FCC 47 CFR PART 15 SUBPART C

Product Type	:	VoIP Gateway
Applicant	:	Comtrend Corporation
Address	:	3F-1, 10 Lane 609, Chung Hsin Road, Section 5 San Chung City, Taipei Hsien, Taiwan 241
Trade Name	:	COMTREND
Model Number	:	CT-820C
Test Specification	:	FCC 47 CFR PART 15 SUBPART C: Oct., 2009 ANSI C63.4-2003
Issue Date	:	Aug. 02, 2010

Issue by

A Test Lab Techno Corp.
No. 140-1, Changan Street, Bade City,
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Taiwan Accreditation Foundation accreditation number: 1330

Revision History

Rev.	Issue Date	Revisions	Revised By
00	Jul. 27, 2010	Initial Issue	
01	Aug. 02, 2010	Revise Product Name	Linda Su

Verification

Issued Date: 2010/08/02

Product Type	:	VoIP Gateway
Applicant	:	Comtrend Corporation
Address	:	3F-1, 10 Lane 609, Chung Hsin Road, Section 5 San Chung City, Taipei Hsien, Taiwan 241
Trade Name	:	COMTREND
Model Number	:	CT-820C
FCC ID	:	L9V-820C
EUT Rated Voltage	:	DC 12V, 1.5A
Test Voltage	:	120 Vac / 60 Hz
Applicable Standard	:	FCC 47 CFR PART 15 SUBPART C: Oct., 2009 ANSI C63.4-2003
Test Result	:	Complied
Performing Lab.	:	A Test Lab Techno Corp. No. 140-1, Changan Street, Bade City, Taoyuan County 334, Taiwan R.O.C. Tel：+86-3-2710188 / Fax：+86-3-2710190 Taiwan Accreditation Foundation accreditation number: 1330 http://www.atl-lab.com.tw/e-index.htm

The above equipment was tested by A Test Lab Techno Corp. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4: 2003 and the energy emitted by the sample tested as described in this report is in compliance with the requirements of FCC Rules Part 15.207, 15.209, 15.247 .
The test results of this report relate only to the tested sample identified in this report.

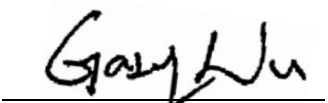
Approved By	:		Reviewed By	:	
(Manager)		(Miller Lee)	(Testing Engineer)		(Gary Wu)

TABLE OF CONTENTS

1 General Information

1.1 Summary of Test Result

Standard		Item	Result	Remark
15.247	RSS-GEN			
15.207	7.2.2	AC Power Conducted Emission	PASS	-----
-----	6	Receiver Radiated Emissions	PASS	-----
Standard		Item	Result	Remark
15.247	RSS-210			
15.247(d)	A8.5	Transmitter Radiated Emissions	PASS	-----
15.247(b)(3)	A8.4	Max. Output Power	PASS	-----
15.247(a)(2)	A8.2 (a)	6dB RF Bandwidth	PASS	-----
15.247(e)	A8.2 (b)	Power Spectral Density	PASS	-----
15.247(c)	A8.5	Out of Band Conducted Spurious Emission	PASS	-----
15.247(d)	A8.5	Band Edge Measurement	PASS	-----
15.247(c)	A8.5	Occupied Bandwidth Measurement	PASS	-----
15.203	-	Antenna Requirement	PASS	-----

The test results of this report relate only to the tested sample(s) identified in this report. Manufacturer or whom it may concern should recognize the pass or fail of the test result.

1.2 Measurement Uncertainty

Conducted Emission

The measurement uncertainty is evaluated as ± 2.24 dB.

Radiated Emission

The measurement uncertainty of 30 MHz - 1GHz is evaluated as ± 3.072dB.

2 EUT Description

Product	:	VoIP Gateway
Trade Name	:	COMTREND
Model Number	:	CT-820C
Applicant	:	Comtrend Corporation 3F-1, 10 Lane 609, Chung Hsin Road, Section 5 San Chung City, Taipei Hsien, Taiwan 241
Manufacturer	:	Comtrend Corporation 3F-1, 10 Lane 609, Chung Hsin Road, Section 5 San Chung City, Taipei Hsien, Taiwan 241
FCC ID	:	L9V-820C
Frequency Range	:	2412 ~ 2462 MHz
Modulation Type	:	IEEE 802.11b:DSSS(CCK, DQPSK, DBPSK) IEEE 802.11g:DSSS(CCK, DQPSK, DBPSK)+ OFDM(QPSK, BPSK, 16-QAM, 64-QAM)
Antenna Type	:	External Type
Antenna Gain	:	2 dBi
RF Output Power	:	IEEE 802.11b: 0.192 W / 22.83 dBm IEEE 802.11g: 0.307 W / 24.87 dBm
Serial Number	:	107820CxxxF-A9000001
Software Version	:	C101-S310CTU-C01_R01
Hardware Version	:	CTL-1
Component		
Power Adapter	:	SPEC LIN, SW1201500-W01 Input:100-240Vac, 0.5A, 50-60Hz Output: 12Vdc, 1.5A Cable out: Non-Shielded, 1.8 m

3 Test Methodology

3.1. Mode of Operation

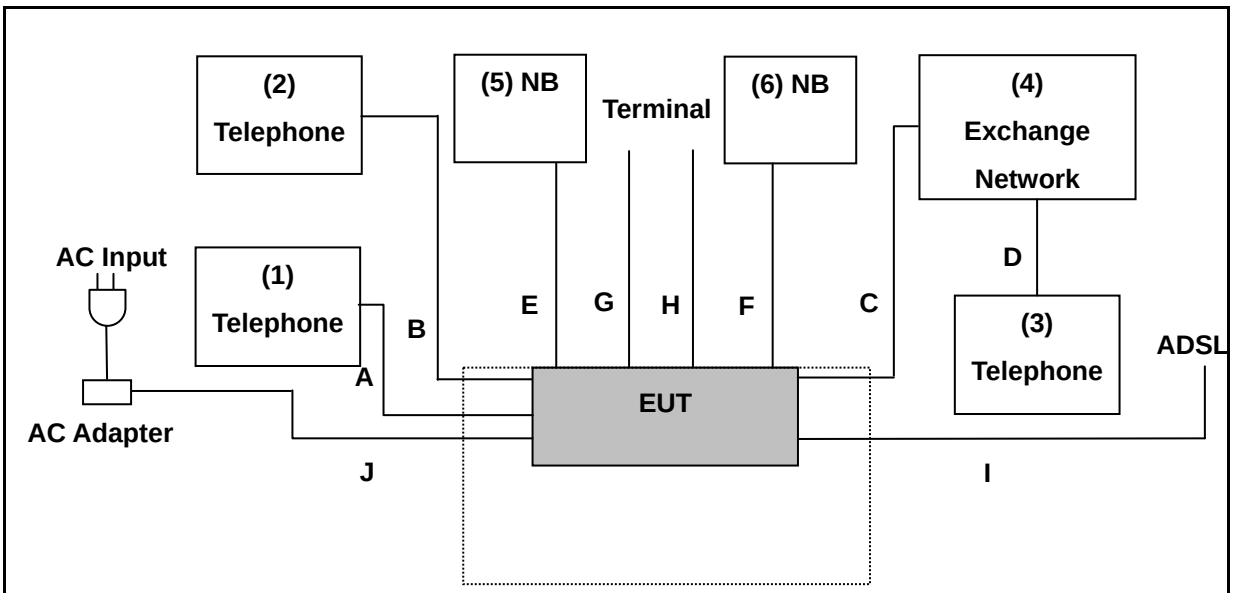
Decision of Test ATL has verified the construction and function in typical operation. All the test modes were carried out with the EUT in normal operation, which was shown in this test report and defined as:

Test Mode
Mode 1: Normal Operation Mode
Mode 2: IEEE 802.11b Link Mode
Mode 3: IEEE 802.11g Link Mode
Mode 4: Receiver Mode

3.2. EUT Exercise Software

1.	Setup the EUT and simulators as shown on 3.3.
2.	Turn on the power of all equipment.
3.	Boot the notebook from Hard Disk.
4.	Data will be communicated between notebook and partner notebook through EUT.
5.	Telecom signal was communicated between notebook and partner notebook through the LAN port of the EUT.
6.	The Notebook will show the transmitting and receiving characteristics when the communication is successful.
7.	Repeat the above procedure (4) to (6).

3.3. Configuration of Test System Details



Signal Cable Type		Signal Cable Description
A	Telephone Cable	Non-Shielded, 7.0m
B	Telephone Cable	Non-Shielded, 7.0m
C	Telephone Cable	Non-Shielded, 7.0m
D	Telephone Cable	Non-Shielded, 7.0m
E	LAN Cable	Non-Shielded, 7.0m
F	LAN Cable	Non-Shielded, 7.0m
G	LAN Cable	Non-Shielded, 7.0m
H	LAN Cable	Non-Shielded, 7.0m
I	LAN Cable	Non-Shielded, 7.0m
J	Power Cable	Non-Shielded, 1.8m

Devices Description					
Product		Manufacturer	Model Number	Serial Number	Power Cord
1.	Telephone	H · T · T	N/A	N/A	N/A
2.	Telephone	H · T · T	N/A	N/A	N/A
3.	Telephone	H · T · T	N/A	N/A	N/A
4.	Exchange Network	Smart	UK-106	N/A	Non-Shielded, 2.0m
5.	Notebook	DELL	D531	GCDCD-T6HYQ-3MQ8R-JCPD3-3G8G2	Non-Shielded, 1.8m
6.	Notebook	DELL	D531	CN-OXM006-48643-87A-3398	Non-Shielded, 1.8m

3.4. Test Site Environment

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	25
Humidity (%RH)	25-75	50
Barometric pressure (mbar)	860-1060	950

4 Conducted Emission Measurement

4.1. Limit

Frequency (MHz)	Quasi-peak	Average
0.15 - 0.5	66 to 56	56 to 46
0.50 - 5.0	56	46
5.0 - 30.0	60	50

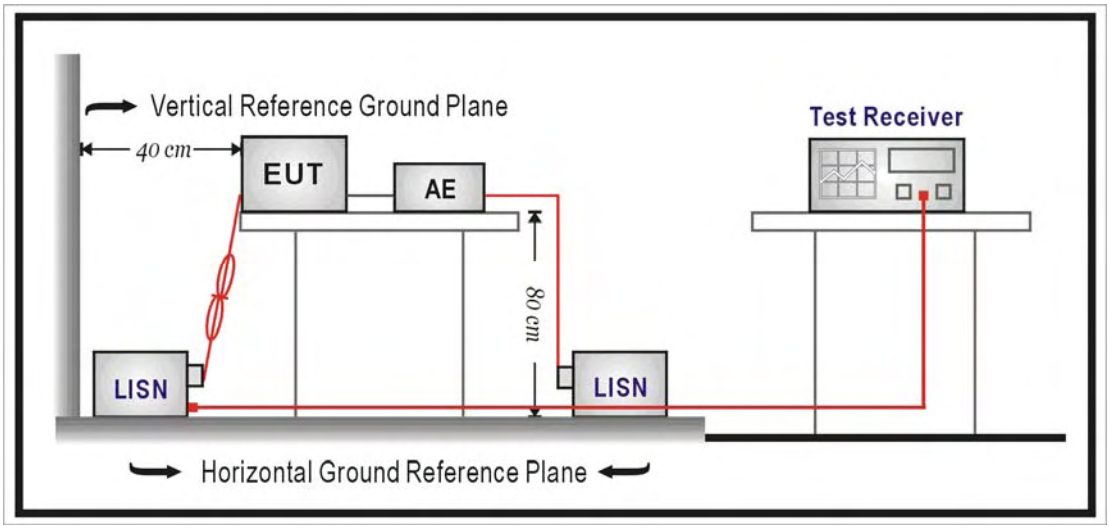
4.2. Test Instruments

Describe	Manufacturer	Model Number	Serial Number	Cal. Date	Remark
Test Receiver	R&S	ESCI	100367	07/01/2010	(1)
LISN	R&S	ENV216	101040	03/02/2010	(1)
LISN	R&S	ENV216	101041	03/02/2010	(1)
Test Site	ATL	TE02	TE02	N.C.R.	-----

Remark: (1) Calibration period 1 year. (2) Calibration period 2 years.

NOTE: N.C.R. = No Calibration Request.

4.3. Test Setup



4.4. Test Procedure

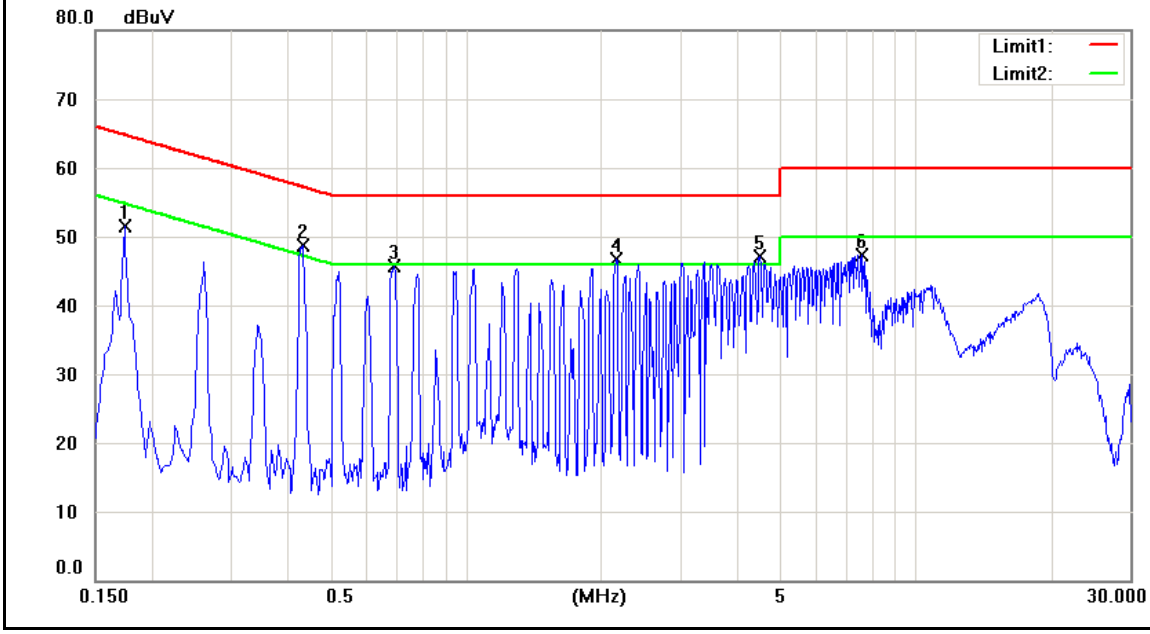
The power line conducted emission measurements were performed in a shielded enclosure. The EUT was assembled on a wooden table which is 80 centimeters high, was placed 40 centimeters from the back wall and at least 1 meter from the sidewall.

Power was fed to the EUT from the public utility power grid through a line filter and EMCO Model 3162/2 SH Line Impedance Stabilization Networks (LISN). The LISN housing, measuring instrumentation case, ground plane, etc., were electrically bonded together at the same RF potential. The Spectrum analyzer was connected to the AC line through an isolation transformer. The 50-ohm output of the LISN was connected to the spectrum analyzer directly. Conducted emission levels were in the CISPR quasi-peak detection mode. The analyzer's 6 dB bandwidth was set to 9 KHz. No post-detector video filter was used.

The spectrum was scanned from 150 KHz to 30 MHz. The physical arrangement of the test system and associated cabling was varied (within the scope of arrangements likely to be encountered in actual use) to determine the effect on the unit's emanations in amplitude and frequency. All spurious emission frequencies were observed. The highest emission amplitudes relative to the appropriate limit were measured and have been recorded in paragraph 4.1.

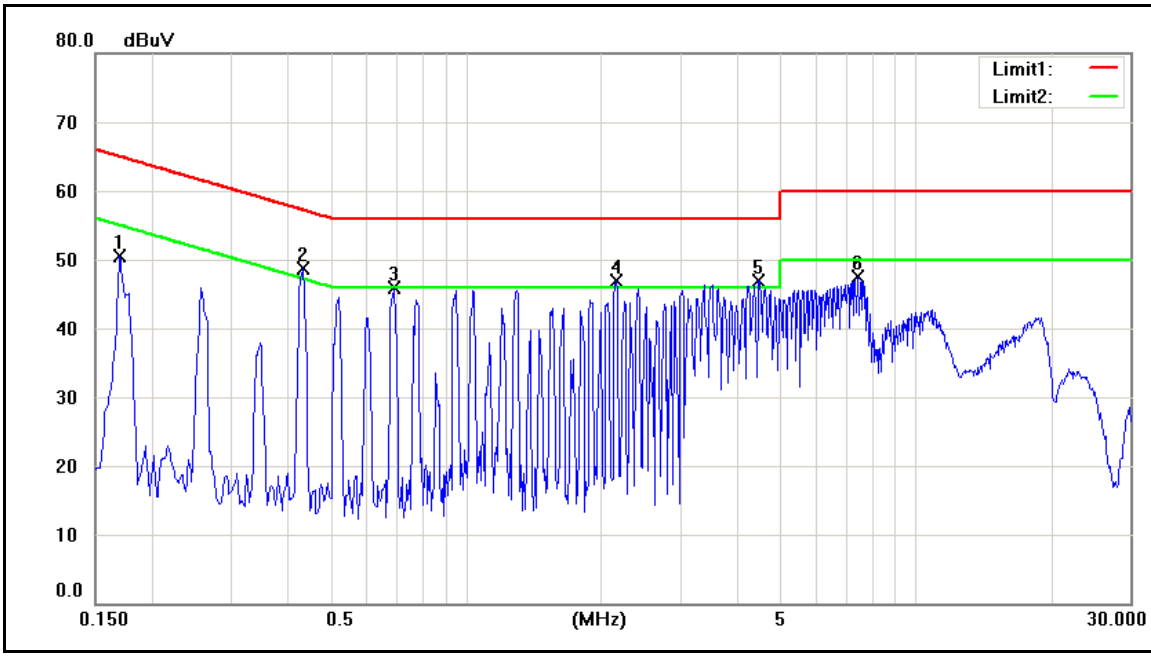
4.5. Test Result

Standard:	**FCC Part 15C**	**Line:**	**L1**
Test item:	**Conducted Emission**	**Power:**	**AC 120V/60Hz**
Model:	**CT-820C**	**Temp.(℃)/Hum.(%RH):**	**26(℃)/60%RH**
Mode:	**Mode 1**	**Date:**	**2010/7/14**
		Test By:	**Gary Wu**
Description:			



No.	Frequency (MHz)	QP reading (dBuV)	AVG reading (dBuV)	Correction factor (dB)	QP result (dBuV)	AVG result (dBuV)	QP limit (dBuV)	AVG limit (dBuV)	QP margin (dB)	AVG margin (dB)	Remark
1	0.1740	40.12	30.41	10.10	50.22	40.51	64.77	54.77	-14.55	-14.26	Pass
2	0.4340	38.03	35.60	9.99	48.02	45.59	57.18	47.18	-9.16	-1.59	Pass
3	0.6900	35.36	31.44	9.87	45.23	41.31	56.00	46.00	-10.77	-4.69	Pass
4	2.1660	35.80	24.02	9.73	45.53	33.75	56.00	46.00	-10.47	-12.25	Pass
5	4.5020	35.25	18.32	9.86	45.11	28.18	56.00	46.00	-10.89	-17.82	Pass
6	7.5700	35.90	20.70	9.92	45.82	30.62	60.00	50.00	-14.18	-19.38	Pass

Standard:	**FCC Part 15C**	**Line:**	**N**
Test item:	**Conducted Emission**	**Power:**	**AC 120V/60Hz**
Model:	**CT-820C**	**Temp.(℃)/Hum.(%RH):**	**26(℃)/60%RH**
Mode:	**Mode 1**	**Date:**	**2010/7/14**
		Test By:	**Gary Wu**
Description:			



No.	Frequency (MHz)	QP reading (dBuV)	AVG reading (dBuV)	Correction factor (dB)	QP result (dBuV)	AVG result (dBuV)	QP limit (dBuV)	AVG limit (dBuV)	QP margin (dB)	AVG margin (dB)	Remark
1	0.1700	38.91	28.83	10.09	49.00	38.92	64.96	54.96	-15.96	-16.04	Pass
2	0.4340	38.09	35.34	9.99	48.08	45.33	57.18	47.18	-9.10	-1.85	Pass
3	0.6900	34.55	30.89	9.87	44.42	40.76	56.00	46.00	-11.58	-5.24	Pass
4	2.1660	35.37	23.77	9.72	45.09	33.49	56.00	46.00	-10.91	-12.51	Pass
5	4.4980	35.31	18.42	9.85	45.16	28.27	56.00	46.00	-10.84	-17.73	Pass
6	7.4580	36.05	20.72	9.90	45.95	30.62	60.00	50.00	-14.05	-19.38	Pass

5 Radiated Interference Measurement

5.1. Limit

Frequency Range (MHz)	Peak (dBuV)
30 to 88	40
88 to 216	43.5
216 to 960	46
Above 960	54

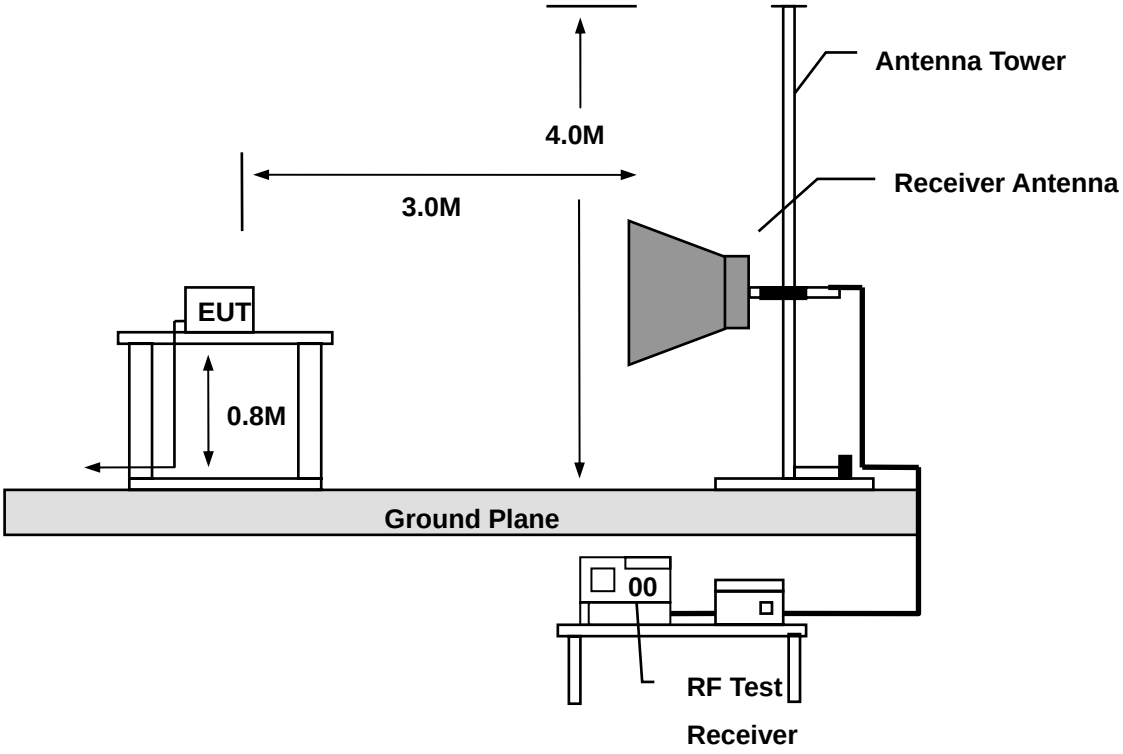
5.2. Test Instruments

3 Meter Chamber					
Equipment	**Manufacturer**	**Model Number**	**Serial Number**	**Cal. Date**	**Remark**
RF Pre-selector	Agilent	N9039A	MY46520256	01/27/2009	(2)
Spectrum Analyzer	Agilent	E4446A	MY46180578	01/20/2009	(2)
Pre Amplifier	Agilent	8449B	3008A02237	02/24/2010	(1)
Pre Amplifier	Agilent	8447D	2944A10961	02/24/2010	(1)
Bi-log Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	9163-270	06/23/2009	(2)
Horn Antenna	SCHWARZBECK MESS-ELEKTRONIK	BBHA9120D	9120D-550	07/01/2009	(2)
Horn Antenna	SCHWARZBECK MESS-ELEKTRONIK	BBHA9170	9170-320	06/30/2009	(2)
Test Site	ATL	TE01	888001	08/06/2009	(1)

Remark: (1) Calibration period 1 year. (2) Calibration period 2 years.

NOTE: N.C.R. = No Calibration Request.

5.3. Setup



5.4. Test Procedure

Final radiation measurements were made on a three-meter, Semi Anechoic Chamber. The EUT system was placed on a nonconductive turntable which is 0.8 meters height, top surface 1.0 x 1.5 meter. The spectrum was examined from 250 MHz to 2.5 GHz in order to cover the whole spectrum below 10th harmonic which could generate from the EUT. During the test, EUT was set to transmit continuously & Measurements spectrum range from 30 MHz to 26.5 GHz is investigated.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, and then the video bandwidth is set to 1 MHz for peak measurements and 10 Hz for average measurements.

A nonconductive material surrounded the EUT to supporting the EUT for standing on tree orthogonal planes. At each condition, the EUT was rotated 360 degrees, and the antenna was raised and lowered from one to four meters to find the maximum emission levels. Measurements were taken using both horizontal and vertical antenna polarization.

SCHWARZBECK MESS-ELEKTRONIK Biconilog Antenna (mode VULB9163) at 3 Meter and the SCHWARZBECK Double Ridged Guide Antenna (model BBHA9120D&9170) was used in frequencies 1 – 26.5 GHz at a distance of 1 meter. All test results were extrapolated to equivalent signal at 3 meters utilizing an inverse linear distance extrapolation Factor (20dB/decade).

For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than average limit (that means the emission level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.

Appropriate preamplifiers were used for improving sensitivity and precautions were taken to avoid overloading or desensitizing the spectrum analyzer. No post – detector video filters were used in the test.

The spectrum analyzer's 6 dB bandwidth was set to 1 MHz, and the analyzer was operated in the peak detection mode, for frequencies both below and up 1 GHz. The average levels were obtained by subtracting the duty cycle correction factor from the peak readings.

The following procedures were used to convert the emission levels measured in decibels referenced to 1 microvolt (dBuV) into field intensity in micro volts pre meter (uV/m).

The actual field intensity in decibels referenced to 1 microvolt in to field intensity in micro colts per meter (dBuV/m).

The actual field is intensity in referenced to 1 microvolt per meter (dBuV/m) is determined by algebraically adding the measured reading in dBuV, the antenna factor (dB), and cable loss (dB) and Subtracting the gain of preamplifier (dB) is auto calculate in spectrum analyzer.

(1) Amplitude (dBuV/m) = FI (dBuV) +AF (dBuV) +CL (dBuV)-Gain (dB)

FI= Reading of the field intensity.

AF= Antenna factor.

CL= Cable loss.

P.S Amplitude is auto calculate in spectrum analyzer.

(2) Actual Amplitude (dBuV/m) = Amplitude (dBuV)-Dis(dB)

The FCC specified emission limits were calculated according the EUT operating frequency and by following linear interpolation equations:

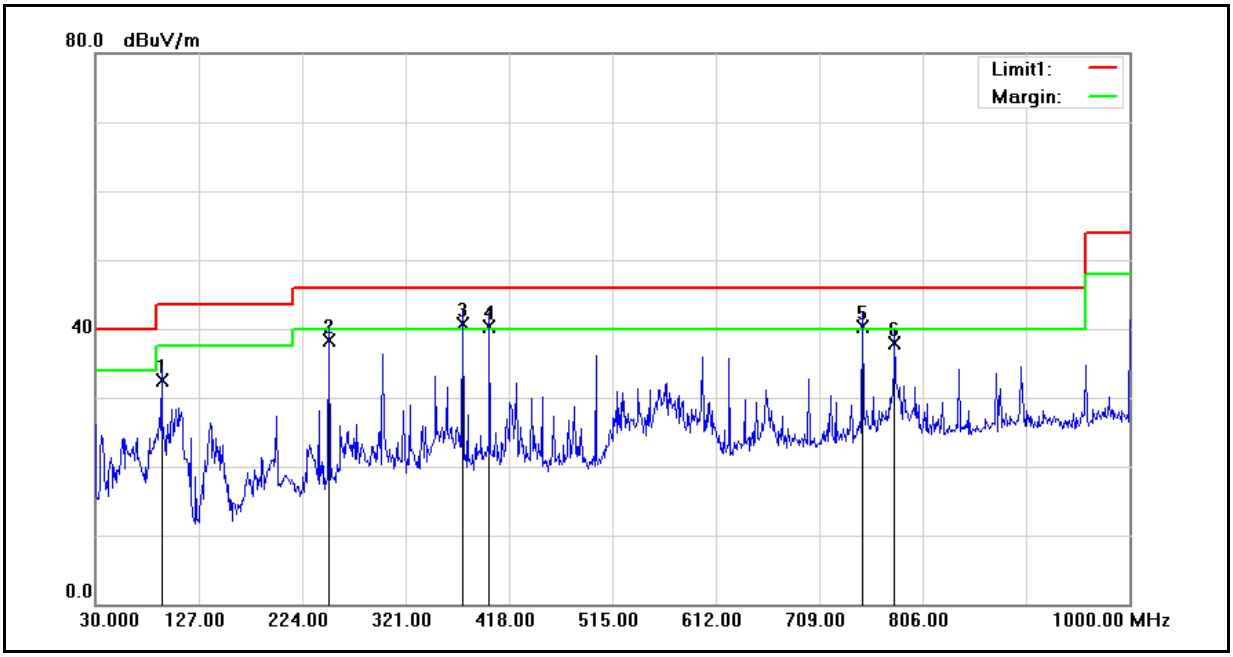
(a) For fundamental frequency : Transmitter Output < +30dBm

(b) For spurious frequency : Spurious emission limits = fundamental emission limit /10

5.5. Test Result

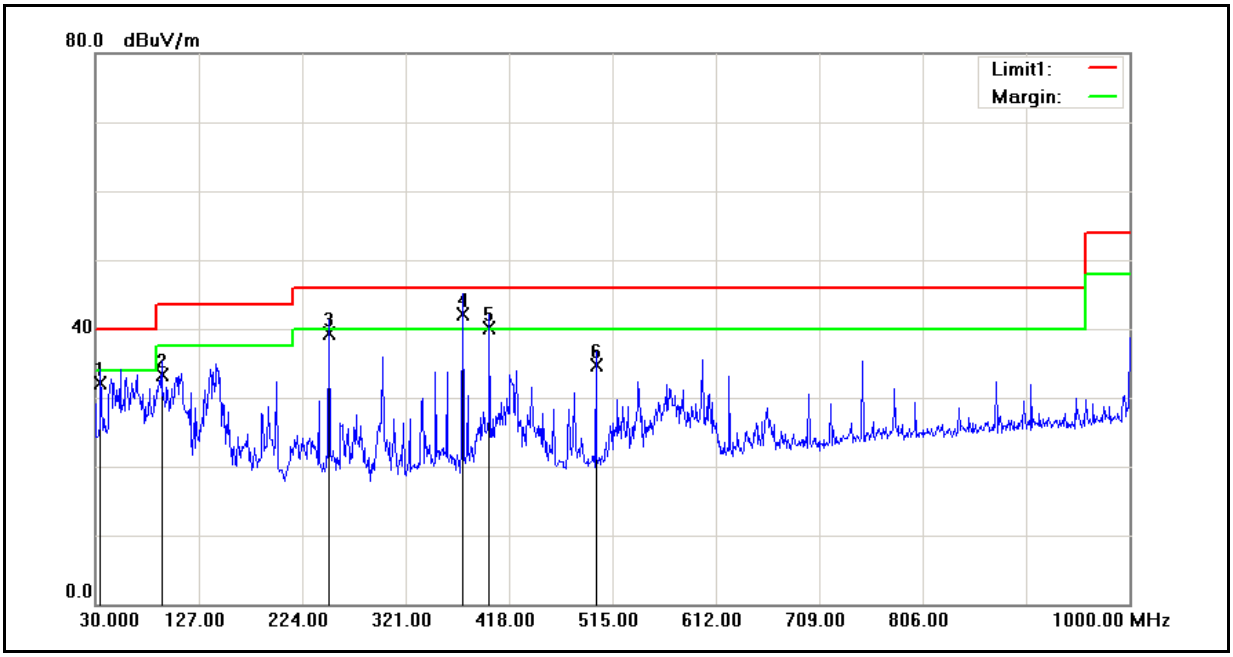
5.5.1. Below 1GHz

Standard:	**FCC Part 15C**	**Test Distance:**	**3m**
Test item:	**Radiated Emission**	**Power:**	**AC 120V/60Hz**
Model:	**CT-820C**	**Temp.(℃)/Hum.(%RH):**	**26(℃)/60%RH**
Mode:	**Mode 1**	**Date:**	**2010/7/15**
Ant.Polar.:	**Horizontal**	**Test By:**	**Gary Wu**



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	92.5000	47.89	-15.31	32.58	43.50	-10.92	QP
2	250.0000	50.22	-11.95	38.27	46.00	-7.73	QP
3	375.0000	49.29	-8.62	40.67	46.00	-5.33	QP
4	400.0000	48.98	-8.60	40.38	46.00	-5.62	QP
5	750.0000	42.54	-2.26	40.28	46.00	-5.72	QP
6	780.0000	39.77	-1.93	37.84	46.00	-8.16	QP

Standard:	**FCC Part 15C**	**Test Distance:**	**3m**
Test item:	**Radiated Emission**	**Power:**	**AC 120V/60Hz**
Model:	**CT-820C**	**Temp.(℃)/Hum.(%RH):**	**26(℃)/60%RH**
Mode:	**Mode 1**	**Date:**	**2010/7/15**
Ant.Polar.:	**Vertical**	**Test By:**	**Gary Wu**



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	35.5000	45.09	-12.96	32.13	40.00	-7.87	QP
2	92.5000	48.54	-15.31	33.23	43.50	-10.27	QP
3	250.0000	51.22	-11.95	39.27	46.00	-6.73	QP
4	375.0000	50.67	-8.62	42.05	46.00	-3.95	QP
5	400.0000	48.80	-8.60	40.20	46.00	-5.80	QP
6	500.0000	41.55	-6.79	34.76	46.00	-11.24	QP

5.5.2. Above 1GHz

Standard:	**FCC Part 15C**	**Test Distance:**	**3m**
Test item:	**Radiated Emission**	**Power:**	**AC 120V/60Hz**
Model:	**CT-820C**	**Temp.(℃)/Hum.(%RH):**	**26(℃)/60%RH**
Mode:	**Mode 2**	**Date:**	**2010/7/22**
Frequency:	**2412MHz**	**Test By:**	**Gary Wu**

Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
1070.000	47.78	-5.96	41.82	74.00	-32.18	peak	H
1280.000	44.80	-4.79	40.01	74.00	-33.99	peak	H
1609.000	54.01	-3.17	50.84	74.00	-23.16	peak	H
4824.000	41.94	7.92	49.86	74.00	-24.14	peak	H
7236.000	34.71	15.03	49.74	74.00	-24.26	peak	H
1063.000	47.81	-6.00	41.81	74.00	-32.19	peak	V
1203.000	49.15	-5.22	43.93	74.00	-30.07	peak	V
1532.000	49.62	-3.45	46.17	74.00	-27.83	peak	V
4824.000	50.19	7.92	58.11	74.00	-15.89	peak	V
4824.000	40.43	7.92	48.35	54.00	-5.65	AVG	V
7236.000	36.52	15.03	51.55	74.00	-20.45	peak	V

Standard:	**FCC Part 15C**	**Test Distance:**	**3m**
Test item:	**Radiated Emission**	**Power:**	**AC 120V/60Hz**
Model:	**CT-820C**	**Temp.(℃)/Hum.(%RH):**	**26(℃)/60%RH**
Mode:	**Mode 2**	**Date:**	**2010/7/22**
Frequency:	**2437MHz**	**Test By:**	**Gary Wu**

Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
1070.000	49.45	-5.96	43.49	74.00	-30.51	peak	H
1280.000	44.49	-4.79	39.70	74.00	-34.30	peak	H
1623.000	54.53	-3.13	51.40	74.00	-22.60	peak	H
4874.000	38.35	8.09	46.44	74.00	-27.56	peak	H
7311.000	35.01	15.23	50.24	74.00	-23.76	peak	H
1070.000	47.07	-5.96	41.11	74.00	-32.89	peak	V
1203.000	49.42	-5.22	44.20	74.00	-29.80	peak	V
1623.000	50.04	-3.13	46.91	74.00	-27.09	peak	V
4874.000	49.03	8.09	57.12	74.00	-16.88	peak	V
4874.000	37.42	8.09	45.51	54.00	-8.49	AVG	V
7311.000	36.92	15.23	52.15	74.00	-21.85	peak	V
7311.000	34.46	15.23	49.69	54.00	-4.31	AVG	V

Standard:	**FCC Part 15C**	**Test Distance:**	**3m**
Test item:	**Radiated Emission**	**Power:**	**AC 120V/60Hz**
Model:	**CT-820C**	**Temp.(℃)/Hum.(%RH):**	**26(℃)/60%RH**
Mode:	**Mode 2**	**Date:**	**2010/7/22**
Frequency:	**2462MHz**	**Test By:**	**Gary Wu**

Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
1070.000	48.76	-5.96	42.80	74.00	-31.20	peak	H
1280.000	44.61	-4.79	39.82	74.00	-34.18	peak	H
1644.000	56.94	-3.05	53.89	74.00	-20.11	peak	H
1644.000	32.54	-3.05	29.49	54.00	-24.51	AVG	H
4924.000	36.52	8.25	44.77	74.00	-29.23	peak	H
7386.000	35.72	15.42	51.14	74.00	-22.86	peak	H
1070.000	45.14	-5.96	39.18	74.00	-34.82	peak	V
1147.000	46.10	-5.54	40.56	74.00	-33.44	peak	V
1644.000	49.24	-3.05	46.19	74.00	-27.81	peak	V
4924.000	45.23	8.25	53.48	74.00	-20.52	peak	V
4924.000	33.77	8.25	42.02	54.00	-11.98	AVG	V
7386.000	37.59	15.42	53.01	74.00	-20.99	peak	V
7386.000	29.48	15.42	44.90	54.00	-9.10	AVG	V

Standard:	**FCC Part 15C**	**Test Distance:**	**3m**
Test item:	**Radiated Emission**	**Power:**	**AC 120V/60Hz**
Model:	**CT-820C**	**Temp.(℃)/Hum.(%RH):**	**26(℃)/60%RH**
Mode:	**Mode 3**	**Date:**	**2010/7/22**
Frequency:	**2412MHz**	**Test By:**	**Gary Wu**

Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
1070.000	49.02	-5.96	43.06	74.00	-30.94	peak	H
1203.000	45.89	-5.22	40.67	74.00	-33.33	peak	H
1609.000	53.42	-3.17	50.25	74.00	-23.75	peak	H
4824.000	38.20	7.92	46.12	74.00	-27.88	peak	H
7236.000	35.10	15.03	50.13	74.00	-23.87	peak	H
1070.000	45.72	-5.96	39.76	74.00	-34.24	peak	V
1203.000	48.52	-5.22	43.30	74.00	-30.70	peak	V
1609.000	46.54	-3.17	43.37	74.00	-30.63	peak	V
4824.000	45.08	7.92	53.00	74.00	-21.00	peak	V
4824.000	34.98	7.92	42.90	54.00	-11.10	AVG	V
7236.000	35.88	15.03	50.91	74.00	-23.09	peak	V

Standard:	**FCC Part 15C**	**Test Distance:**	**3m**
Test item:	**Radiated Emission**	**Power:**	**AC 120V/60Hz**
Model:	**CT-820C**	**Temp.(℃)/Hum.(%RH):**	**26(℃)/60%RH**
Mode:	**Mode 3**	**Date:**	**2010/7/22**
Frequency:	**2437MHz**	**Test By:**	**Gary Wu**

Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
1063.000	48.19	-6.00	42.19	74.00	-31.81	peak	H
1203.000	44.23	-5.22	39.01	74.00	-34.99	peak	H
1623.000	53.01	-3.13	49.88	74.00	-24.12	peak	H
4874.000	36.10	8.09	44.19	74.00	-29.81	peak	H
7311.000	35.55	15.23	50.78	74.00	-23.22	peak	H
1070.000	46.71	-5.96	40.75	74.00	-33.25	peak	V
1203.000	47.88	-5.22	42.66	74.00	-31.34	peak	V
1623.000	48.60	-3.13	45.47	74.00	-28.53	peak	V
4874.000	39.11	8.09	47.20	74.00	-26.80	peak	V
7311.000	34.55	15.23	49.78	74.00	-24.22	peak	V

Standard:	**FCC Part 15C**	**Test Distance:**	**3m**
Test item:	**Radiated Emission**	**Power:**	**AC 120V/60Hz**
Model:	**CT-820C**	**Temp.(℃)/Hum.(%RH):**	**26(℃)/60%RH**
Mode:	**Mode 3**	**Date:**	**2010/7/22**
Frequency:	**2462MHz**	**Test By:**	**Gary Wu**

Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
1063.000	48.30	-6.00	42.30	74.00	-31.70	peak	H
1203.000	45.67	-5.22	40.45	74.00	-33.55	peak	H
1644.000	57.29	-3.05	54.24	74.00	-19.76	peak	H
1644.000	30.25	-3.05	27.20	54.00	-26.80	AVG	H
4924.000	36.64	8.25	44.89	74.00	-29.11	peak	H
7386.000	35.48	15.42	50.90	74.00	-23.10	peak	H
1063.000	47.82	-6.00	41.82	74.00	-32.18	peak	V
1203.000	47.92	-5.22	42.70	74.00	-31.30	peak	V
1644.000	49.81	-3.05	46.76	74.00	-27.24	peak	V
4924.000	40.16	8.25	48.41	74.00	-25.59	peak	V
7386.000	36.38	15.42	51.80	74.00	-22.20	peak	V

Standard:	**FCC Part 15B**	**Test Distance:**	**3m**
Test item:	**Radiated Emission**	**Power:**	**AC 120V/60Hz**
Model:	**CT-820C**	**Temp.(℃)/Hum.(%RH):**	**26(℃)/60%RH**
Mode:	**Mode 4**	**Date:**	**2010/7/22**
Frequency:	**2437MHz**	**Test By:**	**Gary Wu**

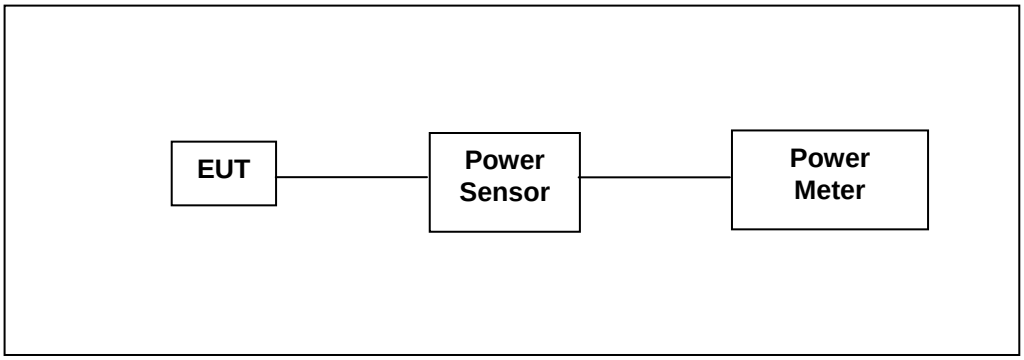
Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Peak Limit (dBuV/m)	AVG. Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
1609.000	44.47	-3.17	41.30	74.00	54.00	-32.70	peak	H
6852.000	36.94	13.96	50.90	74.00	54.00	-23.10	peak	H
1609.000	48.32	-3.17	45.15	74.00	54.00	-28.85	peak	V
7405.000	36.15	15.48	51.63	74.00	54.00	-22.37	peak	V

6 Maximum Conducted Output Power Measurement

6.1. Limit

For systems using digital modulation in the 2400-2483.5MHz, the limit for peak output power is 30dBm.

6.2. Test Setup



6.3. Test Instruments

Equipment	Manufacturer	Model Number	Serial Number	Cal. Date	Remark
Single Channel PK Power Sensor	Agilent	N1911A	MY45101619	07/19/2010	(1)
Wideband Power Meter	Agilent	N1921A	MY45241957	07/19/2010	(1)
Test Site	ATL	TE06	TE06	N.C.R.	-----

Remark: (1) Calibration period 1 year. (2) Calibration period 2 years.

NOTE: N.C.R. = No Calibration Request.

6.4. Test Procedure

The tests below are run with the EUT's transmitter set at high power in TX mode. The EUT is needed to force selection of output power level and channel number. While testing, EUT was set to transmit continuously. Remove the Subjective device's antenna and connect the RF output port to power sensor. The maximum peak output power shall not exceed 1 watt.

Use a direct connection between the antenna port of transmitter and the power sensor, for prevent the power sensor input attenuation 40-50 dB. Set the RBW Bandwidth of the emission or use a channel power meter mode.

For antennas with gains of 6 dBi or less, maximum allowed transmitter output is 1 watt (+30 dBm). For antennas with gains greater than 6 dBi, transmitter output level must be decreased by an amount equal to (GAIN - 6)/3 dBm.

The antenna port of the EUT was connected to the input of a power sensor. Power was read directly and cable loss correction was added to the reading to obtain power at the EUT antenna terminals.

6.5. Test Result

Model	CT-820C					
Test Item	Maximum Conducted Output Power					
Test Mode	Mode 2: IEEE 802.11b Link Mode					
Date of Test	07/20/2010			Test Site	TE06	
Frequency (MHz)	Data Rate	Average Power		Peak Power		Limit (dBm)
		(dBm)	(W)	(dBm)	(W)	
2412	1	18.09	0.064	22.30	0.170	< 30
2437		18.20	0.066	22.24	0.167	< 30
2462		18.55	0.072	22.65	0.184	< 30
2412	11	18.07	0.064	22.68	0.185	< 30
2437		17.81	0.060	22.60	0.182	< 30
2462		18.23	0.067	**22.83**	**0.192**	< 30

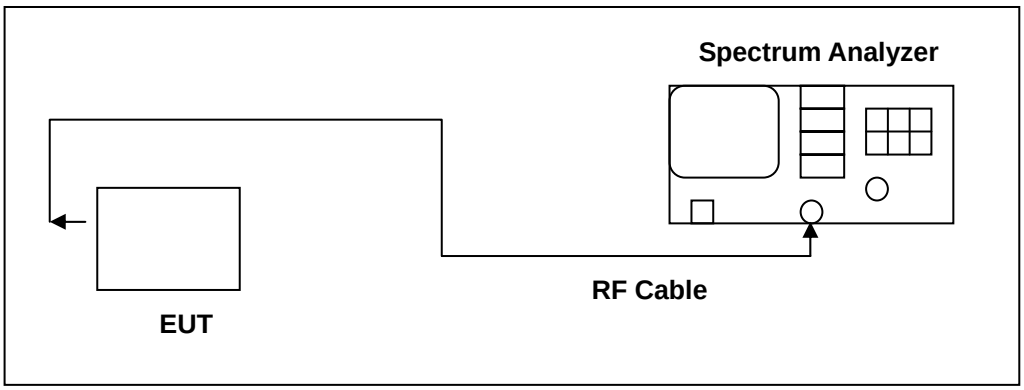
Model	CT-820C					
Test Item	Maximum Conducted Output Power					
Test Mode	Mode 3: IEEE 802.11g Link Mode					
Date of Test	07/14/2010			Test Site	TE06	
Frequency (MHz)	Data Rate	Average Power		Peak Power		Limit (dBm)
		(dBm)	(W)	(dBm)	(W)	
2412	6	14.82	0.030	24.78	0.301	< 30
2437		14.76	0.030	24.80	0.302	< 30
2462		14.50	0.028	**24.87**	**0.307**	< 30
2412	54	13.56	0.023	24.39	0.275	< 30
2437		13.98	0.025	24.48	0.281	< 30
2462		13.80	0.024	24.51	0.282	< 30

7 6dB RF Bandwidth Measurement

7.1. Limit

Systems using digital modulation techniques may operate in the 2400–2483.5 MHz bands. The minimum 6 dB band-width shall be at least 500 kHz.

7.2. Test Setup



7.3. Test Instruments

Equipment	Manufacturer	Model Number	Serial Number	Cal. Date	Remark
Spectrum Analyzer	Agilent	E4445A	MY46181986	05/14/2009	(2)
Test Site	ATL	TE06	TE06	N.C.R.	-----

Remark: (1) Calibration period 1 year. (2) Calibration period 2 years.

NOTE: N.C.R. = No Calibration Request.

7.4. Test Procedure

The EUT was setup to ANSI C63.4, 2003; tested to DTS test procedure of Oct 2002 KDB558074 for compliance to FCC 47CFR 15.247 requirements.

The antenna port of the EUT was connected to the input of a spectrum analyzer. Analyzer RES BW was set to 100 kHz. For each RF output channel investigated, the spectrum analyzer center frequency was set to the channel carrier. A peak output reading was taken, a DISPLAY line was drawn 6 dB lower than peak level. The 6 dB bandwidth was determined from where the channel output spectrum intersected the display line.

The test was performed at 3 channels (Channel 1, 6, 11)

7.5. Test Result

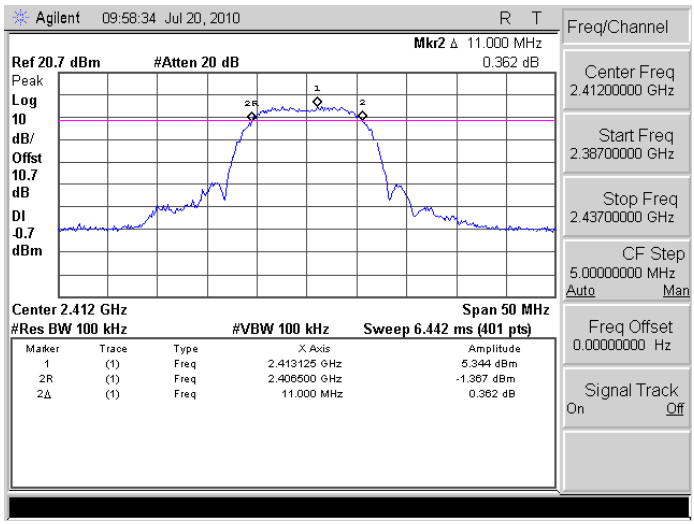
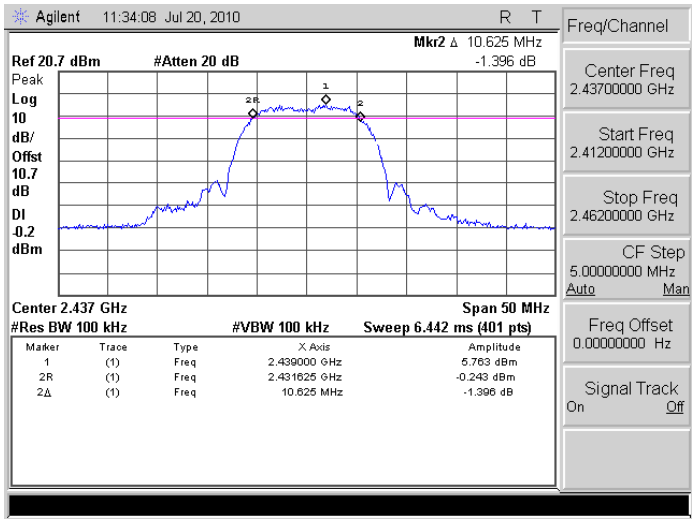
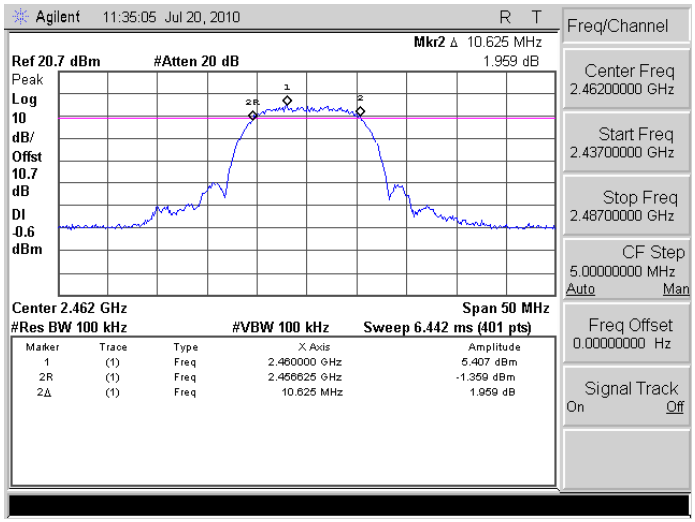
Model	CT-820C		
Test Item	6dB RF Bandwidth		
Test Mode	Mode 2: IEEE 802.11b Link Mode		
Date of Test	07/20/2010	Test Site	TE06

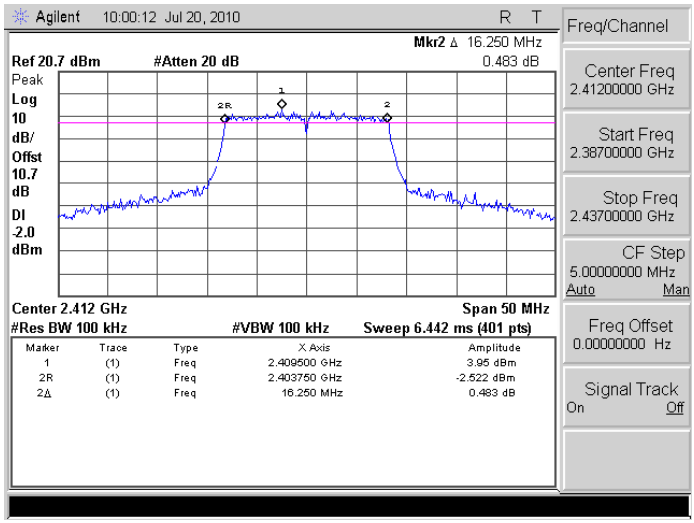
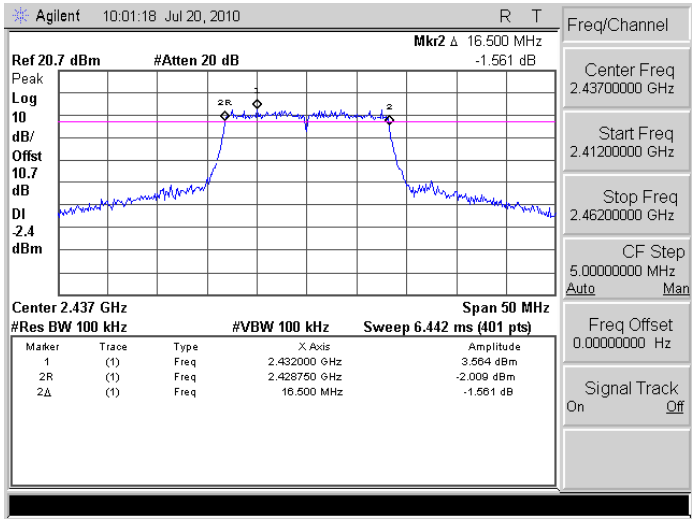
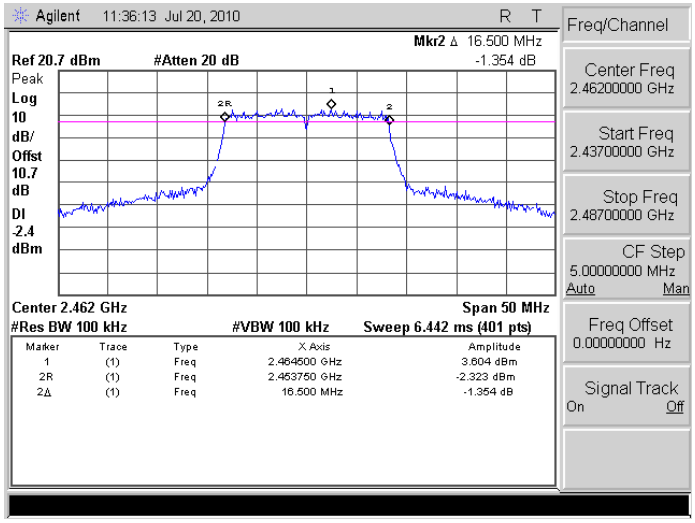
Frequency (MHz)	Measurement (kHz)	Limit (kHz)
2412	11000	> 500
2437	10625	> 500
2462	10625	> 500

Model	CT-820C		
Test Item	6dB RF Bandwidth		
Test Mode	Mode 3: IEEE 802.11g Link Mode		
Date of Test	07/20/2010	Test Site	TE06

Frequency (MHz)	Measurement (kHz)	Limit (kHz)
2412	16250	> 500
2437	16500	> 500
2462	16500	> 500

7.6. Test Graphs

Mode 2: IEEE 802.11b Link Mode	
2412	
2437	
2462	

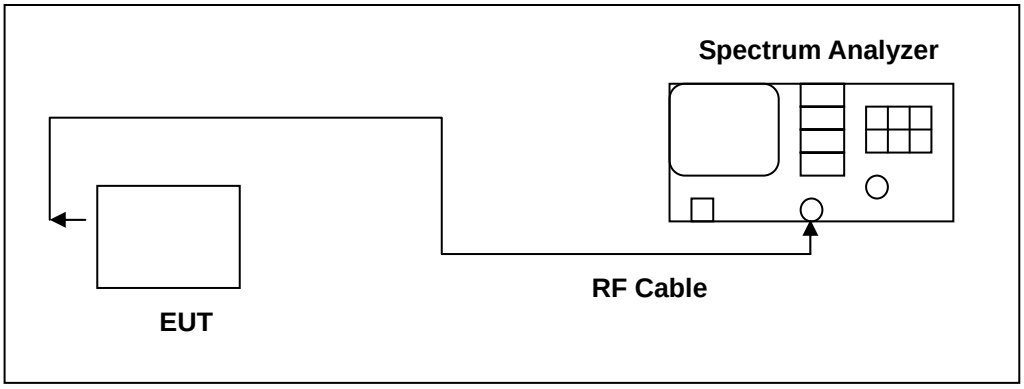
Mode 3: IEEE 802.11g Link Mode	
2412	
2437	
2462	

8 Maximum Power Density Measurement

8.1. Limit

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

8.2. Test Setup



8.3. Test Instruments

Equipment	Manufacturer	Model Number	Serial Number	Cal. Date	Remark
Spectrum Analyzer	Agilent	E4445A	MY46181986	05/14/2009	(2)
Test Site	ATL	TE06	TE06	N.C.R.	-----

Remark: (1) Calibration period 1 year. (2) Calibration period 2 years.

NOTE: N.C.R. = No Calibration Request.

8.4. Test Procedure

The EUT was setup to ANSI C63.4, 2003; tested to DTS test procedure of Oct 2002 KDB558074 for compliance to FCC 47CFR 15.247 requirements.

The spectrum analyzer RES BW was set to 3 kHz. The START and STOP frequencies were set to the band edges of the maximum output pass band. If there is no clear maximum amplitude in any given portion of the band, it may be necessary to make measurements at a number of bands defined by several START and STOP frequency pairs. The specification calls for a 1 second interval at each 3 kHz bandwidth; total SWEEP TIME is calculated as follows:

SWEEP TIME (SEC) = (Fstop, kHz - Fstart, kHz)/3 kHz

Antenna output of the EUT was coupled directly to spectrum analyzer; if an external attenuator and/or cable was used, these losses are compensated for with the analyzer OFFSET function.

8.5. Test Result

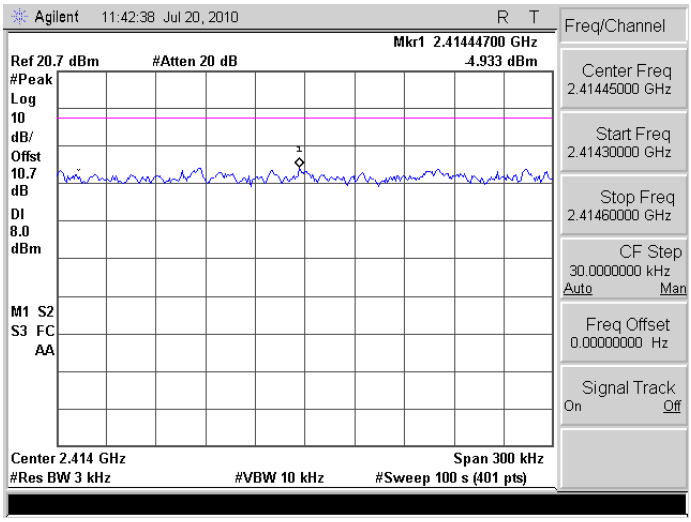
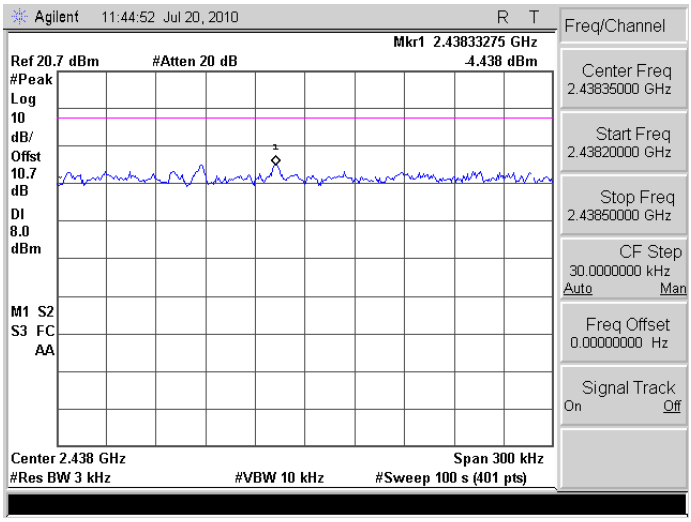
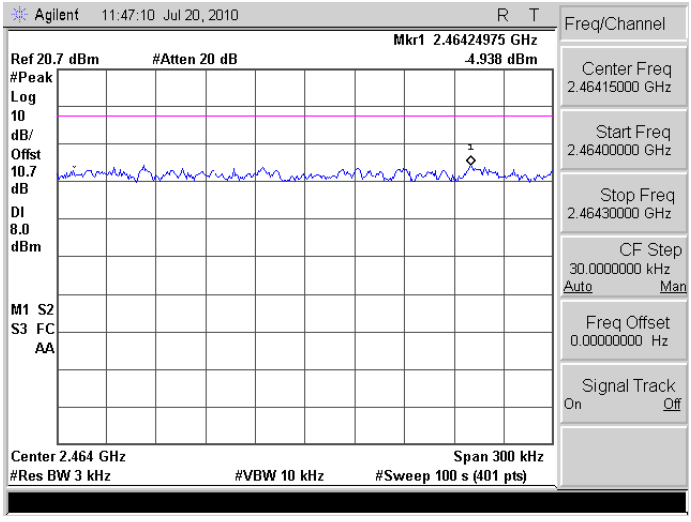
Model	CT-820C		
Test Item	Maximum Power Density		
Test Mode	Mode 2: IEEE 802.11b Link Mode		
Date of Test	07/20/2010	Test Site	TE06

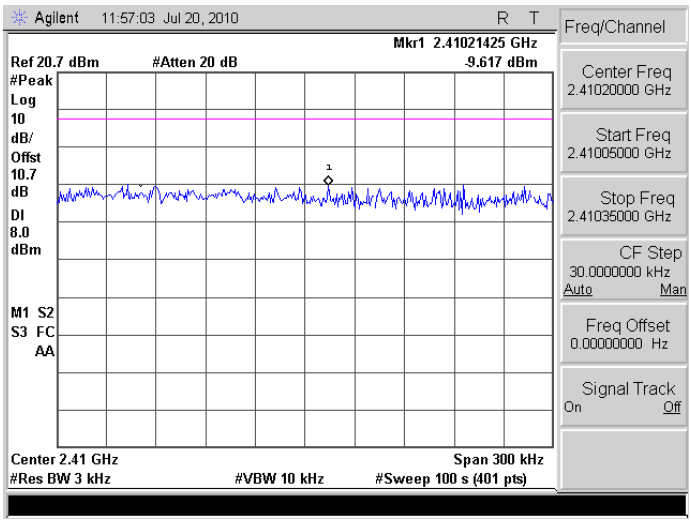
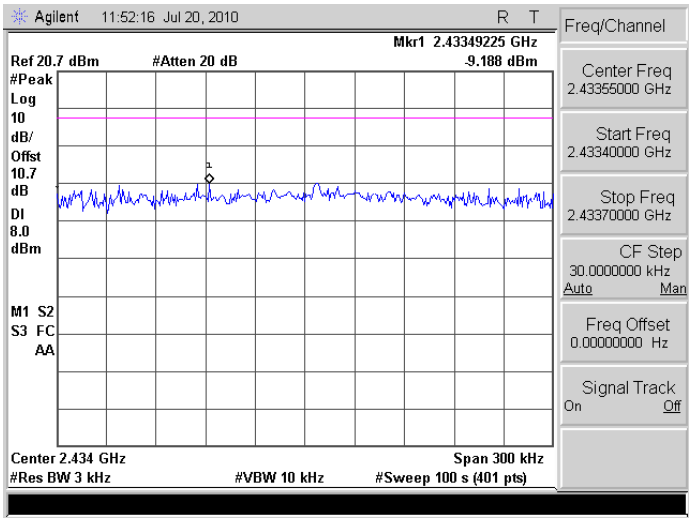
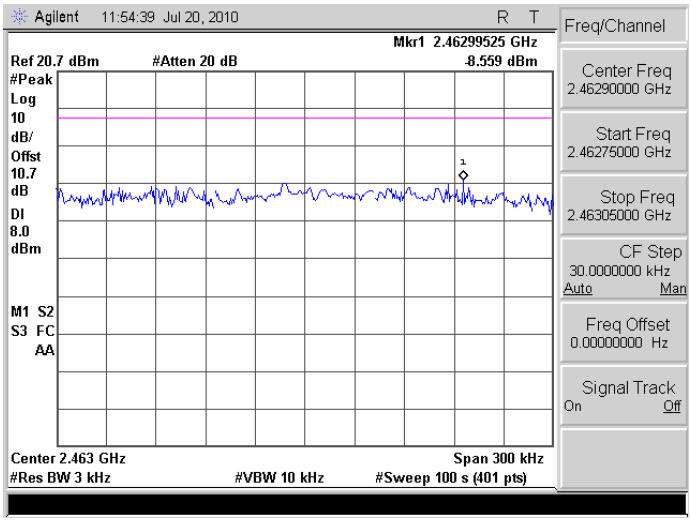
Frequency (MHz)	Measurement (dBm)	Limit (dBm)
2412	-4.933	< 8
2437	-4.438	< 8
2462	-4.938	< 8

Model	CT-820C		
Test Item	Maximum Power Density		
Test Mode	Mode 3: IEEE 802.11g Link Mode		
Date of Test	07/20/2010	Test Site	TE06

Frequency (MHz)	Measurement (dBm)	Limit (dBm)
2412	-9.617	< 8
2437	-9.188	< 8
2462	-8.559	< 8

8.6. Test Graphs

Mode 2: IEEE 802.11b Link Mode	
2412	
2437	
2462	

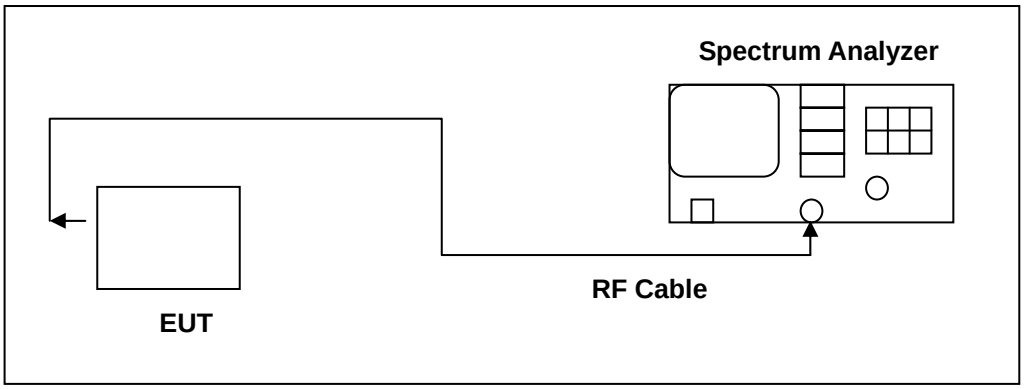
Mode 3: IEEE 802.11g Link Mode	
2412	
2437	
2462	

9 Out of Band Conducted Emissions Measurement

9.1. Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power

9.2. Test Setup



9.3. Test Instruments

Equipment	Manufacturer	Model Number	Serial Number	Cal. Date	Remark
Spectrum Analyzer	Agilent	E4445A	MY46181986	05/14/2009	(2)
Test Site	ATL	TE06	TE06	N.C.R.	-----

Remark: (1) Calibration period 1 year. (2) Calibration period 2 years.

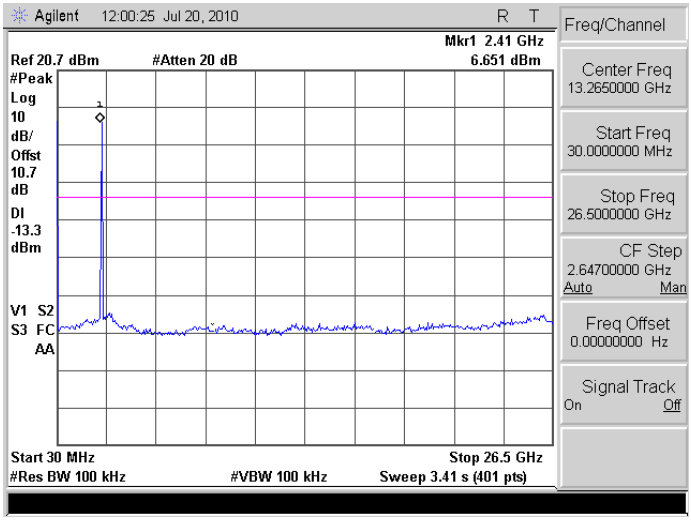
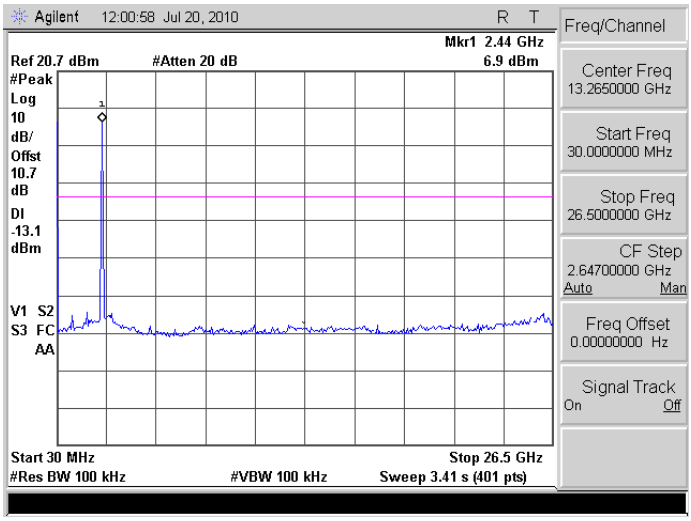
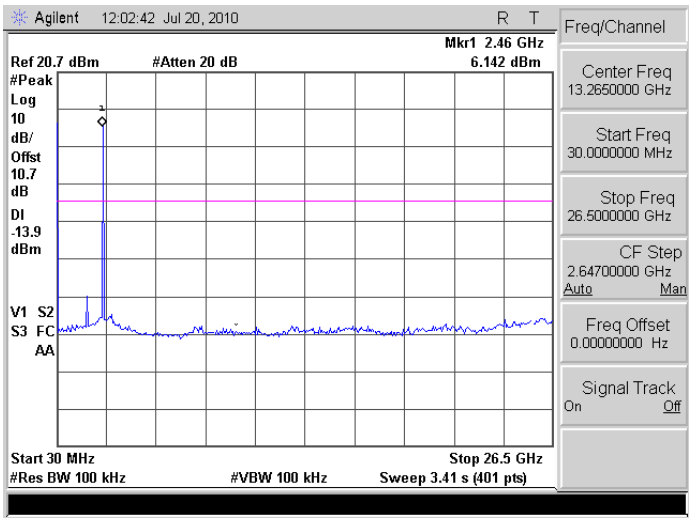
NOTE: N.C.R. = No Calibration Request.

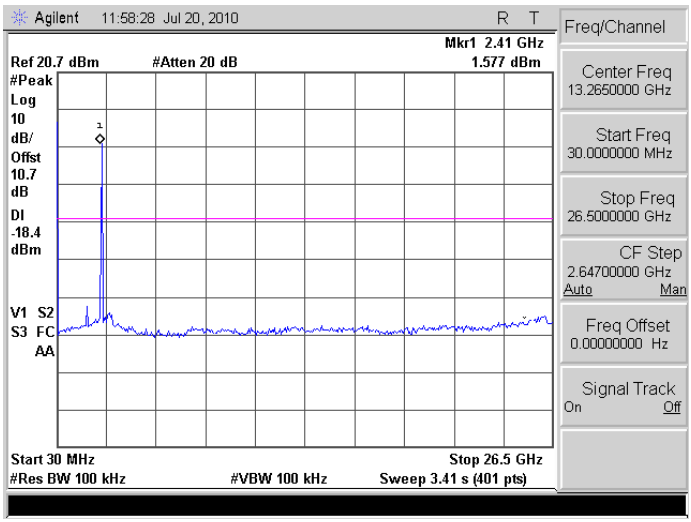
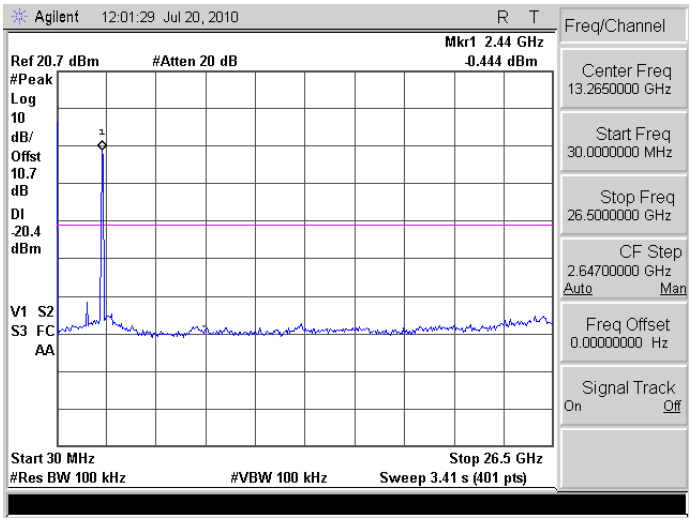
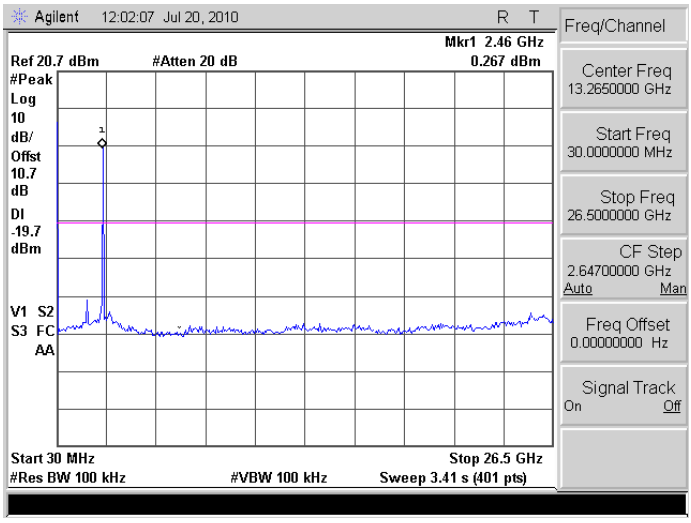
9.4. Test Procedure

In any 100 kHz bandwidth outside the EUT pass band, the RF power produced by the modulation products of the spreading sequence, the information sequence, and the carrier frequency shall be at least 20 dB below that of the maximum in-band 100 kHz emission, antenna output of the EUT was coupled directly to spectrum analyzer; if an external attenuator and/or cable was used, these losses are compensated for with the analyzer OFFSET function.

All other types of emissions from the EUT shall meet the general limits for radiated frequencies outside the pass band. The test was performed at 3 channels (Channel 1, 6, 11)

9.5. Test Graphs

Mode 2: IEEE 802.11b Link Mode	
2412	
2437	
2462	

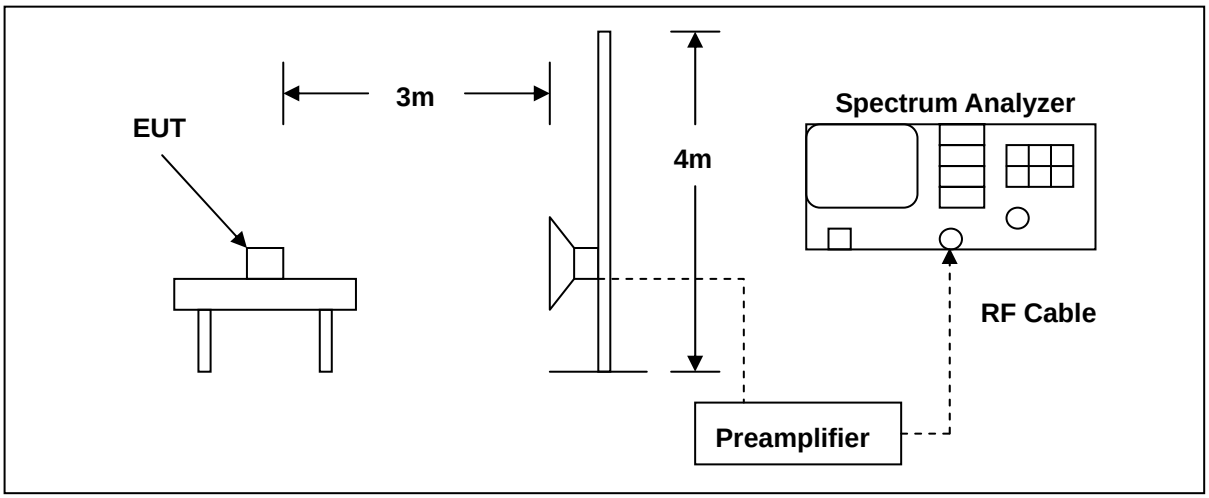
Mode 3: IEEE 802.11g Link Mode	
2412	
2437	
2462	

10 Band Edges Measurement

10.1. Limit

In any 100 kHz bandwidth outside the intentional radiation frequency band, the radio frequency power shall be at least 20 dB below the highest level of the radiated power. In addition, radiated emissions which fall in the restricted bands must also comply with the radiated emission limits.

10.2. Test Setup



10.3. Test Instruments

Equipment	Manufacturer	Model Number	Serial Number	Cal. Date	Remark
Spectrum Analyzer	Agilent	E4408B	MY45107753	06/23/2009	(2)
Pre Amplifier	Agilent	8449B	3008A02237	02/24/2010	(1)
Horn Antenna	SCHWARZBECK MESS-ELEKTRONIK	9120D	9120D-550	07/01/2009	(2)
Test Site	ATL	TE06	TE06	N.C.R.	-----

Remark: (1) Calibration period 1 year. (2) Calibration period 2 years.

NOTE: N.C.R. = No Calibration Request.

10.4. Test Procedure

The EUT was setup to ANSI C63.4, 2003; tested to DTS test procedure of Oct 2002 KDB558074 for compliance to FCC 47CFR 15.247 requirements.

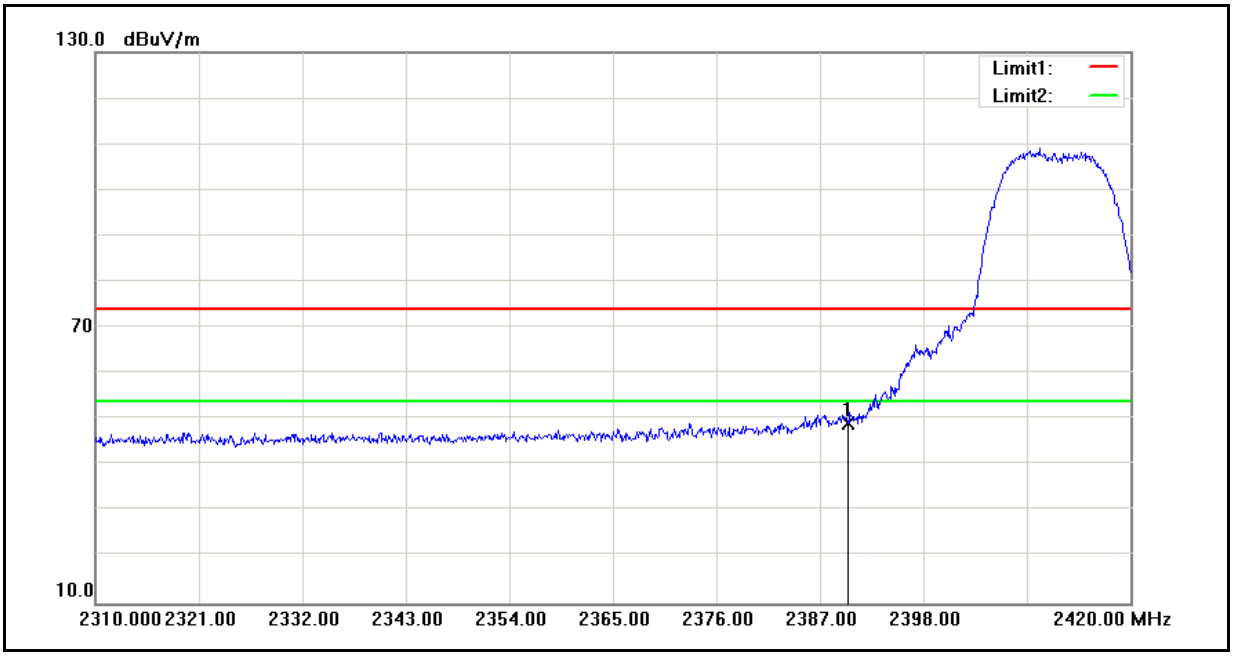
The emissions on the harmonics frequencies, the limits, and the margin of compliance are presented. These tests were made when the transmitter was in full radiated power. The additional test was performed to show compliance with the requirement at the band-edge frequency 2483.5 MHz and up to 2500 MHz and at 2390.0 MHz.

The transmitter was configured with the worst case antenna and setup to transmit at the highest channel. Then the field strength was measured at 2483.5 MHz.

The transmitter was then configured with the worst case antenna and setup to transmit at the lowest channel. Then the field strength was measured at 2390.0 MHz. These tests were performed at 4 different bit rates.

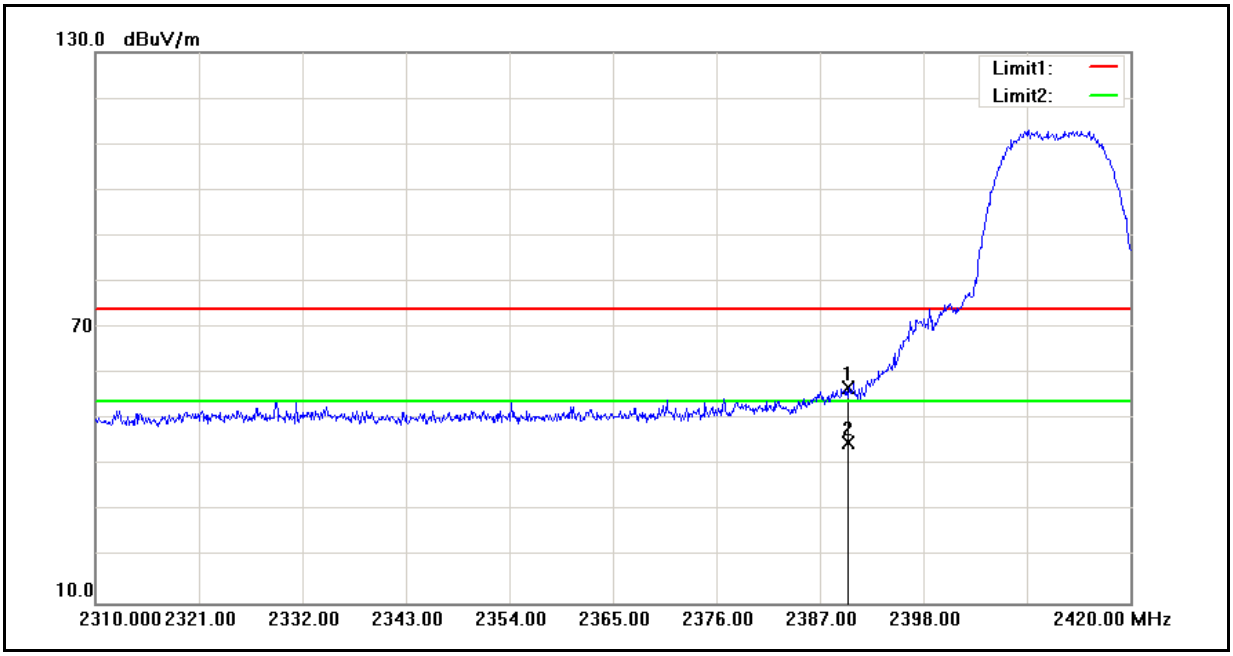
10.5. Test Result

Standard:	**FCC Part 15C**	**Test Distance:**	**3m**
Test item:	**Radiated Emission**	**Power:**	**AC 120V/60Hz**
Model:	**CT-820C**	**Temp.(℃)/Hum.(%RH):**	**26(℃)/60%RH**
Mode:	**Mode 2**	**Date:**	**2010/7/20**
Frequency:	**2412 MHz**	**Test By:**	**Gary Wu**
Ant.Polar.:	**Horizontal**		



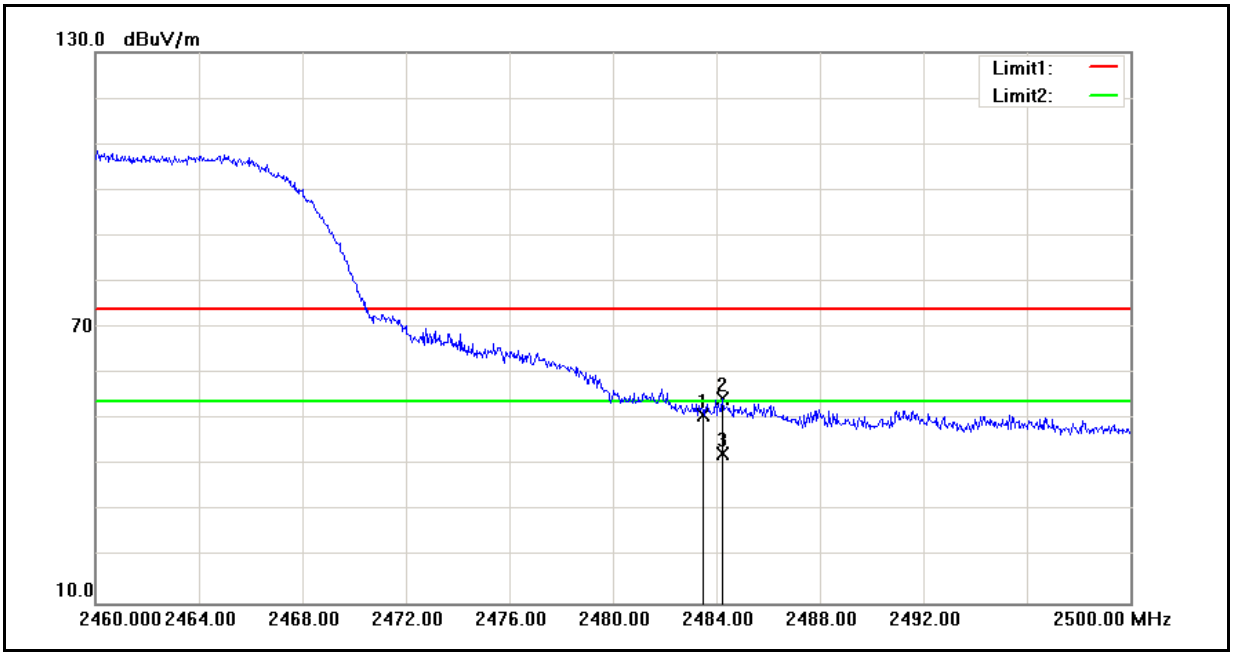
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2390.000	49.28	-0.22	49.06	74.00	-24.94	peak

Standard:	**FCC Part 15C**	**Test Distance:**	**3m**
Test item:	**Radiated Emission**	**Power:**	**AC 120V/60Hz**
Model:	**CT-820C**	**Temp.(℃)/Hum.(%RH):**	**26(℃)/60%RH**
Mode:	**Mode 2**	**Date:**	**2010/7/20**
Frequency:	**2412 MHz**	**Test By:**	**Gary Wu**
Ant.Polar.:	**Vertical**		



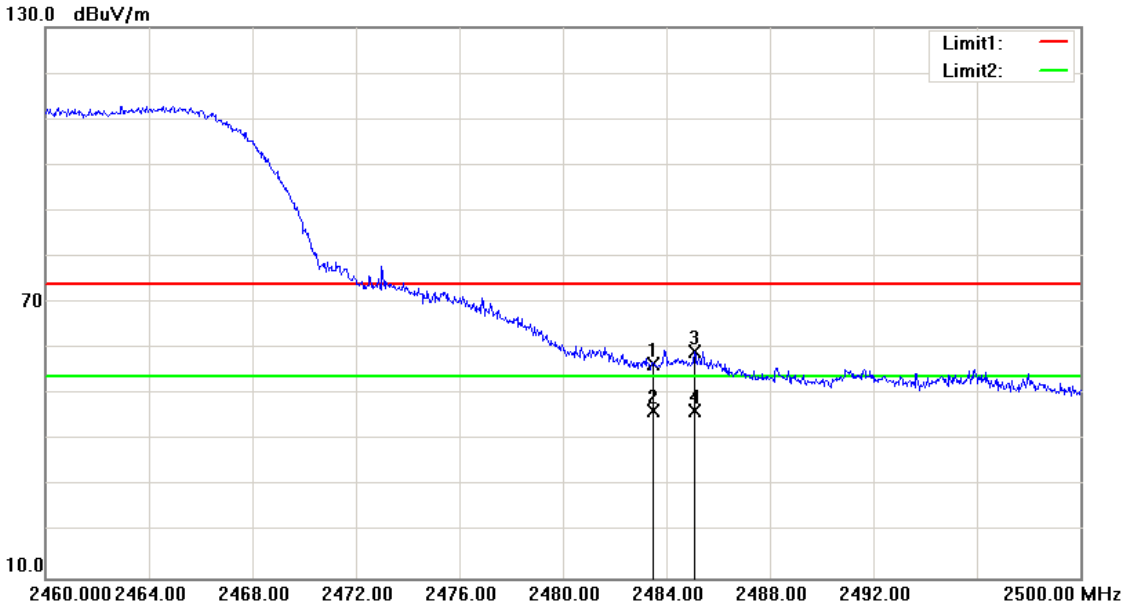
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2390.000	57.14	-0.22	56.92	74.00	-17.08	peak
2	2390.000	45.04	-0.22	44.82	54.00	-9.18	AVG

Standard:	**FCC Part 15C**	**Test Distance:**	**3m**
Test item:	**Radiated Emission**	**Power:**	**AC 120V/60Hz**
Model:	**CT-820C**	**Temp.(℃)/Hum.(%RH):**	**26(℃)/60%RH**
Mode:	**Mode 2**	**Date:**	**2010/7/20**
Frequency:	**2462 MHz**	**Test By:**	**Gary Wu**
Ant.Polar.:	**Horizontal**		



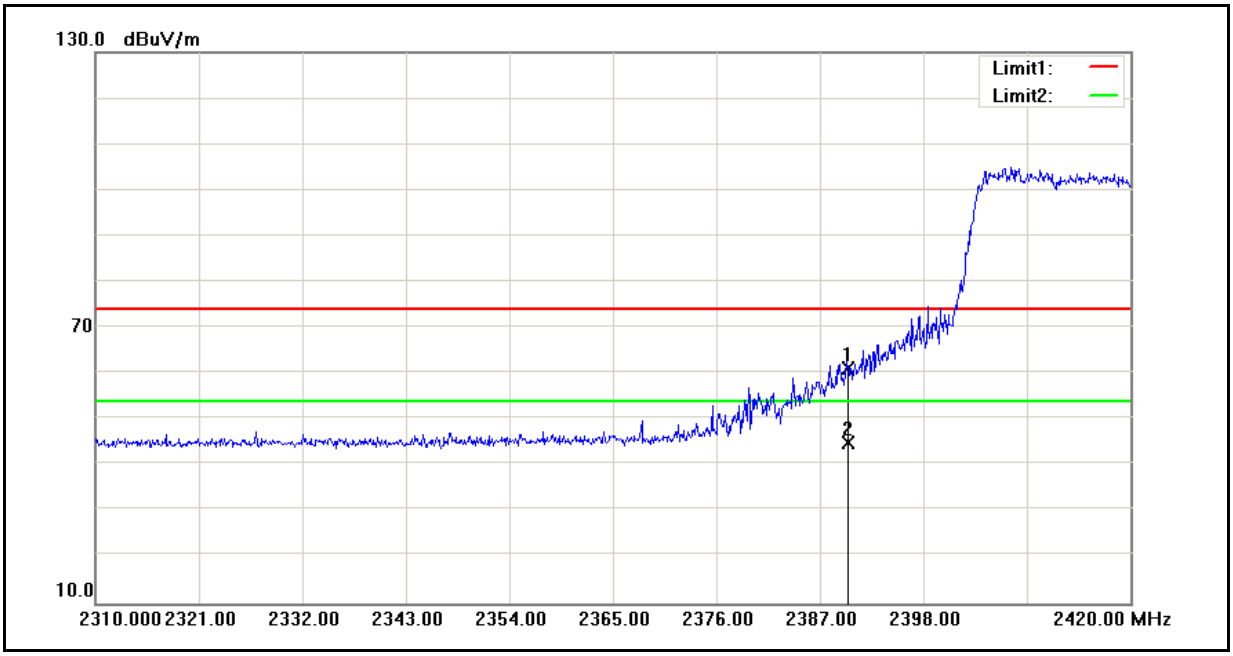
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2483.500	50.89	0.16	51.05	74.00	-22.95	peak
2	2484.240	54.27	0.16	54.43	74.00	-19.57	peak
3	2484.240	42.41	0.16	42.57	54.00	-11.43	AVG

Standard:	**FCC Part 15C**	**Test Distance:**	**3m**
Test item:	**Radiated Emission**	**Power:**	**AC 120V/60Hz**
Model:	**CT-820C**	**Temp.(℃)/Hum.(%RH):**	**26(℃)/60%RH**
Mode:	**Mode 2**	**Date:**	**2010/7/20**
Frequency:	**2462 MHz**	**Test By:**	**Gary Wu**
Ant.Polar.:	**Vertical**		



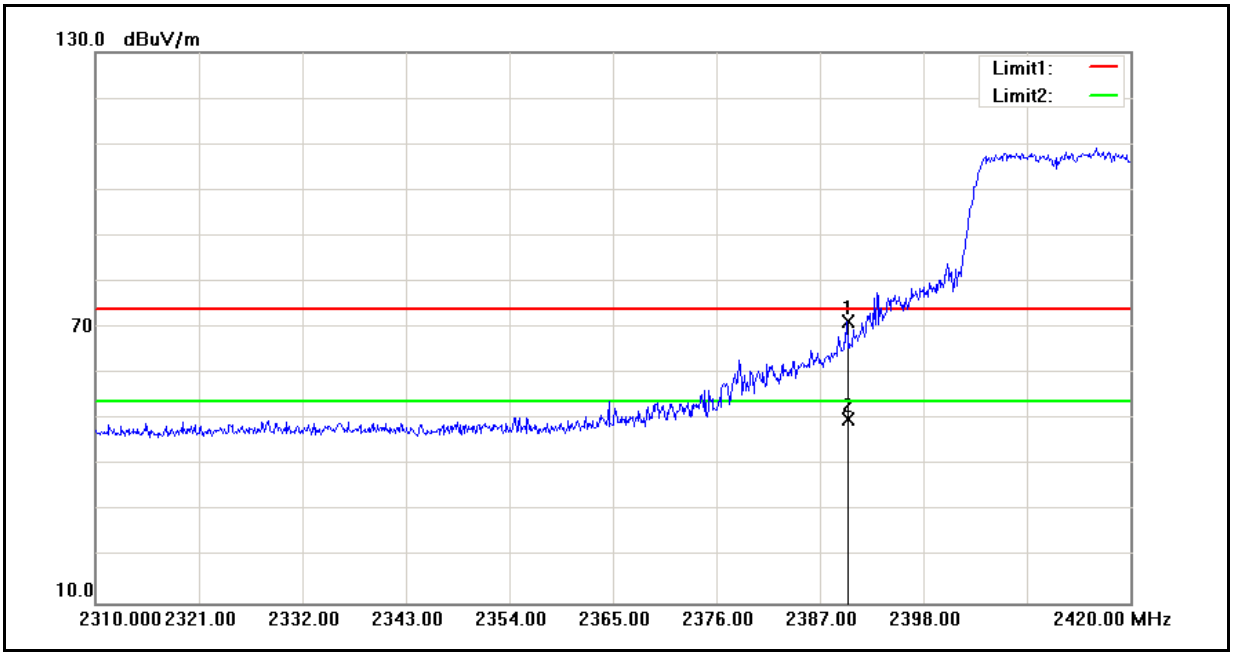
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2483.500	56.53	0.16	56.69	74.00	-17.31	peak
2	2483.500	46.17	0.16	46.33	54.00	-7.67	AVG
3	2485.080	59.21	0.16	59.37	74.00	-14.63	peak
4	2485.080	46.25	0.16	46.41	54.00	-7.59	AVG

Standard:	**FCC Part 15C**	**Test Distance:**	**3m**
Test item:	**Radiated Emission**	**Power:**	**AC 120V/60Hz**
Model:	**CT-820C**	**Temp.(℃)/Hum.(%RH):**	**26(℃)/60%RH**
Mode:	**Mode 3**	**Date:**	**2010/7/20**
Frequency:	**2412 MHz**	**Test By:**	**Gary Wu**
Ant.Polar.:	**Horizontal**		



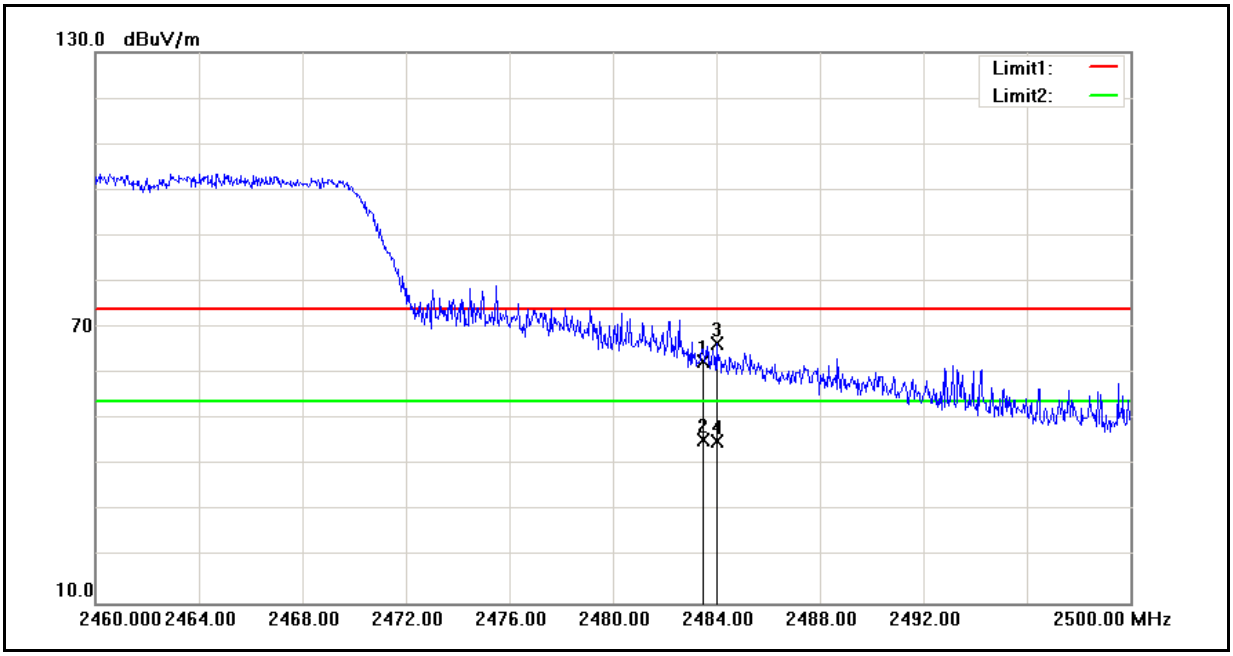
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2390.000	61.44	-0.22	61.22	74.00	-12.78	peak
2	2390.000	45.11	-0.22	44.89	54.00	-9.11	AVG

Standard:	**FCC Part 15C**	**Test Distance:**	**3m**
Test item:	**Radiated Emission**	**Power:**	**AC 120V/60Hz**
Model:	**CT-820C**	**Temp.(℃)/Hum.(%RH):**	**26(℃)/60%RH**
Mode:	**Mode 3**	**Date:**	**2010/7/20**
Frequency:	**2412 MHz**	**Test By:**	**Gary Wu**
Ant.Polar.:	**Vertical**		



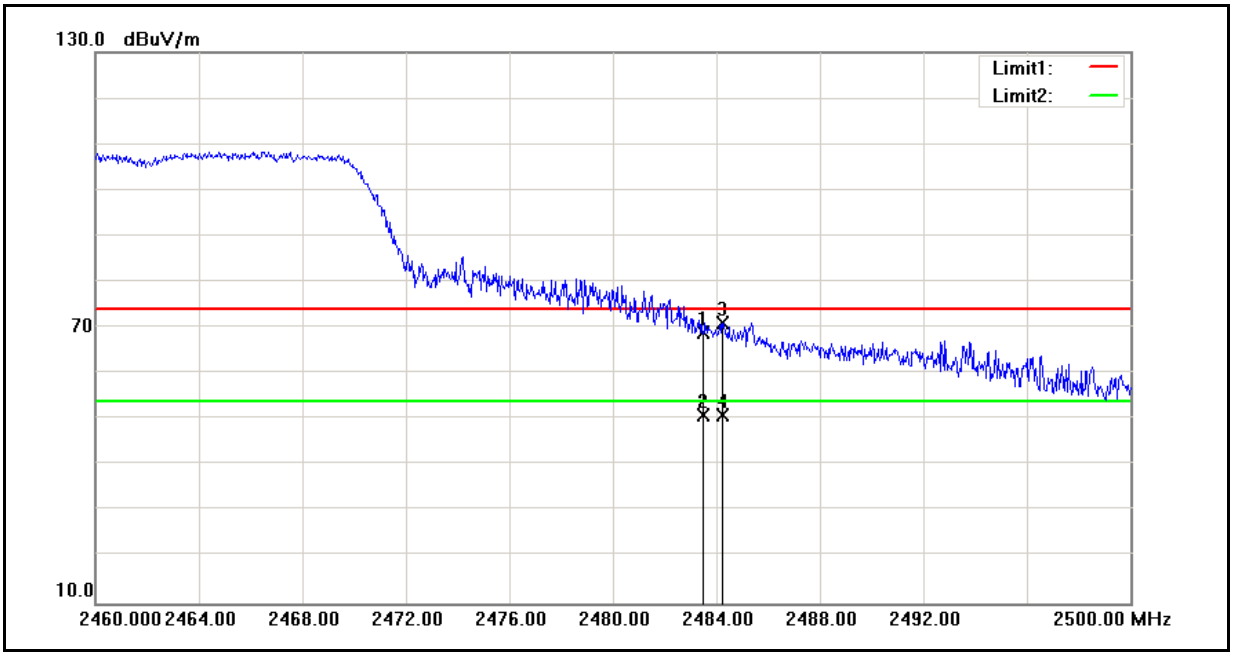
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2390.000	71.59	-0.22	71.37	74.00	-2.63	peak
2	2390.000	50.13	-0.22	49.91	54.00	-4.09	AVG

Standard:	**FCC Part 15C**	**Test Distance:**	**3m**
Test item:	**Radiated Emission**	**Power:**	**AC 120V/60Hz**
Model:	**CT-820C**	**Temp.(℃)/Hum.(%RH):**	**26(℃)/60%RH**
Mode:	**Mode 3**	**Date:**	**2010/7/20**
Frequency:	**2462 MHz**	**Test By:**	**Gary Wu**
Ant.Polar.:	**Horizontal**		



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2483.500	62.45	0.16	62.61	74.00	-11.39	peak
2	2483.500	45.28	0.16	45.44	54.00	-8.56	AVG
3	2484.000	66.26	0.16	66.42	74.00	-7.58	peak
4	2484.000	45.07	0.16	45.23	54.00	-8.77	AVG

Standard:	**FCC Part 15C**	**Test Distance:**	**3m**
Test item:	**Radiated Emission**	**Power:**	**AC 120V/60Hz**
Model:	**CT-820C**	**Temp.(℃)/Hum.(%RH):**	**26(℃)/60%RH**
Mode:	**Mode 3**	**Date:**	**2010/7/20**
Frequency:	**2462 MHz**	**Test By:**	**Gary Wu**
Ant.Polar.:	**Vertical**		



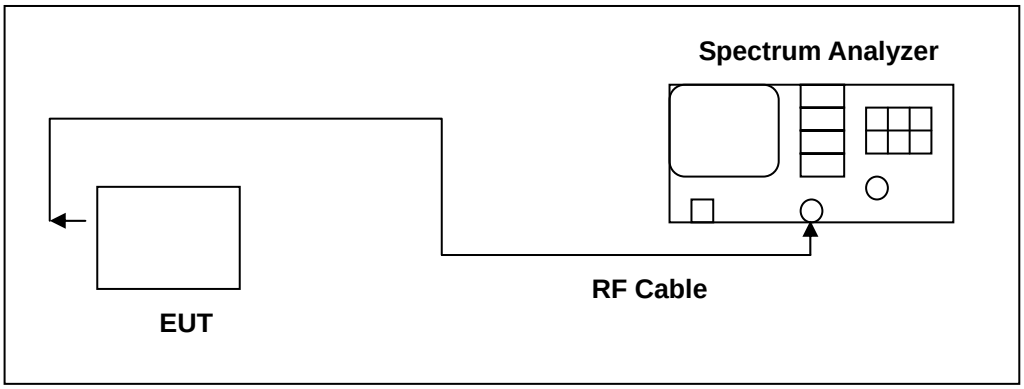
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2483.500	68.68	0.16	68.84	74.00	-5.16	peak
2	2483.500	50.77	0.16	50.93	54.00	-3.07	AVG
3	2484.240	71.00	0.16	71.16	74.00	-2.84	peak
4	2484.240	50.66	0.16	50.82	54.00	-3.18	AVG

11 99 % Occupied Bandwidth Measurement

11.1. Limit

N/A

11.2. Test Setup



11.3. Test Instruments

Equipment	Manufacturer	Model Number	Serial Number	Cal. Date	Remark
Spectrum Analyzer	Agilent	E4445A	MY46181986	05/14/2009	(2)
Test Site	ATL	TE06	TE06	N.C.R.	-----

Remark: (1) Calibration period 1 year. (2) Calibration period 2 years.

NOTE: N.C.R. = No Calibration Request.

11.4. Test Procedure

The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled.

11.5. Test Result

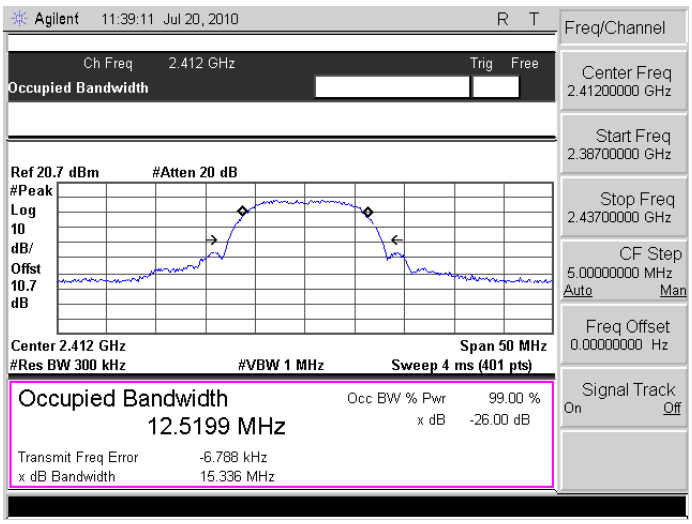
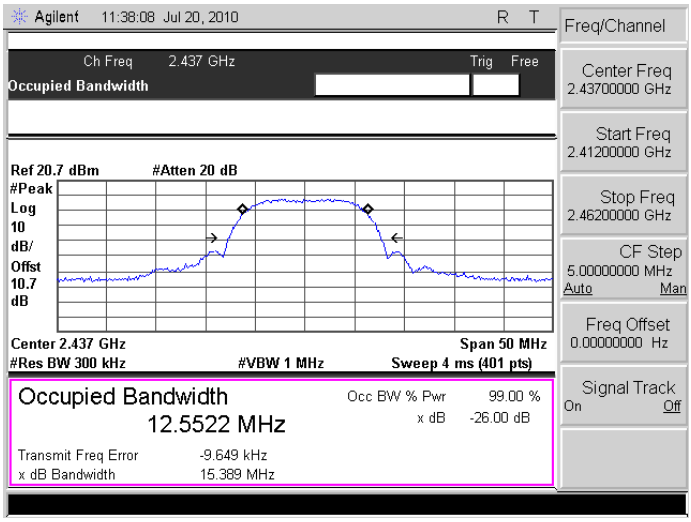
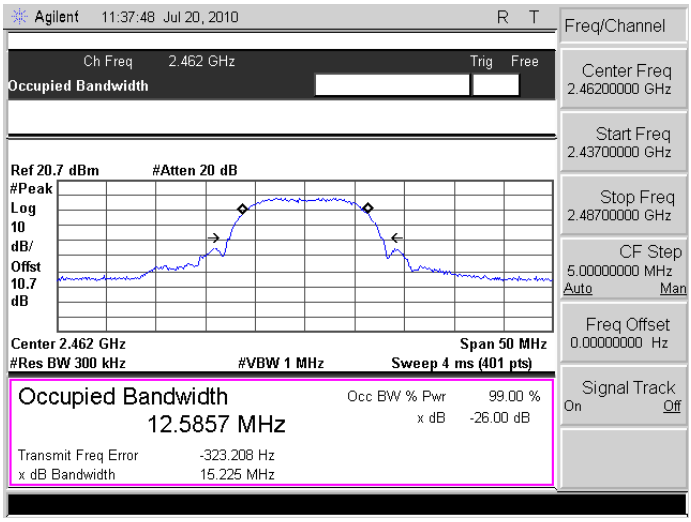
Model	CT-820C		
Test Item	99 % Occupied Bandwidth		
Test Mode	Mode 2: IEEE 802.11b Link Mode		
Date of Test	07/20/2010	Test Site	TE06

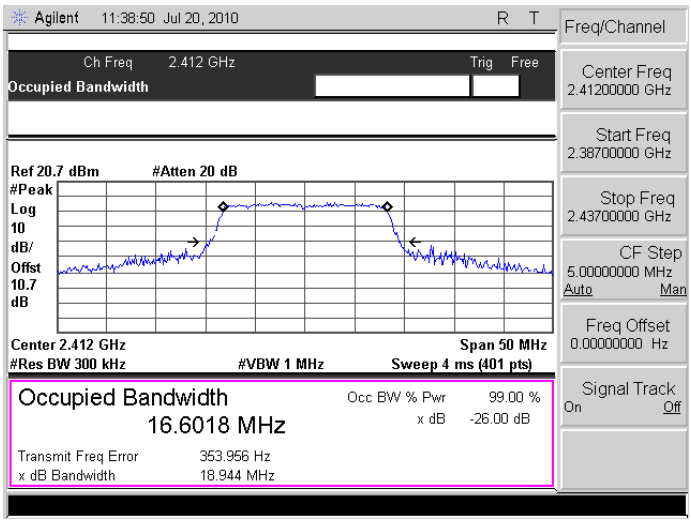
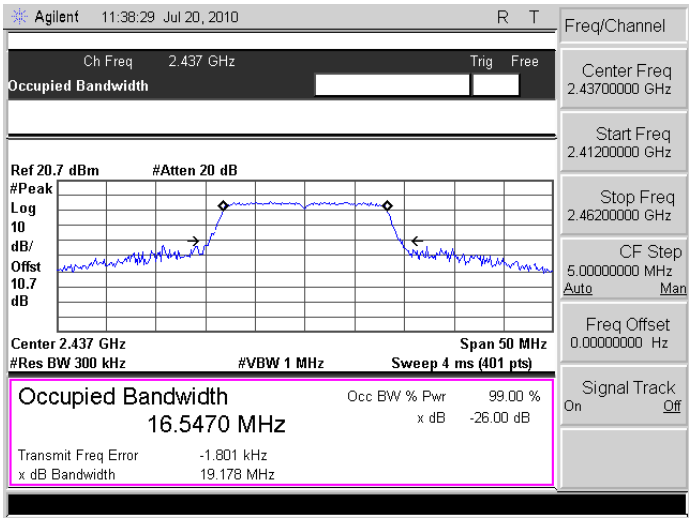
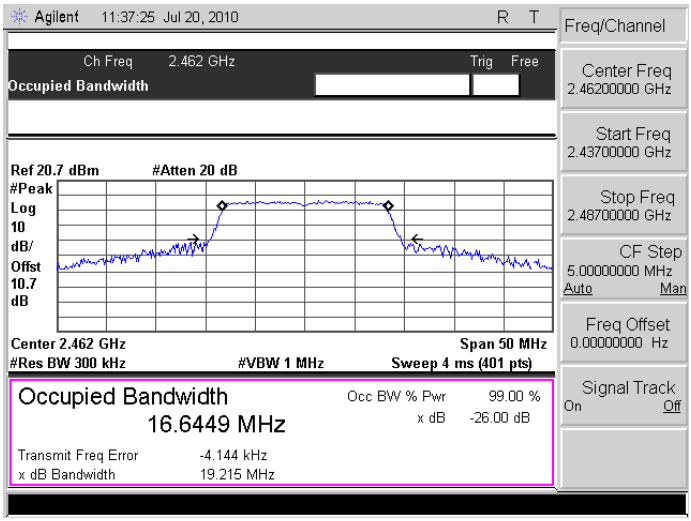
Frequency (MHz)	Measurement (kHz)	Limit (kHz)
2412	12519.9	-----
2437	12552.2	-----
2462	12585.7	-----

Model	CT-820C		
Test Item	99 % Occupied Bandwidth		
Test Mode	Mode 3: IEEE 802.11g Link Mode		
Date of Test	07/20/2010	Test Site	TE06

Frequency (MHz)	Measurement (kHz)	Limit (kHz)
2412	16601.8	-----
2437	16547.0	-----
2462	16644.9	-----

11.6. Test Graphs

Mode 2: IEEE 802.11b Link Mode	
2412	
2437	
2462	

Mode 3: IEEE 802.11g Link Mode	
2412	
2437	
2462	

12 Antenna Measurement

12.1. Limit

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

12.2. Antenna Connector Construction

The antenna used in this product is **External antenna**. And the maximum Gain of this antenna is only **2 dBi**.