



*EMC Test Report
Application for Grant of Equipment Authorization
pursuant to
Industry Canada RSS-Gen Issue 2 / RSS 210 Issue 7
FCC Part 15 Subpart C
RFID Tag System model GW3000 and MR3000*

UPN: 8398A-GW3000
8398A-MR3000
FCC ID: XGR-GW3000
XGR-MR3000

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TEST SITE(S): Elliott Laboratories
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IC Site Registration #: IC 2845A-2 and IC 2845B-5

REPORT DATE: July 2, 2009

FINAL TEST DATES: June 23 and June 24, 2009

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Testing Cert #2016-01

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REVISION HISTORY

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SCOPE

An electromagnetic emissions test has been performed on the Ambient Systems, B.V. RFID Tag System model GW3000, pursuant to the following rules:

Industry Canada RSS-Gen Issue 2
RSS 210 Issue 7 "Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment"
FCC Part 15 Subpart C

Conducted and radiated emissions data has been collected, reduced, and analyzed within this report in accordance with measurement guidelines set forth in the following reference standards and as outlined in Elliott Laboratories test procedures:

ANSI C63.4:2003
FCC DTS Measurement Procedure KDB558074, March 2005

The intentional radiator above has been tested in a simulated typical installation to demonstrate compliance with the relevant Industry Canada 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.

OBJECTIVE

The primary objective of the manufacturer is compliance with the regulations outlined in the previous section.

Prior to marketing in the USA, all unlicensed transmitters and transceivers require certification. Receive-only devices operating between 30 MHz and 960 MHz are subject to either certification or a manufacturer's declaration of conformity, with all other receive-only devices exempt from the technical requirements.

Prior to marketing in Canada, Class I transmitters, receivers and transceivers require certification. Class II devices are required to meet the appropriate technical requirements but are exempt from certification requirements.

Certification is a procedure where the manufacturer submits test data and technical information to a certification body and receives a certificate or grant of equipment authorization upon successful completion of the certification body's 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.

Maintenance of compliance 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.).

Testing was performed only on RFID Tag System model GW3000. This model was considered representative of the MR3000 router, FCC ID XGR-MR3000. The Gateway and Router circuitry are electrically and physically identical, sharing the exact same PC Board. However, the Gateway has an additional connector inserted in the PC Board that provides an RS-232 port for configuring and managing the system.

STATEMENT OF COMPLIANCE

The tested sample of Ambient Systems, B.V. RFID Tag System model GW3000 complied with the requirements of the following regulations:

Industry Canada RSS-Gen Issue 2
RSS 210 Issue 7 "Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment"
FCC Part 15 Subpart C

Maintenance of compliance is the responsibility of the manufacturer. Any modifications to the product should be assessed to determine their potential impact on the compliance status of the device with respect to the standards detailed in this test report.

The test results recorded herein are based on a single type test of Ambient Systems, B.V. RFID Tag System model GW3000 and therefore apply only to the tested sample. The sample was selected and prepared by Bob Ashlock of Ambient Systems, B.V..

DEVIATIONS FROM THE STANDARDS

No deviations were made from the published requirements listed in the scope of this report.

TEST RESULTS SUMMARY**DIGITAL TRANSMISSION SYSTEMS (2400 – 2483.5MHz)**

FCC Rule Part	RSS Rule Part	Description	Measured Value / Comments	Limit / Requirement	Result
15.247(a)	RSS 210 A8.2	Digital Modulation	Systems uses DSSS techniques	-	Complies
15.247 (a) (2)	RSS 210 A8.2 (1)	6dB Bandwidth	1.6 MHz	>500kHz	Complies
	RSP100	99% Bandwidth	2.9 MHz	Information only	Complies
15.247 (b) (3)	RSS 210 A8.2 (4)	Output Power (multipoint systems)	22.6 dBm (0.182 Watts) EIRP = 0.575 W ^{Note 1}	1 Watt, EIRP limited to 4 Watts.	Complies
15.247(d)	RSS 210 A8.2 (2)	Power Spectral Density	7.3 dBm / 3kHz	8dBm/3kHz	Complies
15.247(c)	RSS 210 A8.5	Antenna Port Spurious Emissions 30MHz – 25 GHz	All emissions below -30dBc limit	< -30dBc ^{Note 2}	Complies
15.247(c) / 15.209	RSS 210 A8.5	Radiated Spurious Emissions 30MHz – 25 GHz	52.7dBμV/m @ 2389.8MHz (-1.3dB)	15.207 in restricted bands, all others <-30dBc ^{Note 2}	Complies

Note 1: EIRP calculated using antenna gain of 5.0 dBi for the highest EIRP multi-point system.

Note 2: Limit of -30dBc used because the power was measured using the UNII test procedure (maximum power averaged over a transmission burst) / RMS averaging over a time interval, as permitted under RSS 210 section A8.4(4).

GENERAL REQUIREMENTS APPLICABLE TO ALL BANDS

FCC Rule Part	RSS Rule part	Description	Measured Value / Comments	Limit / Requirement	Result (margin)
15.203	-	RF Connector	Antenna is internal and integral to the device	-	Complies
15.109	RSS GEN 7.2.3 Table 1	Receiver spurious emissions	37.7dB μ V/m @ 32.009MHz (-2.3dB)	Refer to standard	Complies
15.207	RSS GEN Table 2	AC Conducted Emissions	39.0dB μ V @ 0.365MHz	Refer to standard	Complies (- 9.6 dB)
15.247 (b) (5) 15.407 (f)	RSS 102	RF Exposure Requirements	Refer to MPE calculations in Exhibit 11, RSS 102 declaration and User Manual statements.	Refer to OET 65, FCC Part 1 and RSS 102	Complies
-	RSP 100 RSS GEN 7.1.5	User Manual		Statement required regarding non-interference	Complies
-	RSP 100 RSS GEN 7.1.5	User Manual		Statement for products with detachable antenna	Complies

MEASUREMENT UNCERTAINTIES

ISO/IEC 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 UKAS document LAB 34.

Measurement Type	Frequency Range (MHz)	Calculated Uncertainty (dB)
Conducted Emissions	0.15 to 30	± 2.4
Radiated Emissions	0.015 to 30	± 3.0
Radiated Emissions	30 to 1000	± 3.6
Radiated Emissions	1000 to 40000	± 6.0

EQUIPMENT UNDER TEST (EUT) DETAILS**GENERAL**

The Ambient Systems, B.V. RFID Tag System model GW3000 is a 2.4GHz ZigBee RFID gateway device. The Gateway is designed to communicate with RFID tags as well as other Routers which also communicate with each other and the RFID Tags to form a network. The EUT is generally wall or ceiling mounted, but since the EUT can be placed on a table top during operation, the EUT was treated as table-top equipment during testing to simulate the end-user environment. The electrical rating of the EUT is 6 - 12.6 Volts , 0.5 Amps max.

The sample was received on June 22, 2009 and tested on June 23 and June 24, 2009. The EUT consisted of the following component(s):

Company	Model	Description	Serial Number	FCC ID
Ambient Systems	GW3000	ZigBee RFID gateway	190	XGR-GW3000

OTHER EUT DETAILS

Testing performed on the GW3000 Gateway was considered representative of the MR3000 router, FCC ID XGR-MR3000. The Gateway and Router circuitry are electrically and physically identical, sharing the exact same PC Board. However, the Gateway has an additional connector inserted in the PC Board that provides an RS-232 port for configuring and managing the system.

The Ambient GW3000 will also be marketed under the DeltaTrak brand, using model number 20170 for US and 20170C for Canada. The Ambient MR3000 will also be marketed under the DeltaTrak brand, using model number 20171 for US and 20171C for Canada.

ANTENNA SYSTEM

The antenna is an external 5.0 dBi monopole. The antenna connects to the EUT via a non-standard reverse SMA antenna connector, thereby meeting the requirements of FCC 15.203.

ENCLOSURE

The EUT enclosure is primarily constructed of Plastic. It measures approximately 13 cm wide by 7 cm deep by 5 cm high.

MODIFICATIONS

No modifications were made to the EUT during the time the product was at Elliott.

SUPPORT EQUIPMENT

No support equipment was used during testing.

EUT INTERFACE PORTS

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

Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length(m)
Antenna	Antenna	Direct connection	NA	NA
Serial (RJ-11)	Unterminated	4 wire phone cable	Unshielded	2.0
DC Power	External pwr supply	2 wire	Unshielded	2.0

EUT OPERATION

During emissions testing the EUT was configured to transmit continuously on the selected channel, unless otherwise noted.

TEST SITE**GENERAL INFORMATION**

Final test measurements were taken on June 25, 2009 at the test sites listed below. Pursuant to section 2.948 of the FCC's Rules and section 3.3 of RSP-100, construction, calibration, and equipment data has been filed with the Commission and with industry Canada.

Site	Registration Numbers		Location
	FCC	Canada	
SVOATS #2	90593	IC 2845A-2	684 West Maude Ave, Sunnyvale CA 94085-3518
Chamber 5	211948	IC 2845B-5	41039 Boyce Road Fremont, CA 94538-2435

ANSI C63.4:2003 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, on OATS sites, of predictable local TV, radio, and mobile communications traffic. The test site(s) contain separate areas for radiated and conducted emissions testing. Considerable engineering effort has been expended to ensure that the facilities conform to all pertinent requirements of ANSI C63.4:2003.

CONDUCTED EMISSIONS CONSIDERATIONS

Conducted emissions testing is performed in conformance with ANSI C63.4:2003. 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 or in a semi-anechoic chamber. The test sites are maintained free of conductive objects within the CISPR defined elliptical area incorporated in ANSI C63.4:2003 guidelines and meet the Normalized Site Attenuation (NSA) requirements of ANSI C63.4:2003.

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. If the repetition frequency of the signal being measured is below 20Hz, peak measurements are made in lieu of Quasi-Peak 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, unless the signal is pulsed in which case the average (or video) bandwidth of the measuring instrument is reduced to onset of pulse desensitization and then increased.

INSTRUMENT CONTROL COMPUTER

The receivers utilize either a Rohde & 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.

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 loop antenna is used below 30 MHz. For the measurement range 30 MHz to 1000 MHz either a combination of a biconical antenna and a log periodic or a bi-log antenna is used. Above 1000 MHz, horn antennas are used. The antenna calibration factors to convert the received voltage to an electric field strength are included with appropriate cable loss and amplifier gain factors to determine an overall site factor, which is then programmed into the test receivers or incorporated into the test software.

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. Measurements below 30 MHz are made with the loop antenna at a fixed height of 1m above the ground plane.

ANSI C63.4:2003 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.

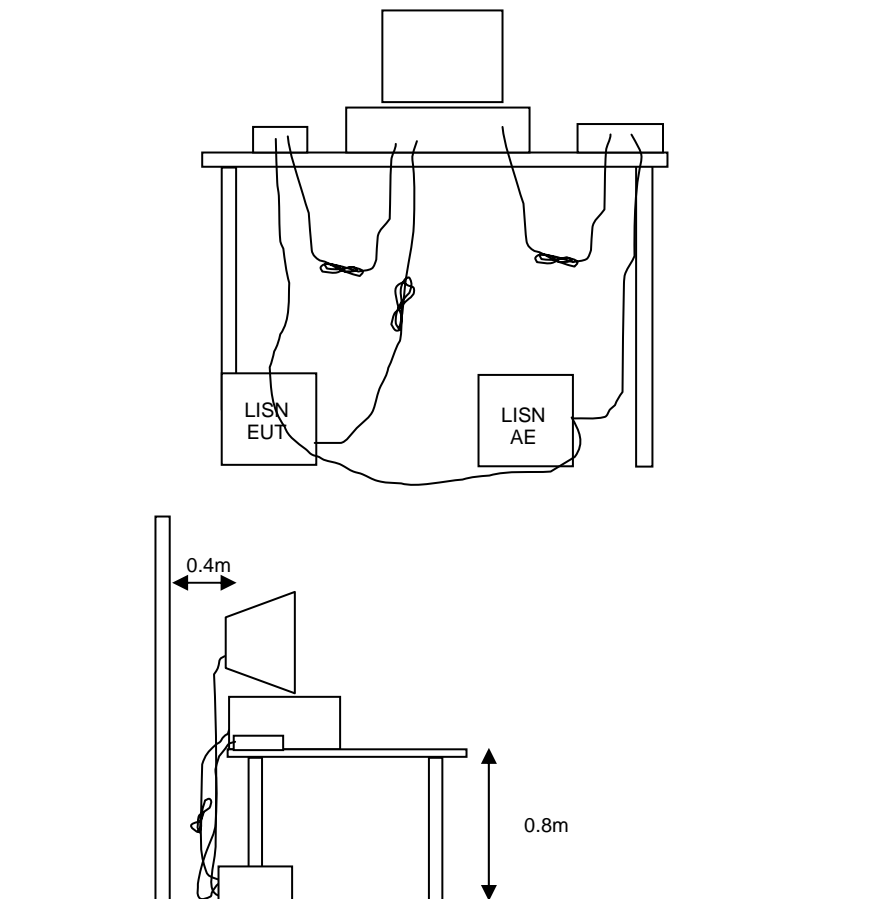
TEST PROCEDURES

EUT AND CABLE PLACEMENT

The regulations require 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 C63.4:2003, 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.



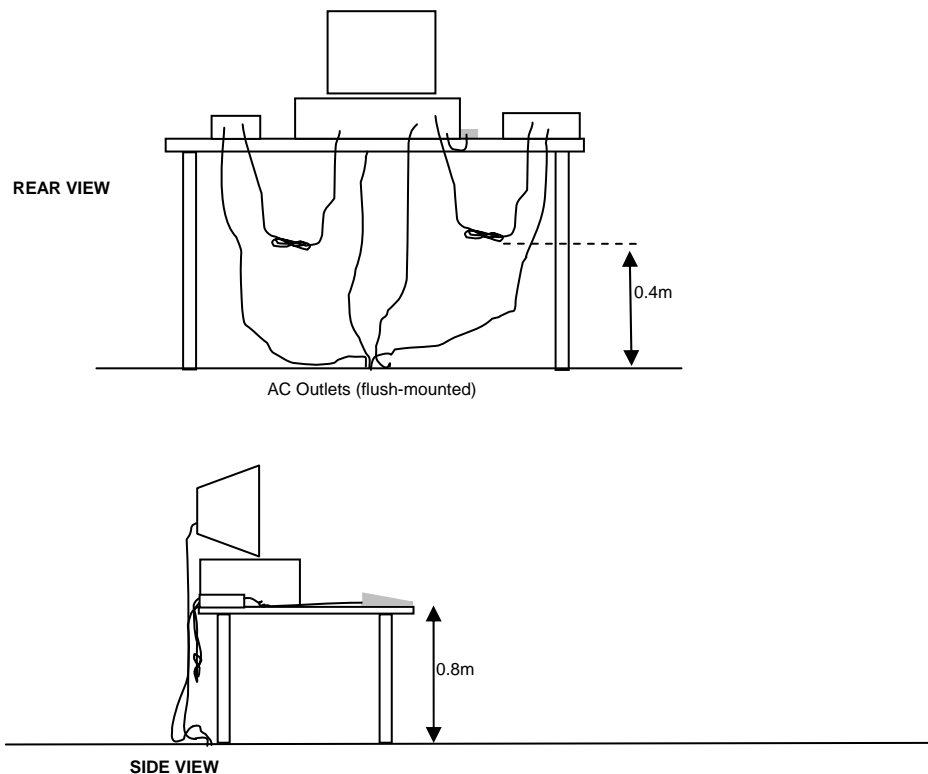
RADIATED EMISSIONS

A preliminary scan of the radiated emissions is performed in which all significant EUT frequencies are identified with the system in a nominal configuration. At least two scans are performed, one scan for each antenna polarization (horizontal and vertical; loop parallel and perpendicular to the EUT). During the preliminary scans, the EUT is rotated through 360°, the antenna height is varied (for measurements above 30 MHz) and cable positions are varied to determine the highest emission relative to the limit. Preliminary scans may be performed in a fully anechoic chamber for the purposes of identifying the frequencies of the highest emissions from the EUT.

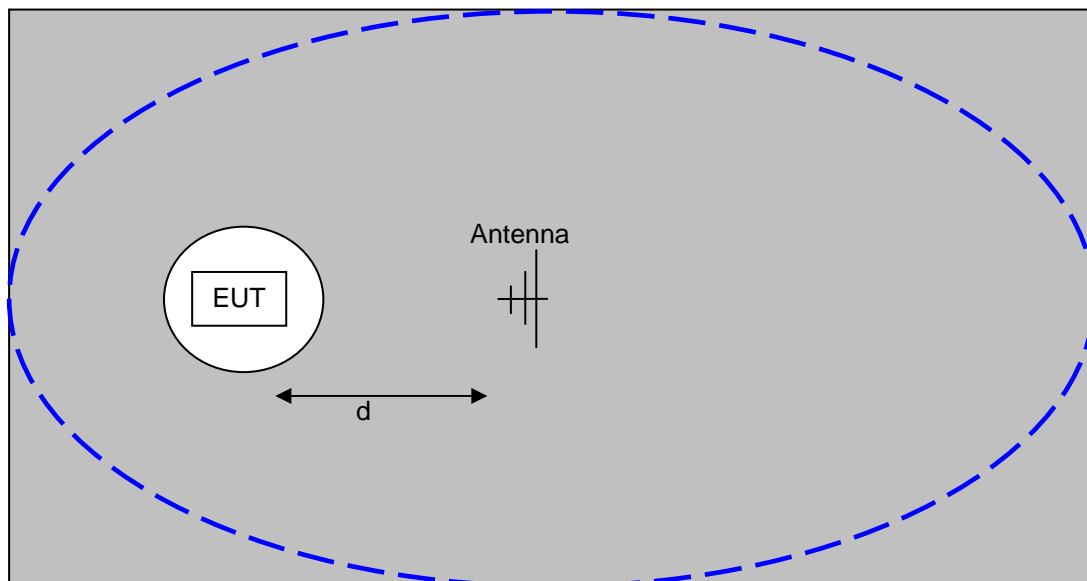
A speaker is provided in the receiver to aid in discriminating between EUT and ambient emissions. Other methods used during the preliminary scan for EUT emissions involve scanning with near field magnetic loops, monitoring I/O cables with RF current clamps, and cycling power to the EUT.

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 (for measurements above 30 MHz, measurements below 30 MHz are made with the loop antenna at a fixed height of 1m). 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.

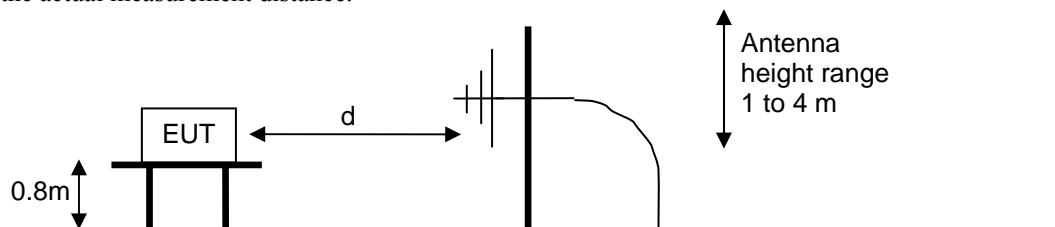
When testing above 18 GHz, the receive antenna is located at 1 meter from the EUT and the antenna height is restricted to a maximum of 2.5 meters.



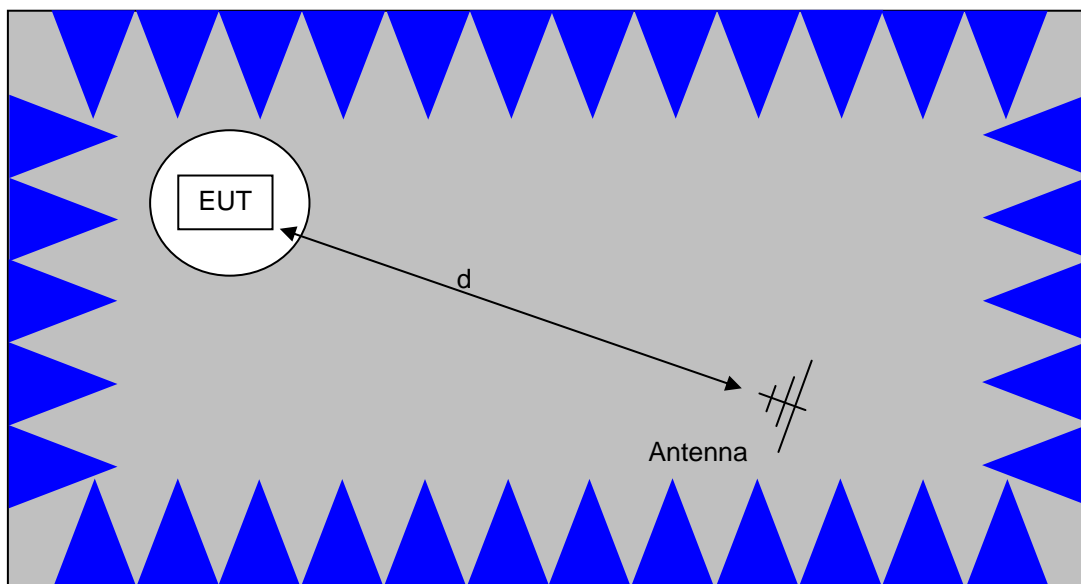
Typical Test Configuration for Radiated Field Strength Measurements



The ground plane extends beyond the ellipse defined in CISPR 16 / CISPR 22 / ANSI C63.4 and is large enough to accommodate test distances (d) of 3m and 10m. Refer to the test data tables for the actual measurement distance.

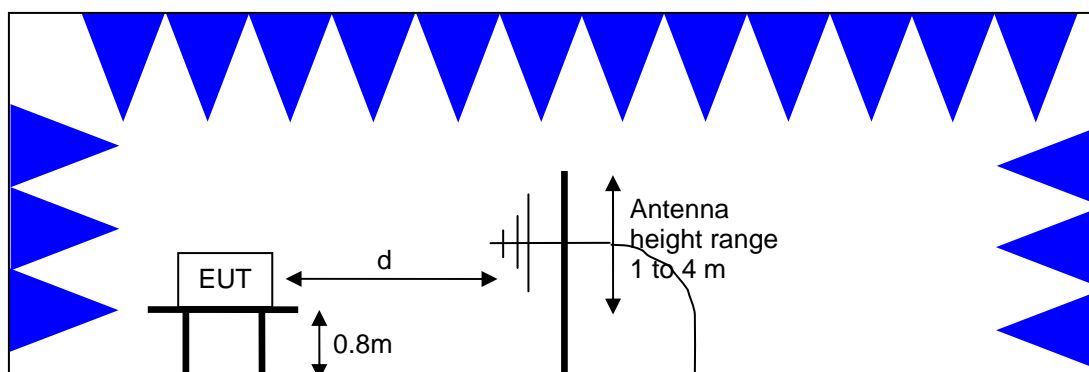


Test Configuration for Radiated Field Strength Measurements
OATS- Plan and Side Views



The anechoic materials on the walls and ceiling ensure compliance with the normalized site attenuation requirements of CISPR 16 / CISPR 22 / ANSI C63.4 for an alternate test site at the measurement distances used.

Floor-standing equipment is placed on the floor with insulating supports between the unit and the ground plane.



Test Configuration for Radiated Field Strength Measurements
Semi-Anechoic Chamber, Plan and Side Views

BANDWIDTH MEASUREMENTS

The 6dB, 20dB and/or 26dB signal bandwidth is measured in using the bandwidths recommended by ANSI C63.4. When required, the 99% bandwidth is measured using the methods detailed in RSS GEN.

SPECIFICATION LIMITS AND SAMPLE CALCULATIONS

The limits for conducted emissions are given in units of microvolts, and the limits for radiated emissions are given in units of microvolts per meter at a specified test distance. 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.

For reference, converting the specification limits from linear to decibel form is accomplished by taking the base ten logarithm, then multiplying by 20. These limits in both linear and logarithmic form are as follows:

CONDUCTED EMISSIONS SPECIFICATION LIMITS: FCC 15.207; FCC 15.107(a), RSS GEN

The table below shows the limits for the emissions on the AC power line from an intentional radiator and a receiver.

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

GENERAL TRANSMITTER RADIATED EMISSIONS SPECIFICATION LIMITS

The table below shows the limits for the spurious emissions from transmitters that fall in restricted bands¹ (with the exception of transmitters operating under FCC Part 15 Subpart D and RSS 210 Annex 9), the limits for all emissions from a low power device operating under the general rules of RSS 310 (tables 3 and 4), RSS 210 (table 2) and FCC Part 15 Subpart C section 15.209.

Frequency Range (MHz)	Limit (uV/m)	Limit (dBuV/m @ 3m)
0.009-0.490	2400/F _{KHz} @ 300m	67.6-20*log ₁₀ (F _{KHz}) @ 300m
0.490-1.705	24000/F _{KHz} @ 30m	87.6-20*log ₁₀ (F _{KHz}) @ 30m
1.705 to 30	30 @ 30m	29.5 @ 30m
30 to 88	100 @ 3m	40 @ 3m
88 to 216	150 @ 3m	43.5 @ 3m
216 to 960	200 @ 3m	46.0 @ 3m
Above 960	500 @ 3m	54.0 @ 3m

RECEIVER RADIATED SPURIOUS EMISSIONS SPECIFICATION LIMITS

The table below shows the limits for the spurious emissions from receivers as detailed in FCC Part 15.109, RSS 210 Table 2, RSS GEN Table 1 and RSS 310 Table 3. Note that receivers operating outside of the frequency range 30 MHz – 960 MHz are exempt from the requirements of 15.109.

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

¹ The restricted bands are detailed in FCC 15.203, RSS 210 Table 1 and RSS 310 Table 2

OUTPUT POWER LIMITS – DIGITAL TRANSMISSION SYSTEMS

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 Watt (30 dBm)	8 dBm/3kHz
2400 – 2483.5	1 Watt (30 dBm)	8 dBm/3kHz
5725 – 5850	1 Watt (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.

TRANSMIT MODE SPURIOUS RADIATED EMISSIONS LIMITS – FHSS and DTS SYSTEMS

The limits for unwanted (spurious) emissions from the transmitter falling in the restricted bands are those specified in the general limits sections of FCC Part 15 and RSS 210. All other unwanted (spurious) emissions shall be at least 20dB below the level of the highest in-band signal level (30dB if the power is measured using the sample detector/power averaging method).

SAMPLE CALCULATIONS - CONDUCTED EMISSIONS

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

$$R_r - S = M$$

where:

R_r = Receiver Reading in dBuV

S = Specification Limit in dBuV

M = Margin to Specification in +/- dB

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 above 30MHz, is calculated by using the following formula:

$$F_d = 20 * \text{LOG}_{10} (D_m/D_s)$$

where:

F_d = Distance Factor in dB

D_m = Measurement Distance in meters

D_s = Specification Distance in meters

For electric field measurements below 30MHz the extrapolation factor is either determined by making measurements at multiple distances or a theoretical value is calculated using the formula:

$$F_d = 40 * \text{LOG}_{10} (D_m/D_s)$$

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:

$$R_r = \text{Receiver Reading in dBuV/m}$$

$$F_d = \text{Distance Factor in dB}$$

$$R_c = \text{Corrected Reading in dBuV/m}$$

$$L_s = \text{Specification Limit in dBuV/m}$$

$$M = \text{Margin in dB Relative to Spec}$$

SAMPLE CALCULATIONS - FIELD STRENGTH TO EIRP CONVERSION

Where the radiated electric field strength is expressed in terms of the equivalent isotropic radiated power (eirp), or where a field strength measurement of output power is made in lieu of a direct measurement, the following formula is used to convert between eirp and field strength at a distance of 3m from the equipment under test:

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

where P is the eirp (Watts)

Appendix A Test Equipment Calibration Data

1 Page

Radiated Emissions, 30 - 10,000 MHz, 22-Jun-09**Engineer: Suhaila Khushzad**

<u>Manufacturer</u>	<u>Description</u>	<u>Model #</u>	<u>Asset #</u>	<u>Cal Due</u>
EMCO	Log Periodic Antenna, 0.3-1 GHz	3146A	364	23-Dec-09
Hewlett Packard	EMC Spectrum Analyzer, 9 kHz - 6.5 GHz	8595EM	787	18-May-10
EMCO	Biconical Antenna, 30-300 MHz	3110B	801	19-Sep-09
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	870	09-Oct-09
EMCO	Antenna, Horn, 1-18 GHz (SA40-Red)	3115	1142	15-Jul-10
Hewlett Packard	SpecAn 30 Hz -40 GHz, SV (SA40) Red	8564E (84125C)	1148	12-Mar-10
Hewlett Packard	Preamplifier, 100 kHz - 1.3 GHz	8447D OPT 010	1826	26-May-10

Conducted Emissions - AC Power Ports, 23-Jun-09**Engineer: John Caizzi**

<u>Manufacturer</u>	<u>Description</u>	<u>Model #</u>	<u>Asset #</u>	<u>Cal Due</u>
EMCO	LISN, 10 kHz-100 MHz	3825/2	1292	11-Mar-10
Rohde & Schwarz	EMI Test Receiver, 20 Hz-7 GHz	ESIB7	1538	19-Sep-09

Radiated Emissions, 30 - 1,000 MHz, 23-Jun-09**Engineer: John Caizzi**

<u>Manufacturer</u>	<u>Description</u>	<u>Model #</u>	<u>Asset #</u>	<u>Cal Due</u>
Rohde & Schwarz	EMI Test Receiver, 20 Hz-7 GHz	ESIB7	1538	19-Sep-09
Com-Power Corp.	Preamplifier, 30-1000 MHz	PA-103	1632	13-Apr-10
Sunol Sciences	Biconilog, 30-3000 MHz	JB3	1657	23-May-10

Radio Spurious Emissions, 24-Jun-09**Engineer: Suhaila Khushzad**

<u>Manufacturer</u>	<u>Description</u>	<u>Model #</u>	<u>Asset #</u>	<u>Cal Due</u>
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	870	09-Oct-09
EMCO	Antenna, Horn, 1-18 GHz (SA40-Red)	3115	1142	15-Jul-10
Hewlett Packard	SpecAn 30 Hz -40 GHz, SV (SA40) Red	8564E (84125C)	1148	12-Mar-10
Micro-Tronics	Band Reject Filter, 2400-2500 MHz	BRM50702-02	1683	05-Aug-09

Radio Antenna Port (Power and Spurious Emissions), 26-Jun-09**Engineer: Rafael Varelas**

<u>Manufacturer</u>	<u>Description</u>	<u>Model #</u>	<u>Asset #</u>	<u>Cal Due</u>
Hewlett Packard	SpecAn 30 Hz -40 GHz, SV (SA40) Red	8564E (84125C)	1148	12-Mar-10

Appendix B Test Data

T75760 37 Pages



EMC Test Data

Client:	Ambient Systems	Job Number:	J75672
Model:	Gateway (GW3000)	T-Log Number:	T75760
		Account Manager:	Christine Krebill
Contact:	Bob Ashlock		-
Emissions Standard(s):	FCC 15.247/RSS-210	Class:	-
Immunity Standard(s):	-	Environment:	-

EMC Test Data

For The

Ambient Systems

Model

Gateway (GW3000)

Date of Last Test: 6/25/2009



EMC Test Data

Client:	Ambient Systems	Job Number:	J75672
Model:	Gateway (GW3000)	T-Log Number:	T75760
		Account Manger:	Christine Krebill
Contact:	Bob Ashlock		
Emissions Standard(s):	FCC 15.247/RSS-210	Class:	-
Immunity Standard(s):	-	Environment:	-

EUT INFORMATION

The following information was collected during the test session(s).

General Description

The EUT is a 2.4GHz ZigBee RFID gateway device. The Gateway is designed to communicate with RFID tags as well as other Routers which also communicate with each other and the RFID Tags to form a network. The EUT is generally wall or ceiling mounted, but since the EUT can be placed on a table top during operation, the EUT was treated as table-top equipment during testing to simulate the end-user environment. The electrical rating of the EUT is 6 - 12.6 Volts , 0.5 Amps max.

Equipment Under Test

Manufacturer	Model	Description	Serial Number	FCC ID
Ambient Systems	GW3000	ZigBee RFID gateway	190	XGR-GW3000

Other EUT Details

Testing performed on the GW3000 Gateway was considered representative of the MR3000 router, FCC ID XGR-MR3000. The Gateway and Router circuitry are electrically and physically identical, sharing the exact same PC Board. However, the Gateway has an additional connector inserted in the PC Board that provides an RS-232 port for configuring and managing the system.

The Ambient GW3000 will also be marketed under the DeltaTrak brand, using model number 20170. The Ambient MR3000 will also be marketed under the DeltaTrak brand, using model number 20171.

EUT Antenna (Intentional Radiators Only)

The antenna is an external 5dBi monopole. The antenna connects to the EUT via a non-standard reverse SMA antenna connector, thereby meeting the requirements of FCC 15.203.

EUT Enclosure

The EUT enclosure is primarily constructed of Plastic. It measures approximately 13 cm wide by 7 cm deep by 5 cm high.

Modification History

Mod. #	Test	Date	Modification
1			No modifications were made to the EUT during testing.
2			
3			

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



EMC Test Data

Client:	Ambient Systems	Job Number:	J75672
Model:	Gateway (GW3000)	T-Log Number:	T75760
		Account Manger:	Christine Krebill
Contact:	Bob Ashlock		
Emissions Standard(s):	FCC 15.247/RSS-210	Class:	-
Immunity Standard(s):	-	Environment:	-

Test Configuration #1

The following information was collected during the test session(s).

Local Support Equipment

Manufacturer	Model	Description	Serial Number	FCC ID
None	-	-	-	-

Remote Support Equipment

Manufacturer	Model	Description	Serial Number	FCC ID
None	-	-	-	-

Cabling and Ports

Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length(m)
Antenna	Antenna	Direct connection	NA	NA
Serial (RJ-11)	Unterminated	4 wire phone cable	Unshielded	2.0
DC Power	External pwr supply	2 wire	Unshielded	2.0

EUT Operation During Emissions Tests

During emissions testing the EUT was configured to transmit continuously on the selected channel, unless otherwise noted.

Client:	Ambient Systems	Job Number:	J75672
Model:	Gateway (GW3000)	T-Log Number:	T75760
Contact:	Bob Ashlock	Account Manager:	Christine Krebill
Standard:	FCC 15.247/RSS-210	Class:	-

Conducted Emissions

(Elliott Laboratories Fremont Facility, Semi-Anechoic Chamber)

Test Specific Details

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: 6/23/2009
 Test Engineer: John Caizzi
 Test Location: Fremont Chamber #5

Config. Used: 1
 Config Change: none
 EUT Voltage: 120V/60Hz

General Test Configuration

For tabletop equipment, the EUT was located on a wooden table inside the semi-anechoic chamber, 40 cm from a vertical coupling plane and 80cm from the LISN.

Ambient Conditions:
 Temperature: 24 °C
 Rel. Humidity: 44 %

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	CE, AC Power, 120V/60Hz	EN 55022 Class B	Pass	39.0dBµV @ 0.365MHz (-9.6dB)

Modifications Made During Testing

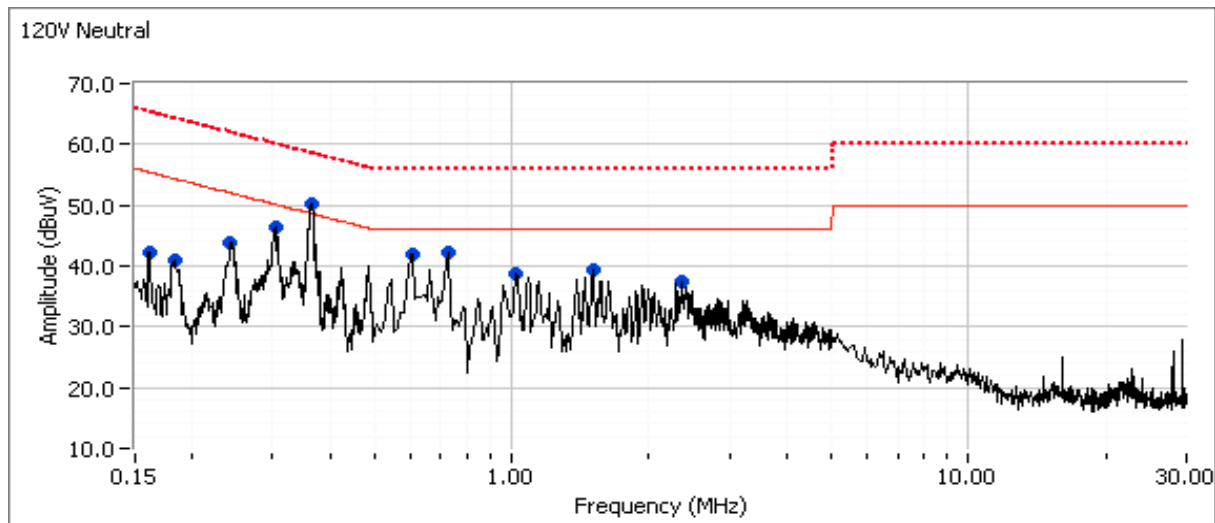
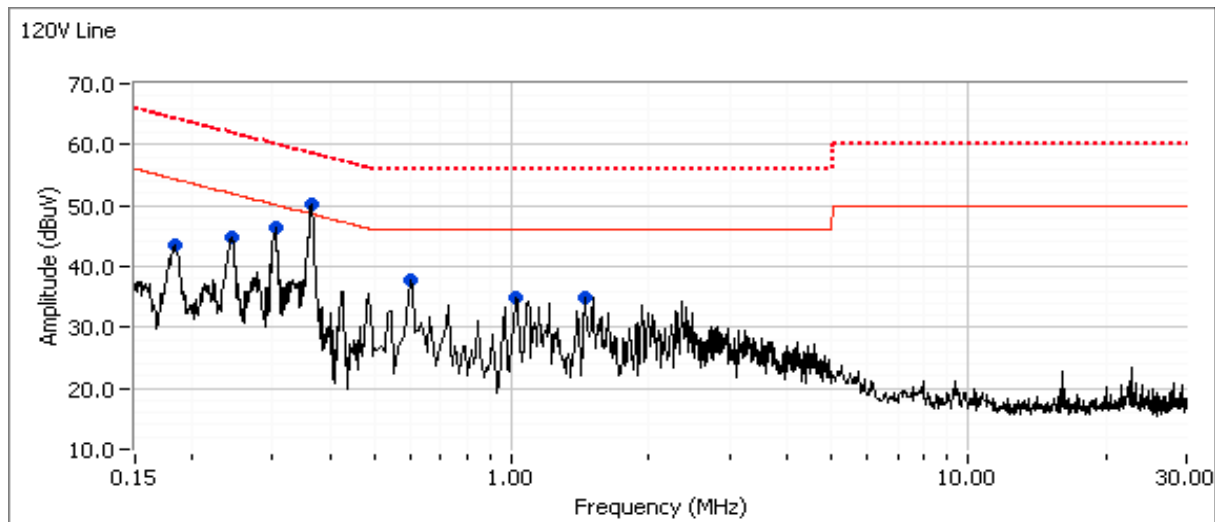
No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

Client: Ambient Systems	Job Number: J75672
Model: Gateway (GW3000)	T-Log Number: T75760
Contact: Bob Ashlock	Account Manager: Christine Krebill
Standard: FCC 15.247/RSS-210	Class: -

Run #1: AC Power Port Conducted Emissions, 0.15 - 30MHz, 120V/60Hz



Client:	Ambient Systems	Job Number:	J75672
Model:	Gateway (GW3000)	T-Log Number:	T75760
Contact:	Bob Ashlock	Account Manager:	Christine Krebill
Standard:	FCC 15.247/RSS-210	Class:	-

Preliminary peak readings captured during pre-scan (peak readings vs. average limit)

Frequency MHz	Level dBμV	AC Line	EN 55022 Class B Limit	Margin	Detector QP/Ave	Comments
0.363	50.3	Line	48.6	1.7	Peak	
0.303	46.4	Line	50.1	-3.7	Peak	
0.242	44.9	Line	52.0	-7.1	Peak	
0.605	37.9	Line	46.0	-8.1	Peak	
0.181	43.5	Line	54.3	-10.8	Peak	
1.450	34.9	Line	46.0	-11.1	Peak	
1.023	34.9	Line	46.0	-11.1	Peak	
0.365	50.1	Neutral	48.6	1.5	Peak	
0.303	46.5	Neutral	50.1	-3.6	Peak	
0.725	42.1	Neutral	46.0	-3.9	Peak	
0.604	42.0	Neutral	46.0	-4.0	Peak	
1.510	39.3	Neutral	46.0	-6.7	Peak	
1.029	38.7	Neutral	46.0	-7.3	Peak	
0.244	43.8	Neutral	52.0	-8.2	Peak	
2.358	37.4	Neutral	46.0	-8.6	Peak	
0.161	42.3	Neutral	55.4	-13.1	Peak	
0.184	40.8	Neutral	54.3	-13.5	Peak	

Client:	Ambient Systems	Job Number:	J75672
Model:	Gateway (GW3000)	T-Log Number:	T75760
Contact:	Bob Ashlock	Account Manager:	Christine Krebill
Standard:	FCC 15.247/RSS-210	Class:	-

Final quasi-peak and average readings

Frequency MHz	Level dB μ V	AC Line	EN 55022 Class B Limit	EN 55022 Class B Margin	Detector QP/Ave	Comments
0.363	48.4	Line	58.7	-10.3	QP	
0.303	43.6	Line	60.2	-16.6	QP	
0.363	30.7	Line	48.7	-18.0	AVG	
0.242	41.9	Line	62.0	-20.1	QP	
0.605	35.6	Line	56.0	-20.4	QP	
0.303	27.8	Line	50.2	-22.4	AVG	
0.605	23.4	Line	46.0	-22.6	AVG	
0.181	40.4	Line	64.4	-24.0	QP	
1.450	31.8	Line	56.0	-24.2	QP	
1.023	29.9	Line	56.0	-26.1	QP	
0.242	24.6	Line	52.0	-27.4	AVG	
1.450	18.0	Line	46.0	-28.0	AVG	
1.023	16.7	Line	46.0	-29.3	AVG	
0.181	23.1	Line	54.4	-31.3	AVG	
0.365	39.0	Neutral	48.6	-9.6	AVG	
0.604	34.7	Neutral	46.0	-11.3	AVG	
0.365	46.8	Neutral	58.6	-11.8	QP	
0.303	38.1	Neutral	50.2	-12.1	AVG	
0.725	31.3	Neutral	46.0	-14.7	AVG	
0.604	41.1	Neutral	56.0	-14.9	QP	
1.510	31.0	Neutral	46.0	-15.0	AVG	
0.725	40.8	Neutral	56.0	-15.2	QP	
0.303	44.5	Neutral	60.2	-15.7	QP	
1.029	29.1	Neutral	46.0	-16.9	AVG	
1.510	37.5	Neutral	56.0	-18.5	QP	
1.029	36.4	Neutral	56.0	-19.6	QP	
0.244	29.8	Neutral	52.0	-22.2	AVG	
0.244	39.6	Neutral	62.0	-22.4	QP	

Client:	Ambient Systems	Job Number:	J75672
Model:	Gateway (GW3000)	T-Log Number:	T75760
Contact:	Bob Ashlock	Account Manager:	Christine Krebill
Standard:	FCC 15.247/RSS-210	Class:	-

Radiated Emissions

(Elliott Laboratories Fremont Facility, Semi-Anechoic Chamber)

Test Specific Details

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: 6/23/2009
Test Engineer: John Caizzi
Test Location: Fremont Chamber #5

Config. Used: 1
Config Change: none
EUT Voltage: 120V/60Hz

General Test Configuration

The EUT was located on the turntable for radiated emissions testing.

The test distance and extrapolation factor (if applicable) are detailed under each run description.

Note, **preliminary** testing indicates that the emissions were maximized by orientation of the EUT and elevation of the measurement antenna. **Maximized** testing indicated that the emissions were maximized by orientation of the EUT, elevation of the measurement antenna, and manipulation of the EUT's interface cables.

Ambient Conditions:

Temperature:	24 °C
Rel. Humidity:	44 %

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	RE, 30 - 1000 MHz, Preliminary Scan	FCC Class B	Eval	33.9dBμV/m @ 32.009MHz (-6.1dB)
2	RE, 30 - 1000 MHz, Maximized Emissions	FCC Class B	Pass	37.7dBμV/m @ 32.009MHz (-2.3dB)

Modifications Made During Testing

No modifications were made to the EUT during testing

Deviations From The Standard

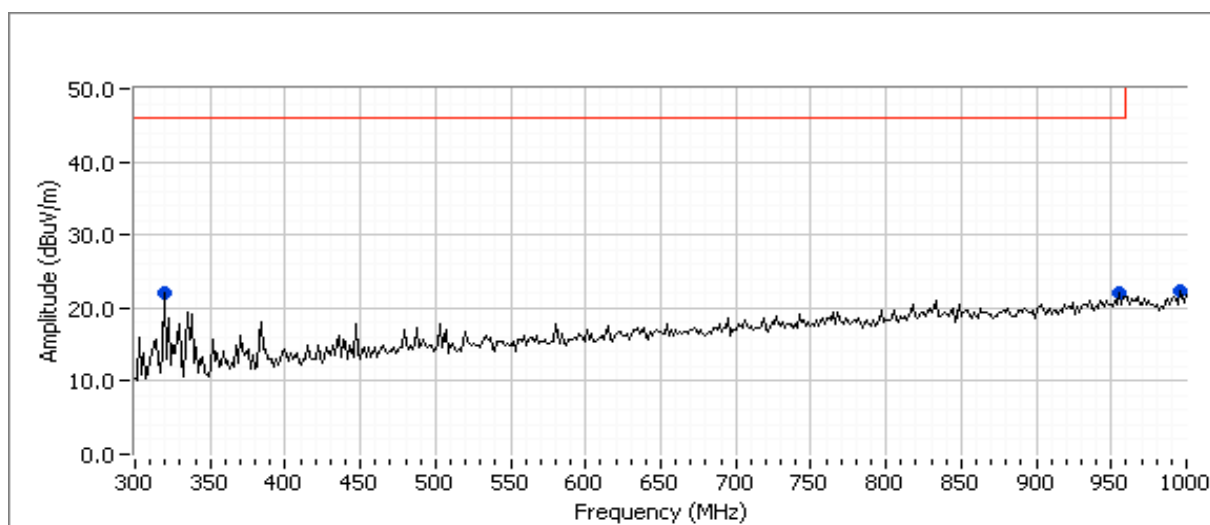
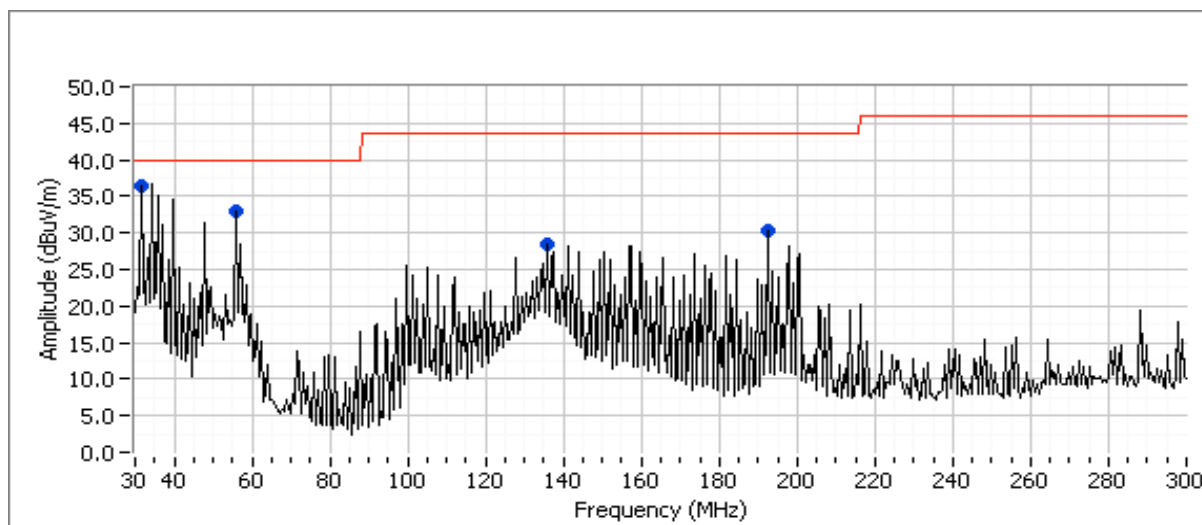
No deviations were made from the requirements of the standard.

Note - Preliminary testing showed no significant emissions above 1GHz.

Client: Ambient Systems	Job Number: J75672
Model: Gateway (GW3000)	T-Log Number: T75760
Contact: Bob Ashlock	Account Manager: Christine Krebill
Standard: FCC 15.247/RSS-210	Class: -

Run #1: Preliminary Radiated Emissions, 30 - 1000 MHz. Rx mode, 2440 MHz.

Frequency Range	Test Distance	Limit Distance	Extrapolation Factor
30 - 1000 MHz	3	3	0.0



Client:	Ambient Systems	Job Number:	J75672
Model:	Gateway (GW3000)	T-Log Number:	T75760
Contact:	Bob Ashlock	Account Manager:	Christine Krebill
Standard:	FCC 15.247/RSS-210	Class:	-

Preliminary peak readings captured during pre-scan

Frequency	Level	Pol	FCC Class B		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
32.009	36.4	V	40.0	-3.6	Peak	315	1.0	
55.995	33.0	V	40.0	-7.0	Peak	356	1.0	
192.010	30.4	V	43.5	-13.1	Peak	53	1.0	
136.003	28.5	V	43.5	-15.0	Peak	206	1.0	
320.018	22.1	H	46.0	-23.9	Peak	120	1.0	
954.580	22.1	V	46.0	-23.9	Peak	18	1.0	

Preliminary quasi-peak readings (no manipulation of EUT interface cables)

Frequency	Level	Pol	FCC Class B		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
32.009	33.9	V	40.0	-6.1	QP	301	1.00	
55.995	32.4	V	40.0	-7.6	QP	348	1.00	
192.010	30.6	V	43.5	-12.9	QP	65	1.00	
136.003	28.7	V	43.5	-14.8	QP	213	1.00	
320.018	21.7	H	46.0	-24.3	QP	116	1.00	
954.580	17.7	V	46.0	-28.3	QP	120	2.01	

Run #2: Maximized Readings From Run #1

Maximized quasi-peak readings (includes manipulation of EUT interface cables)

Frequency	Level	Pol	FCC Class B		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
32.009	37.7	V	40.0	-2.3	QP	290	1.0	
55.995	37.2	V	40.0	-2.8	QP	360	1.0	
192.010	30.6	V	43.5	-12.9	QP	65	1.00	Moving cables reduced reading.
136.003	28.7	V	43.5	-14.8	QP	213	1.00	Moving cables reduced reading.
320.018	21.7	H	46.0	-24.3	QP	116	1.00	Moving cables reduced reading.
954.580	17.7	V	46.0	-28.3	QP	120	2.01	Moving cables reduced reading.

Client:	Ambient Systems	Job Number:	J75672
Model:	Gateway (GW3000)	T-Log Number:	T75760
Contact:	Bob Ashlock	Account Manager:	Christine Krebill
Standard:	FCC 15.247/RSS-210	Class:	N/A

RSS 210 and FCC 15.247 (DTS) Radiated Spurious Emissions

Test Specific Details

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: 6/24/2009
Test Engineer: Suhaila Khushzad
Test Location: OATS #2

Config. Used: 1
Config Change: None
EUT Voltage: 12.V DC

General Test Configuration

The EUT and all local support equipment were located on the turntable for radiated spurious emissions testing. All remote support equipment was located approximately 30 meters from the EUT with all I/O connections running on top of the groundplane or rou

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

Ambient Conditions:
Temperature: 23.9 °C
Rel. Humidity: 53 %

Summary of Results - Device Operating in the 2400-2483.5 MHz Band

Run #	Mode	Channel	Power Setting	Measured Power	Test Performed	Limit	Result / Margin
1a	ZigBee	Channel 14 (2420 MHz)	-1.5	-	Restricted Band Edge (2390 MHz)	FCC Part 15.209 / 15.247(c)	52.7dBμV/m @ 2389.8MHz (-1.3dB)
			-1.5	-	Radiated Emissions, 1 - 26 GHz	FCC Part 15.209 / 15.247(c)	47.8dBμV/m @ 4841.0MHz (-6.2dB)
1b	ZigBee	Channel 15 (2425 MHz)	-0.4	-	Restricted Band Edge (2390 MHz)	FCC Part 15.209 / 15.247(c)	51.4dBμV/m @ 2389.7MHz (-2.6dB)
			-0.4	-	Radiated Emissions, 1 - 26 GHz	FCC Part 15.209 / 15.247(c)	50.9dBμV/m @ 12122.7MHz (-3.1dB)
1c	ZigBee	Channel 18 (2440 MHz)	+0.2	-	Radiated Emissions, 1 - 26 GHz	FCC Part 15.209 / 15.247(c)	52.7dBμV/m @ 4881.0MHz (-1.3dB)
1d	ZigBee	high (2450 MHz)	-0.4	-	Restricted Band Edge (2483.5 MHz)	FCC Part 15.209 / 15.247(c)	50.3dBμV/m @ 2483.5MHz (-3.7dB)
			-0.4	-	Radiated Emissions, 1 - 26 GHz	FCC Part 15.209 / 15.247(c)	72.6dBμV/m @ 9802.1MHz (-1.4dB)
1e	ZigBee	high (2455 MHz)	-1.5	-	Restricted Band Edge (2483.5 MHz)	FCC Part 15.209 / 15.247(c)	51.1dBμV/m @ 2483.5MHz (-2.9dB)
			-1.5	-	Radiated Emissions, 1 - 26 GHz	FCC Part 15.209 / 15.247(c)	52.3dBμV/m @ 4909.3MHz (-1.7dB)

Client:	Ambient Systems	Job Number:	J75672
Model:	Gateway (GW3000)	T-Log Number:	T75760
Contact:	Bob Ashlock	Account Manager:	Christine Krebill
Standard:	FCC 15.247/RSS-210	Class:	N/A

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.

Note - No radio related emissions below 1 GHz were found during preliminary testing.

Client:	Ambient Systems	Job Number:	J75672
Model:	Gateway (GW3000)	T-Log Number:	T75760
Contact:	Bob Ashlock	Account Manager:	Christine Krebill
Standard:	FCC 15.247/RSS-210	Class:	N/A

Run #1: Radiated Spurious Emissions, 30 - 25000 MHz,

Run #1a: Low Channel 14 @ 2420 MHz, Power -1.5

Fundamental Signal Field Strength: Peak and average values measured in 1 MHz, and peak value measured in 100kHz

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2420.330	117.7	V	-	-	AVG	34	1.0	RB 1 MHz; VB: 10 Hz pwr -1.5
2419.930	120.0	V	-	-	PK	34	1.0	RB 1 MHz; VB: 1 MHz pwr -1.5
2420.400	109.1	H	-	-	AVG	164	1.0	RB 1 MHz; VB: 10 Hz pwr -1.5
2420.870	111.7	H	-	-	PK	164	1.0	RB 1 MHz; VB: 1 MHz pwr -1.5
2420.520	107.3	H	-	-	PK	164	1.0	RB 100 kHz; VB: 100 kHz pwr -1.5
2419.760	116.5	V	-	-	PK	34	1.0	RB 100 kHz; VB: 100 kHz pwr -1.5

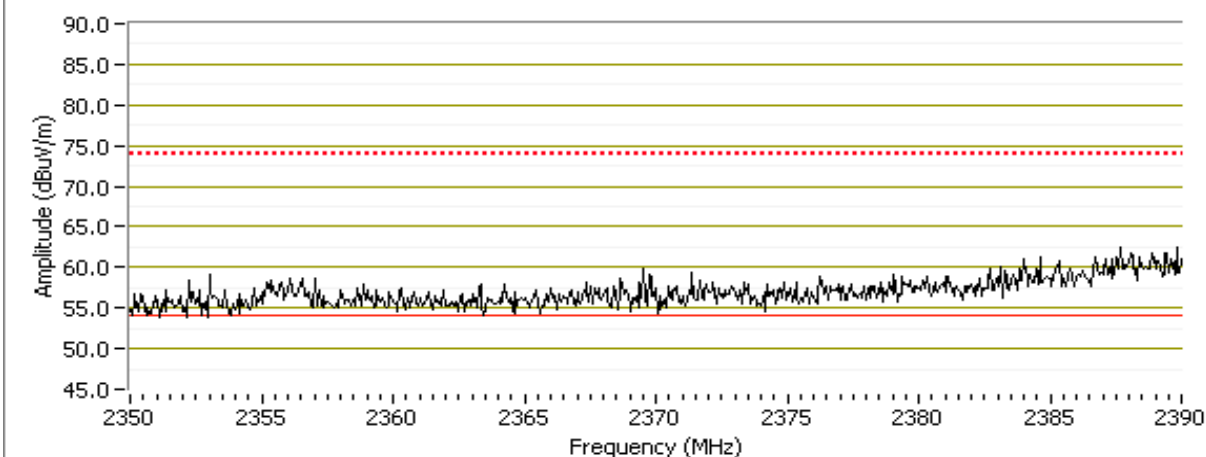
Fundamental emission level @ 3m in 100kHz RBW:	116.5	dB μ V/m	
Limit for emissions outside of restricted bands:	96.5	dB μ V/m	Limit is -20dBc (Peak power measurement)
Limit for emissions outside of restricted bands:	86.5	dB μ V/m	Limit is -30dBc (UNII power measurement)

Band Edge Signal Field Strength - Direct measurement of field strength

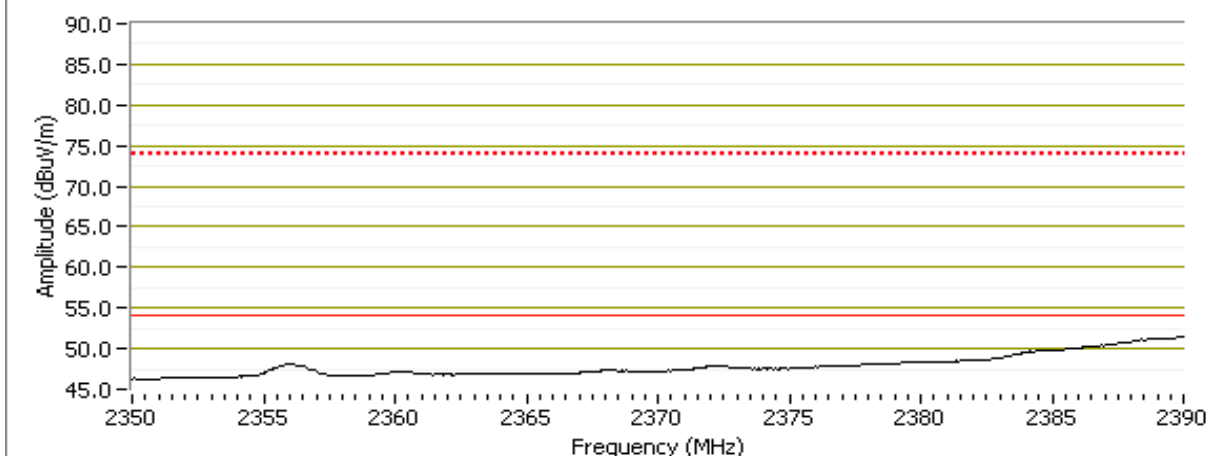
Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2389.800	52.7	V	54.0	-1.3	AVG	34	1.0	RB 1 MHz; VB: 10 Hz pwr -1.5
2388.930	47.4	H	54.0	-6.6	AVG	164	1.0	RB 1 MHz; VB: 10 Hz pwr -1.5
2389.470	62.8	V	74.0	-11.2	PK	34	1.0	RB 1 MHz; VB: 1 MHz pwr -1.5
2373.800	57.8	H	74.0	-16.2	PK	164	1.0	RB 1 MHz; VB: 1 MHz pwr -1.5

Client:	Ambient Systems	Job Number:	J75672
Model:	Gateway (GW3000)	T-Log Number:	T75760
Contact:	Bob Ashlock	Account Manager:	Christine Krebill
Standard:	FCC 15.247/RSS-210	Class:	N/A

RB 1 MHz; VB 1 MHz BE @ 2390 MHz, Peak-V

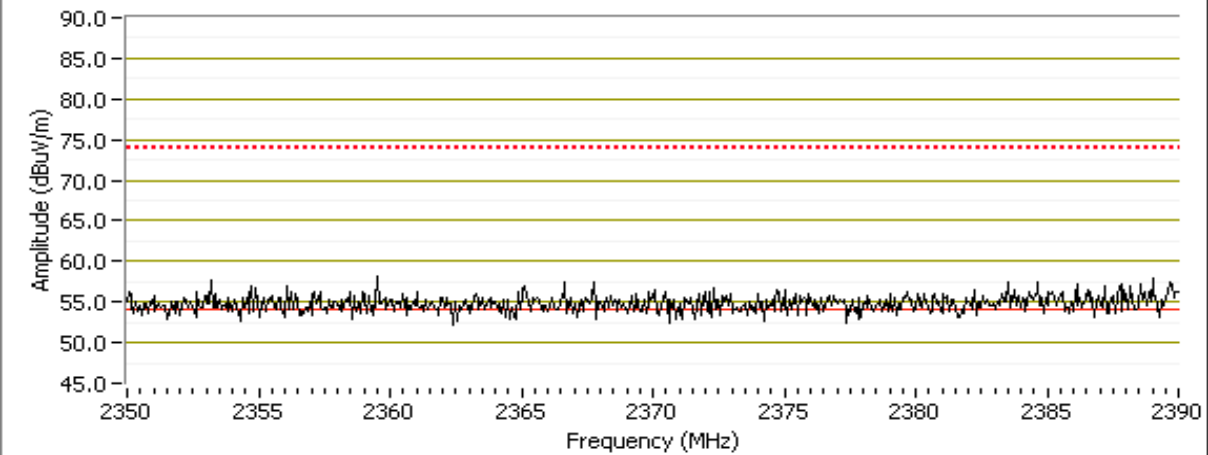


RB 1 MHz; VB 10 Hz BE @ 2390 MHz, Avg-V

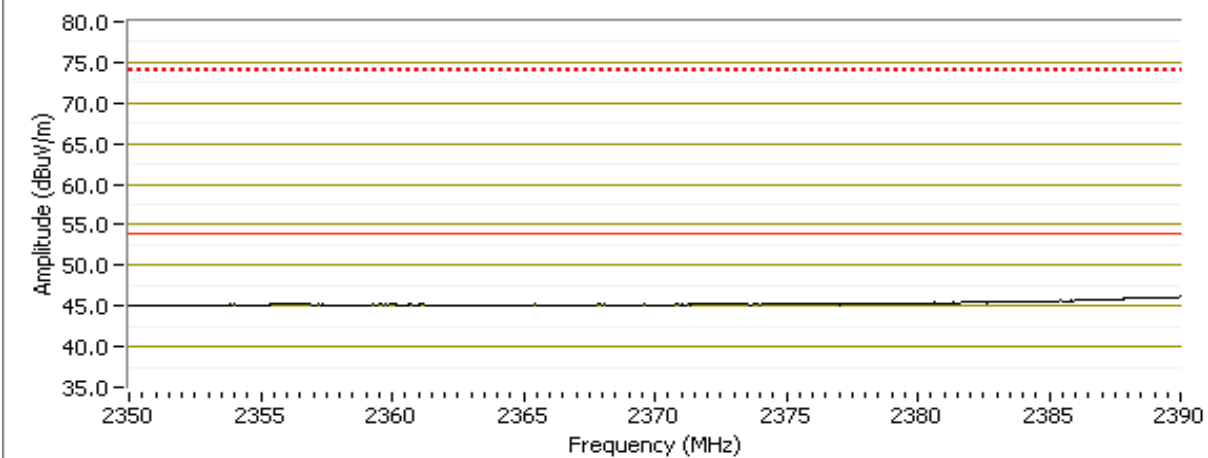


Client:	Ambient Systems	Job Number:	J75672
Model:	Gateway (GW3000)	T-Log Number:	T75760
Contact:	Bob Ashlock	Account Manager:	Christine Krebill
Standard:	FCC 15.247/RSS-210	Class:	N/A

RB 1 MHz; VB 1 MHz BE @ 2390 MHz, Peak-H



RB 1 MHz; VB 10 Hz BE @ 2390 MHz, Avg-H



Client:	Ambient Systems	Job Number:	J75672
Model:	Gateway (GW3000)	T-Log Number:	T75760
Contact:	Bob Ashlock	Account Manager:	Christine Krebill
Standard:	FCC 15.247/RSS-210	Class:	N/A

Other Spurious Emissions

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBμV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
4841.000	47.8	V	54.0	-6.2	AVG	274	1.1	RB 1 MHz; VB: 10 Hz pwr -1.5
7258.670	44.4	V	54.0	-9.6	AVG	168	1.4	RB 1 MHz; VB: 10 Hz pwr -1.5
7258.670	44.0	H	54.0	-10.0	AVG	9	1.6	RB 1 MHz; VB: 10 Hz pwr -1.5
4838.670	41.8	H	54.0	-12.2	AVG	265	1.0	RB 1 MHz; VB: 10 Hz pwr -1.5
9678.000	60.3	V	74.0	-13.7	PK	105	1.3	RB 1 MHz; VB: 1 MHz pwr -1.5
4836.670	58.2	H	74.0	-15.8	PK	265	1.0	RB 1 MHz; VB: 1 MHz pwr -1.5
4840.930	54.3	V	74.0	-19.7	PK	274	1.1	RB 1 MHz; VB: 1 MHz pwr -1.5
7258.800	53.3	V	74.0	-20.7	PK	168	1.4	RB 1 MHz; VB: 1 MHz pwr -1.5
9678.200	52.7	V	74.0	-21.3	AVG	105	1.3	RB 1 MHz; VB: 10 Hz pwr -1.5
7258.600	52.4	H	74.0	-21.6	PK	9	1.6	RB 1 MHz; VB: 1 MHz pwr -1.5

Note 1: For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 20dB below the level of the fundamental and measured in 100kHz.

Client:	Ambient Systems	Job Number:	J75672
Model:	Gateway (GW3000)	T-Log Number:	T75760
Contact:	Bob Ashlock	Account Manager:	Christine Krebill
Standard:	FCC 15.247/RSS-210	Class:	N/A

Run #1b: Low Channel 15 @ 2425 MHz, Power -0.4

Fundamental Signal Field Strength: Peak and average values measured in 1 MHz, and peak value measured in 100kHz

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2425.330	118.4	V	-	-	AVG	28	1.1	RB 1 MHz; VB: 10 Hz pwr -0.4
2424.870	120.6	V	-	-	PK	28	1.1	RB 1 MHz; VB: 1 MHz pwr -0.4
2425.330	112.4	H	-	-	AVG	350	2.1	RB 1 MHz; VB: 10 Hz pwr -0.4
2424.930	114.4	H	-	-	PK	350	2.1	RB 1 MHz; VB: 1 MHz pwr -0.4
2425.000	110.2	H	-	-	PK	350	2.1	RB 100 kHz; VB: 100 kHz pwr -0.4
2424.770	116.3	V	-	-	PK	28	1.1	RB 100 kHz; VB: 100 kHz pwr -0.4

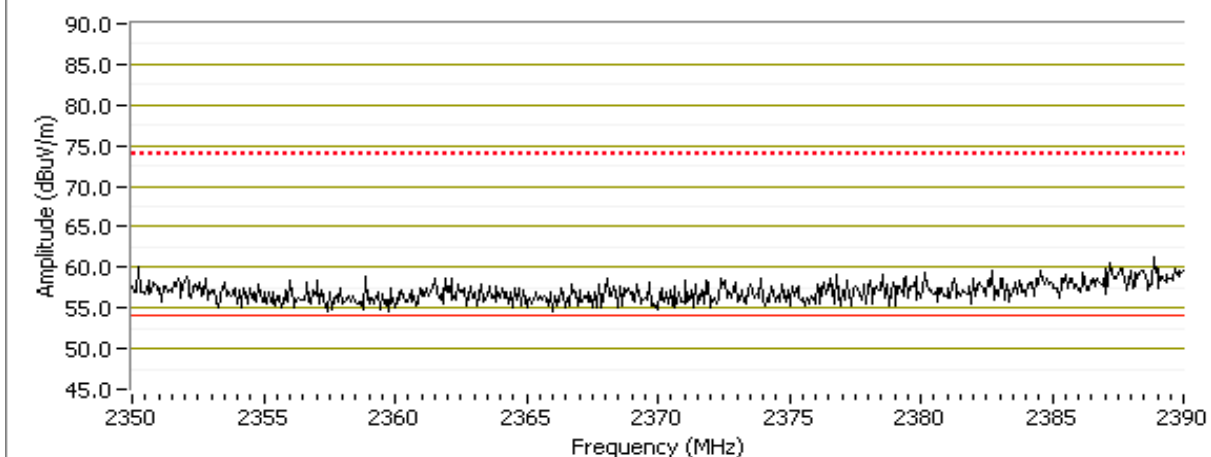
Fundamental emission level @ 3m in 100kHz RBW:	116.3	dB μ V/m	
Limit for emissions outside of restricted bands:	96.3	dB μ V/m	Limit is -20dBc (Peak power measurement)
Limit for emissions outside of restricted bands:	86.3	dB μ V/m	Limit is -30dBc (UNII power measurement)

Band Edge Signal Field Strength - Direct measurement of field strength

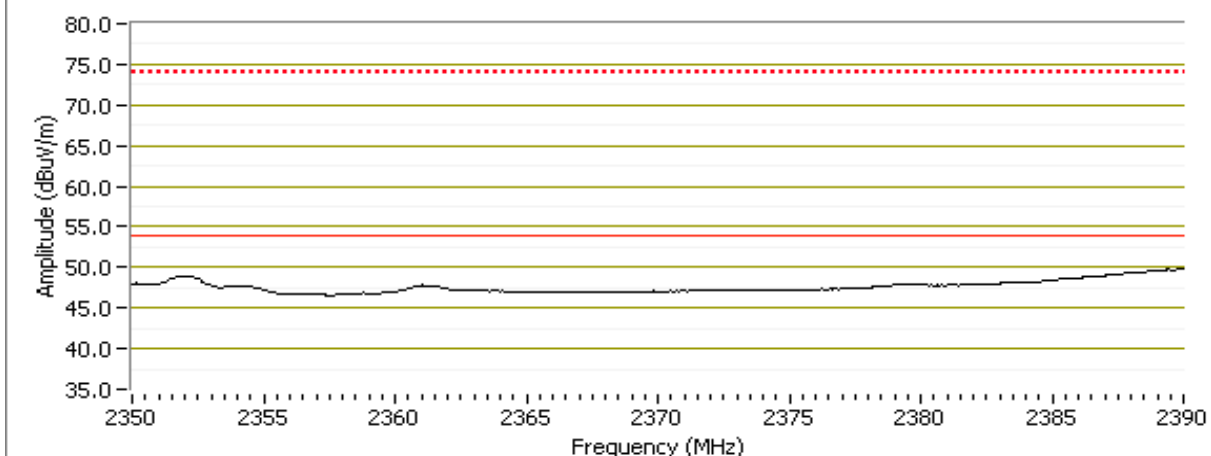
Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2389.730	51.4	V	54.0	-2.6	AVG	28	1.1	RB 1 MHz; VB: 10 Hz pwr -0.4
2389.870	48.1	H	54.0	-5.9	AVG	350	2.1	RB 1 MHz; VB: 10 Hz pwr -0.4
2385.800	61.9	V	74.0	-12.1	PK	28	1.1	RB 1 MHz; VB: 1 MHz pwr -0.4
2357.400	58.9	H	74.0	-15.1	PK	350	2.1	RB 1 MHz; VB: 1 MHz pwr -0.4

Client:	Ambient Systems	Job Number:	J75672
Model:	Gateway (GW3000)	T-Log Number:	T75760
Contact:	Bob Ashlock	Account Manager:	Christine Krebill
Standard:	FCC 15.247/RSS-210	Class:	N/A

RB 1 MHz; VB 1 MHz BE @ 2390 MHz, Peak-V

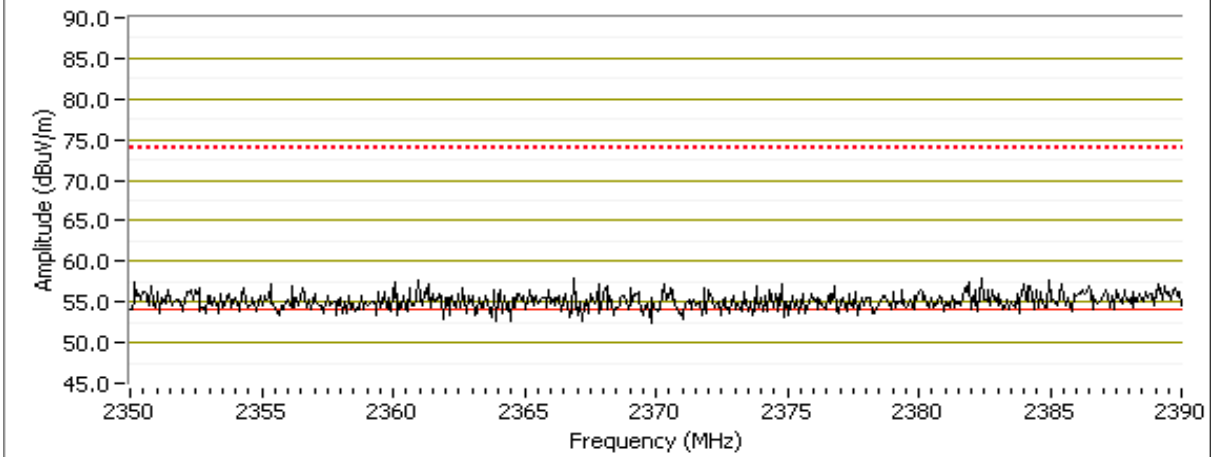


RB 1 MHz; VB 10 Hz BE @ 2390 MHz, Avg-V

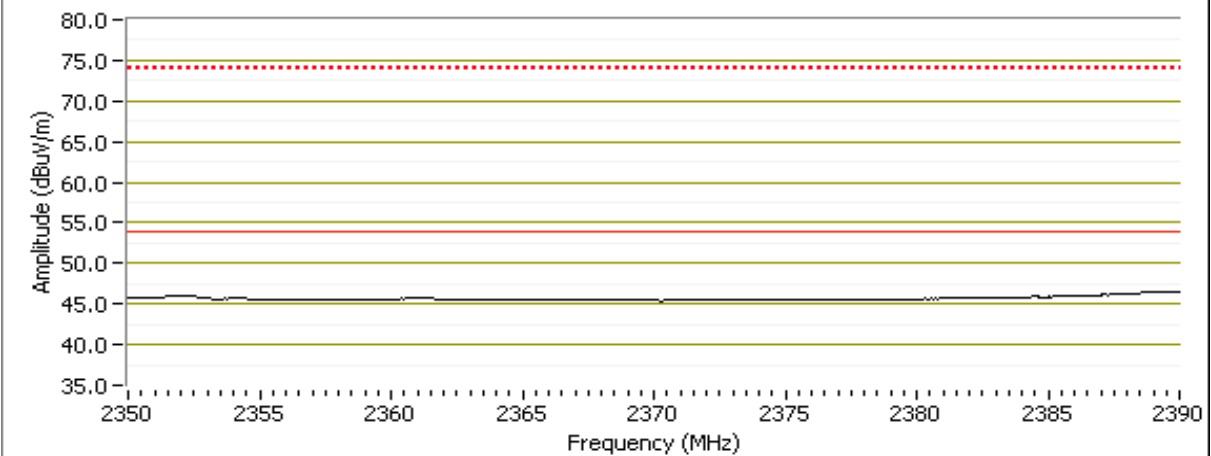


Client:	Ambient Systems	Job Number:	J75672
Model:	Gateway (GW3000)	T-Log Number:	T75760
Contact:	Bob Ashlock	Account Manager:	Christine Krebill
Standard:	FCC 15.247/RSS-210	Class:	N/A

RB 1 MHz; VB 1 MHz BE @ 2390 MHz, Peak-H



RB 1 MHz; VB 10 Hz BE @ 2390 MHz, Avg-H



Client:	Ambient Systems	Job Number:	J75672
Model:	Gateway (GW3000)	T-Log Number:	T75760
Contact:	Bob Ashlock	Account Manager:	Christine Krebill
Standard:	FCC 15.247/RSS-210	Class:	N/A

Other Spurious Emissions

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBμV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
12122.670	50.9	H	54.0	-3.1	AVG	173	1.4	RB 1 MHz; VB: 10 Hz pwr -0.4
7273.670	49.8	V	54.0	-4.2	AVG	32	1.6	RB 1 MHz; VB: 10 Hz pwr -0.4
4849.330	49.6	V	54.0	-4.4	AVG	57	2.1	RB 1 MHz; VB: 10 Hz pwr -0.4
9702.270	69.0	H	74.0	-5.0	PK	113	1.8	RB 1 MHz; VB: 1 MHz pwr -0.4
12122.800	48.9	V	54.0	-5.1	AVG	15	1.5	RB 1 MHz; VB: 10 Hz pwr -0.4
4849.130	48.6	H	54.0	-5.4	AVG	277	1.8	RB 1 MHz; VB: 10 Hz pwr -0.4
7276.600	47.0	H	54.0	-7.0	AVG	7	1.7	RB 1 MHz; VB: 10 Hz pwr -0.4
4854.670	63.2	H	74.0	-10.8	PK	277	1.8	RB 1 MHz; VB: 1 MHz pwr -0.4
9698.070	62.8	H	74.0	-11.2	AVG	113	1.8	RB 1 MHz; VB: 10 Hz pwr -0.4
9698.330	60.8	V	74.0	-13.2	PK	196	1.8	RB 1 MHz; VB: 1 MHz pwr -0.4
12127.600	59.7	H	74.0	-14.3	PK	173	1.4	RB 1 MHz; VB: 1 MHz pwr -0.4
7276.530	57.7	V	74.0	-16.3	PK	32	1.6	RB 1 MHz; VB: 1 MHz pwr -0.4
12127.800	57.7	V	74.0	-16.3	PK	15	1.5	RB 1 MHz; VB: 1 MHz pwr -0.4
4849.200	57.4	V	74.0	-16.6	PK	57	2.1	RB 1 MHz; VB: 1 MHz pwr -0.4
7273.730	54.9	H	74.0	-19.1	PK	7	1.7	RB 1 MHz; VB: 1 MHz pwr -0.4
9702.270	53.5	V	74.0	-20.5	AVG	196	1.8	RB 1 MHz; VB: 10 Hz pwr -0.4

Client:	Ambient Systems	Job Number:	J75672
Model:	Gateway (GW3000)	T-Log Number:	T75760
Contact:	Bob Ashlock	Account Manager:	Christine Krebill
Standard:	FCC 15.247/RSS-210	Class:	N/A

Run #1c: Center Channel @ 2440 MHz, Power +0.2

Fundamental emission level @ 3m in 100kHz RBW:						dBµV/m	Limit is -20dBc (Peak power measurement) Limit is -30dBc (UNII power measurement)		
Limit for emissions outside of restricted bands:					-20	dBµV/m			
Limit for emissions outside of restricted bands:					-30	dBµV/m			
Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments	
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters		
4881.000	52.7	V	54.0	-1.3	AVG	68	2.0	RB 1 MHz; VB: 10 Hz	pwr+0.6
12202.730	52.6	V	54.0	-1.4	AVG	322	1.3	RB 1 MHz; VB: 10 Hz	pwr+0.6
7321.530	52.5	V	54.0	-1.5	AVG	39	1.5	RB 1 MHz; VB: 10 Hz	pwr+0.6
12197.730	52.3	H	54.0	-1.7	AVG	178	1.4	RB 1 MHz; VB: 10 Hz	pwr+0.2
7321.600	51.2	H	54.0	-2.8	AVG	126	1.6	RB 1 MHz; VB: 10 Hz	pwr+0.6
9758.270	70.6	H	74.0	-3.4	PK	135	1.8	RB 1 MHz; VB: 1 MHz	pwr+0.2
4881.070	48.0	H	54.0	-6.0	AVG	37	1.3	RB 1 MHz; VB: 10 Hz	pwr+0.6
9762.270	64.9	V	74.0	-9.1	PK	105	1.3	RB 1 MHz; VB: 1 MHz	pwr+0.6
9762.200	64.4	H	74.0	-9.6	AVG	135	1.8	RB 1 MHz; VB: 10 Hz	pwr+0.2
12202.930	61.0	V	74.0	-13.0	PK	322	1.3	RB 1 MHz; VB: 1 MHz	pwr+0.6
12202.800	60.9	H	74.0	-13.1	PK	178	1.4	RB 1 MHz; VB: 1 MHz	pwr+0.2
7321.670	59.8	V	74.0	-14.2	PK	39	1.5	RB 1 MHz; VB: 1 MHz	pwr+0.6
4881.000	59.4	V	74.0	-14.6	PK	68	2.0	RB 1 MHz; VB: 1 MHz	pwr+0.6
9758.130	58.8	V	74.0	-15.2	AVG	105	1.3	RB 1 MHz; VB: 10 Hz	pwr+0.6
7318.670	58.6	H	74.0	-15.4	PK	126	1.6	RB 1 MHz; VB: 1 MHz	pwr+0.6
4881.070	55.1	H	74.0	-18.9	PK	37	1.3	RB 1 MHz; VB: 1 MHz	pwr+0.6

Client:	Ambient Systems	Job Number:	J75672
Model:	Gateway (GW3000)	T-Log Number:	T75760
Contact:	Bob Ashlock	Account Manager:	Christine Krebill
Standard:	FCC 15.247/RSS-210	Class:	N/A

Run #1d: High Channel 20 @ 2450 MHz, Max Power -0.4

Fundamental Signal Field Strength: Peak and average values measured in 1 MHz, and peak value measured in 100kHz

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2450.330	116.1	V	-	-	AVG	148	1.4	RB 1 MHz; VB: 10 Hz pwr -0.4
2449.870	118.3	V	-	-	PK	148	1.4	RB 1 MHz; VB: 1 MHz pwr -0.4
2450.330	110.8	H	-	-	AVG	351	2.1	RB 1 MHz; VB: 10 Hz pwr -0.4
2449.870	113.3	H	-	-	PK	351	2.1	RB 1 MHz; VB: 1 MHz pwr -0.4
2449.590	109.2	H	-	-	PK	351	2.1	RB 100 kHz; VB: 100 kHz pwr -0.4
2450.130	112.0	V	-	-	PK	148	1.4	RB 100 kHz; VB: 100 kHz pwr -0.4

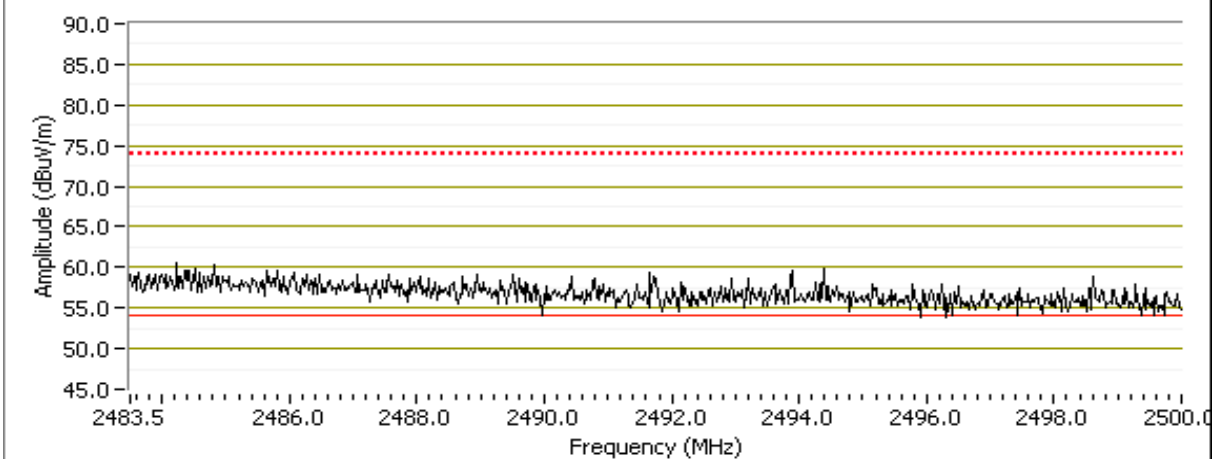
Fundamental emission level @ 3m in 100kHz RBW:	112	dB μ V/m	
Limit for emissions outside of restricted bands:	92	dB μ V/m	Limit is -20dBc (Peak power measurement)
Limit for emissions outside of restricted bands:	82	dB μ V/m	Limit is -30dBc (UNII power measurement)

Band Edge Signal Field Strength - Direct measurement of field strength

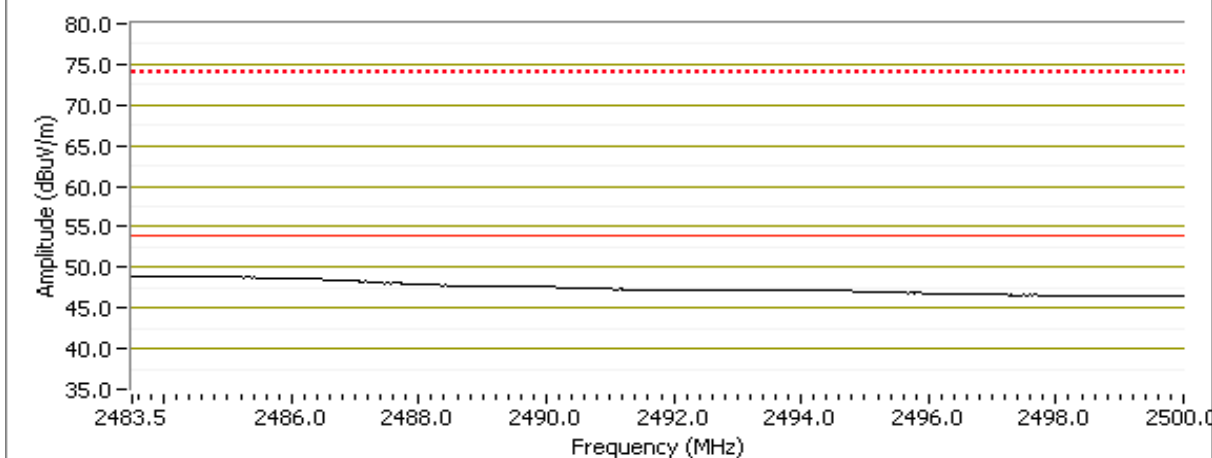
Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2483.500	50.3	V	54.0	-3.7	AVG	148	1.4	RB 1 MHz; VB: 10 Hz pwr -0.4
2483.910	61.0	V	74.0	-13.0	PK	148	1.4	RB 1 MHz; VB: 1 MHz pwr -0.4
2483.500	47.8	H	54.0	-6.2	AVG	351	2.1	RB 1 MHz; VB: 10 Hz pwr -0.4
2488.310	59.3	H	74.0	-14.7	PK	351	2.1	RB 1 MHz; VB: 1 MHz pwr -0.4

Client:	Ambient Systems	Job Number:	J75672
Model:	Gateway (GW3000)	T-Log Number:	T75760
Contact:	Bob Ashlock	Account Manager:	Christine Krebill
Standard:	FCC 15.247/RSS-210	Class:	N/A

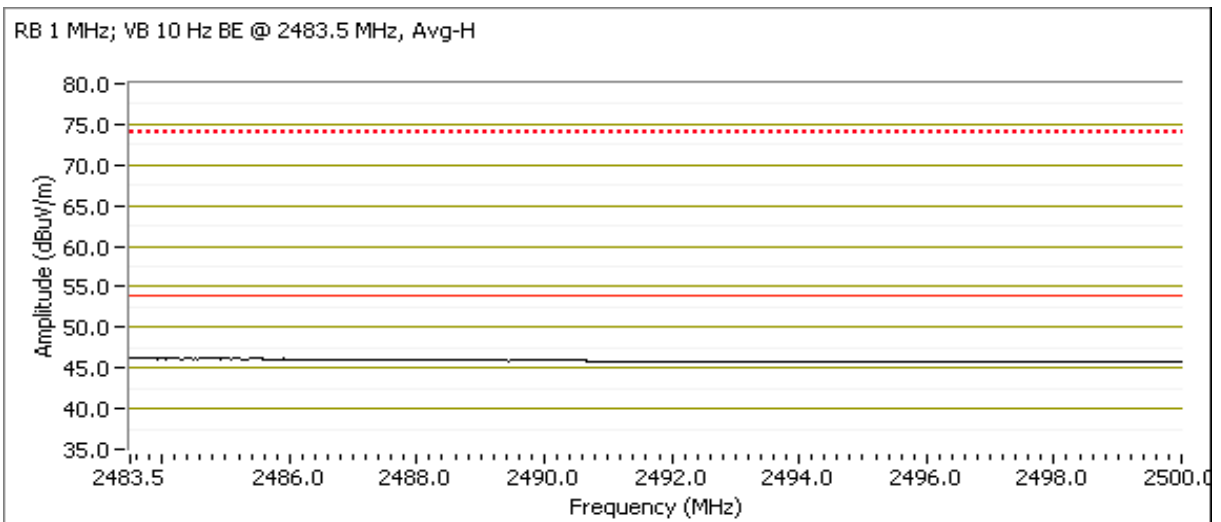
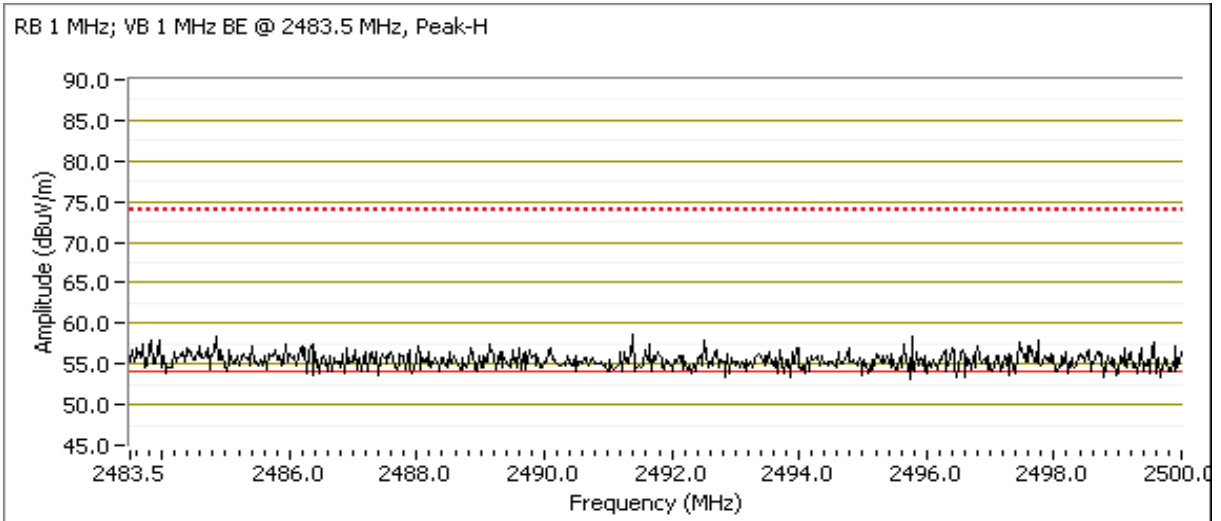
RB 1 MHz; VB 1 MHz BE @ 2483.5 MHz, Peak-V



RB 1 MHz; VB 10 Hz BE @ 2483.5 MHz, Avg-V



Client:	Ambient Systems	Job Number:	J75672
Model:	Gateway (GW3000)	T-Log Number:	T75760
Contact:	Bob Ashlock	Account Manager:	Christine Krebill
Standard:	FCC 15.247/RSS-210	Class:	N/A



Client:	Ambient Systems	Job Number:	J75672
Model:	Gateway (GW3000)	T-Log Number:	T75760
Contact:	Bob Ashlock	Account Manager:	Christine Krebill
Standard:	FCC 15.247/RSS-210	Class:	N/A

Other Spurious Emissions

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBμV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
9802.070	72.6	H	74.0	-1.4	PK	137	1.5	RB 1 MHz; VB: 1 MHz pwr -0.4
4899.200	52.3	V	54.0	-1.7	AVG	273	1.0	RB 1 MHz; VB: 10 Hz pwr -0.4
7351.530	51.9	V	54.0	-2.1	AVG	38	1.4	RB 1 MHz; VB: 10 Hz pwr -0.4
12252.870	50.9	V	54.0	-3.1	AVG	314	1.3	RB 1 MHz; VB: 10 Hz pwr -0.4
12247.930	50.7	H	54.0	-3.3	AVG	177	1.3	RB 1 MHz; VB: 10 Hz pwr -0.4
7351.530	49.8	H	54.0	-4.2	AVG	128	1.7	RB 1 MHz; VB: 10 Hz pwr -0.4
4899.200	46.1	H	54.0	-7.9	AVG	53	2.0	RB 1 MHz; VB: 10 Hz pwr -0.4
9802.270	65.0	V	74.0	-9.0	PK	270	1.4	RB 1 MHz; VB: 1 MHz pwr -0.4
9798.070	63.1	H	74.0	-10.9	AVG	137	1.5	RB 1 MHz; VB: 10 Hz pwr -0.4
7351.670	59.6	V	74.0	-14.4	PK	38	1.4	RB 1 MHz; VB: 1 MHz pwr -0.4
12247.670	59.3	V	74.0	-14.7	PK	314	1.3	RB 1 MHz; VB: 1 MHz pwr -0.4
12252.670	59.2	H	74.0	-14.8	PK	177	1.3	RB 1 MHz; VB: 1 MHz pwr -0.4
4899.070	58.7	V	74.0	-15.3	PK	273	1.0	RB 1 MHz; VB: 1 MHz pwr -0.4
7348.670	57.7	H	74.0	-16.3	PK	128	1.7	RB 1 MHz; VB: 1 MHz pwr -0.4
9798.200	57.4	V	74.0	-16.6	AVG	270	1.4	RB 1 MHz; VB: 10 Hz pwr -0.4
4899.130	52.2	H	74.0	-21.8	PK	53	2.0	RB 1 MHz; VB: 1 MHz pwr -0.4

Client:	Ambient Systems	Job Number:	J75672
Model:	Gateway (GW3000)	T-Log Number:	T75760
Contact:	Bob Ashlock	Account Manager:	Christine Krebill
Standard:	FCC 15.247/RSS-210	Class:	N/A

Run #1e: High Channel 21 @ 2455 MHz, Max Power -1.5,

Fundamental Signal Field Strength: Peak and average values measured in 1 MHz, and peak value measured in 100kHz

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2455.270	115.7	V	-	-	AVG	122	1.3	RB 1 MHz; VB: 10 Hz pwr -1.5
2454.800	117.7	V	-	-	PK	122	1.3	RB 1 MHz; VB: 1 MHz pwr -1.5
2455.270	110.1	H	-	-	AVG	355	2.0	RB 1 MHz; VB: 10 Hz pwr -1.5
2455.870	112.5	H	-	-	PK	355	2.0	RB 1 MHz; VB: 1 MHz pwr -1.5
2455.670	107.1	H	-	-	PK	355	2.0	RB 100 kHz; VB: 100 kHz pwr -1.5
2455.200	111.5	V	-	-	PK	122	1.3	RB 100 kHz; VB: 100 kHz pwr -1.5

Fundamental emission level @ 3m in 100kHz RBW:	111.5	dB μ V/m
Limit for emissions outside of restricted bands:	91.5	dB μ V/m
Limit for emissions outside of restricted bands:	81.5	dB μ V/m

Limit is -20dBc (Peak power measurement)

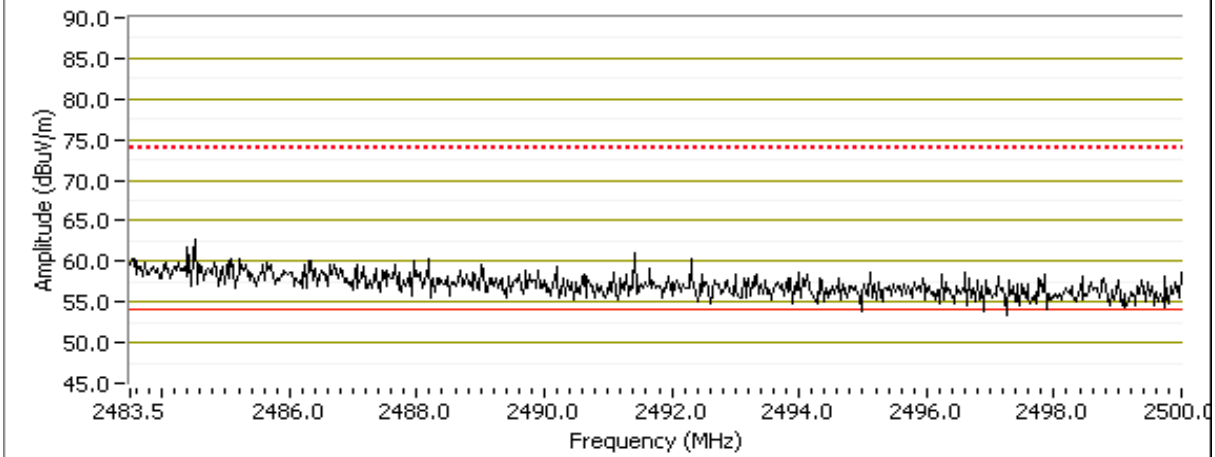
Limit is -30dBc (UNII power measurement)

Band Edge Signal Field Strength - Direct measurement of field strength

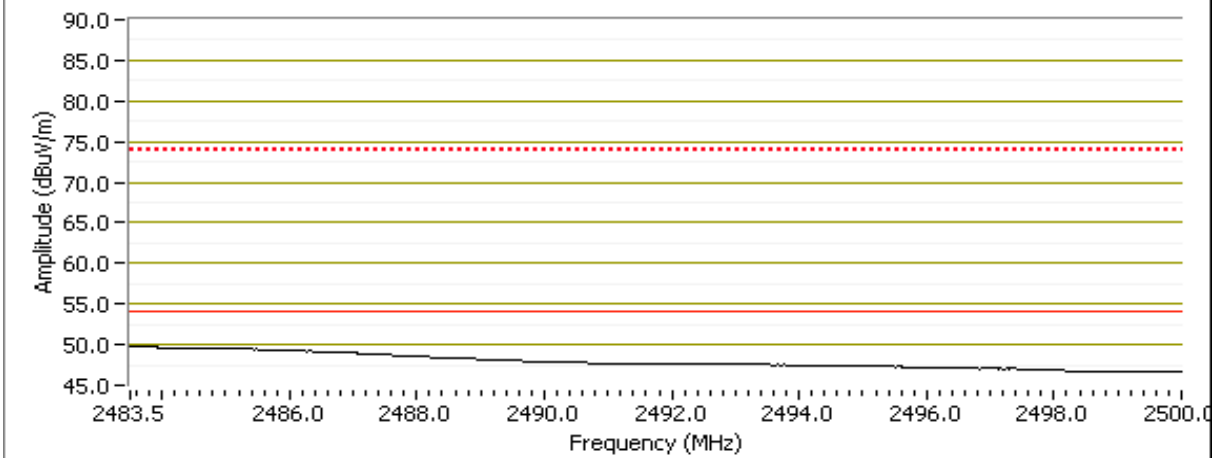
Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2483.500	51.1	V	54.0	-2.9	AVG	122	1.3	RB 1 MHz; VB: 10 Hz pwr -1.5
2486.940	61.7	V	74.0	-12.3	PK	122	1.3	RB 1 MHz; VB: 1 MHz pwr -1.5
2483.530	49.3	H	54.0	-4.7	AVG	355	2.0	RB 1 MHz; VB: 10 Hz pwr -1.5
2486.190	59.9	H	74.0	-14.1	PK	355	2.0	RB 1 MHz; VB: 1 MHz pwr -1.5

Client:	Ambient Systems	Job Number:	J75672
Model:	Gateway (GW3000)	T-Log Number:	T75760
Contact:	Bob Ashlock	Account Manager:	Christine Krebill
Standard:	FCC 15.247/RSS-210	Class:	N/A

RB 1 MHz; VB 1 MHz BE @ 2483.5 MHz, Peak -V

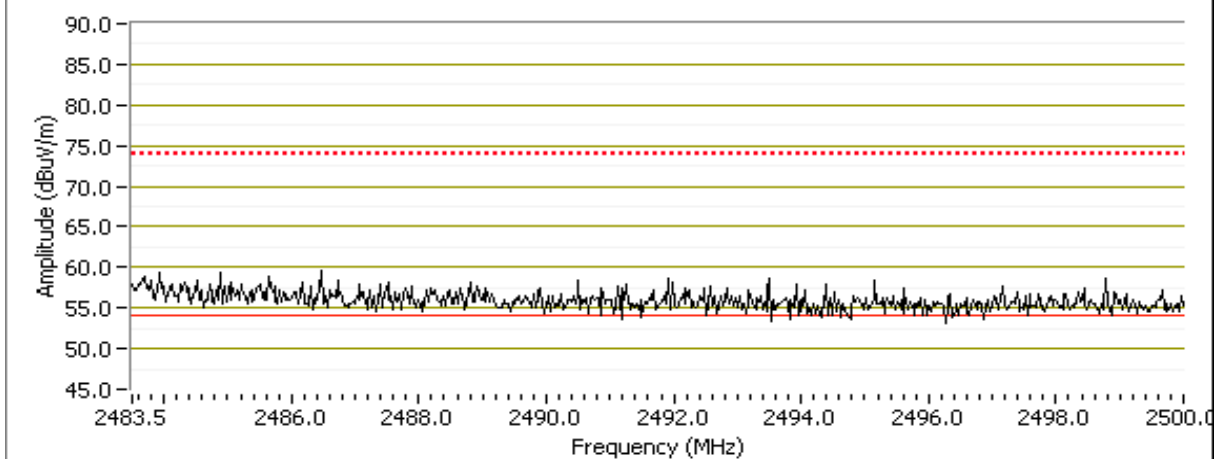


RB 1 MHz; VB 10 Hz BE @ 2483.5 MHz, Avg -V

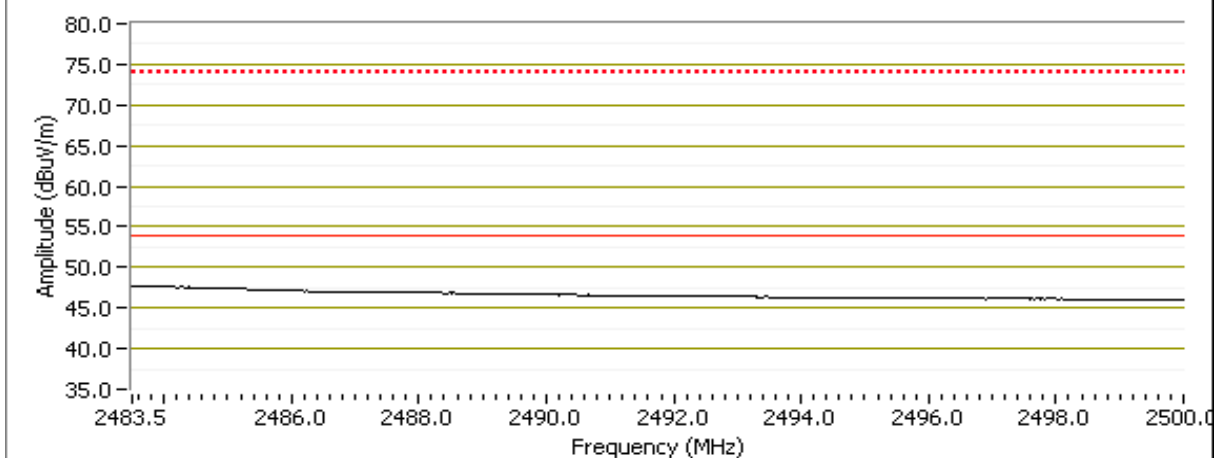


Client:	Ambient Systems	Job Number:	J75672
Model:	Gateway (GW3000)	T-Log Number:	T75760
Contact:	Bob Ashlock	Account Manager:	Christine Krebill
Standard:	FCC 15.247/RSS-210	Class:	N/A

RB 1 MHz; VB 1 MHz BE @ 2483.5 MHz, Peak -H



RB 1 MHz; VB 10 Hz BE @ 2483.5 MHz, Avg -H



Client:	Ambient Systems	Job Number:	J75672
Model:	Gateway (GW3000)	T-Log Number:	T75760
Contact:	Bob Ashlock	Account Manager:	Christine Krebill
Standard:	FCC 15.247/RSS-210	Class:	N/A

Other Spurious Emissions

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBμV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
4909.330	52.3	V	54.0	-1.7	AVG	265	1.0	RB 1 MHz; VB: 10 Hz pwr -1.5
4911.070	59.2	V	74.0	-14.8	PK	265	1.0	RB 1 MHz; VB: 1 MHz pwr -1.5
7363.670	49.5	V	54.0	-4.5	AVG	28	1.5	RB 1 MHz; VB: 10 Hz pwr -1.5
7366.730	57.5	V	74.0	-16.5	PK	28	1.5	RB 1 MHz; VB: 1 MHz pwr -1.5
4909.130	45.8	H	54.0	-8.2	AVG	58	2.1	RB 1 MHz; VB: 10 Hz pwr -1.5
4911.070	53.1	H	74.0	-20.9	PK	58	2.1	RB 1 MHz; VB: 1 MHz pwr -1.5
7366.600	43.9	H	54.0	-10.1	AVG	227	2.1	RB 1 MHz; VB: 10 Hz pwr -1.5
7366.800	52.9	H	74.0	-21.1	PK	227	2.1	RB 1 MHz; VB: 1 MHz pwr -1.5

Note 1: For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 20dB below the level of the fundamental and measured in 100kHz.

Client:	Ambient Systems	Job Number:	J75672
Model:	Gateway (GW3000)	T-Log Number:	T75760
Contact:	Bob Ashlock	Account Manager:	Christine Krebill
Standard:	FCC 15.247/RSS-210	Class:	N/A

RSS 210 and FCC 15.247 (DTS) Antenna Port Measurements Power, PSD, Bandwidth and Spurious Emissions

Test Specific Details

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: 6/25/2009
Test Engineer: Rafael Varelas
Test Location: SVOATS #2

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

General Test Configuration

The EUT was connected to the spectrum analyzer or power meter via a suitable attenuator. All measurements were made on a single chain.

All measurements have been corrected to allow for the external attenuators used.

Ambient Conditions:
Temperature: 12 °C
Rel. Humidity: 81 %

Summary of Results

Run #	Pwr setting	Avg Pwr	Test Performed	Limit	Pass / Fail	Result / Margin
1	-0.4	-	Output Power	15.247(b)	Pass	22.6 dBm
2	-1.5	-	Power spectral Density (PSD)	15.247(d)	Pass	7.3 dBm/3kHz
3	-1.5	-	Minimum 6dB Bandwidth	15.247(a)	Pass	1.6 MHz
3	-1.5	-	99% Bandwidth	RSS GEN	-	2.9 MHz
4	-0.4	-	Spurious emissions	15.247(b)	Pass	All emissions below -30dBc limit

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.

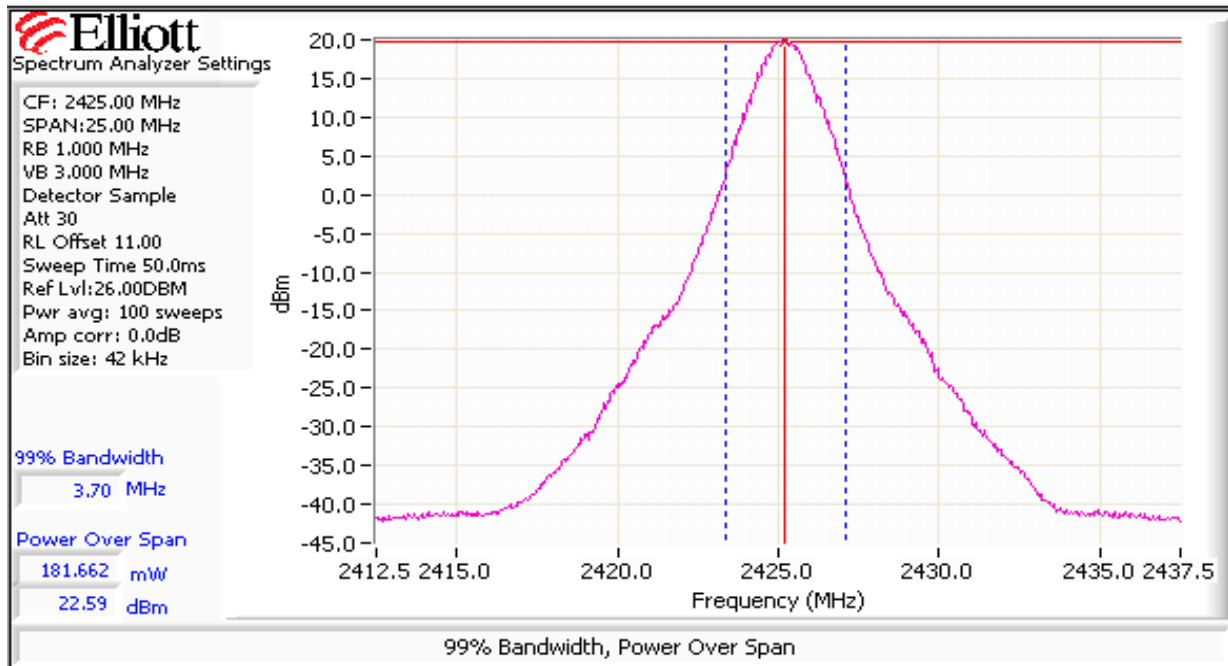
Client: Ambient Systems	Job Number: J75672
Model: Gateway (GW3000)	T-Log Number: T75760
Contact: Bob Ashlock	Account Manager: Christine Krebill
Standard: FCC 15.247/RSS-210	Class: N/A

Run #1: Output Power

Power Setting ²	Frequency (MHz)	Output Power		Antenna Gain (dBi)	Result	EIRP ^{Note 2}		Output Power	
		(dBm) ¹	mW			dBm	W	(dBm) ³	mW
-1.5	2420	21.9	154.9	5.0	Pass	26.9	0.490		
-0.4	2425	22.6	182.0	5.0	Pass	27.6	0.575		
-0.4	2440	22.2	166.0	5.0	Pass	27.2	0.525		
-0.4	2450	22.2	166.0	5.0	Pass	27.2	0.525		
-1.5	2455	21.2	131.8	5.0	Pass	26.2	0.417		

Note 1: Output power measured using a spectrum analyzer (see plots below):
RBW=1MHz, VB=3 MHz, sample detector, power averaging on (transmitted signal was continuous) and power integration over 25 MHz. **Spurious limit is -30dBc because this method was used.**
The output power limit is 30dBm

Note 2: Power setting - the software power setting used during testing, included for reference only.

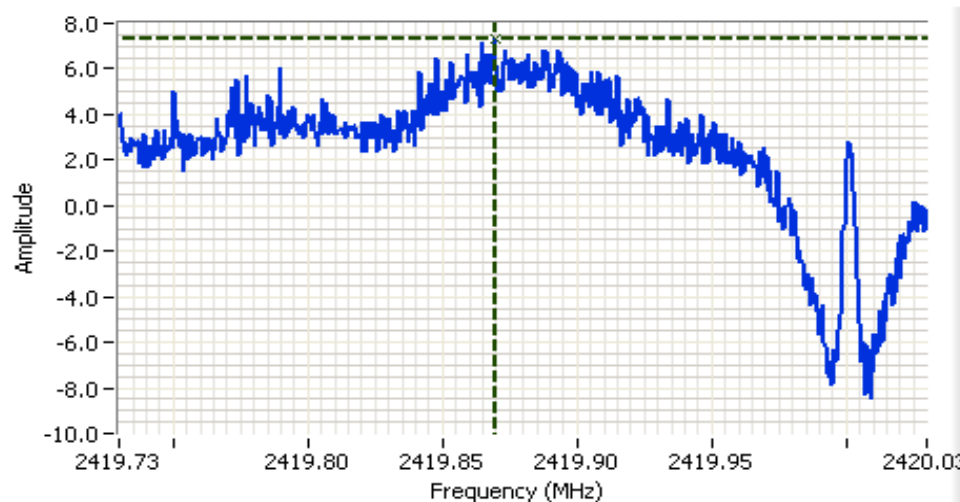


Client: Ambient Systems	Job Number: J75672
Model: Gateway (GW3000)	T-Log Number: T75760
Contact: Bob Ashlock	Account Manager: Christine Krebill
Standard: FCC 15.247/RSS-210	Class: N/A

Run #2: Power spectral Density

Power Setting	Frequency (MHz)	PSD	Limit dBm/3kHz	Result
		(dBm/3kHz) <small>Note 1</small>		
-1.5	2420	7.3	8.0	Pass
-0.4	2425	7.2	8.0	Pass
-0.4	2440	7.1	8.0	Pass
-0.4	2450	6.8	8.0	Pass
-1.5	2455	6.2	8.0	Pass

Note 1: Power spectral density measured using RB=3 kHz, VB=10kHz, analyzer with peak detector and with a sweep time set to ensure a dwell time of at least 1 second per 3kHz. The measurement is made at the frequency of PPSD determined from preliminary scans using RB=3kHz using multiple sweeps at a faster rate over the 6dB bandwidth of the signal.



Analyzer Settings

HP8564E
CF: 2419.880 MHz
SPAN: 300 kHz
RB 3.00 kHz
VB 10.00 kHz
Detector POS
Att 30
RL Offset 11.00
Sweep Time 100.0s
Ref Lvl: 29.00DBM

Comments

PSD = 7.3 dBm/3kHz
2420 MHz

Cursor 1 2419.8694 7.33

0.0000

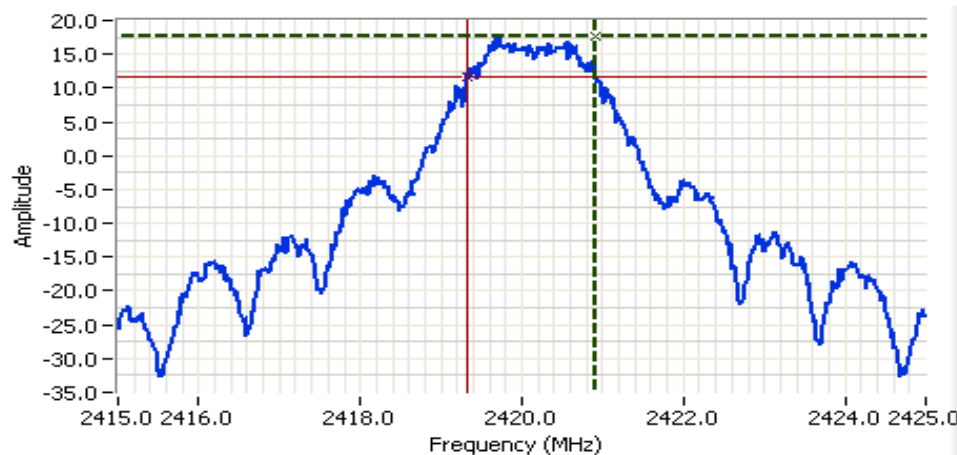
0.00

Client: Ambient Systems	Job Number: J75672
Model: Gateway (GW3000)	T-Log Number: T75760
Contact: Bob Ashlock	Account Manager: Christine Krebill
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Run #3: Signal Bandwidth

Power Setting	Frequency (MHz)	Resolution Bandwidth	Bandwidth (MHz)	
			6dB	99%
-1.5	2420	100kHz	1.6	2.9
-0.4	2425	100kHz	1.7	2.8
-0.4	2440	100kHz	1.6	2.7
-0.4	2450	100kHz	1.6	2.7
-1.5	2455	100kHz	1.6	2.7

Note 1: 99% bandwidth measured in accordance with RSS GEN, with RB > 1% of the span and VB > 3xRB



Analyzer Settings

HP8564E
CF: 2420.000 MHz
SPAN: 10.000 MHz
RB 100 kHz
VB 100 kHz
Detector POS
Att 30
RL Offset 11.00
Sweep Time 50.0ms
Ref Lvl: 29.00DBM

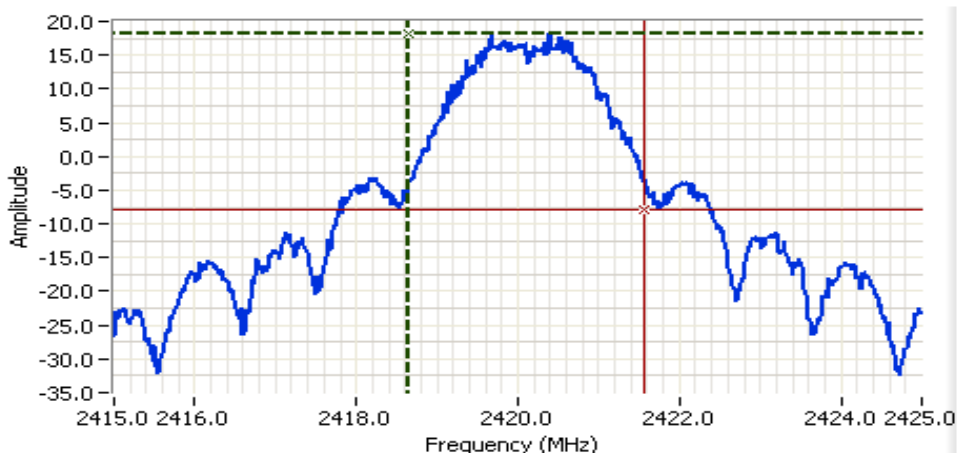
Comments

6dB BW: 1.567 MHz
2420 MHz

Cursor 1	2420.9000	17.67	
Cursor 2	2419.3333	11.67	

Delta Freq. 1.567

Delta Amplitude 6.00



Analyzer Settings

HP8564E
CF: 2420.000 MHz
SPAN: 10.000 MHz
RB 100 kHz
VB 300 kHz
Detector POS
Att 30
RL Offset 11.00
Sweep Time 50.0ms
Ref Lvl: 29.00DBM

Comments

99% BW: 2.912 MHz
2420 MHz

Cursor 1	2418.6439	18.17	
Cursor 2	2421.5557	-7.83	

Delta Freq. 2.912

Delta Amplitude 26.00



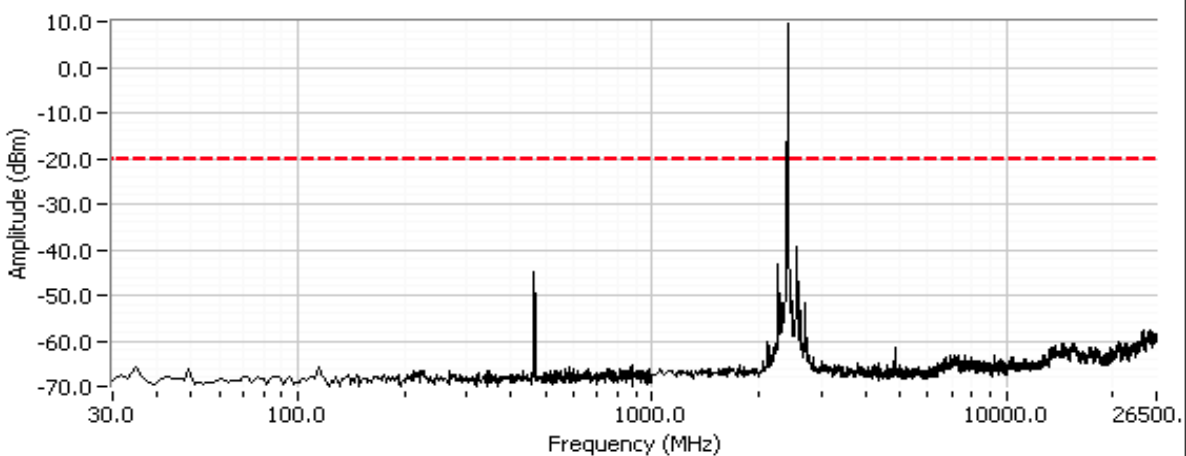
Client: Ambient Systems	Job Number: J75672
Model: Gateway (GW3000)	T-Log Number: T75760
Contact: Bob Ashlock	Account Manager: Christine Krebill
Standard: FCC 15.247/RSS-210	Class: N/A

Run #4: Out of Band Spurious Emissions

Frequency (MHz)	Limit	Result
2420	-30dBc	Pass
2425	-30dBc	Pass
2440	-30dBc	Pass
2450	-30dBc	Pass
2455	-30dBc	Pass

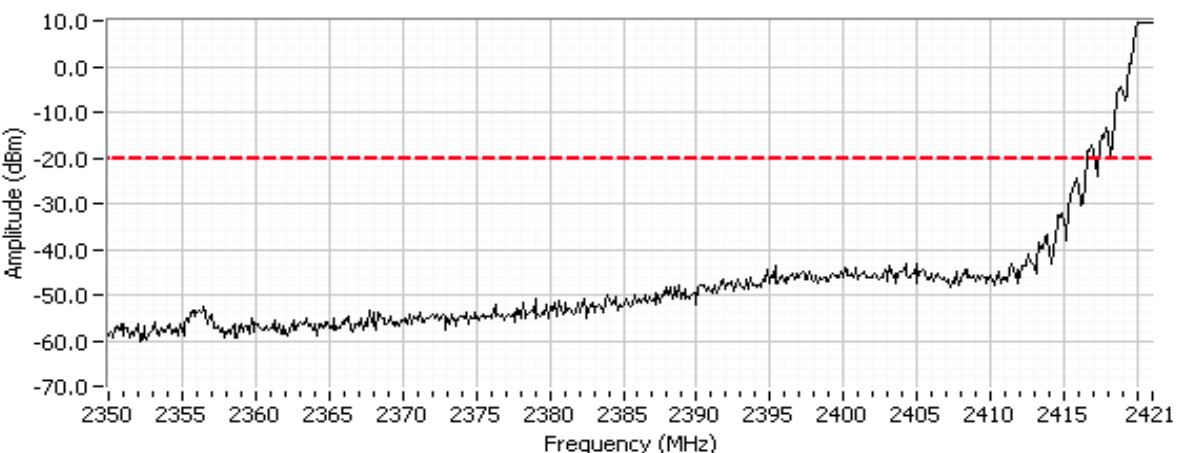
Plots for low channel, power setting(s) = -1.5dBm @ 2420 MHz

Out of Band Spurious Emissions, 2420 MHz



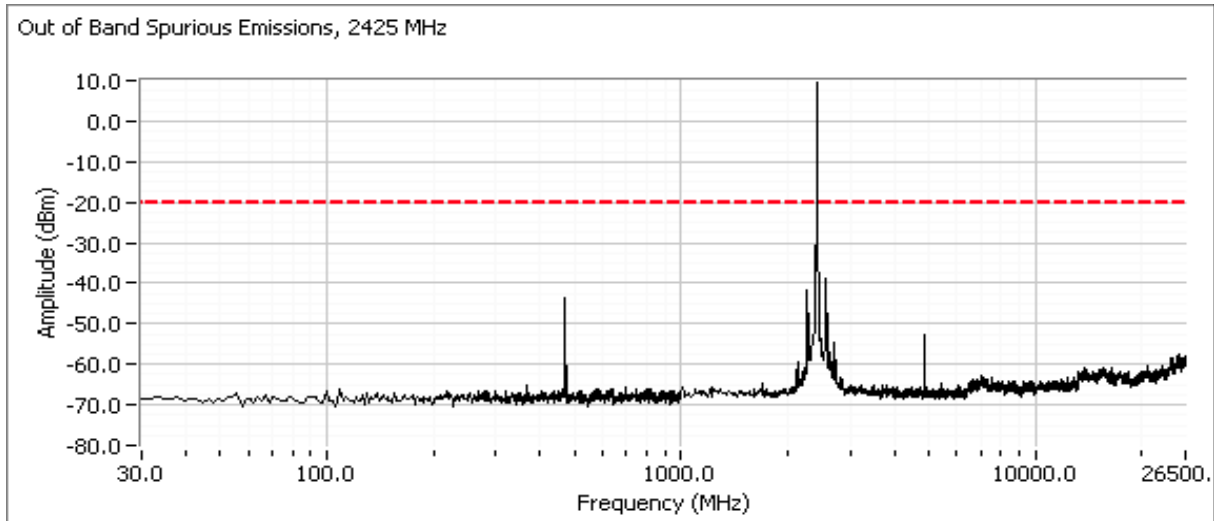
Additional plot showing compliance with -30dBc limit from 2390 MHz to 2400 MHz. Radiated measurements used to show compliance with the limits in the restricted band below 2390 MHz.

Out of Band Spurious Emissions, 2420 MHz

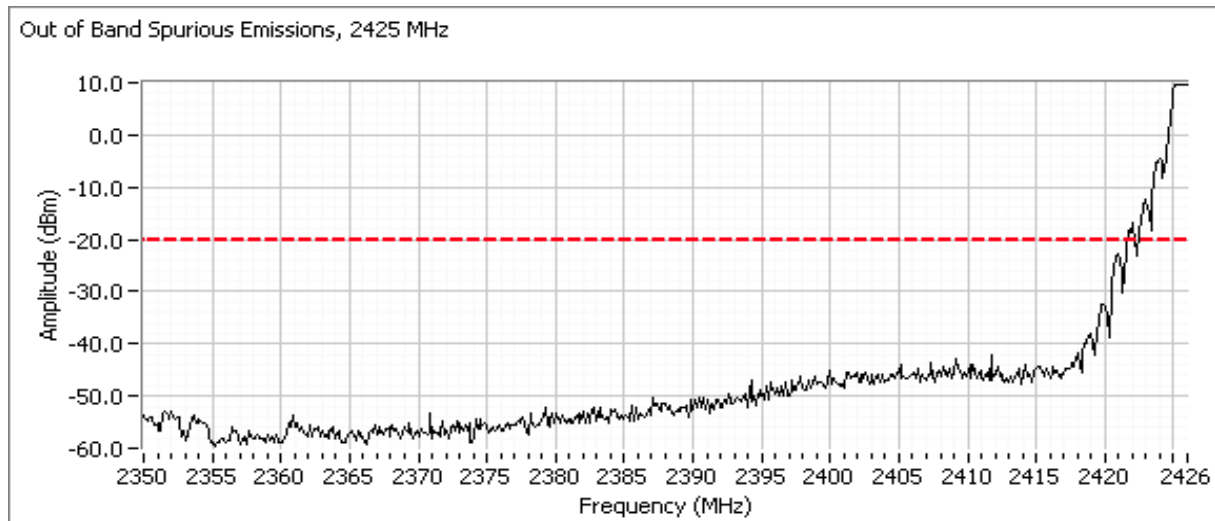


Client: Ambient Systems	Job Number: J75672
Model: Gateway (GW3000)	T-Log Number: T75760
Contact: Bob Ashlock	Account Manager: Christine Krebill
Standard: FCC 15.247/RSS-210	Class: N/A

Plots for low channel, power setting(s) = -0.4dBm @ 2425 MHz

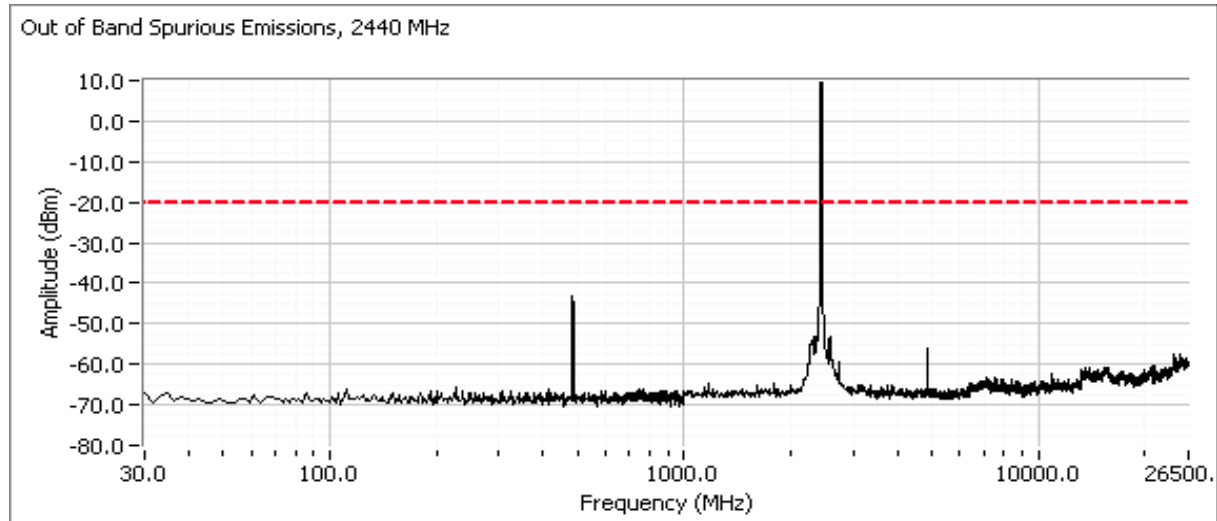


Additional plot showing compliance with -30dBc limit from 2390 MHz to 2400 MHz. Radiated measurements used to show compliance with the limits in the restricted band below 2390 MHz.

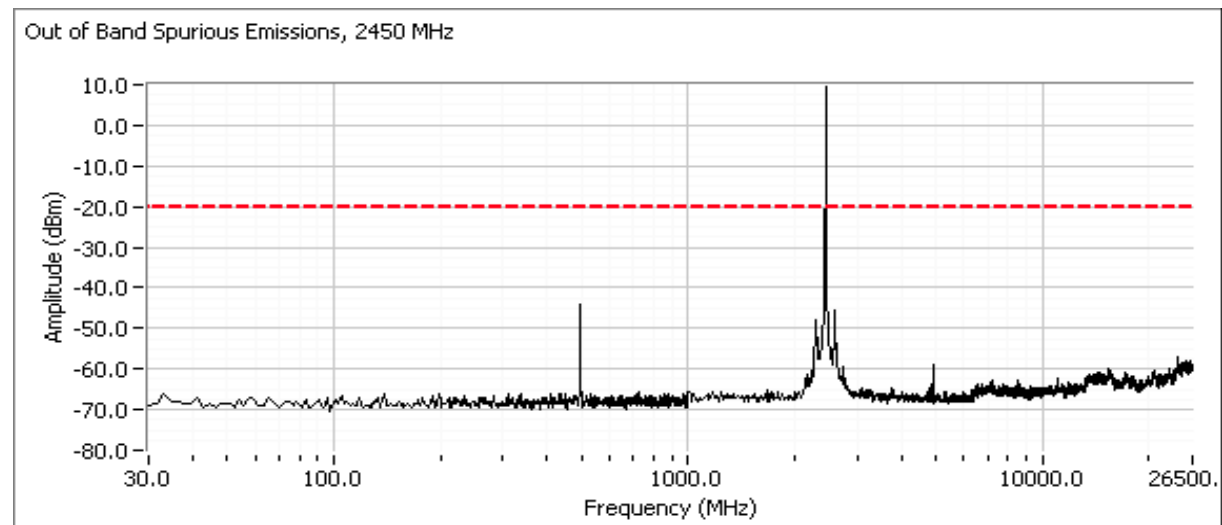


Client: Ambient Systems	Job Number: J75672
Model: Gateway (GW3000)	T-Log Number: T75760
Contact: Bob Ashlock	Account Manager: Christine Krebill
Standard: FCC 15.247/RSS-210	Class: N/A

Plots for center channel, power setting(s) = -0.4dBm @ 2440 MHz

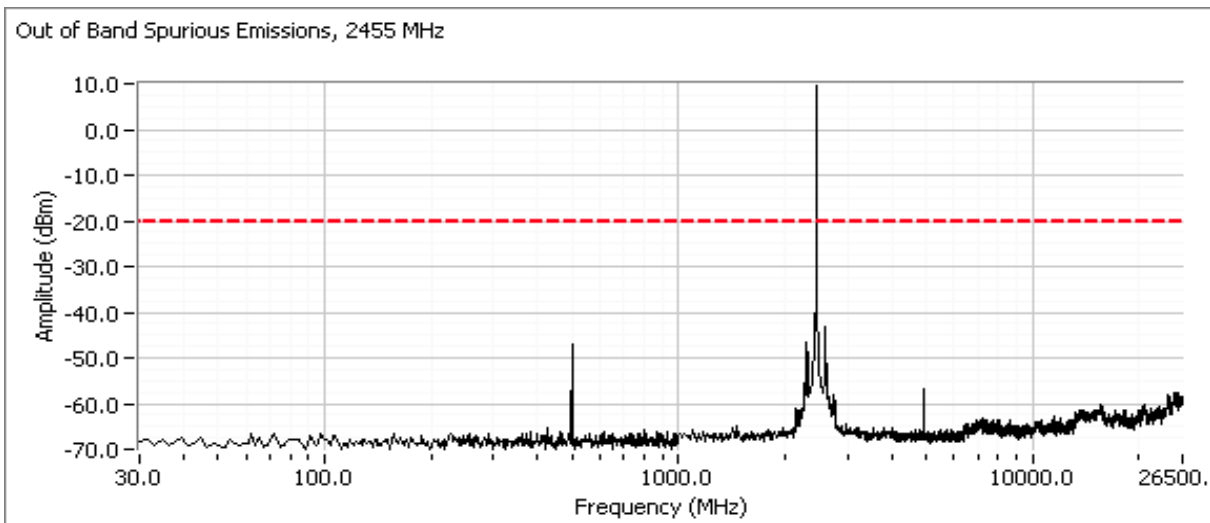


Plots for high channel, power setting(s) = -0.4dBm @ 2450 MHz



Client:	Ambient Systems	Job Number:	J75672
Model:	Gateway (GW3000)	T-Log Number:	T75760
Contact:	Bob Ashlock	Account Manager:	Christine Krebill
Standard:	FCC 15.247/RSS-210	Class:	N/A

Plots for high channel, power setting(s) = -1.5dBm @ 2455 MHz



Appendix C Photographs of Test Configurations

Uploaded as a separate exhibit.

Appendix D Proposed FCC ID Label & Label Location

Uploaded as a separate exhibit.

Appendix E Detailed Photographs

Uploaded as a separate exhibit.

Appendix F Operator's Manual

Uploaded as a separate exhibit.

Appendix G Block Diagram

Uploaded as a separate exhibit.

Appendix H Schematic Diagrams

Uploaded as a separate exhibit.

Appendix I Theory of Operation

Uploaded as a separate exhibit.

Appendix J Advertising Literature

Uploaded as a separate exhibit.

Appendix K RF Exposure Information

Uploaded as a separate exhibit.