EMC Test Report
Industry Canada RSS-Gen Issue 3 / RSS 210 Issue 8
FCC Part 15 Subpart C

Model: XI-N450

IC CERTIFICATION #:	5428AXIN450
FCC ID:	SK6XI-N450
APPLICANT:	Xirrus, Inc. 2101 Corporate Center Dr. Newbury Park, CA 91320
TEST SITE(S):	Elliott Laboratories 41039 Boyce Road. Fremont, CA. 94538-2435
IC SITE REGISTRATION #:	2845B-3; 2845B-4, 2845B-5, 2845B-7
REPORT DATE:	July 21, 2011
FINAL TEST DATES:	June 14, 16, 22, 28-30, July 8 and July 12, 2011
TOTAL NUMBER OF PAGES:	141

PROGRAM MGR /
TECHNICAL REVIEWER:

Mark Briggs
Staff Engineer

QUALITY ASSURANCE DELEGATE /
FINAL REPORT PREPARER:

David Guidotti
Senior Technical Writer

Testing Cert #2016.01

REVISION HISTORY

Rev#	Date	Comments	Modified By
-		First release	

TABLE OF CONTENTS

SCOPE

An electromagnetic emissions test has been performed on the Xirrus, Inc. model XI-N450, pursuant to the following rules:

Industry Canada RSS-Gen Issue 3
RSS 210 Issue 8 "Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment"
FCC Part 15 Subpart C

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

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

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

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

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

OBJECTIVE

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

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

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

Certification is a procedure where the manufacturer submits test data and technical information to a certification body and receives a certificate or grant of equipment authorization upon successful completion of the certification body's review of the submitted documents. Once the equipment authorization has been obtained, the label indicating compliance must be attached to all identical units, which are subsequently manufactured.

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

STATEMENT OF COMPLIANCE

The tested sample of Xirrus, Inc. model XI-N450 complied with the requirements of the following regulations:

Industry Canada RSS-Gen Issue 3
RSS 210 Issue 8 "Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment"
FCC Part 15 Subpart C

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

The test results recorded herein are based on a single type test of Xirrus, Inc. model XI-N450 and therefore apply only to the tested sample. The sample was selected and prepared by Steve Smith of Xirrus, Inc..

DEVIATIONS FROM THE STANDARDS

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

TEST RESULTS SUMMARY

DIGITAL TRANSMISSION SYSTEMS (2400 – 2483.5MHz)

FCC Rule Part	RSS Rule Part	Description	Measured Value / Comments	Limit / Requirement	Result
15.247(a)	RSS 210 A8.2	Digital Modulation	Systems uses OFDM / DSSS techniques	System must utilize a digital transmission technology	Complies
15.247 (a) (2)	RSS 210 A8.2 (1)	6dB Bandwidth	> 9.4 MHz	>500kHz	Complies
15.247 (b) (3)	RSS 210 A8.2 (4)	Output Power (multipoint systems)	802.11b: 0.264W 802.11g: 0.228W HT20: 0.147W HT40: 0.071W EIRP = 0.9W Note 1	1Watt, EIRP limited to 4 Watts.	Complies
15.247(d)	RSS 210 A8.2 (2)	Power Spectral Density	-0.5 dBm / 3kHz	8dBm/3kHz	Complies
15.247(c)	RSS 210 A8.5	Antenna Port Spurious Emissions 30MHz – 25 GHz	All spurious emissions < -30dBc	< -30dBc Note 2	Complies
15.247(c) / 15.209	RSS 210 A8.5	Radiated Spurious Emissions 30MHz – 25 GHz	53.9dBµV/m @ 2390.0MHz (-0.1dB)	15.207 in restricted bands, all others <-30dBc Note 2	Complies

Note 1: EIRP calculated using antenna gain of 2dBi per chain (effective gain of 6.8dBi for MIMO operation).
Note 2: Limit of -30dBc used because the power was measured using the UNII test procedure (maximum power averaged over a transmission burst).
Note 3: The output power is automatically reduced when modules are co-located and operating in the same band. A maximum of three modules may operate in this band as operation is limited to ensure no two radios are operating on the same or overlapping channels. When multiple modules are operating in this band the output power levels for each radio are reduced to ensure the total output power in the band is below 30dBm and the total eirp does not exceed 36dBm.

DIGITAL TRANSMISSION SYSTEMS (5725 –5850 MHz)

FCC Rule Part	RSS Rule Part	Description	Measured Value / Comments	Limit / Requirement	Result
15.247(a)	RSS 210 A8.2	Digital Modulation	Systems uses OFDM techniques	System must utilize a digital transmission technology	Complies
15.247 (a) (2)	RSS 210 A8.2 (1)	6dB Bandwidth	> 16.3MHz	>500kHz	Complies
15.247 (b)	RSS 210 A8.2 (4)	Output Power (multipoint systems)	802.11a: 0.138W HT20: 0.124W HT40: 0.518W EIRP = 3.9 W Note 1	1Watt, EIRP limited to 4 Watts.	Complies
15.247(d)	RSS 210 A8.2 (2)	Power Spectral Density	-3.2 dBm / 3kHz	Maximum permitted is 8dBm/3kHz	Complies
15.247(c)	RSS 210 A8.5	Antenna Port Spurious Emissions – 30MHz – 40 GHz	All spurious emissions below the limit	HT40: < -20dBc 802.11a, HT20: < -30dBc Note 2	Complies
15.247(c) / 15.209	RSS 210 A8.5 Table 2, 3	Radiated Spurious Emissions 30MHz – 40 GHz	53.6dBµV/m @ 5440.0MHz	15.207 in restricted bands, all others <-30dBc Note 2	Complies (-0.4dB)

Note 1: EIRP calculated using antenna gain of 4 dBi per chain (effective gain of 8.8dBi for MIMO operation).
Note 2: Limit of -30dBc used for HT20 and 802.11a modes because the power was measured using the UNII test procedure (maximum power averaged over a transmission burst). HT40 output power is peak power.
Note 3:The output power is automatically reduced when modules are co-located and operating in the same band. A maximum of five modules may operate in this band as operation is limited to ensure no two radios are operating on the same or overlapping channels. When multiple modules are operating in this band the output power levels for each radio are reduced to ensure the total output power in the band is below 30dBm and the total eirp does not exceed 36dBm.

GENERAL REQUIREMENTS APPLICABLE TO ALL BANDS

FCC Rule Part	RSS Rule part	Description	Measured Value / Comments	Limit / Requirement	Result (margin)
15.203	-	RF Connector	Antenna is integral to the module	Unique or integral antenna required	Complies
15.207	RSS GEN Table 2	AC Conducted Emissions	53.4dBµV @ 4.897MHz	Refer to page 20	Complies (-2.6dB)
15.109	RSS GEN 7.2.3 Table 1	Receiver spurious emissions	45.6dBµV/m @ 7500.1MHz	Refer to page 21	Complies (-8.4dB)
15.247 (b) (5) 15.407 (f)	RSS 102	RF Exposure Requirements	Refer to MPE calculations in Exhibit 11, RSS 102 declaration and User Manual	Refer to OET 65, FCC Part 1 and RSS 102	Complies
-	RSP 100 RSS GEN 7.1.5	User Manual	Refer to User Manual	Statement required regarding non-interference	Complies
-	RSP 100 RSS GEN 7.1.5	User Manual	Antenna is integral	Statement for products with detachable antenna	N/A
-	RSP 100 RSS GEN 4.4.1	99% Bandwidth	802.11b: 14.3 MHz 802.11g: 17.2 MHz 802.11a: 17.3 MHz HT20: 18.3 MHz HT40: 36.9 MHz	Information only	N/A

MEASUREMENT UNCERTAINTIES

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level and were calculated in accordance with UKAS document LAB 34.

Measurement Type	Measurement Unit	Frequency Range	Expanded Uncertainty
RF power, conducted (power meter)	dBm	25 to 7000 MHz	± 0.52 dB
RF power, conducted (Spectrum analyzer)	dBm	25 to 7000 MHz	± 0.7 dB
Conducted emission of transmitter	dBm	25 to 26500 MHz	± 0.7 dB
Conducted emission of receiver	dBm	25 to 26500 MHz	± 0.7 dB
Radiated emission (substitution method)	dBm	25 to 26500 MHz	± 2.5 dB
Radiated emission (field strength)	dBµV/m	25 to 1000 MHz	± 3.6 dB
		1000 to 40000 MHz	± 6.0 dB
Conducted Emissions (AC Power)	dBµV	0.15 to 30 MHz	± 2.4 dB

EQUIPMENT UNDER TEST (EUT) DETAILS

GENERAL

The Xirrus, Inc. model XI-N450 is an 802.11abgn 3x3 module intended to be installed in Xirrus Wireless Access Points. The module supports 802.11bgn 3x3 in the 2400-2483.5MHz, 5725-5850MHz, 5150-5250MHz, 5250-5350MHz and 5470-5725MHz bands. It additionally supports 802.11a SISO mode in the 5150-5250MHz, 5250-5350MHz and 5470-5725MHz bands at a higher per chain power. SISO modes in the other bands operate at the same output power per chain as the equivalent MIMO mode. It can operate in both 20- and 40-MHz channels in 802.11n mode.

The samples were received on June 14, 2011 and tested on June 14, 16, 22, 28-30, July 8 and July 12, 2011. For testing purposes four samples of the XI-N450 3x3 module, and four samples of a depopulated 2x2 version of the module (model number XI-N300) were installed into an Xirrus XR4820 host system capable of containing a maximum of 8 modules.

Normally, the XR4000 would be ceiling mounted during operation. The host system was tested as table-top equipment. The host system is powered via Power-Over-Ethernet (PoE). Compliance of the modules with the AC conducted emissions limits was evaluated by measuring the emissions at the AC input to a typical PoE injector used to power the host system.

The EUT consisted of the following component(s):

Company	Model	Description	Serial Number	FCC ID
Xirrus Inc.	XI-N450	802.11abgn 3x3 module	11000000239	SK6XI-N450

ANTENNA SYSTEM

The antenna system is integrated into the module with two antennas per module (one for each transmit-receive chain). The nominal antenna gains are 1dBi in the 2.4GHz band and 4dBi in the 5GHz bands.

ENCLOSURE

The EUT has no enclosure. It is designed to be installed within the enclosure of a host computer.

MODIFICATIONS

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

SUPPORT EQUIPMENT

The following equipment was used as support equipment for testing:

Company	Model	Description	Serial Number	FCC ID
Xirrus	XR4820	Access Point	-	-

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

Company	Model	Description	Serial Number	FCC ID
Linksys	SR2016	Gigabit Switch	n/a	DoC
HP	Compaq 6910P	PC Laptop	n/a	DoC
Xirrus	POE75U-1UP-N-X	Power Injector	n/a	N/A

EUT INTERFACE PORTS

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

Port		Cable(s)		
From	To	Description	Shielded/Unshielded	Length(m)
PoE ETH 0	PoE Injector	Cat 5	Unshielded	10
ETH 1	Gigabit Switch	Cat 5	Unshielded	10
Laptop Ethernet	Gigabit Switch	Cat 5	Unshielded	1
Console	not cabled	n/a	n/a	n/a

EUT OPERATION

The modules were installed into a host system for spurious emissions tests.

To evaluate the radiated spurious emissions related to the transmitter the module was evaluated in all operating modes (802.11b, 802.11g, 802.11a, 802.11n in both20- and 40-MHz channels) using ART software utility to place the module(s) under test in a continuous transmit modes. For legacy modes each transmit chain was evaluated independently and for the 802.11n modes both chains were active.

For measurements at the restricted band edges one module was operating on the channel closest to the band edge. For other spurious emissions measurements multiple radios were operating simultaneously such that all operating modes were active simultaneously on the high, center or low channel in each band. As the host system can also house a 2x2 version of the module, during radiated spurious emissions tests there were up to eight radios active simultaneously on the same channel for these spurious measurements. When installed into host systems the host system firmware will not allow multiple radios to operate on the same or overlapping channels, so if signals were above the limit with multiple radios active, and those signals were related to harmonics of the transmitted signal, then the measurements were repeated with only one set of radios or one mode active because these harmonic emissions would only be present form one radio at any specific time.

During radiated emissions tests for receiver spurious emissions all 8 radios were in receive mode with all chains active on the following channels: 2437 MHz, 5200 MHz, 5280 MHz, 5600 MHz, 5785 MHz, 2412 MHz, 2472 MHz, 5180 MHz, 5320 MHz, 5500 MHz, 5700 MHz, 5785 MHz, 2462 MHz, 5240MHz, 5260 MHz, and 5540 MHz. This ensured that at least one module was on the center channel in each operating band as required by RSS 210 and RSS GEN.

Measurements on the host system for the frequency range 30 – 1000 MHz demonstrated that all significant emissions were from the host system. Digital device emissions from the host system above 1GHz (occurring at 2.5GHz, 5.0GHz and 7.5GHz) were excluded from the scope of this test report and will be evaluated as a part of the host system digital device tests.

AC conducted emissions measurements were made on the AC input to the Power-Over-Ethernet (PoE) injector used to power the host system. For these measurements all 8 radios were in a transmit/receive mode with all chains active on the following channels: 2437 MHz, 5200 MHz, 5280 MHz, 5600 MHz, 5785 MHz, 2412 MHz, 2472 MHz, 5180 MHz, 5320 MHz, 5500 MHz, 5700 MHz, 5785 MHz, 2462 MHz, 5240MHz, 5260 MHz, 5540 MHz.

TEST SITE

GENERAL INFORMATION

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

Site	Registration Numbers		Location
	FCC	Canada	
Chamber 3	769238	2845B-3	41039 Boyce Road Fremont, CA 94538-2435
Chamber 4	211948	2845B-4	
Chamber 5	211948	2845B-5	
Chamber 7	A2LA accreditation	2845B-7	

ANSI C63.4:2003 recommends that ambient noise at the test site be at least 6 dB below the allowable limits. Ambient levels are below this requirement. The test site(s) contain separate areas for radiated and conducted emissions testing. Considerable engineering effort has been expended to ensure that the facilities conform to all pertinent requirements of ANSI C63.4:2003.

CONDUCTED EMISSIONS CONSIDERATIONS

Conducted emissions testing is performed in conformance with ANSI C63.4:2003. Measurements are made with the EUT connected to the public power network through a nominal, standardized RF impedance, which is provided by a line impedance stabilization network, known as a LISN. A LISN is inserted in series with each current-carrying conductor in the EUT power cord.

RADIATED EMISSIONS CONSIDERATIONS

The FCC has determined that radiation measurements made in a shielded enclosure are not suitable for determining levels of radiated emissions. Radiated measurements are performed in an open field environment or in a semi-anechoic chamber. The test sites are maintained free of conductive objects within the CISPR defined elliptical area incorporated in ANSI C63.4:2003 guidelines and meet the Normalized Site Attenuation (NSA) requirements of ANSI C63.4:2003.

MEASUREMENT INSTRUMENTATION

RECEIVER SYSTEM

An EMI receiver as specified in CISPR 16-1-1 is used for emissions measurements. The receivers used can measure over the frequency range of 9 kHz up to 2000 MHz. These receivers allow both ease of measurement and high accuracy to be achieved. The receivers have Peak, Average, and CISPR (Quasi-peak) detectors built into their design so no external adapters are necessary. The receiver automatically sets the required bandwidth for the CISPR detector used during measurements. If the repetition frequency of the signal being measured is below 20Hz, peak measurements are made in lieu of Quasi-Peak measurements.

For measurements above the frequency range of the receivers, a spectrum analyzer is utilized because it provides visibility of the entire spectrum along with the precision and versatility required to support engineering analysis. Average measurements above 1000MHz are performed on the spectrum analyzer using the linear-average method with a resolution bandwidth of 1 MHz and a video bandwidth of 10 Hz, unless the signal is pulsed in which case the average (or video) bandwidth of the measuring instrument is reduced to onset of pulse desensitization and then increased.

INSTRUMENT CONTROL COMPUTER

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

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

LINE IMPEDANCE STABILIZATION NETWORK (LISN)

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

FILTERS/ATTENUATORS

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

ANTENNAS

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

ANTENNA MAST AND EQUIPMENT TURNTABLE

The antennas used to measure the radiated electric field strength are mounted on a non-conductive antenna mast equipped with a motor-drive to vary the antenna height. Measurements below 30 MHz are made with the loop antenna at a fixed height of 1m above the ground plane.

ANSI C63.4:2003 specifies that the test height above ground for table mounted devices shall be 80 centimeters. Floor mounted equipment shall be placed on the ground plane if the device is normally used on a conductive floor or separated from the ground plane by insulating material from 3 to 12 mm if the device is normally used on a non-conductive floor. During radiated measurements, the EUT is positioned on a motorized turntable in conformance with this requirement.

INSTRUMENT CALIBRATION

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

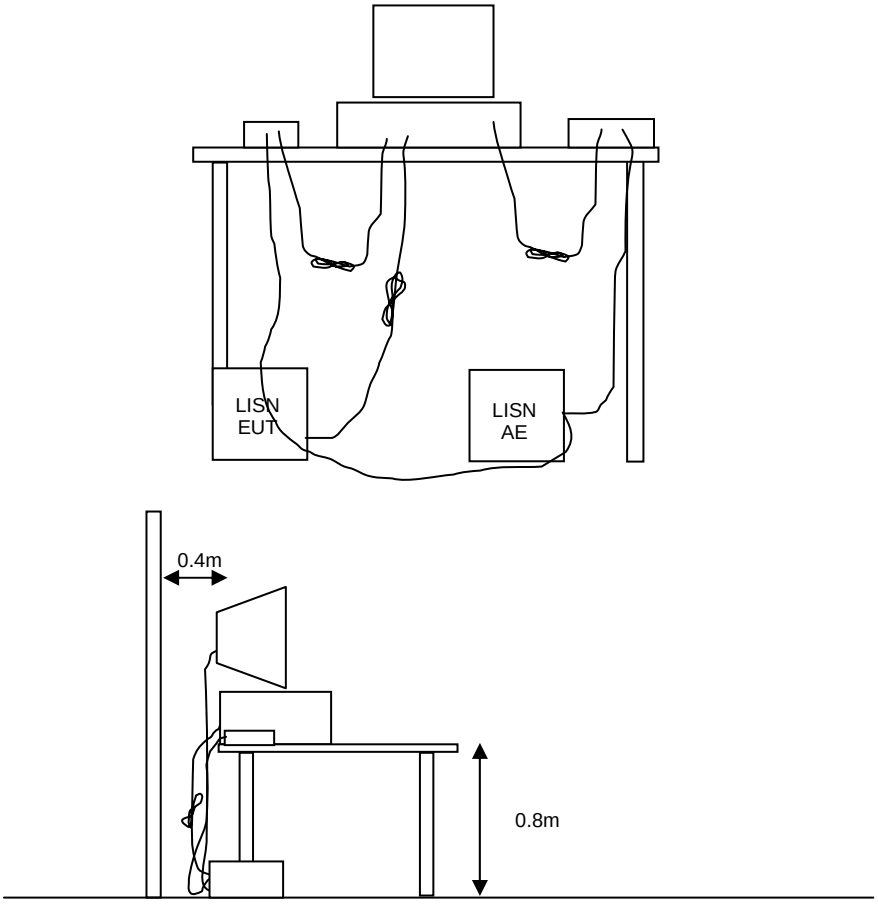
TEST PROCEDURES

EUT AND CABLE PLACEMENT

The regulations require that interconnecting cables be connected to the available ports of the unit and that the placement of the unit and the attached cables simulate the worst case orientation that can be expected from a typical installation, so far as practicable. To this end, the position of the unit and associated cabling is varied within the guidelines of ANSI C63.4:2003, and the worst-case orientation is used for final measurements.

CONDUCTED EMISSIONS

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



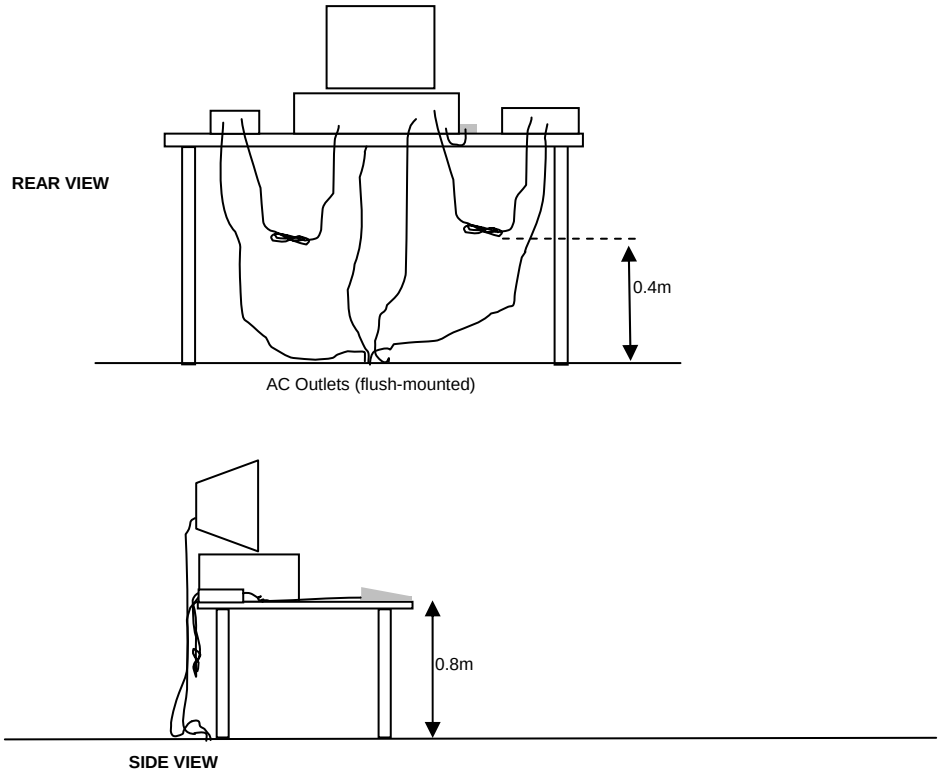
RADIATED EMISSIONS

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

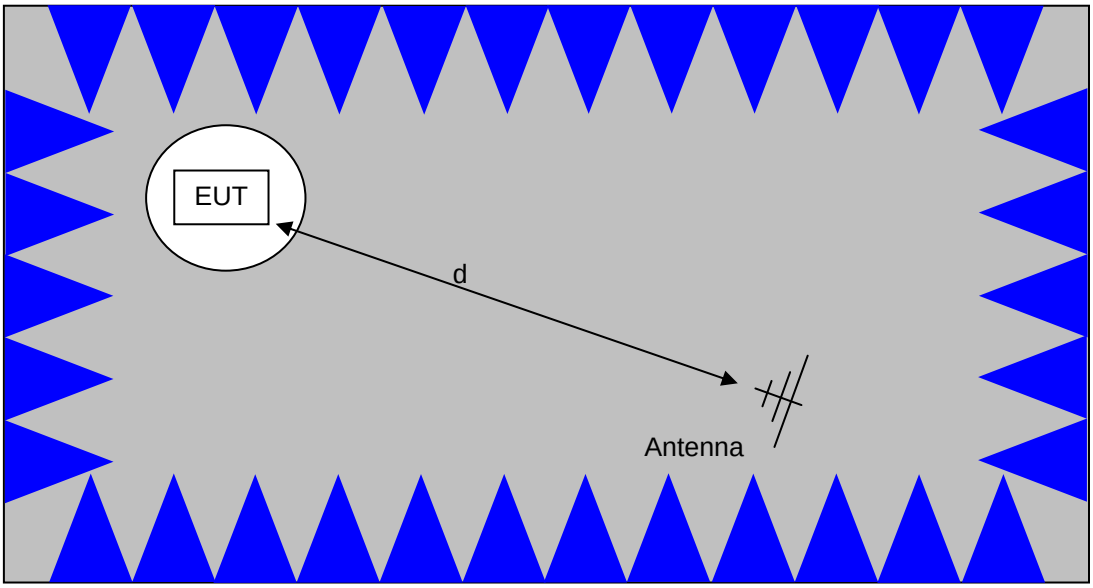
A speaker is provided in the receiver to aid in discriminating between EUT and ambient emissions. Other methods used during the preliminary scan for EUT emissions involve scanning with near field magnetic loops, monitoring I/O cables with RF current clamps, and cycling power to the EUT.

Final maximization is a phase in which the highest amplitude emissions identified in the spectral search are viewed while the EUT azimuth angle is varied from 0 to 360 degrees relative to the receiving antenna. The azimuth, which results in the highest emission is then maintained while varying the antenna height from one to four meters (for measurements above 30 MHz, measurements below 30 MHz are made with the loop antenna at a fixed height of 1m). The result is the identification of the highest amplitude for each of the highest peaks. Each recorded level is corrected in the receiver using appropriate factors for cables, connectors, antennas, and preamplifier gain.

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

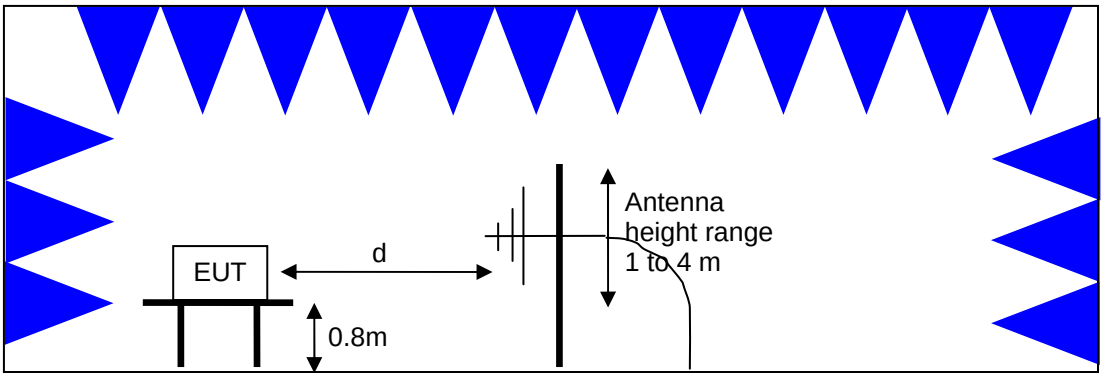


Typical Test Configuration for Radiated Field Strength Measurements



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

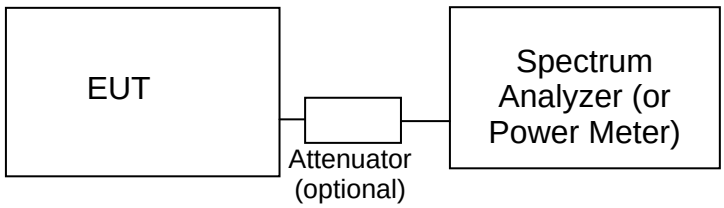
Floor-standing equipment is placed on the floor with insulating supports between the unit and the ground plane.



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

CONDUCTED EMISSIONS FROM ANTENNA PORT

Direct measurements of power, bandwidth and power spectral density are performed, where possible, 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.



Test Configuration for Antenna Port Measurements

Measurement bandwidths (video and resolution) are set in accordance with the relevant standards and Elliott's test procedures for the type of radio being tested. When power measurements are made using a resolution bandwidth less than the signal bandwidth the power is calculated by summing the power across the signal bandwidth using either the analyzer channel power function or by capturing the trace data and calculating the power using software. In both cases the summed power is corrected to account for the equivalent noise bandwidth (ENBW) of the resolution bandwidth used.

If power averaging is used (typically for certain digital modulation techniques), the EUT is configured to transmit continuously. Power averaging is performed using either the built-in function of the analyzer or, if the analyzer does not feature power averaging, using external software. In both cases the average power is calculated over a number of sweeps (typically 100). When the EUT cannot be configured to continuously transmit then either the analyzer is configured to perform a gated sweep to ensure that the power is averaged over periods that the device is transmitting or power averaging is disabled and a max-hold feature is used.

If a power meter is used to make output power measurements the sensor head type (peak or average) is stated in the test data table.

BANDWIDTH MEASUREMENTS

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

SPECIFICATION LIMITS AND SAMPLE CALCULATIONS

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

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

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

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

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

GENERAL TRANSMITTER RADIATED EMISSIONS SPECIFICATION LIMITS

The table below shows the limits for the spurious emissions from transmitters that fall in restricted bands[1] (with the exception of transmitters operating under FCC Part 15 Subpart D and RSS 210 Annex 9), the limits for all emissions from a low power device operating under the general rules of RSS 310 (tables 3 and 4), RSS 210 (table 2) and FCC Part 15 Subpart C section 15.209.

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

RECEIVER RADIATED SPURIOUS EMISSIONS SPECIFICATION LIMITS

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

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

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

OUTPUT POWER LIMITS – DIGITAL TRANSMISSION SYSTEMS

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

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

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

TRANSMIT MODE SPURIOUS RADIATED EMISSIONS LIMITS – FHSS and DTS SYSTEMS

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

SAMPLE CALCULATIONS - CONDUCTED EMISSIONS

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

$$R_r - S = M$$

where:

R_r = Receiver Reading in dBuV

S = Specification Limit in dBuV

M = Margin to Specification in +/- dB

SAMPLE CALCULATIONS - RADIATED EMISSIONS

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

A distance factor, when used for electric field measurements above 30MHz, is calculated by using the following formula:

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

where:

F_d = Distance Factor in dB

D_m = Measurement Distance in meters

D_s = Specification Distance in meters

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

$$F_d = 40*LOG_{10} (D_m/D_s)$$

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

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

$$R_c = R_r + F_d$$

and

$$M = R_c - L_s$$

where:

R_r = Receiver Reading in dBuV/m

F_d = Distance Factor in dB

R_c = Corrected Reading in dBuV/m

L_s = Specification Limit in dBuV/m

M = Margin in dB Relative to Spec

SAMPLE CALCULATIONS - FIELD STRENGTH TO EIRP CONVERSION

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

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

where P is the eirp (Watts)

For a measurement at 3m the conversion from a logarithmic value for field strength (dBuV/m) to an eirp power (dBm) is -95.3dB.

Appendix A Test Equipment Calibration Data

Radiated Emissions, 1000 - 40,000 MHz

Manufacturer	Description	Model	Asset #	Cal Due
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	263	12/8/2011
EMCO	Antenna, Horn, 1-18 GHz	3115	487	7/6/2012
Hewlett Packard	Head (Inc flex cable, 1143, 2198) Red	84125C	1145	2/17/2012
A.H. Systems	Purple System Horn, 18-40GHz	SAS-574, p/n: 2581	2160	2/9/2012
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	785	5/18/2012
EMCO	Antenna, Horn, 1-18GHz	3115	868	6/8/2012
EMCO	Antenna, Horn, 1-18 GHz	3115	786	12/11/2011
Hewlett Packard	SpecAn 30 Hz -40 GHz, SV (SA40) Red	8564E (84125C)	1148	7/12/2011
Micro-Tronics	Band Reject Filter, 2400-2500 MHz	BRM50702-02	2249	10/11/2011
Hewlett Packard	EMC Spectrum Analyzer, 9 KHz - 22 GHz	8593EM	1319	11/22/2011
Rohde & Schwarz	Test Receiver, 0.009-2750 MHz	ESN	1332	1/17/2012
Sunol Sciences	Biconilog, 30-3000 MHz	JB3	1548	6/24/2012
Com-Power Corp.	Preamplifier, 30-1000 MHz	PA-103A	2359	2/15/2012

Radio Antenna Port (Power and Spurious Emissions)

Manufacturer	Description	Model	Asset #	Cal Due
Hewlett Packard	SpecAn 9 kHz - 40 GHz, FT (SA40) Blue	8564E (84125C)	1393	7/14/2011

Conducted Emissions - AC Power Ports, 09-Jul-11

Manufacturer	Description	Model	Asset #	Cal Due
Rohde & Schwarz	Pulse Limiter	ESH3 Z2	812	1/18/2012
EMCO	LISN, 10 kHz-100 MHz	3825/2	1292	3/1/2012
Rohde & Schwarz	EMI Test Receiver, 20 Hz-7 GHz	ESIB7	1756	4/6/2012

Appendix B Test Data

Test log number Pages 27 - 139

Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		-
Emissions Standard(s):	-	Class:	-
Immunity Standard(s):	-	Environment:	-

EMC Test Data

For The

Xirrus, Inc.

Model

XR4000 3x3

Date of Last Test: 7/14/2011

Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

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

Test Specific Details

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

Date of Test: 6/29/2011
Test Engineer: John Caizzi/R. Varelas
Test Location: Fremont Chamber #7

Config. Used: 1
Config Change: None
Host Unit Voltage POE

General Test Configuration

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

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

Ambient Conditions:

Temperature: 21 °C
Rel. Humidity: 35 %

Summary of Results

1	Output Power Chain A+B+C	15.247(b)	Pass	802.11b: 24.2 dBm 802.11g: 23.6 dBm 802.11a: 21.4 dBm
2	PSD Chain A+B+C	15.247(d)	Pass	802.11b: -0.5 dBm/3kHz 802.11g: -1.6 dBm/3kHz 802.11a: -3.2 dBm/3kHz
3	Minimum 6dB Bandwidth	15.247(a)	Pass	802.11b: 9.4 MHz 802.11g: 16.6 MHz 802.11a: 16.3 MHz
3	99% Bandwidth	RSS GEN	Pass	802.11b: 14.3 MHz 802.11g: 17.2 MHz 802.11a: 17.3 MHz
4	Spurious emissions	15.247(b)	Pass	All signals were more than 30dB below the fundamental

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:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

Run #1: Output Power - Chain 0+1+2

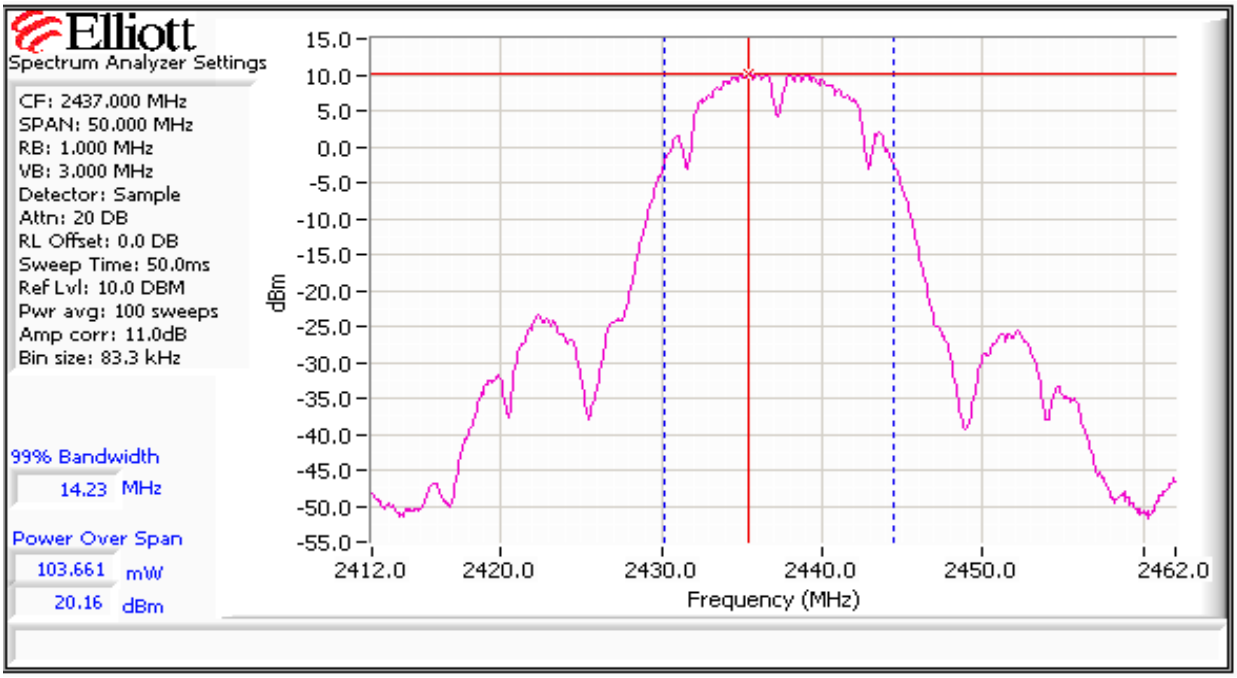
Run #1a Operating Mode: 802.11b
Transmitted signal on chain is coherent ? yes

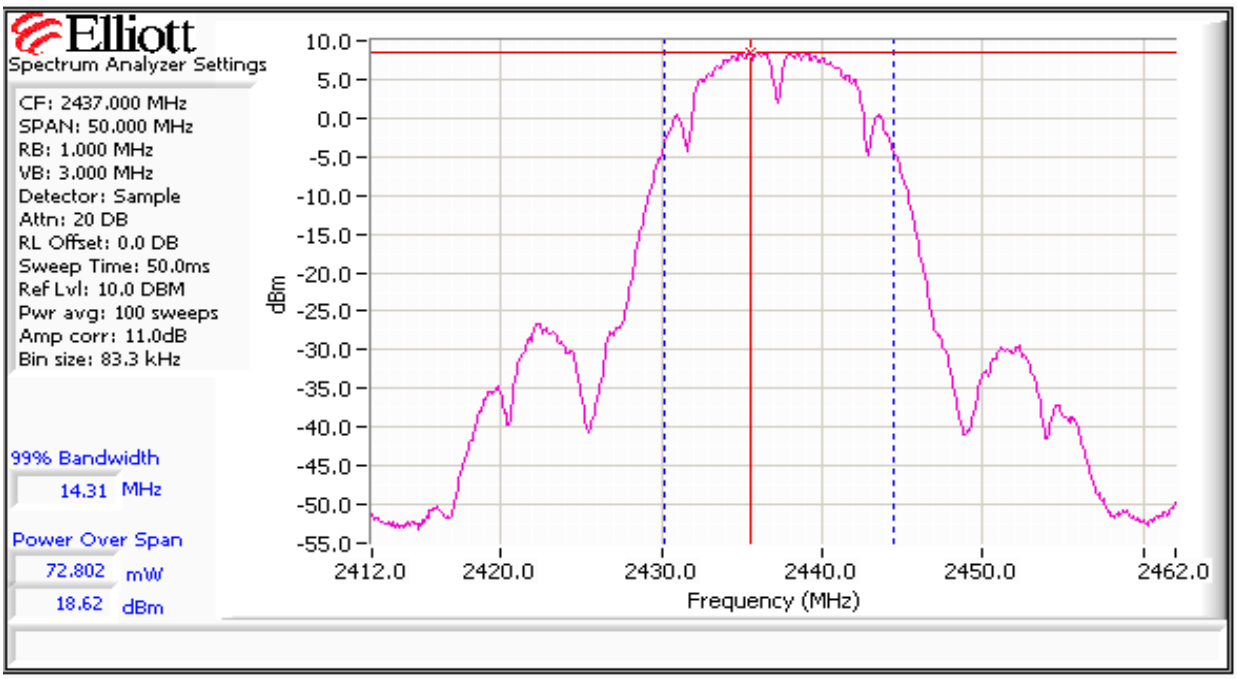
2412 MHz	Chain 0	Chain 1	Chain 2	Chain 4	Total Across All Chains		Limit	
Power Setting Note 3		17.0						
Output Power (dBm) Note 1	18.2	17.6	18.1		22.7 dBm	0.188 W	29.2 dBm	0.837 W
Antenna Gain (dBi) Note 2	2	2	2		6.8 dBi		Pass	
eirp (dBm) Note 2	20.2	19.6	20.1		29.5 dBm	0.895 W		

2437 MHz	Chain 1	Chain 2	Chain 3	Chain 4	Total Across All Chains		Limit	
Power Setting Note 3		17.0						
Output Power (dBm) Note 1	20.2	18.6	19.4		24.2 dBm	0.264 W	29.2 dBm	0.837 W
Antenna Gain (dBi) Note 2	2	2	2		6.8 dBi		Pass	
eirp (dBm) Note 2	22.16	20.62	21.4		31.0 dBm	1.253 W		

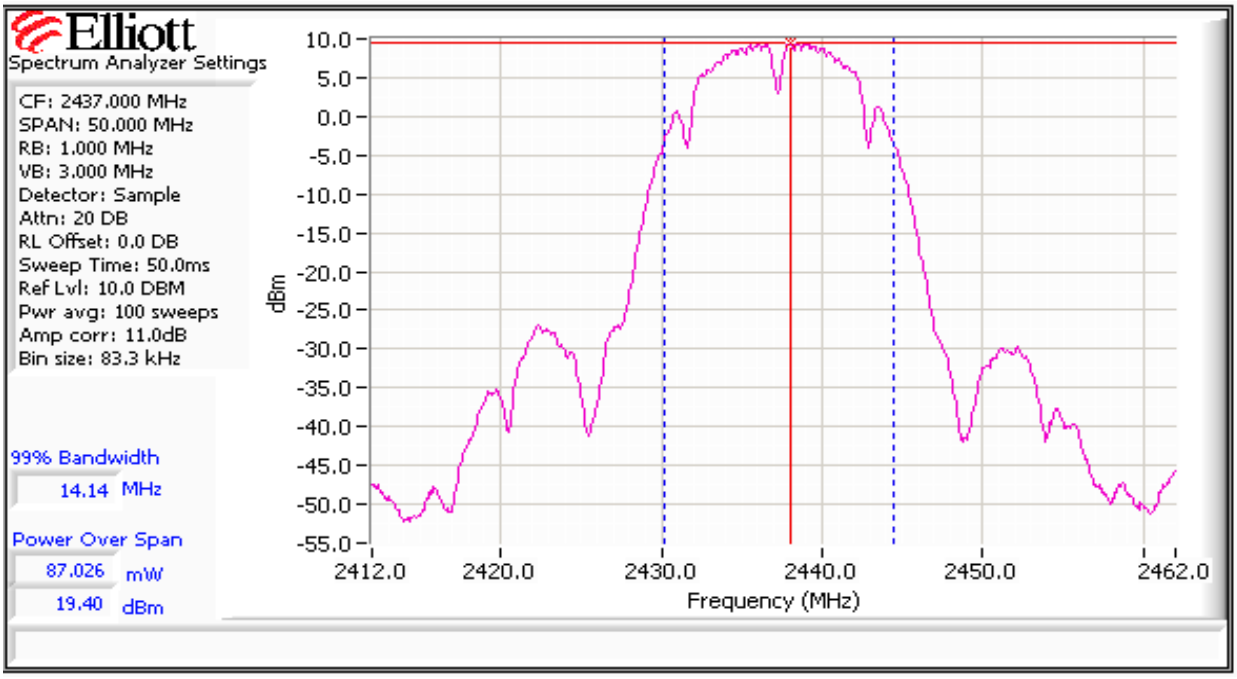
2462 MHz	Chain 1	Chain 2	Chain 3	Chain 4	Total Across All Chains		Limit	
Power Setting Note 3		16.5						
Output Power (dBm) Note 1	19.3	17.83	19.0		23.5 dBm	0.225 W	29.2 dBm	0.837 W
Antenna Gain (dBi) Note 2	2	2	2		6.8 dBi		Pass	
eirp (dBm) Note 2	21.3	19.83	21		30.3 dBm	1.071 W		

Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A





Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A



Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

Run #1b Operating Mode: 802.11g

Transmitted signal on chain is coherent ? yes

2412 MHz	Chain 0	Chain 1	Chain 2	Chain 4	Total Across All Chains		Limit	
Power Setting Note 3		13.0						
Output Power (dBm) Note 1	13.8	13.6	13.8		18.5 dBm	0.071 W	29.2 dBm	0.837 W
Antenna Gain (dBi) Note 2	2	2	2		6.8 dBi		Pass	
eirp (dBm) Note 2	15.75	15.59	15.83		25.3 dBm	0.336 W		

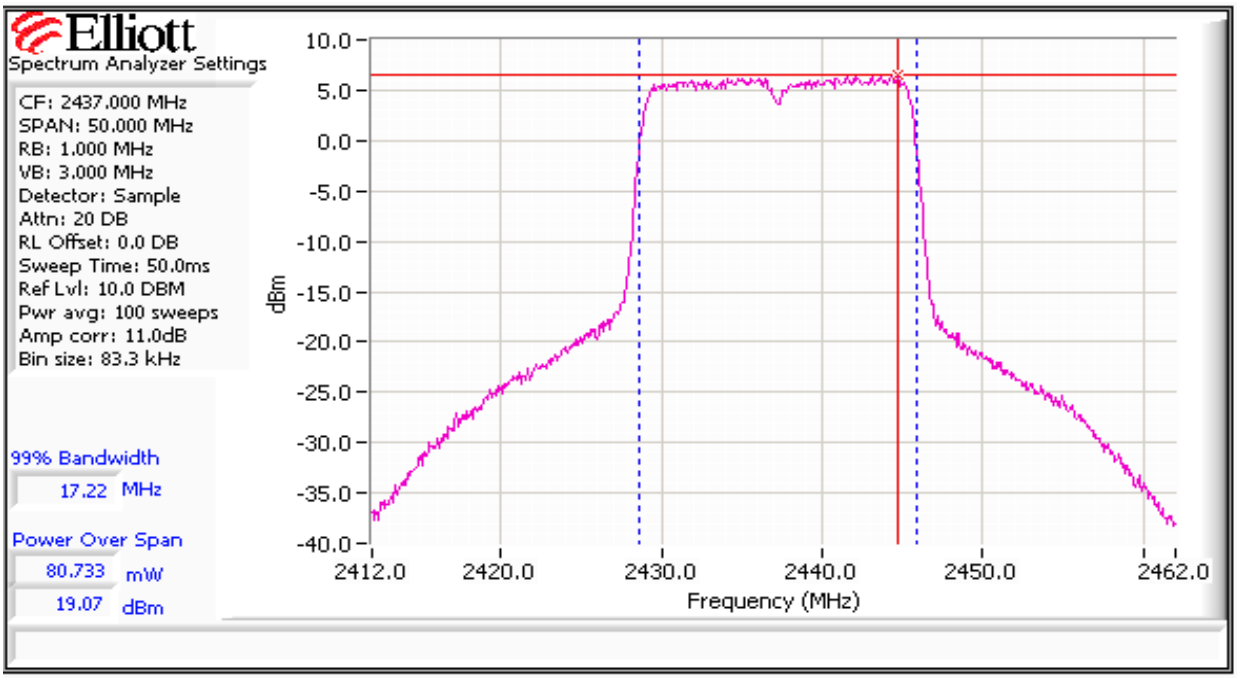
2417 MHz	Chain 0	Chain 1	Chain 2	Chain 4	Total Across All Chains		Limit	
Power Setting Note 3		16.0						
Output Power (dBm) Note 1	17.1	16.6	17.1		21.7 dBm	0.149 W	29.2 dBm	0.837 W
Antenna Gain (dBi) Note 2	2	2	2		6.8 dBi		Pass	
eirp (dBm) Note 2	19.08	18.63	19.13		28.5 dBm	0.707 W		

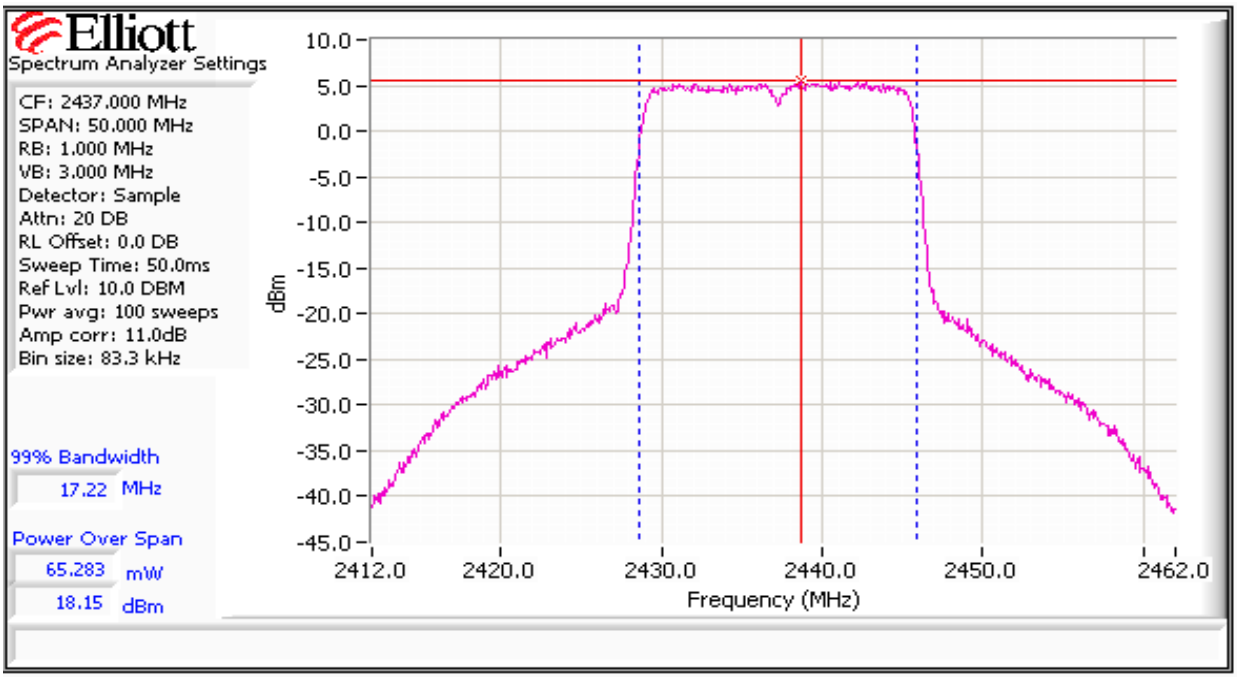
2437 MHz	Chain 0	Chain 1	Chain 2	Chain 4	Total Across All Chains		Limit	
Power Setting Note 3		17.0						
Output Power (dBm) Note 1	19.1	18.2	19.1		23.6 dBm	0.228 W	29.2 dBm	0.837 W
Antenna Gain (dBi) Note 2	2	2	2		6.8 dBi		Pass	
eirp (dBm) Note 2	21.07	20.15	21.11		30.3 dBm	1.082 W		

2457 MHz	Chain 0	Chain 1	Chain 2	Chain 4	Total Across All Chains		Limit	
Power Setting Note 3		15.5						
Output Power (dBm) Note 1	17.5	16.4	17.3		21.8 dBm	0.153 W	29.2 dBm	0.837 W
Antenna Gain (dBi) Note 2	2	2	2		6.8 dBi		Pass	
eirp (dBm) Note 2	19.48	18.38	19.26		28.6 dBm	0.726 W		

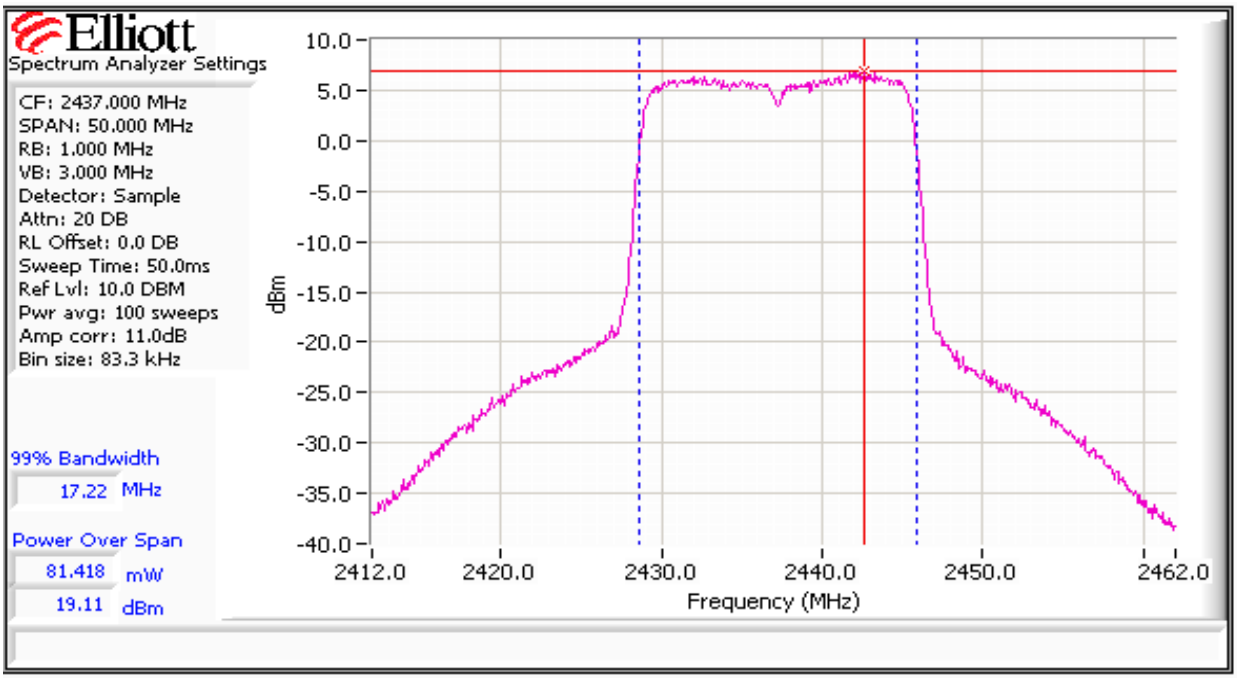
2462 MHz	Chain 0	Chain 1	Chain 2	Chain 4	Total Across All Chains		Limit	
Power Setting Note 3		13.5						
Output Power (dBm) Note 1	15.0	13.9	15.5		19.6 dBm	0.092 W	29.2 dBm	0.837 W
Antenna Gain (dBi) Note 2	2	2	2		6.8 dBi		Pass	
eirp (dBm) Note 2	17	15.93	17.47		26.4 dBm	0.435 W		

Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A





Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A



Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

Run #1c Operating Mode: 802.11a
Transmitted signal on chain is coherent ? yes

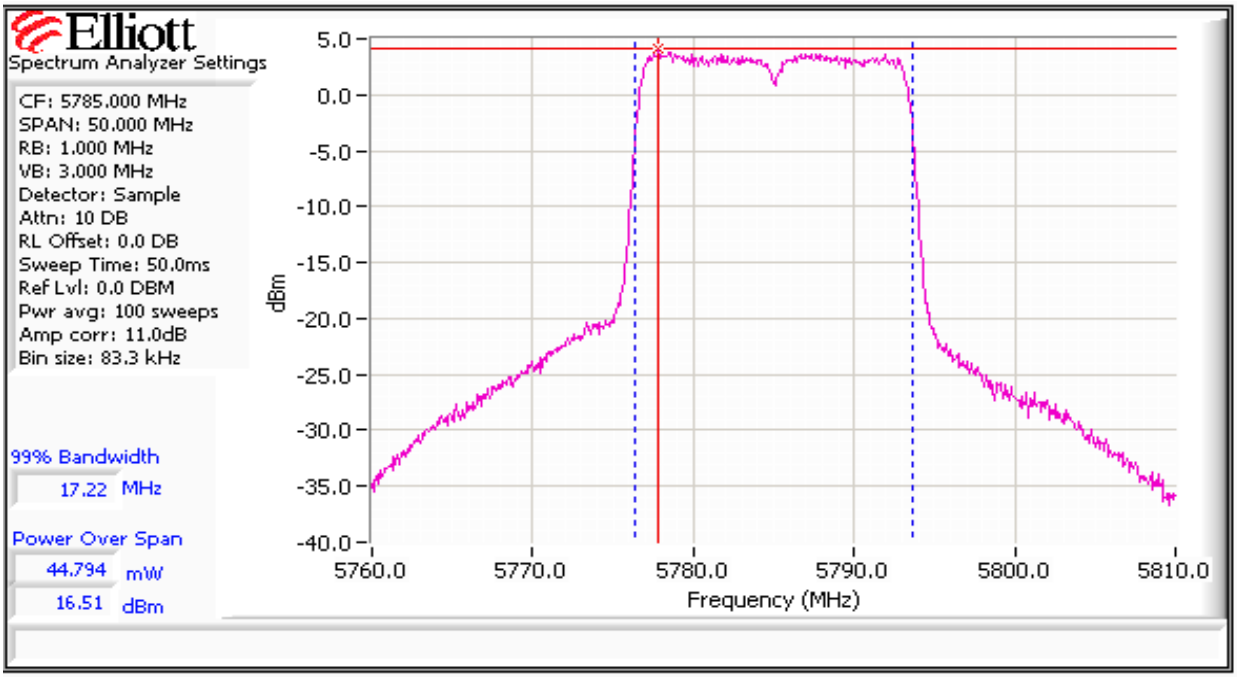
5745 MHz	Chain 0	Chain 1	Chain 2	Chain 4	Total Across All Chains		Limit	
Power Setting Note 3	17.0							
Output Power (dBm) Note 1	17.08	16.06	15.7		21.1 dBm	0.129 W	27.2 dBm	0.528 W
Antenna Gain (dBi) Note 2	4	4	4		8.8 dBi		Pass	
eirp (dBm) Note 2	21.08	20.06	19.7		29.9 dBm	0.969 W		

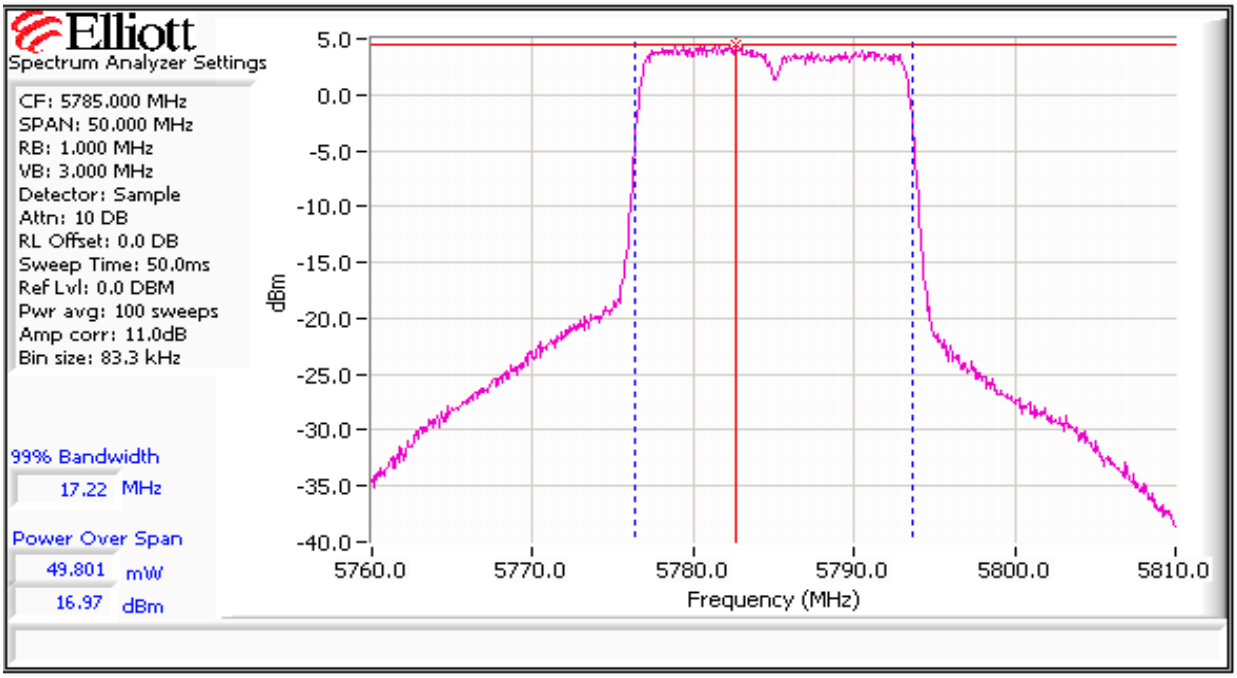
5785 MHz	Chain 0	Chain 1	Chain 2	Chain 4	Total Across All Chains		Limit	
Power Setting Note 3	17.0							
Output Power (dBm) Note 1	16.51	16.97	16.38		21.4 dBm	0.138 W	27.2 dBm	0.528 W
Antenna Gain (dBi) Note 2	4	4	4		8.8 dBi		Pass	
eirp (dBm) Note 2	20.51	20.97	20.38		30.2 dBm	1.040 W		

5825 MHz	Chain 0	Chain 1	Chain 2	Chain 4	Total Across All Chains		Limit	
Power Setting Note 3	17.0							
Output Power (dBm) Note 1	16.06	16.74	16.43		21.2 dBm	0.132 W	27.2 dBm	0.528 W
Antenna Gain (dBi) Note 2	4	4	4		8.8 dBi		Pass	
eirp (dBm) Note 2	20.06	20.74	20.43		30.0 dBm	0.991 W		

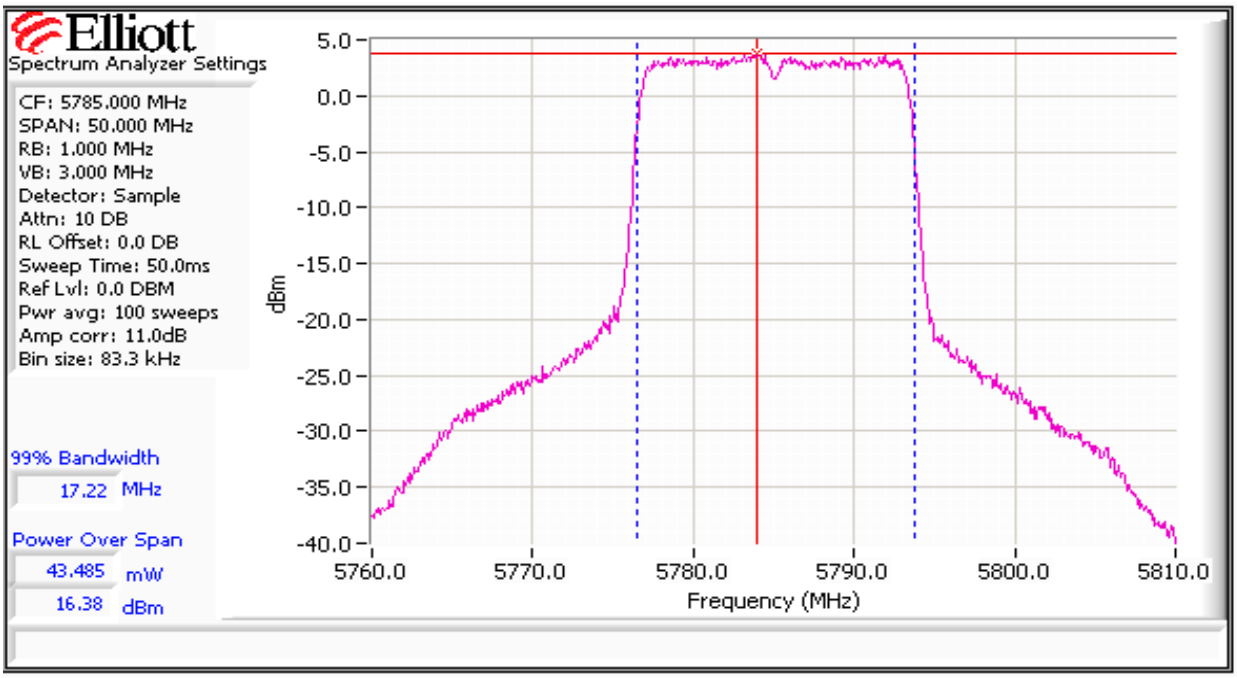
Note 1:	Output power measured using a spectrum analyzer (see plots below) with RBW=1MHz, VB=3 MHz, sample detector, power averaging on (transmitted signal was continuous) and power integration over 50 MHz (option #2, method 1 in KDB 558074, equivalent to method 1 of DA-02-2138A1 for U-NII devices). Spurious limit becomes -30dBc.
Note 2:	As there is coherency between chains the effective antenna gain is the sum of the individual antenna gains and the eirp is the product of the total power and the effective antenna gain
Note 3:	Power setting - if a single number the same power setting was used for each chain. If multiple numbers the power setting for each chain is separated by a comma (e.g. x,y would indicate power setting x for chain 1, power setting y for chain 2.

Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A





Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

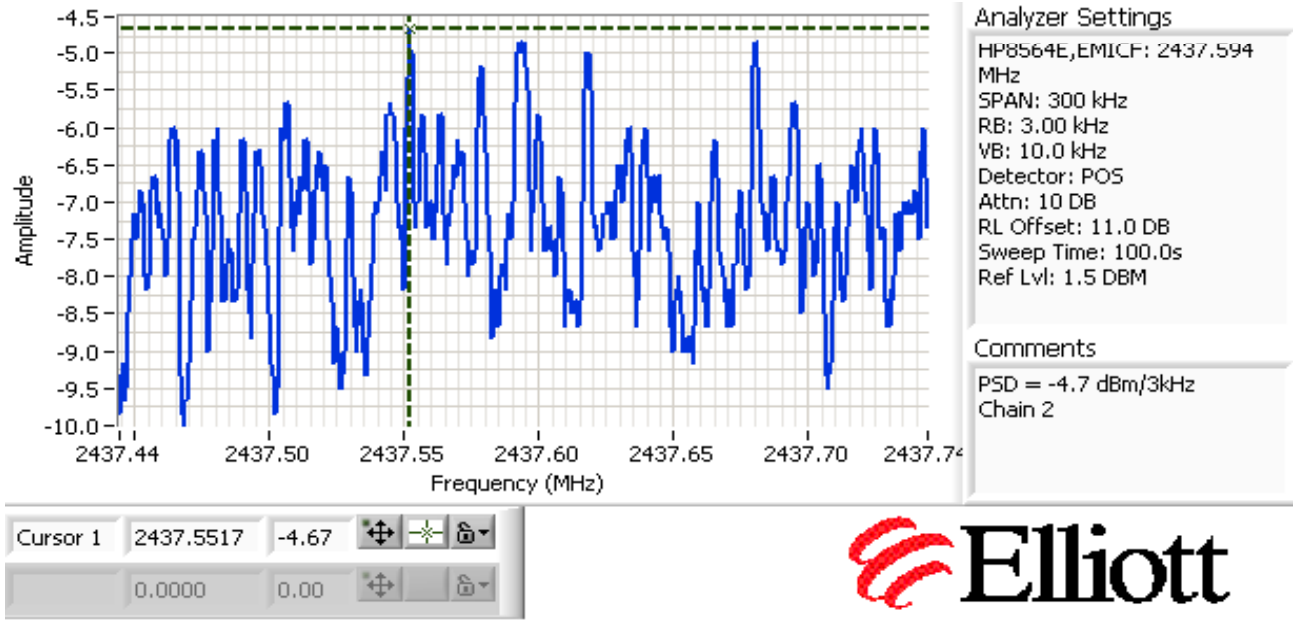


Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

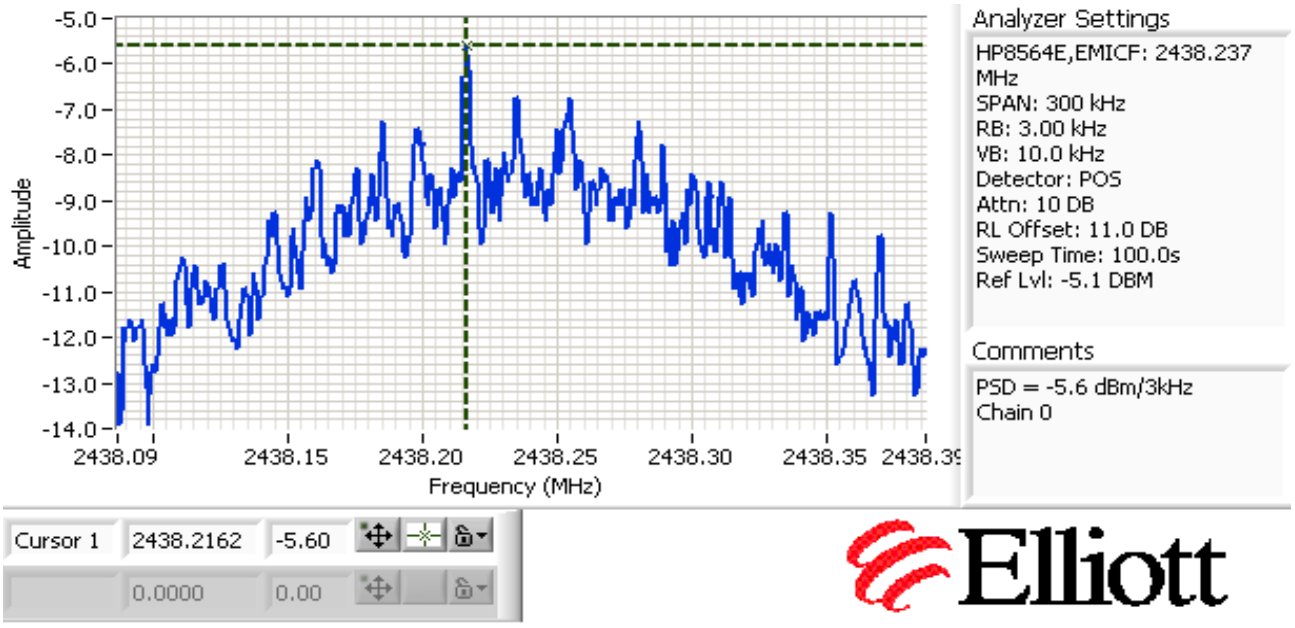
Run #2: Power spectral Density

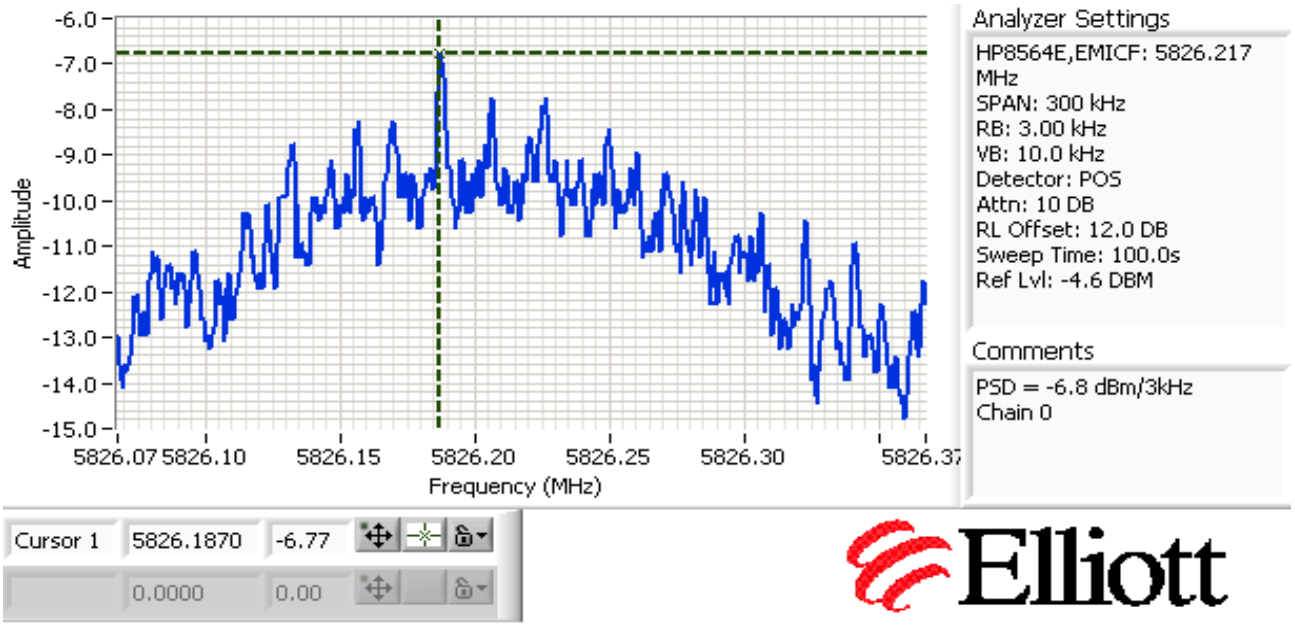
Power Setting	Frequency (MHz)	PSD (dBm/3kHz) Note 1					Limit dBm/3kHz	Result
		Chain 0	Chain 1	Chain 2	Chain 4	Total		
17.0	2412 - 802.11b	-5.8	-5.8	-5.1		-0.8	8.0	Pass
17.0	2437 - 802.11b	-5.5	-5.7	-4.7		-0.5	8.0	Pass
16.5	2462 - 802.11b	-5.7	-6.9	-5.9		-1.4	8.0	Pass
13.0	2412 - 802.11g	-11.1	-11.3	-11.8		-6.6	8.0	Pass
17.0	2437 - 802.11g	-5.6	-7.8	-6.1		-1.6	8.0	Pass
13.5	2462 - 802.11g	-10.6	-11.1	-10.1		-5.8	8.0	Pass
17.0	5745	-8.1	-9.3	-9.6		-4.2	8.0	Pass
17.0	5785	-8.3	-8.8	-9.1		-3.9	8.0	Pass
17.0	5825	-6.8	-8.3	-9.3		-3.2	8.0	Pass

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



Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A





Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

Run #3: Signal Bandwidth

Run 3a Operating mode: 802.11b

Power Setting	Frequency (MHz)	Resolution Bandwidth	Bandwidth (MHz) 6dB	99%
19.5	2412	100 kHz	10.1	14.3
17.0	2437	100 kHz	9.4	14.3
16.5	2462	100 kHz	9.8	14.2

Run 3b Operating mode: 802.11g

Power Setting	Frequency (MHz)	Resolution Bandwidth	Bandwidth (MHz) 6dB	99%
13.0	2412	100 kHz	16.7	17.1
17.0	2437	100 kHz	16.6	17.2
13.5	2462	100 kHz	16.7	17.2

Run 3c Operating mode: 802.11a

Power Setting	Frequency (MHz)	Resolution Bandwidth	Bandwidth (MHz) 6dB	99%
17	5745	100 kHz	16.4	17.3
17	5785	100 kHz	16.5	17.2
17	5825	100 kHz	16.3	17.2

Note 1:	Measured on a single chain
Note 2:	99% bandwidth measured in accordance with RSS GEN, with RB > 1% of the span and VB > 3xRB

Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

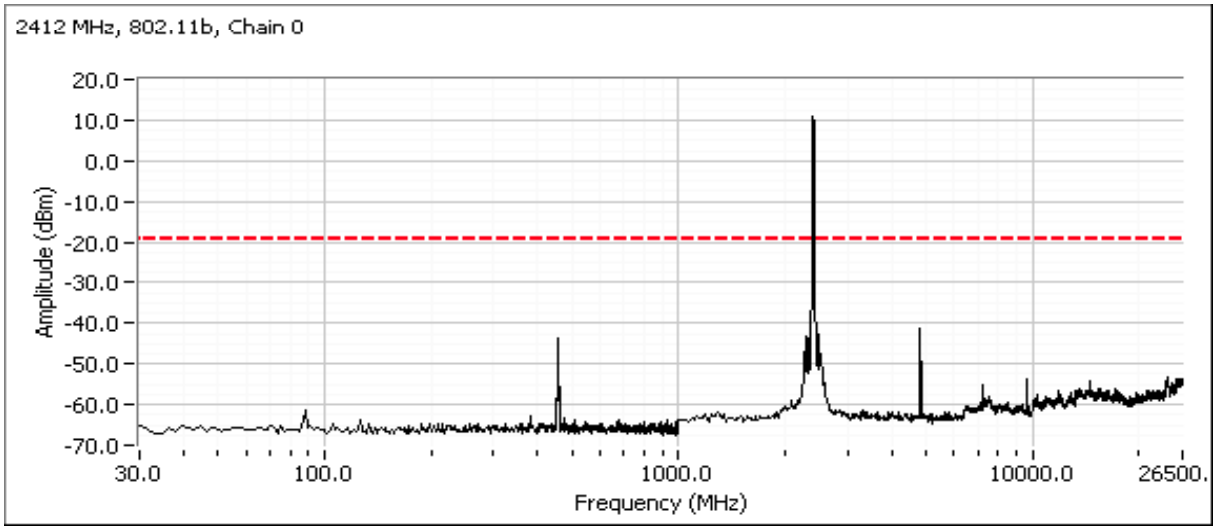
Run #4: Out of Band Spurious Emissions

Power Setting Per Chain				Frequency (MHz)	Limit	Result
#0	#1	#2	#4			
19.5	19.5	19.5		2412 - 802.11b	-30dBc	Pass
17.0	17.0	17.0		2437 - 802.11b	-30dBc	Pass
16.5	16.5	16.5		2462 - 802.11b	-30dBc	Pass
13.0	13.0	13.0		2412 - 802.11g	-30dBc	Pass
17.0	17.0	17.0		2437 - 802.11g	-30dBc	Pass
13.5	13.5	13.5		2462 - 802.11g	-30dBc	Pass
17.0	17.0	17.0		5745 - 802.11a	-30dBc	Pass
17.0	17.0	17.0		5785 - 802.11a	-30dBc	Pass
17.0	17.0	17.0		5825 - 802.11a	-30dBc	Pass

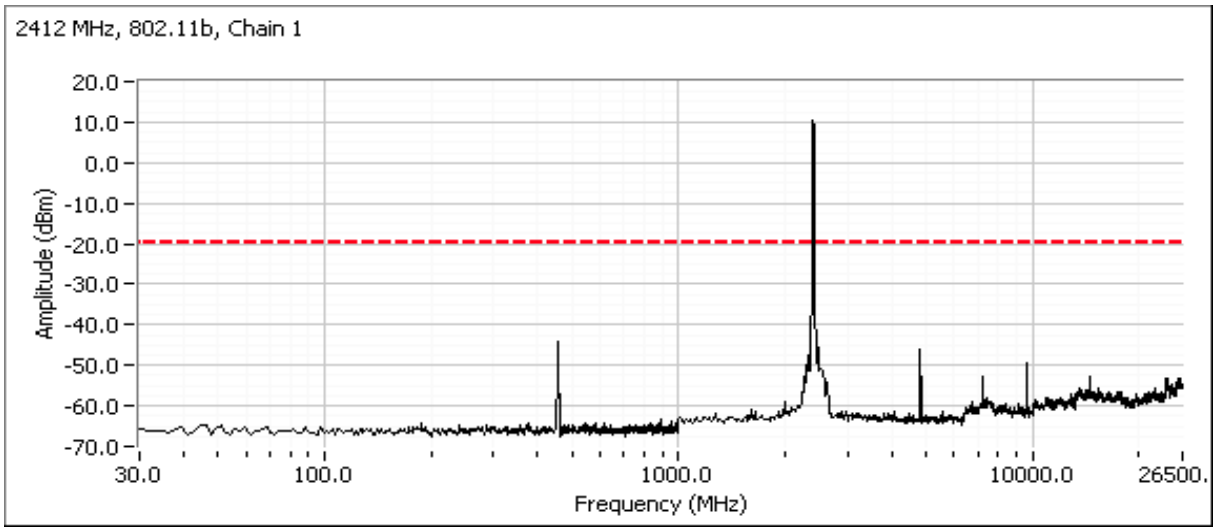
Note 1:	Measured on each chain individually

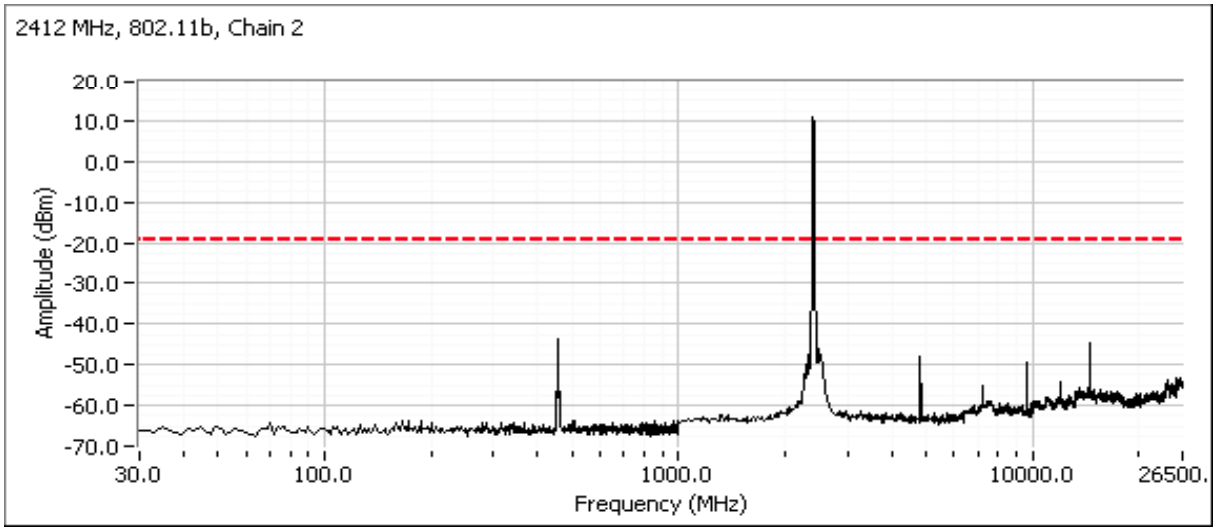
802.11b Mode

Plots for low channel, power setting(s) = 19.5



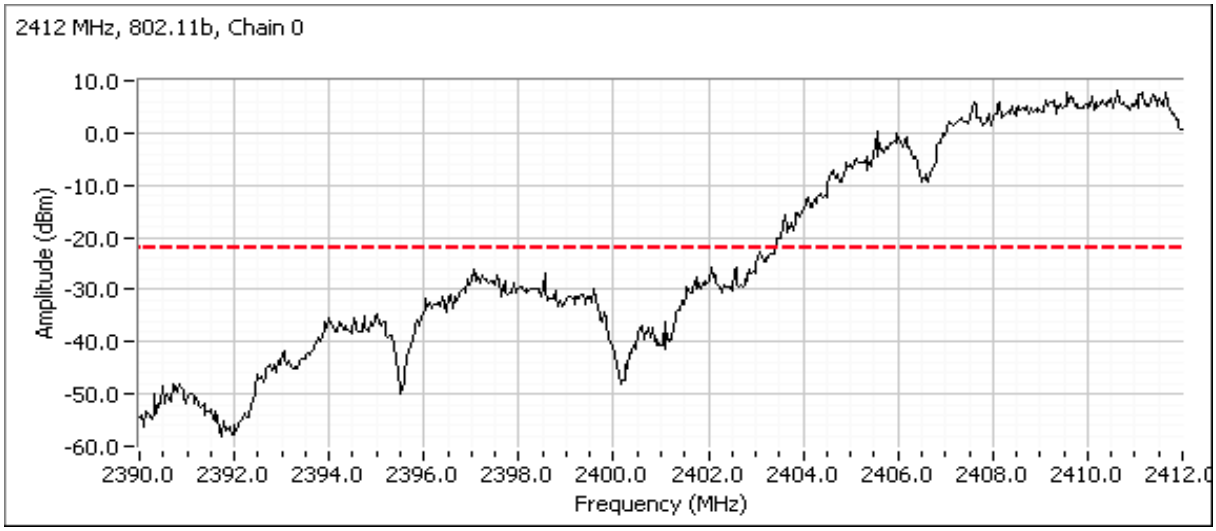
Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

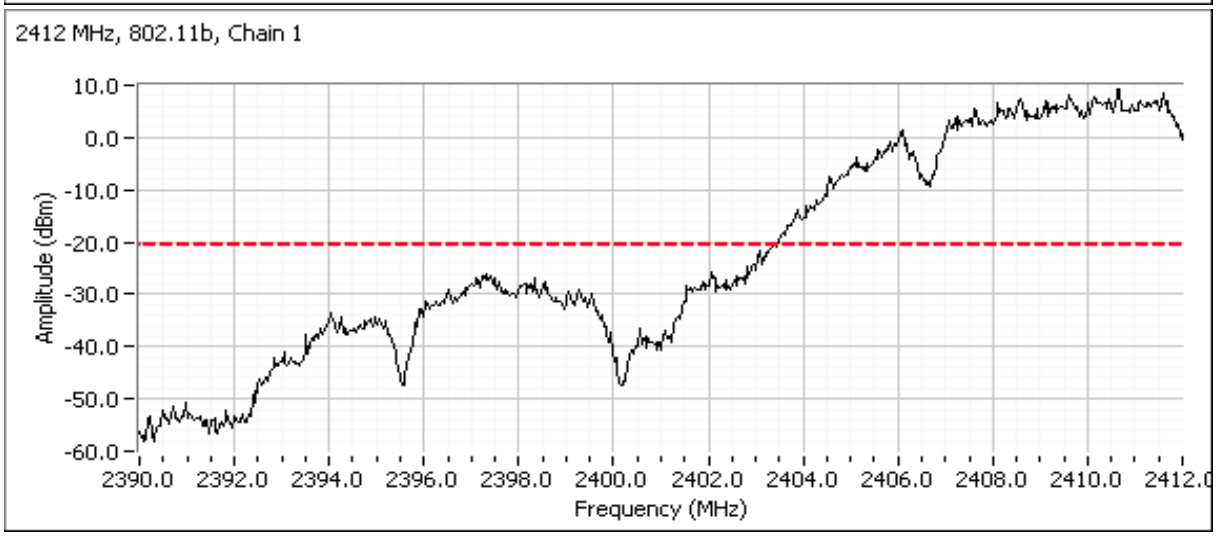




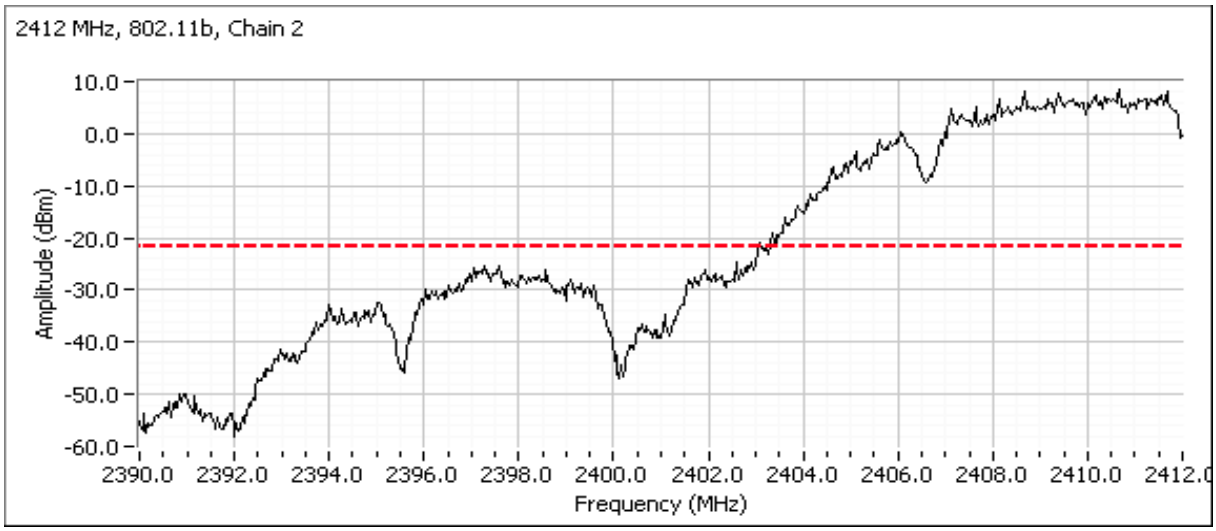
Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

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

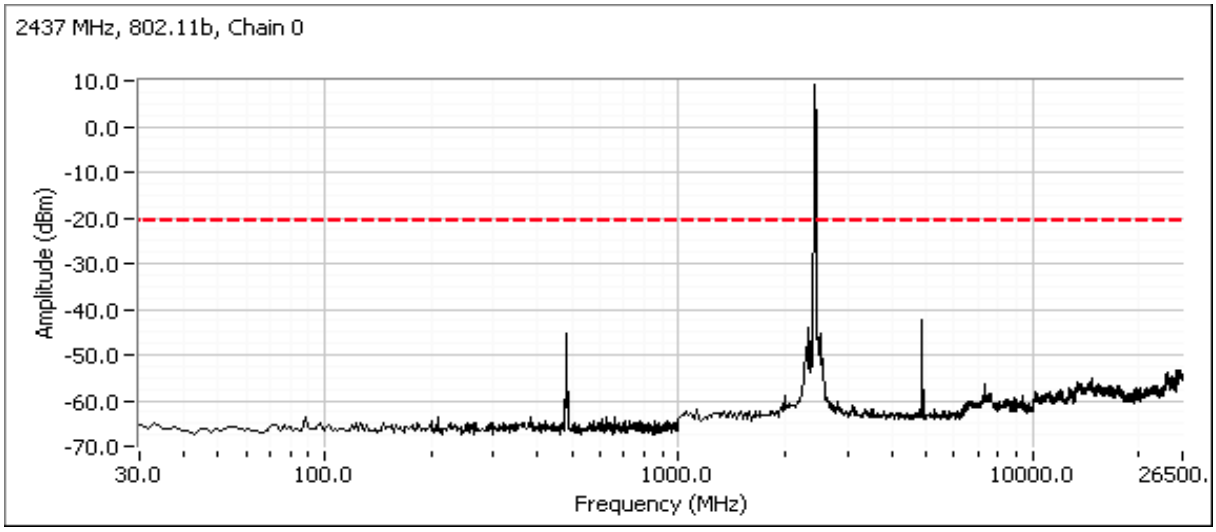




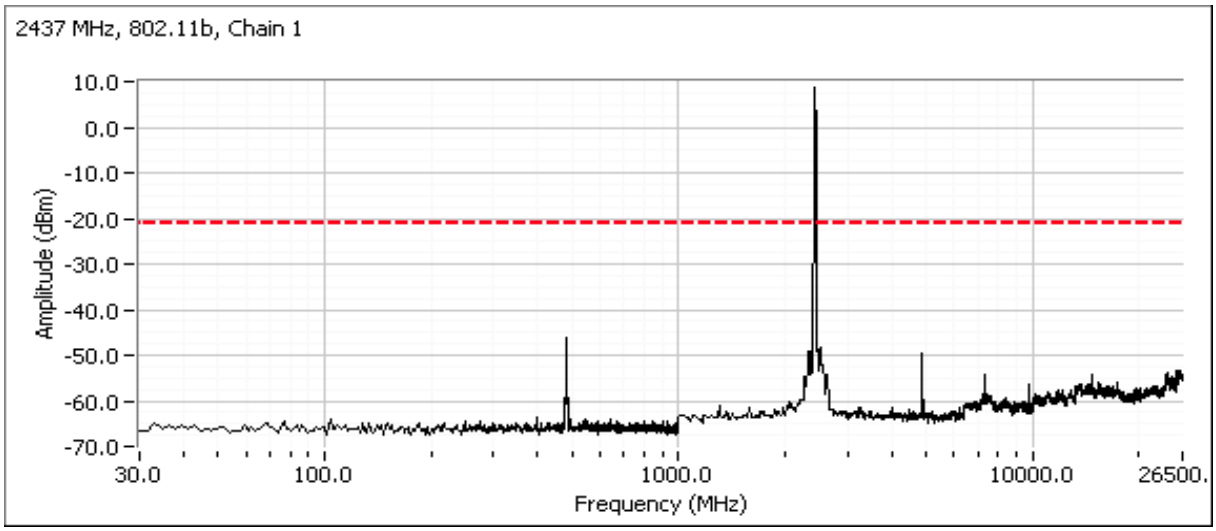
Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

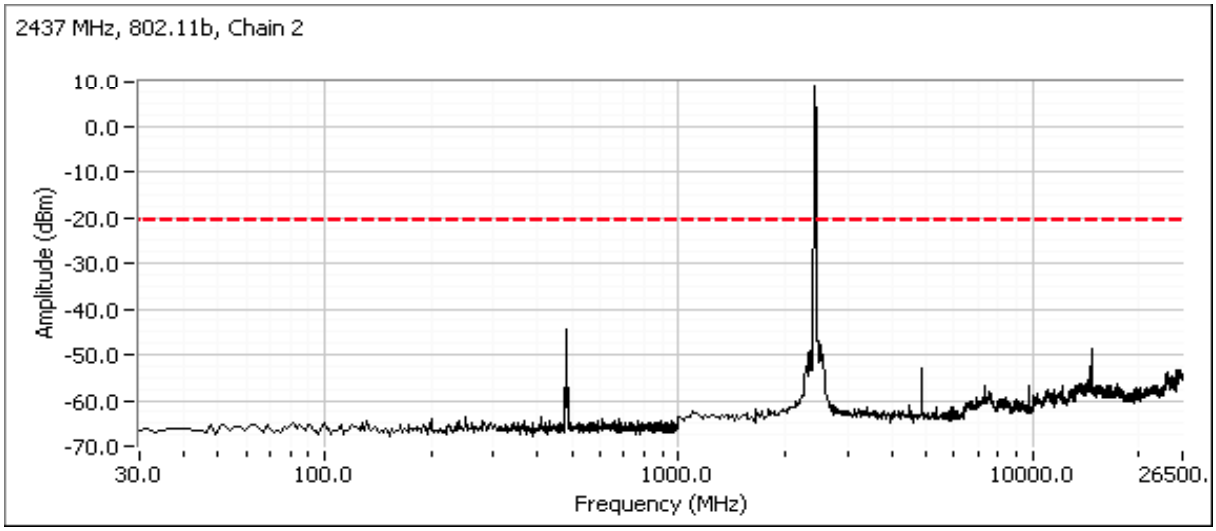


Plots for center channel, power setting(s) = 17.0



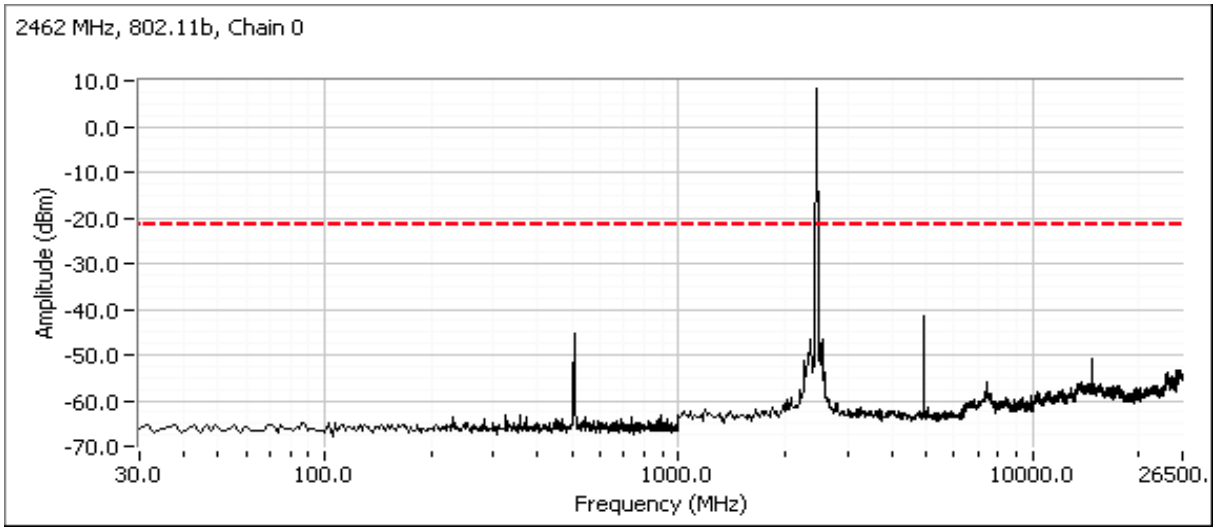
Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

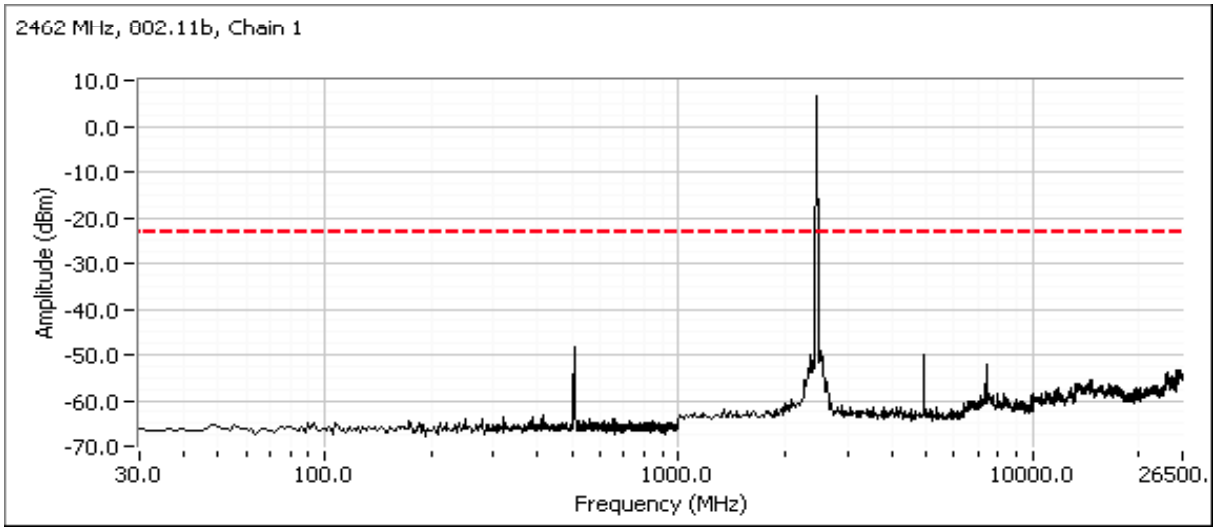




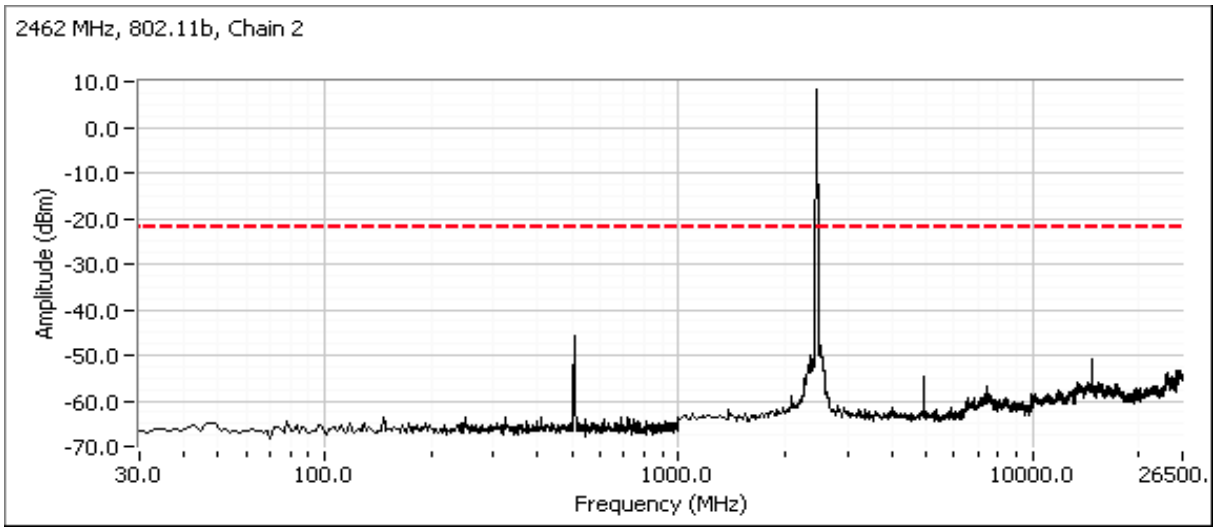
Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

Plots for high channel, power setting(s) = 16.5



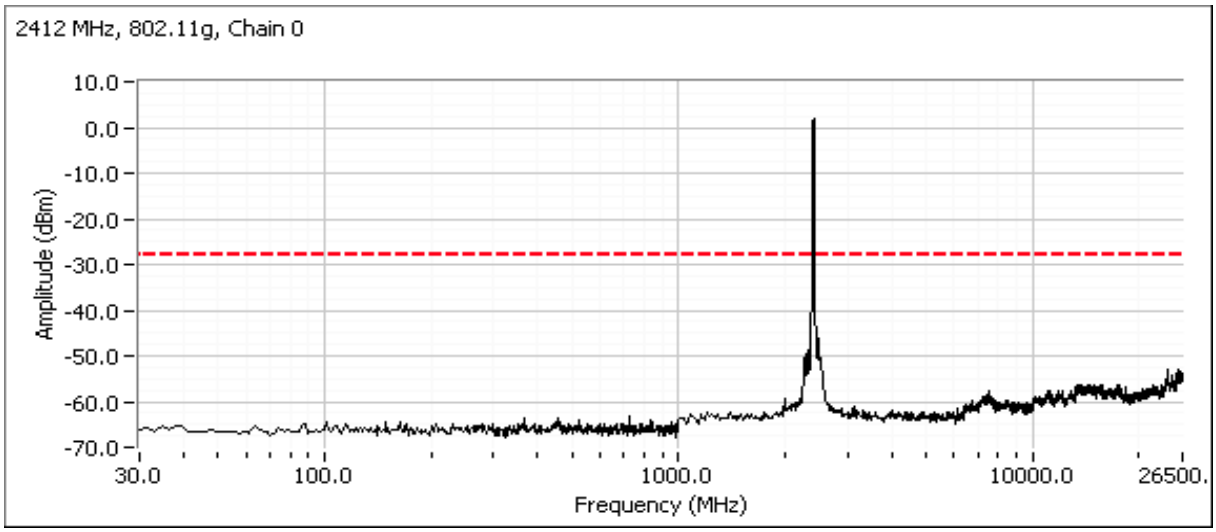


Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

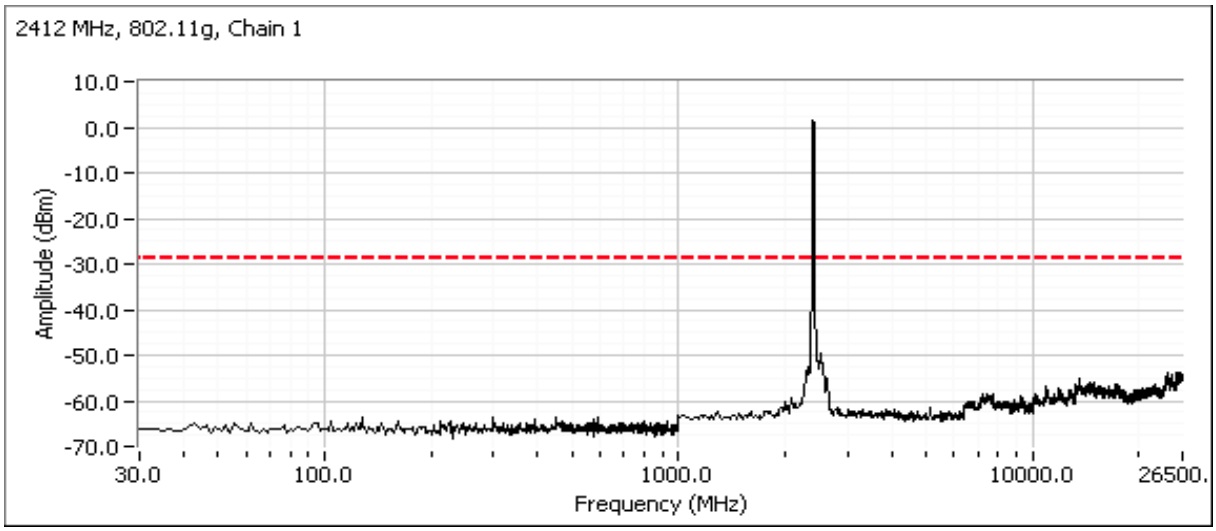


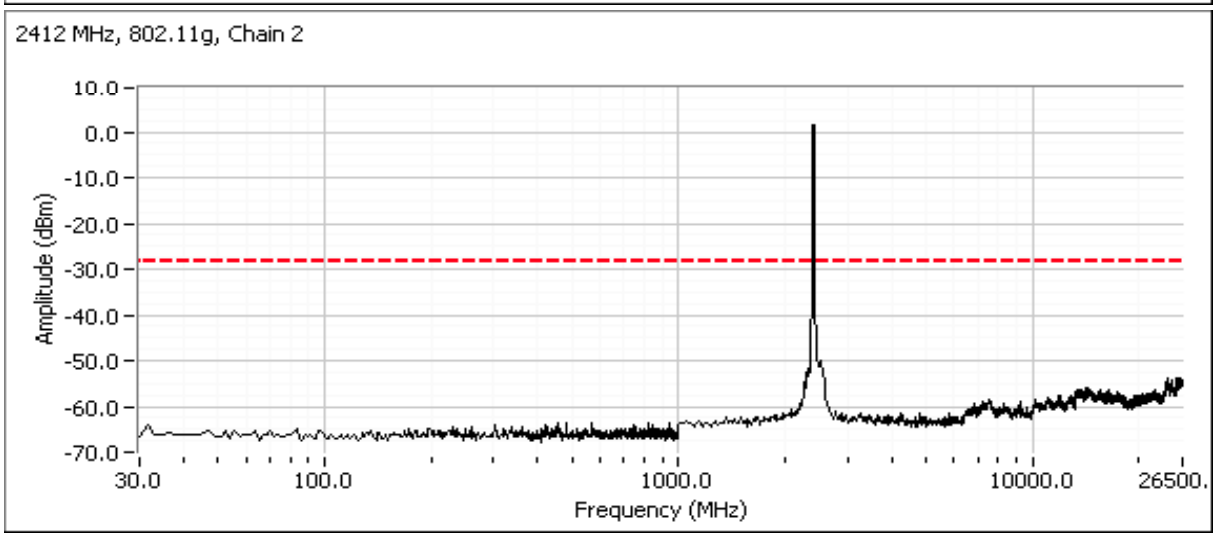
802.11g Mode

Plots for low channel, power setting(s) = 13.0



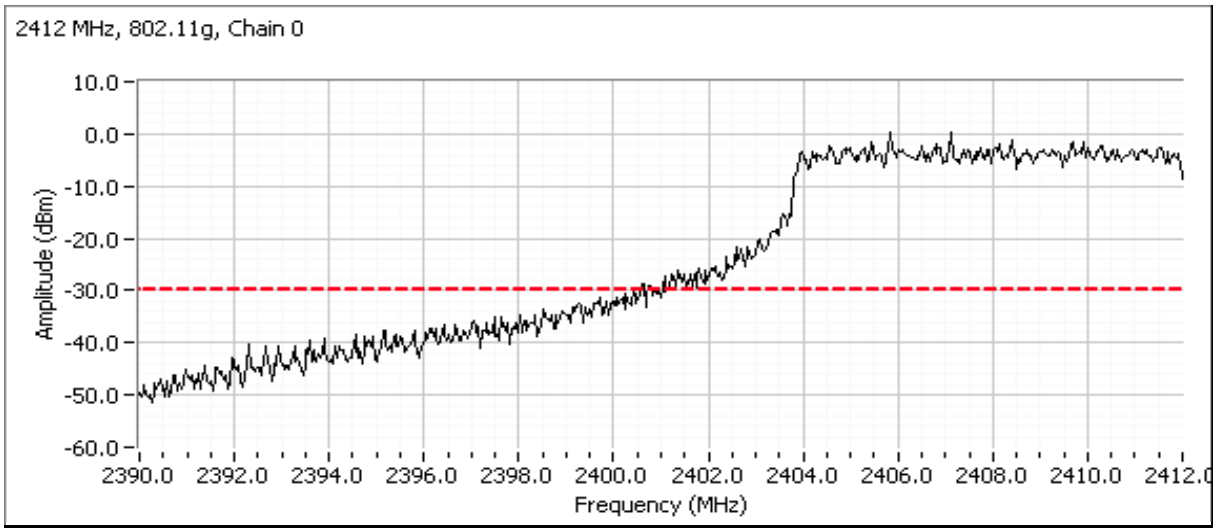
Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

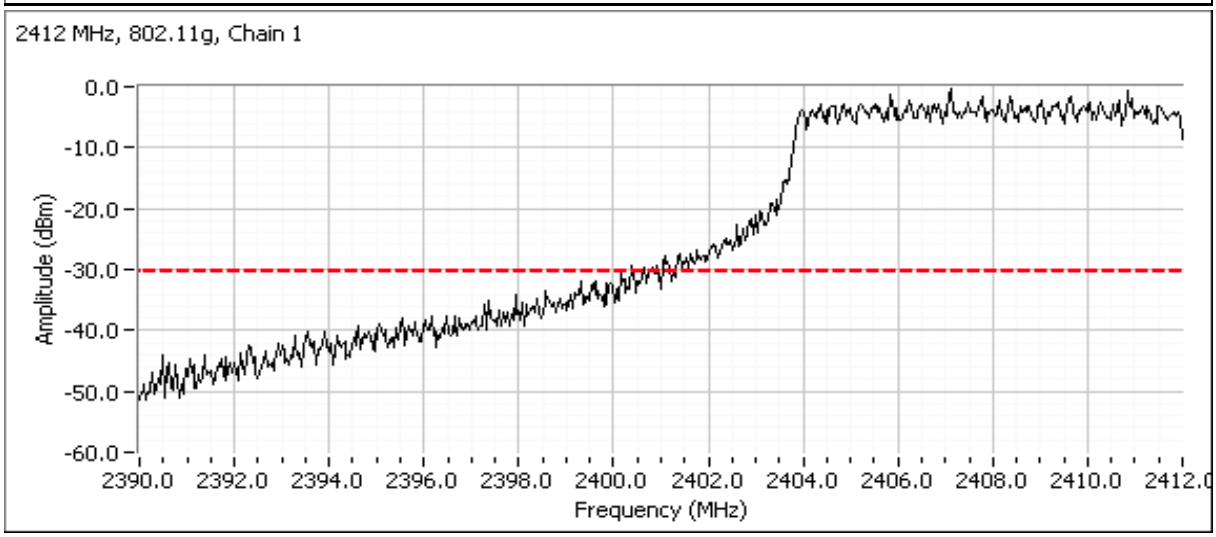




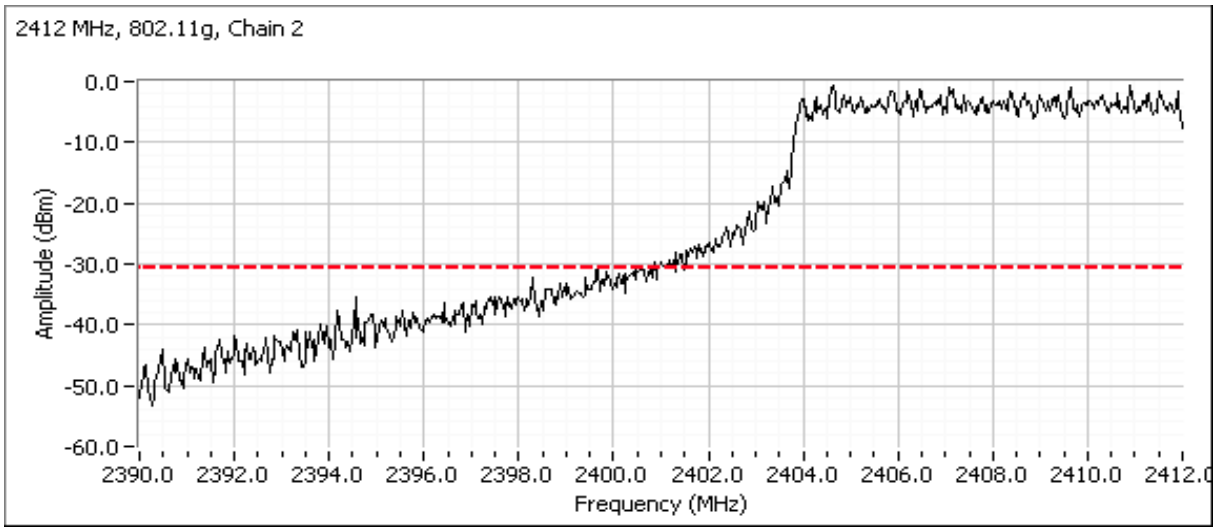
Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

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

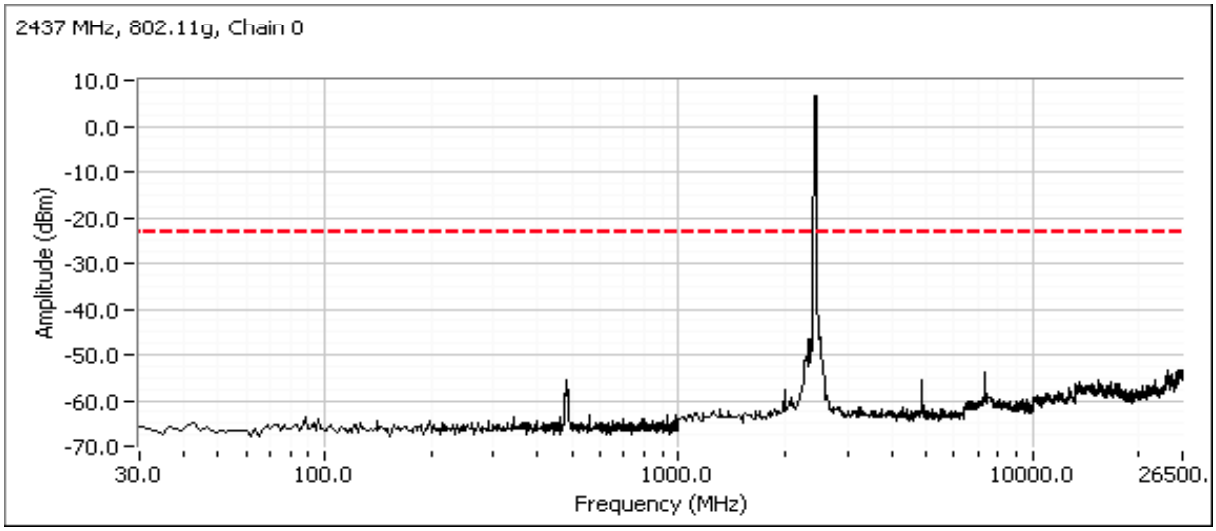




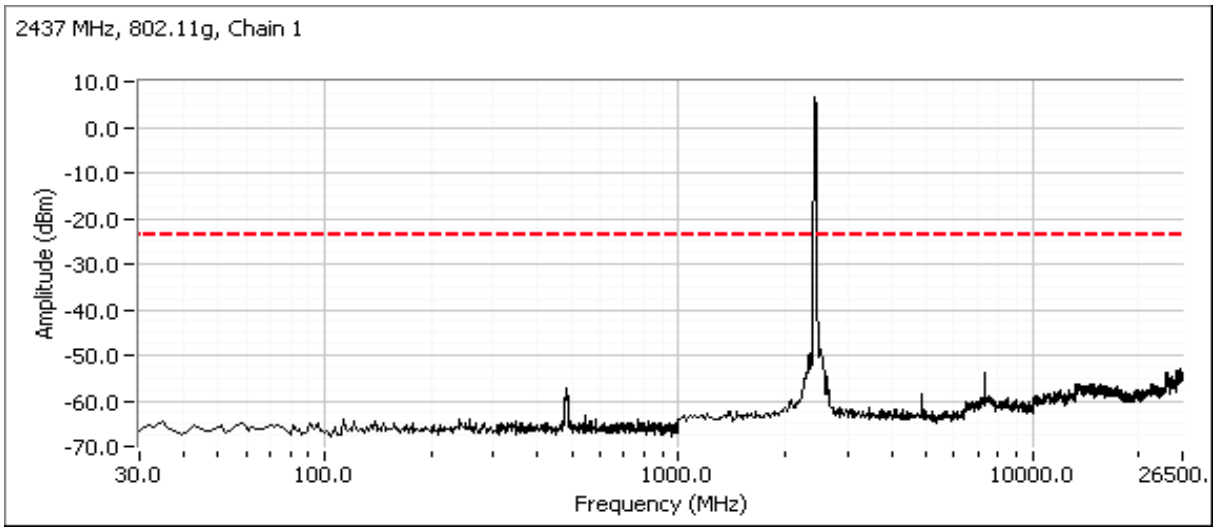
Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

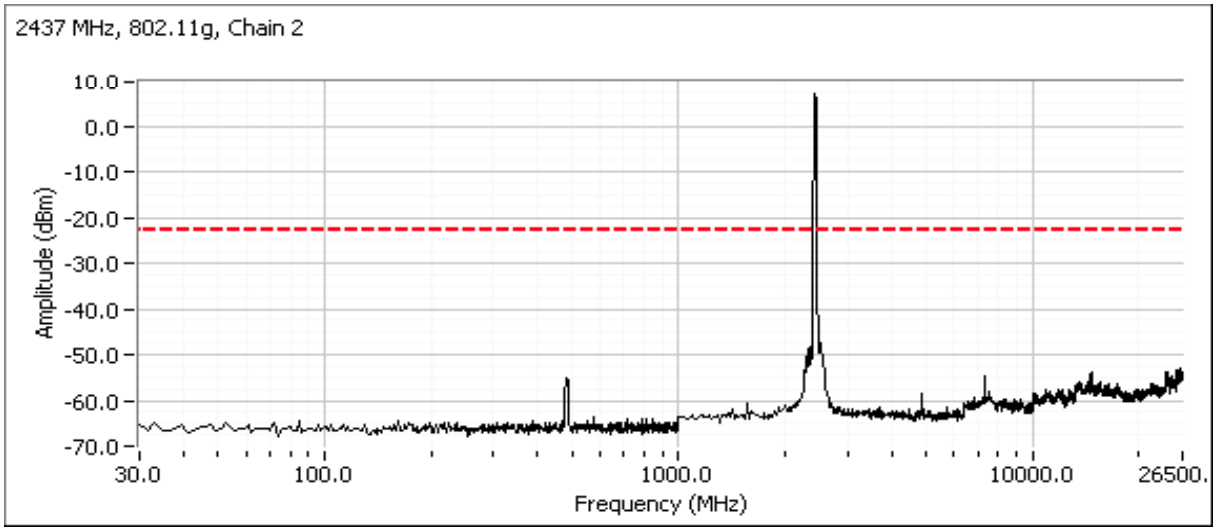


Plots for center channel, power setting(s) = 17.0



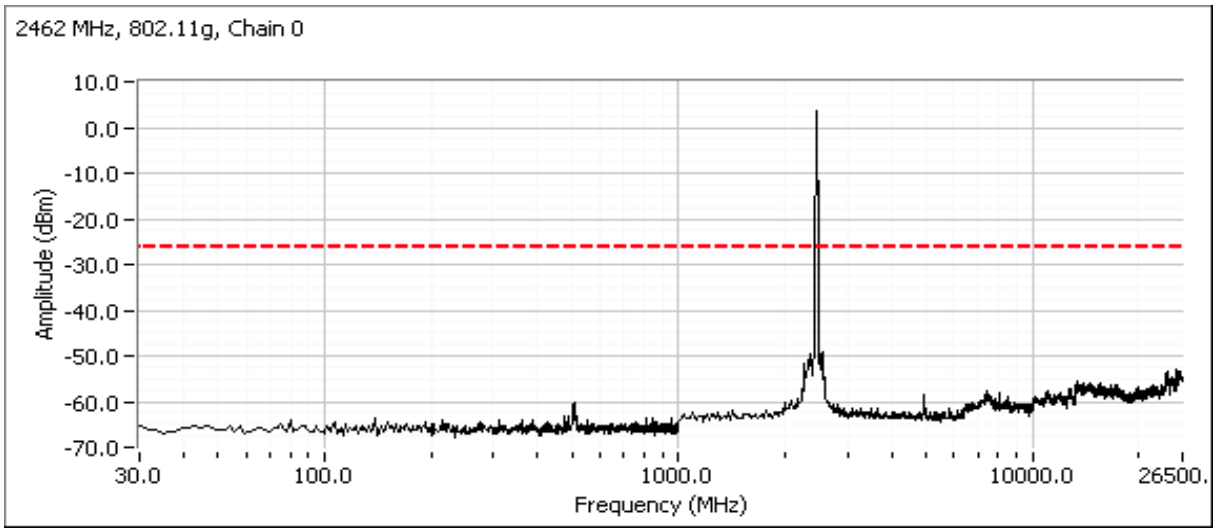
Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

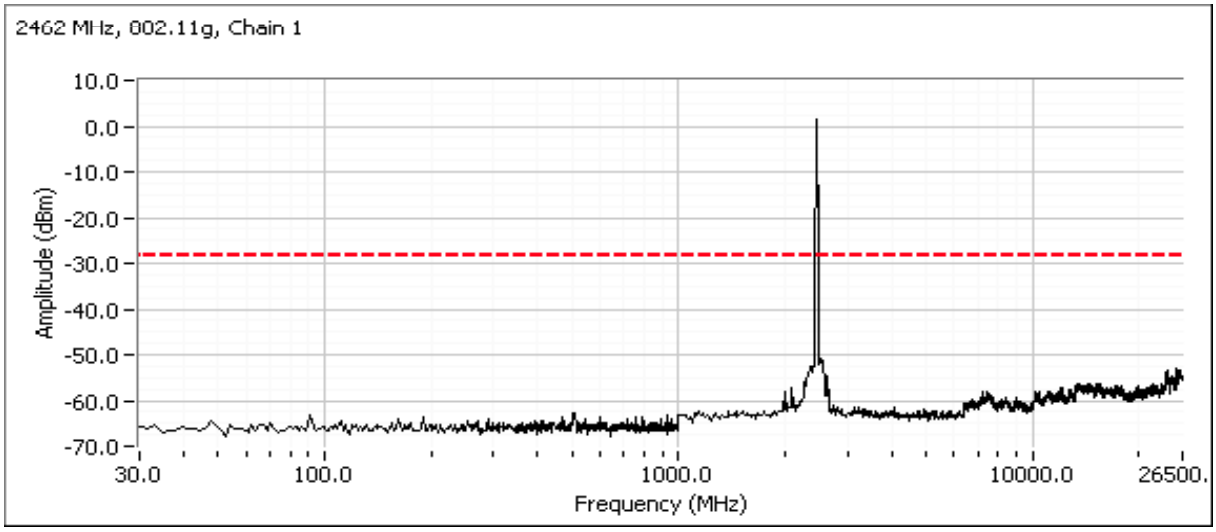




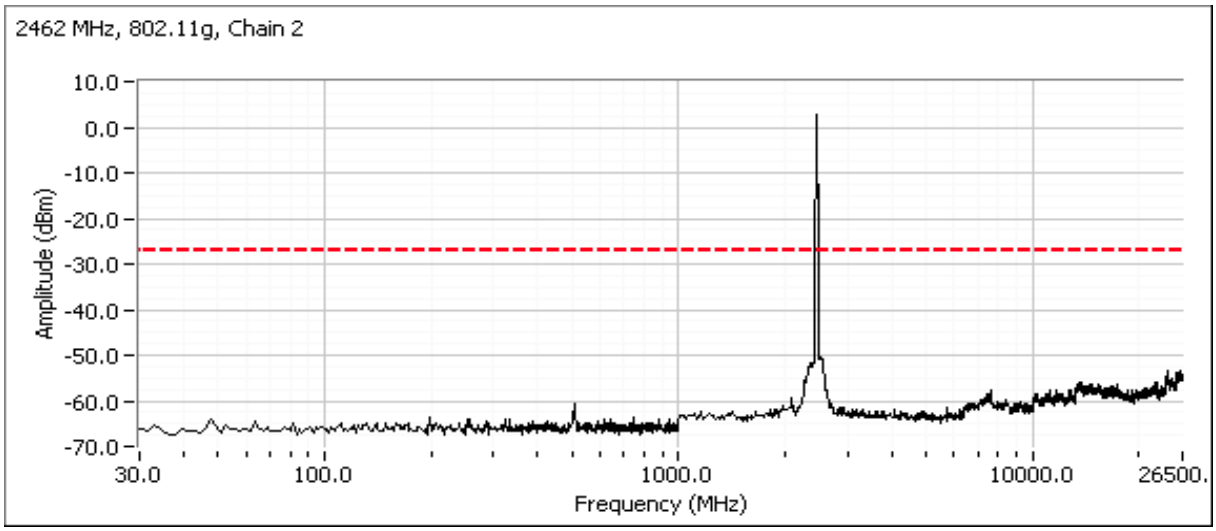
Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

Plots for high channel, power setting(s) = 13.5



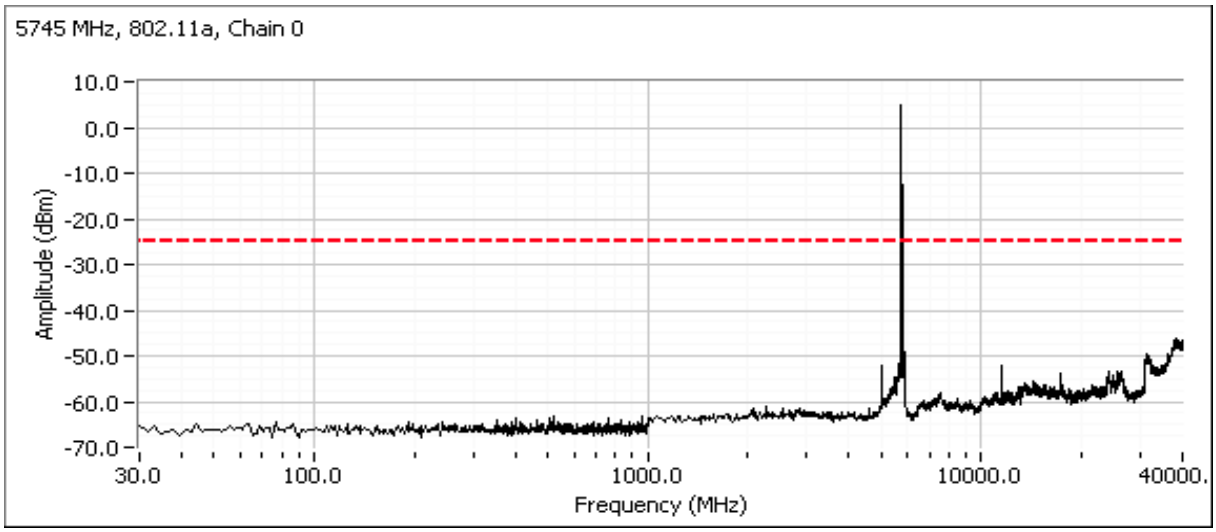


Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

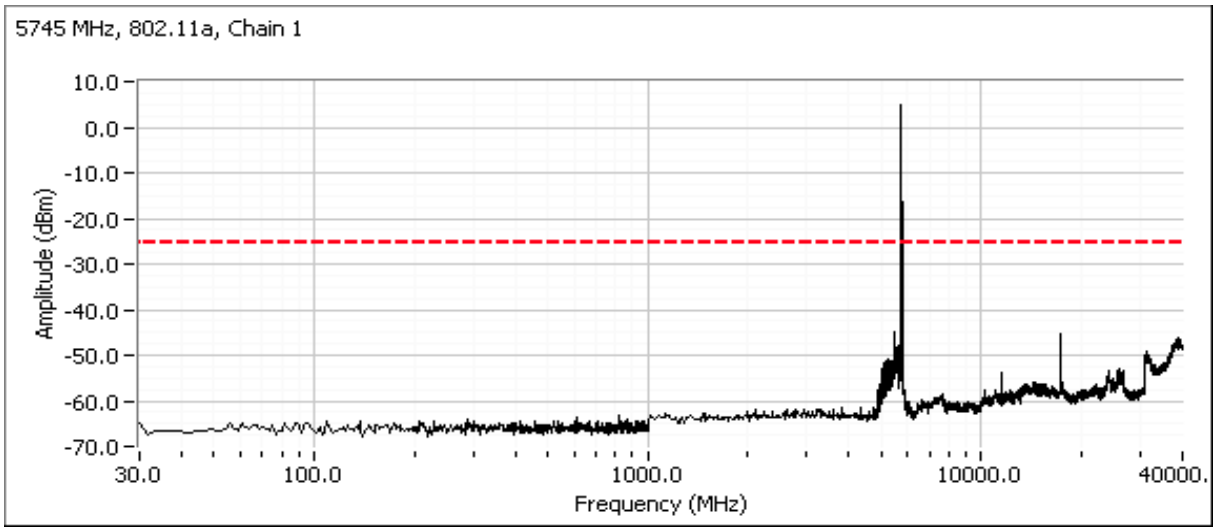


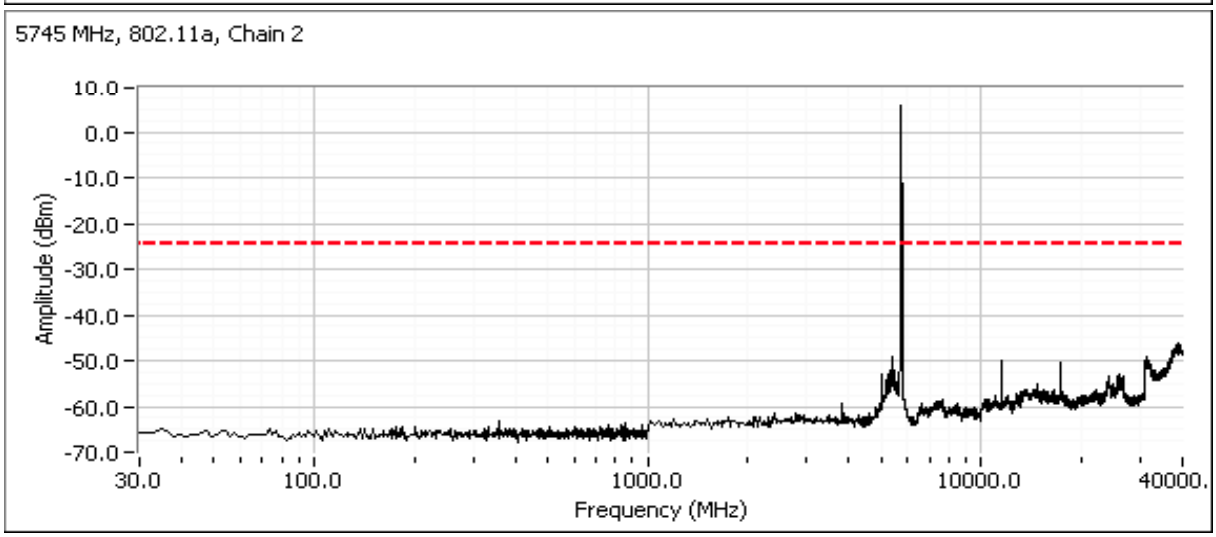
802.11a Mode

Plots for low channel, power setting(s) = 17.0



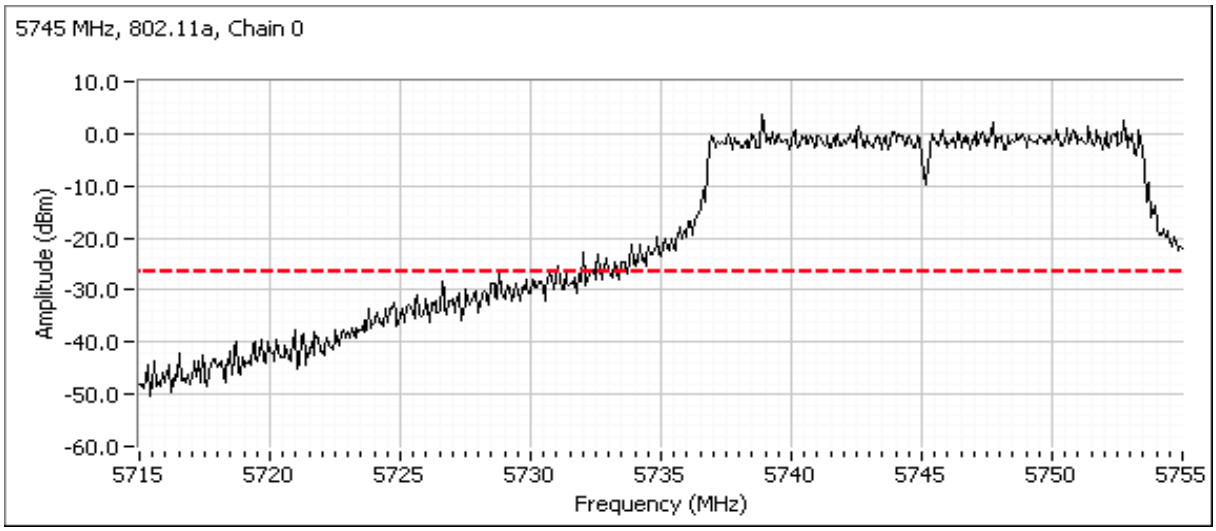
Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

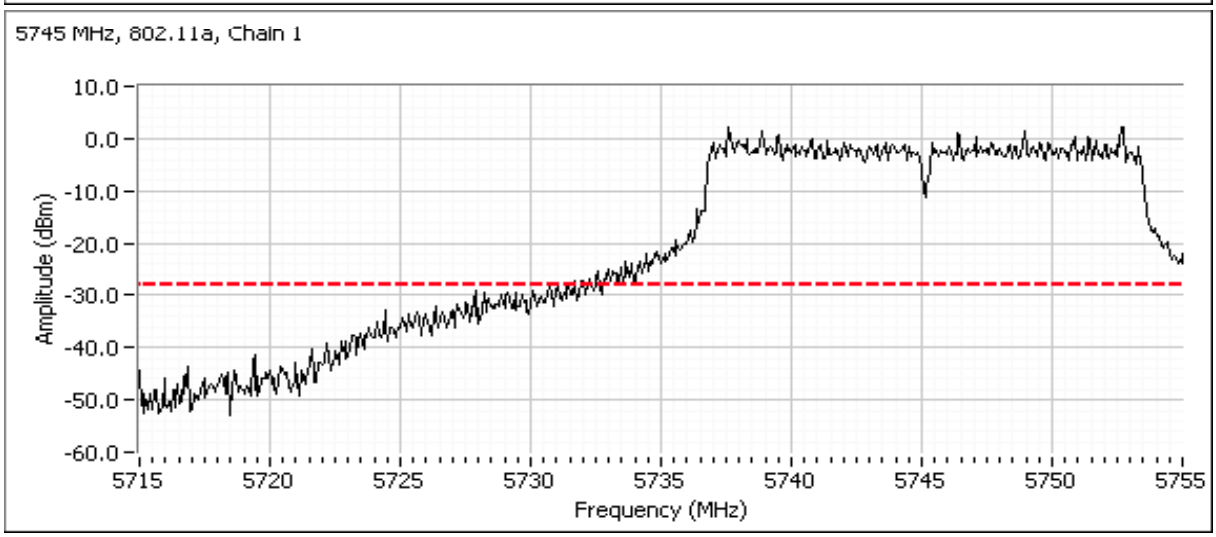




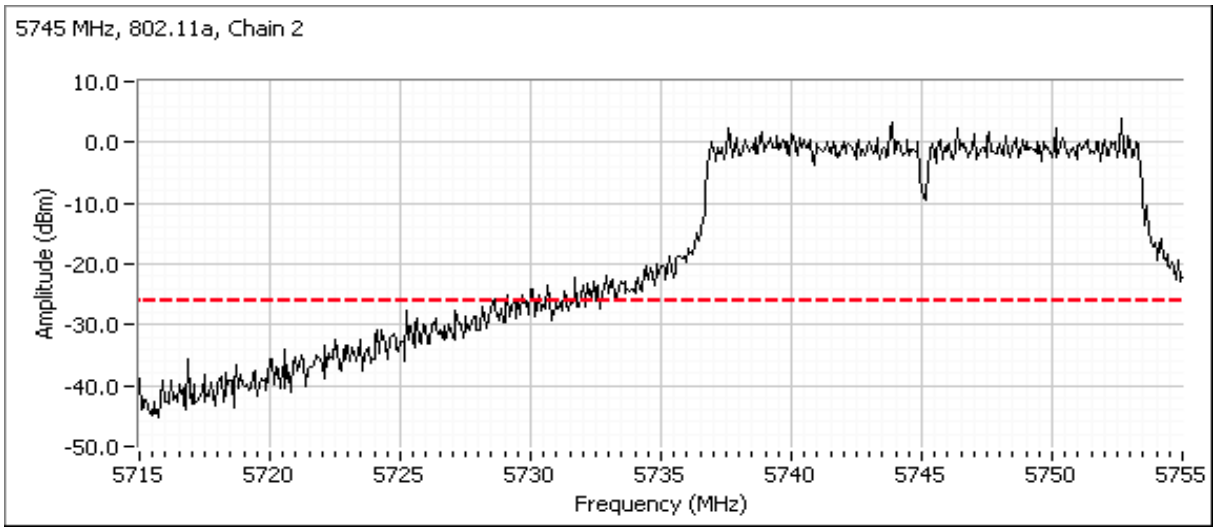
Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

Additional plot from 5715 - 5755 MHz showing compliance with -30dBc at the band edge.

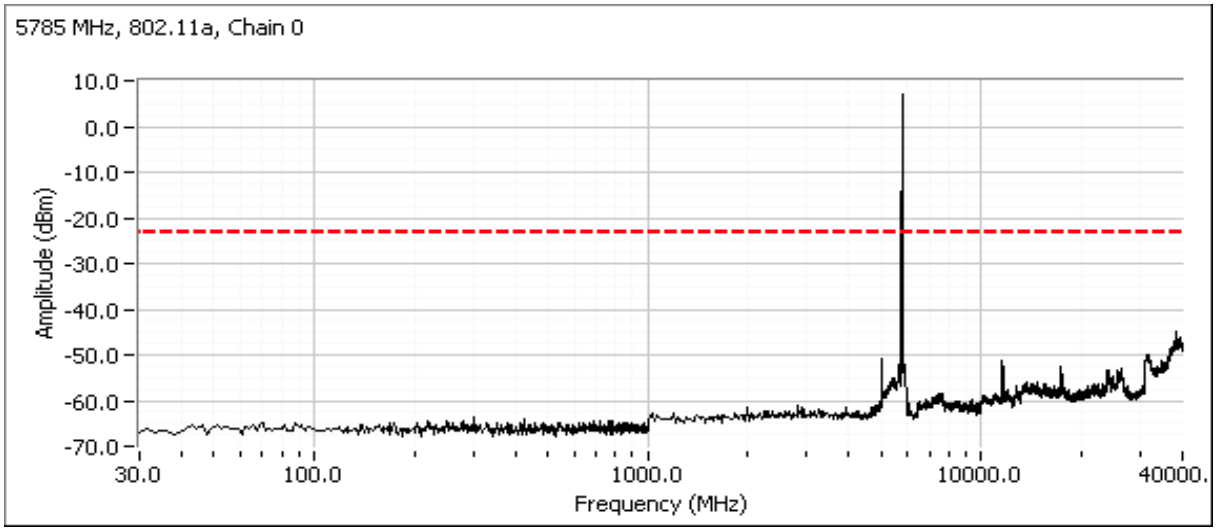




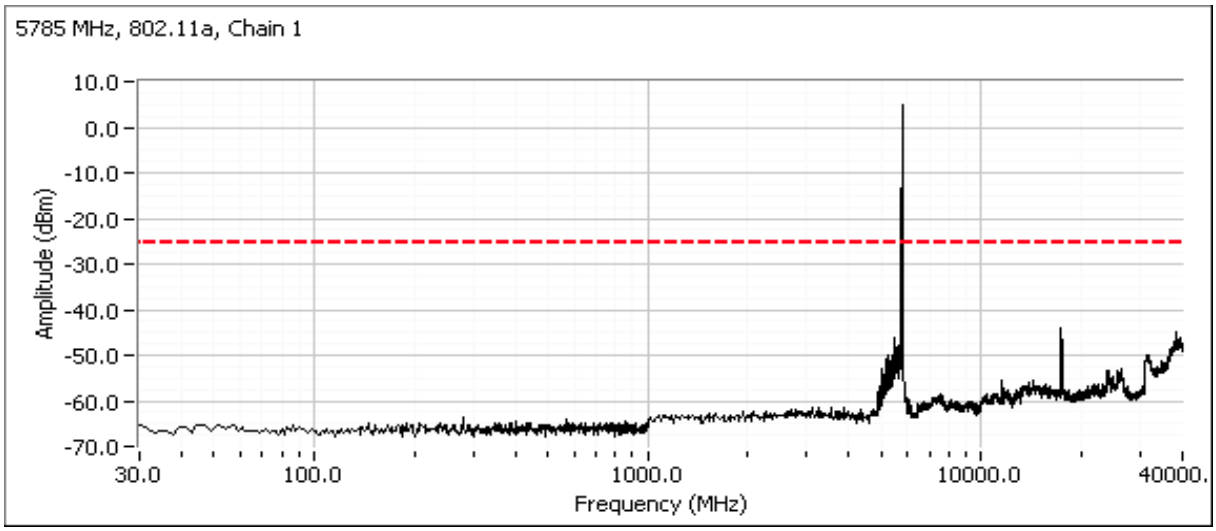
Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

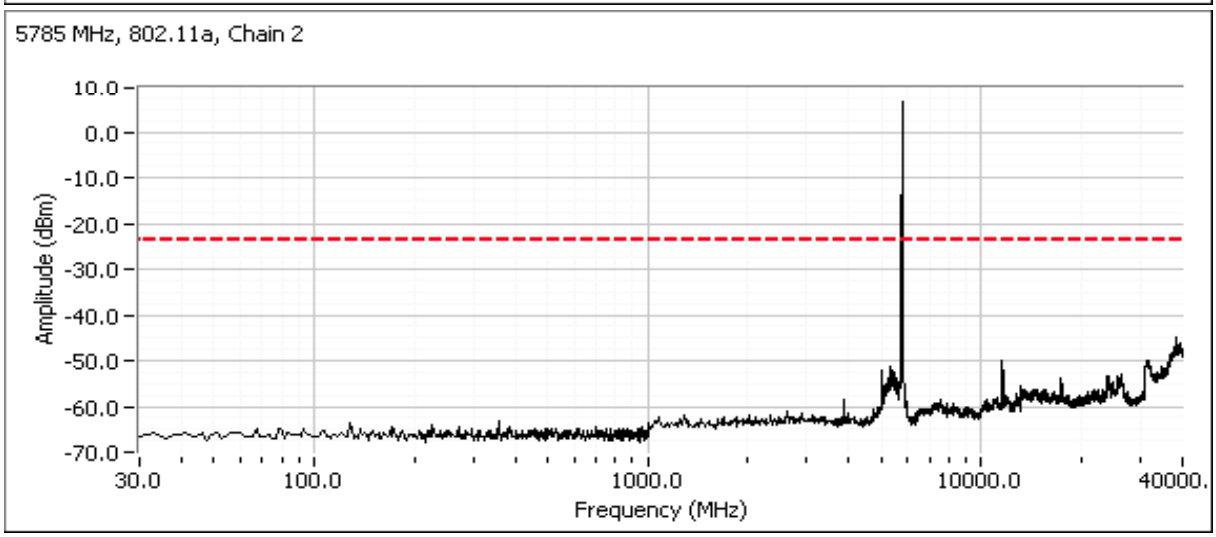


Plots for center channel, power setting(s) = 17.0



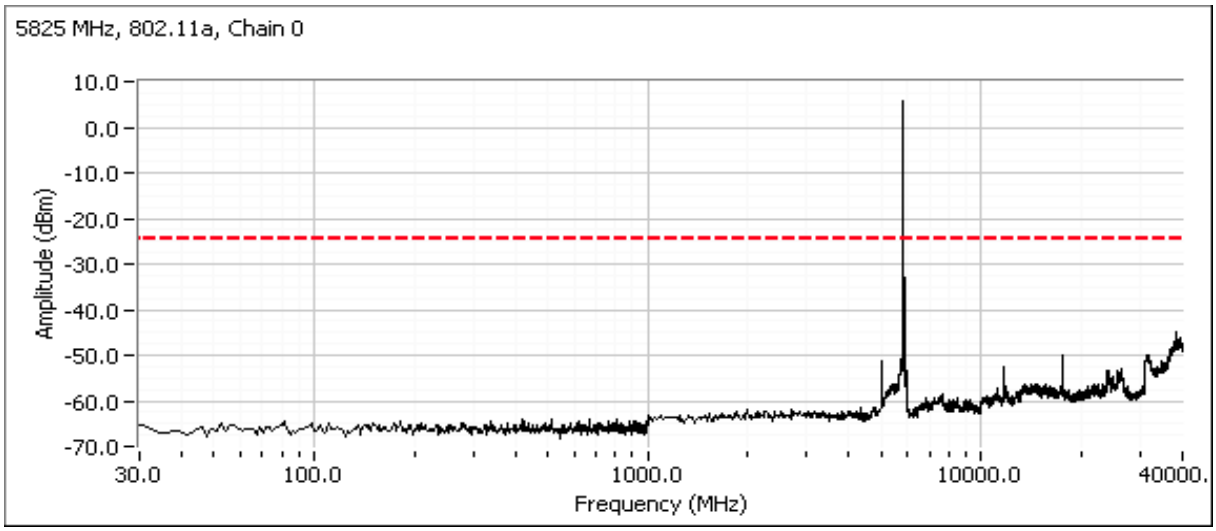
Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

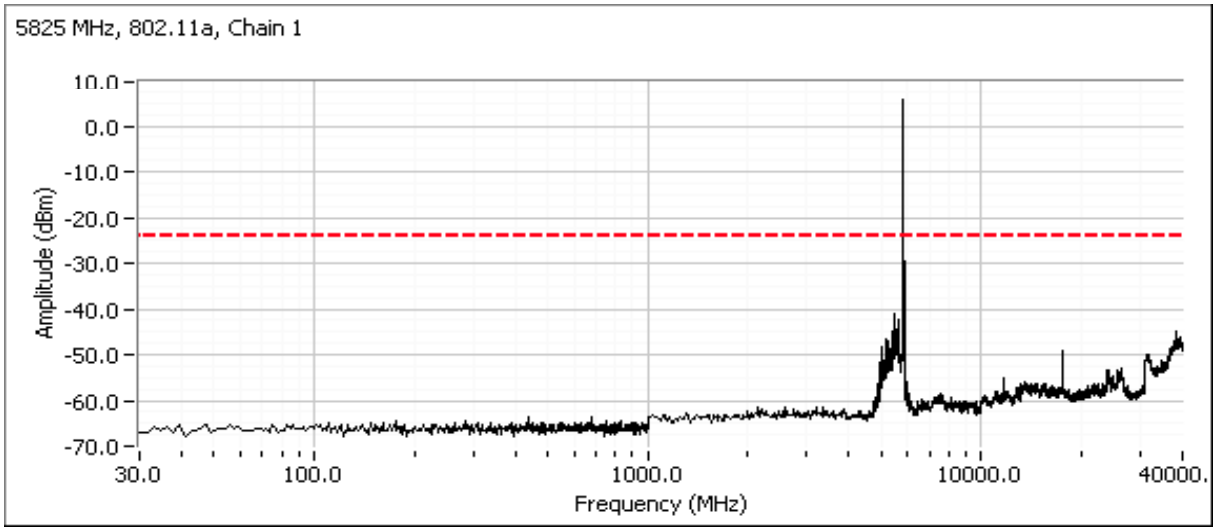




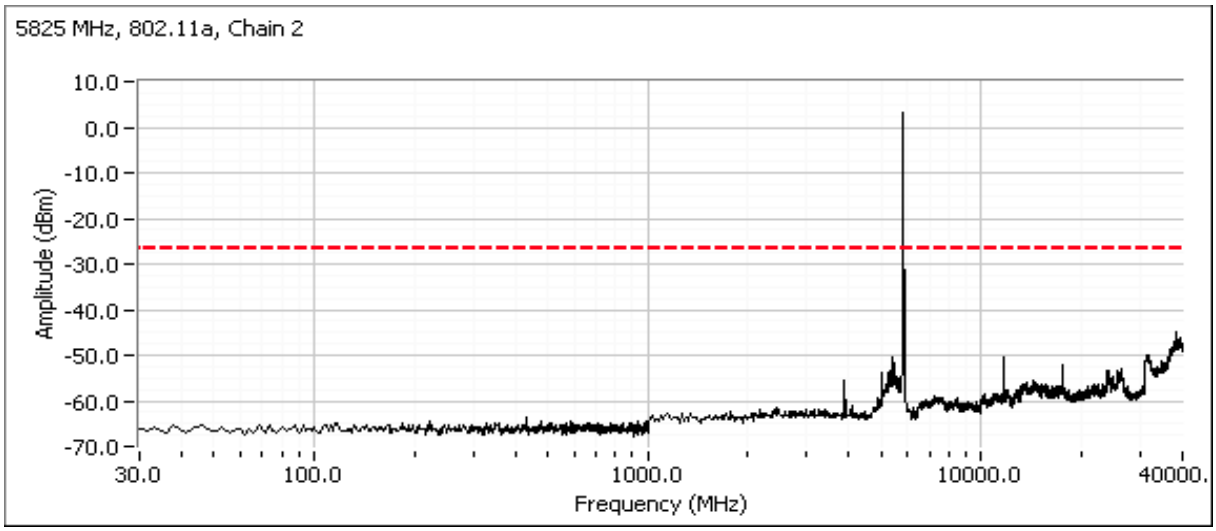
Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

Plots for high channel, power setting(s) = 17.0

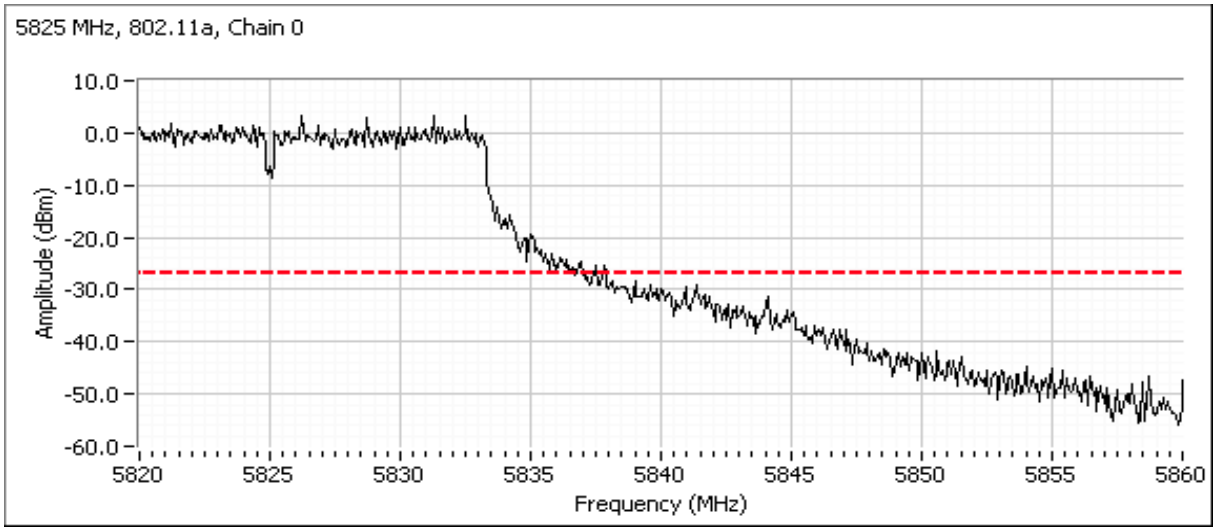




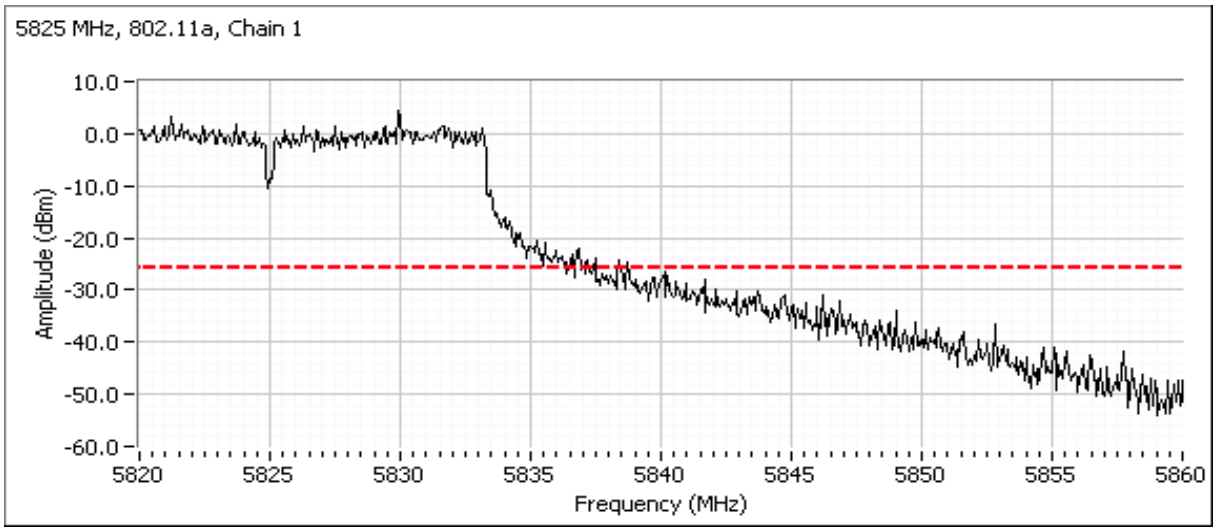
Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

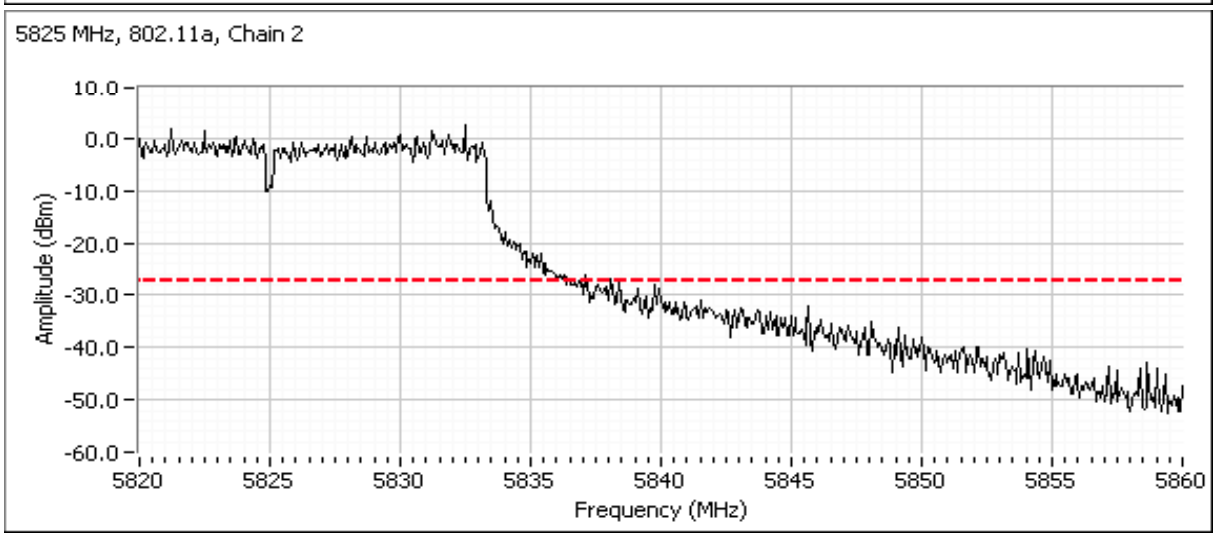


Additional plot from 5820 - 5860 MHz showing compliance with -30dBc at the band edge.



Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A





Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

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

Test Specific Details

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

Date of Test: 6/28/2011
Test Engineer: Rafael Varelas
Test Location: FT Lab #4

Config. Used: -
Config Change: -
EUT Voltage: POE

General Test Configuration

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

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

Ambient Conditions:

Temperature: 20.7 °C
Rel. Humidity: 38 %

Summary of Results

Run #	Test Performed	Limit	Pass / Fail	Result / Margin
1	Output Power Chain A+B+C	15.247(b)	Pass	802.11n20: 28.4 dBm 802.11n40: 25.3 dBm
2	PSD Chain A+B+C	15.247(d)	Pass	n20: -3.1 dBm/3kHz n40: -9.2 dBm/3kHz
3	Minimum 6dB Bandwidth	15.247(a)	Pass	802.11n20: 17.6 MHz 802.11n40: 36.3 MHz
3	99% Bandwidth	RSS GEN	Pass	802.11n20: 18.1 MHz 802.11n40: 36.8 MHz
4	Spurious emissions	15.247(b)	Pass	All signals were more than 30dB below the fundamental

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:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

Run #1: Output Power - Chain 0 +1 + 2

Note 1:	Output power measured using a spectrum analyzer (see plots below) with RBW=1MHz, VB=3 MHz, sample detector, power averaging on (transmitted signal was continuous) and power integration over 50 MHz (option #2, method 1 in KDB 558074, equivalent to method 1 of DA-02-2138A1 for U-NII devices). Spurious limit becomes -30dBc.
Note 2:	Power setting - the software power setting used during testing, included for reference only.
Note 3:	Power setting - the software power setting used during testing, included for reference only.

Transmitted signal on chain is coherent ? Yes

2412 MHz - 802.11n20	Chain 0	Chain 1	Chain 2	Chain 4	Total Across All Chains		Limit	
Power Setting Note 3	13.0	13.0	13.0					
Output Power (dBm) Note 1	12.6	12.3	13.1		17.5 dBm	0.056 W	29.2 dBm	0.837 W
Antenna Gain (dBi) Note 2	2.0	2.0	2.0		6.8 dBi		Pass	
eirp (dBm) Note 2	14.6	14.3	15.1		24.2 dBm	0.264 W		

2437 MHz - 802.11n20	Chain 0	Chain 1	Chain 2	Chain 4	Total Across All Chains		Limit	
Power Setting Note 3	17.0	17.0	17.0					
Output Power (dBm) Note 1	16.8	16.3	17.5		21.7 dBm	0.147 W	29.2 dBm	0.837 W
Antenna Gain (dBi) Note 2	2.0	2.0	2.0		6.8 dBi		Pass	
eirp (dBm) Note 2	18.8	18.3	19.5		28.4 dBm	0.698 W		

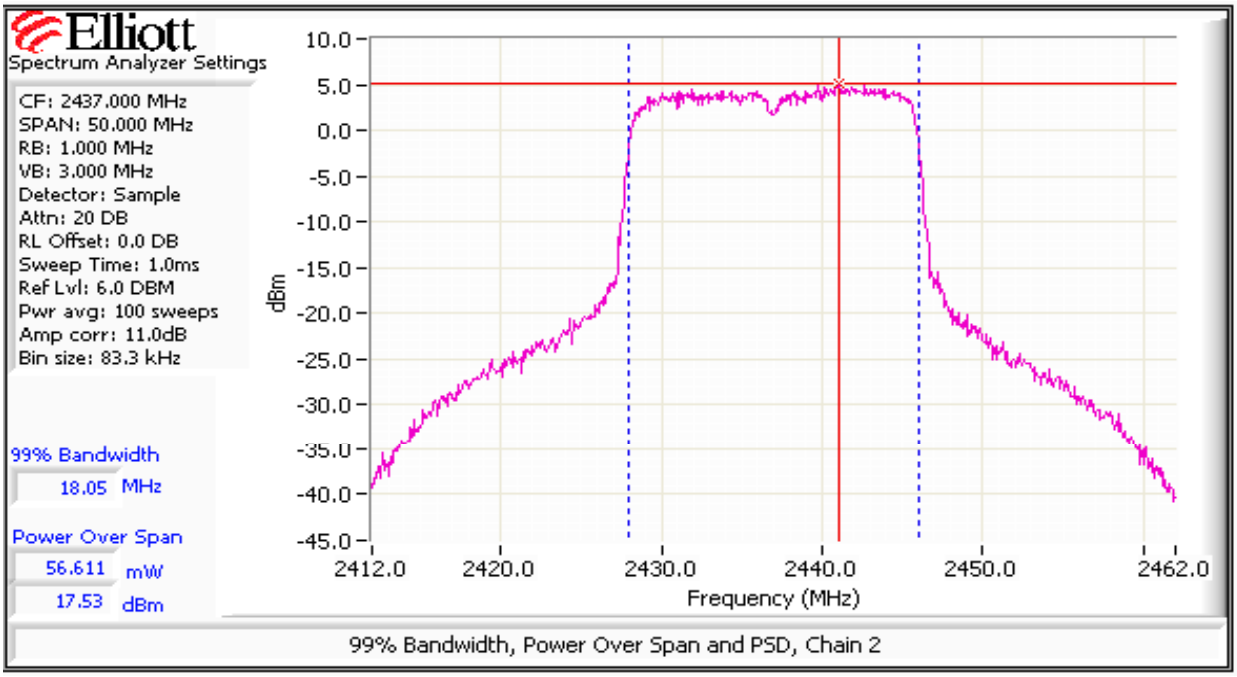
2462 MHz - 802.11n20	Chain 0	Chain 1	Chain 2	Chain 4	Total Across All Chains		Limit	
Power Setting Note 3	12.5	12.5	12.5					
Output Power (dBm) Note 1	12.3	11	11.9		16.5 dBm	0.045 W	29.2 dBm	0.837 W
Antenna Gain (dBi) Note 2	2.0	2.0	2.0		6.8 dBi		Pass	
eirp (dBm) Note 2	14.3	13	13.9		23.3 dBm	0.214 W		

2422 MHz - 802.11n40	Chain 0	Chain 1	Chain 2	Chain 4	Total Across All Chains		Limit	
Power Setting Note 3	8.5	8.5	8.5					
Output Power (dBm) Note 1	8.4	7.6	8.65		13.0 dBm	0.020 W	29.2 dBm	0.837 W
Antenna Gain (dBi) Note 2	2.0	2.0	2.0		6.8 dBi		Pass	
eirp (dBm) Note 2	10.4	9.6	10.65		19.8 dBm	0.095 W		

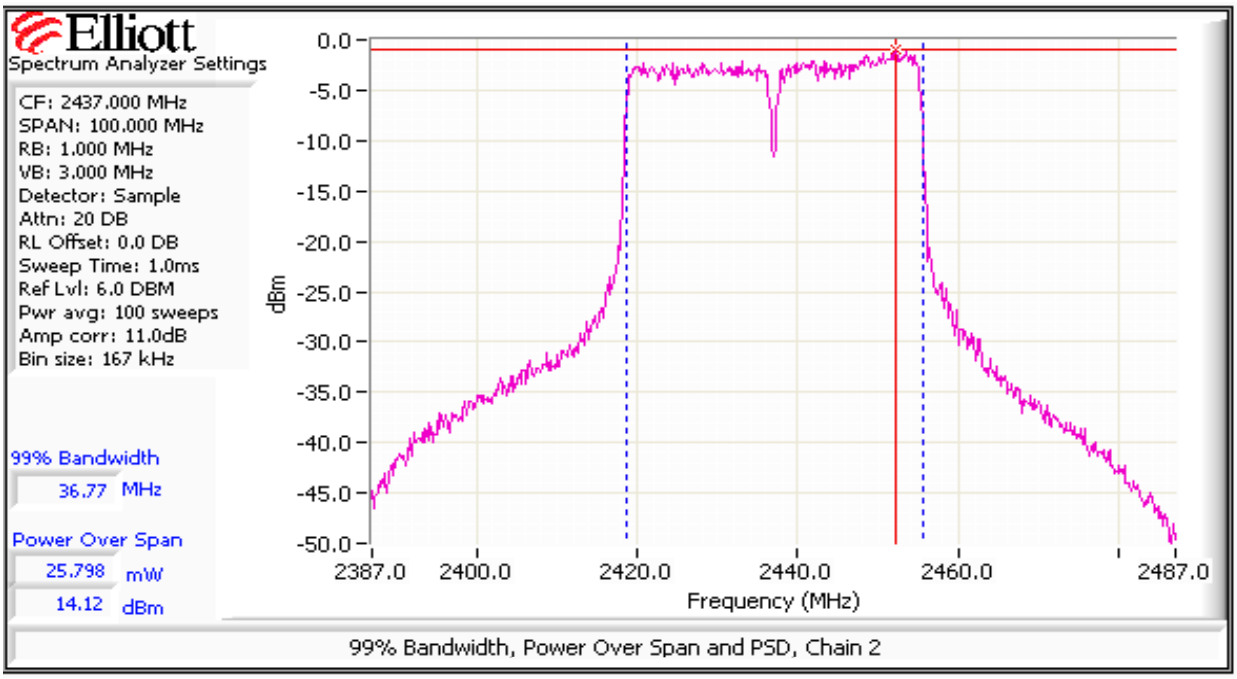
2437 MHz - 802.11n40	Chain 0	Chain 1	Chain 2	Chain 4	Total Across All Chains		Limit	
Power Setting Note 3	13.5	13.5	13.5					
Output Power (dBm) Note 1	14	13.1	14.1		18.5 dBm	0.071 W	29.2 dBm	0.837 W
Antenna Gain (dBi) Note 2	2.0	2.0	2.0		6.8 dBi		Pass	
eirp (dBm) Note 2	16	15.1	16.1		25.3 dBm	0.339 W		

Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

2452 MHz - 802.11n40	Chain 0	Chain 1	Chain 2	Chain 4	Total Across All Chains		Limit	
Power Setting Note 3	10.0	10.0	10.0					
Output Power (dBm) Note 1	9.6	8.6	9.4		14.0 dBm	0.025 W	29.2 dBm	0.837 W
Antenna Gain (dBi) Note 2	2.0	2.0	2.0		6.8 dBi		Pass	
eirp (dBm) Note 2	11.6	10.6	11.4		20.8 dBm	0.119 W		



Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

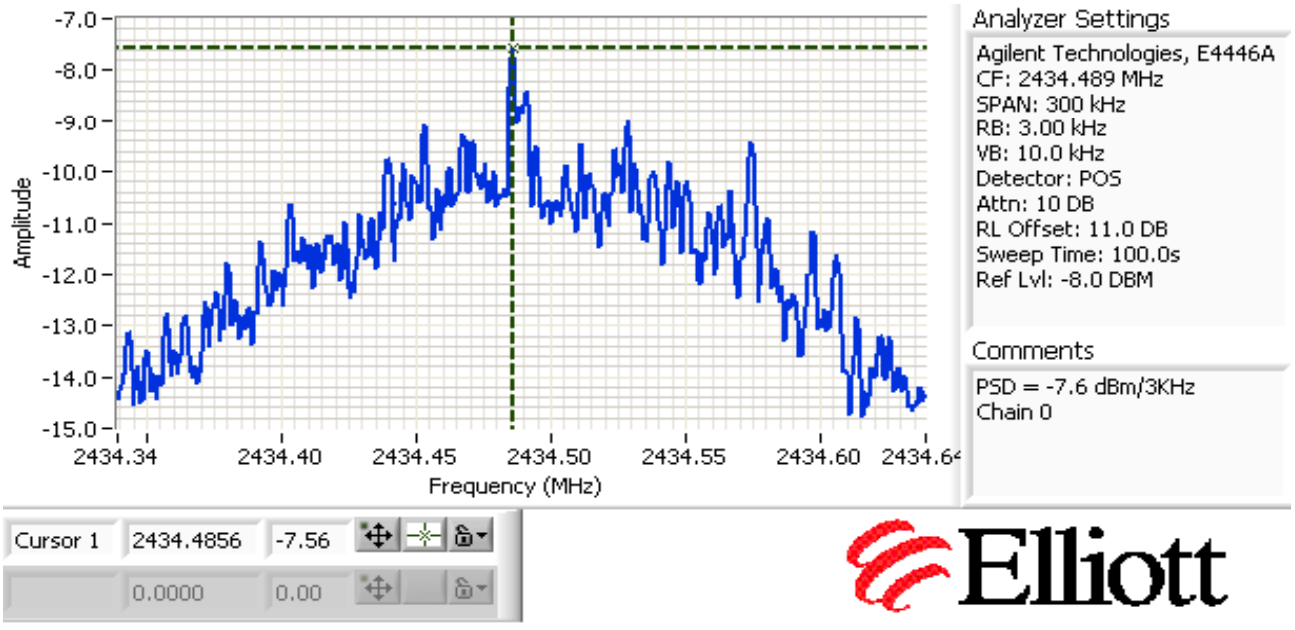


Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

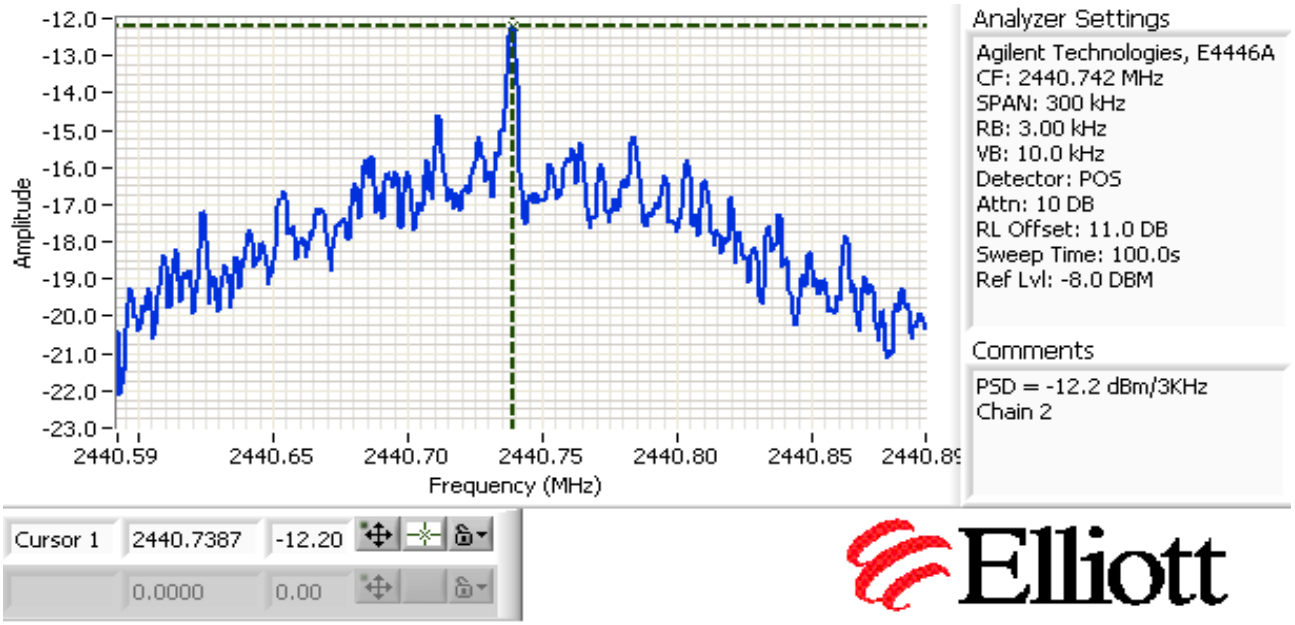
Run #2: Power spectral Density

Power Setting	Frequency (MHz)	PSD (dBm/3kHz) Note 1 Chain 0	Chain 1	Chain 2	Chain 4	Total	Limit dBm/3kHz	Result
13.0	2412 802.11n20	-13.5	-12.4	-10.9		-7.4	8.0	Pass
17.0	2437 802.11n20	-7.6	-8.1	-7.9		-3.1	8.0	Pass
12.5	2462 802.11n20	-12.4	-14.3	-12.5		-8.2	8.0	Pass
8.5	2422 802.11n40	-19.5	-19.4	-18.3		-14.3	8.0	Pass
13.5	2437 802.11n40	-15.1	-15.5	-12.2		-9.2	8.0	Pass
10.0	2452 802.11n40	-17.9	-18.6	-19.6		-13.9	8.0	Pass

Note 1:	Power spectral density measured using RB=3 kHz, VB=10kHz, analyzer with peak detector and with a sweep time set to ensure a dwell time of at least 1 second per 3kHz. The measurement is made at the frequency of PPSD determined from preliminary scans using RB=3kHz using multiple sweeps at a faster rate over the 6dB bandwidth of the signal.
Note 2:	The operation of mutliple radios in the band does not affect power spectral density as radios cannot operate on overlapping channels.



Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A



Run #3: Signal Bandwidth

Power Setting	Frequency (MHz)	Resolution Bandwidth	Bandwidth (MHz) 6dB	99%
13.0	2412 802.11n20	100kHz	17.7	18.1
17.0	2437 802.11n20	100kHz	17.6	18.1
12.5	2462 802.11n20	100kHz	17.6	18.1
8.5	2422 802.11n40	100kHz	36.3	36.6
13.5	2437 802.11n40	100kHz	36.3	36.8
10.0	2452 802.11n40	100kHz	36.3	36.6

Note 1:	Measured with all chains connected together through a combiner, unused ports on the combiner terminated in 50ohms.
Note 2:	99% bandwidth measured in accordance with RSS GEN, with RB > 1% of the span and VB > 3xRB

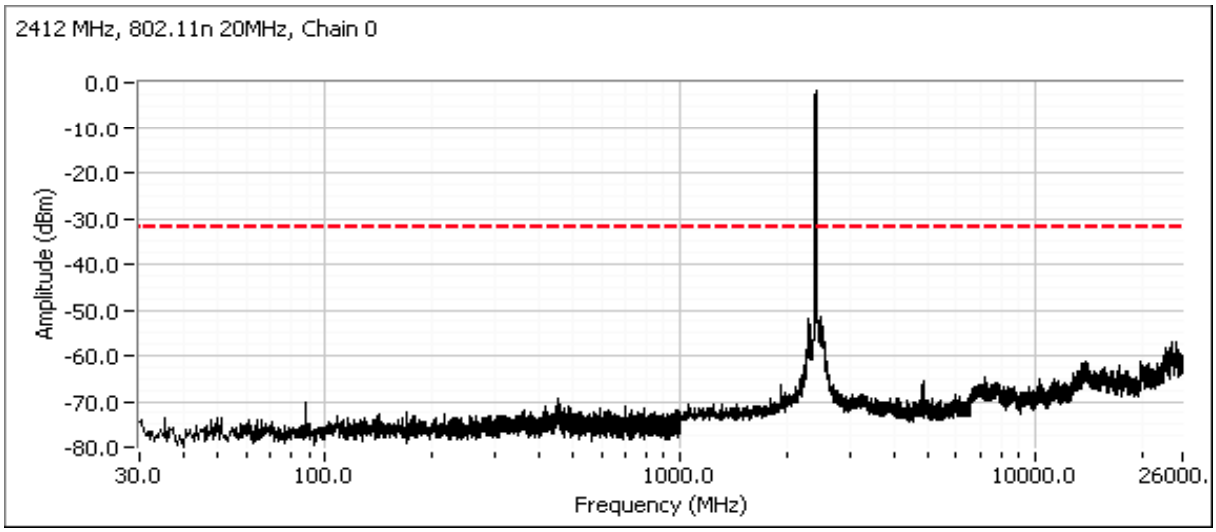
Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

Run #4: Out of Band Spurious Emissions

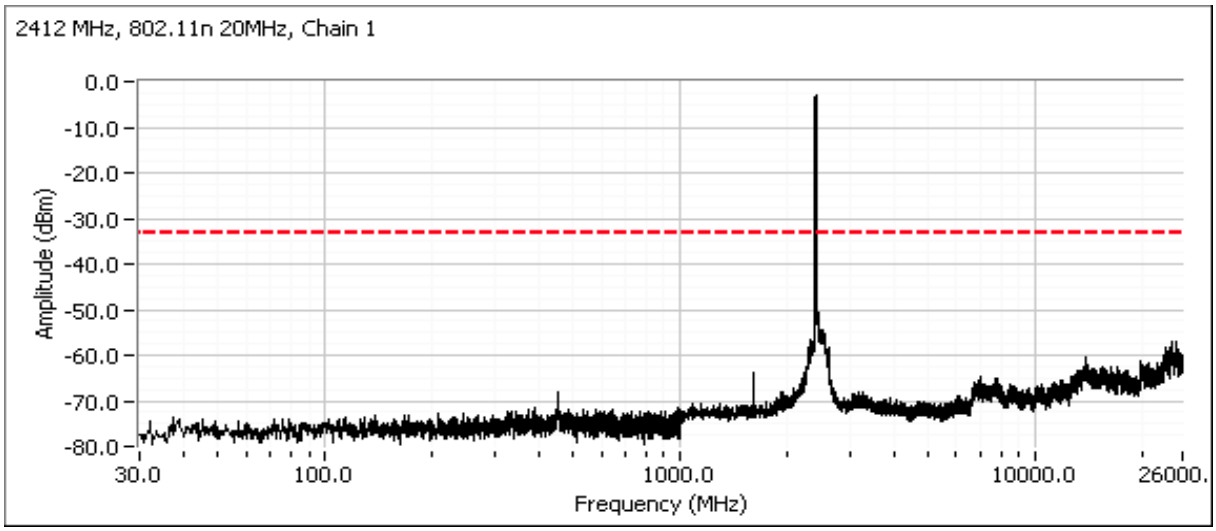
Power Setting Per Chain				Frequency (MHz)	Limit	Result
#0	#1	#2	#4			
13.0	13.0	13.0		2412 802.11n20	-30dBc	Pass
17.0	17.0	17.0		2437 802.11n20	-30dBc	Pass
12.5	12.5	12.5		2462 802.11n20	-30dBc	Pass
8.5	8.5	8.5		2422 802.11n40	-30dBc	Pass
13.5	13.5	13.5		2437 802.11n40	-30dBc	Pass
10.0	10.0	10.0		2452 802.11n40	-30dBc	Pass

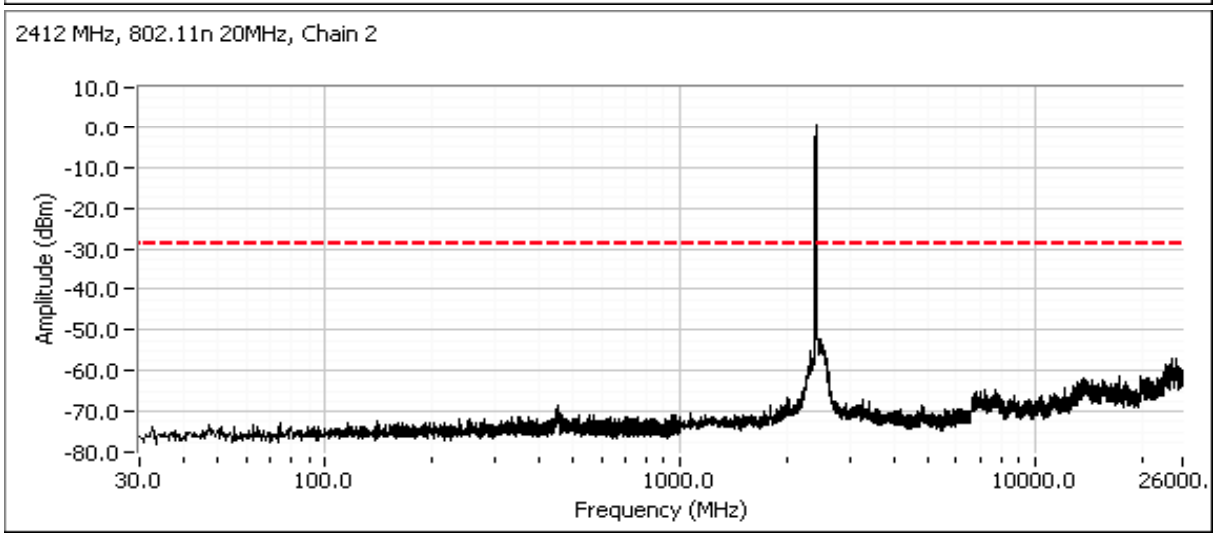
Note 1:	Measurements made on each chain individually.
Note 2:	Measured using RB>=100kHz, VB>= RB

Plots for low channel - 802.11n (20MHz) - , power setting(s) = 13.0



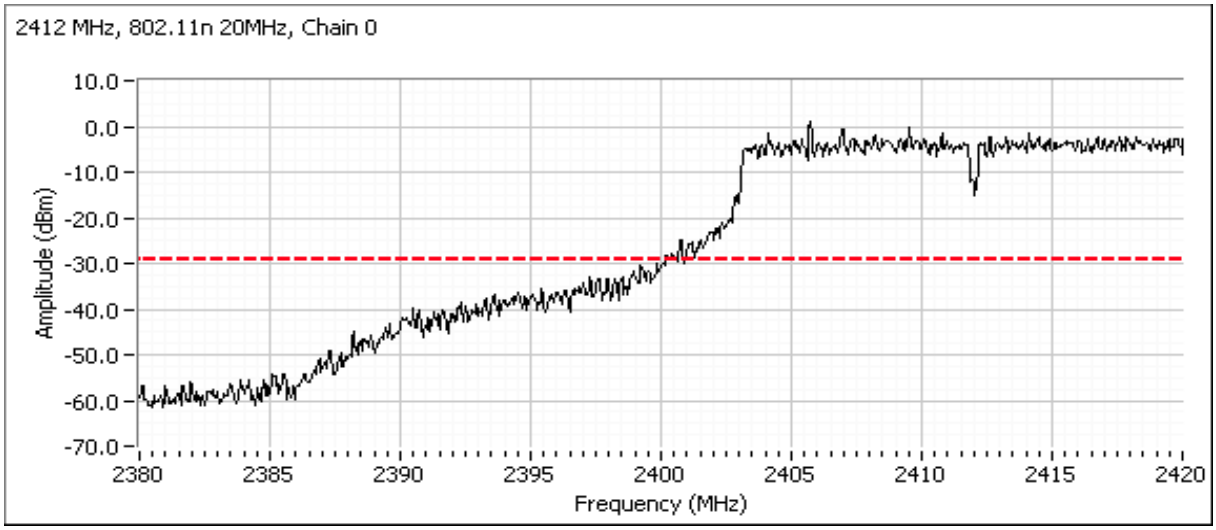
Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

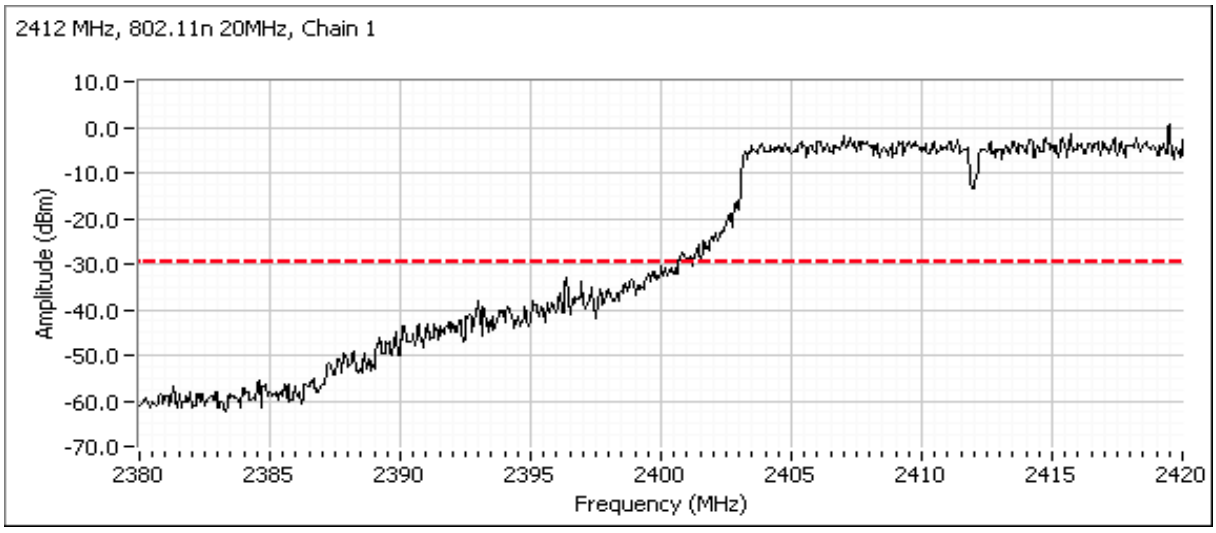




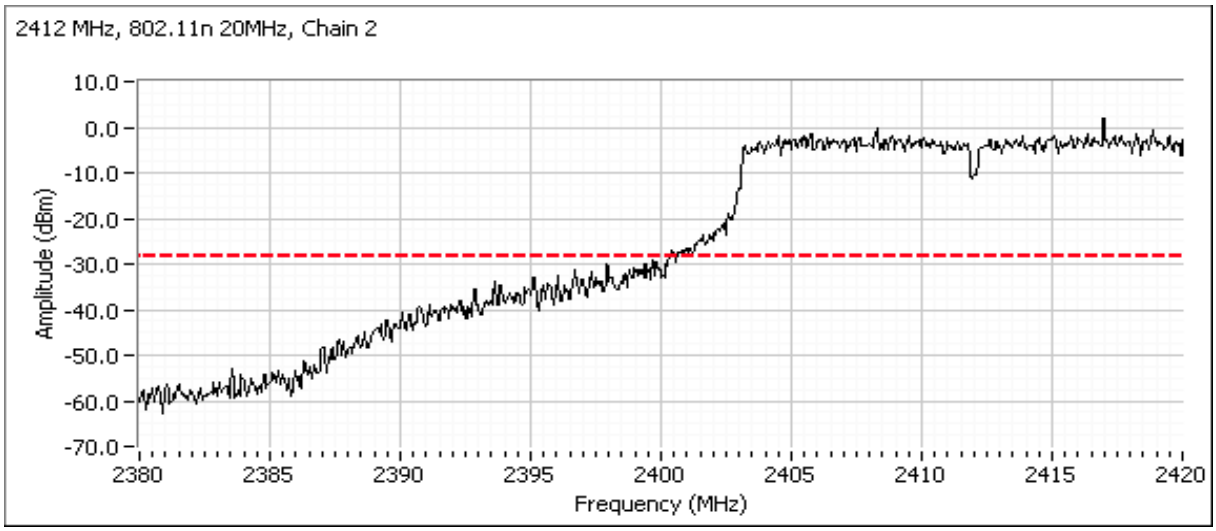
Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

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

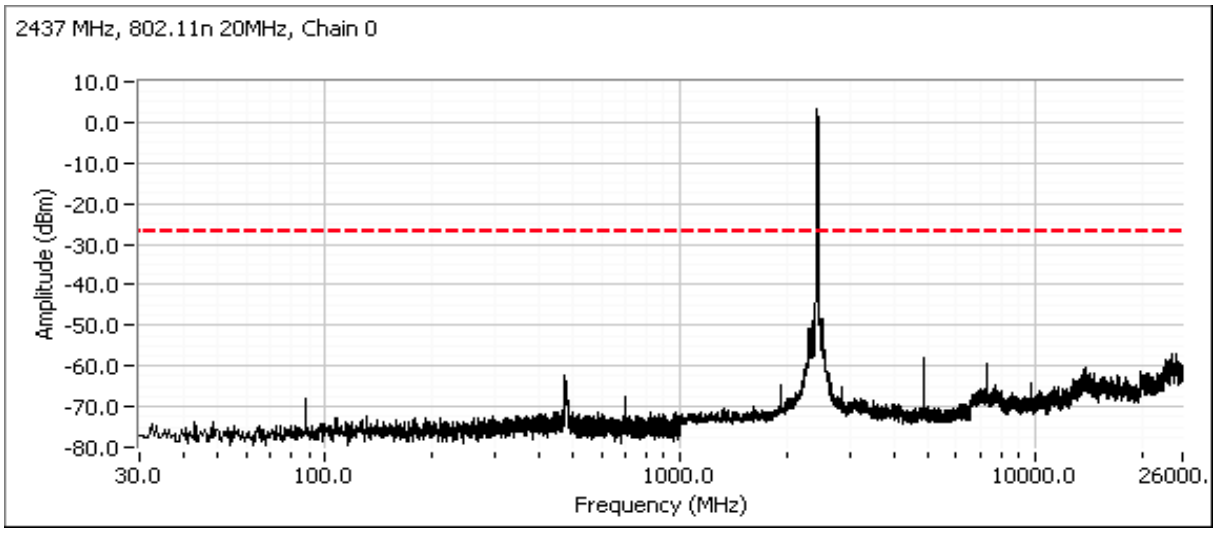




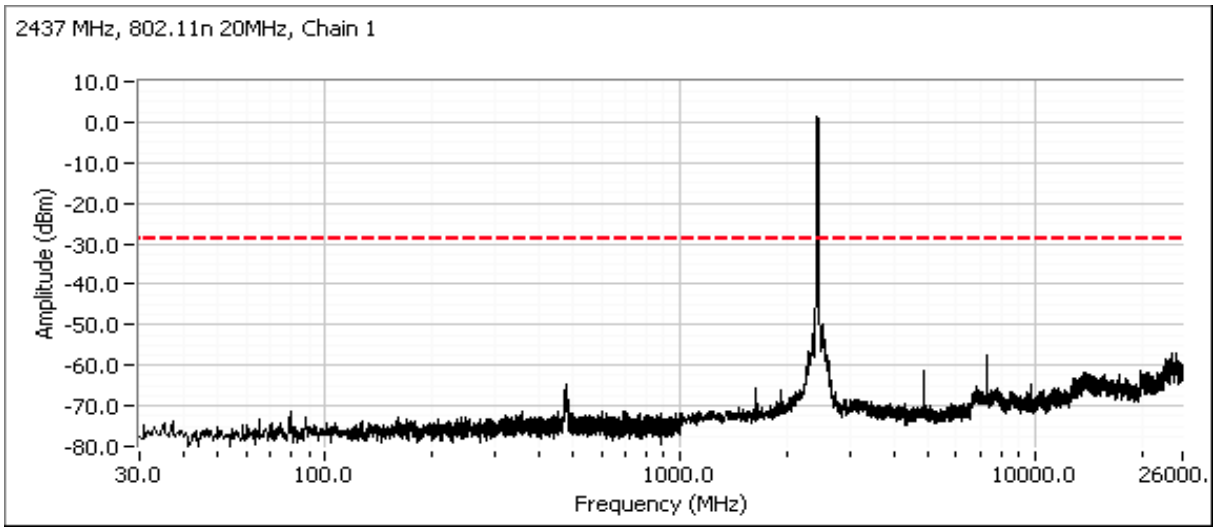
Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

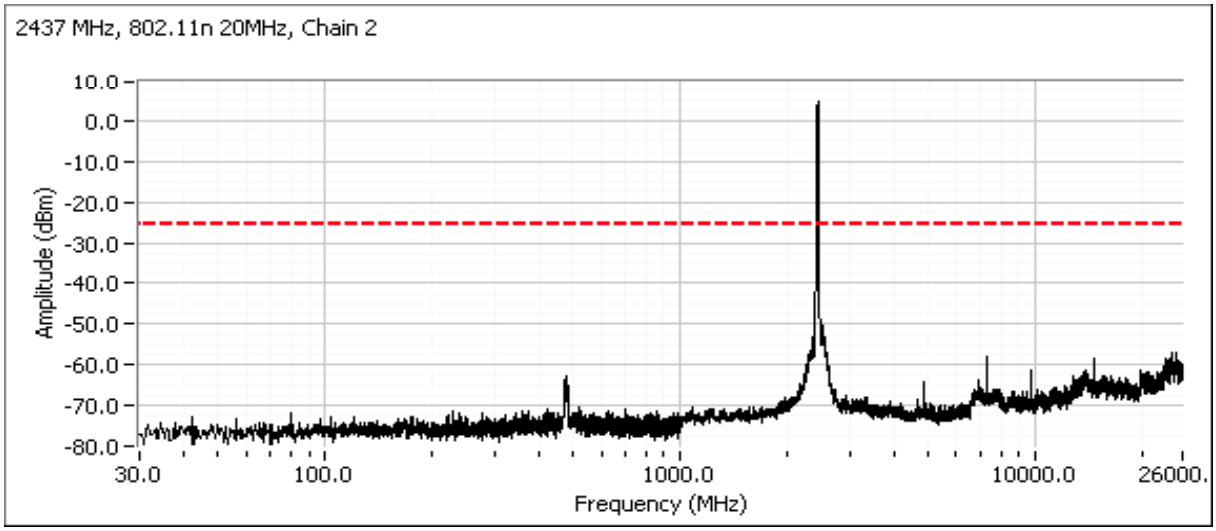


Plots for center channel - 802.11n (20MHz) - , power setting(s) = 17.0



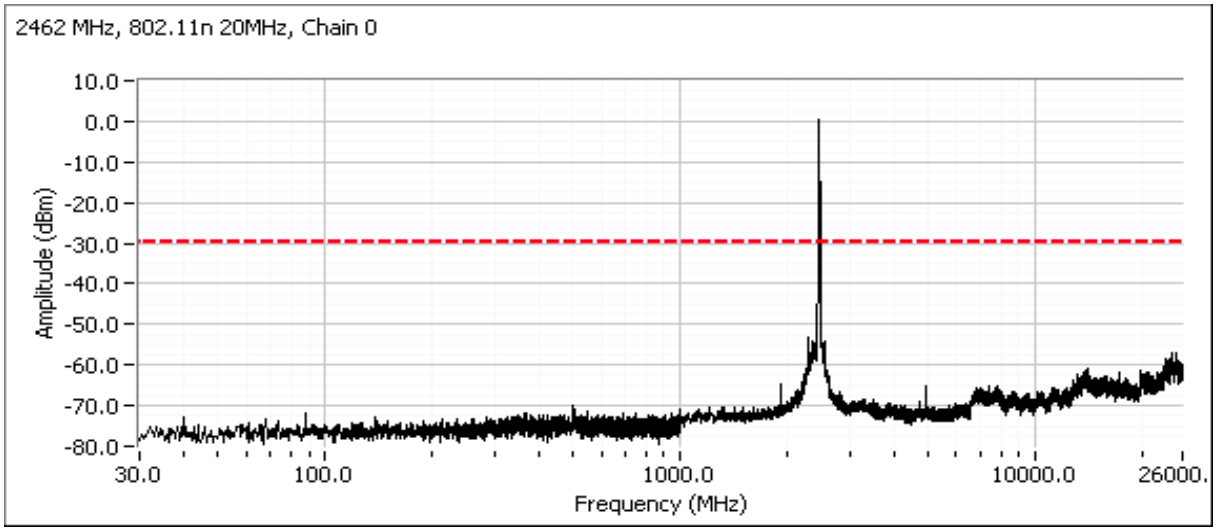
Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

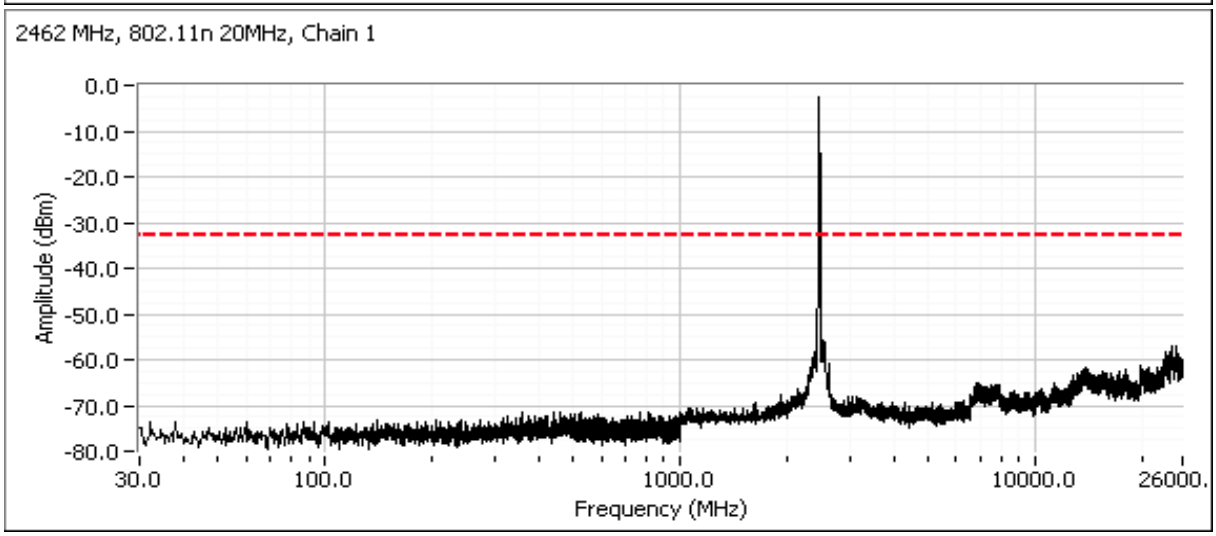




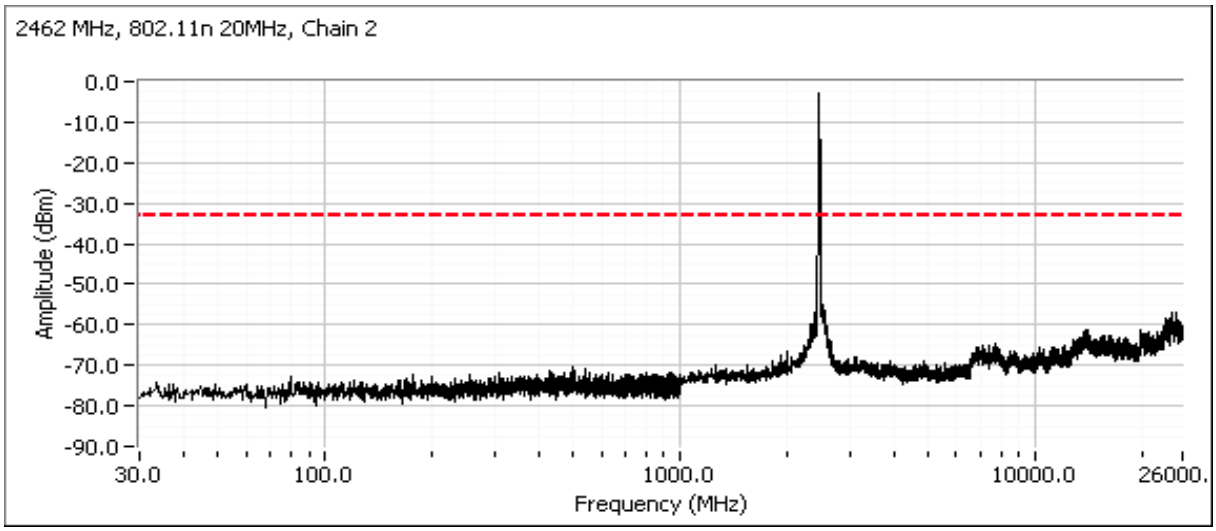
Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

Plots for high channel - 802.11n (20MHz) - , power setting(s) = 12.5

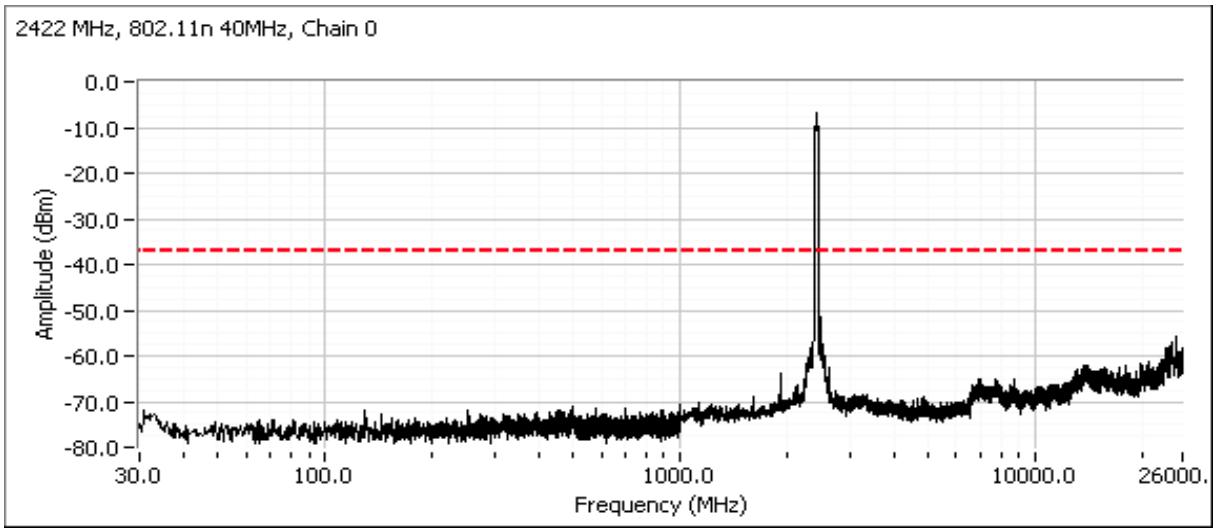




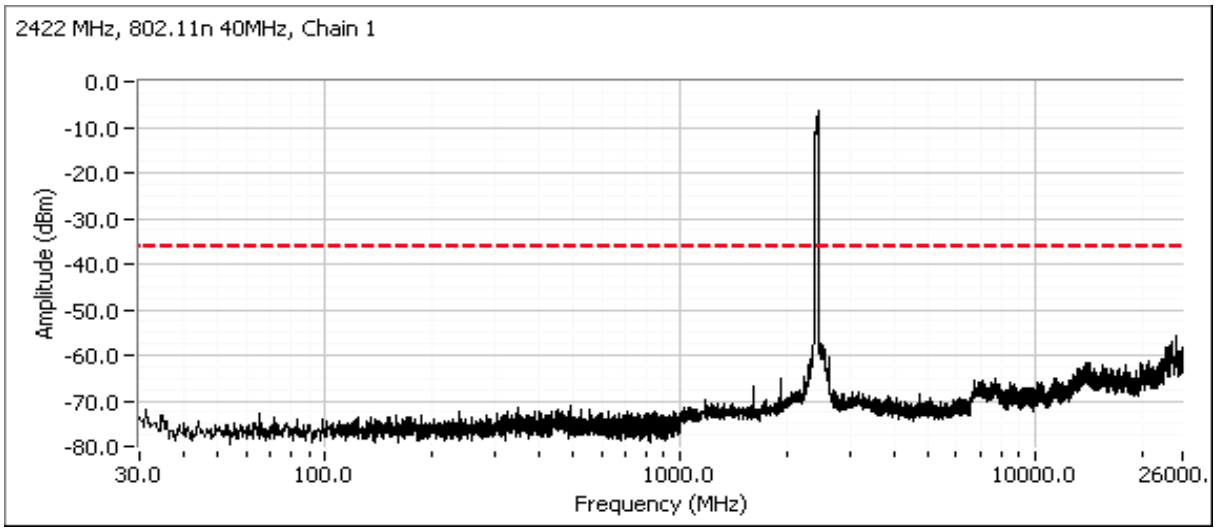
Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

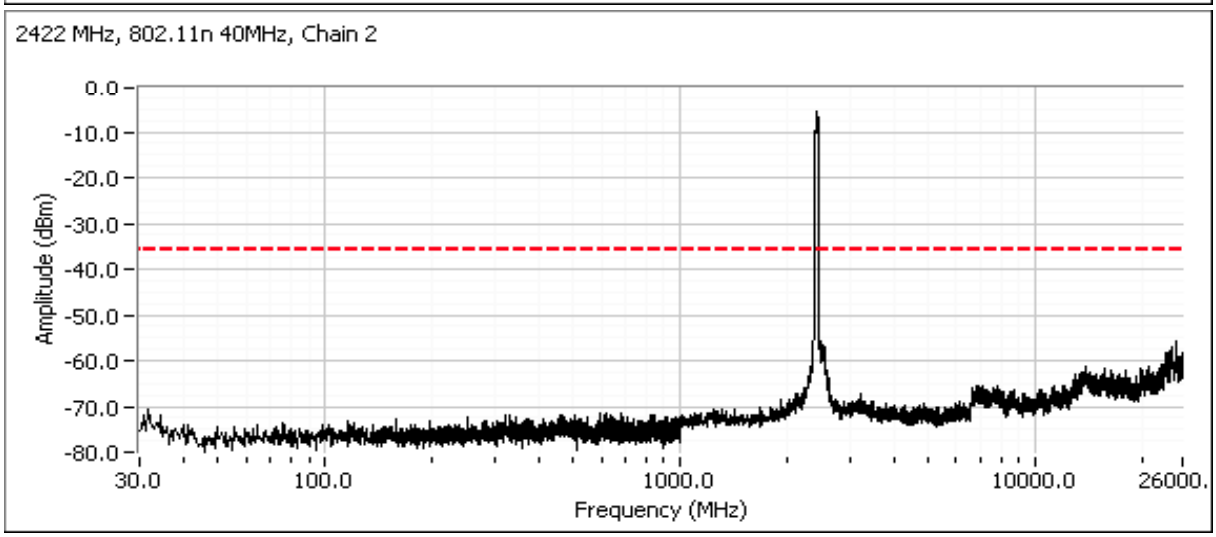


Plots for low channel - 802.11n (40MHz) - , power setting(s) = 8.5



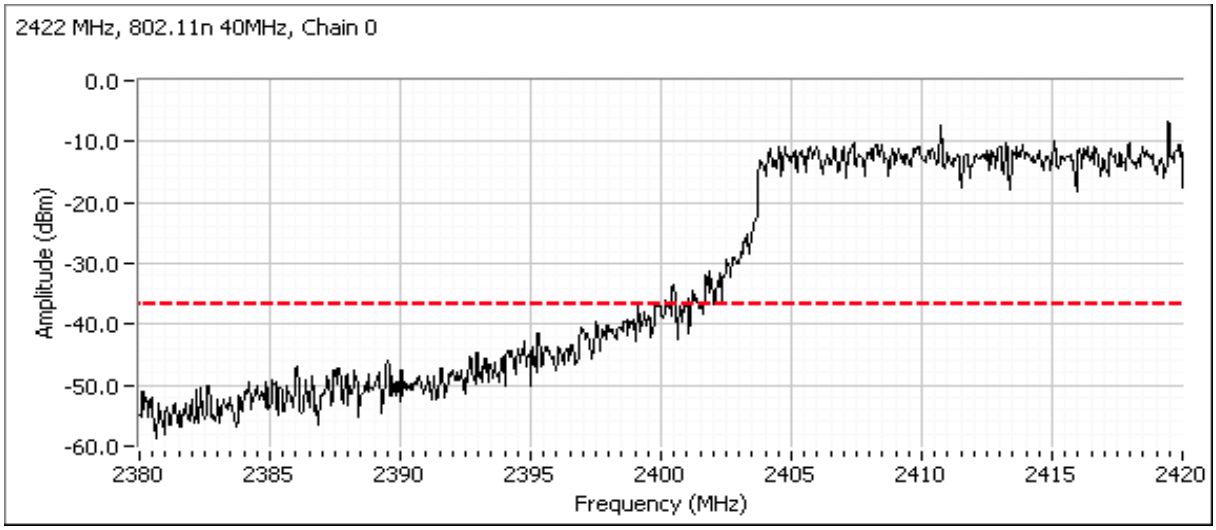
Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

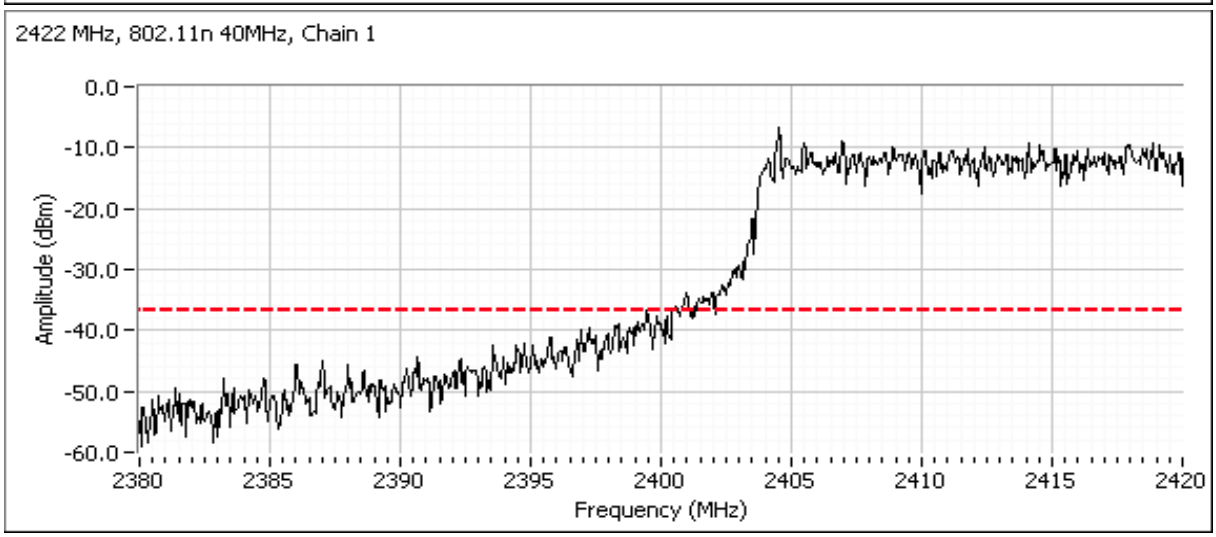




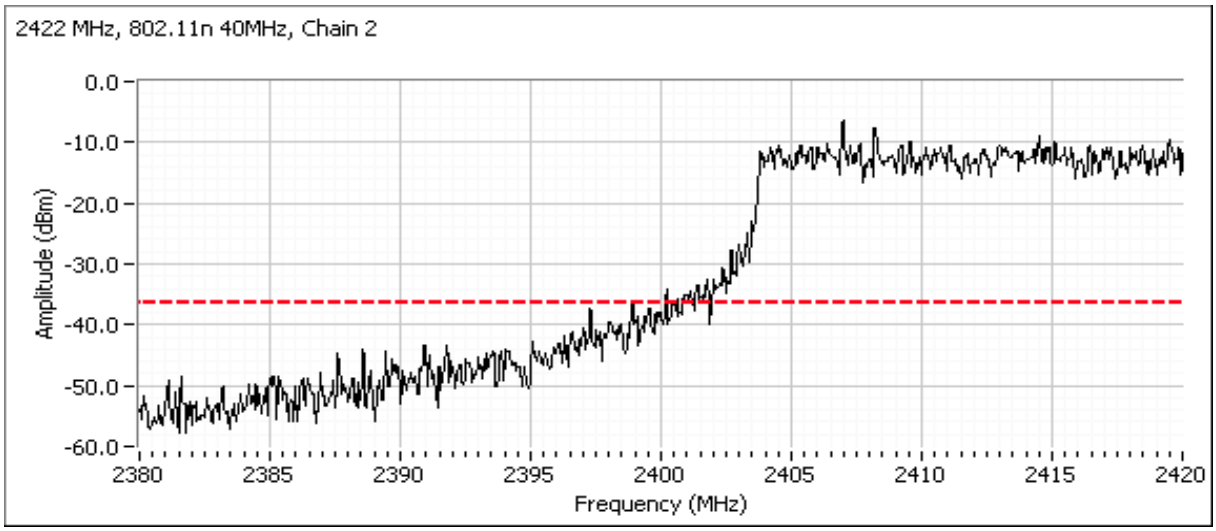
Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

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

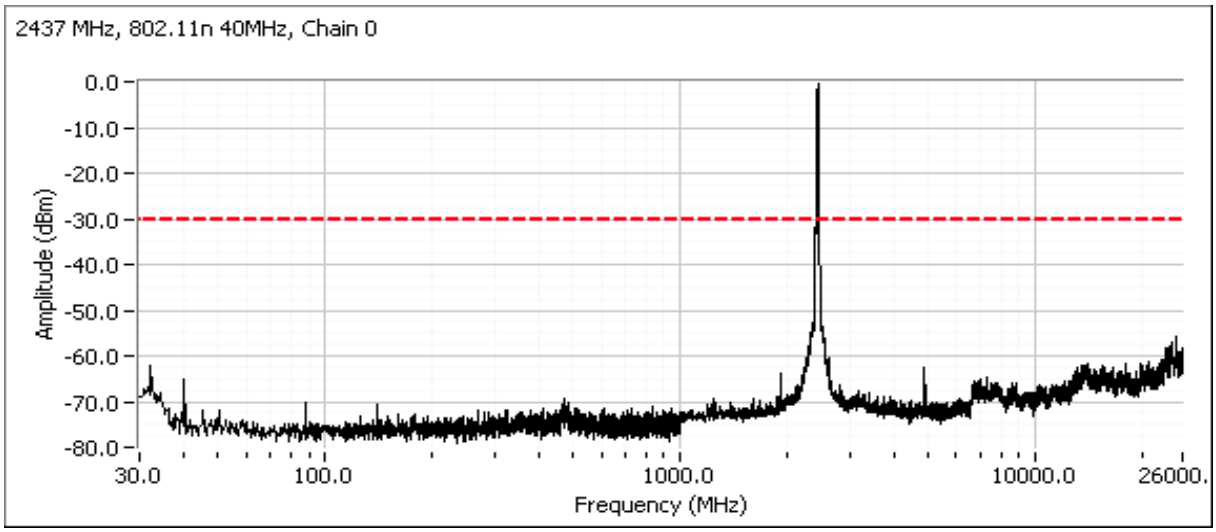




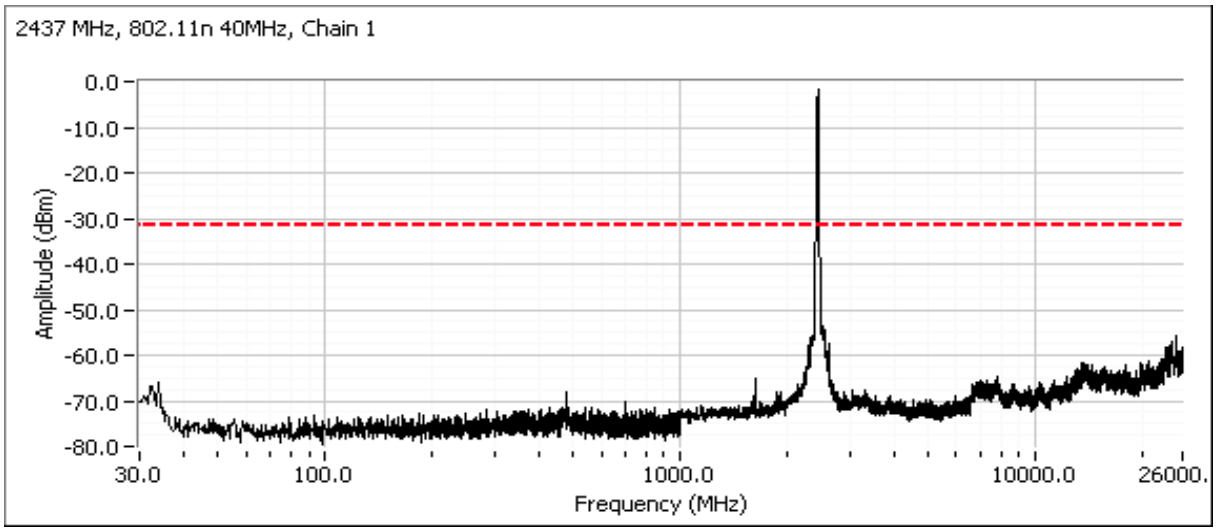
Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

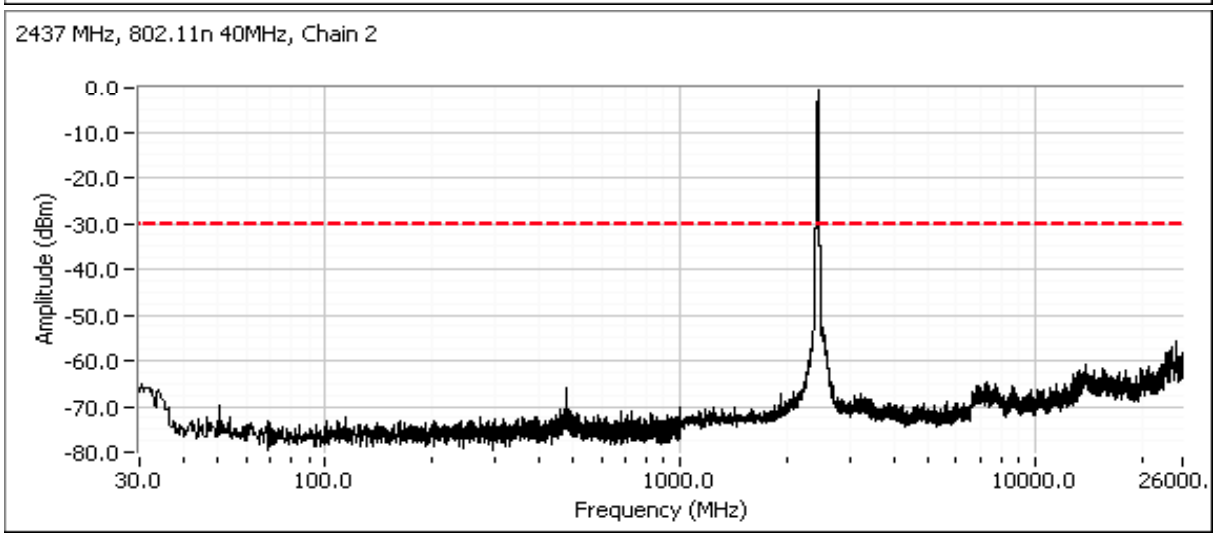


Plots for center channel - 802.11n (40MHz) - , power setting(s) = 13.5



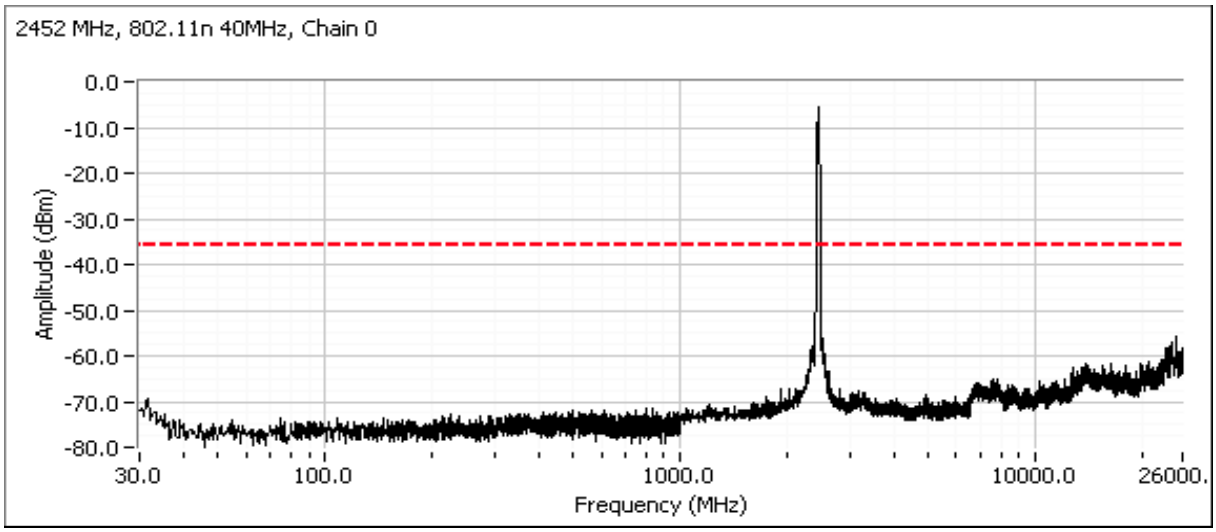
Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

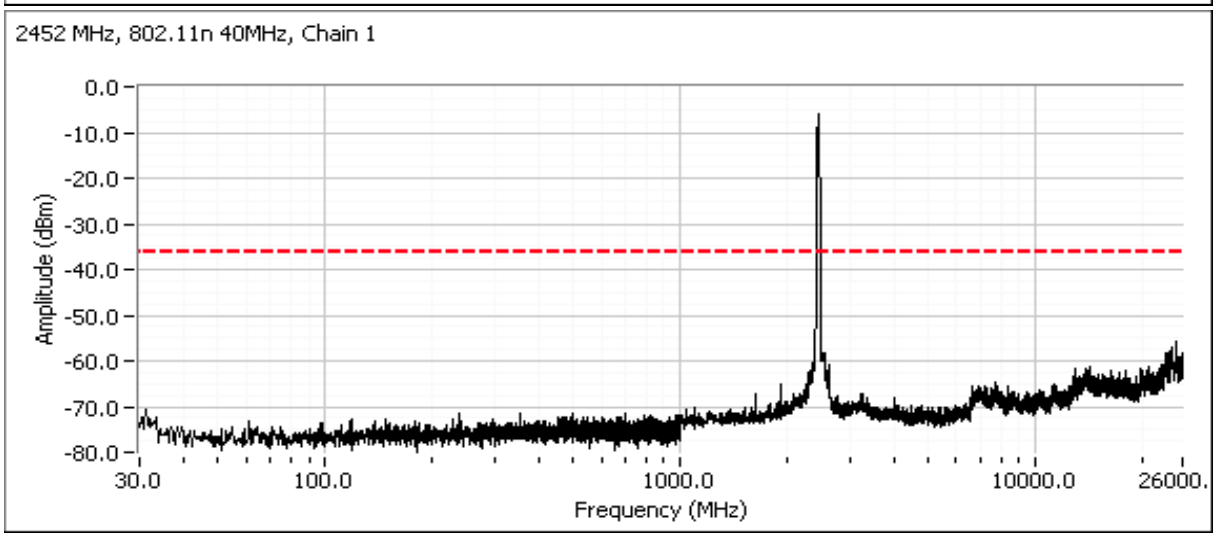




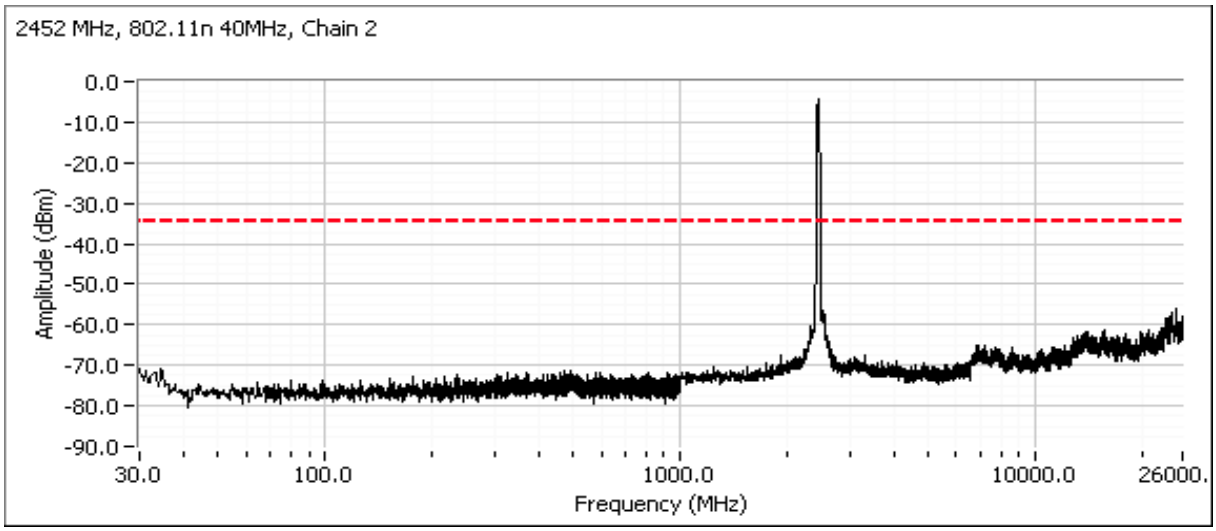
Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

Plots for high channel - 802.11n (40MHz) - , power setting(s) = 10.0





Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A



Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

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

Test Specific Details

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

Date of Test: 6/30/2011
Test Engineer: Rafael Varelas
Test Location: FT Chamber #7

Config. Used: -
Config Change: -
EUT Voltage: POE

General Test Configuration

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

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

Ambient Conditions:

Temperature: 21.2 °C
Rel. Humidity: 39 %

Summary of Results

Run #	Test Performed	Limit	Pass / Fail	Result / Margin
1	Output Power Chain A+B+C	15.247(b)	Pass	802.11n20: 20.9 dBm 802.11n40: 21.4 dBm
2	PSD Chain A+B+C	15.247(d)	Pass	n20: -3.2 dBm/3kHz n40: -6.5 dBm/3kHz
3	Minimum 6dB Bandwidth	15.247(a)	Pass	802.11n20: 17.5 MHz 802.11n40: 36.5 MHz
3	99% Bandwidth	RSS GEN	Pass	802.11n20: 18.3 MHz 802.11n40: 36.9 MHz
4	Spurious emissions	15.247(b)	Pass	All emissios are below the limit

Modifications Made During Testing

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

Run #1: Output Power - Chain 0 +1 + 2

Transmitted signal on chain is coherent ? Yes

Single radio Operating in the Band

5745MHz - 802.11n20	Chain 0	Chain 1	Chain 2	Chain 4	Total Across All Chains		Limit	
Power Setting Note 2	17.0	17.0	17.0					
Output Power (dBm) Note 1	14.3	14.3	16.5		19.9 dBm	0.098 W	27.2 dBm	0.528 W
Antenna Gain (dBi) Note 2	4.0	4.0	4.0		8.8 dBi		Pass	
eirp (dBm) Note 2	18.3	18.3	20.5		28.7 dBm	0.742 W		

5785 MHz - 802.11n20	Chain 0	Chain 1	Chain 2	Chain 4	Total Across All Chains		Limit	
Power Setting Note 2	17.0	17.0	17.0					
Output Power (dBm) Note 1	16.4	15.3	16.3		20.8 dBm	0.120 W	27.2 dBm	0.528 W
Antenna Gain (dBi) Note 2	4.0	4.0	4.0		8.8 dBi		Pass	
eirp (dBm) Note 2	20.4	19.3	20.3		29.6 dBm	0.906 W		

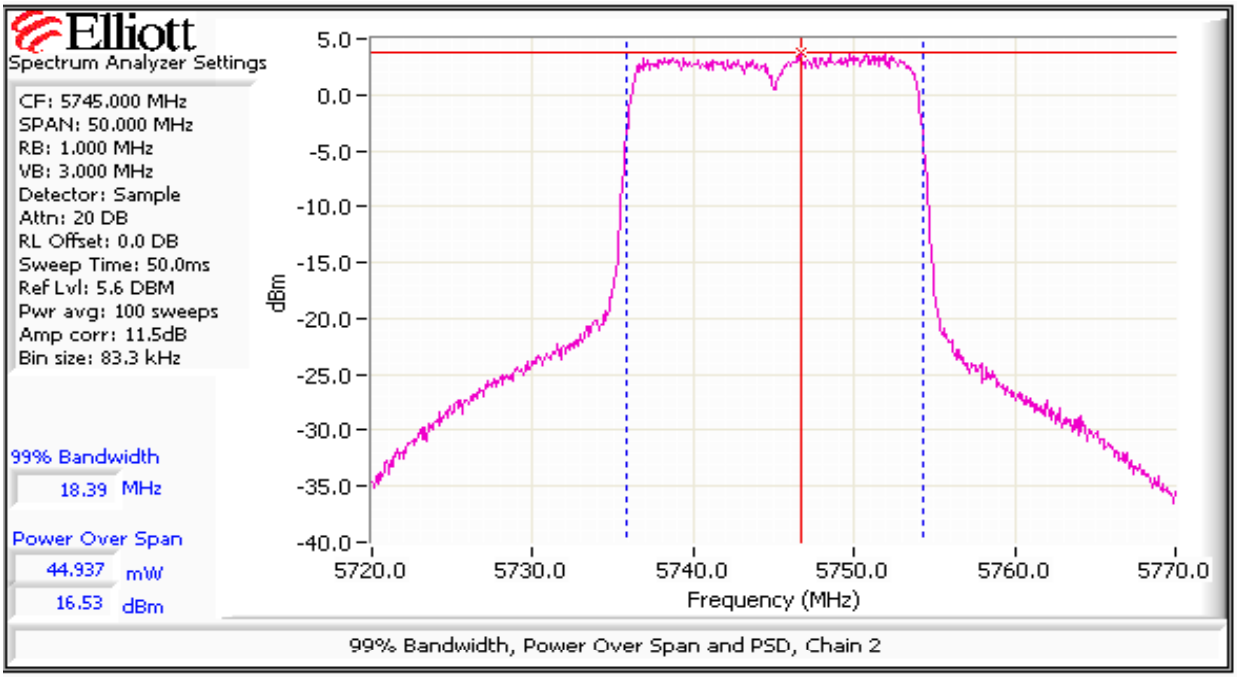
5825 MHz - 802.11n20	Chain 0	Chain 1	Chain 2	Chain 4	Total Across All Chains		Limit	
Power Setting Note 2	17.0	17.0	17.0					
Output Power (dBm) Note 1	15.8	16.4	16.3		20.9 dBm	0.124 W	27.2 dBm	0.528 W
Antenna Gain (dBi) Note 2	4.0	4.0	4.0		8.8 dBi		Pass	
eirp (dBm) Note 2	19.8	20.4	20.3		29.7 dBm	0.937 W		

5755 MHz - 802.11n40	Chain 0	Chain 1	Chain 2	Chain 4	Total Across All Chains		Limit	
Power Setting Note 3	14.0	14.0	14.0					
Output Power (dBm) Note 3	21.1	23.0	22.1		26.9 dBm	0.491 W	27.2 dBm	0.528 W
Antenna Gain (dBi) Note 2	4.0	4.0	4.0		8.8 dBi		Pass	
eirp (dBm) Note 2	25.1	27.0	26.1		35.7 dBm	3.696 W		

5795 MHz - 802.11n40	Chain 0	Chain 1	Chain 2	Chain 4	Total Across All Chains		Limit	
Power Setting Note 2	14.0	14.0	14.0					
Output Power (dBm) Note 3	21.6	23	22.4		27.1 dBm	0.518 W	27.2 dBm	0.528 W
Antenna Gain (dBi) Note 2	4.0	4.0	4.0		8.8 dBi		Pass	
eirp (dBm) Note 2	25.6	27	26.4		35.9 dBm	3.902 W		

Note 1:	Output power measured using a spectrum analyzer (see plots below) with RBW=1MHz, VB=3 MHz, sample detector, power averaging on (transmitted signal was continuous) and power integration over 50 MHz (option #2, method 1 in KDB 558074, equivalent to method 1 of DA-02-2138A1 for U-NII devices). Spurious limit becomes -30dBc.
Note 2:	Power setting - the software power setting used during testing, included for reference only.
Note 3:	Output power measured using a Peak Power Sensor. Spurious limit becomes -20dBc. (No Plot)

Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

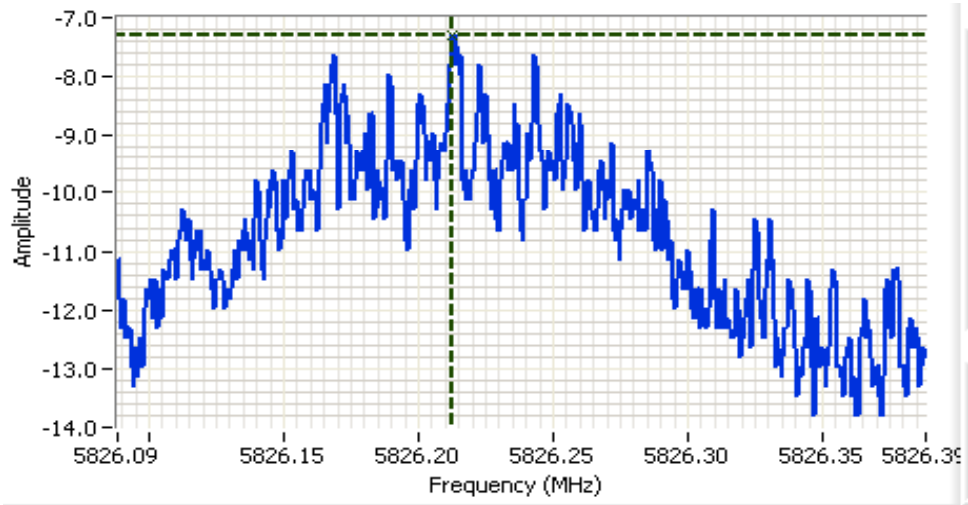


Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

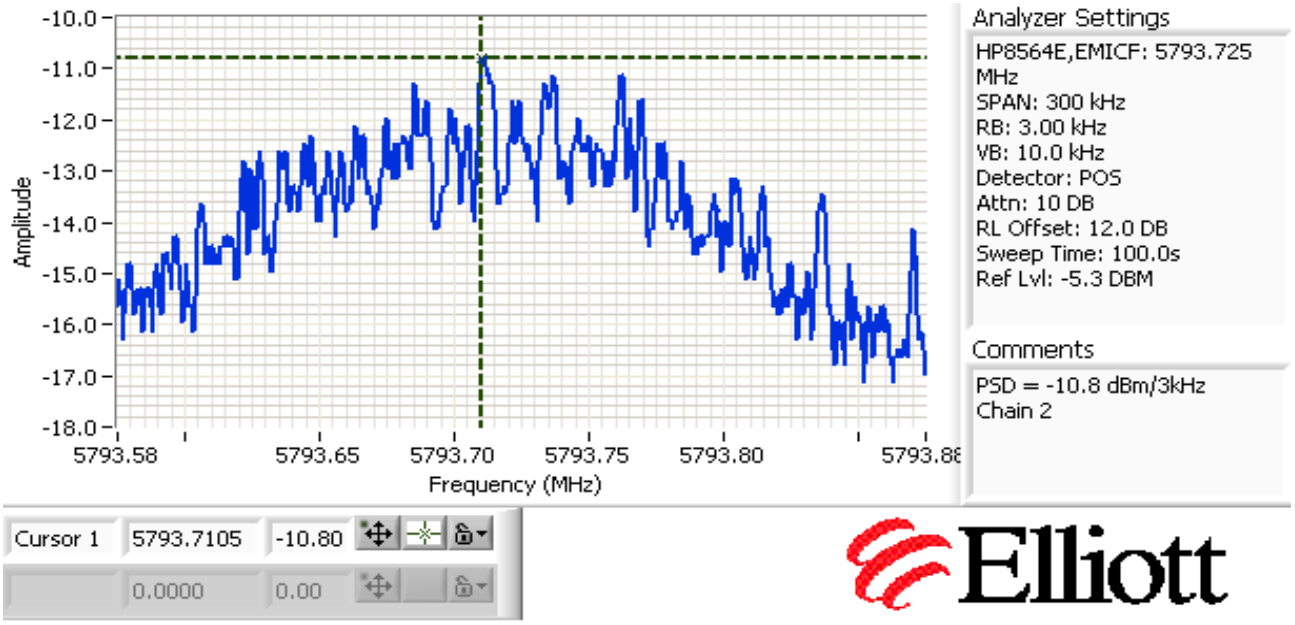
Run #2: Power spectral Density

Power Setting	Frequency (MHz)	PSD (dBm/3kHz) Note 1 Chain 0	Chain 1	Chain 2	Chain 4	Total	Limit dBm/3kHz	Result
17.0	5745 - 802.11n20	-10.3	-9.8	-8.5		-4.7	8.0	Pass
17.0	5785 - 802.11n20	-9.0	-8.3	-8.0		-3.6	8.0	Pass
17.0	5825 - 802.11n20	-9.3	-7.5	-7.3		-3.2	8.0	Pass
17.0	5755 - 802.11n40	-12.1	-13.3	-11.1		-7.3	8.0	Pass
17.0	5795 - 802.11n40	-12.3	-10.8	-10.8		-6.5	8.0	Pass

Note 1:	Power spectral density measured using RB=3 kHz, VB=10kHz, analyzer with peak detector and with a sweep time set to ensure a dwell time of at least 1 second per 3kHz. The measurement is made at the frequency of PPSD determined from preliminary scans using RB=3kHz using multiple sweeps at a faster rate over the 6dB bandwidth of the signal.
Note 2:	The operation of mutliple radios in the band does not affect power spectral density as radios cannot operate on overlapping channels.



Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A



Run #3: Signal Bandwidth

Power Setting	Frequency (MHz)	Resolution Bandwidth	Bandwidth (MHz) 6dB	99%
17.0	5745 - 802.11n20	100kHz	17.7	18.3
17.0	5785 - 802.11n20	100kHz	17.7	18.3
17.0	5825 - 802.11n20	100kHz	17.5	18.3
17.0	5755 - 802.11n40	100kHz	36.5	36.9
17.0	5795 - 802.11n40	100kHz	36.5	36.9

Note 1:	Measured on a single chain
Note 2:	99% bandwidth measured in accordance with RSS GEN, with RB > 1% of the span and VB > 3xRB

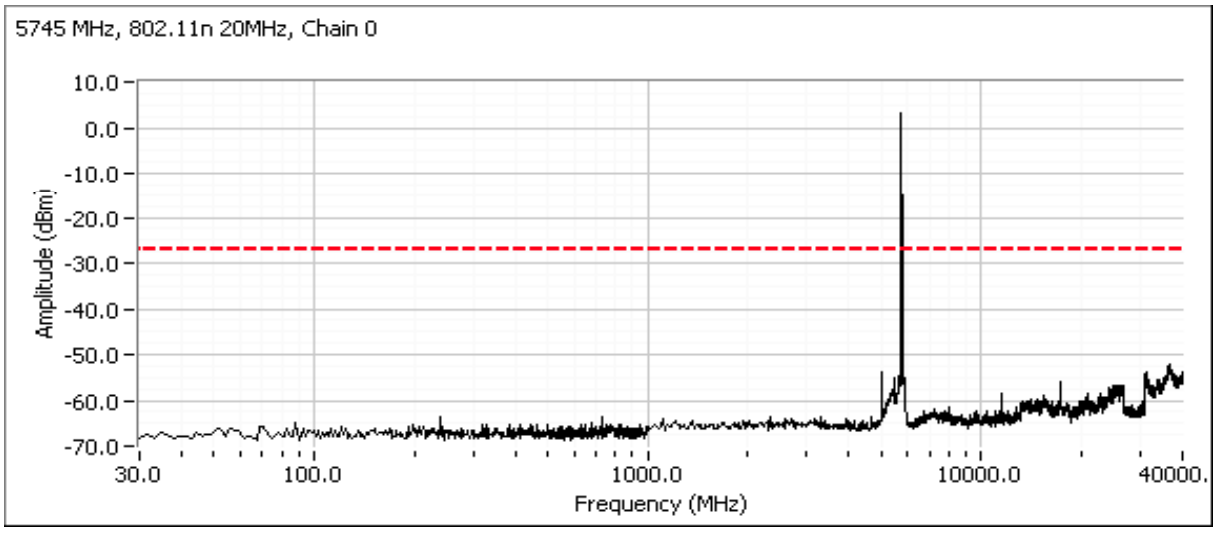
Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

Run #4: Out of Band Spurious Emissions

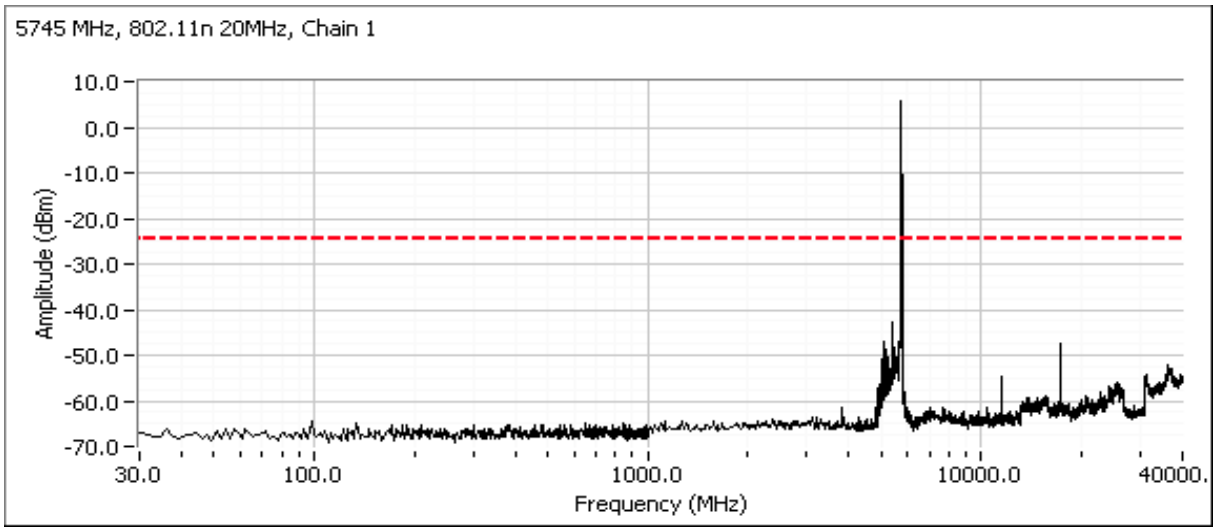
Power Setting Per Chain				Frequency (MHz)	Limit	Result
#0	#1	#2	#4			
17.0	17.0	17.0		5745 802.11n20	-30dBc	Pass
17.0	17.0	17.0		5785 802.11n20	-30dBc	Pass
17.0	17.0	17.0		5825 802.11n20	-30dBc	Pass
17.0	17.0	17.0		5755 802.11n40	-20dBc	Pass
17.0	17.0	17.0		5795 802.11n40	-20dBc	Pass

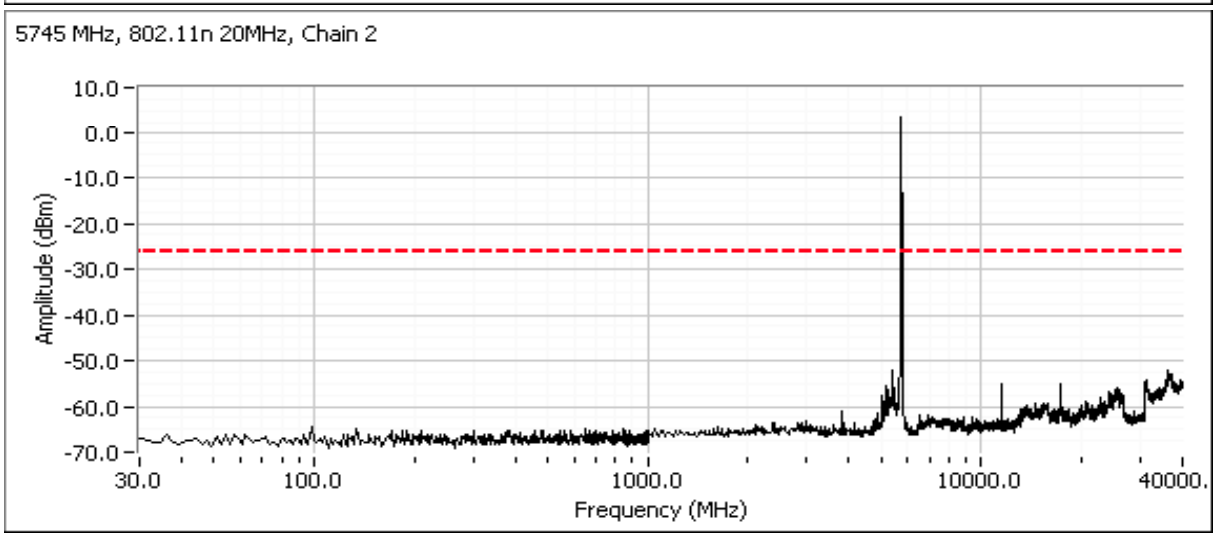
Note 1:	Measurements made on each chain individually.
Note 2:	Measured using RB>=100kHz, VB>= RB

Plots for low channel - 802.11n (20MHz) - , power setting(s) = 17.0



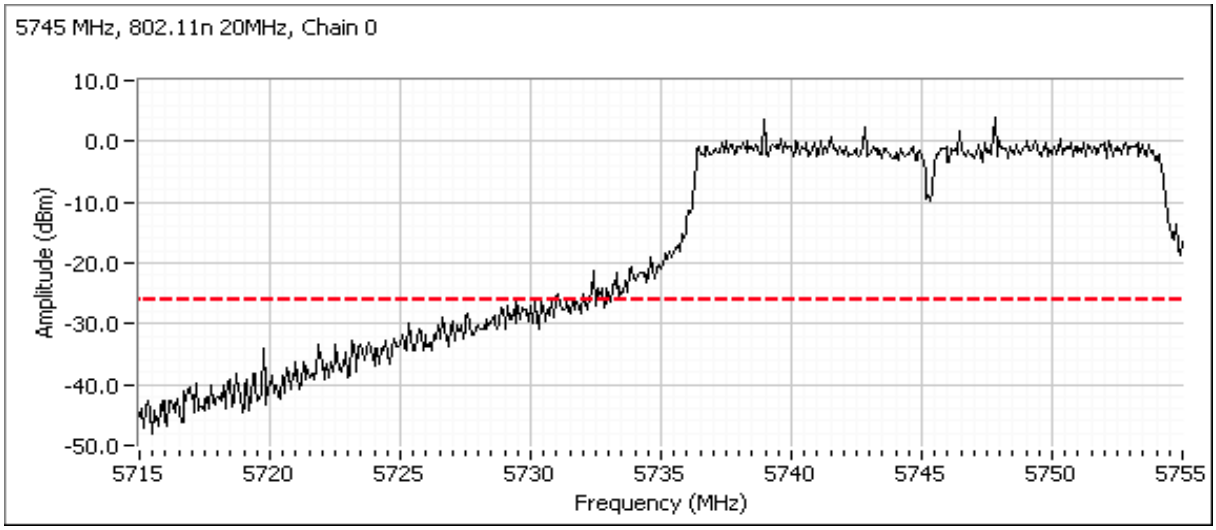
Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

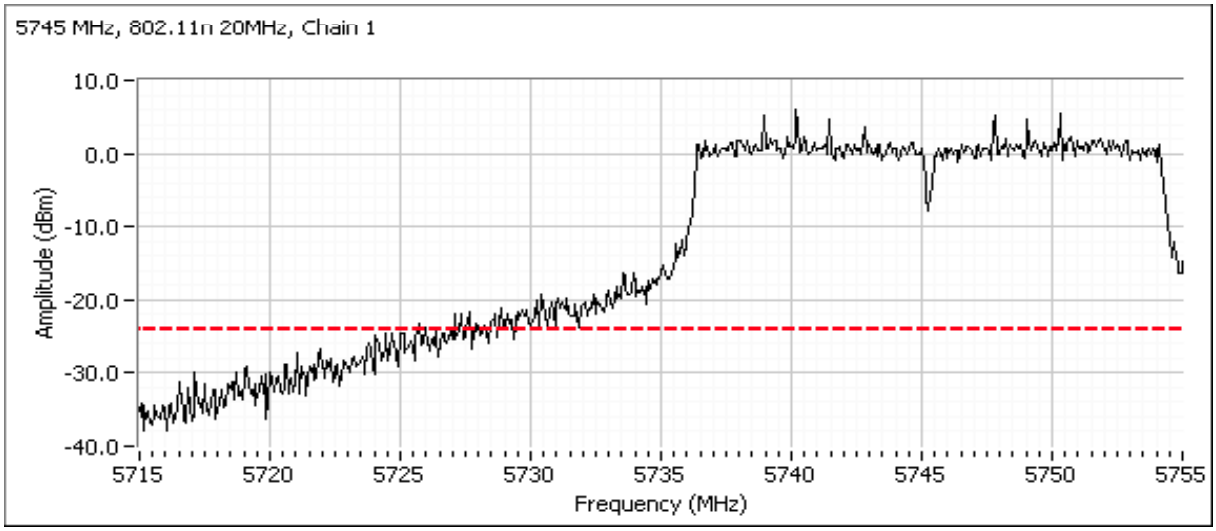




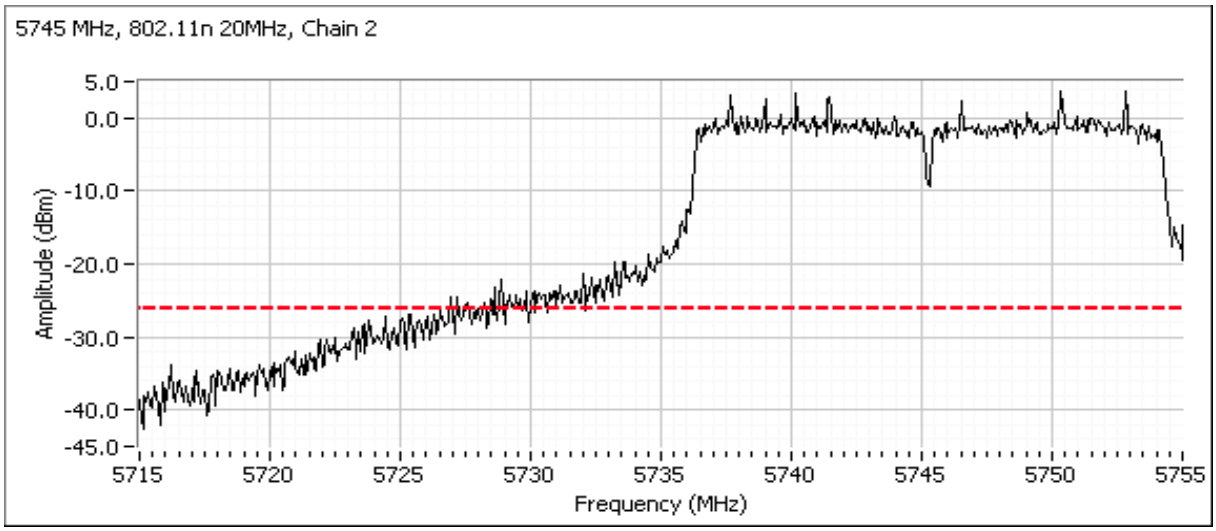
Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

Additional plot from 5715 - 5755 MHz showing compliance with -30dBc at the band edge.

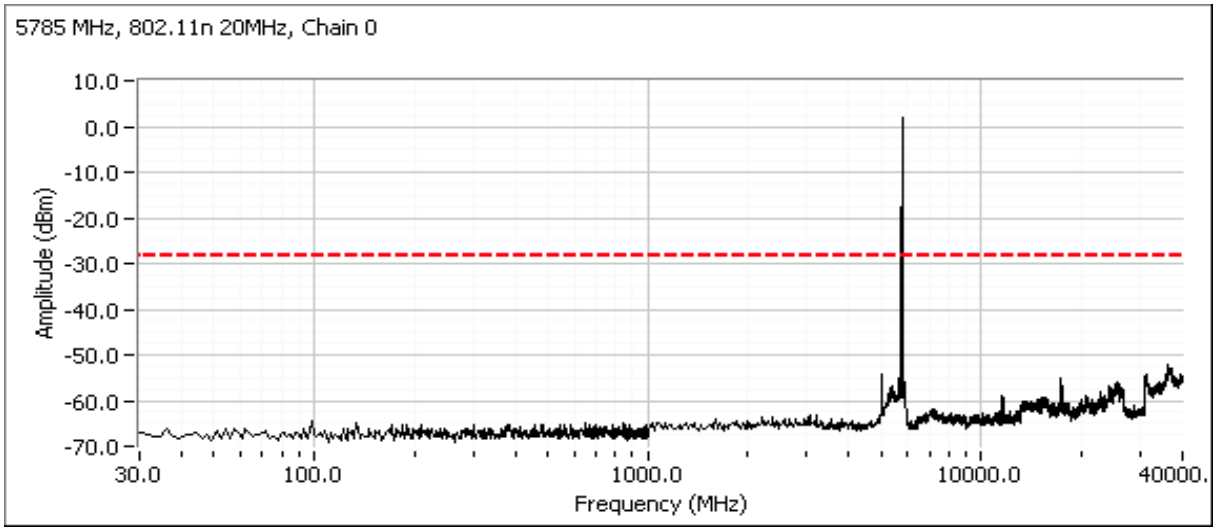




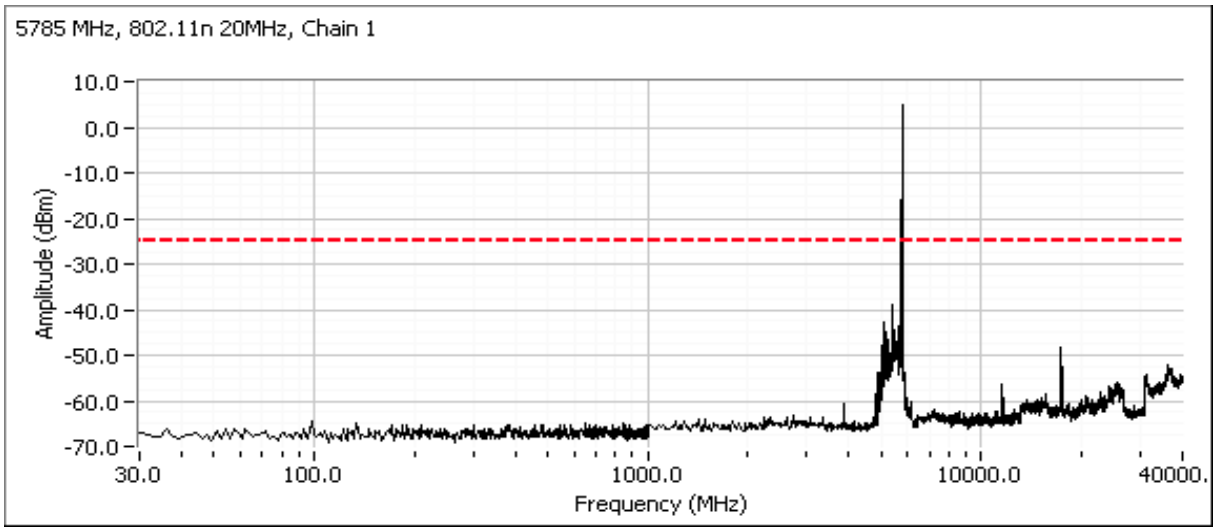
Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

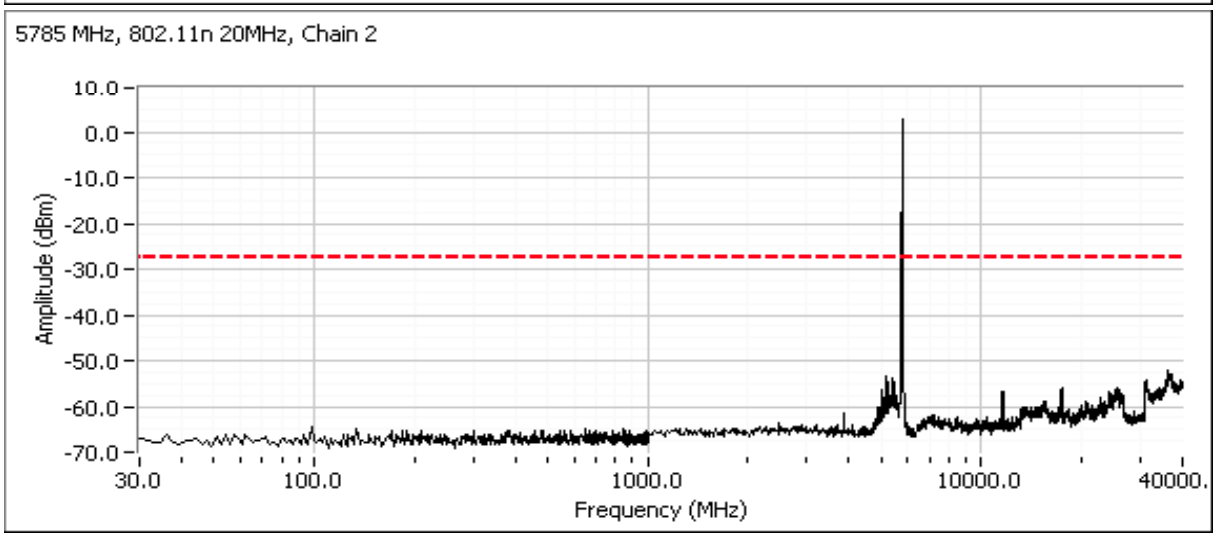


Plots for center channel - 802.11n (20MHz) - , power setting(s) = 17.0



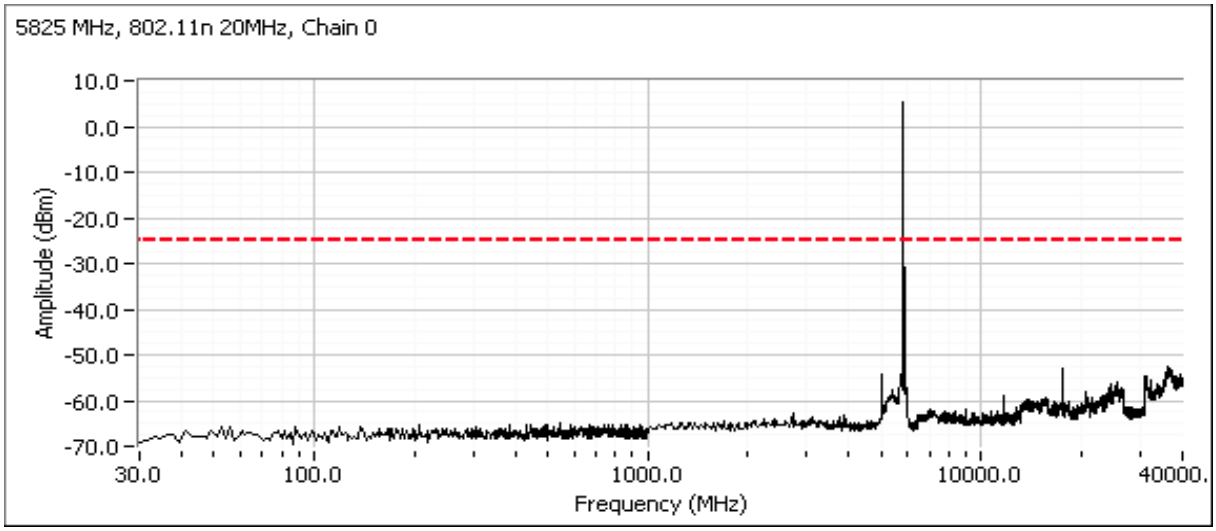
Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

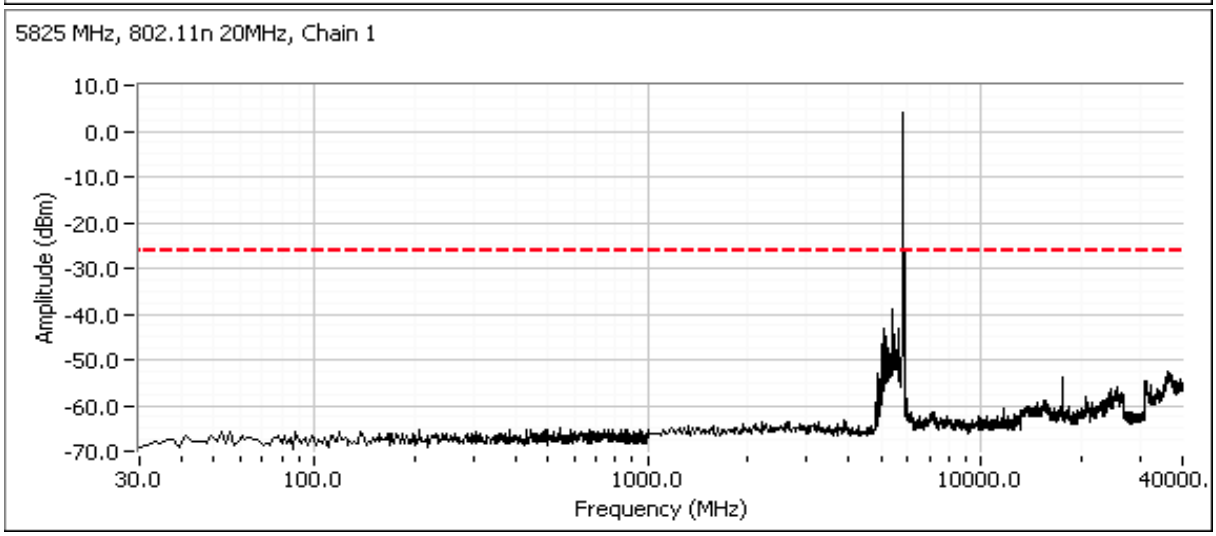




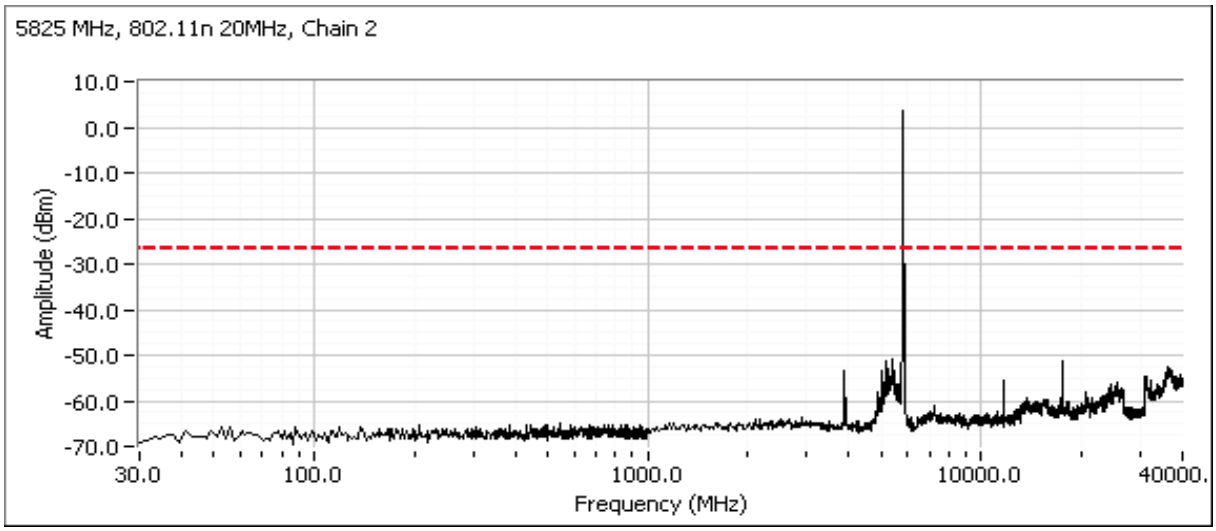
Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

Plots for high channel - 802.11n (20MHz) - , power setting(s) = 17.0



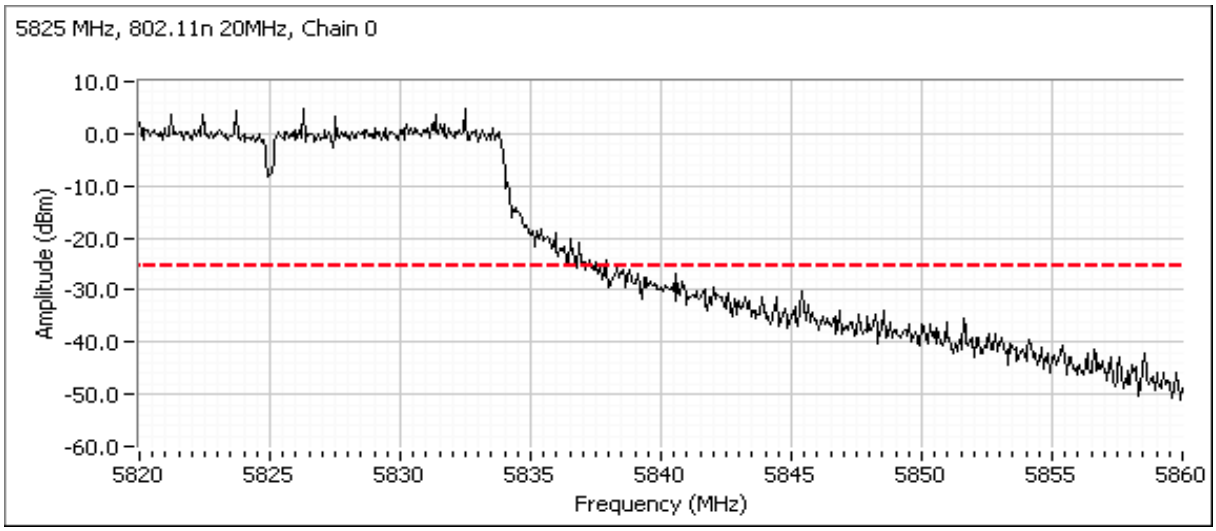


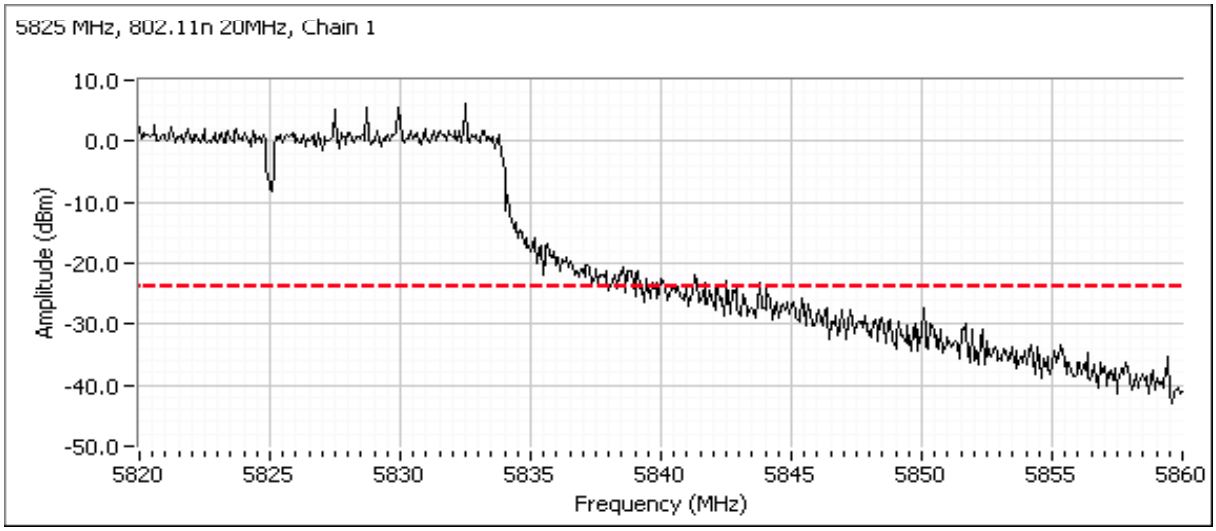
Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A



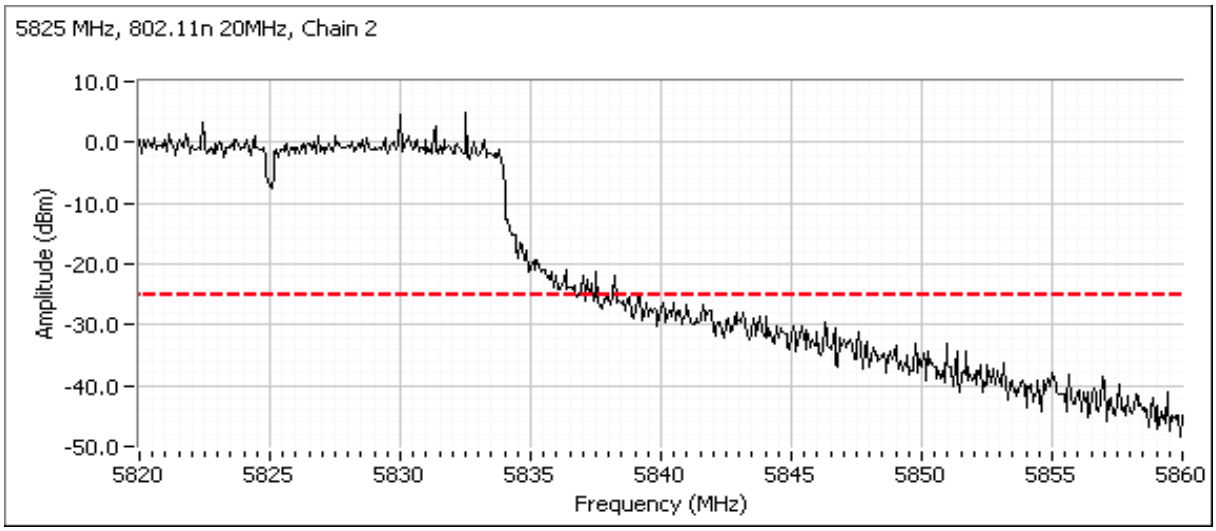
Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

Additional plot from 5820 - 5860 MHz showing compliance with -30dBc at the band edge.

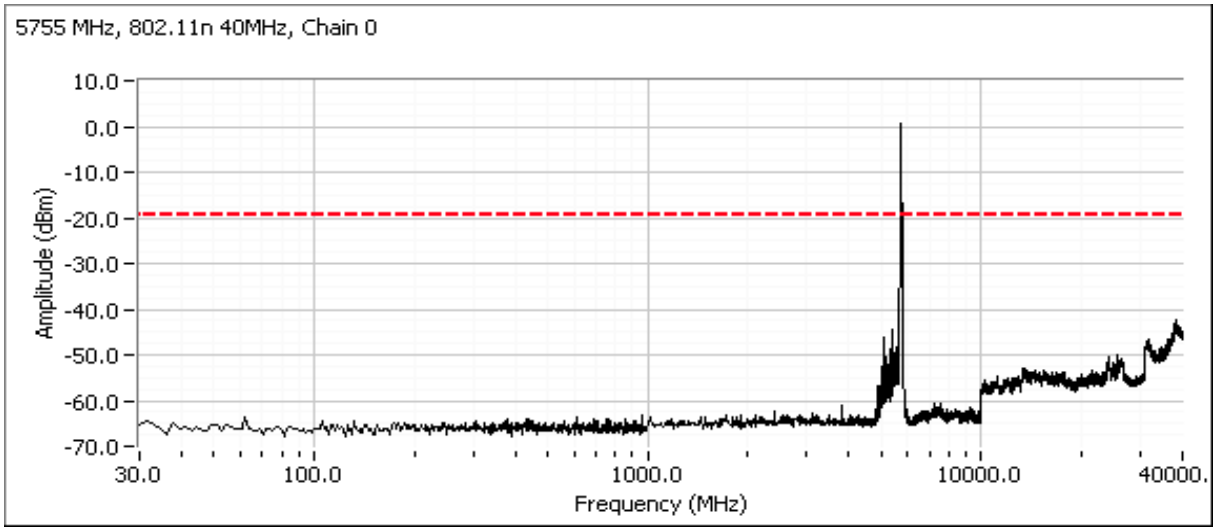




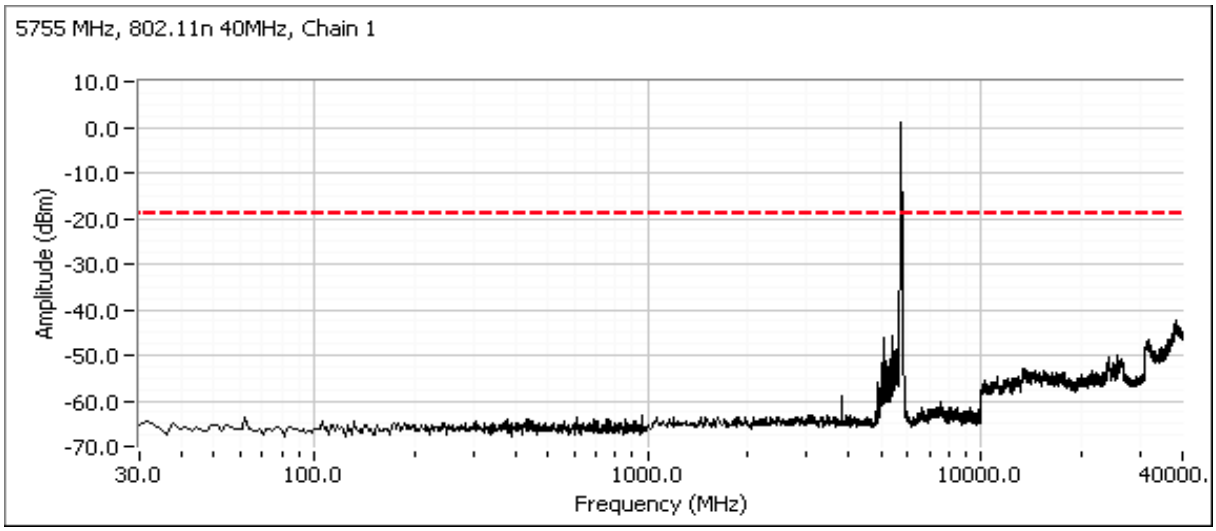
Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

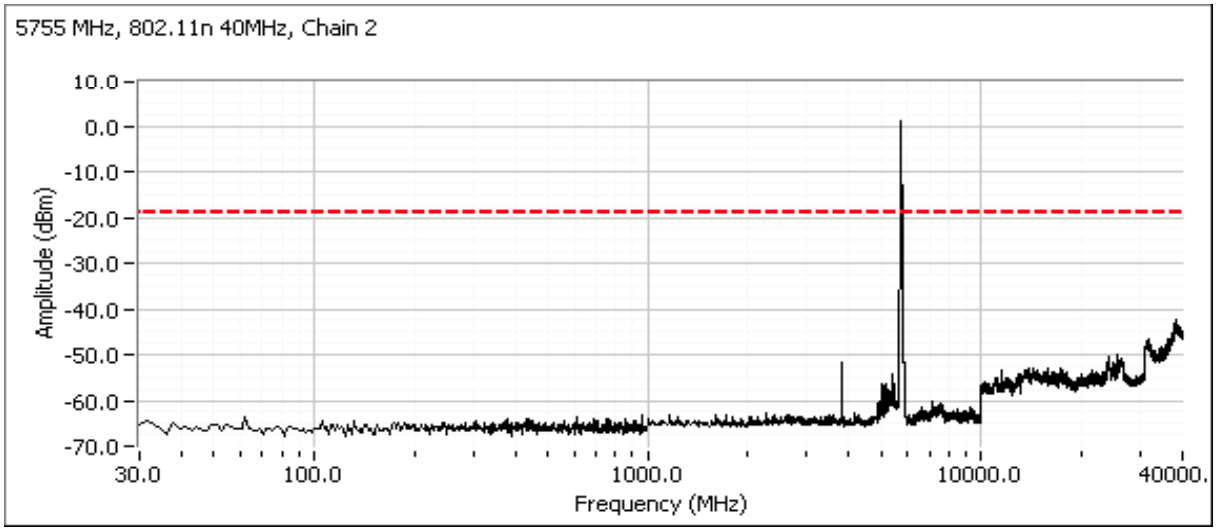


Plots for low channel - 802.11n (40MHz) - , power setting(s) = 17.0



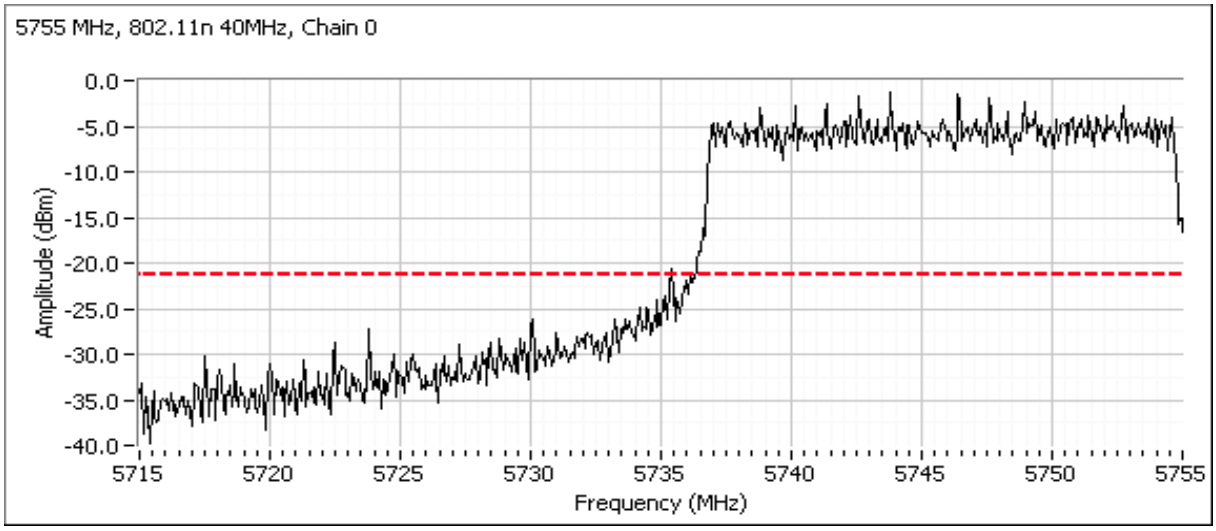
Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

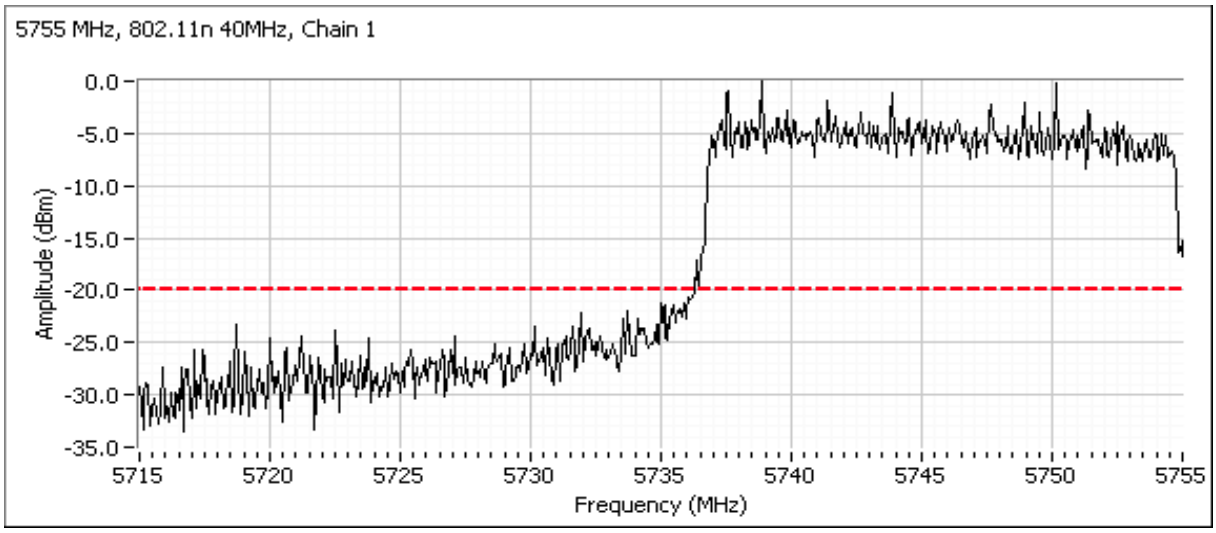




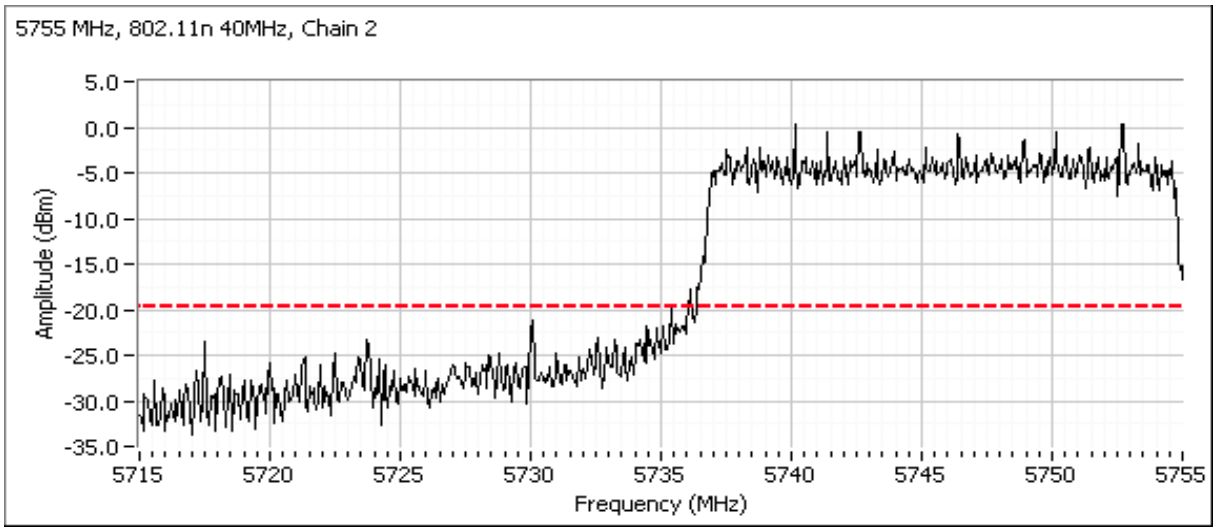
Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

Additional plot from 5715 - 5755 MHz showing compliance with -30dBc at the band edge.



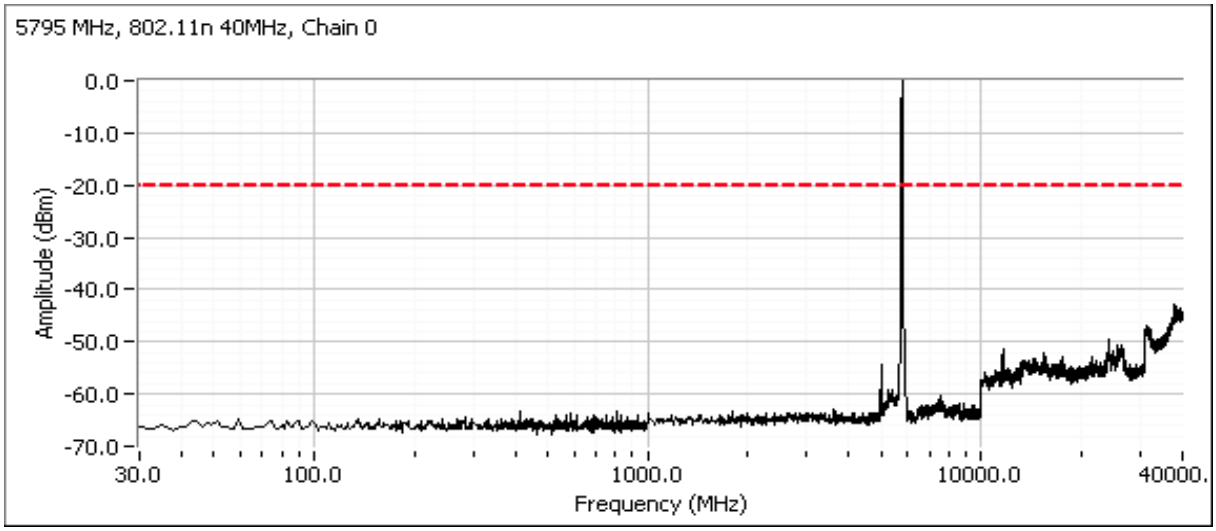


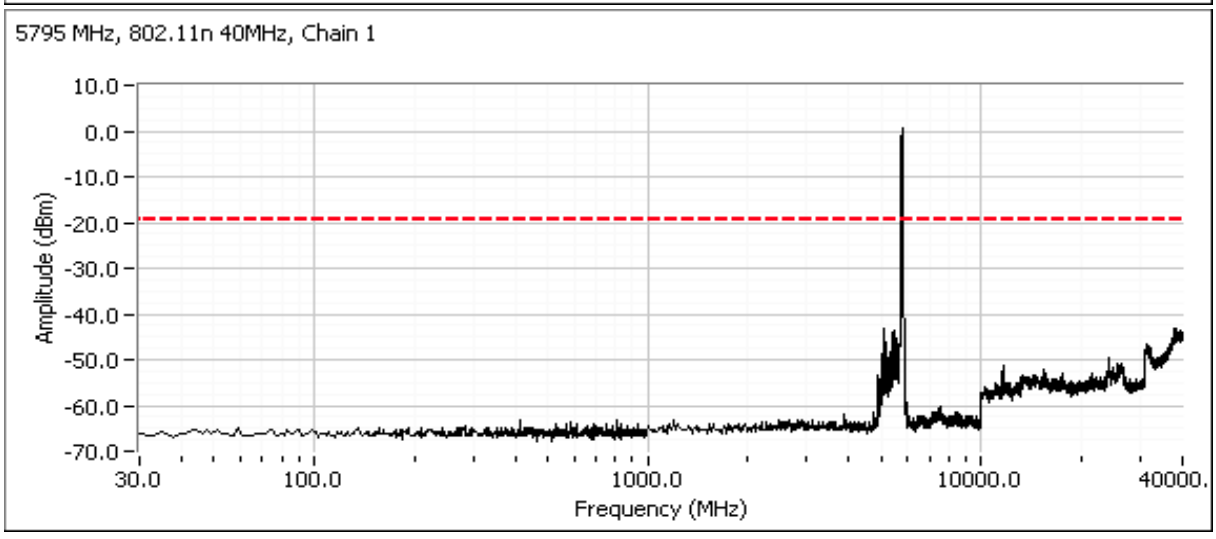
Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A



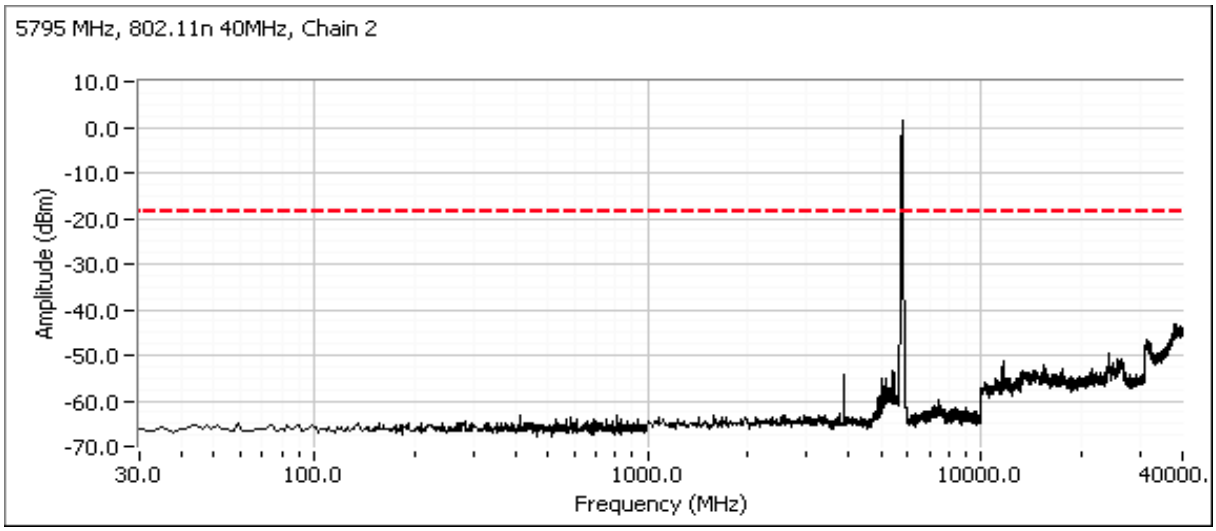
Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

Plots for high channel - 802.11n (40MHz) - , power setting(s) = 17.0



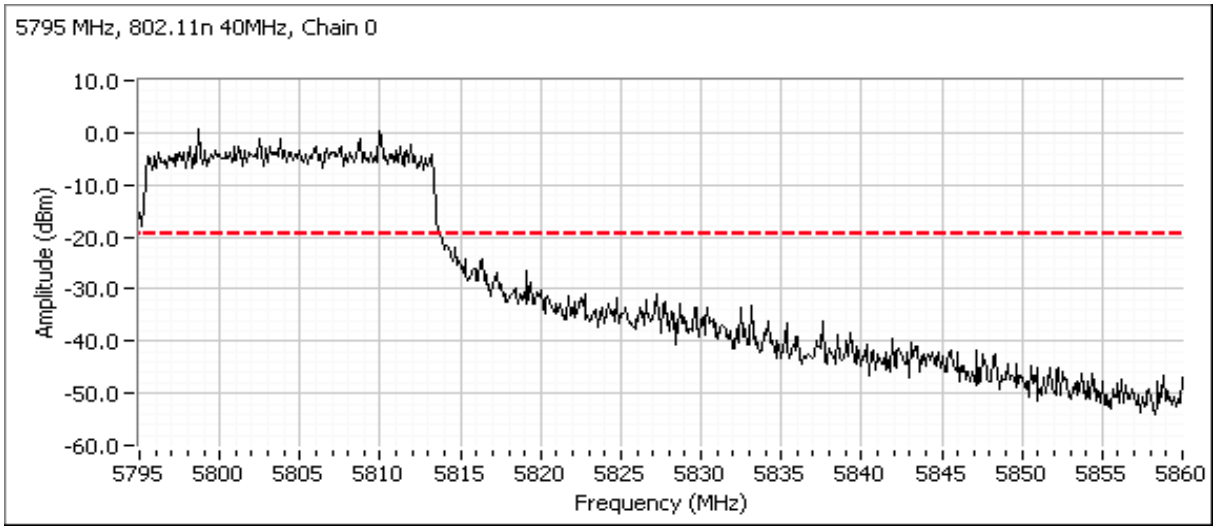


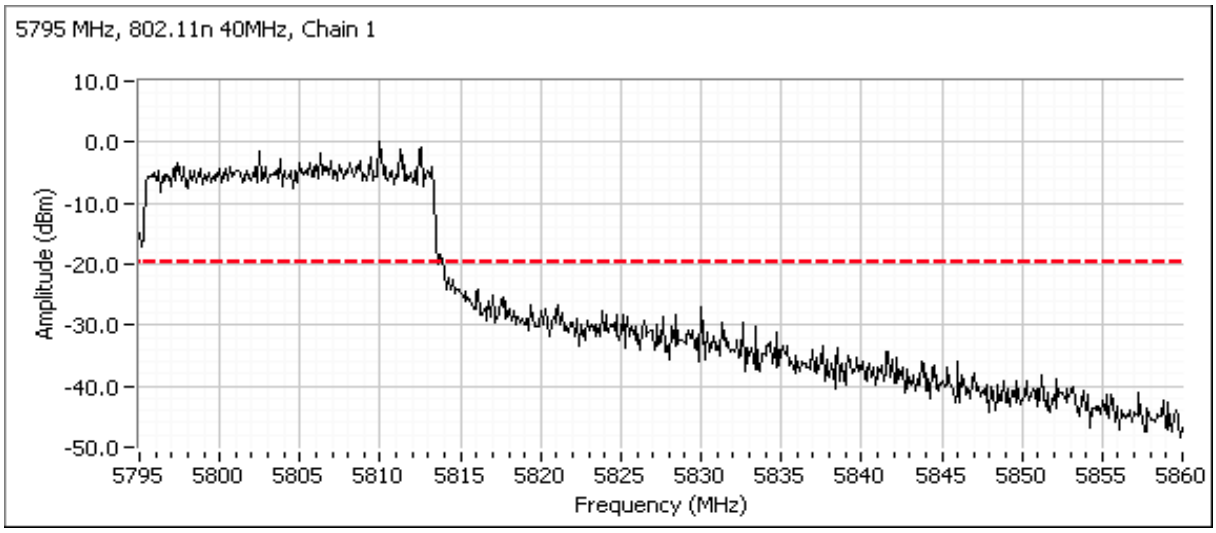
Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A



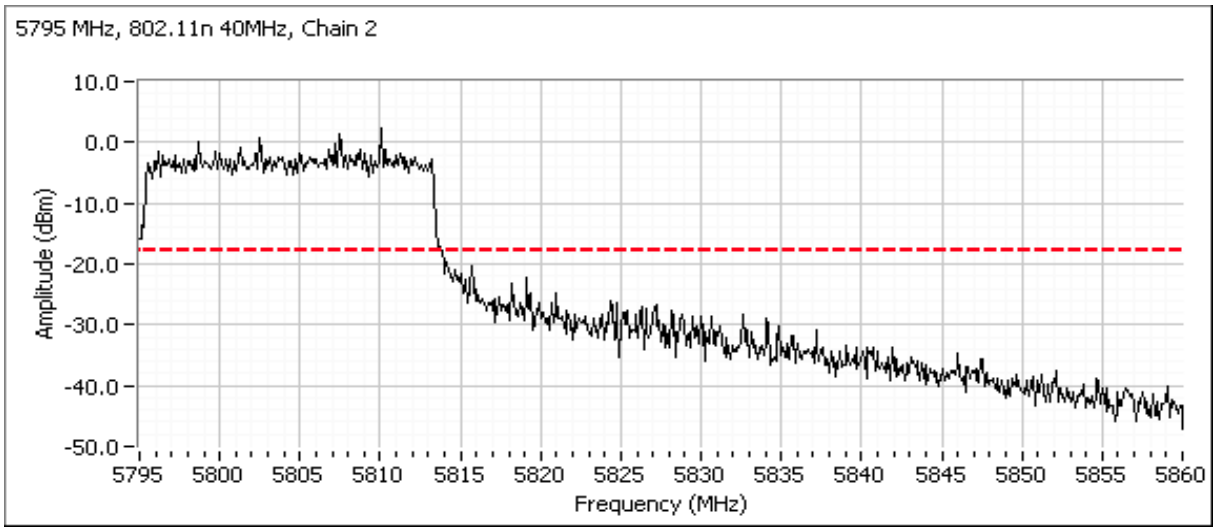
Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

Additional plot from 5820 - 5860 MHz showing compliance with -20dBc at the band edge.





Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A



Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

RSS 210 and FCC 15.247 (DTS) Antenna Port Measurements
MIMO and Smart Antenna Systems
Power at Low Power Setting

Test Specific Details

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

Date of Test: 6/28/2011 / 7/12/2011
Test Engineer: Rafael Varelas / Joseph Cadigal
Test Location: FT Lab #4 & Chamber#5

Config. Used: -
Config Change: -
EUT Voltage: POE

General Test Configuration

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

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

Ambient Conditions:

Temperature: 20.7 °C
Rel. Humidity: 38 %

Output power - low power setting to comply with eirp limit when modules are co-located

The module can be co-located with other 2x2 or 3x3 modules in the same host system. When operating with other modules the host system limits operation such that no two radios operate on the same or on overlapping channels, however multiple modules may be operating in the same operating band.

When multiple modules operate in the same band the total output power and total eirp within that band need to comply with the maximum allowed limits for that band. As the host system does not allow modules to operate on overlapping channels, PSD measurements are not required.

The following measurements demonstrate that the output power for the module can be reduced to a level that allows for multiple modules to operate in the same band without exceeding the allowed output power and eirp limits.

Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

Run #1: Output Power

Transmitted signal on chain is coherent ? Yes

The limit in the 2400-2483.5MHz band is a maximum eirp of 36dBm and maximum conducted power of 30dBm. There are three 20MHz channels therefore the power per channel would be restricted to 25.2dBm conducted power and 31.22dBm eirp. For MIMO modes the effective antenna gain is 6.77dBi so the maximum conducted power is 24.46Bm to meet the eirp power limit per radio.

At the maximum power ratings in all modes the output power meets these requirements, therefore no power reductions are necessary when operating more than one module in this band.

2437MHz -802.11b	Chain 0	Chain 1	Chain 2	Chain 4	Total Across All Chains		Limit	
Power Setting Note 3	17.0							
Output Power (dBm) Note 1	20.2	18.6	19.4		24.2 dBm	0.264 W	24.5 dBm	0.279 W
Antenna Gain (dBi) Note 2	2	2	2		6.8 dBi		Pass	
eirp (dBm) Note 2	22.16	20.62	21.4		31.0 dBm	1.253 W		

2437MHz -802.11g	Chain 0	Chain 1	Chain 2	Chain 4	Total Across All Chains		Limit	
Power Setting Note 3	17.0							
Output Power (dBm) Note 1	19.1	18.2	19.1		23.6 dBm	0.228 W	24.5 dBm	0.279 W
Antenna Gain (dBi) Note 2	2	2	2		6.8 dBi		Pass	
eirp (dBm) Note 2	21.07	20.15	21.11		30.3 dBm	1.082 W		

2437 MHz - 802.11n20	Chain 0	Chain 1	Chain 2	Chain 4	Total Across All Chains		Limit	
Power Setting Note 3	17.0							
Output Power (dBm) Note 1	16.8	16.3	17.5		21.7 dBm	0.147 W	24.5 dBm	0.279 W
Antenna Gain (dBi) Note 2	2.0	2.0	2.0		6.8 dBi		Pass	
eirp (dBm) Note 2	18.8	18.3	19.5		28.4 dBm	0.698 W		

2437 MHz - 802.11n40	Chain 0	Chain 1	Chain 2	Chain 4	Total Across All Chains		Limit	
Power Setting Note 3	13.5							
Output Power (dBm) Note 1	14	13.1	14.1		18.5 dBm	0.071 W	24.5 dBm	0.279 W
Antenna Gain (dBi) Note 2	2.0	2.0	2.0		6.8 dBi		Pass	
eirp (dBm) Note 2	16	15.1	16.1		25.3 dBm	0.339 W		

Note 1:	Output power measured using a spectrum analyzer with RBW=1MHz, VB=3 MHz, sample detector, power averaging on (transmitted signal was continuous) and power integration over 50 MHz for 20MHz channels and 80MHz for 40MHz channels (option #2, method 1 in KDB 558074, equivalent to method 1 of DA-02-2138A1 for U-NII devices). Spurious limit becomes -30dBc.
Note 2:	Power setting - the software power setting used during testing, included for reference only.
Note 3:	Antenna gains have been summed to account for correlation between chains.

Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

The limit in the 5725-5850MHz band is a maximum eirp of 36dBm and maximum conducted power of 30dBm. There are five 20MHz channels therefore the power per channel would be restricted to 23dBm conducted power and 29dBm eirp. For MIMO modes the effective antenna gain is 8.78dBi so the maximum conducted power is 20.22dBm to meet an eirp per radio of less than 29dBm.

5785 MHz - 802.11a	Chain 0	Chain 1	Chain 2	Chain 4	Total Across All Chains		Limit	
Power Setting Note 3	15.0							
Output Power (dBm) Note 1	13.8	12.46	12.42		17.7 dBm	0.059 W	20.2 dBm	0.106 W
Antenna Gain (dBi) Note 2	4.0	4.0	4.0		8.8 dBi		Pass	
eirp (dBm) Note 2	17.8	16.5	16.42		26.5 dBm	0.445 W		

5825 MHz - 802.11n20	Chain 0	Chain 1	Chain 2	Chain 4	Total Across All Chains		Limit	
Power Setting Note 3	15.0							
Output Power (dBm) Note 1	15.86	15.87	13.32		19.9 dBm	0.099 W	20.2 dBm	0.106 W
Antenna Gain (dBi) Note 2	4.0	4.0	4.0		8.8 dBi		Pass	
eirp (dBm) Note 2	19.86	19.87	17.32		28.7 dBm	0.743 W		

5795 MHz - 802.11n40	Chain 0	Chain 1	Chain 2	Chain 4	Total Across All Chains		Limit	
Power Setting Note 3	6.0							
Output Power (dBm) Note 4	12.1	12.7	10.1		16.5 dBm	0.045 W	20.2 dBm	0.106 W
Antenna Gain (dBi) Note 2	4.0	4.0	4.0		8.8 dBi		Pass	
eirp (dBm) Note 2	16.1	16.7	14.1		25.3 dBm	0.340 W		

Note 1:	Output power measured using a spectrum analyzer with RBW=1MHz, VB=3 MHz, sample detector, power averaging on (transmitted signal was continuous) and power integration over 50 MHz for 20MHz channels and 80MHz for 40MHz channels (option #2, method 1 in KDB 558074, equivalent to method 1 of DA-02-2138A1 for U-NII devices). Spurious limit becomes -30dBc.
Note 2:	Power setting - the software power setting used during testing, included for reference only.
Note 3:	Antenna gains have been summed to account for correlation between chains.
Note 4:	Output power for HT40 mode in the 5Ghz band is made using a peak power meter. Spurious limit for this mode is -20dBc.

Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

RSS 210 and FCC 15.247 (DTS) Radiated Spurious Emissions
802.11bg, HT20 Band Edge and Spurious, HT40 Band Edge

Test Specific Details

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

General Test Configuration

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

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

Ambient Conditions:

Temperature: 20-25 °C

Rel. Humidity: 30-40 %

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:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

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

Run #	Mode	Channel	Power Setting		Test Performed	Limit	Result / Margin
1a Low Channel	HT20	2412 MHz	13.0		Restricted Band Edge (2390 MHz)	FCC Part 15.209 / 15.247(c)	53.9dBµV/m @ 2390.0MHz (-0.1dB)
		2417 MHz	15.5		Restricted Band Edge (2390 MHz)	FCC Part 15.209 / 15.247(c)	53.5dBµV/m @ 2389.95MHz (-0.5dB)
1c High Channel		2462 MHz	12.5		Restricted Band Edge (2483.5 MHz)	FCC Part 15.209 / 15.247(c)	53.7dBµV/m @ 2483.5MHz (-0.3dB)
		2457 MHz	15.5		Restricted Band Edge (2483.5 MHz)	FCC Part 15.209 / 15.247(c)	53.5dBµV/m @ 2483.52MHz (-0.5dB)
2a Low Channel	802.11g	2412 MHz	13.0		Restricted Band Edge (2390 MHz)	FCC Part 15.209 / 15.247(c)	53.5dBµV/m @ 2389.9MHz (-0.5dB)
		2417 MHz	16.0		Restricted Band Edge (2390 MHz)	FCC Part 15.209 / 15.247(c)	52.4dBµV/m @ 2389.04MHz (-1.6dB)
2c High Channel	802.11g	2457 MHz	15.5		Restricted Band Edge (2483.5 MHz)	FCC Part 15.209 / 15.247(c)	51.7dBµV/m @ 2486.87MHz (-2.3dB)
		2462 MHz	13.5		Restricted Band Edge (2483.5 MHz)	FCC Part 15.209 / 15.247(c)	53.5dBµV/m @ 2483.5MHz (-0.5dB)
3a Low	802.11b	2412 MHz	19.5		Restricted Band Edge (2390 MHz)	FCC Part 15.209 / 15.247(c)	53.9dBµV/m @ 2386.3MHz (-0.1dB)
3c High		2462 MHz	16.5		Restricted Band Edge (2483.5 MHz)	FCC Part 15.209 / 15.247(c)	52.6dBµV/m @ 2487.6MHz (-1.4dB)
4a Low Channel	HT40	2422 MHz	8.5		Restricted Band Edge (2390 MHz)	FCC Part 15.209 / 15.247(c)	53.2dBµV/m @ 2389.9MHz (-0.8dB)
		2427 MHz	9.0		Restricted Band Edge (2390 MHz)	FCC Part 15.209 / 15.247(c)	53.1dBµV/m @ 2389.53MHz (-0.9dB)
		2432 MHz	10.0		Restricted Band Edge (2390 MHz)	FCC Part 15.209 / 15.247(c)	53.0dBµV/m @ 2389.86MHz (-1.0dB)
		2437 MHz	13.5		Restricted Band Edge (2390 MHz)	FCC Part 15.209 / 15.247(c)	53.9dBµV/m @ 2387.12MHz (-0.1dB)
4c High Channel	n40	high 2452 MHz	10.0		Restricted Band Edge (2483.5 MHz)	FCC Part 15.209 / 15.247(c)	53.5dBµV/m @ 2483.5MHz (-0.5dB)
		2447 MHz	11.5		Restricted Band Edge (2483.5 MHz)	FCC Part 15.209 / 15.247(c)	53.5dBµV/m @ 2483.56MHz (-0.5dB)
		2442 MHz	12.0		Restricted Band Edge (2483.5 MHz)	FCC Part 15.209 / 15.247(c)	52.7dBµV/m @ 2483.51MHz (-1.3dB)
		2437 MHz	13.5		Restricted Band Edge (2483.5 MHz)	FCC Part 15.209 / 15.247(c)	53.1dBµV/m @ 2483.78MHz (-0.9dB)

Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

Run #1: Radiated Spurious Emissions, 30 - 26500 MHz. Operating Mode: 802.11n 20 MHz, 3x3

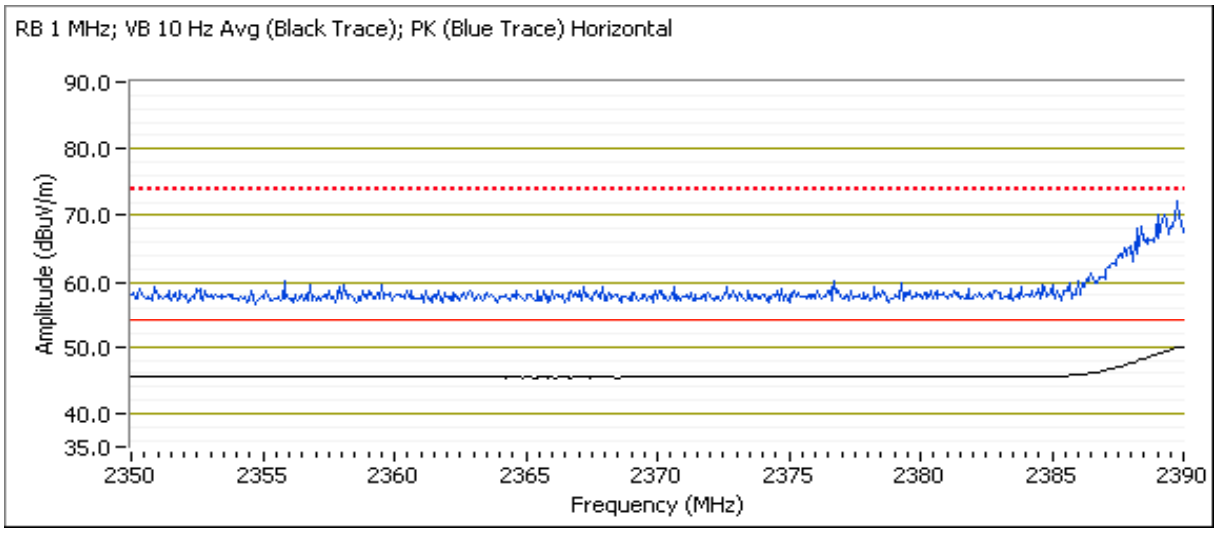
Date of Test: 6/14/2011 Test Location: FT Chamber #7

Test Engineer: M. Birgani / R. Varelas

Run #1a: Channel 1@ 2412 MHz, Radio #4

Band Edge Signal Field Strength - Direct measurement of field strength

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2389.990	53.9	H	54.0	-0.1	AVG	213	1.0	Power Setting 13.0
2388.850	72.9	H	74.0	-1.1	PK	213	1.0	Power Setting 13.0

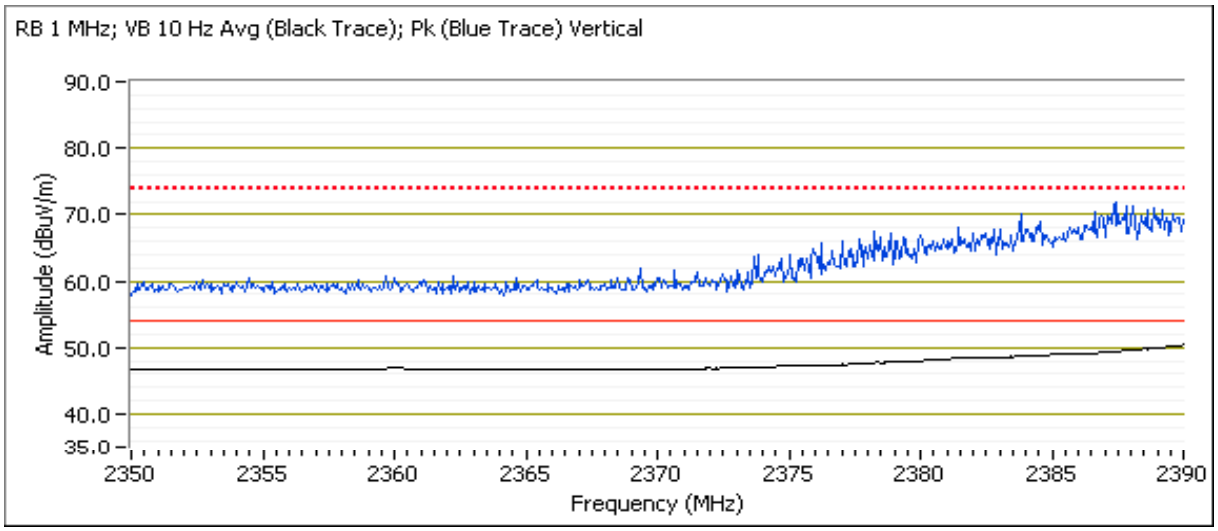


Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

Channel 2 @ 2417 MHz, Radio #4

Band Edge Signal Field Strength - Direct measurement of field strength

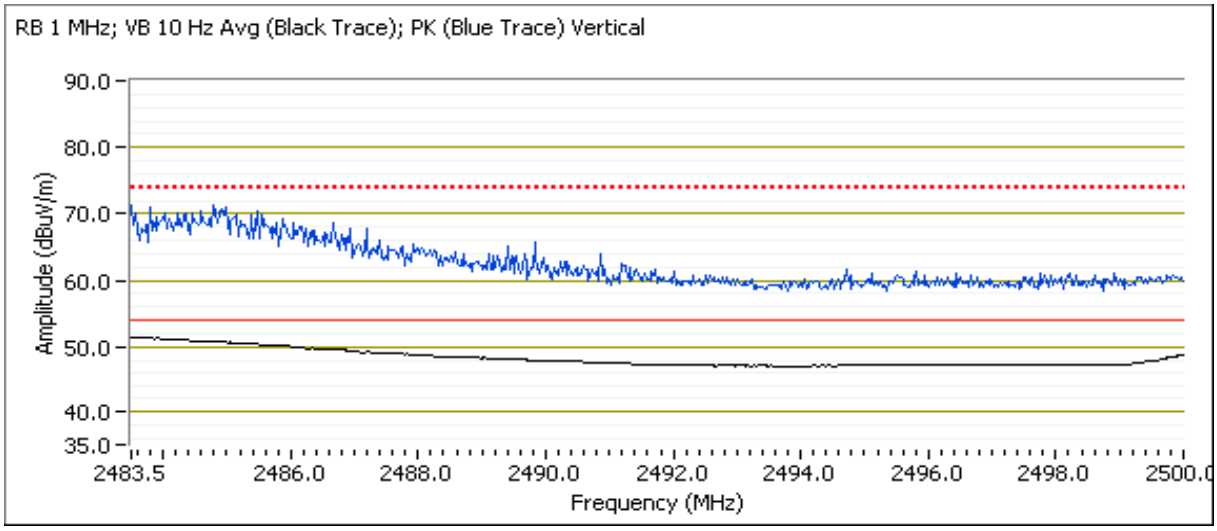
Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2389.950	53.5	V	54.0	-0.5	AVG	360	1.2	RB 1 MHz;VB 10 Hz;Pk
2387.820	70.2	V	74.0	-3.8	PK	360	1.2	RB 1 MHz;VB 3 MHz;Pk



Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

Run #1c: High Channel @ 2462 MHz, Radio #0
Band Edge Signal Field Strength - Direct measurement of field strength

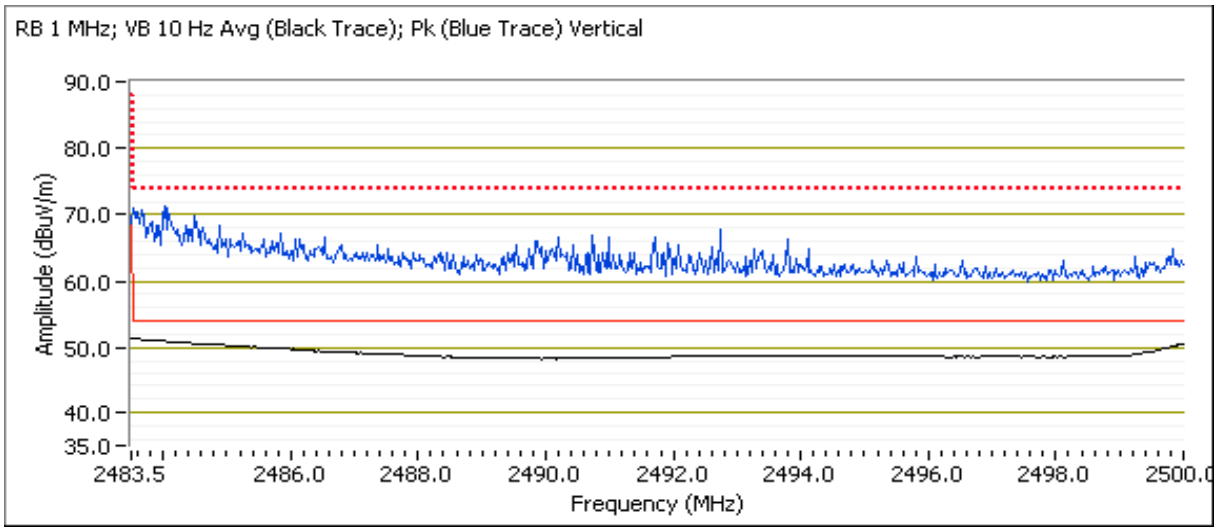
Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2483.500	53.7	V	54.0	-0.3	AVG	305	1.1	Power Setting 12.5
2485.240	72.3	V	74.0	-1.7	PK	305	1.1	Power Setting 12.5



Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

Channel 10 @ 2457 MHz, Radio #4
Band Edge Signal Field Strength - Direct measurement of field strength

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2483.520	53.5	V	54.0	-0.5	AVG	323	1.1	Power Setting 15.5
2484.460	68.6	V	74.0	-5.4	PK	323	1.1	Power Setting 15.5
2483.500	49.8	H	54.0	-4.2	AVG	301	1.2	Power Setting 15.5
2485.230	66.3	H	74.0	-7.7	PK	301	1.2	Power Setting 15.5



Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

Run #2: Radiated Spurious Emissions, 30 - 26500 MHz. Operating Mode: 802.11g MHz, 3x3

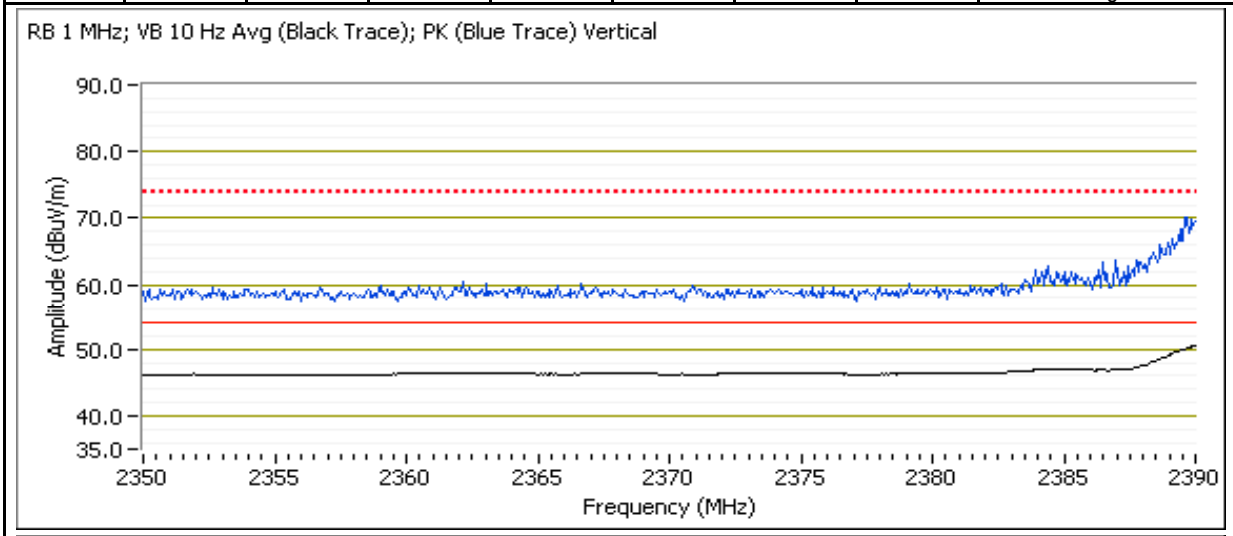
Date of Test: 6/14/2011 Test Location: FT Chamber #7

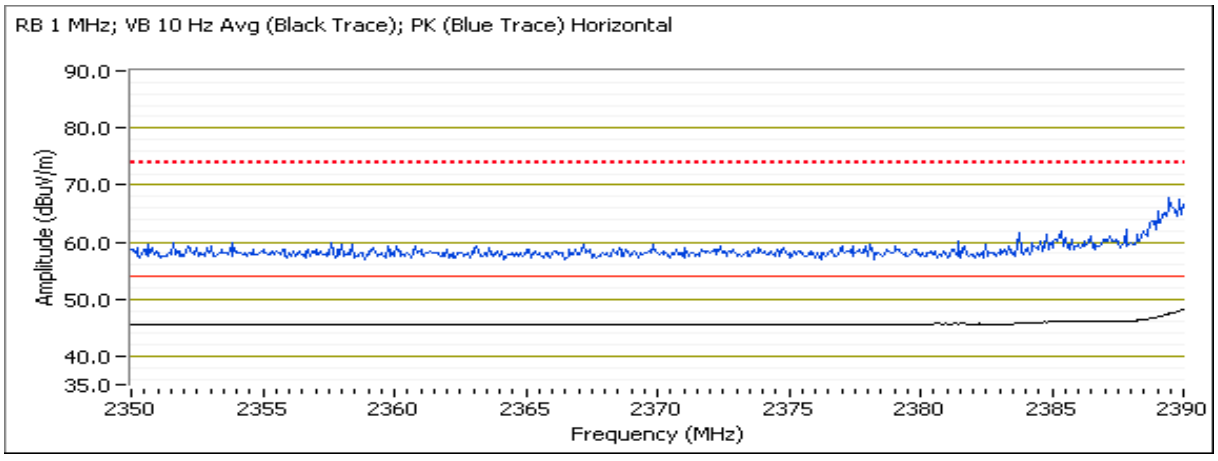
Test Engineer: R. Varelas

Run #2a: Channel 1@ 2412 MHz, Radio #4

Band Edge Signal Field Strength - Direct measurement of field strength

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2389.860	53.5	V	54.0	-0.5	AVG	206	1.2	Power Setting 13.0
2389.980	71.1	V	74.0	-2.9	PK	206	1.2	Power Setting 13.0
2389.840	50.9	H	54.0	-3.1	AVG	194	1.0	Power Setting 13.0
2389.920	68.5	H	74.0	-5.5	PK	194	1.0	Power Setting 13.0



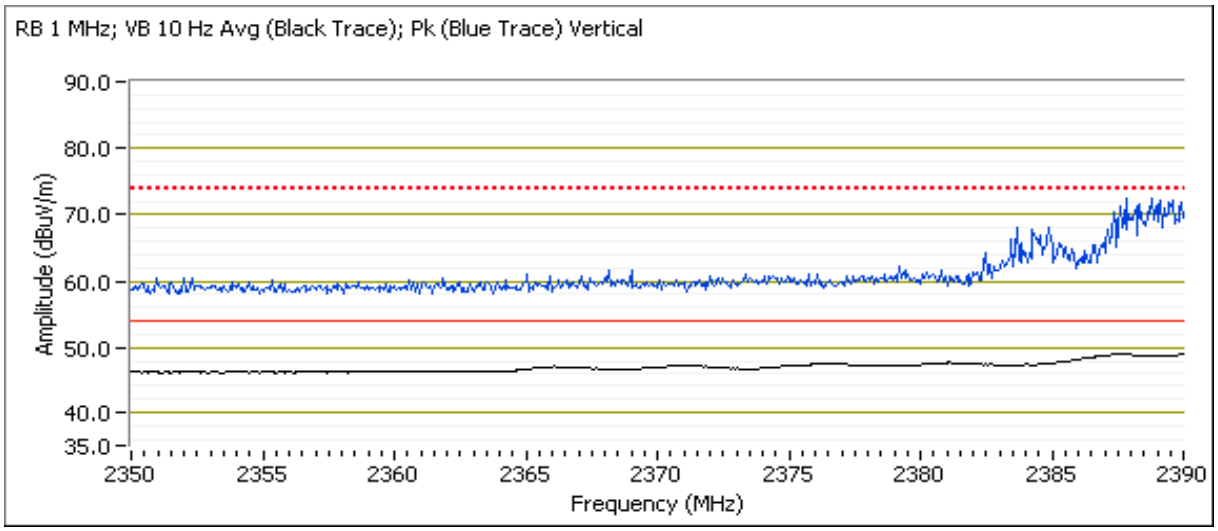


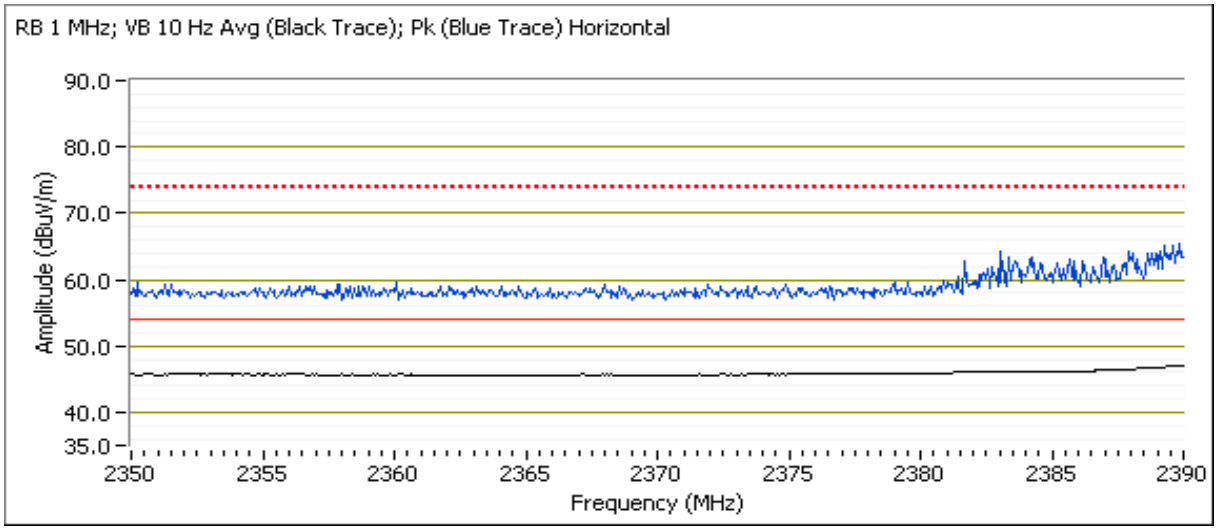
Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

Channel 2 @ 2417 MHz, Radio #4

Band Edge Signal Field Strength - Direct measurement of field strength

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2389.040	52.4	V	54.0	-1.6	AVG	306	1.1	Power Setting 16.0
2389.080	72.1	V	74.0	-1.9	PK	306	1.1	Power Setting 16.0
2389.960	49.4	H	54.0	-4.6	AVG	303	1.0	Power Setting 16.0
2389.870	65.8	H	74.0	-8.2	PK	303	1.0	Power Setting 16.0

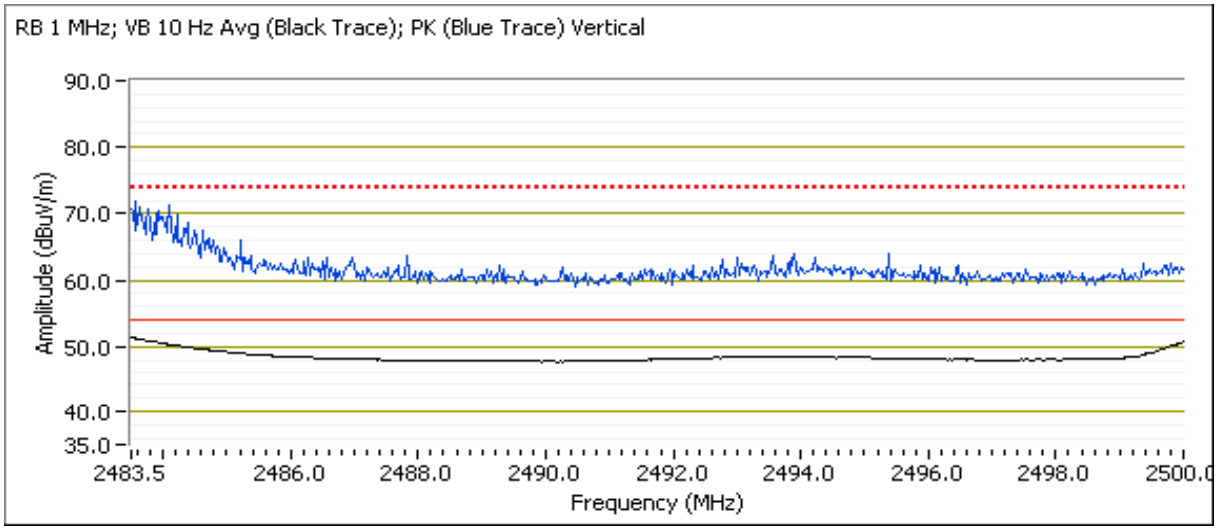


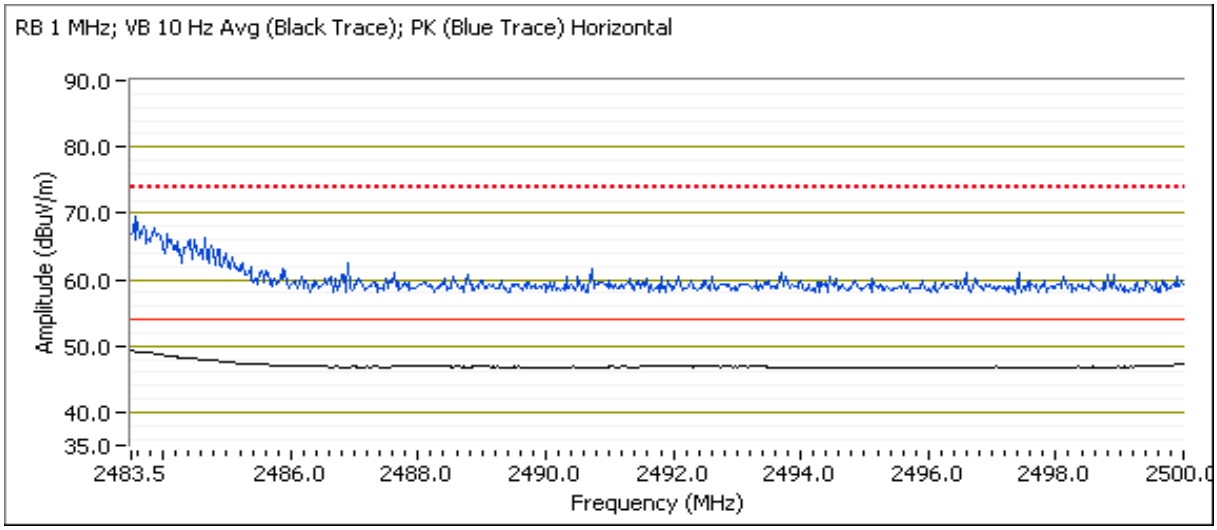


Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

Run #2c: High Channel @ 2462 MHz, Radio #4
Band Edge Signal Field Strength - Direct measurement of field strength

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2483.500	53.5	V	54.0	-0.5	AVG	240	1.1	Power Setting 13.5
2483.870	70.0	V	74.0	-4.0	PK	240	1.1	Power Setting 13.5
2483.620	51.2	H	54.0	-2.8	AVG	193	1.0	Power Setting 13.5
2483.790	67.2	H	74.0	-6.8	PK	193	1.0	Power Setting 13.5

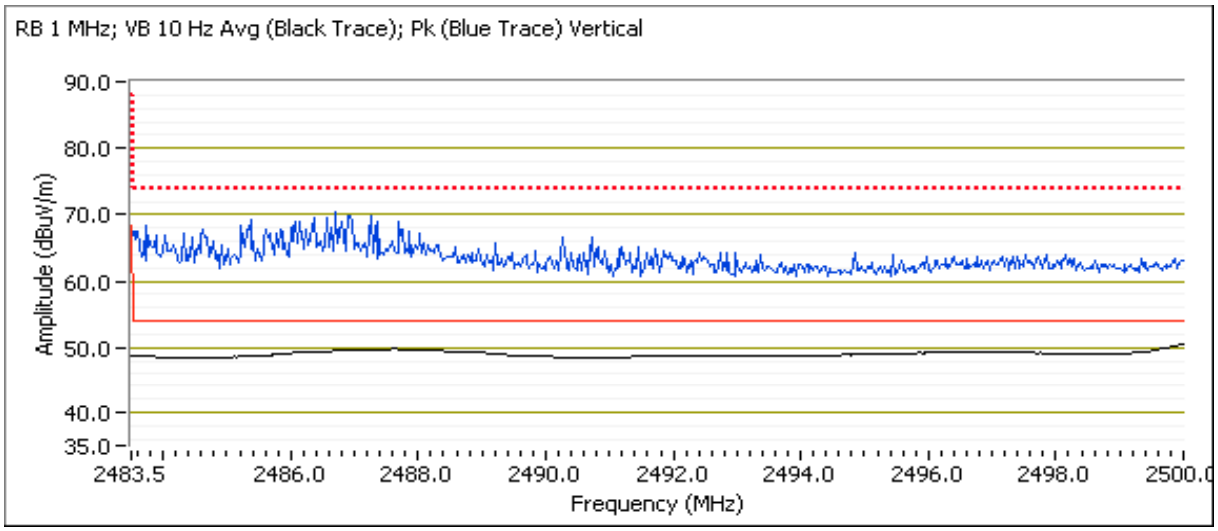


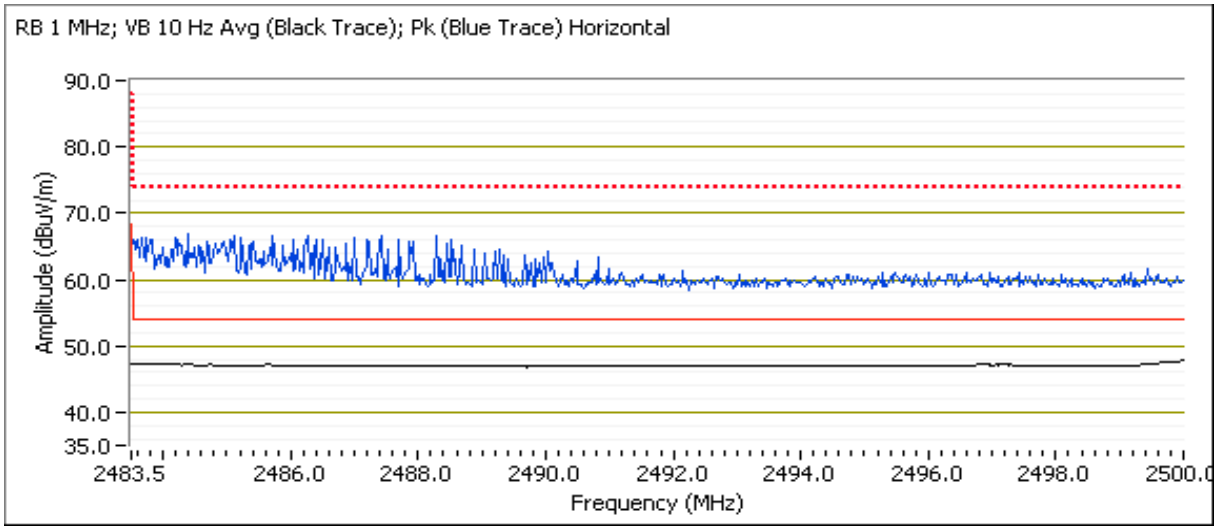


Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

Channel 10 @ 2457 MHz, Radio #4
Band Edge Signal Field Strength - Direct measurement of field strength

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2486.870	51.7	V	54.0	-2.3	AVG	323	1.1	Power Setting 15.5
2487.160	69.5	V	74.0	-4.5	PK	323	1.1	Power Setting 15.5
2483.630	49.1	H	54.0	-4.9	AVG	301	1.2	Power Setting 15.5
2484.540	66.3	H	74.0	-7.7	PK	301	1.2	Power Setting 15.5





Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

Run #3: Radiated Spurious Emissions, 30 - 26500 MHz. Operating Mode: 802.11b MHz, 3x3

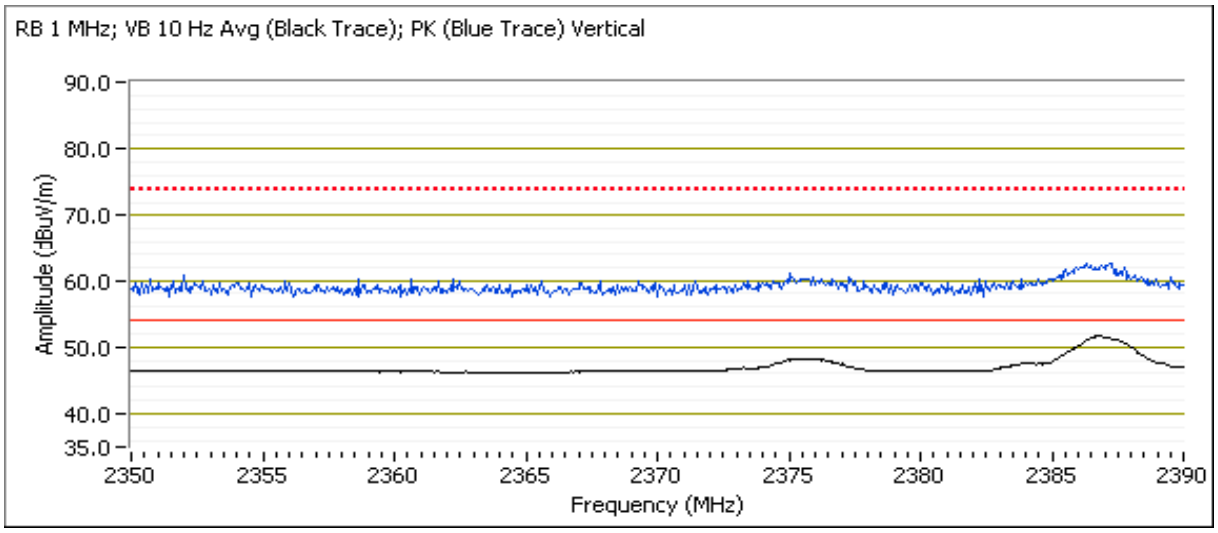
Date of Test: 6/14/2011 Test Location: FT Chamber #7

Test Engineer: R. Varelas

Run #3a: Channel 1@ 2412 MHz, Radio #4

Band Edge Signal Field Strength - Direct measurement of field strength

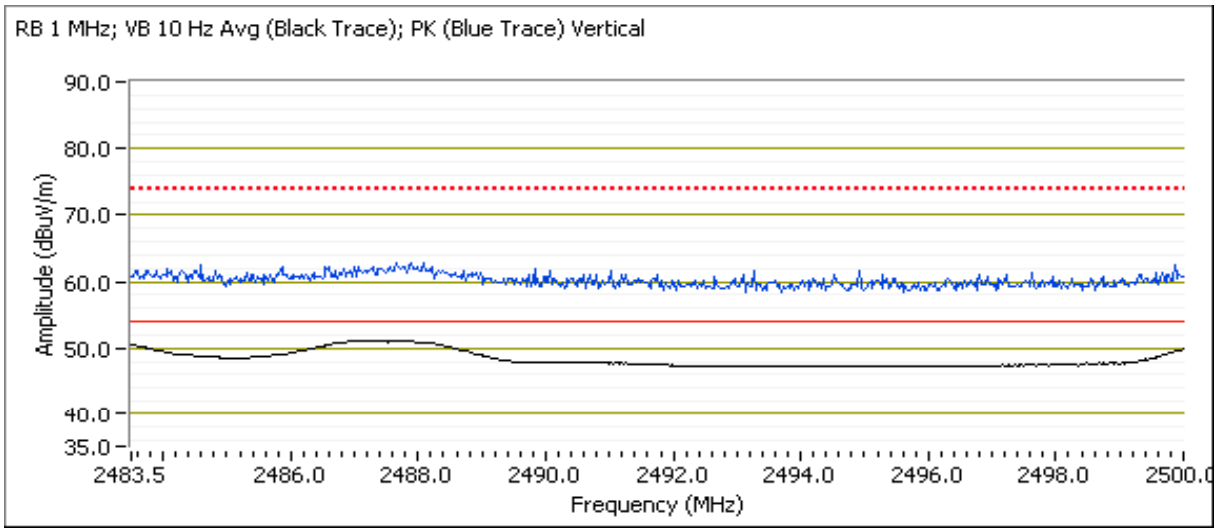
Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2386.280	53.9	V	54.0	-0.1	AVG	202	1.0	Power Setting 19.5
2386.080	62.8	V	74.0	-11.2	PK	202	1.0	Power Setting 19.5
2386.730	50.7	H	54.0	-3.3	AVG	314	1.2	Power Setting 19.5
2379.970	60.6	H	74.0	-13.4	PK	314	1.2	Power Setting 19.5

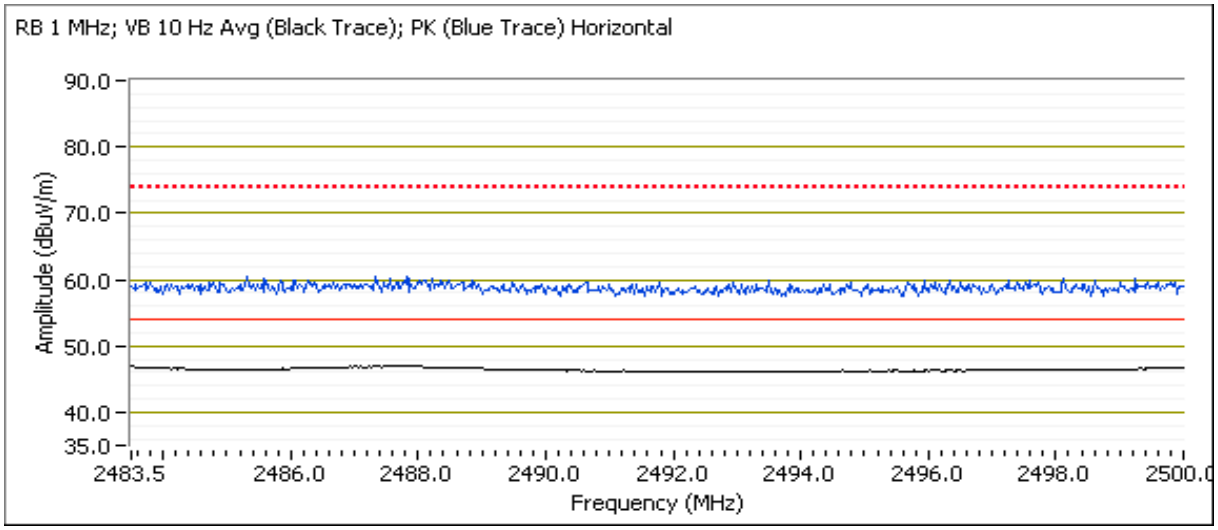


Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

Run #3c: High Channel @ 2462 MHz, Radio #4
Band Edge Signal Field Strength - Direct measurement of field strength

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2487.560	52.6	V	54.0	-1.4	AVG	223	1.1	Power Setting 16.5
2487.770	62.6	V	74.0	-11.4	PK	223	1.1	Power Setting 16.5
2487.000	48.7	H	54.0	-5.3	AVG	191	1.0	Power Setting 16.5
2489.980	60.6	H	74.0	-13.4	PK	191	1.0	Power Setting 16.5





Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

Run #4: Radiated Spurious Emissions, 30 - 26500 MHz. Operating Mode: 802.11n 40MHz, 3x3

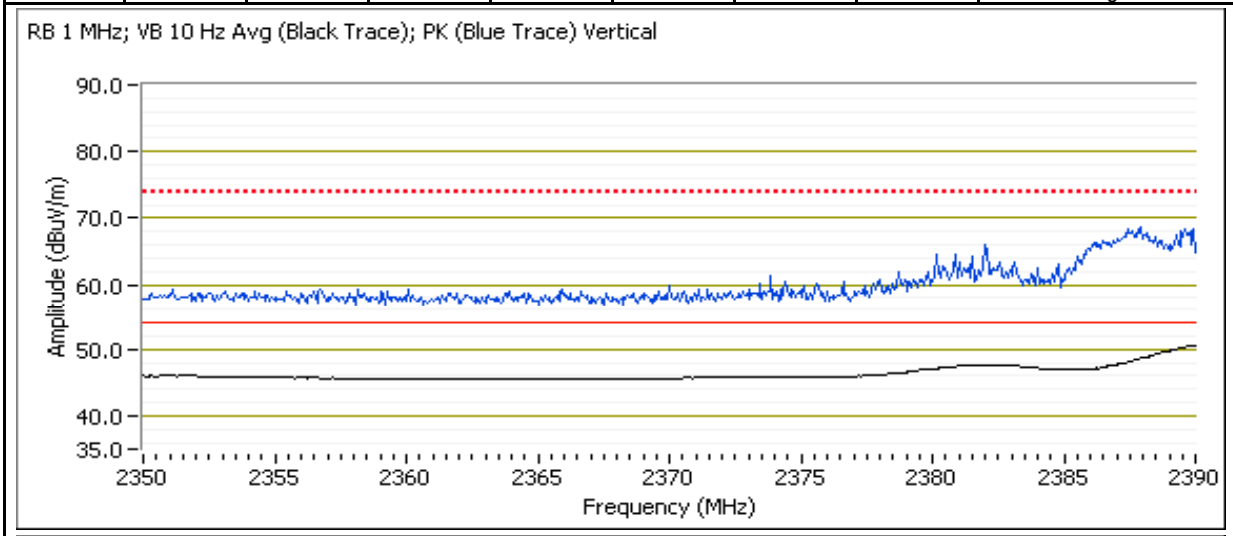
Date of Test: 6/14/2011 Test Location: FT Chamber #7

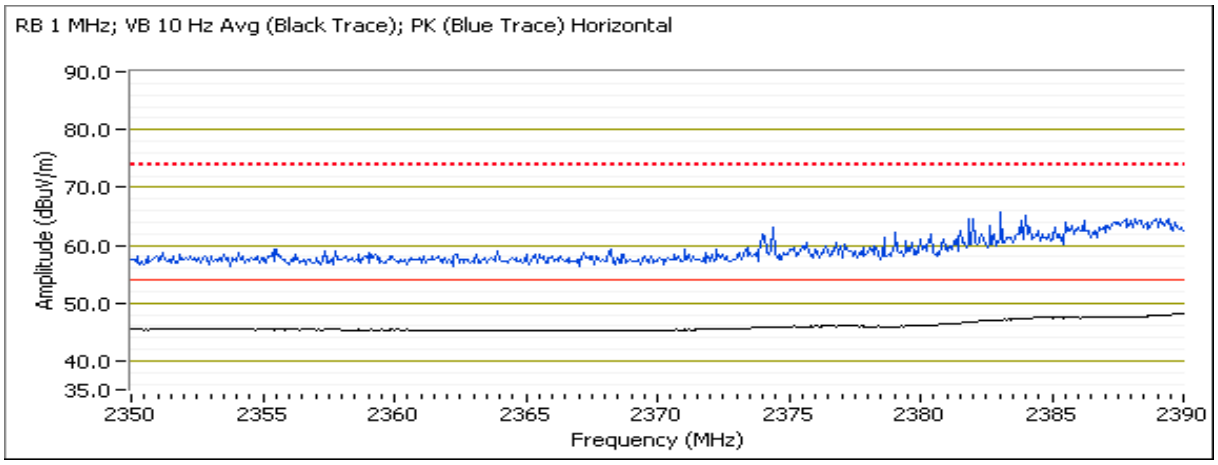
Test Engineer: R. Varelas

Run #4a: Channel 1@ 2422 MHz, Radio #4

Band Edge Signal Field Strength - Direct measurement of field strength

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2389.940	53.2	V	54.0	-0.8	AVG	200	1.0	Power Setting 8.5
2389.660	69.3	V	74.0	-4.7	PK	200	1.0	Power Setting 8.5
2389.730	50.4	H	54.0	-3.6	AVG	200	1.0	Power Setting 8.5
2388.670	64.5	H	74.0	-9.5	PK	200	1.0	Power Setting 8.5



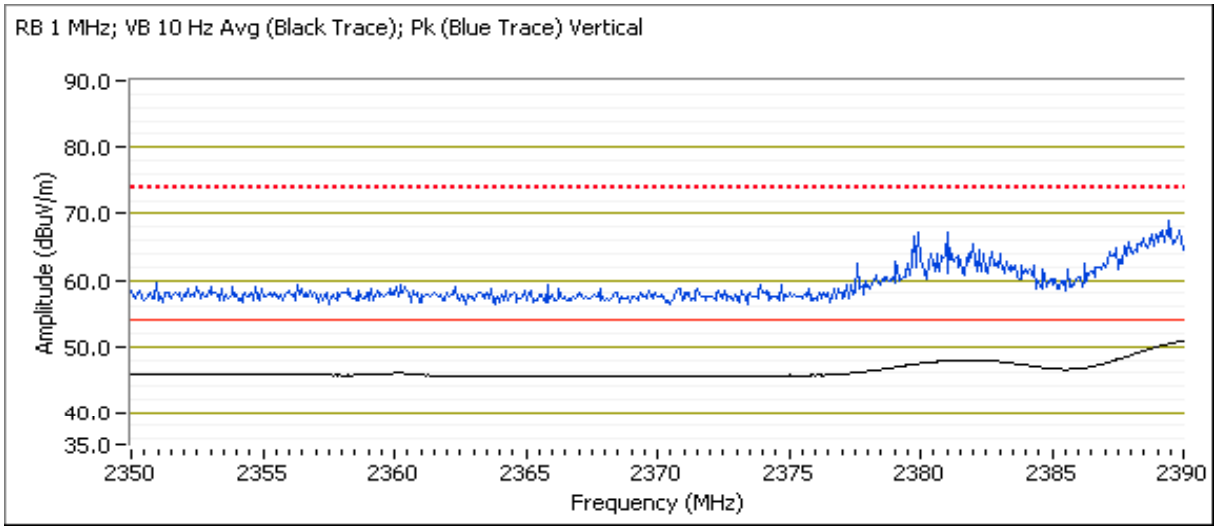


Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

Channel 4 @ 2427 MHz, Radio #4

Band Edge Signal Field Strength - Direct measurement of field strength

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2389.530	53.1	V	54.0	-0.9	AVG	50	1.2	Power Setting 9.0
2389.540	69.0	V	74.0	-5.0	PK	50	1.2	Power Setting 9.0

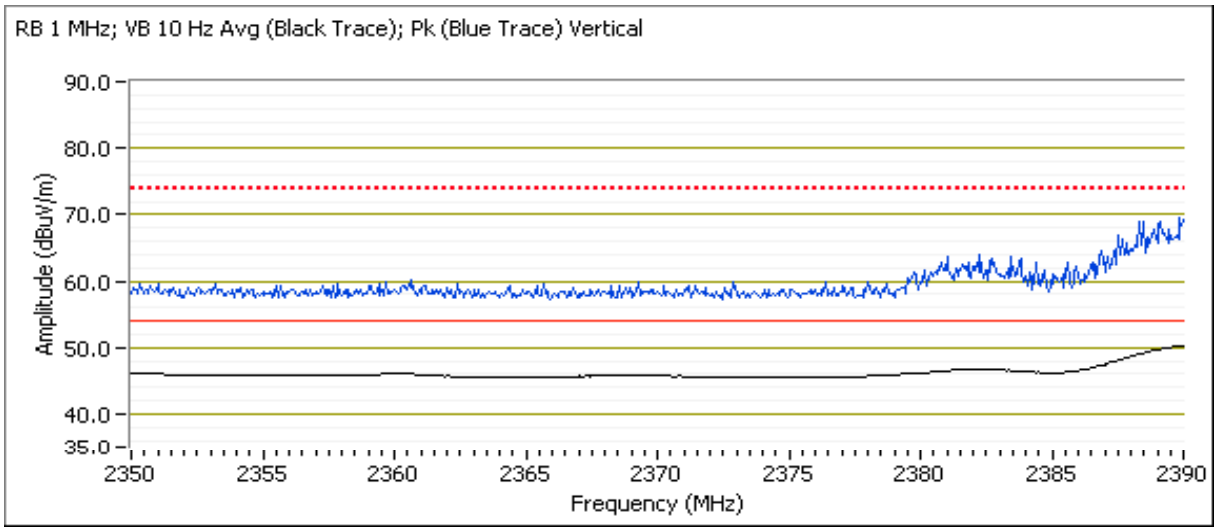


Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

Channel 5 @ 2432 MHz, Radio #4

Band Edge Signal Field Strength - Direct measurement of field strength

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2389.960	53.0	V	54.0	-1.0	AVG	50	1.2	Power Setting 10.0
2387.560	68.8	V	74.0	-5.2	PK	50	1.2	Power Setting 10.0



Channel 6 @ 2437 MHz, Radio #4

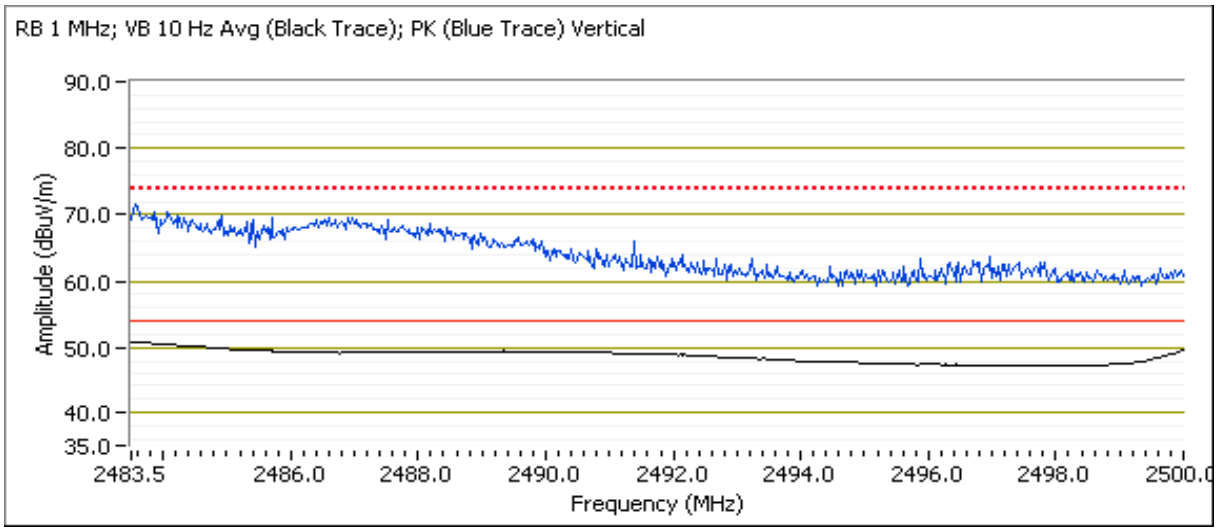
Band Edge Signal Field Strength - Direct measurement of field strength

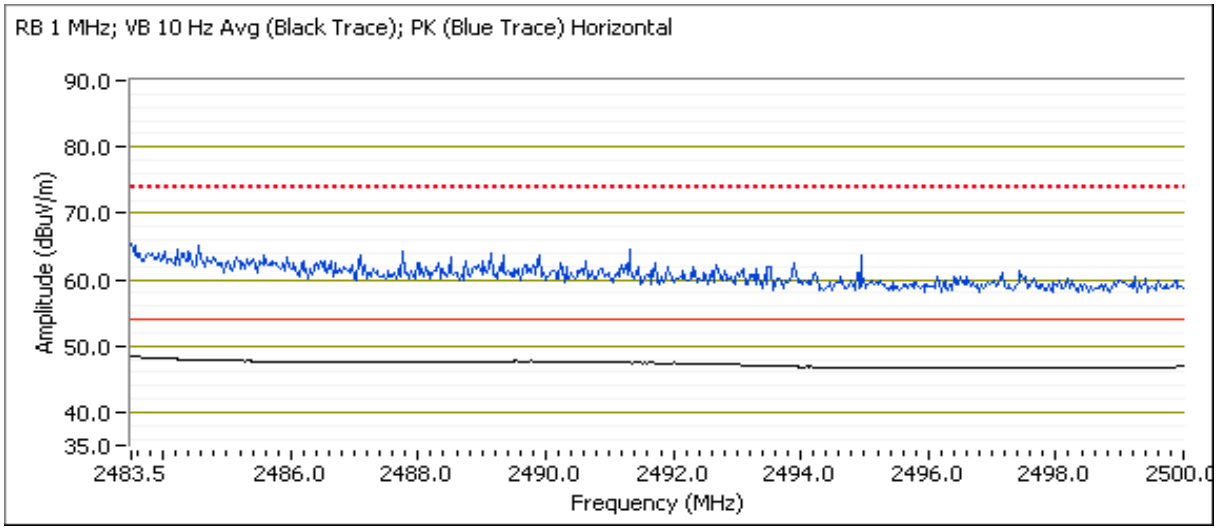
Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2387.120	53.9	V	54.0	-0.1	AVG	304	1.2	Power Setting 13.5
2389.080	70.6	V	74.0	-3.4	PK	304	1.2	Power Setting 13.5

Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

Run #4c: High Channel @ 2452 MHz, Radio #4
Band Edge Signal Field Strength - Direct measurement of field strength

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2483.510	53.5	V	54.0	-0.5	AVG	224	1.1	Power Setting 10.0
2484.300	70.5	V	74.0	-3.5	PK	224	1.1	Power Setting 10.0
2483.500	50.4	H	54.0	-3.6	AVG	201	1.2	Power Setting 10.0
2484.150	64.8	H	74.0	-9.2	PK	201	1.2	Power Setting 10.0

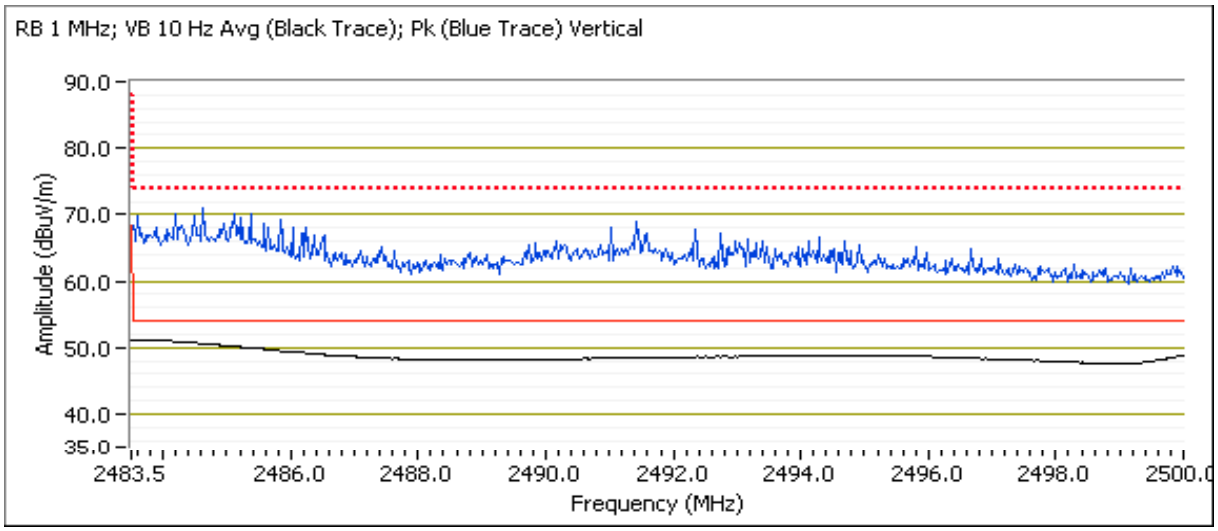




Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

Channel @ 2447 MHz, Radio #4
Band Edge Signal Field Strength - Direct measurement of field strength

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2483.560	53.5	V	54.0	-0.5	AVG	35	1.1	Power Setting 11.5
2483.980	70.1	V	74.0	-3.9	PK	35	1.1	Power Setting 11.5

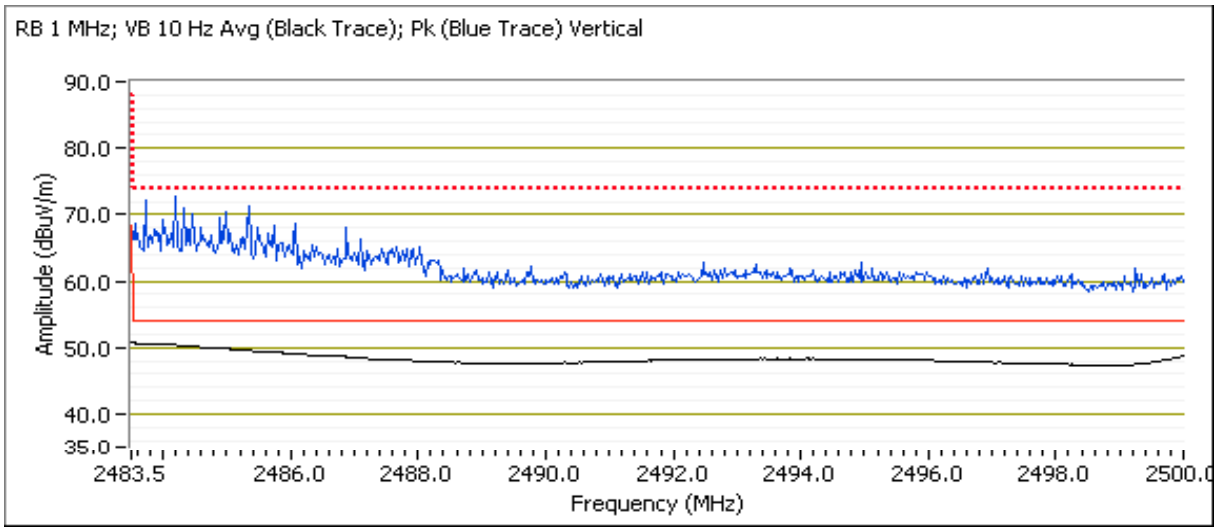


Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

Channel @ 2442 MHz, Radio #4

Band Edge Signal Field Strength - Direct measurement of field strength

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2483.510	52.7	V	54.0	-1.3	AVG	35	1.1	Power Setting 12
2484.920	70.1	V	74.0	-3.9	PK	35	1.1	Power Setting 12



Channel @ 2437 MHz, Radio #4

Band Edge Signal Field Strength - Direct measurement of field strength

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2483.780	53.1	V	54.0	-0.9	AVG	320	1.1	Power Setting 13.5
2484.450	70.3	V	74.0	-3.7	PK	320	1.1	Power Setting 13.5

Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

RSS 210 and FCC 15.247 (DTS) Radiated Spurious Emissions
802.11b, 802.11g, HT20 and HT40 Modes

Test Specific Details

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

General Test Configuration

The EUT and all local support equipment were located on the turntable for radiated spurious emissions testing.
For radiated emissions testing the measurement antenna was located 3 meters from the EUT.

Ambient Conditions:

Temperature: 20-25 °C
Rel. Humidity: 30-40 %

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.

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

Run #	Mode	Channel	Power Setting		Test Performed	Limit	Result / Margin
1a	HT20 802.11b 802.11g	Low 2412 MHz	17.0		Radiated Emissions, 1 - 26 GHz	FCC Part 15.209 / 15.247(c)	46.9dBµV/m @ 5000.0MHz (-7.1dB)
1b		Center 2437 MHz	17.0		Radiated Emissions, 1 - 26 GHz	FCC Part 15.209 / 15.247(c)	46.2dBµV/m @ 4890.3MHz (-7.8dB)
1c		High 2462 MHz	17.0		Radiated Emissions, 1 - 26 GHz	FCC Part 15.209 / 15.247(c)	45.4dBµV/m @ 7500.1MHz (-8.6dB)
2a	n40	Low 2422 MHz	17.0		Radiated Emissions, 1 - 26 GHz	FCC Part 15.209 / 15.247(c)	41.4dBµV/m @ 1208.5MHz (-12.6dB)
2b	n40	Center 2437 MHz	17.0		Radiated Emissions, 1 - 26 GHz	FCC Part 15.209 / 15.247(c)	40.7dBµV/m @ 1199.9MHz (-13.3dB)
2c	n40	High 2452 MHz	17.0		Radiated Emissions, 1 - 26 GHz	FCC Part 15.209 / 15.247(c)	40.7dBµV/m @ 1199.9MHz (-13.3dB)

Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

Run #1: Radiated Spurious Emissions, 1-26.5GHz. HT20, 802.11g and 802.11b - 2x2 and 3x3 modules.

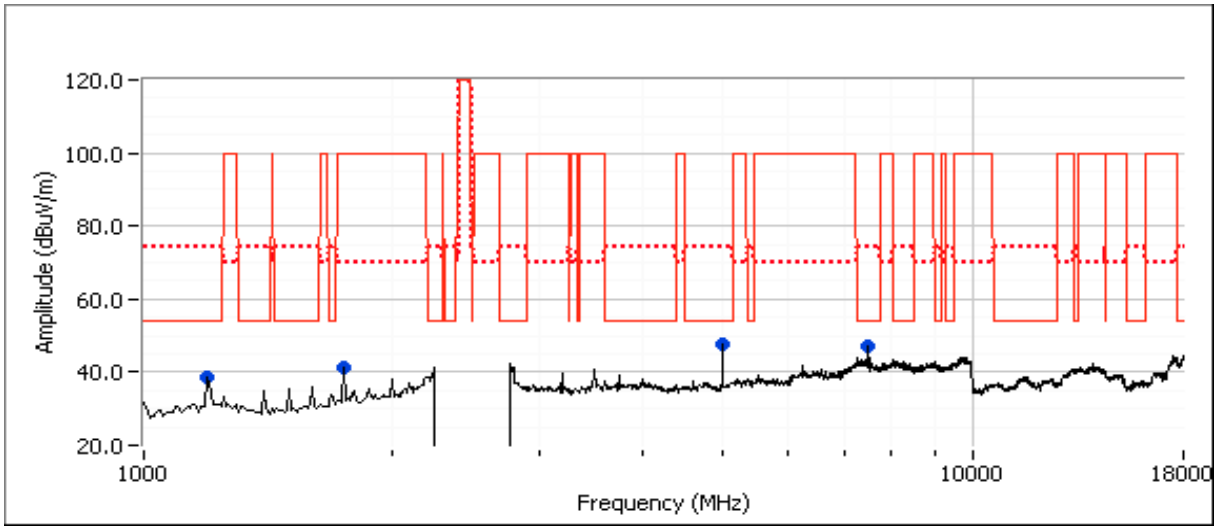
Date of Test: 6/14/2011 Test Location: FT Chamber #7

Test Engineer: M. Birgani / R. Varelas

Run #1a: Channel 1@ 2412 MHz

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
5000.030	46.9	V	54.0	-7.1	AVG	19	1.3	RB 1 MHz;VB 10 Hz;Pk
7500.020	45.3	V	54.0	-8.7	AVG	238	1.2	RB 1 MHz;VB 10 Hz;Pk
1200.100	38.4	V	54.0	-15.6	Peak	64	1.0	
7500.040	53.0	V	74.0	-21.0	PK	238	1.2	RB 1 MHz;VB 3 MHz;Pk
5000.110	51.1	V	74.0	-22.9	PK	19	1.3	RB 1 MHz;VB 3 MHz;Pk
1750.100	41.1	V	70.0	-28.9	Peak	337	1.3	

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 30dB below the level of the fundamental and measured in 100kHz.
Note 2:	Signal is not in a restricted band but the more stringent restricted band limit was used.
Note 3:	No significant emissions were observed for 10-26GHz

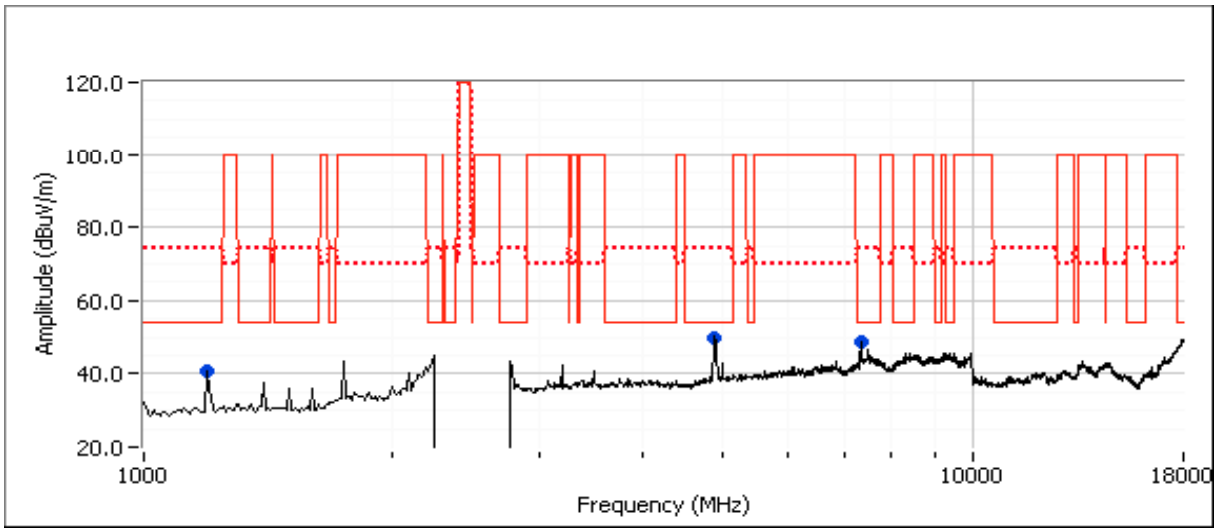


Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

Run #1b: Center Channel @ 2437 MHz

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
4890.270	46.2	V	54.0	-7.8	AVG	25	1.0	RB 1 MHz;VB 10 Hz;Pk
7342.210	44.8	V	54.0	-9.2	AVG	86	1.3	RB 1 MHz;VB 10 Hz;Pk
1199.940	40.6	V	54.0	-13.4	Peak	205	1.3	
4893.870	59.2	V	74.0	-14.8	PK	25	1.0	RB 1 MHz;VB 3 MHz;Pk
7352.070	57.3	V	74.0	-16.7	PK	86	1.3	RB 1 MHz;VB 3 MHz;Pk

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 30dB below the level of the fundamental and measured in 100kHz.
Note 2:	Signal is not in a restricted band but the more stringent restricted band limit was used.

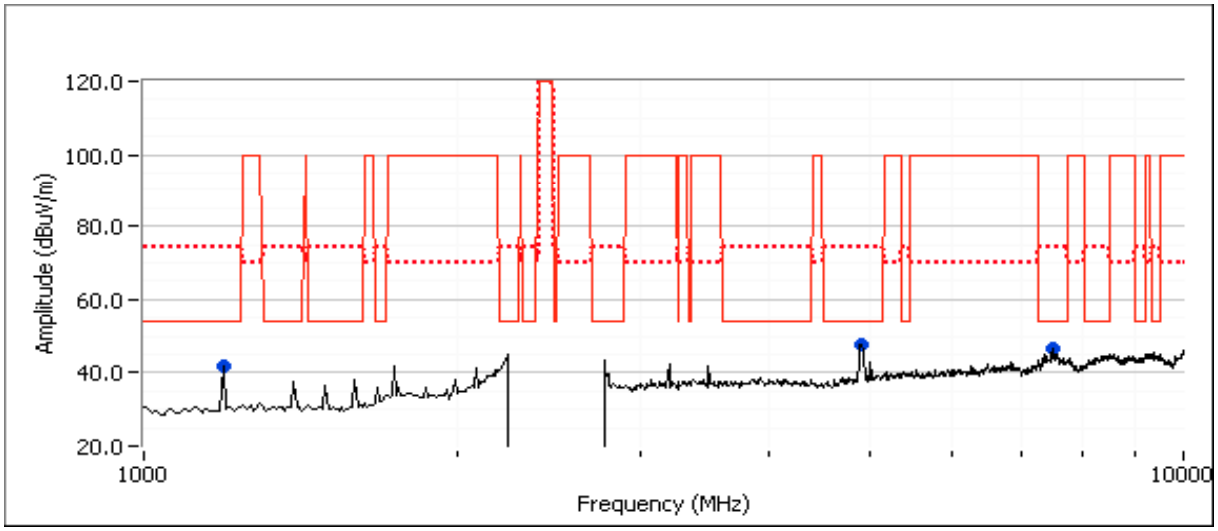


Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

Run #1c: High Channel @ 2462 MHz

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
7500.060	45.4	V	54.0	-8.6	AVG	64	1.3	RB 1 MHz;VB 10 Hz;Pk
4903.960	42.8	V	54.0	-11.2	AVG	36	1.2	RB 1 MHz;VB 10 Hz;Pk
1199.940	41.6	V	54.0	-12.4	Peak	211	1.3	
4915.960	56.9	V	74.0	-17.1	PK	36	1.2	RB 1 MHz;VB 3 MHz;Pk
7499.920	52.6	V	74.0	-21.4	PK	64	1.3	RB 1 MHz;VB 3 MHz;Pk

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 30dB below the level of the fundamental and measured in 100kHz.
Note 2:	Signal is not in a restricted band but the more stringent restricted band limit was used.
Note 3:	No significant emissions were observed for 10-26GHz



Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

Run #2: Radiated Spurious Emissions, 30 - 26500 MHz. Operating Mode: 802.11n 40MHz, 2x2

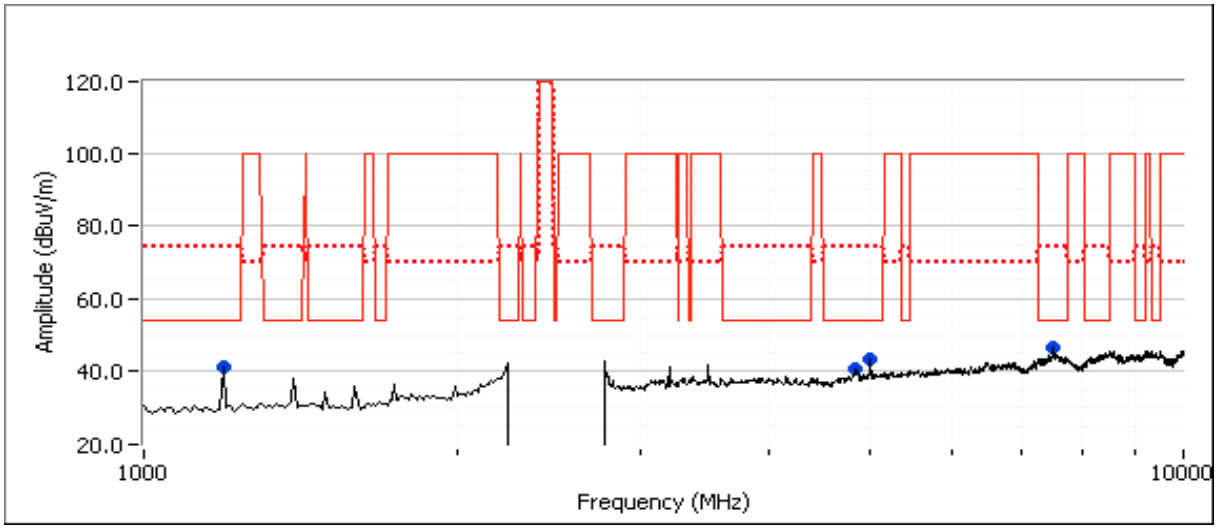
Date of Test: 6/14/2011 Test Location: FT Chamber #7

Test Engineer: R. Varelas

Run #2a: Channel 3 @ 2422 MHz, Radio #4

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
1208.480	41.4	V	54.0	-12.6	Peak	221	1.3	
5000.000	41.3	V	54.0	-12.7	AVG	102	1.7	RB 1 MHz;VB 10 Hz;Pk
5000.130	48.0	V	74.0	-26.0	PK	102	1.7	RB 1 MHz;VB 3 MHz;Pk
7500.170	41.1	V	54.0	-12.9	AVG	82	1.7	RB 1 MHz;VB 10 Hz;Pk
7498.840	49.6	V	74.0	-24.4	PK	82	1.7	RB 1 MHz;VB 3 MHz;Pk
4847.660	40.5	V	54.0	-13.5	Peak	214	1.3	

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 30dB below the level of the fundamental and measured in 100kHz.
Note 2:	Signal is not in a restricted band but the more stringent restricted band limit was used.

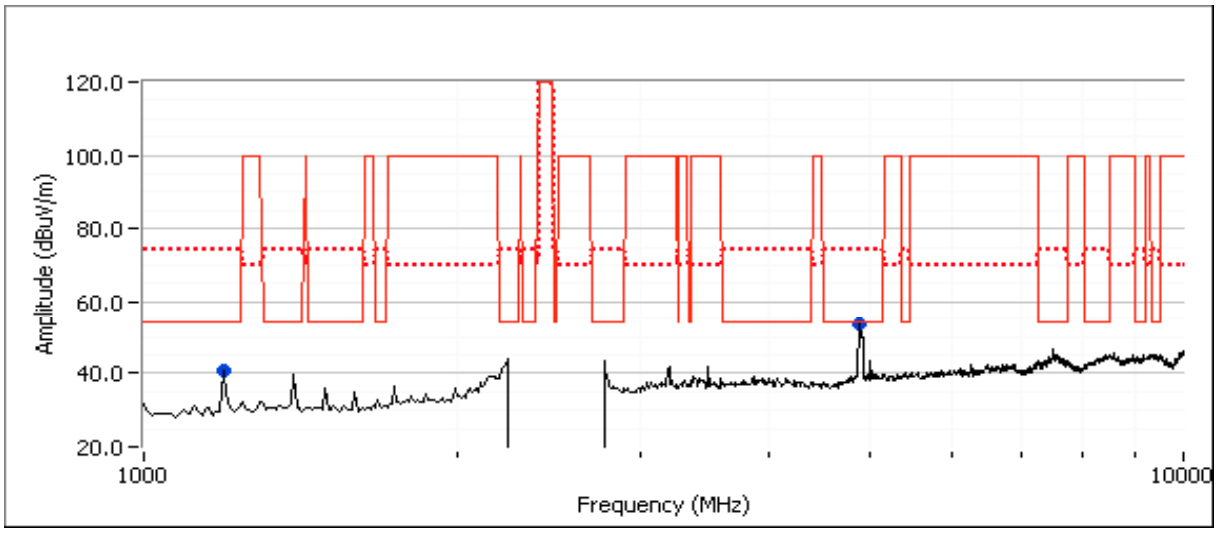


Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

Run #2b: Center Channel @ 2437 MHz

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
1199.940	40.7	V	54.0	-13.3	Peak	207	1.3	
4892.140	40.3	V	54.0	-13.7	AVG	220	1.0	RB 1 MHz;VB 10 Hz;Pk
4890.800	52.3	V	74.0	-21.7	PK	220	1.0	RB 1 MHz;VB 3 MHz;Pk

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 30dB below the level of the fundamental and measured in 100kHz.
Note 2:	Signal is not in a restricted band but the more stringent restricted band limit was used.

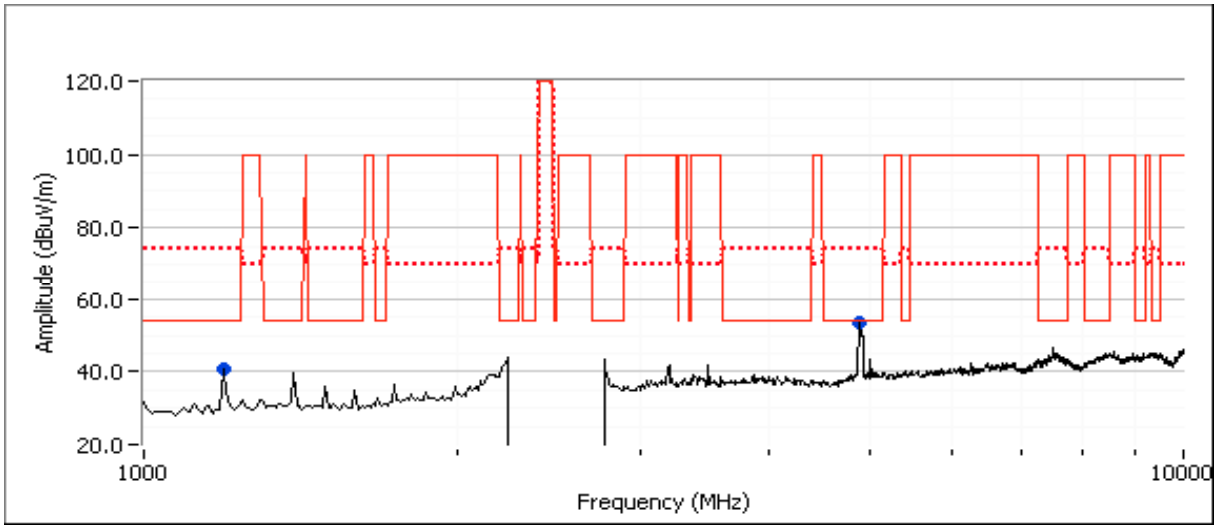


Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

Run #2c: High Channel @ 2452 MHz, Radio #4
Other Spurious Emissions

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
1199.940	40.7	V	54.0	-13.3	Peak	207	1.3	
4892.140	40.3	V	54.0	-13.7	AVG	220	1.0	RB 1 MHz;VB 10 Hz;Pk
4890.800	52.3	V	74.0	-21.7	PK	220	1.0	RB 1 MHz;VB 3 MHz;Pk

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 30dB below the level of the fundamental and measured in 100kHz.
Note 2:	Signal is not in a restricted band but the more stringent restricted band limit was used.



Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

RSS 210 and FCC 15.247 (DTS) Radiated Spurious Emissions
HT40 2.4GHz, 802.11a, HT20 and HT40 5GHz

Test Specific Details

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

General Test Configuration

The EUT and all local support equipment were located on the turntable for radiated spurious emissions testing.
For radiated emissions testing the measurement antenna was located 3 meters from the EUT.

Ambient Conditions:

Temperature: 20-25 °C
Rel. Humidity: 30-40 %

Summary of Results - Device Operating in the 5725 - 5850 MHz Band

Spurious Radiated Emissions: 2x2 and 3x3 Modules for 802.11a; HT20; and HT40 modes

Run #	Mode	Channel	Power Setting		Test Performed	Limit	Result / Margin
1a Low Channel	802.11a Chain 012	5745 MHz	17		Radiated Emissions, 1 - 40GHz	FCC Part 15.209 / 15.247(c)	53.6dBµV/m @ 5440.0MHz (-0.4dB)
	802.11n20 Chain 012	5745 MHz	17				
	802.11n40 Chain 012	5755MHz	14				
1b Center Channel	802.11a Chain 012	5785 MHz	17		Radiated Emissions, 1 - 40GHz	FCC Part 15.209 / 15.247(c)	52.6dBµV/m @ 11568.2MHz (-1.4dB)
	802.11n20 Chain 012	5785 MHz	17				
	802.11n40 Chain 012	5795 MHz	14				
1c High Channel	802.11a Chain 012	5825 MHz	17		Radiated Emissions, 1 - 40GHz	FCC Part 15.209 / 15.247(c)	53.1dBµV/m @ 11646.9MHz (-0.9dB)
	802.11n20 Chain 012	5825 MHz	17				
	802.11n40 Chain 012	5795 MHz 3x3	17		Radiated Emissions, 1 - 40GHz	FCC Part 15.209 / 15.247(c)	51.6dBµV/m @ 5435.7MHz (-2.4dB)

Modifications Made During Testing

No modifications were made to the EUT during testing

Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

Deviations From The Standard

No deviations were made from the requirements of the standard.

Run #1: Radiated Spurious Emissions, 30 - 40,000 MHz. Operating Mode: 802.11a, 802.11n20, and 802.11n40

Date of Test: 6/22/2011
Test Engineer: Rafael Varelas
Test Location: FT Chamber #4

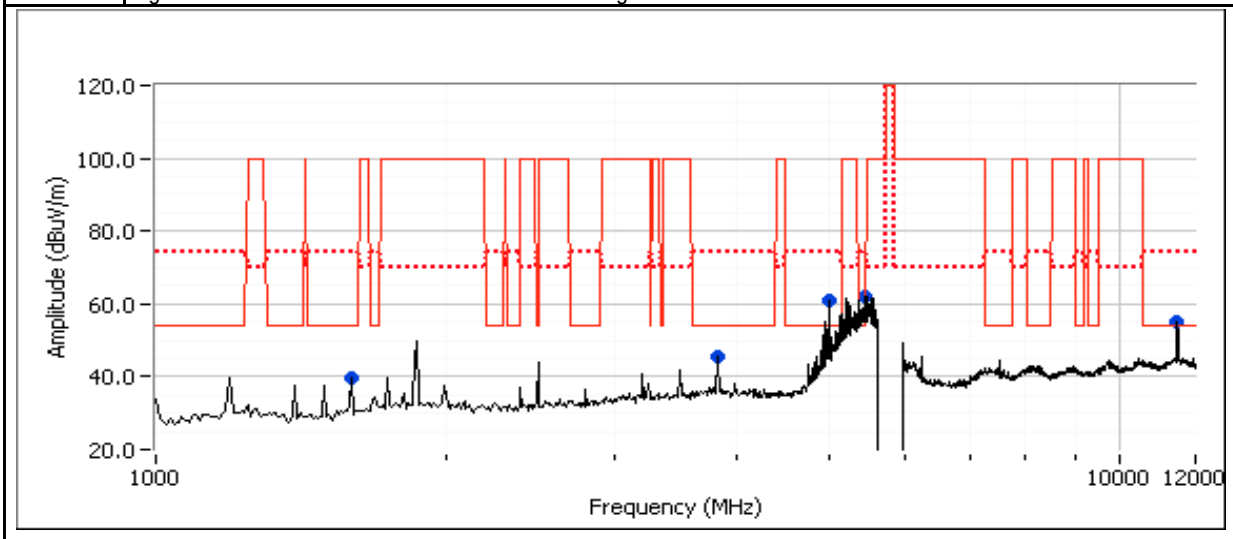
Run #1a: Low Channel

Spurious Radiated Emissions: 2x2 and 3x3 Radio for 802.11a; 2x2 and 3x3 Radio for 802.11n20; 2x2 and 3x3 Radio for 802.11n40

Spurious Emissions:

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
5440.000	53.6	V	54.0	-0.4	AVG	231	1.0	RB 1 MHz;VB 10 Hz;Pk
5440.120	62.1	V	74.0	-11.9	PK	231	1.0	RB 1 MHz;VB 3 MHz;Pk
3829.980	38.4	H	54.0	-15.6	AVG	42	1.0	RB 1 MHz;VB 10 Hz;Pk
3830.170	49.3	H	74.0	-24.7	PK	42	1.0	RB 1 MHz;VB 3 MHz;Pk
11485.860	52.6	V	54.0	-1.4	AVG	6	1.0	RB 1 MHz;VB 10 Hz;Pk
11486.120	65.3	V	74.0	-8.7	PK	6	1.0	RB 1 MHz;VB 3 MHz;Pk
1599.980	39.7	V	54.0	-14.3	Peak	102	1.0	
5000.090	60.9	V	-	-	Peak	132	1.0	Digital

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 30dB below the level of the fundamental and measured in 100kHz.
Note 2:	Signal is not in a restricted band but the more stringent restricted band limit was used.

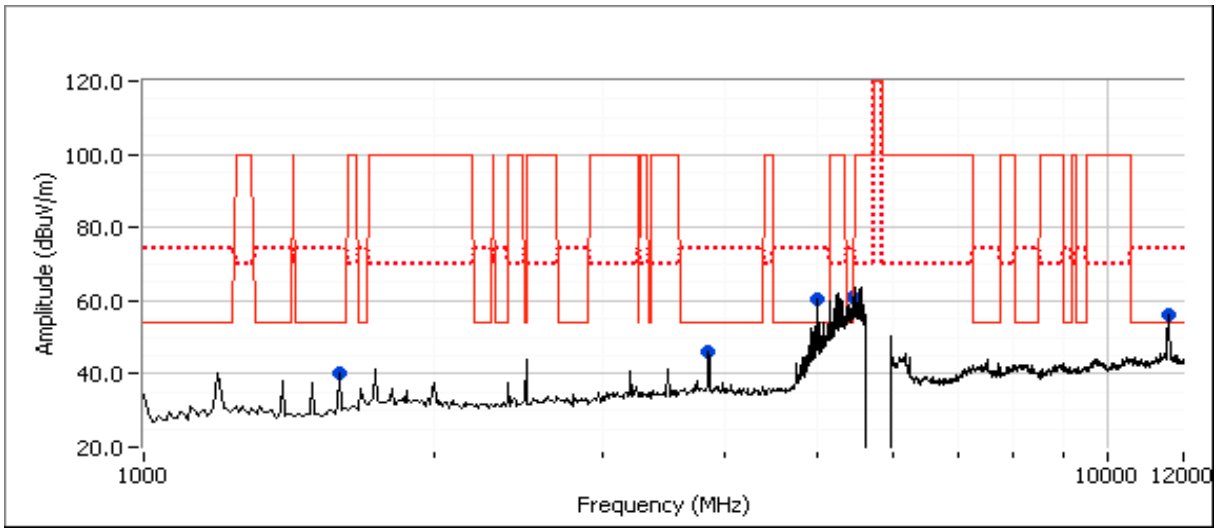


Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

Run #1b: Center Channel
Spurious Radiated Emissions: 2x2 and 3x3 Radio for 802.11a; 2x2 and 3x3 Radio for 802.11n20; 2x2 and 3x3 Radio for 802.11n40
Spurious Emissions:

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
11568.230	52.6	V	54.0	-1.4	AVG	313	1.1	RB 1 MHz;VB 10 Hz;Pk
11568.560	65.1	V	74.0	-8.9	PK	313	1.1	RB 1 MHz;VB 3 MHz;Pk
3856.740	41.2	H	54.0	-12.8	AVG	320	1.0	RB 1 MHz;VB 10 Hz;Pk
3856.720	52.3	H	74.0	-21.7	PK	320	1.0	RB 1 MHz;VB 3 MHz;Pk
5439.940	49.3	V	54.0	-4.7	AVG	317	1.0	RB 1 MHz;VB 10 Hz;Pk
5439.960	60.6	V	74.0	-13.4	PK	317	1.0	RB 1 MHz;VB 3 MHz;Pk
1600.100	40.1	V	54.0	-13.9	Peak	183	1.3	
5000.090	60.4	V	-	-	Peak	142	1.0	Digital

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 30dB below the level of the fundamental and measured in 100kHz.
Note 2:	Signal is not in a restricted band but the more stringent restricted band limit was used.

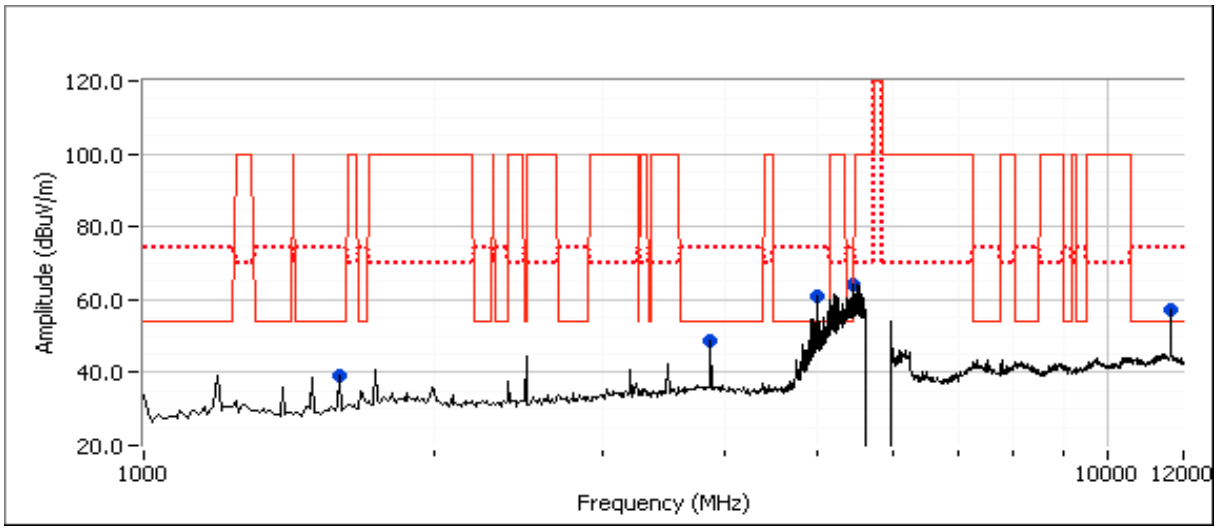


Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

Run #1c: High Channel @ 5825 MHz
Spurious Radiated Emissions: 2x2 and 3x3 Radio for 802.11a (power setting =17); 2x2 and 3x3 Radio for 802.11n20 (power setting =17); 2x2 and 3x3 Radio for 802.11n40 (power setting =14, see run 5d for setting =17 on 3x3 radio)
Spurious Emissions:

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
11646.880	53.1	V	54.0	-0.9	AVG	5	1.0	RB 1 MHz;VB 10 Hz;Pk
11642.680	65.8	V	74.0	-8.2	PK	5	1.0	RB 1 MHz;VB 3 MHz;Pk
3883.450	37.5	H	54.0	-16.5	AVG	348	1.0	RB 1 MHz;VB 10 Hz;Pk
3883.410	50.3	H	74.0	-23.7	PK	348	1.0	RB 1 MHz;VB 3 MHz;Pk
5440.010	50.1	V	54.0	-3.9	AVG	323	1.0	RB 1 MHz;VB 10 Hz;Pk
5439.790	59.9	V	74.0	-14.1	PK	323	1.0	RB 1 MHz;VB 3 MHz;Pk
1600.100	39.2	V	54.0	-14.8	Peak	164	1.3	
5000.090	61.0	V	-	-	Peak	140	1.0	Digital

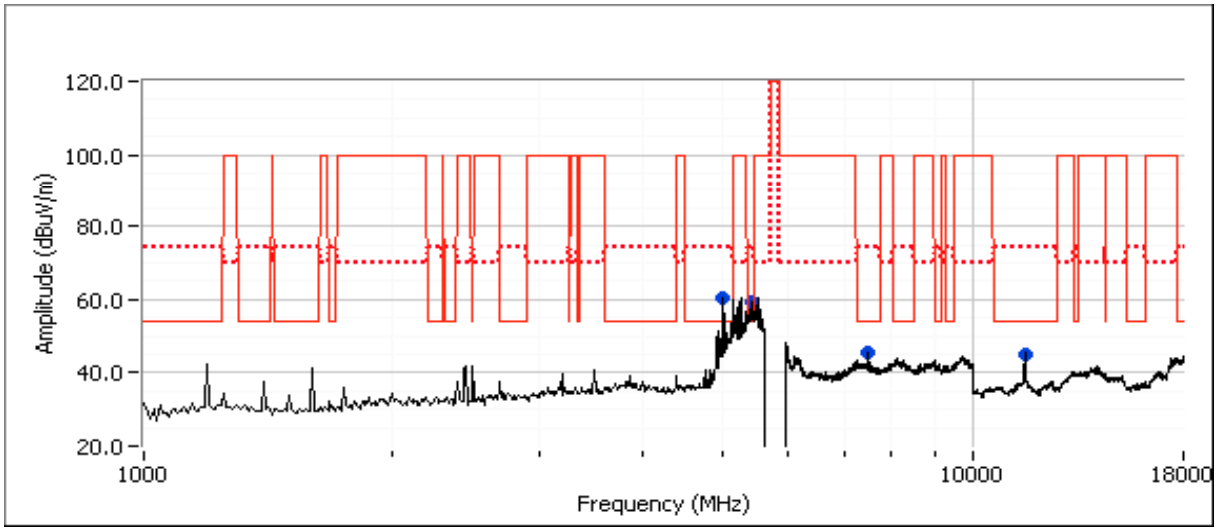
Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 30dB below the level of the fundamental and measured in 100kHz.
Note 2:	Signal is not in a restricted band but the more stringent restricted band limit was used.



Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

Run #1c: High Channel @ 5795 MHz
Spurious Radiated Emissions: 3x3 Radio for 802.11n40 (radios not operating at the same time on the same channel)
Spurious Emissions:

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
5435.700	51.6	V	54.0	-2.4	AVG	153	1.3	RB 1 MHz;VB 10 Hz;Pk
5436.710	63.5	V	74.0	-10.5	PK	153	1.3	RB 1 MHz;VB 3 MHz;Pk
7502.820	37.1	V	54.0	-16.9	AVG	301	1.6	RB 1 MHz;VB 10 Hz;Pk
11563.060	33.5	V	54.0	-20.5	AVG	96	1.3	RB 1 MHz;VB 10 Hz;Pk
7505.240	48.9	V	74.0	-25.1	PK	301	1.6	RB 1 MHz;VB 3 MHz;Pk
11561.700	47.7	V	74.0	-26.3	PK	96	1.3	RB 1 MHz;VB 3 MHz;Pk
Digital Device (host system) - Class A								
5000.000	57.9	V	60.0	-2.1	AVG	140	1.0	RB 1 MHz;VB 10 Hz;Pk
5000.000	63.4	V	80.0	-16.6	PK	140	1.0	RB 1 MHz;VB 3 MHz;Pk



Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

RSS 210 Receiver Radiated Spurious Emissions

Test Specific Details

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

Date of Test: 6/17/2011 1:08
Test Engineer: Rafael Varelas
Test Location: Fremont Chamber #7

Config. Used: 1
Config Change: None
EUT Voltage: POE

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 .

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

Ambient Conditions:

Temperature: 20-25 °C
Rel. Humidity: 30-40 %

Summary of Results

Run #	Mode	Channel	Power Setting	Measured Power	Test Performed	Limit	Result / Margin
1	Rx	ALL	-		Radiated Emissions, 1 - 18GHz	FCC 15.209 / 15 E	45.6dBµV/m @ 7500.1MHz (-8.4dB)

Test performed with one of each module type (2x2 or 3x3) tuned to the center frequency of each operating band.

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.

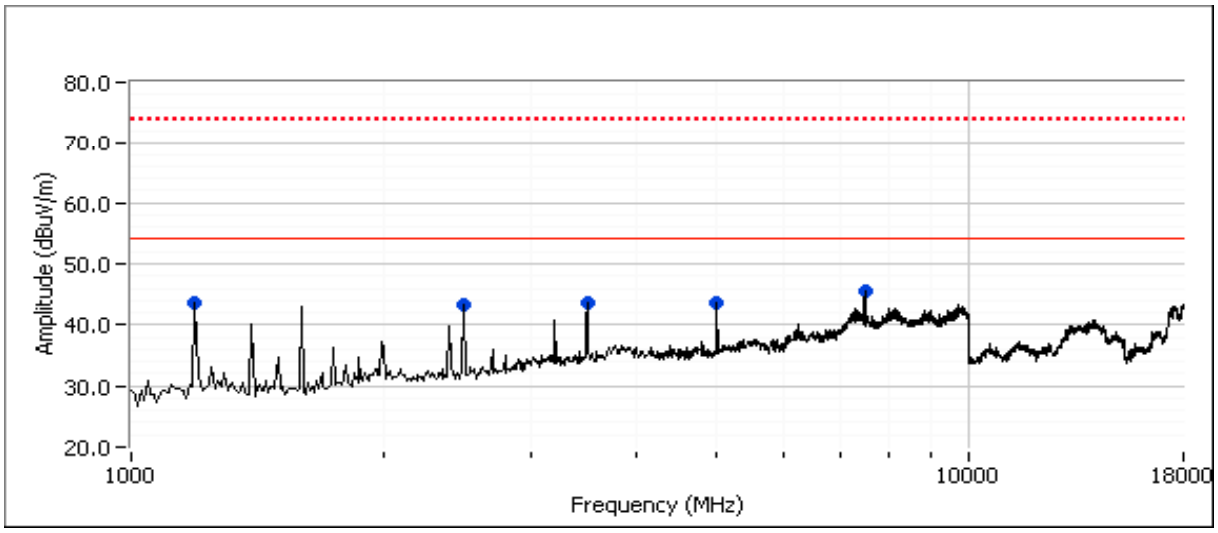
Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	N/A

Run #1, Radiated Spurious Emissions, 1000 - 18,000 MHz.

Channel 6, 3x3 and 2x2 Radio; Channel 157, 3x3 and 2x2 Radio; Channel 40, 3x3and 2x2 Radio;
Channel 60, 3x3 and 2x2 Radio; Channel 116 2x2 and 3x3 Radio;

Date of Test: 6/16/2011
Test Engineer: Rafael Varelas
Test Location: FT Chamber #7

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
7500.050	45.6	V	54.0	-8.4	AVG	54	1.7	RB 1 MHz;VB 10 Hz;Pk
7499.620	51.8	V	74.0	-22.2	PK	54	1.7	RB 1 MHz;VB 3 MHz;Pk
1200.020	44.0	H	54.0	-10.0	AVG	214	1.1	RB 1 MHz;VB 10 Hz;Pk
1200.040	47.0	H	74.0	-27.0	PK	214	1.1	RB 1 MHz;VB 3 MHz;Pk
5000.090	43.5	V	54.0	-10.5	Peak	140	1.0	
3500.150	43.5	V	54.0	-10.5	Peak	277	1.0	
2500.260	43.3	V	54.0	-10.7	Peak	223	1.6	



Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	-

Conducted Emissions

(Elliott Laboratories Fremont Facility, Semi-Anechoic Chamber)

Test Specific Details

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

Date of Test: 7/8/2011
Test Engineer: Joseph Cadigal
Test Location: Fremont Chamber #4
Config. Used: 1
Config Change: none
EUT Voltage: 120V/60Hz

General Test Configuration

For tabletop equipment, the EUT was located on a wooden table inside the semi-anechoic chamber, 40 cm from a vertical coupling plane and 80cm from the LISN. A second LISN was used for all local support equipment. Remote support equipment was located outside of the semi-anechoic chamber. Any cables running to remote support equipment where routed through metal conduit and when possible passed through a ferrite clamp upon exiting the chamber.

Ambient Conditions:

Temperature: 24 °C
Rel. Humidity: 37 %

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	CE, AC Power,120V/60Hz	Class B	Pass	53.4dBµV @ 4.897MHz (-2.6dB)

Modifications Made During Testing

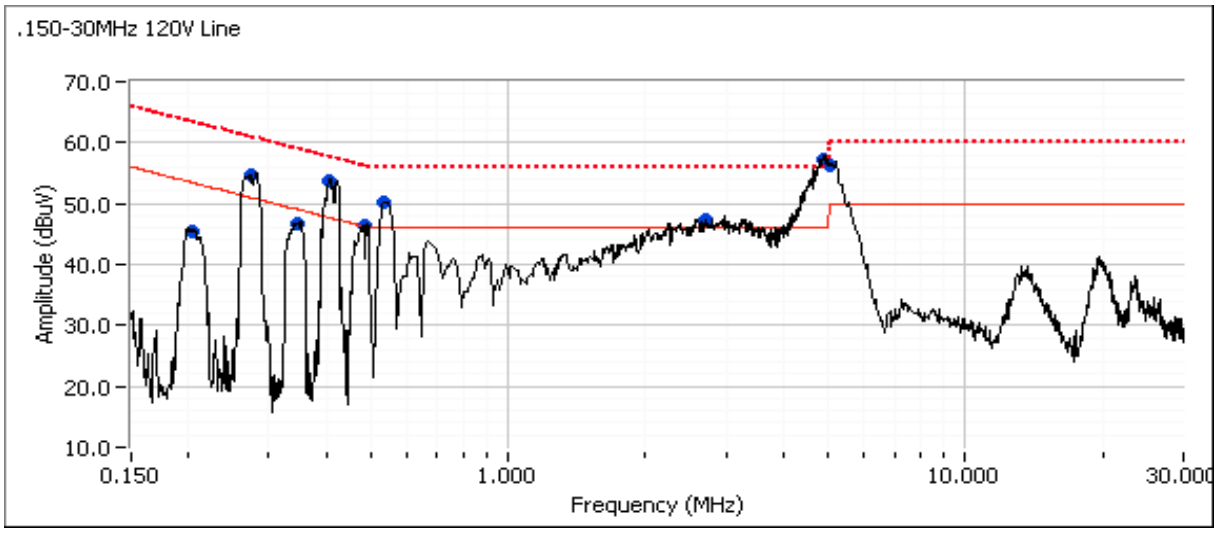
No modifications were made to the EUT during testing

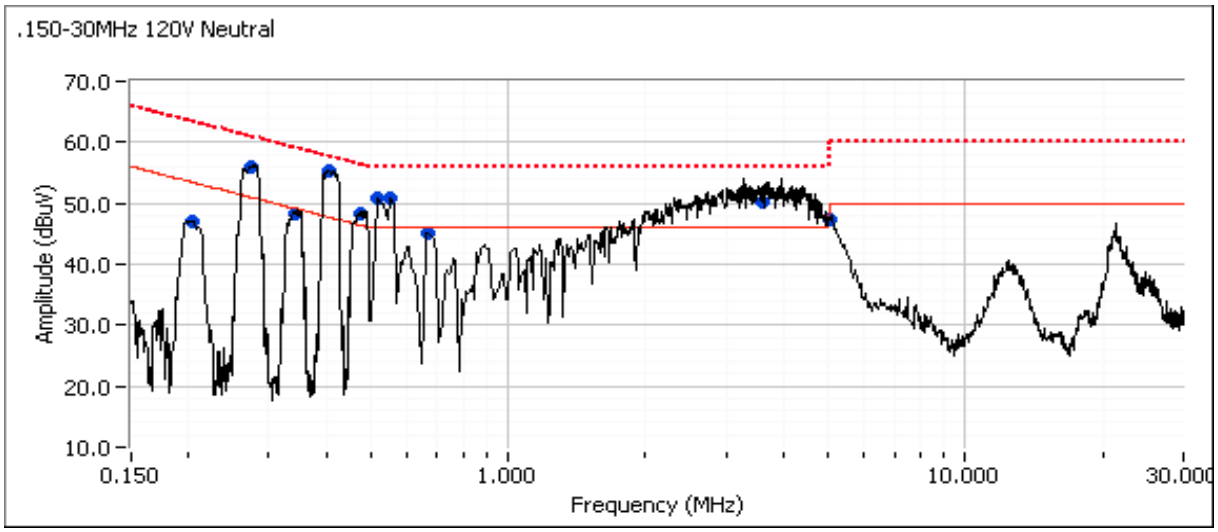
Deviations From The Standard

No deviations were made from the requirements of the standard.

Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	-

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





Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	-

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

Frequency	Level	AC	Class B		Detector	Comments
MHz	dBµV	Line	Limit	Margin	QP/Ave	
0.409	53.8	Line 1	47.7	6.1	Peak	
0.484	46.5	Line 1	46.3	0.2	Peak	
0.346	46.6	Line 1	49.1	-2.5	Peak	
0.273	54.8	Line 1	51.0	3.8	Peak	
0.204	45.5	Line 1	53.5	-8.0	Peak	
0.544	50.2	Line 1	46.0	4.2	Peak	
4.897	57.1	Line 1	46.0	11.1	Peak	
2.715	47.5	Line 1	46.0	1.5	Peak	
5.095	56.3	Line 1	50.0	6.3	Peak	
0.204	47.0	Neutral	53.4	-6.4	Peak	
0.275	56.0	Neutral	51.0	5.0	Peak	
0.341	48.4	Neutral	49.2	-0.8	Peak	
0.408	55.2	Neutral	47.7	7.5	Peak	
0.474	48.3	Neutral	46.4	1.9	Peak	
3.611	50.1	Neutral	46.0	4.1	Peak	
0.559	50.7	Neutral	46.0	4.7	Peak	
0.524	50.8	Neutral	46.0	4.8	Peak	
0.676	45.1	Neutral	46.0	-0.9	Peak	
5.032	47.2	Neutral	50.0	-2.8	Peak	

Final quasi-peak and average readings

Frequency	Level	AC	Class B		Detector	Comments
MHz	dBµV	Line	Limit	Margin	QP/Ave	
4.897	53.4	Line 1	56.0	-2.6	QP	QP (1.00s)
0.408	54.0	Neutral	57.7	-3.7	QP	QP (1.00s)
0.275	54.9	Neutral	61.0	-6.1	QP	QP (1.00s)
5.095	53.7	Line 1	60.0	-6.3	QP	QP (1.00s)
0.558	48.8	Neutral	56.0	-7.2	QP	QP (1.00s)
3.611	48.6	Neutral	56.0	-7.4	QP	QP (1.00s)
4.897	38.4	Line 1	46.0	-7.6	AVG	AVG (0.10s)
0.409	49.9	Line 1	57.7	-7.8	QP	QP (1.00s)
0.524	48.0	Neutral	56.0	-8.0	QP	QP (1.00s)
0.408	39.3	Neutral	47.7	-8.4	AVG	AVG (0.10s)
0.273	51.9	Line 1	61.0	-9.1	QP	QP (1.00s)
0.275	40.9	Neutral	51.0	-10.1	AVG	AVG (0.10s)
0.474	46.3	Neutral	56.4	-10.1	QP	QP (1.00s)
3.611	34.5	Neutral	46.0	-11.5	AVG	AVG (0.10s)
5.095	38.4	Line 1	50.0	-11.6	AVG	AVG (0.10s)
0.544	44.1	Line 1	56.0	-11.9	QP	QP (1.00s)
0.341	46.7	Neutral	59.2	-12.5	QP	QP (1.00s)

Client:	Xirrus, Inc.	Job Number:	J81188
Model:	XR4000 3x3	T-Log Number:	T83592
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		
Standard:	-	Class:	-

Frequency	Level	AC	Class B		Detector	Comments
MHz	dBµV	Line	Limit	Margin	QP/Ave	
0.676	43.3	Neutral	56.0	-12.7	QP	QP (1.00s)
2.715	41.8	Line 1	56.0	-14.2	QP	QP (1.00s)
0.484	42.0	Line 1	56.3	-14.3	QP	QP (1.00s)
0.345	43.1	Line 1	59.1	-16.0	QP	QP (1.00s)
0.341	33.0	Neutral	49.2	-16.2	AVG	AVG (0.10s)
0.474	30.1	Neutral	46.4	-16.3	AVG	AVG (0.10s)
5.032	42.7	Neutral	60.0	-17.3	QP	QP (1.00s)
0.204	36.0	Neutral	53.4	-17.4	AVG	AVG (0.10s)
0.204	45.4	Neutral	63.4	-18.0	QP	QP (1.00s)
0.558	27.5	Neutral	46.0	-18.5	AVG	AVG (0.10s)
0.273	32.0	Line 1	51.0	-19.0	AVG	AVG (0.10s)
0.676	25.8	Neutral	46.0	-20.2	AVG	AVG (0.10s)
0.204	41.1	Line 1	63.4	-22.3	QP	QP (1.00s)
2.715	23.5	Line 1	46.0	-22.5	AVG	AVG (0.10s)
0.409	24.9	Line 1	47.7	-22.8	AVG	AVG (0.10s)
0.524	23.0	Neutral	46.0	-23.0	AVG	AVG (0.10s)
5.032	26.5	Neutral	50.0	-23.5	AVG	AVG (0.10s)
0.484	22.6	Line 1	46.3	-23.7	AVG	AVG (0.10s)
0.345	24.7	Line 1	49.1	-24.4	AVG	AVG (0.10s)
0.544	17.9	Line 1	46.0	-28.1	AVG	AVG (0.10s)
0.204	24.8	Line 1	53.4	-28.6	AVG	AVG (0.10s)

Appendix C Photographs of Test Configurations

Uploaded as a separate exhibit

End of Report

This page is intentionally blank and
marks the last page of this test report.