



FCC TEST REPORT (15.407)

REPORT NO.: RF110701E03-1

MODEL NO.: DIR-815

FCC ID: KA2IR815B1

RECEIVED: July 01, 2011

TESTED: July 28 to Sep. 15, 2011

ISSUED: Mar. 03, 2012

APPLICANT: D-Link Corporation

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ISSUED BY: Bureau Veritas Consumer Products Services (H.K.)
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Table of Contents

RELEASE CONTROL RECORD	4
1. CERTIFICATION	5
2. SUMMARY OF TEST RESULTS	6
2.1 MEASUREMENT UNCERTAINTY	7
3. GENERAL INFORMATION	8
3.1 GENERAL DESCRIPTION OF EUT	8
3.2 DESCRIPTION OF TEST MODES	11
3.2.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL	12
3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS	15
3.4 DESCRIPTION OF SUPPORT UNITS.....	16
3.5 CONFIGURATION OF SYSTEM UNDER TEST	17
4. TEST TYPES AND RESULTS	18
4.1 CONDUCTED EMISSION MEASUREMENT	18
4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT	18
4.1.2 TEST INSTRUMENTS.....	18
4.1.3 TEST PROCEDURES	19
4.1.4 DEVIATION FROM TEST STANDARD	19
4.1.5 TEST SETUP	20
4.1.6 EUT OPERATING CONDITIONS	20
4.1.7 TEST RESULTS	21
4.2 RADIATED EMISSION MEASUREMENT	23
4.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT	23
4.2.2 LIMITS OF UNWANTED EMISSION OUT OF THE RESTRICTED BANDS.....	24
4.2.3 TEST INSTRUMENTS.....	25
4.2.4 TEST PROCEDURES	26
4.2.5 DEVIATION FROM TEST STANDARD	26
4.2.6 TEST SETUP	27
4.2.7 EUT OPERATING CONDITION	27
4.2.8 TEST RESULTS	28
4.3 OUTPUT TRANSMIT POWER MEASUREMENT	49
4.3.1 LIMITS OF OUTPUT TRANSMIT POWER MEASUREMENT	49
4.3.2 TEST INSTRUMENTS.....	49
4.3.3 TEST PROCEDURE.....	49
4.3.4 DEVIATION FROM TEST STANDARD	49
4.3.5 TEST SETUP	50
4.3.6 EUT OPERATING CONDITIONS	50
4.3.7 TEST RESULTS	51
4.4 PEAK POWER EXCURSION MEASUREMENT	57
4.4.1 LIMITS OF PEAK POWER EXCURSION MEASUREMENT	57
4.4.2 TEST INSTRUMENTS.....	57



A D T

4.4.3	TEST PROCEDURE.....	57
4.4.4	DEVIATION FROM TEST STANDARD.....	57
4.4.5	TEST SETUP	58
4.4.6	EUT OPERATING CONDITIONS	58
4.4.7	TEST RESULTS	59
4.5	PEAK POWER SPECTRAL DENSITY MEASUREMENT	62
4.5.1	LIMITS OF PEAK POWER SPECTRAL DENSITY MEASUREMENT	62
4.5.2	TEST INSTRUMENTS.....	62
4.5.3	TEST PROCEDURES	62
4.5.4	DEVIATION FROM TEST STANDARD.....	62
4.5.5	TEST SETUP	62
4.5.6	EUT OPERATING CONDITIONS	62
4.5.7	TEST RESULTS	63
4.6	FREQUENCY STABILITY.....	66
4.6.1	LIMITS OF FREQUENCY STABILITY MEASUREMENT	66
4.6.2	TEST INSTRUMENTS.....	66
4.6.3	TEST PROCEDURE.....	66
4.6.4	DEVIATION FROM TEST STANDARD.....	67
4.6.5	TEST SETUP	67
4.6.6	EUT OPERATING CONDITION.....	67
4.6.7	TEST RESULTS	68
4.7	CONDUCTED OUT-BAND EMISSION MEASUREMENT.....	69
4.7.1	TEST INSTRUMENTS.....	69
4.7.2	TEST PROCEDURE.....	69
4.7.3	EUT OPERATING CONDITION.....	69
4.7.4	TEST RESULTS	69
5.	INFORMATION ON THE TESTING LABORATORIES	76
6.	APPENDIX A - MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB.....	77



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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF110701E03-1	Original release	Mar. 03, 2012




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1. CERTIFICATION

PRODUCT: Wireless N Router
BRAND NAME: D-Link
MODEL NO.: DIR-815
TEST SAMPLE: MASS-PRODUCTION
APPLICANT: D-Link Corporation
TESTED: July 28 to Sep. 15, 2011
STANDARDS: FCC Part 15, Subpart E (Section 15.407)
ANSI C63.4-2003
ANSI C63.10-2009

The above equipment (Model: DIR-815) has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, 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 : , **DATE:** Mar. 03, 2012
(Midoli Peng, Specialist)

APPROVED BY : , **DATE:** Mar. 03, 2012
(May Chen, Deputy Manager)

2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC Part 15, Subpart E (Section 15.407)			
Standard Section	Test Type	Result	Remark
15.407(b)(5)	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -10.38dB at 0.541MHz
15.407(b/1/2/3) (b)(5)	Electric Field Strength Spurious Emissions, 30MHz ~ 40000MHz	PASS	Meet the requirement of limit. Minimum passing margin is -1.0dB at 5150.0MHzxc
15.407(a/1/2/3)	Output Transmit Power	PASS	Meet the requirement of limit.
15.407(a)(6)	Peak Power Excursion	PASS	Meet the requirement of limit.
15.407(a/1/2/3)	Peak Power Spectral Density	PASS	Meet the requirement of limit.
15.407(g)	Frequency Stability	PASS	Meet the requirement of limit.
15.203	Antenna Requirement	PASS	Antenna connector is MHF not a standard connector.

NOTE: The EUT was operating in 2400 ~ 2483.5MHz, 5.15~5.25GHz and 5.725~5.850GHz frequencies band. This report was recorded the RF parameters including 5.15~5.25GHz. For the 2400 ~ 2483.5MHz and 5.725~5.85GHz RF parameters was recorded in another test report.



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2.1 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

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

Measurement	Value
Conducted emissions	2.45 dB
Radiated emissions (30MHz-1GHz)	3.81 dB
Radiated emissions (1GHz -18GHz)	2.19 dB
Radiated emissions (18GHz -40GHz)	2.56 dB



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3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	Wireless N Router
MODEL NO.	DIR-815
FCC ID	KA2IR815B1
POWER SUPPLY	DC 12V from power adapter
MODULATION TYPE	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
MODULATION TECHNOLOGY	DSSS, OFDM
TRANSFER RATE	802.11b: 11 / 5.5 / 2 / 1Mbps 802.11g: 54 / 48 / 36 / 24 / 18 / 12 / 9 / 6Mbps HT20 MCS0~7 (800ns GI): 6.5Mbps, 13Mbps, 19.5Mbps, 26Mbps, 39Mbps, 52Mbps, 58.5Mbps, 65Mbps HT20 MCS8~15 (800ns GI): 13Mbps, 26Mbps, 39Mbps, 52Mbps, 78Mbps, 104Mbps, 117Mbps, 130Mbps HT40 MCS0~7 (800ns GI): 13.5Mbps, 27Mbps, 40.5Mbps, 54Mbps, 81Mbps, 108Mbps, 121.5Mbps, 135Mbps HT40 MCS8~15 (800ns GI): 27Mbps, 54Mbps, 81Mbps, 108Mbps, 162Mbps, 216Mbps, 243Mbps, 270Mbps HT20 MCS0~7 (400ns GI): 7.2Mbps, 14.4Mbps, 21.7Mbps, 28.9Mbps, 43.3Mbps, 57.8Mbps, 65.0Mbps, 72.2Mbps HT20 MCS8~15 (400ns GI): 14.444Mbps, 28.889Mbps, 43.333Mbps, 57.778Mbps, 86.667Mbps, 115.556Mbps, 130.000Mbps, 144.444Mbps HT40 MCS0~7 (400ns GI): 15Mbps, 30Mbps, 45Mbps, 60Mbps, 90Mbps, 120Mbps, 135Mbps, 150Mbps HT40 MCS8~15 (400ns GI): 30Mbps, 60Mbps, 90Mbps, 120Mbps, 180Mbps, 240Mbps, 270Mbps, 300Mbps
OPERATING FREQUENCY	For 15.407 802.11a: 5.18 ~ 5.24GHz For 15.247 802.11b & 802.11g: 2.412 ~ 2.462GHz 802.11a: 5.745 ~ 5.825GHz



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NUMBER OF CHANNEL	For 15.407 4 for 802.11a, 802.11n (20MHz) 2 for 802.11n (40MHz)
	For 15.247(2.4GHz) 11 for 802.11b, 802.11g, 802.11n (20MHz) 7 for 802.11n (40MHz)
	For 15.247(5GHz) 5 for 802.11a, 802.11n (20MHz) 2 for 802.11n (40MHz)
MAXIMUM OUTPUT POWER	For 15.407 802.11a: 26.9mW 802.11n (20MHz): 29.7mW 802.11n (40MHz): 43.9mW For 15.247(2.4GHz) 802.11b: 120.2mW 802.11g: 229.1mW 802.11n (20MHz): 306.2mW 802.11n (40MHz): 244.0mW For 15.247(5GHz) 802.11a: 316.2mW 802.11n (20MHz): 328.1mW 802.11n (40MHz): 332.0mW
ANTENNA TYPE	Please see note
DATA CABLE	Ethernet cable (unshielded, 1.5m)
I/O PORTS	INTERNET port x 1 LAN port (10, 100Mbps) x 4
ASSOCIATED DEVICES	Adapter x 1

NOTE:

- There are two antennas provided to this EUT, please refer to the following table:

Transmitter Circuit	Brand	Model	Gain (dBi) include cable loss	Antenna Type	Connector
Chain (0) (P2 footprint)	WHA YU GROUP	C037-511133-A (SSR-12198)	2.4GHz : 2 5GHz : 3	Dipole	MHF
Chain (1) (P1 footprint)	WHA YU GROUP	C037-511134-A (SSR-12197)	2.4GHz : 2 5GHz : 3	Dipole	MHF

2. The EUT must be supplied with a power adapter as following table:

Brand	Model No.	Spec.
D-Link	CAP012121 US	AC Input: 100-240V 0.35A, 47-63Hz DC Output: 12V, 1.0A DC output cable: Unshielded, 1.5m

3. The EUT was pre-tested in chamber under the following modes:

Test Mode	Description
Mode A	Laying-flat type
Mode B	Stand-up type

From the above modes, the radiated emissions worse case was found in Mode A. Therefore only the test data of the mode was recorded in this report.

4. Conducted emission and Radiated emission of the simultaneous operation has been evaluated and no non-compliance was found.
5. The EUT is 2 * 2 spatial MIMO (2Tx & 2Rx) without beam forming function. The 11abg legacy mode is limited to single transmitter only.
6. When the EUT operating in 802.11n, the software operation, which is defined by manufacturer, MCS (Modulation and Coding Schemes) from 0 to 15.
7. The above EUT information was declared by the manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.



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3.2 DESCRIPTION OF TEST MODES

Operated in 5150MHz ~ 5350MHz bands:

Four channels are provided for 802.11a and 802.11n (20MHz):

CHANNEL	FREQUENCY
36	5180 MHz
40	5200 MHz
44	5220 MHz
48	5240 MHz

Two channels are provided for 802.11n (40MHz):

CHANNEL	FREQUENCY
38	5190 MHz
46	5230 MHz



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3.2.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

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

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

ANTENNA COMBINATION MODE:

COMBINATION MODE	OPERATION MODE	TX CHAIN(0)	TX CHAIN(1)
A	802.11 a	√	-
B	802.11n(20MHz) for MCS0~15	√	√
C	802.11n(40MHz) for MCS0~15	√	√

Note: 1. The above information was declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.

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)	COMBINATION
For 5 GHz 802.11n (20MHz)	36 to 48	40	OFDM	BPSK	6.5	B



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RADIATED EMISSION TEST (BELOW 1 GHz):

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

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)	COMBINATION
For 5 GHz 802.11n (20MHz)	36 to 48	40	OFDM	BPSK	6.5	B

RADIATED EMISSION TEST (ABOVE 1 GHz):

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

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)	COMBINATION
802.11a	36 to 48	36, 40, 48	OFDM	BPSK	6	A
For 5 GHz 802.11n (20MHz)	36 to 48	36, 40, 48	OFDM	BPSK	6.5	B
For 5 GHz 802.11n (40MHz)	38 to 46	38, 46	OFDM	BPSK	13.5	C

ANTENNA PORT CONDUCTED MEASUREMENT:

- This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.
- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)	COMBINATION
802.11a	36 to 48	36, 40, 48	OFDM	BPSK	6	A
For 5 GHz 802.11n (20MHz)	36 to 48	36, 40, 48	OFDM	BPSK	6.5	B
For 5 GHz 802.11n (40MHz)	38 to 46	38, 46	OFDM	BPSK	13.5	C



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CONDUCTED OUT-BAND EMISSION 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)	COMBINATION
802.11a	36 to 48	36, 48	OFDM	BPSK	6	A
For 5 GHz 802.11n (20MHz)	36 to 48	36, 48	OFDM	BPSK	6.5	B
For 5 GHz 802.11n (40MHz)	38 to 46	38, 46	OFDM	BPSK	13.5	C

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
PLC	26deg. C, 67%RH	120Vac, 60Hz	Eagle Chen
RE<1G	30deg. C, 74%RH	120Vac, 60Hz	Rex Huang
RE ³ 1G	25deg. C, 68%RH	120Vac, 60Hz	Evan Huang
APCM	25deg. C, 60%RH	120Vac, 60Hz	Frank Liu
OB	25deg. C, 60%RH	120Vac, 60Hz	Frank Liu

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 E (Section 15.407)

ANSI C63.4-2003

ANSI C63.10-2009

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.



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3.4 DESCRIPTION OF SUPPORT UNITS

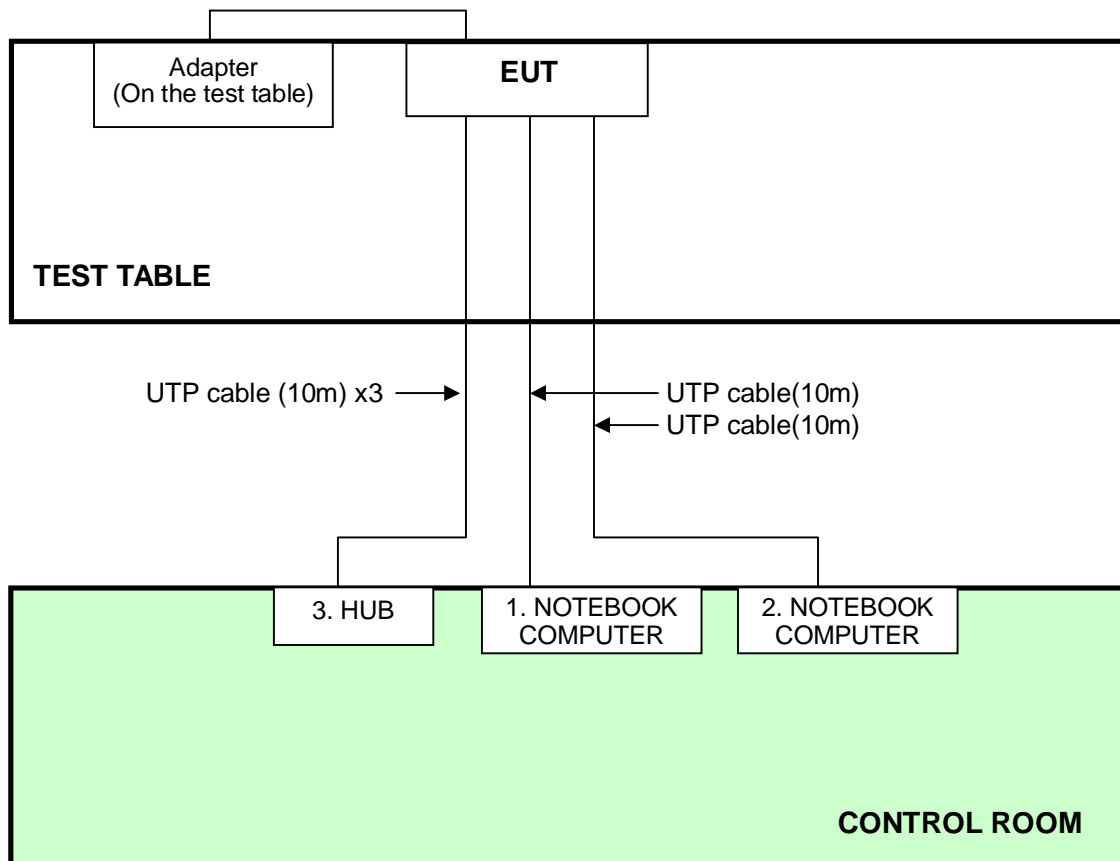
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	NOTEBOOK COMPUTER	DELL	PP32LA	FSLB32S	FCC DoC
2	NOTEBOOK COMPUTER	DELL	PP32LA	GSLB32S	FCC DoC
3	HUB	ZyXEL	ES-116P	S060H02000215	FCC DoC

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	UTP Cable, 10m
2	UTP Cable, 10m
3	UTP Cable, 10m

NOTE: All power cords of the above support units are non shielded (1.8m).

3.5 CONFIGURATION OF SYSTEM UNDER TEST





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4. TEST TYPES AND RESULTS

4.1 CONDUCTED EMISSION MEASUREMENT

4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

FREQUENCY OF EMISSION (MHz)	CONDUCTED LIMIT (dBµV)	
	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 0.50 MHz.
 3. All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

4.1.2 TEST INSTRUMENTS

Test date: Sep. 15, 2011

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
ROHDE & SCHWARZ Test Receiver	ESCS 30	100287	Mar. 02, 2011	Mar. 01, 2012
Line-Impedance Stabilization Network (for EUT)	NSLK 8127	8127-523	Sep. 17, 2010	Sep. 16, 2011
Line-Impedance Stabilization Network (for Peripheral)	ENV-216	100072	June 10, 2011	June 09, 2012
RF Cable (JYEBAO)	5DFB	CONCAB-003	Aug. 05, 2011	Aug. 04, 2012
50 ohms Terminator	50	3	Nov. 03, 2010	Nov. 02, 2011
Software	BV ADT_Cond_V7.3.7	NA	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 Shielded Room No. A.

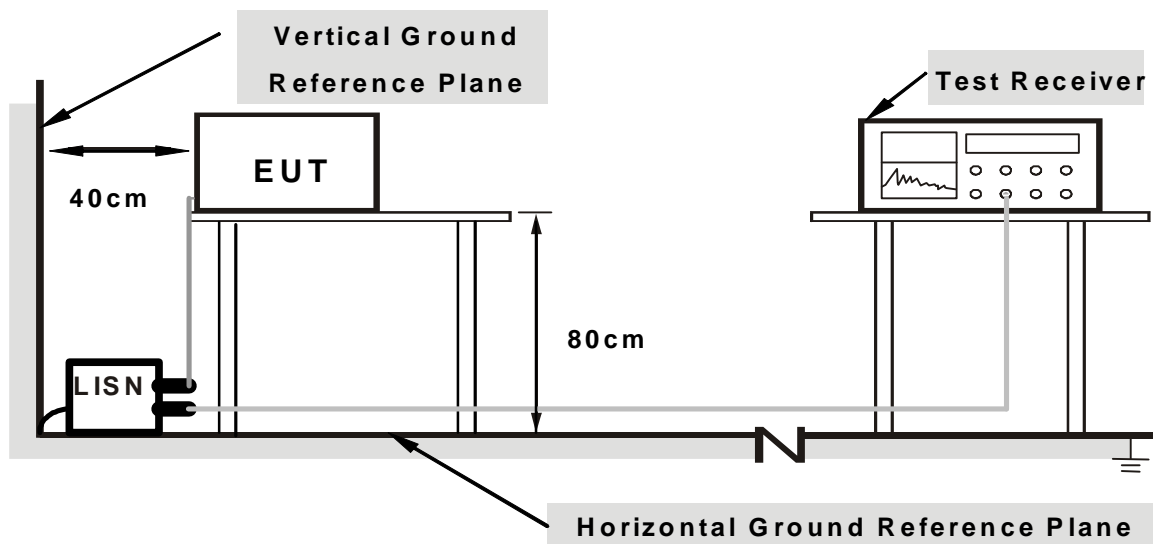
4.1.3 TEST PROCEDURES

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

4.1.4 DEVIATION FROM TEST STANDARD

No deviation

4.1.5 TEST SETUP



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

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

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

4.1.6 EUT OPERATING CONDITIONS

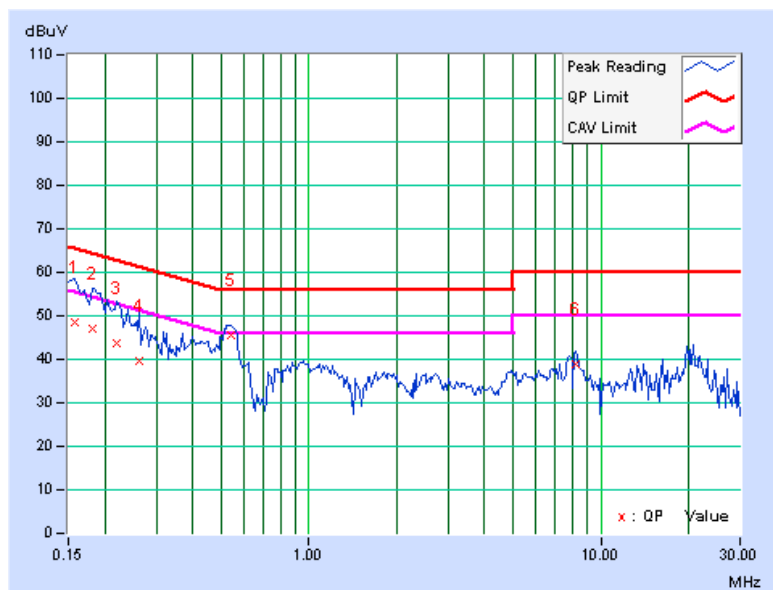
1. Placed the EUT on testing table.
2. Prepared computer systems (support unit 1~2) to act as communication partner and placed it outside of testing area.
3. The communication partner ran test program “RT3352 AP V1.0.1.8, RT3x7x V1.5.8.1 AP” to enable EUT under transmission/receiving condition continuously at specific channel frequency.

4.1.7 TEST RESULTS

PHASE	Line (L)	6dB BANDWIDTH	9 kHz
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No	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
	[MHz]	Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
		(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.158	0.36	48.12	34.33	48.48	34.69	65.58	55.58	-17.09	-20.88
2	0.181	0.36	46.56	17.31	46.92	17.67	64.43	54.43	-17.51	-36.76
3	0.220	0.36	43.26	31.45	43.62	31.81	62.81	52.81	-19.19	-21.00
4	0.263	0.36	39.26	28.63	39.62	28.99	61.33	51.33	-21.71	-22.34
5	0.541	0.37	45.25	33.64	45.62	34.01	56.00	46.00	-10.38	-11.99
6	8.199	0.64	38.31	33.26	38.95	33.90	60.00	50.00	-21.05	-16.10

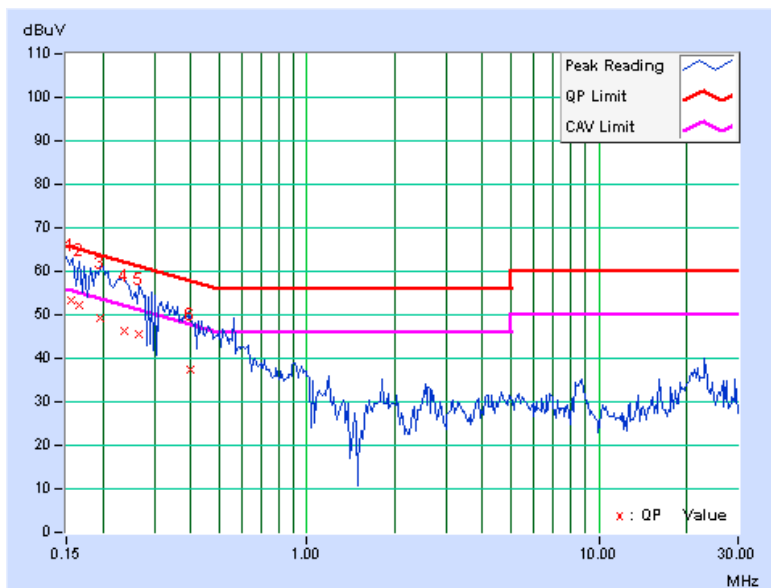
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. The emission levels of other frequencies were very low against the limit.
 3. Margin value = Emission level - Limit value
 4. Correction factor = Insertion loss + Cable loss
 5. Emission Level = Correction Factor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



PHASE	Neutral (N)	6dB BANDWIDTH	9 kHz
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No	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
	[MHz]	Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
		(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.155	0.10	53.24	27.52	53.34	27.62	65.71	55.71	-12.38	-28.10
2	0.166	0.10	52.25	28.14	52.35	28.24	65.18	55.18	-12.83	-26.94
3	0.197	0.10	49.22	19.43	49.32	19.53	63.74	53.74	-14.42	-34.21
4	0.236	0.10	46.27	16.26	46.37	16.36	62.24	52.24	-15.87	-35.88
5	0.267	0.10	45.29	24.31	45.39	24.41	61.20	51.20	-15.81	-26.79
6	0.400	0.11	37.43	18.33	37.54	18.44	57.85	47.85	-20.31	-29.41

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



4.2 RADIATED EMISSION MEASUREMENT

4.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT

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

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

NOTE:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.
4. Section 15.205 restricted bands of operation shall compliance with the limits in Section 15.209.



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4.2.2 LIMITS OF UNWANTED EMISSION OUT OF THE RESTRICTED BANDS

Frequencies (MHz)	EIRP Limit (dBm)	Equivalent Field Strength at 3m (dB μ V/m) *note 3
5150~5250	-27	68.3
5250~5350	-27	68.3
5470~5725	-27	68.3
5725~5825	-27 *note 1	68.3
	-17 *note 2	78.3

NOTE:

1. For frequencies 10MHz or greater above or below the band edge.
2. All emissions within the frequency range from the band edge to 10MHz above or below the band edge.
3. The following formula is used to convert the equipment isotropic radiated power (eirp) to field strength

$$E = \frac{1000000\sqrt{30P}}{3} \mu\text{V/m, where P is the eirp (Watts)}$$



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4.2.3 TEST INSTRUMENTS

Test date: July 28 to Aug. 18, 2011

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Agilent Spectrum Analyzer	E4446A	MY48250254	July 12, 2011	July 11, 2012
Agilent Pre-Selector	N9039A	MY46520311	July 12, 2011	July 11, 2012
Agilent Signal Generator	N5181A	MY49060517	July 12, 2011	July 11, 2012
Mini-Circuits Pre-Amplifier	ZFL-1000VH2B	AMP-ZFL-03	Nov. 16, 2010	Nov. 15, 2011
Agilent Pre-Amplifier	8449B	3008A02578	July 04, 2011	July 03, 2012
Miteq Pre-Amplifier	AFS33-1800265 0-30-8P-44	881786	Nov. 16, 2010	Nov. 15, 2011
SCHWARZBECK Trilog Broadband Antenna	VULB 9168	9168-360	Apr. 14, 2011	Apr. 13, 2012
AISI Horn_Antenna	AIH.8018	0000320091110	Nov. 12, 2010	Nov. 11, 2011
SCHWARZBECK Horn_Antenna	BBHA 9170	9170-424	Oct. 08, 2010	Oct. 07, 2011
RF CABLE	NA	RF104-201 RF104-203 RF104-204	Dec. 27, 2010	Dec. 26, 2011
RF Cable	NA	CHGCAB_001	Oct. 12, 2010	Oct. 11, 2011
Software	ADT_Radiated_V8.7.05	NA	NA	NA
CT Antenna Tower & Turn Table	NA	NA	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 horn antenna, preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
3. The test was performed in 966 Chamber No. G.
4. The FCC Site Registration No. is 966073.
5. The VCCI Site Registration No. is G-137.
6. The CANADA Site Registration No. is IC 7450H-2.

4.2.4 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meters chamber room. 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 height of antenna 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 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

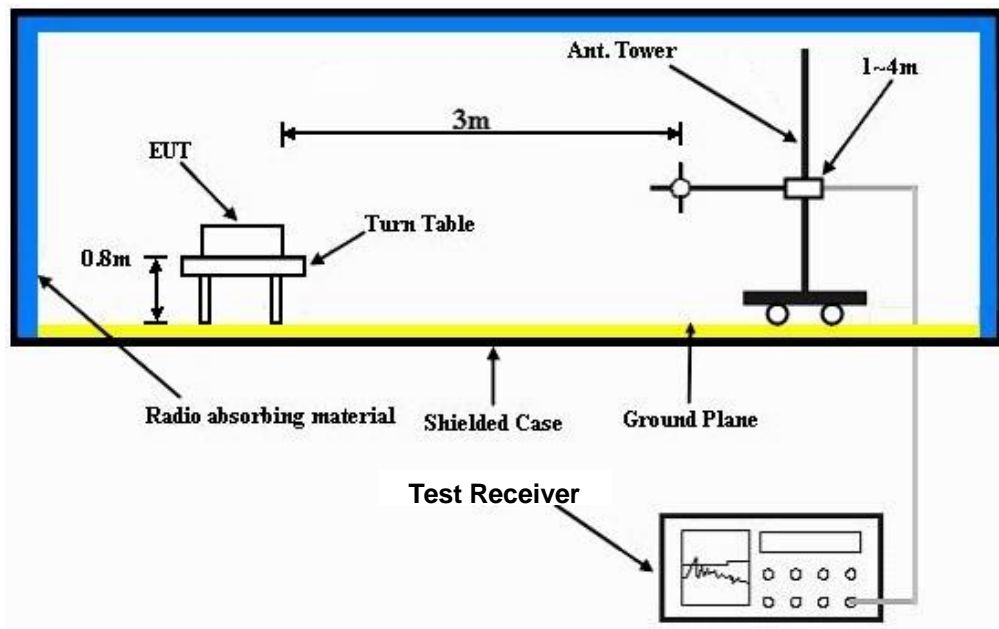
NOTE:

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

4.2.5 DEVIATION FROM TEST STANDARD

No deviation

4.2.6 TEST SETUP



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

4.2.7 EUT OPERATING CONDITION

Same as 4.1.6

4.2.8 TEST RESULTS

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

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 40	FREQUENCY RANGE	Below 1000MHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	30deg. C, 74%RH	TESTED BY	Rex Huang

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	132.30	33.4 QP	43.5	-10.1	2.00 H	162	19.78	13.66
2	266.81	37.2 QP	46.0	-8.8	1.00 H	163	23.31	13.91
3	322.67	35.8 QP	46.0	-10.2	1.00 H	300	20.08	15.74
4	500.13	42.7 QP	46.0	-3.3	1.00 H	251	22.79	19.92
5	666.10	37.3 QP	46.0	-8.7	1.25 H	177	14.85	22.45
6	821.16	32.1 QP	46.0	-13.9	1.00 H	200	6.61	25.47
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	66.23	35.4 QP	40.0	-4.6	1.00 V	161	22.47	12.91
2	104.15	36.2 QP	43.5	-7.3	1.75 V	209	26.04	10.14
3	262.55	33.4 QP	46.0	-12.6	1.75 V	311	19.69	13.75
4	373.98	35.7 QP	46.0	-10.3	1.00 V	168	18.66	17.02
5	500.01	42.9 QP	46.0	-3.1	1.75 V	0	23.00	19.92
6	667.67	35.9 QP	46.0	-10.1	1.50 V	231	13.40	22.46

- 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.



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ABOVE 1GHz WORST-CASE DATA

802.11a OFDM MODULATION

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 36	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 68%RH	TESTED BY	Evan Huang

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	5127.20	55.7 PK	74.0	-18.3	1.00 H	112	15.34	40.36
2	5127.20	47.2 AV	54.0	-6.8	1.00 H	112	6.84	40.36
3	*5180.00	101.3 PK			1.59 H	126	60.85	40.45
4	*5180.00	92.2 AV			1.59 H	126	51.75	40.45
5	#10360.00	54.6 PK	68.3	-13.7	1.54 H	111	7.79	46.81
6	15540.00	60.3 PK	74.0	-13.7	1.00 H	23	9.13	51.17
7	15540.00	49.2 AV	54.0	-4.8	1.00 H	23	-1.97	51.17

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	5127.20	63.6 PK	74.0	-10.4	1.45 V	2	23.24	40.36
2	5127.20	49.6 AV	54.0	-4.4	1.45 V	2	9.24	40.36
3	*5180.00	107.1 PK			1.32 V	69	66.65	40.45
4	*5180.00	98.1 AV			1.32 V	69	57.65	40.45
5	#10360.00	57.6 PK	68.3	-10.7	1.28 V	153	10.79	46.81
6	15540.00	60.9 PK	74.0	-13.1	1.28 V	161	9.73	51.17
7	15540.00	49.6 AV	54.0	-4.4	1.28 V	161	-1.57	51.17

- 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 is out the restricted band.



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 40	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 68%RH	TESTED BY	Evan Huang

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	*5200.00	101.6 PK			1.54 H	123	61.11	40.49
2	*5200.00	92.3 AV			1.54 H	123	51.81	40.49
3	#10400.00	54.3 PK	68.3	-14.0	1.53 H	112	7.45	46.85
4	15600.00	60.7 PK	74.0	-13.3	1.00 H	123	9.42	51.28
5	15600.00	49.3 AV	54.0	-4.7	1.00 H	123	-1.98	51.28

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	*5200.00	106.9 PK			1.46 V	66	66.41	40.49
2	*5200.00	98.4 AV			1.46 V	66	57.91	40.49
3	#10400.00	57.4 PK	68.3	-10.9	1.24 V	143	10.55	46.85
4	15600.00	60.3 PK	74.0	-13.7	1.27 V	159	9.02	51.28
5	15600.00	49.7 AV	54.0	-4.3	1.27 V	159	-1.58	51.28

- 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 is out the restricted band.



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 48	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 68%RH	TESTED BY	Evan Huang

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

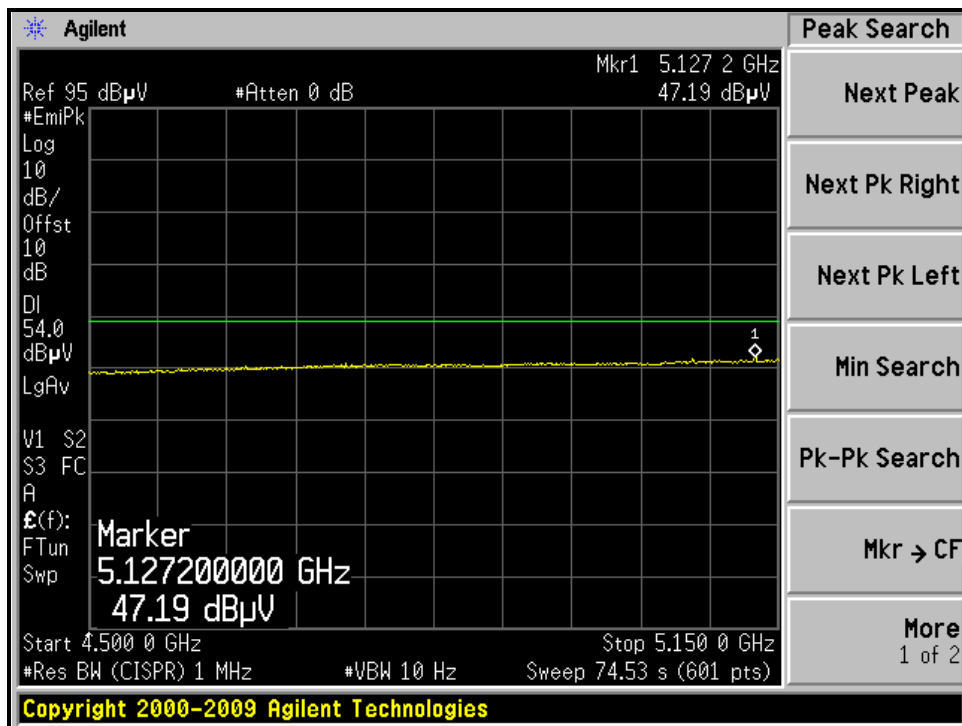
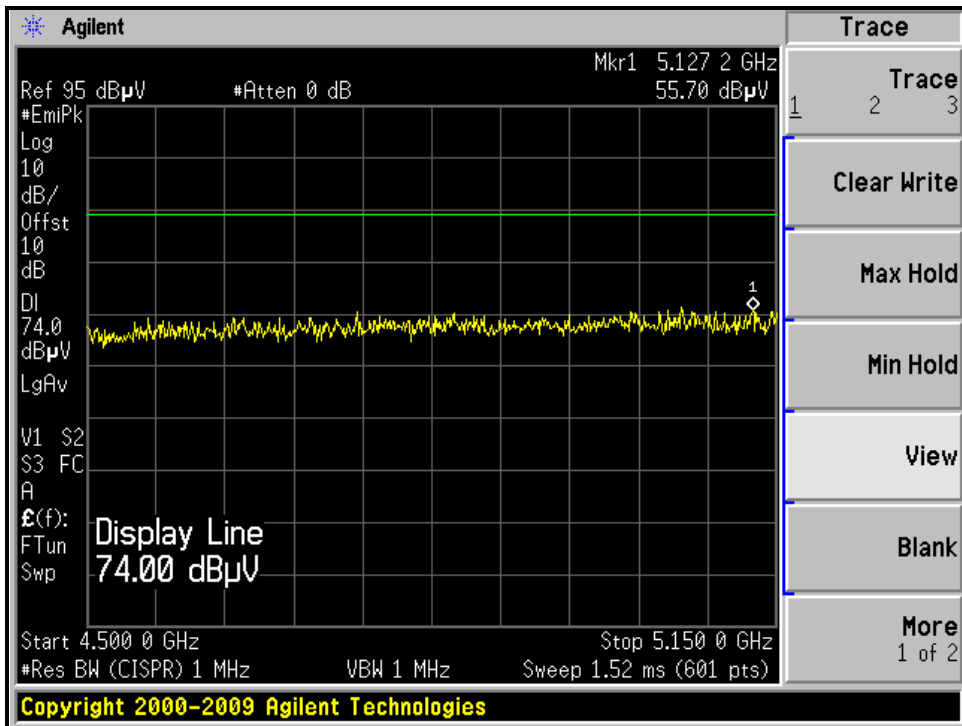
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1	*5240.00	101.3 PK			1.51 H	124	60.74	40.56
2	*5240.00	92.6 AV			1.51 H	124	52.04	40.56
3	5436.90	57.9 PK	74.0	-16.1	1.00 H	112	16.97	40.93
4	5436.90	45.5 AV	54.0	-8.5	1.00 H	112	4.57	40.93
5	#10480.00	54.2 PK	68.3	-14.1	1.59 H	113	7.29	46.91
6	15720.00	60.4 PK	74.0	-13.6	1.00 H	126	8.78	51.62
7	15720.00	49.7 AV	54.0	-4.3	1.00 H	126	-1.92	51.62

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	*5240.00	106.3 PK			1.46 V	312	65.74	40.56
2	*5240.00	98.4 AV			1.46 V	312	57.84	40.56
3	5436.90	57.6 PK	74.0	-16.4	1.12 V	312	16.67	40.93
4	5436.90	45.2 AV	54.0	-8.8	1.12 V	312	4.27	40.93
5	#10480.00	54.3 PK	68.3	-14.0	1.44 V	41	7.39	46.91
6	15720.00	60.3 PK	74.0	-13.7	1.24 V	154	8.68	51.62
7	15720.00	49.3 AV	54.0	-4.7	1.24 V	154	-2.32	51.62

- 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 is out the restricted band.

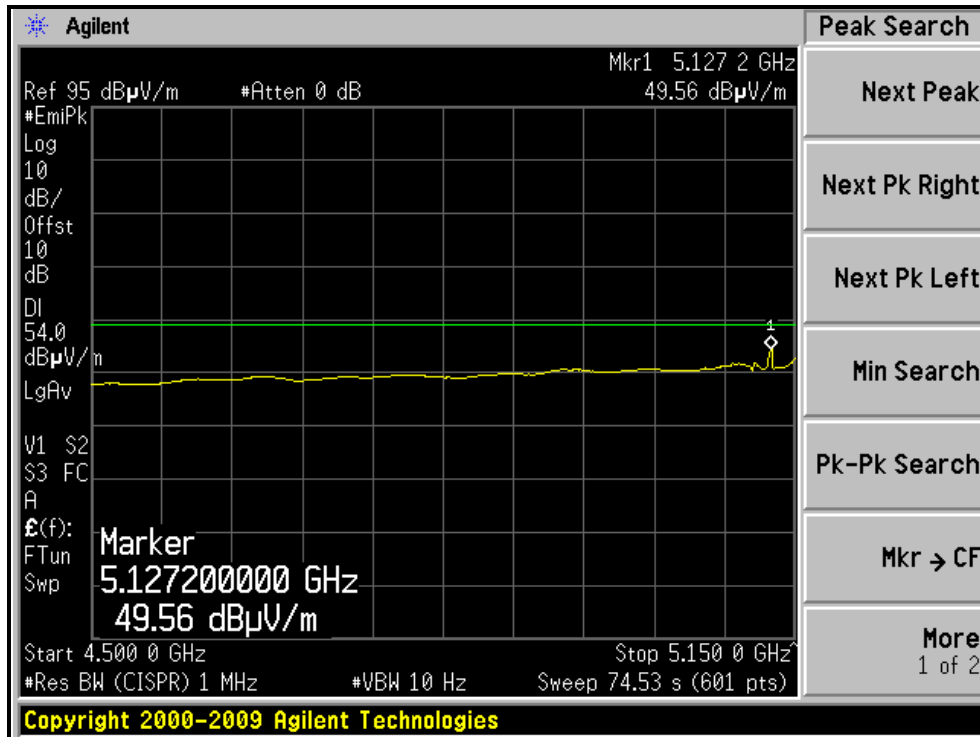
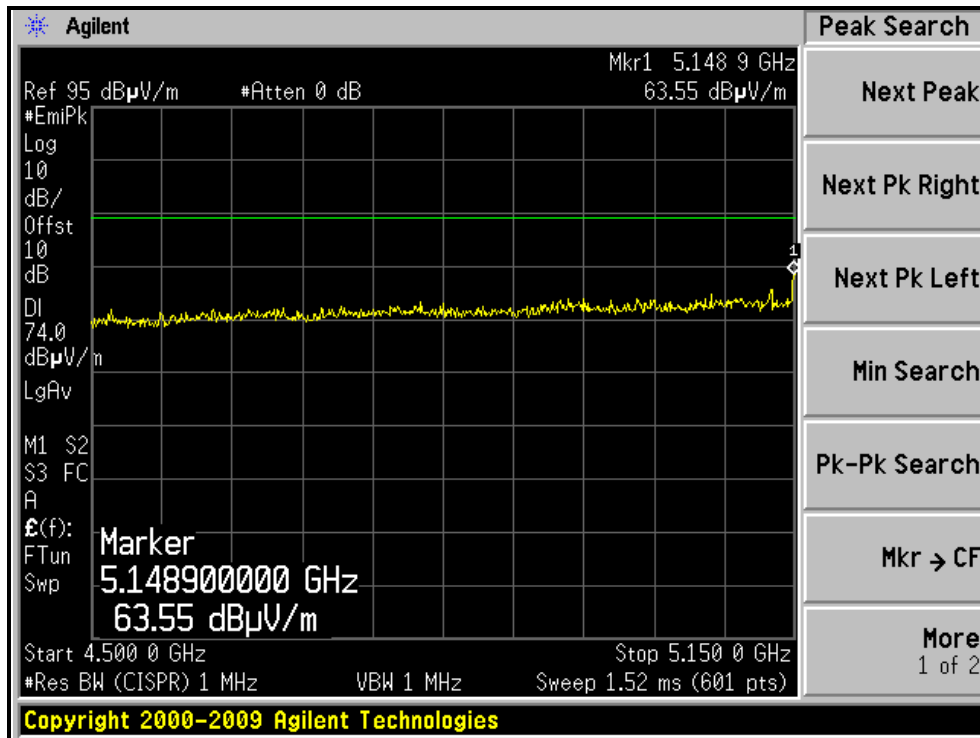
RESTRICTED BANDEDGE (802.11a MODE, CH36, HORIZONTAL)





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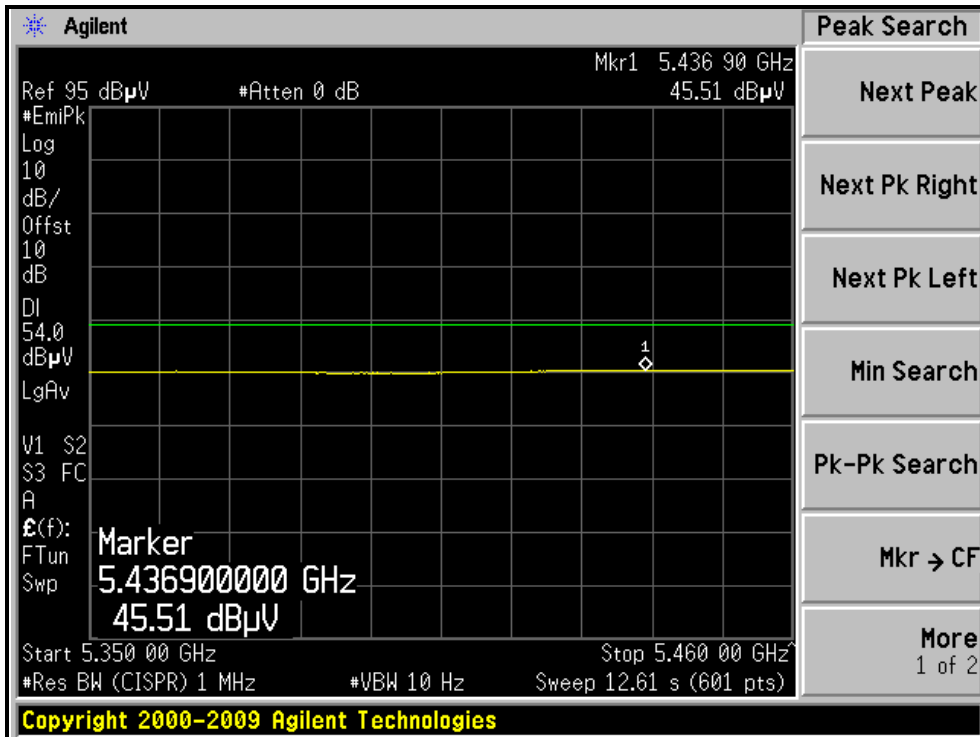
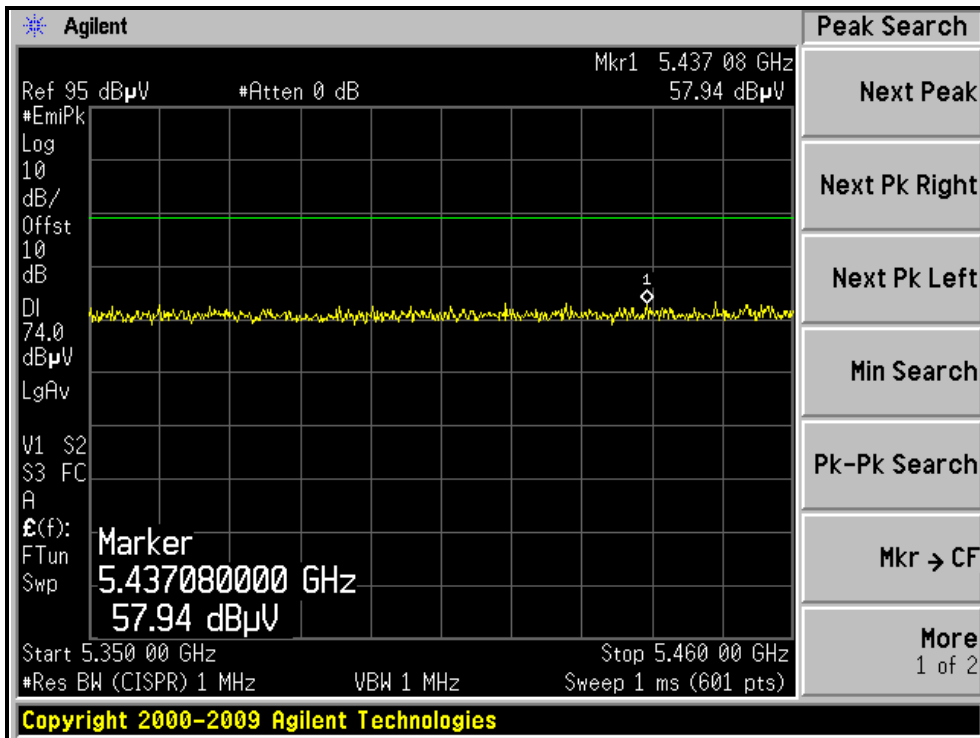
RESTRICTED BANDEDGE (802.11a MODE, CH36, VERTICAL)



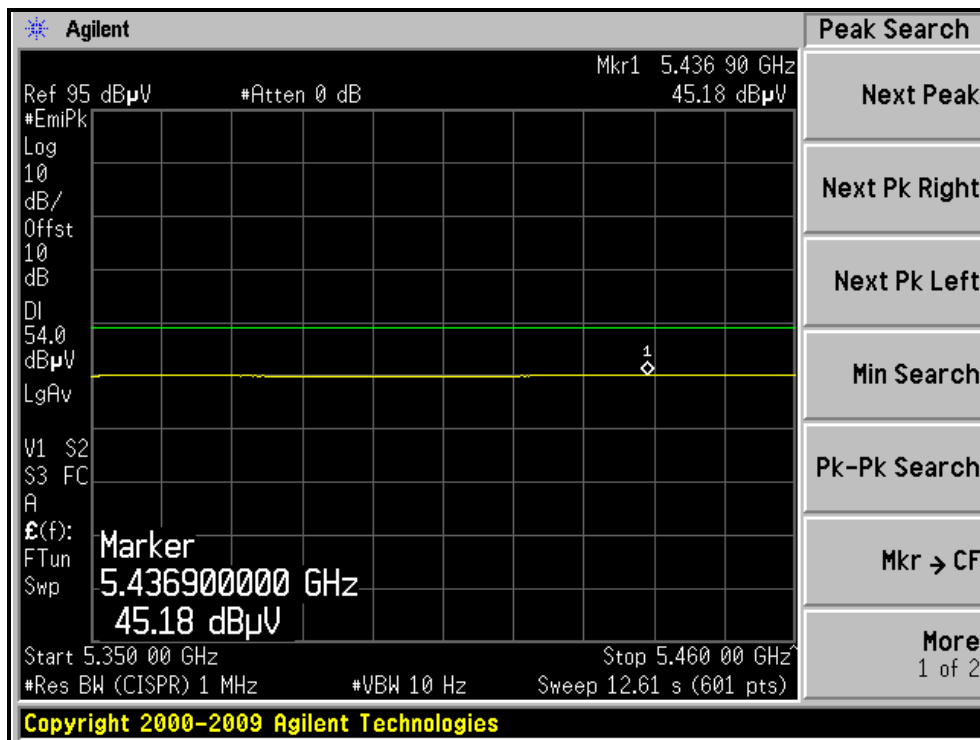
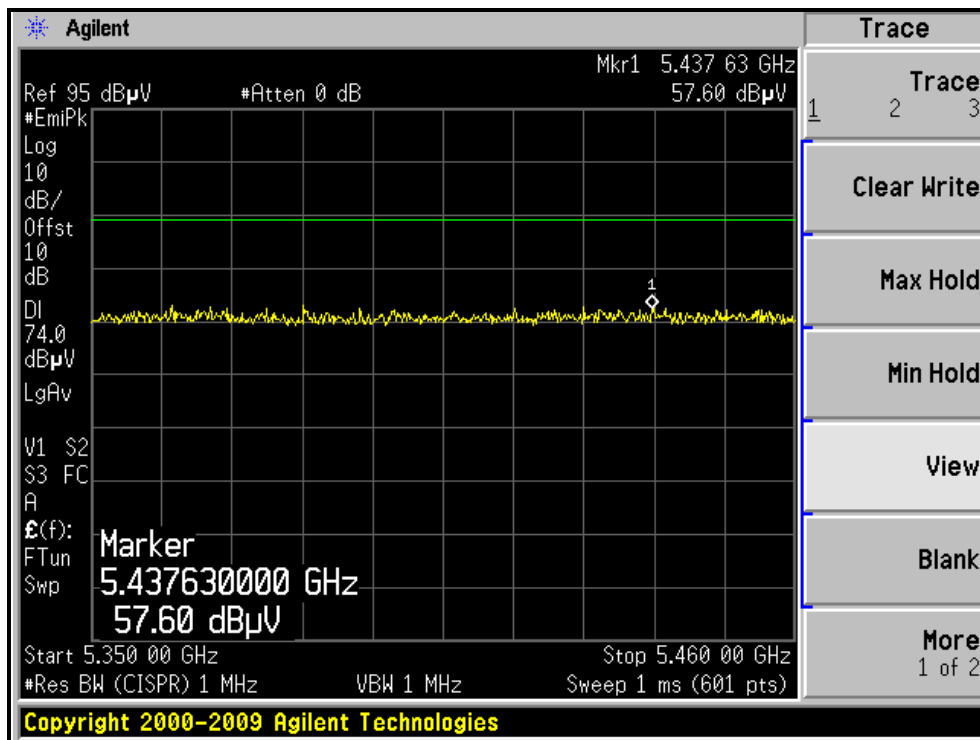


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RESTRICTED BANDEDGE (802.11a MODE, CH48, HORIZONTAL)



RESTRICTED BANDEDGE (802.11a MODE, CH48, VERTICAL)





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802.11n (20MHz) OFDM MODULATION

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 36	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 68%RH	TESTED BY	Evan Huang

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	5127.20	57.2 PK	74.0	-16.8	1.00 H	112	16.84	40.36
2	5127.20	45.8 AV	54.0	-8.2	1.00 H	112	5.44	40.36
3	*5180.00	103.6 PK			1.00 H	122	63.15	40.45
4	*5180.00	94.3 AV			1.00 H	122	53.85	40.45
5	#10360.00	54.1 PK	68.3	-14.2	1.54 H	123	7.29	46.81
6	15540.00	60.7 PK	74.0	-13.3	1.00 H	129	9.53	51.17
7	15540.00	49.3 AV	54.0	-4.7	1.00 H	129	-1.87	51.17

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	5128.30	61.5 PK	74.0	-12.5	1.66 V	26	21.14	40.36
2	5128.30	50.7 AV	54.0	-3.3	1.66 V	26	10.34	40.36
3	*5180.00	108.6 PK			1.48 V	293	68.15	40.45
4	*5180.00	100.5 AV			1.48 V	293	60.05	40.45
5	#10360.00	56.1 PK	68.3	-12.2	1.62 V	353	9.29	46.81
6	15540.00	60.4 PK	74.0	-13.6	1.64 V	54	9.23	51.17
7	15540.00	49.6 AV	54.0	-4.4	1.64 V	54	-1.57	51.17

- 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 is out the restricted band.



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 40	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 68%RH	TESTED BY	Evan Huang

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	*5200.00	103.7 PK			1.00 H	123	63.21	40.49
2	*5200.00	94.5 AV			1.00 H	123	54.01	40.49
3	#10400.00	54.3 PK	68.3	-14.0	1.56 H	124	7.45	46.85
4	15600.00	60.4 PK	74.0	-13.6	1.00 H	126	9.12	51.28
5	15600.00	49.6 AV	54.0	-4.4	1.00 H	126	-1.68	51.28
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	5148.10	61.1 PK	74.0	-12.9	1.51 V	66	20.70	40.40
2	5148.10	51.0 AV	54.0	-3.0	1.51 V	66	10.60	40.40
3	*5200.00	108.8 PK			1.45 V	65	68.31	40.49
4	*5200.00	100.8 AV			1.45 V	65	60.31	40.49
5	#10400.00	58.2 PK	68.3	-10.1	1.51 V	280	11.35	46.85
6	15600.00	60.3 PK	74.0	-13.7	1.62 V	59	9.02	51.28
7	15600.00	49.4 AV	54.0	-4.6	1.62 V	59	-1.88	51.28

- 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 is out the restricted band.



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 48	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 68%RH	TESTED BY	Evan Huang

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

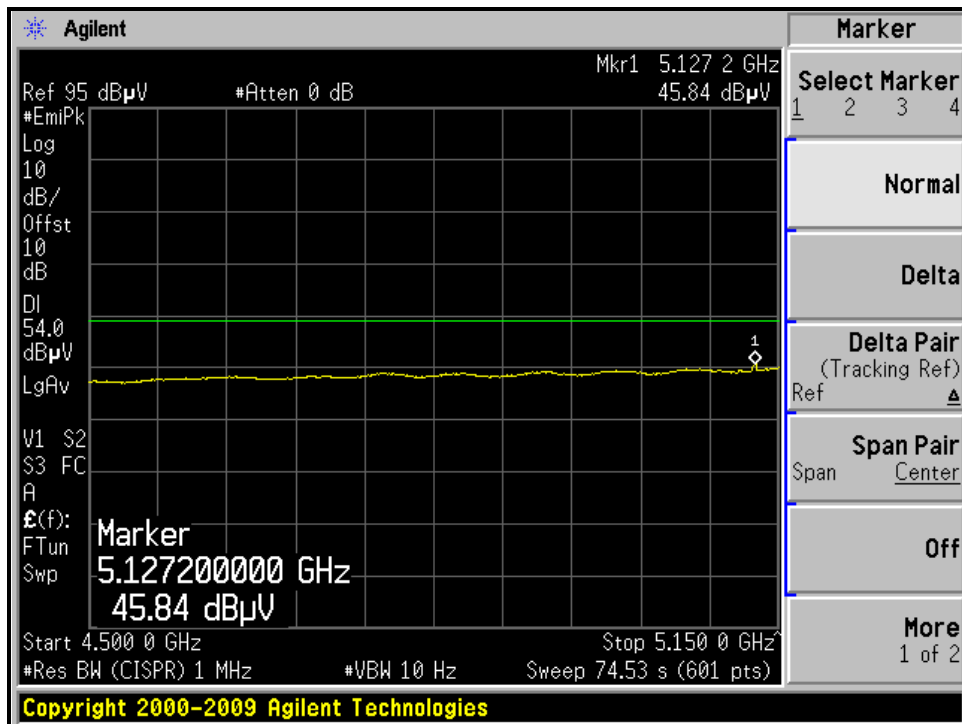
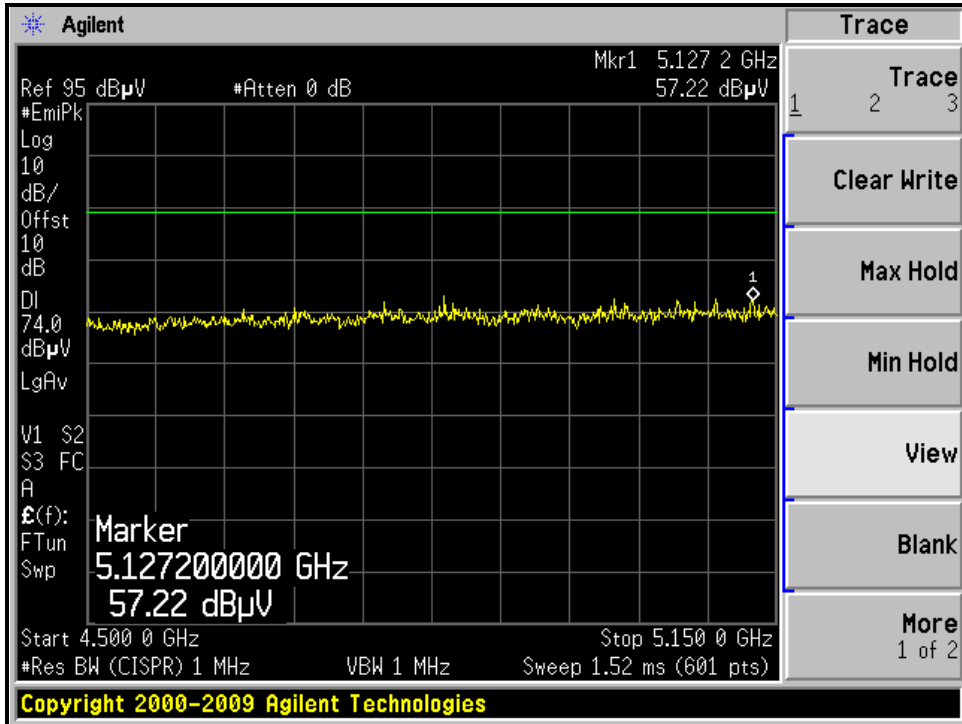
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5240.00	104.1 PK			1.00 H	126	63.54	40.56
2	*5240.00	94.9 AV			1.00 H	126	54.34	40.56
3	5365.58	57.0 PK	74.0	-17.0	1.00 H	105	16.21	40.79
4	5365.58	45.2 AV	54.0	-8.8	1.00 H	105	4.41	40.79
5	#10480.00	54.6 PK	68.3	-13.7	1.51 H	121	7.69	46.91
6	15720.00	60.7 PK	74.0	-13.3	1.00 H	124	9.08	51.62
7	15720.00	49.1 AV	54.0	-4.9	1.00 H	124	-2.52	51.62

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	*5240.00	110.4 PK			1.48 V	65	69.84	40.56
2	*5240.00	101.8 AV			1.48 V	65	61.24	40.56
3	5365.22	58.3 PK	74.0	-15.7	1.12 V	311	17.54	40.79
4	5365.22	45.6 AV	54.0	-8.4	1.12 V	311	4.81	40.79
5	#10480.00	60.7 PK	68.3	-7.6	1.56 V	351	13.79	46.91
6	15720.00	60.7 PK	74.0	-13.3	1.63 V	63	9.08	51.62
7	15720.00	49.7 AV	54.0	-4.3	1.63 V	63	-1.92	51.62

- 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 is out the restricted band.

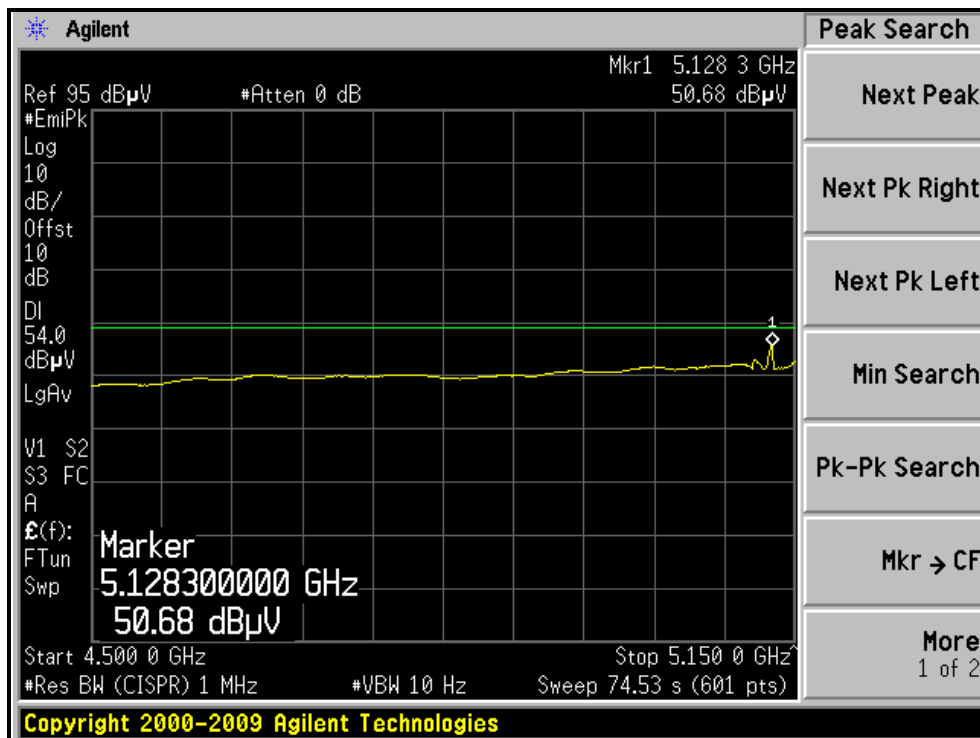
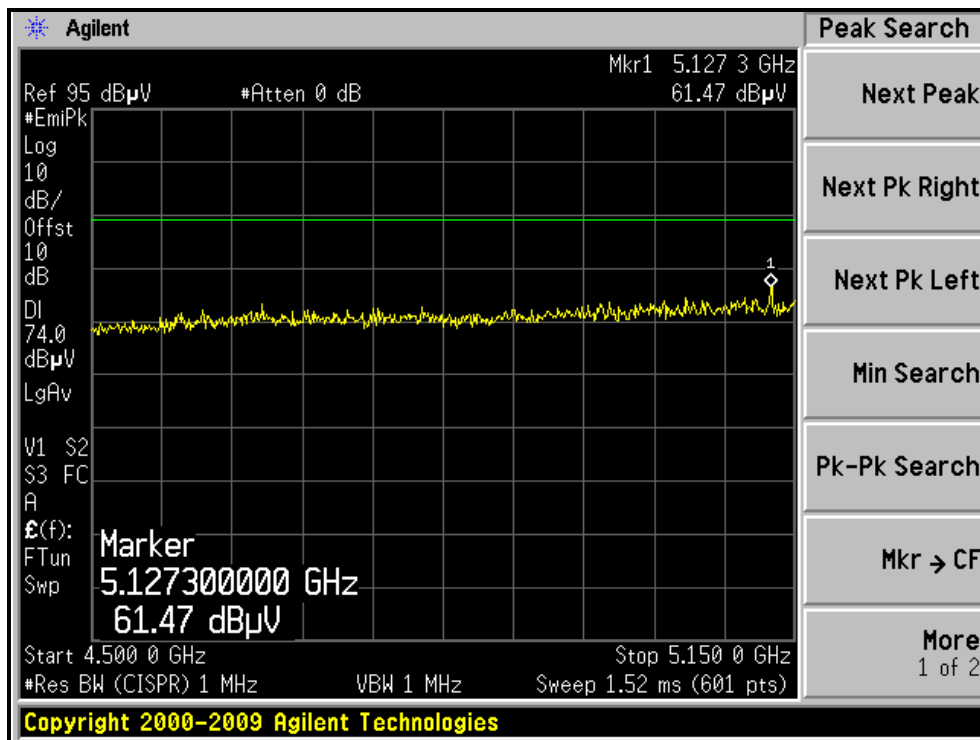
RESTRICTED BANDEDGE (802.11n (20MHz) MODE,CH36, HORIZONTAL)





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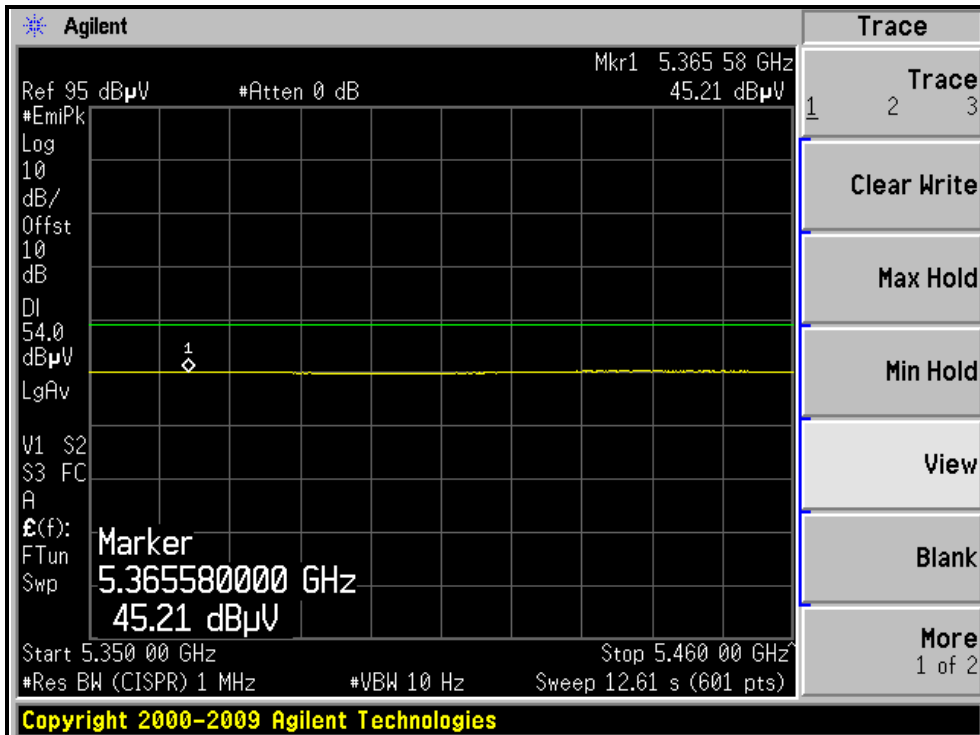
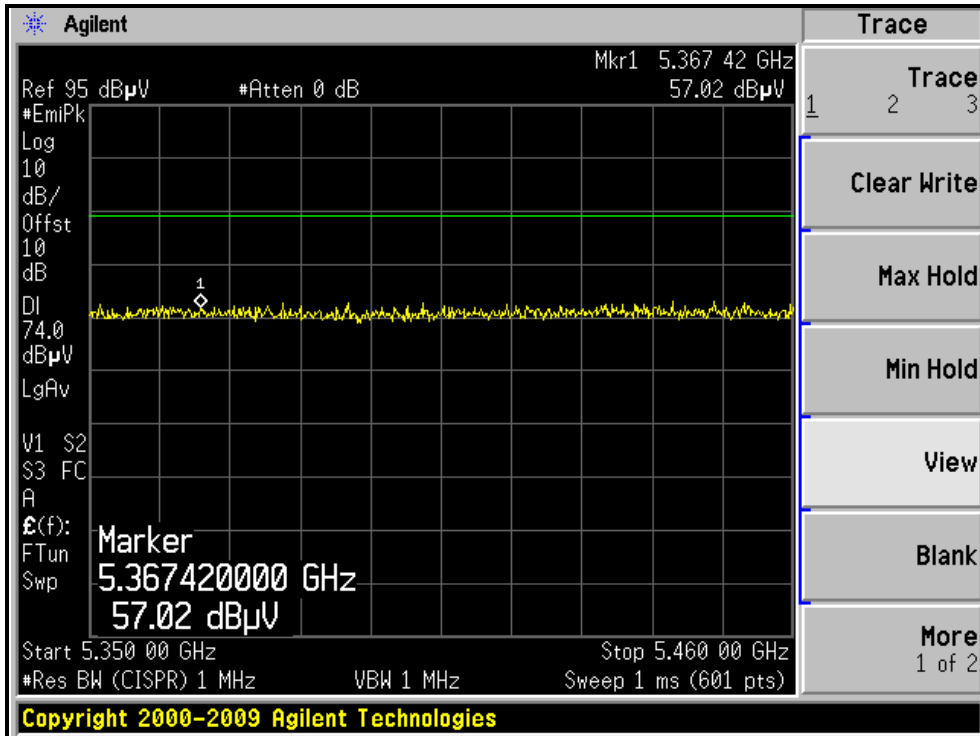
RESTRICTED BANDEDGE (802.11n (20MHz) MODE,CH36, VERTICAL)



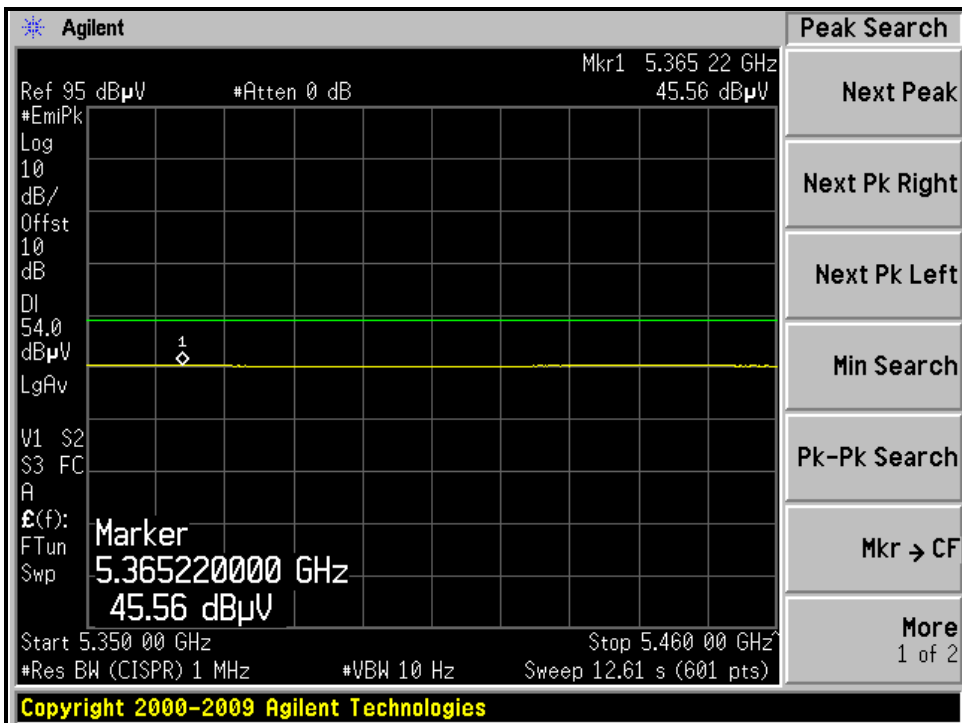
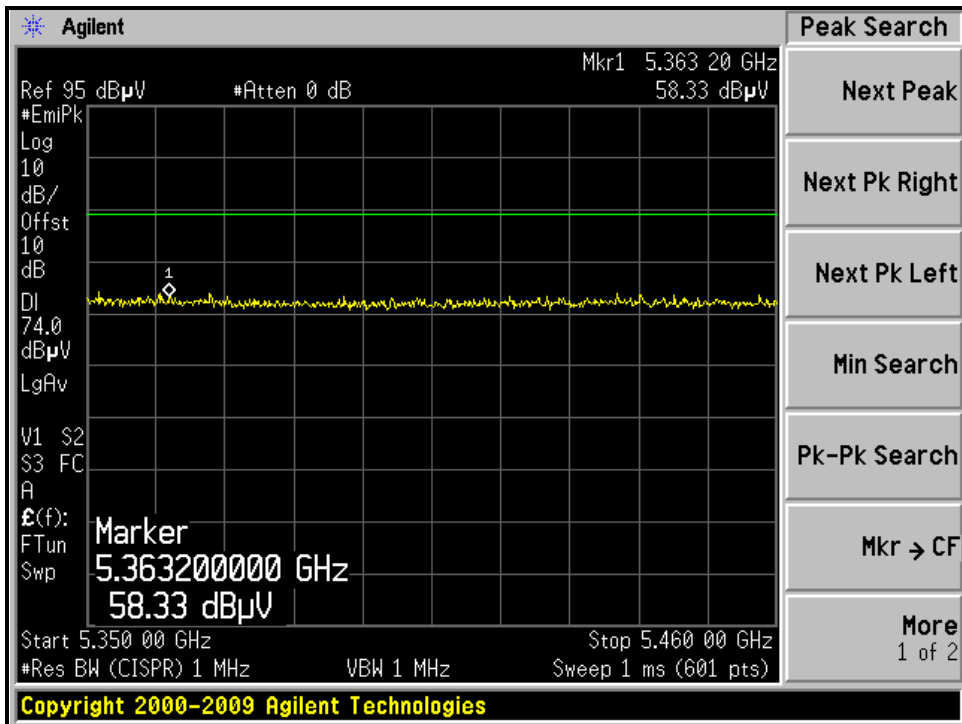


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RESTRICTED BANDEDGE (802.11n (20MHz) MODE,CH 48, HORIZONTAL)



RESTRICTED BANDEDGE (802.11n (20MHz) MODE,CH 48, VERTICAL)





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802.11n (40MHz) OFDM MODULATION

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 38	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 68%RH	TESTED BY	Evan Huang

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	5150.00	55.7 PK	74.0	-18.3	1.00 H	123	15.30	40.40
2	5150.00	44.8 AV	54.0	-9.2	1.00 H	123	4.40	40.40
3	*5190.00	100.3 PK			1.00 H	124	59.83	40.47
4	*5190.00	90.3 AV			1.00 H	124	49.83	40.47
5	#10380.00	54.1 PK	68.3	-14.2	1.54 H	129	7.27	46.83
6	15570.00	60.4 PK	74.0	-13.6	1.00 H	126	9.18	51.22
7	15570.00	49.3 AV	54.0	-4.7	1.00 H	126	-1.92	51.22

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	5150.00	73.0 PK	74.0	-1.0	1.62 V	62	32.60	40.40
2	5150.00	48.3 AV	54.0	-5.7	1.62 V	62	7.90	40.40
3	*5190.00	106.1 PK			1.48 V	292	65.63	40.47
4	*5190.00	97.3 AV			1.48 V	292	56.83	40.47
5	#10380.00	53.8 PK	68.3	-14.5	1.32 V	312	6.97	46.83
6	15570.00	60.9 PK	74.0	-13.1	1.31 V	294	9.68	51.22
7	15570.00	49.3 AV	54.0	-4.7	1.31 V	294	-1.92	51.22

- 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 is out the restricted band.



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 46	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 68%RH	TESTED BY	Evan Huang

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

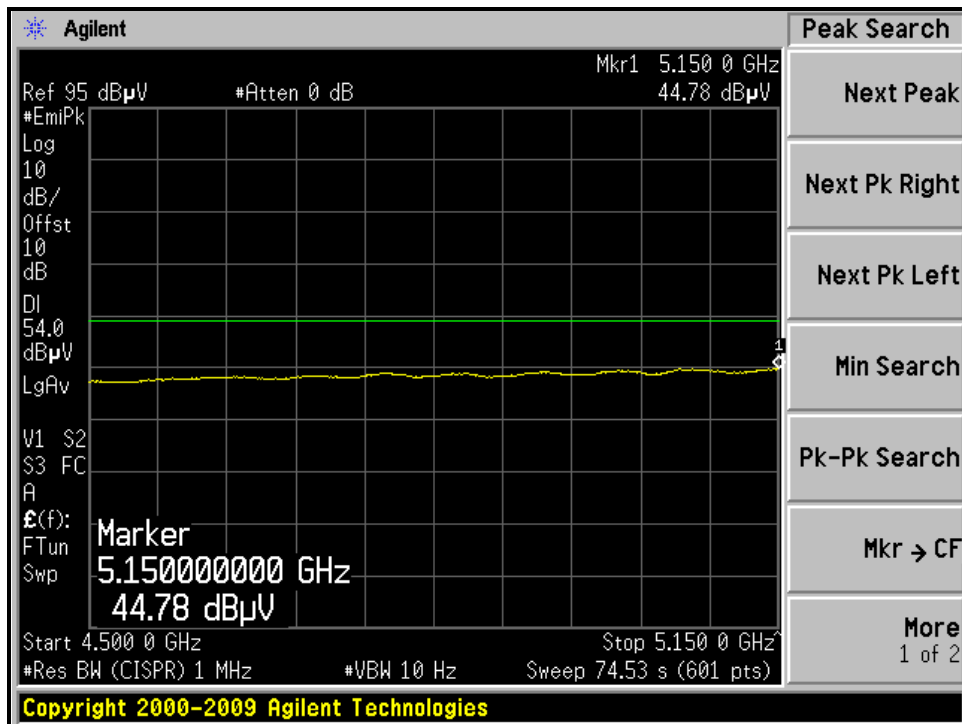
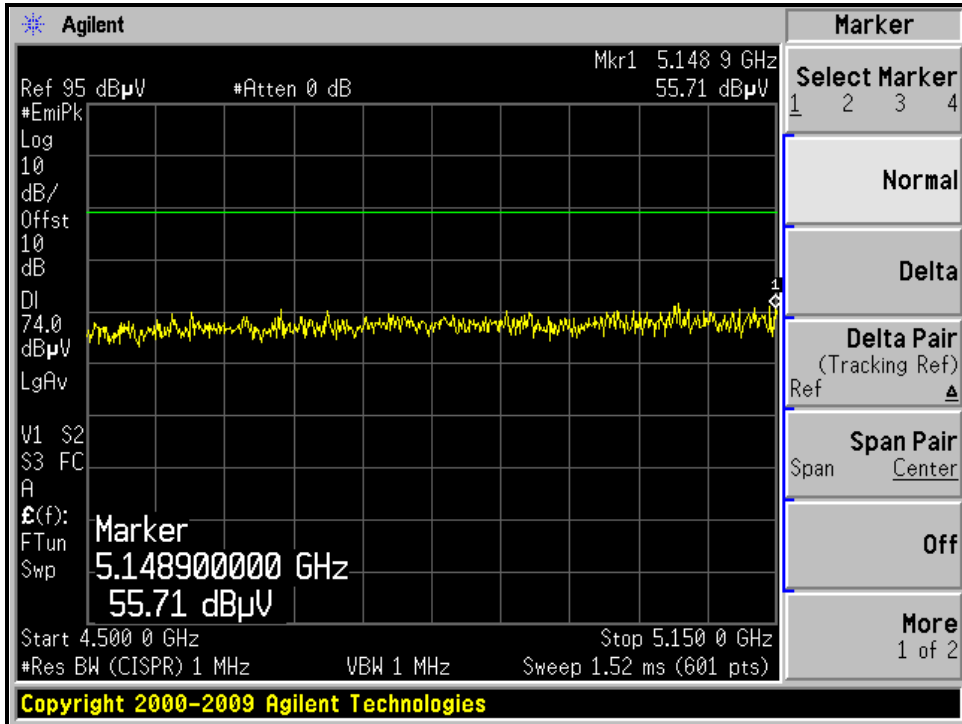
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5230.00	100.2 PK			1.00 H	133	59.66	40.54
2	*5230.00	90.1 AV			1.00 H	133	49.56	40.54
3	5435.98	57.8 PK	74.0	-16.2	1.00 H	114	16.87	40.93
4	5435.98	45.5 AV	54.0	-8.5	1.00 H	114	4.57	40.93
5	#10460.00	54.6 PK	68.3	-13.7	1.56 H	124	7.70	46.90
6	15690.00	60.3 PK	74.0	-13.7	1.00 H	121	8.76	51.54
7	15690.00	49.2 AV	54.0	-4.8	1.00 H	121	-2.34	51.54

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	*5230.00	104.6 PK			1.28 V	48	64.06	40.54
2	*5230.00	96.2 AV			1.28 V	48	55.66	40.54
3	5435.98	57.3 PK	74.0	-16.7	1.14 V	323	16.37	40.93
4	5435.98	45.5 AV	54.0	-8.5	1.14 V	323	4.57	40.93
5	#10460.00	56.1 PK	68.3	-12.2	1.61 V	46	9.20	46.90
6	15690.00	56.5 PK	74.0	-17.5	1.35 V	241	4.96	51.54
7	15690.00	44.3 AV	54.0	-9.7	1.35 V	241	-7.24	51.54

- 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 is out the restricted band.

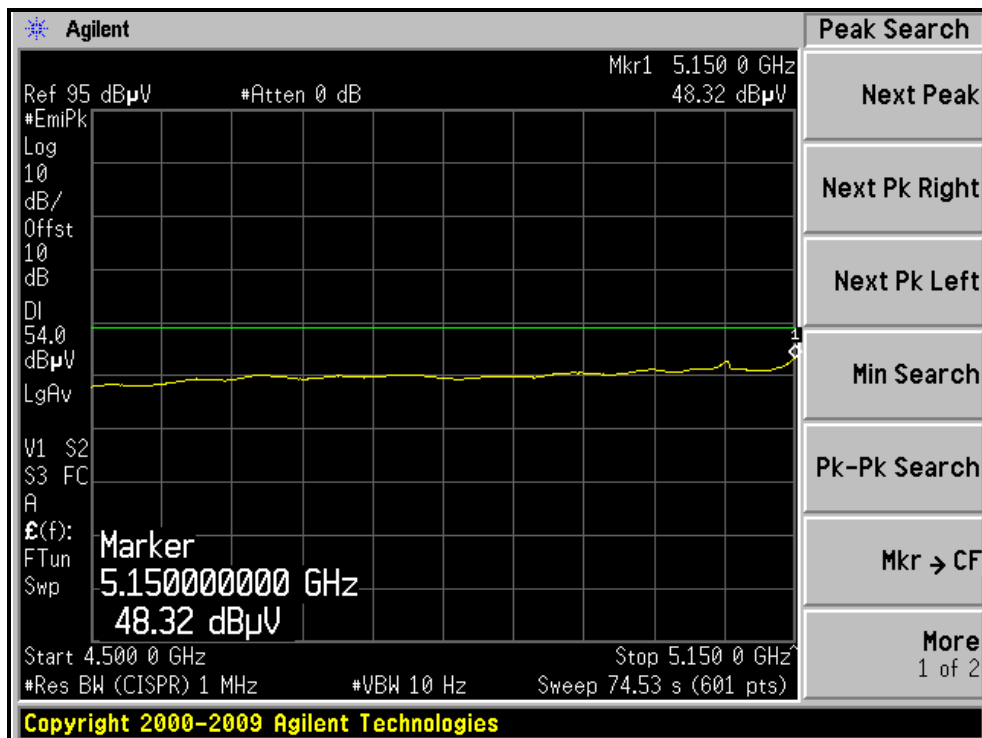
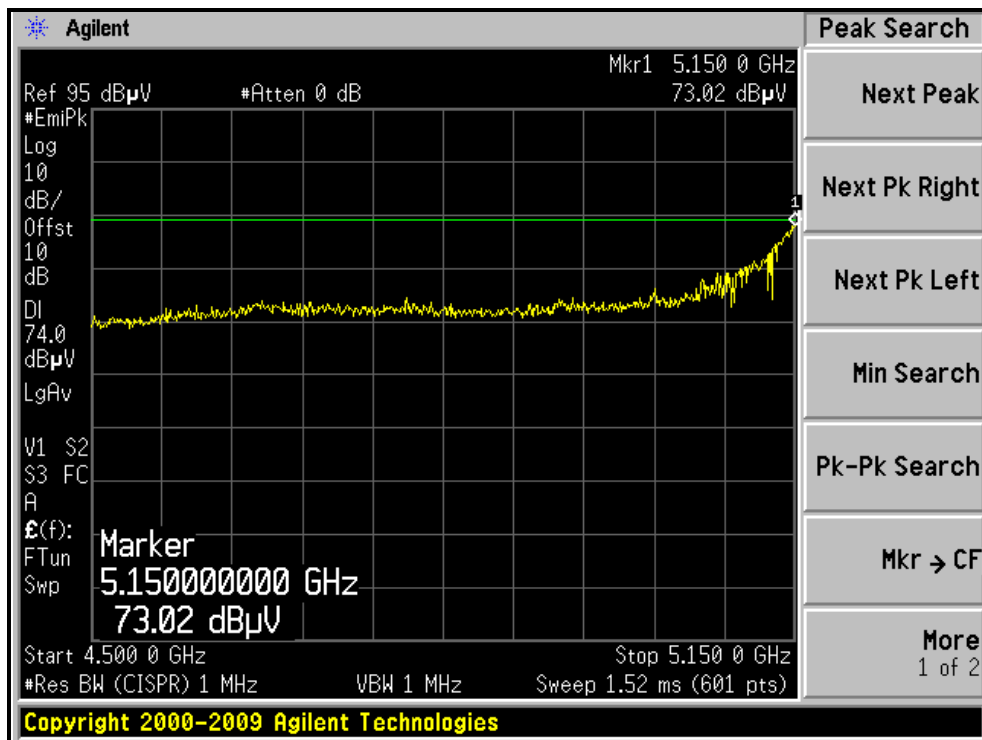
RESTRICTED BANDEDGE (802.11n (40MHz) MODE, CH38, HORIZONTAL)





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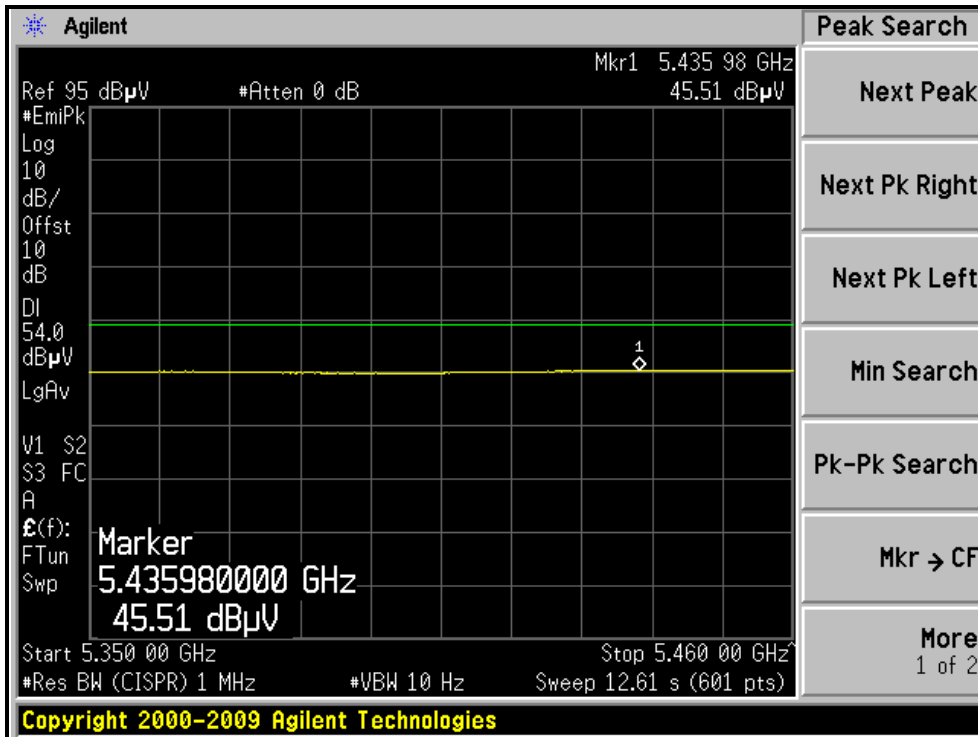
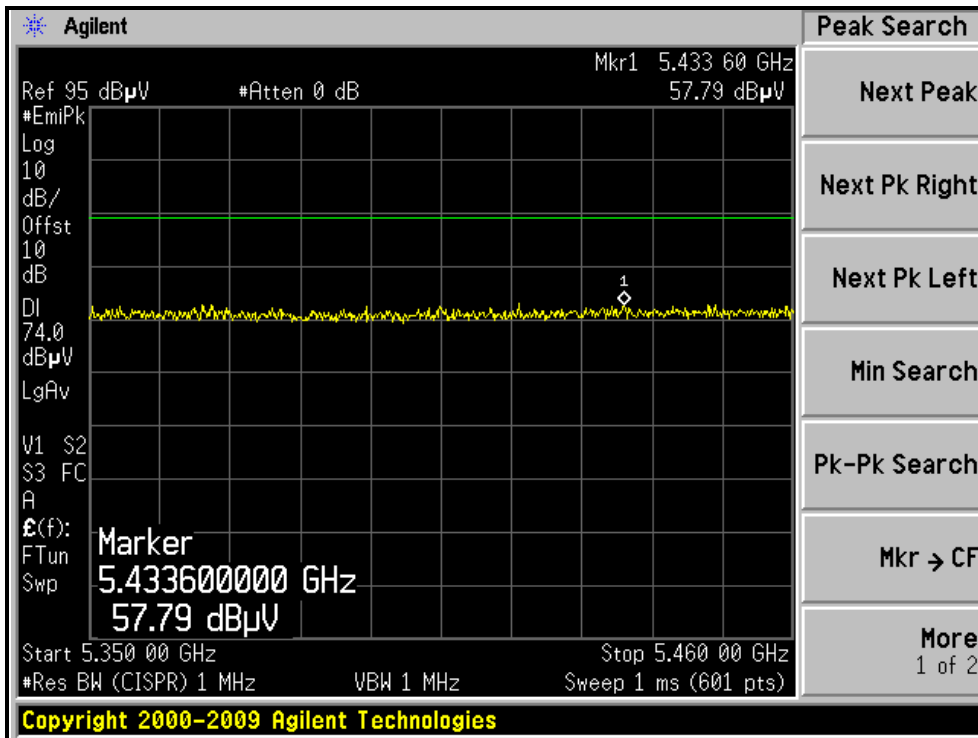
RESTRICTED BANDEDGE (802.11n (40MHz) MODE,CH38, VERTICAL)





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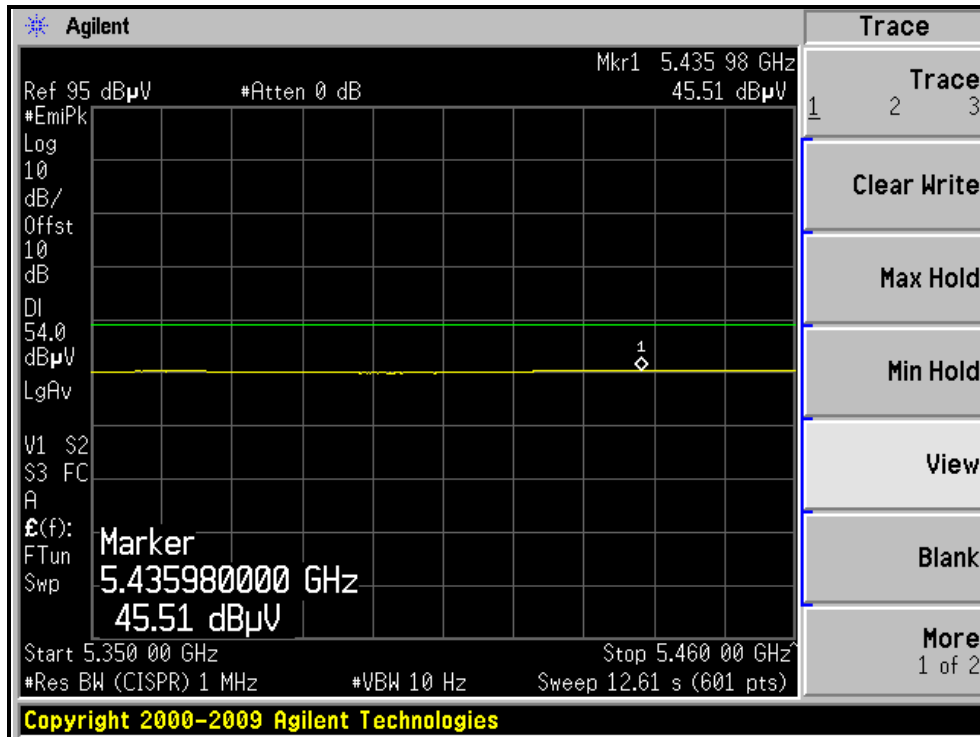
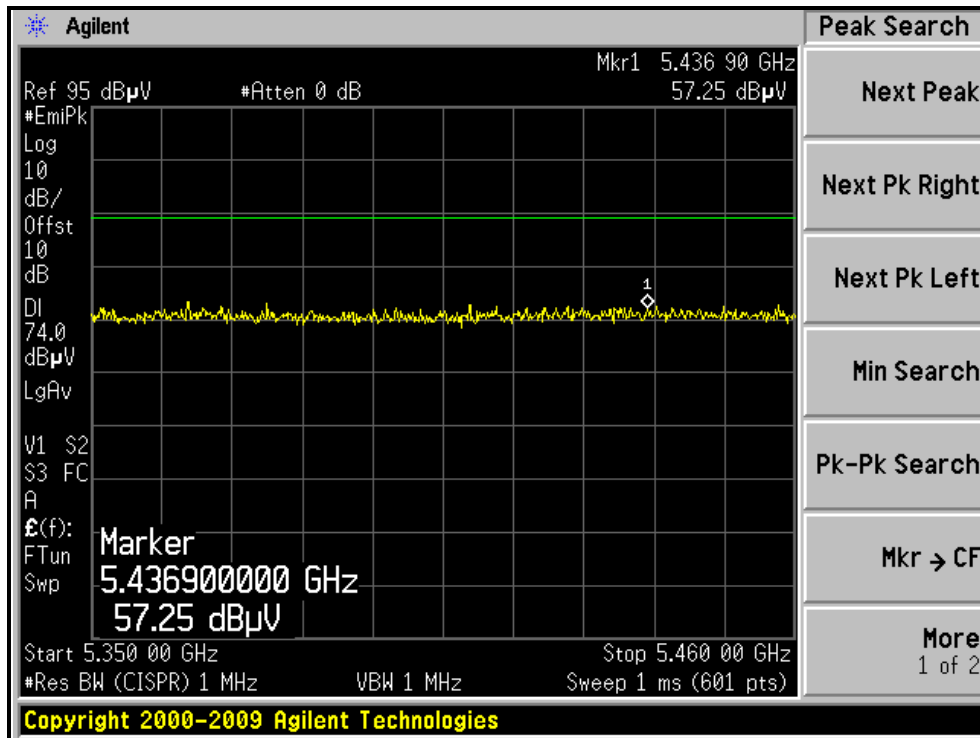
RESTRICTED BANDEDGE (802.11n (40MHz) MODE, CH46, HORIZONTAL)





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RESTRICTED BANDEDGE (802.11n (40MHz) MODE, CH46, VERTICAL)



4.3 OUTPUT TRANSMIT POWER MEASUREMENT

4.3.1 LIMITS OF OUTPUT TRANSMIT POWER MEASUREMENT

Frequency Band	Limit
5.15 – 5.25GHz	The lesser of 50mW (17dBm) or 4dBm + 10logB
5.25 – 5.35GHz	The lesser of 250mW (24dBm) or 11dBm + 10logB
5.47 – 5.725GHz	The lesser of 250mW (24dBm) or 11dBm + 10logB
5.725 – 5.825GHz	The lesser of 1W (30dBm) or 17dBm + 10logB

NOTE: Where B is the 26dB emission bandwidth in MHz.

4.3.2 TEST INSTRUMENTS

Test date: Aug. 29, 2011

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer	E4446A	MY48250254	July 12, 2011	July 11, 2012

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

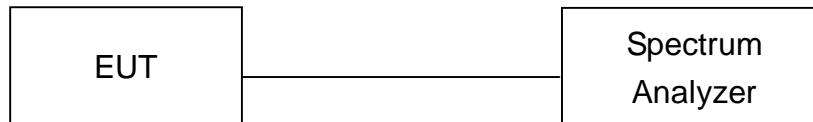
4.3.3 TEST PROCEDURE

1. The transmitter output was connected to the spectrum analyzer.
2. Set span to encompass the entire emission bandwidth of the signal.
3. Set RBW to 1MHz, VBW to 3MHz.
4. Using the spectrum analyzer's channel power measurement function to measure the output power.

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 specific channel frequencies individually.



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4.3.7 TEST RESULTS

802.11a OFDM MODULATION:

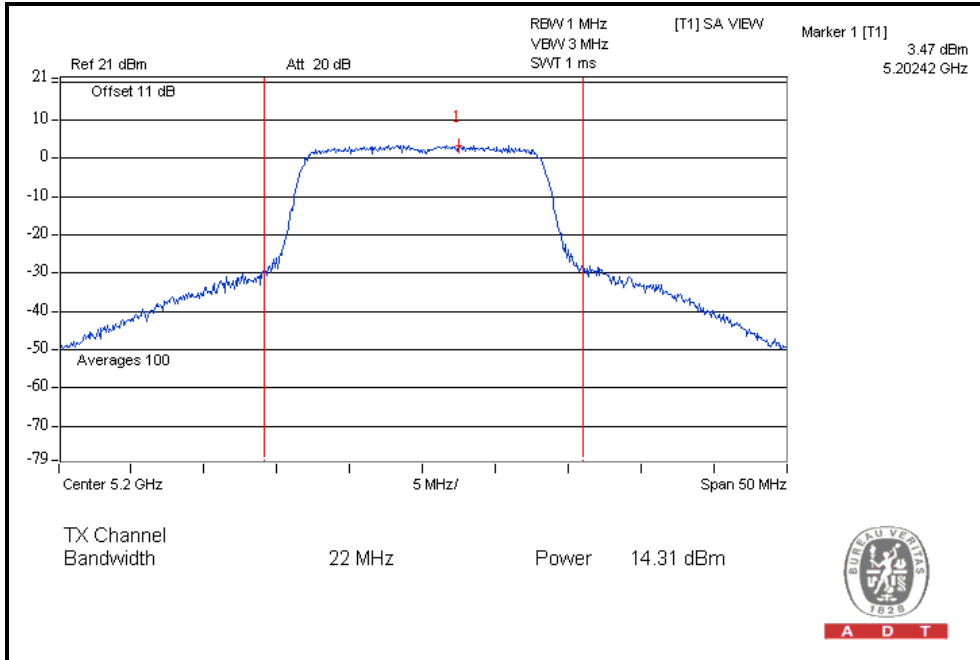
CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER (mW)	PEAK POWER (dBm)	PEAK POWER LIMIT (dBm)	26dBc Occupied Bandwidth (MHz)	PASS/ FAIL
36	5180	25.7	14.1	17	23.53	PASS
40	5200	26.9	14.3	17	21.56	PASS
48	5240	25.7	14.1	17	22.36	PASS

NOTE: The 26dBc Occupied Bandwidth plot, please refer to the following pages.

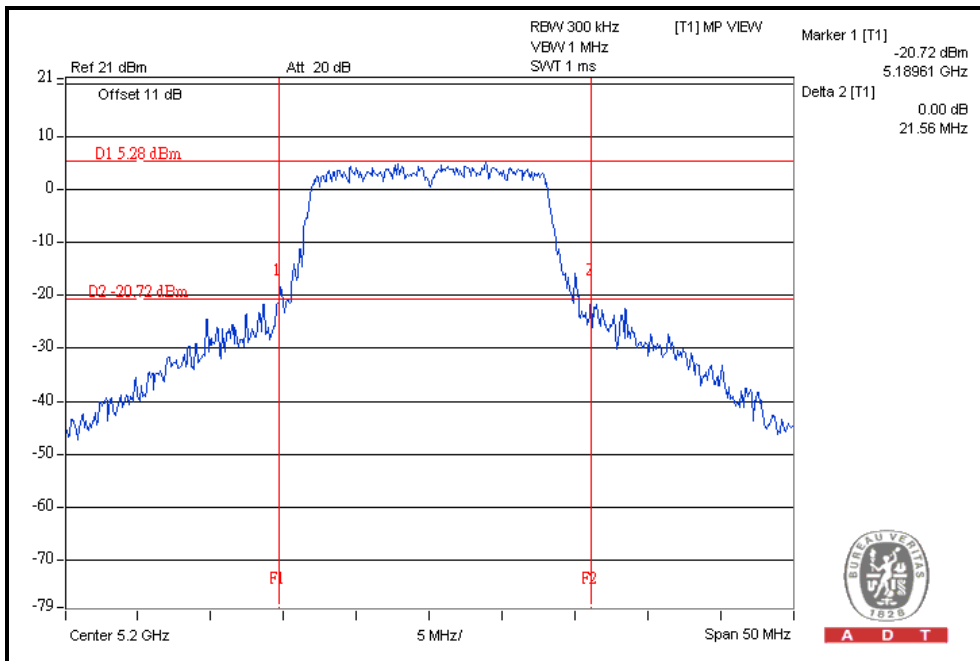


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Peak Power Output: CH40



26dB Occupied Bandwidth: CH40





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802.11n (20MHz) OFDM MODULATION:

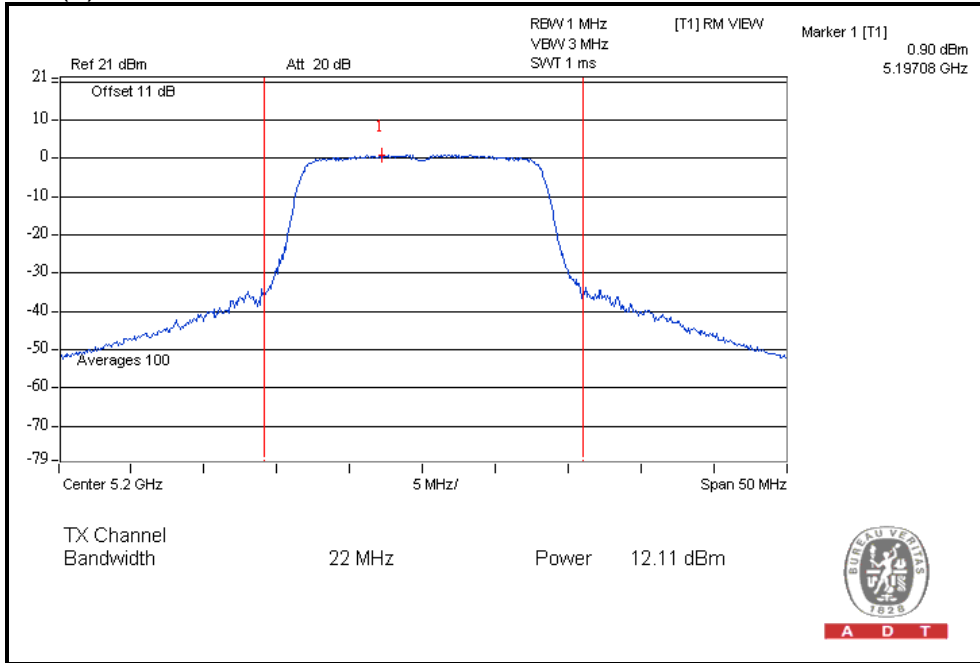
CHANNEL	CHANNEL FREQUENCY (MHz)	OUTPUT POWER (dBm)		TOTAL OUTPUT POWER (mW)	TOTAL OUTPUT POWER (dBm)	OUTPUT POWER LIMIT (dBm)	26dBc Occupied Bandwidth (MHz)		PASS / FAIL
		CHAIN(0)	CHAIN(1)				CHAIN(0)	CHAIN(1)	
36	5180	11.8	11.1	28.0	14.5	17	19.39	19.86	PASS
40	5200	12.1	11.3	29.7	14.7	17	21.23	20.68	PASS
48	5240	11.0	11.9	28.1	14.5	17	22.65	19.98	PASS

NOTE: The 26dBc Occupied Bandwidth plot, please refer to the following pages.

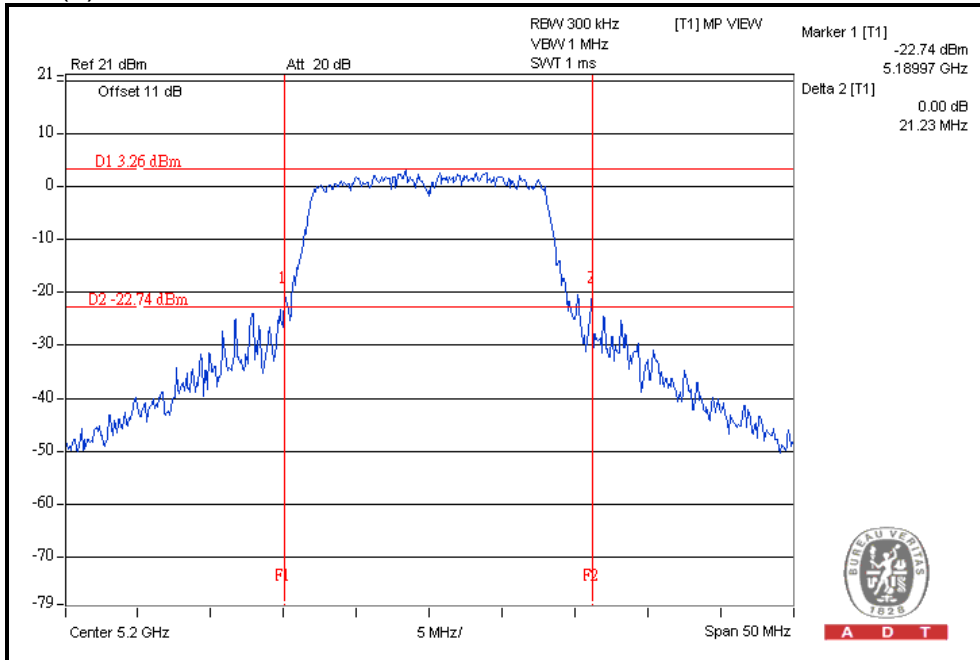


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Peak Power Output: For Chain (0) : CH40



26dB Occupied Bandwidth: For Chain (0) : CH40





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802.11n (40MHz) OFDM MODULATION:

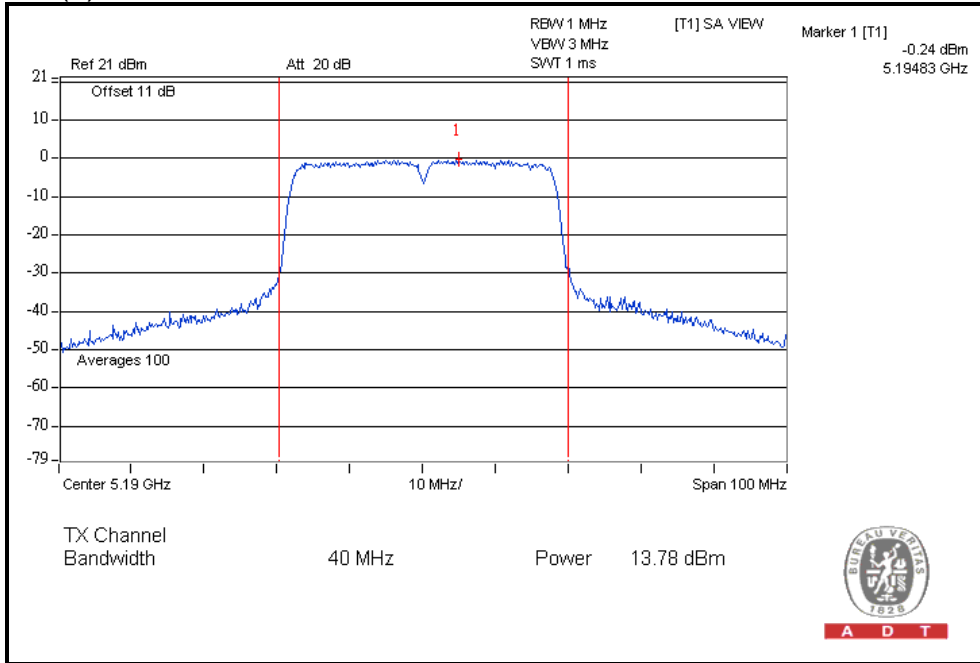
CHANNEL	CHANNEL FREQUENCY (MHz)	OUTPUT POWER (dBm)		TOTAL OUTPUT POWER (mW)	TOTAL OUTPUT POWER (dBm)	OUTPUT POWER LIMIT (dBm)	26dBc Occupied Bandwidth (MHz)		PASS / FAIL
		CHAIN(0)	CHAIN(1)				CHAIN(0)	CHAIN(1)	
38	5190	13.8	13.0	43.9	16.4	17	39.49	39.60	PASS
46	5230	13.0	13.6	42.9	16.3	17	39.24	39.22	PASS

NOTE: The 26dBc Occupied Bandwidth plot, please refer to the following pages.

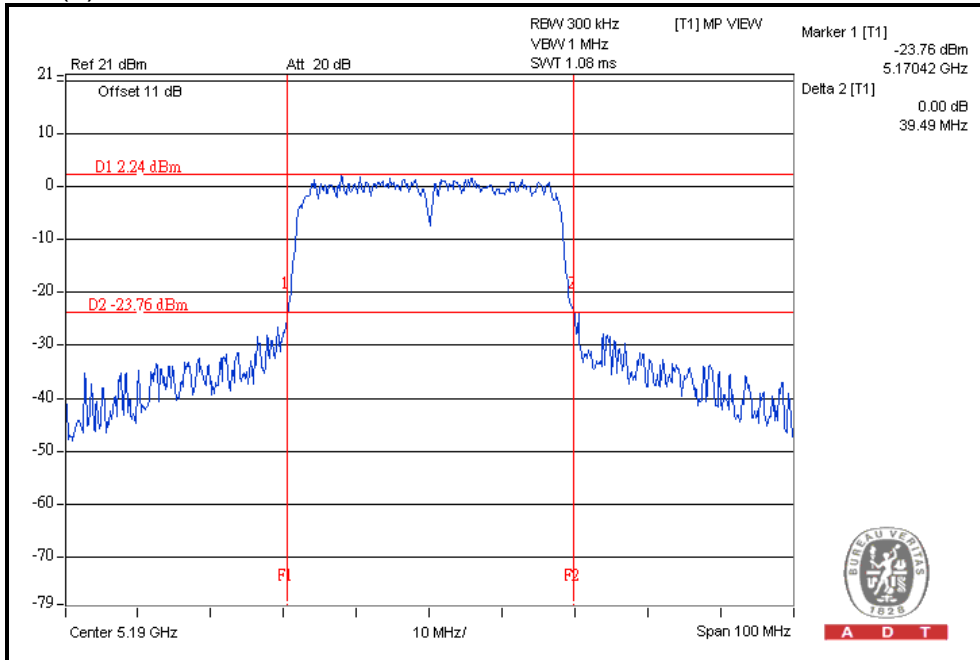


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Peak Power Output: For Chain (0) : CH38



26dB Occupied Bandwidth: For Chain (0) : CH38



4.4 PEAK POWER EXCURSION MEASUREMENT

4.4.1 LIMITS OF PEAK POWER EXCURSION MEASUREMENT

Frequency Band	Limit
5.15 – 5.25 GHz	13dB
5.25 – 5.35 GHz	13dB
5.47 – 5.725GHz	13dB
5.725 – 5.825 GHz	13dB

4.4.2 TEST INSTRUMENTS

Test date: Aug. 29, 2011

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer	E4446A	MY48250254	July 12, 2011	July 11, 2012

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

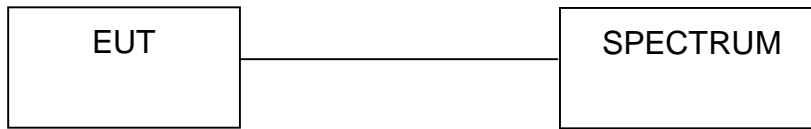
4.4.3 TEST PROCEDURE

1. Connect the cable from the spectrum analyzer to the EUT antenna port using an appropriate RF attenuator.
2. Verify the antenna port selected is the active one if the system has more than one antenna.
3. Verify the unlicensed wireless device is set to operate at 100 % duty cycle at the maximum allowed power for operation.
4. Testing shall be done on the center frequency of each U-NII band.
5. Set the spectrum analyzer span to view the entire emission bandwidth. The largest difference between the following two traces must be 13 dB for all frequencies across the emission bandwidth.
 - a. First trace: set RBW = 1 MHz, VBW = 3 MHz with peak detector and max hold settings.
 - b. Second trace: set RBW = 1 MHz, VBW = 3 MHz with sample detector and trace average across 100 traces in power averaging mode.

4.4.4 DEVIATION FROM TEST STANDARD

No deviation

4.4.5 TEST SETUP



4.4.6 EUT OPERATING CONDITIONS

The software provided by client to enable the EUT under transmission condition continuously at specific channel frequencies individually.



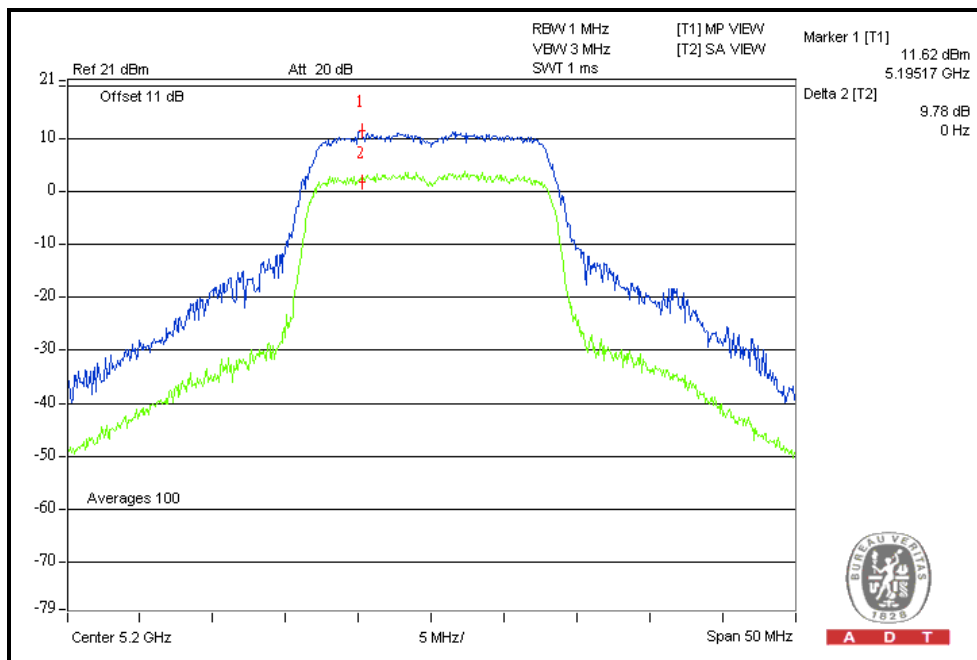
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4.4.7 TEST RESULTS

802.11a OFDM MODULATION

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER EXCURSION (dB)	PEAK to AVERAGE EXCURSION LIMIT (dB)	PASS/FAIL
36	5180	8.9	13	PASS
40	5200	9.8	13	PASS
48	5240	9.8	13	PASS

CH40



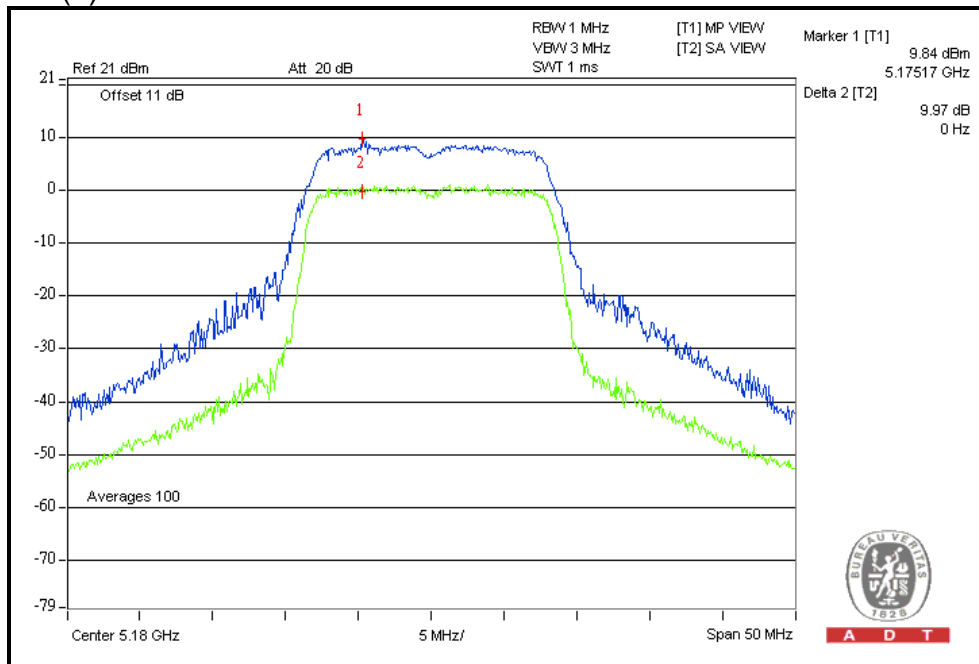


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802.11n (20MHz) OFDM MODULATION:

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER EXCURSION (dB)		PEAK to AVERAGE EXCURSION LIMIT (dB)	PASS/FAIL
		CHAIN(0)	CHAIN(1)		
36	5180	10.0	8.7	13	PASS
40	5200	9.8	8.3	13	PASS
48	5240	9.6	8.0	13	PASS

For Chain (0) : CH36



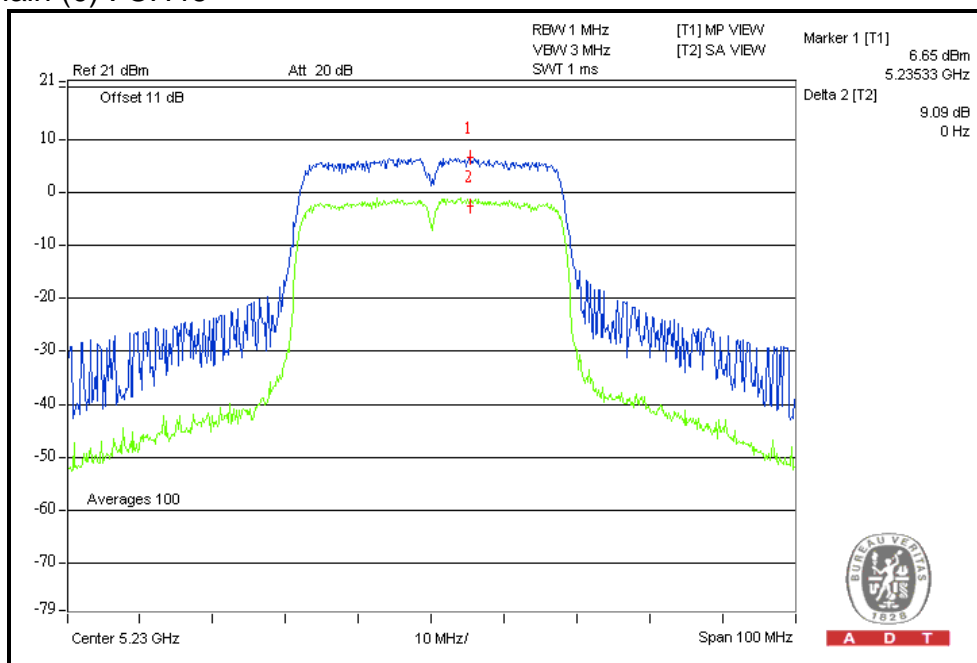


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802.11n (40MHz) OFDM MODULATION:

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER EXCURSION (dB)		PEAK to AVERAGE EXCURSION LIMIT (dB)	PASS/FAIL
		CHAIN(0)	CHAIN(1)		
38	5190	8.0	8.5	13	PASS
46	5230	9.1	8.1	13	PASS

For Chain (0) : CH46





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4.5 PEAK POWER SPECTRAL DENSITY MEASUREMENT

4.5.1 LIMITS OF PEAK POWER SPECTRAL DENSITY MEASUREMENT

Frequency Band	Limit
5.15 ~ 5.25GHz	4dBm
5.25 ~ 5.35GHz	11dBm
5.47 ~ 5.725GHz	11dBm
5.725 ~ 5.825GHz	17dBm

4.5.2 TEST INSTRUMENTS

Test date: Aug. 29, 2011

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer	E4446A	MY48250254	July 12, 2011	July 11, 2012

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 PROCEDURES

1. The transmitter output was connected to the spectrum analyzer.
2. Set RBW=1MHz, VBW=3MHz. The PPSD is the highest level found across the emission in any 1MHz band.

4.5.4 DEVIATION FROM TEST STANDARD

No deviation

4.5.5 TEST SETUP



4.5.6 EUT OPERATING CONDITIONS

Same as 4.3.6



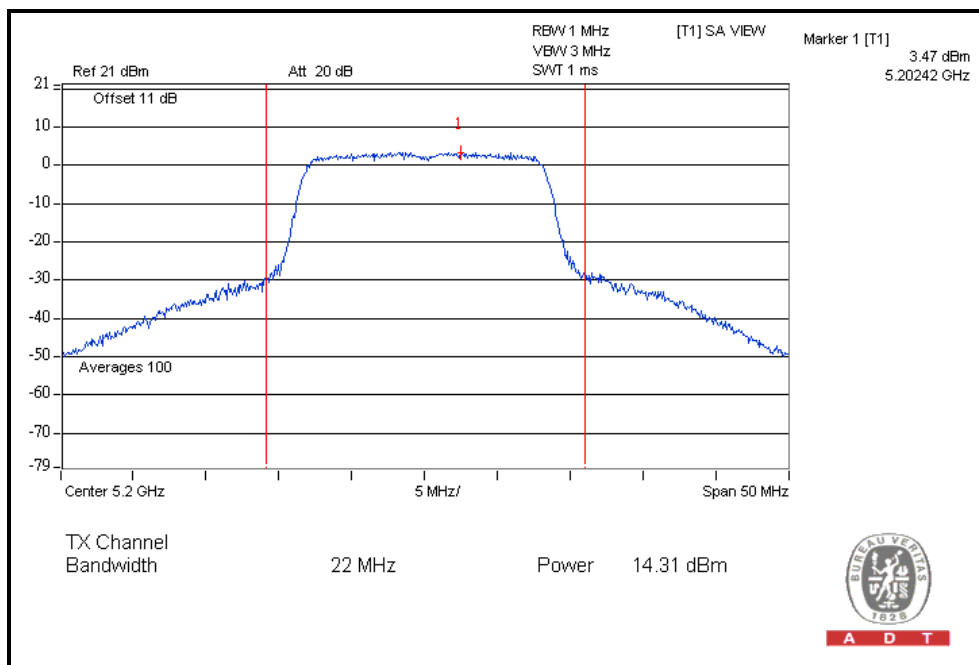
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4.5.7 TEST RESULTS

802.11a OFDM MODULATION

CHANNEL	CHANNEL FREQUENCY (MHz)	RF POWER LEVEL IN 1MHz BW (dBm)	MAXIMUM LIMIT (dBm)	PASS/FAIL
36	5180	3.4	4	PASS
40	5200	3.5	4	PASS
48	5240	3.3	4	PASS

CH40



A D T

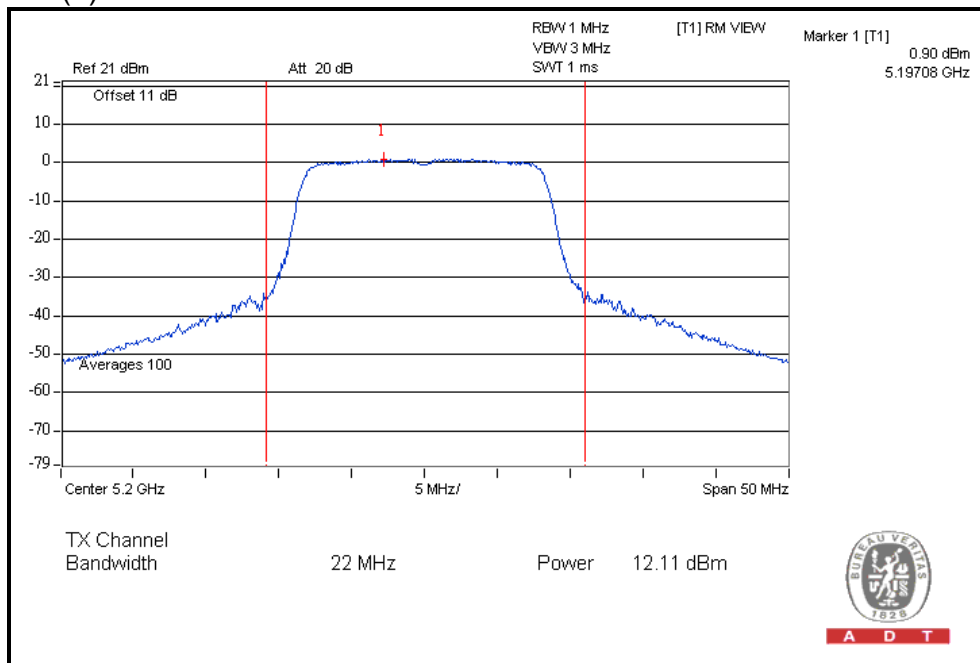


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802.11n (20MHz) OFDM MODULATION:

CHANNEL	CHANNEL FREQUENCY (MHz)	RF POWER LEVEL IN 3kHz BW (dBm)		TOTAL POWER DENSITY (dBm)	MAXIMUM LIMIT (dBm)	PASS / FAIL
		CHAIN(0)	CHAIN(1)			
36	5180	0.8	0.0	3.4	4	PASS
40	5200	1.0	0.1	3.6	4	PASS
48	5240	-0.1	0.7	3.3	4	PASS

For Chain (0): CH40



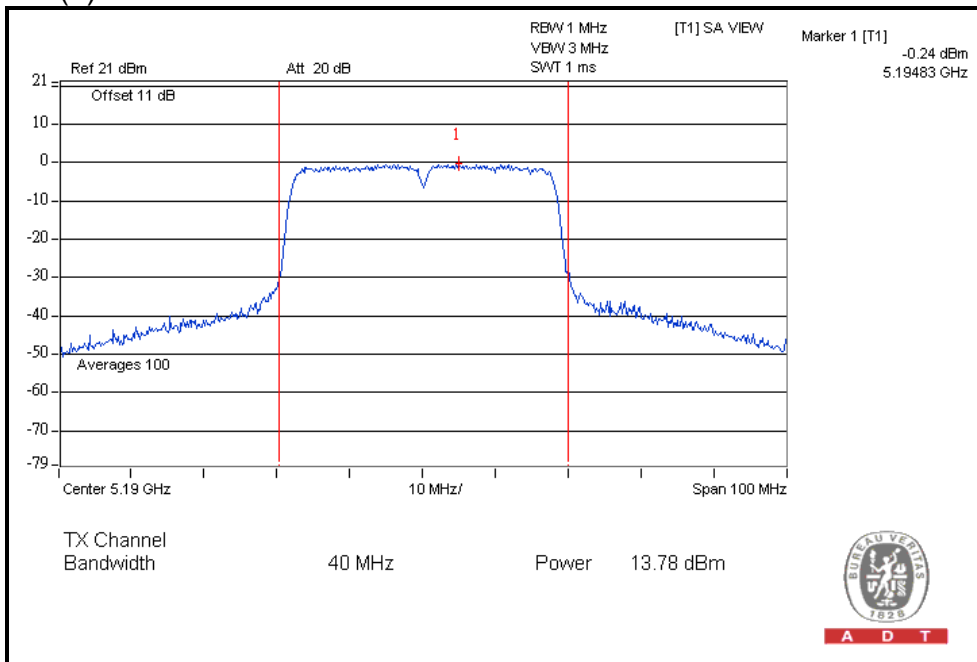


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802.11n (40MHz) OFDM MODULATION:

CHANNEL	CHANNEL FREQUENCY (MHz)	RF POWER LEVEL IN 3kHz BW (dBm)		TOTAL POWER DENSITY (dBm)	MAXIMUM LIMIT (dBm)	PASS / FAIL
		CHAIN(0)	CHAIN(1)			
38	5190	-0.2	-0.9	2.5	4	PASS
46	5230	-0.9	-0.4	2.4	4	PASS

For Chain (0): CH38



4.6 FREQUENCY STABILITY

4.6.1 LIMITS OF FREQUENCY STABILITY MEASUREMENT

The frequency tolerance of the carrier signal shall be maintained within the band of the operating frequency over a temperature variation of –30 degrees to 50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C.

4.6.2 TEST INSTRUMENTS

Test date: Aug. 29, 2011

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S Spectrum Analyzer	FSP40	100036	Dec. 08, 2010	Dec. 07, 2011

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

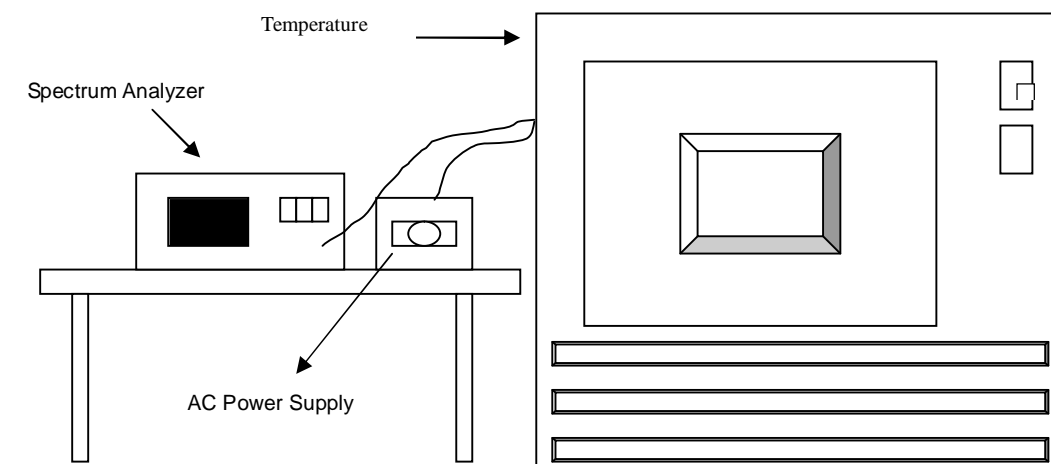
4.6.3 TEST PROCEDURE

1. The EUT was placed inside the environmental test chamber and powered by nominal AC voltage.
2. Turn the EUT on and couple its output to a spectrum analyzer.
3. Turn the EUT off and set the chamber to the highest temperature specified.
4. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT on and measure the operating frequency after 2, 5, and 10 minutes.
5. Repeat step 2 and 3 with the temperature chamber set to the lowest temperature.
6. The test chamber was allowed to stabilize at +20 degree C for a minimum of 30 minutes. The supply voltage was then adjusted on the EUT from 85% to 115% and the frequency record.

4.6.4 DEVIATION FROM TEST STANDARD

No deviation

4.6.5 TEST SETUP



4.6.6 EUT OPERATING CONDITION

The software provided by client to enable the EUT under transmission condition continuously at specific channel frequencies individually.



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4.6.7 TEST RESULTS

Operating frequency: 5180MHz									
Temp. (°C)	Power supply (VAC)	0 minute		2 minute		5 minute		10 minute	
		(MHz)	(%)	(MHz)	(%)	(MHz)	(%)	(MHz)	(%)
50	138	5180.0223	4.3050	5180.0248	4.7876	5180.0232	4.4788	5180.0266	5.1351
	120	5180.021	4.0541	5180.0236	4.5560	5180.0237	4.5753	5180.027	5.2124
	102	5180.0219	4.2278	5180.0243	4.6911	5180.0238	4.5946	5180.0278	5.3668
40	138	5180.0115	2.2201	5180.0149	2.8764	5180.01	1.9305	5180.0069	1.3320
	120	5180.0124	2.3938	5180.0152	2.9344	5180.0104	2.0077	5180.0055	1.0618
	102	5180.0112	2.1622	5180.0154	2.9730	5180.011	2.1236	5180.0051	0.9846
30	138	5180.0048	0.9266	5180.0085	1.6409	5180.0041	0.7915	5180.0067	1.2934
	120	5180.005	0.9653	5180.0078	1.5058	5180.0043	0.8301	5180.0072	1.3900
	102	5180.0043	0.8301	5180.0081	1.5637	5180.0044	0.8494	5180.0064	1.2355
20	138	5180.0034	0.6564	5179.9982	-0.3475	5180.0021	0.4054	5180.003	0.5792
	120	5180.0028	0.5405	5179.9988	-0.2317	5180.0035	0.6757	5180.0015	0.2896
	102	5180.0026	0.5019	5179.9992	-0.1544	5180.0034	0.6564	5180.0016	0.3089
10	138	5179.9815	-3.5714	5179.9797	-3.9189	5179.9777	-4.3050	5179.9781	-4.2278
	120	5179.9801	-3.8417	5179.9798	-3.8996	5179.9778	-4.2857	5179.9779	-4.2664
	102	5179.9802	-3.8224	5179.9793	-3.9961	5179.9792	-4.0154	5179.9788	-4.0927
0	138	5180.0019	0.3668	5180.0045	0.8687	5180.0001	0.0193	5179.9961	-0.7529
	120	5180.0013	0.2510	5180.0043	0.8301	5180.001	0.1931	5179.9948	-1.0039
	102	5180.0004	0.0772	5180.0043	0.8301	5180.001	0.1931	5179.9949	-0.9846
-10	138	5179.9864	-2.6255	5179.9856	-2.7799	5179.9862	-2.6641	5179.9808	-3.7066
	120	5179.9875	-2.4131	5179.9855	-2.7992	5179.9863	-2.6448	5179.981	-3.6680
	102	5179.9859	-2.7220	5179.9854	-2.8185	5179.985	-2.8958	5179.9799	-3.8803
-20	138	5179.9884	-2.2394	5179.9908	-1.7761	5179.9872	-2.4710	5179.9836	-3.1660
	120	5179.9871	-2.4903	5179.992	-1.5444	5179.9887	-2.1815	5179.9848	-2.9344
	102	5179.9871	-2.4903	5179.9919	-1.5637	5179.987	-2.5097	5179.9843	-3.0309
-30	138	5179.9973	-0.5212	5180.0009	0.1737	5179.9975	-0.4826	5179.9988	-0.2317
	120	5179.9965	-0.6757	5180.0026	0.5019	5179.9967	-0.6371	5179.9982	-0.3475
	102	5179.9968	-0.6178	5180.0007	0.1351	5179.9967	-0.6371	5179.9987	-0.2510

4.7 CONDUCTED OUT-BAND EMISSION MEASUREMENT

4.7.1 TEST INSTRUMENTS

Test date : Aug. 29, 2011

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S Spectrum Analyzer	FSP40	100036	Dec. 08, 2010	Dec. 07, 2011

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

4.7.2 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer via a low loss cable. Set RBW of spectrum analyzer to 1MHz with suitable frequency span including 100 MHz or 200 MHz bandwidth from band edge. The band edges was measured and recorded.

4.7.3 EUT OPERATING CONDITION

The software provided by client to enable the EUT under transmission condition continuously at specific channel frequencies individually.

4.7.4 TEST RESULTS

For 5.15 to 5.35GHz band:

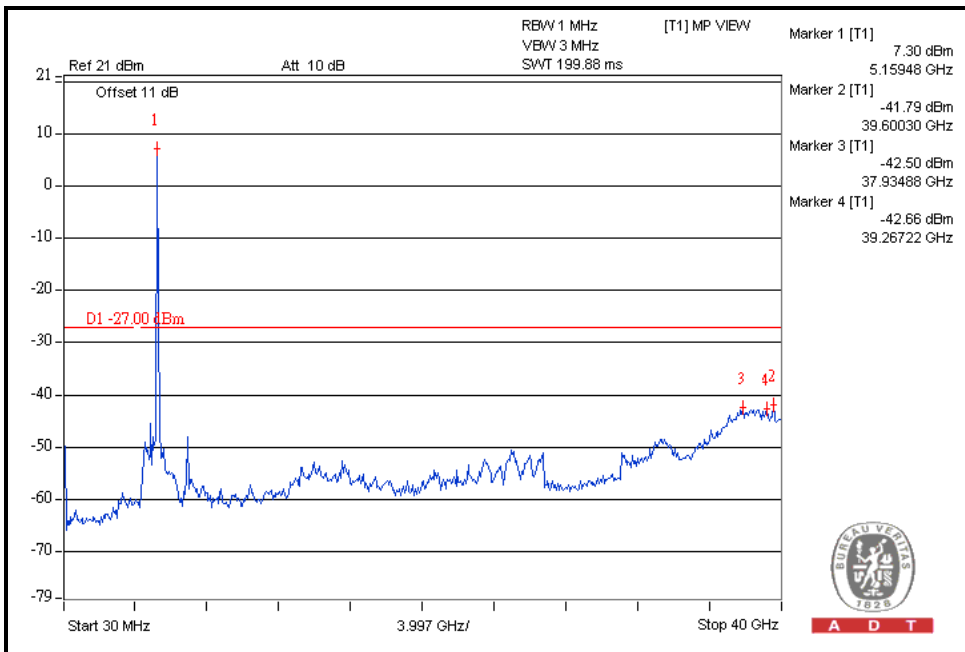
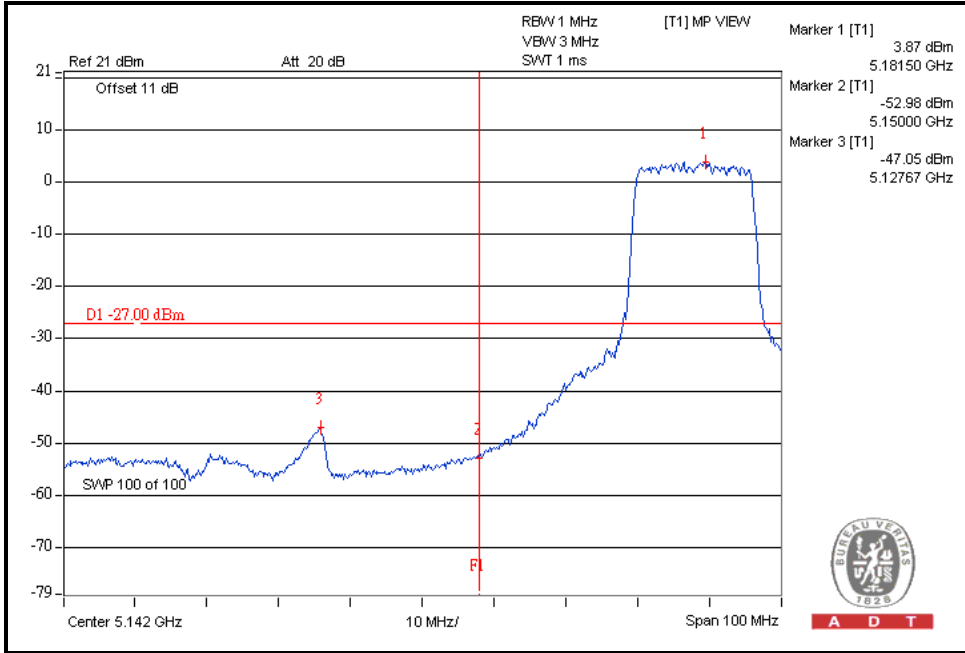
The spectrum plots (Peak RBW=1MHz, VBW=3MHz) are attached on the following pages.



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Performing measurements: Measure and add 10 log(N) dB 802.11a OFDM MODULATION

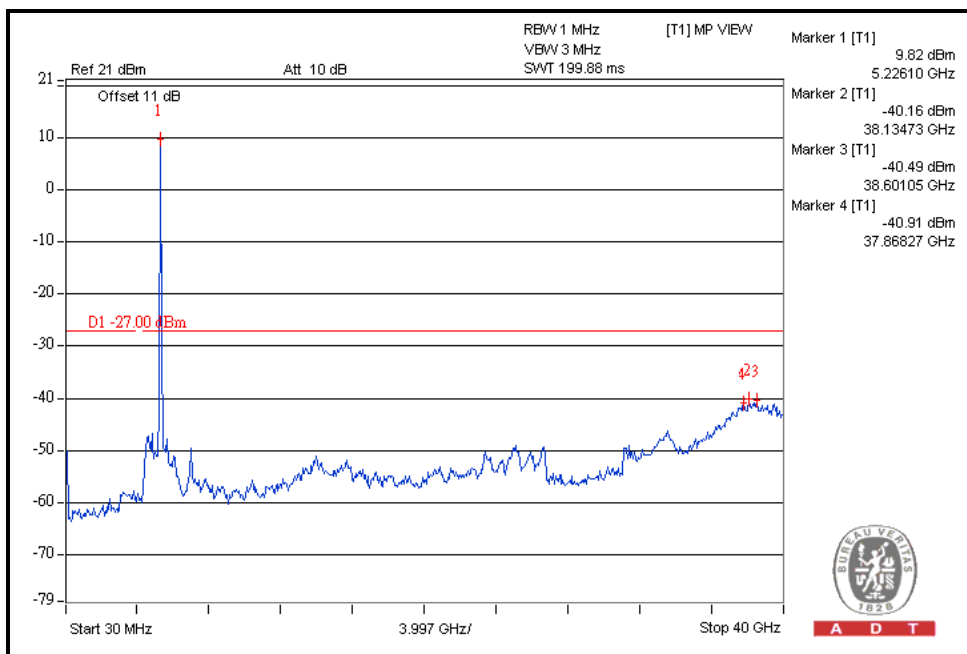
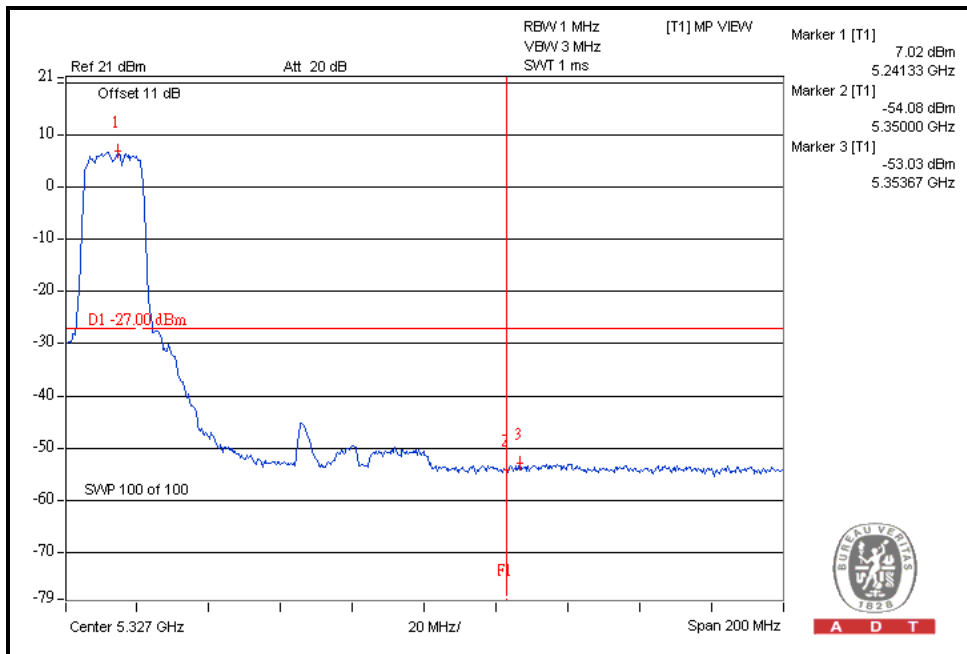
CH36





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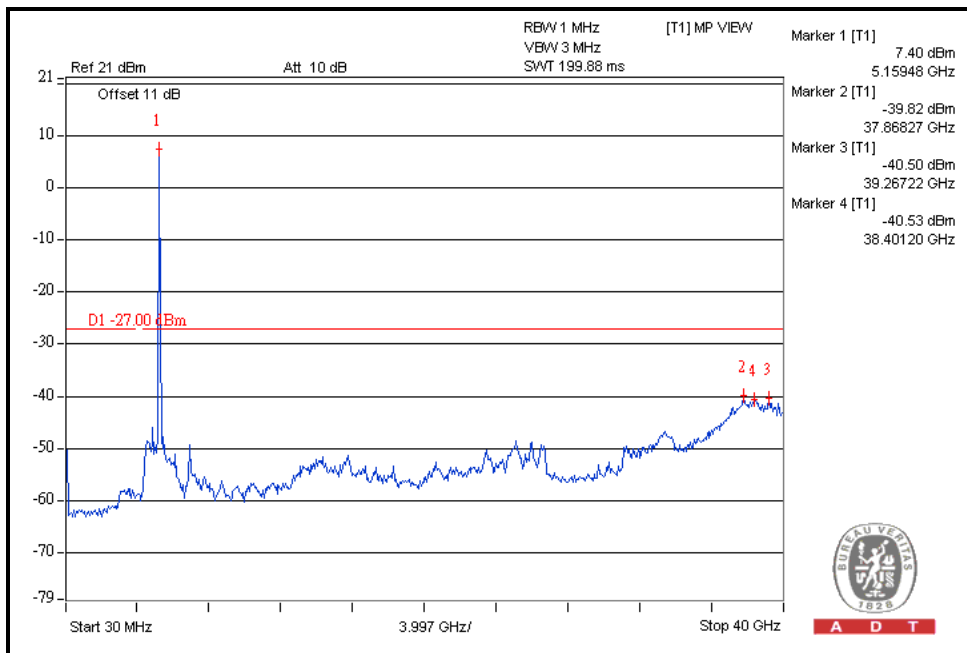
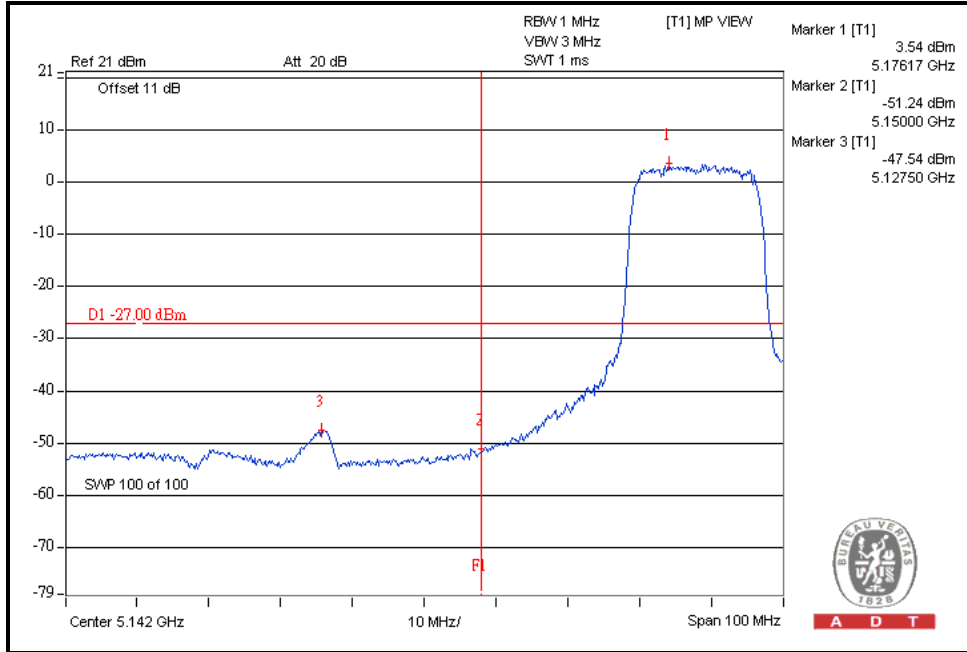




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802.11n (20MHz) OFDM MODULATION:

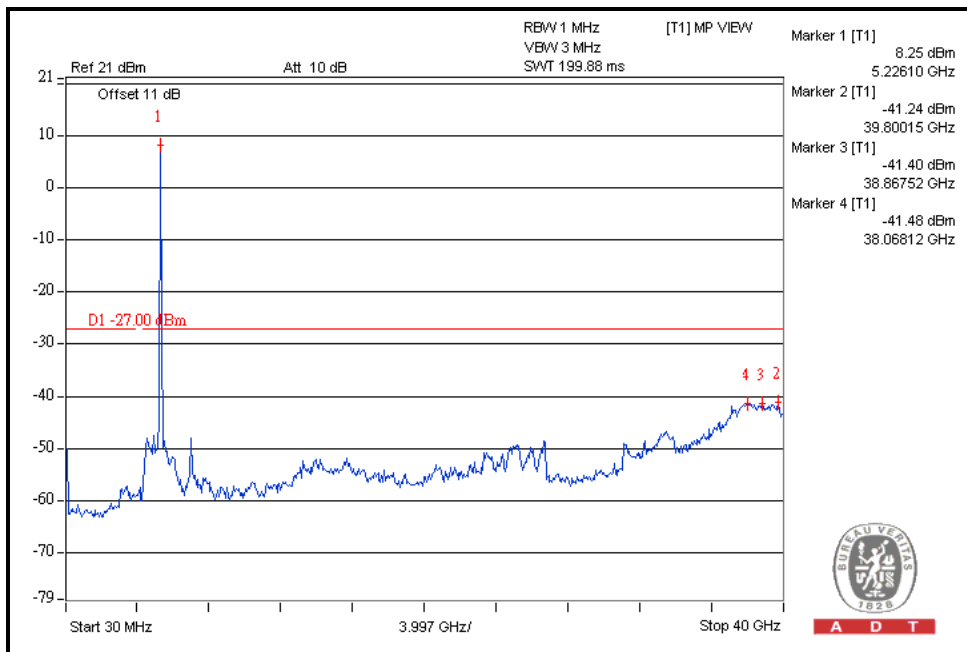
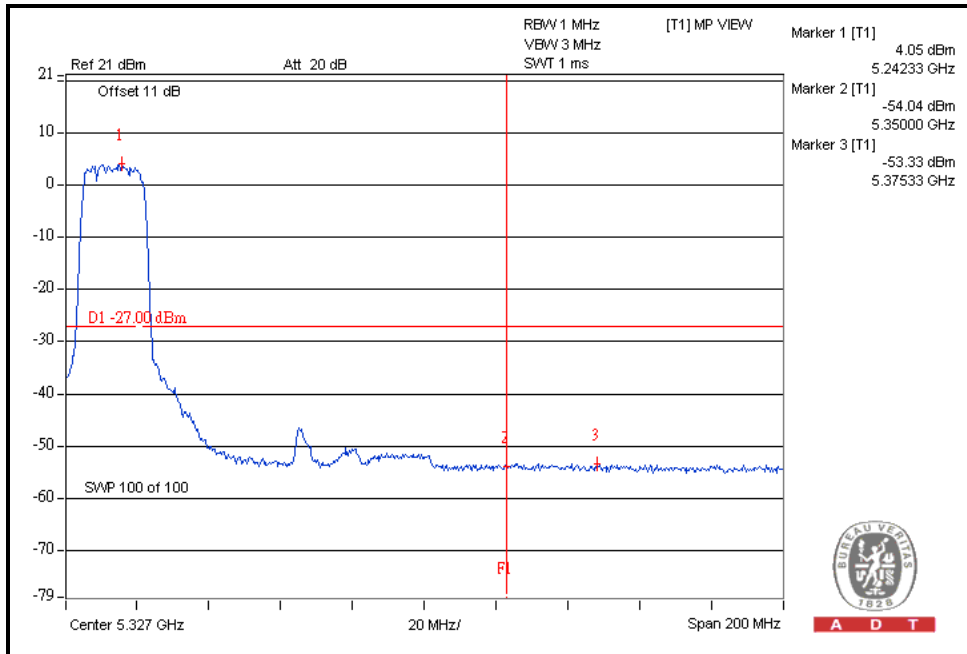
CH36





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CH48

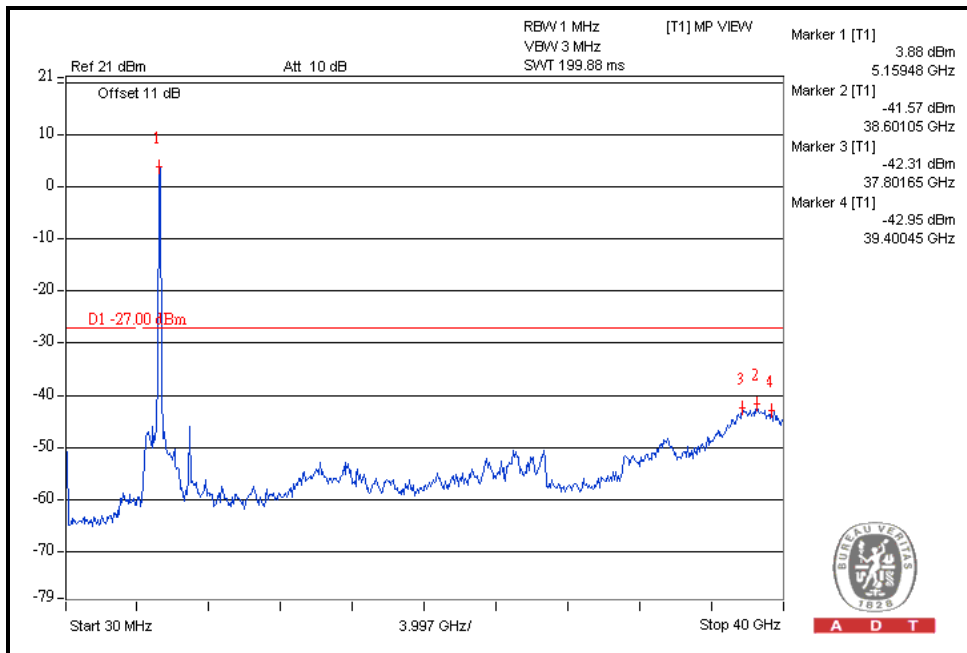
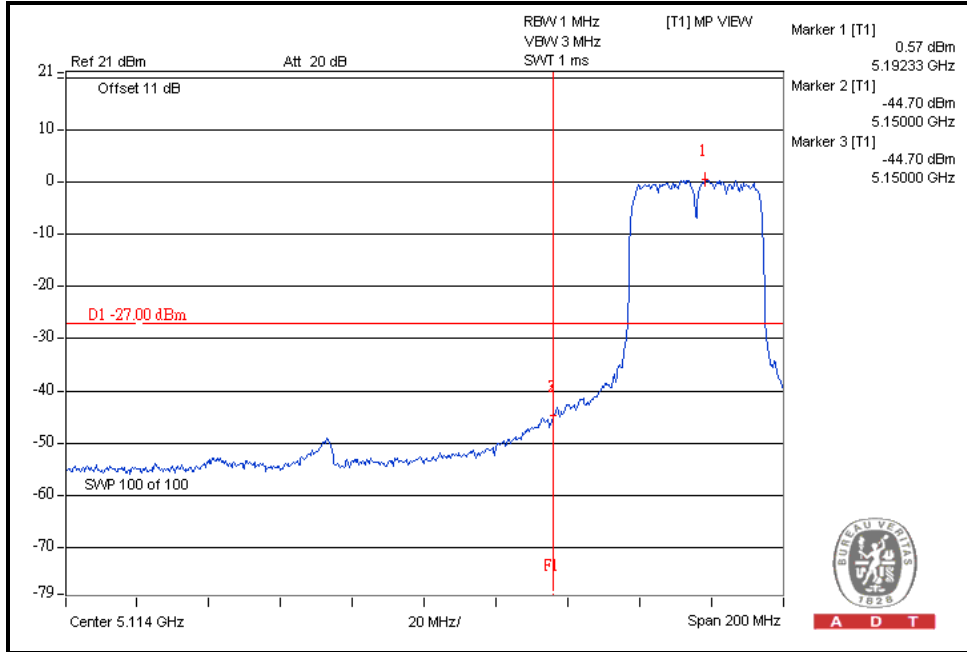




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802.11n (40MHz) OFDM MODULATION:

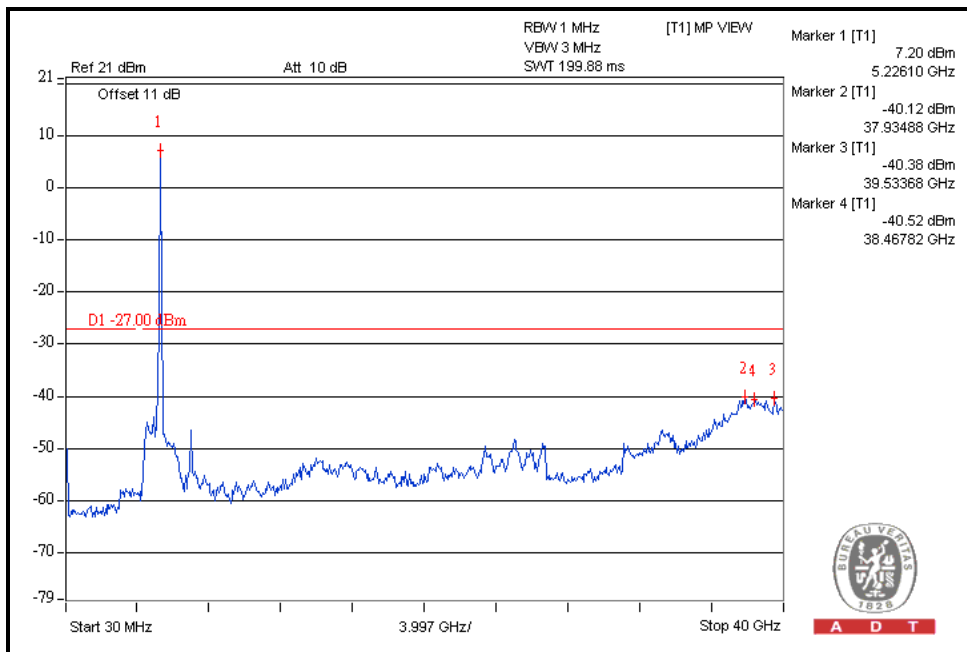
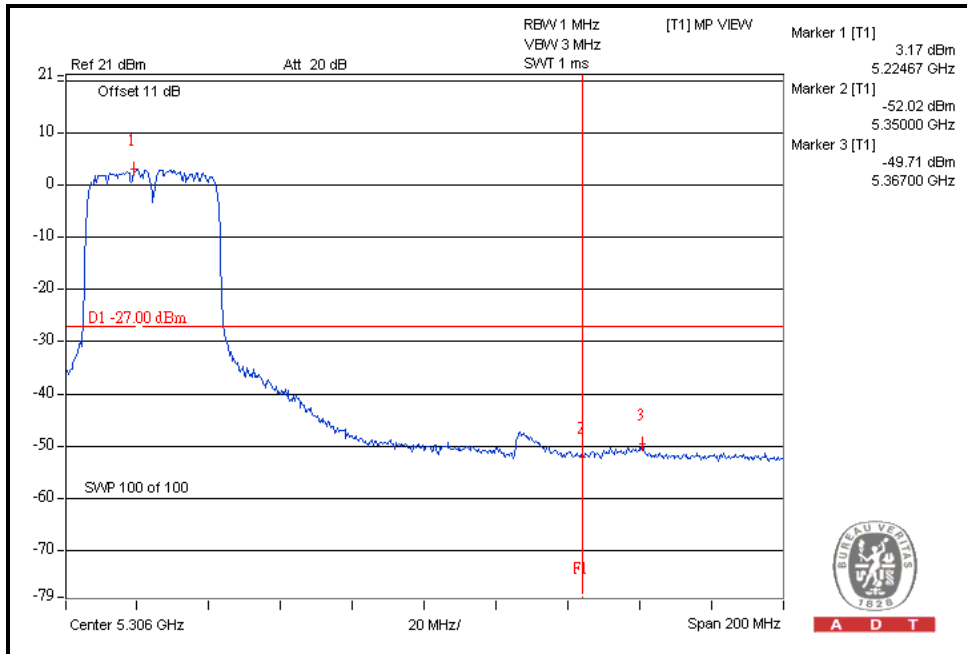
CH38





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CH46





5. INFORMATION ON THE TESTING LABORATORIES

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

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:

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Fax: 886-2-26052943

Hsin Chu EMC/RF Lab:

Tel: 886-3-5935343

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Fax: 886-3-3185050

Email: service.adt@tw.bureauveritas.com

Web Site: www.adt.com.tw

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



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6.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.

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