

*Electromagnetic Emissions Test Report
Application for Grant of Equipment Authorization
pursuant to
Industry Canada RSS-Gen Issue 2 / RSS 210 Issue 7
FCC Part 15, Subpart E
on the
Xirrus, Inc.
Transmitter
Model: XN4*

UPN: 5428A-XN4
FCC ID: SK6XN4

GRANTEE: Xirrus, Inc.
2101 Corporate Center Dr.
Newbury Park, CA 91320

TEST SITE(S): Elliott Laboratories
684 W. Maude Ave
Sunnyvale, CA 94086
IC Site Registration #: IC 2845-1; IC 2845-2

REPORT DATE: January 21, 2009

FINAL TEST DATE: October 24, through November 11, 2008
January 7, 2009

AUTHORIZED SIGNATORY:



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Testing Cert #2016-01

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REVISION HISTORY

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SCOPE

An electromagnetic emissions test has been performed on the Xirrus, Inc. model XN4 pursuant to the following rules:

Industry Canada RSS-Gen Issue 2
RSS 210 Issue 7 “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.

The test results recorded herein are based on a single type test of the Xirrus, Inc. model XN4 and therefore apply only to the tested sample. The sample was selected and prepared by Steve Smith of Xirrus, Inc.

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 XN4 complied with the requirements of the following regulations:

RSS 210 Issue 7 "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 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.).

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	Device shall be designed for indoor use only	Complies
15.407(a) (1)	-	26dB Bandwidth	a: 21.4 MHz a2x: 23.4 MHz n20: 22.3MHz n40: 40.3MHz	N/A – limits output power if < 20MHz	N/A
15.407 (a) (1)	A9.2(1)	Output Power	Single radio a: 16.2 dBm a2x: 16.1dBm n20: 16.6dBm n40: 16.3dBm 4x radio a2x: 16.6dBm 2x radio n40: 16.7dBm 0.047 Watts	17dBm	Complies
15.407 (a) (1)	-	Power Spectral Density	a: 3.7 dBm/MHz a2x: 3.6dBm/MHz n20: 3.9 dBm/MHz n40: 0.6 dBm/MHz	4 dBm/MHz	Complies
-	A9.5 (2)			5 dBm/MHz	Complies
<p>Output power is detailed for a single radio operating in the 5150-5250 MHz band and also for multiple radios operating in the band. A maximum of four radios using 20MHz channels or two radios using 40MHz channels can operate in the band (the device does not allow two radios to operate on overlapping channels). When multiple radios are operational in the band the maximum output power per radio is reduced by $10\log(n)$ where n is the number of radios in the band.</p> <p>The maximum power is detailed for a single radio for each mode (802.11a, 802.11a 2x2 MIMO, 802.11n 20MHz and 802.11n 40 MHz). The maximum output power across the band for 40MHz and 20MHz channels is also provided.</p>					

General requirements for all bands

FCC Rule Part	RSS Rule Part	Description	Measured Value / Comments	Limit / Requirement	Result
15.401	A9.5a	Modulation	Digital Modulation is used (OFDM)	Digital modulation is required	Complies
-	RSP 100	99% bandwidth	a: 17.2 MHz n20: 18.4 MHz n40: 36.7MHz	Information only	
15.407(b) (5) / 15.209	A9.3	Spurious Emissions below 1GHz	No emissions related to transmitter/receiver below 1GHz. Digital device tested against FCC / ICES 003 Class B limits		
15.407(b) (2)	A9.3	Spurious Emissions above 1GHz	53.7dB μ V/m (484.2 μ V/m) @ 5149.9MHz	Refer to SPURIOUS LIMITS –UNII and LELAN DEVICES	Complies (-0.3dB)
15.407(a)(6)	-	Peak Excursion Ratio	12.9 dB	< 13dB	Complies

FCC Rule Part	RSS Rule Part	Description	Measured Value / Comments	Limit / Requirement	Result
15.407 (c)	A9.5(4)	Operation in the absence of information to transmit	Operation is discontinued in the absence of information (Operational Description p16)	Device shall automatically discontinue operation in the absence of information to transmit	Complies
15.407 (g)	A9.5 (5)	Frequency Stability	Frequency stability is better than 10ppm Operational Description p 16)		Complies
15.407 (h1)	A9.4	Transmit Power Control	TPC is not required as the 23dBm maximum eirp is below 500mW eirp	The U-NII device shall have the capability to operate with a mean EIRP value lower than 24dBm (250mW)	Complies
15.407 (h2)	A9.4	Dynamic frequency Selection (device with radar detection)	Not applicable, device does not currently operate in either 5470 – 5725 or 5250 – 5350 MHz bands.		
	A9.9g	User Manual information	Refer to pages 434 and 435 of the user manual		Complies

GENERAL REQUIREMENTS APPLICABLE TO ALL BANDS

FCC Rule Part	RSS Rule part	Description	Measured Value / Comments	Limit / Requirement	Result (margin)
15.203	-	RF Connector	Internal antennas are integral to the device. External antenna connects using reverse TNC	Unique connector or integral antenna	Complies
15.109	RSS GEN 7.2.3 Table 1	Receiver spurious emissions	44.2dB μ V/m (162.2 μ V/m) @ 1320.1MHz	Refer to LIMITS FOR RECEIVER RADIATED SPURIOUS EMISSIONS	Complies (- 9.8 dB)
15.207	RSS GEN Table 2	AC Conducted Emissions	41.3dB μ V @ 2.972MHz	Refer to standard	Complies (- 4.7 dB)
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 statements (page 434).	Refer to OET 65, FCC Part 1 and RSS 102	Complies
	RSP 100 RSS GEN 7.1.5	User Manual	Refer to pages 434 and 435 of the user manual	Statements required regarding non-interference and detachable antenna	Complies
Receiver spurious emissions are given for operation in the 2.4GHz and 5.7GHz bands. When the receiver was operating in the 5 GHz UNII / LELAN bands no significant signals were observed.					

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	Frequency Range (MHz)	Calculated Uncertainty (dB)
Conducted Emissions	0.15 to 30	± 2.4
Radiated Emissions	0.015 to 30	± 3.0
Radiated Emissions	30 to 1000	± 3.6
Radiated Emissions	1000 to 40000	± 6.0

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

The Xirrus, Inc. model XN4 is a multi-radio 802.11abgn Access Point radio which is designed to act as a hub for a wireless local area network (WLAN). The device contains 4 individual 802.11abgn radios supporting legacy mode and 3x3n modes in the 2.4GHz band and legacy and 2x2n modes in the 5 GHz bands. All four radios use internal antennas, with one radio also having the option to use an external antenna (the external antenna only supports legacy mode operation, no MIMO modes). The XN4 is powered via a proprietary PoE connection.

Normally, the EUT's would be ceiling mounted during operation. Preliminary measurements were made with the EUT tested as table-top equipment and also at a height of 1.5m above the ground plane. No significant difference in emissions was observed so formal tests were performed as table-top equipment

The sample was received on October 23, 2008 and tested on October 24, November 3, November 4, November 5, November 6, November 7, November 10 and November 11, 2008. Conducted emissions measurements were made on January 7, 2009. The EUT consisted of the following component(s):

Company	Model	Description	Serial Number	FCC ID
Xirrus	XN4	802.11abgn access point	Prototype	SK6XN4
PhiHong	P73800202A1	PoE Injector	POE60U-560(G)-SS-R	N/A

ANTENNA SYSTEM

Each of the radios connects to an internal antenna set configured for 3x3 MIMO operation in 2.4GHz bands and 2x2 MIMO operation in the 5GHz bands. Each internal antenna has a maximum gain of between 0 and 1dBi in the 2.4GHz band and 6dBi in the 5GHz bands.

One radio also has provision for connecting to a single external antenna to operate (typically) as a single-chain, receive-only radio. The external antenna connects to the EUT via a non-standard reverse TNC antenna connector, thereby meeting the requirements of FCC 15.203. The external antenna's maximum gain is 2.5dBi for all bands.

ENCLOSURE

The EUT enclosure is primarily constructed of plastic. It measures approximately 32 cm in diameter by 6 cm high.

MODIFICATIONS

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

SUPPORT EQUIPMENT

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

Company	Model	Description	Serial Number	FCC ID
IBM	Thinkpad R51	Laptop	-	-

No remote support equipment was used during testing.

EUT INTERFACE PORTS

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

Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length(m)
PoE IN	Switch	Cat 5	Unshielded	10.0
PoE Out	Data& Power IN	Cat 5	Unshielded	1.0
AC Power	PoE	3 wire	Unshielded	1.5

Note: The service port was not connected during testing. The manufacturer stated that this is for setup purposes and therefore would not normally be connected.

EUT OPERATION

During testing the EUT was configured in either a transmit or a receive mode using ART software.

For transmit mode one or more of the four radios was configured to continuously transmit on a specific channel on one or more chains. Each radio could be configured for a single chain operation (legacy 802.11b, g or a modes) or for multi-chain (MIMO) operation (all modes). In receive mode one or more radios was configured in a receive only mode with all chains active.

When evaluating the external antenna only one radio was operating during testing. When evaluating the internal antennas the rf port and radiated band edge measurements were made with a single radio operational. Radiated spurious measurements were made with multiple radios active to allow for evaluating spurious emissions with radios active on top, bottom and center channels. This also allowed for evaluation of any inter-modulation products from the system (none were observed).

TEST SITE**GENERAL INFORMATION**

Final test measurements were taken on October 24, November 3, November 4, November 5, November 6, November 7, November 10 and November 11, 2008 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	
SVOATS #1	90592	IC 2845-1	684 West Maude Ave, Sunnyvale CA 94085-3518
SVOATS #2	90593	IC 2845-2	

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 with the exception, on OATS sites, of predictable local TV, radio, and mobile communications traffic. 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 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.

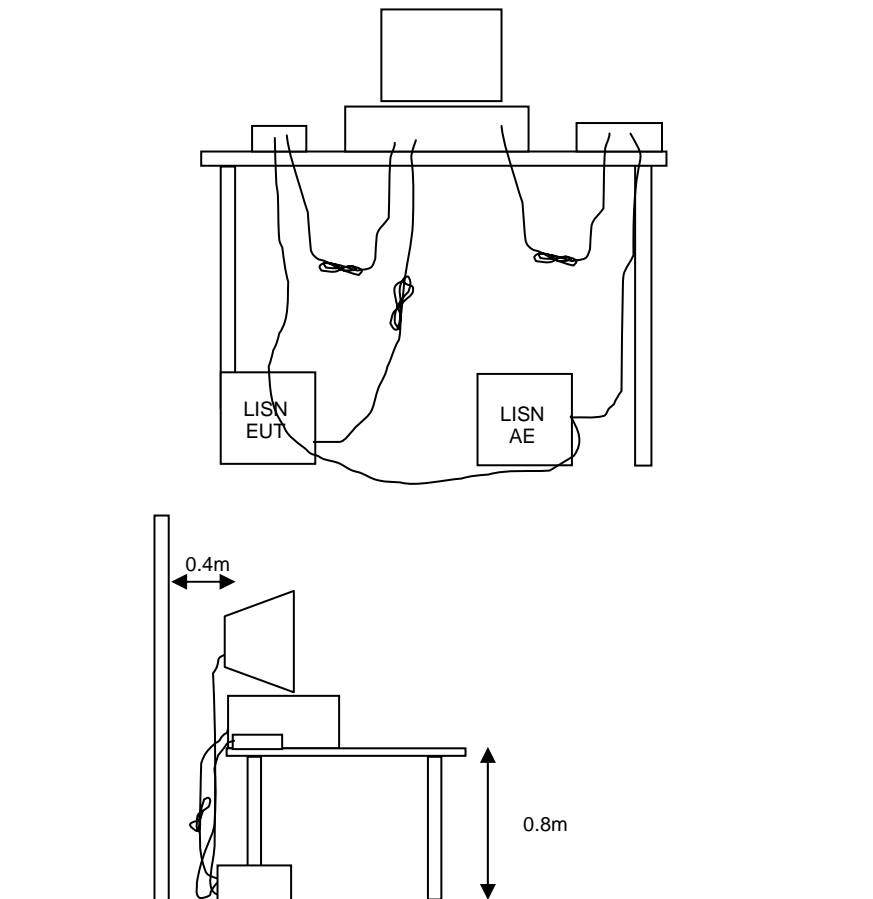
TEST PROCEDURES

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.



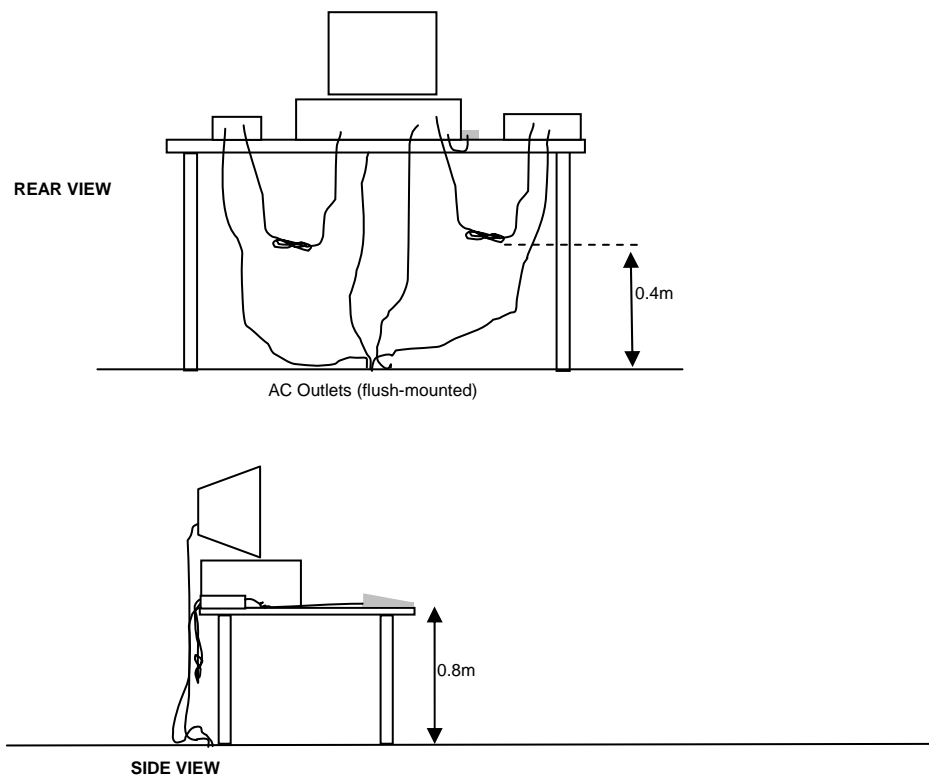
RADIATED EMISSIONS

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.

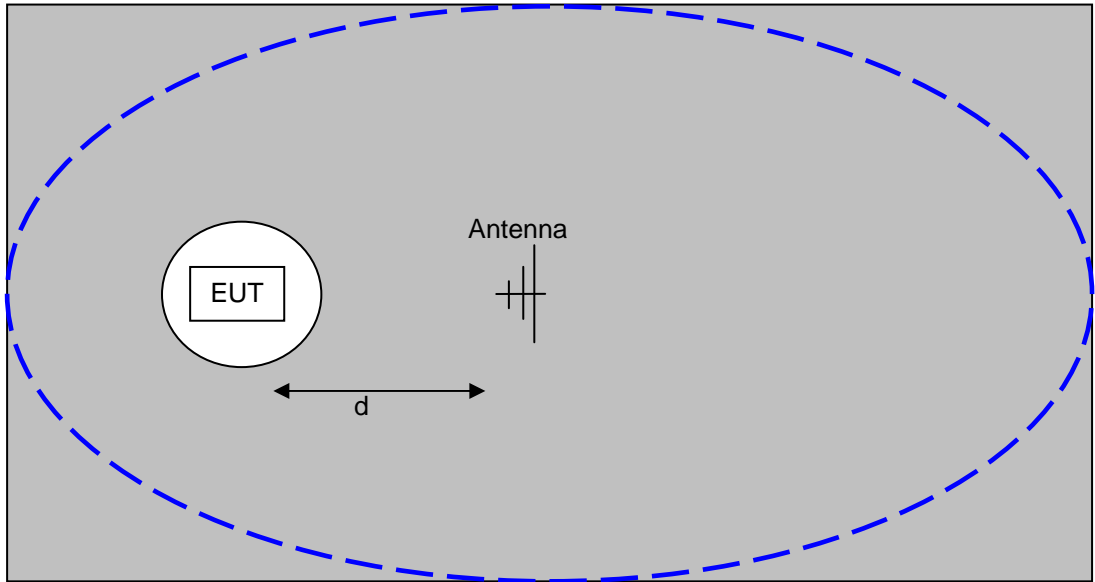
A speaker is provided in the receiver to aid in discriminating between EUT and ambient emissions. Other methods used during the preliminary scan for EUT emissions involve scanning with near field magnetic loops, monitoring I/O cables with RF current clamps, and cycling power to the EUT.

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.

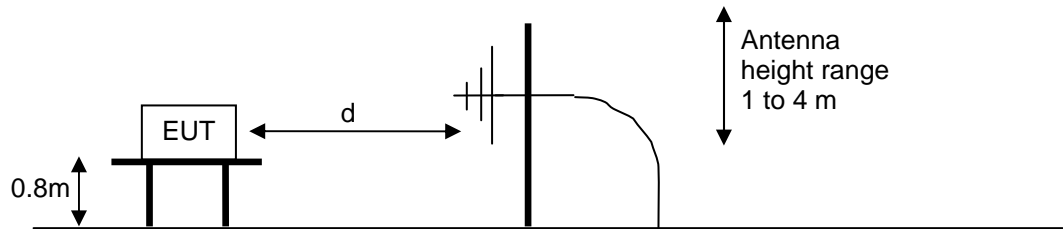
When testing above 18 GHz, the receive antenna is located at 1 meter from the EUT and the antenna height is restricted to a maximum of 2.5 meters.



Typical Test Configuration for Radiated Field Strength Measurements



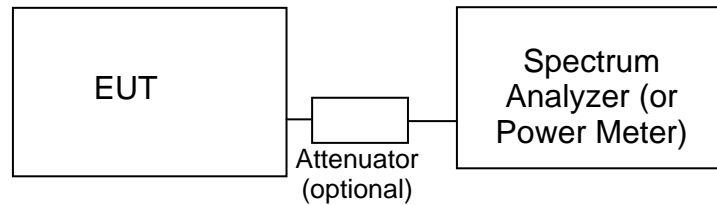
The ground plane extends beyond the ellipse defined in CISPR 16 / CISPR 22 / ANSI C63.4 and is large enough to accommodate test distances (d) of 3m and 10m. Refer to the test data tables for the actual measurement distance.



Test Configuration for Radiated Field Strength Measurements
OATS- 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:

LIMITS FOR RECEIVER RADIATED SPURIOUS EMISSIONS

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

GENERAL TRANSMITTER RADIATED EMISSIONS SPECIFICATION LIMITS

The table below shows the limits for the spurious emissions from transmitters that fall in restricted bands¹ (with the exception of transmitters operating under FCC Part 15 Subpart D and RSS 210 Annex 9), the limits for all emissions from a low power device operating under the general rules of RSS 310 (tables 3 and 4), RSS 210 (table 2) and FCC Part 15 Subpart C section 15.209.

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

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.

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

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) ¹ 1W (30dBm) eirp	11 dBm/MHz
5470 - 5725	250 mW (24 dBm) ² 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.

SPURIOUS 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 -27dBm/MHz , which is a field strength of 68.3dBuV/m/MHz at a distance of 3m. This is an average limit so the peak value of the emission may not exceed -7dBm/MHz (68.3dBuV/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 -17dBm/MHz .

¹ If EIRP exceeds 500mW the device must employ TPC

² If EIRP exceeds 500mW the device must employ TPC

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 = Receiver Reading in dBuV/m

F_d = Distance Factor in dB

R_C = Corrected Reading in dBuV/m

L_S = Specification Limit in dBuV/m

M = Margin in dB Relative to Spec

EXHIBIT 1: Test Equipment Calibration Data

1 Page

Radiated Emissions, 30 - 40,000 MHz, 24-Oct-08**Engineer: Mehran Birgani**

<u>Manufacturer</u>	<u>Description</u>	<u>Model #</u>	<u>Asset #</u>	<u>Cal Due</u>
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	870	09-Oct-09
EMCO	Antenna, Horn, 1-18 GHz	3115	1561	10-Jun-10
Hewlett Packard	SpecAn 9 kHz - 40 GHz, (SA40)	8564E	CH5273	24-Oct-08

Radiated Emissions, 30 - 18,000 MHz, 30-Oct-08 (Receiver Spurious)**Engineer: Mehran Birgani**

<u>Manufacturer</u>	<u>Description</u>	<u>Model #</u>	<u>Asset #</u>	<u>Cal Due</u>
EMCO	Antenna, Horn, 1-18 GHz	3115	487	15-Jul-10
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	785	06-Jun-09
Hewlett Packard	SpecAn 30 Hz -40 GHz, SV (SA40) Red	8564E (84125C)	1148	24-Nov-08

Radiated Emissions, 1000 - 40,000 MHz, 03-Nov-08**Engineer: Mehran Birgani**

<u>Manufacturer</u>	<u>Description</u>	<u>Model #</u>	<u>Asset #</u>	<u>Cal Due</u>
EMCO	Antenna, Horn, 1-18 GHz	3115	487	15-Jul-10
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	785	06-Jun-09
Hewlett Packard	SpecAn 30 Hz -40 GHz, SV (SA40) Red	8564E (84125C)	1148	24-Nov-08

Radiated Emissions, 1000 - 40,000 MHz, 05-Nov-08**Engineer: Rafael Varelas**

<u>Manufacturer</u>	<u>Description</u>	<u>Model #</u>	<u>Asset #</u>	<u>Cal Due</u>
EMCO	Antenna, Horn, 1-18 GHz	3115	487	15-Jul-10
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	785	06-Jun-09
Hewlett Packard	SpecAn 30 Hz -40 GHz, SV (SA40) Red	8564E (84125C)	1148	24-Nov-08

Receiver Spurious Emissions, 14-Nov-08**Engineer: Suhaila Khushzad**

<u>Manufacturer</u>	<u>Description</u>	<u>Model #</u>	<u>Asset #</u>	<u>Cal Due</u>
EMCO	Antenna, Horn, 1-18 GHz	3115	487	15-Jul-10
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	785	06-Jun-09
Hewlett Packard	SpecAn 30 Hz -40 GHz, SV (SA40) Red	8564E (84125C)	1148	24-Nov-08

Conducted Emissions - AC Power and Telecommunications Ports, 07-Jan-09**Engineer: Joseph Cadigal**

<u>Manufacturer</u>	<u>Description</u>	<u>Model #</u>	<u>Asset #</u>	<u>Cal Due</u>
Hewlett Packard	SpecAn 9 KHz-26.5 GHz, Non-Program	8563E	284	29-Dec-09
Elliott Laboratories	LISN, FCC / CISPR	LISN-4, OATS	362	31-Jul-09
Fischer Custom Comm.	150-50 ohm adapter, 1/2, 0.15 to 80 MHz	FCC-801-150-50	873	03-Jun-09
Rohde & Schwarz	Test Receiver, 9 kHz-2750 MHz	ESCS 30	1337	02-Oct-09
Rohde & Schwarz	Pulse Limiter	ESH3 Z2	1398	12-Feb-09

Radio Antenna Port (Power and Spurious Emissions), 06-Nov-08 to 11-Nov-08**Engineer: Mehran Birgani**

<u>Manufacturer</u>	<u>Description</u>	<u>Model #</u>	<u>Asset #</u>	<u>Cal Due</u>
Hewlett Packard	SpecAn 30 Hz -40 GHz, SV (SA40) Red	8564E (84125C)	1148	24-Nov-08

EXHIBIT 2: Test Measurement Data

61 Pages

Client:	Xirrus	Job Number:	J71484
Model:	XN4	T-Log Number:	T73388
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		Mark Briggs
Emissions Standard(s):	FCC 15 E, RSS 210	Class:	NII
Immunity Standard(s):	-	Environment:	Wireless

NII RF Port Test Data

For The

Xirrus

Model

XN4

Date of Last Test: 11/11/2008

Client: Xirrus	Job Number: J71484
Model: XN4	T-Log Number: T73388
	Account Manager: Susan Pelzl
Contact: Steve Smith	
Standard: FCC 15 E, RSS 210	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: 11/6/2008
Test Engineer: Mehran Birgani
Test Location: SV OATS #2

Config. Used: -
Config Change: Direct connection
EUT Voltage: 120V/60Hz

General Test Configuration

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

Ambient Conditions: Temperature: 15-35 °C
 Rel. Humidity: 10-60 %

Summary of Results

Run #	Test Performed	Limit	Pass / Fail	Result / Margin
1	Power, 5150 - 5250MHz	15.407(a) (1), (2)	Pass	Single radio: 16.2 dBm 4x radio: 16.3 dBm
1	PSD, 5150 - 5250MHz	15.407(a) (1), (2)	Pass	3.7 dBm/MHz
1	26dB Bandwidth	15.407	-	23.4 MHz
1	99% Bandwidth	RSS 210	-	17.2 MHz
2	Peak Excursion Envelope	15.407(a) (6)	Pass	11.9 dB
3	Antenna Conducted Out of Band Spurious	15.407(b)	Pass	All emissions below the -27dBm/MHz limit

Modifications Made During Testing

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

Client: Xirrus	Job Number: J71484
Model: XN4	T-Log Number: T73388
Contact: Steve Smith	Account Manager: Susan Pelzl
Standard: FCC 15 E, RSS 210	Class: N/A

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

Antenna gain used is for the internal antenna. The external antenna gain is lower (2.5dBi) and not used for MIMO modes.

Antenna Gain (dBi): **3.0**

Power settings for a single radio operating in the band

Frequency (MHz)	Software Setting	Bandwidth		Output Power ¹ dBm		Power (Watts)	PSD ² dBm/MHz			Result
		26dB	99% ⁴	Measured	Limit		Measured	FCC Limit	RSS Limit ³	
5180	18.5	23.4	17.2	16.2	17.0	0.042	3.7	4.0	7.0	Pass
5200	18.0	21.5	17.2	15.9	17.0	0.039	3.5	4.0	7.0	Pass
5240	18.5	21.5	17.2	16.1	17.0	0.041	3.6	4.0	7.0	Pass

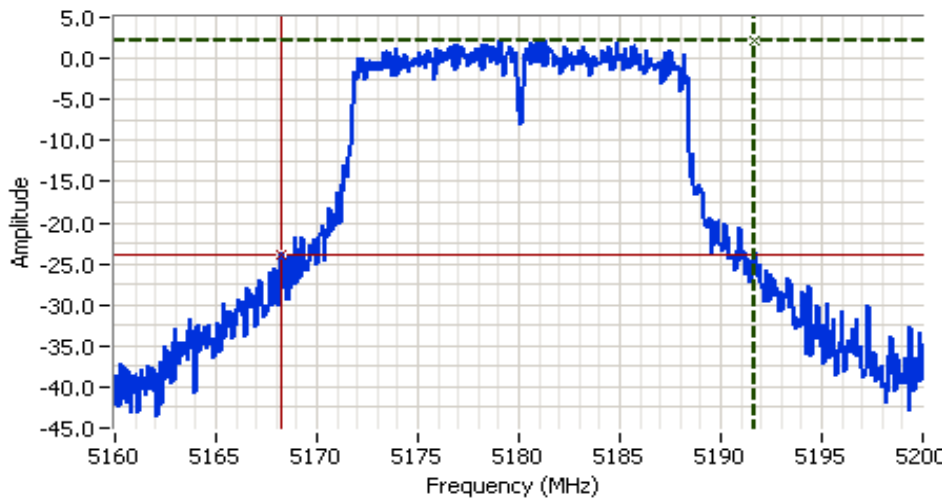
Power settings for all four channels being used in the band

Output power measured on the centre channel to demonstrate power control is available to set the power to a level low enough to comply with limits when all four radios are operational in the band. Only power was measured - aggregation of PSD is not applicable as the device cannot have more than one radio operating on a channel.

Frequency (MHz)	Software Setting	Bandwidth		Measured Power ¹		
		26dB	99% ⁴	dBm	mW	Limit
5200	11.0	19.1	17.2	10.3	10.7	Limit
Total Power Across The Band				16.3	42.9	17 dBm

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 40 MHz
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

Client: Xirrus	Job Number: J71484
Model: XN4	T-Log Number: T73388
Contact: Steve Smith	Account Manager: Susan Pelzl
Standard: FCC 15 E, RSS 210	Class: N/A



Analyzer Settings

HP8564E
 CF: 5180.000 MHz
 SPAN: 40.000 MHz
 RB 100 kHz
 VB 300 kHz
 Detector POS
 Att 30
 RL Offset 7.00
 Sweep Time 50.0ms
 Ref Lvl: 18.00DBM

Comments

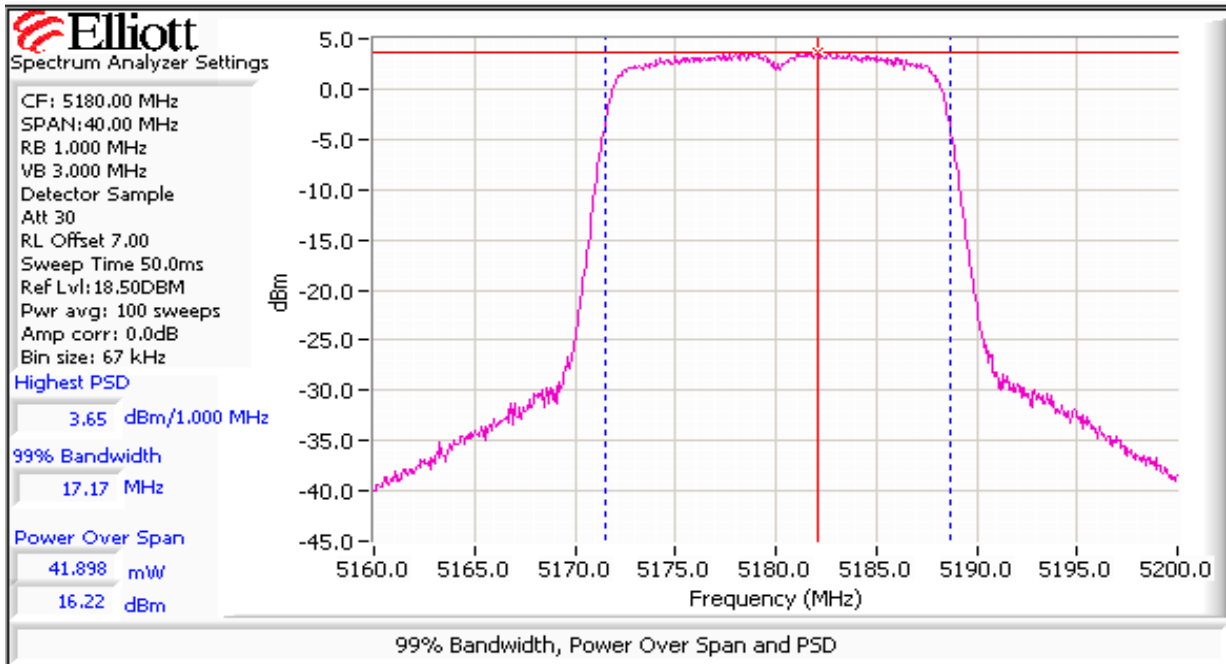
26dB BW: 23.400 MHz
 Setting: 18.5dBm

Cursor 1 5191.6667 2.17

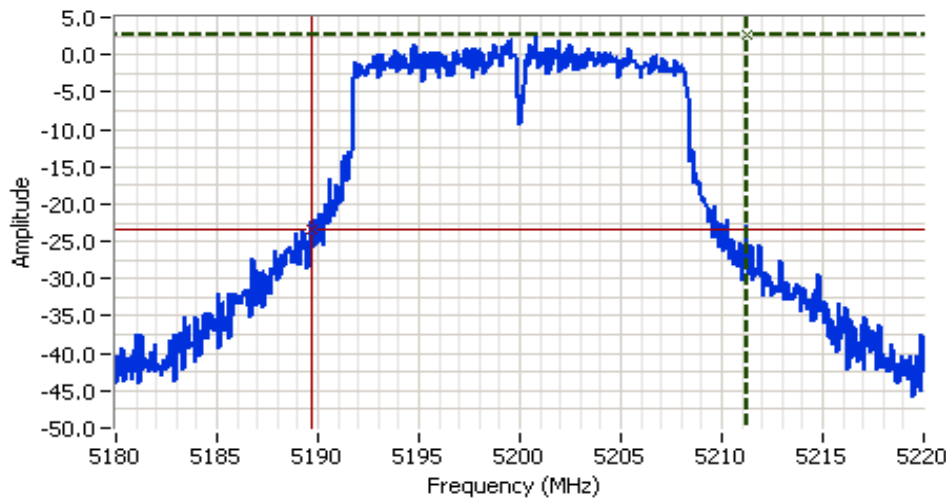
Cursor 2 5168.2667 -23.83

Delta Freq. 23.400

Delta Amplitude 26.00



Client: Xirrus	Job Number: J71484
Model: XN4	T-Log Number: T73388
Contact: Steve Smith	Account Manager: Susan Pelzl
Standard: FCC 15 E, RSS 210	Class: N/A



Analyzer Settings

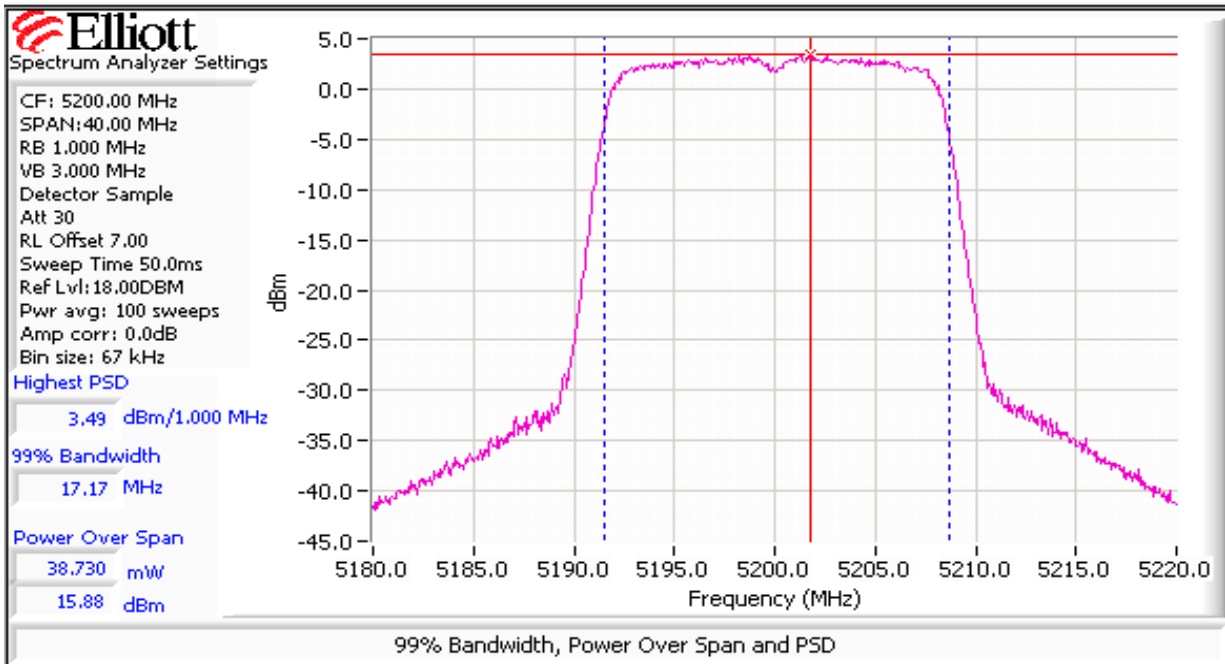
HP8564E
 CF: 5200.000 MHz
 SPAN: 40.000 MHz
 RB 100 kHz
 VB 300 kHz
 Detector POS
 Att 20
 RL Offset 7.00
 Sweep Time 50.0ms
 Ref Lvl: 8.10DBM

Comments

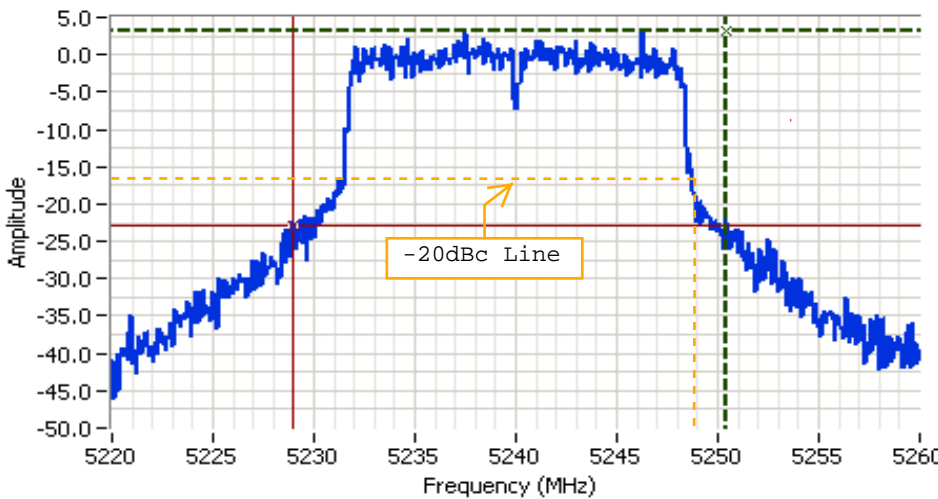
26dB BW: 21.467 MHz
 Setting: 18.0dBm

Cursor 1 5211.2000 2.60  Delta Freq. 21.467

Cursor 2 5189.7333 -23.40  Delta Amplitude 26.00



Client: Xirrus	Job Number: J71484
Model: XN4	T-Log Number: T73388
Contact: Steve Smith	Account Manager: Susan Pelzl
Standard: FCC 15 E, RSS 210	Class: N/A



Analyzer Settings

HP8564E
 CF: 5240.000 MHz
 SPAN: 40.000 MHz
 RB 100 kHz
 VB 300 kHz
 Detector POS
 Att 20
 RL Offset 7.00
 Sweep Time 50.0ms
 Ref Lvl: 8.70DBM

Comments

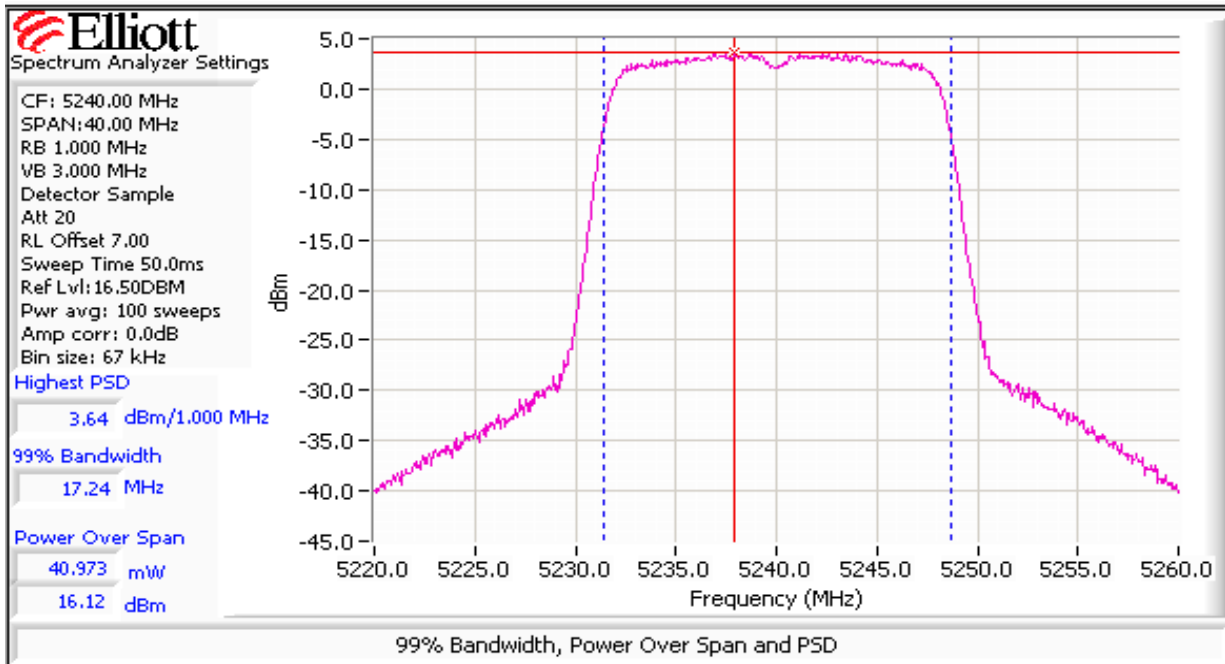
26dB BW: 21.467 MHz
 Setting: 18.5dBm

Cursor 1 5250.4667 3.20

Cursor 2 5229.0000 -22.80

Delta Freq. 21.467

Delta Amplitude 26.00



Client: Xirrus	Job Number: J71484
Model: XN4	T-Log Number: T73388
Contact: Steve Smith	Account Manager: Susan Pelzl
Standard: FCC 15 E, RSS 210	Class: N/A

Run #2: Peak Excursion Measurement

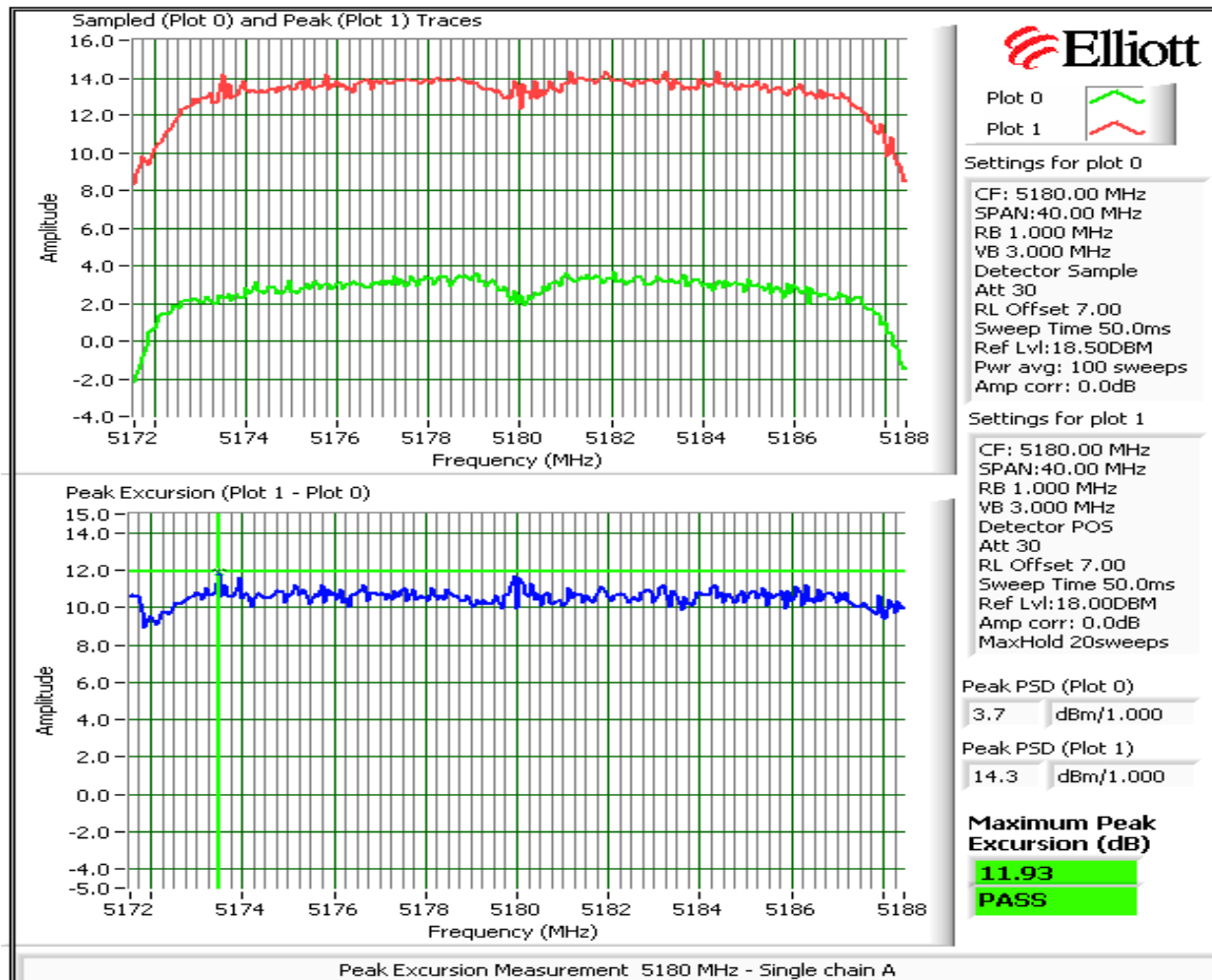
Device meets the requirement for the peak excursion

Freq (MHz)	Peak Excursion(Value)	Limit	Freq (MHz)	Peak Excursion(Value)	Limit	Freq (MHz)	Peak Excursion(Value)	Limit
5180	11.9	13.0	5260		13.0	5500		13.0
5200	11.9	13.0	5300		13.0	5600		13.0
5240	11.8	13.0	5320		13.0	5700		13.0

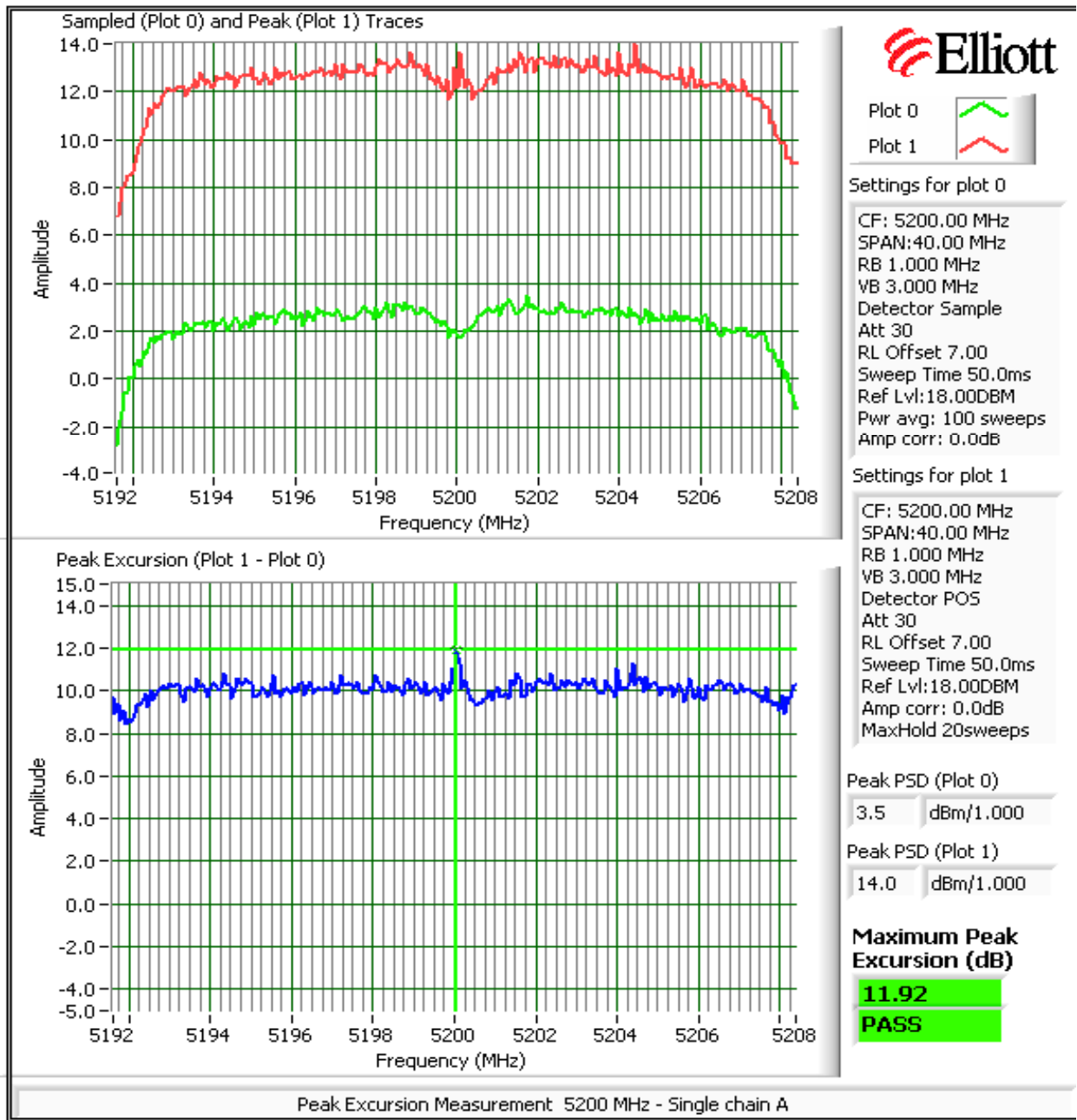
Plots Showing Peak Excursion

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

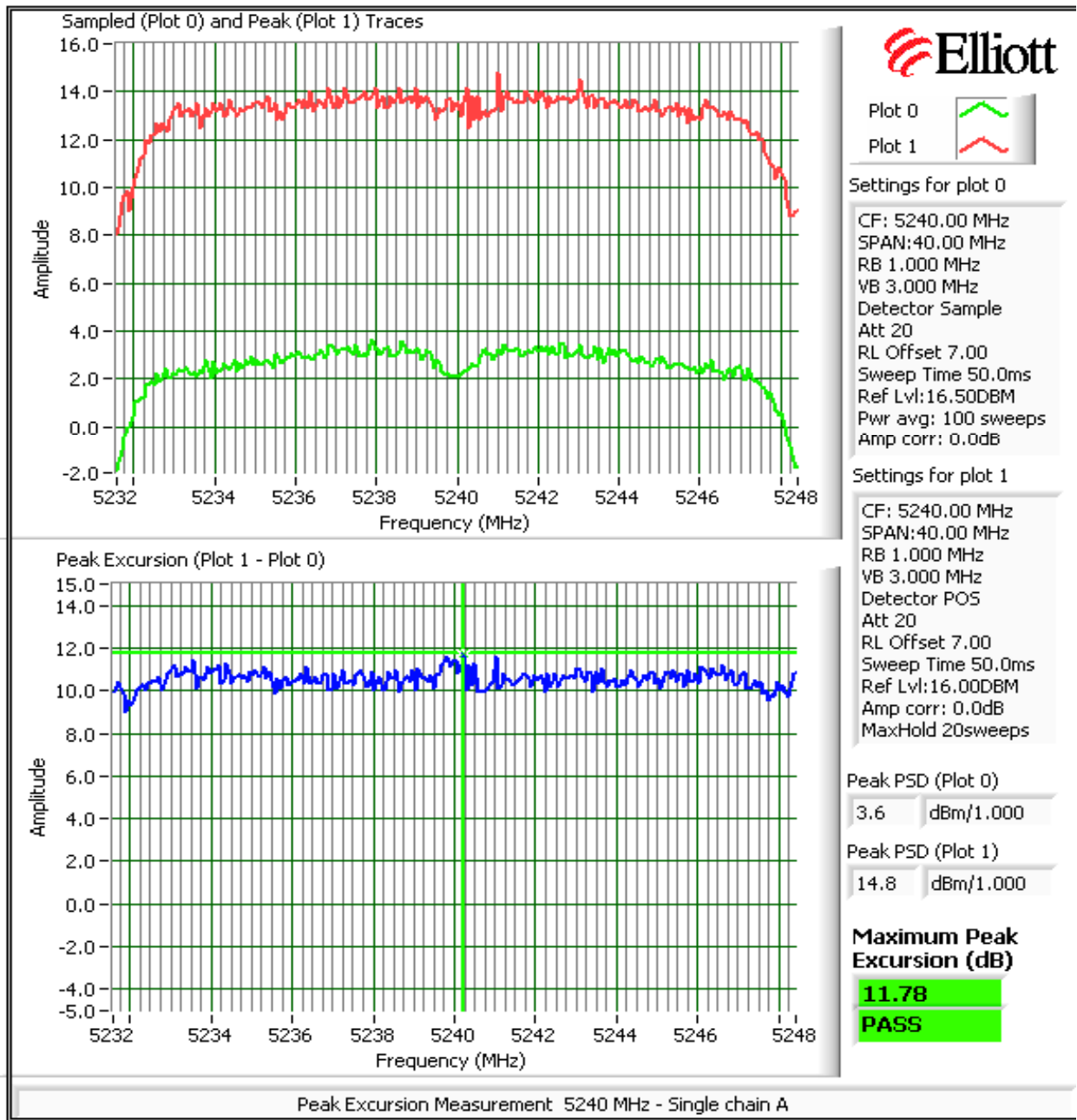
Trace B: RBW = 1 MHz, VBW = 3MHz, Integrated average power



Client: Xirrus	Job Number: J71484
Model: XN4	T-Log Number: T73388
Contact: Steve Smith	Account Manager: Susan Pelzl
Standard: FCC 15 E, RSS 210	Class: N/A



Client: Xirrus	Job Number: J71484
Model: XN4	T-Log Number: T73388
Contact: Steve Smith	Account Manager: Susan Pelzl
Standard: FCC 15 E, RSS 210	Class: N/A

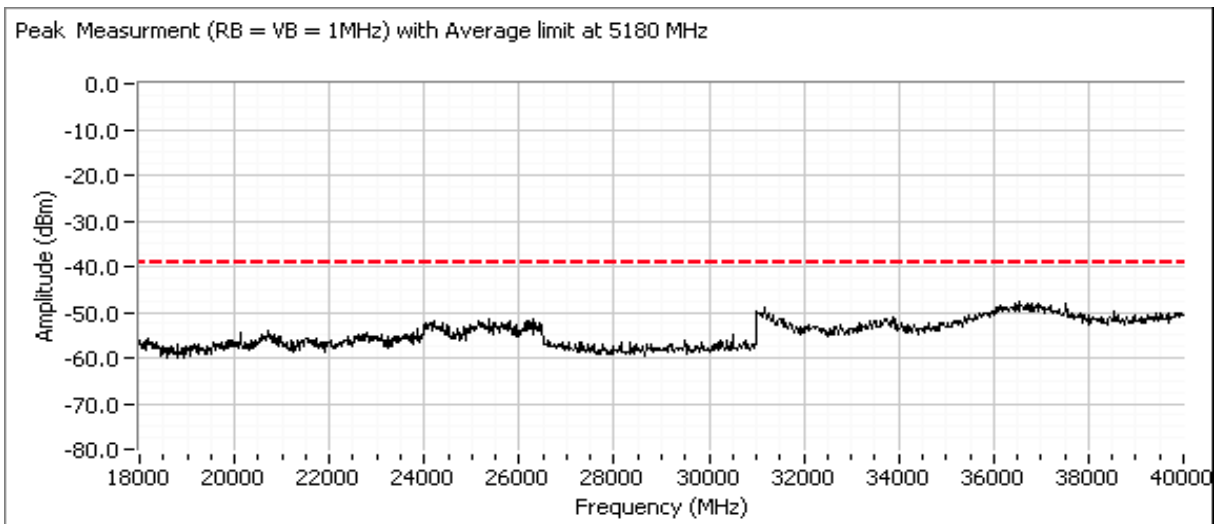
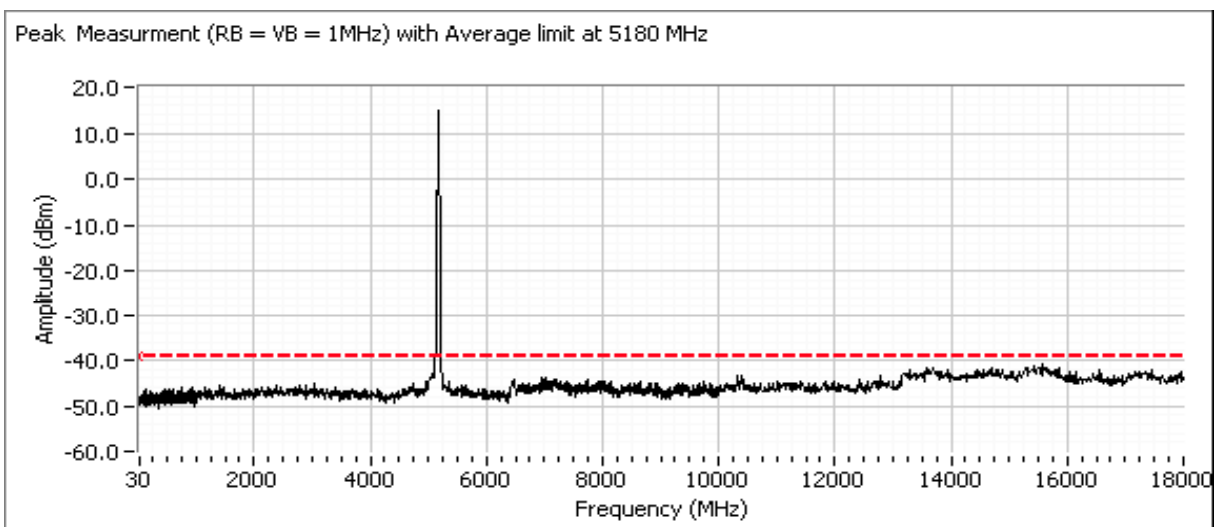


Client: Xirrus	Job Number: J71484
Model: XN4	T-Log Number: T73388
Contact: Steve Smith	Account Manager: Susan Pelzl
Standard: FCC 15 E, RSS 210	Class: N/A

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

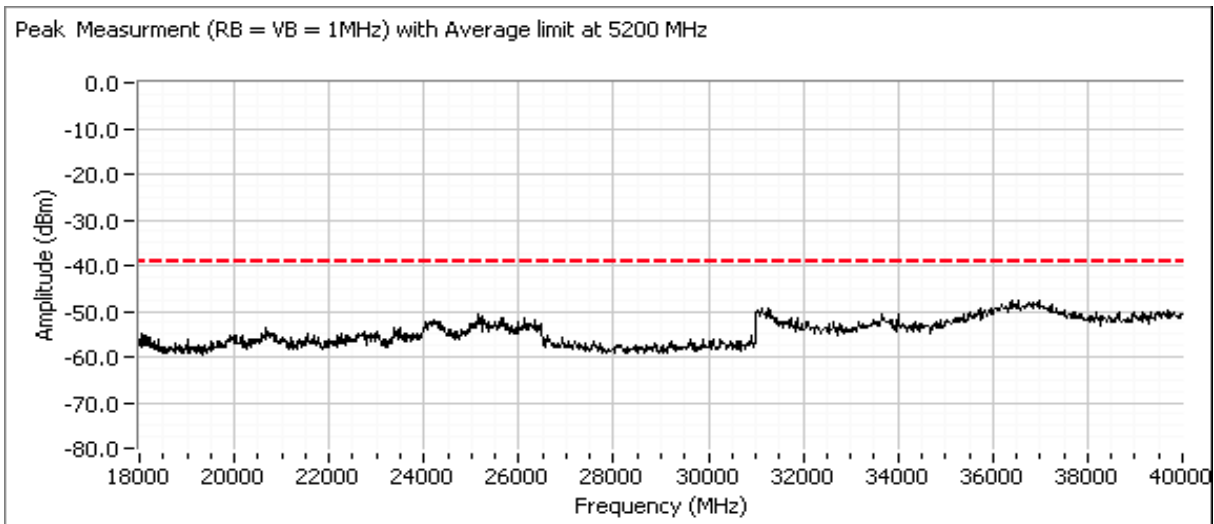
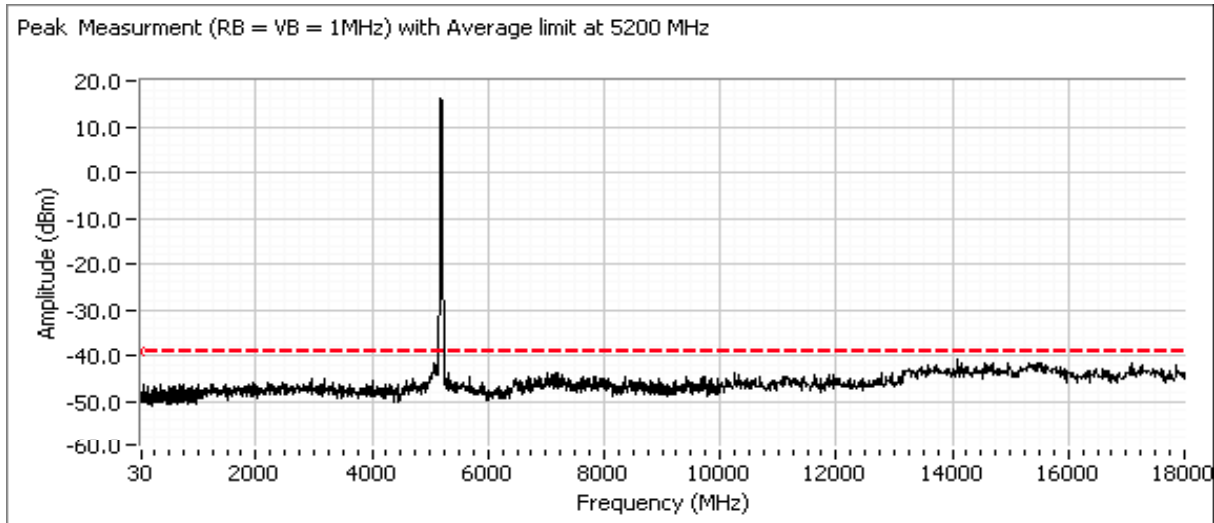
Low channel, 5150 - 5250 MHz Band, Chains A and C with power setting of 20dBm

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



Client: Xirrus	Job Number: J71484
Model: XN4	T-Log Number: T73388
Contact: Steve Smith	Account Manager: Susan Pelzl
Standard: FCC 15 E, RSS 210	Class: N/A

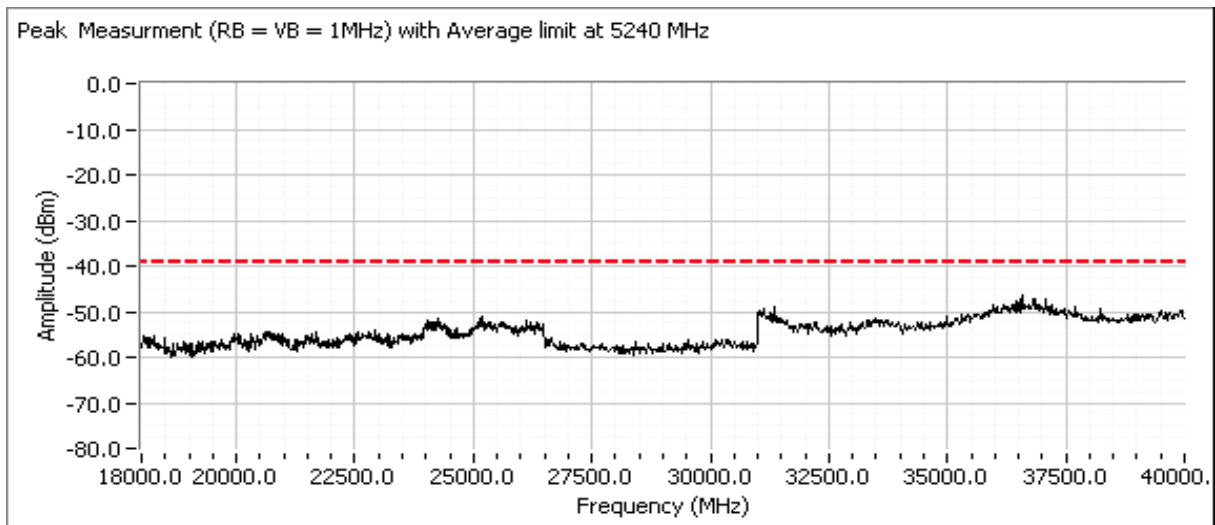
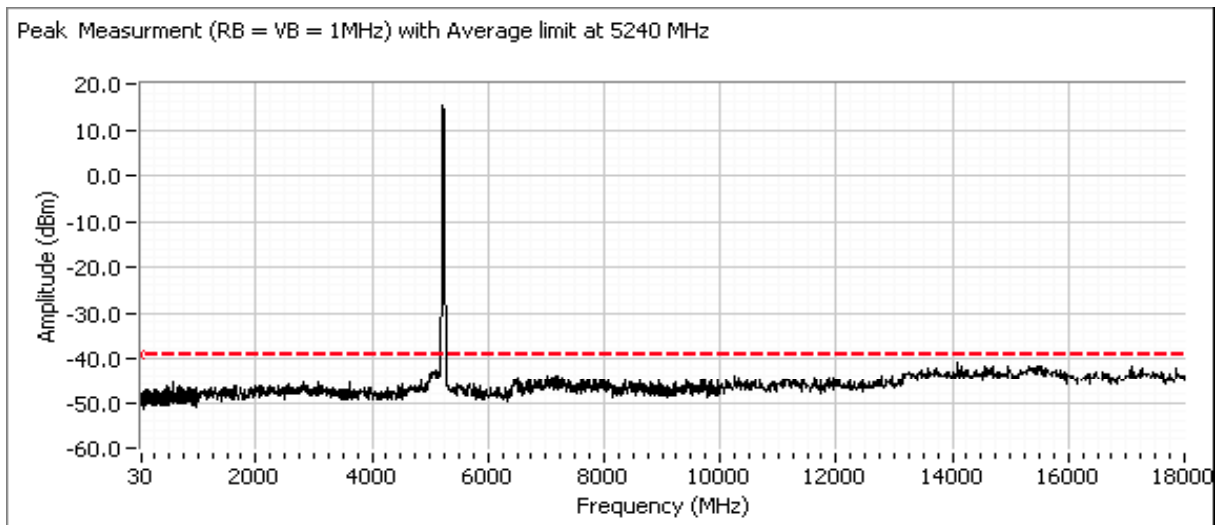
Center channel, 5150 - 5250 MHz Band, Chains A and C with power setting of 20dBm



Client: Xirrus	Job Number: J71484
Model: XN4	T-Log Number: T73388
Contact: Steve Smith	Account Manager: Susan Pelzl
Standard: FCC 15 E, RSS 210	Class: N/A

High channel, 5150 - 5250 MHz Band, Chains A and C

Note: Initial approval for FCC will only allow operation in the 5150 - 5250 MHz NII band so a plot showing -20dBc at 5250 MHz and above is included (see 26dB bandwidth plot showing -20dBc line).



Client: Xirrus	Job Number: J71484
Model: XN4	T-Log Number: T73388
	Account Manager: Susan Pelzl
Contact: Steve Smith	
Standard: FCC 15 E, RSS 210	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: 11/7/2008
Test Engineer: Rafael Varelas
Test Location: OATS #1

Config. Used: -
Config Change: Direct connection
EUT Voltage: PoE

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: 15-36 °C
 Rel. Humidity: 10-60 %

Summary of Results

Run #	Test Performed	Limit	Pass / Fail	Result / Margin
1	Power, 5150 - 5250MHz	15.407(a) (1), (2)	Pass	Single radio: 16.1 dBm 4x radio: 16.6 dBm
1	PSD, 5150 - 5250MHz	15.407(a) (1), (2)	Pass	3.6 dBm/MHz
1	26dB Bandwidth	15.407	-	21.9 MHz
1	99% Bandwidth	RSS 210	-	17.2 MHz
2	Peak Excursion Envelope	15.407(a) (6)	Pass	12.6 dB
3	Antenna Conducted Out of Band Spurious	15.407(b)		Covered by single-chain mode measurements

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	Job Number: J71484
Model: XN4	T-Log Number: T73388
	Account Manager: Susan Pelzl
Contact: Steve Smith	
Standard: FCC 15 E, RSS 210	Class: N/A

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

Antenna gain used is for the internal antenna. The external antenna gain is lower (2.5dBi) and not used for MIMO modes.

	Chain 1	Chain 2	Chain 3	Coherent	Effective ⁵
Antenna Gain (dBi):	3		3	Yes	6.0

Power settings for a single radio operating in the band

Frequency (MHz)	Software Setting	26dB BW (MHz)	Measured Output Power ¹ dBm			Total		Limit (dBm)	Max Power (W)	Pass or Fail
			Chain 1	Chain 2	Chain 3	mW	dBm			
5180	14.5	20.8	12.4		13.7	40.8	16.1	17.0	0.041	PASS
5200	15.0	22.1	12.6		12.9	37.6	15.8			PASS
5240	15.0	21.9	12.5		13.6	40.5	16.1			PASS

Frequency (MHz)	99% ⁴ BW	Total Power	PSD ² dBm/MHz			Total PSD		Limit		Pass or Fail
			Chain 1	Chain 2	Chain 3	mW/MHz	dBm/MHz	FCC	RSS 210 ³	
5180	17.2	16.1	-0.1		1.2	2.3	3.6	4.0	4.0	PASS
5200	17.2	15.8	0.0		0.5	2.1	3.3	4.0	4.0	PASS
5240	17.2	16.1	-0.1		1.0	2.2	3.5	4.0	4.0	PASS

- Note 1: Output power measured using a spectrum analyzer (see plots below for the high power measurements): RBW=1MHz, VB=3 MHz, sample detector, power averaging on (transmitted signal was continuous) and power integration over 50MHz.
- 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 are 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.

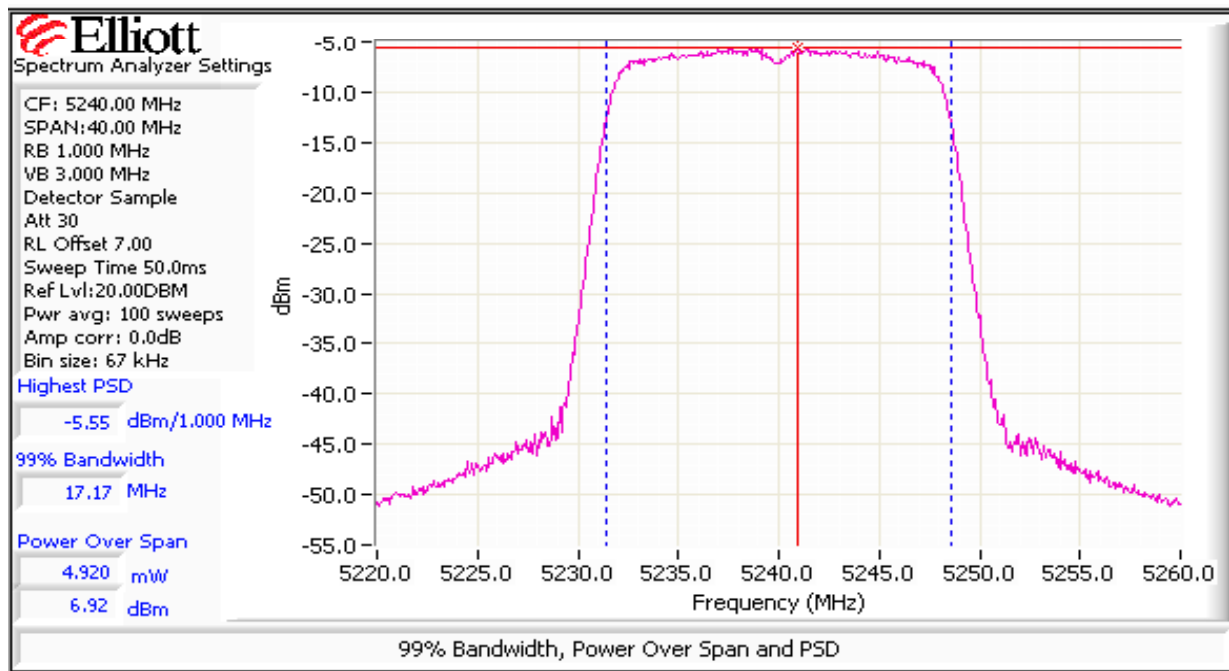
Client: Xirrus	Job Number: J71484
Model: XN4	T-Log Number: T73388
Contact: Steve Smith	Account Manager: Susan Pelzl
Standard: FCC 15 E, RSS 210	Class: N/A

Power settings for all four 802.11a channels being used in the band:

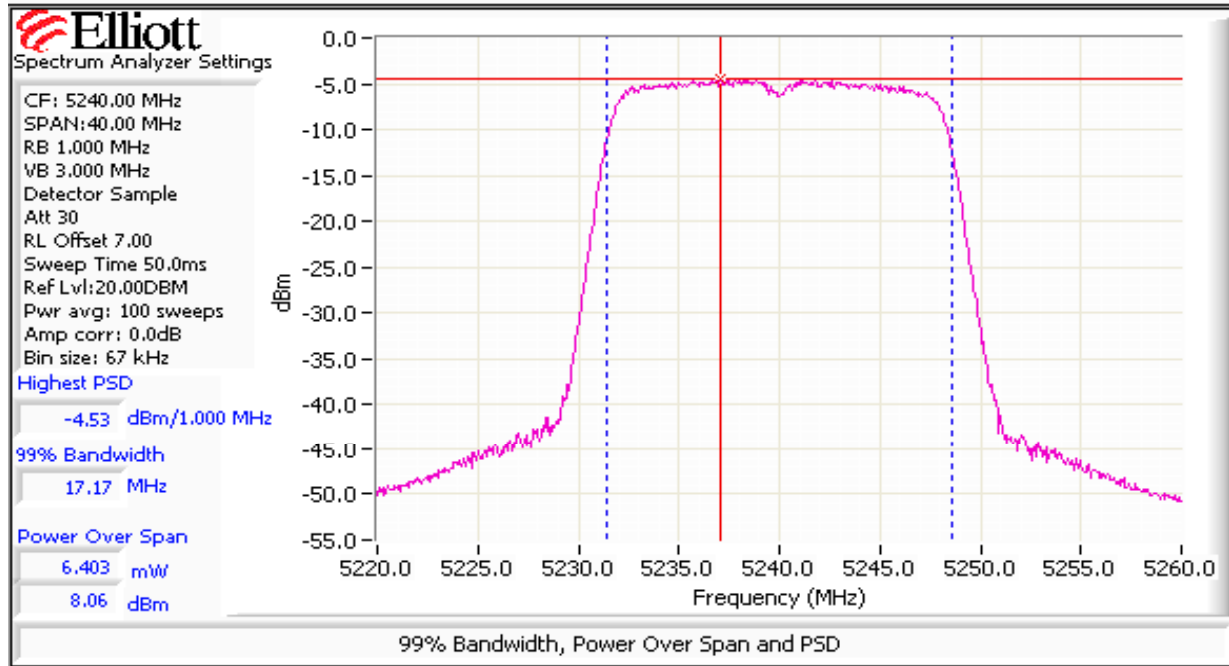
Output power measured on the high channel to demonstrate power control is available to set the power to a level low enough to comply with limits when all four radios are operational in the band. Only power was measured - aggregation of PSD is not applicable as the device cannot have more than one radio operating on a channel.

Frequency (MHz)	Software Setting	26dB BW (MHz)	Measured Output Power ¹ dBm			Total		Limit	P (W)	Result
			Chain 1	Chain 2	Chain 3	mW	dBm			
5240	8.5	21.9	6.9		8.1	11.4	10.6	17.0	0.045	PASS
Total power in the band (four radios operational):						45.4	16.6	17.0	0.045	PASS

Note 1: Output power measured using a spectrum analyzer (see plots below for the high power measurements): RBW=1MHz, VB=3 MHz, sample detector, power averaging on (transmitted signal was continuous) and power integration over 50MHz.



Client: Xirrus	Job Number: J71484
Model: XN4	T-Log Number: T73388
Contact: Steve Smith	Account Manager: Susan Pelzl
Standard: FCC 15 E, RSS 210	Class: N/A



Run #2: Peak Excursion Measurement

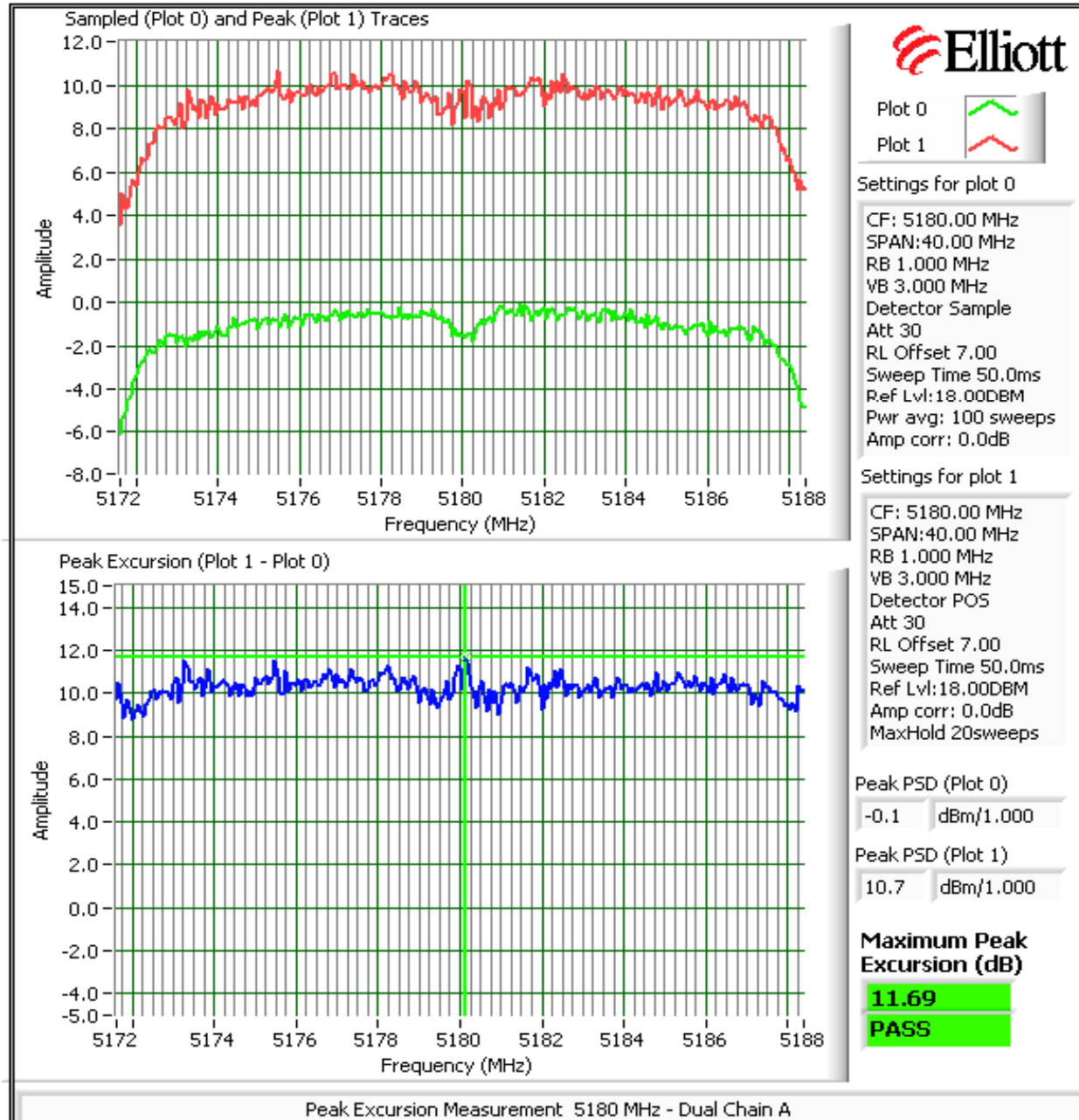
Device meets the requirement for the peak excursion

Freq		Peak Excursion(dB)		Freq		Peak Excursion(dB)		
(MHz)	Value	Limit	(MHz)	Value	Limit	(MHz)	Value	Limit
5180	12.6	13.0	5260		13.0	5500		13.0
5200	11.7	13.0	5300		13.0	5600		13.0
5240	11.3	13.0	5320		13.0	5700		13.0

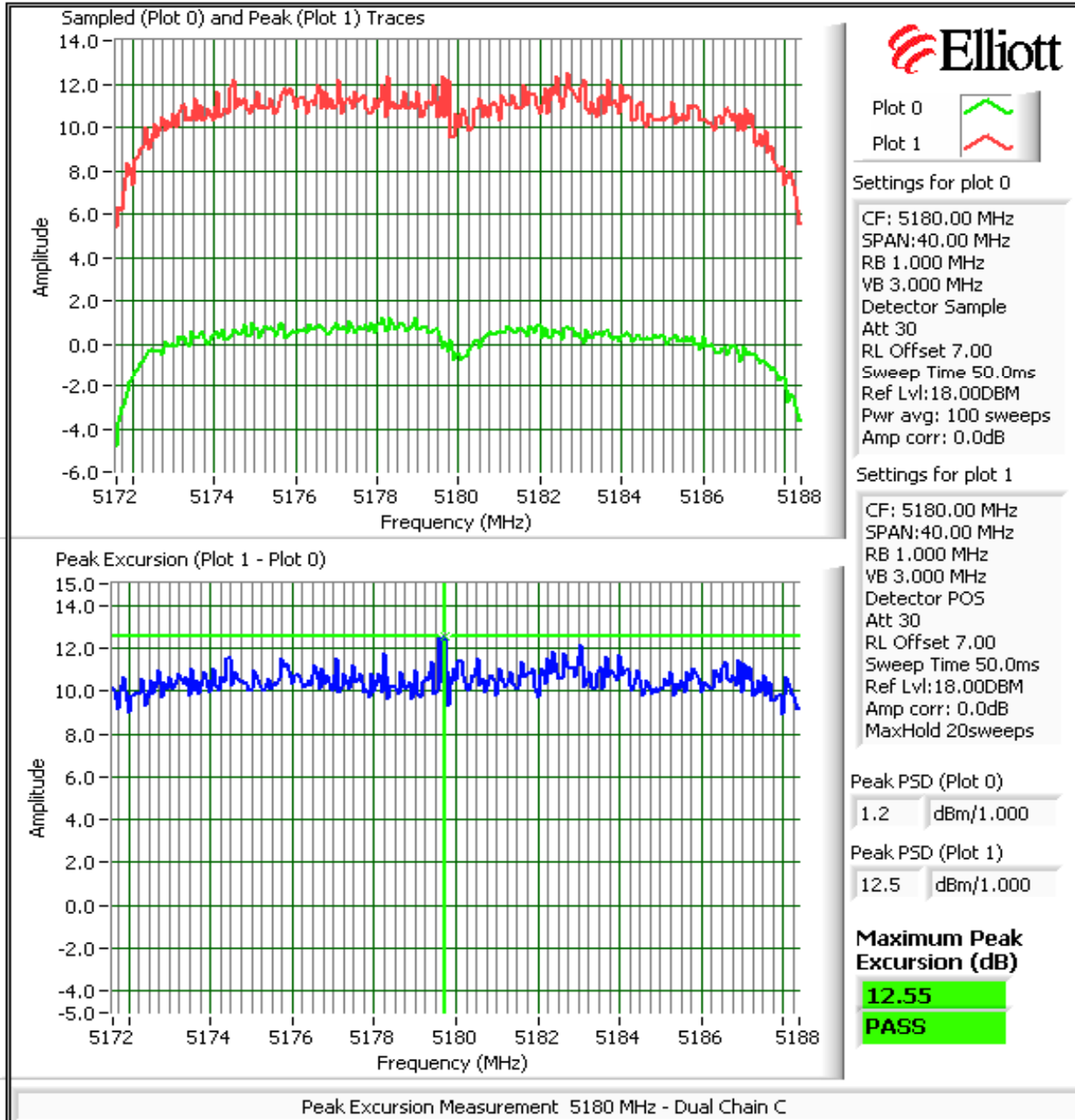
Plots Showing Peak Excursion

Trace A: RBW = VBW = 3MHz, Peak hold
Trace B: RBW = 1 MHz, VBW = 3MHz, Integrated average power

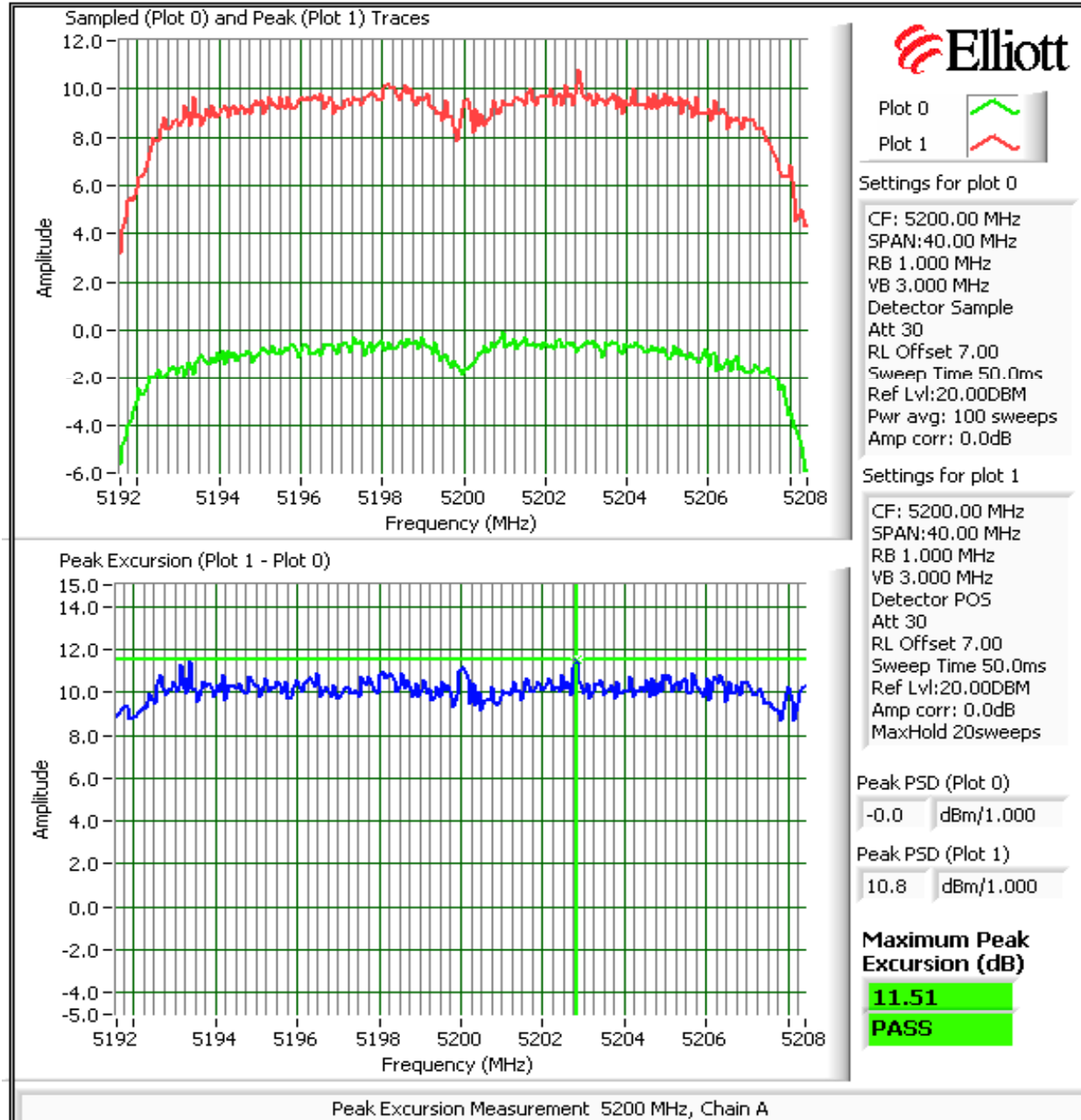
Client: Xirrus	Job Number: J71484
Model: XN4	T-Log Number: T73388
Contact: Steve Smith	Account Manager: Susan Pelzl
Standard: FCC 15 E, RSS 210	Class: N/A



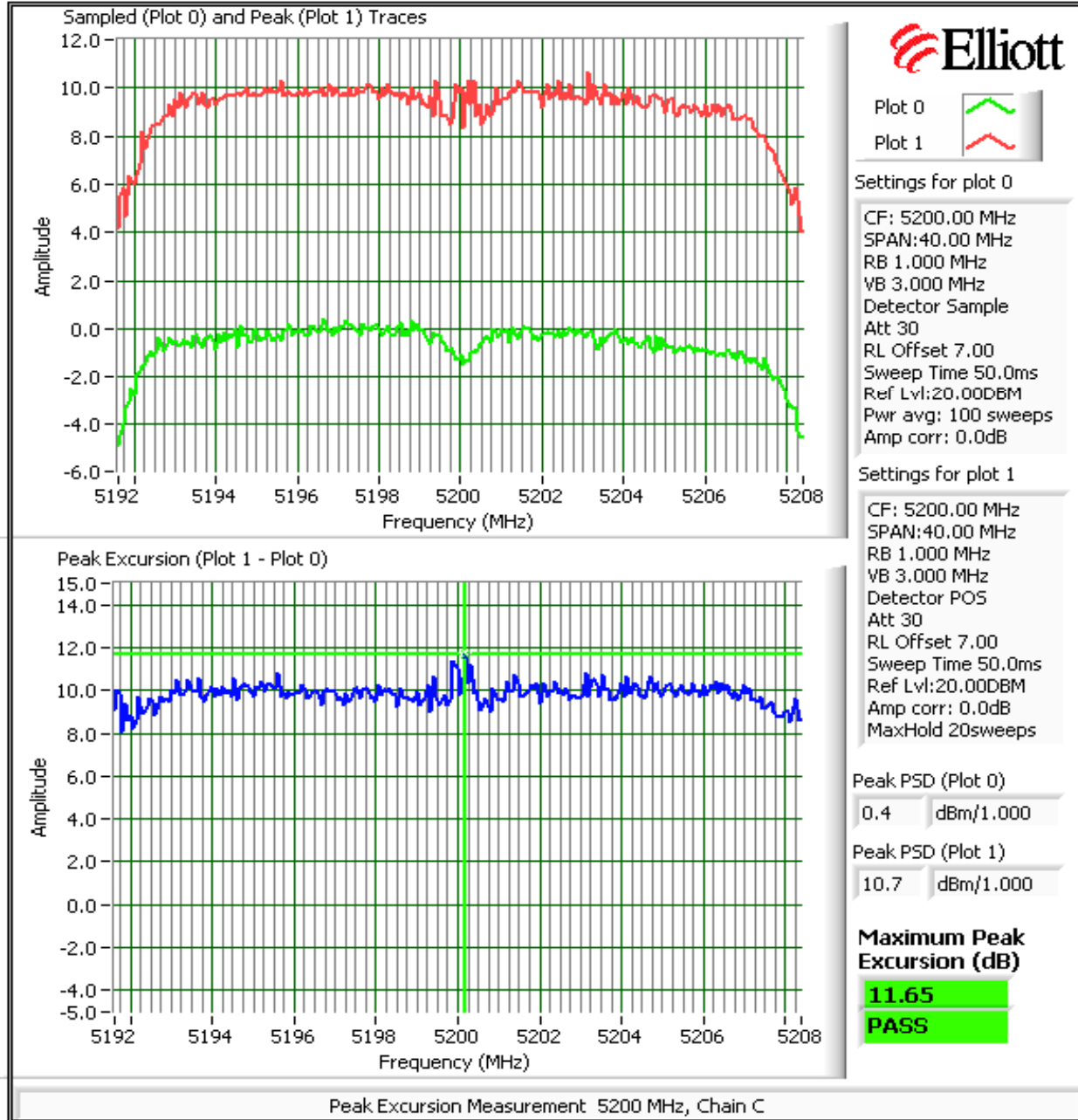
Client: Xirrus	Job Number: J71484
Model: XN4	T-Log Number: T73388
Contact: Steve Smith	Account Manager: Susan Pelzl
Standard: FCC 15 E, RSS 210	Class: N/A



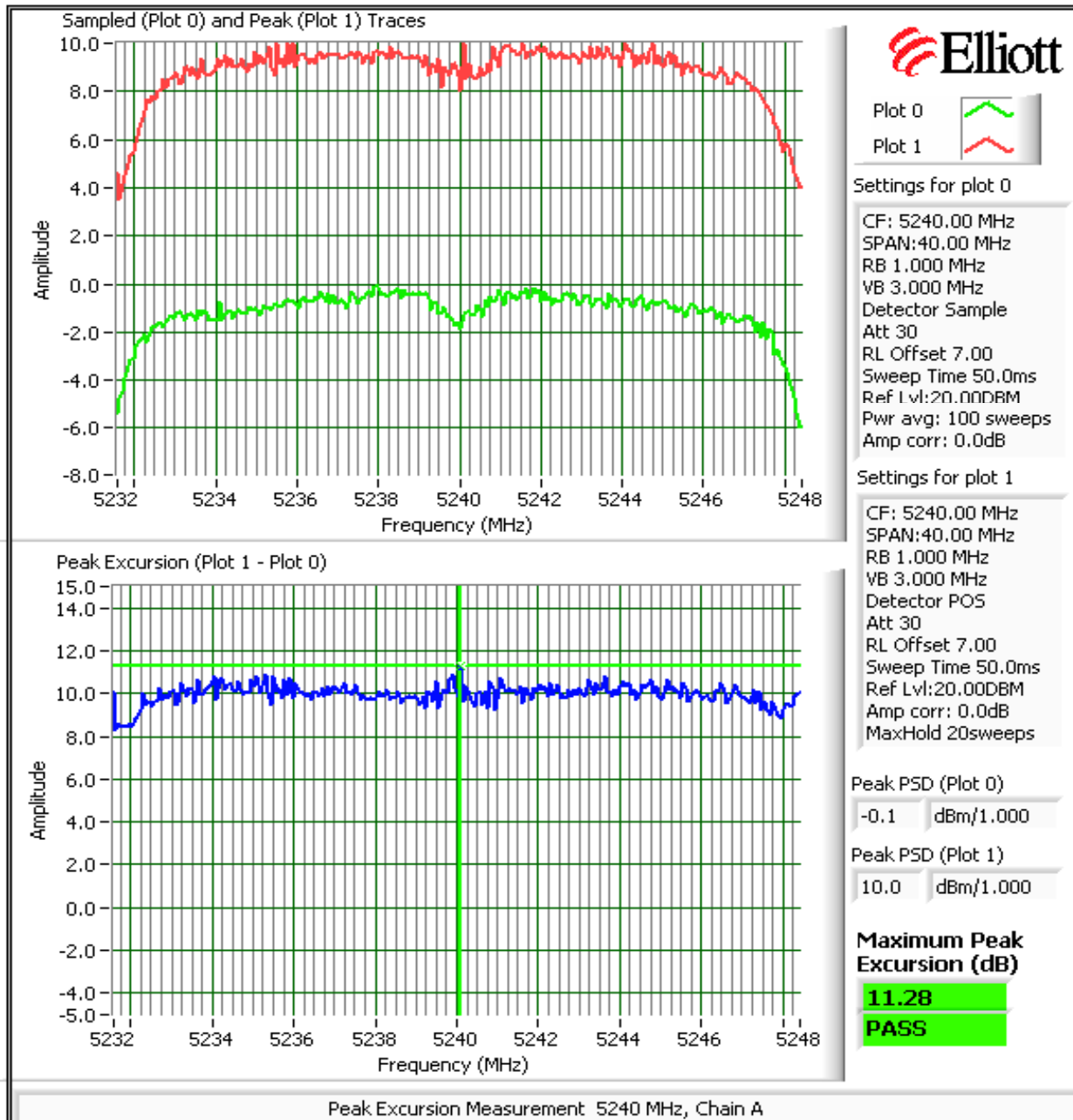
Client: Xirrus	Job Number: J71484
Model: XN4	T-Log Number: T73388
Contact: Steve Smith	Account Manager: Susan Pelzl
Standard: FCC 15 E, RSS 210	Class: N/A



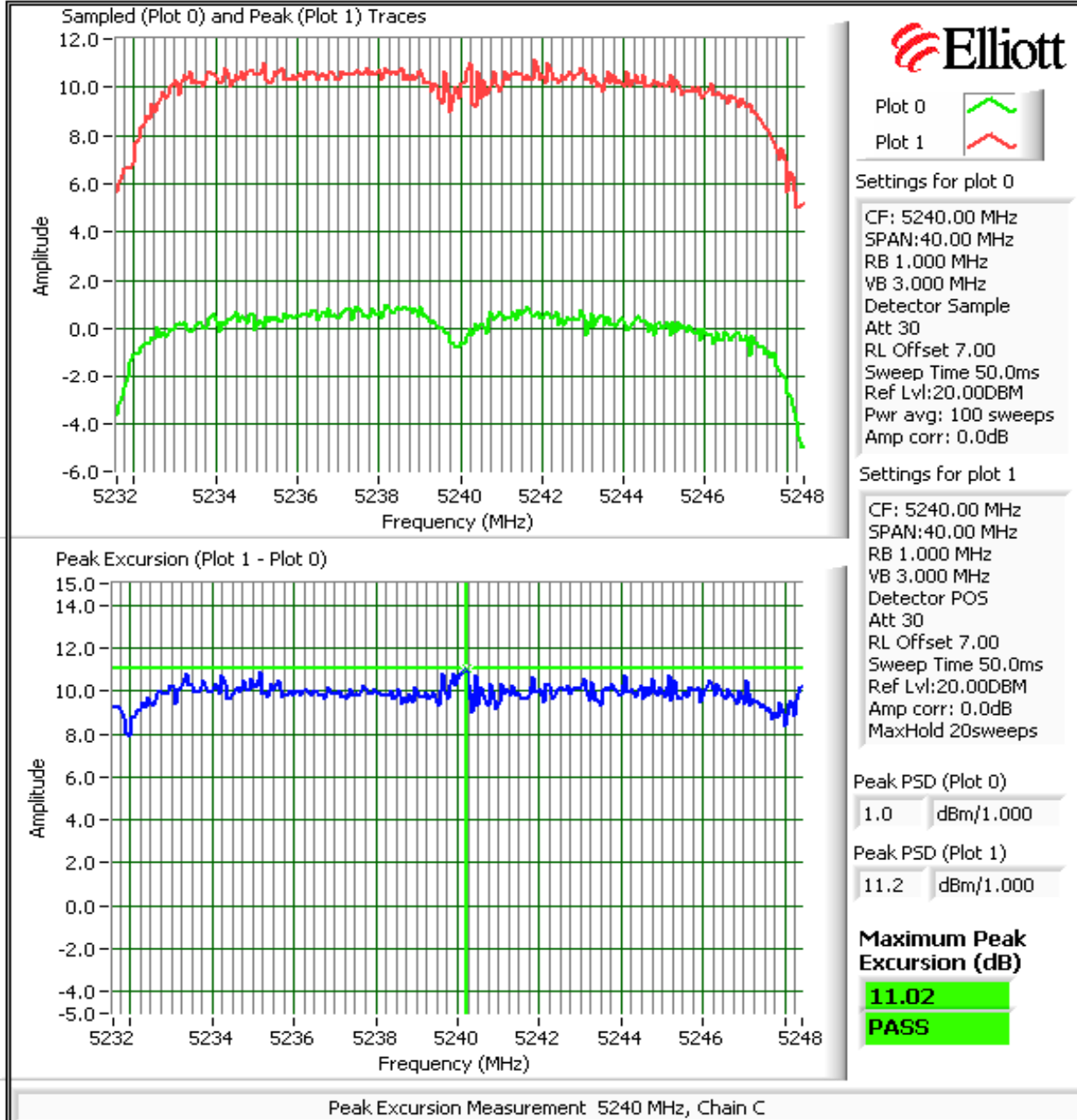
Client: Xirrus	Job Number: J71484
Model: XN4	T-Log Number: T73388
Contact: Steve Smith	Account Manager: Susan Pelzl
Standard: FCC 15 E, RSS 210	Class: N/A



Client: Xirrus	Job Number: J71484
Model: XN4	T-Log Number: T73388
Contact: Steve Smith	Account Manager: Susan Pelzl
Standard: FCC 15 E, RSS 210	Class: N/A



Client: Xirrus	Job Number: J71484
Model: XN4	T-Log Number: T73388
Contact: Steve Smith	Account Manager: Susan Pelzl
Standard: FCC 15 E, RSS 210	Class: N/A



Client: Xirrus	Job Number: J71484
Model: XN4	T-Log Number: T73388
	Account Manager: Susan Pelzl
Contact: Steve Smith	
Standard: FCC 15 E, RSS 210	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: 11/10 and 11/2008
Test Engineer: Mehran Birgani
Test Location: SV OATS #1

Config. Used: AC powered
Config Change: Direct connection
EUT Voltage: PoE

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: 15-36 °C
 Rel. Humidity: 10-60 %

Summary of Results

Run #	Mode	Test Performed	Limit	Pass / Fail	Result / Margin
1	n20MHz	Power, 5150 - 5250MHz	15.407(a) (1), (2)	Pass	Single radio: 16.6 dBm 4x radio: 16.5 dBm
1	n20MHz	PSD, 5150 - 5250MHz	15.407(a) (1), (2)	Pass	3.9 dBm/MHz
1	n20MHz	99% Bandwidth	RSS 210	-	18.4 MHz
1	n40MHz	Power, 5150 - 5250MHz	15.407(a) (1), (2)	Pass	Single radio: 16.3 dBm 2x radio: 16.7 dBm
1	n40MHz	PSD, 5150 - 5250MHz	15.407(a) (1), (2)	Pass	0.6 dBm/MHz
1	n40MHz	99% Bandwidth	RSS 210	-	36.7 MHz
2	n20 & n40	Peak Excursion Envelope	15.407(a) (6)	Pass	12.9 dB
3	n20 & n40	Antenna Conducted Spurious	15.407(b)	Pass	< -27dBm/MHz eirp

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	Job Number: J71484
Model: XN4	T-Log Number: T73388
Contact: Steve Smith	Account Manager: Susan Pelzl
Standard: FCC 15 E, RSS 210	Class: N/A

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

Antenna gain used is for the internal antenna. The external antenna gain is lower (2.5dBi) and not used for MIMO modes.

	Chain 1	Chain 2	Chain 3	Coherent	Effective ⁵
Antenna Gain (dBi):	3		3	No	3.0

Power settings for a single radio operating in the band

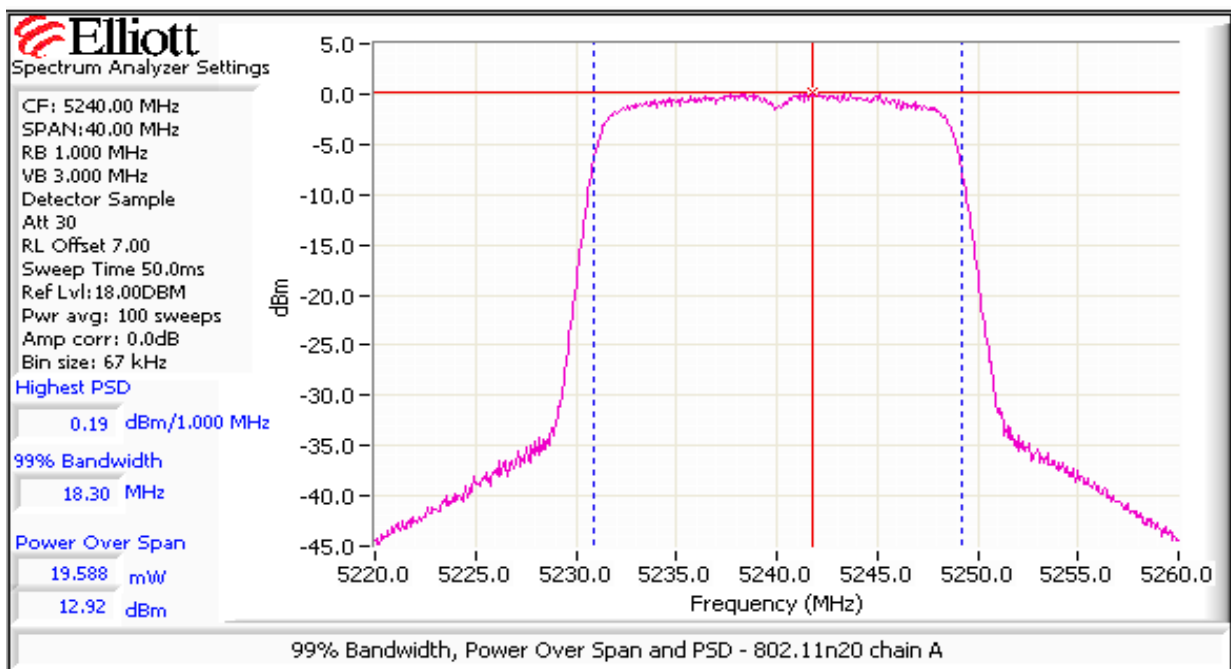
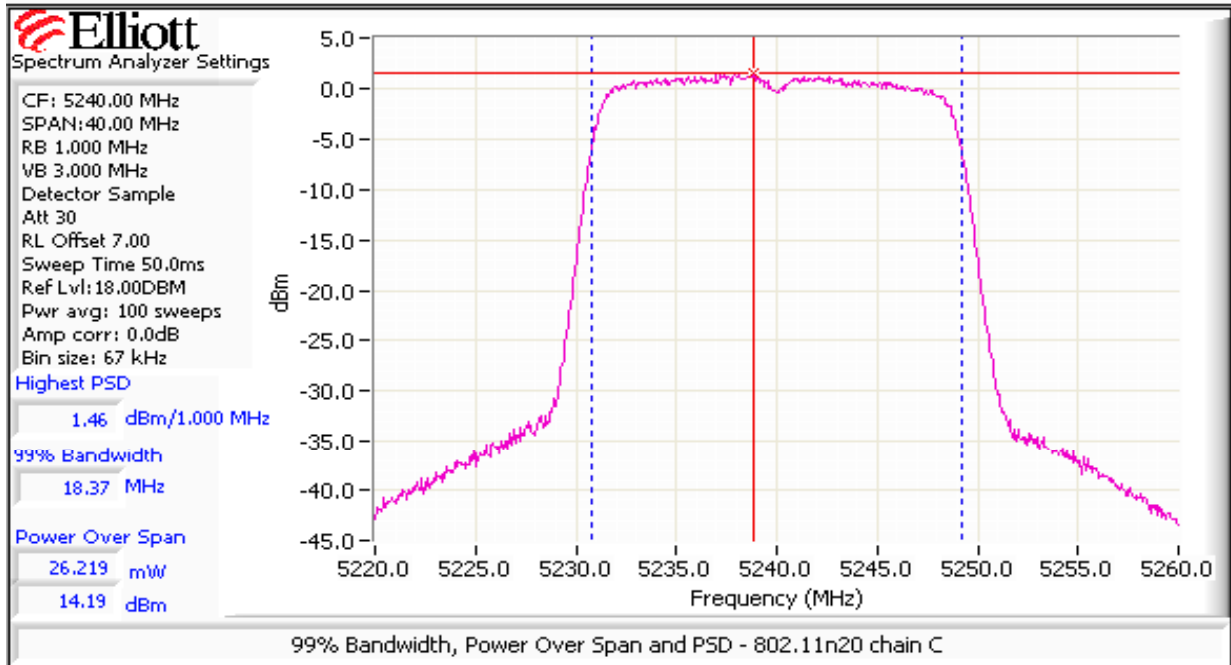
Frequency (MHz)	Software Setting	26dB BW (MHz)	Measured Output Power ¹ dBm			Total		Limit (dBm)	Max Power (W)	Pass or Fail
			Chain 1	Chain 2	Chain 3	mW	dBm			
5180	15.0	22.3	12.9		14.0	44.6	16.5	0.046	PASS	
5200	15.0	22.5	12.6		14.1	43.9	16.4		PASS	
5240	15.5	22.9	12.9		14.2	45.8	16.6		PASS	
5190	13.0	40.4	10.9		12.1	28.5	14.6	0.043	PASS	
5230	15.5	41.2	12.6		13.9	42.7	16.3		PASS	

Frequency (MHz)	99% ⁴ BW	Total Power	PSD ² dBm/MHz			Total PSD		Limit		Pass or Fail
			Chain 1	Chain 2	Chain 3	mW/MHz	dBm/MHz	FCC	RSS 210 ³	
5180	18.4	16.5	0.3		1.2	2.4	3.8	4.0	7.0	PASS
5200	18.3	16.4	-0.2		1.3	2.3	3.6	4.0	7.0	PASS
5240	18.4	16.6	0.2		1.5	2.5	3.9	4.0	7.0	PASS
5190	36.7	14.6	-5.2		-3.9	0.7	-1.5	4.0	7.0	PASS
5230	36.6	16.3	-3.3		-1.7	1.1	0.6	4.0	7.0	PASS

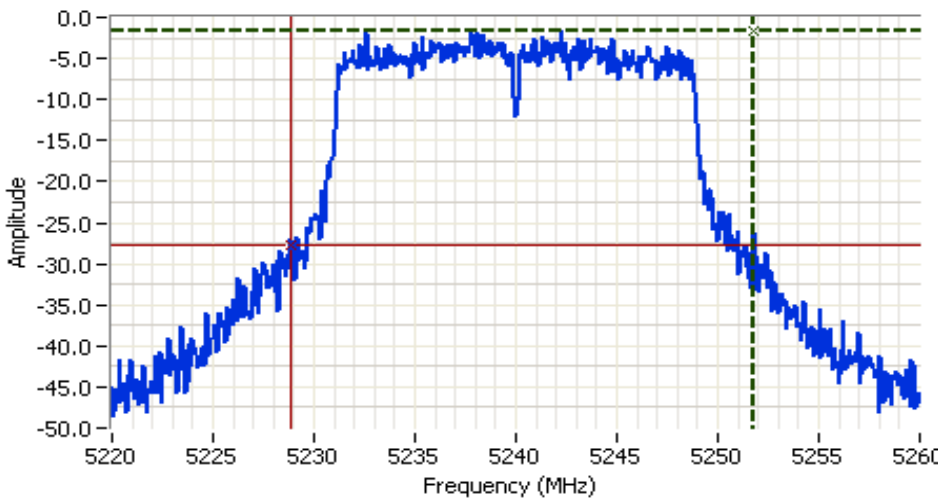
- Note 1: Output power measured using a spectrum analyzer (see plots below for the high power measurements): RBW=1MHz, VB=3 MHz, sample detector, power averaging on (transmitted signal was continuous) and power integration over 40MHz (20MHz mode) and 80MHz (40MHz mode)
- Note 2: Measured using the same 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 are 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	Job Number: J71484
Model: XN4	T-Log Number: T73388
Contact: Steve Smith	Account Manager: Susan Pelzl
Standard: FCC 15 E, RSS 210	Class: N/A

Plots showing power/PSD measurements and 26dB bandwidth measurements at the high power setting



Client: Xirrus	Job Number: J71484
Model: XN4	T-Log Number: T73388
Contact: Steve Smith	Account Manager: Susan Pelzl
Standard: FCC 15 E, RSS 210	Class: N/A



Analyzer Settings

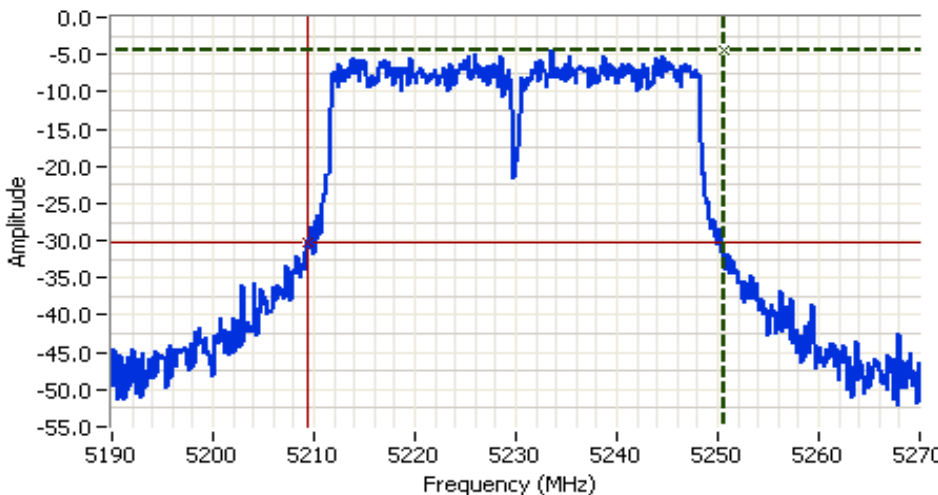
HP8564E
CF: 5240.000 MHz
SPAN: 40.000 MHz
RB 100 kHz
VB 300 kHz
Detector POS
Att 30
RL Offset 7.00
Sweep Time 50.0ms
Ref Lvl: 18.00DBM

Comments

26dB BW: 22.933 MHz
802.11n 20
Dual chain A

Cursor 1	5251.8000	-1.67	
Cursor 2	5228.8667	-27.67	

Delta Freq. 22.933
Delta Amplitude 26.00



Analyzer Settings

HP8564E
CF: 5230.000 MHz
SPAN: 80.000 MHz
RB 100 kHz
VB 300 kHz
Detector POS
Att 30
RL Offset 7.00
Sweep Time 50.0ms
Ref Lvl: 18.00DBM

Comments

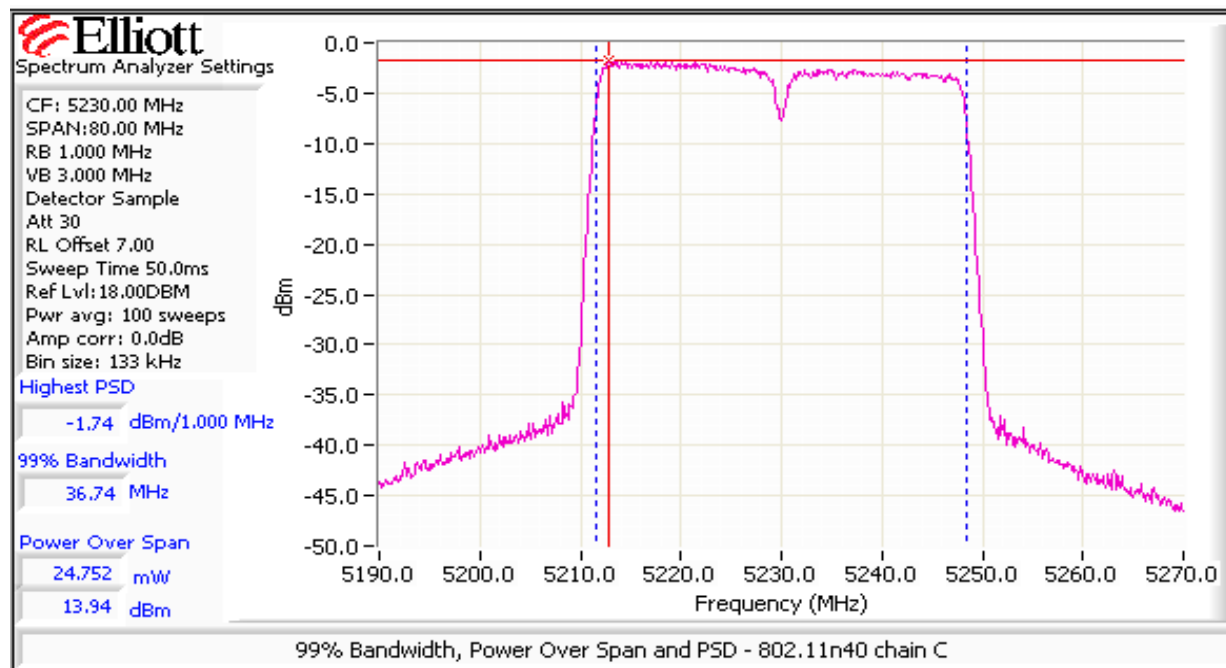
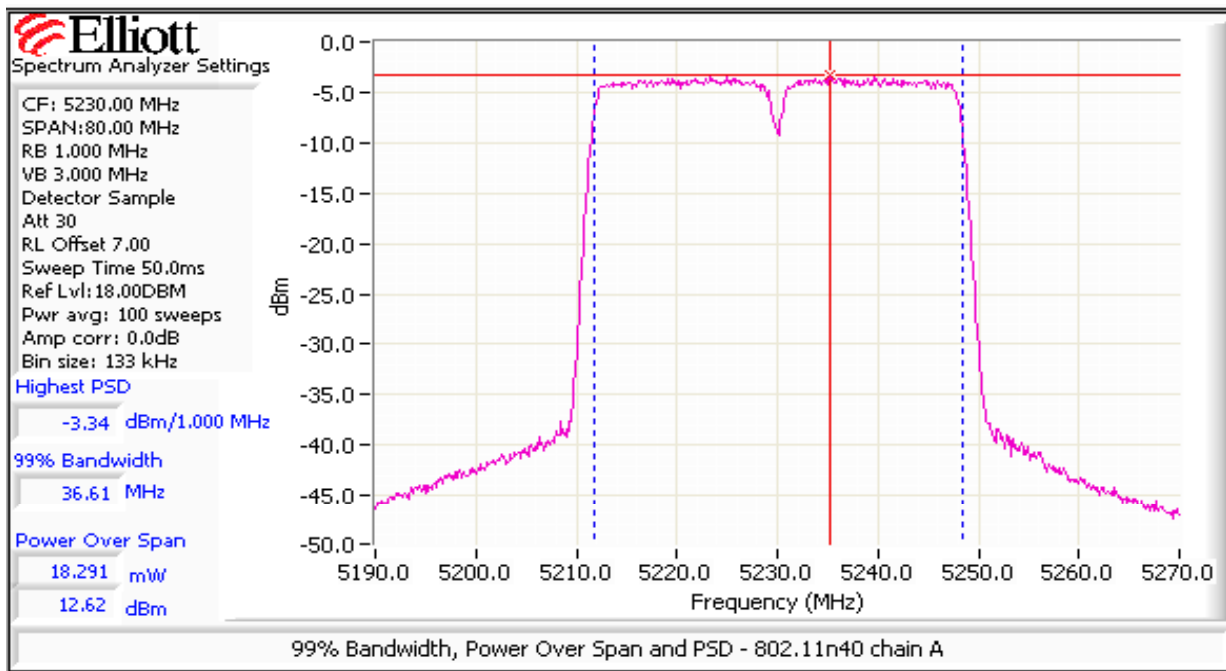
26dB BW: 41.200 MHz
802.11n 40
Dual chain A

Cursor 1	5250.5333	-4.33	
Cursor 2	5209.3333	-30.33	

Delta Freq. 41.200
Delta Amplitude 26.00



Client: Xirrus	Job Number: J71484
Model: XN4	T-Log Number: T73388
Contact: Steve Smith	Account Manager: Susan Pelzl
Standard: FCC 15 E, RSS 210	Class: N/A



Client: Xirrus	Job Number: J71484
Model: XN4	T-Log Number: T73388
Contact: Steve Smith	Account Manager: Susan Pelzl
Standard: FCC 15 E, RSS 210	Class: N/A

Power settings for all four n20 channels and both n40 channels being used in the band:

The lowest power level required per radio is 14dBm for two radios operating in n40MHz (two 40 MHz or one 40MHz channel and one 20MHz channel available, with both radios at 14dBm the total power in the band is 17dBm).

Output power measured on the center channel to demonstrate power control is available to set the power to a level low enough to comply with limits when all four radios are operational in the band. Only power was measured - aggregation of PSD is not applicable as the device cannot have more than one radio operating on a channel.

Frequency (MHz)	Software Setting	26dB BW (MHz)	Measured Output Power ¹ dBm			Total		Limit	P (W)	Result
			Chain 1	Chain 2	Chain 3	mW	dBm			
5200	8.5	22.5	6.7		8.2	11.3	10.5			
Total power in the band (four radios operational in n20MHz mode):						45.1	16.5	17.0	0.045	PASS

Frequency (MHz)	Software Setting	26dB BW (MHz)	Measured Output Power ¹ dBm			Total		Limit	P (W)	Result
			Chain 1	Chain 2	Chain 3	mW	dBm			
5190	12.0	40.4	9.8		11.4	23.4	13.7			
5230	12.0	41.2	9.7		11.4	23.1	13.6			
Total power in the band (two radios operational in n40MHz mode):						46.5	16.7	17.0	0.046	PASS

- Note 1: Output power measured using a spectrum analyzer (see plots below for the high power measurements): RBW=1MHz, VB=3 MHz, sample detector, power averaging on (transmitted signal was continuous) and power integration over 40MHz (20MHz mode) and 80MHz (40MHz mode)
- 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	Job Number: J71484
Model: XN4	T-Log Number: T73388
Contact: Steve Smith	Account Manager: Susan Pelzl
Standard: FCC 15 E, RSS 210	Class: N/A

Run #2: Peak Excursion Measurement

Device meets the requirement for the peak excursion

Freq (MHz)	Mode/Chain	Peak Excursion(dB)		Mode/Chain	Peak Excursion(dB)	
		Value	Limit		Value	Limit
5180	n20 A	11.7	13.0	n20 C	11.1	13.0
5200	n20 A	11.4	13.0	n20 C	12.1	13.0
5240	n20 A	11.9	13.0	n20 C	11.6	13.0
5190	n40 A	12.9	13.0	n40 A	12.7	13.0
5230	n40 A	12.3	13.0	n40 C	12.6	13.0

Plots Showing Peak Excursion

Trace A: RBW = VBW = 3MHz, Peak hold; Trace B: RBW = 1 MHz, VBW = 3MHz, Integrated average power



Client: Xirrus	Job Number: J71484
Model: XN4	T-Log Number: T73388
	Account Manager: Susan Pelzl
Contact: Steve Smith	
Standard: FCC 15 E, RSS 210	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:	2
Maximum Antenna Gain:	3.0 dBi
Spurious Limit:	-27.0 dBm/MHz eirp
Adjustment for 2 chains:	-3.0 dB adjustment for multiple chains.
Limit Used On Plots ^{Note 1} :	-33.0 dBm/MHz Average Limit (RB=1MHz, VB=10Hz)
	-13.0 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.

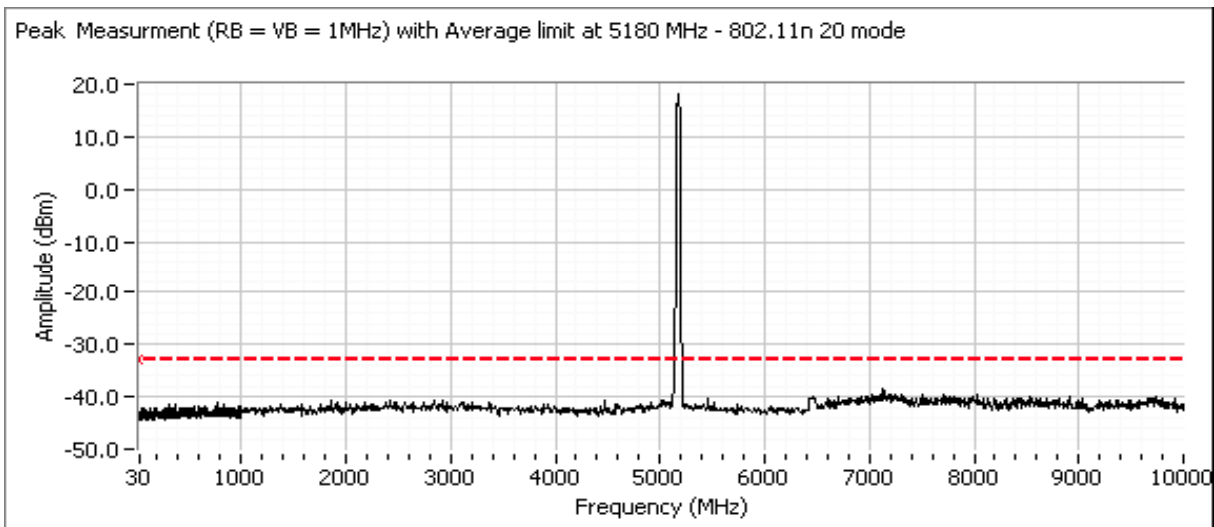
Client: Xirrus	Job Number: J71484
Model: XN4	T-Log Number: T73388
Contact: Steve Smith	Account Manager: Susan Pelzl
Standard: FCC 15 E, RSS 210	Class: N/A

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

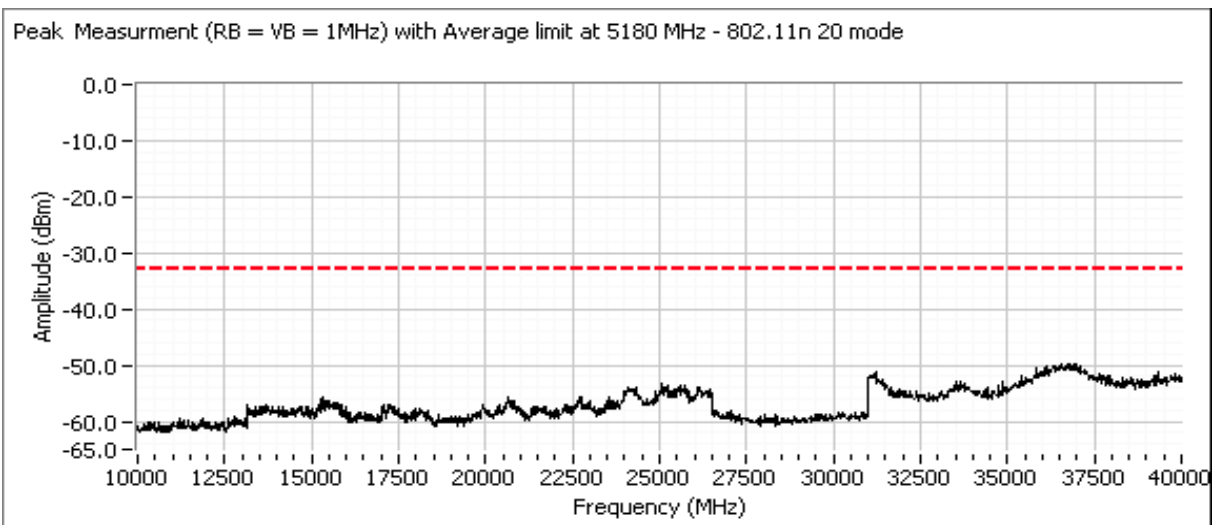
802.11n - 20MHz, Low channel, 5150 - 5250 MHz Band (5180 MHz) with power setting of 17.0 dBm.

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

20dB attenuation pad at front of analyzer and 20dB attenuation at software level.

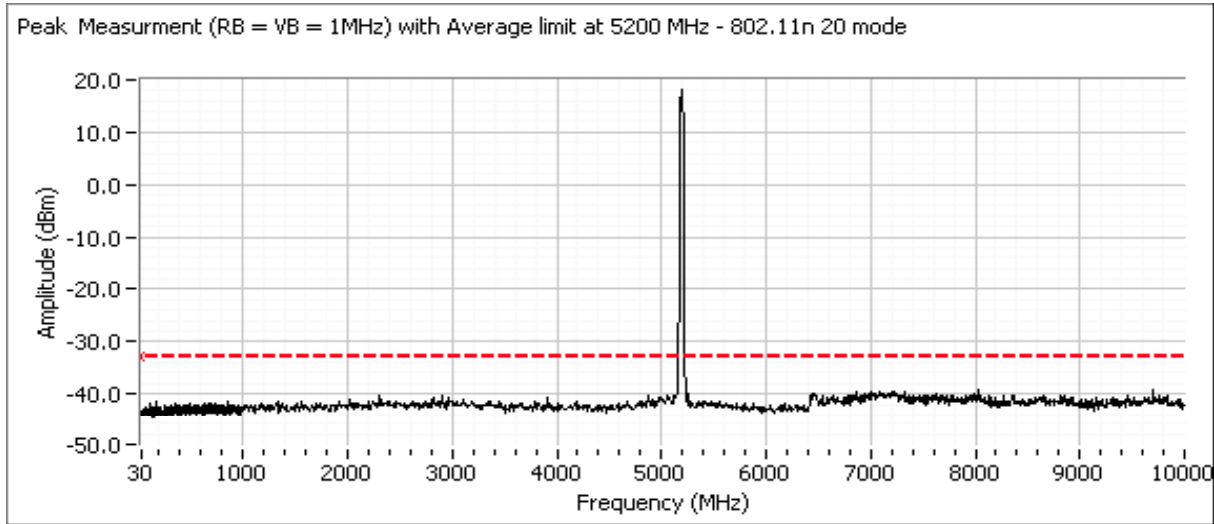


20dB attenuation pad at front of analyzer and 0dB attenuation at software level to reduce the noise floor.

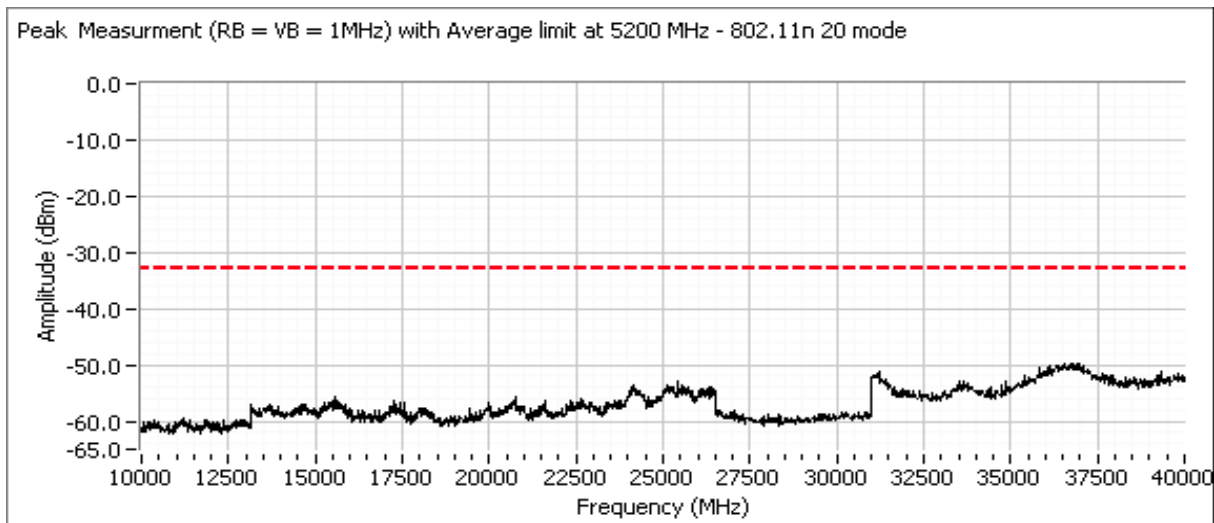


Client: Xirrus	Job Number: J71484
Model: XN4	T-Log Number: T73388
Contact: Steve Smith	Account Manager: Susan Pelzl
Standard: FCC 15 E, RSS 210	Class: N/A

802.11n - 20MHz, Center channel, 5150 - 5250 MHz Band (5200 MHz) with power setting of 17.0 dBm.
20dB attenuation pad at front of analyzer and 20dB attenuation at software level.



20dB attenuation pad at front of analyzer and 0dB attenuation at software level to reduce the noise floor.

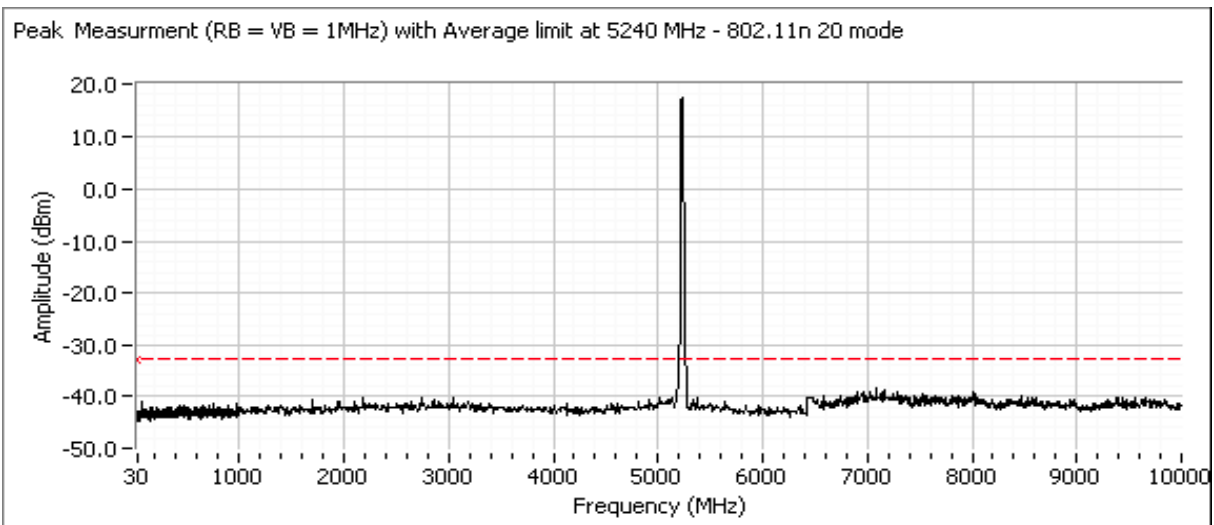


Client: Xirrus	Job Number: J71484
Model: XN4	T-Log Number: T73388
Contact: Steve Smith	Account Manager: Susan Pelzl
Standard: FCC 15 E, RSS 210	Class: N/A

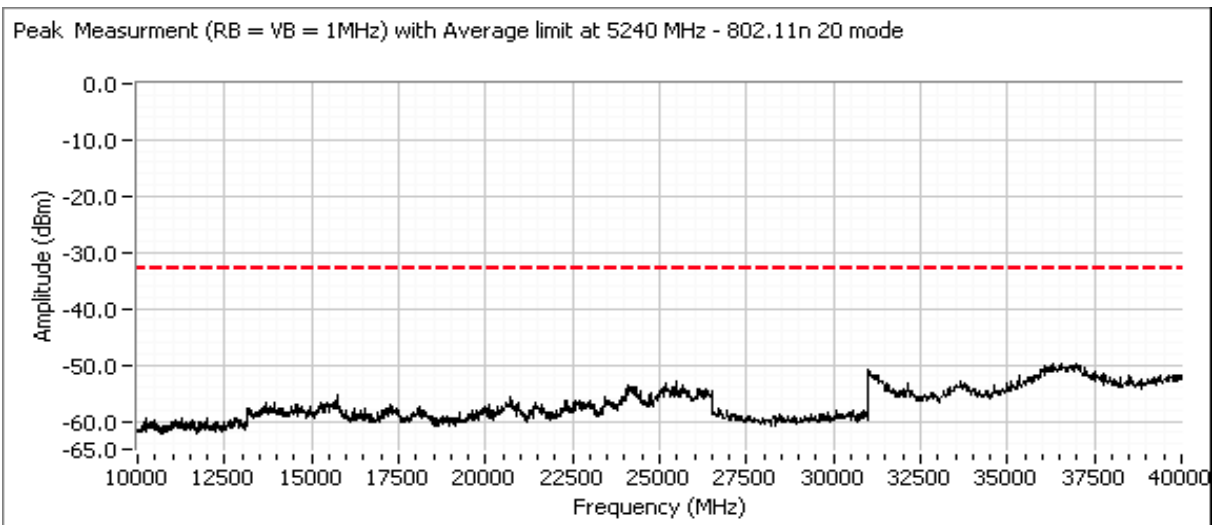
802.11n - 20MHz, High channel, 5150 - 5250 MHz Band (5240 MHz) with power setting of 17.0 dBm.

Note: Initial approval for FCC will only allow operation in the 5150 - 5250 MHz NII band so a plot showing -20dBc at 5250 MHz and above is included.

20dB attenuation pad at front of analyzer and 20dB attenuation at software level.

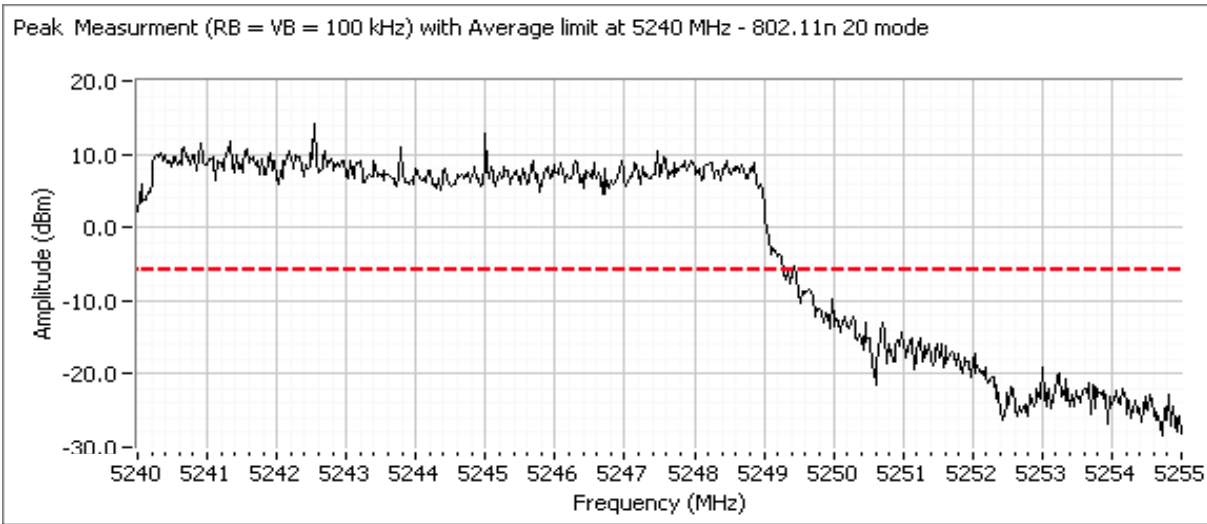


20dB attenuation pad at front of analyzer and 0dB attenuation at software level to reduce the noise floor.



Client: Xirrus	Job Number: J71484
Model: XN4	T-Log Number: T73388
Contact: Steve Smith	Account Manager: Susan Pelzl
Standard: FCC 15 E, RSS 210	Class: N/A

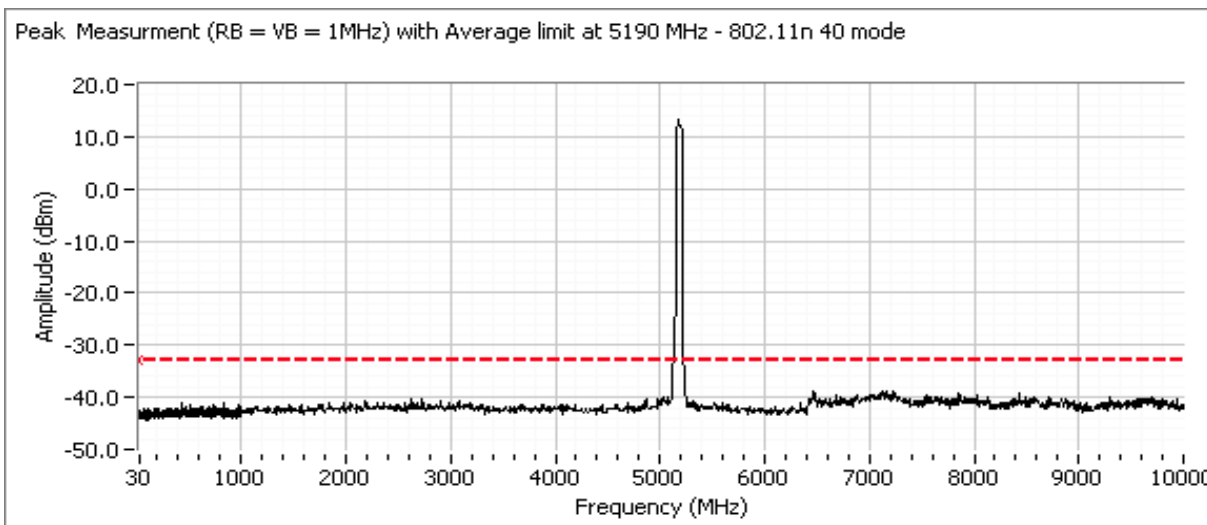
-20dBc of 5240 MHz signal for compliance with FCC at 5250 MHz with power setting of 15.5dBm.



802.11n - 40MHz, Low channel, 5150 - 5250 MHz Band (5190 MHz) with power setting of 17.0dBm.

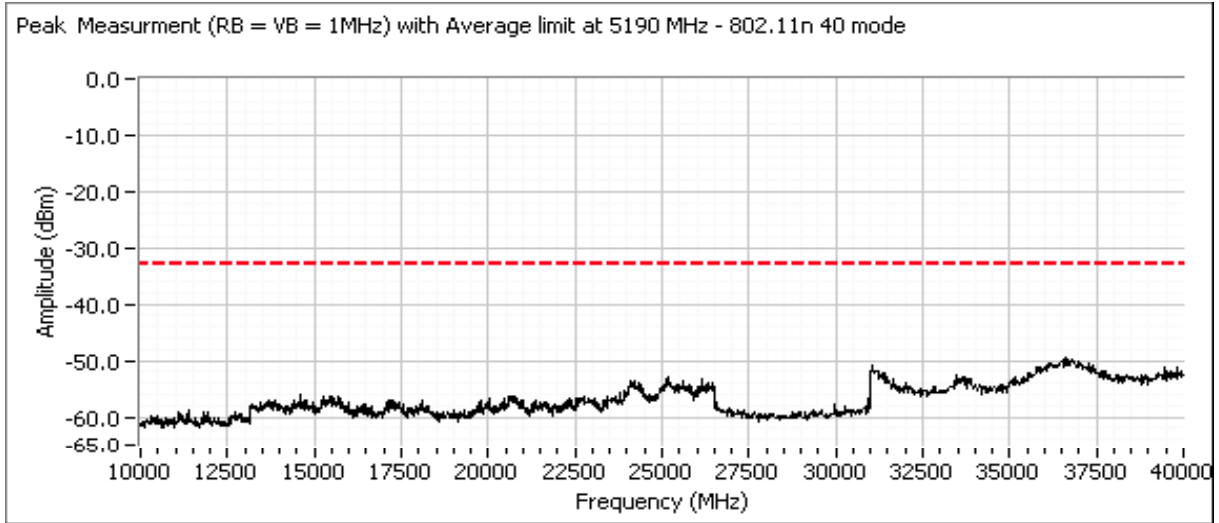
Compliance with the radiated limits for the restricted band immediately below 5150MHz is demonstrated through the radiated emissions tests.

20dB attenuation pad at front of analyzer and 20dB attenuation at software level.



Client: Xirrus	Job Number: J71484
Model: XN4	T-Log Number: T73388
Contact: Steve Smith	Account Manager: Susan Pelzl
Standard: FCC 15 E, RSS 210	Class: N/A

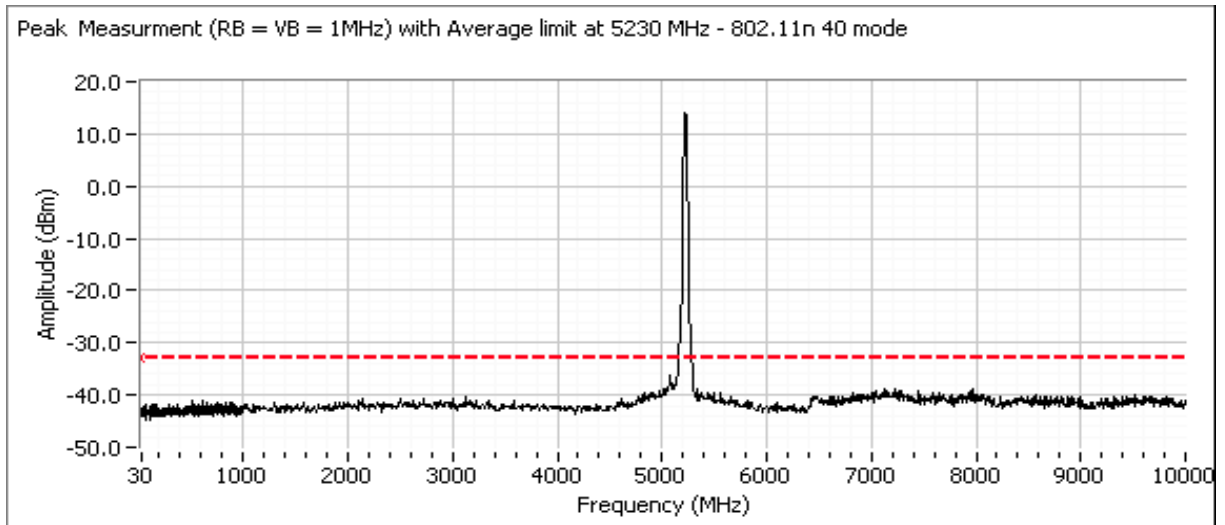
20dB attenuation pad at front of analyzer and 0dB attenuation at software level to reduce the noise floor.



802.11n - 40MHz, High channel, 5150 - 5250 MHz Band (5230 MHz)

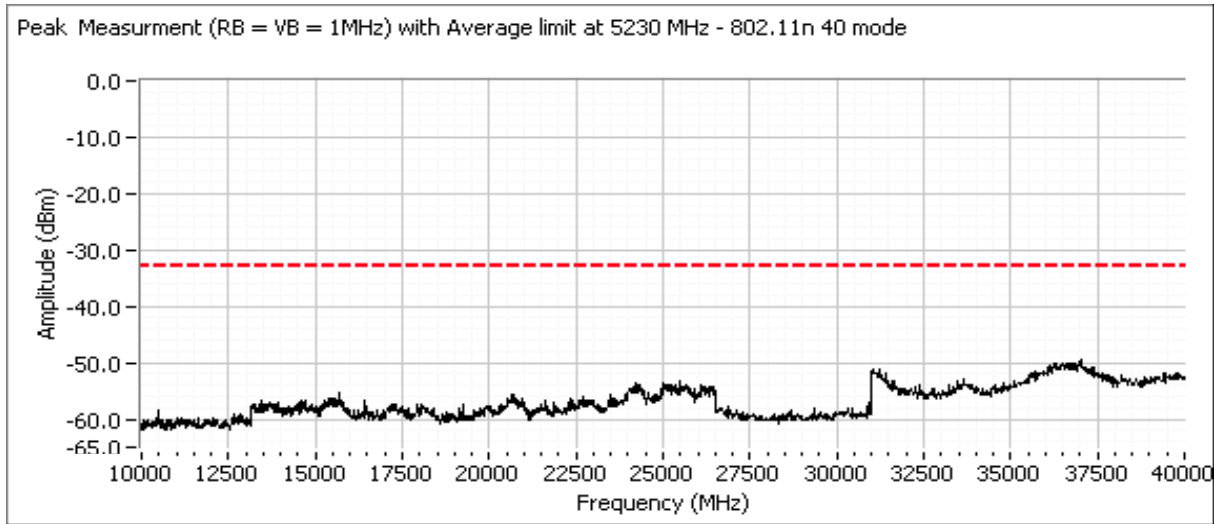
Note; Initial approval for FCC will only allow operation in the 5150 - 5250 MHz NII band so a plot showing -20dBc at 5250 MHz and above is included.

20dB attenuation pad at front of analyzer and 20dB attenuation at software level.

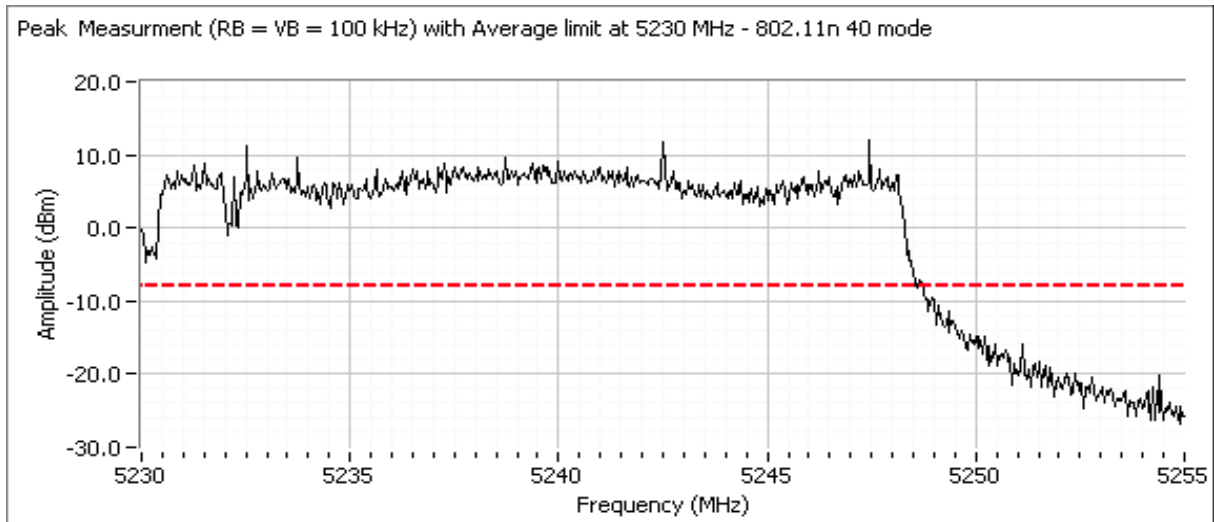


Client: Xirrus	Job Number: J71484
Model: XN4	T-Log Number: T73388
Contact: Steve Smith	Account Manager: Susan Pelzl
Standard: FCC 15 E, RSS 210	Class: N/A

20dB attenuation pad at front of analyzer and 0dB attenuation at software level to reduce the noise floor.



-20dBc of 5240 MHz signal for compliance with FCC at 5250 MHz with power setting of 15.5dBm.



Client:	Xirrus	Job Number:	J71484
Model:	XN4	T-Log Number:	T73389
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		Mark Briggs
Emissions Standard(s):	FCC 15E / RSS 210	Class:	UNII
Immunity Standard(s):	-	Environment:	Wireless

EMC Test Data

For The

Xirrus

Model

XN4

Date of Last Test: 11/6/2008

Client: Xirrus	Job Number: J71484
Model: XN4	T-Log Number: T73389
	Account Manager: Susan Pelzl
Contact: Steve Smith	
Standard: FCC 15E / RSS 21	Class: NII

**RSS 210 and FCC 15.407 (UNII - 5150 - 5250 MHz)
Radiated Spurious Emissions, Band Edges - Internal Antenna**

Test Specific Details

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

General Test Configuration

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

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

Ambient Conditions: Temperature: 15-35 °C
 Rel. Humidity: 10-60 %

Summary of Results

Run #	Mode	Channel	Power Setting	Test Performed	Limit	Result / Margin
1a	802.11a Chain A	5180 MHz	20.0dBm	Restricted Band Edge at 5150 MHz	15.209	51.8dBµV/m (389.0µV/m) @ 5149.9MHz (-2.2dB)
1b	802.11a Chain A+C	5180 MHz	18.5dBm	Restricted Band Edge at 5150 MHz	15.209	53.2dBµV/m (457.1µV/m) @ 5149.9MHz (-0.8dB)
1c	802.11n20 Chain A+C	5180 MHz	17.0dBm	Restricted Band Edge at 5150 MHz	15.209	53.7dBµV/m (484.2µV/m) @ 5149.9MHz (-0.3dB)
1d	802.11n40 Chain A+C	5190 MHz	13.0dBm	Restricted Band Edge at 5150 MHz	15.209	52.4dBµV/m (416.9µV/m) @ 5148.3MHz (-1.6dB)

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	Job Number: J71484
Model: XN4	T-Log Number: T73389
Contact: Steve Smith	Account Manager: Susan Pelzl
Standard: FCC 15E / RSS 210	Class: NII

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

Date of Test: 10/24/2008
 Test Engineer: Mehran Birgani
 Test Location: SV OATS #1

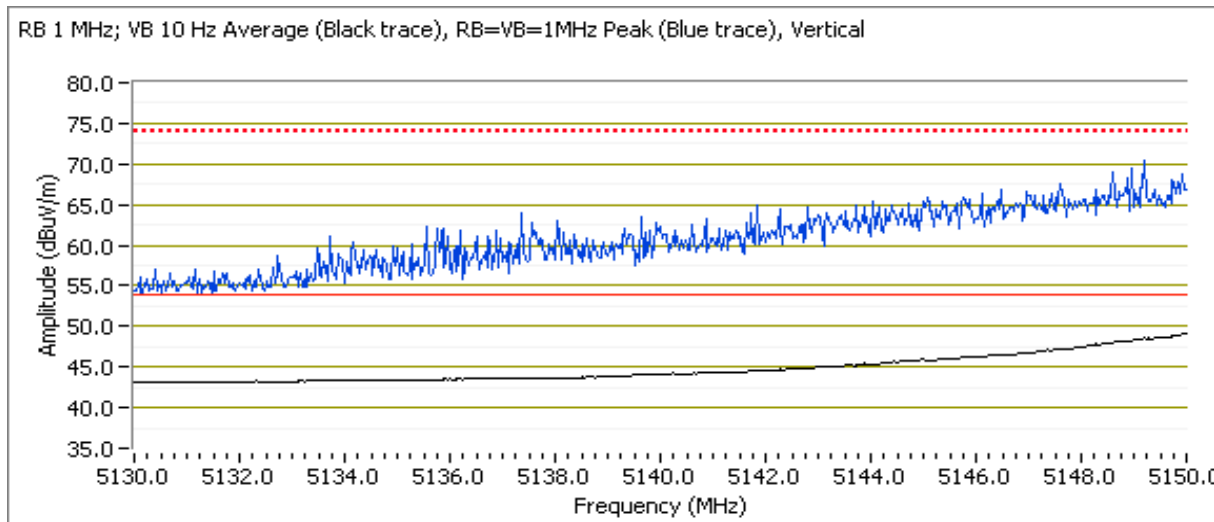
Config. Used: 1
 Config Change: None
 EUT Voltage: POE

Run #1a: 5180 MHz, 802.11a, Chain A with power setting of 20.0 dBm

5150 MHz Band Edge Signal Radiated Field Strength

Frequency MHz	Level dB μ V/m	Pol V/H	FCC 15.209		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
5149.930	51.8	V	54.0	-2.2	AVG	276	1.9	RB 1 MHz; VB: 10 Hz
5150.000	46.6	H	54.0	-7.4	AVG	15	1.0	RB 1 MHz; VB: 10 Hz
5148.630	61.8	H	74.0	-12.2	PK	15	1.0	RB 1 MHz; VB: 1 MHz
5149.500	69.2	V	74.0	-4.8	PK	276	1.9	RB 1 MHz; VB: 1 MHz

Note 1: For emissions in restricted band immediately below 5150MHz, the limit of 15.209 was used.



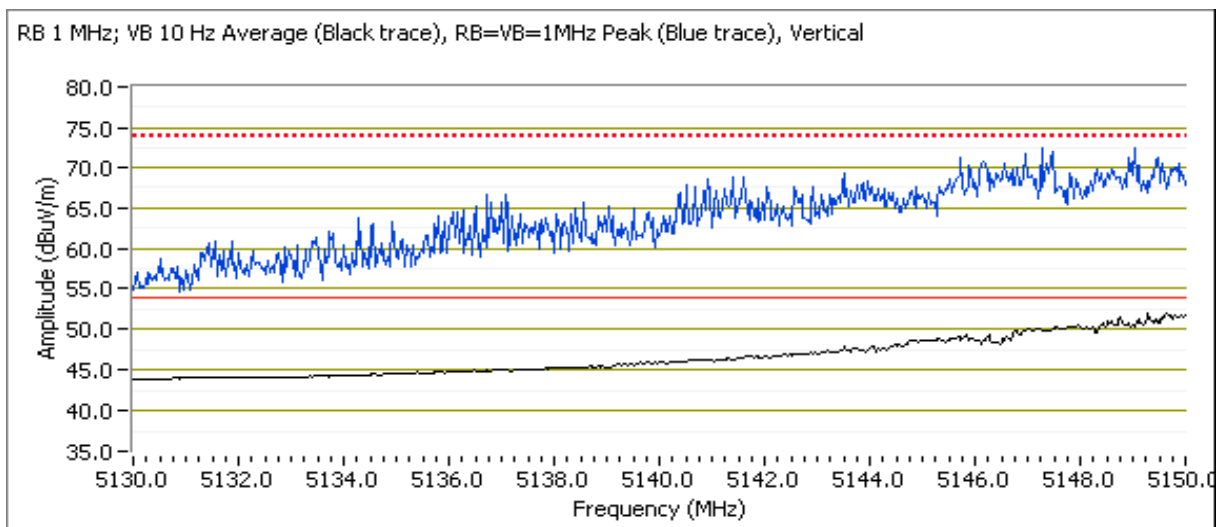
Client: Xirrus	Job Number: J71484
Model: XN4	T-Log Number: T73389
Contact: Steve Smith	Account Manager: Susan Pelzl
Standard: FCC 15E / RSS 210	Class: NII

Run #1b: 5180 MHz, 802.11a, Chain A+C with power setting of 18.5 dBm

5150 MHz Band Edge Signal Radiated Field Strength

Frequency MHz	Level dB μ V/m	Pol V/H	FCC 15.209		Detector PK/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
5149.830	48.9	H	54.0	-5.1	AVG	236	2.4	RB 1 MHz; VB: 10 Hz
5149.930	53.2	V	54.0	-0.8	AVG	271	2.0	RB 1 MHz; VB: 10 Hz
5149.730	69.6	V	74.0	-4.4	PK	271	2.0	RB 1 MHz; VB: 1 MHz
5149.970	63.7	H	74.0	-10.3	PK	236	2.4	RB 1 MHz; VB: 1 MHz

Note 1: For emissions in restricted band immediately below 5150MHz, the limit of 15.209 was used.



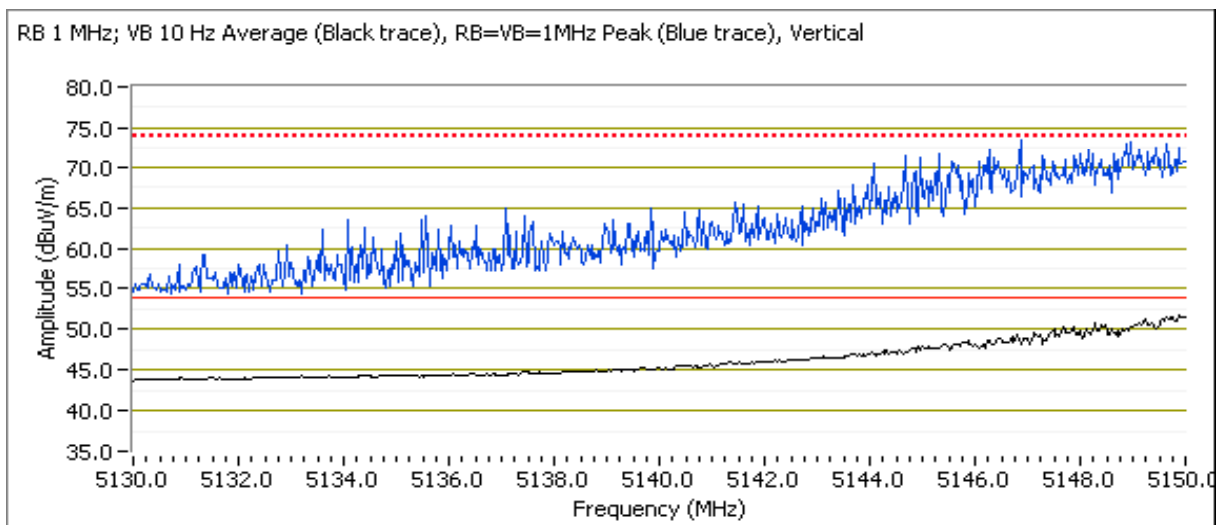
Client: Xirrus	Job Number: J71484
Model: XN4	T-Log Number: T73389
Contact: Steve Smith	Account Manager: Susan Pelzl
Standard: FCC 15E / RSS 210	Class: NII

Run #1c: 5180 MHz, 802.11n 20MHz Chain A+C with power setting of 17.0 dBm

5150 MHz Band Edge Signal Radiated Field Strength

Frequency MHz	Level dB μ V/m	Pol V/H	FCC 15.209		Detector PK/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
5149.930	53.7	V	54.0	-0.3	AVG	256	1.6	RB 1 MHz; VB: 10 Hz
5146.600	72.6	V	74.0	-1.4	PK	256	1.6	RB 1 MHz; VB: 1 MHz
5147.500	61.7	H	74.0	-12.3	PK	231	2.5	RB 1 MHz; VB: 1 MHz
5149.830	72.8	V	74.0	-1.2	PK	256	1.6	RB 1 MHz; VB: 1 MHz

Note 1: For emissions in restricted band immediately below 5150MHz, the limit of 15.209 was used.



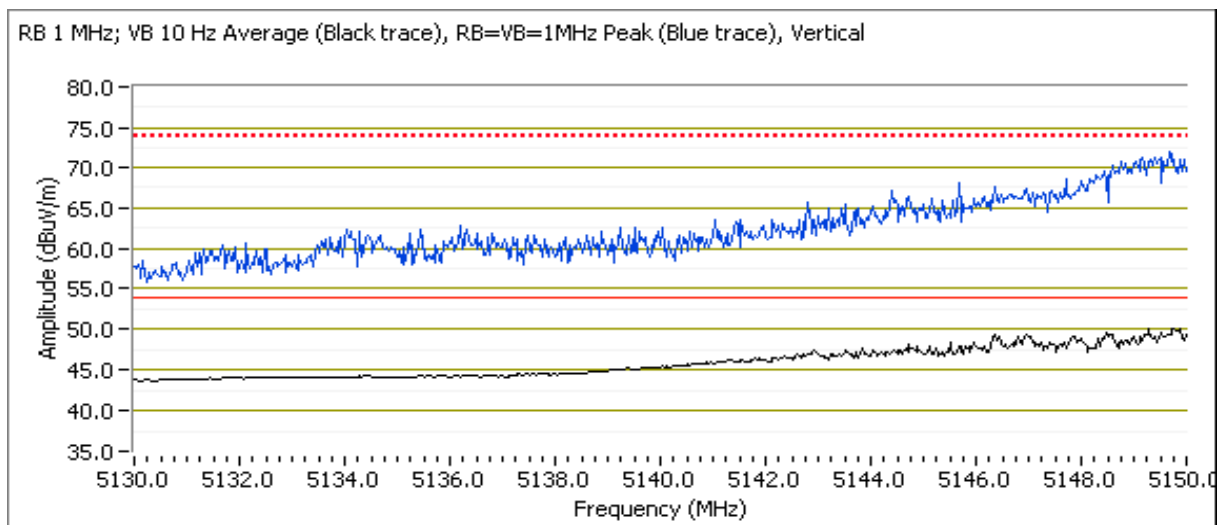
Client: Xirrus	Job Number: J71484
Model: XN4	T-Log Number: T73389
Contact: Steve Smith	Account Manager: Susan Pelzl
Standard: FCC 15.247 / RSS 210	Class: N/A

Run #1d: 5190 MHz, 802.11n 40MHz Chain A+C with power setting of 13.0 dBm

5150 MHz Band Edge Signal Radiated Field Strength

Frequency MHz	Level dB μ V/m	Pol V/H	FCC 15.209		Detector PK/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
5148.300	52.4	V	54.0	-1.6	AVG	253	1.6	RB 1 MHz; VB: 10 Hz
5149.500	46.3	H	54.0	-7.7	AVG	235	1.0	RB 1 MHz; VB: 10 Hz
5149.530	69.7	V	74.0	-4.3	PK	253	1.6	RB 1 MHz; VB: 1 MHz
5149.830	63.8	H	74.0	-10.2	PK	235	1.0	RB 1 MHz; VB: 1 MHz

Note 1: For emissions in restricted band immediately below 5150MHz, the limit of 15.209 was used.



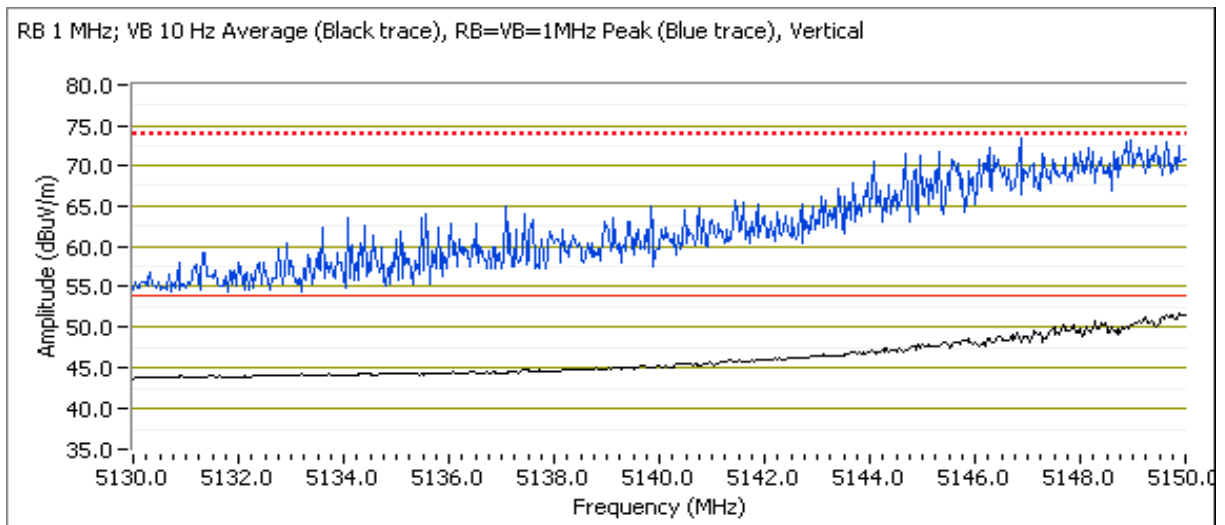
Client: Xirrus	Job Number: J71484
Model: XN4	T-Log Number: T73389
Contact: Steve Smith	Account Manager: Susan Pelzl
Standard: FCC 15E / RSS 210	Class: NII

Run #1c: 5180 MHz, 802.11n 20MHz Chain A+C with power setting of 17.0 dBm

5150 MHz Band Edge Signal Radiated Field Strength

Frequency MHz	Level dB μ V/m	Pol V/H	FCC 15.209		Detector PK/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
5149.930	53.7	V	54.0	-0.3	AVG	256	1.6	RB 1 MHz; VB: 10 Hz
5146.600	72.6	V	74.0	-1.4	PK	256	1.6	RB 1 MHz; VB: 1 MHz
5147.500	61.7	H	74.0	-12.3	PK	231	2.5	RB 1 MHz; VB: 1 MHz
5149.830	72.8	V	74.0	-1.2	PK	256	1.6	RB 1 MHz; VB: 1 MHz

Note 1: For emissions in restricted band immediately below 5150MHz, the limit of 15.209 was used.



Client: Xirrus	Job Number: J71484
Model: XN4	T-Log Number: T73389
Contact: Steve Smith	Account Manager: Susan Pelzl
Standard: FCC 15E / RSS 21	Class: NII

Run #1, Radiated Spurious Emissions, 30 - 40,000 MH. Operation in the 5150-5250 MHz Band, 802.11a Mode

Run #1a: 5180 MHz, 802.11a, 802.11n20 and 802.11n40 Low Channel

Radio	Channel (MHz)	Mode	Power Setting		Comments
			Chain A	Chain C	
1	5180	a	20	20	
2	5180	n20	20	20	
3	5190	n40	20	20	
4	-	-			

Scan made in anechoic chamber, measurements in tables below taken on OATS.

Spurious Radiated Emissions:

Frequency MHz	Level dB μ V/m	Pol v/h	15.209 / 15E		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
6902.620	33.9	H	54.0	-20.1	AVG	58	1.0	Note 2, RB 1 MHz; VB: 10 Hz
6906.880	33.9	V	54.0	-20.1	AVG	21	1.0	Note 2, RB 1 MHz; VB: 10 Hz
6919.930	34.4	V	54.0	-19.6	AVG	349	1.0	Note 2, RB 1 MHz; VB: 10 Hz
6922.720	34.2	H	54.0	-19.8	AVG	253	1.0	Note 2, RB 1 MHz; VB: 10 Hz
10355.230	39.3	H	54.0	-14.7	AVG	27	1.0	Note 2, RB 1 MHz; VB: 10 Hz
10357.720	39.9	V	54.0	-14.1	AVG	233	1.0	Note 2, RB 1 MHz; VB: 10 Hz
10381.820	39.5	V	54.0	-14.5	AVG	258	1.4	Note 2, RB 1 MHz; VB: 10 Hz
10381.820	39.4	H	54.0	-14.6	AVG	177	1.0	Note 2, RB 1 MHz; VB: 10 Hz
6904.370	45.3	V	74.0	-28.7	PK	21	1.0	Note 2, RB 1 MHz; VB: 1 MHz
6908.000	44.7	H	74.0	-29.3	PK	58	1.0	Note 2, RB 1 MHz; VB: 1 MHz
6914.730	45.3	V	74.0	-28.7	PK	349	1.0	Note 2, RB 1 MHz; VB: 1 MHz
6917.270	45.6	H	74.0	-28.4	PK	253	1.0	Note 2, RB 1 MHz; VB: 1 MHz
10359.200	51.1	V	74.0	-22.9	PK	233	1.0	Note 2, RB 1 MHz; VB: 1 MHz
10359.580	50.4	H	74.0	-23.6	PK	27	1.0	Note 2, RB 1 MHz; VB: 1 MHz
10376.800	50.3	H	74.0	-23.7	PK	177	1.0	Note 2, RB 1 MHz; VB: 1 MHz
10380.750	50.6	V	74.0	-23.4	PK	258	1.4	Note 2, RB 1 MHz; VB: 1 MHz

Note 1: For emissions in restricted bands, the limit of 15.209 was used. For all other emissions outside the 5150 - 5250MHz band the **average** limit was set to -27dBm/MHz (-68.3 dBuV/m) and peak limit set to 20dB higher than the average limit (88.3 dBuV/m).

Note 2: Not in a restricted band

Client: Xirrus	Job Number: J71484
Model: XN4	T-Log Number: T73389
	Account Manager: Susan Pelzl
Contact: Steve Smith	
Standard: FCC 15E / RSS 210	Class: NII

Run #1b: 5200 MHz, 802.11a, 802.11n20 Center Channel

Radio	Channel (MHz)	Mode	Power Setting		Comments
			Chain A	Chain C	
1	5200	a	20	20	
2	5200	n20	20	20	

Spurious Radiated Emissions:

Frequency MHz	Level dB μ V/m	Pol v/h	15.209 / 15E		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
6933.170	34.5	H	54.0	-19.5	AVG	253	1.0	Note 2, RB 1 MHz; VB: 10 Hz
6933.300	35.6	V	54.0	-18.4	AVG	310	1.0	Note 2, RB 1 MHz; VB: 10 Hz
10398.500	40.3	H	54.0	-13.7	AVG	315	1.0	Note 2, RB 1 MHz; VB: 10 Hz
10398.820	40.4	V	54.0	-13.6	AVG	18	1.6	Note 2, RB 1 MHz; VB: 10 Hz
6931.500	46.1	V	74.0	-27.9	PK	310	1.0	Note 2, RB 1 MHz; VB: 1 MHz
6935.450	45.8	H	74.0	-28.2	PK	253	1.0	Note 2, RB 1 MHz; VB: 1 MHz
10398.620	51.6	H	74.0	-22.4	PK	315	1.0	Note 2, RB 1 MHz; VB: 1 MHz
10402.000	51.7	V	74.0	-22.3	PK	18	1.6	Note 2, RB 1 MHz; VB: 1 MHz

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions outside the 5150 - 5250MHz band the average limit was set to -27dBm/MHz (~68.3 dB μ V/m) and peak limit set to 20dB higher than the average limit (88.3 dB μ V/m).
Note 2:	Not in a restricted band

Client: Xirrus	Job Number: J71484
Model: XN4	T-Log Number: T73389
	Account Manager: Susan Pelzl
Contact: Steve Smith	
Standard: FCC 15E / RSS 210	Class: NII

Run #1c: 802.11a, 802.11n20 and 802.11n40, High Channel

Radio	Channel (MHz)	Mode	Power Setting		Comments
			Chain A	Chain C	
1	5240	a	20	20	
2	5240	n20	20	20	
3	5230	n40	20	20	

Spurious Radiated Emissions:

Frequency MHz	Level dB μ V/m	Pol v/h	15.209 / 15E		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
6966.600	34.0	H	54.0	-20.0	AVG	76	1.0	Note 2, RB 1 MHz; VB: 10 Hz
6986.350	34.0	H	54.0	-20.0	AVG	10	1.0	Note 2, RB 1 MHz; VB: 10 Hz
10460.280	38.9	V	54.0	-15.1	AVG	53	1.0	Note 2, RB 1 MHz; VB: 10 Hz
10463.780	38.7	H	54.0	-15.3	AVG	355	1.0	Note 2, RB 1 MHz; VB: 10 Hz
10475.170	38.8	H	54.0	-15.2	AVG	0	1.0	Note 2, RB 1 MHz; VB: 10 Hz
10476.380	38.9	V	54.0	-15.1	AVG	246	1.0	Note 2, RB 1 MHz; VB: 10 Hz
6976.020	45.1	H	74.0	-28.9	PK	76	1.0	Note 2, RB 1 MHz; VB: 1 MHz
6982.680	45.1	H	74.0	-28.9	PK	10	1.0	Note 2, RB 1 MHz; VB: 1 MHz
10457.720	50.5	V	74.0	-23.5	PK	53	1.0	Note 2, RB 1 MHz; VB: 1 MHz
10461.730	49.7	H	74.0	-24.3	PK	355	1.0	Note 2, RB 1 MHz; VB: 1 MHz
10476.120	51.0	V	74.0	-23.0	PK	246	1.0	Note 2, RB 1 MHz; VB: 1 MHz
10476.230	49.9	H	74.0	-24.1	PK	0	1.0	Note 2, RB 1 MHz; VB: 1 MHz

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions outside the 5150 - 5250MHz band the average limit was set to -27dBm/MHz (-68.3 dB μ V/m) and peak limit set to 20dB higher than the average limit (88.3 dB μ V/m).
Note 2:	Not in a restricted band

Client: Xirrus	Job Number: J71484
Model: XN4	T-Log Number: T73389
	Account Manager: Susan Pelzl
Contact: Steve Smith	
Standard: FCC 15E / RSS 210	Class: NII

**RSS 210 and FCC 15.407 (UNII - 5150 - 5250 MHz)
Radiated Spurious Emissions, Band Edges - External Antenna**

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: 11/5/2008
 Test Engineer: Rafael Varelas
 Test Location: OATS #1

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 with all I/O connections running on top of the groundplane.

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

Ambient Conditions:

Temperature: 15-35 °C
 Rel. Humidity: 10-60 %

Summary of Results

Run #	Mode	Channel	Power Setting	Test Performed	Limit	Result / Margin
1	802.11a Chain B	5180 MHz	20.0	Restricted Band Edge at 5150 MHz	15.209	51.5dB μ V/m @ 5149.9MHz (-2.5dB)

Modifications Made During Testing

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

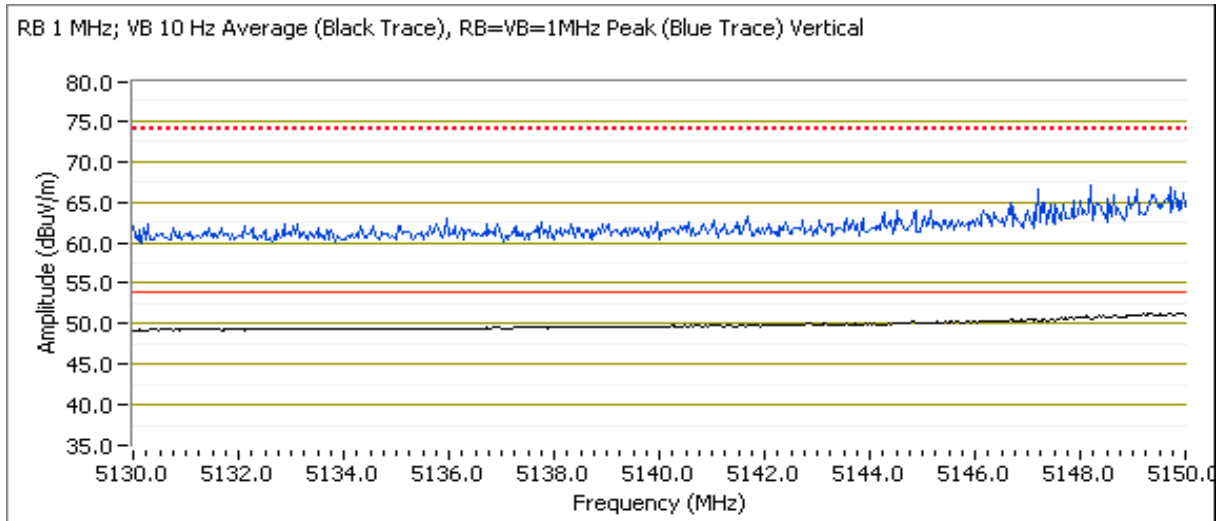
Client: Xirrus	Job Number: J71484
Model: XN4	T-Log Number: T73389
Contact: Steve Smith	Account Manager: Susan Pelzl
Standard: FCC 15E / RSS 210	Class: NII

Run #1, Radiated Spurious Emissions, 30 - 40,000 MH. Operation in the 5150-5250 MHz Band
 5180 MHz, 802.11a, Chain B with power setting of 20dBm

5150 MHz Band Edge Signal Radiated Field Strength

Frequency MHz	Level dB μ V/m	Pol V/H	FCC 15.209		Detector PK/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
5149.940	51.5	V	54.0	-2.5	Avg	303	1.9	RB 1 MHz; VB: 10 Hz
5147.440	66.6	V	74.0	-7.4	PK	303	1.9	RB 1 MHz; VB: 1 MHz
5149.810	49.5	H	54.0	-4.5	Avg	347	1.0	RB 1 MHz; VB: 10 Hz
5149.210	62.0	H	74.0	-12.0	PK	347	1.0	RB 1 MHz; VB: 1 MHz

Note 1: For emissions in restricted band immediately below 5150MHz, the limit of 15.209 was used.



Client: Xirrus	Job Number: J71484
Model: XN4	T-Log Number: T73389
	Account Manager: Susan Pelzl
Contact: Steve Smith	
Standard: FCC 15E / RSS 210	Class: NII

**RSS 210 and FCC 15.407 (UNII - 5150 - 5250 MHz)
Radiated Spurious Emissions, External Antenna**

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: 11/5/2008
 Test Engineer: Rafael Varelas
 Test Location: OATS #1

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 with all I/O connections running on top of the groundplane.

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

Ambient Conditions: Temperature: 15-35 °C
 Rel. Humidity: 10-60 %

Summary of Results

Run #	Mode	Channel	Power Setting	Radio	Test Performed	Limit	Result / Margin
1	802.11a	5180 MHz	20	4	Radiated Emissions, 1 - 40 GHz	FCC 15.209 / 15 E	40.5dBµV/m @ 10359.7MHz (-13.5dB)
	802.11a	5200 MHz		4			41.6dBµV/m @ 10398MHz (-12.4dB)
	802.11a	5240 MHz		4			40.9dBµV/m @ 10479.0MHz (-13.1dB)

Modifications Made During Testing

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

Client: Xirrus	Job Number: J71484
Model: XN4	T-Log Number: T73389
Contact: Steve Smith	Account Manager: Susan Pelzl
Standard: FCC 15E / RSS 210	Class: NII

Run #1, Radiated Spurious Emissions, 30 - 40,000 MH. Operation in the 5150-5250 MHz Band, 802.11a Mode, External Ant.
Run #1a: 5180 MHz, 802.11a, Low Channel, With External Antenna

Frequency Range	Test Distance	Limit Distance	Extrapolation Factor
1000 - 18000 MHz	3	3	0.0

Spurious Radiated Emissions:

Frequency MHz	Level dB μ V/m	Pol v/h	15.209 / 15E		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
10359.660	40.5	V	54.0	-13.5	AVG	360	1.0	RB 1 MHz; VB: 10 Hz
10359.760	51.9	V	74.0	-22.1	PK	360	1.0	RB 1 MHz; VB: 1 MHz
6906.680	39.0	V	54.0	-15.0	AVG	0	1.0	RB 1 MHz; VB: 10 Hz
6906.230	48.6	V	74.0	-25.4	PK	0	1.0	RB 1 MHz; VB: 1 MHz
6906.520	34.4	H	54.0	-19.6	AVG	233	1.0	RB 1 MHz; VB: 10 Hz
6905.270	45.8	H	74.0	-28.2	PK	233	1.0	RB 1 MHz; VB: 1 MHz
10359.680	39.8	H	54.0	-14.2	AVG	298	1.0	RB 1 MHz; VB: 10 Hz
10360.380	51.1	H	74.0	-22.9	PK	298	1.0	RB 1 MHz; VB: 1 MHz

Run #1b: 5200 MHz, 802.11a, Center Channel, With External Antenna

Spurious Radiated Emissions:

Frequency MHz	Level dB μ V/m	Pol v/h	15.209 / 15E		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
10398.520	41.6	H	54.0	-12.4	AVG	0	2.1	RB 1 MHz; VB: 10 Hz
10400.070	52.6	H	74.0	-21.4	PK	0	2.1	RB 1 MHz; VB: 1 MHz
6933.080	35.9	H	54.0	-18.1	AVG	360	2.3	RB 1 MHz; VB: 10 Hz
6931.920	46.6	H	74.0	-27.4	PK	360	2.3	RB 1 MHz; VB: 1 MHz
10398.670	41.1	V	54.0	-12.9	AVG	5	1.1	RB 1 MHz; VB: 10 Hz
10400.080	52.2	V	74.0	-21.8	PK	5	1.1	RB 1 MHz; VB: 1 MHz
6933.390	37.9	V	54.0	-16.1	AVG	253	1.0	RB 1 MHz; VB: 10 Hz
6933.330	47.9	V	74.0	-26.1	PK	253	1.0	RB 1 MHz; VB: 1 MHz

Run #1c: 5240 MHz, 802.11a, High Channel, With External Antenna

Frequency MHz	Level dB μ V/m	Pol v/h	15.209 / 15E		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
10478.990	40.9	V	54.0	-13.1	AVG	351	1.0	MHz; VB: 10 Hz
10479.360	51.8	V	74.0	-22.2	PK	351	1.0	MHz; VB: 1 MHz
6972.750	34.5	V	54.0	-19.5	AVG	244	1.0	MHz; VB: 10 Hz
6970.150	45.5	V	74.0	-28.5	PK	244	1.0	MHz; VB: 1 MHz
10478.530	40.1	H	54.0	-13.9	AVG	360	1.0	MHz; VB: 10 Hz
10481.310	54.9	H	74.0	-19.1	PK	360	1.0	MHz; VB: 1 MHz
6970.120	34.5	H	54.0	-19.5	AVG	50	1.0	MHz; VB: 10 Hz
6971.690	46.0	H	74.0	-28.0	PK	50	1.0	MHz; VB: 1 MHz



EMC Test Data

Client:	Xirrus	Job Number:	J71484
Model:	XN4	T-Log Number:	T73387
Contact:	Steve Smith	Account Manager:	Susan Pelzl
Emissions Standard(s):	FCC 15.247 / RSS 210		Mark Briggs
Immunity Standard(s):	-	Class:	DTS
		Environment:	Wireless

DTS Radiated Emissions Test Data

For The

Xirrus

Model

XN4

Date of Last Test: 11/14/2008

Client: Xirrus	Job Number: J71484
Model: XN4	T-Log Number: T73387
	Account Manager: Susan Pelzl
Contact: Steve Smith	
Standard: FCC 15.247 / RSS 210	Class: DTS

Radiated Emissions (Reveiver)

Test Specific Details

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

General Test Configuration

The EUT and all local support equipment were located on the turntable for radiated emissions testing. Remote support equipment was located approximately 30 meters from the test area with all I/O connections running on top of the groundplane routed overhead.

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

Note, **preliminary** testing indicates that the emissions were maximized by orientation of the EUT and elevation of the measurement antenna. **Maximized** testing indicated that the emissions were maximized by orientation of the EUT, elevation of the measurement antenna, and manipulation of the EUT's interface cables.

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

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1 (Internal Antenna)	RE, 1000 - 18000 MHz Maximized Emissions	RSS GEN	Pass	44.2dBµV/m (162.2µV/m) @ 1320.1MHz (-9.8dB)
2 (External Antenna)	RE, 1000 - 18000 MHz Maximized Emissions	RSS GEN	Pass	39.2dBµV/m @ 7713.5MHz (-14.8dB)

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.

Frequency Range	Test Distance	Limit Distance	Extrapolation Factor
1000 - 18,000 MHz	3	3	0.0

Client: Xirrus	Job Number: J71484
Model: XN4	T-Log Number: T73387
	Account Manager: Susan Pelzl
Contact: Steve Smith	
Standard: FCC 15.247 / RSS 210	Class: DTS

Run #1: Maximized readings, 1000 - 18,000 MHz, Internal Antenna

Date of Test: 10/30/08
 Test Engineer: Mehran Birgani
 Test Location: SV OATS #2

Config. Used: 1
 Config Change: -
 EUT Voltage: POE

Radio 1	Radio 2	Radio 3	Radio 4
2437 single	2437 All	5785 Single	5785 All

Single = only one Rx chain active. All = all RX chains active (2 in 5Ghz band, 3 in 2.4 band)

Frequency MHz	Level dB μ V/m	Pol v/h	RSS GEN		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
1320.050	44.2	H	54.0	-9.8	AVG	241	1.0	RB 1 MHz; VB: 10 Hz Note 1
1320.060	43.2	V	54.0	-10.8	AVG	38	2.1	RB 1 MHz; VB: 10 Hz Note 1
1386.040	35.4	H	54.0	-18.6	AVG	242	1.0	RB 1 MHz; VB: 10 Hz Note 1
1386.130	32.8	V	54.0	-21.2	AVG	237	1.1	RB 1 MHz; VB: 10 Hz Note 1
1642.100	28.4	H	54.0	-25.6	AVG	90	1.0	RB 1 MHz; VB: 10 Hz Note 1
1642.880	30.0	V	54.0	-24.0	AVG	306	1.2	RB 1 MHz; VB: 10 Hz Note 1
2303.000	30.7	H	54.0	-23.3	AVG	63	1.0	RB 1 MHz; VB: 10 Hz Note 1
2626.670	35.3	H	54.0	-18.7	AVG	0	1.0	RB 1 MHz; VB: 10 Hz Note 1
2969.990	32.7	H	54.0	-21.3	AVG	86	1.0	RB 1 MHz; VB: 10 Hz Note 1
7463.710	35.8	H	54.0	-18.2	AVG	187	1.0	RB 1 MHz; VB: 10 Hz Note 2
7713.360	37.7	H	54.0	-16.3	AVG	128	2.0	RB 1 MHz; VB: 10 Hz Note 2
7713.420	38.4	V	54.0	-15.6	AVG	173	1.0	RB 1 MHz; VB: 10 Hz Note 2
1320.120	47.5	H	74.0	-26.5	PK	241	1.0	RB 1 MHz; VB: 1 MHz Note 1
1320.330	47.1	V	74.0	-26.9	PK	38	2.1	RB 1 MHz; VB: 1 MHz Note 1
1386.070	44.2	H	74.0	-29.8	PK	242	1.0	RB 1 MHz; VB: 1 MHz Note 1
1386.100	41.5	V	74.0	-32.5	PK	237	1.1	RB 1 MHz; VB: 1 MHz Note 1
1641.800	40.6	H	74.0	-33.4	PK	90	1.0	RB 1 MHz; VB: 1 MHz Note 1
1642.220	42.5	V	74.0	-31.5	PK	306	1.2	RB 1 MHz; VB: 1 MHz Note 1
2302.970	40.5	H	74.0	-33.5	PK	63	1.0	RB 1 MHz; VB: 1 MHz Note 1
2628.290	53.9	H	74.0	-20.1	PK	0	1.0	RB 1 MHz; VB: 1 MHz Note 1
2970.380	42.0	H	74.0	-32.0	PK	86	1.0	RB 1 MHz; VB: 1 MHz Note 1
7469.530	46.9	H	74.0	-27.1	PK	187	1.0	RB 1 MHz; VB: 1 MHz Note 2
7713.100	48.8	V	74.0	-25.2	PK	173	1.0	RB 1 MHz; VB: 1 MHz Note 2
7713.280	47.7	H	74.0	-26.3	PK	128	2.0	RB 1 MHz; VB: 1 MHz Note 2

Note 1: Signal is independent of the tuned frequency and related to the digital device operation.

Note 2: Related to the receivers tuned to 5.785 GHz

Note 3: Preliminary scans showed no significant emissions related to the receiver when the receivers were operating in the 5150-5350 and 5470-5725 MHz bands.

Client: Xirrus	Job Number: J71484
Model: XN4	T-Log Number: T73387
	Account Manager: Susan Pelzl
Contact: Steve Smith	
Standard: FCC 15.247 / RSS 210	Class: DTS

Run #2: Maximized readings, 1000 - 18,000 MHz, External Antenna

Date of Test: 11/14/2008
 Test Engineer: Suhaila Khushzad
 Test Location: OATS # 1

Config. Used: 1
 Config Change: -
 EUT Voltage: POE

Radio 1	Radio 2	Radio 3	Radio 4
-	-	-	5785

Frequency MHz	Level dB μ V/m	Pol v/h	RSS GEN		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
7713.470	39.2	V	54.0	-14.8	AVG	357	1.0	RB 1 MHz; VB: 10 Hz
7713.870	48.2	V	74.0	-25.8	PK	357	1.0	RB 1 MHz; VB: 1 MHz
7713.440	37.0	H	54.0	-17.0	AVG	204	1.7	RB 1 MHz; VB: 10 Hz Noise Floor
7727.190	48.4	H	74.0	-25.6	PK	204	1.7	RB 1 MHz; VB: 1 MHz Noise Floor
7442.280	35.7	V	54.0	-18.3	AVG	15	1.7	RB 1 MHz; VB: 10 Hz Noise Floor
7473.100	46.9	V	74.0	-27.1	PK	15	1.7	RB 1 MHz; VB: 1 MHz Noise Floor
7442.210	35.7	H	54.0	-18.3	AVG	325	1.0	RB 1 MHz; VB: 10 Hz Noise Floor
7455.830	47.4	H	74.0	-26.6	PK	325	1.0	RB 1 MHz; VB: 1 MHz Noise Floor

Note 1: Signals related to the digital device were excluded from being measured. Only receiver-related emissions were evaluated.

Note 2: Preliminary scans showed no significant emissions related to the receiver when the receivers were operating in the 5150-5350 and 5470-5725 MHz bands.



EMC Test Data

Client:	Xirrus	Job Number:	J71484
Model:	XN4	T-Log Number:	T73385 (EMC)
		Account Manager:	Susan Pelzl
Contact:	Steve Smith		Mark Briggs
Emissions Standard(s):	EN 301 489-17, FCC 15B	Class:	FCC Class B
Immunity Standard(s):	EN 301 489-17	Environment:	-

EMC Test Data

For The

Xirrus

Model

XN4

Date of Last Test: 1/21/2009

Client: Xirrus	Job Number: J71484
Model: XN4	T-Log Number: T73385 (EMC)
	Account Manager: Susan Pelzl
Contact: Steve Smith	
Standard: EN 301 489-17, FCC 15B	Class: FCC Class B

Conducted Emissions - Power Ports

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: 1/7/2009 12:48
 Test Engineer: Joseph Cadigal
 Test Location: SVOATS #1

Config. Used: 1
 Config Change: None
 EUT Voltage: 230V/50Hz, 120V/60Hz

General Test Configuration

The EUT was located on a wooden table, 40 cm from a vertical coupling plane and 80cm from the LISN. A second LISN was used for all local support equipment. Remote support equipment was located approximately 30 meters from the test area. All I/O connections were routed overhead.

Ambient Conditions:

Temperature:	13 °C
Rel. Humidity:	66 %

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	CE, AC Power, 120V/60Hz	FCC 15.209 FCC Class B	Pass	41.3dBµV @ 2.972MHz (-4.7dB)
2	CE, AC Power, 120V/60Hz	EN 55022 Class A	Pass	48.3dBµV @ 3.397MHz (-11.7dB)

Modifications Made During Testing

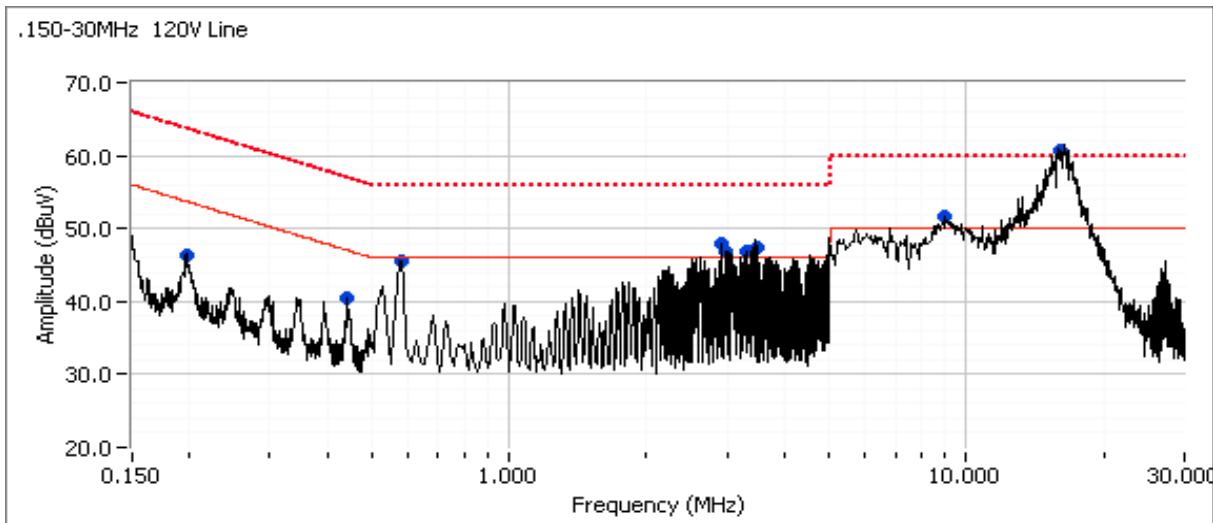
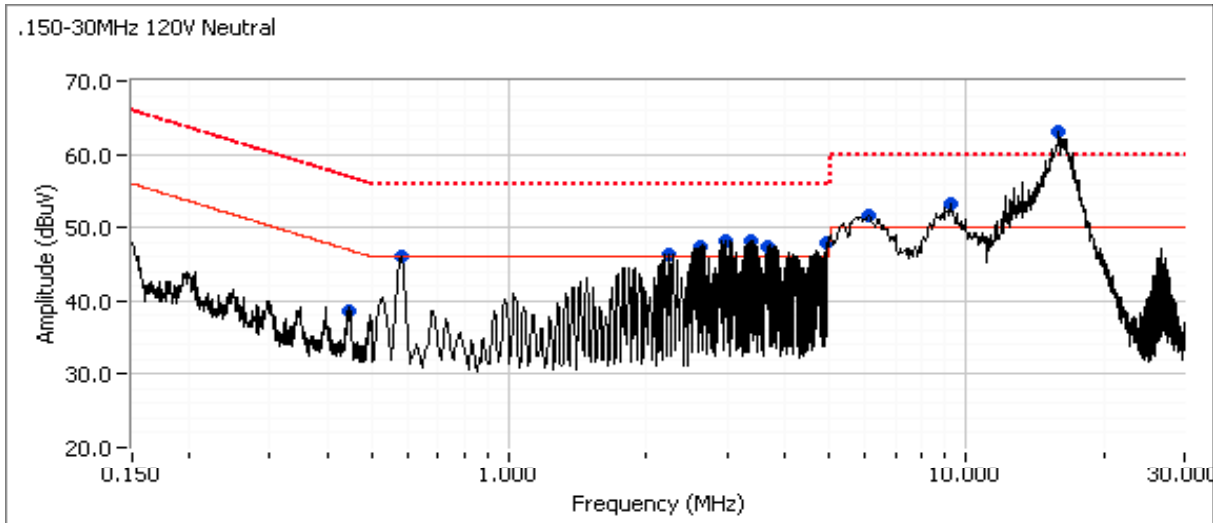
No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

Client: Xirrus	Job Number: J71484
Model: XN4	T-Log Number: T73385 (EMC)
Contact: Steve Smith	Account Manager: Susan Pelzl
Standard: EN 301 489-17, FCC 15B	Class: FCC Class B

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



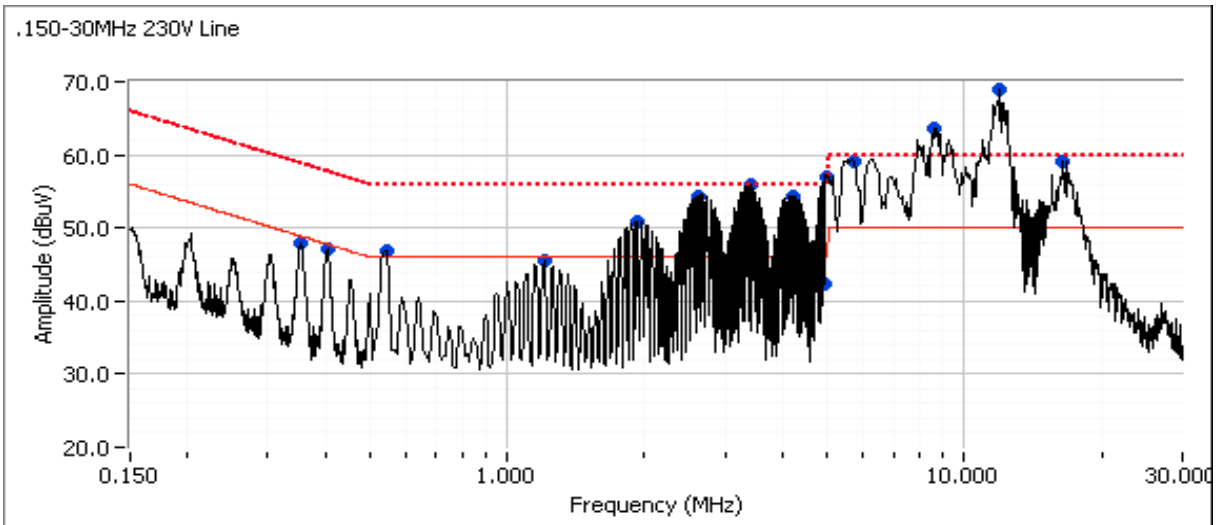
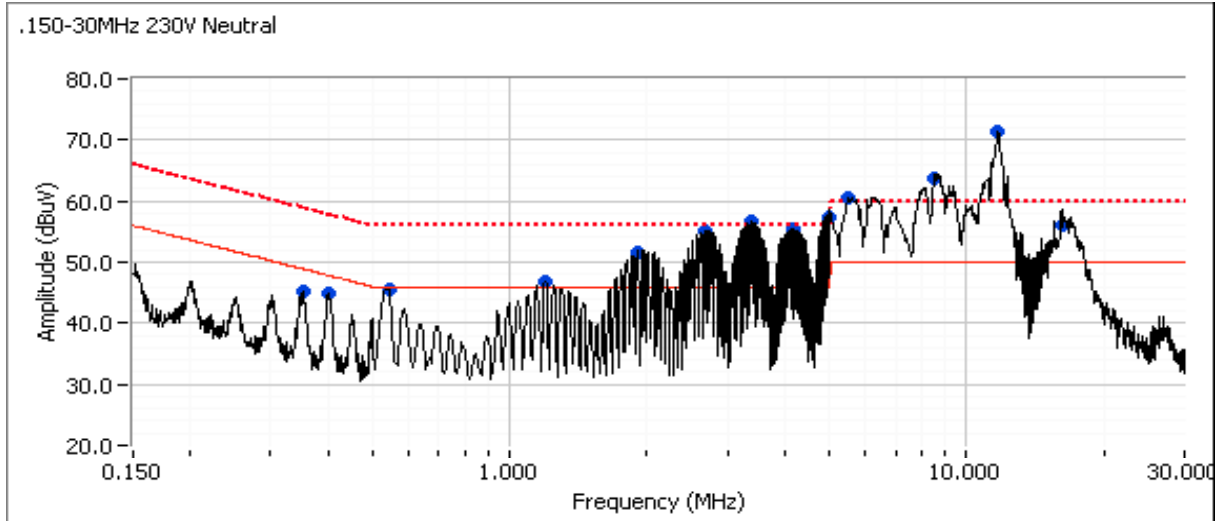
Run #1: AC Power Port Conducted Emissions, 0.15 - 30MHz, 120V/60Hz Continued next page...

Client: Xirrus	Job Number: J71484
Model: XN4	T-Log Number: T73385 (EMC)
	Account Manager: Susan Pelzl
Contact: Steve Smith	
Standard: EN 301 489-17, FCC 15B	Class: FCC Class B

Frequency MHz	Level dB μ V	AC Line	Class B		Detector QP/Ave	Comments
			Limit	Margin		
2.972	41.3	Line 1	46.0	-4.7	AVG	AVG (0.100s)
0.594	41.0	Line 1	46.0	-5.0	AVG	AVG (0.100s)
2.634	40.7	Neutral	46.0	-5.3	AVG	AVG (0.100s)
2.981	40.5	Neutral	46.0	-5.5	AVG	AVG (0.100s)
2.921	40.1	Line 1	46.0	-5.9	AVG	AVG (0.100s)
3.318	40.0	Line 1	46.0	-6.0	AVG	AVG (0.100s)
3.378	39.5	Neutral	46.0	-6.5	AVG	AVG (0.100s)
3.466	39.4	Line 1	46.0	-6.6	AVG	AVG (0.100s)
2.236	39.1	Neutral	46.0	-6.9	AVG	AVG (0.100s)
0.594	38.7	Neutral	46.0	-7.3	AVG	AVG (0.100s)
3.677	34.8	Neutral	46.0	-11.2	AVG	AVG (0.100s)
2.634	42.7	Neutral	56.0	-13.3	QP	QP (1.000s)
15.905	46.6	Neutral	60.0	-13.4	QP	QP (1.000s)
3.466	42.5	Line 1	56.0	-13.5	QP	QP (1.000s)
2.972	42.5	Line 1	56.0	-13.5	QP	QP (1.000s)
0.594	42.3	Line 1	56.0	-13.7	QP	QP (1.000s)
2.921	42.0	Line 1	56.0	-14.0	QP	QP (1.000s)
3.318	41.9	Line 1	56.0	-14.1	QP	QP (1.000s)
2.981	41.9	Neutral	56.0	-14.1	QP	QP (1.000s)
16.098	45.7	Line 1	60.0	-14.3	QP	QP (1.000s)
2.236	41.2	Neutral	56.0	-14.8	QP	QP (1.000s)
3.378	40.9	Neutral	56.0	-15.1	QP	QP (1.000s)
15.905	34.8	Neutral	50.0	-15.2	AVG	AVG (0.100s)
4.970	30.2	Neutral	46.0	-15.8	AVG	AVG (0.100s)
16.098	34.1	Line 1	50.0	-15.9	AVG	AVG (0.100s)
0.444	30.9	Line 1	47.0	-16.1	AVG	AVG (0.100s)
0.594	39.9	Neutral	56.0	-16.1	QP	QP (1.000s)
0.447	30.4	Neutral	46.9	-16.5	AVG	AVG (0.100s)
0.198	36.7	Line 1	53.7	-17.0	AVG	AVG (0.100s)
3.677	37.5	Neutral	56.0	-18.5	QP	QP (1.000s)
9.146	30.6	Neutral	50.0	-19.4	AVG	AVG (0.100s)
8.966	29.0	Line 1	50.0	-21.0	AVG	AVG (0.100s)
4.970	33.9	Neutral	56.0	-22.1	QP	QP (1.000s)
9.146	37.1	Neutral	60.0	-22.9	QP	QP (1.000s)
0.444	33.2	Line 1	57.0	-23.8	QP	QP (1.000s)
6.114	26.0	Neutral	50.0	-24.0	AVG	AVG (0.100s)
0.198	39.4	Line 1	63.7	-24.3	QP	QP (1.000s)
8.966	35.5	Line 1	60.0	-24.5	QP	QP (1.000s)
0.447	32.1	Neutral	56.9	-24.8	QP	QP (1.000s)
6.114	32.6	Neutral	60.0	-27.4	QP	QP (1.000s)

Client: Xirrus	Job Number: J71484
Model: XN4	T-Log Number: T73385 (EMC)
Contact: Steve Smith	Account Manager: Susan Pelzl
Standard: EN 301 489-17, FCC 15B	Class: FCC Class B

Run #2: AC Power Port Conducted Emissions, 0.15 - 30MHz, 230V/50Hz



Run #2: AC Power Port Conducted Emissions, 0.15 - 30MHz, 230V/50Hz Continued next page...

Client: Xirrus	Job Number: J71484
Model: XN4	T-Log Number: T73385 (EMC)
	Account Manager: Susan Pelzl
Contact: Steve Smith	
Standard: EN 301 489-17, FCC 15B	Class: FCC Class B

Frequency MHz	Level dB μ V	AC Line	EN55022 A		Detector QP/Ave	Comments
			Limit	Margin		
0.555	42.1	Neutral	60.0	-17.9	AVG	AVG (0.100s)
0.556	40.5	Line 1	60.0	-19.5	AVG	AVG (0.100s)
1.916	44.4	Neutral	60.0	-15.6	AVG	AVG (0.100s)
1.927	45.0	Line 1	60.0	-15.0	AVG	AVG (0.100s)
2.637	47.3	Line 1	60.0	-12.7	AVG	AVG (0.100s)
2.671	46.6	Neutral	60.0	-13.4	AVG	AVG (0.100s)
3.377	44.0	Neutral	60.0	-16.0	AVG	AVG (0.100s)
3.397	48.3	Line 1	60.0	-11.7	AVG	AVG (0.100s)
4.209	43.9	Line 1	60.0	-16.1	AVG	AVG (0.100s)
4.981	42.7	Line 1	60.0	-17.3	AVG	AVG (0.100s)

EXHIBIT 3: Photographs of Test Configurations

EXHIBIT 4: Proposed FCC ID Label & Label Location

Uploaded as a separate document

EXHIBIT 5: Detailed Photographs

Uploaded as a separate document

EXHIBIT 6: Operator's Manual

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EXHIBIT 7: Block Diagram

Uploaded as a separate document

EXHIBIT 8: Schematic Diagrams

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EXHIBIT 9: Theory of Operation

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EXHIBIT 10: RF Exposure Information

Uploaded as a separate document