

FCC TEST REPORT (15.407)

REPORT NO.: RF990929E04-1

MODEL NO.: E4200

FCC ID: Q87-E4200

RECEIVED: Sep. 29, 2010

TESTED: Sep. 29 to Oct. 08, 2010

ISSUED: Oct. 12, 2010

APPLICANT: Cisco Consumer Products LLC

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ISSUED BY: Bureau Veritas Consumer Products Services
(H.K.) Ltd., Taoyuan Branch Hsin Chu Laboratory

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1. CERTIFICATION

PRODUCT: High Performance Wireless-N Router
BRAND NAME: Cisco
MODEL NO.: E4200
TEST SAMPLE: ENGINEERING SAMPLE
TESTED: Sep. 29 to Oct. 08, 2010
APPLICANT: Cisco Consumer Products LLC
STANDARDS: FCC Part 15, Subpart E (Section 15.407)
ANSI C63.4-2003

The above equipment (Model: E4200) 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:** Oct. 12, 2010
(Midoli Peng, Specialist)

TECHNICAL ACCEPTANCE : Hank Chung , **DATE:** Oct. 12, 2010
(Hank Chung, Deputy Manager)

APPROVED BY : May Chen , **DATE:** Oct. 12, 2010
(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 -10.04dB at 0.170MHz
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 -0.8dB 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	No antenna connector is used.

NOTE:

1. 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 5.725~5.850GHz 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)	3.3 dB
Radiated emissions (1GHz -18GHz)	2.49 dB
Radiated emissions (18GHz -40GHz)	2.70 dB

MAXIMUM OUTPUT POWER	For 15.407 802.11a: 28.8mW 802.11n (20MHz): 29.3mW 802.11n (40MHz): 45.5mW For 15.247(2.4GHz) 802.11b: 316.2mW 802.11g: 562.3mW 802.11n (20MHz): 935.7mW 802.11n (40MHz): 760.4mW For 15.247(5GHz) 802.11a: 186.2mW 802.11n (20MHz): 533.6mW 802.11n (40MHz): 546.8mW
ANTENNA TYPE	Please see note 1
DATA CABLE	NA
I/O PORTS	RJ-45 port x 4 (Ethernet (10,100,1000Mbps)) RJ-45 port x 1 (Internet(10,100,1000Mbps)) USB port x 1(USB 2.0)
ASSOCIATED DEVICES	Power adapter x 1

NOTE:

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

Chain	Antenna Type	Antenna Connector	Antenna Gain (dBi)	Frequency range (MHz to MHz)
2G0	PIFA	NA	3.6	2400 to 2483.5
2G1	PIFA	NA	3.8	2400 to 2483.5
2G2	PIFA	NA	3.8	2400 to 2483.5
J12	PIFA	NA	5.2	5150 to 5850
J13	PIFA	NA	4.8	5150 to 5850
J14	PIFA	NA	5.3	5150 to 5850

2. The EUT must be supplied with a power adapter and following two different models could be chosen:

Adapter 1	
Brand:	Leader
Model No.:	NU30-4120250-I3
Input power :	AC100-240V, 0.8A, 50/60Hz AC input cable (Unshielded, 0.4m)
Output power :	DC 12V, 2.5A DC output cable (Unshielded, 1.5m)
Adapter 2	
Brand:	Hongkwang
Model No.:	HK-AX-120A200-DH
Input power :	AC100-240V, 0.8A, 50/60Hz AC input cable (Unshielded, 0.4m)
Output power :	DC 12V, 2A DC output cable (Unshielded, 1.9m)

For radiated test, the EUT was pre-tested with above adapters, the worse case was found in adapter 2. Therefore only the test data of the adapter was recorded in this report.

3. **For 2.4GHz:** The EUT is 2 * 3 spatial MIMO (2Tx & 3Rx) without beam forming function. The antenna configurations are two transmitter antennas and three receiver antennas, as there are 3 PIFA antennas. Spatial multiplexing modes for simultaneous transmission using 2 antennas, and for simultaneous receiver using 3 antennas. The 11b/g legacy mode is limited to single transmitter only.
4. **For 5GHz:** The EUT is 3 * 3 spatial MIMO (3Tx & 3Rx) without beam forming function. The antenna configurations are three transmitter antennas and three receiver antennas, as there are 3 PIFA antennas. Spatial multiplexing modes for simultaneous transmission using 3 antennas, and for simultaneous receiver using 3 antennas. The 11a legacy mode is limited to single transmitter only.
5. The EUT complies with 802.11n standards and backwards compatible with 802. 11a, 802.11b, 802.11g products.
6. 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	
1	√				With adapter 1
2	√	√	√	√	With adapter 2

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(J12)	TX CHAIN(J13)	TX CHAIN(J14)
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 MODE
Worst Channel	-	-	-	-	-	-

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 MODE
802.11n (20MHz)	36 to 48	36	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 MODE
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	C

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 MODE
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	C

✧ 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)	COMBINATION MODE
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	C

※ After verification, bandwidth as show worst chain in report by investigations.

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE≥1G	25deg. C, 67%RH, 1015 hPa	120Vac, 60Hz	Frank Liu
RE<1G	25deg. C, 68%RH, 1015 hPa	120Vac, 60Hz	Rex Huang
PLC	27deg. C, 60%RH, 1015 hPa	120Vac, 60Hz	Eagle Chen
APCM	25deg. C, 60%RH, 1015 hPa	120Vac, 60Hz	Kent 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 (15.407)

ANSI C63.4-2003

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

NOTE: The EUT has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (DoC). The test report has been issued separately.

3.4 DESCRIPTION OF SUPPORT UNITS

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

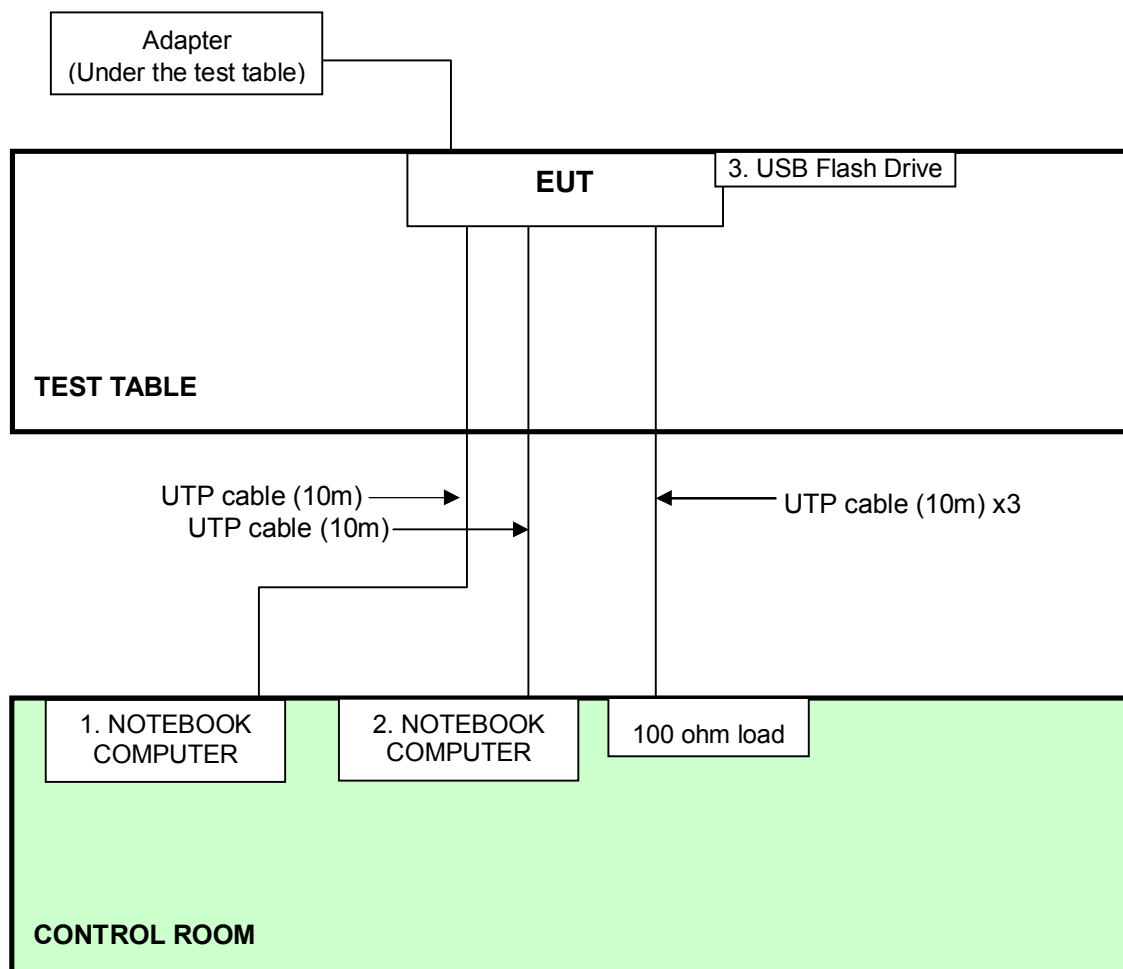
For Conducted test:					
No.	Product	Brand	Model No.	Serial No.	FCC ID
1	NOTEBOOK COMPUTER	DELL	PP18L	4799903248	FCC DoC
2	NOTEBOOK COMPUTER	DELL	PP27L	7YLB32S	FCC DoC
3	USB Flash Drive	SanDisk	SDCZ2-512-A10	5485439362	FCC DoC
For Radiated test:					
No.	Product	Brand	Model No.	Serial No.	FCC ID
1	NOTEBOOK COMPUTER	DELL	PP17L	CN-ONF743-48643-7AV-0124	FCC DoC
2	NOTEBOOK COMPUTER	DELL	D531	CN-0XM006-48643-86L-4472	QDS-BRCM1019
3	HUB	ZyXEL	ES-116P	S060H02000215	FCC DoC
4	iPod nano	Apple	A1137	6U6078FMUPR	FCC DoC

For Conducted test:	
No.	Signal cable description
1	UTP cable (10m)
2	UTP cable (10m)
3	NA
For Radiated test:	
No.	Signal cable description
1	UTP cable (10m)
2	UTP cable (10m)
3	UTP cable (10m)
4	USB cable (shielded, 1m)

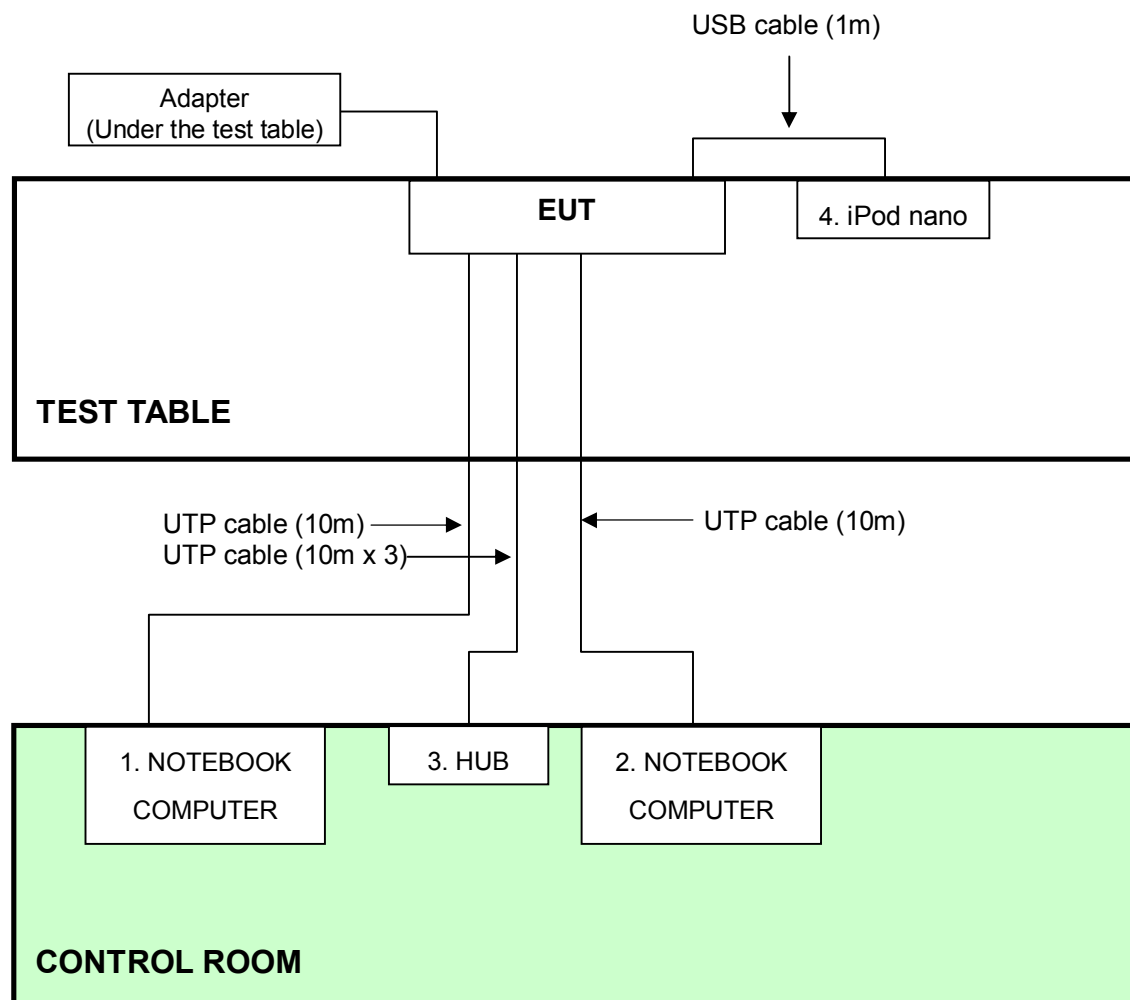
Note: The power cords of the above support units were unshielded (1.8m).

3.5 CONFIGURATION OF SYSTEM UNDER TEST

For Conducted test:



For Radiated 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

Test date: Oct. 08, 2010

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
ROHDE & SCHWARZ Test Receiver	ESCS 30	100287	Mar. 01, 2010	Feb. 28, 2011
Line-Impedance Stabilization Network (for EUT)	NSLK 8127	8127-523	Oct. 07, 2010	Oct. 06, 2011
Line-Impedance Stabilization Network (for Peripheral)	ENV-216	100072	June 11, 2010	June 10, 2011
RF Cable (JYEBAO)	5DFB	COACAB-001	Dec. 14, 2009	Dec. 13, 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. A.
3. The VCCI Con A Registration No. is C-817.

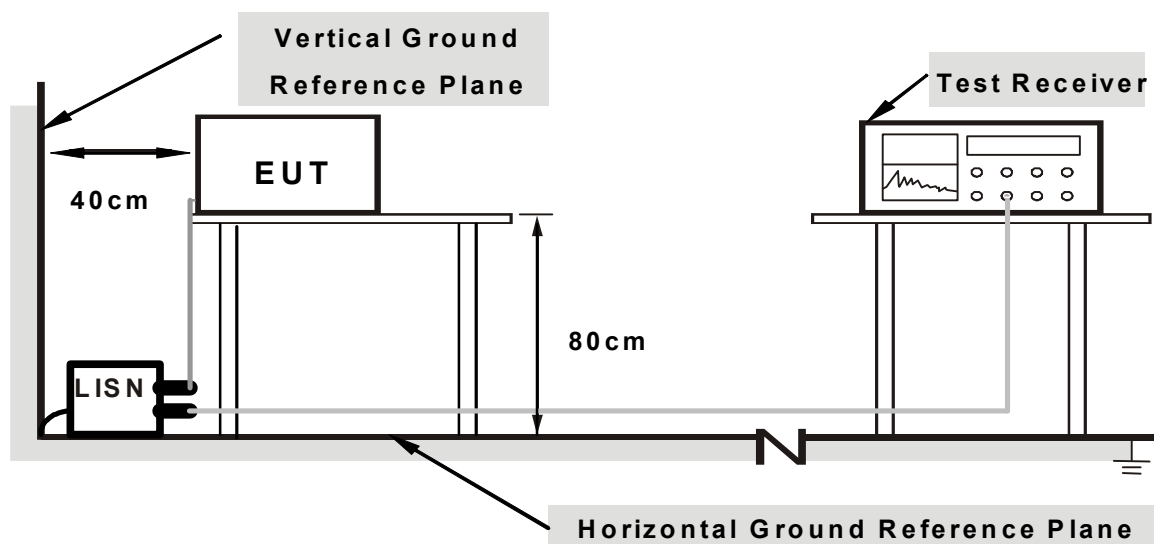
4.1.3 TEST PROCEDURES

- 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

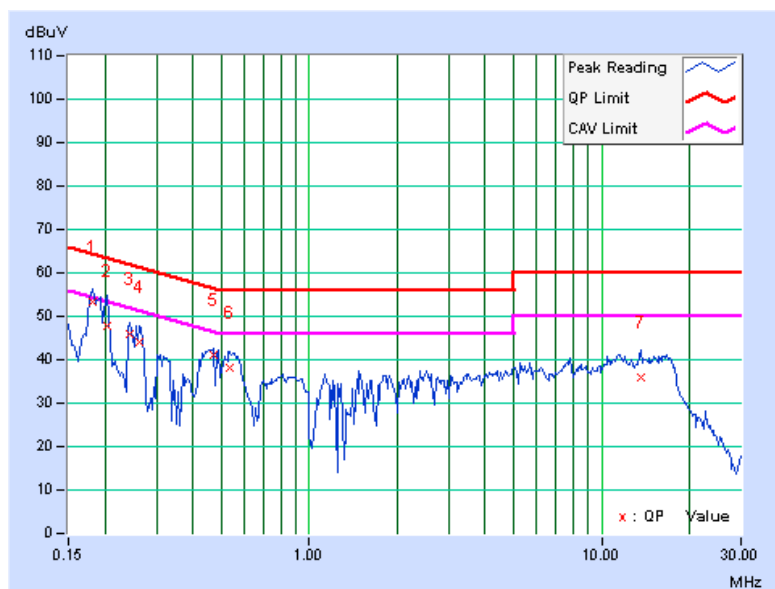
1. Turn on the power of all equipment.
2. Support units 1 ~ 2 (Notebook Computer) run a test program “Broadcom command” to enable of EUT via UTP cables continuously.

4.1.7 TEST RESULTS

TEST MODE	With adapter 1		
PHASE	Line (L)	6dB BANDWIDTH	9 kHz

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.181	0.04	53.19	-	53.23	-	64.43	54.43	-11.20	-
2	0.205	0.04	47.75	-	47.79	-	63.42	53.42	-15.63	-
3	0.244	0.04	46.05	-	46.09	-	61.97	51.97	-15.88	-
4	0.263	0.04	44.07	-	44.11	-	61.33	51.33	-17.21	-
5	0.470	0.06	41.03	-	41.09	-	56.51	46.51	-15.42	-
6	0.537	0.06	37.98	-	38.04	-	56.00	46.00	-17.96	-
7	13.563	0.45	35.54	-	35.99	-	60.00	50.00	-24.01	-

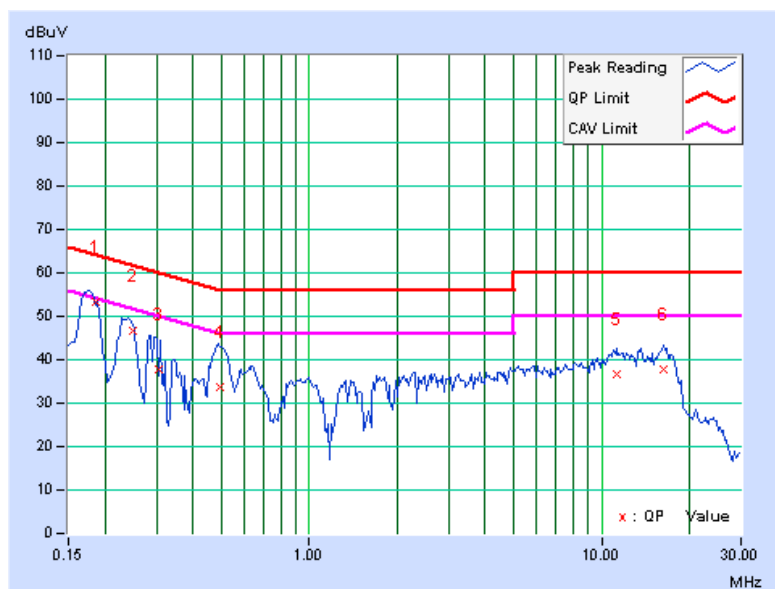
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
 3. The emission levels of other frequencies were very low against the limit.
 4. Margin value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



TEST MODE	With adapter 1		
PHASE	Neutral (N)	6dB BANDWIDTH	9 kHz

	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
No		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.186	0.05	53.29	-	53.34	-	64.19	54.19	-10.85	-
2	0.250	0.05	46.49	-	46.54	-	61.75	51.75	-15.20	-
3	0.307	0.06	37.69	-	37.75	-	60.06	50.06	-22.31	-
4	0.498	0.07	33.57	-	33.64	-	56.04	46.04	-22.40	-
5	11.320	0.33	36.44	-	36.77	-	60.00	50.00	-23.23	-
6	16.223	0.54	37.15	-	37.69	-	60.00	50.00	-22.31	-

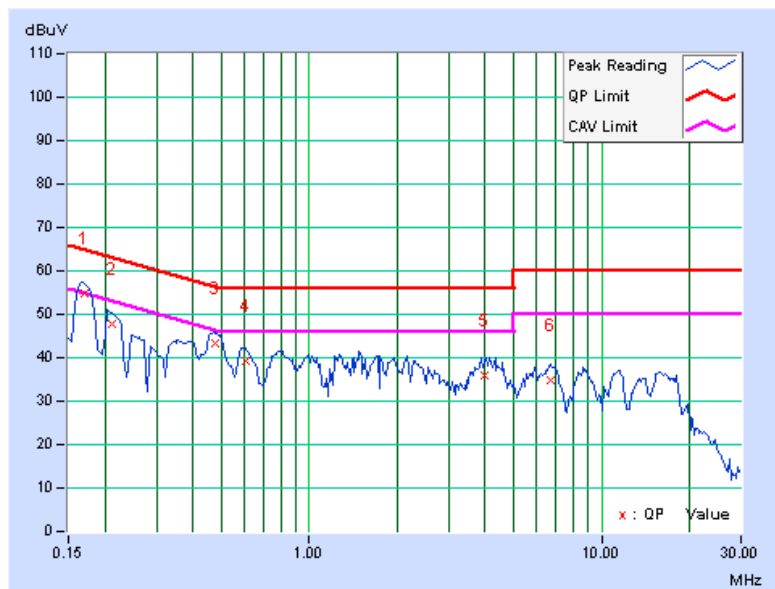
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
 3. The emission levels of other frequencies were very low against the limit.
 4. Margin value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



TEST MODE	With adapter 2		
PHASE	Line (L)	6dB BANDWIDTH	9 kHz

	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
No		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.170	0.04	54.90	-	54.94	-	64.98	54.98	-10.04	-
2	0.213	0.04	47.61	-	47.65	-	63.11	53.11	-15.46	-
3	0.474	0.06	43.11	-	43.17	-	56.44	46.44	-13.27	-
4	0.607	0.07	39.11	-	39.18	-	56.00	46.00	-16.82	-
5	4.004	0.13	35.65	-	35.78	-	56.00	46.00	-20.22	-
6	6.711	0.18	34.56	-	34.74	-	60.00	50.00	-25.26	-

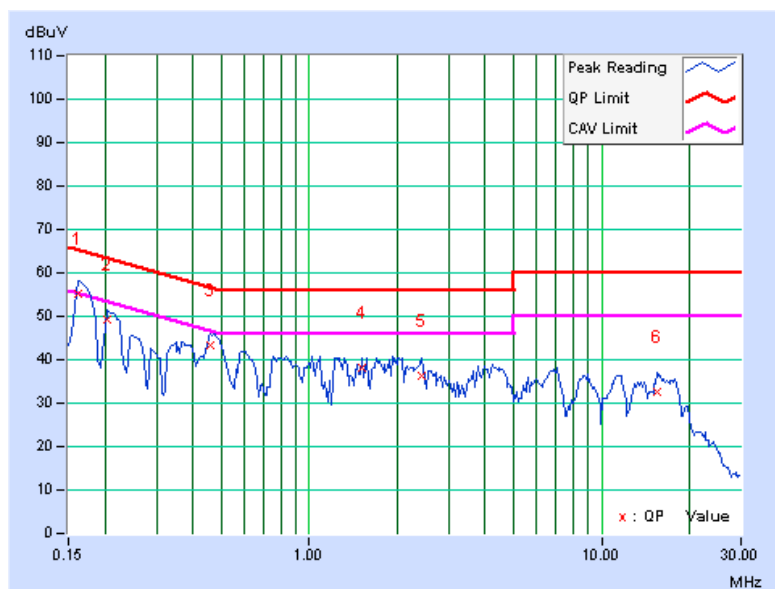
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
 3. The emission levels of other frequencies were very low against the limit.
 4. Margin value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



TEST MODE	With adapter 2		
PHASE	Neutral (N)	6dB BANDWIDTH	9 kHz

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.162	0.05	55.02	-	55.07	-	65.38	55.38	-10.31	-
2	0.205	0.05	49.04	-	49.09	-	63.42	53.42	-14.33	-
3	0.459	0.06	43.25	-	43.31	-	56.72	46.72	-13.40	-
4	1.520	0.12	37.98	-	38.10	-	56.00	46.00	-17.90	-
5	2.438	0.13	36.21	-	36.34	-	56.00	46.00	-19.66	-
6	15.523	0.54	31.88	-	32.42	-	60.00	50.00	-27.58	-

- 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. Section 15.205 restricted bands of operation shall compliance with the limits in Section 15.209.

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

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

4.2.3 TEST INSTRUMENTS

Below 1GHz test:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Agilent Spectrum Analyzer	E4446A	MY48250253	Aug. 02, 2010	Aug. 01, 2011
Agilent Pre-Selector	N9039A	MY46520311	July 14, 2010	July 13, 2011
Agilent Signal Generator	N5181A	MY49060517	July 14, 2010	July 13, 2011
Mini-Circuits Pre-Amplifier	ZFL-1000VH2B	AMP-ZFL-03	Nov. 18, 2009	Nov. 17, 2010
Agilent Pre-Amplifier	8449B	3008A02578	July 05, 2010	July 04, 2011
Miteq Pre-Amplifier	AFS33-1800265 0-30-8P-44	881786	NA	NA
SCHWARZBECK Trilog Broadband Antenna	VULB 9168	9168-360	Apr. 29, 2010	Apr. 28, 2011
AISI Horn_Antenna	AIH.8018	0000320091110	Nov. 16, 2009	Nov. 15, 2010
SCHWARZBECK Horn_Antenna	BBHA 9170	9170-424	Sep. 29, 2010	Sep. 28, 2011
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 966073.
5. The VCCI Site Registration No. is G-137.
6. The CANADA Site Registration No. is IC 7450H-2.



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Above 1GHz test:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
ROHDE & SCHWARZ Spectrum Analyzer	FSP40	100036	Dec. 18, 2009	Dec. 17, 2010
Agilent PSA Spectrum Analyzer	E4446A	MY46180622	May 12 , 2010	May 11 , 2011
HP Pre_Amplifier	8449B	300801923	Nov. 02, 2009	Nov. 01, 2010
ROHDE & SCHWARZ Test Receiver	ESCS30	847124/029	Sep. 03, 2010	Sep. 02, 2011
SCHWARZBECK TRILOG Broadband Antenna	VULB 9168	138	Apr. 28, 2010	Apr. 27, 2011
Schwarzbeck Horn_Antenna	BBHA9120	D124	Dec. 18, 2009	Dec. 17, 2010
Schwarzbeck Horn_Antenna	BBHA 9170	BBHA9170153	Jan. 22, 2010	Jan. 21, 2011
RF Switches	EMH-011	1001	NA	NA
RF CABLE (Chaintek)	Sucoflex 104+ Sucoflex 106	RF104-101+R F106-101	Aug. 24, 2010	Aug. 23, 2011
RF Cable	8DFB	STCCAB-30M- 1GHz	NA	NA
Software	ADT_Radiated_ V7.6.15.9.2	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) and Spectrum Analyzer (model: FSP40) are used only for the measurement of emission frequency above 1GHz if tested.

3. The test was performed in Open Site No. C.

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 meter chamber room for below 1GHz and 10 meter open area test site for above 1GHz. 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 quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f. The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

NOTE:

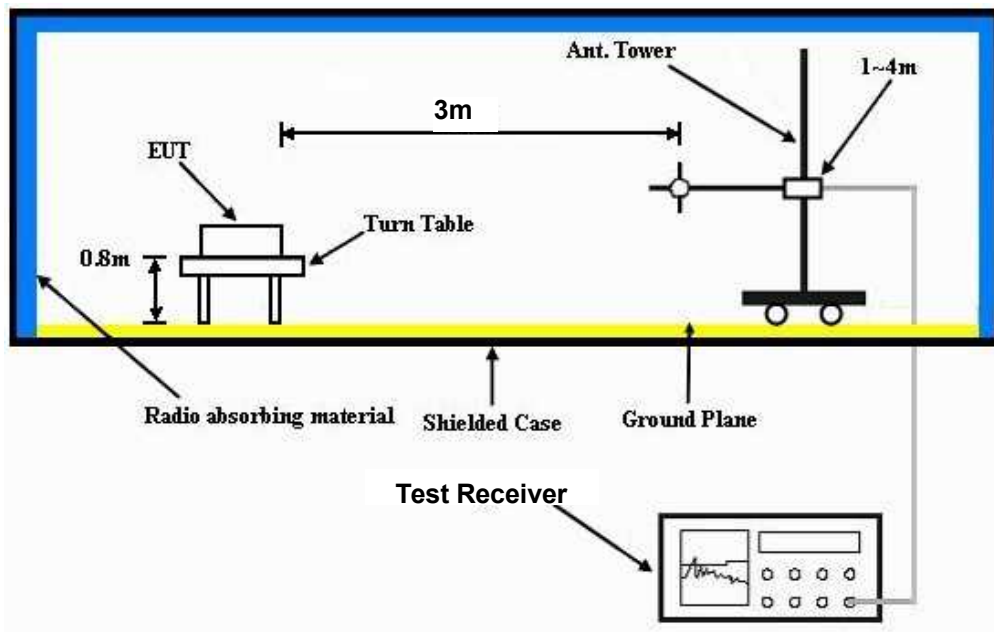
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

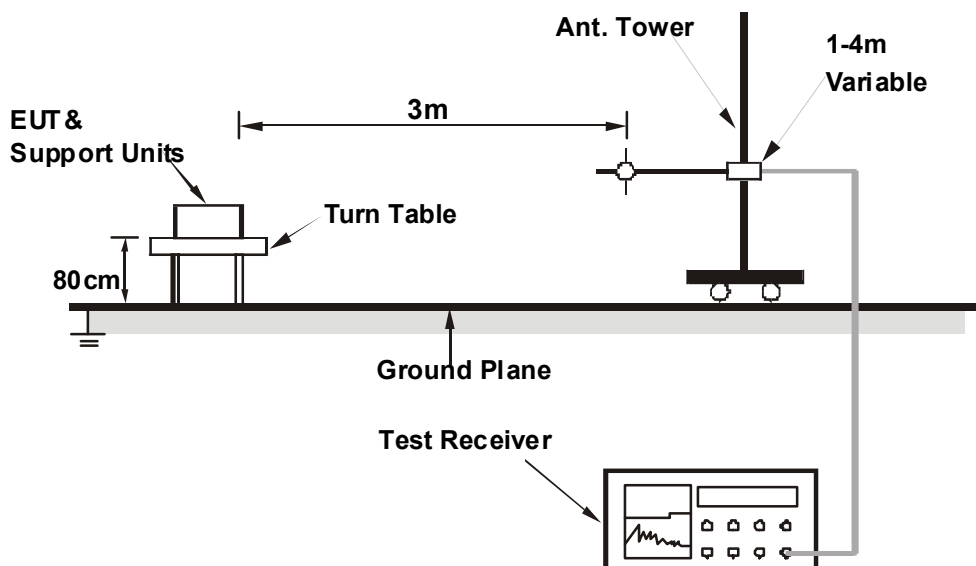
No deviation

4.2.6 TEST SETUP

Below 1GHz test:



Above 1GHz test:



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 36	FREQUENCY RANGE	Below 1000MHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	25deg. C, 68%RH 1015 hPa	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	69.10	35.2 QP	40.0	-4.8	1.64 H	84	23.14	12.06
2	249.96	43.0 QP	46.0	-3.0	1.34 H	222	29.84	13.18
3	357.01	38.4 QP	46.0	-7.6	1.54 H	85	21.97	16.43
4	480.03	38.3 QP	46.0	-7.7	1.02 H	236	19.07	19.23
5	499.97	39.2 QP	46.0	-6.8	1.54 H	216	19.54	19.70
6	625.20	41.2 QP	46.0	-4.8	1.00 H	360	18.96	22.25
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	48.20	35.5 QP	40.0	-4.5	1.47 V	84	21.47	14.00
2	86.90	36.2 QP	40.0	-3.8	1.11 V	108	27.49	8.73
3	249.97	39.5 QP	46.0	-6.5	1.11 V	62	26.29	13.18
4	374.98	35.9 QP	46.0	-10.1	1.68 V	95	19.06	16.81
5	480.02	35.5 QP	46.0	-10.5	1.98 V	63	16.24	19.23
6	499.96	38.2 QP	46.0	-7.8	1.65 V	93	18.50	19.70
7	625.12	40.6 QP	46.0	-5.4	1.16 V	96	18.33	22.25
8	874.96	35.7 QP	46.0	-10.3	1.00 V	92	9.89	25.81

- 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	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 67%RH 1015 hPa	TESTED BY	Frank Liu

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	67.9 PK	74.0	-6.1	1.55 H	13	30.03	37.85
2	5150.00	52.8 AV	54.0	-1.2	1.55 H	13	14.94	37.85
3	*5180.00	110.1 PK			1.38 H	17	72.18	37.92
4	*5180.00	99.9 AV			1.38 H	17	61.96	37.92
5	#10360.00	55.2 PK	68.3	-13.1	1.62 H	29	5.98	49.22
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	60.8 PK	74.0	-13.2	1.25 V	98	22.93	37.85
2	5150.00	49.8 AV	54.0	-4.2	1.25 V	98	11.91	37.85
3	*5180.00	104.5 PK			1.39 V	73	66.58	37.92
4	*5180.00	94.6 AV			1.39 V	73	56.68	37.92
5	7500.00	53.7 PK	74.0	-20.3	1.59 V	220	8.75	44.95
6	7500.00	46.3 AV	54.0	-7.7	1.59 V	220	1.35	44.95
7	#10360.00	59.4 PK	68.3	-8.9	1.54 V	289	10.18	49.22

- 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 40	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 67%RH 1015 hPa	TESTED BY	Frank Liu

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	110.4 PK			1.39 H	63	72.44	37.96
2	*5200.00	99.7 AV			1.39 H	63	61.74	37.96
3	#10400.00	55.4 PK	68.3	-12.9	1.59 H	46	6.16	49.24
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	104.4 PK			1.36 V	89	66.44	37.96
2	*5200.00	94.5 AV			1.36 V	89	56.54	37.96
3	7500.00	53.9 PK	74.0	-20.1	1.54 V	231	8.95	44.95
4	7500.00	46.7 AV	54.0	-7.3	1.54 V	231	1.75	44.95
5	#10400.00	59.2 PK	68.3	-9.1	1.53 V	287	9.96	49.24

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.



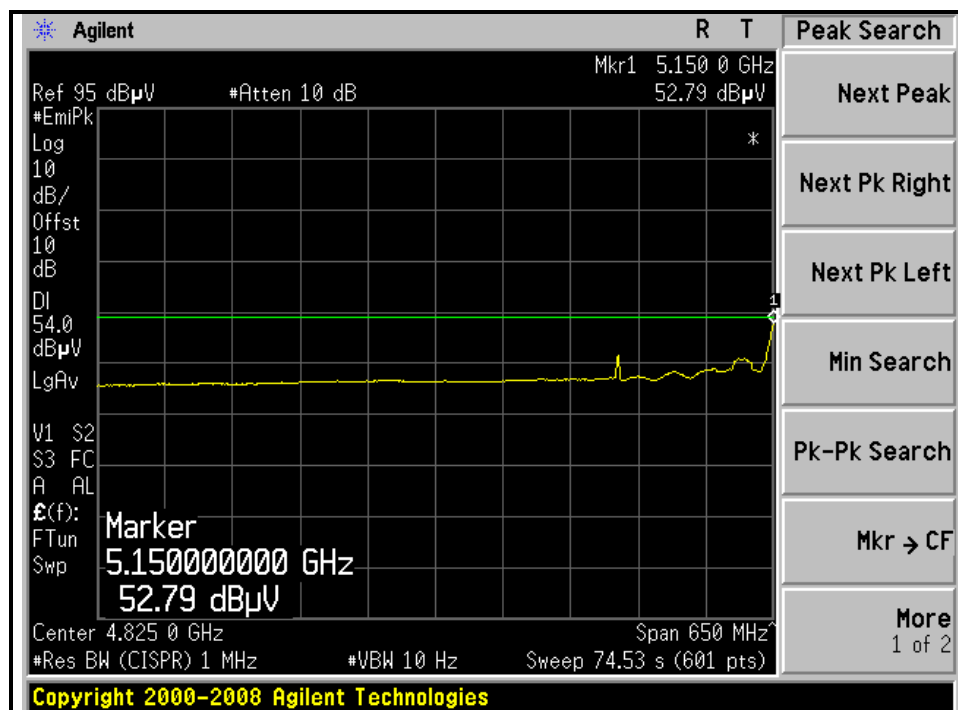
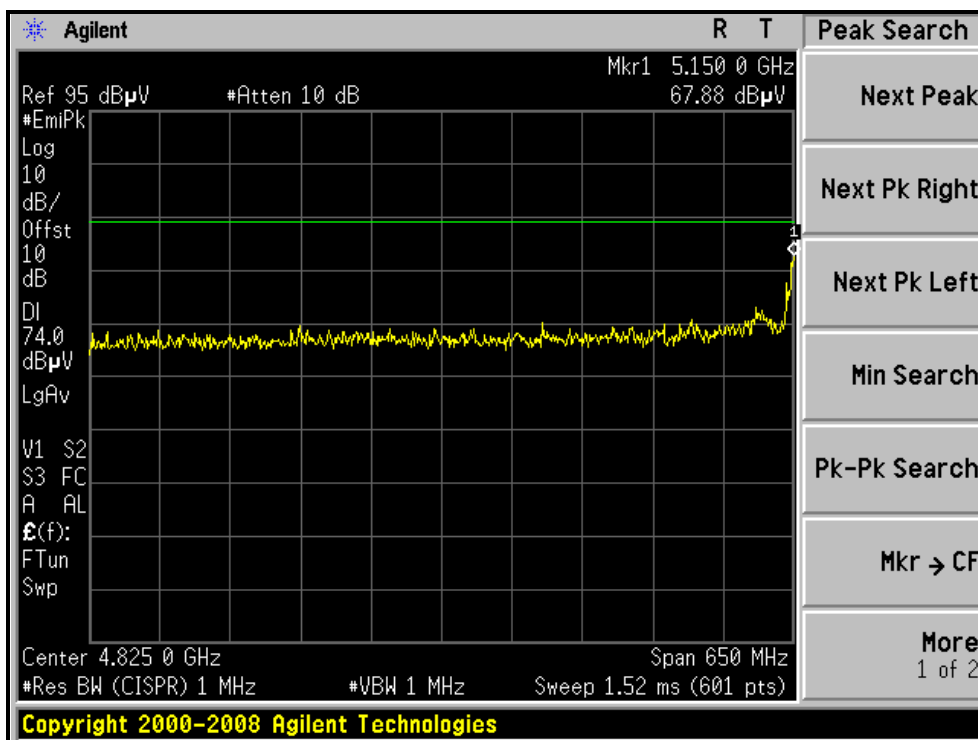
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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 48	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 67%RH 1015 hPa	TESTED BY	Frank Liu

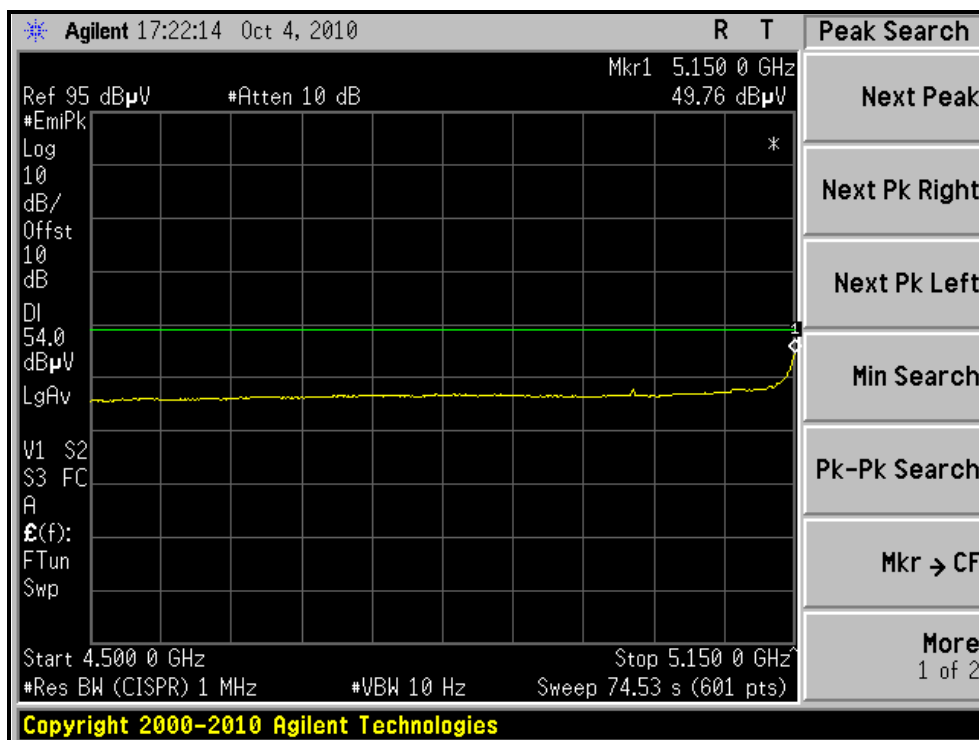
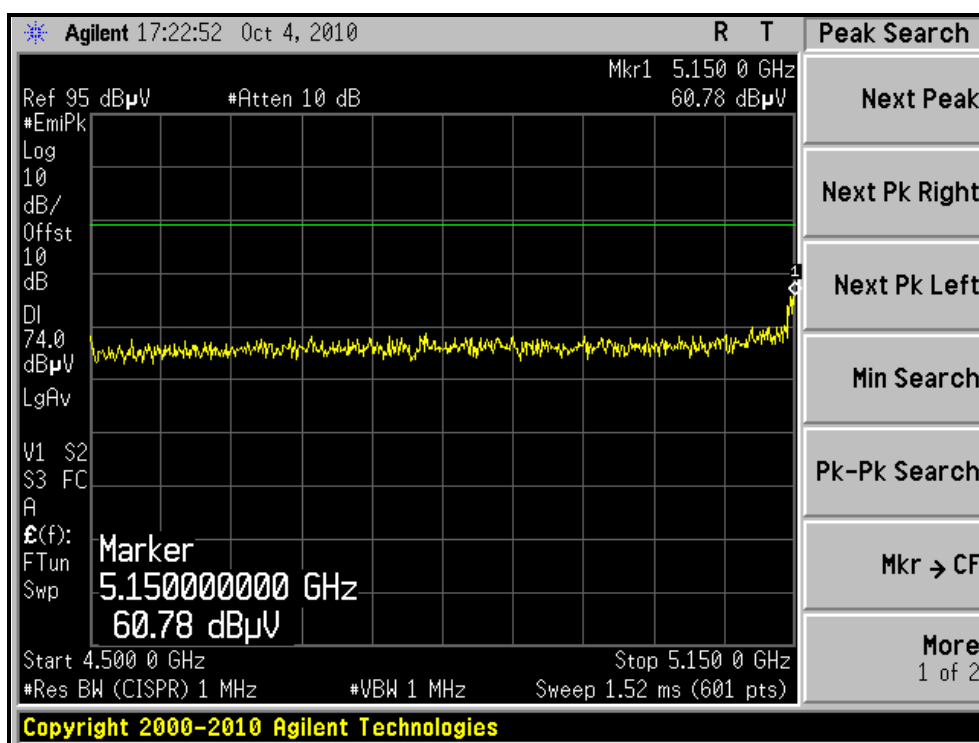
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NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5240.00	110.1 PK			1.55 H	16	72.06	38.04
2	*5240.00	99.6 AV			1.55 H	16	61.56	38.04
3	5350.00	55.4 PK	74.0	-18.6	1.55 H	13	17.15	38.28
4	5350.00	43.4 AV	54.0	-10.6	1.55 H	13	5.13	38.28
5	#10480.00	56.2 PK	68.3	-12.1	1.74 H	351	6.91	49.29
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	104.1 PK			1.37 V	69	66.06	38.04
2	*5240.00	94.2 AV			1.37 V	69	56.16	38.04
3	5350.00	53.4 PK	74.0	-20.6	1.25 V	90	15.13	38.28
4	5350.00	42.4 AV	54.0	-11.6	1.25 V	90	4.08	38.28
5	7500.00	54.6 PK	74.0	-19.4	1.52 V	253	9.65	44.95
6	7500.00	47.7 AV	54.0	-6.3	1.52 V	253	2.75	44.95
7	#10480.00	56.0 PK	68.3	-12.3	1.45 V	79	6.71	49.29

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.

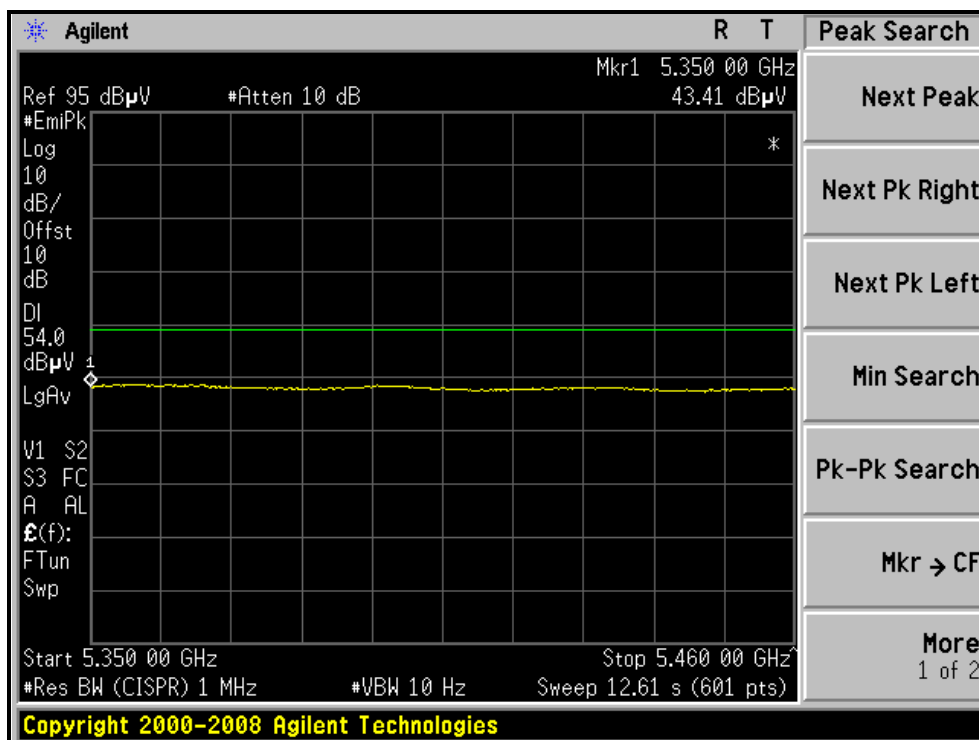
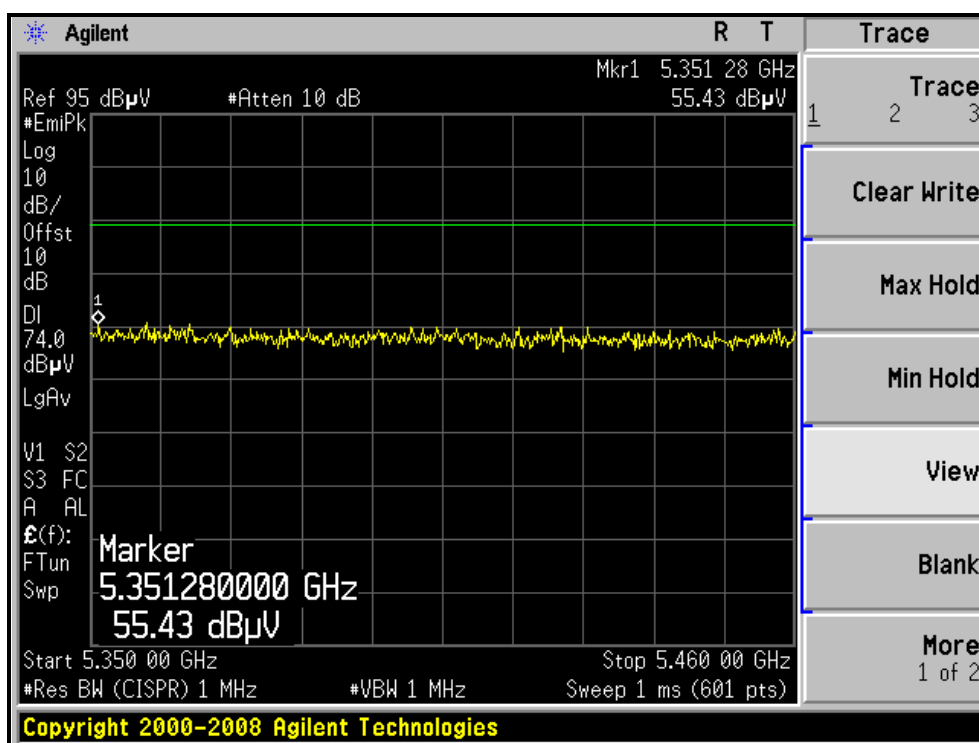
RESTRICTED BANDEDGE (802.11a MODE, CH36, HORIZONTAL)



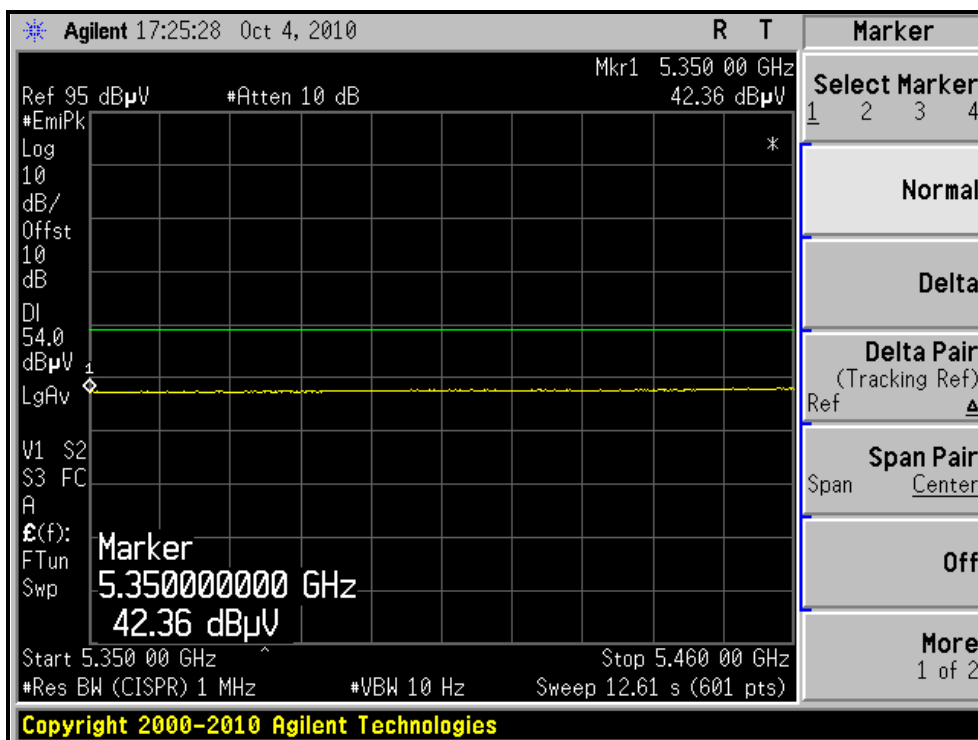
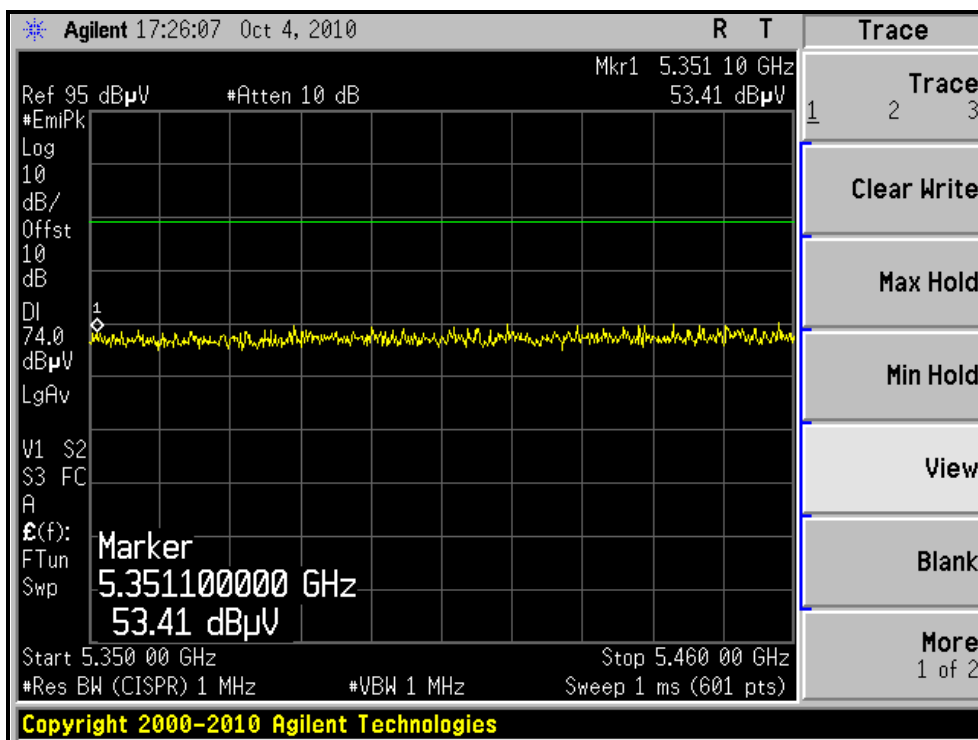
RESTRICTED BANDEDGE (802.11a MODE, CH36, VERTICAL)



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	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 67%RH 1015 hPa	TESTED BY	Frank Liu

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	63.8 PK	74.0	-10.2	1.70 H	10	25.99	37.85
2	5150.00	52.5 AV	54.0	-1.5	1.70 H	10	14.69	37.85
3	*5180.00	109.0 PK			1.38 H	38	71.08	37.92
4	*5180.00	98.8 AV			1.38 H	38	60.88	37.92
5	7500.00	50.4 PK	74.0	-23.6	1.53 H	96	5.45	44.95
6	7500.00	40.5 AV	54.0	-13.5	1.53 H	96	-4.45	44.95
7	#10360.00	55.6 PK	68.3	-12.7	1.86 H	31	6.38	49.22
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	59.3 PK	74.0	-14.7	1.24 V	15	21.41	37.85
2	5150.00	48.1 AV	54.0	-5.9	1.24 V	15	10.28	37.85
3	*5180.00	106.7 PK			1.24 V	15	68.78	37.92
4	*5180.00	95.9 AV			1.24 V	15	57.98	37.92
5	7500.00	53.3 PK	74.0	-20.7	1.77 V	339	8.35	44.95
6	7500.00	47.5 AV	54.0	-6.5	1.77 V	339	2.55	44.95
7	#10360.00	61.6 PK	68.3	-6.7	1.51 V	279	12.38	49.22

- 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 40	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 67%RH 1015 hPa	TESTED BY	Frank Liu

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	108.9 PK			1.47 H	39	70.94	37.96
2	*5200.00	98.1 AV			1.47 H	39	60.14	37.96
3	7500.00	50.2 PK	74.0	-23.8	1.54 H	99	5.25	44.95
4	7500.00	40.7 AV	54.0	-13.3	1.54 H	99	-4.25	44.95
5	#10400.00	55.2 PK	68.3	-13.1	1.24 H	309	5.96	49.24
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			1.21 V	37	68.94	37.96
2	*5200.00	95.3 AV			1.21 V	37	57.34	37.96
3	7500.00	53.1 PK	74.0	-20.9	1.69 V	320	8.15	44.95
4	7500.00	47.4 AV	54.0	-6.6	1.69 V	320	2.45	44.95
5	#10400.00	61.2 PK	68.3	-7.1	1.53 V	281	11.96	49.24

- 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.



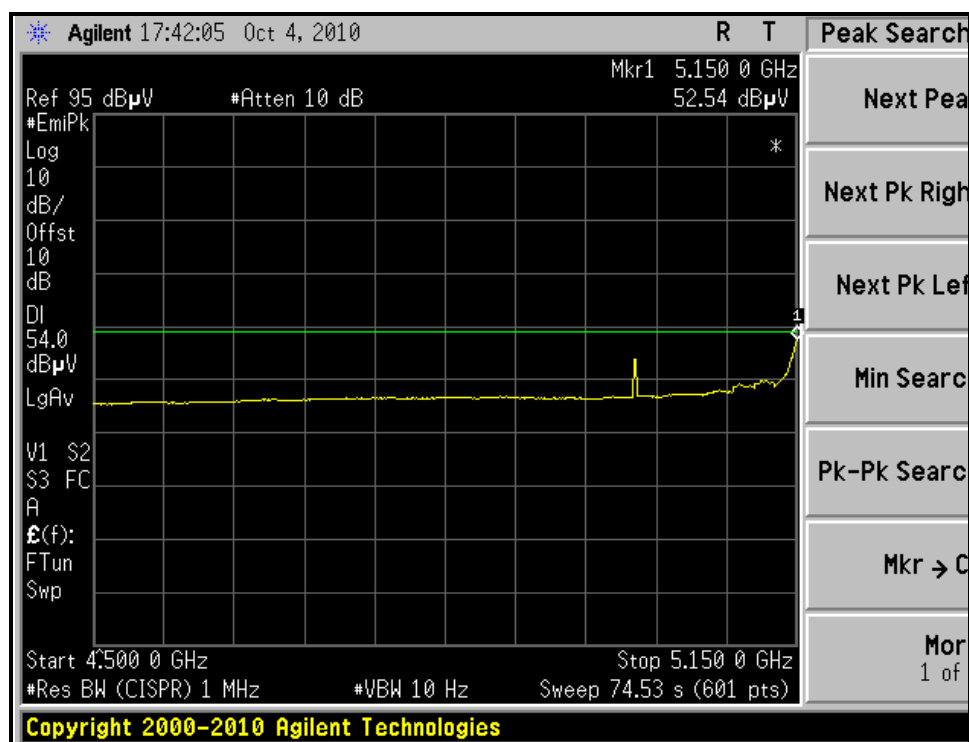
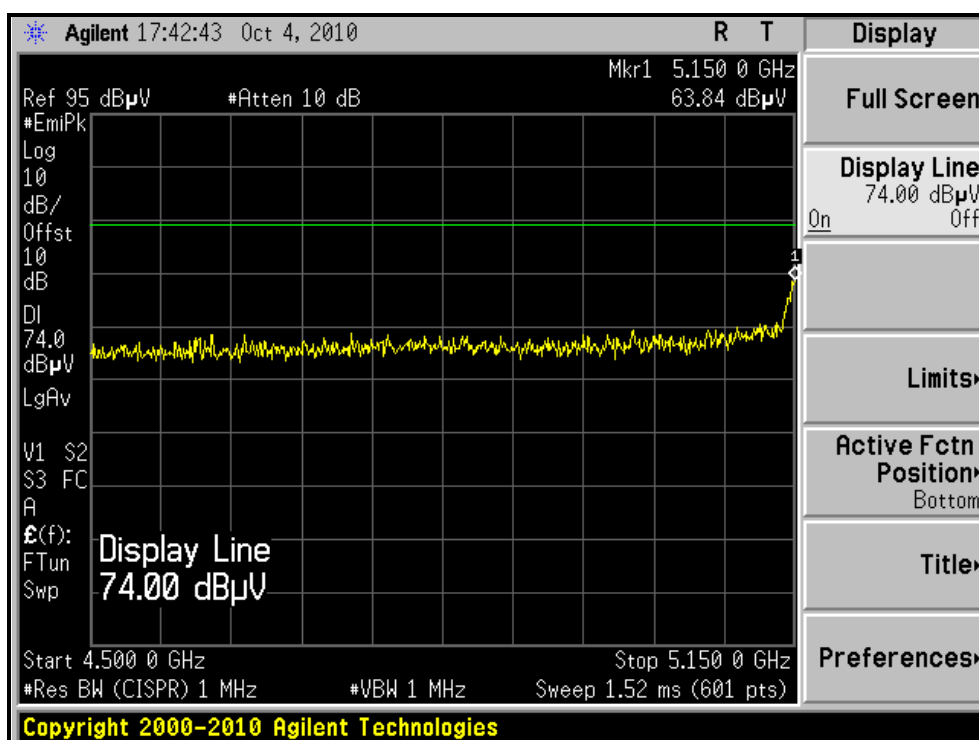
A D T

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, 67%RH 1015 hPa	TESTED BY	Frank Liu

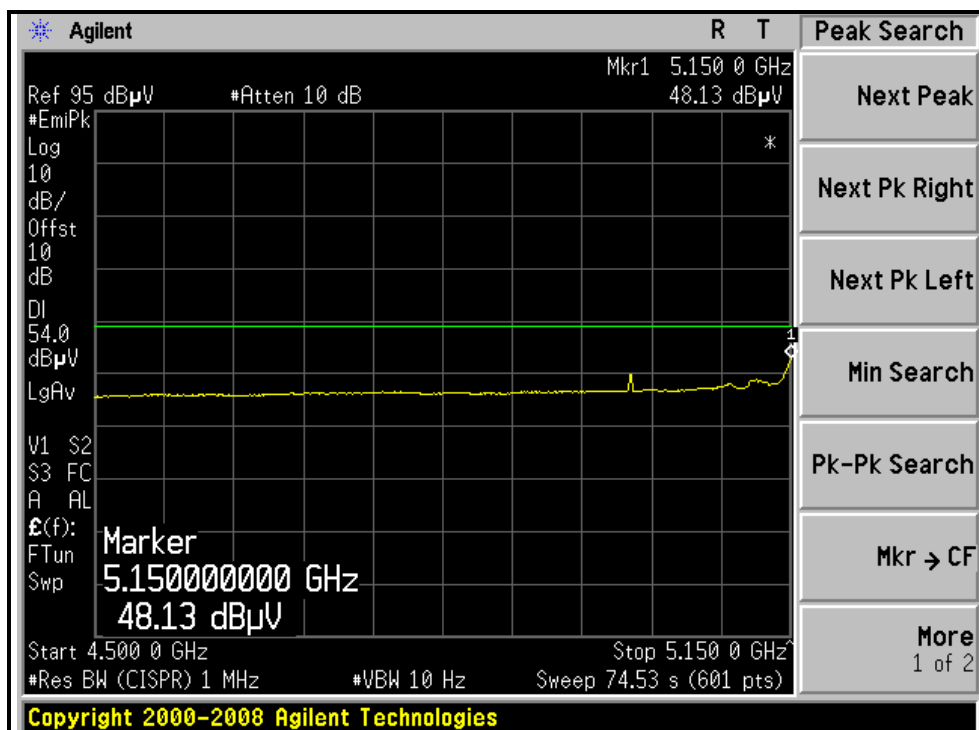
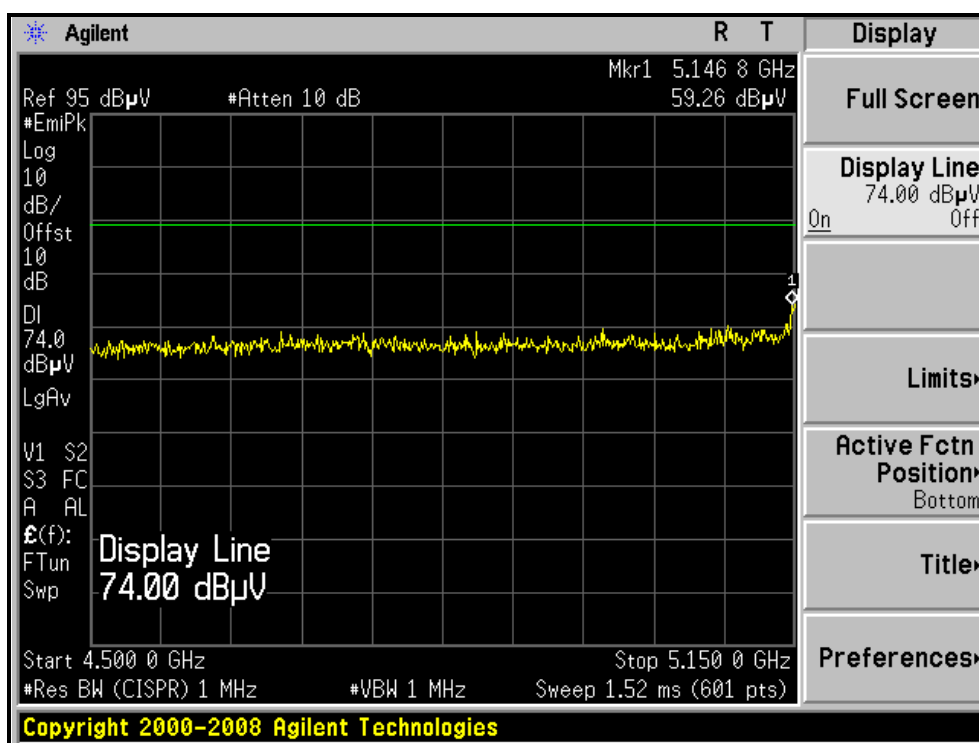
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5240.00	109.0 PK			1.48 H	36	70.96	38.04
2	*5240.00	98.4 AV			1.48 H	36	60.36	38.04
3	5352.40	57.5 PK	74.0	-16.6	1.46 H	32	19.16	38.29
4	5352.40	45.4 AV	54.0	-8.6	1.46 H	32	7.10	38.29
5	7500.00	50.5 PK	74.0	-23.5	1.51 H	126	5.55	44.95
6	7500.00	41.0 AV	54.0	-13.0	1.51 H	126	-3.95	44.95
7	#10480.00	55.3 PK	68.3	-13.0	1.29 H	333	6.01	49.29
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	106.1 PK			1.23 V	11	68.06	38.04
2	*5240.00	95.2 AV			1.23 V	11	57.16	38.04
3	5350.00	55.4 PK	74.0	-18.6	1.22 V	69	17.15	38.28
4	5350.00	43.6 AV	54.0	-10.4	1.22 V	69	5.34	38.28
5	7500.00	53.5 PK	74.0	-20.5	1.51 V	26	8.55	44.95
6	7500.00	47.6 AV	54.0	-6.4	1.51 V	26	2.65	44.95
7	#10480.00	57.4 PK	68.3	-10.9	1.56 V	284	8.11	49.29

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.

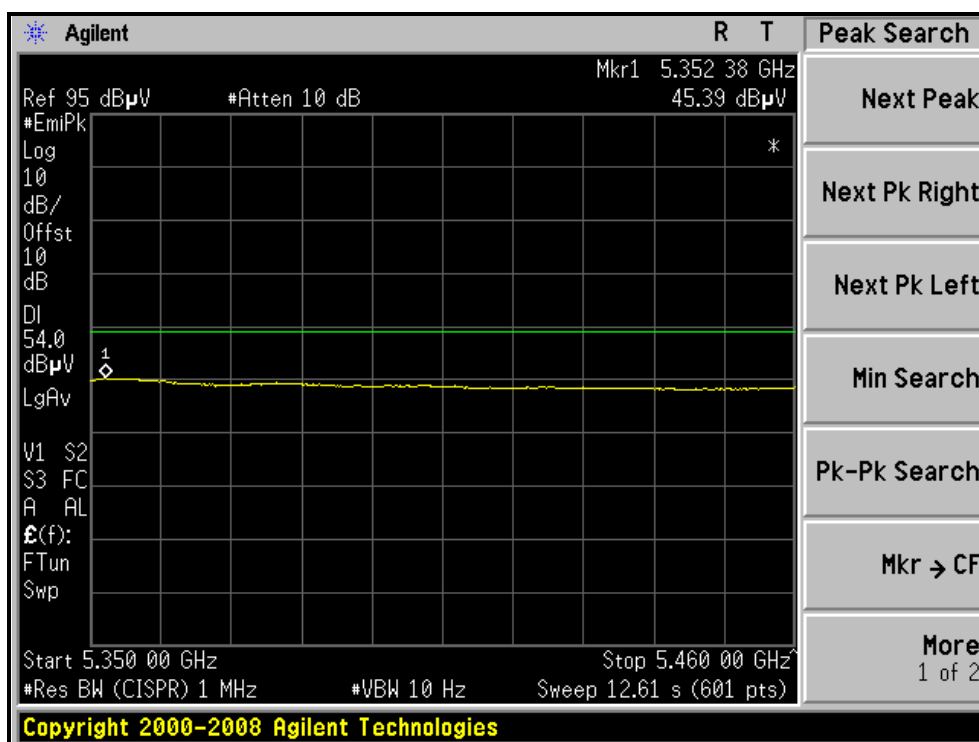
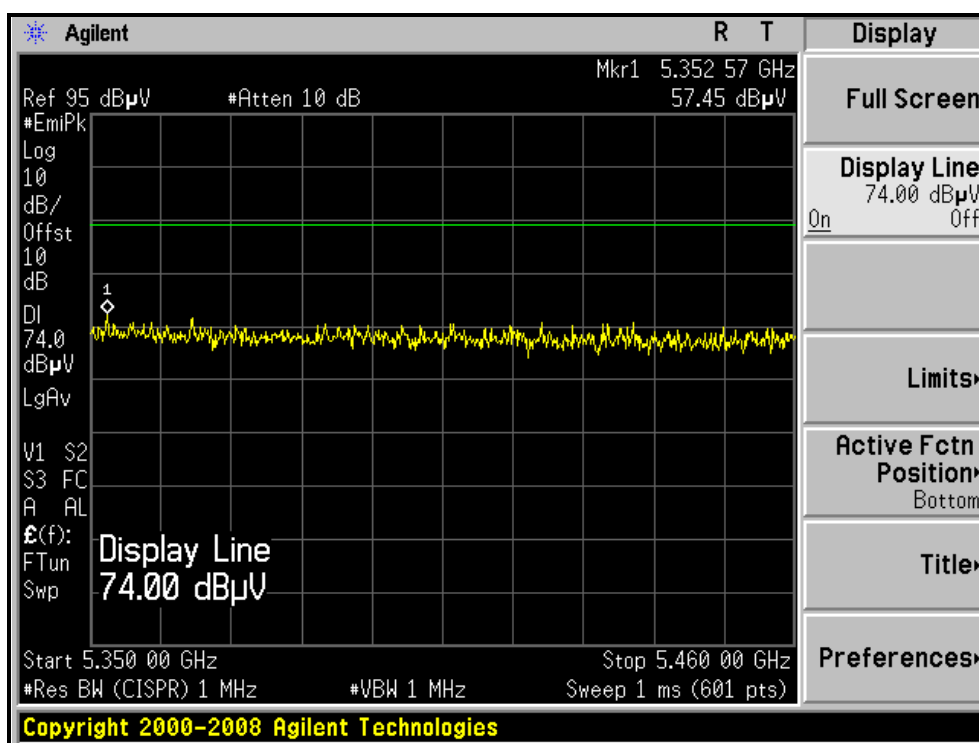
RESTRICTED BANDEDGE (802.11n (20MHz) MODE,CH36, HORIZONTAL)



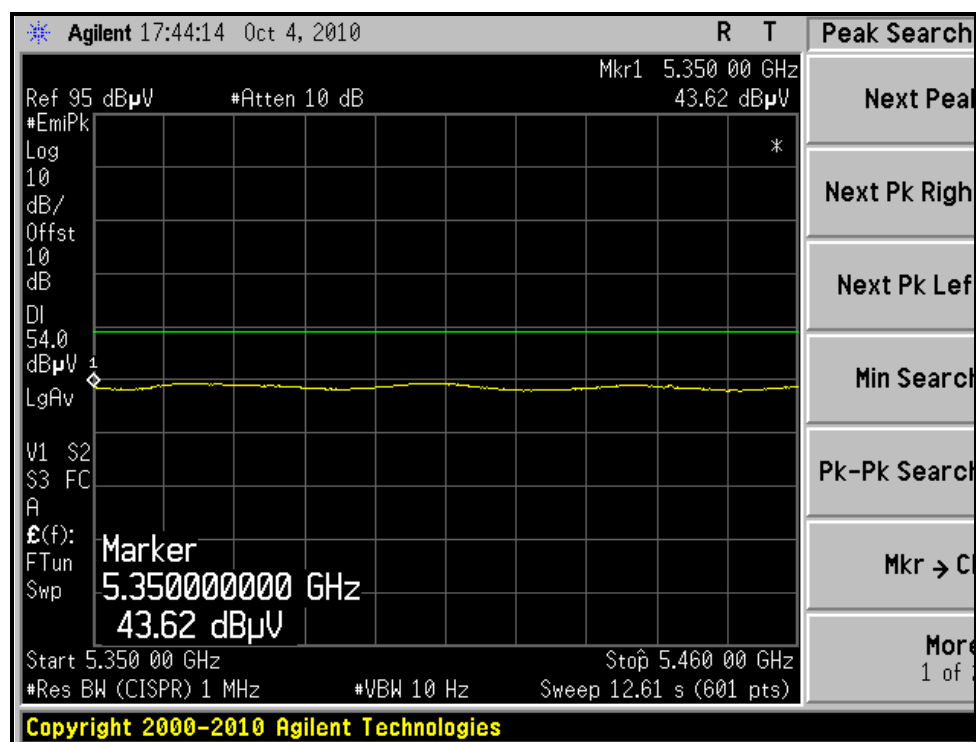
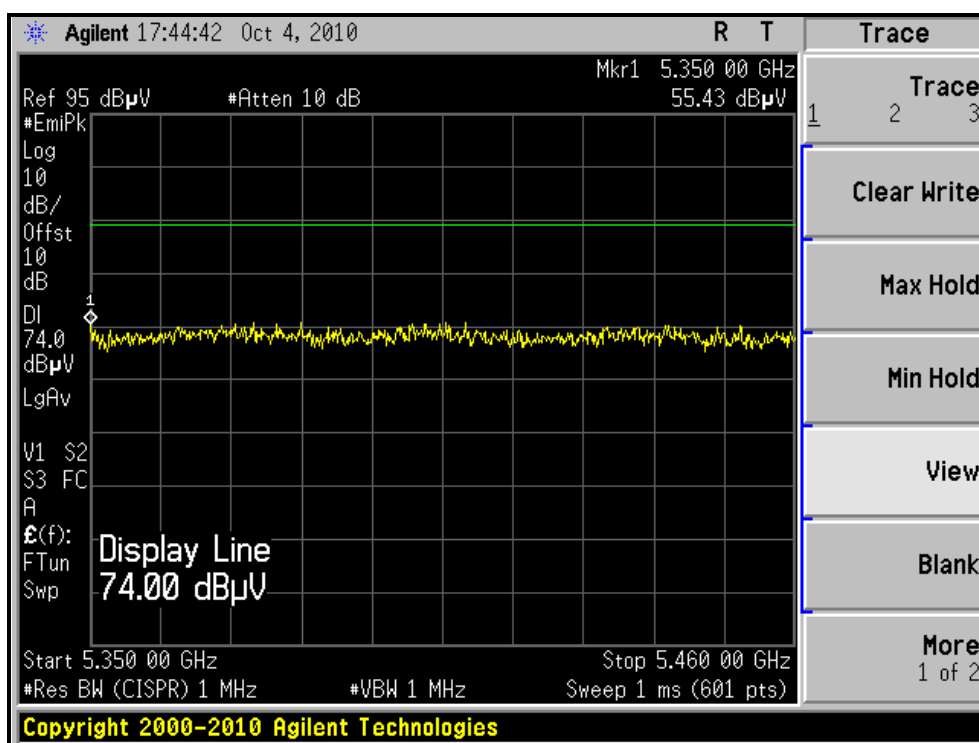
RESTRICTED BANDEDGE (802.11n (20MHz) MODE,CH36, VERTICAL)



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



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



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, 67%RH 1015 hPa	TESTED BY	Frank Liu

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	5000.00	57.4 PK	74.0	-16.6	1.49 H	119	19.88	37.52
2	5000.00	50.9 AV	54.0	-3.1	1.49 H	119	13.38	37.52
3	5150.00	64.5 PK	74.0	-9.5	1.41 H	18	26.68	37.85
4	5150.00	53.2 AV	54.0	-0.8	1.41 H	18	15.33	37.85
5	*5190.00	104.1 PK			1.47 H	131	66.16	37.94
6	*5190.00	92.0 AV			1.47 H	131	54.06	37.94
7	11380.00	59.4 PK	74.0	-14.6	1.51 H	253	7.99	51.41
8	11380.00	46.4 AV	54.0	-7.6	1.51 H	253	-5.04	51.41
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	59.4 PK	74.0	-14.6	1.22 V	187	21.54	37.85
2	5150.00	48.1 AV	54.0	-5.9	1.22 V	187	10.29	37.85
3	*5190.00	101.4 PK			1.22 V	187	63.46	37.94
4	*5190.00	89.4 AV			1.22 V	187	51.46	37.94
5	7500.00	54.2 PK	74.0	-19.8	1.35 V	347	9.25	44.95
6	7500.00	44.5 AV	54.0	-9.5	1.35 V	347	-0.45	44.95
7	11380.00	59.1 PK	74.0	-14.9	1.50 V	282	7.69	51.41
8	11380.00	44.9 AV	54.0	-9.1	1.50 V	282	-6.55	51.41

- 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.



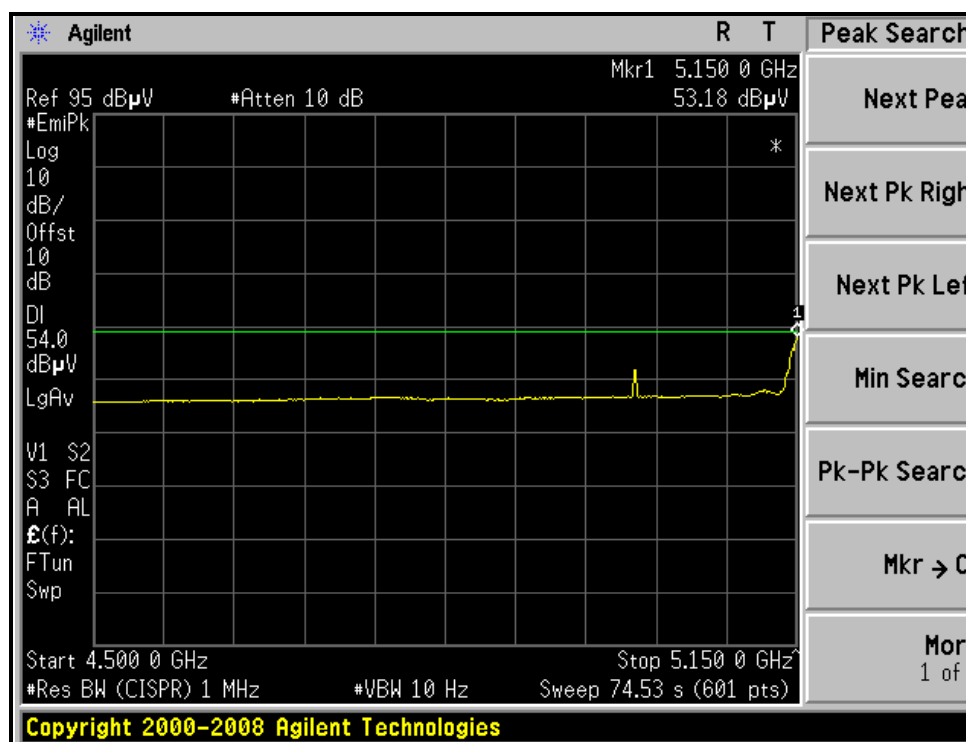
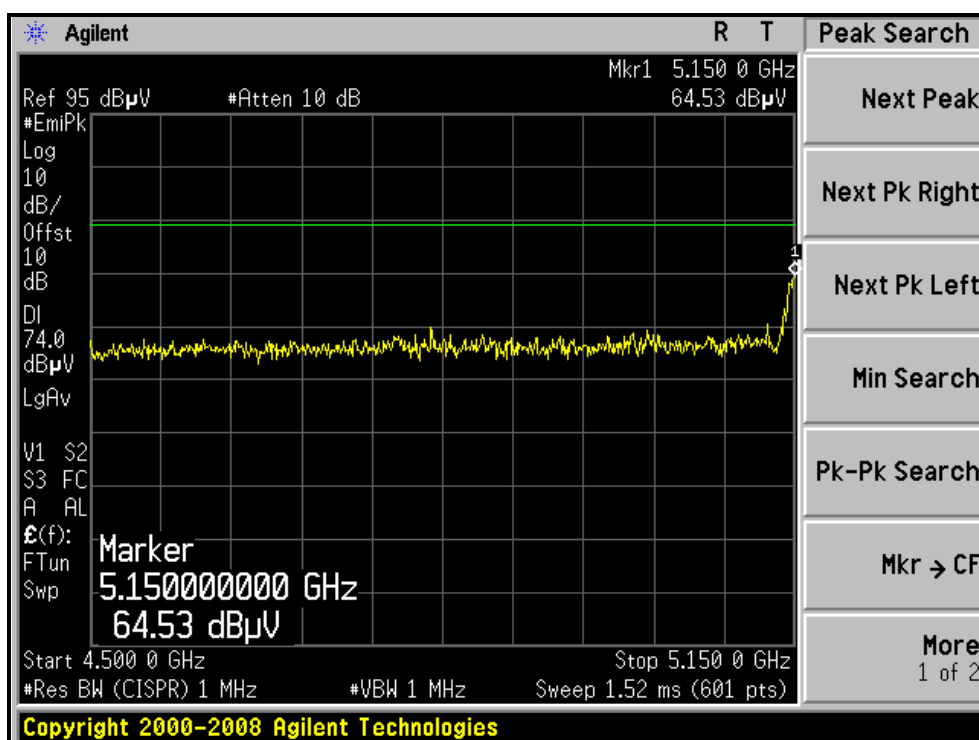
A D T

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	25deg. C, 67%RH 1015 hPa	TESTED BY	Frank Liu

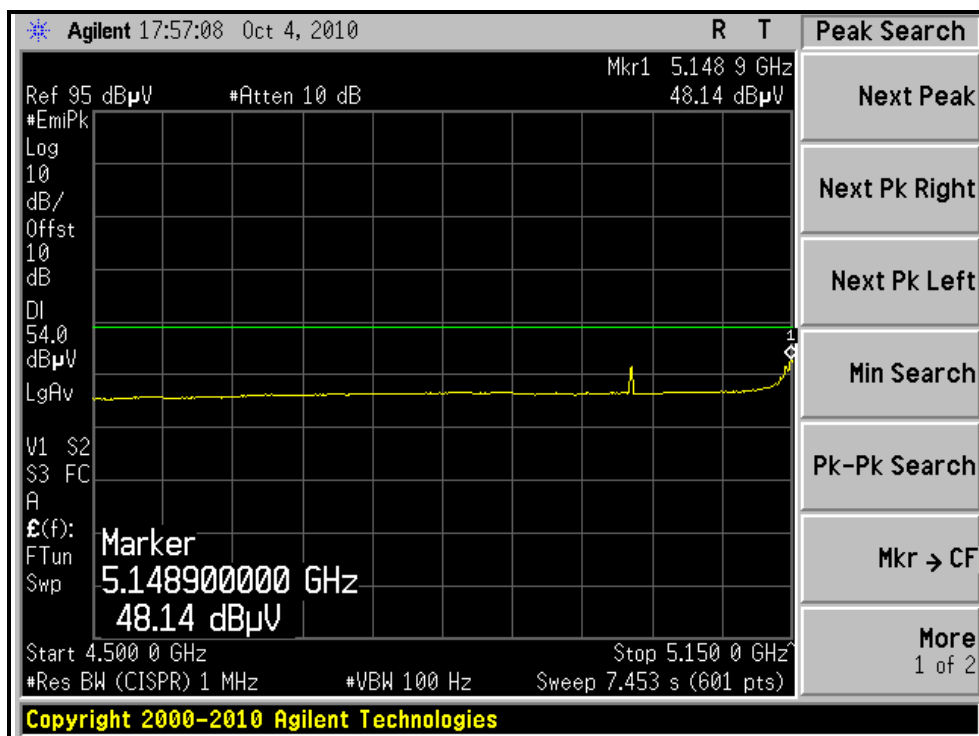
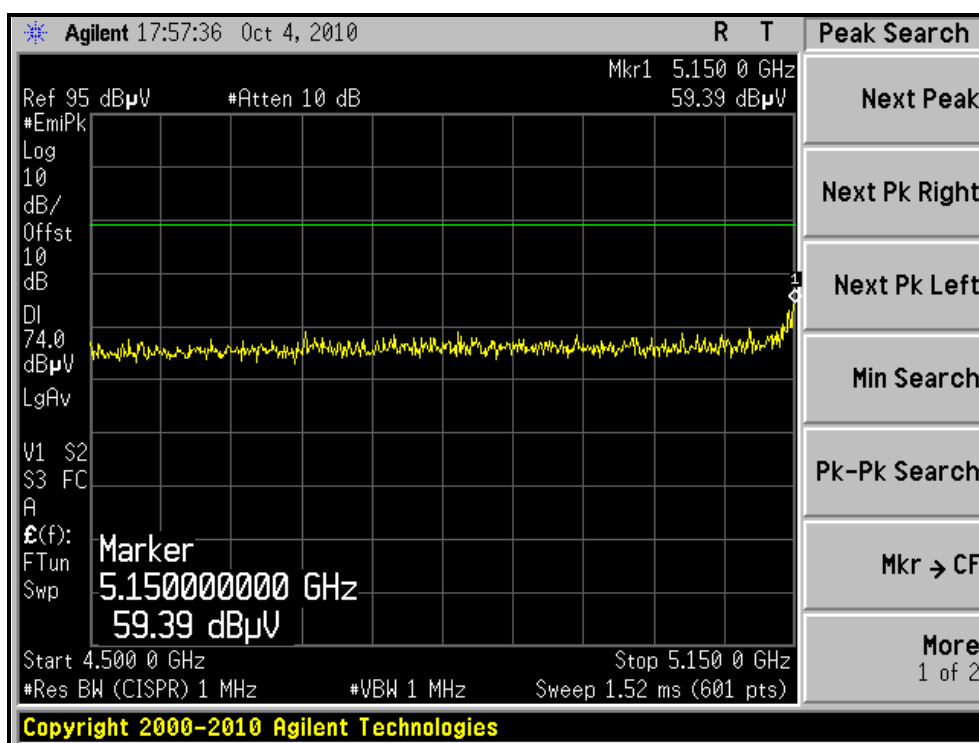
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5000.00	58.5 PK	74.0	-15.5	1.32 H	0	20.98	37.52
2	5000.00	51.5 AV	54.0	-2.5	1.32 H	0	13.98	37.52
3	*5230.00	105.4 PK			1.59 H	43	67.38	38.02
4	*5230.00	91.7 AV			1.59 H	43	53.68	38.02
5	5350.00	55.0 PK	74.0	-19.0	1.57 H	32	16.72	38.28
6	5350.00	44.7 AV	54.0	-9.3	1.57 H	32	6.40	38.28
7	#10460.00	59.6 PK	68.3	-8.7	1.57 H	264	10.32	49.28
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	*5230.00	100.6 PK			1.24 V	193	62.58	38.02
2	*5230.00	88.1 AV			1.24 V	193	50.08	38.02
3	5350.00	54.6 PK	74.0	-19.5	1.24 V	193	16.27	38.28
4	5350.00	42.2 AV	54.0	-11.8	1.24 V	193	3.92	38.28
5	#10460.00	59.1 PK	68.3	-9.2	1.52 V	263	9.82	49.28

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.

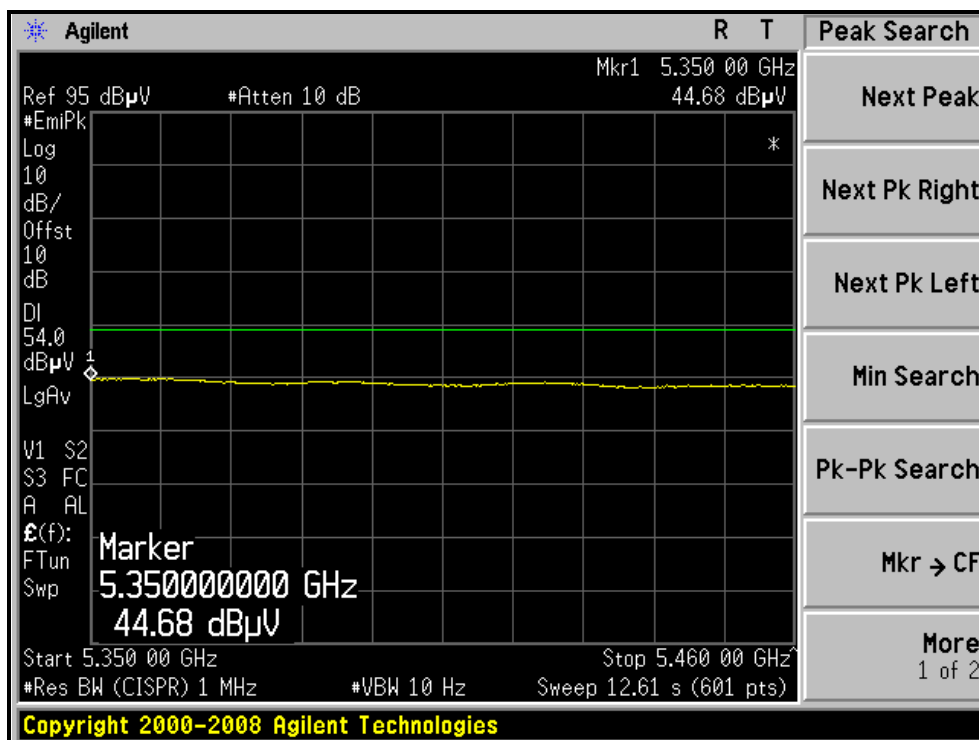
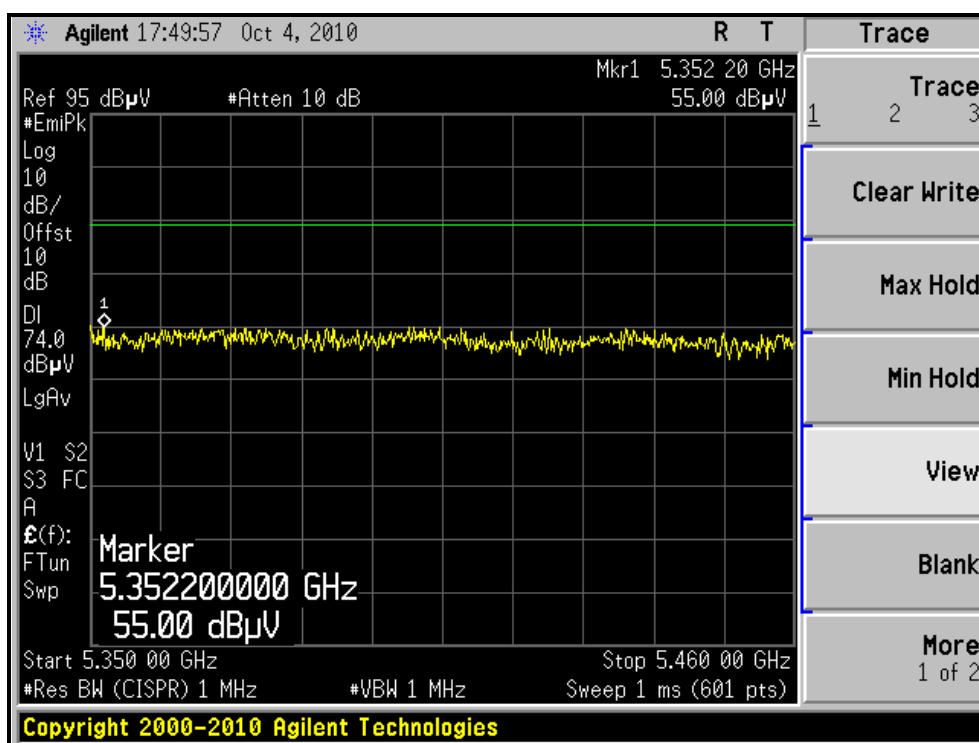
RESTRICTED BANDEDGE (802.11n (40MHz) MODE, CH38, HORIZONTAL)



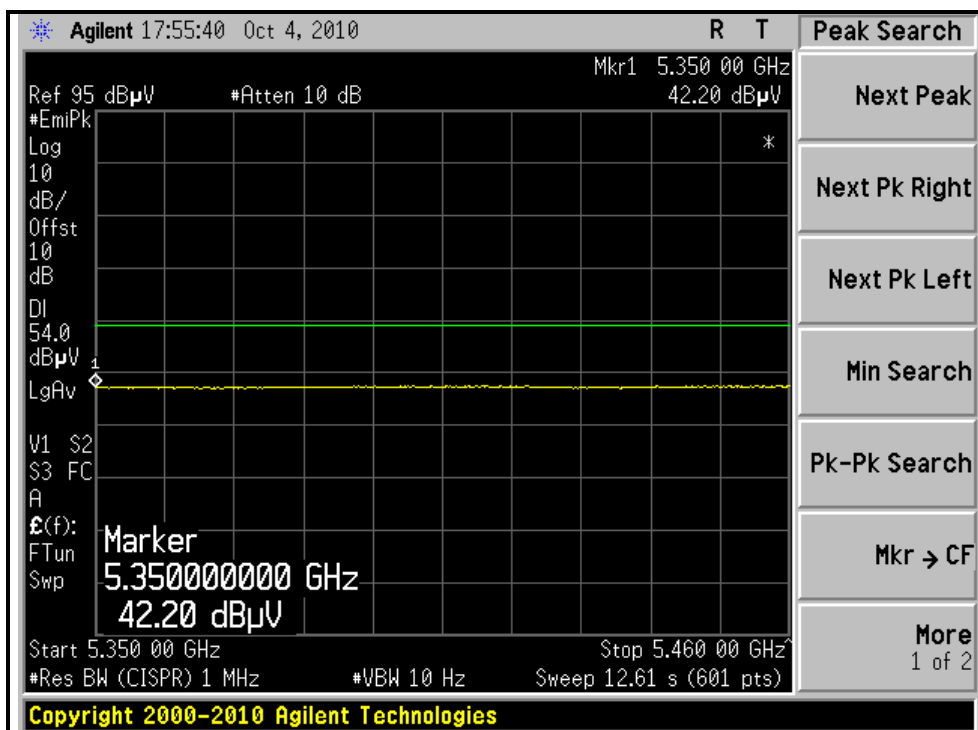
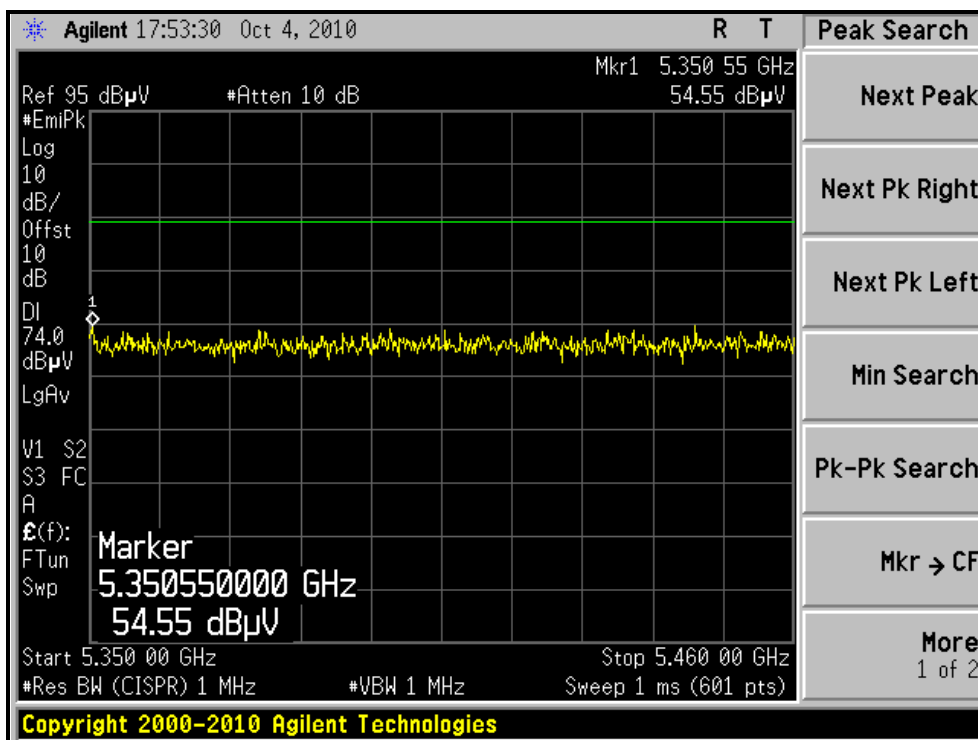
RESTRICTED BANDEDGE (802.11n (40MHz) MODE,CH38, VERTICAL)



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	July 14, 2010	July 13, 2011

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

4.3.3 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:

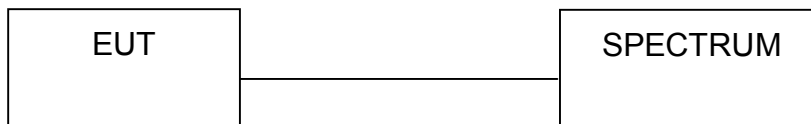
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

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.

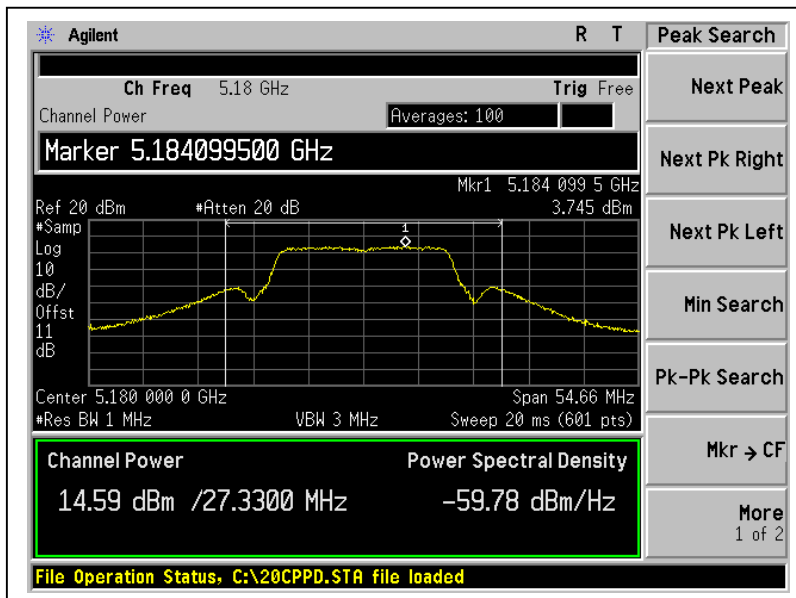
4.3.7 TEST RESULTS

802.11a OFDM MODULATION:

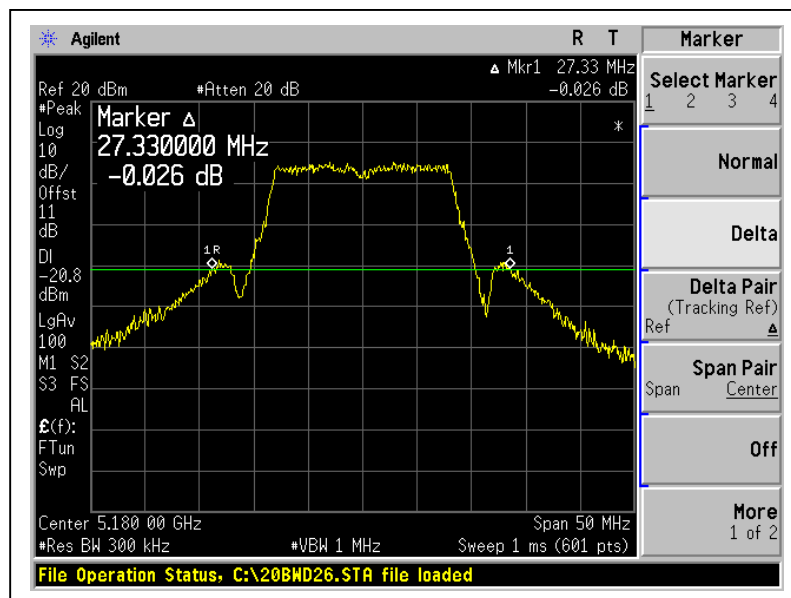
CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER (mW)	PEAK POWER (dBm)	PEAK POWER LIMIT (dBm)	26dBc Occupied Bandwidth (MHz)	PASS/ FAIL
36	5180	28.8	14.6	17	27.33	PASS
40	5200	27.5	14.4	17	26.83	PASS
48	5240	26.9	14.3	17	26.08	PASS

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

Peak Power Output: CH36



26dB Occupied Bandwidth: CH36

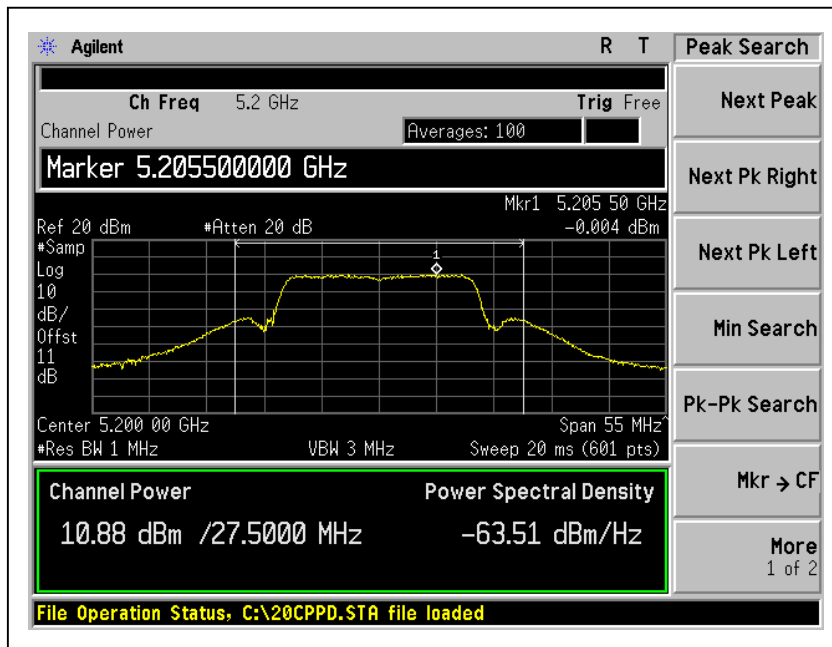


802.11n (20MHz) OFDM MODULATION:

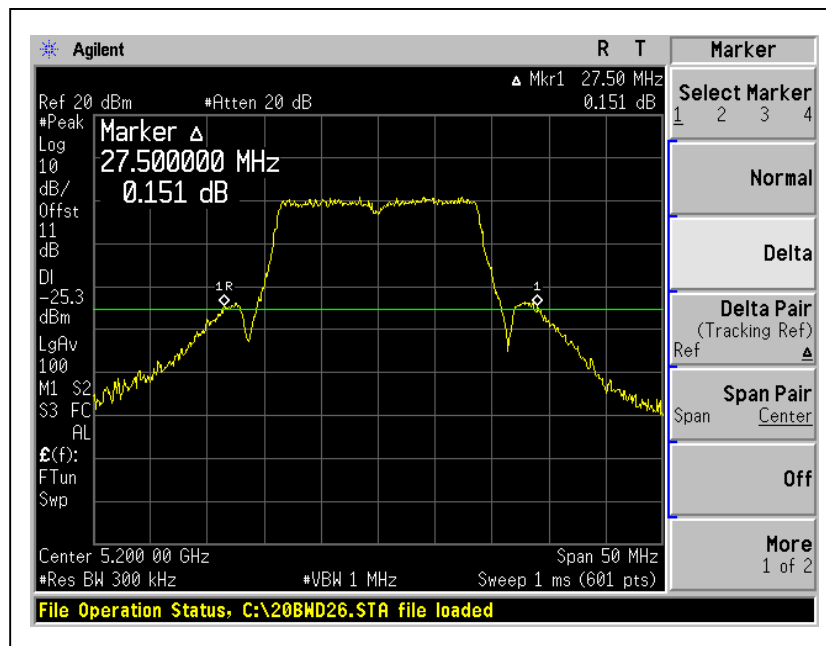
CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (dBm)			TOTAL PEAK POWER (mW)	TOTAL PEAK POWER (dBm)	PEAK POWER LIMIT (dBm)	26dBc Occupied Bandwidth (MHz)	PASS / FAIL
		CHAIN(J12)	CHAIN(J13)	CHAIN(J14)					
36	5180	10.8	9.2	9.5	29.3	14.7	17	27.42	PASS
40	5200	10.9	9.1	9.5	29.3	14.7	17	27.50	PASS
48	5240	10.7	9.2	9.4	28.8	14.6	17	26.08	PASS

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

Peak Power Output:
For Chain(J12) : CH40



26dB Occupied Bandwidth:
CH40

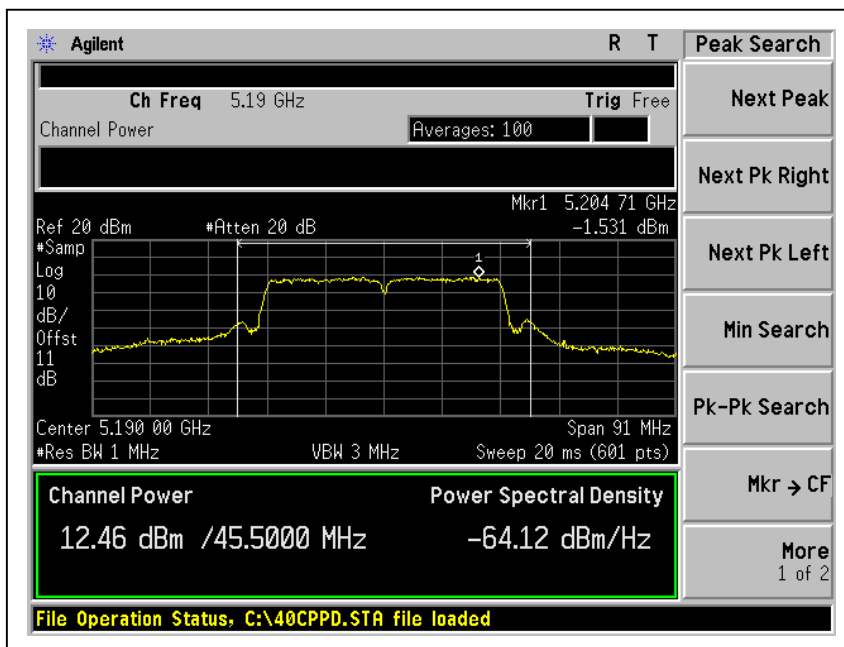


802.11n (40MHz) OFDM MODULATION:

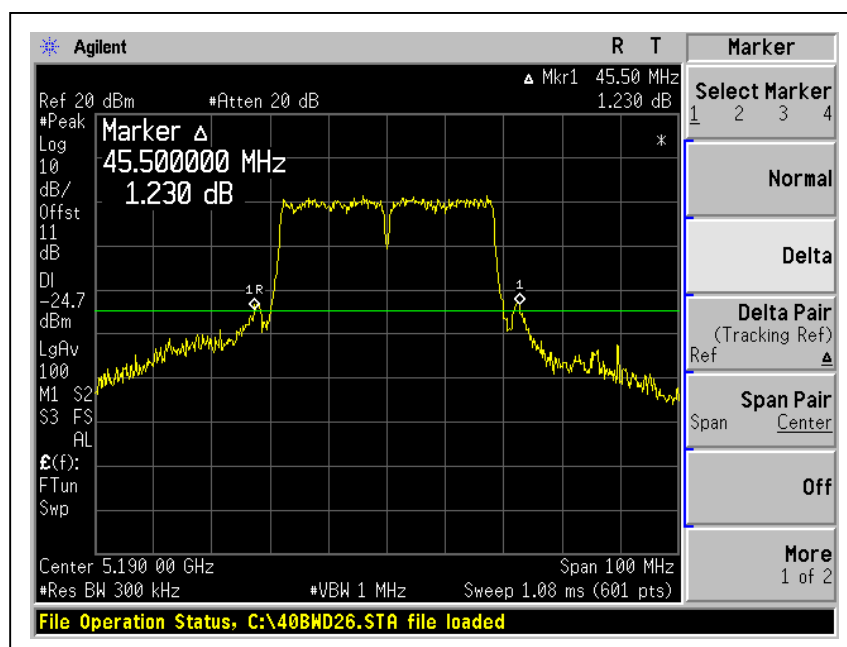
CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (dBm)			TOTAL PEAK POWER (mW)	TOTAL PEAK POWER (dBm)	PEAK POWER LIMIT (dBm)	26dBc Occupied Bandwidth (MHz)	PASS / FAIL
		CHAIN(J12)	CHAIN(J13)	CHAIN(J14)					
38	5190	12.5	11.1	11.7	45.5	16.6	17	45.5	PASS
46	5230	12.5	11.1	11.7	45.5	16.6	17	45.5	PASS

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

Peak Power Output:
For Chain(J12) :CH38



26dB Occupied Bandwidth:
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

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer	E4446A	MY48250254	July 14, 2010	July 13, 2011

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

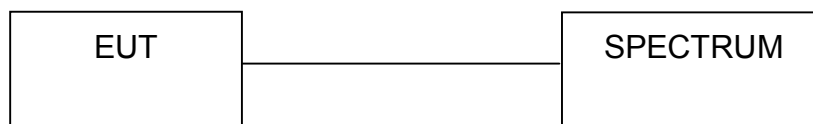
4.4.3 TEST PROCEDURE

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

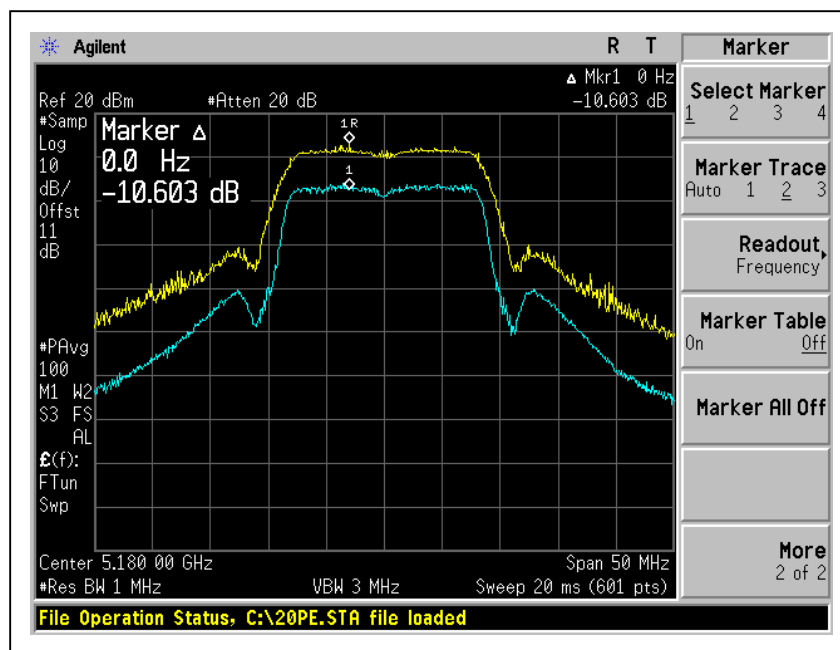
The software provided by client to enable the EUT under transmission condition continuously at specific channel frequencies individually.

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	10.6	13	PASS
40	5200	9.8	13	PASS
48	5240	10.0	13	PASS

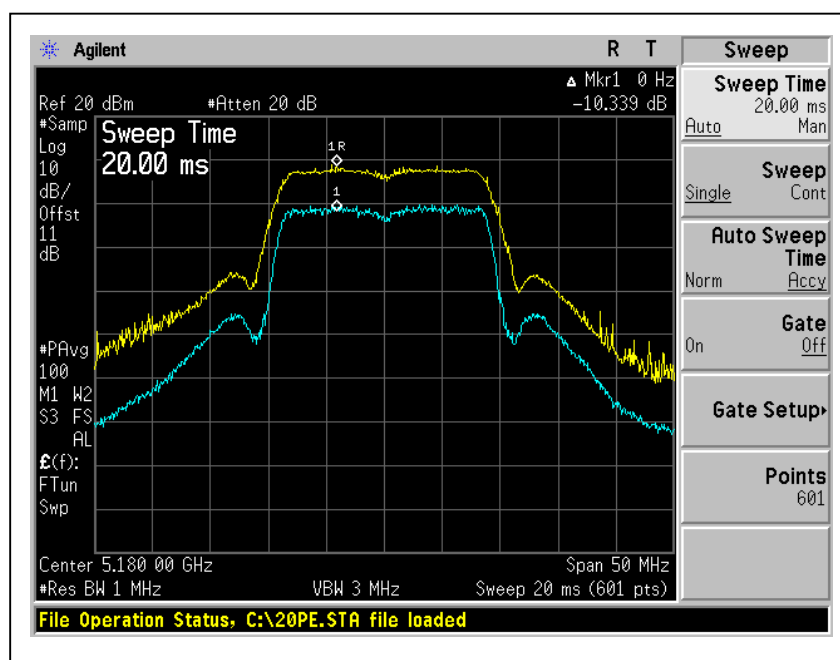
CH36



802.11n (20MHz) OFDM MODULATION:

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER EXCURSION (dB)	PEAK to AVERAGE EXCURSION LIMIT (dB)	PASS/FAIL
36	5180	10.3	13	PASS
40	5200	9.4	13	PASS
48	5240	10.0	13	PASS

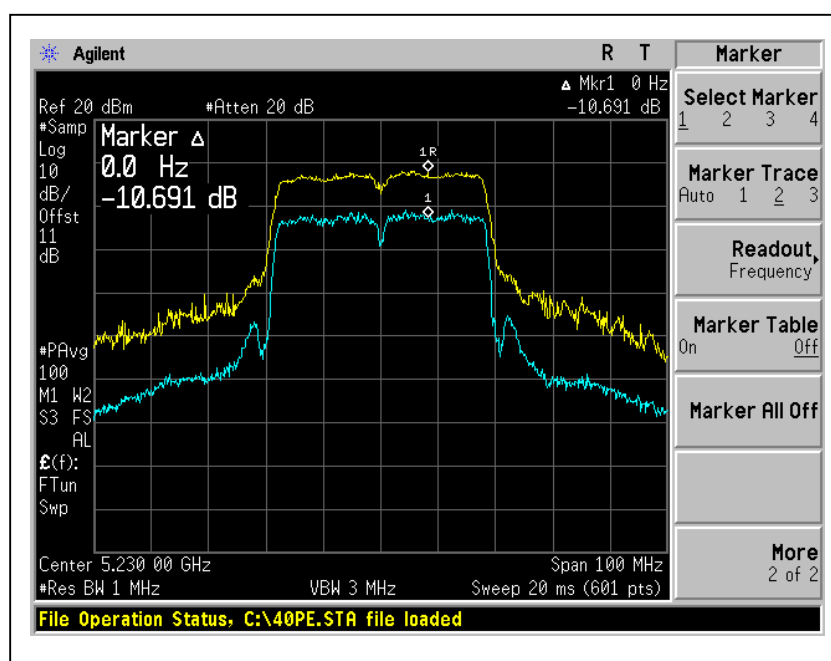
CH36



802.11n (40MHz) OFDM MODULATION:

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER EXCURSION (dB)	PEAK to AVERAGE EXCURSION LIMIT (dB)	PASS/FAIL
38	5190	10.4	13	PASS
46	5230	10.7	13	PASS

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

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer	E4446A	MY48250254	July 14, 2010	July 13, 2011

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

4.5.3 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

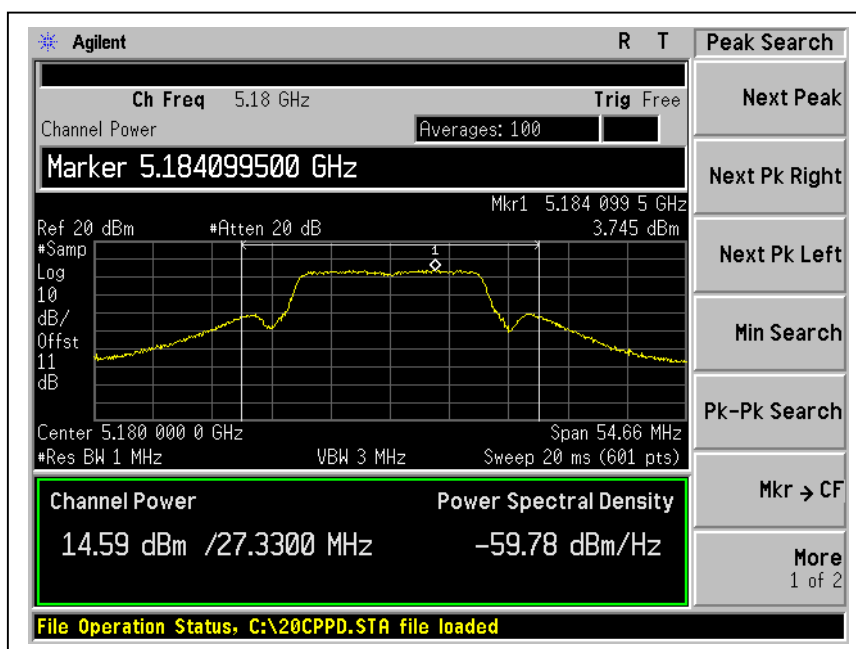
Same as 4.3.6

4.5.7 TEST RESULTS

802.11a OFDM MODULATION

CHANNEL	CHANNEL FREQUENCY (MHz)	RF POWER LEVEL IN 1MHz BW (dBm)	MAXIMUM LIMIT (dBm)	PASS/FAIL
36	5180	3.7	4	PASS
40	5200	3.6	4	PASS
48	5240	3.5	4	PASS

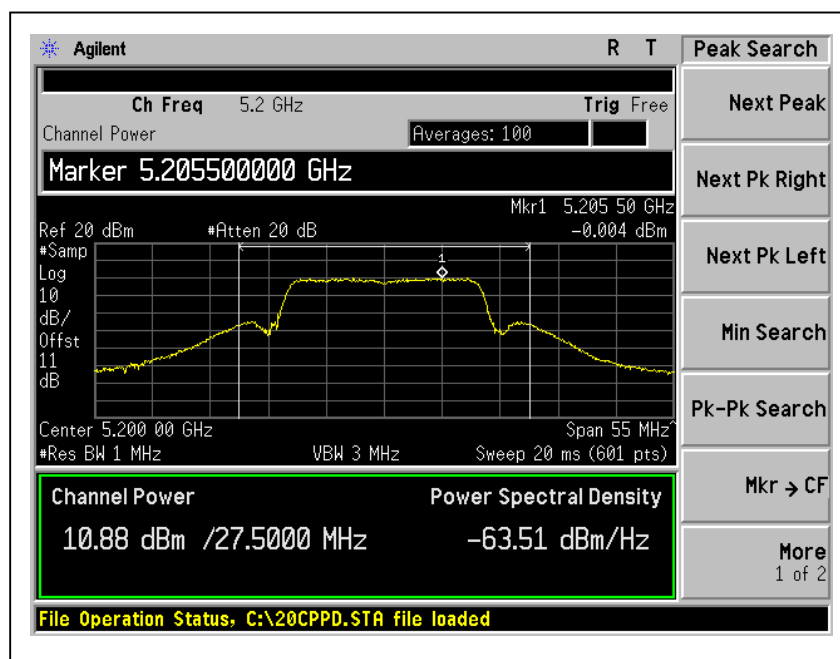
CH36



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(J12)	CHAIN(J13)	CHAIN(J14)			
36	5180	-0.1	-1.9	-1.6	3.6	4	PASS
40	5200	0.0	-1.9	-1.7	3.7	4	PASS
48	5240	-0.3	-1.5	-1.7	3.6	4	PASS

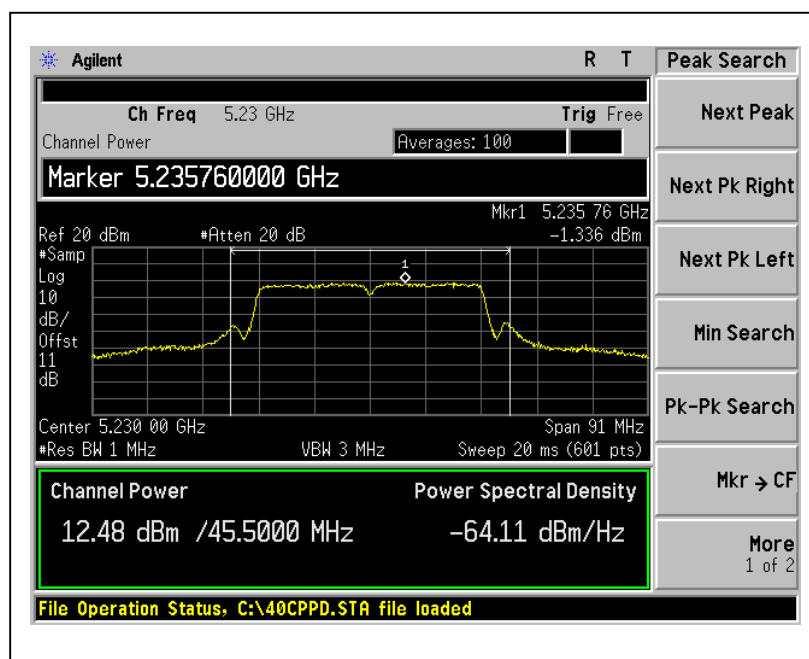
For Chain (J12) : CH40



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(J12)	CHAIN(J13)	CHAIN(J14)			
38	5190	-1.5	-1.8	-1.5	3.2	4	PASS
46	5230	-1.3	-2.1	-1.6	3.1	4	PASS

For Chain ((J12) : CH46



4.6 FREQUENCY STABILITY

4.6.1 LIMITS OF FREQUENCY STABILITY MEASUREMENT

The frequency tolerance of the carrier signal shall be maintained within 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

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S SPECTRUM ANALYZER	FSP40	100036	Dec. 18, 2009	Dec. 17, 2010

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

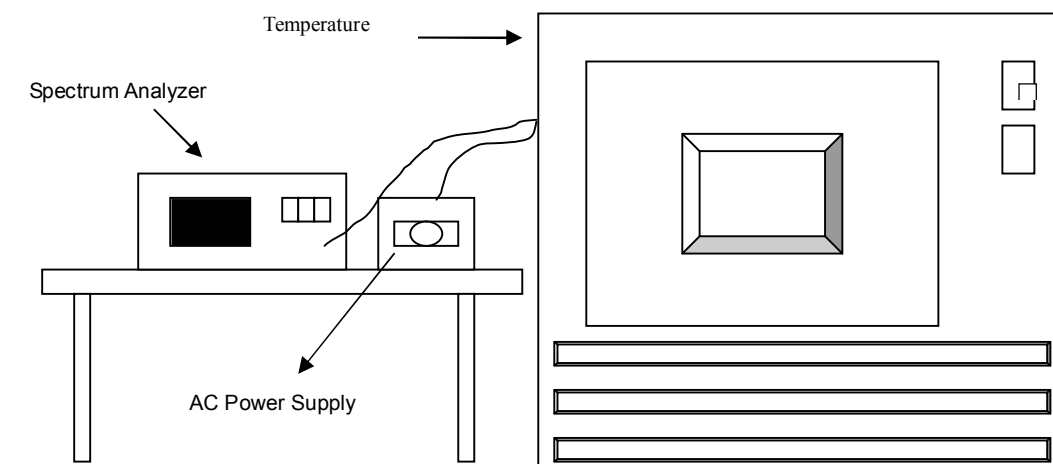
4.6.3 TEST PROCEDURE

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.

4.6.7 TEST RESULTS

Operating frequency: 5240MHz									
Temp. (°C)	Power supply (VAC)	0 minute		2 minute		5 minute		10 minute	
		(MHz)	(%)	(MHz)	(%)	(MHz)	(%)	(MHz)	(%)
50	126.5	5240.0138	0.000263	5240.0089	0.000170	5240.0052	0.000099	5240.0043	0.000082
	110	5240.0138	0.000263	5240.0119	0.000227	5240.0082	0.000156	5240.0067	0.000128
	93.5	5240.0138	0.000263	5240.0079	0.000151	5240.0062	0.000118	5240.0053	0.000101
40	126.5	5239.9719	0.000536	5239.9815	0.000353	5239.9815	0.000353	5239.9816	0.000351
	110	5239.972	0.000534	5239.9815	0.000353	5239.9817	0.000349	5239.9812	0.000359
	93.5	5239.9819	0.000345	5239.9818	0.000347	5239.9814	0.000355	5239.9815	0.000353
30	126.5	5239.976	0.000458	5239.9758	0.000462	5239.9759	0.000460	5239.9745	0.000487
	110	5239.976	0.000458	5239.976	0.000458	5239.9760	0.000458	5239.9753	0.000471
	93.5	5239.976	0.000458	5239.9758	0.000462	5239.9758	0.000462	5239.9747	0.000483
20	126.5	5239.9909	0.000174	5239.9907	0.000177	5239.9907	0.000177	5239.9907	0.000177
	110	5239.991	0.000172	5239.9911	0.000170	5239.9911	0.000170	5239.9905	0.000181
	93.5	5239.9909	0.000174	5239.9907	0.000177	5239.9907	0.000177	5239.9902	0.000187
10	126.5	5239.9962	0.000073	5239.9961	0.000074	5239.9961	0.000074	5239.9949	0.000097
	110	5239.9962	0.000073	5239.9961	0.000074	5239.9963	0.000071	5239.9947	0.000101
	93.5	5239.9962	0.000073	5239.996	0.000076	5239.9960	0.000076	5239.9945	0.000105
0	126.5	5240.0144	0.000275	5240.0129	0.000246	5240.0112	0.000214	5240.0113	0.000216
	110	5240.0142	0.000271	5240.0149	0.000284	5240.0132	0.000252	5240.0137	0.000261
	93.5	5240.0142	0.000271	5240.0119	0.000227	5240.0112	0.000214	5240.0135	0.000258
-10	126.5	5240.0202	0.000385	5240.0206	0.000393	5240.0210	0.000401	5240.0209	0.000399
	110	5240.0202	0.000385	5240.0205	0.000391	5240.0210	0.000401	5240.0215	0.000410
	93.5	5240.0204	0.000389	5240.0203	0.000387	5240.0210	0.000401	5240.0213	0.000406
-20	126.5	5239.9954	0.000088	5239.9950	0.000095	5239.9950	0.000095	5239.9937	0.000120
	110	5239.9954	0.000088	5239.9952	0.000092	5239.9953	0.000090	5239.9935	0.000124
	93.5	5239.9954	0.000088	5239.9950	0.000095	5239.9950	0.000095	5239.9932	0.000130
-30	126.5	5240.0068	0.000130	5240.0019	0.000036	5240.0022	0.000042	5240.0023	0.000044
	110	5240.0068	0.000130	5240.0049	0.000094	5240.0032	0.000061	5240.0029	0.000055
	93.5	5240.0048	0.000092	5240.0019	0.000036	5240.0022	0.000042	5240.0027	0.000052

4.7 CONDUCTED OUT-BAND EMISSION MEASUREMENT

4.7.1 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S SPECTRUM ANALYZER	FSP40	100036	Dec. 18, 2009	Dec. 17, 2010

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

4.7.2 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 100MHz or 200MHz 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.

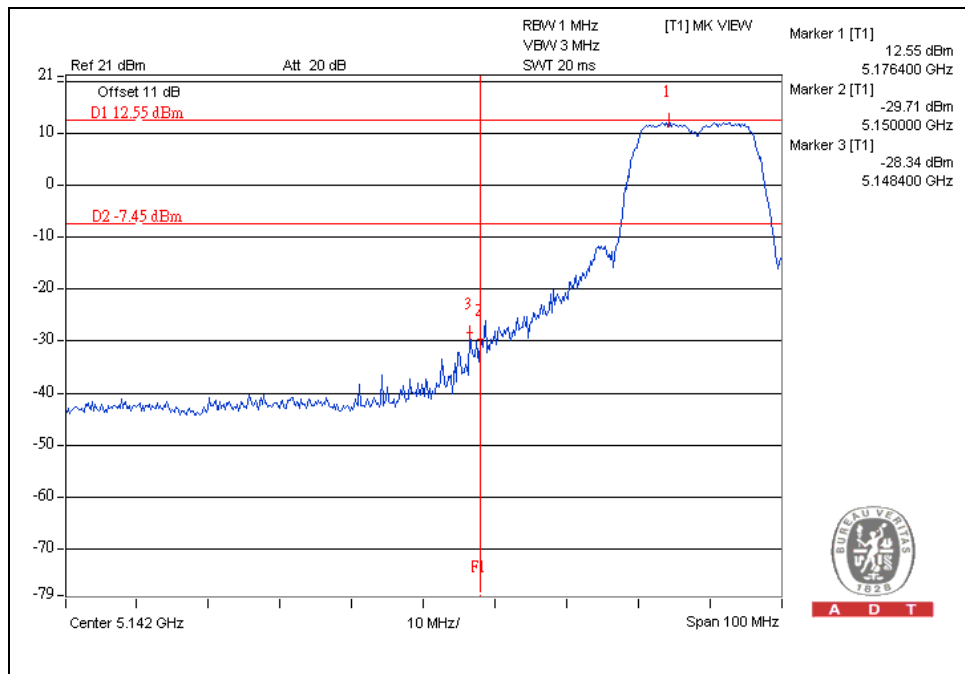
4.7.4 TEST RESULTS

For 5.15 to 5.35GHz band:

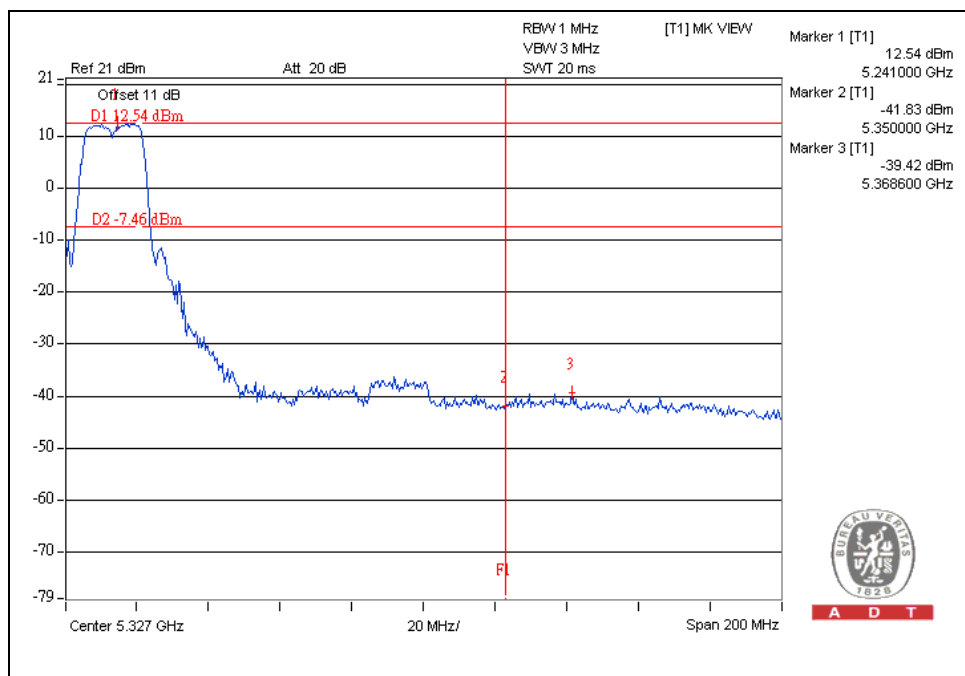
The spectrum plots (Peak RBW=1MHz, VBW=3MHz) are attached on the following pages.

802.11a OFDM modulation

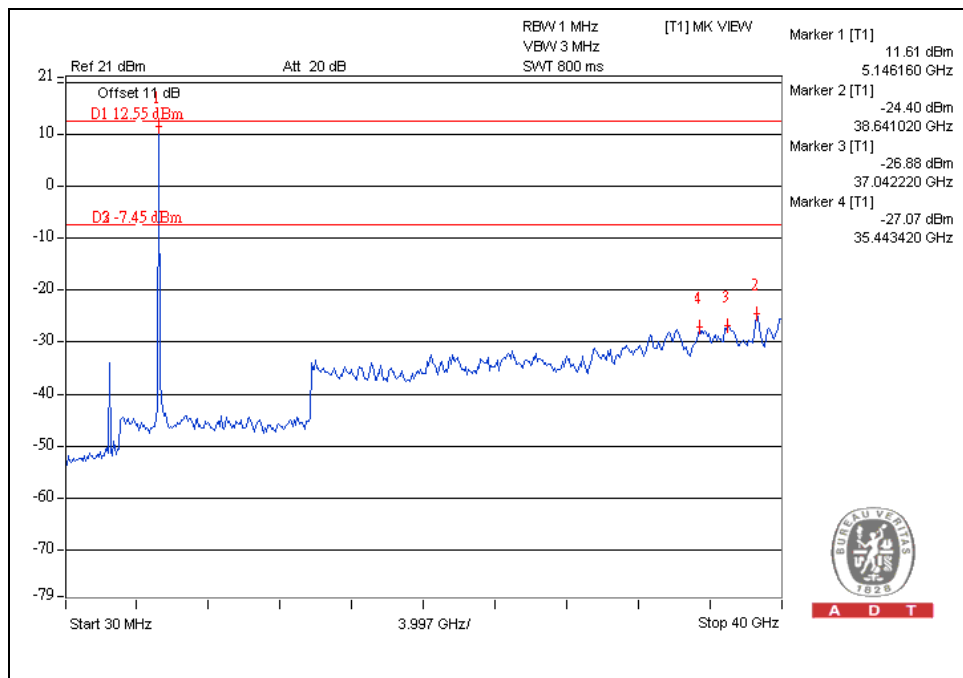
CH 36



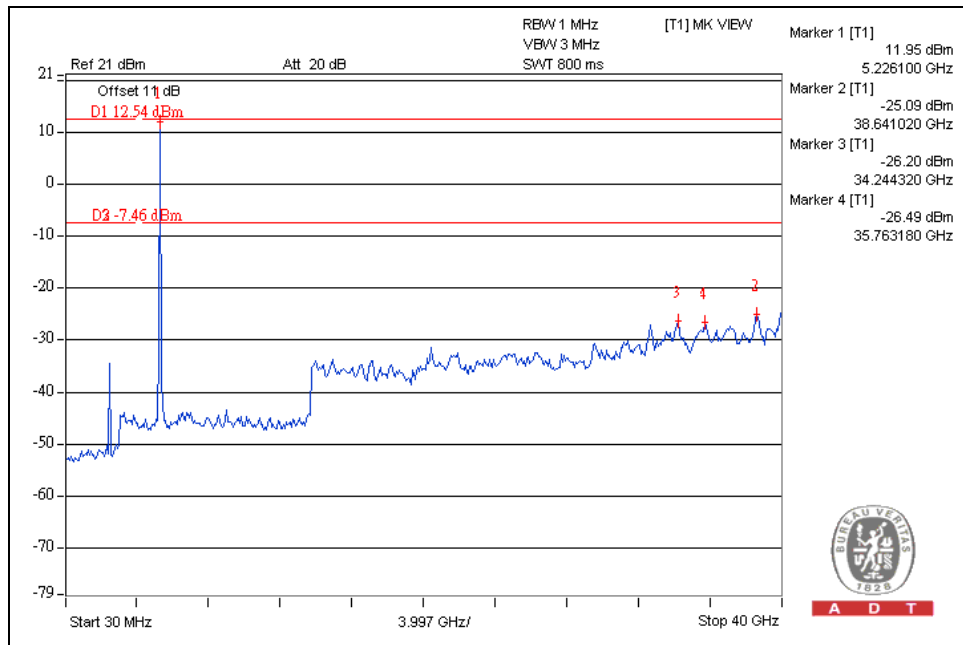
CH 48



CH 36

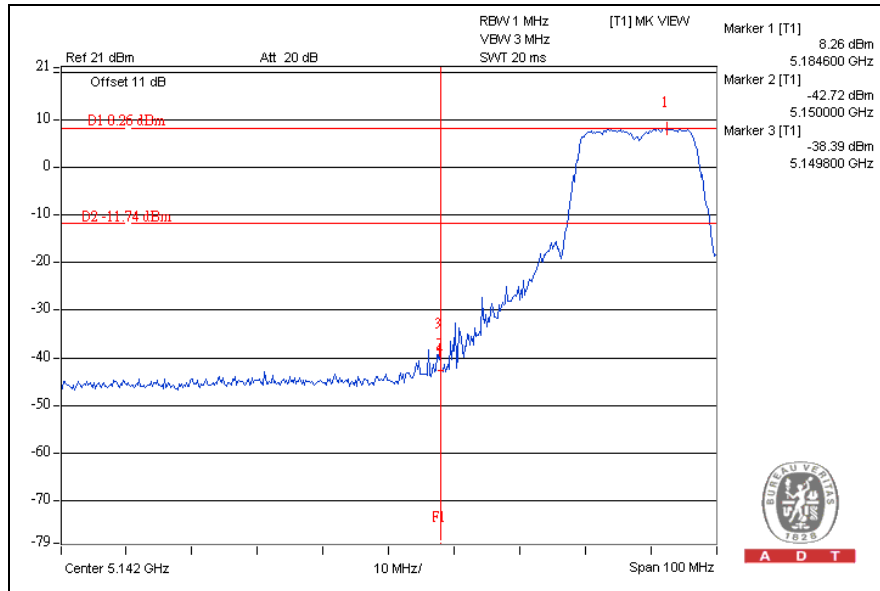


CH 48

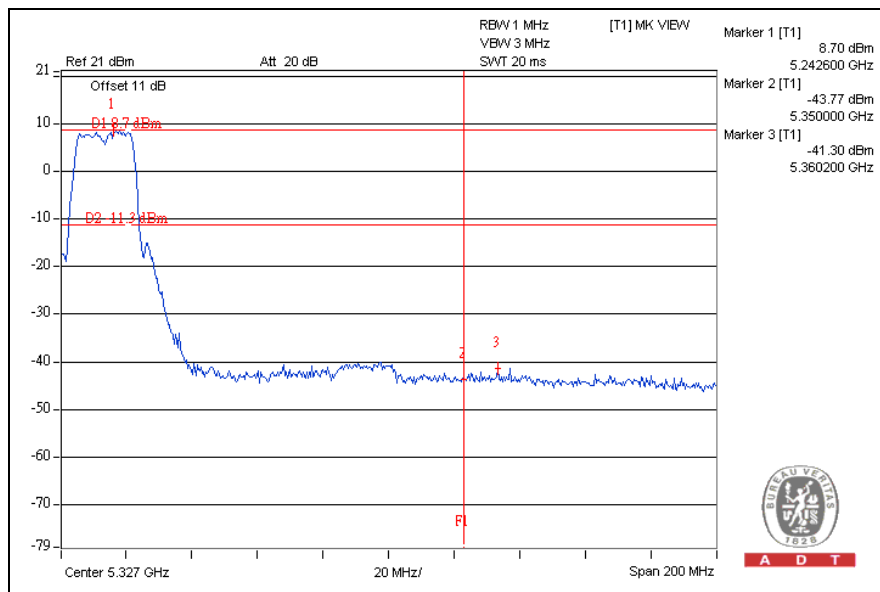


802.11n (20MHz) OFDM MODULATION:

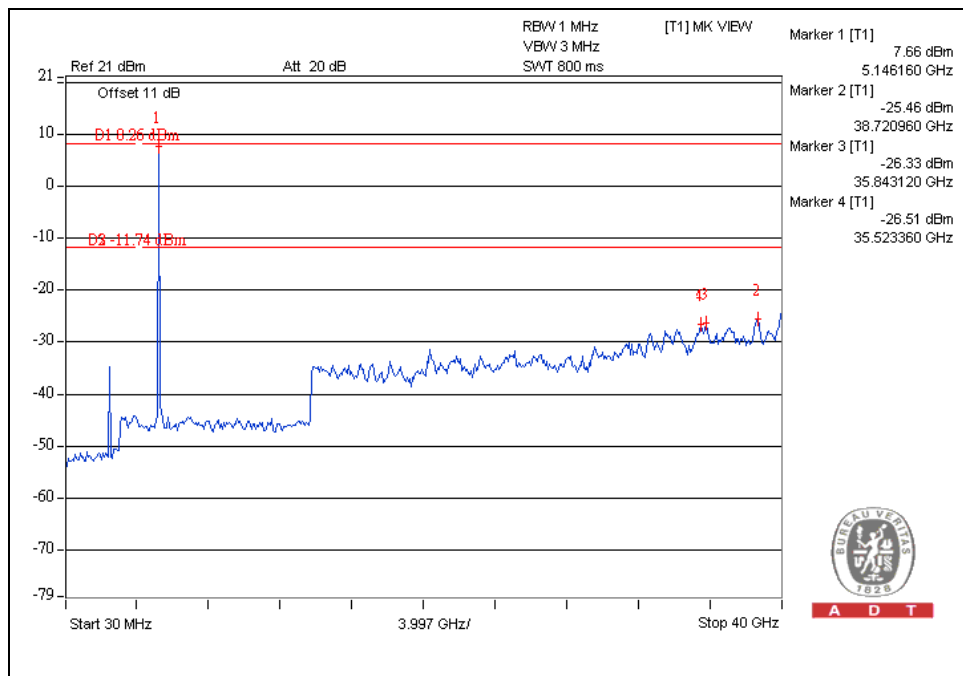
CH36



CH48

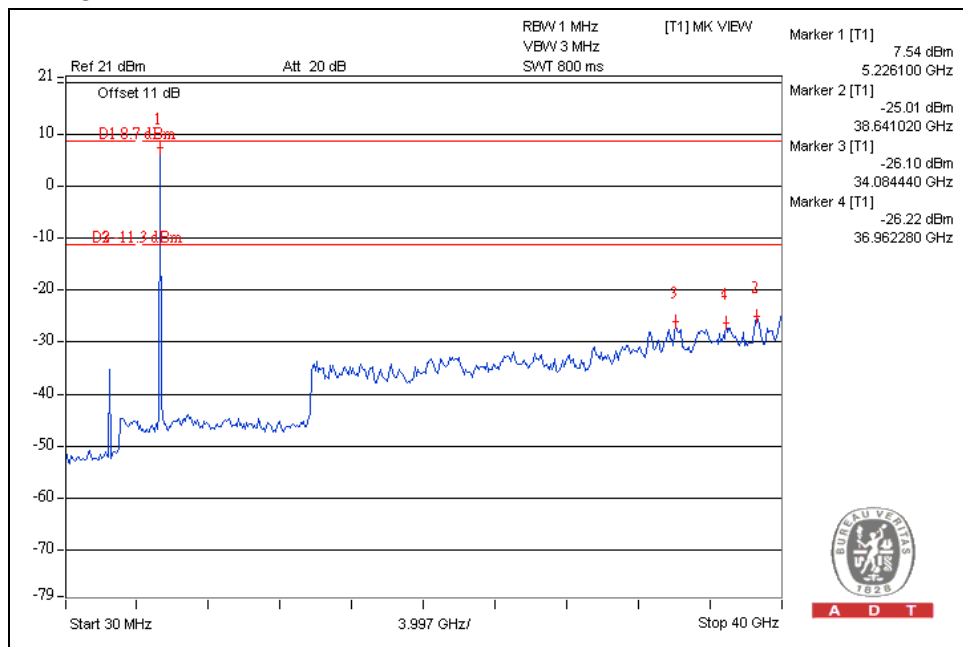


CH36



A D T

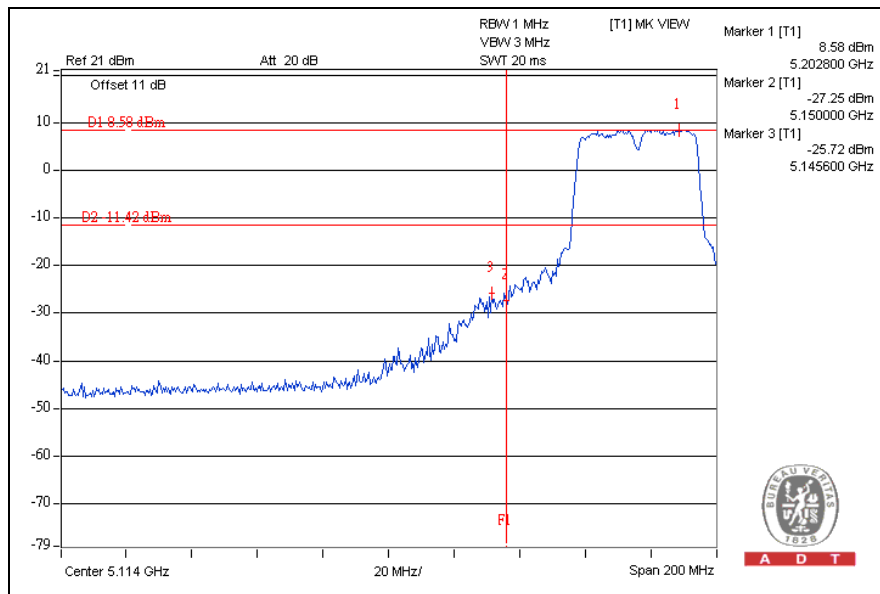
CH48



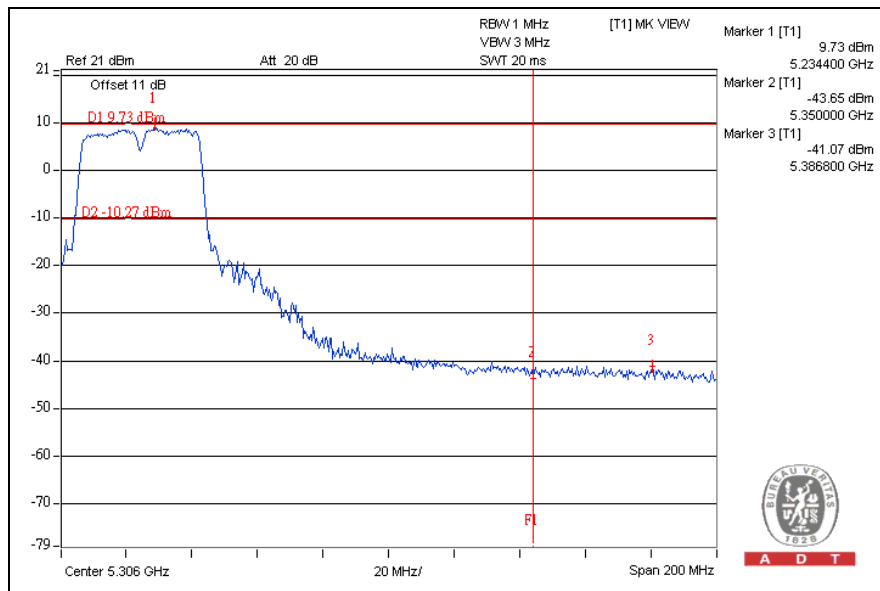
A D T

802.11n (40MHz) OFDM MODULATION:

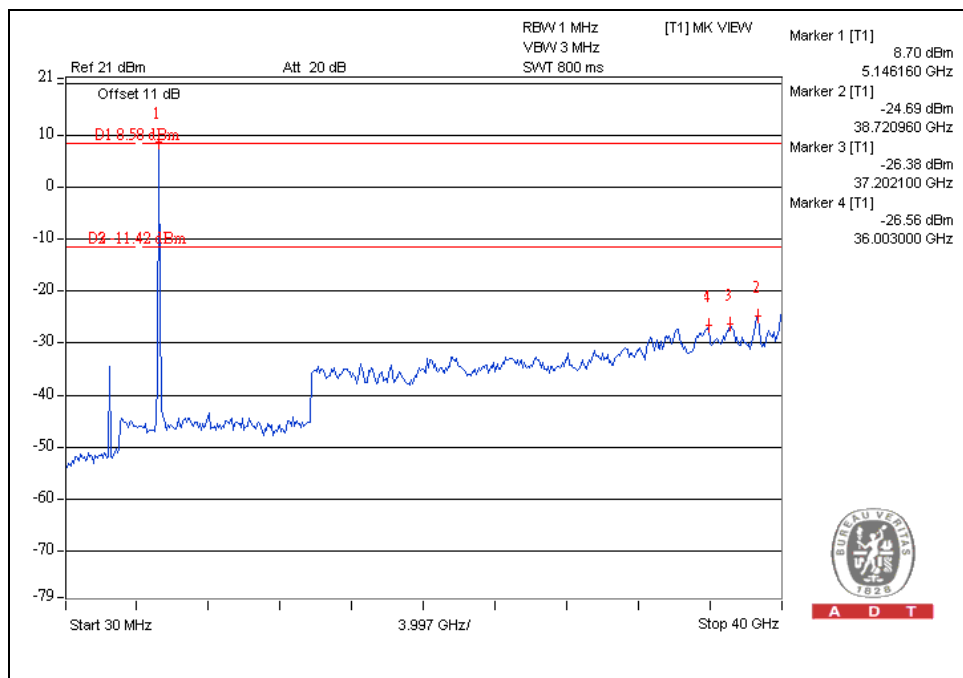
CH38



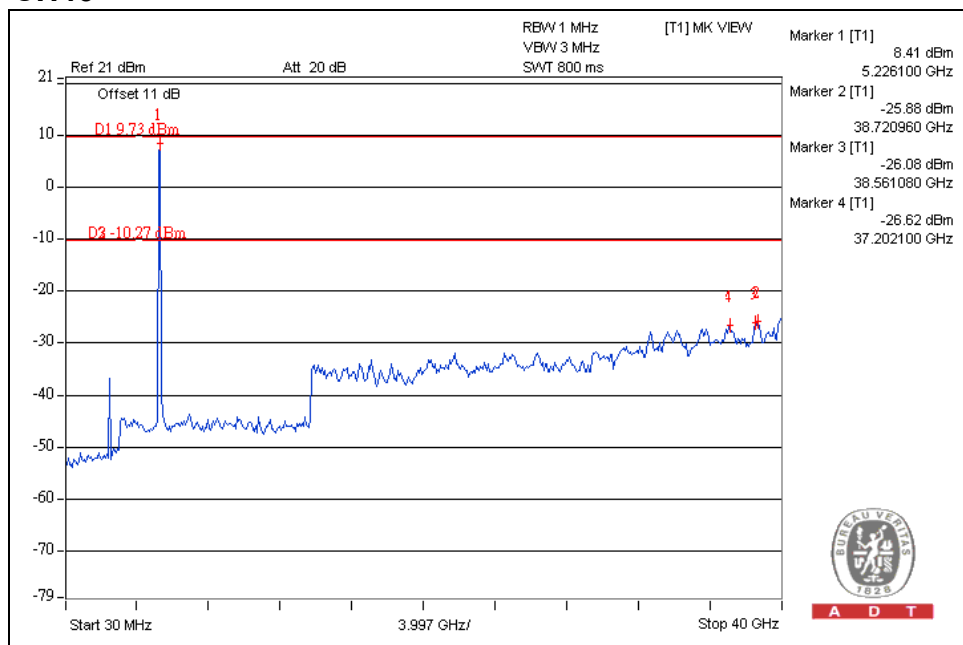
CH46



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

Email: service@adt.com.tw

Web Site: www.adt.com.tw

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



A D T

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.