

FCC TEST REPORT (15.407)

REPORT NO.: RF990203H11-1

MODEL NO.: WMP-A01

RECEIVED: Feb. 03, 2010

TESTED: Apr. 23 to 29, 2010

ISSUED: Jan. 14, 2011

APPLICANT: Alpha Networks Inc.

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ISSUED BY: Bureau Veritas Consumer Products Services (H.K.)
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1. CERTIFICATION

PRODUCT: Wireless Mini PCI adapter
BRAND NAME: Alpha
MODEL NO.: WMP-A01
TEST SAMPLE: MASS-PRODUCTION
TESTED: Apr. 23 to 29, 2010
APPLICANT: Alpha Networks Inc.
STANDARDS: FCC Part 15, Subpart E (Section 15.407),
ANSI C63.4-2003

The above equipment (Model: WMP-A01) 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 : Midoli Peng , **DATE:** Jan. 14, 2011
(Midoli Peng, Specialist)

TECHNICAL ACCEPTANCE : Hank Chung , **DATE:** Jan. 14, 2011
(Hank Chung, Deputy Manager)

APPROVED BY : May Chen , **DATE:** Jan. 14, 2011
(May Chen, Deputy Manager)

2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

For 802.11a

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 -23.82dB at 16.344MHz
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 -0.7dB at 5150.00MHz
15.407(a/1/2/3)	Peak 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 RP-N plug not a standard connector.

NOTE:

1. The EUT was operating in 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 5.725~5.850GHz RF parameters was recorded in another test report.

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)	3.30 dB
Radiated emissions (1GHz -18GHz)	2.19 dB
Radiated emissions (18GHz -40GHz)	2.55 dB

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	Wireless Mini PCI adapter
MODEL NO.	WMP-A01
FCC ID	RRKWMPA01A1
POWER SUPPLY	DC 3.3V±10% and 5V±5% from host equipment
MODULATION TYPE	64QAM, 16QAM, QPSK, BPSK for OFDM
MODULATION TECHNOLOGY	OFDM
TRANSFER RATE	<p>802.11a: 54/48/36/24/18/12/9/6Mbps.</p> <p>HT20 MCS0~7 (800ns GI): 6.5Mbps, 13Mbps, 19.5Mbps, 26Mbps, 39Mbps, 52Mbps, 58.5Mbps, 65Mbps.</p> <p>HT20 MCS8~15 (800ns GI): 13Mbps, 26Mbps, 39Mbps, 52Mbps, 78Mbps, 104Mbps, 117Mbps, 130Mbps.</p> <p>HT40 MCS0~7 (800ns GI): 13.5Mbps, 27Mbps, 40.5Mbps, 54Mbps, 81Mbps, 108Mbps, 121.5Mbps, 135Mbps.</p> <p>HT40 MCS8~15 (800ns GI): 27Mbps, 54Mbps, 81Mbps, 108Mbps, 162Mbps, 216Mbps, 243Mbps, 270Mbps.</p> <p>HT20 MCS0~7 (400ns GI): 7.2Mbps, 14.4Mbps, 21.7Mbps, 28.9Mbps, 43.3Mbps, 57.8Mbps, 65.0Mbps, 72.2Mbps.</p> <p>HT20 MCS8~15 (400ns GI): 14.444Mbps, 28.889Mbps, 43.333Mbps, 57.778Mbps, 86.667Mbps, 115.556Mbps, 130.000Mbps, 144.444Mbps.</p> <p>HT40 MCS0~7 (400ns GI): 15.0Mbps, 30.0Mbps, 45.0Mbps, 60.0Mbps, 90.0Mbps, 120.0Mbps, 135.0Mbps, 150.0Mbps.</p> <p>HT40 MCS8~15 (400ns GI): 30.0Mbps, 60.0Mbps, 90.0Mbps, 120.0Mbps, 180.0Mbps, 240.0Mbps, 270.0Mbps, 300.0Mbps.</p>
FREQUENCY RANGE	For 15.407 802.11a: 5.18 ~ 5.24GHz
	For 15.247 802.11a: 5.745 ~ 5.825GHz
NUMBER OF CHANNEL	For 15.407 4 for 802.11a, 802.11n (20MHz) 2 for 802.11n (40MHz)
	For 15.247 5 for 802.11a, 802.11n (20MHz) 2 for 802.11n (40MHz)

MAXIMUM OUTPUT POWER	For 15.407 802.11a: 22.3mW 802.11n (20MHz): 42.8mW 802.11n (40MHz): 42.9mW For 15.247 802.11a: 729.2mW 802.11n (20MHz): 973.5mW 802.11n (40MHz): 905.0mW
ANTENNA TYPE	Please see note 1
ANTENNA CONNECTOR	Please see note 1
DATA CABLE	NA
I/O PORTS	NA
ASSOCIATED DEVICES	NA

NOTE:

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

Chain	Manufacture	Model	Gain (dBi)	Cable Loss(dB)	Net Gain (dBi)	Cable Length (cm)	Antenna Type	Connector
Chain (0) Antenna (1)	Grand-Tek	R-SA64G7210180C	7	1) 3 2) 2.4	1) 4 2) 4.6	1) 20 2) 20	Dipole	RP-N plug
Chain (1) Antenna (2)	Grand-Tek	R-SA64G7210380C	7	1) 3.3 2) 3.0	1) 3.7 2) 4	1) 40 2) 40	Dipole	RP-N plug

The EUT was pre-tested with above antennas, the worse case was found in antenna gain < 2)4.6dBi > and gain < 2)4dBi >.

- The EUT incorporates a MIMO function with 802.11n. Physically, the EUT provides two completed transmitters and two completed receivers.
- The EUT is 2 * 2 spatial MIMO (2Tx & 2Rx) without beam forming function. The antenna configurations are two transmitter antennas and two receiver antennas, as there are 2 Dipole antennas. Spatial multiplexing modes for simultaneous transmission using 2 antennas, and for simultaneous receiver using 2 antennas.
- The EUT complies with 802.11n standards and backwards compatible with 802. 11a products.
- 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

Operated in 5150MHz ~ 5250MHz 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

3.2.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL:

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

ANTENNA COMBINATION MODE:

COMBINATION MODE	OPERATION MODE	TX CHAIN(0)	TX CHAIN(1)
A	802.11 a	√	√
B	802.11n(20MHz) for MCS0~7, 800nsGI	√	√
C	802.11n(20MHz) for MCS8~15, 800nsGI	√	√
D	802.11n(40MHz) for MCS0~7, 800nsGI	√	√
E	802.11n(40MHz) for MCS8~15, 800nsGI	√	√
F	802.11n(20MHz) for MCS0~7, 400nsGI	√	√
G	802.11n(20MHz) for MCS8~15, 400nsGI	√	√
H	802.11n(40MHz) for MCS0~7, 400nsGI	√	√
I	802.11n(40MHz) for MCS8~15, 400nsGI	√	√

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.
2. Mode A, B and D the worst modes, were selected as representative mode for the report.

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)	TX COMBINATION
802.11n (20MHz)	36 to 48	48	OFDM	BPSK	6.5	B

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)	TX COMBINATION
802.11n (20MHz)	36 to 48	48	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)	TX COMBINATION
802.11a	36 to 48	36, 40, 48	OFDM	BPSK	6	A
802.11n (20MHz)	36 to 48	36, 40, 48	OFDM	BPSK	6.5	B
802.11n (40MHz)	38 to 46	38, 46	OFDM	BPSK	13.5	D

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)	TX COMBINATION
802.11a	36 to 48	36, 48	OFDM	BPSK	6	A
802.11n (20MHz)	36 to 48	36, 48	OFDM	BPSK	6.5	B
802.11n (40MHz)	38 to 46	38, 46	OFDM	BPSK	13.5	D

✂ After verification, conducted out band emission as show worst chain in report by investigations.

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)	TX COMBINATION
802.11a	36 to 48	36, 40, 48	OFDM	BPSK	6	A
802.11n (20MHz)	36 to 48	36, 40, 48	OFDM	BPSK	6.5	B
802.11n (40MHz)	38 to 46	38, 46	OFDM	BPSK	13.5	D

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER (SYSTEM)	TESTED BY
RE \geq 1G	20deg. C, 73%RH, 1014 hPa	120Vac, 60Hz	Eric Lee
RE<1G	21deg. C, 71%RH, 1014 hPa	120Vac, 60Hz	Eric Lee
PLC	23deg. C, 75%RH, 1014 hPa	120Vac, 60Hz	Leo Peng
APCM	21deg. C, 67%RH, 1014 hPa	120Vac, 60Hz	Rex Huang

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:

47 CFR Part 15, Subpart E. (15.407)

ANSI C63.4 : 2003

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

3.4 DESCRIPTION OF SUPPORT UNITS

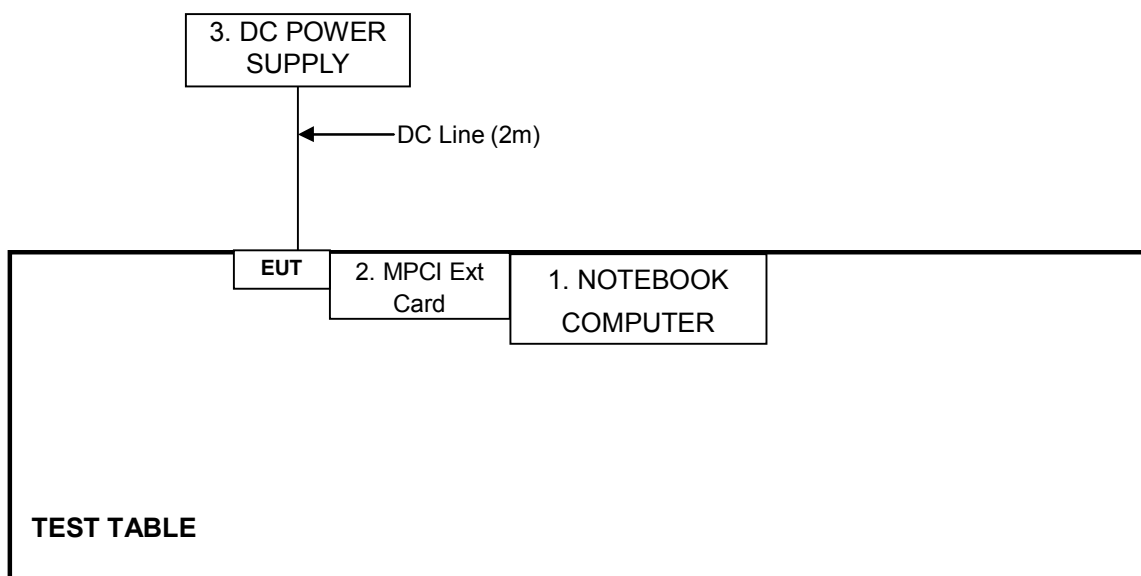
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	NOTEBOOK COMPUTER	DELL	PP32LA	FSLB32S	FCC DoC
2	MPCI Ext Card	NA	NA	NA	NA
3	DC POWER SUPPLY	Topward	6603D	795558	NA

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

NOTE: 1. All power cords of the above support units are non shielded (1.8m).

3.5 CONFIGURATION OF SYSTEM UNDER TEST



4. TEST TYPES AND RESULTS

4.1 CONDUCTED EMISSION MEASUREMENT

4.1.1 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 0.50 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

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver	ESCS 30	100375	Mar. 09, 2010	Mar. 08, 2011
Line-Impedance Stabilization Network (for EUT)	NSLK 8127	8127-522	Sep. 23, 2009	Sep. 22, 2010
Line-Impedance Stabilization Network (for Peripheral)	ESH3-Z5	848773/004	Oct. 26, 2009	Oct. 25, 2010
RF Cable (JYEBAO)	5DFB	COBCAB-001	Nov. 24, 2009	Nov. 23, 2010
50 ohms Terminator	50	3	Oct. 28, 2009	Oct. 27, 2010
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. C.
- 3 The VCCI Con C Registration No. is C-3611.

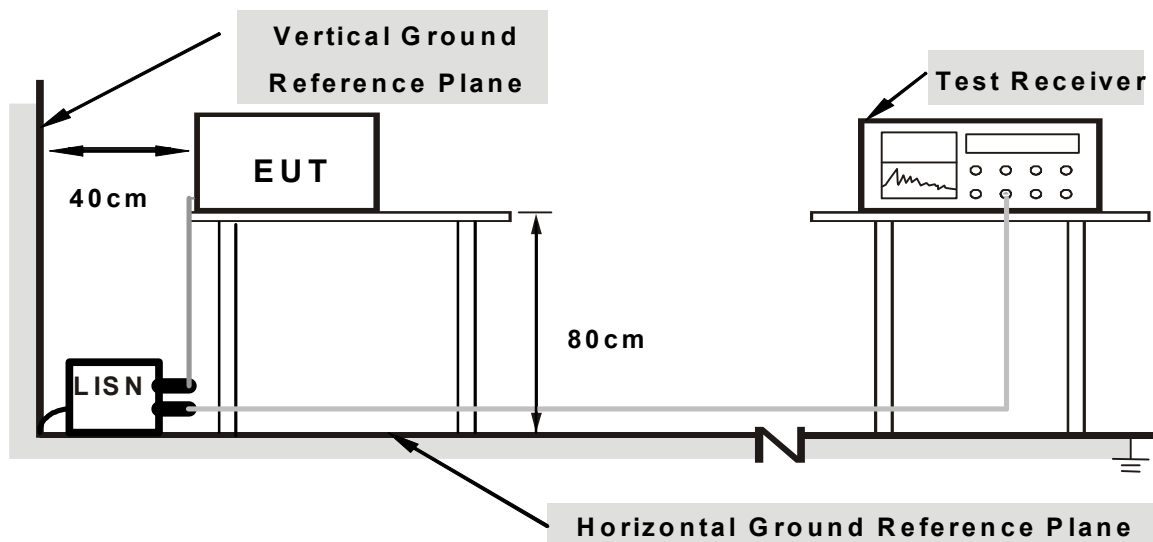
4.1.3 TEST PROCEDURES

- 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. The two LISNs
- b. 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. Connect the EUT with the support unit 1 (Notebook Computer) which placed on a testing table.
2. The communication partner run test program “ART v9b21” to enable EUT under transmission/receiving condition continuously at specific channel frequency.

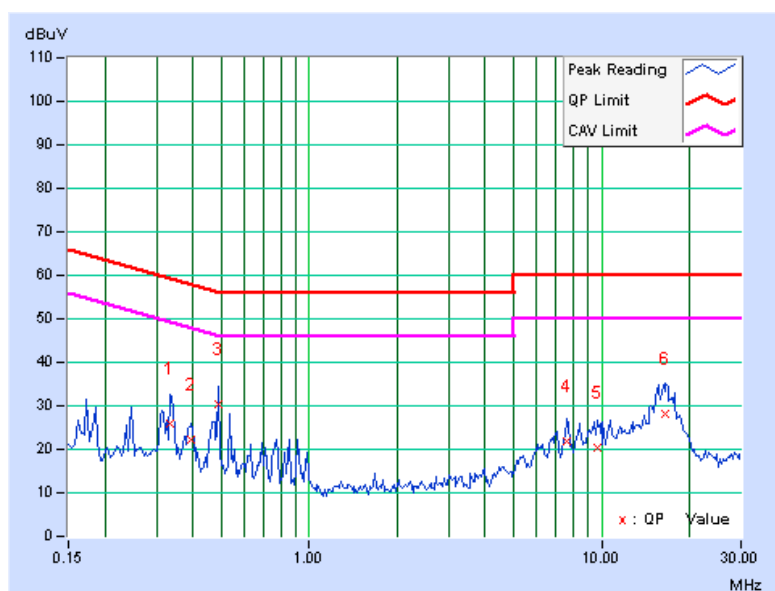
4.1.7 TEST RESULTS

802.11n (20MHz) OFDM MODULATION:

PHASE	Line (L)	6dB BANDWIDTH	9 kHz
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No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.334	0.06	25.86	18.66	25.92	18.72	59.36	49.36	-33.44	-30.64
2	0.396	0.06	22.13	13.45	22.19	13.51	57.93	47.93	-35.75	-34.43
3	0.490	0.06	30.31	21.24	30.37	21.30	56.17	46.17	-25.80	-24.87
4	7.578	0.29	21.38	18.73	21.67	19.02	60.00	50.00	-38.33	-30.98
5	9.625	0.34	20.05	16.48	20.39	16.82	60.00	50.00	-39.61	-33.18
6	16.563	0.46	27.81	23.73	28.27	24.19	60.00	50.00	-31.73	-25.81

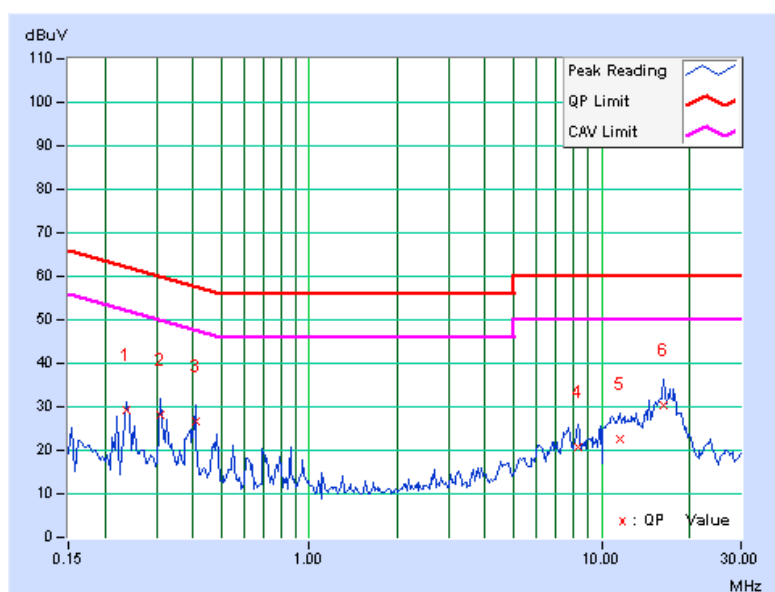
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
 3. The emission levels of other frequencies were very low against the limit.
 4. Margin value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



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 (uV)]	[dB (uV)]	[dB (uV)]	[dB (uV)]	[dB (uV)]
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.236	0.06	29.07	20.91	29.13	20.97	62.24	52.24	-33.11	-31.27
2	0.310	0.07	28.19	20.93	28.26	21.00	59.97	49.97	-31.71	-28.97
3	0.408	0.07	26.77	16.36	26.84	16.43	57.69	47.69	-30.85	-31.26
4	8.297	0.31	20.51	18.50	20.82	18.81	60.00	50.00	-39.18	-31.19
5	11.531	0.38	22.09	16.97	22.47	17.35	60.00	50.00	-37.53	-32.65
6	16.344	0.46	29.83	25.72	30.29	26.18	60.00	50.00	-29.71	-23.82

- 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.



4.2 RADIATED EMISSION MEASUREMENT

4.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT

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

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

NOTE:

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

4.2.2 LIMITS OF UNWANTED EMISSION OUT OF THE RESTRICTED BANDS

Frequencies (MHz)	EIRP Limit (dBm)	Equivalent Field Strength at 3m (dBμV/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

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

4.2.3 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Agilent Spectrum Analyzer	E4446A	MY48250253	Aug. 03, 2009	Aug. 02, 2010
Agilent Pre-Selector	N9039A	MY46520311	Aug. 17, 2009	Aug. 16, 2010
Agilent Signal Generator	N5181A	MY49060517	July 20, 2009	July 19, 2010
Mini-Circuits Pre-Amplifier	ZFL-1000VH2B	AMP-ZFL-03	Nov. 18, 2009	Nov. 17, 2010
Agilent Pre-Amplifier	8449B	3008A02578	July 06, 2009	July 05, 2010
Miteq Pre-Amplifier	AFS33-1800265 0-30-8P-44	881786	NA	NA
SCHWARZBECK Trilog Broadband Antenna	VULB 9168	9168-360	Sep. 30, 2009	Sep. 29, 2010
AISI Horn_Antenna	AIH.8018	0000320091110	Nov. 16, 2009	Nov. 15, 2010
SCHWARZBECK Horn_Antenna	BBHA 9170	9170-424	Sep. 30, 2009	Sep. 29, 2010
RF CABLE	NA	RF104-201 RF104-203 RF104-204	Dec. 24, 2009	Dec. 23, 2010
RF Cable	NA	CHGCAB_001	NA	NA
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 656396.

5. The VCCI Site Registration No. is R-1626.

6. The CANADA Site Registration No. is IC 7450G-3.

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 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 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.

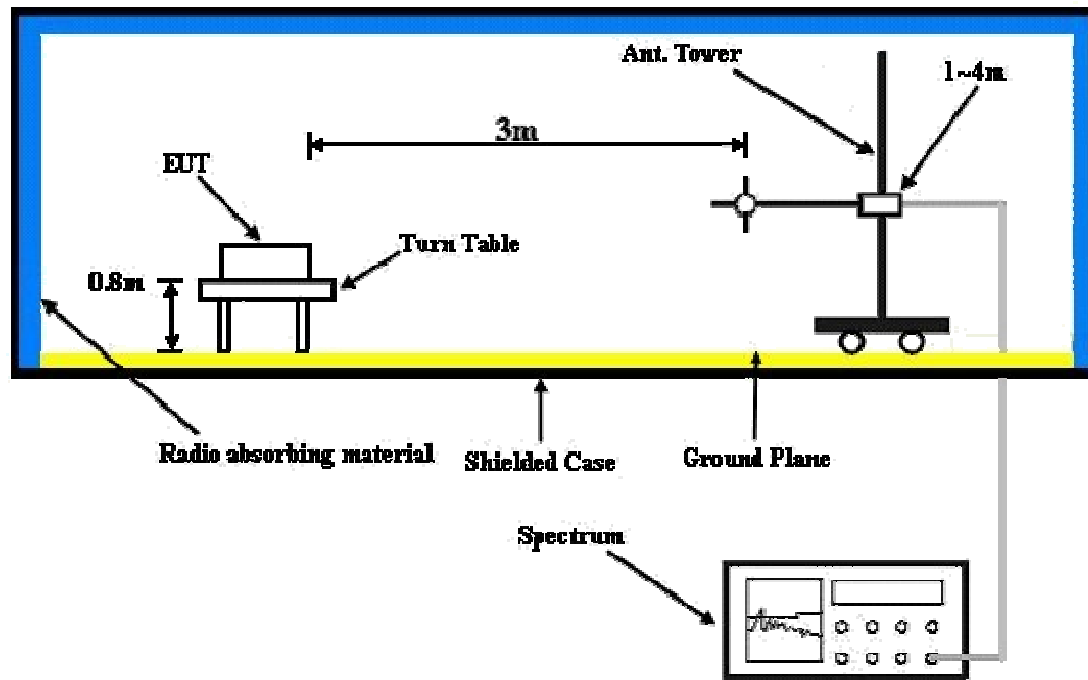
NOTE:

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 48	FREQUENCY RANGE	Below 1000MHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	21deg. C, 71%RH 1014 hPa	TESTED BY	Eric Lee

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	214.62	34.5 QP	43.5	-9.0	1.50 H	360	23.20	11.26
2	232.38	35.3 QP	46.0	-10.7	1.25 H	0	23.25	12.06
3	310.90	40.4 QP	46.0	-5.6	1.00 H	360	25.69	14.74
4	322.03	41.0 QP	46.0	-5.0	1.25 H	24	25.97	15.03
5	351.52	38.0 QP	46.0	-8.0	1.00 H	4	22.14	15.82
6	564.32	36.9 QP	46.0	-9.2	1.50 H	252	15.99	20.86
7	592.03	37.0 QP	46.0	-9.0	1.50 H	247	15.42	21.55
8	618.09	36.8 QP	46.0	-9.2	1.50 H	226	14.82	21.99
9	743.38	29.9 QP	46.0	-16.1	1.00 H	237	6.08	23.84
10	948.96	32.8 QP	46.0	-13.2	1.00 H	265	6.30	26.52
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	210.83	28.6 QP	43.5	-14.9	2.25 V	151	17.56	11.08
2	232.74	29.3 QP	46.0	-16.7	1.00 V	299	17.23	12.07
3	304.62	32.0 QP	46.0	-14.0	2.00 V	319	17.45	14.57
4	321.91	34.4 QP	46.0	-11.6	2.00 V	256	19.39	15.03
5	365.14	32.9 QP	46.0	-13.1	1.75 V	334	16.75	16.17
6	564.20	33.0 QP	46.0	-13.0	1.25 V	63	12.10	20.86
7	608.73	34.2 QP	46.0	-11.8	1.50 V	233	12.37	21.87
8	621.52	34.2 QP	46.0	-11.8	1.00 V	304	12.19	22.03
9	747.88	30.5 QP	46.0	-15.5	2.00 V	355	6.56	23.91
10	847.95	30.6 QP	46.0	-15.4	1.50 V	284	5.19	25.43

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

ABOVE 1GHz WORST-CASE DATA

802.11a OFDM MODULATION

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 36	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	20deg. C, 73%RH 1014 hPa	TESTED BY	Eric Lee

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	57.9 PK	74.0	-16.1	1.24 H	119	17.98	39.94
2	5150.00	46.0 AV	54.0	-8.1	1.24 H	119	6.01	39.94
3	*5180.00	96.2 PK			1.21 H	117	56.22	40.02
4	*5180.00	85.8 AV			1.21 H	117	45.76	40.02
5	#10360.00	57.1 PK	68.3	-11.2	1.45 H	40	10.54	46.53
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	64.3 PK	74.0	-9.7	1.14 V	43	24.35	39.94
2	5150.00	52.2 AV	54.0	-1.8	1.14 V	43	12.29	39.94
3	*5180.00	114.5 PK			1.11 V	43	74.44	40.02
4	*5180.00	103.1 AV			1.11 V	43	63.12	40.02
5	#10360.00	60.6 PK	68.3	-7.8	1.23 V	259	14.02	46.53

- 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 (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	20deg. C, 73%RH 1014 hPa	TESTED BY	Eric Lee

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	96.6 PK			1.29 H	128	56.50	40.07
2	*5200.00	85.9 AV			1.29 H	128	45.87	40.07
3	#10400.00	56.1 PK	68.3	-12.2	1.60 H	74	9.51	46.57
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	114.3 PK			1.12 V	69	74.26	40.07
2	*5200.00	102.9 AV			1.12 V	69	62.82	40.07
3	#10400.00	61.3 PK	68.3	-7.0	1.30 V	269	14.71	46.57

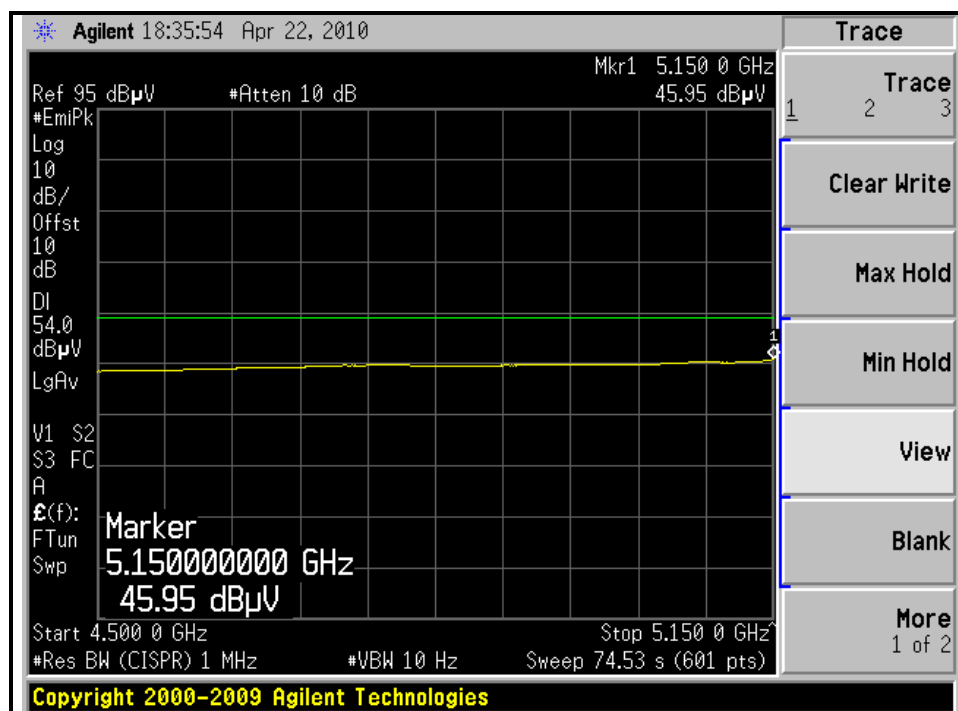
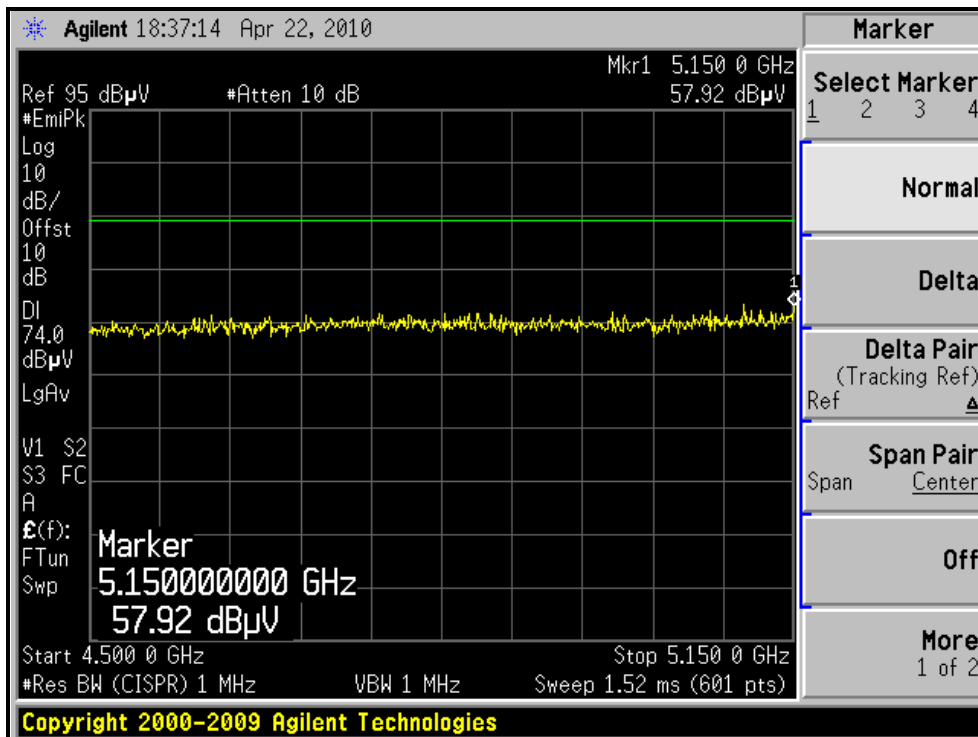
- REMARKS:** 1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. “ * ”: Fundamental frequency.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

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 48	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	20deg. C, 73%RH 1014 hPa	TESTED BY	Eric Lee

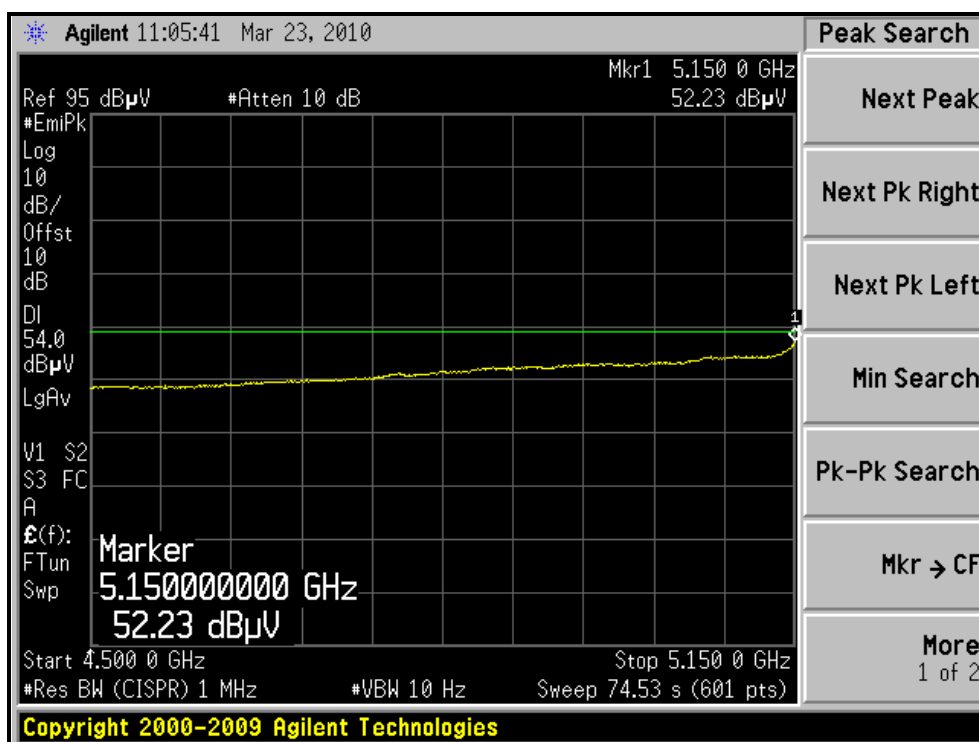
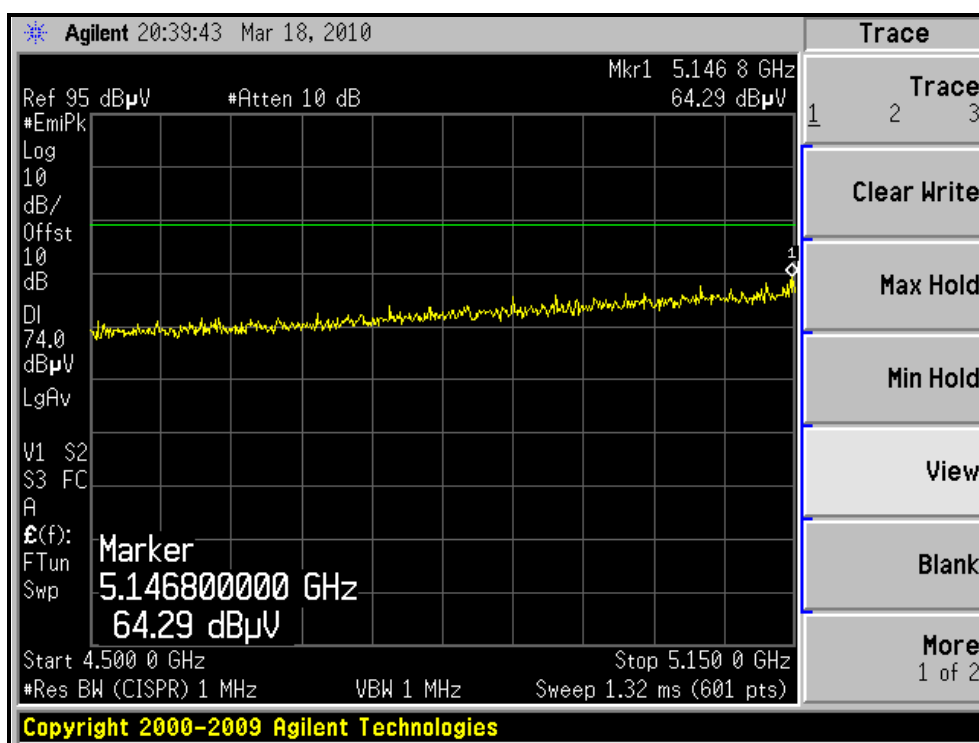
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NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5240.00	96.7 PK			1.30 H	124	56.57	40.17
2	*5240.00	85.6 AV			1.30 H	124	45.44	40.17
3	5350.00	51.6 PK	74.0	-22.4	1.29 H	250	11.13	40.47
4	5350.00	40.3 AV	54.0	-13.7	1.29 H	250	-0.20	40.47
5	#10480.00	56.1 PK	68.3	-12.2	1.42 H	83	9.41	46.67
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	113.9 PK			1.10 V	69	73.75	40.17
2	*5240.00	103.1 AV			1.10 V	69	62.94	40.17
3	5350.00	53.0 PK	74.0	-21.0	1.11 V	60	12.51	40.47
4	5350.00	41.4 AV	54.0	-12.6	1.11 V	60	0.93	40.47
5	#10480.00	61.4 PK	68.3	-6.9	1.49 V	208	14.77	46.67

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.

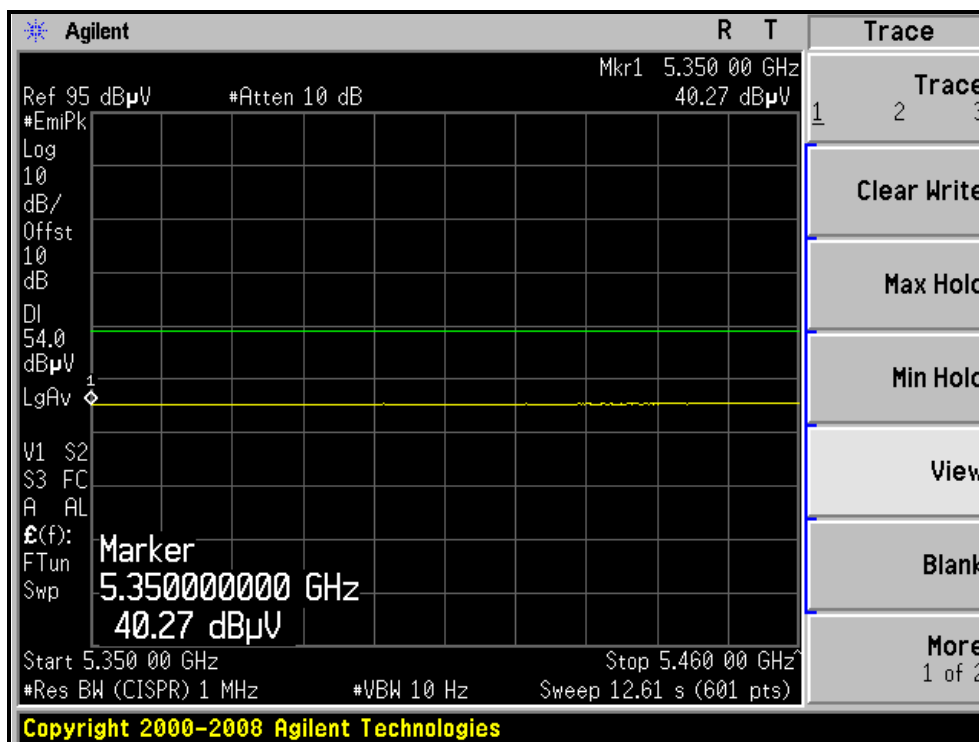
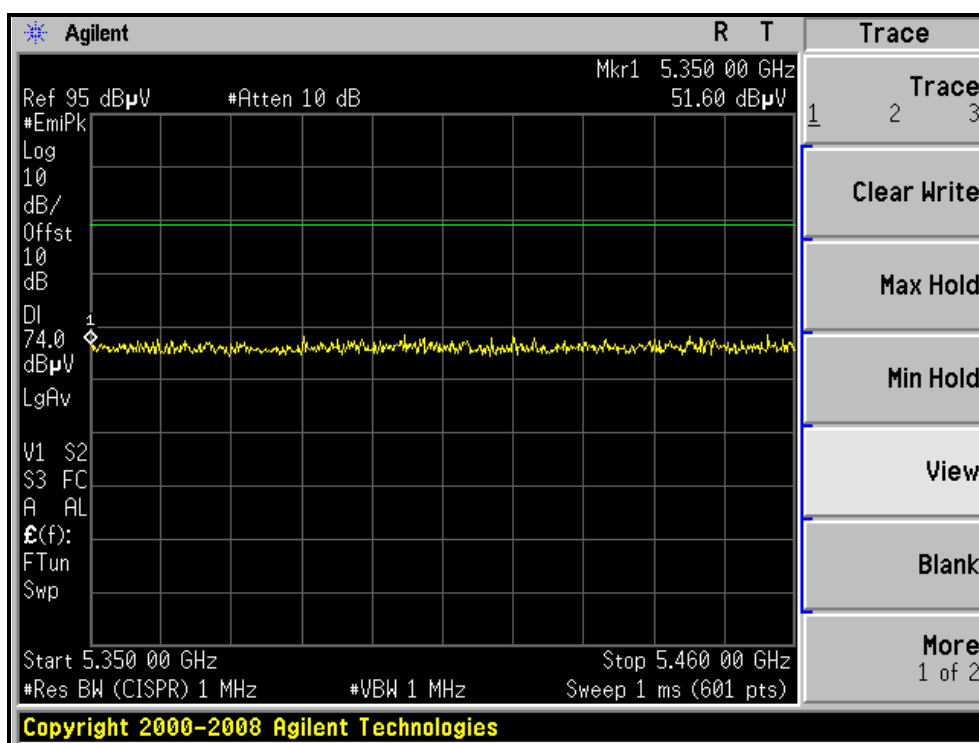
RESTRICTED BANDEDGE (802.11a MODE, CH36, HORIZONTAL)



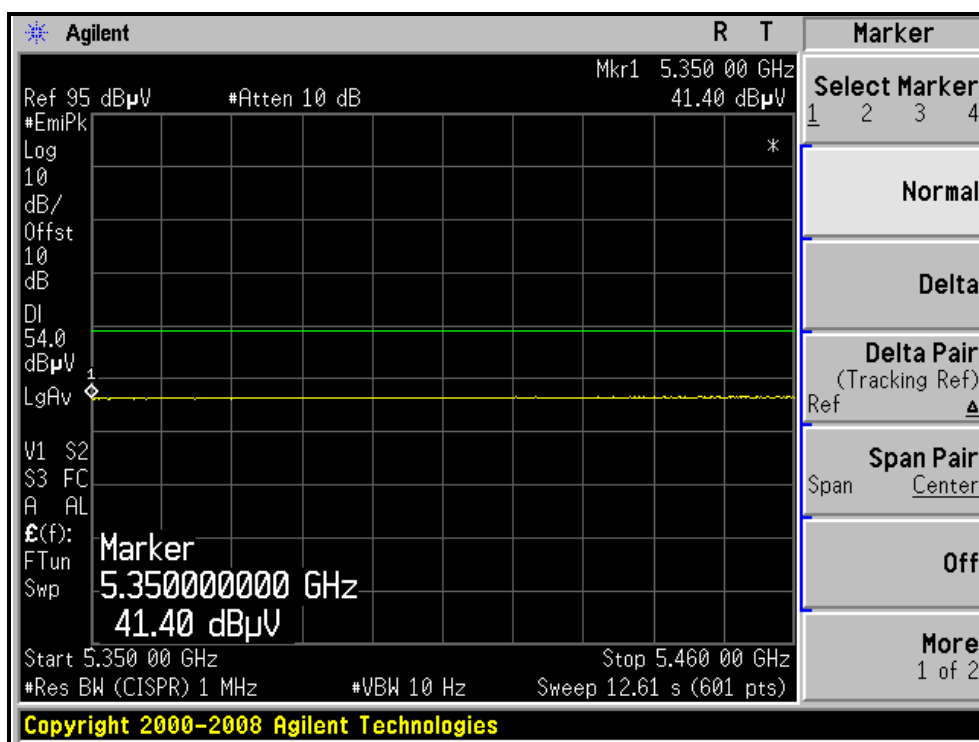
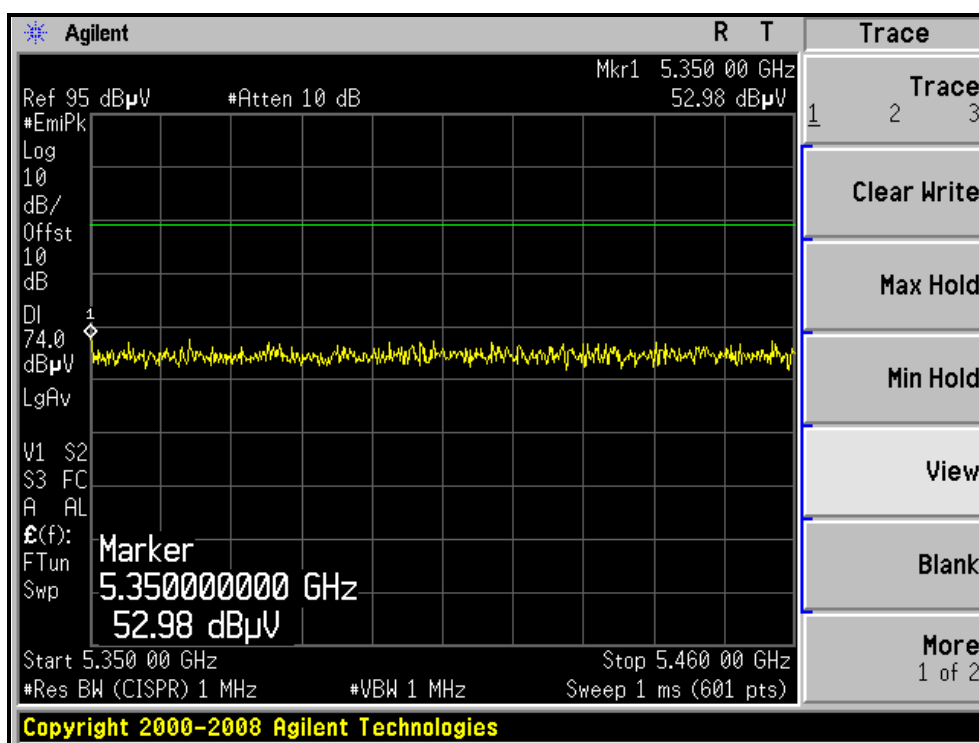
RESTRICTED BANDEDGE (802.11a MODE, CH36, VERTICAL)



RESTRICTED BANDEDGE (802.11a MODE, CH48, HORIZONTAL)



RESTRICTED BANDEDGE (802.11a MODE, CH48, VERTICAL)



802.11n (20MHz) OFDM MODULATION

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 36	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	20deg. C, 73%RH 1014 hPa	TESTED BY	Eric Lee

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	57.8 PK	74.0	-16.2	1.01 H	25	17.89	39.94
2	5150.00	45.8 AV	54.0	-8.2	1.01 H	25	5.85	39.94
3	*5180.00	96.5 PK			1.22 H	20	56.48	40.02
4	*5180.00	86.7 AV			1.22 H	20	46.67	40.02
5	#10360.00	57.5 PK	68.3	-10.8	1.40 H	37	10.96	46.53
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	65.9 PK	74.0	-8.1	1.11 V	60	25.99	39.94
2	5150.00	53.3 AV	54.0	-0.7	1.11 V	60	13.33	39.94
3	*5180.00	114.6 PK			1.11 V	50	74.53	40.02
4	*5180.00	103.5 AV			1.11 V	50	63.44	40.02
5	#10360.00	60.7 PK	68.3	-7.7	1.24 V	265	14.12	46.53

- 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.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 40	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	20deg. C, 73%RH 1014 hPa	TESTED BY	Eric Lee

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	96.7 PK			1.19 H	17	56.64	40.07
2	*5200.00	86.5 AV			1.19 H	17	46.39	40.07
3	#10400.00	58.0 PK	68.3	-10.3	1.50 H	41	11.45	46.57
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	114.7 PK			1.12 V	65	74.62	40.07
2	*5200.00	103.5 AV			1.12 V	65	63.43	40.07
3	#10400.00	61.2 PK	68.3	-7.1	1.19 V	295	14.65	46.57

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.



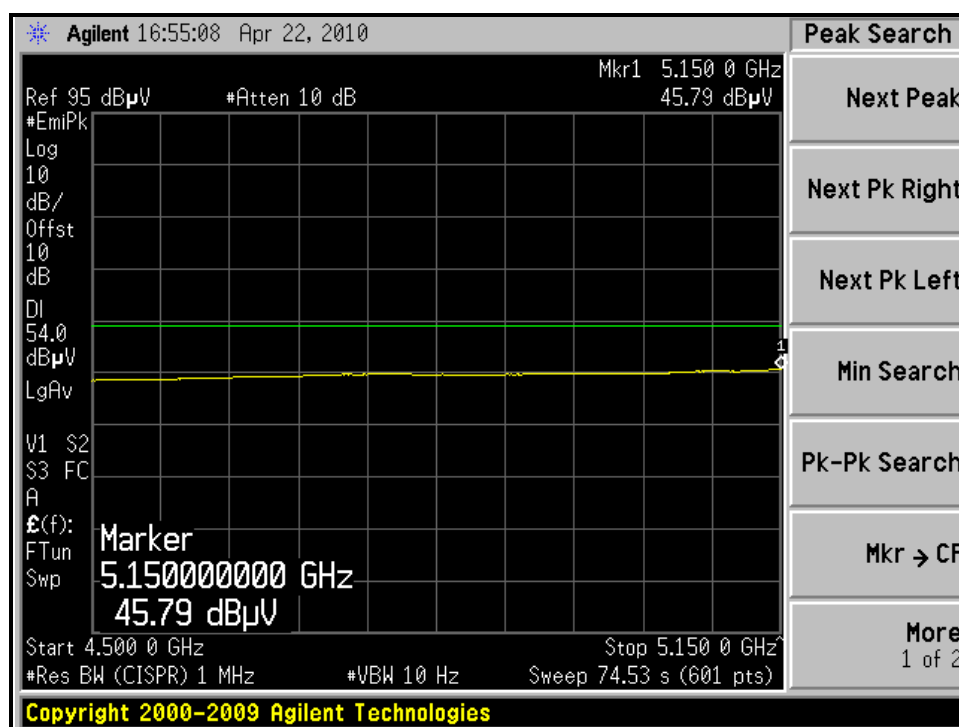
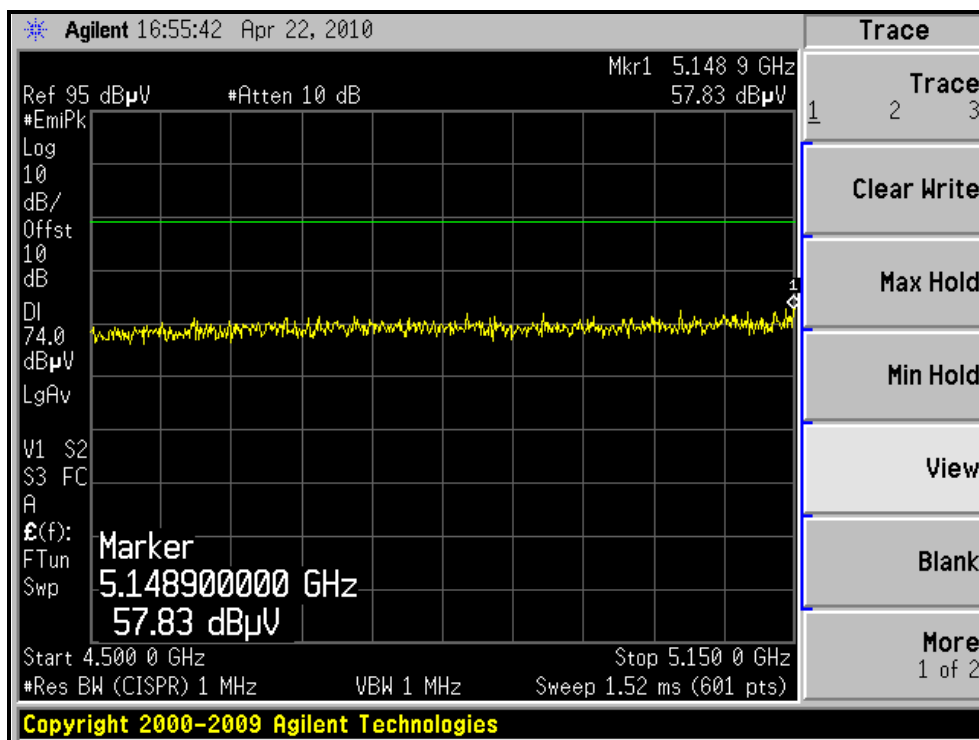
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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 48	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	20deg. C, 73%RH 1014 hPa	TESTED BY	Eric Lee

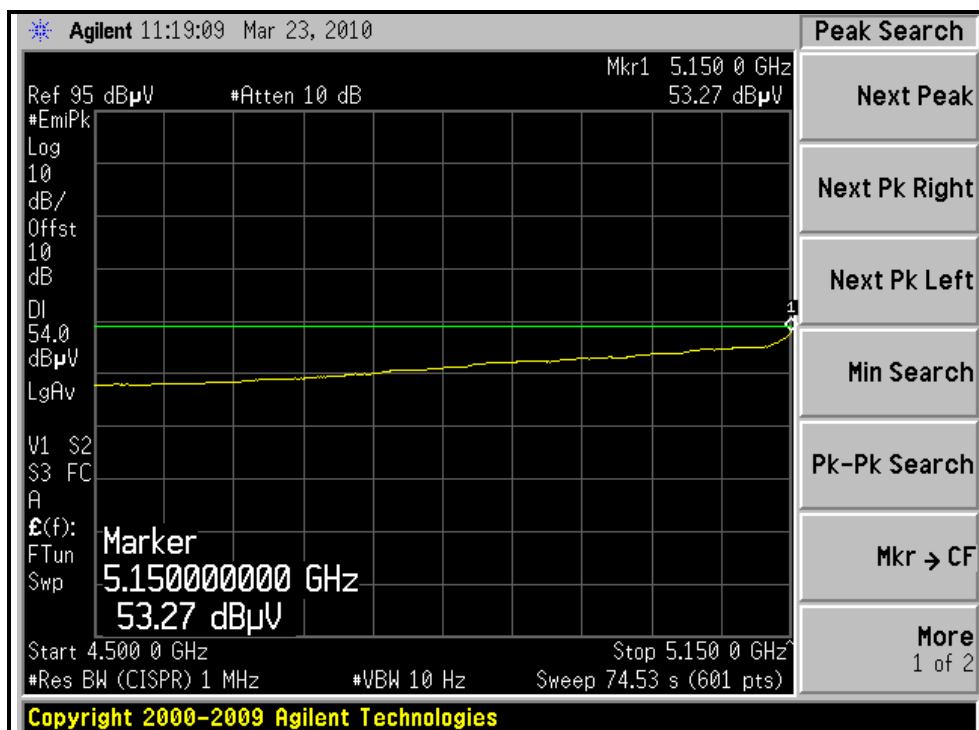
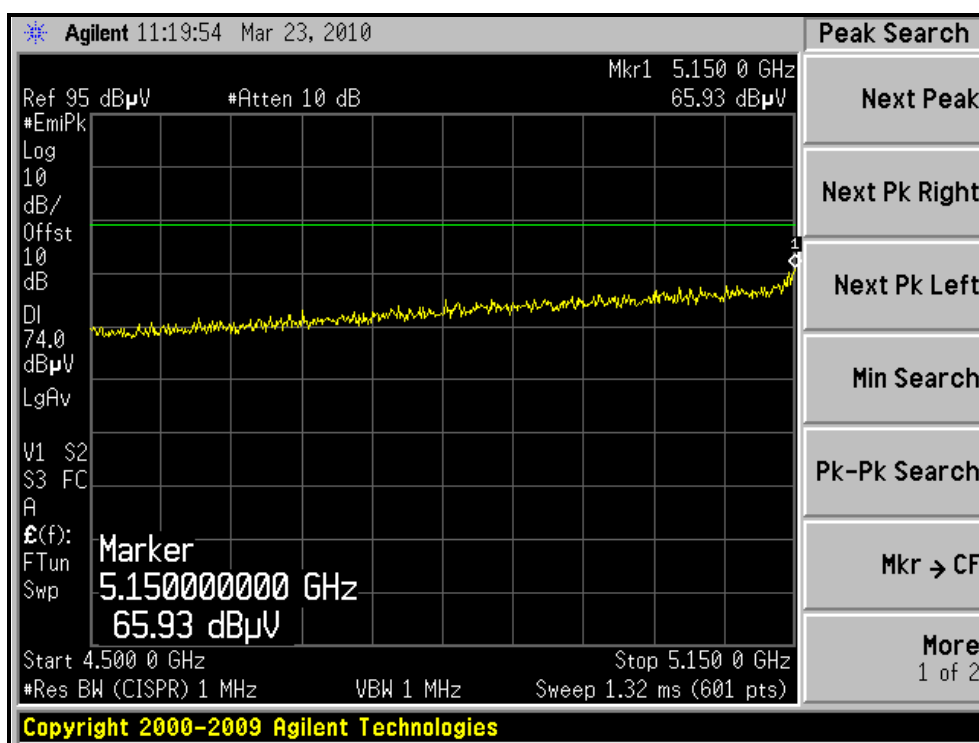
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5240.00	97.1 PK			1.29 H	33	56.94	40.17
2	*5240.00	86.7 AV			1.29 H	33	46.54	40.17
3	5350.00	51.6 PK	74.0	-22.4	1.10 H	75	11.17	40.47
4	5350.00	40.4 AV	54.0	-13.6	1.10 H	75	-0.11	40.47
5	#10480.00	57.9 PK	68.3	-10.5	1.46 H	351	11.18	46.67
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	114.5 PK			1.14 V	71	74.33	40.17
2	*5240.00	103.3 AV			1.14 V	71	63.12	40.17
3	5350.00	52.5 PK	74.0	-21.5	1.54 V	51	12.06	40.47
4	5350.00	40.9 AV	54.0	-13.1	1.54 V	51	0.39	40.47
5	#10480.00	61.0 PK	68.3	-7.3	1.51 V	360	14.31	46.67

- 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.

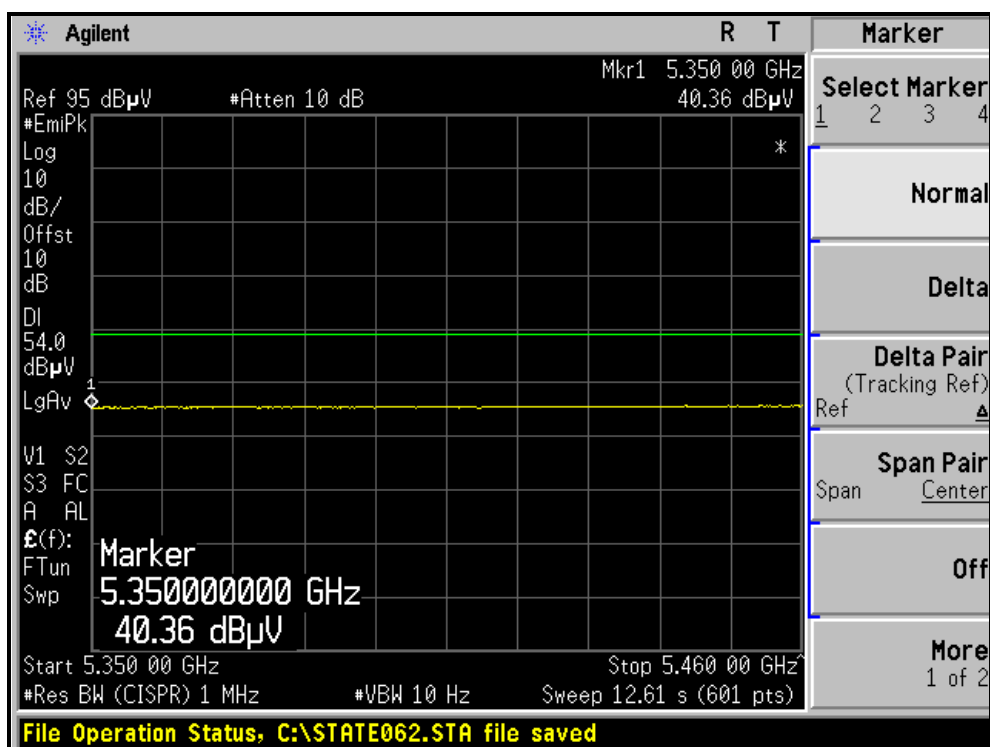
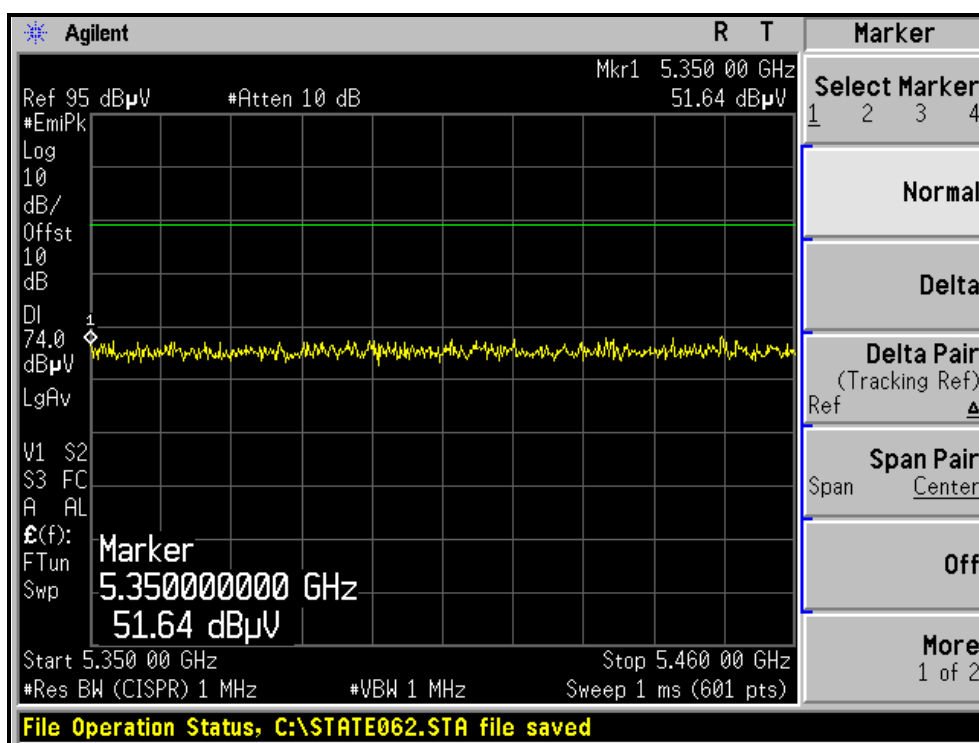
RESTRICTED BANDEDGE (802.11n (20MHz) MODE,CH36, HORIZONTAL)



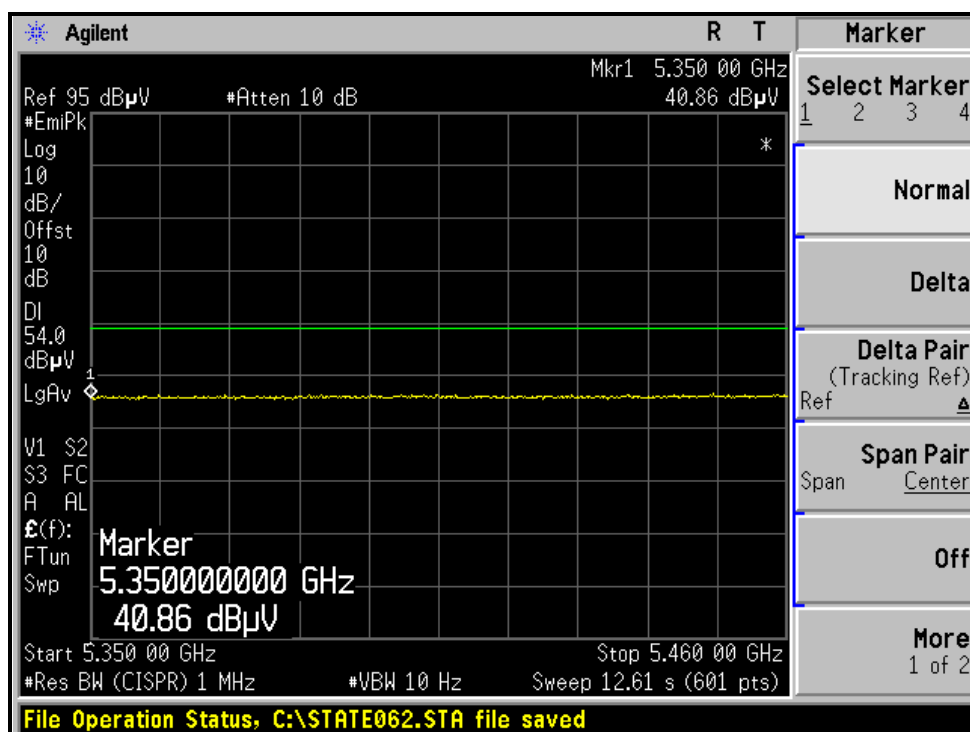
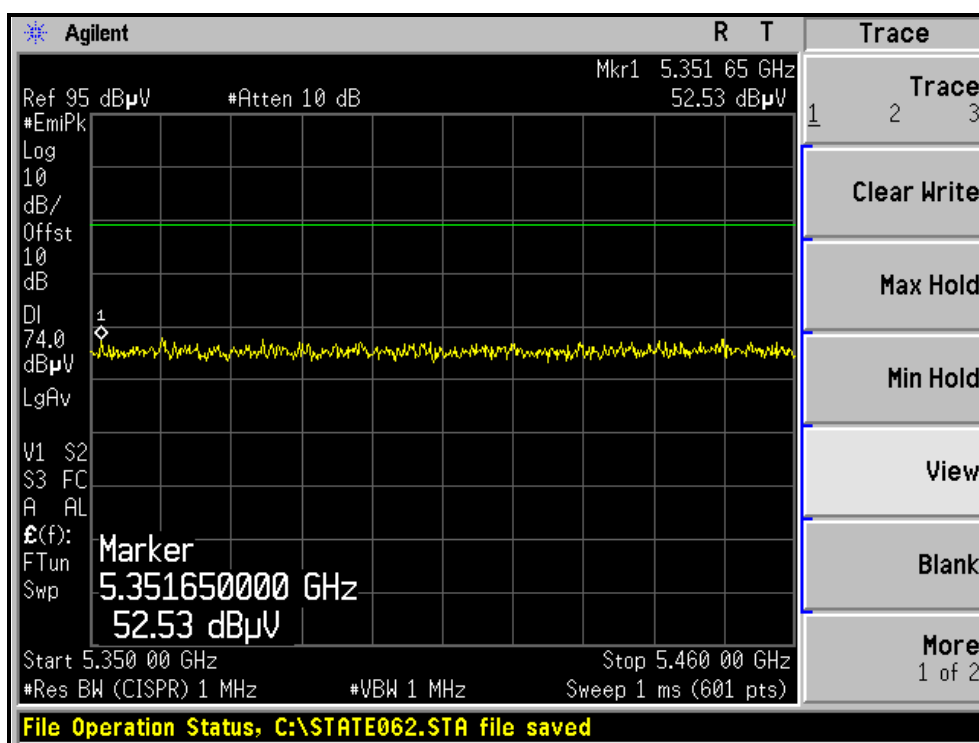
RESTRICTED BANDEDGE (802.11n (20MHz) MODE,CH36, VERTICAL)



RESTRICTED BANDEDGE (802.11n (20MHz) MODE,CH48, HORIZONTAL)



RESTRICTED BANDEDGE (802.11n (20MHz) MODE,CH48, VERTICAL)





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802.11n (40MHz) OFDM MODULATION

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 38	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	20deg. C, 73%RH 1014 hPa	TESTED BY	Eric Lee

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	57.5 PK	74.0	-16.5	1.02 H	260	17.53	39.94
2	5150.00	45.9 AV	54.0	-8.1	1.02 H	260	6.00	39.94
3	*5190.00	92.1 PK			1.01 H	258	52.10	40.04
4	*5190.00	81.6 AV			1.01 H	258	41.57	40.04
5	#10380.00	60.0 PK	68.3	-8.3	1.48 H	57	13.48	46.55
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	67.4 PK	74.0	-6.6	1.18 V	69	27.46	39.94
2	5150.00	52.5 AV	54.0	-1.5	1.18 V	69	12.57	39.94
3	*5190.00	110.6 PK			1.18 V	66	70.54	40.04
4	*5190.00	97.3 AV			1.18 V	66	57.22	40.04
5	#10380.00	60.1 PK	68.3	-8.2	1.20 V	81	13.56	46.05

- 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.



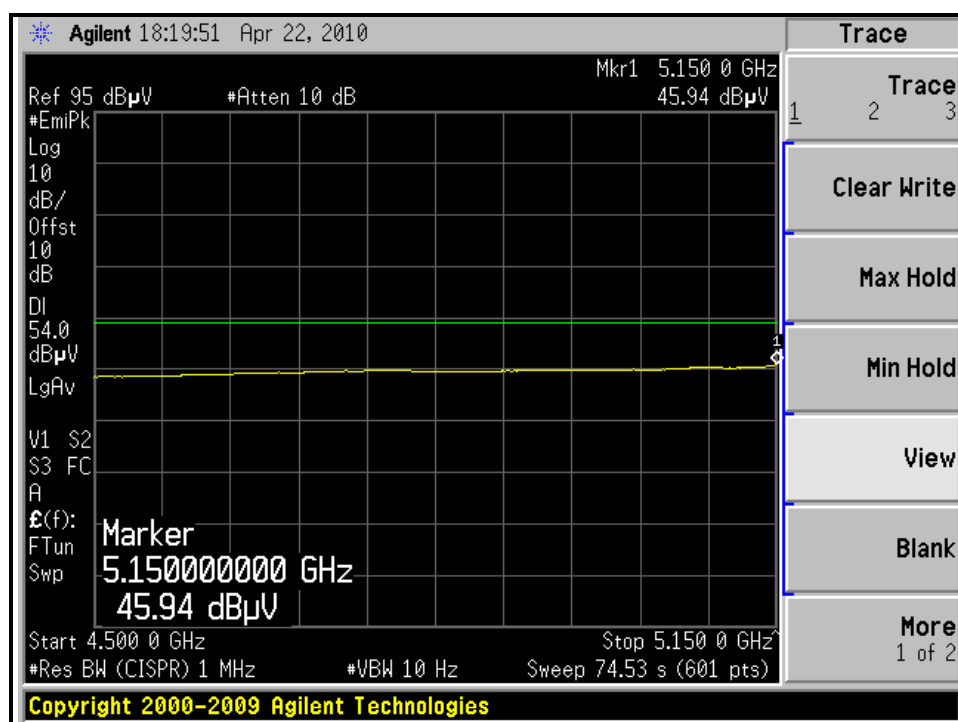
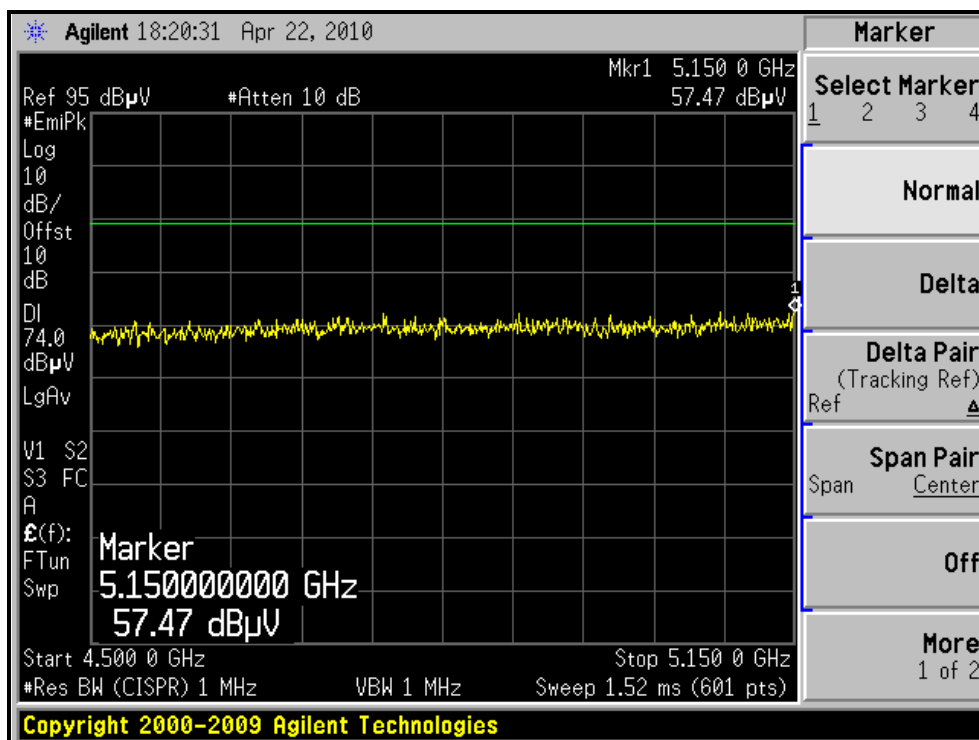
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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 46	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	20deg. C, 73%RH 1014 hPa	TESTED BY	Eric Lee

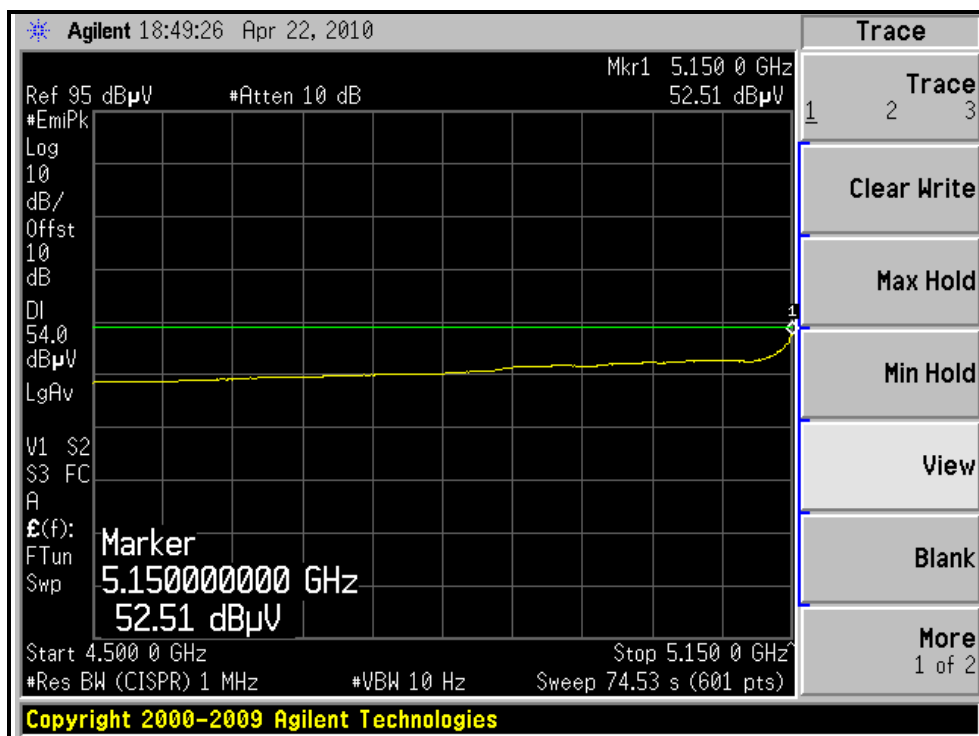
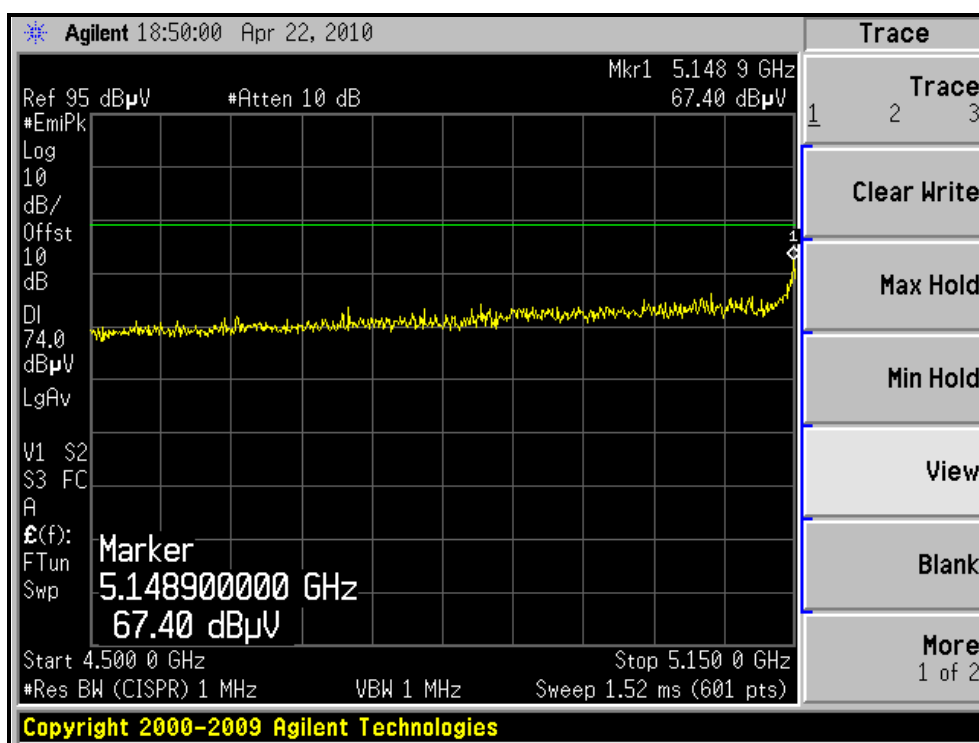
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	58.6 PK	74.0	-15.5	1.40 H	83	18.61	39.94
2	5150.00	46.7 AV	54.0	-7.3	1.40 H	83	6.76	39.94
3	*5230.00	94.1 PK			1.09 H	261	53.96	40.15
4	*5230.00	82.7 AV			1.09 H	261	42.52	40.15
5	5350.00	51.1 PK	74.0	-23.0	1.20 H	66	10.58	40.47
6	5350.00	41.1 AV	54.0	-12.9	1.20 H	66	0.65	40.47
7	#10460.00	60.3 PK	68.3	-8.0	1.09 H	44	13.66	46.65
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	62.9 PK	74.0	-11.1	1.09 V	67	22.95	39.94
2	5150.00	52.5 AV	54.0	-1.5	1.09 V	67	12.56	39.94
3	*5230.00	112.3 PK			1.09 V	67	72.16	40.15
4	*5230.00	99.5 AV			1.09 V	67	59.30	40.15
5	5350.00	52.4 PK	74.0	-21.6	1.54 V	55	11.95	40.47
6	5350.00	40.3 AV	54.0	-13.7	1.54 V	55	-0.13	40.47
7	#10460.00	60.3 PK	68.3	-8.0	1.33 V	65	13.64	46.65

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.

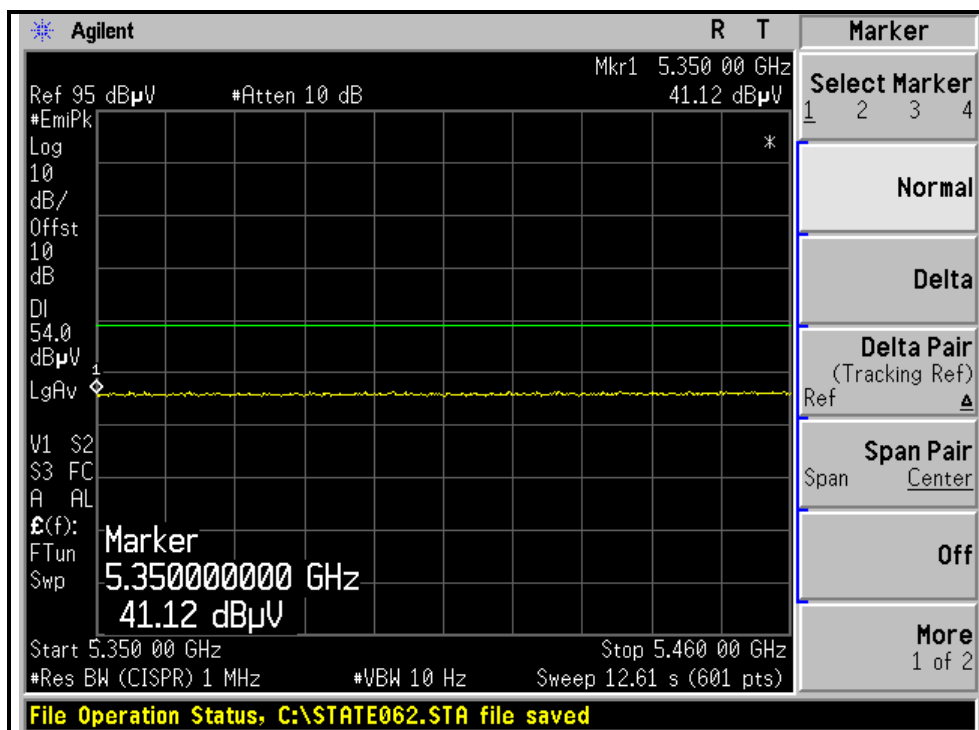
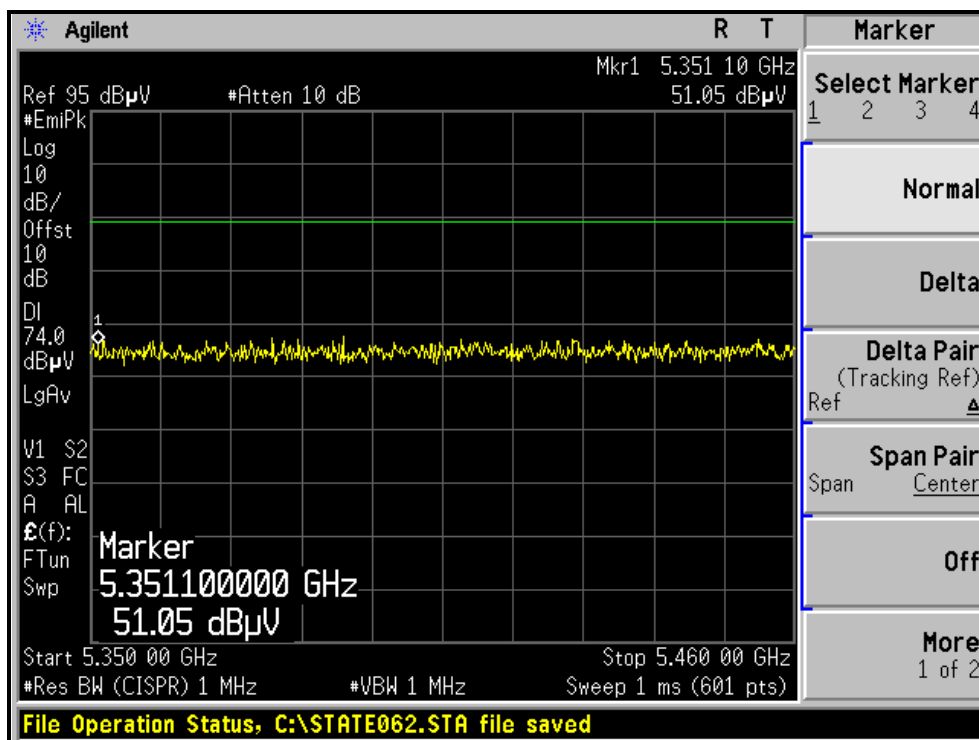
RESTRICTED BANDEDGE (802.11n (40MHz) MODE, CH38, HORIZONTAL)



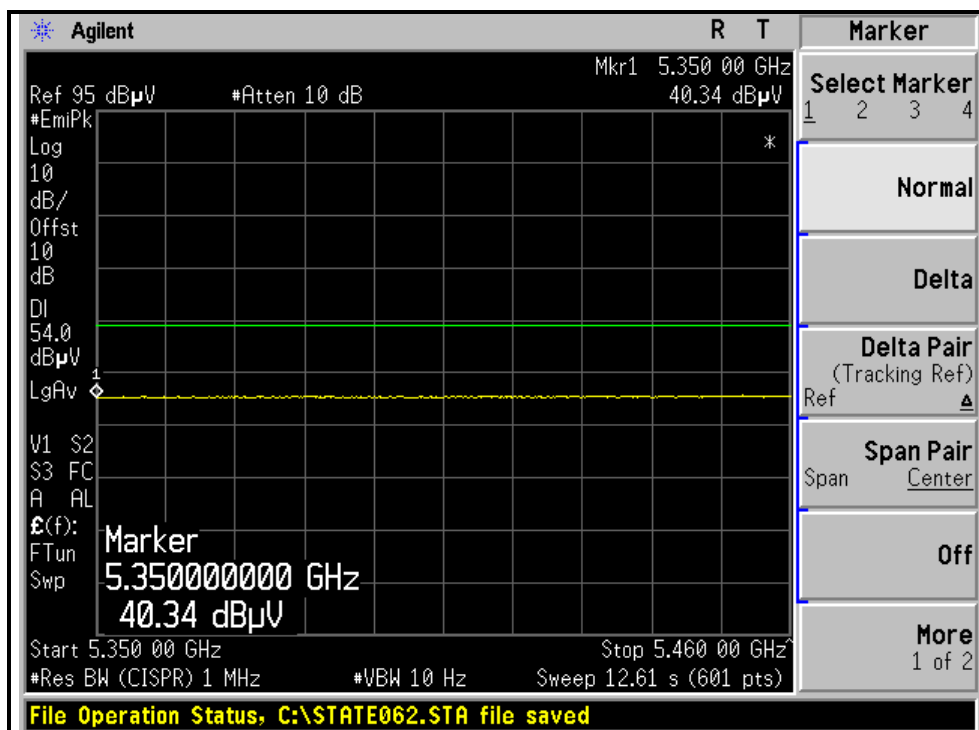
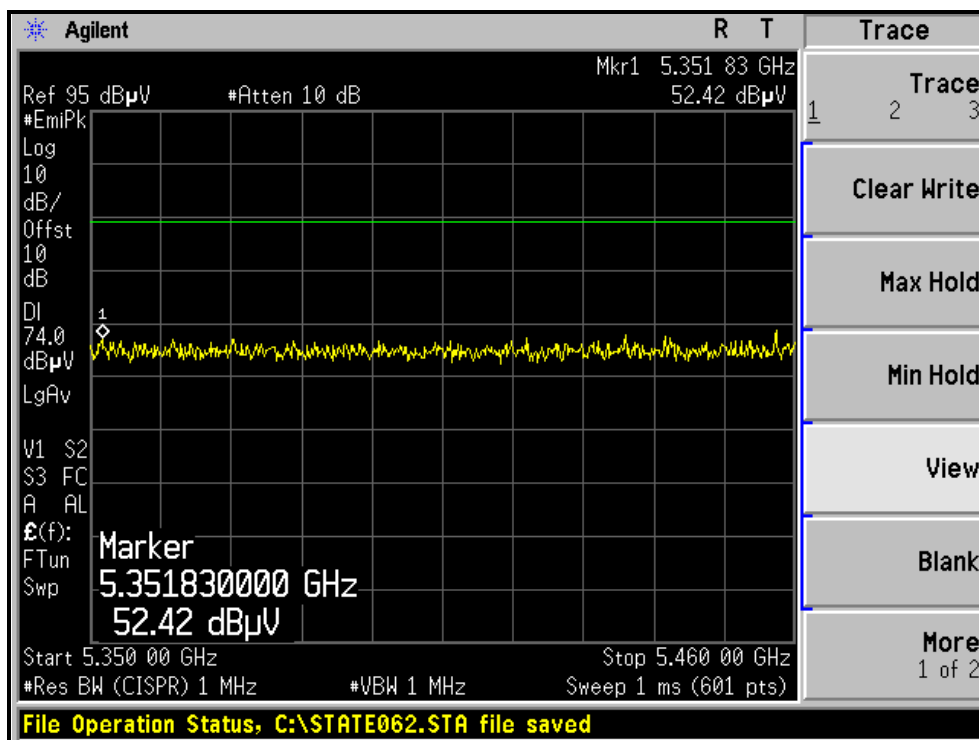
RESTRICTED BANDEDGE (802.11n (40MHz) MODE,CH38, VERTICAL)



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



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



4.3 PEAK TRANSMIT POWER MEASUREMENT

4.3.1 LIMITS OF PEAK 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

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer	E4446A	MY48250254	Aug. 03, 2009	Aug. 02, 2010

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 300kHz.
4. Using the spectrum analyzer's channel power measurement function to measure the output power.

NOTE:

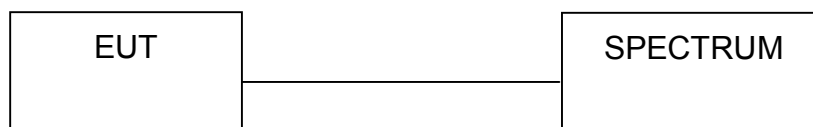
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

The transmitter output operates continuously therefore Method # 1 is used.

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.

4.3.7 TEST RESULTS

802.11a OFDM MODULATION:

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (dBm)		TOTAL PEAK POWER (dBm)	TOTAL PEAK POWER (mW)	PEAK POWER LIMIT (dBm)	26dBc Occupied Bandwidth (MHz)	PASS/ FAIL
		Chain 0	Chain 1					
36	5180	9.2	11.2	15.7	21.5	15.7	23.58	PASS
40	5200	9.2	11.1	15.7	21.2	15.7	24.25	PASS
48	5240	9.3	11.4	15.7	22.3	15.7	24.33	PASS

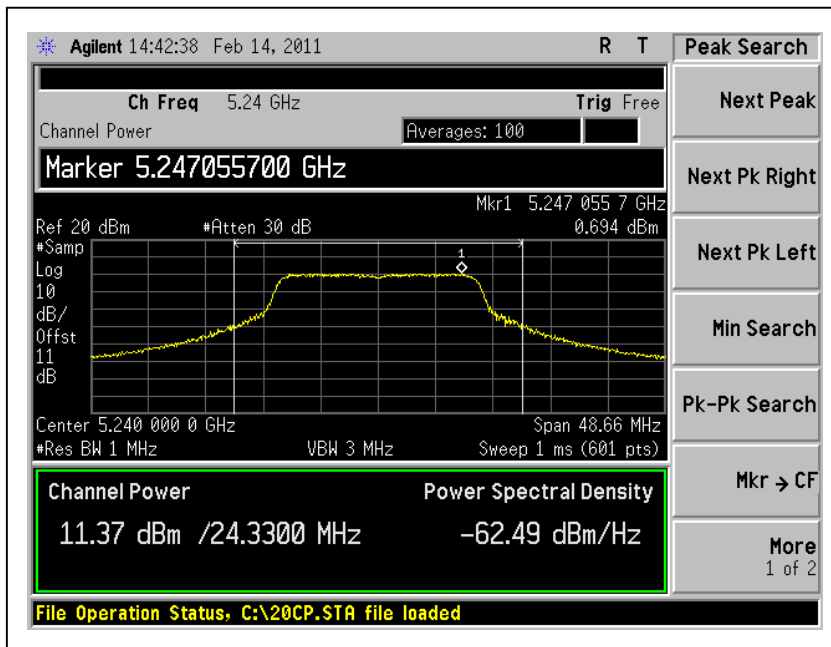
NOTE: 1. The 26dBc Occupied Bandwidth plot, please refer to the following page.

$$2. \text{ Directional gain} = \text{Directional gain} = 10 \log(10^{G1/20} + 10^{G2/20})^2 / 2$$

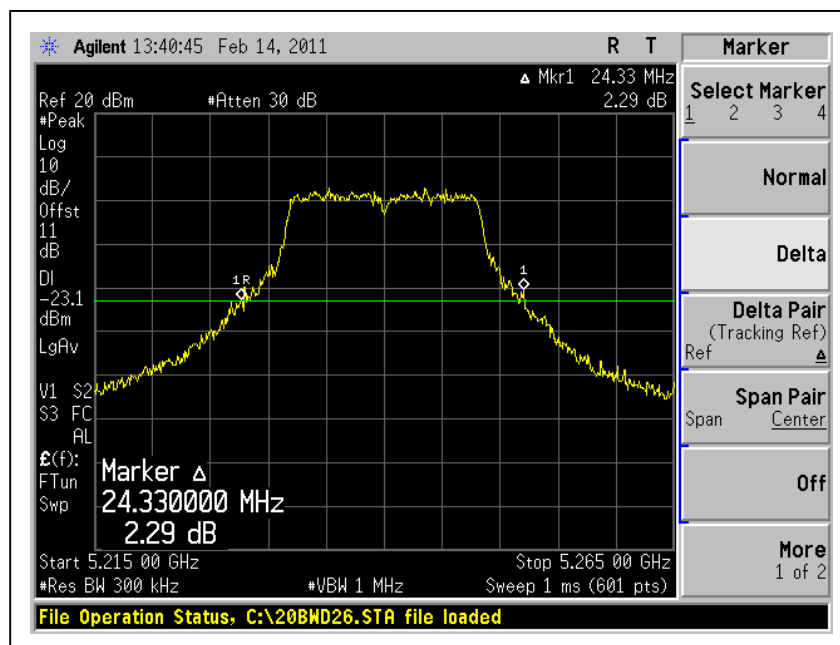
$$\text{Effective Legacy Gain (dBi)} = 7.3$$

The effective legacy gain is 7.3dBi, therefore the limit needs to reduce.

Peak Power Output:
For Chain (1) :CH48



26dB Occupied Bandwidth:
CH48

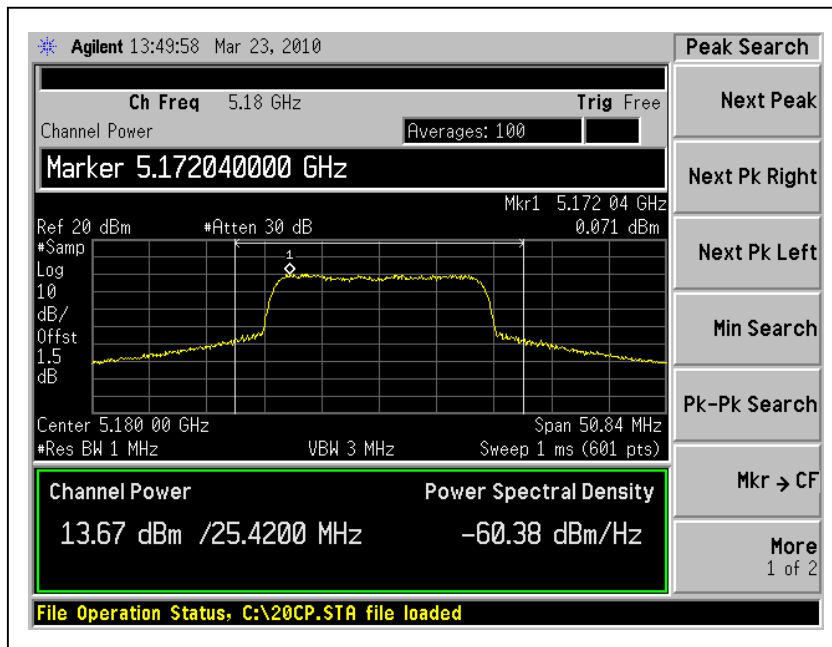


802.11n (20MHz) OFDM modulation:

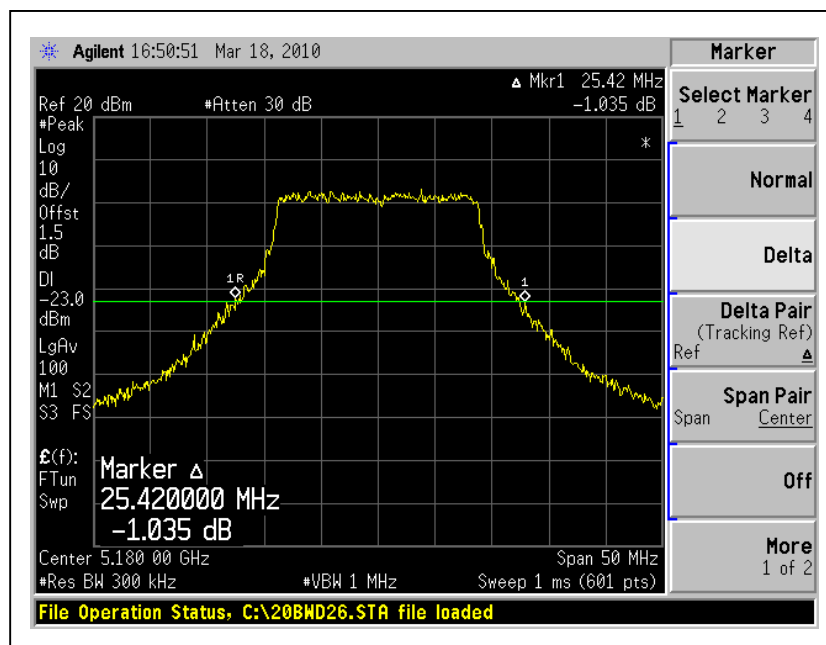
CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (dBm)		TOTAL PEAK POWER (dBm)	TOTAL PEAK POWER (mW)	PEAK POWER LIMIT (dBm)	26dBc Occupied Bandwidth (MHz)	PASS/ FAIL
		Chain 0	Chain 1					
36	5180	12.5	13.7	16.1	41.2	17.0	25.42	PASS
40	5200	12.4	13.7	16.1	40.8	17.0	24.75	PASS
48	5240	13.2	13.4	16.3	42.8	17.0	24.83	PASS

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

Peak Power Output:
For Chain (1) :CH36



26dB Occupied Bandwidth:
CH36

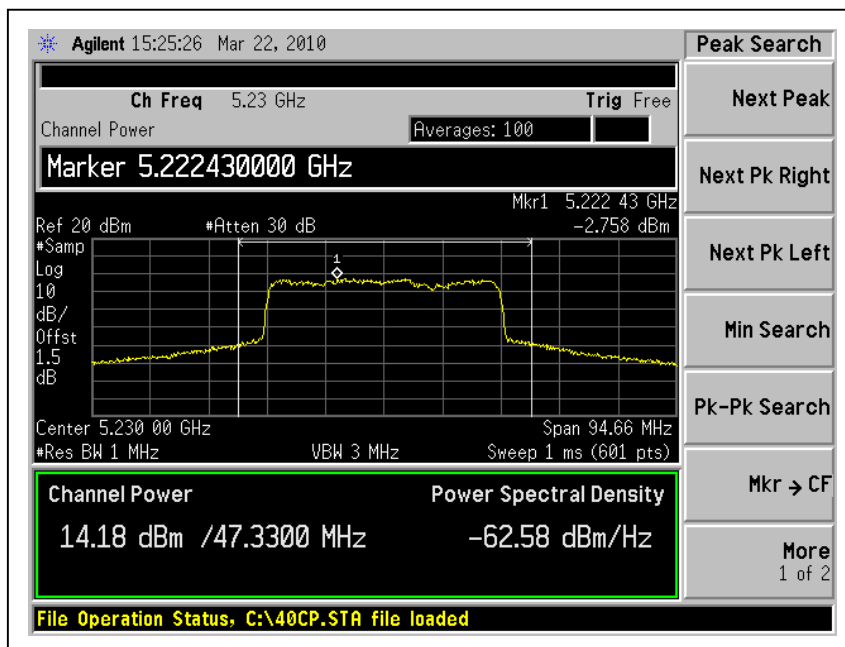


802.11n (40MHz) OFDM MODULATION:

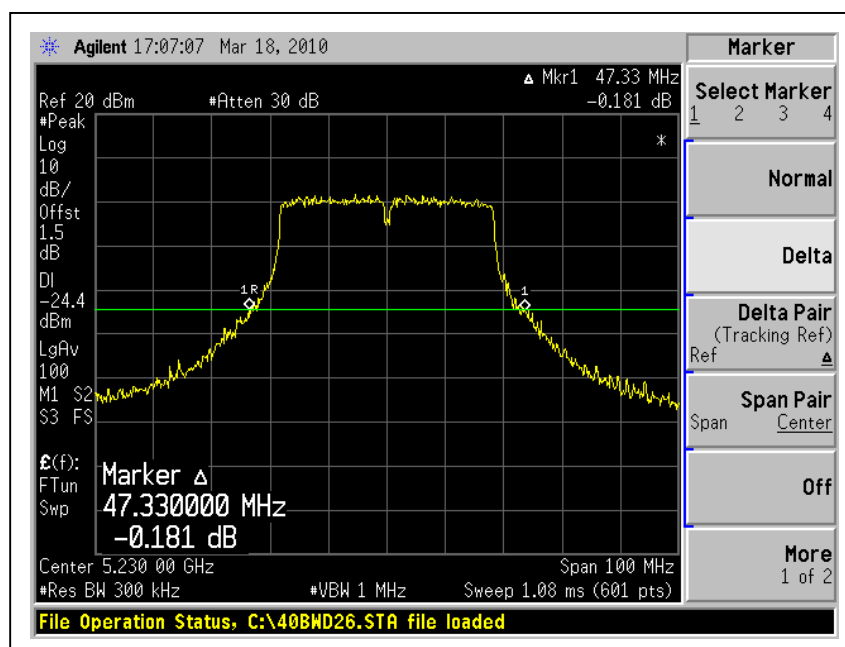
CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (dBm)		TOTAL PEAK POWER (dBm)	TOTAL PEAK POWER (mW)	PEAK POWER LIMIT (dBm)	26dBc Occupied Bandwidth (MHz)	PASS/ FAIL
		Chain 0	Chain 1					
38	5190	9.7	11.1	13.5	22.2	17.0	46.17	PASS
46	5230	12.2	14.2	16.3	42.9	17.0	47.33	PASS

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

Peak Power Output:
For Chain (1) :CH46



26dB Occupied Bandwidth:
CH46





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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

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer	E4446A	MY48250254	Aug. 03, 2009	Aug. 02, 2010

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

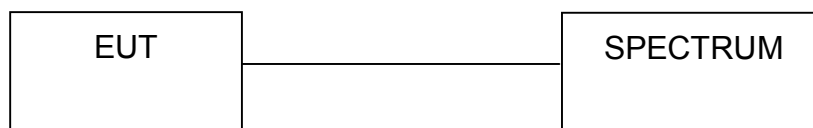
4.4.3 TEST PROCEDURE

1. The transmitter output was connected to the spectrum analyzer.
2. Set the spectrum bandwidth span to view the entire spectrum.
3. Using peak detector and Max-hold function for Trace 1 (RB=1MHz, VB=3MHz) and 2 (RB=1MHz, VB=300kHz).
4. The largest difference between Trace 1 and Trace 2 in any 1MHz band on any frequency was recorded.

4.4.4 DEVIATION FROM TEST STANDARD

No deviation

4.4.5 TEST SETUP



4.4.6 EUT OPERATING CONDITIONS

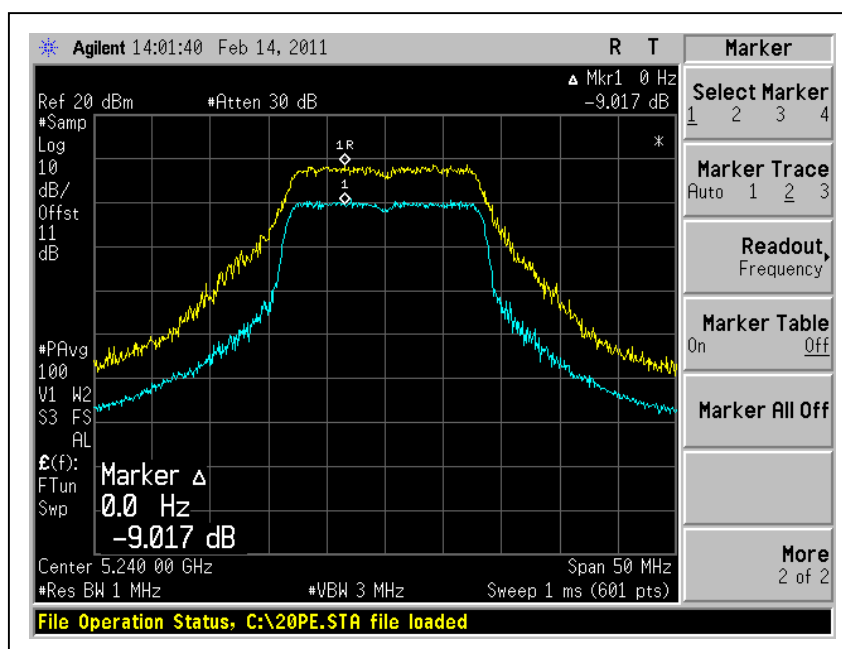
The software provided by client to enable the EUT under transmission condition continuously at specific channel frequencies individually.

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	8.5	13	PASS
40	5200	8.7	13	PASS
48	5240	9	13	PASS

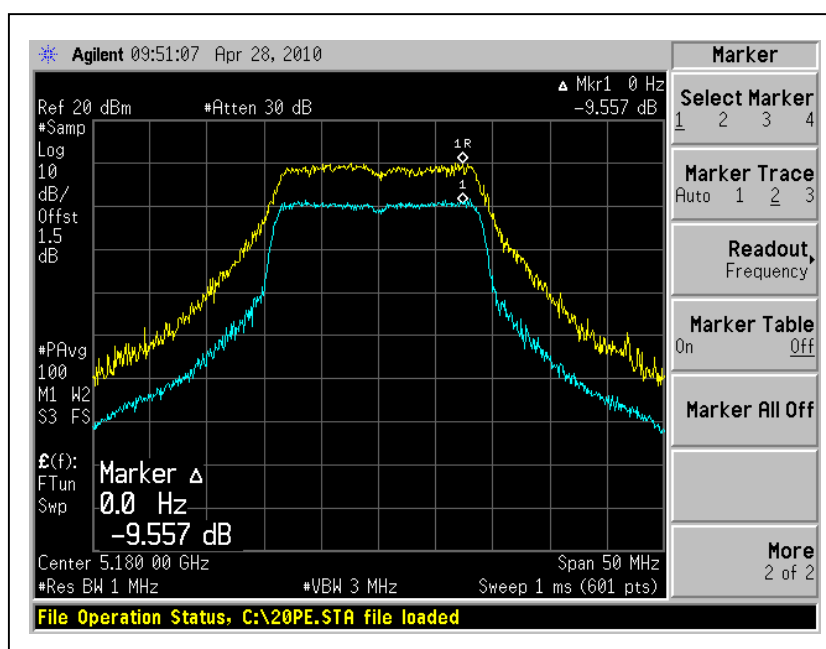
CH48



802.11n (20MHz) OFDM MODULATION:

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER EXCURSION (dB)	PEAK to AVERAGE EXCURSION LIMIT (dB)	PASS/FAIL
36	5180	9.6	13	PASS
40	5200	9.5	13	PASS
48	5240	9.4	13	PASS

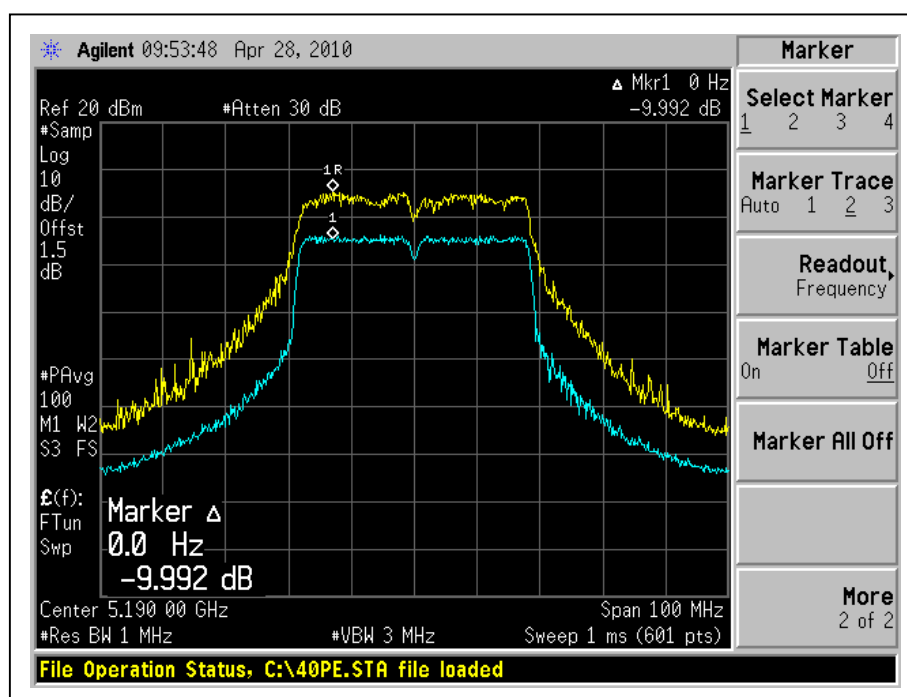
CH36



802.11n (40MHz) OFDM MODULATION:

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER EXCURSION (dB)	PEAK to AVERAGE EXCURSION LIMIT (dB)	PASS/FAIL
38	5190	10.0	13	PASS
46	5230	9.5	13	PASS

CH38



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

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer	E4446A	MY48250254	Aug. 03, 2009	Aug. 02, 2010

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

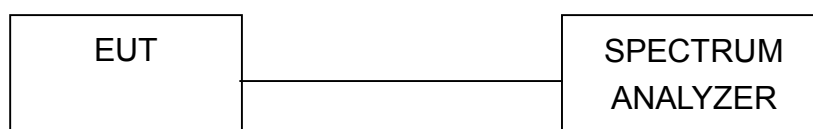
4.5.3 TEST PROCEDURES

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

4.5.7 TEST RESULTS

802.11a OFDM modulation

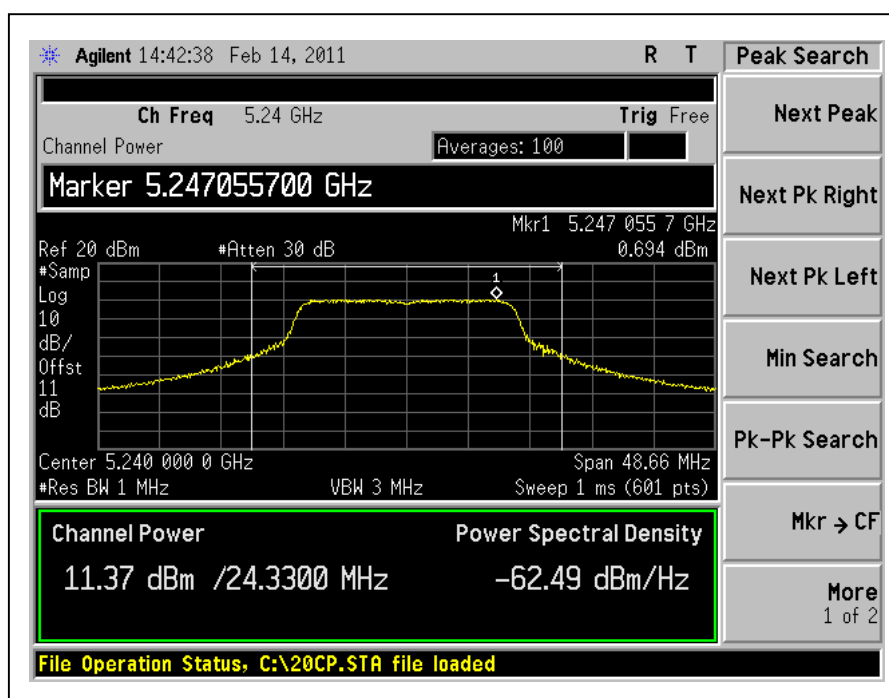
CHANNEL	CHANNEL FREQUENCY (MHz)	RF POWER LEVEL IN 1MHz BW (dBm)		TOTAL OUTPUT POWER DENSITY (dBm)	MAXIMUM LIMIT (dBm)	PASS/FAIL
		Chain (0)	Chain(1)			
36	5180	-1.6	0.4	2.5	2.7	PASS
40	5200	-1.8	0.1	2.3	2.7	PASS
48	5240	-1.9	0.7	2.6	2.7	PASS

Directional gain = Directional gain = $10 \log(10^{G1/20} + 10^{G2/20})^2 / 2$

Effective Legacy Gain (dBi) = 7.3

The effective legacy gain is 7.3dBi, therefore the limit needs to reduce.

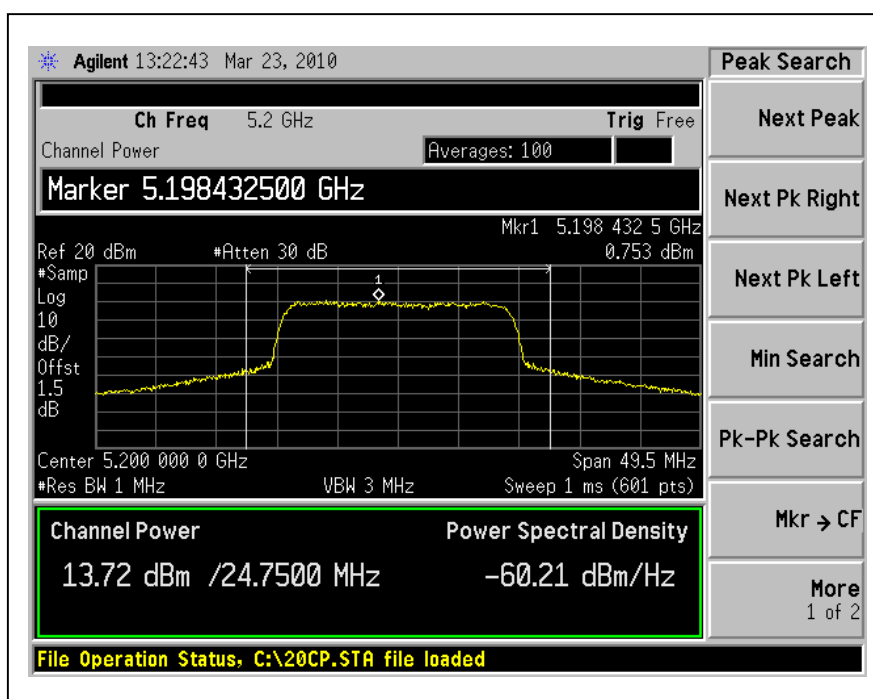
For Chain (1) : CH48



802.11n (20MHz) OFDM MODULATION:

CHANNEL	CHANNEL FREQUENCY (MHz)	RF POWER LEVEL IN 1MHz BW (dBm)		TOTAL OUTPUT POWER DENSITY (dBm)	MAXIMUM LIMIT (dBm)	PASS/FAIL
		Chain (0)	Chain(1)			
36	5180	-0.9	0.1	2.6	4	PASS
40	5200	-1.4	0.8	2.8	4	PASS
48	5240	-0.4	-0.4	2.6	4	PASS

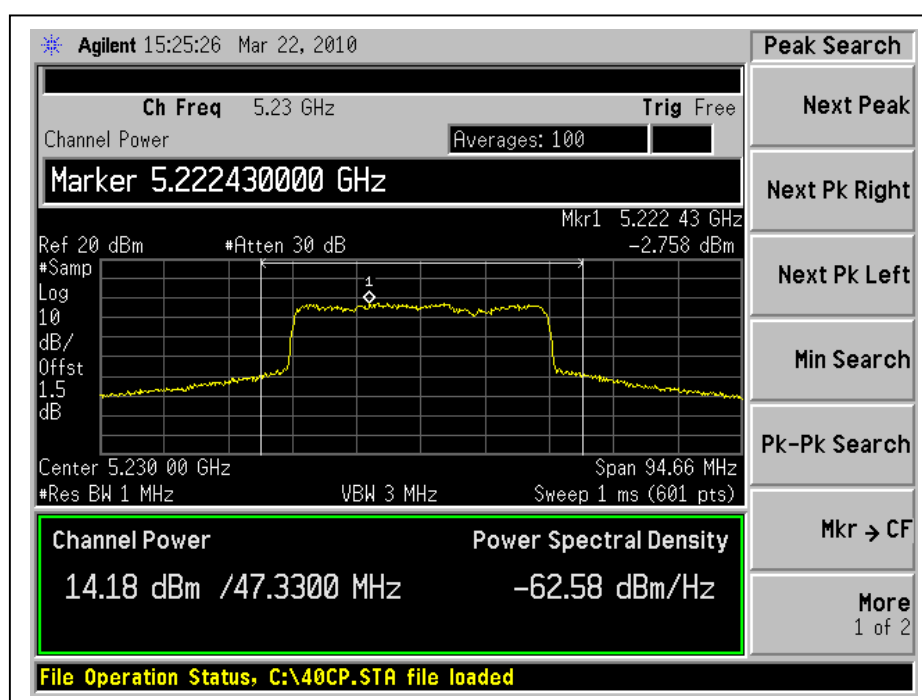
For Chain (1) : CH40



802.11n (40MHz) OFDM modulation:

CHANNEL	CHANNEL FREQUENCY (MHz)	RF POWER LEVEL IN 1MHz BW (dBm)		TOTAL OUTPUT POWER DENSITY (dBm)	MAXIMUM LIMIT (dBm)	PASS/FAIL
		Chain (0)	Chain(1)			
38	5190	-7.1	-5.3	-3.1	4	PASS
46	5230	-5.1	-2.8	-0.8	4	PASS

For Chain (1) : CH46



4.6 20dB BANDWIDTH MEASUREMENT

4.6.1 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer	E4446A	MY48250254	Aug. 03, 2009	Aug. 02, 2010

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

4.6.2 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 100kHz RBW and 100kHz VBW. The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

4.6.3 TEST SETUP



4.6.4 EUT OPERATING CONDITIONS

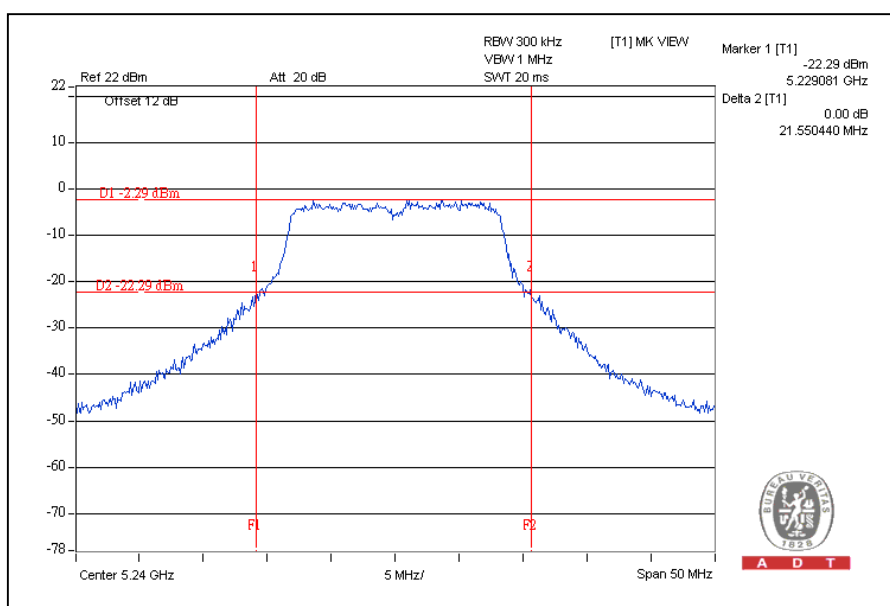
The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

4.6.5 TEST RESULTS

802.11a OFDM modulation

CHANNEL	CHANNEL FREQUENCY (MHz)	20dB BANDWIDTH (MHz)
36	5180	20.92
40	5200	21.13
48	5240	21.55

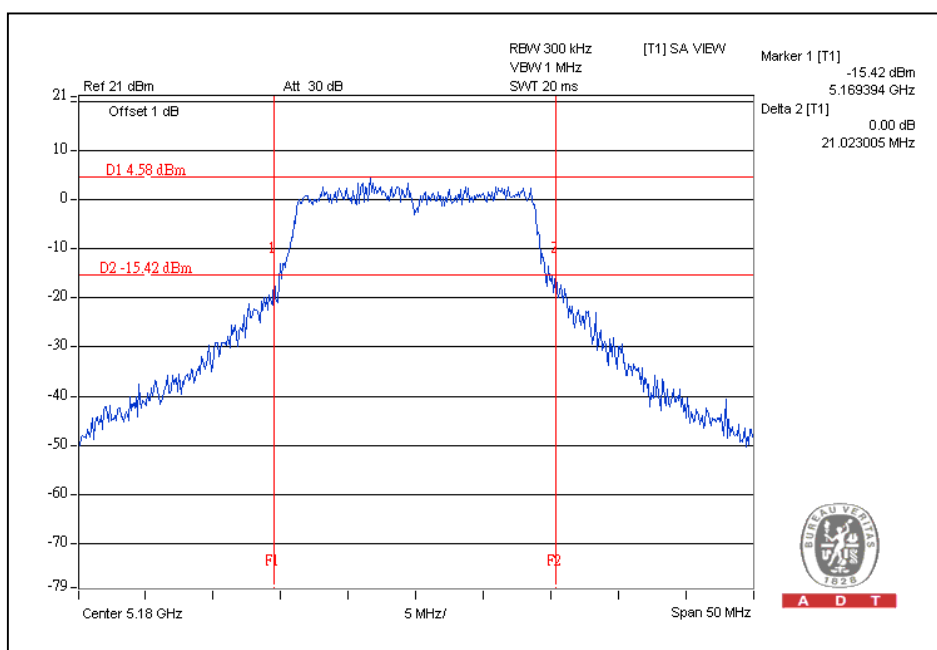
CH48



802.11n (20MHz) OFDM modulation:

CHANNEL	CHANNEL FREQUENCY (MHz)	20dB BANDWIDTH (MHz)
36	5180	21.02
40	5200	20.50
48	5240	20.83

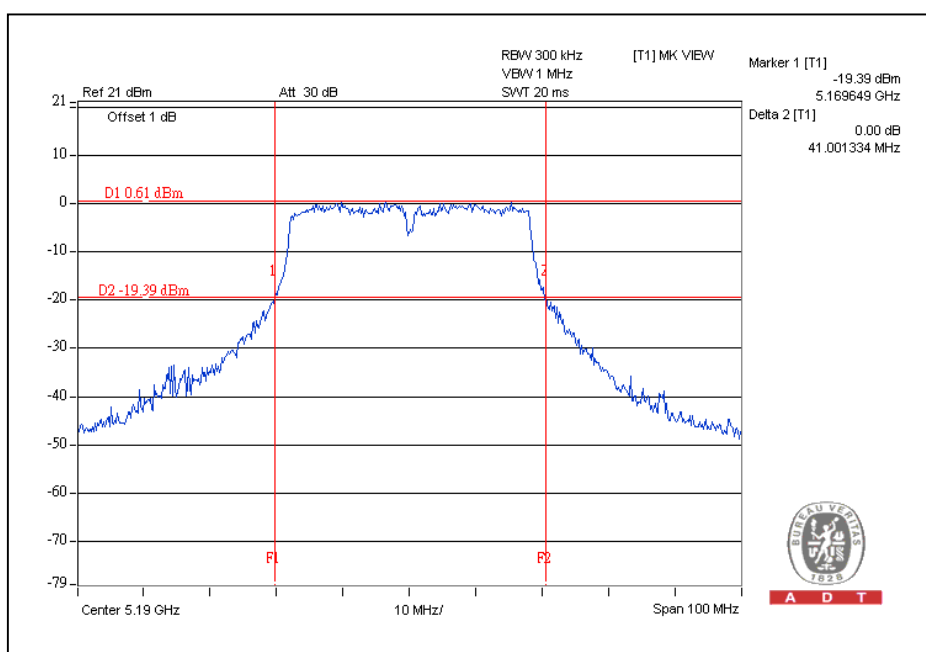
CH36



802.11n (40MHz) OFDM MODULATION:

CHANNEL	CHANNEL FREQUENCY (MHz)	20dB BANDWIDTH (MHz)
38	5190	41.00
46	5230	40.65

CH38





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4.7 FREQUENCY STABILITY

4.7.1 LIMITS OF FREQUENCY STABILITY MEASUREMENT

The frequency tolerance of the carrier signal shall be maintained within $\pm 0.02\%$ 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.

4.7.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer	E4446A	MY48250254	Aug. 03, 2009	Aug. 02, 2010

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

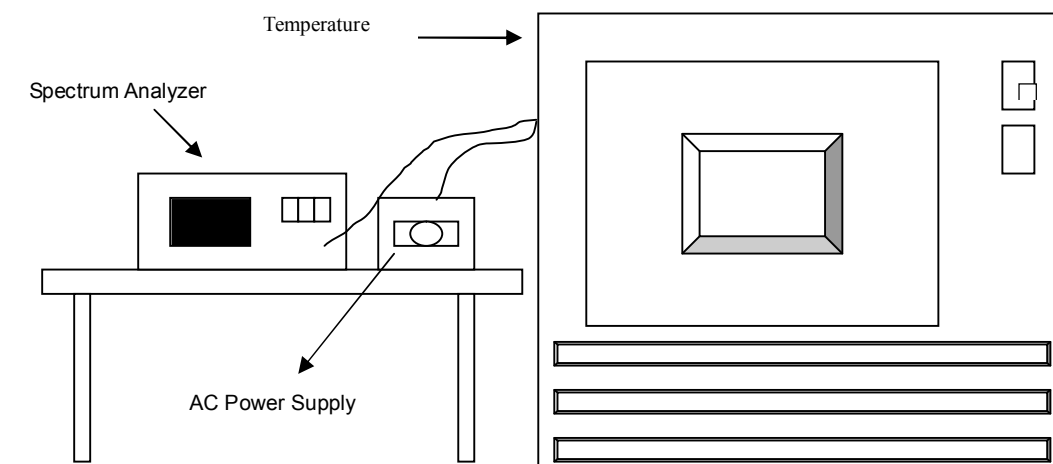
4.7.3 TEST PROCEDURE

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.

4.7.4 DEVIATION FROM TEST STANDARD

No deviation

4.7.5 TEST SETUP



4.7.6 EUT OPERATING CONDITION

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

4.7.7 TEST RESULTS

Operating frequency: 5240MHz				Limit : $\pm 0.02\%$			
Temp. (°C)	Power supply (VAC)	2 minute		5 minute		10 minute	
		(MHz)	(%)	(MHz)	(%)	(MHz)	(%)
50	138	5240.0068	0.000130	5240.0065	0.000124	5240.0060	0.000115
	120	5240.0068	0.000130	5240.0065	0.000124	5240.0062	0.000118
	102	5240.0068	0.000130	5240.0064	0.000122	5240.0059	0.000113
40	138	5239.9825	0.000334	5239.9919	0.000155	5239.9914	0.000164
	120	5239.9826	0.000332	5239.9919	0.000155	5239.9916	0.000160
	102	5239.9925	0.000143	5239.9922	0.000149	5239.9913	0.000166
30	138	5240.025	0.000477	5240.0233	0.000445	5240.0211	0.000403
	120	5240.0248	0.000473	5240.0253	0.000483	5240.0231	0.000441
	102	5240.0248	0.000473	5240.0223	0.000426	5240.0211	0.000403
20	138	5239.9866	0.000256	5239.9862	0.000263	5239.9858	0.000271
	120	5239.9866	0.000256	5239.9864	0.000260	5239.9859	0.000269
	102	5239.9866	0.000256	5239.9862	0.000263	5239.9857	0.000273
10	138	5240.006	0.000115	5240.0054	0.000103	5240.0049	0.000094
	120	5240.006	0.000115	5240.0056	0.000107	5240.0052	0.000099
	102	5240.006	0.000115	5240.0054	0.000103	5240.0049	0.000094
0	138	5240.0308	0.000588	5240.031	0.000592	5240.0309	0.000590
	120	5240.0308	0.000588	5240.0309	0.000590	5240.0309	0.000590
	102	5240.031	0.000592	5240.0307	0.000586	5240.0309	0.000590
-10	138	5240.0244	0.000466	5240.0193	0.000368	5240.0151	0.000288
	120	5240.0244	0.000466	5240.0223	0.000426	5240.0181	0.000345
	102	5240.0244	0.000466	5240.0183	0.000349	5240.0161	0.000307
-20	138	5240.0174	0.000332	5240.0123	0.000235	5240.0121	0.000231
	120	5240.0174	0.000332	5240.0153	0.000292	5240.0131	0.000250
	102	5240.0154	0.000294	5240.0123	0.000235	5240.0121	0.000231
-30	138	5240.0015	0.000029	5240.0011	0.000021	5240.0006	0.000011
	120	5240.0016	0.000031	5240.0015	0.000029	5240.0010	0.000019
	102	5240.0015	0.000029	5240.0011	0.000021	5240.0006	0.000011



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4.8 CONDUCTED OUT-BAND EMISSION MEASUREMENT

4.8.1 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer	E4446A	MY48250254	Aug. 03, 2009	Aug. 02, 2010

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

4.8.2 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 bandwidth from band edge. The band edges was measured and recorded.

4.8.3 EUT OPERATING CONDITION

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

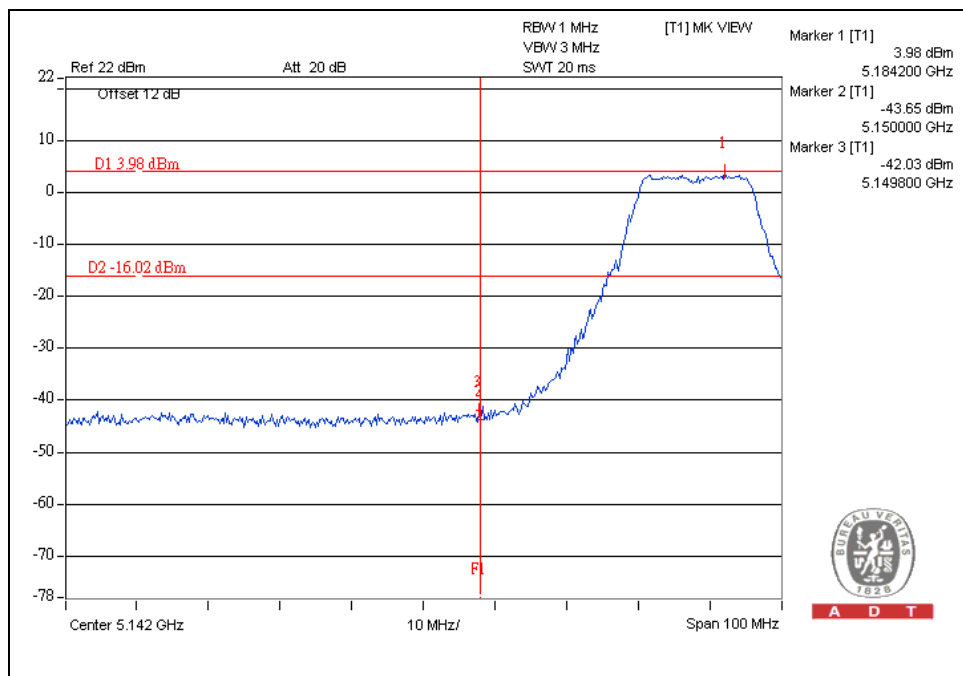
4.8.4 TEST RESULTS

For 5.15 to 5.25GHz band:

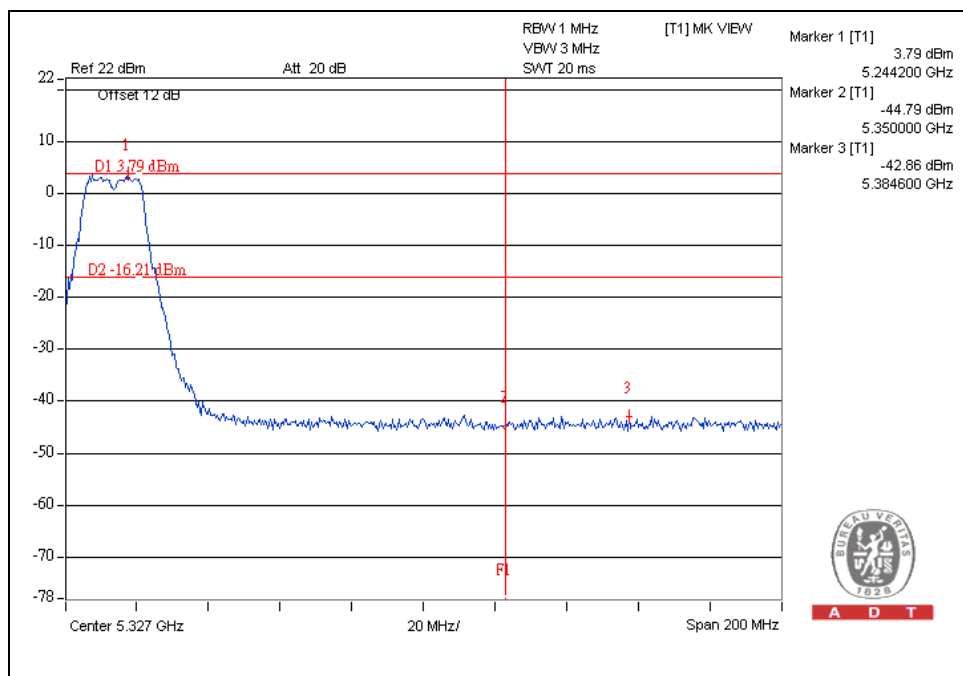
The spectrum plots (Peak RBW=1MHz, VBW=3MHz) are attached on the following pages.

802.11a OFDM modulation

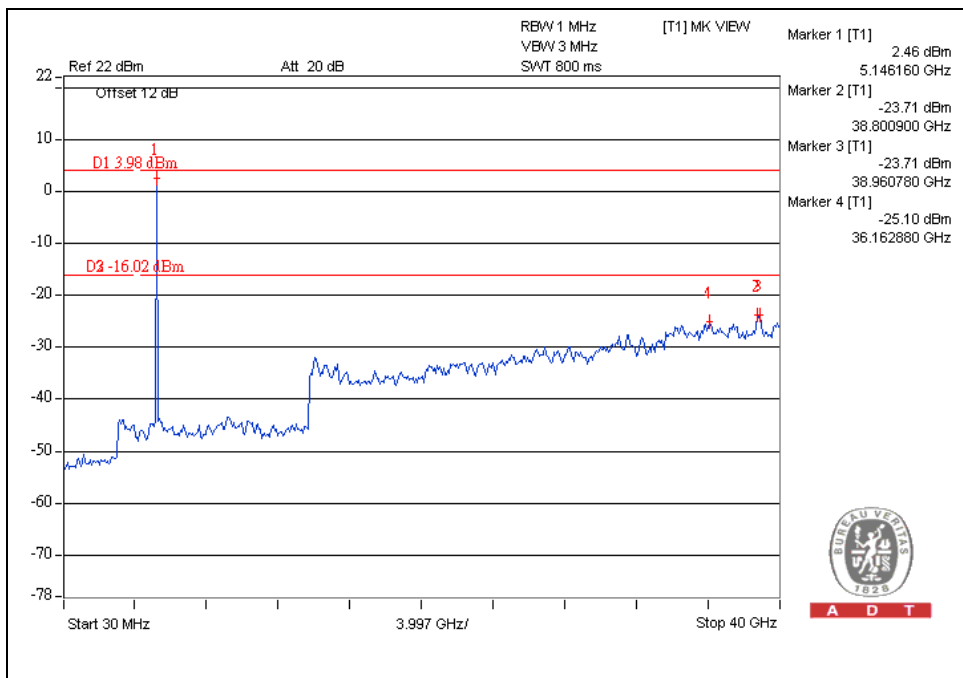
CH 36



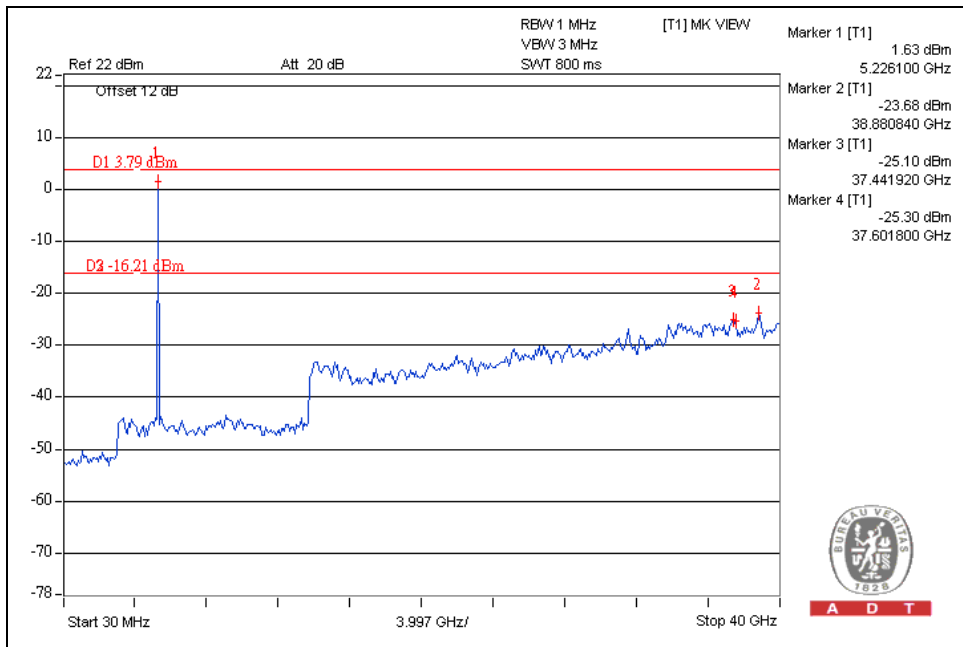
CH 48



CH 36

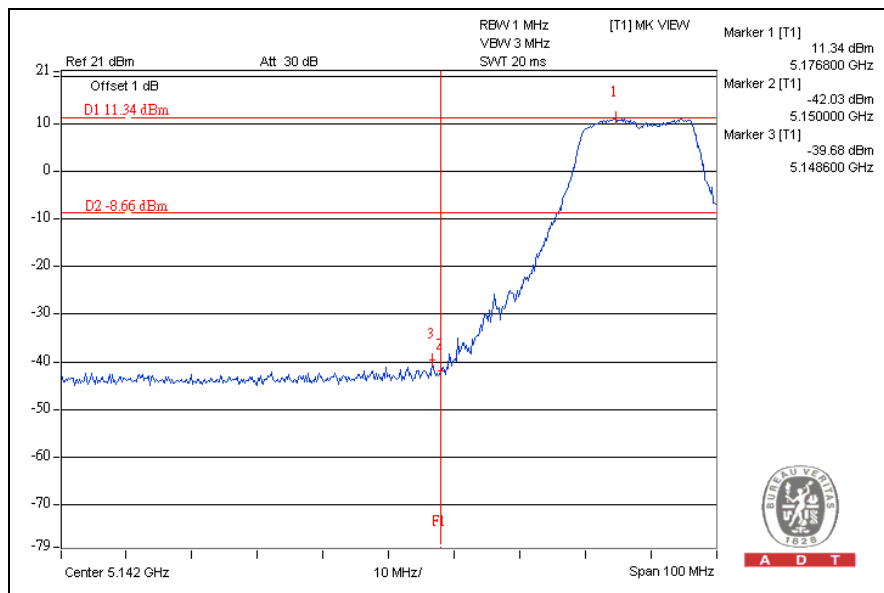


CH 48

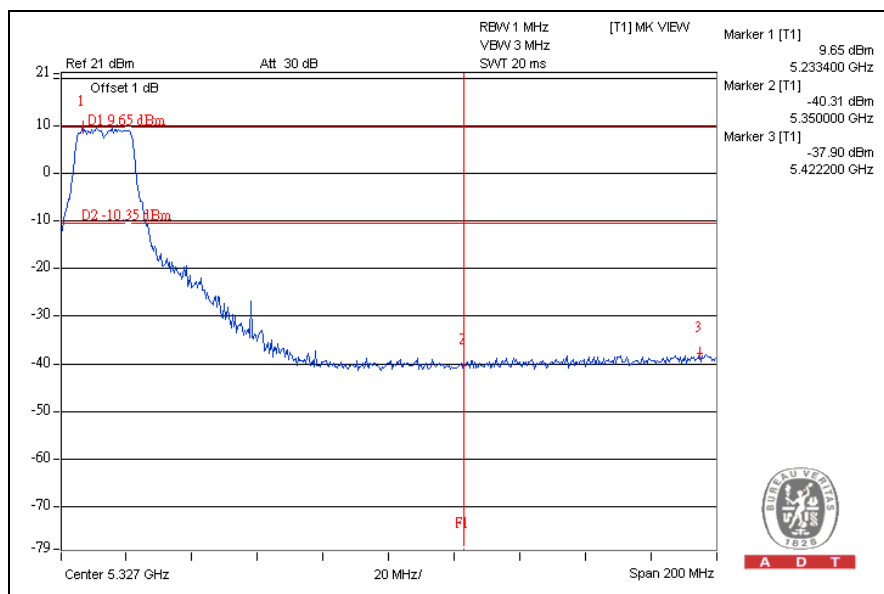


802.11n (20MHz) OFDM MODULATION:

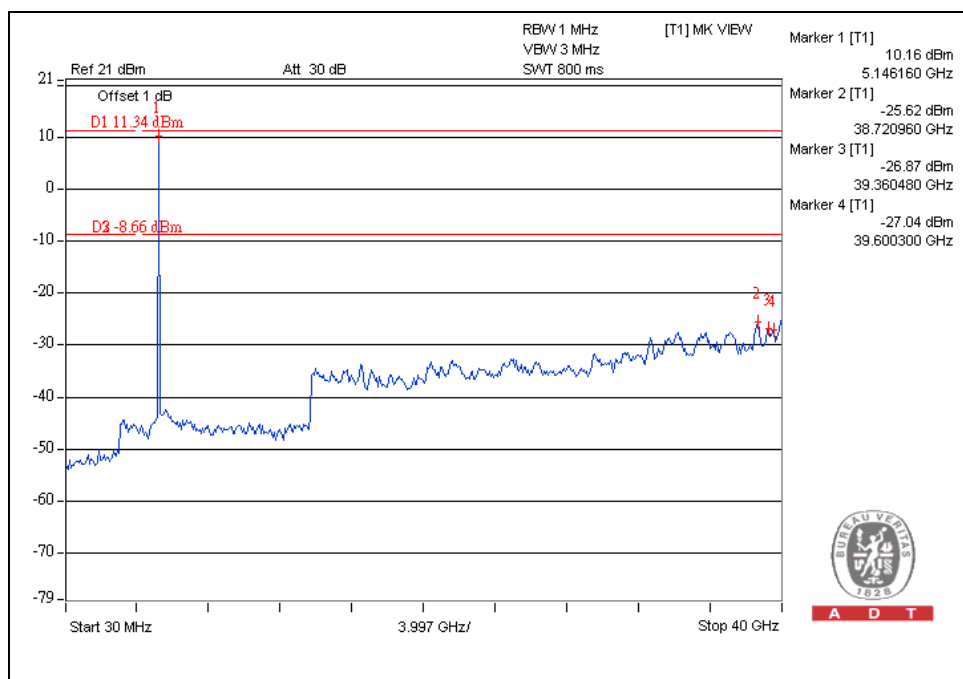
CH36



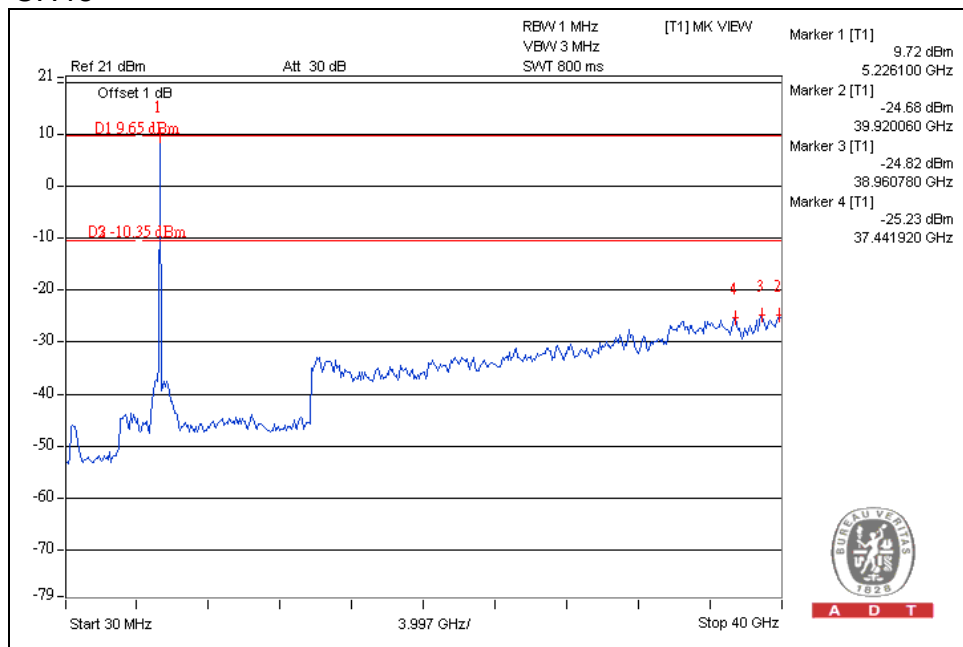
CH48



CH36

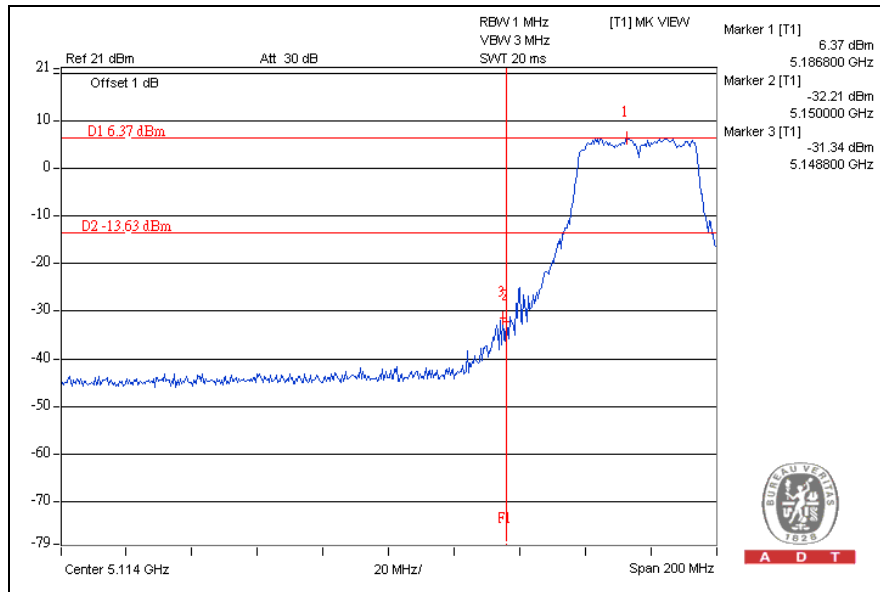


CH48

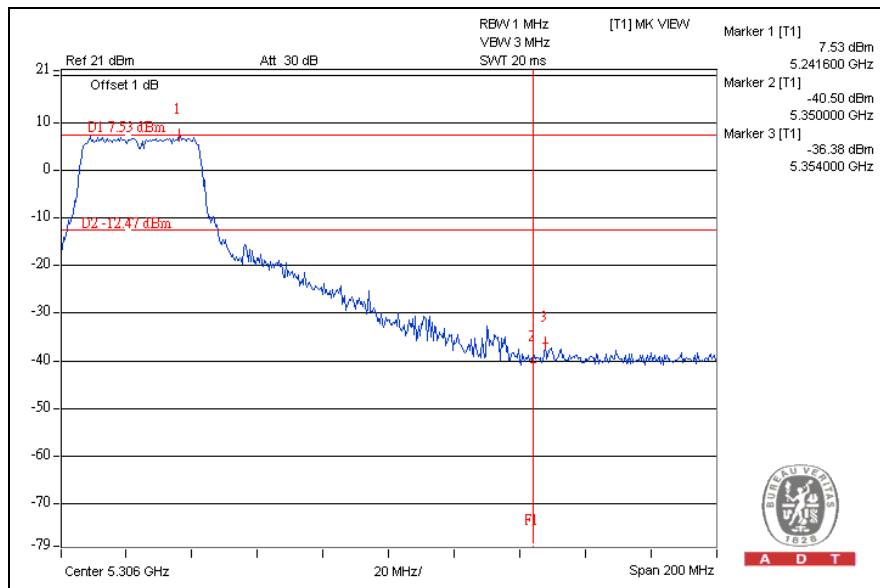


802.11n (40MHz) OFDM MODULATION:

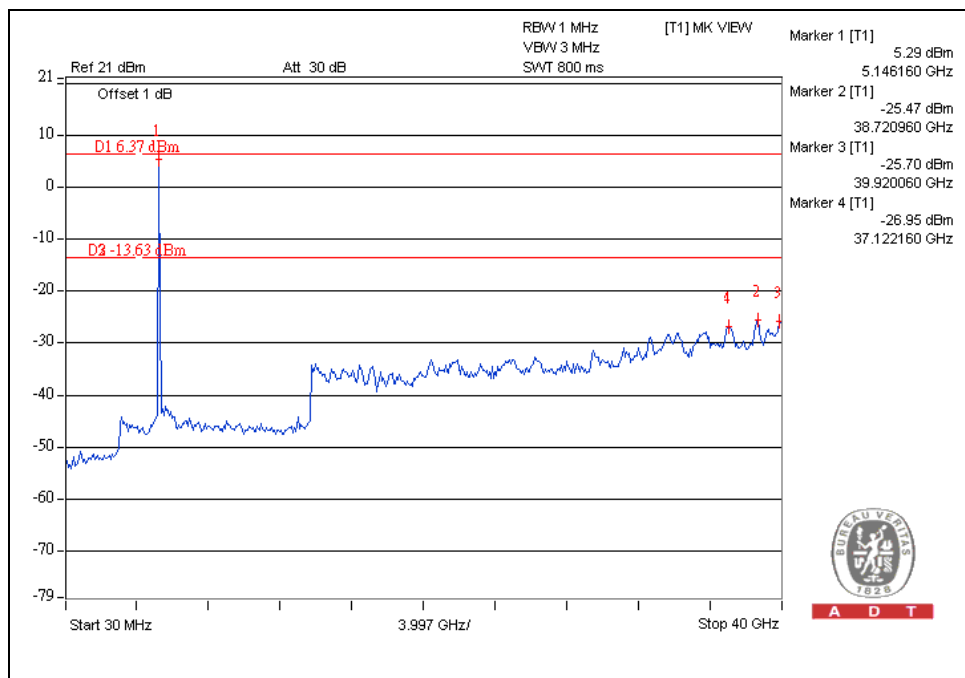
CH38



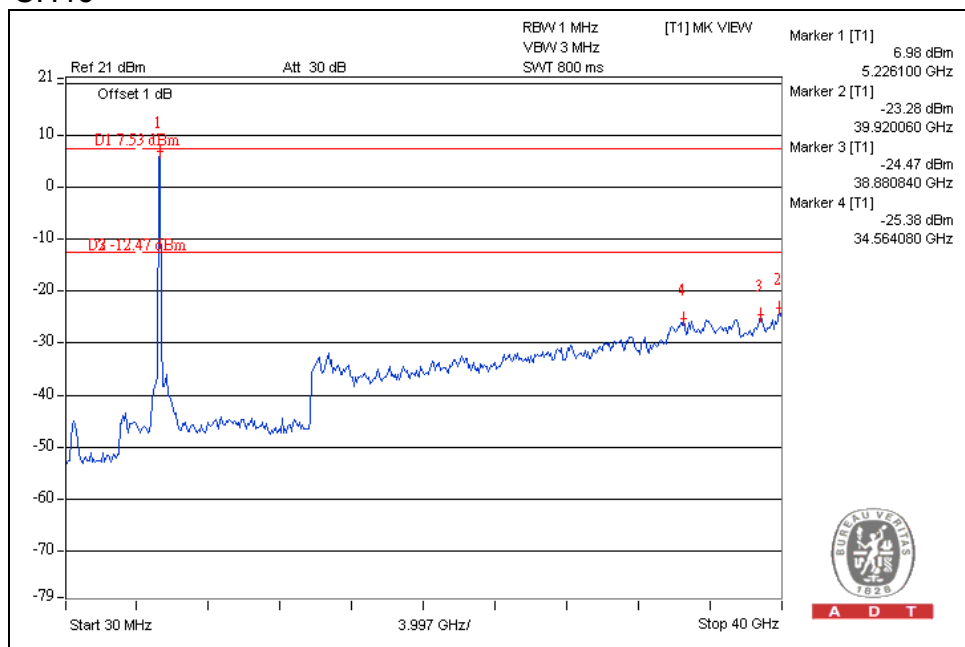
CH46



CH38



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:
Tel: 886-2-26052180
Fax: 886-2-26052943

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



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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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