UltraTech
Group of Labs

Ultratech's Accreditations:

ANSI American National Standards Institute
0685

31040/SIT

C-1376

Canada
46390-2049

NVLAP
200093-0

BSMI
SL2-IN-E-1119R

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Oakville, Ontario,
Canada L6H 6G4

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Website: www.ultratech-labs.com
Email: vic@ultratech-labs.com

Aug. 03, 2006

TIMCO ENGINEERING INC.
P.O. Box 370
849 N.W. State Road 45
Newberry, Florida
USA 32669

Subject: **FCC Certification Authorization Application under FCC Part 15, Subpart C, Sec. 15.247 - Digital Modulation Transmitters operating in the frequency band 2400 - 2483.5 MHz.**

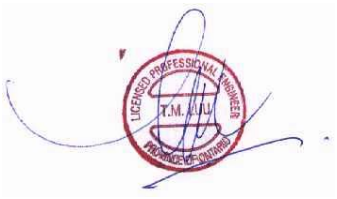
Product: **Mobile Collaboration Device 1000**
Model No.: **MCD1000**
FCC ID: **T78-MCD1000**
Contains **FCC ID: NKRDRCM**

Dear Sir/Madam

As appointed agent for **Librestream Technologies Inc.**, we would like to submit this application for FCC Certification of the above product. Please review all required documents uploaded to TIMCO Upload Web Site.

If you have any queries, please do not hesitate to contact us.

Yours truly,



Tri Minh Luu, P. Eng.,
V.P., Engineering

Encl

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Website: www.ultratech-labs.com
Email: vic@ultratech-labs.com

Aug. 03, 2006

Librestream Technologies Inc.
Unit 200, 55 Rothwell Road
Winnipeg, MB
Canada, R3P 2M5

Attn.: **Elwood Friesen**

Subject: **FCC Certification Application Testing under FCC Part 15, Subpart C, Sec. 15.247 - Digital Modulation Transmitters operating in the frequency band 2400 - 2483.5 MHz.**

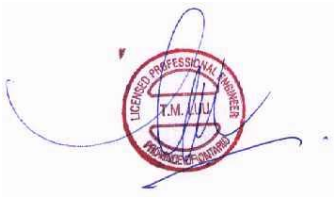
Product: **Mobile Collaboration Device 1000**
Model No.: **MCD1000**
FCC ID: **T78-MCD1000**
Contains **FCC ID: NKRDRCM**

Dear Mr. Friesen,

The product sample, as provided by you, has been tested and found to comply with **FCC Part 15, Subpart C, Sec. 15.247 - Digital Modulation Transmitters operating in the frequency band 2400 - 2483.5 MHz.**

Enclosed you will find copies of the engineering report. If you have any queries, please do not hesitate to contact us.

Yours truly,



Tri Minh Luu, P. Eng.,
V.P., Engineering

Encl.

ENGINEERING TEST REPORT

Mobile Collaboration Device 1000
Model Number: MCD1000

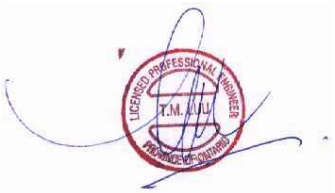
FCC ID: T78-MCD1000
(Contains FCC ID: NKRDRCM)

Applicant: **Librestream Technologies Inc.**
Unit 200, 55 Rothwell Road
Winnipeg, MB
Canada, R3P 2M5

In Accordance With

FEDERAL COMMUNICATIONS COMMISSION (FCC)
PART 15, SUBPART C, SEC. 15.247
Digital Modulation Transmitters operating in the frequency band 2400 - 2483.5 MHz

UltraTech's File No.: TUV-010FCC15C

This Test report is Issued under the Authority of Tri M. Luu, Professional Engineer, Vice President of Engineering UltraTech Group of Labs Date: Aug. 03, 2006	
Report Prepared by: Tri Luu, P.Eng. Issued Date: Aug. 03, 2006	Tested by: Hung Trinh, RFI Technologist Test Dates: July 25-July 28, 2006

- *The results in this Test Report apply only to the sample(s) tested, and the sample tested is randomly selected.*
- *This report must not be used by the client to claim product endorsement by NVLAP or any agency of the US Government.*

UltraTech

3000 Bristol Circle, Oakville, Ontario, Canada, L6H 6G4
Tel.: (905) 829-1570 Fax.: (905) 829-8050
Website: www.ultratech-labs.com Email: vic@ultratech-labs.com, Email: tri.luu@sympatico.ca

TABLE OF CONTENTS

EXHIBIT 1. INTRODUCTION

1.1. SCOPE

Reference:	FCC Part 15, Subpart C, Section 15.247
Title	Telecommunication - Code of Federal Regulations, CFR 47, Part 15
Purpose of Test:	To gain FCC Certification Authorization for Digital Modulation Transmitters operating in the Frequency Band 2400 - 2483.5 MHz .
Test Procedures	Both conducted and radiated emissions measurements were conducted in accordance with American National Standards Institute ANSI C63.4 - American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.
Environmental Classification:	• Residential • Light-industry, Commercial • Industry

1.2. RELATED SUBMITAL(S)/GRANT(S)

None

1.3. NORMATIVE REFERENCES

Publication	YEAR	Title
FCC CFR Parts 0-19	Feb. 16 - 2006	Code of Federal Regulations – Telecommunication
ANSI C63.4	2004	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
CISPR 22 +A1 EN 55022	2003-04-10 2004-10-14 2003	Limits and Methods of Measurements of Radio Disturbance Characteristics of Information Technology Equipment
CISPR 16-1-1	2003	Specification for radio disturbance and immunity measuring apparatus and methods. Part 1-1: Measuring Apparatus
CISPR 16-2-1	2003	Specification for radio disturbance and immunity measuring apparatus and methods. Part 2-1: Conducted disturbance measurement
CISPR 16-2-3	2003	Specification for radio disturbance and immunity measuring apparatus and methods. Part 2-3: Radiated disturbance measurement
FCC Test Procedures	Mar. 23, 2005	Measurement of Digital Transmission Systems. Operating under Section 15.247
FCC Public Notice DA 00-1407	2000	Part 15 Unlicensed Modular Transmitter Approval

EXHIBIT 2. PERFORMANCE ASSESSMENT

2.1. CLIENT INFORMATION

APPLICANT:	
Name:	Librestream Technologies Inc.
Address:	Unit 200, 55 Rothwell Road Winnipeg, MB Canada, R3P 2M5
Contact Person:	Elwood Friesen Phone #: (204) 487-0612 (221) Fax #: (204) 487-0914 Email Address: elwood.friesen@librestream.com

MANUFACTURER:	
Name:	Librestream Technologies Inc.
Address:	Unit 200, 55 Rothwell Road Winnipeg, MB Canada, R3P 2M5
Contact Person:	Elwood Friesen Phone #: (204) 487-0612 (211) Fax #: (204) 487-0914 Email Address: elwood.friesen@librestream.com

2.2. EQUIPMENT UNDER TEST (EUT) INFORMATION

The following information (with the exception of the Date of Receipt) has been supplied by the applicant.

Brand Name	Librestream Technologies Inc.
Product Name	Mobile Collaboration Device 1000
Model Number:	MCD1000
Serial Number	preproduction sample
Type of Equipment	Digital Modulation Transmitters
Input Power Supply Type	3 Vdc rechargeable battery (CUI Battery Charger, Model 3A-181WP12
Primary User Functions of EUT:	Provide data communication link through air

2.3. EUT'S TECHNICAL SPECIFICATIONS

TRANSMITTER	
Equipment Type:	▪ Portable (body worn)
Intended Operating Environment:	▪ Residential ▪ Commercial, light industry & heavy industry
Power Supply Requirement:	3 Vdc Rechargeable Battery (CUI Battery Charger, Model 3A-181WP12)
RF Output Power Rating: (Conducted)	• 14.29 dBm (26.9 mWatts) for 802.11b • 17.39 dBm (54.8 mWatts) for 802.11g
Operating Frequency Range:	2412 - 2462 MHz
RF Output Impedance:	50 Ohms
Number of Channels:	11
Duty Cycle:	100%
6 dB Bandwidth:	10.08 MHz
Modulation Type:	802.11b: DBPSK(1Mbps), DQPSK(2Mbps), CCK(5.5/11Mbps) 802.11g: OFDM (6M - 54Mbps)
Emission Designation:	10M1GXW
Antenna Connector Type:	• Integral antenna, couple to the radio using MCXX connector inside the EUT.
Antenna Description:	Manufacturer: Centurion (Laird) Type: Patch Model: CASF94505 Frequency Range: 2.4-6 GHz In/Out Impedance: 50 Ohms Gain: 2.8 dBi in 2.4-2.5 GHz band

RECEVER	
Operating Frequency Range:	2412 - 2462 MHz
RF Input Impedance:	50 Ohms

2.4. LIST OF EUT'S PORTS

Port Number	EUT's Port Description	Number of Identical Ports	Connector Type	Cable Type (Shielded/Non-shielded)
1	Ethernet	1	RJ-45	Non-shielded
2	S-Video	1	S-Video	Non-shielded
3	Subject Audio	1	1.8mm Stereo	Non-shielded
4	USB	1	USB	Non-shielded
5	Headset	1	2.5 mm	Non-shielded

2.5. ANCILLARY EQUIPMENT

N/A

2.6. TEST SETUP BLOCK DIAGRAM

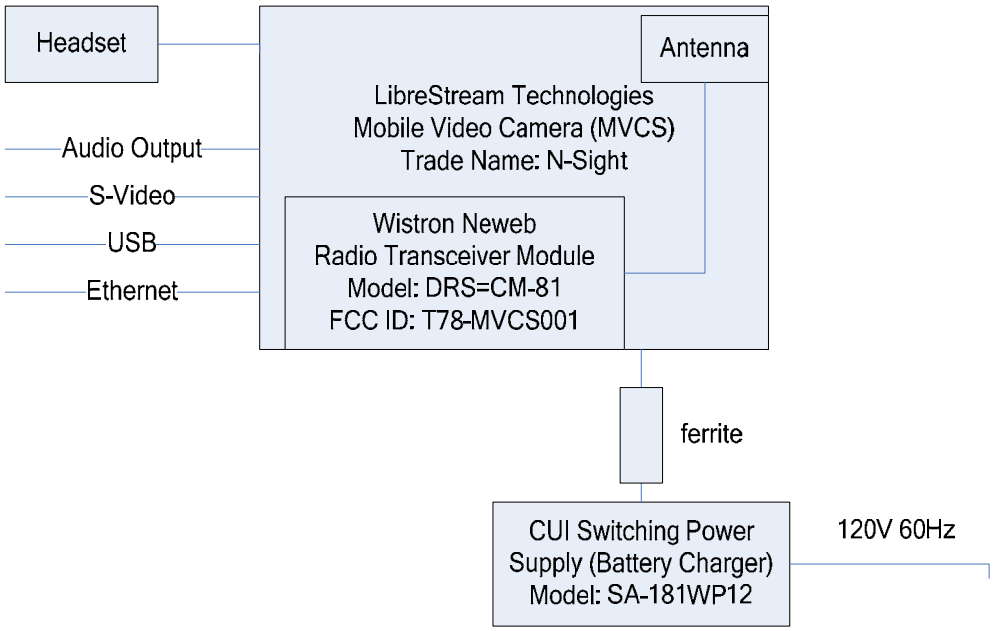


EXHIBIT 3. EUT OPERATING CONDITIONS AND CONFIGURATIONS DURING TESTS

3.1. CLIMATE TEST CONDITIONS

The climate conditions of the test environment are as follows:

Temperature:	21°C
Humidity:	51%
Pressure:	102 kPa
Power input source:	3 Vdc Rechargeable Battery (CUI Battery Charger, Model 3A-181WP12)

3.2. OPERATIONAL TEST CONDITIONS & ARRANGEMENT FOR TESTS

Operating Modes:	▪ Each of lowest, middle and highest channel frequencies transmits continuously for emissions measurements. ▪ The EUT operates in normal Direct Sequence mode for occupancy duration, and frequency separation.
Special Test Software:	▪ Special software is provided by the Applicant to select and operate the EUT at each channel frequency continuously. For example, the transmitter will be operated at each of lowest, middle and highest frequencies individually continuously during testing.
Special Hardware Used:	N/A
Transmitter Test Antenna:	The EUT is tested with the antenna fitted in a manner typical of normal intended use as an integral antenna equipment.

Transmitter Test Signals:	
Frequencies: ▪ 2412 - 2462 MHz band:	Lowest, middle and highest channel frequencies tested: 2412, 2437 and 2462 MHz
Transmitter Wanted Output Test Signals: ▪ RF Power Output (measured maximum output power): ▪ Normal Test Modulation ▪ Modulating signal source:	 ▪ 14.29 dBm (26.9 mWatts) ▪ As provided for IEEE 802.11b and 802.11g ▪ Internal

EXHIBIT 4. SUMMARY OF TEST RESULTS

4.1. LOCATION OF TESTS

All of the measurements described in this report were performed at Ultratech Group of Labs located in the city of Oakville, Province of Ontario, Canada.

- AC Powerline Conducted Emissions were performed in UltraTech's shielded room, 16'(L) by 12'(W) by 12'(H).

- Radiated Emissions were performed at the Ultratech's 3-10 Meter Open Field Test Site (OFTS) situated in the Town of Oakville, province of Ontario. This test site has been calibrated in accordance with ANSI C63.4, and found to be in compliance with the requirements of Sec. 2.948 of the FCC Rules. The descriptions and site measurement data of the Oakville Open Field Test Site has been filed with FCC office (FCC File No.: 31040/SIT 1300B3) and Industry Canada office (Industry Canada File No.: IC2049). Last Date of Site Calibration: Jan. 10, 2006.

4.2. APPLICABILITY & SUMMARY OF EMC EMISSION TEST RESULTS

FCC PARAGRAPH.	TEST REQUIREMENTS	COMPLIANCE (YES/NO)
15.107(a) & 15.207(a)	Class B - AC Power Conducted Emissions on Tx, Rx and standby modes	Yes
15.247(a)(2)	6dB Bandwidth of a Digital Modulation System	See Note (2)
15.247(b) & (c)	Maximum Peak Power (Conducted)	Yes
15.247(i) & 1.1307, 1.1310, 2.1091 & 2.1093	RF Exposure Limit	See Note (2)
15.247(d)	RF Conducted Spurious Emissions at the Transmitter Antenna Terminal	See Note (2)
15.247(e)	Transmitted Power Density of a Digital Modulation System	Yes
15.247(d), 15.209 & 15.205	Transmitter Radiated Emissions	Yes
FCC Part 15, Sub. B, Sec. 15.109(b)	Class A Radiated Emissions	Yes. Note 1

Notes:

(1) A separate engineering test report for compliance with FCC Part 15, Subpart B - Class A Unintentional Radiators will be provided upon request.
(2) Please refer to the enclosed test report via FCC ID: NKRDRCM

4.3. MODIFICATIONS INCORPORATED IN THE EUT FOR COMPLIANCE PURPOSES

N/A

EXHIBIT 5. MEASUREMENTS, EXAMINATIONS & TEST DATA FOR EMC EMISSIONS

5.1. TEST PROCEDURES

This section contains test results only. Details of test methods and procedures can be found in ANSI C63.4, "FCC Measurement of Digital Transmission Systems Operating under Section 15.247 - March 23, 2005", ULTR-P001-2004, ULTR-P002-2004 and ULTR-P003-2004.

5.2. MEASUREMENT UNCERTAINTIES

The measurement uncertainties stated were calculated in accordance with requirements of UKAS Document LAB 34 with a confidence level of 95%. Please refer to Exhibit 6 for Measurement Uncertainties.

5.3. MEASUREMENT EQUIPMENT USED:

The measurement equipment used complied with the requirements of the Standards referenced in the Methods & Procedures ANSI C63.4 and CISPR 16-1.

5.4. ESSENTIAL/PRIMARY FUNCTIONS AS DECLARED BY THE MANUACTURER:

The essential function of the EUT is to correctly communicate data to and from radios over RF link.

5.5. COMPLIANCE WITH FCC PART 15 – GENERAL TECHNICAL REQUIREMENTS

FCC Section	FCC Rules	
15.203	Described how the EUT complies with the requirement that either its antenna is permanently attached, or that it employs a unique antenna connector, for every antenna proposed for use with the EUT. The exception is in those cases where EUT must be professionally installed. In order to demonstrate that professional installation is required, the following 3 points must be addressed: • The application (or intended use) of the EUT • The installation requirements of the EUT • The method by which the EUT will be marketed	Integral antenna located inside the MCD1000 Unit
15.204	Provided the information for every antenna proposed for use with the EUT: (a) type (e.g. Yagi, patch, grid, dish, etc…), (b) manufacturer and model number (c) gain with reference to an isotropic radiator	N/A

5.6. AC POWERLINE CONDUCTED EMISSIONS @ FCC PART 15, SUBPART B, PARA.15.107(A) & 15.207

5.6.1. Limits

The equipment shall meet the limits of the following table:

	CLASS B LIMITS		
Test Frequency Range (MHz)	**Quasi-Peak (dBμV)**	**Average* (dBμV)**	**Measuring Bandwidth**
0.15 to 0.5	66 to 56*	56 to 46*	RBW = 9 kHz VBW ≥ 9 kHz for QP VBW = 1 Hz for Average
0.5 to 5	56	46	RBW = 9 kHz VBW ≥ 9 kHz for QP VBW = 1 Hz for Average
5 to 30	60	50	RBW = 9 kHz VBW ≥ 9 kHz for QP VBW = 1 Hz for Average

* Decreasing linearly with logarithm of frequency

5.6.2. Method of Measurements

Refer to Ultratech Test Procedures, File # ULTR P001-2004 and ANSI C63.4 for measurement methods

5.6.3. Test Equipment List

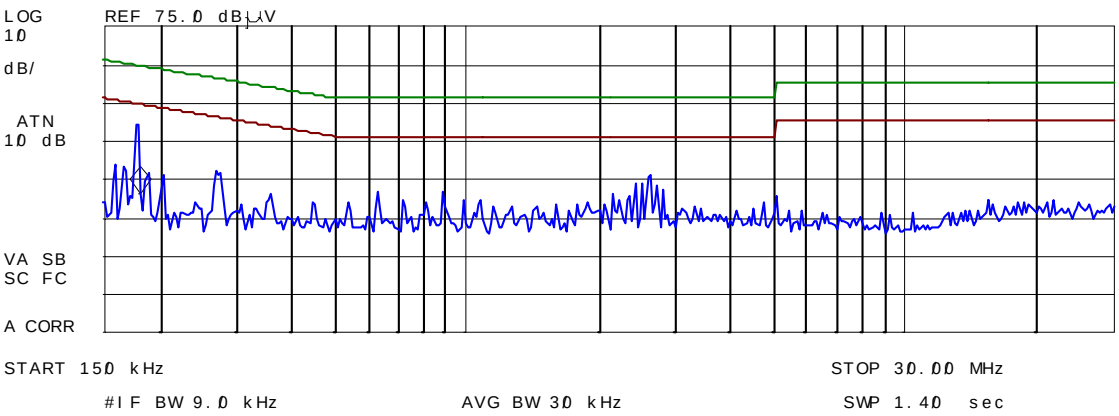
Test Instruments	Manufacturer	Model No.	Serial No.	Frequency Range
EMI Receiver System/Spectrum Analyzer with built-in Amplifier	Hewlett Packard	HP 8546A	3520A00248	9KHz-5.6GHz, 50 Ohms
Transient Limiter	Hewlett Packard	11947A	310701998	9 kHz – 200 MHz 10 dB attenuation
L.I.S.N.	EMCO	3825/2	89071531	9 kHz – 200 MHz 50 Ohms / 50 μH
12'x16'x12' RF Shielded Chamber	RF Shielding	…	..	…

5.6.4. Test Data

Conforms with FCC Part 15.207(a). Please find the attached Plots # 1 to 2 for details of measurements.

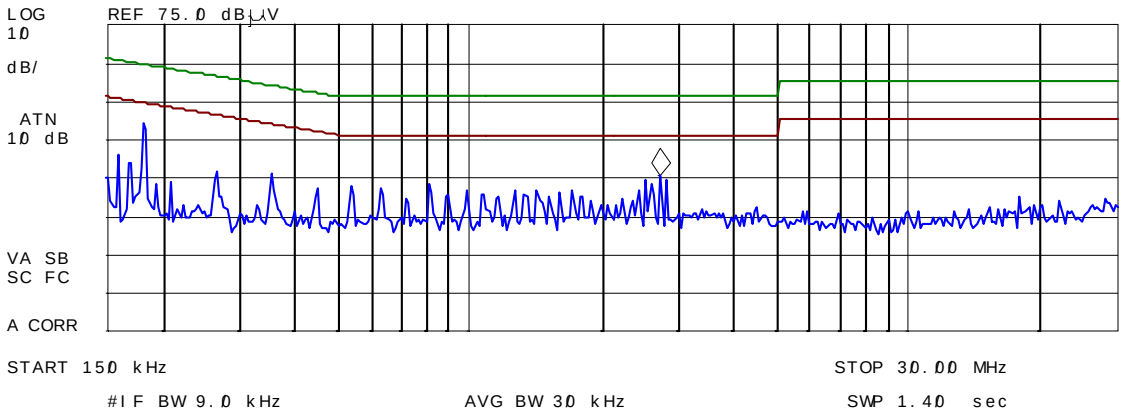
Plot #1: AC POWER LINE CONDUCTED EMISSIONS MEASUREMENT PLOT				
Detector:[X] PEAK [X] QUASI-PEAK [X] AVERAGE		Temp: 23°C	Humidity :20%	File #: TUVR-011Q
Line Tested: L1	Line Voltage : 120 Vac	Test Tech : Wei	Test Date: 25st Jul, 2006	
Standard : FCC Class B	Comments:			

Signal	Freq (MHz)	PK Amp	QP Amp	AV Amp	AV△L1
1	0.181975	52.0	50.5	38.7	-25.8
2	0.452000	33.0	30.6	27.9	-29.0
3	2.619500	38.0	36.0	30.2	-25.8



Plot #2: AC POWER LINE CONDUCTED EMISSIONS MEASUREMENT PLOT				
Detector:[**X**] PEAK [**X**] QUASI-PEAK [**X**] AVERAGE		Temp: 23°C	Humidity :20%	File #: TUVR-011Q
Line Tested: L2	Line Voltage : 120 Vac	Test Tech : Wei	Test Date: 25st Jul, 2006	
Standard : FCC Class B	Comments:			

Signal	Freq (MHz)	PK Amp	QP Amp	AV Amp	AV△L1
1	0.181725	52.8	51.5	41.1	-23.4
2	0.363375	39.6	37.1	32.7	-26.0
3	2.717500	39.3	37.0	35.0	-21.0



5.7. 6 DB BANDWIDTH @ FCC 15.247(A)(2)

5.7.1. Limits

For a Digital Modulation System, the minimum 6 dB bandwidth shall be at least 500 KHz.

5.7.2. Test Data

Conforms. Refer to the enclosed test report via FCC ID: NKRDRCM

5.8. OUTPUT POWER (CONDUCTED) @ FCC 15.247(B)&(C)

5.8.1. Limits

FCC 15.247(b):

(3) For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the *maximum conducted output power* is the highest total transmit power occurring in any mode.

(4) The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

FCC 15.247(c): Operation with directional antenna gains greater than 6 dBi.

(1) Fixed point-to-point operation:

(i) Systems operating in the 2400-2483.5 MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

(iii) Fixed, point-to-point operation, as used in paragraphs (c)(4)(i) and (c)(4)(ii) of this section, excludes the use of point-to-multipoint systems, omnidirectional applications, and multiple co-located intentional radiators transmitting the same information. The operator of the spread spectrum or digitally modulated intentional radiator or, if the equipment is professionally installed, the installer is responsible for ensuring that the system is used exclusively for fixed, point-to-point operations. The instruction manual furnished with the intentional radiator shall contain language in the installation instructions informing the operator and the installer of this responsibility.

(2) In addition to the provisions in paragraphs (b)(1), (b)(3), (b)(4) and (c)(1)(i) of this section, transmitters operating in the 2400-2483.5 MHz band that emit multiple directional beams, simultaneously or sequentially, for the purpose of directing signals to individual receivers or to groups of receivers provided the emissions comply with the following:

(i) Different information must be transmitted to each receiver.

(ii) If the transmitter employs an antenna system that emits multiple directional beams but does not do emit multiple directional beams simultaneously, the total output power conducted to the array or arrays that comprise the device, i.e., the sum of the power supplied to all antennas, antenna elements, staves, etc. and summed across all carriers or frequency channels, shall not exceed the limit specified in paragraph (b)(1) or (b)(3) of this section, as applicable. However, the total conducted output power shall be reduced by 1 dB below the specified limits for each 3 dB that the directional gain of the antenna/antenna array exceeds 6 dBi. The directional antenna gain shall be computed as follows:

(A) The directional gain shall be calculated as the sum of 10 log number of array elements or staves) plus the directional gain of the element or stave having the highest gain.

(B) A lower value for the directional gain than that calculated in paragraph (c)(2)(ii)(A) of this section will be accepted if sufficient evidence is presented, e.g., due to shading of the array or coherence loss in the beamforming.

(ii) If a transmitter employs an antenna that operates simultaneously on multiple directional beams using the same or different frequency channels, the power supplied to each emission beam is subject to the power limit specified in paragraph (c)(2)(ii) of this section. If transmitted beams overlap, the power shall be reduced to ensure that their aggregate power does not exceed the limit specified in paragraph (c)(2)(ii) of this section. In addition, the aggregate power transmitted simultaneously on all beams shall not exceed the limit specified in paragraph (c)(2)(ii) of this section by more than 8 dB.

(iii) Transmitters that emit a single directional beam shall operate under the provisions of paragraph (c)(1) of this section.

5.8.2. Test Equipment List

Test Instruments	Manufacturer	Model No.	Serial No.	Frequency Range
Spectrum Analyzer/ EMI Receiver	Rohde & Schawrz	FSEK20/B4/B21	834157/005	9 kHz – 40 GHz with external mixer
RF Signal Generator	Hewlett Packard	HP 83752B	3610A00457	0.01 – 20 GHz
67297 RF Detector (Diode Detector)	Herotex	DZ122-553	63400	..
Storage Oscilloscope	Philips	PM3320A	ST9907959	--

5.8.3. Method of Measurements & Test Arrangement

Refer to "FCC Measurement of Digital Transmission Systems Operating under Section 15.247 - March 23, 2005"

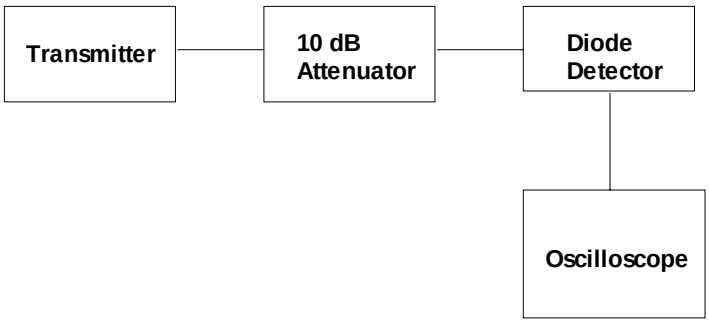
This is an RF conducted test. Use a direct connection between the antenna port of the transmitter, peak diode detector and oscilloscope, through suitable attenuation. Power Output Option 1, total peak output power measurement, was used to test this DTS device.

Power Output Option 1:

The total peak power was measured using peak detector diode method as described below:

Step 1:

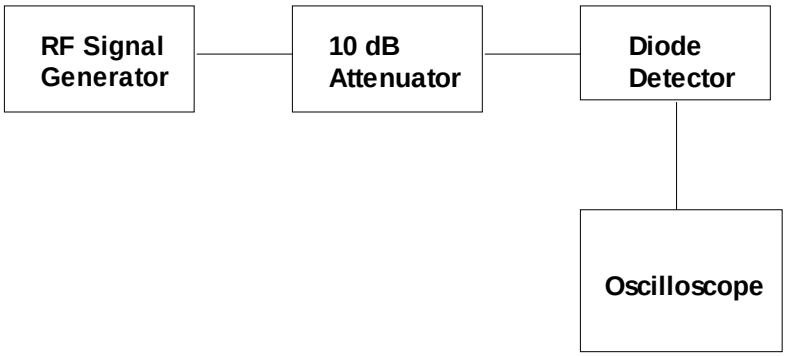
- Connect the transmitter output to a diode detector through an attenuator
- Connect the diode detector to the vertical channel of an oscilloscope.
- Observe and record the y parameter of the DC level on the oscilloscope.



Step 2: Peak Power Measurements

- Replace the transmitter by a RF signal generator
- Set the signal generator frequency be the same as the transmitter frequency
- Adjust the rf output level of the RF signal generator until the DC level on the oscilloscope is same as that (y) recorded in step 1.
- Measure the RF signal generator output level using a power meter
- Calculate the total peak power (Pp) by adding the signal generator level with the attenuator value and the cable loss.
- Calculate the peak EIRP: EIRP = Pp + G

  Where: EIRP: Effective isotropic radiated power in dBm
  Pp: Peak conducted power in dBm
  G: Transmitter antenna gain in dBi



5.8.4. Test Data

Method of Output Power Measurements:

Option #1:	Total Peak Power using Peak Diode Detector for both 802.11b and 802.11g

The following test data is the worst-case measurements.

5.8.4.1. Test Configuration #1: Modulation IEEE 802.11b

Frequency (MHz)	Modulation	Power Setting (dBm)	(full bandwidth) Peak Power at Antenna Terminals (dBm)	Maximum Antenna Gain (dBi)	(full bandwidth) Peak EIRP (dBm)	Limit for Power at Antenna Port (dBm)	Limit for EIRP (dBm)
2412	BPSK @ 1 Mb/s	14.0	14.05	2.8	16.85	30.0	36.0
2437	BPSK @ 1 Mb/s	14.0	14.29	2.8	17.09	30.0	36.0
2462	BPSK @ 1 Mb/s	14.0	14.29	2.8	17.09	30.0	36.0
2412	QPSK @ 2 Mb/s	14.0	14.05	2.8	16.85	30.0	36.0
2437	QPSK @ 2 Mb/s	14.0	14.05	2.8	16.85	30.0	36.0
2462	QPSK @ 2 Mb/s	14.0	14.29	2.8	17.09	30.0	36.0
2412	CCK @ 11 Mb/s	14.0	14.05	2.8	16.85	30.0	36.0
2437	CCK @ 11 Mb/s	14.0	14.05	2.8	16.85	30.0	36.0
2462	CCK @ 11 Mb/s	14.0	14.29	2.8	17.09	30.0	36.0

5.8.4.2. Test Configuration #2: Modulation IEEE 802.11g

Frequency (MHz)	Modulation	Power Setting (dBm)	(full bandwidth) Peak Power at Antenna Terminals (dBm)	Maximum Antenna Gain (dBi)	(full bandwidth) Peak EIRP (dBm)	Limit for Power at Antenna Port (dBm)	Limit for EIRP (dBm)
2412	BPSK @ 9 Mb/s	14.0	17.30	2.8	20.10	30.0	36.0
2437	BPSK @ 9 Mb/s	14.0	17.06	2.8	19.86	30.0	36.0
2462	BPSK @ 9 Mb/s	14.0	16.55	2.8	19.35	30.0	36.0
2412	QPSK @ 18 Mb/s	14.0	16.55	2.8	19.35	30.0	36.0
2437	QPSK @ 18 Mb/s	14.0	16.55	2.8	19.35	30.0	36.0
2462	QPSK @ 18 Mb/s	14.0	16.55	2.8	19.35	30.0	36.0
2412	16QAM @ 36 Mb/s	14.0	16.94	2.8	19.74	30.0	36.0
2437	16QAM @ 36 Mb/s	14.0	16.94	2.8	19.74	30.0	36.0
2462	16QAM @ 36 Mb/s	14.0	16.94	2.8	19.74	30.0	36.0
2412	64QAM @ 54 Mb/s	14.0	16.94	2.8	19.74	30.0	36.0
2437	64QAM @ 54 Mb/s	14.0	16.94	2.8	19.74	30.0	36.0
2462	64QAM @ 54 Mb/s	14.0	16.94	2.8	19.74	30.0	36.0

5.9. RF EXPOSURE REQUIRMENTS @ FCC 15.247(I), 1.1307(B)(1)

Conforms. Refer to the enclosed test report for SAR tests

5.10. TRANSMITTER BAND-EDGE & SPURIOUS EMISSIONS (CONDUCTED), FCC CFR 47, PARA. 15.247(D)

5.10.1. Limits

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, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

5.10.2. Test Data

Conforms. Refer to the enclosed test report via FCC ID: NKRDRCM

5.11. TRANSMITTED POWER DENSITY OF A DIGITAL MODULATION SYSTEM, FCC CFR 47, PARA. 15.247(E)

5.11.1. Limits

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. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

5.11.2. Test Data

Conforms. Refer to the enclosed test report via FCC ID: NKRDRCM

5.12. TRANSMITTER BAND-EDGE & SPURIOUS EMISSIONS (RADIATED @ 3 METERS), FCC CFR 47, PARA. 15.247(D), 15.209 & 15.205

5.12.1. Limits

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, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in § 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a) (see § 15.205(c)).

Remarks:

- Applies to harmonics/spurious emissions that fall in the restricted bands listed in Section 15.205. The maximum permitted average field strength is listed in Section 15.209.
- **@ FCC CFR 47, Para. 15.237(c)** - The emission limits as specified above are based on measurement instrument employing an average detector. The provisions in **@15.35** for limiting peak emissions apply.

FCC CFR 47, Part 15, Subpart C, Para. 15.205(a) - Restricted Frequency Bands

MHz	MHz	MHz	GHz
0.090 - 0.110	162.0125 - 167.17	2310 - 2390	9.3 - 9.5
0.49 – 0.51	167.72 - 173.2	2483.5 - 2500	10.6 - 12.7
2.1735 - 2.1905	240 - 285	2655 - 2900	13.25 - 13.4
8.362 - 8.366	322 - 335.4	3260 - 3267	14.47 - 14.5
13.36 - 13.41	399.9 - 410	3332 - 3339	14.35 - 16.2
25.5 – 25.67	608 - 614	3345.8 - 3358	17.7 - 21.4
37.5 – 38.25	960 - 1240	3600 - 4400	22.01 - 23.12
73 - 75.4	1300 - 1427	4500 - 5250	23.6 - 24.0
108 – 121.94	1435 - 1626.5	5350 - 5460	31.2 - 31.8
123 – 138	1660 - 1710	7250 - 7750	36.43 - 36.5
149.9 – 150.05	1718.8 - 1722.2	8025 - 8500	Above 38.6
156.7 – 156.9	2200 - 2300	9000 - 9200	

FCC CFR 47, Part 15, Subpart C, Para. 15.209(a)
-- Field Strength Limits within Restricted Frequency Bands --

FREQUENCY (MHz)	FIELD STRENGTH LIMITS (microvolts/m)	DISTANCE (Meters)
0.009 - 0.490	2,400 / F (KHz)	300
0.490 - 1.705	24,000 / 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

5.12.2. Method of Measurements

Refer to "FCC Measurement of Digital Transmission Systems Operating under Section 15.247 - March 23, 2005" and Ultratech Test Procedures, File # ULTR P003-2004 and ANSI C63.4 for measurement methods

Radiated emission test: Applies to harmonics/spurs that fall in the restricted bands listed in Section 15.205. The maximum permitted average field strength is listed in Section 15.209. A pre-amp (and possibly a high-pass filter) is necessary for this measurement. For measurements above 1 GHz, set RBW = 1MHz, VBW = 10 Hz, Sweep: Auto. If the emission is pulsed, modify the unit for continuous operation; use the settings shown above, then correct the reading by subtracting the peak-average correction factor, derived from the appropriate duty cycle calculation. See Section 15.35(b) and (c).

5.12.3. Test Equipment List

Test Instruments	Manufacturer	Model No.	Serial No.	Frequency Range
Spectrum Analyzer/ EMI Receiver	Rohde & Schawrz	FSEK20/B4/B21	834157/005	9 kHz – 40 GHz with external mixer
Microwave Amplifier	Hewlett Packard	HP 83017A		1 GHz to 26.5 GHz
Biconilog Antenna	EMCO	3143	1029	20 MHz to 2 GHz
Horn Antenna	EMCO	3155	9701-5061	1 GHz – 18 GHz
Horn Antenna	EMCO	3160-09	..	18 GHz – 26.5 GHz

5.12.4. Photographs of Test Setup

Refer to the Photographs #3 to #5 in Annex 1 for setup and arrangement of equipment under tests and its ancillary equipment.

5.12.5. Test Data

5.12.5.1. Transmitter Radiated Band-edge Spurious Emissions

Please refer to Plots # 3 to 14 for detailed measurements of band-edge radiated emissions.

Photo #3: Lower Band-Edge Radiated Emissions - Horizontal Polarization

2412 MHz @ 802.11b, CCK @ 11 Mbps
Trace 1: RBW= 1 MHz, VBW= 3 MHz
Trace 2: RBW= 1 MHz, VBW= 10 Hz

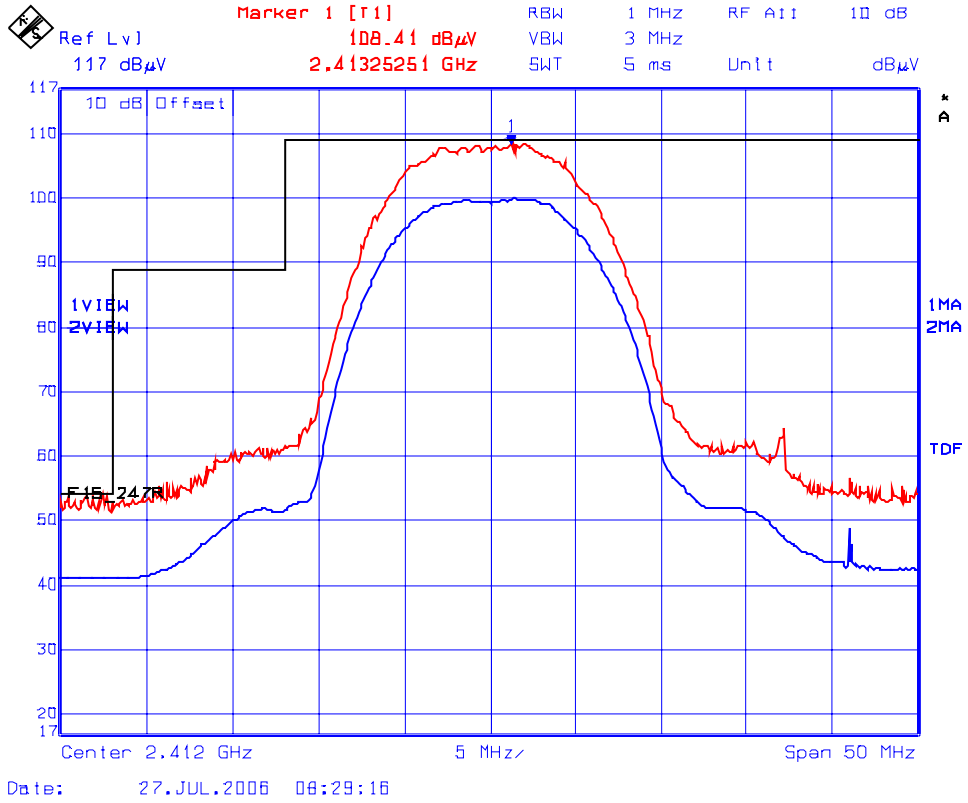
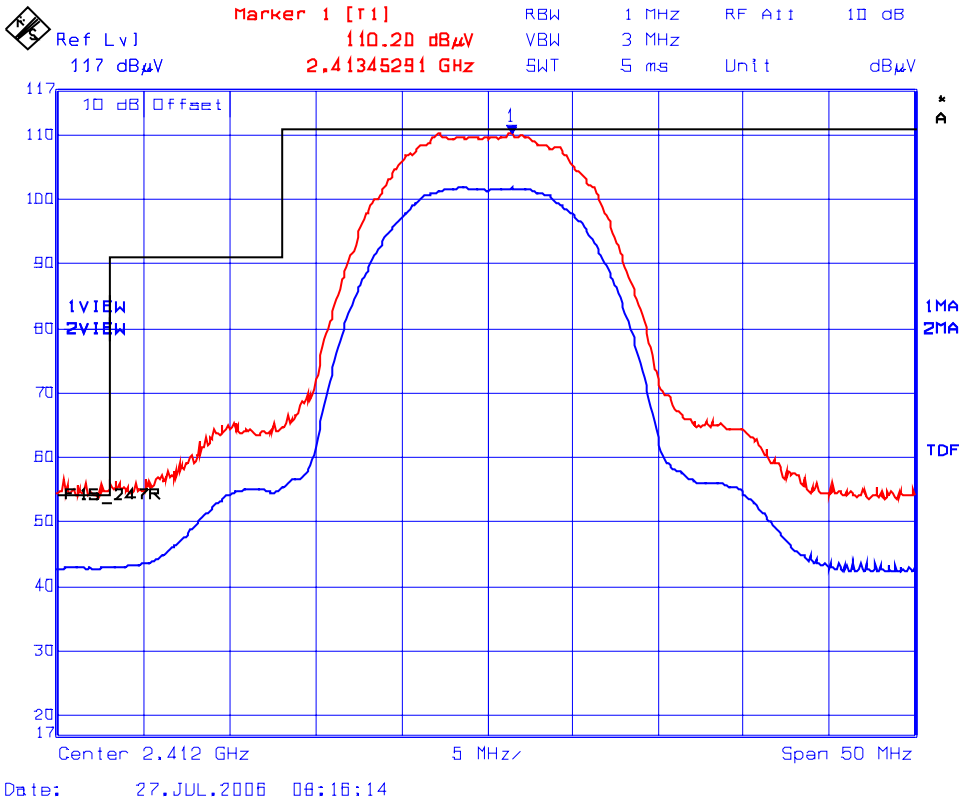


Photo #4: Lower Band-Edge Radiated Emissions – Vertical Polarization

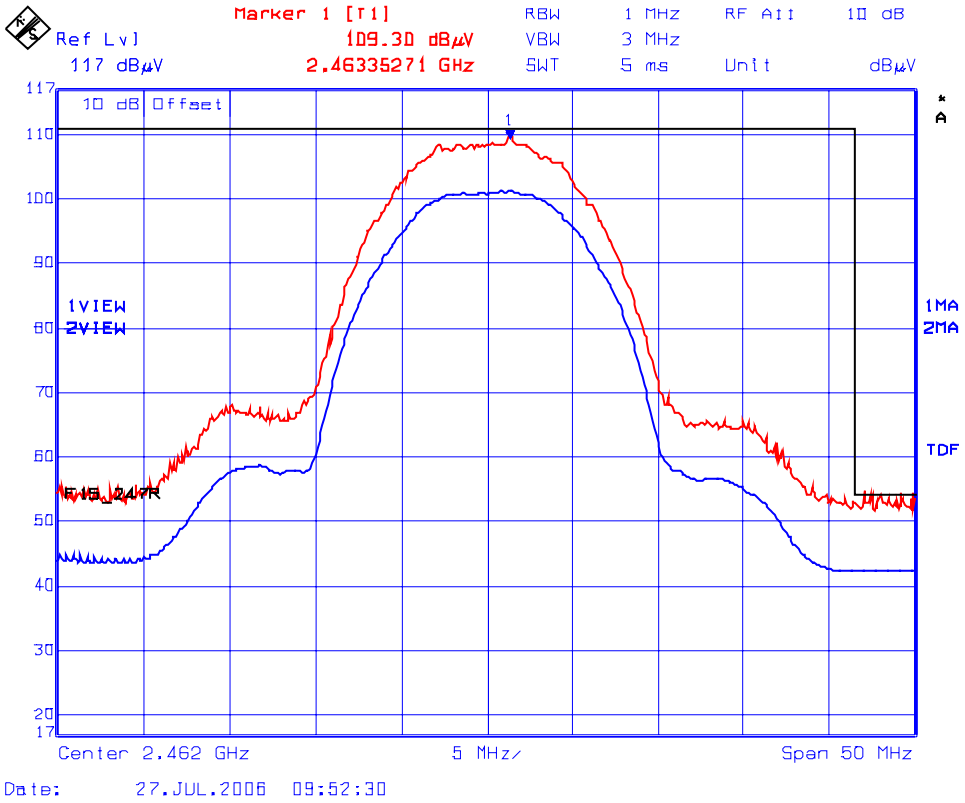
2412 MHz @ 802.11b, CCK @ 11 Mbps
Trace 1: RBW= 1 MHz, VBW= 3 MHz
Trace 2: RBW= 1 MHz, VBW= 10 Hz



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Photo #5: Upper Band-Edge Radiated Emissions – Horizontal Polarization

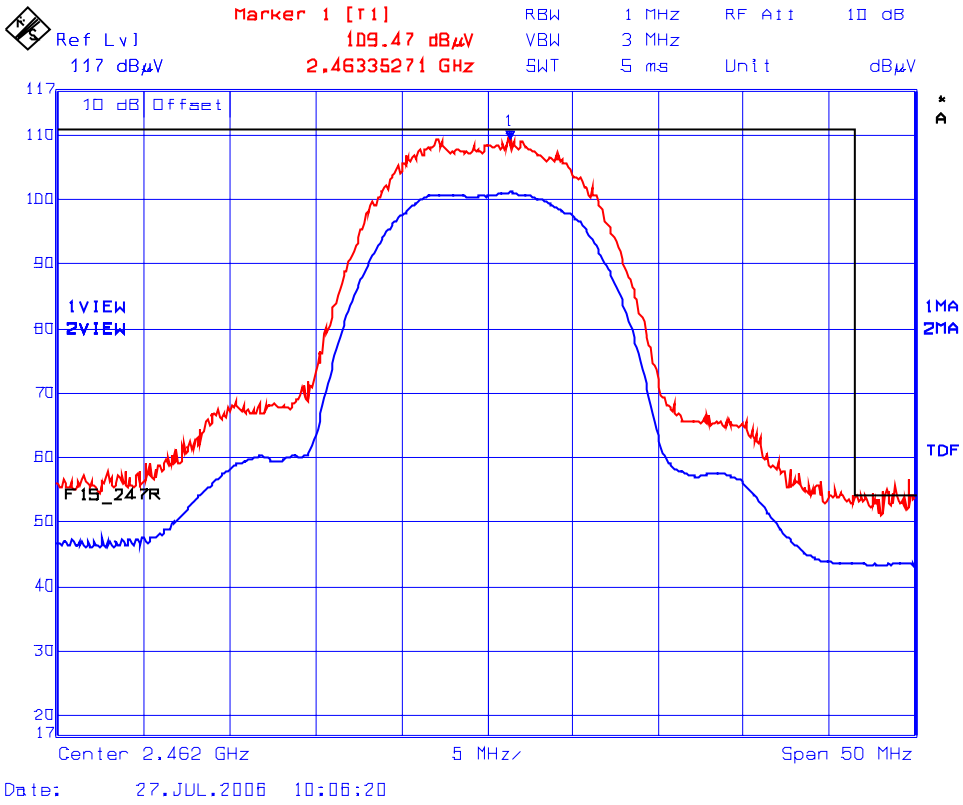
2462 MHz @ 802.11b, CCK @ 11 Mbps
Trace 1: RBW= 1 MHz, VBW= 3 MHz
Trace 2: RBW= 1 MHz, VBW= 10 Hz



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Photo #6: Upper Band-Edge Radiated Emissions – Vertical Polarization

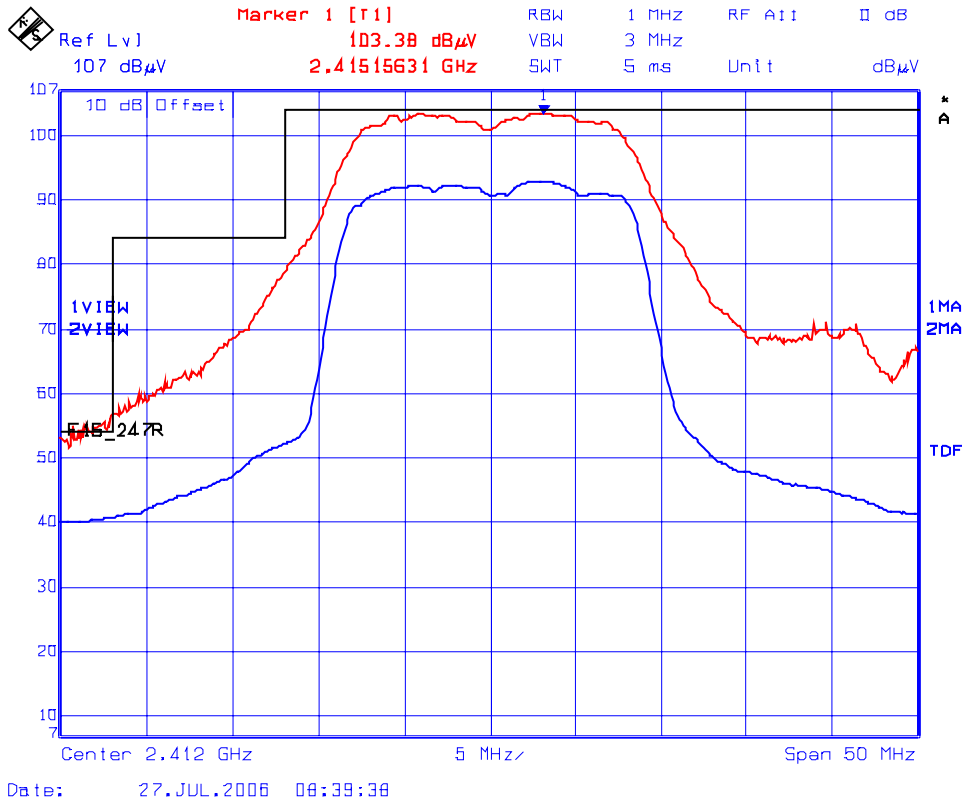
2462 MHz @ 802.11b, CCK @ 11 Mbps
Trace 1: RBW= 1 MHz, VBW= 3 MHz
Trace 2: RBW= 1 MHz, VBW= 10 Hz



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Photo #7: Lower Band-Edge Radiated Emissions - Horizontal Polarization

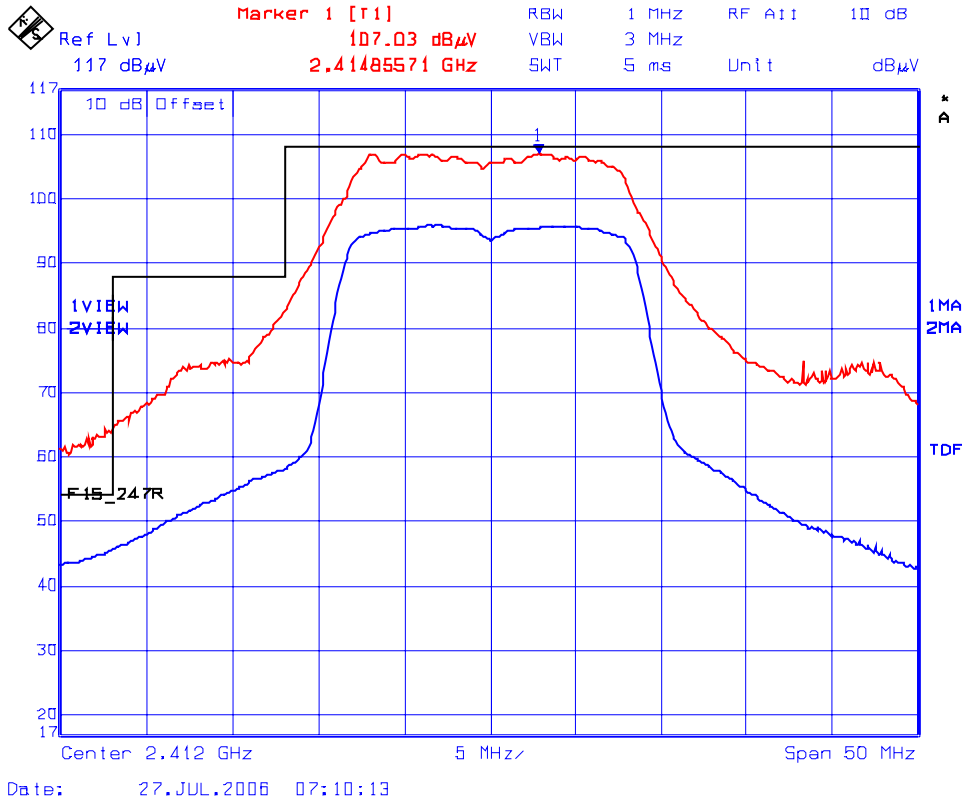
2412 MHz, 802.11g, BPSK @ 9 Mbps
Trace 1: RBW= 1 MHz, VBW= 3 MHz
Trace 2: RBW= 1 MHz, VBW= 10 Hz



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Photo #8: Lower Band-Edge Radiated Emissions - Vertical Polarization

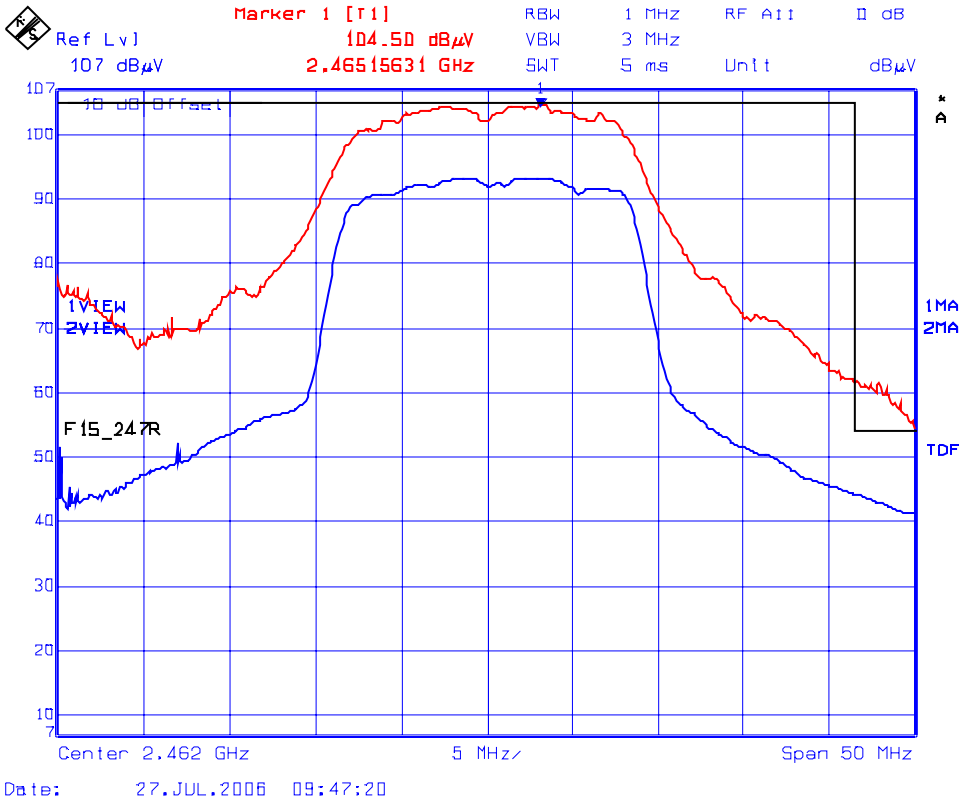
2412 MHz, 802.11g, BPSK @ 9 Mbps
Trace 1: RBW= 1 MHz, VBW= 3 MHz
Trace 2: RBW= 1 MHz, VBW= 10 Hz



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Photo #9: Upper Band-Edge Radiated Emissions - Horizontal Polarization

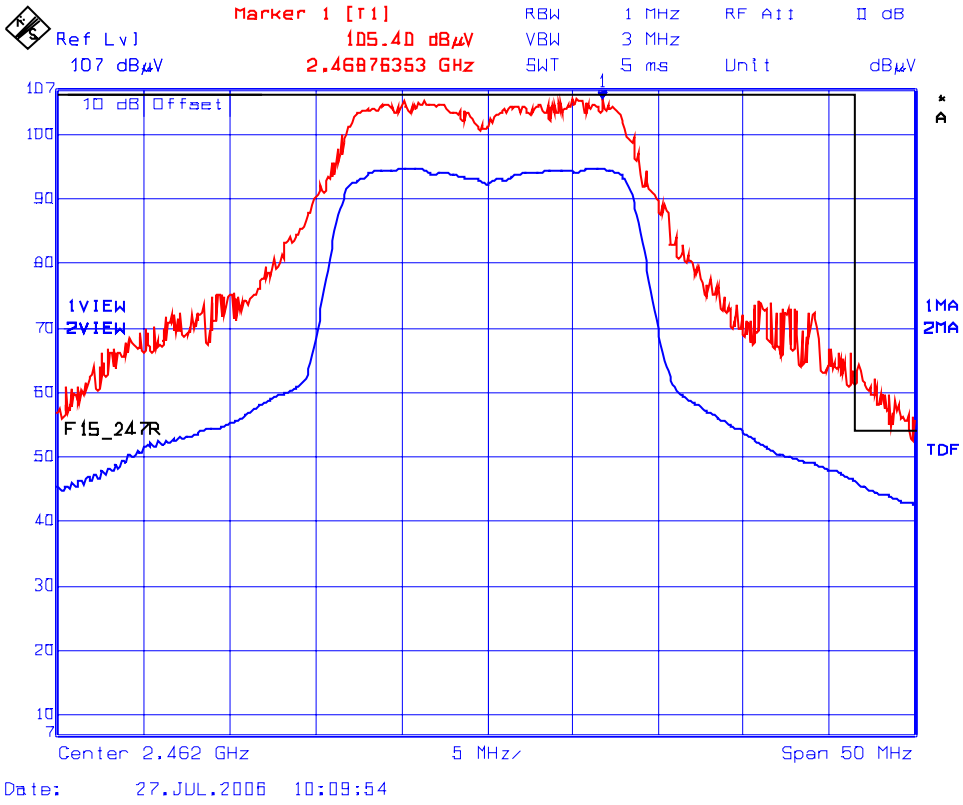
2462 MHz, 802.11g, BPSK @ 9 Mbps
Trace 1: RBW= 1 MHz, VBW= 3 MHz
Trace 2: RBW= 1 MHz, VBW= 10 Hz



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Photo #10: Upper Band-Edge Radiated Emissions - Vertical Polarization

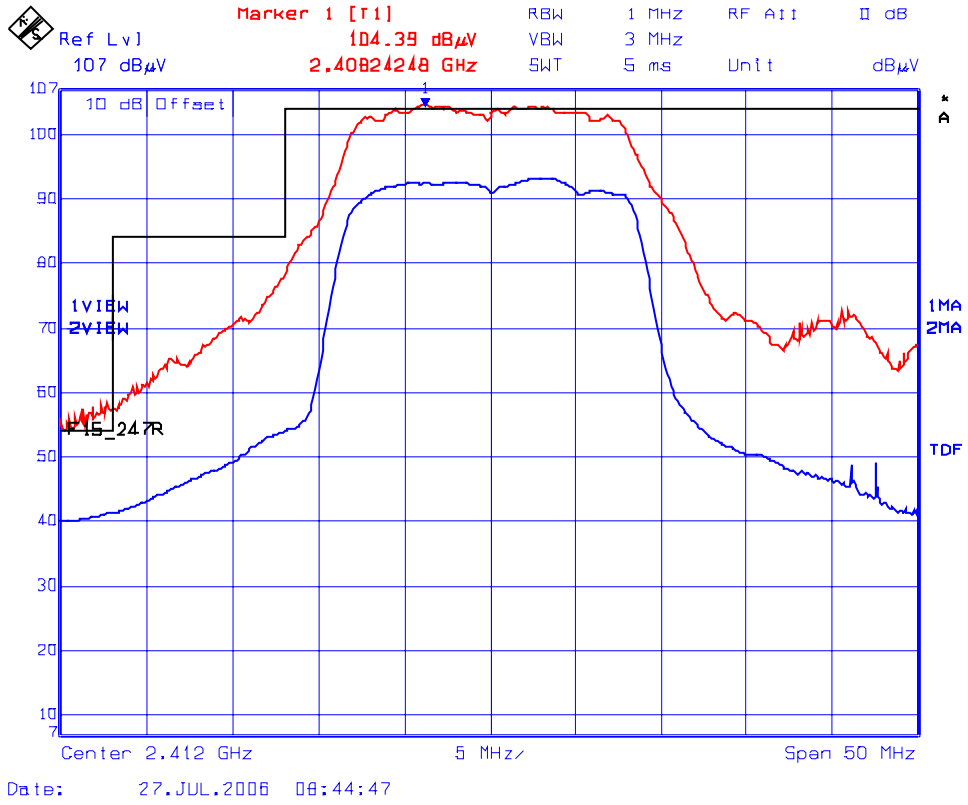
2462 MHz, 802.11g, BPSK @ 9 Mbps
Trace 1: RBW= 1 MHz, VBW= 3 MHz
Trace 2: RBW= 1 MHz, VBW= 10 Hz



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Photo #11: Lower Band-Edge Radiated Emissions - Horizontal Polarization

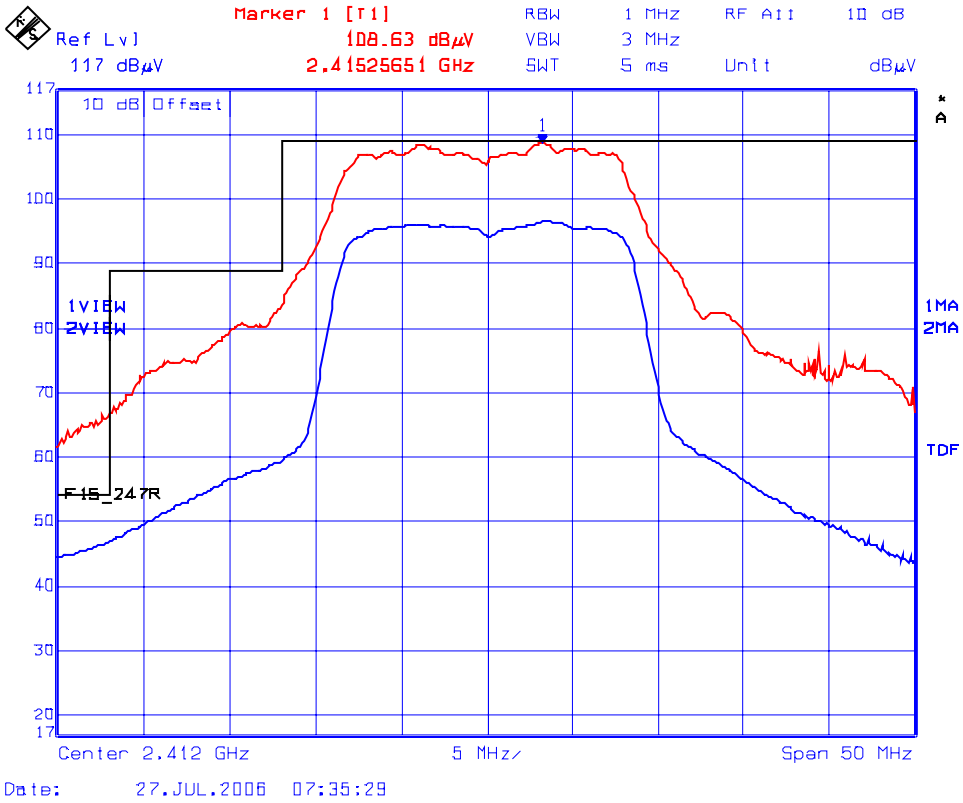
2412 MHz, 802.11g, 64QAM @ 54 Mbps
Trace 1: RBW= 1 MHz, VBW= 3 MHz
Trace 2: RBW= 1 MHz, VBW= 10 Hz



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Photo #12: Lower Band-Edge Radiated Emissions - Vertical Polarization

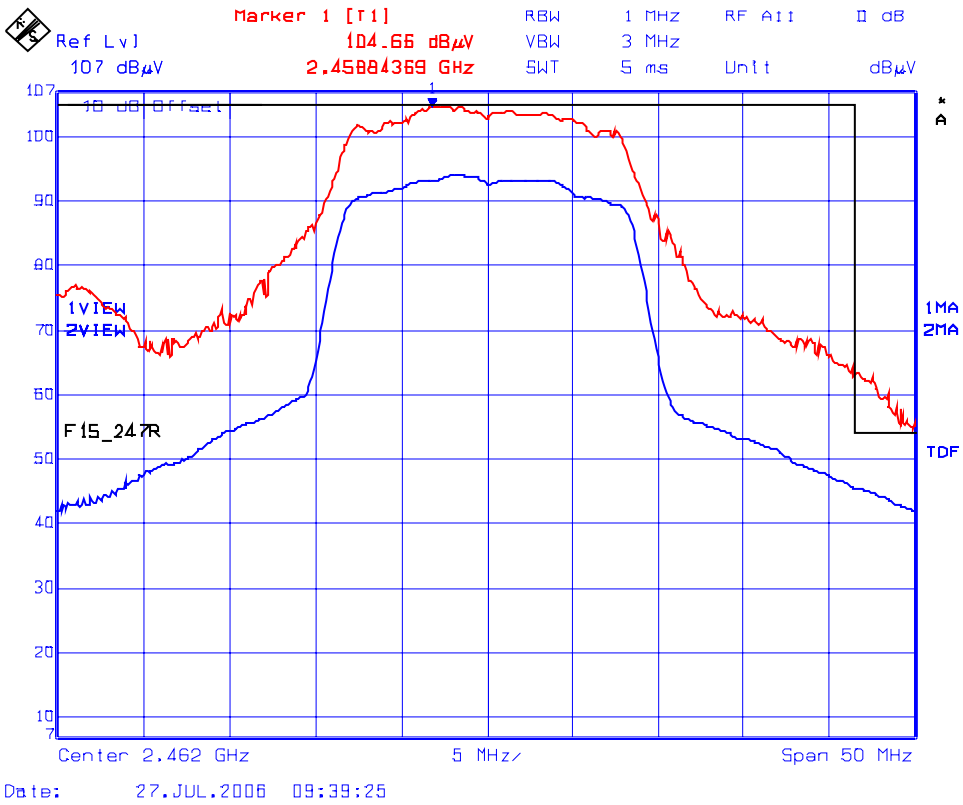
2412 MHz, 802.11g, 64QAM @ 54 Mbps
Trace 1: RBW= 1 MHz, VBW= 3 MHz
Trace 2: RBW= 1 MHz, VBW= 10 Hz



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Photo #13: Upper Band-Edge Radiated Emissions - Horizontal Polarization

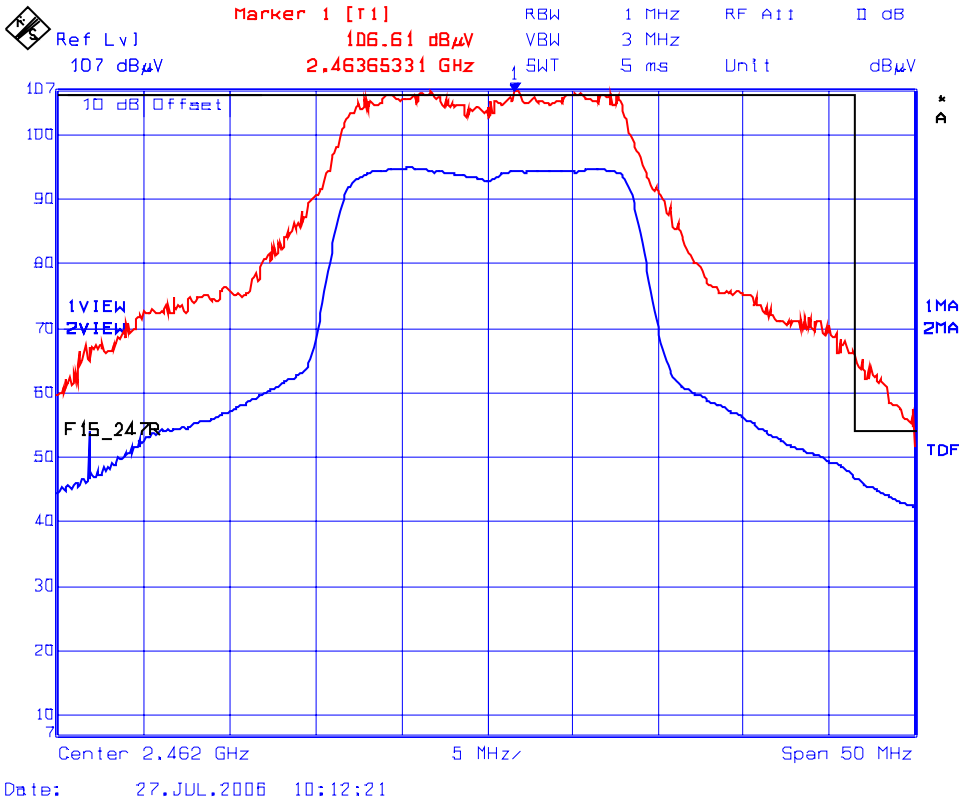
2462 MHz, 802.11g, 64QAM @ 54 Mbps
Trace 1: RBW= 1 MHz, VBW= 3 MHz
Trace 2: RBW= 1 MHz, VBW= 10 Hz



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Photo #14: Upper Band-Edge Radiated Emissions - Vertical Polarization

2462 MHz, 802.11g, 64QAM @ 54 Mbps
Trace 1: RBW= 1 MHz, VBW= 3 MHz
Trace 2: RBW= 1 MHz, VBW= 10 Hz



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

5.12.5.2. Transmitter Radiated Spurious Emissions

Remark: The transmitter with modulation of IEEE 802.11g (64QAM @ 54 Mb/s) and maximum allowable conducted RF output power settings of 14 dBm were set for testing of the worst case.

Lowest Frequency (2412 MHz), Modulation: IEEE 802.11g (64QAM @ 54 Mb/s)

Frequency (MHz)	RF Peak Level (dBµV/m)	RF AVG Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Limit 15.247 (dBµV/m)	Margin (dB)	Pass/ Fail
2412	110.2	N/A	V	N/A	N/A	N/A	Pass
2412	108.4	N/A	H	N/A	N/A	N/A	Pass
4824	63.6	49.1	V	54.0	N/A	-4.9	Pass
4824	61.5	48.4	H	54.0	N/A	-5.6	Pass
30 – 25,000	**	**	V & H	FCC 15.209	FCC 15.247	**	Pass
The emissions were scanned from 30 MHz to 25 GHz. All emissions less than 20 dB below the FCC Limits are recorded.							

Middle Frequency (2437 MHz), Modulation: IEEE 802.11g (64QAM @ 54 Mb/s)

Frequency (MHz)	RF Peak Level (dBµV/m)	RF AVG Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Limit 15.247 (dBµV/m)	Margin (dB)	Pass/ Fail
2437	109.6	N/A	V	N/A	N/A	N/A	Pass
2437	109.1	N/A	H	N/A	N/A	N/A	Pass
4874	64.1	49.5	V	54.0	N/A	-4.5	Pass
4874	63.1	49.3	H	54.0	N/A	-4.7	Pass
30 – 25,000	**	**	V & H	FCC 15.209	FCC 15.247	**	Pass
The emissions were scanned from 30 MHz to 25 GHz. All emissions less than 20 dB below the FCC Limits are recorded.							

Highest Frequency (2462 MHz), Modulation: IEEE 802.11g (64QAM @ 54 Mb/s)

Frequency (MHz)	RF Peak Level (dBµV/m)	RF AVG Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Limit 15.247 (dBµV/m)	Margin (dB)	Pass/ Fail
2462	109.5	N/A	V	N/A	N/A	N/A	Pass
2462	109.3	N/A	H	N/A	N/A	N/A	Pass
4924	66.0	53.6	V	54.0	N/A	-0.4	Pass
4924	65.0	51.2	H	54.0	N/A	-2.8	Pass
30 – 25,000	**	**	V & H	FCC 15.209	FCC 15.247	**	Pass
The emissions were scanned from 30 MHz to 25 GHz. All emissions less than 20 dB below the FCC Limits are recorded.							

EXHIBIT 6. MEASUREMENT UNCERTAINTY

The measurement uncertainties stated were calculated in accordance with the requirements of NIST Technical Note 1297 and LAB 34

6.1. LINE CONDUCTED EMISSION MEASUREMENT UNCERTAINTY

CONTRIBUTION (Line Conducted)	PROBABILITY DISTRIBUTION	UNCERTAINTY (dB)	
		9-150 kHz	0.15-30 MHz
EMI Receiver specification	Rectangular	±1.5	±1.5
LISN coupling specification	Rectangular	±1.5	±1.5
Cable and Input Transient Limiter calibration	Normal (k=2)	±0.3	±0.5
Mismatch: Receiver VRC Γ_1 = 0.03 LISN VRC Γ_R = 0.8(9 kHz) 0.2 (30 MHz) Uncertainty limits 20Log(1±$\Gamma_1\Gamma_R$)	U-Shaped	±0.2	±0.3
System repeatability	Std. deviation	±0.2	±0.05
Repeatability of EUT	--	--	--
Combined standard uncertainty	Normal	±1.25	±1.30
Expanded uncertainty U	Normal (k=2)	±2.50	±2.60

Sample Calculation for Measurement Accuracy in 450 kHz to 30 MHz Band:

$$u_c(y) = \sqrt{\sum_{I=1}^{m} u_i^2(y)} = \pm \sqrt{(1.5^2 + 1.5^2)/3 + (0.5/2)^2 + (0.05/2)^2 + 0.35^2} = \pm 1.30 \text{ dB}$$

$$U = 2u_c(y) = \pm 2.6 \text{ dB}$$

6.2. RADIATED EMISSION MEASUREMENT UNCERTAINTY

CONTRIBUTION (Radiated Emissions)	PROBABILITY DISTRIBUTION	UNCERTAINTY (± dB)	
		3 m	10 m
Antenna Factor Calibration	Normal (k=2)	±1.0	±1.0
Cable Loss Calibration	Normal (k=2)	±0.3	±0.5
EMI Receiver specification	Rectangular	±1.5	±1.5
Antenna Directivity	Rectangular	+0.5	+0.5
Antenna factor variation with height	Rectangular	±2.0	±0.5
Antenna phase center variation	Rectangular	0.0	±0.2
Antenna factor frequency interpolation	Rectangular	±0.25	±0.25
Measurement distance variation	Rectangular	±0.6	±0.4
Site imperfections	Rectangular	±2.0	±2.0
Mismatch: Receiver VRC $\Gamma_1 = 0.2$ Antenna VRC $\Gamma_R = 0.67$(Bi) 0.3 (Lp) Uncertainty limits 20Log(1±$\Gamma_1\Gamma_R$)	U-Shaped	+1.1 -1.25	±0.5
System repeatability	Std. Deviation	±0.5	±0.5
Repeatability of EUT		-	-
Combined standard uncertainty	Normal	+2.19 / -2.21	+1.74 / -1.72
Expanded uncertainty U	Normal (k=2)	+4.38 / -4.42	+3.48 / -3.44

Calculation for maximum uncertainty when 3m biconical antenna including a factor of k=2 is used:

$U = 2u_c(y) = 2x(+2.19) = +4.38$ dB And $U = 2u_c(y) = 2x(-2.21) = -4.42$ dB