Elliott Laboratories Inc.
www.elliottlabs.com
684 West Maude Avenue
Sunnyvale, CA 94086-3518
408-245-7800 Phone
408-245-3499 Fax

Electromagnetic Emissions Test Report and Application for Grant of Equipment Authorization pursuant to FCC Part 15, Subpart E (UNII Devices) and Industry Canada RSS 210 Issue 4 (LELAN Devices) on the Atheros Communications Model: AR5BAP-00030

FCC ID: PPD-AR5BAP-00030

GRANTEE: Atheros Communications
529 Almanor
Sunnyvale, CA 94085

TEST SITE: Elliott Laboratories, Inc.
684 W. Maude Avenue
Sunnyvale, CA 94086

REPORT DATE: October 19, 2001

FINAL TEST DATE: October 11 and October 18, 2001

AUTHORIZED SIGNATORY: _____

Mark Briggs
Director of Engineering

DECLARATIONS OF COMPLIANCE

Equipment Name and Model:
AR5BAP-00030

Manufacturer:
Atheros Communications
529 Almanor
Sunnyvale, CA 94085

Tested to applicable standards:
RSS-210, Issue 4, December 2000 (Low Power License-Exempt Radiocommunication Devices)
FCC Part 15 Subpart E (UNII Devices)

Measurement Facility Description Filed With Department of Industry:

Departmental Acknowledgement Number: IC2845 **SV2** Dated August 8, 2001
Departmental Acknowledgement Number: IC2845 **SV4** Dated August 20, 2001

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

Signature	_____
Name	Mark Briggs
Title	Director of Engineering
Company	Elliott Laboratories Inc.
Address	684 W. Maude Ave Sunnyvale, CA 94086 USA
Date:	October 19, 2001

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 model AR5BAP-00030 pursuant to Subpart E of Part 15 of FCC Rules for Unlicensed National Information Infrastructure (UNII) devices and RSS-210 Issue 4 for licence-exempt local area network (LELAN) devices. Conducted and radiated emissions data has been collected, reduced, and analyzed within this report in accordance with measurement guidelines set forth in ANSI C63.4-1992 as outlined in Elliott Laboratories test procedures.

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

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

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

The test results recorded herein are based on a single type test of the Atheros Communications model AR5BAP-00030 and therefore apply only to the tested sample. The sample was selected and prepared by Eric Dukatz of Atheros Communications.

OBJECTIVE

The primary objective of the manufacturer is compliance with Subpart E of Part 15 of FCC Rules 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

The test data below represents the highest recorded measurements with respect to the FCC Part 15 Subpart E and RSS 210 limits. Unless stated otherwise, the complete data can be found in the Tests Data Sheets (Exhibit 2) submitted with this report.

FCC Part 15 Section	RSS 210 Section	Description	Comments	Result
Operation in the 5.15 – 5.25 GHz Band (Normal Mode)				
15.407 (d)		Maximum Antenna Gain /Integral Antenna	6 dBi Integral	Pass
15.407(e)		Indoor operation only	Refer to user's manual in Exhibit 7	Pass
15.407(a) (1)	6.2.2 q1 (i)	Bandwidth	25.83 MHz (26-dB), 17.33 MHz (20-dB)	N/A
15.407(a) (1)	6.2.2 q1 (i)	Output Power	13.9 dBm	Pass
15.407(a) (1))	6.2.2 q1 (i)	Power Spectral Density	-1.4 dBm/MHz	Pass
Operation in the 5.25 – 5.35 GHz Band (Normal Mode)				
		Maximum Antenna Gain	6 dBi Integral	Pass
15.407(a) (2)	6.2.2 q1 (ii)	Bandwidth	32.67 MHz (26-dB), 18.3 MHz (20-dB)	N/A
15.407(a) (2)	6.2.2 q1 (ii)	Output Power	21.1 dBm	Pass
15.407(a) (2))	6.2.2 q1 (ii)	Power Spectral Density	6.1 dBm/MHz	Pass
Operation in the 5.15 – 5.25 GHz Band (Turbo Mode)				
15.407 (d)		Maximum Antenna Gain /Integral Antenna	6 dBi Integral	Pass
15.407(e)		Indoor operation only	Refer to user's manual in Exhibit 7	Pass
15.407(a) (1)	6.2.2 q1 (i)	Bandwidth	43.8 MHz (26-dB), 33.17 MHz (20-dB)	N/A
15.407(a) (1)	6.2.2 q1 (i)	Output Power	16 dBm	Pass
15.407(a) (1))	6.2.2 q1 (i)	Power Spectral Density	-1.6 dBm / MHz	Pass
Operation in the 5.25 – 5.35 GHz Band (Turbo Mode)				
		Maximum Antenna Gain	6 dBi Integral	Pass
15.407(a) (2)	6.2.2 q1 (ii)	Bandwidth	54.7 MHz (26-dB), 33.17 MHz (20-dB)	N/A
15.407(a) (2)	6.2.2 q1 (ii)	Output Power	21.2 dBm	Pass
15.407(a) (2))	6.2.2 q1 (ii)	Power Spectral Density	3.8 dBm/MHz	Pass
Spurious Emissions (All Modes)				
15.407(b) (5) / 15.209	6.2.2 q1 (ii)	Spurious Emissions below 1GHz	-4.2 dB @ 67.92MHz	Pass
15.407(b) (2)	6.2.2 q1 (ii)	Spurious Emissions above 1GHz	-0.6 dB @ 10,538 MHz	Pass

FCC Part 15 Section	RSS 210 Section	Description	Comments	Result
Other Requirements (Both Modes)				
	6.2.2 q(iv)(a)	Digital Modulation	Digital Modulation is used, refer to the "Theory of Operations" in exhibit 8 for a detailed explanation.	Pass
	6.2.2 q(iv)(b)	Peak Spectral Density	15.6 dBm/MHz in Normal mode	Pass
15.407(a)(6)		Peak Excursion Ratio	Less than 13dB	Pass
	6.2.2 q(iv)(c)	Channel Selection	The device was tested on the following channels in turbo mode: 9, 13 and 17. The device was tested on the following channels in normal mode: 6, 14 and 20. These channels represent the lowest, center and highest frequencies of operation in each mode.	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 the "Theory of Operations" in exhibit 9 for a detailed explanation.	Pass
15.407 (g)	6.2.2 q(iv)(e)	Frequency Stability	Frequency stability is =/-20ppm. Refer to the "Theory of Operations" (exhibit 9) for a detailed analysis.	Pass
	6.2.2 q(iv)(g)	User Manual information	All relevant statements have been included in the user's manuals. Refer to Exhibit 6 for details	N/A
15.407 (f)	6.2.2 q(iv)(g)	RF Exposure Requirements	Refer to MPE Calculations (Exhibit 11)	Pass
15.407(b) / 15.207	6.6	AC Conducted Emissions	-13dB @ 0.694MHz	Pass

MEASUREMENT UNCERTAINTIES

ISO Guide 25 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level and were calculated in accordance with NAMAS document NIS 81.

Measurement Type	Frequency Range (MHz)	Calculated Uncertainty (dB)
Conducted Emissions	0.15 to 30	± 2.4
Radiated Emissions	30 to 1000	± 3.2

EQUIPMENT UNDER TEST (EUT) DETAILS

GENERAL

The Atheros Communications model AR5BAP-00030 is a UNII radio, which is designed to provide LAN access.

Normally, the EUT would be wall-mounted during operation. The EUT was treated as tabletop equipment during testing to simulate the end user environment. The electrical rating of the EUT is 120 V, 60 Hz, 3 Amps.

The sample was received on October 11, 2001 and tested on October 11 and October 18, 2001. The EUT consisted of the following component(s):

Manufacturer/Model/Description	Serial Number
Atheros Communications AR5BAP-00030 Wireless LAN Access Point	143
Atheros Communications AR5BAP-00030 Wireless LAN Access Point	144

ANTENNA

The EUT uses an integral antenna with a gain of 6 dBi.

ENCLOSURE

The EUT enclosure is primarily constructed with a plated steel shield inside a plastic enclosure. It measures approximately 17 cm wide by 20 cm deep by 7 cm high.

MODIFICATIONS

The EUT required the following modifications during testing in order to comply with the specifications for radiated emissions below 1GHz:

A 2.5” x 2.25” piece of Echosorb material ARC DD-10214 was added to the top cover of the EUT above the micro-controller and SDRAM

SUPPORT EQUIPMENT

The following equipment was used as local support equipment when testing antenna port emissions, radiated emissions above 1GHz and for measuring the output power:

Manufacturer	Model	Description	Serial Number	FCC ID
IBM	2647-8BU	Laptop	78-RUPN5	DoC
Boonton	4531	Power Meter	100201	N/A
Boonton	57318	Power Sensor	2110	N/A

The following equipment was used as remote support equipment when testing conducted and radiated emissions below 1GHz:

Manufacturer	Model	Description	Serial Number	FCC ID
IBM	Thinkpad	Laptop	78-RVPN5 10/02	DoC
Netgear	DS108	Hub	DS18J18380052	DoC

EUT INTERFACE PORTS

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

Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length (m)
Ethernet	Laptop (Hub*)	RJ-45	Unshielded	30

* The hub was used between the EUT and the laptop for radiated and conducted emissions tests below 1GHz.

EUT OPERATION

The radio was transmitting at full power on the specified channel with a duty cycle of 99% (maximum allowed). The EUT was tested in both normal mode (channel bandwidth of approximately 30 MHz) and turbo mode (channel bandwidth of approximately 60 MHz).

"Normal Mode" allows data rates of up to 54 Mb/s. The device was, therefore, tested in Normal mode at the data rate that produced the highest output power for normal mode (6 Mb/s).

"Turbo Mode" allows data rates of up to 72Mb/s. At data rates higher than 12Mb/s the PA gain is reduced to improve signal fidelity. The device was, therefore, tested in turbo mode at the data rate that produced the highest output power for turbo mode (12Mb/s).

ANTENNA REQUIREMENTS

As the device is intended to operate in the 15.15 – 15.25 GHz band an integral antenna as detailed in 15.407 (d) and RSS-210 6.2.2(q1) (i) is required. The antenna for the device is an integral antenna with a gain of 6 dBi.

TEST SITE

GENERAL INFORMATION

Final test measurements were taken on October 11, October 15 and October 18, 2001 at the Elliott Laboratories Open Area Test Sites #2 & #4 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 4 and RSS-212, construction, calibration, and equipment data for the test sites have been filed with the Federal Communications Commission.

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

CONDUCTED EMISSIONS CONSIDERATIONS

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

RADIATED EMISSIONS CONSIDERATIONS

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

MEASUREMENT INSTRUMENTATION

RECEIVER SYSTEM

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

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

INSTRUMENT CONTROL COMPUTER

The receivers utilize either a Rohde & 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

Both a spectrum analyzer and a power meter are used for all direct output power measurements from transmitters.

FILTERS/ATTENUATORS

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

ANTENNAS

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

ANTENNA MAST AND EQUIPMENT TURNTABLE

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

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

INSTRUMENT CALIBRATION

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

TEST PROCEDURES

EUT AND CABLE PLACEMENT

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

CONDUCTED EMISSIONS

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

RADIATED EMISSIONS

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

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

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

CONDUCTED EMISSIONS FROM ANTENNA PORT

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

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

SPECIFICATION LIMITS AND SAMPLE CALCULATIONS

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

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

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

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) 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
5150 - 5250	50mW (17 dBm)	4 dBm/MHz
5250 - 5350	250 mW (24 dBm)	11 dBm/MHz
5725 – 5825	1 Watts (30 dBm)	17 dBm/MHz

For system using antennas with gains exceeding 6dBi, the output power and power spectral density limits are reduced by 1dB for every dB the antenna gain exceeds 6dBi.
Fixed point-to-point applications using the 5725 – 5825 MHz band may use antennas with gains of up to 23dBi without this limitation. If the gain exceeds 23dBi then the output power limit of 1 Watt is reduced by 1dB for every dB the gain exceeds 23dBi.

RS-210 6.2.2(q1) 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
5150 - 5250	200mW (23 dBm)	10 dBm/MHz
5250 - 5350	250 mW (24 dBm)	11 dBm/MHz
5725 – 5825	1 Watts (30 dBm)	17 dBm/MHz

For system using antennas with gains exceeding 6dBi, the output power and power spectral density limits are reduced by 1dB for every dB the antenna gain exceeds 6dBi.
Fixed point-to-point applications using the 5725 – 5825 MHz band may use antennas with gains of up to 23dBi without this limitation. If the gain exceeds 23dBi then the output power limit of 1 Watt is reduced by 1dB for every dB the gain exceeds 23dBi.

SPURIOUS RADIATED EMISSIONS LIMITS

The table below shows the limits for unwanted (spurious) emissions falling in the restricted bands detailed in Part 15.205 and Industry Canada RSS-210 Table 2.

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

The table below shows the limits for unwanted (spurious) emissions outside of the restricted band.

Operating Frequency (MHz)	EIRP Limit (dBm)	Equivalent Field Strength At 3m (dBuV/m)
5150 - 5250	-27 dBm	68.3 dBuV/m
5250 - 5350	-27 dBm	68.3 dBuV/m
5725 – 5825	-27 dBm (note 1)	68.3 dBuV/m
	-17 dBm (note 2)	78.3 dBuV/m

Note 1: Applies to spurious signals separated by more than 10 MHz from the allocated band.
Note 2: Applies to spurious signals within 10 MHz of the allocated band.

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 and Industry Canada RSS-210 section 6.6.

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

SAMPLE CALCULATIONS - CONDUCTED EMISSIONS

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

$$R_r - B = C$$

and

$$C - S = M$$

where:

R_r = Receiver Reading in dBuV

B = Broadband Correction Factor*

C = Corrected Reading in dBuV

S = Specification Limit in dBuV

M = Margin to Specification in +/- dB

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

SAMPLE CALCULATIONS - RADIATED EMISSIONS

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

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

where:

F_d = Distance Factor in dB

D_m = Measurement Distance in meters

D_s = Specification Distance in meters

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

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

$$R_c = R_r + F_d$$

and

$$M = R_c - L_s$$

where:

R_r = Receiver Reading in dBuV/m

F_d = Distance Factor in dB

R_c = Corrected Reading in dBuV/m

L_s = Specification Limit in dBuV/m

M = Margin in dB Relative to Spec

APPENDIX 1: Test Equipment Calibration Data

1 Page

Antenna Conducted and Radiated Emissions, 12-Oct-01 09:02 PM
Engineer: jmartinez

Manufacturer	Description	Model #	Assett #	Cal interval	Last Calibrated	Cal Due
Hewlett Packard	High Pass filter, 8.2GHz	P/N 84300-80039	1156	12	3/27/01	3/27/02
EMCO	Horn Antenna, D. Ridge 1-18GHz	3115	868	12	10/26/00	10/26/01
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	870	12	1/11/01	1/11/02
Hewlett Packard	Spectrum Analyzer 9KHz - 26GHz	8563E	284	12	2/22/01	2/22/02

Antenna Conducted Emissions, 18-Oct-01 12:42 PM
Engineer: jmartinez

Manufacturer	Description	Model #	Assett #	Cal interval	Last Calibrated	Cal Due
Hewlett Packard	Microwave EMI test system (SA40, 30Hz - 40GHz)	84125C	1149	12	2/5/01	2/5/02

APPENDIX 2: Test Data Log Sheets

ELECTROMAGNETIC EMISSIONS

TEST LOG SHEETS

AND

MEASUREMENT DATA

T 45008 62 Pages

Elliott

EMC Test Data

Client:	Atheros Communications	Job Number:	J44997
Model:	AR5BAP-00030	T-Log Number:	T45008
		Proj Eng:	Mark Briggs
Contact:	Eric Dukatz		
Emissions Spec:	FCC 15 Sub. B & E, RSS-210	Class:	B
Immunity Spec:	-	Environment:	-

EMC Test Data

For The

Atheros Communications

Model

AR5BAP-00030

Client:	Atheros Communications	Job Number:	J44997
Model:	AR5BAP-00030	T-Log Number:	T45008
		Proj Eng:	Mark Briggs
Contact:	Eric Dukatz		
Emissions Spec:	FCC 15 Sub. B & E, RSS-210	Class:	B
Immunity Spec:	-	Environment:	-

EUT INFORMATION

General Description

The EUT is a 802.11A Wireless LAN access point. Normally, the EUT would be wall-mounted during operation. The EUT was treated as table-top equipment during testing to simulate the end user environment. The electrical rating of the EUT is 120 V, 60 Hz, 3 Amps.

Equipment Under Test

Manufacturer	Model	Description	Serial Number	FCC ID
Atheros Communications	AR5BAP-00030	Wirelesss LAN Access Point	143	-
Atheros Communications	AR5BAP-00030	Wirelesss LAN Access Point	144	-

Antenna

The EUT uses an integral antenna with a gain of 6 dBi.

EUT Enclosure

The EUT enclosure is primarily constructed of plastic. It measures approximately 17 cm wide by 13 cm deep by 11 cm high (with antennas vertical).

Modification History

Mod. #	Test	Date	Modification
1	Radiated Emissions (30-1000 MHz)	10/15/2001	Added Echosorb material ARC DD-10214 to top cover of EUT,covering microcontroller and SDRAM

Client:	Atheros Communications	Job Number:	J44997
Model:	AR5BAP-00030	T-Log Number:	T45008
		Proj Eng:	Mark Briggs
Contact:	Eric Dukatz		
Emissions Spec:	FCC 15 Sub. B & E, RSS-210	Class:	B
Immunity Spec:	-	Environment:	-

Test Configuration #1

Local Support Equipment

Manufacturer	Model	Description	Serial Number	FCC ID
none				

Remote Support Equipment

Manufacturer	Model	Description	Serial Number	FCC ID
IBM	Thinkpad	Laptop	78-RVPN5 10/02	DoC
Netgear	DS108	Hub	DS18J18380052	DoC

Interface Ports

Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length(m)
DC power input	transformer	2-wire	Unshielded	1
RJ 45	Hub	CAT 5	Unshielded	30

Note: The serial port was not connected as the manufacturer stated that this is for configuration purpose and therefore would not normally be connected.

EUT Operation During Emissions (Digital Device and Radio Testing)

Serial Number 144 was used with the Tx 99.SCR set at 5.26GHz. The EUT was in transmit mode, powered via external 3.3V DC input. The EUT contained internal shield over RF section plus larger shield covering entire PCB.

Client:	Atheros Communications	Job Number:	J44997
Model:	AR5BAP-00030	T-Log Number:	T45008
		Proj Eng:	Mark Briggs
Contact:	Eric Dukatz		
Emissions Spec:	FCC 15 Sub. B & E, RSS-210	Class:	B
Immunity Spec:	-	Environment:	-

Test Configuration #2

Local Support Equipment

Manufacturer	Model	Description	Serial Number	FCC ID
IBM	2647-8BU	Laptop	78-RUPN5	DoC
Boonton	4531	Power Meter	100201	N/A
Boonton	57318	Power Sensor	2110	N/A

Remote Support Equipment

Manufacturer	Model	Description	Serial Number	FCC ID
None				

Interface Ports

		Cable(s)		
Port	Connected To	Description	Shielded or Unshielded	Length(m)
Ethernet	Laptop	RJ-45	Unshielded	30
Serial	Laptop	RS-232	Shielded	1

EUT Operation During Emissions Testing (Radio)

The radio was transmitting at full power on the specified channel with a duty cycle of 99% (maximum allowed). The EUT was tested in both normal mode (chanel bandwidth of approximately 30 MHz) and turbo mode (channel bandwidth of approximately 60 MHz).

"Normal Mode" allows data rates of up to 54 Mb/s. The device was, therefore, tested in normal mode at the data rate that produced the highest output power for normal mode (6 Mb/s).

"Turbo Mode" allows data rates of up to 72Mb/s. At data rates higher than 12Mb/s the PA gain is reduced to improve signal fidelity. The device was, therefore, tested in turbo mode at the data rate that produced the highest output power in that mode (12Mb/s).

Client:	Atheros Communications	Job Number:	J44997
Model:	AR5BAP-00030	T-Log Number:	T45008
		Proj Eng:	Mark Briggs
Contact:	Eric Dukatz		
Spec:	FCC 15 Sub. B & E, RSS-210	Class:	B

FCC Part 15 Subpart E Tests - NORMAL MODE

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:	10/11/20001	Config. Used:	2
Test Engineer:	Jmartinez	Config Change:	None
Test Location:	SVOATS# 4	Host Unit Voltage	120Vac, 60Hz

General Test Configuration

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

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

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: 16°C

Rel. Humidity: 42%

Summary of Results: Normal Mode

Run #	Test Performed	Limit	Result	Comments
1	Output Power	15.407(a) (1), (2)	Pass	13.9dBm /21.1dBm
2	Power Spectral Density (PSD)	15.407(a) (1), (2)	Pass	-1.4 / 6.1 dBm/MHz
3	26dB Bandwidth	15.407	Pass	> 20 MHz
3	20 dB Bandwidth	RSS 210	Pass	Used 26 dB BW
4	Peak Excursion Envelope	15.407(a) (6)	Pass	Peak to average excursion < 13dB
5	Antenna Conducted - Out of Band Spurious	15.407(b)	Pass	All emissions below the 27dBm/MHz limit
6	RE, 1000 - 40000 MHz - Spurious Emissions	15.407(b)(6)	Pass	-1.3dB@10520MHz (EUT@ 5.26GHz)

Client:	Atheros Communications	Job Number:	J44997
Model:	AR5BAP-00030	T-Log Number:	T45008
		Proj Eng:	Mark Briggs
Contact:	Eric Dukatz		
Spec:	FCC 15 Sub. B & E, RSS-210	Class:	B

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.

Run #1: Output Power; S/N: 144

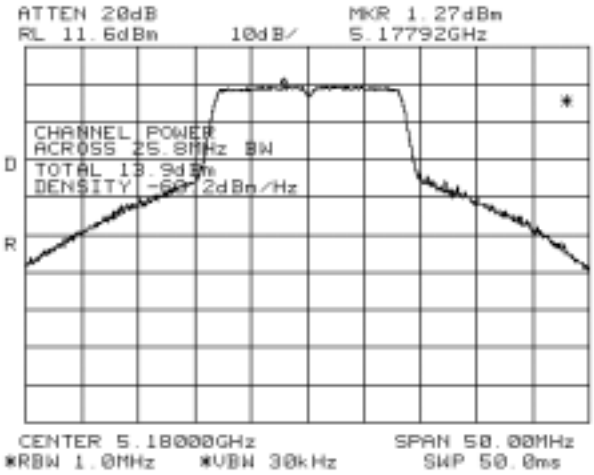
Antenna Gain: 6 dBi

Channel	Frequency (MHz)	26-dB Signal BW	Output Power (dBm)	FCC Limit (dBm) (note 3)	Comments
Low	5180	25.83	**13.9**	17.0	Note 2
	5180	25.83	13.9	17.0	Note 1
Mid	5260	32.67	**18.1**	24.0	Note 2
	5260	32.67	21.1	24.0	Note 1
High	5320	28.25	**17.2**	24.0	Note 2
	5320	28.25	19.8	24.0	Note 1

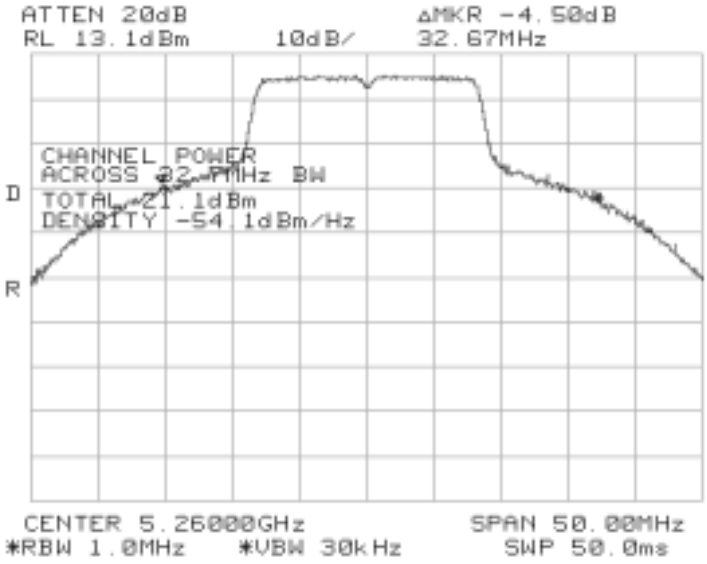
Note 1:	Measured using spectrum analyzer's power measurement function (RBW = 1MHz, VBW = 30kHz)
Note 2:	Measured using a Boonton Power Meter with a peak power sensor in average mode
Note 3:	RSS 210 limit is 23dBm in the 5.15 to 5.25 GHz band, 6dB higher than the FCC limit. This limit is based on the emission bandwidth and operating frequency.
Note 4:	RSS 210 limit is 24dBm in the 5.25 to 5.35 GHz band, same as the FCC limit. This limit is based on the emission bandwidth and operating frequency.
Note 5:	Nominal power levels listed in the runs below are based on measuremnt with the power meter

Client:	Atheros Communications	Job Number:	J44997
Model:	AR5BAP-00030	T-Log Number:	T45008
		Proj Eng:	Mark Briggs
Contact:	Eric Dukatz		
Spec:	FCC 15 Sub. B & E, RSS-210	Class:	B

Spectrum Analyzer channel power @ 5.18 GHz

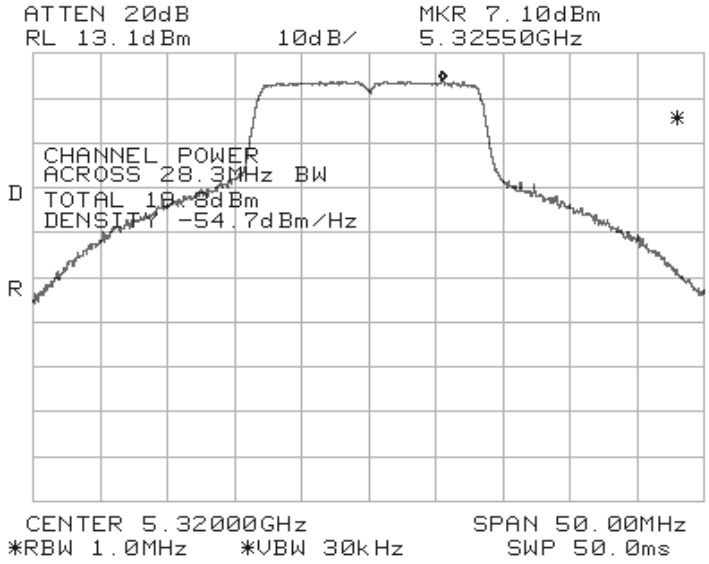


Spectrum Analyzer channel power @ 5.26 GHz



Client:	Atheros Communications	Job Number:	J44997
Model:	AR5BAP-00030	T-Log Number:	T45008
		Proj Eng:	Mark Briggs
Contact:	Eric Dukatz		
Spec:	FCC 15 Sub. B & E, RSS-210	Class:	B

Spectrum Analyzer channel power @ 5.32 GHz



Client:	Atheros Communications	Job Number:	J44997
Model:	AR5BAP-00030	T-Log Number:	T45008
		Proj Eng:	Mark Briggs
Contact:	Eric Dukatz		
Spec:	FCC 15 Sub. B & E, RSS-210	Class:	B

Run #2: Power Spectral Density

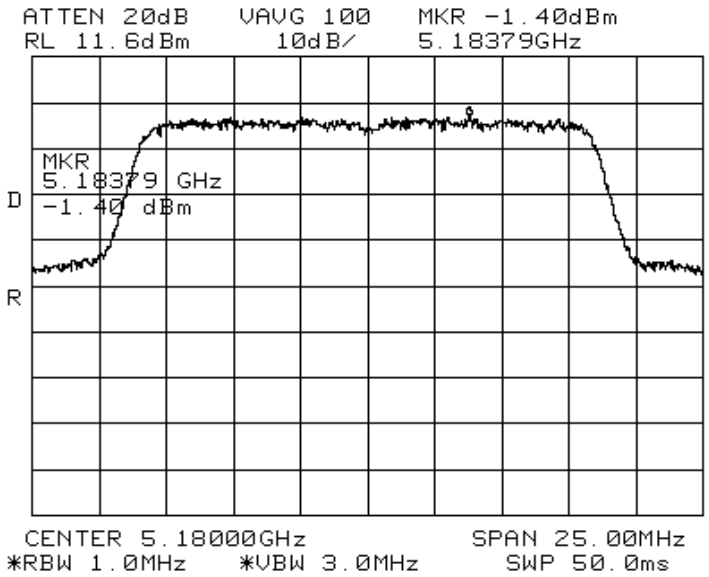
Antenna Gain: 6 dBi

Channel	Frequency (MHz)	Power Spectral	FCC Limit (dBm) note 2	Graph Reference	
Low	5180	-1.40	4.0	T45008/602	Note 1
Mid	5260	6.1	11.0	T45008/604	Note 1
High	5320	4.8	11.0	T45008/607	Note 1

Note 1:	The above measurements were made using RBW = 1MHz, VBW = 1MHz, video averaging on. To demonstrate compliance with RSS 210, the peak PSD was also measured using RBW= VBW=1MHz, video averaging off during the peak excursion measurements (run #4). As per RSS 210 requirements, the peak PSD of **7.9 dBm** in the 5.15 to 5.25 GHz band did not exceed the maximum permitted average PSD of 10dBm by more than 6dB. Similarly, in the 5.25-5.35GHz band, the peak power sepctral density of 15.6dBm did not exceed the maximum permitted average PSD of 11dBm by more than 6dB. No restriction is placed on the output power or average PSD with respect to RSS 210.
Note 2:	RSS 210 limit is 10dBm/MHz in the 5.15 to 5.25 GHz band, 6dB higher than the FCC limit.

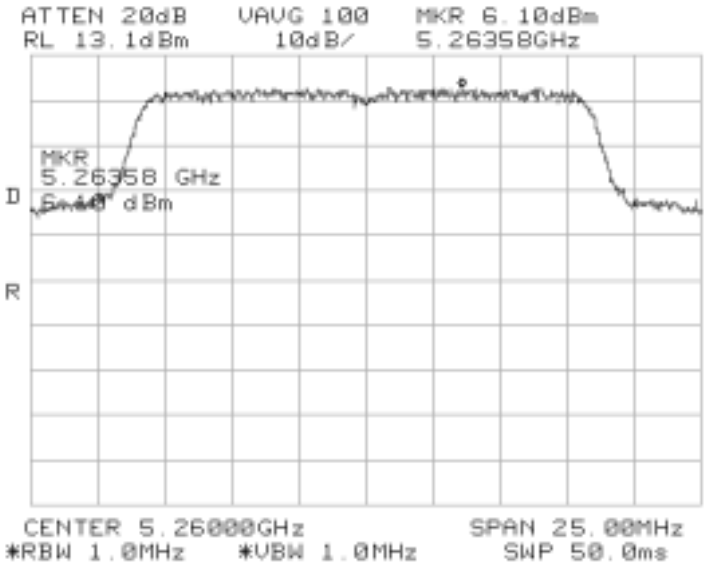
Plots Showing Power Spectral Density (RBW = 1MHz, VBW = 1 MHz, video averaging ON)

T45008 / 602 @ 13.9 dBm

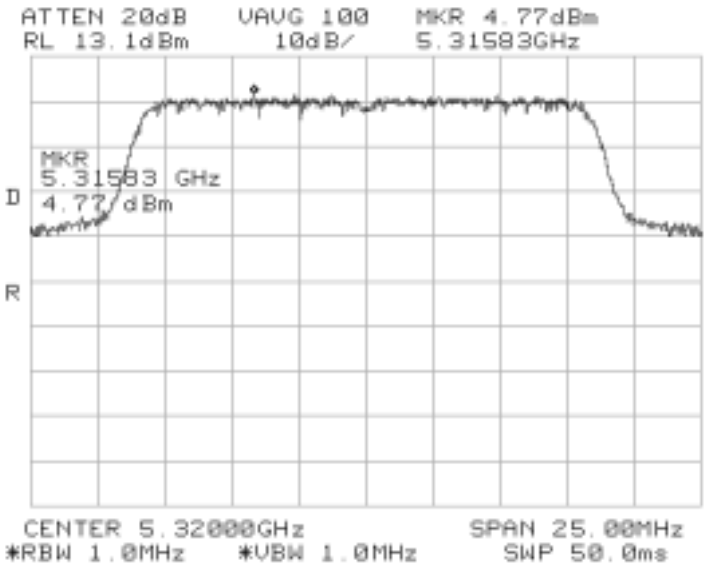


Client:	Atheros Communications	Job Number:	J44997
Model:	AR5BAP-00030	T-Log Number:	T45008
		Proj Eng:	Mark Briggs
Contact:	Eric Dukatz		
Spec:	FCC 15 Sub. B & E, RSS-210	Class:	B

T45008 / 604 @ 18.1 dBm



T45008 / 607 @ 17.2 dBm



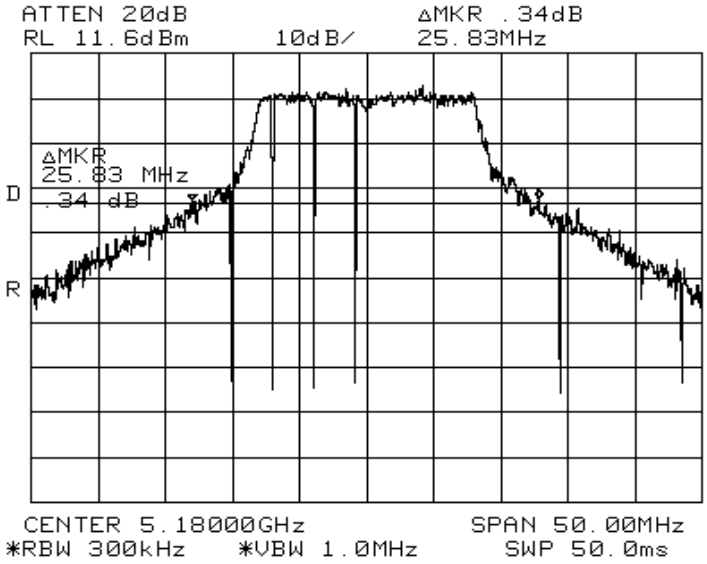
Client:	Atheros Communications	Job Number:	J44997
Model:	AR5BAP-00030	T-Log Number:	T45008
		Proj Eng:	Mark Briggs
Contact:	Eric Dukatz		
Spec:	FCC 15 Sub. B & E, RSS-210	Class:	B

Run #3: Signal Bandwidth

Channel	Frequency (MHz)	Resolution Bandwidth	26 dB Signal Bandwidth (MHz)	20 dB Signal Bandwidth (MHz)	Graph reference #
Low	5180	300 kHz	25.83	17.33	T45008/702
Mid	5260	300 kHz	32.67	18.3	T45008/704
High	5320	300 kHz	28.25	18.58	T45008/707

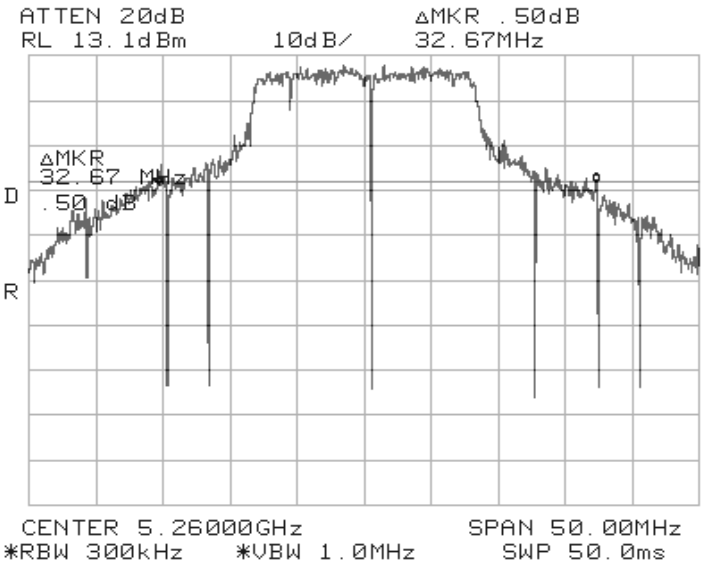
Plots Showing Signal Bandwidth

T45008 / 702 @ 13.9 dBm

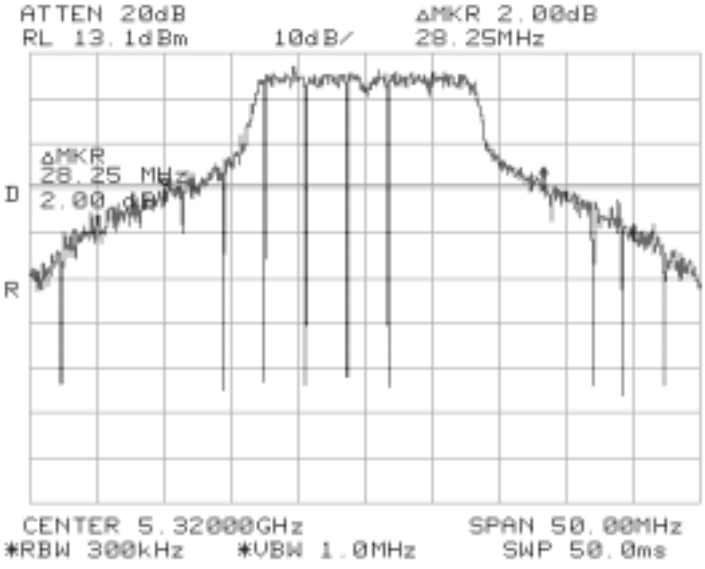


Client:	Atheros Communications	Job Number:	J44997
Model:	AR5BAP-00030	T-Log Number:	T45008
		Proj Eng:	Mark Briggs
Contact:	Eric Dukatz		
Spec:	FCC 15 Sub. B & E, RSS-210	Class:	B

T45008 / 704 @ 18.1 dBm



T45008 / 707 @ 17.2 dBm



Client:	Atheros Communications	Job Number:	J44997
Model:	AR5BAP-00030	T-Log Number:	T45008
		Proj Eng:	Mark Briggs
Contact:	Eric Dukatz		
Spec:	FCC 15 Sub. B & E, RSS-210	Class:	B

Run #4: Peak Excursion Measurement

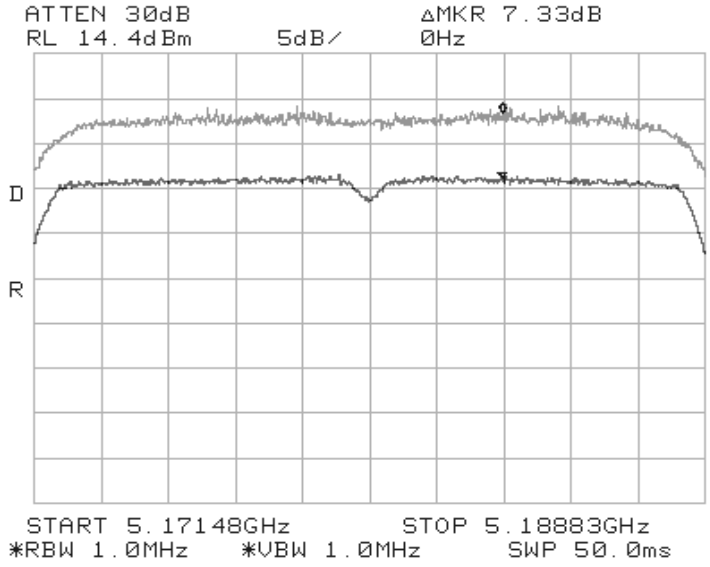
Plots Showing Peak Excursion

Trace A: RBW = VBW = 1MHz

Trace B: RBW = 1 MHz, VBW = 30kHz

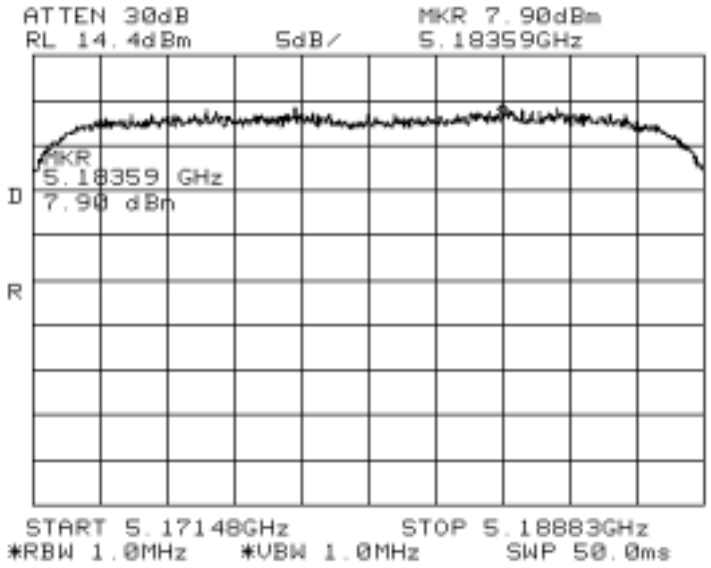
Low Channel Peak Excursion = 7.33 dB. Peak power spectral density (RSS210 only) = 7.90 dBm. Power @ 13.9 dBm

FCC Peak Excursion



Client:	Atheros Communications	Job Number:	J44997
Model:	AR5BAP-00030	T-Log Number:	T45008
		Proj Eng:	Mark Briggs
Contact:	Eric Dukatz		
Spec:	FCC 15 Sub. B & E, RSS-210	Class:	B

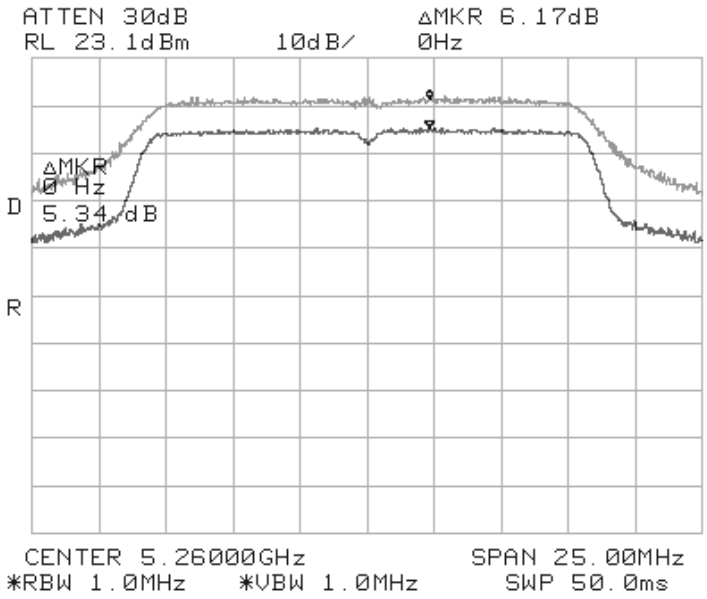
Canada Peak Spectral Density



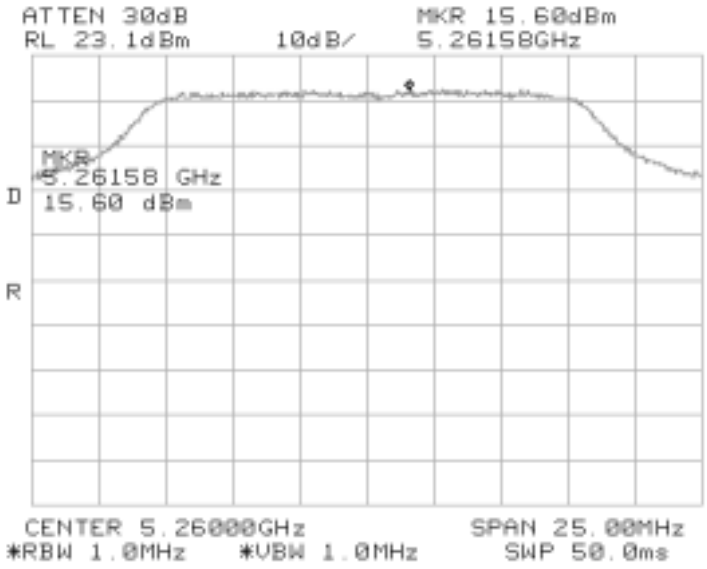
Client:	Atheros Communications	Job Number:	J44997
Model:	AR5BAP-00030	T-Log Number:	T45008
		Proj Eng:	Mark Briggs
Contact:	Eric Dukatz		
Spec:	FCC 15 Sub. B & E, RSS-210	Class:	B

Mid Channel Peak Excursion = 6.17 dB. Peak power spectral density (RSS210 only) = 15.6 dBm. Power @ 18 dBm

FCC Peak Excursion



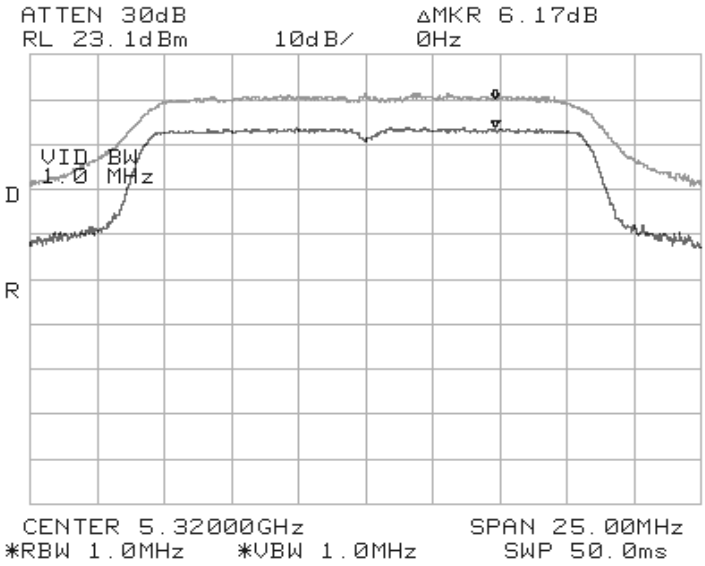
Canada Peak Spectral Density



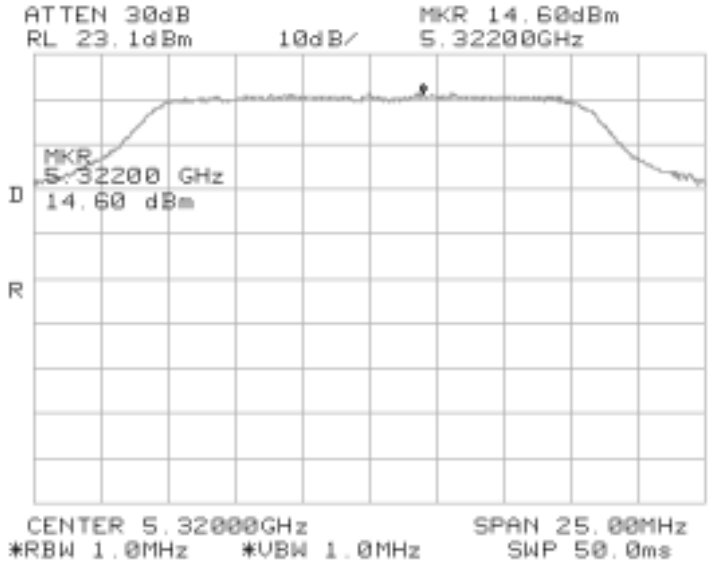
Client:	Atheros Communications	Job Number:	J44997
Model:	AR5BAP-00030	T-Log Number:	T45008
		Proj Eng:	Mark Briggs
Contact:	Eric Dukatz		
Spec:	FCC 15 Sub. B & E, RSS-210	Class:	B

High Channel Peak Excursion = 6.17 dB. Peak power spectral density (RSS210 only) = 14.6 dBm. Power @ 17.2 dBm

FCC Peak Excursion



Canada Peak Spectral Density



Client:	Atheros Communications	Job Number:	J44997
Model:	AR5BAP-00030	T-Log Number:	T45008
		Proj Eng:	Mark Briggs
Contact:	Eric Dukatz		
Spec:	FCC 15 Sub. B & E, RSS-210	Class:	B

Run #5: Out Of Band Spurious Emissions - Antenna Conducted

The antenna gain of the radios integral antenna is 6 dBi. The EIRP limit is -27dBm/MHz for all out of band signals that do not

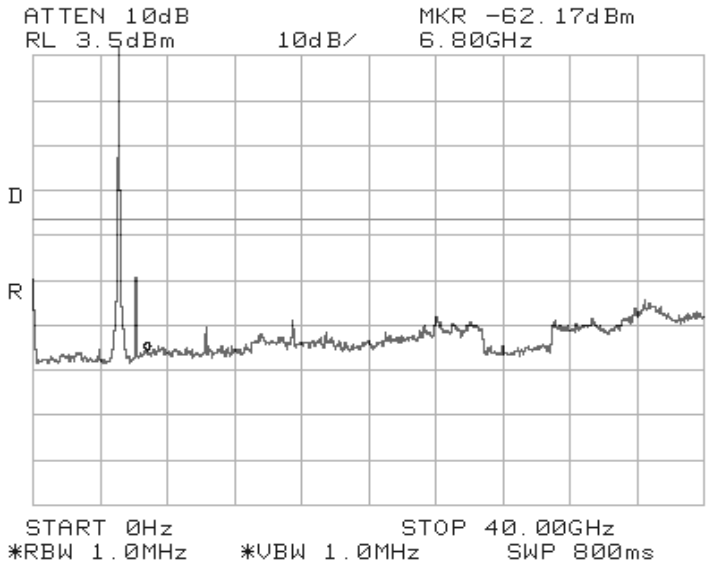
Channel	Frequency (MHz)	Frequency Range	Highest Spurious Signal	Graph reference #
Low	5180	30 - 1000 MHz	Note 4	T45008/801
		1 to 7 GHz	6216 (Note 3)	T45008/801 & 802
		7 to 10 GHz	10359 (Note 3)	T45008/801 & 803
		10 GHz to 20 GHz	15539 (Note 1)	T45008/801 & 804
		20 GHz to 40 GHz	None	T45008/801
Mid	5260	30 - 1000 MHz	Note 4	T45008/806
		1 to 7 GHz	4208 (Note 1), 6312 (Note 3)	T45008/806 & 807
		7 to 10 GHz	10520 (Note 3)	T45008/806 & 808
		10 GHz to 20 GHz	None	T45008/806
		20 GHz to 40 GHz	None	T45008/806
High	5320	30 - 1000 MHz	Note 4	T45008/811
		1 to 7 GHz	4255 (note 1), 6383 (Note 3)	T45008/811 & 812
		7 to 10 GHz	10640 (Note 1)	T45008/811 & 813
		10 GHz to 20 GHz	15960 (Note 1)	T45008/811 & 814
		20 GHz to 40 GHz	None	T45008/811

Note 1:	Signal is in a restricted band. Refer to run #6 for field strength measurements.
Note 2:	Signal is not in restricted band. Limit is -27dBm eirp. As the signal strength is not significantly lower than -27dBm field strength measurements were made (refer to run #6).
Note 3:	Signal is not in restricted band. Limit is -27dBm eirp. As the signal strength is significantly lower than -27dBm no field strength measurements required.
Note 4:	All spurious signals in this frequency band measured during digital device radiated emissions test.

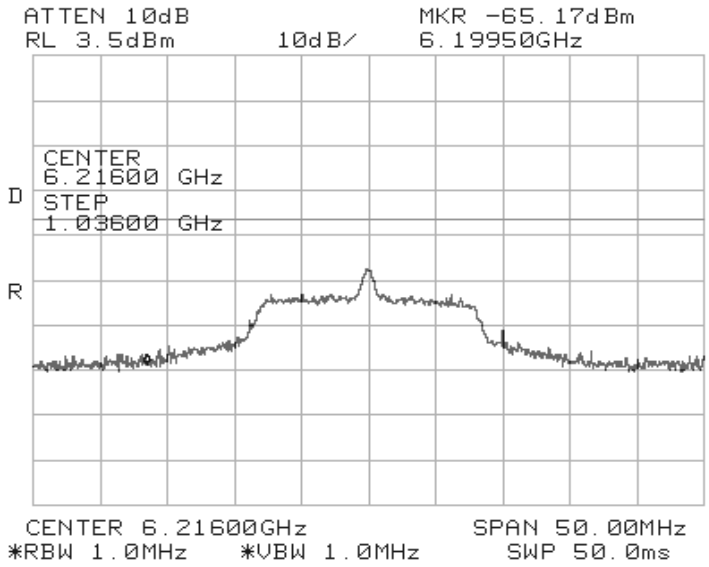
Client:	Atheros Communications	Job Number:	J44997
Model:	AR5BAP-00030	T-Log Number:	T45008
		Proj Eng:	Mark Briggs
Contact:	Eric Dukatz		
Spec:	FCC 15 Sub. B & E, RSS-210	Class:	B

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

T45008/801 0 - 40,000 MHz (16 dBm @ 5.18 GHz)

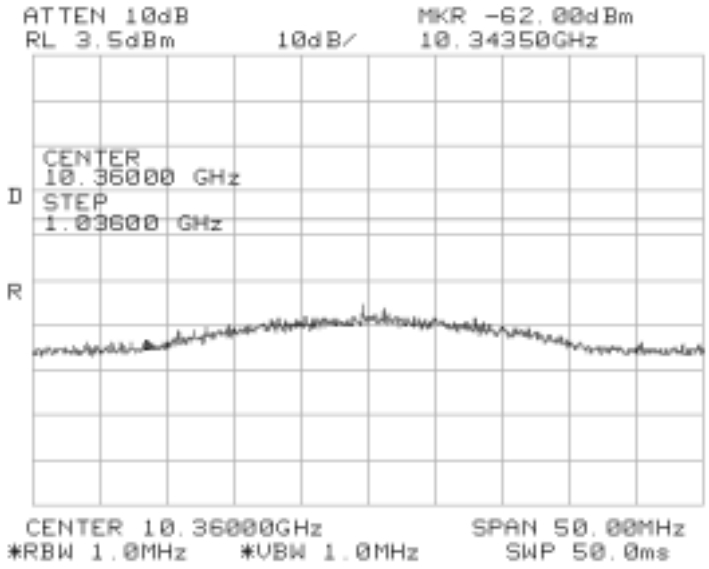


T45008 / 802

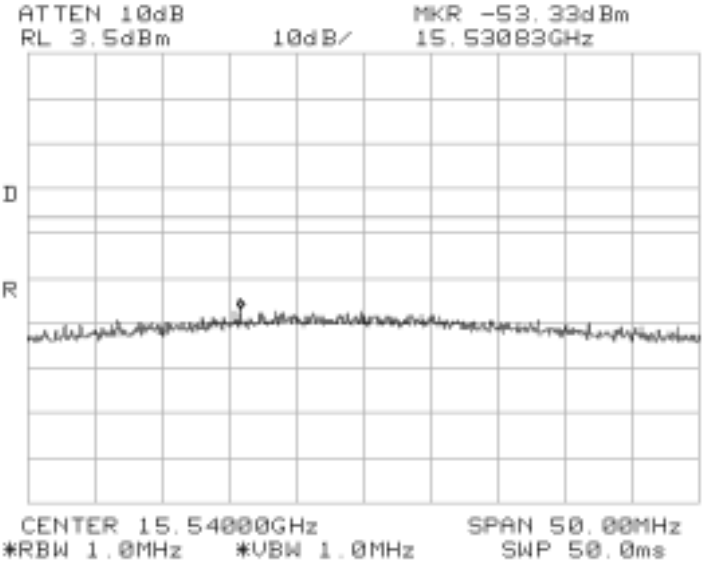


Client:	Atheros Communications	Job Number:	J44997
Model:	AR5BAP-00030	T-Log Number:	T45008
		Proj Eng:	Mark Briggs
Contact:	Eric Dukatz		
Spec:	FCC 15 Sub. B & E, RSS-210	Class:	B

T45008 / 803

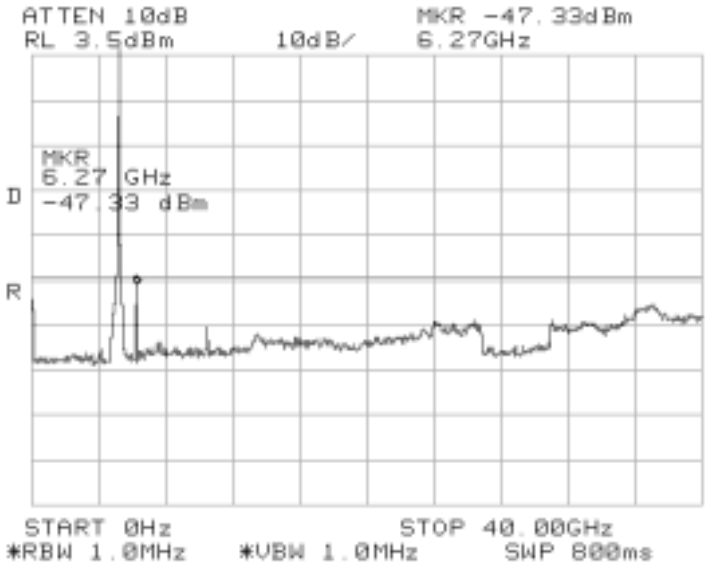


T45008 / 804

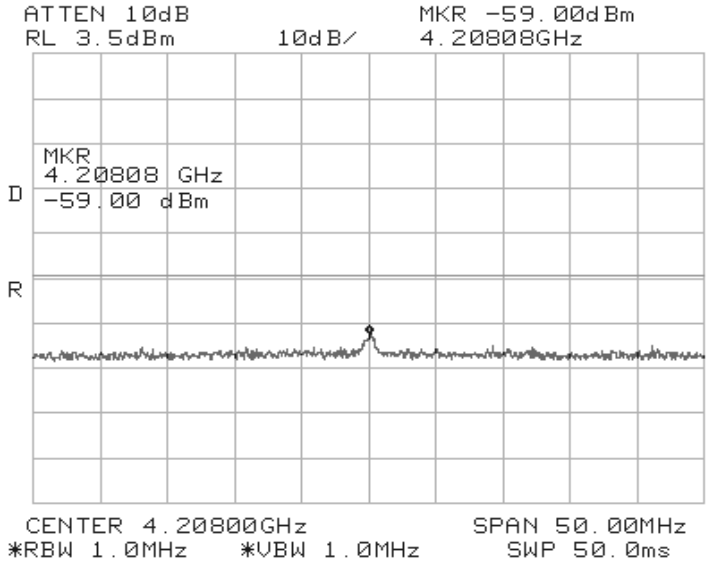


Client:	Atheros Communications	Job Number:	J44997
Model:	AR5BAP-00030	T-Log Number:	T45008
		Proj Eng:	Mark Briggs
Contact:	Eric Dukatz		
Spec:	FCC 15 Sub. B & E, RSS-210	Class:	B

T45008/806, 0 - 40,000 MHz (19 dBm @ 5.26 GHz)

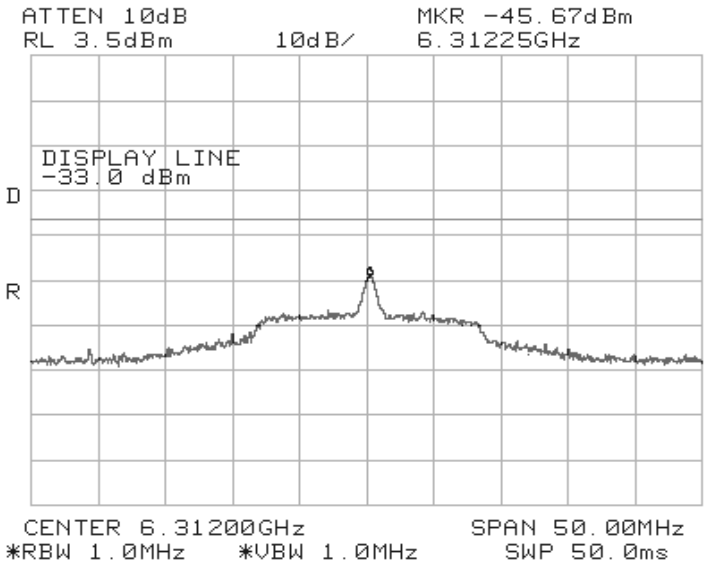


T45008 / 807 (4 GHz)

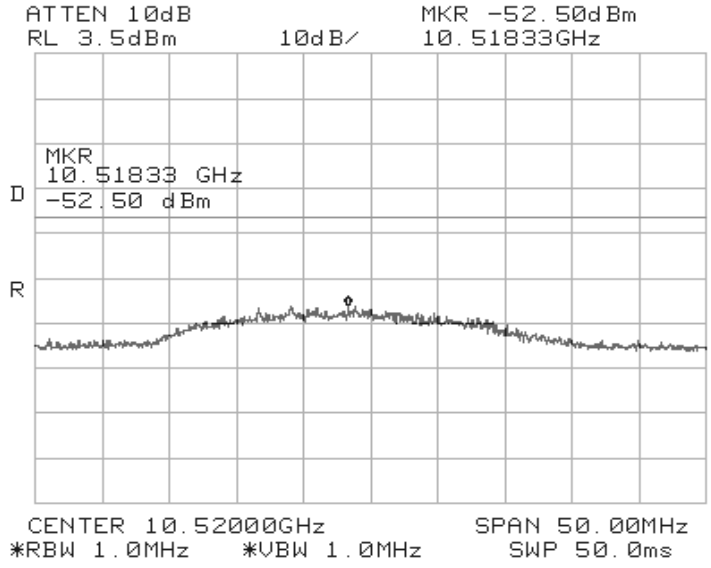


Client:	Atheros Communications	Job Number:	J44997
Model:	AR5BAP-00030	T-Log Number:	T45008
		Proj Eng:	Mark Briggs
Contact:	Eric Dukatz		
Spec:	FCC 15 Sub. B & E, RSS-210	Class:	B

T45008 / 807 (6 GHz)

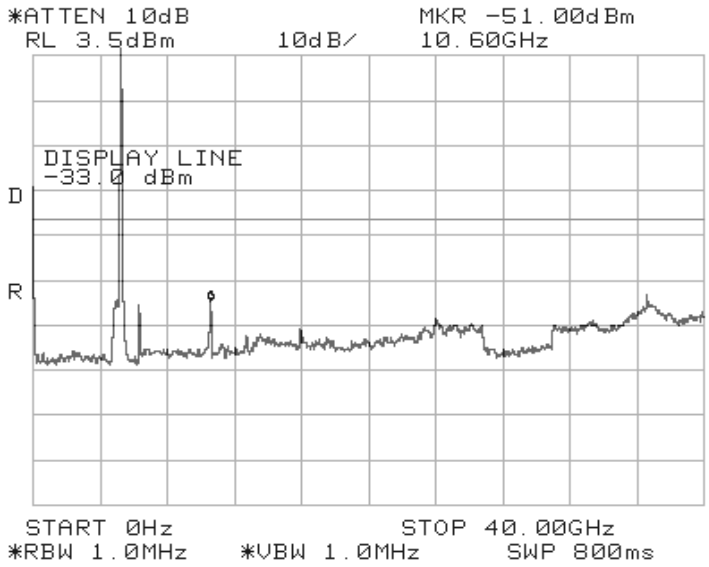


T45008 / 808

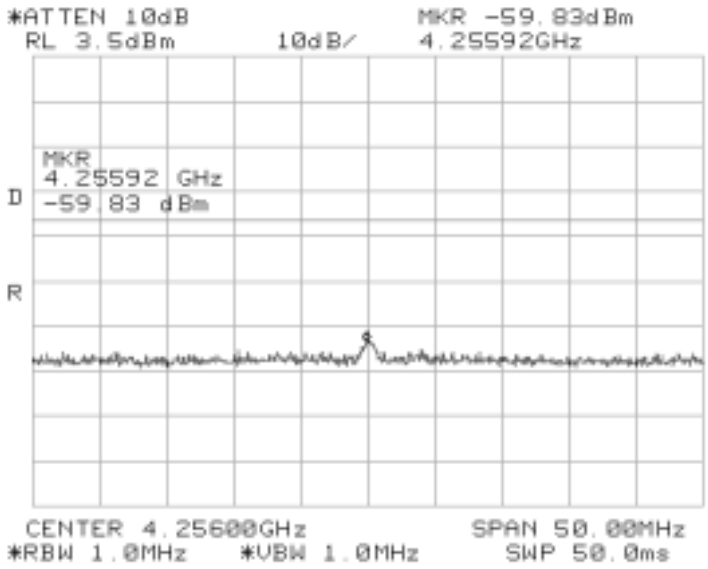


Client:	Atheros Communications	Job Number:	J44997
Model:	AR5BAP-00030	T-Log Number:	T45008
		Proj Eng:	Mark Briggs
Contact:	Eric Dukatz		
Spec:	FCC 15 Sub. B & E, RSS-210	Class:	B

T45008/811: 0 - 40,000 MHz (19.2 dBm @ 5.32 GHz)

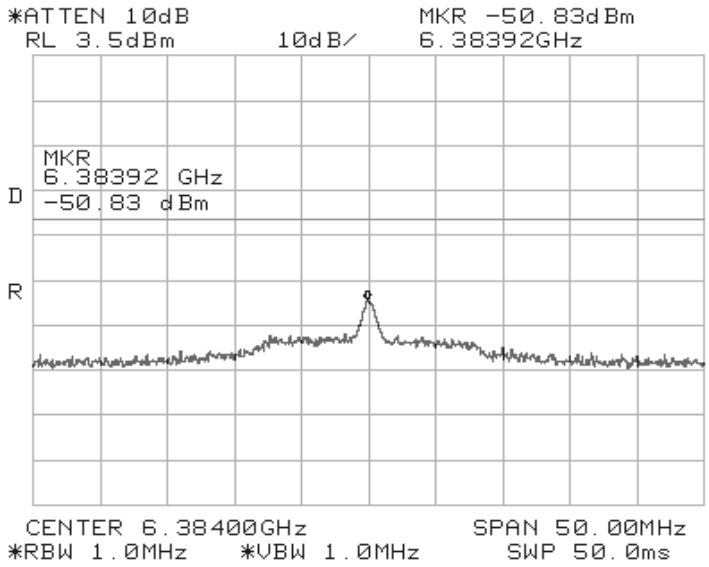


T45008 / 812 (4 GHz)

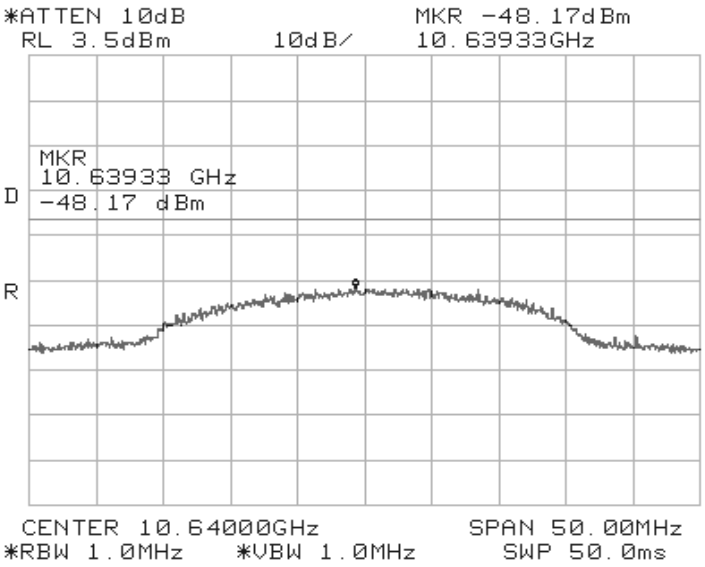


Client:	Atheros Communications	Job Number:	J44997
Model:	AR5BAP-00030	T-Log Number:	T45008
		Proj Eng:	Mark Briggs
Contact:	Eric Dukatz		
Spec:	FCC 15 Sub. B & E, RSS-210	Class:	B

T45008 / 812 (6 GHz)

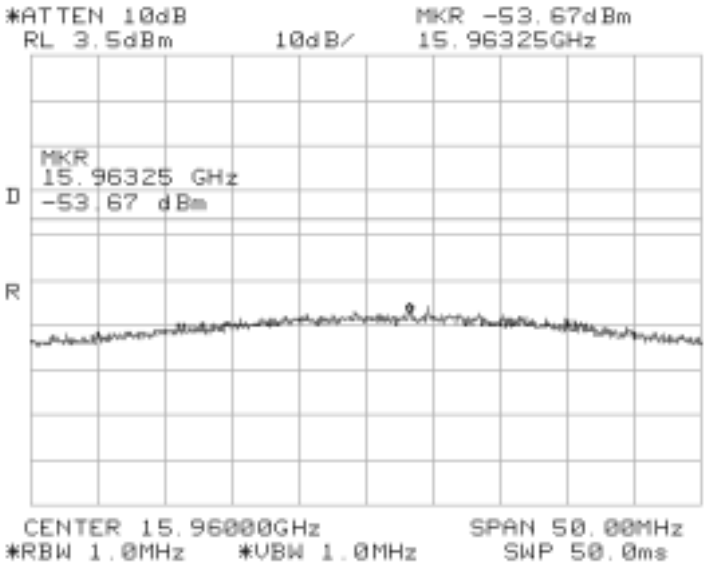


T45008 / 813



Client:	Atheros Communications	Job Number:	J44997
Model:	AR5BAP-00030	T-Log Number:	T45008
		Proj Eng:	Mark Briggs
Contact:	Eric Dukatz		
Spec:	FCC 15 Sub. B & E, RSS-210	Class:	B

T45008 / 814



Client:	Atheros Communications	Job Number:	J44997
Model:	AR5BAP-00030	T-Log Number:	T45008
		Proj Eng:	Mark Briggs
Contact:	Eric Dukatz		
Spec:	FCC 15 Sub. B & E, RSS-210	Class:	B

Band Edge Measurements:

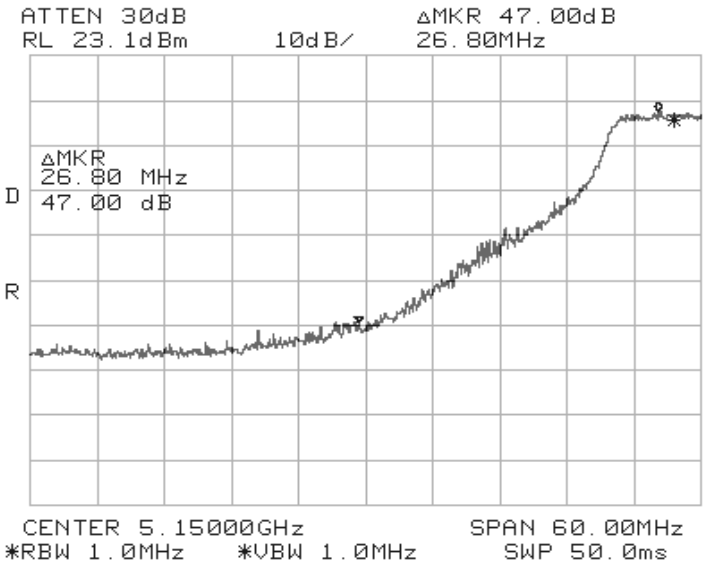
For signals in the restricted bands immediately above and below the 5.15 to 5.35 GHz allocated band a measurement was

Plots Showing Out-Of-Band Emissions (Peak RBW=VBW=1MHz; Average RBW = 1MHz, VBW = 10Hz)

5.15 GHz band edge, EUT operating on the lowest channel. Power = 13.9 dBm

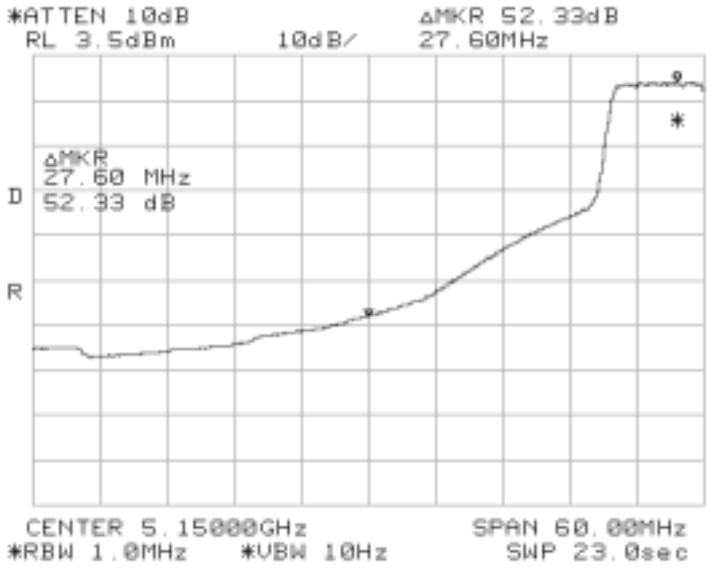
The highest signal within 50 MHz of the 5.15 GHz band was -47 dBc (Peak) / -52.33 dBc (Average)

Peak Bandedge



Client:	Atheros Communications	Job Number:	J44997
Model:	AR5BAP-00030	T-Log Number:	T45008
		Proj Eng:	Mark Briggs
Contact:	Eric Dukatz		
Spec:	FCC 15 Sub. B & E, RSS-210	Class:	B

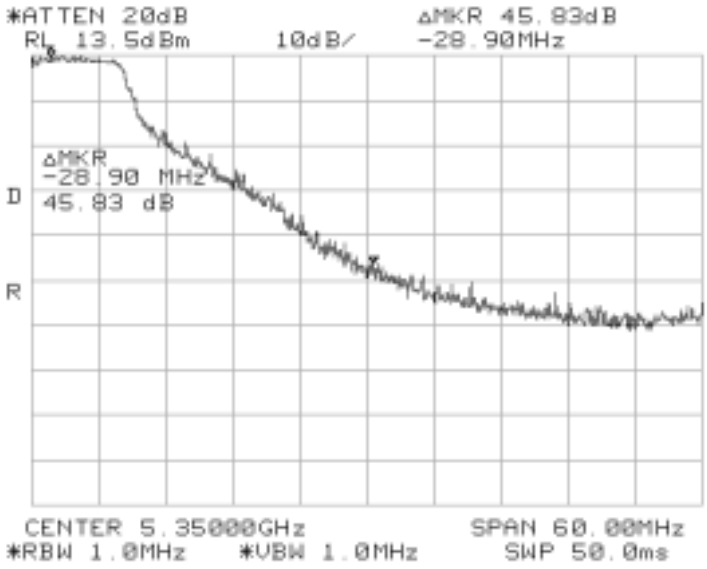
Average Bandedge



5.35 GHz band edge EUT operating on the highest channel. Power = 17.2 dBm

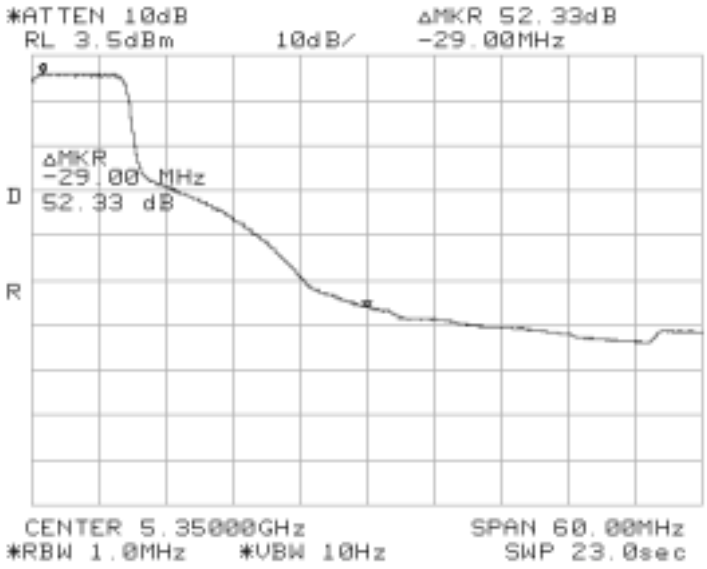
The highest signal in the 5.35 to 5.46 GHz band was -45.83 dBc (Peak) / -52.33 dBc (Average)

Peak Bandedge



Client:	Atheros Communications	Job Number:	J44997
Model:	AR5BAP-00030	T-Log Number:	T45008
		Proj Eng:	Mark Briggs
Contact:	Eric Dukatz		
Spec:	FCC 15 Sub. B & E, RSS-210	Class:	B

Average Bandedge



Client:	Atheros Communications	Job Number:	J44997
Model:	AR5BAP-00030	T-Log Number:	T45008
		Proj Eng:	Mark Briggs
Contact:	Eric Dukatz		
Spec:	FCC 15 Sub. B & E, RSS-210	Class:	B

Run #6a: Radiated Spurious Emissions, 1000 - 40000 MHz

Spurious emissions from 30 - 1000 MHz were measured while performing emissions measurements of the digital device. Refer

Limit for emissions in restricted bands:	54dBuV/m (Average)	74dBuV/m (Peak)
Limit for emissions outside of restricted bands:	EIRP < -27dBm/MHz	(68dBuV/m)

Fundamental signal measurements (to calculate the band edge field strengths): Power = 13.9 dBm @ 5180 MHz, 17.2 dBm @ 5320 MHz.

Frequency	Level	Pol	15.209 / 15.407		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
5180.0	113.8	v	-	-	Pk	336	1.7	RBW = VBW = 1 MHz
5180.0	103.4	v	-	-	Avg	336	1.7	RBW = 1MHz, VBW = 10Hz
5180.0	102.6	h	-	-	Pk	310	2.2	RBW = VBW = 1 MHz
5180.0	93.1	h	-	-	Avg	310	2.2	RBW = 1MHz, VBW = 10Hz
5320.0	115.3	v	-	-	Pk	310	1.5	RBW = VBW = 1 MHz
5320.0	104.2	v	-	-	Avg	310	1.5	RBW = 1MHz, VBW = 10Hz
5320.0	104.4	h	-	-	Pk	311	2.2	RBW = VBW = 1 MHz
5320.0	93.0	h	-	-	Avg	311	2.2	RBW = 1MHz, VBW = 10Hz

Band Edge Field Strength Calculations Power = 13.9 dBm @ 5180 MHz, 17.2 dBm @ 5320 MHz.

Frequency	Level	Pol	15.209 / 15.407		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
5150.0	66.8	v	74.0	-7.3	Pk			Note 1
5150.0	51.1	v	54.0	-2.9	Avg			Note 1
5350.0	69.5	v	74.0	-4.5	Pk			Note 2
5350.0	51.9	v	54.0	-2.1	Avg			Note 2

Note 1:	EUT operating on the lowest channel available in the 5.15 - 5.25 MHz band. Signal level calculated using the
Note 2:	EUT operating on highest channel available in the 5.25 - 5.35 MHz band. Signal level calculated using the relative

Elliott

EMC Test Data

Client:	Atheros Communications	Job Number:	J44997
Model:	AR5BAP-00030	T-Log Number:	T45008
		Proj Eng:	Mark Briggs
Contact:	Eric Dukatz		
Spec:	FCC 15 Sub. B & E, RSS-210	Class:	B

Run #6b: Radiated Spurious Emissions, 1000 - 40000 MHz

EUT On Lowest Channel Available (Low Channel, 5.18 GHz) Power @ 16 dBm

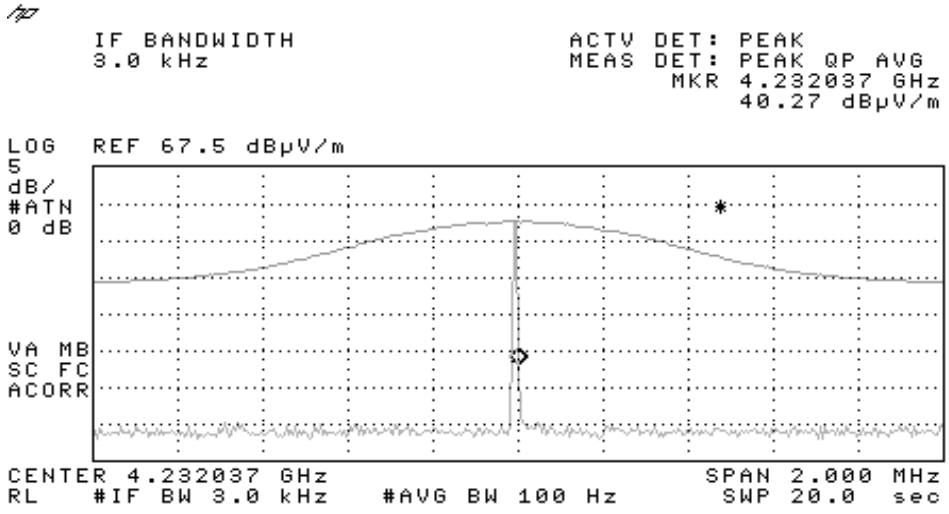
Frequency	Level	Pol	15.209 / 15.407		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
10360.0	60.3	h	68.3	-8.0	Pk	100	1.4	Note 4
10360.0	58.6	v	68.3	-9.7	Pk	100	1.4	Note 4
15540.0	42.7	v	54.0	-11.3	Avg	134	1.3	Note 2
15540.0	39.7	h	54.0	-14.3	Avg	239	1.3	Note 2
15540.0	56.7	v	74.0	-17.3	Pk	134	1.3	Note 2
15540.0	52.9	h	74.0	-21.1	Pk	239	1.3	Note 2
6216.0	46.5	v	68.3	-21.8	Note 3			Note 4; Noise Floor measurement
EUT On Center Channel (Middle Channel, 5.26 GHz) Power @ 18.1 dBm								
10520.0	67.0	v	68.3	-1.3	Pk	333	1.3	Note 4
10520.0	65.3	h	68.3	-3.0	Pk	10	1.4	Note 4
4208.0	41.3	v	54.0	-12.7	Pk	285	1.6	Note 2: Noise Floor Measurement
6312.0	50.8	v	68.3	-17.5	Note 3	63	1.3	Note 4 & 5
6312.0	41.7	h	68.3	-26.6	Note 3	196	1.2	Note 4 & 5
EUT On Highest Channel Available (High Channel, 5.32 GHz) Power @ 17.2 dBm								
10640.0	47.8	v	54.0	-6.2	Avg	330	1.6	Note 2
15960.0	46.1	h	54.0	-7.9	Avg	16	1.5	Note 2
10640.0	45.9	h	54.0	-8.1	Avg	300	1.4	Note 2
10640.0	63.1	v	74.0	-11.0	Pk	330	1.6	Note 2
15960.0	42.7	v	54.0	-11.3	Avg	145	1.6	Note 2
10640.0	60.6	h	74.0	-13.4	Pk	300	1.4	Note 2
4255.9	40.0	v	54.0	-14.0	Pk	285	1.5	Note 2: Noise Floor Measurement
15960.0	58.7	h	74.0	-15.3	Pk	16	1.5	Note 2
15960.0	55.2	v	74.0	-18.8	Pk	145	1.6	Note 2
6383.0	45.6	v	68.3	-22.7	Note 3	350	1.4	Note 4; Noise Floor Measurement

See following page for test notes…

Client:	Atheros Communications	Job Number:	J44997
Model:	AR5BAP-00030	T-Log Number:	T45008
		Proj Eng:	Mark Briggs
Contact:	Eric Dukatz		
Spec:	FCC 15 Sub. B & E, RSS-210	Class:	B

...test notes for run 6b

Note 1:	For emissions falling in the restricted bands detailed in 15.205 the general limits of 15.209 apply. For all other emissions the limit is EIRP < -27dBm (equivalent to a field strength at 3m of 68dBuV/m)
Note 2:	Signal is in a restricted band
Note 3:	Restricted Band Peak Measurements: Resolution and Video BW: 1 MHz, Restricted Band Average Measurements: Resolution Bw: 1MHz and Video Bw: 10 Hz. All other measurements, RBW = 1MHz and VBW = 3MHz, video averaging on (100 samples).
Note 4:	Signal does not fall in a restricted band.
Note 5:	This measurement was made using a resolution bandwidth of 3 kHz The instrumentation noise floor was too high to allow measurements with RBW = 1MHz because a preamplifier could not be used (with the EUT operating the intentional signal would overload the amplifier and there is no low pass filter with sufficient shape factor to reject the intentionally trasmitted signal but pass the spuroius signal). The signal was a narrowband signal (as verified during the conducted antenna measurements) and so the amplitude (peak/average) in a 3kHz bandwidth would be the same as that in a 1MHz bandwidth (please refer to the plot below). The peak reading has been compared with the average limit.



Plot showing LO signal at 4GHz measured using RBW = 1MHz and RBW = 3kHz. Amplitude of the signal does not

Client:	Atheros Communications	Job Number:	J44997
Model:	AR5BAP-00030	T-Log Number:	T45008
		Proj Eng:	Mark Briggs
Contact:	Eric Dukatz		
Spec:	FCC 15 Sub. B & E, RSS-210	Class:	B

FCC Part 15 Subpart E Tests - TURBO MODE

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:	10/11/20001	Config. Used:	2
Test Engineer:	Jmartinez	Config Change:	None
Test Location:	SVOATS# 4	Host Unit Voltage	120Vac, 60 Hz

General Test Configuration

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

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

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: 16°C

Rel. Humidity: 42%

Summary of Results: Turbo Mode

Run #	Test Performed	Limit	Result	Comments
1	Output Power	15.407(a) (1), (2)	Pass	16dBm / 21.2dBm
2	Power Spectral Density (PSD)	15.407(a) (1), (2)	Pass	3.8dBm
3	26dB Bandwidth	15.407	Pass	>42 MHz
3	20 dB Bandwidth	RSS 210	Pass	33.2MHz
4	Peak Excursion Envelope	15.407(a) (6)	Pass	Peak to average excursion < 13dB
5	Antenna Conducted - Out of Band Spurious	15.407(b)	Pass	All emissions below the 27dBm/MHz limit
6	RE, 1000 - 40000 MHz - Spurious Emissions	15.407(b)(6)	Pass	-.6dB @ 10.538 GHz

Client:	Atheros Communications	Job Number:	J44997
Model:	AR5BAP-00030	T-Log Number:	T45008
		Proj Eng:	Mark Briggs
Contact:	Eric Dukatz		
Spec:	FCC 15 Sub. B & E, RSS-210	Class:	B

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.

Run #1: Output Power; S/N: 144

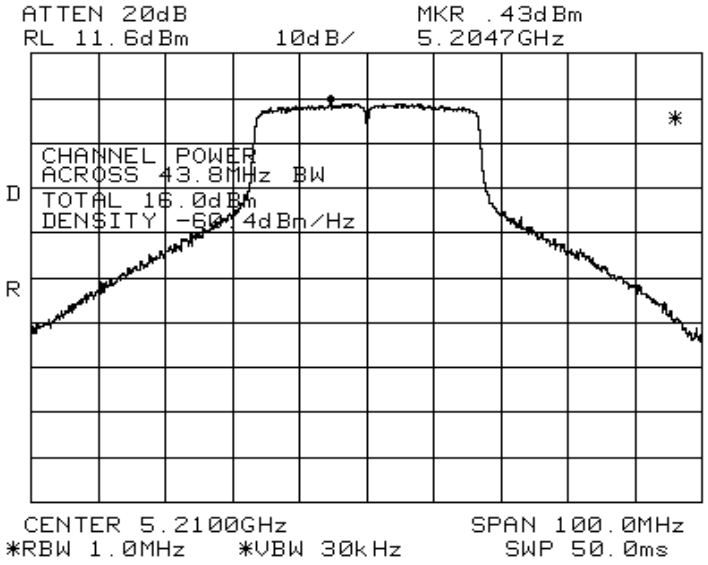
Antenna Gain: 6 dBi

Channel	Frequency (MHz)	26-dB Signal BW	Output Power (dBm)	FCC Limit (dBm) (note 3)	Comments
Low	5210	43.8	**14.1**	17.0	Note 2
	5210	43.8	16.0	17.0	Note 1
Mid	5250	42.7	**14.0**	17.0	Note 2
	5250	42.7	15.9	17.0	Note 1
High	5290	54.7	**18.0**	24.0	Note 2
	5290	54.7	21.2	24.0	Note 1

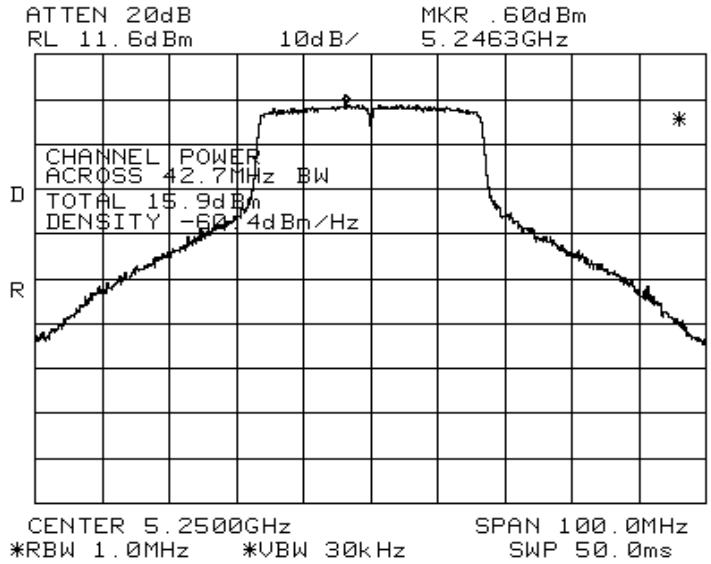
Note 1:	Measured using spectrum analyzer's power measurement function (RBW = 1MHz, VBW = 30kHz)
Note 2:	Measured using a Boonton Power Meter with a peak power sensor in average mode
Note 3:	RSS 210 limit is 23dBm in the 5.15 to 5.25 GHz band, 6dB higher than the FCC limit. This limit is based on the emission bandwidth and operating frequency.
Note 4:	RSS 210 limit is 24dBm in the 5.25 to 5.35 GHz band, same as the FCC limit. This limit is based on the emission bandwidth and operating frequency.
Note 5:	Nominal power levels listed in the runs below are based on measuremnt with the power meter

Client:	Atheros Communications	Job Number:	J44997
Model:	AR5BAP-00030	T-Log Number:	T45008
		Proj Eng:	Mark Briggs
Contact:	Eric Dukatz		
Spec:	FCC 15 Sub. B & E, RSS-210	Class:	B

Spectrum Analyzer channel power @ 5.21 GHz

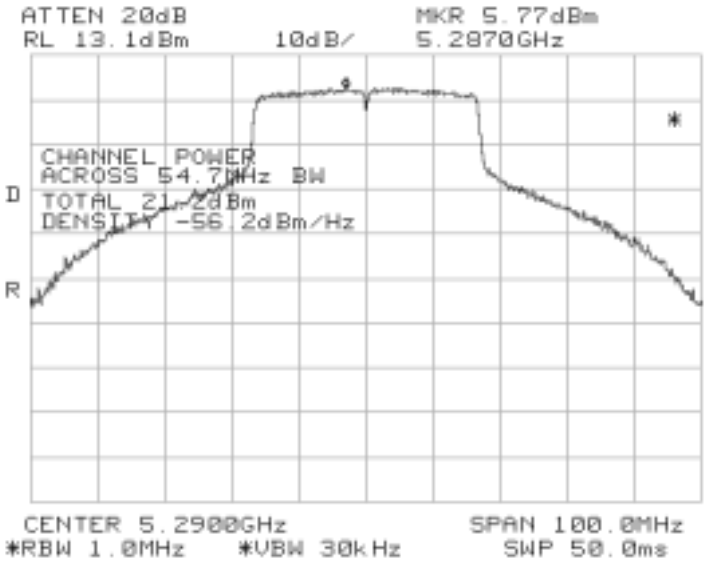


Spectrum Analyzer channel power @ 5.25 GHz



Client:	Atheros Communications	Job Number:	J44997
Model:	AR5BAP-00030	T-Log Number:	T45008
		Proj Eng:	Mark Briggs
Contact:	Eric Dukatz		
Spec:	FCC 15 Sub. B & E, RSS-210	Class:	B

Spectrum Analyzer channel power @ 5.29 GHz



Client:	Atheros Communications	Job Number:	J44997
Model:	AR5BAP-00030	T-Log Number:	T45008
		Proj Eng:	Mark Briggs
Contact:	Eric Dukatz		
Spec:	FCC 15 Sub. B & E, RSS-210	Class:	B

Run #2: Power Spectral Density

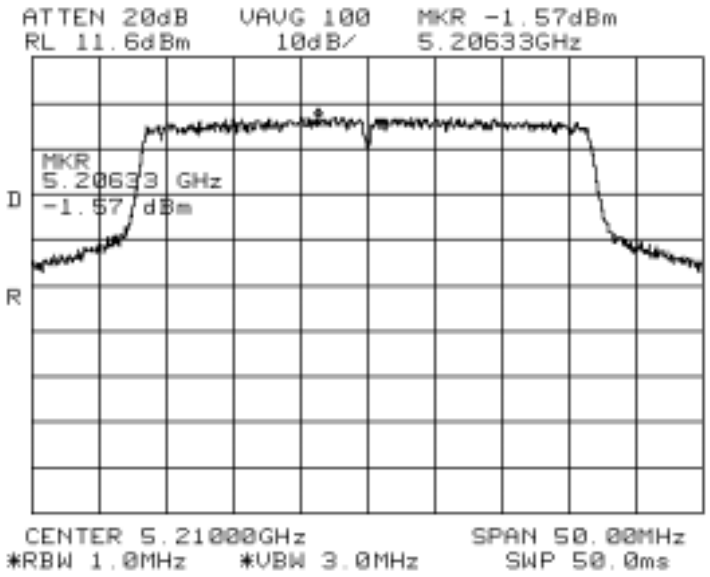
Antenna Gain: 6 dBi

Channel	Frequency (MHz)	Power Spectral	FCC Limit (dBm) note 2	Graph Reference	
Low	5210	-1.6	4.0	T45008/203	Note 1
Mid	5250	-1.4	4.0	T45008/205	Note 1
High	5290	3.8	11.0	T45008/206	Note 1

Note 1:	The above measurements were made using RBW = 1MHz, VBW = 1MHz, video averaging on. To demonstrate compliance with RSS 210, the peak PSD was also measured using RBW= VBW=1MHz, video averaging off during the peak excursion measurements (run #4). The peak PSD of **12.93 dBm** did not exceed the maximum permitted average PSD of 10dBm (5.15 to 5.25 GHz band) or 11dBm (5.25-5.35GHz band) by more than 6dB so no restriction is placed on the output power or average PSD with respect to RSS 210.
Note 2:	RSS 210 limit is 10dBm/MHz in the 5.15 to 5.25 GHz band, 6dB higher than the FCC limit.

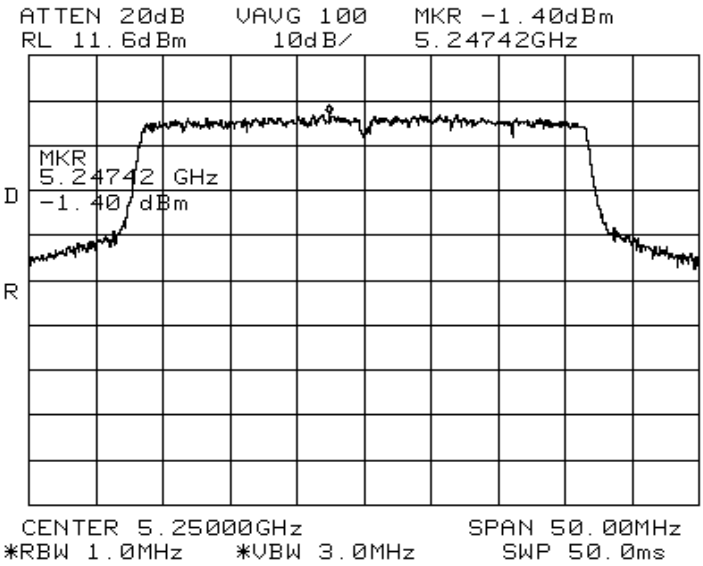
Plots Showing Power Spectral Density (RBW = 1MHz, VBW = 1 MHz, video averaging ON)

T45008 / 203 @ 14.1 dBm

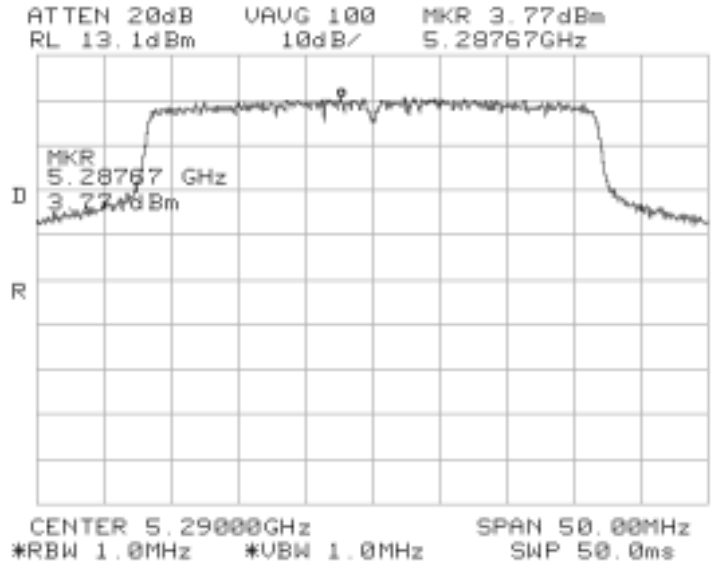


Client:	Atheros Communications	Job Number:	J44997
Model:	AR5BAP-00030	T-Log Number:	T45008
		Proj Eng:	Mark Briggs
Contact:	Eric Dukatz		
Spec:	FCC 15 Sub. B & E, RSS-210	Class:	B

T45008 / 205 @ 14.0 dBm



T45008 / 206 @ 18 dBm



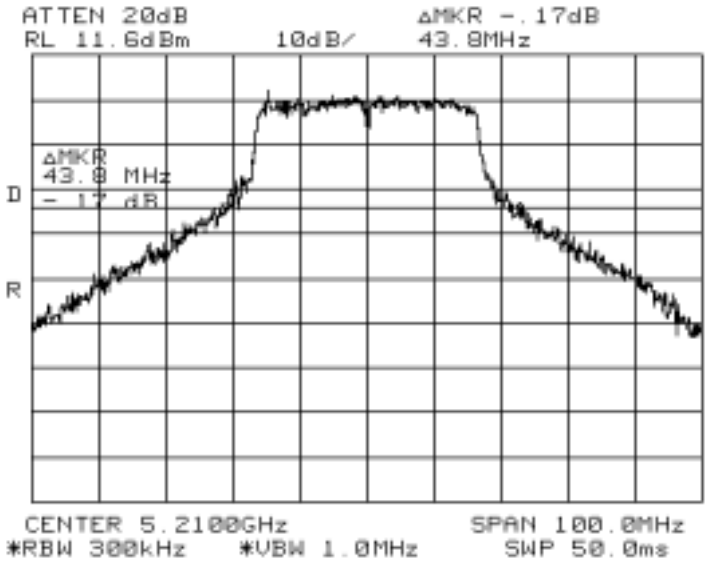
Client:	Atheros Communications	Job Number:	J44997
Model:	AR5BAP-00030	T-Log Number:	T45008
		Proj Eng:	Mark Briggs
Contact:	Eric Dukatz		
Spec:	FCC 15 Sub. B & E, RSS-210	Class:	B

Run #3: Signal Bandwidth

Channel	Frequency (MHz)	Resolution Bandwidth	26 dB Signal Bandwidth (MHz)	20 dB Signal Bandwidth (MHz)	Graph reference #
Low	5210	300 kHz	43.8	33.17	T45008/303
Mid	5250	300 kHz	42.7	33.17	T45008/305
High	5290	300 kHz	54.7	33.17	T45008/306

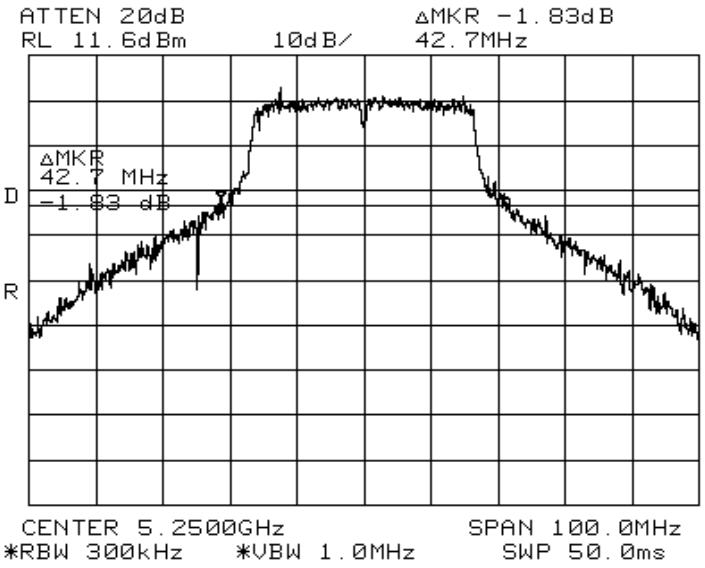
Plots Showing Signal Bandwidth

T45008 / 303 @ 14.1 dBm

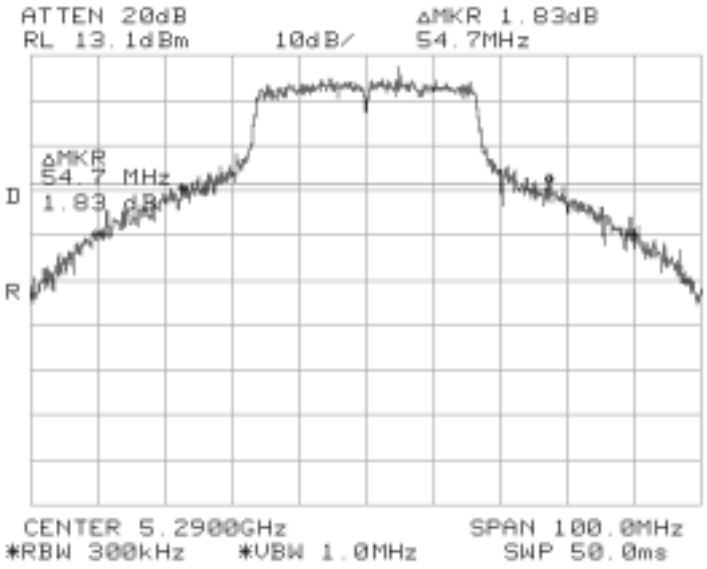


Client:	Atheros Communications	Job Number:	J44997
Model:	AR5BAP-00030	T-Log Number:	T45008
		Proj Eng:	Mark Briggs
Contact:	Eric Dukatz		
Spec:	FCC 15 Sub. B & E, RSS-210	Class:	B

T45008 / 305 @ 14.0 dBm



T45008 / 306 @ 18 dBm



Client:	Atheros Communications	Job Number:	J44997
Model:	AR5BAP-00030	T-Log Number:	T45008
		Proj Eng:	Mark Briggs
Contact:	Eric Dukatz		
Spec:	FCC 15 Sub. B & E, RSS-210	Class:	B

Run #4: Peak Excursion Measurement

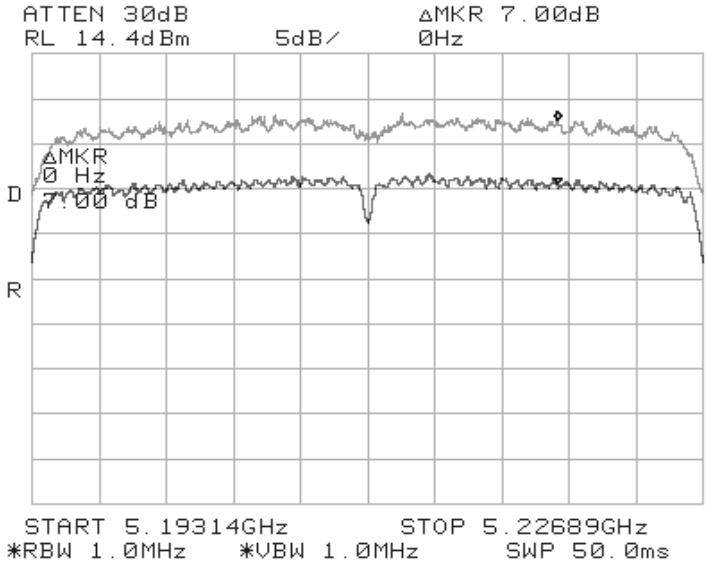
Plots Showing Peak Excursion

Trace A: RBW = VBW = 1MHz

Trace B: RBW = 1 MHz, VBW = 30kHz

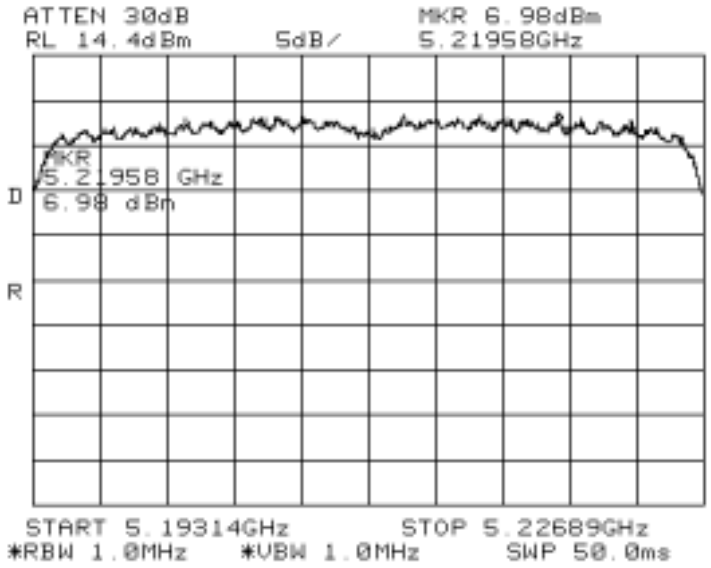
Low Channel Peak Excursion = 7.0 dB. Peak power spectral density (RSS210 only) = 6.98 dBm. Power @ 14.1 dBm

FCC Peak Excursion



Client:	Atheros Communications	Job Number:	J44997
Model:	AR5BAP-00030	T-Log Number:	T45008
		Proj Eng:	Mark Briggs
Contact:	Eric Dukatz		
Spec:	FCC 15 Sub. B & E, RSS-210	Class:	B

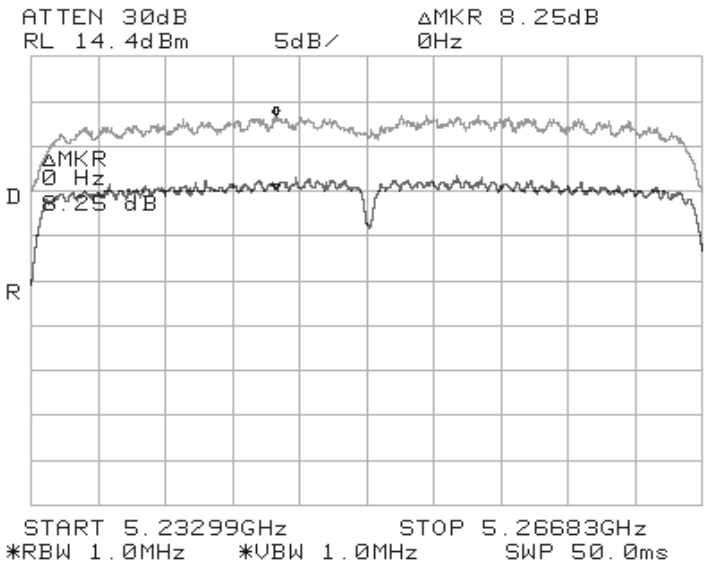
Canada Power Spectral Density



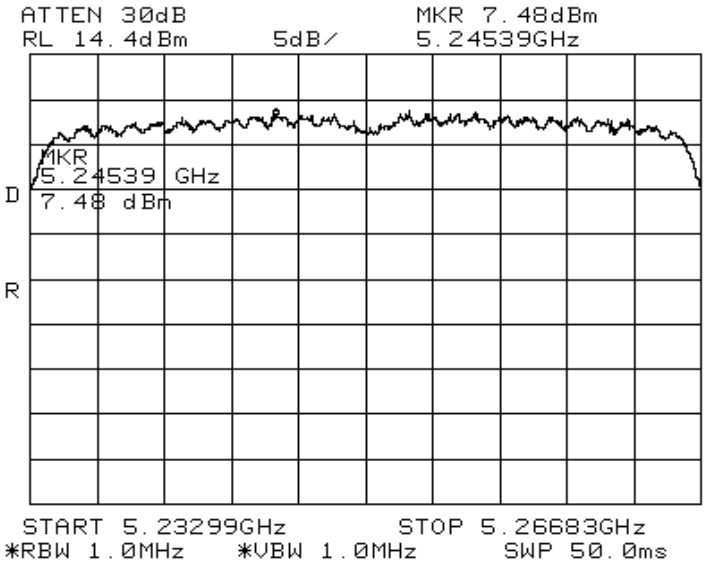
Client:	Atheros Communications	Job Number:	J44997
Model:	AR5BAP-00030	T-Log Number:	T45008
		Proj Eng:	Mark Briggs
Contact:	Eric Dukatz		
Spec:	FCC 15 Sub. B & E, RSS-210	Class:	B

Mid Channel Peak Excursion = 8.25 dB. Peak power spectral density (RSS210 only) = 7.48 dBm. Power @ 14.0 dBm

FCC Peak Excursion



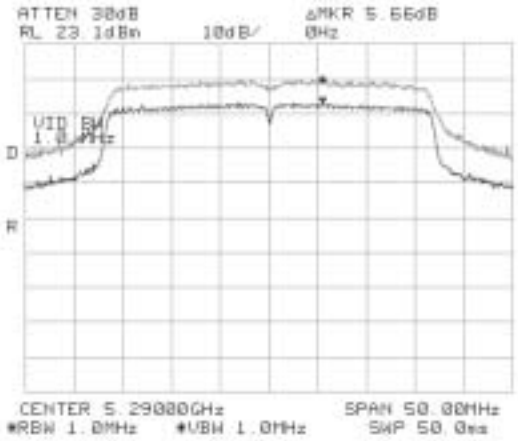
Canada Power Spectral Density



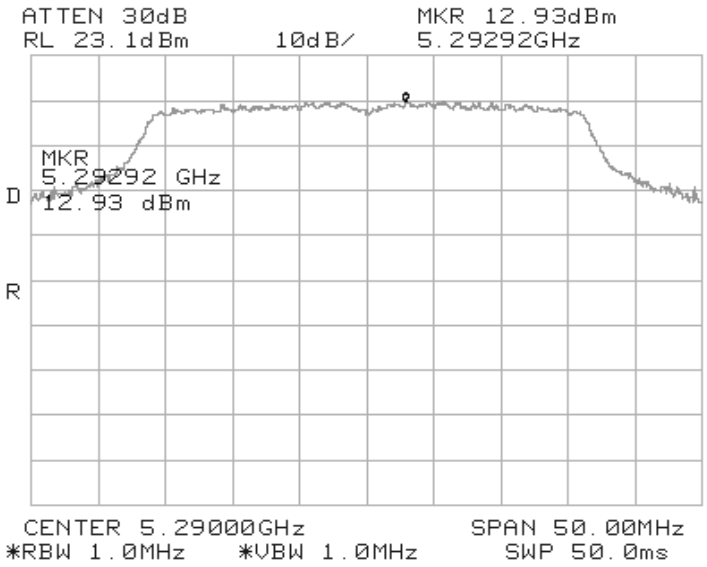
Client:	Atheros Communications	Job Number:	J44997
Model:	AR5BAP-00030	T-Log Number:	T45008
		Proj Eng:	Mark Briggs
Contact:	Eric Dukatz		
Spec:	FCC 15 Sub. B & E, RSS-210	Class:	B

High Channel Peak Excursion = 5.66 dB. Peak power spectral density (RSS210 only) = 12.93 dBm. Power @ 18 dBm

FCC Peak Excursion



Canada Power Spectral Density



Client:	Atheros Communications	Job Number:	J44997
Model:	AR5BAP-00030	T-Log Number:	T45008
		Proj Eng:	Mark Briggs
Contact:	Eric Dukatz		
Spec:	FCC 15 Sub. B & E, RSS-210	Class:	B

Run #5: Out Of Band Spurious Emissions - Antenna Conducted

The antenna gain of the radios integral antenna is 6dBi. The EIRP limit is -27dBm/MHz for all out of band signals that do not

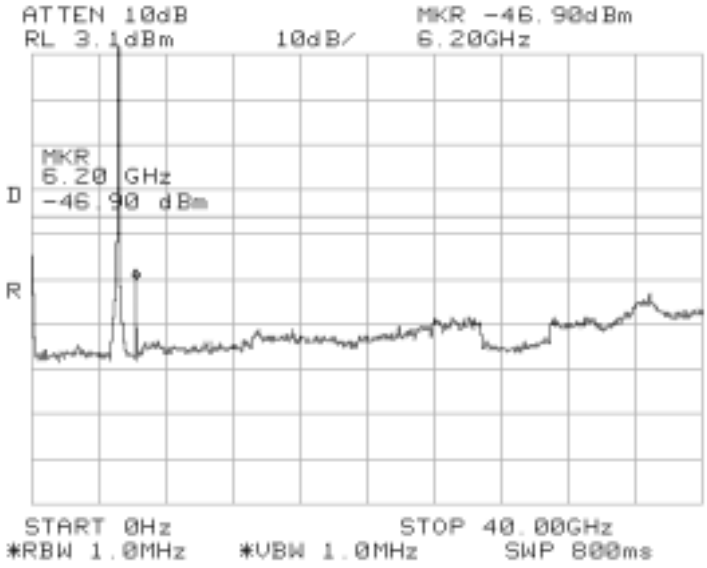
Channel	Frequency (MHz)	Frequency Range	Highest Spurious Signal	Graph reference #
Low	5210	30 - 1000 MHz	Note 4	T45008/501
		1 to 5.15 GHz	None	T45008/501
		5.25 to 10 GHz	6252 (Note 3)	T45008/501 & 503
		10 GHz to 20 GHz	15629 (Note 1)	T45008/501 & 504
		20 GHz to 40 GHz	None	T45008/501
Mid	5250	30 - 1000 MHz	Note 4	T45008/506
		1 to 7 GHz	6230 (Note 3)	T45008/506 & 507
		7 to 10 GHz	10500 (Note 3)	T45008/506 & 508
		10 GHz to 20 GHz	15750 (Note 1)	T45008/506 & 509
		20 GHz to 40 GHz	None	T45008/506
High	5290	30 - 1000 MHz	Note 4	T45008/511
		1 to 7 GHz	6348.2 (Note 3)	T45008/511 & 512
		7 to 10 GHz	10583 (Note 3)	T45008/511 & 513
		10 GHz to 20 GHz	15854 (Note 1)	T45008/511 & 514
		20 GHz to 40 GHz	None	T45008/511

Note 1:	Signal is in a restricted band. Refer to run #6 for field strength measurements.
Note 2:	Signal is not in restricted band. Limit is -27dBm eirp. As the signal strength is significantly lower than -27dBm no field strength measurements required.
Note 3:	Signal is not in restricted band. Limit is -27dBm eirp. Although the signal strength is significantly lower than -27dBm field strength measurements were made (refer to run #6)
Note 4:	All spurious signals in this frequency band measured during digital device radiated emissions test.

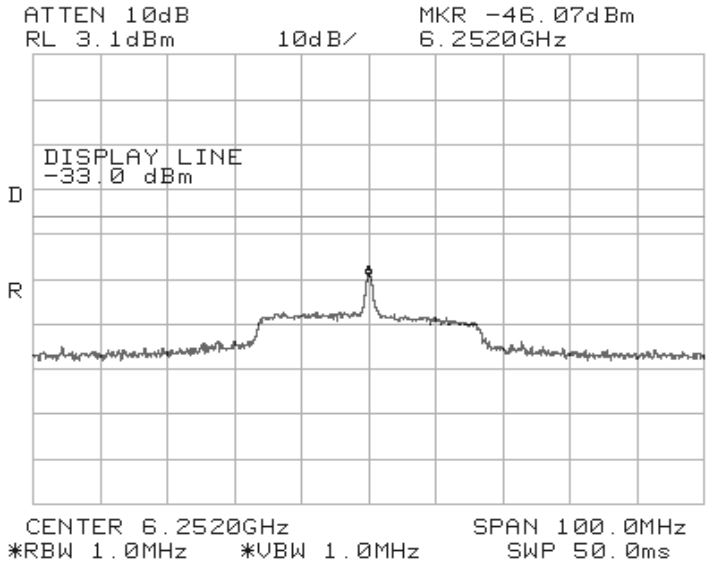
Client:	Atheros Communications	Job Number:	J44997
Model:	AR5BAP-00030	T-Log Number:	T45008
		Proj Eng:	Mark Briggs
Contact:	Eric Dukatz		
Spec:	FCC 15 Sub. B & E, RSS-210	Class:	B

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

T45008/501 - 40,000 MHz (16.1 dBm @ 5.21 GHz)

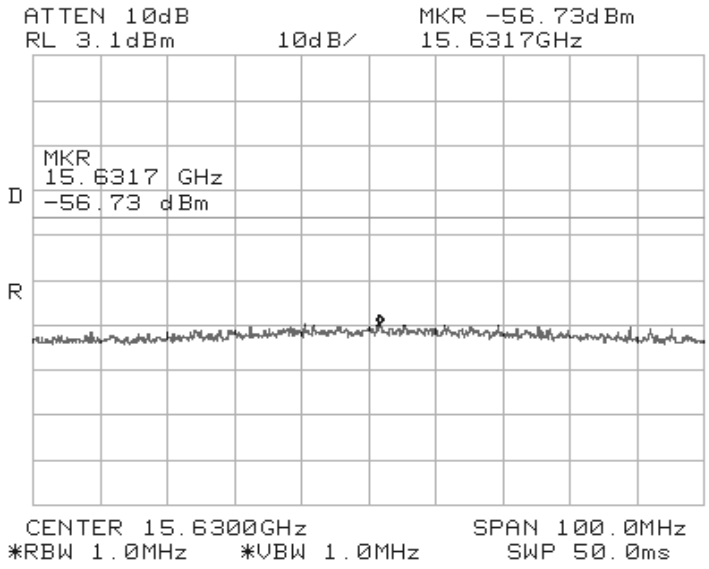


T45008 / 503

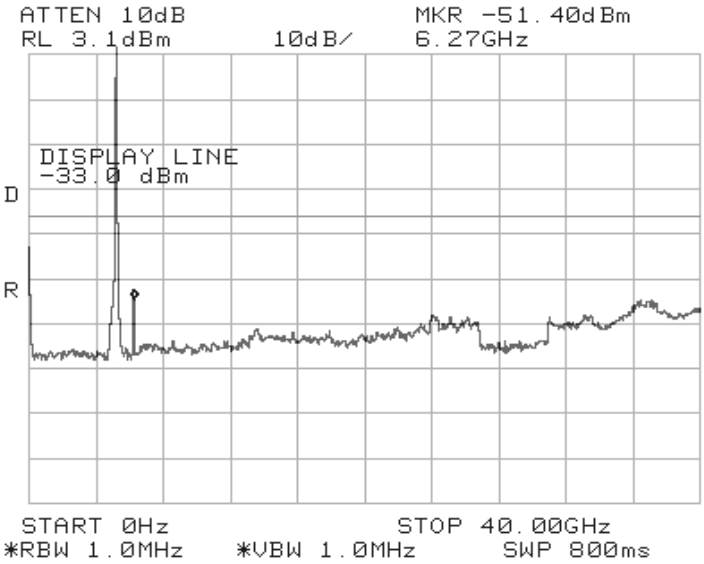


Client:	Atheros Communications	Job Number:	J44997
Model:	AR5BAP-00030	T-Log Number:	T45008
		Proj Eng:	Mark Briggs
Contact:	Eric Dukatz		
Spec:	FCC 15 Sub. B & E, RSS-210	Class:	B

T45008 / 504

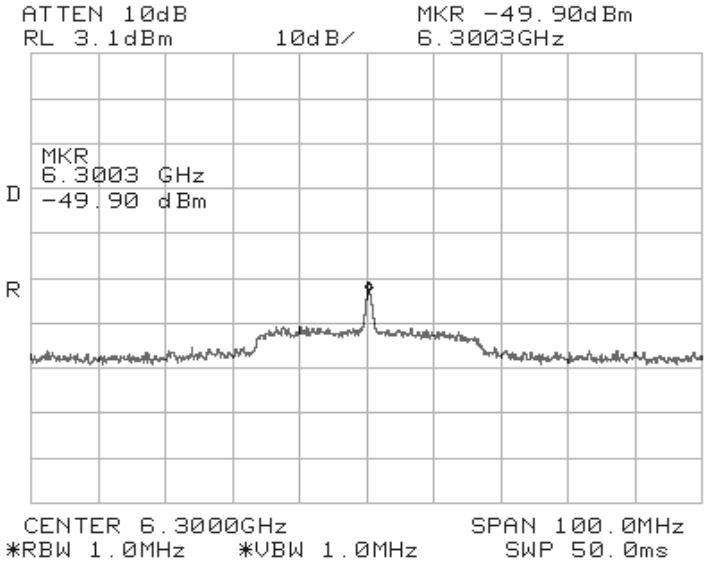


T45008/506 0 - 40,000 MHz (16 dBm @ 5.25 GHz)

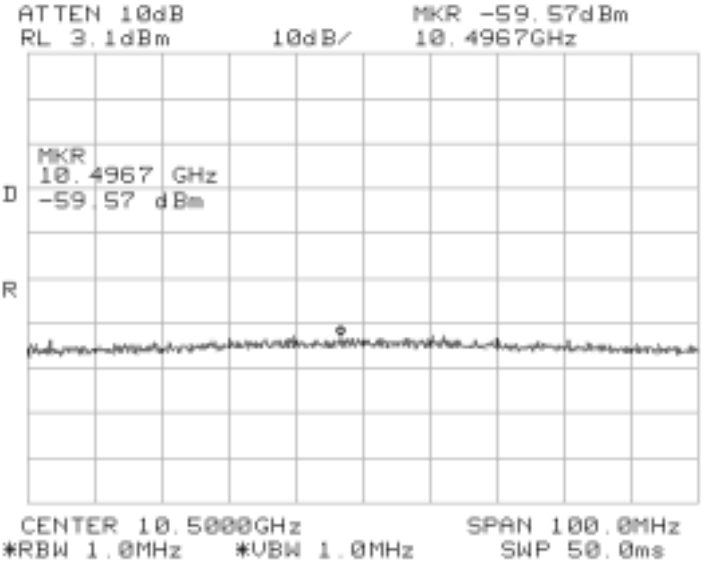


Client:	Atheros Communications	Job Number:	J44997
Model:	AR5BAP-00030	T-Log Number:	T45008
		Proj Eng:	Mark Briggs
Contact:	Eric Dukatz		
Spec:	FCC 15 Sub. B & E, RSS-210	Class:	B

T45008 / 507

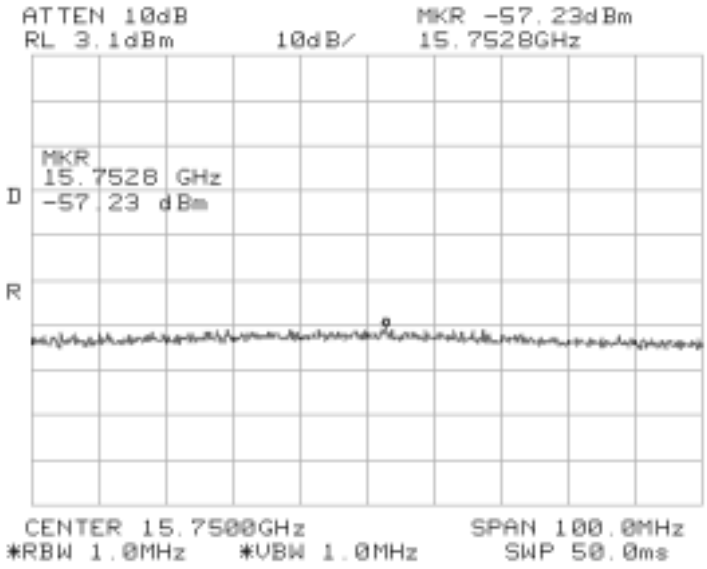


T45008 / 508

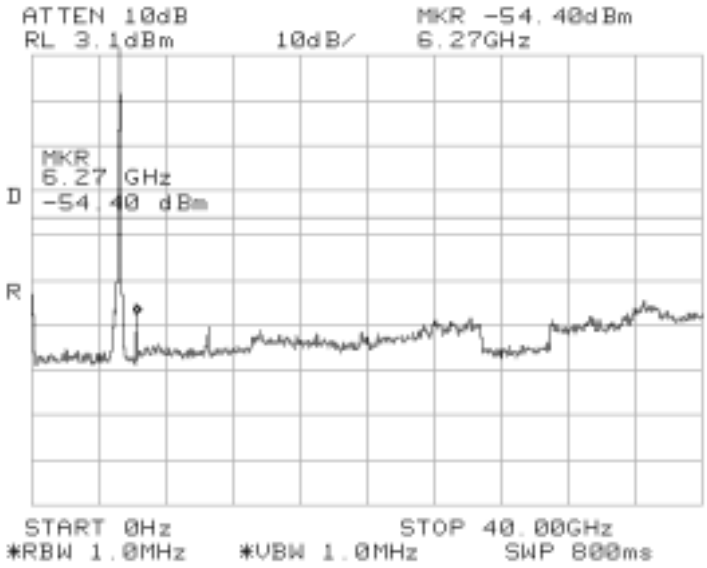


Client:	Atheros Communications	Job Number:	J44997
Model:	AR5BAP-00030	T-Log Number:	T45008
		Proj Eng:	Mark Briggs
Contact:	Eric Dukatz		
Spec:	FCC 15 Sub. B & E, RSS-210	Class:	B

T45008 / 509

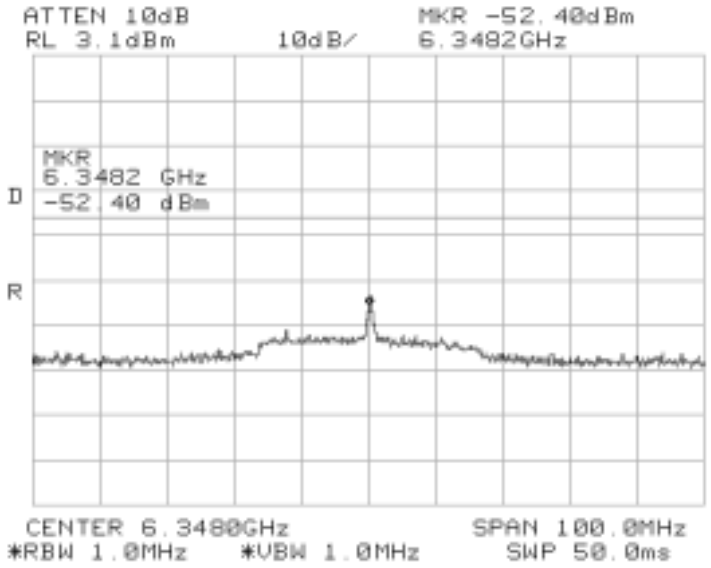


T45008/511 0 - 40,000 MHz (18 dBm @ 5.29 GHz)

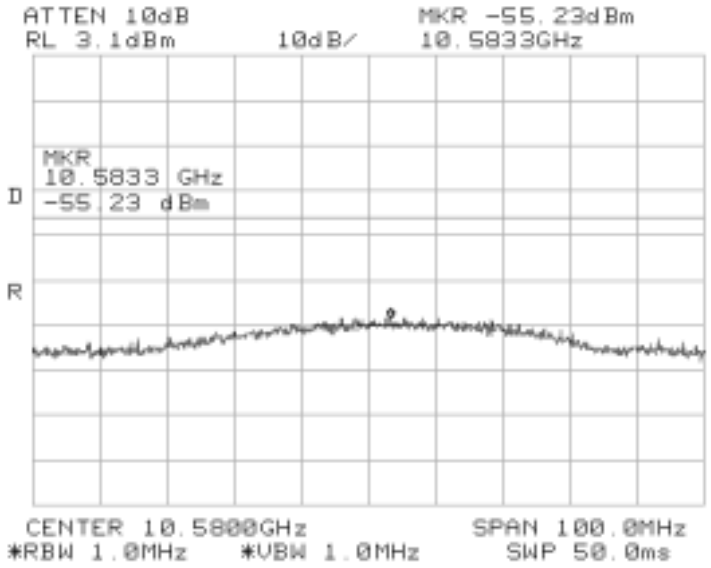


Client:	Atheros Communications	Job Number:	J44997
Model:	AR5BAP-00030	T-Log Number:	T45008
		Proj Eng:	Mark Briggs
Contact:	Eric Dukatz		
Spec:	FCC 15 Sub. B & E, RSS-210	Class:	B

T45008 / 512

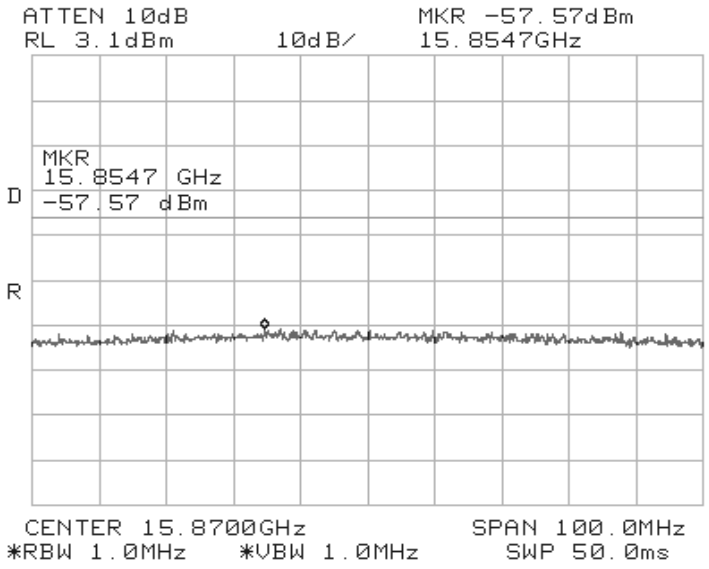


T45008 / 513



Client:	Atheros Communications	Job Number:	J44997
Model:	AR5BAP-00030	T-Log Number:	T45008
		Proj Eng:	Mark Briggs
Contact:	Eric Dukatz		
Spec:	FCC 15 Sub. B & E, RSS-210	Class:	B

T45008 / 514



Client:	Atheros Communications	Job Number:	J44997
Model:	AR5BAP-00030	T-Log Number:	T45008
		Proj Eng:	Mark Briggs
Contact:	Eric Dukatz		
Spec:	FCC 15 Sub. B & E, RSS-210	Class:	B

Band Edge Measurements:

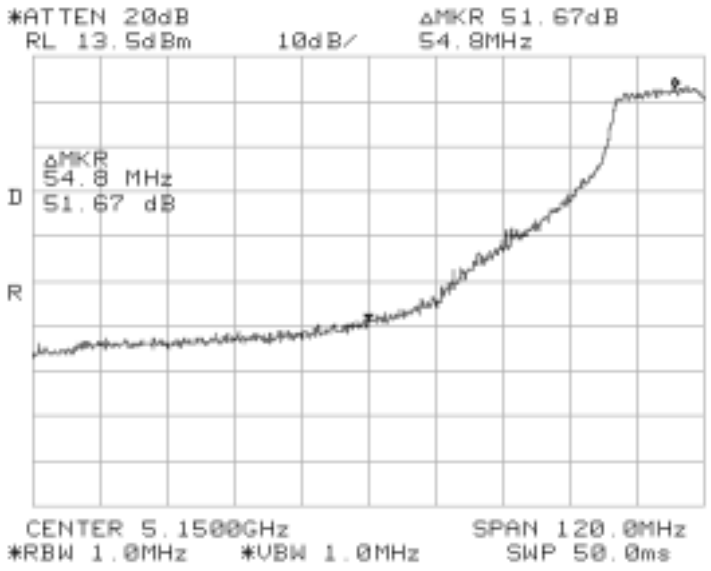
For signals in the restricted bands immediately above and below the 5.15 to 5.35 GHz allocated band a measurement was

Plots Showing Out-Of-Band Emissions (Peak RBW=VBW=1MHz; Average RBW = 1MHz, VBW = 10Hz)

5.15 GHz band edge, EUT operating on the lowest channel. Power = 14 dBm

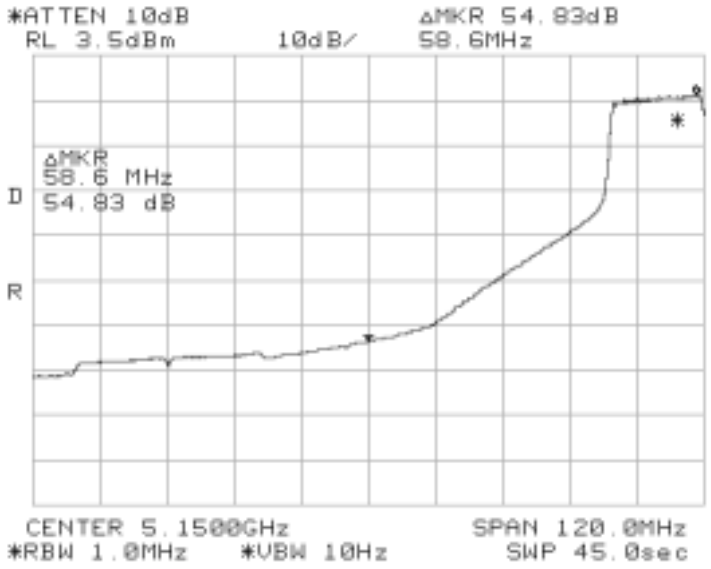
The highest signal within 50 MHz of the 5.15 GHz band was -51.67 dBc (Peak) / -54.83 dBc (Average)

Peak Bandedge



Client:	Atheros Communications	Job Number:	J44997
Model:	AR5BAP-00030	T-Log Number:	T45008
		Proj Eng:	Mark Briggs
Contact:	Eric Dukatz		
Spec:	FCC 15 Sub. B & E, RSS-210	Class:	B

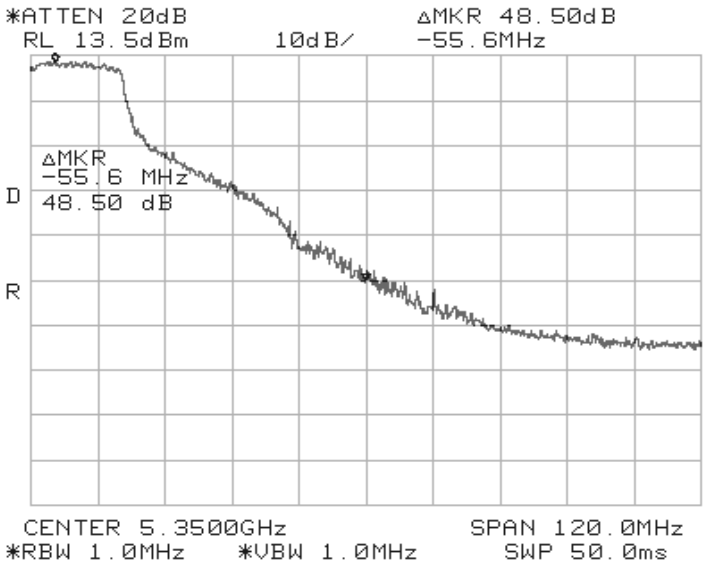
Average Bandedge



5.35 GHz band edge EUT operating on the highest channel. Power = 18 dBm

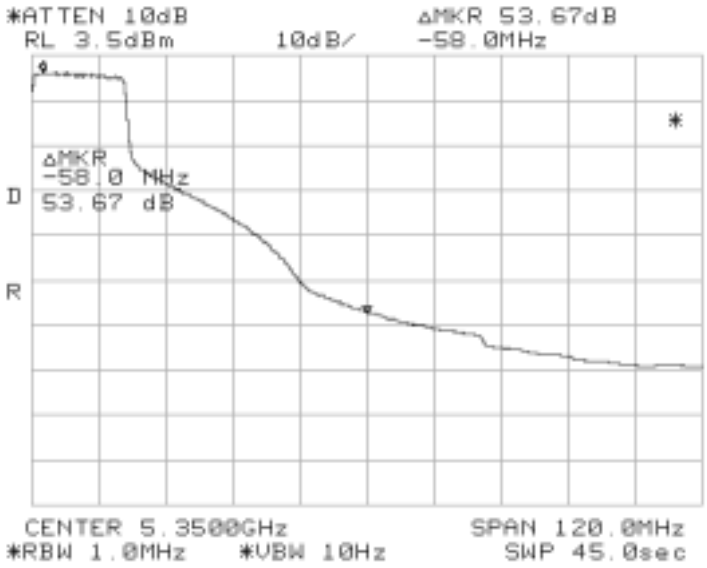
The highest signal in the 5.35 to 5.46 GHz band was -48.5dBc (Peak) / - 53.67dBc (Average)

Peak Bandedge



Client:	Atheros Communications	Job Number:	J44997
Model:	AR5BAP-00030	T-Log Number:	T45008
		Proj Eng:	Mark Briggs
Contact:	Eric Dukatz		
Spec:	FCC 15 Sub. B & E, RSS-210	Class:	B

Average Bandedge



Client:	Atheros Communications	Job Number:	J44997
Model:	AR5BAP-00030	T-Log Number:	T45008
		Proj Eng:	Mark Briggs
Contact:	Eric Dukatz		
Spec:	FCC 15 Sub. B & E, RSS-210	Class:	B

Run #6a: Radiated Spurious Emissions, 1000 - 40000 MHz

Spurious emissions from 30 - 1000 MHz were measured while performing emissions measurements of the digital device. Refer

Limit for emissions in restricted bands:	54dBuV/m (Average)	74dBuV/m (Peak)
Limit for emissions outside of restricted bands:	EIRP < -27dBm/MHz	(68dBuV/m)

Fundamental signal measurements (to calculate the band edge field strengths):Power= 16.1 dBm @ 5210MHz, 18.0 dBm @ 5290 MHz.

Frequency	Level	Pol	15.209 / 15.407		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
5210.0	112.9	v	-	-	Pk	336	1.7	RBW = VBW = 1 MHz
5210.0	102.5	v	-	-	Avg	336	1.7	RBW = 1MHz, VBW = 10Hz
5210.0	98.3	h	-	-	Pk	310	2.2	RBW = VBW = 1 MHz
5210.0	89.5	h	-	-	Avg	310	2.2	RBW = 1MHz, VBW = 10Hz
5290.0	115.7	v	-	-	Pk	310	1.5	RBW = VBW = 1 MHz
5290.0	105.6	v	-	-	Avg	310	1.5	RBW = 1MHz, VBW = 10Hz
5290.0	104.3	h	-	-	Pk	311	2.2	RBW = VBW = 1 MHz
5290.0	94.8	h	-	-	Avg	311	2.2	RBW = 1MHz, VBW = 10Hz

Band Edge Field Strength Calculations; Power= 16.1 dBm @ 5210MHz, 18.0 dBm @ 5290 MHz.

Frequency	Level	Pol	15.209 / 15.407		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
5150.0	61.2	v	74.0	-12.8	Avg			Note 1
5150.0	47.7	v	54.0	-6.3	Pk			Note 1
5350.0	67.2	v	74.0	-6.8	Avg			Note 2
5350.0	51.9	v	54.0	-2.1	Pk			Note 2

Note 1:	EUT operating on the lowest channel available in the 5.15 - 5.25 MHz band. Signal level calculated using the relative measurements in run #5 (-51.7 dBc for peak and -54.8 dBc for average) applied to the highest peak and average field strength measurements of the fundamental signal level.
Note 2:	EUT operating on highest channel available in the 5.25 - 5.35 MHz band. Signal level calculated using the relative measurements in run #5 (-48.5 dBc for peak and -53.67 dBc for average) applied to the highest peak and average field strength measurements of the fundamental signal level.

Elliott

EMC Test Data

Client:	Atheros Communications	Job Number:	J44997
Model:	AR5BAP-00030	T-Log Number:	T45008
		Proj Eng:	Mark Briggs
Contact:	Eric Dukatz		
Spec:	FCC 15 Sub. B & E, RSS-210	Class:	B

Run #6b: Radiated Spurious Emissions, 1000 - 40000 MHz

EUT On Lowest Channel Available (Low Channel, 5.21 GHz); Power = 16.1 dBm

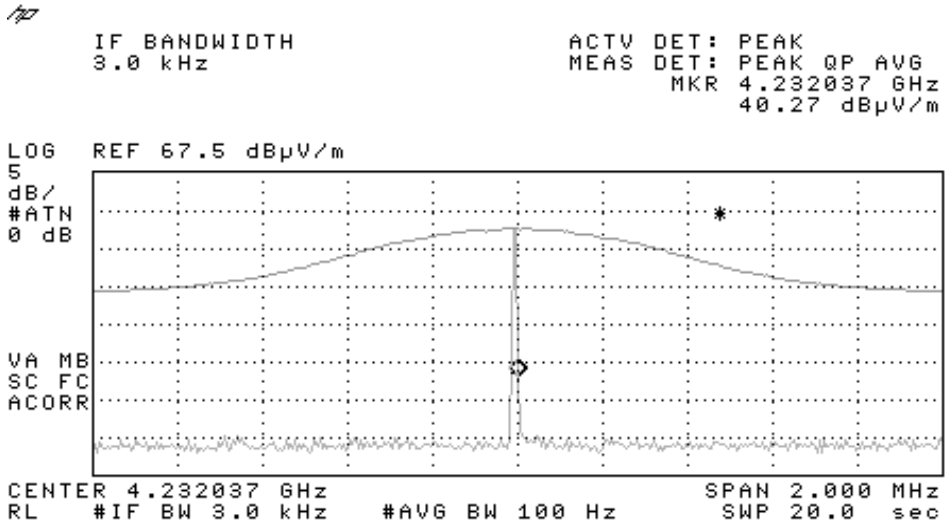
Frequency	Level	Pol	15.209 / 15.407		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
15630.0	50.0	v	54.0	-4.0	Avg	167	1.3	Note 2; Noise Floor measurement
15630.0	49.0	h	54.0	-5.0	Avg	135	1.3	Note 2; Noise Floor measurement
6252.0	58.9	v	68.3	-9.4	Note 3	7	1.3	Note 4 & 5
15630.0	64.3	v	74.0	-9.7	Pk	167	1.3	Note 2; Noise Floor measurement
15630.0	61.9	h	74.0	-12.1	Pk	135	1.4	Note 2; Noise Floor measurement
EUT On Center Channel (Middle Channel 5.25 GHz); Power = 16.0 dBm								
15750.0	47.1	h	54.0	-6.9	Avg	0	1.3	Note 2
15750.0	46.7	v	54.0	-7.3	Avg	320	1.4	Note 2
10500.0	60.1	v	68.3	-8.2	Note 3	98	1.4	Note 4
10500.0	59.1	h	68.3	-9.2	Note 3	262	1.4	Note 4
15750.0	60.3	v	74.0	-13.7	Pk	320	1.4	Note 2
15750.0	59.5	h	74.0	-14.5	Pk	0	1.3	Note 2
6230.0	51.5	v	68.3	-16.8	Note 3	7	1.4	Note 4 & 5
EUT On Highest Channel Available (High Channel, 5.29 GHz); Power= 18.0 dBm								
10538.0	53.4	v	54.0	-0.6	Avg	356	1.3	Note 2
10538.0	51.2	h	54.0	-2.8	Avg	36	1.4	Note 2
10538.0	68.0	v	74.0	-6.0	Pk	356	1.3	Note 2
10538.0	64.9	h	74.0	-9.1	Pk	36	1.4	Note 2
6348.0	52.1	v	68.3	-16.2	Note 3	358	1.3	Note 4 & 5
6348.0	44.4	h	68.3	-24.0	Note 3	358	1.3	Note 4 & 5

See following page for test notes…

Client:	Atheros Communications	Job Number:	J44997
Model:	AR5BAP-00030	T-Log Number:	T45008
		Proj Eng:	Mark Briggs
Contact:	Eric Dukatz		
Spec:	FCC 15 Sub. B & E, RSS-210	Class:	B

...test notes for run 6b

Note 1:	For emissions falling in the restricted bands detailed in 15.205 the general limits of 15.209 apply. For all other emissions the limit is EIRP < -27dBm (equivalent to a field strength at 3m of 68dBuV/m)
Note 2:	Signal is in a restricted band
Note 3:	Restricted Band Peak Measurements: Resolution and Video BW: 1 MHz, Restricted Band Average Measurements: Resolution Bw: 1MHz and Video Bw: 10 Hz. All other measurements, RBW = 1MHz and VBW = 3MHz, video averaging on (100 samples).
Note 4:	Signal does not fall in a restricted band.
Note 5:	This measurement was made using a resolution bandwidth of 3 kHz The instrumentation noise floor was too high to allow measurements with RBW = 1MHz because a preamplifier could not be used (with the EUT operating the intentional signal would overload the amplifier and there is no low pass filter with sufficient shape factor to reject the intentionally trasmitted signal but pass the spuroius signal). The signal was a narrowband signal (as verified during the conducted antenna measurements) and so the amplitude (peak/average) in a 3kHz bandwidth would be the same as that in a 1MHz bandwidth (please refer to the plot below). The peak reading has been compared with the average limit.



Plot showing LO signal at 4GHz measured using RBW = 1MHz and RBW = 3kHz. Amplitude of the signal does not

Client:	Atheros Communications	Job Number:	J44997
Model:	AR5BAP-00030	T-Log Number:	T45008
		Proj Eng:	Mark Briggs
Contact:	Eric Dukatz		
Spec:	FCC 15 Sub. B & E, RSS-210	Class:	B

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: 10/15/2001
Test Engineer: Marissa Faustino
Test Location: SVOATS #1

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

General Test Configuration

For tabletop equipment, the EUT was located on a wooden table, 40 cm from a vertical coupling plane and 80cm from the LISN. Remote support equipment was located approximately 30 meters away from the test area, with all I/O connections routed overhead.

Ambient Conditions:

Temperature: 29°C
Rel. Humidity: 24%

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	CE, AC Power 120V/60Hz	FCC B	Pass	-13dB @ .694MHz

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 Communications	Job Number:	J44997
Model:	AR5BAP-00030	T-Log Number:	T45008
		Proj Eng:	Mark Briggs
Contact:	Eric Dukatz		
Spec:	FCC 15 Sub. B & E, RSS-210	Class:	B

Run #1: AC Power Port Conducted Emissions, 0.45 - 30 MHz 120 V / 60 Hz

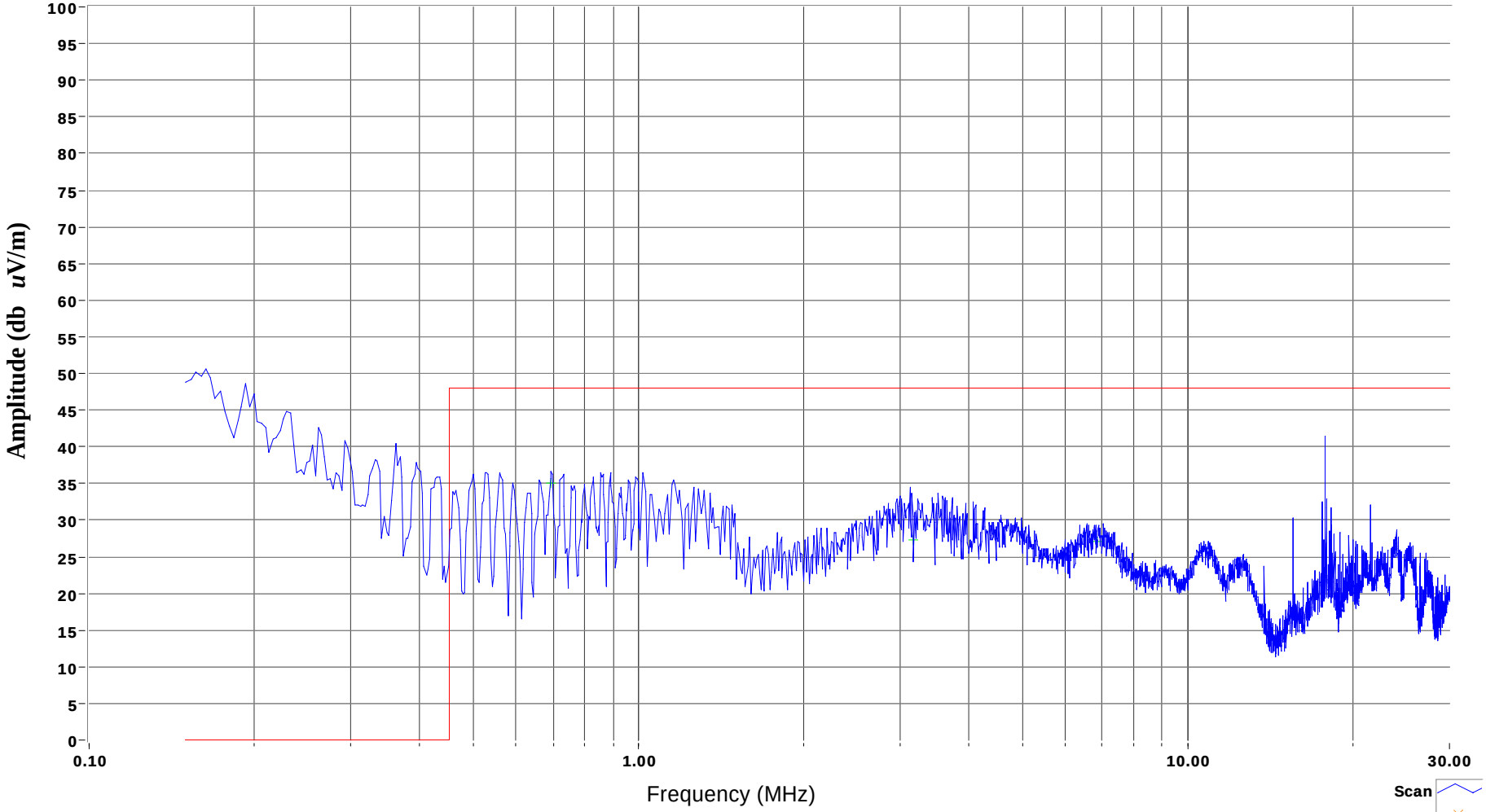
Frequency	Level	Interface	FCC B		Detector	Comments
MHz	dBµV	Port	Limit	Margin	QP/Ave	
0.6940	35.0	Line 1	48.0	-13.0	QP	
1.3606	33.0	Neutral	48.0	-15.0	QP	
3.8658	32.8	Neutral	48.0	-15.2	QP	
7.1907	28.5	Neutral	48.0	-19.5	QP	
3.1748	27.2	Line 1	48.0	-20.8	QP	
6.8451	27.0	Line 1	48.0	-21.0	QP	

SVOATS #1: Atheros Communications LISN 304 Run 1

Spec:
FCC-B

Mains Lead
Line 1

T45008



10/25/2001

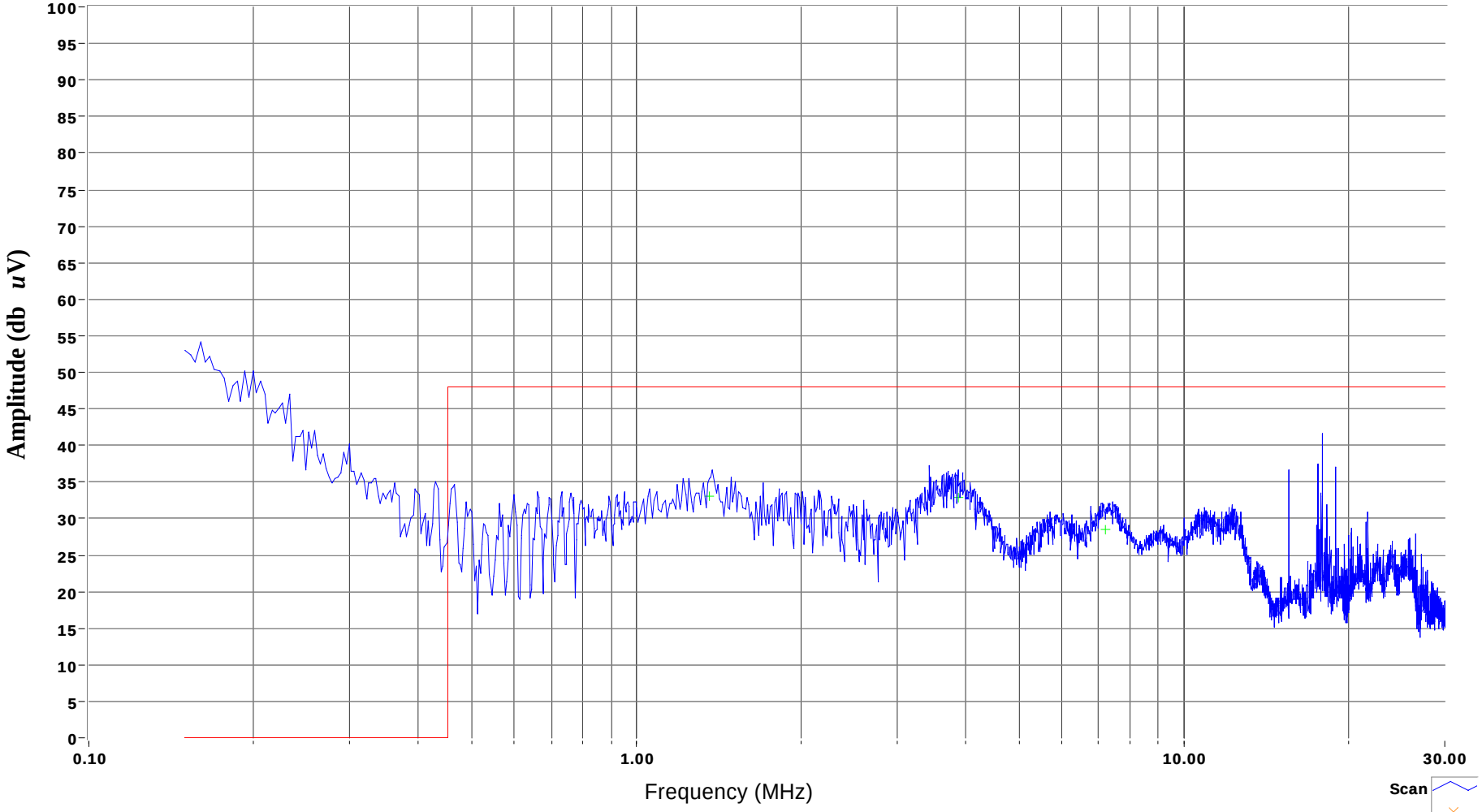
Marissa Faustino

SVOATS #1: Atheros Communications ARBAP-00300 Run 1

Spec:
FCC-B

Mains Lead
Neutral

T45008



10/25/2001

Marissa Faustino

Elliott

EMC Test Data

Client:	Atheros Communications	Job Number:	J44997
Model:	AR5BAP-00030	T-Log Number:	T45008
		Proj Eng:	Mark Briggs
Contact:	Eric Dukatz		
Spec:	FCC 15 Sub. B & E, RSS-210	Class:	B

Radiated 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: 10/15/2001
Test Engineer: Marissa Faustino
Test Location: SVOATS #1

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

General Test Configuration

The EUT was located on the turntable for radiated emissions testing. Remote support equipment was located approximately 30 meters from the test area with all I/O connections routed overhead.
On the OATS, the measurement antenna was located 3 meters from the EUT for the measurement range 30 - 1000 MHz.
Note, **preliminary** testing indicates that the emissions were maximized by orientation of the EUT and elevation of the measurement antenna. **Maximized** testing indicated that the emissions were maximized by orientation of the EUT, elevation of the measurement antenna, and manipulation of the EUT's interface cables.

Ambient Conditions:

Temperature: 29°C
Rel. Humidity: 24%

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	RE, Preliminary Scan 30 - 1000 MHz	FCC B	Eval	-4.2dB @ 67.92MHz
2	RE, 30 - 1000MHz - Maximized Emissions	FCC B	Pass	-4.2dB @ 67.92MHz

Modifications Made During Testing:

The following modifications were made to the EUT during testing in order to comply with the requirements of the standard:
1)Added Echosorb material ARC DD-10214 to top cover of EUT,covering microcontroller and SDRAM

Deviations From The Standard

No deviations were made from the requirements of the standard.

Elliott

EMC Test Data

Client:	Atheros Communications	Job Number:	J44997
Model:	AR5BAP-00030	T-Log Number:	T45008
		Proj Eng:	Mark Briggs
Contact:	Eric Dukatz		
Spec:	FCC 15 Sub. B & E, RSS-210	Class:	B

Run #1: Preliminary Radiated Emissions, 30-1000 MHz

Frequency	Level	Pol	Spec	Spec	Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
67.920	35.9	V	40.0	-4.1	QP	0	1.0	
54.430	35.6	V	40.0	-4.4	QP	0	1.0	
44.338	34.6	V	40.0	-5.4	QP	0	1.0	
287.997	**40.3**	H	46.0	**-5.7**	QP	179	1.0	288 MHz (H) reading 41.8 dBuV/m before installing Mod 1
672.000	**39.0**	H	46.0	**-7.0**	QP	266	1.0	672 MHz (H) reading 37.8 dBuV/m before installing Mod 1
479.885	**38.7**	H	46.0	**-7.3**	QP	47	1.0	480 MHz(H) reading 47.7dBuV/m before installing Mod 1
287.997	**38.6**	V	46.0	**-7.4**	QP	33	1.9	288 MHz (v) with mod 1 installed
672.000	37.8	H	46.0	-8.2	QP	358	1.0	
672.000	**36.5**	V	46.0	**-9.5**	QP	299	1.0	672 MHz(V) reading 44 dBuV/m before installing Mod 1
256.060	35.6	H	46.0	-10.4	QP	308	1.3	
479.885	**35.1**	V	46.0	**-10.9**	QP	299	1.0	480 MHz(v) reading 44.5 dBuV/m before installing Mod 1
383.994	34.2	H	46.0	-11.8	QP	222	1.0	
148.100	31.4	V	43.5	-12.1	QP	218	1.0	
30.640	27.2	V	40.0	-12.8	QP	71	1.0	
32.020	25.9	V	40.0	-14.1	QP	0	1.0	
257.720	31.4	H	46.0	-14.6	QP	303	1.0	
265.020	31.4	H	46.0	-14.6	QP	158	1.0	
267.016	31.3	H	46.0	-14.7	QP	144	1.9	
263.014	31.2	H	46.0	-14.8	QP	0	1.5	
209.990	27.5	V	43.5	-16.0	QP	258	1.0	
256.013	29.5	V	46.0	-16.5	QP	116	1.0	
142.990	27.0	V	43.5	-16.5	QP	257	1.0	
249.930	28.7	V	46.0	-17.3	QP	279	1.0	
136.990	26.0	V	43.5	-17.5	QP	281	1.0	
80.940	22.4	V	40.0	-17.6	QP	110	1.0	
383.994	27.9	V	46.0	-18.1	QP	338	1.0	
297.019	27.5	V	46.0	-18.5	QP	0	1.0	
288.980	27.5	H	46.0	-18.5	QP	359	1.2	
254.020	26.3	H	46.0	-19.7	QP	0	1.8	

Elliott

EMC Test Data

Client:	Atheros Communications	Job Number:	J44997
Model:	AR5BAP-00030	T-Log Number:	T45008
		Proj Eng:	Mark Briggs
Contact:	Eric Dukatz		
Spec:	FCC 15 Sub. B & E, RSS-210	Class:	B

Run #2: Maximized Readings From Run #1

Perfomed after Mod 1 installed in EUT

Frequency	Level	Pol	Spec	Spec	Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
67.920	35.9	V	40.0	-4.1	QP	0	1.0	
54.430	35.6	V	40.0	-4.4	QP	0	1.0	
287.997	41.6	H	46.0	-4.4	QP	179	1.0	
44.338	34.6	V	40.0	-5.4	QP	0	1.0	
479.885	40.0	H	46.0	-6.0	QP	47	1.0	
672.000	39.0	H	46.0	-7.0	QP	266	1.0	

APPENDIX 3: Test Configuration Photographs

2 Pages

APPENDIX 4: Proposed FCC ID Label & Label Location

1 Page

APPENDIX 5: Detailed Photographs of Atheros Communications Model AR5BAP-00030Construction

6 Pages

APPENDIX 6: Operator's Manual for Atheros Communications Model AR5BAP-00030

22 Pages

APPENDIX 7: Block Diagram of Atheros Communications Model AR5BAP-00030

1 Page

APPENDIX 8: Schematic Diagrams for Atheros Communications Model AR5BAP-00030

12 Pages

APPENDIX 9: Theory of Operation for Atheros Communications Model AR5BAP-00030

8 Pages

APPENDIX 10: Advertising Literature

None Available At This Time

APPENDIX 11: RF Exposure Information

MPE Calculation