

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

*Model: XI-N450*

IC CERTIFICATION #: 5428AXIN450  
FCC ID: SK6XI-N450

APPLICANT: Xirrus, Inc.  
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TEST SITE(S): Elliott Laboratories  
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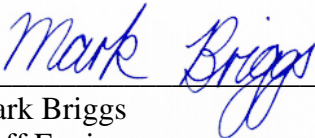
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**REVISION HISTORY**

Rev#	Date	Comments	Modified By
1		First release	

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## 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 E requirements for UNII Devices (using FCC DA 02-2138, August 30, 2002)

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 UNII test procedure 2002-08 DA-02-2138, August 2002

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:

RSS 210 Issue 8 “Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment”

FCC Part 15, Subpart E requirements for UNII Devices

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****UNII / LELAN DEVICES****Operation in the 5.15 – 5.25 GHz Band**

FCC Rule Part	RSS Rule Part	Description	Measured Value / Comments	Limit / Requirement	Result
15.407(e)		Indoor operation only	Refer to user's manual	N/A	Complies
15.407(a)(2)		26dB Bandwidth	> 20MHz	N/A – limits output power if < 20MHz	N/A
15.407(a)(1)	A9.2(1)	Output Power	802.11a SISO: 42.7mW MIMO: 22.4mW HT 20: 23.4 mW HT40: 22.9 mW	17dBm (eirp < 23dBm)	Complies
15.407(a)(1)	-	Power Spectral Density	SISO: 3.9dBm/MHz MIMO: 1.2dBm/MHz	SISO: 4dBm/MHz MIMO: 1.2dBm/MHz	Complies
-	A9.5(2)			SISO: 6dBm/MHz MIMO: 1.2dBm/MHz	Complies
The output power is automatically reduced when modules are co-located and operating in the same band. A maximum of four 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 17dBm and the total eirp does not exceed 23dBm.					

**Operation in the 5.25 – 5.35 GHz Band**

Note: The device is restricted to indoor use only, therefore the spectral density of spurious emissions in the 5.15 – 5.25 GHz band were limited to the power spectral limits for intentional signals detailed in FCC 15.407(a)(1) and RSS 210 6.2.2 q1 (i)

FCC Rule Part	RSS Rule Part	Description	Measured Value / Comments	Limit / Requirement	Result (margin)
15.407(a)(2)		26dB Bandwidth	> 20MHz	N/A – limits output power if < 20MHz	N/A
15.407(a)(2)	A9.2(2)	Output Power	802.11a SISO: 107.2mW MIMO: 100mW HT20: 120.2 mW HT40: 125.9 mW	24dBm (eirp < 30dBm)	Complies
15.407(a)(2)	-	Power Spectral Density	SISO: 8.0dBm/MHz MIMO: 8.0dBm/MHz	SISO: 11dBm/MHz MIMO: 8.2dBm/MHz	Complies
-	A9.2(2) / A9.5(2)	Power Spectral Density		11 dBm / MHz	Complies
The output power is automatically reduced when modules are co-located and operating in the same band. A maximum of four 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 24dBm and the total eirp does not exceed 30dBm.					

**Operation in the 5.47 – 5.725 GHz Band**

FCC Rule Part	RSS Rule Part	Description	Measured Value / Comments	Limit / Requirement	Result (margin)
15.407(a) (2)		26dB Bandwidth	> 20MHz	N/A – limits output power if < 20MHz	N/A
15.407(a) (2)	A9.2(2)	Output Power	802.11a SISO: 55mW MIMO: 107.2mW HT20: 102.3 mW HT40: 114.8 mW	24 dBm / 250mW (eirp < 30dBm)	Complies
15.407(a) (2)		Power Spectral Density	SISO: 5.0dBm/MHz MIMO: 7.3dBm/MHz	SISO: 11dBm/MHz MIMO: 8.2dBm/MHz	Complies
	A9.2(2) / A9.5 (2)	Power Spectral Density		11 dBm / MHz	Complies
KDB 443999	A9	Non-operation in 5600 – 5650 MHz sub band	Device cannot operate in the 5600 – 5650 MHz band –refer to Operational Description		Complies
The output power is automatically reduced when modules are co-located and operating in the same band. A maximum of eight 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 24dBm and the total eirp does not exceed 30dBm.					

**Requirements for all U-NII/LELAN bands**

FCC Rule Part	RSS Rule Part	Description	Measured Value / Comments	Limit / Requirement	Result
15.407	A9.5a	Modulation	Digital Modulation is used (OFDM)	Digital modulation is required	Complies
15.407(b) (5) / 15.209	A9.3	Spurious Emissions below 1GHz	Independent of transmitter	Refer to page 25	N/A
15.407(b) (5) / 15.209	A9.3	Spurious Emissions above 1GHz	53.8dB $\mu$ V/m @ 5150.0MHz		Complies (-0.2dB)
15.407(a)(6)	-	Peak Excursion Ratio	12.5 dB	< 13dB	Complies
	A9.5 (3)	Channel Selection	Spurious emissions tested at outermost channels in each band	Device was tested on the top, bottom and center channels in each band	N/A
15			Measurements on three channels in each band		
15.407 (c)	A9.5(4)	Operation in the absence of information to transmit	Operation is discontinued in the absence of information (Operational Description p6)	Shall automatically discontinue operation in the absence of information to transmit	Complies
15.407 (g)	A9.5 (5)	Frequency Stability	Frequency stability is 5ppm (Operational Description pp 2, 6)	Signal shall remain within the allocated band	Complies
15.407 (h1)	A9.4	Transmit Power Control	Meets 802.11h TPC and DFS requirements (Operational Description p6)	The capability to operate with a mean EIRP < 24dBm (250mW)	Complies
15.407 (h2)	A9.4	Dynamic frequency Selection (Master)	Refer to separate test report, reference R83908		
	A9.9g	User Manual information	Refer to User Manual	Warning regarding interference from Satellite Systems	Complies
Scans for radiated emissions on the host system indicated that all emissions below 1GHz were independent of the transceiver operating frequency and mode (transmit vs receive mode). All emissions below 1Ghz were attributed to the digital device circuitry in the host system and on the modules and are covered by host-system testing against the Class A limits for digital devices..					



**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	53.4dB $\mu$ V @ 4.897MHz	Refer to page 22	Complies (-2.6dB)
15.109	RSS GEN 7.2.3 Table 1	Receiver spurious emissions	45.6dB $\mu$ V/m @ 7500.1MHz	Refer to page 23	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	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	802.11a: 17.1 MHz HT20: 18.4 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)	dB $\mu$ V/m	25 to 1000 MHz	± 3.6 dB
		1000 to 40000 MHz	± 6.0 dB
Conducted Emissions (AC Power)	dB $\mu$ V	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 15, 16, 21-24, 27, 30 and July 6, 8, 12, 13, 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		Description	Cable(s) Shielded/Unshielded	Length(m)
From	To			
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 both 20- 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 from 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.



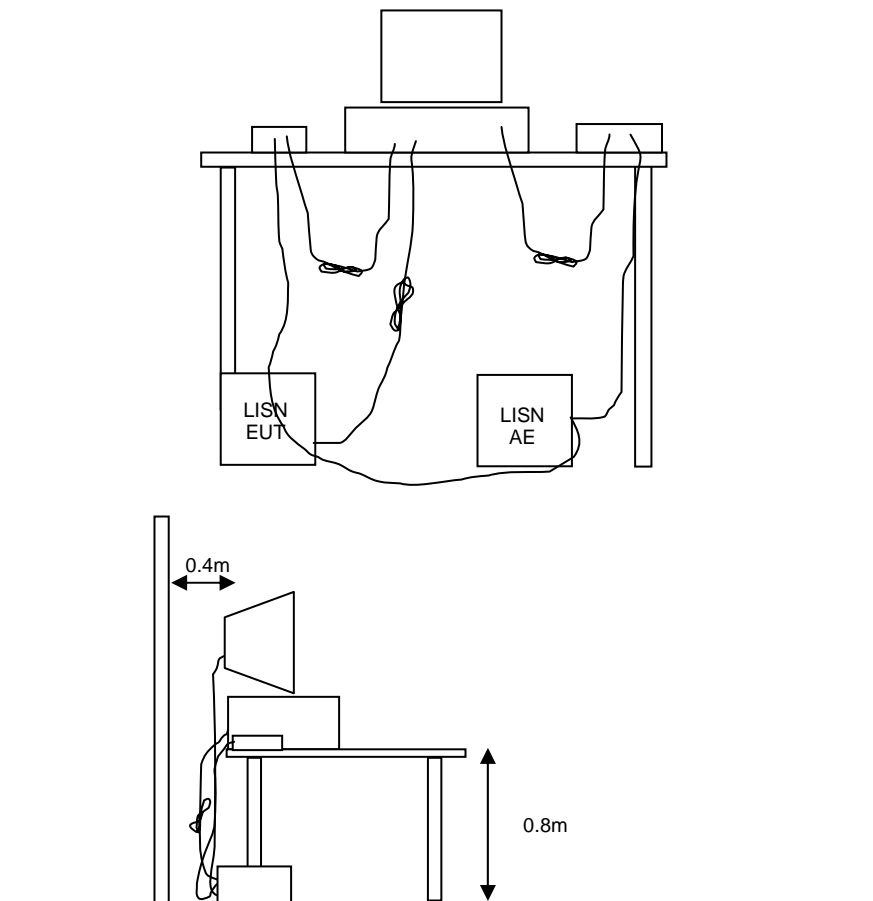
## TEST PROCEDURES

### 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.



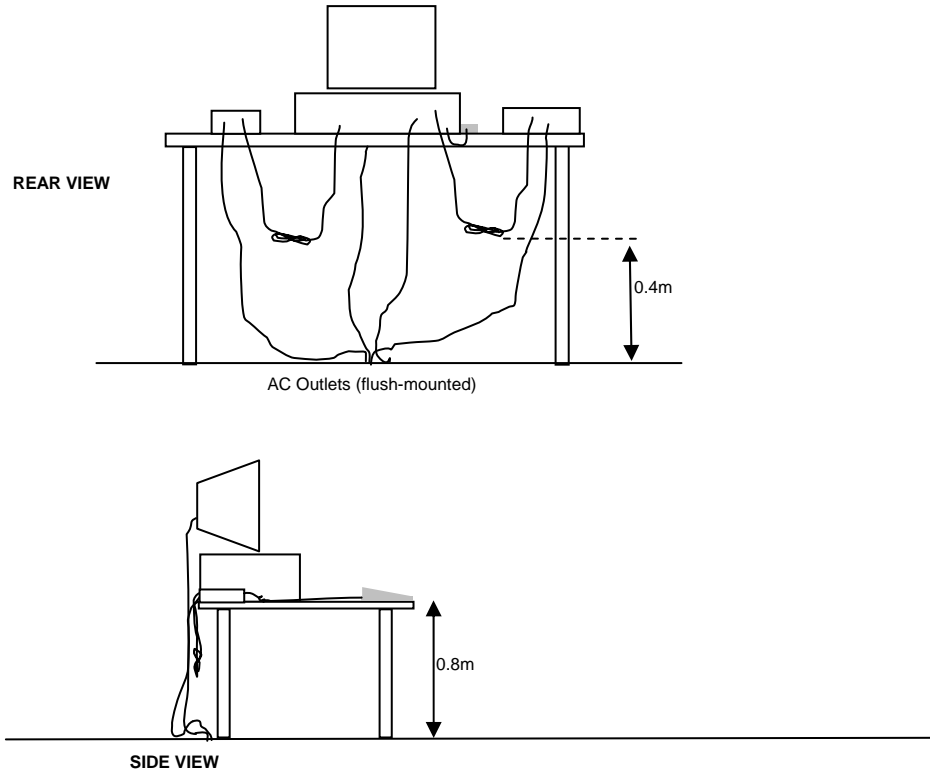
**RADIATED EMISSIONS**

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.

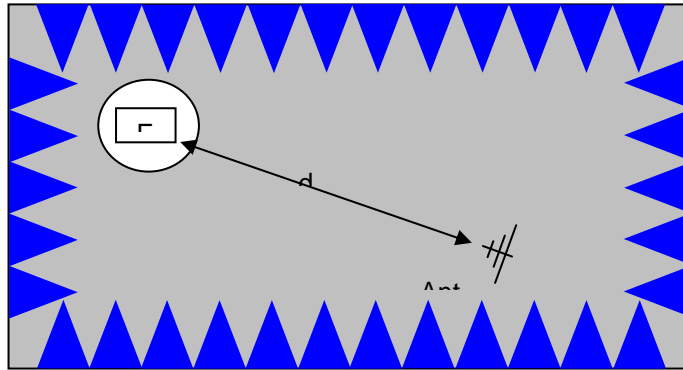
A speaker is provided in the receiver to aid in discriminating between EUT and ambient emissions. Other methods used during the preliminary scan for EUT emissions involve scanning with near field magnetic loops, monitoring I/O cables with RF current clamps, and cycling power to the EUT.

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.

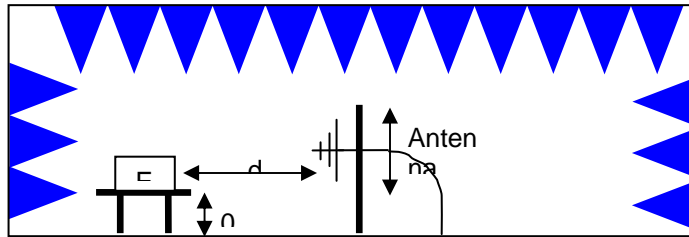
When testing above 18 GHz, the receive antenna is located at 1 meter from the EUT and the antenna height is restricted to a maximum of 2.5 meters.



Typical Test Configuration for Radiated Field Strength Measurements



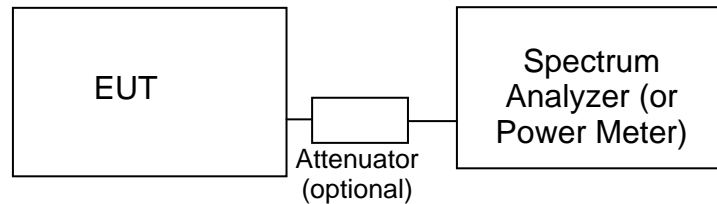
The anechoic materials on the walls and ceiling ensure compliance with the normalized site attenuation requirements of CISPR 16 / CISPR 22 / ANSI C63.4 for an alternate test site at the measurement distances used



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<sup>1</sup> (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 <sub>KHz</sub> @ 300m	67.6-20*log <sub>10</sub> (F <sub>KHz</sub> ) @ 300m
0.490-1.705	24000/F <sub>KHz</sub> @ 30m	87.6-20*log <sub>10</sub> (F <sub>KHz</sub> ) @ 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

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

*FCC 15.407 (a) OUTPUT POWER LIMITS*

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

Operating Frequency (MHz)	Output Power	Power Spectral Density
5150 – 5250	50mW (17 dBm)	4 dBm/MHz
5250 – 5350	250 mW (24 dBm)	11 dBm/MHz
5725 – 5825	1 Watts (30 dBm)	17 dBm/MHz

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

The peak excursion envelope is limited to 13dB.

*OUTPUT POWER LIMITS –LELAN DEVICES*

The table below shows the limits for output power and output power density defined by RSS 210. Where the signal bandwidth is less than 20 MHz the maximum output power is reduced to the power spectral density limit plus 10 times the log of the bandwidth (in MHz).

Operating Frequency (MHz)	Output Power	Power Spectral Density
5150 – 5250	200mW (23 dBm) eirp	10 dBm/MHz eirp
5250 – 5350	250 mW (24 dBm) <sup>2</sup> 1W (30dBm) eirp	11 dBm/MHz
5470 – 5725	250 mW (24 dBm) <sup>3</sup> 1W (30dBm) eirp	11 dBm/MHz
5725 – 5825	1 Watts (30 dBm) 4W eirp	17 dBm/MHz

In addition, the power spectral density limit shall be reduced by 1dB for every dB the highest power spectral density exceeds the “average” power spectral density ) by more than 3dB. The “average” power spectral density is determined by dividing the output power by  $10\log(\text{EBW})$  where EBW is the 99% power bandwidth.

Fixed point-to-point applications using the 5725 – 5825 MHz band may use antennas with gains of up to 23dBi without this limitation. If the gain exceeds 23dBi then the output power limit of 1 Watt is reduced by 1dB for every dB the gain exceeds 23dBi.

<sup>2</sup> If EIRP exceeds 500mW the device must employ TPC

<sup>3</sup> If EIRP exceeds 500mW the device must employ TPC



*SPURIOUS EMISSIONS LIMITS –UNII and LELAN DEVICES*

The spurious emissions limits for signals below 1GHz are the FCC/RSS-GEN general limits. For emissions above 1GHz, signals in restricted bands are subject to the FCC/RSS GEN general limits. All other signals have a limit of  $-27\text{dBm/MHz}$ , which is a field strength of  $68.3\text{dBuV/m/MHz}$  at a distance of 3m. For devices operating in the 5725-5850MHz bands under the LELAN/UNII rules, the limit within 10MHz of the allocated band is increased to  $-17\text{dBm/MHz}$ .

**SAMPLE CALCULATIONS - CONDUCTED EMISSIONS**

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

$$R_r - S = M$$

where:

$R_r$  = Receiver Reading in dBuV

$S$  = Specification Limit in dBuV

$M$  = Margin to Specification in +/- dB

**SAMPLE CALCULATIONS - RADIATED EMISSIONS**

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

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

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

where:

$F_d$  = Distance Factor in dB

$D_m$  = Measurement Distance in meters

$D_s$  = Specification Distance in meters

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

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

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

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

$$R_c = R_r + F_d$$

and

$$M = R_c - L_s$$

where:

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

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

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

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

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

#### *SAMPLE CALCULATIONS - FIELD STRENGTH TO EIRP CONVERSION*

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

<u>Manufacturer</u>	<u>Description</u>	<u>Model</u>	<u>Asset #</u>	<u>Cal Due</u>
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)**

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

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

<u>Manufacturer</u>	<u>Description</u>	<u>Model</u>	<u>Asset #</u>	<u>Cal Due</u>
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 30-158



## EMC Test Data

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 (LELAN) and FCC 15.407(UNII)**  
**Antenna Port Measurements**  
Power, PSD, Peak Excursion, 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: 6/23/2011 17:51  
Test Engineer: Rafael Varelas  
Test Location: Fremont Chamber #4

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

**Summary of Results**

Run #	Test Performed	Limit	Pass / Fail	Result / Margin
1	Power, 5150 - 5250MHz	15.407(a) (1), (2)	Pass	802.11n 20MHz: 23.4 mW 802.11n n40MHz: 22.9 mW
1	PSD, 5150 - 5250MHz	15.407(a) (1), (2)	Pass	802.11n 20MHz: 1.2 dBm/MHz 802.11n n40MHz: -2.0 dBm/MHz
1	Power, 5250 - 5350MHz	15.407(a) (1), (2)	Pass	802.11n 20MHz: 120.2 mW 802.11n n40MHz: 125.9 mW
1	PSD, 5250 - 5350MHz	15.407(a) (1), (2)	Pass	802.11n 20MHz: 8.0 dBm/MHz 802.11n n40MHz: 5.4 dBm/MHz
1	Power, 5470 - 5725MHz	15.407(a) (1), (2)	Pass	802.11n 20MHz: 102.3 mW 802.11n n40MHz: 114.8 mW
1	PSD, 5470 - 5725MHz	15.407(a) (1), (2)	Pass	802.11n 20MHz: 7.3 dBm/MHz 802.11n n40MHz: 5.2 dBm/MHz
1	26dB Bandwidth	15.407 (Information only)	-	> 20MHz for all modes
1	99% Bandwidth	RSS 210 (Information only)	N/A	802.11n 20MHz: 18.4 MHz 802.11n n40MHz: 36.9 MHz
2	Peak Excursion Envelope	15.407(a) (6) 13dB	Pass	12.5 dB
3	Antenna Conducted - Out of Band Spurious	15.407(b) -27dBm/MHz	Pass	All emissions below the -27dBm/MHz limit

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

**General Test Configuration**

When measuring the conducted emissions from the EUT's antenna port, the antenna port of the EUT was connected to the spectrum analyzer or power meter via a suitable attenuator to prevent overloading the measurement system. All measurements are corrected to allow for the external attenuators and cables used.

**Ambient Conditions:**                      Temperature:            20.7 °C  
    Rel. Humidity:            36 %

**Modifications Made During Testing**

No modifications were made to the EUT during testing

**Deviations From The Standard**

No deviations were made from the requirements of the standard.

**Run #1: Bandwidth, Output Power and Power Spectral Density - MIMO Systems**

Note 1:	Output power measured using a spectrum analyzer (see plots below). RBW=1MHz, VB=3 MHz, sample detector, power averaging on (transmitted signal was continuous) and power integration over 50 MHz for 20MHz channels and 100MHz for 40MHz channels (method 1 of DA-02-2138A1).
Note 2:	Measured using the same analyzer settings used for output power.
Note 3:	For RSS-210 the limit for the 5150 - 5250 MHz band accounts for the antenna gain as the maximum eirp allowed is 10dBm/MHz. The limits are also corrected for instances where the highest measured value of the PSD exceeds the average PSD (calculated from the measured power divided by the measured 99% bandwidth) by more than 3dB by the amount that the measured value exceeds the average by more than 3dB.
Note 4:	99% Bandwidth measured in accordance with RSS GEN - RB > 1% of span and VB >=3xRB
Note 5:	For MIMO systems the total output power and total PSD are calculated from the sum of the powers of the individual chains (in linear terms). The antenna gain used to determine the EIRP and limits for PSD/Output power depends on the operating mode of the MIMO device. If the signals on the non-coherent between the transmit chains then the gain used to determine the limits is the highest gain of the individual chains and the EIRP is the sum of the products of gain and power on each chain. If the signals are coherent then the effective antenna gain is the sum (in linear terms) of the gains for each chain and the EIRP is the product of the effective gain and total power.



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

### MIMO Device - 5150-5250 MHz Band

	Chain 0	Chain 1	Chain 2	Coherent	Effective <sup>5</sup>	EIRP (mW)	EIRP (dBm)
Antenna Gain (dBi):	4	4	4	Yes	8.8	177.9	22.5

### Power

Frequency (MHz)	Software Setting	26dB BW (MHz)	Measured Output Power <sup>1</sup> dBm			Total		Limit (dBm)	Max Power (W)	Pass or Fail
			Chain 0	Chain 1	Chain 2	mW	dBm			

#### 20MHz Mode

5180	9.5	27.9	8.8	9.0	9.1	23.6	13.7	14.2	0.024	PASS
5200	9.5	26.8	8.8	8.3	9.2	22.7	13.6	14.2		PASS
5240	9.5	28.1	8.7	8.1	10.0	23.7	13.7	14.2		PASS

#### 40MHz Mode

5190	7.0	49.8	3.9	4.6	4.8	8.3	9.2	14.2	0.008	PASS
5230	9.5	51.2	8.5	8.2	9.6	22.9	13.6	14.2		PASS

### PSD

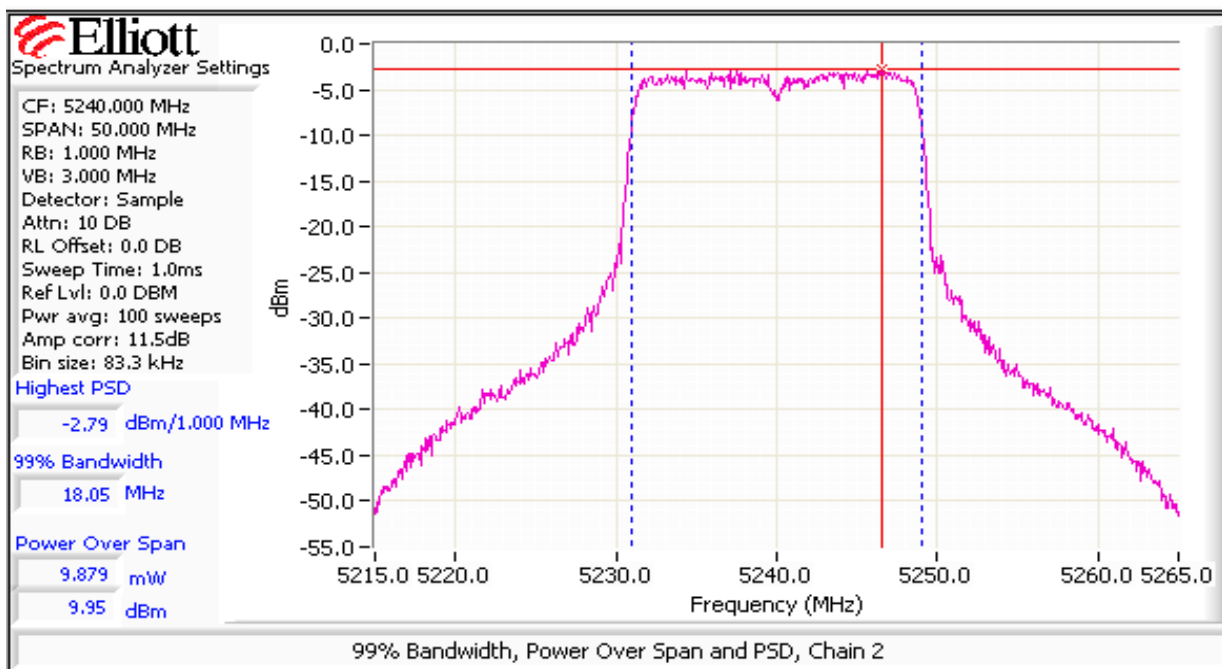
Frequency (MHz)	99% <sup>4</sup> BW	Total Power	PSD <sup>2</sup> dBm/MHz			Total PSD		Limit		Pass or Fail
			Chain 0	Chain 1	Chain 2	mW/MHz	dBm/MHz	FCC	RSS 210 <sup>3</sup>	

#### 20MHz Mode

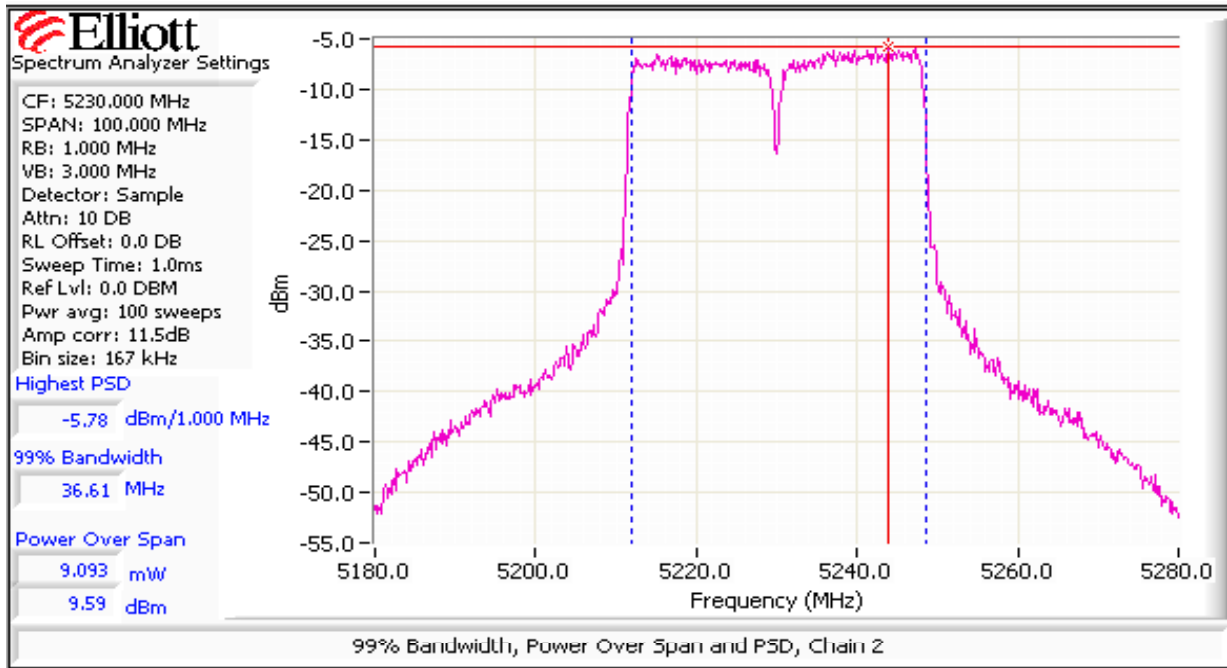
5180	18.1	13.7	-3.7	-3.6	-3.4	1.3	1.2	1.2	1.2	PASS
5200	18.1	13.6	-3.9	-4.5	-3.3	1.2	0.9	1.2	1.2	PASS
5240	18.1	13.7	-3.7	-4.7	-2.8	1.3	1.1	1.2	1.2	PASS

#### 40MHz Mode

5190	36.6	9.2	-11.7	-11.0	-10.7	0.2	-6.3	1.2	1.2	PASS
5230	36.6	13.6	-7.2	-7.5	-5.8	0.6	-2.0	1.2	1.2	PASS



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
Contact: Steve Smith	Account Manager: Susan Pelzl
Standard: -	Class: N/A

### MIMO Device - 5250-5350 MHz Band

	Chain 0	Chain 1	Chain 2	Coherent	Effective <sup>5</sup>	EIRP (mW)	EIRP (dBm)
Antenna Gain (dBi):	4	4	4	Yes	8.8	908.4	29.6

### Power

Frequency (MHz)	Software Setting	26dB BW (MHz)	Measured Output Power <sup>1</sup> dBm			Total		Limit (dBm)	Max Power (W)	Pass or Fail
			Chain 0	Chain 1	Chain 2	mW	dBm			

#### 20MHz Mode

5260	17.0	31.0	16.3	14.9	15.9	112.5	20.5	21.2	0.121	PASS
5300	17.0	33.2	16.0	16.6	15.5	120.5	20.8	21.2		PASS
5320	11.5	28.7	9.0	10.5	8.9	26.9	14.3	21.2		PASS

#### 40MHz Mode

5270	17.0	51.2	15.8	16.3	16.5	125.3	21.0	21.2	0.125	PASS
5310	8.0	50.7	6.4	5.5	6.0	11.9	10.8	21.2		PASS

### PSD

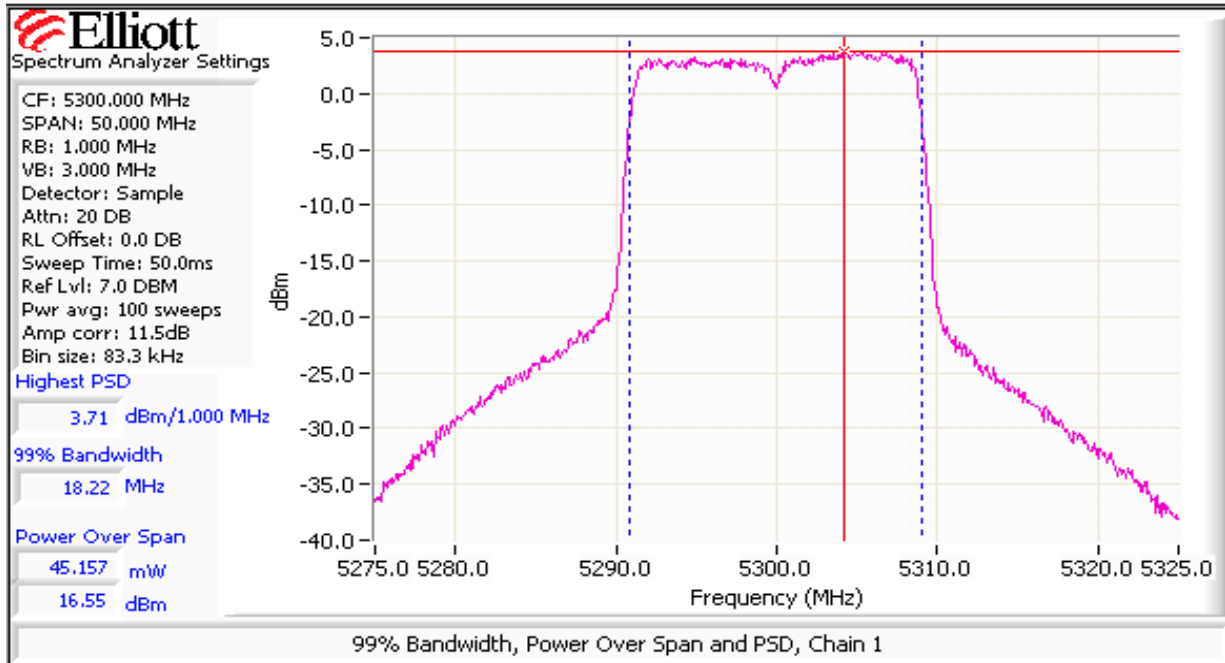
Frequency (MHz)	99% <sup>4</sup> BW	Total Power	PSD <sup>2</sup> dBm/MHz			Total PSD		Limit		Pass or Fail
			Chain 0	Chain 1	Chain 2	mW/MHz	dBm/MHz	FCC	RSS 210 <sup>3</sup>	

#### 20MHz Mode

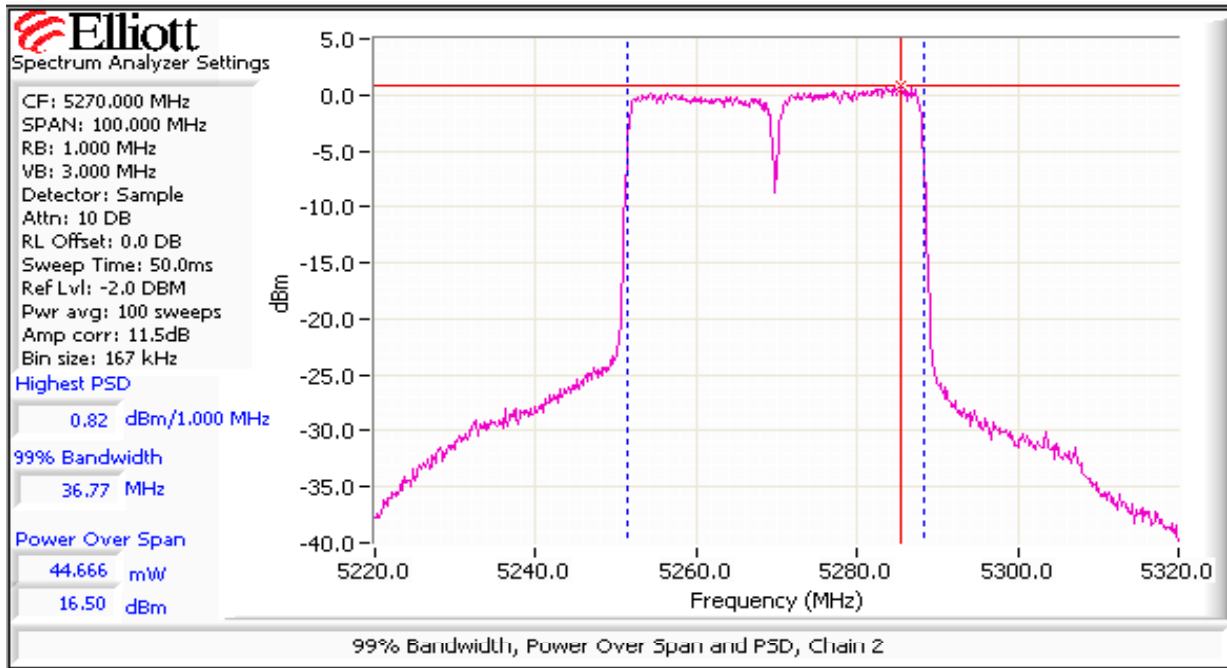
5260	18.3	20.5	3.6	2.1	3.1	6.0	7.7	8.2	11.0	PASS
5300	18.3	20.8	3.2	3.7	2.7	6.3	8.0	8.2	11.0	PASS
5320	18.2	14.3	-3.9	-2.0	-4.1	1.4	1.6	8.2	11.0	PASS

#### 40MHz Mode

5270	36.6	21.0	0.4	0.7	0.8	3.5	5.4	8.2	11.0	PASS
5310	36.6	10.8	-9.0	-10.3	-9.7	0.3	-4.9	8.2	11.0	PASS



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

**MIMO Device - 5470-5725 MHz Band**

	Chain 0	Chain 1	Chain 2	Coherent	Effective <sup>5</sup>	EIRP (mW)	EIRP (dBm)
Antenna Gain (dBi):	4	4	4	Yes	8.8	763.5	28.8

**Power**

Frequency (MHz)	Software Setting	26dB BW (MHz)	Measured Output Power <sup>1</sup> dBm			Total		Limit (dBm)	Max Power (W)	Pass or Fail
			Chain 0	Chain 1	Chain 2	mW	dBm			

**20MHz Mode**

5500	16.5	27.8	13.4	14.6	13.8	74.2	18.7	21.2	0.101	PASS
5580	17.0	29.7	13.5	14.5	14.2	76.9	18.9	21.2		PASS
5700	17.0	36.8	14.1	16.7	14.6	101.3	20.1	21.2		PASS

**40MHz Mode**

5510	8.5	49.8	5.2	7.8	5.4	12.8	11.1	21.2	0.115	PASS
5550	16.5	54.7	14.3	16.6	14.8	102.4	20.1	21.2		PASS
5670	17.0	62.8	14.5	17.3	15.2	114.6	20.6	21.2		PASS

**PSD**

Frequency (MHz)	99% <sup>4</sup> BW	Total Power	PSD <sup>2</sup> dBm/MHz			Total PSD		Limit		Pass or Fail
			Chain 0	Chain 1	Chain 2	mW/MHz	dBm/MHz	FCC	RSS 210 <sup>3</sup>	

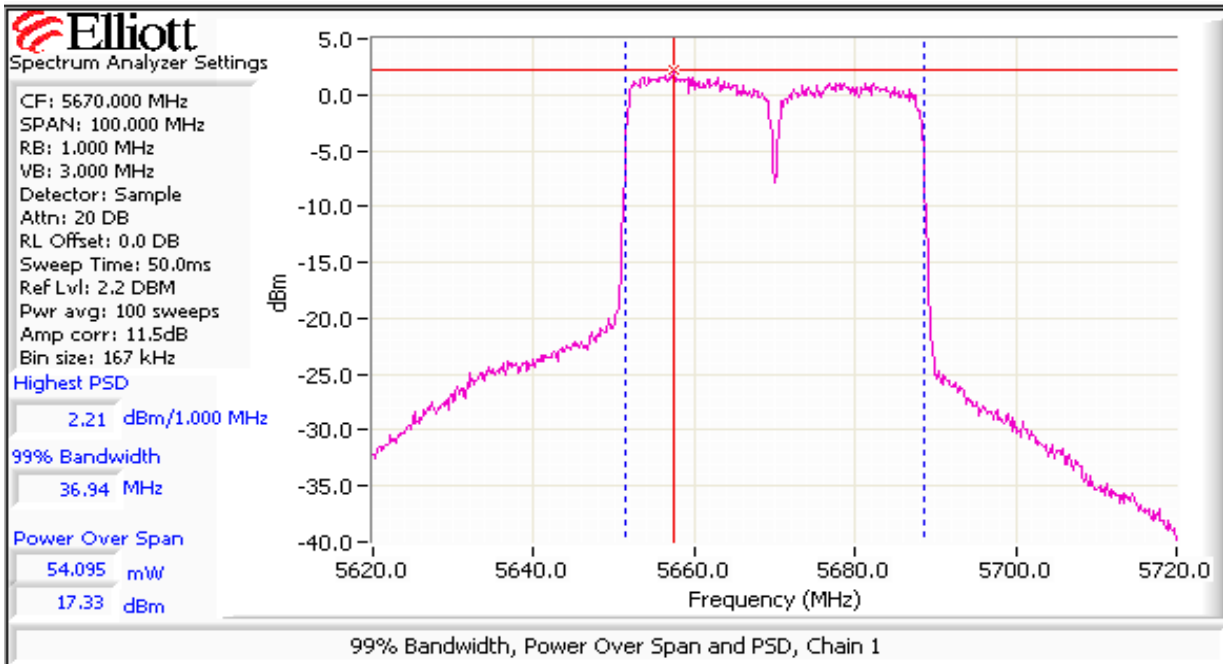
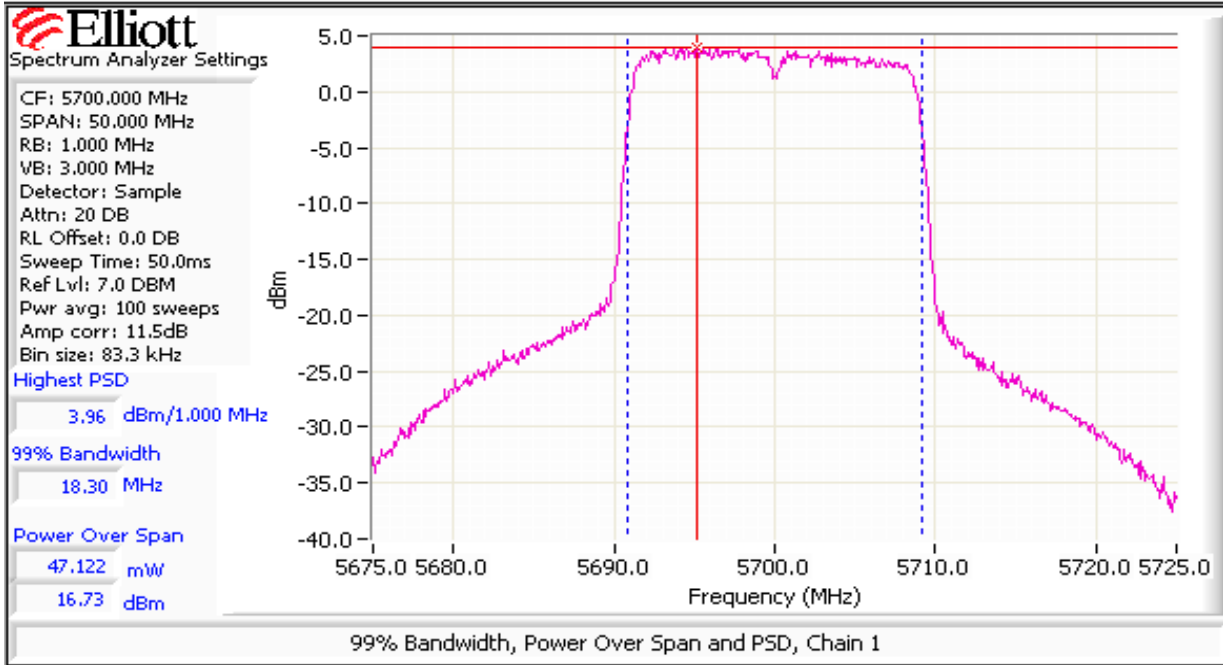
**20MHz Mode**

5500	18.3	18.7	0.9	1.9	1.3	4.1	6.1	8.2	11.0	PASS
5580	18.2	18.9	1.1	1.8	1.4	4.2	6.2	8.2	11.0	PASS
5700	18.4	20.1	1.5	4.0	1.7	5.4	7.3	8.2	11.0	PASS

**40MHz Mode**

5510	36.8	11.1	-10.1	-8.0	-10.2	0.4	-4.5	8.2	11.0	PASS
5550	36.6	20.1	-1.1	1.1	-0.5	3.0	4.7	8.2	11.0	PASS
5670	36.9	20.6	-1.1	2.2	-0.7	3.3	5.2	8.2	11.0	PASS

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: Peak Excursion Measurement**

20MHz: Device meets the requirement for the peak excursion

Peak Excursion(dB)			Peak Excursion(dB)			Peak Excursion(dB)		
Freq (MHz)	Value	Limit	Freq (MHz)	Value	Limit	Freq (MHz)	Value	Limit
5180	11.3/11.3/12.0	13.0	5260	11.4/11.5/11.6	13.0	5500	11.4/11.1/12.0	13.0
5200	12.5/11.1/11.7	13.0	5300	11.7/11.2/11.8	13.0	5580	11.3/10.9/12.1	13.0
5240	10.9/11.5/11.5	13.0	5320	11.9/11.0/11.7	13.0	5700	11.3/11.8/11.3	13.0

40MHz: Device meets the requirement for the peak excursion

Peak Excursion(dB)			Peak Excursion(dB)			Peak Excursion(dB)		
Freq (MHz)	Value	Limit	Freq (MHz)	Value	Limit	Freq (MHz)	Value	Limit
5190	11.8/11.5/11.9	13.0	5270	10.8/10.5/9.4	13.0	5510	11.7/11.8/10.3	13.0
5230	12.1/11.9/11.0	13.0	5310	10.4/11.2/11.5	13.0	5550	9.8/11.2/12.5	13.0
						5670	11.4/12.3/10.3	13.0

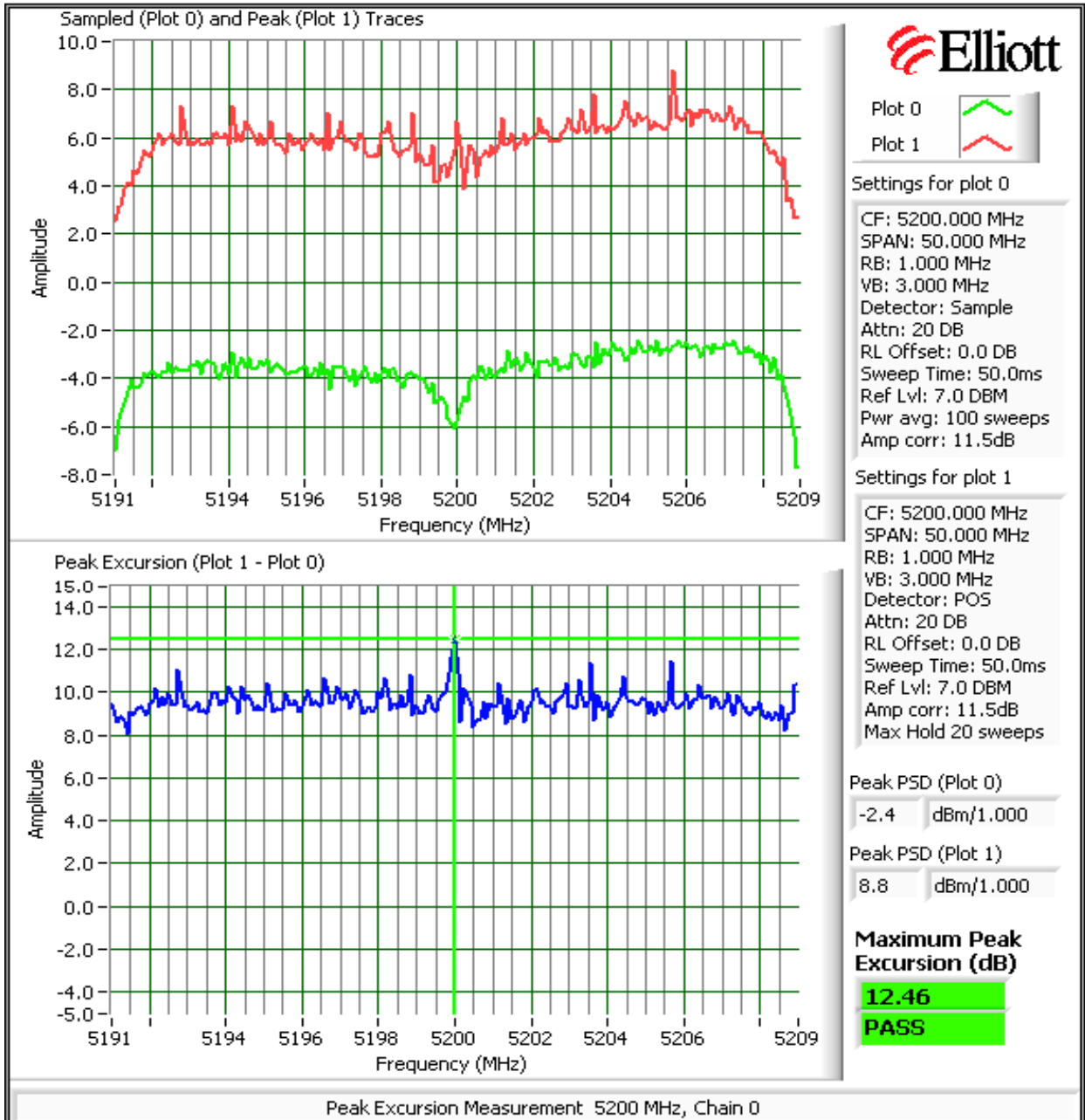
Plots Showing Peak Excursion

Trace A: RBW = 1MHz, VBW = 3MHz, Peak hold

Trace B: Same settings as used for power/PSD measurements (RBW = 1 MHz, VBW = 3MHz, Integrated average power)

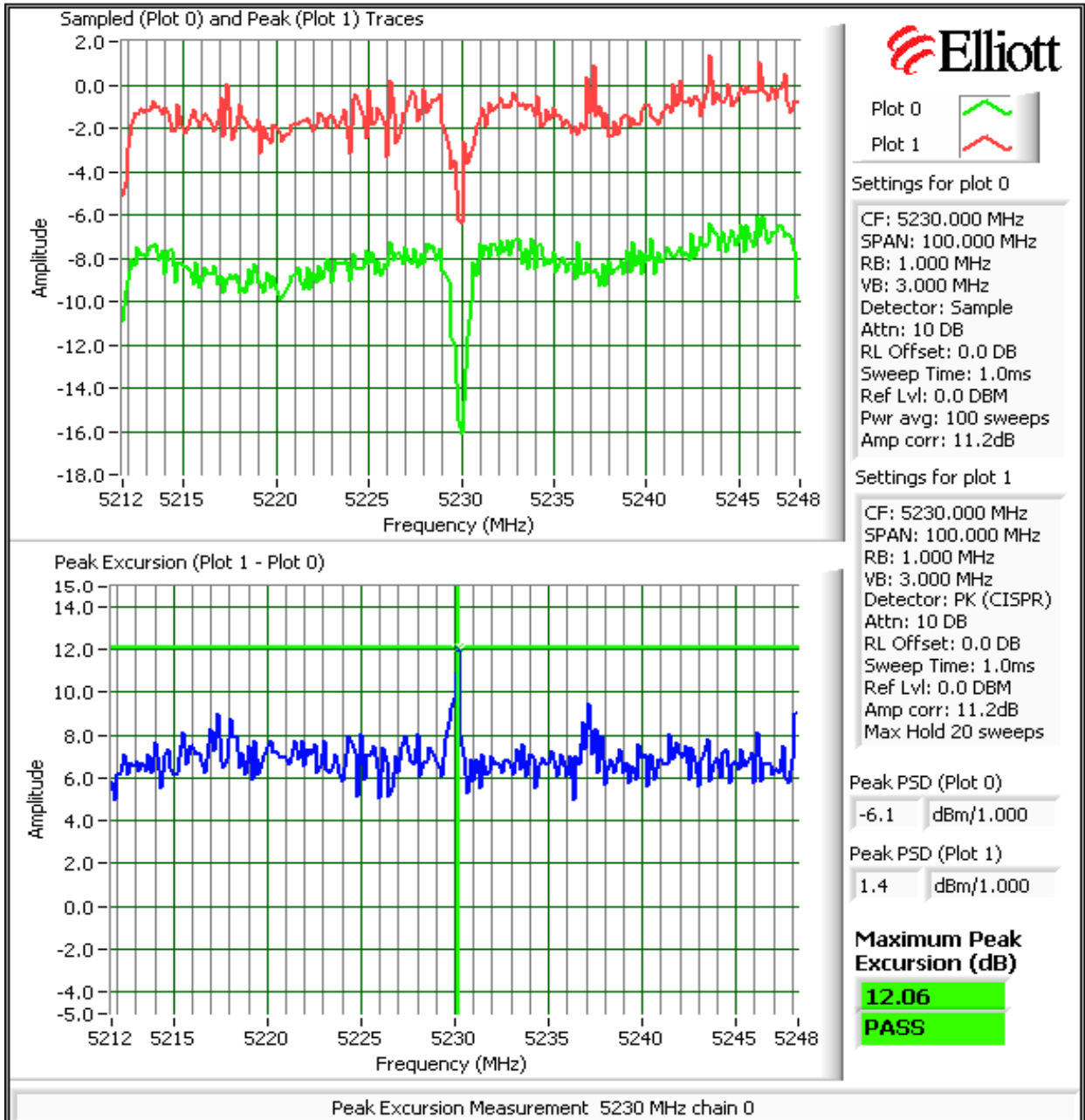
Worst case transmit chain for HT20 and HT40 modes provided.

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

MIMO Devices: Antenna gain used is the effective gain calculated in the power section of this data sheet. The plots were obtained for each chain individually and the limit was adjusted to account for all chains transmitting simultaneously

Number of transmit chains: 3  
 Maximum Antenna Gain: 4.0 dBi  
 Spurious Limit: -27.0 dBm/MHz eirp  
 Adjustment for 3 chains: -4.8 dB adjustment for multiple chains.  
 Limit Used On Plots <sup>Note 1:</sup>:  
 -35.8 dBm/MHz Average Limit (RB=1MHz, VB=10Hz)  
 -15.8 dBm/MHz Peak Limit (RB=VB=1MHz)

Note 1:	The -27dBm/MHz limit is an eirp limit. The limit for antenna port conducted measurements is adjusted to take into consideration the maximum antenna gain (limit = -27dBm - antenna gain). Radiated field strength measurements for signals more than 50MHz from the bands and that are close to the limit are made to determine compliance as the antenna gain is not known at these frequencies.
Note 2:	All spurious signals below 1GHz are measured during digital device radiated emissions test.
Note 3:	Signals within 10MHz of the 5.725 or 5.825 Band edge are subject to a limit of -17dBm EIRP
Note 4:	If the device is for outdoor use then the -27dBm eirp limit also applies in the 5150 - 5250 MHz band.
Note 5:	Signals that fall in the restricted bands of 15.205 are subject to the limit of 15.209.

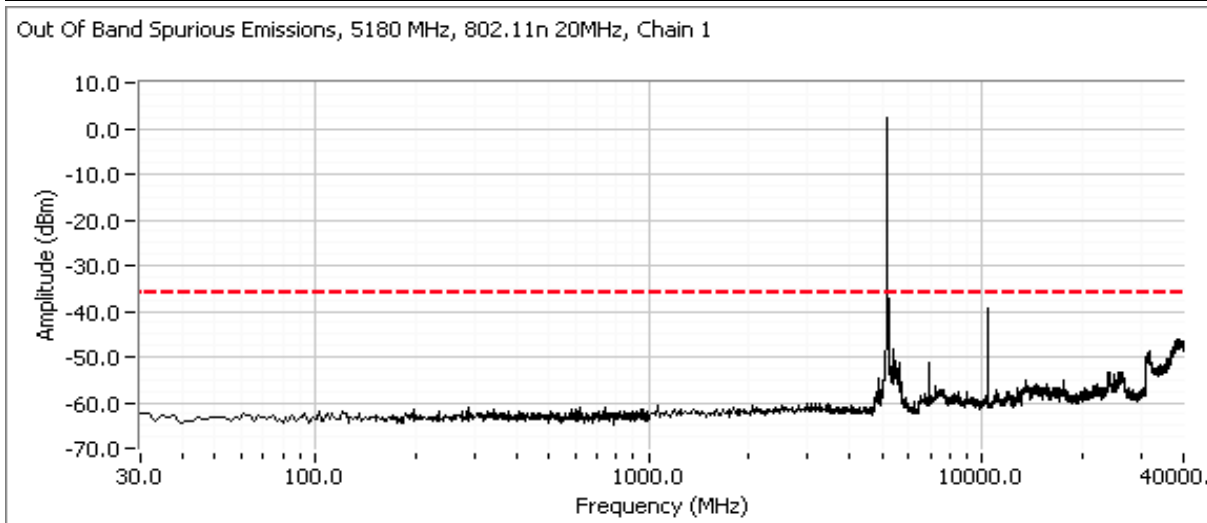
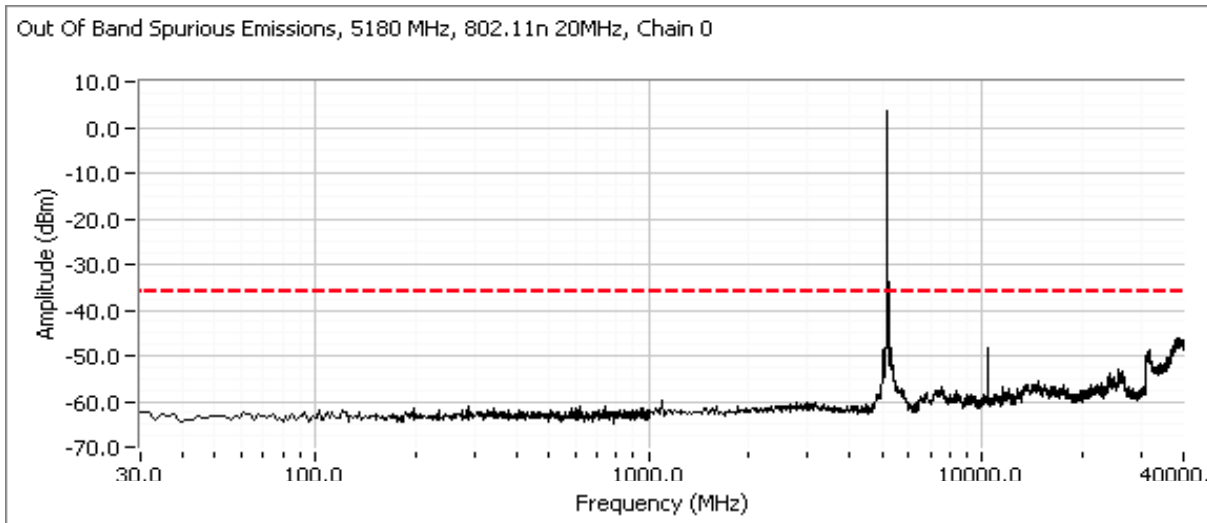
Client: Xirrus, Inc.	Job Number: J81188
Model: XR4000 3x3	T-Log Number: T83592
	Account Manager: Susan Pelzl
Contact: Steve Smith	
Standard: -	Class: N/A

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

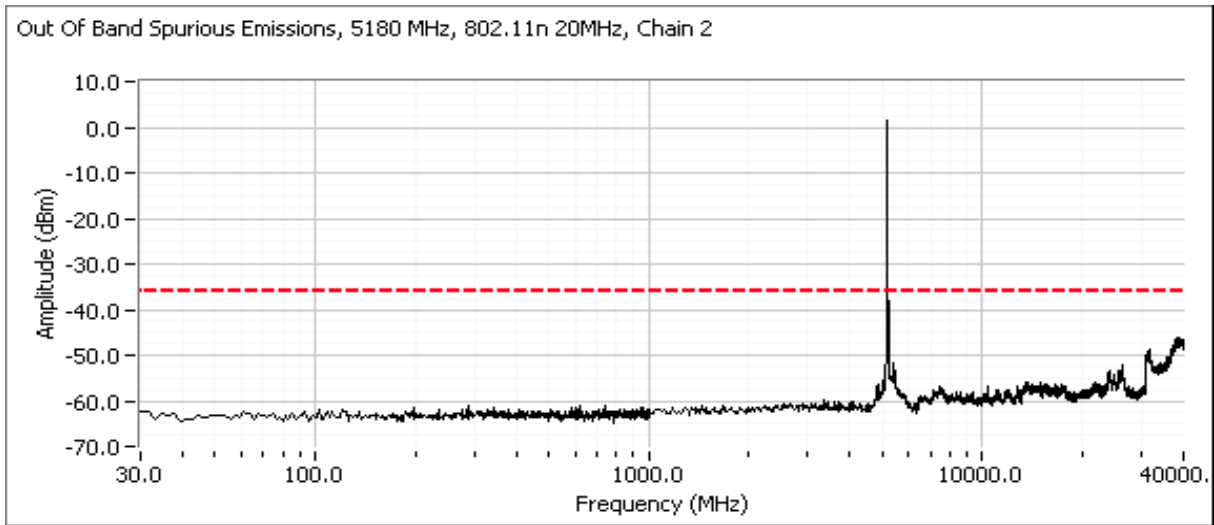
Low channel, 5150 - 5250 MHz Band

Compliance with the radiated limits for the restricted band immediately below 5150MHz is demonstrated through the radiated emissions tests.

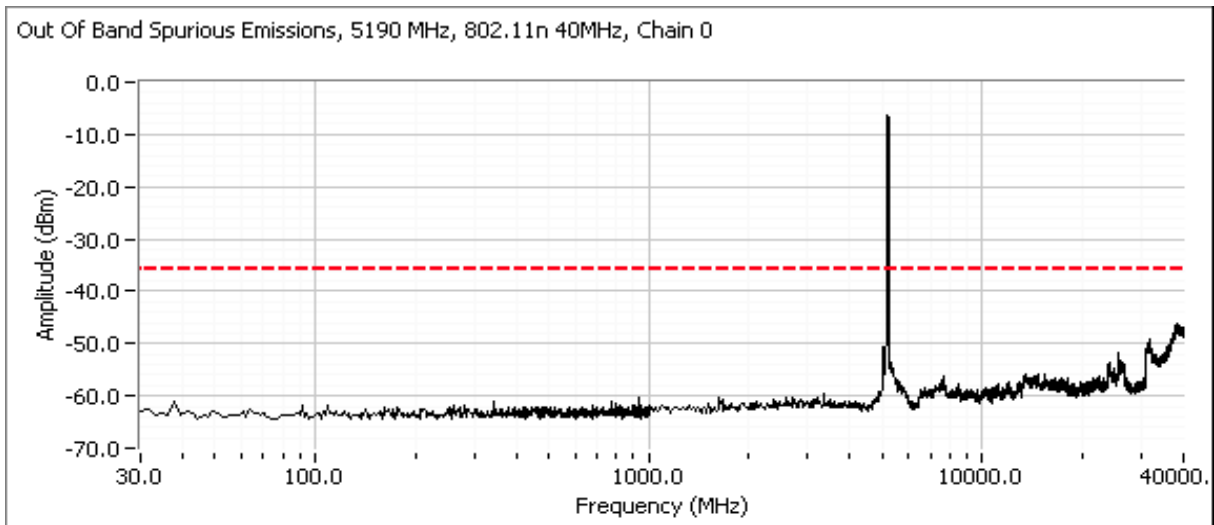
n20 Mode



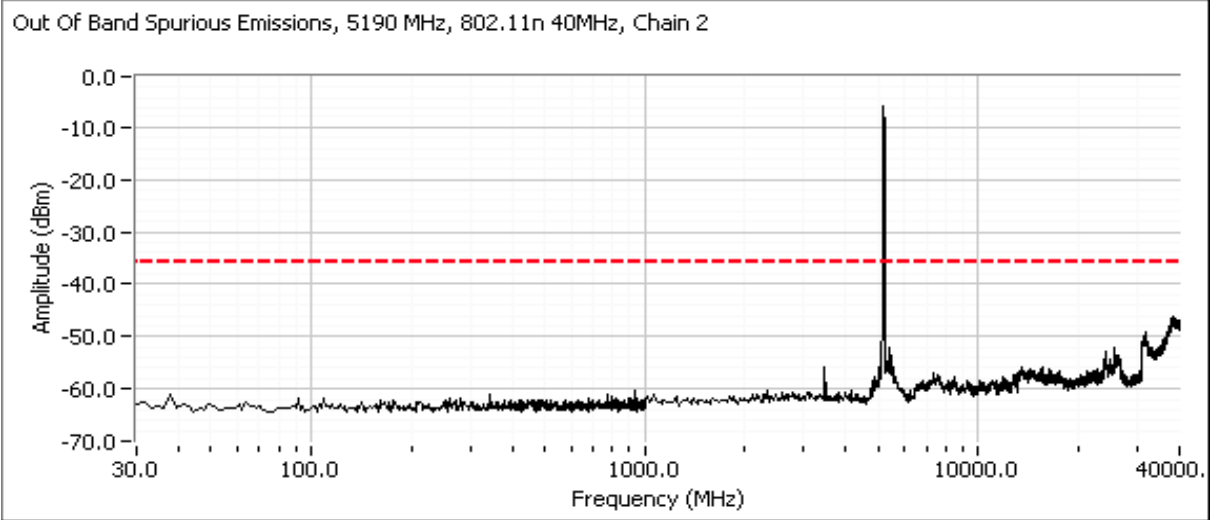
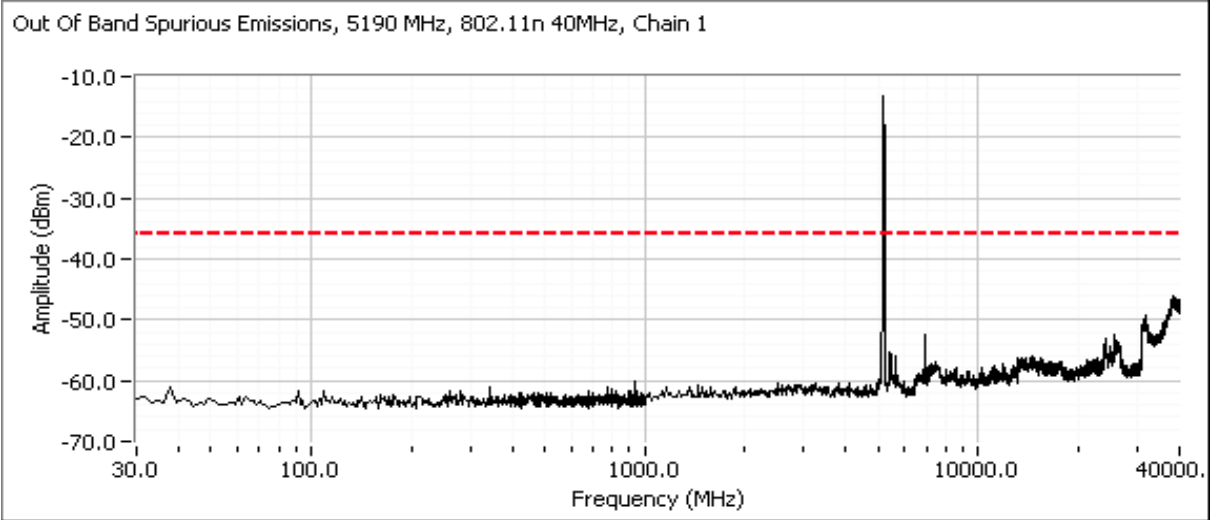
Client: Xirrus, Inc.	Job Number: J81188
Model: XR4000 3x3	T-Log Number: T83592
	Account Manager: Susan Pelzl
Contact: Steve Smith	
Standard: -	Class: N/A



n40 Mode

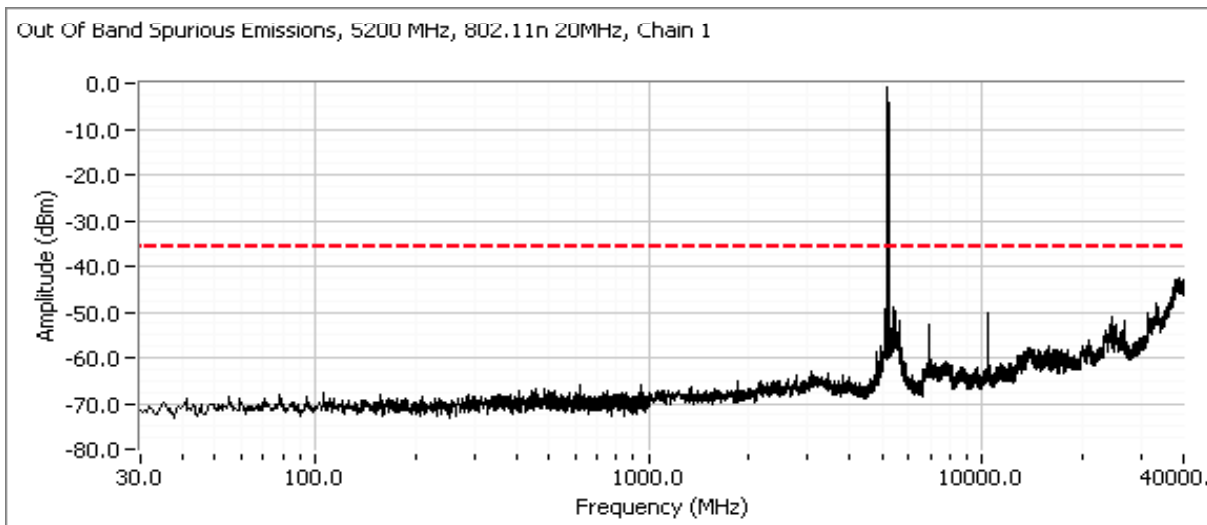
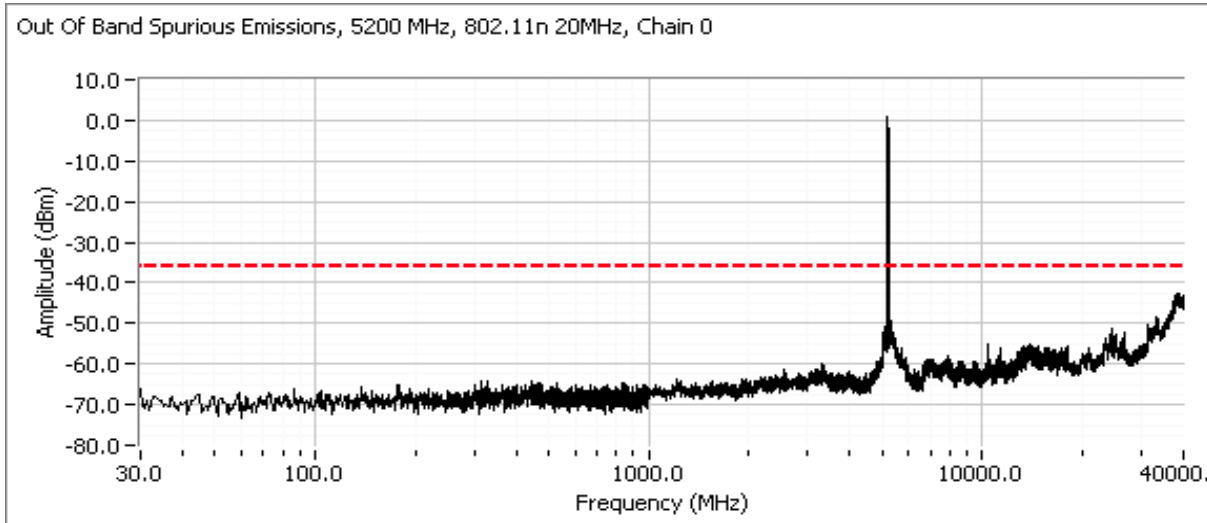


Client: Xirrus, Inc.	Job Number: J81188
Model: XR4000 3x3	T-Log Number: T83592
	Account Manager: Susan Pelzl
Contact: Steve Smith	
Standard: -	Class: N/A

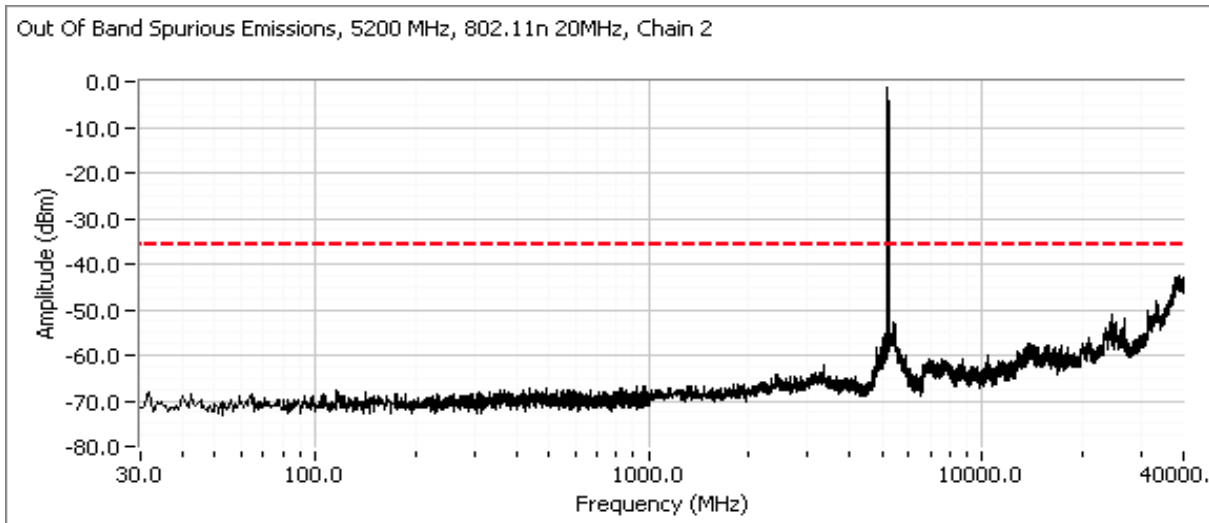


Client: Xirrus, Inc.	Job Number: J81188
Model: XR4000 3x3	T-Log Number: T83592
	Account Manager: Susan Pelzl
Contact: Steve Smith	
Standard: -	Class: N/A

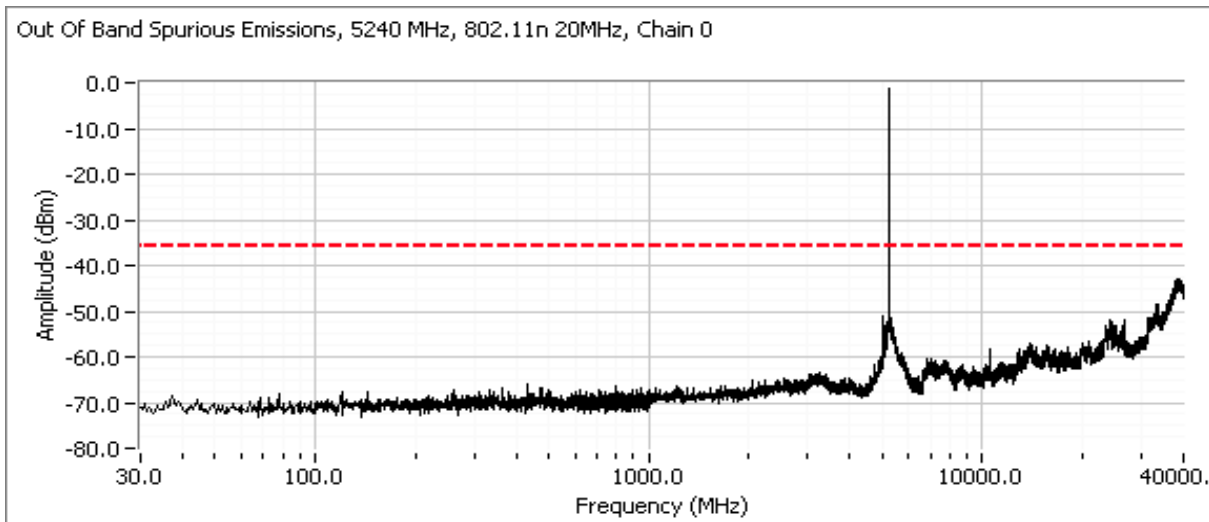
Center channel, 5150 - 5250 MHz Band  
n20 Mode



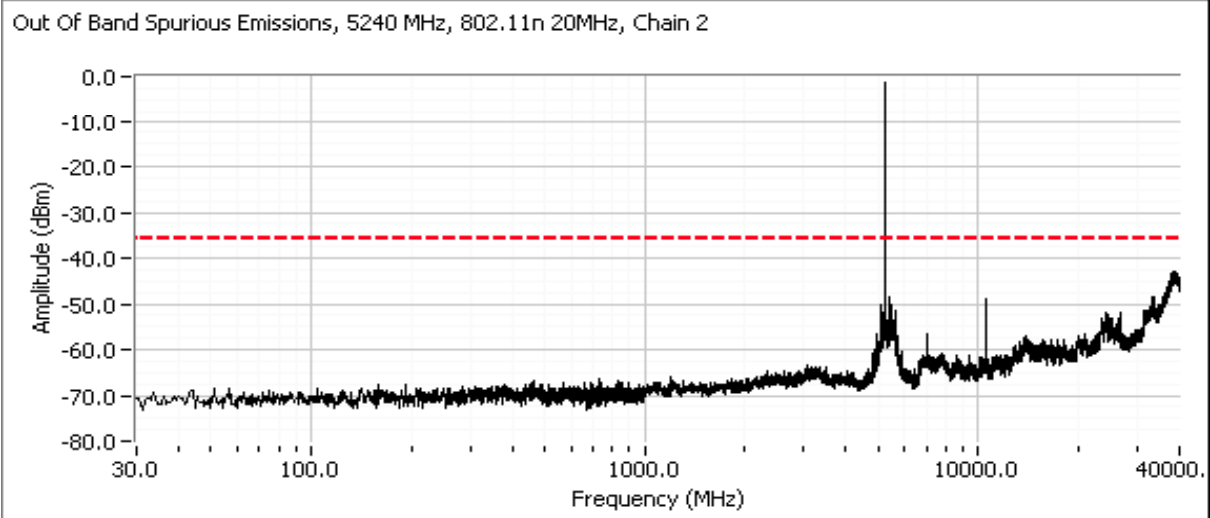
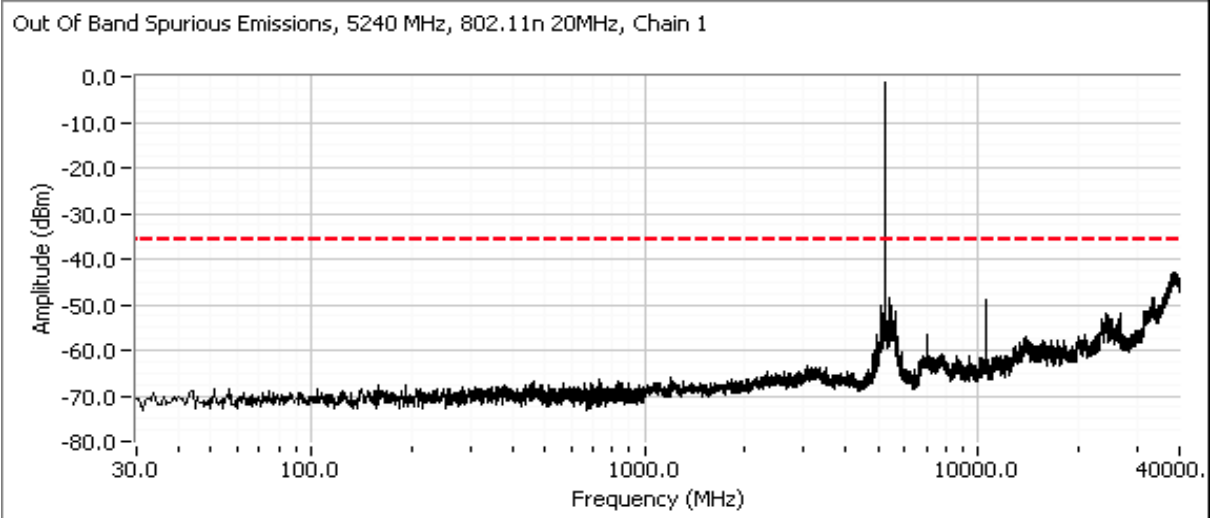
Client: Xirrus, Inc.	Job Number: J81188
Model: XR4000 3x3	T-Log Number: T83592
	Account Manager: Susan Pelzl
Contact: Steve Smith	
Standard: -	Class: N/A



High channel, 5150 - 5250 MHz Band  
n20 Mode



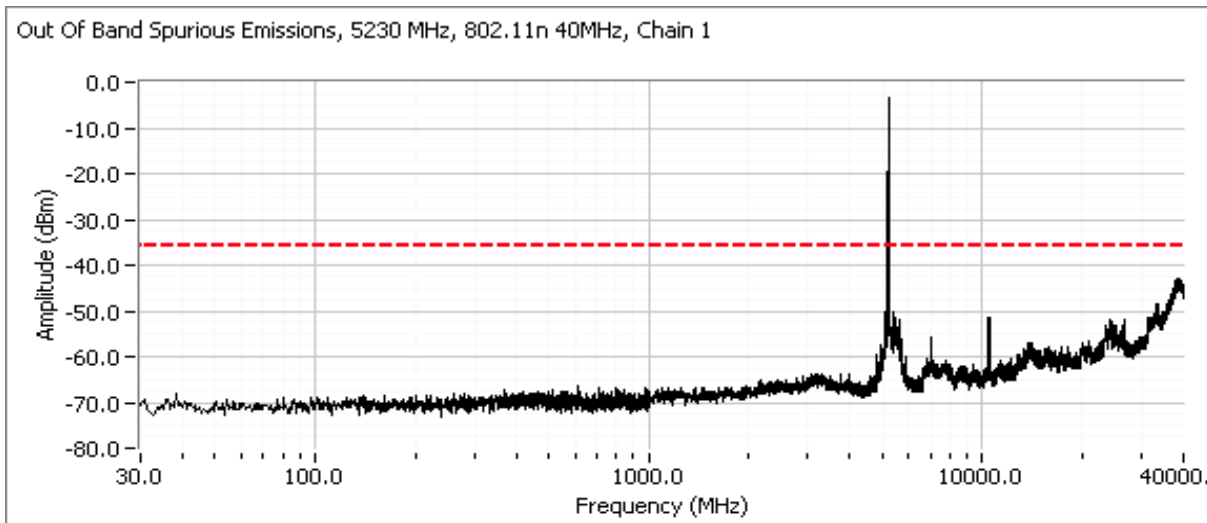
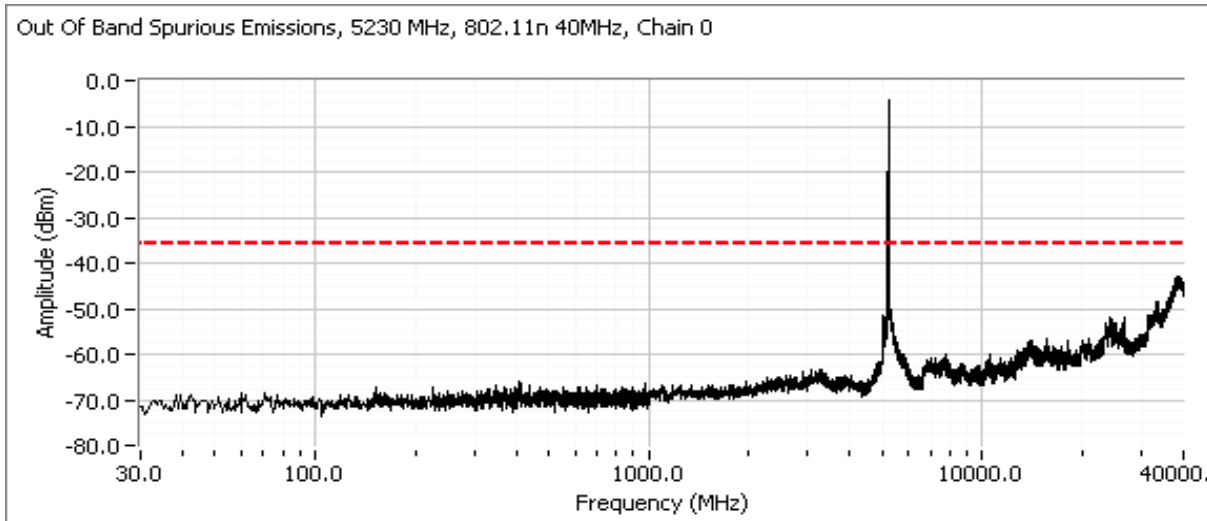
Client: Xirrus, Inc.	Job Number: J81188
Model: XR4000 3x3	T-Log Number: T83592
	Account Manager: Susan Pelzl
Contact: Steve Smith	
Standard: -	Class: N/A



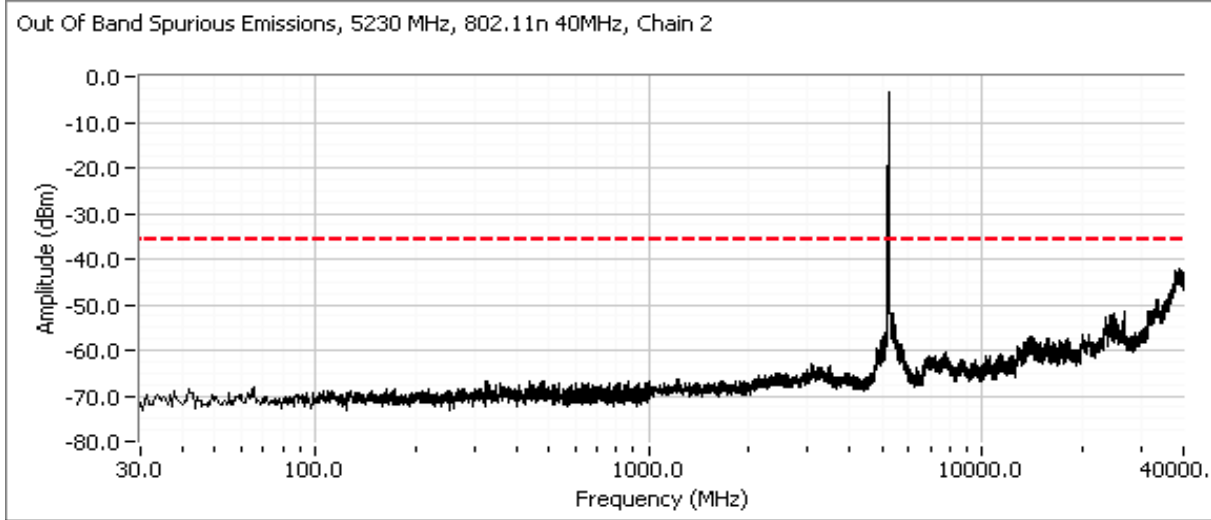


Client: Xirrus, Inc.	Job Number: J81188
Model: XR4000 3x3	T-Log Number: T83592
	Account Manager: Susan Pelzl
Contact: Steve Smith	
Standard: -	Class: N/A

n40 Mode

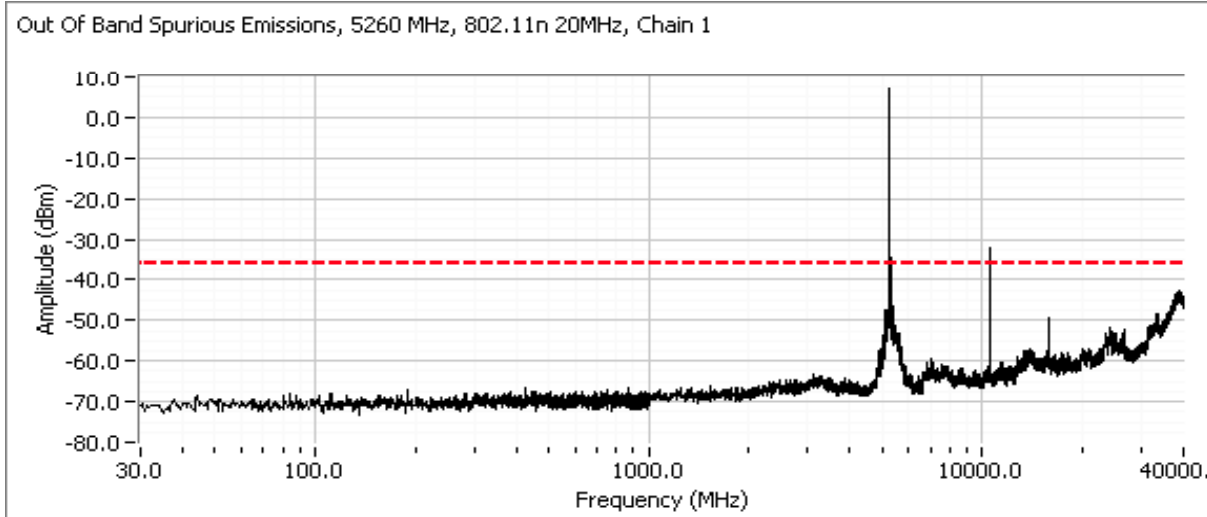
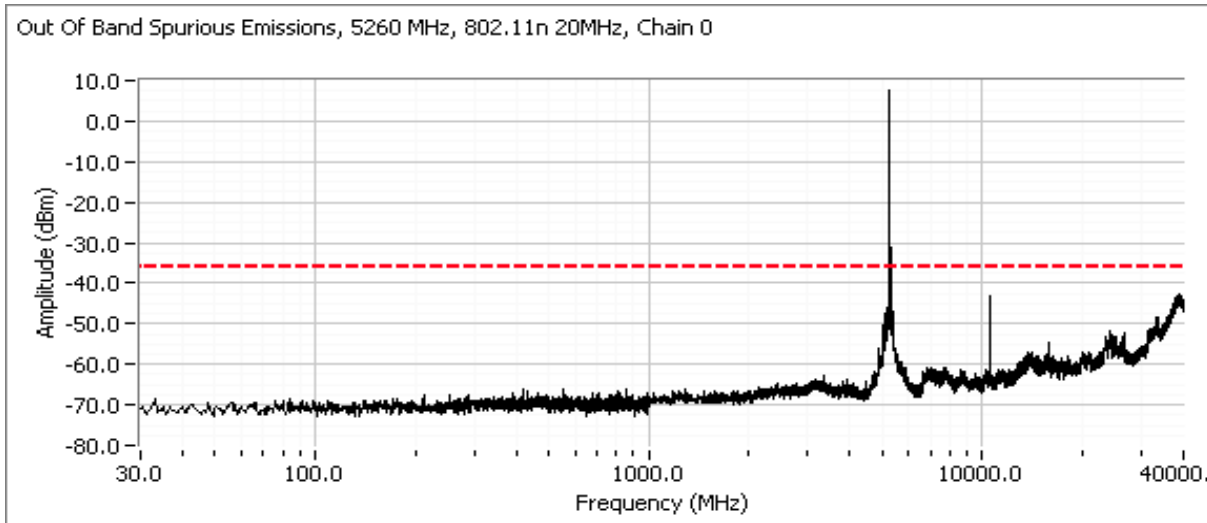


Client: Xirrus, Inc.	Job Number: J81188
Model: XR4000 3x3	T-Log Number: T83592
	Account Manager: Susan Pelzl
Contact: Steve Smith	
Standard: -	Class: N/A



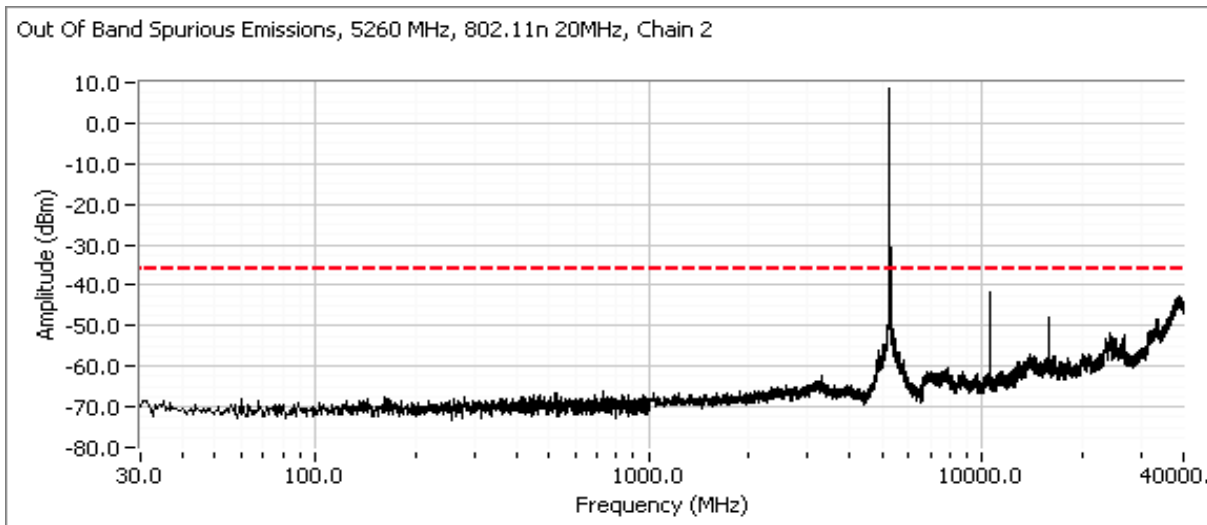
Client: Xirrus, Inc.	Job Number: J81188
Model: XR4000 3x3	T-Log Number: T83592
	Account Manager: Susan Pelzl
Contact: Steve Smith	
Standard: -	Class: N/A

Low channel, 5250 - 5350 MHz Band  
N20 Mode

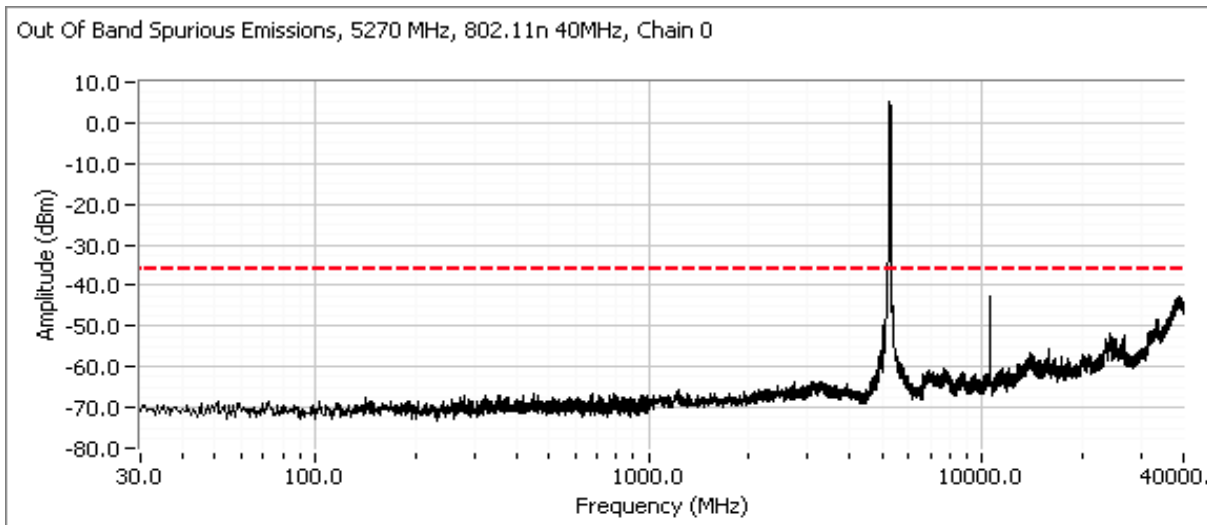


Client: Xirrus, Inc.	Job Number: J81188
Model: XR4000 3x3	T-Log Number: T83592
	Account Manager: Susan Pelzl
Contact: Steve Smith	
Standard: -	Class: N/A

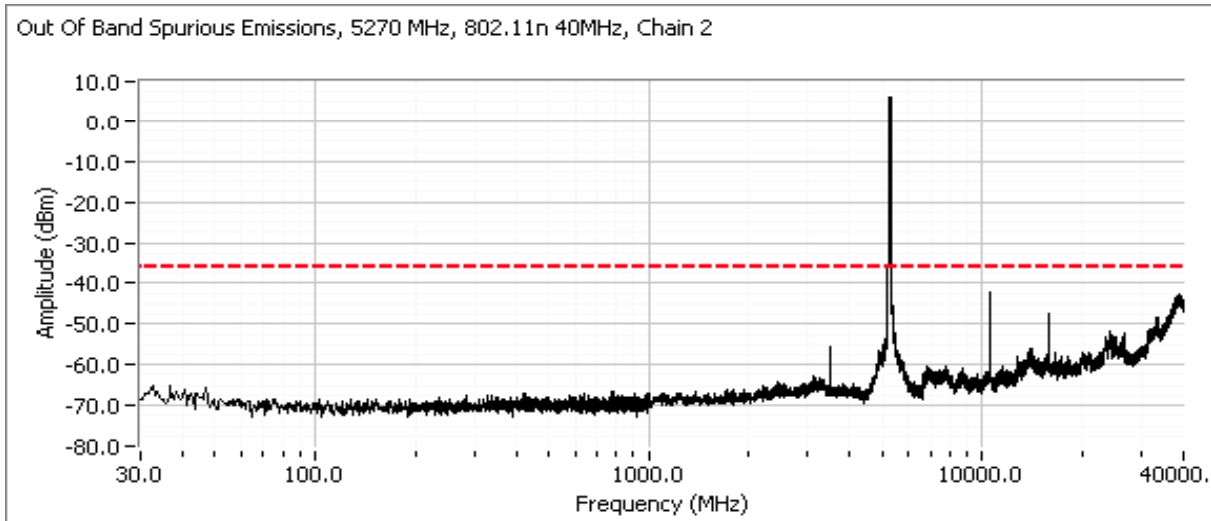
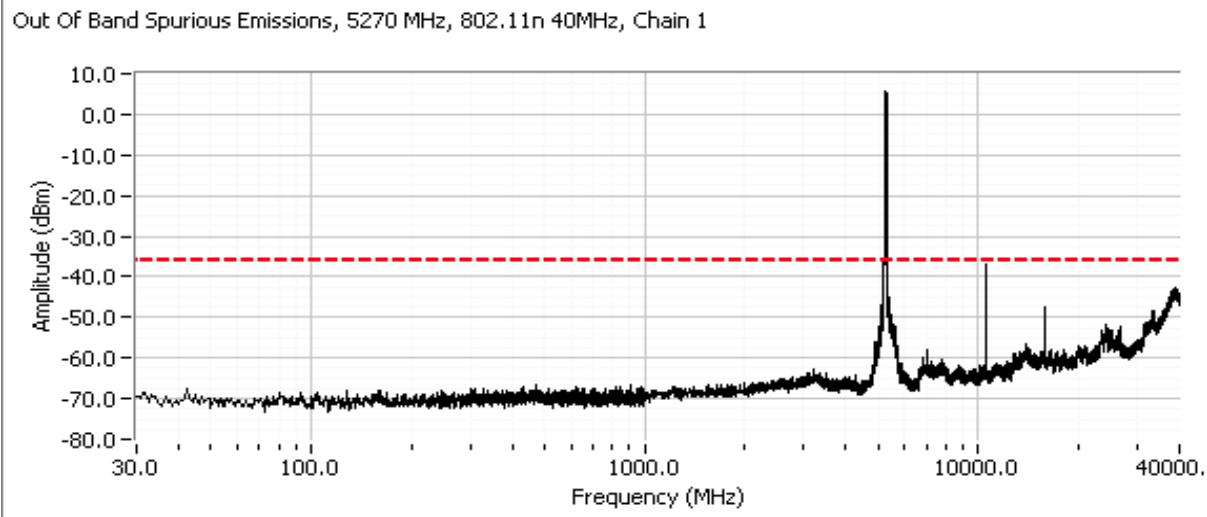
2nd Harmonic Measured Radiated - Complies with Radiated Emissions



N40 Mode

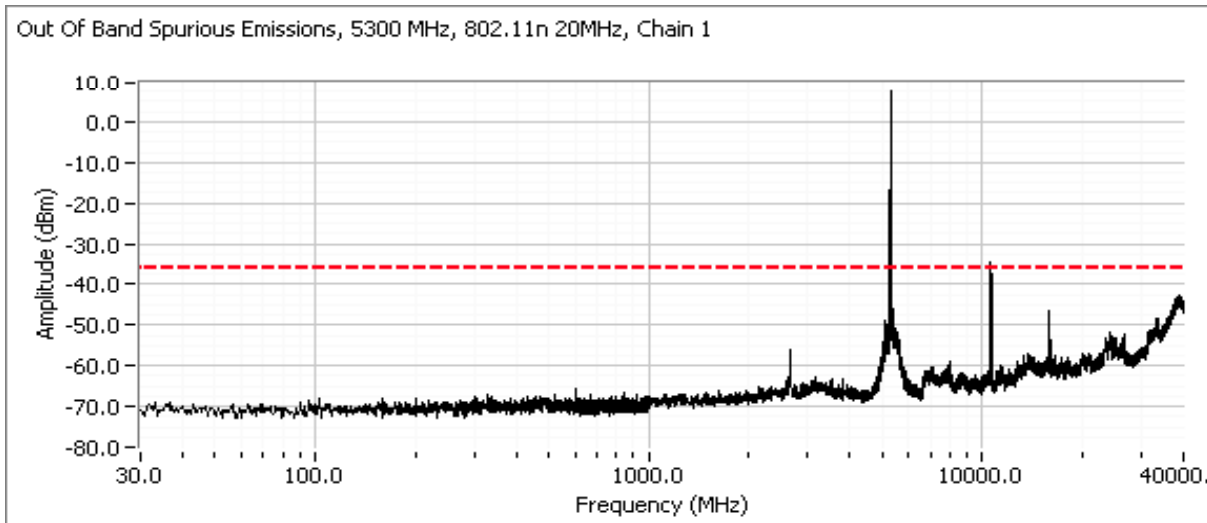
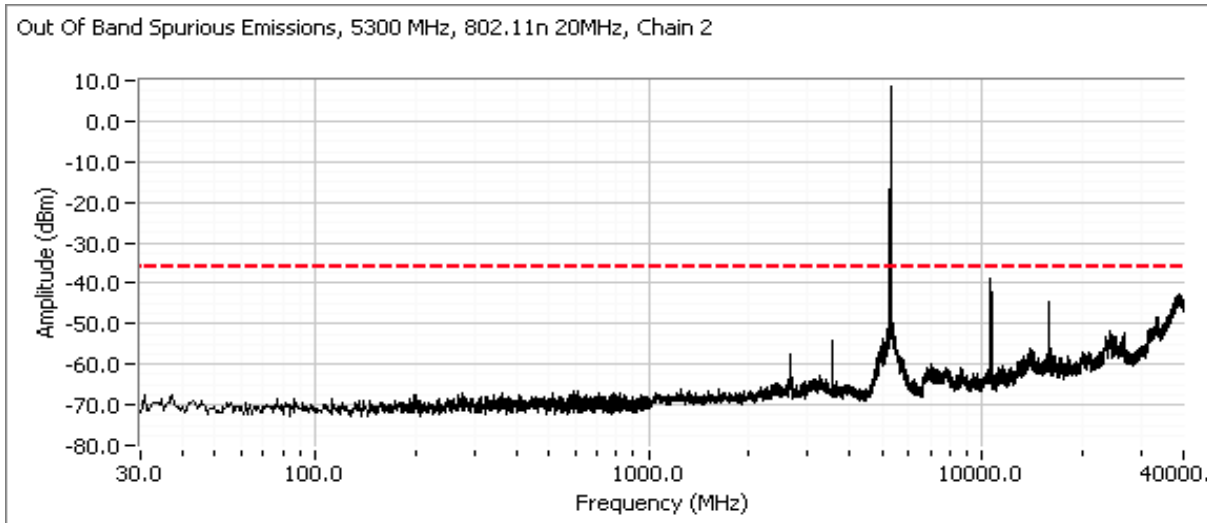


Client: Xirrus, Inc.	Job Number: J81188
Model: XR4000 3x3	T-Log Number: T83592
	Account Manager: Susan Pelzl
Contact: Steve Smith	
Standard: -	Class: N/A



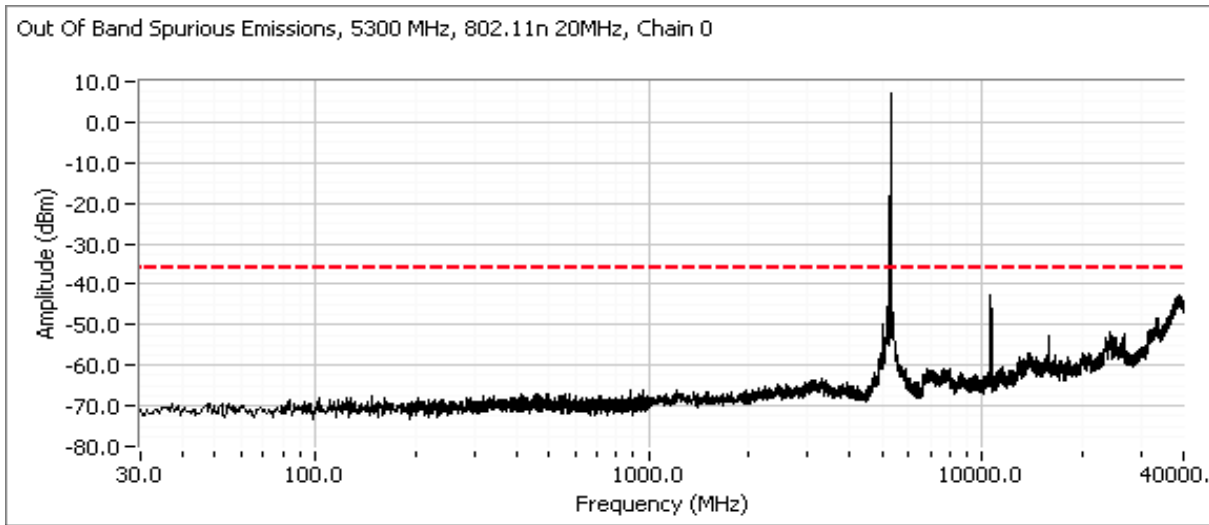
Client: Xirrus, Inc.	Job Number: J81188
Model: XR4000 3x3	T-Log Number: T83592
	Account Manager: Susan Pelzl
Contact: Steve Smith	
Standard: -	Class: N/A

Center channel, 5250 - 5350 MHz Band



2nd Harmonic Measured Radiated - Complies with Radiated Emissions

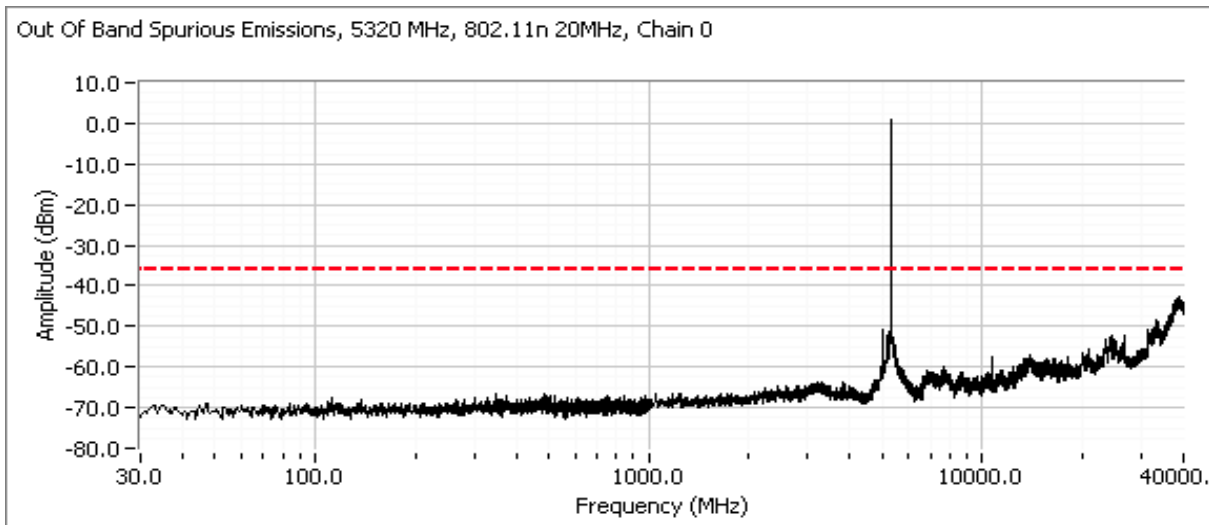
Client: Xirrus, Inc.	Job Number: J81188
Model: XR4000 3x3	T-Log Number: T83592
	Account Manager: Susan Pelzl
Contact: Steve Smith	
Standard: -	Class: N/A



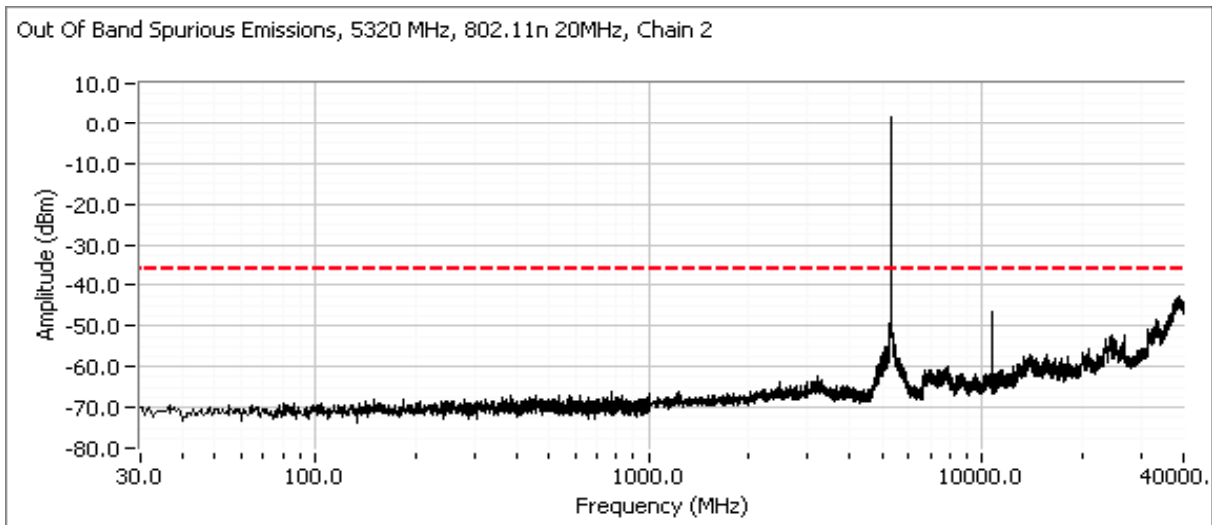
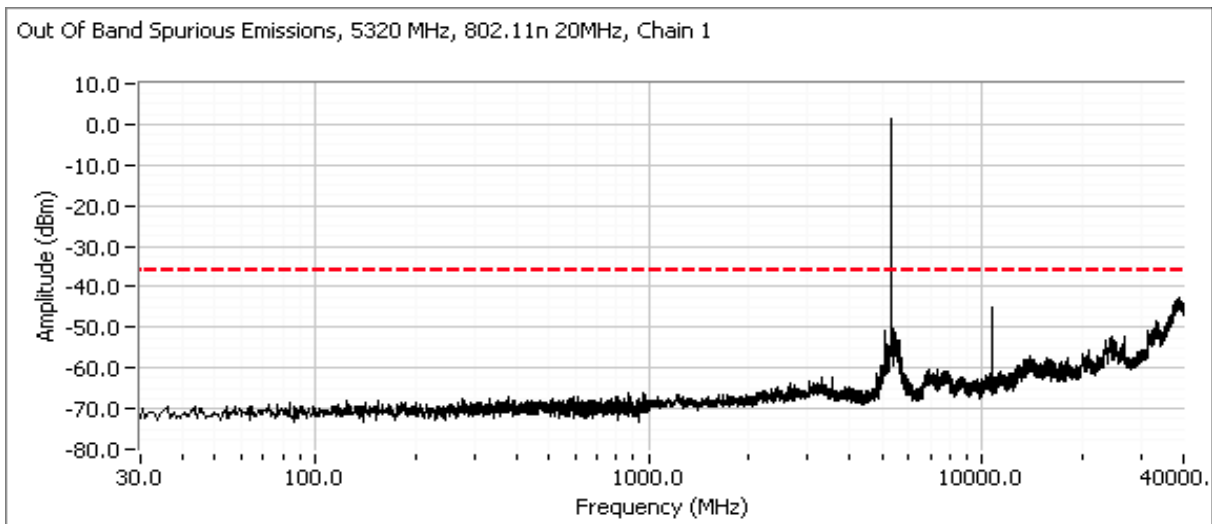
High channel, 5250 - 5350 MHz Band

Note - compliance with the radiated limits for the restricted band immediately above 5350MHz is demonstrated through the radiated emissions tests.

n20 mode



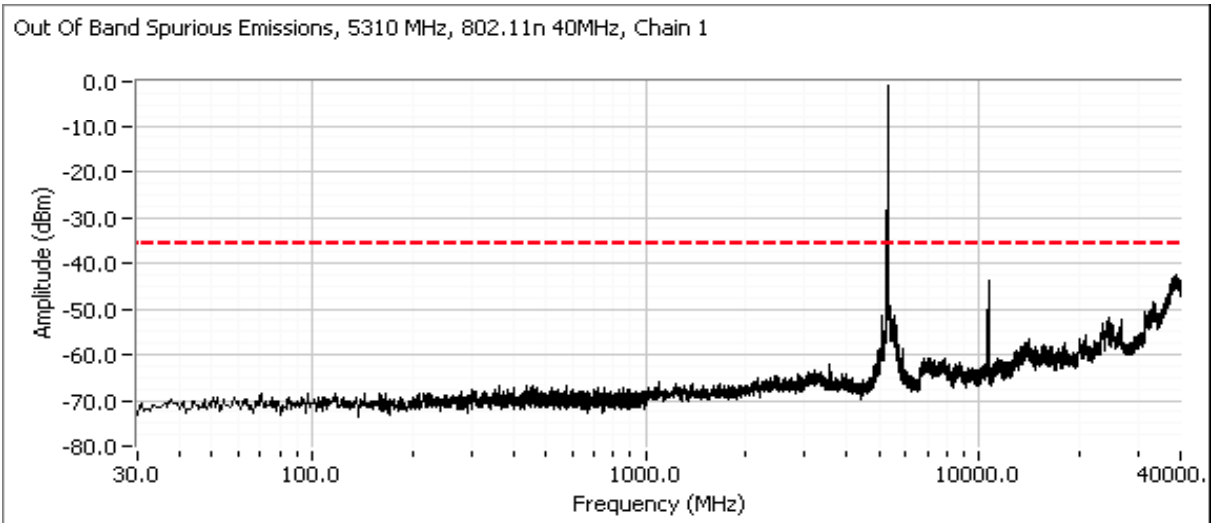
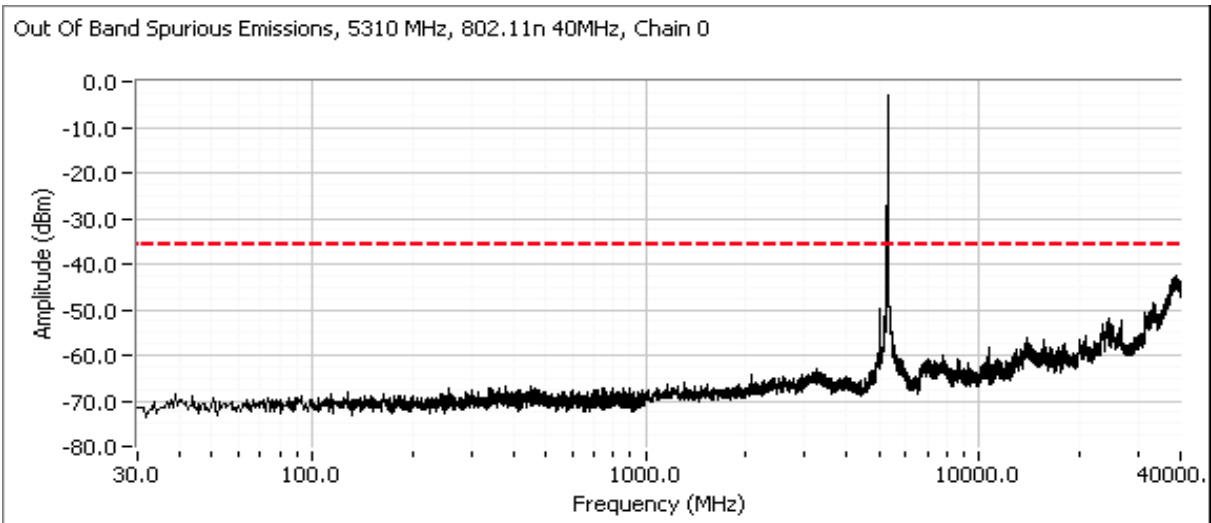
Client: Xirrus, Inc.	Job Number: J81188
Model: XR4000 3x3	T-Log Number: T83592
	Account Manager: Susan Pelzl
Contact: Steve Smith	
Standard: -	Class: N/A



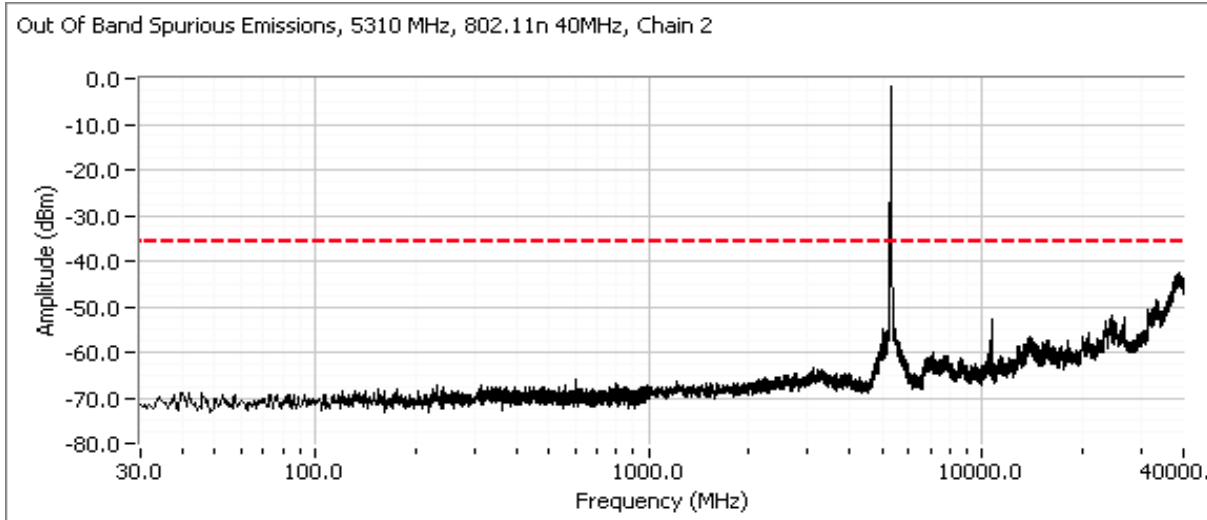


Client: Xirrus, Inc.	Job Number: J81188
Model: XR4000 3x3	T-Log Number: T83592
	Account Manager: Susan Pelzl
Contact: Steve Smith	
Standard: -	Class: N/A

n40 mode



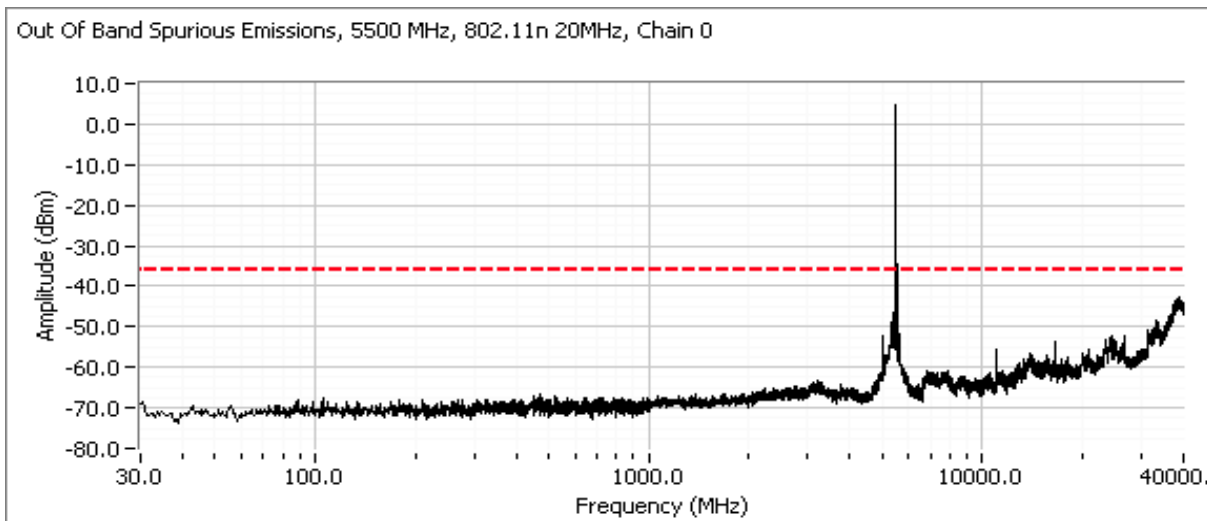
Client: Xirrus, Inc.	Job Number: J81188
Model: XR4000 3x3	T-Log Number: T83592
	Account Manager: Susan Pelzl
Contact: Steve Smith	
Standard: -	Class: N/A



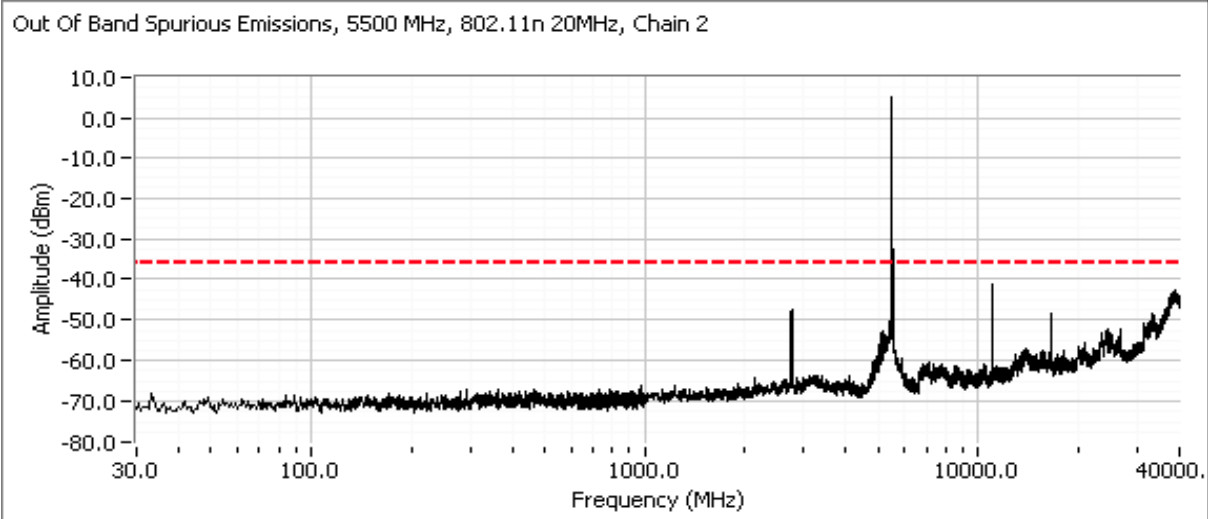
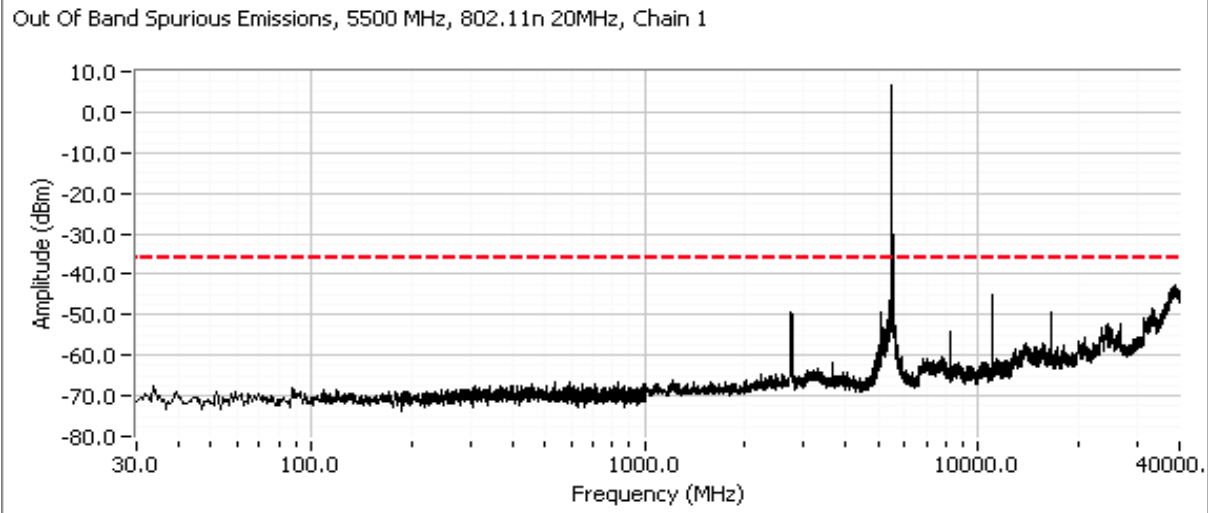
Low channel, 5470 - 5725 MHz Band

Compliance with the -27dBm/MHz limit in the 5460 - 5470 MHz band immediately below the allocated band is demonstrated via radiated measurements.

n20 Mode

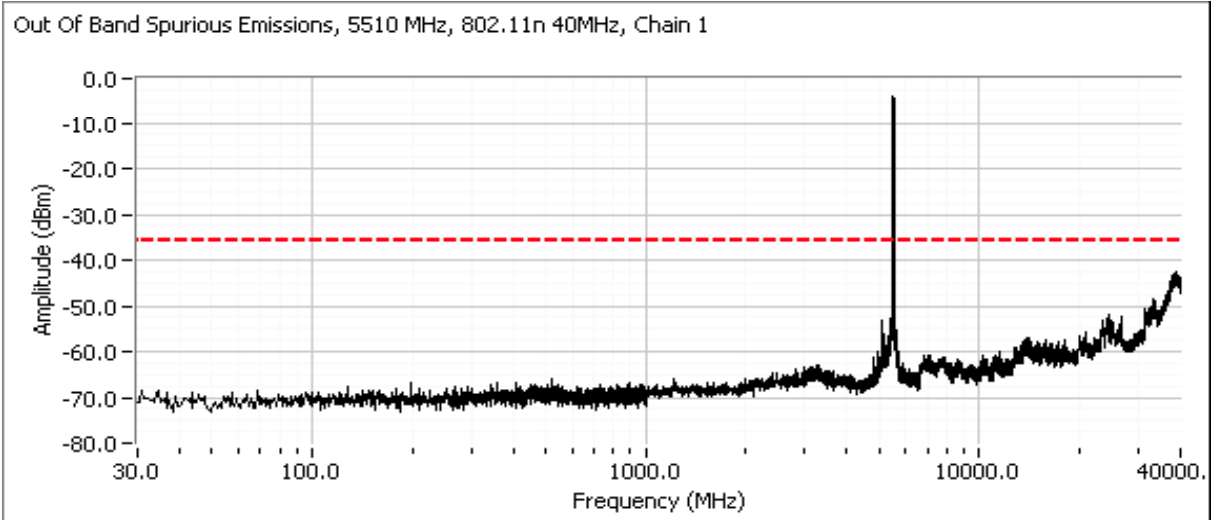
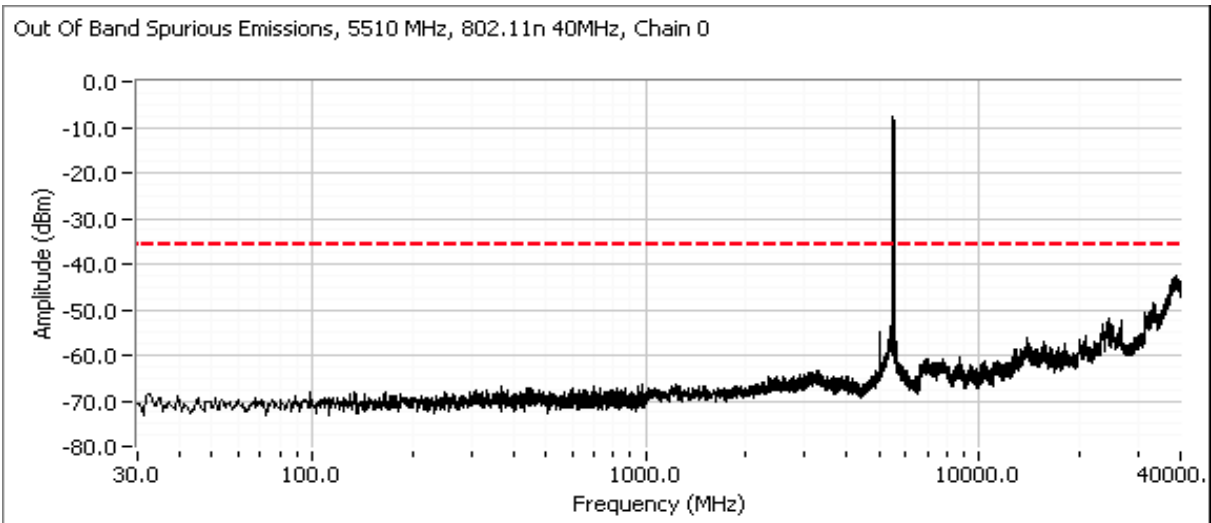


Client: Xirrus, Inc.	Job Number: J81188
Model: XR4000 3x3	T-Log Number: T83592
	Account Manager: Susan Pelzl
Contact: Steve Smith	
Standard: -	Class: N/A

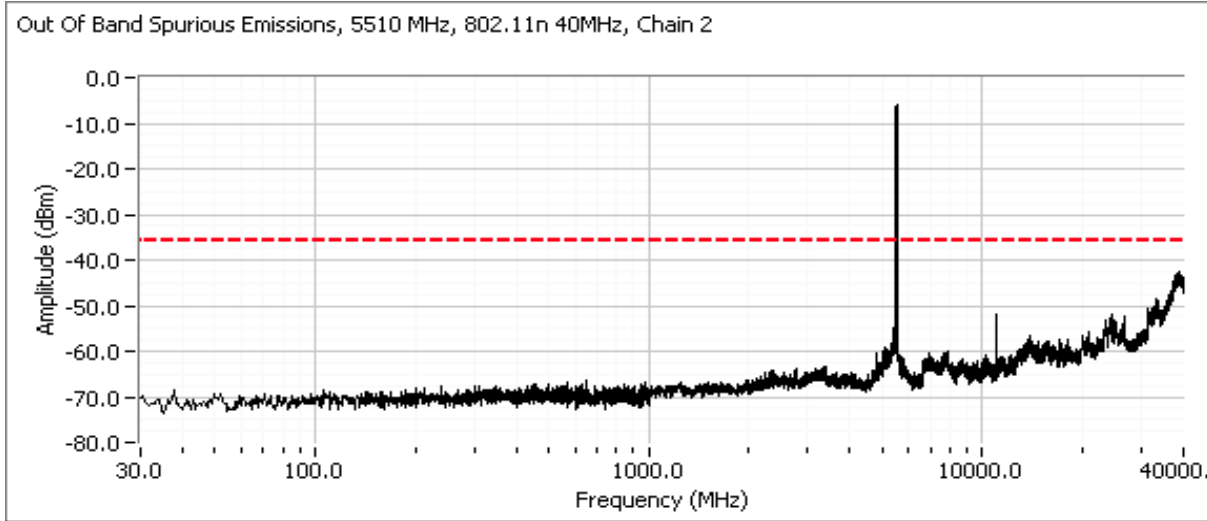


Client: Xirrus, Inc.	Job Number: J81188
Model: XR4000 3x3	T-Log Number: T83592
	Account Manager: Susan Pelzl
Contact: Steve Smith	
Standard: -	Class: N/A

n40 Mode



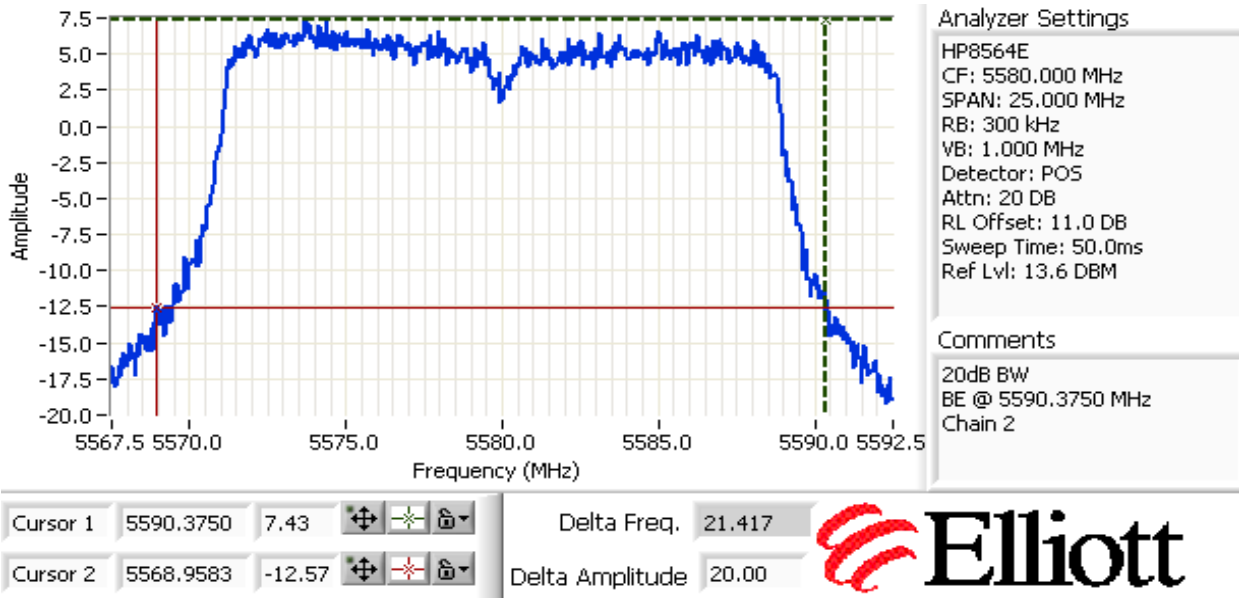
Client: Xirrus, Inc.	Job Number: J81188
Model: XR4000 3x3	T-Log Number: T83592
Contact: Steve Smith	Account Manager: Susan Pelzl
Standard: -	Class: N/A



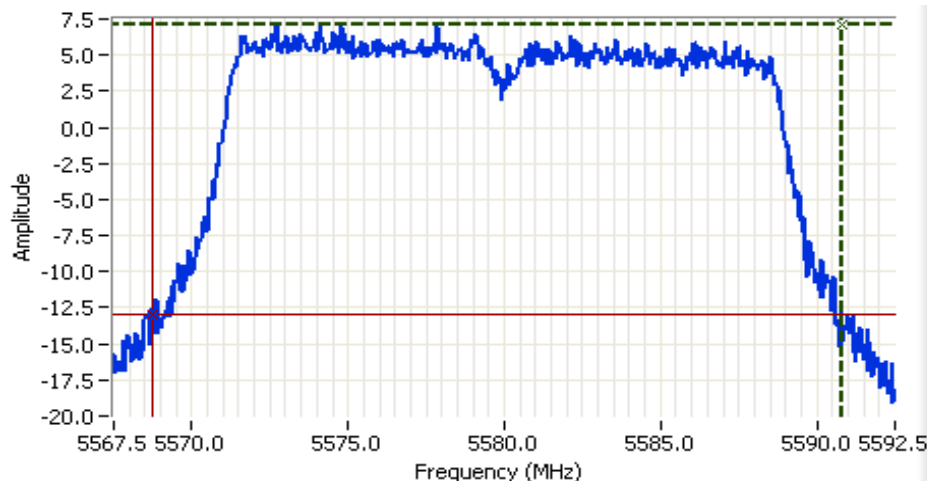
Center channel, 5470 - 5725 MHz Band

For master devices - This plot is showing that the 20dB bandwidth of the channel closest to 5600 MHz does not spill into the 5600-5650 MHz band.

n20 Mode



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



**Analyzer Settings**

HP8564E  
CF: 5580.000 MHz  
SPAN: 25.000 MHz  
RB: 300 kHz  
VB: 1.000 MHz  
Detector: POS  
Attn: 20 DB  
RL Offset: 11.0 DB  
Sweep Time: 50.0ms  
Ref Lvl: 13.6 DBM

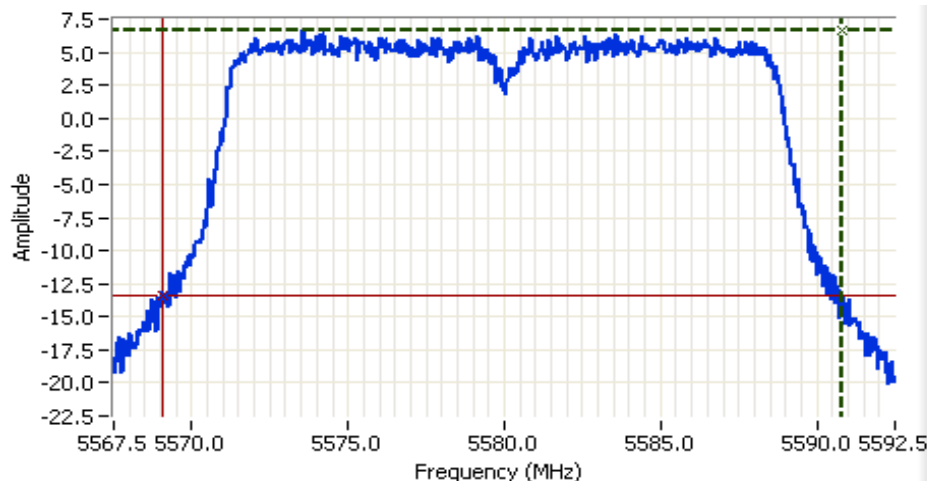
**Comments**

20dB BW  
BE @ 5590.7917 MHz  
Chain 0

Cursor 1	5590.7917	7.10	
Cursor 2	5568.7500	-12.90	

Delta Freq. 22.042

Delta Amplitude 20.00



**Analyzer Settings**

HP8564E  
CF: 5580.000 MHz  
SPAN: 25.000 MHz  
RB: 300 kHz  
VB: 1.000 MHz  
Detector: POS  
Attn: 20 DB  
RL Offset: 11.0 DB  
Sweep Time: 50.0ms  
Ref Lvl: 13.6 DBM

**Comments**

20dB BW  
BE @ 5590.8333 MHz  
Chain 1

Cursor 1	5590.8333	6.60	
Cursor 2	5569.0833	-13.40	

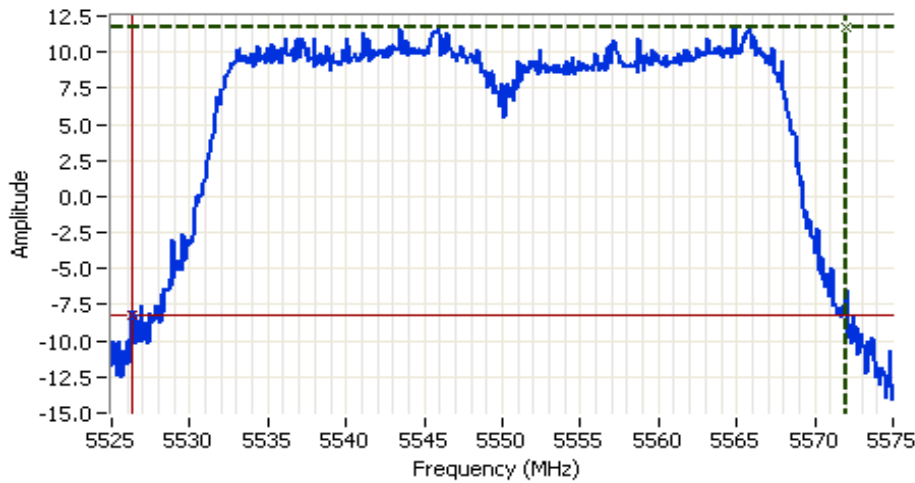
Delta Freq. 21.750

Delta Amplitude 20.00



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

n40 Mode



Analyzer Settings

HP8564E  
CF: 5550.000 MHz  
SPAN: 50.000 MHz  
RB: 1.000 MHz  
VB: 3.000 MHz  
Detector: POS  
Attn: 20 DB  
RL Offset: 11.0 DB  
Sweep Time: 50.0ms  
Ref Lvl: 13.6 DBM

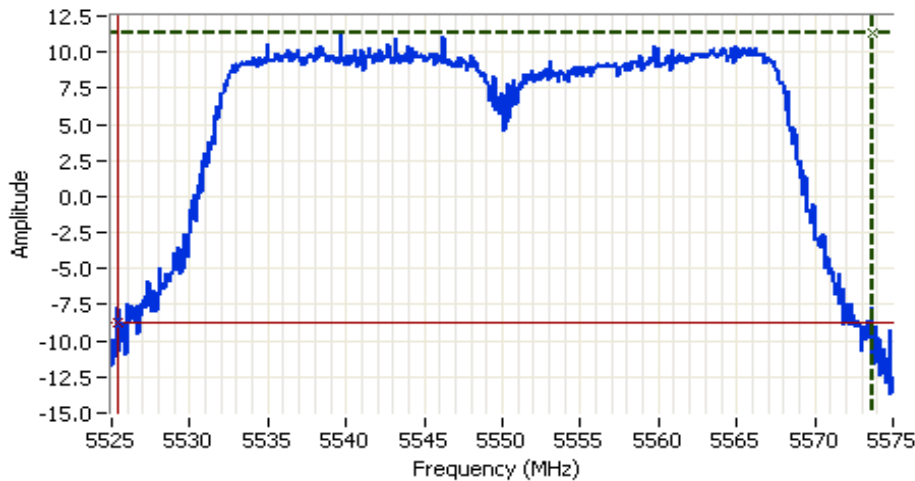
Comments

20dB BW  
BE @ 5572.0000 MHz  
Chain 2

Cursor 1 5572.0000 11.77  
Cursor 2 5526.2500 -8.23

Delta Freq. 45.750

Delta Amplitude 20.00



Analyzer Settings

HP8564E  
CF: 5550.000 MHz  
SPAN: 50.000 MHz  
RB: 1.000 MHz  
VB: 3.000 MHz  
Detector: POS  
Attn: 20 DB  
RL Offset: 11.0 DB  
Sweep Time: 50.0ms  
Ref Lvl: 13.6 DBM

Comments

20dB BW  
BE @ 5573.6667 MHz  
Chain 0

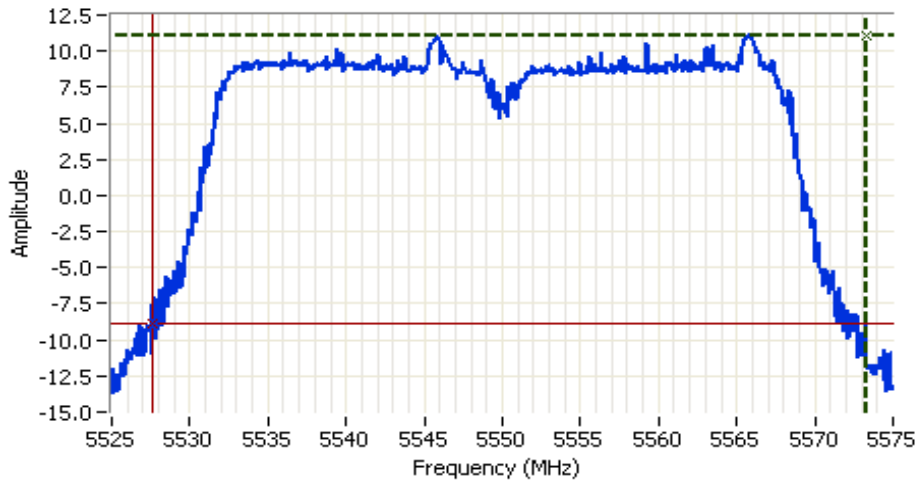
Cursor 1 5573.6667 11.27  
Cursor 2 5525.4167 -8.73

Delta Freq. 48.250

Delta Amplitude 20.00



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



**Analyzer Settings**

HP8564E  
 CF: 5550.000 MHz  
 SPAN: 50.000 MHz  
 RB: 1.000 MHz  
 VB: 3.000 MHz  
 Detector: POS  
 Attn: 20 DB  
 RL Offset: 11.0 DB  
 Sweep Time: 50.0ms  
 Ref Lvl: 13.6 DBM

**Comments**

20dB BW  
 BE @ 5573.2500 MHz  
 Chain 1

Cursor 1	5573.2500	11.10	
Cursor 2	5527.6667	-8.90	

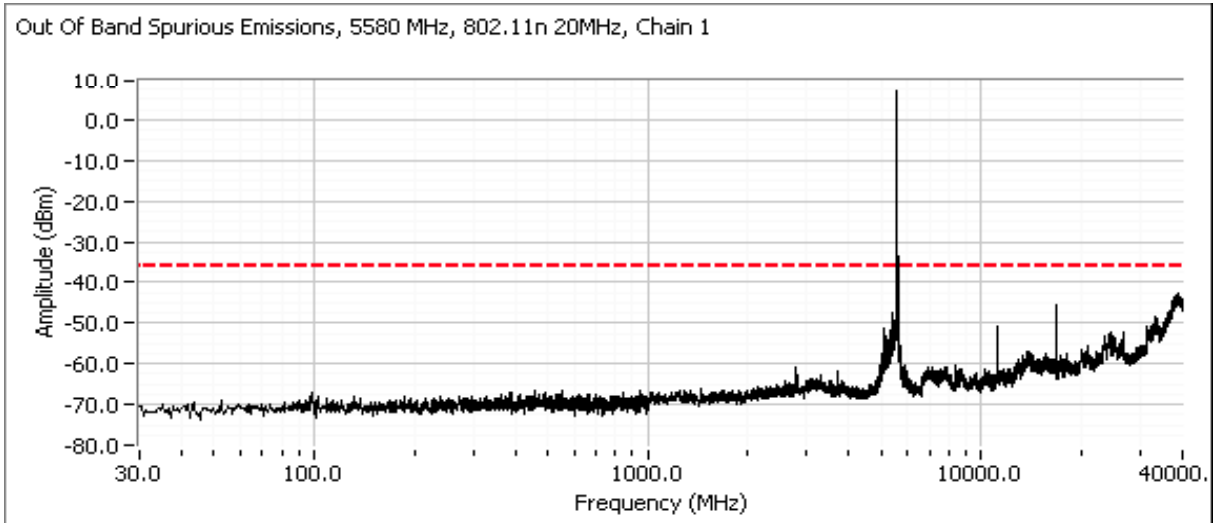
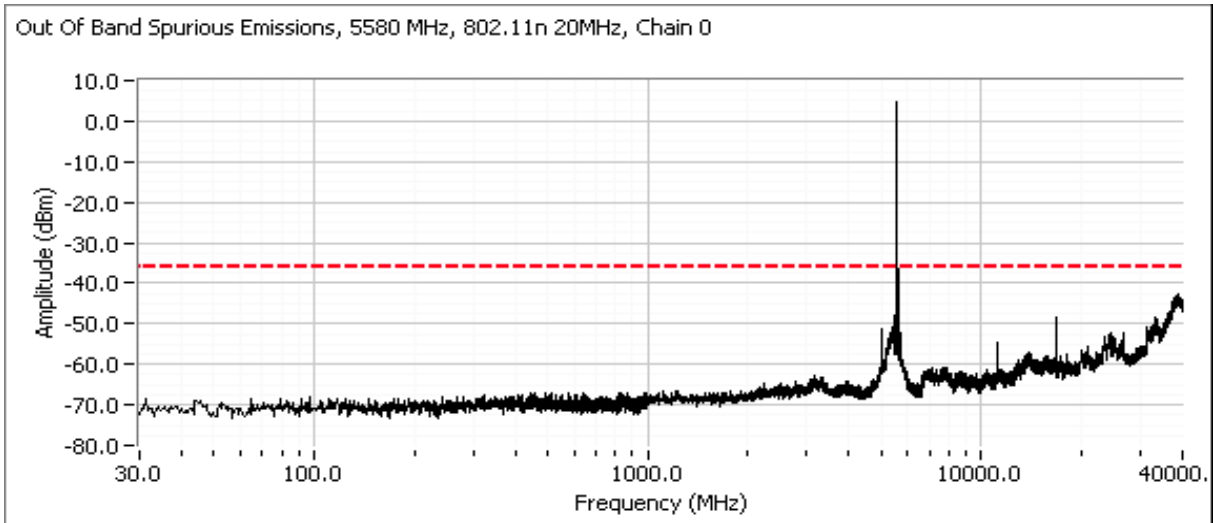
Delta Freq. 45.583  
 Delta Amplitude 20.00



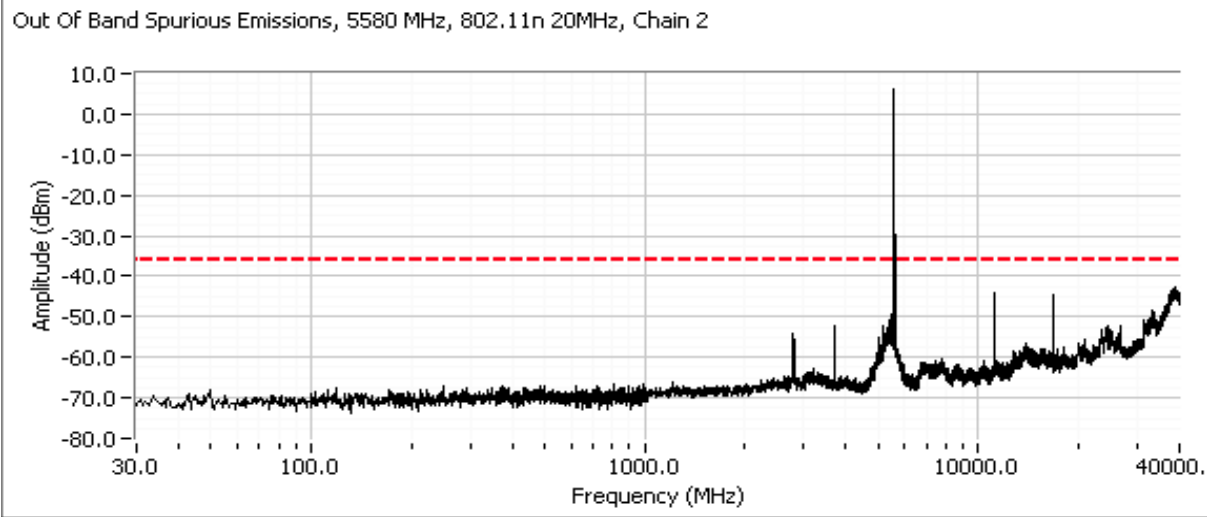


Client: Xirrus, Inc.	Job Number: J81188
Model: XR4000 3x3	T-Log Number: T83592
	Account Manager: Susan Pelzl
Contact: Steve Smith	
Standard: -	Class: N/A

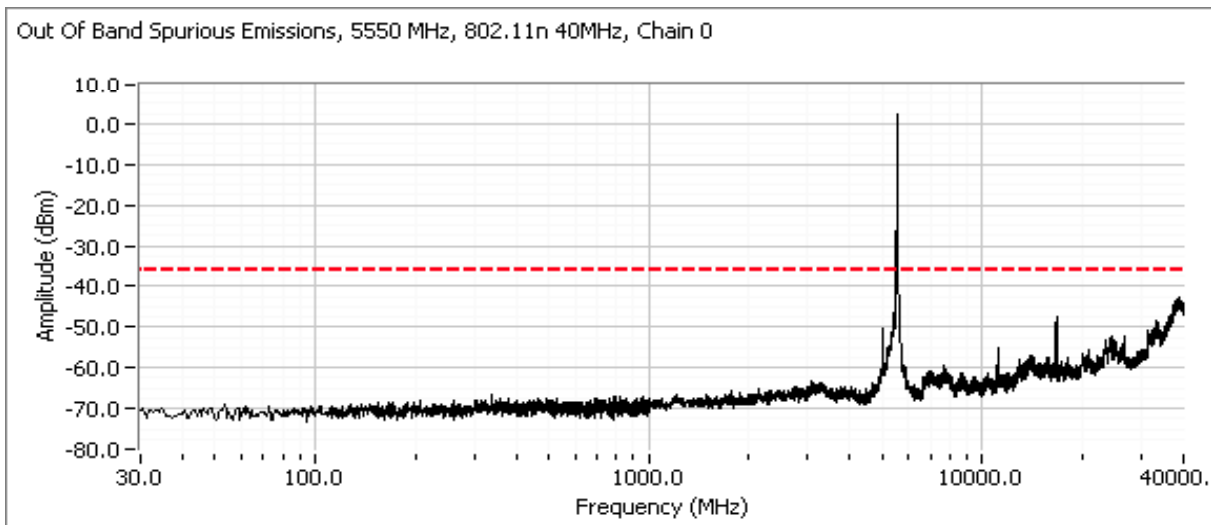
Wide-band plot, RB=VB=1MHz (Peak measurements versus limit).  
n20 Mode



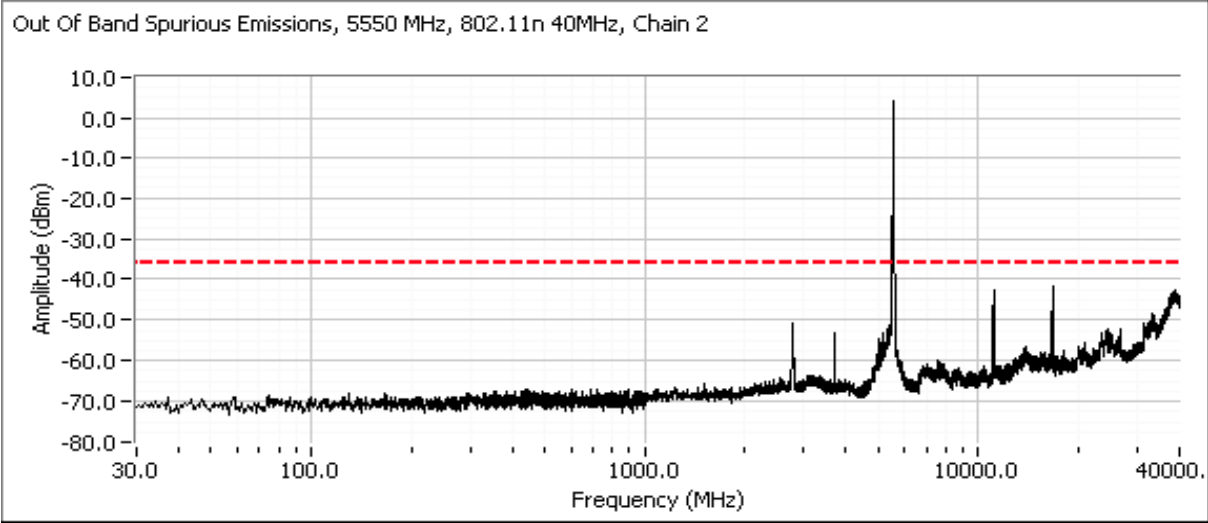
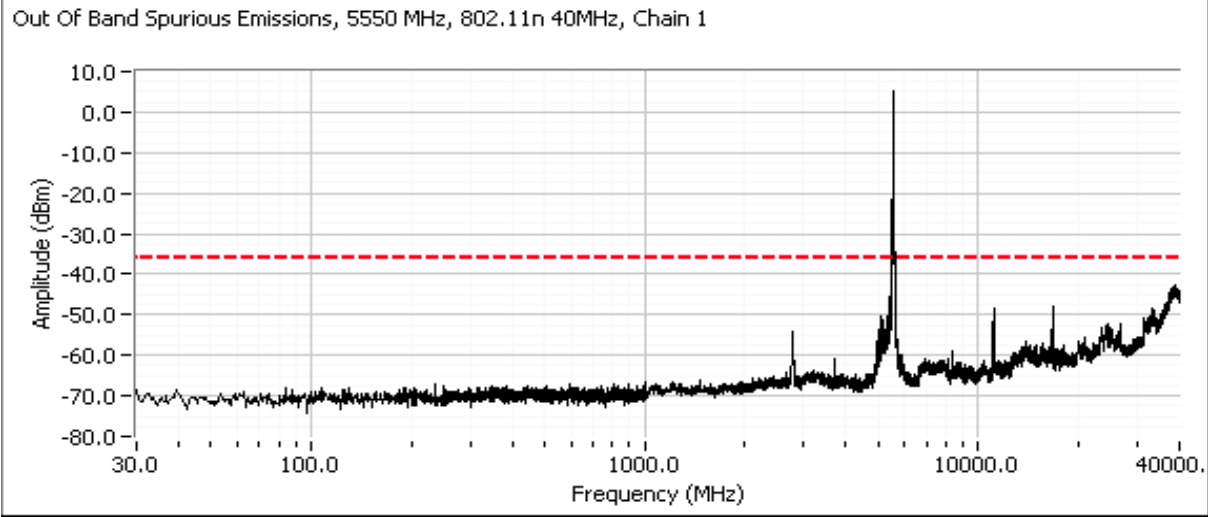
Client: Xirrus, Inc.	Job Number: J81188
Model: XR4000 3x3	T-Log Number: T83592
	Account Manager: Susan Pelzl
Contact: Steve Smith	
Standard: -	Class: N/A



n40 Mode



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
Contact: Steve Smith	Account Manager: Susan Pelzl
Standard: -	Class: N/A

Channel adjacent to 5650 MHz (Master Device)

Plots showing that the 20dB bandwidth of the channel closest to 5650 MHz does not spill into the 5600-5650 MHz band.

n20 Mode



Analyzer Settings

HP8564E  
CF: 5560.000 MHz  
SPAN: 25.000 MHz  
RB: 100 kHz  
VB: 300 kHz  
Detector: POS  
Attn: 20 DB  
RL Offset: 11.0 DB  
Sweep Time: 50.0ms  
Ref Lvl: 13.6 DBM

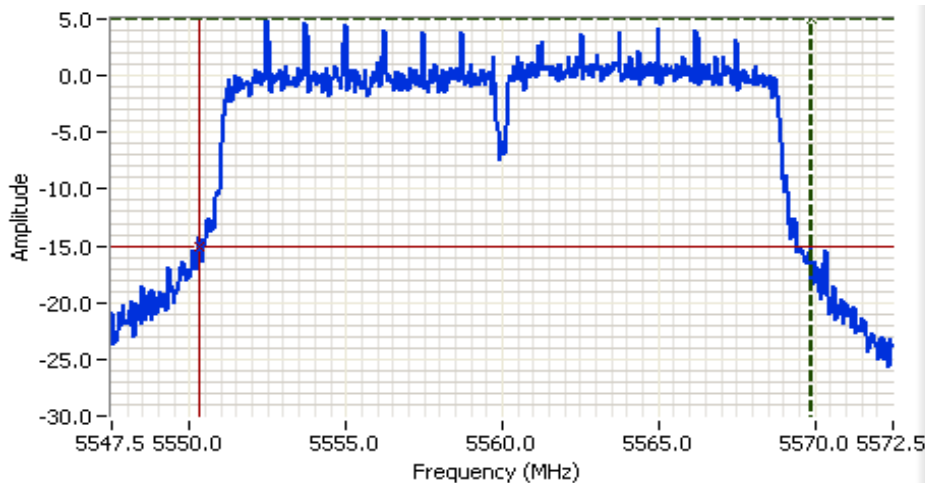
Comments

20dB BW  
BE @ 5550.1250 MHz  
Chain 2

Cursor 1	5569.5000	5.10	
Cursor 2	5550.1250	-14.90	

Delta Freq. 19.375

Delta Amplitude 20.00



Analyzer Settings

HP8564E  
CF: 5560.000 MHz  
SPAN: 25.000 MHz  
RB: 100 kHz  
VB: 300 kHz  
Detector: POS  
Attn: 20 DB  
RL Offset: 11.0 DB  
Sweep Time: 50.0ms  
Ref Lvl: 13.6 DBM

Comments

20dB BW  
BE @ 5550.2917 MHz  
Chain 0

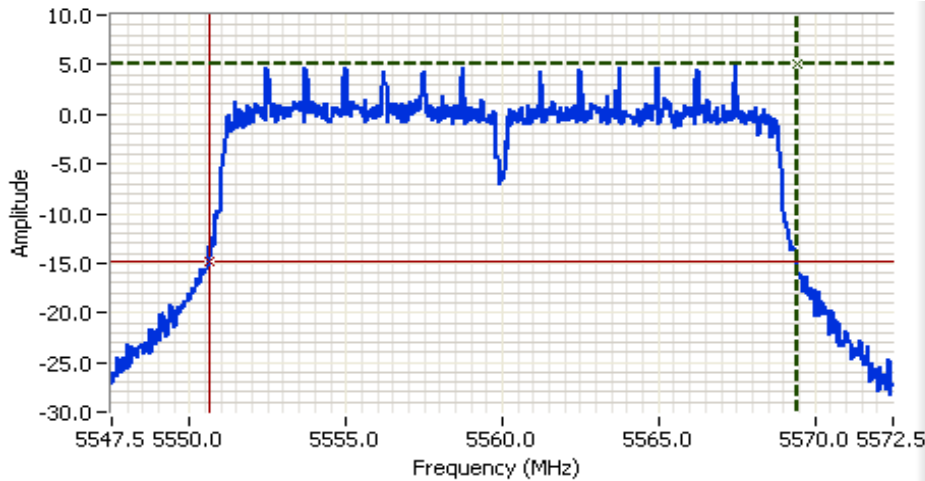
Cursor 1	5569.8750	4.93	
Cursor 2	5550.2917	-15.07	

Delta Freq. 19.583

Delta Amplitude 20.00



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



**Analyzer Settings**

HP8564E  
CF: 5560.000 MHz  
SPAN: 25.000 MHz  
RB: 100 kHz  
VB: 300 kHz  
Detector: POS  
Attn: 20 DB  
RL Offset: 11.0 DB  
Sweep Time: 50.0ms  
Ref Lvl: 13.6 DBM

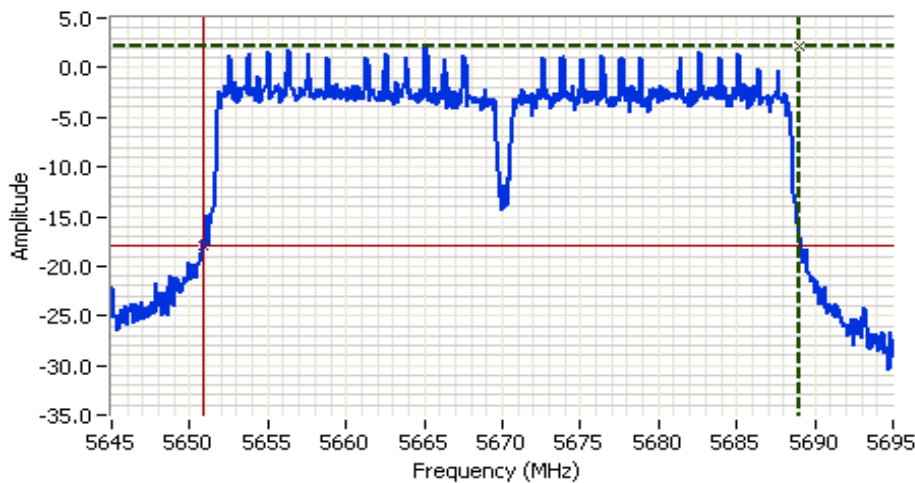
**Comments**

20dB BW  
BE @ 5550.6250 MHz  
Chain 1

Cursor 1	5569.4167	5.10		Delta Freq.	18.792
Cursor 2	5550.6250	-14.90		Delta Amplitude	20.00



**n40 Mode**



**Analyzer Settings**

HP8564E  
CF: 5670.000 MHz  
SPAN: 50.000 MHz  
RB: 100 kHz  
VB: 300 kHz  
Detector: POS  
Attn: 20 DB  
RL Offset: 11.0 DB  
Sweep Time: 50.0ms  
Ref Lvl: 13.6 DBM

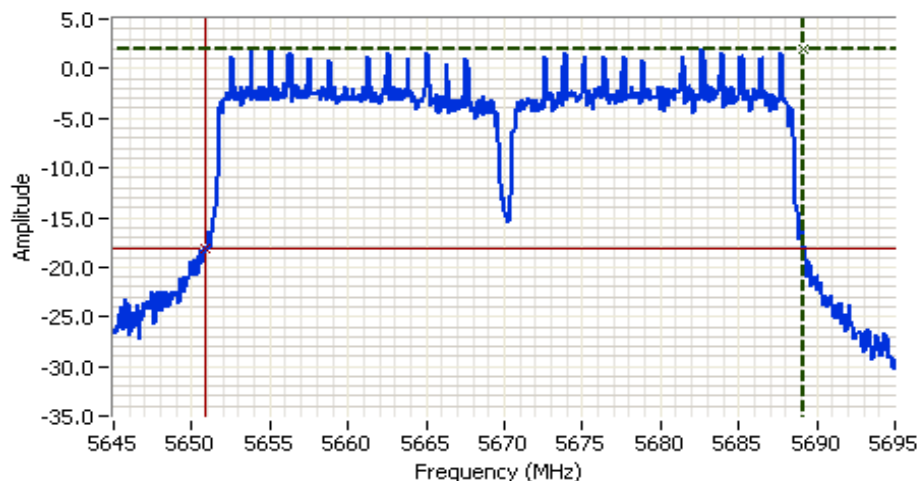
**Comments**

20dB BW  
BE @ 5650.8333 MHz  
Chain 2

Cursor 1	5689.0000	2.10		Delta Freq.	38.167
Cursor 2	5650.8333	-17.90		Delta Amplitude	20.00



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



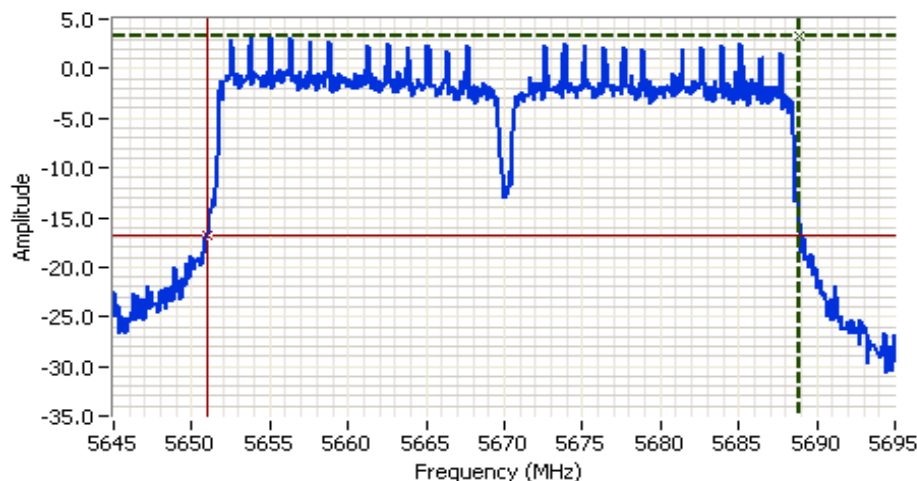
**Analyzer Settings**

HP8564E  
CF: 5670.000 MHz  
SPAN: 50.000 MHz  
RB: 100 kHz  
VB: 300 kHz  
Detector: POS  
Attn: 20 DB  
RL Offset: 11.0 DB  
Sweep Time: 50.0ms  
Ref Lvl: 13.6 DBM

**Comments**

20dB BW  
BE @ 5650.9167 MHz  
Chain 0

Cursor 1	5689.1667	1.93		Delta Freq.	38.250
Cursor 2	5650.9167	-18.07		Delta Amplitude	20.00



**Analyzer Settings**

HP8564E  
CF: 5670.000 MHz  
SPAN: 50.000 MHz  
RB: 100 kHz  
VB: 300 kHz  
Detector: POS  
Attn: 20 DB  
RL Offset: 11.0 DB  
Sweep Time: 50.0ms  
Ref Lvl: 13.6 DBM

**Comments**

20dB BW  
BE @ 5651.0000 MHz  
Chain 1

Cursor 1	5688.9167	3.27		Delta Freq.	37.917
Cursor 2	5651.0000	-16.73		Delta Amplitude	20.00

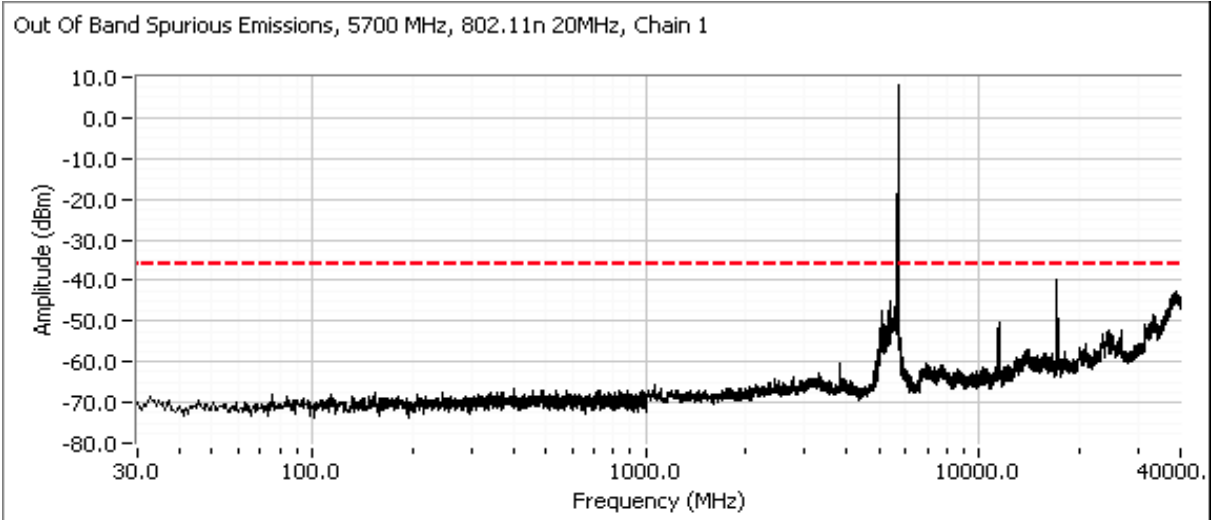
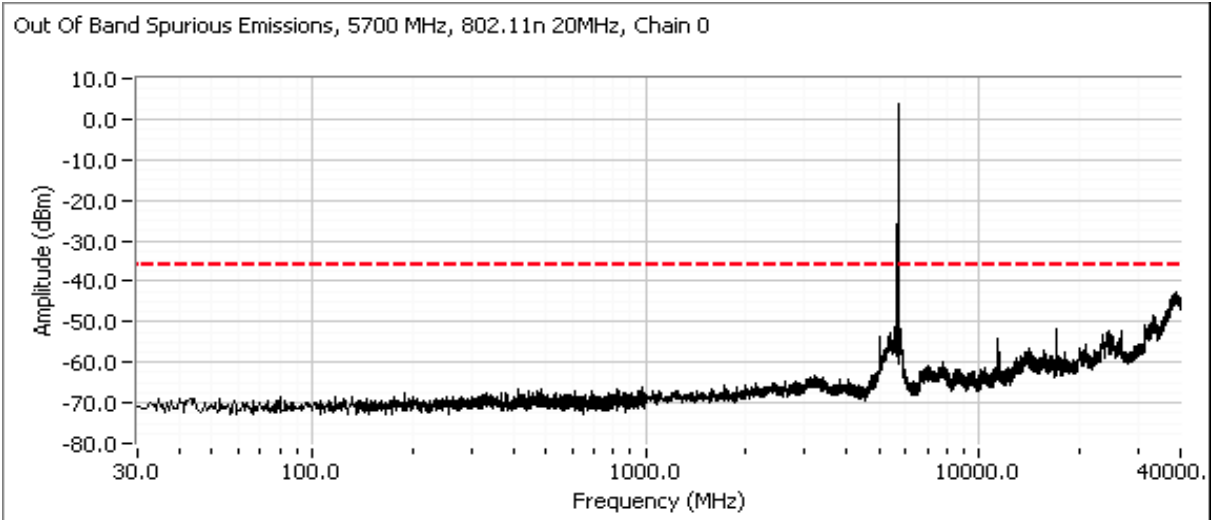


Client: Xirrus, Inc.	Job Number: J81188
Model: XR4000 3x3	T-Log Number: T83592
	Account Manager: Susan Pelzl
Contact: Steve Smith	
Standard: -	Class: N/A

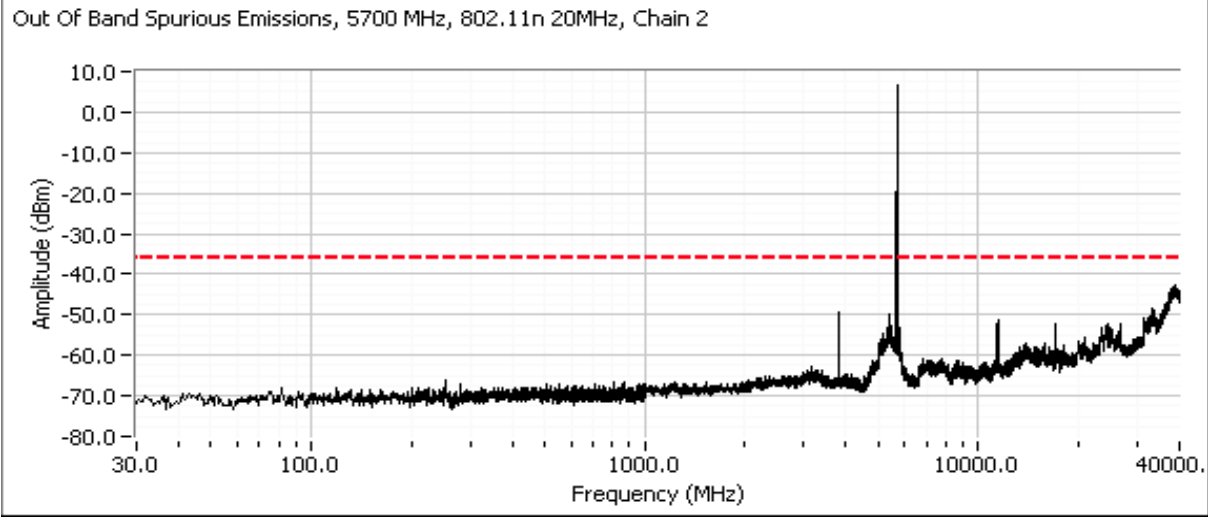
High channel, 5470 - 5725 MHz Band

Compliance with the -27dBm/MHz limit above the 5725MHz band edge is demonstrated using radiated measurements.

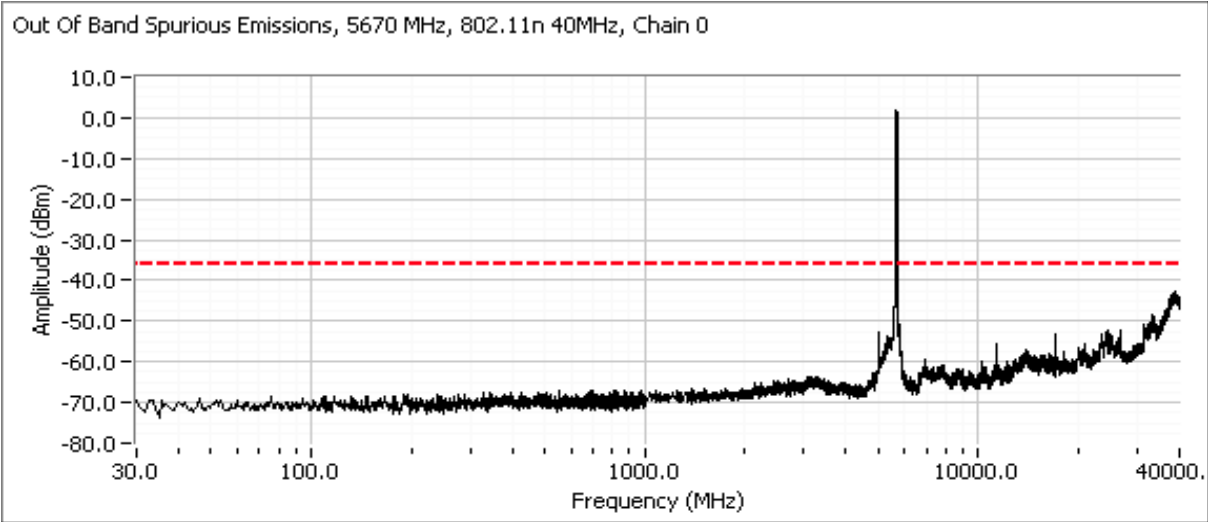
n20 Mode



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



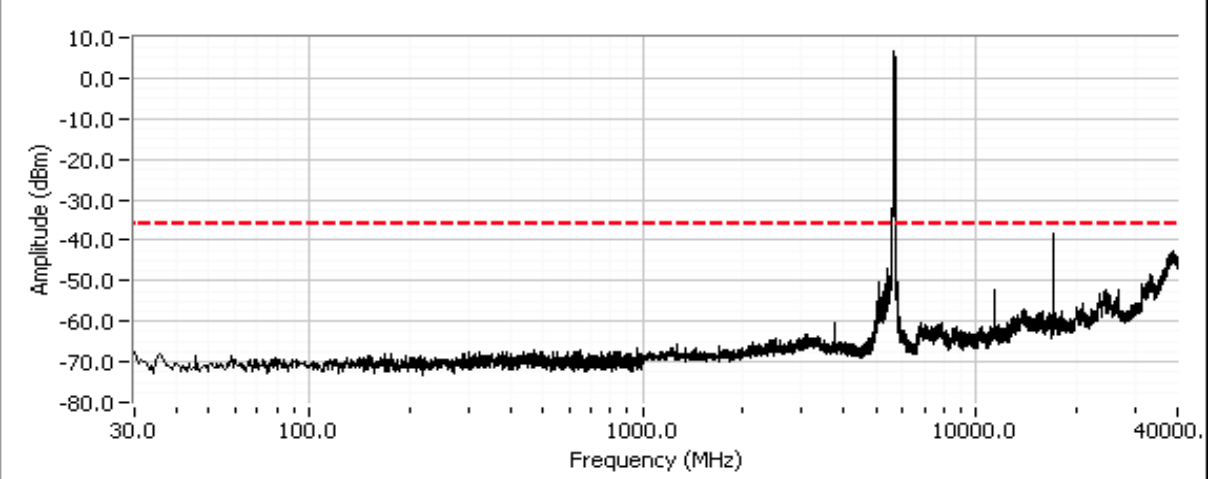
n40 Mode



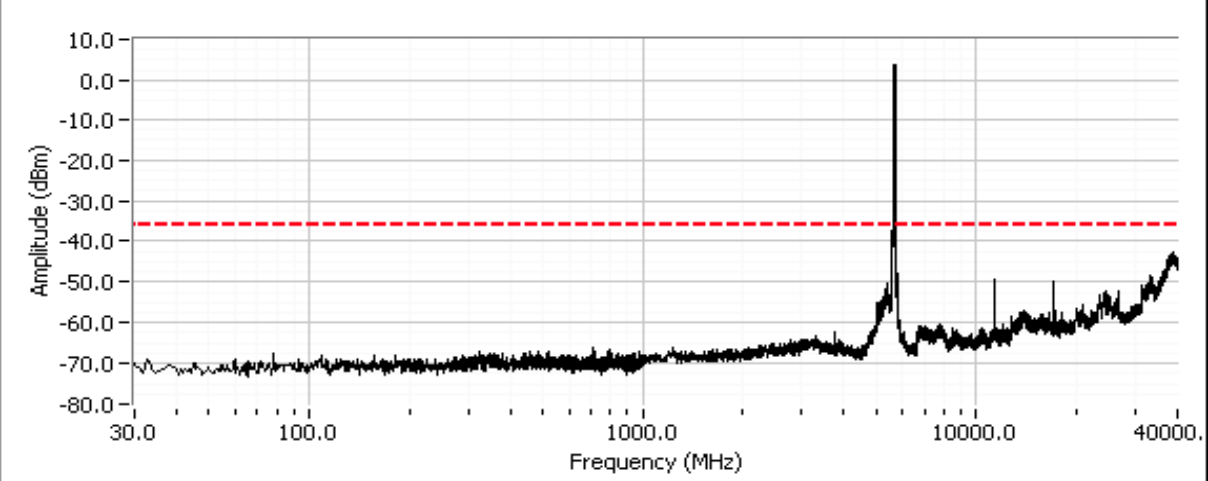


Client: Xirrus, Inc.	Job Number: J81188
Model: XR4000 3x3	T-Log Number: T83592
	Account Manager: Susan Pelzl
Contact: Steve Smith	
Standard: -	Class: N/A

Out Of Band Spurious Emissions, 5670 MHz, 802.11n 40MHz, Chain 1



Out Of Band Spurious Emissions, 5670 MHz, 802.11n 40MHz, 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

**RSS-210 (LELAN) and FCC 15.407(UNII)  
Antenna Port Measurements  
Power, PSD, Peak Excursion, 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: 6/24/2011  
Test Engineer: Rafael Varelas  
Test Location: FT Lab #4

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

**Summary of Results**

Run #	Test Performed	Limit	Pass / Fail	Result / Margin
1	Power, 5150 - 5250MHz	15.407(a) (1), (2)	Pass	802.11a: 42.7 mW
1	PSD, 5150 - 5250MHz	15.407(a) (1), (2)	Pass	802.11a: 3.9 dBm/MHz
1	Power, 5250 - 5350MHz	15.407(a) (1), (2)	Pass	802.11a: 107.2 mW
1	PSD, 5250 - 5350MHz	15.407(a) (1), (2)	Pass	802.11a: 8.0 dBm/MHz
1	Power, 5470 - 5725MHz	15.407(a) (1), (2)	Pass	802.11a: 55.0 mW
1	PSD, 5470 - 5725MHz	15.407(a) (1), (2)	Pass	802.11a: 5.0 dBm/MHz
1	26dB Bandwidth	15.407 (Information only)	-	> 20MHz for all modes
1	99% Bandwidth	RSS 210 (Information only)	N/A	802.11a: 17.1 MHz
2	Peak Excursion Envelope	15.407(a) (6) 13dB	Pass	10.6dB
3	Antenna Conducted - Out of Band Spurious	15.407(b) -27dBm/MHz	Pass	All emissions below the -27dBm/MHz limit

**General Test Configuration**

When measuring the conducted emissions from the EUT's antenna port, the antenna port of the EUT was connected to the spectrum analyzer or power meter via a suitable attenuator to prevent overloading the measurement system. All measurements are corrected to allow for the external attenuators and cables used.

**Ambient Conditions:**

Temperature: 20.3 °C  
Rel. Humidity: 35 %

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

### Modifications Made During Testing

No modifications were made to the EUT during testing

### Deviations From The Standard

No deviations were made from the requirements of the standard.

### Run #1: Bandwidth, Output Power and Power Spectral Density - Single Chain Systems

Note 1:	Output power measured using a spectrum analyzer (see plots below). RBW=1MHz, VB=3 MHz, sample detector, power averaging on (transmitted signal was continuous) and power integration over 50 MHz (method 1 of DA-02-2138A1).
Note 2:	Measured using the same analyzer settings used for output power.
Note 3:	For RSS-210 the limit for the 5150 - 5250 MHz band accounts for the antenna gain as the maximum eirp allowed is 10dBm/MHz. The limits are also corrected for instances where the highest measured value of the PSD exceeds the average PSD (calculated from the measured power divided by the measured 99% bandwidth) by more than 3dB by the amount that the measured value exceeds the average by more than 3dB.
Note 4:	99% Bandwidth measured in accordance with RSS GEN - RB > 1% of span and VB >=3xRB

#### Single Chain Operation, 5150-5250MHz Band

Antenna Gain (dBi): 4 EIRP: 100.0 mW 20.0 dBm

Frequency (MHz)	Software Setting	Bandwidth		Output Power <sup>1</sup> dBm		Power (Watts)	PSD <sup>2</sup> dBm/MHz			Result
		26dB	99% <sup>4</sup>	Measured	Limit		Measured	FCC Limit	RSS Limit <sup>3</sup>	
5180	15.5	26.7	17.0	15.3	17.0	0.034	2.9	4.0	6.0	Pass
5200	16.0	27.8	17.0	16.0	17.0	0.040	3.8	4.0	6.0	Pass
5240	16.0	28.6	17.0	16.3	17.0	0.043	3.9	4.0	6.0	Pass

#### Single Chain Operation, 5250-5350 MHz Band

Antenna Gain (dBi): 4 EIRP: 269.2 mW 24.3 dBm

Frequency (MHz)	Software Setting	Bandwidth		Output Power <sup>1</sup> dBm		Power (Watts)	PSD <sup>2</sup> dBm/MHz			Result
		26dB	99% <sup>4</sup>	Measured	Limit		Measured	FCC Limit	RSS Limit <sup>3</sup>	
5260	20.0	33.6	17.0	20.3	24.0	0.107	8.0	11.0	11.0	Pass
5300	20.0	32.9	17.0	20.1	24.0	0.102	7.9	11.0	11.0	Pass
5320	14.0	28.6	17.0	13.6	24.0	0.023	1.5	11.0	11.0	Pass

#### Single Chain Operation, 5470- 5725 MHz Band

Antenna Gain (dBi): 4 EIRP: 138.0 mW 21.4 dBm

Frequency (MHz)	Software Setting	Bandwidth		Output Power <sup>1</sup> dBm		Power (Watts)	PSD <sup>2</sup> dBm/MHz			Result
		26dB	99% <sup>4</sup>	Measured	Limit		Measured	FCC Limit	RSS Limit <sup>3</sup>	
5500	20.0	29.1	17.0	17.4	24.0	0.055	5.0	11.0	11.0	Pass
5580	20.0	29.3	17.0	16.4	24.0	0.044	3.8	11.0	11.0	Pass
5700	20.0	31.1	17.0	16.0	24.0	0.040	3.5	11.0	11.0	Pass

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: Peak Excursion Measurement**

20MHz: Device meets the requirement for the peak excursion

Peak Excursion (dB)			Peak Excursion (dB)			Peak Excursion (dB)		
Freq (MHz)	Value	Limit	Freq (MHz)	Value	Limit	Freq (MHz)	Value	Limit
5180	8.8	13.0	5260	8.9	13.0	5500	7.6	13.0
5200	10.6	13.0	5300	7.6	13.0	5580	9.1	13.0
5240	8.4	13.0	5320	9.7	13.0	5700	8.4	13.0

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

Maximum Antenna Gain: 4.0 dBi  
 Spurious Limit: -27.0 dBm/MHz eirp  
 Limit Used On Plots <sup>Note 1</sup>:  
 -31.0 dBm/MHz Average Limit (RB=1MHz, VB=10Hz)  
 -11.0 dBm/MHz Peak Limit (RB=VB=1MHz)

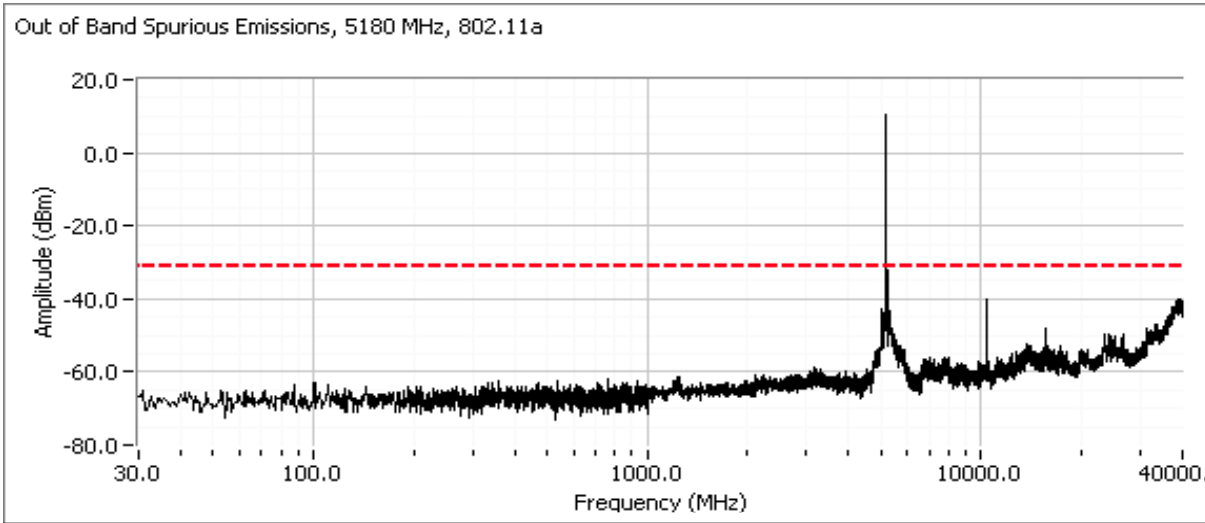
- Note 1: The -27dBm/MHz limit is an eirp limit. The limit for antenna port conducted measurements is adjusted to take into consideration the maximum antenna gain (limit = -27dBm - antenna gain). Radiated field strength measurements for signals more than 50MHz from the bands and that are close to the limit are made to determine compliance as the antenna gain is not known at these frequencies.
- Note 2: All spurious signals below 1GHz are measured during digital device radiated emissions test.
- Note 3: Signals within 10MHz of the 5.725 or 5.825 Band edge are subject to a limit of -17dBm EIRP
- Note 4: If the device is for outdoor use then the -27dBm eirp limit also applies in the 5150 - 5250 MHz band.
- Note 5: Signals that fall in the restricted bands of 15.205 are subject to the limit of 15.209.

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

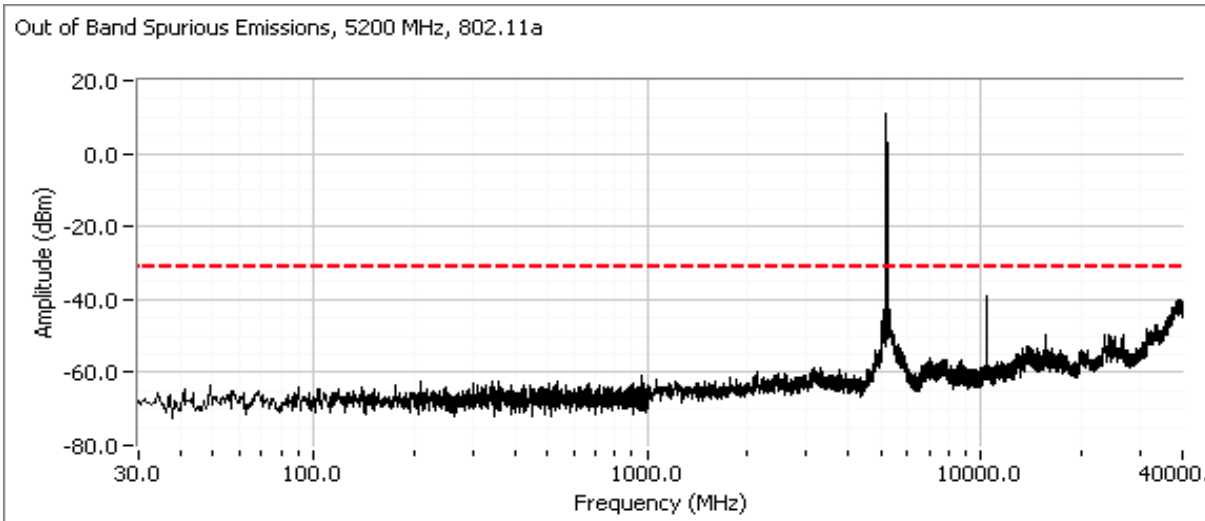
Plots Showing Out-Of-Band Emissions (RBW=VBW=1MHz)

Low channel, 5150 - 5250 MHz Band

Compliance with the radiated limits for the restricted band immediately below 5150MHz is demonstrated through the radiated emissions tests.

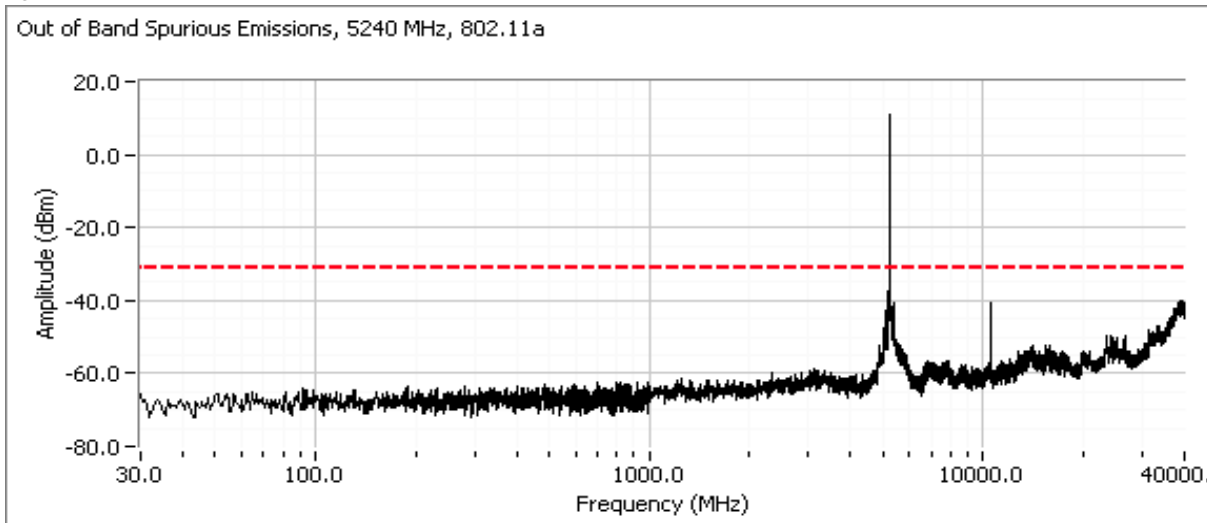


Center channel, 5150 - 5250 MHz Band

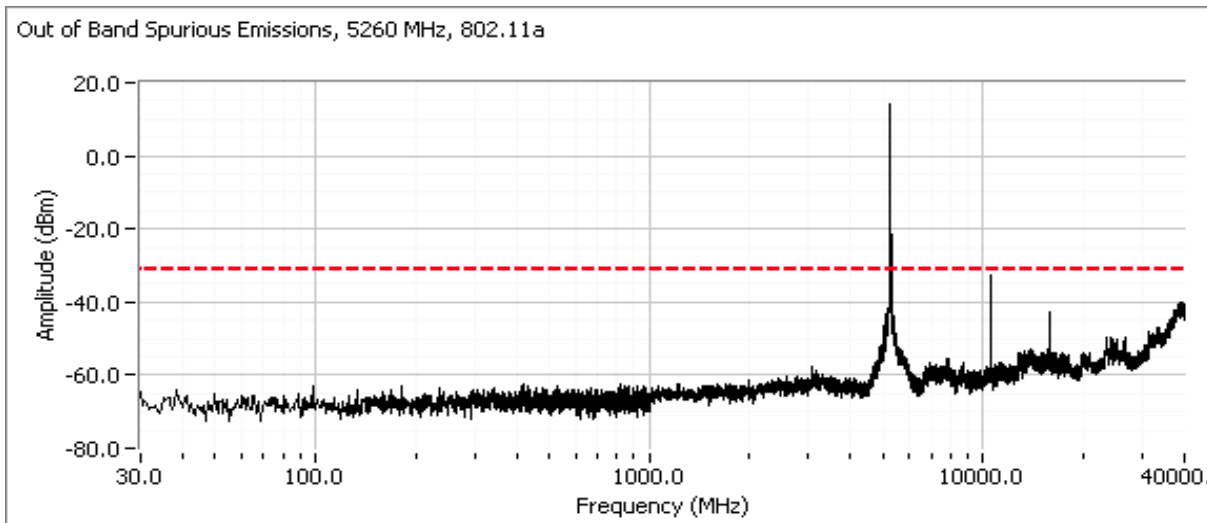


Client: Xirrus, Inc.	Job Number: J81188
Model: XR4000 3x3	T-Log Number: T83592
	Account Manager: Susan Pelzl
Contact: Steve Smith	
Standard: -	Class: N/A

High channel, 5150 - 5250 MHz Band



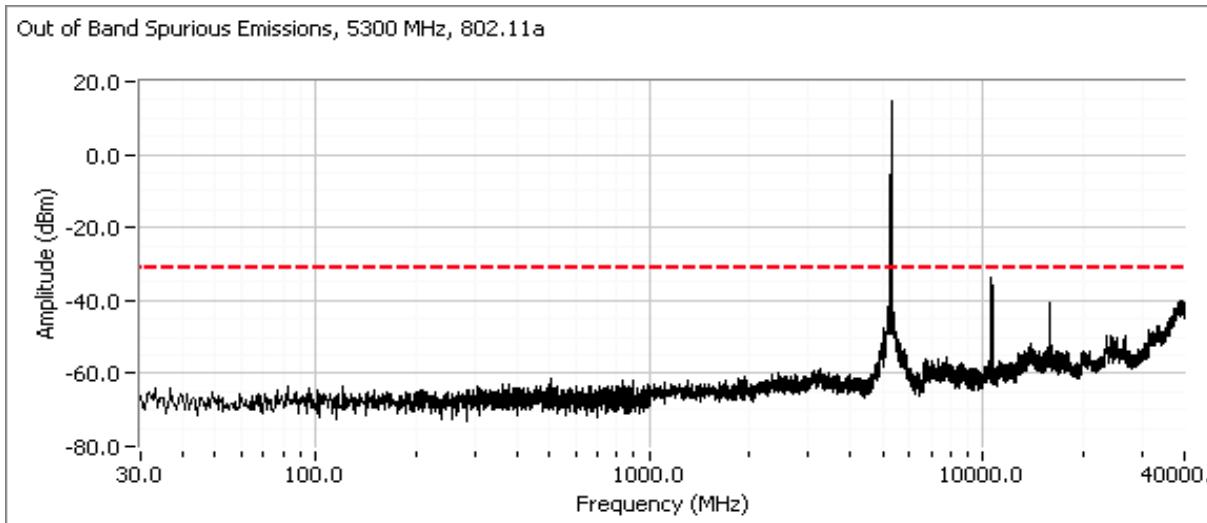
Low channel, 5250 - 5350 MHz Band



Wide-band plot, RB=VB=1MHz (Peak measurements versus limit).

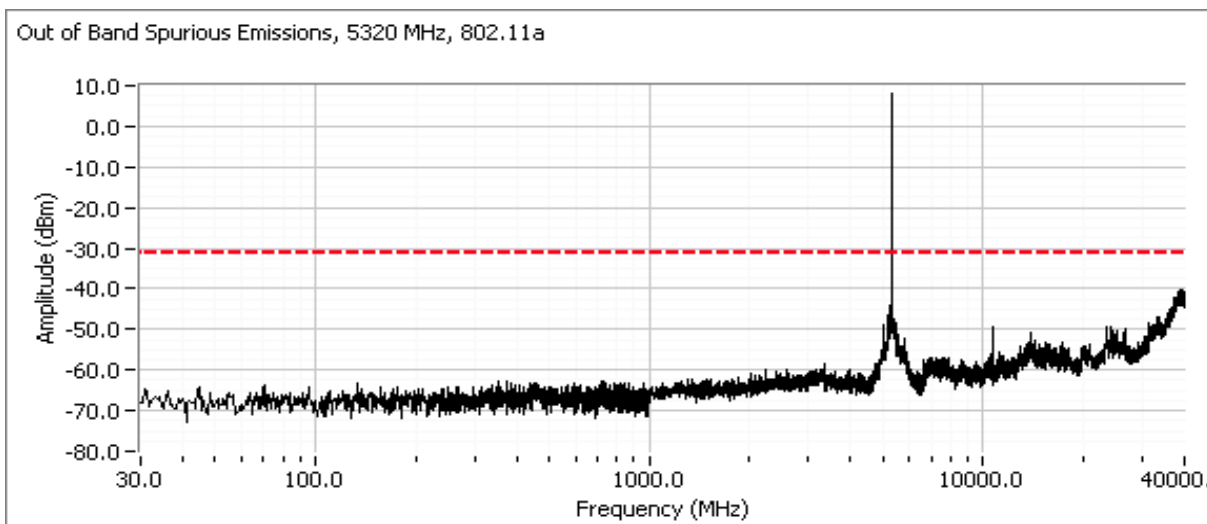
Client: Xirrus, Inc.	Job Number: J81188
Model: XR4000 3x3	T-Log Number: T83592
	Account Manager: Susan Pelzl
Contact: Steve Smith	
Standard: -	Class: N/A

Center channel, 5250 - 5350 MHz Band



High channel, 5250 - 5350 MHz Band

Note - compliance with the radiated limits for the restricted band immediately above 5350MHz is demonstrated through the radiated emissions tests.

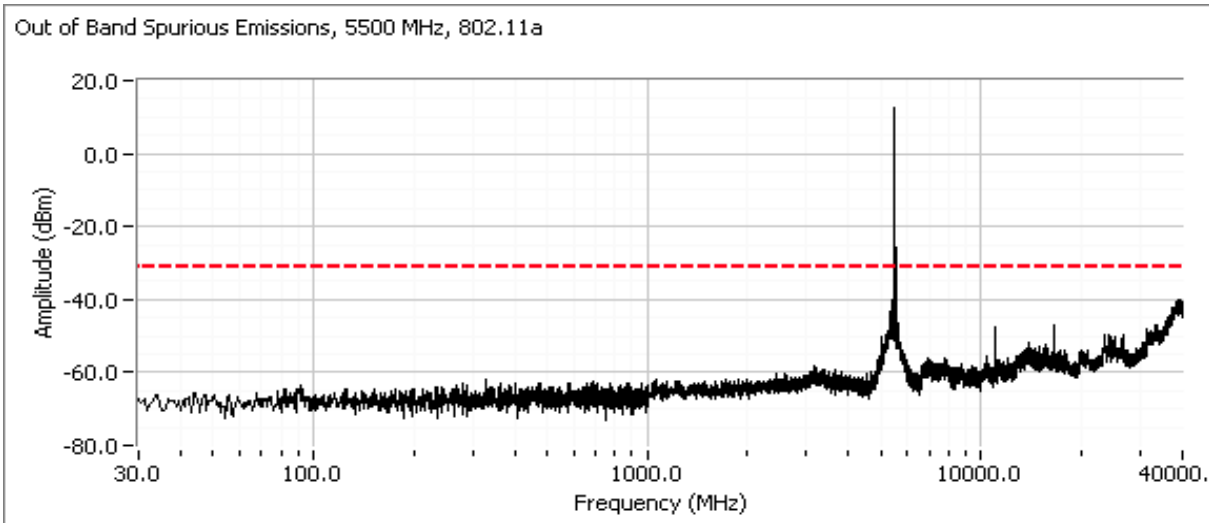


Client: Xirrus, Inc.	Job Number: J81188
Model: XR4000 3x3	T-Log Number: T83592
	Account Manager: Susan Pelzl
Contact: Steve Smith	
Standard: -	Class: N/A

Low channel, 5470 - 5725 MHz Band

Compliance with the -27dBm/MHz limit in the 5460 - 5470 MHz band immediately below the allocated band is demonstrated via a radiated measurement.

Out of Band Spurious Emissions, 5500 MHz, 802.11a



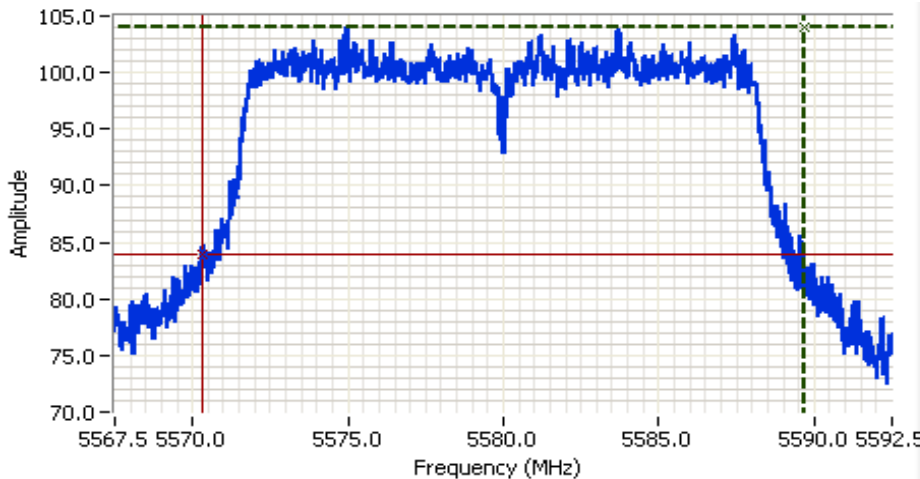
Wide-band plot, RB=VB=1MHz (Peak measurements versus limit).



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

**Center channel, 5470 - 5725 MHz Band**

For master devices - This plot is showing that the 20dB bandwidth of the channel closest to 5600 MHz does not spill into the 5600-5650 MHz band.



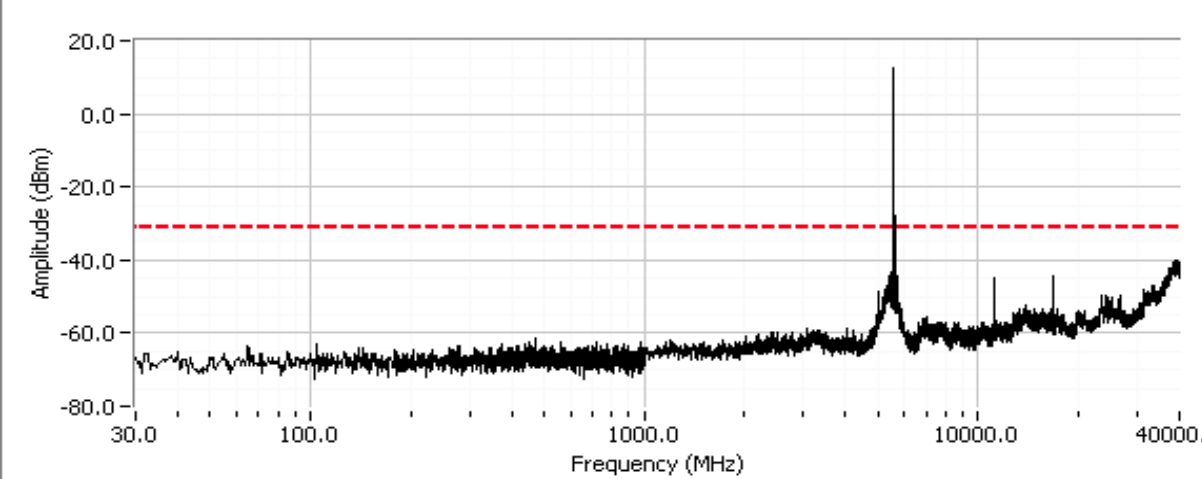
**Analyzer Settings**  
 Agilent Technologies, E4446A  
 CF: 5580.000 MHz  
 SPAN: 25.000 MHz  
 RB: 200 kHz  
 VB: 620 kHz  
 Detector: POS  
 Attn: 20 DB  
 RL Offset: 0.0 DB  
 Sweep Time: 1.0ms  
 Ref Lvl: 116.0 DBUW

**Comments**  
 20dB BW BE = 5589.657 MHz

Cursor 1 5589.6574 103.97  
 Cursor 2 5570.3343 83.97  
 Delta Freq. 19.323  
 Delta Amplitude 20.00



**Out of Band Spurious Emissions, 5580 MHz, 802.11a**

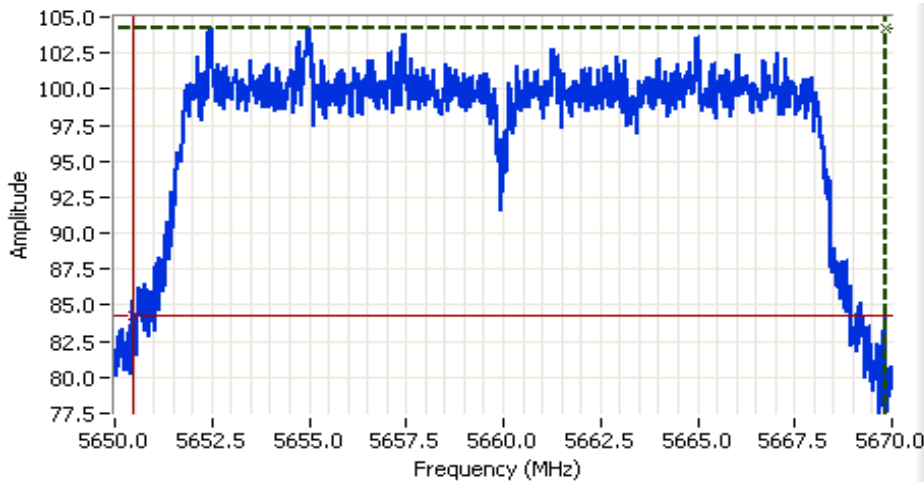


Wide-band plot, RB=VB=1MHz (Peak measurements versus limit).

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 adjacent to 5650 MHz (Master Device)**

Plots showing that the 20dB bandwidth of the channel closest to 5650 MHz does not spill into the 5600-5650 MHz band.



**Analyzer Settings**  
 Agilent Technologies, E4446A  
 CF: 5660.000 MHz  
 SPAN: 20.000 MHz  
 RB: 200 kHz  
 VB: 620 kHz  
 Detector: POS  
 Attn: 20 DB  
 RL Offset: 0.0 DB  
 Sweep Time: 1.0ms  
 Ref Lvl: 116.0 DBUV

**Comments**  
 20dB BW BE: 5650.4468 MHz

Cursor 1	5669.8333	104.26	
Cursor 2	5650.4468	84.26	

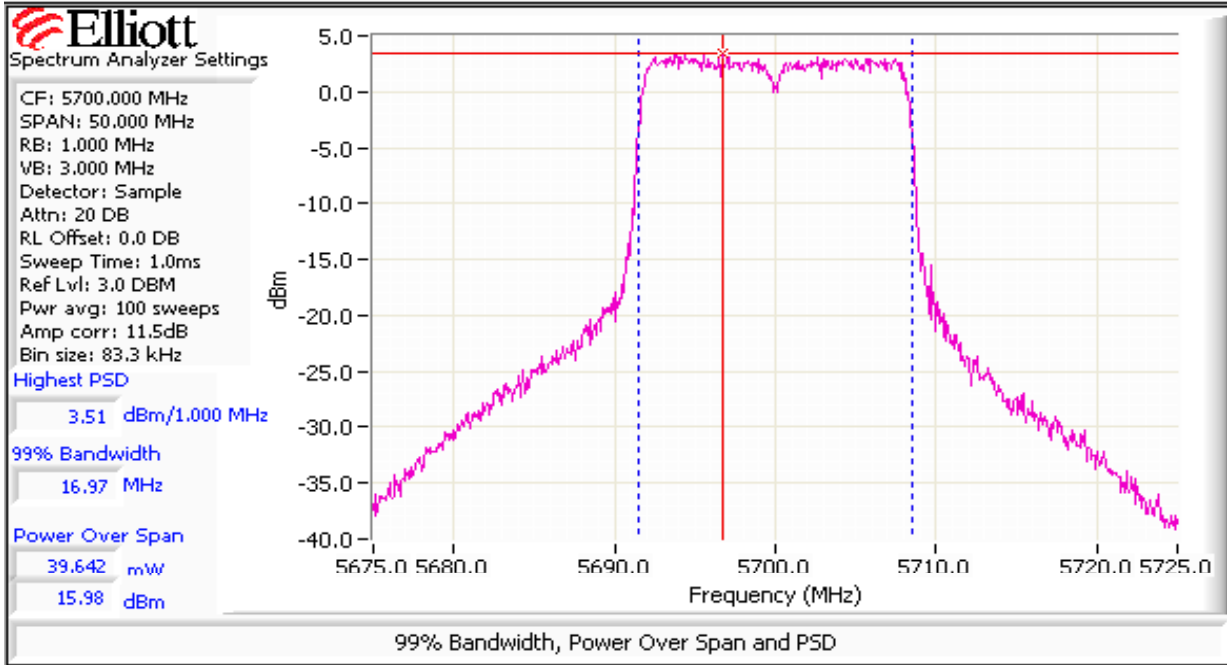
Delta Freq. 19.386  
 Delta Amplitude 20.00



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

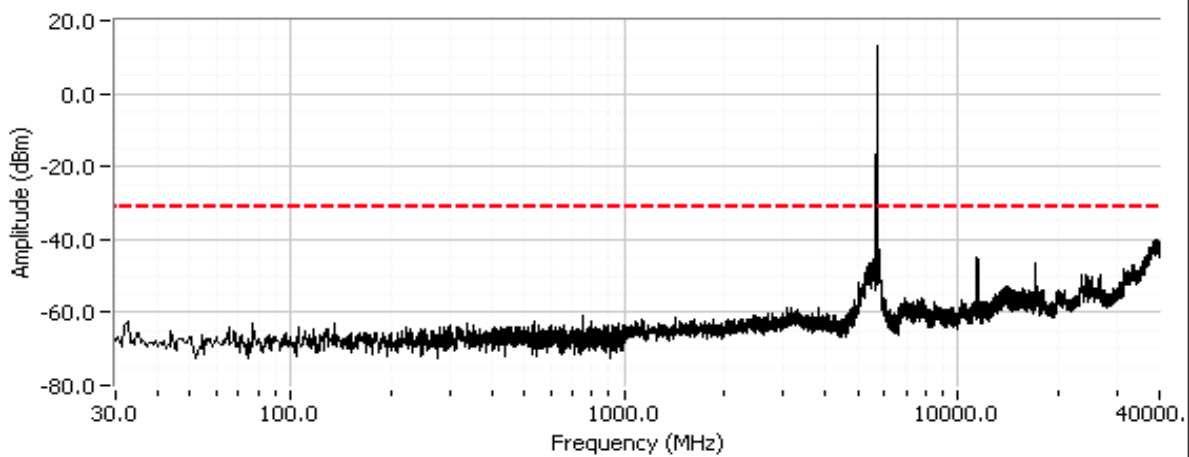
High channel, 5470 - 5725 MHz Band

Plot showing compliance with the -27dBm/MHz limit above the 5725MHz band edge. RB=1MHz, VB=3MHz, power averaging enabled (100 traces):



	Power Setting	Band edge Level		Antenna Gain (dBi)	EIRP		Total EIRP dBm/MHz	Limit dBm/MHz	Result
		dBm/MHz	mW/MHz		mW/MHz	dBm/MHz			
Chain 1	20	-38.0	0.00016	4.0	0.0003981	-34.0	-34.0	-27	PASS

Out of Band Spurious Emissions, 5700 MHz, 802.11a



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 (LELAN) and FCC 15.407(UNII)  
Antenna Port Measurements  
Power, PSD, Peak Excursion, 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: 6/27/2011  
Test Engineer: Rafael Varelas  
Test Location: FT Lab #4

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

**Summary of Results**

Run #	Test Performed	Limit	Pass / Fail	Result / Margin
1	Power, 5150 - 5250MHz	15.407(a) (1), (2)	Pass	802.11a: 22.4 mW
1	PSD, 5150 - 5250MHz	15.407(a) (1), (2)	Pass	802.11a: 1.0 dBm/MHz
1	Power, 5250 - 5350MHz	15.407(a) (1), (2)	Pass	802.11a: 100 mW
1	PSD, 5250 - 5350MHz	15.407(a) (1), (2)	Pass	802.11a: 7.6 dBm/MHz
1	Max EIRP 5250 - 5350MHz	TPC required if EIRP ≥ 500mW (27dBm). EIRP ≥ 200mW (23dBm) DFS threshold = -64dBm.	Pass	EIRP = 14.8 dBm (30.2 mW)
1	Power, 5470 - 5725MHz	15.407(a) (1), (2)	Pass	802.11a: 107.2 mW
1	PSD, 5470 - 5725MHz	15.407(a) (1), (2)	Pass	802.11a: 8.0 dBm/MHz
1	Max EIRP 5470 - 5725MHz	TPC required if EIRP ≥ 500mW (27dBm). EIRP ≥ 200mW (23dBm) DFS threshold = -64dBm.	Pass	EIRP = 14.8 dBm (30.2 mW)
1	26dB Bandwidth	15.407 (Information only)	-	> 20MHz for all modes
1	99% Bandwidth	RSS 210 (Information only)	N/A	802.11a: 17.1 MHz
2	Peak Excursion Envelope	15.407(a) (6) 13dB	Pass	10.5 dB
3	Antenna Conducted - Out of Band Spurious	15.407(b) -27dBm/MHz	Pass	All emissions below the -27dBm/MHz limit

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

**General Test Configuration**

When measuring the conducted emissions from the EUT's antenna port, the antenna port of the EUT was connected to the spectrum analyzer or power meter via a suitable attenuator to prevent overloading the measurement system. All measurements are corrected to allow for the external attenuators and cables used.

**Ambient Conditions:**

Temperature: 20.4 °C  
Rel. Humidity: 36 %

**Modifications Made During Testing**

No modifications were made to the EUT during testing

**Deviations From The Standard**

No deviations were made from the requirements of the standard.

**Run #1: Bandwidth, Output Power and Power Spectral Density - MIMO Systems**

Note 1:	Output power measured using a spectrum analyzer (see plots below). RBW=1MHz, VB=3 MHz, sample detector, power averaging on (transmitted signal was continuous) and power integration over 50 MHz (method 1 of DA-02-2138A1).
Note 2:	Measured using the same analyzer settings used for output power.
Note 3:	For RSS-210 the limit for the 5150 - 5250 MHz band accounts for the antenna gain as the maximum eirp allowed is 10dBm/MHz. The limits are also corrected for instances where the highest measured value of the PSD exceeds the average PSD (calculated from the measured power divided by the measured 99% bandwidth) by more than 3dB by the amount that the measured value exceeds the average by more than 3dB.
Note 4:	99% Bandwidth measured in accordance with RSS GEN - RB > 1% of span and VB >=3xRB
Note 5:	For MIMO systems the total output power and total PSD are calculated from the sum of the powers of the individual chains (in linear terms). The antenna gain used to determine the EIRP and limits for PSD/Output power depends on the operating mode of the MIMO device. If the signals on the non-coherent between the transmit chains then the gain used to determine the limits is the highest gain of the individual chains and the EIRP is the sum of the products of gain and power on each chain. If the signals are coherent then the effective antenna gain is the sum (in linear terms) of the gains for each chain and the EIRP is the product of the effective gain and total power.

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

### MIMO Device - 5150-5250 MHz Band

	Chain 0	Chain 1	Chain 2	Coherent	Effective <sup>5</sup>	EIRP (mW)	EIRP (dBm)
Antenna Gain (dBi):	4	4	4	Yes	8.8	169.5	22.3

### Power

Frequency (MHz)	Software Setting	26dB BW (MHz)	Measured Output Power <sup>1</sup> dBm			Total		Limit (dBm)	Max Power (W)	Pass or Fail
			Chain 0	Chain 1	Chain 2	mW	dBm			
5180	9.0	26.8	8.9	7.9	7.5	19.4	12.9	14.2	0.022	PASS
5200	9.0	26.7	9.2	8.3	8.7	22.5	13.5			PASS
5240	8.5	27.2	8.2	8.0	8.5	20.0	13.0			PASS

### PSD

Frequency (MHz)	99% <sup>4</sup> BW	Total Power	PSD <sup>2</sup> dBm/MHz			Total PSD		Limit		Pass or Fail
			Chain 0	Chain 1	Chain 2	mW/MHz	dBm/MHz	FCC	RSS 210 <sup>3</sup>	
5180	17.0	12.9	-3.8	-4.6	-5.0	1.1	0.4	1.2	1.2	PASS
5200	17.0	13.5	-3.2	-4.3	-3.8	1.3	1.0	1.2	1.2	PASS
5240	17.0	13.0	-4.0	-4.6	-3.9	1.2	0.7	1.2	1.2	PASS

### MIMO Device - 5250-5350 MHz Band

	Chain 0	Chain 1	Chain 2	Coherent	Effective <sup>5</sup>	EIRP (mW)	EIRP (dBm)
Antenna Gain (dBi):	4	4	4	Yes	8.8	751.4	28.8

### Power

Frequency (MHz)	Software Setting	26dB BW (MHz)	Measured Output Power <sup>1</sup> dBm			Total		Limit (dBm)	Max Power (W)	Pass or Fail
			Chain 0	Chain 1	Chain 2	mW	dBm			
5260	14.5	29.1	15.1	14.8	15.7	99.7	20.0	21.2	0.100	PASS
5300	14.5	27.6	14.5	15.4	15.5	98.3	19.9			PASS
5320	12.5	25.8	11.9	13.4	12.5	55.1	17.4			PASS

### PSD

Frequency (MHz)	99% <sup>4</sup> BW	Total Power	PSD <sup>2</sup> dBm/MHz			Total PSD		Limit		Pass or Fail
			Chain 0	Chain 1	Chain 2	mW/MHz	dBm/MHz	FCC	RSS 210 <sup>3</sup>	
5260	17.0	20.0	2.9	2.1	3.3	5.7	7.6	8.2	11.0	PASS
5300	17.0	19.9	2.5	3.1	2.8	5.7	7.6	8.2	11.0	PASS
5320	17.0	17.4	-0.5	0.7	0.1	3.1	4.9	8.2	11.0	PASS

Power was lowered from the level evaluated for radiated spurious emissions

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

### Output Power at Low Power Setting - 5250-5350 MHz Band

As EIRP exceeds 500mW TPC is required - measurements to show eirp < 250mW.  
Limit is set to 24dBm (250mW) minus the antenna gain (dBi).

Frequency (MHz)	Software Setting	26dB BW (MHz)	Measured Output Power <sup>1</sup> dBm			Total		Limit (dBm)	Max Power (W)	Pass or Fail
			Chain 0	Chain 1	Chain 2	mW	dBm			
5260	10.0		9.8	9.8	10.4	30.1	14.8	15.2	PASS	
5300	10.0		9.6	10.3	10.1	30.1	14.8		PASS	
5320	10.0		9.5	10.3	9.7	28.9	14.6		PASS	

### MIMO Device - 5470-5725 MHz Band

	Chain 0	Chain 1	Chain 2	Coherent	Effective <sup>5</sup>	EIRP (mW)	EIRP (dBm)
Antenna Gain (dBi):	4	4	4	Yes	8.8	808.6	29.1

### Power

Frequency (MHz)	Software Setting	26dB BW (MHz)	Measured Output Power <sup>1</sup> dBm			Total		Limit (dBm)	Max Power (W)	Pass or Fail
			Chain 0	Chain 1	Chain 2	mW	dBm			
5500	16.5	27.3	14.4	16.3	15.2	103.3	20.1	21.2	PASS	
5580	16.0	26.8	14.3	15.9	14.9	96.7	19.9		PASS	
5700	16.0	28.0	14.7	16.6	15.1	107.3	20.3		PASS	

### PSD

Frequency (MHz)	99% <sup>4</sup> BW	Total Power	PSD <sup>2</sup> dBm/MHz			Total PSD		Limit		Pass or Fail
			Chain 0	Chain 1	Chain 2	mW/MHz	dBm/MHz	FCC	RSS 210 <sup>3</sup>	
5500	17.0	20.1	2.2	4.0	2.7	6.0	7.8	8.2	11.0	PASS
5580	17.0	19.9	2.3	3.8	2.7	6.0	7.8	8.2	11.0	PASS
5700	17.1	20.3	2.2	4.2	2.9	6.2	8.0	8.2	11.0	PASS

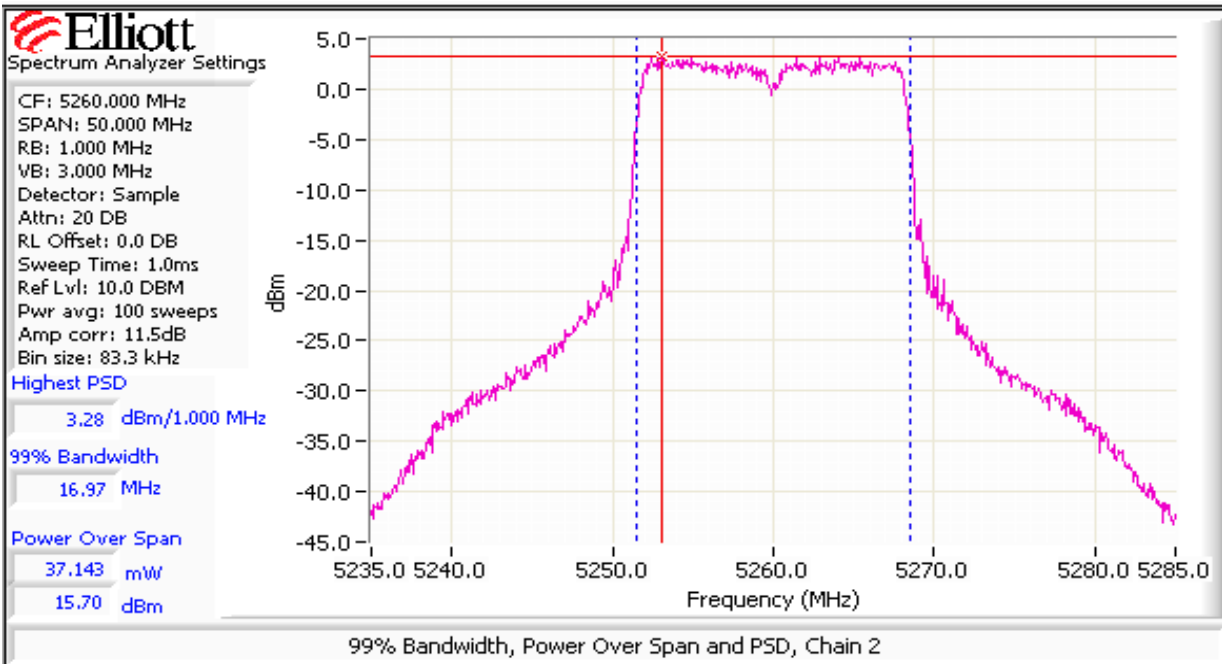
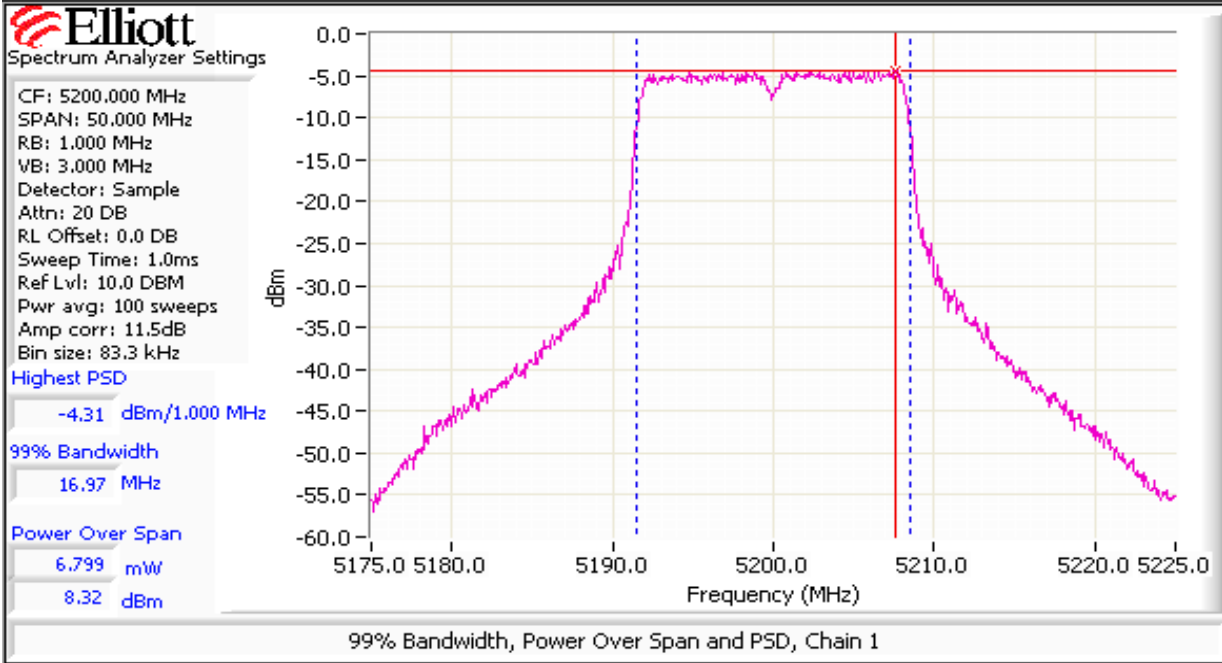
### Output Power at Low Power Setting - 5470-5725 MHz Band

As EIRP exceeds 500mW TPC is required - measurements to show eirp < 250mW.  
Limit is set to 24dBm (250mW) minus the antenna gain (dBi).

Frequency (MHz)	Software Setting	26dB BW (MHz)	Measured Output Power <sup>1</sup> dBm			Total		Limit (dBm)	Max Power (W)	Pass or Fail
			Chain 0	Chain 1	Chain 2	mW	dBm			
5500	10.5		8.7	10.2	8.6	25.1	14.0	15.2	PASS	
5580	10.5		8.1	10.5	8.9	25.4	14.1		PASS	
5700	10.5		8.8	11.3	9.7	30.3	14.8		PASS	

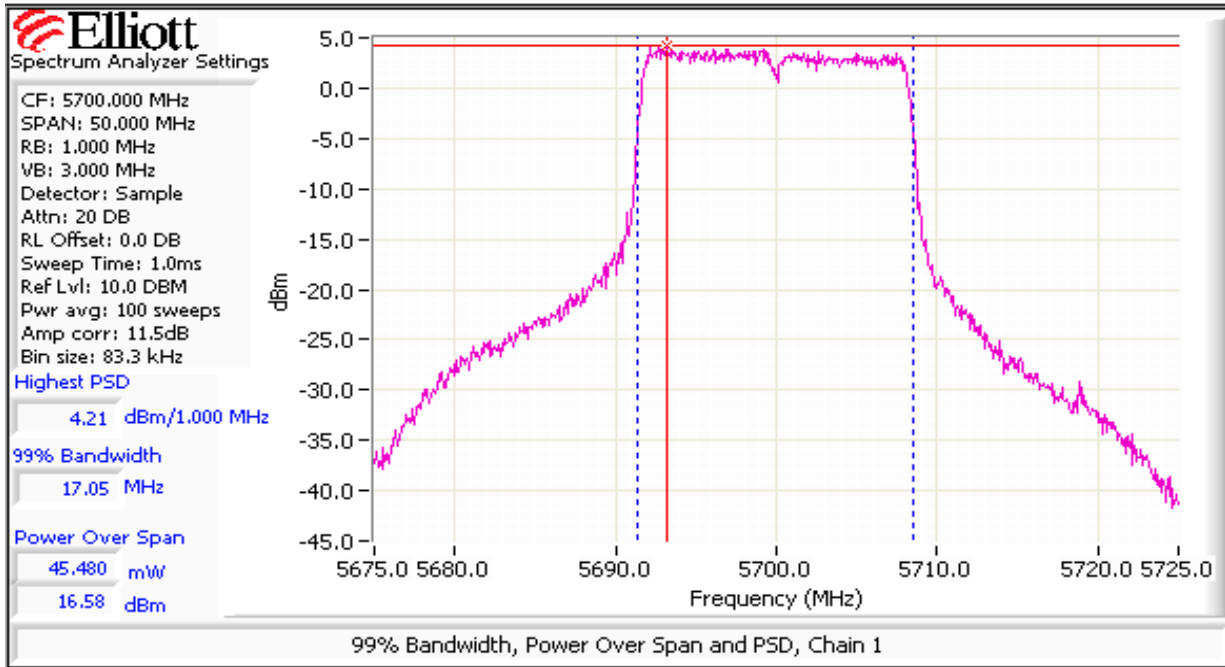
Power was lowered from the level evaluated for radiated spurious emissions

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: Peak Excursion Measurement

20MHz: Device meets the requirement for the peak excursion

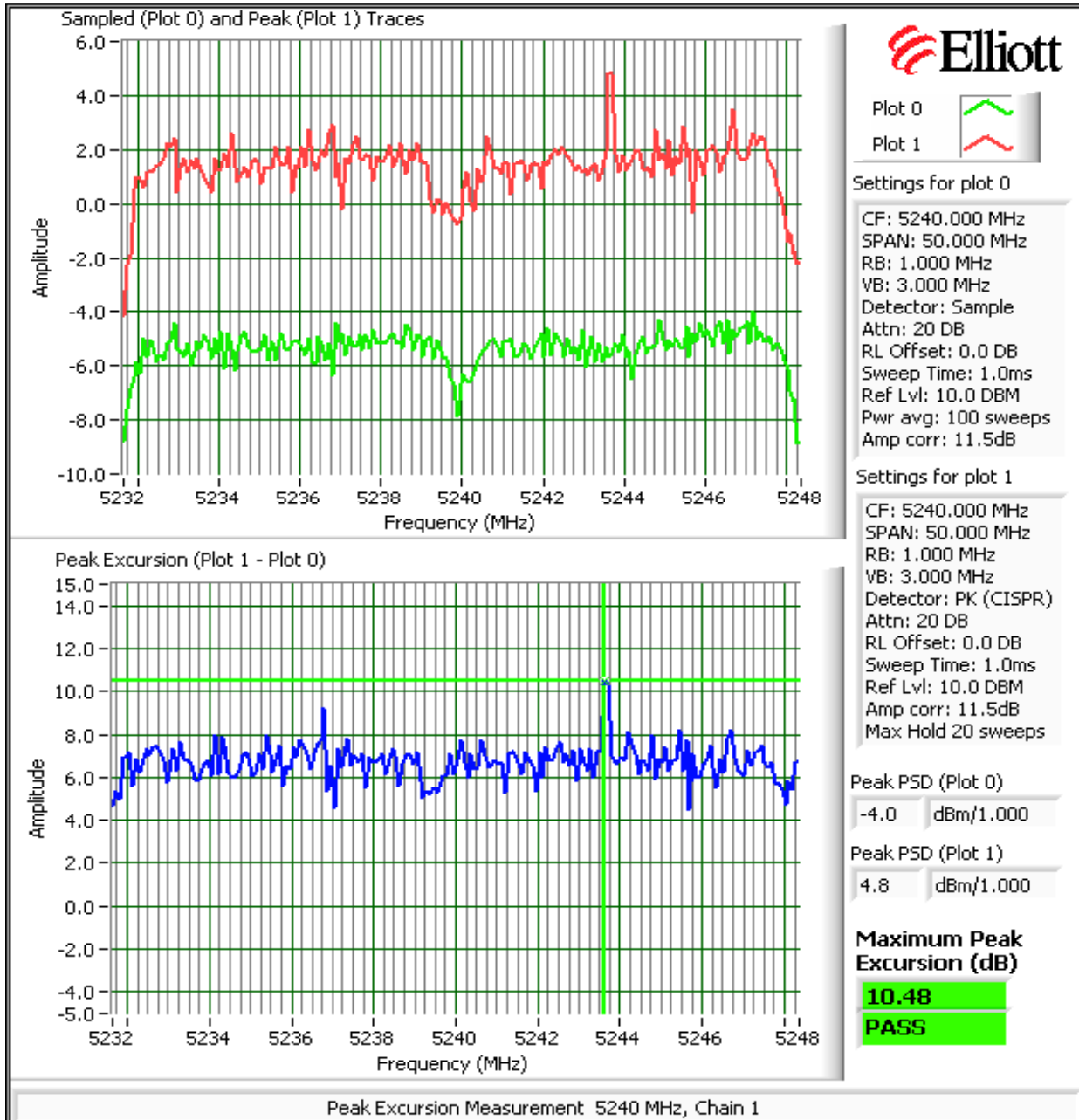
Freq (MHz)	Value	Limit	Freq (MHz)	Value	Limit	Freq (MHz)	Value	Limit
5180	8.3/7.7/9.4	13.0	5260	8.5/8.9/9.6	13.0	5500	8.2/8.8/9.3	13.0
5200	9.0/8.8/9.5	13.0	5300	8.7/10.1/8.8	13.0	5580	7.8/10.0/10.0	13.0
5240	8.2/10.5/9.2	13.0	5320	9.1/9.8/9.3	13.0	5700	9.9/9.0/9.7	13.0

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

**Plot Showing Worst Case Peak Excursion**

Trace A: RBW = 1MHz, VBW = 3MHz, Peak hold

Trace B: Same settings as used for power/PSD measurements (RBW = 1 MHz, VBW = 3MHz, Integrated average power)



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: Out Of Band Spurious Emissions - Antenna Conducted**

MIMO Devices: Antenna gain used is the effective gain calculated in the power section of this data sheet. The plots were obtained for each chain individually and the limit was adjusted to account for all chains transmitting simultaneously

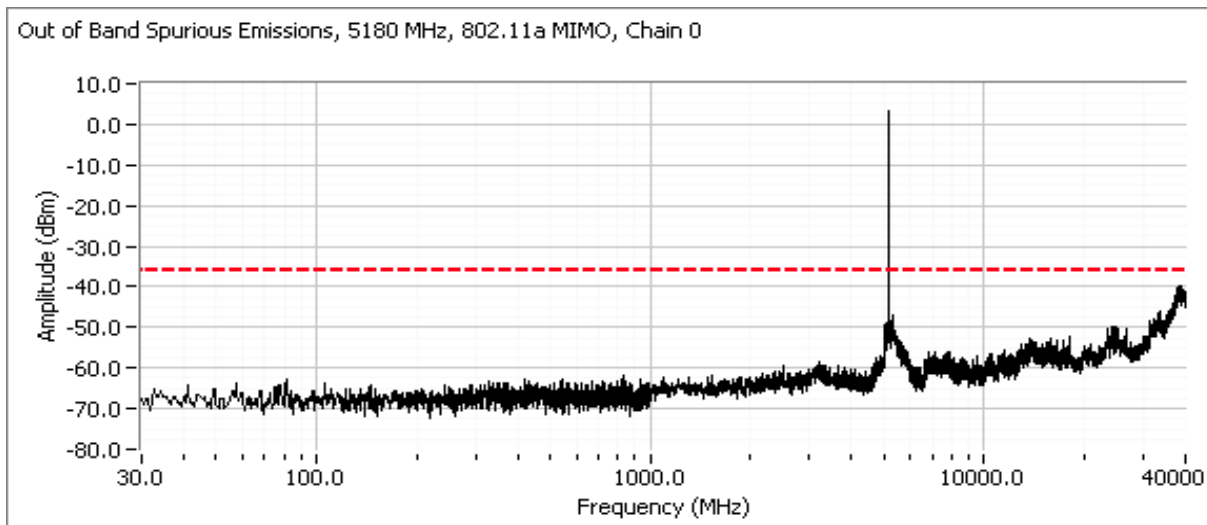
Number of transmit chains: 3  
 Maximum Antenna Gain: 4.0 dBi  
 Spurious Limit: -27.0 dBm/MHz eirp  
 Adjustment for 3 chains: -4.8 dB adjustment for multiple chains.  
 Limit Used On Plots <sup>Note 1</sup>: -35.8 dBm/MHz Average Limit (same method as used for in-band power/PSD)

- Note 1: The -27dBm/MHz limit is an eirp limit. The limit for antenna port conducted measurements is adjusted to take into consideration the maximum antenna gain (limit = -27dBm - antenna gain). Radiated field strength measurements for signals more than 50MHz from the bands and that are close to the limit are made to determine compliance as the antenna gain is not known at these frequencies.
- Note 2: All spurious signals below 1GHz are measured during digital device radiated emissions test.
- Note 3: Signals within 10MHz of the 5.725 or 5.825 Band edge are subject to a limit of -17dBm EIRP
- Note 4: If the device is for outdoor use then the -27dBm eirp limit also applies in the 5150 - 5250 MHz band.
- Note 5: Signals that fall in the restricted bands of 15.205 are subject to the limit of 15.209.

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

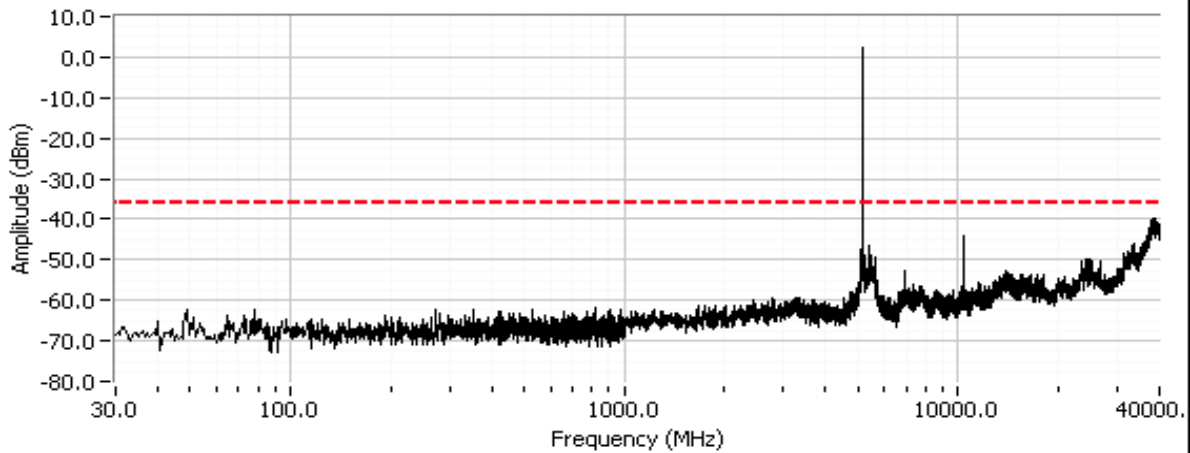
**Low channel, 5150 - 5250 MHz Band**

Compliance with the radiated limits for the restricted band immediately below 5150MHz is demonstrated through the radiated emissions tests.

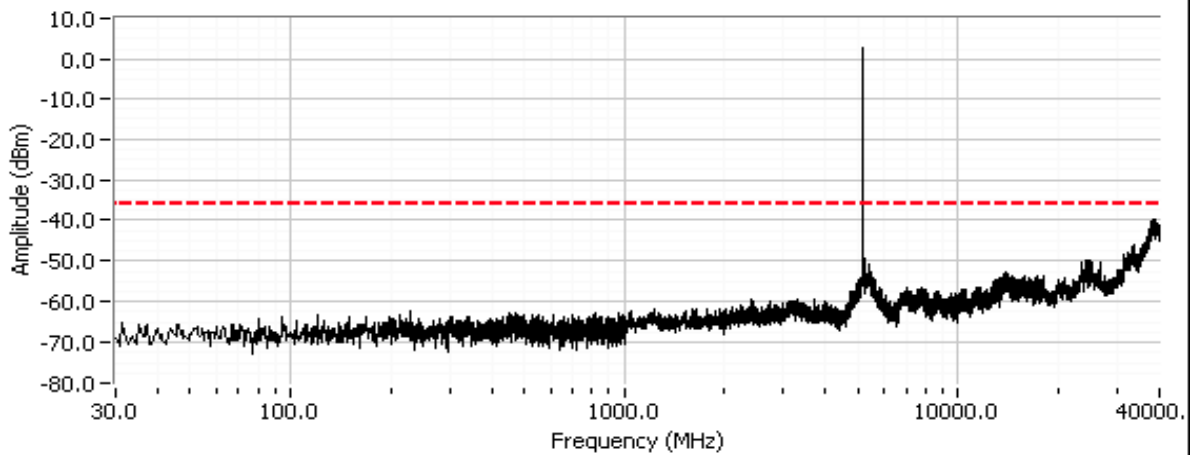


Client: Xirrus, Inc.	Job Number: J81188
Model: XR4000 3x3	T-Log Number: T83592
	Account Manager: Susan Pelzl
Contact: Steve Smith	
Standard: -	Class: N/A

Out of Band Spurious Emissions, 5180 MHz, 802.11a MIMO, Chain 1



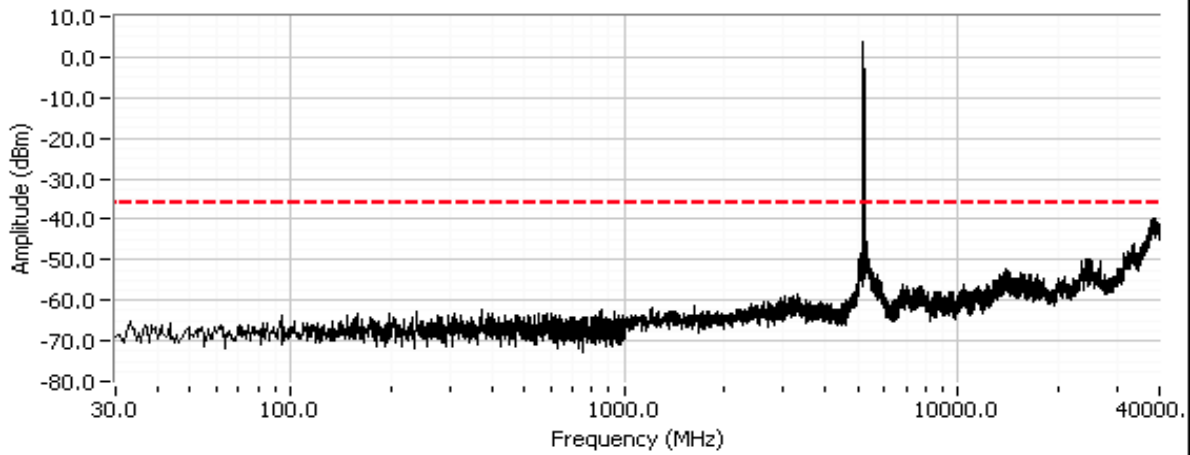
Out of Band Spurious Emissions, 5180 MHz, 802.11a MIMO, Chain 2



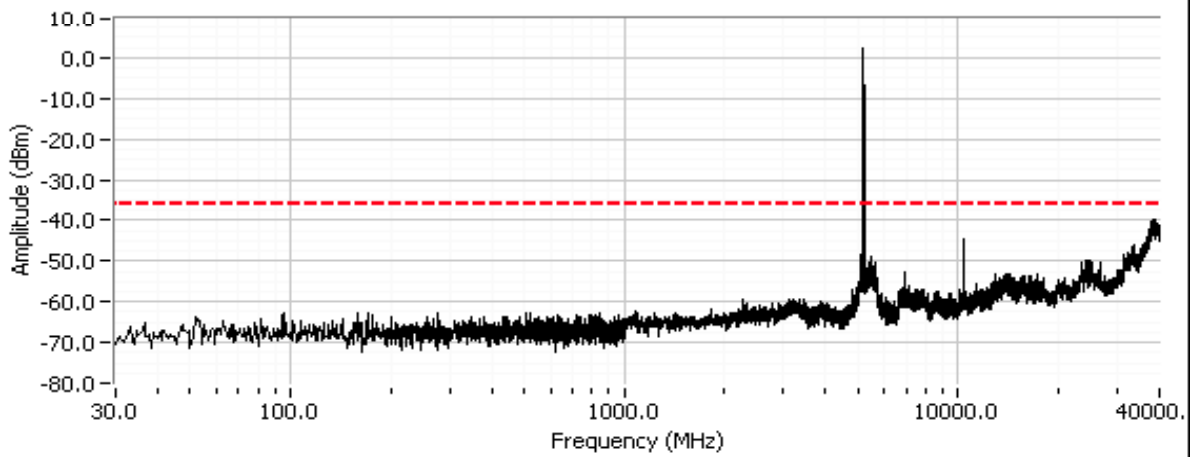
Client: Xirrus, Inc.	Job Number: J81188
Model: XR4000 3x3	T-Log Number: T83592
	Account Manager: Susan Pelzl
Contact: Steve Smith	
Standard: -	Class: N/A

Center channel, 5150 - 5250 MHz Band

Out of Band Spurious Emissions, 5200 MHz, 802.11a MIMO, Chain 0

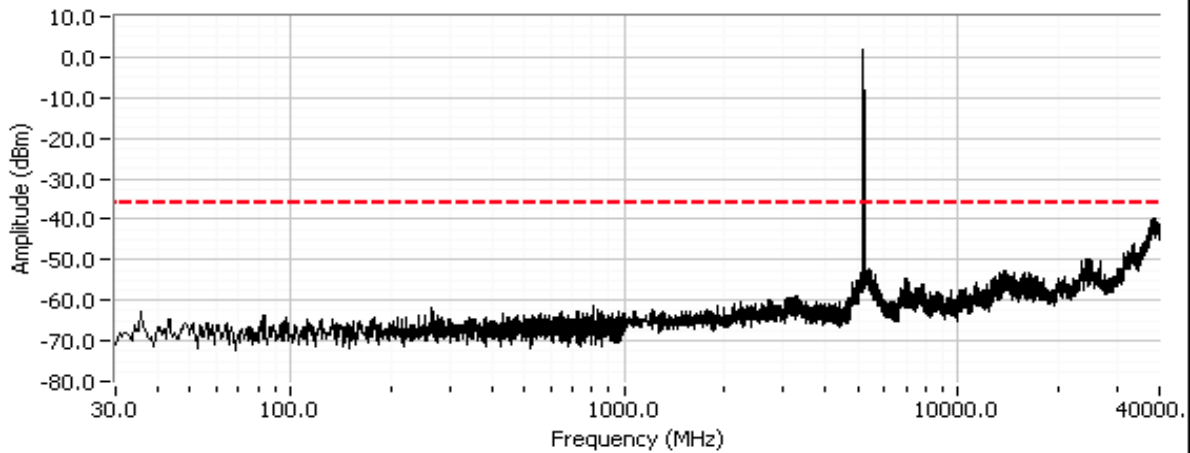


Out of Band Spurious Emissions, 5200 MHz, 802.11a MIMO, Chain 1



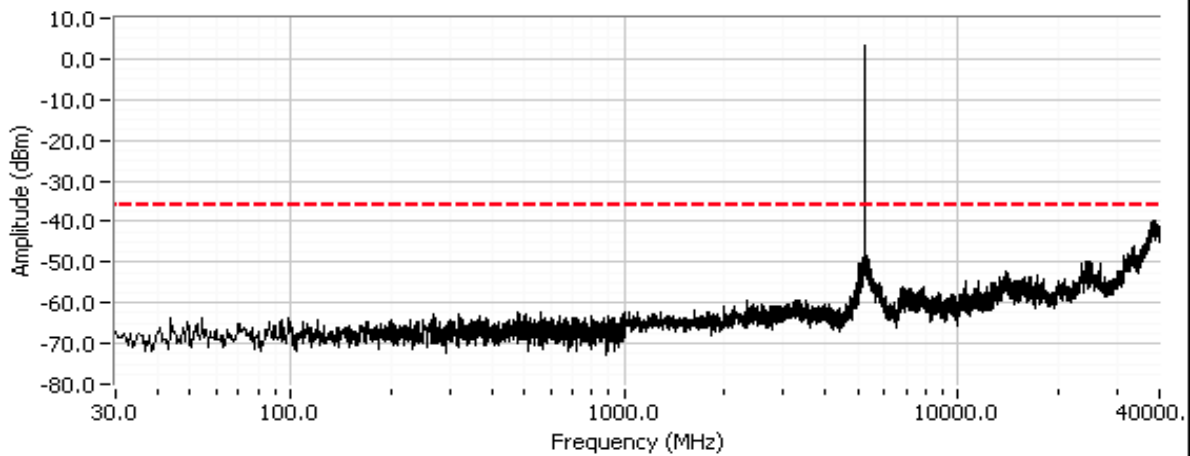
Client: Xirrus, Inc.	Job Number: J81188
Model: XR4000 3x3	T-Log Number: T83592
	Account Manager: Susan Pelzl
Contact: Steve Smith	
Standard: -	Class: N/A

Out of Band Spurious Emissions, 5200 MHz, 802.11a MIMO, Chain 2



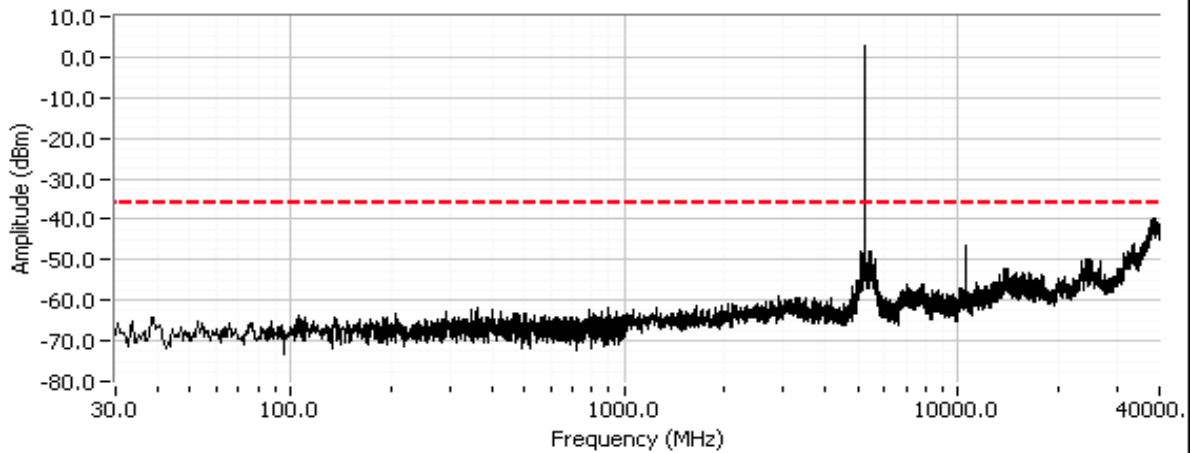
High channel, 5150 - 5250 MHz Band

Out of Band Spurious Emissions, 5240 MHz, 802.11a MIMO, Chain 0

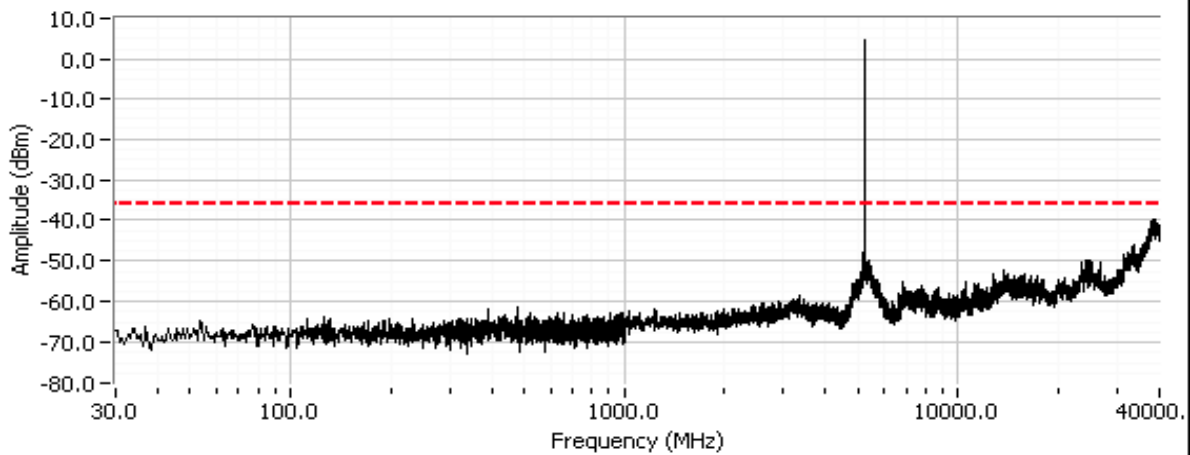


Client: Xirrus, Inc.	Job Number: J81188
Model: XR4000 3x3	T-Log Number: T83592
	Account Manager: Susan Pelzl
Contact: Steve Smith	
Standard: -	Class: N/A

Out of Band Spurious Emissions, 5240 MHz, 802.11a MIMO, Chain 1



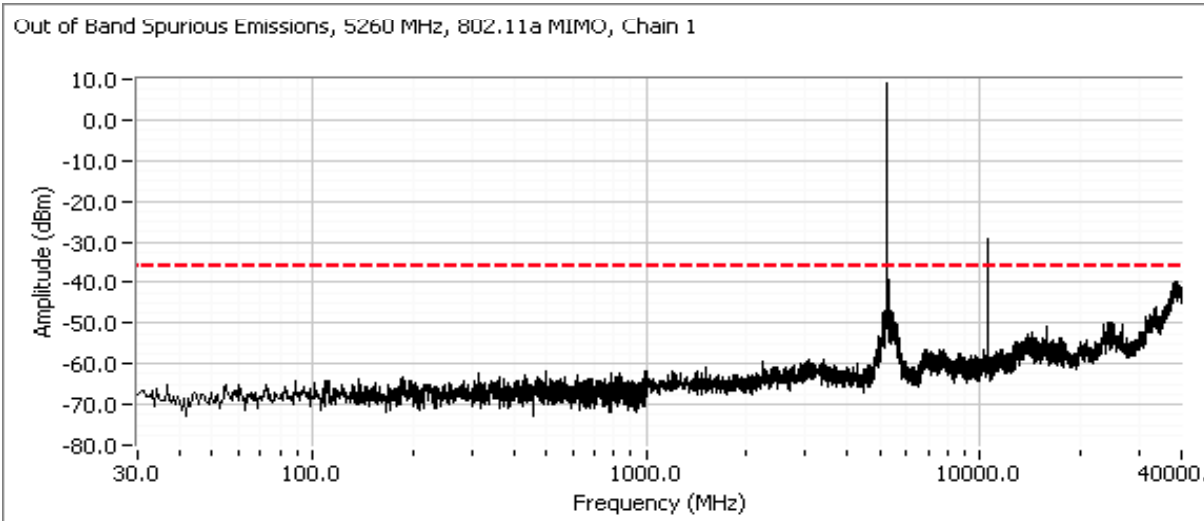
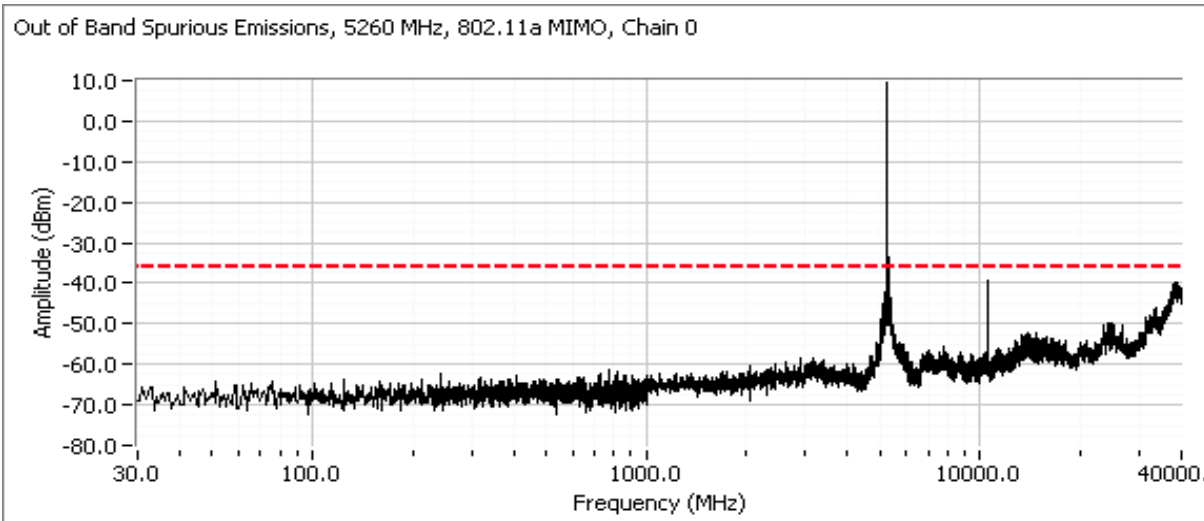
Out of Band Spurious Emissions, 5240 MHz, 802.11a MIMO, Chain 2



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

Low channel, 5250 - 5350 MHz Band

Wide-band plot, RB=VB=1MHz (Peak measurements versus limit).

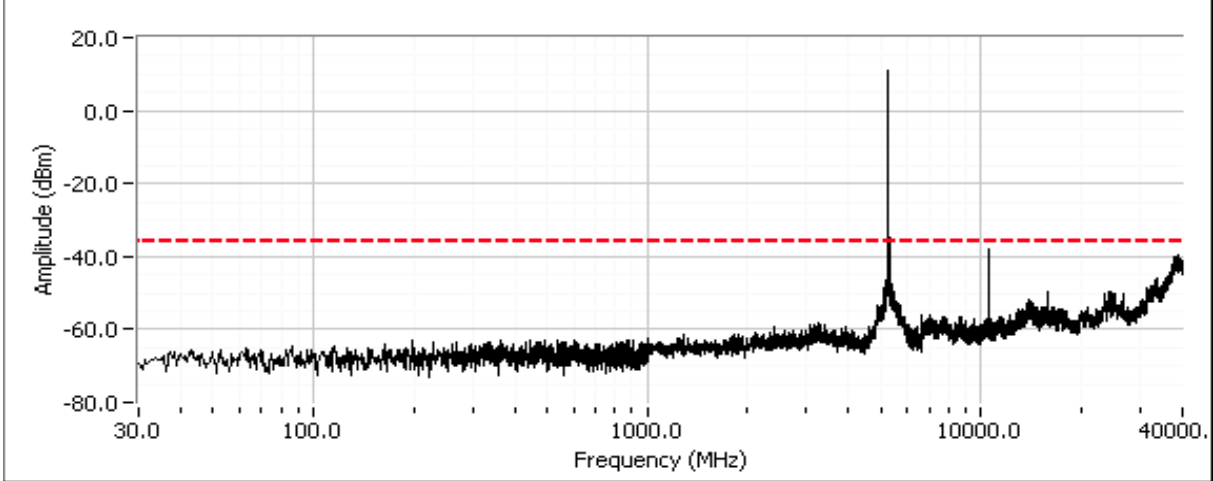


2nd Harmonic Measured Radiated - Complies with Radiated Emissions



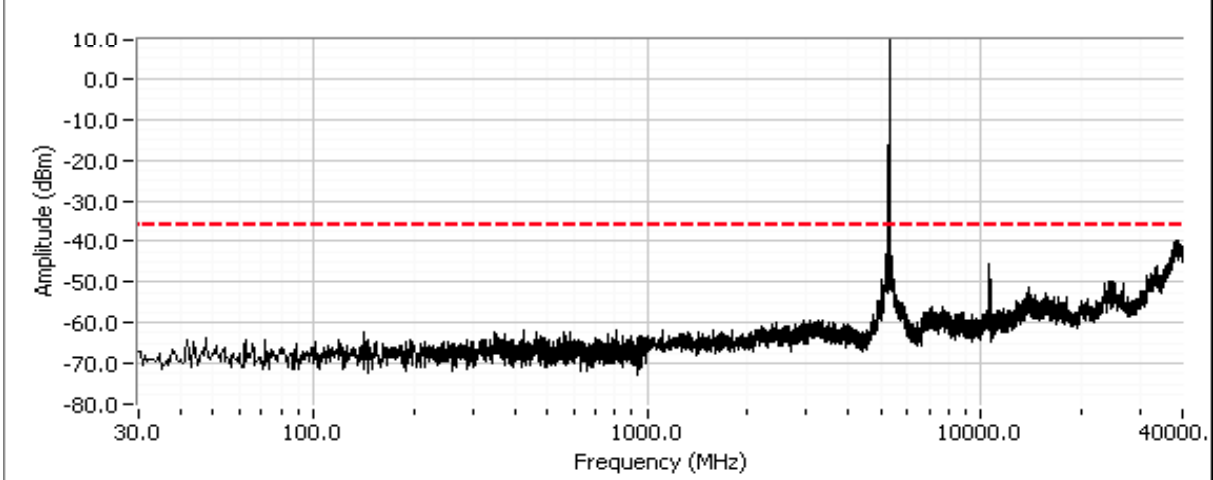
Client: Xirrus, Inc.	Job Number: J81188
Model: XR4000 3x3	T-Log Number: T83592
	Account Manager: Susan Pelzl
Contact: Steve Smith	
Standard: -	Class: N/A

Out of Band Spurious Emissions, 5260 MHz, 802.11a MIMO, Chain 2



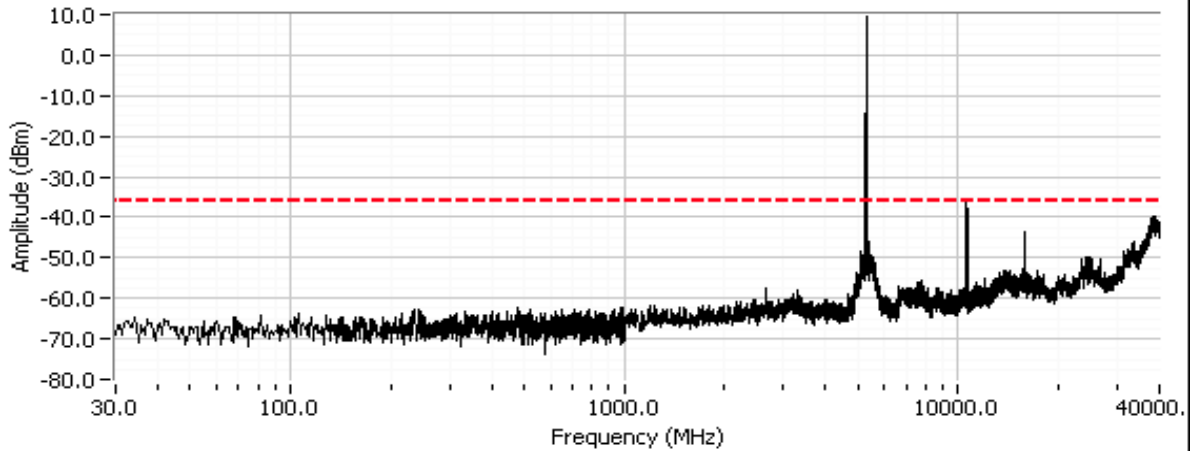
Center channel, 5250 - 5350 MHz Band

Out of Band Spurious Emissions, 5300 MHz, 802.11a MIMO, Chain 0

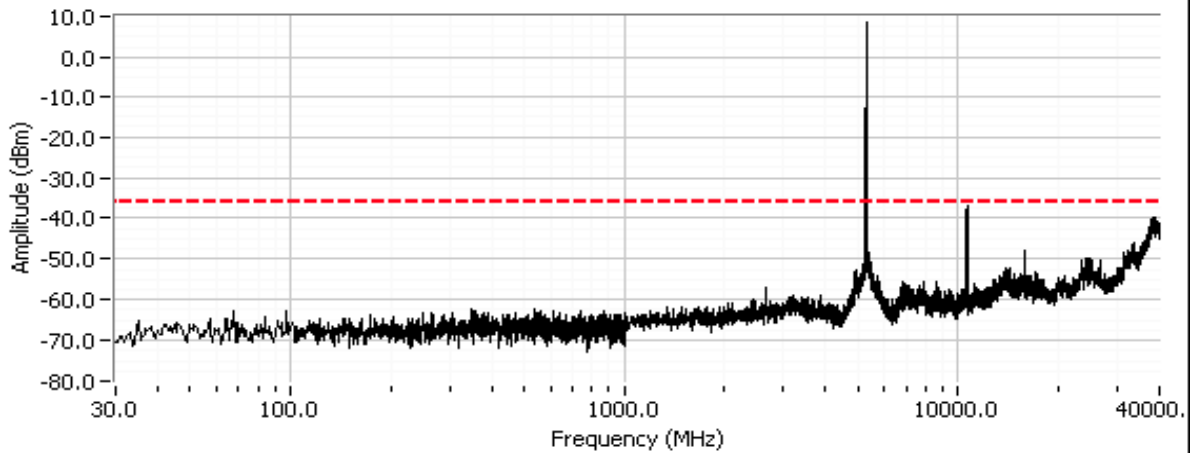


Client: Xirrus, Inc.	Job Number: J81188
Model: XR4000 3x3	T-Log Number: T83592
	Account Manager: Susan Pelzl
Contact: Steve Smith	
Standard: -	Class: N/A

Out of Band Spurious Emissions, 5300 MHz, 802.11a MIMO, Chain 1



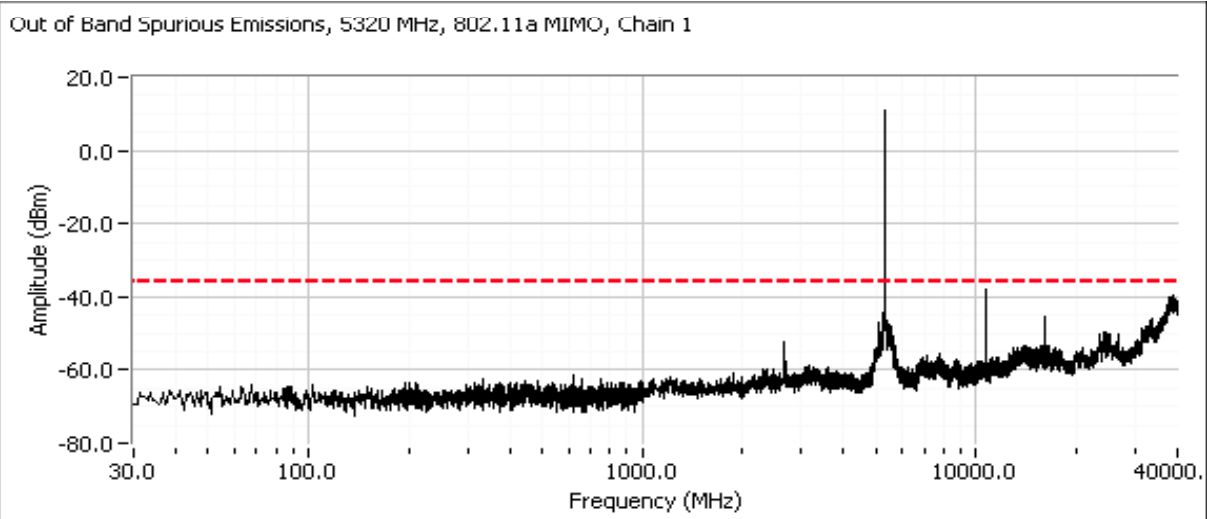
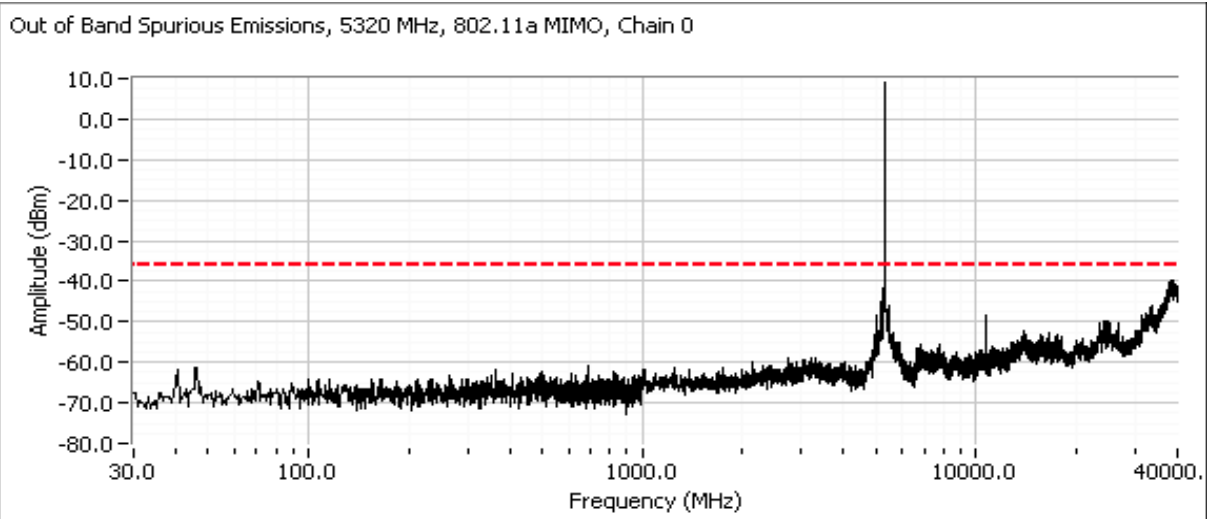
Out of Band Spurious Emissions, 5300 MHz, 802.11a MIMO, Chain 2



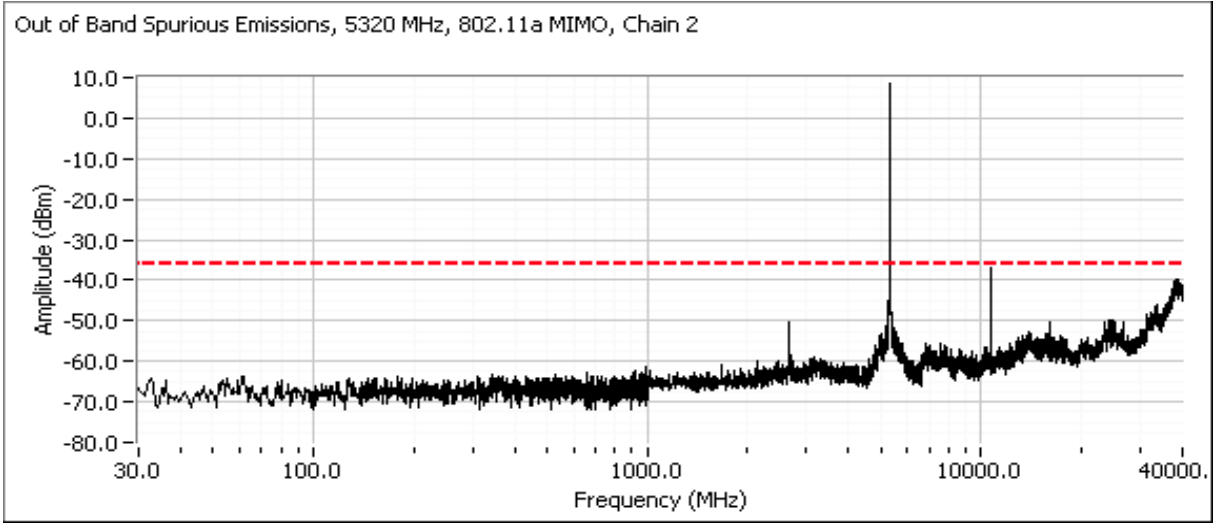
Client: Xirrus, Inc.	Job Number: J81188
Model: XR4000 3x3	T-Log Number: T83592
	Account Manager: Susan Pelzl
Contact: Steve Smith	
Standard: -	Class: N/A

High channel, 5250 - 5350 MHz Band

Note - compliance with the radiated limits for the restricted band immediately above 5350MHz is demonstrated through the radiated emissions tests.



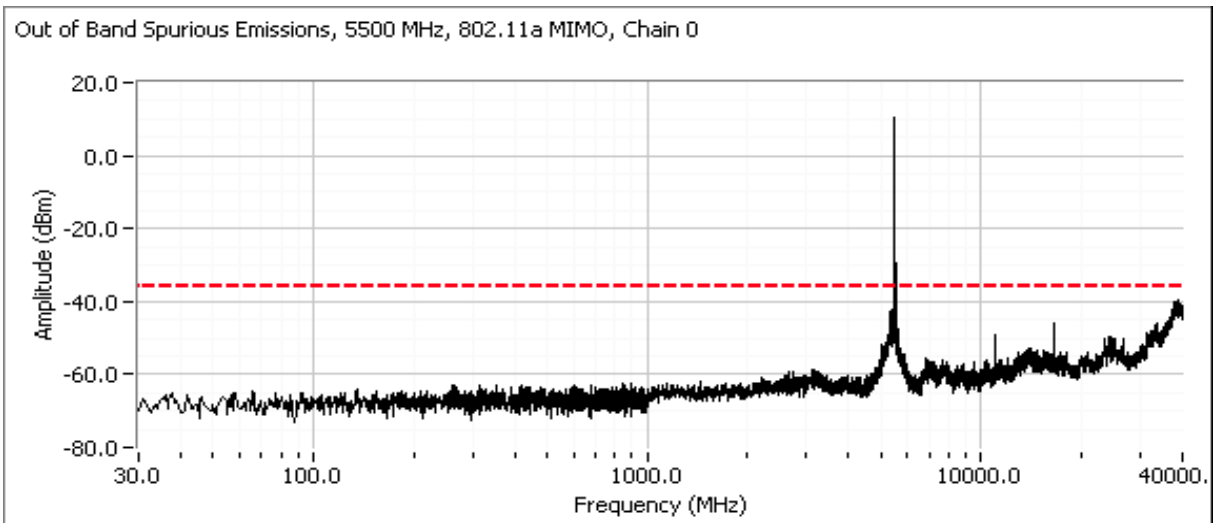
Client: Xirrus, Inc.	Job Number: J81188
Model: XR4000 3x3	T-Log Number: T83592
	Account Manager: Susan Pelzl
Contact: Steve Smith	
Standard: -	Class: N/A



Low channel, 5470 - 5725 MHz Band

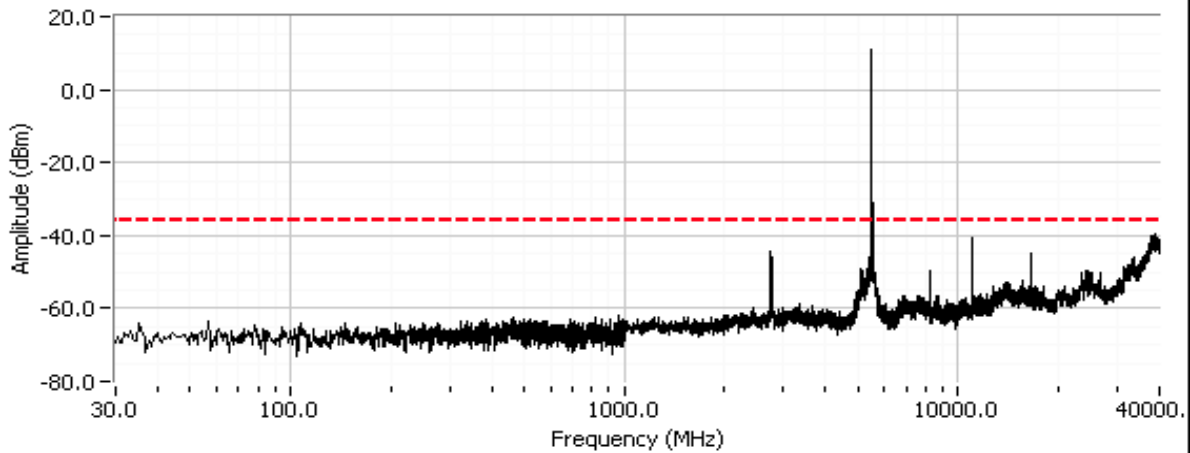
Compliance with the -27dBm/MHz limit in the 5460 - 5470 MHz band immediately below the allocated band has been demonstrated through radiated measurements.

Wide-band plot, RB=VB=1MHz (Peak measurements versus limit).

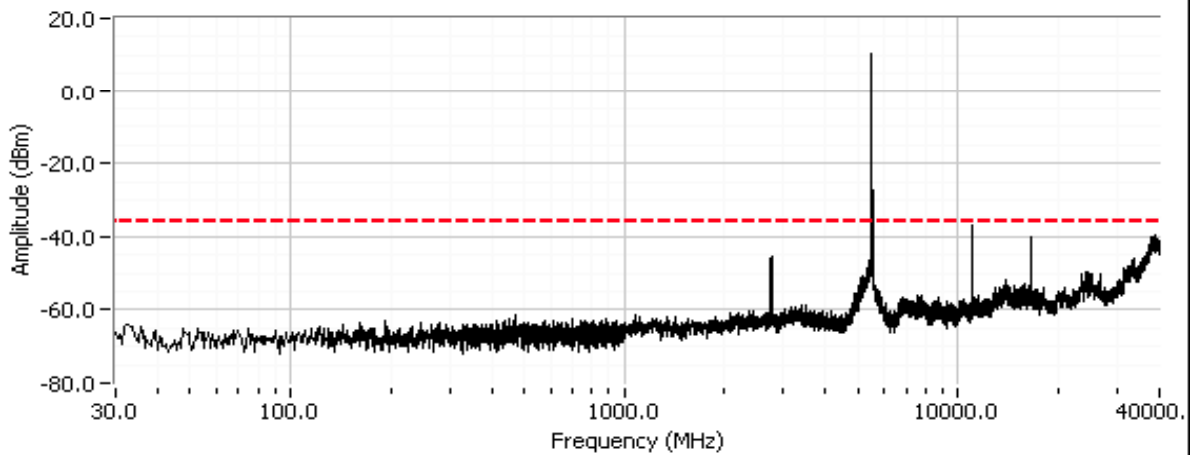


Client: Xirrus, Inc.	Job Number: J81188
Model: XR4000 3x3	T-Log Number: T83592
	Account Manager: Susan Pelzl
Contact: Steve Smith	
Standard: -	Class: N/A

Out of Band Spurious Emissions, 5500 MHz, 802.11a MIMO, Chain 1



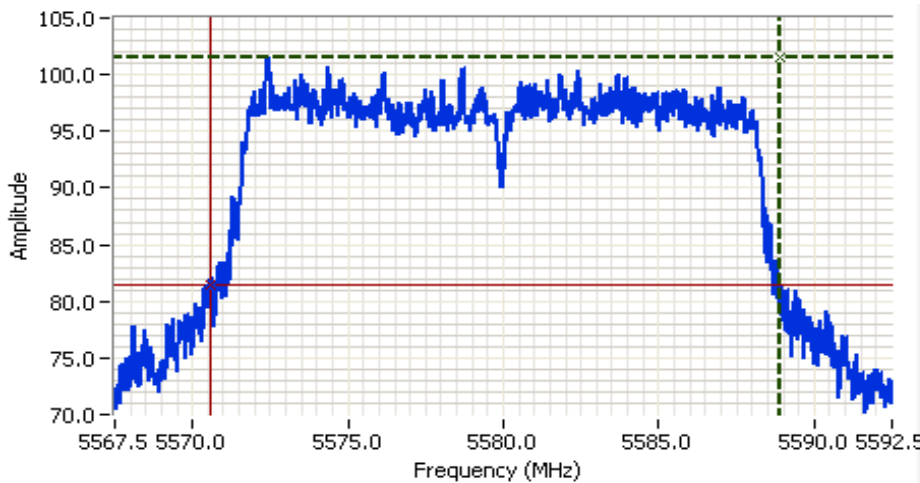
Out of Band Spurious Emissions, 5500 MHz, 802.11a MIMO, Chain 2



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

Center channel, 5470 - 5725 MHz Band

For master devices - This plot is showing that the 20dB bandwidth of the channel closest to 5600 MHz does not spill into the 5600-5650 MHz band.

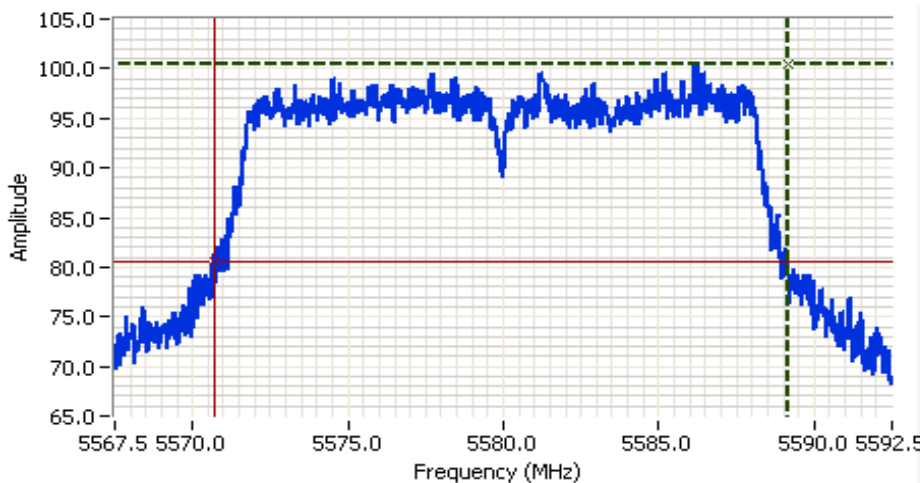


**Analyzer Settings**  
 Agilent Technologies, E4446A  
 CF: 5580.000 MHz  
 SPAN: 25.000 MHz  
 RB: 200 kHz  
 VB: 620 kHz  
 Detector: POS  
 Attn: 20 DB  
 RL Offset: 0.0 DB  
 Sweep Time: 1.0ms  
 Ref Lvl: 107.0 DBUV

**Comments**  
 20dB BW BE: 5588.932 MHz  
 Chain 2

Cursor 1 5588.9321 101.46  
 Cursor 2 5570.5844 81.46

Delta Freq. 18.348  
 Delta Amplitude 20.00



**Analyzer Settings**  
 Agilent Technologies, E4446A  
 CF: 5580.000 MHz  
 SPAN: 25.000 MHz  
 RB: 200 kHz  
 VB: 620 kHz  
 Detector: POS  
 Attn: 20 DB  
 RL Offset: 0.0 DB  
 Sweep Time: 1.0ms  
 Ref Lvl: 107.0 DBUV

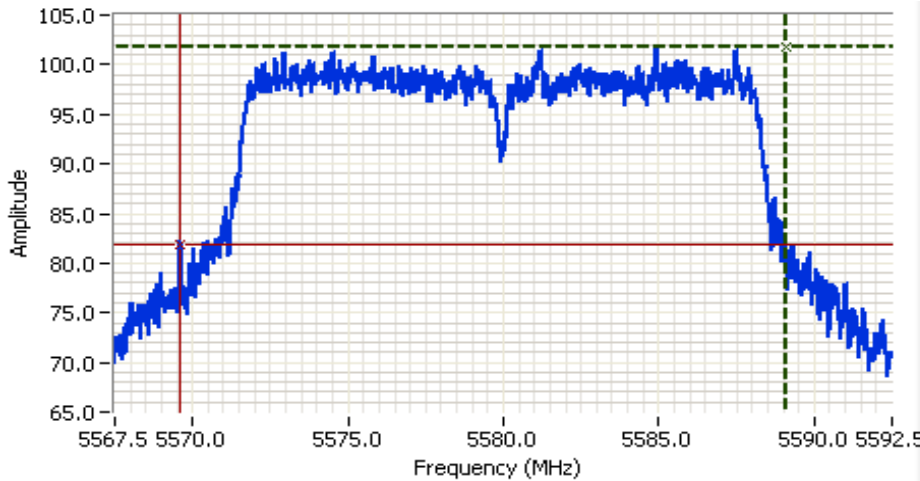
**Comments**  
 20dB BW BE: 5589.182 MHz  
 Chain 0

Cursor 1 5589.1822 100.50  
 Cursor 2 5570.6761 80.50

Delta Freq. 18.506  
 Delta Amplitude 20.00



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



**Analyzer Settings**  
 Agilent Technologies, E4446A  
 CF: 5580.000 MHz  
 SPAN: 25.000 MHz  
 RB: 200 kHz  
 VB: 620 kHz  
 Detector: POS  
 Attn: 20 DB  
 RL Offset: 0.0 DB  
 Sweep Time: 1.0ms  
 Ref Lvl: 107.0 DBUV

**Comments**  
 20dB BW BE: 5589.098 MHz  
 Chain 1

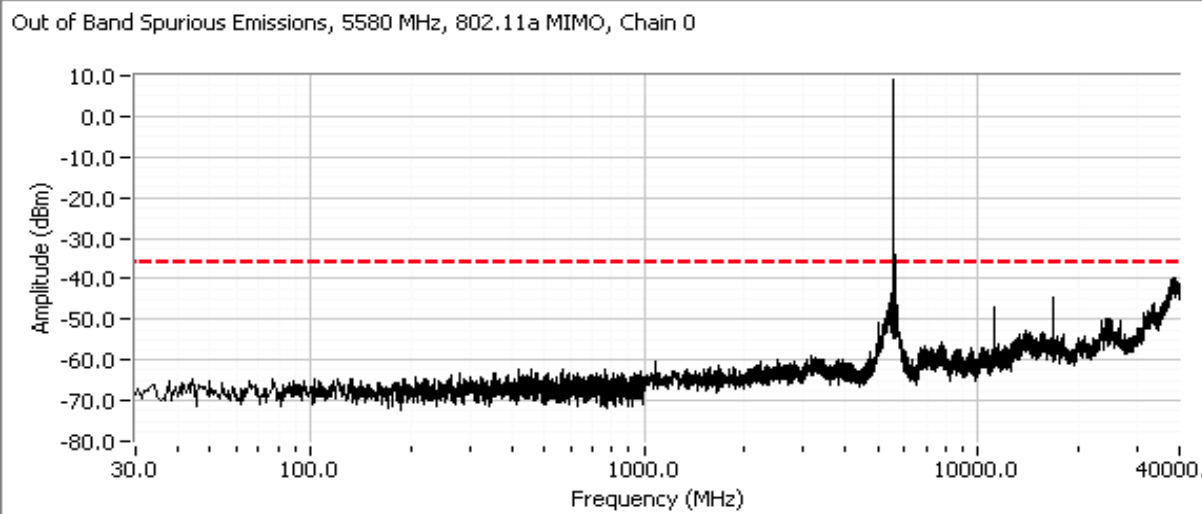
Cursor 1	5589.0989	101.78	
Cursor 2	5569.6090	81.78	

Delta Freq. 19.490

Delta Amplitude 20.00

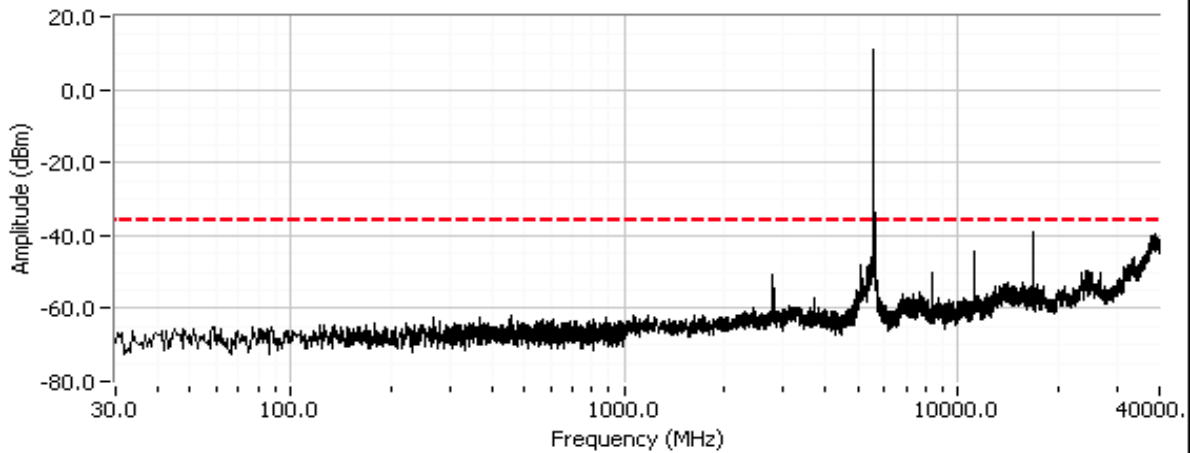


Wide-band plot, RB=VB=1MHz (Peak measurements versus limit).

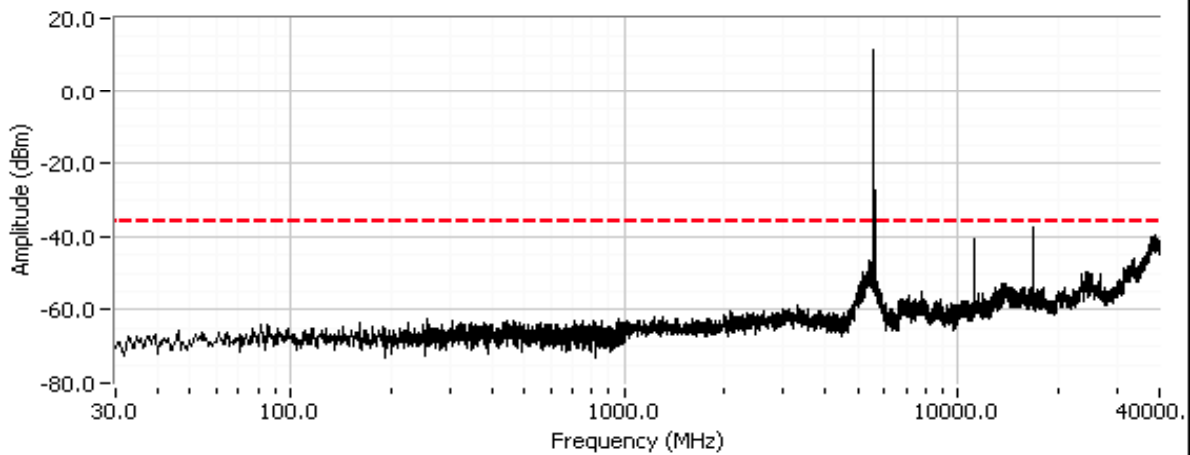


Client: Xirrus, Inc.	Job Number: J81188
Model: XR4000 3x3	T-Log Number: T83592
	Account Manager: Susan Pelzl
Contact: Steve Smith	
Standard: -	Class: N/A

Out of Band Spurious Emissions, 5580 MHz, 802.11a MIMO, Chain 1



Out of Band Spurious Emissions, 5580 MHz, 802.11a MIMO, Chain 2

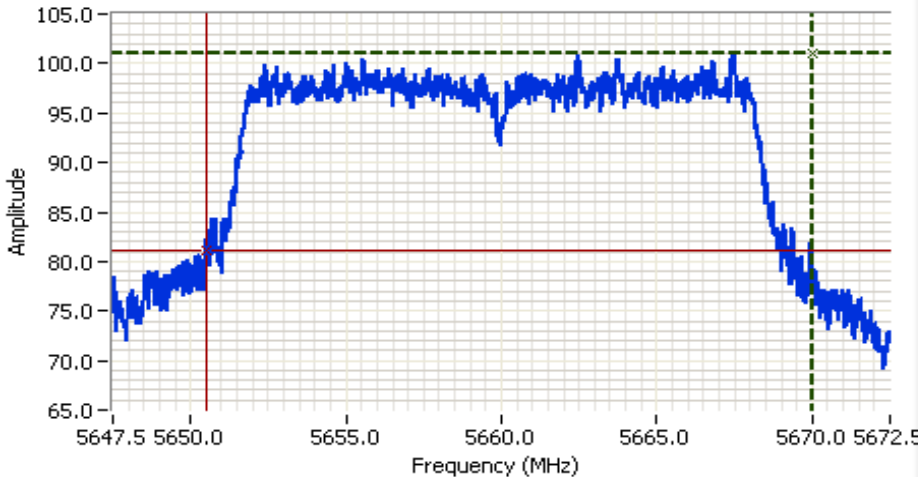




Client: Xirrus, Inc.	Job Number: J81188
Model: XR4000 3x3	T-Log Number: T83592
Contact: Steve Smith	Account Manager: Susan Pelzl
Standard: -	Class: N/A

**Channel adjacent to 5650 MHz (Master Device)**

Plots showing that the 20dB bandwidth of the channel closest to 5650 MHz does not spill into the 5600-5650 MHz band.

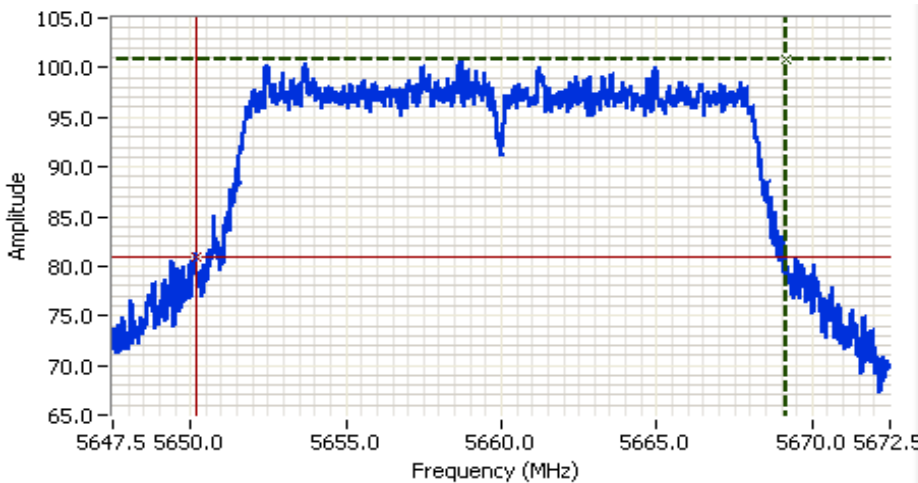


**Analyzer Settings**  
 Agilent Technologies, E4446A  
 CF: 5660.000 MHz  
 SPAN: 25.000 MHz  
 RB: 200 kHz  
 VB: 620 kHz  
 Detector: POS  
 Attn: 20 DB  
 RL Offset: 0.0 DB  
 Sweep Time: 1.0ms  
 Ref Lvl: 107.0 DBUV

**Comments**  
 20dB BW BE: 5650.534 MHz  
 Chain 2

Cursor 1 5669.9992 101.04  
 Cursor 2 5650.5343 81.04

Delta Freq. 19.465  
 Delta Amplitude 20.00



**Analyzer Settings**  
 Agilent Technologies, E4446A  
 CF: 5660.000 MHz  
 SPAN: 25.000 MHz  
 RB: 200 kHz  
 VB: 620 kHz  
 Detector: POS  
 Attn: 20 DB  
 RL Offset: 0.0 DB  
 Sweep Time: 1.0ms  
 Ref Lvl: 107.0 DBUV

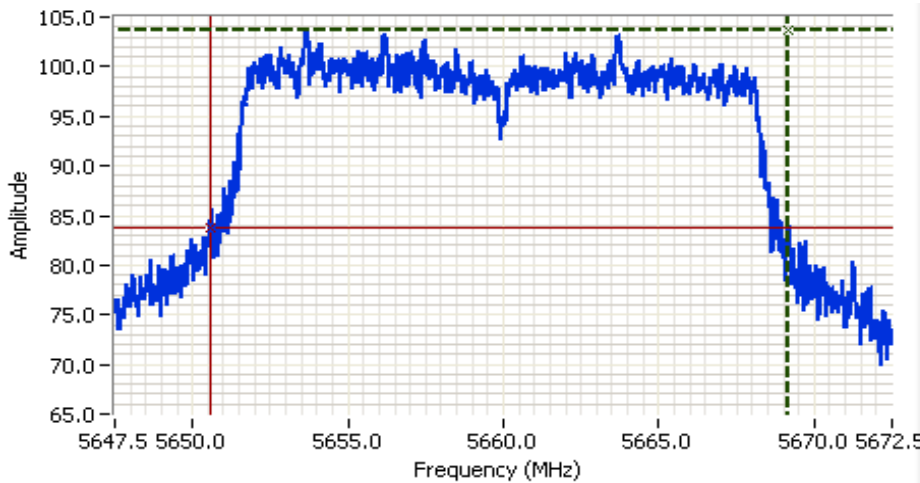
**Comments**  
 20dB BW BE: 5650.167 MHz  
 Chain 0

Cursor 1 5669.1739 100.86  
 Cursor 2 5650.1676 80.86

Delta Freq. 19.006  
 Delta Amplitude 20.00



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



**Analyzer Settings**  
 Agilent Technologies, E4446A  
 CF: 5660.000 MHz  
 SPAN: 25.000 MHz  
 RB: 200 kHz  
 VB: 620 kHz  
 Detector: POS  
 Attn: 20 DB  
 RL Offset: 0.0 DB  
 Sweep Time: 1.0ms  
 Ref Lvl: 107.0 DBUV

**Comments**  
 20dB BW BE: 5650.601 MHz  
 Chain 1

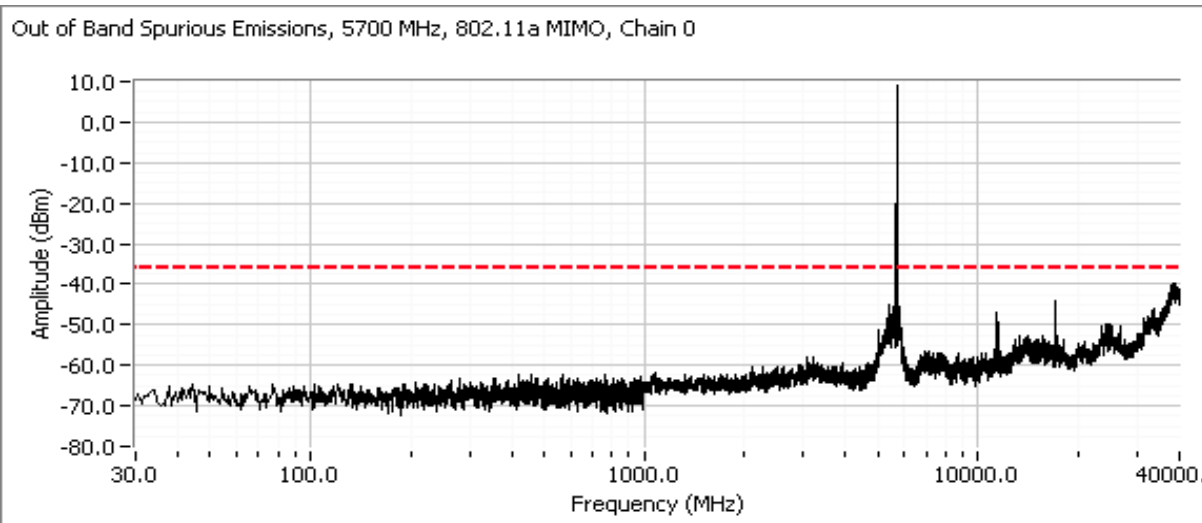
Cursor 1	5669.1906	103.72	Delta Freq.	18.590
Cursor 2	5650.6010	83.72	Delta Amplitude	20.00



**High channel, 5470 - 5725 MHz Band**

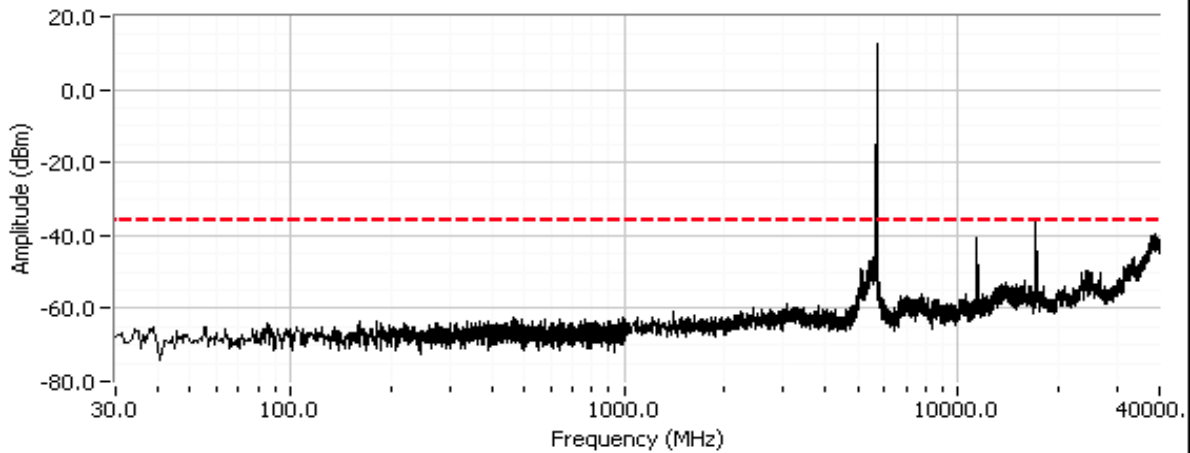
Compliance with the -27dBm/MHz limit above the 5725MHz band edge was demonstrated via radiated measurements.

Wide-band plot, RB=VB=1MHz (Peak measurements versus limit).

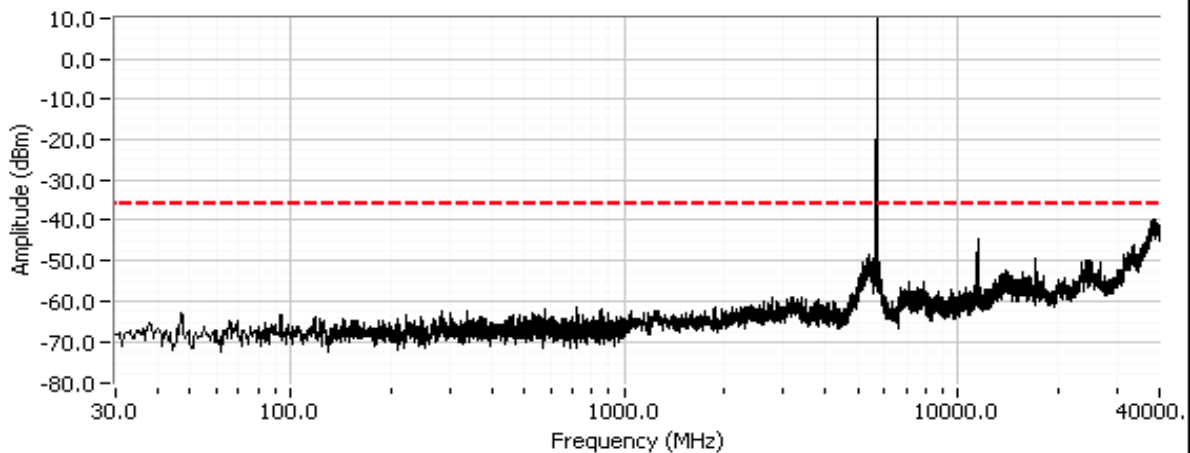


Client: Xirrus, Inc.	Job Number: J81188
Model: XR4000 3x3	T-Log Number: T83592
	Account Manager: Susan Pelzl
Contact: Steve Smith	
Standard: -	Class: N/A

Out of Band Spurious Emissions, 5700 MHz, 802.11a MIMO, Chain 1



Out of Band Spurious Emissions, 5700 MHz, 802.11a MIMO, 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

**RSS-210 (LELAN) and FCC 15.407(UNII)  
Antenna Port Measurements  
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: 7/12 & 7/13/2011 12:00:00 AM      Config. Used: 1  
 Test Engineer: Joseph Cadigal/ R. Varelas      Config Change: None  
 Test Location: FT Chamber#5      EUT Voltage: POE

**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.

**5150-5250 MHz Band**

The limit in this band is a maximum eirp of 23dBm and maximum conducted power of 17dBm. There are four 20MHz channels therefore the power per channel would be restricted to 11dBm conducted power and 17dBm eirp. For MIMO modes the effective antenna gain is 8.8dBi so the maximum conducted power is 8.2dBm to meet an eirp per radio of less than 17dBm.

	Chain 0	Chain 1	Chain 2	Coherent	Effective <sup>5</sup>	EIRP (mW)	EIRP (dBm)
Antenna Gain (dBi):	4	4	4	Yes	8.8	40.7	16.1

**Power**

Frequency (MHz)	Software Setting	26dB BW (MHz)	Measured Output Power <sup>1</sup> dBm			Total		Limit (dBm)	Max Power (W)	Pass or Fail
			Chain 0	Chain 1	Chain 2	mW	dBm			
<b>802.11a SISO</b>										
5240	10.0	26.7	10.2			10.5	10.2	11.0	0.010	PASS
<b>802.11a MIMO</b>										
5240	3.0	27.9	3.3	2.2	2.1	5.4	7.3	8.2	0.005	PASS
<b>HT20 MIMO</b>										
5240	3.0	27.9	1.0	-1.9	-2.9	2.4	3.8	8.2	0.002	PASS
<b>HT40 MIMO</b>										
5230	4.0	49.8	1.8	-1.0	-2.1	2.9	4.7	8.2	0.003	PASS

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

### 5250-5350 MHz Band

The limit in this band is a maximum eirp of 30dBm and maximum conducted power of 24dBm. There are four 20MHz channels therefore the power per channel would be restricted to 18dBm conducted power and 24dBm eirp. For MIMO modes the effective antenna gain is 8.8dBi so the maximum conducted power is 15.2dBm to meet an eirp per radio of less than 24dBm.

	Chain 0	Chain 1	Chain 2	Coherent	Effective <sup>5</sup>	EIRP (mW)	EIRP (dBm)
Antenna Gain (dBi):	4	4	4	Yes	8.8	81.6	19.1

### Power

Frequency (MHz)	Software Setting	26dB BW (MHz)	Measured Output Power <sup>1</sup> dBm			Total		Limit (dBm)	Max Power (W)	Pass or Fail
			Chain 0	Chain 1	Chain 2	mW	dBm			
<b>802.11a SISO</b>										
5300	14.0	26.7	11.8			15.1	11.8	18.0	0.015	PASS
<b>802.11a MIMO</b>										
5300	9.0	28.7	6.0	5.8	4.9	10.8	10.3	15.2	0.011	PASS
<b>HT20 MIMO</b>										
5300	9.0	28.7	6.0	5.7	5.2	11.0	10.4	15.2	0.011	PASS
<b>HT40 MIMO</b>										
5270	9.0	50.7	7.0	5.8	5.9	12.7	11.0	15.2	0.013	PASS

### 5470-5725 MHz Band

The limit in this band is a maximum eirp of 30dBm and maximum conducted power of 24dBm. There are eight 20MHz channels therefore the power per channel would be restricted to 15dBm conducted power and 21dBm eirp. For MIMO modes the effective antenna gain is 8.8dBi so the maximum conducted power is 12.2dBm to meet an eirp per radio of less than 21dBm.

	Chain 0	Chain 1	Chain 2	Coherent	Effective <sup>5</sup>	EIRP (mW)	EIRP (dBm)
Antenna Gain (dBi):	4	4	4	Yes	8.8	72.8	18.6

### Power

Frequency (MHz)	Software Setting	26dB BW (MHz)	Measured Output Power <sup>1</sup> dBm			Total		Limit (dBm)	Max Power (W)	Pass or Fail
			Chain 0	Chain 1	Chain 2	mW	dBm			
<b>802.11a SISO</b>										
5580	14.0	26.7	11.0			12.5	11.0	15.0	0.013	PASS
<b>802.11a MIMO</b>										
5580	8.0	27.8	5.7	4.5	5.0	9.7	9.8	12.2	0.010	PASS
<b>HT20 MIMO</b>										
5580	8.0	27.8	5.2	4.7	4.9	9.4	9.7	12.2	0.009	PASS
<b>HT40 MIMO</b>										
5550	8.0	49.8	6.2	5.6	4.8	10.8	10.3	12.2	0.011	PASS

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

**RSS 210 and FCC 15.407 (UNII) Radiated Spurious Emissions**

**Summary of Results  
System S/N:1, Radio 2**

Run #	Mode	Channel	Power Setting	Measured Power	Test Performed	Limit	Result / Margin
1	802.11a Chain 012	5150-5250 #36 (Low)	14.0		Restricted Band Edge at 5150 MHz	15.209	53.0dBµV/m @ 5148.9MHz (-1.0dB)
		#40	17.0		Restricted Band Edge at 5150 MHz	15.209	49.3dBµV/m @ 5149.8MHz (-4.7dB)
	802.11a Chain 0	5150-5250 Low	16.5		Restricted Band Edge at 5150 MHz	15.209	53.6dBµV/m @ 5150.0MHz (-0.4dB)
2	802.11a Chain 012	5250-5350 #64 (High)	12.5		Restricted Band Edge at 5350 MHz	15.209	53.4dBµV/m @ 5350.0MHz (-0.6dB)
		#60	17.0		Restricted Band Edge at 5350 MHz	15.209	50.3dBµV/m @ 5350.0MHz (-3.7dB)
	802.11a Chain 0	5250-5350 #64 (High)	14.0		Restricted Band Edge at 5350 MHz	15.209	53.6dBµV/m @ 5350.0MHz (-0.4dB)
		#60	20.0		Restricted Band Edge at 5350 MHz	15.209	48.6dBµV/m @ 5350.2MHz (-5.4dB)
3	802.11a Chain 012	5470-5725 Low	16.5		Restricted Band Edge at 5460 MHz	15.209	53.7dBµV/m @ 5440.0MHz (-0.3dB)
					Band Edge 5460 - 5470 MHz	15E	60.8dBµV/m @ 5469.9MHz (-7.5dB)
	802.11a Chain 0	5470-5725 Low	20.0		Restricted Band Edge at 5460 MHz	15.209	48.6dBµV/m @ 5460.0MHz (-5.4dB)
					Band Edge 5460 - 5470 MHz	15E	62.1dBµV/m @ 5469.5MHz (-6.2dB)
	802.11a Chain 012	5470-5725 High	17.0		Band Edge 5725MHz	15E	61.2dBµV/m @ 5725.0MHz (-7.1dB)
802.11a Chain 0	5470-5725 High	20.0		Band Edge 5725MHz	15E	Perfomed conducted	

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

**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**

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

**Ambient Conditions:**

Temperature: 10-25 °C  
Rel. Humidity: 25-65 %

**Modifications Made During Testing**

No modifications were made to the EUT during testing

**Deviations From The Standard**

No deviations were made from the requirements of the standard.

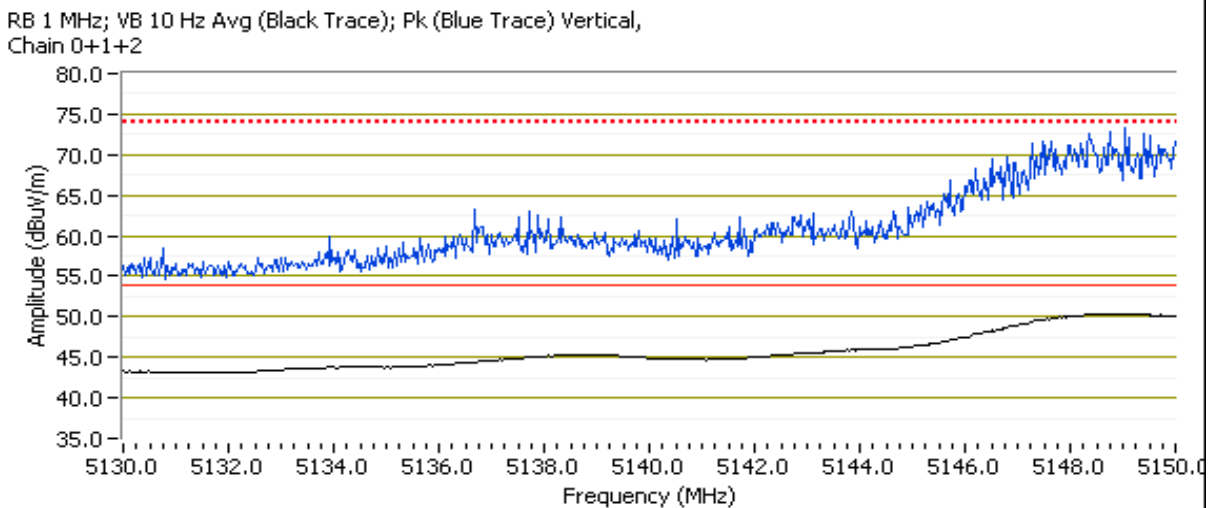
Run #1, Radiated Spurious Emissions at Band Edges. Operation in the 5150-5250 MHz Band

Run #1a: Low Channel (Channel 36, 5180MHz)

Date of Test: 6/15/2011, Rafael Varelas, FT#7

**5150 MHz Band Edge Signal Radiated Field Strength - MIMO**

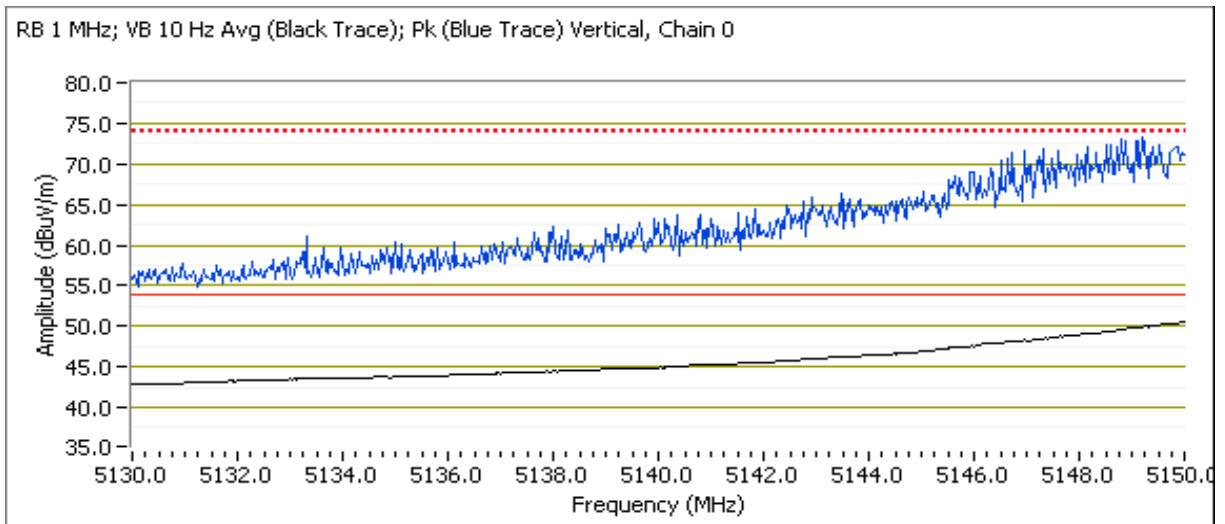
Frequency MHz	Level dB $\mu$ V/m	Pol v/h	FCC 15.209		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments	Chains
			Limit	Margin					
5148.920	53.0	V	54.0	-1.0	AVG	1	1.1	Power 14.0dBm	0+1+2
5148.360	71.3	V	74.0	-2.7	PK	1	1.1	Power 14.0dBm	0+1+2
5149.060	45.1	H	54.0	-8.9	AVG	49	1.3	Power 14.0dBm	0+1+2
5149.150	60.7	H	74.0	-13.3	PK	49	1.3	Power 14.0dBm	0+1+2



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

**5150 MHz Band Edge Signal Radiated Field Strength - SISO (Chain 0)**

Frequency MHz	Level dB $\mu$ V/m	Pol v/h	FCC 15.209		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments	Chains
			Limit	Margin					
5149.980	53.6	V	54.0	-0.4	AVG	1	1.1	Power 16.5dBm	0
5149.900	73.1	V	74.0	-0.9	PK	1	1.1	Power 16.5dBm	0
5149.960	45.3	H	54.0	-8.7	AVG	40	1.3	Power 16.5dBm	0
5149.460	60.8	H	74.0	-13.2	PK	40	1.3	Power 16.5dBm	0





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

**Run #1b: Adjacent Low Channel (Channel 40, 5200MHz)**

Date of Test: 6/21/2011

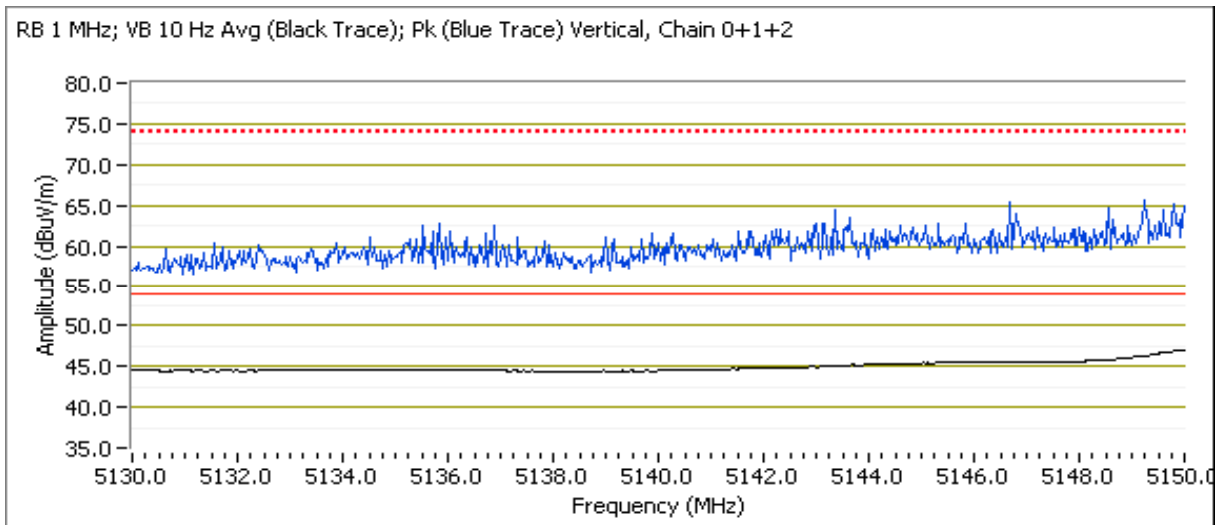
Test Engineer: Rafael Varelas

Test Location: FT Chamber #7

**5150 MHz Band Edge Signal Radiated Field Strength - MIMO**

Frequency	Level	Pol	FCC 15.209		Detector	Azimuth	Height	Comments	Chains
MHz	dB $\mu$ V/m	v/h	Limit	Margin	PK/QP/Avg	degrees	meters		
5149.830	49.3	V	54.0	-4.7	AVG	260	1.4	Power 17.0dBm	0+1+2
5148.170	64.6	V	74.0	-9.4	PK	260	1.4	Power 17.0dBm	0+1+2
5149.730	42.6	H	54.0	-11.4	AVG	108	1.0	Power 17.0dBm	0+1+2
5149.080	54.1	H	74.0	-19.9	PK	108	1.0	Power 17.0dBm	0+1+2

RB 1 MHz; VB 10 Hz Avg (Black Trace); Pk (Blue Trace) Vertical, Chain 0+1+2



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

**Run #2, Radiated Spurious Emissions at Band Edges. Operation in the 5250-5350 MHz Band**

**Run #2a High Channel**

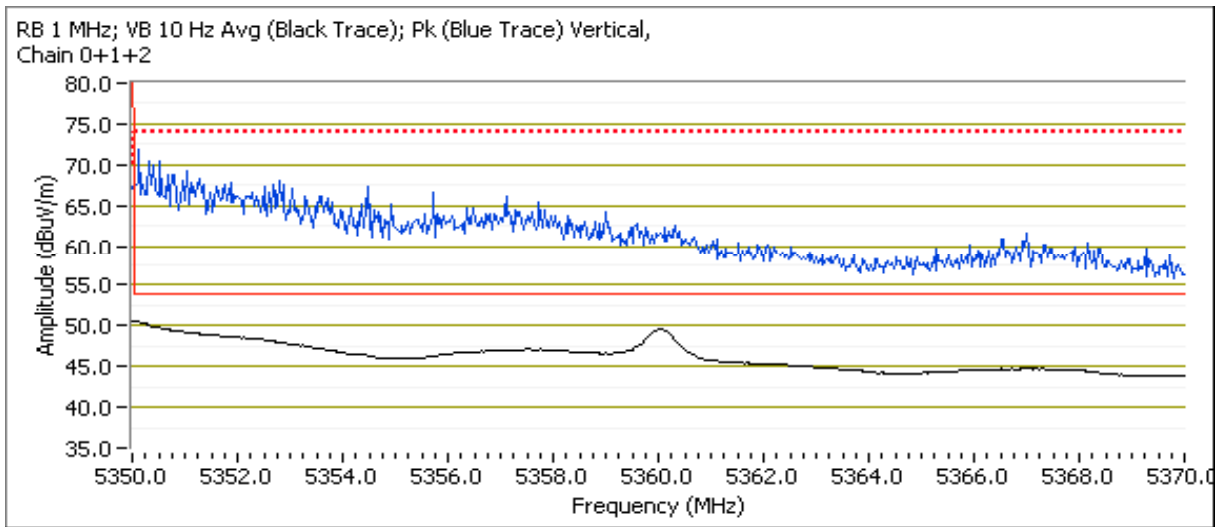
Date of Test: 6/15/2011

Test Engineer: Rafael Varelas

Test Location: FT Chamber #7

**5350 MHz Band Edge Signal Radiated Field Strength - MIMO**

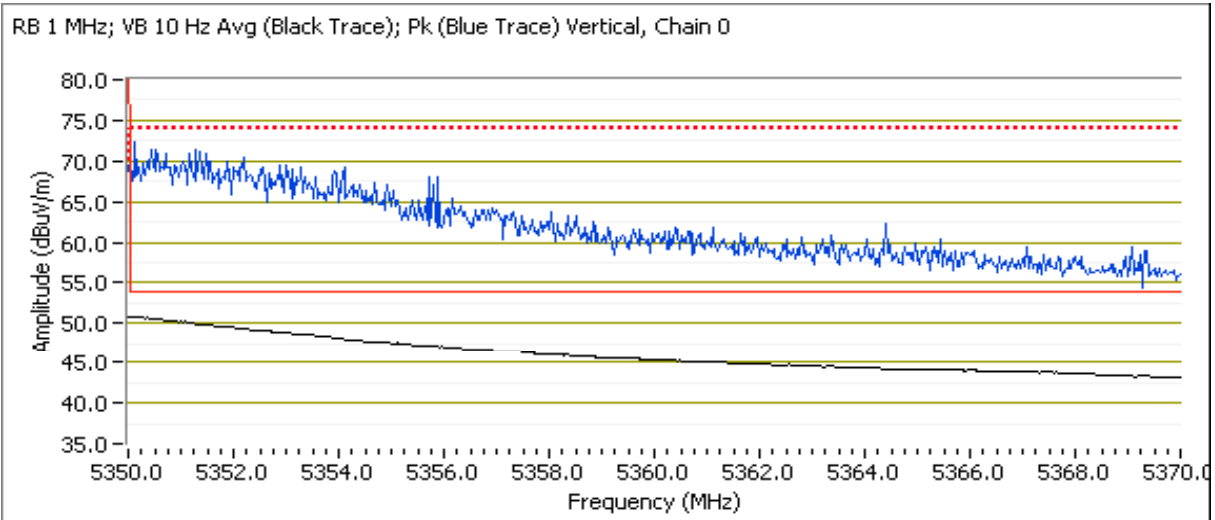
Frequency MHz	Level dB $\mu$ V/m	Pol v/h	FCC 15.209		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments	Chains
			Limit	Margin					
5350.000	53.4	V	54.0	-0.6	AVG	352	1.2	Power 12.5dBm	0+1+2
5350.980	69.3	V	74.0	-4.7	PK	352	1.2	Power 12.5dBm	0+1+2
5350.950	46.9	H	54.0	-7.1	AVG	15	1.6	Power 12.5dBm	0+1+2
5351.820	65.7	H	74.0	-8.3	PK	15	1.6	Power 12.5dBm	0+1+2



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

### 5350 MHz Band Edge Signal Radiated Field Strength - SISO Chain 0

Frequency MHz	Level dB $\mu$ V/m	Pol v/h	FCC 15.209		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments	Chains
			Limit	Margin					
5350.020	53.6	V	54.0	-0.4	AVG	352	1.2	Power 14.0dBm	0
5351.060	71.7	V	74.0	-2.3	PK	352	1.2	Power 14.0dBm	0
5350.030	48.4	H	54.0	-5.6	AVG	15	1.6	Power 14.0dBm	0
5351.400	63.8	H	74.0	-10.2	PK	15	1.6	Power 14.0dBm	0



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

**Run #2b Adjacent High Channel (Channel 60, 5300 MHz)**

Date of Test: 6/21/2011

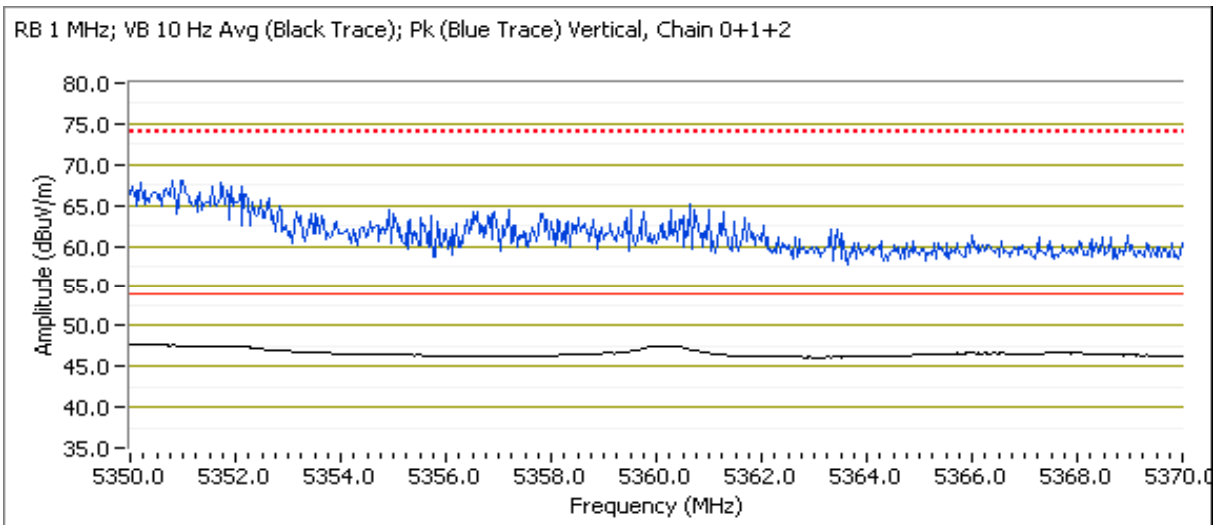
Test Engineer: Rafael Varelas

Test Location: FT Chamber #7

**5350 MHz Band Edge Signal Radiated Field Strength - MIMO**

Frequency	Level	Pol	FCC 15.209		Detector	Azimuth	Height	Comments	Chains
MHz	dB $\mu$ V/m	v/h	Limit	Margin	PK/QP/Avg	degrees	meters		
5350.000	50.3	V	54.0	-3.7	AVG	272	1.3	Power 17.0dBm	0+1+2
5351.730	66.0	V	74.0	-8.0	PK	272	1.3	Power 17.0dBm	0+1+2
5350.660	43.2	H	54.0	-10.8	AVG	255	1.0	Power 17.0dBm	0+1+2
5350.330	54.6	H	74.0	-19.4	PK	255	1.0	Power 17.0dBm	0+1+2

RB 1 MHz; VB 10 Hz Avg (Black Trace); Pk (Blue Trace) Vertical, Chain 0+1+2

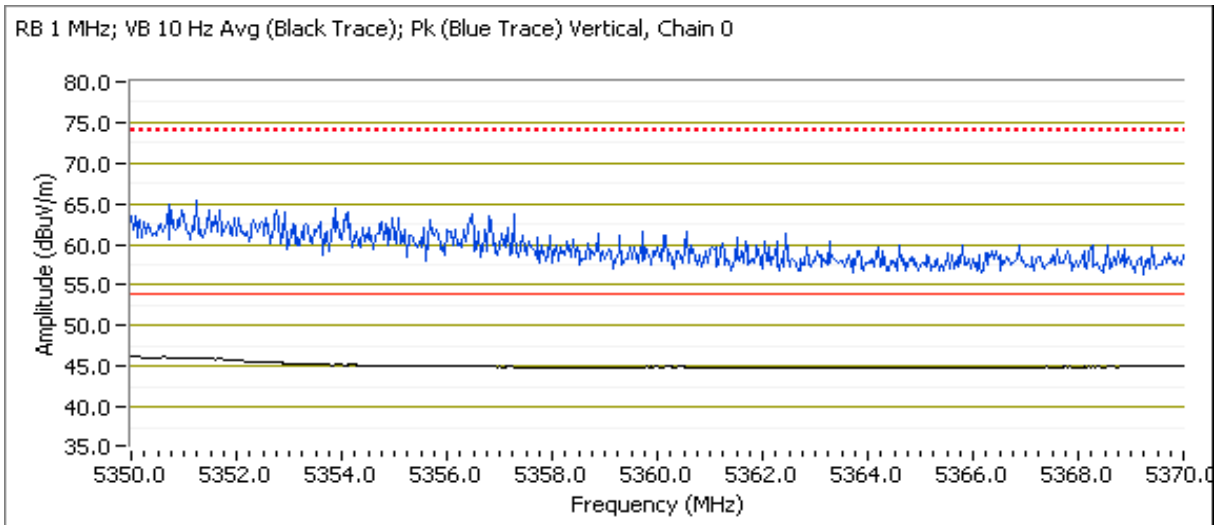


Client: Xirrus, Inc.	Job Number: J81188
Model: XR4000 3x3	T-Log Number: T83592
Contact: Steve Smith	Account Manager: Susan Pelzl
Standard: -	Class: N/A

### 5350 MHz Band Edge Signal Radiated Field Strength - SISO Chain 0

Frequency MHz	Level dB $\mu$ V/m	Pol v/h	FCC 15.209		Detector PK/QP/Avg	Azimuth degrees	Height meters	Comments	Chains
			Limit	Margin					
5350.190	48.6	V	54.0	-5.4	AVG	251	1.2	Power 20.0dBm	0
5350.040	65.4	V	74.0	-8.6	PK	251	1.2	Power 20.0dBm	0
5350.910	43.0	H	54.0	-11.0	AVG	235	1.0	Power 20.0dBm	0
5350.920	54.4	H	74.0	-19.6	PK	235	1.0	Power 20.0dBm	0

RB 1 MHz; VB 10 Hz Avg (Black Trace); Pk (Blue Trace) Vertical, Chain 0



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

**Run #3, Radiated Spurious Emissions at Band Edges. Operation in the 5470-5725 MHz Band**

Run #3a: Low Channel, Channel 100 (5500 MHz)

5350-5460 MHz Restricted Band Edge Signal Radiated Field Strength

Date of Test: 6/15/2011

Test Engineer: Rafael Varelas

Test Location: FT Chamber #7

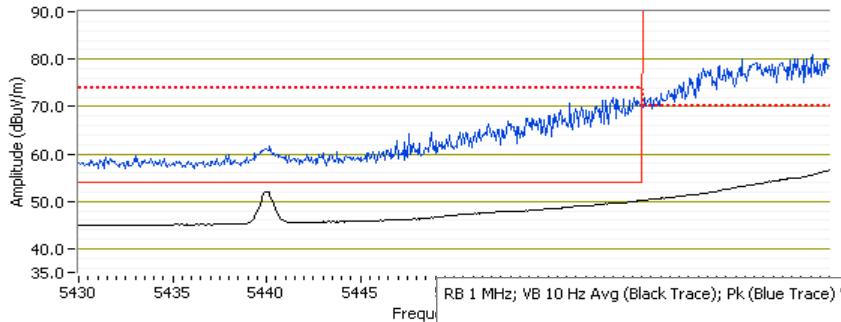
MIMO Mode (Chains 0,1,2)

Frequency MHz	Level dB $\mu$ V/m	Pol v/h	FCC 15.209		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments	Chains
			Limit	Margin					
5440.000	53.7	V	54.0	-0.3	AVG	8	1.3	Power 16.5dBm	0+1+2
5459.930	70.2	V	74.0	-3.8	PK	8	1.3	Power 16.5dBm	0+1+2
5459.550	44.1	H	54.0	-9.9	AVG	0	1.4	Power 16.5dBm	0+1+2
5459.020	54.9	H	74.0	-19.1	PK	0	1.4	Power 16.5dBm	0+1+2

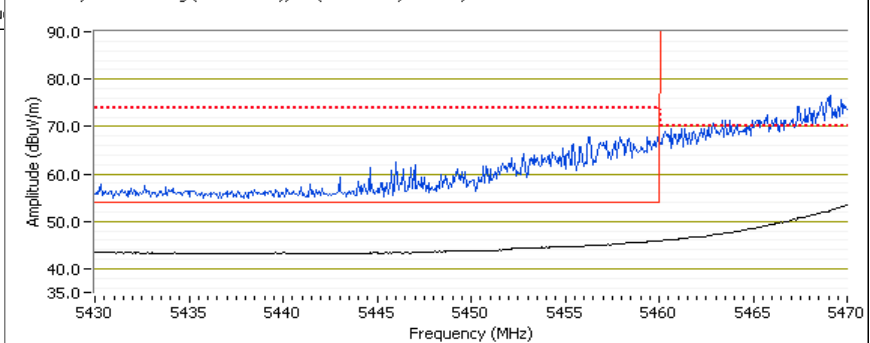
SISO Mode (Chain 0)

Frequency MHz	Level dB $\mu$ V/m	Pol v/h	FCC 15.209		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments	Chains
			Limit	Margin					
5459.960	48.6	V	54.0	-5.4	AVG	336	1.3	Power 20.0dBm	0
5460.000	67.3	V	74.0	-6.7	PK	336	1.3	Power 20.0dBm	0
5458.810	43.6	H	54.0	-10.4	AVG	8	1.0	Power 20.0dBm	0
5458.330	54.8	H	74.0	-19.2	PK	8	1.0	Power 20.0dBm	0

RB 1 MHz; VB 10 Hz Avg (Black Trace); Pk (Blue Trace) Vertical, Chain 0+1+2



RB 1 MHz; VB 10 Hz Avg (Black Trace); Pk (Blue Trace) Vertical, Chain 0



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

**5460 - 5470 MHz Band Edge Radiated Field Strength**

Date of Test: 6/21/2011  
 Test Engineer: Rafael Varelas  
 Test Location: FT Chamber #7

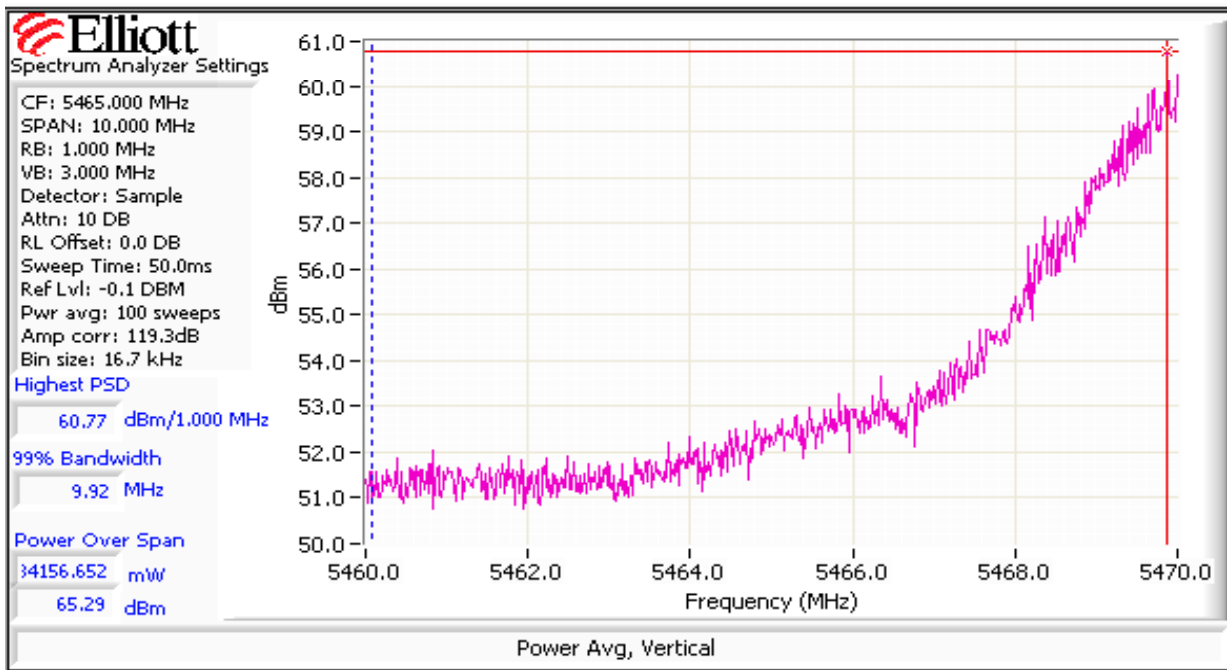
**MIMO Mode (Chain 0,1,2)**

Frequency	Level	Pol	15 E		Detector	Azimuth	Height	Comments
MHz	dB $\mu$ V/m	v/h	Limit	Margin	PK/QP/Avg	degrees	meters	
5469.880	60.8	V	68.3	-7.5	Pavg	281	1.3	Power 16.5dBm 0+1+2

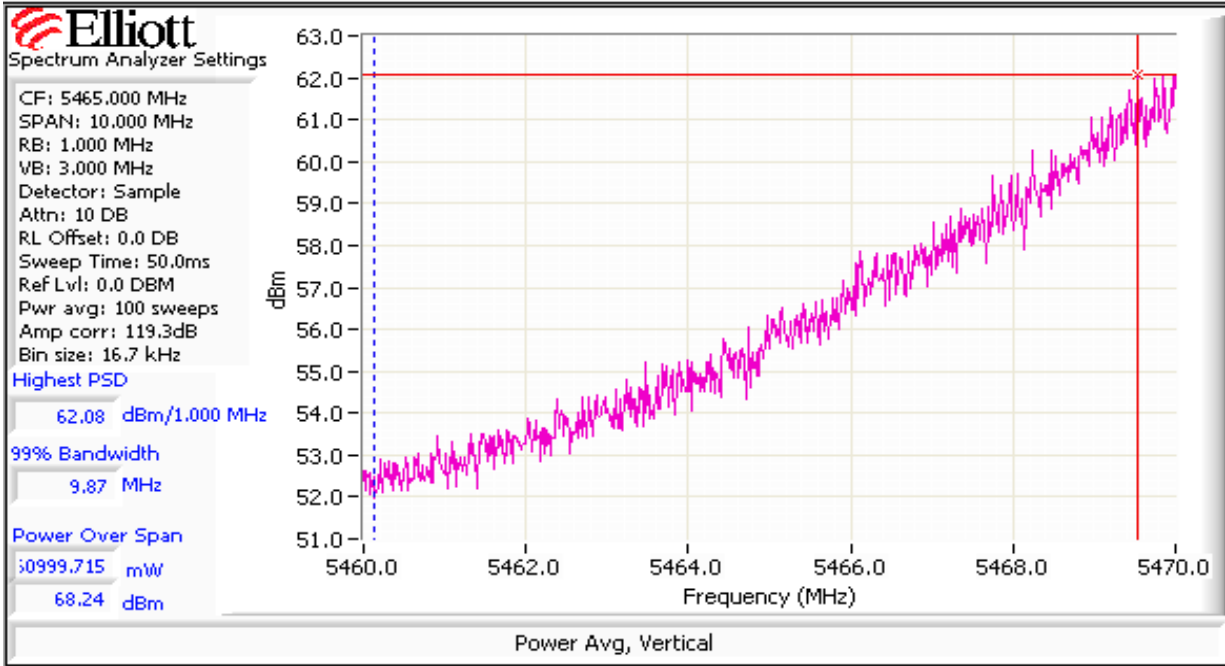
**SISO Mode (Chain 0)**

Frequency	Level	Pol	15 E		Detector	Azimuth	Height	Comments
MHz	dB $\mu$ V/m	v/h	Limit	Margin	PK/QP/Avg	degrees	meters	
5469.530	62.1	V	68.3	-6.2	Pavg	250	1.1	Power 20.0dBm 0

For emissions in the 5460-5470MHz frequency range the limit is -27dBm/MHz eirp (68.3dBuV/m). The measurement method required is the same measurement method used to determine the in-band power spectral density or a peak measurement (RB=1MHz, VB>1MHz). Pavg indicates that the power averaging method of measurement was used, PK indicates that a peak measurement was made.



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





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

Run #3b: High Channel

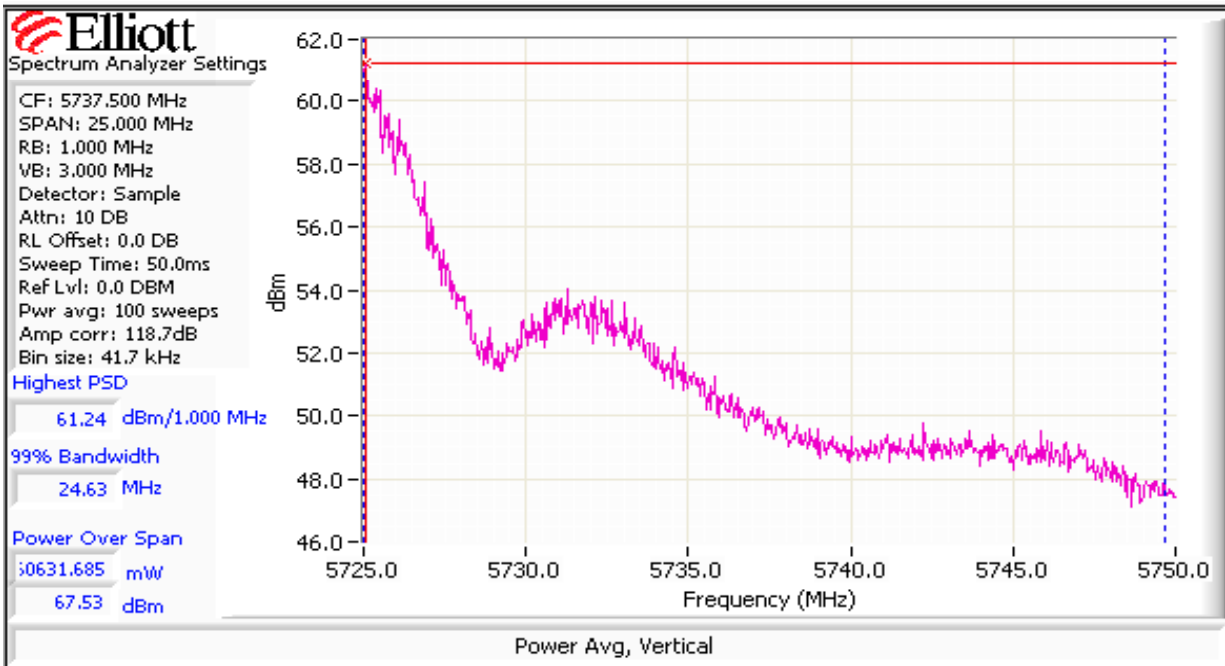
5725 MHz Band Edge Radiated Field Strength  
MIMO Mode (Chain 0,1,2)

Frequency	Level	Pol	15 E		Detector	Azimuth	Height	Comments
MHz	dB $\mu$ V/m	v/h	Limit	Margin	PK/QP/Avg	degrees	meters	
5725.040	61.2	V	68.3	-7.1	Pavg	255	1.1	Power 17.0dBm 0+1+2

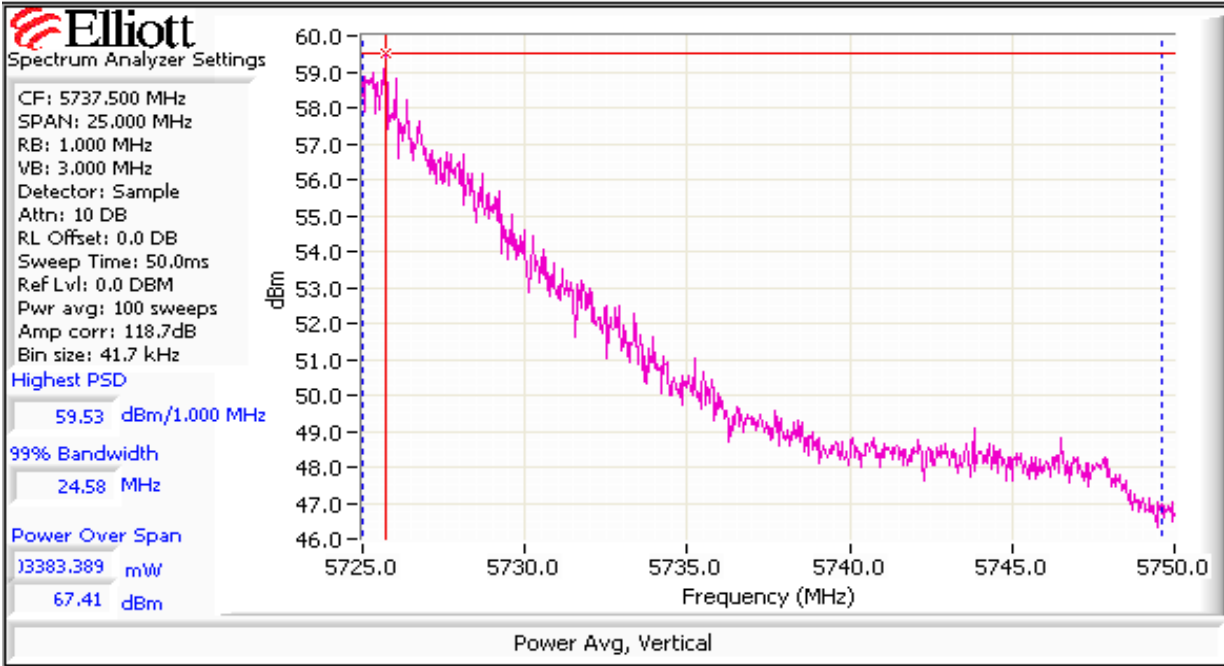
SISO Mode (Chain 0)

Frequency	Level	Pol	15 E		Detector	Azimuth	Height	Comments
MHz	dB $\mu$ V/m	v/h	Limit	Margin	PK/QP/Avg	degrees	meters	
5725.710	59.5	V	68.3	-8.8	Pavg	245	1.3	Power 17.5dBm 0

For emissions immediately above 5725 MHz the limit is -27dBm/MHz eirp (68.3dBuV/m). The measurement method required is the same measurement method used to determine the in-band power spectral density or a peak measurement (RB=1MHz, VB>1MHz). Pavg indicates that the power averaging method of measurement was used, PK indicates that a peak measurement was made.



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



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

## RSS 210 and FCC 15.407 (UNII) 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.

### General Test Configuration

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

### Ambient Conditions:

Temperature: 20.3 °C  
Rel. Humidity: 34 %

### Summary of Results

#### System S/N:1, Radio 2

Run #	Mode	Channel	Power Setting	Test Performed	Limit	Result / Margin
1	HT20 Chain 012	5150-5250 #36 (low)	13.5	Restricted Band Edge at 5150 MHz	15.209	53.8dBµV/m @ 5150.0MHz (-0.2dB)
		5150-5250 #40	17.0	Restricted Band Edge at 5150 MHz		50.6dBµV/m @ 5149.9MHz (-3.4dB)
2	HT20 Chain 012	5250-5350 #64 (High)	11.5	Restricted Band Edge at 5350 MHz	15.209	53.6dBµV/m @ 5350.0MHz (-0.4dB)
		5150-5250 #60	17.0	Restricted Band Edge at 5150 MHz		50.0dBµV/m @ 5350.1MHz (-4.0dB)
3	HT20 Chain 012	5470-5725 Low	16.5	Restricted Band Edge at 5460 MHz	15.209	53.3dBµV/m @ 5459.5MHz (-0.7dB)
				Band Edge 5460 - 5470 MHz	15E	59.8dBµV/m @ 5469.9MHz (-8.5dB)
		5470-5725 High	17.0	Band Edge 5725MHz	15E	66.9dBµV/m @ 5725.3MHz (-1.4dB)

### 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
Contact: Steve Smith	Account Manager: Susan Pelzl
Standard: -	Class: N/A

**Run #1, Radiated Spurious Emissions at Band Edges. Operation in the 5150-5250 MHz Band**

Run #1a: Low Channel, 5180 MHz

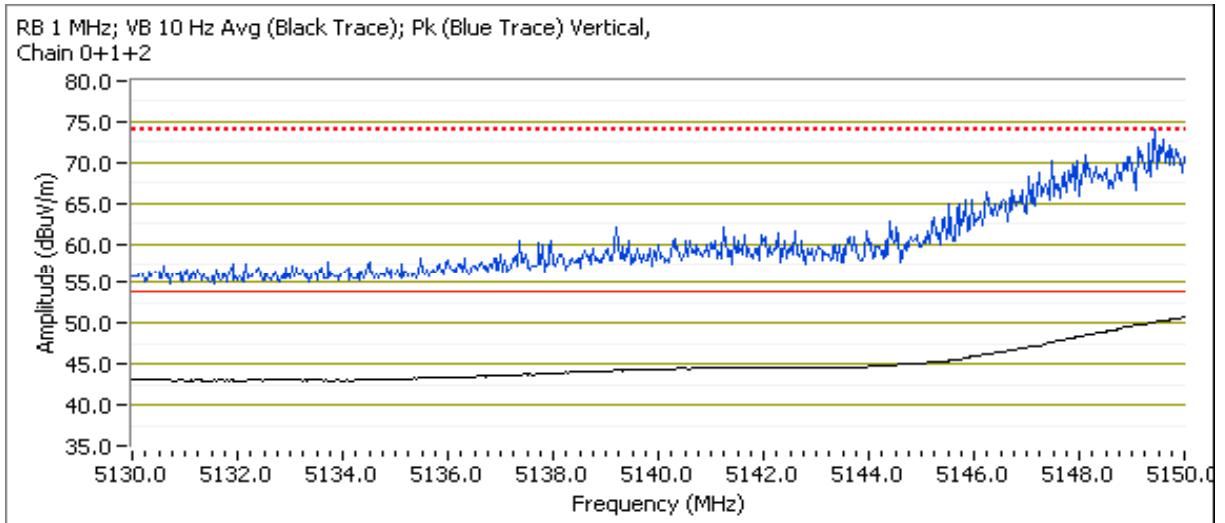
Date of Test: 6/15/2011

Test Engineer: Rafael Varelas

Test Location: FT Chamber #7

**5150 MHz Band Edge Signal Radiated Field Strength**

Frequency MHz	Level dB $\mu$ V/m	Pol v/h	FCC 15.209		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments	Chains
			Limit	Margin					
5149.980	53.8	V	54.0	-0.2	AVG	356	1.1	Power 13.5dBm	0+1+2
5149.830	72.3	V	74.0	-1.7	PK	356	1.1	Power 13.5dBm	0+1+2
5149.700	46.6	H	54.0	-7.4	AVG	11	1.7	Power 13.5dBm	0+1+2
5149.270	62.0	H	74.0	-12.0	PK	11	1.7	Power 13.5dBm	0+1+2



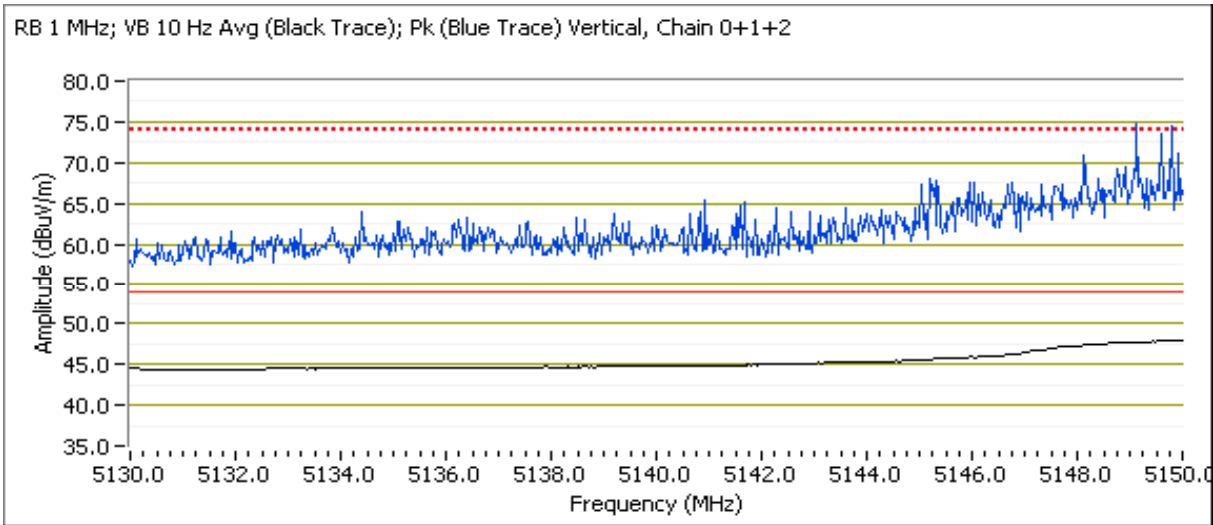
Client: Xirrus, Inc.	Job Number: J81188
Model: XR4000 3x3	T-Log Number: T83592
Contact: Steve Smith	Account Manager: Susan Pelzl
Standard: -	Class: N/A

Run #1b: Channel 40, 5200 MHz  
 Date of Test: 6/21/2011  
 Test Engineer: Rafael Varelas  
 Test Location: FT Chamber #7

**5150 MHz Band Edge Signal Radiated Field Strength**

Frequency MHz	Level dB $\mu$ V/m	Pol v/h	FCC 15.209		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments	Chains
			Limit	Margin					
5149.920	50.6	V	54.0	-3.4	AVG	272	1.1	Power 17.0dBm	0+1+2
5149.630	69.7	V	74.0	-4.3	PK	272	1.1	Power 17.0dBm	0+1+2
5149.160	42.6	H	54.0	-11.4	AVG	24	1.0	Power 17.0dBm	0+1+2
5148.730	54.0	H	74.0	-20.0	PK	24	1.0	Power 17.0dBm	0+1+2

RB 1 MHz; VB 10 Hz Avg (Black Trace); Pk (Blue Trace) Vertical, Chain 0+1+2



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

**Run #2, Radiated Spurious Emissions at Band Edges. Operation in the 5250-5350 MHz Band**

**Run #2a High Channel**

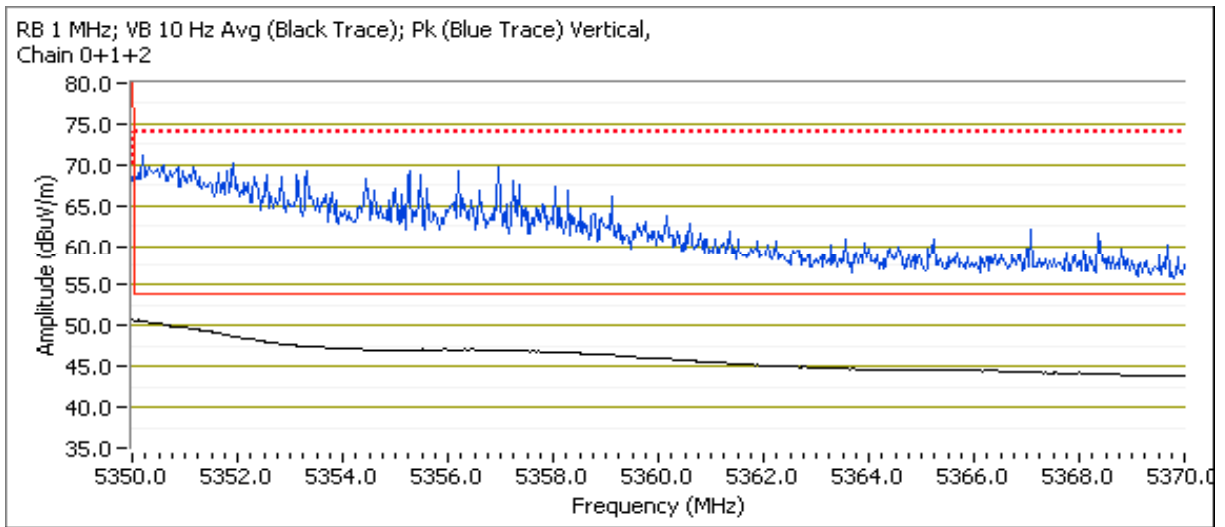
Date of Test: 6/15/2011

Test Engineer: Rafael Varelas

Test Location: FT Chamber #7

**5350 MHz Band Edge Signal Radiated Field Strength**

Frequency MHz	Level dB $\mu$ V/m	Pol v/h	FCC 15.209		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments	Chains
			Limit	Margin					
5350.000	53.6	V	54.0	-0.4	AVG	340	1.0	Power 11.5dBm	0+1+2
5351.960	69.2	V	74.0	-4.8	PK	340	1.0	Power 11.5dBm	0+1+2
5350.170	45.3	H	54.0	-8.7	AVG	12	1.0	Power 11.5dBm	0+1+2
5351.340	59.2	H	74.0	-14.8	PK	12	1.0	Power 11.5dBm	0+1+2



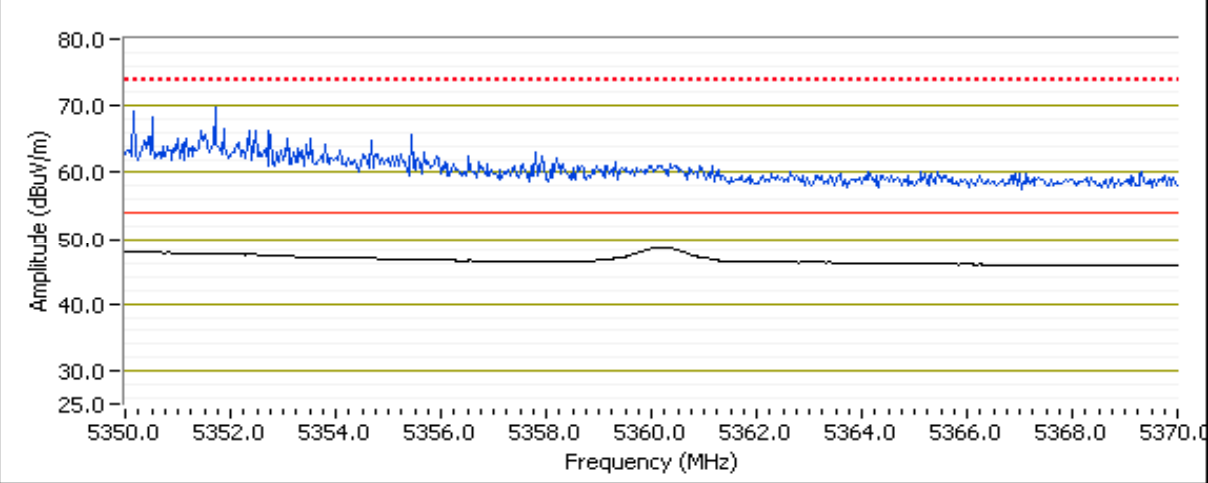
Client: Xirrus, Inc.	Job Number: J81188
Model: XR4000 3x3	T-Log Number: T83592
Contact: Steve Smith	Account Manager: Susan Pelzl
Standard: -	Class: N/A

Run #2a Channel 60, 5300 MHz  
 Date of Test: 6/21/2011  
 Test Engineer: Rafael Varelas  
 Test Location: FT Chamber #7

**5350 MHz Band Edge Signal Radiated Field Strength**

Frequency MHz	Level dB $\mu$ V/m	Pol v/h	FCC 15.209		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments	Chains
			Limit	Margin					
5350.050	50.0	V	54.0	-4.0	AVG	275	1.2	Power 17.0dBm	0+1+2
5351.520	67.3	V	74.0	-6.7	PK	275	1.2	Power 17.0dBm	0+1+2
5350.740	43.4	H	54.0	-10.6	AVG	257	2.0	Power 17.0dBm	0+1+2
5352.030	55.1	H	74.0	-18.9	PK	257	2.0	Power 17.0dBm	0+1+2

RB 1 MHz; VB 10 Hz Avg (Black Trace); Pk (Blue Trace) Vertical, Chain 0+1+2



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

**Run #3, Radiated Spurious Emissions at Band Edges. Operation in the 5470-5725 MHz Band**

**Run #3a: Low Channel**

Date of Test: 6/15/2011

Test Engineer: Rafael Varelas

Test Location: FT Chamber #7

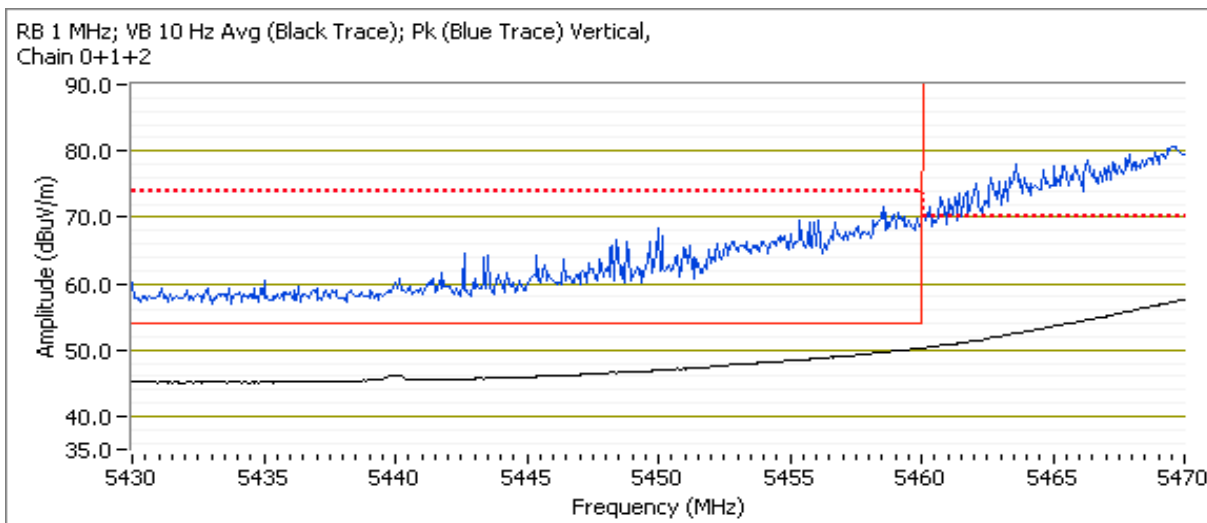
**5350-5460 MHz Restricted Band Edge Signal Radiated Field Strength**

Frequency	Level	Pol	FCC 15.209		Detector	Azimuth	Height	Comments	Chains
MHz	dB $\mu$ V/m	v/h	Limit	Margin	PK/QP/Avg	degrees	meters		
5459.480	53.3	V	54.0	-0.7	AVG	0	1.2	Power 16.5dBm	0+1+2
5458.750	70.2	V	74.0	-3.8	PK	0	1.2	Power 16.5dBm	0+1+2
5457.730	43.9	H	54.0	-10.1	AVG	352	1.0	Power 16.5dBm	0+1+2
5459.380	55.0	H	74.0	-19.0	PK	352	1.0	Power 16.5dBm	0+1+2

**5460 - 5470 MHz Band Edge Radiated Field Strength**

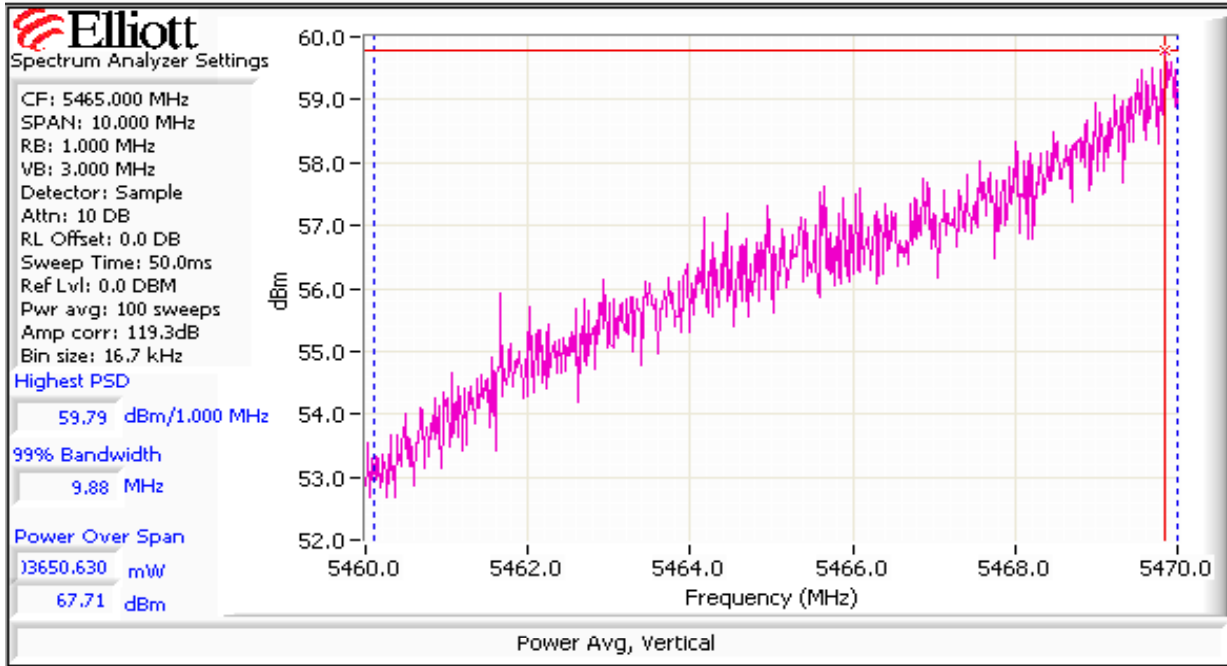
Frequency	Level	Pol	15 E		Detector	Azimuth	Height	Comments
MHz	dB $\mu$ V/m	v/h	Limit	Margin	PK/QP/Avg	degrees	meters	
5469.850	59.8	V	68.3	-8.5	Pavg	284	1.2	Power 16.5dBm

For emissions in the 5460-5470MHz frequency range the limit is -27dBm/MHz eirp (68.3dBuV/m). The measurement method required is the same measurement method used to determine the in-band power spectral density or a peak measurement (RB=1MHz, VB>1MHz). Pavg indicates that the power averaging method of measurement was used, PK indicates that a peak measurement was made.





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



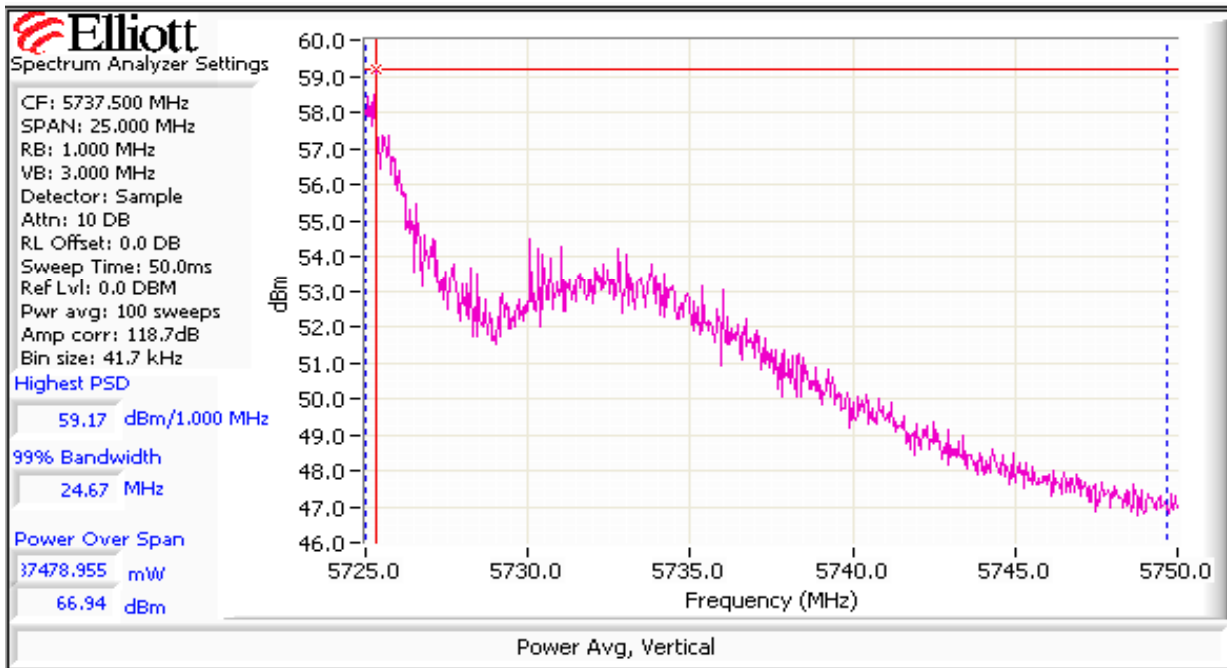
Client: Xirrus, Inc.	Job Number: J81188
Model: XR4000 3x3	T-Log Number: T83592
Contact: Steve Smith	Account Manager: Susan Pelzi
Standard: -	Class: N/A

Run #3b: High Channel

5725 MHz Band Edge Radiated Field Strength

Frequency	Level	Pol	15 E		Detector	Azimuth	Height	Comments
MHz	dB $\mu$ V/m	v/h	Limit	Margin	PK/QP/Avg	degrees	meters	
5725.290	59.2	V	68.3	-9.1	Pavg	260	1.2	Power 17.0dBm 0+1+2

For emissions immediately above 5725 MHz the limit is -27dBm/MHz eirp (68.3dBuV/m). The measurement method required is the same measurement method used to determine the in-band power spectral density or a peak measurement (RB=1MHz, VB>1MHz). Pavg indicates that the power averaging method of measurement was used, PK indicates that a peak measurement was made.



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

## RSS 210 and FCC 15.407 (UNII) 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.

### General Test Configuration

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

**Ambient Conditions:**                      Temperature:            20.3 °C  
    Rel. Humidity:            34 %

### Summary of Results System S/N:1, Radio 2

Run #	Mode	Channel	Power Setting	Test Performed	Limit	Result / Margin
1	HT40 Chain 012	5150-5250 #38(low)	7.0	Restricted Band Edge at 5150 MHz	15.209	53.4dBµV/m @ 5150.0MHz (-0.6dB)
		5150-5250 #46	17.0	Restricted Band Edge at 5150 MHz		53.3dBµV/m @ 5144.3MHz (-0.7dB)
2	HT40 Chain 012	5250-5350 #62 (High)	8.0	Restricted Band Edge at 5350 MHz	15.209	53.4dBµV/m @ 5352.4MHz (-0.6dB)
		5250-5350 #54	17.0	Restricted Band Edge at 5350 MHz		53.5dBµV/m @ 5351.8MHz (-0.5dB)
3	HT40 Chain 012	5470-5725 #102 (Low, 5510MHz)	8.5	Restricted Band Edge at 5460 MHz	15.209	53.6dBµV/m @ 5459.9MHz (-0.4dB)
				Band Edge 5460 - 5470 MHz	15E	54.7dBµV/m @ 5462.2MHz (-13.6dB)
		5470-5725 High	17.0	Band Edge 5725MHz	15E	57.1dBµV/m @ 5740.4MHz (-11.2dB)
		5150-5250 5550MHz	11.5	Restricted Band Edge at 5460 MHz	15.209	53.4dBµV/m @ 5459.8MHz (-0.6dB)

### 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.

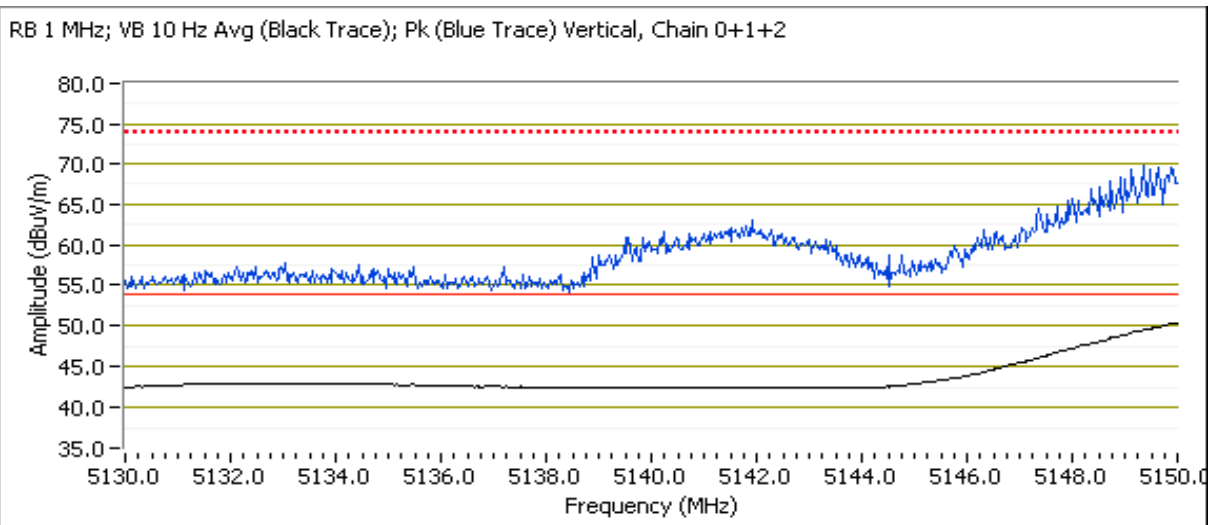
Client: Xirrus, Inc.	Job Number: J81188
Model: XR4000 3x3	T-Log Number: T83592
Contact: Steve Smith	Account Manager: Susan Pelzl
Standard: -	Class: N/A

Run #1, Radiated Spurious Emissions at Band Edges. Operation in the 5150-5250 MHz Band

Run #1a: Low Channel, 5190 MHz  
 Date of Test: 6/21/2011  
 Test Engineer: Rafael Varelas  
 Test Location: FT Chamber #7

*5150 MHz Band Edge Signal Radiated Field Strength*

Frequency	Level	Pol	FCC 15.209		Detector	Azimuth	Height	Comments	Chains
MHz	dB $\mu$ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters		
5149.960	53.4	V	54.0	-0.6	AVG	220	1.4	Power 7dBm	0+1+2
5148.800	68.5	V	74.0	-5.5	PK	220	1.4	Power 7dBm	0+1+2
5147.020	43.4	H	54.0	-10.6	AVG	222	1.4	Power 7dBm	0+1+2
5149.780	55.4	H	74.0	-18.6	PK	222	1.4	Power 7dBm	0+1+2



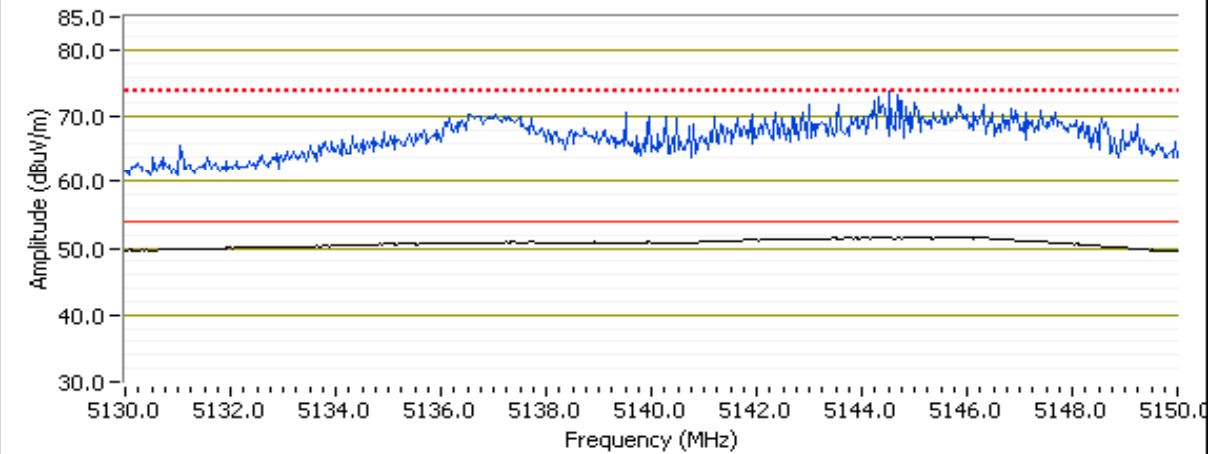
Client: Xirrus, Inc.	Job Number: J81188
Model: XR4000 3x3	T-Log Number: T83592
Contact: Steve Smith	Account Manager: Susan Pelzl
Standard: -	Class: N/A

Run #1a: Channel 46, 5230 MHz  
 Date of Test: 6/30/2011  
 Test Engineer: M. Birgani  
 Test Location: FT Chamber #7

### 5150 MHz Band Edge Signal Radiated Field Strength

Frequency MHz	Level dB $\mu$ V/m	Pol v/h	FCC 15.209		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments	Chains
			Limit	Margin					
5144.330	53.3	V	54.0	-0.7	AVG	347	1.0	RB 1 MHz;VB 10 Hz;Pk	
5145.070	71.9	V	74.0	-2.1	PK	347	1.0	RB 1 MHz;VB 3 MHz;Pk	
5145.300	44.9	H	54.0	-9.1	AVG	35	1.1	RB 1 MHz;VB 10 Hz;Pk	
5148.230	59.6	H	74.0	-14.4	PK	35	1.1	RB 1 MHz;VB 3 MHz;Pk	

RB 1 MHz; VB 10 Hz Average (Black Trace); RB=VB=1MHz Peak (Blue Trace), Vertical (Chain 0+1+2)



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

**Run #2, Radiated Spurious Emissions at Band Edges. Operation in the 5250-5350 MHz Band**

**Run #2a Channel 62, 5310 MHz**

Date of Test: 6/21/2011

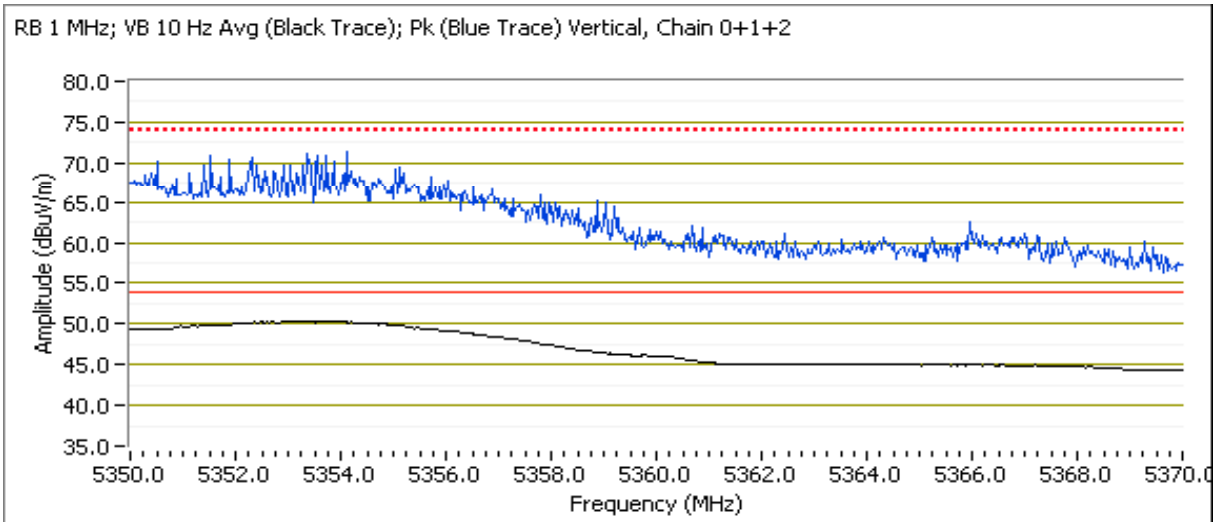
Test Engineer: Rafael Varelas

Test Location: FT Chamber #7

**5350 MHz Band Edge Signal Radiated Field Strength**

Frequency	Level	Pol	FCC 15.209		Detector	Azimuth	Height	Comments	Chains
MHz	dB $\mu$ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters		
5352.400	53.4	V	54.0	-0.6	AVG	254	1.3	Power 8.0dBm	0+1+2
5350.210	70.4	V	74.0	-3.6	PK	254	1.3	Power 8.0dBm	0+1+2
5352.300	43.6	H	54.0	-10.4	AVG	253	1.0	Power 8.0dBm	0+1+2
5352.460	56.0	H	74.0	-18.0	PK	253	1.0	Power 8.0dBm	0+1+2

RB 1 MHz; VB 10 Hz Avg (Black Trace); Pk (Blue Trace) Vertical, Chain 0+1+2



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

Run #2b Channel 54

Date of Test: 6/30/2011

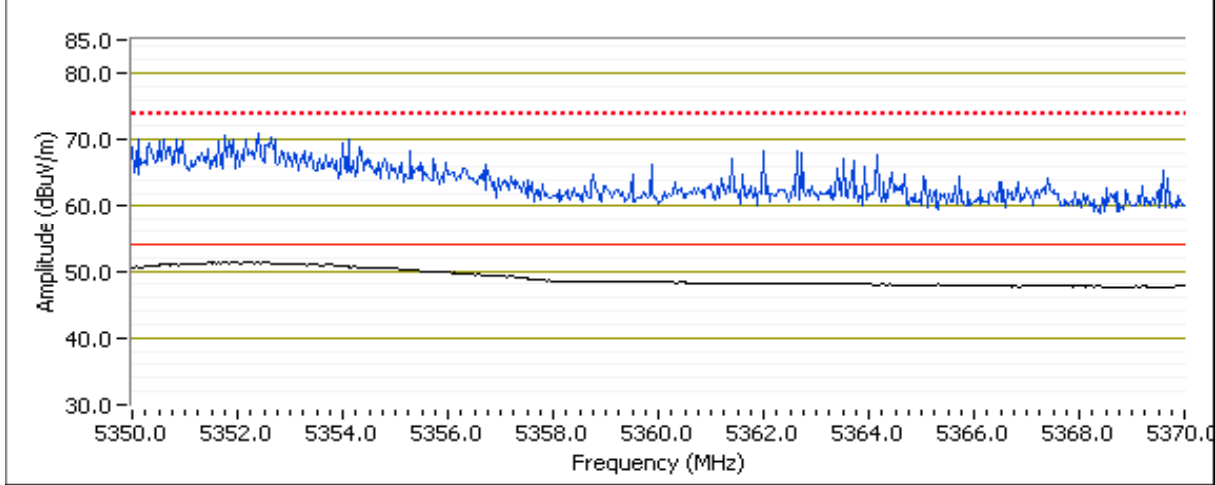
Test Engineer: M. Birgani

Test Location: FT Chamber #7

**5350 MHz Band Edge Signal Radiated Field Strength**

Frequency MHz	Level dB $\mu$ V/m	Pol v/h	FCC 15.209		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments	Chains
			Limit	Margin					
5351.830	53.5	V	54.0	-0.5	AVG	335	1.0	RB 1 MHz;VB 10 Hz;Pk	
5352.400	71.1	V	74.0	-2.9	PK	335	1.0	RB 1 MHz;VB 3 MHz;Pk	
5350.630	44.6	H	54.0	-9.4	AVG	343	1.1	RB 1 MHz;VB 10 Hz;Pk	
5360.670	56.1	H	74.0	-17.9	PK	343	1.1	RB 1 MHz;VB 3 MHz;Pk	

RB 1 MHz; VB 10 Hz Average (Black Trace); RB=VB=1MHz Peak (Blue Trace), Vertical (Chain 0+1+2)



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

Run #3, Radiated Spurious Emissions at Band Edges. Operation in the 5470-5725 MHz Band

Run #3a: Low Channel

Date of Test: 6/21/2011

Test Engineer: Rafael Varelas

Test Location: FT Chamber #7

*5350-5460 MHz Restricted Band Edge Signal Radiated Field Strength*

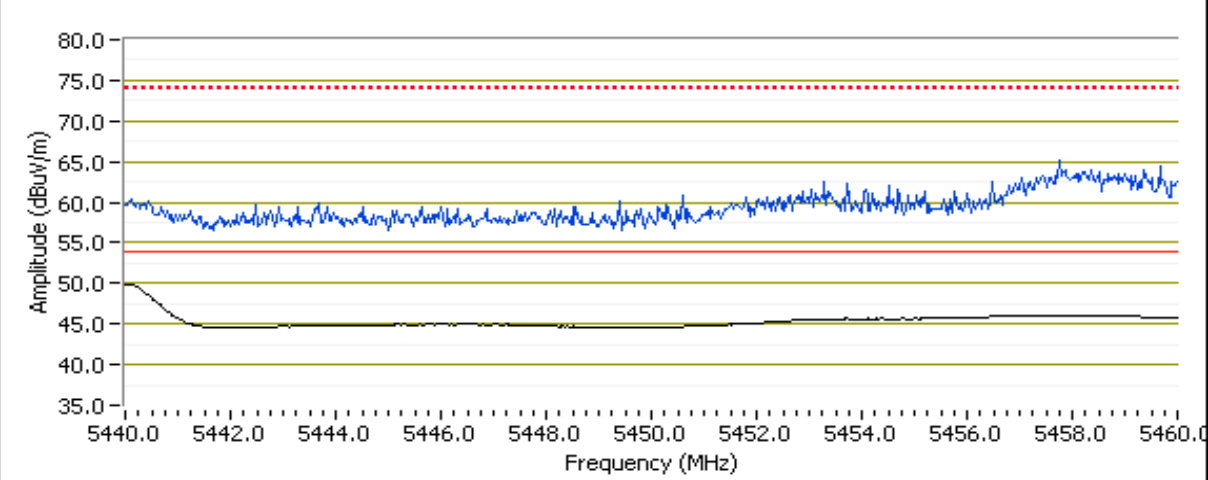
Frequency	Level	Pol	FCC 15.209		Detector	Azimuth	Height	Comments	Chains
MHz	dB $\mu$ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters		
5459.890	53.6	V	54.0	-0.4	AVG	267	1.3	Power 8.5dBm	0+1+2
5459.870	71.3	V	74.0	-2.7	PK	267	1.3	Power 8.5dBm	0+1+2
5459.410	43.9	H	54.0	-10.1	AVG	251	1.0	Power 8.5dBm	0+1+2
5459.750	55.6	H	74.0	-18.4	PK	251	1.0	Power 8.5dBm	0+1+2

*5460 - 5470 MHz Band Edge Radiated Field Strength*

Frequency	Level	Pol	15 E		Detector	Azimuth	Height	Comments
MHz	dB $\mu$ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
5462.200	54.7	V	68.3	-13.6	Pavg	267	1.3	Power 8.5dBm 0+1+2

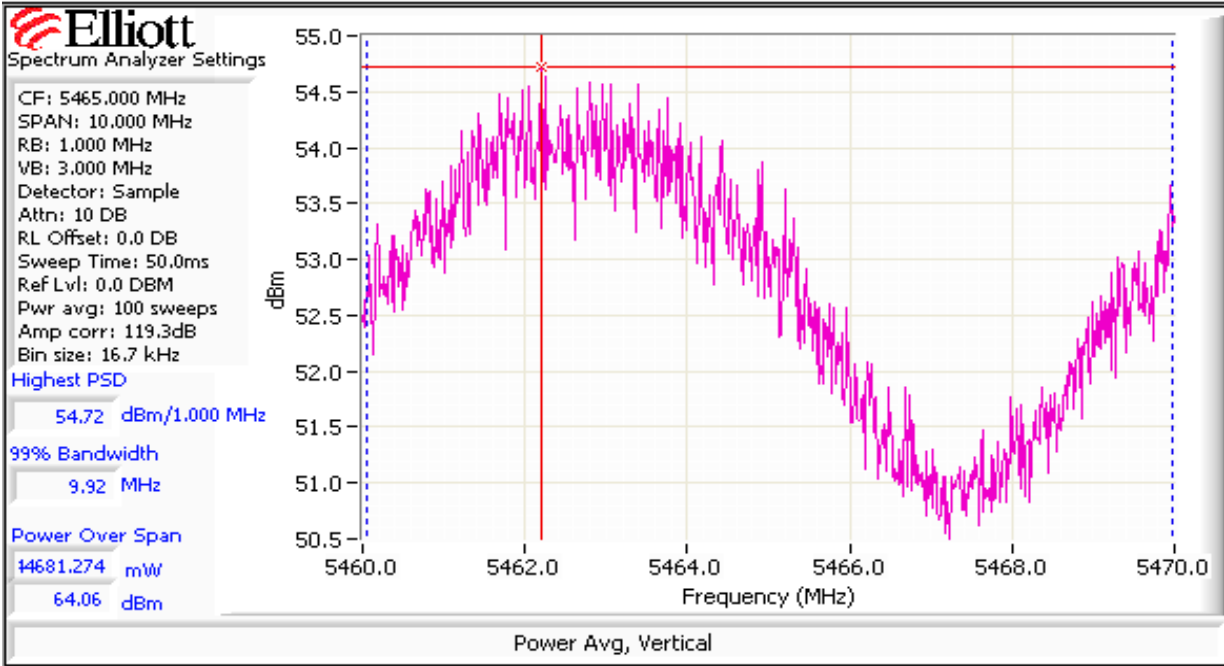
For emissions in the 5460-5470MHz frequency range the limit is -27dBm/MHz eirp (68.3dBuV/m). The measurement method required is the same measurement method used to determine the in-band power spectral density or a peak measurement (RB=1MHz, VB>1MHz). Pavg indicates that the power averaging method of measurement was used, PK indicates that a peak measurement was made.

RB 1 MHz; VB 10 Hz Avg (Black Trace); Pk (Blue Trace) Vertical, Chain 0+1+2





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



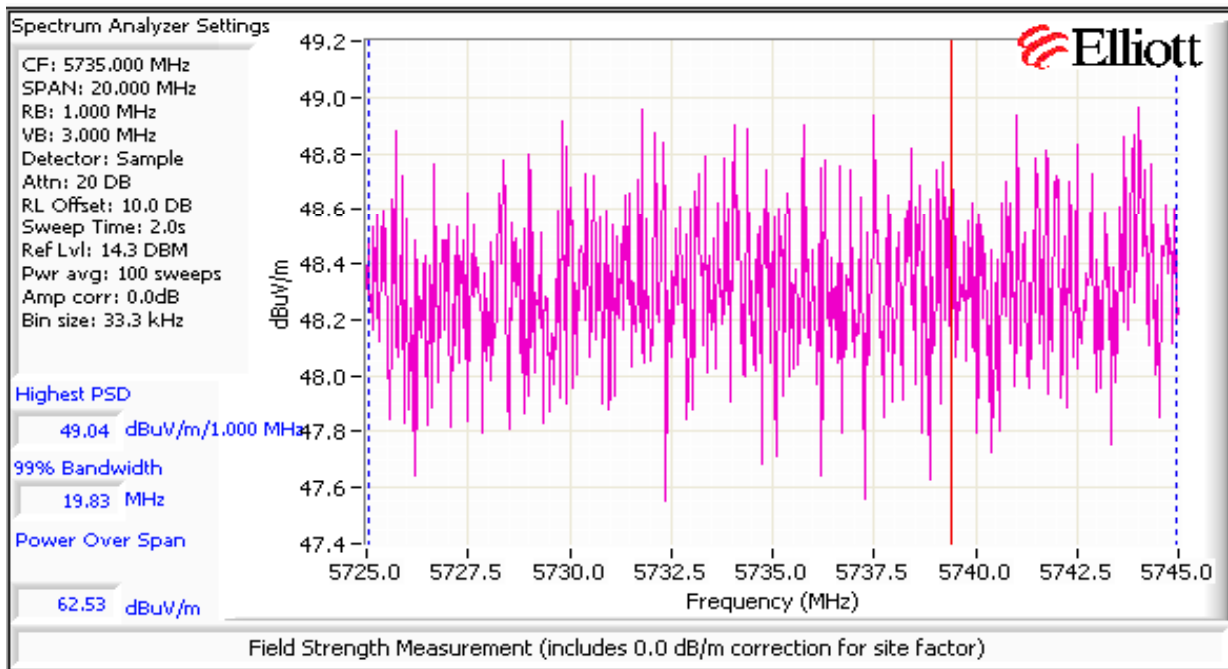
Client: Xirrus, Inc.	Job Number: J81188
Model: XR4000 3x3	T-Log Number: T83592
Contact: Steve Smith	Account Manager: Susan Pelzl
Standard: -	Class: N/A

Run #3b: High Channel

*5725 MHz Band Edge Radiated Field Strength*

Frequency MHz	Level dB $\mu$ V/m	Pol v/h	15 E		Detector PK/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
5740.430	57.1	V	68.3	-11.2	PK	4	1.1	RB 1 MHz;VB 3 MHz;Pk
5734.370	55.5	H	68.3	-12.8	PK	327	1.4	RB 1 MHz;VB 3 MHz;Pk

For emissions immediately above 5725 MHz the limit is -27dBm/MHz eirp (68.3dB $\mu$ V/m). The measurement method required is the same measurement method used to determine the in-band power spectral density or a peak measurement (RB=1MHz, VB>1MHz). Pavg indicates that the power averaging method of measurement was used, PK indicates that a peak measurement was made.



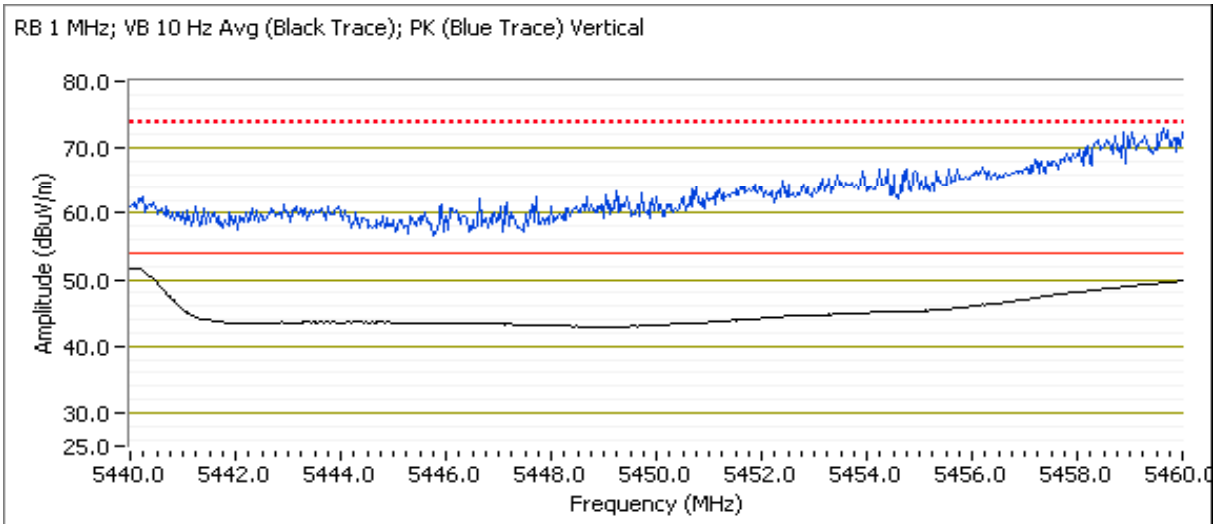
Client: Xirrus, Inc.	Job Number: J81188
Model: XR4000 3x3	T-Log Number: T83592
Contact: Steve Smith	Account Manager: Susan Pelzl
Standard: -	Class: N/A

Run #3c: Channel 110 @ 5510 MHz  
 Date of Test: 7/5/2011  
 Test Engineer: Rafael Varelas  
 Test Location: FT Chamber #7

**5350-5460 MHz Restricted Band Edge Signal Radiated Field Strength**

Frequency MHz	Level dB $\mu$ V/m	Pol v/h	FCC 15.209		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments	Chains
			Limit	Margin					
5459.840	53.4	V	54.0	-0.6	AVG	134	1.2	RB 1 MHz;VB 10 Hz;Pk, 11.5	
5459.110	72.8	V	74.0	-1.2	PK	134	1.2	RB 1 MHz;VB 3 MHz;Pk, 11.5	
5440.100	53.4	V	54.0	-0.6	AVG	134	1.2	RB 1 MHz;VB 10 Hz;Pk, 11.5	
5443.070	60.5	V	74.0	-13.5	PK	134	1.2	RB 1 MHz;VB 3 MHz;Pk, 11.5	
5459.370	41.0	H	54.0	-13.0	AVG	196	1.2	RB 1 MHz;VB 10 Hz;Pk	
5459.780	58.6	H	74.0	-15.4	PK	196	1.2	RB 1 MHz;VB 3 MHz;Pk	

RB 1 MHz; VB 10 Hz Avg (Black Trace); PK (Blue Trace) Vertical



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 15.407 (UNII) 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.

### General Test Configuration

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

### Ambient Conditions:

Temperature: 20.5 °C                      Rel. Humidity: 34 %

### Summary of Results

For each measurement the system was configured with multiple 2x2 and 3x3 modules tuned to the low, center or high channel as appropriate for each run and configured with one radio of each module type operating in 802.11a, HT20 and HT40 modes. As multiple modules could be co-located (with the condition that no two modules would operate on overlapping channels) when emissions exceeded the limit with all the modules operating simultaneously on the same frequency for a harmonically related signal, each mode/module type was evaluated separately. Signals independent of the operating frequency were only evaluated with multiple transmitters operational.

Run #	Mode	Channel	Power Setting	Measured Power	Test Performed	Limit	Result / Margin
1	802.11a Chain 012	5150-5250 Low	13.5		Radiated Emissions, 1 - 40 GHz	FCC 15.209 / 15 E	53.8dBµV/m @ 5440.0MHz (-0.2dB)
	802.11n20 Chain 012		13.5				
	802.11n40 Chain 012		6.0				
	802.11a Chain 012	5150-5250 Center	17		Radiated Emissions, 1 - 40 GHz	FCC 15.209 / 15 E	52.1dBµV/m @ 4960.1MHz (-1.9dB)
	802.11n20 Chain 012		17				
	802.11n40 Chain 012		10				
	802.11a Chain 012	5150-5250 High	17		Radiated Emissions, 1 - 40 GHz	FCC 15.209 / 15 E	52.8dBµV/m @ 5440.0MHz (-1.2dB)
	802.11n20 Chain 012		17				
	802.11n40 Chain 012		10				

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

Run #	Mode	Channel	Power Setting	Measured Power	Test Performed	Limit	Result / Margin
2	802.11a Chain 012	5250-5350 Low	17		Radiated Emissions, 1 - 40 GHz	FCC 15.209 / 15 E	53.4dB $\mu$ V/m @ 5440.1MHz (-0.6dB)
	802.11n20 Chain 012		17		Radiated Emissions, 1 - 40 GHz		
	802.11n40 Chain 012		14		Radiated Emissions, 1 - 40 GHz		
	802.11a Chain 012	5250-5350 Center	17		Radiated Emissions, 1 - 40 GHz	FCC 15.209 / 15 E	53.6dB $\mu$ V/m @ 10602.2MHz (-0.4dB)
	802.11n20 Chain 012		17		Radiated Emissions, 1 - 40 GHz		
	802.11n40 Chain 012		14		Radiated Emissions, 1 - 40 GHz		
	802.11a Chain 012	5250-5350 High	17		Radiated Emissions, 1 - 40 GHz	FCC 15.209 / 15 E	53.0dB $\mu$ V/m @ 4960.0MHz (-1.0dB)
	802.11n20 Chain 012		17		Radiated Emissions, 1 - 40 GHz		
	802.11n40 Chain 012		14		Radiated Emissions, 1 - 40 GHz		
3	802.11a Chain 012	5470-5725 Low	17		Radiated Emissions, 1 - 40 GHz	FCC 15.209 / 15 E	51.0dB $\mu$ V/m @ 5040.0MHz (-3.0dB)
	802.11n20 Chain 012		17		Radiated Emissions, 1 - 40 GHz		
	802.11n40 Chain 012		14		Radiated Emissions, 1 - 40 GHz		
	802.11a Chain 012	5470-5725 Center	17		Radiated Emissions, 1 - 40 GHz	FCC 15.209 / 15 E	51.3dB $\mu$ V/m @ 11158.7MHz (-2.7dB)
	802.11n20 Chain 012		17		Radiated Emissions, 1 - 40 GHz		
	802.11n40 Chain 012		14		Radiated Emissions, 1 - 40 GHz		
	802.11a Chain 012	5470-5725 High	17		Radiated Emissions, 1 - 40 GHz	FCC 15.209 / 15 E	52.7dB $\mu$ V/m @ 11394.1MHz (-1.3dB)
	802.11n20 Chain 012		17		Radiated Emissions, 1 - 40 GHz		
	802.11n40 Chain 012		14		Radiated Emissions, 1 - 40 GHz		
4	802.11a Chain 0	36	16		Radiated Emissions, 1 - 40 GHz	FCC 15.209 / 15 E	41.6dB $\mu$ V/m @ 2494.2MHz (-12.4dB)

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

**General Test Configuration**

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

**Ambient Conditions:**

Temperature: 20.5 °C  
 Rel. Humidity: 34 %

**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
Contact: Steve Smith	Account Manager: Susan Pelzi
Standard: -	Class: N/A

**Run #1, Radiated Spurious Emissions, 30 - 40,000 MHz. Operation in the 5150-5250 MHz Band**

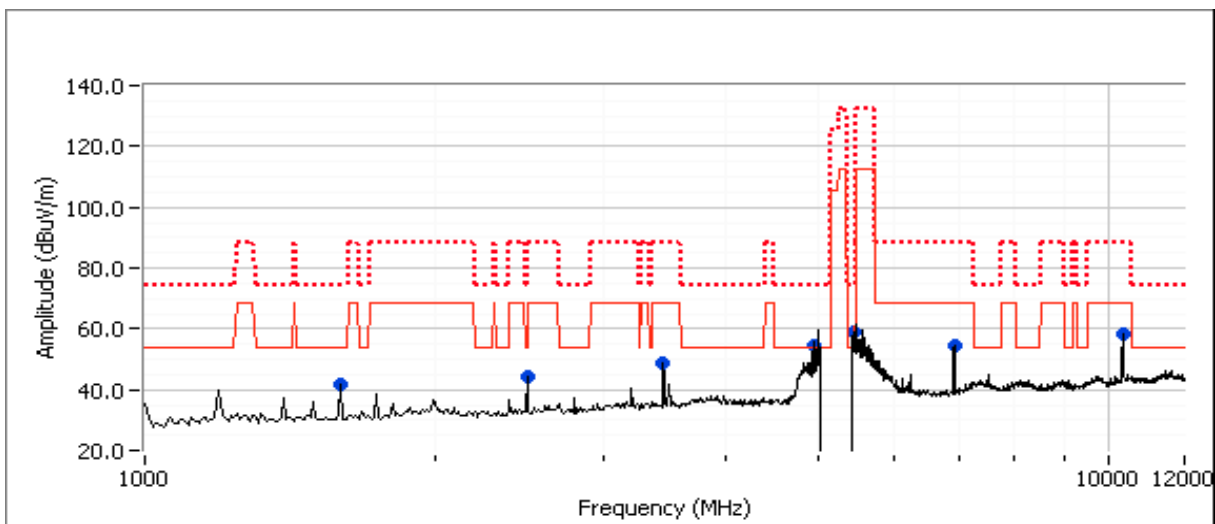
Date of Test: 6/22/2011  
 Test Engineer: Rafael Varelas  
 Test Location: FT Chamber #7

**Run #1a: Low Channel**

**Spurious Radiated Emissions:**

Frequency MHz	Level dB $\mu$ V/m	Pol v/h	15.209 / 15E		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
5440.030	53.8	V	54.0	-0.2	AVG	324	1.0	RB 1 MHz;VB 10 Hz;Pk
5440.690	61.7	V	74.0	-12.3	PK	324	1.0	RB 1 MHz;VB 3 MHz;Pk
1600.100	41.5	V	54.0	-12.5	Peak	176	1.3	
2500.270	44.5	V	54.0	-9.5	Peak	186	1.0	
3453.480	49.0	H	68.3	-19.3	Peak	7	1.0	
6906.660	54.6	V	68.3	-13.7	Peak	223	1.3	
10359.910	58.2	V	68.3	-10.1	Peak	69	1.3	
4960.020	50.5	V	54.0	-3.5	AVG	96	1.0	RB 1 MHz;VB 10 Hz;Pk
4960.420	58.3	V	74.0	-15.7	PK	96	1.0	RB 1 MHz;VB 3 MHz;Pk

- Note 1: For emissions in restricted bands, the limit of 15.209 was used which requires average and peak measurements.
- Note 2: For emissions outside of the restricted bands the limit is -27dBm/MHz eirp (68.3dBuV/m). The measurement method required is the same measurement method used to determine the in-band power spectral density or a peak measurement (RB=1MHz, VB>1MHz). Pavg indicates that the power averaging method of measurement was used for the measurement of emissions outside of the restricted bands. PK indicates that a peak measurement was made.

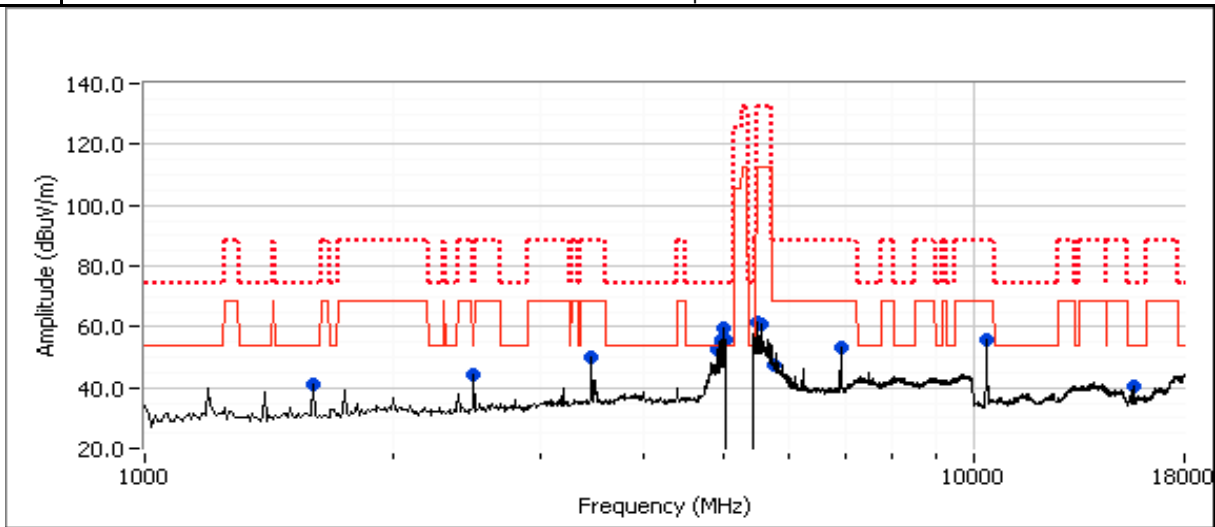


Client: Xirrus, Inc.	Job Number: J81188
Model: XR4000 3x3	T-Log Number: T83592
Contact: Steve Smith	Account Manager: Susan Pelzi
Standard: -	Class: N/A

**Run #1b: Center Channel**

Frequency MHz	Level dB $\mu$ V/m	Pol v/h	15.209 / 15E		Detector PK/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
4960.100	52.1	V	54.0	-1.9	AVG	207	1.0	RB 1 MHz;VB 10 Hz;Pk
4959.830	59.3	V	74.0	-14.7	PK	207	1.0	RB 1 MHz;VB 3 MHz;Pk
4919.980	47.1	V	54.0	-6.9	AVG	227	1.0	RB 1 MHz;VB 10 Hz;Pk
4919.930	56.3	V	74.0	-17.7	PK	227	1.0	RB 1 MHz;VB 3 MHz;Pk
5033.540	47.0	V	54.0	-7.0	AVG	240	1.0	RB 1 MHz;VB 10 Hz;Pk
5033.730	58.8	V	74.0	-15.2	PK	240	1.0	RB 1 MHz;VB 3 MHz;Pk
1595.830	40.9	V	54.0	-13.1	Peak	183	1.0	
2500.180	44.5	V	54.0	-9.5	Peak	181	1.3	Digital Emissions
3465.830	49.8	H	68.3	-18.5	Peak	14	1.0	
5000.150	59.7	V	-	-	Peak	131	1.3	Digital Emissions
5473.330	61.4	V	112.3	-50.9	Peak	204	1.3	
5555.830	61.1	V	112.3	-51.2	Peak	214	1.0	
5739.170	47.3	V	68.3	-21.0	Peak	280	1.3	
6937.500	53.1	V	68.3	-15.2	Peak	205	1.0	
10386.670	55.8	V	68.3	-12.5	Peak	41	1.6	
15613.330	40.3	V	54.0	-13.7	Peak	311	1.3	

- Note 1: For emissions in restricted bands, the limit of 15.209 was used which requires average and peak measurements.
- Note 2: For emissions outside of the restricted bands the limit is -27dBm/MHz eirp (68.3dBuV/m). The measurement method required is the same measurement method used to determine the in-band power spectral density or a peak measurement (RB=1MHz, VB>1MHz). Pavg indicates that the power averaging method of measurement was used for the measurement of emissions outside of the restricted bands. PK indicates that a peak measurement was made.



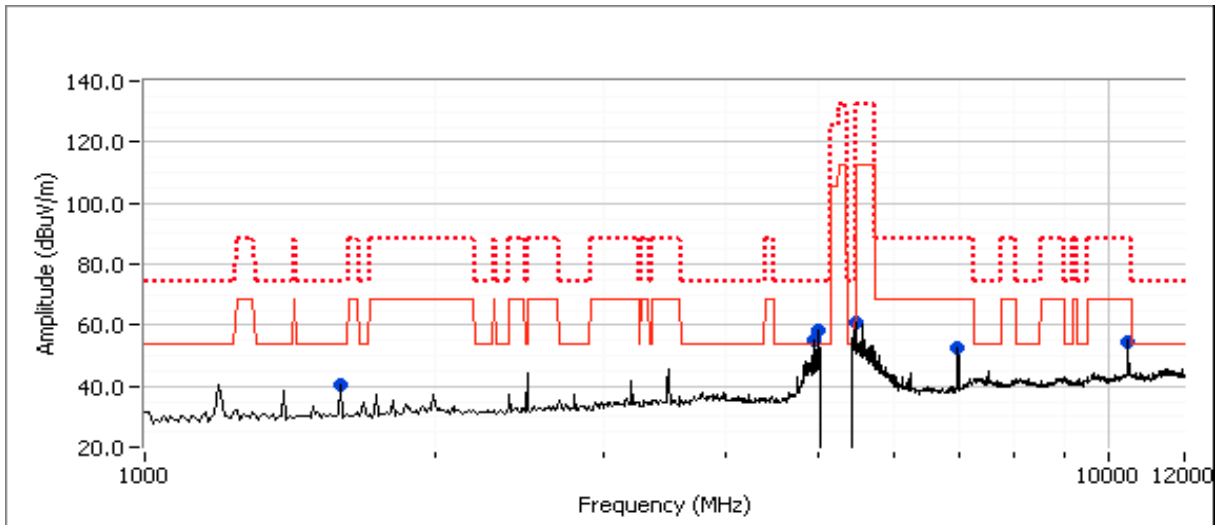


Client: Xirrus, Inc.	Job Number: J81188
Model: XR4000 3x3	T-Log Number: T83592
Contact: Steve Smith	Account Manager: Susan Pelzl
Standard: -	Class: N/A

**Run #1c: High Channel**
**Spurious Radiated Emissions:**

Frequency MHz	Level dB $\mu$ V/m	Pol v/h	15.209 / 15E		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
5439.980	52.8	V	54.0	-1.2	AVG	201	1.0	RB 1 MHz;VB 10 Hz;Pk
5439.740	62.3	V	74.0	-11.7	PK	201	1.0	RB 1 MHz;VB 3 MHz;Pk
1600.100	40.7	V	54.0	-13.3	Peak	186	1.3	
5000.090	58.3	V	-	-	Peak	176	1.0	Digital
6986.680	52.6	V	68.3	-15.7	Peak	225	1.0	
10479.430	54.5	V	68.3	-13.8	Peak	147	1.3	
4960.040	52.0	V	54.0	-2.0	AVG	193	1.0	RB 1 MHz;VB 10 Hz;Pk
4960.040	59.7	V	74.0	-14.3	PK	193	1.0	RB 1 MHz;VB 3 MHz;Pk

- Note 1: For emissions in restricted bands, the limit of 15.209 was used which requires average and peak measurements.
- Note 2: For emissions outside of the restricted bands the limit is -27dBm/MHz eirp (68.3dBuV/m). The measurement method required is the same measurement method used to determine the in-band power spectral density or a peak measurement (RB=1MHz, VB>1MHz). Pavg indicates that the power averaging method of measurement was used for the measurement of emissions outside of the restricted bands. PK indicates that a peak measurement was made.



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

**Run #2, Radiated Spurious Emissions, 30 - 40,000 MHz. Operation in the 5250-5350 MHz Band**

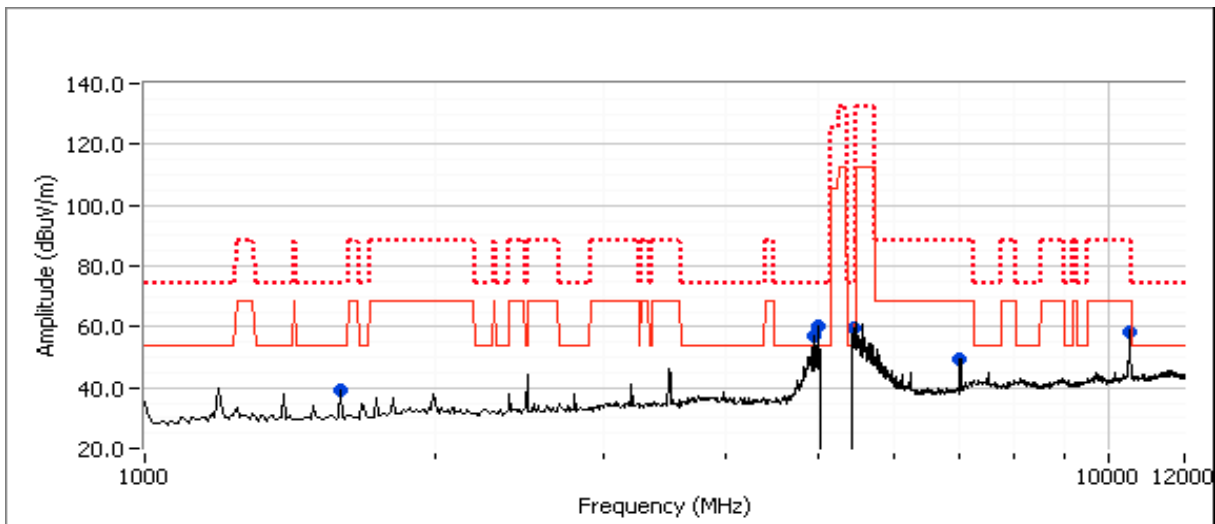
Date of Test: 6/22/2011  
 Test Engineer: Rafael Varelas  
 Test Location: FT Chamber #7

**Run #2a: Low Channel**

*Spurious Radiated Emissions:*

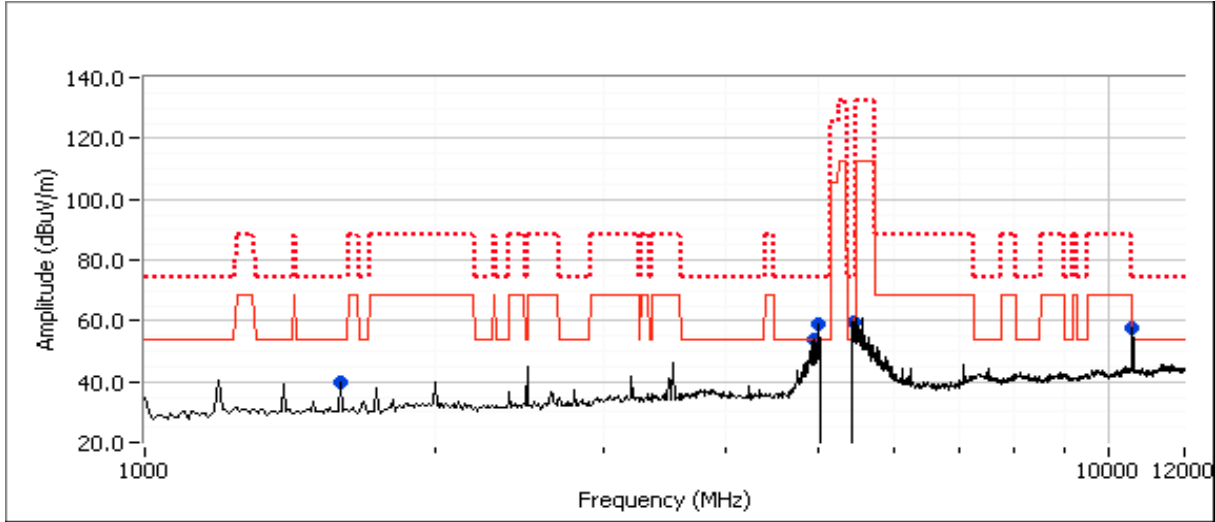
Frequency MHz	Level dB $\mu$ V/m	Pol v/h	15.209 / 15E		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
5440.090	53.4	V	54.0	-0.6	AVG	320	1.0	RB 1 MHz;VB 10 Hz;Pk
5440.190	62.6	V	74.0	-11.4	PK	320	1.0	RB 1 MHz;VB 3 MHz;Pk
1600.100	39.4	V	54.0	-14.6	Peak	180	1.3	
5000.090	60.0	V	-	-	Peak	136	1.0	Digital
7026.630	49.6	V	68.3	-18.7	Peak	207	1.0	
10520.610	58.3	V	68.3	-10.0	Peak	195	1.0	
4959.980	52.0	V	54.0	-2.0	AVG	227	1.0	RB 1 MHz;VB 10 Hz;Pk
4959.810	60.1	V	74.0	-13.9	PK	227	1.0	RB 1 MHz;VB 3 MHz;Pk

- Note 1: For emissions in restricted bands, the limit of 15.209 was used which requires average and peak measurements.
- Note 2: For emissions outside of the restricted bands the limit is -27dBm/MHz eirp (68.3dB $\mu$ V/m). The measurement method required is the same measurement method used to determine the in-band power spectral density or a peak measurement (RB=1MHz, VB>1MHz). Pavg indicates that the power averaging method of measurement was used for the measurement of emissions outside of the restricted bands. PK indicates that a peak measurement was made.



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

**Run #2b: Center Channel**



**Spurious Radiated Emissions:  
3x3 module 802.11a mode**

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments	Mode
MHz	dBuV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters		
10601.110	52.8	V	54.0	-1.2	AVG	204	1.0	3x3 radio	A
10601.000	65.6	V	74.0	-8.4	PK	204	1.0	RB 1 MHz;VB 3 MHz;Pk	
<b>2x2 and 3x3 modules, HT 20 mode</b>									
10601.970	50.3	V	54.0	-3.7	AVG	205	1.0	2x2 and 3x3 radio	n20
10602.950	63.3	V	74.0	-10.7	PK	205	1.0	RB 1 MHz;VB 3 MHz;Pk	
<b>2x2 and 3x3 modules, HT 40 mode</b>									
10627.270	47.7	V	54.0	-6.3	AVG	160	1.1	2x2 and 3x3 radio	n40
10617.270	59.0	V	74.0	-15.0	PK	160	1.1	RB 1 MHz;VB 3 MHz;Pk	
<b>All modules operational</b>									
1595.830	40.0	V	54.0	-14.0	Peak	148	1.3		
5000.090	59.0	V	-	-	Peak	141	1.0	Digital	
4959.990	49.6	V	54.0	-4.4	AVG	231	1.0	RB 1 MHz;VB 10 Hz;Pk	
4959.870	56.1	V	74.0	-17.9	PK	231	1.0	RB 1 MHz;VB 3 MHz;Pk	
5439.980	52.1	V	54.0	-1.9	AVG	222	1.0	RB 1 MHz;VB 10 Hz;Pk	
5439.700	62.3	V	74.0	-11.7	PK	222	1.0	RB 1 MHz;VB 3 MHz;Pk	

Note 1: For emissions in restricted bands, the limit of 15.209 was used which requires average and peak measurements.

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

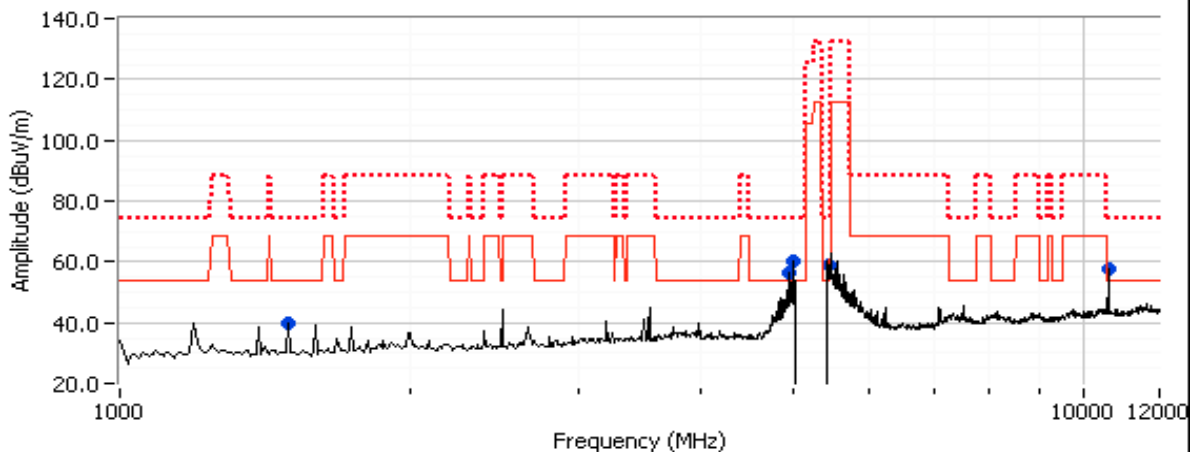
**Run #2c: High Channel**

**Spurious Radiated Emissions:**

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments	Mode
MHz	dB $\mu$ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters		
<i>All modules operational</i>									
4959.960	53.0	V	54.0	-1.0	AVG	190	1.0	RB 1 MHz;VB 10 Hz;Pk	
4959.970	61.0	V	74.0	-13.0	PK	190	1.0	RB 1 MHz;VB 3 MHz;Pk	
1500.120	40.0	V	54.0	-14.0	Peak	181	1.0		
5000.090	60.5	V	-	-	Peak	139	1.0	Digital	
5440.010	52.8	V	54.0	-1.2	AVG	250	1.0	RB 1 MHz;VB 10 Hz;Pk	
5437.180	61.9	V	74.0	-12.1	PK	250	1.0	RB 1 MHz;VB 3 MHz;Pk	
<i>2x2 and 3x3 modules, 802.11a mode</i>									
10641.430	52.6	V	54.0	-1.4	AVG	162	1.0	2x2 and 3x3 radio	A
10640.750	65.4	V	74.0	-8.6	PK	162	1.0	RB 1 MHz;VB 3 MHz;Pk	
<i>2x2 and 3x3 modules, HT 20 mode</i>									
10646.900	52.8	V	54.0	-1.2	AVG	161	1.1	2x2 and 3x3 radio	n20
10646.760	65.5	V	74.0	-8.5	PK	161	1.1	RB 1 MHz;VB 3 MHz;Pk	
<i>2x2 and 3x3 modules, HT 40 mode</i>									
10610.760	46.7	V	54.0	-7.3	AVG	161	1.0	2x2 and 3x3 radio	n40
10632.300	58.5	V	74.0	-15.5	PK	161	1.0	RB 1 MHz;VB 3 MHz;Pk	

Note 1: For emissions in restricted bands, the limit of 15.209 was used which requires average and peak measurements.

Note 2: For emissions outside of the restricted bands the limit is -27dBm/MHz eirp (68.3dBuV/m). The measurement method required is the same measurement method used to determine the in-band power spectral density or a peak measurement (RB=1MHz, VB>1MHz). Pavg indicates that the power averaging method of measurement was used for the measurement of emissions outside of the restricted bands. PK indicates that a peak measurement was made.



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 - 40,000 MHz. Operation in the 5470-5725 MHz Band**

Date of Test: 6/22/2011  
 Test Engineer: Rafael Varelas  
 Test Location: FT Chamber #7

**Run #3a: 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*

Frequency MHz	Level dB $\mu$ V/m	Pol v/h	15.209 / 15E		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments	Chain
			Limit	Margin					
5039.980	51.0	V	54.0	-3.0	AVG	230	1.1	RB 1 MHz;VB 10 Hz;Pk	
5039.720	58.1	V	74.0	-15.9	PK	230	1.1	RB 1 MHz;VB 3 MHz;Pk	
3666.640	40.7	H	54.0	-13.3	AVG	299	1.2	RB 1 MHz;VB 10 Hz;Pk	
3666.620	54.6	H	74.0	-19.4	PK	299	1.2	RB 1 MHz;VB 3 MHz;Pk	
10997.020	50.6	V	54.0	-3.4	AVG	315	1.2	RB 1 MHz;VB 10 Hz;Pk	All
10995.160	62.3	V	74.0	-11.7	PK	315	1.2	RB 1 MHz;VB 3 MHz;Pk	
1600.100	40.3	V	54.0	-13.7	Peak	148	1.3		
5000.090	57.5	V	-	-	Peak	244	1.0	Digital	

Note 1: For emissions in restricted bands, the limit of 15.209 was used which requires average and peak measurements.

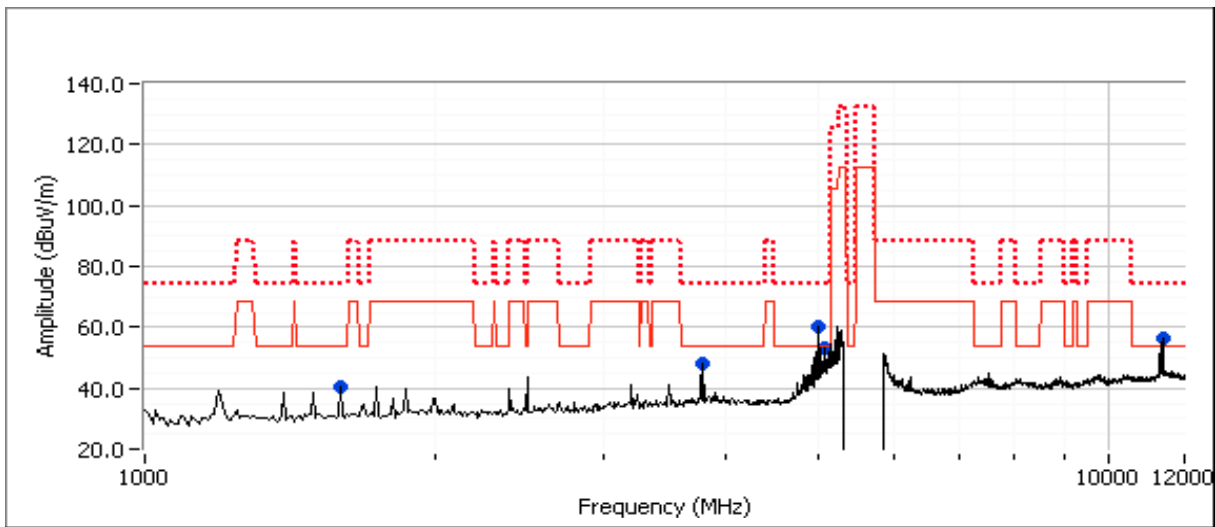
Note 2: For emissions outside of the restricted bands the limit is -27dBm/MHz eirp (68.3dB $\mu$ V/m). The measurement method required is the same measurement method used to determine the in-band power spectral density or a peak measurement (RB=1MHz, VB>1MHz). Pavg indicates that the power averaging method of measurement was used for the measurement of emissions outside of the restricted bands. PK indicates that a peak measurement was made.

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

Run #3b: 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 Radiated Emissions:*



Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments	Chain
MHz	dBµV/m	v/h	Limit	Margin	PK/QP/Avg	degrees	meters		
11158.710	51.3	V	54.0	-2.7	AVG	332	1.2	RB 1 MHz;VB 10 Hz;Pk	All
11147.110	62.8	V	74.0	-11.2	PK	332	1.2	RB 1 MHz;VB 3 MHz;Pk	
1599.980	41.3	V	54.0	-12.7	Peak	194	1.3		
5000.090	58.5	V	-	-	Peak	174	1.3	Digital	
3700.150	45.0	H	54.0	-9.0	Peak	309	1.0		
5080.120	48.1	V	54.0	-5.9	AVG	282	1.0	RB 1 MHz;VB 10 Hz;Pk	
5080.010	56.5	V	74.0	-17.5	PK	282	1.0	RB 1 MHz;VB 3 MHz;Pk	

Note 1: For emissions in restricted bands, the limit of 15.209 was used which requires average and peak measurements.

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**

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 Radiated Emissions:*

Frequency MHz	Level dB $\mu$ V/m	Pol v/h	15.209 / 15E		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments	Chain
			Limit	Margin					
11394.140	52.7	V	54.0	-1.3	AVG	319	1.3	RB 1 MHz;VB 10 Hz;Pk	All
11395.070	65.6	V	74.0	-8.4	PK	319	1.3	RB 1 MHz;VB 3 MHz;Pk	
5080.130	49.9	V	54.0	-4.1	AVG	154	1.0	RB 1 MHz;VB 10 Hz;Pk	
5080.110	58.5	V	74.0	-15.5	PK	154	1.0	RB 1 MHz;VB 3 MHz;Pk	
3800.030	40.7	H	54.0	-13.3	AVG	292	1.0	RB 1 MHz;VB 10 Hz;Pk	
3799.910	52.6	H	74.0	-21.4	PK	292	1.0	RB 1 MHz;VB 3 MHz;Pk	
1600.100	40.6	V	54.0	-13.4	Peak	181	1.3		
5000.090	59.9	V	-	-	Peak	139	1.0	Digital	

Note 1: For emissions in restricted bands, the limit of 15.209 was used which requires average and peak measurements.

Note 2: For emissions outside of the restricted bands the limit is -27dBm/MHz eirp (68.3dB $\mu$ V/m). The measurement method required is the same measurement method used to determine the in-band power spectral density or a peak measurement (RB=1MHz, VB>1MHz). Pavg indicates that the power averaging method of measurement was used for the measurement of emissions outside of the restricted bands. PK indicates that a peak measurement was made.

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

Run #4, Radiated Spurious Emissions, 1000 - 40,000 MHz. Operation in the 5150-5250 MHz Band

Date of Test: 7/6/2011  
 Test Engineer: John Caizzi  
 Test Location: FT Chamber #7

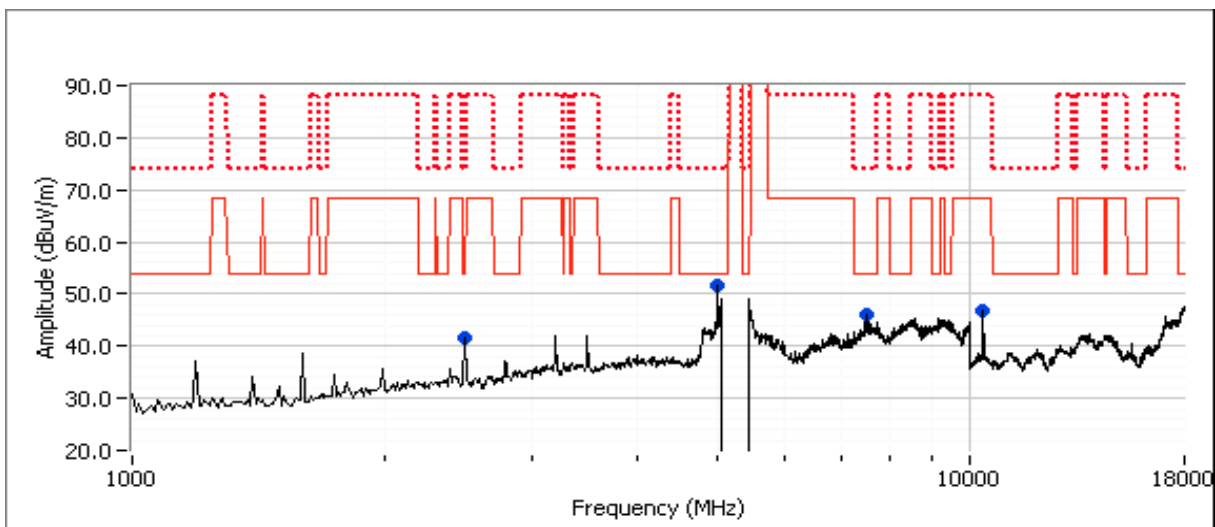
Run #4a: Low Channel

Spurious Radiated Emissions:

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments	Chain
MHz	dB $\mu$ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters		0
2494.170	41.6	V	54.0	-12.4	Peak	230	1.0		
10346.670	46.9	V	68.3	-21.4	Peak	290	1.0		
4999.970	50.8	V	54.0	-3.2	AVG	12	1.00	Digital Device emission at 5GHz.	
4999.740	56.4	V	74.0	-17.6	PK	12	1.00	Digital Device emission at 5GHz.	
7500.010	45.2	V	54.0	-8.8	AVG	28	1.95	Digital Device emission at 7.5GHz.	
7500.380	51.8	V	74.0	-22.2	PK	28	1.95	Digital Device emission at 7.5GHz.	

Note 1: For emissions in restricted bands, the limit of 15.209 was used which requires average and peak measurements.

Note 2: For emissions outside of the restricted bands the limit is -27dBm/MHz eirp (68.3dB $\mu$ V/m). The measurement method required is the same measurement method used to determine the in-band power spectral density or a peak measurement (RB=1MHz, VB>1MHz). Pavg indicates that the power averaging method of measurement was used for the measurement of emissions outside of the restricted bands. PK indicates that a peak measurement was made.





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.**

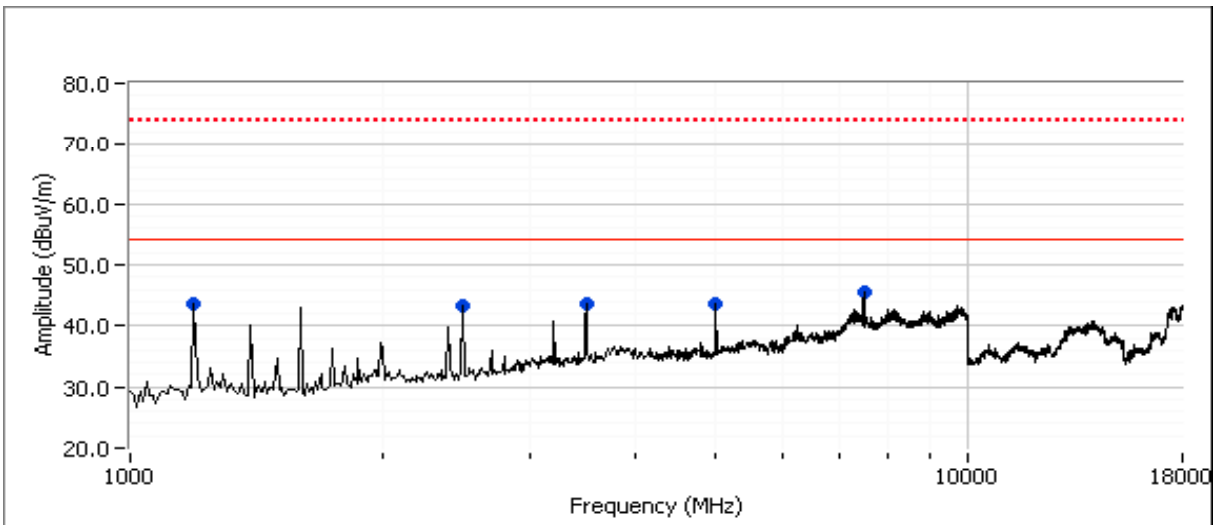
Channel 6, 3x3 and 2x2 Radio; Channel 157, 3x3 and 2x2 Radio; Channel 40, 3x3 and 2x2 Radio;  
Channel 60, 3x3 and 2x2 Radio; Channel 116 2x2 and 3x3 Radio;

Date of Test: 6/16/2011

Test Engineer: Rafael Varelas

Test Location: FT Chamber #7

Frequency MHz	Level dB $\mu$ V/m	Pol v/h	15.209 / 15E		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
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	Config. Used: 1
Test Engineer: Joseph Cadigal	Config Change: none
Test Location: Fremont Chamber #4	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 were routed through metal conduit and when possible passed through a ferrite clamp upon exiting the chamber.

<b>Ambient Conditions:</b>	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

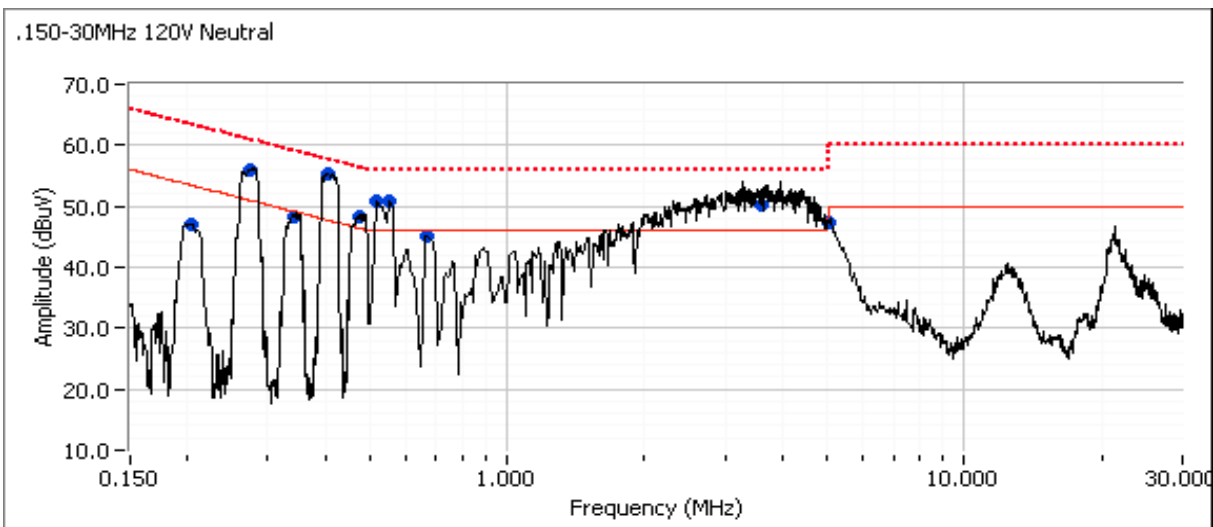
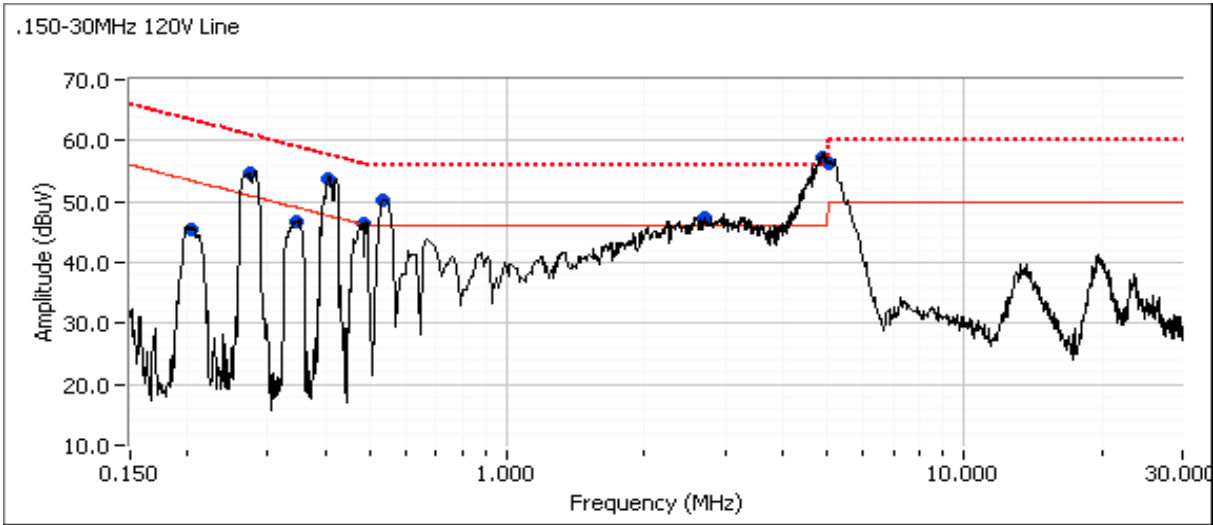
No modifications were made to the EUT during testing

#### 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
Contact: Steve Smith	Account Manager: Susan Pelzl
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
Contact: Steve Smith	Account Manager: Susan Pelzl
Standard: -	Class: -

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

Frequency MHz	Level dB $\mu$ V	AC Line	Class B		Detector QP/Ave	Comments
			Limit	Margin		
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 MHz	Level dB $\mu$ V	AC Line	Class B		Detector QP/Ave	Comments
			Limit	Margin		
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
Contact:	Steve Smith	Account Manager:	Susan Pelzl
Standard:	-	Class:	-

Frequency MHz	Level dB $\mu$ V	AC Line	Class B		Detector QP/Ave	Comments
			Limit	Margin		
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*

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