

***Electromagnetic Emissions Test Report  
and  
Application for Grant of Equipment Authorization  
pursuant to  
FCC Part 15, Subpart C (15.247) DTS Specifications  
FCC Part 15 Subpart E (UNII Devices)  
and  
Industry Canada RSS 210 Issue 5 (LELAN Devices)  
on the Xirrus, Inc.  
Model: XS-3900 (XS-3900-16 and XS-3700-8)***

FCC ID: SK6XS390016 and SK6XS37008  
UPN: 5428A-XS390016 and 5428A-XS37008

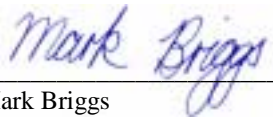
GRANTEE: Xirrus, Inc.  
370 North Westlake Blvd., Suite 200  
Westlake Village, CA 91362

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

REPORT DATE: March 29, 2005

FINAL TEST DATE: January 24, January 27, January 28,  
January 29, February 1, March 28, 2005

AUTHORIZED SIGNATORY:

  
\_\_\_\_\_  
Mark Briggs  
Vice President of Engineering



2016-01

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**DECLARATIONS OF COMPLIANCE**

Equipment Name and Model:  
XS-3900

Manufacturer:  
Xirrus, Inc.  
370 North Westlake Blvd., Suite 200  
Westlake Village, CA 91362

Tested to applicable standards:  
RSS-210, Issue 5, November 2001 (Low Power License-Exempt Radiocommunication Devices)  
FCC Part 15.247 (DTS)  
FCC Part 15 Subpart E (UNII Devices)

Measurement Facility Description Filed With Department of Industry:

Departmental Acknowledgement Number: IC2845 **SV1**  
Departmental Acknowledgement Number: IC2845 **SV3**

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

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

Date: February 7, 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 Xirrus, Inc. model XS-3900 pursuant to Subparts C and E of Part 15 of FCC Rules for Unlicensed National Information Infrastructure (UNII) devices and RSS-210 Issue 5 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 C63.4-2003 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 Xirrus, Inc. model XS-3900 and therefore apply only to the tested sample. The sample was selected and prepared by Ian Laity of Xirrus, Inc.

**OBJECTIVE**

The primary objective of the manufacturer is compliance with Subparts C and 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**

**FCC Part 15.247, RSS 210 – 2400 – 2483.5 MHz**

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 DSSS techniques	System must utilize a digital transmission technology	Complies
15.247 (a) (2)	6.2.2(o)(b)	6dB Bandwidth	802.11b: 13.1 MHz 802.11g: 16.7 MHz	Minimum allowed is 500kHz	Complies
	RSP 100	99% Bandwidth	802.11b: 14.9 MHz 802.11g: 17.2 MHz	For information only	Complies
15.247 (b) (3) 15.247 (b) (4) (i)	6.2.2(o)(b)	Output Power, 2400 - 2483.5 MHz (per transmitter)	802.11b: 18.0 dBm (0.06W) 802.11g: 21.3 dBm (0.13 W) EIRP: 0.54 W	Multipoint applications: Maximum permitted is 1Watt <sup>1</sup>	Complies
15.247 (b) (3) 15.247 (b) (4) (i)	6.2.2(o)(b)	Output Power, 2400 - 2483.5 MHz (aggregate)	4 transmitters 0.54 W Peak (EIRP = 2.13W)		Complies
15.247(d)	6.2.2(o)(b)	Power Spectral Density	802.11b: -8.68dBm / 3kHz 802.11g: 3.12 dBm / 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	51.5dBµV/m (375.8µV/m) @ 2483.5MHz (-2.5dB)	Emissions in restricted bands must meet the radiated emissions limits detailed in 15.207. All others must be < -20dBc	Complies
15.207		AC Conducted Emissions	47.1dBµV @ 8.970MHz (-2.9dB)		Complies
	6.6	AC Conducted Emissions	47.6dBµV @ 8.970MHz (-0.4dB)		Complies
15.247 (b) (5)		RF Exposure Requirements		Refer to MPE calculations in Exhibit 11 and page 3 of the user's manual	
15.203		RF Connector	Antennas are either internal to the device. There are also 3 reverse gender TNC rf ports.	Unique antenna connection required for user-installed applications.	Complies

EIRP calculated using antenna gain of 6dBi for the highest EIRP point-to-multipoint system.

Aggregate power is the sum of the output powers from the maximum number of individual transceivers that can operate in the band specified without two trx using overlapping channels. It is possible for all four transceivers to operate in the band.

<sup>1</sup> Maximum permitted output power is reduced by 1dB for every 3dB that the antenna gain exceeds 6dBi

**FCC Part 15.247, RSS 210 - 5725 - 5850 MHz**

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 DSSS techniques	System must utilize a digital transmission technology	Complies
15.247 (a) (2)	6.2.2(o)(b)	6dB Bandwidth	16.63 MHz	Minimum allowed is 500kHz	Complies
	RSP 100	99% Bandwidth	32.5 MHz	For information only	Complies
15.247 (b) (3) 15.247	6.2.2(o)(b)	Output Power, 5725 - 5850 MHz (per transceiver)	19.7 dBm (0.094 Watts) EIRP = 0.375 W	Multi-point applications: Maximum is 1Watt, with EIRP limited to 4 Watts.	Complies
15.247 (b) (3) 15.247	6.2.2(o)(b)	Output Power, 5725 - 5850 MHz (aggregate)	5 channels 0.47 Watts (EIRP = 1.88W)	Multi-point applications: Maximum is 1Watt, EIRP limited to 4 Watts.	Complies
15.247(d)	6.2.2(o)(b)	Power Spectral Density	-12.2dBm/3kHz	Maximum permitted is 8dBm/3kHz	Complies
15.247(c)	6.2.2(o)(e1)	Antenna Port Spurious Emissions ñ 30MHzñ40 GHz	All spurious emissions < -20dBc	All spurious emissions < -20dBc.	Complies
15.247(c) / 15.209		Radiated Spurious Emissions 30MHz-40 GHz	Point-point: 53.8dBµV/m (489.8µV/m) @ 11490.0MHz (-0.2dB)	Emissions in restricted bands must meet the radiated emissions limits detailed in 15.207. All others must be < -20dBc	Complies
15.247 (b) (5)		RF Exposure Requirements		Refer to MPE calculations in Exhibit 11 and page 3 of the users manual	
15.203		RF Connector	Antennas are either internal to the device. There are also 3 reverse gender TNC rf ports.	Unique antenna connection required for user-installed applications.	Complies

EIRP calculated using antenna gain of 6dBi for the highest EIRP point-to-multipoint system.

Aggregate power is the sum of the output powers from the maximum number of individual transceivers that can operate in the band specified without two trx using the same channels. There are 5 channels available in the band.

**FCC Part 15E, RSS 210 – 5150 - 5350 MHz**

FCC Part 15 Section	RSS 210 Section	Description	Comments	Result
<b>Operation in the 5.15 ñ 5.35 GHz Band</b> Note: The device is restricted to indoor use only, therefore the spectral density of spurious emissions in the 5.15 ñ 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(e)		Indoor operation only	Refer to userís manual in Exhibit 6	COMPLIES
15.407(a) (1)	6.2.2 q1 (i)	Bandwidth	20dB: 34 MHz 99%: 28 MHz	N/A
15.407(a) (1)	6.2.2 q1 (i)	Output Power (5150 -5250 MHz)	11 dBm (0.012 W) per transceiver 17dBm (0.05W) aggregate across all channels	COMPLIES
15.407(a) (1)	6.2.2 q1 (i)	Output Power (5250 -5350 MHz)	17.6 dBm (0.058 W) per transceiver 23.6 dBm (0.23 W) aggregate across all channels	COMPLIES
15.407(a) (1)	6.2.2 q1 (i)	Power Spectral Density (5150 -5250 MHz)	-1.2 dBm/MHz	COMPLIES
15.407(a) (1)	6.2.2 q1 (i)	Power Spectral Density (5250 -5350 MHz)	5.6 dBm/MHz	COMPLIES
15.407(b) (5) / 15.209	6.2.2 q1 (ii)	Spurious Emissions below 1GHz	No transmitter emissions below 1GHz. Device meets Class A digital device emissions limits.	COMPLIES
15.407(b) (2)	6.2.2 q1 (ii)	Spurious Emissions above 1GHz	53.9dBµV/m (495.5µV/m) @ 5150.0MHz (-0.1dB)	COMPLIES
<b>General requirements for all bands</b>				
	6.2.2 q(iv)(a)	Digital Modulation	Digital Modulation is used, refer to the iTheory of Operationsí (Exhibit 9) for a detailed explanation.	COMPLIES
	6.2.2 q(iv)(b)	Peak Spectral Density	9.3dBm/MHz (5150 ñ 5250 MHz) 16.4dBm/MHz (5250 ñ 5350 MHz)	COMPLIES
15.407(a)(6)		Peak Excursion Ratio	11.7dB	COMPLIES
	6.2.2 q(iv)(c)	Channel Selection	The device was tested on the highest, lowest and center channels available.	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 13 of 17 in the iTheory of Operationsí in Exhibit 9 for a detailed explanation.	COMPLIES
15.407 (g)	6.2.2 q(iv)(e)	Frequency Stability	Frequency stability is 5 ppm, refer to the iTheory of Operationsí in Exhibit 9 for a detailed analysis.	COMPLIES
	6.2.2 q(iv)(g)	User Manual information	All relevant statements have been included in the userís manuals. Refer to Exhibit 6 for details	COMPLIES
15.407 (f)	6.2.2 q(iv)(g)	RF Exposure Requirements	Refer to MPE calculations in Exhibit 11 and page 3 of the userís manual	COMPLIES

Aggregate power is the sum of the output powers from the maximum number of individual transceivers that can operate in the band specified without two trx using the same channels. There are 4 channels available in each band.



**FCC Part 15.109 (Receiver), FCC Part 15.207/15.107, RSS 210 (Receiver and AC Conducted Emissions)**

FCC Part 15 Section	RSS 210 Section	Description	Comments	Result
15.107 15.207		AC Conducted Emissions	47.1dB $\mu$ V @ 8.970MHz (-2.9dB)	COMPLIES
	6.6	AC Conducted Emissions	47.6dB $\mu$ V @ 8.970MHz (-0.4dB)	COMPLIES
15.109		Receiver Spurious Emissions	47.1dB $\mu$ V/m (225.9 $\mu$ V/m) @ 7053.4MHz (-6.9dB)	COMPLIES

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

The Xirrus, Inc. model XS-3900 is a multi-radio 802.11abg Access Point radio which is designed to act as a hub for a wireless local area network (WLAN). There are two versions of the system, one (model XS-3900-16) contains 16 separate transceivers; the other (model XS-3700-8) contains 8 transceivers. The radio interfaces are provided via four identical circuit boards. Each of the boards has four 802.11abg radios installed onto it (in the 8-port version two of these radios are removed from each board).

Three of the radios on each board connect to internally mounted antennas and operate only in the 5 GHz bands (5150 ñ 5350 MHz and 5725 ñ 5850 MHz) using 802.11a.

The fourth radio operates in all of the bands (2400 ñ 2483.5 MHz, 5150 ñ 5350 MHz and 5725 ñ 5850 MHz) using 802.11a (5GHz bands) and 802.11b and g (2.4 GHz bands) . The fourth radio has the ability to connect to external antennas via a reverse gender TNC connector.

In the 8-transceiver version of the device, the radio boards contain one 802.11abg radio connected to an internal antenna for operation in the 5 GHz bands and one 802.11abg that can connect to either internal or external antenna and can operate in any of the available bands.

The integral 5GHz antennas have 6dBi gain and are arranged around the perimeter of the device. This arrangement is to provide 360-degree coverage around the system, with the individual antennas providing coverage over a beam-width of approximately 60 degrees each. Although all transceivers can be operational at any given time the system will not operate with two or more transceivers operating on the same channel.

In addition to the radio interfaces the system has two gigabit-ethernet ports, a 10/100Base-Tx port, an AC power port and a console port (RS 232). The console port is intended for management and configuration only and is not intended to be permanently connected.

A sample of the 16-port version was fully tested against the requirements of RSS-210, FCC Part 15 Subpart C, FCC Part 15 Subpart E, ICES-003 and FCC Part 15 Subpart B. A sample of the 8-port version was fully tested against the requirements of ICES-003 and FCC Part 15 Subpart B. A limited set of measurements were performed on the radiated spurious emissions from the 8-port version verified that the rf performance was not significantly different from the 16-port version. The 8-port and 16-port versions will require separate certifications, and the intent is to obtain these certifications based on the test data for the 16-port version as being representative of worst-case.

The samples were received on January 24, 2005 and tested on January 24, January 27, January 28, January 29, February 1, 2005, March 24 and March 28, 2005. The EUT consisted of the following component(s):

Manufacturer	Model	Description	Serial Number	FCC ID
Xirrus	XS-3900-16	802.11 a/b/g access point	-	SK6XS390016
Xirrus	XS-3700-8	802.11 a/b/g access point	-	SK6XS37008

#### ANTENNA

The antennas are integral to the device, with the exception of four transceivers that may connect to an external antenna via a non standard, reverse-gender, TNC connector. These antenna connections meet the requirements of 15.203.

The device was tested with the following external antennas:

Manufacturer	Model #	Type	Frequency Range (MHz)	Gain
Cushcraft	S2406P	Patch	2400 ñ 2483.5	6dBi
Cushcraft	S2403BP	Omni	2400 ñ 2483.5	3dBd (5.2dBi)
Cushcraft	S5703B	Omni	5725 ñ 5850 <sup>1</sup>	3dBd (5.2dBi)

#### ENCLOSURE

The EUT enclosure is primarily constructed of plastic. It is circular with a diameter of 48 cm and a height of 10cm.

#### MODIFICATIONS

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

<sup>1</sup> The system was tested in all three 5GHz bands with this antenna connected

**SUPPORT EQUIPMENT**

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

Manufacturer	Model	Description	Serial Number	FCC ID
Toshiba	Satellite 160 (PSA60U 03501D)	Laptop PC	XG0516882	DoC
D-Link	DGS-1005D	Gigabit Ethernet Switch	DR1914B005832	-

**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)
EUT GE #1	Ethernet Switch	Cat 5	unshielded	15
EUT GE #2	Ethernet Switch	Cat 5	unshielded	15
EUT Console	Laptop serial	flat cable	unshielded	15
EUT 10/100	Laptop ethernet	Cat 5	unshielded	5
EUT AC power	AC power	3-wire	unshielded	2

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**EUT OPERATION DURING TESTING**

For digital device radiated emissions tests and receive mode tests the device was operating with data transferred to and from the gigabit ethernet and 10/100 ethernet ports. The transceivers were all in a receive mode.

For transmit mode measurements the transceiver under test was configured to transmit on the specified channel. The transceivers were set to transmit at a data rate of 6Mb/s in the 5GHz band using 802.11a and at 1Mb/s (CCK) or 6Mb/s (OFDM) in the 2.4 GHz band. The data rates were selected based on them representing the highest power spectral density for the mode.

For AC conducted emissions measurements and for measurements for radiated spurious emissions at inter-modulation frequencies the device was configured with all 16 radios transmitting continuously on channels 2412, 2437, 2467, 2472, 5180, 5260, 5280, 5300, 5200, 5220, 5240, 5745, 5765, 5785 and 5805. All radios were configured for maximum output power for the specified band on each channel. The transceivers were set to transmit at a data rate of 6Mb/s in the 5GHz band using 802.11a and at 1Mb/s in the 2.4 GHz band using 802.11b. The data rates were selected based on them representing the highest power spectral density for the mode. For the 2.4 GHz band the CCK modulation was used as it generated the highest levels of spurious emissions at harmonic frequencies.

The system was tested with a single transceiver operating on each of the channels required by FCC Part 15 and RSS 210, that is 3 channels per operating band per operating mode. Radiated spurious emissions measurements were made with the internal antennas and with the highest gain antennas of each type for the external antennas.

Measurements were made with the EUT located on a table at a height of 0.8m above the ground plane. As the EUT is intended to be ceiling-mounted, additional measurements were made with the EUT at a height of 1.5m above the ground plane.

Additional measurements were made on output power and radiated spurious emissions with all transceivers transmitting continuously to ensure that no inter-modulation products were being generated. The only spurious emissions with all transmitters operational were the individual emissions from the transceivers and no inter-modulation products were observed. The output power from a single transceiver remained constant as the other transceivers were enabled.

The rf exposure evaluation was done by calculation and assumed all 16 transceivers (8-transceivers for the 8-radio version) could be operational at the same time. The calculation does not account for the fact that the individual antenna patterns from all 16 antennas do not overlap and does not account for the fact that the transceivers would not be transmitting 100% of the time.

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**TEST SITE**

**GENERAL INFORMATION**

Final test measurements were taken on January 24, January 27, January 28, January 29 and February 1, 2005 at 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 guidelines.

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**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.

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**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. As an alternative, and where permitted by the regulations, the power is calculated by integrating the power over the signal bandwidth using a spectrum analyzer.

**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.



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**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.

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**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 terms 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:

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

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 15.247 (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.

**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 (RESTRICTED BANDS)**

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

**SPURIOUS RADIATED EMISSIONS LIMITS (OTHER BANDS)**

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

Operating Frequency (MHz)	EIRP Limit (dBm)	Equivalent Field Strength At 3m (dBuV/m)
902 – 928	-20dBc (note 1)	-
2400 – 2483.5	-20dBc (note 1,2)	-
5150 - 5250	-27 dBm	68.3 dBuV/m
5250 - 5350	-27 dBm (note 3)	68.3 dBuV/m
5725 – 5850	-20dBc (note 1,2)	-

Note 1: Spurious emissions in a 100kHz bandwidth must be 20dB lower than the highest in-band signal level in a 100kHz bandwidth.

Note 2: Spurious emissions limit is -30dBc if output power is measured using the alternative method (power averaged over a transmission burst).

Note 3: If operation is restricted to indoor use only then emissions in the band 5.15 – 5.25 GHz must meet the power spectral density limits for the intentional signals detailed in RSS 210 and FCC Subpart E for devices operating in the 5.15 – 5.25 GHz band.

**FCC 15.207 AC POWER PORT CONDUCTED EMISSIONS LIMITS**

The table below shows the limits for emissions on the AC power line as detailed in FCC Part 15.207.

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

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**SAMPLE CALCULATIONS - CONDUCTED EMISSIONS**

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

$$R_r + A = C$$

and

$$C - S = M$$

where:

$R_r$  = Receiver Reading in dBuV

A = Attenuation (cable loss, pulse limiter loss)

C = Corrected Reading in dBuV

S = Specification Limit in dBuV

M = Margin to Specification in +/- dB

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**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:

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

where:

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

$$D_m = \text{Measurement Distance in meters}$$

$$D_s = \text{Specification Distance in meters}$$

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:

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

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

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

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

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



**EXHIBIT 1: Test Equipment Calibration Data**

2 Pages

<u>Manufacturer</u>	<u>Description</u>	<u>Model #</u>	<u>Asset #</u>	<u>Cal Due</u>
EMCO	Biconical Antenna, 30-300 MHz	3110B	801	09-Jul-05
Hewlett Packard	EMC Spectrum Analyzer 30Hz - 26.5GHz	8563EC	WC,1033	01-Jun-05
Hewlett Packard	EMC Spectrum Analyzer, 9KHz - 22GHz	8593EM	1319	30-Nov-05
Elliott Laboratories	FCC / CISPR LISN	LISN-4, OATS	362	01-Jul-05
EMCO	Horn Antenna, D. Ridge 1-18GHz	3115	487	13-May-06
EMCO	Horn Antenna, D. Ridge 1-18GHz	3115	786	08-Nov-05
EMCO	Horn antenna, D. Ridge 1-18GHz (SA40 system antenna)30Hz sunnyvale	3115	1142	11-Jun-06
EMCO (ETS-Lindgren)	Log Periodic Antenna, 0.2-2 GHz	3148	1595	01-Jun-05
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	870	13-Jan-06
Rohde & Schwarz	Power Meter, Single Channel	NRVS	1534	18-Mar-05
Rohde & Schwarz	Power Sensor, 1uW-100mW, DC-18 GHz, 50ohm	NRV-Z51	1535	22-Sep-05
Rohde & Schwarz	Power Sensor, 100uW - 2W, Peak	NRV-Z32	1417	18-Mar-05
Rohde & Schwarz	Pulse Limiter	ESH3 Z2	372	01-Sep-05
Rohde & Schwarz	Test Receiver, 9kHz-2750MHz	ESCS 30	1337	12-Jan-06
Rohde & Schwarz	Test Receiver, 9kHz-2750MHz	ESCS 30	1337	12-Jan-06

**Radiated Emissions, 30 - 1,000 MHz, 27-Jan-05****Engineer: Rafael Varelas**

<u>Manufacturer</u>	<u>Description</u>	<u>Model #</u>	<u>Asset #</u>	<u>Cal Due</u>
Elliott Laboratories	FCC / CISPR LISN	LISN-4, OATS	362	01-Jul-05
Rohde & Schwarz	Pulse Limiter	ESH3 Z2	372	01-Sep-05
EMCO	Biconical Antenna, 30-300 MHz	3110B	801	09-Jul-05
Rohde & Schwarz	Test Receiver, 9kHz-2750MHz	ESCS 30	1337	12-Jan-06
EMCO (ETS-Lindgren)	Log Periodic Antenna, 0.2-2 GHz	3148	1595	01-Jun-05

**Spurious emissions, power, psd (802.11b mode), 09-Feb-05****Engineer: Mark Briggs**

<u>Manufacturer</u>	<u>Description</u>	<u>Model #</u>	<u>Asset #</u>	<u>Cal Due</u>
EMCO	Horn Antenna, D. Ridge 1-18GHz	3115	487	13-May-06
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	870	13-Jan-06
EMCO	Horn antenna, D. Ridge 1-18GHz (SA40 system antenna)30Hz sunnyvale	3115	1142	11-Jun-06
Rohde & Schwarz	20dB attenuator	NRV-Z32	1417	18-Mar-05
Rohde & Schwarz	Power Meter, Single Channel	NRVS	1534	18-Mar-05
Rohde & Schwarz	Power Sensor, 1uW-100mW, DC-18 GHz, 50ohm	NRV-Z51	1535	22-Sep-05
Hewlett Packard	EMC Spectrum Analyzer 30Hz - 26.5GHz	8563EC	WC,1033	01-Jun-05

**Radiated Emissions, 30 - 6,000 MHz, 18-Feb-05****Engineer: Rafael Varelas**

<u>Manufacturer</u>	<u>Description</u>	<u>Model #</u>	<u>Asset #</u>	<u>Cal Due</u>
EMCO	Horn Antenna, D. Ridge 1-18GHz	3115	786	08-Nov-05
EMCO	Biconical Antenna, 30-300 MHz	3110B	801	09-Jul-05
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	870	13-Jan-06
Hewlett Packard	EMC Spectrum Analyzer, 9KHz - 22GHz	8593EM	1319	30-Nov-05
Rohde & Schwarz	Test Receiver, 9kHz-2750MHz	ESCS 30	1337	12-Jan-06
EMCO (ETS-Lindgren)	Log Periodic Antenna, 0.2-2 GHz	3148	1595	01-Jun-05

**Radiated Emissions, 30 - 40,000 MHz, 24-Mar-05****Engineer: Juan Martinez**

<u>Manufacturer</u>	<u>Description</u>	<u>Model #</u>	<u>Asset #</u>	<u>Cal Due</u>
Hewlett Packard	EMC Spectrum Analyzer 9kHz - 6.5GHz	8595EM	780	26-Mar-05
EMCO	Horn Antenna, D. Ridge 1-18GHz	3115	786	08-Nov-05
Hewlett Packard	Microwave EMI test system (SA40, 30Hz - 40GHz), Sunnyvale	84125C	1149	11-Jun-05

**Power, PSD, Peak Excursion, 28-Mar-05****Engineer: Mark Briggs**

<u>Manufacturer</u>	<u>Description</u>	<u>Model #</u>	<u>Asset #</u>	<u>Cal Due</u>
Hewlett Packard	Microwave EMI test system (SA40, 30Hz - 40GHz), Sunnyvale	84125C	1149	11-Jun-05
Rohde & Schwarz	Peak Power Sensor 100uW - 2 Watts	NRV-Z32	1423	01-Mar-06
Rohde & Schwarz	Power Meter, Single Channel	NRVS	1534	01-Mar-06
Rohde & Schwarz	Power Sensor, 1uW-100mW, DC-18 GHz, 50ohm	NRV-Z51	1535	22-Sep-05

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**EXHIBIT 2: Test Data Log Sheets**

**ELECTROMAGNETIC EMISSIONS**

**TEST LOG SHEETS**

**AND**

**MEASUREMENT DATA**

T59089	41 Pages (5GHz DTS and UNII test results; receive mode spurious emissions)
T59090	29 Pages (2.4 GHz DTS test results)
T59091	15 Pages (AC conducted emissions, digital device radiated emissions)



## EMC Test Data

Client: Xirrus, Inc.	Job Number: J57788
Model: XS-3900-16 and XS-3700-8 Access Points	T-Log Number: T59089
	Account Manager: Joe Rohlfes
Contact: Ian Laity	
Emissions Spec: FCC 15.247, 15.401, RSS-210	Class: Radio
Immunity Spec: -	Environment: -

## EMC Test Data

For The

**Xirrus, Inc.**

Model

**XS-3900-16 and XS-3700-8 Access  
Points**

Date of Last Test: 3/24/2005



## EMC Test Data

Client: Xirrus, Inc.	Job Number: J57788
Model: XS-3900-16 and XS-3700-8 Access Points	T-Log Number: T59089
Contact: Ian Laity	Account Manager: Joe Rohlfes
Emissions Spec: FCC 15.247, 15.401, RSS-210	Class: Radio
Immunity Spec: -	Environment: -

### EUT INFORMATION

#### General Description

The Xirrus, Inc. model XS-3900 is a multi-radio 802.11abg Access Point radio which is designed to act as a hub for a wireless local area network (WLAN). There are two versions of the system, one (model XS-3900-16) contains 16 separate transceivers, the other (model XS-3700-8) contains 8 transceivers. The radio interfaces are provided via four identical circuit boards. Each of the boards has four 802.11abg radios installed onto it (in the 8-port version two of these radios are removed from each board).

Normally, the EUT would be ceiling mounted during operation. The EUT was tested as both table-top equipment and also tested with the EUT raised to a height of 1.5m above the ground plane. The electrical rating of the device is 100 - 240Vac, 50/60Hz, 0.5 - 3 A.

#### Equipment Under Test

Manufacturer	Model	Description	Serial Number	FCC ID
Xirrus	XS-3900-16	802.11 a/b/g access point		

#### EUT Antenna

The antennas are either integral to the device or connect to the EUT via a non-standard, reverse gender TNC connector, thereby meeting the requirements of FCC 15.203.

#### EUT Enclosure

The EUT enclosure is primarily constructed of plastic. It is circular with a diameter of 48 cm and a height of 10cm.

#### Modification History

Mod. #	Test	Date	Modification
1			
2			
3			

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



## EMC Test Data

Client: Xirrus, Inc.	Job Number: J57788
Model: XS-3900-16 and XS-3700-8 Access Points	T-Log Number: T59089
Contact: Ian Laity	Account Manager: Joe Rohlfes
Emissions Spec: FCC 15.247, 15.401, RSS-210	Class: Radio
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
Toshiba	Satellite 160 (PSA60U 03501D)	Laptop PC	XG0516882	DoC
D-Link	DGS-1005D	Gigabit Ethernet Switch	DR1914B005832	-

#### Interface Cabling and Ports

Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length(m)
EUT GE #1	Ethernet Switch	Cat 5, w/ferrite	unshielded	15
EUT GE #2	Ethernet Switch	Cat 5, w/ferrite	unshielded	15
EUT Console	Laptop serial	flat cable	unshielded	15
EUT 10/100	Laptop ethernet	Cat 5	unshielded	5
EUT AC power	AC power	3-wire	unshielded	2

Note: The Console port was disconnected during digital device testing but remained connected for the radio transmitter tests. The port is only used for diagnostics/configuration and is not intended to be permanently connected. It was used during testing to configure the EUT on the required channel.

#### EUT Operation During Emissions Tests

The EUT was in either transmit mode or receive mode, as detailed in the individual run descriptions. The transmitter(s) were set to operate at the worst case data rates (6Mb/s using OFDM and 1Mb/s using CCK) and to transmit continuously (99% duty cycle). The gigabit ethernet ports were sending packets to and from the switch. The 10/100 ethernet port was transmitting data packets to the laptop.



# EMC Test Data

Client: Xirrus, Inc.	Job Number: J57788
Model: XS-3900-16 and XS-3700-8 Access Points	T-Log Number: T59089
	Account Manager: Joe Rohlfes
Contact: Ian Laity	
Spec: FCC 15.247, 15.401, RSS-210	Class: Radio

## Radiated Emissions, 1 - 10GHz Receiver Spurious Emissions and Digital Device Emissions RSS 210/FCC 15.109

### 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: 1/27/2005	Config. Used: #1
Test Engineer: Mark Briggs	Config Change: N/A
Test Location: SVOATS #1	EUT Voltage: 120V/60Hz

### General Test Configuration

The EUT was located on the turntable for radiated emissions testing. Remote support equipment was located approximately 5 meters from the test area with all I/O connections routed overhead. As the EUT would normally be ceiling-mounted, the device was evaluated with it located on the standard 0.8m-high table with the face that would normally be pointing toward the floor pointing upwards, with the same face pointing downwards and with the device elevated to a height of ~1.5m. Receiver emissions were highest with the device at the elevated height. Transmitter emissions were not significantly affected by either device orientation or elevation.

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:        14 °C  
   Rel. Humidity:      65 %

### Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	RE, 1000 - 10000 MHz, Maximized Emissions	RSS 210 / FCC 15.209	Pass	47.1dBµV/m (225.9µV/m) @ 7053.4MHz (-6.9dB)

### Modifications Made During Testing:

No modifications were made to the EUT during testing





## EMC Test Data

Client: Xirrus, Inc.	Job Number: J57788
Model: XS-3900-16 and XS-3700-8 Access Points	T-Log Number: T59089
	Account Manager: Joe Rohlfes
Contact: Ian Laity	
Spec: FCC 15.247, 15.401, RSS-210	Class: Radio

### Deviations From The Standard

No deviations were made from the requirements of the standard.

### Run #1: Radiated Spurious Emissions, 1000 - 10000 MHz (Receiver spurious and digital device emissions)

All 16 radios receiving continuously on channels 2412, 2437, 2467, 2472, 5180, 5260, 5280, 5300, 5200, 5220, 5240, 5745, 5765, 5785 and 5805.

Note that all significant emissions below 1GHz were from the digital device (as demonstrated by preliminary scans with the transmitters operating, receivers operating and radios in stand-by) and are covered in a separate test session.

EUT tested on table top and at a height of ~ 1.5m above the ground plane. EUT was oriented with the main cover pointing upwards (i.e. the part that, when ceiling mounted, would normally be pointing downwards) to ensure the EUT's antennas' main beams were aligned with the measurement antenna

Frequency MHz	Level dBµV/m	Pol v/h	FCC Class B		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
7053.367	47.1	V	54.0	-6.9	AVG	300	2.1	
7000.020	45.6	V	54.0	-8.5	AVG	140	1.3	
7053.366	43.8	H	54.0	-10.2	AVG	0	1.0	
2309.998	43.6	H	54.0	-10.4	AVG	300	1.6	
7000.022	43.5	H	54.0	-10.5	AVG	180	1.0	
2309.998	39.5	V	54.0	-14.5	AVG	96	1.3	
7026.689	38.0	H	54.0	-16.0	AVG	40	1.2	
7080.180	36.5	H	54.0	-17.5	AVG	300	1.7	
2501.251	35.5	V	54.0	-18.5	AVG	20	1.3	
2500.095	35.4	H	54.0	-18.6	AVG	350	1.6	
1253.183	33.2	V	54.0	-20.9	AVG	14	1.0	
1249.665	32.6	H	54.0	-21.4	AVG	172	1.0	
7053.367	52.6	V	74.0	-21.4	PK	300	2.1	
7000.020	50.5	V	74.0	-23.5	PK	140	1.3	
7053.366	50.0	H	74.0	-24.1	PK	0	1.0	
7000.022	49.3	H	74.0	-24.7	PK	180	1.0	
2309.998	49.2	H	74.0	-24.8	PK	300	1.6	
7026.689	47.5	H	74.0	-26.5	PK	40	1.2	
2309.998	47.4	V	74.0	-26.6	PK	96	1.3	
2501.251	46.6	V	74.0	-27.4	PK	20	1.3	
7080.180	46.6	H	74.0	-27.4	PK	300	1.7	
1253.183	44.3	V	74.0	-29.7	PK	14	1.0	
2500.095	44.2	H	74.0	-29.8	PK	350	1.6	
1249.665	44.1	H	74.0	-30.0	PK	172	1.0	



## EMC Test Data

Client: Xirrus, Inc.	Job Number: J57788
Model: XS-3900-16 and XS-3700-8 Access Points	T-Log Number: T59089
	Account Manager: Joe Rohlfes
Contact: Ian Laity	
Spec: FCC 15.247, 15.401, RSS-210	Class: N/A

### FCC 15.247 DTS - 5725 - 5850MHz Band 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: 1/28/2005

Config. Used: 1

Test Engineer: Juan Martinez

Config Change: None

Test Location: SVOATS #2

EUT 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.

#### Summary of Results

Run #	Test Performed	Limit	Pass / Fail	Result / Margin
1	Antenna Conducted Emissions, 30 - 40,000 MHz	15.247(c)	Pass	All out of band signals below -30dBc
2	6dB Bandwidth	15.247(a)	Pass	16.63 MHz
3	Output Power	15.247(b)	Pass	19.7dBm
4	Power Spectral Density (PSD)	15.247(d)	Pass	-12.2dBm

#### Modifications Made During Testing:

No modifications were made to the EUT during testing

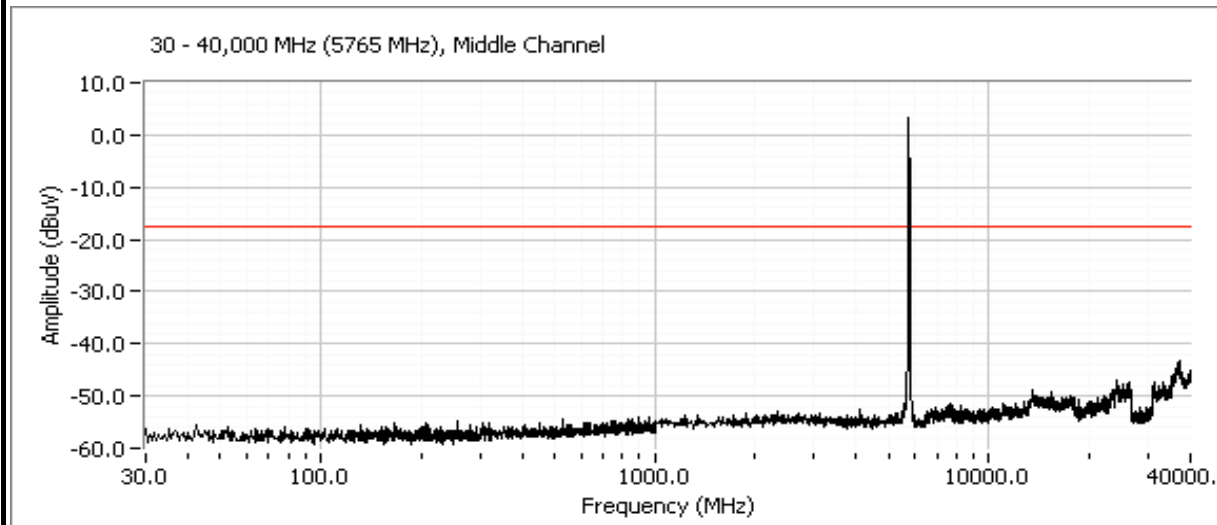
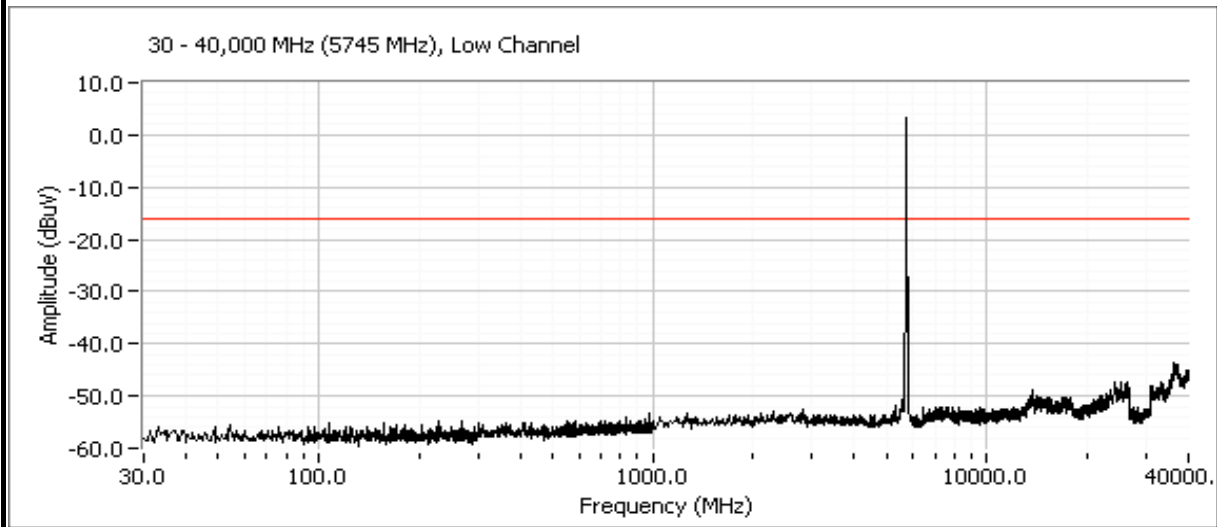
#### Deviations From The Standard

No deviations were made from the requirements of the standard.

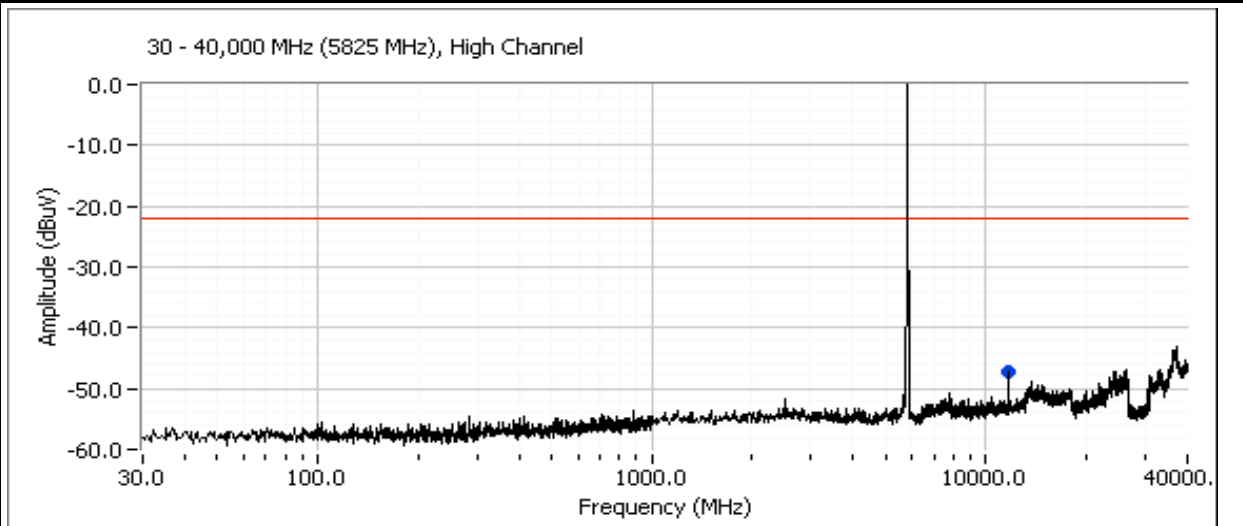
Client: Xirrus, Inc.	Job Number: J57788
Model: XS-3900-16 and XS-3700-8 Access Points	T-Log Number: T59089
	Account Manager: Joe Rohlfes
Contact: Ian Laity	
Spec: FCC 15.247, 15.401, RSS-210	Class: N/A

**Run #1: Antenna Conducted Spurious Emissions, 30 - 40,000 MHz.**

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



Client: Xirrus, Inc.	Job Number: J57788
Model: XS-3900-16 and XS-3700-8 Access Points	T-Log Number: T59089
	Account Manager: Joe Rohlfes
Contact: Ian Laity	
Spec: FCC 15.247, 15.401, RSS-210	Class: N/A





# EMC Test Data

Client: Xirrus, Inc.	Job Number: J57788
Model: XS-3900-16 and XS-3700-8 Access Points	T-Log Number: T59089
	Account Manager: Joe Rohlfes
Contact: Ian Laity	
Spec: FCC 15.247, 15.401, RSS-210	Class: N/A

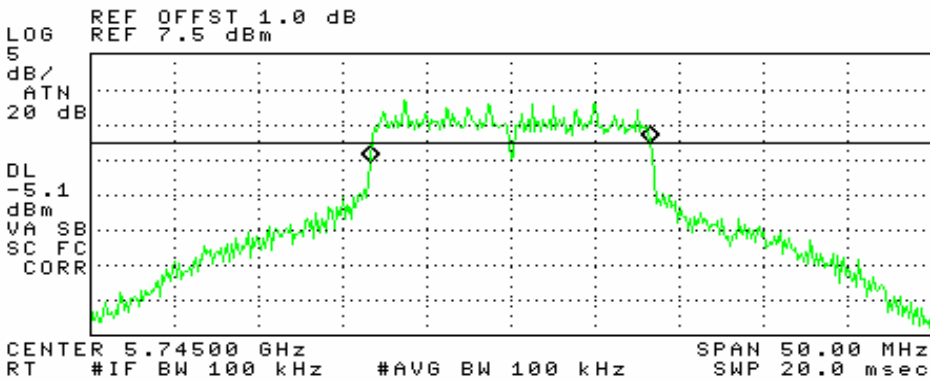
## Run #2: Signal Bandwidth

Channel	Frequency (MHz)	Resolution Bandwidth	6dB Signal Bandwidth	99% Signal Bandwidth
Low	5745	100 kHz	16.63 MHz	28.13 MHz
Mid	5765	100 kHz	16.75 MHz	29.75 MHz
High	5825	100 kHz	16.75 MHz	32.50 MHz

### Low Channel

12:23:27 JAN 28, 2005

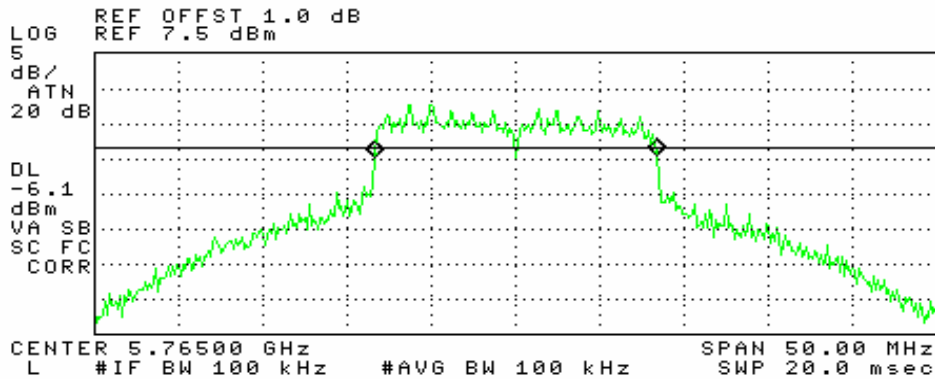
ACTV DET: PEAK  
 MEAS DET: PEAK QP AVG  
 MKRΔ 16.63 MHz  
 2.64 dB



### Middle Channel

14:36:20 JAN 28, 2005

ACTV DET: PEAK  
 MEAS DET: PEAK QP AVG  
 MKRΔ 16.75 MHz  
 .19 dB





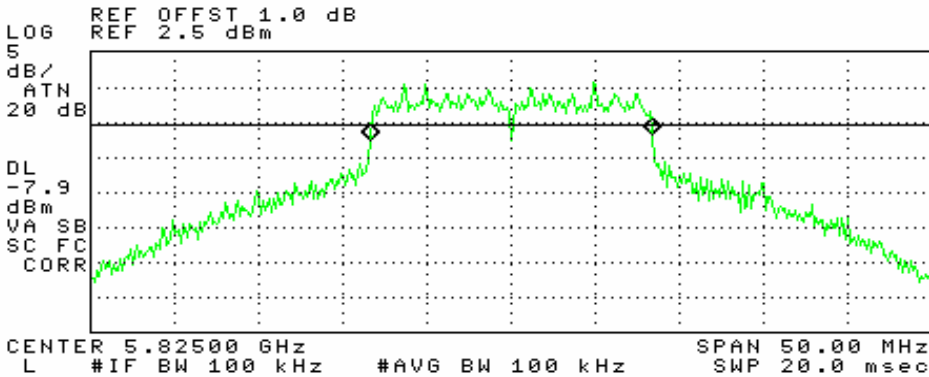
# EMC Test Data

Client: Xirrus, Inc.	Job Number: J57788
Model: XS-3900-16 and XS-3700-8 Access Points	T-Log Number: T59089
	Account Manager: Joe Rohlfes
Contact: Ian Laity	
Spec: FCC 15.247, 15.401, RSS-210	Class: N/A

## High Channel

12:44:47 JAN 28, 2005

ACTV DET: PEAK  
 MEAS DET: PEAK QP AVG  
 MKRΔ 16.75 MHz  
 .83 dB



### Run #3: Output Power

Maximum antenna gain:      6 dBi      internal antenna  
    5.2 dBi      external antenna

Channel	Frequency (MHz)	Res BW	Output Power (dBm)	Output Power (W)	EIRP (W) internal	EIRP (W) external <sup>2</sup>
Low	5745	-	19.7	0.0942	0.375	0.312
Mid	5765	-	19.0	0.0794	0.316	0.263
High	5825	-	16.3	0.0427	0.170	0.141
Aggregate Power			26.7	0.4709	1.875	1.686

- Note 1: Output power measured using a peak power meter
- Note 2: Aggregate power is the maximum total power across the band, assuming all 5 channels in the band are being used. For the eirp, there are only 3 external antenna connections, therefore the eirp for the external antennas is the eirp for 3 external and 2 internal antennas.
- Note 3: External antenna has high gain of 5.2dBi (3dBd)



# EMC Test Data

Client: Xirrus, Inc.	Job Number: J57788
Model: XS-3900-16 and XS-3700-8 Access Points	T-Log Number: T59089
	Account Manager: Joe Rohlfes
Contact: Ian Laity	
Spec: FCC 15.247, 15.401, RSS-210	Class: N/A

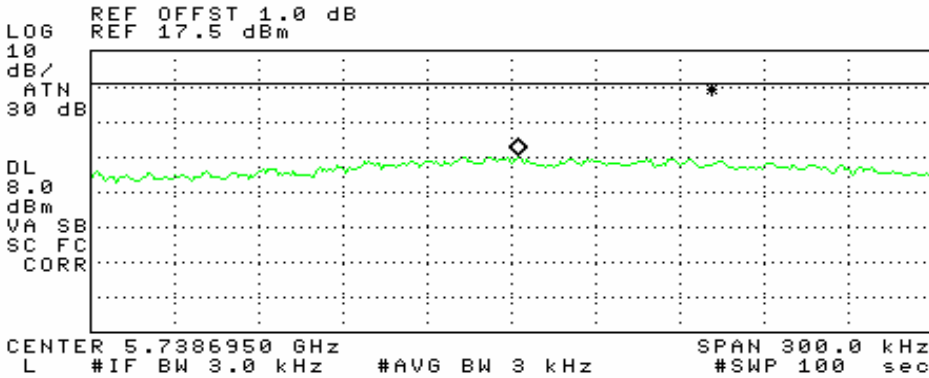
## Run #4: Power Spectral Density

Channel	Frequency (MHz)	Res BW	P.S.D. (averaged over 1 second in a 3kHz bandwidth) (dBm)
Low	5745	3 kHz	-12.2
Mid	5765	3 kHz	-12.2
High	5825	3 kHz	-15.8

### Low Channel

12:30:08 JAN 28, 2005

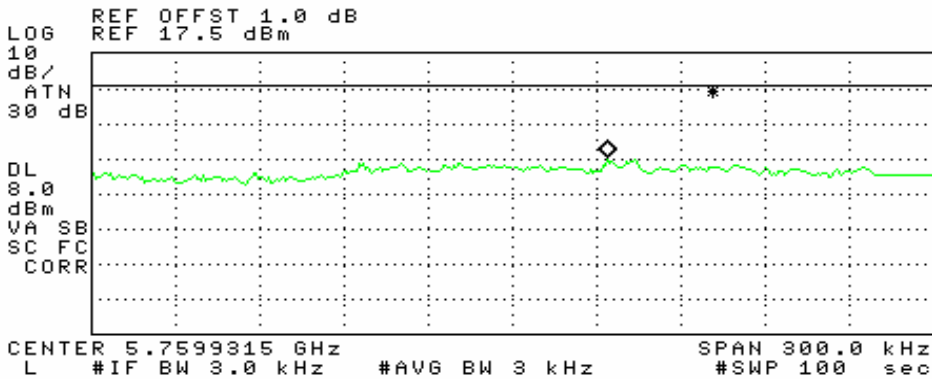
ACTV DET: PEAK  
 MEAS DET: PEAK QP AVG  
 MKR 5.7386973 GHz  
 -12.20 dBm



### Middle Channel

14:41:53 JAN 28, 2005

ACTV DET: PEAK  
 MEAS DET: PEAK QP AVG  
 MKR 5.7599653 GHz  
 -12.22 dBm





# EMC Test Data

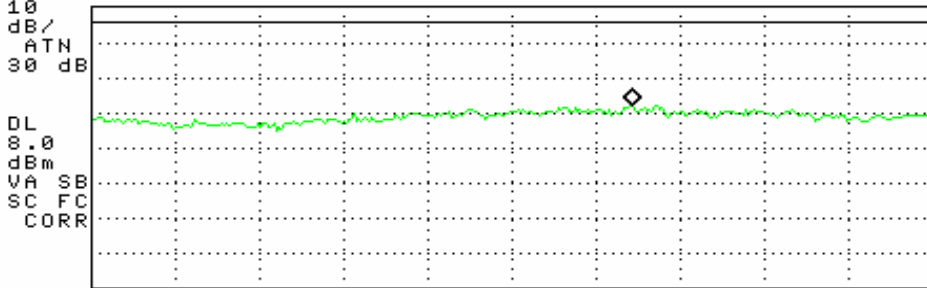
Client: Xirrus, Inc.	Job Number: J57788
Model: XS-3900-16 and XS-3700-8 Access Points	T-Log Number: T59089
	Account Manager: Joe Rohlfes
Contact: Ian Laity	
Spec: FCC 15.247, 15.401, RSS-210	Class: N/A

## High Channel

12:55:09 JAN 28, 2005

ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 5.8299678 GHz  
-15.79 dBm

LOG REF OFFST 1.0 dB  
dB/ REF 12.5 dBm



CENTER 5.8299250 GHz SPAN 300.0 kHz  
RT #IF BW 3.0 kHz #AVG BW 3 kHz #SWP 100 sec





# EMC Test Data

Client: Xirrus, Inc.	Job Number: J57788
Model: XS-3900-16 and XS-3700-8 Access Points	T-Log Number: T59089
	Account Manager: Joe Rohlfes
Contact: Ian Laity	
Spec: FCC 15.247, 15.401, RSS-210	Class: N/A

## FCC Part 15 Subpart E Tests

### Power and peak excursion remeasured using method # 1 of DA-02-2138A1

#### 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: 3/28/2005	Config. Used: 1
Test Engineer: Mark Briggs	Config Change: -
Test Location: -	EUT 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:	42 %

#### Summary of Results

Run #	Test Performed	Limit	Pass / Fail	Result / Margin
1	Output Power (per transmitter)	15.407(a) (1), (2)	Pass	5150 - 5250: 10.96dBm 5250 - 5350: 17.63dBm
1	Output Power (aggregated across the band)	15.407(a) (1), (2)	Pass	5151 - 5250: 17.0 dBm (50mW) 5250 - 5350: 23.6 dBm (231mW)
1	Power Spectral Density (PSD)	15.407(a) (1), (2)	Pass	5150 - 5250: -1.6dBm 5250 - 5350: 5.6dBm
1	Peak excursion	15.407(a) (1), (2)	Pass	11.7dBm

#### 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: Xirrus, Inc.	Job Number: J57788
Model: XS-3900-16 and XS-3700-8 Access Points	T-Log Number: T59089
	Account Manager: Joe Rohlfes
Contact: Ian Laity	
Spec: FCC 15.247, 15.401, RSS-210	Class: N/A

## Run #1: Bandwidth, Output Power and Power Spectral Density

Antenna Gain: 6 dBi

### Original power levels used for all radiated spurious tests: Radio #2, 6Mb/s

Frequency (MHz)	Output Power (dBm)					(dBm/MHz)		S/W settings	
	Average <sup>1</sup>	Peak <sup>2</sup>	FCC <sup>3</sup>	Limit	Margin	FCC <sup>3</sup>	Peak	Gain	Pwr
5180	12.4	17.0	11.54	17.0	-5.4	-0.72		18	15
5240	12.4	17.3	11.59	17.3	-5.7	-0.45		18	15

Aggregate power across all 4 channels, assuming all 4 at highest measured power: 17.6 dBm  
 Aggregate power across all 4 channels, assuming all 4 at highest measured power: 57 mW

### Certification power levels to meet power aggregation requirements

Frequency (MHz)	Output Power (dBm)					(dBm/MHz)		Peak	S/W settings	
	Average <sup>1</sup>	Peak <sup>2</sup>	FCC <sup>3</sup>	Limit	Margin	FCC <sup>3</sup>	Peak Excursion	Gain	Pwr	
5180	11.5	16.4	10.61	17.0	-6.4	-1.59	8.2	10.4	18	14
5240	11.6	16.5	10.96	17.0	-6.0	-1.19	9.25	11.1	18	14

Aggregate power across all 4 channels, assuming all 4 at highest measured power: 17.0 dBm  
 Aggregate power across all 4 channels, assuming all 4 at highest measured power: 50 mW

Frequency (MHz)	Output Power (dBm)					(dBm/MHz)		Peak	S/W settings	
	Average <sup>1</sup>	Peak <sup>2</sup>	FCC <sup>3</sup>	Limit	Margin	FCC <sup>3</sup>	Peak Excursion	Gain	Pwr	
5260	17.2	22.0	17.38	24.0	-6.6	5.35	15.42	10.9	28	-
5320	17.5	20.1	17.63	24.0	-6.3	5.6	16.42	11.7	30	-

Aggregate power across all 4 channels, assuming all 4 at highest measured power: 23.6 dBm  
 Aggregate power across all 4 channels, assuming all 4 at highest measured power: 231 mW

Note 1 Average power measured using average power meter

Note 2 Peak power measured using peak envelope power sensor

Note 3 Output power measured in accordance with DA-02-2138A1, method 1 with a spectrum analyzer set for: RBW=1MHz, VB=3MHz, power averaging over 100 sweeps, power integration over 30MHz. Power spectral density measured using same settings.

Note 4 Measurement of peak power spectral density was made using RBW = 1MHz, VBW = 3MHz. The average value is the peak output power 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.

Note 4 Peak excursion - maximum difference between the trace used for the power measurement (RB=1MHz, VB=3MHz, sample detector, power average of 100 sweeps) and that for a peak power measurement (RB=1MHz, VB=3MHz).

Client: Xirrus, Inc.	Job Number: J57788
Model: XS-3900-16 and XS-3700-8 Access Points	T-Log Number: T59089
	Account Manager: Joe Rohlfes
Contact: Ian Laity	
Spec: FCC 15.247, 15.401, RSS-210	Class: N/A

**Power plots - sample detection, power averaging ...**

**Spectrum Analyzer Settings**

RB 1.0MHz  
 VB 3.0MHz  
 Detector Sample  
 Att 30  
 RL Offset 0.0  
 Sweep Time 5.0ms  
 Units DBM

Bin size: 42kHz

**Peak Power per RBW**

-1.59 dBm/RBW

**99% Bandwidth (MHz)**

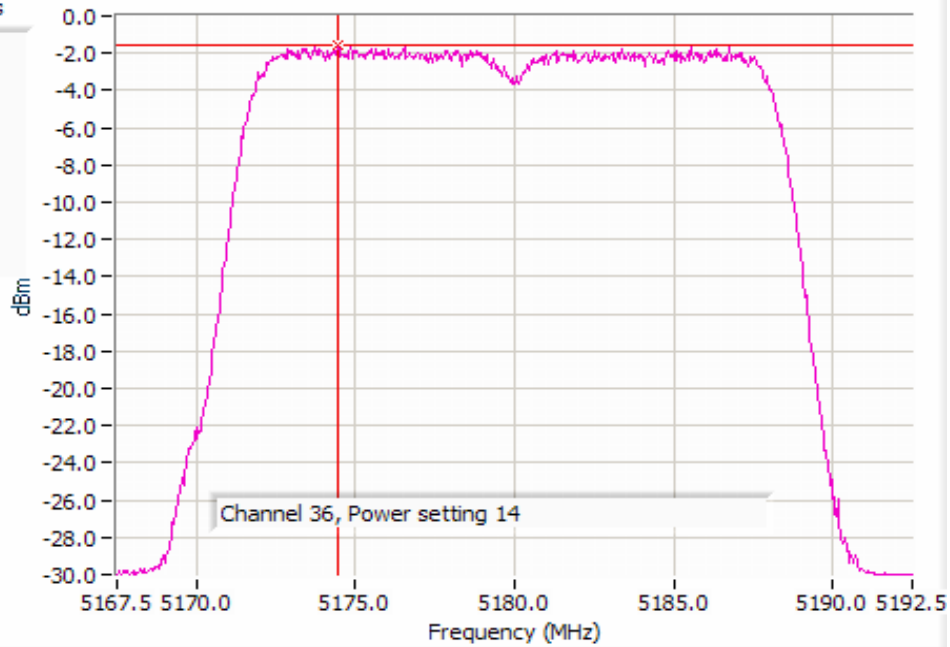
18.00

**Power Over Span (mW)**

11.495

**Power Over Span (dBm)**

10.61



**Spectrum Analyzer Settings**

RB 1.0MHz  
 VB 3.0MHz  
 Detector Sample  
 Att 20  
 RL Offset 1.0  
 Sweep Time 5.0ms  
 Units DBM

Bin size: 42kHz

**Peak Power per RBW**

-1.19 dBm/RBW

**99% Bandwidth (MHz)**

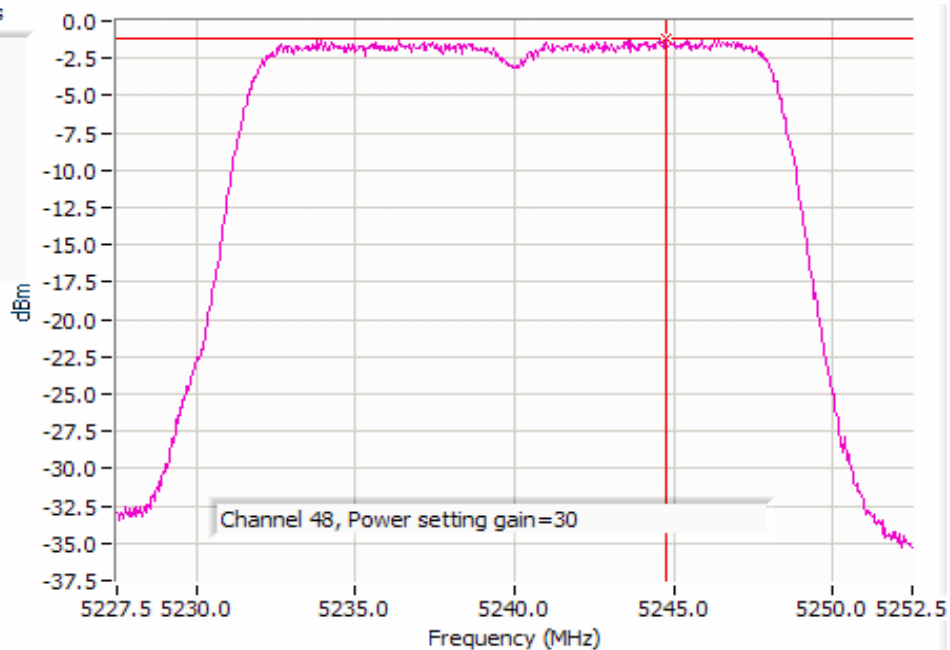
18.00

**Power Over Span (mW)**

12.470

**Power Over Span (dBm)**

10.96



Client: Xirrus, Inc.	Job Number: J57788
Model: XS-3900-16 and XS-3700-8 Access Points	T-Log Number: T59089
Contact: Ian Laity	Account Manager: Joe Rohlfes
Spec: FCC 15.247, 15.401, RSS-210	Class: N/A

### Spectrum Analyzer Settings

RB 1.0MHz  
 VB 3.0MHz  
 Detector Sample  
 Att 30  
 RL Offset 1.0  
 Sweep Time 5.0ms  
 Units DBM

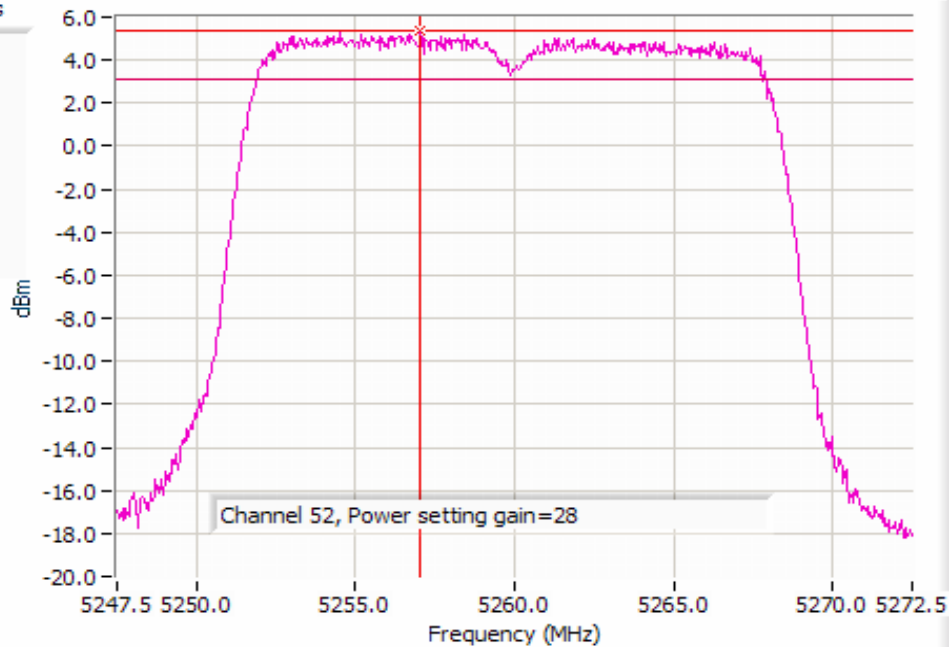
Bin size: 42kHz

Peak Power per RBW  
 5.35 dBm/RBW

99% Bandwidth (MHz)  
 18.00

Power Over Span (mW)  
 54.742

Power Over Span (dBm)  
 17.38



### Spectrum Analyzer Settings

RB 1.0MHz  
 VB 3.0MHz  
 Detector Sample  
 Att 30  
 RL Offset 1.0  
 Sweep Time 5.0ms  
 Units DBM

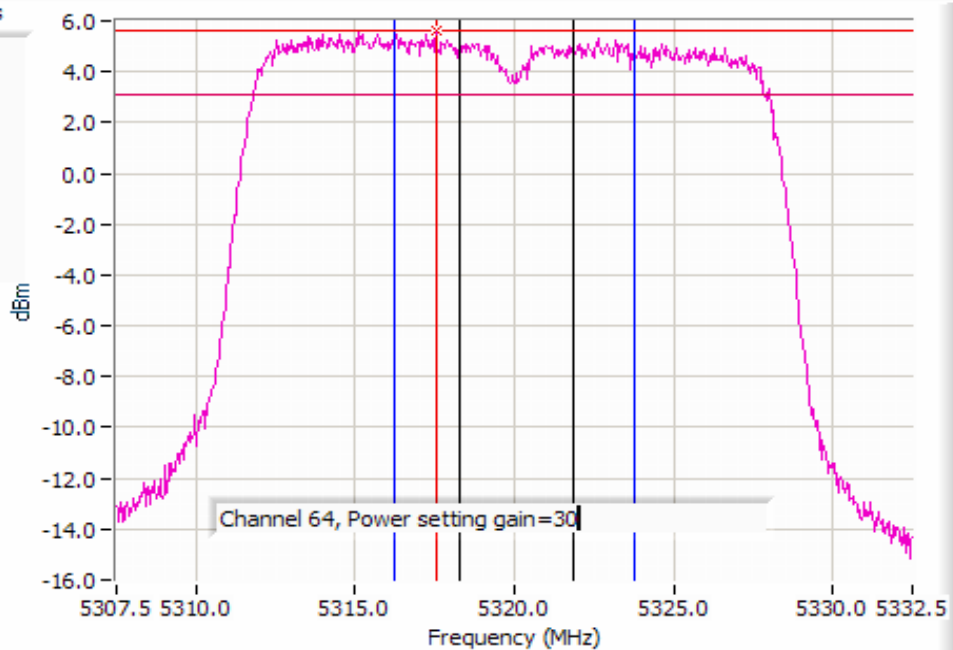
Bin size: 42kHz

Peak Power per RBW  
 5.60 dBm/RBW

99% Bandwidth (MHz)  
 18.00

Power Over Span (mW)  
 57.909

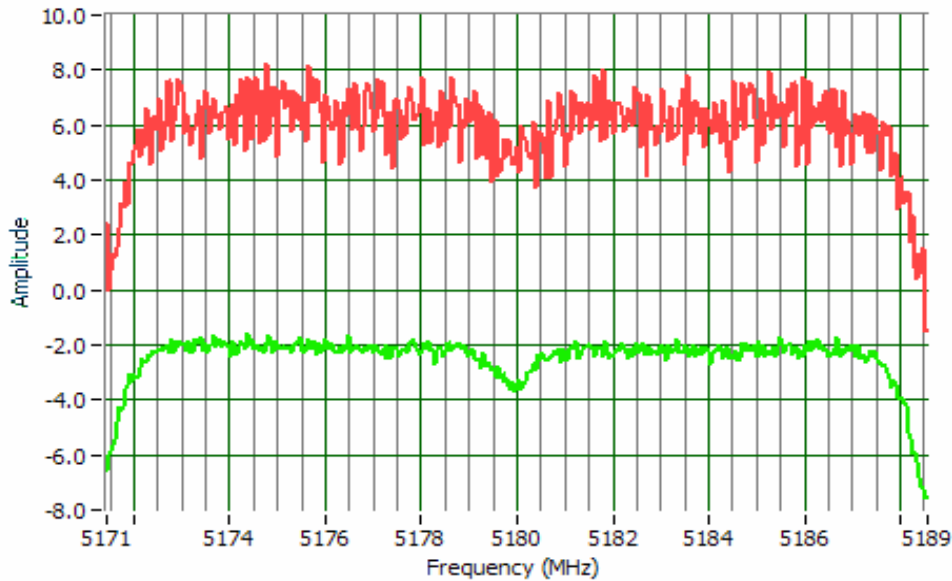
Power Over Span (dBm)  
 17.63



Client: Xirrus, Inc.	Job Number: J57788
Model: XS-3900-16 and XS-3700-8 Access Points	T-Log Number: T59089
	Account Manager: Joe Rohlfes
Contact: Ian Laity	
Spec: FCC 15.247, 15.401, RSS-210	Class: N/A

### Peak Excursion Plots

Sampled (Power Averaged) and Peak Power



Plot 0

Plot 1

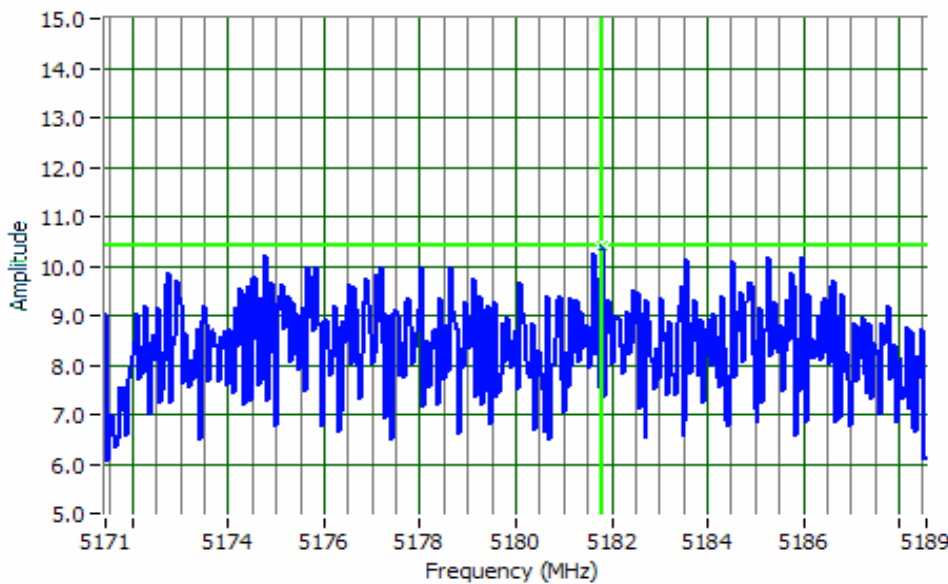
Settings for plot 0

- RB 1.0MHZ
- VB 3.0MHZ
- Detector Sample
- Att 30
- RL Offset 0.0
- Sweep Time 5.0ms
- Units DBM

Settings for plot 1

- RB 1.0MHZ
- VB 3.0MHZ
- Detector POS
- Att 30
- RL Offset 0.0
- Sweep Time 5.0ms
- Units DBM

Peak Excursion



Peak excursion  
(Plot 1 - Plot 0)

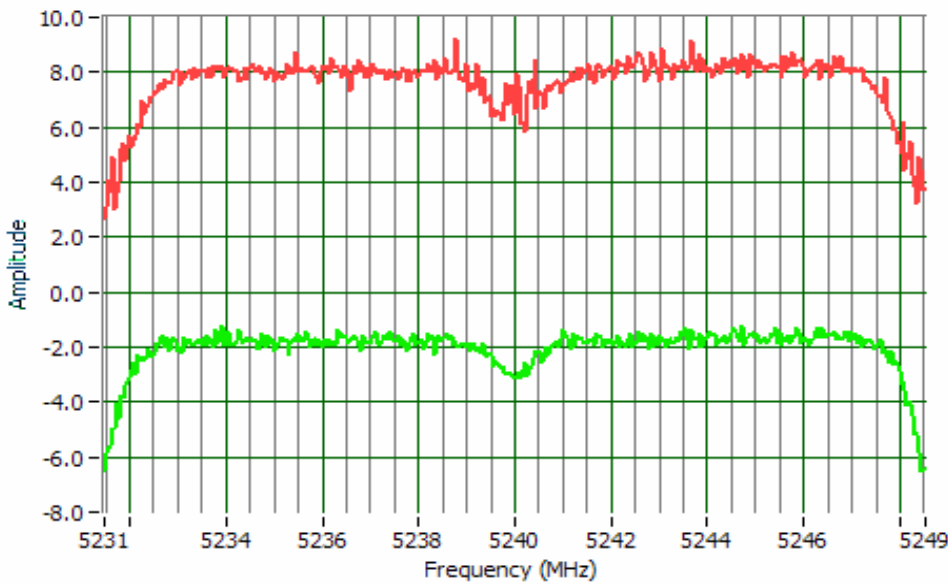
Clear Window



Maximum Peak Excursion 5181.79 10.40

Client: Xirrus, Inc.	Job Number: J57788
Model: XS-3900-16 and XS-3700-8 Access Points	T-Log Number: T59089
	Account Manager: Joe Rohlfes
Contact: Ian Laity	
Spec: FCC 15.247, 15.401, RSS-210	Class: N/A

Sampled (Power Averaged) and Peak Traces



Plot 0

Plot 1

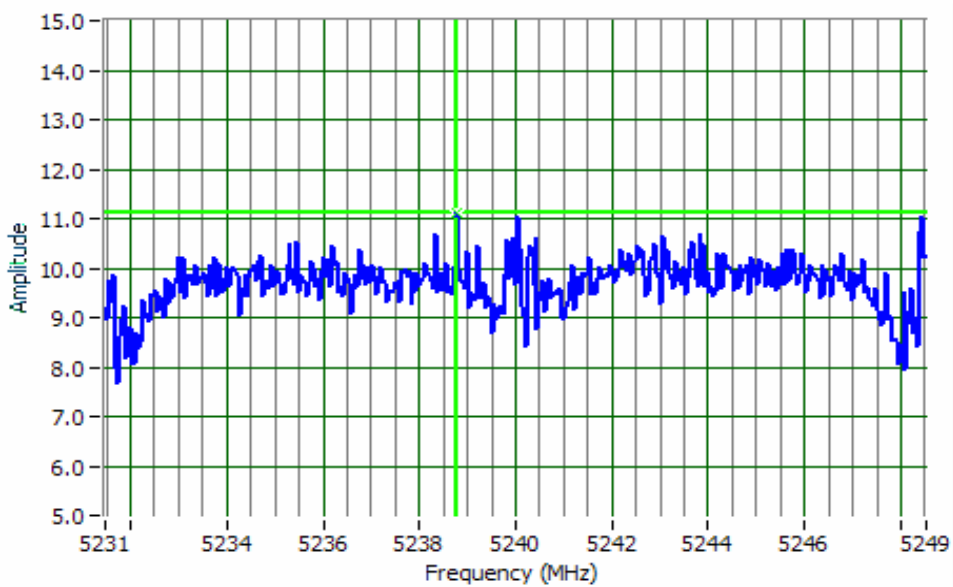
Settings for plot 0

- RB 1.0MHz
- VB 3.0MHz
- Detector Sample
- Att 20
- RL Offset 1.0
- Sweep Time 5.0ms
- Units DBM

Settings for plot 1

- RB 1.0MHz
- VB 3.0MHz
- Detector POS
- Att 30
- RL Offset 1.0
- Sweep Time 5.0ms
- Units DBM

Peak Excursion



Peak PSD (Plot 0)

-1.19 dBm/1.0MHz

Peak PSD (Plot 1)

9.25 dBm/1.0MHz

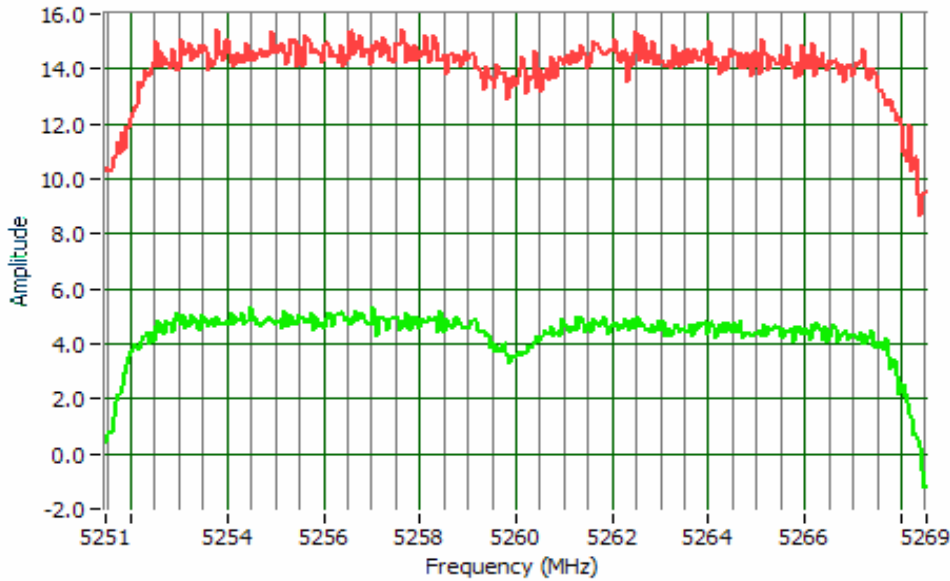
Peak excursion (Plot 1 - Plot 0)

Maximum Peak Excursion (dB)

11.12

Client: Xirrus, Inc.	Job Number: J57788
Model: XS-3900-16 and XS-3700-8 Access Points	T-Log Number: T59089
Contact: Ian Laity	Account Manager: Joe Rohlfes
Spec: FCC 15.247, 15.401, RSS-210	Class: N/A

Sampled (Power Averaged) and Peak Traces



Plot 0

Plot 1

Settings for plot 0

RB 1.0MHZ  
 VB 3.0MHZ  
 Detector Sample  
 Att 30  
 RL Offset 1.0  
 Sweep Time 5.0ms  
 Units DBM

Settings for plot 1

RB 1.0MHZ  
 VB 3.0MHZ  
 Detector POS  
 Att 30  
 RL Offset 1.0  
 Sweep Time 5.0ms  
 Units DBM

Peak PSD (Plot 0)

5.35 dBm/1.0MHz

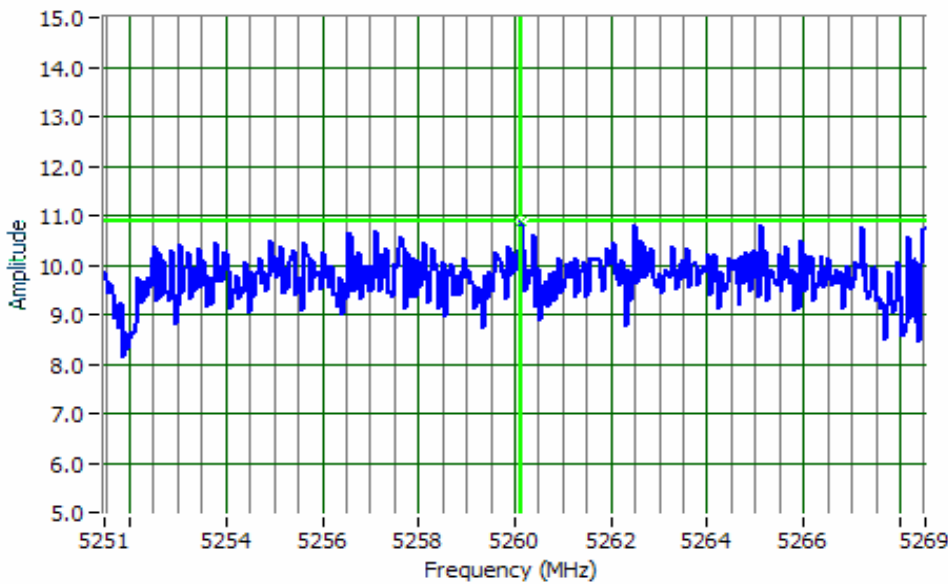
Peak PSD (Plot 1)

15.42 dBm/1.0MHz

Peak excursion  
 (Plot 1 - Plot 0)

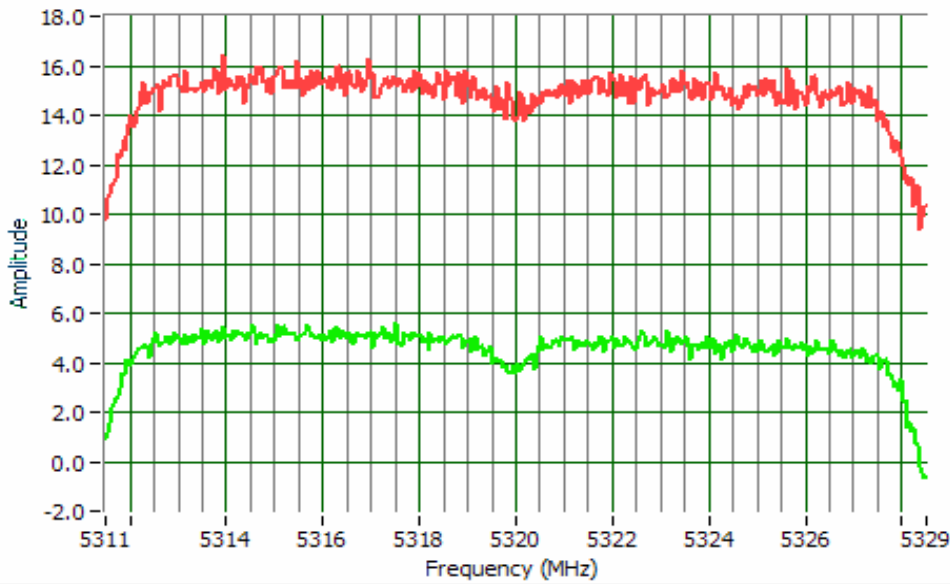
Maximum Peak  
 Excursion (dB)  
 10.87

Peak Excursion



Client: Xirrus, Inc.	Job Number: J57788
Model: XS-3900-16 and XS-3700-8 Access Points	T-Log Number: T59089
	Account Manager: Joe Rohlfes
Contact: Ian Laity	
Spec: FCC 15.247, 15.401, RSS-210	Class: N/A

Sampled (Power Averaged) and Peak Traces



Plot 0

Plot 1

Settings for plot 0

RB 1.0MHz  
 VB 3.0MHz  
 Detector Sample  
 Att 30  
 RL Offset 1.0  
 Sweep Time 5.0ms  
 Units DBM

Settings for plot 1

RB 1.0MHz  
 VB 3.0MHz  
 Detector POS  
 Att 30  
 RL Offset 1.0  
 Sweep Time 5.0ms  
 Units DBM

Peak PSD (Plot 0)

5.60 dBm/1.0MHz

Peak PSD (Plot 1)

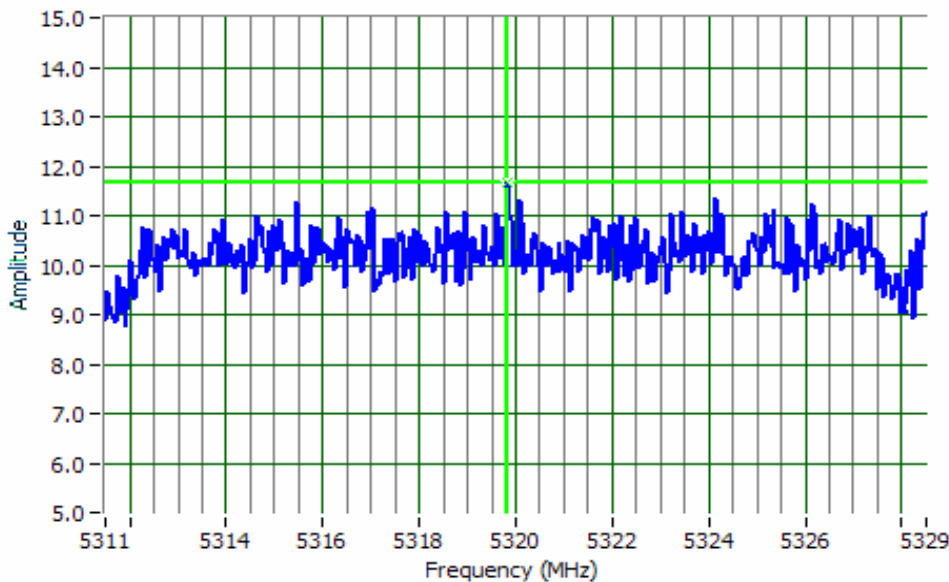
16.42 dBm/1.0MHz

Peak excursion  
 (Plot 1 - Plot 0)

Maximum Peak  
 Excursion (dB)

11.66

Peak Excursion







# EMC Test Data

Client: Xirrus, Inc.	Job Number: J57788
Model: XS-3900-16 and XS-3700-8 Access Points	T-Log Number: T59089
	Account Manager: Joe Rohlfes
Contact: Ian Laity	
Spec: FCC 15.247, 15.401, RSS-210	Class: N/A

## FCC Part 15 Subpart E Tests - Bandwidth and Spurious

### 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: 1/24/2005	Config. Used: 1
Test Engineer: Chris Byleckie	Config Change: -
Test Location: Chamber #2	EUT 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:	42 %

### Summary of Results

Run #	Test Performed	Limit	Pass / Fail	Result / Margin
1	26dB Bandwidth	15.407	Pass	> 20 MHz
1	20 dB Bandwidth	RSS 210	Pass	> 20 MHz
2	Antenna Conducted - Out of Band Spurious	15.407(b)	Pass	All emissions < -27dBm/MHz

### Modifications Made During Testing:

No modifications were made to the EUT during testing

### Deviations From The Standard

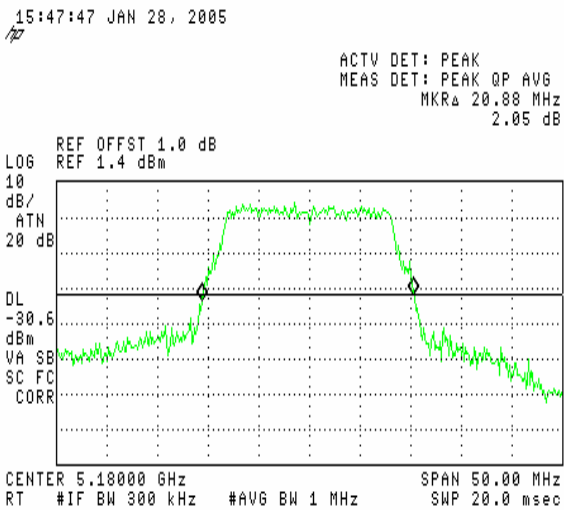
No deviations were made from the requirements of the standard.

Client: Xirrus, Inc.	Job Number: J57788
Model: XS-3900-16 and XS-3700-8 Access Points	T-Log Number: T59089
	Account Manager: Joe Rohlfes
Contact: Ian Laity	
Spec: FCC 15.247, 15.401, RSS-210	Class: N/A

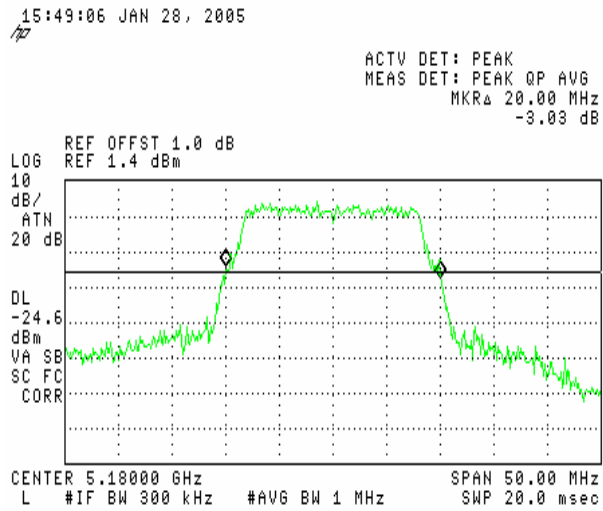
### Run #1: Bandwidth

Frequency (MHz)	Bandwidth (MHz)		
	20dB	26dB	99%
5180	20.0	20.8	17.1
5260	33.9	43.9	26.6
5320	32.0	43.0	27.9

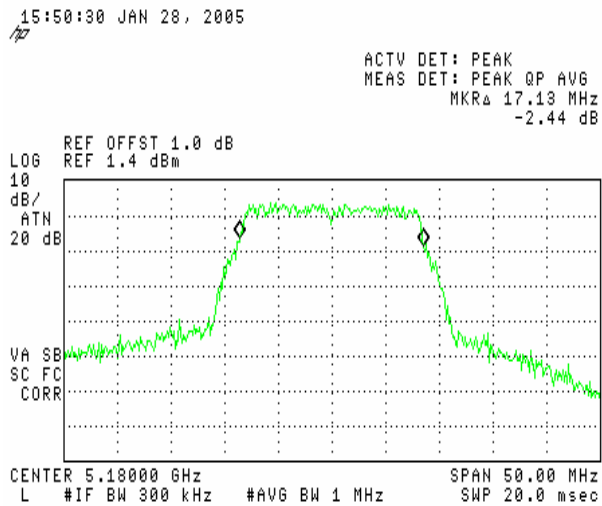
#### 5180 MHz (26-dB BW)



#### 5180 MHz (20-dB BW)



#### 5180 MHz (99% BW)





# EMC Test Data

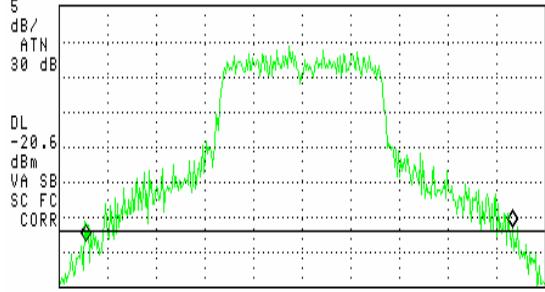
Client: Xirrus, Inc.	Job Number: J57788
Model: XS-3900-16 and XS-3700-8 Access Points	T-Log Number: T59089
	Account Manager: Joe Rohlfes
Contact: Ian Laity	
Spec: FCC 15.247, 15.401, RSS-210	Class: N/A

## 5260 MHz (26-dB BW)

15:39:39 JAN 28, 2005

ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR $\Delta$  43.88 MHz  
1.79 dB

REF OFFST 1.0 dB  
REF 11.4 dBm



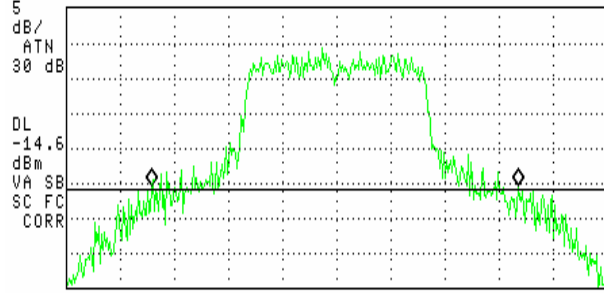
CENTER 5.26000 GHz SPAN 50.00 MHz  
L #IF BW 300 kHz #AVG BW 1 MHz SWP 20.0 msec

## 5260 MHz (20-dB BW)

15:40:36 JAN 28, 2005

ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR $\Delta$  33.88 MHz  
-1.17 dB

REF OFFST 1.0 dB  
REF 11.4 dBm



CENTER 5.26000 GHz SPAN 50.00 MHz  
L #IF BW 300 kHz #AVG BW 1 MHz SWP 20.0 msec

## 5260 MHz (99% BW)

15:41:58 JAN 28, 2005

ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR $\Delta$  26.63 MHz  
-1.01 dB

REF OFFST 1.0 dB  
REF 11.4 dBm



CENTER 5.26000 GHz SPAN 50.00 MHz  
L #IF BW 300 kHz #AVG BW 1 MHz SWP 20.0 msec



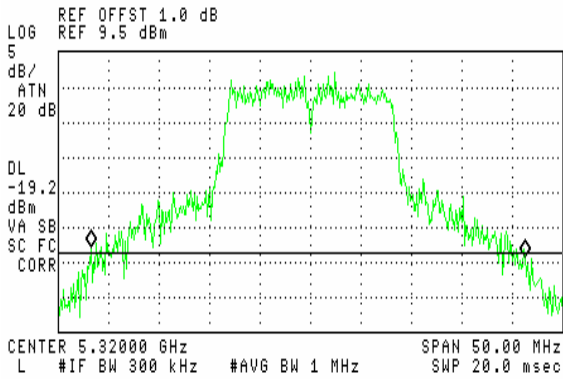
# EMC Test Data

Client: Xirrus, Inc.	Job Number: J57788
Model: XS-3900-16 and XS-3700-8 Access Points	T-Log Number: T59089
	Account Manager: Joe Rohlfes
Contact: Ian Laity	
Spec: FCC 15.247, 15.401, RSS-210	Class: N/A

### 5320 MHz (26-dB BW)

15:04:18 JAN 28, 2005

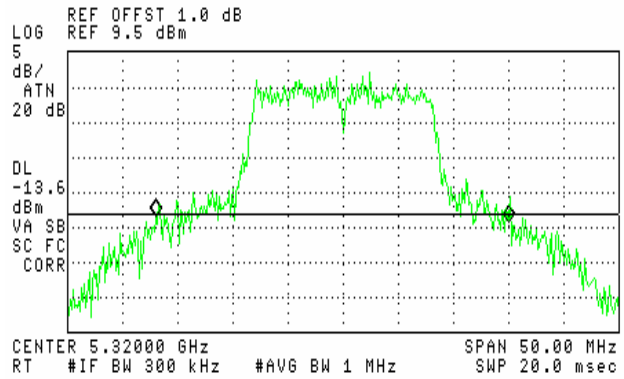
ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKRΔ 43.00 MHz  
-1.41 dB



### 5320 MHz (20-dB BW)

15:07:15 JAN 28, 2005

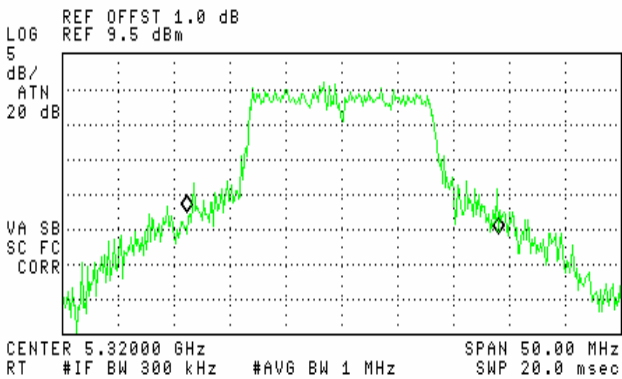
ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKRΔ 32.00 MHz  
-.86 dB



### 5320 MHz (99% BW)

15:08:31 JAN 28, 2005

ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKRΔ 27.88 MHz  
-3.16 dB





# EMC Test Data

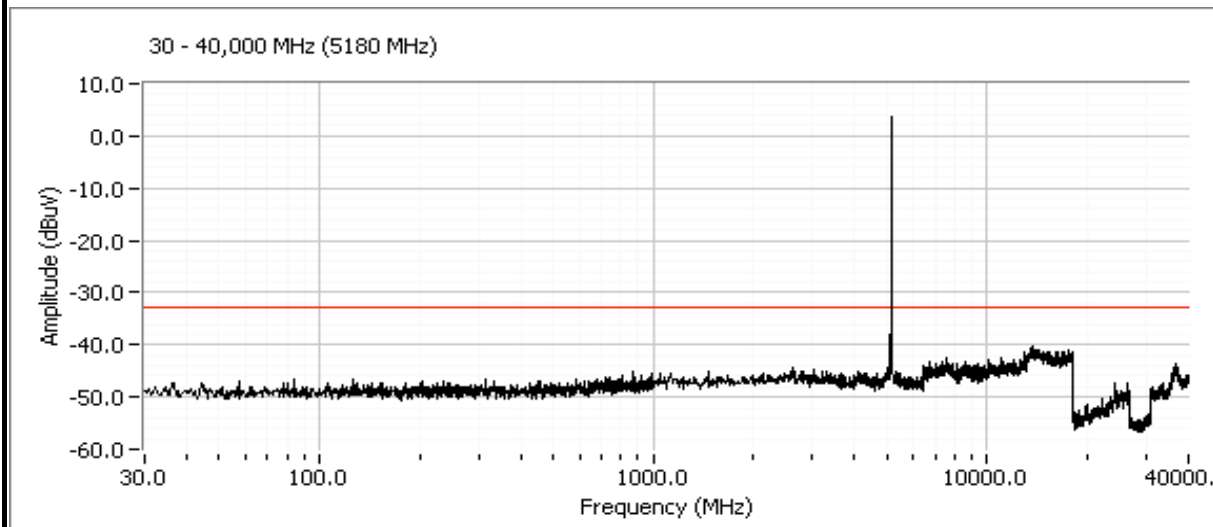
Client: Xirrus, Inc.	Job Number: J57788
Model: XS-3900-16 and XS-3700-8 Access Points	T-Log Number: T59089
	Account Manager: Joe Rohlfes
Contact: Ian Laity	
Spec: FCC 15.247, 15.401, RSS-210	Class: N/A

**Run #2: 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 fall in restricted bands. A limit of -33 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 6dBi 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.

Note 1:	Signal is in a restricted band.
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 the 30-1000MHz measured during digital device radiated emissions test.
Note 5:	Signal is within 10MHz of the 5.725 or 5.825 Band edge. Limit is -17dBm EIRP

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

Radio #2 data rate 6Mbps  
 Antenna conducted emissions, 30 - 40,000 MHz, 5180 MHz (Ch. 36)



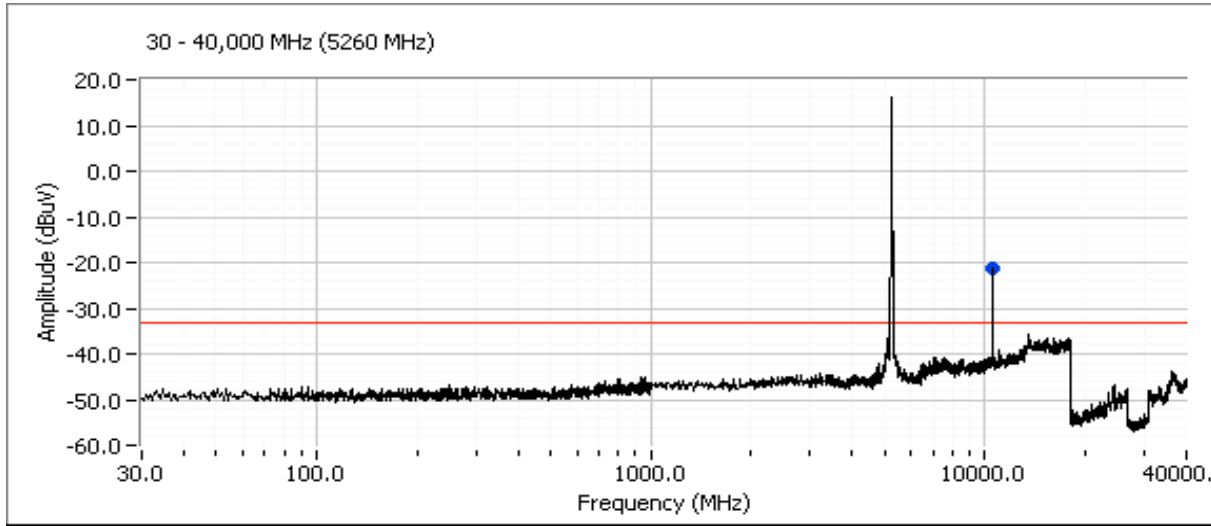
Frequency	Level	Port	15.209 / 15E	Detector	Comments
MHz	dBm		Limit	Margin	Pk/QP/Avg
<b>No emissions detected</b>					



# EMC Test Data

Client: Xirrus, Inc.	Job Number: J57788
Model: XS-3900-16 and XS-3700-8 Access Points	T-Log Number: T59089
	Account Manager: Joe Rohlfes
Contact: Ian Laity	
Spec: FCC 15.247, 15.401, RSS-210	Class: N/A

## Antenna conducted emissions, 30 - 40,000 MHz, 5260 MHz (Ch. 52)



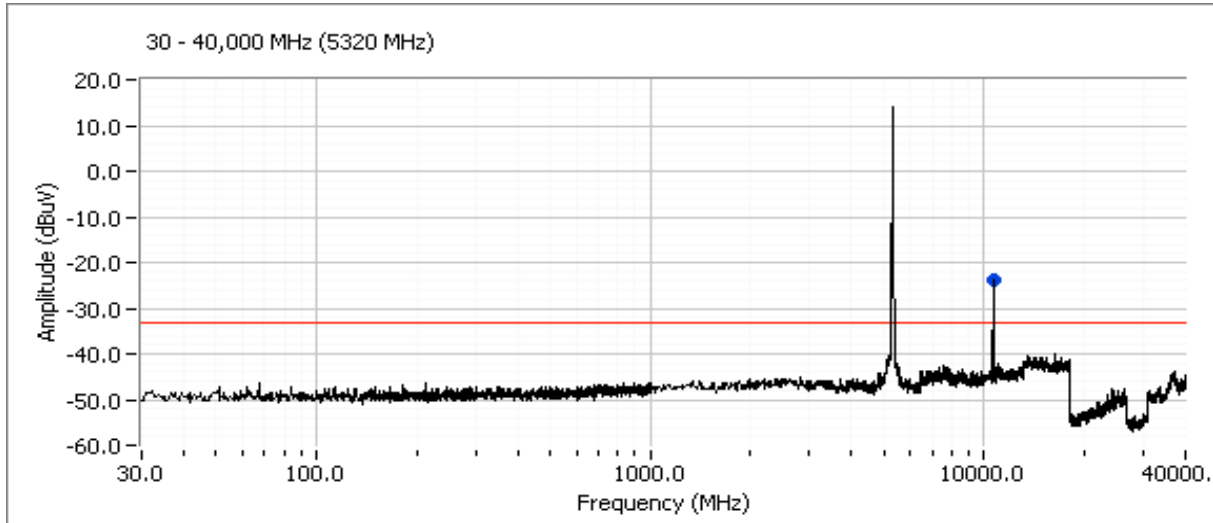
Frequency	Level	Port	15.209 / 15E		Detector	Comments
MHz	dBm		Limit	Margin	Pk/QP/Avg	
10520.65	-34.5	RF Port	-33.0	-1.5	AVG	



# EMC Test Data

Client: Xirrus, Inc.	Job Number: J57788
Model: XS-3900-16 and XS-3700-8 Access Points	T-Log Number: T59089
	Account Manager: Joe Rohlfes
Contact: Ian Laity	
Spec: FCC 15.247, 15.401, RSS-210	Class: N/A

## Antenna conducted emissions, 30 - 40,000 MHz, 5320 MHz (Ch. 64)



Frequency	Level	Port	15.209 / 15E		Detector	Comments
MHz	dBm		Limit	Margin	Pk/QP/Avg	
10640.44	-35.7	RF Port	-33.0	-2.7	AVG	

Client: Xirrus, Inc.	Job Number: J57788
Model: XS-3900-16 and XS-3700-8 Access Points	T-Log Number: T59089
	Account Manager: Joe Rohlfes
Contact: Ian Laity	
Spec: FCC 15.247, 15.401, RSS-210	Class: N/A

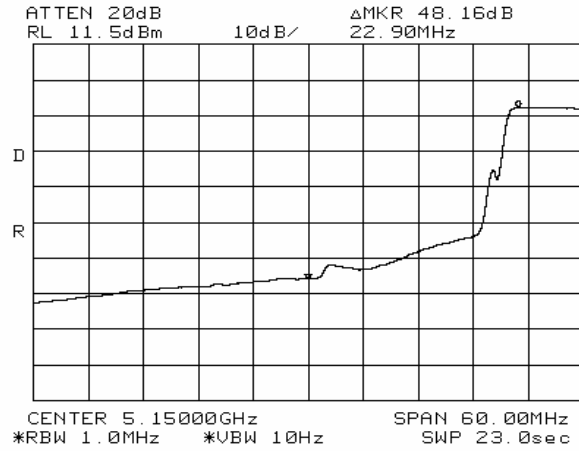
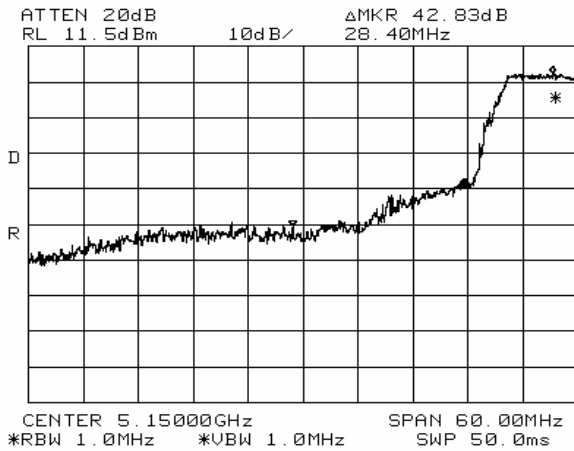
### Band Edge Measurements (5150 MHz and 5350 MHz):

For signals in the restricted bands immediately above and below the 5.15 to 5.35 GHz allocated band a measurement was made of the amplitude of the spurious emissions with respect to the intentional signals. The relative amplitude, in dBc, was then applied to the average and peak field strength of the intentional signal made on the OATS to calculate the field strength of the unintentional signals.

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

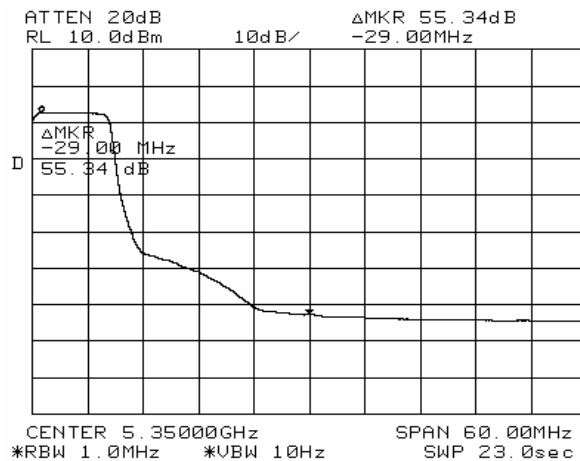
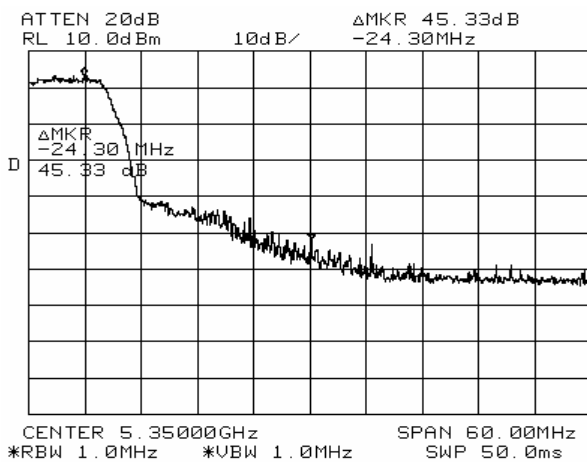
#### 5.15 GHz band edge, EUT operating on the lowest channel

The highest signal within 50 MHz of the 5.15 GHz band was -42.83 dBc (Peak) / -48.16dBc (Average)



#### 5.35 GHz band edge EUT operating on channel 17 (highest channel):

The highest signal in the 5.35 to 5.46 GHz band was -45.3dBc (Peak) / -55.34dBc (Average)







# EMC Test Data

Client: Xirrus, Inc.	Job Number: J57788
Model: XS-3900-16 and XS-3700-8 Access Points	T-Log Number: T59089
	Account Manager: Joe Rohlfs
Contact: Ian Laity	
Spec: FCC 15.247, 15.401, RSS-210	Class: N/A

## Band Edge Measurements:

For signals in the restricted bands immediately above and below the 5.725 to 5.825 GHz allocated band measurements were made of the antenna conducted power. The EIRP was then calculated by adding the antenna gain (in dBi) to the measure power level with RBW = 1MHz, VBW = 1MHz, video averaging on. For signals at the band edge the resolution bandwidth was reduced and the total power in a 1MHz bandwidth calculated by summing the individual power in each resolution bandwidth.

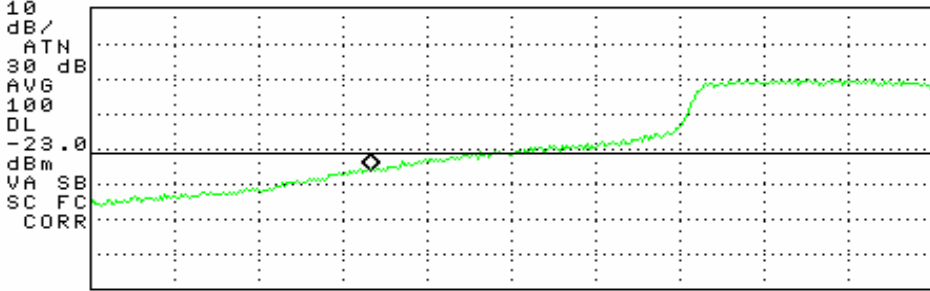
The limit for signals within 10MHz of the band edges is -17dBm/MHz. For signals further than 10MHz away from the band edge the limit is -27dBm/MHz.

12:09:38 JAN 28, 2005

~~17~~

ACTV DET: SMPL  
MEAS DET: PEAK QP AVG  
MKR 5.72498 GHz  
-27.61 dBm

LOG REF OFFST 1.0 dB  
REF 18.5 dBm



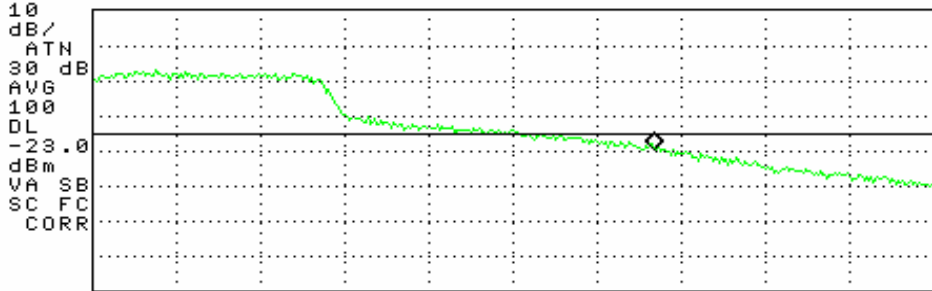
START 5.71500 GHz STOP 5.74500 GHz  
RL #IF BW 1.0 MHz #AVG BW 1 MHz SWP 20.0 msec

12:59:58 JAN 28, 2005

~~17~~

ACTV DET: SMPL  
MEAS DET: PEAK QP AVG  
MKR 5.82503 GHz  
-27.27 dBm

LOG REF OFFST 1.0 dB  
REF 12.5 dBm



START 5.80500 GHz STOP 5.83500 GHz  
L #IF BW 1.0 MHz #AVG BW 1 MHz SWP 20.0 msec



## EMC Test Data

Client: Xirrus, Inc.	Job Number: J57788
Model: XS-3900-16 and XS-3700-8 Access Points	T-Log Number: T59089
	Account Manager: Joe Rohlfes
Contact: Ian Laity	
Spec: FCC 15.247, 15.401, RSS-210	Class: N/A

### Radiated Spurious Emissions - Transmit Mode 5GHz Bands (FCC 15E and 15.247) With Internal Antennas

#### 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: 1/24/2005; 1/27/2005                      Config. Used: 1  
 Test Engineer: Chris Byleckie, Mark Briggs            Config Change: none  
 Test Location: OATS #1                                      EUT Voltage: 120V/60Hz

#### General Test Configuration

The EUT was located on the turntable for radiated spurious emissions testing. All remote support equipment was located approximately 5 meters from the EUT with all I/O cables routed overhead. EUT tested on table top and at a height of ~ 1.5m above the ground plane. EUT was oriented with the main cover pointing upwards (i.e. the part that, when ceiling mounted, would normally be pointing downwards) to ensure the EUT's antennas' main beams were aligned with the measurement antenna.

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

**Ambient Conditions:**                      Temperature:            11 °C  
    Rel. Humidity:            89 %

#### Summary of Results

Run #	Test Performed	Limit	Pass / Fail	Result / Margin
1a - c	Spurious Emissions, 1000 - 40000 MHz: 5150 - 5350 MHz Operation	FCC Part 15.209 FCC Part 15 E	Pass	53.9dBµV/m (495.5µV/m) @ 5150.0MHz (-0.1dB)
2a - d	Spurious Emissions, 1000 - 40000 MHz: 5725 - 5850 MHz Operation	FCC Part 15.209 FCC Part 15.247( c)	Pass	52.5dBµV/m (419.3µV/m) @ 17235.0MHz (-1.6dB)
3	Spurious Emissions, 1000 - 40000 MHz: All 16 transmitters operational	FCC Part 15.209 FCC 15.247 & 15E	Pass	No significant intermod products

#### 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: Xirrus, Inc.	Job Number: J57788
Model: XS-3900-16 and XS-3700-8 Access Points	T-Log Number: T59089
	Account Manager: Joe Rohlfes
Contact: Ian Laity	
Spec: FCC 15.247, 15.401, RSS-210	Class: N/A

**Run #1: Radiated Spurious Emissions, 1000 - 4000 MHz.**  
**EUT operating in the 5150 - 5350 MHz band (FCC 15 E)**

**Radio #3 Data rate - 6Mbps. All measurements with only one transmitter operational.**

**Run #1a: Radiated Spurious Emissions, 1000 - 40000 MHz. Low Channel @ 5180 MHz**

Gain - 18

	H	V	
Fundamental emission level @ 3m in 1MHz RBW:	88.64	110.25	Peak Measurement (RB=VB=1MHz)
Fundamental emission level @ 3m in 1MHz RBW:	80.6	102.06	Average Measurement (RB=1MHz, VB=10Hz)
Delta Marker - Peak	42.83 dB		
Delta Marker - Average	48.16 dB		
Calculated Band-Edge Measurement:	67.42 dBuV/m		Peak
Calculated Band-Edge Measurement:	53.9 dBuV/m		Average

**Band Edge Signal Radiated Field Strength**

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments
MHz	dBuV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
5150.000	53.9	-	54.0	-0.1	Avg	265	1.1	Note 2
5150.000	67.4	-	74.0	-6.6	Pk	265	1.1	Note 2

**Other Spurious Radiated Emissions:**

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments
MHz	dBuV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
15540.57	49.1	h	54.0	-4.9	Avg	0	1.0	
15540.57	48.9	v	54.0	-5.1	AVg	0	1.0	
6973.00	55.3	v	68.3	-13.0	Avg	301	1.2	Non restricted band
12063.00	46.0	h	54.0	-8.0	Avg	0	1.0	
12063.00	46.0	v	54.0	-8.0	Avg	0	1.0	
13816.00	49.9	v	68.3	-18.4	Avg	0	1.0	Non restricted band
13816.00	49.3	h	68.3	-19.0	Avg	0	1.0	Non restricted band
15540.57	59.8	v	74.0	-14.2	Pk	0	1.0	
15540.57	59.6	h	74.0	-14.4	Pk	0	1.0	
6973.00	47.7	h	68.3	-20.6	Avg	322	1.1	Non restricted band
12063.00	57.0	v	74.0	-17.0	Pk	0	1.0	
12063.00	57.0	h	74.0	-17.0	Pk	0	1.0	
10361.49	45.0	v	68.3	-23.3	Avg	0	1.0	Non restricted band
10361.49	45.0	h	68.3	-23.3	Avg	0	1.0	Non restricted band

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 (~68.3dBuV/m).

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



# EMC Test Data

Client: Xirrus, Inc.	Job Number: J57788
Model: XS-3900-16 and XS-3700-8 Access Points	T-Log Number: T59089
	Account Manager: Joe Rohlfes
Contact: Ian Laity	
Spec: FCC 15.247, 15.401, RSS-210	Class: N/A

**Run #1b: Radiated Spurious Emissions, 1000 - 40000 MHz. Center Channel @ 5260 MHz**

	H	V	
Fundamental emission level @ 3m in 1MHz RBW:	100.3	118.6	Peak Measurement (RB=VB=1MHz)
Fundamental emission level @ 3m in 1MHz RBW:	91.97	110.2	Average Measurement (RB=1MHz, VB=10Hz)

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB $\mu$ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
15780.00	48.1	v	54.0	-5.9	AVg	0	1.0	
15780.00	48.1	h	54.0	-6.0	AVg	0	1.0	
10520.00	52.4	v	68.3	-15.9	Avg	114	1.1	Non restricted band
10520.00	50.7	h	68.3	-17.6	Avg	300	1.1	Non restricted band
15780.00	58.8	h	74.0	-15.2	Pk	0	1.0	
15780.00	58.7	v	74.0	-15.3	Pk	0	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 (~68.3dBuV/m).



# EMC Test Data

Client: Xirrus, Inc.	Job Number: J57788
Model: XS-3900-16 and XS-3700-8 Access Points	T-Log Number: T59089
	Account Manager: Joe Rohlfes
Contact: Ian Laity	
Spec: FCC 15.247, 15.401, RSS-210	Class: N/A

**Run #1c: Radiated Spurious Emissions, 1000 - 40000 MHz. High Channel @ 5320 MHz  
Gain - 25**

	H	V	
Fundamental emission level @ 3m in 1MHz RBW:	98.8	117.65	Peak Measurement (RB=VB=1MHz)
Fundamental emission level @ 3m in 1MHz RBW:	90.5	109.22	Average Measurement (RB=1MHz, VB=10Hz)
Delta Marker - Peak	45.33 dB		
Delta Marker - Average	55.43 dB		
Calculated Band-Edge Measurement:	72.32 dBuV/m		Peak
Calculated Band-Edge Measurement:	53.79 dBuV/m		Average

**Band Edge Signal Radiated Field Strength**

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments
MHz	dBuV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
5320.000	53.8	-	54.0	-0.2	Avg	75	1.0	Note 2
5320.000	72.3	-	74.0	-1.7	Pk	75	1.0	Note 2

**Other Spurious Radiated Emissions:**

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBuV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
10635.31	53.4	v	54.0	-0.6	Avg	39	1.0	
10635.31	51.2	h	54.0	-2.8	Avg	26	1.0	
15960.62	47.9	h	54.0	-6.1	Avg	0	1.0	
15960.62	47.8	v	54.0	-6.3	Avg	0	1.0	
12390.15	46.2	h	54.0	-7.8	Avg	0	1.0	
12390.00	46.0	v	54.0	-8.0	Avg	0	1.0	
10635.31	65.6	v	74.0	-8.4	PK	39	1.0	
10635.31	64.6	h	74.0	-9.4	PK	26	1.0	
7108.00	50.6	v	68.3	-17.7	Avg		1.0	Non restricted band
14193.00	50.0	h	68.3	-18.3	Avg	0	1.0	Non restricted band
14193.00	49.9	v	68.3	-18.4	Avg	0	1.0	Non restricted band
7108.00	48.2	h	68.3	-20.1	Avg		1.0	Non restricted band
15960.62	58.6	v	74.0	-15.4	PK	0	1.0	
15960.62	58.4	h	74.0	-15.6	PK	0	1.0	
12390.15	57.3	h	74.0	-16.8	PK	0	1.0	
12390.00	57.1	v	74.0	-16.9	Pk	0	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 (~68.3dBuV/m).
Note 2:	Band-edge measurement calculated from the fundamental field strength (peak or average) minus the band edge delta marker measurement.



# EMC Test Data

Client: Xirrus, Inc.	Job Number: J57788
Model: XS-3900-16 and XS-3700-8 Access Points	T-Log Number: T59089
	Account Manager: Joe Rohlfes
Contact: Ian Laity	
Spec: FCC 15.247, 15.401, RSS-210	Class: N/A

**Run #2: Radiated Spurious Emissions, 1000 - 4000 MHz.**

**EUT operating in the 5725 - 5850 MHz band (FCC 15.247)**

**Run #2a: Radiated Spurious Emissions, 1000 - 40000 MHz. Center Channel @ 5745 MHz**

	H	V	
Fundamental emission level @ 3m in 1MHz RBW:	106.1	112.6	Peak Measurement (RB=VB=1MHz)
Fundamental emission level @ 3m in 1MHz RBW:	97.17	113.96	Average Measurement (RB=1MHz, VB=10Hz)

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB $\mu$ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
17235.00	52.5	h	54.0	-1.6	Avg	0	1.0	
17235.00	52.2	v	54.0	-1.8	Avg	0	1.0	
11490.00	45.4	v	54.0	-8.7	Avg	0	1.0	
11490.00	45.0	h	54.0	-9.0	Avg	0	1.0	
17235.00	63.9	h	74.0	-10.2	Pk	0	1.0	
17235.00	63.8	v	74.0	-10.2	Pk	0	1.0	
11490.00	56.7	v	74.0	-17.3	Pk	0	1.0	
11490.00	55.5	h	74.0	-18.6	Pk	0	1.0	
15293.00	60.3	v	82.6	-22.3	Pk	0	1.0	Non restricted band
15293.00	60.3	h	82.6	-22.3	Pk	0	1.0	Non restricted band
7890.00	52.8	v	82.6	-29.8	Pk	0	1.0	Non restricted band
7890.00	52.7	h	82.6	-30.0	Pk	0	1.0	Non restricted band

Note 1: For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set to -30dBc.



# EMC Test Data

Client: Xirrus, Inc.	Job Number: J57788
Model: XS-3900-16 and XS-3700-8 Access Points	T-Log Number: T59089
	Account Manager: Joe Rohlfes
Contact: Ian Laity	
Spec: FCC 15.247, 15.401, RSS-210	Class: N/A

## Run #2b: Radiated Spurious Emissions, 1000 - 40000 MHz. Center Channel @ 5765MHz

	H	V	
Fundamental emission level @ 3m in 1MHz RBW:	103.23	121.23	Peak Measurement (RB=VB=1MHz)
Fundamental emission level @ 3m in 1MHz RBW:	94.85	112.67	Average Measurement (RB=1MHz, VB=10Hz)

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
11529.135	46.1	v	54.0	-7.9	Avg	0	0.0	
11529.610	45.3	h	54.0	-8.7	Avg	0	0.0	
11529.135	57.0	v	74.0	-17.0	Pk	0	0.0	
11529.610	56.8	h	74.0	-17.2	Pk	0	0.0	
17293.859	65.3	v	91.2	-25.9	Pk	0	0.0	
17294.869	64.6	h	91.2	-26.6	Pk	0	0.0	
17294.869	53.3	h	-	-	AVG	0	0.0	
17293.859	53.3	v	-	-	AVG	0	0.0	

Note 1: For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set to -30dBc.

## Run #2c: Radiated Spurious Emissions, 1000 - 40000 MHz. High Channel @ 5805 MHz

	H	V	
Fundamental emission level @ 3m in 1MHz RBW:	101.24	119.4	Peak Measurement (RB=VB=1MHz)
Fundamental emission level @ 3m in 1MHz RBW:	92.9	110.79	Average Measurement (RB=1MHz, VB=10Hz)

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
17413.609	54.2	v	-	-	AVG	360	1.0	
17413.750	54.0	H	-	-	AVG	360	1.0	
11609.620	45.0	v	54.0	-9.0	Avg	0	1.0	
11608.810	44.6	h	54.0	-9.4	Avg	0	1.0	
11609.620	56.0	v	74.0	-18.0	Pk	0	1.0	
11608.810	55.4	h	74.0	-18.6	Pk	0	1.0	
17413.750	65.2	H	89.4	-24.2	Pk	360	1.0	
17413.609	65.0	v	89.4	-24.5	Pk	360	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 -30dBc.



# EMC Test Data

Client: Xirrus, Inc.	Job Number: J57788
Model: XS-3900-16 and XS-3700-8 Access Points	T-Log Number: T59089
	Account Manager: Joe Rohlfes
Contact: Ian Laity	
Spec: FCC 15.247, 15.401, RSS-210	Class: N/A

**Run #2d: Radiated Spurious Emissions, 1000 - 40000 MHz. High Channel @ 5825 MHz**

	H	V	
Fundamental emission level @ 3m in 1MHz RBW:	102.38	114.8	Peak Measurement (RB=VB=1MHz)
Fundamental emission level @ 3m in 1MHz RBW:	93.45	106.44	Average Measurement (RB=1MHz, VB=10Hz)

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB $\mu$ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
15504.930	48.9	H	54.0	-5.1	Avg	0	1.0	
15506.195	48.9	V	54.0	-5.1	Avg	0	1.0	
11650.820	45.5	V	54.0	-8.5	Avg	0	1.0	
11651.195	45.2	H	54.0	-8.8	Avg	0	1.0	
15504.930	60.2	H	74.0	-13.8	Pk	0	1.0	
15506.195	59.6	V	74.0	-14.4	Pk	0	1.0	
11651.195	57.2	H	74.0	-16.8	Pk	0	1.0	
11650.820	56.6	V	74.0	-17.5	Pk	0	1.0	
17474.926	66.2	V	84.8	-18.6	Pk	0	1.0	
17473.859	65.8	H	84.8	-19.0	Pk	0	1.0	
17474.926	54.3	V	-	-	AVG	0	1.0	
17473.859	54.5	H	-	-	AVG	0	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 -30dBc.





## EMC Test Data

Client: Xirrus, Inc.	Job Number: J57788
Model: XS-3900-16 and XS-3700-8 Access Points	T-Log Number: T59089
	Account Manager: Joe Rohlfes
Contact: Ian Laity	
Spec: FCC 15.247, 15.401, RSS-210	Class: N/A

### Run #3: Radiated Spurious Emissions, 1000 - 4000 MHz (Intermodulation Signals)

All 16 radios transmitting continuously on channels 2412, 2437, 2467, 2472, 5180, 5260, 5280, 5300, 5200, 5220, 5240, 5745, 5765, 5785 and 5805

Maximum output power for the specified band on each channel.

6Mb/s on 5GHz transmitters using 802.11a; 1Mb/s on 2.4 GHz channels using 802.11b

Frequency MHz	Level dB $\mu$ V/m	Pol v/h	FCC Class B		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
10599.407	50.2	H	54.0	-3.8	AVG	340	1.0	2 x 5300
9749.467	57.3	H	68.3	-11.0	AVG	280	1.0	not in restricted band
10599.407	62.3	H	74.0	-11.7	PK	340	1.0	2 x 5300
20680.031	42.0	V	54.0	-12.0	AVG	0	1.7	
9648.290	56.3	H	68.3	-12.0	AVG	90	1.0	not in restricted band
20680.029	40.0	H	54.0	-14.1	AVG	0	1.7	
9749.467	72.0	H	88.3	-16.3	PK	280	1.0	not in restricted band
9648.290	69.2	H	88.3	-19.1	PK	90	1.0	not in restricted band
20680.031	51.0	V	74.0	-23.0	PK	0	1.7	
20680.029	50.0	H	74.0	-24.0	PK	0	1.7	
10360.155	38.2	H	68.3	-30.1	AVG	220	2.0	Not in RB, 2x 5180
10360.155	50.6	H	88.3	-37.7	PK	220	2.0	Not in RB, 2x 5180

All other emissions from the device with all transmitters operational were harmonics of the fundamental signals and, therefore, covered by the tests above for the individual channels in the 5GHz band and by the tests performed on low/center and high channels in the 2.4GHz band.

For signals in restricted bands the limits of 15.209 were applied. For inter-modulation products not in restricted bands the more stringent limit of FCC Part 15 E was used. For harmonics related to a specific transmitter in the 2.4GHz and 5725 - 5850 MHz bands a -30dBc limit (ref 15.247, RSS 210 (o)) was used. For harmonics of the fundamental in the 5150 - 5350 MHz band a -27dBm eirp (68.3dBuV/m) limit was used (ref FCC 15 E, RSS 210 (q)).



# EMC Test Data

Client: Xirrus, Inc.	Job Number: J57788
Model: XS-3900-16 and XS-3700-8 Access Points	T-Log Number: T59089
	Account Manager: Joe Rohlfes
Contact: Ian Laity	
Spec: FCC 15.247, 15.401, RSS-210	Class: N/A

## Radiated Spurious Emissions - Transmit Mode 5725-5850 MHz Bands(FCC 15.247) With Cushcraft 5.2dBi Omni

### 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: 3/24/2005	Config. Used: 1
Test Engineer: Juan Martinez	Config Change: None
Test Location: SVOATS #1	EUT Voltage: 120V/60Hz

### General Test Configuration

The EUT and all local support equipment were located on the turntable for radiated spurious emissions testing. All remote support equipment was located approximately 30 meters from the EUT with all I/O connections routed in overhead.

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

**Ambient Conditions:**            Temperature:        20 °C  
    Rel. Humidity:        35 %

### Summary of Results

Run #	Test Performed	Limit	Pass / Fail	Result / Margin
1	RE, 30 - 40,000 MHz - Spurious Emissions	FCC Part 15.209 / 15.247( c)	Pass	52.8dBµV/m (435.5µV/m) @ 11570.0MHz (-1.2dB)
2	RE, 30 - 40,000 MHz - Spurious Emissions	FCC 15E / RSS 210	Pass	51.5dBµV/m (375.8µV/m) @ 5150.0MHz (-2.5dB)

### 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: Xirrus, Inc.	Job Number: J57788
Model: XS-3900-16 and XS-3700-8 Access Points	T-Log Number: T59089
	Account Manager: Joe Rohlfes
Contact: Ian Laity	
Spec: FCC 15.247, 15.401, RSS-210	Class: N/A

### Run #1a: Radiated Spurious Emissions, 30 - 40,000 MHz. Low Channel @ 5745 MHz

Frequency MHz	Level dB $\mu$ V/m	Pol v/h	15.209 / 15.247		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
11490.00	52.4	v	54.0	-1.6	Avg	-	-	Note 2, Setting 31
11490.00	48.8	h	54.0	-5.2	Avg	-	-	Note 2, Setting 31
17235.00	45.4	v	54.0	-8.6	Avg	-	-	Note 2, Setting 31
11490.00	65.0	v	74.0	-9.0	Pk	-	-	Note 2, Setting 31
17235.00	44.3	h	54.0	-9.7	Avg	-	-	Note 2, Setting 31
11490.00	62.8	h	74.0	-11.2	Pk	-	-	Note 2, Setting 31
17235.00	57.0	v	74.0	-17.0	Pk	-	-	Note 2, Setting 31
17235.00	56.5	h	74.0	-17.5	Pk	-	-	Note 2, Setting 31

### Run #1b: Radiated Spurious Emissions, 30 - 40,000 MHz. Center Channel @ 5785 MHz

Frequency MHz	Level dB $\mu$ V/m	Pol v/h	15.209 / 15.247		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
11570.00	52.8	v	54.0	-1.2	Avg	-	-	Note 2, Setting 31
11570.00	48.1	h	54.0	-5.9	Avg	-	-	Note 2, Setting 31
11570.00	66.5	v	74.0	-7.5	Pk	-	-	Note 2, Setting 31
17355.00	44.1	h	54.0	-9.9	Avg	-	-	Note 2, Setting 31
17355.00	43.8	v	54.0	-10.2	Avg	-	-	Note 2, Setting 31
11570.00	61.9	h	74.0	-12.1	Pk	-	-	Note 2, Setting 31
17355.00	57.7	v	74.0	-16.3	Pk	-	-	Note 2, Setting 31
17355.00	55.0	h	74.0	-19.0	Pk	-	-	Note 2, Setting 31

### Run #1c: Radiated Spurious Emissions, 30 - 40,000 MHz. High Channel @ 5805 MHz

Frequency MHz	Level dB $\mu$ V/m	Pol v/h	15.209 / 15E		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
11610.00	52.8	v	54.0	-1.2	Avg	-	-	Note 2, Setting 31
11610.00	48.1	h	54.0	-5.9	Avg	-	-	Note 2, Setting 31
11610.00	66.5	v	74.0	-7.5	Pk	-	-	Note 2, Setting 31
11610.00	61.9	h	74.0	-12.1	Pk	-	-	Note 2, Setting 31

### Run #1d: Radiated Spurious Emissions, 30 - 40,000 MHz. High Channel @ 5825 MHz

Frequency MHz	Level dB $\mu$ V/m	Pol v/h	15.209 / 15.247		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
11650.00	51.4	v	54.0	-2.6	Avg	-	-	Note 2
11650.00	49.5	h	54.0	-4.5	Avg	-	-	Note 2
11650.00	65.5	v	74.0	-8.5	Pk	-	-	Note 2
11650.00	60.1	h	74.0	-13.9	Pk	-	-	Note 2

Note 1: For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set to -20dBc.

Note 2: No harmonic emissions detected above the 3rd harmonic close to 20-dB of the limit.



# EMC Test Data

Client: Xirrus, Inc.	Job Number: J57788
Model: XS-3900-16 and XS-3700-8 Access Points	T-Log Number: T59089
	Account Manager: Joe Rohlfes
Contact: Ian Laity	
Spec: FCC 15.247, 15.401, RSS-210	Class: N/A

## Run #2a: Radiated Spurious Emissions, 30 - 40,000 MHz. Low Channel @ 5180 MHz

Delta Marker - Peak	42.83 dB
Delta Marker - Average	48.16 dB

### Fundamental Signal Radiated Field Strength

Frequency MHz	Level dB $\mu$ V/m	Pol v/h	15.209 / 15E		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
5181.365	99.7	V	-	-	AVG	110	1.2	
5181.365	108.1	V	-	-	PK	110	1.2	

### Band Edge Signal Radiated Field Strength

Frequency MHz	Level dB $\mu$ V/m	Pol v/h	15.209 / 15E		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
5150.000	51.5	V	54.0	-2.5	AVG	113	1.0	Note 2
5150.000	65.3	V	74.0	-8.7	PK	113	1.0	Note 2

### Other Spurious Radiated Emissions:

Frequency MHz	Level dB $\mu$ V/m	Pol v/h	15.209 / 15E		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
10360.00	49.5	h	68.3	-18.8	Avg	-	-	Note 3
10360.00	48.5	v	68.3	-19.8	Avg	-	-	Note 3

- 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.
- Note 3: No harmonic emissions detected above the 2nd harmonic close to 20-dB of the limit.

## Run #2b: Radiated Spurious Emissions, 30 - 40,000 MHz. Center Channel @ 5260 MHz

Frequency MHz	Level dB $\mu$ V/m	Pol v/h	15.209 / 15E		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
10520.00	51.2	v	54.0	-2.8	Avg	-	-	Note 2, Setting 12
10520.00	47.5	h	54.0	-6.5	Avg	-	-	Note 2, Setting 12
10520.00	65.2	v	74.0	-8.8	PK	-	-	Note 2, Setting 12
10520.00	61.2	h	74.0	-12.8	PK	-	-	Note 2, Setting 12

- 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: No harmonic emissions detected above the 2nd harmonic close to 20-dB of the limit.



# EMC Test Data

Client: Xirrus, Inc.	Job Number: J57788
Model: XS-3900-16 and XS-3700-8 Access Points	T-Log Number: T59089
	Account Manager: Joe Rohlfes
Contact: Ian Laity	
Spec: FCC 15.247, 15.401, RSS-210	Class: N/A

## Run #2c: Radiated Spurious Emissions, 30 - 40,000 MHz. High Channel @ 5320 MHz

	H	V	
Fundamental emission level @ 3m in 1MHz RBW:	100.1	91.4	Peak Measurement (RB=VB=1MHz)
Fundamental emission level @ 3m in 1MHz RBW:	92.4	84.1	Average Measurement (RB=1MHz, VB=10Hz)
Delta Marker - Peak	45.33 dB		
Delta Marker - Average	55.43 dB		
Calculated Band-Edge Measurement:	54.77 dBuV/m		Peak
Calculated Band-Edge Measurement:	36.97 dBuV/m		Average

### Fundamental Signal Radiated Field Strength

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments
MHz	dBuV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
5318.980	84.1	H	-	-	AVG	35	1.9	
5318.980	91.4	H	-	-	PK	35	1.9	
5318.643	92.4	V	-	-	AVG	110	1.2	
5318.643	100.1	V	-	-	PK	110	1.2	

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments
MHz	dBuV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
10640.00	49.8	v	54.0	-4.2	Avg	-	-	Note 3, Setting 12
15960.00	45.5	v	54.0	-8.5	Avg	-	-	Note 3, Setting 12
10640.00	45.1	h	54.0	-8.9	Avg	-	-	Note 3, Setting 12
15960.00	44.6	h	54.0	-9.4	Avg	-	-	Note 3, Setting 12
10640.00	62.1	v	74.0	-11.9	Pk	-	-	Note 3, Setting 12
10640.00	57.5	h	74.0	-16.5	Pk	-	-	Note 3, Setting 12
5350.000	37.0	v	54.0	-17.0	Avg	110	1.2	Note 2
5350.000	54.8	h	74.0	-19.2	Pk	110	1.2	Note 2
15960.00	52.1	v	74.0	-21.9	Pk	-	-	Note 3, Setting 12
15960.00	51.2	h	74.0	-22.8	Pk	-	-	Note 3, Setting 12

- 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.
- Note 3: No harmonic emissions detected above the 3rd harmonic close to 20-dB of the limit.



## EMC Test Data

Client:	Xirrus, Inc.	Job Number:	J57788
Model:	XS-3900-16 and XS-3700-8 Access Points	T-Log Number:	T59090
		Account Manager:	Joe Rohlfes
Contact:	Ian Laity		
Emissions Spec:	FCC 15.247, 15.401, RSS-210	Class:	Radio
Immunity Spec:	-	Environment:	-

## EMC Test Data

For The

**Xirrus, Inc.**

Model

**XS-3900-16 and XS-3700-8 Access  
Points**

Date of Last Test: 2/24/2005



## EMC Test Data

Client:	Xirrus, Inc.	Job Number:	J57788
Model:	XS-3900-16 and XS-3700-8 Access Points	T-Log Number:	T59090
Contact:	Ian Laity	Account Manager:	Joe Rohlfes
Emissions Spec:	FCC 15.247, 15.401, RSS-210	Class:	Radio
Immunity Spec:	-	Environment:	-

### EUT INFORMATION

#### General Description

The Xirrus, Inc. model XS-3900 is a multi-radio 802.11abg Access Point radio which is designed to act as a hub for a wireless local area network (WLAN). There are two versions of the system, one (model XS-3900-16) contains 16 separate transceivers, the other (model XS-3700-8) contains 8 transceivers. The radio interfaces are provided via four identical circuit boards. Each of the boards has four 802.11abg radios installed onto it (in the 8-port version two of these radios are removed from each board).

Normally, the EUT would be ceiling mounted during operation. The EUT was tested as both table-top equipment and also tested with the EUT raised to a height of 1.5m above the ground plane. The electrical rating of the device is 100 - 240Vac, 50/60Hz, 0.5 - 3 A.

#### Equipment Under Test

Manufacturer	Model	Description	Serial Number	FCC ID
Xirrus	XS-3900-16	802.11 a/b/g access point		

#### EUT Antenna

The antennas are either integral to the device or connect to the EUT via a non-standard, reverse gender TNC connector, thereby meeting the requirements of FCC 15.203.

#### EUT Enclosure

The EUT enclosure is primarily constructed of plastic. It is circular with a diameter of 48 cm and a height of 10cm.

#### Modification History

Mod. #	Test	Date	Modification
1	-	-	-
2			
3			

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



## EMC Test Data

Client:	Xirrus, Inc.	Job Number:	J57788
Model:	XS-3900-16 and XS-3700-8 Access Points	T-Log Number:	T59090
Contact:	Ian Laity	Account Manager:	Joe Rohlfes
Emissions Spec:	FCC 15.247, 15.401, RSS-210	Class:	Radio
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
Toshiba	Satellite 160 (PSA60U 03501D)	Laptop PC	XG0516882	DoC
D-Link	DGS-1005D	Gigabit Ethernet Switch	DR1914B005832	-

#### Interface Cabling and Ports

Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length(m)
EUT GE #1	Ethernet Switch	Cat 5	unshielded	15
EUT GE #2	Ethernet Switch	Cat 5	unshielded	15
EUT Console	Laptop serial	flat cable	unshielded	15
EUT 10/100	Laptop ethernet	Cat 5	unshielded	5
EUT AC power	AC power	3-wire	unshielded	2

Note: The **Console** port was disconnected during digital device testing but remained connected for the radio transmitter tests. The port is only used for diagnostics/configuration and is not intended to be permanently connected. It was used during testing to configure the EUT on the required channel.

#### EUT Operation During Emissions Tests

The EUT was in either transmit mode or receive mode, as detailed in the individual run descriptions. The transmitter(s) were set to operate at the worst case data rates (6Mb/s using OFDM and 1Mb/s using CCK) and to transmit continuously (99% duty cycle). The gigabit ethernet ports were sending packets to and from the switch. The 10/100 ethernet port was transmitting data packets to the laptop.







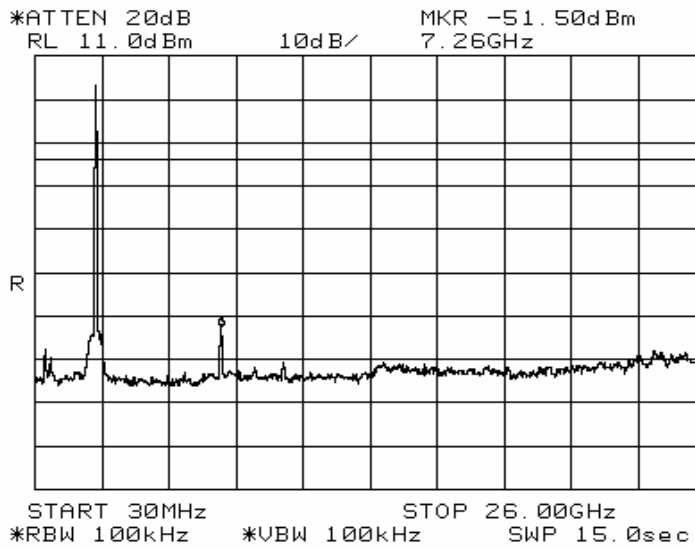
# EMC Test Data

Client: Xirrus, Inc.	Job Number: J57788
Model: XS-3900-16 and XS-3700-8 Access Points	T-Log Number: T59090
Contact: Ian Laity	Account Manager: Joe Rohlfs
Spec: FCC 15.247, 15.401, RSS-210	Class: N/A

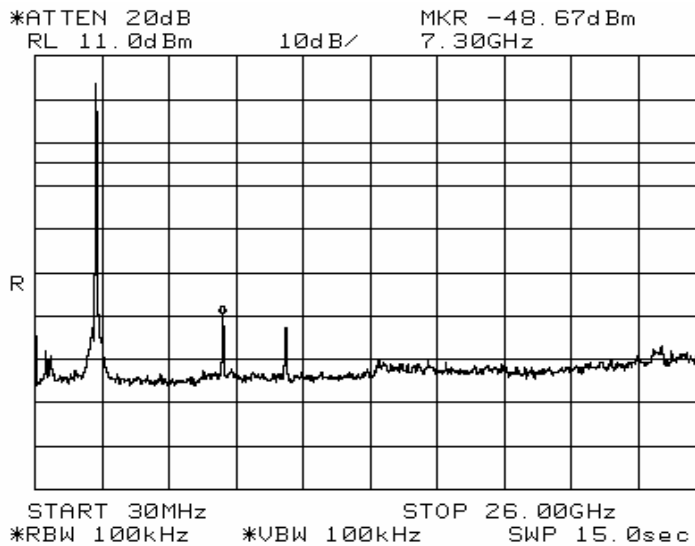
## Run #1d: Antenna Conducted Spurious Emissions, 30 - 26,500 MHz.

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.

### Low Channel



### Middle Channel

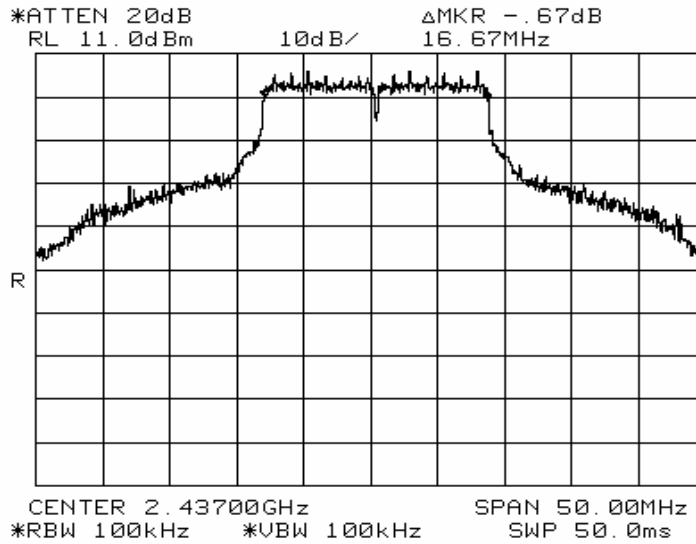




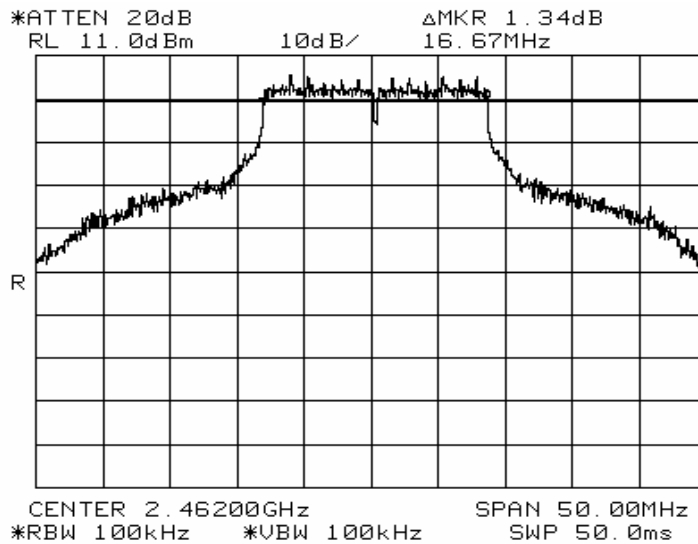


Client: Xirrus, Inc.	Job Number: J57788
Model: XS-3900-16 and XS-3700-8 Access Points	T-Log Number: T59090
	Account Manager: Joe Rohlfs
Contact: Ian Laity	
Spec: FCC 15.247, 15.401, RSS-210	Class: N/A

### Middle Channel



### High Channel





# EMC Test Data

Client: Xirrus, Inc.	Job Number: J57788
Model: XS-3900-16 and XS-3700-8 Access Points	T-Log Number: T59090
	Account Manager: Joe Rohlfes
Contact: Ian Laity	
Spec: FCC 15.247, 15.401, RSS-210	Class: N/A

### Run #3: Output Power

Maximum antenna gain: 6 dBi

Channel	Frequency (MHz)	Peak Output Power (dBm)	Average Output Power (dBm)	Peak Output Power (W)	EIRP (W, Peak)
Low	2412	21.3	16.7	0.1349	0.5370
Mid	2437	21.1	16.7	0.1288	0.5129
High	2462	21.0	16.5	0.1259	0.5012

Note 1: Output power measured using a peak power meter for peak power and average sensor for average power.

### Aggregate power from the system:

With all four transceivers capable of operating in the 2400-2483.5 MHz band the total output power = 0.063W x 4

Total peak power across the band is:	27.3 dBm	0.537 W
Total peak eirp across the band is:	33.3 dBm	2.138 W
Total average power across the band is:	22.7 dBm	0.186 W
Total average eirp across the band is:	28.7 dBm	0.741 W

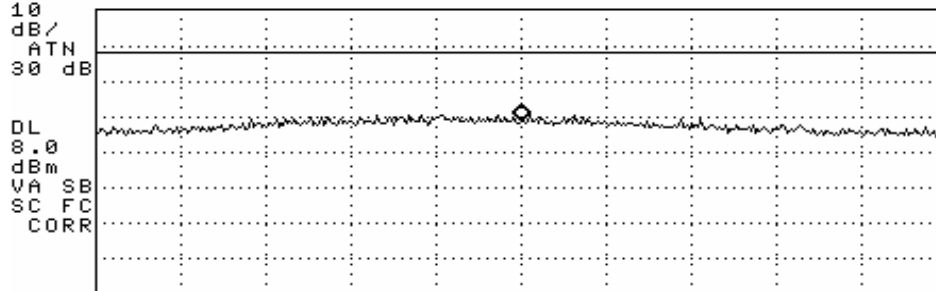
### Run #4: Power Spectral Density

Channel	Frequency (MHz)	Res BW	P.S.D. (averaged over 1 second in a 3kHz bandwidth) dBm
Low	2412	3 kHz	-11.39
Mid	2437	3 kHz	-8.68
High	2462	3 kHz	-8.68

22:45:26 FEB 18, 2005

ACTV DET: PEAK  
 MEAS DET: PEAK QP AVG  
 MKR 2.4107475 GHz  
 -11.33 dBm

LOG REF 20.0 dBm



CENTER 2.4107475 GHz SPAN 300.0 kHz  
 RT #IF BW 3.0 kHz #AVG BW 3 kHz #SWP 100 sec

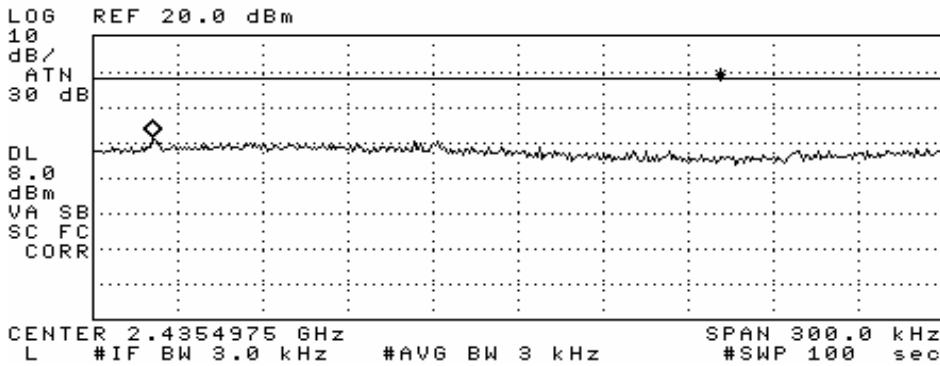


# EMC Test Data

Client:	Xirrus, Inc.	Job Number:	J57788
Model:	XS-3900-16 and XS-3700-8 Access Points	T-Log Number:	T59090
Contact:	Ian Laity	Account Manager:	Joe Rohlfs
Spec:	FCC 15.247, 15.401, RSS-210	Class:	N/A

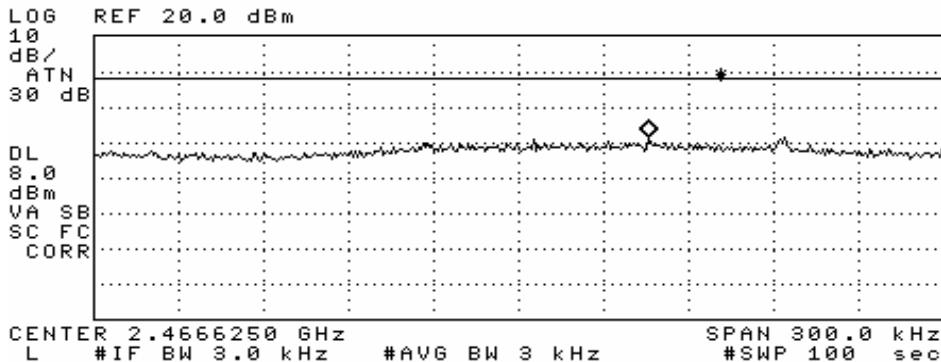
22:49:39 FEB 18, 2005

ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 2.4353685 GHz  
-8.68 dBm



22:58:31 FEB 18, 2005

ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 2.4666708 GHz  
-8.68 dBm



### Run #5: Bandedge

The highest signal level in the restricted bands above and below the allocated band was at the band edge. The highest peak and average field strengths in the restricted band are calculated from the field strength of the fundamental by subtracting a correction factor. The typical factor is the difference between the highest peak and average in band signal level and the highest peak and average restricted band levels.

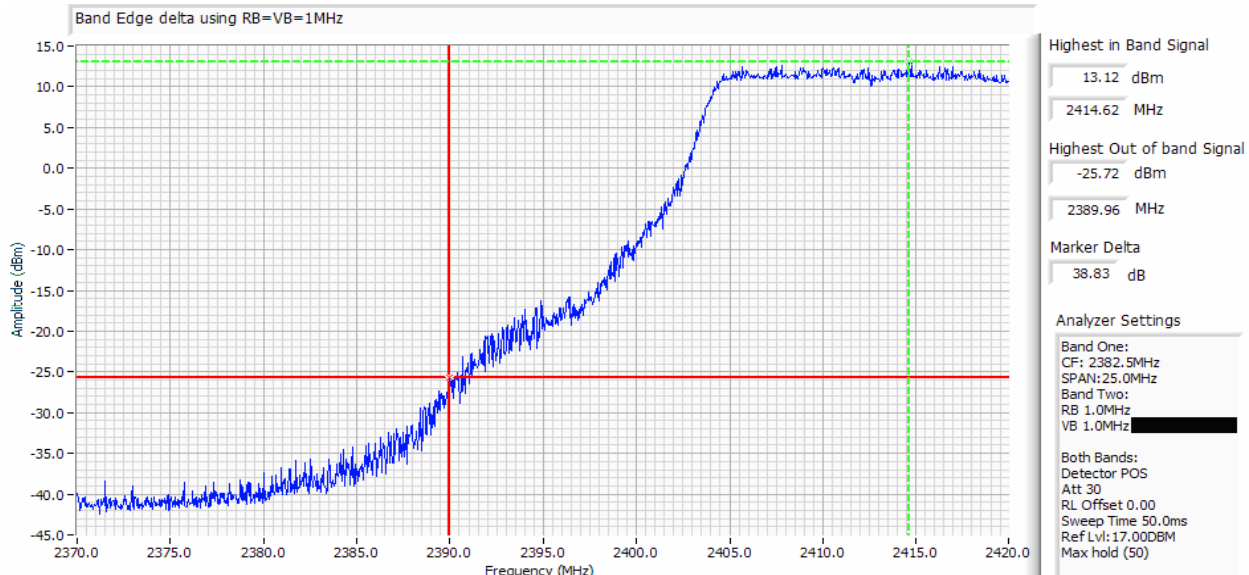
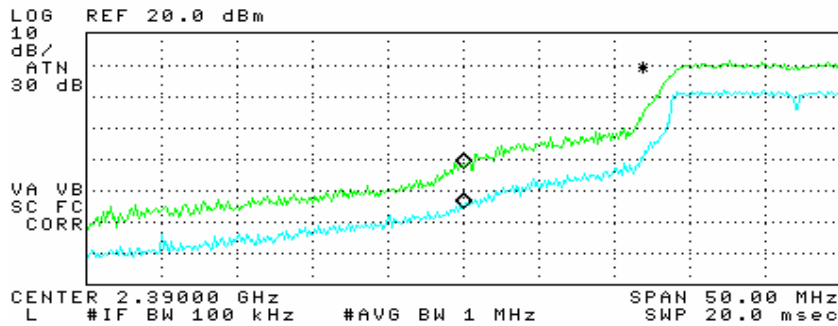
As the highest restricted band signal was at the band edge the correction factor is determined as follows: Difference between the band-edge level and highest in-band level measured using RBW= 1MHz. A second correction, the difference between the band edge level measured in 1MHz and measured in 100 kHz was then added.

Client:	Xirrus, Inc.	Job Number:	J57788
Model:	XS-3900-16 and XS-3700-8 Access Points	T-Log Number:	T59090
Contact:	Ian Laity	Account Manager:	Joe Rohlfs
Spec:	FCC 15.247, 15.401, RSS-210	Class:	N/A

Channel	Marker Deltas		Correction Factor
	Band Edge:Inband delta (1MHz)	Band edge delta 1MHz:100kHz	
2412	38.83	12.69	51.52
2462	36.33	13.6	49.93

22:37:55 FEB 18, 2005

ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR Δ 0 Hz  
12.69 dB





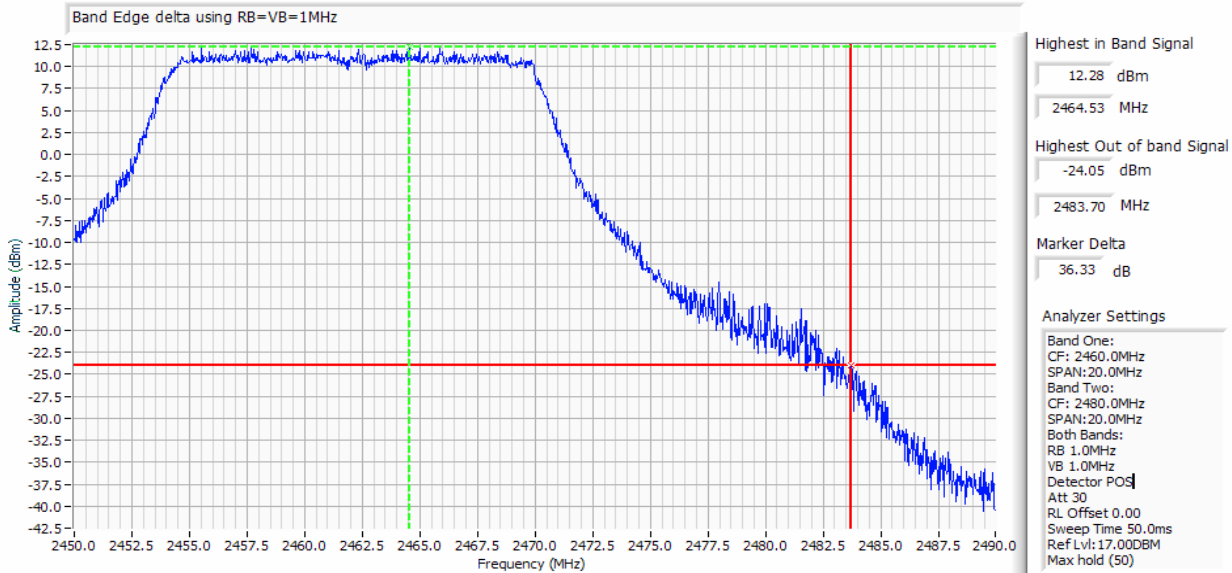
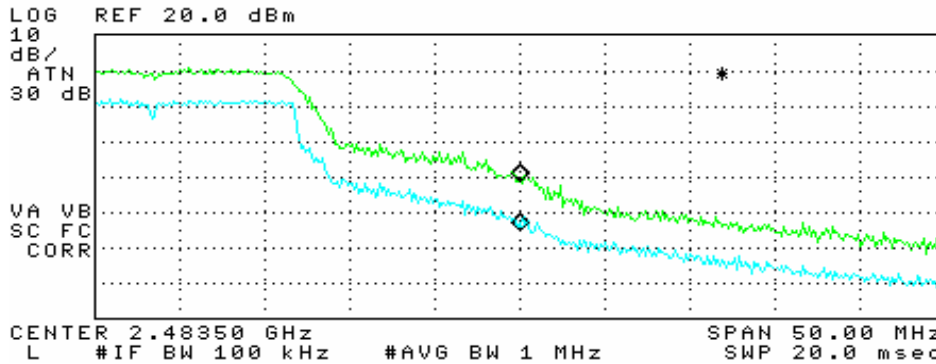


# EMC Test Data

Client: Xirrus, Inc.	Job Number: J57788
Model: XS-3900-16 and XS-3700-8 Access Points	T-Log Number: T59090
Contact: Ian Laity	Account Manager: Joe Rohlfs
Spec: FCC 15.247, 15.401, RSS-210	Class: N/A

22:54:46 FEB 18, 2005

ACTV DET: PEAK  
 MEAS DET: PEAK QP AVG  
 MKRΔ 0 Hz  
 13.61 dB







# EMC Test Data

Client:	Xirrus, Inc.	Job Number:	J57788
Model:	XS-3900-16 and XS-3700-8 Access Points	T-Log Number:	T59090
		Account Manager:	Joe Rohlfes
Contact:	Ian Laity		
Spec:	FCC 15.247, 15.401, RSS-210	Class:	N/A

**Run #1a: Radiated Spurious Emissions, 30 - 26,000 MHz. Low Channel @ 2412 MHz**

Marker Delta Measurements

restricted band level: In band level: 38.8 delta between highest in-band and band-edge (100kHz)  
 1MHz: 100kHz 12.7 delta at band edge between 1MHz and 100kHz measurements.  
 Correction factor -51.5 used to determine band edge level from fundamental level

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB $\mu$ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
<b>Internal</b>								
2405.800	91.3	V	-	-	AVG	110	1.1	RBW =1 MHz
2405.800	99.9	V	-	-	PK	110	1.1	RBW =1 MHz
2411.035	85.1	V	-	-	AVG	0	1.0	#1 Fundamental, RBW= 100kHz
2411.035	92.1	V	-	-	PK	0	1.0	#1 Fundamental, RBW= 100kHz
<b>2439.000</b>	<b>39.8</b>	<b>V</b>	<b>54.0</b>	<b>-14.2</b>	<b>AVG</b>	-	-	<b>Bandedge</b>
<b>2439.000</b>	<b>48.4</b>	<b>V</b>	<b>74.0</b>	<b>-25.6</b>	<b>PK</b>	-	-	<b>Bandedge</b>
<b>OMNI antenna</b>								
<b>Power 16</b>								
2412.800	97.8	V	-	-	AVG	270	1.0	RBW =1 MHz
2412.800	106.5	V	-	-	PK	270	1.0	RBW =1 MHz
2411.035	91.6	V	-	-	AVG	270	1.0	#1 Fundamental
2411.035	98.1	V	-	-	PK	270	1.0	#1 Fundamental
<b>2439.000</b>	<b>46.3</b>	<b>V</b>	<b>54.0</b>	<b>-7.7</b>	<b>AVG</b>	-	-	<b>Bandedge</b>
<b>2439.000</b>	<b>55.0</b>	<b>V</b>	<b>74.0</b>	<b>-19.0</b>	<b>PK</b>	-	-	<b>Bandedge</b>
<b>Patch antenna</b>								
2410.523	98.5	V	-	-	AVG	130	1.0	RBW =1 MHz
2410.523	107.2	V	-	-	PK	130	1.0	RBW =1 MHz
2411.035	92.0	V	-	-	AVG	130	1.0	#1 Fundamental
2411.035	98.9	V	-	-	PK	130	1.0	#1 Fundamental
<b>2439.000</b>	<b>47.0</b>	<b>V</b>	<b>54.0</b>	<b>-7.0</b>	<b>AVG</b>	-	-	<b>Bandedge</b>
<b>2439.000</b>	<b>55.7</b>	<b>V</b>	<b>74.0</b>	<b>-18.3</b>	<b>PK</b>	-	-	<b>Bandedge</b>

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



## EMC Test Data

Client:	Xirrus, Inc.	Job Number:	J57788
Model:	XS-3900-16 and XS-3700-8 Access Points	T-Log Number:	T59090
Contact:	Ian Laity	Account Manager:	Joe Rohlfes
Spec:	FCC 15.247, 15.401, RSS-210	Class:	N/A

**Run #1b: Radiated Spurious Emissions, 30 - 26,000 MHz. Center Channel @ 2437 MHz**

Frequency MHz	Level dB $\mu$ V/m	Pol v/h	15.209 / 15.247		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
4873.935	36.4	V	54.0	-17.7	AVG	0	1.0	2nd harmonic
4873.935	47.1	V	74.0	-26.9	PK	0	1.0	2nd harmonic
7311.155	35.5	V	54.0	-18.5	AVG	0	1.0	3rd harmonic
7311.155	46.8	V	74.0	-27.2	PK	0	1.0	3rd harmonic

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

Note 2: No second harmonic detected. No other emissions above second harmonic detected 20-dB of the limit



# EMC Test Data

Client:	Xirrus, Inc.	Job Number:	J57788
Model:	XS-3900-16 and XS-3700-8 Access Points	T-Log Number:	T59090
		Account Manager:	Joe Rohlfes
Contact:	Ian Laity		
Spec:	FCC 15.247, 15.401, RSS-210	Class:	N/A

## Run #1c: Radiated Spurious Emissions, 30 - 26,000 MHz. High Channel @ 2462 MHz

### Marker Delta Measurements

restricted band level: In band level: 36.3 delta between highest in-band and band-edge (100kHz)  
 1MHz: 100kHz 13.6 delta at band edge between 1MHz and 100kHz measurements.  
 Correction factor -49.9 used to determine band edge level from fundamental level

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB $\mu$ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
<b>OMNI antenna</b>								
<b>Power 16</b>								
2462.728	97.4	V	-	-	AVG	167	1.0	RBW =1 MHz
2462.728	105.6	V	-	-	PK	167	1.0	RBW =1 MHz
2461.475	90.4	V	-	-	AVG	167	1.0	#11 Fundamental
2461.475	97.4	V	-	-	PK	167	1.0	#11 Fundamental
<b>2483.500</b>	<b>47.5</b>	<b>V</b>	<b>54.0</b>	<b>-6.5</b>	<b>AVG</b>	-	-	<b>Bandedge</b>
<b>2483.500</b>	<b>55.7</b>	<b>V</b>	<b>74.0</b>	<b>-18.3</b>	<b>PK</b>	-	-	<b>Bandedge</b>
<b>Patch antenna</b>								
2461.108	101.4	V	-	-	AVG	106	1.1	RBW =1 MHz
2461.108	109.7	V	-	-	PK	106	1.1	RBW =1 MHz
2461.475	95.0	V	-	-	AVG	106	1.1	#11 Fundamental
2461.475	101.3	V	-	-	PK	106	1.1	#11 Fundamental
<b>2483.500</b>	<b>51.5</b>	<b>V</b>	<b>54.0</b>	<b>-2.5</b>	<b>AVG</b>	-	-	<b>Bandedge</b>
<b>2483.500</b>	<b>59.8</b>	<b>V</b>	<b>74.0</b>	<b>-14.2</b>	<b>PK</b>	-	-	<b>Bandedge</b>
<b>Internal</b>								
2463.283	92.9	V	-	-	AVG	104	1.3	RBW =1 MHz
2463.283	101.7	V	-	-	PK	104	1.3	RBW =1 MHz
2461.475	86.5	V	-	-	AVG	-	-	#11 Fundamental, RBW = 100kHz
2461.475	93.6	V	-	-	PK	-	-	#11 Fundamental, RBW = 100kHz
<b>2483.500</b>	<b>43.0</b>	<b>V</b>	<b>54.0</b>	<b>-11.0</b>	<b>AVG</b>	-	-	<b>Bandedge</b>
<b>2483.500</b>	<b>51.8</b>	<b>V</b>	<b>74.0</b>	<b>-22.2</b>	<b>PK</b>	-	-	<b>Bandedge</b>

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

Note 2: No second harmonic detected. No other emissions above second harmonic detected 20-dB of the limit









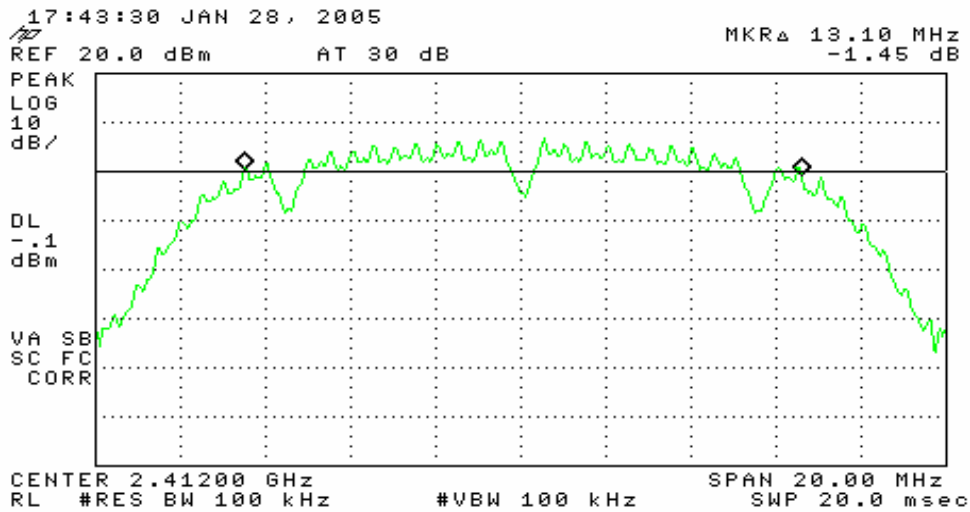
Client: Xirrus, Inc.	Job Number: J57788
Model: XS-3900-16 and XS-3700-8 Access Points	T-Log Number: T59090
Contact: Ian Laity	Account Manager: Joe Rohlfs
Spec: FCC 15.247, 15.401, RSS-210	Class: N/A

### Run #2: Signal Bandwidth

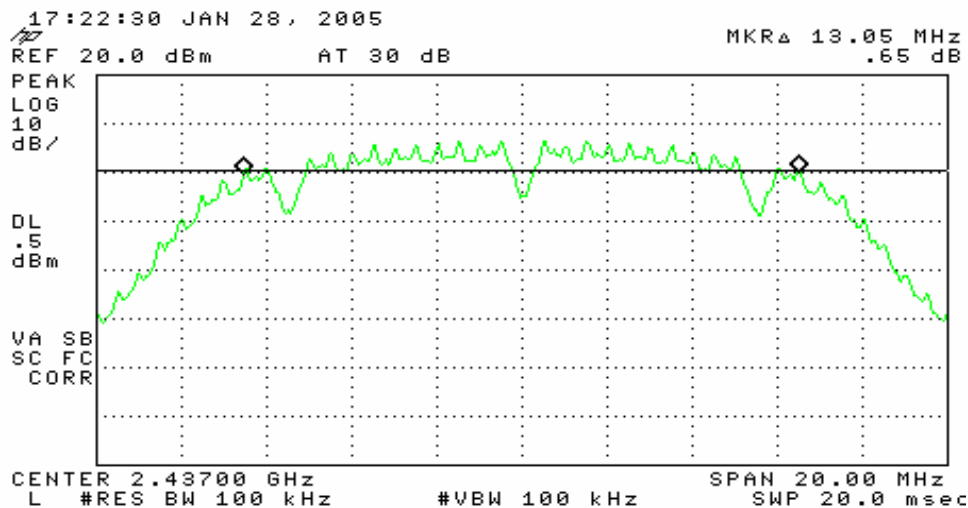
Data rate 1Mbps

Channel	Frequency (MHz)	Resolution Bandwidth	6dB Signal Bandwidth (MHz)	99% Signal Bandwidth (MHz)
Low	2412	100kHz	13.1	14.8
Mid	2437	100kHz	13.1	14.9
High	2462	100kHz	13.1	14.8

#### Low Channel

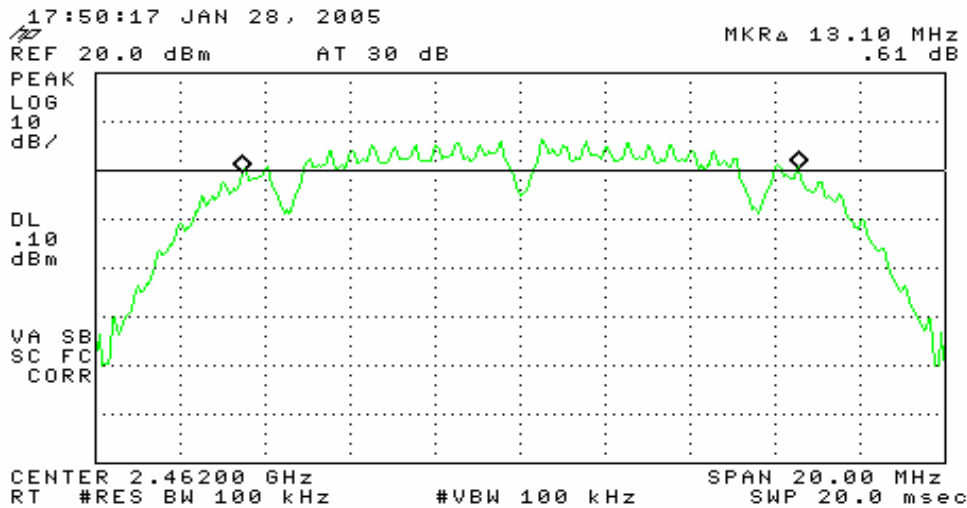


#### Middle Channel



Client:	Xirrus, Inc.	Job Number:	J57788
Model:	XS-3900-16 and XS-3700-8 Access Points	T-Log Number:	T59090
Contact:	Ian Laity	Account Manager:	Joe Rohlfs
Spec:	FCC 15.247, 15.401, RSS-210	Class:	N/A

### High Channel



### Run #3: Output Power

Maximum antenna gain: 6 dBi

Channel	Frequency (MHz)	Peak Output Power (dBm)	Average Output Power (dBm)	Output Power (W)	EIRP (W)
Low	2412	18.0	16.7	0.0631	0.2512
Mid	2437	18.0	16.6	0.0631	0.2512
High	2462	17.8	16.5	0.0603	0.2399

Note 1: Output power measured using a peak power meter for peak power and average sensor for average power.

### Aggregate power from the system:

With all four transceivers capable of operating in the 2400-2483.5 MHz band the total output power = 0.063W x 4

Total peak power across the band is:	24.0 dBm	0.251 W
Total peak eirp across the band is:	30.0 dBm	1.000 W
Total average power across the band is:	22.7 dBm	0.186 W
Total average eirp across the band is:	28.7 dBm	0.741 W



# EMC Test Data

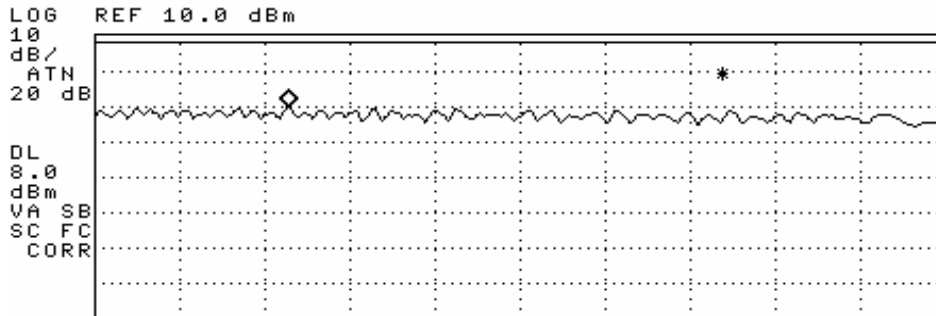
Client: Xirrus, Inc.	Job Number: J57788
Model: XS-3900-16 and XS-3700-8 Access Points	T-Log Number: T59090
Contact: Ian Laity	Account Manager: Joe Rohlfs
Spec: FCC 15.247, 15.401, RSS-210	Class: N/A

## Run #4: Power Spectral Density

Channel	Frequency (MHz)	Res BW	P.S.D. (averaged over 1 second in a 3kHz bandwidth) dBm
Low	2412	3 kHz	-10.59
Mid	2437	3 kHz	-11.01
High	2462	3 kHz	3.12

22:16:09 FEB 18, 2005

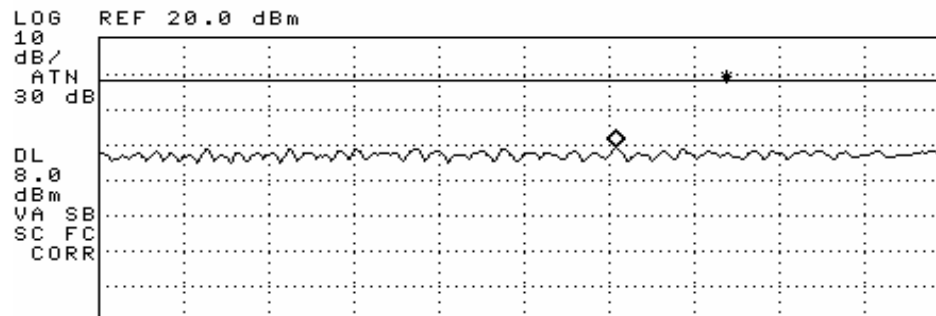
ACTV DET: PEAK  
 MEAS DET: PEAK QP AVG  
 MKR 2.4128976 GHz  
 -10.59 dBm



CENTER 2.4129794 GHz SPAN 300.0 kHz  
 RT #IF BW 3.0 kHz #AVG BW 3 kHz #SWP 100 sec

22:20:18 FEB 18, 2005

ACTV DET: PEAK  
 MEAS DET: PEAK QP AVG  
 MKR 2.4350523 GHz  
 -11.01 dBm



CENTER 2.4350200 GHz SPAN 300.0 kHz  
 RT #IF BW 3.0 kHz AVG BW 3 kHz #SWP 100 sec



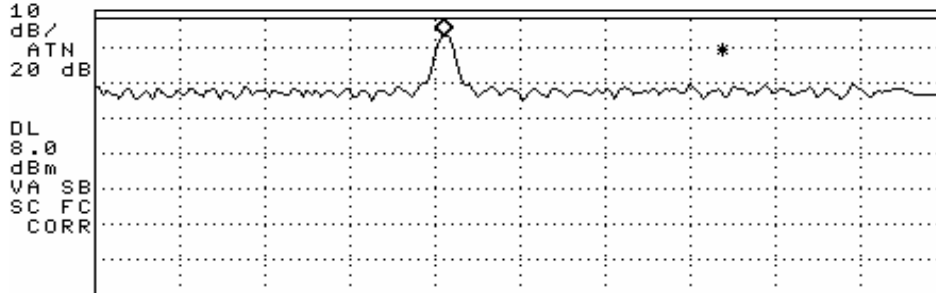
# EMC Test Data

Client:	Xirrus, Inc.	Job Number:	J57788
Model:	XS-3900-16 and XS-3700-8 Access Points	T-Log Number:	T59090
Contact:	Ian Laity	Account Manager:	Joe Rohlfs
Spec:	FCC 15.247, 15.401, RSS-210	Class:	N/A

22:31:22 FEB 18, 2005

ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 2.4634680 GHz  
3.12 dBm

LOG REF 10.0 dBm



CENTER 2.4634950 GHz SPAN 300.0 kHz  
RT #IF BW 3.0 kHz #AVG BW 3 kHz #SWP 100 sec



# EMC Test Data

Client:	Xirrus, Inc.	Job Number:	J57788
Model:	XS-3900-16 and XS-3700-8 Access Points	T-Log Number:	T59090
		Account Manager:	Joe Rohlfes
Contact:	Ian Laity		
Spec:	FCC 15.247, 15.401, RSS-210	Class:	N/A

## FCC 15.247 DTS - Spurious Emissions (802.11b)

### 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: 2/24/2005	Config. Used: 1
Test Engineer: Juan Martinez	Config Change: None
Test Location: SVOATS #3	EUT Voltage: 120V/60Hz

### General Test Configuration

The EUT and all local support equipment were located on the turntable for radiated spurious emissions testing. All remote support equipment was located approximately 30 meters from the EUT with all I/O connections routed overhead.

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

**Ambient Conditions:**

Temperature:	13 °C
Rel. Humidity:	72 %

### Summary of Results

Run #	Test Performed	Limit	Pass / Fail	Result / Margin
1a - 1c	RE, 30 - 26,000 MHz - Spurious Emissions	FCC Part 15.209 / 15.247( c)	Pass	49.9dBuV/m @ 2439 MHz (-4.1dB)

### Modifications Made During Testing:

No modifications were made to the EUT during testing

### Deviations From The Standard

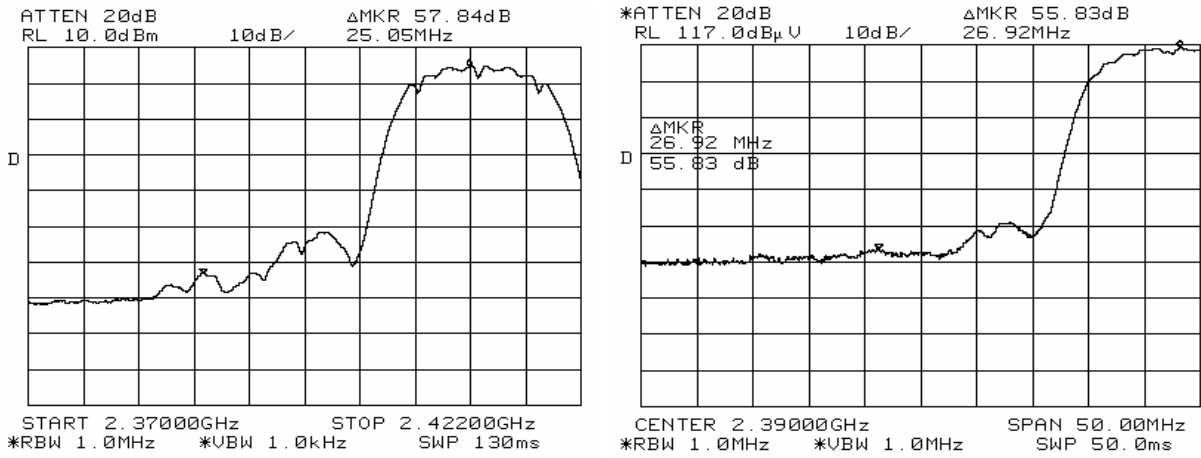
No deviations were made from the requirements of the standard.



# EMC Test Data

Client: Xirrus, Inc.	Job Number: J57788
Model: XS-3900-16 and XS-3700-8 Access Points	T-Log Number: T59090
Contact: Ian Laity	Account Manager: Joe Rohlfes
Spec: FCC 15.247, 15.401, RSS-210	Class: N/A

## Run #1a: Radiated Spurious Emissions, 30 - 26,000 MHz. Low Channel @ 2412 MHz



### Internal (Power Setting of 17)

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBμV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2386.600	40.9	V	54.0	-13.1	AVG	-	-	Bandedge
2386.600	45.7	V	74.0	-28.3	PK	-	-	Bandedge
4824.115	41.1	V	54.0	-12.9	AVG	0	1.0	2nd harmonic
4824.115	48.1	V	74.0	-25.9	PK	0	1.0	2nd harmonic
2411.035	98.7	V	-	-	AVG	0	1.0	#1 Fundamental
2411.035	101.5	V	-	-	PK	0	1.0	#1 Fundamental
2413.060	96.5	H	-	-	AVG	0	1.0	#1 Fundamental
2413.060	99.6	H	-	-	PK	0	1.0	#1 Fundamental

### OMNI antenna (Power Setting of 16)

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBμV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2386.600	42.7	V	54.0	-11.3	AVG	-	-	Bandedge
2386.600	48.2	V	74.0	-25.8	PK	-	-	Bandedge
4874.425	34.2	V	54.0	-19.8	AVG	0	1.0	2nd harmonic
4874.425	45.7	V	74.0	-28.4	PK	0	1.0	2nd harmonic
2412.923	100.5	V	-	-	AVG	269	1.0	RBW = 1MHz
2412.923	104.0	V	-	-	PK	269	1.0	RBW = 1MHz
2411.035	91.8	V	-	-	AVG	0	1.0	#1 Fundamental, RBW= 100kHz
2411.035	101.0	V	-	-	PK	0	1.0	#1 Fundamental, RBW= 100kHz



## EMC Test Data

Client:	Xirrus, Inc.	Job Number:	J57788
Model:	XS-3900-16 and XS-3700-8 Access Points	T-Log Number:	T59090
Contact:	Ian Laity	Account Manager:	Joe Rohlfes
Spec:	FCC 15.247, 15.401, RSS-210	Class:	N/A

### Patch antenna

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB $\mu$ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
<b>2386.600</b>	<b>45.5</b>	<b>V</b>	<b>54.0</b>	<b>-8.5</b>	<b>AVG</b>	-	-	<b>Bandedge</b>
<b>2386.600</b>	<b>50.7</b>	<b>V</b>	<b>74.0</b>	<b>-23.3</b>	<b>PK</b>	-	-	<b>Bandedge</b>
4874.990	34.1	V	54.0	-19.9	AVG	0	1.0	2nd harmonic
4874.990	45.9	V	74.0	-28.1	PK	0	1.0	2nd harmonic
2411.003	103.3	V	-	-	AVG	136	1.2	RBW = 1MHz
2411.003	106.5	V	-	-	PK	136	1.2	RBW = 1MHz
2411.035	94.3	V	-	-	AVG	0	1.0	#1 Fundamental
2411.035	103.8	V	-	-	PK	0	1.0	#1 Fundamental

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

Note 2: No other emissions above second harmonic detected close to 20-dB of the limit.



# EMC Test Data

Client: Xirrus, Inc.	Job Number: J57788
Model: XS-3900-16 and XS-3700-8 Access Points	T-Log Number: T59090
	Account Manager: Joe Rohlfes
Contact: Ian Laity	
Spec: FCC 15.247, 15.401, RSS-210	Class: N/A

## Run #1b: Radiated Spurious Emissions, 30 - 26,000 MHz. Center Channel @ 2437 MHz

### OMNI antenna

#### Power 17

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB $\mu$ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
4874.115	54.0	V	54.0	0.0	AVG	0	1.0	2nd harmonic
4874.115	56.7	V	74.0	-17.3	PK	0	1.0	2nd harmonic

#### Power 16

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB $\mu$ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
4874.105	49.9	V	54.0	-4.1	AVG	0	1.0	2nd harmonic
4874.105	53.2	V	74.0	-20.8	PK	0	1.0	2nd harmonic
7309.670	35.6	V	54.0	-18.4	AVG	0	1.0	3rd harmonic
7309.670	47.3	V	74.0	-26.7	PK	0	1.0	3rd harmonic

### Externa Patch antenna

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB $\mu$ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
4874.020	46.5	V	54.0	-7.5	AVG	0	1.0	2nd harmonic
4874.020	51.4	V	74.0	-22.6	PK	0	1.0	2nd harmonic
7312.020	35.5	V	54.0	-18.5	AVG	0	1.0	3rd harmonic
7312.020	47.6	V	74.0	-26.4	PK	0	1.0	3rd harmonic

### Internal

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB $\mu$ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
7310.495	41.3	H	54.0	-12.7	AVG	0	1.0	3rd harmonic
7310.495	49.8	H	74.0	-24.2	PK	0	1.0	3rd harmonic
4873.985	34.8	H	54.0	-19.2	AVG	0	1.0	2nd harmonic
4873.985	46.4	H	74.0	-27.6	PK	0	1.0	2nd harmonic
4874.095	39.7	V	54.0	-14.3	AVG	0	1.0	2nd harmonic
4874.095	49.0	V	74.0	-25.0	PK	0	1.0	2nd harmonic
7310.070	40.8	V	54.0	-13.2	AVG	0	1.0	3rd harmonic
7310.070	49.2	V	74.0	-24.8	PK	0	1.0	3rd harmonic

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

Note 2: No other emissions above second harmonic detected close to 20-dB of the limit.

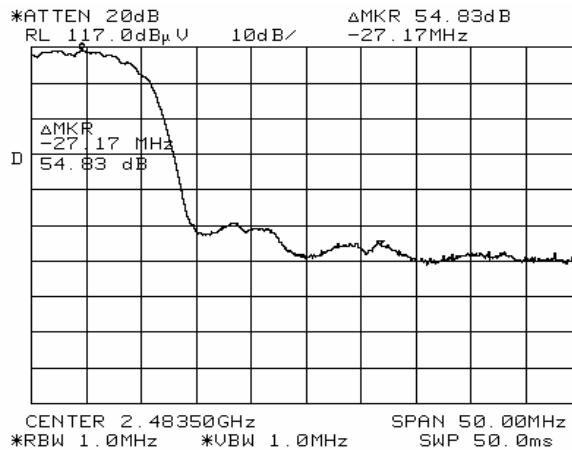




# EMC Test Data

Client: Xirrus, Inc.	Job Number: J57788
Model: XS-3900-16 and XS-3700-8 Access Points	T-Log Number: T59090
Contact: Ian Laity	Account Manager: Joe Rohlfes
Spec: FCC 15.247, 15.401, RSS-210	Class: N/A

## Run #1c: Radiated Spurious Emissions, 30 - 26,000 MHz. High Channel @ 2462 MHz



Band edge marker deltas: Average -58.3dB, Peak -54.8dB

### OMNI antenna Power 16

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2461.033	100.8	V	-	-	AVG	267	1.0	RBW = 1MHz
2461.033	104.3	V	-	-	PK	267	1.0	RBW = 1MHz
2461.475	92.6	V	-	-	AVG	-	-	#11 Fundamental, RBW = 100kHz
2461.475	101.4	V	-	-	PK	-	-	#11 Fundamental, RBW = 100kHz
2461.475	80.3	H	-	-	AVG	-	-	#11 Fundamental, RBW = 100kHz
2461.475	90.4	H	-	-	PK	-	-	#11 Fundamental, RBW = 100kHz
<b>2490.000</b>	<b>42.5</b>	<b>V</b>	<b>54.0</b>	<b>-11.5</b>	<b>AVG</b>	-	-	<b>Bandedge</b>
<b>2490.000</b>	<b>49.5</b>	<b>V</b>	<b>74.0</b>	<b>-24.5</b>	<b>PK</b>	-	-	<b>Bandedge</b>
4924.050	51.5	V	54.0	-2.5	AVG	0	1.0	#11 2nd harmonic
4924.050	54.6	V	74.0	-19.4	PK	0	1.0	#11 2nd harmonic
7386.405	36.0	V	54.0	-18.0	AVG	0	1.0	#11 3rd harmonic
7386.405	47.1	V	74.0	-26.9	PK	0	1.0	#11 3rd harmonic

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

Note 2: No other emissions above second harmonic detected close to 20-dB of the limit.



# EMC Test Data

Client:	Xirrus, Inc.	Job Number:	J57788
Model:	XS-3900-16 and XS-3700-8 Access Points	T-Log Number:	T59090
Contact:	Ian Laity	Account Manager:	Joe Rohlfes
Spec:	FCC 15.247, 15.401, RSS-210	Class:	N/A

Patch antenna								
Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB $\mu$ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2462.945	105.1	V	-	-	AVG	115	1.1	RBW = 1MHz
2462.945	108.3	V	-	-	PK	115	1.1	RBW = 1MHz
2461.475	96.9	V	-	-	AVG	0	1.0	#11 Fundamental
2461.475	105.7	V	-	-	PK	0	1.0	#11 Fundamental
<b>2490.000</b>	<b>46.8</b>	<b>V</b>	<b>54.0</b>	<b>-7.2</b>	<b>AVG</b>	-	-	<b>Bandedge</b>
<b>2490.000</b>	<b>53.5</b>	<b>V</b>	<b>74.0</b>	<b>-20.5</b>	<b>PK</b>	-	-	<b>Bandedge</b>
4924.070	42.7	V	54.0	-11.3	AVG	0	1.0	#11 2nd harmonic
4924.070	49.1	V	74.0	-24.9	PK	0	1.0	#11 2nd harmonic

Internal								
Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB $\mu$ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2461.475	98.6	V	-	-	AVG	0	1.0	#11 Fundamental
2461.475	101.5	V	-	-	PK	0	1.0	#11 Fundamental
2463.025	93.1	H	-	-	AVG	0	1.0	#11 Fundamental
2463.025	96.3	H	-	-	PK	0	1.0	#11 Fundamental
<b>2490.000</b>	<b>43.2</b>	<b>V</b>	<b>54.0</b>	<b>-10.8</b>	<b>AVG</b>	-	-	<b>Bandedge</b>
<b>2490.000</b>	<b>46.7</b>	<b>V</b>	<b>74.0</b>	<b>-27.3</b>	<b>PK</b>	-	-	<b>Bandedge</b>
4924.065	41.7	V	54.0	-12.3	AVG	0	1.0	#11 2nd harmonic
4924.065	48.9	V	74.0	-25.1	PK	0	1.0	#11 2nd harmonic
7385.730	36.2	V	54.0	-17.9	AVG	0	1.0	#11 3rd harmonic
7385.730	48.8	V	74.0	-25.2	PK	0	1.0	#11 3rd harmonic
7385.560	36.5	H	54.0	-17.5	AVG	0	1.0	#11 3rd harmonic
7385.560	47.8	H	74.0	-26.2	PK	0	1.0	#11 3rd harmonic
4924.090	36.6	H	54.0	-17.4	AVG	0	1.0	#11 2nd harmonic
4924.090	46.0	H	74.0	-28.0	PK	0	1.0	#11 2nd harmonic

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

Note 2: No other emissions above second harmonic detected close to 20-dB of the limit.



## EMC Test Data

Client:	Xirrus, Inc.	Job Number:	J57788
Model:	XS-3900-16 and XS-3700-8 Access Points	T-Log Number:	T59091
		Account Manager:	Joe Rohlfes
Contact:	Ian Laity		
Emissions Spec:	FCC 15.247, 15.401, RSS-210	Class:	Radio
Immunity Spec:	-	Environment:	-

# EMC Test Data

For The

**Xirrus, Inc.**

Model

**XS-3900-16 and XS-3700-8 Access  
Points**

Date of Last Test: 2/18/2005



## EMC Test Data

Client:	Xirrus, Inc.	Job Number:	J57788
Model:	XS-3900-16 and XS-3700-8 Access Points	T-Log Number:	T59091
Contact:	Ian Laity	Account Manager:	Joe Rohlfes
Emissions Spec:	FCC 15.247, 15.401, RSS-210	Class:	Radio
Immunity Spec:	-	Environment:	-

### EUT INFORMATION

#### General Description

The Xirrus, Inc. model XS-3900 is a multi-radio 802.11abg Access Point radio which is designed to act as a hub for a wireless local area network (WLAN). There are two versions of the system, one (model XS-3900-16) contains 16 separate transceivers, the other (model XS-3700-8) contains 8 transceivers. The radio interfaces are provided via four identical circuit boards. Each of the boards has four 802.11abg radios installed onto it (in the 8-port version two of these radios are removed from each board).

Normally, the EUT would be ceiling mounted during operation. The EUT was tested as both table-top equipment and also tested with the EUT raised to a height of 1.5m above the ground plane. The electrical rating of the device is 100 - 240Vac, 50/60Hz, 0.5 - 3 A.

#### Equipment Under Test

Manufacturer	Model	Description	Serial Number	FCC ID
Xirrus	XS-3900-16	802.11 a/b/g access point		
Xirrus	XS-3700-8	802.11 a/b/g access point		

#### EUT Antenna

The antennas are either integral to the device or connect to the EUT via a non-standard, reverse gender TNC connector, thereby meeting the requirements of FCC 15.203.

#### EUT Enclosure

The EUT enclosure is primarily constructed of plastic. It is circular with a diameter of 48 cm and a height of 10cm.

#### Modification History

Mod. #	Test	Date	Modification
1			
2			
3			

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



## EMC Test Data

Client:	Xirrus, Inc.	Job Number:	J57788
Model:	XS-3900-16 and XS-3700-8 Access Points	T-Log Number:	T59091
Contact:	Ian Laity	Account Manager:	Joe Rohlfes
Emissions Spec:	FCC 15.247, 15.401, RSS-210	Class:	Radio
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
Toshiba	Satellite 160 (PSA60U 03501D)	Laptop PC	XG0516882	DoC
D-Link	DGS-1005D	Gigabit Ethernet Switch	DR1914B005832	-

#### Interface Cabling and Ports

Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length(m)
EUT GE #1	Ethernet Switch	Cat 5	unshielded	15
EUT GE #2	Ethernet Switch	Cat 5	unshielded	15
EUT Console	Laptop serial	flat cable	unshielded	15
EUT 10/100	Laptop ethernet	Cat 5	unshielded	5
EUT AC power	AC power	3-wire	unshielded	2

Note: The Console port was disconnected during digital device testing but remained connected for the radio transmitter tests. The port is only used for diagnostics/configuration and is not intended to be permanently connected. It was used during testing to configure the EUT on the required channel.

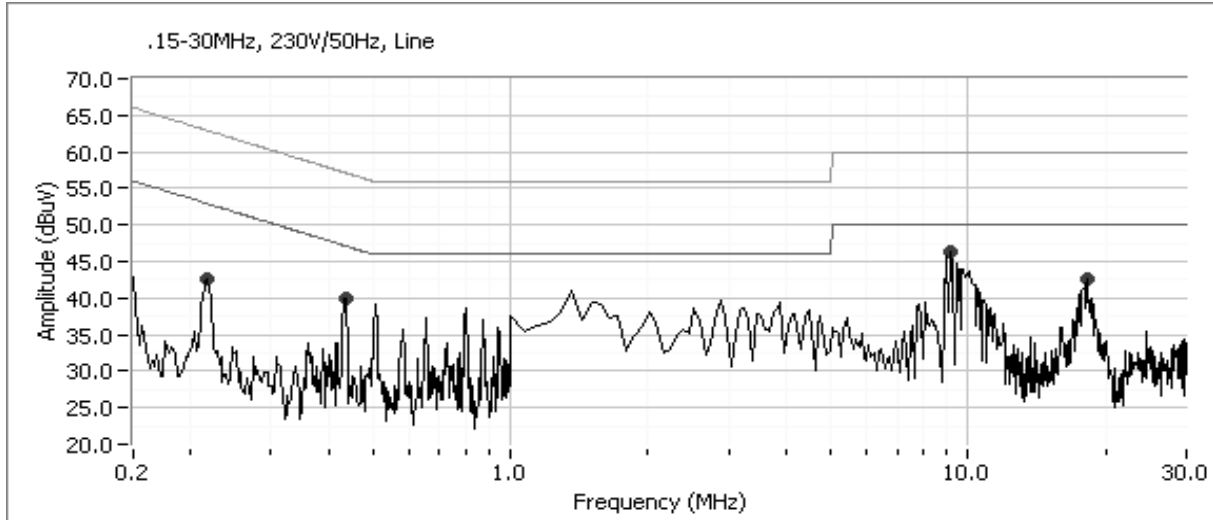
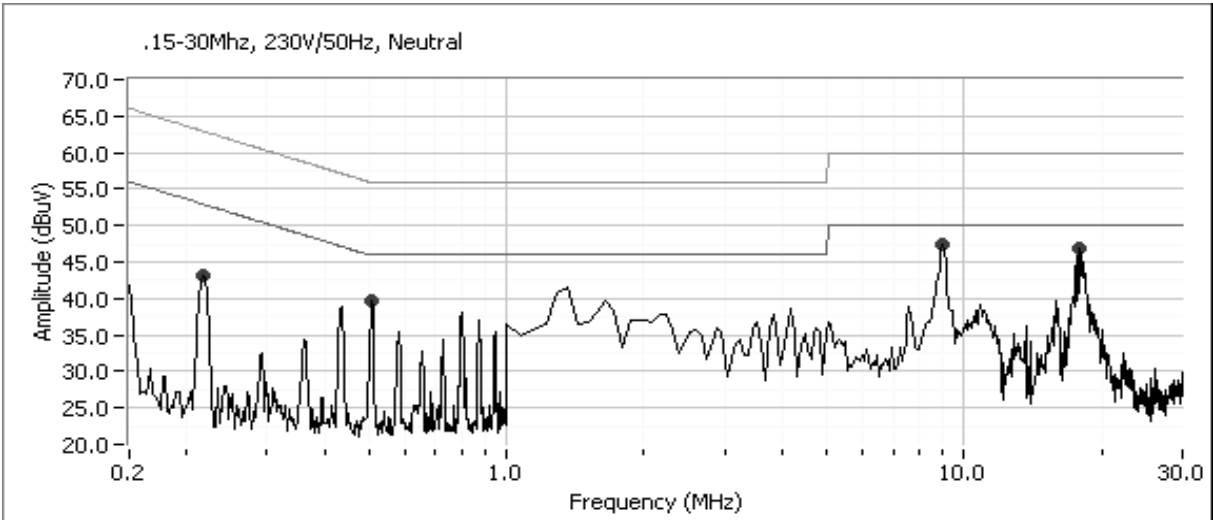
#### EUT Operation During Emissions Tests

The EUT was in either transmit mode or receive mode, as detailed in the individual run descriptions. The transmitter(s) were set to operate at the worst case data rates (6Mb/s using OFDM and 1Mb/s using CCK) and to transmit continuously (99% duty cycle). The gigabit ethernet ports were sending packets to and from the switch. The 10/100 ethernet port was transmitting data packets to the laptop.



Client: Xirrus, Inc.	Job Number: J57788
Model: XS-3900-16 and XS-3700-8 Access Points	T-Log Number: T59091
	Account Manager: Joe Rohlfes
Contact: Ian Laity	
Spec: FCC 15.247, 15.401, RSS-210	Class: Radio

**Run #1: AC Power Port Conducted Emissions, 0.15 - 30MHz, 230V/50Hz**  
**All transmitters active and connected to internal antennas except three external antennas also connected**  
**2.4 GHz Patch and Omni and 5GHz Omni used externally. See Note 1**



Note - frequency range of scan was 0.15 - 30 MHz - graph axes marked to 1 decimal place.



## EMC Test Data

Client: Xirrus, Inc.	Job Number: J57788
Model: XS-3900-16 and XS-3700-8 Access Points	T-Log Number: T59091
	Account Manager: Joe Rohlfes
Contact: Ian Laity	
Spec: FCC 15.247, 15.401, RSS-210	Class: Radio

### Run #1: Continued

Frequency MHz	Level dB $\mu$ V	AC Line	EN 301 489-17 Limit	Margin	Detector QP/Ave	Comments
8.970	47.1	N	50.0	-2.9	Average	
8.970	45.4	L	50.0	-4.6	Average	
0.506	37.6	N	46.0	-8.4	Average	
0.432	37.3	L	47.2	-9.9	Average	
8.970	47.5	N	60.0	-12.5	QP	
0.217	39.6	N	52.9	-13.3	Average	
0.217	39.6	L	52.9	-13.3	Average	
8.970	46.1	L	60.0	-13.9	QP	
0.506	38.5	N	56.0	-17.5	QP	
0.432	38.9	L	57.2	-18.3	QP	
17.910	31.4	N	50.0	-18.6	Average	
18.290	30.2	L	50.0	-19.8	Average	
18.290	40.0	L	60.0	-20.0	QP	
0.217	42.4	N	62.9	-20.5	QP	
0.217	42.4	L	62.9	-20.5	QP	
17.910	38.6	N	60.0	-21.4	QP	

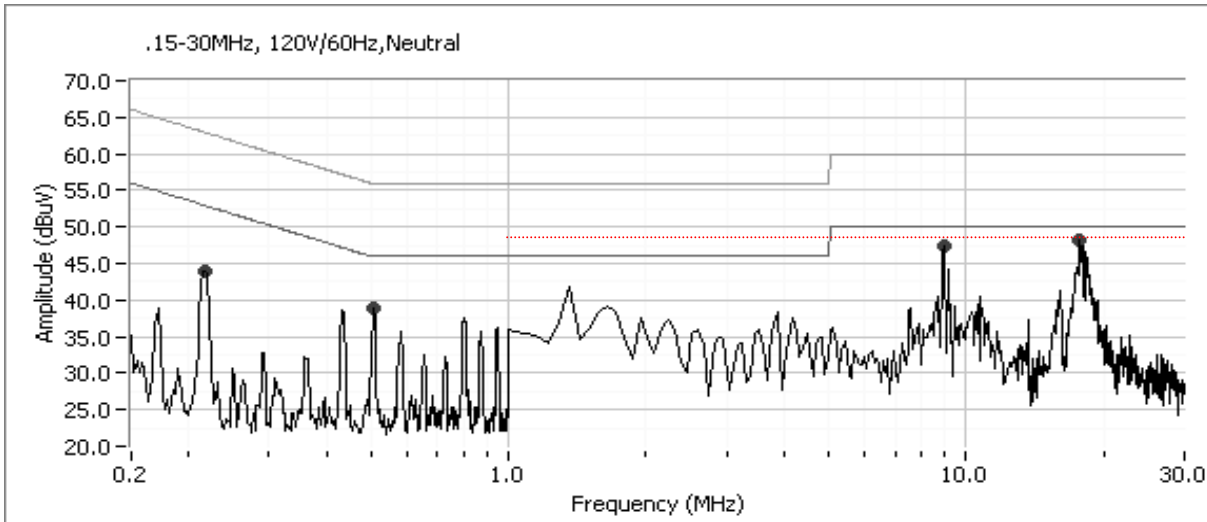
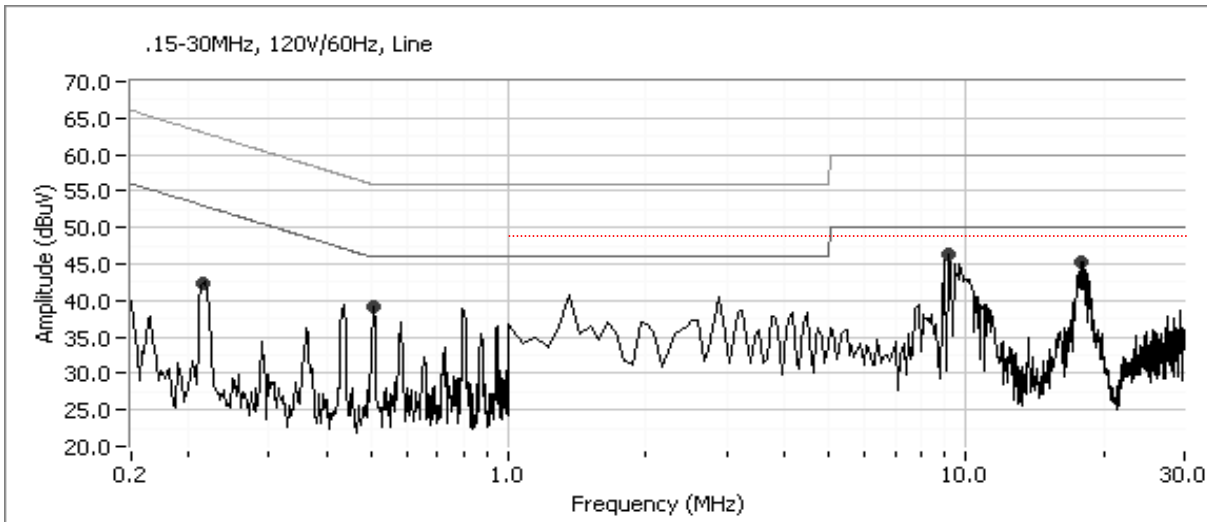
Note 1: All 16 radios transmitting continuously on channels 2412, 2437, 2467, 2472, 5180, 5260, 5280, 5300, 5200, 5220, 5240, 5745, 5765, 5785 and 5805  
 Maximum output power for the specified band on each channel.  
 6Mb/s on 5GHz transmitters using 802.11a; 1Mb/s on 2.4 GHz channels using 802.11b



Client: Xirrus, Inc.	Job Number: J57788
Model: XS-3900-16 and XS-3700-8 Access Points	T-Log Number: T59091
Contact: Ian Laity	Account Manager: Joe Rohlfes
Spec: FCC 15.247, 15.401, RSS-210	Class: Radio

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

All transmitters active and connected to internal antennas except three external antennas also connected  
2.4 GHz Patch and Omni and 5GHz Omni used externally. See Note 1



Note - frequency range of scan was 0.15 - 30 MHz - graph axes marked to 1 decimal place.



## EMC Test Data

Client: Xirrus, Inc.	Job Number: J57788
Model: XS-3900-16 and XS-3700-8 Access Points	T-Log Number: T59091
	Account Manager: Joe Rohlfes
Contact: Ian Laity	
Spec: FCC 15.247, 15.401, RSS-210	Class: Radio

### Run #2: Continued

Frequency MHz	Level dB $\mu$ V	AC Line	FCC 15.209/15.109		Detector QP/Ave	Comments
			Limit	Margin		
8.970	47.1	N	50.0	-2.9	Average	
9.160	45.4	L	50.0	-4.6	Average	
0.506	37.4	L	46.0	-8.6	Average	
0.507	36.8	N	46.0	-9.2	Average	
8.970	47.6	N	60.0	-12.4	QP	
9.160	46.0	L	60.0	-14.0	QP	
0.216	38.6	N	53.0	-14.4	Average	
0.215	38.4	L	53.0	-14.6	Average	
17.850	42.9	N	60.0	-17.1	QP	
17.840	42.9	L	60.0	-17.1	QP	
0.506	38.3	L	56.0	-17.7	QP	
17.840	32.1	L	50.0	-17.9	Average	
0.507	37.8	N	56.0	-18.2	QP	
17.850	30.5	N	50.0	-19.5	Average	
0.216	42.9	N	63.0	-20.1	QP	
0.215	42.8	L	63.0	-20.2	QP	

Frequency MHz	Level dB $\mu$ V	AC Line	RSS 210		Detector QP/Ave	Comments
			Limit	Margin		
8.970	47.6	N	48.0	-0.4	QP	
9.160	46.0	L	48.0	-2.0	QP	
17.850	42.9	N	48.0	-5.1	QP	
17.840	42.9	L	48.0	-5.1	QP	
0.506	38.3	L	48.0	-9.7	QP	
0.507	37.8	N	48.0	-10.2	QP	

Note 1: All 16 radios transmitting continuously on channels 2412, 2437, 2467, 2472, 5180, 5260, 5280, 5300, 5200, 5220, 5240, 5745, 5765, 5785 and 5805  
 Maximum output power for the specified band on each channel.  
 6Mb/s on 5GHz transmitters using 802.11a; 1Mb/s on 2.4 GHz channels using 802.11b



# EMC Test Data

Client:	Xirrus, Inc.	Job Number:	J57788
Model:	XS-3900-16 and XS-3700-8 Access Points	T-Log Number:	T59091
		Account Manager:	Joe Rohlfes
Contact:	Ian Laity		
Spec:	FCC 15.247, 15.401, RSS-210	Class:	Radio

## Radiated Emissions (Digital) XS-3900-16

### 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: 1/27/2005	Config. Used: 1
Test Engineer: Chris Byleckie	Config Change: None
Test Location: SVOATS #1	EUT Voltage: 120V/60Hz

### General Test Configuration

The EUT and all local support equipment were located on the turntable for radiated emissions testing. Remote support equipment was located approximately 5 meters from the test area with all I/O connections routed overhead .

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

**Ambient Conditions:**            Temperature:            14 °C  
    Rel. Humidity:            65 %

### Summary of Results

Run #	Test Performed	Limit	Result	Margin
2	RE, 30 - 1000MHz, Maximized Emissions	EN55022 A	Pass	45.3dBµV/m @ 500.005MHz (-1.7dB)

### 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:	Xirrus, Inc.	Job Number:	J57788
Model:	XS-3900-16 and XS-3700-8 Access Points	T-Log Number:	T59091
		Account Manager:	Joe Rohlfes
Contact:	Ian Laity		
Spec:	FCC 15.247, 15.401, RSS-210	Class:	Radio

**Run #1: Preliminary Radiated Emissions, 30-1000 MHz**  
**All transmitters active and connected to internal antennas except three external antennas also connected**  
**2.4 GHz Patch and Omni and 5GHz Omni used externally. See Note 1**

Frequency MHz	Level dBμV/m	Pol v/h	EN55022 A		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
500.005	45.3	V	47.0	-1.7	QP	245	1.6	
500.005	41.5	H	47.0	-5.5	QP	102	1.0	
375.013	40.7	H	47.0	-6.3	QP	255	1.0	
750.029	39.2	V	47.0	-7.8	QP	220	1.2	
263.999	38.6	H	47.0	-8.4	QP	315	1.8	
624.995	38.5	V	47.0	-8.5	QP	240	1.6	Note 2
375.013	37.8	V	47.0	-9.2	QP	110	1.0	
263.999	37.5	V	47.0	-9.5	QP	275	1.0	
125.001	30.0	V	40.0	-10.0	QP	186	1.0	
132.003	29.4	V	40.0	-10.6	QP	150	1.0	
200.002	28.6	V	40.0	-11.4	QP	0	1.0	Note 2
400.011	35.5	V	47.0	-11.5	QP	240	2.1	
875.010	35.4	H	47.0	-11.6	QP	200	1.0	Note 2
197.997	28.2	V	40.0	-11.8	QP	314	1.0	
990.005	35.1	V	47.0	-11.9	QP	110	1.9	
52.950	27.2	V	40.0	-12.8	QP	0	1.0	Broadband
141.881	27.2	V	40.0	-12.8	QP	0	1.0	
824.983	33.9	V	47.0	-13.1	QP	345	1.0	
214.126	26.1	V	40.0	-13.9	QP	348	1.0	
143.256	25.7	V	40.0	-14.3	QP	216	1.0	
125.001	25.4	H	40.0	-14.6	QP	360	1.0	
185.877	24.7	V	40.0	-15.3	QP	0	1.0	
44.175	24.0	V	40.0	-16.0	QP	0	1.0	Broadband
61.050	24.0	V	40.0	-16.0	QP	0	1.0	Broadband
222.750	23.3	V	40.0	-16.7	QP	300	1.0	
396.006	30.3	V	47.0	-16.7	QP	70	2.1	
214.877	22.7	V	40.0	-17.3	QP	325	1.0	
152.006	22.0	V	40.0	-18.0	QP	0	1.0	
147.504	21.1	V	40.0	-18.9	QP	0	1.0	
30.000	12.2	H	40.0	-27.8	QP	360	1.0	Noise Floor
32.700	11.9	H	40.0	-28.1	QP	0	1.0	Noise Floor
39.450	11.6	H	40.0	-28.4	QP	360	1.0	Noise Floor
40.800	10.7	H	40.0	-29.3	QP	0	1.0	Noise Floor



## EMC Test Data

Client:	Xirrus, Inc.	Job Number:	J57788
Model:	XS-3900-16 and XS-3700-8 Access Points	T-Log Number:	T59091
		Account Manager:	Joe Rohlfes
Contact:	Ian Laity		
Spec:	FCC 15.247, 15.401, RSS-210	Class:	Radio

**Run #1: Continued**

Note 1: Radios on Channels 2412, 2437, 2462, 5180, 5260, 5280, 5300, 5200, 5220, 5240, 5745, 5765, 5785 and 5805, Max gain on all 801.11a channels. 2.4 GHz channels set to gain of 9 and 802.11b mode.

Note 2: EUT emissions could not be observed due to the presence of a large ambient signal. A signal substitution was performed to the level of the ambient

**Run #2: Maximized Readings From Run #1**

Frequency	Level	Pol	EN55022 A		Detector	Azimuth	Height	Comments
			Limit	Margin				
MHz	dB $\mu$ V/m	v/h			Pk/QP/Avg	degrees	meters	
500.005	45.3	V	47.0	-1.7	QP	230	1.6	
375.013	42.3	V	47.0	-4.7	QP	250	2.5	
500.005	41.5	H	47.0	-5.5	QP	95	1.0	
375.013	40.7	H	47.0	-6.3	QP	260	1.0	
750.029	39.2	V	47.0	-7.8	QP	100	1.4	
263.999	38.6	H	47.0	-8.4	QP	315	1.8	



# EMC Test Data

Client: Xirrus, Inc.	Job Number: J57788
Model: XS-3900-16 and XS-3700-8 Access Points	T-Log Number: T59091
	Account Manager: Joe Rohlfes
Contact: Ian Laity	
Spec: FCC 15.247, 15.401, RSS-210	Class: Radio

## Radiated Emissions (Digital Device) XS-3700-8

### 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: 2/16/2005	Config. Used: 1
Test Engineer: Rafael	Config Change: None
Test Location: SVOATS #1	EUT Voltage: 230/50Hz

### General Test Configuration

The EUT and all local support equipment were located on the turntable for radiated emissions testing. Remote support equipment was located approximately 5 meters from the test area with all I/O connections routed overhead .

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

**Ambient Conditions:**

Temperature:	12 °C
Rel. Humidity:	95 %

### Summary of Results

Run #	Test Performed	Limit	Result	Margin
2	RE, 30 - 1000MHz, Maximized Emissions	EN55022 A	Pass	44.1dBµV/m @ 375.013MHz (-2.9dB)
3	RE, 1 - 6GHz, Maximized Emissions	FCC A	Pass	46.348.4 @ 1485.01485 (-3.2dB)

### 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.



# EMC Test Data

Client: Xirrus, Inc.	Job Number: J57788
Model: XS-3900-16 and XS-3700-8 Access Points	T-Log Number: T59091
	Account Manager: Joe Rohlfes
Contact: Ian Laity	
Spec: FCC 15.247, 15.401, RSS-210	Class: Radio

**Run #1: Preliminary Radiated Emissions, 30-1000 MHz**  
**All transmitters active and connected to internal antennas**  
**8 Port AP**

Frequency MHz	Level dBµV/m	Pol v/h	EN55022 A		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
375.013	44.1	H	47.0	-2.9	QP	230	2.7	
500.005	43.2	H	47.0	-3.8	QP	225	1.7	
125.001	34.9	H	40.0	-5.1	QP	135	3.8	
500.005	41.7	V	47.0	-5.3	QP	285	1.7	
624.995	40.5	V	47.0	-6.5	QP	350	1.9	Note 2
53.650	33.5	V	40.0	-6.5	QP	330	1.0	Broadband
125.001	31.8	V	40.0	-8.2	QP	340	1.0	
375.013	38.4	V	47.0	-8.6	QP	345	3.4	
197.997	31.2	V	40.0	-8.8	QP	40	1.0	
750.029	37.7	V	47.0	-9.3	QP	130	1.2	
132.003	30.4	V	40.0	-9.6	QP	290	1.0	
52.950	30.2	V	40.0	-9.8	QP	345	1.0	Broadband
263.999	36.7	V	47.0	-10.3	QP	10	1.0	
200.002	29.3	V	40.0	-10.7	QP	330	1.0	Note 2
824.983	33.5	V	47.0	-13.5	QP	120	1.6	
185.877	25.8	V	40.0	-14.2	QP	310	1.0	
250.000	31.5	H	47.0	-15.5	QP	320	1.4	
990.005	31.3	V	47.0	-15.7	QP	30	1.9	
1000.000	31.3	V	47.0	-15.7	QP	25	1.5	
141.881	23.4	V	40.0	-16.6	QP	230	1.0	
214.126	23.4	V	40.0	-16.6	QP	220	1.0	
143.256	23.3	V	40.0	-16.7	QP	270	1.0	
263.999	30.1	H	47.0	-16.9	QP	165	1.3	
61.050	22.9	V	40.0	-17.1	QP	15	1.0	Broadband
275.000	29.5	H	47.0	-17.5	QP	130	1.3	
1000.000	28.6	H	47.0	-18.4	QP	330	2.1	
396.006	28.5	V	47.0	-18.5	QP	320	1.6	
222.750	20.7	V	40.0	-19.3	QP	265	1.0	
400.011	25.3	V	47.0	-21.7	QP	130	1.8	
147.504	17.9	V	40.0	-22.1	QP	245	1.0	
152.006	17.8	V	40.0	-22.2	QP	150	1.0	
214.877	17.6	V	40.0	-22.4	QP	355	1.0	
44.175	17.4	V	40.0	-22.6	QP	120	1.0	Broadband



## EMC Test Data

Client:	Xirrus, Inc.	Job Number:	J57788
Model:	XS-3900-16 and XS-3700-8 Access Points	T-Log Number:	T59091
Contact:	Ian Laity	Account Manager:	Joe Rohlfes
Spec:	FCC 15.247, 15.401, RSS-210	Class:	Radio

### Run #1: Continued

Note 1: Radios on Channels 2412, 2427, 2437, 2462, 5180, 5200, 5220, 5240, Max gain on all 801.11a channels. 2.4 GHz channels set to gain of 27 and 802.11b mode.

Note 2: EUT emissions could not be observed due to the presence of a large ambient signal. A signal substitution was performed to the level of the ambient

### Run #2: Maximized Readings From Run #1

Frequency MHz	Level dB $\mu$ V/m	Pol v/h	EN55022 A		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
375.013	44.1	H	47.0	-2.9	QP	235	2.7	
500.005	43.2	H	47.0	-3.8	QP	200	1.7	
125.001	34.9	H	40.0	-5.1	QP	145	3.8	
500.005	41.7	V	47.0	-5.3	QP	300	1.7	
624.995	40.5	V	47.0	-6.5	QP	330	1.9	Note 2
53.650	33.5	V	40.0	-6.5	QP	345	1.0	Broadband

Note 2: EUT emissions could not be observed due to the presence of a large ambient signal. A signal substitution was performed to the level of the ambient





## EMC Test Data

Client:	Xirrus, Inc.	Job Number:	J57788
Model:	XS-3900-16 and XS-3700-8 Access Points	T-Log Number:	T59091
		Account Manager:	Joe Rohlfes
Contact:	Ian Laity		
Spec:	FCC 15.247, 15.401, RSS-210	Class:	Radio

### Run #3: Maximized readings, 1000 - 6000 MHz

Measurements made at 3m test distance and extrapolated to 10m using -10.5 correction factor.

#### 8 Port AP

Frequency MHz	Level dB $\mu$ V/m	Pol v/h	FCC Class A		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
1485.000	46.3	V	49.5	-3.2	Avg	330	1.1	
1485.000	43.2	H	49.5	-6.3	Avg	10	1.4	
1650.000	42.7	V	49.5	-6.8	Avg	45	2.4	
1650.000	42.6	H	49.5	-6.9	Avg	300	1.7	
2805.000	36.8	V	49.5	-12.7	Avg	330	1.2	
3062.500	32.4	V	49.5	-17.1	Avg	345	1.0	
2805.000	31.6	H	49.5	-17.9	Avg	140	1.4	
1250.000	31.3	V	49.5	-18.2	Avg	30	1.0	
1485.000	48.4	V	69.5	-21.1	Pk	330	1.1	
1485.000	45.8	H	69.5	-23.7	Pk	10	1.4	
1650.000	45.4	V	69.5	-24.1	Pk	45	2.4	
1650.000	45.3	H	69.5	-24.2	Pk	300	1.7	
2805.000	43.5	V	69.5	-26.0	Pk	330	1.2	
3062.500	42.2	V	69.5	-27.3	Pk	345	1.0	
2805.000	41.6	H	69.5	-27.9	Pk	140	1.4	
1250.000	39.0	V	69.5	-30.5	Pk	30	1.0	

Note 1: Radios on Channels 2412, 2427, 2437, 2462, 5180, 5200, 5220, 5240, Max gain on all 801.11a channels. 2.4 GHz channels set to gain of 27 and 802.11b mode.