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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) FCC Part 15, Subpart E (UNII) and Industry Canada RSS 210 Issue 5 for an Intentional Radiator on the Atheros Communications, Inc. Model: AR5BXB6-M 802.11 a/b/g PCI Express Module

FCC ID:	PPD-AR5BXB6-M
UPN:	4105-AR5BCB6
GRANTEE:	Atheros Communications, Inc. 529 Almanor Sunnyvale, CA 94085
TEST SITE:	Elliott Laboratories, Inc. 684 W. Maude Avenue Sunnyvale, CA 94086
REPORT DATE:	June 29, 2005
FINAL TEST DATE:	June 21, 2005
AUTHORIZED SIGNATORY:	Mark Briggs Principal Engineer

ACCREDITED

2016-01

DECLARATIONS OF COMPLIANCE

Equipment Name and Model:

AR5BXB6-M 802.11 a/b/g PCI Express Module

Manufacturer:

Atheros Communications, Inc.
529 Almanor
Sunnyvale, CA 94085

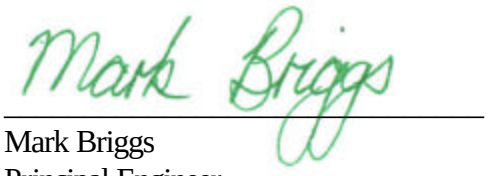
Tested to applicable standards:

RSS-210, Issue 5, November 2001 (Low Power License-Exempt Radiocommunication Devices)
FCC Part 15.247 (DTS)
FCC Part 15 E (UNII)

Measurement Facility Description Filed With Department of Industry:

Departmental Acknowledgement Number: IC2845 **SV1** Dated August 16, 2004
Departmental Acknowledgement Number: IC2845 **SV2** Dated August 16, 2004
Departmental Acknowledgement Number: IC2845 **SV3** Dated August 16, 2004

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 C63.4:2003 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	Principal Engineer
Company	Elliott Laboratories Inc.
Address	684 W. Maude Ave Sunnyvale, CA 94086 USA
Date:	June 29, 2005

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.).

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SCOPE

An electromagnetic emissions test has been performed on the Atheros Communications, Inc. model AR5BXB6-M 802.11 a/b/g PCI Express Module 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 C63.4:2003 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 Atheros Communications, Inc. model AR5BXB6-M 802.11 a/b/g PCI Express Module and therefore apply only to the tested sample. The sample was selected and prepared by Michael Green of Atheros Communications, Inc.

OBJECTIVE

The primary objective of the manufacturer is compliance with Subparts C and E 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 15.247 / RSS 210 6.2.2(o) – 2400 – 2483.5 MHz Band

FCC Part 15 Section	RSS 210 Section	Description	Measured Value	Comments	Result
15.247(a)	6.2.2(o)(b)	Digital Modulation	Systems uses OFDM and DSS techniques	System must utilize a digital transmission technology	Complies
15.247 (a) (2)	6.2.2(o)(b)	6dB Bandwidth	802.11b: 10.1 MHz 802.11g: 16.7 MHz Turbo: 32.0 MHz	Minimum allowed is 500kHz	Complies
	RSP 100	99% Bandwidth	802.11b: 15.8 MHz 802.11g: 17.5 MHz Turbo: 33.8 MHz	For information only	Complies
15.247 (b) (3)	6.2.2(o)(b)	Output Power, (Peak power measurement) 2400 - 2483.5 MHz	802.11b: 20.0 dBm 802.11g: 22.8 dBm Turbo: 22.6 dBm EIRP = 0.436 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	802.11b: -2.6dBm/3kHz 802.11g: -4.0dBm/3kHz Turbo: -6.6dBm/3kHz	Maximum permitted is 8dBm/3kHz	Complies
15.247(c)	6.2.2(o)(e1)	Antenna Port Spurious Emissions – 30MHz – 25 GHz	All spurious emissions < -20dBc	All spurious emissions < -20dBc.	Complies
15.247(c) / 15.209		Radiated Spurious Emissions –30MHz – 25 GHz	53.2dBuV/m (457.1uV/m) @ 2390.0MHz (-0.8dB)	Emissions in restricted bands must meet the radiated emissions limits detailed in 15.207. All others must be < -20dBc	Complies
	7.3, Table 3	Receiver Spurious Emissions –30MHz – 7.5 GHz	38.8dBuV/m (87.1uV/m)) @ 995.400 MHz (-15.2dB)	Used more stringent limit of FCC 15.209	Complies

Note: receive mode emissions below 1 GHz are representative of transmit mode emissions below 1GHz. Preliminary scans in an anechoic chamber of the emissions in transmit mode and receive mode on all operating channels showed no significant differences in the emissions from the EUT and host system's test fixture between the modes.

FCC 15.247 / RSS 210 6.2.2(o) – 5725-5850 MHz Band

FCC Part 15 Section	RSS 210 Section	Description	Measured Value	Comments	Result
15.247(a)	6.2.2(o)(b)	Digital Modulation	Systems uses OFDM techniques	System must utilize a digital transmission technology	Complies
15.247 (a) (2)	6.2.2(o)(b)	6dB Bandwidth	802.11a: 16.5 MHz Turbo: 32.2 MHz	Minimum allowed is 500kHz	Complies
	RSP 100	99% Bandwidth	802.11a: 17.0 MHz Turbo: 33.5 MHz	For information only	Complies
15.247 (b) (3) 15.247	6.2.2(o)(b)	Output Power, (Peak power measurement) 5725 - 5850 MHz	802.11a: 21.5dBm EIRP = 0.48 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	802.11a: -5.5dBkHz Turbo: -7.4dBmHz	Maximum permitted is 8dBm/3kHz	Complies
15.247(c)	6.2.2(o)(e1)	Antenna Port Spurious Emissions – 30MHz – 40 GHz	All spurious emissions < -20dBc	All spurious emissions < -20dBc.	Complies
15.247(c) / 15.209		Radiated Spurious Emissions 30MHz – 40 GHz	51.8dBµV/m (387.7µV/m) @ 11649.0 MHz (-2.2dB)	Emissions in restricted bands subject to 15.207. All others must be < -20dBc	Complies
	7.3, Table 3	Receiver Spurious Emissions 30MHz – 18 GHz	38.8dBuV/m (87.1uV/m)) @ 995.400 MHz (-15.2dB)	Used more stringent limit of LP0002	Complies

Note: receive mode emissions below 1 GHz are representative of transmit mode emissions below 1GHz. Preliminary scans in an anechoic chamber of the emissions in transmit mode and receive mode on all operating channels showed no significant differences in the emissions from the EUT and host system's test fixture between the modes.

FCC 15 E / RSS 210 6.2.2(q1) – 5150 - 5350 MHz Band

FCC Part 15 Section	RSS 210 Section	Description	Comments	Result
15.407(e)		Indoor operation only	The device is not designed for outdoor use and the user is instructed that the device is for indoor use only	COMPLIES
	6.2.2 q(iv)(b)	Peak Spectral Density	Peak power spectral density does not exceed the average by more than 6dB	COMPLIES
15.407(a)(6)		Peak Excursion Ratio	Peak to average excursion 11.7dB	COMPLIES
	6.2.2 q(iv)(c)	Channel Selection	The device was tested on the following channels: 5180, 5240, 5260 and 5320 MHz in 802.11a mode and 5200 and 5290 MHz in turbo mode. These channels represent the highest, lowest and center channels for 802.11a mode and both available turbo channels.	N/A
15.407 (c)	6.2.2 q(iv)(d)	Automatic Discontinuation of Operation in the absence of information to transmit	Operation is discontinued in the absence of information to transmit refer to page 4 of the operational description.	COMPLIES
15.407 (g)	6.2.2 q(iv)(e)	Frequency Stability	Frequency stability is better than 20 ppm, refer to page 4 of the operational description.	COMPLIES
15.407(a) (1)	6.2.2 q1 (i)	99% Bandwidth	17.0 MHz (802.11a) 34.0 MHz (turbo)	N/A
15.407(a) (2)	6.2.2 q1 (ii)	Min. 26dB Bandwidth	28.9 MHz (802.11a) 46.9 MHz (turbo)	N/A
Operation in the 5.15 – 5.25 GHz Band				
15.407(a) (1)	6.2.2 q1 (i)	Output Power (using DA-02-2138)	5150 - 5250: 16.1 dBm	COMPLIES
15.407(a) (1))	6.2.2 q1 (i)	Power Spectral Density	5150 - 5250: 4.0 dBm/MHz	COMPLIES
Operation in the 5.25 – 5.35 GHz Band Note: The device is restricted to indoor use only, therefore the spectral density of spurious emissions in the 5.15 – 5.25 GHz band were limited to the power spectral limits for intentional signals detailed in FCC 15.407(a)(1) and RSS 210 6.2.2 q1 (i)				
15.407(a) (2)	6.2.2 q1 (ii)	Output Power (using DA-02-2138)	5250 - 5350: 16.1dBm	COMPLIES
15.407(a) (2))	6.2.2 q1 (ii)	Power Spectral Density	5250 - 5350: 4.0 dBm/MHz	COMPLIES
Spurious Emissions				
15.407(b) (5) / 15.209	6.2.2 q1 (ii)	Antenna Port Spurious Emissions, 30MHz - 40GHz	All emissions less than -27dBm/MHz	COMPLIES
15.407(b) (5) / 15.209	6.2.2 q1 (ii)	Radiated Spurious Emissions below 1GHz	38.8dBuV/m (87.1uV/m)) @ 995.400 MHz (-15.2dB)	COMPLIES
15.407(b) (2)	6.2.2 q1 (ii)	Radiated Spurious Emissions 1 - 40GHz	53.7dBµV/m (485.8µV/m) @ 10638.7MHz (-1.8dB)	COMPLIES
	7.3, Table 3	Receiver Radiated Spurious Emissions 1 – 18 GHz	38.8dBuV/m (87.1uV/m)) @ 995.400 MHz (-15.2dB)	COMPLIES

Note: receive mode emissions below 1GHz are representative of transmit mode emissions below 1GHz. Preliminary scans in an anechoic chamber of the emissions in transmit mode and receive mode on all operating channels showed no significant differences in the emissions from the EUT and host system's test fixture between the modes.

FCC and RSS 210 Requirements Common To All Operating Bands

FCC Part 15 Section	RSS 210 Section	Description	Measured Value	Comments	Result
15.207		AC Conducted Emissions	48.8dBuV @ 0.225MHz (-13.8dB)		Complies
	6.6	AC Conducted Emissions	29.8dBuV @ 17.82 MHz (-18.2dB)		Complies
15.247 (b) (5)		RF Exposure Requirements	Mobile device with separation distance >=20cm stated in manual	Minimum separation distance of 20cm is sufficient – supported in user manual(s)	Complies
15.203, 15.407 (d)		RF Connector	Antennas will be integrated into the host system	Antennas connect via a non-standard Hirose connector	Complies

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 UKAS document LAB 34.

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 Atheros Communications, Inc. model AR5BXB6-M 802.11 a/b/g PCI Express Module is an 802.11a/b/g wireless adapter designed to connect to a PCI Express port of a PC. As the objective was to obtain a modular approval for the EUT the device was located on an extender card, outside of the host PC. The host PC and module were considered table-top equipment during testing to simulate the end-user environment. The EUT is powered via the host PCs PCI Express interface bus.

The sample was received on June 20, 2005 and tested between June 21 and June 29, 2005. The EUT consisted of the following component(s):

Manufacturer	Model	Description	Serial Number	FCC ID
Atheros	AR5BXB6	802.11 abg PCI Express Module		

OTHER EUT DETAILS

The EUT's antennas connect to the device via a non-standard connector. The EUT has two antenna rf ports (aux and main) designed to provide spatial diversity. The antennas are designed to be installed above the display of the host laptop. Two different antennas were evaluated, as detailed below.

The radio utilizes a WNC W/N-S-1.13-300W- (2-2-1) & 300B-(2-2-1) Omni directional antenna, which has a maximum antenna gain of 3.6dBi (Including cable loss) at 2.4GHz band, and gain of 4.8dBi (Including cable loss) at 5.8GHz band. The radio also utilizes a WNC WN-S-1.37-300W- (2-2-1) & 300B-(2-2-1) Omni directional antenna, which has a maximum antenna gain of 5.6dBi (including cable loss) at 5.2GHz band. All other lower gain antennas of the same type that may be used with this module are listed in a separate document.

The model AR5BXB6-M is electrically identical to the Atheros module AR5BXB6. the only difference is that the model AR5BXB6 is BIOS locked to allow after-market installation of the module into specific host devices.

ENCLOSURE

The EUT does not have an enclosure. It does have a shield over the rf circuits.

MODIFICATIONS

The EUT did not require modifications during testing in order to comply with the emission specifications.

SUPPORT EQUIPMENT

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

Manufacturer	Model	Description	Serial Number	FCC ID
IBM	Thinkpad S141-020	Laptop PC	AA-GHOWK	-

EUT INTERFACE PORTS

The EUT was connected into the PCI Express bus of the laptop via an extender card installed in the PC-Card slot of the IBM laptop.

EUT OPERATION DURING TESTING

The EUT was either in a continuous transmit mode (actually, a mode with a > 99% duty cycle referenced by the ART software as "Frame") or in a continuous receive mode. For transmit mode tests the data rate was set to 1Mb/s (802.11b), 6Mb/s (802.11g and 802.11a) or 12 Mb/s (turbo). These data rates produced the highest PSD in their respective modes.

Spurious emissions were measured using the highest gain antenna for the frequency band under test. Additional measurements at harmonics were made on the channel in each band with the highest emissions using the other antenna.

ANTENNA REQUIREMENTS

The antenna port is a non standard, Hirose connector, which meets the requirements of 15.203.

TEST SITE

GENERAL INFORMATION

Final test measurements were taken on June 21, 2005at the Elliott Laboratories Open Area Test Site #1 & 2 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 C63.4:2003. 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. The test site is maintained free of conductive objects within the CISPR defined elliptical area incorporated in ANSI C63.4:2003 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 C63.4:2003 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 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 C63.4:2003 , 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

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:

$$R_r = C$$

and

$$C - S = M$$

where:

R_r = Receiver Reading in dBuV

C = Corrected 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, 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

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Conducted Emissions - AC Power Ports

Manufacturer	Description	Model #	Asset #	Cal Due
Rohde& Schwarz	Pulse Limiter	ESH3 Z2	812	11-Feb-06
Fischer Custom Comm.	LISN, Freq. 0.9 -30 MHz,16 Amp	FCC-LISN-50/250-16-2	1079	01-Jul-05
Rohde & Schwarz	Test Receiver, 9kHz-2750MHz	ESCS 30	1337	12-Jan-06

Radiated Emissions, 30 - 40,000 MHz

Manufacturer	Description	Model #	Asset #	Cal Due
Elliott Laboratories	Tunable Dipole Antenna	(White)(30-60 MHz)	343	07-Apr-06
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	785	26-Apr-06
Hewlett Packard	EMC Spectrum Analyzer, 9KHz - 22GHz	8593EM	1319	28-Mar-06
EMCO	Biconical Antenna, 30-300 MHz	3110B	1320	25-Aug-05
EMCO	Log Periodic Antenna, 0.2-2 GHz	3148	1321	30-Mar-07
Rohde & Schwarz	Test Receiver, 0.009-2750 MHz	ESN	1332	23-May-06
ETS-Lindgren	Horn Antenna, D. Ridge 1-18GHz	3117	1662	11-Apr-06
Hewlett Packard	Microwave EMI test system, □1-26.5 GHz	84125B	1145	11-Jul-05

Frequency range, Carrier Frequency, Power, 06-Jul-05

Manufacturer	Description	Model #	Asset #	Cal Due
Rohde & Schwarz	Power Sensor 100uW - 10 Watts	NRV-Z53	1236	01-Mar-06
Rohde & Schwarz	Power Meter, Single Channel	NRVS	1290	09-May-06
Agilent	Spectrum analyzer, 9kHz - 26 GHz	8563E	WC 1033	17-Feb-06

EXHIBIT 2: Test Data Log Sheets

ELECTROMAGNETIC EMISSIONS

TEST LOG SHEETS

AND

MEASUREMENT DATA

T60077 70 Pages

Elliott

EMC Test Data

Client:	Atheros	Job Number:	J59977
Model:	AR5BXB6 802.11 a/b/g PCI Express Module	T-Log Number:	T60077
		Account Manager:	Joe Rohlfes
Contact:	Michael Green		
Emissions Spec:	FCC 15E,15.247	Class:	n/a
Immunity Spec:	-	Environment:	n/a

EMC Test Data

For The

Atheros

Model

AR5BXB6 802.11 a/b/g PCI Express Module

Date of Last Test: 7/6/2005

Client:	Atheros	Job Number:	J59977
Model:	AR5BXB6 802.11 a/b/g PCI Express Module	T-Log Number:	T60077
		Account Manager:	Joe Rohlfes
Contact:	Michael Green		
Emissions Spec:	FCC 15E,15.247	Class:	n/a
Immunity Spec:	-	Environment:	n/a

EUT INFORMATION

General Description

The EUT is an 802.11a/b/g wireless adapter designed to connect to a PCI Express port of a PC. As the objective was to obtain a modular approval for the EUT the device was located on an extender card, outside of the host PC. Additional digital device emissions tests were performed with the EUT installed inside a host PC. The host PC was, therefore, treated as tabletop equipment during testing to simulate the end-user environment. The EUT is powered via the host PCs PCI Express interface bus.

Equipment Under Test

Manufacturer	Model	Description	Serial Number	FCC ID
Atheros	AR5BXB6	802.11 abg/USB adapter	Prototype	-
Atheros	AR5BXB6	802.11 abg/USB adapter	Prototype	-

EUT Antenna

The EUT's antennas connect to the device via a non-standard (Hirose) connector. The EUT has two antenna rf ports (aux and main) designed to provide spatial diversity. The antennas are designed to be installed above the display of the host laptop. Two different antennas were evaluated, as detailed below.

The radio was tested with:
WNC W/N-S-1.13-300W-(2-2-1) & 300B-(2-2-1) Omnidirectional antenna, which has a maximum antenna gain of 3.6dBi (including cable loss) at 2.4GHz, and a gain of 4.8dBi (including cable loss) at 5.8GHz;
WNC WN-S-1.37-300W-(2-2-1) & 300B-(2-2-1) Omnidirectional antenna, which has a maximum antenna gain of 5.6dBi (including cable loss) at 5.2GHz.
All other lower gain antennas of the same type that may be used with this module are listed in a separate document.

EUT Enclosure

The EUT does not have an enclosure. It does have a shield over the rf circuits.

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:	Atheros	Job Number:	J59977
Model:	AR5BXB6 802.11 a/b/g PCI Express Module	T-Log Number:	T60077
		Account Manager:	Joe Rohlfes
Contact:	Michael Green		
Emissions Spec:	FCC 15E,15.247	Class:	n/a
Immunity Spec:	-	Environment:	n/a

Test Configuration #1

Local Support Equipment

Manufacturer	Model	Description	Serial Number	FCC ID
IBM		Laptop		DoC

Interface Cabling and Ports

Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length(m)
None				

EUT connected to the host system via an extender card installed in the top PCCard slot. The EUT was tested outside of a host system as it is being tested to obtain a modular approval for the FCC.

EUT Operation During Emissions Tests

During testing the device was transmitting continuously or in a continuous receive mode on the channel specified. For transmit-mode tests the data rates were set to 1Mb/s for 802.11b mode, 6Mb/s for 802.11a mode and 12Mb/s for turbo mode.

Client:	Atheros	Job Number:	J59977
Model:	AR5BXB6 802.11 a/b/g PCI Express Module	T-Log Number:	T60077
		Account Manager:	Joe Rohlfes
Contact:	Michael Green		
Spec:	FCC 15E,15.247	Class:	n/a

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: 4/20/2005
Test Engineer: Mehran Birgani
Test Location: SVOATS #2
Config. Used: 1
Config Change: None
EUT Voltage: Host System

General Test Configuration

The EUT was 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: 20 °C
Rel. Humidity: 58 %

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	CE, AC Power, 230V/50Hz	EN55022 Class B	Pass	40.7dBµV @ 22.025MHz (-9.3dB)
2	CE, AC Power,120V/60Hz	EN55022 Class B	Pass	48.8dBµV @ 0.225MHz (-13.8dB)
3	CE, AC Power,120V/60Hz	RSS 210	Pass	48.8dBµV @ 0.225MHz (-13.8dB)

AC conducted emissions were independent of operating frequency and mode, therefore all final measurements made with the EUT operating at 5320 MHz.

Modifications Made During Testing:

No modifications were made to the EUT during testing

Deviations From The Standard

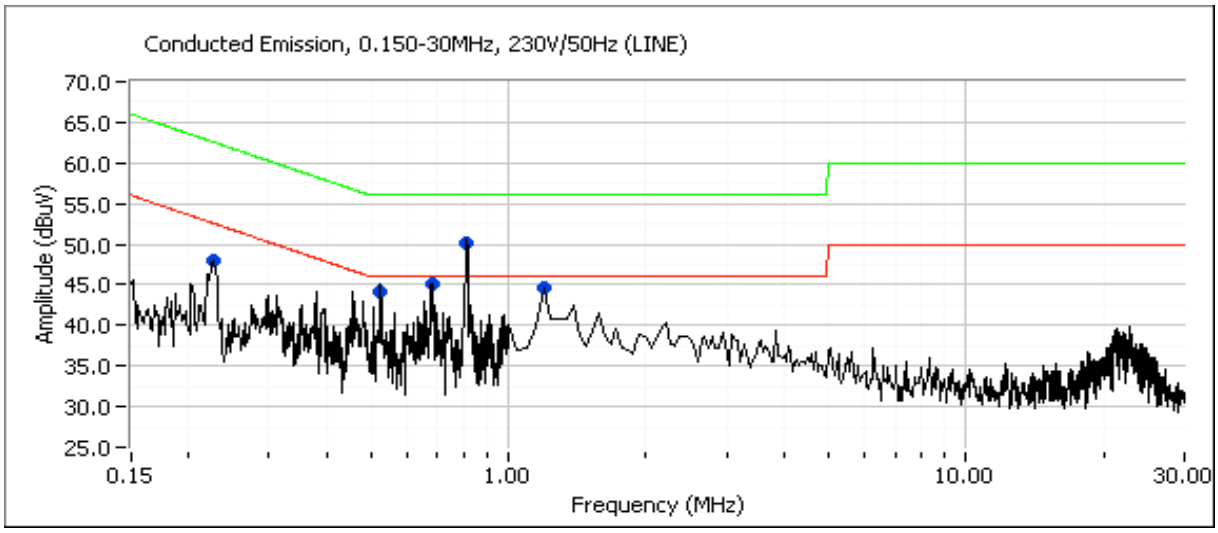
No deviations were made from the requirements of the standard.

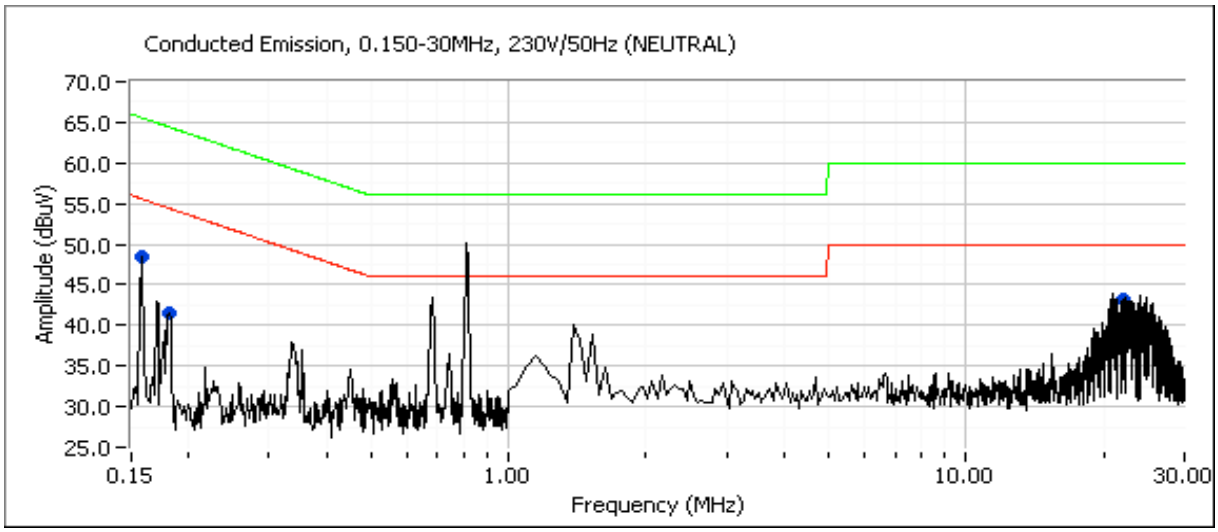
EMC Test Data

Client:	Atheros	Job Number:	J59977
Model:	AR5BXB6 802.11 a/b/g PCI Express Module	T-Log Number:	T60077
		Account Manager:	Joe Rohlfes
Contact:	Michael Green		
Spec:	FCC 15E,15.247	Class:	n/a

Run #1: AC Power Port Conducted Emissions, 0.15 - 30MHz, 230V/50Hz

Configuration: 802.11a Mode, 5320 MHz and Tx Mode





Elliott

EMC Test Data

Client:	Atheros	Job Number:	J59977
Model:	AR5BXB6 802.11 a/b/g PCI Express Module	T-Log Number:	T60077
		Account Manager:	Joe Rohlfes
Contact:	Michael Green		
Spec:	FCC 15E,15.247	Class:	n/a

Run #1: AC Power Port Conducted Emissions, 0.15 - 30MHz, 230V/50Hz

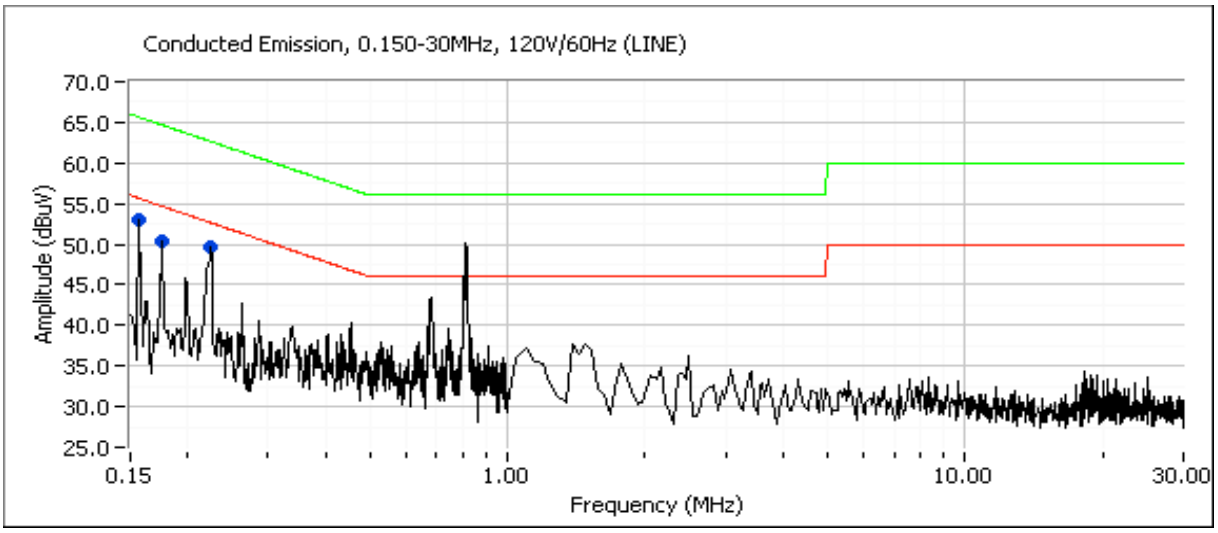
Configuration: 802.11a Mode, 5320 MHz and Tx Mode

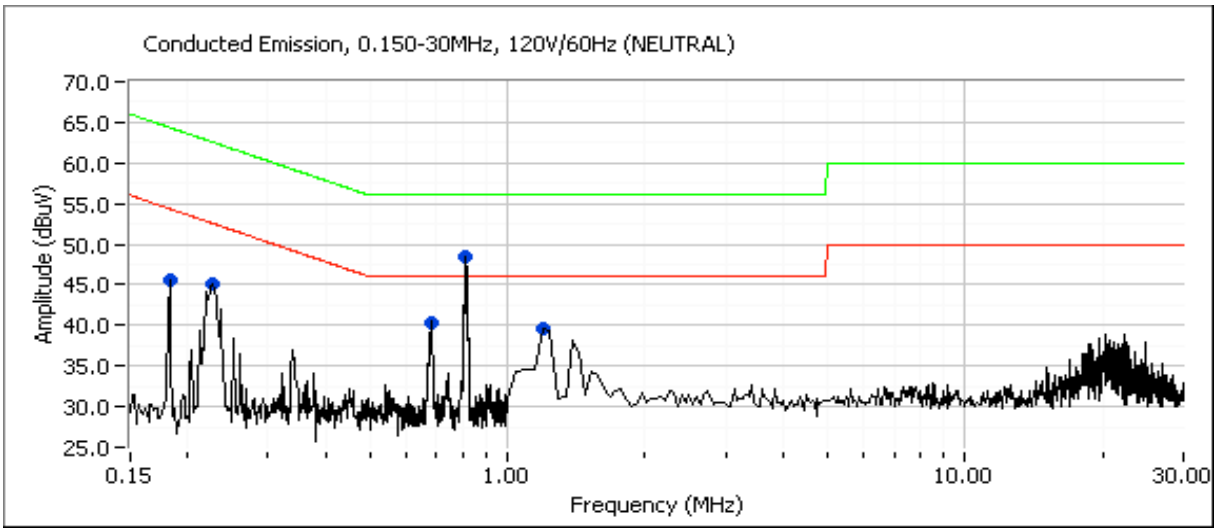
Frequency	Level	AC	EN55022 Class B		Detector	Comments
MHz	dBµV	Line	Limit	Margin	QP/Ave	
22.025	40.7	Neutral	50.0	-9.3	Average	
0.225	45.2	Line	62.6	-17.4	QP	
22.025	42.4	Neutral	60.0	-17.6	QP	
0.223	40.8	Neutral	62.7	-21.9	QP	
0.223	29.1	Neutral	52.7	-23.6	Average	
0.225	28.5	Line	52.6	-24.1	Average	
0.561	18.5	Line	46.0	-27.5	Average	
0.561	26.6	Line	56.0	-29.4	QP	
0.813	43.0	Line	56.0	-13.0	QP	Ambient
0.813	39.6	Line	46.0	-6.4	Average	Ambient
0.680	42.4	Line	56.0	-13.6	QP	Ambient
0.680	39.1	Line	46.0	-6.9	Average	Ambient
1.168	40.5	Line	56.0	-15.5	QP	Ambient
1.168	35.9	Line	46.0	-10.1	Average	Ambient

Client:	Atheros	Job Number:	J59977
Model:	AR5BXB6 802.11 a/b/g PCI Express Module	T-Log Number:	T60077
		Account Manager:	Joe Rohlfes
Contact:	Michael Green		
Spec:	FCC 15E,15.247	Class:	n/a

Run #2: AC Power Port Conducted Emissions, 0.15 - 30MHz, 120V/60Hz

Configuration: 802.11a Mode, 5320 MHz and Tx Mode





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EMC Test Data

Client:	Atheros	Job Number:	J59977
Model:	AR5BXB6 802.11 a/b/g PCI Express Module	T-Log Number:	T60077
		Account Manager:	Joe Rohlfes
Contact:	Michael Green		
Spec:	FCC 15E,15.247	Class:	n/a

Run #2: AC Power Port Conducted Emissions, 0.15 - 30MHz, 120V/60Hz

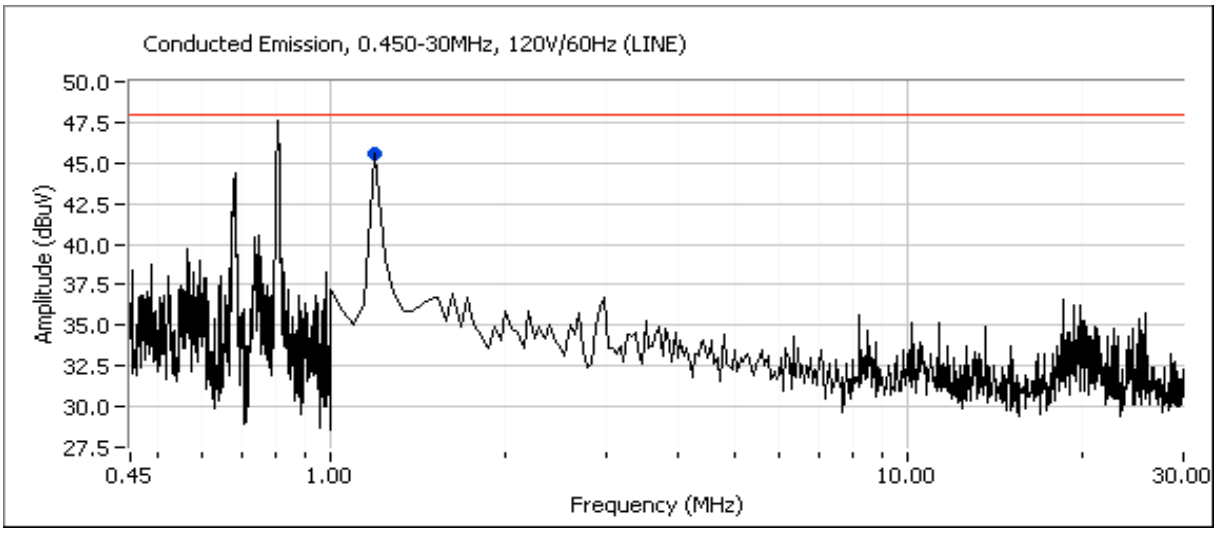
Configuration: 802.11a Mode, 5320 MHz and Tx Mode

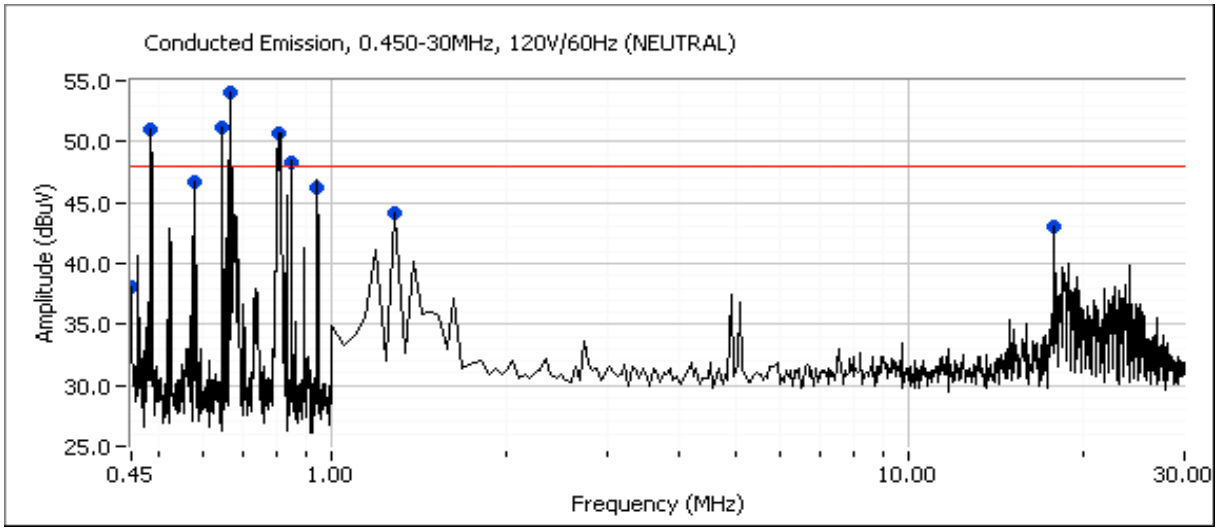
Frequency	Level	AC	EN55022 Class B		Detector	Comments
MHz	dBµV	Line	Limit	Margin	QP/Ave	
0.225	48.8	Line	62.6	-13.8	QP	
0.225	34.5	Line	52.6	-18.1	Average	
0.227	43.2	Neutral	62.6	-19.4	QP	
0.227	31.4	Neutral	52.6	-21.2	Average	
0.157	42.6	Line	65.6	-23.0	QP	
0.176	40.1	Line	64.7	-24.6	QP	
0.181	34.8	Neutral	64.4	-29.6	QP	
0.668	13.6	Neutral	46.0	-32.4	Average	
0.668	19.1	Neutral	56.0	-36.9	QP	
0.176	11.2	Line	54.7	-43.5	Average	
0.157	12.0	Line	55.6	-43.6	Average	
0.181	6.5	Neutral	54.4	-47.9	Average	

Client:	Atheros	Job Number:	J59977
Model:	AR5BXB6 802.11 a/b/g PCI Express Module	T-Log Number:	T60077
		Account Manager:	Joe Rohlfes
Contact:	Michael Green		
Spec:	FCC 15E,15.247	Class:	n/a

Run #3: AC Power Port Conducted Emissions, 0.45 - 30MHz, 120V/60Hz

Configuration: 802.11a Mode, 5320 MHz and Tx Mode





Client:	Atheros	Job Number:	J59977
Model:	AR5BXB6 802.11 a/b/g PCI Express Module	T-Log Number:	T60077
		Account Manager:	Joe Rohlfes
Contact:	Michael Green		
Spec:	FCC 15E,15.247	Class:	n/a

Run #3: AC Power Port Conducted Emissions, 0.15 - 30MHz, 120V/60Hz

Configuration: 802.11a Mode, 5320 MHz and Tx Mode

Frequency	Level	AC	RSS 210		Detector	Comments
MHz	dBµV	Line	Limit	Margin	QP/Ave	
17.820	29.8	Neutral	48.0	-18.2	QP	
0.450	28.4	Line	48.0	-19.6	QP	
0.450	26.6	Neutral	48.0	-21.4	QP	
0.559	24.3	Line	48.0	-23.7	QP	
0.563	24.3	Neutral	48.0	-23.7	QP	
0.677	16.5	Neutral	48.0	-31.5	QP	
0.487	15.0	Neutral	48.0	-33.0	QP	
1.238	12.3	Line	48.0	-35.7	QP	
1.290	10.6	Neutral	48.0	-37.4	QP	
0.648	9.4	Neutral	48.0	-38.6	QP	
0.943	8.0	Neutral	48.0	-40.0	QP	
0.808	45.0	Neutral	48.0	-3.0	QP	Ambient

Client:	Atheros	Job Number:	J59977
Model:	AR5BXB6 802.11 a/b/g PCI Express Module	T-Log Number:	T60077
		Account Manager:	Joe Rohlfes
Contact:	Michael Green		
Spec:	FCC 15E,15.247	Class:	n/a

Radiated Emissions - Receiver

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: 6/20/2005
Test Engineer: Mehran Birgani
Test Location: SVOATS #1
Config. Used: 1
Config Change: None
EUT Voltage: 120V/60Hz

General Test Configuration

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

The test distance and extrapolation factor (if used) 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.

Note, for testing above 1 GHz, the FCC specifies the limit as an average measurement. In addition, the FCC states that the peak reading of any emission above 1 GHz, can not exceed the average limit by more than 20 dB.

Ambient Conditions:

Temperature: 22 °C
Rel. Humidity: 44 %

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	RE, 1000 - 18000 MHz, Maximized Emissions	RSS 210	Pass	30.1dBµV/m (31.9µV/m) @ 1196.2MHz (-23.9dB)
2	RE, 30 - 1000 MHz, Maximized Emissions	RSS 210	Pass	38.8dBµV/m (87.1µV/m) @ 995.400MHz (-15.2dB)

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.

Elliott

EMC Test Data

Client:	Atheros	Job Number:	J59977
Model:	AR5BXB6 802.11 a/b/g PCI Express Module	T-Log Number:	T60077
		Account Manager:	Joe Rohlfes
Contact:	Michael Green		
Spec:	FCC 15E,15.247	Class:	n/a

Run #1: Maximized readings, 1000 - 40000 MHz : Receive Mode

Date of Test: 6/20/2005
Test Engineer: Mehran Birgani
Test Location: SVOATS #1

Config. Used: #1
Config Change: -
EUT Voltage: 120V/60Hz

Frequency	Level	Pol	RSS 210		Detector	Azimuth	Height	Comments
MHz	dBµV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
1196.230	30.1	V	54.0	-23.9	Avg	104	1.7	
1196.230	29.9	H	54.0	-24.1	Avg	233	2.1	
2490.030	29.9	H	54.0	-24.1	Avg	327	2.3	
2490.030	29.3	V	54.0	-24.7	Avg	196	1.0	
4997.780	28.5	H	54.0	-25.5	Avg	73	1.0	
4997.780	47.5	H	74.0	-26.5	Pk	233	2.1	
1199.963	26.5	V	54.0	-27.5	Avg	130	2.2	
1199.963	45.8	V	74.0	-28.2	Pk	130	2.2	
2491.920	45.2	V	74.0	-28.8	Pk	104	1.7	
2491.920	45.1	V	74.0	-28.9	Pk	196	1.0	
4991.365	45.0	H	74.0	-29.0	Pk	327	2.3	
4991.365	41.6	H	74.0	-32.4	Pk	73	1.0	

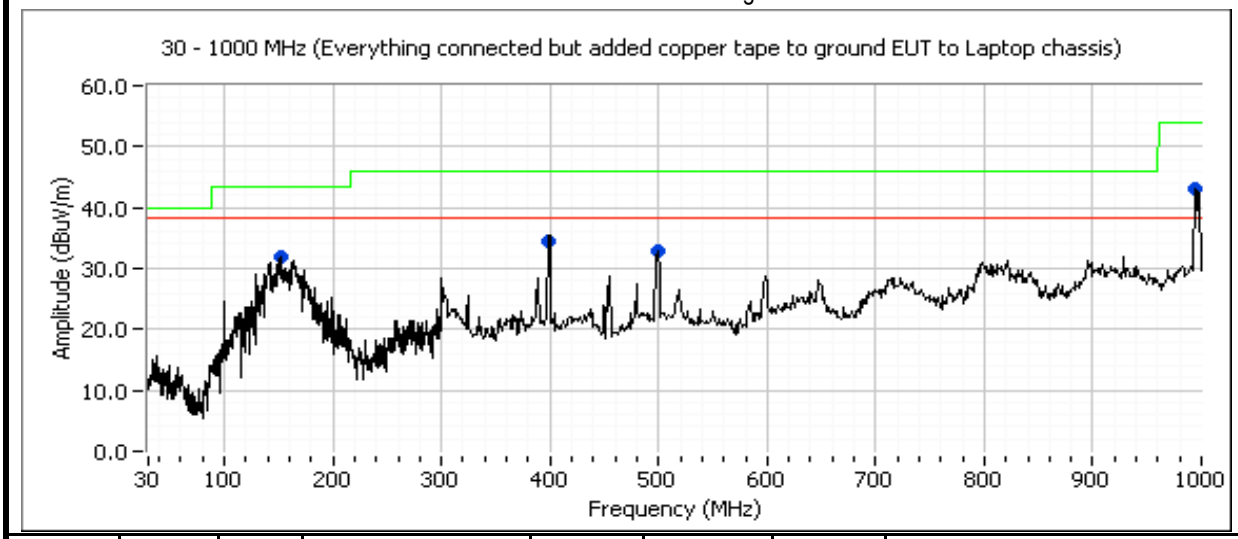
Note 1:	No other signals observed within 20dB of the limit line. Signals above were independent of receive channel. The measurements above were made with the device operating in receive mode on the center channel in the 2.4 GHz band. The device was scanned operating on the top/bottom channels in the 2.4 GHz band and the 5GHz bands. No other significant emissions were observed on these channels.
Note 2:	Limit used is the FCC 15.209 limit which is more stringent than the RSS 210 limit

EMC Test Data

Client:	Atheros	Job Number:	J59977
Model:	AR5BXB6 802.11 a/b/g PCI Express Module	T-Log Number:	T60077
		Account Manager:	Joe Rohlfes
Contact:	Michael Green		
Spec:	FCC 15E,15.247	Class:	n/a

Run #2: Preliminary Radiated Emissions, 30-1000 MHz

Date of Test: 6/22/2005 Config. Used: #1
Test Engineer: Juan Martinez Config Change: -
Test Location: Chamber #2 Host Unit Voltage 120V/60Hz



Frequency	Level	Pol	FCC B		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
151.500	31.9	V	43.5	-11.6	Peak	360	1.7	
399.167	34.5	H	46.0	-11.5	Peak	181	1.7	
499.500	33.0	H	46.0	-13.0	Peak	31	1.7	
994.167	43.0	V	54.0	-11.1	Peak	269	1.7	

Maximized Readings from Run #2

Date of Test: 6/24/2005 Config. Used: #1
Test Engineer: Rafael Varelas Config Change: -
Test Location: SVOATS #2 Host Unit Voltage 120V/60Hz

Frequency	Level	Pol	FCC B		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
995.400	38.8	V	54.0	-15.2	QP	320	1.0	
167.100	27.3	V	43.5	-16.2	QP	297	1.0	Broadband
499.500	28.3	H	46.0	-17.7	QP	210	1.0	
400.115	23.2	H	46.0	-22.8	QP	15	1.6	

Client:	Atheros	Job Number:	J59977
Model:	AR5BXB6 802.11 a/b/g PCI Express Module	T-Log Number:	T60077
		Account Manager:	Joe Rohlfes
Contact:	Michael Green		
Spec:	FCC 15E,15.247	Class:	N/A

FCC 15.247 DTS - Power, Bandwidth and Spurious Emissions

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: 6/21/2005 Config. Used: 1
Test Engineer: Mehran Birgani Config Change: None
Test Location: SVOATS #1 Host Unit Voltage 120V/60Hz

General Test Configuration

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:

Temperature: 20 °C
Rel. Humidity: 45 %

Summary of Results

Run #	Test Performed	Limit	Pass / Fail	Result / Margin
1	Antenna Port Spurious Emissions 30 - 25000 MHz	FCC Part 15.209 / 15.247(c)	Pass	All emissions more than 20dB below in-band level
2	Bandwidth (802.11b)	15.247(a)	Pass	6dB: 10.1 MHz 99%: 15.8 MHz
2	Bandwidth (802.11g)	15.247(a)	Pass	6dB: 16.7 MHz 99%: 17.5 MHz
2	Bandwidth (Turbo)	15.247(a)	Pass	6dB: 32.0 MHz 99%: 33.8 MHz
3	Output Power (802.11b)	15.247(b)	Pass	20dBm (0.10W)
3	Output Power (802.11g)	15.247(b)	Pass	22.8dBm (0.19W)
3	Output Power (Turbo)	15.247(b)	Pass	22.6dBm (0.18W)
4	Power Spectral Density (PSD)	15.247(d)	Pass	.11b: -2.6dBm/3kHz .11g: -4.0dBm/3kHz Turbo: -6.6dBm/3kHz

Modifications Made During Testing:

No modifications were made to the EUT during testing

Client:	Atheros	Job Number:	J59977
Model:	AR5BXB6 802.11 a/b/g PCI Express Module	T-Log Number:	T60077
		Account Manager:	Joe Rohlfes
Contact:	Michael Green		
Spec:	FCC 15E,15.247	Class:	N/A

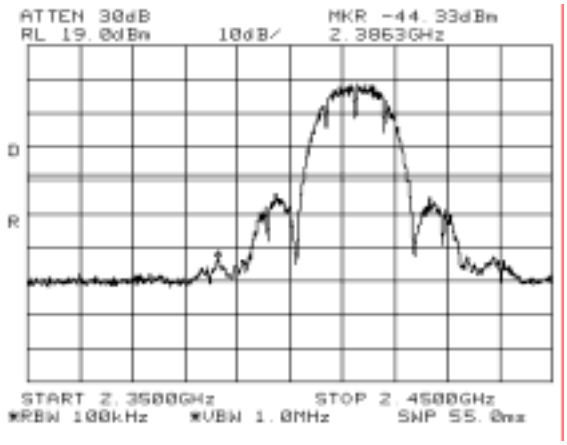
Deviations From The Standard

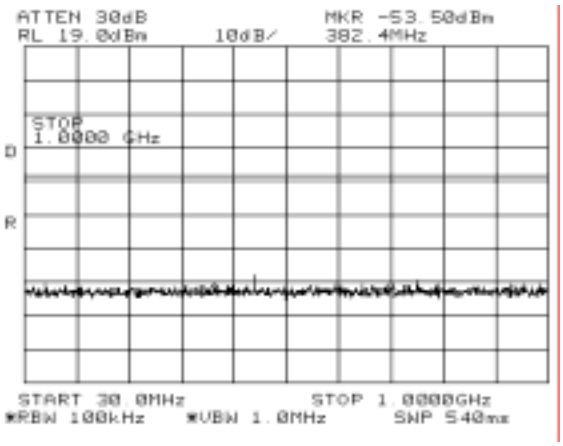
No deviations were made from the requirements of the standard.

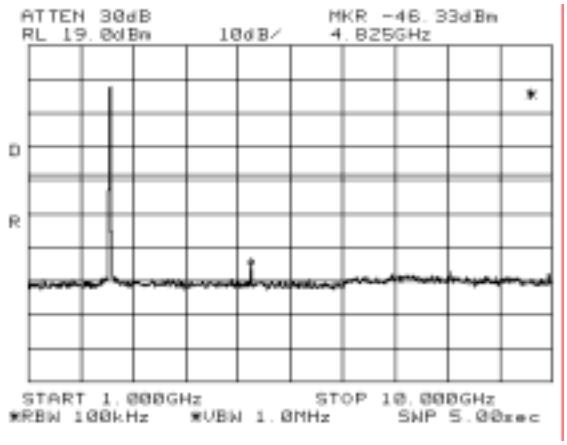
Run #1 Antenna Conducted Spurious Emissions, 30 - 25000 MHz.

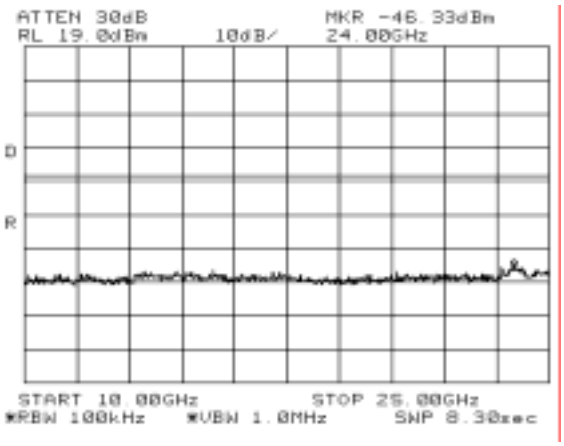
Refer to plots below. Scans made using RBW=VB=100 KHz with the limit line set at 20dB below the highest in-band signal level.

Run #1a, 2412 MHz, 802.11b



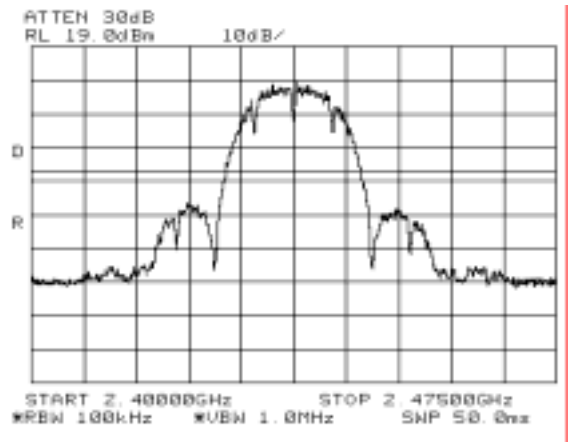


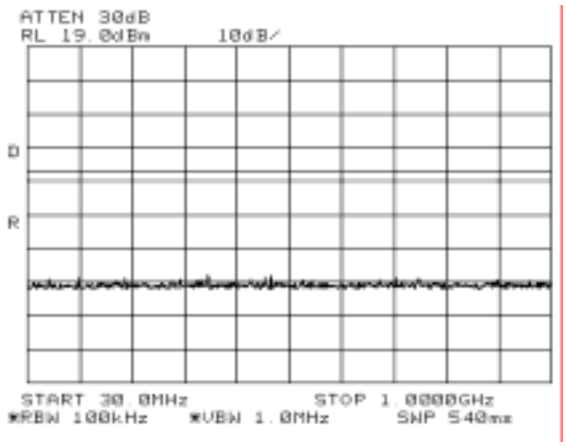


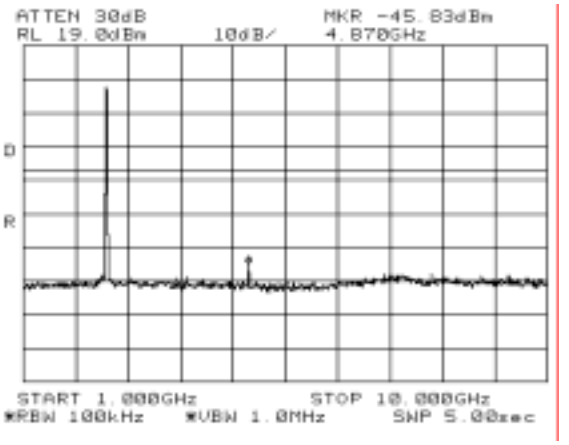


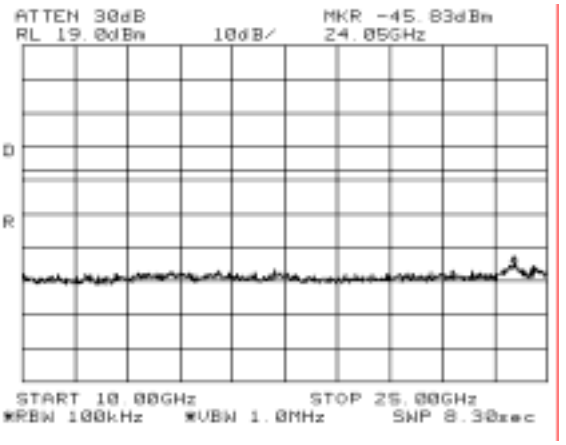
Client:	Atheros	Job Number:	J59977
Model:	AR5BXB6 802.11 a/b/g PCI Express Module	T-Log Number:	T60077
		Account Manager:	Joe Rohlfes
Contact:	Michael Green		
Spec:	FCC 15E,15.247	Class:	N/A

Run #1b, 2437 MHz, 802.11b



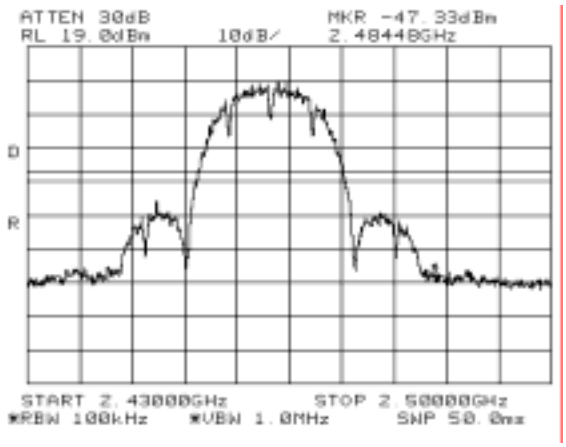


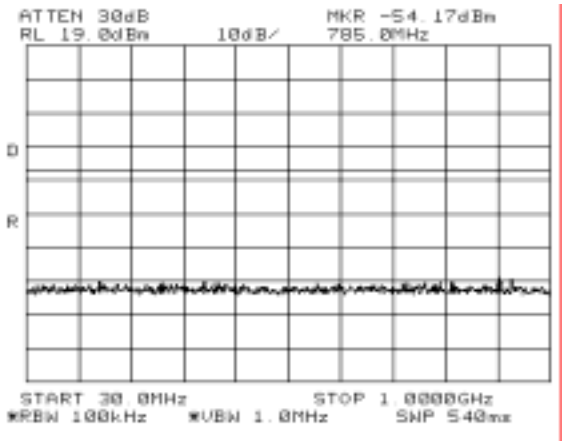


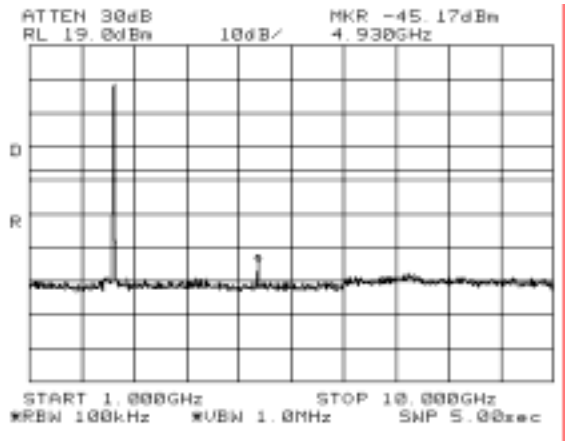


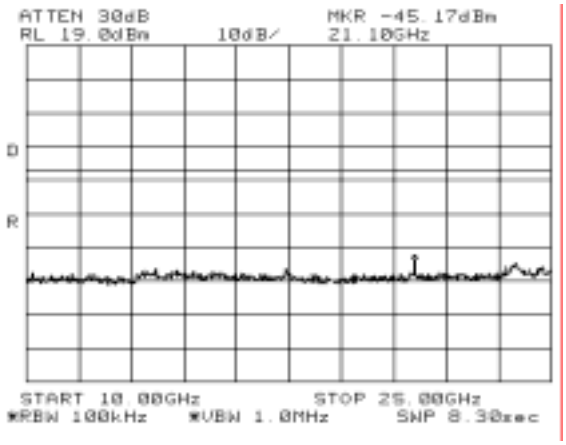
Client:	Atheros	Job Number:	J59977
Model:	AR5BXB6 802.11 a/b/g PCI Express Module	T-Log Number:	T60077
		Account Manager:	Joe Rohlfes
Contact:	Michael Green		
Spec:	FCC 15E,15.247	Class:	N/A

Run #1c, 2462 MHz, 802.11b



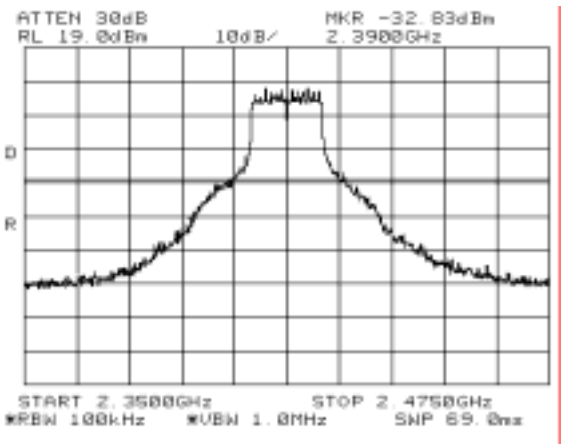


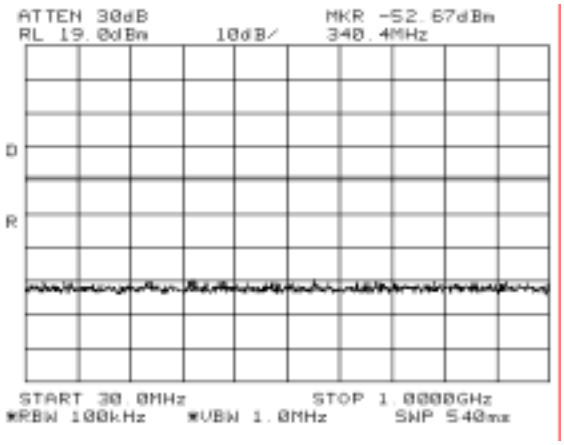


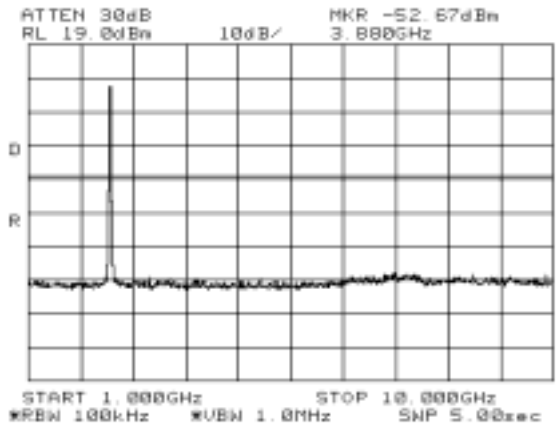


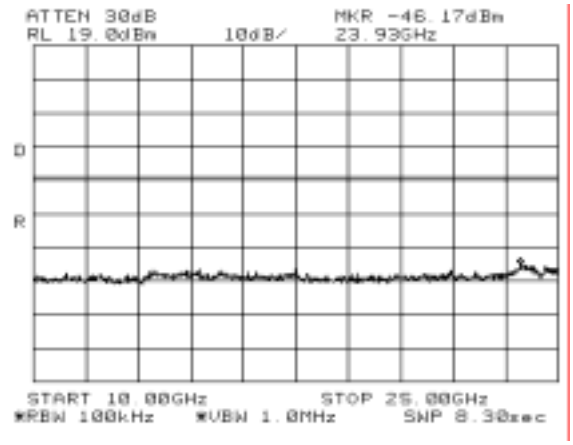
Client:	Atheros	Job Number:	J59977
Model:	AR5BXB6 802.11 a/b/g PCI Express Module	T-Log Number:	T60077
		Account Manager:	Joe Rohlfes
Contact:	Michael Green		
Spec:	FCC 15E,15.247	Class:	N/A

Run #1d, 2412 MHz, 802.11g



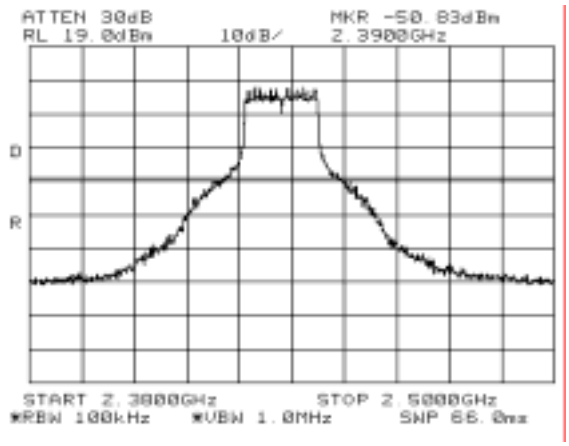


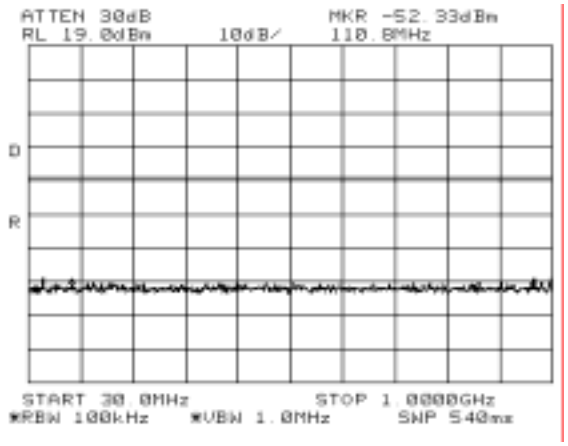


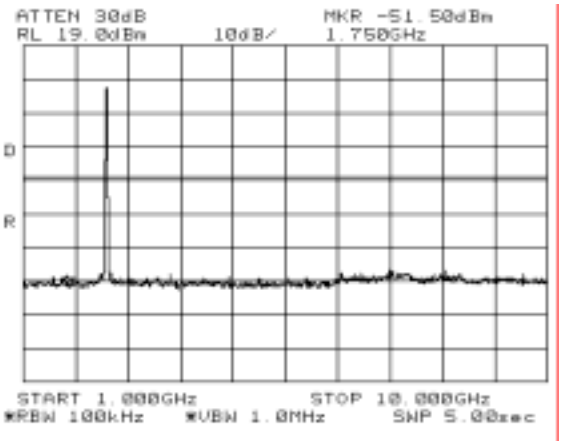


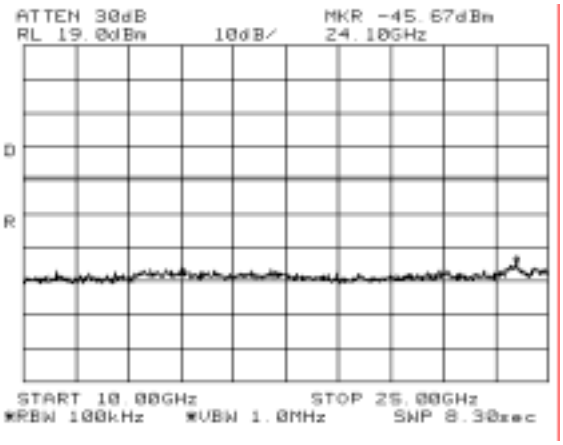
Client:	Atheros	Job Number:	J59977
Model:	AR5BXB6 802.11 a/b/g PCI Express Module	T-Log Number:	T60077
		Account Manager:	Joe Rohlfes
Contact:	Michael Green		
Spec:	FCC 15E,15.247	Class:	N/A

Run #1e, 2437 MHz, 802.11g



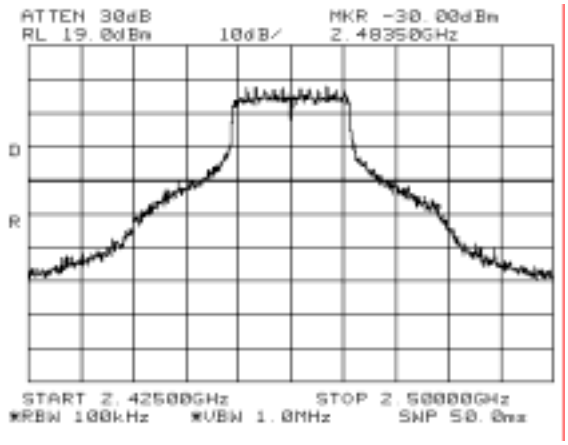


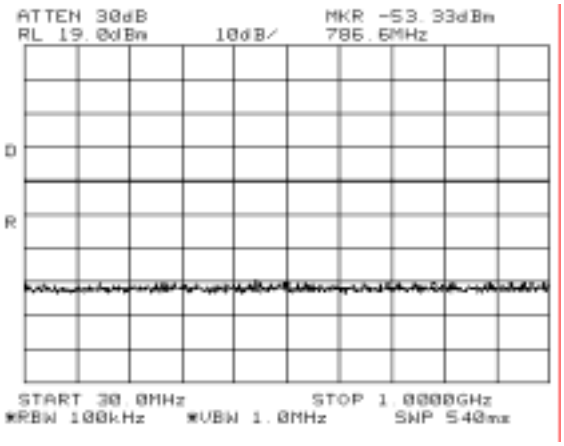


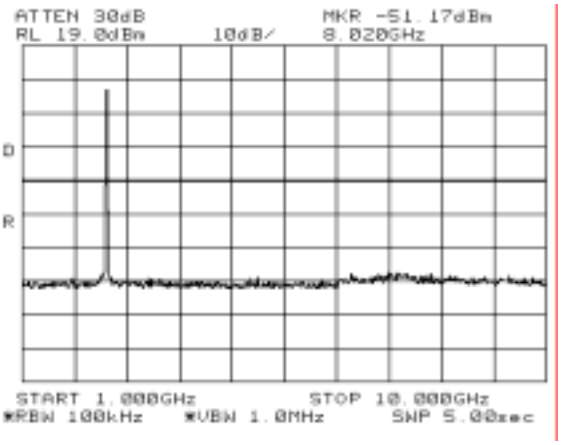


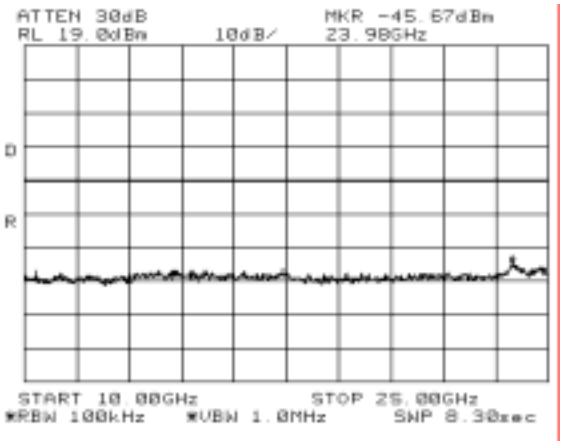
Client:	Atheros	Job Number:	J59977
Model:	AR5BXB6 802.11 a/b/g PCI Express Module	T-Log Number:	T60077
		Account Manager:	Joe Rohlfes
Contact:	Michael Green		
Spec:	FCC 15E,15.247	Class:	N/A

Run #1f, 2462 MHz, 802.11g



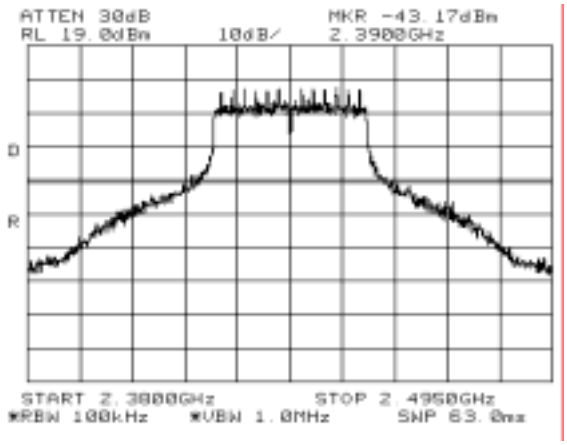


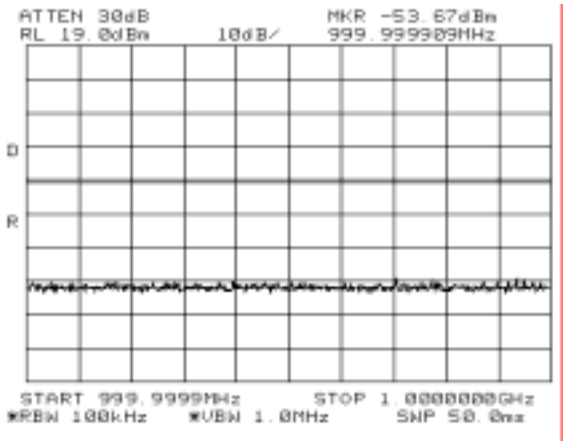


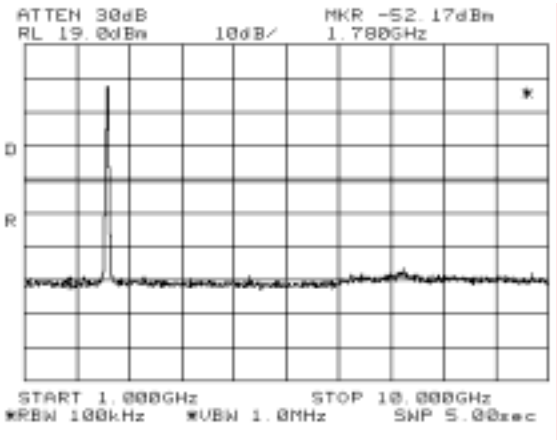


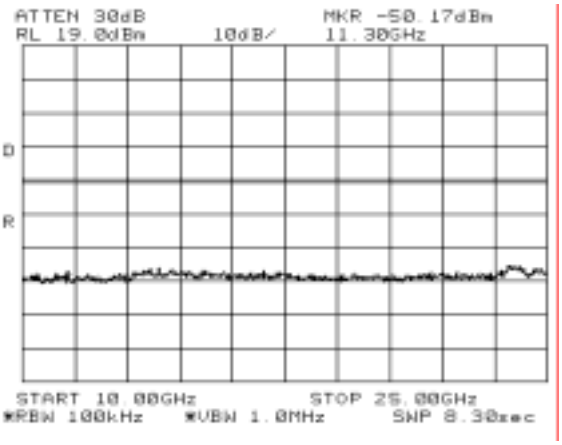
Client:	Atheros	Job Number:	J59977
Model:	AR5BXB6 802.11 a/b/g PCI Express Module	T-Log Number:	T60077
		Account Manager:	Joe Rohlfes
Contact:	Michael Green		
Spec:	FCC 15E,15.247	Class:	N/A

Run #1g, 2437 MHz, Turbo









Client:	Atheros	Job Number:	J59977
Model:	AR5BXB6 802.11 a/b/g PCI Express Module	T-Log Number:	T60077
		Account Manager:	Joe Rohlfes
Contact:	Michael Green		
Spec:	FCC 15E,15.247	Class:	N/A

Run #2: Signal Bandwidth

Channel	Mode	Resolution Bandwidth	6dB Signal Bandwidth (MHz)	99% Signal Bandwidth (MHz)
2412	802.11b	100kHz	10.1	15.9
2437	802.11b	100kHz	10.1	15.9
2462	802.11b	100kHz	10.1	15.8
2412	802.11g	100kHz	16.7	17.6
2437	802.11g	100kHz	16.7	17.5
2462	802.11g	100kHz	16.7	17.5
2437	Turbo	100kHz	32.0	33.8

Run #3: Output Power

Maximum antenna gain: 3.62 dBi (Highest Gain antenna is EBJ Aux in this band)

EUT power setting at 19 for 802.11g and turbo modes, 20 for 802.11b mode

Channel	Mode	Res BW	Output Power (dBm)	Output Power (W)	EIRP (W)
2412	802.11b	n/a	20.0	0.100	0.230
2437	802.11b	n/a	20.0	0.100	0.230
2462	802.11b	n/a	20.0	0.100	0.230
2412	802.11g	n/a	22.8	0.191	0.439
2437	802.11g	n/a	22.6	0.182	0.419
2462	802.11g	n/a	22.6	0.182	0.419
2437	Turbo	n/a	22.6	0.182	0.419

Note 1: Output power measured using a peak power meter.

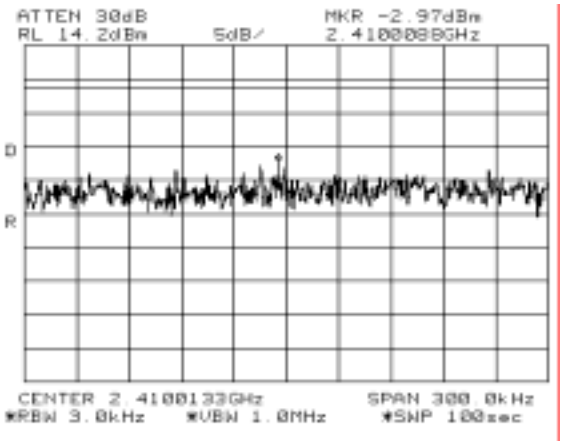
Run #4: Power Spectral Density

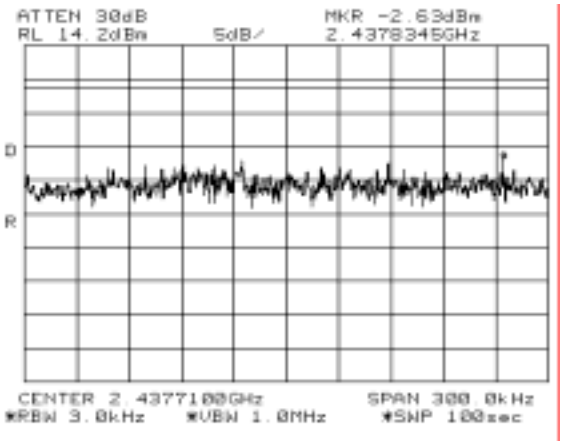
Channel	Mode	Freq. (MHz)	P.S.D. (averaged over 1 second in a 3kHz bandwidth) dBm	Limit	Result
2412	802.11b	2410.00	-3.0	8.0	Pass
2437	802.11b	2436.83	-2.6	8.0	Pass
2462	802.11b	2461.20	-3.6	8.0	Pass
2412	802.11g	2407.00	-4.0	8.0	Pass
2437	802.11g	2438.23	-4.8	8.0	Pass
2462	802.11g	2457.96	-6.0	8.0	Pass
2437	Turbo	2437.00	-6.6	8.0	Pass

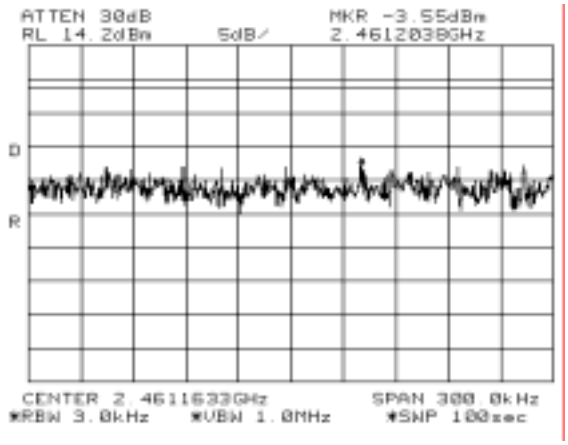
Power spectral density plots on following pages ...

Client:	Atheros	Job Number:	J59977
Model:	AR5BXB6 802.11 a/b/g PCI Express Module	T-Log Number:	T60077
		Account Manager:	Joe Rohlfes
Contact:	Michael Green		
Spec:	FCC 15E,15.247	Class:	N/A

Plots for 802.11b mode

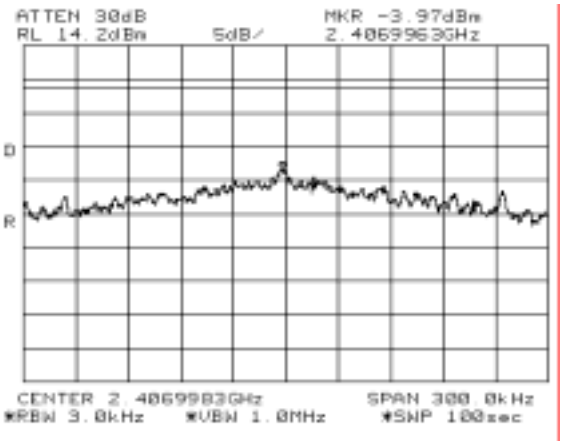


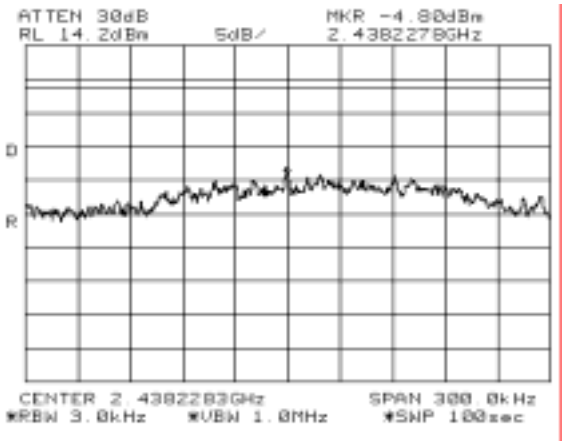


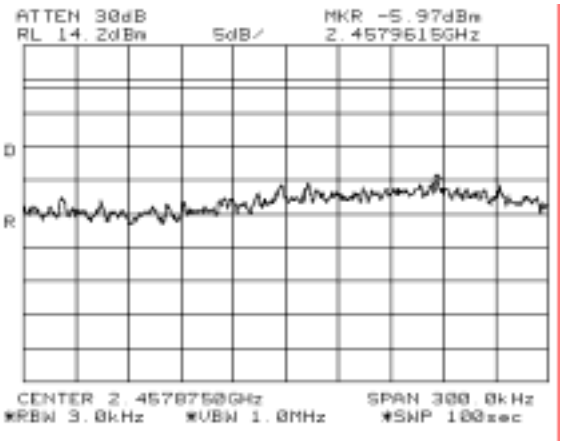


Client:	Atheros	Job Number:	J59977
Model:	AR5BXB6 802.11 a/b/g PCI Express Module	T-Log Number:	T60077
		Account Manager:	Joe Rohlfes
Contact:	Michael Green		
Spec:	FCC 15E,15.247	Class:	N/A

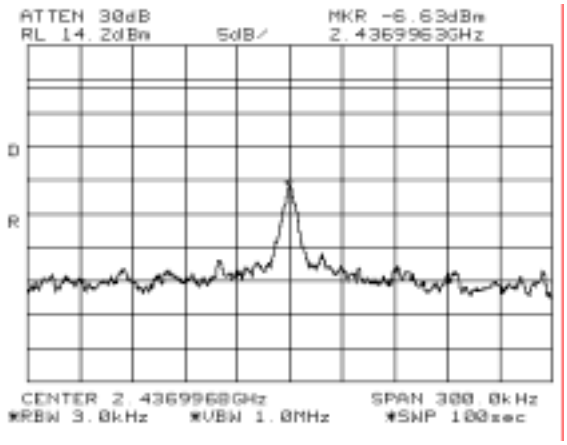
Plots for 802.11g mode







Plots for 802.11g Turbo mode



Client:	Atheros	Job Number:	J59977
Model:	AR5BXB6 802.11 a/b/g PCI Express Module	T-Log Number:	T60077
		Account Manager:	Joe Rohlfes
Contact:	Michael Green		
Spec:	FCC 15E,15.247	Class:	N/A

Radiated Emissions 1 - 26 GHz (Transmit Mode)
EUT Operating in the 2.4GHz Band
FCC 15.247

Test Specifics

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

Date of Test: 6/16/2005 - 6/21/2005 Config. Used: #1
Test Engineer: Varelas, Birgani, Briggs Config Change: None
Test Location: SVOATS #2, #1 Host Unit Voltage 120V/60Hz

General Test Configuration

The EUT and host laptop were located on the turntable for radiated spurious emissions testing. The EUT was controlled via ART software that set the EUT to transmit continuously at target power of 19 and 20, 1Mb/s for 802.11b mode and 6Mb/s for 802.11a and 802.11g modes.

For radiated emissions testing the measurement antenna was located 3 meters from the EUT, unless stated otherwise.

Ambient Conditions:

Temperature: 16 °C
Rel. Humidity: 80 %

Summary of Results

Run #	Test Performed	Limit	Pass / Fail	Result / Margin
1a - c (EUT @ 2412, 2437, 2462)	802.11b Fundamental and Spurious Emissions, 1 - 26 GHz	FCC Part 15.209 / 15.247(c)	Pass	52.5dBµV/m (422.7µV/m) @ 4824.1MHz (-1.5dB)
2a - c (EUT @ 2412, 2437, 2462)	802.11g Fundamental and Spurious Emissions, 1 - 26 GHz	FCC Part 15.209 / 15.247(c)	Pass	53.2dBµV/m (457.1µV/m) @ 2390.0MHz (-0.8dB)
3	Turbo Mode Fundamental and band edges	FCC Part 15.209 / 15.247(c)	Pass	47.6dBµV/m (239.9µV/m) @ 2390.0MHz (-6.4dB)

Modifications Made During Testing:

No modifications were made to the EUT during testing

Deviations From The Standard

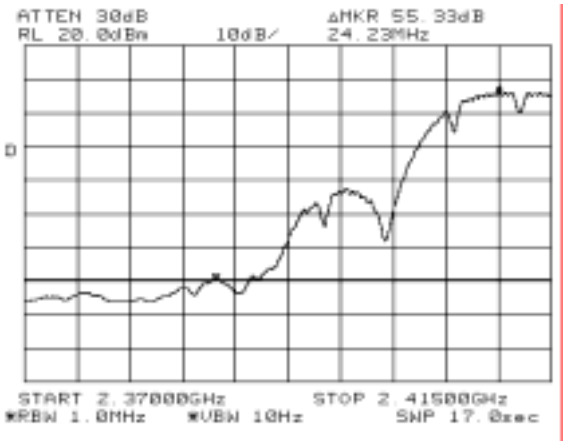
No deviations were made from the standard.

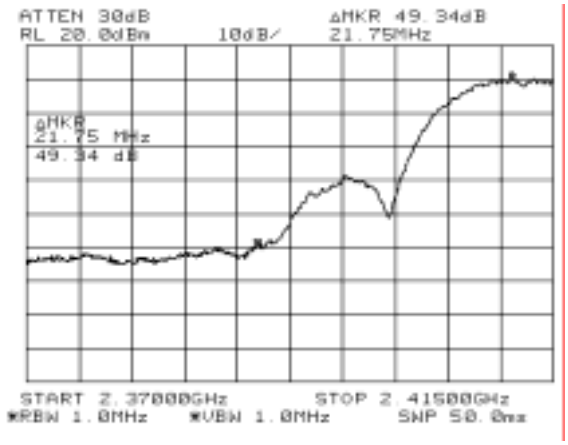
Client:	Atheros	Job Number:	J59977
Model:	AR5BXB6 802.11 a/b/g PCI Express Module	T-Log Number:	T60077
		Account Manager:	Joe Rohlfes
Contact:	Michael Green		
Spec:	FCC 15E,15.247	Class:	N/A

Run #1: 802.11b Mode with Wistron EBJ Aux Antenna (Highest gain antenna in 2.4GHz Band)

Run #1a: Radiated Spurious Emissions. Low Channel @ 2412 MHz 802.11b (1Mb/s) 802.11b Mode
Power level setting = 20 (target power in ART)

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2411.460	101.8	H	-	-	AVG	196	1.2	Fundamental
2411.460	104.8	H	-	-	PK	196	1.2	Fundamental
2411.275	90.5	V	-	-	AVG	205	1.0	Fundamental
2411.275	93.7	V	-	-	PK	205	1.0	Fundamental





Method 1, band edge marker delta

Delta Marker - Peak	49.30 dB	RB = VB= 1MHz
Delta Marker - Average	55.30 dB	RB=1MHz, VB = 10Hz

Band Edge Signal Radiated Field Strength

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2386.350	46.5	V	54.0	-7.5	Avg	235	1.1	
2389.700	55.5	V	74.0	-18.5	Pk	235	1.1	

Client:	Atheros	Job Number:	J59977
Model:	AR5BXB6 802.11 a/b/g PCI Express Module	T-Log Number:	T60077
		Account Manager:	Joe Rohlfes
Contact:	Michael Green		
Spec:	FCC 15E,15.247	Class:	N/A

Run #1a: Radiated Spurious Emissions. Low Channel @ 2412 MHz 802.11b (1Mb/s) 802.11b Mode

Spurious Radiated Emissions:

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
4824.02	51.1	V	54.0	-2.9	AVG	343	1.0	
4823.885	50.6	H	54.0	-3.5	AVG	84	1.6	
14470.61	43.1	V	54.0	-10.9	AVG	37	1.9	Noise Floor
14471.08	42.6	H	54.0	-11.4	AVG	152	1.0	Noise Floor
9647.635	40.0	H	54.0	-14.0	AVG	39	1.0	Noise Floor
9646.93	39.4	V	54.0	-14.6	AVG	195	1.0	Noise Floor
12059.50	39.0	V	54.0	-15.0	AVG	77	1.5	Noise Floor
12059.49	38.9	H	54.0	-15.1	AVG	58	1.1	Noise Floor
14470.61	54.5	V	74.0	-19.5	PK	37	1.9	Noise Floor
4823.885	54.3	H	74.0	-19.7	PK	84	1.6	
4824.02	54.2	V	74.0	-19.8	PK	343	1.0	
14471.08	54.0	H	74.0	-20.0	PK	152	1.0	Noise Floor
7237.800	51.2	H	72.9	-21.7	AVG	107	1.8	Non-restricted
9646.93	51.6	V	74.0	-22.4	PK	195	1.0	Noise Floor
9647.635	51.6	H	74.0	-22.4	PK	39	1.0	Noise Floor
12059.49	50.8	H	74.0	-23.2	PK	58	1.1	Noise Floor
12059.50	50.3	V	74.0	-23.7	PK	77	1.5	Noise Floor
7236.75	44.2	V	72.9	-28.7	AVG	300	1.0	Non-restricted
7237.800	57.0	H	-	-	PK	107	1.8	Non-restricted
7236.75	52.6	V	-	-	PK	300	1.0	Non-restricted

Note 1:	For emissions in restricted bands, the limit of 15.209 was used.
Note 2:	Band-edge measurement calculated from the fundamental field strength (peak or average) minus the band edge delta marker measurement.

EUT at 2412 MHz, 802.11b Mode (Channel and mode with highest spurious emissions from run 1 and run 2)

Spurious Radiated Emissions:

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
4824.060	52.5	V	54.0	-1.5	AVG	334	1.0	2nd Harmonic (Aux, 20.0dBm)
4824.017	47.2	H	54.0	-6.8	AVG	125	1.0	2nd Harmonic (Aux, 20.0dBm)
4824.060	54.9	V	74.0	-19.1	PK	334	1.0	2nd Harmonic (Aux, 20.0dBm)
4824.017	51.2	H	74.0	-22.8	PK	125	1.0	2nd Harmonic (Aux, 20.0dBm)

Elliott

EMC Test Data

Client:	Atheros	Job Number:	J59977
Model:	AR5BXB6 802.11 a/b/g PCI Express Module	T-Log Number:	T60077
		Account Manager:	Joe Rohlfes
Contact:	Michael Green		
Spec:	FCC 15E,15.247	Class:	N/A

Run #1b: Radiated Spurious Emissions. Center Channel @ 2437 MHz, 802.11b
Power level setting = 20 (target power in ART)

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
4874.055	46.6	V	54.0	-7.4	AVG	171	1.0	
4874.06	46.6	H	54.0	-7.4	AVG	83	1.6	
7309.43	46.6	H	54.0	-7.5	AVG	103	1.2	
14621.25	40.9	V	54.0	-13.1	AVG	206	1.7	Noise Floor
7310.325	40.7	V	54.0	-13.3	AVG	322	1.3	
14620.53	40.3	H	54.0	-13.7	AVG	190	1.0	Noise Floor
12186.03	38.8	V	54.0	-15.3	AVG	242	1.0	Noise Floor
9746.58	38.7	H	54.0	-15.3	AVG	212	1.0	Noise Floor
12184.57	38.7	H	54.0	-15.3	AVG	132	1.0	Noise Floor
9744.600	38.6	V	54.0	-15.5	AVG	179	1.1	Noise Floor
7309.43	53.0	H	74.0	-21.0	PK	103	1.2	
14621.25	51.7	V	74.0	-22.3	PK	206	1.7	Noise Floor
4874.055	51.5	V	74.0	-22.5	PK	171	1.0	
4874.06	51.3	H	74.0	-22.7	PK	83	1.6	
9744.600	51.3	V	74.0	-22.7	PK	179	1.1	Noise Floor
14620.53	51.3	H	74.0	-22.8	PK	190	1.0	Noise Floor
9746.58	50.4	H	74.0	-23.6	PK	212	1.0	Noise Floor
12186.03	50.2	V	74.0	-23.8	PK	242	1.0	Noise Floor
7310.325	50.0	V	74.0	-24.0	PK	322	1.3	
12184.57	49.8	H	74.0	-24.2	PK	132	1.0	Noise Floor

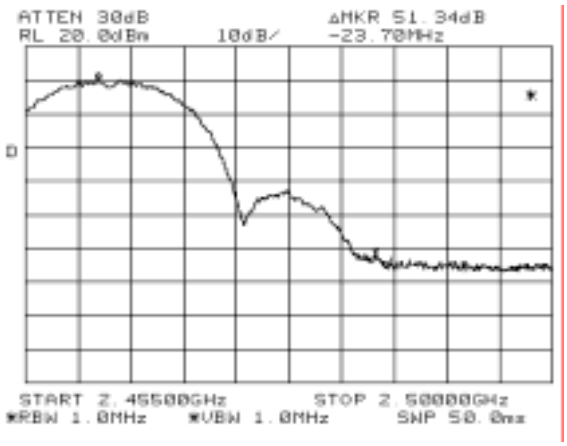
Elliott

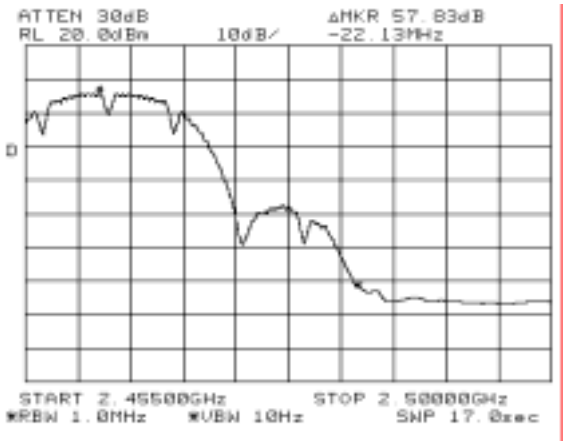
EMC Test Data

Client:	Atheros	Job Number:	J59977
Model:	AR5BXB6 802.11 a/b/g PCI Express Module	T-Log Number:	T60077
		Account Manager:	Joe Rohlfes
Contact:	Michael Green		
Spec:	FCC 15E,15.247	Class:	N/A

Run #1c: Radiated Spurious Emissions. High Channel @ 2462 MHz 802.11b (1Mb/s)
Fundamental Signal, power level setting = 20 (target power in ART)

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2462.805	99.0	H	-	-	AVG	172	1.9	Fundamental
2462.805	101.9	H	-	-	PK	172	1.9	Fundamental
2461.207	92.9	V	-	-	AVG	4	1.1	Fundamental
2461.207	96.0	V	-	-	PK	4	1.1	Fundamental





Method 1, band edge marker delta

Delta Marker - Peak	51.03 dB	RB = VB= 1MHz
Delta Marker - Average	57.80 dB	RB=1MHz, VB = 10Hz

Band Edge Signal Radiated Field Strength

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	41.2	H	54.0	-12.8	Avg	172	1.9	
2484.000	50.9	H	74.0	-23.1	Pk	172	1.9	

Client:	Atheros	Job Number:	J59977
Model:	AR5BXB6 802.11 a/b/g PCI Express Module	T-Log Number:	T60077
		Account Manager:	Joe Rohlfes
Contact:	Michael Green		
Spec:	FCC 15E,15.247	Class:	N/A

Run #1c: Radiated Spurious Emissions. High Channel @ 2462 MHz 802.11b (1Mb/s)

Spurious Radiated Emissions:

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
4924.10	47.3	V	54.0	-6.7	AVG	229	1.0	
4923.950	45.9	H	54.0	-8.1	AVG	268	1.0	
7386.675	45.4	H	54.0	-8.6	AVG	81	1.9	
9848.53	39.7	V	54.0	-14.3	AVG	13	1.0	Noise Floor
9846.945	39.5	H	54.0	-14.5	AVG	287	1.6	Noise Floor
14771.01	39.5	V	54.0	-14.5	AVG	168	1.0	Noise Floor
14771.83	39.5	H	54.0	-14.6	AVG	284	1.0	Noise Floor
12308.86	38.8	H	54.0	-15.3	AVG	66	1.0	Noise Floor
12309.26	38.8	V	54.0	-15.3	AVG	93	1.0	Noise Floor
7387.82	37.7	V	54.0	-16.3	AVG	291	1.3	
7386.675	52.4	H	74.0	-21.6	PK	81	1.9	
4924.10	51.7	V	74.0	-22.3	PK	229	1.0	
14771.83	51.5	H	74.0	-22.5	PK	284	1.0	Noise Floor
4923.950	51.2	H	74.0	-22.8	PK	268	1.0	
9846.945	51.2	H	74.0	-22.8	PK	287	1.6	Noise Floor
12308.86	50.9	H	74.0	-23.1	PK	66	1.0	Noise Floor
14771.01	50.9	V	74.0	-23.1	PK	168	1.0	Noise Floor
9848.53	50.7	V	74.0	-23.3	PK	13	1.0	Noise Floor
12309.26	49.8	V	74.0	-24.2	PK	93	1.0	Noise Floor
7387.82	48.1	V	74.0	-25.9	PK	291	1.3	

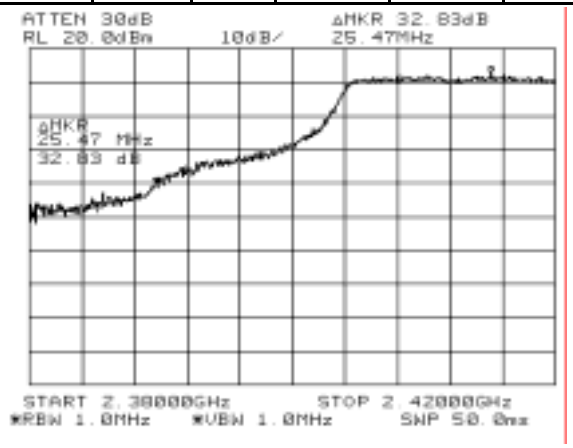
Note 1:	For emissions in restricted bands, the limit of 15.209 was used.
Note 2:	Band-edge measurement calculated from the fundamental field strength (peak or average) minus the band edge delta marker measurement.

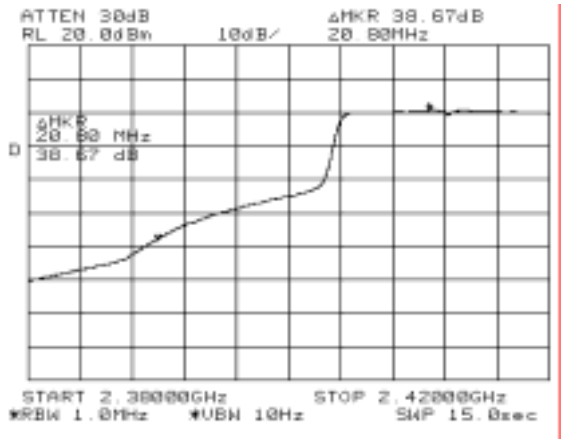
Client:	Atheros	Job Number:	J59977
Model:	AR5BXB6 802.11 a/b/g PCI Express Module	T-Log Number:	T60077
		Account Manager:	Joe Rohlfes
Contact:	Michael Green		
Spec:	FCC 15E,15.247	Class:	N/A

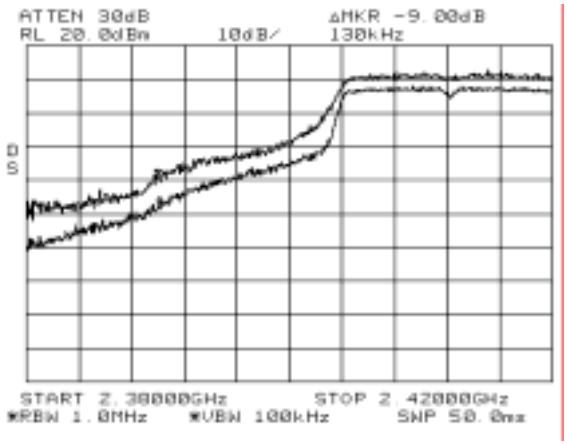
Run #2: 802.11g Mode with Wistron EBJ Aux Antenna (Highest gain antenna in 2.4GHz Band)

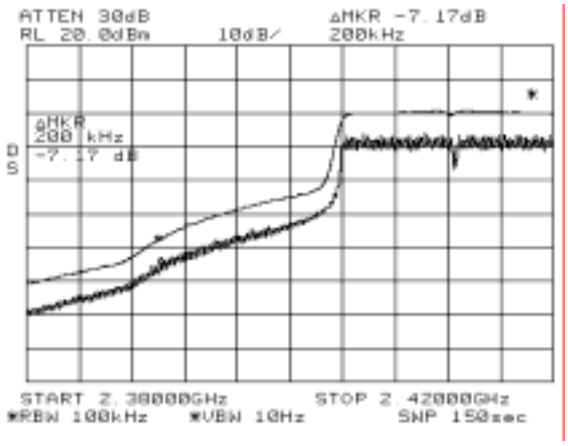
Run #2a: Radiated Spurious Emissions. Low Channel @ 2412 MHz 802.11g (6Mb/s)
Fundamental Signal, power level setting = 19 (target power in ART)

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2410.753	99.1	H	-	-	AVG	197	1.9	Fundamental
2410.753	108.7	H	-	-	PK	197	1.9	Fundamental
2405.233	93.8	V	-	-	AVG	197	1.9	Fundamental
2405.233	102.2	V	-	-	PK	197	1.9	Fundamental









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Client:	Atheros	Job Number:	J59977
Model:	AR5BXB6 802.11 a/b/g PCI Express Module	T-Log Number:	T60077
		Account Manager:	Joe Rohlfes
Contact:	Michael Green		
Spec:	FCC 15E,15.247	Class:	N/A

Run #2a (continued): Radiated Spurious Emissions. Low Channel @ 2412 MHz 802.11g (6Mb/s)

Delta Marker (In-band to restricted band) - Peak	32.80 dB	RB = VB= 1MHz
Delta Marker (In-band to restricted band) - Average	38.70 dB	RB=1MHz, VB = 10Hz
Bandwidth delta marker at band edge (average)	7.20 dB	100k to 1 MHz, Average
Bandwidth delta marker at band edge (peak)	9.00 dB	100k to 1 MHz, Peak
Correction factor - average	**45.90 dB**	
Correction factor - peak	**41.80 dB**	

As the highest out of band signal is directly at the band edge, and to account for the fact that a 1MHz measurement bandwidth includes signal in the restricted band and in the allocated band, the additional bandwidth correction factors (100kHz - 1MHz bandwidth) were added to the deltas between in-band and band-edge signal levels noted above.

Band Edge Signal Radiated Field Strength,

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2390.000	53.2	H	54.0	-0.8	Avg	210	1.1	Note 2
2390.000	66.9	H	74.0	-7.1	Pk	210	1.1	Note 2

Spurious Radiated Emissions:

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
7234.605	42.4	H	54.0	-11.6	AVG	77	1.0	Noise floor
7237.405	40.1	V	54.0	-13.9	AVG	30	1.0	Noise floor
4822.610	37.7	H	54.0	-16.3	AVG	275	1.0	Noise floor
4823.020	36.6	V	54.0	-17.4	AVG	266	1.0	Noise floor
7234.605	53.3	H	74.0	-20.7	PK	77	1.0	Noise floor
7237.405	51.5	V	74.0	-22.6	PK	30	1.0	Noise floor
4822.610	49.2	H	74.0	-24.9	PK	275	1.0	Noise floor
4823.020	48.2	V	74.0	-25.8	PK	266	1.0	Noise floor

Note 2:	Band-edge measurement calculated from the fundamental field strength (peak or average) minus the band edge delta marker measurement minus bandwudth correction factor at the band edge

Client:	Atheros	Job Number:	J59977
Model:	AR5BXB6 802.11 a/b/g PCI Express Module	T-Log Number:	T60077
		Account Manager:	Joe Rohlfes
Contact:	Michael Green		
Spec:	FCC 15E,15.247	Class:	N/A

Run #2b: Radiated Spurious Emissions. Center Channel @ 2437 MHz 802.11g (6Mb/s)
Power level setting = 19 (target power in ART)

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
7310.010	39.7	H	54.0	-14.3	AVG	79	1.0	Noise Floor
7311.120	37.8	V	54.0	-16.2	AVG	360	1.0	Noise Floor
4874.050	36.8	V	54.0	-17.3	AVG	214	1.0	Noise Floor
4873.780	36.6	H	54.0	-17.4	AVG	80	1.6	Noise Floor
7310.010	51.6	H	74.0	-22.4	PK	79	1.0	Noise Floor
7311.120	49.8	V	74.0	-24.2	PK	360	1.0	Noise Floor
4873.780	48.9	H	74.0	-25.2	PK	80	1.6	Noise Floor
4874.050	48.2	V	74.0	-25.8	PK	214	1.0	Noise Floor

Note 1:	All other emissions more than 20dB below the limit.

Run #2c: Radiated Spurious Emissions. Highest Channel @ 2462 MHz 802.11g (6Mb/s)
Fundamental Signal, power level setting = 19 (target power in ART)

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2459.118	95.6	H	-	-	AVG	340	1.1	Fundamental
2459.118	104.1	H	-	-	PK	340	1.1	Fundamental
2460.934	89.4	V	-	-	AVG	6	1.1	Fundamental
2460.934	98.0	V	-	-	PK	6	1.1	Fundamental

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Client:	Atheros	Job Number:	J59977
Model:	AR5BXB6 802.11 a/b/g PCI Express Module	T-Log Number:	T60077
		Account Manager:	Joe Rohlfes
Contact:	Michael Green		
Spec:	FCC 15E,15.247	Class:	N/A

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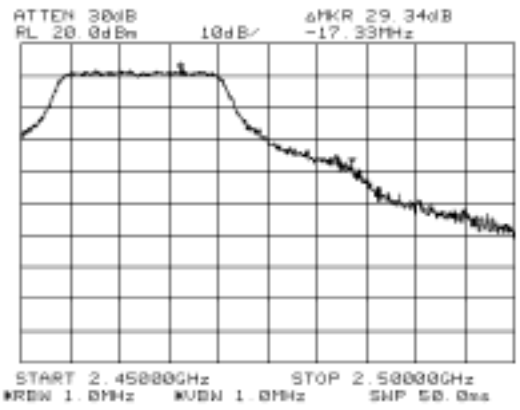
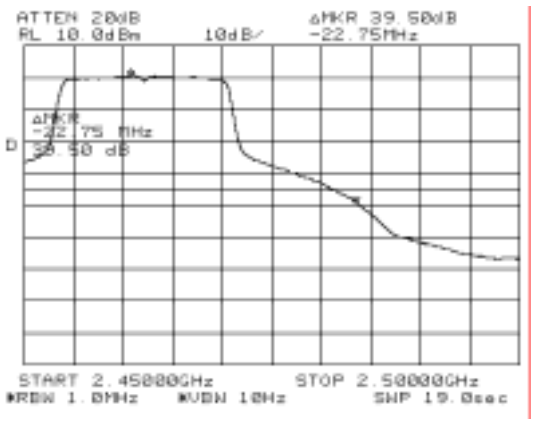
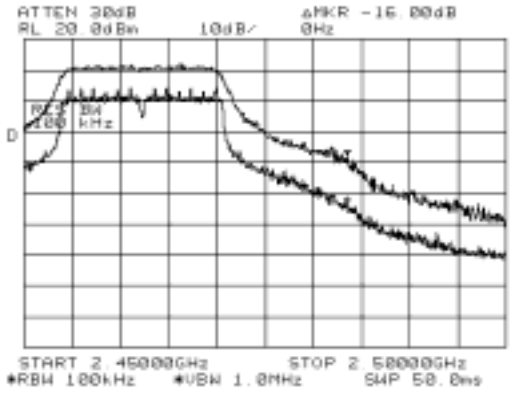
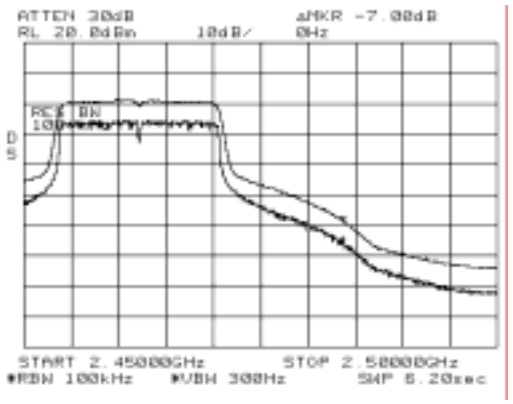








Marker deltas:

Delta Marker (In-band to restricted band) - Peak	29.30 dB	RB = VB= 1MHz
Delta Marker (In-band to restricted band) - Average	39.50 dB	RB=1MHz, VB = 10Hz
Bandwidth delta marker at band edge (average)	7.00 dB	100k to 1 MHz, Average
Bandwidth delta marker at band edge (peak)	16.00 dB	100k to 1 MHz, Peak
Correction factor - average	46.50 dB	This factor used, highest out of band @ band edge
Correction factor - peak	45.30 dB	This factor used, highest out of band @ band edge

As the highest out of band signal is directly at the band edge, and to account for the fact that a 1MHz measurement bandwidth includes signal in the restricted band and in the allocated band, the additional bandwidth correction factors (100kHz - 1MHz bandwidth) were added to the deltas between in-band and band-edge signal levels noted above.

Band Edge Signal Radiated Field Strength, 100kHz delta method

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	49.1	H	54.0	-4.9	Avg	225	1.1	Note 2
2483.500	58.8	H	74.0	-15.2	Pk	225	1.1	Note 2

Note 2:	Band-edge measurement calculated from the fundamental field strength (peak or average) minus the band edge delta marker measurement minus bandwudth correction factor at the band edge

Client:	Atheros	Job Number:	J59977
Model:	AR5BXB6 802.11 a/b/g PCI Express Module	T-Log Number:	T60077
		Account Manager:	Joe Rohlfes
Contact:	Michael Green		
Spec:	FCC 15E,15.247	Class:	N/A

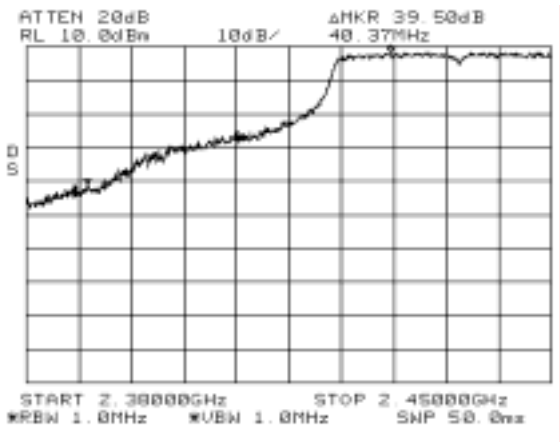
Spurious Radiated Emissions (channel 11, 2462 MHz):

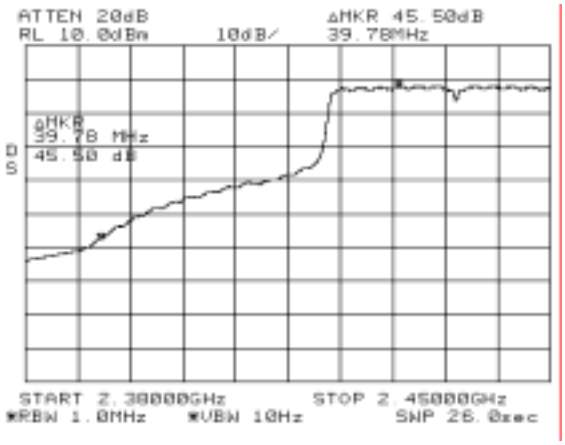
Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
7385.090	38.9	H	54.0	-15.1	AVG	83	1.0	Noise Floor
7385.767	38.0	V	54.0	-16.0	AVG	328	1.8	Noise Floor
4923.870	36.0	H	54.0	-18.0	AVG	81	1.0	Noise Floor
4922.500	35.9	V	54.0	-18.2	AVG	194	1.0	Noise Floor
7385.090	50.9	H	74.0	-23.1	PK	83	1.0	Noise Floor
7385.767	49.8	V	74.0	-24.2	PK	328	1.8	Noise Floor
4922.500	48.4	V	74.0	-25.6	PK	194	1.0	Noise Floor
4923.870	47.6	H	74.0	-26.4	PK	81	1.0	Noise Floor

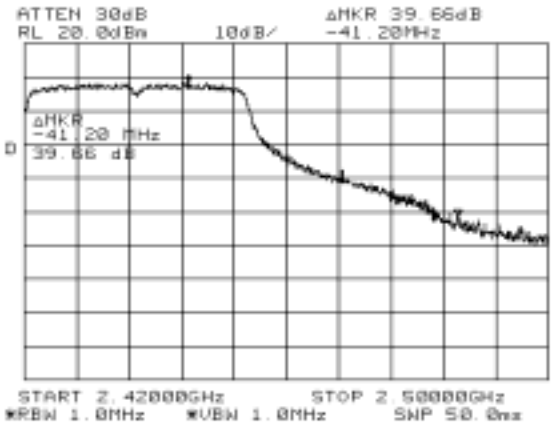
Client:	Atheros	Job Number:	J59977
Model:	AR5BXB6 802.11 a/b/g PCI Express Module	T-Log Number:	T60077
		Account Manager:	Joe Rohlfes
Contact:	Michael Green		
Spec:	FCC 15E,15.247	Class:	N/A

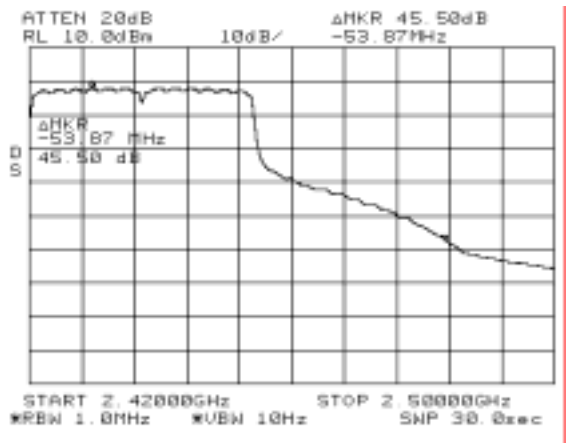
Run #3: Turbo Mode with Wistron EBJ Aux Antenna (Highest gain antenna in 2.4GHz Band)
Radiated Spurious Emissions. Turbo Channel @ 2437 MHz (12Mb/s), power setting = 19
Fundamental Signal

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2439.917	93.1	H	-	-	AVG	185	1.9	Fundamental
2439.917	101.5	H	-	-	PK	185	1.9	Fundamental
2442.308	87.7	V	-	-	AVG	246	1.0	Fundamental
2442.308	96.8	V	-	-	PK	246	1.0	Fundamental









EMC Test Data

Client:	Atheros	Job Number:	J59977
Model:	AR5BXB6 802.11 a/b/g PCI Express Module	T-Log Number:	T60077
		Account Manager:	Joe Rohlfes
Contact:	Michael Green		
Spec:	FCC 15E,15.247	Class:	N/A

Band edge marker delta - 2390 MHz

Delta Marker - Peak	39.50 dB	RB = VB= 1MHz
Delta Marker - Average	45.50 dB	RB=1MHz, VB = 10Hz

Band edge marker delta - 2483.5 MHz

Delta Marker - Peak	39.66 dB	RB = VB= 1MHz
Delta Marker - Average	45.50 dB	RB=1MHz, VB = 10Hz

Band Edge Signal Radiated Field Strength

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2390.000	47.6	V	54.0	-6.4	AVG	185	1.9	Note 2
2389.000	62.0	V	74.0	-12.0	PK	185	1.9	Note 2
2483.500	47.6	V	54.0	-6.4	AVG	185	1.9	Note 2
2484.000	61.8	V	74.0	-12.2	PK	185	1.9	Note 2

Note 1:	All other spruious emissions between 1 and 26GHz were below the noise floor.
Note 2:	Band-edge measurement calculated from the fundamental field strength (peak or average) minus the band edge delta marker measurement.

Client:	Atheros	Job Number:	J59977
Model:	AR5BXB6 802.11 a/b/g PCI Express Module	T-Log Number:	T60077
		Account Manager:	Joe Rohlfes
Contact:	Michael Green		
Spec:	FCC 15E,15.247	Class:	N/A

FCC 15.247 DTS - Power, Bandwidth and Spurious Emissions

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: 6/21/2005 Config. Used: 1
Test Engineer: Mehran Birgani Config Change: None
Test Location: SVOATS #1 Host Unit Voltage 120V/60Hz

General Test Configuration

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:

Temperature: 20 °C
Rel. Humidity: 45 %

Summary of Results

Run #	Test Performed	Limit	Pass / Fail	Result / Margin
1	Antenna Port Spurious Emissions 30 - 40000 MHz	FCC Part 15.209 / 15.247(c)	Pass	All emissions > -20dBc
2	6dB Bandwidth	15.247(a)	Pass	802.11a: 16.5MHz Turbo: 32.2MHz
2	99% Bandwidth	15.247(a)	Pass	802.11a: 17.0MHz Turbo: 33.5MHz
3	Output Power	15.247(b)	Pass	21.5dBm (0.141 W)
4	Power Spectral Density (PSD)	15.247(d)	Pass	-5.5dBm/3kHz

Modifications Made During Testing:

No modifications were made to the EUT during testing

Deviations From The Standard

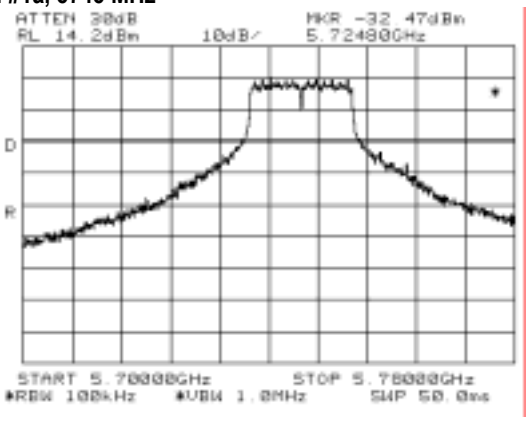
No deviations were made from the requirements of the standard.

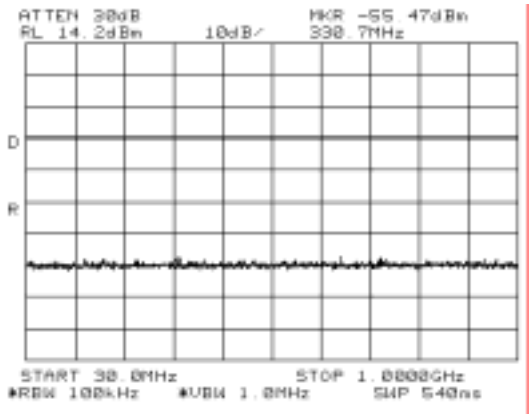
Client:	Atheros	Job Number:	J59977
Model:	AR5BXB6 802.11 a/b/g PCI Express Module	T-Log Number:	T60077
		Account Manager:	Joe Rohlfes
Contact:	Michael Green		
Spec:	FCC 15E,15.247	Class:	N/A

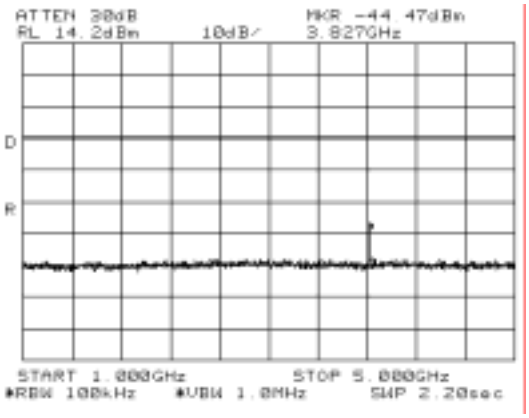
Run #1 Antenna Conducted Spurious Emissions, 30 - 40000 MHz.

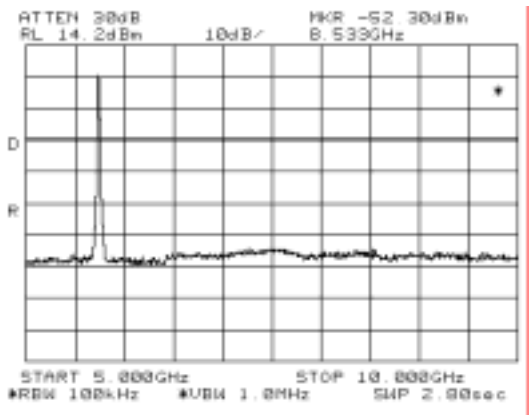
Refer to plots below. Scans made using RBW=VB=100 KHz with the limit line set at 20dB below the highest in-band signal level. Plots show compliance with the -20dBc limit atupper and lower band edges for the highest and lowest channels.

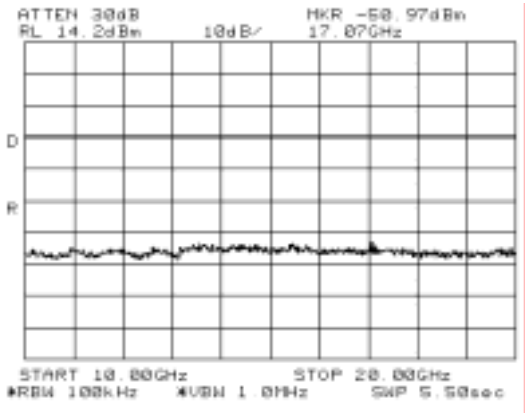
Run #1a, 5745 MHz

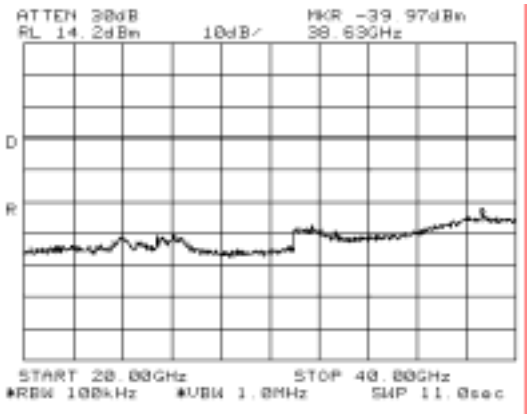






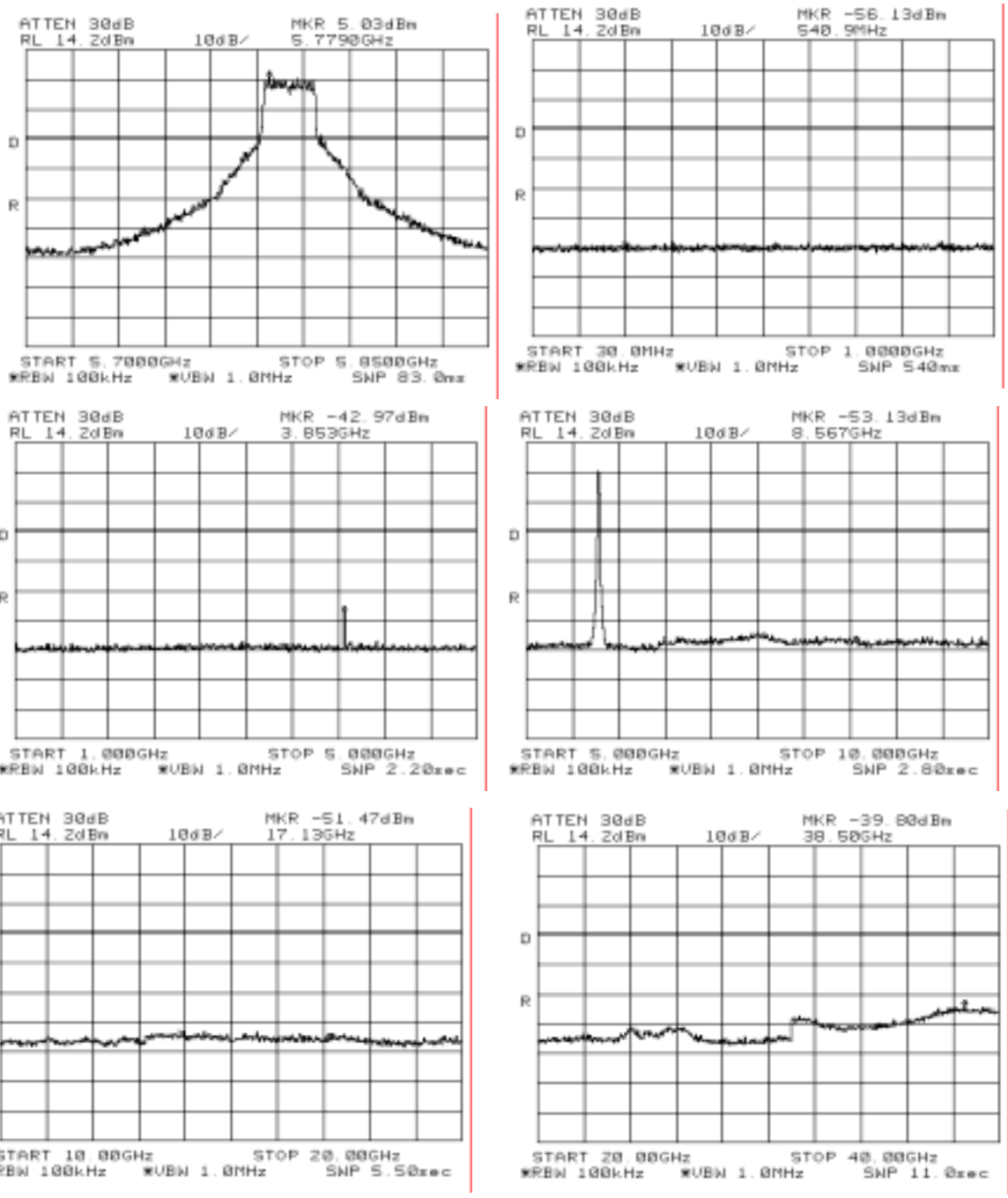






Client:	Atheros	Job Number:	J59977
Model:	AR5BXB6 802.11 a/b/g PCI Express Module	T-Log Number:	T60077
		Account Manager:	Joe Rohlfes
Contact:	Michael Green		
Spec:	FCC 15E,15.247	Class:	N/A

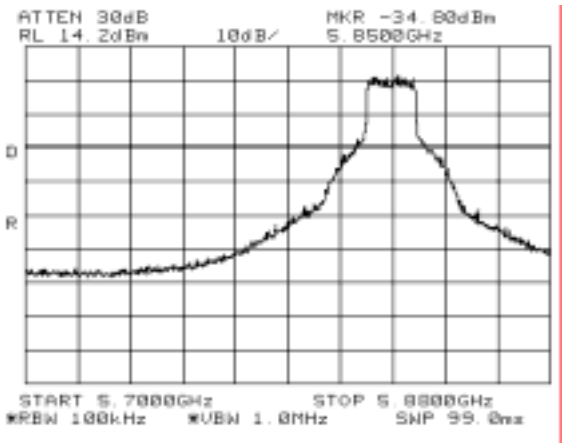
Run #1b, 5785 MHz

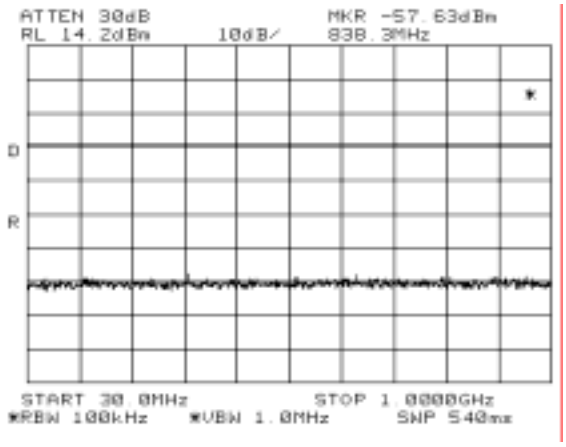


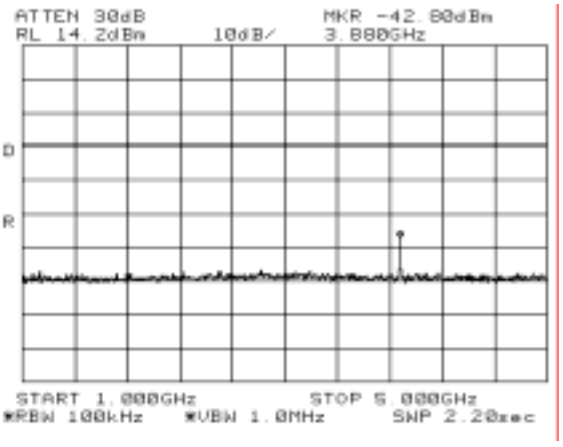
EMC Test Data

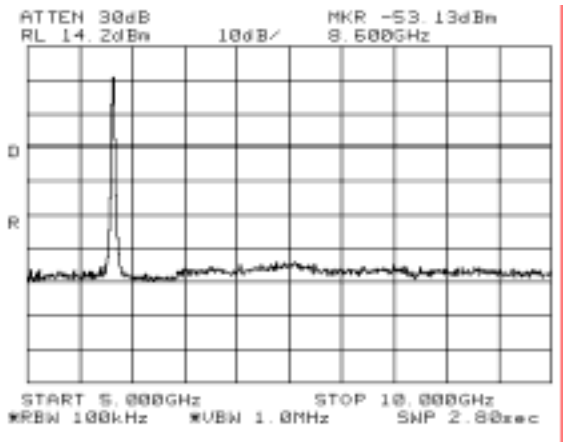
Client:	Atheros	Job Number:	J59977
Model:	AR5BXB6 802.11 a/b/g PCI Express Module	T-Log Number:	T60077
		Account Manager:	Joe Rohlfes
Contact:	Michael Green		
Spec:	FCC 15E,15.247	Class:	N/A

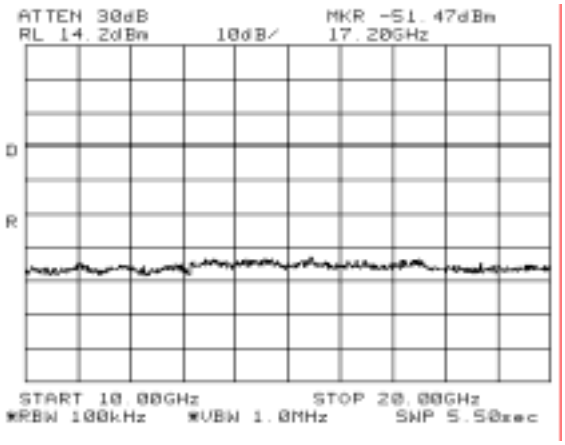
Run #1c, 5825 MHz

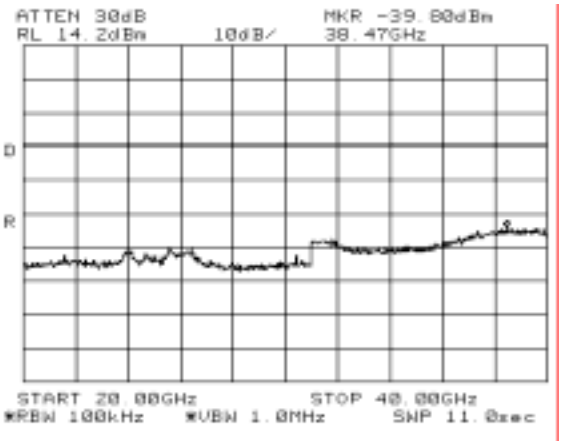






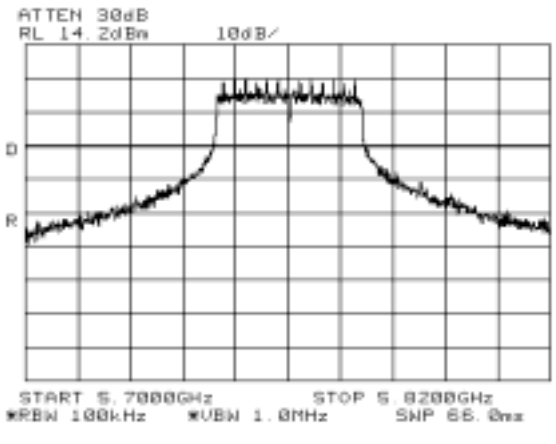


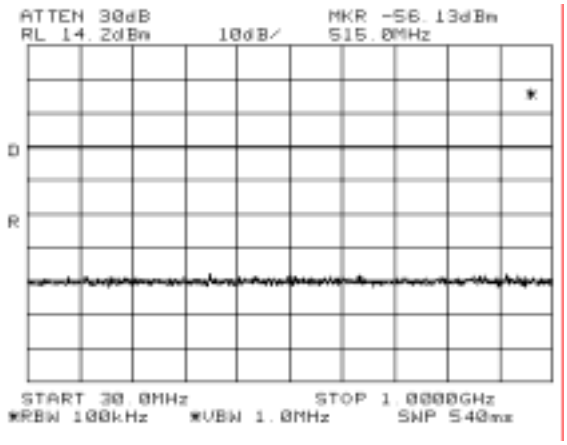


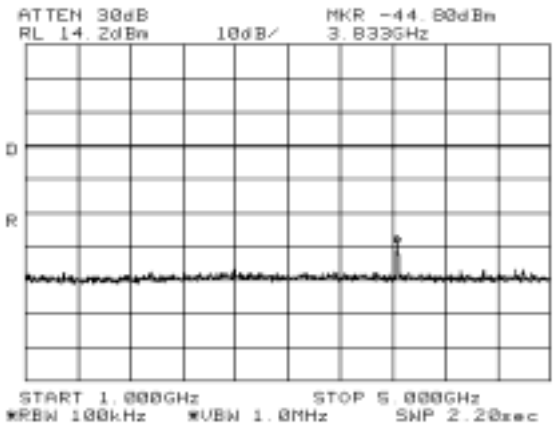


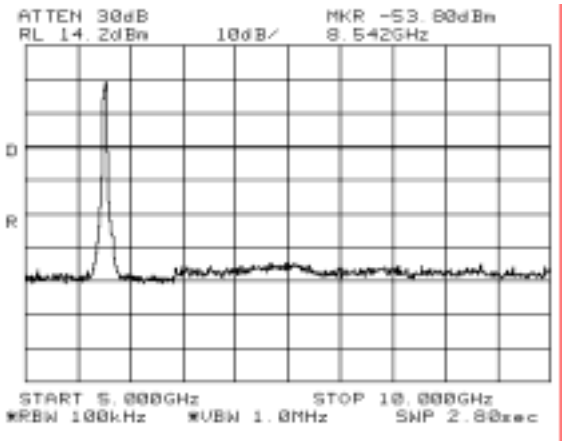
Client:	Atheros	Job Number:	J59977
Model:	AR5BXB6 802.11 a/b/g PCI Express Module	T-Log Number:	T60077
		Account Manager:	Joe Rohlfes
Contact:	Michael Green		
Spec:	FCC 15E,15.247	Class:	N/A

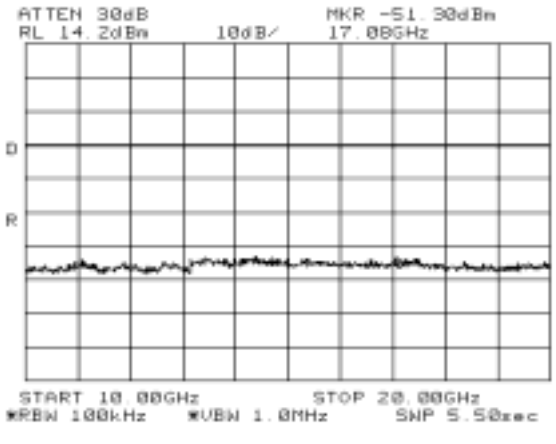
Run #1d, 5760 MHz, Turbo Mode

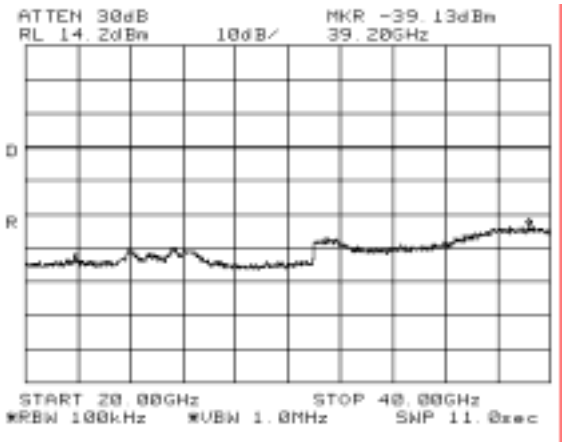






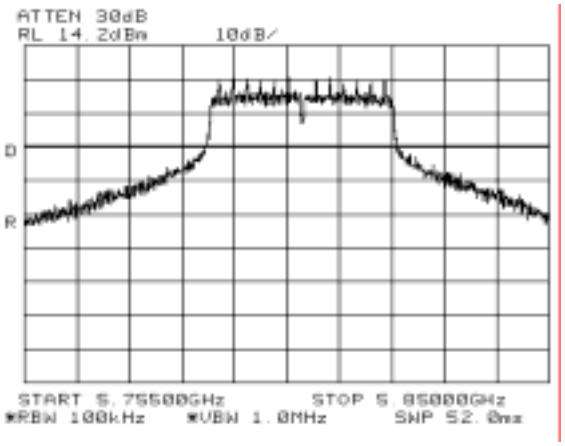


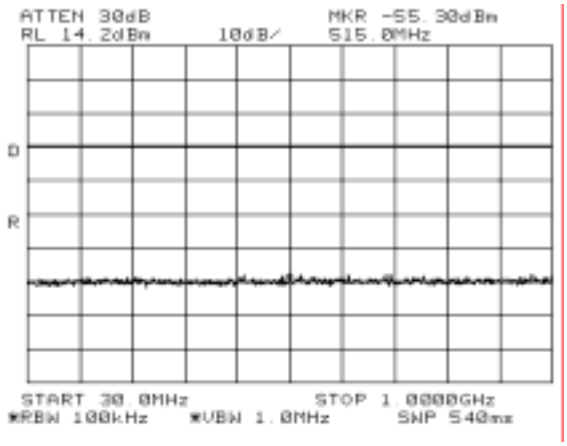


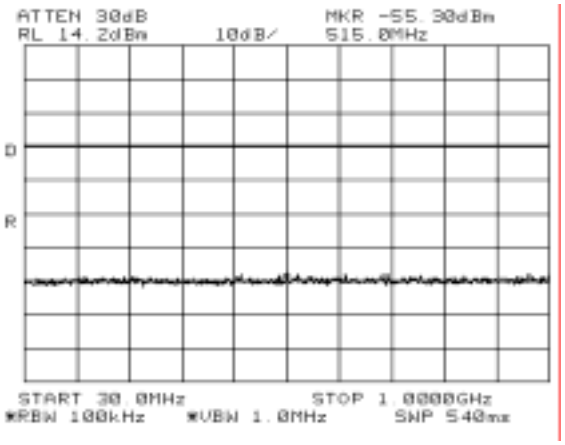


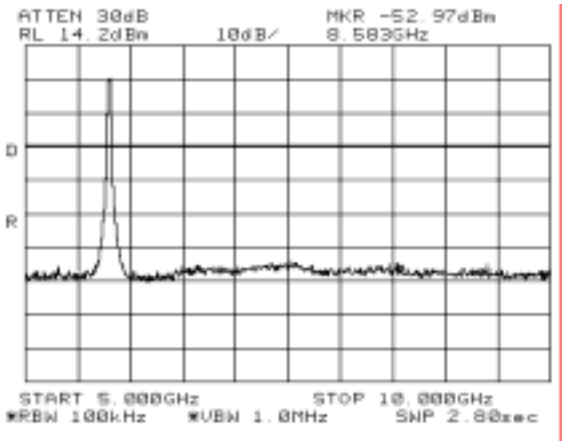
Client:	Atheros	Job Number:	J59977
Model:	AR5BXB6 802.11 a/b/g PCI Express Module	T-Log Number:	T60077
		Account Manager:	Joe Rohlfes
Contact:	Michael Green		
Spec:	FCC 15E,15.247	Class:	N/A

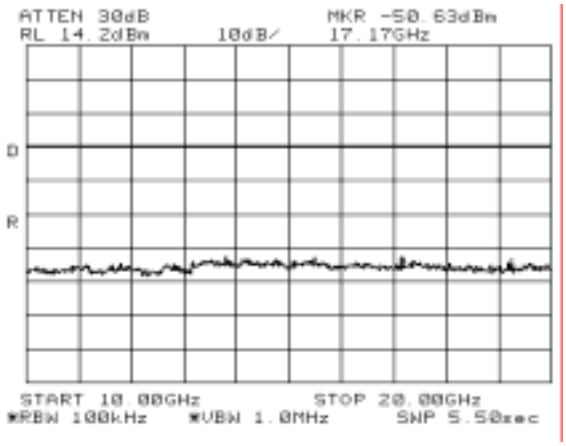
Run #1d, 5805 MHz, Turbo Mode

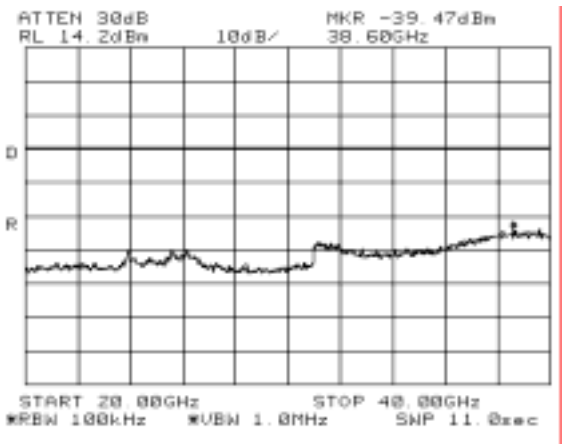












Client:	Atheros	Job Number:	J59977
Model:	AR5BXB6 802.11 a/b/g PCI Express Module	T-Log Number:	T60077
		Account Manager:	Joe Rohlfes
Contact:	Michael Green		
Spec:	FCC 15E,15.247	Class:	N/A

Run #2: Signal Bandwidth

Channel	Mode	Resolution Bandwidth	6dB Signal Bandwidth (MHz)	99% Signal Bandwidth (MHz)
5745	802.11a	100kHz	16.6	17.0
5785	802.11a	100kHz	16.7	17.0
5825	802.11a	100kHz	16.5	17.0
5760	Turbo	100kHz	32.3	33.5
5805	Turbo	100kHz	32.2	33.1

Run #3: Output Power

Maximum antenna gain: 4.76 dBi (Highest Gain antenna is EBJ Main in this band)

EUT power setting at 18 for all measurements

Channel	Mode	Res BW	Output Power (dBm)	Output Power (W)	EIRP (W)
5745	802.11a	n/a	21.5	0.141	0.423
5785	802.11a	n/a	21.4	0.138	0.413
5825	802.11a	n/a	21.3	0.135	0.404
5760	Turbo	n/a	21.4	0.138	0.413
5805	Turbo	n/a	21.3	0.135	0.404

Note 1:	Output power measured using a peak power meter.

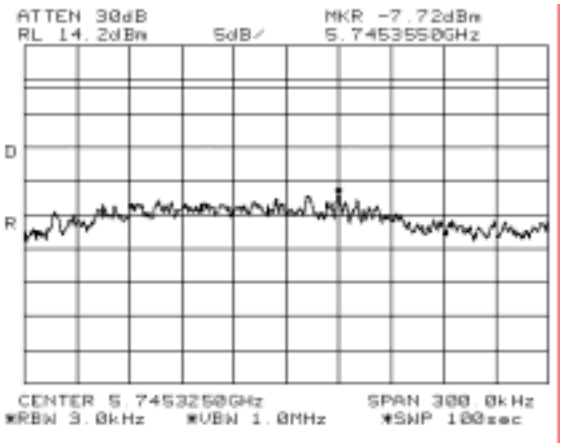
Run #4: Power Spectral Density

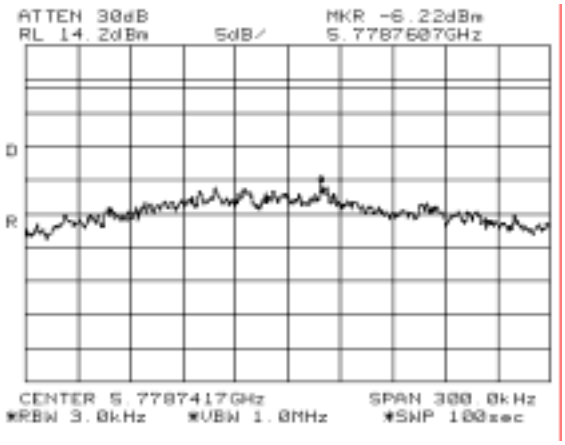
Channel	Mode	Freq. (MHz)	P.S.D. (averaged over 1 second in a 3kHz bandwidth) dBm	Limit	Result
5745	802.11a	5745.36	-7.7	8.0	Pass
5785	802.11a	5778.76	-6.2	8.0	Pass
5825	802.11a	5819.99	-5.5	8.0	Pass
5760	Turbo	5757.49	-9.0	8.0	Pass
5805	Turbo	5809.94	-7.4	8.0	Pass

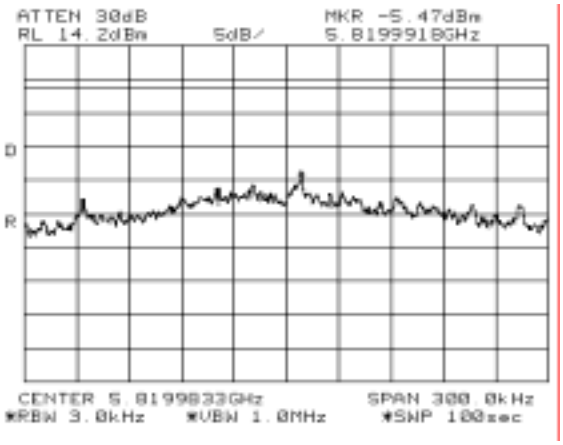
Power spectral density plots on following pages …

Client:	Atheros	Job Number:	J59977
Model:	AR5BXB6 802.11 a/b/g PCI Express Module	T-Log Number:	T60077
		Account Manager:	Joe Rohlfes
Contact:	Michael Green		
Spec:	FCC 15E,15.247	Class:	N/A

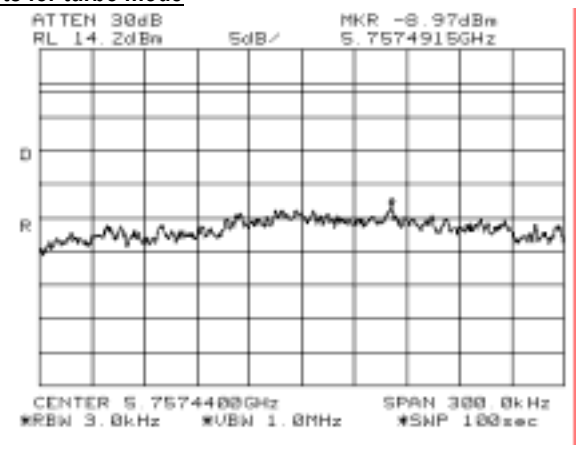
Plots for 802.11a mode

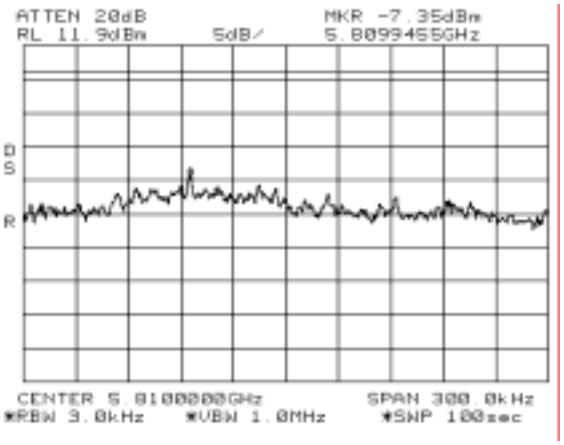






Plots for turbo mode





Client:	Atheros	Job Number:	J59977
Model:	AR5BXB6 802.11 a/b/g PCI Express Module	T-Log Number:	T60077
		Account Manager:	Joe Rohlfes
Contact:	Michael Green		
Spec:	FCC 15E,15.247	Class:	N/A

FCC Part 15 Subpart E Tests - Antenna Port Measurements

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: 6/21/2005 Config. Used: 1
Test Engineer: Mehran Birgani Config Change: none
Test Location: SVOATS #1 Host Unit Voltage 120V/60Hz

General Test Configuration

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 and cables used.

Ambient Conditions:

Temperature: 20 °C
Rel. Humidity: 50 %

Summary of Results

Run #	Test Performed	Limit	Pass / Fail	Result / Margin
1	Output Power	15.407(a) (1), (2)	Pass	16.1dBm
1	Power Spectral Density (PSD)	15.407(a) (1), (2)	Pass	4dBm/MHz
1	26dB Bandwidth	15.407	-	> 20 MHz
1	20 dB Bandwidth	RSS 210	-	> 20 MHz
2	Peak Excursion Envelope	15.407(a) (6)	Pass	Worst case was 11.7dB (Turbo mode)
3	Antenna Conducted - Out of Band Spurious	15.407(b)	Pass	All emissions below the 27dBm/MHz 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:	Atheros	Job Number:	J59977
Model:	AR5BXB6 802.11 a/b/g PCI Express Module	T-Log Number:	T60077
		Account Manager:	Joe Rohlfes
Contact:	Michael Green		
Spec:	FCC 15E,15.247	Class:	N/A

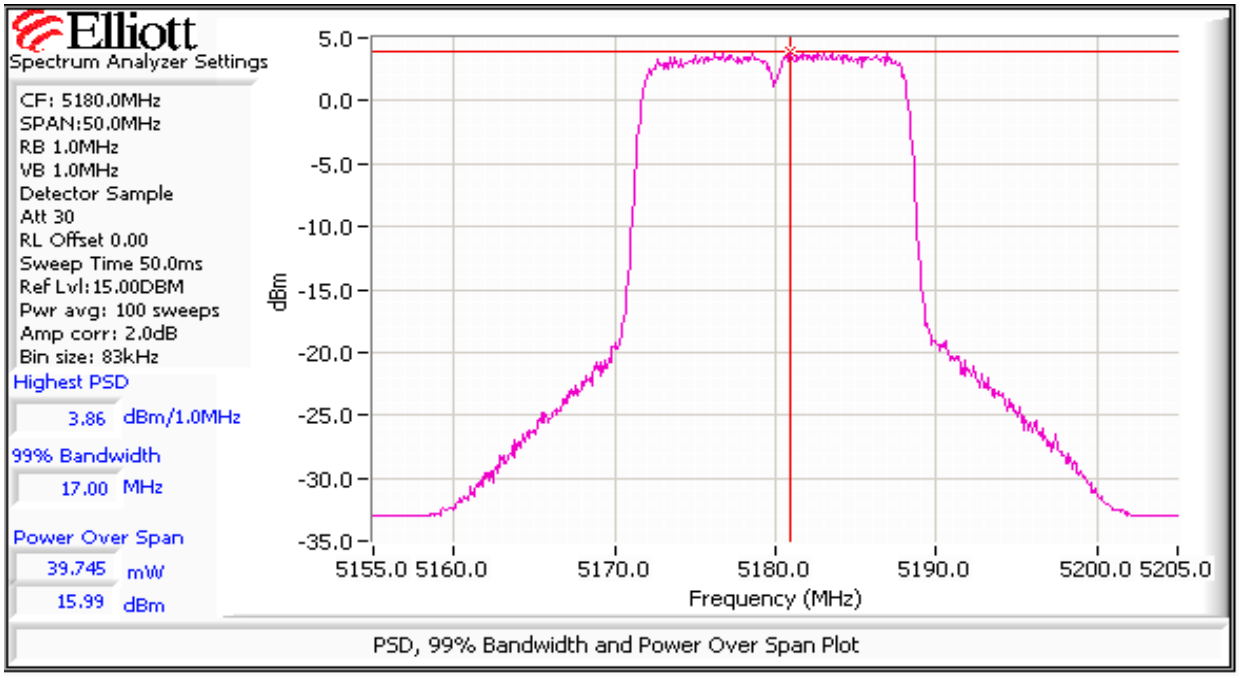
Run #1: Bandwidth, Output Power and Power Spectral Density
Nominal power setting = 18 for all channels

Antenna Gain: 5.56 dBi (highest gain anntena in 5.150-5.350 is ED4 Main)

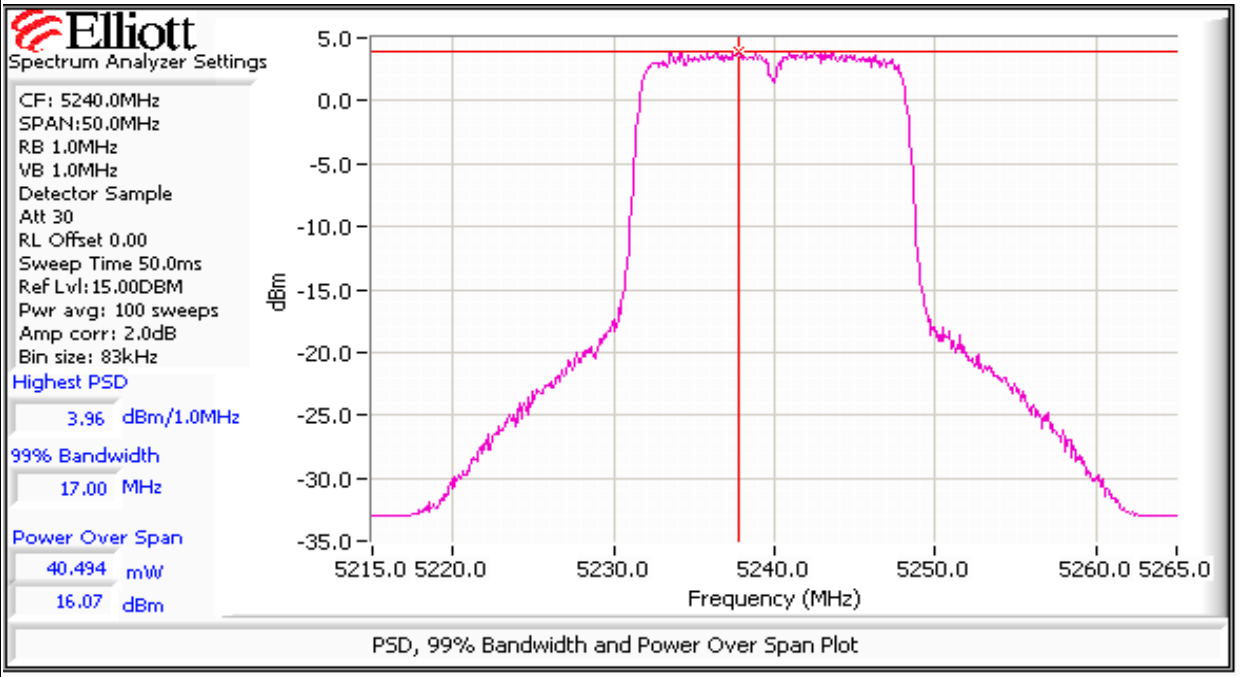
Frequency	Bandwidth (note 1) MHz			Output Power (note 2) dBm		Power (Watts)	PSD (FCC - note 3) dBm/MHz		PSD (RSS210 - note 4) dBm/MHz	
(MHz)	20dB	26dB	99%	Measured	Limit		Measured	Limit	Avg	Peak
5180	20.2	29.8	17.0	16.0	17.0	0.040	3.9	4.0	9.7	12.7
5240	22.1	33.7	17.0	16.1	17.0	0.041	4.0	4.0	9.7	12.9
5260	22.2	32.7	17.0	16.1	24.0	0.041	4.0	11.0	9.7	13.3
5320	21.3	28.9	17.0	14.2	24.0	0.026	2.2	11.0	9.7	11.5
5200	36.9	46.9	34.0	14.7	17.0	0.030	0.0	4.0	6.7	10.2
5290	36.6	48.1	34.0	16.0	24.0	0.040	1.2	11.0	6.7	8.9

Note 1	Bandwidth measured using RBW = 300kHz.
Note 2	Output power measured using a spectrum analyzer with: RBW=1MHz, VB=1 MHz, sample/peak detector, power averaging on (100 samples) and power integration over 50 MHz span.
Note 3	RB=1MHz, VB=3 MHz, peak detector.
Note 4	Measurement of peak power spectral density was made using RBW = 1MHz, VBW = 1MHz. The average value is the peak output power (measured to be 22.0dBm) divided by the 99% bandwidth. For RSS210 the measured value must not exceed the average value by more than 6dB without reducing the limit for output power.

Client:	Atheros	Job Number:	J59977
Model:	AR5BXB6 802.11 a/b/g PCI Express Module	T-Log Number:	T60077
		Account Manager:	Joe Rohlfes
Contact:	Michael Green		
Spec:	FCC 15E,15.247	Class:	N/A



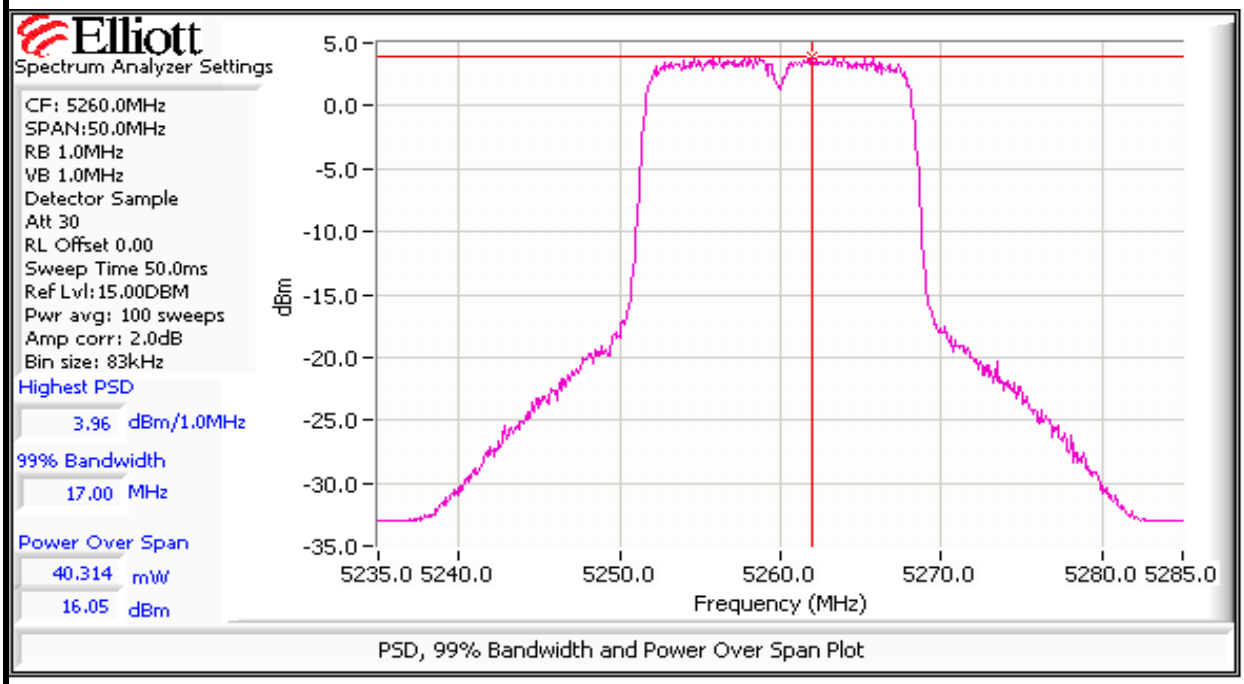
PSD, 99% Bandwidth and Power Over Span Plot



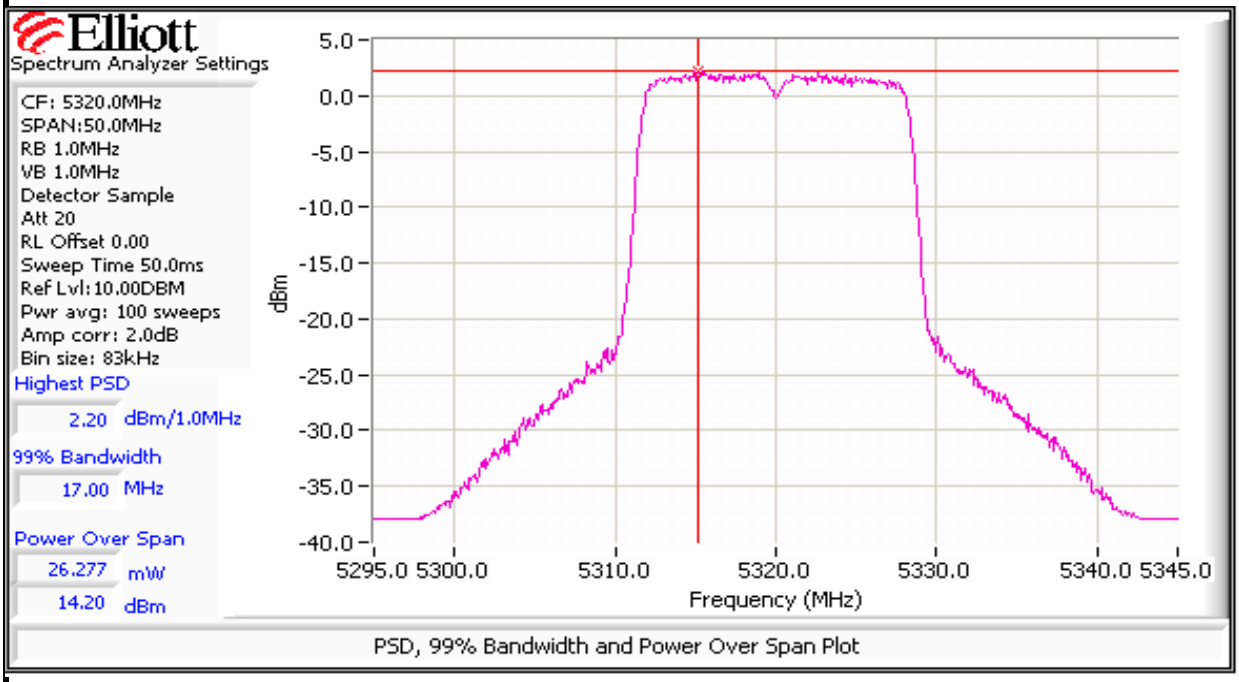
PSD, 99% Bandwidth and Power Over Span Plot

EMC Test Data

Client:	Atheros	Job Number:	J59977
Model:	AR5BXB6 802.11 a/b/g PCI Express Module	T-Log Number:	T60077
		Account Manager:	Joe Rohlfes
Contact:	Michael Green		
Spec:	FCC 15E,15.247	Class:	N/A



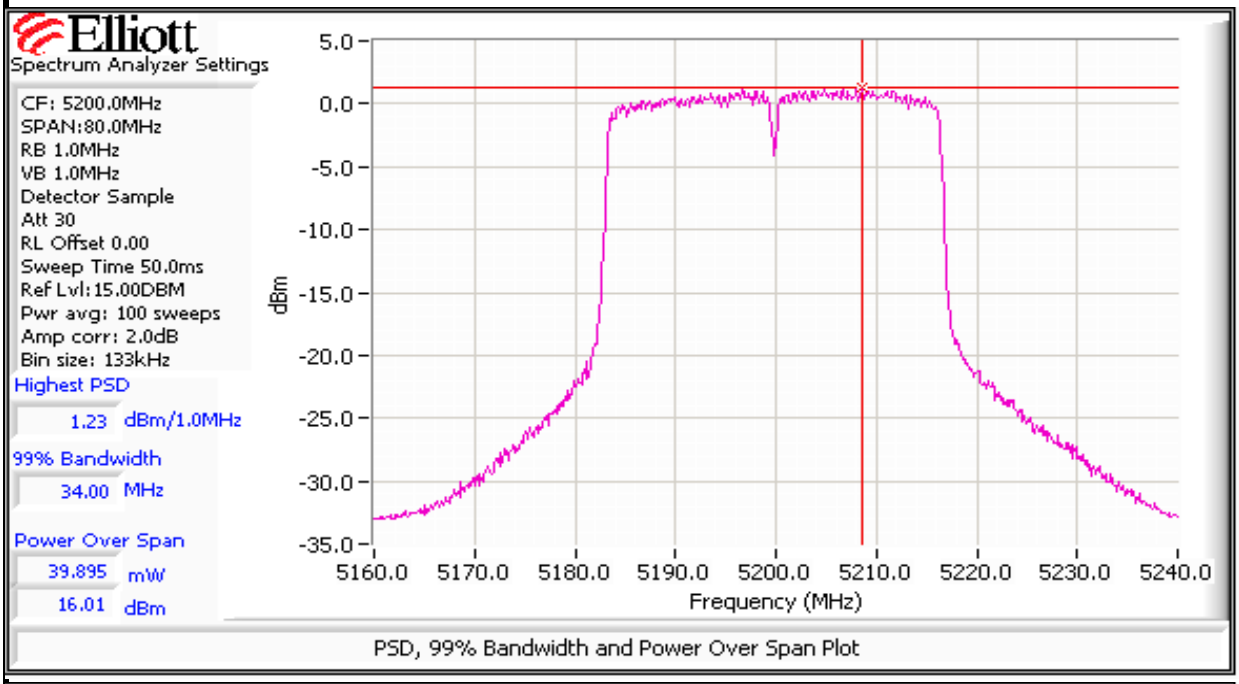
PSD, 99% Bandwidth and Power Over Span Plot



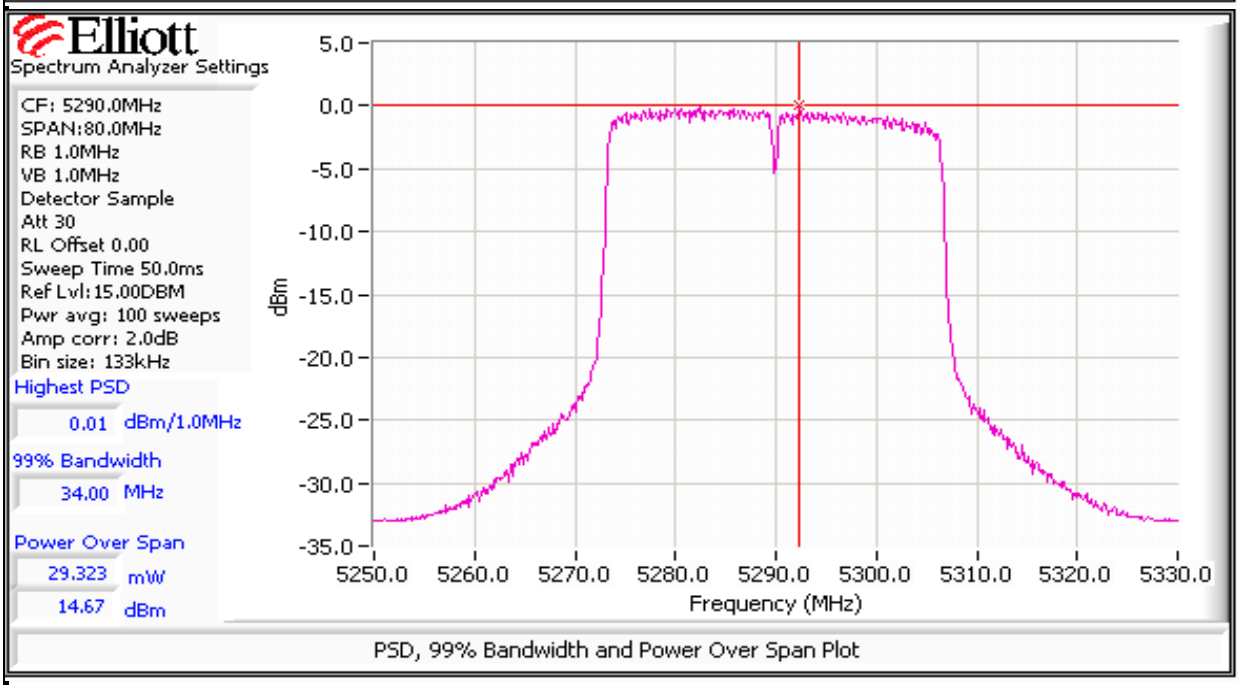
PSD, 99% Bandwidth and Power Over Span Plot

EMC Test Data

Client:	Atheros	Job Number:	J59977
Model:	AR5BXB6 802.11 a/b/g PCI Express Module	T-Log Number:	T60077
		Account Manager:	Joe Rohlfes
Contact:	Michael Green		
Spec:	FCC 15E,15.247	Class:	N/A



PSD, 99% Bandwidth and Power Over Span Plot

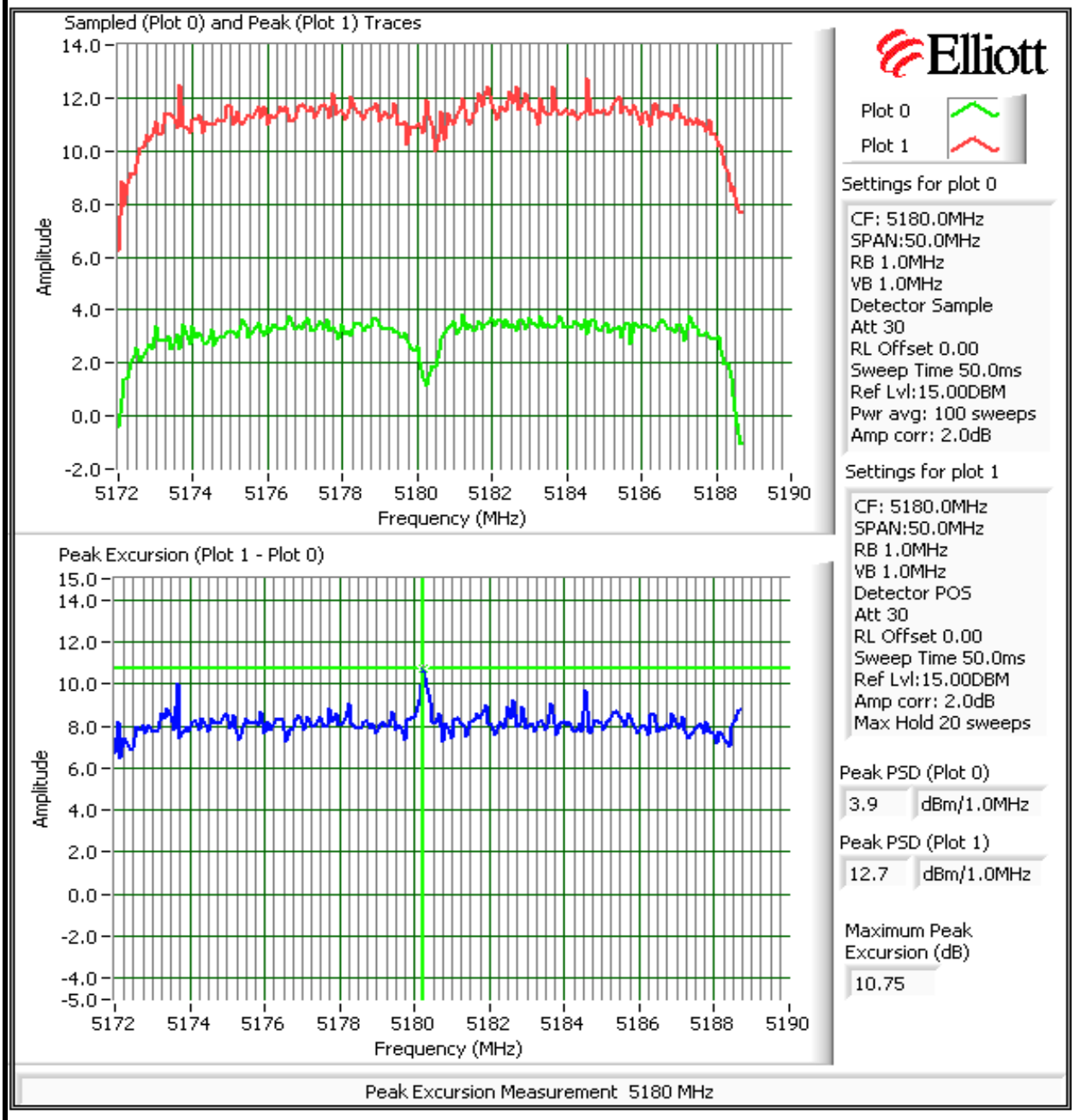


PSD, 99% Bandwidth and Power Over Span Plot

Client:	Atheros	Job Number:	J59977
Model:	AR5BXB6 802.11 a/b/g PCI Express Module	T-Log Number:	T60077
		Account Manager:	Joe Rohlfes
Contact:	Michael Green		
Spec:	FCC 15E,15.247	Class:	N/A

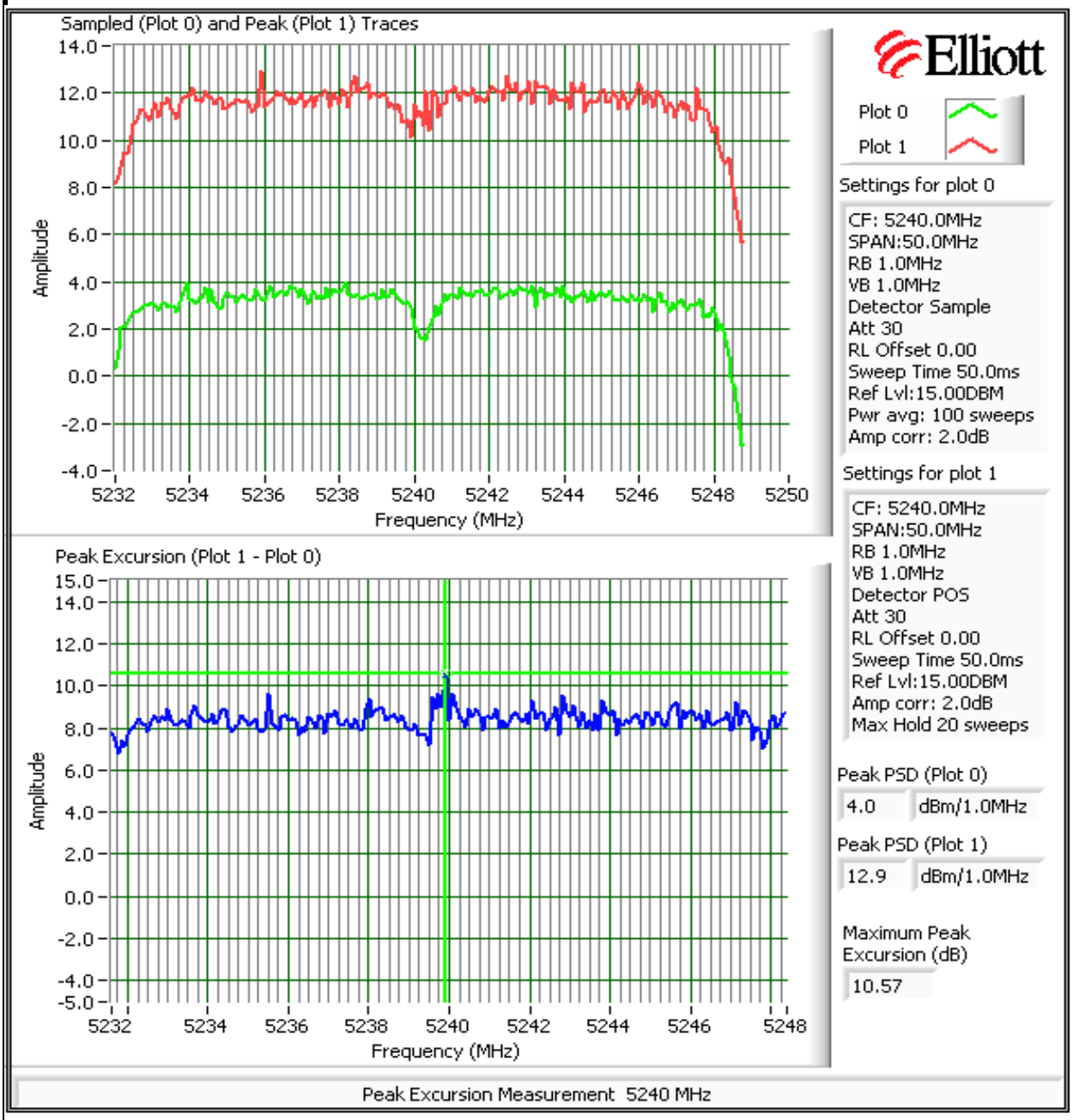
Run #2: Peak Excursion Measurement

Plots Showing Peak Excursion



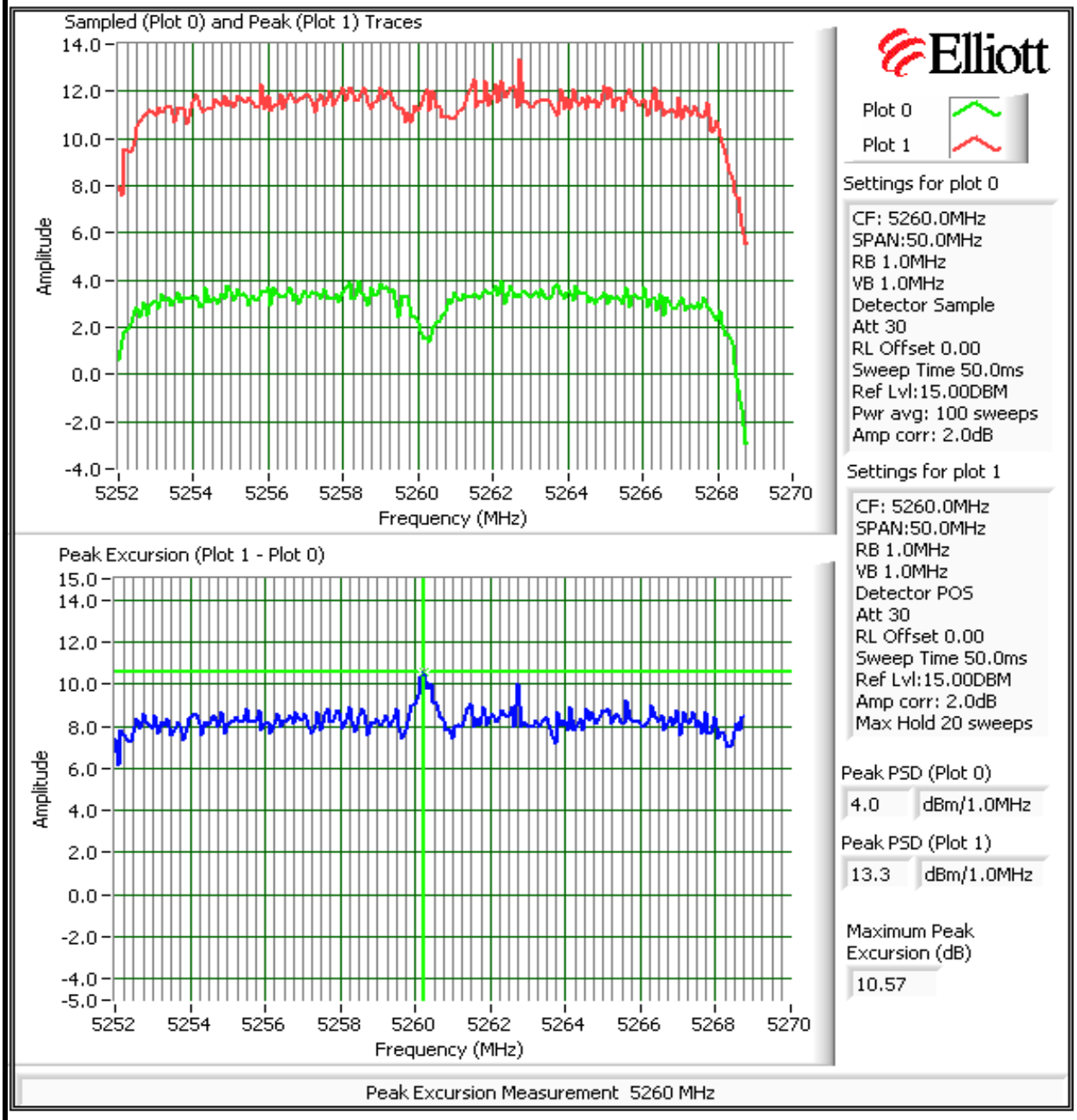
EMC Test Data

Client:	Atheros	Job Number:	J59977
Model:	AR5BXB6 802.11 a/b/g PCI Express Module	T-Log Number:	T60077
		Account Manager:	Joe Rohlfes
Contact:	Michael Green		
Spec:	FCC 15E,15.247	Class:	N/A



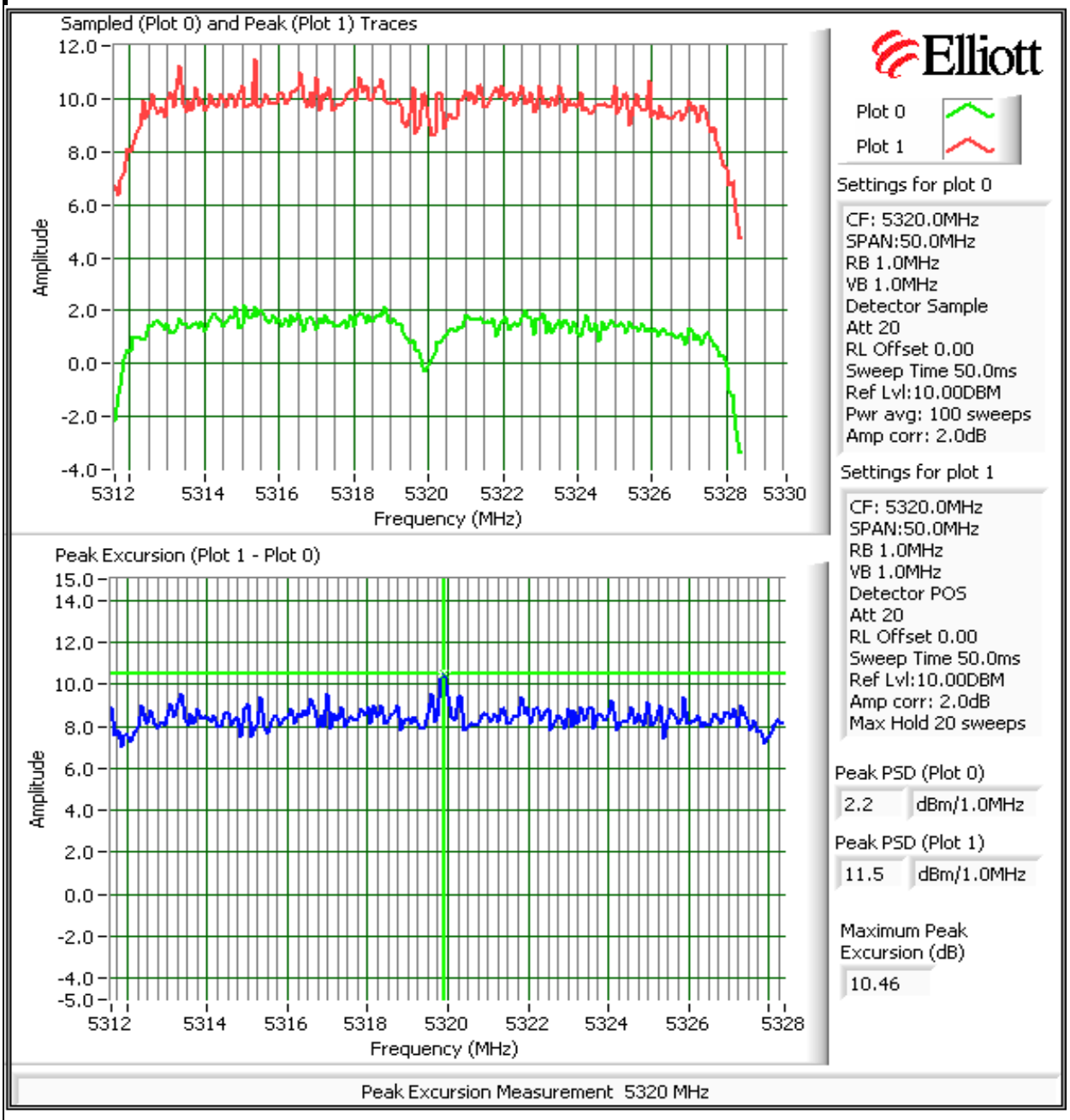
EMC Test Data

Client:	Atheros	Job Number:	J59977
Model:	AR5BXB6 802.11 a/b/g PCI Express Module	T-Log Number:	T60077
		Account Manager:	Joe Rohlfes
Contact:	Michael Green		
Spec:	FCC 15E,15.247	Class:	N/A



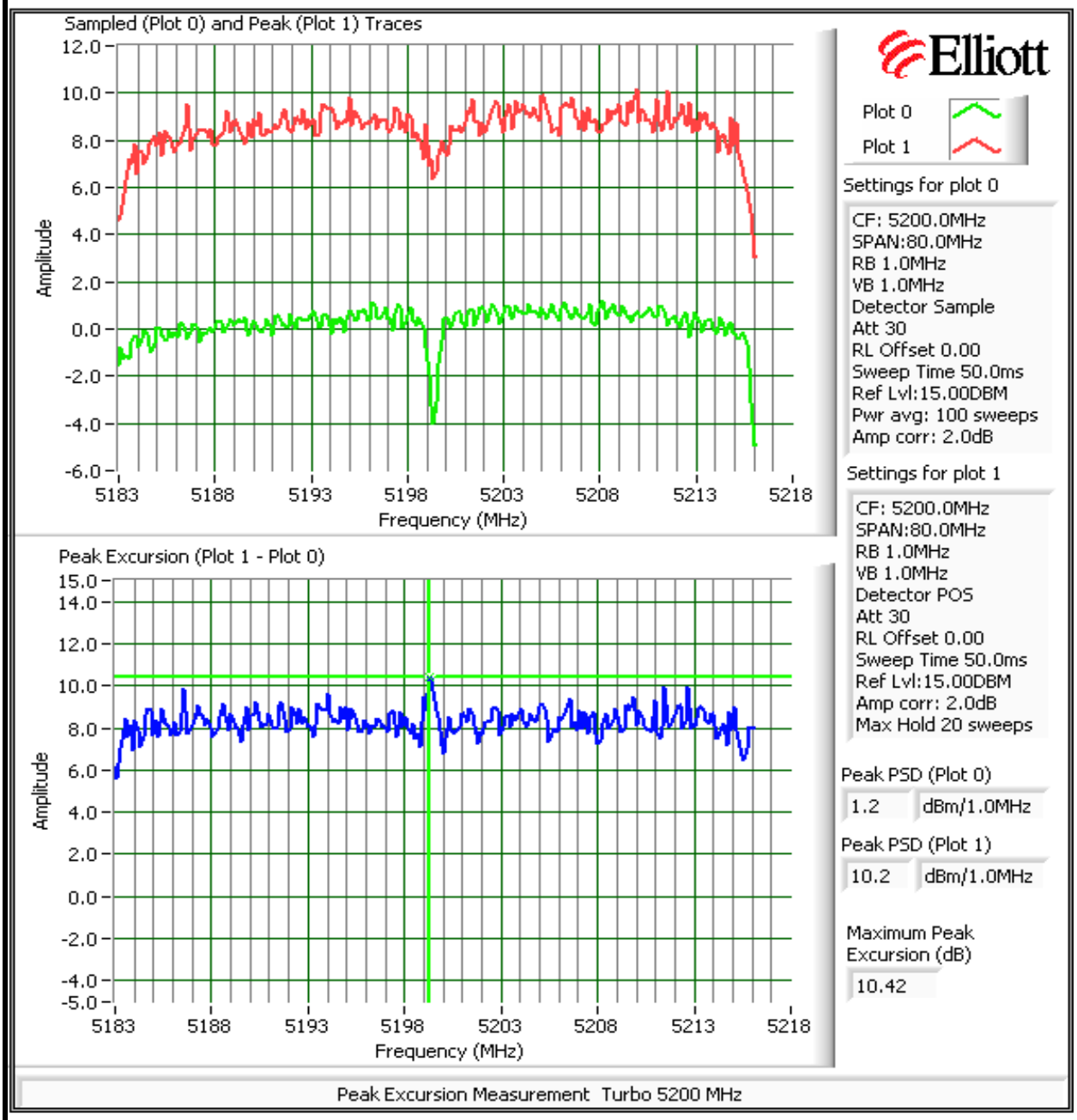
EMC Test Data

Client:	Atheros	Job Number:	J59977
Model:	AR5BXB6 802.11 a/b/g PCI Express Module	T-Log Number:	T60077
		Account Manager:	Joe Rohlfes
Contact:	Michael Green		
Spec:	FCC 15E,15.247	Class:	N/A



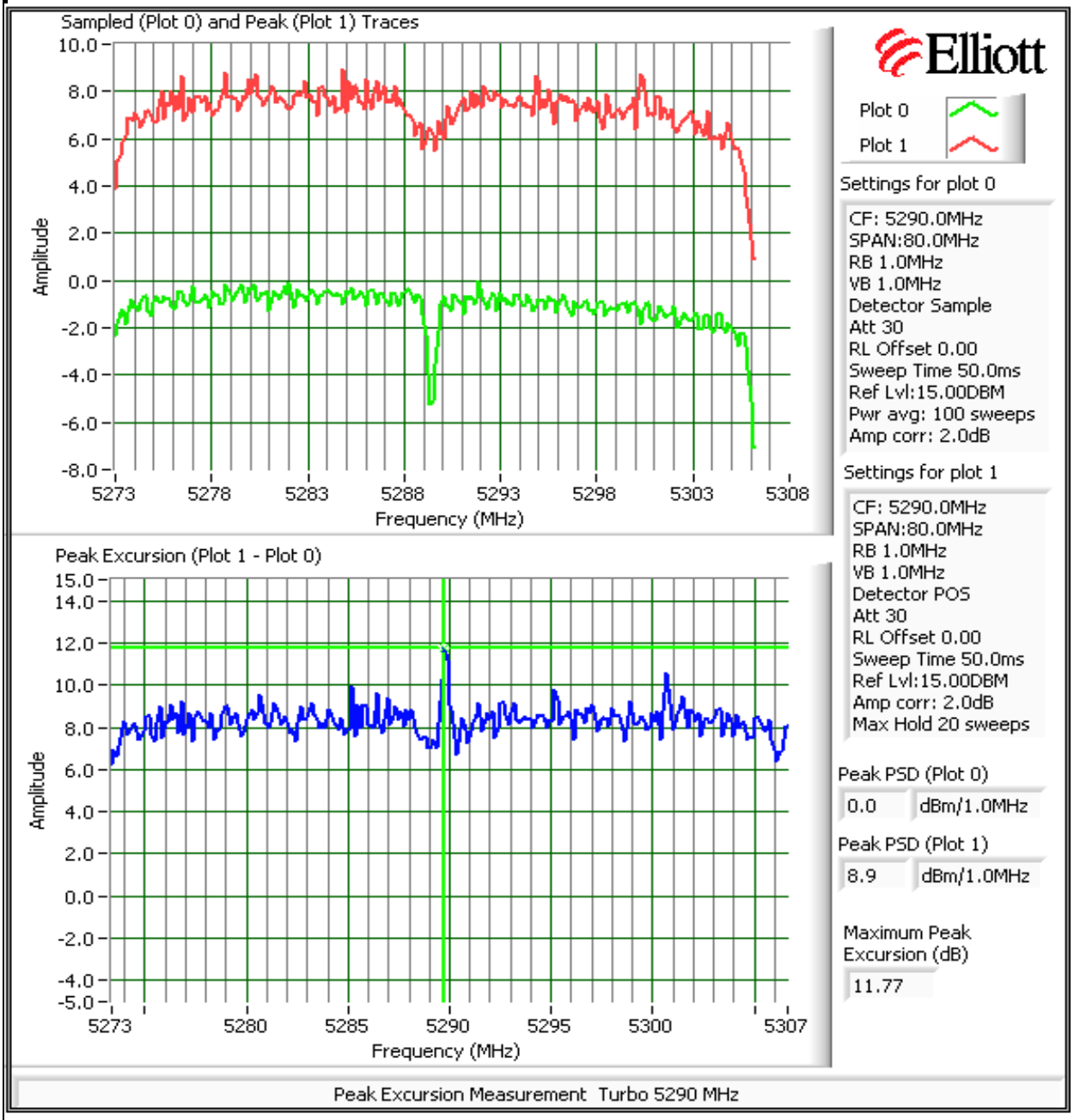
EMC Test Data

Client:	Atheros	Job Number:	J59977
Model:	AR5BXB6 802.11 a/b/g PCI Express Module	T-Log Number:	T60077
		Account Manager:	Joe Rohlfes
Contact:	Michael Green		
Spec:	FCC 15E,15.247	Class:	N/A



EMC Test Data

Client:	Atheros	Job Number:	J59977
Model:	AR5BXB6 802.11 a/b/g PCI Express Module	T-Log Number:	T60077
		Account Manager:	Joe Rohlfes
Contact:	Michael Green		
Spec:	FCC 15E,15.247	Class:	N/A



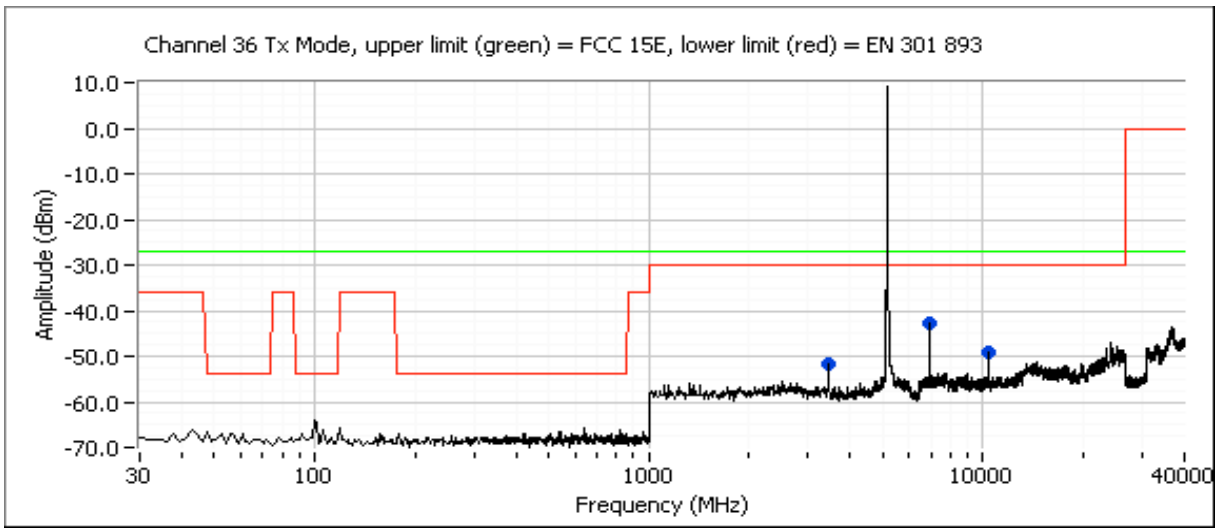
Client:	Atheros	Job Number:	J59977
Model:	AR5BXB6 802.11 a/b/g PCI Express Module	T-Log Number:	T60077
		Account Manager:	Joe Rohlfes
Contact:	Michael Green		
Spec:	FCC 15E,15.247	Class:	N/A

Run #3: Out Of Band Spurious Emissions - Antenna Conducted

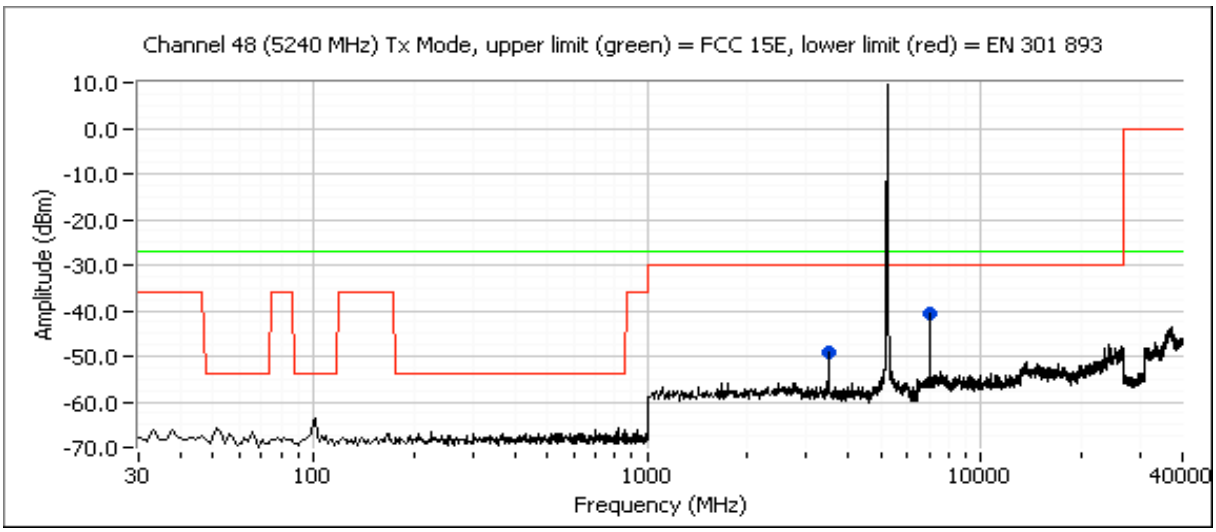
The antenna gain of the radios integral antenna is 1.45dBi. The EIRP limit is -27dBm/MHz for all out of band signals that do not fall in restricted bands. A limit of -28.5 dBm was, therefore, used for signals not in restricted bands and close to the intentional band with the assumption that the antenna gain was equal to 1.45 within 100 MHz of the upper and lower band edges. For signals removed from the band edge by more than 100MHz, radiated measurements were made (refer to run #6) if the signal amplitude exceeded -37dBm.

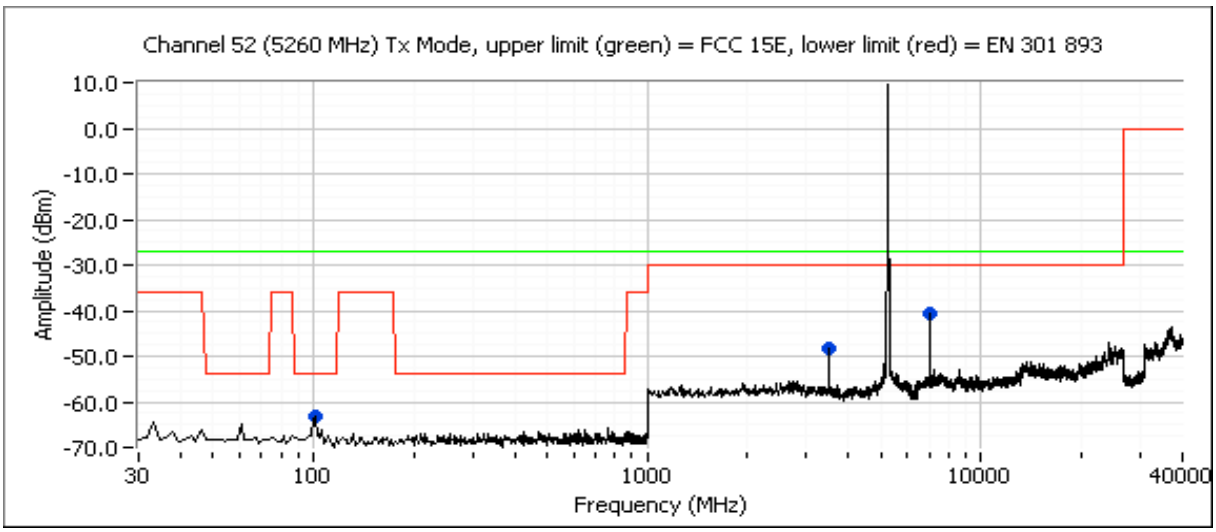
Channel	Mode	Frequency Range	Highest Spurious Signal
5180	802.11a	30 - 40000 MHz	All below -27dBm eirp
5240	802.11a	30 - 40000 MHz	All below -27dBm eirp
5260	802.11a	30 - 40000 MHz	All below -27dBm eirp
5320	802.11a	30 - 40000 MHz	All below -27dBm eirp
5200	Turbo	30 - 40000 MHz	All below -27dBm eirp
5290	Turbo	30 - 40000 MHz	All below -27dBm eirp

Plots Showing Out-Of-Band Emissions (RBW=VBW=1MHz)

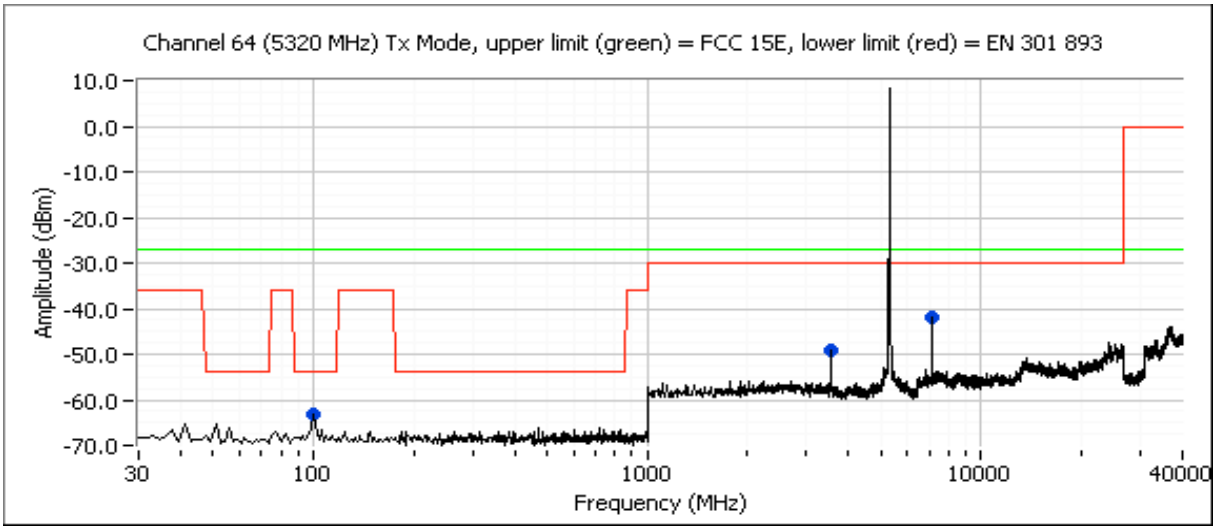


Client:	Atheros	Job Number:	J59977
Model:	AR5BXB6 802.11 a/b/g PCI Express Module	T-Log Number:	T60077
		Account Manager:	Joe Rohlfes
Contact:	Michael Green		
Spec:	FCC 15E,15.247	Class:	N/A





Client:	Atheros	Job Number:	J59977
Model:	AR5BXB6 802.11 a/b/g PCI Express Module	T-Log Number:	T60077
		Account Manager:	Joe Rohlfes
Contact:	Michael Green		
Spec:	FCC 15E,15.247	Class:	N/A



Note - as turbo mode has a lower PSD than the 802.11a mode, plots of the 802.11a mode are considere the worst case for spurious emissions.

Client:	Atheros	Job Number:	J59977
Model:	AR5BXB6 802.11 a/b/g PCI Express Module	T-Log Number:	T60077
		Account Manager:	Joe Rohlfes
Contact:	Michael Green		
Spec:	FCC 15E,15.247	Class:	n/a

Radiated Emissions 1 - 40GHz (Transmit Mode)

5150 - 5240, 5260 - 5320 and 5725 - 5850 MHz Bands

FCC 15 E / FCC 15.247

Test Specifics

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

Date of Test: 6/16/2005 - 6/21/2005 Config. Used: #1
Test Engineer: Varelas, Birgani, Briggs Config Change: None
Test Location: SVOATS #2, #1 Host Unit Voltage 120V/60Hz

General Test Configuration

The EUT and host laptop were located on the turntable for radiated spurious emissions testing. The EUT was controlled via ART software that set the EUT to transmit continuously at target power of 18, 1Mb/s for 802.11b mode and 6Mb/s for 802.11a and 802.11g modes.

For radiated emissions testing the measurement antenna was located 3 meters from the EUT, unless stated otherwise.

Ambient Conditions:

Temperature: 15 °C
Rel. Humidity: 75 %

Summary of Results

Run #	Test Performed	Limit	Pass / Fail	Result / Margin
1a - d (5180, 5240, 5260, 5320)	802.11a (5150 - 5350 MHz) Radiated Spurious Emissions, 1 - 40 GHz	FCC Part 15.209 / 15E	Pass	53.7dBµV/m (485.8µV/m) @ 10638.7MHz (-0.3dB)
2a, b (5200, 5290)	Turbo Mode (5150 - 5350 MHz) Radiated Spurious Emissions, 1 - 40 GHz	FCC Part 15.209 / 15E	Pass	50.6dBµV/m (338.8µV/m) @ 5150.0MHz (-3.4dB)
3a, 3b, 3c (5745, 5785, 5825)	802.11a (5725 - 5850 MHz) Radiated Spurious Emissions, 1 - 40 GHz	FCC Part 15.209 / 15.247	Pass	51.8dBµV/m (387.7µV/m) @ 11649.0MHz (-2.2dB)

Modifications Made During Testing:

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the standard:

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EMC Test Data

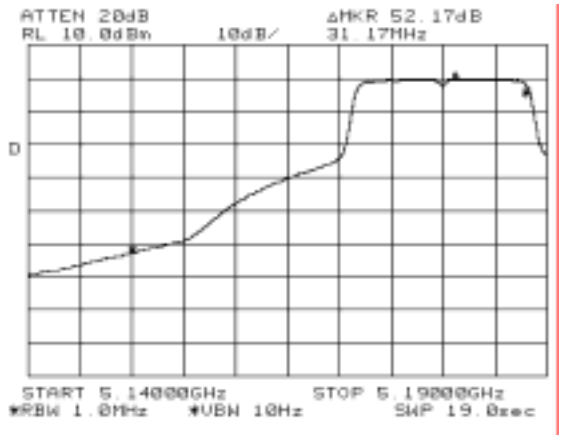
Client:	Atheros	Job Number:	J59977
Model:	AR5BXB6 802.11 a/b/g PCI Express Module	T-Log Number:	T60077
		Account Manager:	Joe Rohlfes
Contact:	Michael Green		
Spec:	FCC 15E,15.247	Class:	n/a

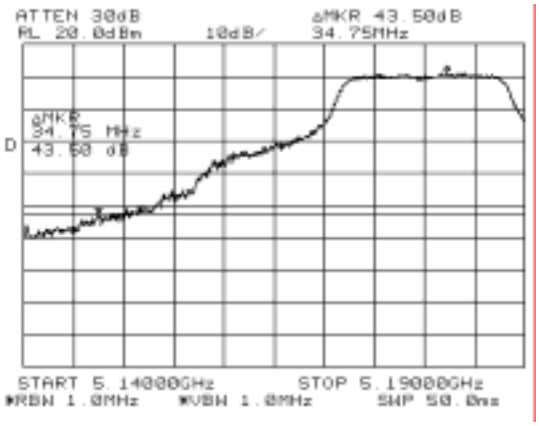
Run #1: 802.11a Mode, 5150 - 5350 MHz

Run #1a: Radiated Spurious Emissions. Channel 36 @ 5180 MHz

Fundamental Signal, power level setting = 18 (target power in ART)

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments
MHz	dBµV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
5175.975	100.0	V	-	-	AVG	159	2.1	Fundamental
5175.975	109.0	V	-	-	PK	159	2.1	Fundamental
5176.934	97.1	H	-	-	AVG	92	1.0	Fundamental
5176.934	106.2	H	-	-	PK	92	1.0	Fundamental





Method 1, band edge marker delta

Delta Marker - Peak	43.50 dB	RB = VB= 1MHz
Delta Marker - Average	52.20 dB	RB=1MHz, VB = 10Hz

Band Edge Signal Radiated Field Strength

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments
MHz	dBµV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
5150.000	47.8	V	54.0	-6.2	Avg	159	2.1	
5147.500	65.5	V	74.0	-8.5	Pk	159	2.1	

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set to -27dBm/MHz (~68dBuV/m).
Note 2:	Band-edge measurement calculated from the fundamental field strength (peak or average) minus the band edge delta marker measurement.

Client:	Atheros	Job Number:	J59977
Model:	AR5BXB6 802.11 a/b/g PCI Express Module	T-Log Number:	T60077
		Account Manager:	Joe Rohlfes
Contact:	Michael Green		
Spec:	FCC 15E,15.247	Class:	n/a

Other Spurious Radiated Emissions (#36, 5180 MHz):

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments
MHz	dBµV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
15542.27	46.0	V	54.0	-8.1	AVG	20	1.2	
10360.75	58.9	H	68.3	-9.4	PK	34	1.4	Non-restricted (pk reading, avg limit)
10357.20	58.9	V	68.3	-9.5	PK	52	1.4	Non-restricted (pk reading, avg limit)
15541.70	40.0	H	54.0	-14.0	AVG	35	1.0	
15542.27	59.7	V	74.0	-14.4	PK	20	1.2	
10360.75	47.2	H	68.3	-21.1	AVG	34	1.4	Non-restricted
10357.20	47.0	V	68.3	-21.3	AVG	52	1.4	Non-restricted
15541.70	52.0	H	74.0	-22.0	PK	35	1.0	

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set to -27dBm/MHz (~68dBuV/m).

Run #1b: Radiated Spurious Emissions. Channel 48 @ 5240 MHz
Spurious Emissions (ED4 Antenna (Main), Power level 18dBm)

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments
MHz	dBµV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
15717.85	47.5	V	54.0	-6.5	AVG	21	1.3	
15719.33	44.0	H	54.0	-10.0	AVG	44	1.0	
15717.85	59.5	V	74.0	-14.6	PK	21	1.3	
15719.33	56.1	H	74.0	-17.9	PK	44	1.0	
10478.55	49.5	V	68.3	-18.8	AVG	340	1.4	Non-restricted
10481.00	47.6	H	68.3	-20.7	AVG	53	1.3	Non-restricted
10478.55	64.8	V	68.3	-3.5	PK	340	1.4	Non-restricted (pk reading, avg limit)
10481.00	60.9	H	68.3	-7.4	PK	53	1.3	Non-restricted (pk reading, avg limit)

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set to -27dBm/MHz (~68dBuV/m).

Client:	Atheros	Job Number:	J59977
Model:	AR5BXB6 802.11 a/b/g PCI Express Module	T-Log Number:	T60077
		Account Manager:	Joe Rohlfes
Contact:	Michael Green		
Spec:	FCC 15E,15.247	Class:	n/a

Run #1c: Radiated Spurious Emissions. Channel 52 @ 5260 MHz
Spurious Emissions

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments
MHz	dBµV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
15777.75	48.1	V	54.0	-5.9	AVG	20	1.2	
15776.10	43.3	H	54.0	-10.7	AVG	44	1.3	
15777.75	60.1	V	74.0	-13.9	PK	20	1.2	
10519.98	51.4	V	68.3	-16.9	AVG	220	1.5	Partial ambient, Non-restricted
15776.10	55.7	H	74.0	-18.3	PK	44	1.3	
10519.75	48.9	H	68.3	-19.4	AVG	35	1.2	Partial ambient, Non-restricted
10519.98	63.2	V	68.3	-5.1	PK	220	1.5	Non-restricted (pk reading, avg limit)
10519.75	60.7	H	68.3	-7.7	PK	35	1.2	Non-restricted (pk reading, avg limit)

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set to -27dBm/MHz (~68dBuV/m).

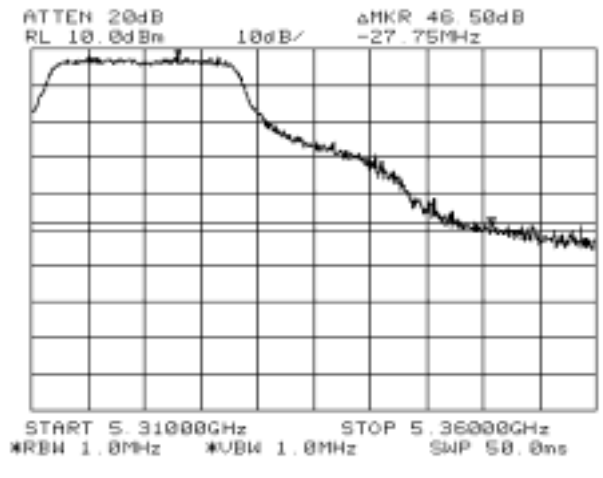
Elliott

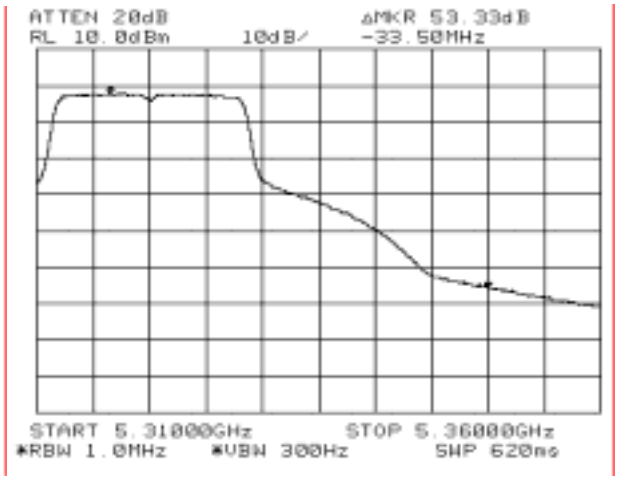
EMC Test Data

Client:	Atheros	Job Number:	J59977
Model:	AR5BXB6 802.11 a/b/g PCI Express Module	T-Log Number:	T60077
		Account Manager:	Joe Rohlfes
Contact:	Michael Green		
Spec:	FCC 15E,15.247	Class:	n/a

Run #1d: Radiated Spurious Emissions. High Channel @ 5320 MHz
Fundamental Signal, power level setting = 18 (target power in ART)

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments
MHz	dBµV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
5320.000	99.7	V	-	-	AVG	50	1.0	Fundamental
5320.000	108.0	V	-	-	PK	50	1.0	Fundamental
5323.450	98.6	H	-	-	AVG	46	1.4	Fundamental
5323.450	107.5	H	-	-	PK	46	1.4	Fundamental





Method 1, band edge marker delta

Delta Marker - Peak	46.50 dB	RB = VB= 1MHz
Delta Marker - Average	53.30 dB	RB=1MHz, VB = 10Hz

Band Edge Signal Radiated Field Strength

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments
MHz	dBµV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
5350.000	46.4	V	54.0	-7.6	Avg	210	1.0	
5350.700	61.5	V	74.0	-12.5	Pk	210	1.0	

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set to -27dBm/MHz (~68dBuV/m).
Note 2:	Band-edge measurement calculated from the fundamental field strength (peak or average) minus the band edge delta marker measurement.

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EMC Test Data

Client:	Atheros	Job Number:	J59977
Model:	AR5BXB6 802.11 a/b/g PCI Express Module	T-Log Number:	T60077
		Account Manager:	Joe Rohlfes
Contact:	Michael Green		
Spec:	FCC 15E,15.247	Class:	n/a

Other Spurious Radiated Emissions:

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
10641.55	45.7	V	54.0	-8.3	AVG	225	1.6	
10639.75	45.1	H	54.0	-8.9	AVG	46	1.4	
15959.70	44.8	V	54.0	-9.2	AVG	360	1.3	
15953.80	43.6	H	54.0	-10.4	AVG	40	1.4	
10639.75	60.4	H	74.0	-13.6	PK	46	1.4	
10641.55	60.3	V	74.0	-13.8	PK	225	1.6	
15959.70	57.2	V	74.0	-16.8	PK	360	1.3	
15953.80	56.4	H	74.0	-17.6	PK	40	1.4	

Note 1: For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set to -27dBm/MHz (~68dBuV/m).

Radiated Spurious Emissions. Channel 48 @ 5240 MHz
Run #1e: Spurious Emissions using the EBJ antenna
Spurious Emissions (EBJ Antenna, Power level 18, EUT at 5240 MHz)

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments
MHz	dBµV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
15721.77	46.8	V	54.0	-7.2	AVG	241	1.4	
15717.93	44.0	H	54.0	-10.0	AVG	261	1.2	
10479.78	55.5	V	68.3	-12.8	AVG	249	1.4	Non-restricted
15721.77	58.5	V	74.0	-15.5	PK	241	1.4	
15717.93	56.5	H	74.0	-17.6	PK	261	1.2	
10481.52	47.6	V	68.3	-20.7	AVG	249	1.3	Non-restricted
10479.78	68.3	V	68.3	0.0	PK	249	1.4	Non-restricted (pk reading, avg limit)
10481.52	61.1	V	68.3	-7.2	PK	249	1.3	Non-restricted (pk reading, avg limit)

Power level 17

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments
MHz	dBµV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
10481.50	54.2	V	68.3	-14.1	AVG	274	1.4	2nd Harmonic (Aux, 17.0dBm)
10481.50	68.5	V	88.3	-19.8	PK	274	1.4	2nd Harmonic (Aux, 17.0dBm)

EBJ Antenna, Power level 16.5

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments
MHz	dBµV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
10480.22	52.8	V	68.3	-15.5	AVG	248	1.4	2nd Harmonic (Aux, 16.5dBm)
10481.65	49.2	H	68.3	-19.1	AVG	338	1.1	2nd Harmonic (Aux, 16.5dBm)
10480.22	64.8	V	88.3	-23.5	PK	248	1.4	2nd Harmonic (Aux, 16.5dBm)
10481.65	62.6	H	88.3	-25.7	PK	338	1.1	2nd Harmonic (Aux, 16.5dBm)

Elliott

EMC Test Data

Client:	Atheros	Job Number:	J59977
Model:	AR5BXB6 802.11 a/b/g PCI Express Module	T-Log Number:	T60077
		Account Manager:	Joe Rohlfes
Contact:	Michael Green		
Spec:	FCC 15E,15.247	Class:	n/a

Spurious Emissions (EBJ Antenna, Power level 18, EUT at 5320 MHz)

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments
MHz	dBµV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
10638.69	53.7	H	54.0	-0.3	AVG	42	1.0	
10638.69	64.5	H	74.0	-9.5	PK	42	1.0	
10637.19	52.7	V	54.0	-1.3	AVG	53	1.4	
10637.19	65.1	V	74.0	-8.9	PK	53	1.4	

Client:	Atheros	Job Number:	J59977
Model:	AR5BXB6 802.11 a/b/g PCI Express Module	T-Log Number:	T60077
		Account Manager:	Joe Rohlfes
Contact:	Michael Green		
Spec:	FCC 15E,15.247	Class:	n/a

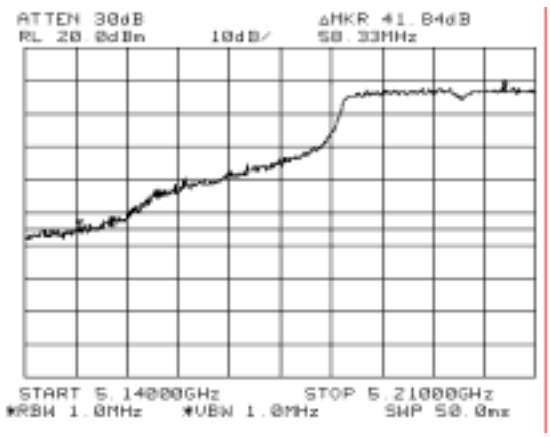
Run #2: Turbo Mode, 5150 - 5350 MHz

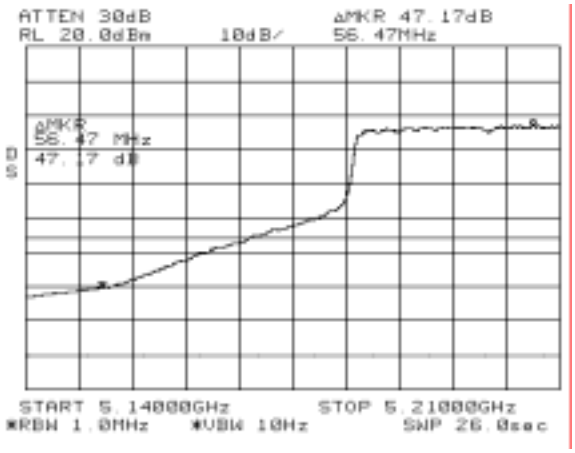
As the PSD for turbo mode is lower than that for 802.11a mode measurements of harmonic signals were considered covered by the 802.11a mode tests.

Run #2a: Radiated Spurious Emissions. Turbo Channel @ 5200 MHz

Fundamental Signal, power level setting = 18 (target power in ART)

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments
MHz	dBµV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
5201.400	97.8	V	-	-	AVG	190	2.0	Fundamental
5201.400	106.1	V	-	-	PK	190	2.0	Fundamental
5201.925	95.0	H	-	-	AVG	99	1.0	Fundamental
5201.925	103.0	H	-	-	PK	99	1.0	Fundamental





Method 1, band edge marker delta

Delta Marker - Peak	41.8 dB	RB = VB= 1MHz
Delta Marker - Average	47.20 dB	RB=1MHz, VB = 10Hz

Band Edge Signal Radiated Field Strength

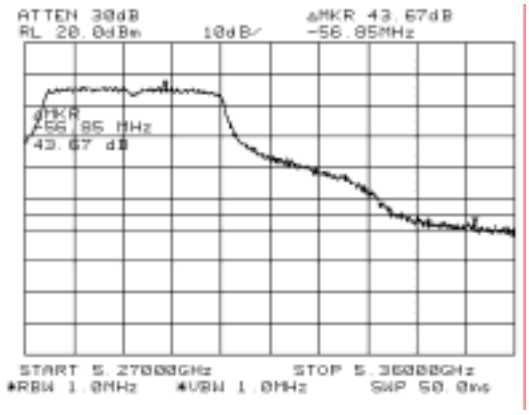
Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments
MHz	dBµV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
5150.000	50.6	V	54.0	-3.4	Avg	159	2.1	Using first method
5148.000	64.3	V	74.0	-9.7	Pk	159	2.1	Using first method

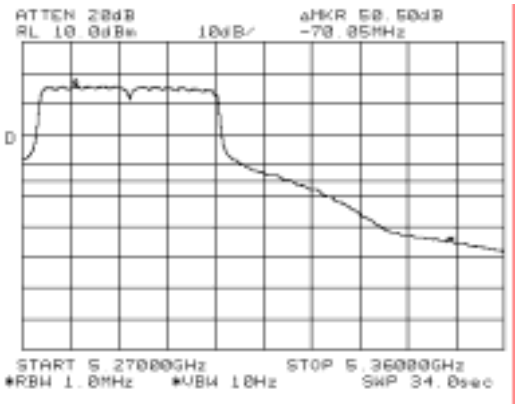
Note 2:	Band-edge measurement calculated from the fundamental field strength (peak or average) minus the band edge delta marker measurement.

Client:	Atheros	Job Number:	J59977
Model:	AR5BXB6 802.11 a/b/g PCI Express Module	T-Log Number:	T60077
		Account Manager:	Joe Rohlfes
Contact:	Michael Green		
Spec:	FCC 15E,15.247	Class:	n/a

Run #2b: Radiated Spurious Emissions. Turbo Channel @ 5290 MHz
Fundamental Signal, power level setting = 18 (target power in ART)

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments
MHz	dBµV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
5276.292	95.4	V	-	-	AVG	180	1.1	Fundamental
5276.292	103.7	V	-	-	PK	180	1.1	Fundamental
5288.133	95.2	H	-	-	AVG	104	1.0	Fundamental
5288.133	103.6	H	-	-	PK	104	1.0	Fundamental





Method 1, band edge marker delta (5350 MHz band edge)

Delta Marker - Peak	43.7 dB	RB = VB= 1MHz
Delta Marker - Average	50.5 dB	RB=1MHz, VB = 10Hz

Band Edge Signal Radiated Field Strength - 5350 MHz

Frequency	Level	Pol	15.209 / 15E / LP002		Detector	Azimuth	Height	Comments
MHz	dBµV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
5350.000	44.9	V	54.0	-9.1	AVG	180	1.1	
5352.000	60.0	V	74.0	-14.0	PK	180	1.1	

Note 2:	Band-edge measurement calculated from the fundamental field strength (peak or average) minus the band edge delta marker measurement.

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EMC Test Data

Client:	Atheros	Job Number:	J59977
Model:	AR5BXB6 802.11 a/b/g PCI Express Module	T-Log Number:	T60077
		Account Manager:	Joe Rohlfes
Contact:	Michael Green		
Spec:	FCC 15E,15.247	Class:	n/a

Run #3: 802.11a Mode, 5725 - 5850 MHz, Wistron "EBJ" Main Antenna

Run #3a: Radiated Spurious Emissions. Channel @ 5745 MHz

Fundamental Signal, power level setting = 18 (target power in ART)

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
5739.459	99.5	H	-	-	AVG	2	1.0	Fundamental
5739.459	107.9	H	-	-	PK	2	1.0	Fundamental
5742.000	95.8	V	-	-	AVG	66	1.0	Fundamental
5742.000	104.8	V	-	-	PK	66	1.0	Fundamental

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	
11489.70	49.9	H	54.0	-4.1	AVG	50	1.1	
11487.75	47.7	V	54.0	-6.3	AVG	304	1.4	
11489.70	62.0	H	74.0	-12.0	PK	50	1.1	
11487.75	59.7	V	74.0	-14.3	PK	304	1.4	
17233.40	44.0	H	-	-	AVG	41	1.0	Note 2
17222.15	41.3	V	-	-	AVG	35	1.0	Note 2
17233.40	54.7	H	-	-	PK	41	1.0	Note 2
17222.15	52.6	V	-	-	PK	35	1.0	Note 2

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. All other emissions were subject to the limit of -20dBc.
Note 2:	Emissions more than 20dB below the limit of -20dBc

Run #3b: Radiated Spurious Emissions. Channel @ 5785 MHz

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
11571.80	51.9	V	54.0	-2.1	AVG	210	1.0	
11574.90	49.7	H	54.0	-4.3	AVG	61	1.4	
11571.80	63.9	V	74.0	-10.1	PK	210	1.0	
11574.90	61.4	H	74.0	-12.6	PK	61	1.4	
17363.55	42.7	H	-	-	AVG	59	1.2	Note 2
17365.90	41.9	V	-	-	AVG	318	1.0	Note 2
17365.90	54.2	V	-	-	PK	318	1.0	Note 2
17363.55	54.3	H	-	-	PK	59	1.2	Note 2

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. All other emissions were subject to the limit of -20dBc.
Note 2:	Emissions more than 20dB below the limit of -20dBc

Elliott

EMC Test Data

Client:	Atheros	Job Number:	J59977
Model:	AR5BXB6 802.11 a/b/g PCI Express Module	T-Log Number:	T60077
		Account Manager:	Joe Rohlfes
Contact:	Michael Green		
Spec:	FCC 15E,15.247	Class:	n/a

Run #3c: Radiated Spurious Emissions. High Channel @ 5825 MHz

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
11649.05	51.8	V	54.0	-2.2	AVG	209	1.4	
11649.65	49.4	H	54.0	-4.6	AVG	57	1.7	
11649.05	64.0	V	74.0	-10.0	PK	209	1.4	
11649.65	60.9	H	74.0	-13.1	PK	57	1.7	
17474.25	43.7	H	-	-	AVG	360	1.2	Note 2
17477.50	43.2	V	-	-	AVG	165	1.2	Note 2
17474.25	55.6	H	-	-	PK	360	1.2	Note 2
17477.50	54.6	V	-	-	PK	165	1.2	Note 2

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. All other emissions were subject to the limit of -20dBc.
Note 2:	Emissions more than 20dB below the limit of -20dBc

Run #3d: Radiated Spurious Emissions. Channel @ 5785 MHz - spot check with Wistron ED4 Antenna (Main)
Spurious Emissions (ED4 Antenna (Main), Power level 18dBm)

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
11570.27	45.6	V	54.0	-8.4	AVG	232	1.4	2nd Harmonic (Main, 18.0dBm)
11570.40	45.0	H	54.0	-9.1	AVG	360	1.4	2nd Harmonic (Main, 18.0dBm)
11570.27	56.5	V	74.0	-17.5	PK	232	1.4	2nd Harmonic (Main, 18.0dBm)
11570.40	56.4	H	74.0	-17.6	PK	360	1.4	2nd Harmonic (Main, 18.0dBm)
17357.25	42.3	H	-	-	AVG	247	1.2	Note 2
17354.18	40.3	V	-	-	AVG	360	1.7	Note 2
17357.25	54.5	H	-	-	PK	247	1.2	Note 2
17354.18	51.5	V	-	-	PK	360	1.7	Note 2

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. All other emissions were subject to the limit of -20dBc.
Note 2:	Emissions more than 20dB below the limit of -20dBc