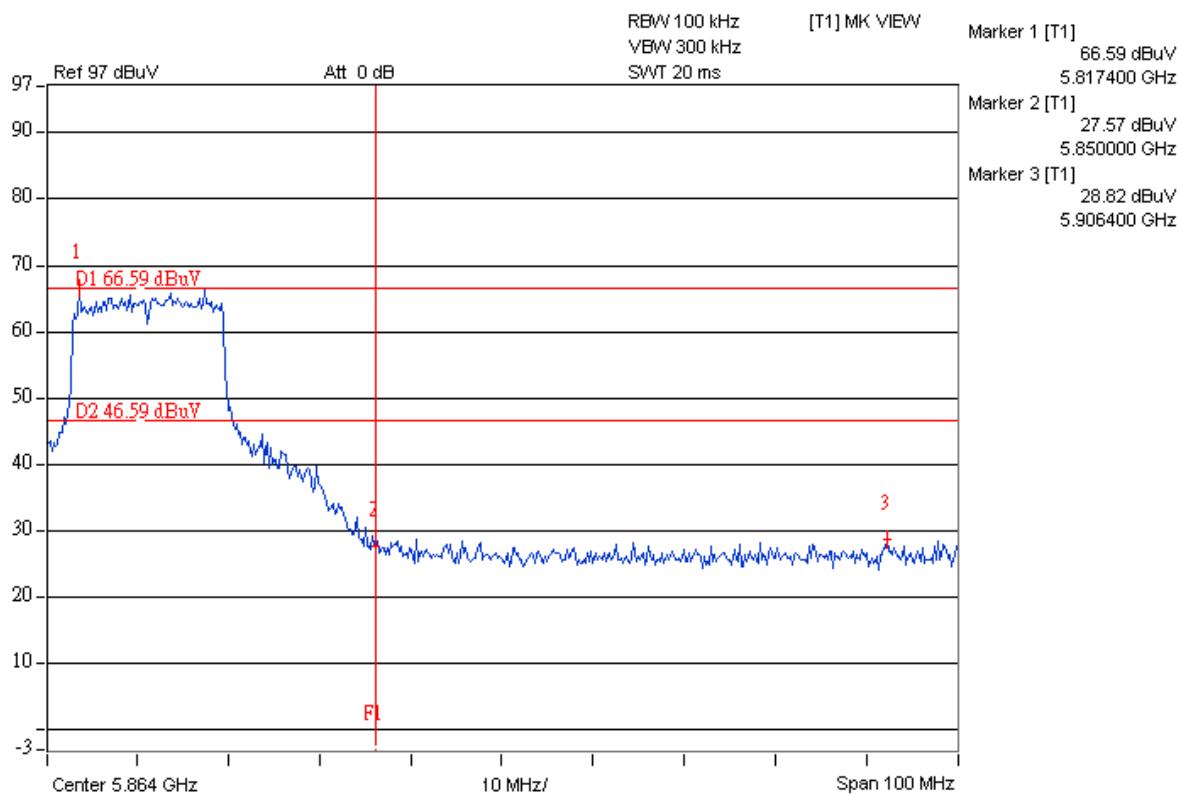
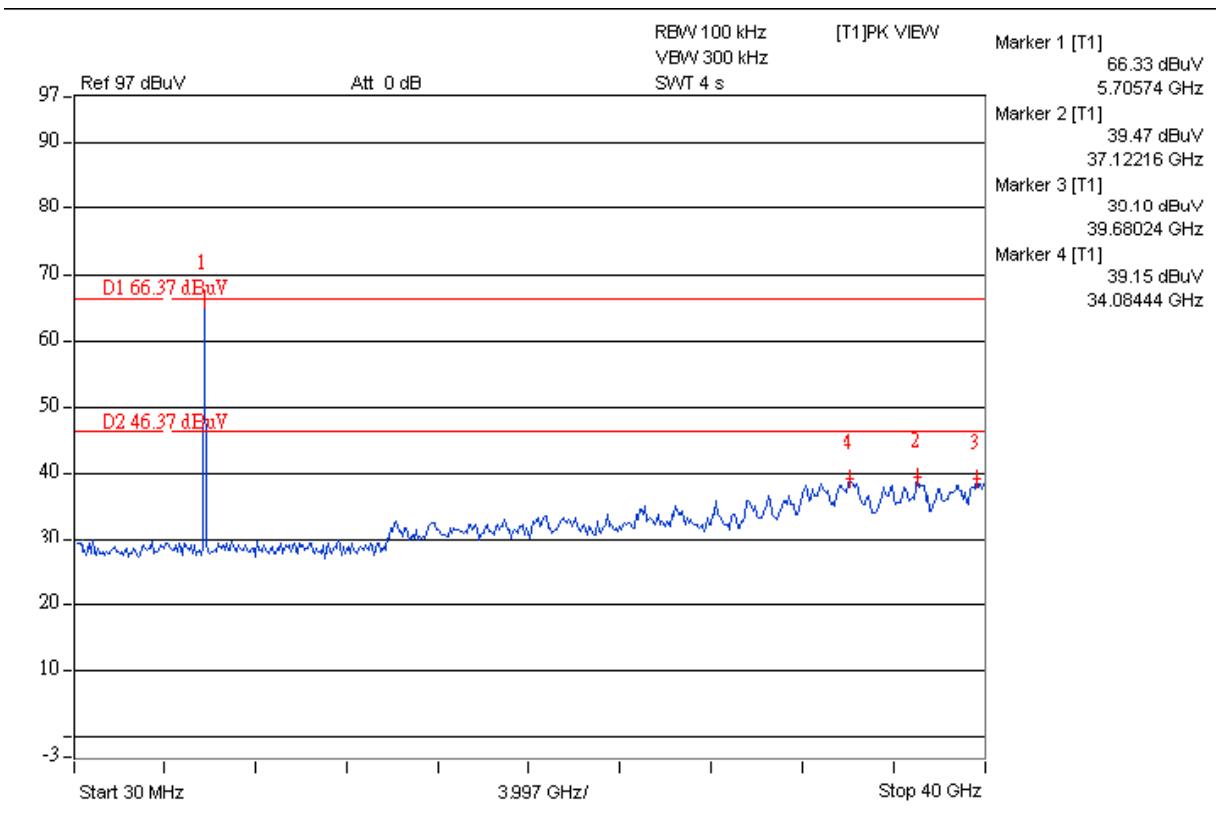


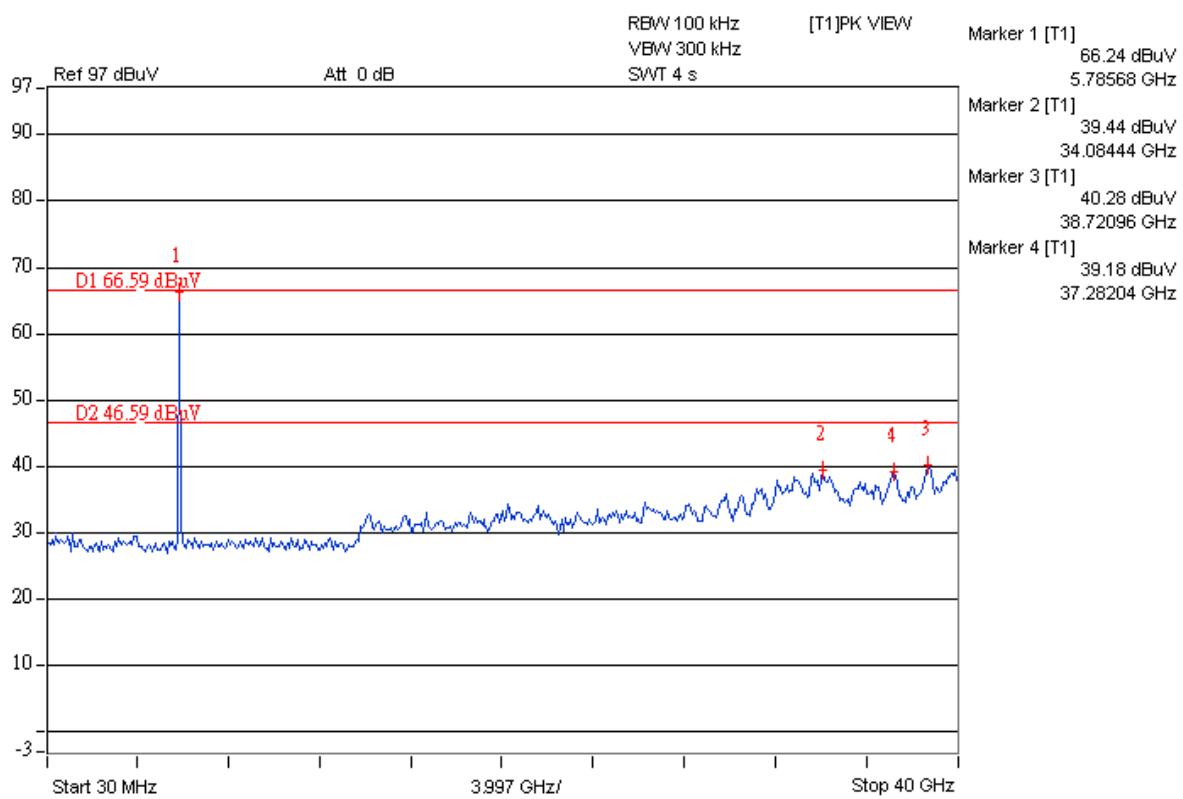
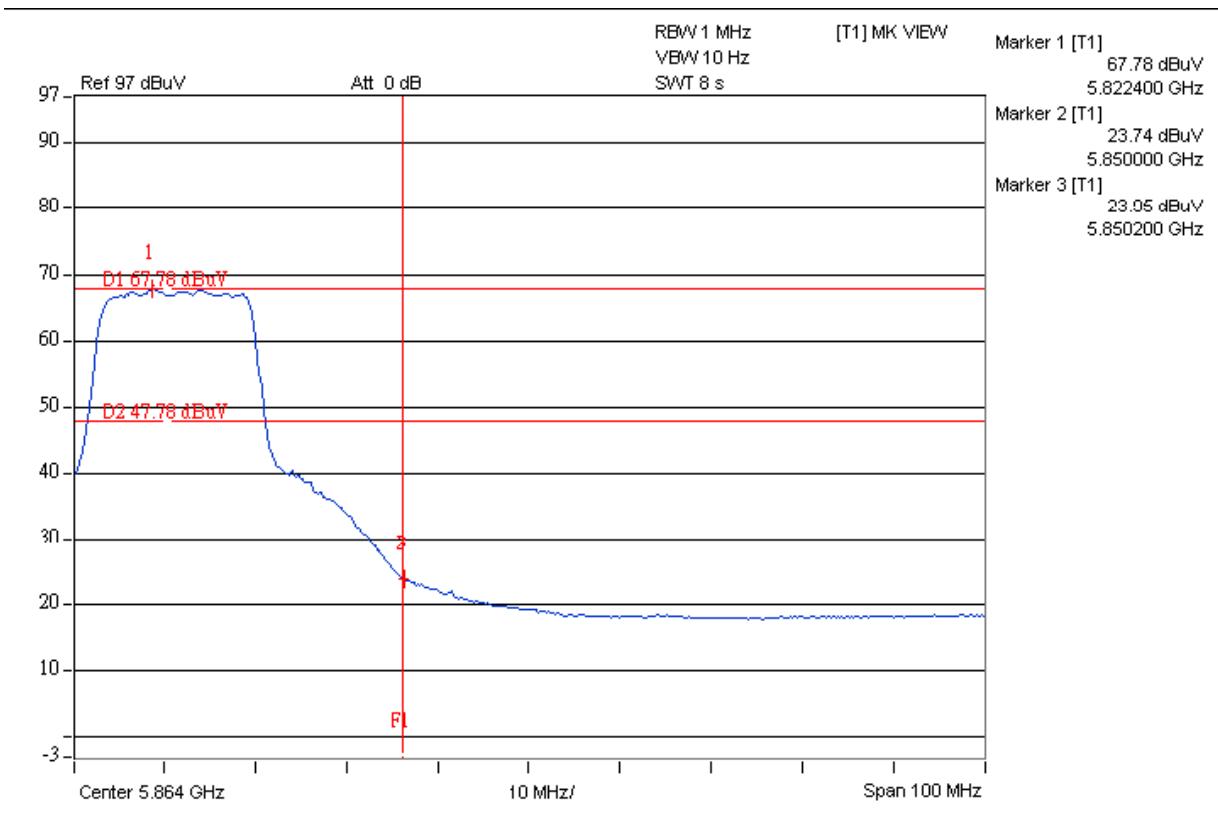
7.6.5. TEST RESULTS

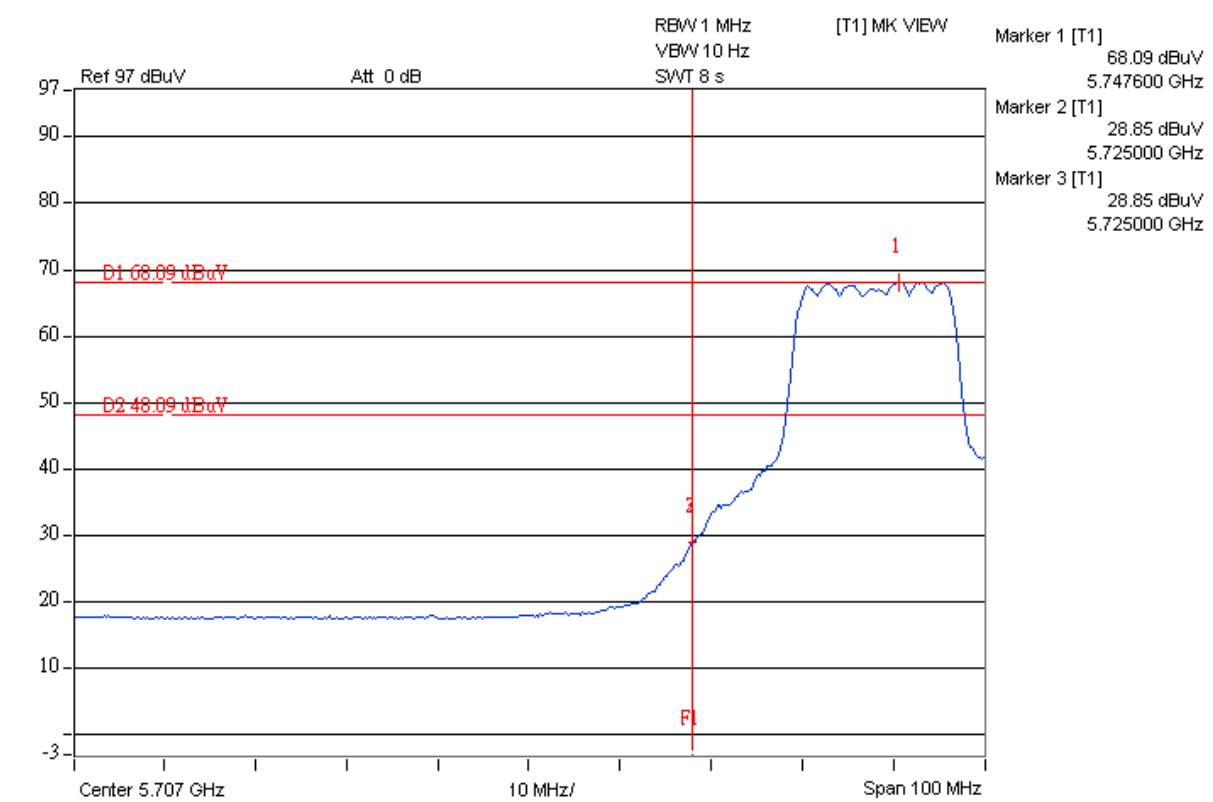
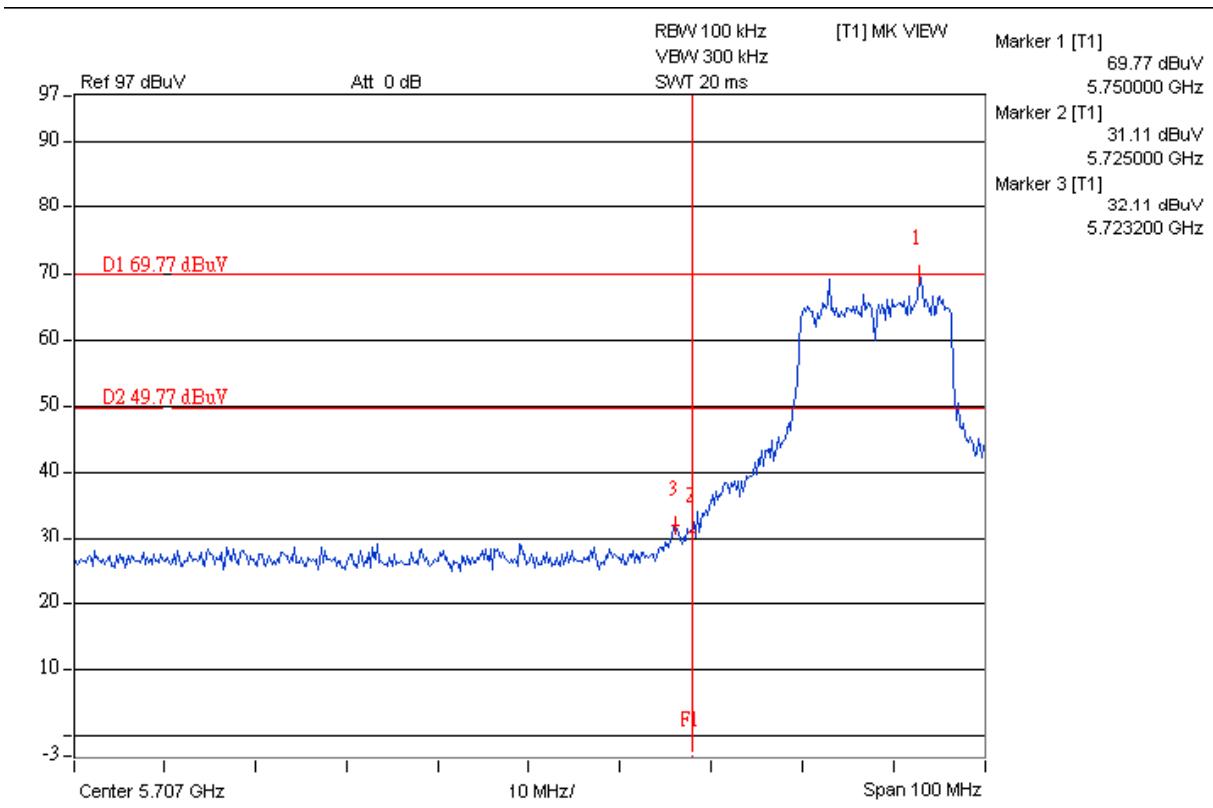
PASS

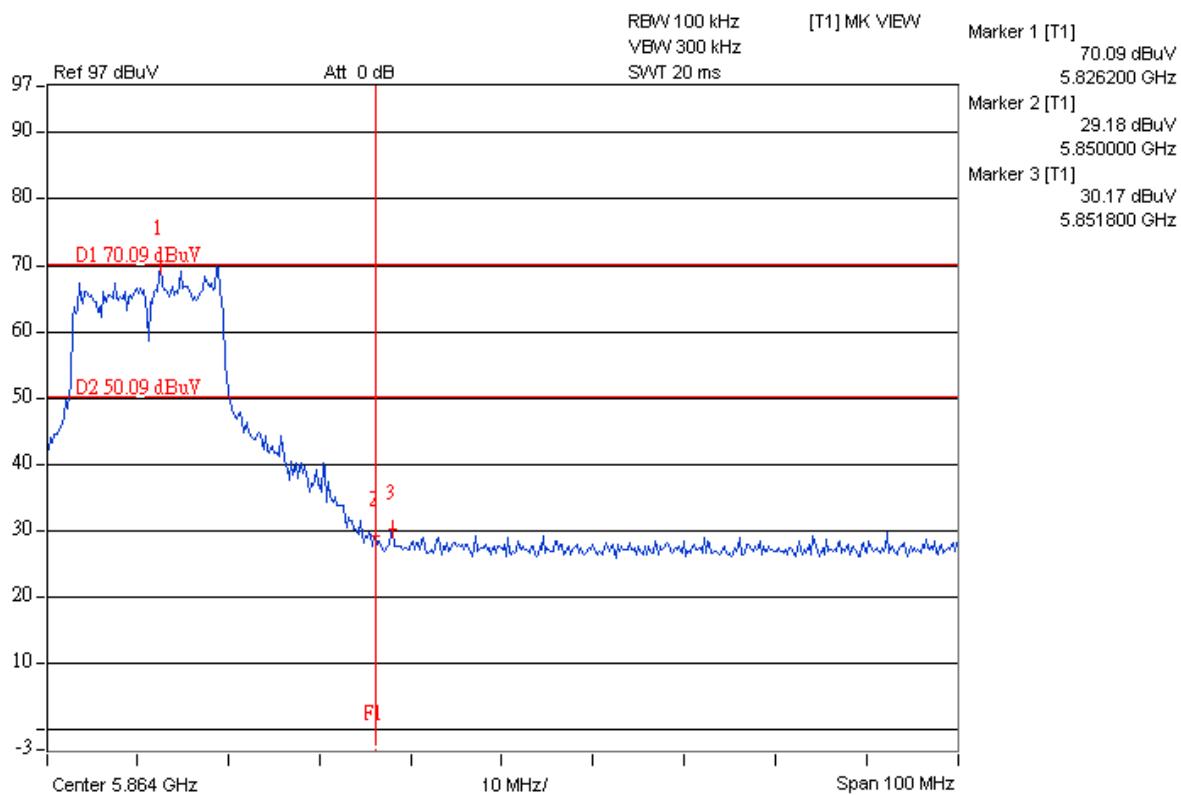
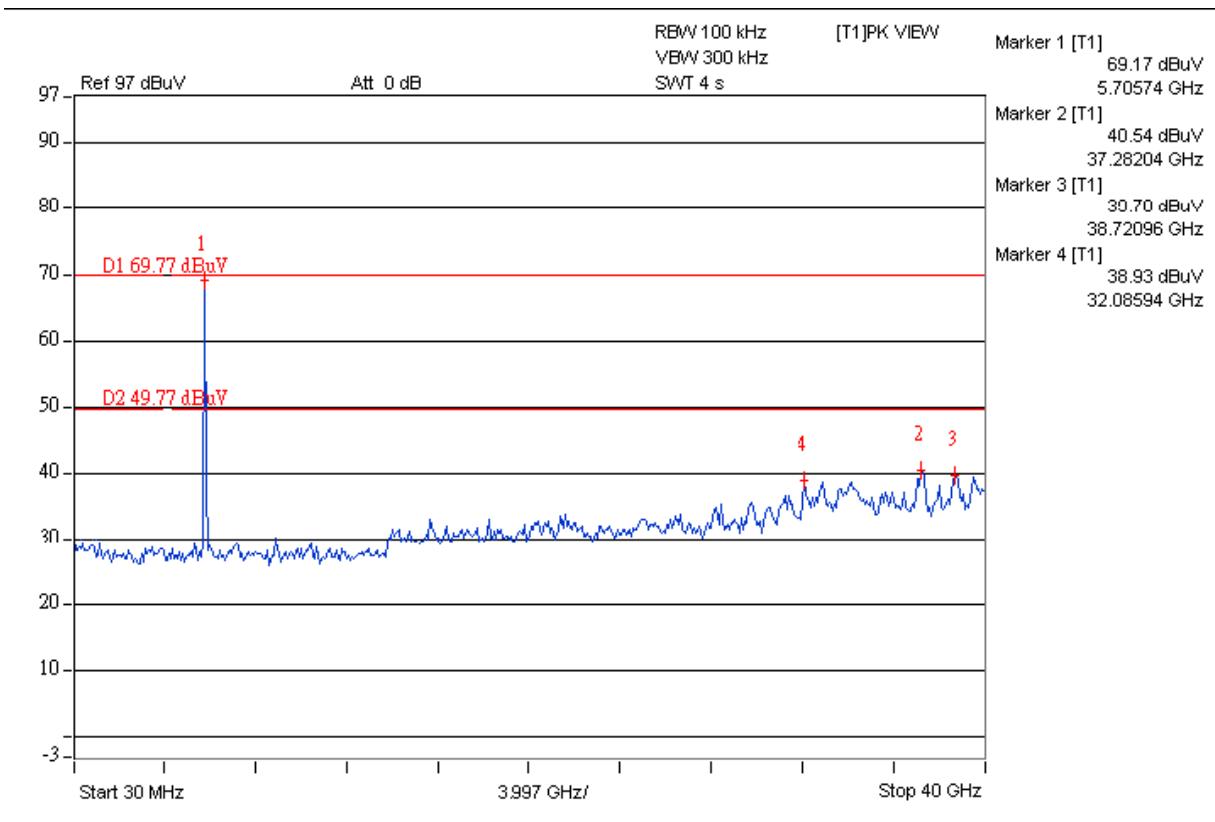
The spectrum plots are attached on the following pages. D1 line indicates the highest level, D2 line indicates the 20dB offset below D1. It shows compliance with the requirement in part 15.247(d).

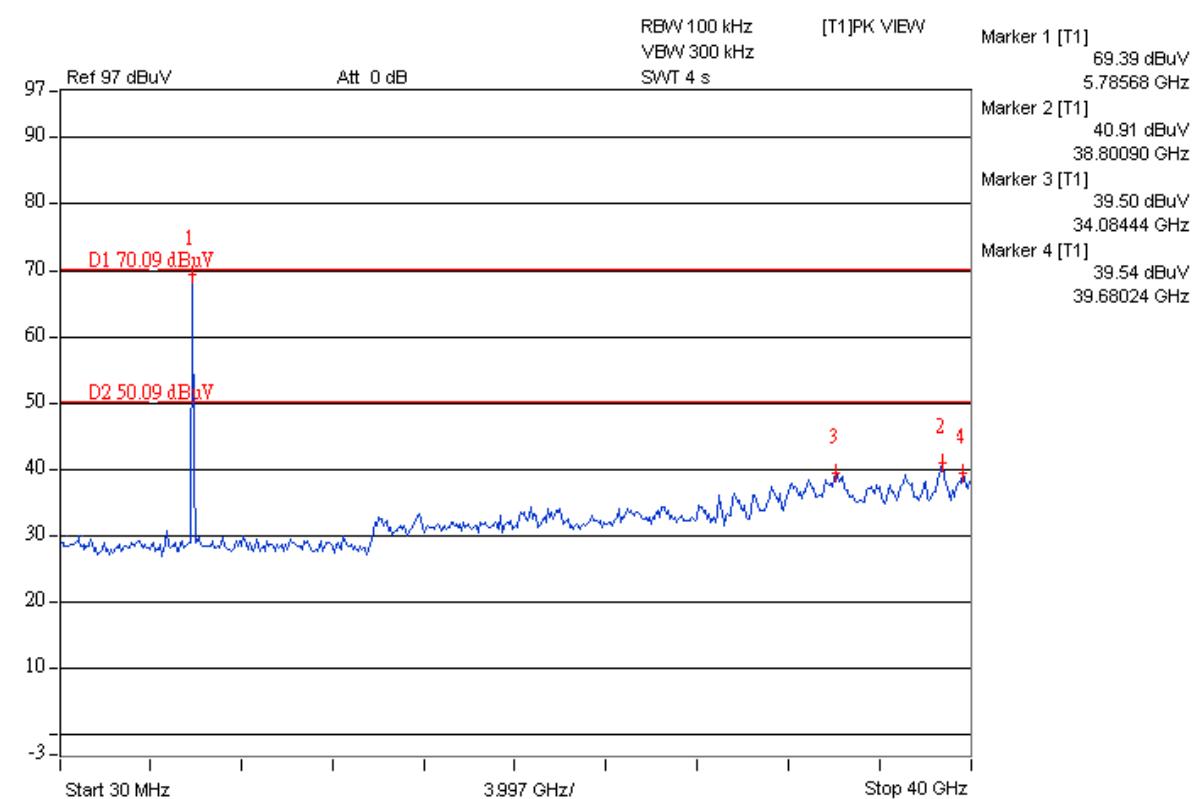
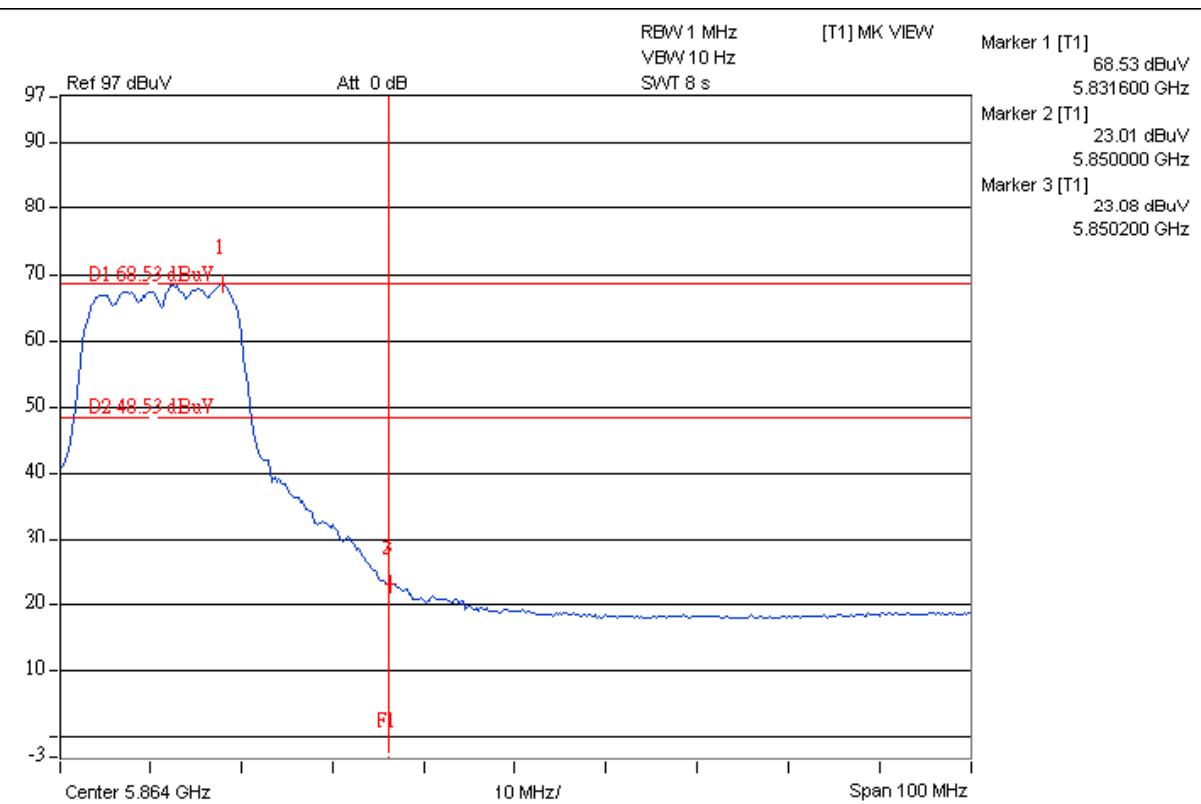
802.11a

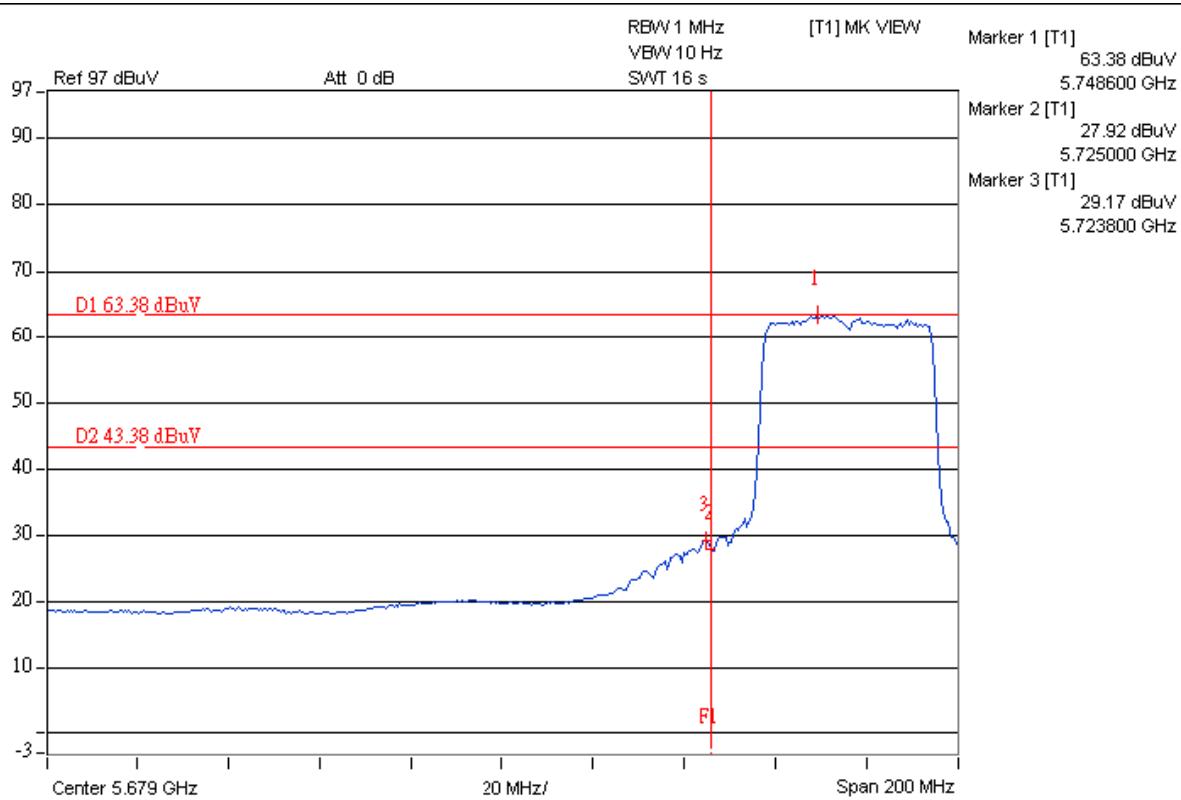
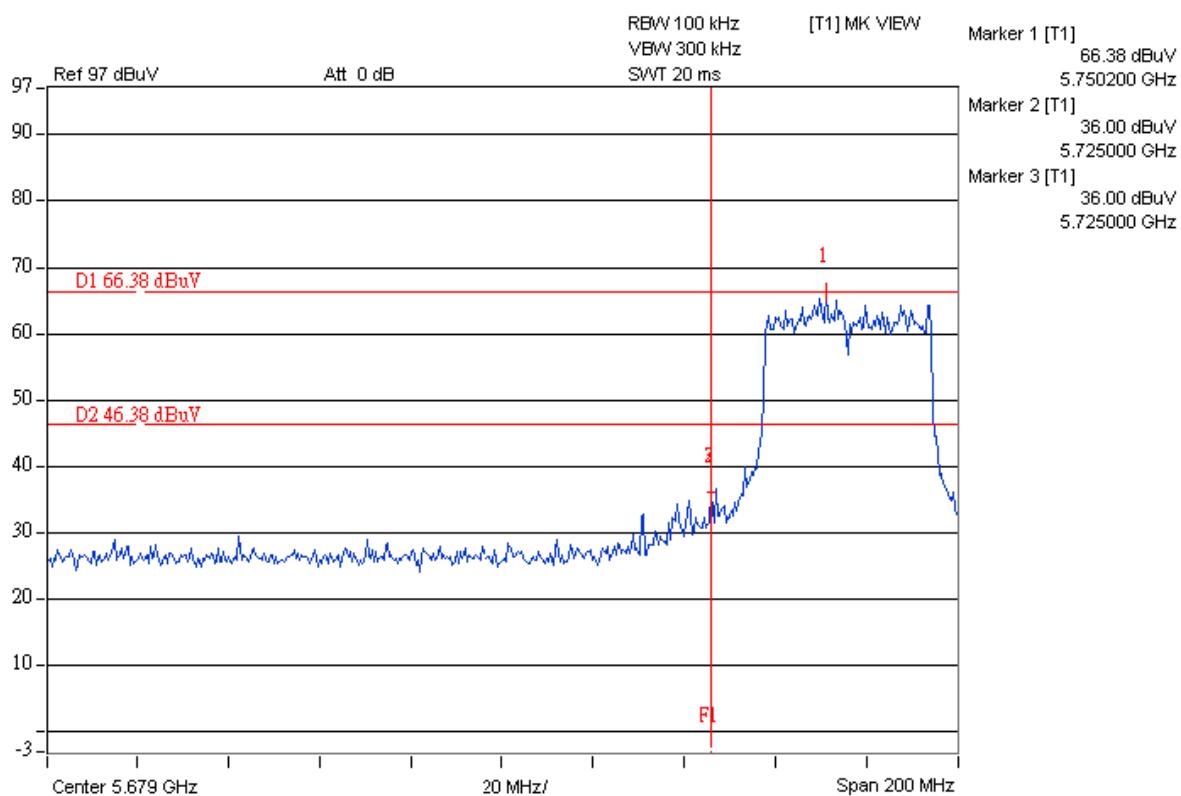


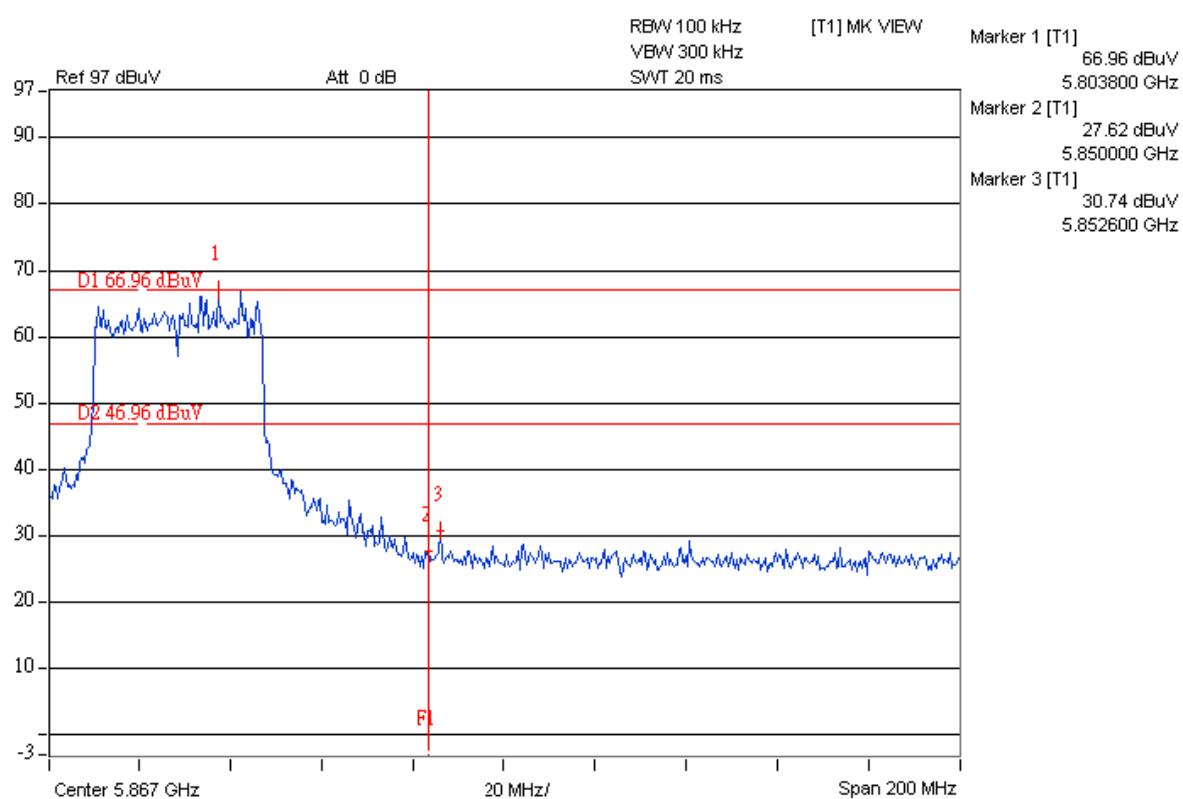
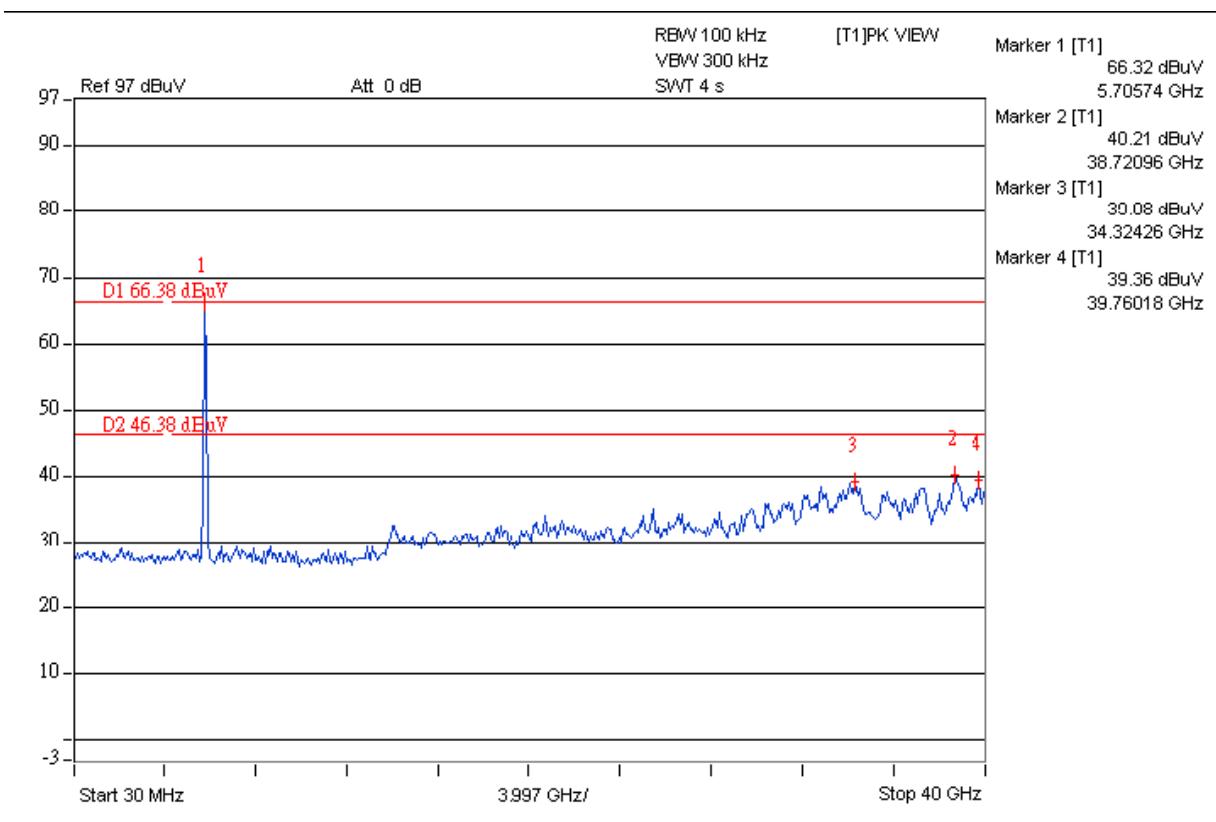


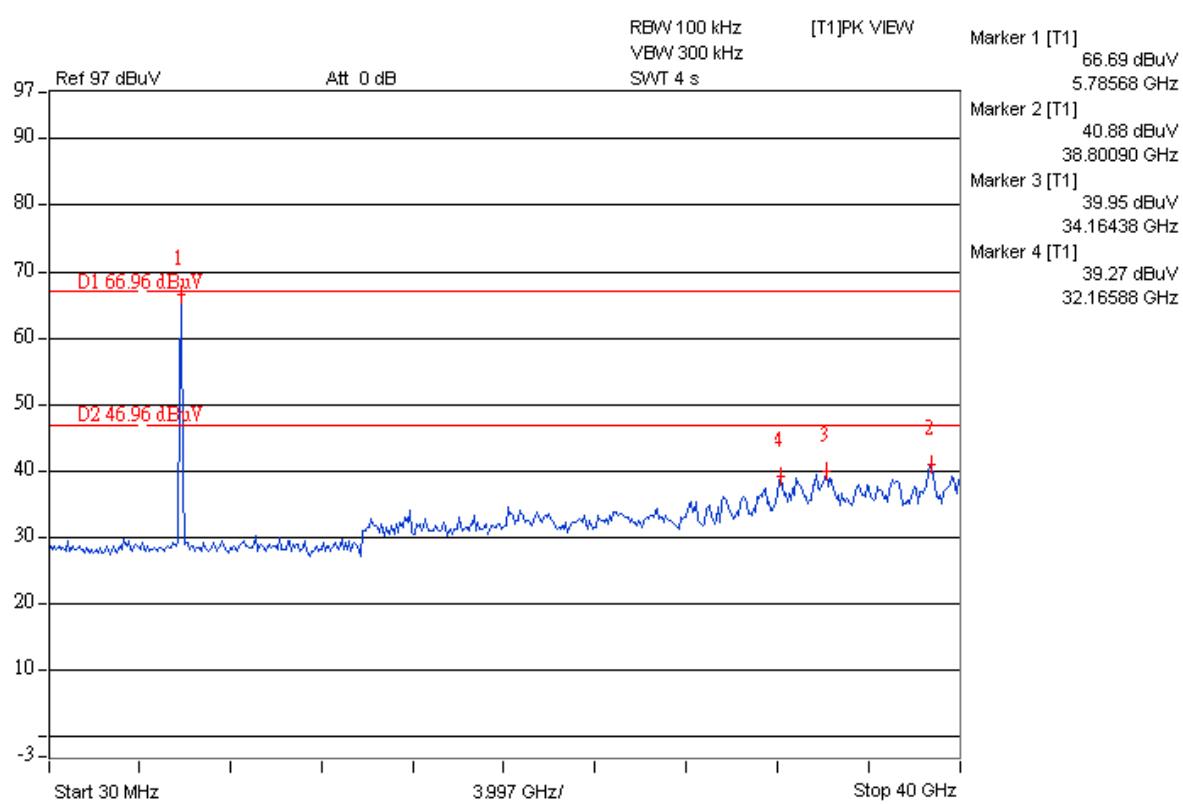
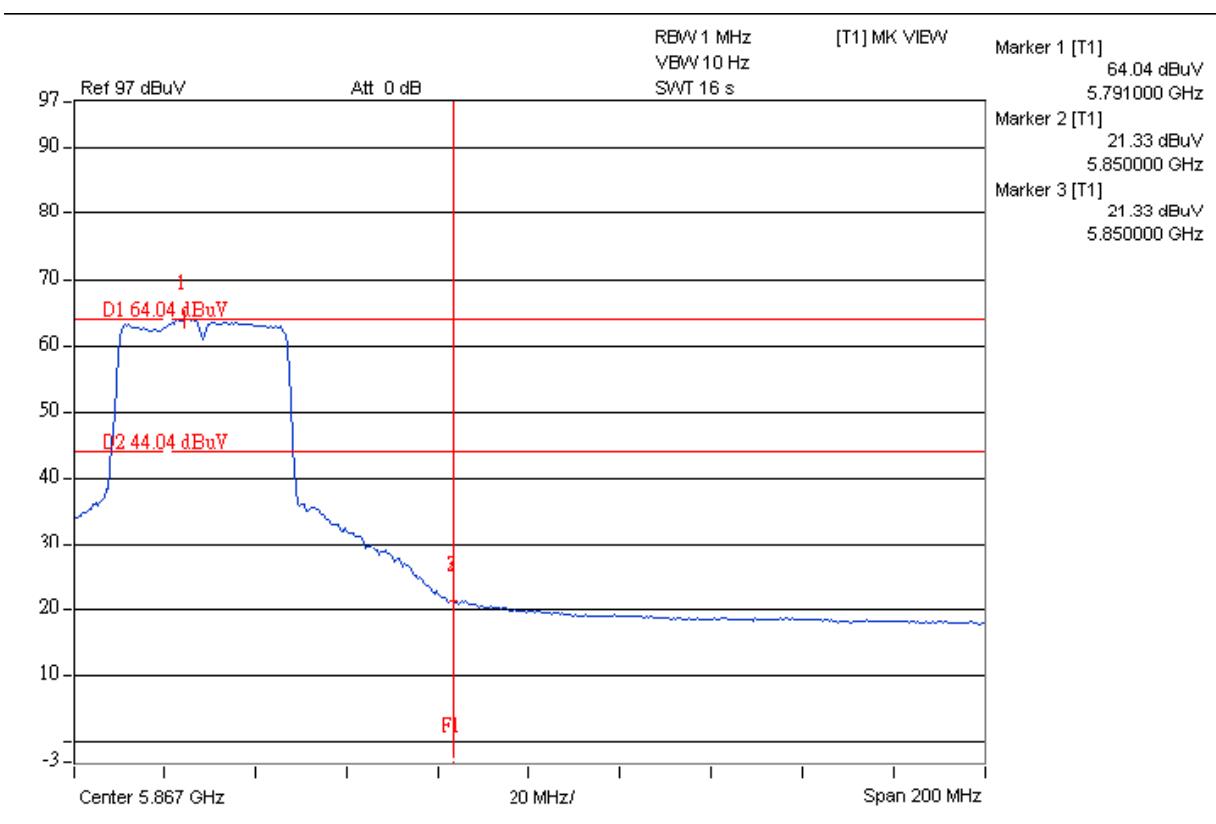
802.11n (20MHz)





802.11n (40MHz)





8. ANTENNA REQUIREMENT

8.1 STANDARD APPLICABLE

47 CFR §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.

Antenna requirement must meet at least one of the following:

- a) Antenna must be permanently attached to the device.
- b) Antenna must use a unique type of connector to attach to the device.
- c) Device must be professionally installed. Installer shall be responsible for ensuring that the correct antenna is employed with the device.

8.2 ANTENNA CONNECTED CONSTRUCTION

Device must be professionally installed. Installer shall be responsible for ensuring that the correct antenna is employed with the device.

Antenna type for point to point link.

5180-5825MHz dipole antenna, model: ATQ1-58, 0dBi antenna Gain.

-----END REPORT-----