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FCC TEST REPORT (WLAN - 15.247)

REPORT NO.: RF981015H02

MODEL NO.: MC3090Z

RECEIVED: Oct. 15, 2009

TESTED: Oct. 22 to 28, 2009

ISSUED: Nov. 23, 2009

APPLICANT: Motorola Inc.

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

PRODUCT: Mobile Computing Terminal
BRAND NAME: MOTOROLA
MODEL NO.: MC3090Z
TEST SAMPLE: ENGINEERING SAMPLE
TESTED: Oct. 22 to 28, 2009
APPLICANT: Motorola Inc.
STANDARDS: FCC Part 15, Subpart C (Section 15.247),
ANSI C63.4-2003

The above equipment 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 : Carol Liao , **DATE:** Nov. 23, 2009
(Carol Liao, Specialist)

TECHNICAL ACCEPTANCE : Hank Chung , **DATE:** Nov. 23, 2009
(Hank Chung, Deputy Manager)

APPROVED BY : May Chen , **DATE:** Nov. 23, 2009
(May Chen, Deputy Manager)

2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

For 802.11b & g, 2412~2462MHz Band

APPLIED STANDARD: FCC Part 15, Subpart C (Section 15.247)			
Standard Section	Test Type and Limit	Result	Remark
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -14.01dB at 0.205MHz
15.247(a)(2)	Spectrum Bandwidth of a Direct Sequence Spread Spectrum System Limit: min. 500kHz	PASS	Meet the requirement of limit.
15.247(b)	Maximum Peak Output Power Limit: max. 30dBm	PASS	Meet the requirement of limit.
15.247(d)	Radiated Emissions Limit: Table 15.209	PASS	Meet the requirement of limit. Minimum passing margin is -3.02dB at 4924.00MHz
15.247(e)	Power Spectral Density Limit: max. 8dBm	PASS	Meet the requirement of limit.
15.247(d)	Conducted Out-Band Emission Measurement Limit: 20dB less than the peak value of fundamental frequency	PASS	Meet the requirement of limit.



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For 802.11a, 5725~5850MHz Band

APPLIED STANDARD: FCC Part 15, Subpart C (Section 15.247)			
Standard Section	Test Type and Limit	Result	Remark
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -14.41dB at 0.205MHz
15.247(a)(2)	Spectrum Bandwidth of a Direct Sequence Spread Spectrum System Limit: min. 500kHz	PASS	Meet the requirement of limit.
15.247(b)	Maximum Peak Output Power Limit: max. 30dBm	PASS	Meet the requirement of limit.
15.247(d)	Radiated Emissions Limit: Table 15.209	PASS	Meet the requirement of limit. Minimum passing margin is -7.95dB at 500.00MHz
15.247(e)	Power Spectral Density Limit: max. 8dBm	PASS	Meet the requirement of limit.
15.247(d)	Conducted Out-Band Emission Measurement Limit: 20dB less than the peak value of fundamental frequency	PASS	Meet the requirement of limit.

NOTE:

1. There are Bluetooth technology, RFID technology and WLAN technology used for the EUT.
2. For Bluetooth technology, the test data please refer "RF981015H02-2".
3. For RFID technology, the test data please refer "RF981015H02-3".
4. For WLAN technology, the EUT was operating in 2400 ~ 2483.5MHz, 5.15~5.35GHz, 5.47~5.725GHz and 5.725~5.850GHz frequencies band. This report was recorded the RF parameters including 2400 ~ 2483.5MHz and 5.725~5.850GHz. For the 5.15~5.35GHz and 5.47~5.725GHz RF parameters was recorded in another test report "RF981015H02-1".



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2.1 MEASUREMENT UNCERTAINTY

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

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

Measurement	Value
Conducted emissions	2.45 dB
Radiated emissions (30MHz-1GHz)	3.98 dB
Radiated emissions (1GHz -18GHz)	2.49 dB
Radiated emissions (18GHz -40GHz)	2.70 dB



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3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	Mobile Computing Terminal
MODEL NO.	MC3090Z
FCC ID	UZ7MC3090Z
POWER SUPPLY	DC 12V to cradle, DC 5.4V from power adapter or DC 3.7V from battery
MODULATION TYPE	For WLAN : CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM For Bluetooth : GFSK For RFID : PR-ASK(DRM) , DSB-ASK(MRM), PR-ASK(XRM)
MODULATION TECHNOLOGY	For WLAN : DSSS, OFDM For Bluetooth : FHSS For RFID : FHSS
TRANSFER RATE	For WLAN : 802.11b: 11 / 5.5 / 2 / 1Mbps 802.11g: 54 / 48 / 36 / 24 / 18 / 12 / 9 / 6Mbps 802.11a: 54 / 48 / 36 / 24 / 18 / 12 / 9 / 6Mbps For Bluetooth : DH 1, DH 3, DH 5
FREQUENCY RANGE	For WLAN : For 15.407 802.11a: 5.18 ~ 5.32GHz, 5.50 ~ 5.70GHz For 15.247(2.4GHz) 802.11b & 802.11g: 2412 ~ 2462MHz For 15.247(5GHz) 802.11a: 5.745 ~ 5.825GHz For Bluetooth :2402MHz ~ 2480MHz For RFID : 902.75MHz ~ 927.25MHz



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NUMBER OF CHANNEL	For WLAN : For 15.407 19 for 802.11a For 15.247(2.4GHz) 11 for 802.11b, 802.11g For 15.247(5GHz) 5 for 802.11a
	For Bluetooth : 79
	For RFID : 50
MAXIMUM OUTPUT POWER	For WLAN : For 15.407 802.11a: 40.7mW For 15.247(2.4GHz) 802.11b: 83.2mW 802.11g: 93.3mW For 15.247(5GHz) 802.11a: 77.6mW
	For Bluetooth : 1.3 mW
	For RFID : PR-ASK(DRM): 660.7mW DSB-ASK(MRM): 977.2mW PR-ASK(XRM): 977.2mW
ANTENNA TYPE	Please see note 3
DATA CABLE	USB Cable x 1 (Part No.: 25-67868-03R) (only for test, not for sale together)
I/O PORTS	USB port x 1, Audio port x 1
ASSOCIATED DEVICES	Battery x 1

NOTE:

1. There are Bluetooth technology, RFID technology and WLAN technology used for the EUT. <the Bluetooth test data please refer "RF981015H02-2, the RFID test data please refer "RF981015H02-3>
2. The EUT was pre-tested under the following modes:

Test Mode	Description
Mode A	X-Y plane
Mode B	Z-X plane
Mode C	Z-Y plane

From the above modes, the worst emission level was found in **Mode A**. Therefore only the test data of the mode was recorded in this report individually.

3. There are four antennas provided to this EUT, please refer to the following table:

For WLAN (RX has diversity function)					
No.	Model	Antenna Type	Gain (dBi)	Connector Type	Frequency range (MHz)
1	OZONE WLAN 1	PCB(TX,RX)	2.96 (2.4G) 4.16 (5G)	N/A	2400~2850 4920~5850
2	OZONE WLAN 2	PIFA(RX only)	3.45 (2.4G) 3.32 (5G)	N/A	2400~2850 4920~5850
For Bluetooth					
No.	Model	Antenna Type	Gain (dBi)	Connector Type	Frequency range (MHz)
1	Mica 2.4GHz	SMD	-0.45	N/A	2400~2500
For RFID					
No.	Model	Antenna Type	Gain (dBi)	Connector Type	Frequency range (MHz)
1	OZONE RFID	Hor- dipole, outside antenna, Ver- slot, inside antenna	1.7483(Max)	N/A	902~928

4. The EUT could be supplied with the a charger, power adapter and Li-ion battery as below table:

Cradle (only for test, not for sale together)	
Brand:	SYMBOL
Part No.:	CRD3000-1001RR
Input power :	+12V-----3.3A
I/O Ports:	USB Port x 1 RJ-45(console) Port x 1
Associated devices:	USB cable x 1 (Part No.: 25-68596-01R) (1.6m, Unshielded without core) RJ-45(console) cable x 1 (Part No.: 25-63852-01R) (1.8m, Unshielded without core) Adapter x 1 (Part No.: 50-14000-148R)
Adapter (only for Cradle use, not for sale together)	
Brand:	HIPRO
Model No.:	HP-O2040D43
Part No.:	50-14000-148R
Input power :	100-240V, 50-60Hz, 1.5A
Output power :	+12V-----3.33A DC output cable (1.8m, Unshielded)



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Adapter (only for test, not for sale together)	
Brand:	MOTOROLA
Model No.:	EADP-16BB A
Part No.:	50-14000-249R
Input power :	100-240V, 50-60Hz, 0.4A
Output power :	+5.4V-----3.0A DC output cable (1.8m, Unshielded)
Li-ion Battery 1	
Brand:	MOTOROLA/ Palladium Energy Inc
Model No.:	82-127909-01
RATING:	3.7V, 4800mAh
Li-ion Battery 2	
Brand:	Symbol/ Sole Energy Tech Corp.
Model No.:	55-060112-05
RATING:	3.7V, 4400mAh

5. The EUT operates in both the 5GHz and 2.4GHz Bands and compatibility with 802.11a, 802.11b, 802.11g, RFID technology and Bluetooth technology.
6. RFID and scanner have no function while the EUT is under charger condition.
7. The above EUT information was declared by the manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.

3.2 DESCRIPTION OF TEST MODES

Operated in 2400 ~ 2483.5MHz band:

Eleven channels are provided for 802.11b, 802.11g:

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

Operated in 5725 ~ 5850MHz band:

Five channels are provided for 802.11a:

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

3.2.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

The device has different accessory, therefore the worst case base on investigation by different combination for each test item and its data was recorded in this report.

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	PLC	RE < 1G	RE ≥ 1G	APCM	
A			√	√	Scanner Stand-alone
B	√	√			Scanner + Cradle + adapter

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

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)	EUT CONFIGURE MODE
For 2.4 GHz 802.11g	1 to 11	1	OFDM	BPSK	6	B
For 5 GHz 802.11a	149 to 165	165	OFDM	BPSK	6	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)	EUT CONFIGURE MODE
For 2.4 GHz 802.11g	1 to 11	1	OFDM	BPSK	6	B
For 5 GHz 802.11a	149 to 165	165	OFDM	BPSK	6	B



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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)	EUT CONFIGURE MODE
802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1	A
802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6	A
802.11a	149 to 165	149, 157, 165	OFDM	BPSK	6	A

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)	EUT CONFIGURE MODE
802.11b	1 to 11	1, 11	DSSS	DBPSK	1	A
802.11g	1 to 11	1, 11	OFDM	BPSK	6	A
802.11a	149 to 165	149, 165	OFDM	BPSK	6	A

ANTENNA PORT CONDUCTED MEASUREMENT:

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

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)	EUT CONFIGURE MODE
802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1	A
802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6	A
802.11a	149 to 165	149, 157, 165	OFDM	BPSK	6	A



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3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

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

FCC Part 15, Subpart C. (15.247)

ANSI C63.4-2003

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

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



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3.4 DESCRIPTION OF SUPPORT UNITS

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

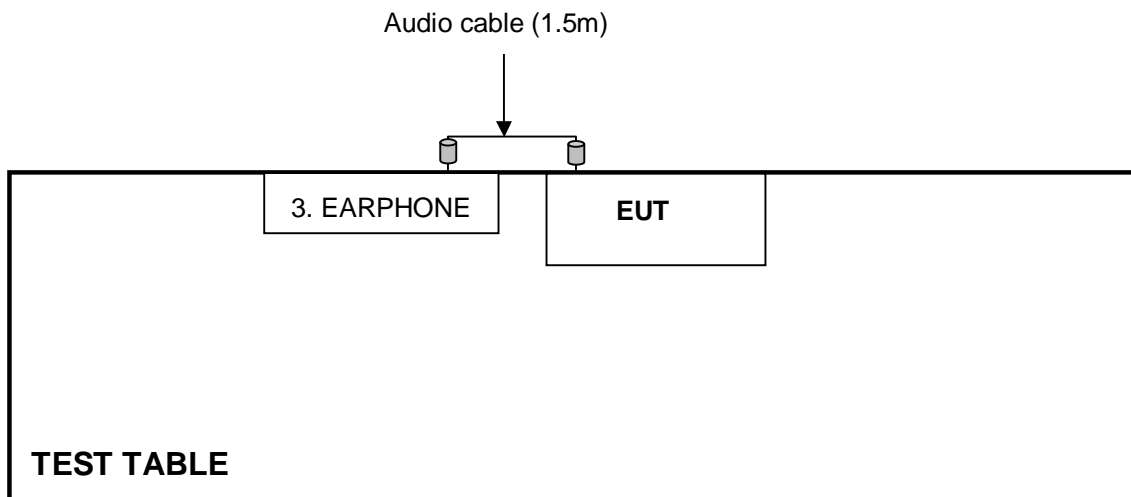
NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	NOTEBOOK COMPUTER	DELL	PP18L	12252644560	FCC DoC
2	MONITOR	DELL	E228WFPc	CN-OX765G-6418 0-88P-09ZM	FCC DoC
3	PRINTER	HP	hp deskjet 3535	TH45P164GT	NA
4	EARPHONE	VXI	A380800253	50-11300-050R	NA
5	MOUSE	DELL	M056UOA	FOROBSN	FCC DoC
6	WIRELESS ACCESS POINT	Air Station	WLA-G54	N/A	NA
7	BATTERY	MOTOROLA	82-127909-01	N/A	NA
8	CRADLE	SYMBOL	CRD3000-1001RR	N/A	NA

No.	Signal cable description
1	USB Cable, 1.8m, Shielded and RS232 Cable, 1.8m
2	1.8 m braid shielded wire, terminated with VGA connector via metallic frame, with two cores.
3	1.8 m braid shielded wire, terminated with DB25 and centronics connector via metallic frame, w/o core
4	Audio Cable, 1.5m with two cores.
5	1.8m foil shielded wire, USB Connector, w/o core.
6	NA
7	NA
8	NA

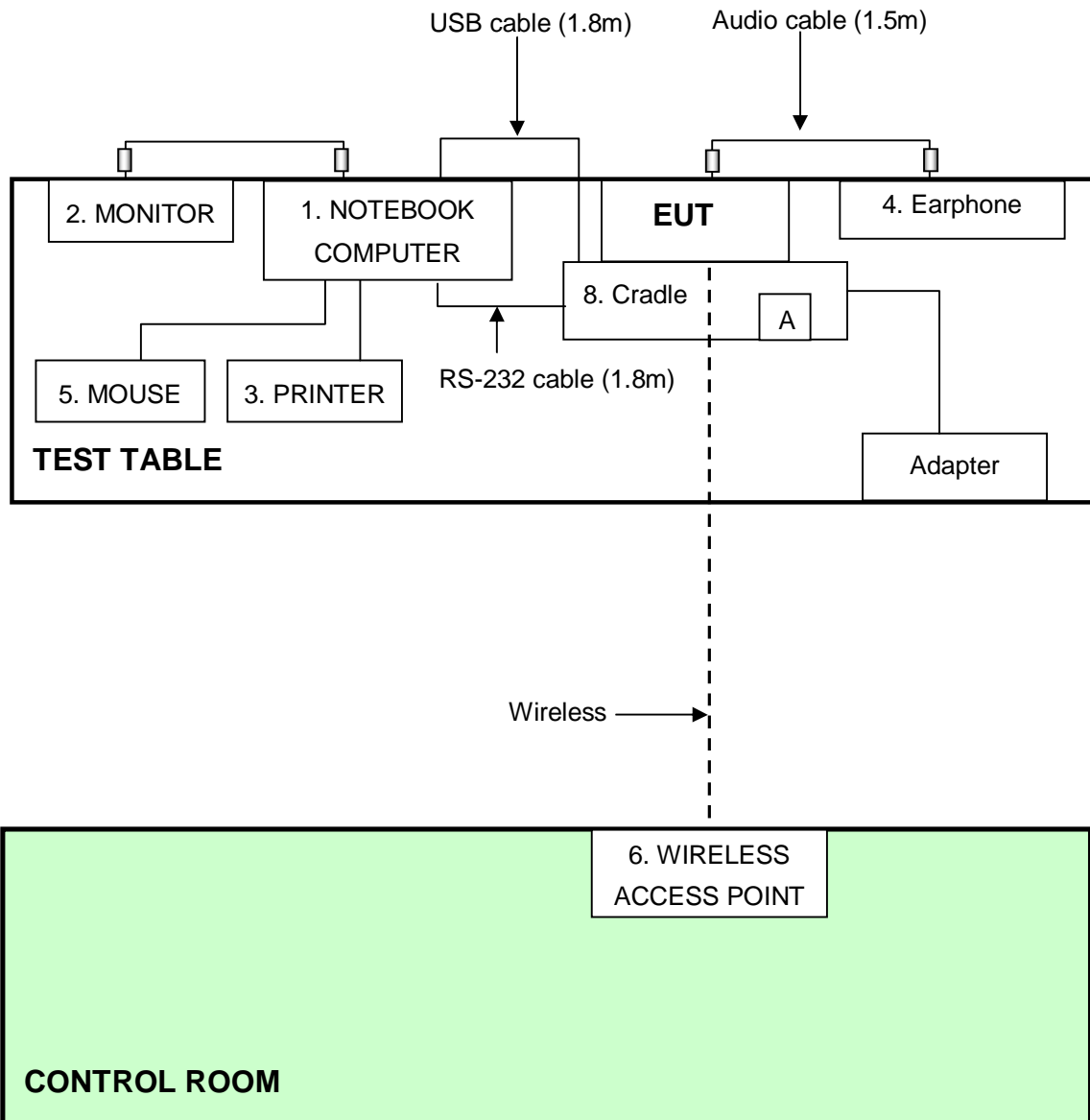
Note: 1. All power cords of the above support units are unshielded (1.8m).

3.5 CONFIGURATION OF SYSTEM UNDER TEST

For Scanner Stand-alone Mode:



For Scanner + Cradle + adapter Mode:



NOTE: 1. Item A is the Battery (Support unit 7).



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4. TEST TYPES AND RESULTS (802.11b & g, 2400 ~ 2483.5MHz Band)

4.1 CONDUCTED EMISSION MEASUREMENT

4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

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

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

4.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
ROHDE & SCHWARZ Test Receiver	ESCS 30	100287	Mar. 05, 2009	Mar. 04, 2010
Line-Impedance Stabilization Network (for EUT)	KNW-407	8-1395-12	May 04, 2009	May 03, 2010
Line-Impedance Stabilization Network (for Peripheral)	ENV-216	100072	June 08, 2009	June 07, 2010
RF Cable (JYEBAO)	5DFB	COACAB-001	Dec 15, 2008	Dec 14, 2009
50 ohms Terminator	50	3	Nov. 05, 2008	Nov. 04, 2009
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.

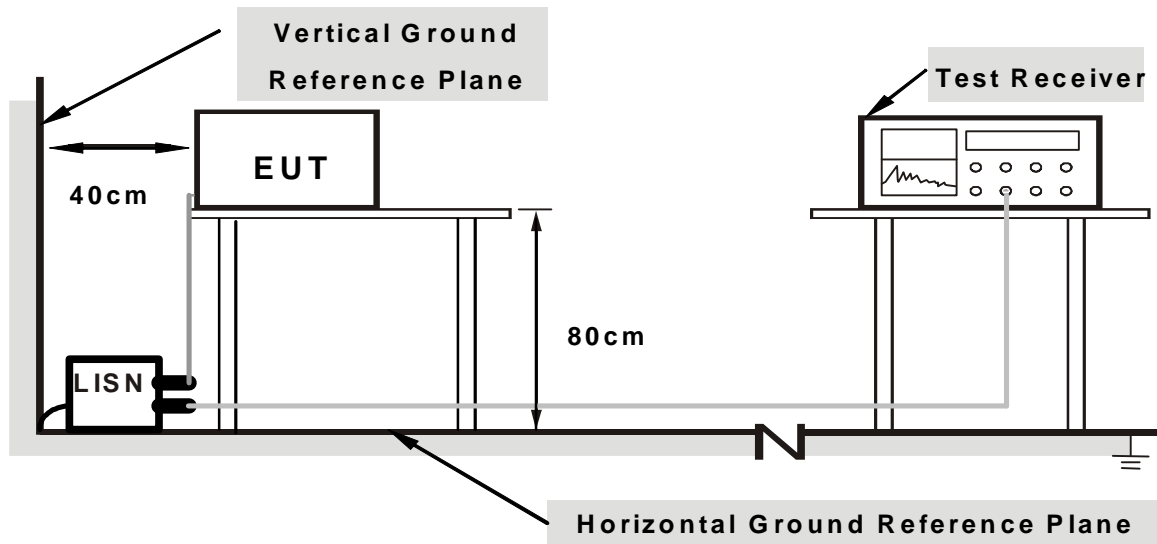
4.1.3 TEST PROCEDURES

- 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 provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) were 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. Set the EUT under charger condition via cradle.
2. EUT runs the test program "EMI.exe" to transmission/receiving condition continuously with Support unit 1 (Notebook Computer) via one USB cable
3. EUT plays music and sends "H" messages to printer, and the printer prints them on paper.
4. EUT runs the test program "ICMP Ping.exe" to communicate with Support unit 6 (Access Point) via wireless transmission.
5. The support unit 7 (battery) is charging from cradle continuously.

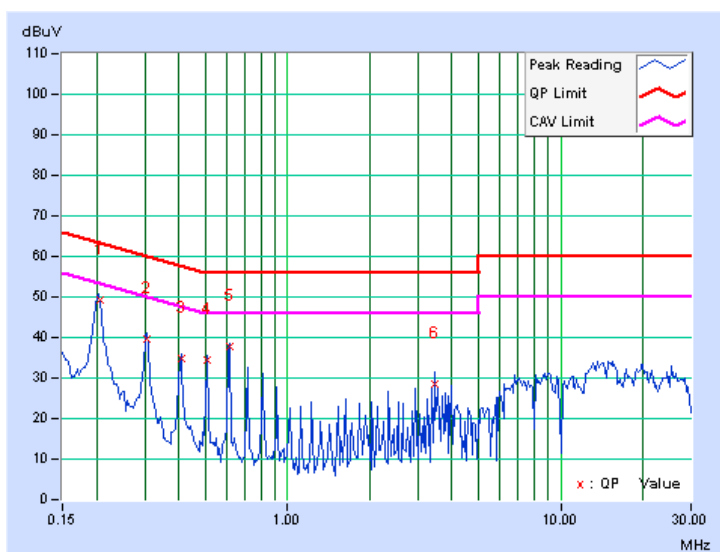
4.1.7 TEST RESULTS

802.11g OFDM MODULATION:

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	PHASE	Line (L)
MODULATION TYPE	BPSK	6dB BANDWIDTH	9 kHz
TRANSFER RATE	6Mbps	INPUT POWER (SYSTEM)	120Vac, 60 Hz
ENVIRONMENTAL CONDITIONS	25deg. C, 66%RH, 965hPa	TESTED BY	Andy Ho

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	0.205	0.17	49.23	-	49.40	-	63.40
2	0.306	0.12	39.67	-	39.79	-	60.07	50.07	-20.28	-
3	0.408	0.08	34.90	-	34.98	-	57.69	47.69	-22.71	-
4	0.509	0.08	34.38	-	34.46	-	56.00	46.00	-21.54	-
5	0.611	0.07	37.72	-	37.79	-	56.00	46.00	-18.21	-
6	3.460	0.12	28.25	-	28.37	-	56.00	46.00	-27.63	-

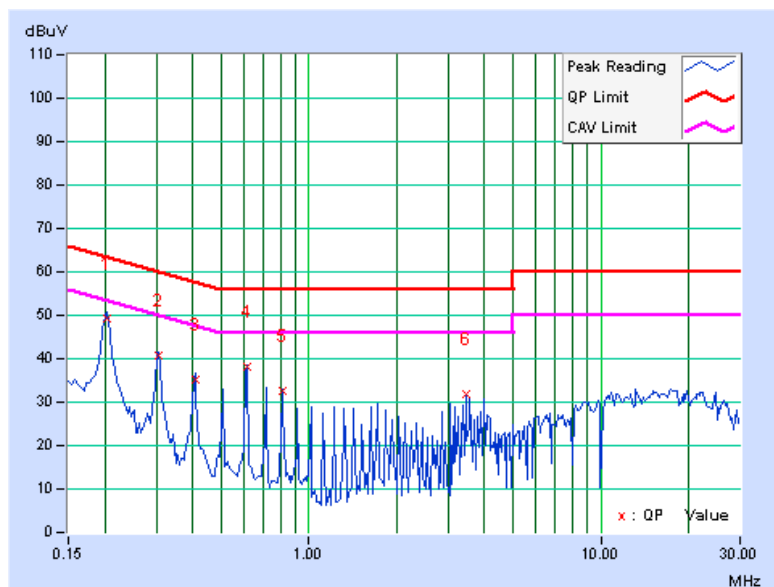
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
 3. The emission levels of other frequencies were very low against the limit.
 4. Margin value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



EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	PHASE	Neutral (N)
MODULATION TYPE	BPSK	6dB BANDWIDTH	9 kHz
TRANSFER RATE	6Mbps	INPUT POWER (SYSTEM)	120Vac, 60 Hz
ENVIRONMENTAL CONDITIONS	25deg. C, 66%RH, 965hPa	TESTED BY	Andy Ho

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	0.205	0.18	49.09	-	49.27	-	63.42
2	0.305	0.13	40.49	-	40.62	-	60.10	50.10	-19.48	-
3	0.408	0.09	35.10	-	35.19	-	57.69	47.69	-22.50	-
4	0.611	0.09	38.02	-	38.11	-	56.00	46.00	-17.89	-
5	0.814	0.08	32.54	-	32.62	-	56.00	46.00	-23.38	-
6	3.459	0.14	31.61	-	31.75	-	56.00	46.00	-24.25	-

- 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.



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4.2.2 TEST INSTRUMENTS

For radiated emission test (Below 1 GHz):

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
ADVANTEST Spectrum Analyzer	U3751	170100022	Nov. 17, 2008	Nov. 16, 2009
ADVANTEST Spectrum Analyzer	U3772	160100280	July 26, 2009	July 25, 2010
HP Pre_Amplifier	8449B	3008A01922	Sep. 25, 2009	Sep. 24, 2010
ROHDE & SCHWARZ Test Receiver	ESCS 30	100027	May 05, 2009	May 04, 2010
SCHWARZBECK Broadband Antenna	VULB-9168	263	April 29, 2009	April 28, 2010
Schwarzbeck Horn_Antenna	BBHA9120	D123	Sep. 21, 2009	Sep. 20, 2010
Schwarzbeck Horn_Antenna	BBHA 9170	BBHA9170153	Jan. 23, 2009	Jan. 22, 2010
RF Switches	EM-H-01-1	1009	Aug. 10, 2009	Aug. 09, 2010
RF Cable	8DFB	STACAB-30M-1GHz-091	Feb. 19, 2009	Feb. 18, 2010
Software	ADT_Radiated_V7.6.15.9.2	NA	NA	NA
CT Antenna Tower & Turn Table	TT100	ADT01	NA	NA
CORCOM AC Filter	MRI2030	107/108	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, HP preamplifier (model: 8449B) and Spectrum Analyzer (model: U3772) are used only for the measurement of emission frequency above 1GHz if tested.

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

4. The VCCI Site Registration No. is R-782.

5. The FCC Site Registration No. is 91097.

6. The CANADA Site Registration No. is IC 7450G-1.



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For radiated emission test (Above 1 GHz):

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
ROHDE & SCHWARZ Spectrum Analyzer	FSP40	100036	Dec. 09, 2008	Dec. 08, 2009
Agilent PSA Spectrum Analyzer	E4446A	MY46180622	Apr. 24 , 2009	Apr. 23 , 2010
HP Pre_Amplifier	8449B	3008A01923	Nov. 10, 2008	Nov. 09, 2009
ROHDE & SCHWARZ Test Receiver	ESCS30	847124/029	Aug. 28, 2009	Aug. 28, 2010
SCHWARZBECK TRILOG Broadband Antenna	VULB 9168	138	Apr. 29, 2009	Apr. 28, 2010
Schwarzbeck Horn_Antenna	BBHA9120	D124	Dec. 09, 2008	Dec. 08, 2009
Schwarzbeck Horn_Antenna	BBHA 9170	BBHA9170153	Jan. 22, 2009	Jan. 21, 2010
RF Switches	EMH-011	08009	Sep. 26, 2009	Sep. 25, 2010
RF CABLE (Chaintek)	Sucoflex 106	28077	Aug. 14, 2009	Aug. 13, 2010
RF Cable	8D	STCCAB-001	Sep. 26, 2009	Sep. 25, 2010
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, HP 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.



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4.2.3 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 10 meter open area test site. 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.

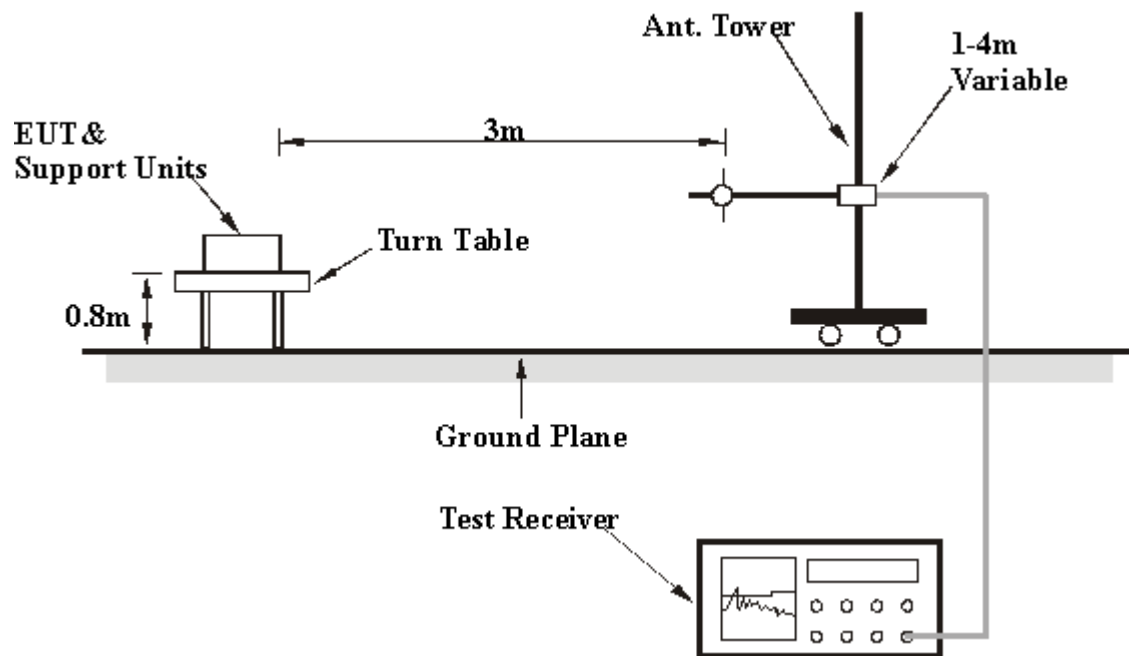
NOTE:

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.

4.2.4 DEVIATION FROM TEST STANDARD

No deviation

4.2.5 TEST SETUP



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

4.2.6 EUT OPERATING CONDITIONS

For Scanner Stand-alone Mode:

1. EUT runs the test program " SymbolCECTxRx" to transmission/receiving condition continuously.

For Scanner + Cradle + adapter Mode:

1. Set the EUT under charger condition via cradle.
2. EUT runs the test program "EMI.exe" to transmission/receiving condition continuously with Support unit 1 (Notebook Computer) via one USB cable
3. EUT plays music and sends "H" messages to printer, and the printer prints them on paper.
4. EUT runs the test program "ICMP Ping.exe" to communicate with Support unit 6 (Access Point) via wireless transmission.
5. The support unit 7 (battery) is charging from cradle continuously.

4.2.7 TEST RESULTS

BELOW 1GHz WORST-CASE DATA : 802.11g OFDM MODULATION

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	FREQUENCY RANGE	Below 1000MHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	24deg. C, 68%RH 965 hPa	TESTED BY	Max Tseng

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	115.00	30.04 QP	43.50	-13.46	2.52 H	212	18.37	11.67
2	149.04	33.75 QP	43.50	-9.75	2.27 H	200	18.40	15.35
3	195.05	32.51 QP	43.50	-10.99	1.98 H	174	20.51	12.00
4	212.95	30.55 QP	43.50	-12.95	2.30 H	118	18.45	12.10
5	400.00	36.91 QP	46.00	-9.09	1.87 H	150	18.65	18.26
6	500.00	38.46 QP	46.00	-7.54	1.74 H	121	17.40	21.06
7	998.40	39.99 QP	54.00	-14.01	1.00 H	33	11.16	28.83
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	71.42	30.90 QP	40.00	-9.10	1.00 V	115	18.83	12.07
2	112.80	32.36 QP	43.50	-11.14	1.00 V	220	20.92	11.44
3	152.35	33.23 QP	43.50	-10.27	1.00 V	178	17.96	15.27
4	196.59	31.56 QP	43.50	-11.94	1.00 V	323	19.69	11.87
5	500.00	37.53 QP	46.00	-8.47	1.00 V	196	16.47	21.06
6	998.50	38.95 QP	54.00	-15.05	1.52 V	122	10.12	28.83

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



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ABOVE 1GHz WORST-CASE DATA

802.11b DSSS MODULATION

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 60%RH 965 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	2390.00	63.18 PK	74.00	-10.82	1.21 H	177	32.90	30.28
2	2390.00	47.75 AV	54.00	-6.25	1.21 H	177	17.47	30.28
3	*2412.00	105.10 PK			1.21 H	177	74.74	30.36
4	*2412.00	102.06 AV			1.21 H	177	71.70	30.36
5	4824.00	51.70 PK	74.00	-22.30	1.14 H	306	14.91	36.79
6	4824.00	45.39 AV	54.00	-8.61	1.14 H	306	8.60	36.79
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	56.04 PK	74.00	-17.96	1.32 V	234	25.76	30.28
2	2390.00	43.82 AV	54.00	-10.18	1.32 V	234	13.54	30.28
3	*2412.00	101.12 PK			1.33 V	234	70.76	30.36
4	*2412.00	98.23 AV			1.33 V	234	67.87	30.36
5	4824.00	52.03 PK	74.00	-21.97	1.02 V	166	15.24	36.79
6	4824.00	46.11 AV	54.00	-7.89	1.02 V	166	9.32	36.79

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



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 6	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 60%RH 965 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	*2437.00	104.90 PK			1.37 H	176	74.44	30.46
2	*2437.00	102.04 AV			1.37 H	176	71.58	30.46
3	4874.00	52.67 PK	74.00	-21.33	1.09 H	214	15.75	36.92
4	4874.00	47.72 AV	54.00	-6.28	1.09 H	214	10.80	36.92
5	7311.00	55.40 PK	74.00	-18.60	1.02 H	305	12.26	43.14
6	7311.00	43.42 AV	54.00	-10.58	1.02 H	305	0.28	43.14
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	98.71 PK			1.27 V	235	68.25	30.46
2	*2437.00	96.17 AV			1.27 V	235	65.71	30.46
3	4874.00	53.16 PK	74.00	-20.84	1.03 V	153	16.24	36.92
4	4874.00	49.20 AV	54.00	-4.80	1.03 V	153	12.28	36.92
5	7311.00	55.36 PK	74.00	-18.64	1.05 V	76	12.22	43.14
6	7311.00	43.26 AV	54.00	-10.74	1.05 V	76	0.12	43.14

- 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 11	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 60%RH 965 hPa	TESTED BY	Rex Huang

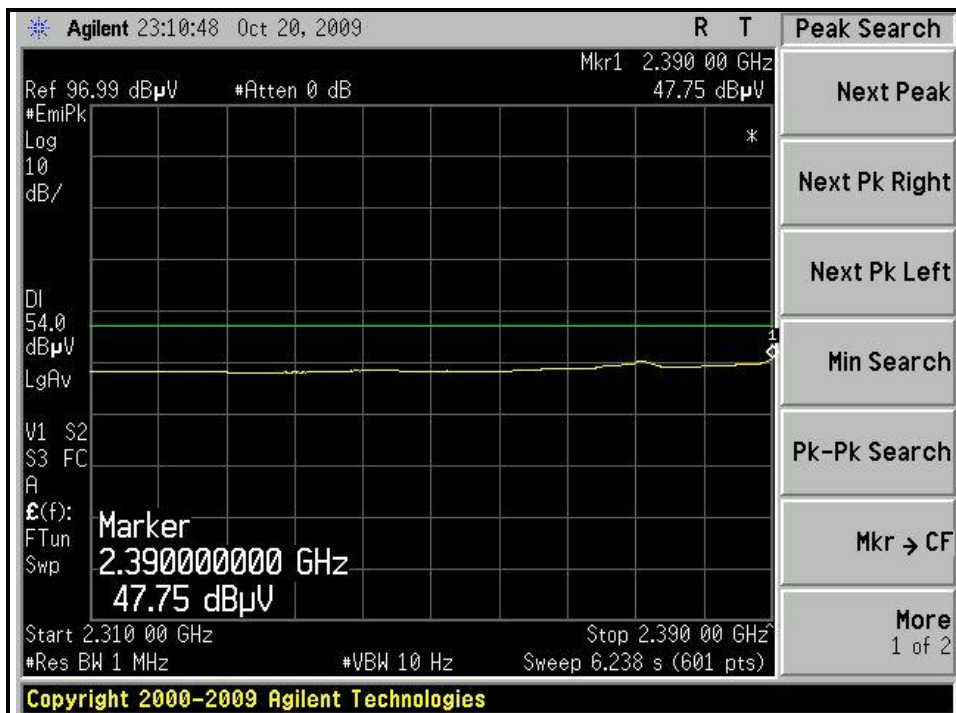
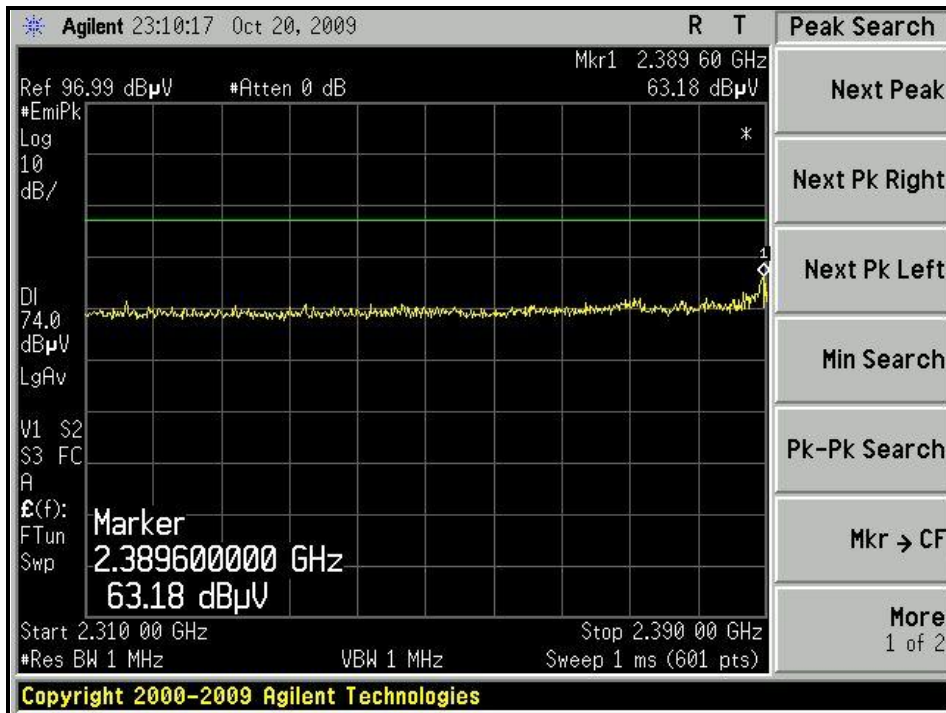
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	104.90 PK			1.39 H	172	74.35	30.55
2	*2462.00	101.92 AV			1.39 H	172	71.37	30.55
3	2483.50	58.40 PK	74.00	-15.60	1.39 H	178	27.77	30.63
4	2483.50	46.81 AV	54.00	-7.19	1.39 H	178	16.18	30.63
5	4924.00	54.50 PK	74.00	-19.50	1.12 H	191	17.44	37.06
6	4924.00	50.38 AV	54.00	-3.62	1.12 H	191	13.32	37.06
7	7386.00	54.46 PK	74.00	-19.54	1.09 H	14	11.33	43.13
8	7386.00	43.08 AV	54.00	-10.92	1.09 H	14	-0.05	43.13
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	99.12 PK			1.27 V	236	68.57	30.55
2	*2462.00	96.59 AV			1.27 V	236	66.04	30.55
3	2483.50	55.09 PK	74.00	-18.91	1.27 V	236	24.46	30.63
4	2483.50	43.76 AV	54.00	-10.24	1.27 V	236	13.13	30.63
5	4924.00	54.84 PK	74.00	-19.16	1.00 V	155	17.78	37.06
6	4924.00	50.98 AV	54.00	-3.02	1.00 V	155	13.92	37.06
7	7386.00	54.08 PK	74.00	-19.92	1.03 V	40	10.95	43.13
8	7386.00	43.04 AV	54.00	-10.96	1.03 V	40	-0.09	43.13

- 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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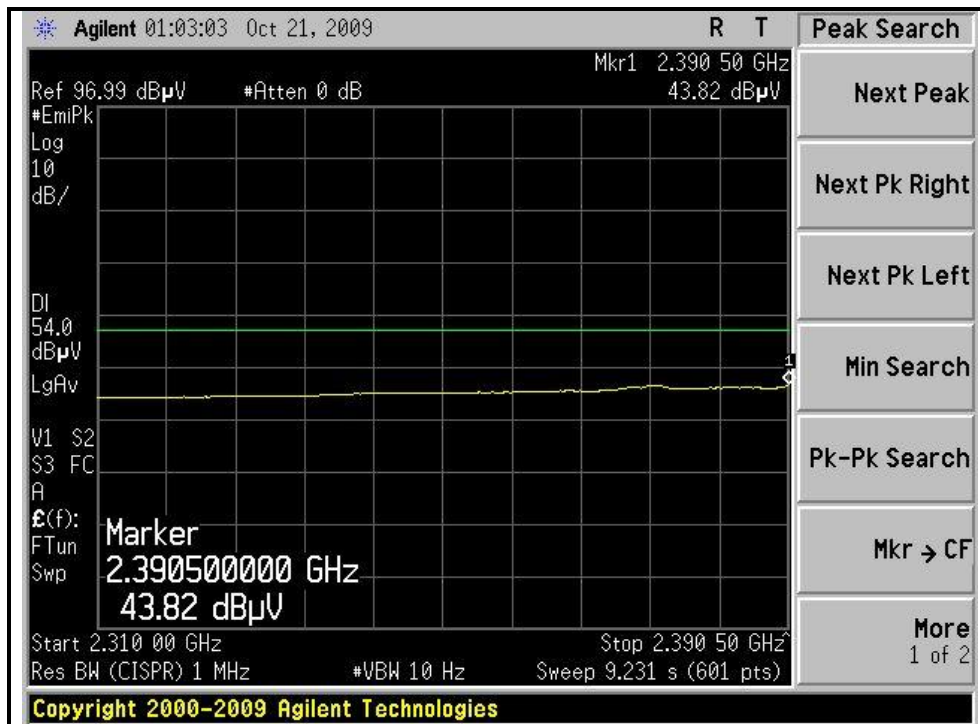
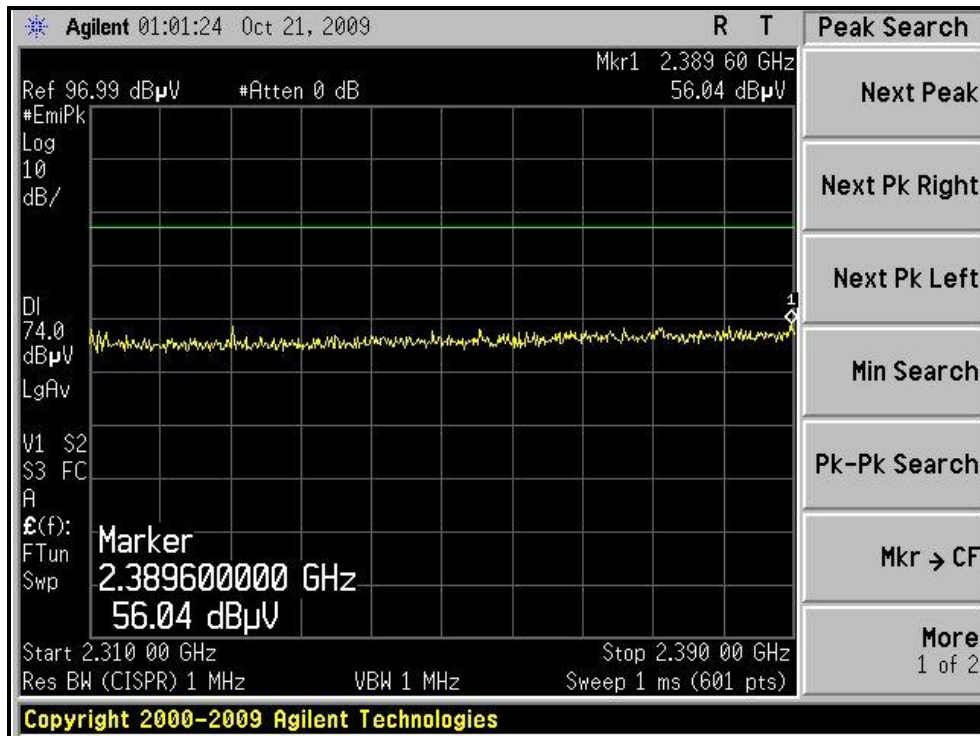
RESTRICTED BANDEDGE (802.11b MODE, CH1, HORIZONTAL)





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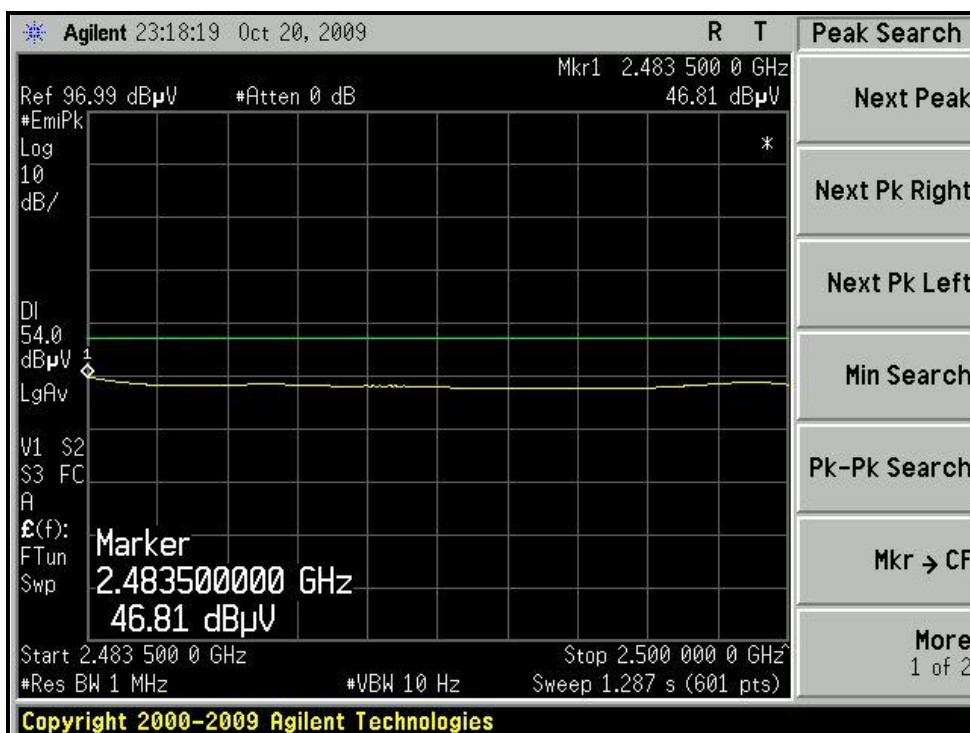
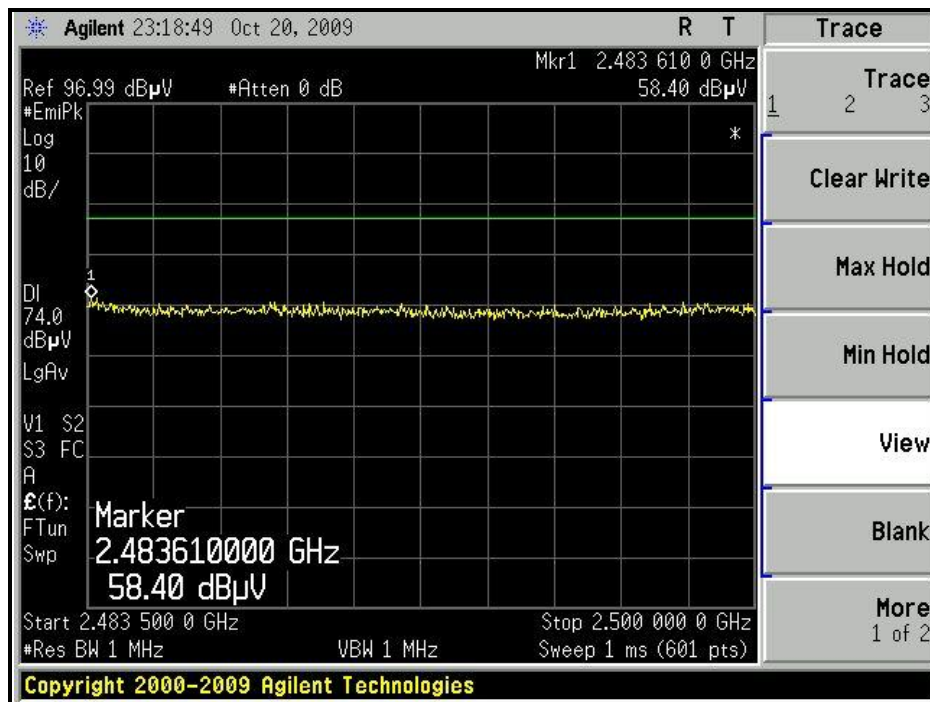
RESTRICTED BANDEDGE (802.11b MODE, CH1, VERTICAL)





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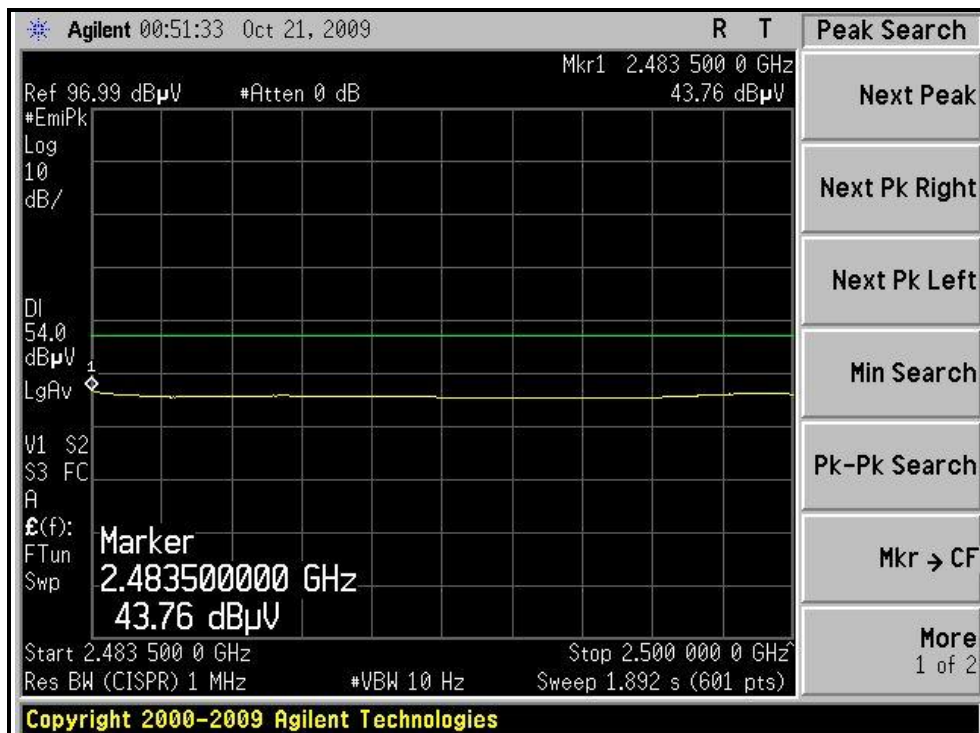
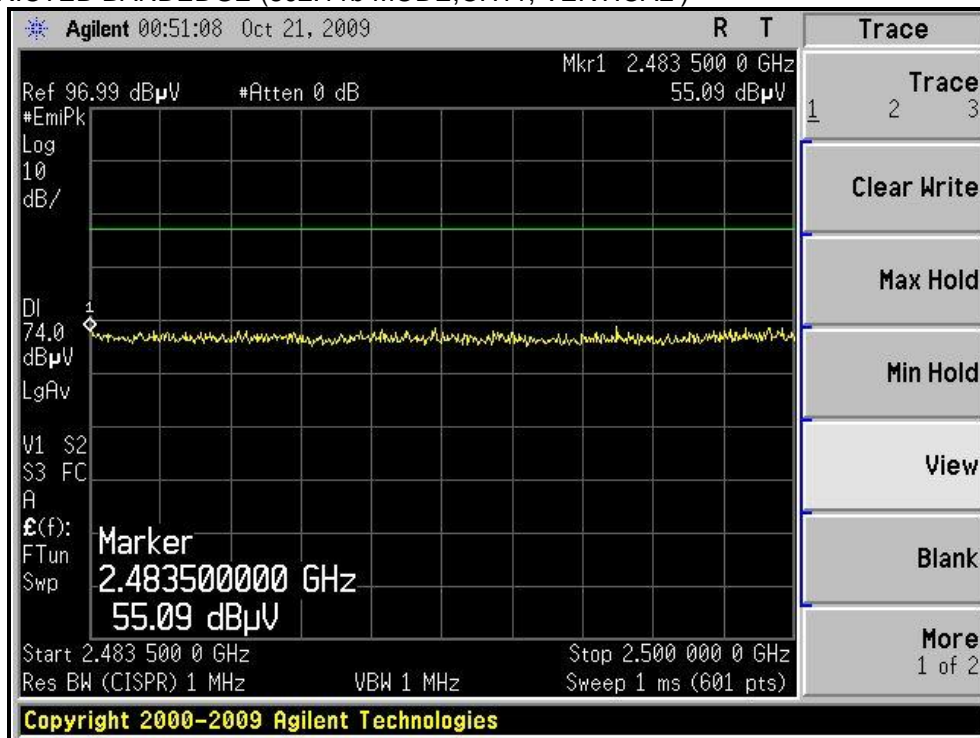
RESTRICTED BANDEDGE (802.11b MODE, CH11, HORIZONTAL)





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RESTRICTED BANDEDGE (802.11b MODE, CH11, VERTICAL)





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802.11g OFDM MODULATION

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 60%RH 965 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	2390.00	60.24 PK	74.00	-13.76	1.20 H	176	29.96	30.28
2	2390.00	48.07 AV	54.00	-5.93	1.20 H	176	17.79	30.28
3	*2412.00	104.61 PK			1.20 H	180	74.25	30.36
4	*2412.00	95.43 AV			1.20 H	180	65.07	30.36
5	4824.00	48.71 PK	74.00	-25.29	1.12 H	305	11.92	36.79
6	4824.00	35.43 AV	54.00	-18.57	1.12 H	305	-1.36	36.79

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	56.11 PK	74.00	-17.89	1.32 V	235	25.83	30.28
2	2390.00	43.87 AV	54.00	-10.13	1.32 V	235	13.59	30.28
3	*2412.00	99.93 PK			1.32 V	235	69.57	30.36
4	*2412.00	90.58 AV			1.32 V	235	60.22	30.36
5	4824.00	48.87 PK	74.00	-25.13	1.02 V	168	12.08	36.79
6	4824.00	35.99 AV	54.00	-18.01	1.02 V	168	-0.80	36.79

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



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 6	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 60%RH 965 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	*2437.00	103.67 PK			1.38 H	177	73.21	30.46
2	*2437.00	94.54 AV			1.38 H	177	64.08	30.46
3	4874.00	48.44 PK	74.00	-25.56	1.10 H	221	11.52	36.92
4	4874.00	35.79 AV	54.00	-18.21	1.10 H	221	-1.13	36.92
5	7311.00	54.16 PK	74.00	-19.84	1.04 H	312	11.02	43.14
6	7311.00	43.22 AV	54.00	-10.78	1.04 H	312	0.08	43.14
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	97.91 PK			1.27 V	235	67.45	30.46
2	*2437.00	88.58 AV			1.27 V	235	58.12	30.46
3	4874.00	48.78 PK	74.00	-25.22	1.02 V	154	11.86	36.92
4	4874.00	36.26 AV	54.00	-17.74	1.02 V	154	-0.66	36.92
5	7311.00	53.23 PK	74.00	-20.77	1.02 V	78	10.09	43.14
6	7311.00	43.14 AV	54.00	-10.86	1.02 V	78	0.00	43.14

- 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 11	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 60%RH 965 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	*2462.00	103.58 PK			1.39 H	180	73.03	30.55
2	*2462.00	94.37 AV			1.39 H	180	63.82	30.55
3	2483.50	58.33 PK	74.00	-15.67	1.39 H	180	27.70	30.63
4	2483.50	46.10 AV	54.00	-7.90	1.39 H	180	15.47	30.63
5	4924.00	48.55 PK	74.00	-25.45	1.12 H	187	11.49	37.06
6	4924.00	35.74 AV	54.00	-18.26	1.12 H	187	-1.32	37.06
7	7386.00	54.65 PK	74.00	-19.35	1.06 H	243	11.52	43.13
8	7386.00	43.11 AV	54.00	-10.89	1.06 H	243	-0.02	43.13

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

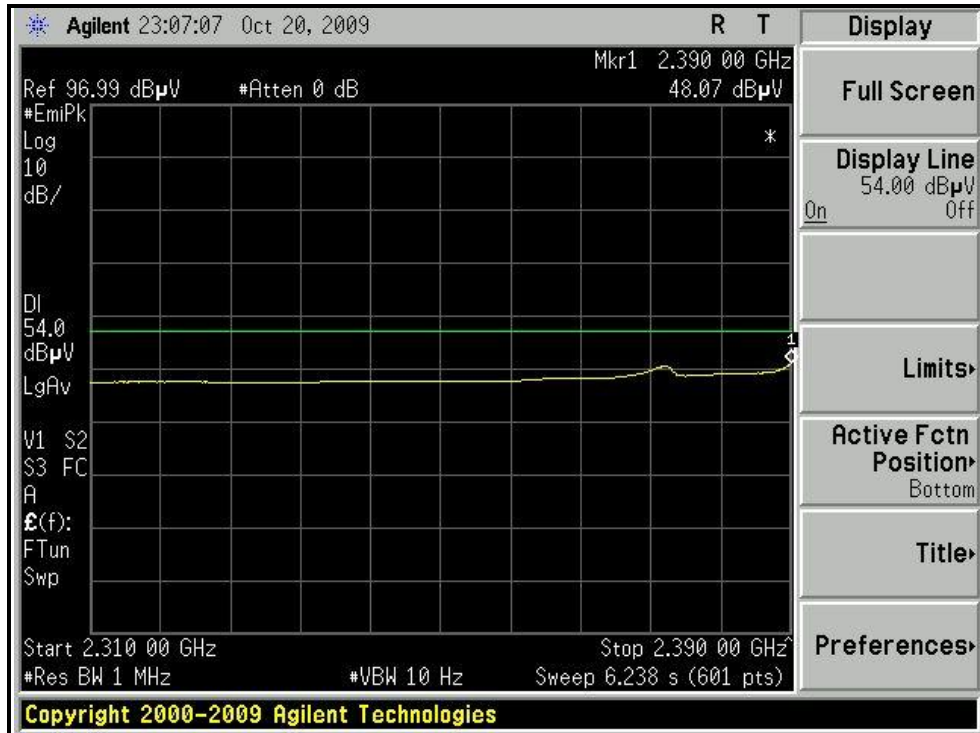
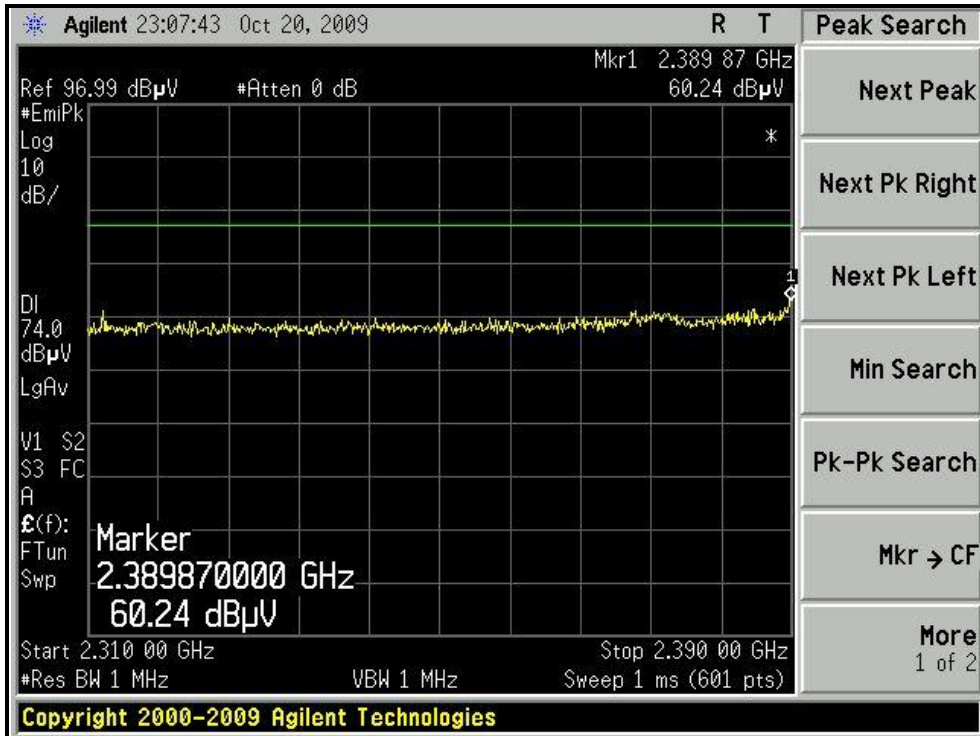
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	97.42 PK			1.26 V	236	66.87	30.55
2	*2462.00	88.26 AV			1.26 V	236	57.71	30.55
3	2483.50	55.87 PK	74.00	-18.13	1.24 V	236	25.24	30.63
4	2483.50	43.17 AV	54.00	-10.83	1.24 V	236	12.54	30.63
5	4924.00	48.62 PK	74.00	-25.38	1.02 V	146	11.56	37.06
6	4924.00	36.35 AV	54.00	-17.65	1.02 V	146	-0.71	37.06
7	7386.00	55.12 PK	74.00	-18.88	1.02 V	58	11.99	43.13
8	7386.00	42.95 AV	54.00	-11.05	1.02 V	58	-0.18	43.13

- 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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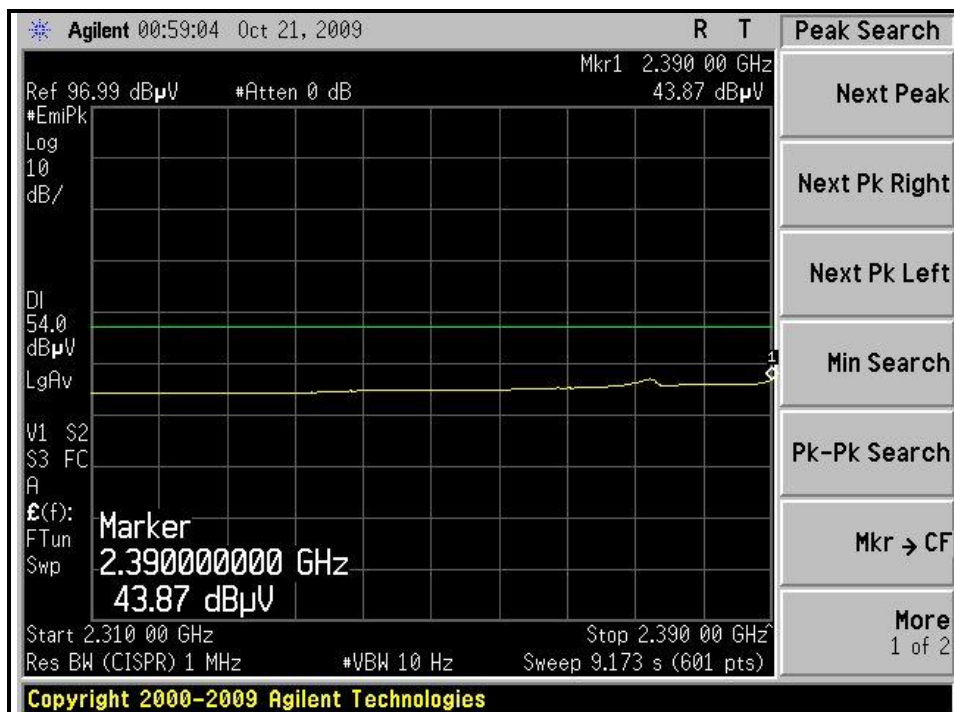
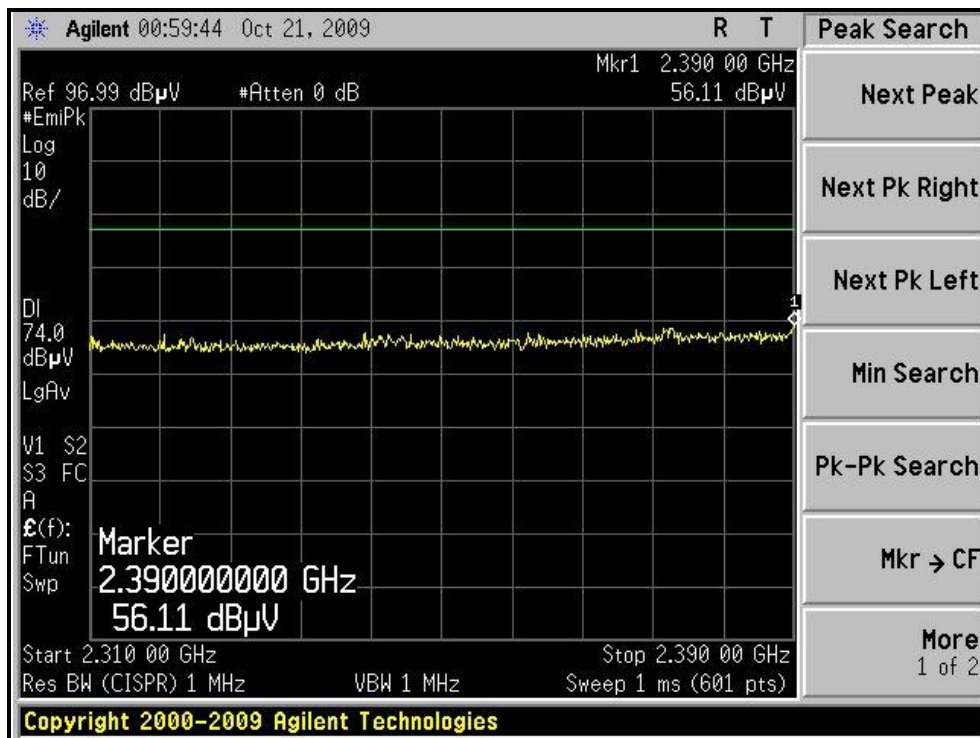
RESTRICTED BANDEDGE (802.11g MODE,CH1, HORIZONTAL)





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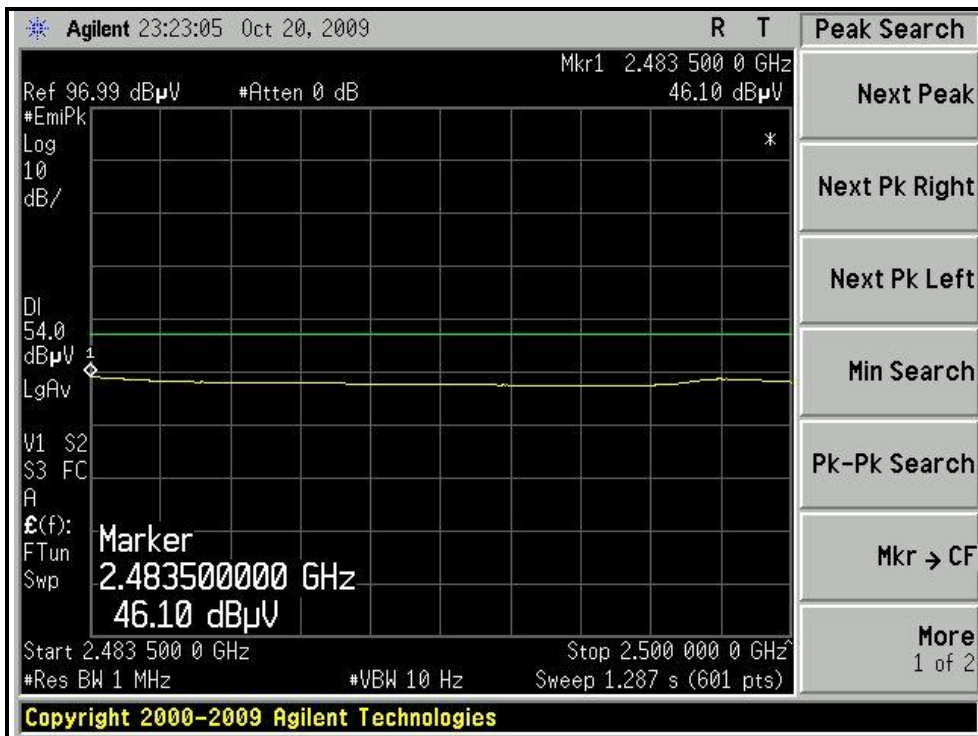
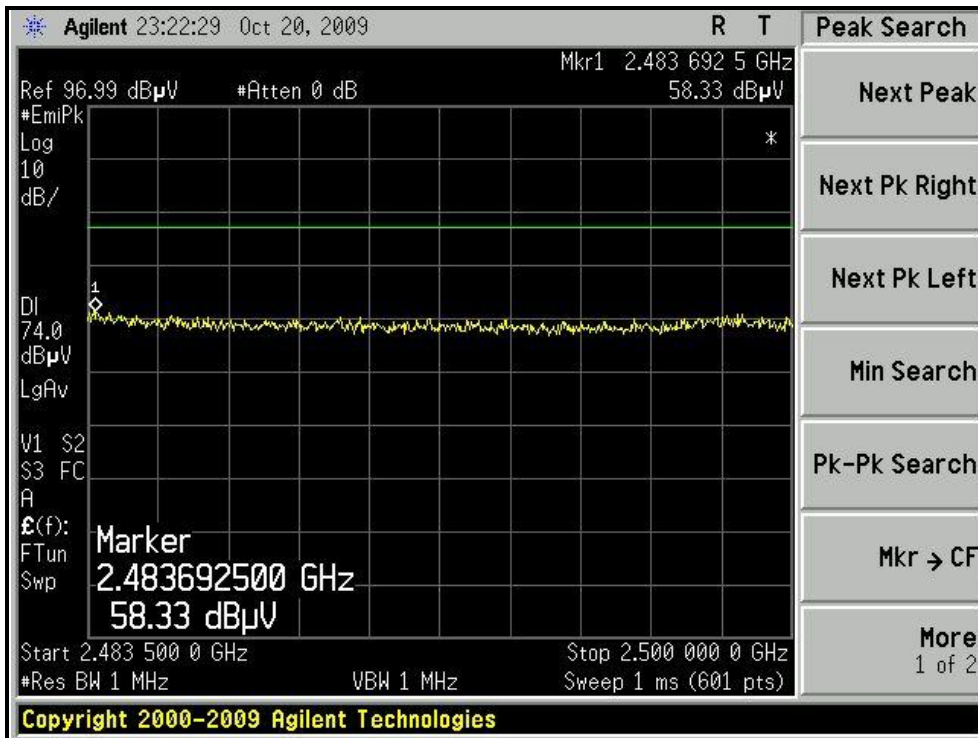
RESTRICTED BANDEDGE (802.11g MODE, CH1, VERTICAL)





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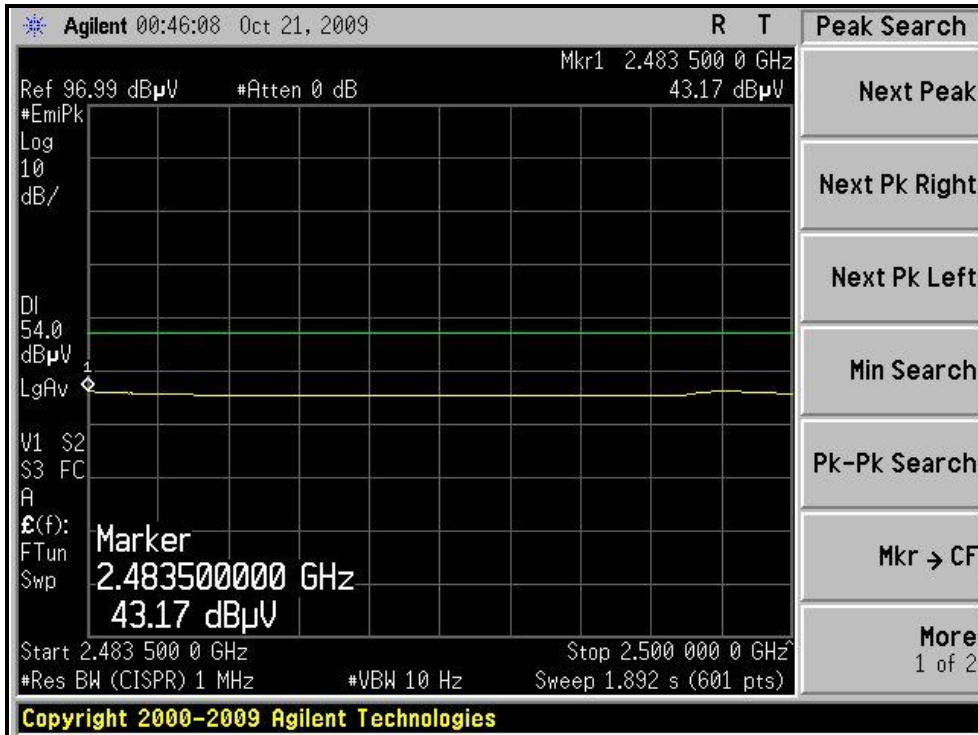
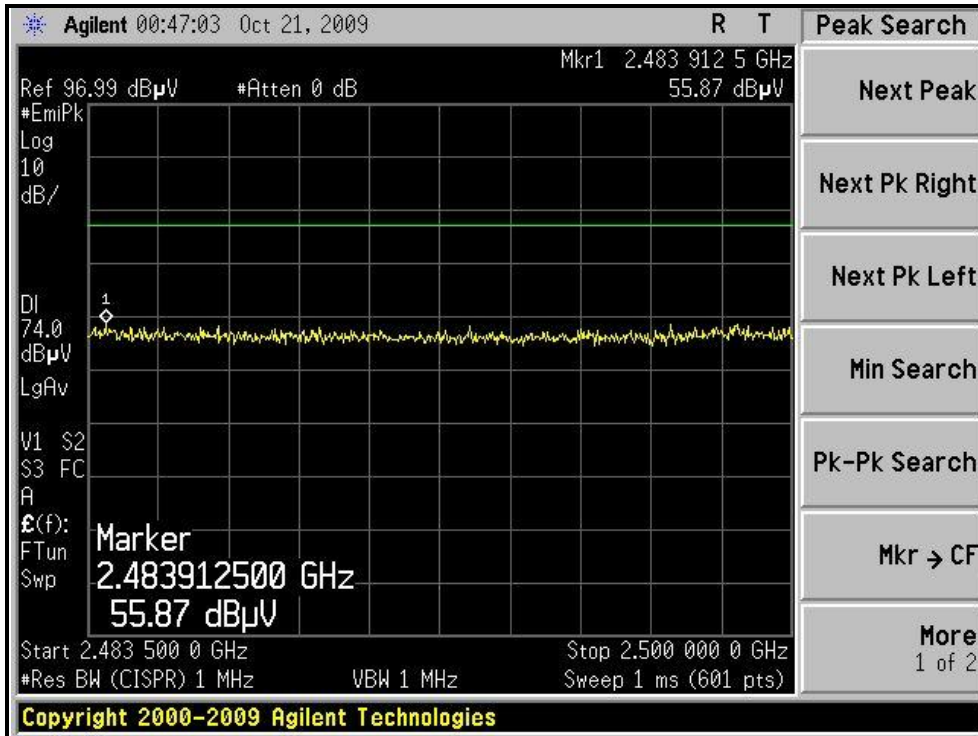
RESTRICTED BANDEDGE (802.11g MODE,CH11, HORIZONTAL)





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RESTRICTED BANDEDGE (802.11g MODE,CH11, VERTICAL)





4.3 6dB BANDWIDTH MEASUREMENT

4.3.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

4.3.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S SPECTRUM ANALYZER	FSP40	100037	Aug. 03, 2009	Aug. 02, 2010

NOTE:

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

4.3.3 TEST PROCEDURE

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

4.3.4 DEVIATION FROM TEST STANDARD

No deviation

4.3.5 TEST SETUP



4.3.6 EUT OPERATING CONDITIONS

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



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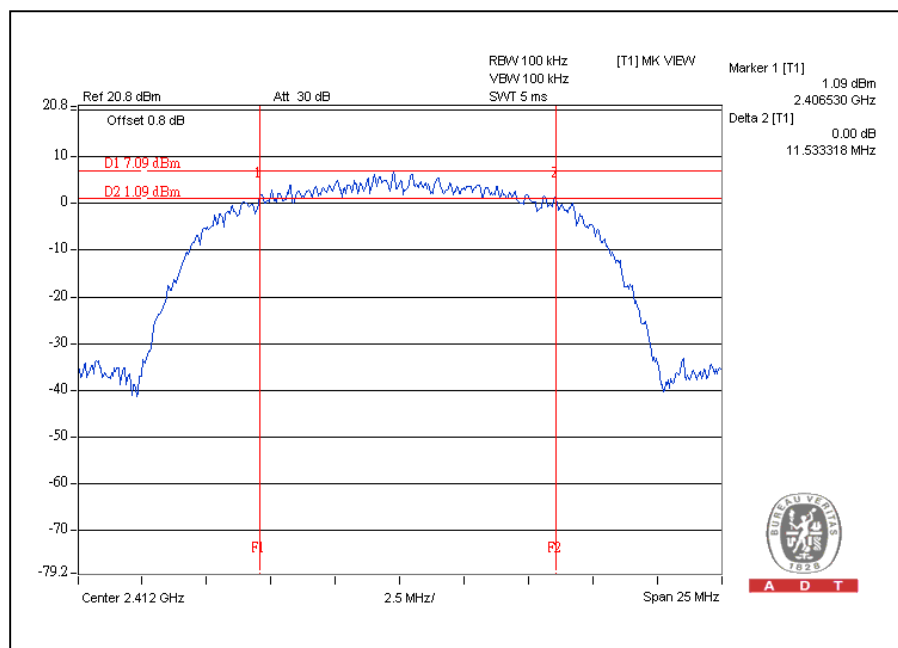
4.3.7 TEST RESULTS

802.11b DSSS MODULATION:

MODULATION TYPE	DBPSK	TRANSFER RATE	1Mbps
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	25deg.C, 60%RH, 965hPa
TESTED BY	Rex Huang		

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	11.53	0.5	PASS
6	2437	11.56	0.5	PASS
11	2462	11.56	0.5	PASS

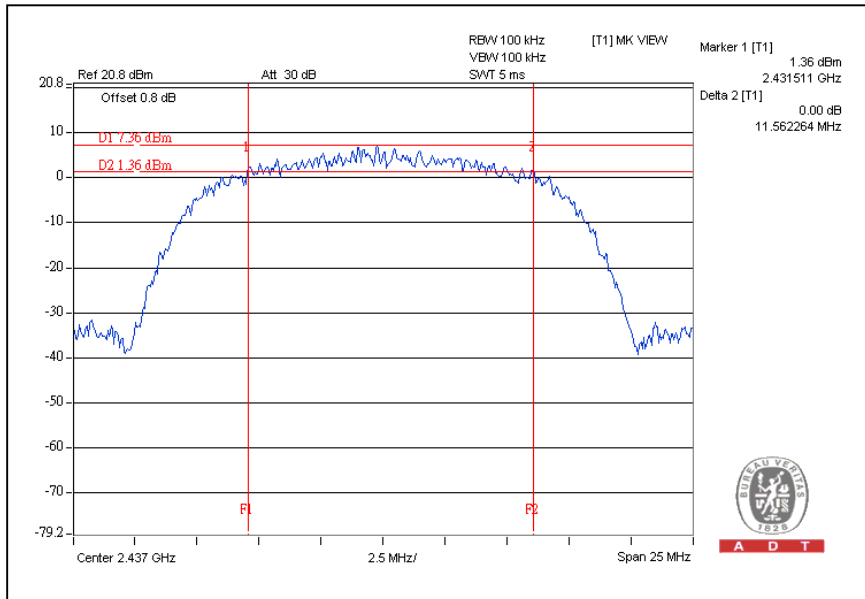
CH1



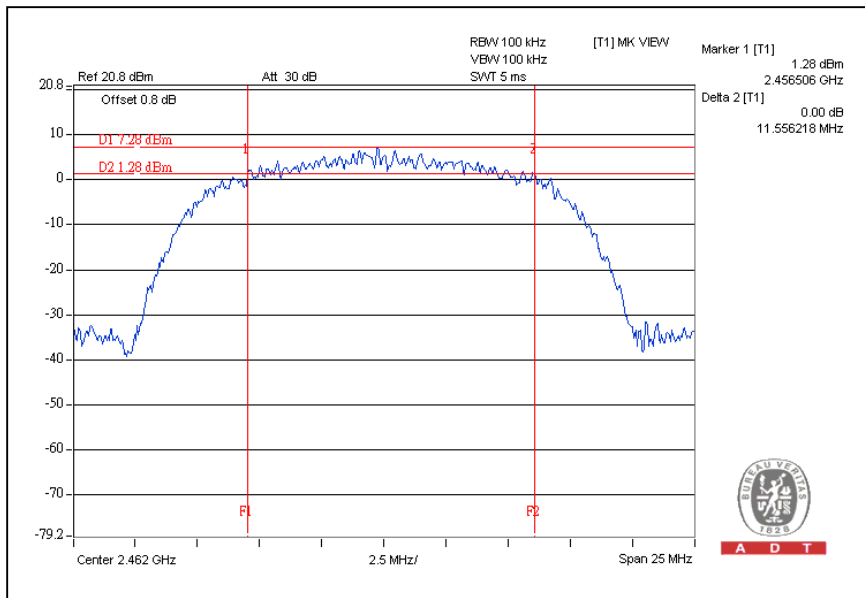


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CH6



CH11





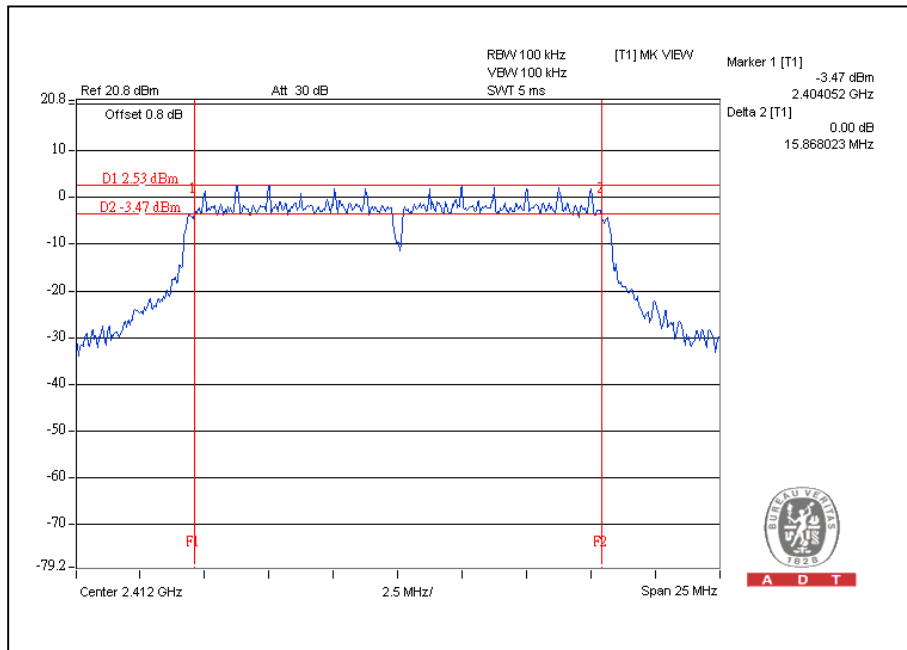
A D T

802.11g OFDM MODULATION:

MODULATION TYPE	BPSK	TRANSFER RATE	6Mbps
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	25deg.C, 60%RH, 965hPa
TESTED BY	Rex Huang		

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	15.87	0.5	PASS
6	2437	15.88	0.5	PASS
11	2462	15.81	0.5	PASS

CH1

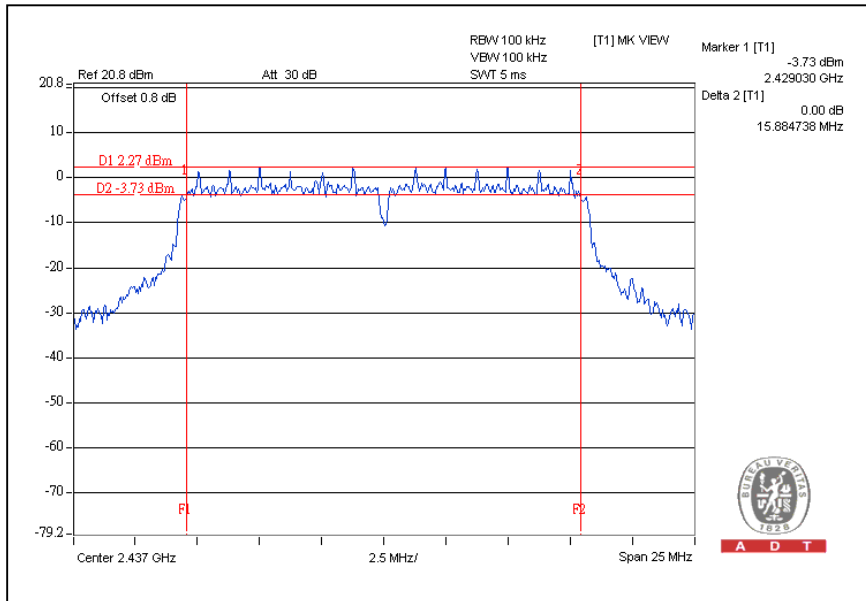


A D T

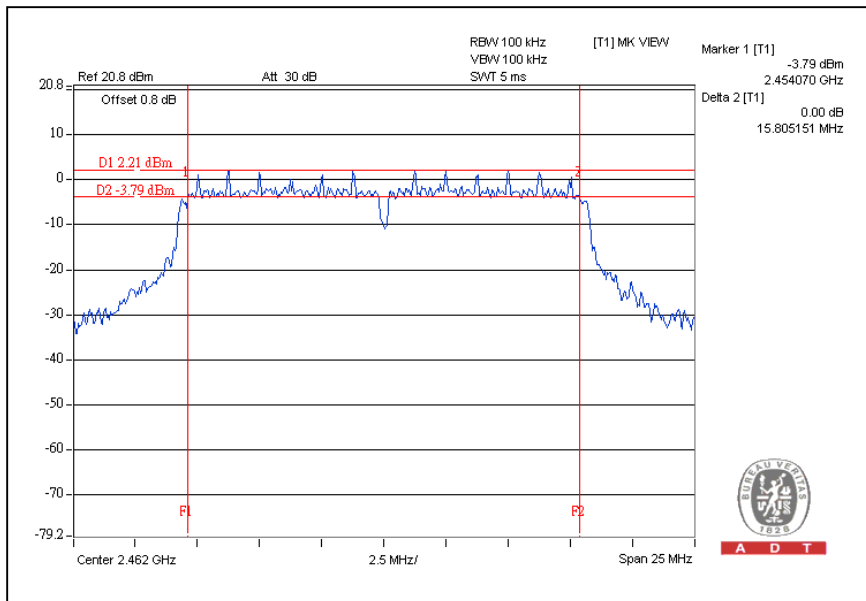


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CH6



CH11



4.4 MAXIMUM PEAK OUTPUT POWER

4.4.1 LIMITS OF MAXIMUM PEAK OUTPUT POWER MEASUREMENT

The Maximum Peak Output Power Limit is 30dBm.

4.4.2 INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Anritsu Power Meter	ML2495A	0824006	April 25, 2009	April 24, 2010
Pulse Power Sensor	MA2411B	0738172	April 25, 2009	April 24, 2010

NOTE:

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

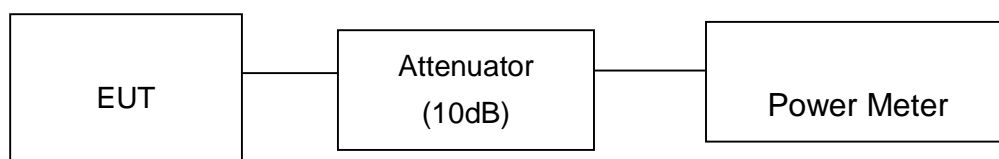
4.4.3 TEST PROCEDURES

1. The transmitter output was connected to the power meter through an attenuator; the bandwidth of the fundamental frequency was measured with the power meter.
2. Record the power level.

4.4.4 DEVIATION FROM TEST STANDARD

No deviation

4.4.5 TEST SETUP



4.4.6 EUT OPERATING CONDITIONS

Same as Item 4.3.6



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4.4.7 TEST RESULTS

802.11b DSSS MODULATION:

MODULATION TYPE	DBPSK	TRANSFER RATE	1Mbps
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	25deg.C, 60%RH, 965hPa
TESTED BY	Rex Huang		

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (dBm)	PEAK POWER OUTPUT (mW)	PEAK POWER LIMIT (dBm)	PASS / FAIL
1	2412	18.9	77.6	30	PASS
6	2437	19.2	83.2	30	PASS
11	2462	19.2	83.2	30	PASS

802.11g OFDM MODULATION:

MODULATION TYPE	BPSK	TRANSFER RATE	6Mbps
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	25deg.C, 60%RH, 965hPa
TESTED BY	Rex Huang		

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (dBm)	PEAK POWER OUTPUT (mW)	PEAK POWER LIMIT (dBm)	PASS / FAIL
1	2412	19.7	93.3	30	PASS
6	2437	19.5	89.1	30	PASS
11	2462	19.2	83.2	30	PASS



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4.5 AVERAGE OUTPUT POWER

4.5.1 FOR REFERENCE.

4.5.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Anritsu Power Meter	ML2495A	0824006	April 25, 2009	April 24, 2010
Pulse Power Sensor	MA2411B	0738172	April 25, 2009	April 24, 2010

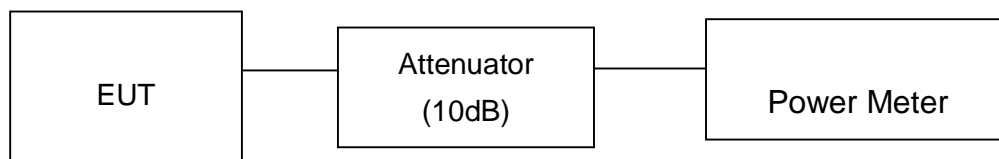
NOTE:

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 power meter through an attenuator, the bandwidth of the fundamental frequency was measured with the power meter.
2. Record the average power level.

4.5.4 TEST SETUP



4.5.5 EUT OPERATING CONDITIONS

Same as Item 4.3.5



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4.5.6 TEST RESULTS

802.11b DSSS MODULATION:

MODULATION TYPE	DBPSK	TRANSFER RATE	1Mbps
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	25deg.C, 60%RH, 965hPa
TESTED BY	Rex Huang		

CHANNEL	CHANNEL FREQUENCY (MHz)	AVERAGE POWER OUTPUT (dBm)
1	2412	16.5
6	2437	16.9
11	2462	16.7

802.11g OFDM MODULATION:

MODULATION TYPE	BPSK	TRANSFER RATE	6Mbps
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	25deg.C, 60%RH, 965hPa
TESTED BY	Rex Huang		

CHANNEL	CHANNEL FREQUENCY (MHz)	AVERAGE POWER OUTPUT (dBm)
1	2412	13.6
6	2437	13.3
11	2462	13.0



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4.6 POWER SPECTRAL DENSITY MEASUREMENT

4.6.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

The Maximum of Power Spectral Density Measurement is 8dBm.

4.6.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S SPECTRUM ANALYZER	FSP40	100037	Aug. 03, 2009	Aug. 02, 2010

NOTE:

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

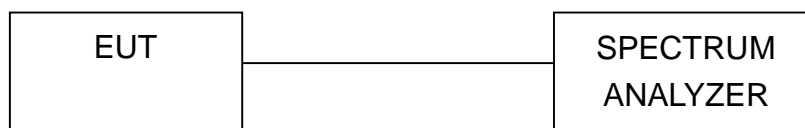
4.6.3 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer through an attenuator, the bandwidth of the fundamental frequency was measured with the spectrum analyzer using 3kHz RBW and 30kHz VBW, set sweep time = span/3kHz. The power spectral density was measured and recorded. The sweep time is allowed to be longer than span/3kHz for a full response of the mixer in the spectrum analyzer.

4.6.4 DEVIATION FROM TEST STANDARD

No deviation

4.6.5 TEST SETUP



4.6.6 EUT OPERATING CONDITION

Same as Item 4.3.6



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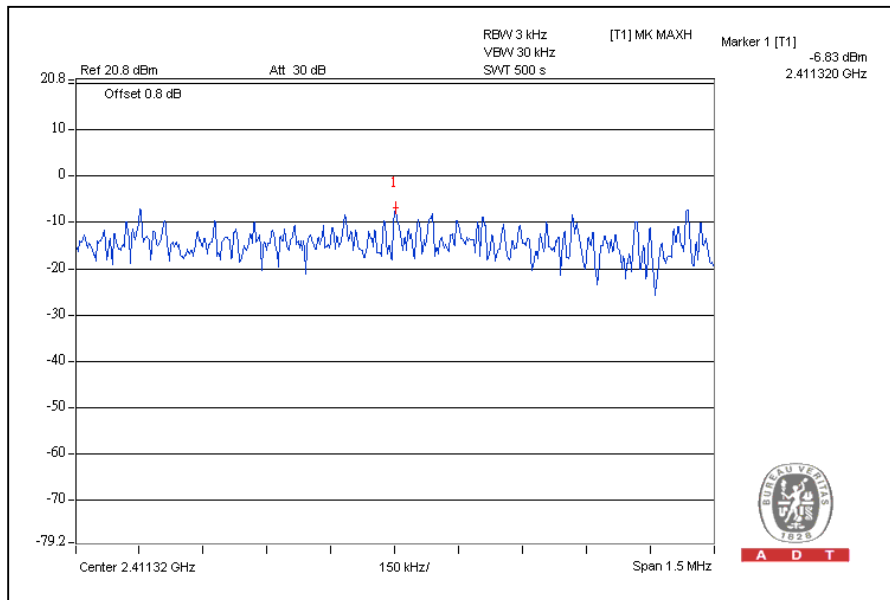
4.6.7 TEST RESULTS

802.11b DSSS MODULATION:

MODULATION TYPE	DBPSK	TRANSFER RATE	1Mbps
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	25deg.C, 60%RH, 965hPa
TESTED BY	Rex Huang		

CHANNEL	CHANNEL FREQUENCY (MHz)	RF POWER LEVEL IN 3kHz BW (dBm)	MAXIMUM LIMIT (dBm)	PASS / FAIL
1	2412	-6.8	8	PASS
6	2437	-6.4	8	PASS
11	2462	-6.5	8	PASS

CH1

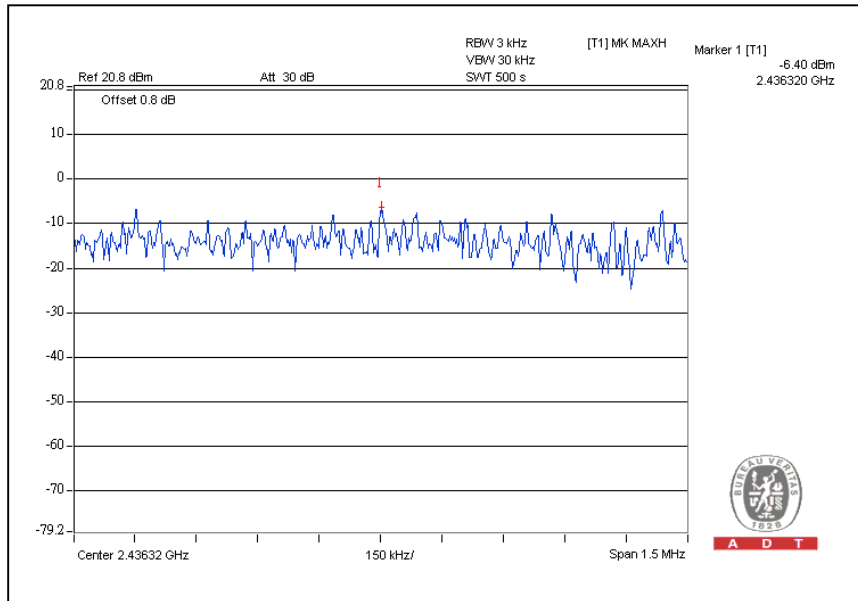


A D T

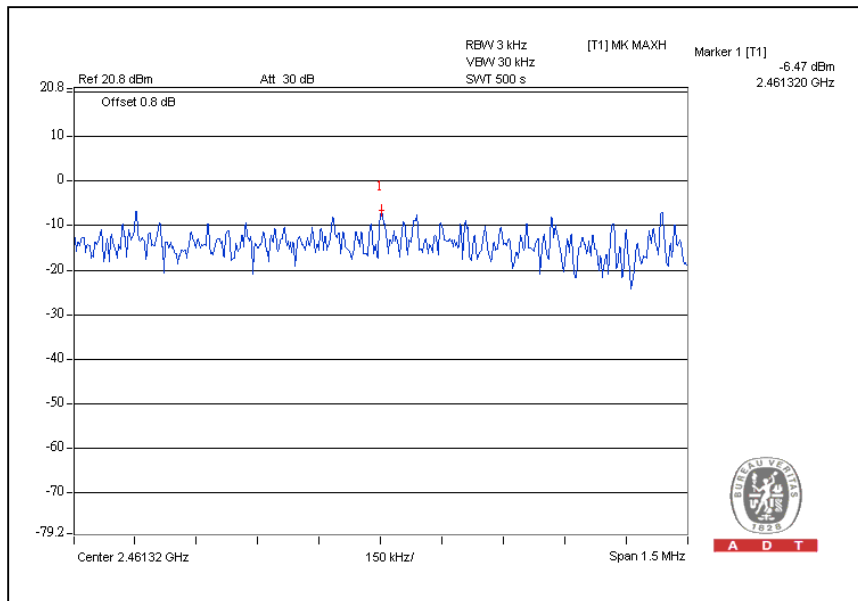


A D T

CH6



CH11





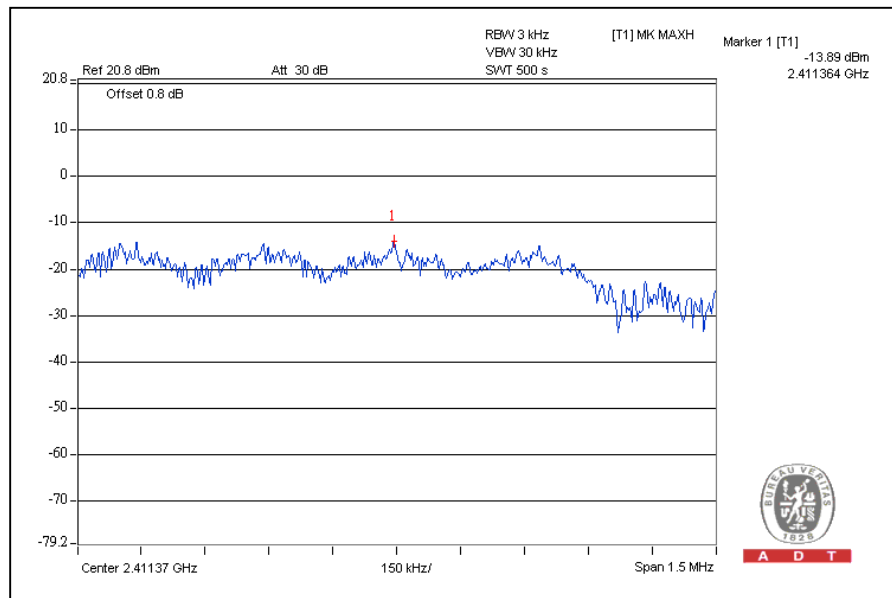
A D T

802.11g OFDM MODULATION:

MODULATION TYPE	BPSK	TRANSFER RATE	6Mbps
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	25deg.C, 60%RH, 965hPa
TESTED BY	Rex Huang		

CHANNEL	CHANNEL FREQUENCY (MHz)	RF POWER LEVEL IN 3kHz BW (dBm)	MAXIMUM LIMIT (dBm)	PASS / FAIL
1	2412	-13.9	8	PASS
6	2437	-12.9	8	PASS
11	2462	-13.6	8	PASS

CH1

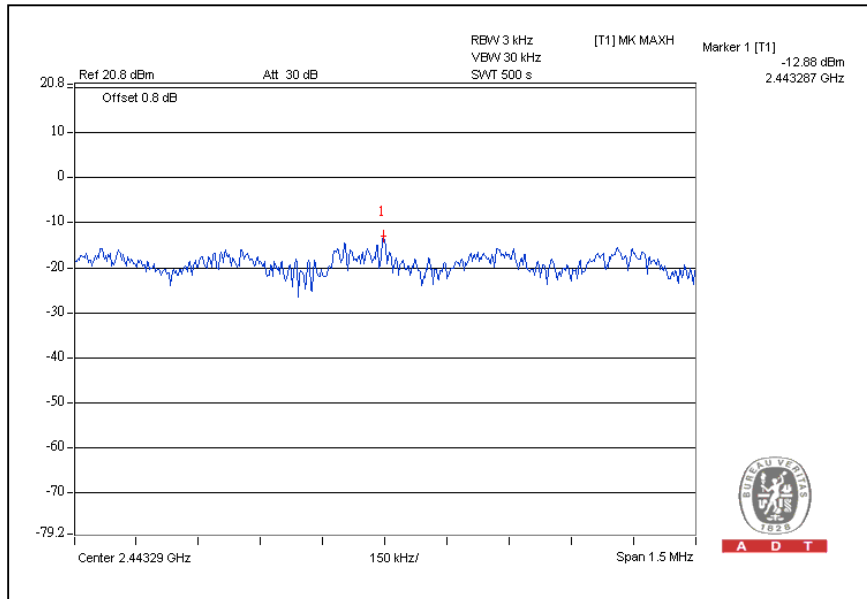


A D T

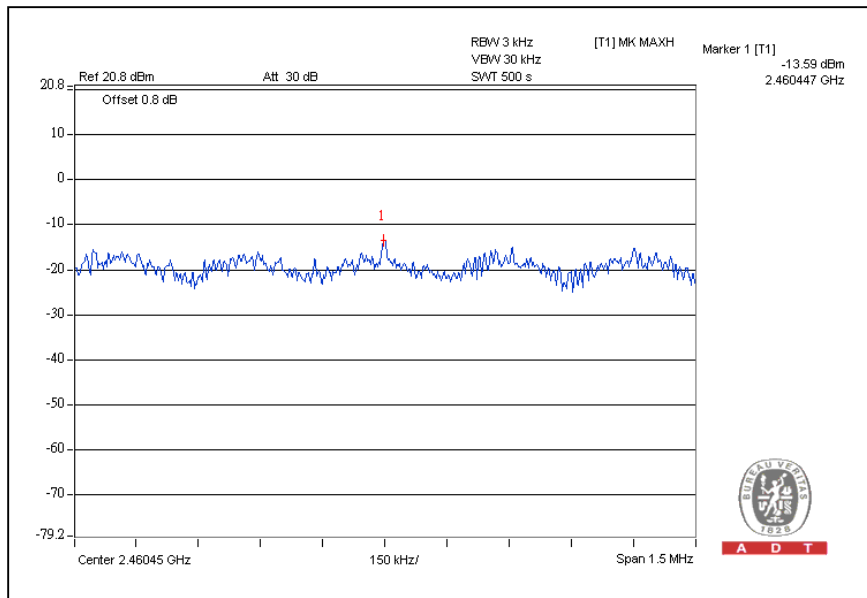


A D T

CH6



CH11



4.7 CONDUCTED OUT-BAND EMISSION MEASUREMENT

4.7.1 LIMITS OF CONDUCTED OUT-BAND EMISSION MEASUREMENT

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

4.7.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S SPECTRUM ANALYZER	FSP40	100037	Aug. 03, 2009	Aug. 02, 2010

NOTE:

1. 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

The transmitter output was connected to the spectrum analyzer via a low loss cable. Set RBW of spectrum analyzer to 100kHz and VBW of spectrum analyzer to 300kHz with suitable frequency span including 100 MHz bandwidth from band edge. The band edges was measured and recorded.

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

4.7.4 DEVIATION FROM TEST STANDARD

No deviation

4.7.5 EUT OPERATING CONDITION

Same as Item 4.3.6

4.7.6 TEST RESULTS

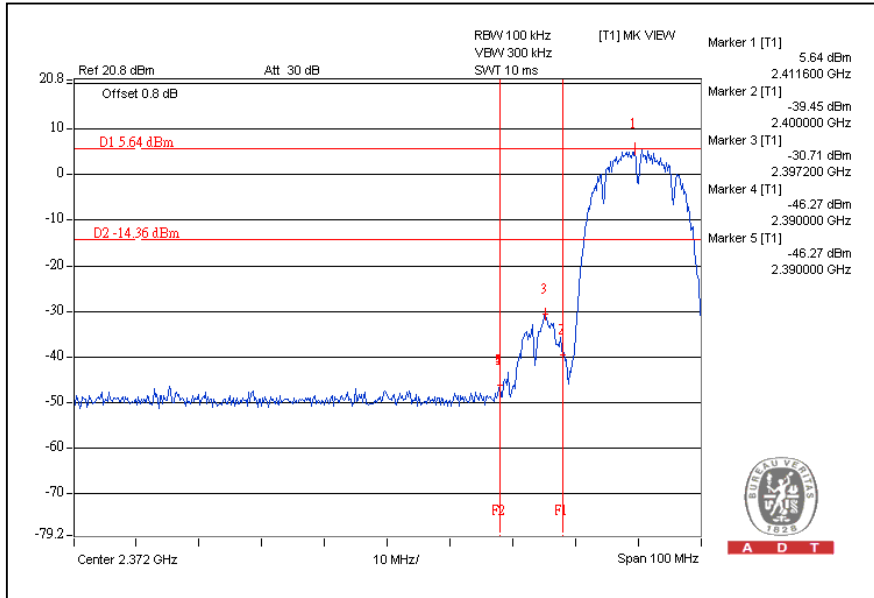
The spectrum plots are attached on the following images. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement in part 15.247(d).



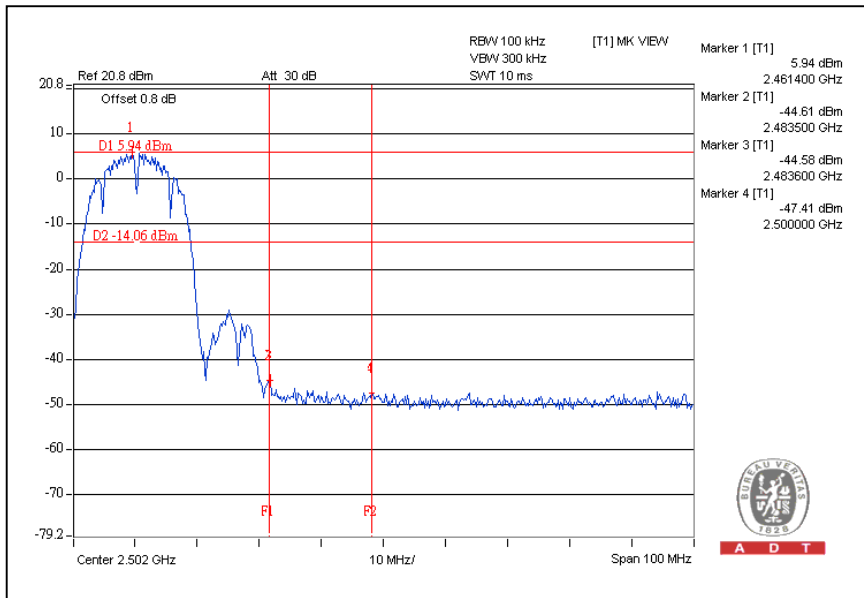
A D T

802.11b DSSS MODULATION:

CH1



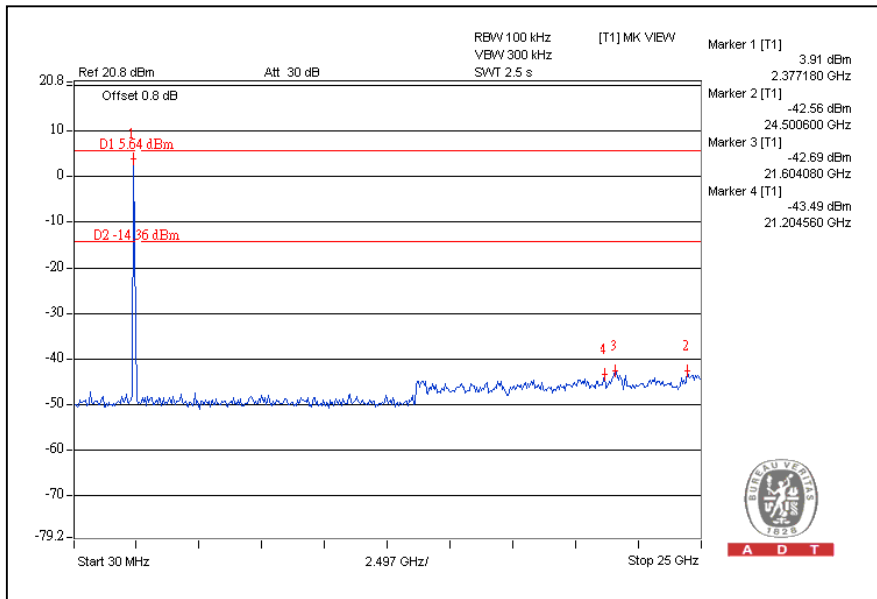
CH11



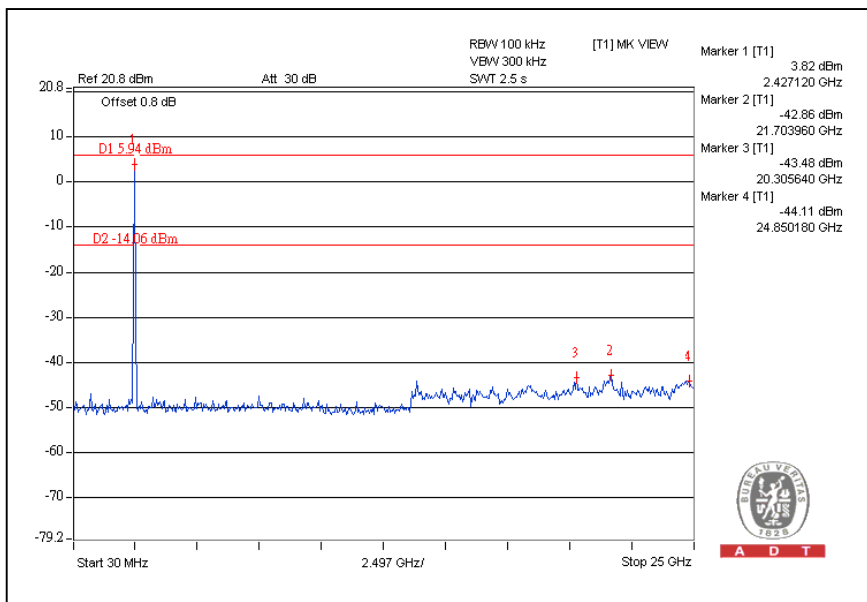


A D T

CH1



CH11

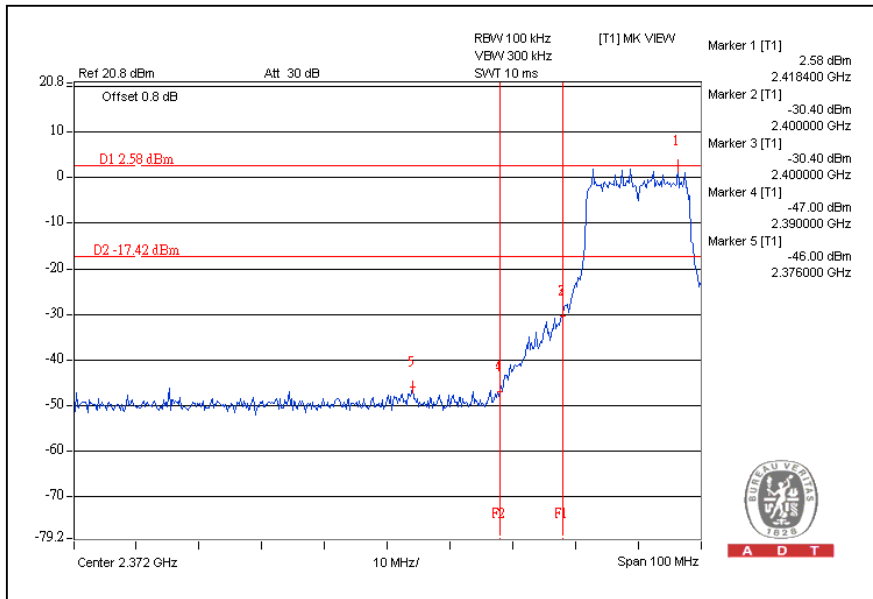




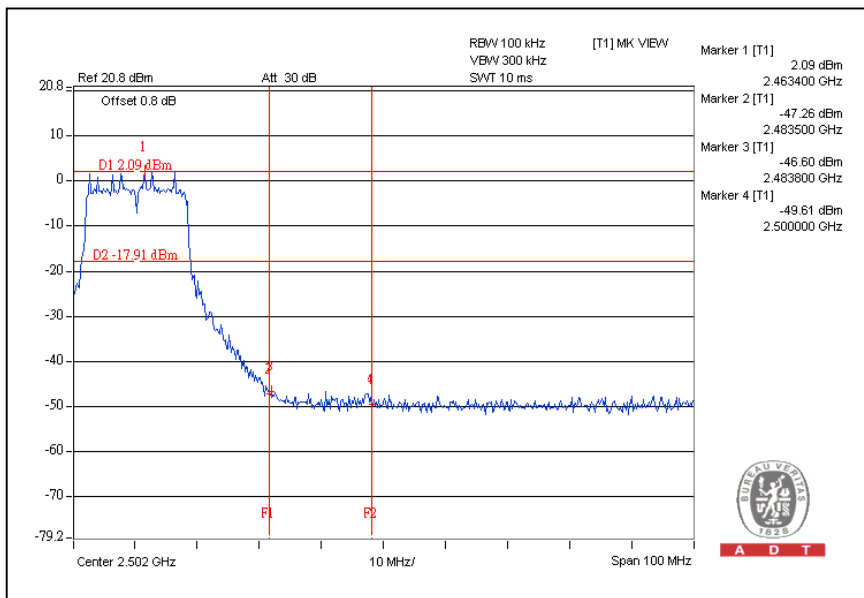
A D T

802.11g OFDM MODULATION:

CH1



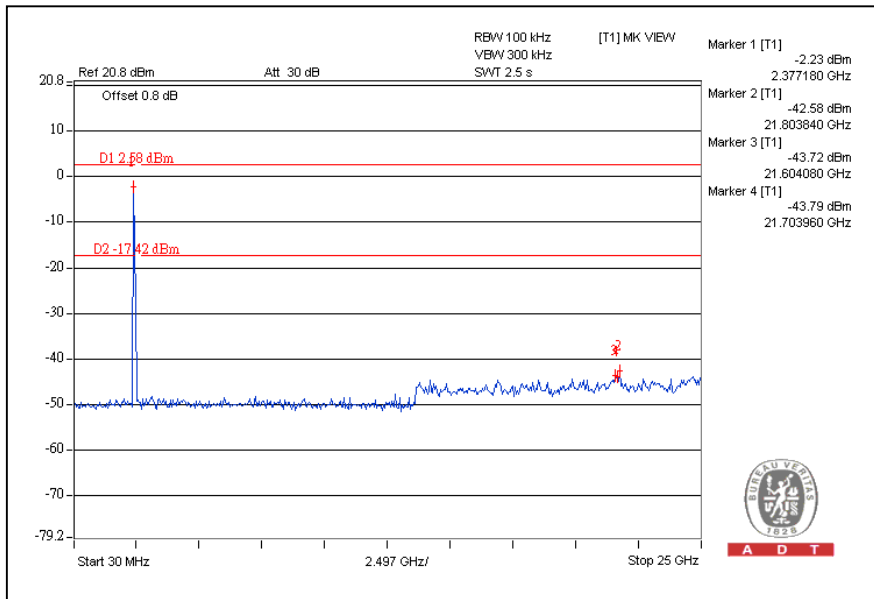
CH11



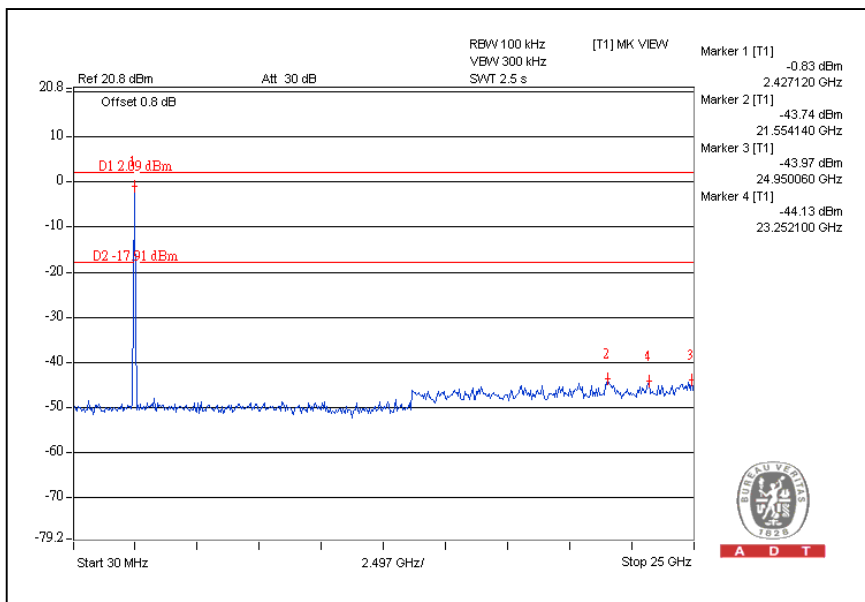


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CH1



CH11



4.8 ANTENNA REQUIREMENT

4.8.1 STANDARD APPLICABLE

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

4.8.2 ANTENNA CONNECTED CONSTRUCTION

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

For WLAN (RX has diversity function)					
No.	Model	Antenna Type	Gain (dBi)	Connector Type	Frequency range (MHz)
1	OZONE WLAN 1	PCB(TX,RX)	2.96 (2.4G) 4.16 (5G)	N/A	2400~2850 4920~5850
2	OZONE WLAN 2	PIFA(RX only)	3.45 (2.4G) 3.32 (5G)	N/A	2400~2850 4920~5850
For Bluetooth					
No.	Model	Antenna Type	Gain (dBi)	Connector Type	Frequency range (MHz)
1	Mica 2.4GHz	SMD	-0.45	N/A	2400~2500
For RFID					
No.	Model	Antenna Type	Gain (dBi)	Connector Type	Frequency range (MHz)
1	OZONE RFID	Hor- dipole, outside antenna, Ver- slot, inside antenna	1.7483(Max)	N/A	902~928



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5. TEST TYPES AND RESULTS (802.11a, 5725~5850MHz Band)

5.1 CONDUCTED EMISSION MEASUREMENT

5.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

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

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

5.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
ROHDE & SCHWARZ Test Receiver	ESCS 30	100287	Mar. 05, 2009	Mar. 04, 2010
Line-Impedance Stabilization Network (for EUT)	KNW-407	8-1395-12	May 04, 2009	May 03, 2010
Line-Impedance Stabilization Network (for Peripheral)	ENV-216	100072	June 08, 2009	June 07, 2010
RF Cable (JYEBAO)	5DFB	COACAB-001	Dec 15, 2008	Dec 14, 2009
50 ohms Terminator	50	3	Nov. 05, 2008	Nov. 04, 2009
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.

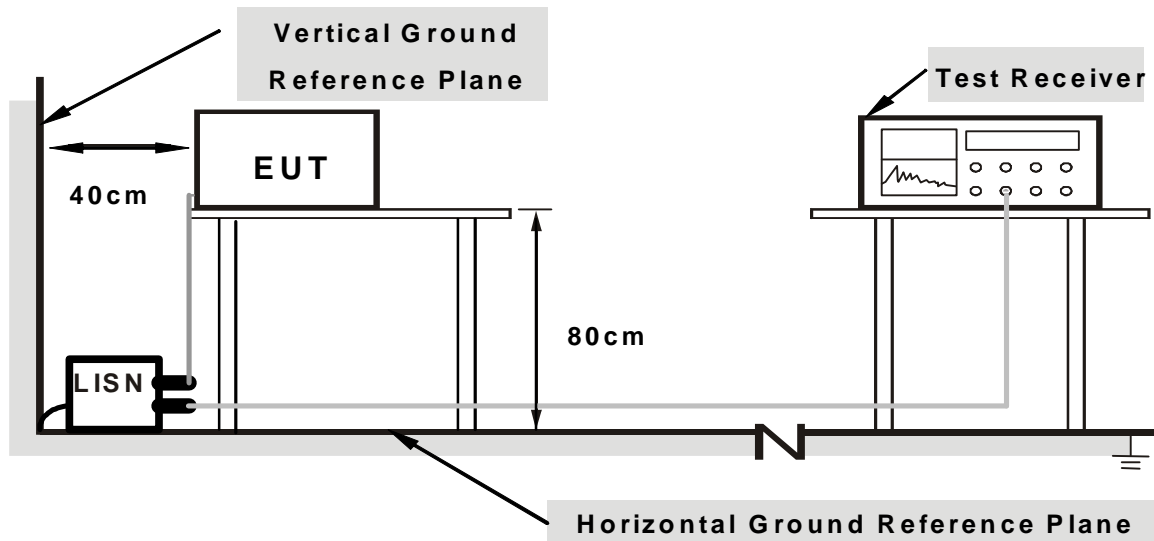
5.1.3 TEST PROCEDURES

- 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 provide 50 ohm/50uH of coupling impedance for the measuring instrument.
- b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit – 20dB) were not recorded.

5.1.4 DEVIATION FROM TEST STANDARD

No deviation

5.1.5 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.

5.1.6 EUT OPERATING CONDITIONS

Same as the 4.1.6

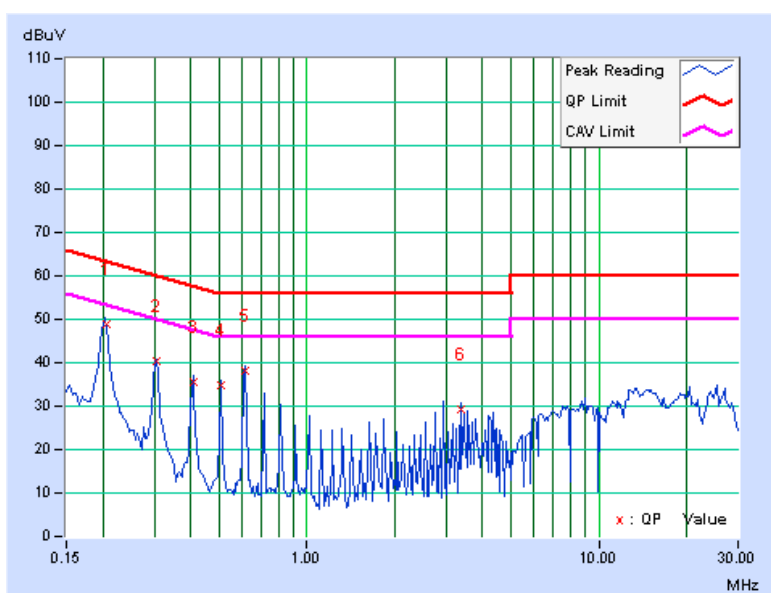
5.1.7 TEST RESULTS

802.11a OFDM MODULATION:

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 165	PHASE	Line (L)
MODULATION TYPE	BPSK	6dB BANDWIDTH	9 kHz
TRANSFER RATE	6bps	INPUT POWER	120Vac, 60 Hz
ENVIRONMENTAL CONDITIONS	25eg. C, 66RH, 965hPa	TESTED BY	Andy Ho

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	0.205	0.17	48.83	-	49.00	-	63.41	53.41	-14.41	-
2	0.305	0.12	40.27	-	40.39	-	60.10	50.10	-19.71	-
3	0.408	0.08	35.42	-	35.50	-	57.69	47.69	-22.19	-
4	0.509	0.08	34.66	-	34.74	-	56.00	46.00	-21.26	-
5	0.611	0.07	37.96	-	38.03	-	56.00	46.00	-17.97	-
6	3.359	0.12	29.23	-	29.35	-	56.00	46.00	-26.65	-

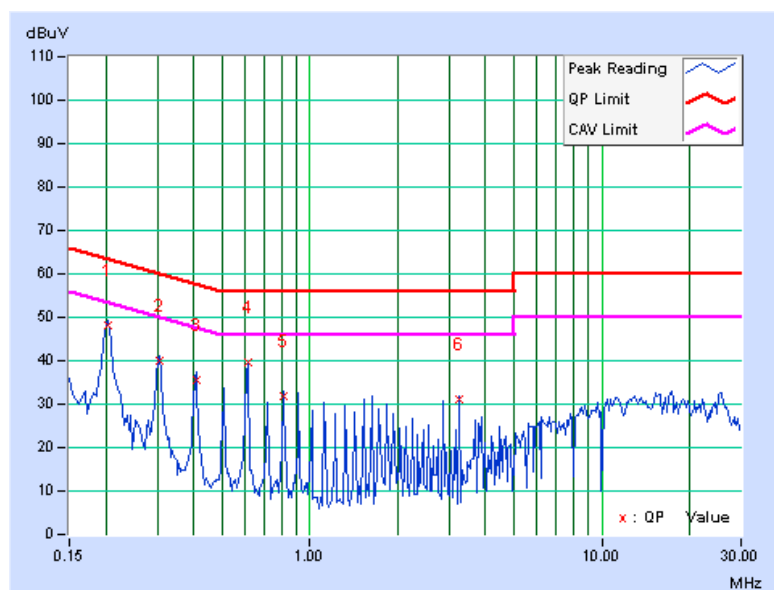
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
 3. The emission levels of other frequencies were very low against the limit.
 4. Margin value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



EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 165	PHASE	Neutral (N)
MODULATION TYPE	BPSK	6dB BANDWIDTH	9 kHz
TRANSFER RATE	6bps	INPUT POWER	120Vac, 60 Hz
ENVIRONMENTAL CONDITIONS	25eg. C, 66RH, 965hPa	TESTED BY	Andy Ho

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	0.205	0.18	48.06	-	48.24	-	63.42
2	0.306	0.13	39.89	-	40.02	-	60.07	50.07	-20.05	-
3	0.408	0.09	35.64	-	35.73	-	57.69	47.69	-21.96	-
4	0.611	0.09	39.61	-	39.70	-	56.00	46.00	-16.30	-
5	0.815	0.08	31.86	-	31.94	-	56.00	46.00	-24.06	-
6	3.257	0.14	30.83	-	30.97	-	56.00	46.00	-25.03	-

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



5.2 RADIATED EMISSION MEASUREMENT

5.2.1 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.



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5.2.2 TEST INSTRUMENTS

For radiated emission test (Below 1 GHz):

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
ADVANTEST Spectrum Analyzer	U3751	170100022	Nov. 17, 2008	Nov. 16, 2009
ADVANTEST Spectrum Analyzer	U3772	160100280	July 26, 2009	July 25, 2010
HP Pre_Amplifier	8449B	3008A01922	Sep. 25, 2009	Sep. 24, 2010
ROHDE & SCHWARZ Test Receiver	ESCS 30	100027	May 05, 2009	May 04, 2010
SCHWARZBECK Broadband Antenna	VULB-9168	263	April 29, 2009	April 28, 2010
Schwarzbeck Horn_Antenna	BBHA9120	D123	Sep. 21, 2009	Sep. 20, 2010
Schwarzbeck Horn_Antenna	BBHA 9170	BBHA9170153	Jan. 23, 2009	Jan. 22, 2010
RF Switches	EM-H-01-1	1009	Aug. 10, 2009	Aug. 09, 2010
RF Cable	8DFB	STACAB-30M-1GHz-091	Feb. 19, 2009	Feb. 18, 2010
Software	ADT_Radiated_V7.6.15.9.2	NA	NA	NA
CT Antenna Tower & Turn Table	TT100	ADT01	NA	NA
CORCOM AC Filter	MRI2030	107/108	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, HP preamplifier (model: 8449B) and Spectrum Analyzer (model: U3772) are used only for the measurement of emission frequency above 1GHz if tested.

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

4. The VCCI Site Registration No. is R-782.

5. The FCC Site Registration No. is 91097.

6. The CANADA Site Registration No. is IC 7450G-1.



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For radiated emission test (Above 1 GHz):

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
ROHDE & SCHWARZ Spectrum Analyzer	FSP40	100036	Dec. 09, 2008	Dec. 08, 2009
Agilent PSA Spectrum Analyzer	E4446A	MY46180622	Apr. 24 , 2009	Apr. 23 , 2010
HP Pre_Amplifier	8449B	3008A01923	Nov. 10, 2008	Nov. 09, 2009
ROHDE & SCHWARZ Test Receiver	ESCS30	847124/029	Aug. 28, 2009	Aug. 28, 2010
SCHWARZBECK TRILOG Broadband Antenna	VULB 9168	138	Apr. 29, 2009	Apr. 28, 2010
Schwarzbeck Horn_Antenna	BBHA9120	D124	Dec. 09, 2008	Dec. 08, 2009
Schwarzbeck Horn_Antenna	BBHA 9170	BBHA9170153	Jan. 22, 2009	Jan. 21, 2010
RF Switches	EMH-011	08009	Sep. 26, 2009	Sep. 25, 2010
RF CABLE (Chaintek)	Sucoflex 106	28077	Aug. 14, 2009	Aug. 13, 2010
RF Cable	8D	STCCAB-001	Sep. 26, 2009	Sep. 25, 2010
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, HP 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.



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5.2.3 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 10 meter open area test site. 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.

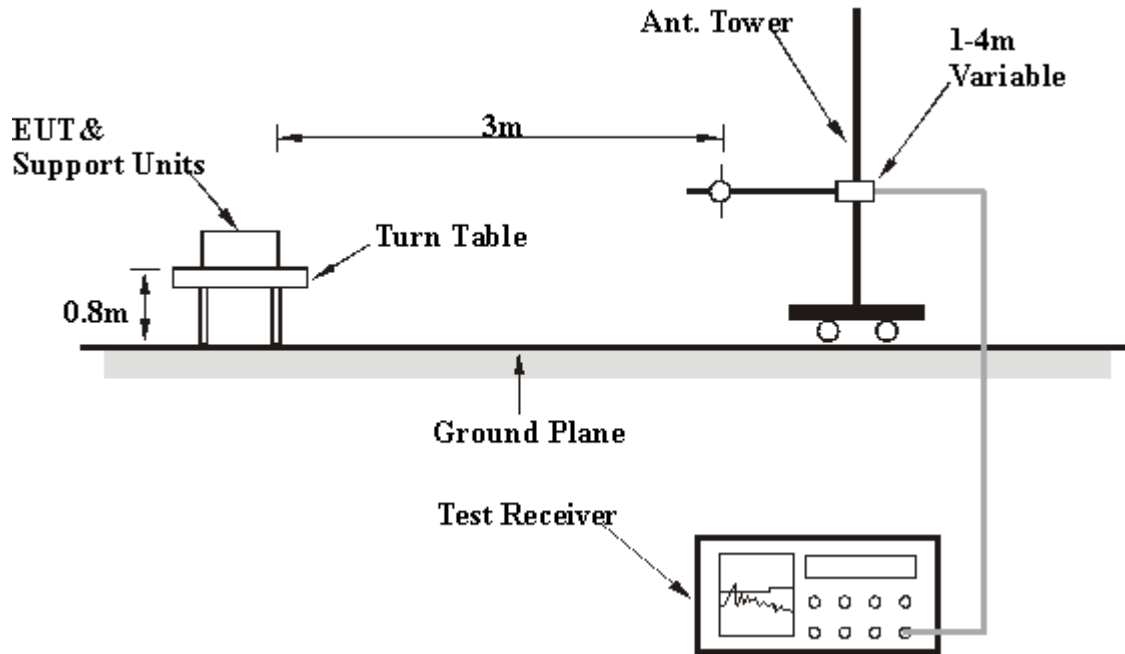
NOTE:

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.

5.2.4 DEVIATION FROM TEST STANDARD

No deviation

5.2.5 TEST SETUP



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

5.2.6 EUT OPERATING CONDITIONS

Same as the 4.2.6

5.2.7 TEST RESULTS

BELOW 1GHz WORST-CASE DATA : 802.11a OFDM MODULATION

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 165	FREQUENCY RANGE	Below 1000MHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	24deg. C, 68%RH 965 hPa	TESTED BY	Max Tseng

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	115.00	31.12 QP	43.50	-12.37	2.47 H	218	19.45	11.67
2	149.50	33.12 QP	43.50	-10.38	2.36 H	252	17.72	15.40
3	196.59	32.99 QP	43.50	-10.51	2.06 H	175	21.12	11.87
4	213.00	30.11 QP	43.50	-13.39	2.29 H	151	18.01	12.10
5	400.00	35.38 QP	46.00	-10.62	1.95 H	235	17.12	18.26
6	500.00	38.05 QP	46.00	-7.95	1.77 H	301	16.99	21.06
7	998.50	39.21 QP	54.00	-14.79	1.00 H	80	10.38	28.83
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	71.42	31.02 QP	40.00	-8.98	1.00 V	309	18.95	12.07
2	112.62	31.00 QP	43.50	-12.50	1.00 V	221	19.57	11.43
3	152.45	34.12 QP	43.50	-9.38	1.00 V	132	18.86	15.26
4	196.60	30.66 QP	43.50	-12.84	1.00 V	160	18.79	11.87
5	500.00	36.47 QP	46.00	-9.53	1.00 V	215	15.41	21.06
6	998.50	39.33 QP	54.00	-14.67	1.71 V	334	10.50	28.83

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



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ABOVE 1GHz DATA

802.11a OFDM MODULATION

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 149	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 60%RH 965 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	*5745.00	103.24 PK			1.00 H	238	65.28	37.96
2	*5745.00	93.79 AV			1.00 H	238	55.83	37.96
3	11490.00	54.33 PK	74.00	-19.67	1.00 H	64	7.10	47.23
4	11490.00	42.14 AV	54.00	-11.86	1.00 H	64	-5.09	47.23
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	*5745.00	104.70 PK			1.04 V	273	66.74	37.96
2	*5745.00	95.79 AV			1.04 V	273	57.83	37.96
3	11490.00	54.03 PK	74.00	-19.97	1.32 V	127	6.80	47.23
4	11490.00	41.99 AV	54.00	-12.01	1.32 V	127	-5.24	47.23

- 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 limit value is defined as per 15.247.



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 157	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 60%RH 965 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	*5785.00	102.54 PK			1.00 H	238	64.47	38.07
2	*5785.00	93.37 AV			1.00 H	238	55.30	38.07
3	11570.00	54.01 PK	74.00	-19.99	1.00 H	176	6.79	47.22
4	11570.00	42.59 AV	54.00	-11.41	1.00 H	176	-4.63	47.22

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	*5785.00	103.30 PK			1.04 V	274	65.23	38.07
2	*5785.00	93.93 AV			1.04 V	274	55.86	38.07
3	11570.00	55.12 PK	74.00	-18.88	1.34 V	226	7.90	47.22
4	11570.00	42.47 AV	54.00	-11.53	1.34 V	226	-4.75	47.22

- 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 limit value is defined as per 15.247.



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 165	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 60%RH 965 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	*5825.00	103.23 PK			1.00 H	222	65.05	38.18
2	*5825.00	93.73 AV			1.00 H	222	55.55	38.18
3	11650.00	55.14 PK	74.00	-18.86	1.00 H	289	7.92	47.22
4	11650.00	42.78 AV	54.00	-11.22	1.00 H	289	-4.44	47.22

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	*5825.00	101.57 PK			1.03 V	268	63.39	38.18
2	*5825.00	92.32 AV			1.03 V	268	54.14	38.18
3	11650.00	55.87 PK	74.00	-18.13	1.32 V	325	8.65	47.22
4	11650.00	42.83 AV	54.00	-11.17	1.32 V	325	-4.39	47.22

- 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 limit value is defined as per 15.247.



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5.3 6dB BANDWIDTH MEASUREMENT

5.3.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

5.3.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S SPECTRUM ANALYZER	FSP40	100037	Aug. 03, 2009	Aug. 02, 2010

NOTE:

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

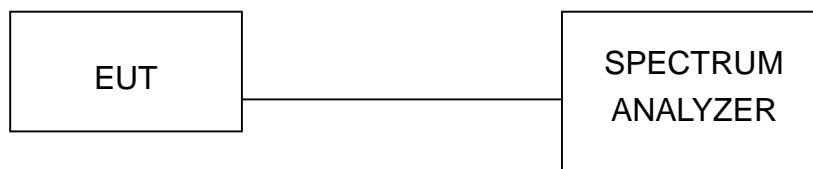
5.3.3 TEST PROCEDURE

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

5.3.4 DEVIATION FROM TEST STANDARD

No deviation

5.3.5 TEST SETUP



5.3.6 EUT OPERATING CONDITIONS

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



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5.3.7 TEST RESULTS

802.11a OFDM MODULATION:

MODULATION TYPE	BPSK	TRANSFER RATE	6Mbps
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	25deg. C, 60%RH, 965hPa
TESTED BY	Rex Huang		

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
149	5745	15.82	0.5	PASS
157	5785	15.82	0.5	PASS
165	5825	15.80	0.5	PASS

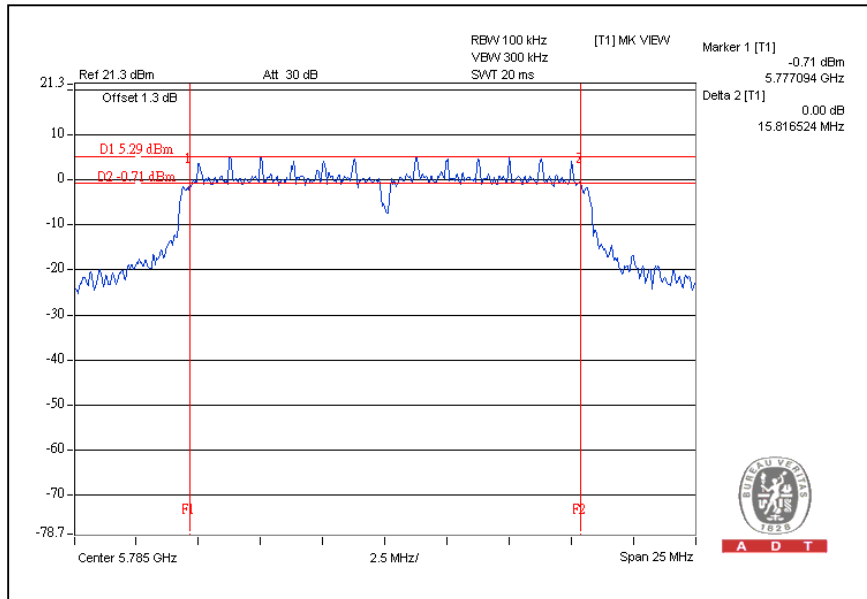
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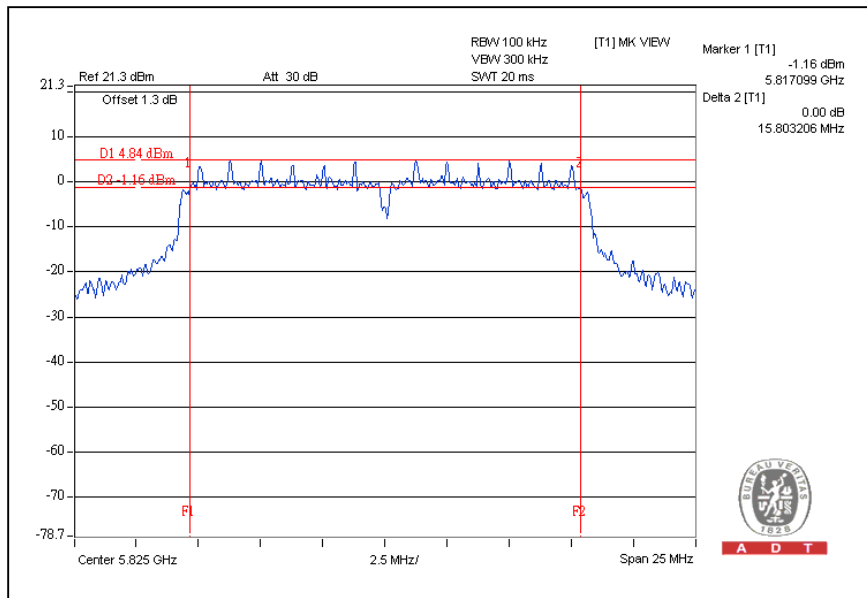


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5.4 MAXIMUM PEAK OUTPUT POWER

5.4.1 LIMITS OF MAXIMUM PEAK OUTPUT POWER MEASUREMENT

The Maximum Peak Output Power Limit is 30dBm.

5.4.2 INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Anritsu Power Meter	ML2495A	0824006	April 25, 2009	April 24, 2010
Pulse Power Sensor	MA2411B	0738172	April 25, 2009	April 24, 2010

NOTE:

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

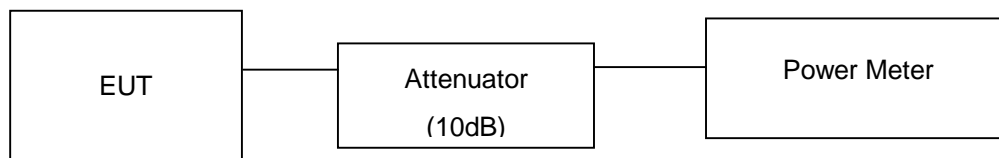
5.4.3 TEST PROCEDURES

1. The transmitter output was connected to the power meter through an attenuator; the bandwidth of the fundamental frequency was measured with the power meter.
2. Record the power level.

5.4.4 DEVIATION FROM TEST STANDARD

No deviation

5.4.5 TEST SETUP



5.4.6 EUT OPERATING CONDITIONS

Same as Item 4.3.6



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5.4.7 TEST RESULTS

802.11a OFDM modulation

MODULATION TYPE	BPSK	TRANSFER RATE	6Mbps
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	25deg. C, 60%RH, 965hPa
TESTED BY	Rex Huang		

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (dBm)	PEAK POWER OUTPUT (mW)	PEAK POWER LIMIT (dBm)	PASS / FAIL
149	5745	18.8	75.9	30	PASS
157	5785	18.9	77.6	30	PASS
165	5825	18.9	77.6	30	PASS



5.5 AVERAGE OUTPUT POWER

5.5.1 For reference.

5.5.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Anritsu Power Meter	ML2495A	0824006	April 25, 2009	April 24, 2010
Pulse Power Sensor	MA2411B	0738172	April 25, 2009	April 24, 2010

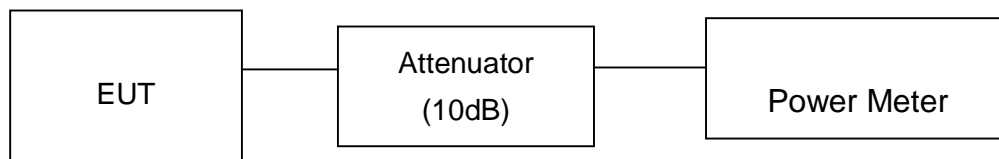
NOTE:

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

5.5.3 TEST PROCEDURES

1. The transmitter output was connected to the power meter through an attenuator, the bandwidth of the fundamental frequency was measured with the power meter.
2. Record the average power level.

5.5.4 TEST SETUP



5.5.5 EUT OPERATING CONDITIONS

Same as Item 4.3.6



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5.5.6 TEST RESULTS

802.11a OFDM MODULATION:

MODULATION TYPE	BPSK	TRANSFER RATE	6Mbps
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	25deg. C, 60%RH, 965hPa
TESTED BY	Rex Huang		

CHANNEL	CHANNEL FREQUENCY (MHz)	AVERAGE POWER OUTPUT (dBm)
149	5745	14.6
157	5785	14.7
165	5825	14.6



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5.6 POWER SPECTRAL DENSITY MEASUREMENT

5.6.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

The Maximum of Power Spectral Density Measurement is 8dBm.

5.6.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S SPECTRUM ANALYZER	FSP40	100037	Aug. 03, 2009	Aug. 02, 2010

NOTE:

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

5.6.3 TEST PROCEDURE

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

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

5.6.4 DEVIATION FROM TEST STANDARD

No deviation

5.6.5 TEST SETUP



5.6.6 EUT OPERATING CONDITION

Same as Item 4.3.6



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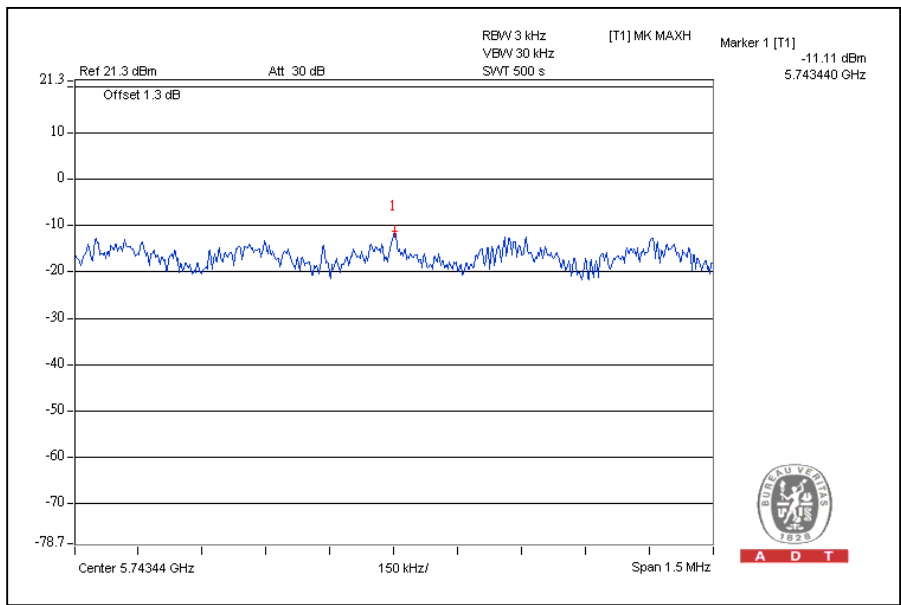
5.6.7 TEST RESULTS

802.11a OFDM modulation

MODULATION TYPE	BPSK	TRANSFER RATE	6Mbps
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	25deg.C, 60%RH, 965hPa
TESTED BY	Rex Huang		

CHANNEL	CHANNEL FREQUENCY (MHz)	RF POWER LEVEL IN 3kHz BW (dBm)	MAXIMUM LIMIT (dBm)	PASS / FAIL
149	5745	-11.1	8	PASS
157	5785	-11.5	8	PASS
165	5825	-11.5	8	PASS

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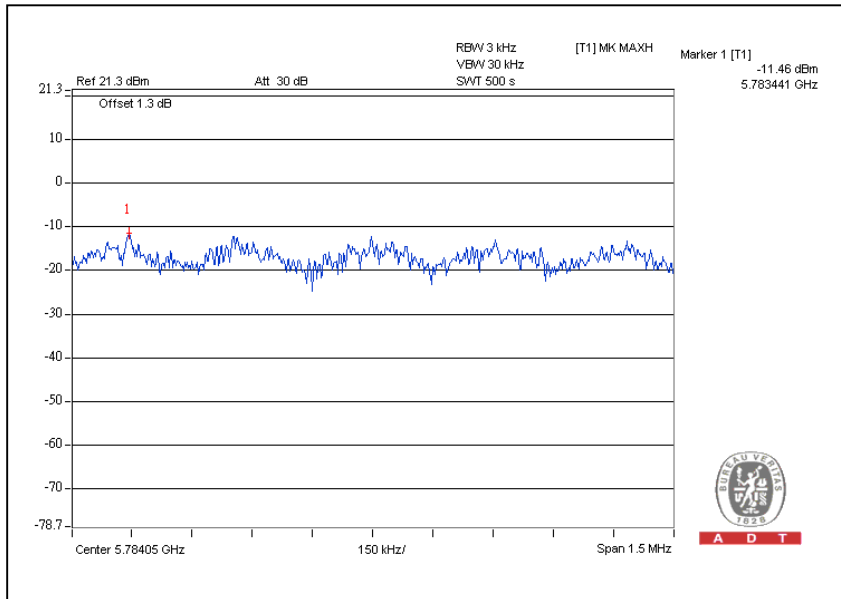


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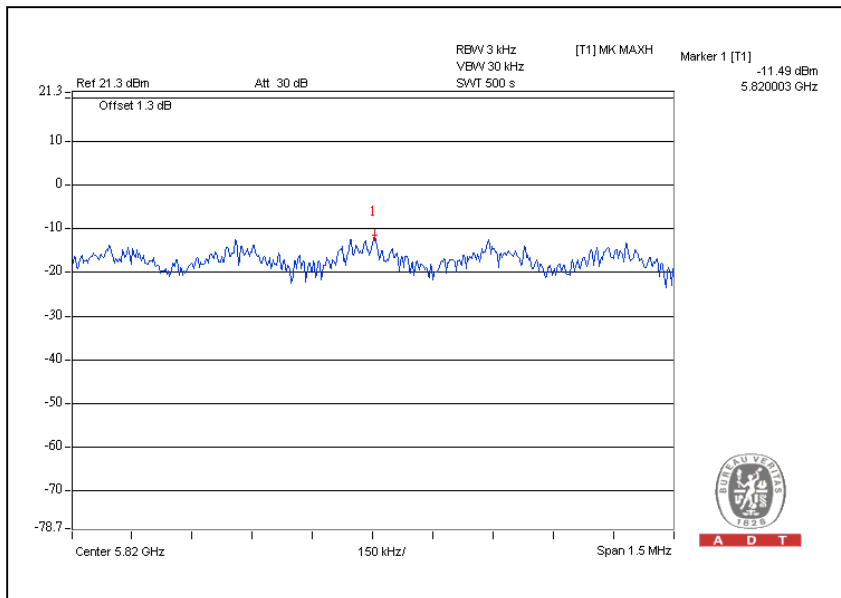


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5.7 CONDUCTED OUT-BAND EMISSION MEASUREMENT

5.7.1 LIMITS OF CONDUCTED OUT-BAND EMISSION MEASUREMENT

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

5.7.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S SPECTRUM ANALYZER	FSP40	100037	Aug. 03, 2009	Aug. 02, 2010

NOTE:

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



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5.7.3 TEST PROCEDURE

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

5.7.4 DEVIATION FROM TEST STANDARD

No deviation

5.7.5 EUT OPERATING CONDITION

Same as Item 4.3.6

5.7.6 TEST RESULTS

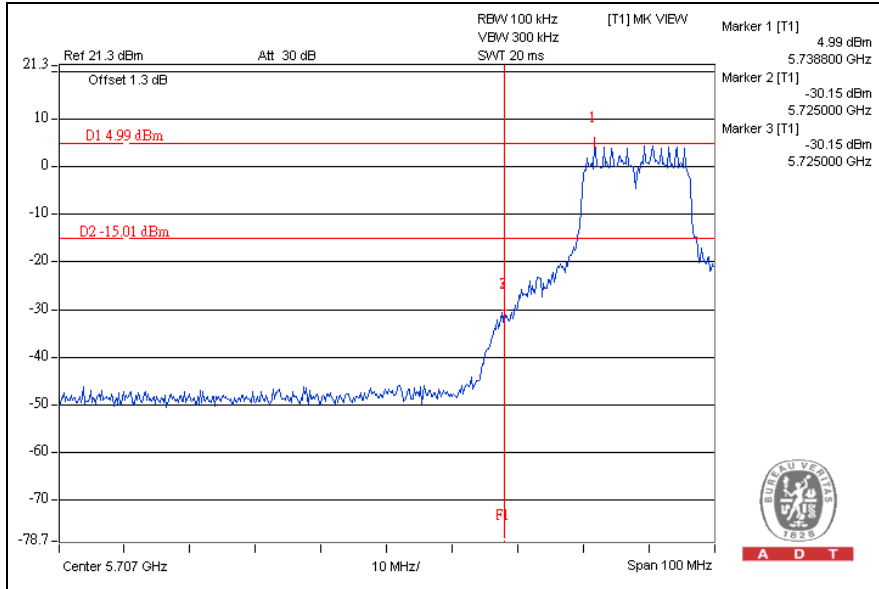
The spectrum plots are attached on the following pages. D2 line indicates the highest level, D1 line indicates the 20dB offset below D2. It shows compliance with the requirement in part 15.247(d).



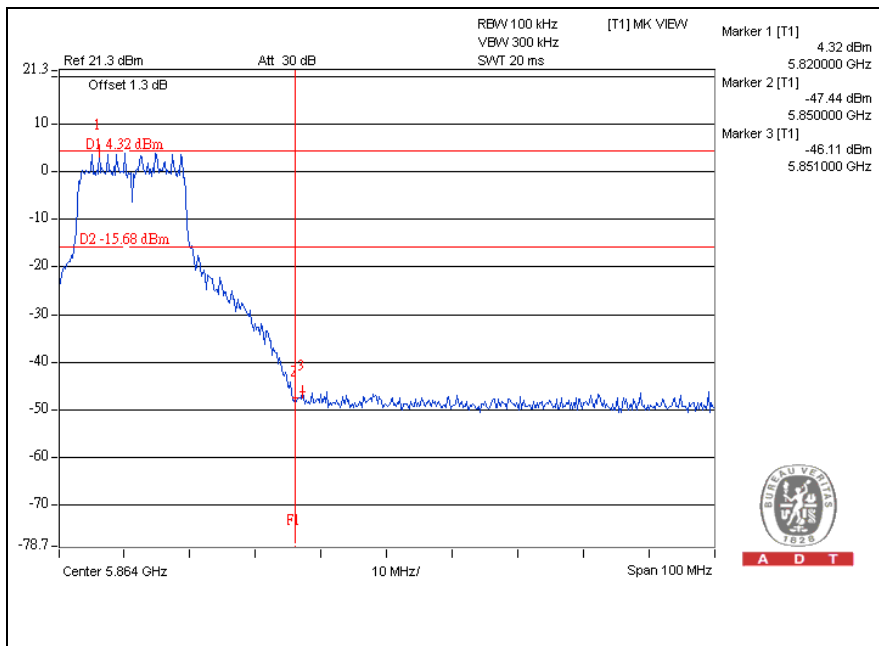
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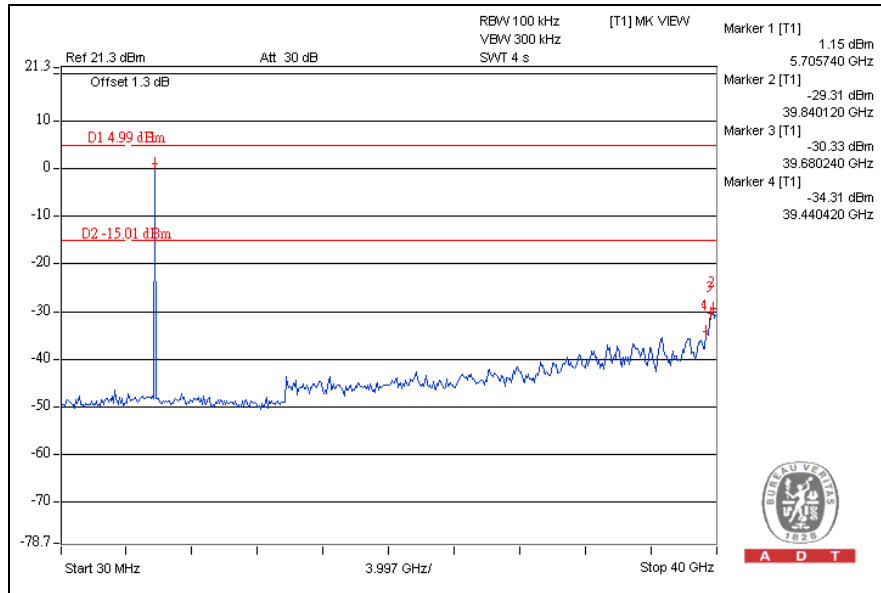
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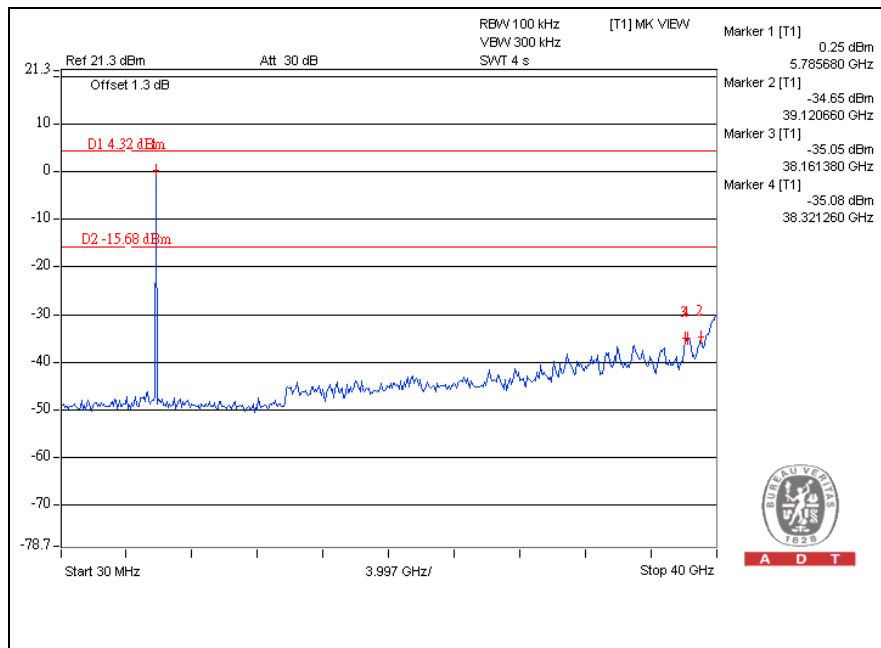


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5.8 ANTENNA REQUIREMENT

5.8.1 STANDARD APPLICABLE

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

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

5.8.2 ANTENNA CONNECTED CONSTRUCTION

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

For WLAN (RX has diversity function)					
No.	Model	Antenna Type	Gain (dBi)	Connector Type	Frequency range (MHz)
1	OZONE WLAN 1	PCB(TX,RX)	2.96 (2.4G) 4.16 (5G)	N/A	2400~2850 4920~5850
2	OZONE WLAN 2	PIFA(RX only)	3.45 (2.4G) 3.32 (5G)	N/A	2400~2850 4920~5850
For Bluetooth					
No.	Model	Antenna Type	Gain (dBi)	Connector Type	Frequency range (MHz)
1	Mica 2.4GHz	SMD	-0.45	N/A	2400~2500
For RFID					
No.	Model	Antenna Type	Gain (dBi)	Connector Type	Frequency range (MHz)
1	OZONE RFID	Hor- dipole, outside antenna, Ver- slot, inside antenna	1.7483(Max)	N/A	902~928



6. 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 by the following approval agencies according to ISO/IEC 17025:

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

Copies of accreditation certificates of our laboratories obtained from approval agencies can be downloaded from our web site:

www.adt.com.tw/index.5/phtml. If you have any comments, please feel free to contact us at the following:

Linko EMC/RF Lab:
Tel: 886-2-26052180
Fax: 886-2-26052943

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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7.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.

---END---