



FCC TEST REPORT (15.247)

REPORT NO.: RF970312L01

MODEL NO.: WMIA-199N

RECEIVED: Mar. 12, 2008

TESTED: Mar. 14 ~ Mar. 25, 2008

ISSUED: Apr. 01, 2008

APPLICANT: SparkLAN Communications, Inc.

ADDRESS: 3Fl., No. 246, Sec. 1, Neihu Road., Neihu Chiu,
Taipei Taiwan 114, R.O.C

ISSUED BY: Advance Data Technology Corporation

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

TEST LOCATION: No. 19, Hwa Ya 2nd Rd, Wen Hwa Tsuen, Kwei
Shan Hsiang, Taoyuan Hsien 333, Taiwan,
R.O.C.

This test report consists of 148 pages in total. It may be duplicated completely for legal use with the approval of the applicant. It should not be reproduced except in full, without the written approval of our laboratory. The client should not use it to claim product endorsement by TAF, A2LA or any government agencies. The test results in the report only apply to the tested sample.





TABLE OF CONTENTS

1.	CERTIFICATION.....	5
2.	SUMMARY OF TEST RESULTS	6
2.1	MEASUREMENT UNCERTAINTY.....	6
3.	GENERAL INFORMATION.....	7
3.1	GENERAL DESCRIPTION OF EUT	7
3.2	DESCRIPTION OF TEST MODES.....	9
3.2.1	CONFIGURATION OF SYSTEM UNDER TEST	9
3.2.2	TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL	10
3.3	GENERAL DESCRIPTION OF APPLIED STANDARDS	14
3.4	DESCRIPTION OF SUPPORT UNITS	14
4.	TEST TYPES AND RESULTS (FOR 2.4GHz BAND)	15
4.1	RADIATED EMISSION MEASUREMENT	15
4.1.1	LIMITS OF RADIATED EMISSION MEASUREMENT.....	15
4.1.2	TEST INSTRUMENTS.....	16
4.1.3	TEST PROCEDURES	17
4.1.4	DEVIATION FROM TEST STANDARD.....	17
4.1.5	TEST SETUP.....	18
4.1.6	EUT OPERATING CONDITIONS	18
4.1.7	TEST RESULTS	19
4.2	CONDUCTED EMISSION MEASUREMENT	32
4.2.1	LIMITS OF CONDUCTED EMISSION MEASUREMENT.....	32
4.2.2	TEST INSTRUMENTS.....	32
4.2.3	TEST PROCEDURES	33
4.2.4	DEVIATION FROM TEST STANDARD.....	33
4.2.5	TEST SETUP.....	34
4.2.6	EUT OPERATING CONDITIONS	34
4.2.7	TEST RESULTS	35
4.3	6dB BANDWIDTH MEASUREMENT.....	37
4.3.1	LIMITS OF 6dB BANDWIDTH MEASUREMENT	37
4.3.2	TEST INSTRUMENTS.....	37
4.3.3	TEST PROCEDURE.....	37
4.3.4	DEVIATION FROM TEST STANDARD.....	37
4.3.5	TEST SETUP.....	38
4.3.6	EUT OPERATING CONDITIONS	38
4.3.7	TEST RESULTS	39
4.4	MAXIMUM PEAK OUTPUT POWER.....	51
4.4.1	LIMITS OF MAXIMUM PEAK OUTPUT POWER MEASUREMENT	51
4.4.2	INSTRUMENTS.....	51
4.4.3	TEST PROCEDURES	51
4.4.4	DEVIATION FROM TEST STANDARD.....	52
4.4.5	TEST SETUP.....	52
4.4.6	EUT OPERATING CONDITIONS	52
4.4.7	TEST RESULTS	53



4.5	POWER SPECTRAL DENSITY MEASUREMENT	55
4.5.1	LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT	55
4.5.2	TEST INSTRUMENTS.....	55
4.5.3	TEST PROCEDURE.....	55
4.5.4	DEVIATION FROM TEST STANDARD.....	56
4.5.5	TEST SETUP	56
4.5.6	EUT OPERATING CONDITION.....	56
4.5.7	TEST RESULTS	57
4.6	BAND EDGES MEASUREMENT	69
4.6.1	LIMITS OF BAND EDGES MEASUREMENT	69
4.6.2	TEST INSTRUMENTS.....	69
4.6.3	TEST PROCEDURE.....	70
4.6.4	DEVIATION FROM TEST STANDARD.....	71
4.6.5	EUT OPERATING CONDITION.....	71
4.6.6	TEST RESULTS	72
4.7	ANTENNA REQUIREMENT	88
4.7.1	STANDARD APPLICABLE	88
4.7.2	ANTENNA CONNECTED CONSTRUCTION	88
5.	TEST TYPES AND RESULTS (FOR 5.0GHz BAND)	89
5.1	RADIATED EMISSION MEASUREMENT	89
5.1.1	LIMITS OF RADIATED EMISSION MEASUREMENT	89
5.1.2	TEST INSTRUMENTS.....	90
5.1.3	TEST PROCEDURES	91
5.1.4	DEVIATION FROM TEST STANDARD.....	91
5.1.5	TEST SETUP	92
5.1.6	EUT OPERATING CONDITIONS	92
5.1.7	TEST RESULTS	93
5.2	CONDUCTED EMISSION MEASUREMENT	102
5.2.1	LIMITS OF CONDUCTED EMISSION MEASUREMENT	102
5.2.2	TEST INSTRUMENTS.....	102
5.2.3	TEST PROCEDURES	103
5.2.4	DEVIATION FROM TEST STANDARD.....	103
5.2.5	TEST SETUP	104
5.2.6	EUT OPERATING CONDITIONS	104
5.2.7	TEST RESULTS	105
5.3	6dB BANDWIDTH MEASUREMENT.....	107
5.3.1	LIMITS OF 6dB BANDWIDTH MEASUREMENT	107
5.3.2	TEST INSTRUMENTS.....	107
5.3.3	TEST PROCEDURE.....	107
5.3.4	DEVIATION FROM TEST STANDARD.....	108
5.3.5	TEST SETUP	108
5.3.6	EUT OPERATING CONDITIONS	108
5.3.7	TEST RESULTS	109
5.4	MAXIMUM PEAK OUTPUT POWER.....	118
5.4.1	LIMITS OF MAXIMUM PEAK OUTPUT POWER MEASUREMENT	118



5.4.2	INSTRUMENTS	118
5.4.3	TEST PROCEDURES	118
5.4.4	DEVIATION FROM TEST STANDARD.....	119
5.4.5	TEST SETUP	119
5.4.6	EUT OPERATING CONDITIONS	119
5.4.7	TEST RESULTS	120
5.5	POWER SPECTRAL DENSITY MEASUREMENT	122
5.5.1	LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT	122
5.5.2	TEST INSTRUMENTS.....	122
5.5.3	TEST PROCEDURE.....	122
5.5.4	DEVIATION FROM TEST STANDARD.....	123
5.5.5	TEST SETUP	123
5.5.6	EUT OPERATING CONDITION.....	123
5.5.7	TEST RESULTS	124
5.6	BAND EDGES MEASUREMENT	133
5.6.1	LIMITS OF BAND EDGES MEASUREMENT	133
5.6.2	TEST INSTRUMENTS.....	133
5.6.3	TEST PROCEDURE.....	134
5.6.4	DEVIATION FROM TEST STANDARD.....	135
5.6.5	EUT OPERATING CONDITION.....	135
5.6.6	TEST RESULTS	135
5.7	ANTENNA REQUIREMENT	145
5.7.1	STANDARD APPLICABLE	145
5.7.2	ANTENNA CONNECTED CONSTRUCTION	145
6.	PHOTOGRAPHS OF THE TEST CONFIGURATION.....	146
7.	INFORMATION ON THE TESTING LABORATORIES	147
8.	APPENDIX A - MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB.....	148



1. CERTIFICATION

PRODUCT: Wireless 11a/b/g/n Mini PCI module

MODEL: WMIA-199N

BRAND: SparkLAN

APPLICANT: SparkLAN Communications, Inc.

TEST SAMPLE: ENGINEERING SAMPLE

TESTED: Mar. 14 ~ Mar. 25, 2008

STANDARDS: FCC Part 15, Subpart C (Section 15.247)

ANSI C63.4-2003

The above equipment (Model: WMIA-199N) 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 : Andrea Hsia , **DATE:** Apr. 01, 2008
Andrea Hsia / Specialist

TECHNICAL
ACCEPTANCE : Long Chen , **DATE:** Apr. 01, 2008
Responsible for RF Long Chen / Senior Engineer

APPROVED BY : Gary Chang , **DATE:** Apr. 01, 2008
Gary Chang / Assistant Manager

2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC PART 15, SUBPART C (SECTION 15.247)			
STANDARD SECTION	TEST TYPE AND LIMIT	RESULT	REMARK
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -18.38dB at 4.176MHz
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 -1.25dB at 2483.50MHz
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:

MEASUREMENT	FREQUENCY	UNCERTAINTY
Conducted emissions	9kHz~30MHz	2.44 dB
Radiated emissions	30MHz ~ 200MHz	3.19 dB
	200MHz ~1000MHz	3.21 dB
	1GHz ~ 18GHz	2.26 dB
	18GHz ~ 40GHz	1.94 dB

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

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

EUT	Wireless 11a/b/g/n Mini PCI module
MODEL NO.	WMIA-199N
FCC ID	RYK-WMIA199N
POWER SUPPLY	3.3Vdc from host equipment
MODULATION TYPE	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
MODULATION TECHNOLOGY	DSSS, OFDM
TRANSFER RATE	802.11b: 11.0/ 5.5/ 2.0/ 1.0Mbps 802.11g: 54.0/ 48.0/ 36.0/ 24.0/ 18.0/ 12.0/ 9.0/ 6.0Mbps 802.11a: 54.0/ 48.0/ 36.0/ 24.0/ 18.0/ 12.0/ 9.0/ 6.0Mbps Draft 802.11n: up to 300.0Mbps
FREQUENCY RANGE	2.4GHz: 2400.0 ~ 2483.5MHz 5.0GHz: 5150.0 ~ 5250.0MHz, 5725.0 ~ 5850.0MHz
NUMBER OF CHANNEL	2.4GHz: 11 for 802.11b, 802.11g, draft 802.11n (20MHz) 7 for draft 802.11n (40MHz) 5.0GHz: 9 for 802.11a, draft 802.11n (20MHz) 4 for draft 802.11n (40MHz)
OUTPUT POWER	108.185mW for 2400.0 ~ 2483.5MHz 17.125mW for 5150.0 ~ 5250.0MHz 128.834mW for 5725.0 ~ 5850.0MHz
ANTENNA TYPE	2.4GHz: PCB antenna with 2.3dBi gain 5.0GHz: PCB antenna with 4.6dBi gain
DATA CABLE	NA
I/O PORTS	NA
ASSOCIATED DEVICES	NA

NOTE:

- The EUT is a Wireless 11a/b/g/n Mini PCI module. The functions of EUT listed as below:

	TEST STANDARD	REFERENCE REPORT
WLAN 802.11b/g, draft 802.11n	FCC Part 15, Subpart C (Section 15.247)	RF970312L01
WLAN 802.11a, draft 802.11n (5725~5850 MHz)		
WLAN 802.11a, draft 802.11n (5150~ 5250MHz)	FCC Part 15, Subpart E (Section 15.407)	RF970312L01-1

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

Frequency Band (MHz)	2400~2483.5	5150~5250	5725~5850
802.11b	√		
802.11g	√		
802.11a		√	√
Draft 802.11n (20MHz)	√	√	√
Draft 802.11n (40MHz)	√	√	√

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

	1TX	2TX
802.11b	√	-
802.11g	√	-
802.11a	√	-
Draft 802.11n (20MHz)	-	√
Draft 802.11n (40MHz)	-	√

4. 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.

3.2 DESCRIPTION OF TEST MODES

FOR 2.4GHz:

11 channels are provided for 802.11b, 802.11g and draft 802.11n (20MHz):

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
1	2412MHz	7	2442MHz
2	2417MHz	8	2447MHz
3	2422MHz	9	2452MHz
4	2427MHz	10	2457MHz
5	2432MHz	11	2462MHz
6	2437MHz		

7 channels are provided for draft 802.11n (40MHz):

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
1	2422MHz	5	2442MHz
2	2427MHz	6	2447MHz
3	2432MHz	7	2452MHz
4	2437MHz		

FOR 5.0GHz (5725 ~ 5850MHz):

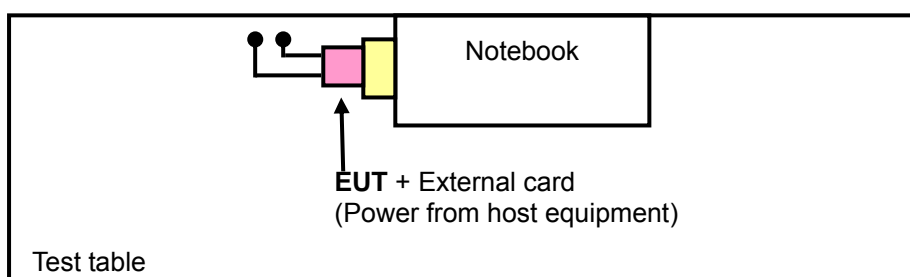
5 channels are provided for 802.11a, draft 802.11n (20MHz):

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
149	5745MHz	161	5805MHz
153	5765MHz	165	5825MHz
157	5785MHz		

2 channels are provided for draft 802.11n (40MHz):

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
151	5755MHz	159	5795MHz

3.2.1 CONFIGURATION OF SYSTEM UNDER TEST



3.2.2 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

FOR 2.4GHz:

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	PLC	RE<1G	RE≥1G	APCM	
-	√	√	√	√	-

Where **PLC**: Power Line Conducted Emission **RE<1G**: Radiated Emission below 1GHz
RE≥1G: Radiated Emission above 1GHz **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, antenna 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)	ANTENNA AXIS
802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1.0	Y
802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6.0	Y
Draft 802.11n (20MHz)	1 to 11	1, 6, 11	OFDM	BPSK	7.2	Y
Draft 802.11n (40MHz)	1 to 7	1, 4, 7	OFDM	BPSK	15.0	Y

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, antenna 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)	ANTENNA AXIS
Draft 802.11n (20MHz)	1 to 11	1	OFDM	BPSK	7.2	Y

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)
Draft 802.11n (20MHz)	1 to 11	1	OFDM	BPSK	7.2

BANDEDGE MEASUREMENT:

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, antenna 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)	ANTENNA AXIS
802.11b	1 to 11	1, 11	DSSS	DBPSK	1.0	Y
802.11g	1 to 11	1, 11	OFDM	BPSK	6.0	Y
Draft 802.11n (20MHz)	1 to 11	1, 11	OFDM	BPSK	7.2	Y
Draft 802.11n (40MHz)	1 to 7	1, 7	OFDM	BPSK	15.0	Y

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.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1.0
802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6.0
Draft 802.11n (20MHz)	1 to 11	1, 6, 11	OFDM	BPSK	7.2
Draft 802.11n (40MHz)	1 to 7	1, 4, 7	OFDM	BPSK	15.0

FOR 5.0GHz:

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	PLC	RE<1G	RE≥1G	APCM	
-	√	√	√	√	-

Where **PLC**: Power Line Conducted Emission **RE<1G**: Radiated Emission below 1GHz
RE≥1G: Radiated Emission above 1GHz **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, antenna 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)	ANTENNA AXIS
802.11a	149 to 165	149, 157, 165	OFDM	BPSK	6.0	Y
Draft 802.11n (20MHz)	149 to 165	149, 157, 165	OFDM	BPSK	7.2	Y
Draft 802.11n (40MHz)	151 to 159	151, 159	OFDM	BPSK	15.0	Y

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, antenna 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)	ANTENNA AXIS
Draft 802.11n (20MHz)	149 to 165	149	OFDM	BPSK	7.2	Y

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)
Draft 802.11n (20MHz)	149 to 165	149	OFDM	BPSK	7.2



BANDEDGE MEASUREMENT:

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, antenna 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)	ANTENNA AXIS
802.11a	149 to 165	149, 165	OFDM	BPSK	6.0	Y
Draft 802.11n (20MHz)	149 to 165	149, 165	OFDM	BPSK	7.2	Y
Draft 802.11n (40MHz)	151 to 159	151, 159	OFDM	BPSK	15.0	Y

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.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11a	149 to 165	149, 157, 165	OFDM	BPSK	6.0
Draft 802.11n (20MHz)	149 to 165	149, 157, 165	OFDM	BPSK	7.2
Draft 802.11n (40MHz)	151 to 159	151, 159	OFDM	BPSK	15.0



3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC Part 15, Subpart C (15.247)

ANSI C63.4-2003

All test items have been performed and recorded as per the above standards.

NOTE: The EUT is also considered as a kind of computer peripheral, because the connection to computer is necessary for typical use. It has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (DoC). The test report has been issued separately.

3.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	NOTEBOOK COMPUTER	IBM	X23	2662-K1T	NA

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	NA

NOTE: 1. All power cords of the above support units are non shielded (1.8m).
2. Item 1 was supplied from client.

4. TEST TYPES AND RESULTS (FOR 2.4GHz BAND)

4.1 RADIATED EMISSION MEASUREMENT

4.1.1 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:

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.



4.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
Test Receiver ROHDE & SCHWARZ	ESI7	838496/016	Dec. 25, 2008
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100039	Dec. 02, 2008
BILOG Antenna SCHWARZBECK	VULB9168	9168-155	Jan. 03, 2009
HORN Antenna SCHWARZBECK	BBHA 9120D	9120D-405	Dec. 17, 2008
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170242	Jan. 06, 2009
Preamplifier Agilent	8449B	3008A01910	Sep. 19, 2008
Preamplifier Agilent	8447D	2944A10634	Dec. 12, 2008
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	274397/4	Nov. 07, 2008
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	283401/4	Nov. 07, 2008
Software ADT.	ADT_Radiated_V7.6	NA	NA
Antenna Tower inn-co GmbH	MA 4000	010303	NA
Antenna Tower Controller inn-co GmbH	CO2000	019303	NA
Turn Table ADT.	TT100.	TT93021704	NA
Turn Table Controller ADT.	SC100.	SC93021704	NA

NOTE: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

2. The test was performed in HwaYa Chamber 4.
3. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
4. The FC Site Registration No. is 460141.
5. The IC Site Registration No. is IC3789B-4.

4.1.3 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.

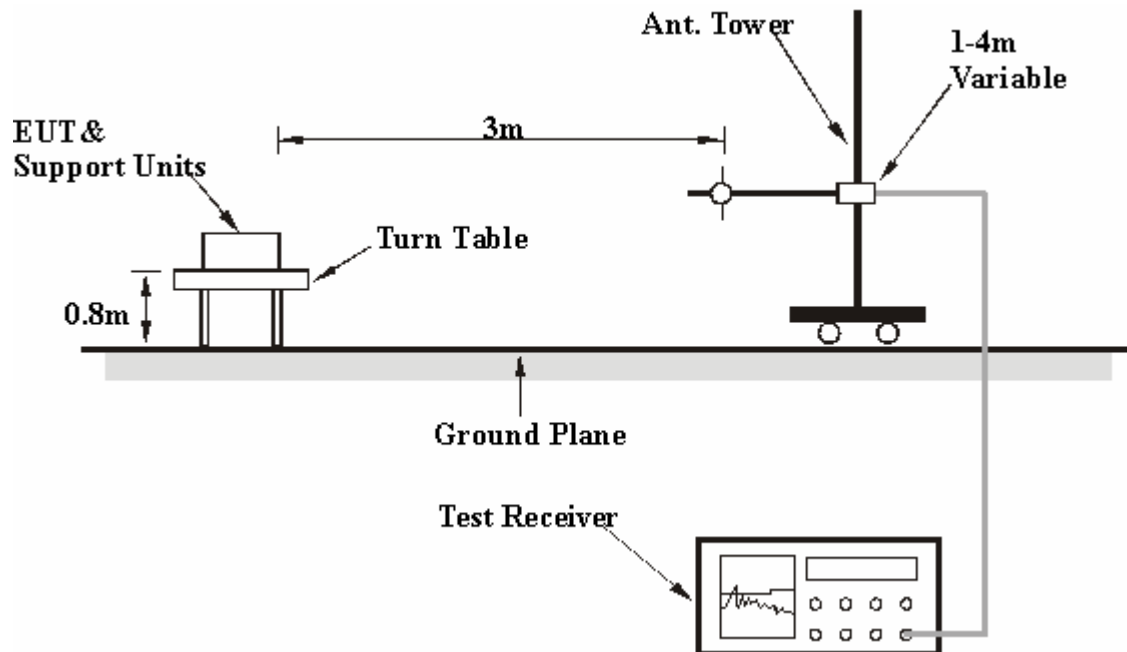
NOTE:

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 1MHz and video bandwidth is 3MHz 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.

4.1.4 DEVIATION FROM TEST STANDARD

No deviation

4.1.5 TEST SETUP



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

4.1.6 EUT OPERATING CONDITIONS

- a. Connected the EUT into the notebook system via external card and placed on a testing table.
- b. The EUT ran a test program (provided by manufacturer) to enable all functions under transmission condition continuously at specific channel frequency.
- c. The necessary accessories enable the EUT in full functions.

4.1.7 TEST RESULTS

802.11b DSSS MODULATION

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	20deg. C, 60%RH 999hPa	TESTED BY	Kevin Liang

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	2390.00	56.94 PK	74.00	-17.06	1.32 H	80	25.55	31.38
2	2390.00	45.44 AV	54.00	-8.56	1.32 H	80	14.05	31.38
3	*2412.00	98.80 PK			1.32 H	80	67.34	31.46
4	*2412.00	94.11 AV			1.32 H	80	62.65	31.46
5	4824.00	47.59 PK	74.00	-26.41	1.05 H	47	9.93	37.66
6	4824.00	36.32 AV	54.00	-17.68	1.05 H	47	-1.34	37.66
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	2390.00	58.11 PK	74.00	-15.89	1.43 V	96	26.73	31.38
2	2390.00	45.94 AV	54.00	-8.06	1.43 V	96	14.55	31.38
3	*2412.00	107.04 PK			1.43 V	95	75.58	31.46
4	*2412.00	102.42 AV			1.43 V	95	70.96	31.46
5	4824.00	48.82 PK	74.00	-25.18	1.12 V	172	11.16	37.66
6	4824.00	37.83 AV	54.00	-16.17	1.12 V	172	0.17	37.66

- 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.



EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 6	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	20deg. C, 60%RH 999hPa	TESTED BY	Kevin Liang

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	*2437.00	100.13 PK			1.06 H	206	68.58	31.55
2	*2437.00	95.48 AV			1.06 H	206	63.93	31.55
3	4874.00	47.50 PK	74.00	-26.50	1.09 H	235	9.71	37.79
4	4874.00	35.91 AV	54.00	-18.09	1.09 H	235	-1.88	37.79
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	108.61 PK			1.21 V	30	77.06	31.55
2	*2437.00	104.48 AV			1.21 V	30	72.93	31.55
3	4874.00	49.90 PK	74.00	-24.10	1.22 V	84	12.11	37.79
4	4874.00	41.23 AV	54.00	-12.77	1.22 V	84	3.44	37.79

- REMARKS:**
1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
 2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
 3. The other emission levels were very low against the limit.
 4. Margin value = Emission level – Limit value.
 5. “ * “: Fundamental frequency.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 11	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	20deg. C, 60%RH 999hPa	TESTED BY	Kevin Liang

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	*2462.00	102.11 PK			1.05 H	207	70.47	31.64
2	*2462.00	97.50 AV			1.05 H	207	65.86	31.64
3	2483.50	56.87 PK	74.00	-17.13	1.05 H	207	25.16	31.71
4	2483.50	46.00 AV	54.00	-8.00	1.05 H	207	14.29	31.71
5	4924.00	48.38 PK	74.00	-25.62	1.01 H	181	10.46	37.92
6	4924.00	35.99 AV	54.00	-18.01	1.01 H	181	-1.93	37.92
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	*2462.00	110.38 PK			1.48 V	25	78.74	31.64
2	*2462.00	105.72 AV			1.48 V	25	74.08	31.64
3	2483.50	56.21 PK	74.00	-17.79	1.48 V	25	24.50	31.71
4	2483.50	46.56 AV	54.00	-7.44	1.48 V	25	14.85	31.71
5	4924.00	51.16 PK	74.00	-22.84	1.31 V	274	13.24	37.92
6	4924.00	38.04 AV	54.00	-15.96	1.31 V	274	0.12	37.92

- 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.

802.11g OFDM MODULATION

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	20deg. C, 60%RH 999hPa	TESTED BY	Kevin Liang

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	2390.00	57.11 PK	74.00	-16.89	1.06 H	217	25.73	31.38
2	2390.00	45.45 AV	54.00	-8.55	1.06 H	217	14.06	31.38
3	*2412.00	97.88 PK			1.06 H	217	66.42	31.46
4	*2412.00	87.55 AV			1.06 H	217	56.09	31.46
5	4824.00	47.28 PK	74.00	-26.72	1.10 H	253	9.62	37.66
6	4824.00	34.09 AV	54.00	-19.91	1.10 H	253	-3.57	37.66
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	2390.00	62.98 PK	74.00	-11.02	1.20 V	159	31.60	31.38
2	2390.00	48.22 AV	54.00	-5.78	1.20 V	159	16.84	31.38
3	*2412.00	106.62 PK			1.20 V	159	75.16	31.46
4	*2412.00	96.65 AV			1.20 V	159	65.19	31.46
5	4824.00	47.84 PK	74.00	-26.16	1.27 V	317	10.18	37.66
6	4824.00	34.95 AV	54.00	-19.05	1.27 V	317	-2.71	37.66

- 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.



EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 6	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	20deg. C, 60%RH 999hPa	TESTED BY	Kevin Liang

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	*2437.00	99.80 PK			1.06 H	206	68.25	31.55
2	*2437.00	89.01 AV			1.06 H	206	57.46	31.55
3	4874.00	47.39 PK	74.00	-26.61	1.23 H	185	9.60	37.79
4	4874.00	34.00 AV	54.00	-20.00	1.23 H	185	-3.79	37.79
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	108.93 PK			1.19 V	193	77.38	31.55
2	*2437.00	98.16 AV			1.19 V	193	66.61	31.55
3	4824.00	47.75 PK	74.00	-26.25	1.30 V	90	10.09	37.66
4	4824.00	34.79 AV	54.00	-19.21	1.30 V	90	-2.87	37.66

- 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.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 11	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	20deg. C, 60%RH 999hPa	TESTED BY	Kevin Liang

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	*2462.00	101.73 PK			1.04 H	208	70.09	31.64
2	*2462.00	91.88 AV			1.04 H	208	60.24	31.64
3	2483.50	63.39 PK	74.00	-10.61	1.05 H	209	31.68	31.71
4	2483.50	48.48 AV	54.00	-5.52	1.05 H	209	16.77	31.71
5	4924.00	47.43 PK	74.00	-26.57	1.34 H	199	9.51	37.92
6	4924.00	34.30 AV	54.00	-19.70	1.34 H	199	-3.62	37.92
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	*2462.00	109.78 PK			1.24 V	15	78.14	31.64
2	*2462.00	99.49 AV			1.24 V	15	67.85	31.64
3	2483.50	69.34 PK	74.00	-4.66	1.24 V	15	37.63	31.71
4	2483.50	50.72 AV	54.00	-3.28	1.24 V	15	19.01	31.71
5	4924.00	48.37 PK	74.00	-25.63	1.09 V	53	10.45	37.92
6	4924.00	35.15 AV	54.00	-18.85	1.09 V	53	-2.77	37.92

- 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.

DRAFT 802.11n (20MHz) OFDM MODULATION

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	20deg. C, 60%RH 999hPa	TESTED BY	Kevin Liang

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	2390.00	62.10 PK	74.00	-11.90	1.33 H	93	30.72	31.38
2	2390.00	47.88 AV	54.00	-6.12	1.33 H	93	16.50	31.38
3	*2412.00	103.12 PK			1.33 H	93	71.66	31.46
4	*2412.00	93.42 AV			1.33 H	93	61.96	31.46
5	4824.00	52.69 PK	74.00	-21.31	1.13 H	236	15.03	37.66
6	4824.00	39.21 AV	54.00	-14.79	1.13 H	236	1.55	37.66
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	2390.00	68.69 PK	74.00	-5.31	1.21 V	336	37.31	31.38
2	2390.00	51.53 AV	54.00	-2.47	1.21 V	336	20.15	31.38
3	*2412.00	109.26 PK			1.21 V	336	77.80	31.46
4	*2412.00	99.51 AV			1.21 V	336	68.05	31.46
5	4824.00	52.51 PK	74.00	-21.49	1.27 V	292	14.85	37.66
6	4824.00	39.60 AV	54.00	-14.40	1.27 V	292	1.94	37.66

- 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.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 6	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	20deg. C, 60%RH 999hPa	TESTED BY	Kevin Liang

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	*2437.00	103.03 PK			1.34 H	33	71.48	31.55
2	*2437.00	93.99 AV			1.34 H	33	62.44	31.55
3	4874.00	46.66 PK	74.00	-27.34	1.30 H	90	8.87	37.79
4	4874.00	33.98 AV	54.00	-20.02	1.30 H	90	-3.81	37.79
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	112.72 PK			1.47 V	100	81.17	31.55
2	*2437.00	103.24 AV			1.47 V	100	71.69	31.55
3	4874.00	48.89 PK	74.00	-25.11	1.09 V	206	11.10	37.79
4	4874.00	37.06 AV	54.00	-16.94	1.09 V	206	-0.73	37.79

- REMARKS:**
1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
 2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
 3. The other emission levels were very low against the limit.
 4. Margin value = Emission level – Limit value.
 5. “ * “: Fundamental frequency.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 11	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	20deg. C, 60%RH 999hPa	TESTED BY	Kevin Liang

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	*2462.00	103.28 PK			1.27 H	96	71.64	31.64
2	*2462.00	93.37 AV			1.27 H	96	61.73	31.64
3	2483.50	58.78 PK	74.00	-15.22	1.27 H	96	27.07	31.71
4	2483.50	47.25 AV	54.00	-6.75	1.27 H	96	15.54	31.71
5	4924.00	48.41 PK	74.00	-25.59	1.10 H	233	10.49	37.92
6	4924.00	36.25 AV	54.00	-17.75	1.10 H	233	-1.67	37.92
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	*2462.00	111.67 PK			1.20 V	359	80.03	31.64
2	*2462.00	100.99 AV			1.20 V	359	69.35	31.64
3	2483.50	65.49 PK	74.00	-8.51	1.20 V	359	33.78	31.71
4	2483.50	52.12 AV	54.00	-1.88	1.20 V	359	20.41	31.71
5	4924.00	49.34 PK	74.00	-24.66	1.25 V	281	11.42	37.92
6	4924.00	36.99 AV	54.00	-17.01	1.25 V	281	-0.93	37.92

- 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.



DRAFT 802.11n (40MHz) OFDM MODULATION

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	20deg. C, 60%RH 999hPa	TESTED BY	Kevin Liang

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	2390.00	63.48 PK	74.00	-10.52	1.33 H	101	32.10	31.38
2	2390.00	48.42 AV	54.00	-5.58	1.33 H	101	17.04	31.38
3	*2422.00	99.18 PK			1.33 H	101	67.68	31.50
4	*2422.00	91.55 AV			1.33 H	101	60.05	31.50
5	4844.00	47.61 PK	74.00	-26.39	1.41 H	216	9.90	37.71
6	4844.00	35.05 AV	54.00	-18.95	1.41 H	216	-2.66	37.71

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	2390.00	67.14 PK	74.00	-6.86	1.18 V	17	35.76	31.38
2	2390.00	50.74 AV	54.00	-3.26	1.18 V	17	19.36	31.38
3	*2422.00	104.05 PK			1.18 V	17	72.55	31.50
4	*2422.00	96.65 AV			1.18 V	17	65.15	31.50
5	4824.00	47.77 PK	74.00	-26.23	1.40 V	207	10.11	37.66
6	4824.00	36.63 AV	54.00	-17.37	1.40 V	207	-1.03	37.66

- 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.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 4	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	20deg. C, 60%RH 999hPa	TESTED BY	Kevin Liang

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	*2437.00	100.11 PK			1.39 H	151	68.56	31.55
2	*2437.00	85.73 AV			1.39 H	151	54.18	31.55
3	4874.00	47.07 PK	74.00	-26.93	1.35 H	183	9.28	37.79
4	4874.00	34.26 AV	54.00	-19.74	1.35 H	183	-3.53	37.79
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	106.47 PK			1.43 V	275	74.92	31.55
2	*2437.00	96.48 AV			1.43 V	275	64.93	31.55
3	4874.00	49.33 PK	74.00	-24.67	1.25 V	195	11.54	37.79
4	4874.00	36.23 AV	54.00	-17.77	1.25 V	195	-1.56	37.79

- REMARKS:**
1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
 2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
 3. The other emission levels were very low against the limit.
 4. Margin value = Emission level – Limit value.
 5. “ * “: Fundamental frequency.



EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 7	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	20deg. C, 60%RH 999hPa	TESTED BY	Kevin Liang

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	*2452.00	98.75 PK			1.28 H	99	67.15	31.60
2	*2452.00	88.15 AV			1.28 H	99	56.55	31.60
3	2483.50	64.49 PK	74.00	-9.51	1.28 H	98	32.78	31.71
4	2483.50	48.68 AV	54.00	-5.32	1.28 H	98	16.97	31.71
5	4904.00	47.81 PK	74.00	-26.19	1.22 H	162	9.94	37.87
6	4904.00	34.31 AV	54.00	-19.69	1.22 H	162	-3.56	37.87
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	*2452.00	105.31 PK			1.16 V	22	73.71	31.60
2	*2452.00	94.78 AV			1.16 V	22	63.18	31.60
3	2483.50	67.68 PK	74.00	-6.32	1.16 V	22	35.97	31.71
4	2483.50	52.75 AV	54.00	-1.25	1.16 V	22	21.04	31.71
5	4904.00	48.00 PK	74.00	-26.00	1.18 V	31	10.13	37.87
6	4904.00	34.95 AV	54.00	-19.05	1.18 V	31	-2.92	37.87

- 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.



BELOW 1GHz WORST-CASE DATA : DRAFT 802.11n (20MHz) OFDM MODULATION

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	FREQUENCY RANGE	Below 1000MHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH 999hPa	TESTED BY	Brad 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	232.11	39.38 QP	46.00	-6.62	1.00 H	346	26.69	12.69
2	265.16	41.33 QP	46.00	-4.67	1.00 H	343	27.31	14.01
3	300.16	38.35 QP	46.00	-7.65	1.00 H	208	23.21	15.14
4	397.37	35.59 QP	46.00	-10.41	1.00 H	211	18.01	17.58
5	500.42	35.59 QP	46.00	-10.41	2.00 H	310	15.29	20.29
6	827.06	38.20 QP	46.00	-7.80	2.00 H	346	11.74	26.47

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	166.00	26.00 QP	43.50	-17.50	1.50 V	55	11.95	14.06
2	267.10	32.24 QP	46.00	-13.76	1.50 V	217	18.05	14.19
3	399.31	31.57 QP	46.00	-14.43	2.00 V	268	13.95	17.62
4	500.42	30.48 QP	46.00	-15.52	2.00 V	280	10.19	20.29
5	663.74	25.74 QP	46.00	-20.26	1.50 V	262	1.98	23.76
6	932.05	29.75 QP	46.00	-16.25	1.50 V	238	1.69	28.06

- 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.

4.2 CONDUCTED EMISSION MEASUREMENT

4.2.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

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

- NOTE:** 1. The lower limit shall apply at the transition frequencies.
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.
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.

4.2.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
Test Receiver ROHDE & SCHWARZ	ESCS30	100289	Dec. 06, 2008
RF signal cable Woken	5D-FB	Cable-HYC01-01	Jan. 06, 2009
LISN ROHDE & SCHWARZ	ESH3-Z5	100312	Jan. 30, 2009
LISN ROHDE & SCHWARZ	NNBL 8226-2	8226-142	May 07, 2008
Software ADT	ADT_Cond_V3	NA	NA

- NOTE:** 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in HwaYa Shielded Room 1.
3. The VCCI Site Registration No. is C-2040.

4.2.3 TEST PROCEDURES

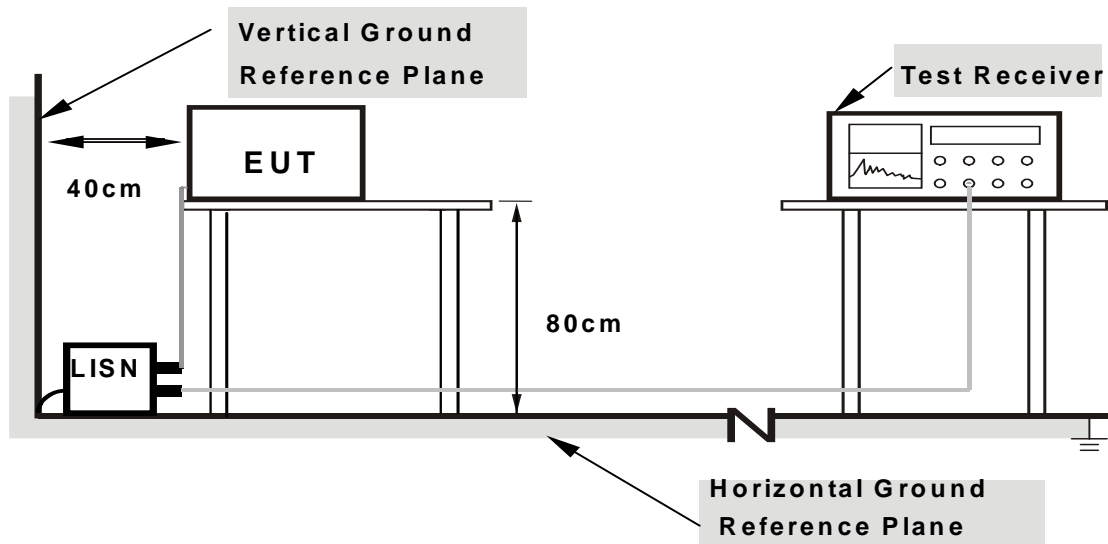
- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

NOTE: All modes of operation were investigated and the worst-case emissions are reported.

4.2.4 DEVIATION FROM TEST STANDARD

No deviation

4.2.5 TEST SETUP



- Note:**
1. Support units were connected to second LISN.
 2. Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

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

4.2.6 EUT OPERATING CONDITIONS

Same as 4.1.6.

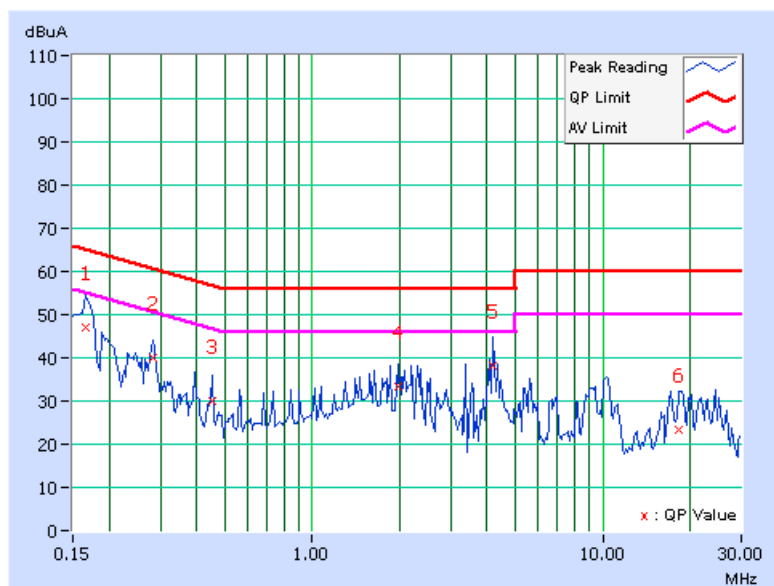
4.2.7 TEST RESULTS

CONDUCTED WORST-CASE DATA : DRAFT 802.11n (20MHz) OFDM MODULATION

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	PHASE	Line 1
MODULATION TYPE	BPSK	INPUT POWER (SYSTEM)	120Vac, 60Hz
TRANSFER RATE	7.2Mbps	6dB BANDWIDTH	9kHz
ENVIRONMENTAL CONDITIONS	20deg. C, 60%RH, 982hPa	TESTED BY	Match Tsui

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
			1	0.166	0.21	45.96	-	46.17	-	65.18
2	0.283	0.21	39.17	-	39.38	-	60.73	50.73	-21.35	-
3	0.451	0.21	29.04	-	29.25	-	56.86	46.86	-27.61	-
4	1.976	0.26	32.45	-	32.71	-	56.00	46.00	-23.29	-
5	4.176	0.39	37.23	-	37.62	-	56.00	46.00	-18.38	-
6	18.350	0.94	22.33	-	23.27	-	60.00	50.00	-36.73	-

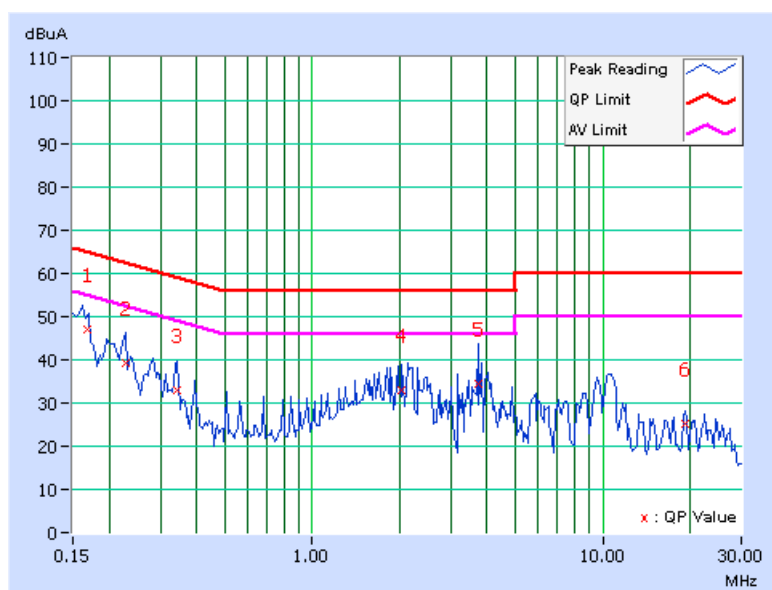
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
 3. The emission levels of other frequencies were very low against the limit.
 4. Margin value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



EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	PHASE	Line 2
MODULATION TYPE	BPSK	INPUT POWER (SYSTEM)	120Vac, 60Hz
TRANSFER RATE	7.2Mbps	6dB BANDWIDTH	9kHz
ENVIRONMENTAL CONDITIONS	20deg. C, 60%RH, 982hPa	TESTED BY	Match Tsui

No	Freq. [MHz]	Corr. Factor [dB]	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.168	0.21	46.46	-	46.67	-	65.05	55.05	-18.39	-
2	0.228	0.21	38.87	-	39.08	-	62.52	52.52	-23.44	-
3	0.341	0.21	32.38	-	32.59	-	59.17	49.17	-26.58	-
4	2.033	0.26	32.53	-	32.79	-	56.00	46.00	-23.21	-
5	3.727	0.37	34.01	-	34.38	-	56.00	46.00	-21.62	-
6	19.207	0.52	24.80	-	25.32	-	60.00	50.00	-34.68	-

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





4.3 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
R&S SPECTRUM ANALYZER	FSP40	100040	Jun. 28, 2008

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

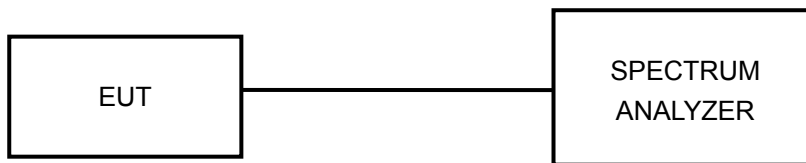
4.3.3 TEST PROCEDURE

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 300kHz VBW. The 6dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6dB.

4.3.4 DEVIATION FROM TEST STANDARD

No deviation

4.3.5 TEST SETUP



4.3.6 EUT OPERATING CONDITIONS

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.



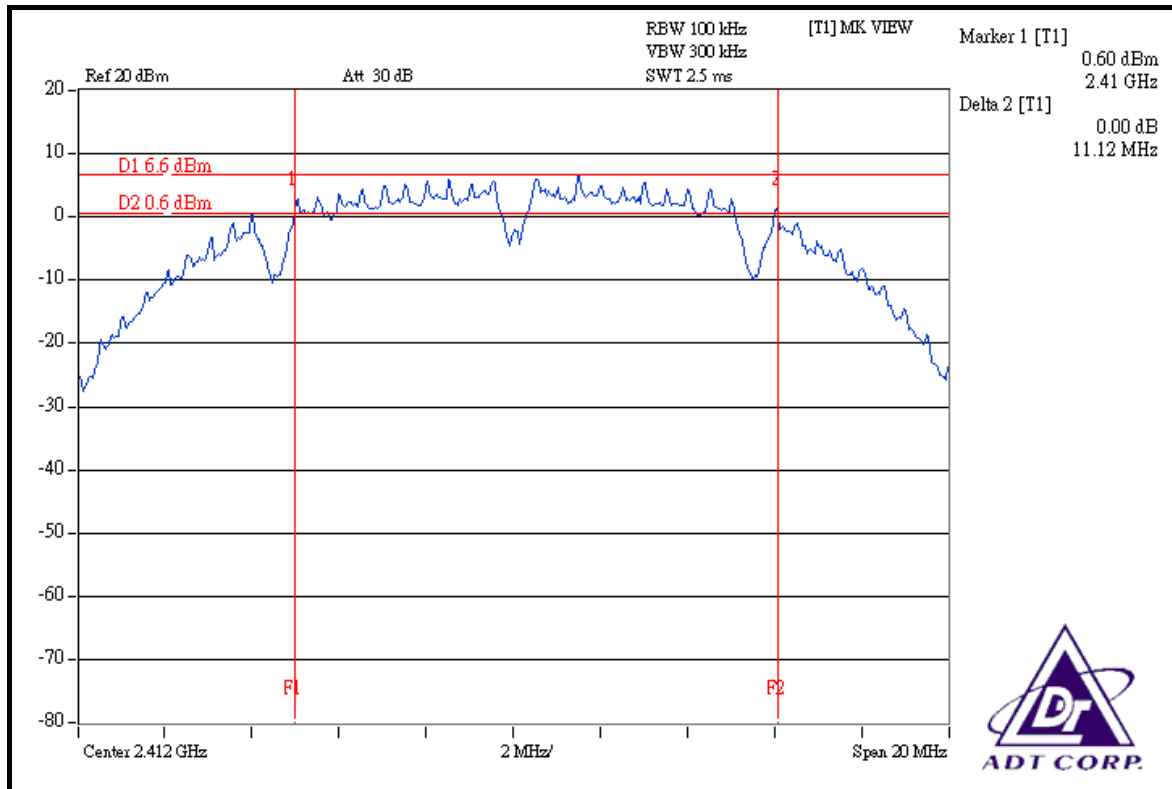
4.3.7 TEST RESULTS

802.11b DSSS MODULATION

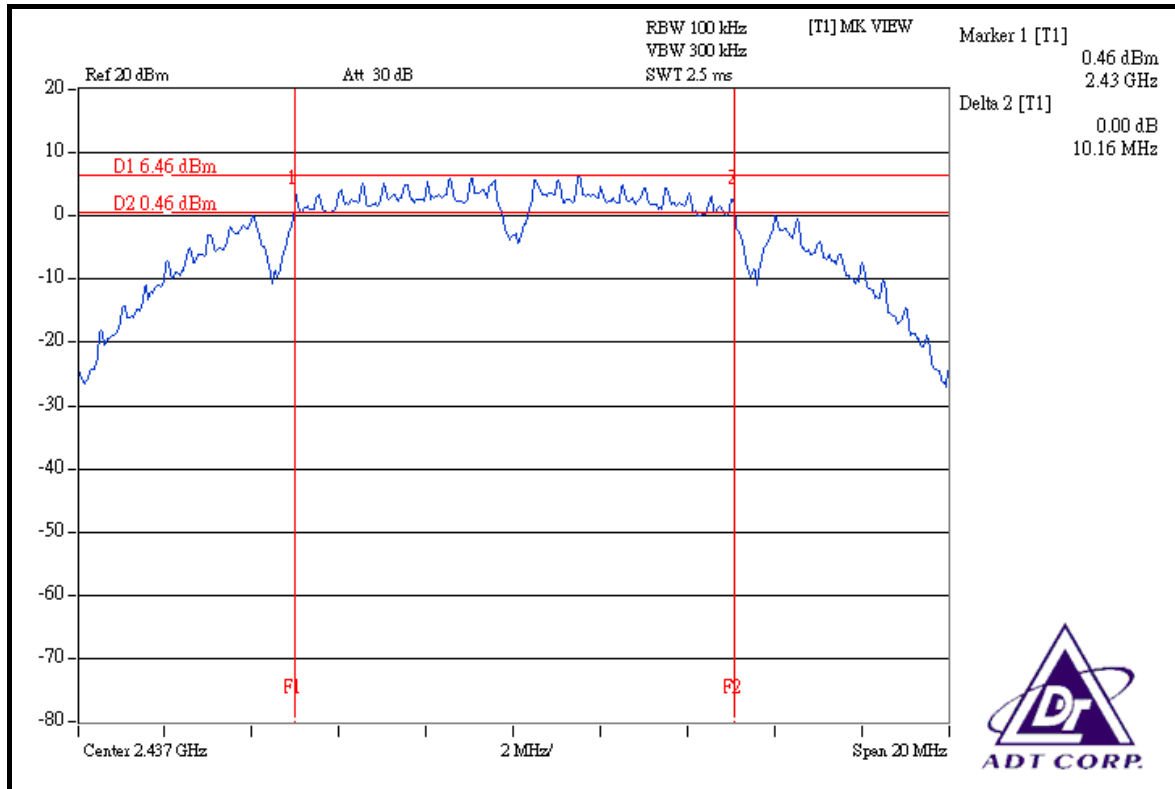
MODULATION TYPE	DBPSK	TRANSFER RATE	1.0Mbps
INPUT POWER (SYSTEM)	120Vac, 60Hz	ENVIRONMENTAL CONDITIONS	25 deg.C, 65 %RH, 991hPa
TESTED BY	Brad Wu		

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	11.12	0.5	PASS
6	2437	10.16	0.5	PASS
11	2462	11.09	0.5	PASS

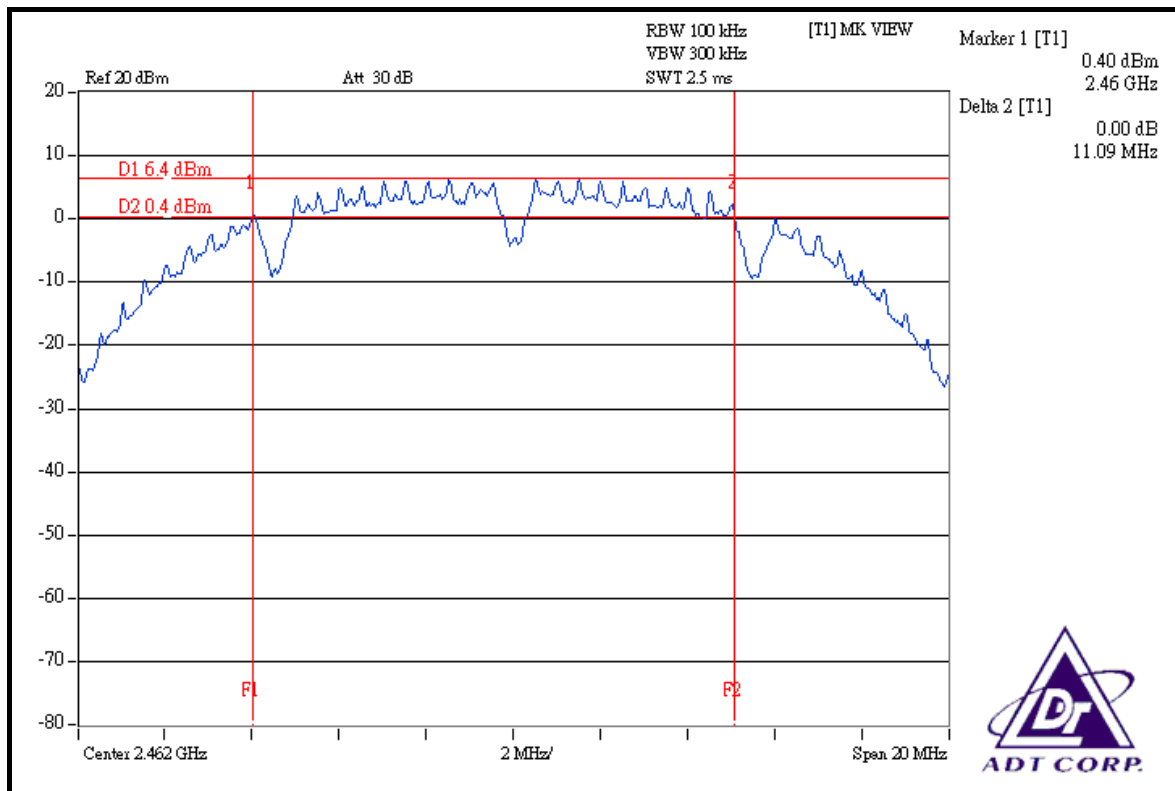
CH 1



CH 6



CH 11



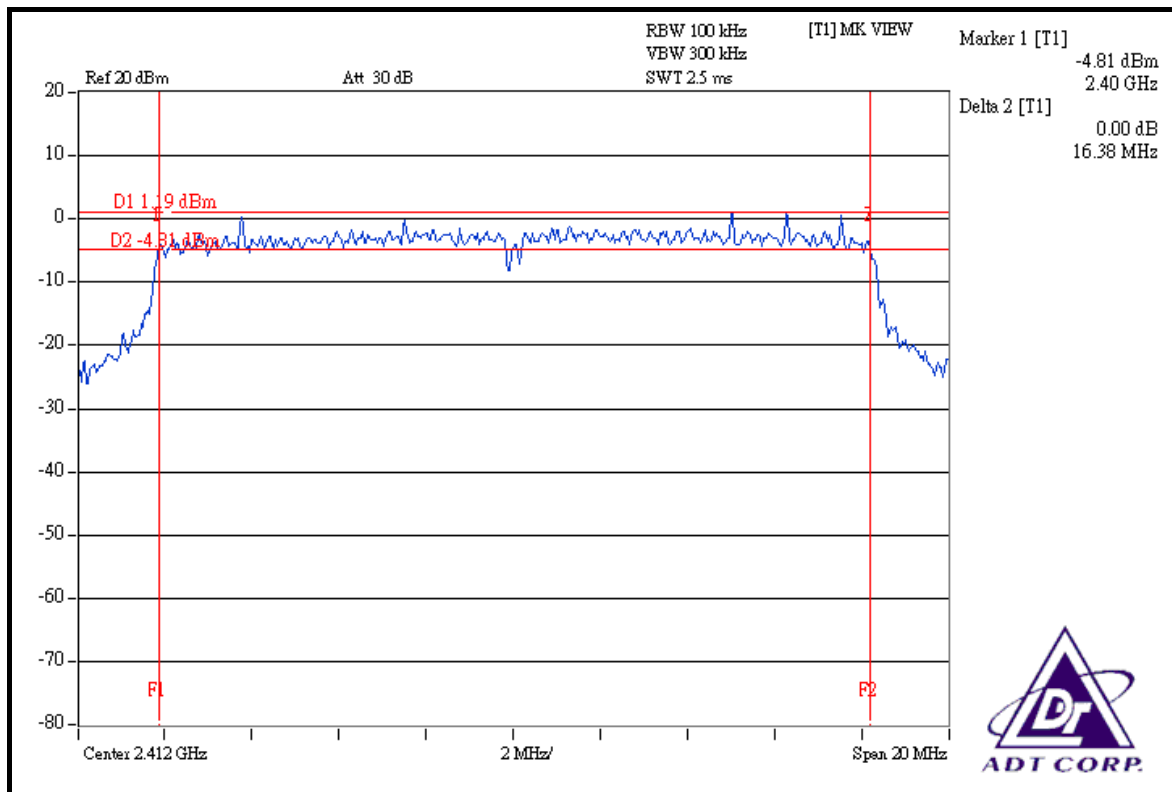


802.11g OFDM MODULATION

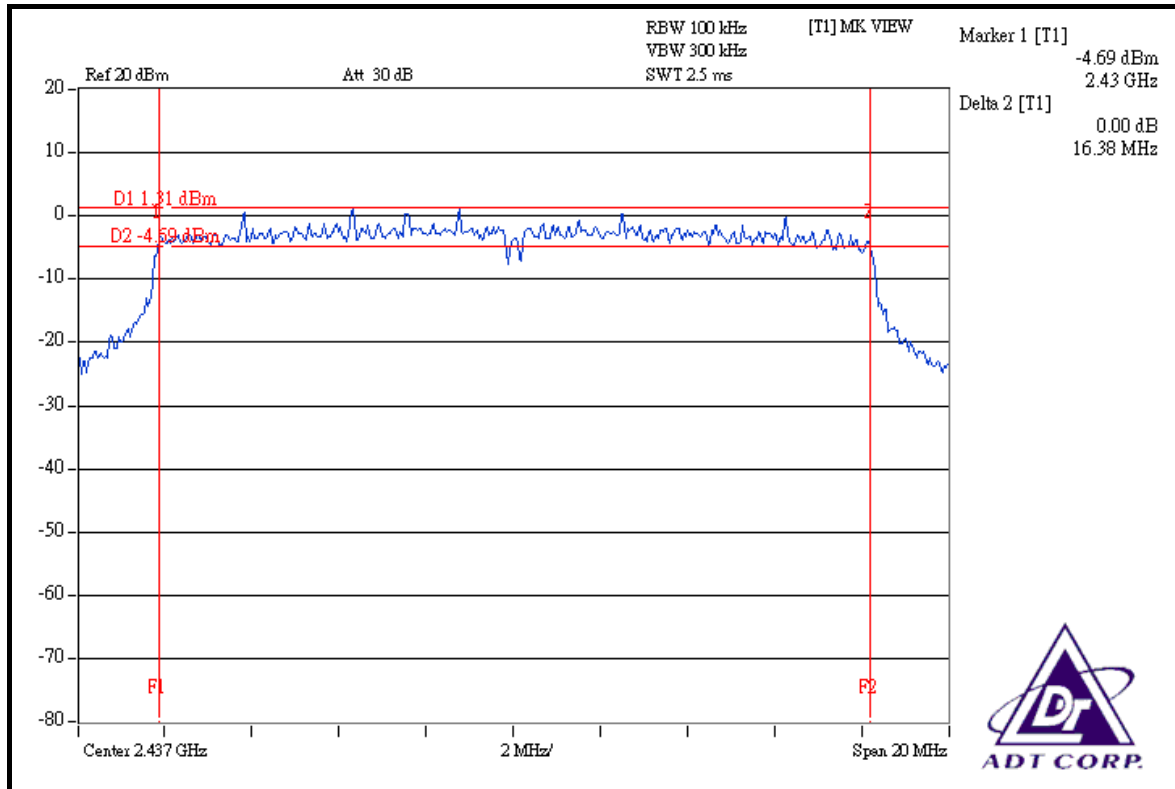
MODULATION TYPE	BPSK	TRANSFER RATE	6.0Mbps
INPUT POWER (SYSTEM)	120Vac, 60Hz	ENVIRONMENTAL CONDITIONS	25 deg.C, 65 %RH, 991hPa
TESTED BY	Brad Wu		

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	16.38	0.5	PASS
6	2437	16.38	0.5	PASS
11	2462	16.40	0.5	PASS

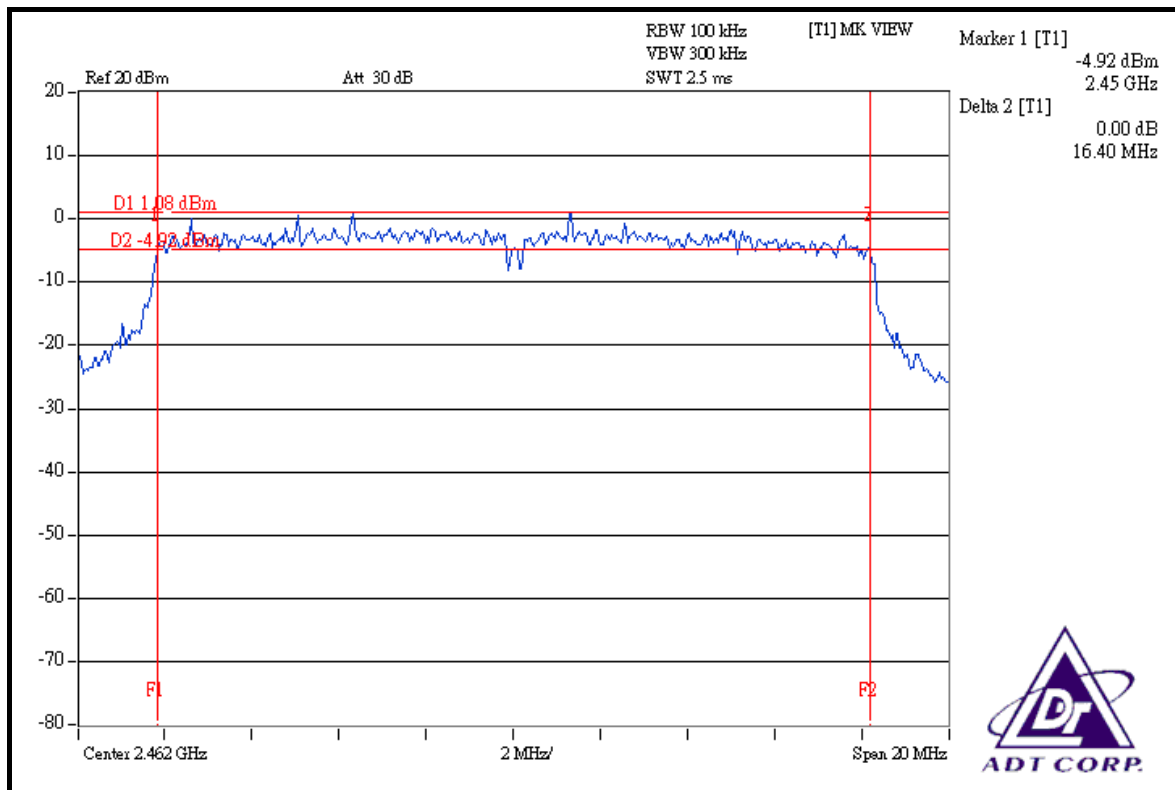
CH 1



CH 6



CH 11





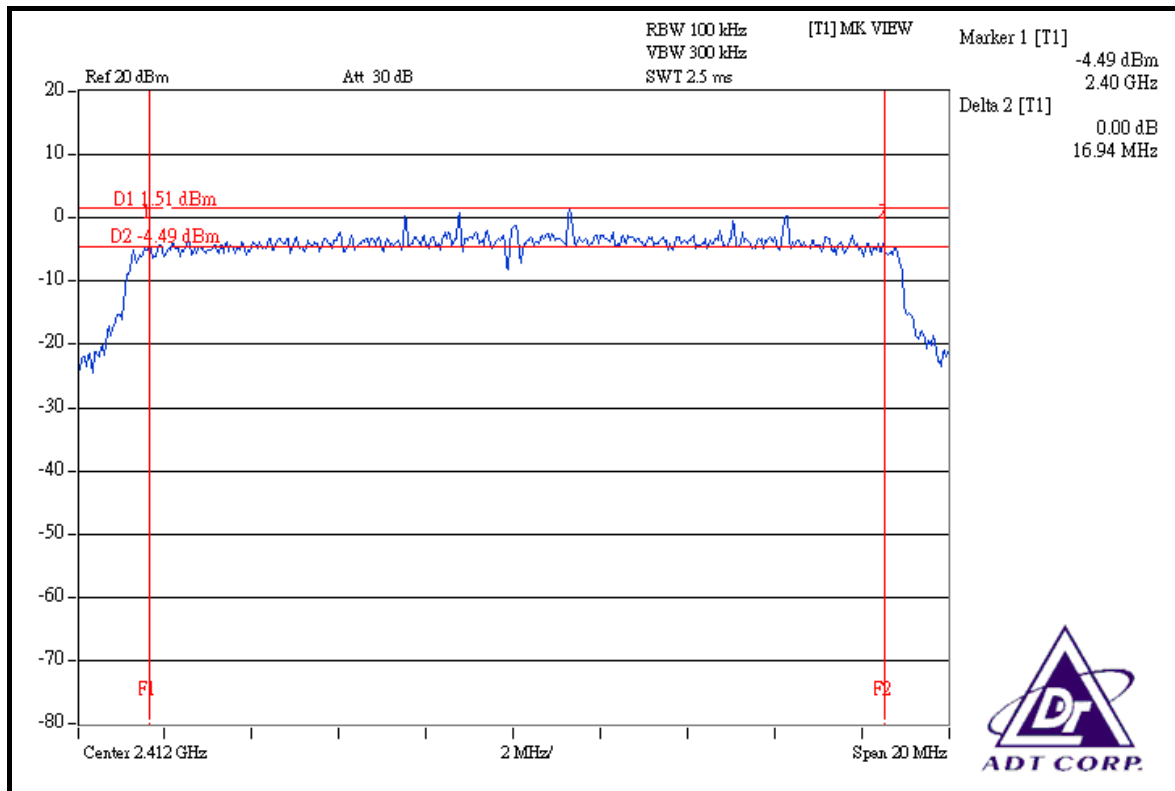
DRAFT 802.11n (20MHz) OFDM MODULATION

MODULATION TYPE	BPSK	TRANSFER RATE	7.2Mbps
INPUT POWER (SYSTEM)	120Vac, 60Hz	ENVIRONMENTAL CONDITIONS	25 deg.C, 65 %RH, 991hPa
TESTED BY	Brad Wu		

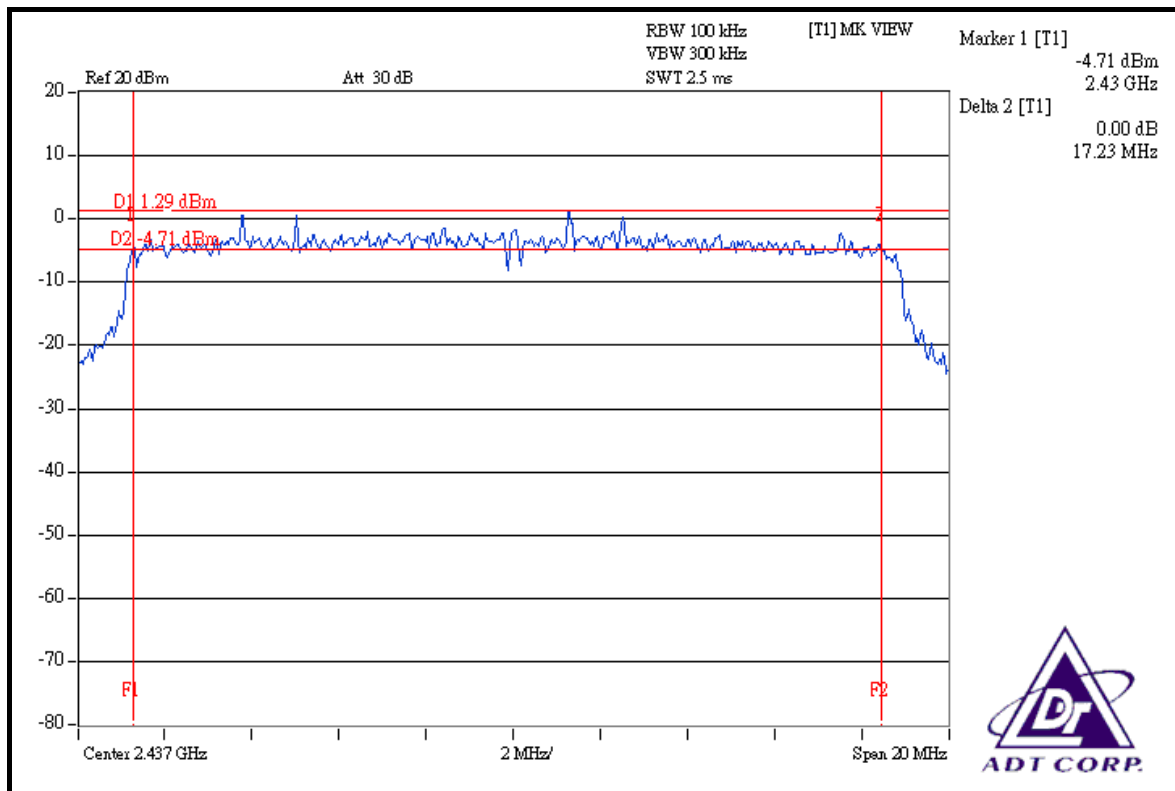
CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1		
1	2412	16.94	17.34	0.5	PASS
6	2437	17.23	17.35	0.5	PASS
11	2462	16.94	17.21	0.5	PASS



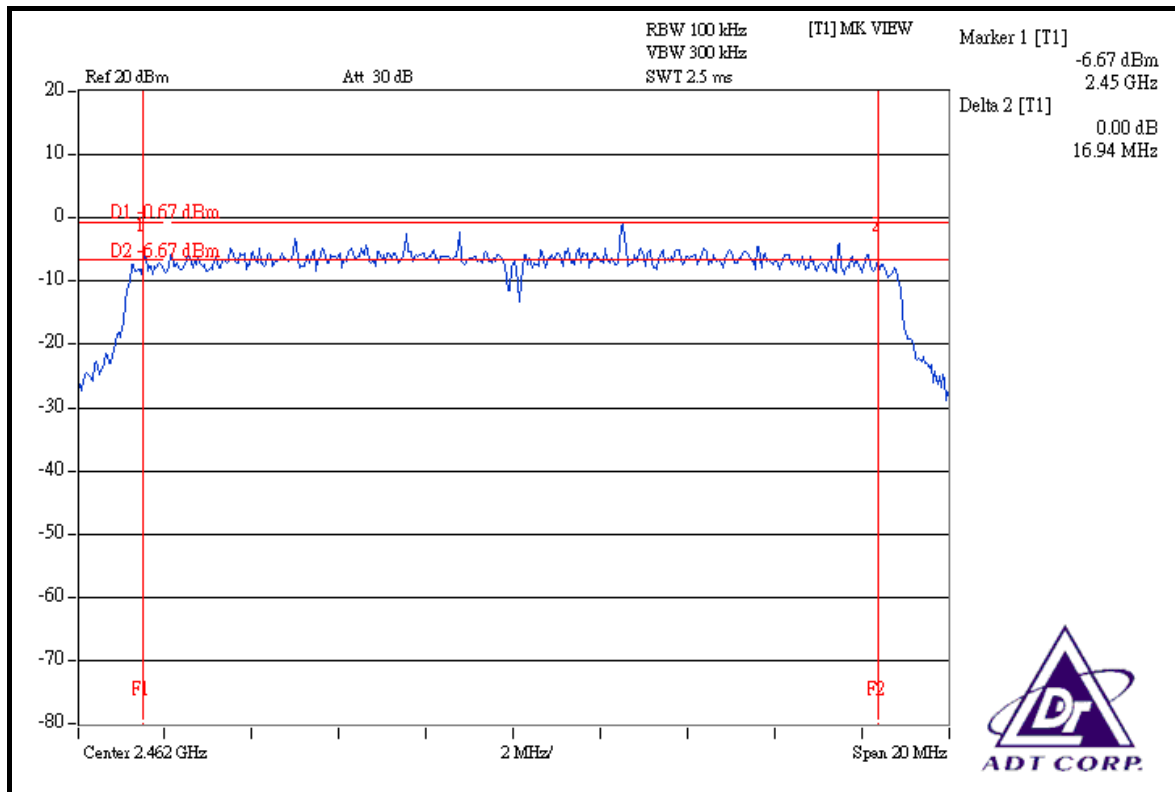
FOR CHAIN 0: CH 1



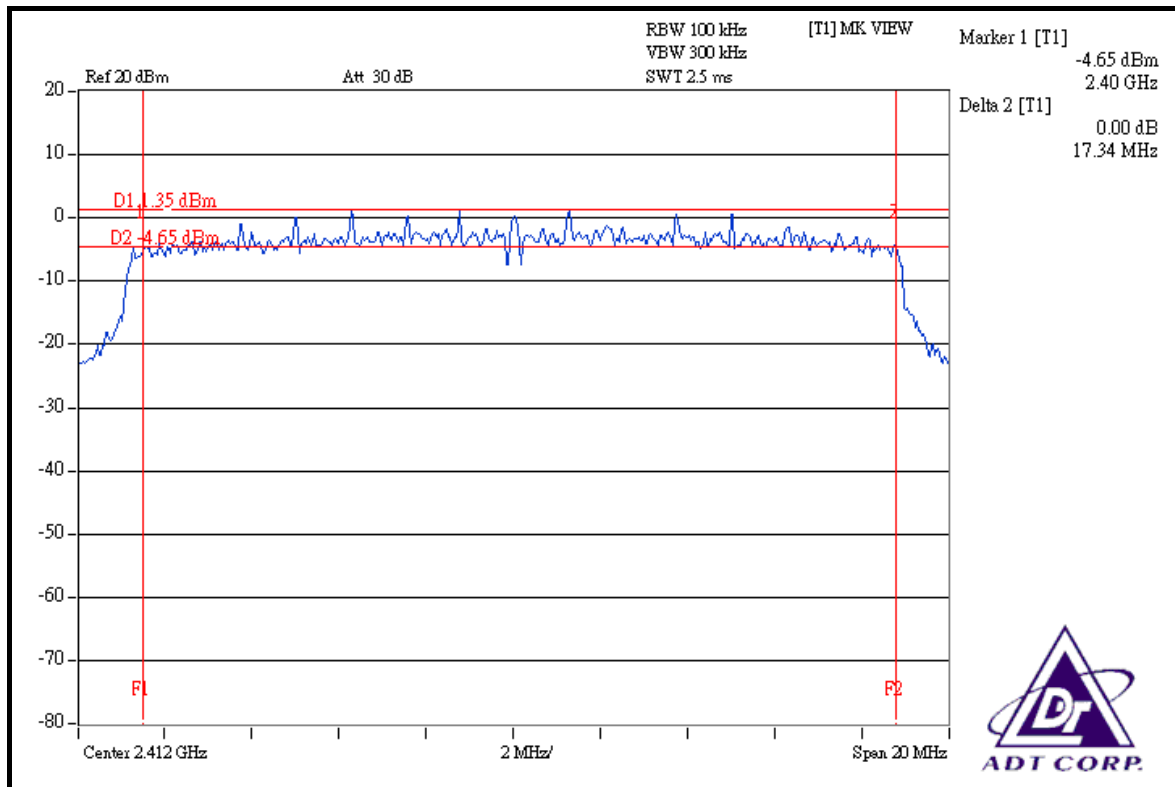
CH 6



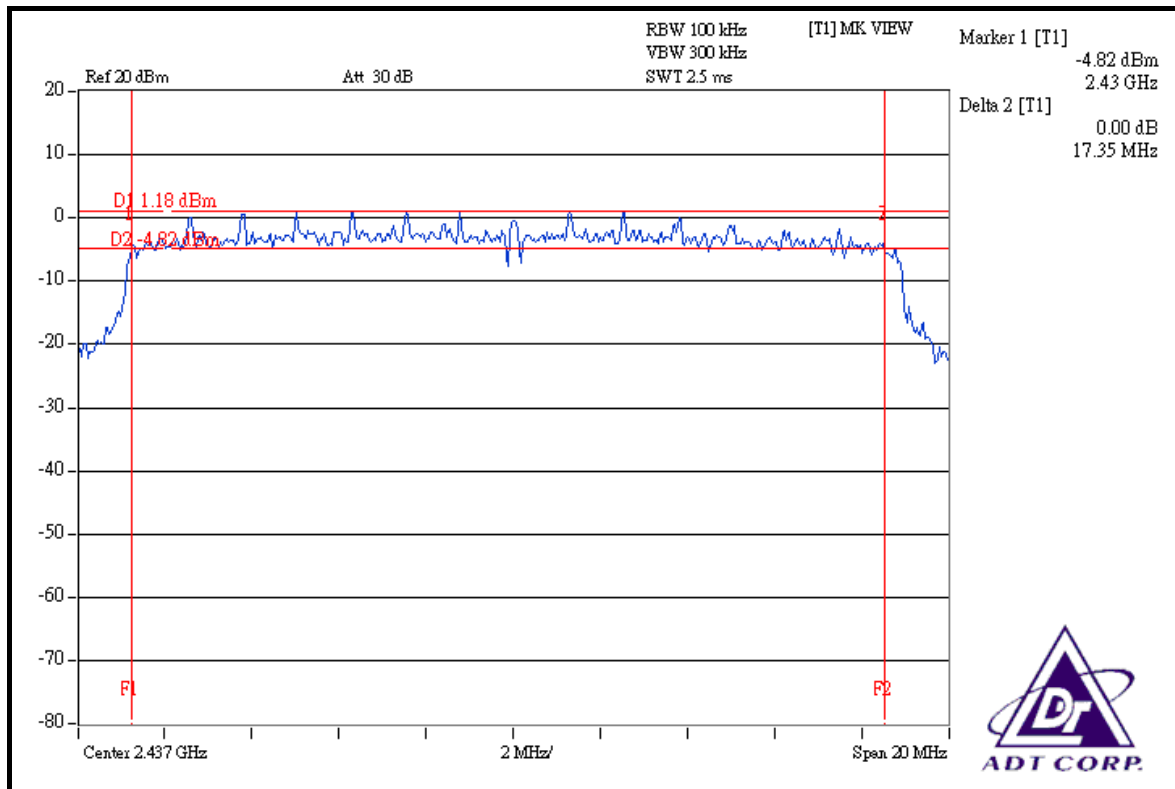
CH 11



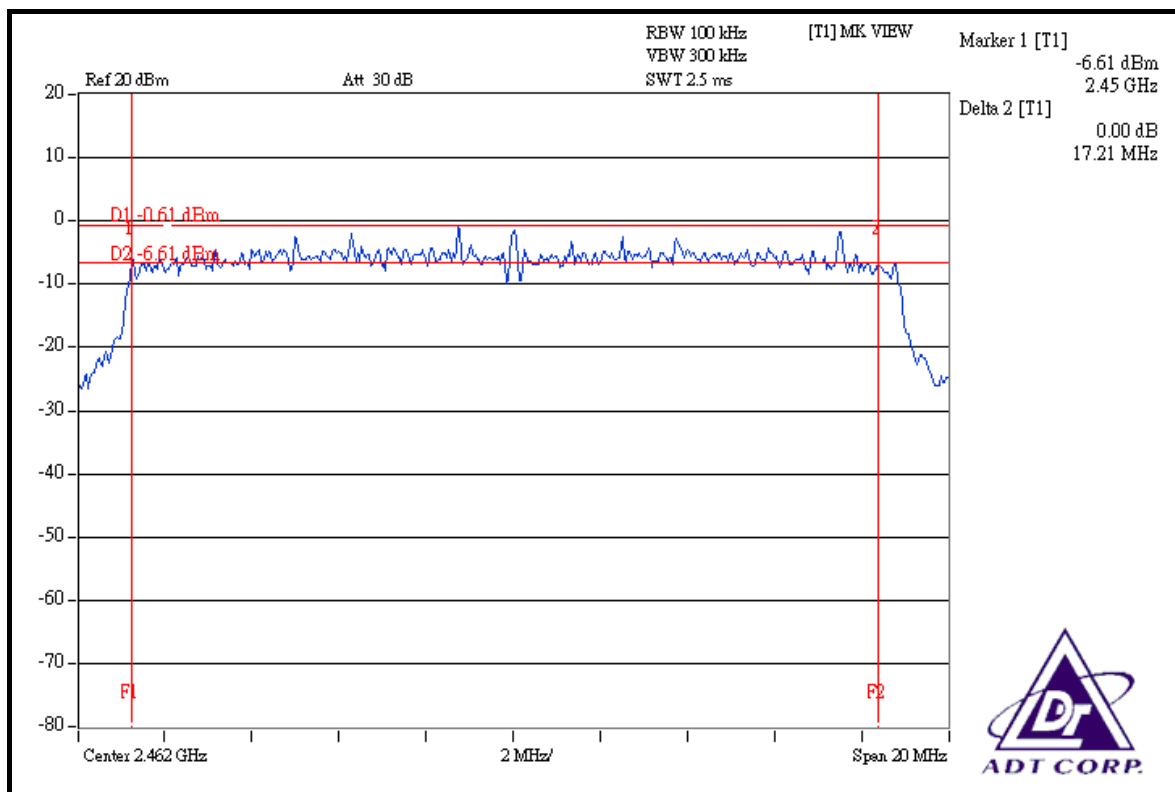
FOR CHAIN 1: CH 1



CH 6



CH 11





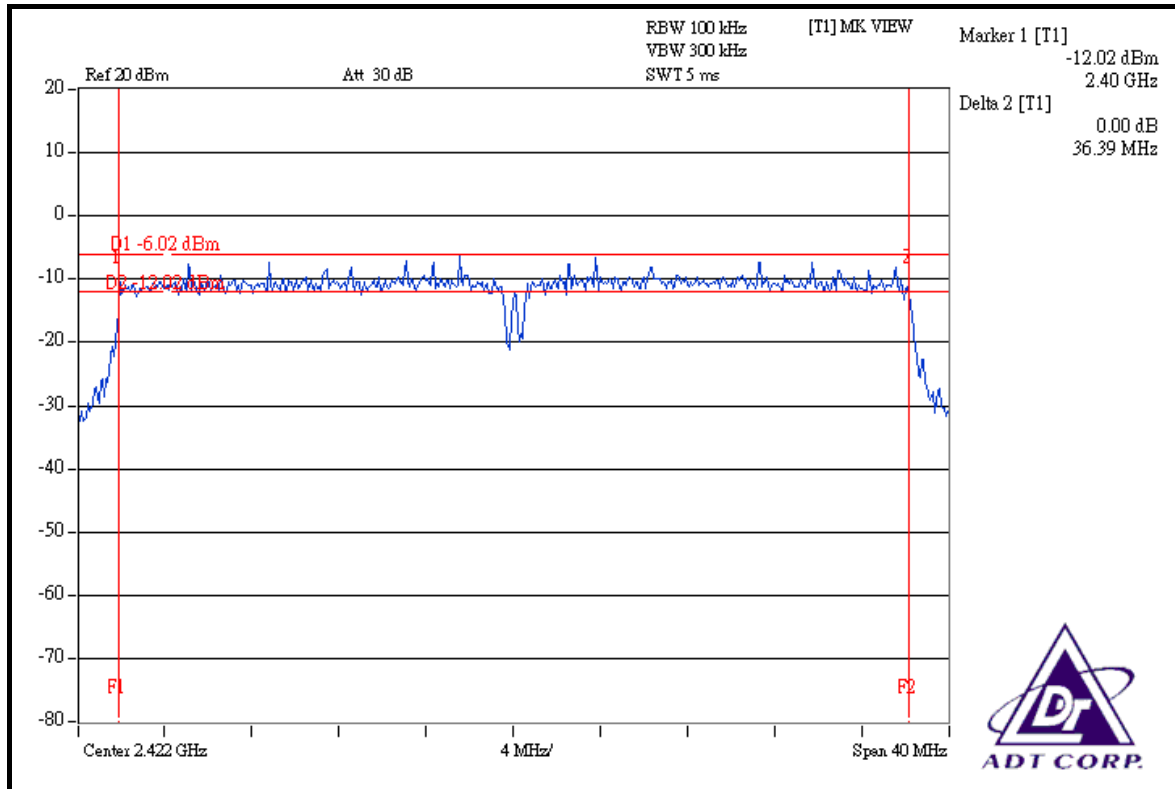
DRAFT 802.11n (40MHz) OFDM MODULATION

MODULATION TYPE	BPSK	TRANSFER RATE	15.0Mbps
INPUT POWER (SYSTEM)	120Vac, 60Hz	ENVIRONMENTAL CONDITIONS	25 deg.C, 65 %RH, 991hPa
TESTED BY	Brad Wu		

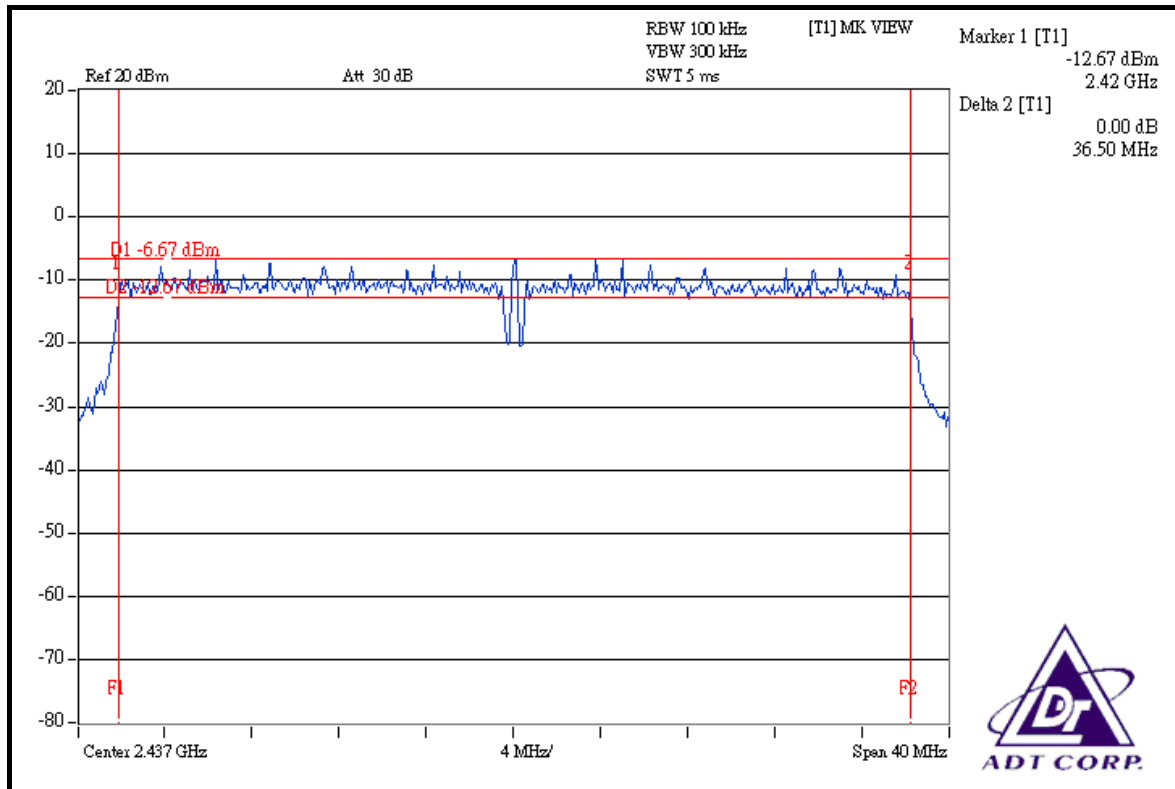
CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1		
1	2422	36.39	36.42	0.5	PASS
4	2437	36.50	35.84	0.5	PASS
7	2452	35.87	35.81	0.5	PASS



FOR CHAIN 0: CH 1

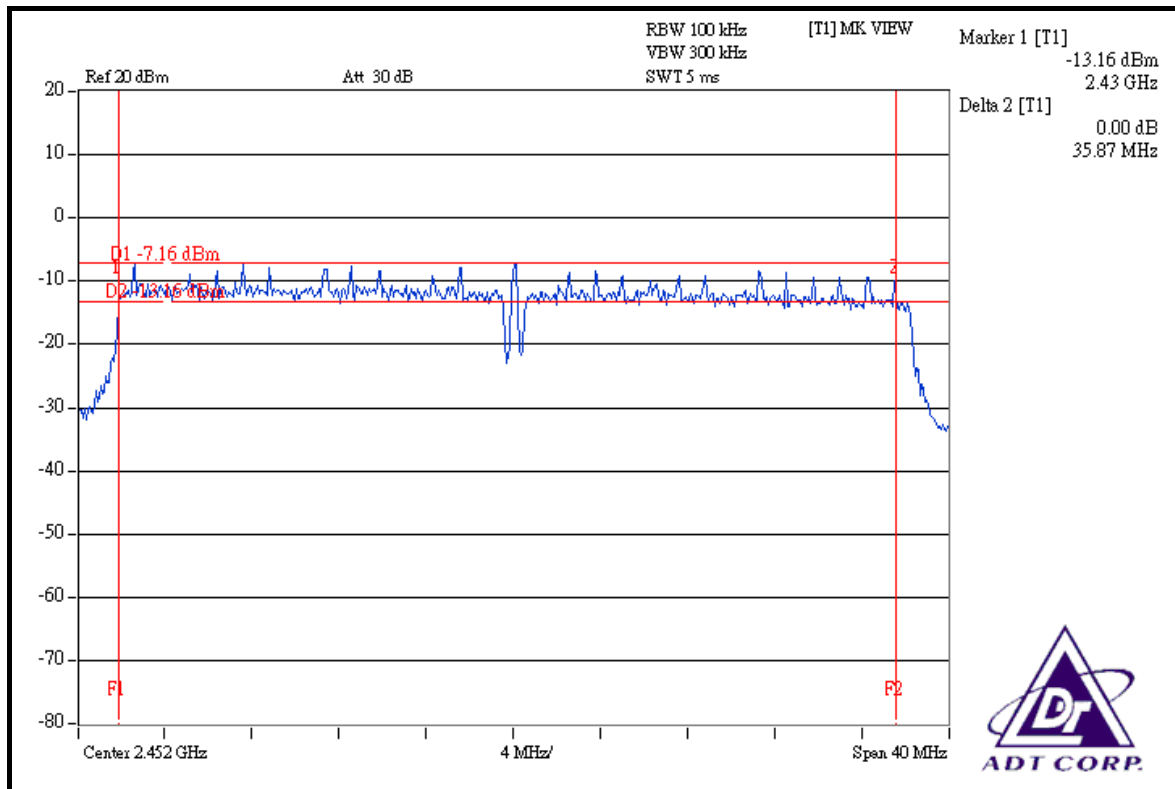


CH 4

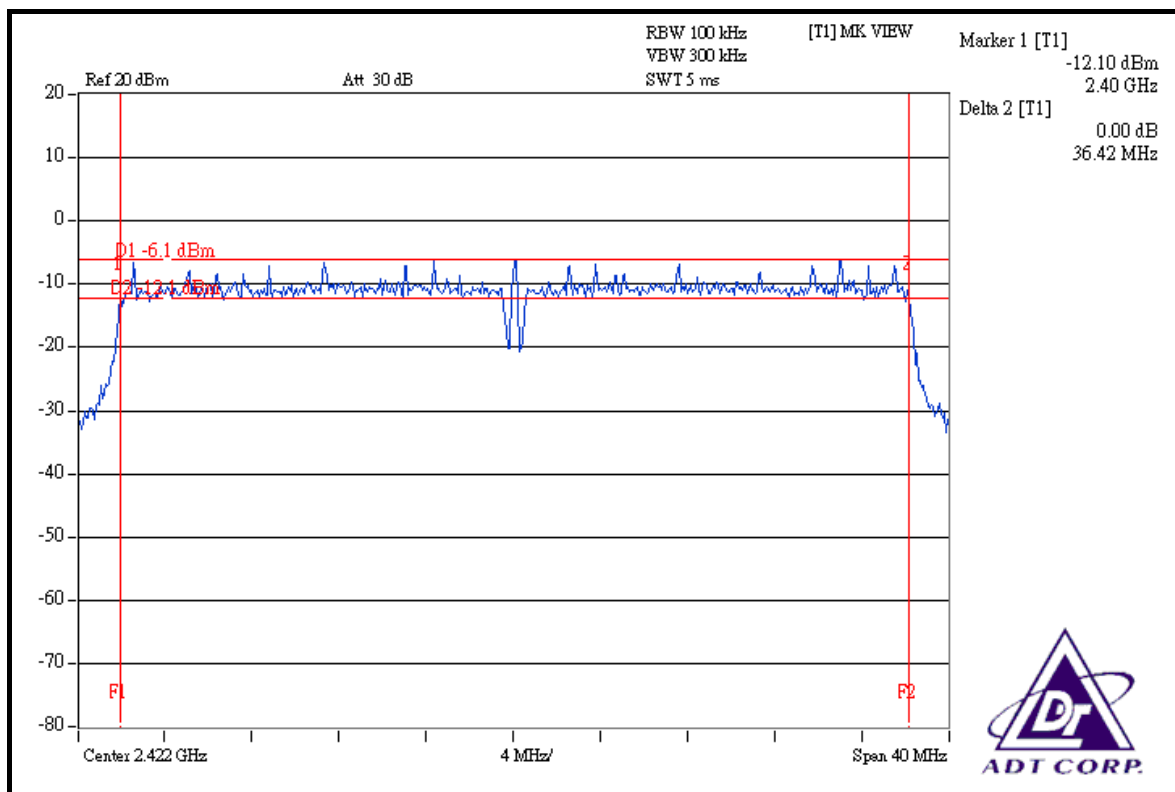




CH 7

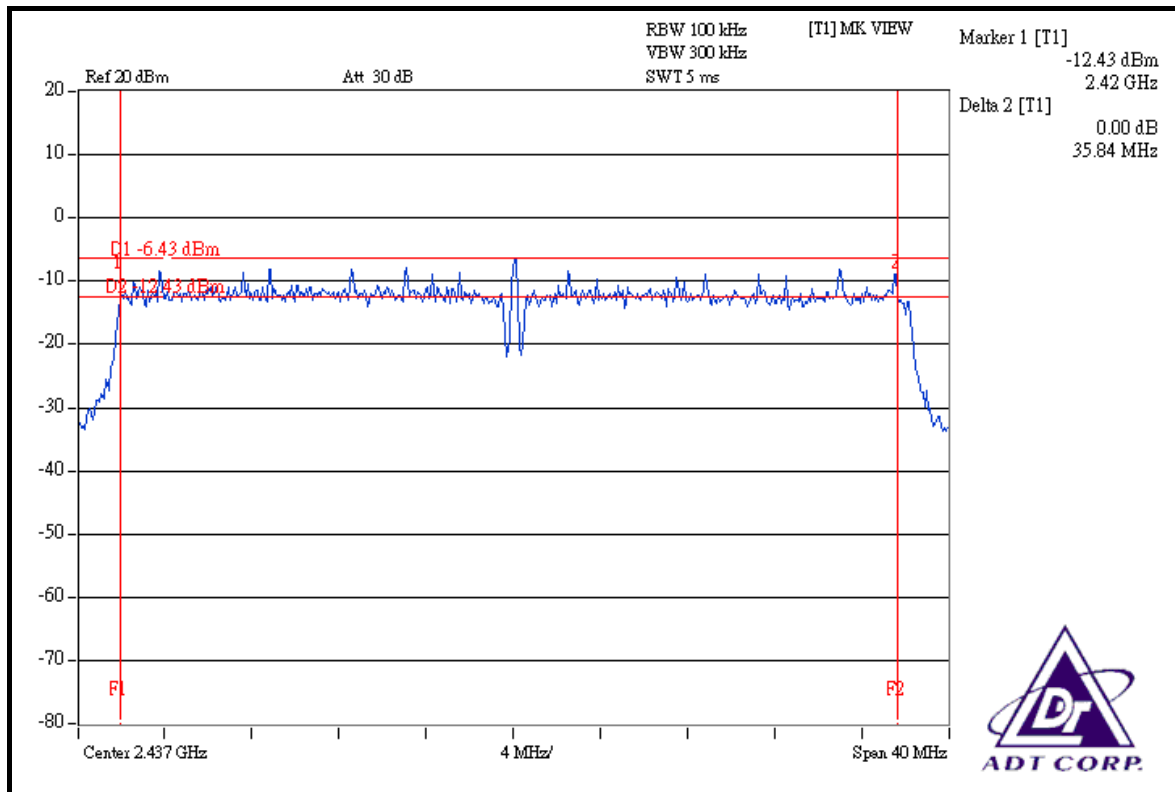


FOR CHAIN 1: CH 1

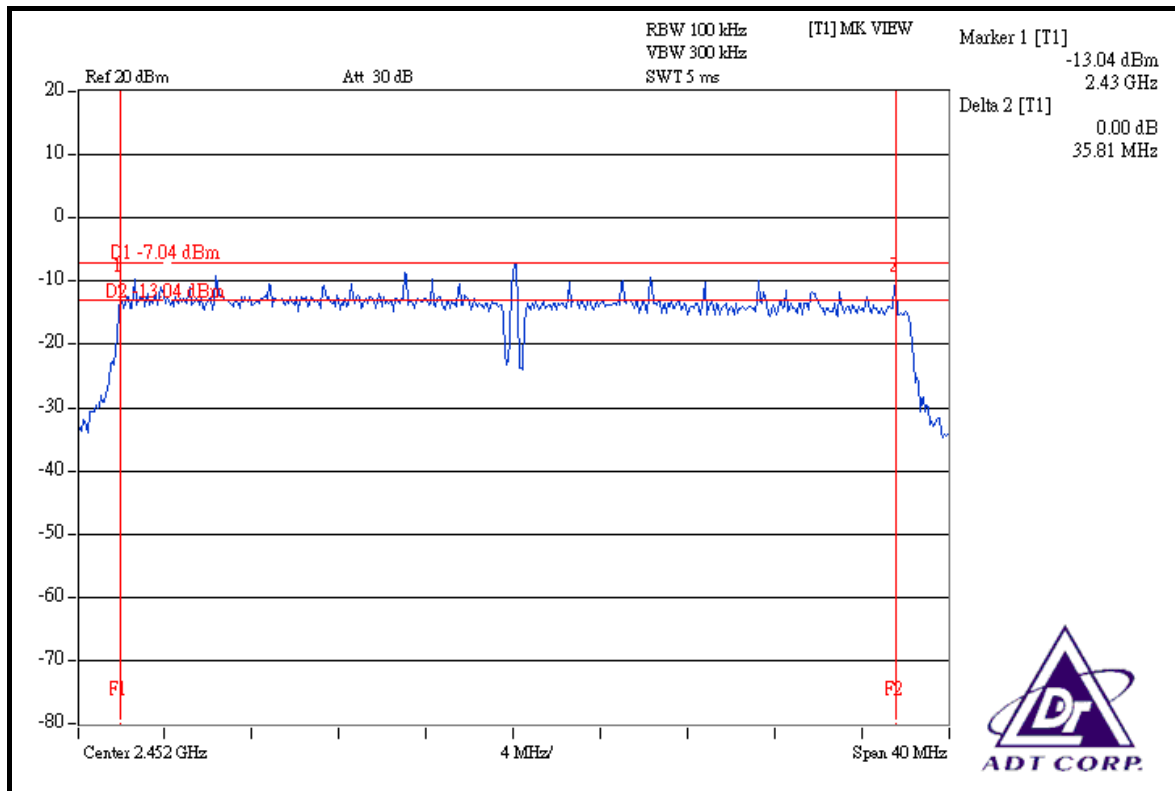




CH 4



CH 7





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
R&S SPECTRUM ANALYZER	FSP40	100040	Jun. 28, 2008
AGILENT SYNTHESIZED SIGNAL GENERATOR	E8257C	MY43320668	Dec. 25, 2008
DIGITAL RT OSCILLOSCOPE	TDS1012	C037299	Nov. 21, 2008
NARDA DETECTOR	4503A	FSCM99899	NA

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

- a. A detector was used on the output port of the EUT. An oscilloscope was used to read the response of the detector.
- b. Replaced the EUT by the signal generator. The center frequency of the S.G was adjusted to the center frequency of the measured channel.
- c. Adjusted the power to have the same reading on oscilloscope. Record the power level.

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

802.11b DSSS MODULATION

MODULATION TYPE	DBPSK	TRANSFER RATE	1.0Mbps
INPUT POWER (SYSTEM)	120Vac, 60Hz	ENVIRONMENTAL CONDITIONS	25 deg.C, 65 %RH, 991hPa
TESTED BY	Brad Wu		

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (dBm)	PASS / FAIL
1	2412	63.387	18.02	30	PASS
6	2437	63.387	18.02	30	PASS
11	2462	63.096	18.00	30	PASS

802.11g OFDM MODULATION

MODULATION TYPE	BPSK	TRANSFER RATE	6.0Mbps
INPUT POWER (SYSTEM)	120Vac, 60Hz	ENVIRONMENTAL CONDITIONS	25 deg.C, 65 %RH, 991hPa
TESTED BY	Brad Wu		

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (dBm)	PASS / FAIL
1	2412	50.582	17.04	30	PASS
6	2437	50.350	17.02	30	PASS
11	2462	50.699	17.05	30	PASS



DRAFT 802.11n (20MHz) OFDM MODULATION

MODULATION TYPE	BPSK	TRANSFER RATE	7.2Mbps
INPUT POWER (SYSTEM)	120Vac, 60Hz	ENVIRONMENTAL CONDITIONS	25 deg.C, 65 %RH, 991hPa
TESTED BY	Brad Wu		

CHAN.	CHAN. FREQ. (MHz)	PEAK POWER OUTPUT (dBm)		TOTAL PEAK POWER (mW)	TOTAL PEAK POWER (dBm)	PEAK POWER LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
1	2412	17.09	17.56	108.185	20.34	30	PASS
6	2437	17.04	17.53	107.206	20.30	30	PASS
11	2462	14.51	14.54	56.693	17.54	30	PASS

DRAFT 802.11n (40MHz) OFDM MODULATION

MODULATION TYPE	BPSK	TRANSFER RATE	15.0Mbps
INPUT POWER (SYSTEM)	120Vac, 60Hz	ENVIRONMENTAL CONDITIONS	25 deg.C, 65 %RH, 991hPa
TESTED BY	Brad Wu		

CHAN.	CHAN. FREQ. (MHz)	PEAK POWER OUTPUT (dBm)		TOTAL PEAK POWER (mW)	TOTAL PEAK POWER (dBm)	PEAK POWER LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
1	2422	13.09	13.54	42.965	16.33	30	PASS
4	2437	13.03	13.08	40.414	16.07	30	PASS
7	2452	12.00	12.56	33.879	15.30	30	PASS



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
R&S SPECTRUM ANALYZER	FSP40	100040	Jun. 28, 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

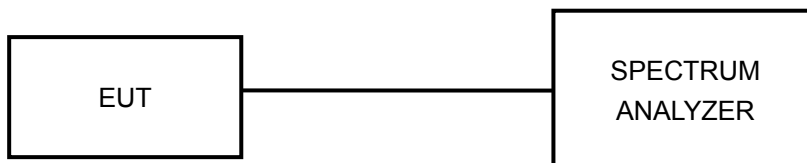
The transmitter output was connected to the spectrum analyzer through an attenuator, the bandwidth of the fundamental frequency was measured with the spectrum analyzer using 3kHz RBW and 30kHz VBW, set sweep time = span/3kHz. The power spectral density was measured and recorded.

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



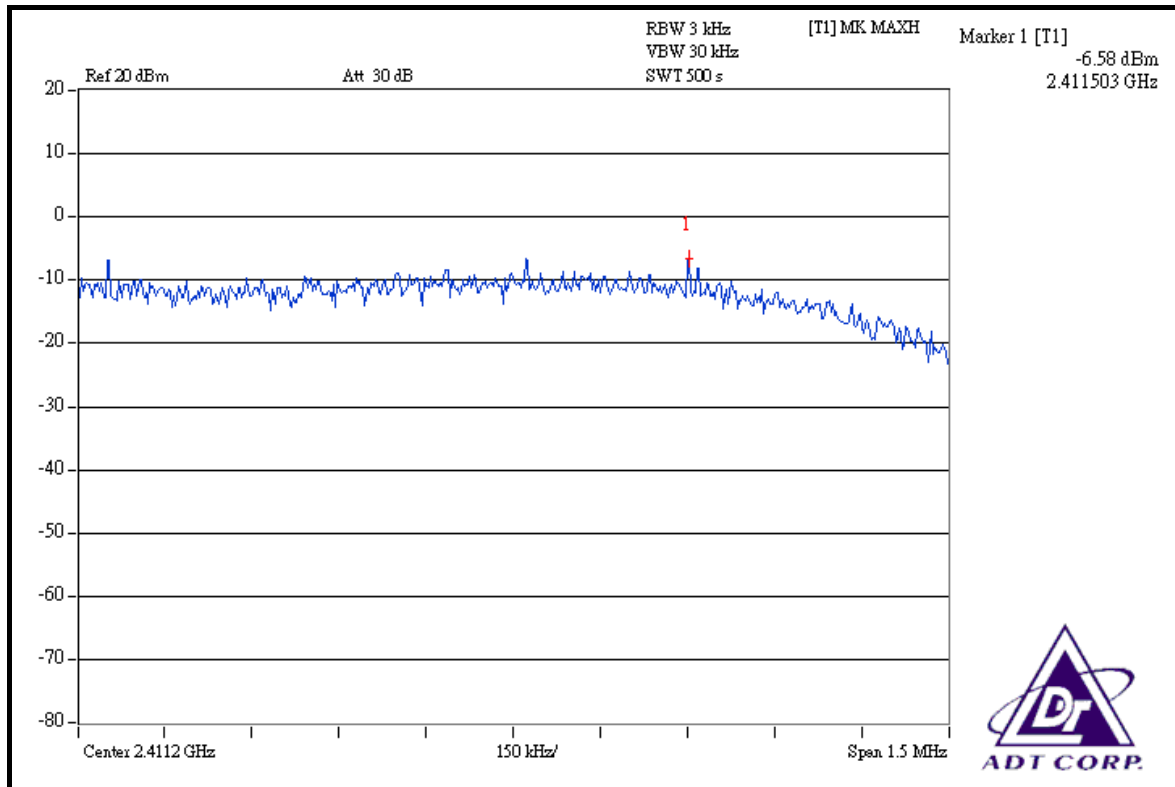
4.5.7 TEST RESULTS

802.11b DSSS MODULATION

MODULATION TYPE	DBPSK	TRANSFER RATE	1.0Mbps
INPUT POWER (SYSTEM)	120Vac, 60Hz	ENVIRONMENTAL CONDITIONS	25 deg.C, 65 %RH, 991hPa
TESTED BY	Brad Wu		

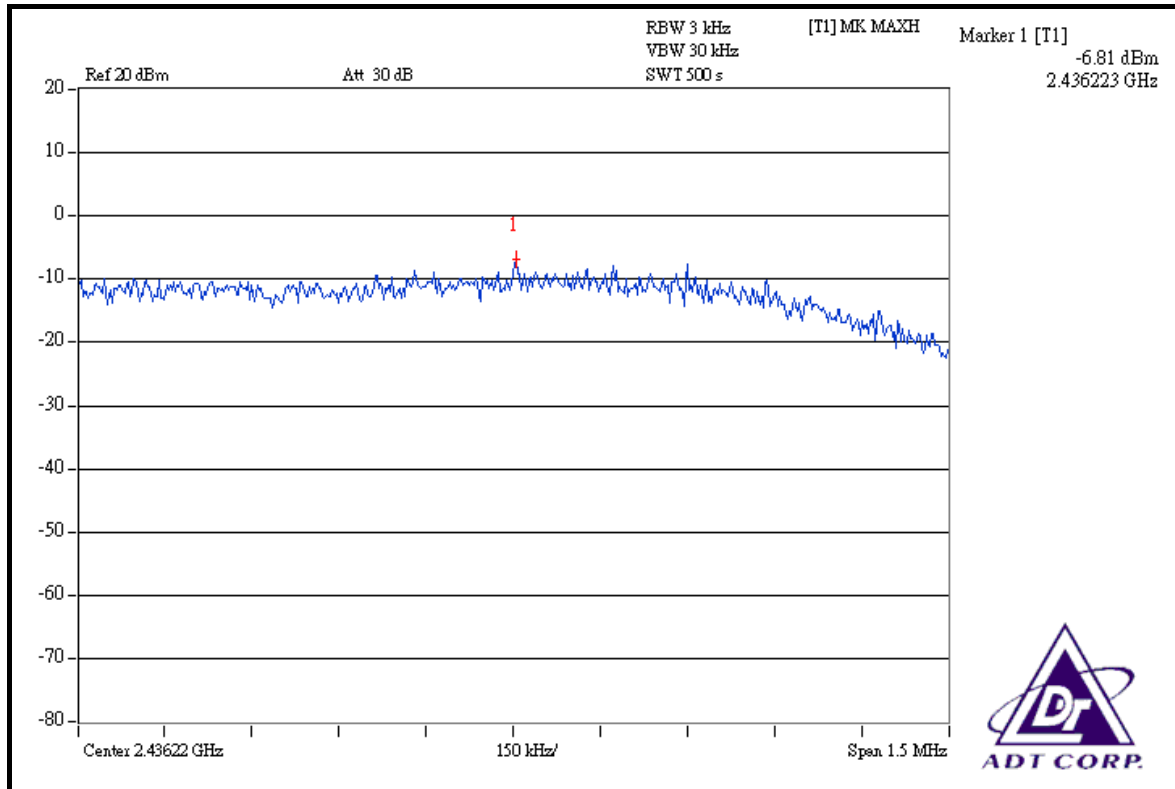
CHANNEL	CHANNEL FREQUENCY (MHz)	RF POWER LEVEL IN 3kHz BW (dBm)	MAXIMUM LIMIT (dBm)	PASS / FAIL
1	2412	-6.58	8	PASS
6	2437	-6.81	8	PASS
11	2462	-6.75	8	PASS

CH 1

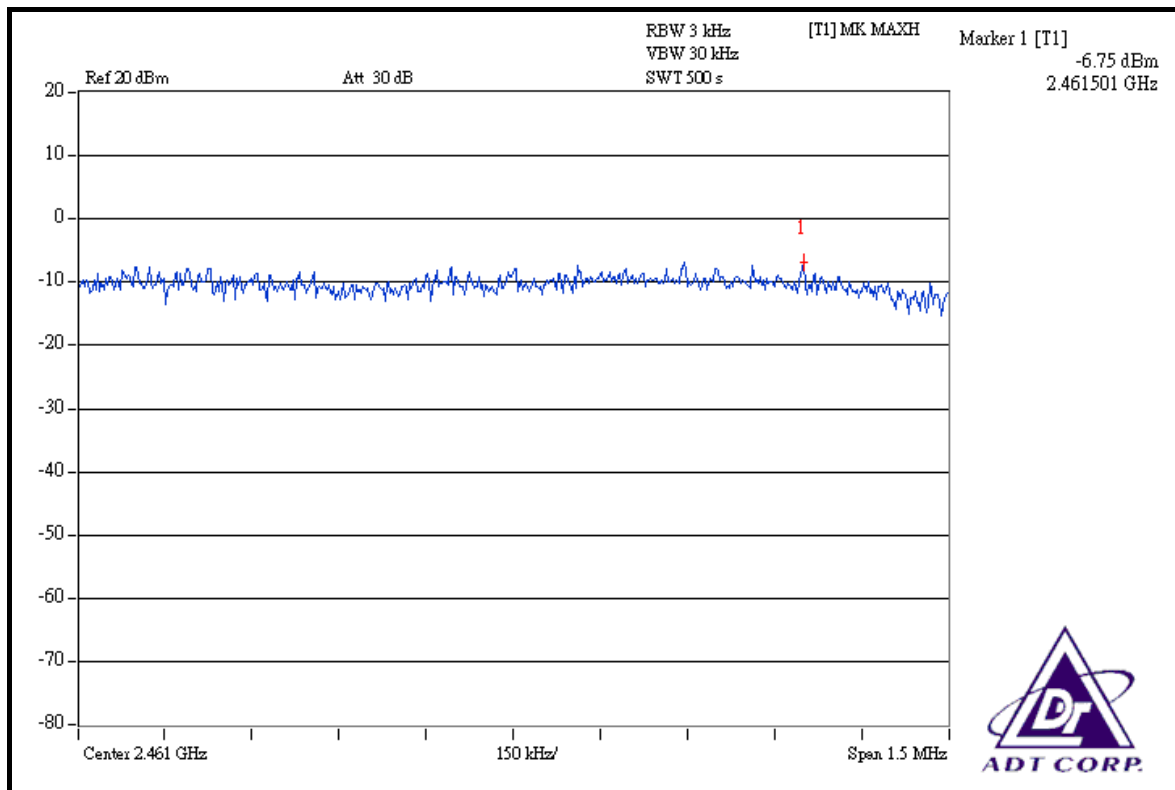




CH 6



CH 11



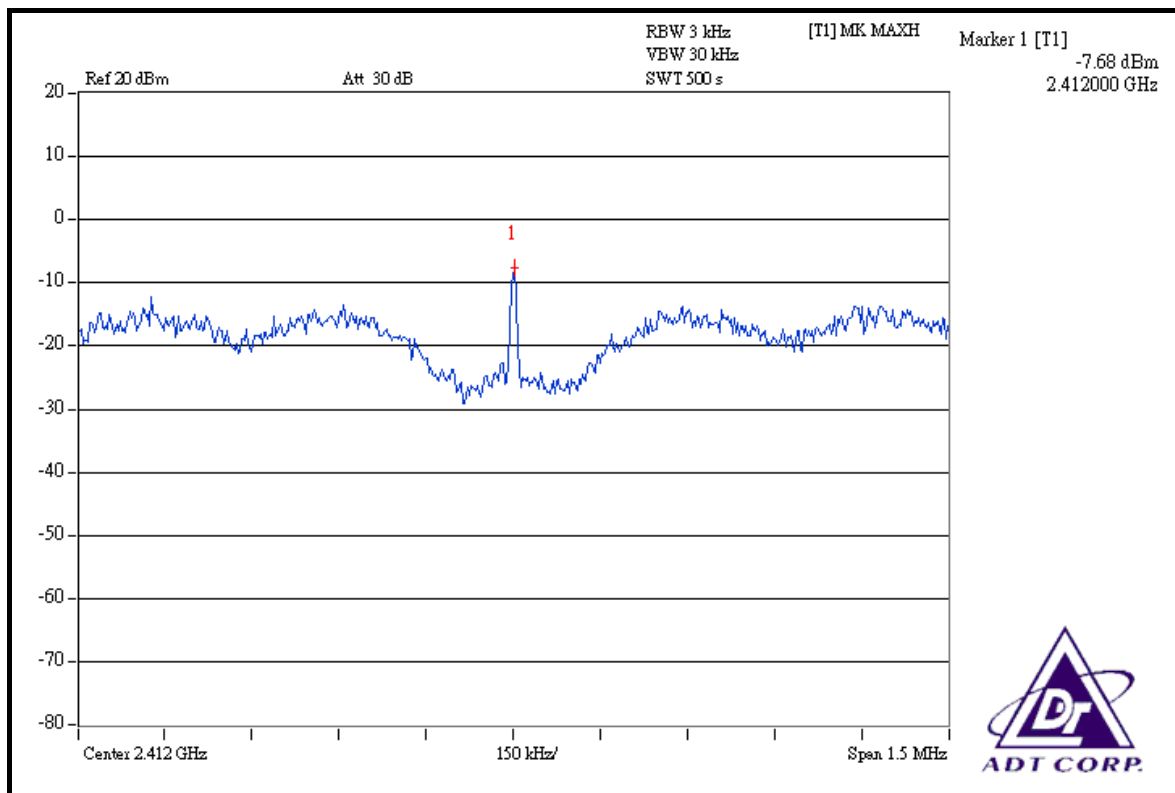


802.11g OFDM MODULATION

MODULATION TYPE	BPSK	TRANSFER RATE	6.0Mbps
INPUT POWER (SYSTEM)	120Vac, 60Hz	ENVIRONMENTAL CONDITIONS	25deg.C, 65%RH, 991hPa
TESTED BY	Long Chen		

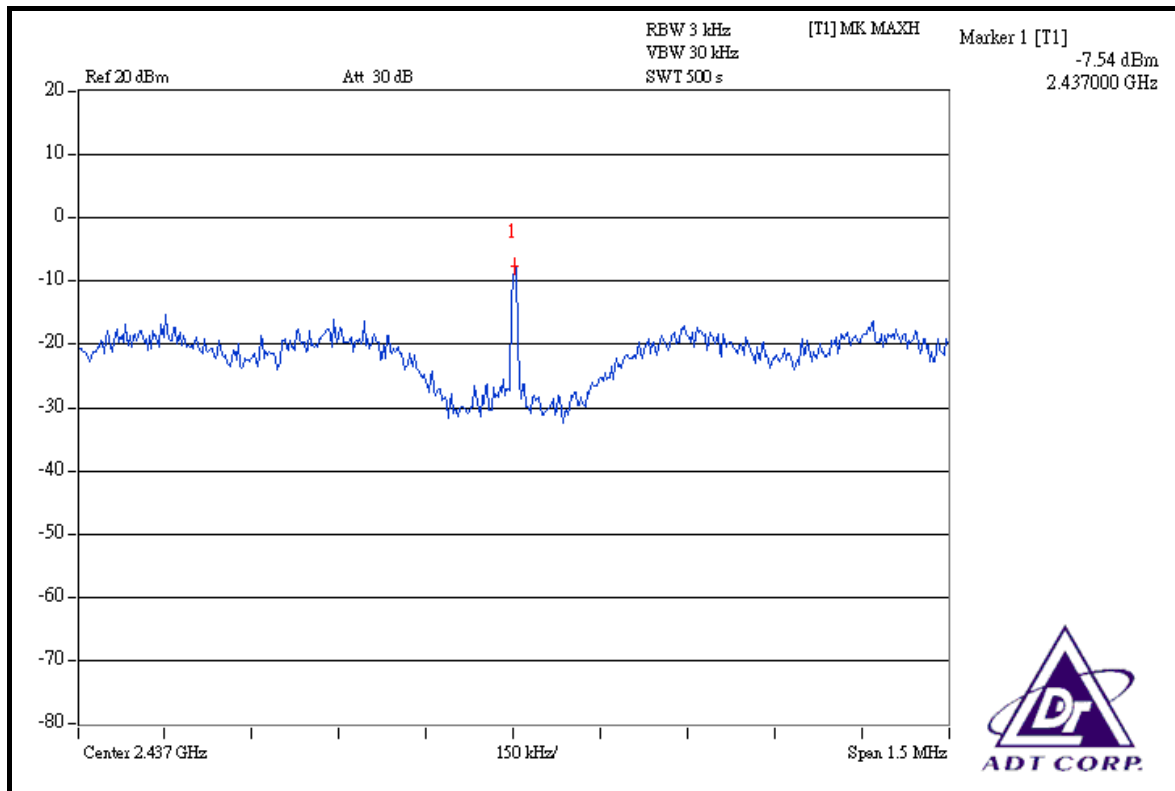
CHANNEL	CHANNEL FREQUENCY (MHz)	RF POWER LEVEL IN 3kHz BW (dBm)	MAXIMUM LIMIT (dBm)	PASS / FAIL
1	2412	-7.68	8	PASS
6	2437	-7.54	8	PASS
11	2462	-7.62	8	PASS

CH 1

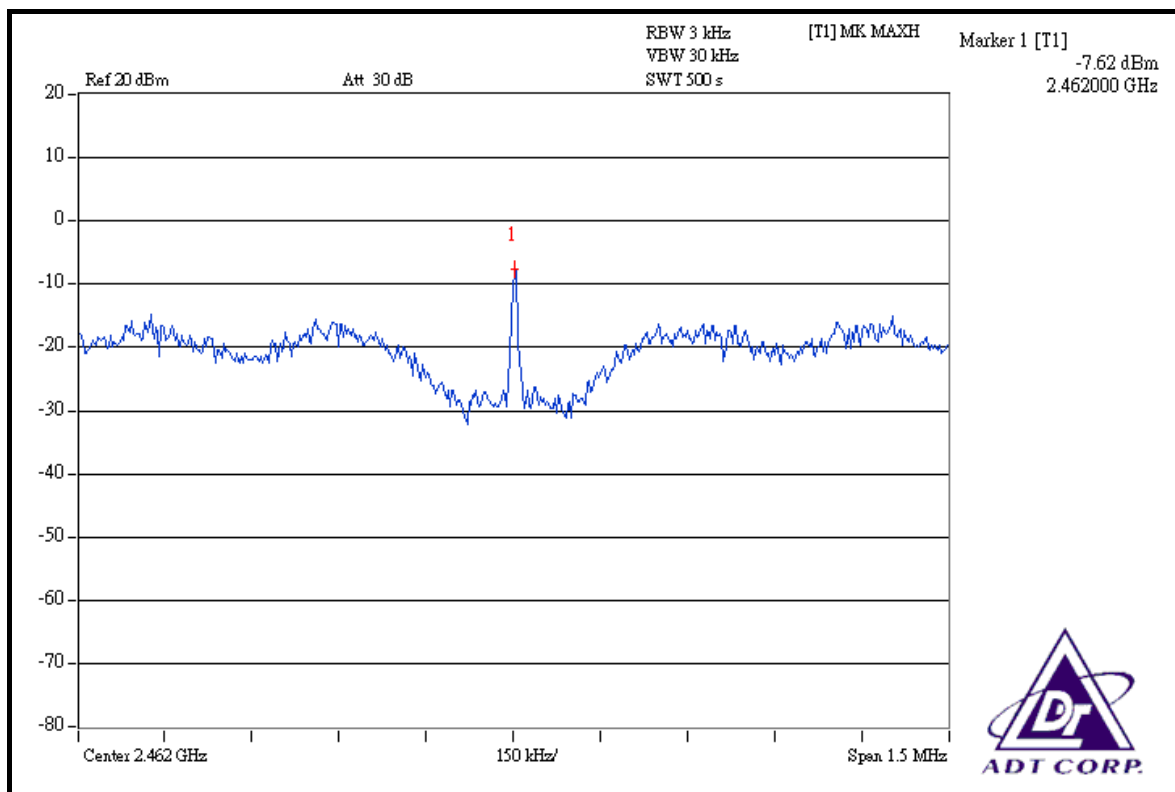




CH 6



CH 11





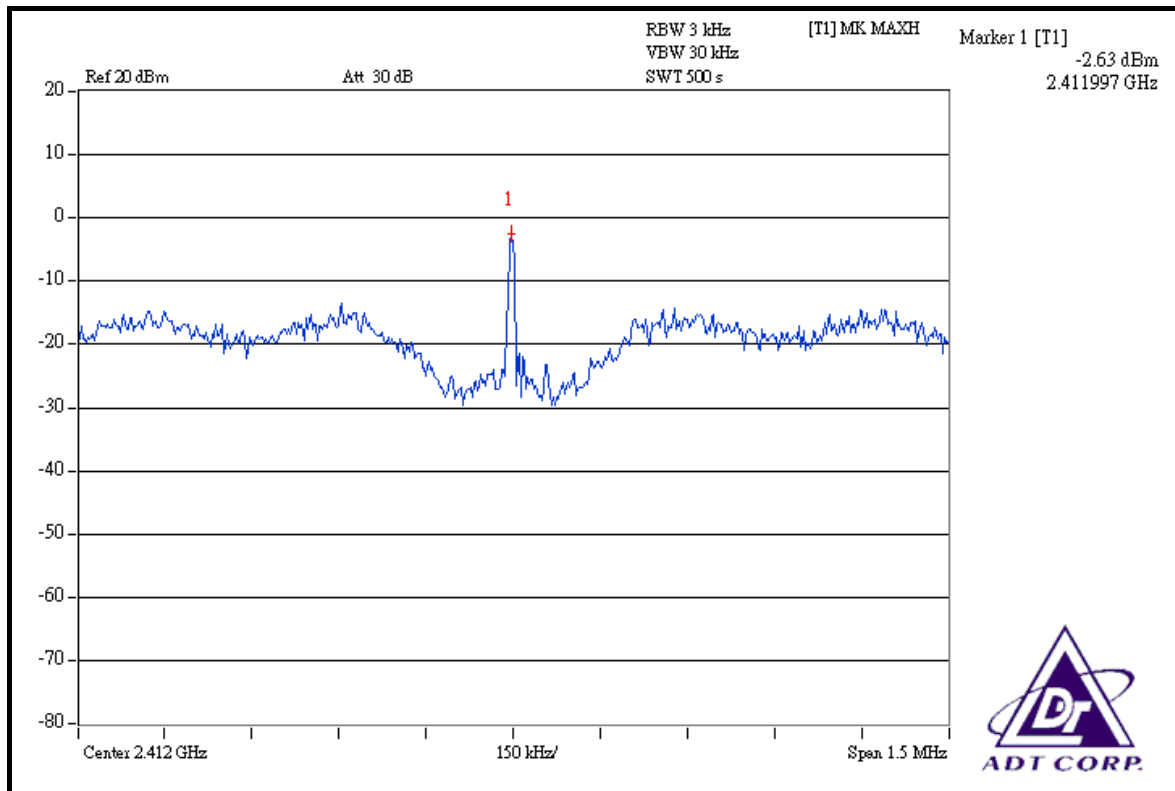
DRAFT 802.11n (20MHz) OFDM MODULATION

MODULATION TYPE	BPSK	TRANSFER RATE	7.2Mbps
INPUT POWER (SYSTEM)	120Vac, 60Hz	ENVIRONMENTAL CONDITIONS	25 deg.C, 65 %RH, 991hPa
TESTED BY	Brad Wu		

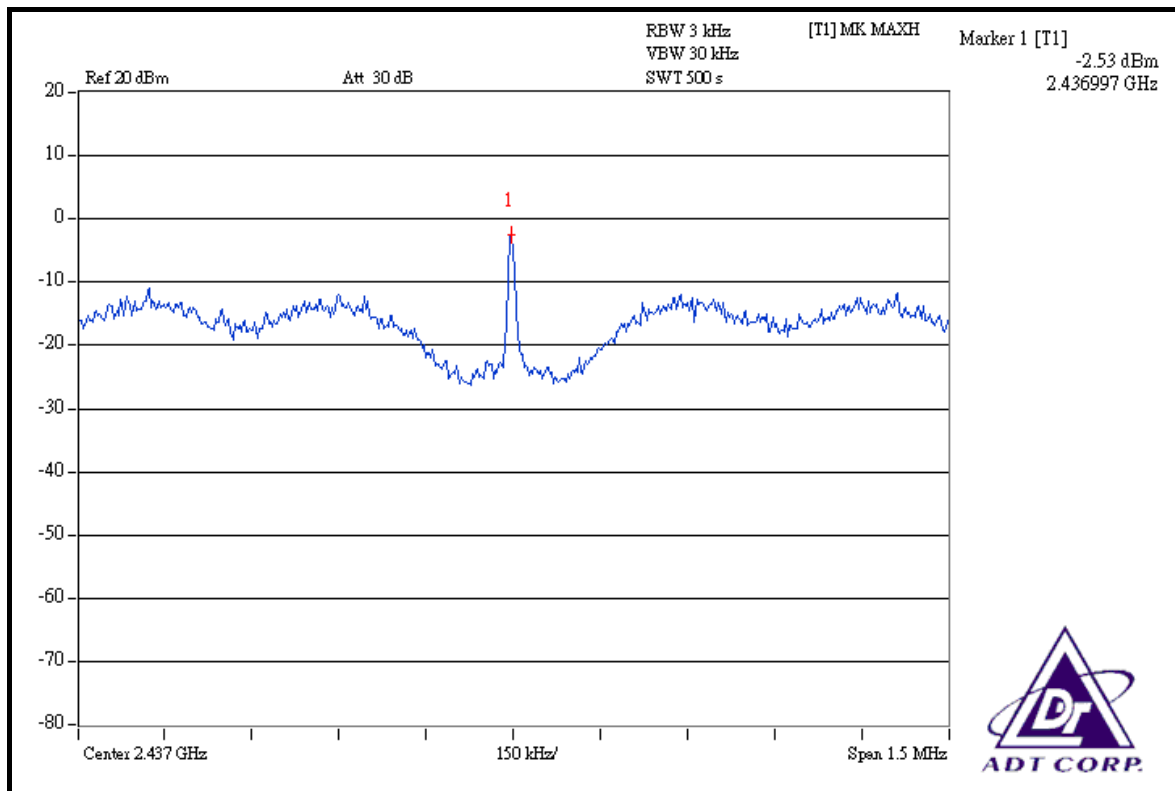
CHAN.	CHAN. FREQ. (MHz)	RF POWER LEVEL IN 3kHz BW (dBm)		TOTAL POWER DENSITY (mW)	TOTAL POWER DENSITY (dBm)	MAX. LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
1	2412	-2.63	-1.32	1.284	1.08	8	PASS
6	2437	-2.53	-1.48	1.270	1.04	8	PASS
11	2462	-5.09	-4.53	0.662	-1.79	8	PASS



FOR CHAIN 0: CH 1

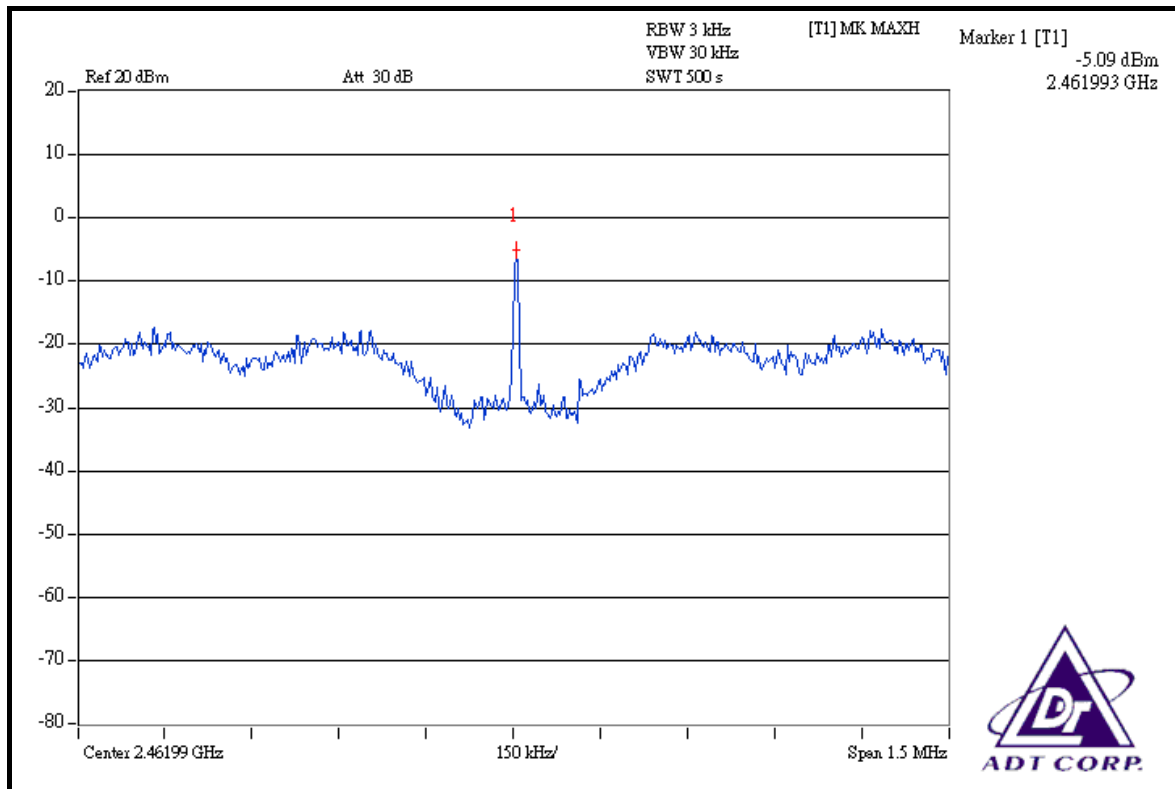


CH 6

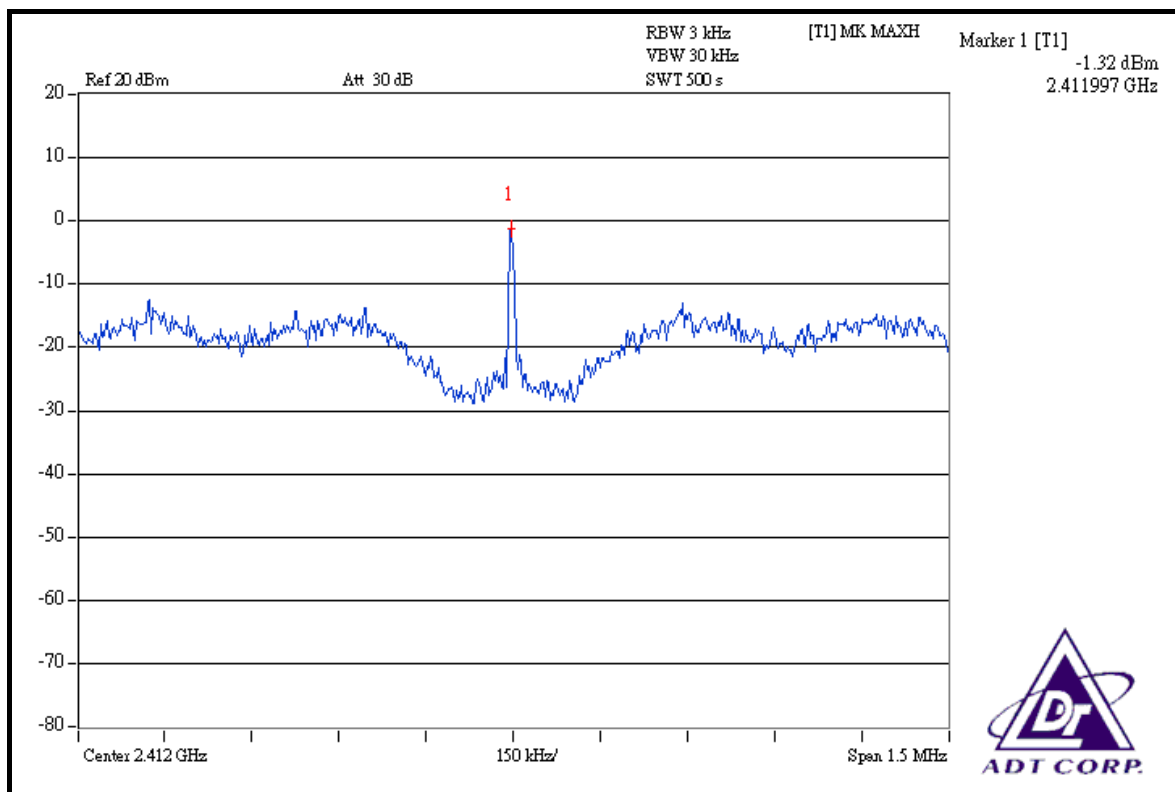




CH 11

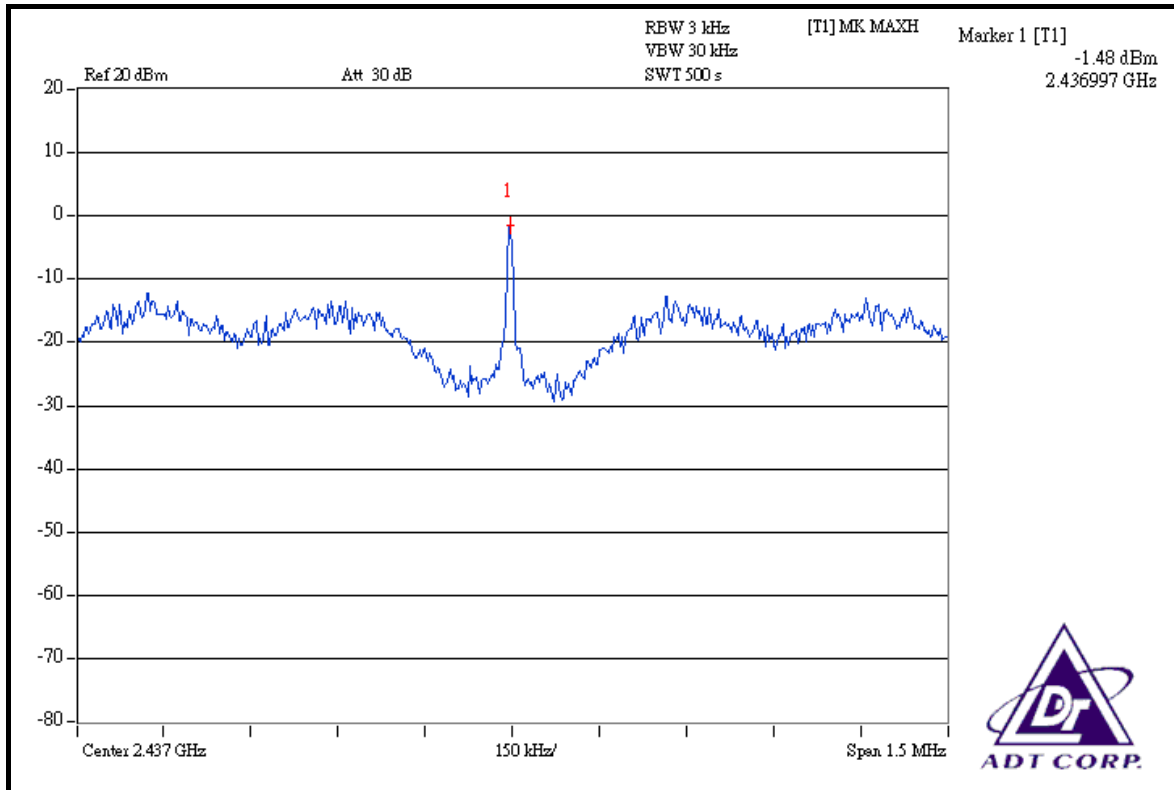


FOR CHAIN 1: CH 1

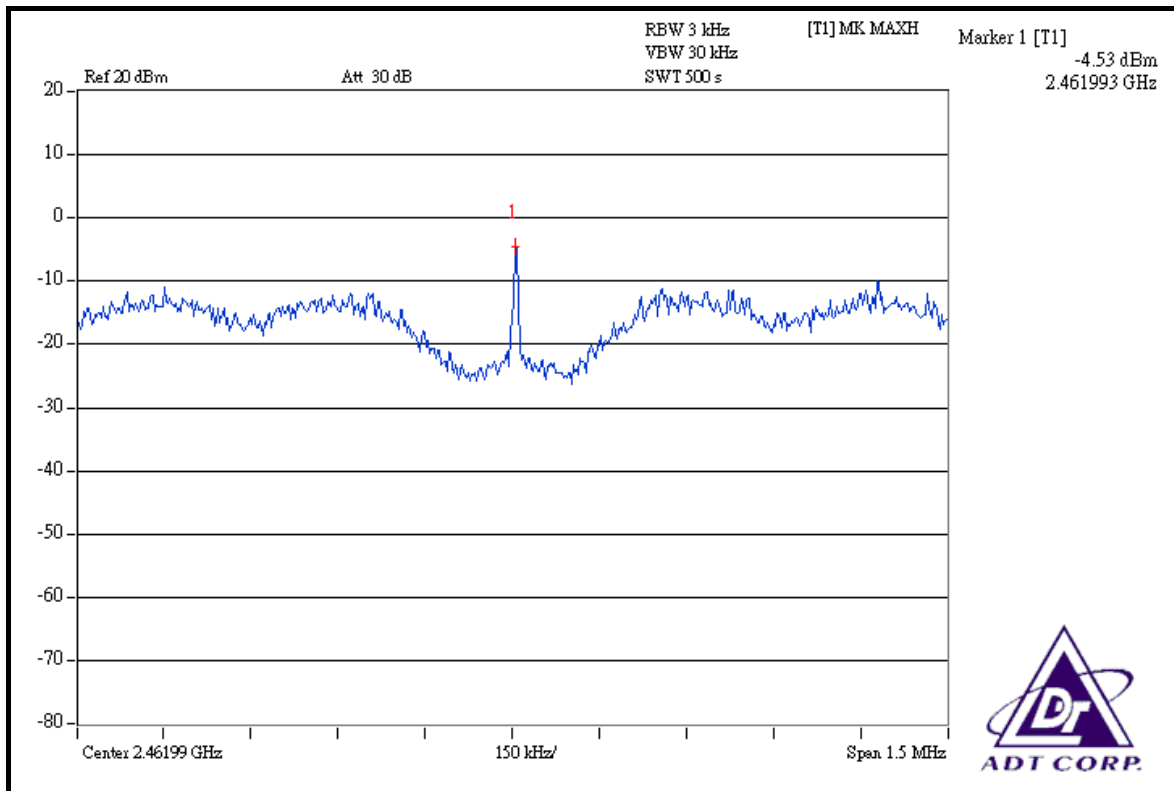




CH 6



CH 11





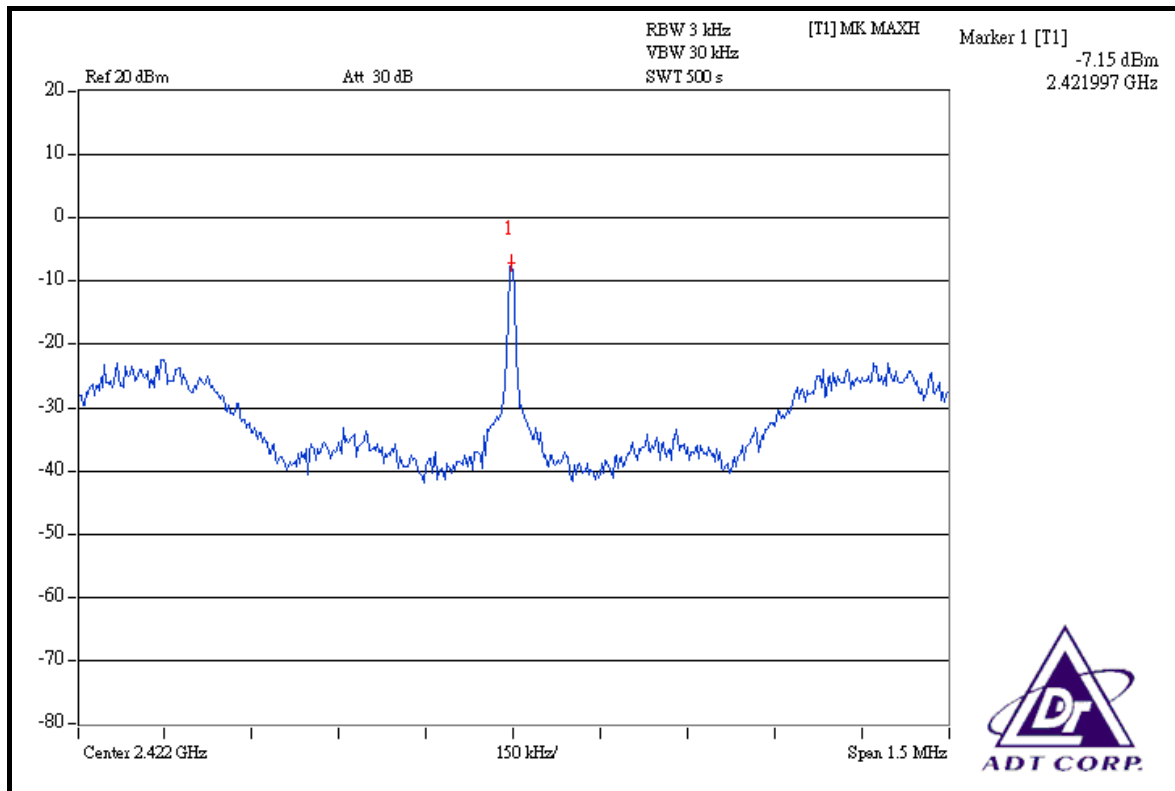
DRAFT 802.11n (40MHz) OFDM MODULATION

MODULATION TYPE	BPSK	TRANSFER RATE	15.0Mbps
INPUT POWER (SYSTEM)	120Vac, 60Hz	ENVIRONMENTAL CONDITIONS	25 deg.C, 65 %RH, 991hPa
TESTED BY	Brad Wu		

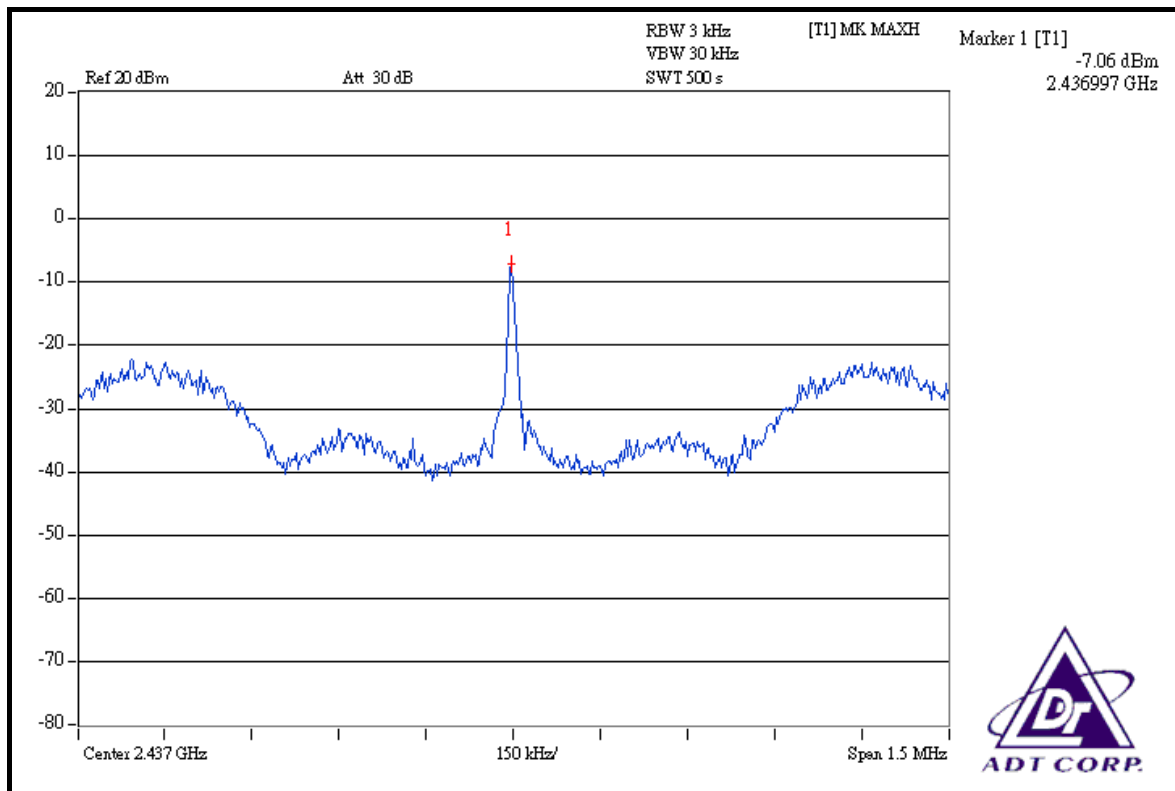
CHAN.	CHAN. FREQ. (MHz)	RF POWER LEVEL IN 3kHz BW (dBm)		TOTAL POWER DENSITY (mW)	TOTAL POWER DENSITY (dBm)	MAX. LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
1	2422	-7.15	-7.13	0.386	-4.13	8	PASS
4	2437	-7.06	-7.48	0.375	-4.25	8	PASS
7	2452	-8.13	-8.09	0.309	-5.10	8	PASS



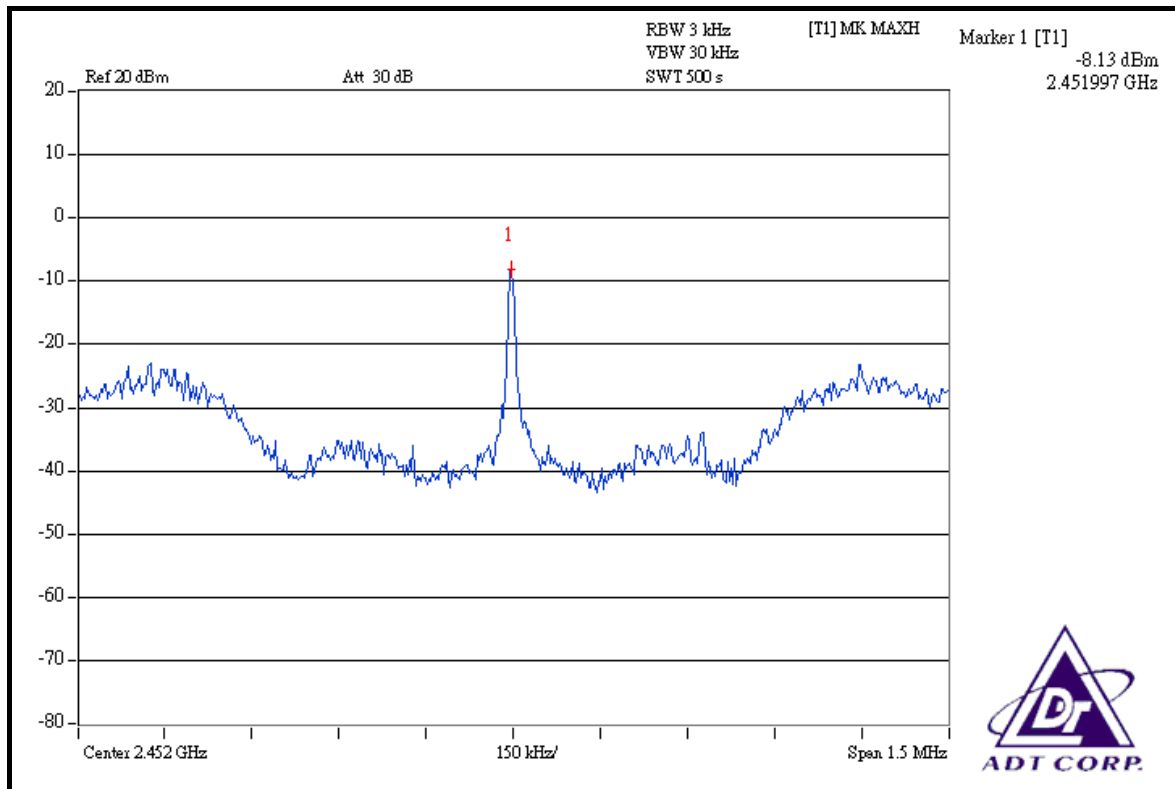
FOR CHAIN 0: CH 1



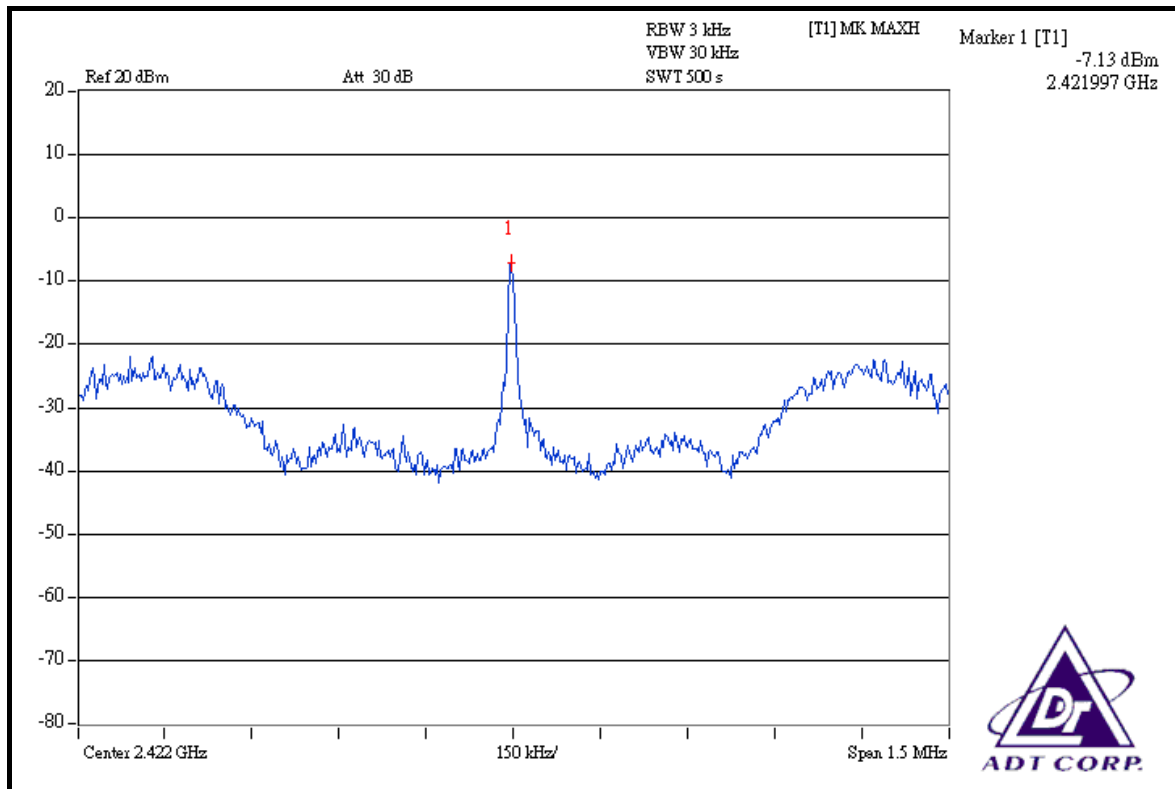
CH 4



CH 7

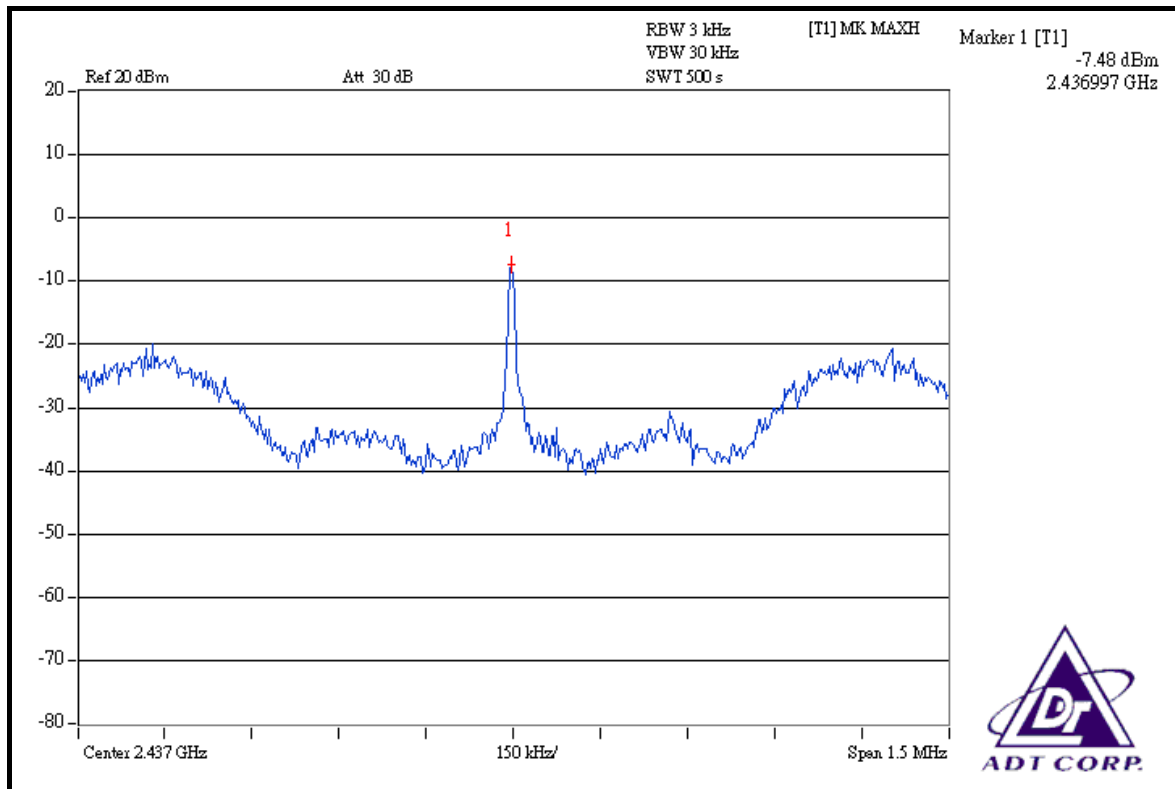


FOR CHAIN 1: CH 1

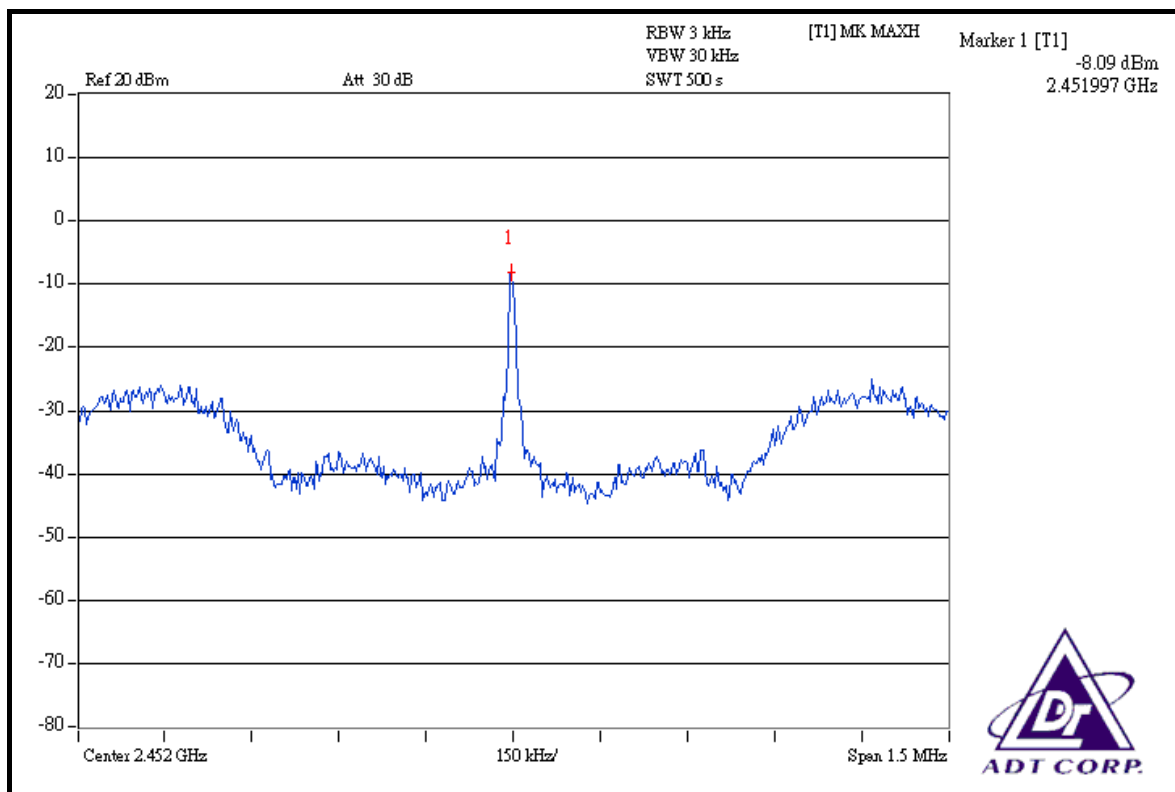




CH 4



CH 7





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
FOR CONDUCTED MEASUREMENT:			
R&S SPECTRUM ANALYZER	FSP40	100040	Jun. 28, 2008
FOR RADIATED MEASUREMENT:			
Test Receiver ROHDE & SCHWARZ	ESI7	838496/016	Dec. 25, 2008
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100039	Dec. 02, 2008
BILOG Antenna SCHWARZBECK	VULB9168	9168-155	Jan. 03, 2009
HORN Antenna SCHWARZBECK	BBHA 9120D	9120D-405	Dec. 17, 2008
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170242	Jan. 06, 2009
Preamplifier Agilent	8449B	3008A01910	Sep. 19, 2008
Preamplifier Agilent	8447D	2944A10634	Dec. 12, 2008
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	274397/4	Nov. 07, 2008
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	283401/4	Nov. 07, 2008
Software ADT.	ADT_Radiated_V7.6	NA	NA
Antenna Tower inn-co GmbH	MA 4000	010303	NA
Turn Table ADT.	TT100.	TT93021704	NA
Turn Table Controller ADT.	SC100.	SC93021704	NA

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

FOR CONDUCTED MEASUREMENT:

The transmitter output was connected to the spectrum analyzer via a low loss cable. 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.

The spectrum plots (Peak RBW = 100kHz, VBW = 300kHz) are attached on the following pages.

FOR RADIATED MEASUREMENT:

- a. 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.
- 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. 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.

The spectrum plots (Peak RBW = 100kHz, VBW = 300kHz) are attached on the following pages.

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.

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 pages. 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).

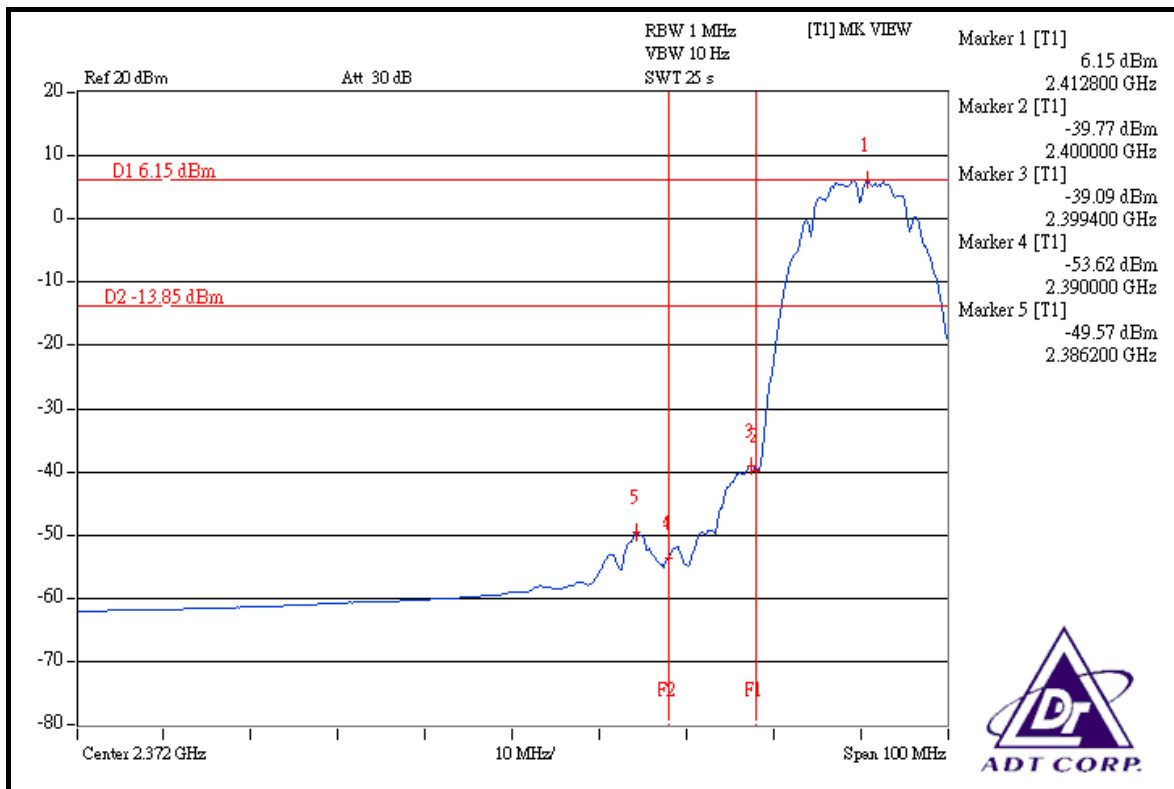
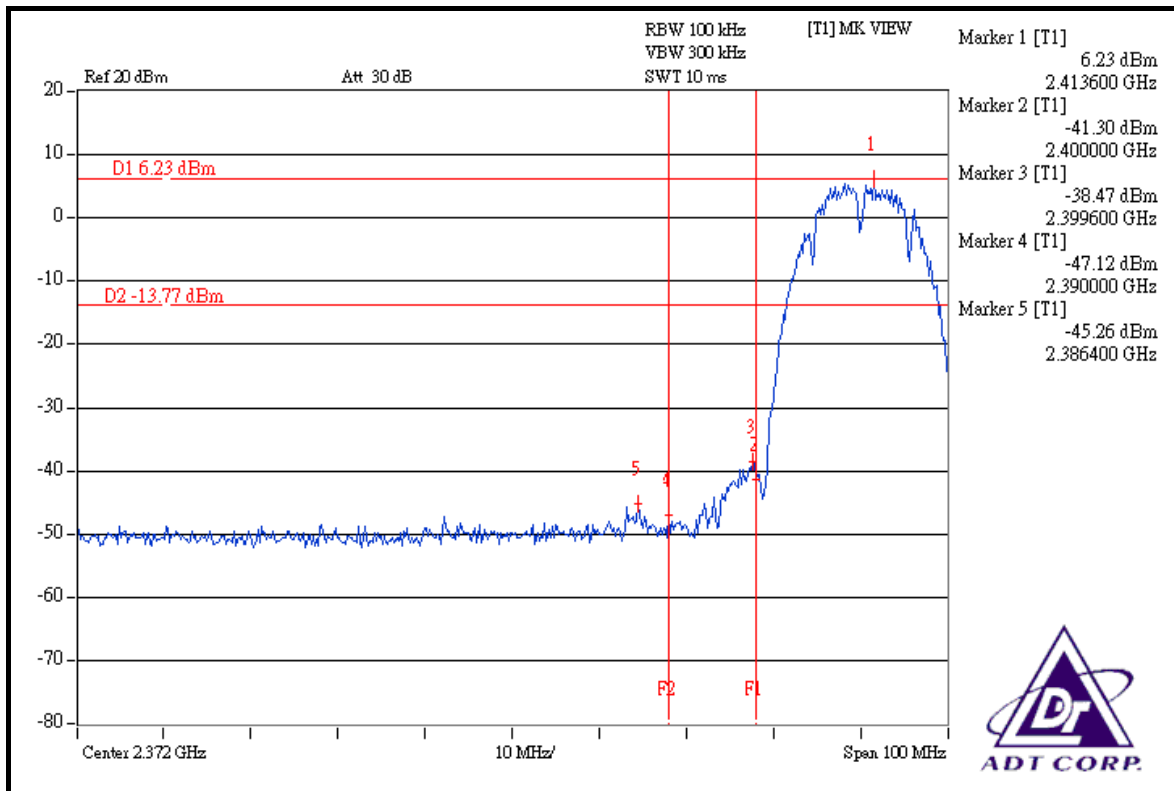
802.11b DSSS MODULATION

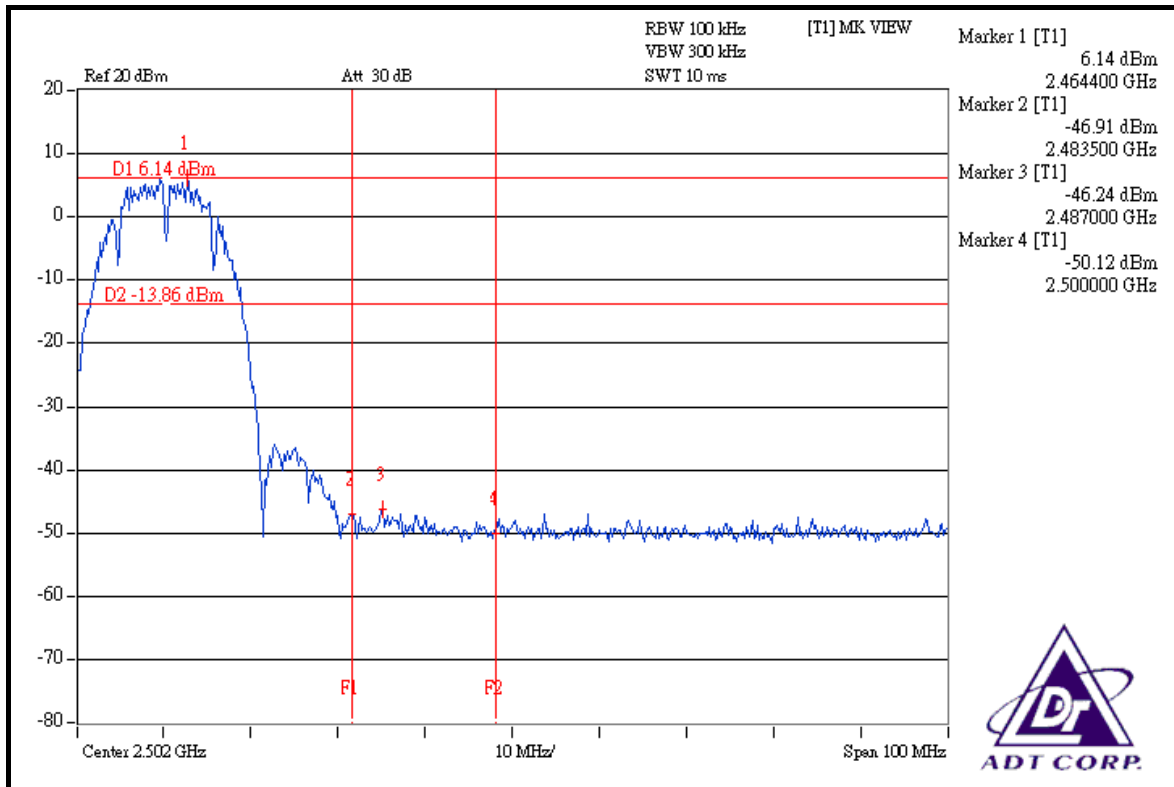
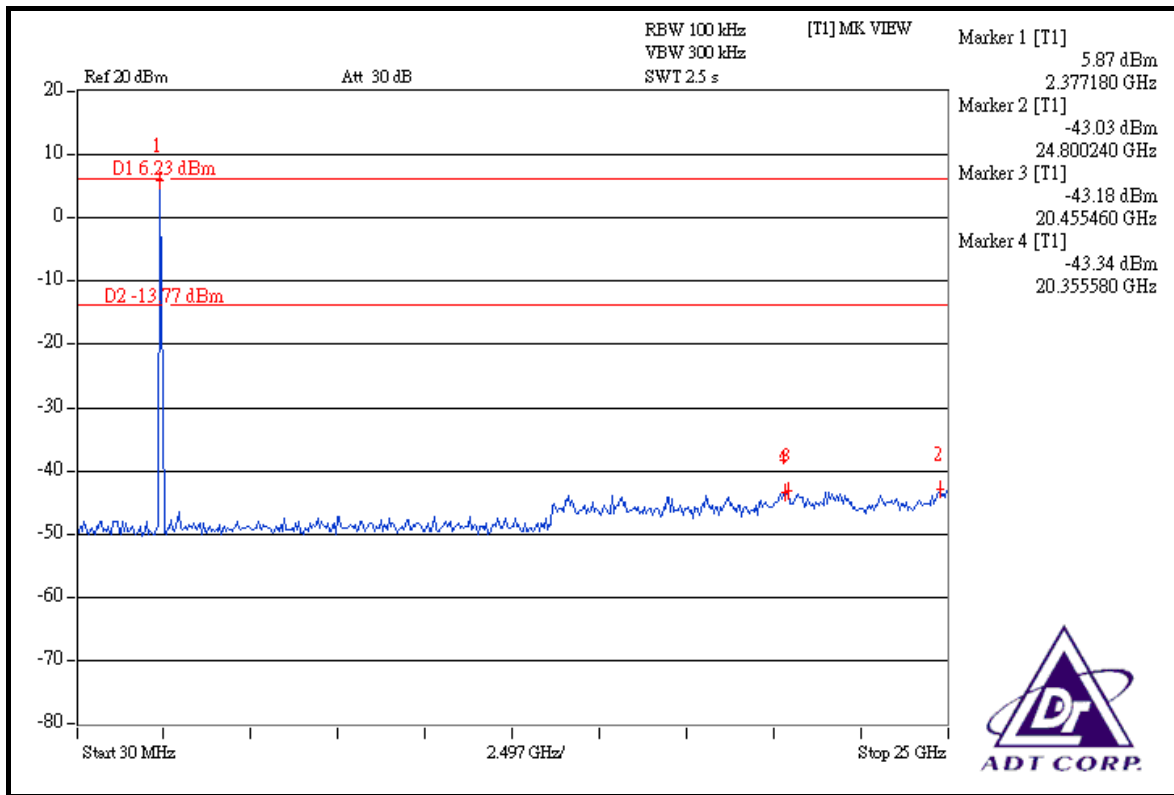
NOTE 1: The band edge emission plot on the next page shows 51.49dBc between carrier maximum power and local maximum emission in restrict band (2.38640GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2.7 is 107.04dBuV/m (Peak), so the maximum field strength in restrict band is $107.04 - 51.49 = 55.55$ dBuV/m which is under 74dBuV/m limit.

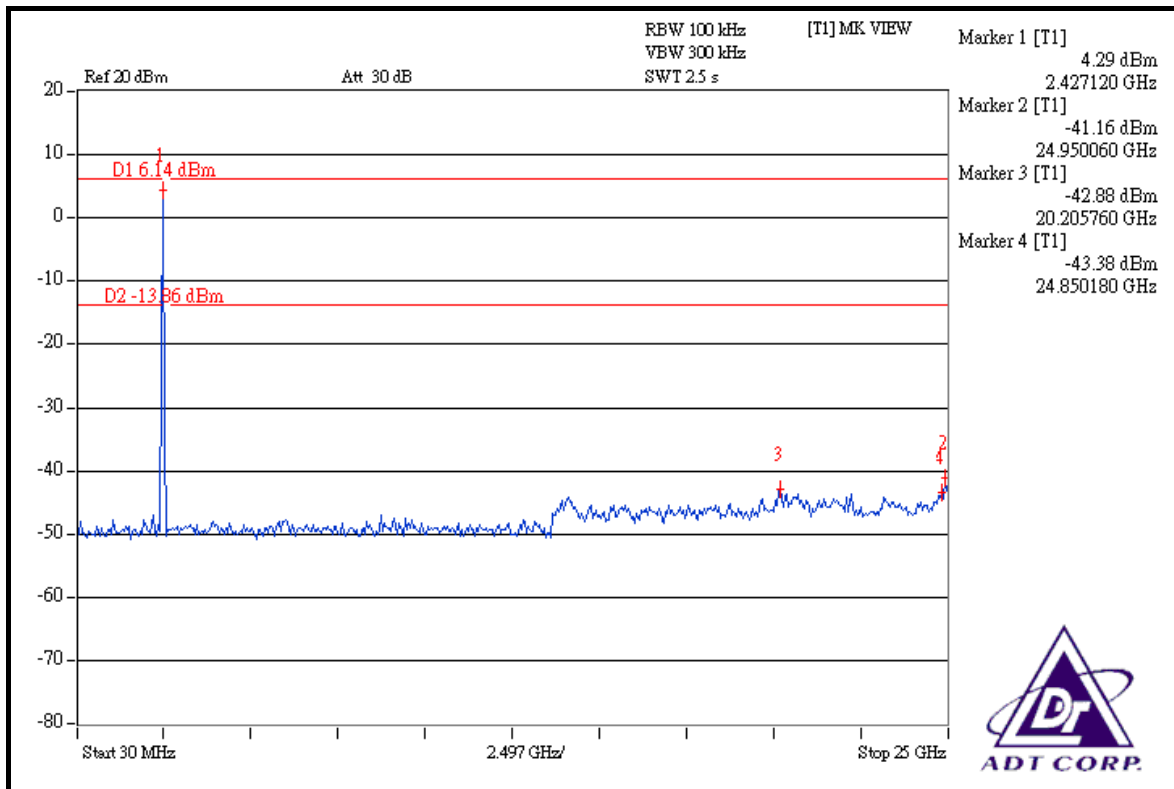
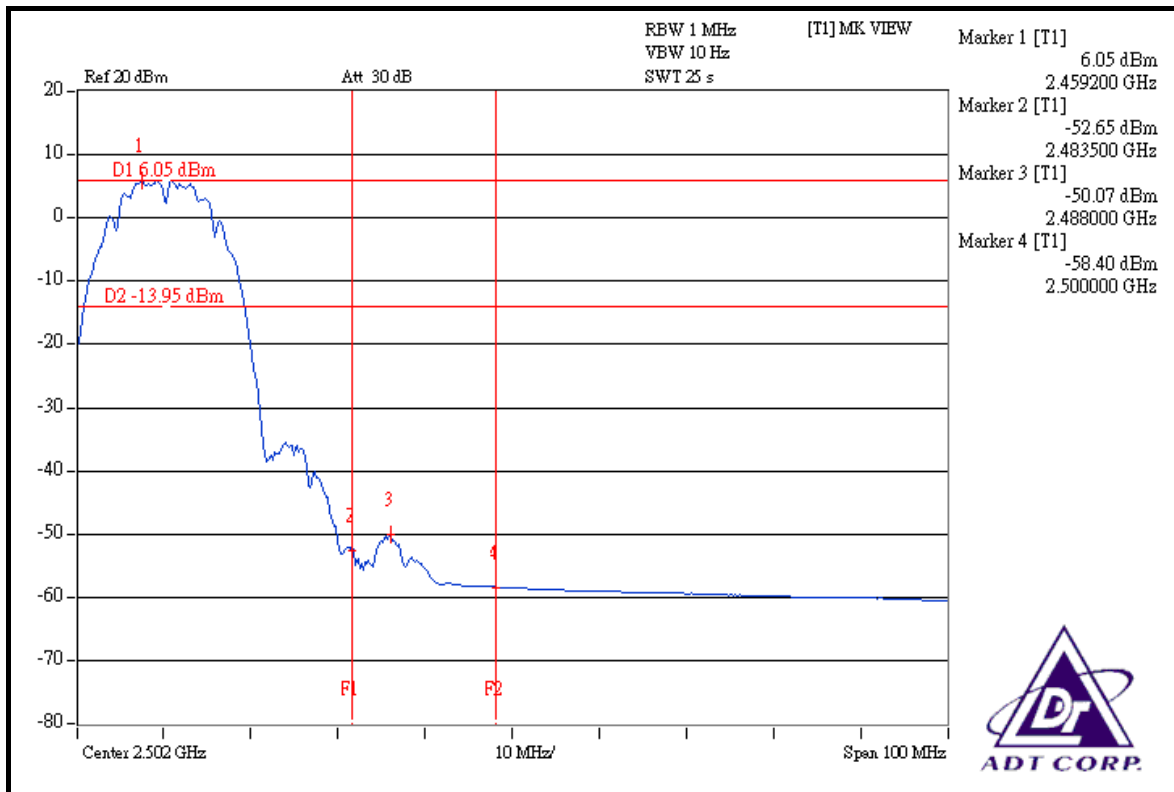
The band edge emission plot of on the next page shows 55.72dBc between carrier maximum power and local maximum emission in restrict band (2.38620GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2.7 is 102.42dBuV/m (Average), so the maximum field strength in restrict band is $102.42 - 55.72 = 46.70$ dBuV/m which is under 54dBuV/m limit.

NOTE 2: The band edge emission plot on the next second page shows 52.38dBc between carrier maximum power and local maximum emission in restrict band (2.48700GHz). The emission of carrier strength list in the test result of channel 11 at the item 4.2.7 is 110.38dBuV/m (Peak), so the maximum field strength in restrict band is $110.38 - 52.38 = 58.00$ dBuV/m which is under 74dBuV/m limit.

The band edge emission plot on the next third page shows 56.12dBc between carrier maximum power and local maximum emission in restrict band (2.48800GHz). The emission of carrier strength list in the test result of channel 11 at the item 4.2.7 is 105.72dBuV/m (Average), so the maximum field strength in restrict band is $105.72 - 56.12 = 49.60$ dBuV/m which is under 54dBuV/m limit.







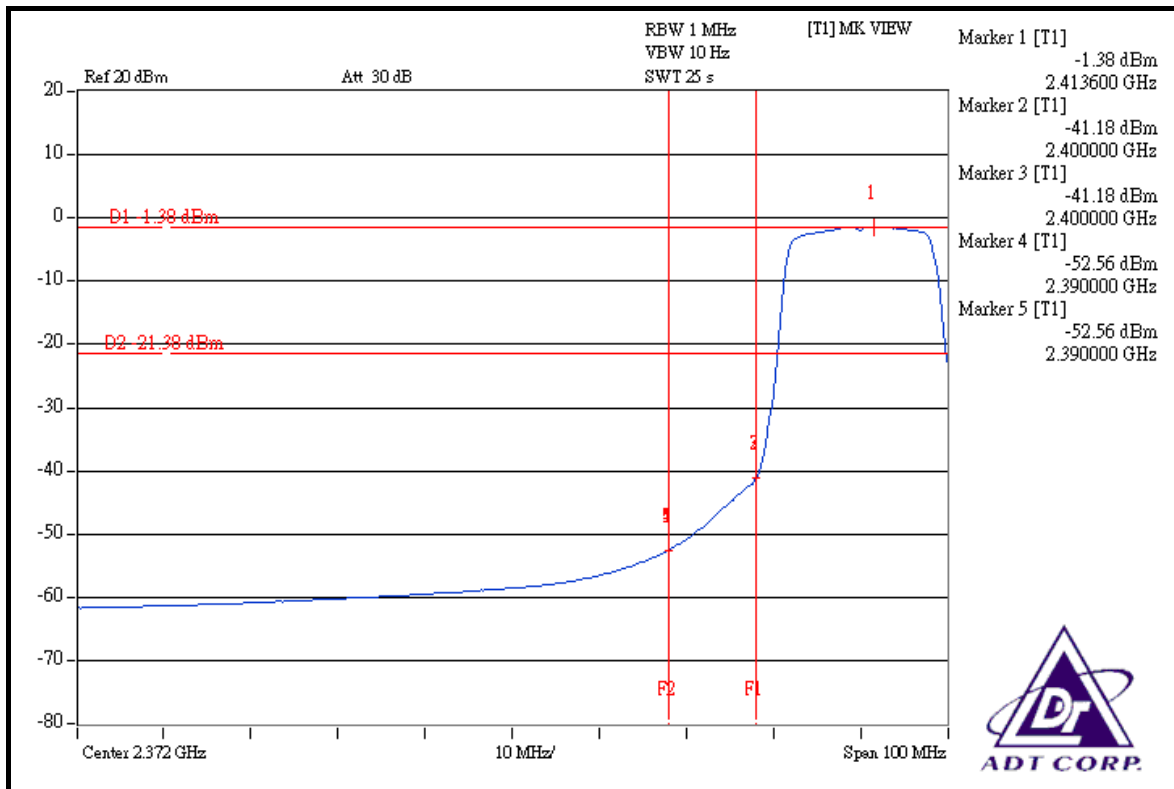
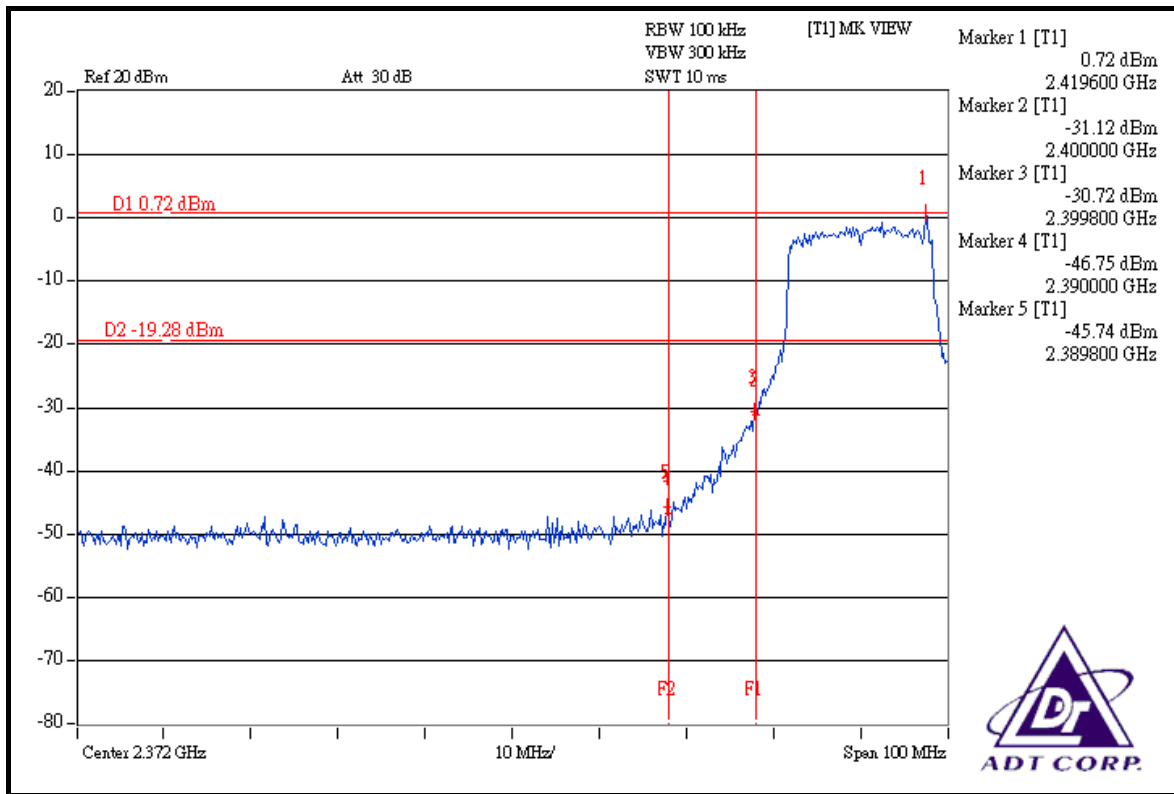
802.11g OFDM MODULATION

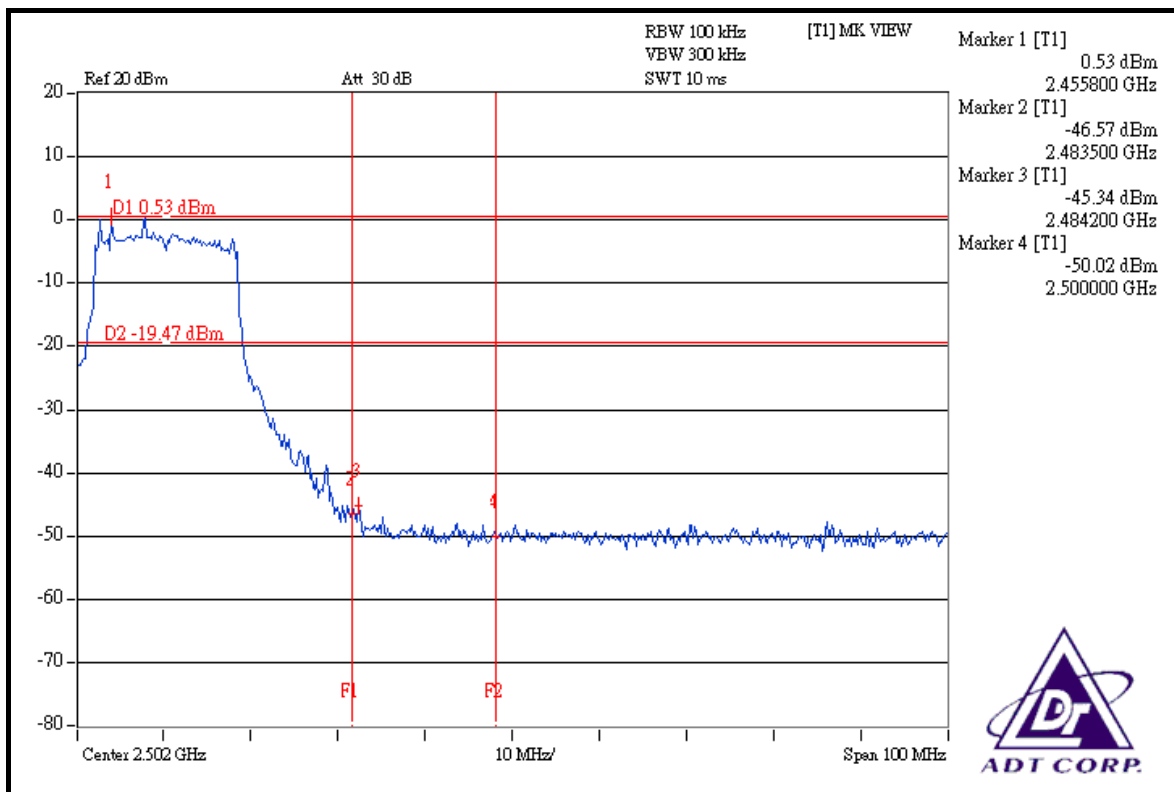
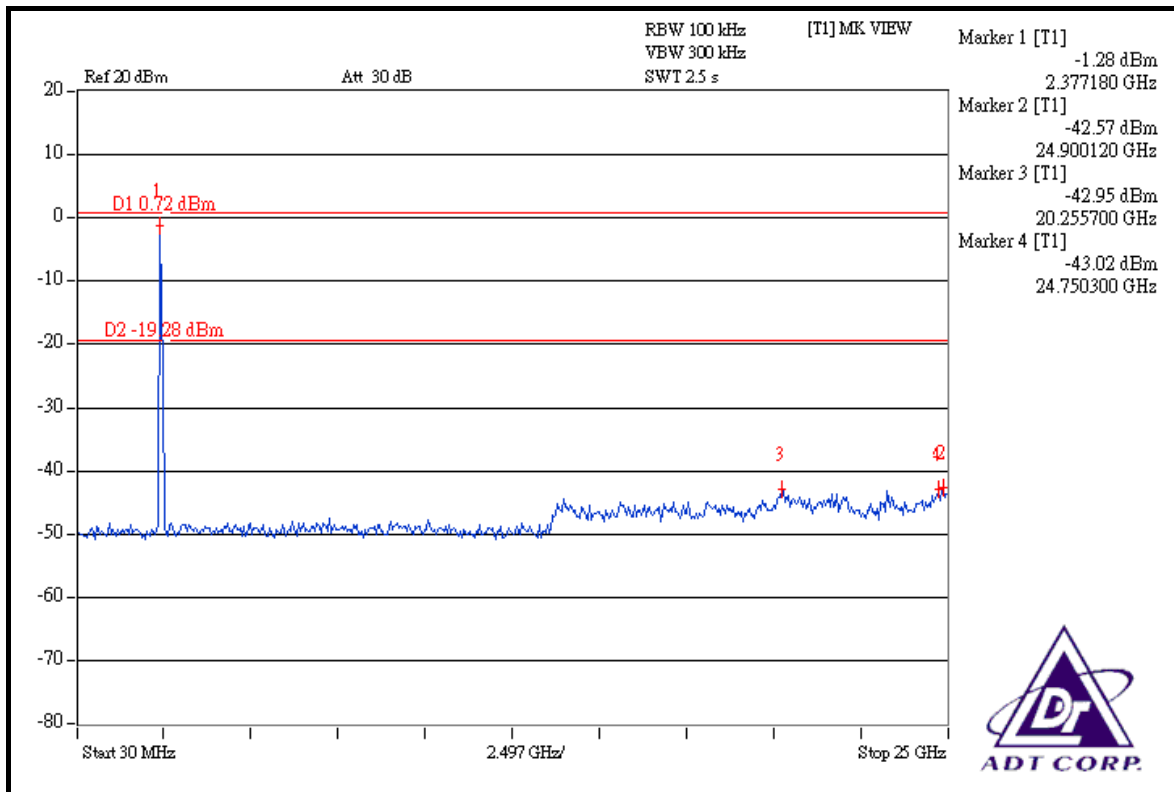
NOTE 1: The band edge emission plot on the next page shows 46.46dBc between carrier maximum power and local maximum emission in restrict band (2.3898GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2.7 is 106.62dBuV/m (Peak), so the maximum field strength in restrict band is $106.62 - 46.46 = 60.16$ dBuV/m which is under 74dBuV/m limit.

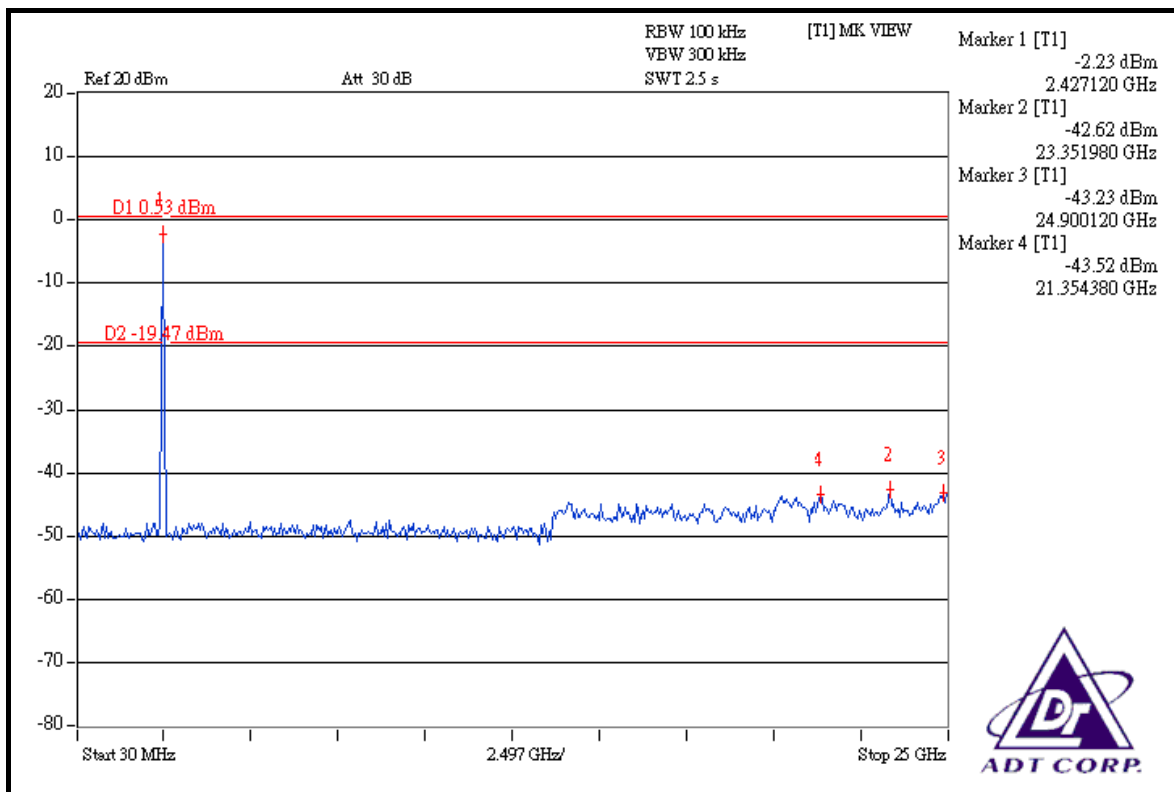
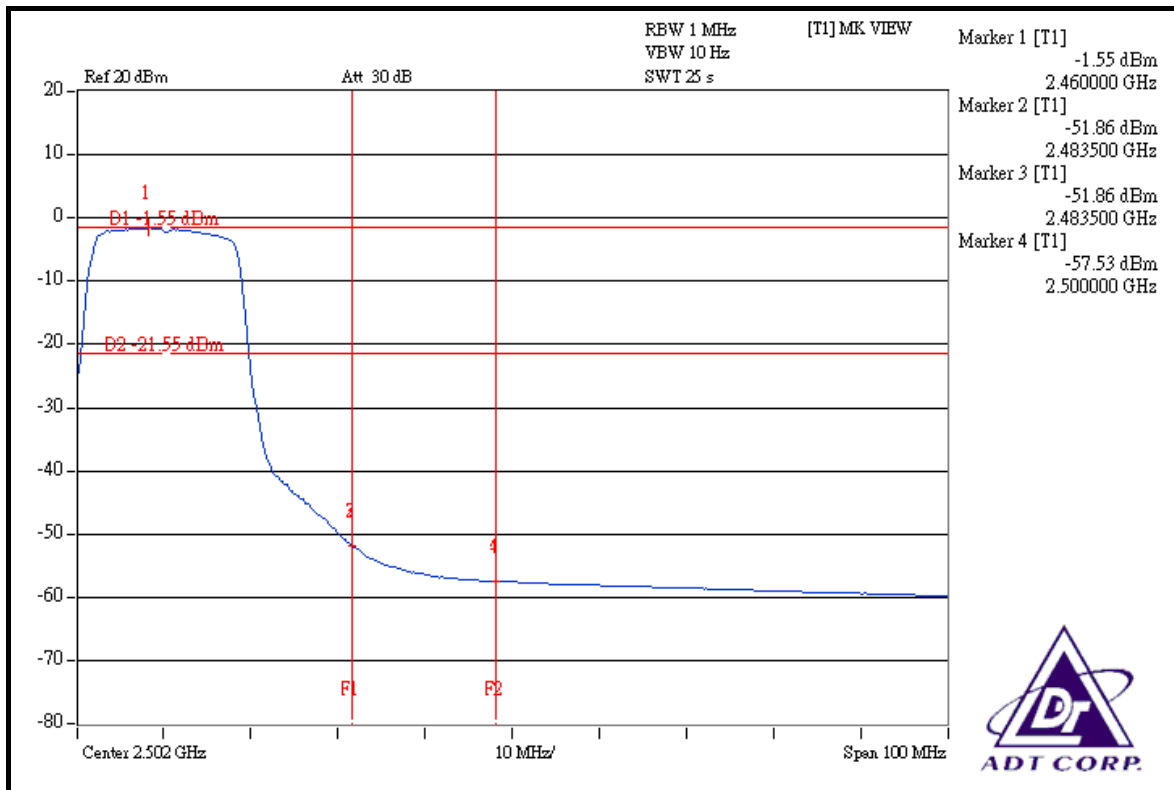
The band edge emission plot of on the next page shows 51.18dBc between carrier maximum power and local maximum emission in restrict band (2.3900GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2.7 is 96.65dBuV/m (Average), so the maximum field strength in restrict band is $96.65 - 51.18 = 45.47$ dBuV/m which is under 54dBuV/m limit.

NOTE 2: The band edge emission plot on the next second page shows 45.87dBc between carrier maximum power and local maximum emission in restrict band (2.4842GHz). The emission of carrier strength list in the test result of channel 11 at the item 4.2.7 is 109.78dBuV/m (Peak), so the maximum field strength in restrict band is $109.78 - 45.87 = 63.91$ dBuV/m which is under 74dBuV/m limit.

The band edge emission plot on the next third page shows 50.31dBc between carrier maximum power and local maximum emission in restrict band (2.4835GHz). The emission of carrier strength list in the test result of channel 11 at the item 4.2.7 is 99.49dBuV/m (Average), so the maximum field strength in restrict band is $99.49 - 50.31 = 49.18$ dBuV/m which is under 54dBuV/m limit.







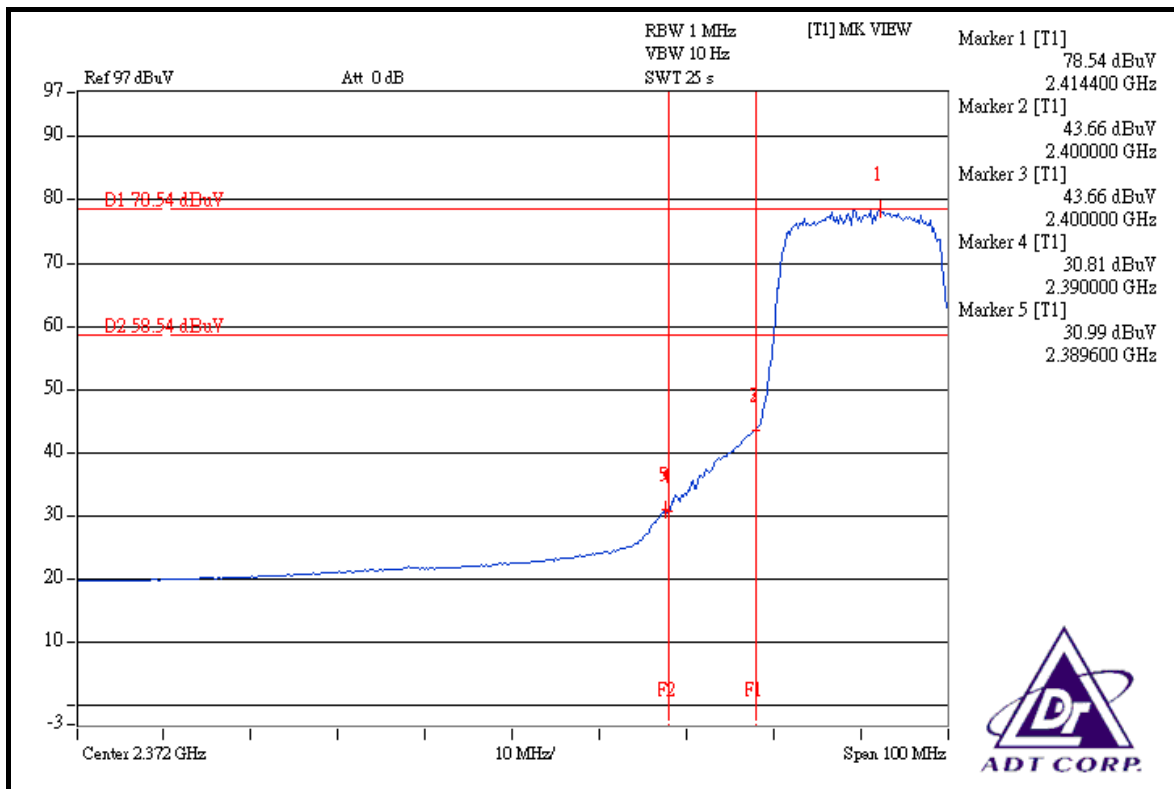
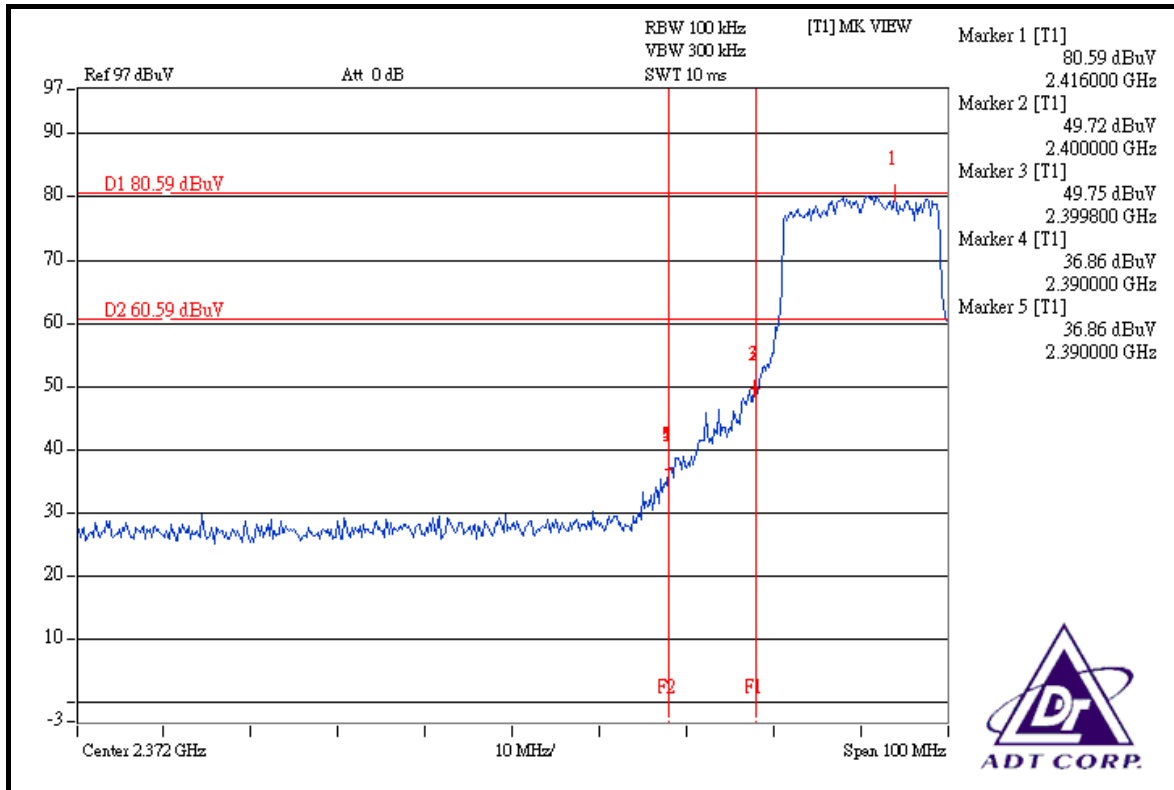
DRAFT 802.11n (20MHz) OFDM MODULATION

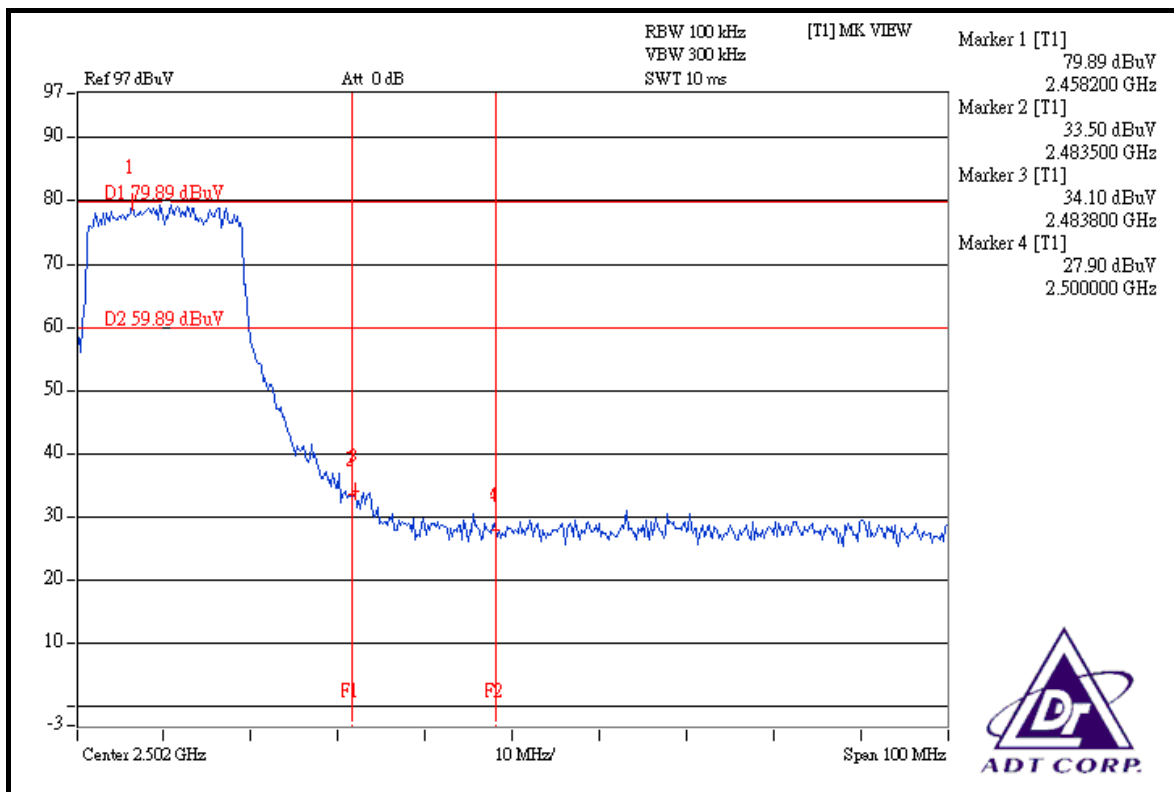
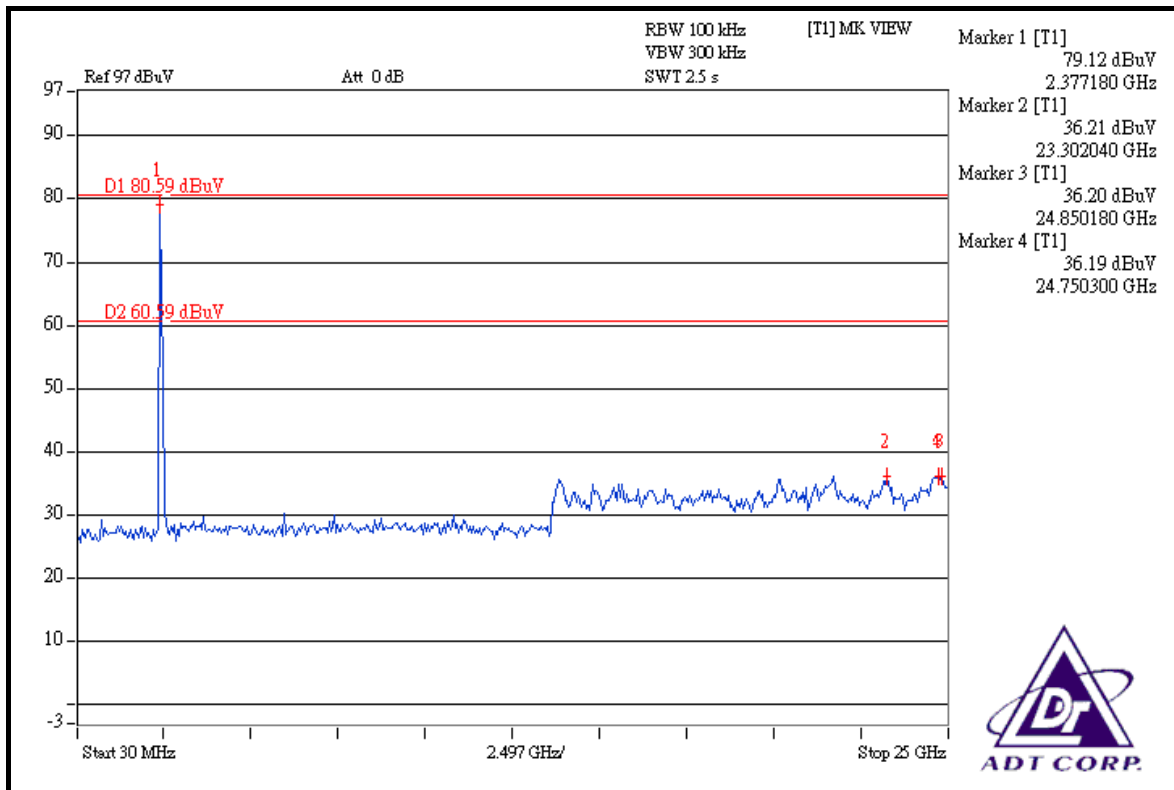
NOTE 1: The band edge emission plot on the next page shows 43.73dBc between carrier maximum power and local maximum emission in restrict band (2.3900GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2.7 is 109.26dBuV/m (Peak), so the maximum field strength in restrict band is $109.26 - 43.73 = 65.53$ dBuV/m which is under 74dBuV/m limit.

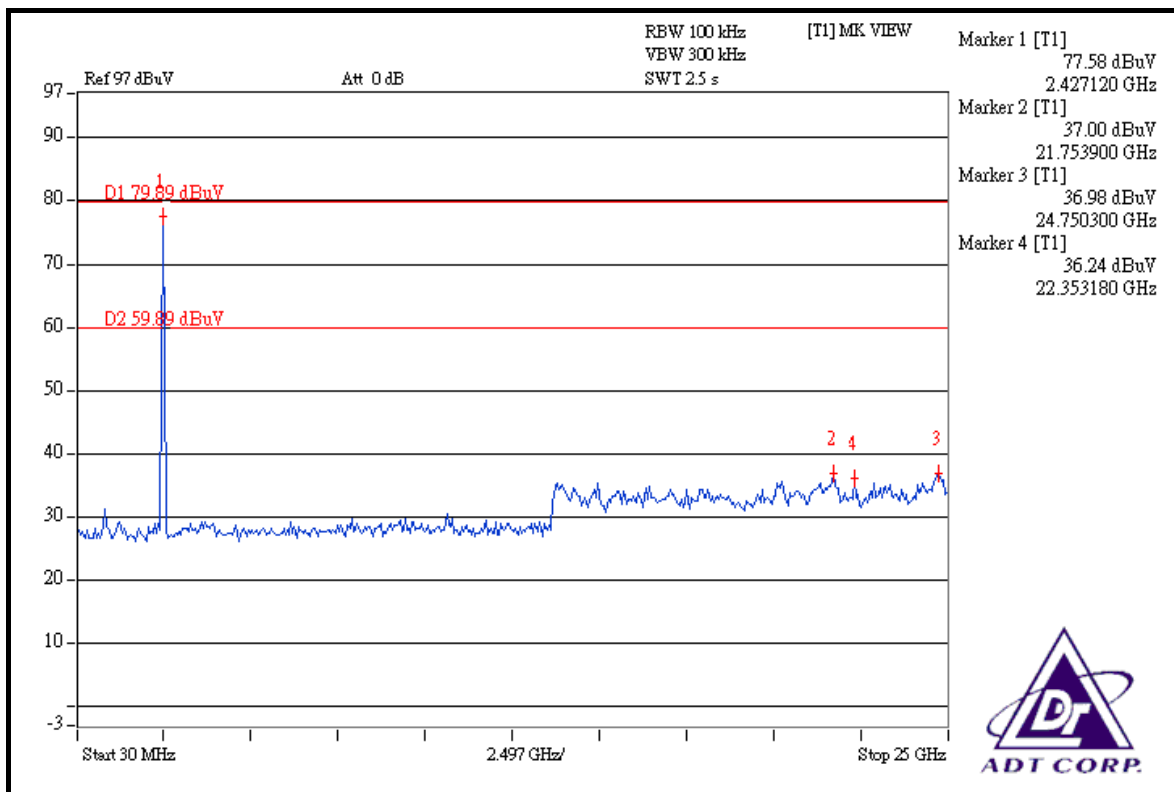
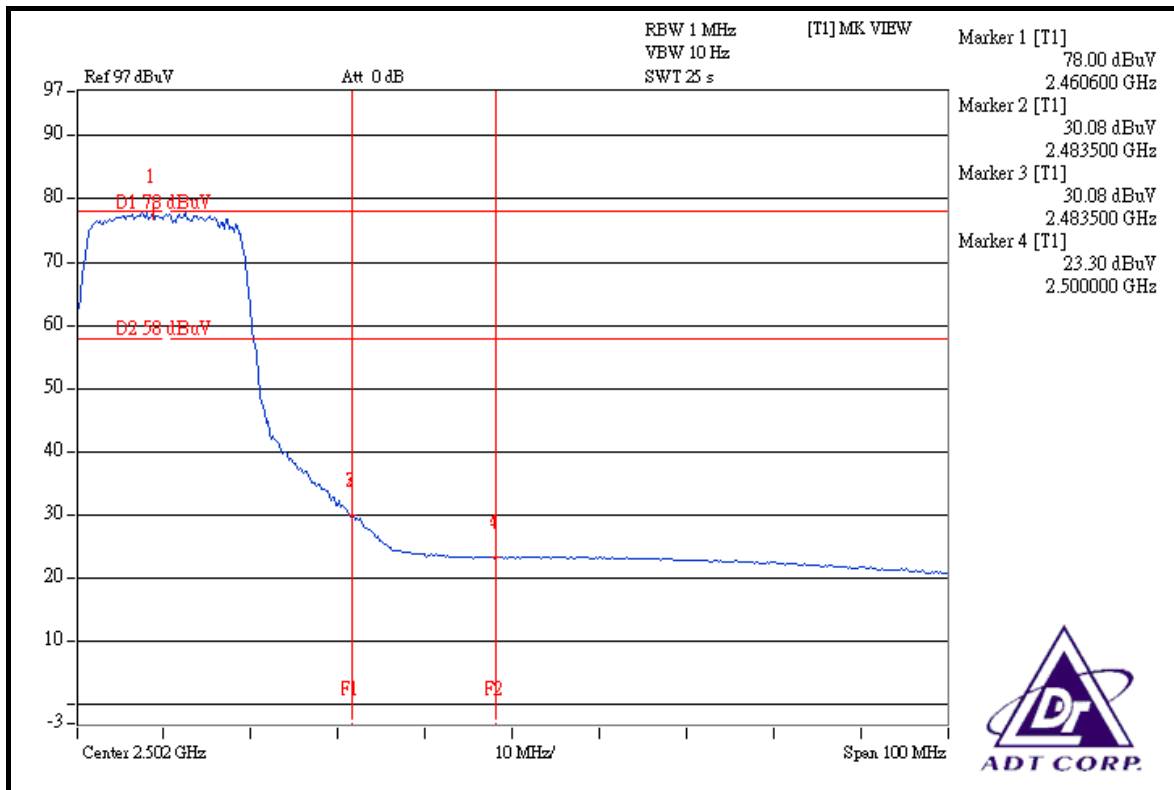
The band edge emission plot of on the next page shows 47.55dBc between carrier maximum power and local maximum emission in restrict band (2.3896GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2.7 is 99.51dBuV/m (Average), so the maximum field strength in restrict band is $99.51 - 47.55 = 51.96$ dBuV/m which is under 54dBuV/m limit.

NOTE 2: The band edge emission plot on the next second page shows 45.79dBc 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 11 at the item 4.2.7 is 111.67dBuV/m (Peak), so the maximum field strength in restrict band is $111.67 - 45.79 = 65.88$ dBuV/m which is under 74dBuV/m limit.

The band edge emission plot on the next third page shows 47.92dBc between carrier maximum power and local maximum emission in restrict band (2.4835GHz). The emission of carrier strength list in the test result of channel 11 at the item 4.2.7 is 100.99dBuV/m (Average), so the maximum field strength in restrict band is $100.99 - 47.92 = 53.07$ dBuV/m which is under 54dBuV/m limit.







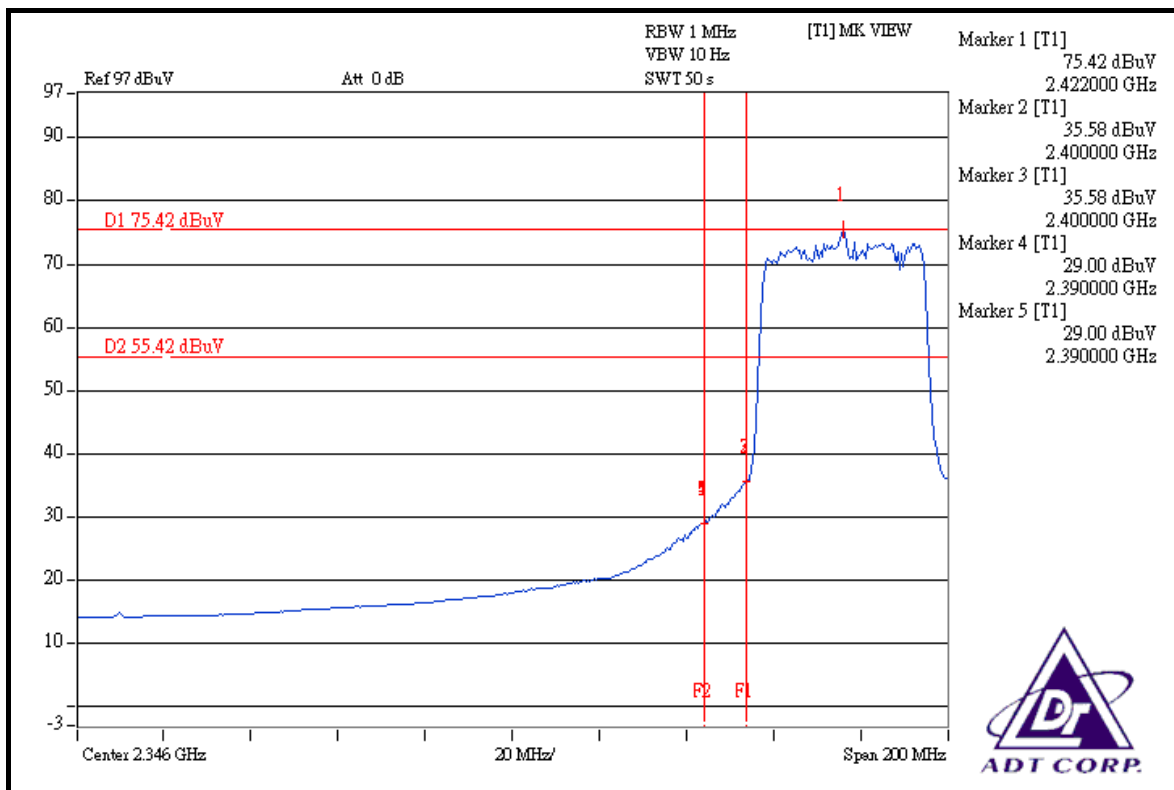
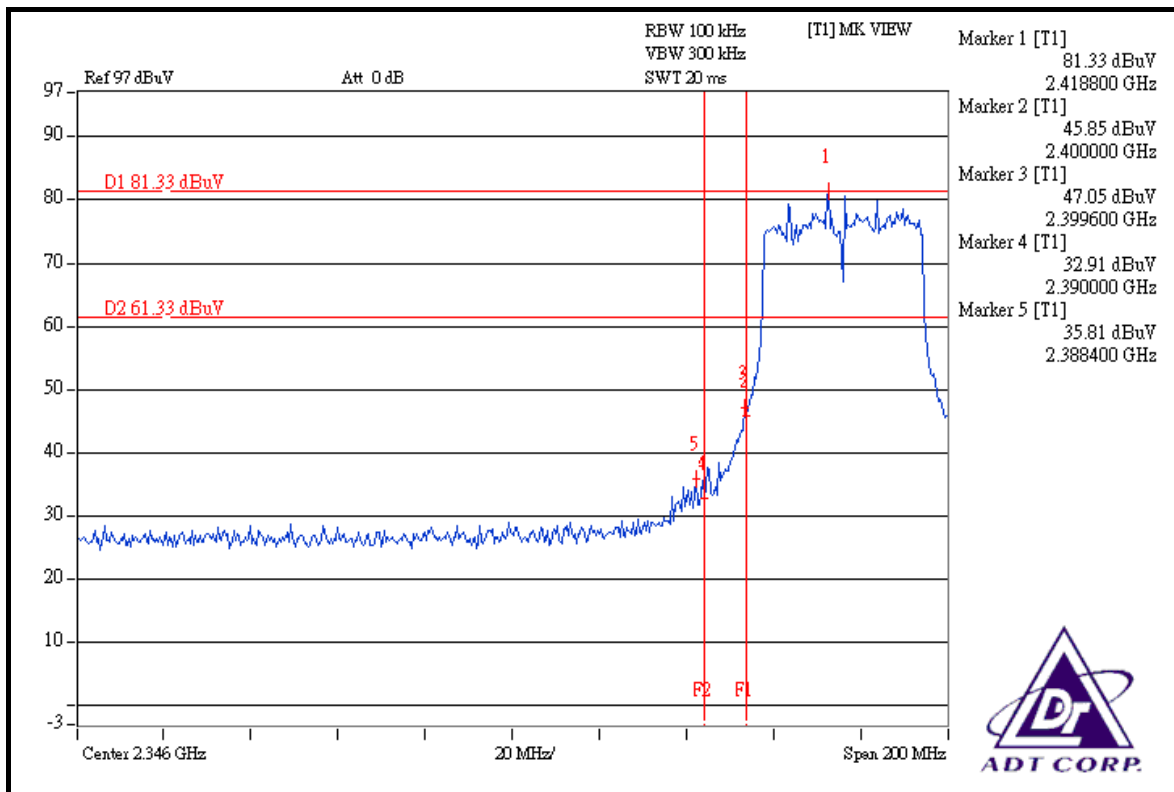
DRAFT 802.11n (40MHz) OFDM MODULATION

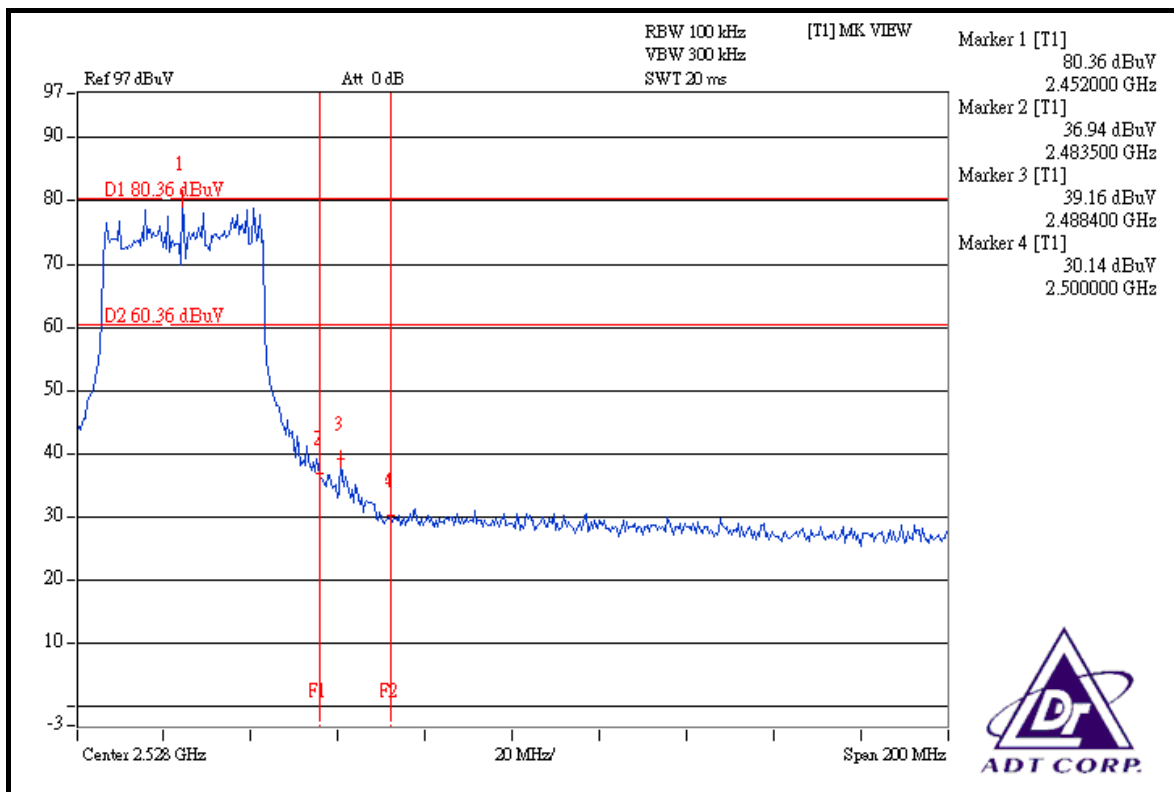
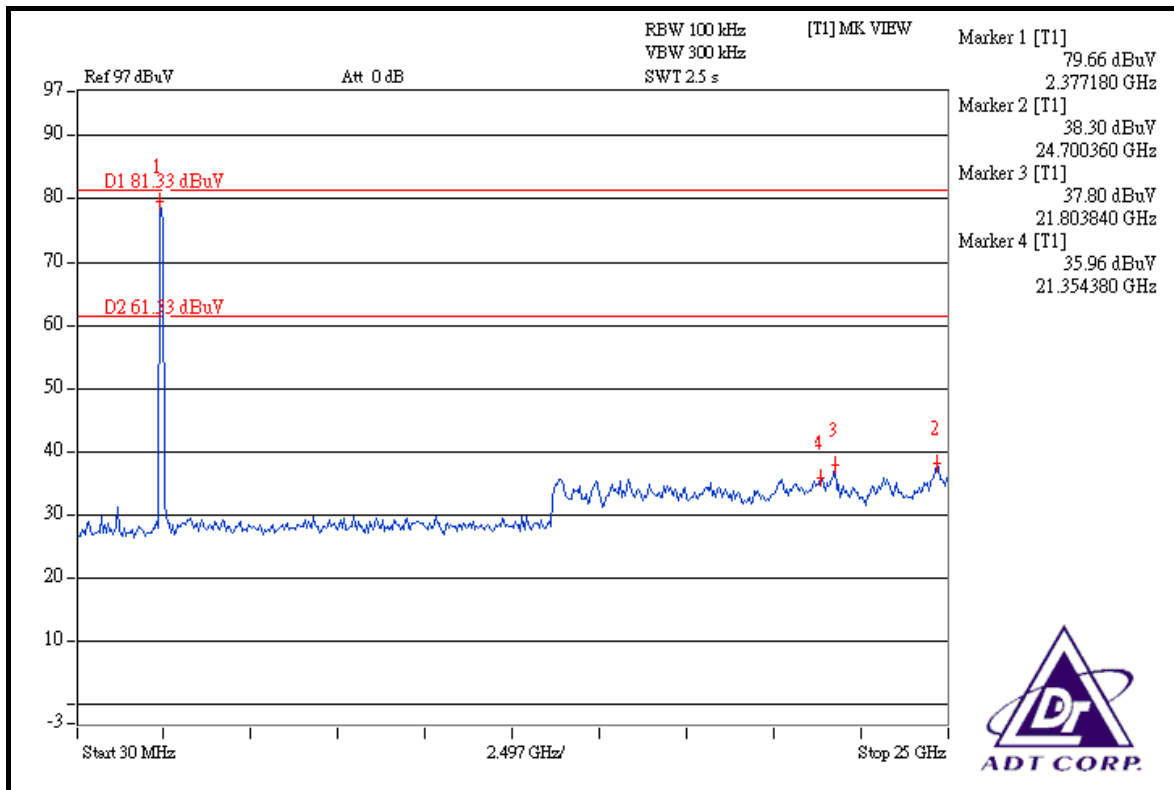
NOTE 1: The band edge emission plot on the next page shows 45.52dBc between carrier maximum power and local maximum emission in restrict band (2.3884GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2.7 is 104.05dBuV/m (Peak), so the maximum field strength in restrict band is $104.05 - 45.52 = 58.53$ dBuV/m which is under 74dBuV/m limit.

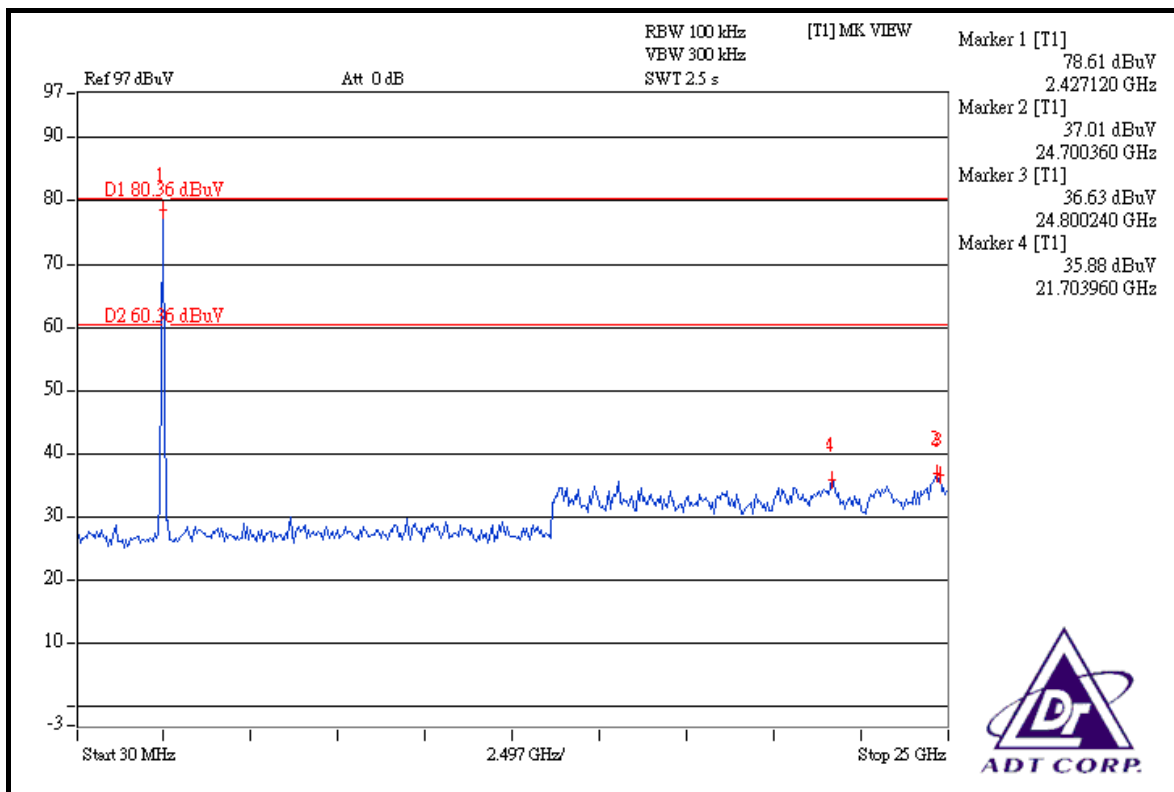
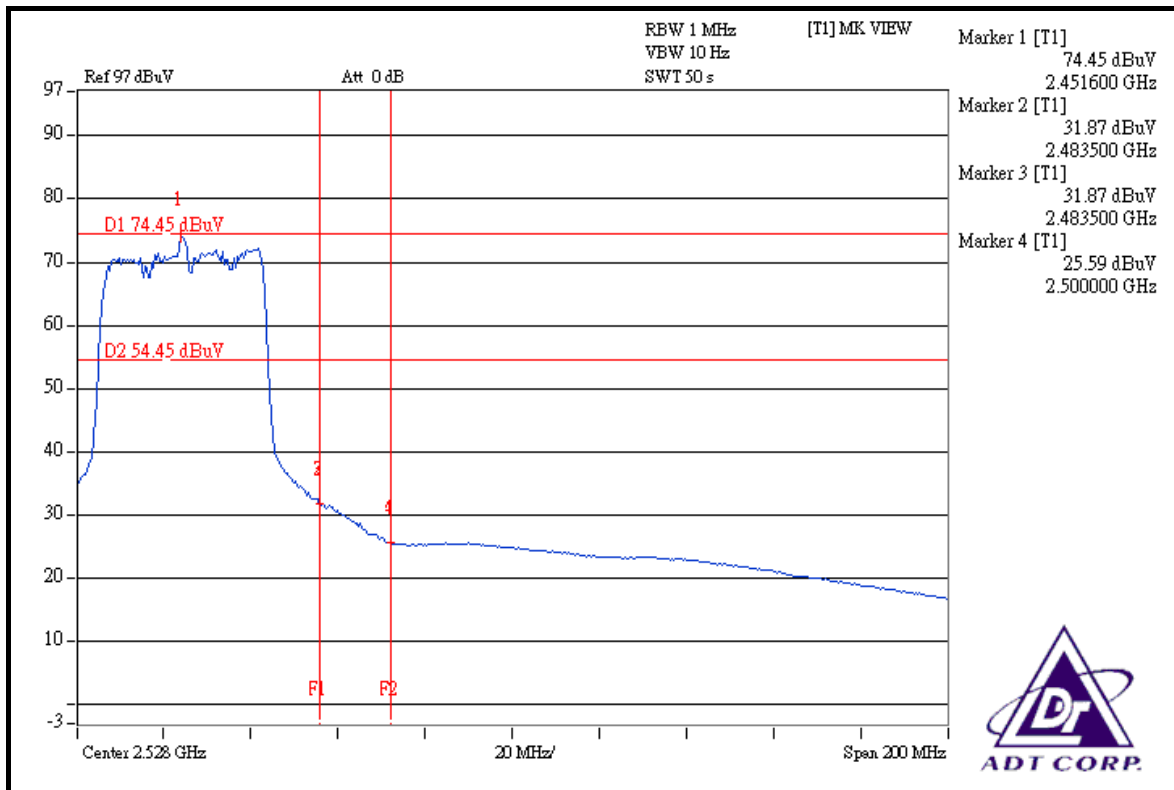
The band edge emission plot of on the next page shows 46.42dBc between carrier maximum power and local maximum emission in restrict band (2.3900GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2.7 is 96.65dBuV/m (Average), so the maximum field strength in restrict band is $96.65 - 46.42 = 50.23$ dBuV/m which is under 54dBuV/m limit.

NOTE 2: The band edge emission plot on the next second page shows 41.20dBc between carrier maximum power and local maximum emission in restrict band (2.4884GHz). The emission of carrier strength list in the test result of channel 7 at the item 4.2.7 is 105.31dBuV/m (Peak), so the maximum field strength in restrict band is $105.31 - 41.20 = 64.11$ dBuV/m which is under 74dBuV/m limit.

The band edge emission plot on the next third page shows 42.58dBc between carrier maximum power and local maximum emission in restrict band (2.4835GHz). The emission of carrier strength list in the test result of channel 7 at the item 4.2.7 is 94.78dBuV/m (Average), so the maximum field strength in restrict band is $94.78 - 42.58 = 52.20$ dBuV/m which is under 54dBuV/m limit.









4.7 ANTENNA REQUIREMENT

4.7.1 STANDARD APPLICABLE

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

4.7.2 ANTENNA CONNECTED CONSTRUCTION

The antenna used in this product is PCB antenna with U.FL-R-SMT connector. The maximum Gain of the antenna is 2.3dBi.

5. TEST TYPES AND RESULTS (FOR 5.0GHz BAND)

5.1 RADIATED EMISSION MEASUREMENT

5.1.1 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:

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.



5.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
Test Receiver ROHDE & SCHWARZ	ESI7	838496/016	Dec. 25, 2008
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100039	Dec. 02, 2008
BILOG Antenna SCHWARZBECK	VULB9168	9168-155	Jan. 03, 2009
HORN Antenna SCHWARZBECK	BBHA 9120D	9120D-405	Dec. 17, 2008
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170242	Jan. 06, 2009
Preamplifier Agilent	8449B	3008A01910	Sep. 19, 2008
Preamplifier Agilent	8447D	2944A10634	Dec. 12, 2008
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	274397/4	Nov. 07, 2008
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	283401/4	Nov. 07, 2008
Software ADT.	ADT_Radiated_V7.6	NA	NA
Antenna Tower inn-co GmbH	MA 4000	010303	NA
Antenna Tower Controller inn-co GmbH	CO2000	019303	NA
Turn Table ADT.	TT100.	TT93021704	NA
Turn Table Controller ADT.	SC100.	SC93021704	NA

- NOTE:**
1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
 2. The test was performed in HwaYa Chamber 4.
 3. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
 4. The FC Site Registration No. is 460141.
 5. The IC Site Registration No. is IC3789B-4.

5.1.3 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.

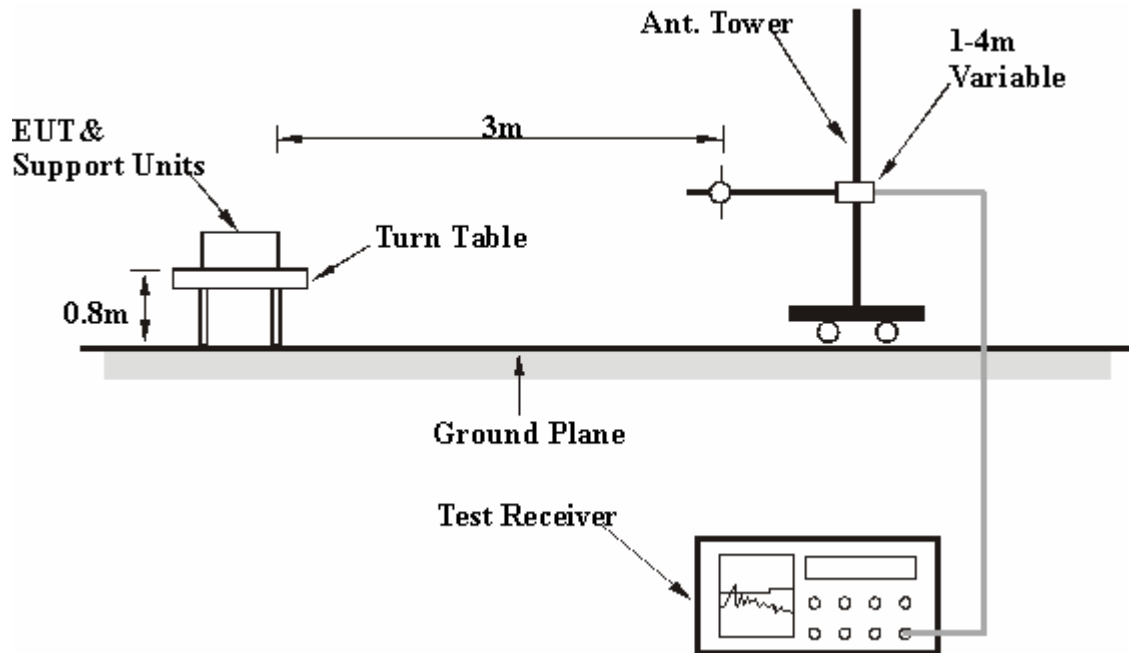
NOTE:

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 1MHz and video bandwidth is 3MHz 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.

5.1.4 DEVIATION FROM TEST STANDARD

No deviation

5.1.5 TEST SETUP



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

5.1.6 EUT OPERATING CONDITIONS

Same as 4.1.6

5.1.7 TEST RESULTS

802.11a OFDM MODULATION

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 149	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	20deg. C, 60%RH 993hPa	TESTED BY	Kevin Liang

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	5725.00	72.14 PK	84.36	-12.22	1.13 H	9	33.23	38.91
2	5725.00	49.74 AV	74.43	-24.96	1.13 H	9	10.83	38.91
3	*5745.00	104.36 PK			1.13 H	9	65.41	38.95
4	*5745.00	94.43 AV			1.13 H	9	55.48	38.95
5	#11490.00	59.89 PK	74.00	-14.11	1.06 H	190	10.12	49.77
6	#11490.00	46.68 AV	54.00	-7.32	1.06 H	190	-3.09	49.77
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	5725.00	82.16 PK	91.95	-9.79	1.00 V	79	43.25	38.91
2	5725.00	60.07 AV	81.40	-21.33	1.00 V	79	21.16	38.91
3	*5745.00	111.95 PK			1.01 V	79	73.00	38.95
4	*5745.00	101.40 AV			1.01 V	79	62.45	38.95
5	#11490.00	61.09 PK	74.00	-12.91	1.12 V	118	11.32	49.77
6	#11490.00	47.52 AV	54.00	-6.48	1.12 V	118	-2.25	49.77

- 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.
 6. “ # “: The radiated frequency falling in the restricted band.
 7. The limit value is defined as per 15.247.



EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 157	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	20deg. C, 60%RH 993hPa	TESTED BY	Kevin Liang

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	*5785.00	104.81 PK			1.05 H	20	65.76	39.05
2	*5785.00	94.62 AV			1.05 H	20	55.57	39.05
3	#11570.00	59.37 PK	74.00	-14.63	1.07 H	133	9.74	49.63
4	#11570.00	46.59 AV	54.00	-7.41	1.07 H	133	-3.04	49.63
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	*5785.00	112.84 PK			1.23 V	79	73.79	39.05
2	*5785.00	102.34 AV			1.23 V	79	63.29	39.05
3	#11570.00	60.17 PK	74.00	-13.83	1.12 V	174	10.54	49.63
4	#11570.00	47.36 AV	54.00	-6.64	1.12 V	174	-2.27	49.63

- REMARKS:**
1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
 2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
 3. The other emission levels were very low against the limit.
 4. Margin value = Emission level – Limit value.
 5. “ * “: Fundamental frequency.
 6. “ # ”: The radiated frequency falling in the restricted band.
 7. The limit value is defined as per 15.247.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 165	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	20deg. C, 60%RH 993hPa	TESTED BY	Kevin Liang

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	*5825.00	105.16 PK			1.00 H	158	66.02	39.14
2	*5825.00	94.40 AV			1.00 H	158	55.26	39.14
3	5850.00	60.17 PK	85.16	-24.99	1.00 H	158	20.97	39.20
4	5850.00	44.35 AV	74.40	-30.05	1.00 H	158	5.15	39.20
5	#11650.00	60.04 PK	74.00	-13.96	1.23 H	137	10.55	49.48
6	#11650.00	46.87 AV	54.00	-7.13	1.23 H	137	-2.62	49.48
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	*5825.00	112.15 PK			1.21 V	79	73.01	39.14
2	*5825.00	101.07 AV			1.21 V	79	61.93	39.14
3	5850.00	70.07 PK	92.15	-22.08	1.21 V	79	30.87	39.20
4	5850.00	55.35 AV	81.07	-25.72	1.21 V	79	16.15	39.20
5	#11650.00	60.62 PK	74.00	-13.37	1.26 V	132	11.14	49.48
6	#11650.00	47.05 AV	54.00	-6.95	1.26 V	132	-2.43	49.48

- REMARKS:**
1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
 2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
 3. The other emission levels were very low against the limit.
 4. Margin value = Emission level – Limit value.
 5. “ * “: Fundamental frequency.
 6. “ # ”: The radiated frequency falling in the restricted band.
 7. The limit value is defined as per 15.247.

DRAFT 802.11n (20MHz) OFDM MODULATION

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 149	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	20deg. C, 60%RH 993hPa	TESTED BY	Kevin Liang

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	5725.00	72.37 PK	85.33	-12.96	1.26 H	152	33.46	38.91
2	5725.00	56.15 AV	74.94	-18.79	1.26 H	152	17.24	38.91
3	*5745.00	105.33 PK			1.26 H	152	66.38	38.95
4	*5745.00	94.94 AV			1.26 H	152	55.99	38.95
5	#11490.00	60.43 PK	74.00	-13.57	1.03 H	199	10.66	49.77
6	#11490.00	46.29 AV	54.00	-7.71	1.03 H	199	-3.48	49.77

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	5725.00	74.34 PK	93.44	-19.10	1.03 V	3	35.43	38.91
2	5725.00	58.25 AV	83.18	-24.93	1.03 V	3	19.34	38.91
3	*5745.00	113.44 PK			1.03 V	4	74.49	38.95
4	*5745.00	103.18 AV			1.03 V	4	64.23	38.95
5	#11490.00	60.93 PK	74.00	-13.07	1.24 V	339	11.16	49.77
6	#11490.00	48.33 AV	54.00	-5.67	1.24 V	339	-1.44	49.77

- 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.
 6. “ # “: The radiated frequency falling in the restricted band.
 7. The limit value is defined as per 15.247.



EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 157	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	20deg. C, 60%RH 993hPa	TESTED BY	Kevin Liang

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	*5785.00	104.99 PK			1.36 H	154	65.94	39.05
2	*5785.00	94.93 AV			1.36 H	154	55.88	39.05
3	#11570.00	58.70 PK	74.00	-15.30	1.29 H	247	9.07	49.63
4	#11570.00	46.06 AV	54.00	-7.94	1.29 H	247	-3.57	49.63
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	*5785.00	113.46 PK			1.33 V	151	74.41	39.05
2	*5785.00	103.38 AV			1.33 V	151	64.33	39.05
3	#11570.00	61.05 PK	74.00	-12.95	1.15 V	233	11.42	49.63
4	#11570.00	47.28 AV	54.00	-6.72	1.15 V	233	-2.35	49.63

- REMARKS:**
1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
 2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
 3. The other emission levels were very low against the limit.
 4. Margin value = Emission level – Limit value.
 5. “ * “: Fundamental frequency.
 6. “ # ”: The radiated frequency falling in the restricted band.
 7. The limit value is defined as per 15.247.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 165	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	20deg. C, 60%RH 993hPa	TESTED BY	Kevin Liang

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	*5825.00	106.30 PK			1.00 H	208	67.16	39.14
2	*5825.00	96.22 AV			1.00 H	208	57.08	39.14
3	5850.00	56.64 PK	86.30	-29.66	1.00 H	209	17.44	39.20
4	5850.00	40.55 AV	76.22	-35.67	1.00 H	209	1.35	39.20
5	#11650.00	58.44 PK	74.00	-15.56	1.07 H	248	8.95	49.48
6	#11650.00	46.19 AV	54.00	-7.81	1.07 H	248	-3.30	49.48
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	*5825.00	113.78 PK			1.45 V	284	74.64	39.14
2	*5825.00	103.26 AV			1.45 V	284	64.12	39.14
3	5850.00	63.95 PK	93.78	-29.83	1.45 V	285	24.75	39.20
4	5850.00	47.48 AV	83.26	-35.78	1.45 V	285	8.28	39.20
5	#11650.00	59.45 PK	74.00	-14.55	1.24 V	300	9.96	49.48
6	#11650.00	46.97 AV	54.00	-7.03	1.24 V	300	-2.52	49.48

- REMARKS:**
1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
 2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
 3. The other emission levels were very low against the limit.
 4. Margin value = Emission level – Limit value.
 5. “ * ”: Fundamental frequency.
 6. “ # ”: The radiated frequency falling in the restricted band.
 7. The limit value is defined as per 15.247.

DRAFT 802.11n (40MHz) OFDM MODULATION

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 151	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	20deg. C, 60%RH 993hPa	TESTED BY	Kevin Liang

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	5725.00	79.67 PK	85.83	-6.16	1.75 H	153	40.76	38.91
2	5725.00	57.52 AV	75.38	-17.86	1.75 H	153	18.61	38.91
3	*5755.00	105.83 PK			1.75 H	153	66.85	38.98
4	*5755.00	95.38 AV			1.75 H	153	56.40	38.98
5	#11510.00	58.40 PK	74.00	-15.60	1.04 H	239	8.65	49.75
6	#11510.00	46.28 AV	54.00	-7.72	1.04 H	239	-3.47	49.75

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	5725.00	82.99 PK	90.83	-7.84	1.03 V	6	44.08	38.91
2	5725.00	60.08 AV	80.09	-20.01	1.03 V	6	21.17	38.91
3	*5755.00	110.83 PK			1.03 V	6	71.85	38.98
4	*5755.00	100.09 AV			1.03 V	6	61.11	38.98
5	#11510.00	59.92 PK	74.00	-14.08	1.23 V	196	10.17	49.75
6	#11510.00	47.14 AV	54.00	-6.86	1.23 V	196	-2.61	49.75

- REMARKS:**
1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
 2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
 3. The other emission levels were very low against the limit.
 4. Margin value = Emission level – Limit value.
 5. “ * “: Fundamental frequency.
 6. “ # “: The radiated frequency falling in the restricted band.
 7. The limit value is defined as per 15.247.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 159	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	20deg. C, 60%RH 993hPa	TESTED BY	Kevin Liang

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	*5795.00	105.01 PK			1.73 H	160	65.94	39.07
2	*5795.00	94.84 AV			1.73 H	160	55.77	39.07
3	5850.00	57.84 PK	85.01	-27.17	1.73 H	160	18.64	39.20
4	5850.00	41.93 AV	74.84	-32.91	1.73 H	160	2.73	39.20
5	#11590.00	58.20 PK	74.00	-15.80	1.52 H	204	8.61	49.59
6	#11590.00	46.03 AV	54.00	-7.97	1.52 H	204	-3.56	49.59
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5795.00	110.84 PK			1.00 V	24	71.77	39.07
2	*5795.00	100.05 AV			1.00 V	24	60.98	39.07
3	5850.00	60.74 PK	90.84	-30.10	1.00 V	25	21.54	39.20
4	5850.00	43.85 AV	80.05	-36.20	1.00 V	25	4.65	39.20
5	#11590.00	59.91 PK	74.00	-14.09	1.23 V	69	10.32	49.59
6	#11590.00	46.68 AV	54.00	-7.32	1.23 V	69	-2.91	49.59

- REMARKS:**
1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
 2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
 3. The other emission levels were very low against the limit.
 4. Margin value = Emission level – Limit value.
 5. “ * “: Fundamental frequency.
 6. “ # ”: The radiated frequency falling in the restricted band.
 7. The limit value is defined as per 15.247.



BELOW 1GHz WORST-CASE DATA : DRAFT 802.11n (20MHz) OFDM MODULATION

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 149	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	20deg. C, 60%RH 993hPa	TESTED BY	Kevin Liang

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	265.16	41.78 QP	46.00	-4.22	1.00 H	10	27.77	14.01
2	300.16	38.06 QP	46.00	-7.94	1.00 H	211	22.92	15.14
3	399.31	36.49 QP	46.00	-9.51	2.00 H	346	18.87	17.62
4	498.47	35.51 QP	46.00	-10.49	2.00 H	334	15.25	20.26
5	838.72	34.31 QP	46.00	-11.69	1.50 H	70	7.59	26.72
6	912.61	36.88 QP	46.00	-9.12	2.00 H	334	9.10	27.78
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	164.06	24.92 QP	43.50	-18.58	1.50 V	76	10.72	14.20
2	267.10	31.45 QP	46.00	-14.55	1.00 V	223	17.27	14.19
3	399.31	27.13 QP	46.00	-18.87	1.00 V	307	9.50	17.62
4	500.42	31.52 QP	46.00	-14.48	1.00 V	247	11.23	20.29
5	665.68	26.08 QP	46.00	-19.92	1.00 V	103	2.30	23.78
6	838.72	41.20 QP	46.00	-4.80	1.50 V	181	14.48	26.72

- 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.

5.2 CONDUCTED EMISSION MEASUREMENT

5.2.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

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

- NOTE:** 1. The lower limit shall apply at the transition frequencies.
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.
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.

5.2.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
Test Receiver ROHDE & SCHWARZ	ESCS30	100289	Dec. 06, 2008
RF signal cable Woken	5D-FB	Cable-HYC01-01	Jan. 06, 2009
LISN ROHDE & SCHWARZ	ESH3-Z5	100312	Jan. 30, 2009
LISN ROHDE & SCHWARZ	NNBL 8226-2	8226-142	May 07, 2008
Software ADT	ADT_Cond_V3	NA	NA

- NOTE:** 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in HwaYa Shielded Room 1.
3. The VCCI Site Registration No. is C-2040.

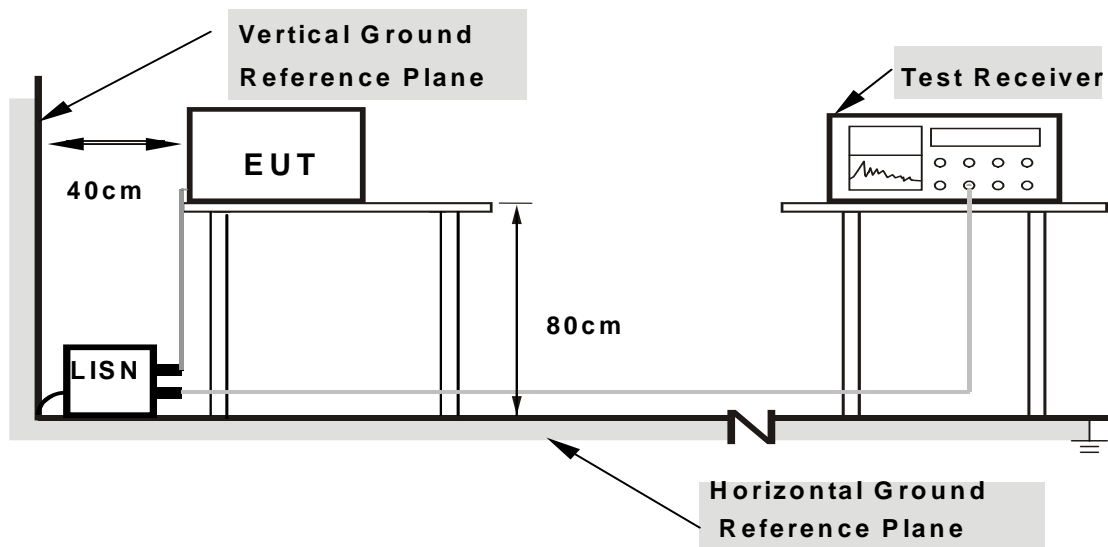
5.2.3 TEST PROCEDURES

- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

5.2.4 DEVIATION FROM TEST STANDARD

No deviation

5.2.5 TEST SETUP



Note: 1. Support units were connected to second LISN.

2. Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

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

5.2.6 EUT OPERATING CONDITIONS

Same as 4.1.6

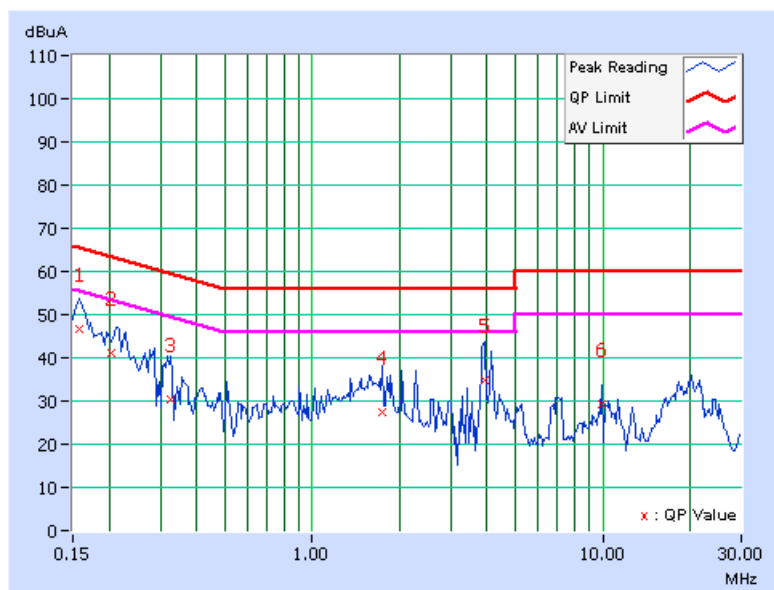
5.2.7 TEST RESULTS

CONDUCTED WORST-CASE DATA : DRAFT 802.11n (20MHz) OFDM MODULATION

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 149	PHASE	Line 1
MODULATION TYPE	BPSK	INPUT POWER (SYSTEM)	120Vac, 60Hz
TRANSFER RATE	7.2Mbps	6dB BANDWIDTH	9kHz
ENVIRONMENTAL CONDITIONS	20deg. C, 60%RH, 988hPa	TESTED BY	Match Tsui

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
			1	0.158	0.21	46.10	-	46.31	-	65.58
2	0.202	0.21	40.55	-	40.76	-	63.52	53.52	-22.76	-
3	0.326	0.21	29.83	-	30.04	-	59.56	49.56	-29.52	-
4	1.752	0.26	26.74	-	27.00	-	56.00	46.00	-29.00	-
5	3.910	0.38	34.36	-	34.74	-	56.00	46.00	-21.26	-
6	9.969	0.54	28.78	-	29.32	-	60.00	50.00	-30.68	-

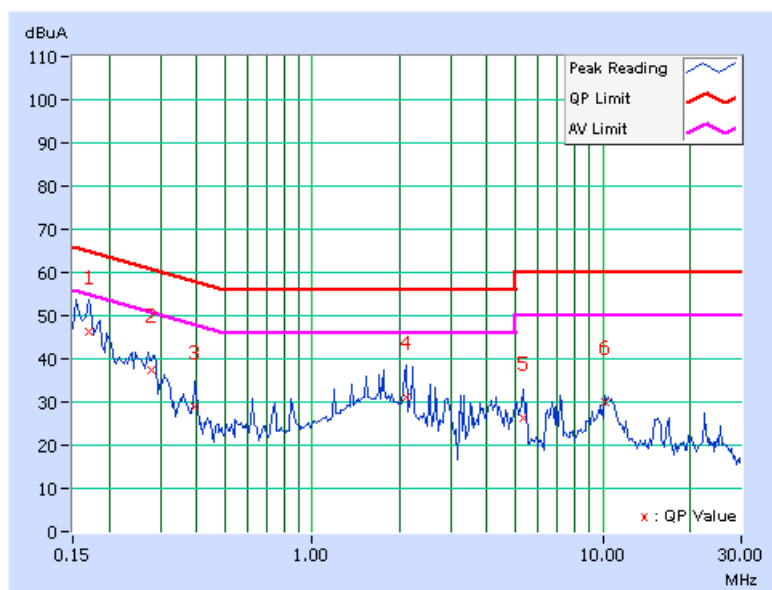
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
 3. The emission levels of other frequencies were very low against the limit.
 4. Margin value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



EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 149	PHASE	Line 2
MODULATION TYPE	BPSK	INPUT POWER (SYSTEM)	120Vac, 60Hz
TRANSFER RATE	7.2Mbps	6dB BANDWIDTH	9kHz
ENVIRONMENTAL CONDITIONS	20deg. C, 60%RH, 988hPa	TESTED BY	Match Tsui

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.170	0.21	45.83	-	46.04	-	64.98	54.98	-18.95	-
2	0.279	0.21	36.78	-	36.99	-	60.85	50.85	-23.86	-
3	0.396	0.21	28.37	-	28.58	-	57.93	47.93	-29.35	-
4	2.099	0.27	30.44	-	30.71	-	56.00	46.00	-25.29	-
5	5.324	0.42	25.90	-	26.32	-	60.00	50.00	-33.68	-
6	10.200	0.54	29.55	-	30.09	-	60.00	50.00	-29.91	-

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





5.3 6dB BANDWIDTH MEASUREMENT

5.3.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT

The minimum of 6dB Bandwidth Measurement is 0.5MHz.

5.3.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
R&S SPECTRUM ANALYZER	FSP40	100040	Jun. 28, 2008

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

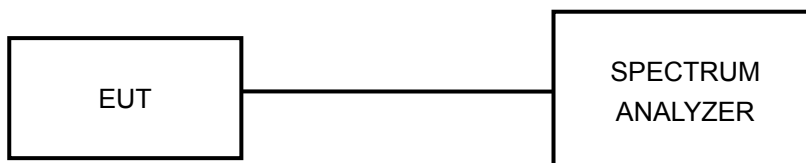
5.3.3 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 100kHz RBW and 300kHz VBW. The 6dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6dB.

5.3.4 DEVIATION FROM TEST STANDARD

No deviation

5.3.5 TEST SETUP



5.3.6 EUT OPERATING CONDITIONS

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.



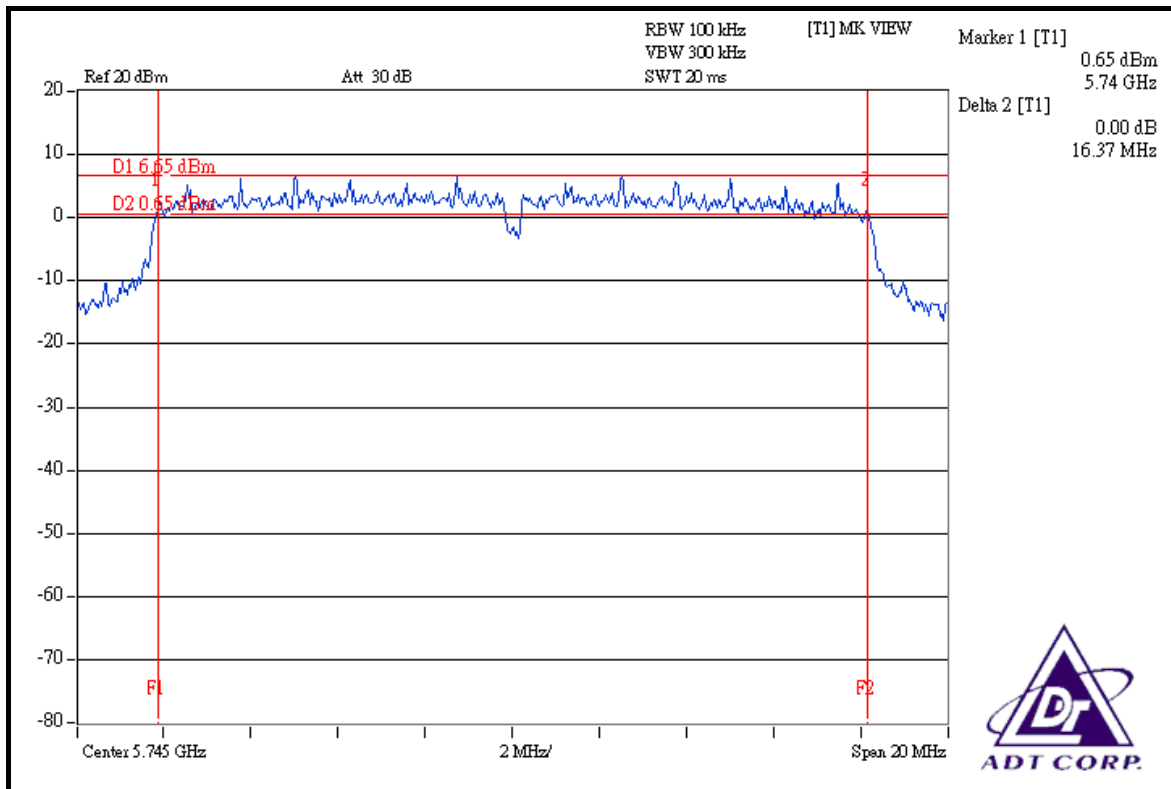
5.3.7 TEST RESULTS

802.11a OFDM MODULATION

MODULATION TYPE	BPSK	TRANSFER RATE	6.0Mbps
INPUT POWER (SYSTEM)	120Vac, 60Hz	ENVIRONMENTAL CONDITIONS	25 deg.C, 65 %RH, 991hPa
TESTED BY	Brad Wu		

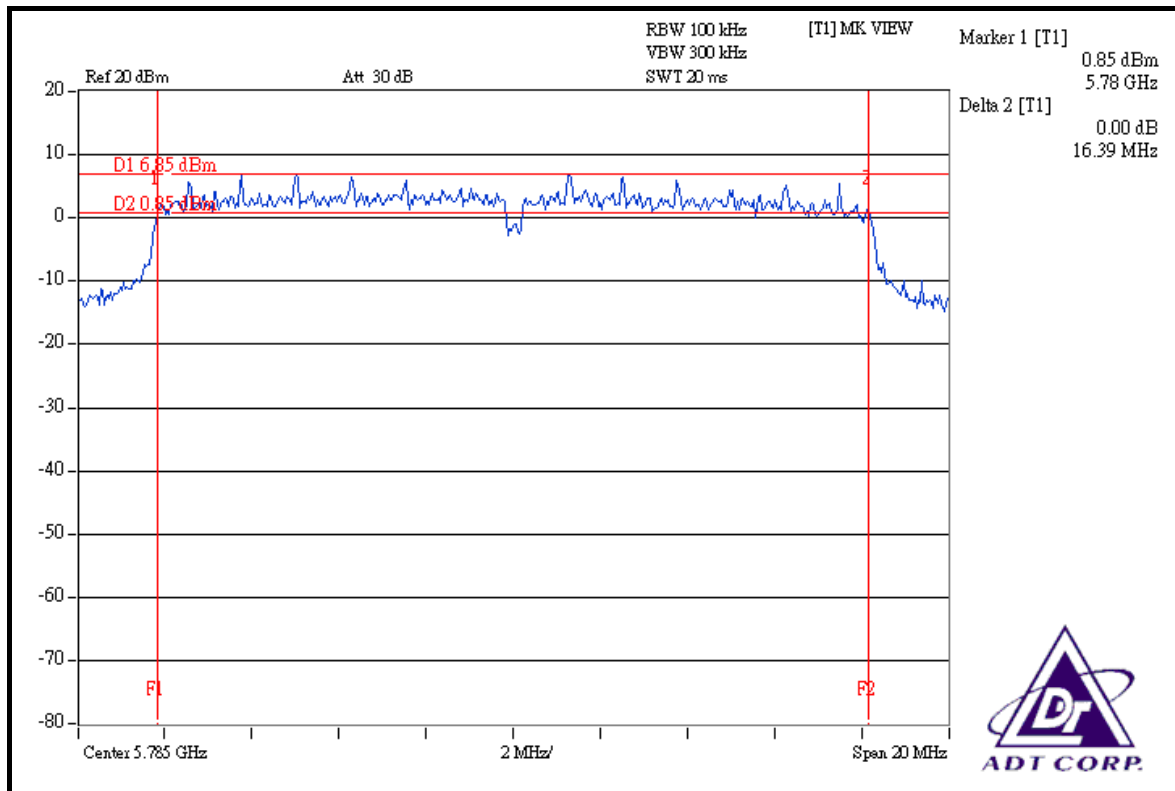
CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
149	5745	16.37	0.5	PASS
157	5785	16.39	0.5	PASS
165	5825	16.41	0.5	PASS

CH 149

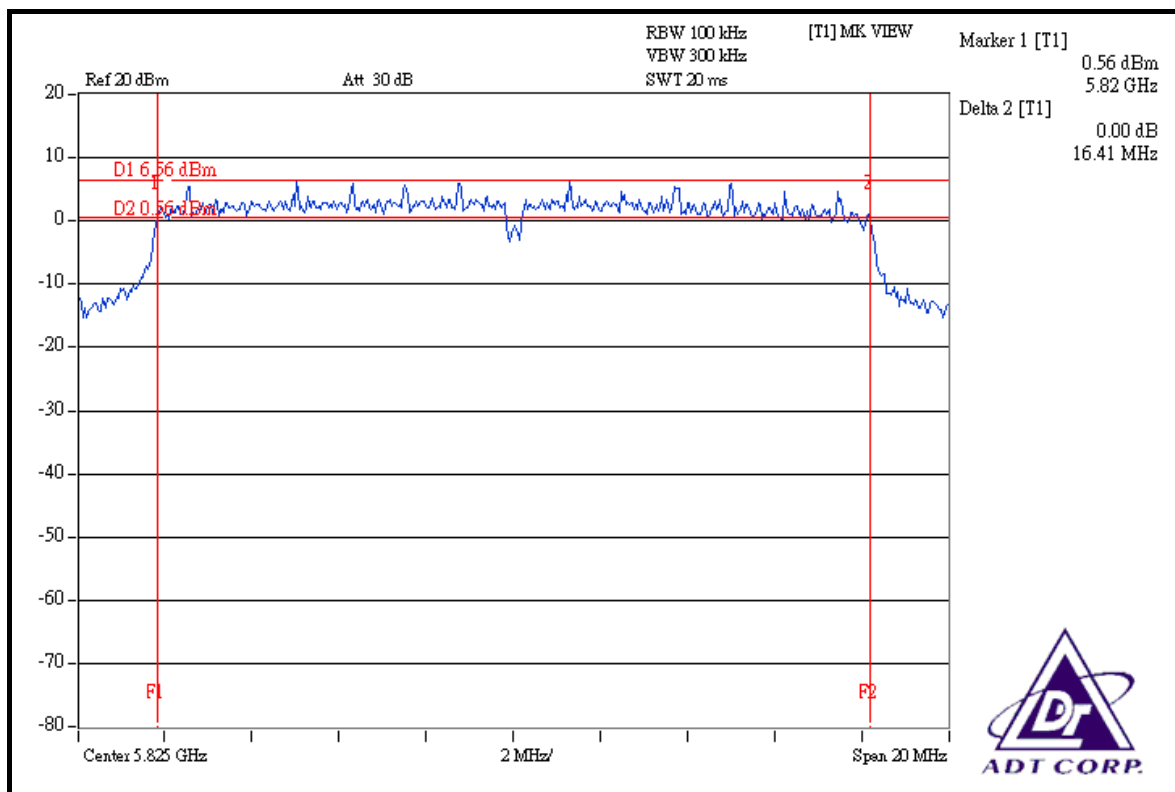




CH 157



CH 165





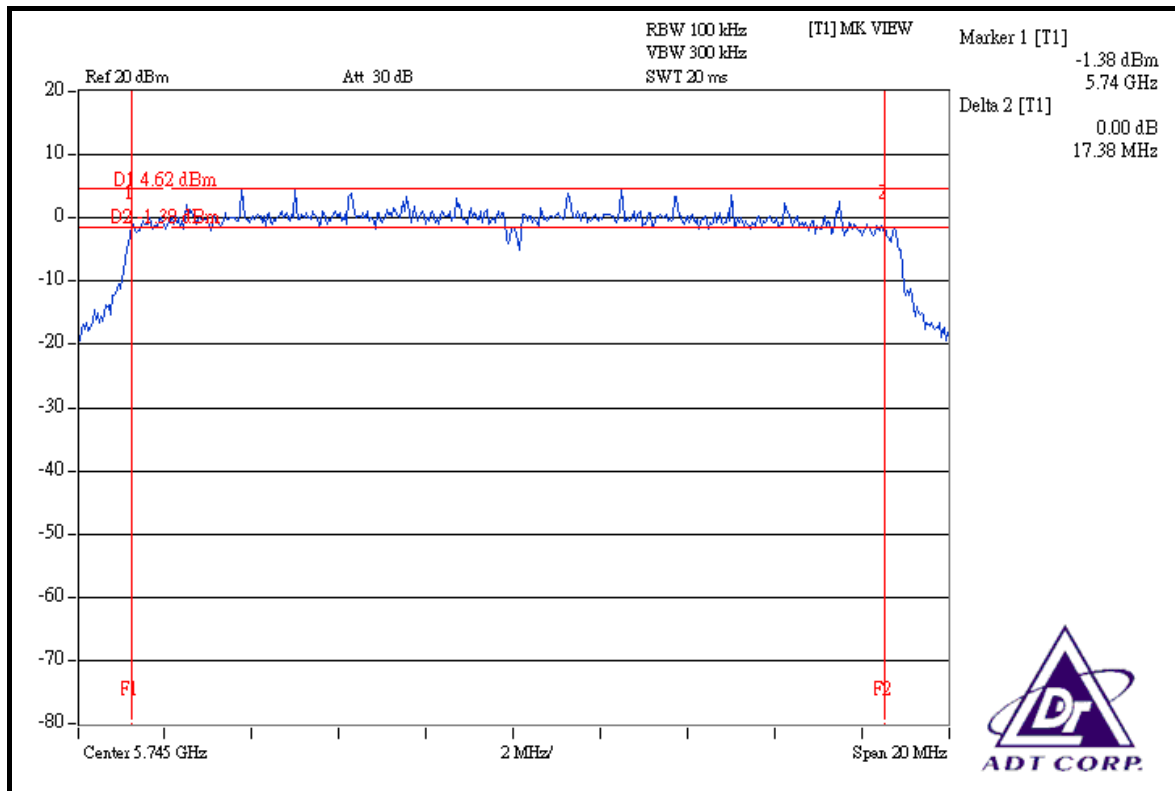
DRAFT 802.11n (20MHz) OFDM MODULATION

MODULATION TYPE	BPSK	TRANSFER RATE	7.2Mbps
INPUT POWER (SYSTEM)	120Vac, 60Hz	ENVIRONMENTAL CONDITIONS	25deg.C, 65%RH, 991hPa
TESTED BY	Brad Wu		

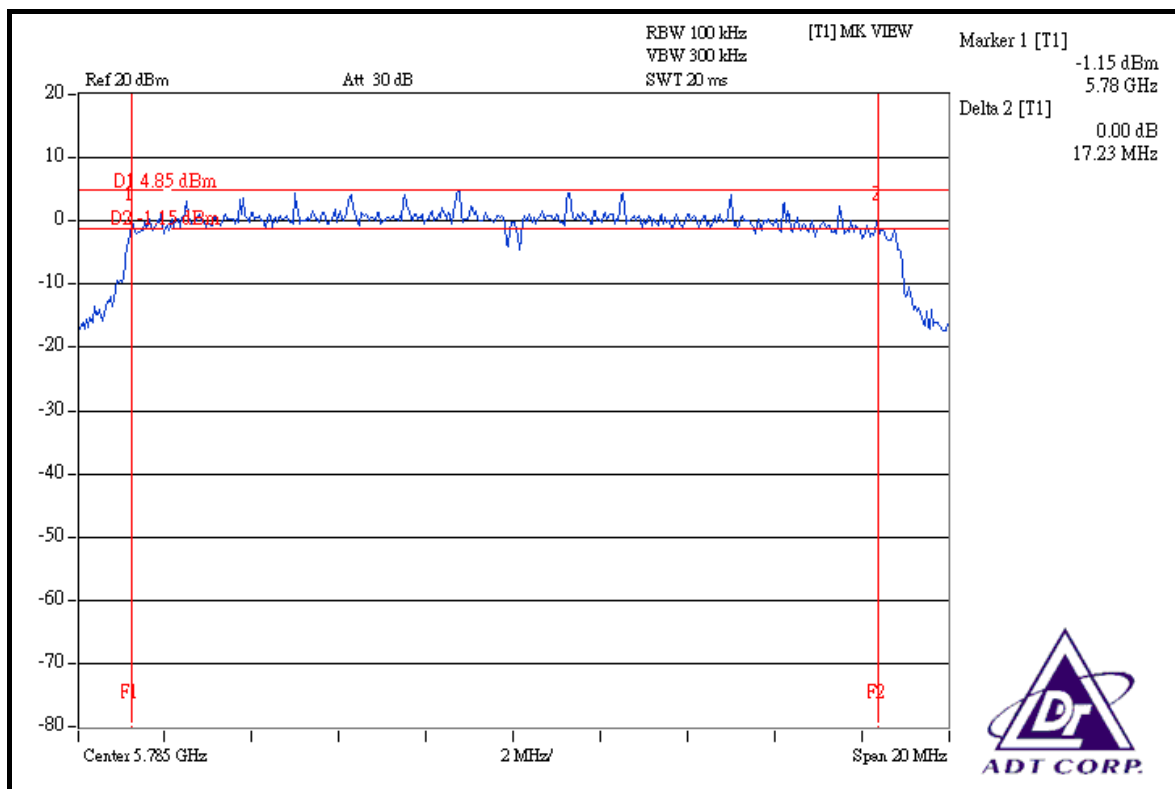
CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1		
149	5745	17.38	17.32	0.5	PASS
157	5785	17.23	17.21	0.5	PASS
165	5825	17.34	17.23	0.5	PASS



FOR CHAIN 0: CH 149

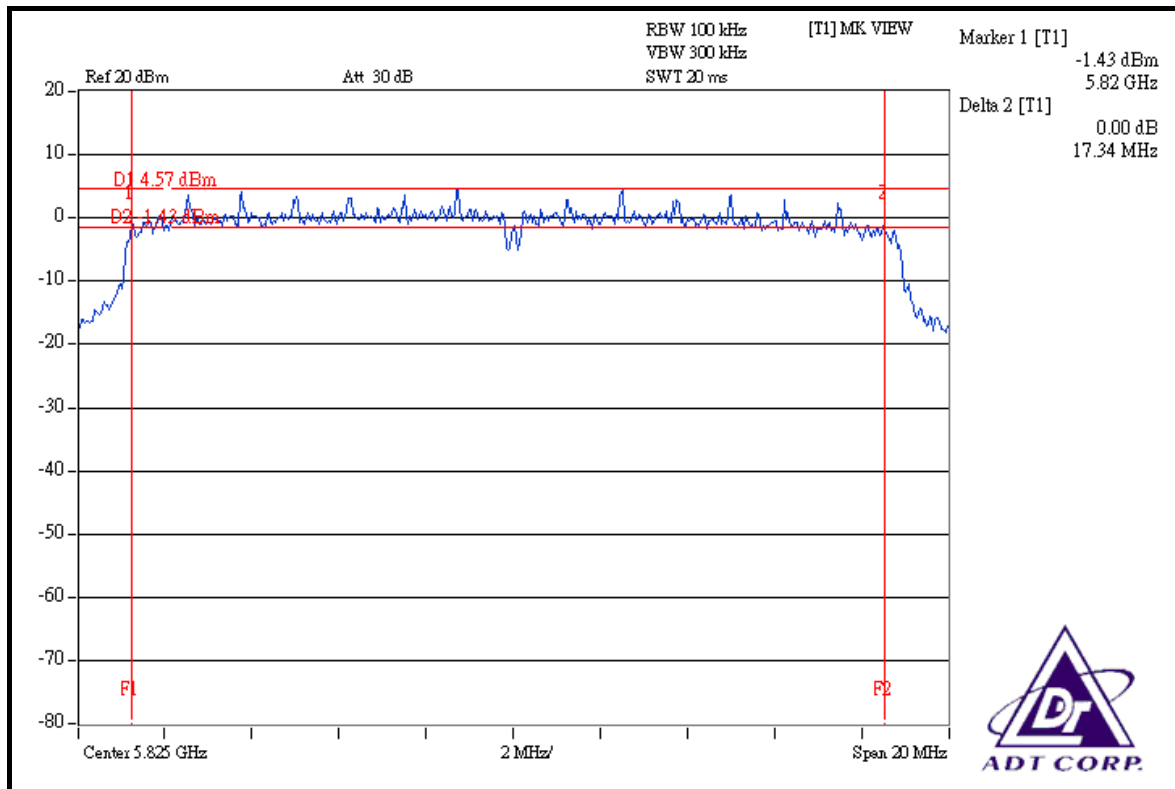


CH 157

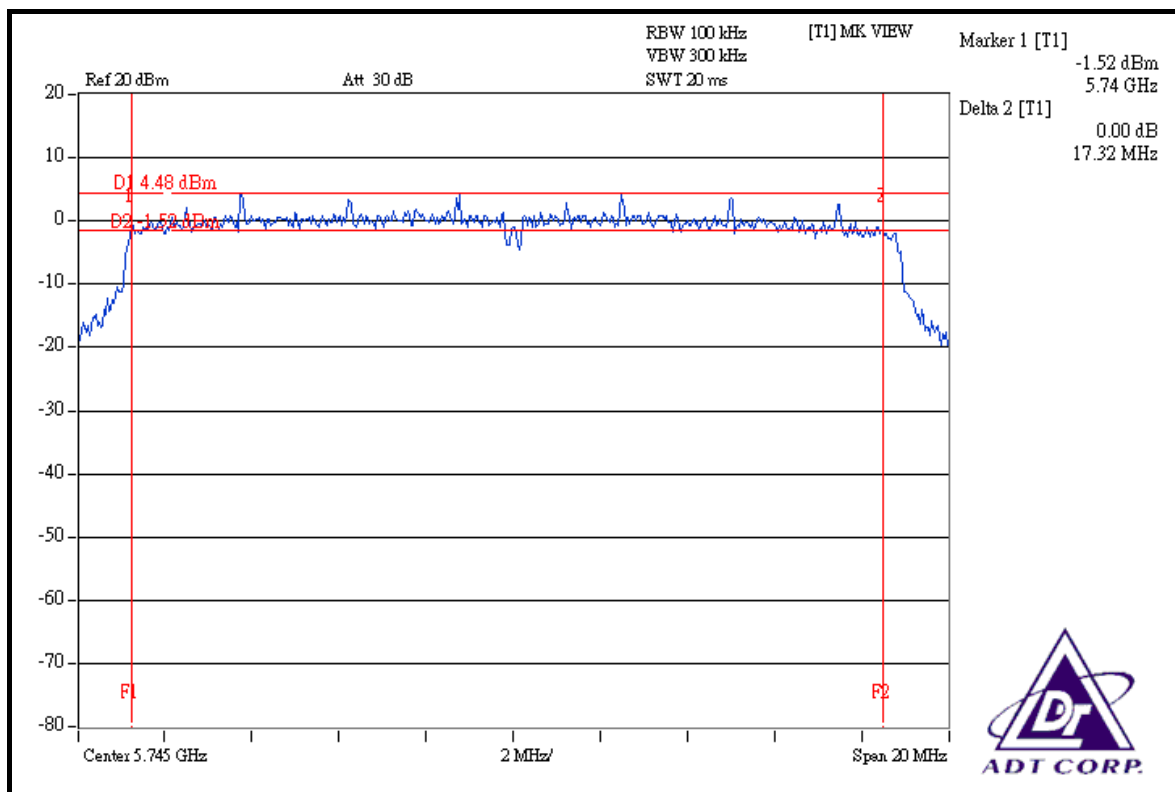




CH 165

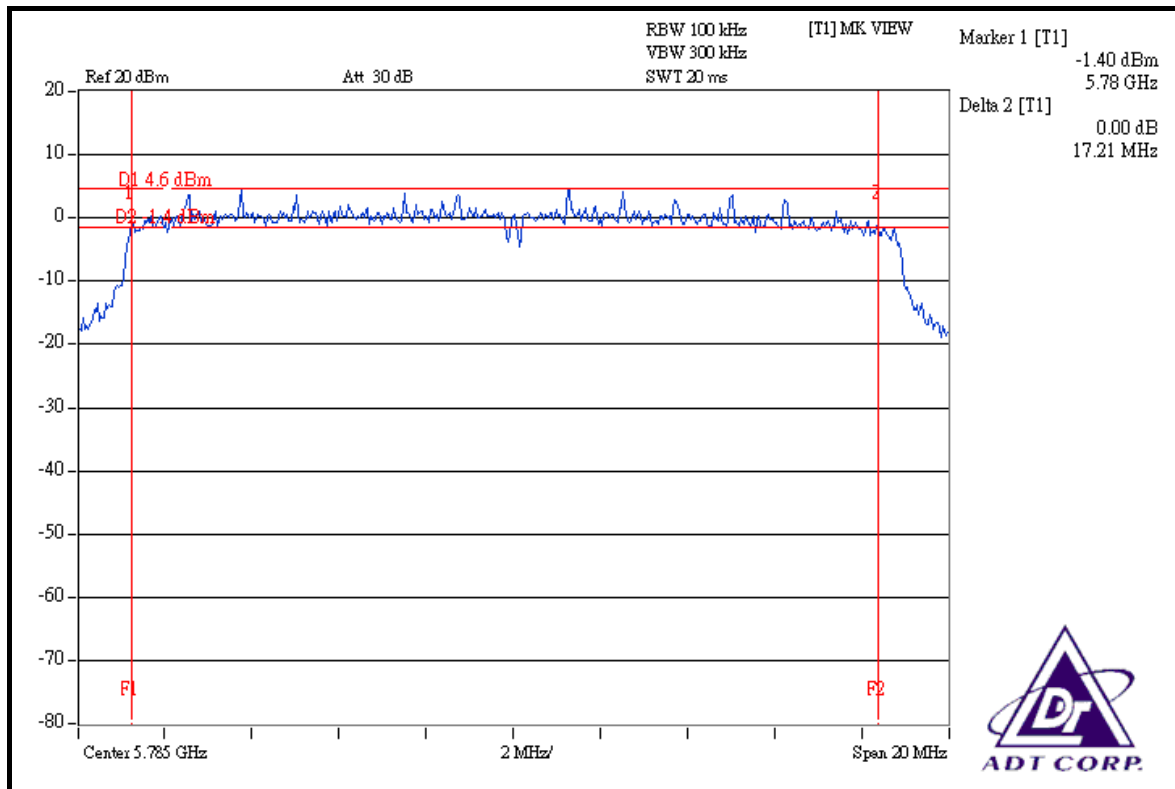


FOR CHAIN 1: CH 149

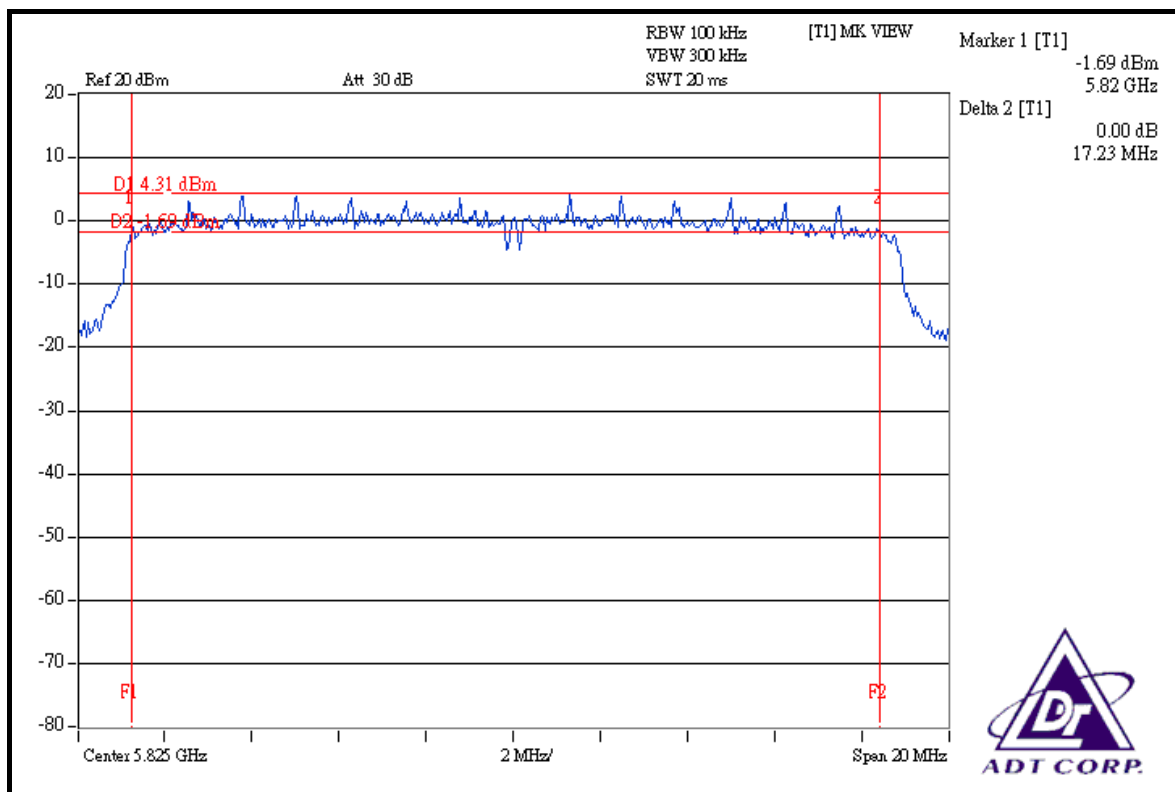




CH 157



CH 165





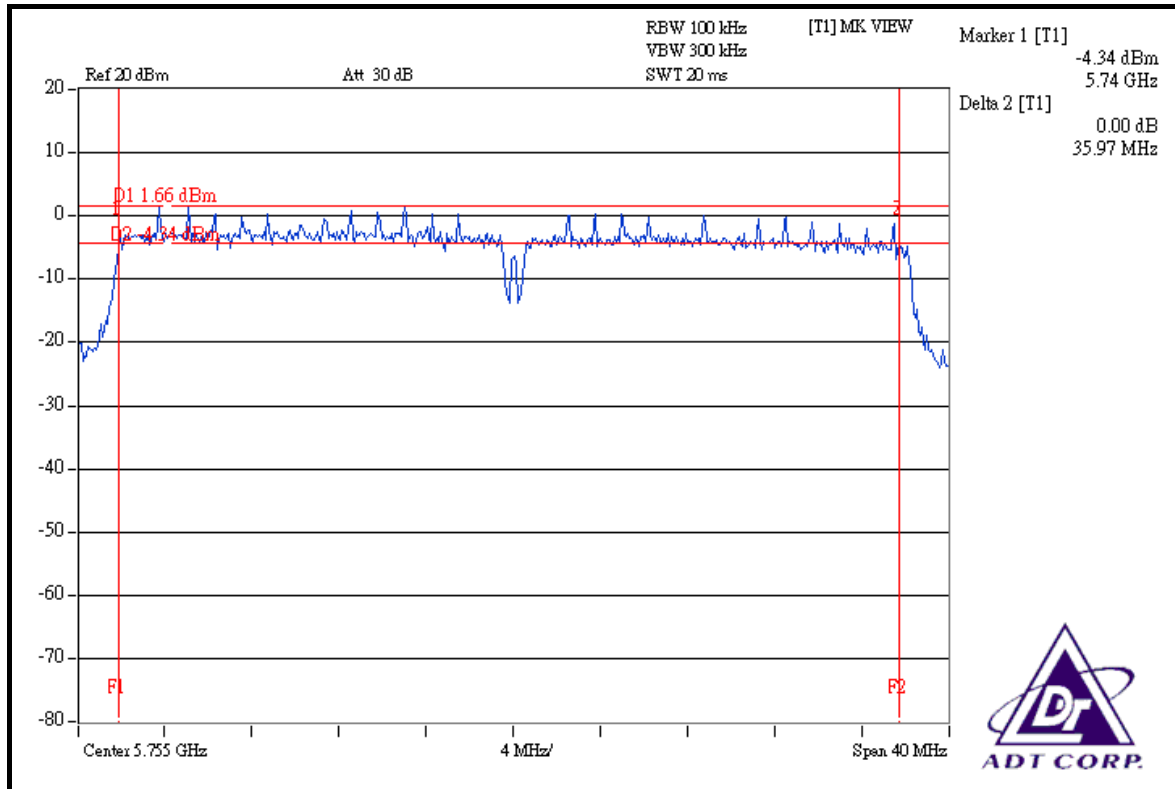
DRAFT 802.11n (40MHz) OFDM MODULATION

MODULATION TYPE	BPSK	TRANSFER RATE	15.0Mbps
INPUT POWER (SYSTEM)	120Vac, 60Hz	ENVIRONMENTAL CONDITIONS	25deg.C, 65%RH, 991hPa
TESTED BY	Brad Wu		

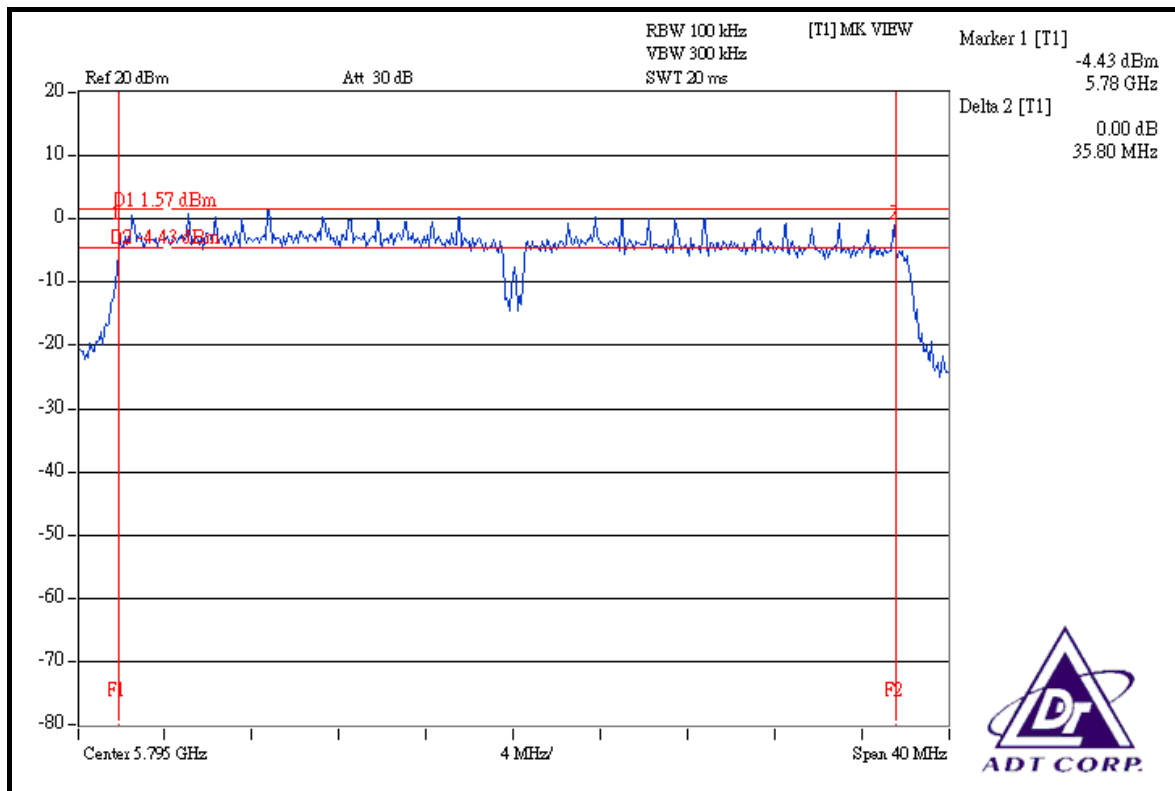
CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1		
151	5755	35.97	35.85	0.5	PASS
159	5795	35.80	35.80	0.5	PASS



FOR CHAIN 0: CH 151

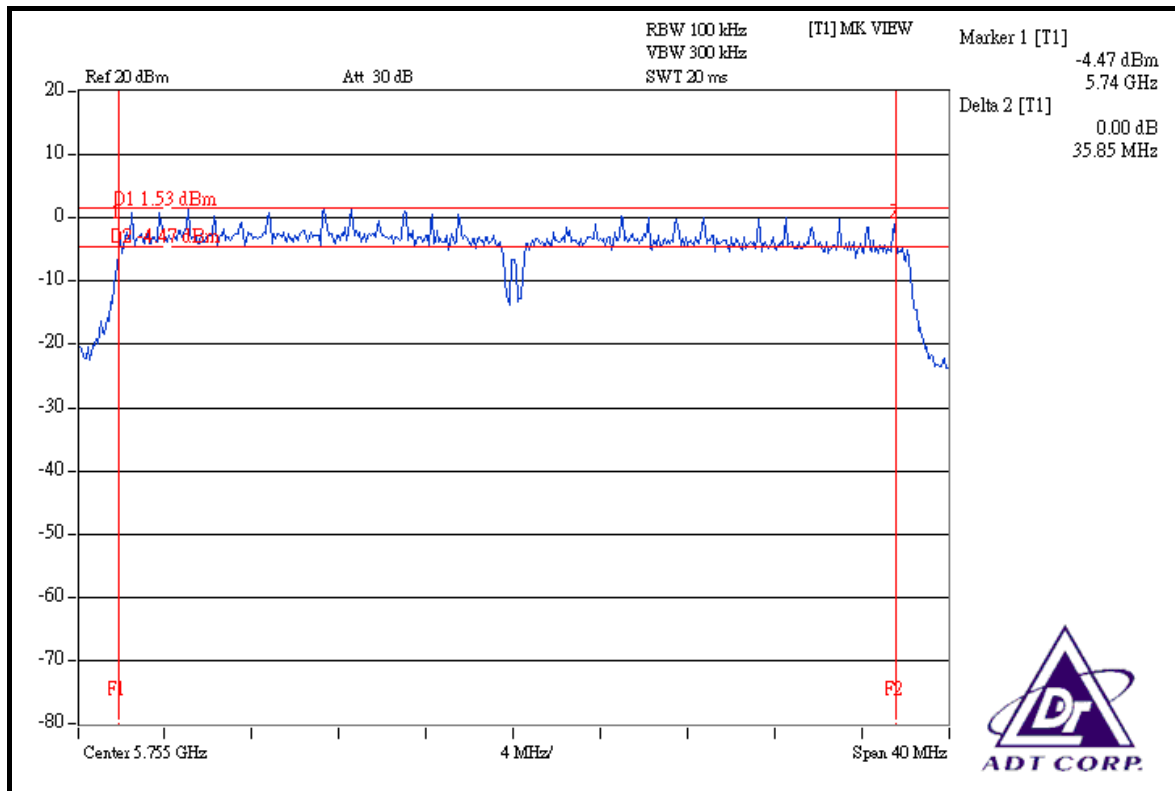


CH 159

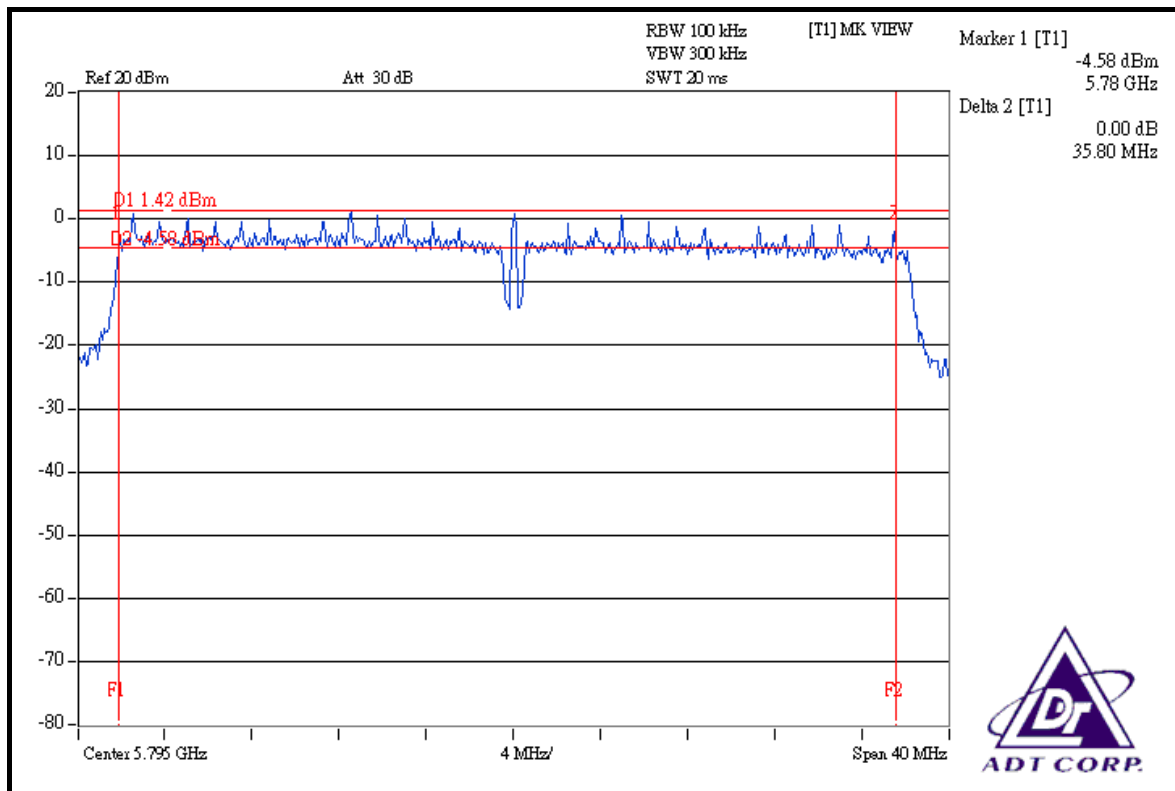




FOR CHAIN 1: CH 151



CH 159





5.4 MAXIMUM PEAK OUTPUT POWER

5.4.1 LIMITS OF MAXIMUM PEAK OUTPUT POWER MEASUREMENT

The Maximum Peak Output Power Measurement is 30dBm.

5.4.2 INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
R&S SPECTRUM ANALYZER	FSP40	100040	Jun. 28, 2008
AGILENT SYNTHESIZED SIGNAL GENERATOR	E8257C	MY43320668	Dec. 25, 2008
DIGITAL RT OSCILLOSCOPE	TDS1012	C037299	Nov. 21, 2008
NARDA DETECTOR	4503A	FSCM99899	NA

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

5.4.3 TEST PROCEDURES

- a. A detector was used on the output port of the EUT. An oscilloscope was used to read the response of the detector.
- b. Replaced the EUT by the signal generator. The center frequency of the S.G was adjusted to the center frequency of the measured channel.
- c. Adjusted the power to have the same reading on oscilloscope. Record the power level.

5.4.4 DEVIATION FROM TEST STANDARD

No deviation

5.4.5 TEST SETUP



5.4.6 EUT OPERATING CONDITIONS

Same as Item 5.3.6



5.4.7 TEST RESULTS

802.11a OFDM MODULATION

MODULATION TYPE	BPSK	TRANSFER RATE	6.0Mbps
INPUT POWER (SYSTEM)	120Vac, 60Hz	ENVIRONMENTAL CONDITIONS	25 deg.C, 65 %RH, 991hPa
TESTED BY	Brad Wu		

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (dBm)	PASS / FAIL
149	5745	128.233	21.08	30	PASS
157	5785	126.765	21.03	30	PASS
165	5825	127.057	21.04	30	PASS

DRAFT 802.11n (20MHz) OFDM MODULATION

MODULATION TYPE	BPSK	TRANSFER RATE	7.2Mbps
INPUT POWER (SYSTEM)	120Vac, 60Hz	ENVIRONMENTAL CONDITIONS	25 deg.C, 65 %RH, 991hPa
TESTED BY	Brad Wu		

CHAN.	CHAN. FREQ. (MHz)	PEAK POWER OUTPUT (dBm)		TOTAL PEAK POWER (mW)	TOTAL PEAK POWER (dBm)	PEAK POWER LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
149	5745	18.09	18.09	128.834	21.10	30	PASS
157	5785	18.02	18.05	127.213	21.05	30	PASS
165	5825	18.01	18.09	127.658	21.06	30	PASS



DRAFT 802.11n (40MHz) OFDM MODULATION

MODULATION TYPE	BPSK	TRANSFER RATE	15.0Mbps
INPUT POWER (SYSTEM)	120Vac, 60Hz	ENVIRONMENTAL CONDITIONS	25 deg.C, 65 %RH, 991hPa
TESTED BY	Brad Wu		

CHAN.	CHAN. FREQ. (MHz)	PEAK POWER OUTPUT (dBm)		TOTAL PEAK POWER (mW)	TOTAL PEAK POWER (dBm)	PEAK POWER LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
151	5755	18.03	18.10	128.099	21.08	30	PASS
159	5795	18.04	18.09	128.096	21.08	30	PASS



5.5 POWER SPECTRAL DENSITY MEASUREMENT

5.5.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

The Maximum of Power Spectral Density Measurement is 8dBm.

5.5.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
R&S SPECTRUM ANALYZER	FSP40	100040	Jun. 28, 2008

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

5.5.3 TEST PROCEDURE

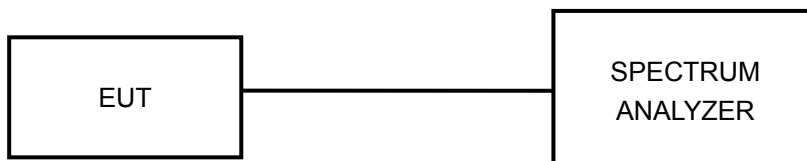
The transmitter output was connected to the spectrum analyzer through an attenuator, the bandwidth of the fundamental frequency was measured with the spectrum analyzer using 3kHz RBW and 30kHz VBW, set sweep time = span/3kHz. The power spectral density was measured and recorded.

The sweep time is allowed to be longer than span/3kHz for a full response of the mixer in the spectrum analyzer.

5.5.4 DEVIATION FROM TEST STANDARD

No deviation

5.5.5 TEST SETUP



5.5.6 EUT OPERATING CONDITION

Same as Item 5.3.6



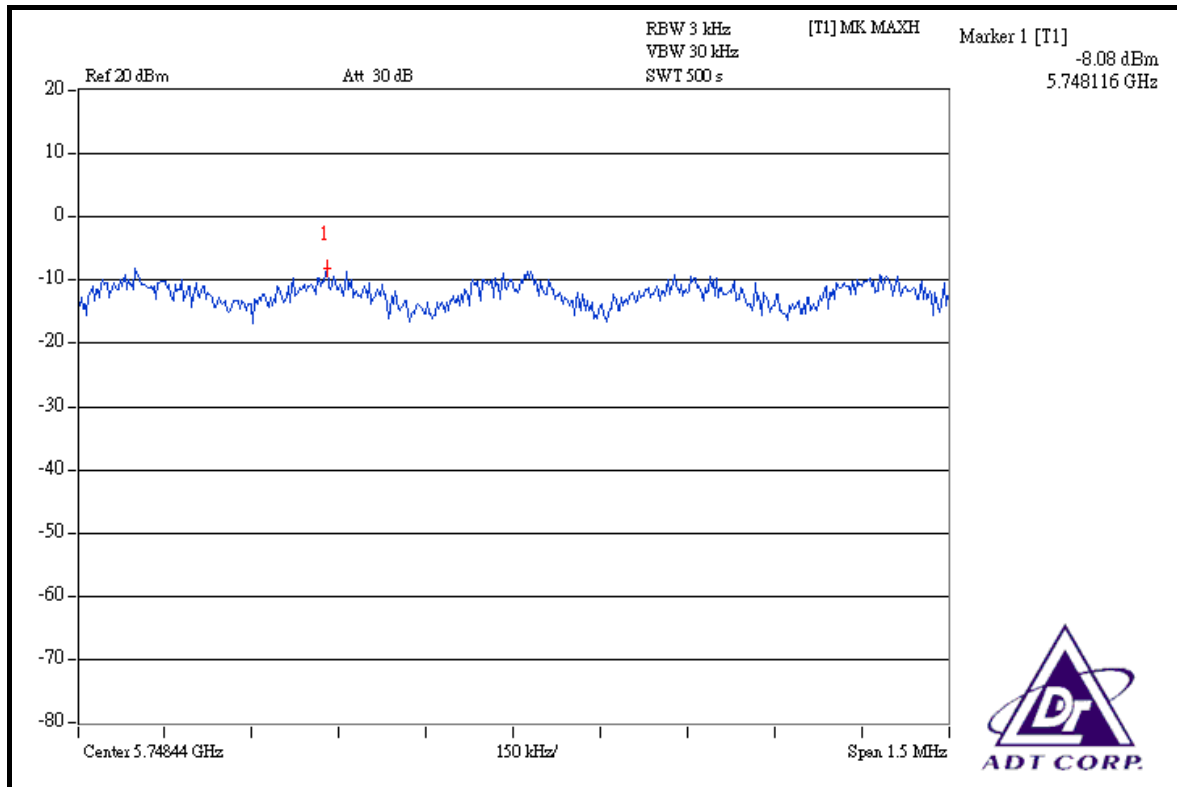
5.5.7 TEST RESULTS

802.11a OFDM MODULATION

MODULATION TYPE	BPSK	TRANSFER RATE	6.0Mbps
INPUT POWER (SYSTEM)	120Vac, 60Hz	ENVIRONMENTAL CONDITIONS	25 deg.C, 65 %RH, 991hPa
TESTED BY	Brad Wu		

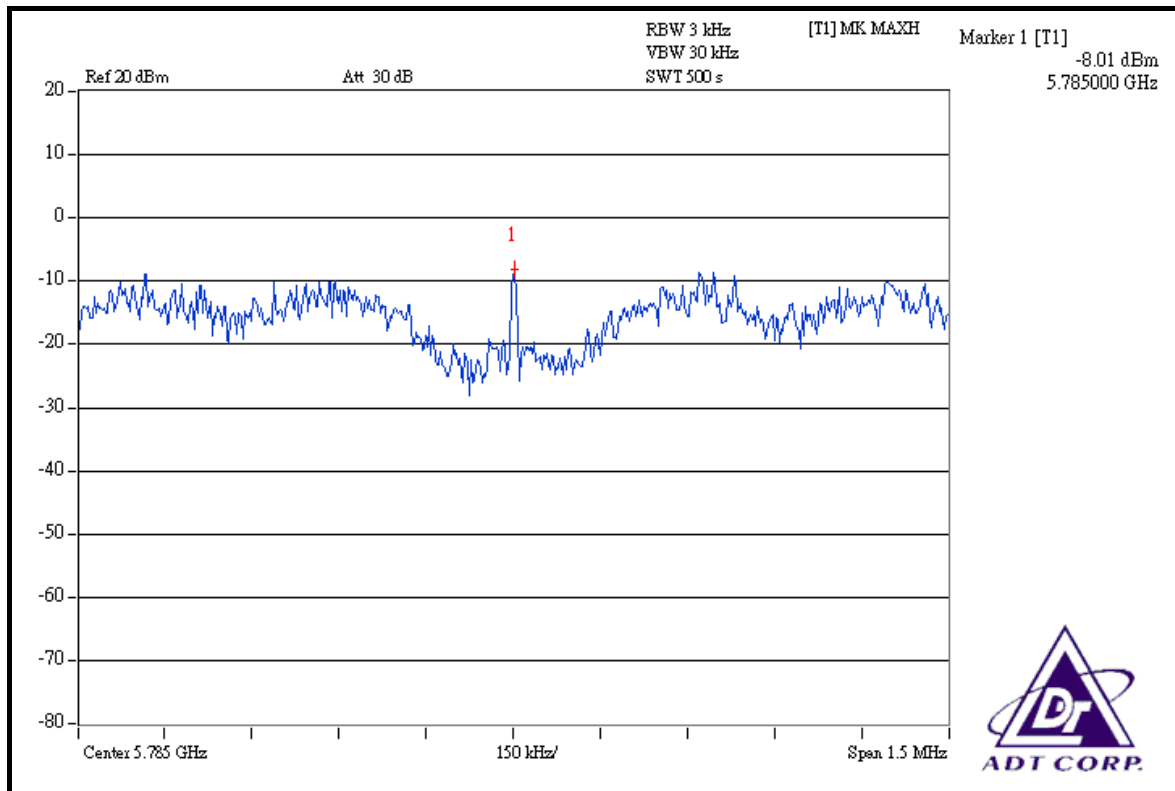
CHANNEL	CHANNEL FREQUENCY (MHz)	RF POWER LEVEL IN 3kHz BW (dBm)	MAXIMUM LIMIT (dBm)	PASS / FAIL
149	5745	-8.08	8	PASS
157	5785	-8.01	8	PASS
165	5825	-7.91	8	PASS

CH 149

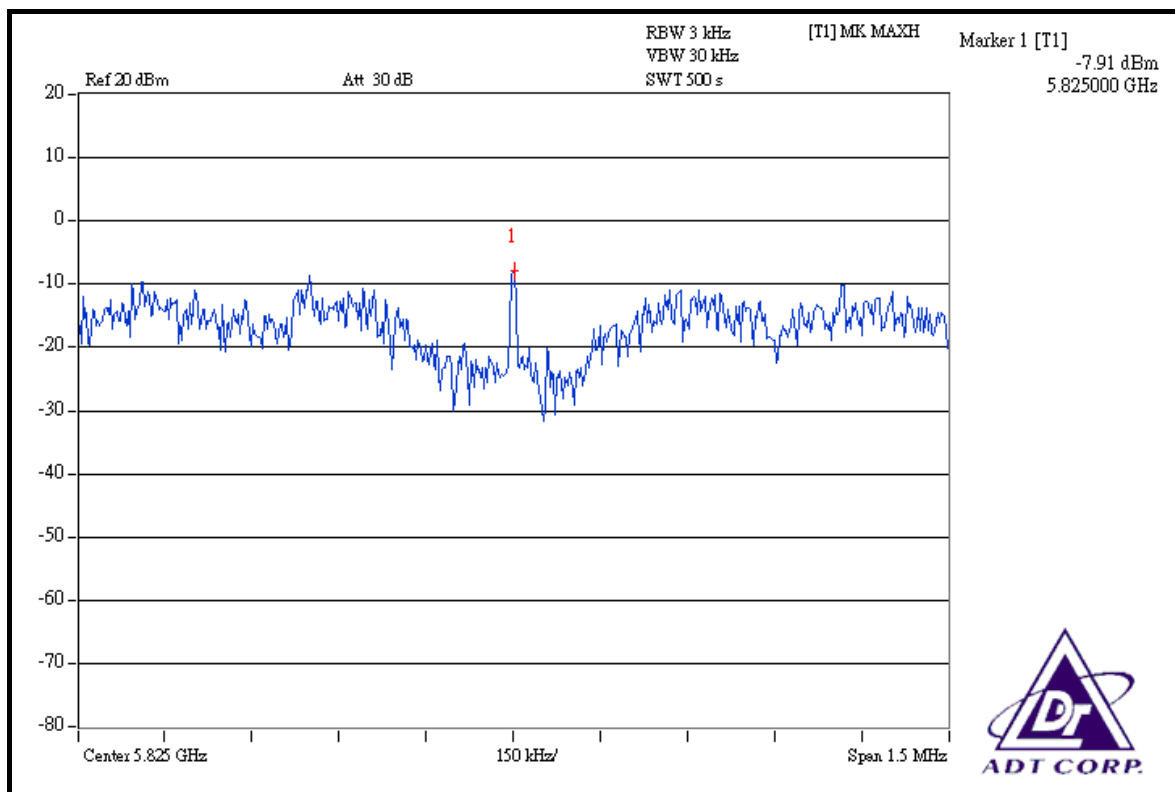




CH 157



CH 165





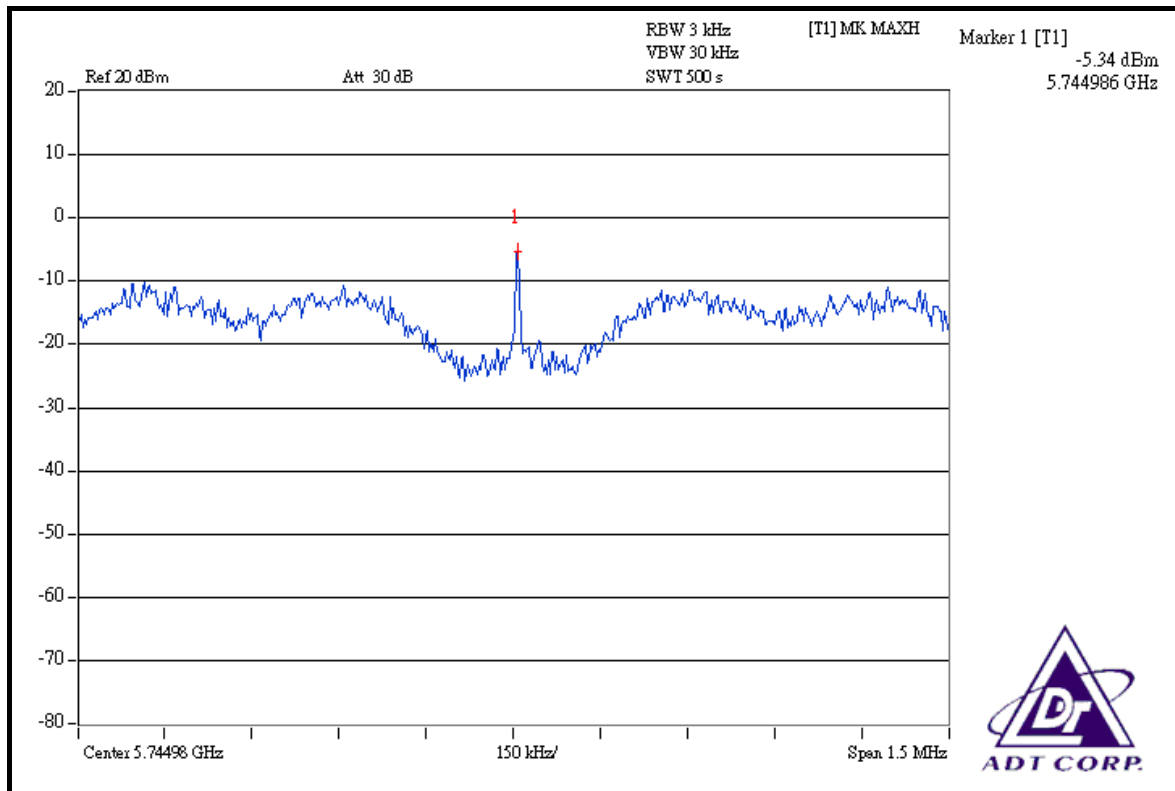
DRAFT 802.11n (20MHz) OFDM MODULATION

MODULATION TYPE	BPSK	TRANSFER RATE	7.2Mbps
INPUT POWER (SYSTEM)	120Vac, 60Hz	ENVIRONMENTAL CONDITIONS	25 deg.C, 65 %RH, 991hPa
TESTED BY	Brad Wu		

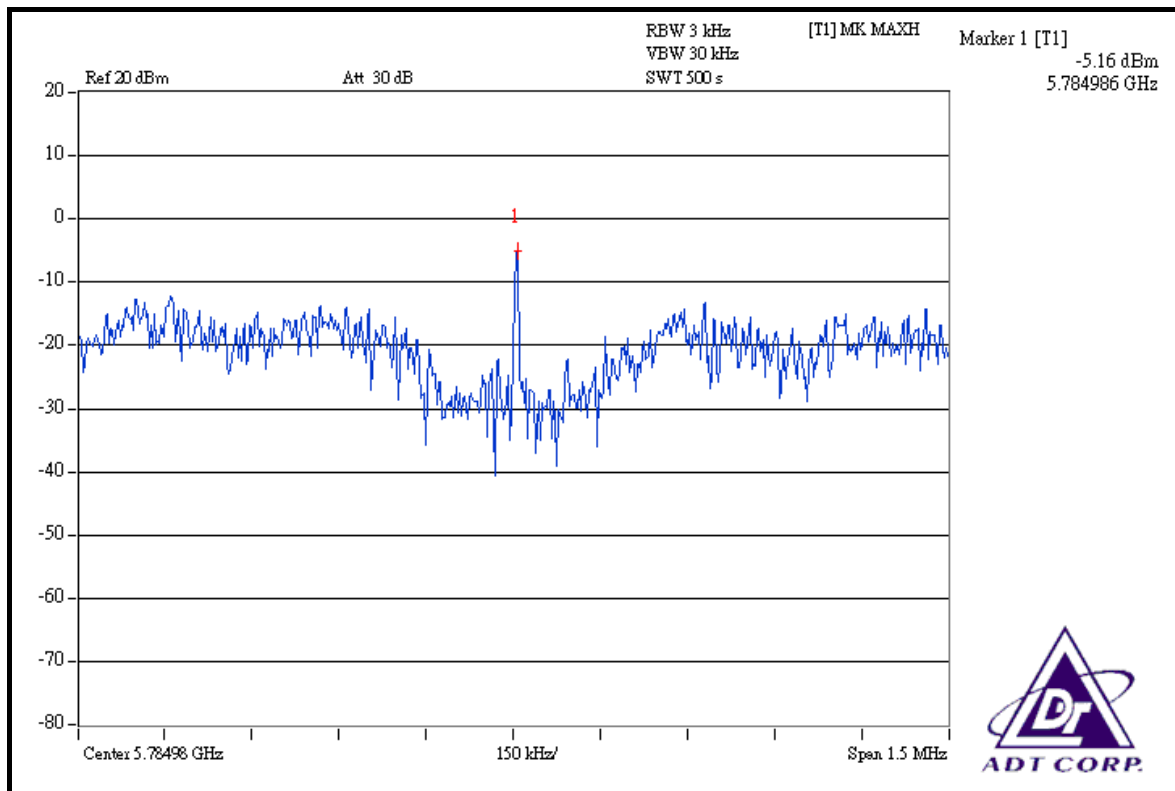
CHAN.	CHAN. FREQ. (MHz)	RF POWER LEVEL IN 3kHz BW (dBm)		TOTAL POWER DENSITY (mW)	TOTAL POWER DENSITY (dBm)	MAX. LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
149	5745	-5.34	-5.65	0.565	-2.48	8	PASS
157	5785	-5.16	-5.56	0.583	-2.35	8	PASS
165	5825	-5.32	-5.57	0.571	-2.43	8	PASS



FOR CHAIN 0: CH 149

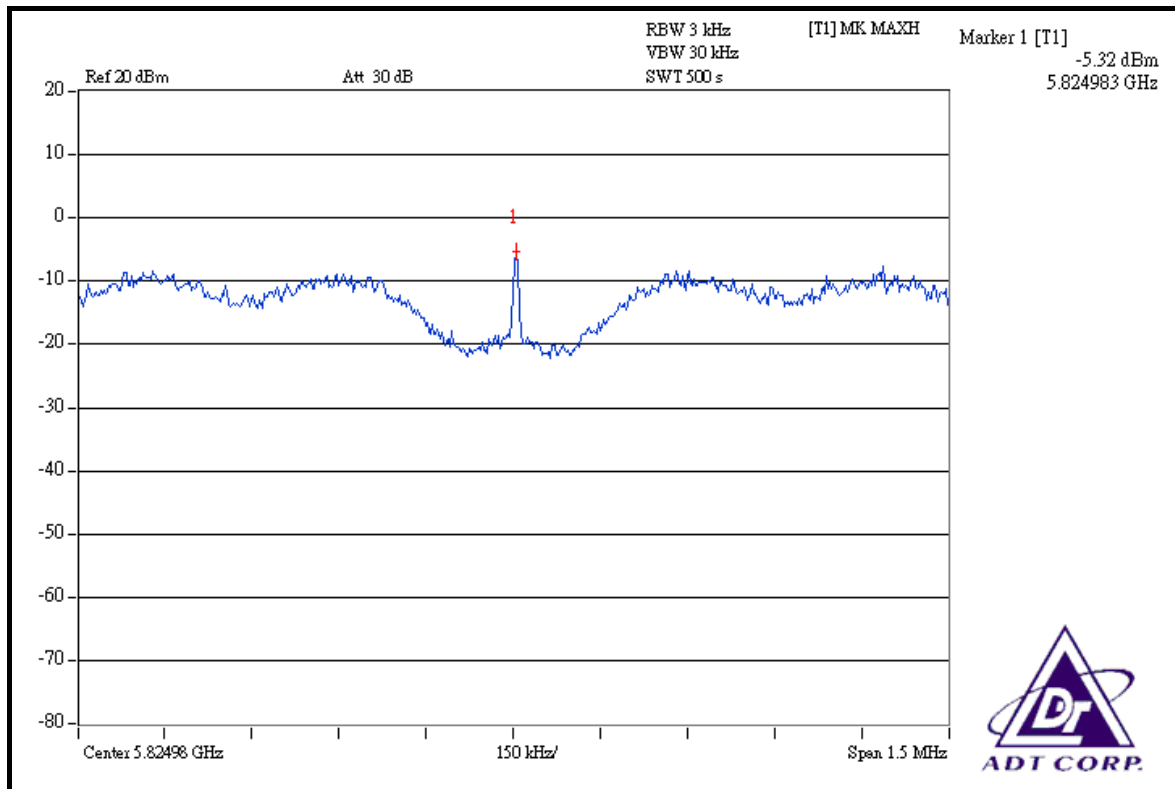


CH 157

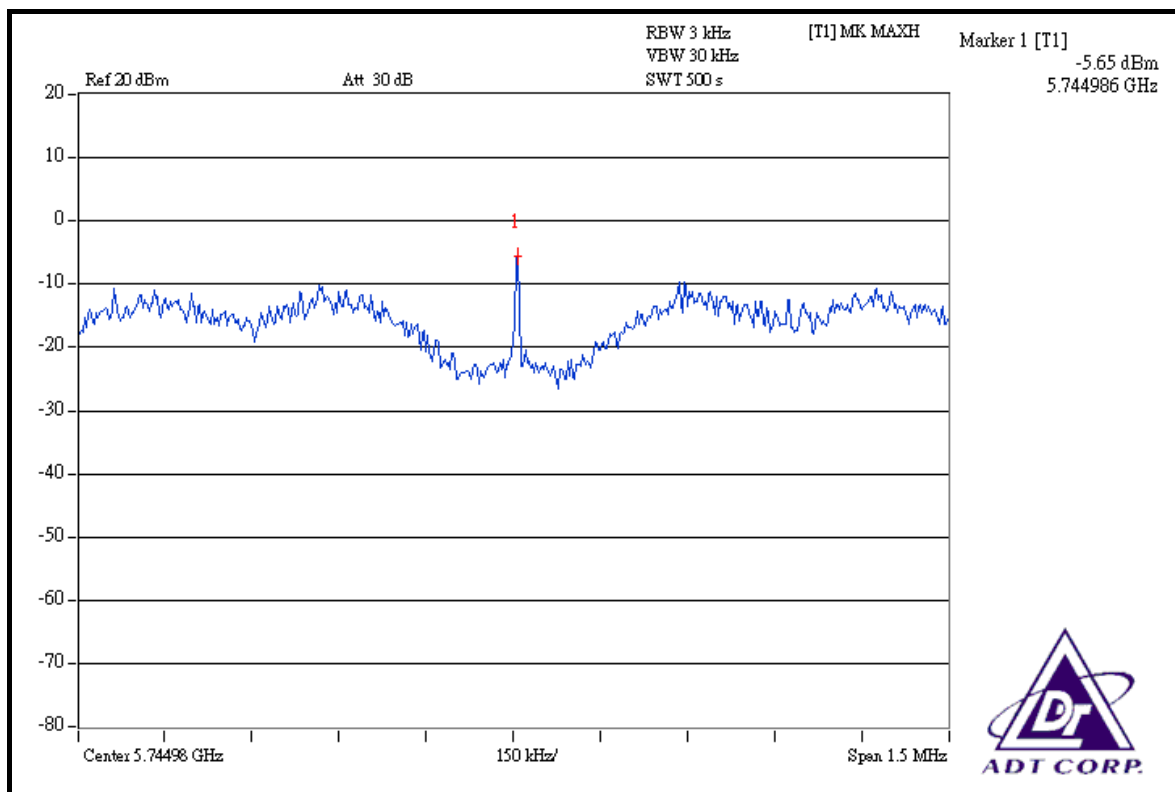




CH 165

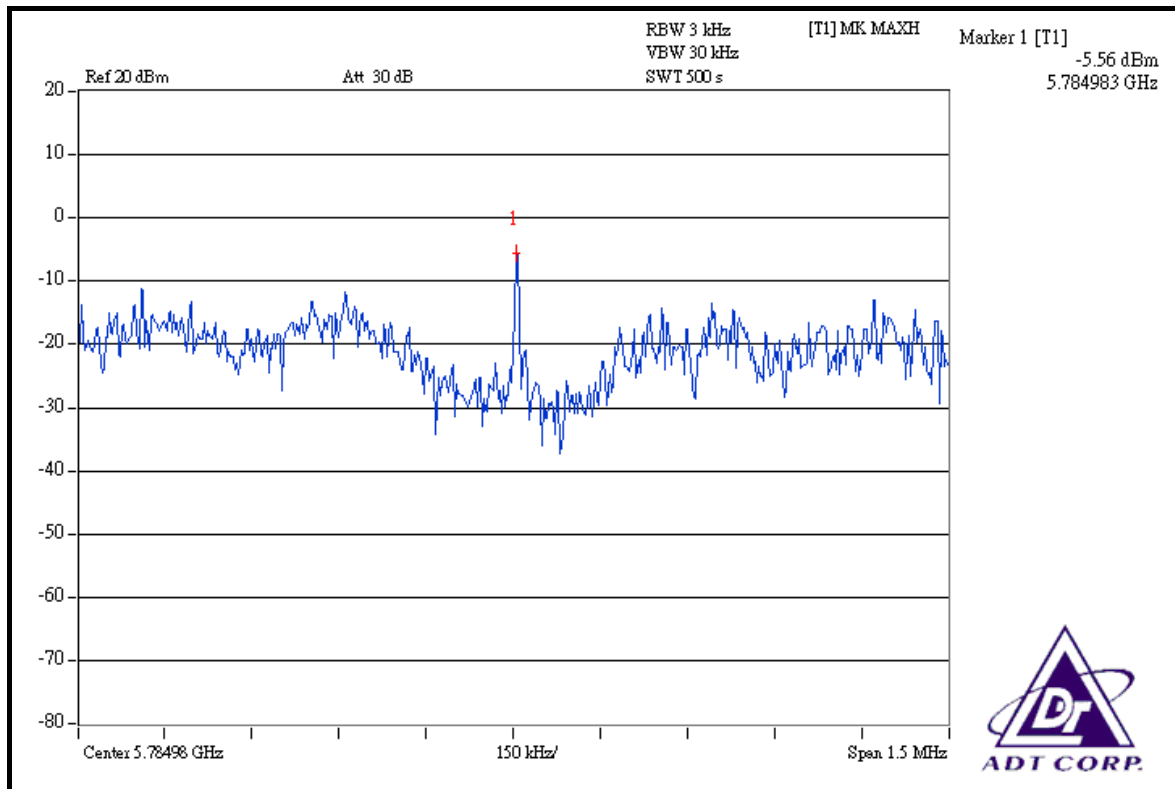


FOR CHAIN 1: CH 149

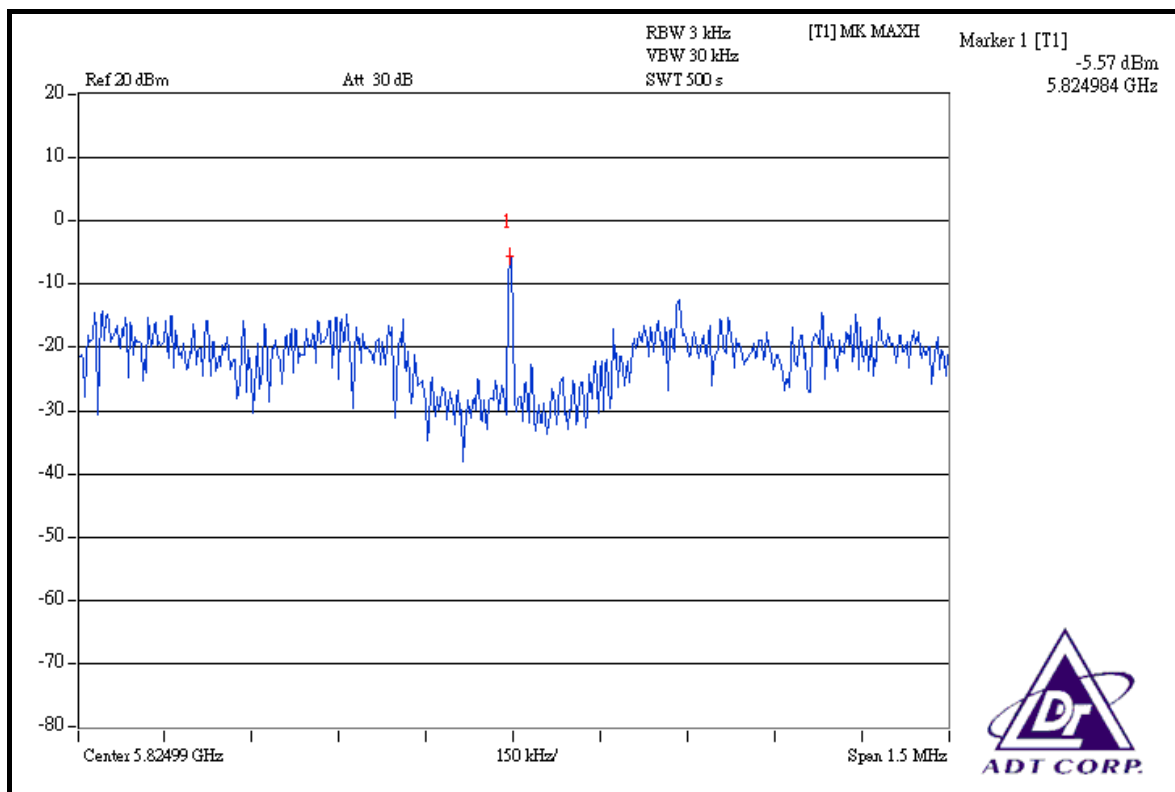




CH 157



CH 165





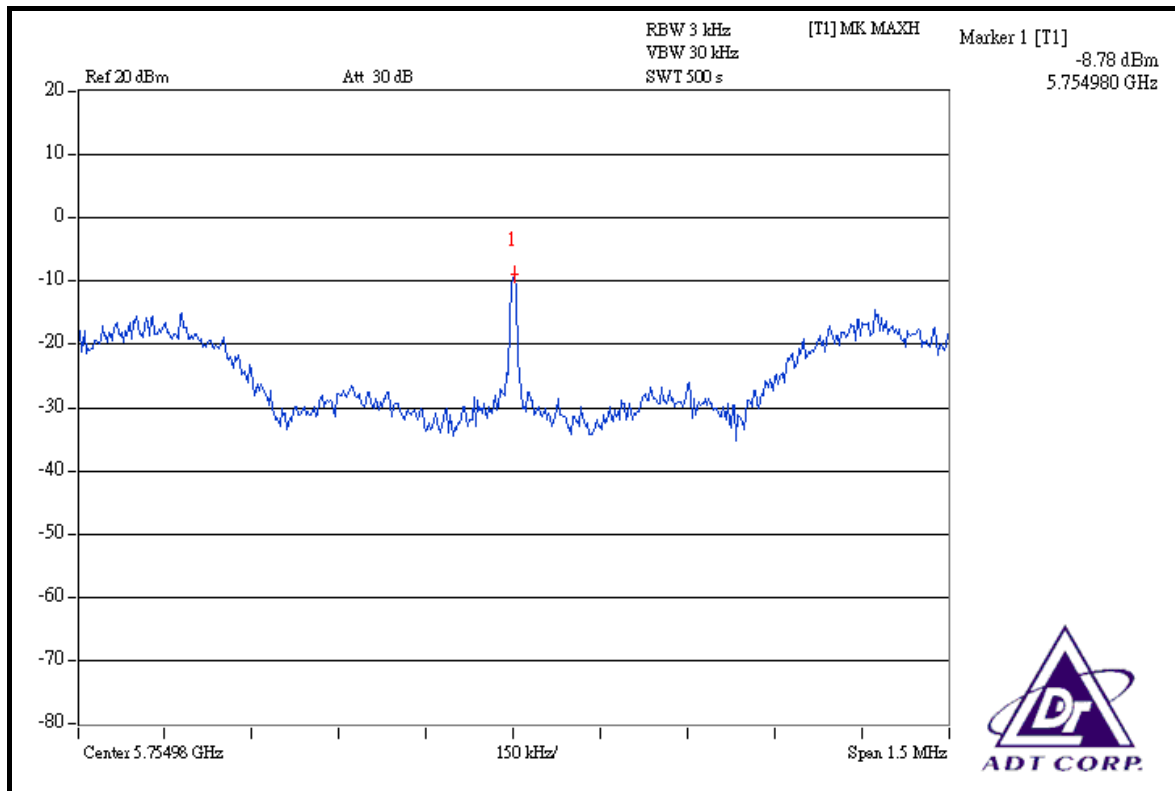
DRAFT 802.11n (40MHz) OFDM MODULATION

MODULATION TYPE	BPSK	TRANSFER RATE	15.0Mbps
INPUT POWER (SYSTEM)	120Vac, 60Hz	ENVIRONMENTAL CONDITIONS	25 deg.C, 65 %RH, 991hPa
TESTED BY	Brad Wu		

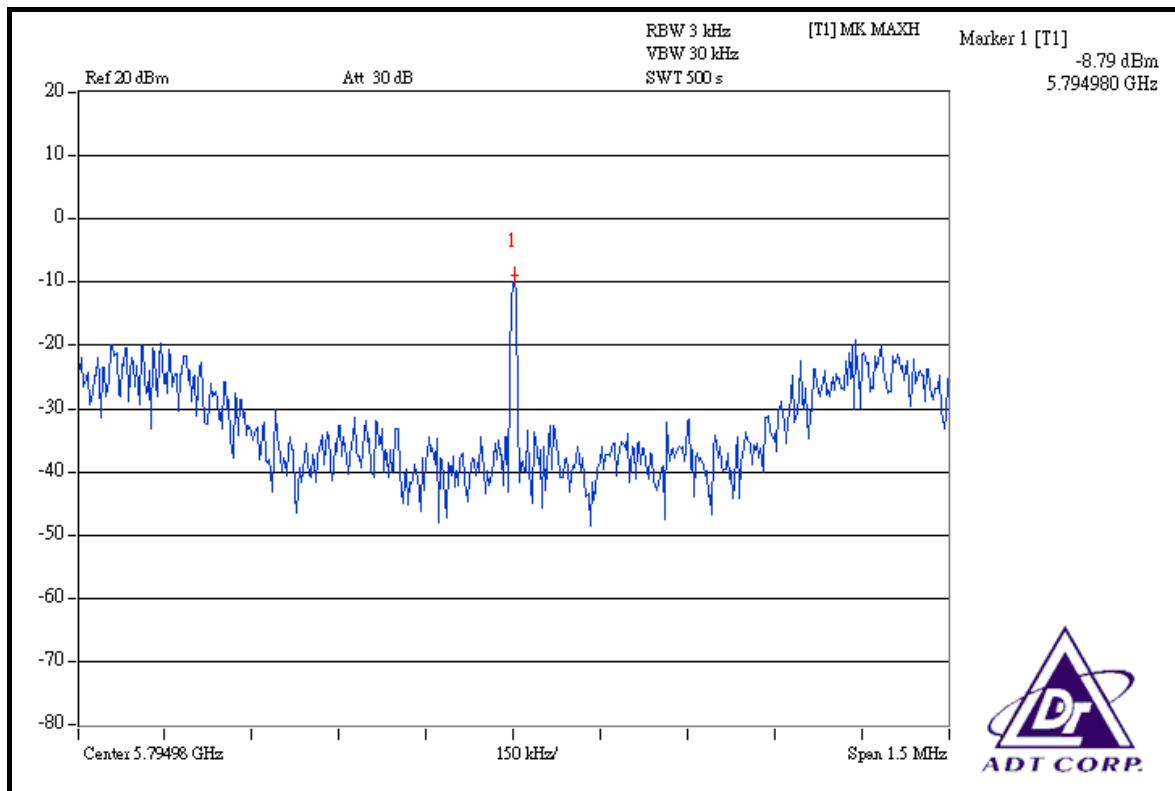
CHAN.	CHAN. FREQ. (MHz)	RF POWER LEVEL IN 3kHz BW (dBm)		TOTAL POWER DENSITY (mW)	TOTAL POWER DENSITY (dBm)	MAX. LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
151	5755	-8.78	-9.79	0.237	-6.25	8	PASS
159	5795	-8.79	-9.73	0.239	-6.22	8	PASS



FOR CHAIN 0: CH 151

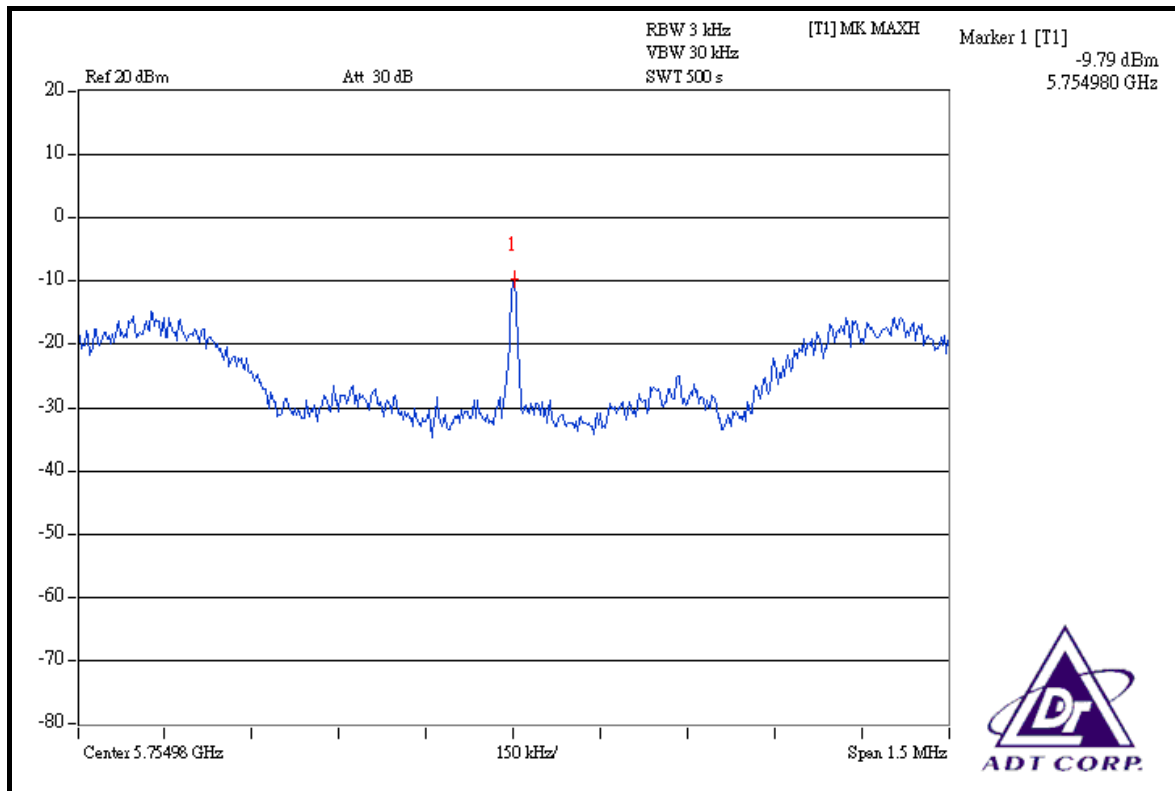


CH 159

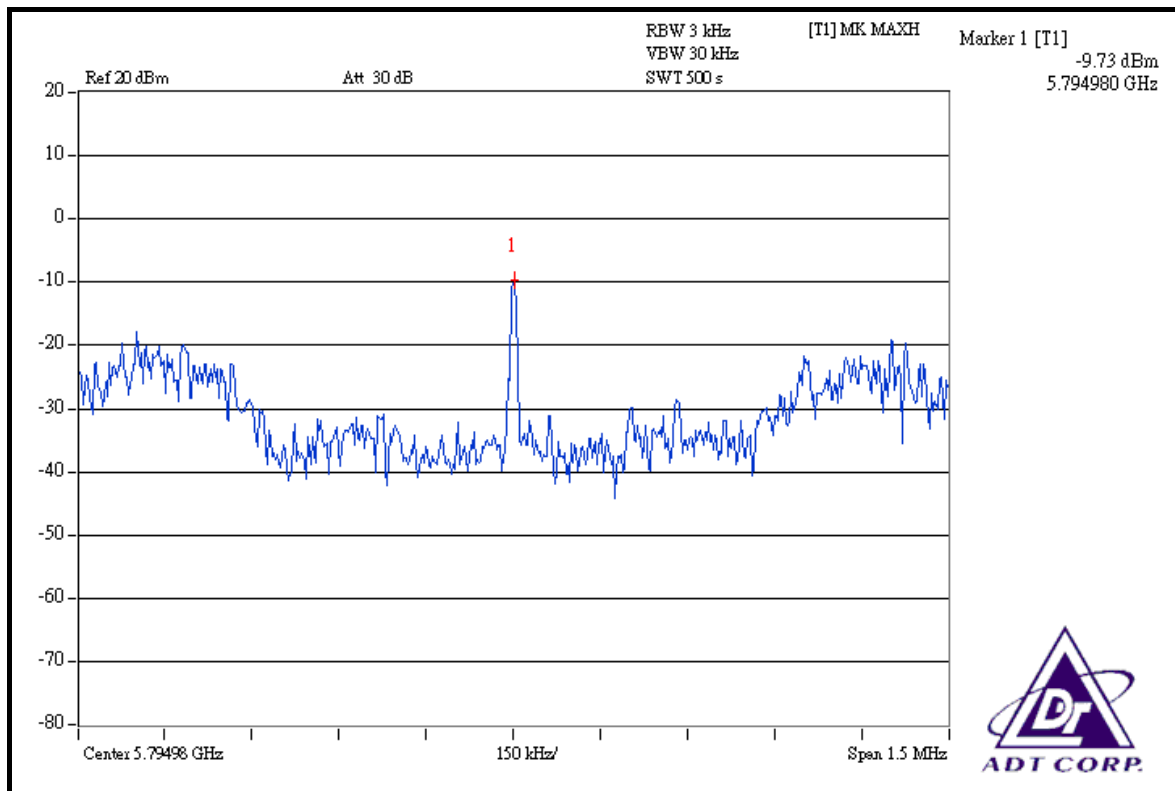




FOR CHAIN 1: CH 151



CH 159





5.6 BAND EDGES MEASUREMENT

5.6.1 LIMITS OF BAND EDGES MEASUREMENT

Below -20dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

5.6.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
FOR CONDUCTED MEASUREMENT:			
R&S SPECTRUM ANALYZER	FSP40	100040	Jun. 28, 2008
FOR RADIATED MEASUREMENT:			
Test Receiver ROHDE & SCHWARZ	ESI7	838496/016	Dec. 25, 2008
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100039	Dec. 02, 2008
BILOG Antenna SCHWARZBECK	VULB9168	9168-155	Jan. 03, 2009
HORN Antenna SCHWARZBECK	BBHA 9120D	9120D-405	Dec. 17, 2008
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170242	Jan. 06, 2009
Preamplifier Agilent	8449B	3008A01910	Sep. 19, 2008
Preamplifier Agilent	8447D	2944A10634	Dec. 12, 2008
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	274397/4	Nov. 07, 2008
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	283401/4	Nov. 07, 2008
Software ADT.	ADT_Radiated_V7.6	NA	NA
Antenna Tower inn-co GmbH	MA 4000	010303	NA
Turn Table ADT.	TT100.	TT93021704	NA
Turn Table Controller ADT.	SC100.	SC93021704	NA

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

5.6.3 TEST PROCEDURE

FOR CONDUCTED MEASUREMENT:

The transmitter output was connected to the spectrum analyzer via a low loss cable. 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.

FOR RADIATED MEASUREMENT:

- a. 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.
- 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. 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.

5.6.4 DEVIATION FROM TEST STANDARD

No deviation

5.6.5 EUT OPERATING CONDITION

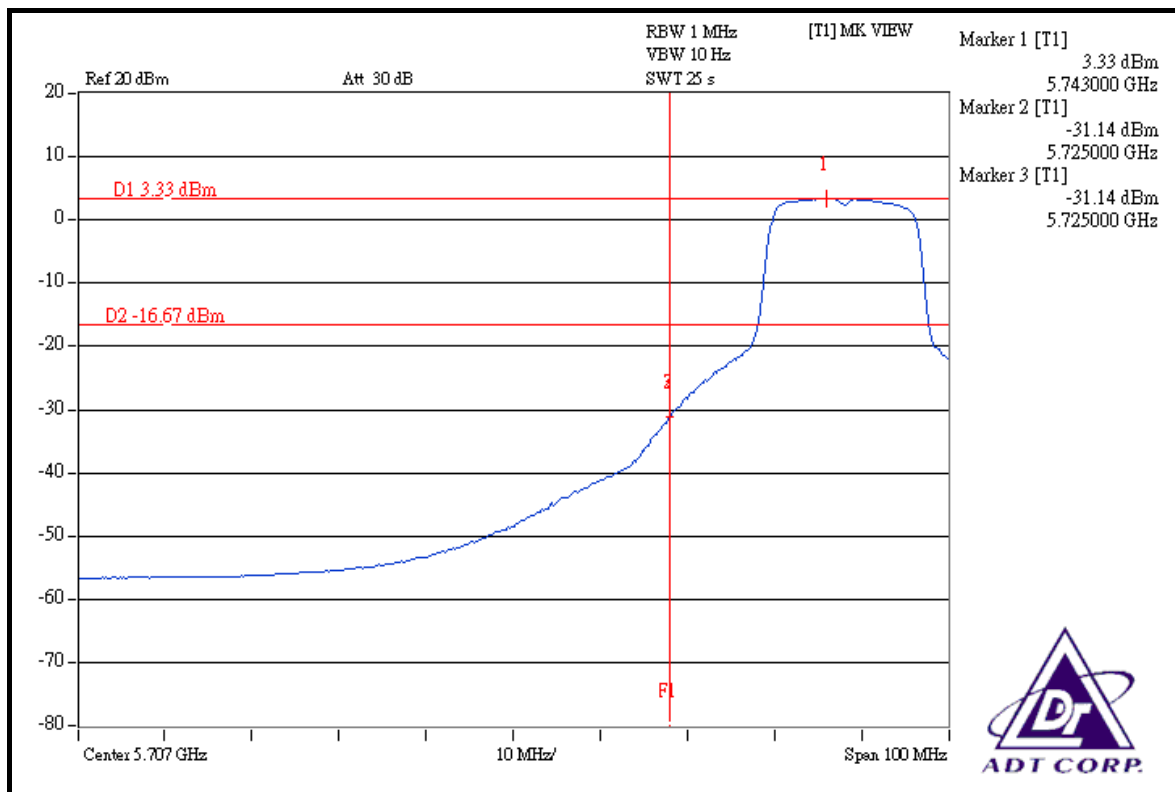
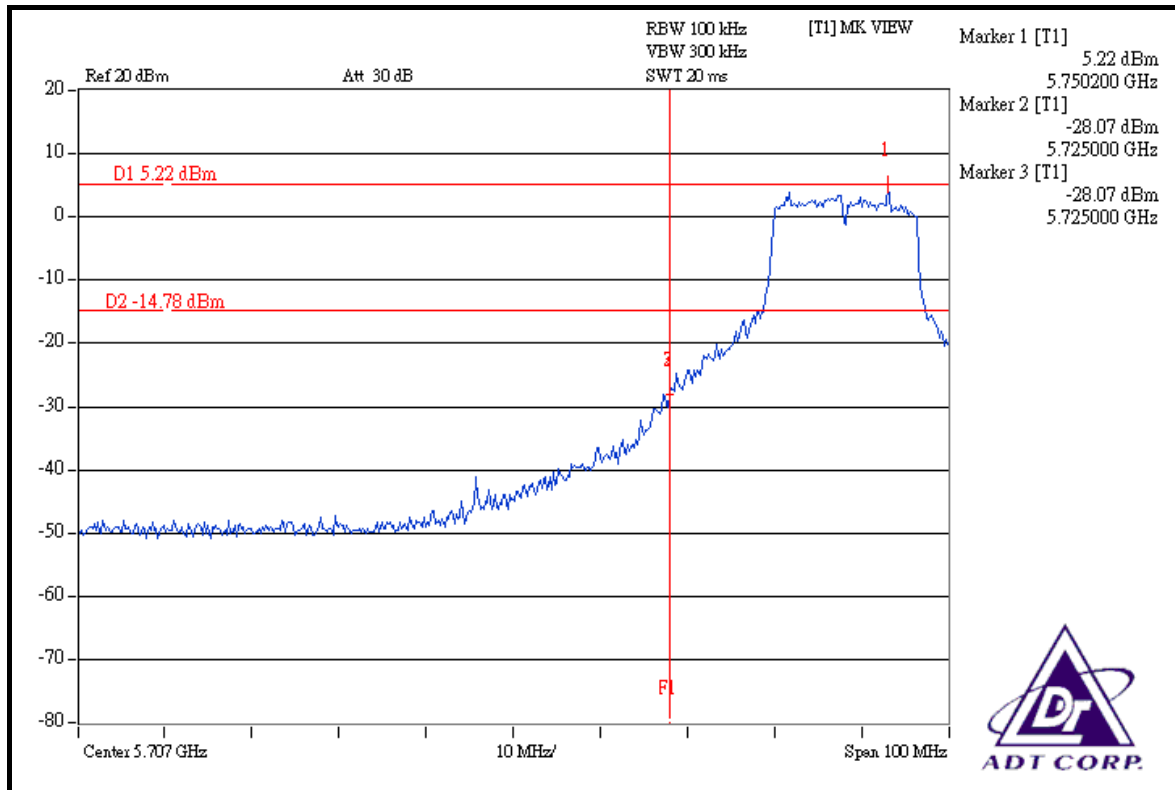
Same as Item 5.3.6

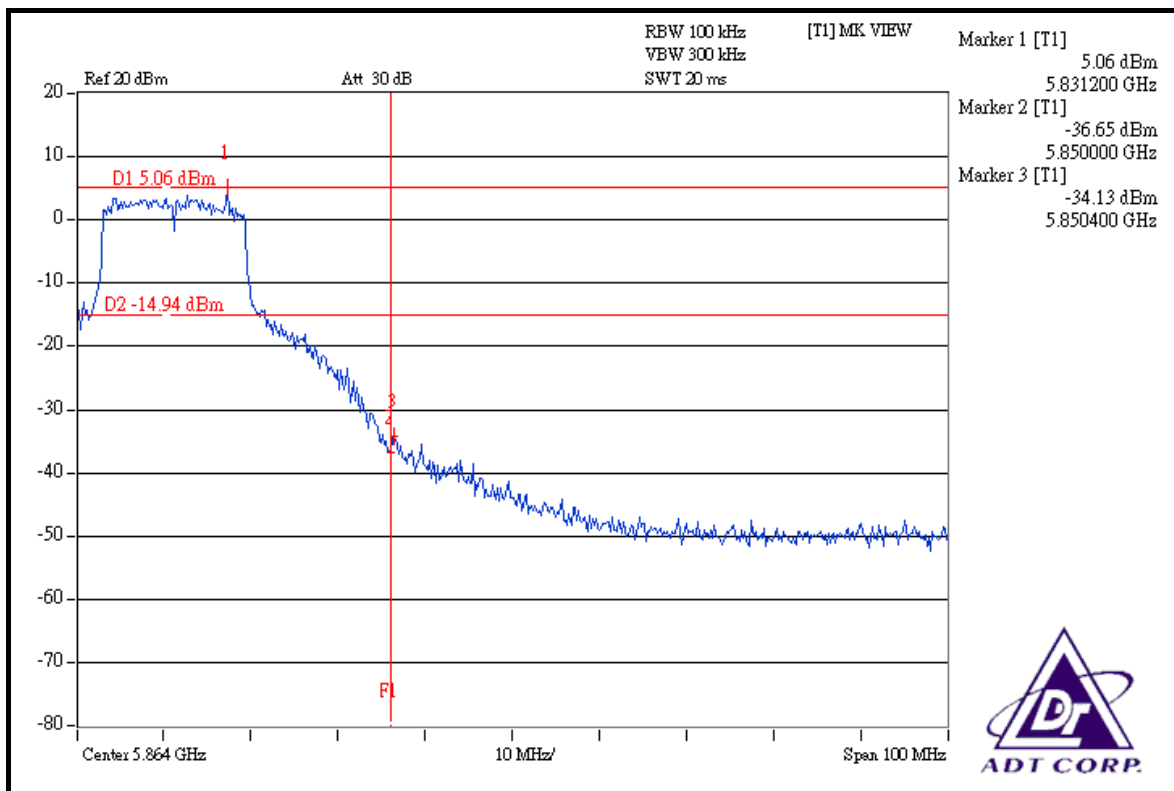
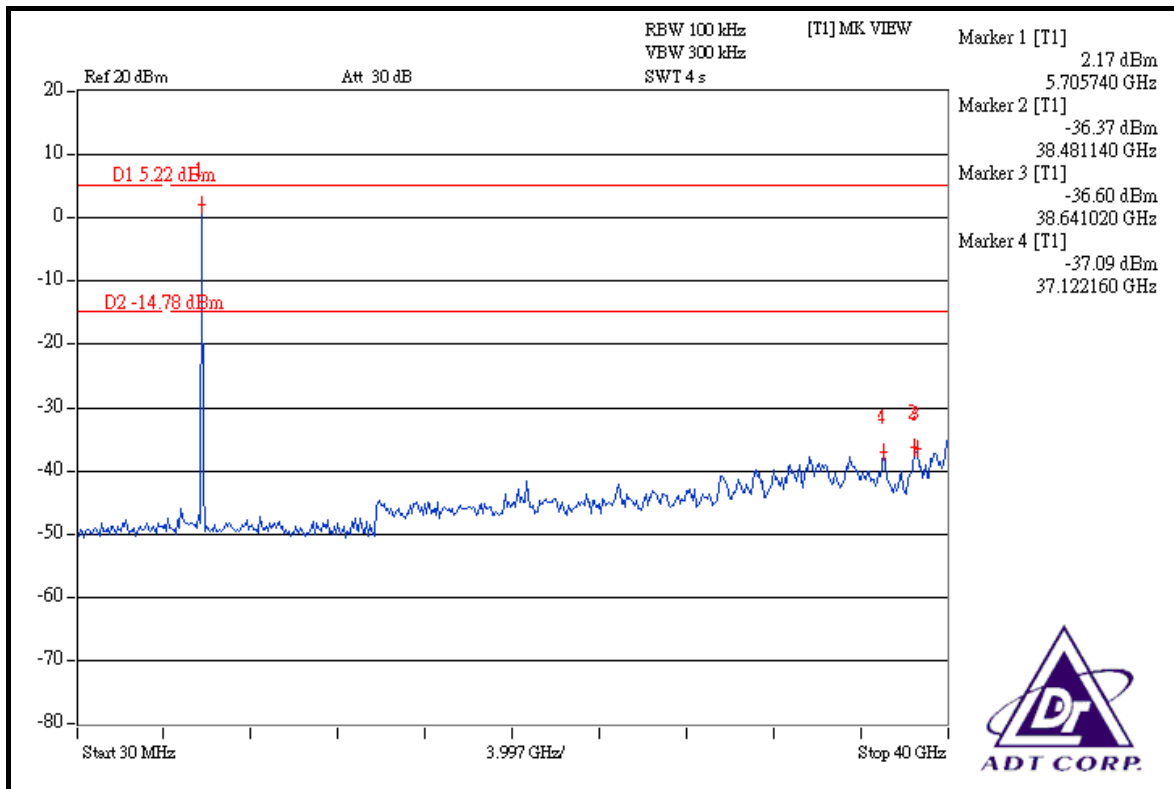
5.6.6 TEST RESULTS

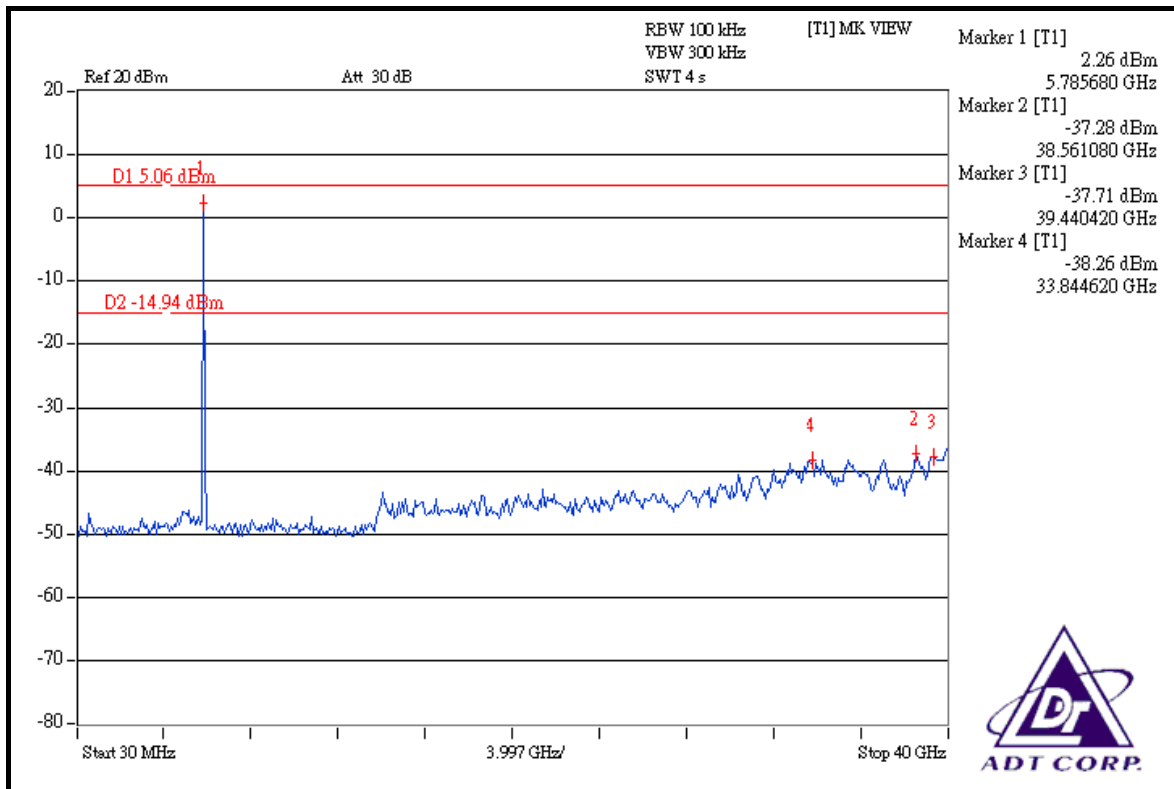
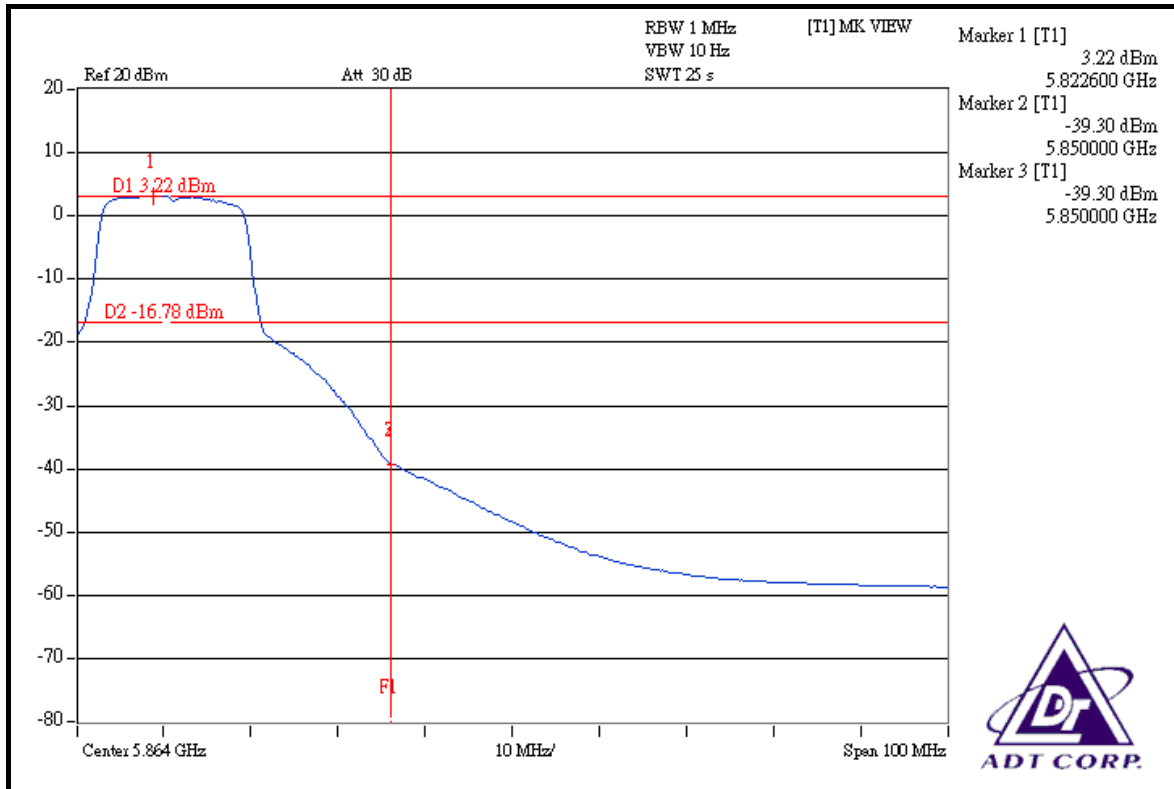
The spectrum plots are attached on the following pages. D1 line indicates the highest level, D2 line indicates the 20dB offset below D1. It shows compliance with the requirement in part 15.247(d).



802.11a OFDM MODULATION

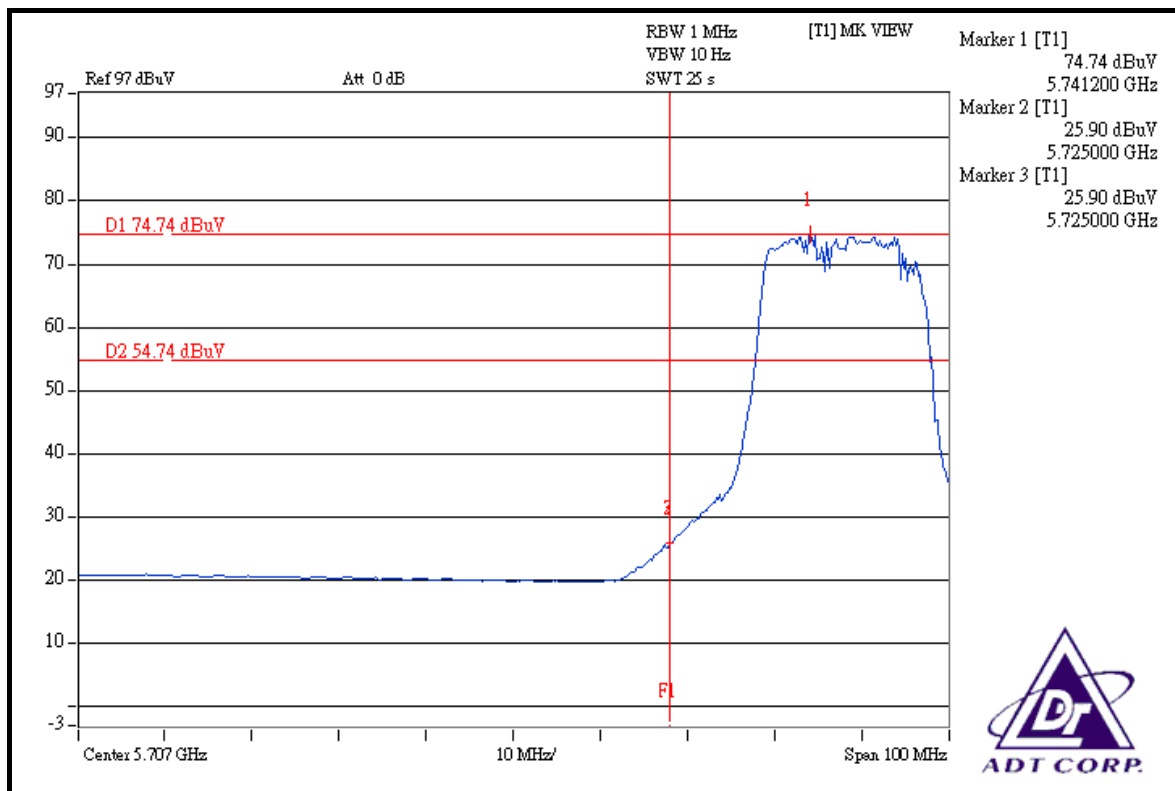
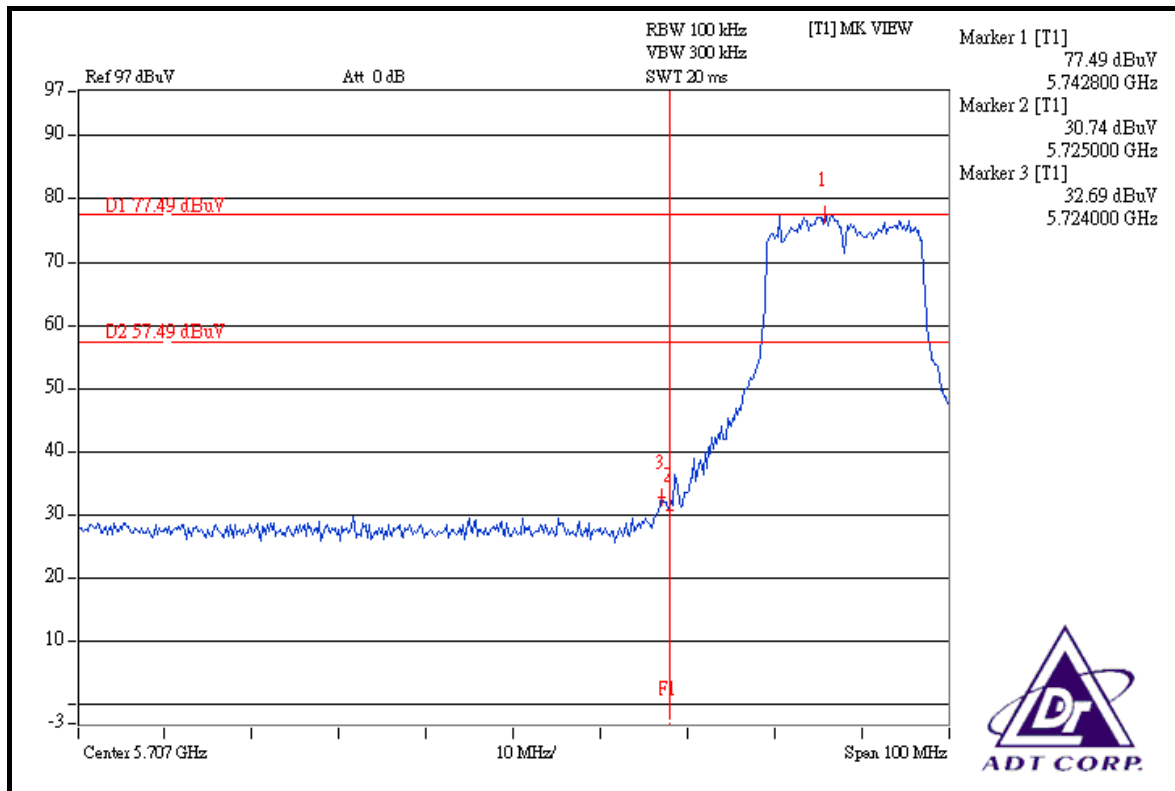


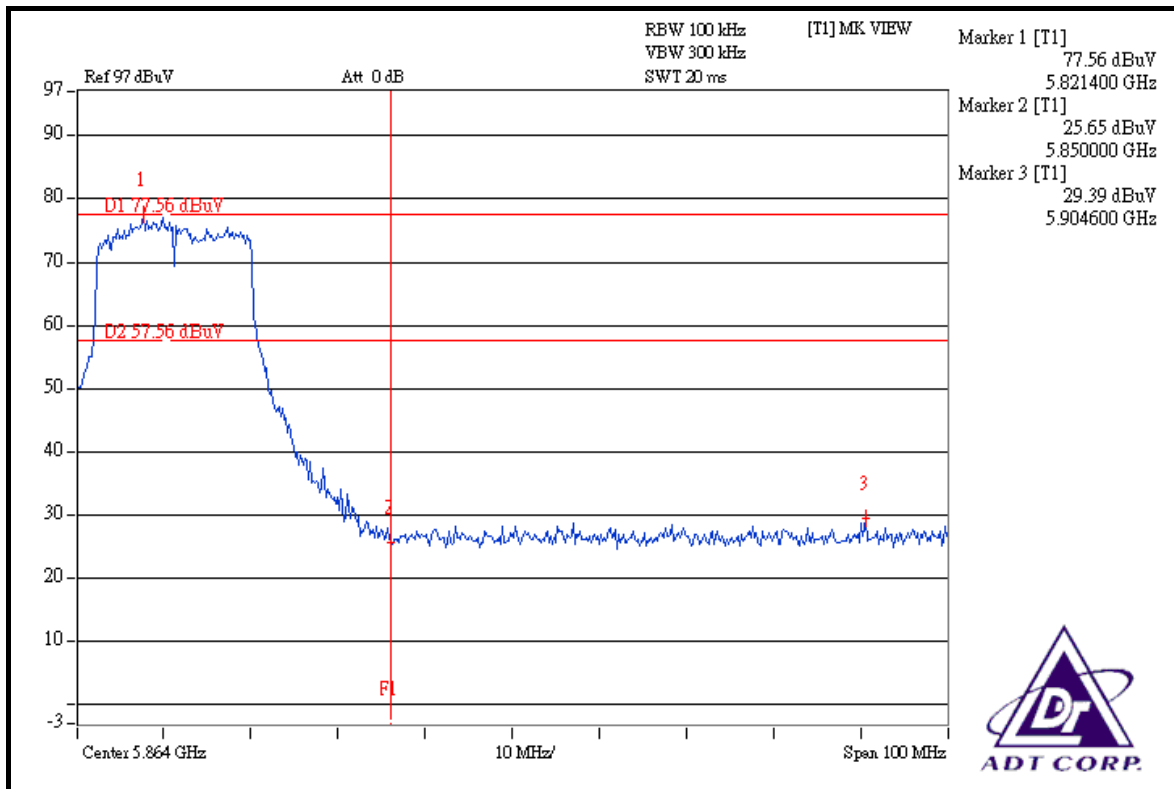
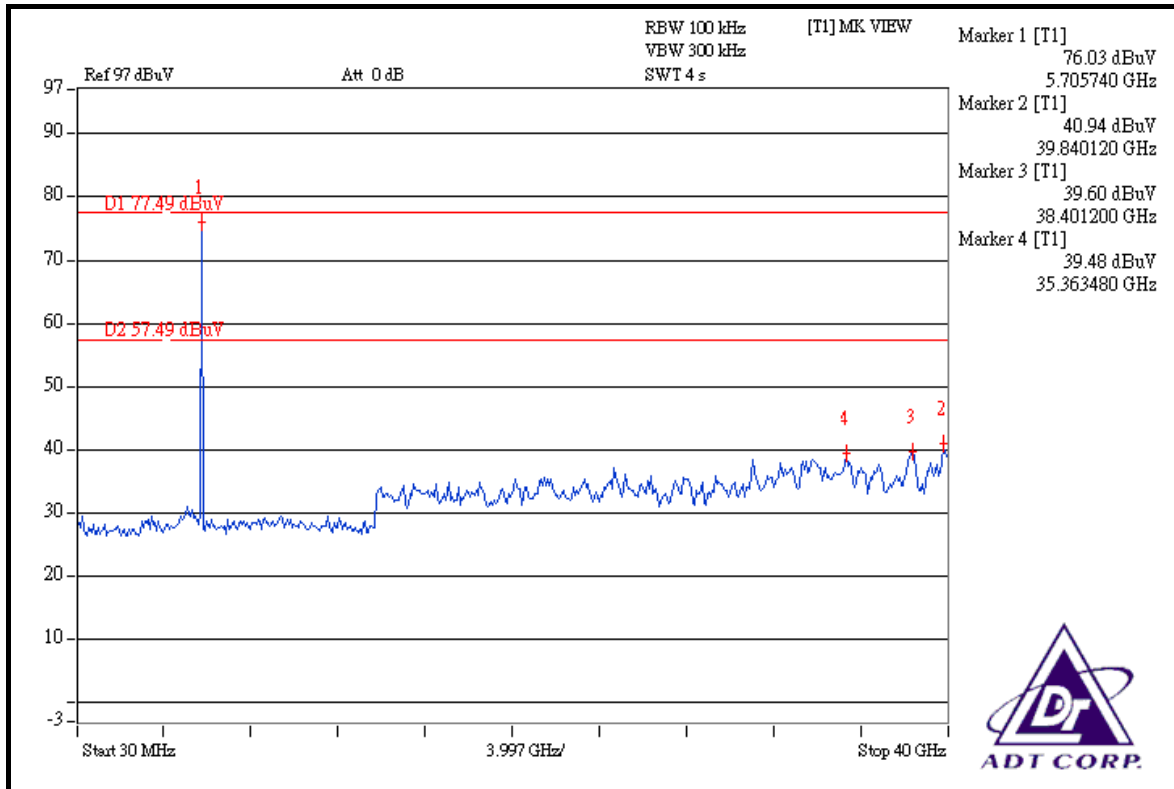


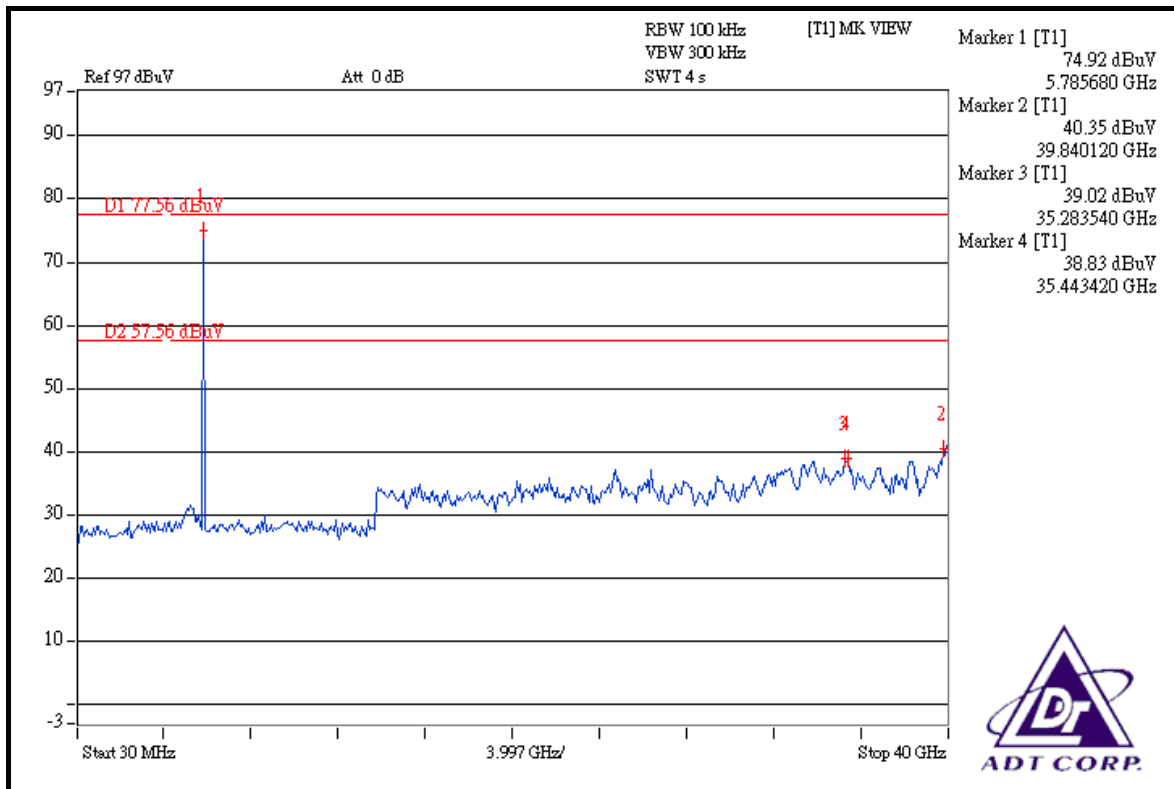
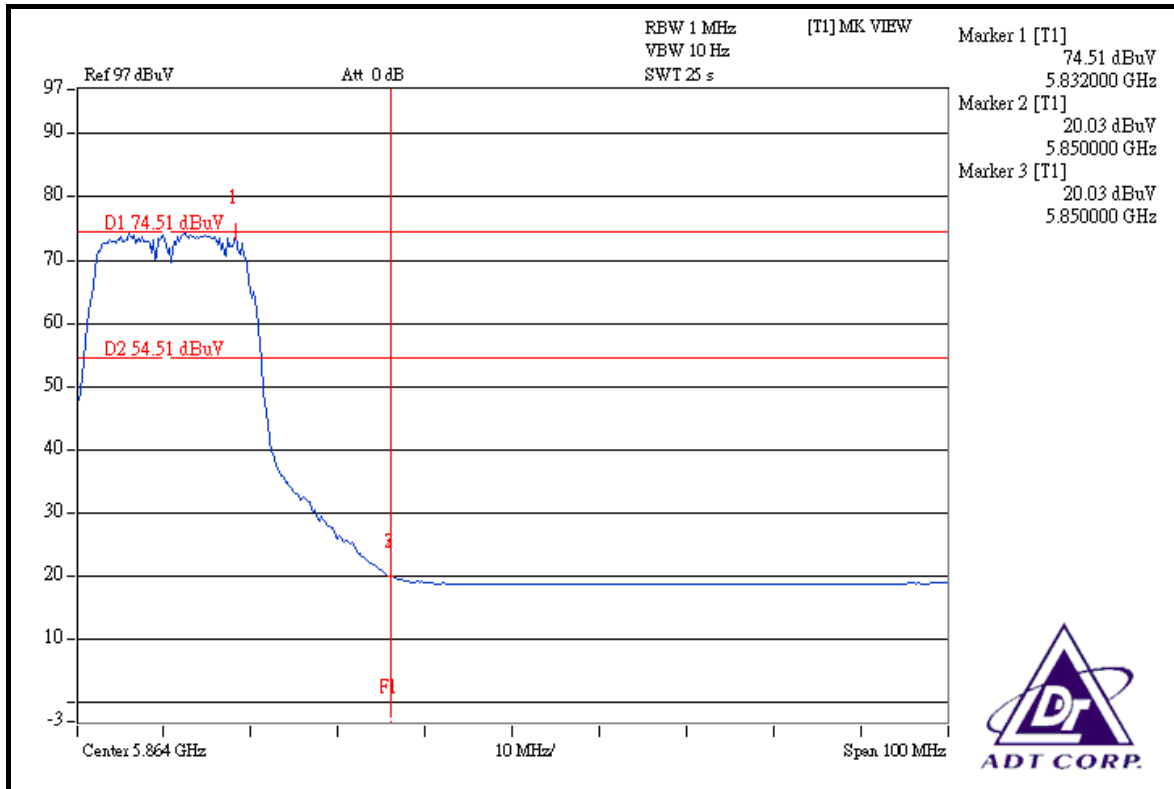




DRAFT 802.11n (20MHz) OFDM MODULATION

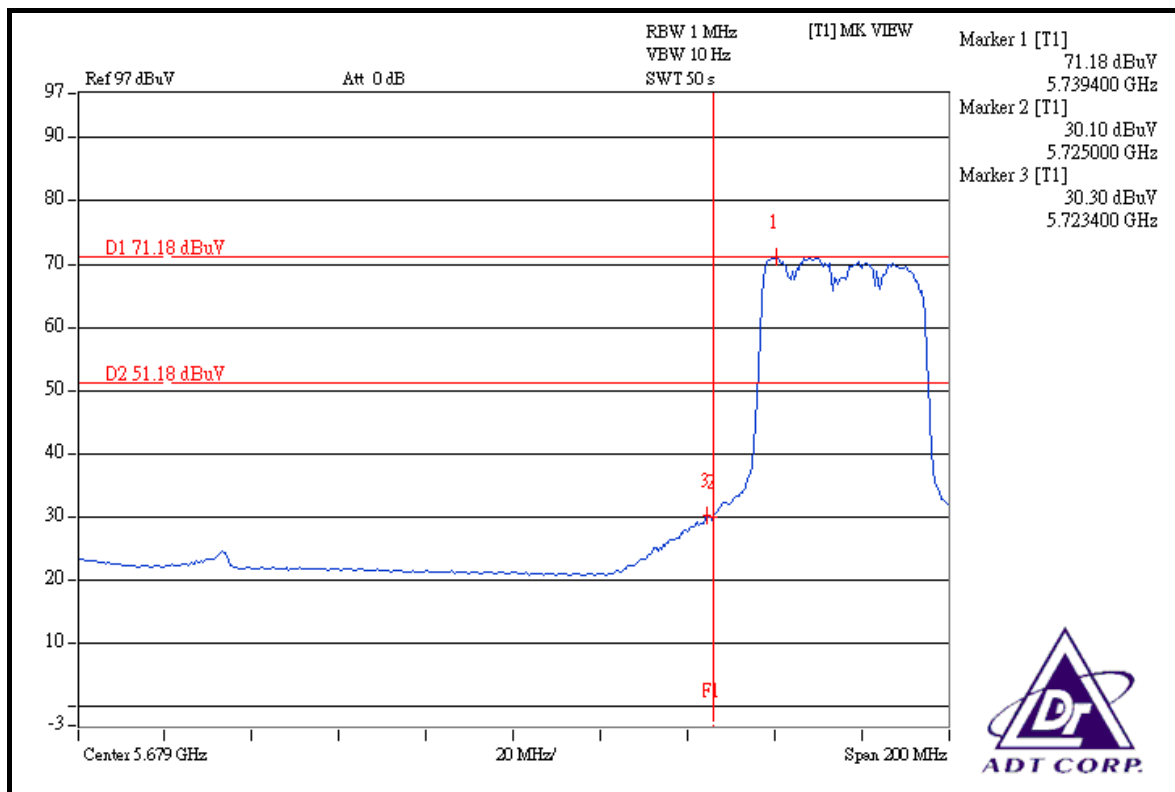
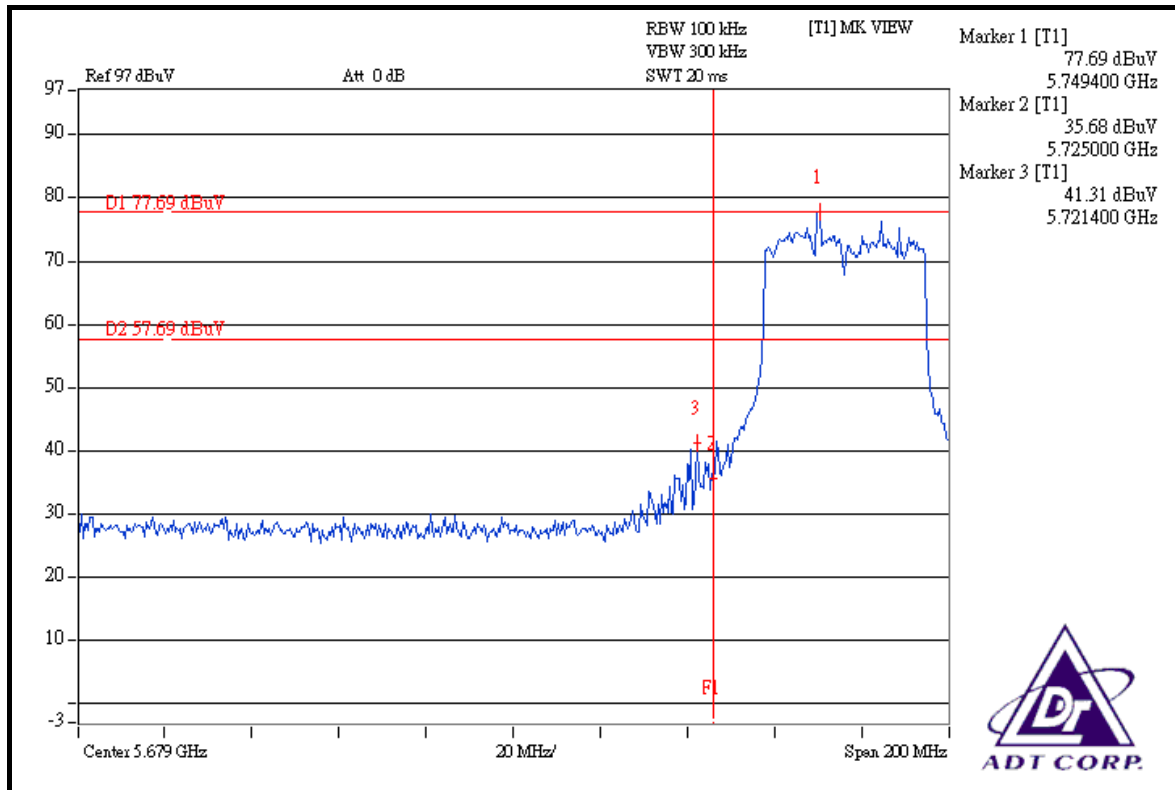


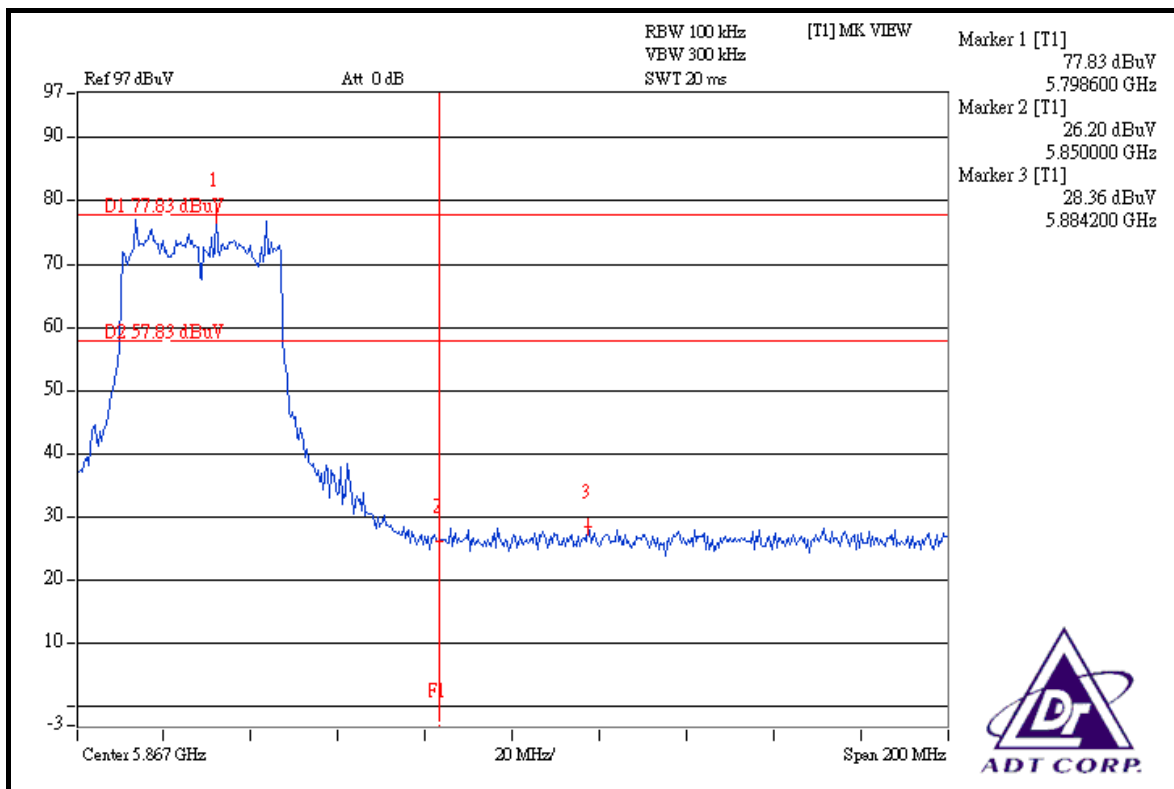
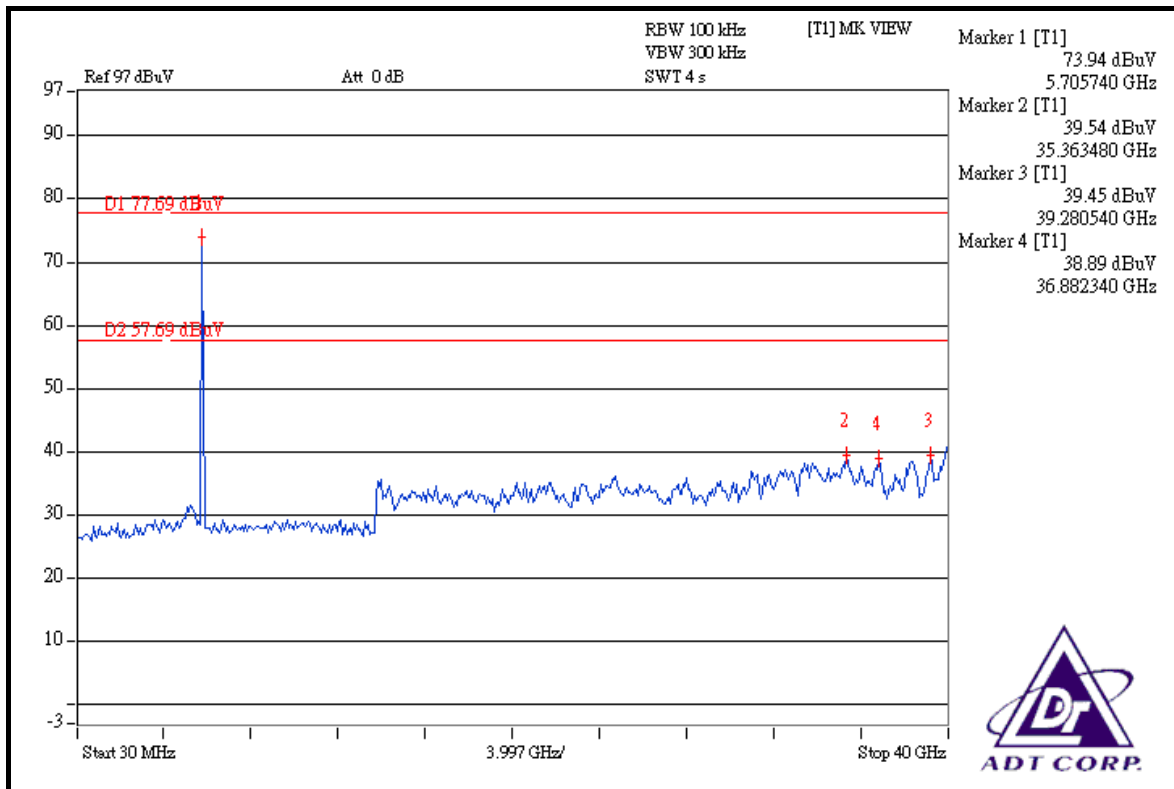


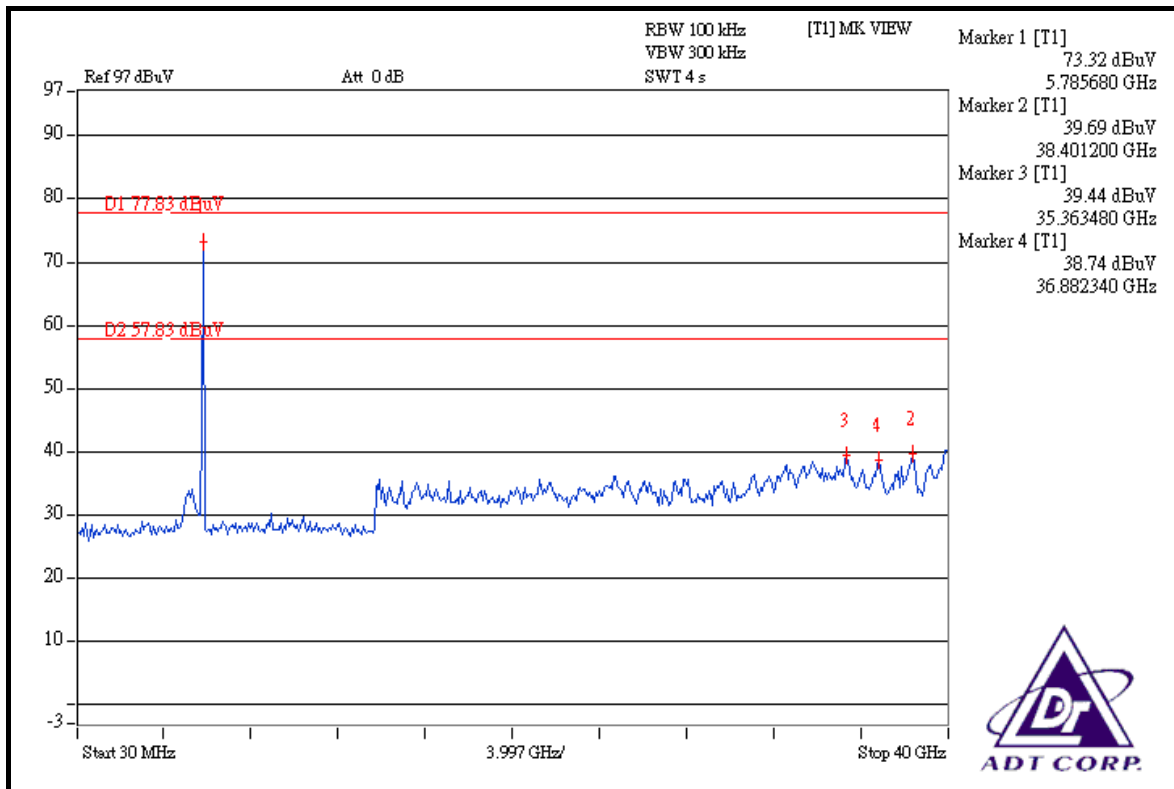
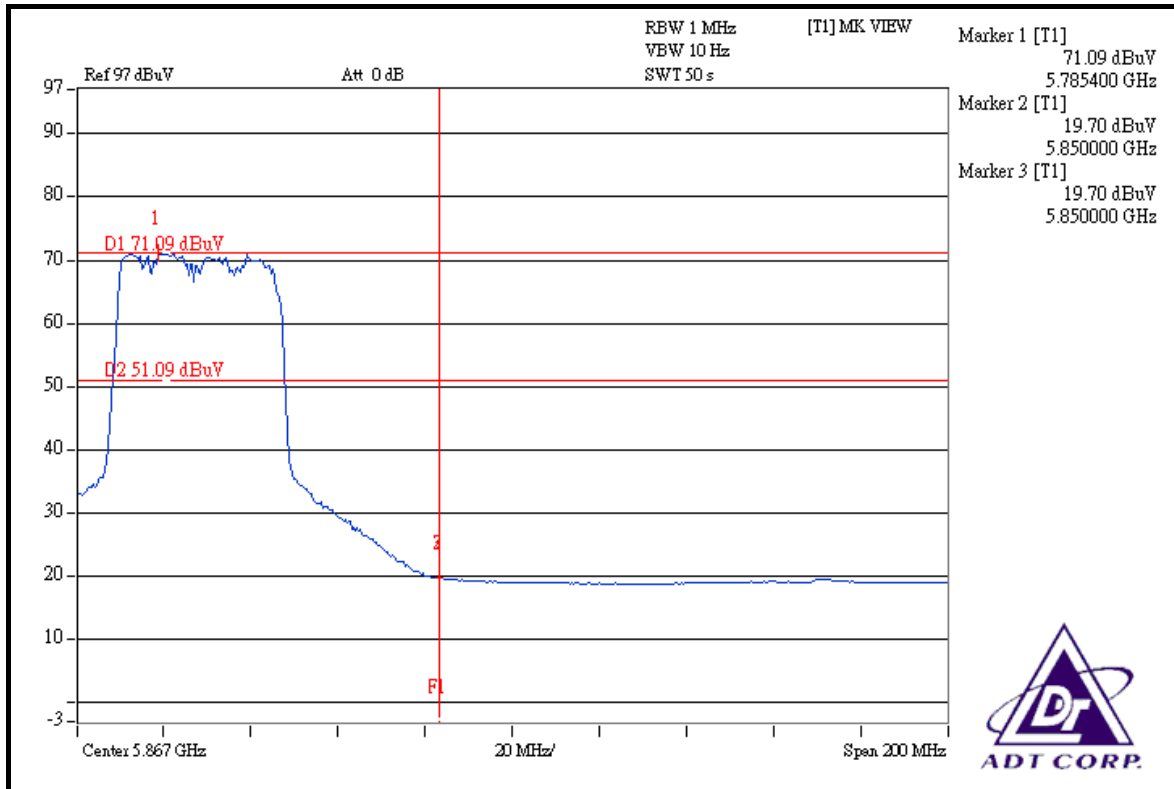




DRAFT 802.11n (40MHz) OFDM MODULATION







5.7 ANTENNA REQUIREMENT

5.7.1 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(a), 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.

5.7.2 ANTENNA CONNECTED CONSTRUCTION

The antenna used in this product is PCB antenna with U.FL-R-SMT connector. The maximum Gain of the antenna is 4.6dBi.



6. PHOTOGRAPHS OF THE TEST CONFIGURATION

Please refer to the attached file (Test Setup Photo).



7. INFORMATION ON THE TESTING LABORATORIES

We, ADT Corp., were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025.

USA	FCC, UL, A2LA
Germany	TUV Rheinland
Japan	VCCI
Norway	NEMKO
Canada	INDUSTRY CANADA , CSA
R.O.C.	TAF, BSMI, NCC
Netherlands	Telefication
Singapore	GOST-ASIA(MOU)
Russia	CERTIS(MOU)

Copies of accreditation certificates of our laboratories obtained from approval agencies can be downloaded from our web site:
www.adt.com.tw/index.5/phtml. If you have any comments, please feel free to contact us at the following:

Linko EMC/RF Lab:
Tel: 886-2-26052180
Fax: 886-2-26051924

Hsin Chu EMC/RF Lab:
Tel: 886-3-5935343
Fax: 886-3-5935342

Hwa Ya EMC/RF/Safety Telecom Lab:
Tel: 886-3-3183232
Fax: 886-3-3185050

Web Site: www.adt.com.tw

The address and road map of all our labs can be found in our web site also.

8. 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.