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Electromagnetic Emissions Test Report and Application for Grant of Equipment Authorization pursuant to FCC Part 15, Subpart C (15.247) DTS Specifications and Industry Canada RSS 210 Issue 5 for an Intentional Radiator on the Unigen Model: UGWR2USxxxx

FCC ID:	R8KUGWR2USXXXX
UPN:	5125A-UGWR2US
GRANTEE:	Unigen 45388 Warm Springs Blvd Fremont, CA 94539
TEST SITE:	Elliott Laboratories, Inc. 684 W. Maude Avenue Sunnyvale, CA 94086
REPORT DATE:	May 12, 2004
REVISION DATE:	October 25, 2004
FINAL TEST DATE:	May 4, October 20 and October 25, 2004
AUTHORIZED SIGNATORY:	Mark Briggs Vice President of Engineering

ACCREDITED

DECLARATIONS OF COMPLIANCE

Equipment Name and Model:
UGWR2USxxxx

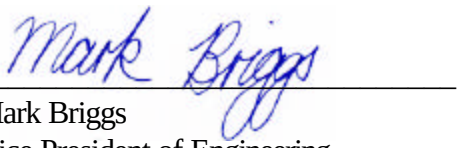
Manufacturer:
Unigen
45388 Warm Springs Blvd
Fremont, CA 94539

Tested to applicable standards:
RSS-210, Issue 5, November 2001 (Low Power License-Exempt Radiocommunication Devices)
FCC Part 15.247 (DTS)

Measurement Facility Description Filed With Department of Industry:

Departmental Acknowledgement Number: IC2845 **SV1** Dated July 30, 2001

I declare that the testing was performed or supervised by me; that the test measurements were made in accordance with the above mentioned departmental standards (through the use of ANSI C63.4 as detailed in section 5.3 of RSS-210, Issue 5); and that the equipment performed in accordance with the data submitted in this report.

Signature	
Name	Mark Briggs
Title	Vice President of Engineering
Company	Elliott Laboratories Inc.
Address	684 W. Maude Ave Sunnyvale, CA 94086 USA
Date:	May 12, 2004

Maintenance of compliance with the above standards is the responsibility of the manufacturer. Any modification of the product which may result in increased emissions should be checked to ensure compliance has been maintained (i.e., printed circuit board layout changes, different line filter, different power supply, harnessing or I/O cable changes, etc.).

TABLE OF CONTENTS

SCOPE

An electromagnetic emissions test has been performed on the Unigen Corporation model UGWR2USxxxx pursuant to Subpart C of Part 15 of FCC Rules for intentional radiators and RSS-210 Issue 5 for licence-exempt low power devices. Conducted and radiated emissions data has been collected, reduced, and analyzed within this report in accordance with measurement guidelines set forth in ANSI C63.4-1992 as outlined in Elliott Laboratories test procedures.

The intentional radiator above has been tested in a simulated typical installation to demonstrate compliance with the relevant FCC performance and procedural standards.

Final system data was gathered in a mode that tended to maximize emissions by varying orientation of EUT, orientation of power and I/O cabling, antenna search height, and antenna polarization.

Every practical effort was made to perform an impartial test using appropriate test equipment of known calibration. All pertinent factors have been applied to reach the determination of compliance.

The test results recorded herein are based on a single type test of the Unigen Corporation model UGWR2USxxxx and therefore apply only to the tested sample. The sample was selected and prepared by Mark Morrissey of Unigen.

The report has been revised to reflect the new test data detailed in Exhibit B.

OBJECTIVE

The primary objective of the manufacturer is compliance with Subpart C of Part 15 of FCC Rules and RSS-210 Issue 5 for license-exempt low power devices for the radiated and conducted emissions of intentional radiators. Certification of these devices is required as a prerequisite to marketing as defined in Part 2 the FCC Rules.

Certification is a procedure where the manufacturer or a contracted laboratory makes measurements and submits the test data and technical information to the FCC. The FCC issues a grant of equipment authorization upon successful completion of their review of the submitted documents. Once the equipment authorization has been obtained, the label indicating compliance must be attached to all identical units which are subsequently manufactured.

SUMMARY OF RESULTS

FCC Part 15 Section	RSS 210 Section	Description	Measured Value	Comments	Result
15.247(a)	6.2.2(o)(b)	Digital Modulation	Systems uses DSSS techniques	System must utilize a digital transmission technology	Complies
15.247 (a) (2)	6.2.2(o)(b)	6dB Bandwidth	960 kHz	Minimum allowed is 500kHz	Complies
	RSP 100	99% Bandwidth	1.175 MHz	For information only	Complies
15.247 (b) (3)	6.2.2(o)(b)	Output Power, 2400 - 2483.5 MHz	10.6 dBm (0.011 Watts) EIRP = 0.018 W	Multi-point applications: Maximum permitted is 1Watt, with EIRP limited to 4 Watts.	Complies
15.247(d)	6.2.2(o)(b)	Power Spectral Density	3.06 dBm / MHz	Maximum permitted is 8dBm/3kHz	Complies
15.247(c)	6.2.2(o)(e1)	Antenna Port Spurious Emissions – 30MHz – 26 GHz	All spurious emissions < -20dBc	All spurious emissions < -20dBc.	Complies
15.247(c) / 15.209		Radiated Spurious Emissions – Without Shield 30MHz – 26 GHz	53.6 dBuV/m @ 4884 MHz (478uV/m @ 3m) (-0.4 dB)	Emissions in restricted bands must meet the radiated emissions limits detailed in 15.207. All others must be < -20dBc	Complies
15.247(c) / 15.209		Radiated Spurious Emissions – With Shield 30MHz – 26 GHz	53.3 dBuV/m @ 2483 MHz (462uV/m @ 3m) (-0.7dB)	Emissions in restricted bands must meet the radiated emissions limits detailed in 15.207. All others must be < -20dBc	Complies
15.207		AC Conducted Emissions	16.7 dBuV @ 1.763 MHz (-29.3 dB)	Unit was operated with an external DC Power source	Complies
	6.6	AC Conducted Emissions			Complies
15.247 (b) (5)		RF Exposure Requirements	MPE calculation	Refer to Theory of Operations	
15.203		RF Connector	Non-standard Hirose connector	The OEM integrators will install inside their final product and the antenna will be integral on the final product.	Complies

EIRP calculated using antenna gain of 2dBi.

MEASUREMENT UNCERTAINTIES

ISO Guide 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level and were calculated in accordance with NAMAS document NIS 81.

Measurement Type	Frequency Range (MHz)	Calculated Uncertainty (dB)
Conducted Emissions	0.15 to 30	± 2.4
Radiated Emissions	30 to 1000	± 3.6

EQUIPMENT UNDER TEST (EUT) DETAILS

GENERAL

The Unigen Corporation model UGWR2USxxxx is a 2.4GHz wireless module which is designed to be integrated in various OEM products. The EUT was placed in a test fixture and the test fixture was treated as tabletop equipment during testing. The electrical rating of the test fixture with the module installed is 4.7 Vdc, 0.23 Amps. The electrical rating for the module is 3.3Vdc ±0.3Vdc, 0.16 Amps

The sample was received on May 4, 2004 and tested on May 4, October 20 and October 25, 2004. The sample was retested for radiated spurious emissions with a shield soldered to the board on October 20, 2004. The EUT consisted of the following component(s):

Manufacturer	Model	Description	Serial Number
Unigen	Cypress Wireless USB	Modular	N/A

ENCLOSURE

The EUT does not have an enclosure as it is designed to be installed within the enclosure of the final product.

MODIFICATIONS

The EUT required the following modification during testing in order to comply with the emission specifications:

Output filter modified to use 2.7nH and 2 pF caps

SUPPORT EQUIPMENT

The following equipment was used as local support equipment for emissions testing:

Manufacturer	Model	Description	Serial Number	FCC ID
Topward	3603D	Power Supply	N/A	N/A
IBM	2647	Laptop	78-7PX8M	DoC

No equipment was used as remote support equipment for emissions testing:

EUT INTERFACE PORTS

The I/O cabling configuration during emissions testing was as follows:

Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length(m)
RS-232	Laptop	Multiwire	Shielded	5
DC	DC Supply	2 wire	Unshielded	1

EUT OPERATION DURING TESTING

Transmitting at full power on low, middle, and high channels. It was also receiving on low and high channels.

ANTENNA REQUIREMENTS

The antenna port is hirose connector. The OEM integrators will install inside their final product and the antenna will be integral on the final product. The antenna used during testing and to be provided to the OEM integrator is a 2dBi ½ dipole.

TEST SITE

GENERAL INFORMATION

Final test measurements were taken on October 25, 2004, at the Elliott Laboratories Open Area Test Site #1 located at 684 West Maude Avenue, Sunnyvale, California. The test site contains separate areas for radiated and conducted emissions testing. Pursuant to section 2.948 of the Rules, construction, calibration, and equipment data has been filed with the Federal Communications Commission. In accordance with Industry Canada rules detailed in RSS 210 Issue 5 and RSS-212, construction, calibration, and equipment data for the test sites have been filed with the Federal Communications Commission.

The FCC recommends that ambient noise at the test site be at least 6 dB below the allowable limits. Ambient levels are below this requirement with the exception of predictable local TV, radio, and mobile communications traffic. The test site contains separate areas for radiated and conducted emissions testing. Considerable engineering effort has been expended to ensure that the facilities conform to all pertinent FCC requirements.

CONDUCTED EMISSIONS CONSIDERATIONS

Conducted emissions testing is performed in conformance with ANSI C63.4-1992. Measurements are made with the EUT connected to the public power network through a nominal, standardized RF impedance, which is provided by a line impedance stabilization network, known as a LISN. A LISN is inserted in series with each current-carrying conductor in the EUT power cord.

RADIATED EMISSIONS CONSIDERATIONS

The FCC has determined that radiation measurements made in a shielded enclosure are not suitable for determining levels of radiated emissions. Radiated measurements are performed in an open field environment. The test site is maintained free of conductive objects within the CISPR defined elliptical area incorporated in ANSI C63.4 guidelines.

MEASUREMENT INSTRUMENTATION

RECEIVER SYSTEM

An EMI receiver as specified in CISPR 16-1 is used for emissions measurements. The receivers used can measure over the frequency range of 9 kHz up to 2000 MHz. These receivers allow both ease of measurement and high accuracy to be achieved. The receivers have Peak, Average, and CISPR (Quasi-peak) detectors built into their design so no external adapters are necessary. The receiver automatically sets the required bandwidth for the CISPR detector used during measurements.

For measurements above the frequency range of the receivers, a spectrum analyzer is utilized because it provides visibility of the entire spectrum along with the precision and versatility required to support engineering analysis. Average measurements above 1000MHz are performed on the spectrum analyzer using the linear-average method with a resolution bandwidth of 1 MHz and a video bandwidth of 10 Hz.

INSTRUMENT CONTROL COMPUTER

The receivers utilize either a Rohde and Schwarz EZM Spectrum Monitor/Controller or contain an internal Spectrum Monitor/Controller to view and convert the receiver measurements to the field strength at an antenna or voltage developed at the LISN measurement port, which is then compared directly with the appropriate specification limit. This provides faster, more accurate readings by performing the conversions described under Sample Calculations within the Test Procedures section of this report. Results are printed in a graphic and/or tabular format, as appropriate. A personal computer is used to record all measurements made with the receivers.

The Spectrum Monitor provides a visual display of the signal being measured. In addition, the controller or a personal computer run automated data collection programs which control the receivers. This provides added accuracy since all site correction factors, such as cable loss and antenna factors are added automatically.

LINE IMPEDANCE STABILIZATION NETWORK (LISN)

Line conducted measurements utilize a fifty microhenry Line Impedance Stabilization Network as the monitoring point. The LISN used also contains a 250 uH CISPR adapter. This network provides for calibrated radio frequency noise measurements by the design of the internal low pass and high pass filters on the EUT and measurement ports, respectively.

POWER METER

A power meter and peak power sensor are used for all direct output power measurements from transmitters as they provide a broadband indication of the power output.

FILTERS/ATTENUATORS

External filters and precision attenuators are often connected between the receiving antenna or LISN and the receiver. This eliminates saturation effects and non-linear operation due to high amplitude transient events.

ANTENNAS

A biconical antenna is used to cover the range from 30 MHz to 300 MHz and a log periodic antenna is utilized from 300 MHz to 1000 MHz. Narrowband tuned dipole antennas are used over the entire 30 to 1000 MHz range for precision measurements of field strength. Above 1000 MHz, a horn antenna is used. The antenna calibration factors are included in site factors programmed into the test receivers.

ANTENNA MAST AND EQUIPMENT TURNTABLE

The antennas used to measure the radiated electric field strength are mounted on a non-conductive antenna mast equipped with a motor-drive to vary the antenna height.

ANSI C63.4 specifies that the test height above ground for table mounted devices shall be 80 centimeters. Floor mounted equipment shall be placed on the ground plane if the device is normally used on a conductive floor or separated from the ground plane by insulating material from 3 to 12 mm if the device is normally used on a non-conductive floor. During radiated measurements, the EUT is positioned on a motorized turntable in conformance with this requirement.

INSTRUMENT CALIBRATION

All test equipment is regularly checked to ensure that performance is maintained in accordance with the manufacturer's specifications. All antennas are calibrated at regular intervals with respect to tuned half-wave dipoles. An exhibit of this report contains the list of test equipment used and calibration information.

TEST PROCEDURES

EUT AND CABLE PLACEMENT

The FCC requires that interconnecting cables be connected to the available ports of the unit and that the placement of the unit and the attached cables simulate the worst case orientation that can be expected from a typical installation, so far as practicable. To this end, the position of the unit and associated cabling is varied within the guidelines of ANSI C63.4, and the worst case orientation is used for final measurements.

CONDUCTED EMISSIONS

Conducted emissions are measured at the plug end of the power cord supplied with the EUT. Excess power cord length is wrapped in a bundle between 30 and 40 centimeters in length near the center of the cord. Preliminary measurements are made to determine the highest amplitude emission relative to the specification limit for all the modes of operation. Placement of system components and varying of cable positions are performed in each mode. A final peak mode scan is then performed in the position and mode for which the highest emission was noted on all current carrying conductors of the power cord.

RADIATED EMISSIONS

Radiated emissions measurements are performed in two phases as well. A preliminary scan of emissions is conducted in which all significant EUT frequencies are identified with the system in a nominal configuration. At least two scans are performed from 30 MHz up to the frequency required by the regulation specified on page 1. One or more of these is with the antenna polarized vertically while the one or more of these is with the antenna polarized horizontally. During the preliminary scans, the EUT is rotated through 360°, the antenna height is varied and cable positions are varied to determine the highest emission relative to the limit.

A speaker is provided in the receiver to aid in discriminating between EUT and ambient emissions. Other methods used during the preliminary scan for EUT emissions involve scanning with near field magnetic loops, monitoring I/O cables with RF current clamps, and cycling power to the EUT.

Final maximization is a phase in which the highest amplitude emissions identified in the spectral search are viewed while the EUT azimuth angle is varied from 0 to 360 degrees relative to the receiving antenna. The azimuth which results in the highest emission is then maintained while varying the antenna height from one to four meters. The result is the identification of the highest amplitude for each of the highest peaks. Each recorded level is corrected in the receiver using appropriate factors for cables, connectors, antennas, and preamplifier gain. Emissions which have values close to the specification limit may also be measured with a tuned dipole antenna to determine compliance.

CONDUCTED EMISSIONS FROM ANTENNA PORT

Direct measurements are performed with the antenna port of the EUT connected to either the power meter or spectrum analyzer via a suitable attenuator and/or filter. These are used to ensure that the front end of the measurement instrument is not overloaded by the fundamental transmission.

Measurement bandwidths (video and resolution) are set in accordance with FCC procedures for the type of radio being tested.

SPECIFICATION LIMITS AND SAMPLE CALCULATIONS

The limits for conducted emissions from the AC power port are given in units of microvolts, the limits for radiated electric field emissions are given in units of microvolts per meter at a specified test distance and the output power limits are given in temrs of Watts, milliwatts or dBm. Data is measured in the logarithmic form of decibels relative to one microvolt, or dB microvolts (dBuV). For radiated emissions, the measured data is converted to the field strength at the antenna in dB microvolts per meter (dBuV/m). The results are then converted to the linear forms of uV and uV/m for comparison to published specifications.

Where the radiated electric field strength is expressed in terms of the equivalent isotropic radiated power (eirp) the following formula is used to determine the field strength limit in terms of microvolts per meter at a distance of 3m from the equipment under test:

$$E = \frac{1000000 \text{ v } 30 \text{ P}}{3} \quad \text{microvolts per meter}$$

where P is the eirp (Watts)

For reference, converting the voltage and electric field strength specification limits from linear to decibel form is accomplished by taking the base ten logarithm, then multiplying by 20. Conversion of power specification limits from linear units (in milliwatts) to decibel form (in dBm) is accomplished by taking the base ten logarithm, then multiplying by 10.

FCC 15.407 (a)and RSS 210 (o) OUTPUT POWER LIMITS

The table below shows the limits for output power and output power density. Where the signal bandwidth is less than 20 MHz the maximum output power is reduced to the power spectral density limit plus 10 times the log of the bandwidth (in MHz).

Operating Frequency (MHz)	Output Power	Power Spectral Density
902 – 928	1 Watts (30 dBm)	8 dBm/3kHz
2400 – 2483.5	1 Watts (30 dBm)	8 dBm/3kHz
5725 – 5850	1 Watts (30 dBm)	8 dBm/3kHz

The maximum permitted output power is reduced by 1dB for every dB the antenna gain exceeds 6dBi. Fixed point-to-point applications using the 5725 – 5850 MHz band are not subject to this restriction.

RSS 210 (o) AND FCC 15.247 SPURIOUS RADIATED EMISSIONS LIMITS

T limits for unwanted (spurious) emissions from the transmitter falling in the restricted bands detailed in Part 15.205 and for all spurious emissions from the receiver are:

Frequency Range (MHz)	Limit (uV/m @ 3m)	Limit (dBuV/m @ 3m)
30 to 88	100	40
88 to 216	150	43.5
216 to 960	200	46.0
Above 960	500	54.0

All other unwanted (spurious) emissions shall be at least 20dB below the level of the highest in-band signal level.

FCC 15.205 AC POWER PORT CONDUCTED EMISSIONS LIMITS

The table below shows the limits for emissions on the AC power line as detailed in FCC Part 15.205.

Frequency (MHz)	Average Limit (dBuV)	Quasi Peak Limit (dBuV)
0.150 to 0.500	Linear decrease on logarithmic frequency axis between 56.0 and 46.0	Linear decrease on logarithmic frequency axis between 66.0 and 56.0
0.500 to 5.000	46.0	56.0
5.000 to 30.000	50.0	60.0

RSS-210 SECTION 6.6 AC POWER PORT CONDUCTED EMISSIONS LIMITS

The table below shows the limits for emissions on the AC power line as detailed in Industry Canada RSS-210 section 6.6.

Frequency Range (MHz)	Limit (uV)	Limit (dBuV)
0.450 to 30.000	250	48

SAMPLE CALCULATIONS - CONDUCTED EMISSIONS

Receiver readings are compared directly to the conducted emissions specification limit (decibel form) as follows:

$$R_r - B = C$$

and

$$C - S = M$$

where:

R_r = Receiver Reading in dBuV

B = Broadband Correction Factor*

C = Corrected Reading in dBuV

S = Specification Limit in dBuV

M = Margin to Specification in +/- dB

* Broadband Level - Per ANSI C63.4, 13 dB may be subtracted from the quasi-peak level if it is determined that the emission is broadband in nature. If the signal level in the average mode is six dB or more below the signal level in the peak mode, the emission is classified as broadband.

SAMPLE CALCULATIONS - RADIATED EMISSIONS

Receiver readings are compared directly to the specification limit (decibel form). The receiver internally corrects for cable loss, preamplifier gain, and antenna factor. The calculations are in the reverse direction of the actual signal flow, thus cable loss is added and the amplifier gain is subtracted. The Antenna Factor converts the voltage at the antenna coaxial connector to the field strength at the antenna elements. A distance factor, when used for electric field measurements, is calculated by using the following formula:

$$F_d = 20*LOG_{10} (D_m/D_s)$$

where:

F_d = Distance Factor in dB

D_m = Measurement Distance in meters

D_s = Specification Distance in meters

Measurement Distance is the distance at which the measurements were taken and Specification Distance is the distance at which the specification limits are based. The antenna factor converts the voltage at the antenna coaxial connector to the field strength at the antenna elements.

The margin of a given emission peak relative to the limit is calculated as follows:

$$R_c = R_r + F_d$$

and

$$M = R_c - L_s$$

where:

R_r = Receiver Reading in dBuV/m

F_d = Distance Factor in dB

R_c = Corrected Reading in dBuV/m

L_s = Specification Limit in dBuV/m

M = Margin in dB Relative to Spec

EXHIBIT 1: Test Equipment Calibration Data

2 Pages

Conducted Emissions - AC Power Ports, 04-May-04
Engineer: Juan Martinez

Manufacturer	Description	Model #	Asset #	Cal Due
Elliott Laboratories	FCC / CISPR LISN	LISN-3, OATS	304	01-Jul-05
Solar Electronics	Support Equipment LISN, 0.150-30.0 MHz	8012-50-R-24-BNC	305	08-Apr-05
Rohde & Schwarz	Test Receiver, 9kHz-2750MHz	ESCS 30	1337	05-Jan-05
Rohde& Schwarz	Pulse Limiter	ESH3 Z2	1593	04-May-05

Radiated Emissions, 30 - 12,500 MHz, 06-May-04
Engineer: David Bare

Manufacturer	Description	Model #	Asset #	Cal Due
EMCO	Biconical Antenna, 30-300 MHz	3110B	801	13-May-04
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	870	12-Jan-05
Hewlett Packard	EMC Spectrum Analyzer, 9KHz-26.5GHz	8593EM	1141	23-Mar-05
Hewlett Packard	High Pass filter, 3.5GHz	84300-80038	1157	12-Apr-05
EMCO	Horn Antenna, D. Ridge 1-18GHz	3115	1242	09-Oct-04
Rohde & Schwarz	Test Receiver, 9kHz-2750MHz	ESCS 30	1337	05-Jan-05
EMCO	Log Periodic Antenna, 0.2-2 GHz	3148	1347	28-Oct-04
EMCO	Log Periodic Antenna, 0.3-1 GHz	3146A	364	19-Sep-04
Elliott Laboratories	Biconical Antenna, 30-300 MHz	EL30.300	54	21-Jan-05
Rohde & Schwarz	Power Sensor, 1uW-100mW, DC-18 GHz, 50ohm	NRV-Z51	1070	25-Mar-05
Rohde & Schwarz	Power Meter, Dual Channel	NRVD	1539	25-Mar-05
ETS-Lindgren	Horn Antenna, D. Ridge 1-18GHz	3117	1662	30-Mar-05

Radio Antenna Port (Power and Frequency Range), 10-May-04
Engineer: dbare

Manufacturer	Description	Model #	Asset #	Cal Due
Hewlett Packard	EMC Spectrum Analyzer 9kHz - 6.5GHz	8595EM	780	26-Feb-05
Tektronix	Oscilloscope 500MHz DSO	TDS520	1000	30-Sep-04
Rohde & Schwarz	Power Sensor, 1uW-100mW, DC-18 GHz, 50ohm	NRV-Z51	1070	25-Mar-05
Rohde & Schwarz	Power Meter, Dual Channel	NRVD	1071	28-Aug-04
Hewlett Packard	Signal Generator (sweep) 0.01 - 26.5 GHz	8340A	1244	N/A

FCC Radiated Emission 1000 - 26,0000 MHz, 11-May-04
Engineer: Juan Martinez

Manufacturer	Description	Model #	Asset #	Cal Due
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	785	23-Jan-05
Hewlett Packard	EMC Spectrum Analyzer, 9KHz-26.5GHz	8593EM	1141	23-Mar-05
EMCO	Horn Antenna, D. Ridge 1-18GHz	3115	1242	09-Oct-04

Antenna Conducted Emissions, 11-May-04
Engineer: Juan Martinez

Manufacturer	Description	Model #	Asset #	Cal Due
Hewlett Packard	EMC Spectrum Analyzer, 9KHz-26.5GHz	8593EM	1141	23-Mar-05

Ch# 2 Pre-Scan, 11-May-04
Engineer: Juan Martinez

Manufacturer	Description	Model #	Asset #	Cal Due
Elliott Laboratories	Log Periodic Antenna 300-1000 MHz	EL300.1000	297	21-Jan-05
Elliott Laboratories	Biconical Antenna, 30-300 MHz	DM-105-T1	382	09-Sep-04
Hewlett Packard	EMC Spectrum Analyzer 9kHz - 6.5GHz	8595EM	780	26-Feb-05
EMCO	Horn Antenna, D. Ridge 1-18GHz	3115	786	29-Oct-04
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	870	12-Jan-05
Hewlett Packard	RF Preamplifier, 100 kHz - 1.3 GHz	8447E	1606	22-Jul-04

Radiated Emissions, 1,000 - 26,500 MHz, 20-Oct-04
Engineer: Mark Briggs

Manufacturer	Description	Model #	Asset #	Cal Due
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	785	23-Jan-05
EMCO	Horn Antenna, D. Ridge 1-18GHz	3115	786	29-Oct-04
Hewlett Packard	EMC Spectrum Analyzer 9kHz - 6.5GHz	8595EM	787	10-Dec-04
Hewlett Packard	EMC Spectrum Analyzer, 9KHz - 22GHz	8593EM	1319	20-Nov-04

Conducted Emissions - RF port, 25-Oct-04
Engineer: David Bare

Manufacturer	Description	Model #	Asset #	Cal Due
Rohde & Schwarz	Power Meter, Dual Channel	NRVD	1071	22-Sep-05
Rohde & Schwarz	Peak Power Sensor 100uW - 2 Watts	NRV-Z32	1536	22-Apr-05

EXHIBIT 2: Test Data Log Sheets

ELECTROMAGNETIC EMISSIONS

TEST LOG SHEETS

AND

MEASUREMENT DATA

T55453_Radio 26 Pages

Elliott

EMC Test Data

Client:	Unigen Corporation	Job Number:	J55447
Model:	UGWR2USxxxx	T-Log Number:	T55453
		Account Manager:	Susan Pelzl
Contact:	Mark Morrissey		
Emissions Spec:	FCC 15.247, RSS-210 , EN 300	Class:	Radio
Immunity Spec:	EN 301 489-17	Environment:	-

EMC Test Data

For The

Unigen Corporation

Model

UGWR2USxxxx

Date of Last Test: 5/7/2004

Client:	Unigen Corporation	Job Number:	J55447
Model:	UGWR2USxxxx	T-Log Number:	T55453
		Account Manger:	Susan Pelzl
Contact:	Mark Morrissey		
Emissions Spec:	FCC 15.247, RSS-210 , EN 300 3	Class:	Radio
Immunity Spec:	EN 301 489-17	Environment:	-

EUT INFORMATION

General Description

The EUT is a 2.4GHz wireless module which is designed to be integrated in various OEM products. The EUT was placed in a test fixture and the test fixture was treated as table-top equipment during testing. The electrical rating of the test fixture with the module installed is 4.7 Vdc, 0.23 Amps. The electrical rating for the module is 3.3Vdc ±0.3Vdc, 0.16 Amps

Equipment Under Test

Manufacturer	Model	Description	Serial Number	FCC ID
Unigen	UGWR2USxxxx	Modular	N/A	R8KUGWR2USXXXX

EUT Enclosure

The EUT does not have an enclosure as it is designed to be installed within the enclosure of the final product.

Modification History

Mod. #	Test	Date	Modification
1			

Modifications applied are assumed to be used on subsequent tests unless otherwise stated as a further modification.

Client:	Unigen Corporation	Job Number:	J55447
Model:	UGWR2USxxxx	T-Log Number:	T55453
		Account Manger:	Susan Pelzl
Contact:	Mark Morrissey		
Emissions Spec:	FCC 15.247, RSS-210 , EN 300 3	Class:	Radio
Immunity Spec:	EN 301 489-17	Environment:	-

Test Configuration #1

Local Support Equipment

Manufacturer	Model	Description	Serial Number	FCC ID
Topward	3603D	Power Supply	N/A	N/A
IBM	2647	Lapotp	78-7PX8M	DoC

Remote Support Equipment

Manufacturer	Model	Description	Serial Number	FCC ID
None				

EUT Interface Ports

EUT Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length (m)
RS-232	Laptop	Multiwire	Shielded	5
DC	DC Supply	2 wire	unshielded	1

EUT Operation During Radio Emissions

Transmitting at full power on low, middle, and high channels. It was also Receiving on low and high channels.

Client:	Unigen Corporation	Job Number:	J55447
Model:	UGWR2USxxxx	T-Log Number:	T55453
		Account Manger:	Susan Pelzl
Contact:	Mark Morrissey		
Emissions Spec:	FCC 15.247, RSS-210 , EN 300 3	Class:	Radio
Immunity Spec:	EN 301 489-17	Environment:	-

EUT Operation During Immunity

Transmitting at full power on low, middle, and high channels. It was also Receiving on low and high channels.

Performance Criteria for Immunity

Criterion A:

During and after the test, the apparatus shall continue to operate as intended. No degradation of performance or loss of function is allowed below a permissible performance level specified by the manufacgturer when the apparagtus is used as intended. In some cases this permissible performance level may be replaced by a permissible loss of performance. During the test the EUT shall not unintentionally transmit or change its operating state and stored data.

In the EUT's Transmit Mode, the 2400MHz carrier frequency was monitored on Elliott's remote Spectrum Analyzer for any carrier dropouts. In the EUT's Receive Mode the spectrum of 2000 to 2900 MHz was being monitored for the presence of any carrier, which would indicate the EUT going into a transmit mode.

Criterion B:

Degradation of performance or loss of function is allowed during the test. During the test the EUT shall not unintentionally transmit or change its operating state and stored data. The EUT shall recover wihtout operator intervention if functionality is lost during the test.

In the EUT's Transmit Mode, the 2400MHz carrier frequency was monitored on Elliott's remote Spectrum Analyzer for any carrier dropouts. In the EUT's Receive Mode the spectrum of 2000 to 2900 MHz was being monitored for the presence of any carrier, which would indicate the EUT going into a transmit mode.

Client:	Unigen Corporation	Job Number:	J55447
Model:	UGWR2USxxxx	T-Log Number:	T55453
		Account Manager:	Susan Pelzl
Contact:	Mark Morrissey		
Spec:	FCC 15.247, RSS-210 , EN 300 328	Class:	Radio

Conducted Emissions - Power Ports

Test Specifics

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 5/4/2004
Test Engineer: Juan Martinez
Test Location: SVOATS #1

Config. Used: 1
Config Change: None
PS Voltage: 120V/60Hz

General Test Configuration

For tabletop equipment, the EUT and power supply were located on a wooden table, 40 cm from a vertical coupling plane and 80cm from the LISN. A second LISN was used for all local support equipment.

Ambient Conditions:

Temperature: 22 °C
Rel. Humidity: 49 %

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	CE, AC Power,120V/60Hz	CISPR 22 B	Pass	

Modifications Made During Testing:

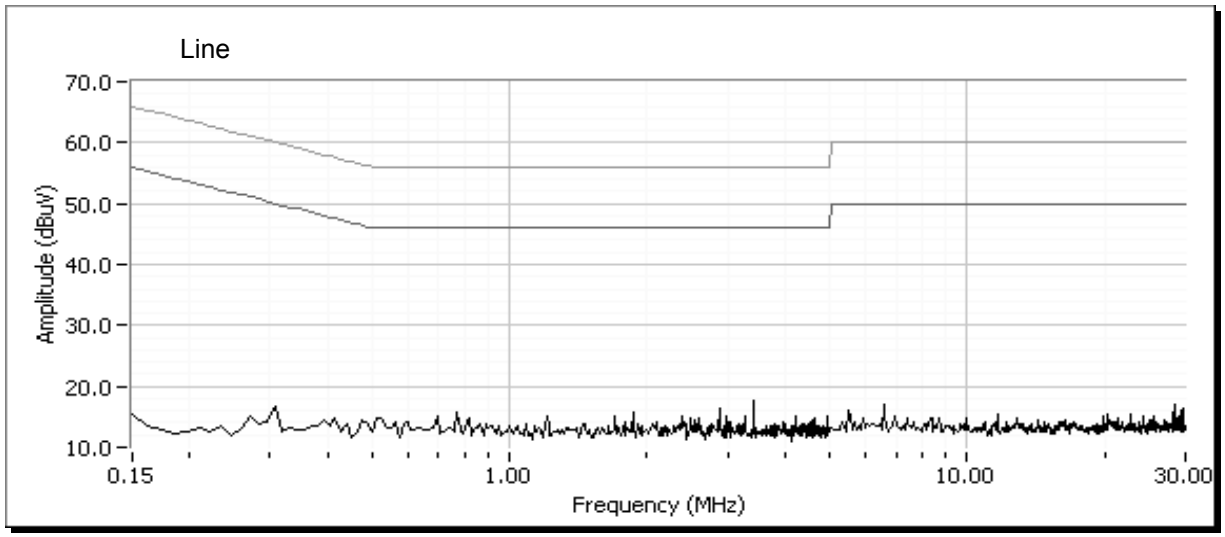
No modifications were made to the EUT during testing

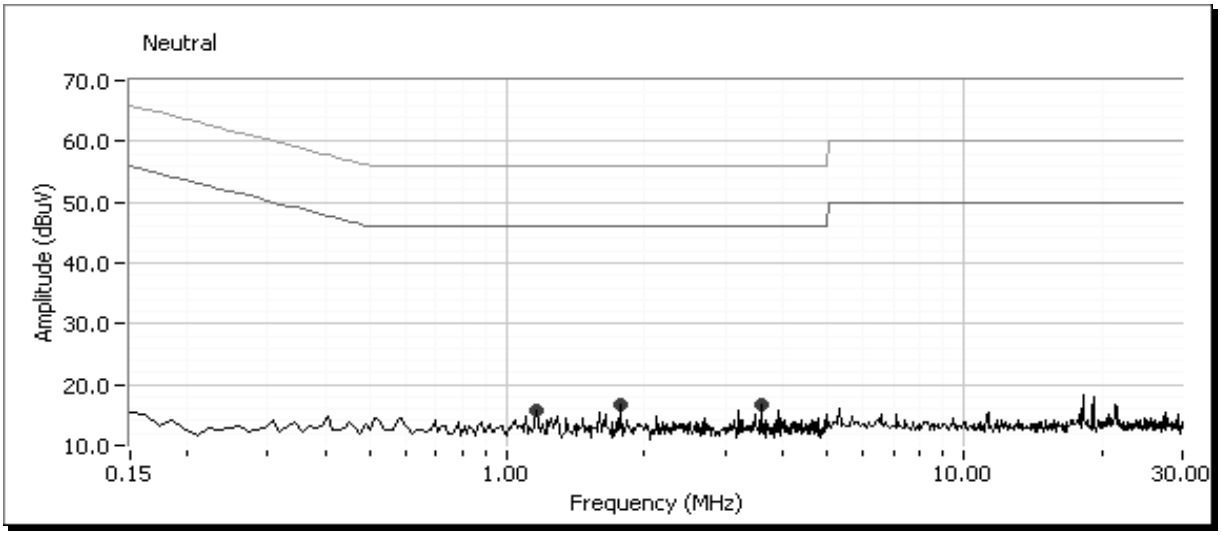
Deviations From The Standard

No deviations were made from the requirements of the standard.

Client:	Unigen Corporation	Job Number:	J55447
Model:	UGWR2USxxxx	T-Log Number:	T55453
		Account Manager:	Susan Pelzl
Contact:	Mark Morrissey		
Spec:	FCC 15.247, RSS-210 , EN 300 328	Class:	Radio

Run #1: AC Power Port Conducted Emissions on the power supply, 0.15 - 30MHz,1230V/60Hz





Elliott

EMC Test Data

Client:	Unigen Corporation	Job Number:	J55447
Model:	UGWR2USxxxx	T-Log Number:	T55453
		Account Manager:	Susan Pelzl
Contact:	Mark Morrissey		
Spec:	FCC 15.247, RSS-210 , EN 300 328	Class:	Radio

Run #1: AC Power Port Conducted Emissions on the power supply, 0.15 - 30MHz,1230V/60Hz

Frequency	Level	AC	CISPR 22 B		Detector	Comments
MHz	dBµV	Line	Limit	Margin	QP/Ave	
1.763	16.7	Neutral	46.0	-29.3	Peak	
3.594	16.7	Neutral	46.0	-29.3	Peak	
0.793	16.2	Line 1	46.0	-29.8	Peak	
1.156	15.9	Neutral	46.0	-30.2	Peak	
1.375	15.8	Line 1	46.0	-30.2	Peak	
6.563	17.1	Line 1	50.0	-32.9	Peak	

Client:	Unigen Corporation	Job Number:	J55447
Model:	UGWR2USxxxx	T-Log Number:	T55453
		Account Manager:	Susan Pelzl
Contact:	Mark Morrissey		
Spec:	FCC 15.247, RSS-210 , EN 300 328	Class:	N/A

Radiated Emissions 15.247 DTS

Test Specifics

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 5/4/2004; 10/20/2004 Config. Used: 1
Test Engineer: Juan Martinez; Mark Briggs Config Change: None
Test Location: SVOATS# 1 & 3 EUT Voltage: 4.7

Note: radiated spurious emissions with shield in place made on 10/20/2004. All others taken 5/4/2004

General Test Configuration

The EUT and all local support equipment were located on the turntable for radiated spurious emissions testing.

For radiated emissions testing the measurement antenna was located 3 meters from the EUT.

When measuring the conducted emissions from the EUT's antenna port, the antenna port of the EUT was connected to the spectrum analyzer or power meter via a suitable attenuator to prevent overloading the measurement system. All measurements are corrected to allow for the external attenuators used.

Ambient Conditions:

Date:	5/4/2004	10/20/2004
Temperature: (°C)	22	16.7
Rel. Humidity: (%)	49	55

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1a	RE, 30 - 25,000 MHz - Spurious Emissions, without shield	FCC Part 15.209 / 15.247(c)	Pass	-0.4dB @ 4884.0MHz (53.6 dBuV/m @ 3m)
1b	RE, 30 - 25,000 MHz - Spurious Emissions, with shield	FCC Part 15.209 / 15.247(c)	Pass	-0.7dB @ 2483.5MHz (53.3dBuV/m @ 3m)
2	6dB Bandwidth	15.247(a)	Pass	960kHz
2	99% Bandwitdh	IC RSS-210	Pass	1.175MHz
3	Output Power	15.247(b)	Pass	10.6dBm
4	Power Spectral Density (PSD)	15.247(d)	Pass	3.06dBm
5	Bandedge	FCC Part 15.209 / 15.247(c)	Pass	52.1dBuV/m average, 64.7dBuV/m peak
6	Out of band	15.247(c)	Pass	Refer to run

Client:	Unigen Corporation	Job Number:	J55447
Model:	UGWR2USxxxx	T-Log Number:	T55453
		Account Manager:	Susan Pelzl
Contact:	Mark Morrissey		
Spec:	FCC 15.247, RSS-210 , EN 300 328	Class:	N/A

Modifications Made During Testing:

The following modifications were made to the EUT during testing in order to comply with the requirements of the standard:
Modified EUT output filter to use 2.7nH and 2 pF caps

Deviations From The Standard

No deviations were made from the requirements of the standard.

Run #1a: Radiated Spurious Emissions, 30 - 26,000 MHz. Low Channel @ 2402 MHz
Without shield in-place

	H	V	
Fundamental emission level @ 3m in 1MHz RBW:	106.02	117.06	Peak Measurement (RBW=VBW = 1MHz)
Fundamental emission level @ 3m in 1MHz RBW:	104.15	114.9	Average Measurement (RBW=VBW = 10Hz)
Delta Marker - Peak	52.35 dB		Refer to plots in Run# 5
Delta Marker - Average	62.85 dB		Refer to plots in Run# 5
Calculated Band-Edge Measurement:	64.7 dBuV/m		Peak Measurement (RBW=VBW = 1MHz)
Calculated Band-Edge Measurement:	52.1 dBuV/m		Average Measurement (RBW=VBW = 10Hz)

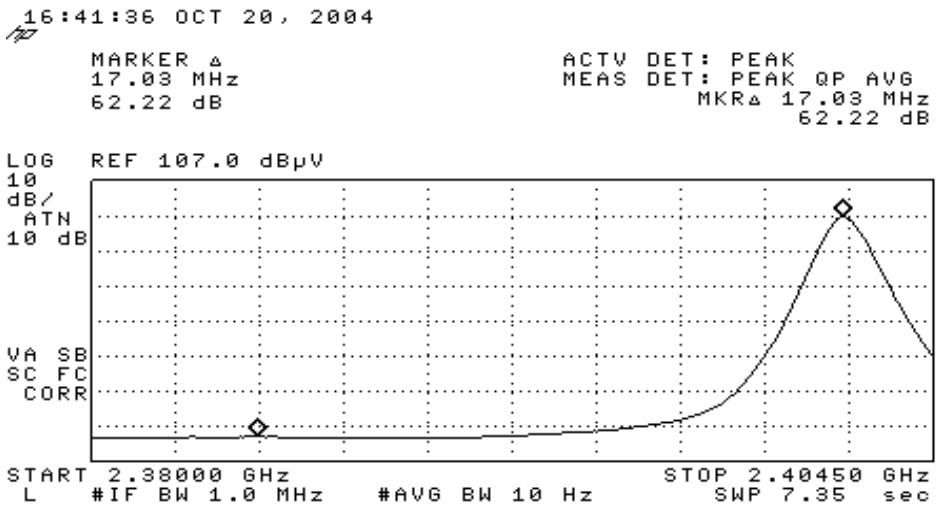
Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
4804.000	53.5	v	54.0	-0.5	Avg	80	1.0	Restricted
4804.000	52.5	h	54.0	-1.5	Avg	52	1.0	Restricted
4804.000	61.5	v	74.0	-12.5	Pk	80	1.0	Restricted
4804.000	58.2	h	74.0	-15.8	Pk	52	1.0	Restricted
7206.000	54.3	v	97.1	-42.7	Pk	150	1.0	Non-Restricted
7206.000	50.0	h	97.1	-47.1	Pk	210	1.0	Non-Restricted

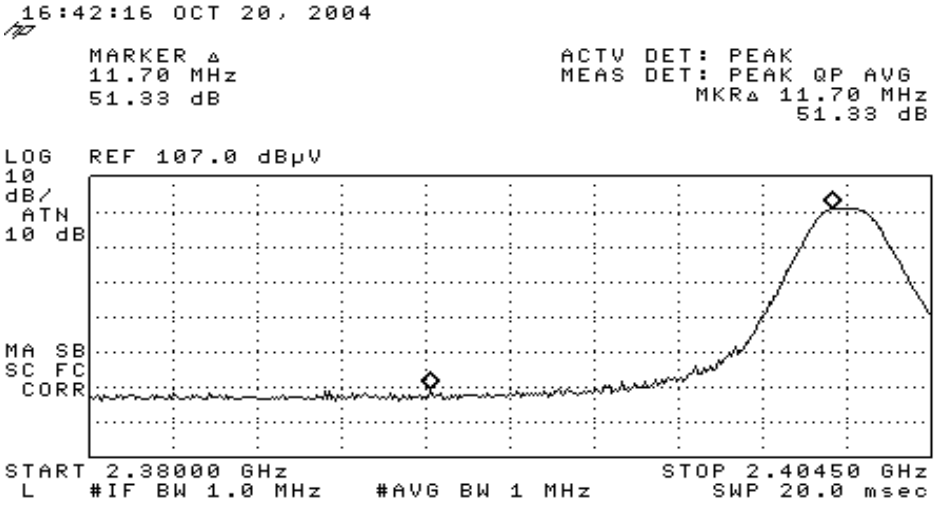
Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 20 dB below the level of the fundamental.
Note 2:	No other emissions detected 20-dB of the limit after the 3rd harmonic.

Client:	Unigen Corporation	Job Number:	J55447
Model:	UGWR2USxxxx	T-Log Number:	T55453
		Account Manager:	Susan Pelzl
Contact:	Mark Morrissey		
Spec:	FCC 15.247, RSS-210 , EN 300 328	Class:	N/A

With shield in-place

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2401.948	114.9	V	-	-	AVG	20	1.6	
2401.948	116.1	V	-	-	PK	20	1.6	Note 1





EMC Test Data

Client:	Unigen Corporation	Job Number:	J55447
Model:	UGWR2USxxxx	T-Log Number:	T55453
		Account Manager:	Susan Pelzl
Contact:	Mark Morrissey		
Spec:	FCC 15.247, RSS-210 , EN 300 328	Class:	N/A

	H	V	
Fundamental emission level @ 3m in 1MHz RBW:		116.1	Peak Measurement (RBW=VBW = 1MHz)
Fundamental emission level @ 3m in 1MHz RBW:		114.9	Average Measurement (RBW=VBW = 10Hz)
Delta Marker - Peak	51.3 dB		
Delta Marker - Average	62.2 dB		
Calculated Band-Edge Measurement:	64.8 dBuV/m		Peak Measurement (RBW=VBW = 1MHz)
Calculated Band-Edge Measurement:	52.7 dBuV/m		Average Measurement (RBW=VBW = 10Hz)

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2385.000	52.7	V	54.0	-1.3	AVG	20	1.6	From antenna
4803.445	45.9	H	54.0	-8.1	AVG	150	2.2	EUT flat
4804.405	45.7	V	54.0	-8.3	AVG	186	1.7	EUT and fixture on side
2389.920	64.8	V	74.0	-9.2	PK	20	1.6	From antenna
4804.458	44.1	V	54.0	-10.0	AVG	190	1.1	EUT flat
4803.393	43.8	H	54.0	-10.2	AVG	133	1.7	EUT and fixture on side
4803.445	55.0	H	74.0	-19.0	PK	150	2.2	EUT flat
4804.405	54.5	V	74.0	-19.5	PK	186	1.7	EUT and fixture on side
4804.458	53.8	V	74.0	-20.3	PK	190	1.1	EUT flat
4803.393	53.4	H	74.0	-20.6	PK	133	1.7	EUT and fixture on side

Note 1:	Within .94dB of measurement w/o shield (measurement uncertainty is greater than the discrepancy for radiated measurement).
Note 2:	No other emissions detected within 20-dB of the limit after the 3rd harmonic. At 20cm the fourth harmonic was below the 15.209 limit.
Note 3:	Measured emissions in all three orthogonal axes. Worst case is reported above. Appears that all emissions were from the antenna since there was little difference in levels as the device was oriented in the different axes.

Client:	Unigen Corporation	Job Number:	J55447
Model:	UGWR2USxxxx	T-Log Number:	T55453
		Account Manager:	Susan Pelzl
Contact:	Mark Morrissey		
Spec:	FCC 15.247, RSS-210 , EN 300 328	Class:	N/A

Run #1b: Radiated Spurious Emissions, 30 - 26,000 MHz. Center Channel @ 2442 MHz
Without shield in-place

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
4884.000	53.6	v	54.0	-0.4	Avg	15	1.0	Restricted
4884.000	52.3	h	54.0	-1.7	Avg	45	1.0	Restricted
7286.000	44.7	v	54.0	-9.3	Avg	180	1.0	Restricted
4884.000	60.5	v	74.0	-13.5	Pk	15	1.0	Restricted
7286.000	39.3	h	54.0	-14.7	Avg	14	1.0	Restricted
4884.000	56.7	h	74.0	-17.4	Pk	45	1.0	Restricted
7286.000	54.8	v	74.0	-19.2	Pk	180	1.0	Restricted
7286.000	51.0	h	74.0	-23.0	Pk	14	1.0	Restricted

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 20 dB below the level of the fundamental.
Note 2:	No other emissions detected 20-dB of the limit after the 3rd harmonic.

With shield in-place

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2442.038	114.4	V	-	-	AVG	293	1.2	
2442.038	115.9	V	-	-	PK	293	1.2	

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
4883.503	45.1	V	54.0	-8.9	AVG	92	1.1	
4884.465	44.8	H	54.0	-9.2	AVG	310	1.4	
4884.465	54.4	H	74.0	-19.6	PK	310	1.4	
4883.503	54.4	V	74.0	-19.6	PK	92	1.1	

Note 1:	No other emissions detected within 20-dB of the limit after the 3rd harmonic. At 20cm the fourth harmonic was below the 15.209 limit.

Client:	Unigen Corporation	Job Number:	J55447
Model:	UGWR2USxxxx	T-Log Number:	T55453
		Account Manager:	Susan Pelzl
Contact:	Mark Morrissey		
Spec:	FCC 15.247, RSS-210 , EN 300 328	Class:	N/A

Run #1c: Radiated Spurious Emissions, 30 - 26,000 MHz. High Channel @ 2477 MHz
Without shield in-place

	H	V	
Fundamental emission level @ 3m in 1MHz RBW:	105.8	116.95	Peak Measurement (RBW=VBW = 1MHz)
Fundamental emission level @ 3m in 1MHz RBW:	102.4	114.9	Average Measurement (RBW=VBW = 10Hz)
Delta Marker - Peak	57.41 dB		Refer to plots in Run# 5
Delta Marker - Average	68.79 dB		Refer to plots in Run# 5
Calculated Band-Edge Measurement:	59.5 dBuV/m		Peak Measurement (RBW=VBW = 1MHz)
Calculated Band-Edge Measurement:	46.1 dBuV/m		Average Measurement (RBW=VBW = 10Hz)

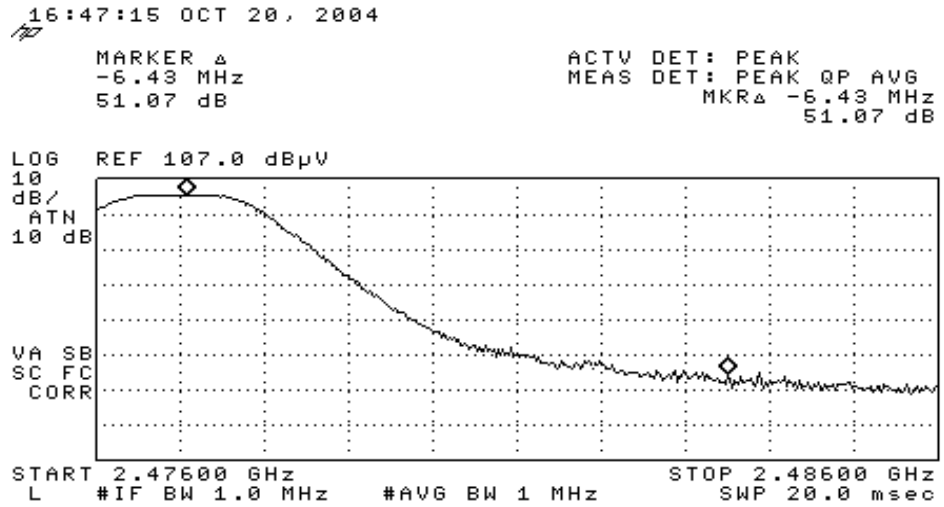
Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
4954.000	53.2	v	54.0	-0.8	Avg	0	1.0	Restricted
4954.000	50.3	h	54.0	-3.7	Avg	145	1.0	Restricted
7356.000	43.4	v	54.0	-10.6	Avg	56	1.0	Restricted
4954.000	62.2	v	74.0	-11.8	Pk	0	1.0	Restricted
7356.000	40.4	h	54.0	-13.6	Avg	14	1.0	Restricted
7356.000	59.6	v	74.0	-14.4	Pk	56	1.0	Restricted
7356.000	57.5	h	74.0	-16.5	Pk	14	1.0	Restricted
4954.000	56.0	h	74.0	-18.0	Pk	145	1.0	Restricted

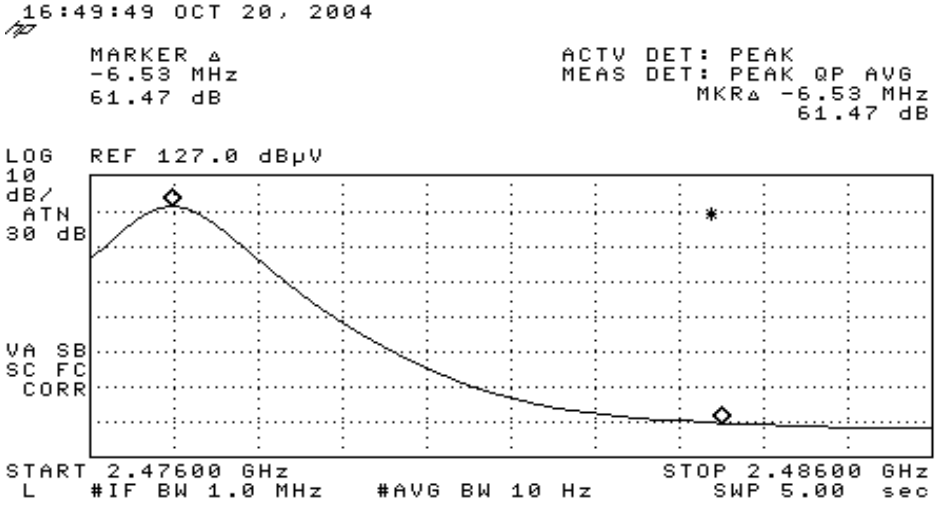
Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 20 dB below the level of the fundamental.
Note 2:	No other emissions detected 20-dB of the limit after the 3rd harmonic.

Client:	Unigen Corporation	Job Number:	J55447
Model:	UGWR2USxxxx	T-Log Number:	T55453
		Account Manager:	Susan Pelzl
Contact:	Mark Morrissey		
Spec:	FCC 15.247, RSS-210 , EN 300 328	Class:	N/A

With shield in-place

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2476.715	116.2	V	-	-	Pk	0	1.0	
2476.715	114.8	V	-	-	Avg	0	1.0	





Elliott

EMC Test Data

Client:	Unigen Corporation	Job Number:	J55447
Model:	UGWR2USxxxx	T-Log Number:	T55453
		Account Manager:	Susan Pelzl
Contact:	Mark Morrissey		
Spec:	FCC 15.247, RSS-210 , EN 300 328	Class:	N/A

	H	V	
Fundamental emission level @ 3m in 1MHz RBW:		116.2	Peak Measurement (RBW=VBW = 1MHz)
Fundamental emission level @ 3m in 1MHz RBW:		114.8	Average Measurement (RBW=VBW = 10Hz)
Delta Marker - Peak	51.1 dB		
Delta Marker - Average	61.47 dB		
Calculated Band-Edge Measurement:	65.1 dBuV/m		Peak Measurement (RBW=VBW = 1MHz)
Calculated Band-Edge Measurement:	53.3 dBuV/m		Average Measurement (RBW=VBW = 10Hz)

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2483.500	53.3	V	54.0	-0.7	AVG	0	1.0	
4953.655	48.3	V	54.0	-5.8	AVG	0	1.0	
4954.413	46.7	H	54.0	-7.3	AVG	0	1.0	
2483.880	65.1	V	74.0	-8.9	PK	0	1.0	
4953.655	56.6	V	74.0	-17.4	PK	0	1.0	
4954.413	55.7	H	74.0	-18.3	PK	0	1.0	

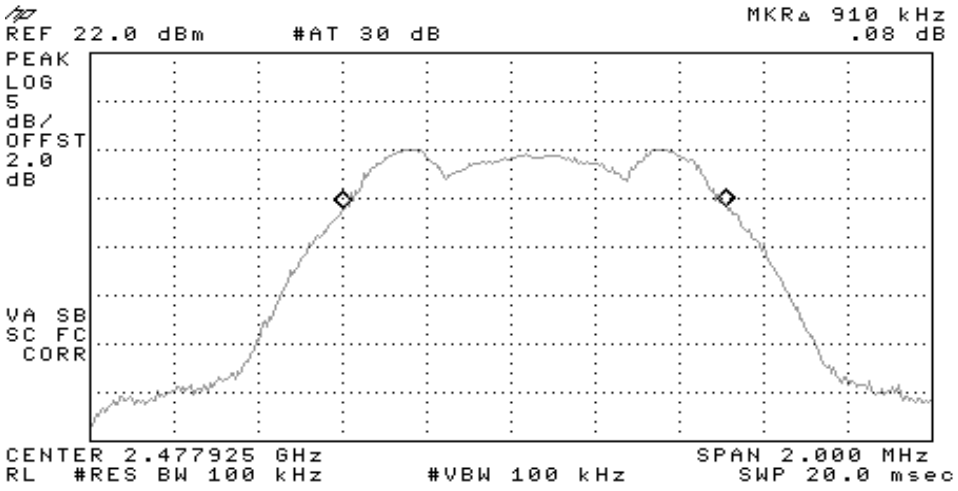
Note 1:	No other emissions detected within 20-dB of the limit after the 3rd harmonic. At 20cm the fourth harmonic was below the 15.209 limit.

Client:	Unigen Corporation	Job Number:	J55447
Model:	UGWR2USxxxx	T-Log Number:	T55453
		Account Manager:	Susan Pelzl
Contact:	Mark Morrissey		
Spec:	FCC 15.247, RSS-210 , EN 300 328	Class:	N/A

Run #2: Signal Bandwidth

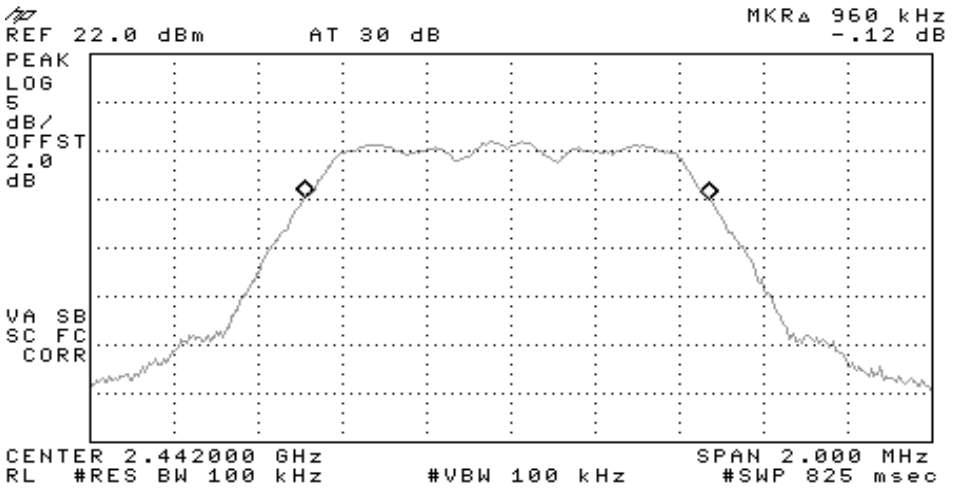
Channel	Frequency (MHz)	Resolution Bandwidth	6dB Signal Bandwidth	IC RSS-210 (99%)
Low	2402	100kHz	940kHz	1.180MHz
Mid	2442	100kHz	960kHz	1.175MHz
High	2477	100kHz	910kHz	1.145MHz

High

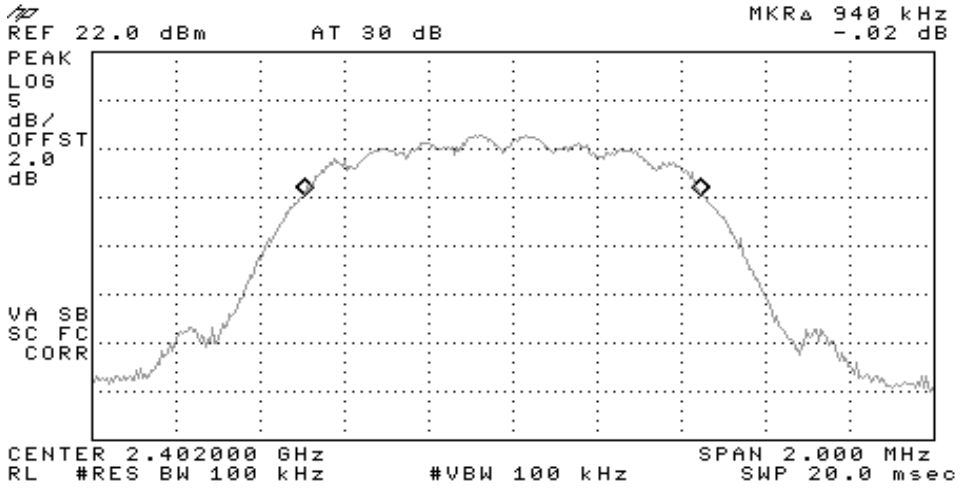


Client:	Unigen Corporation	Job Number:	J55447
Model:	UGWR2USxxxx	T-Log Number:	T55453
		Account Manager:	Susan Pelzl
Contact:	Mark Morrissey		
Spec:	FCC 15.247, RSS-210 , EN 300 328	Class:	N/A

Middle



Low



Client:	Unigen Corporation	Job Number:	J55447
Model:	UGWR2USxxxx	T-Log Number:	T55453
		Account Manager:	Susan Pelzl
Contact:	Mark Morrissey		
Spec:	FCC 15.247, RSS-210 , EN 300 328	Class:	N/A

Run #3: Output Power using peak power meter

Channel	Frequency (MHz)	Res BW	Output Power (dBm)	Output Power (W)
Low	2402	Meter	12.8	0.019
Mid	2442	Meter	11.1	0.013
High	2477	Meter	9.7	0.009

10/25/2004

The power was adjusted using the chipset DSP firmware to reduce the maximium power level to below 25 mW EIRP. This DSP firmware is only accessible to the chip manufacturer, it is not accessible by the OEM or end user. All of the radiated emission data was taken with the origianl DSP power settings.

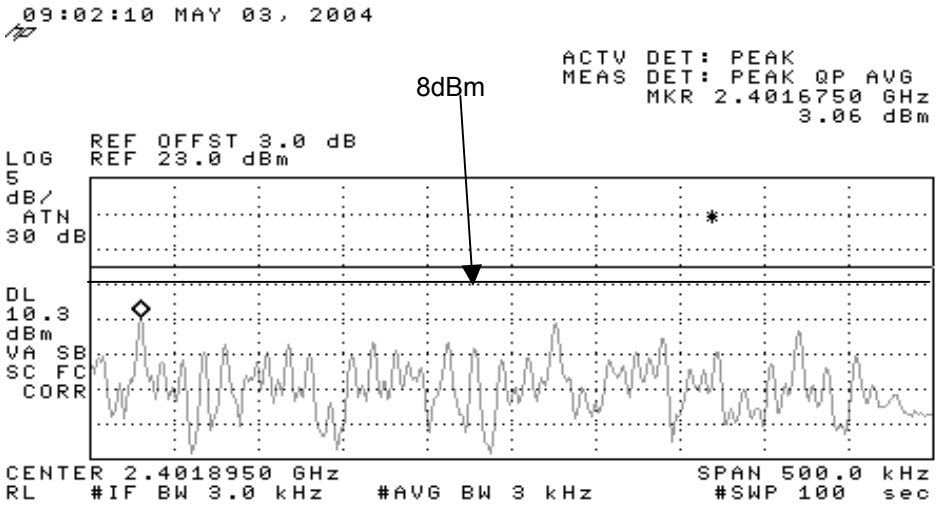
Channel	Frequency (MHz)	Res BW	Output Power (dBm)	Output Power (W)
Low	2402	Meter	9.6	0.009
Mid	2442	Meter	10.6	0.011
High	2477	Meter	9.1	0.008

Client:	Unigen Corporation	Job Number:	J55447
Model:	UGWR2USxxxx	T-Log Number:	T55453
		Account Manager:	Susan Pelzl
Contact:	Mark Morrissey		
Spec:	FCC 15.247, RSS-210 , EN 300 328	Class:	N/A

Run #3: Power Spectral Density

Channel	Frequency (MHz)	Res BW	P.S.D. (averaged over 1 second in a 3kHz bandwidth)	Plot#
Low	2402	3kHz	3.06dBm	101
Mid	2442	3kHz	-1.62dBm	102
High	2477	3kHz	-1.54dBm	103

101



Client:	Unigen Corporation	Job Number:	J55447
Model:	UGWR2USxxxx	T-Log Number:	T55453
		Account Manager:	Susan Pelzl
Contact:	Mark Morrissey		
Spec:	FCC 15.247, RSS-210 , EN 300 328	Class:	N/A

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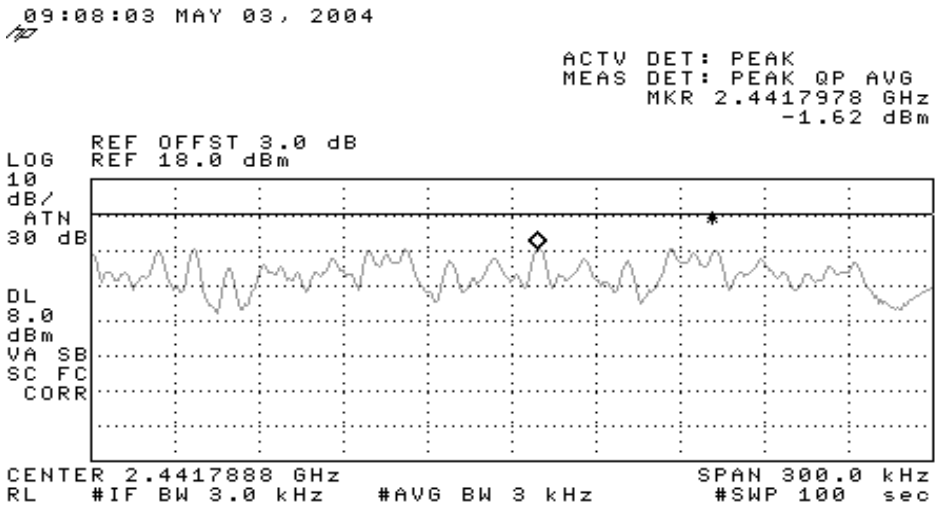

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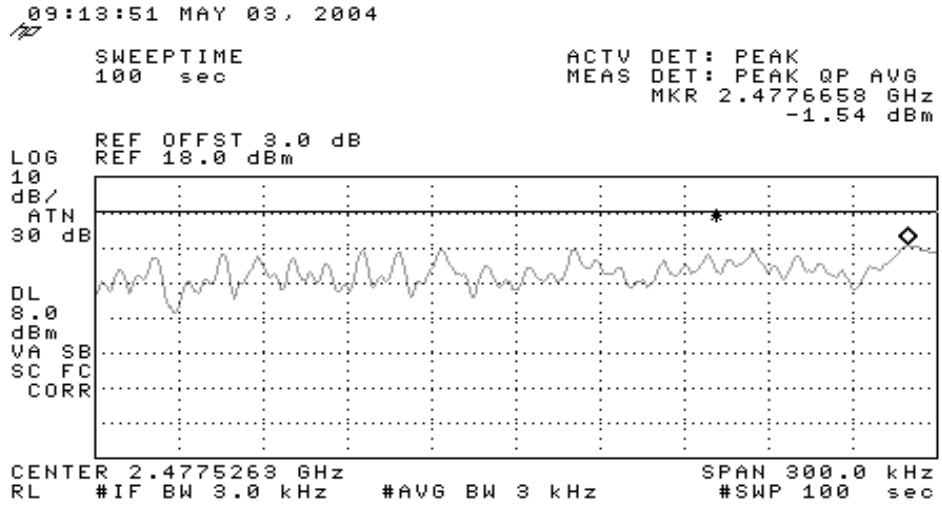
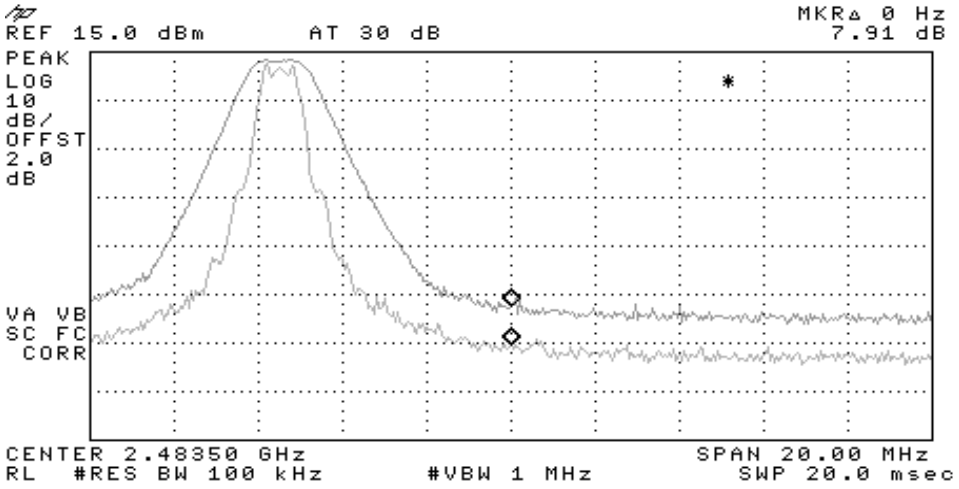


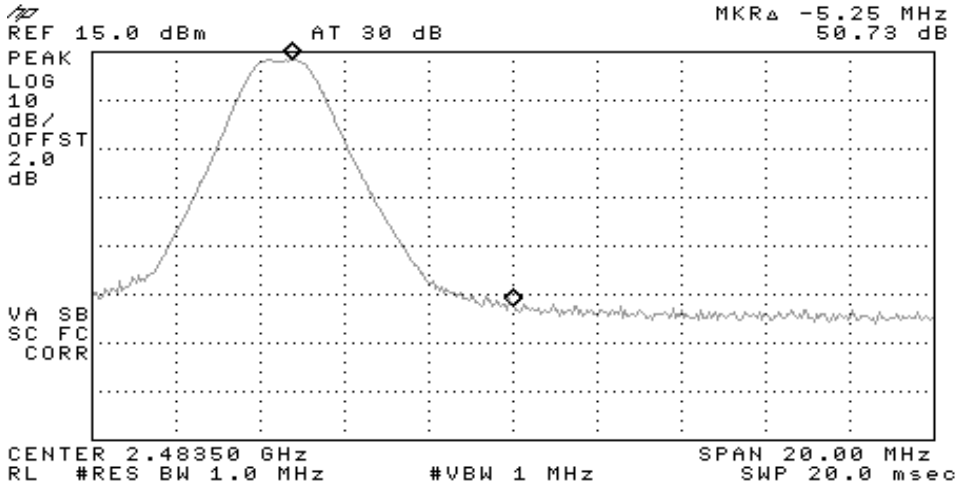
Client:	Unigen Corporation	Job Number:	J55447
Model:	UGWR2USxxxx	T-Log Number:	T55453
		Account Manager:	Susan Pelzl
Contact:	Mark Morrissey		
Spec:	FCC 15.247, RSS-210 , EN 300 328	Class:	N/A

Run# 5: Bandedge

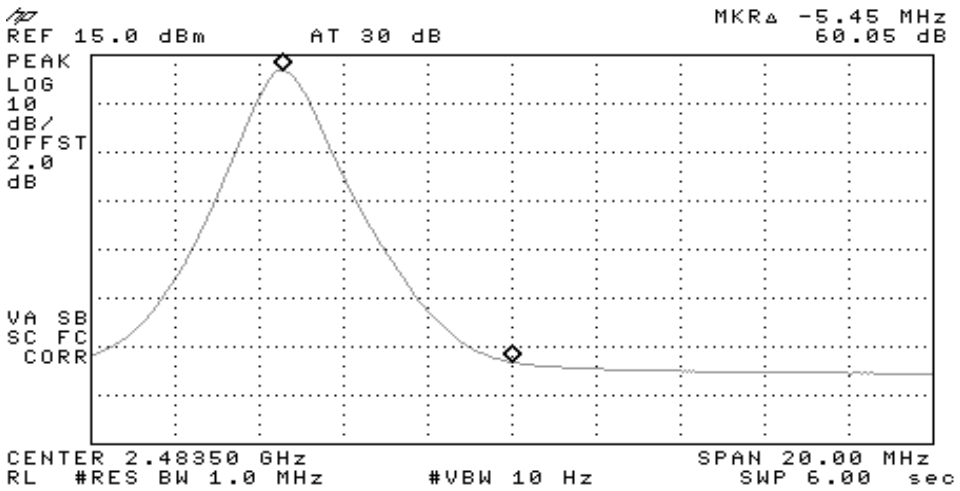
High Channel 2477 MHz

116.95	59.54	74	-14.46
114.9	46.11	54	-7.89



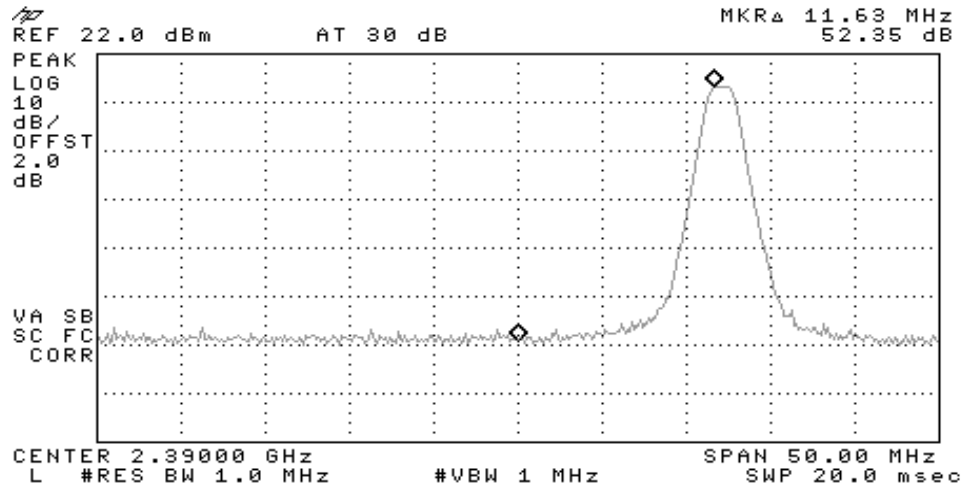


Client:	Unigen Corporation	Job Number:	J55447
Model:	UGWR2USxxxx	T-Log Number:	T55453
		Account Manager:	Susan Pelzl
Contact:	Mark Morrissey		
Spec:	FCC 15.247, RSS-210 , EN 300 328	Class:	N/A

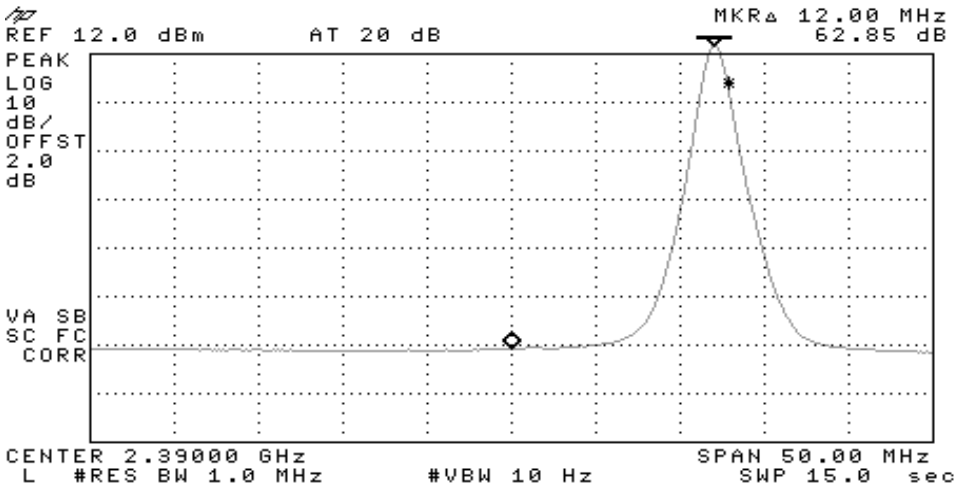


Low Channel 2402 MHz

117.06	64.71	74	-9.29
114.9	52.05	54	-1.95



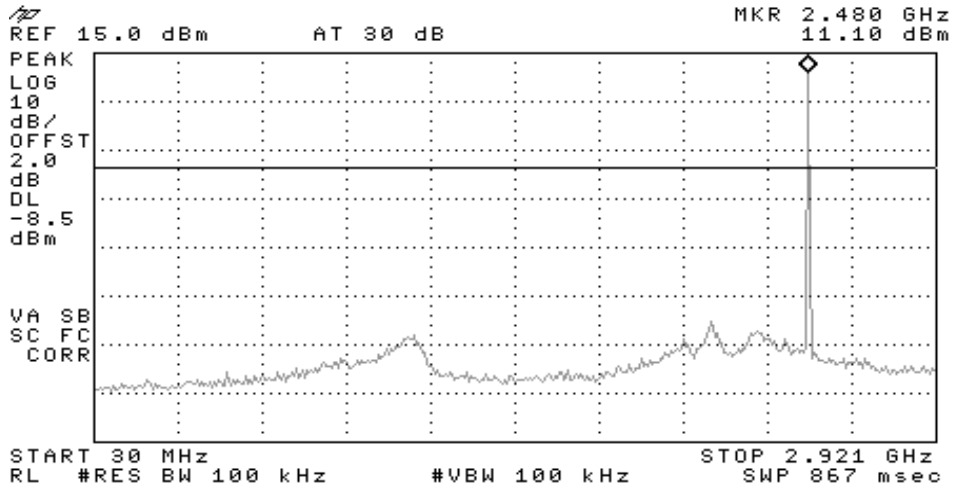
Client:	Unigen Corporation	Job Number:	J55447
Model:	UGWR2USxxxx	T-Log Number:	T55453
		Account Manager:	Susan Pelzl
Contact:	Mark Morrissey		
Spec:	FCC 15.247, RSS-210 , EN 300 328	Class:	N/A

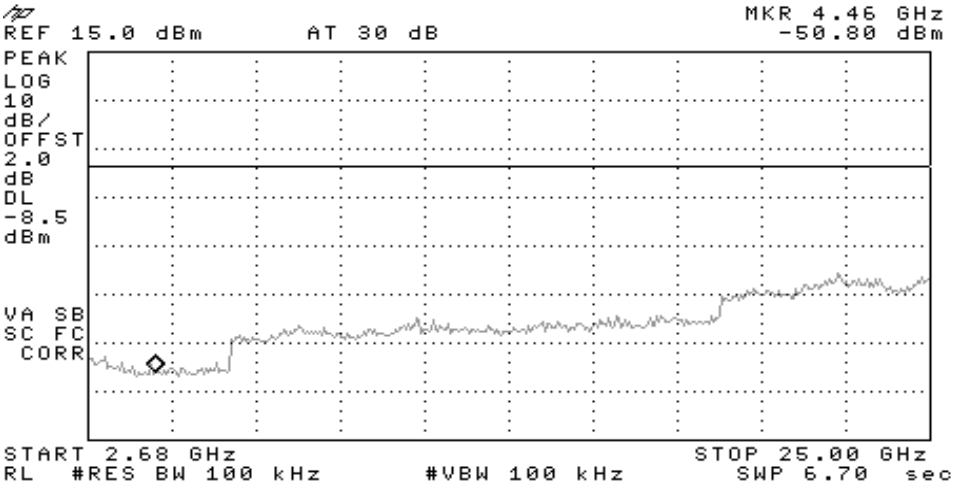


Client:	Unigen Corporation	Job Number:	J55447
Model:	UGWR2USxxxx	T-Log Number:	T55453
		Account Manager:	Susan Pelzl
Contact:	Mark Morrissey		
Spec:	FCC 15.247, RSS-210 , EN 300 328	Class:	N/A

Run# 6: Out of band

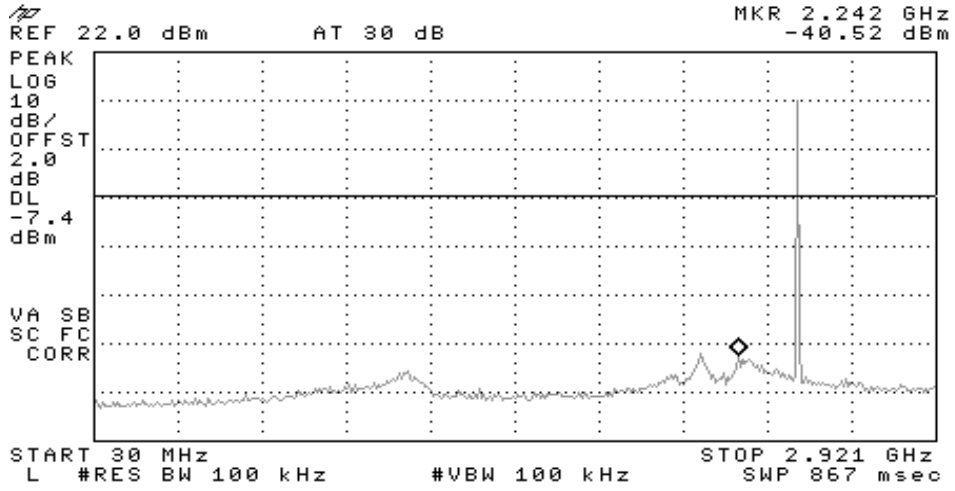
High Channel

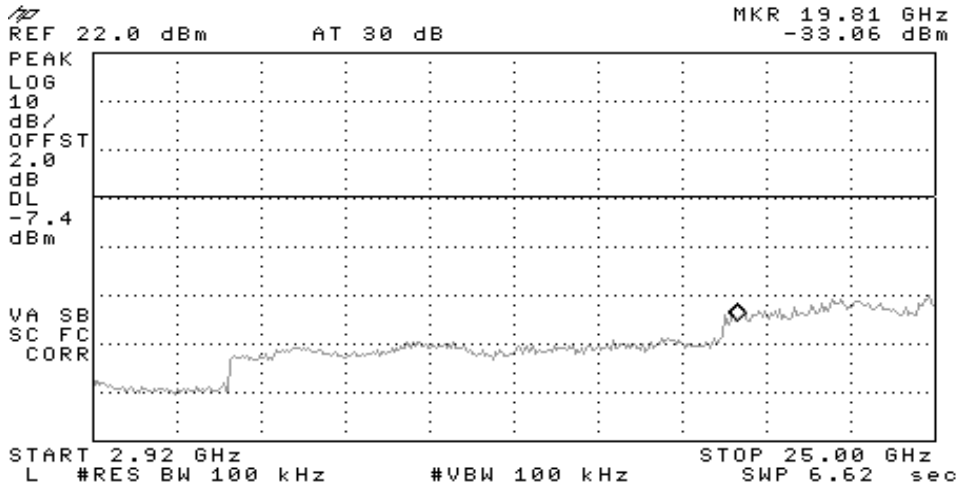




Client:	Unigen Corporation	Job Number:	J55447
Model:	UGWR2USxxxx	T-Log Number:	T55453
		Account Manager:	Susan Pelzl
Contact:	Mark Morrissey		
Spec:	FCC 15.247, RSS-210 , EN 300 328	Class:	N/A

Middle Channel





Client:	Unigen Corporation	Job Number:	J55447
Model:	UGWR2USxxxx	T-Log Number:	T55453
		Account Manager:	Susan Pelzl
Contact:	Mark Morrissey		
Spec:	FCC 15.247, RSS-210 , EN 300 328	Class:	N/A

Low Channel