

EMC Test Report

Application for Grant of Equipment Authorization

FCC Part 15, Subpart E

Model: HR44

FCC ID: PGRHR44

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TEST SITE(S): NTS Silicon Valley
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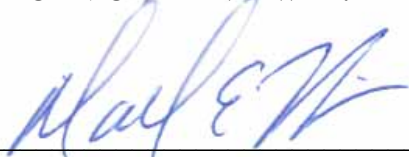
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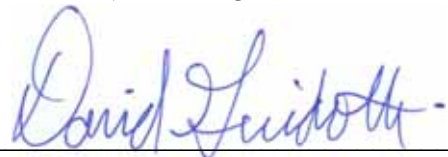
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REVISION HISTORY

Rev#	Date	Comments	Modified By
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SCOPE

An electromagnetic emissions test has been performed on the Pace Americas model HR44, pursuant to the following rules:

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 NTS Silicon Valley test procedures:

ANSI C63.4:2003
FCC UNII test procedure 2002-08 DA-02-2138, August 2002

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

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

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

OBJECTIVE

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

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

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

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

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

STATEMENT OF COMPLIANCE

The tested sample of Pace Americas model HR44 complied with the requirements of the following regulations:

FCC Part 15, Subpart E requirements for UNII Devices

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

The test results recorded herein are based on a single type test of Pace Americas model HR44 and therefore apply only to the tested sample. The sample was selected and prepared by Mark Rieger of Pace Americas.

DEVIATIONS FROM THE STANDARDS

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

TEST RESULTS SUMMARY

UNII / LELAN DEVICES

Operation in the 5.15 – 5.25 GHz Band

FCC Rule Part	RSS Rule Part	Description	Measured Value / Comments	Limit / Requirement	Result
15.407(e)		Indoor operation only	Refer to user's manual	N/A	Complies
15.407(a)(2)		26dB Bandwidth	>20MHz for all modes	N/A – limits output power if < 20MHz	N/A
15.407 (a)(1)	A9.2(1)	Output Power	11a: 16.1dBm (40.8mW) n20: 15.1dBm (32.4 mW) n40: 15.6dBm (36.7 mW) (Max eirp: 0.188W)	17dBm	Complies
15.407 (a)(1)	-	Power Spectral Density	11a: 3.9 dBm/MHz n20: 2.9 dBm/MHz n40: 0.7 dBm/MHz	4 dBm/MHz	Complies
-	A9.5 (2)			5 dBm/MHz	Complies

Operation in the 5.25 – 5.35 GHz Band

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

FCC Rule Part	RSS Rule Part	Description	Measured Value / Comments	Limit / Requirement	Result (margin)
15.407(a)(2)		26dB Bandwidth	> 20MHz for all modes	N/A – limits output power if < 20MHz	N/A
15.407(a)(2)	A9.2(2)	Output Power	11a: 19.1dBm (81.3mW) n20: 22.0dBm (158mW) n40: 21.6dBm (145mW) (Max eirp: 0.814 W)	24 dBm / 250mW (eirp < 30dBm)	Complies
15.407(a)(2)	-	Power Spectral Density	11a: 7.0 dBm/MHz n20: 9.8 dBm/MHz n40: 6.4 dBm/MHz	11 dBm/MHz	Complies
-	A9.2(2) / A9.5 (2)	Power Spectral Density		11 dBm/MHz ¹	Complies

¹ Reduced from 11dBm because highest value exceeded the average value by more than 3dB

Operation in the 5.47 – 5.725 GHz Band

FCC Rule Part	RSS Rule Part	Description	Measured Value / Comments	Limit / Requirement	Result (margin)
15.407(a) (2)		26dB Bandwidth	> 20MHz for all modes	N/A – limits output power if < 20MHz	N/A
15.407(a) (2)	A9.2(2)	Output Power	11a: 17.4dBm (55mW) n20: 21.9dBm (155mW) n40: 21.8dBm (150mW) (Max eirp: 0.795 W)	24 dBm / 250mW (eirp < 30dBm)	Complies
15.407(a) (2))		Power Spectral Density	11a: 5.4 dBm/MHz n20: 9.7 dBm/MHz n40: 6.7 dBm/MHz	11 dBm/MHz	Complies
	A9.2(2) / A9.5 (2)	Power Spectral Density		11 dBm/MHz ²	Complies
KDB 443999	A9	Non-operation in 5600 – 5650 MHz sub band	Device cannot operate in the 5600 – 5650 MHz band –refer to Operational Description		Complies

² Reduced from 11dBm because highest value exceeded the average value by more than 3dB

Requirements for all U-NII/LELAN bands

FCC Rule Part	RSS Rule Part	Description	Measured Value / Comments	Limit / Requirement	Result
15.407	A9.5a	Modulation	Digital Modulation is used	Digital modulation is required	Complies
15.407(b) (5) / 15.209	A9.3	Spurious Emissions	67.8 dB μ V/m @ 5463.3 MHz (-0.5 dB)	Refer to page 23	Complies
15.407(a)(6)	-	Peak Excursion Ratio	9.4 dB	< 13dB	Complies
	A9.5 (3)	Channel Selection	Spurious emissions tested at outermost channels in each band	Device was tested on the top, bottom and center channels in each band	N/A
15			Measurements on three channels in each band		Complies
15.407 (c)	A9.5(4)	Operation in the absence of information to transmit	Operation is discontinued in the absence of information	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	Signal shall remain within the allocated band	Complies
15.407 (h1)	A9.4	Transmit Power Control	TCP mechanism is discussed in the Operational Description	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 without radar detection)	Refer to separate test report, reference R89337	Channel move time < 10s Channel closing transmission time < 260ms	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	Antennas are internal to the device	Unique or integral antenna required	Complies
15.207	RSS GEN Table 2	AC Conducted Emissions	43.4 dB μ V @ 0.397 MHz (-4.5 dB)	Refer to page 20	Complies
15.109	RSS GEN 7.2.3 Table 1	Receiver spurious emissions	N/A – Device tunes above 960MHz	Refer to page 21	N/A
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.	Refer to OET 65, FCC Part 1 and RSS 102	Complies
-	RSP 100 RSS GEN 7.1.5	User Manual	Antennas are internal to the device	Statement for products with detachable antenna	N/A
-	RSP 100 RSS GEN 4.4.1	99% Bandwidth	11a: 17.0 MHz n20: 17.0 MHz n40: 36.4 MHz	Information only	N/A

MEASUREMENT UNCERTAINTIES

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

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

EQUIPMENT UNDER TEST (EUT) DETAILS

GENERAL

The Pace Americas model HR44 is a set-top-box that incorporates 802.11abgn 2x2 and 2.4GHz 802.15.4 radios. Since the EUT would be placed on a table top during operation, the EUT was treated as table-top equipment during testing to simulate the end-user environment. The electrical rating of the EUT is 120 Volts, 60Hz, 1.3 Amps.

The sample was received on August 27, 2012 and tested on August 27, 29, 30 and 31, September 4, 6, 7, 25 and 26, 2012. The EUT consisted of the following component(s):

Company	Model	Description	Serial Number	FCC ID
Direct TV	HR44	Set-top-box	Prototype	PGRHR44
Chicony	EPS44R0-15	External power supply	-	N/A

ANTENNA SYSTEM

The wifi and 802.15.4 radios use separate antennas.
 The peak gain for the WiFi antennas: 3.3 dBi (2.4GHz), 4.1 dBi (5GHz)
 The peak gain for the 802.15.4 antennas: 4.9 dBi (2.4GHz)

ENCLOSURE

The EUT enclosure is primarily constructed of plastic. It measures approximately 34 cm wide by 25 cm deep by 4.5 cm high.

MODIFICATIONS

No modifications were made to the EUT during the time the product was at NTS Silicon Valley.

SUPPORT EQUIPMENT

No local support equipment was used during testing.

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

Company	Model	Description	Serial Number	FCC ID
Dell	Latitude D630	Laptop	-	-

EUT INTERFACE PORTS

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

Port	Connected To	Description	Cable(s)	
			Shielded or Unshielded	Length(m)
Serial	Laptop	Multiwire	Shielded	5
DC power	External power supply	2 wire	Unshielded	2
AC power (ext supply)	AC Mains	3 wire	Unshielded	2

EUT OPERATION

During emissions testing the EUT was transmitting in the mode, on the channel, & at the power called out in the individual tests. For 802.11b mode tests, 1Mb/s was used; 6Mb/s for 802.11g; MCS0 for n20 and n40. These represented the worse case modes.

Note – preliminary testing was performed with both the wifi and zigbee radios operating at the same time. There was no measureable difference with only one radio operating. All final testing was performed with only one radio operating, unless otherwise noted.

TEST SITE

GENERAL INFORMATION

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

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

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

CONDUCTED EMISSIONS CONSIDERATIONS

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

RADIATED EMISSIONS CONSIDERATIONS

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

MEASUREMENT INSTRUMENTATION

RECEIVER SYSTEM

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

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

INSTRUMENT CONTROL COMPUTER

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

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

LINE IMPEDANCE STABILIZATION NETWORK (LISN)

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

FILTERS/ATTENUATORS

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

ANTENNAS

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

ANTENNA MAST AND EQUIPMENT TURNTABLE

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

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

INSTRUMENT CALIBRATION

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

TEST PROCEDURES

EUT AND CABLE PLACEMENT

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

CONDUCTED EMISSIONS

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

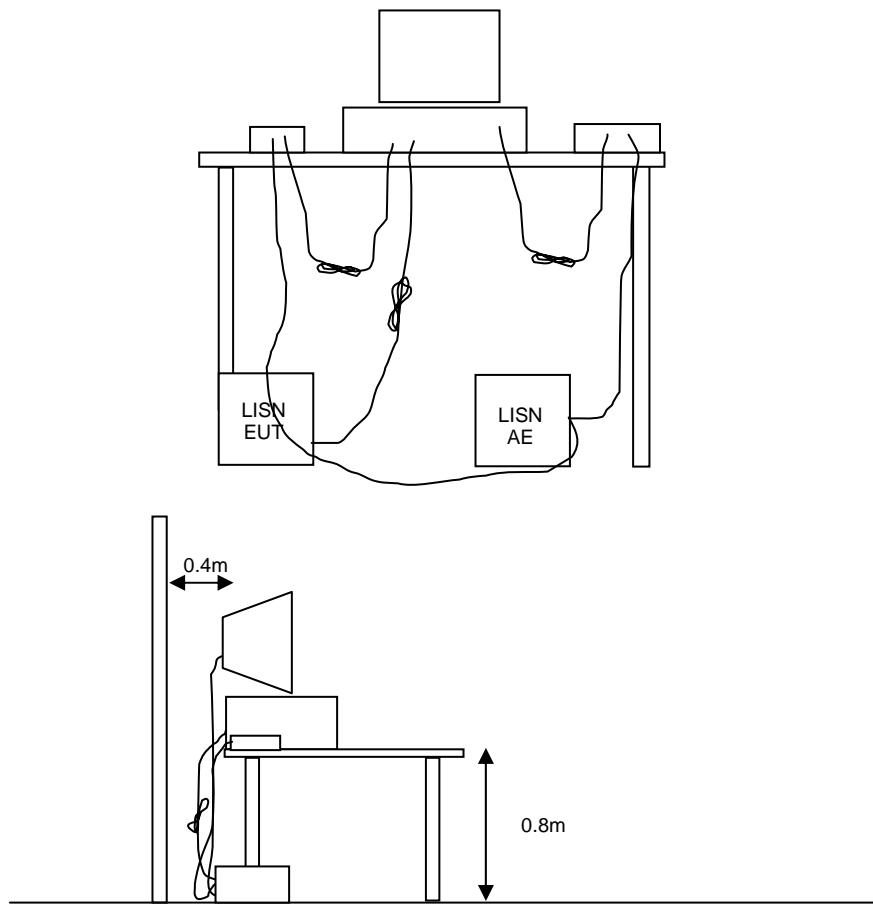


Figure 1 Typical Conducted Emissions Test Configuration

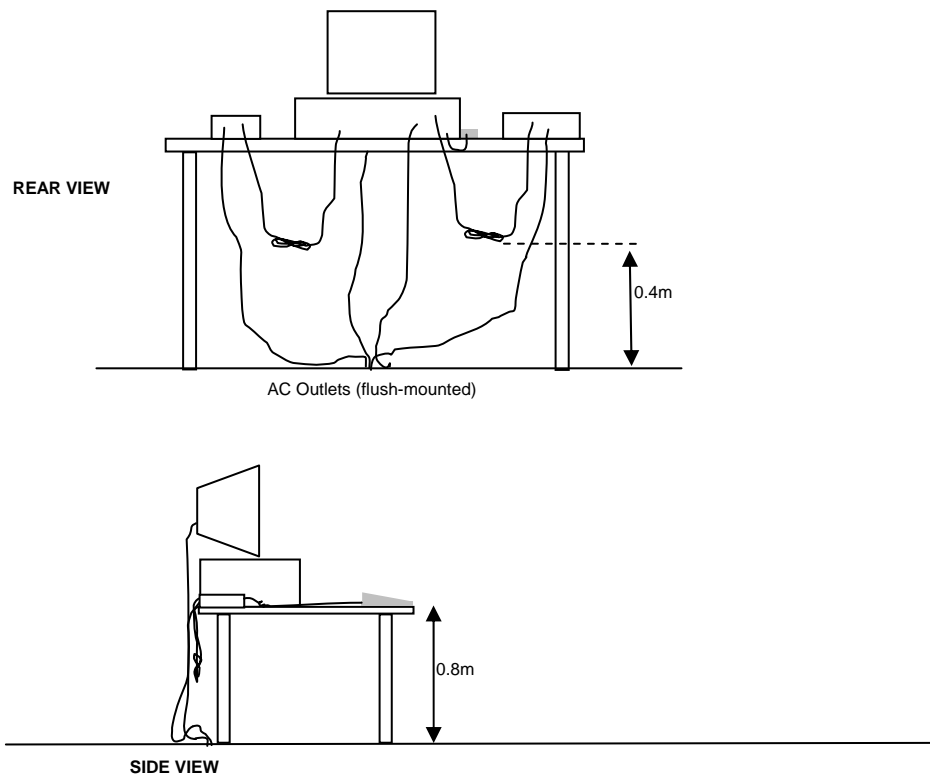
RADIATED EMISSIONS

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

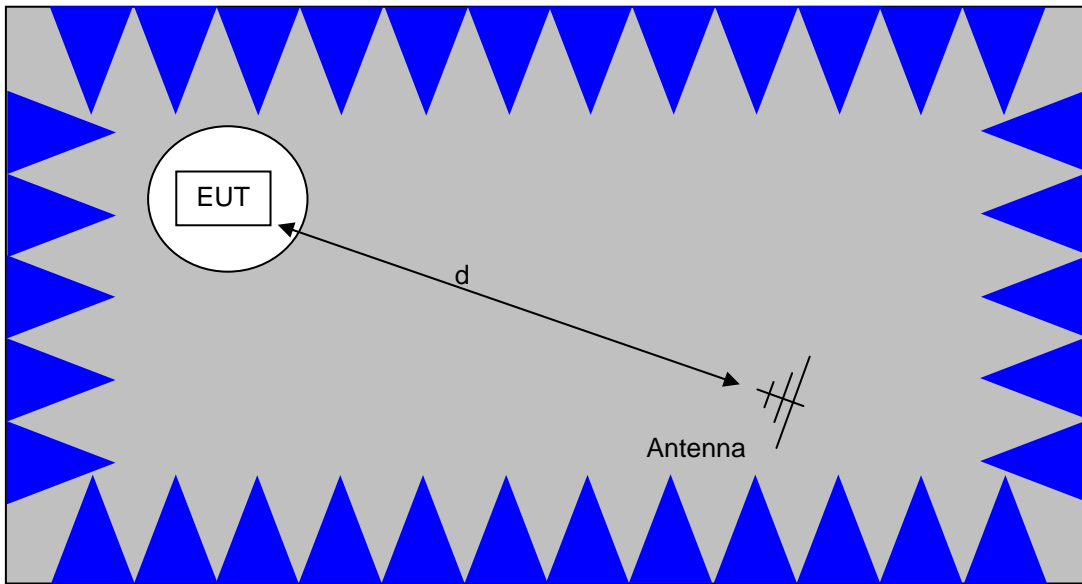
A speaker is provided in the receiver to aid in discriminating between EUT and ambient emissions. Other methods used during the preliminary scan for EUT emissions involve scanning with near field magnetic loops, monitoring I/O cables with RF current clamps, and cycling power to the EUT.

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

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

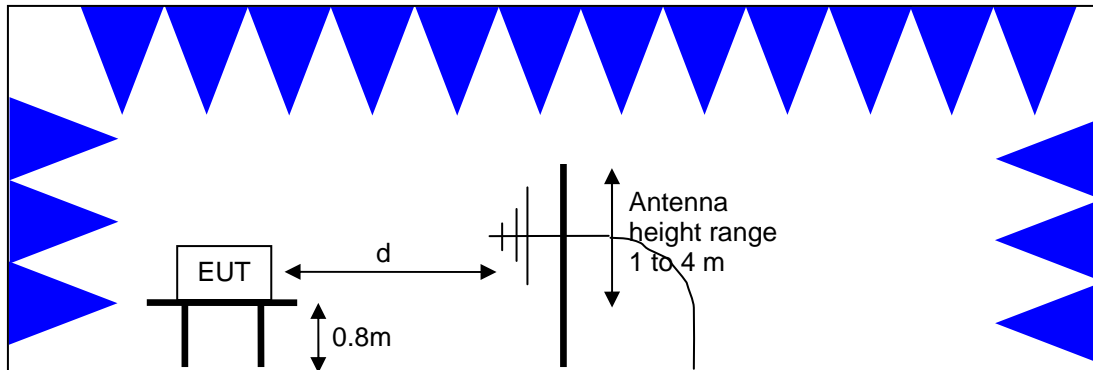


Typical Test Configuration for Radiated Field Strength Measurements



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

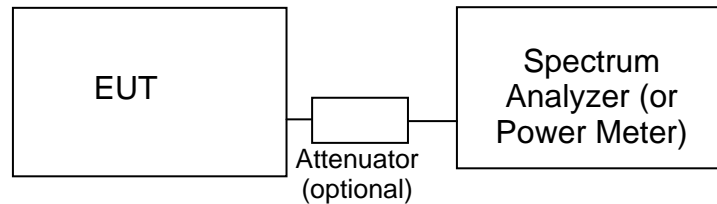
Floor-standing equipment is placed on the floor with insulating supports between the unit and the ground plane.



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

CONDUCTED EMISSIONS FROM ANTENNA PORT

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

**Test Configuration for Antenna Port Measurements**

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

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

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

BANDWIDTH MEASUREMENTS

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

SPECIFICATION LIMITS AND SAMPLE CALCULATIONS

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

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

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

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

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

GENERAL TRANSMITTER RADIATED EMISSIONS SPECIFICATION LIMITS

The table below shows the limits for the spurious emissions from transmitters that fall in restricted bands³ (with the exception of transmitters operating under FCC Part 15 Subpart D and RSS 210 Annex 9), the limits for all emissions from a low power device operating under the general rules of RSS 310 (tables 3 and 4), RSS 210 (table 2) and FCC Part 15 Subpart C section 15.209.

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

RECEIVER RADIATED SPURIOUS EMISSIONS SPECIFICATION LIMITS

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

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

³ The restricted bands are detailed in FCC 15.203, RSS 210 Table 1 and RSS 310 Table 2

FCC 15.407 (a) OUTPUT POWER LIMITS

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

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

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

The peak excursion envelope is limited to 13dB.

OUTPUT POWER LIMITS –LELAN DEVICES

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

Operating Frequency (MHz)	Output Power	Power Spectral Density
5150 – 5250	200mW (23 dBm) eirp	10 dBm/MHz eirp
5250 – 5350	250 mW (24 dBm) ⁴ 1W (30dBm) eirp	11 dBm/MHz
5470 – 5725	250 mW (24 dBm) ⁵ 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 10log(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.

⁴ If EIRP exceeds 500mW the device must employ TPC

⁵ If EIRP exceeds 500mW the device must employ TPC

SPURIOUS EMISSIONS LIMITS –UNII and LELAN DEVICES

The spurious emissions limits for signals below 1GHz are the FCC/RSS-GEN general limits. For emissions above 1GHz, signals in restricted bands are subject to the FCC/RSS GEN general limits. All other signals have a limit of -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 (88.3dBuV/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 .

SAMPLE CALCULATIONS - CONDUCTED EMISSIONS

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

$$R_r - S = M$$

where:

R_r = Receiver Reading in dBuV

S = Specification Limit in dBuV

M = Margin to Specification in +/- dB

SAMPLE CALCULATIONS - RADIATED EMISSIONS

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

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

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

where:

F_d = Distance Factor in dB

D_m = Measurement Distance in meters

D_s = Specification Distance in meters

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

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

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

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

$$R_c = R_r + F_d$$

and

$$M = R_c - L_s$$

where:

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

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

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

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

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

SAMPLE CALCULATIONS - FIELD STRENGTH TO EIRP CONVERSION

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

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

where P is the eirp (Watts)

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

Appendix A Test Equipment Calibration Data

<u>Manufacturer</u>	<u>Description</u>	<u>Model</u>	<u>Asset #</u>	<u>Cal Due</u>
Radiated Emissions, 1,000 - 6,500 MHz, 27-Aug-12				
EMCO	Antenna, Horn, 1-18 GHz	3115	487	7/19/2014
Rohde & Schwarz	EMI Test Receiver, 20 Hz-7 GHz	ESIB7	1538	12/6/2012
Radiated Emissions, 1000 - 6,500 MHz, 28-Aug-12				
Fluke Mfg. Inc.	Digital Multimeter	73	77	5/14/2013
EMCO	Antenna, Horn, 1-18 GHz	3115	1561	7/12/2014
Rohde & Schwarz	EMI Test Receiver, 20 Hz-40 GHz	ESIB40 (1088.7490.40)	2493	12/9/2012
Radiated Emissions, 1000 - 25,000 MHz, 29-Aug-12				
Hewlett Packard	SpecAn 30 Hz -40 GHz, SV (SA40) Red	8564E (84125C)	1148	9/15/2012
EMCO	Antenna, Horn, 1-18 GHz	3115	1561	7/12/2014
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	1780	11/22/2012
Micro-Tronics	Band Reject Filter, 2400-2500 MHz	BRM50702-02	2249	10/11/2012
Radiated Emissions, 1,000 - 26,500 MHz, 29-Aug-12				
Hewlett Packard	SpecAn 30 Hz -40 GHz, SV (SA40) Red	8564E (84125C)	1148	9/15/2012
EMCO	Antenna, Horn, 1-18 GHz	3115	1561	7/12/2014
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	1780	11/22/2012
Micro-Tronics	Band Reject Filter, 2400-2500 MHz	BRM50702-02	2249	10/11/2012
Radiated Emissions, 18 - 40 GHz, 30-Aug-12				
Hewlett Packard	Head (Inc flex cable, 1143, 2198) Red	84125C	1145	7/5/2013
Hewlett Packard	SpecAn 30 Hz -40 GHz, SV (SA40) Red	8564E (84125C)	1148	9/15/2012
A.H. Systems	Red System Horn, 18-40GHz	SAS-574, p/n: 2581	2161	3/20/2013
Radiated Emissions, 1000 - 18,000 MHz, 31-Aug-12				
EMCO	Antenna, Horn, 1-18 GHz (SA40-Blu)	3115	1386	9/21/2012
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	2199	2/23/2013
Micro-Tronics	Band Reject Filter, 5470-5725 MHz	BRC50704-02	2240	10/4/2012
Hewlett Packard	SpecAn 9 kHz - 40 GHz, (SA40) Purple	8564E (84125C)	2415	8/10/2013
Radiated Emissions, 1000 - 18,000 MHz, 04-Sep-12				
Narda West	High Pass Filter, 8 GHz	HPF 180	821	3/22/2013
Hewlett Packard	SpecAn 30 Hz -40 GHz, SV (SA40) Red	8564E (84125C)	1148	9/15/2012
EMCO	Antenna, Horn, 1-18 GHz	3115	1561	7/12/2014
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	1780	11/22/2012
Micro-Tronics	Band Reject Filter, 5150-5350 MHz	BRC50703-02	2239	10/4/2012

<u>Manufacturer</u>	<u>Description</u>	<u>Model</u>	<u>Asset #</u>	<u>Cal Due</u>
Micro-Tronics	Band Reject Filter, 5470-5725 MHz	BRC50704-02	2240	10/4/2012
Radiated Emissions, 1000 - 18,000 MHz, 06-Sep-12				
EMCO	Antenna, Horn, 1-18 GHz	3115	487	7/19/2014
Narda West	High Pass Filter, 8 GHz	HPF 180	821	3/22/2013
Hewlett Packard	SpecAn 30 Hz -40 GHz, SV (SA40) Red	8564E (84125C)	1148	9/15/2012
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	1780	11/22/2012
Micro-Tronics	Band Reject Filter, 5150-5350 MHz	BRC50703-02	2239	10/4/2012
Radiated Emissions, 1000 - 18,000 MHz, 07-Sep-12				
EMCO	Antenna, Horn, 1-18 GHz (SA40-Blu)	3115	1386	9/21/2012
Micro-Tronics	Band Reject Filter, 5470-5725 MHz	BRC50704-02	1730	8/2/2013
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	2199	2/23/2013
Micro-Tronics	Band Reject Filter, 5150-5350 MHz	BRC50703-02	2251	10/11/2012
Hewlett Packard	SpecAn 9 kHz - 40 GHz, (SA40) Purple	8564E (84125C)	2415	8/10/2013
Radiated Emissions, 1000 - 18,000 MHz, 07-Sep-12				
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	263	3/29/2013
Narda West	High Pass Filter, 8 GHz	HPF 180	821	3/22/2013
Hewlett Packard	SpecAn 9 kHz - 40 GHz, FT (SA40) Blue	8564E (84125C)	1393	5/1/2013
EMCO	Antenna, Horn, 1-18 GHz	3115	1561	7/12/2014
Micro-Tronics	Band Reject Filter, 5470-5725 MHz	BRC50704-02	1730	8/2/2013
Micro-Tronics	Band Reject Filter, 5150-5350 MHz	BRC50703-02	2251	10/11/2012
Radiated Emissions, 1 - 12 GHz, 11-Sep-12				
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	263	3/29/2013
EMCO	Antenna, Horn, 1-18GHz	3115	868	6/19/2014
Hewlett Packard	SpecAn 9 kHz - 40 GHz, FT (SA40) Blue	8564E (84125C)	1393	5/1/2013
Micro-Tronics	Band Reject Filter, 5725-5875 MHz	BRC50705-02	1682	3/23/2013
Radiated Emissions, 30 - 12,000 MHz, 12-Sep-12				
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	263	3/29/2013
EMCO	Antenna, Horn, 1-18GHz	3115	868	6/19/2014
Hewlett Packard	SpecAn 9 kHz - 40 GHz, FT (SA40) Blue	8564E (84125C)	1393	5/1/2013
Micro-Tronics	Band Reject Filter, 5725-5875 MHz	BRC50705-02	2241	10/4/2012
Radio Antenna Port (Power and Spurious Emissions), 14-Sep-12				
Rohde & Schwarz	EMI Test Receiver, 20 Hz-7 GHz	ESIB7	1756	5/21/2013

<u>Manufacturer</u>	<u>Description</u>	<u>Model</u>	<u>Asset #</u>	<u>Cal Due</u>
Radio Antenna Port (Power and Spurious Emissions), 17-Sep-12				
Hewlett Packard	SpecAn 9 kHz - 40 GHz, FT (SA40) Blue	8564E (84125C)	1393	5/1/2013
Radio Antenna Port (Power and Spurious Emissions), 19-Sep-12				
Anritsu	Anritsu 68347C Signal Generator, 10MHz-20GHz	68347C	1785	6/29/2013
Agilent	PSA, Spectrum Analyzer, (installed options, 111, 115, 123, 1DS, B7J, HYX,	E4446A	2139	2/23/2013
Radiated Emissions, 1000 - 26,000 MHz, 20-Sep-12				
EMCO	Antenna, Horn, 1-18 GHz	3115	487	7/19/2014
Rohde & Schwarz	EMI Test Receiver, 20 Hz-7 GHz	ESIB7	1630	5/31/2013
Micro-Tronics	Band Reject Filter, 5470-5725 MHz	BRC50704-02	1681	8/31/2013
Hewlett Packard	Head (Inc W1-W4, 1946 , 1947) Purple	84125C	1772	5/1/2013
A.H. Systems	Purple System Horn, 18-40GHz	SAS-574, p/n: 2581	2160	4/17/2013
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	2199	2/23/2013
Micro-Tronics	Band Reject Filter, 2400-2500 MHz	BRM50702-02	2238	10/4/2012
Hewlett Packard	SpecAn 9 kHz - 40 GHz, (SA40) Purple	8564E (84125C)	2415	8/10/2013
Radio Antenna Port (Power and Spurious Emissions), 20-Sep-12				
Anritsu	Anritsu 68347C Signal Generator, 10MHz-20GHz	68347C	1785	6/29/2013
Agilent	PSA, Spectrum Analyzer, (installed options, 111, 115, 123, 1DS, B7J, HYX,	E4446A	2139	2/23/2013
Radiated Emissions, 30 - 2,000 MHz, 21-Sep-12				
Hewlett Packard	SpecAn 30 Hz -40 GHz, SV (SA40) Red	8564E (84125C)	1148	9/14/2013
EMCO	Antenna, Horn, 1-18 GHz (SA40-Red)	3115	1142	8/23/2014
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	1780	11/22/2012
Hewlett Packard	Preamplifier, 100 kHz - 1.3 GHz	8447D OPT 010	1826	5/18/2013
Sunol Sciences	Biconilog, 30-3000 MHz	JB3	2197	2/7/2014
Rohde & Schwarz	EMI Test Receiver, 20 Hz-40 GHz	ESIB40 (1088.7490.40)	2493	12/9/2012
Radio Antenna Port (Power and Spurious Emissions), 24-Sep-12				
Agilent	PSA, Spectrum Analyzer, (installed options, 111, 115, 123, 1DS, B7J, HYX,	E4446A	2139	2/23/2013
Antenna conducted measurements, 25-Sep-12				
Rohde & Schwarz	Power Meter, Single Channel	NRVS	1422	12/13/2012
Rohde & Schwarz	Power Sensor 100 uW - 2 Watts (w/ 20 dB pad, SN BJ5155)	NRV-Z32	1536	12/8/2012
Agilent	PSA, Spectrum Analyzer, (installed options, 111, 115, 123, 1DS, B7J, HYX,	E4446A	2139	2/23/2013

<u>Manufacturer</u>	<u>Description</u>	<u>Model</u>	<u>Asset #</u>	<u>Cal Due</u>
Conducted Emissions - AC Power Ports, 26-Sep-12				
Rohde & Schwarz	Pulse Limiter	ESH3 Z2	1594	5/22/2013
Rohde & Schwarz	EMI Test Receiver, 20 Hz-40 GHz	ESIB40 (1088.7490.40)	2493	12/9/2012
Com-Power	9KHz-30MHz, 50uH, 15Aac, 10Adc, max	LI-215A	2672	5/25/2013
Conducted Emissions - AC Power Ports, 26-Sep-12				
Rohde & Schwarz	Pulse Limiter	ESH3 Z2	1401	5/15/2013
Rohde & Schwarz	EMI Test Receiver, 20 Hz-40 GHz	ESIB40 (1088.7490.40)	2493	12/9/2012
Com-Power	9KHz-30MHz, 50uH, 15Aac, 10Adc, max	LI-215A	2671	5/25/2013

Appendix B Test Data

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EMC Test Data

Client:	Pace Americas	Job Number:	J87430
Product:	HR44	T-Log Number:	T89059
		Account Manager:	Michelle Kim
Contact:	Mark Rieger		-
Emissions Standard(s):	FCC 15.247, 15E, RSS-210, 15B	Class:	-
Immunity Standard(s):	-	Environment:	-

EMC Test Data

For The

Pace Americas

Product

HR44

Date of Last Test: 10/12/2012



EMC Test Data

Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
	Account Manager: Michelle Kim
Contact: Mark Rieger	
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: -

Conducted Emissions

(Elliott Laboratories Fremont Facility, Semi-Anechoic Chamber)

Test Specific Details

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

Date of Test: 9/26/2012	Config. Used: 1
Test Engineer: John Caizzi	Config Change: none
Test Location: Fremont Chamber #5	EUT Voltage: 120V/60Hz

General Test Configuration

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

Ambient Conditions:	Temperature:	23 °C
	Rel. Humidity:	43 %

Summary of Results

Run #	Test Performed	Limit	Result	Margin
2	CE, AC Power, 120V/60Hz	Class B	Pass	43.4 dBµV @ 0.397 MHz (-4.5 dB)

Modifications Made During Testing

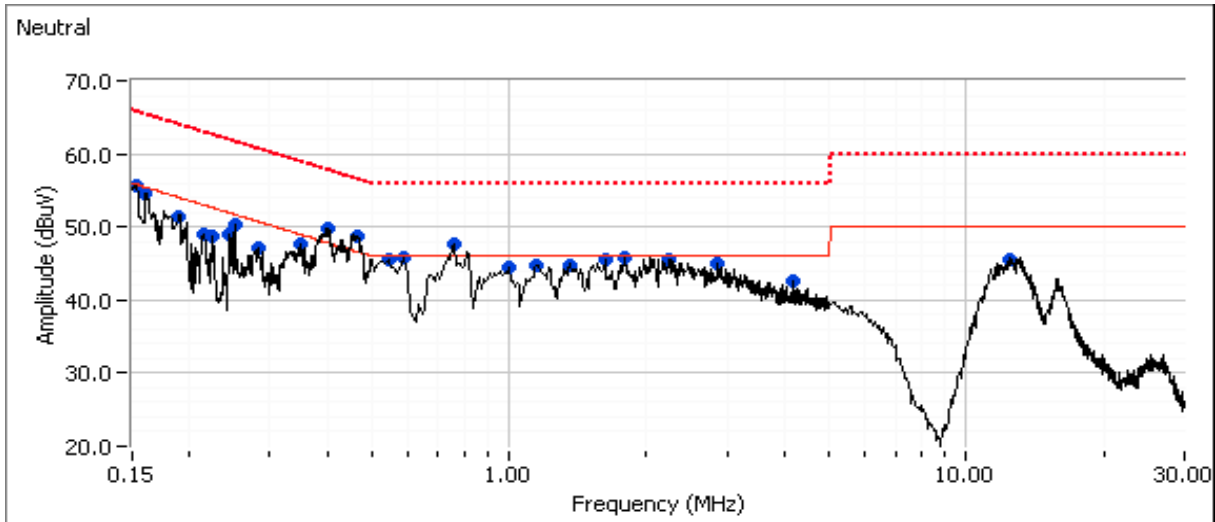
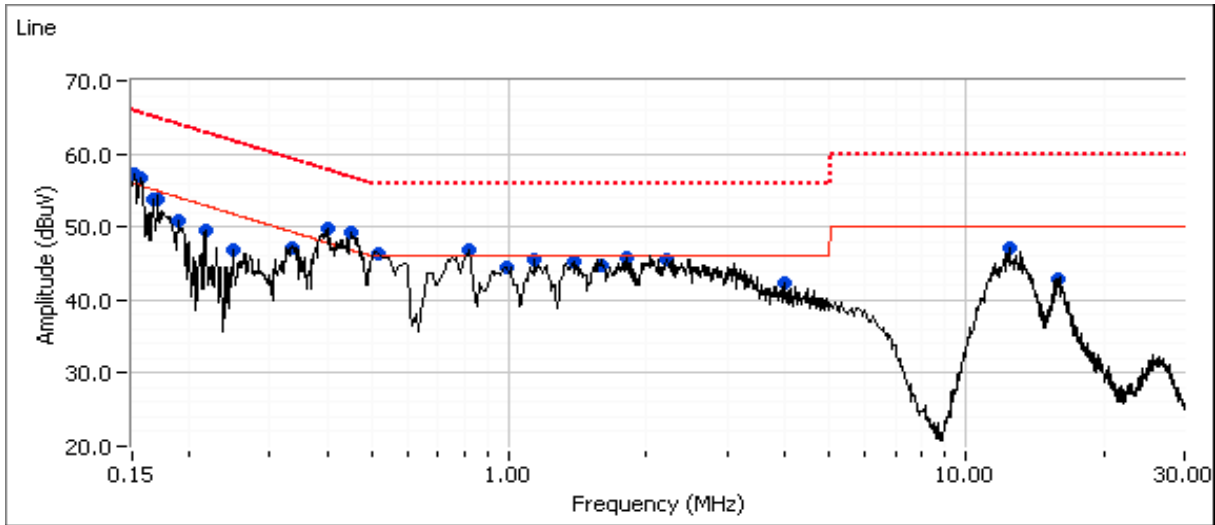
No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: -

Run #2: AC Power Port Conducted Emissions, 0.15 - 30MHz, 120V / 60Hz. Wi-Fi on channel 6, Zigbee on channel 25, max power.





EMC Test Data

Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: -

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

Frequency MHz	Level dB μ V	AC Line	Class B		Detector QP/Ave	Comments
			Limit	Margin		
0.152	57.2	Line	55.9	1.3	Peak	
0.158	56.6	Line	55.6	1.0	Peak	
0.166	53.9	Line	55.1	-1.2	Peak	
0.172	53.9	Line	54.9	-1.0	Peak	
0.190	50.9	Line	54.1	-3.2	Peak	
0.217	49.6	Line	52.9	-3.3	Peak	
0.336	47.0	Line	49.3	-2.3	Peak	
0.397	49.7	Line	47.8	1.9	Peak	
0.452	49.2	Line	46.9	2.3	Peak	
0.249	46.9	Line	51.8	-4.9	Peak	
0.508	46.4	Line	46.0	0.4	Peak	
0.800	46.9	Line	46.0	0.9	Peak	
1.145	45.4	Line	46.0	-0.6	Peak	
0.977	44.4	Line	46.0	-1.6	Peak	
1.364	45.2	Line	46.0	-0.8	Peak	
1.600	44.8	Line	46.0	-1.2	Peak	
1.773	45.7	Line	46.0	-0.3	Peak	
2.196	45.6	Line	46.0	-0.4	Peak	
4.036	42.4	Line	46.0	-3.6	Peak	
12.563	47.0	Line	50.0	-3.0	Peak	
15.763	43.0	Line	50.0	-7.0	Peak	
0.153	55.6	Neutral	55.8	-0.2	Peak	
0.160	54.6	Neutral	55.4	-0.8	Peak	
0.190	51.5	Neutral	54.0	-2.5	Peak	
0.216	49.1	Neutral	53.0	-3.9	Peak	
0.249	50.4	Neutral	51.7	-1.3	Peak	
0.244	48.9	Neutral	51.9	-3.0	Peak	
0.223	48.7	Neutral	52.7	-4.0	Peak	
0.285	47.1	Neutral	50.7	-3.6	Peak	
0.348	47.7	Neutral	49.0	-1.3	Peak	
0.400	49.8	Neutral	47.8	2.0	Peak	
0.465	48.7	Neutral	46.6	2.1	Peak	
0.550	45.5	Neutral	46.0	-0.5	Peak	
0.589	45.7	Neutral	46.0	-0.3	Peak	
0.760	47.7	Neutral	46.0	1.7	Peak	
0.970	44.5	Neutral	46.0	-1.5	Peak	



EMC Test Data

Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: -

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

Frequency	Level	AC	Class B		Detector	Comments
1.784	45.7	Neutral	46.0	-0.3	Peak	
1.361	44.8	Neutral	46.0	-1.2	Peak	
1.161	44.8	Neutral	46.0	-1.2	Peak	
1.622	45.6	Neutral	46.0	-0.4	Peak	
2.240	45.4	Neutral	46.0	-0.6	Peak	
2.891	45.1	Neutral	46.0	-0.9	Peak	
4.173	42.6	Neutral	46.0	-3.4	Peak	
12.516	45.4	Neutral	50.0	-4.6	Peak	



EMC Test Data

Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: -

Final quasi-peak and average readings

Frequency MHz	Level dB μ V	AC Line	Class B		Detector QP/Ave	Comments
			Limit	Margin		
0.152	42.5	Line	55.9	-13.4	AVG	
0.152	53.0	Line	65.9	-12.9	QP	
0.158	38.5	Line	55.6	-17.1	AVG	
0.158	50.4	Line	65.6	-15.2	QP	
0.166	32.5	Line	55.2	-22.7	AVG	
0.166	50.1	Line	65.2	-15.1	QP	
0.172	39.8	Line	54.9	-15.1	AVG	
0.172	49.5	Line	64.9	-15.4	QP	
0.190	33.8	Line	54.0	-20.2	AVG	
0.190	46.0	Line	64.0	-18.0	QP	
0.217	28.1	Line	52.9	-24.8	AVG	
0.217	40.6	Line	62.9	-22.3	QP	
0.336	36.3	Line	49.3	-13.0	AVG	
0.336	45.5	Line	59.3	-13.8	QP	
0.397	43.4	Line	47.9	-4.5	AVG	
0.397	47.4	Line	57.9	-10.5	QP	
0.452	38.6	Line	46.8	-8.2	AVG	
0.452	47.2	Line	56.8	-9.6	QP	
0.249	34.4	Line	51.8	-17.4	AVG	
0.249	42.3	Line	61.8	-19.5	QP	
0.508	35.3	Line	46.0	-10.7	AVG	
0.508	43.5	Line	56.0	-12.5	QP	
0.800	35.1	Line	46.0	-10.9	AVG	
0.800	43.2	Line	56.0	-12.8	QP	
1.145	36.8	Line	46.0	-9.2	AVG	
1.145	42.4	Line	56.0	-13.6	QP	
0.977	36.3	Line	46.0	-9.7	AVG	
0.977	41.3	Line	56.0	-14.7	QP	
1.364	36.9	Line	46.0	-9.1	AVG	
1.364	42.4	Line	56.0	-13.6	QP	
1.600	36.4	Line	46.0	-9.6	AVG	
1.600	42.0	Line	56.0	-14.0	QP	
1.773	35.8	Line	46.0	-10.2	AVG	
1.773	42.7	Line	56.0	-13.3	QP	



EMC Test Data

Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: -

Final quasi-peak and average readings (continued)

Frequency MHz	Level dB μ V	AC Line	Class B		Detector QP/Ave	Comments
			Limit	Margin		
2.196	35.5	Line	46.0	-10.5	AVG	
2.196	42.1	Line	56.0	-13.9	QP	
4.036	31.6	Line	46.0	-14.4	AVG	
4.036	37.7	Line	56.0	-18.3	QP	
12.563	36.4	Line	50.0	-13.6	AVG	
12.563	42.1	Line	60.0	-17.9	QP	
15.763	31.9	Line	50.0	-18.1	AVG	
15.763	38.5	Line	60.0	-21.5	QP	
0.153	42.2	Neutral	55.8	-13.6	AVG	
0.153	53.0	Neutral	65.8	-12.8	QP	
0.160	36.1	Neutral	55.5	-19.4	AVG	
0.160	49.4	Neutral	65.5	-16.1	QP	
0.190	34.0	Neutral	54.0	-20.0	AVG	
0.190	45.9	Neutral	64.0	-18.1	QP	
0.216	29.2	Neutral	53.0	-23.8	AVG	
0.216	40.8	Neutral	63.0	-22.2	QP	
0.249	33.9	Neutral	51.8	-17.9	AVG	
0.249	42.1	Neutral	61.8	-19.7	QP	
0.244	31.8	Neutral	52.0	-20.2	AVG	
0.244	41.1	Neutral	62.0	-20.9	QP	
0.223	26.5	Neutral	52.7	-26.2	AVG	
0.223	39.2	Neutral	62.7	-23.5	QP	
0.285	35.6	Neutral	50.7	-15.1	AVG	
0.285	42.1	Neutral	60.7	-18.6	QP	
0.348	34.8	Neutral	49.0	-14.2	AVG	
0.348	44.5	Neutral	59.0	-14.5	QP	
0.400	38.1	Neutral	47.9	-9.8	AVG	
0.400	48.4	Neutral	57.9	-9.5	QP	
0.465	38.3	Neutral	46.6	-8.3	AVG	
0.465	46.3	Neutral	56.6	-10.3	QP	
0.550	33.2	Neutral	46.0	-12.8	AVG	
0.550	43.1	Neutral	56.0	-12.9	QP	
0.589	32.5	Neutral	46.0	-13.5	AVG	
0.589	42.4	Neutral	56.0	-13.6	QP	
0.760	35.2	Neutral	46.0	-10.8	AVG	
0.760	43.6	Neutral	56.0	-12.4	QP	
0.970	36.8	Neutral	46.0	-9.2	AVG	



EMC Test Data

Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
	Account Manager: Michelle Kim
Contact: Mark Rieger	
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: -

Final quasi-peak and average readings (continued)

Frequency MHz	Level dB μ V	AC Line	Class B		Detector QP/Ave	Comments
			Limit	Margin		
0.970	41.9	Neutral	56.0	-14.1	QP	
1.361	36.5	Neutral	46.0	-9.5	AVG	
1.361	42.6	Neutral	56.0	-13.4	QP	
1.161	36.4	Neutral	46.0	-9.6	AVG	
1.161	41.9	Neutral	56.0	-14.1	QP	
1.622	34.1	Neutral	46.0	-11.9	AVG	
1.622	41.2	Neutral	56.0	-14.8	QP	
1.784	35.8	Neutral	46.0	-10.2	AVG	
1.784	42.0	Neutral	56.0	-14.0	QP	
2.240	34.1	Neutral	46.0	-11.9	AVG	
2.240	41.4	Neutral	56.0	-14.6	QP	
2.891	34.0	Neutral	46.0	-12.0	AVG	
2.891	39.7	Neutral	56.0	-16.3	QP	
4.173	30.3	Neutral	46.0	-15.7	AVG	
4.173	36.7	Neutral	56.0	-19.3	QP	
12.516	36.5	Neutral	50.0	-13.5	AVG	
12.516	41.9	Neutral	60.0	-18.1	QP	



EMC Test Data

Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
	Account Manager: Michelle Kim
Contact: Mark Rieger	
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A

RSS 210 and FCC 15.407 (UNII) Radiated Spurious Emissions

Test Specific Details

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

General Test Configuration

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

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

Ambient Conditions: Temperature: 18-20 °C
 Rel. Humidity: 30-35 %

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.

Notes

All testing performed with both chains transmitting at the noted power setting

Test Procedure Comments:

Unless otherwise noted, average measurements above 1GHz were performed as documented in FCC KDB 789033 G) 6) d) Method VB

For emissions outside of the restricted bands the limit is -27dBm/MHz eirp (68.3dBuV/m). The measurement method required is a peak measurement (RB=1MHz, VB≥3MHz, peak detector).

Antenna: internal antennas
 Duty Cycle: 6Mbps 91.7%



EMC Test Data

Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A

Summary of Results

Run #	Mode	Channel	Power Setting	Measured Power	Test Performed	Limit	Result / Margin
1	a mode	36	17.0		Restricted Band Edge at 5150 MHz	15.209	53.4 dB μ V/m @ 5148.7 MHz (-0.6 dB)
		64	18.0		Restricted Band Edge at 5350 MHz	15.209	52.6 dB μ V/m @ 5350.0 MHz (-1.4 dB)
		100	20.0		Restricted Band Edge at 5460 MHz	15.209	46.4 dB μ V/m @ 5437.5 MHz (-7.6 dB)
		100	20.0		Band Edge at 5470 MHz	15.407	61.3 dB μ V/m @ 5731.5 MHz (-7.0 dB)
		140	20.0		Band Edge at 5725 MHz	15.407	61.3 dB μ V/m @ 5731.5 MHz (-7.0 dB)
2	n20 mode	36	20.0		Restricted Band Edge at 5150 MHz	15.209	51.9 dB μ V/m @ 5149.1 MHz (-2.1 dB)
		64			Restricted Band Edge at 5350 MHz	15.209	46.8 dB μ V/m @ 5351.3 MHz (-7.2 dB)
		100			Restricted Band Edge at 5460 MHz	15.209	45.7 dB μ V/m @ 5440.2 MHz (-8.3 dB)
		100			Band Edge at 5470 MHz	15.407	67.8 dB μ V/m @ 5463.3 MHz (-0.5 dB)
		140			Band Edge at 5725 MHz	15.407	67.6 dB μ V/m @ 5725.1 MHz (-0.7 dB)
3	n40 mode	38	17.0		Restricted Band Edge at 5150 MHz	15.209	53.8 dB μ V/m @ 5150.0 MHz (-0.2 dB)
		62	19.0		Restricted Band Edge at 5350 MHz	15.209	53.1 dB μ V/m @ 5350.0 MHz (-0.9 dB)
		102	20.0		Restricted Band Edge at 5460 MHz	15.209	48.6 dB μ V/m @ 5459.8 MHz (-5.4 dB)
		102	19.0		Band Edge at 5470 MHz	15.407	65.8 dB μ V/m @ 5467.9 MHz (-2.5 dB)
		134	20.0		Band Edge at 5725 MHz	15.407	60.6 dB μ V/m @ 5766.6 MHz (-7.7 dB)



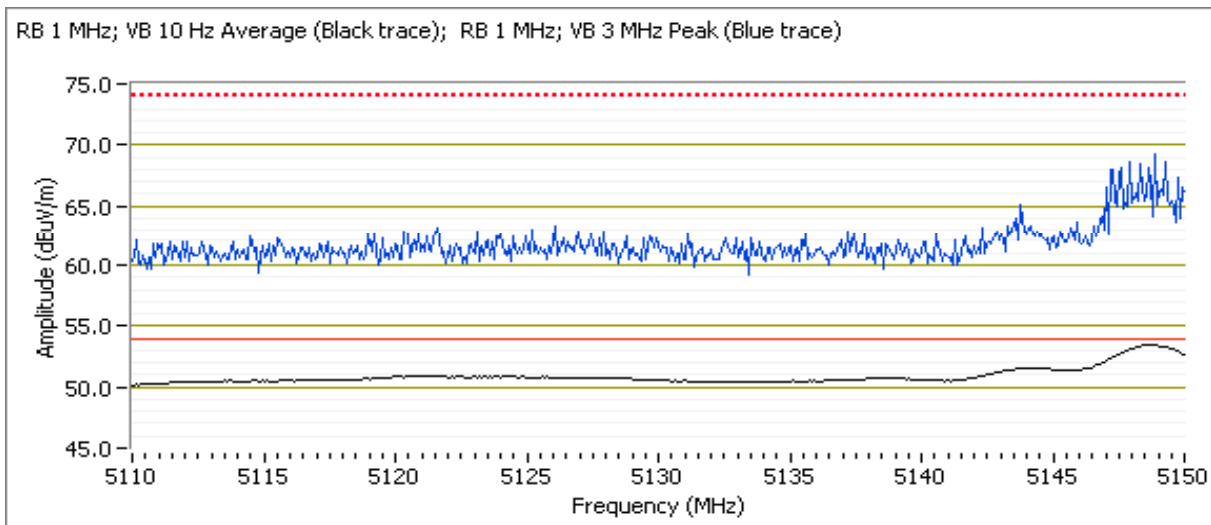
EMC Test Data

Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A

Run #1, Radiated Spurious Emissions, 30 - 40,000 MHz. Operation in 802.11a mode
 Date of Test: 08/27/12 Test Location: FT Chamber #4
 Test Engineer: M. Birgani

Run #1a: Channel 36 @ 5180 MHz (6Mbps Power: 17.0dBm)
 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				
5148.720	53.4	H	54.0	-0.6	AVG	306	1.0	POS; RB 1 MHz; VB: 10 Hz
5148.800	53.3	V	54.0	-0.7	AVG	307	0.9	POS; RB 1 MHz; VB: 10 Hz
5148.640	71.3	V	74.0	-2.7	PK	307	0.9	POS; RB 1 MHz; VB: 3 MHz
5142.790	67.1	H	74.0	-6.9	PK	306	1.0	POS; RB 1 MHz; VB: 3 MHz





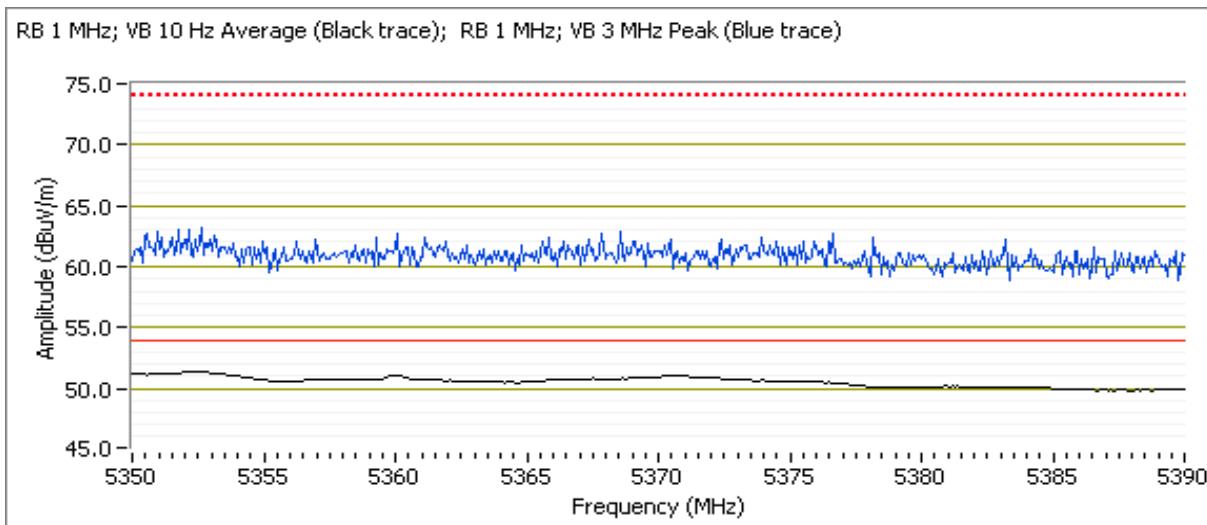
EMC Test Data

Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A

Run #1b: Channel 64 @ 5320 MHz (6Mbps Power: 18.0dBm)

5350 MHz Band Edge Signal Radiated Field Strength

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	v/h	Limit	Margin	PK/QP/Avg	degrees	meters	
5350.000	52.6	H	54.0	-1.4	AVG	294	0.9	POS; RB 1 MHz; VB: 10 Hz
5356.570	63.5	H	74.0	-10.5	PK	294	0.9	POS; RB 1 MHz; VB: 3 MHz





EMC Test Data

Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A

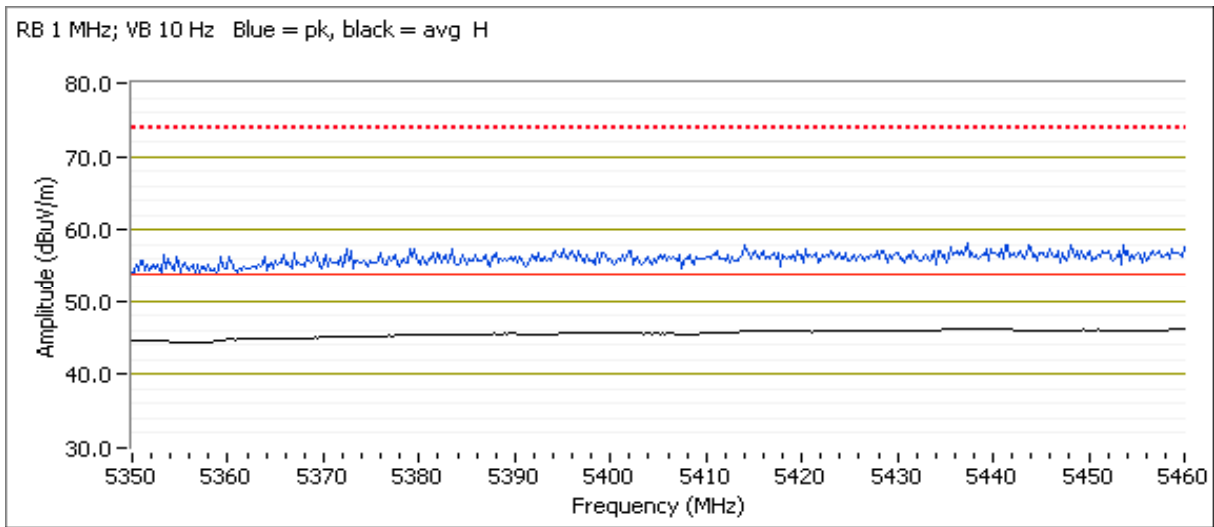
Run #1c: Channel 100 @ 5500 MHz.

Date of Test: 08/27/12
 Test Engineer: John Caizzi

Test Location: Chamber 5

5350-5460 MHz Restricted Band Edge Signal Radiated Field Strength

Frequency	Level	Pol	FCC 15.209		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
5437.520	46.4	H	54.0	-7.6	AVG	250	1.19	20 dBm
5437.520	58.1	H	74.0	-15.9	PK	250	1.19	20 dBm





EMC Test Data

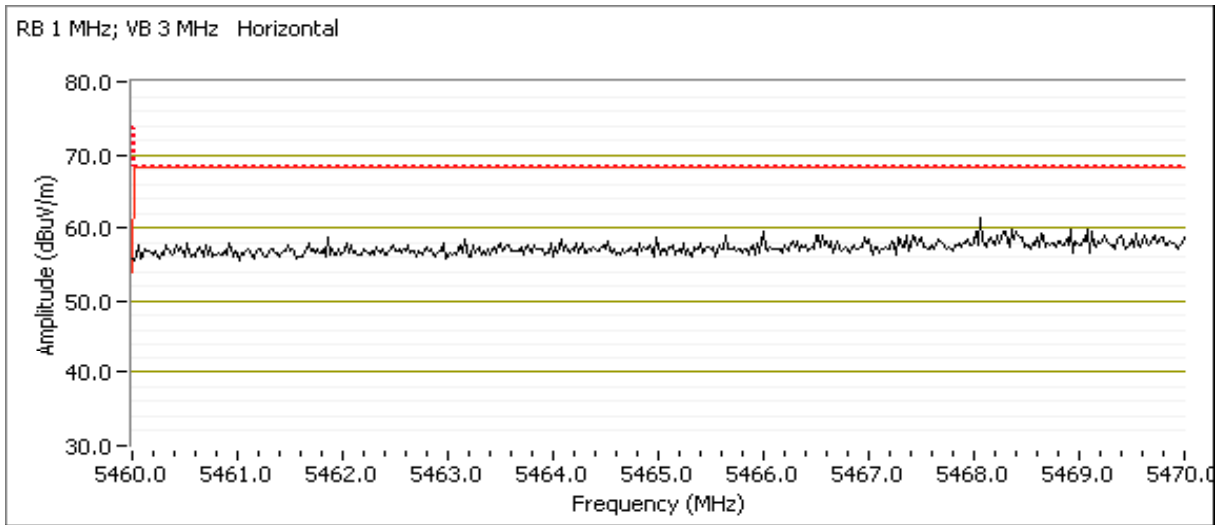
Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A

Date of Test: 08/31/12
 Test Engineer: John Caizzi

Test Location: Chamber 5

5470 MHz Band Edge Signal Radiated Field Strength

Frequency MHz	Level dB μ V/m	Pol v/h	15.407		Detector PK/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
5468.560	59.0	H	68.3	-9.3	PK	301	1.00	
5467.250	58.9	V	68.3	-9.4	PK	113	1.00	





EMC Test Data

Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A

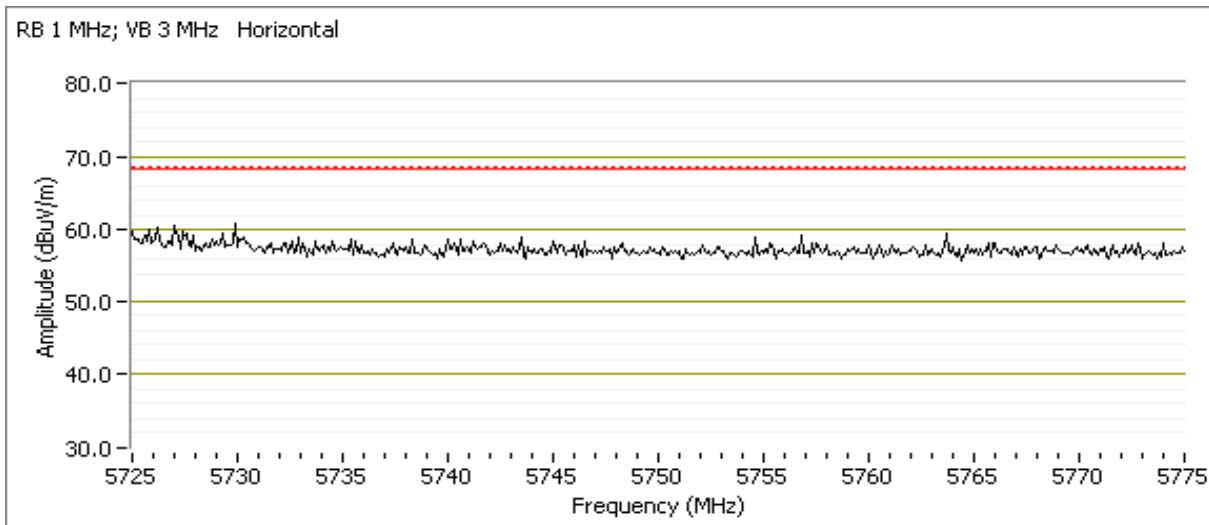
Run #1d: Channel 140 @ 5700 MHz.

Date of Test: 08/31/12
 Test Engineer: John Caizzi

Test Location: Chamber 5

5725 MHz Band Edge Signal Radiated Field Strength

Frequency	Level	Pol	15.407		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
5731.510	61.3	H	68.3	-7.0	PK	114	1.12	





EMC Test Data

Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A

Run #2: Radiated Spurious Emissions, 30 - 40,000 MHz. Operation in 802.11n 20MHz mode

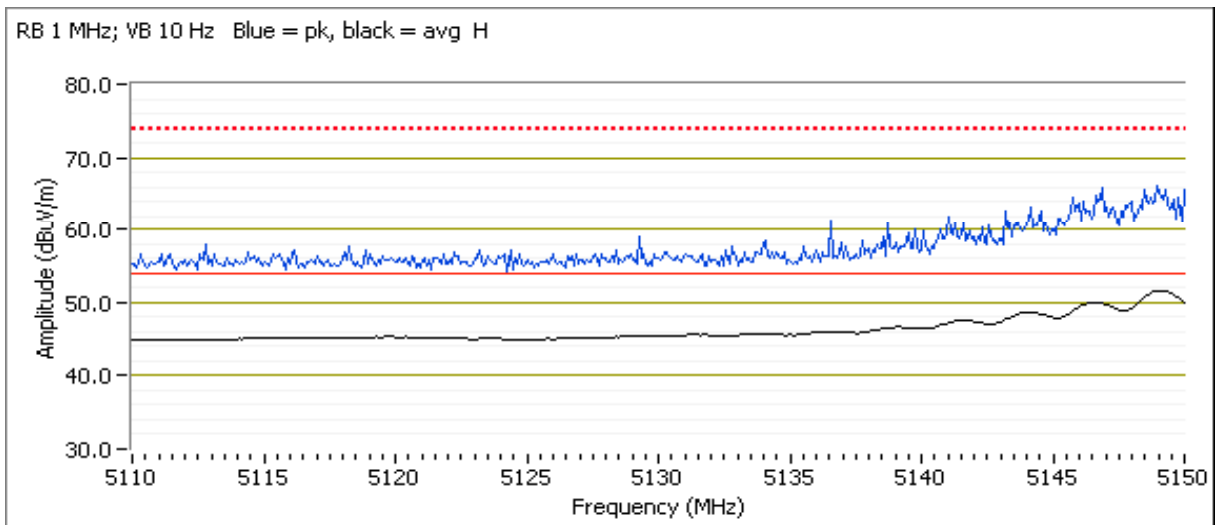
Date of Test: 08/27/12
Test Engineer: John Caizzi

Test Location: Chamber 5

Run #2a: Channel 36 @ 5180 MHz

5150 MHz Band Edge Signal Radiated Field Strength

Frequency	Level	Pol	FCC 15.209		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
5149.120	51.9	H	54.0	-2.1	AVG	299	1.00	20 dBm
5146.310	66.6	H	74.0	-7.4	PK	299	1.00	20 dBm





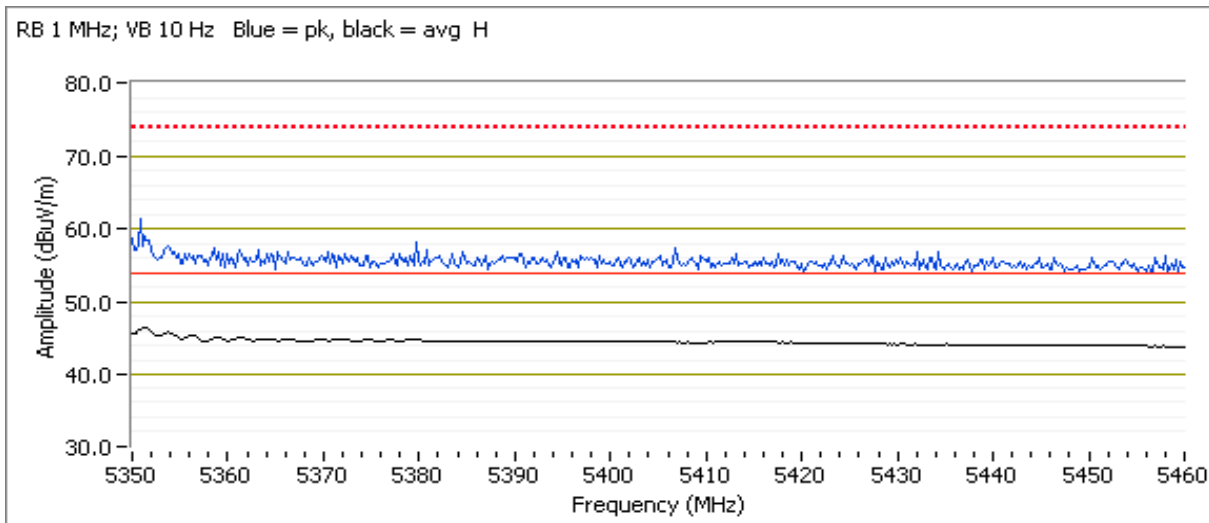
EMC Test Data

Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A

Run #2b: Channel 64 @ 5320 MHz

5350 MHz Band Edge Signal Radiated Field Strength

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
5351.320	46.8	H	54.0	-7.2	AVG	76	1.23	20 dBm
5366.970	57.3	H	74.0	-16.7	PK	76	1.23	20 dBm





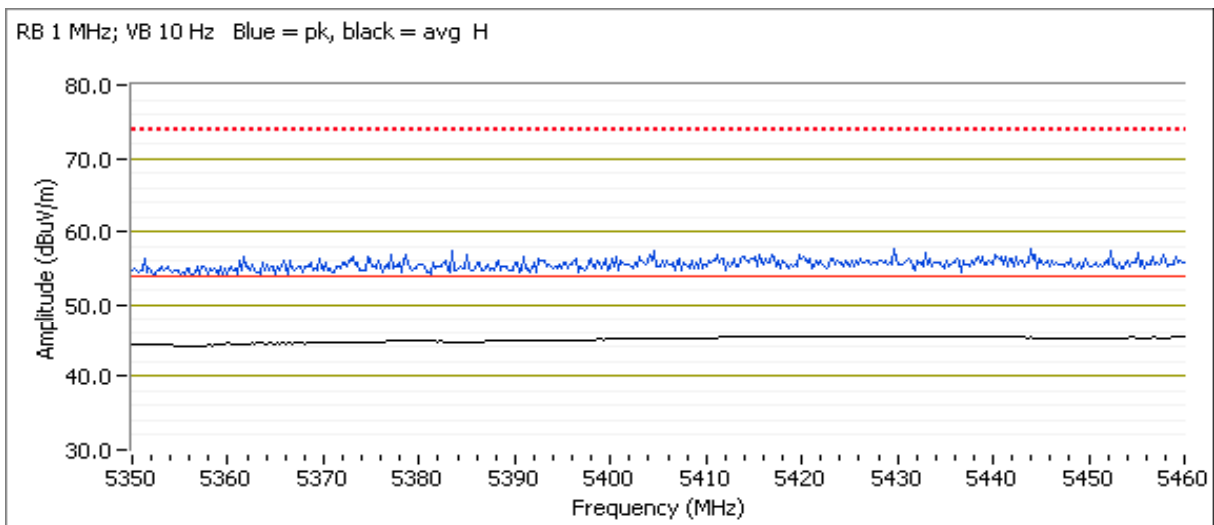
EMC Test Data

Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A

Run #2c: Channel 100 @ 5500 MHz

5350-5460 MHz Restricted 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				
5440.160	45.7	H	54.0	-8.3	AVG	249	1.06	20 dBm
5435.970	57.3	H	74.0	-16.7	PK	249	1.06	20 dBm
5425.390	44.9	V	54.0	-9.1	AVG	1	2.07	20 dBm
5369.180	55.3	V	74.0	-18.7	PK	1	2.07	20 dBm





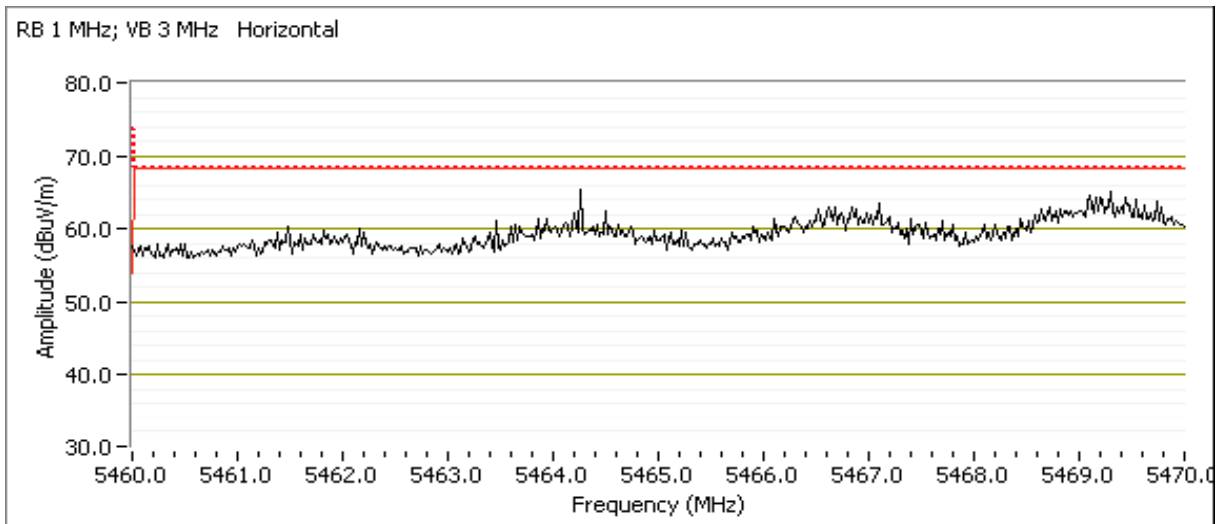
EMC Test Data

Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A

Run #2d: Channel 100 @ 5500 MHz

5460-5470 MHz Restricted Band Edge Signal Radiated Field Strength

Frequency	Level	Pol	FCC 15.209		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
5463.250	67.8	H	68.3	-0.5	PK	82	1.07	20 dBm





EMC Test Data

Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A

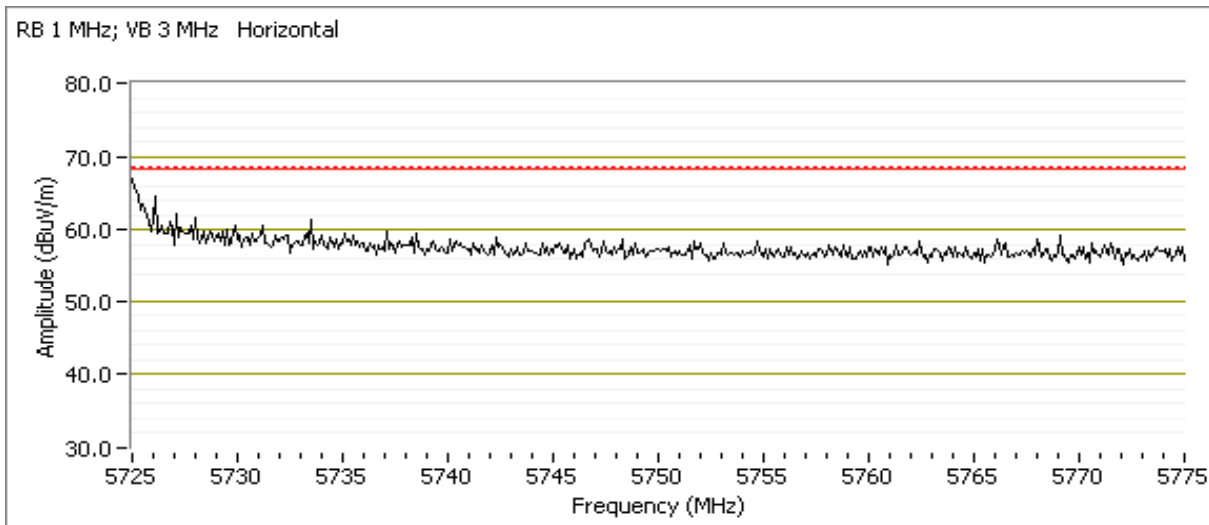
Run #2e: Channel 140 @ 5700 MHz.

Date of Test: 08/31/12
 Test Engineer: John Caizzi

Test Location: Chamber 5

5725 MHz Band Edge Signal Radiated Field Strength

Frequency	Level	Pol	15.407		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
5725.100	67.6	H	68.3	-0.7	PK	255	1.00	





EMC Test Data

Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A

Run #3: Radiated Spurious Emissions, 30 - 40,000 MHz. Operation in 802.11n 40MHz mode

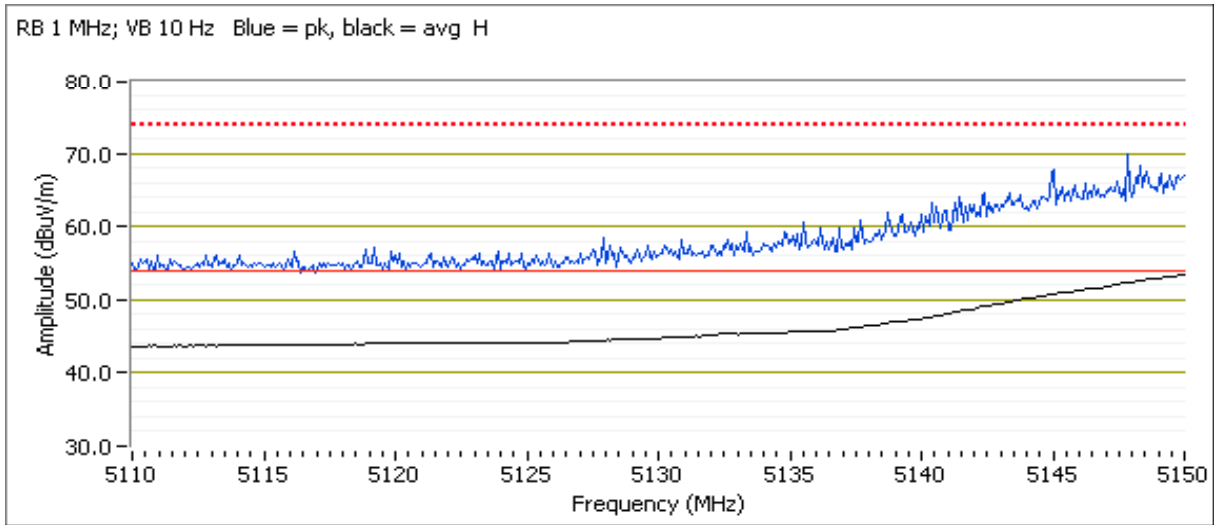
Date of Test: 08/27/12
 Test Engineer: John Caizzi

Test Location: Chamber 5

Run #3a: Channel 38 @ 5190 MHz

5150 MHz Band Edge Signal Radiated Field Strength

Frequency	Level	Pol	FCC 15.209		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
5150.000	58.8	H	54.0	4.8	AVG	86	1.00	20 dBm
5145.910	69.7	H	74.0	-4.3	PK	86	1.00	20 dBm
5150.000	57.9	V	54.0	3.9	AVG	43	1.00	20 dBm
5148.880	68.9	V	74.0	-5.1	PK	43	1.00	20 dBm
5150.000	53.8	H	54.0	-0.2	AVG	59	1.00	17 dBm
5148.480	64.6	H	74.0	-9.4	PK	59	1.00	17 dBm





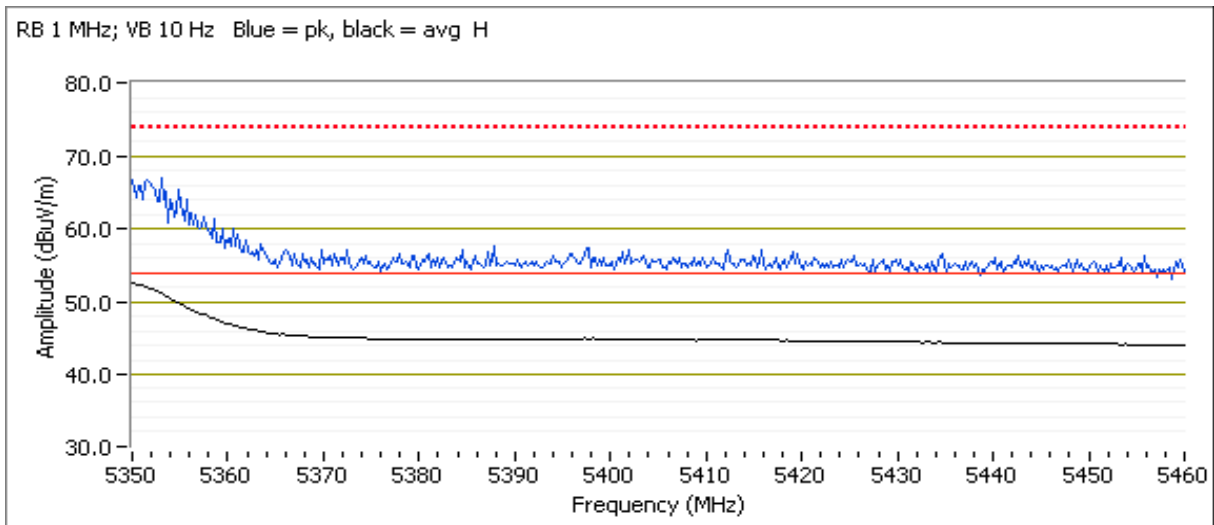
EMC Test Data

Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A

Run #3b: Channel 62 @ 5310 MHz

5350 MHz Band Edge Signal Radiated Field Strength

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
5350.000	53.1	H	54.0	-0.9	AVG	86	1.1	19 dBm
5352.200	65.7	H	74.0	-8.3	PK	86	1.1	19 dBm





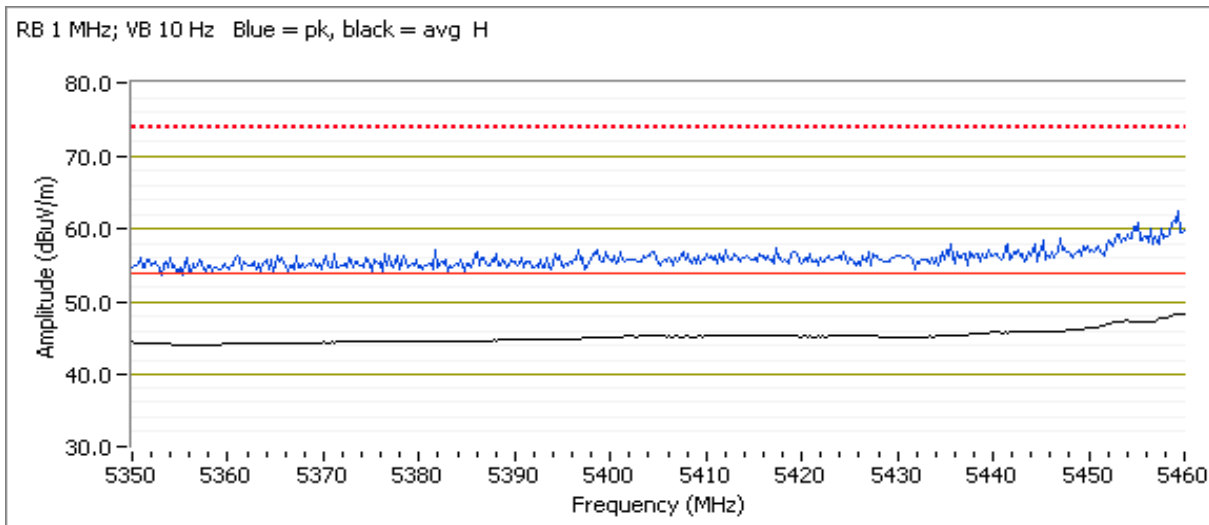
EMC Test Data

Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A

Run #3c: Channel 102 @ 5510 MHz

5350-5460 MHz Restricted Band Edge Signal Radiated Field Strength

Frequency	Level	Pol	FCC 15.209		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
5459.780	48.6	H	54.0	-5.4	AVG	256	1.46	20 dBm
5460.000	59.7	H	74.0	-14.3	PK	256	1.46	20 dBm





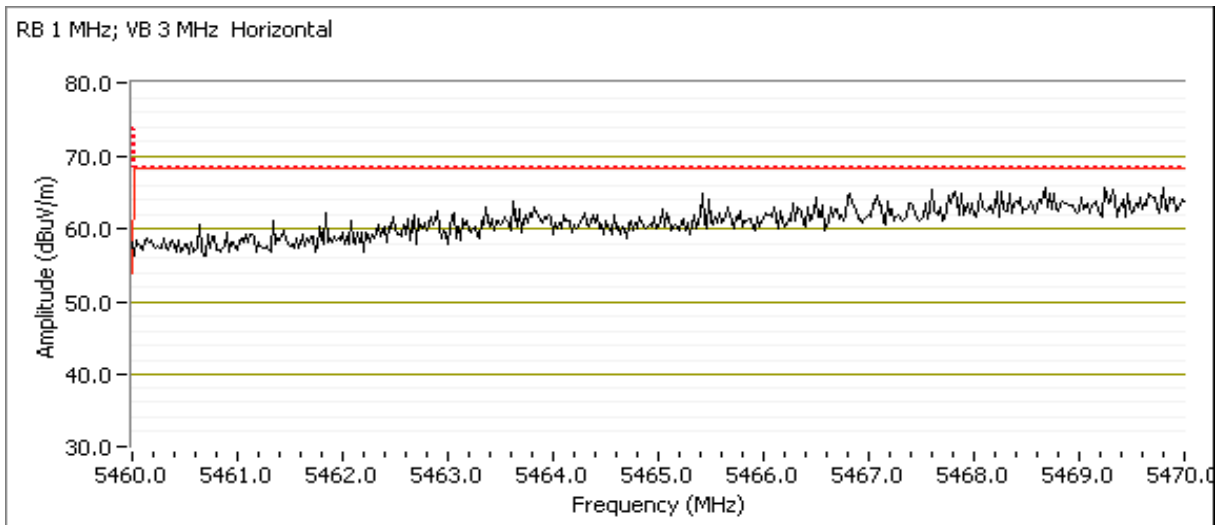
EMC Test Data

Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A

Run #3d: Channel 102 @ 5510 MHz

5460-5470 MHz Restricted Band Edge

Frequency MHz	Level dB μ V/m	Pol v/h	FCC 15.209		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
5465.430	68.7	H	68.3	0.4	PK	256	1.46	20 dBm
5467.880	65.8	H	68.3	-2.5	PK	256	1.46	19 dBm





EMC Test Data

Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A

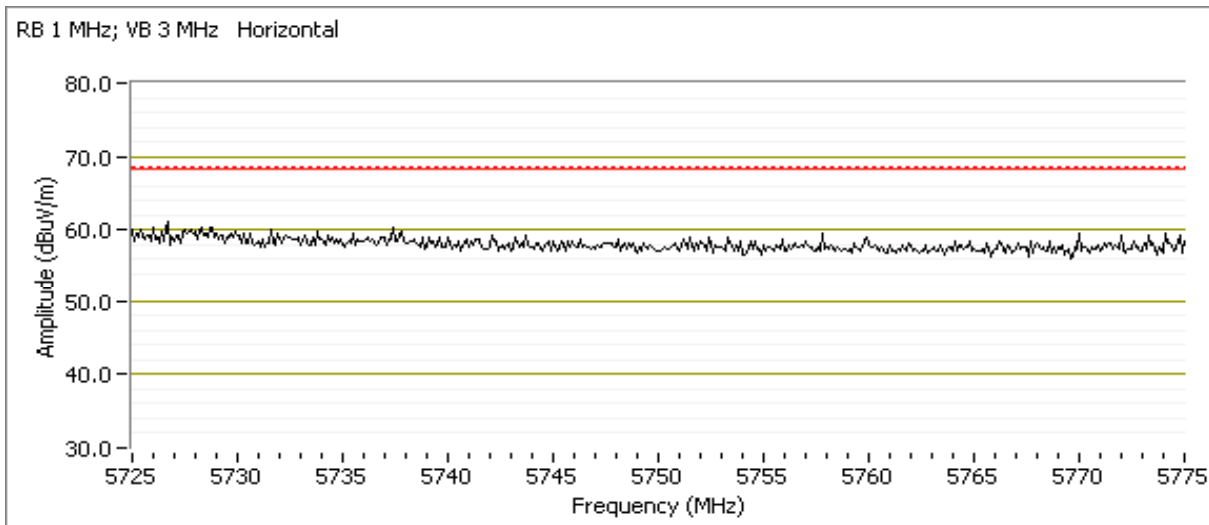
Run #3e: Channel 134 @ 5670 MHz.

Date of Test: 08/31/12
 Test Engineer: John Caizzi

Test Location: Chamber 5

5725 MHz Band Edge Signal Radiated Field Strength

Frequency	Level	Pol	15.407		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
5766.580	60.6	H	68.3	-7.7	PK	255	1.00	





EMC Test Data

Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
	Account Manager: Michelle Kim
Contact: Mark Rieger	
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A

RSS 210 and FCC 15.407 (UNII) Radiated Spurious Emissions

Test Specific Details

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

General Test Configuration

The EUT and all local support equipment were located on the turntable for radiated spurious emissions testing. All remote support equipment was located outside the chamber, with all IO connections routed under the ground plane, through copper pipe, & passed through a ferrite clamp before exiting the chamber.

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

Ambient Conditions:

Temperature: 21.3 °C
Rel. Humidity: 38 %

Summary of Results

Run #	Mode	Channel	Power Setting	Measured Power	Test Performed	Limit	Result / Margin
1	802.11a	36	20		Radiated Emissions, 1 - 40 GHz	FCC 15.209 / 15 E	45.6 dBµV/m @ 1666.1 MHz (-8.4 dB)
		40		45.4 dBµV/m @ 1666.1 MHz (-8.6 dB)			
		48		45.8 dBµV/m @ 8993.3 MHz (-8.2 dB)			
2		52		45.6 dBµV/m @ 9002.5 MHz (-8.4 dB)			
		60		43.8 dBµV/m @ 4165.2 MHz (-10.2 dB)			
		64		39.9 dBµV/m @ 3600.0 MHz (-14.1 dB)			
3		100		47.6 dBµV/m @ 9002.5 MHz (-6.4 dB)			
		116		36.2 dBµV/m @ 3600.0 MHz (-17.8 dB)			
		140		45.9 dBµV/m @ 8993.3 MHz (-8.1 dB)			



EMC Test Data

Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A

Run #	Mode	Channel	Power Setting	Measured Power	Test Performed	Limit	Result / Margin
4	n20	36	20		Radiated Emissions, 1 - 40 GHz	FCC 15.209 / 15 E	48.5 dBµV/m @ 9002.5 MHz (-5.5 dB)
		40	20				48.2 dBµV/m @ 9002.5 MHz (-5.8 dB)
		48	20				38.2 dBµV/m @ 3600.1 MHz (-15.8 dB)
5		52	20				46.2 dBµV/m @ 5043.9 MHz (-7.8 dB)
		60	20				45.0 dBµV/m @ 5043.1 MHz (-9.0 dB)
		64	20				44.5 dBµV/m @ 4165.3 MHz (-9.5 dB)
6		100	20				44.7 dBµV/m @ 4165.2 MHz (-9.3 dB)
		116	20				38.9 dBµV/m @ 8223.1 MHz (-15.1 dB)
		140	20				43.3 dBµV/m @ 1599.8 MHz (-10.7 dB)
7		n40	38	20			
	46		20		44.6 dBµV/m @ 4165.3 MHz (-9.4 dB)		
8	54		20		44.6 dBµV/m @ 4165.2 MHz (-9.4 dB)		
	62		20		44.3 dBµV/m @ 4165.3 MHz (-9.7 dB)		
9	102		20		44.5 dBµV/m @ 11999.7 MHz (-9.5 dB)		
	110		20		46.5 dBµV/m @ 11999.7 MHz (-7.5 dB)		
	134		20		49.0 dBµV/m @ 9002.5 MHz (-5.0 dB)		



EMC Test Data

Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
	Account Manager: Michelle Kim
Contact: Mark Rieger	
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A

Modifications Made During Testing

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

Notes

All testing performed with both chains transmitting at the noted power setting
No radio related emissions below 1GHz observed or above 18GHz

Test Procedure Comments:

Unless otherwise noted, average measurements above 1GHz were performed as documented in FCC KDB 789033 G) 6) d) Method VB

Antenna: internal antennas
Duty Cycle: 6Mbps 91.7%



EMC Test Data

Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A

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

Date of Test: 9/4/2012
 Test Engineer: John Caizzi
 Test Location: Chamber 5

Run #1a: Channel 36 - 5180 MHz

Preliminary Spurious Radiated Emissions from scan

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
8993.330	45.3	V	54.0	-8.7	Peak	129	1.5	
1660.000	44.0	V	54.0	-10.0	Peak	49	1.5	
4162.500	42.5	V	54.0	-11.5	Peak	191	1.0	
2494.170	42.3	V	54.0	-11.7	Peak	237	1.5	
2998.330	45.5	H	68.3	-22.8	Peak	230	1.0	

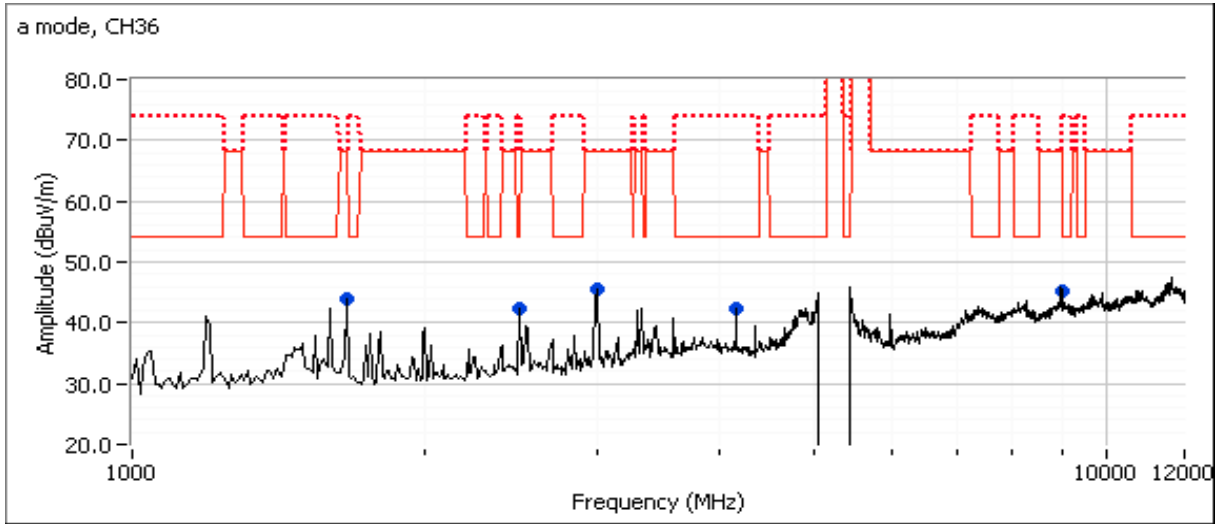
Final peak & average readings.

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2499.090	43.2	V	54.0	-10.8	AVG	237	1.20	
2499.120	47.1	V	74.0	-26.9	PK	237	1.20	
9000.000	39.6	V	54.0	-14.4	AVG	138	1.42	
9000.000	52.9	V	74.0	-21.1	PK	138	1.42	
1666.100	45.6	V	54.0	-8.4	AVG	41	1.70	
1666.170	48.6	V	74.0	-25.4	PK	41	1.70	

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

Note 2: For emissions outside of the restricted bands the limit is -27dBm/MHz eirp (68.3dBuV/m). The measurement method required is a peak measurement (RB=1MHz, VB \geq 3MHz, peak detector).

Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
	Account Manager: Michelle Kim
Contact: Mark Rieger	
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A





EMC Test Data

Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A

Run #1b: Center Channel 40 - 5200 MHz

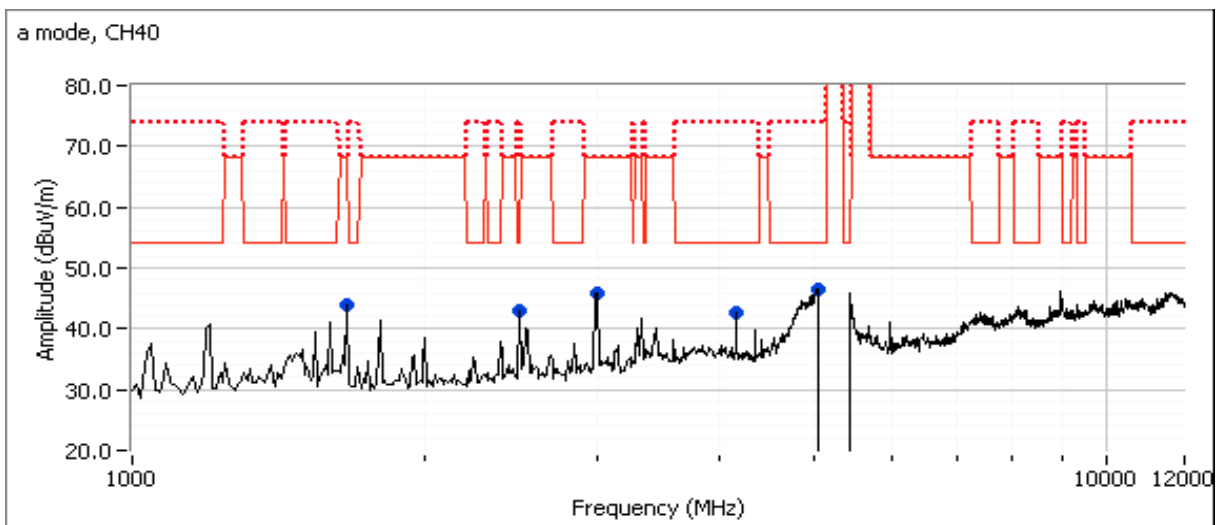
Preliminary Spurious Radiated Emissions from scan

Frequency MHz	Level dB μ V/m	Pol v/h	15.209 / 15E		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
5042.500	46.5	H	54.0	-7.5	Peak	274	1.0	Best measured conducted.
1660.000	43.9	V	54.0	-10.1	Peak	38	1.5	
2494.170	43.1	V	54.0	-10.9	Peak	233	1.5	
4162.500	42.7	V	54.0	-11.3	Peak	194	2.0	
2998.330	46.0	H	68.3	-22.3	Peak	233	1.0	

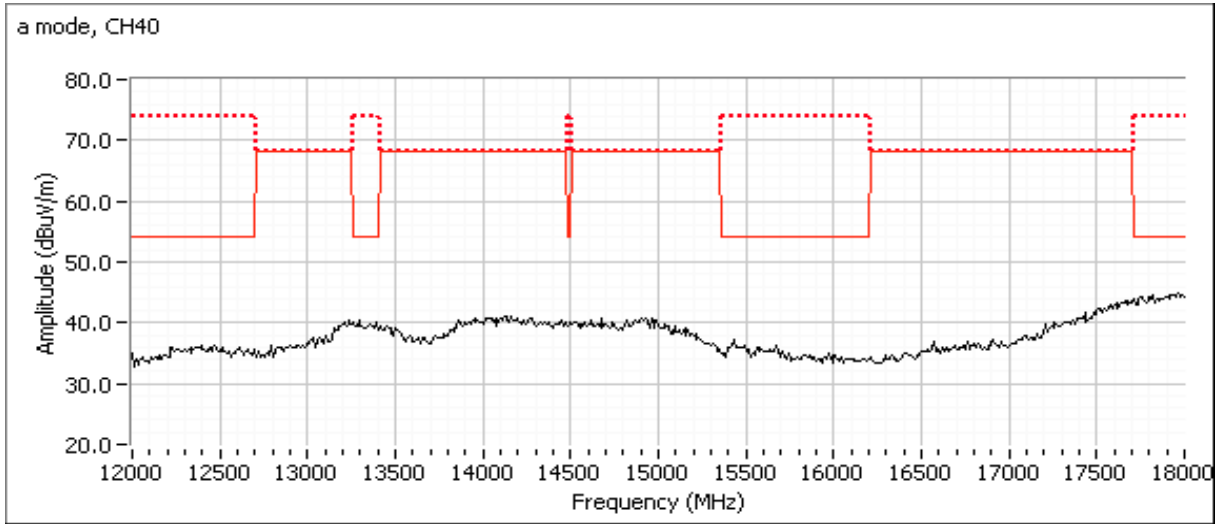
Final peak & average readings.

Frequency MHz	Level dB μ V/m	Pol v/h	15.209 / 15E		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
1666.080	45.4	V	54.0	-8.6	AVG	44	1.67	
1666.250	48.3	V	74.0	-25.7	PK	44	1.67	
2499.070	43.1	V	54.0	-10.9	AVG	238	1.19	
2499.350	47.0	V	74.0	-27.0	PK	238	1.19	

- Note 1: For emissions in restricted bands, the limit of 15.209 was used which requires average and peak measurements.
- Note 2: For emissions outside of the restricted bands the limit is -27dBm/MHz eirp (68.3dBuV/m). The measurement method required is a peak measurement (RB=1MHz, VB \geq 3MHz, peak detector).



Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
	Account Manager: Michelle Kim
Contact: Mark Rieger	
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A



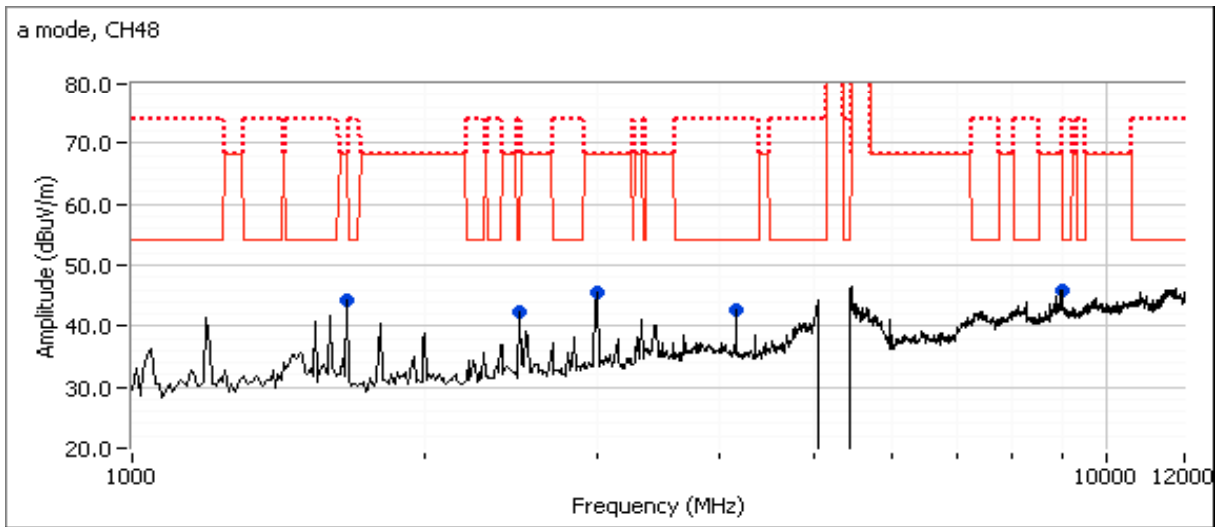
Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A

Run #1c: High Channel 48 - 5240 MHz

Final peak & average readings.

Frequency MHz	Level dB μ V/m	Pol v/h	15.209 / 15E		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
8993.330	45.8	V	54.0	-8.2	Peak	338	1.5	Note 3
1660.000	44.2	V	54.0	-9.8	Peak	40	1.5	Note 3
4162.500	42.8	V	54.0	-11.2	Peak	193	2.0	
2494.170	42.3	V	54.0	-11.7	Peak	227	1.5	Note 3
2998.330	45.4	H	68.3	-22.9	Peak	232	1.0	

- Note 1: For emissions in restricted bands, the limit of 15.209 was used which requires average and peak measurements.
- Note 2: For emissions outside of the restricted bands the limit is -27dBm/MHz eirp (68.3dBuV/m). The measurement method required is a peak measurement (RB=1MHz, VB \geq 3MHz, peak detector).
- Note 3: Signal does not change with channel. Measured previously in runs 1a & 1b.





EMC Test Data

Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A

Run #2, Radiated Spurious Emissions, 30 - 40,000 MHz. Operation in the 5250-5350 MHz Band, 802.11a

Date of Test: 9/4/2012
 Test Engineer: John Caizzi
 Test Location: Chamber 5

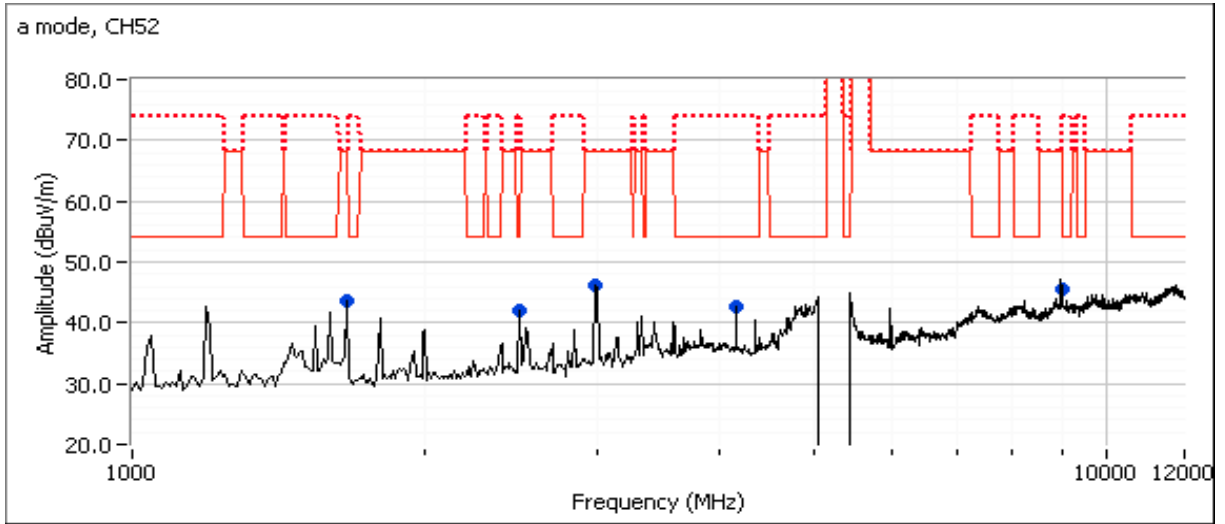
Run #2a: Low Channel 52 - 5260 MHz

Final peak & average readings.

Frequency MHz	Level dB μ V/m	Pol v/h	15.209 / 15E		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
9002.500	45.6	V	54.0	-8.4	Peak	131	2.5	Note 3
1660.000	43.7	V	54.0	-10.3	Peak	41	1.0	Note 3
4162.500	42.8	V	54.0	-11.2	Peak	198	2.0	Note 3
2494.170	42.1	V	54.0	-11.9	Peak	199	1.0	Note 3
2980.000	46.1	V	68.3	-22.2	Peak	278	1.0	

- Note 1: For emissions in restricted bands, the limit of 15.209 was used which requires average and peak measurements.
- Note 2: For emissions outside of the restricted bands the limit is -27dBm/MHz eirp (68.3dB μ V/m). The measurement method required is a peak measurement (RB=1MHz, VB \geq 3MHz, peak detector).
- Note 3: Signal does not change with channel. Measured in previous runs.

Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A





EMC Test Data

Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A

Run #2b: Center Channel 60 - 5300 MHz

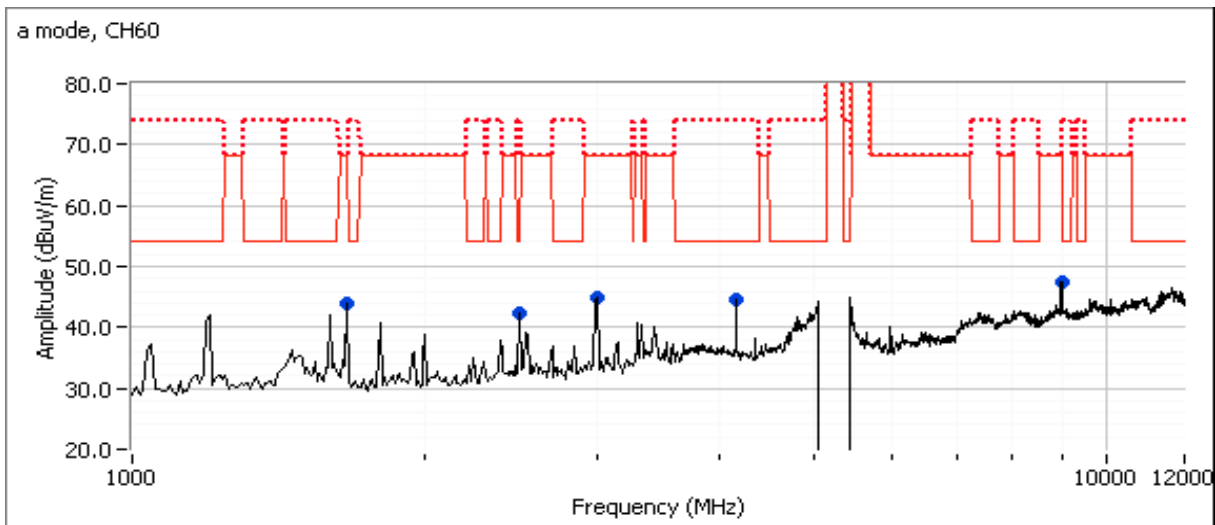
Preliminary Spurious Radiated Emissions from scan

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	v/h	Limit	Margin	PK/QP/Avg	degrees	meters	
8993.330	47.4	V	54.0	-6.6	Peak	328	1.5	
4162.500	44.7	V	54.0	-9.3	Peak	190	2.0	
1660.000	44.0	V	54.0	-10.0	Peak	38	2.5	Note 3
2494.170	42.5	V	54.0	-11.5	Peak	89	1.5	Note 3
2998.330	44.9	H	68.3	-23.4	Peak	230	1.0	

Final peak & average readings.

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	v/h	Limit	Margin	PK/QP/Avg	degrees	meters	
4165.220	43.8	V	54.0	-10.2	AVG	198	1.62	
4165.420	48.7	V	74.0	-25.3	PK	198	1.62	
9000.000	39.8	V	54.0	-14.2	AVG	11	1.22	
9000.310	54.8	V	74.0	-19.2	PK	11	1.22	

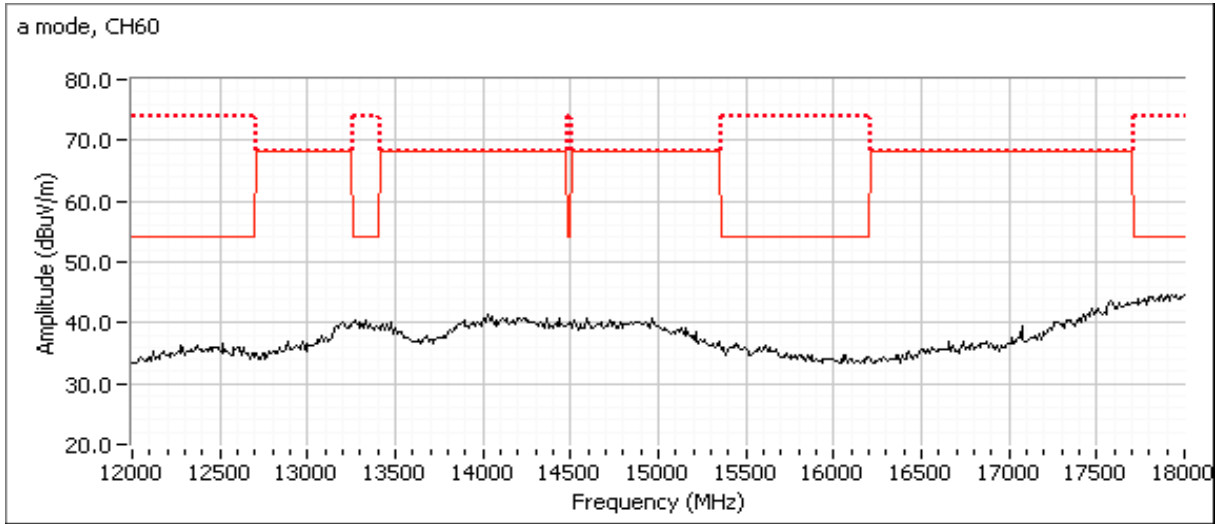
- Note 1: For emissions in restricted bands, the limit of 15.209 was used which requires average and peak measurements.
- Note 2: For emissions outside of the restricted bands the limit is -27dBm/MHz eirp (68.3dBuV/m). The measurement method required is a peak measurement (RB=1MHz, VB \geq 3MHz, peak detector).
- Note 3: Signal does not change with channel. Measured previously in runs 1a & 1b.





EMC Test Data

Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A





EMC Test Data

Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A

Run #2c: High Channel 64 - 5320 MHz

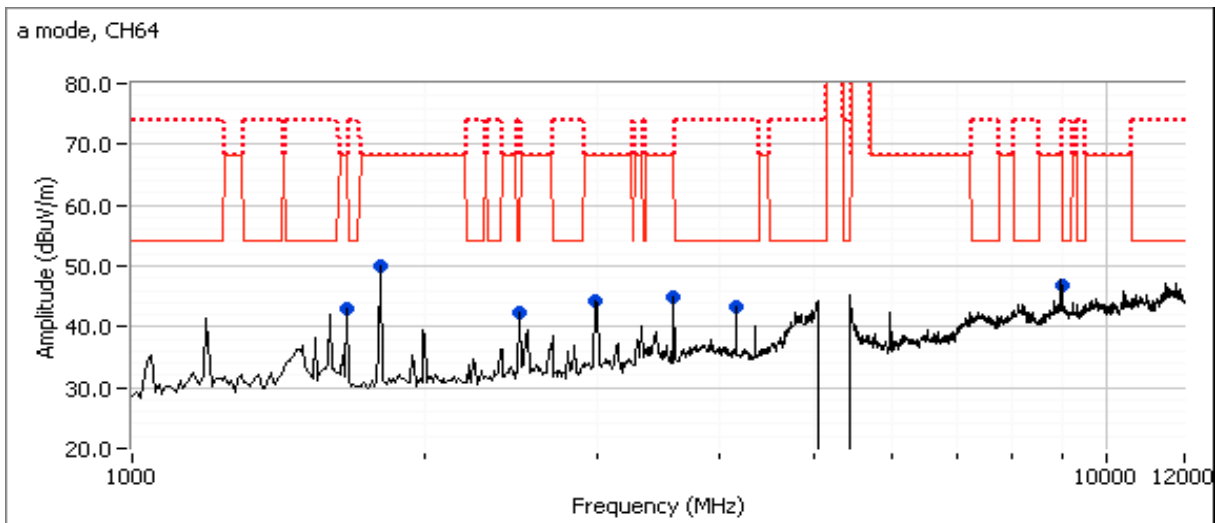
Preliminary Spurious Radiated Emissions from scan

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
9002.500	46.8	V	54.0	-7.2	Peak	318	1.5	Note 3
3594.170	45.0	V	54.0	-9.0	Peak	10	2.0	
4162.500	43.2	V	54.0	-10.8	Peak	199	2.0	Note 3
1660.000	43.0	V	54.0	-11.0	Peak	38	1.5	Note 3
2494.170	42.3	V	54.0	-11.7	Peak	234	1.5	Note 3
1797.500	50.1	V	68.3	-18.2	Peak	10	2.0	
2980.000	44.2	V	68.3	-24.1	Peak	282	1.0	

Final peak & average readings.

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
3600.030	39.9	V	54.0	-14.1	AVG	2	1.14	
3600.240	44.6	V	74.0	-29.4	PK	2	1.14	

- Note 1: For emissions in restricted bands, the limit of 15.209 was used which requires average and peak measurements.
- Note 2: For emissions outside of the restricted bands the limit is -27dBm/MHz eirp (68.3dBuV/m). The measurement method required is a peak measurement (RB=1MHz, VB \geq 3MHz, peak detector).
- Note 3: Signal does not change with channel. Measured in previous runs.





EMC Test Data

Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A

Run #3, Radiated Spurious Emissions, 30 - 40,000 MHz. Operation in the 5470-5725 MHz Band, 802.11a

Date of Test: 9/4/2012
 Test Engineer: John Caizzi
 Test Location: Chamber 5

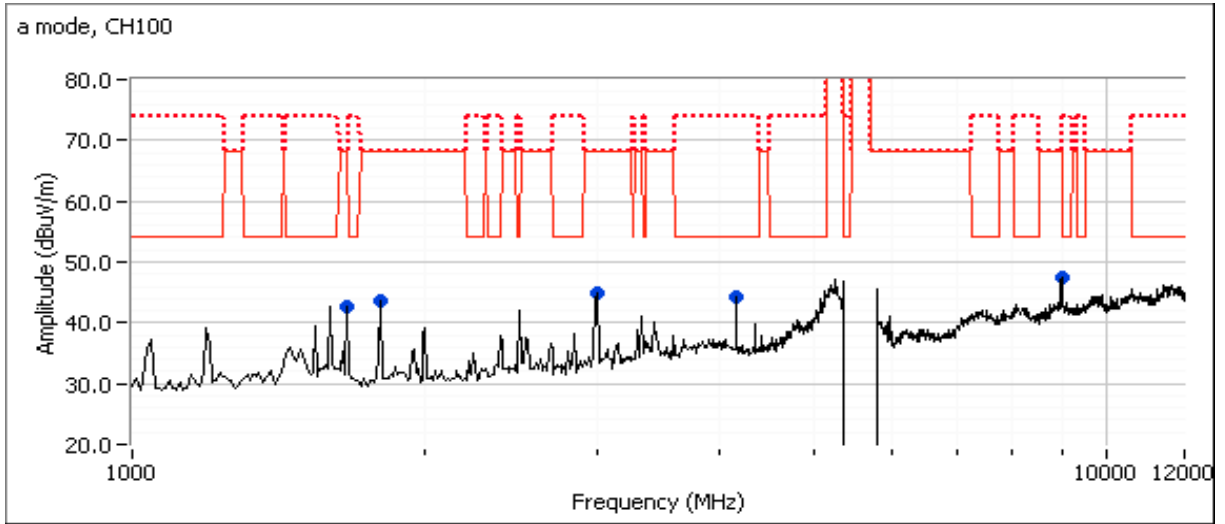
Run #3a: Low Channel 100 - 5500 MHz

Final peak & average readings.

Frequency MHz	Level dB μ V/m	Pol v/h	15.209 / 15E		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
9002.500	47.6	V	54.0	-6.4	Peak	331	1.5	Note 3
4162.500	44.3	V	54.0	-9.7	Peak	193	2.0	Note 3
1660.000	42.8	V	54.0	-11.2	Peak	49	1.0	Note 3
2998.330	45.0	H	68.3	-23.3	Peak	226	1.0	
1797.500	43.7	H	68.3	-24.6	Peak	124	1.0	

- Note 1: For emissions in restricted bands, the limit of 15.209 was used which requires average and peak measurements.
- Note 2: For emissions outside of the restricted bands the limit is -27dBm/MHz eirp (68.3dB μ V/m). The measurement method required is a peak measurement (RB=1MHz, VB \geq 3MHz, peak detector).
- Note 3: Signal does not change with channel. Measured in previous runs.

Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
	Account Manager: Michelle Kim
Contact: Mark Rieger	
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A





EMC Test Data

Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A

Run #3b: Center Channel 116 - 5580 MHz

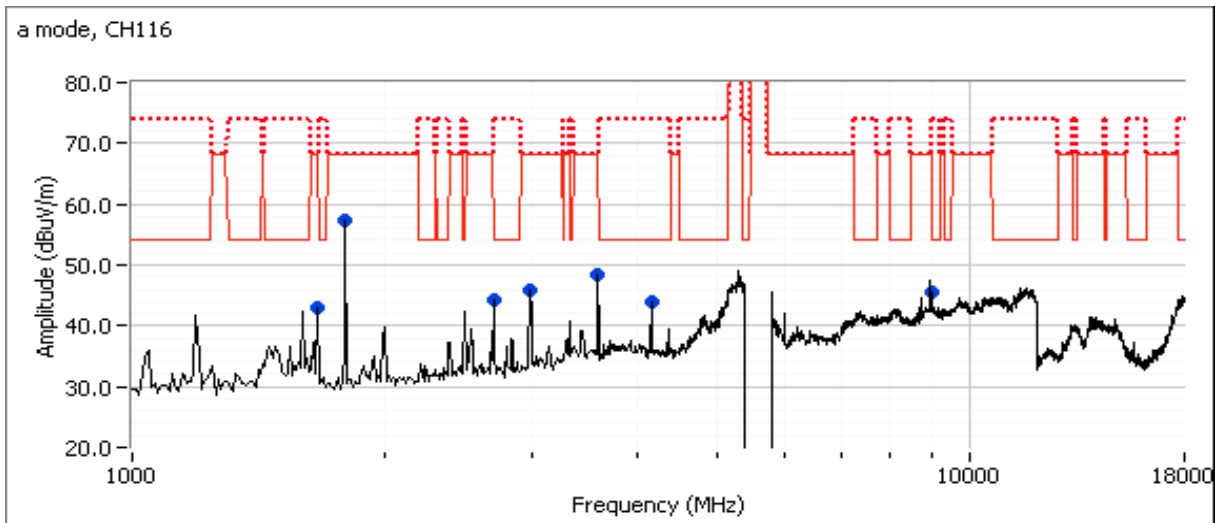
Preliminary Spurious Radiated Emissions from scan

Frequency MHz	Level dB μ V/m	Pol v/h	15.209 / 15E		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
9002.500	45.6	V	54.0	-8.4	Peak	334	1.5	Note 3
2695.830	44.4	V	54.0	-9.6	Peak	107	1.0	
4162.500	44.0	V	54.0	-10.0	Peak	192	2.0	Note 3
1797.500	57.2	V	68.3	-11.1	Peak	96	1.0	
3594.170	48.4	V	54.0	-5.6	Peak	96	1.0	
2980.000	46.0	V	68.3	-22.3	Peak	281	1.0	
1660.000	43.1	V	54.0	-10.9	Peak	31	2.5	Note 3

Final peak & average readings.

Frequency MHz	Level dB μ V/m	Pol v/h	15.209 / 15E		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
2700.120	34.2	V	54.0	-19.8	AVG	176	2.51	
2700.250	43.0	V	74.0	-31.0	PK	176	2.51	
3600.000	36.2	V	54.0	-17.8	AVG	91	1.00	
3600.220	44.5	V	74.0	-29.5	PK	91	1.00	

- Note 1: For emissions in restricted bands, the limit of 15.209 was used which requires average and peak measurements.
- Note 2: For emissions outside of the restricted bands the limit is -27dBm/MHz eirp (68.3dBuV/m). The measurement method required is a peak measurement (RB=1MHz, VB \geq 3MHz, peak detector).
- Note 3: Signal does not change with channel. Measured in previous runs.



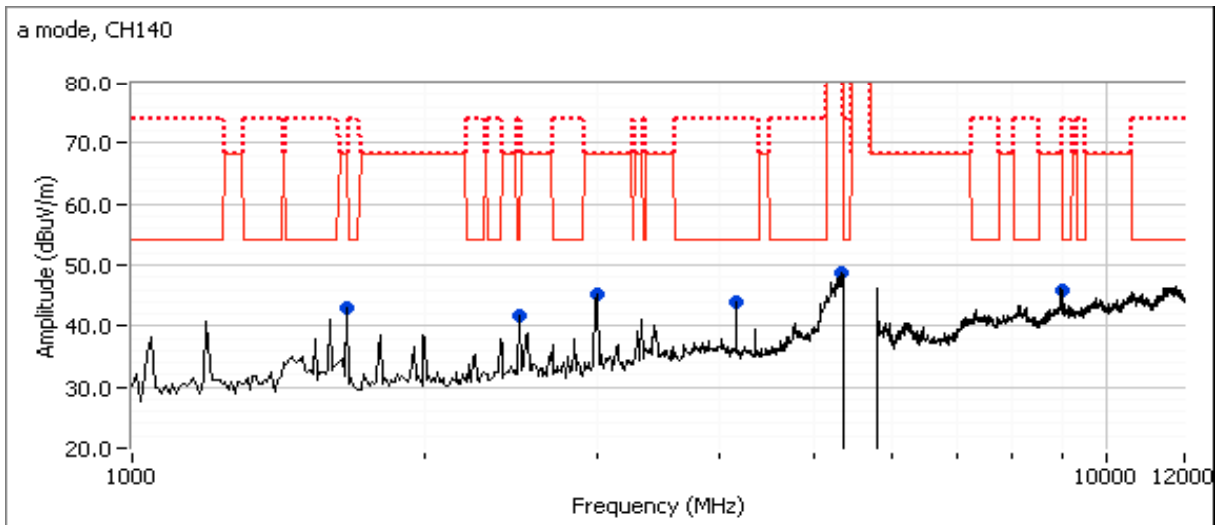
Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A

Run #3c: High Channel 140 - 5700 MHz

Final peak & average readings.

Frequency MHz	Level dB μ V/m	Pol v/h	15.209 / 15E		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
8993.330	45.9	V	54.0	-8.1	Peak	328	1.5	Note 3
4162.500	44.0	V	54.0	-10.0	Peak	195	2.0	Note 3
1660.000	43.1	V	54.0	-10.9	Peak	40	2.5	Note 3
2494.170	41.7	V	54.0	-12.3	Peak	77	1.5	Note 3
5326.670	48.8	H	68.3	-19.5	Peak	82	1.0	Best measured conducted.
2998.330	45.1	H	68.3	-23.2	Peak	232	1.0	

- Note 1: For emissions in restricted bands, the limit of 15.209 was used which requires average and peak measurements.
- Note 2: For emissions outside of the restricted bands the limit is -27dBm/MHz eirp (68.3dBuV/m). The measurement method required is a peak measurement (RB=1MHz, VB \geq 3MHz, peak detector).
- Note 3: Signal does not change with channel. Measured in previous runs.





EMC Test Data

Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
	Account Manager: Michelle Kim
Contact: Mark Rieger	
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A

Run #4, Radiated Spurious Emissions, 30 - 40,000 MHz. Operation in the 5150-5250 MHz Band - 802.11n20

Date of Test: 9/6/2012
 Test Engineer: John Caizzi
 Test Location: Chamber 7

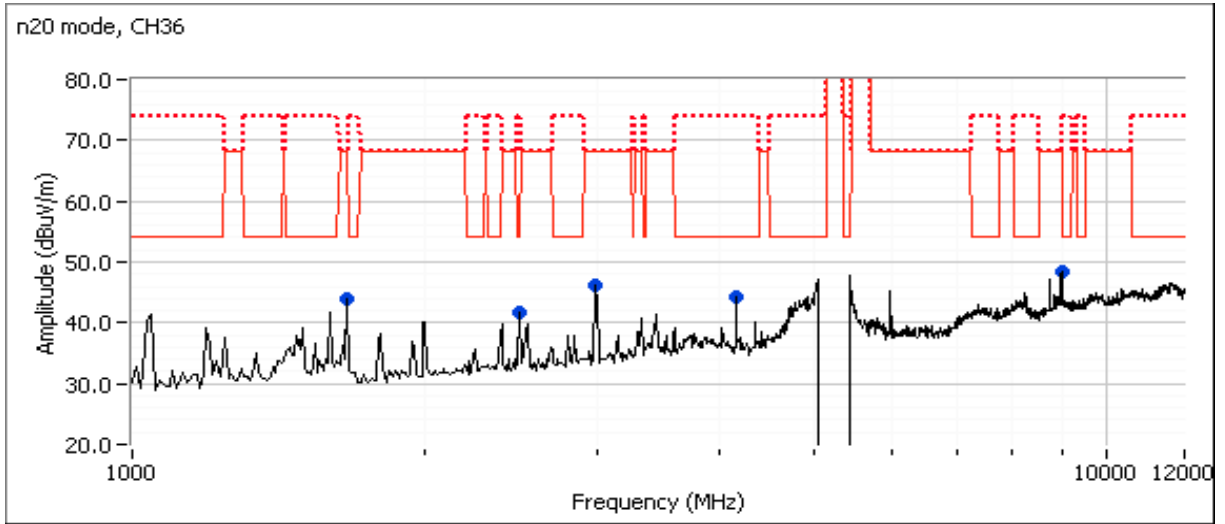
Run #4a: Channel 36 - 5180 MHz

Final peak & average readings.

Frequency MHz	Level dB μ V/m	Pol v/h	15.209 / 15E		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
9002.500	48.5	V	54.0	-5.5	Peak	332	1.5	Note 3
4162.500	44.4	V	54.0	-9.6	Peak	196	1.5	Note 3
1660.000	43.9	V	54.0	-10.1	Peak	318	1.0	Note 3
2494.170	41.6	V	54.0	-12.4	Peak	70	1.5	Note 3
2980.000	46.1	V	68.3	-22.2	Peak	302	1.0	

Note 1:	For emissions in restricted bands, the limit of 15.209 was used which requires average and peak measurements.
Note 2:	For emissions outside of the restricted bands the limit is -27dBm/MHz eirp (68.3dB μ V/m). The measurement method required is a peak measurement (RB=1MHz, VB \geq 3MHz, peak detector).
Note 3:	Signal does not change with mode or channel. Measured in previous runs.

Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
	Account Manager: Michelle Kim
Contact: Mark Rieger	
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A





EMC Test Data

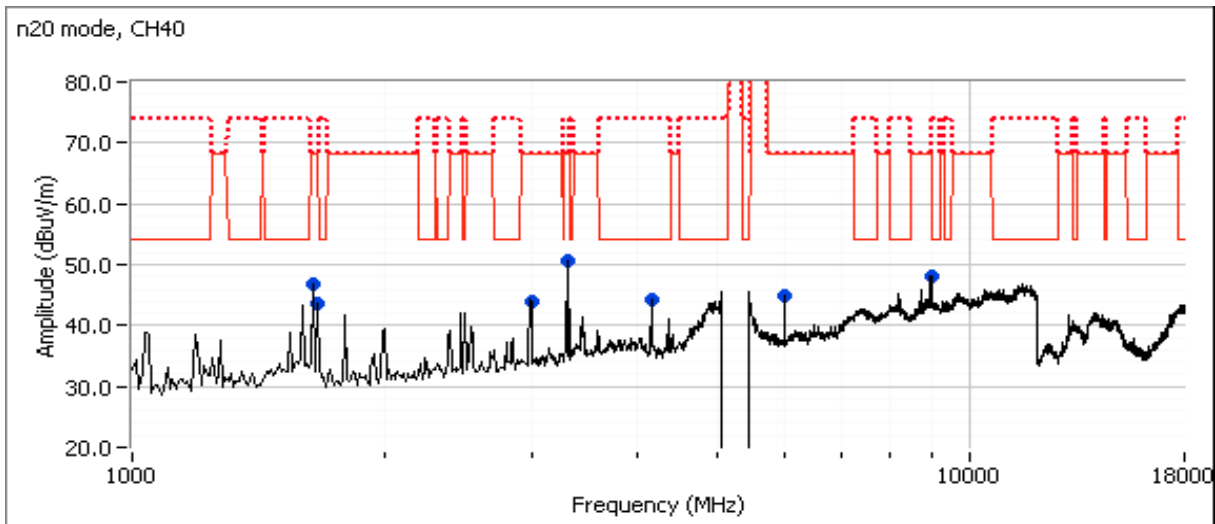
Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A

Run #4b: Center Channel 40 - 5200 MHz

Final peak & average readings.

Frequency MHz	Level dB μ V/m	Pol v/h	15.209 / 15E		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
9002.500	48.2	V	54.0	-5.8	Peak	332	1.5	Note 3
4162.500	44.1	V	54.0	-9.9	Peak	198	1.0	Note 3
1660.000	43.5	V	54.0	-10.5	Peak	312	1.5	Note 3
3300.830	50.5	V	68.3	-17.8	Peak	138	1.5	
1641.670	46.8	V	68.3	-21.5	Peak	130	1.5	
5995.830	45.0	V	68.3	-23.3	Peak	190	1.0	
2998.330	43.9	V	68.3	-24.4	Peak	18	1.0	

- Note 1: For emissions in restricted bands, the limit of 15.209 was used which requires average and peak measurements.
- Note 2: For emissions outside of the restricted bands the limit is -27dBm/MHz eirp (68.3dBuV/m). The measurement method required is a peak measurement (RB=1MHz, VB \geq 3MHz, peak detector).
- Note 3: Signal does not change with mode or channel. Measured in previous runs.





EMC Test Data

Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A

Run #4c: High Channel 48 - 5240 MHz

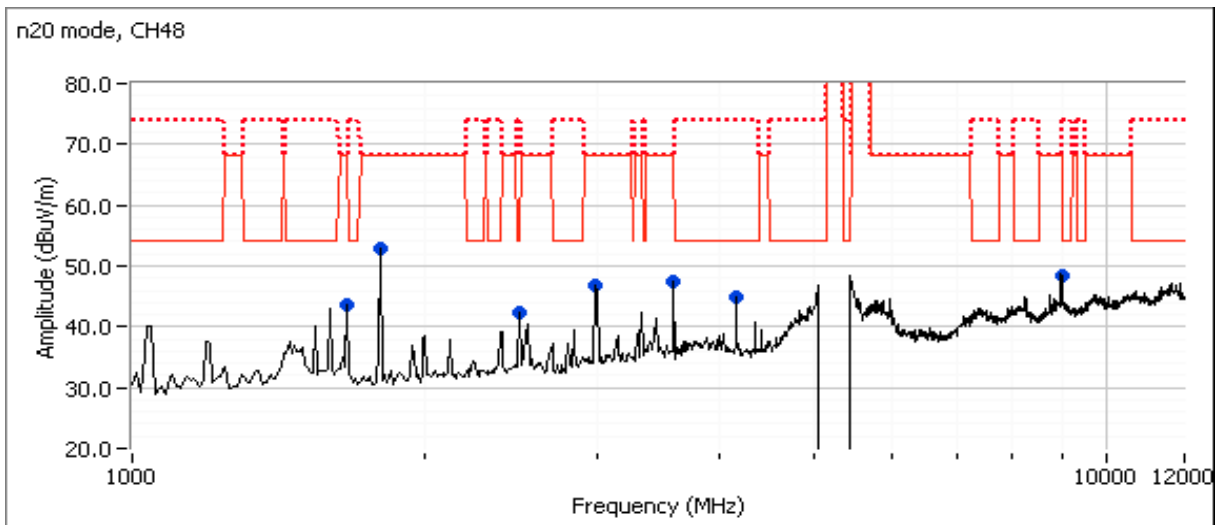
Preliminary Spurious Radiated Emissions from scan

Frequency MHz	Level dB μ V/m	Pol v/h	15.209 / 15E		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
9002.500	48.5	V	54.0	-5.5	Peak	331	1.5	Note 3
4162.500	44.8	V	54.0	-9.2	Peak	192	1.5	Note 3
1660.000	43.5	V	54.0	-10.5	Peak	294	1.5	Note 3
2494.170	42.5	V	54.0	-11.5	Peak	72	1.5	Note 3
1797.500	52.8	V	68.3	-15.5	Peak	0	1.0	
3594.170	47.5	V	68.3	-20.8	Peak	0	1.0	
2989.170	46.7	V	68.3	-21.6	Peak	291	1.0	

Final peak & average readings.

Frequency MHz	Level dB μ V/m	Pol v/h	15.209 / 15E		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
3600.110	38.2	V	54.0	-15.8	AVG	0	1.54	
3600.350	49.8	V	74.0	-24.2	PK	0	1.54	

- Note 1: For emissions in restricted bands, the limit of 15.209 was used which requires average and peak measurements.
- Note 2: For emissions outside of the restricted bands the limit is -27dBm/MHz eirp (68.3dBuV/m). The measurement method required is a peak measurement (RB=1MHz, VB \geq 3MHz, peak detector).
- Note 3: Signal does not change with mode or channel. Measured in previous runs.





EMC Test Data

Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A

Run #5, Radiated Spurious Emissions, 30 - 40,000 MHz. Operation in the 5250-5350 MHz Band, 802.11n20

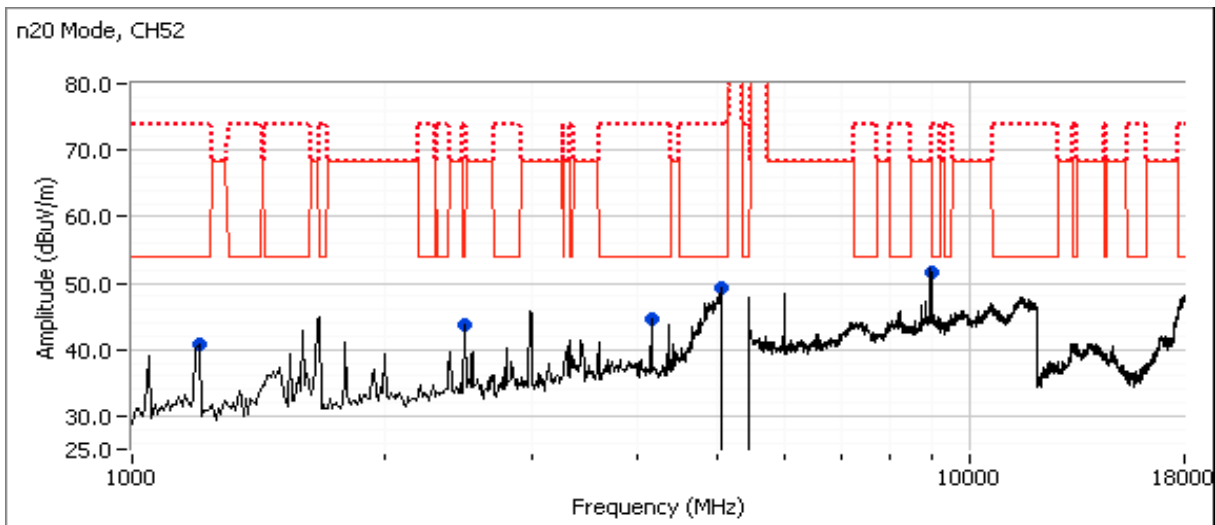
Date of Test: 9/6/2012
 Test Engineer: Rafael Varelas
 Test Location: FT Chamber #4

Run #5a: Low Channel 52 - 5260 MHz

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				
5043.920	46.2	H	54.0	-7.8	AVG	285	1.0	RB 1 MHz;VB 10 Hz;Peak
5052.850	58.5	H	74.0	-15.5	PK	285	1.0	RB 1 MHz;VB 3 MHz;Peak
9000.080	43.0	V	54.0	-11.0	AVG	343	1.2	RB 1 MHz;VB 10 Hz;Peak
9000.140	59.6	V	74.0	-14.4	PK	343	1.2	RB 1 MHz;VB 3 MHz;Peak
4165.270	41.6	V	54.0	-12.4	AVG	125	1.4	RB 1 MHz;VB 10 Hz;Peak
4165.400	47.5	V	74.0	-26.5	PK	125	1.4	RB 1 MHz;VB 3 MHz;Peak
1200.070	40.8	H	54.0	-13.2	Peak	73	1.9	
2499.510	43.6	V	54.0	-10.4	Peak	238	1.9	

- Note 1: For emissions in restricted bands, the limit of 15.209 was used which requires average and peak measurements.
- Note 2: For emissions outside of the restricted bands the limit is -27dBm/MHz eirp (68.3dBuV/m). The measurement method required is a peak measurement (RB=1MHz, VB \geq 3MHz, peak detector).





EMC Test Data

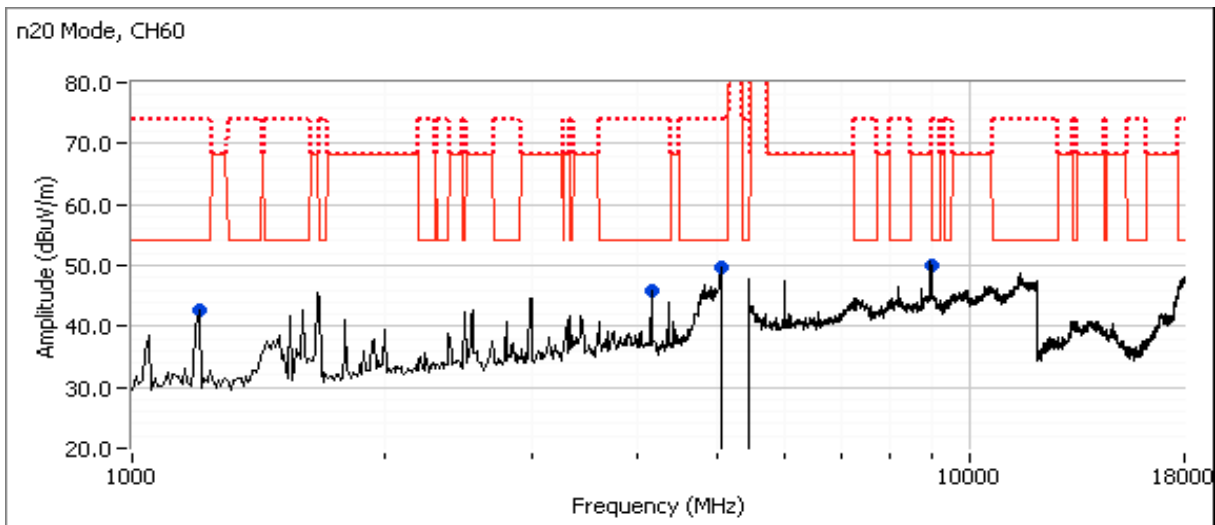
Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A

Run #5b: Center Channel 60 - 5300 MHz

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				
5043.090	45.0	H	54.0	-9.0	AVG	261	1.2	RB 1 MHz;VB 10 Hz;Peak
5043.700	56.1	H	74.0	-17.9	PK	261	1.2	RB 1 MHz;VB 3 MHz;Peak
9000.020	41.1	V	54.0	-12.9	AVG	352	1.2	RB 1 MHz;VB 10 Hz;Peak
9000.280	55.6	V	74.0	-18.4	PK	352	1.2	RB 1 MHz;VB 3 MHz;Peak
4165.210	45.0	V	54.0	-9.0	AVG	195	1.2	RB 1 MHz;VB 10 Hz;Peak
4165.070	50.1	V	74.0	-23.9	PK	195	1.2	RB 1 MHz;VB 3 MHz;Peak
1200.180	42.6	H	54.0	-11.4	Peak	58	1.3	

- Note 1: For emissions in restricted bands, the limit of 15.209 was used which requires average and peak measurements.
- Note 2: For emissions outside of the restricted bands the limit is -27dBm/MHz eirp (68.3dBuV/m). The measurement method required is a peak measurement (RB=1MHz, VB \geq 3MHz, peak detector).





EMC Test Data

Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A

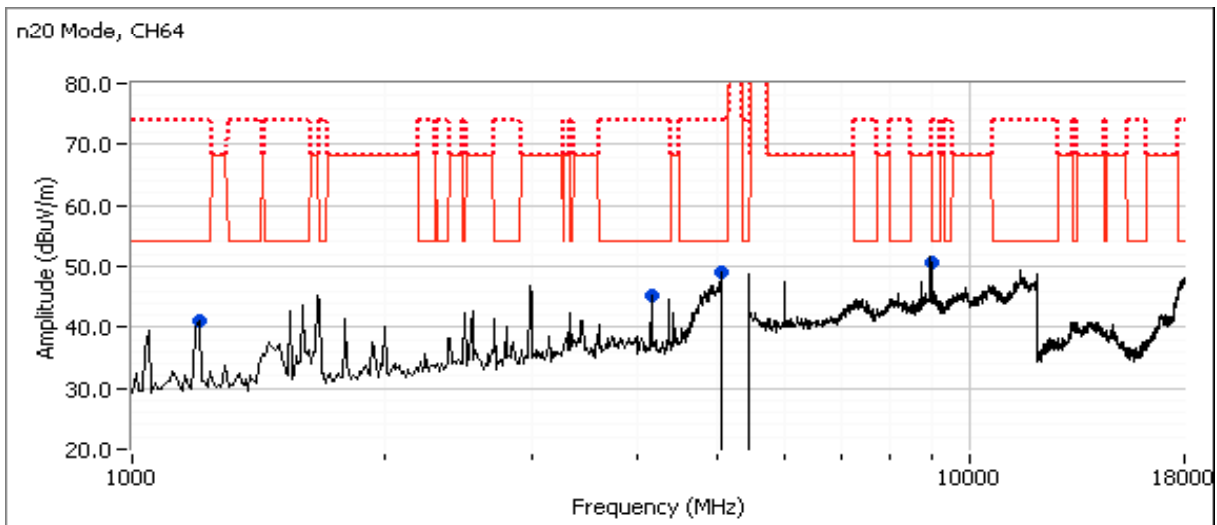
Run #5c: High Channel 64 - 5320 MHz

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				
4165.260	44.5	V	54.0	-9.5	AVG	194	1.3	RB 1 MHz;VB 10 Hz;Peak
4164.600	50.0	V	74.0	-24.0	PK	194	1.3	RB 1 MHz;VB 3 MHz;Peak
5041.530	44.3	H	54.0	-9.7	AVG	246	1.0	RB 1 MHz;VB 10 Hz;Peak
5046.380	55.8	H	74.0	-18.2	PK	246	1.0	RB 1 MHz;VB 3 MHz;Peak
9000.020	42.3	V	54.0	-11.7	AVG	344	1.3	RB 1 MHz;VB 10 Hz;Peak
9000.000	56.7	V	68.3	-11.6	PK	344	1.3	RB 1 MHz;VB 3 MHz;Peak
1200.180	41.1	H	54.0	-12.9	Peak	85	1.3	

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

Note 2: For emissions outside of the restricted bands the limit is -27dBm/MHz eirp (68.3dBuV/m). The measurement method required is a peak measurement (RB=1MHz, VB \geq 3MHz, peak detector).





EMC Test Data

Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A

Run #6, Radiated Spurious Emissions, 30 - 40,000 MHz. Operation in the 5470-5725 MHz Band, 802.11n20

Date of Test: 9/6/2012

Test Engineer: Rafael Varelas

Test Location: FT Chamber #4

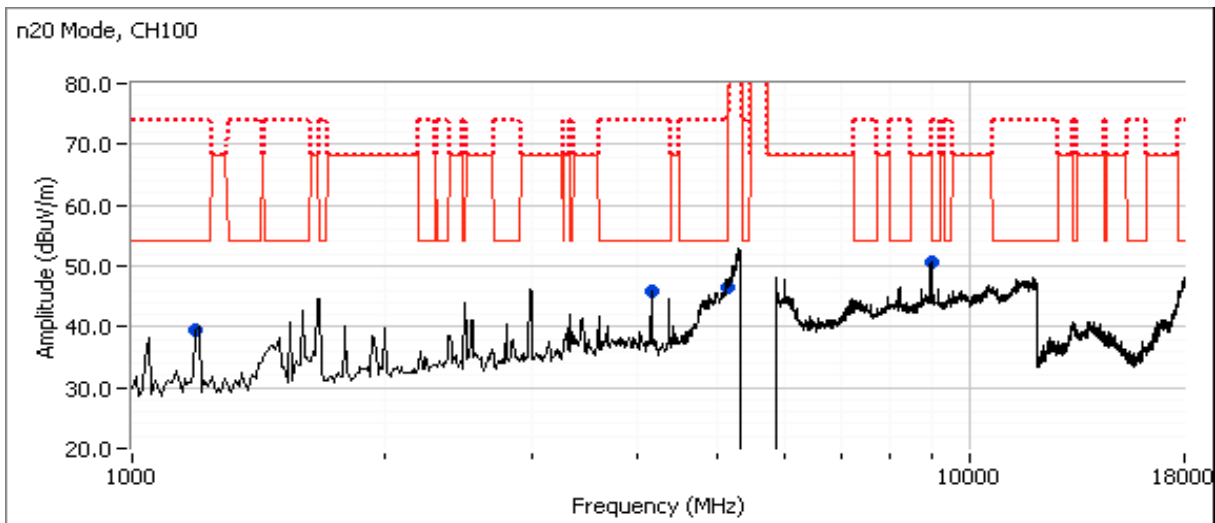
Run #6a: Low Channel 100 - 5500 MHz

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				
4165.190	44.7	V	54.0	-9.3	AVG	193	1.2	RB 1 MHz;VB 10 Hz;Peak
4165.150	50.0	V	74.0	-24.0	PK	193	1.2	RB 1 MHz;VB 3 MHz;Peak
5140.290	43.5	H	54.0	-10.5	AVG	66	1.0	RB 1 MHz;VB 10 Hz;Peak
5141.840	55.9	H	74.0	-18.1	PK	66	1.0	RB 1 MHz;VB 3 MHz;Peak
9000.020	42.2	V	54.0	-11.8	AVG	345	1.2	RB 1 MHz;VB 10 Hz;Peak
9000.030	57.0	V	74.0	-17.0	PK	345	1.2	RB 1 MHz;VB 3 MHz;Peak
1200.190	39.4	H	54.0	-14.6	Peak	70	1.3	

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

Note 2: For emissions outside of the restricted bands the limit is -27dBm/MHz eirp (68.3dBuV/m). The measurement method required is a peak measurement (RB=1MHz, VB \geq 3MHz, peak detector).





EMC Test Data

Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A

Run #6b: Center Channel 116 - 5580 MHz

Date of Test: 9/7/2012
 Test Engineer: John Caizzi
 Test Location: FT Chamber #4

Preliminary Spurious Radiated Emissions from scan

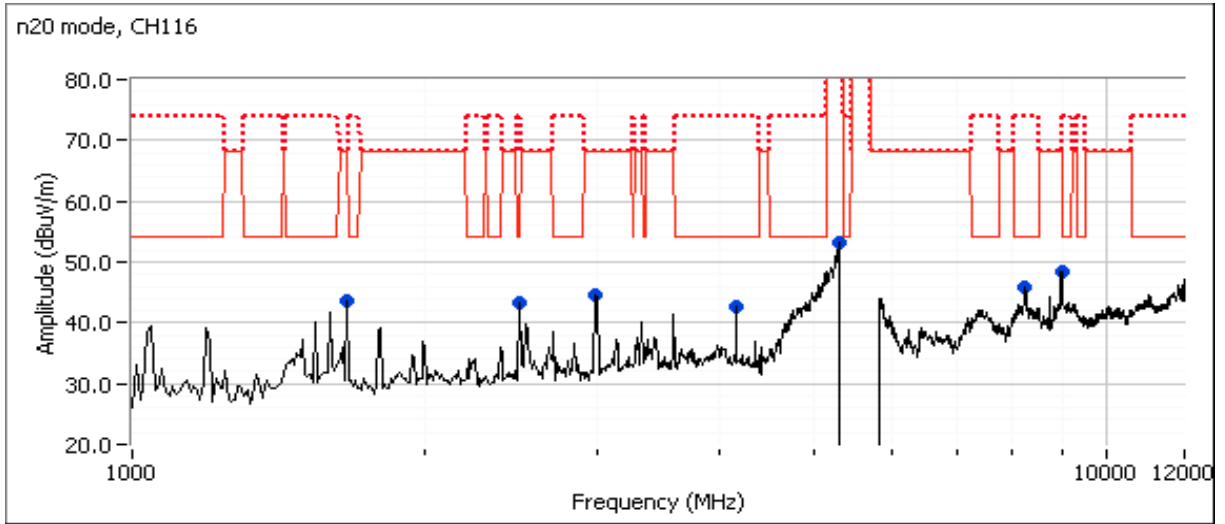
Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
9002.500	48.4	V	54.0	-5.6	Peak	16	1.5	Note 3
8214.170	45.9	V	54.0	-8.1	Peak	1	1.0	
1660.000	43.5	V	54.0	-10.5	Peak	54	1.0	Note 3
2494.170	43.3	V	54.0	-10.7	Peak	237	1.0	Note 3
4162.500	42.6	V	54.0	-11.4	Peak	126	1.5	Note 3
5299.170	53.1	H	68.3	-15.2	Peak	89	1.0	
2980.000	44.6	H	68.3	-23.7	Peak	234	1.0	

Final peak & average readings.

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
8223.080	38.9	V	54.0	-15.1	AVG	6	1.52	
8209.580	55.6	V	74.0	-18.4	PK	6	1.52	

- Note 1: For emissions in restricted bands, the limit of 15.209 was used which requires average and peak measurements.
- Note 2: For emissions outside of the restricted bands the limit is -27dBm/MHz eirp (68.3dBuV/m). The measurement method required is a peak measurement (RB=1MHz, VB \geq 3MHz, peak detector).
- Note 3: Signal does not change with mode or channel. Measured in previous runs.

Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
	Account Manager: Michelle Kim
Contact: Mark Rieger	
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A





EMC Test Data

Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A

Run #6c: High Channel 140 - 5700 MHz

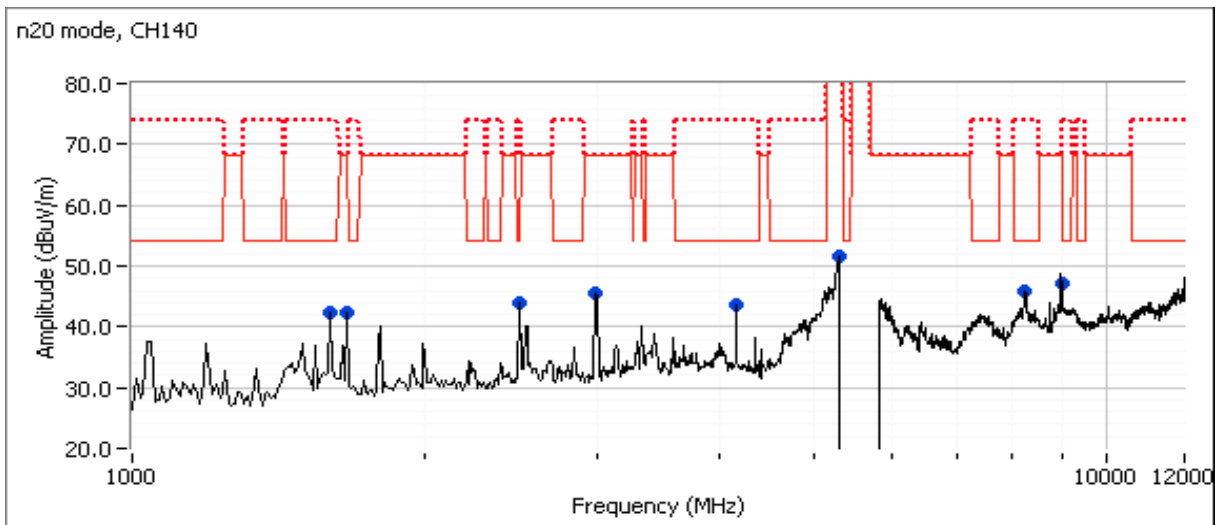
Preliminary Spurious Radiated Emissions from scan

Frequency MHz	Level dB μ V/m	Pol v/h	15.209 / 15E		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
9002.500	47.1	V	54.0	-6.9	Peak	326	1.5	Note 3
8214.170	45.7	V	54.0	-8.3	Peak	6	1.5	Note 3
2494.170	43.8	V	54.0	-10.2	Peak	233	1.5	Note 3
4162.500	43.6	V	54.0	-10.4	Peak	195	1.0	Note 3
1660.000	42.5	V	54.0	-11.5	Peak	54	1.0	Note 3
1595.830	42.4	H	54.0	-11.6	Peak	6	1.0	
5299.170	51.7	H	68.3	-16.6	Peak	89	1.0	
2980.000	45.6	H	68.3	-22.7	Peak	229	1.0	

Final peak & average readings.

Frequency MHz	Level dB μ V/m	Pol v/h	15.209 / 15E		Detector PK/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
1599.820	43.3	H	54.0	-10.7	AVG	16	1.32	
1600.090	46.7	H	74.0	-27.3	PK	16	1.32	

- Note 1: For emissions in restricted bands, the limit of 15.209 was used which requires average and peak measurements.
- Note 2: For emissions outside of the restricted bands the limit is -27dBm/MHz eirp (68.3dB μ V/m). The measurement method required is a peak measurement (RB=1MHz, VB \geq 3MHz, peak detector).
- Note 3: Signal does not change with mode or channel. Measured in previous runs.





EMC Test Data

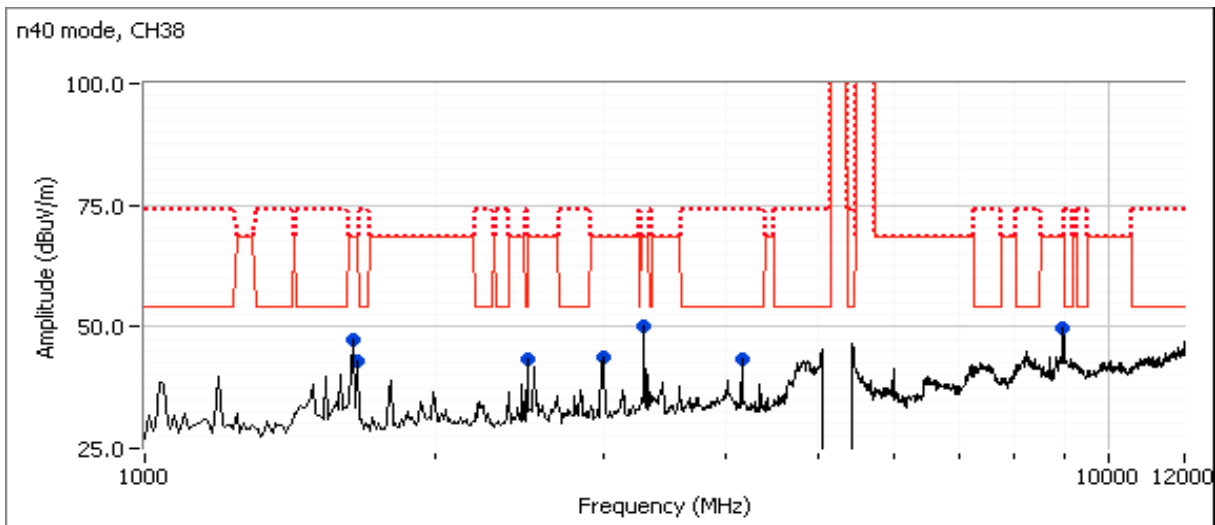
Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A

Run #7, Radiated Spurious Emissions, 30 - 40,000 MHz. Operation in the 5150-5250 MHz Band - 802.11n40
 Date of Test: 9/7/2012 Test Location: FT Chamber #4
 Test Engineer: M. Birgani

Run #7a: Channel 38 - 5190 MHz
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				
4165.240	44.4	V	54.0	-9.6	AVG	195	1.1	RB 1 MHz;VB 10 Hz;Peak
2499.070	42.0	V	54.0	-12.0	AVG	95	1.1	RB 1 MHz;VB 10 Hz;Peak
3300.830	50.3	V	68.3	-18.0	Peak	249	1.5	Note 2
8956.670	49.6	V	68.3	-18.7	Peak	332	1.5	Note 2
1641.670	47.2	V	68.3	-21.1	Peak	249	1.5	Note 2
2989.170	43.9	V	68.3	-24.4	Peak	108	1.0	Note 2
4165.260	49.1	V	74.0	-24.9	PK	195	1.1	RB 1 MHz;VB 3 MHz;Peak
1660.000	43.0	V	68.3	-25.3	Peak	58	1.0	Note 2
2498.910	46.1	V	74.0	-27.9	PK	95	1.1	RB 1 MHz;VB 3 MHz;Peak

- Note 1: For emissions in restricted bands, the limit of 15.209 was used which requires average and peak measurements.
- Note 2: For emissions outside of the restricted bands the limit is -27dBm/MHz eirp (68.3dBuV/m). The measurement method required is a peak measurement (RB=1MHz, VB \geq 3MHz, peak detector).
- Note 3: Signal does not change with mode or channel. Measured in previous runs.



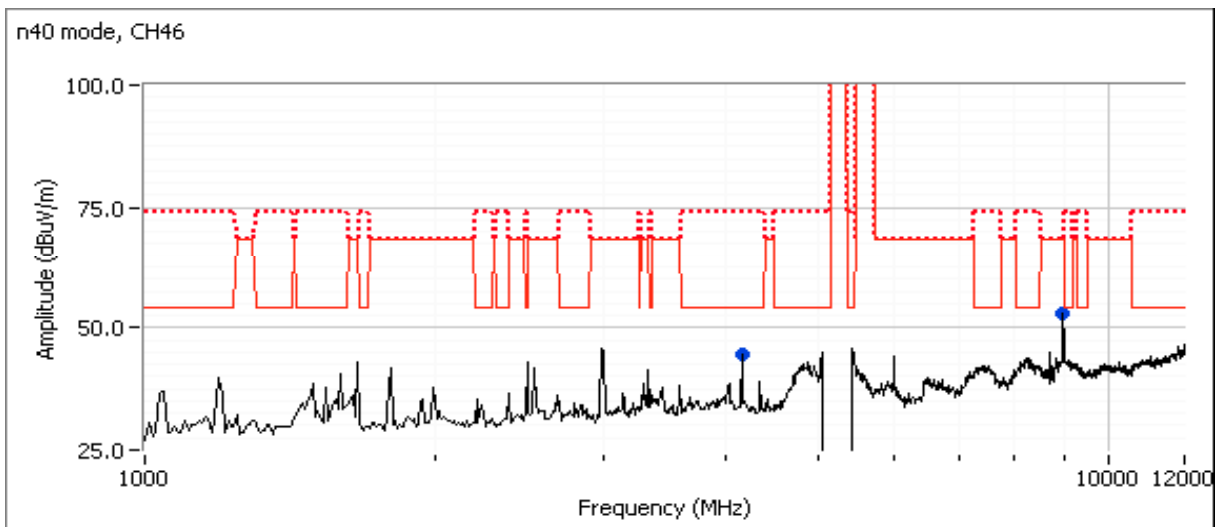
Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A

Run #7c: High Channel 46 - 5230 MHz

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				
4165.270	44.6	V	54.0	-9.4	AVG	193	1.2	RB 1 MHz;VB 10 Hz;Peak
8956.670	53.0	V	68.3	-15.3	Peak	327	1.5	Note 2
4165.000	49.5	V	74.0	-24.5	PK	193	1.2	RB 1 MHz;VB 3 MHz;Peak

- Note 1: For emissions in restricted bands, the limit of 15.209 was used which requires average and peak measurements.
- Note 2: For emissions outside of the restricted bands the limit is -27dBm/MHz eirp (68.3dBuV/m). The measurement method required is a peak measurement (RB=1MHz, VB \geq 3MHz, peak detector).





EMC Test Data

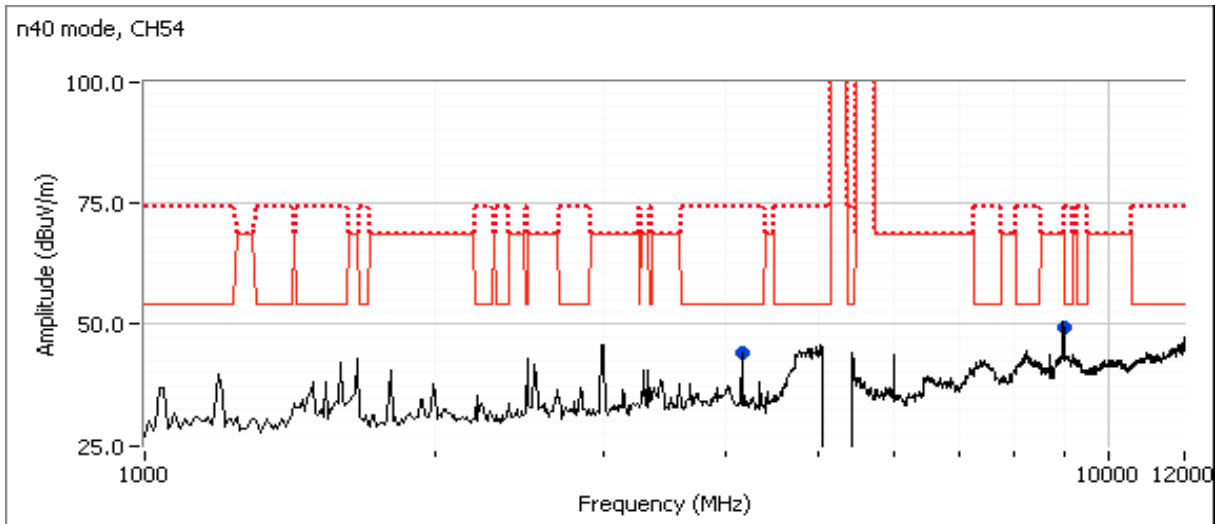
Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A

Run #8, Radiated Spurious Emissions, 30 - 40,000 MHz. Operation in the 5250-5350 MHz Band, 802.11n40
 Date of Test: 9/7/2012 Test Location: FT Chamber #4
 Test Engineer: M. Birgani

Run #8a: Low Channel 54 - 5270 MHz
Spurious Radiated Emissions:

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
4165.240	44.6	V	54.0	-9.4	AVG	195	1.1	RB 1 MHz;VB 10 Hz;Peak
9000.010	39.2	V	54.0	-14.8	AVG	355	1.4	RB 1 MHz;VB 10 Hz;Peak
9000.060	54.2	V	74.0	-19.8	PK	355	1.4	RB 1 MHz;VB 3 MHz;Peak
4165.260	49.1	V	74.0	-24.9	PK	195	1.1	RB 1 MHz;VB 3 MHz;Peak

- Note 1: For emissions in restricted bands, the limit of 15.209 was used which requires average and peak measurements.
- Note 2: For emissions outside of the restricted bands the limit is -27dBm/MHz eirp (68.3dBuV/m). The measurement method required is a peak measurement (RB=1MHz, VB \geq 3MHz, peak detector).





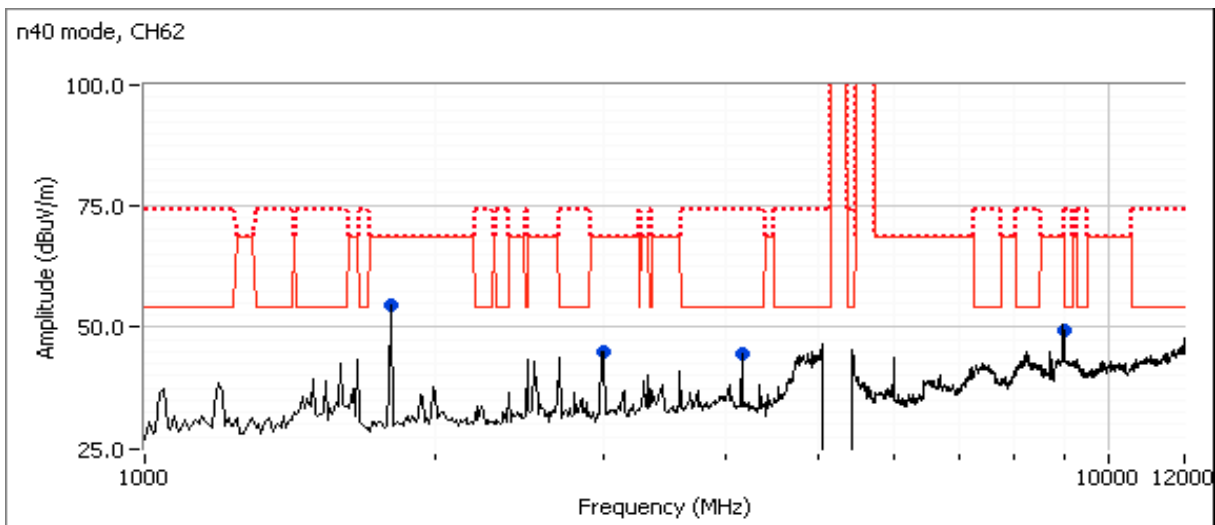
EMC Test Data

Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A

Run #8c: High Channel 62 - 5310 MHz
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				
4165.280	44.3	V	54.0	-9.7	AVG	195	1.1	RB 1 MHz;VB 10 Hz;Peak
1797.500	54.4	V	68.3	-13.9	Peak	260	2.0	Note 2
9000.120	39.2	V	54.0	-14.8	AVG	355	1.4	RB 1 MHz;VB 10 Hz;Peak
9000.090	54.2	V	74.0	-19.8	PK	355	1.4	RB 1 MHz;VB 3 MHz;Peak
2989.170	45.0	V	68.3	-23.3	Peak	109	1.0	Note 2
4165.280	49.1	V	74.0	-24.9	PK	195	1.1	RB 1 MHz;VB 3 MHz;Peak

- Note 1: For emissions in restricted bands, the limit of 15.209 was used which requires average and peak measurements.
- Note 2: For emissions outside of the restricted bands the limit is -27dBm/MHz eirp (68.3dB μ V/m). The measurement method required is a peak measurement (RB=1MHz, VB \geq 3MHz, peak detector).





EMC Test Data

Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A

Run #9, Radiated Spurious Emissions, 30 - 40,000 MHz. Operation in the 5470-5725 MHz Band, 802.11n40
 Date of Test: 9/7/2012
 Test Engineer: John Caizzi
 Test Location: Chamber 4

Run #9a: Low Channel 102 - 5510 MHz

Preliminary Spurious Radiated Emissions from scan

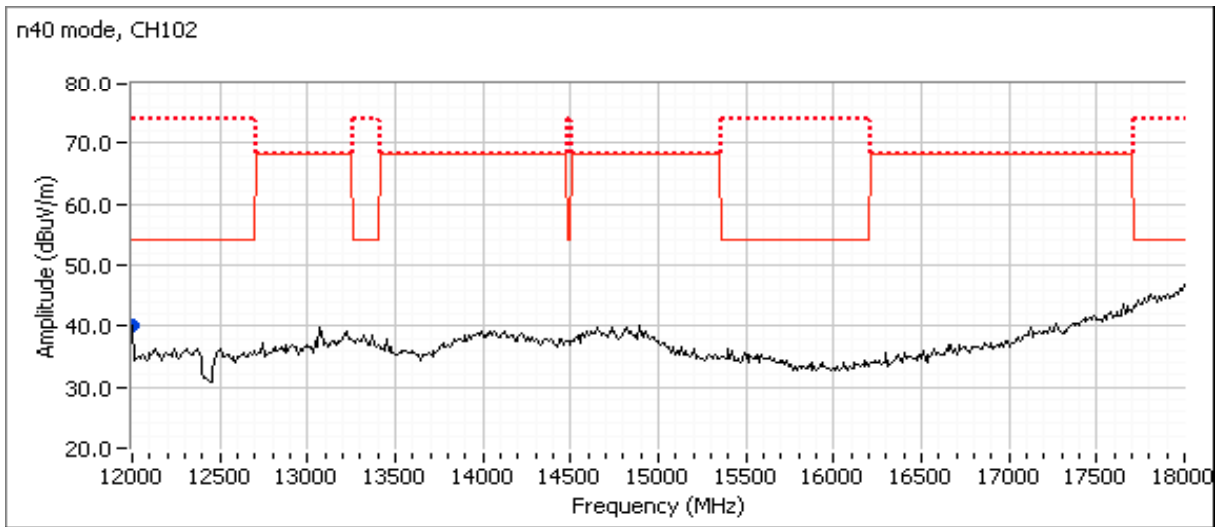
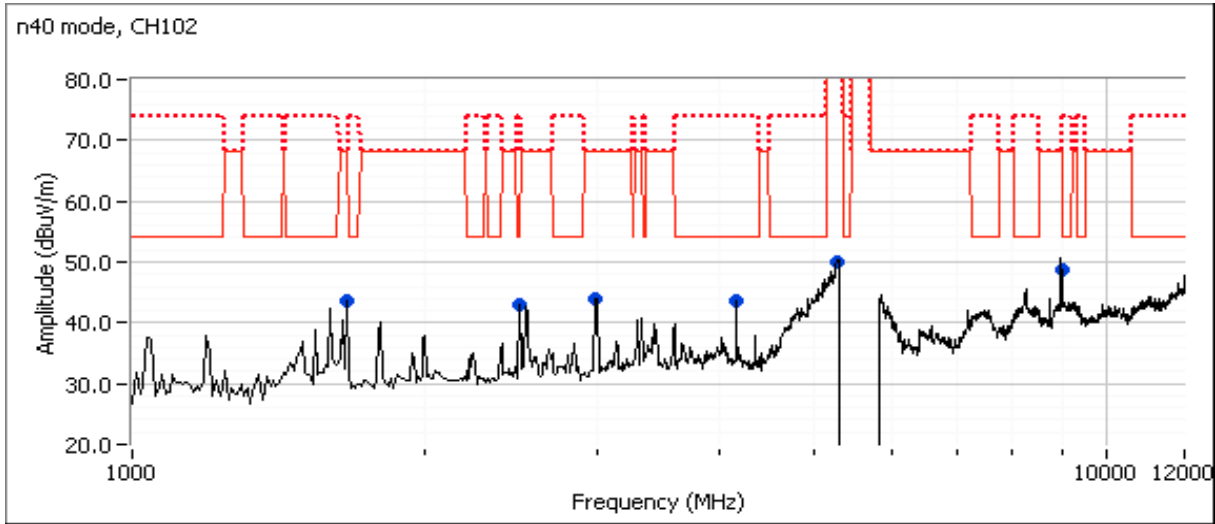
Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
9002.500	48.6	V	54.0	-5.4	Peak	326	1.5	Note 3
1660.000	43.6	V	54.0	-10.4	Peak	42	1.0	Note 3
4162.500	43.5	V	54.0	-10.5	Peak	188	1.0	Note 3
2494.170	42.9	V	54.0	-11.1	Peak	251	1.5	Note 3
12000.000	40.0	V	54.0	-14.0	Peak	164	1.0	
5290.000	50.1	H	68.3	-18.2	Peak	93	1.0	
2989.170	43.8	V	68.3	-24.5	Peak	105	1.0	

Final peak & average readings.

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
11999.720	44.5	V	54.0	-9.5	AVG	132	1.38	
11999.820	52.2	V	74.0	-21.8	PK	132	1.38	

- Note 1: For emissions in restricted bands, the limit of 15.209 was used which requires average and peak measurements.
- Note 2: For emissions outside of the restricted bands the limit is -27dBm/MHz eirp (68.3dBuV/m). The measurement method required is a peak measurement (RB=1MHz, VB \geq 3MHz, peak detector).
- Note 3: Signal does not change with mode or channel. Measured in previous runs.

Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A





EMC Test Data

Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A

Run #9b: Center Channel 110 - 5550 MHz

Preliminary Spurious Radiated Emissions from scan

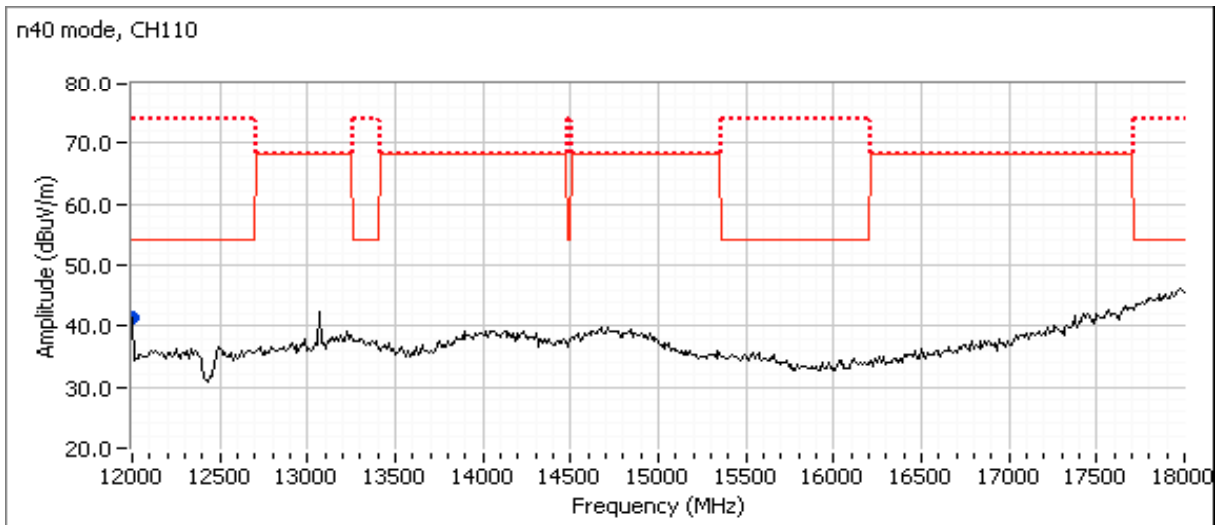
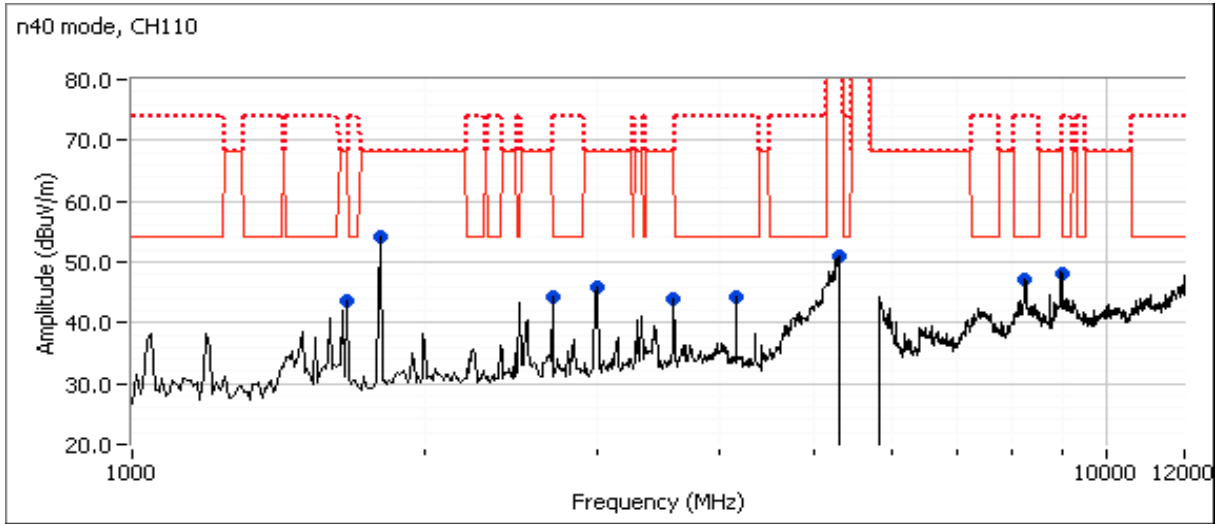
Frequency MHz	Level dB μ V/m	Pol v/h	15.209 / 15E		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
9002.500	48.1	V	54.0	-5.9	Peak	324	1.5	Note 3
8214.170	47.0	V	54.0	-7.0	Peak	360	1.5	Note 3
4162.500	44.3	V	54.0	-9.7	Peak	195	1.5	Note 3
2695.830	44.1	V	54.0	-9.9	Peak	248	1.5	
3594.170	43.8	V	54.0	-10.2	Peak	248	1.5	Note 3
1660.000	43.6	V	54.0	-10.4	Peak	53	1.0	Note 3
12000.000	41.5	V	54.0	-12.5	Peak	0	1.5	
1797.500	54.2	V	68.3	-14.1	Peak	248	1.5	
5299.170	51.1	H	68.3	-17.2	Peak	80	1.5	
2998.330	45.8	H	68.3	-22.5	Peak	228	1.0	

Final peak & average readings.

Frequency MHz	Level dB μ V/m	Pol v/h	15.209 / 15E		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
2741.300	28.8	V	54.0	-25.2	AVG	251	1.06	
2745.500	38.9	V	74.0	-35.1	PK	251	1.06	
11999.650	46.5	V	54.0	-7.5	AVG	6	2.13	
11999.770	53.5	V	74.0	-20.5	PK	6	2.13	

- Note 1: For emissions in restricted bands, the limit of 15.209 was used which requires average and peak measurements.
- Note 2: For emissions outside of the restricted bands the limit is -27dBm/MHz eirp (68.3dBuV/m). The measurement method required is a peak measurement (RB=1MHz, VB \geq 3MHz, peak detector).
- Note 3: Signal does not change with mode or channel. Measured in previous runs.

Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A





EMC Test Data

Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A

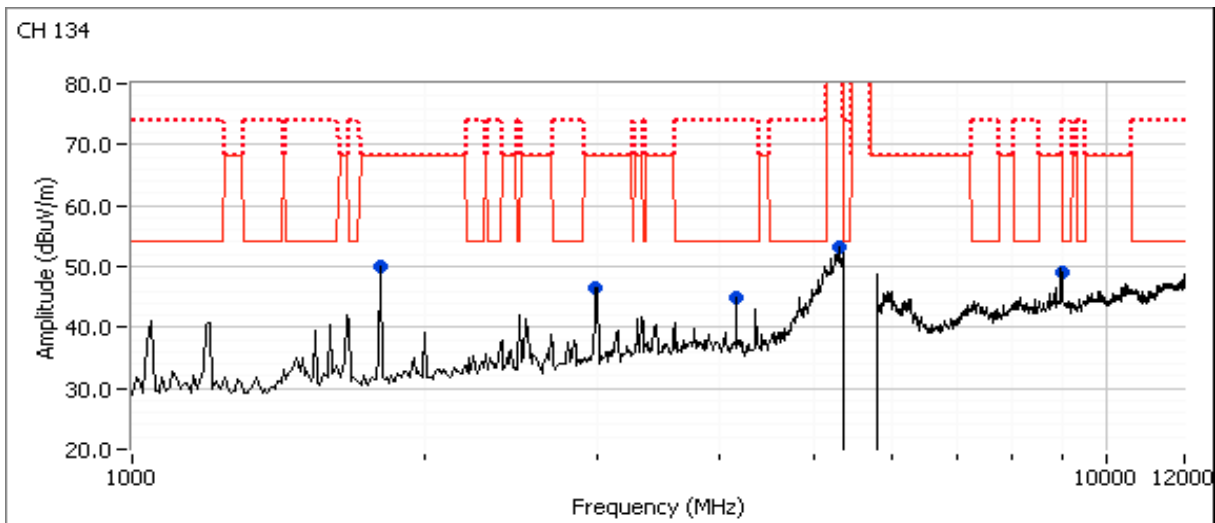
Run #9c: High Channel 134 - 5670 MHz, 20 dBm

Date of Test: 8/31/2012
 Test Engineer: John Caizzi
 Test Location: Chamber 5

Final peak & average readings.

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
9002.500	49.0	V	54.0	-5.0	Peak	338	1.5	Note 3
4162.500	44.8	V	54.0	-9.2	Peak	177	1.5	Note 3
5299.170	53.3	H	68.3	-15.0	Peak	93	1.0	
1797.500	50.0	H	68.3	-18.3	Peak	175	1.5	
2989.170	46.5	H	68.3	-21.8	Peak	226	1.0	

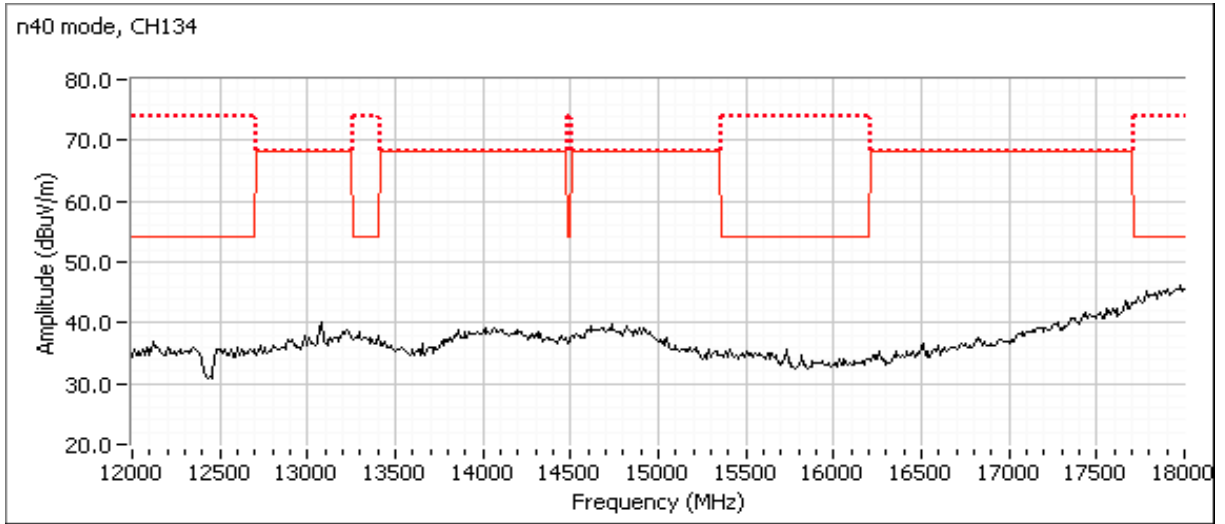
- Note 1: For emissions in restricted bands, the limit of 15.209 was used which requires average and peak measurements.
- Note 2: For emissions outside of the restricted bands the limit is -27dBm/MHz eirp (68.3dBuV/m). The measurement method required is a peak measurement (RB=1MHz, VB \geq 3MHz, peak detector).
- Note 3: Signal does not change with mode or channel. Measured in previous runs.





EMC Test Data

Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A



Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
	Account Manager: Michelle Kim
Contact: Mark Rieger	
Standard: FCC 15.247, 15E, RSS-210, 15B	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: 9/19/2012, 9/20/2012, 9/24/12
 Test Engineer: D. Demirci, M. Birgani, J. Caizzi
 Test Location: FT Lab#4

Config. Used: Direct connection to antenna ports.
 Config Change: NA
 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:	22 °C
Rel. Humidity:	34 %

Modifications Made During Testing

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

Notes

Legacy mode, 802.11a are single chain only. Chain with highest power reported

Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A

Summary of Results

Run #	Test Performed	Limit	Pass / Fail	Result / Margin
1	Power 5150 - 5250MHz	15.407(a) (1), (2)	PASS	11a: 16.1dBm (40.8mW) n20: 15.1dBm (32.4mW) n40: 15.6dBm (36.7mW)
1	PSD 5150 - 5250MHz	15.407(a) (1), (2)	PASS	11a: 3.9 dBm/MHz n20: 2.9 dBm/MHz n40: 0.7 dBm/MHz
1	Power 5250 - 5350MHz	15.407(a) (1), (2)	PASS	11a: 19.1dBm (81.3mW) n20: 22.0dBm (158mW) n40: 21.6dBm (145mW)
1	PSD 5250 - 5350MHz	15.407(a) (1), (2)	PASS	11a: 7.0 dBm/MHz n20: 9.8 dBm/MHz n40: 6.4 dBm/MHz
1	Max EIRP 5250 - 5350MHz	TPC required if EIRP ≥ 500mW (27dBm) EIRP ≥ 200mW (23dBm) DFS threshold = -64dBm	N/A	EIRP = 29.1 dBm (814 mW)
1	Power 5470 - 5725MHz	15.407(a) (1), (2)	PASS	11a: 17.4dBm (55mW) n20: 21.9dBm (155mW) n40: 21.8dBm (150mW)
1	PSD 5470 - 5725MHz	15.407(a) (1), (2)	PASS	11a: 5.4 dBm/MHz n20: 9.7 dBm/MHz n40: 6.7 dBm/MHz
1	Max EIRP 5470 - 5725MHz	TPC required if EIRP ≥ 500mW (27dBm) EIRP ≥ 200mW (23dBm) DFS threshold = -64dBm	N/A	EIRP = 29.0 dBm (794.5 mW)
1	26dB Bandwidth	15.407 (Information only)	-	> 20MHz for all modes
1	99% Bandwidth	RSS 210 (Information only)	N/A	802.11a: 17.0 MHz 802.11n 20MHz: 17.0 MHz 802.11n n40MHz: 36.4 MHz
2	Peak Excursion Envelope	15.407(a) (6) 13dB	PASS	9.4 dB
3	Antenna Conducted Out of Band Spurious	15.407(b) -27dBm/MHz	PASS	All emissions below the -27dBm/MHz limit



EMC Test Data

Client:	Pace Americas	Job Number:	J87430
Model:	HR44	T-Log Number:	T89059
		Account Manager:	Michelle Kim
Contact:	Mark Rieger		
Standard:	FCC 15.247, 15E, RSS-210, 15B	Class:	N/A

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

Note 1:	Output power measured using a spectrum analyzer (see plots below). RBW=1MHz, VB=3 MHz, # of points in sweep $\geq 2 \times \text{span} / \text{RBW}$, sample detector, power averaging on (transmitted signal was continuous) and power integration over 50 MHz (method SA-1 of KDB 789033).
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 $\geq 3 \times \text{RB}$
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: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A

MIMO Device - 5150-5250 MHz Band

	Chain 1	Chain 2	Chain 3	Coherent	Effective ⁵	EIRP (mW)	EIRP (dBm)
Antenna Gain (dBi):	4.1	4.1		Yes	7.1	188.4	22.8

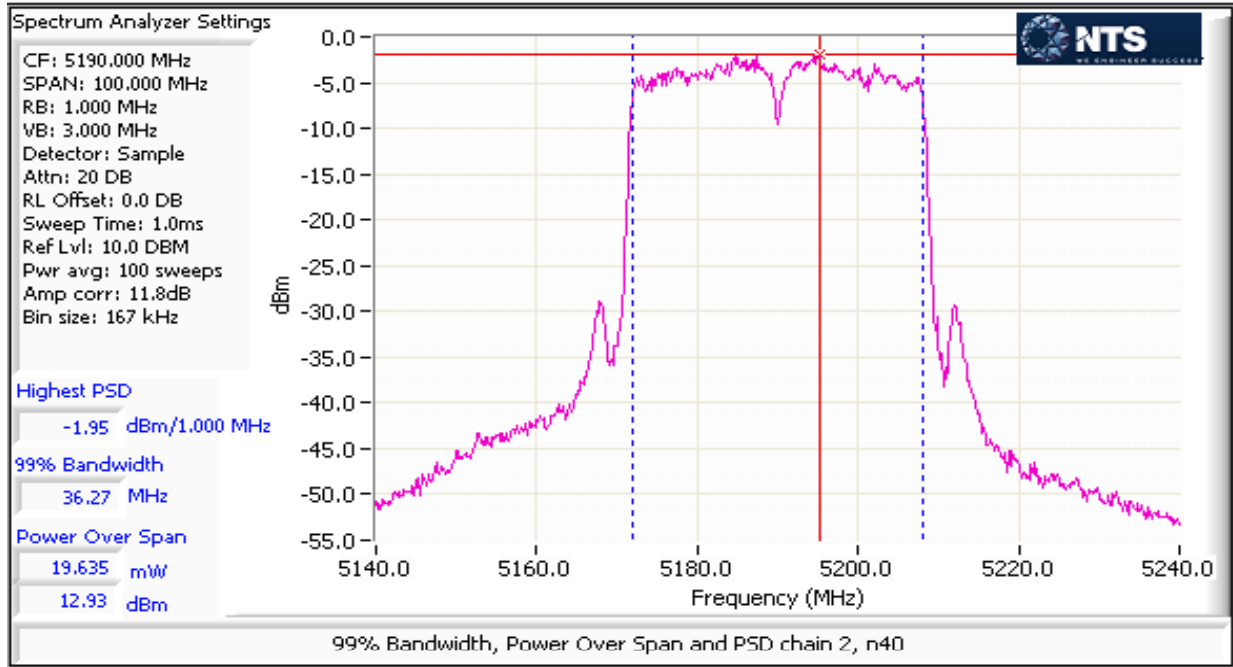
Power

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			
802.11a										
5180	q68	20.3		15.7		36.9	15.7	17.0	0.041	PASS
5200	q70	20.3		16.1		40.8	16.1	17.0		PASS
5240	q70	20.3		16.1		40.8	16.1	17.0		PASS
802.11n20										
5180	q52	20.3	11.9	12.3		32.4	15.1	15.9	0.032	PASS
5200	q52	20.3	11.8	12.2		31.9	15.0	15.9		PASS
5240	q52	20.3	11.7	12.0		30.6	14.9	15.9		PASS
802.11n40										
5190	q54	46.5	12.3	12.9		36.7	15.6	15.9	0.037	PASS
5230	q54	40.0	12.4	12.5		35.3	15.5	15.9		PASS

PSD

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	
802.11a										
5180	16.9	15.7		3.8		2.4	3.8	4.0	5.9	PASS
5200	16.9	16.1		3.9		2.4	3.9	4.0	5.9	PASS
5240	16.9	16.1		3.8		2.4	3.8	4.0	5.9	PASS
802.11n20										
5180	16.9	15.1	-0.4	0.1		1.9	2.9	2.9	2.9	PASS
5200	16.9	15.0	-0.3	-0.1		1.9	2.8	2.9	2.9	PASS
5240	16.9	14.9	-0.4	-0.2		1.9	2.7	2.9	2.9	PASS
802.11n40										
5190	36.3	15.6	-2.8	-2.0		1.2	0.7	2.9	2.9	PASS
5230	36.3	15.5	-2.5	-2.4		1.1	0.5	2.9	2.9	PASS

Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A



Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A

MIMO Device - 5250-5350 MHz Band

	Chain 1	Chain 2	Chain 3	Coherent	Effective ⁵	EIRP (mW)	EIRP (dBm)
Antenna Gain (dBi):	4.1	4.1		Yes	7.1	813.9	29.1

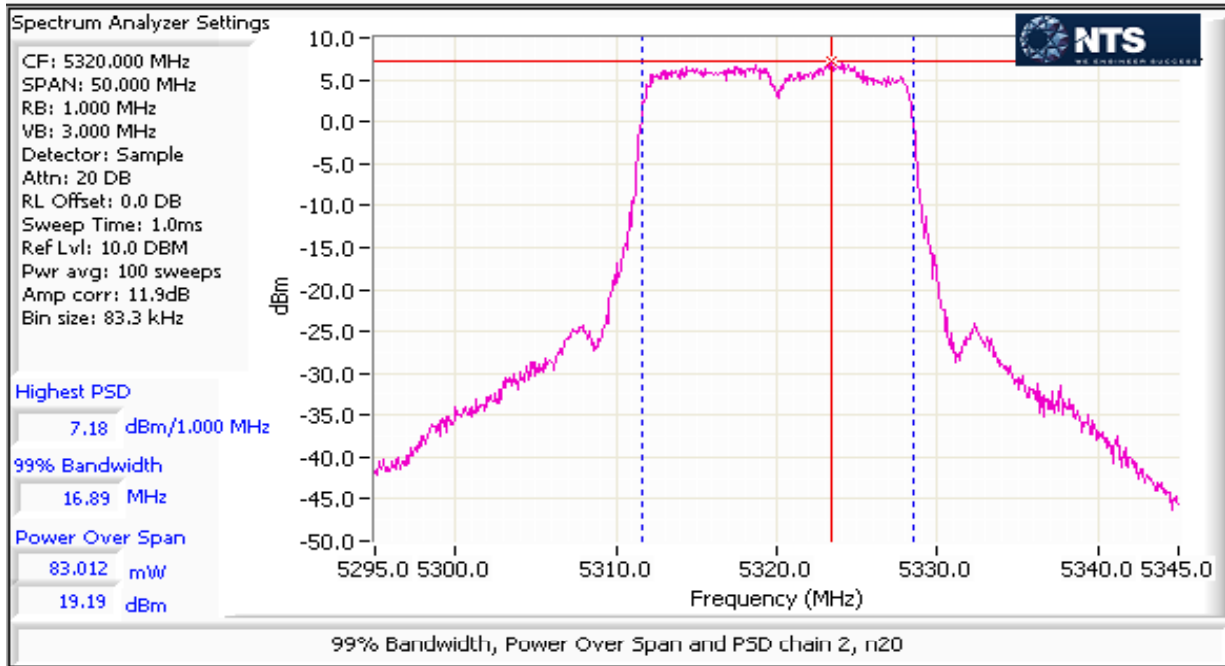
Power

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			
802.11a										
5260	20	20.5		18.9		77.6	18.9	22.9	0.081	PASS
5300	20	20.5		19.1		81.3	19.1	22.9		PASS
5320	18	20.3		17.6		57.0	17.6	22.9		PASS
802.11n20										
5260	20	20.8	18.9	19.0		157.6	22.0	22.9	0.158	PASS
5300	q76	20.8	18.4	18.1		134.7	21.3	22.9		PASS
5320	q78	20.8	18.8	19.2		158.3	22.0	22.9		PASS
802.11n40										
5270	20	44.3	18.9	18.4		145.3	21.6	22.9	0.145	PASS
5310	19	45.0	17.6	17.6		115.1	20.6	22.9		PASS

PSD

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	
802.11a										
5260	17.0	18.9		6.7		4.7	6.7	11.0	11.0	PASS
5300	17.0	19.1		7.0		5.0	7.0	11.0	11.0	PASS
5320	16.9	17.6		5.3		3.4	5.3	11.0	11.0	PASS
802.11n20										
5260	17.0	22.0	6.6	6.8		9.3	9.7	9.9	11.0	PASS
5300	16.9	21.3	6.2	5.9		8.0	9.0	9.9	11.0	PASS
5320	17.0	22.0	6.4	7.2		9.6	9.8	9.9	11.0	PASS
802.11n40										
5270	36.4	21.6	3.5	3.2		4.3	6.4	9.9	11.0	PASS
5310	36.3	20.6	2.5	2.6		3.6	5.5	9.9	11.0	PASS

Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
	Account Manager: Michelle Kim
Contact: Mark Rieger	
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A



Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A

MIMO Device - 5470-5725 MHz Band

	Chain 1	Chain 2	Chain 3	Coherent	Effective ⁵	EIRP (mW)	EIRP (dBm)
Antenna Gain (dBi):	4.1	4.1		Yes	7.1	794.5	29.0

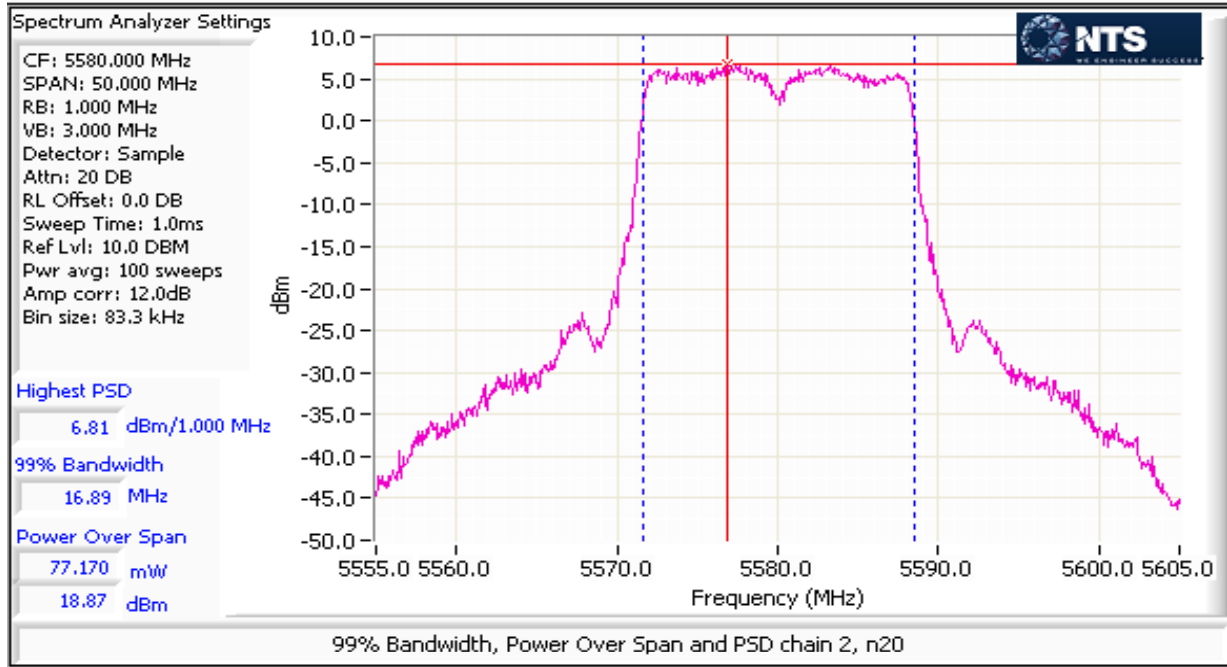
Power

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			
802.11a										
5500	20	20.5	17.4			55.0	17.4	22.9	0.055	PASS
5580	20	20.2	17.4			55.0	17.4	22.9		PASS
5700	20	20.4	17.2			52.5	17.2	22.9		PASS
802.11n20										
5500	20	20.5	18.9	18.8		154.6	21.9	22.9	0.155	PASS
5580	20	20.5	18.5	18.9		148.0	21.7	22.9		PASS
5700	20	22.3	18.7	18.9		151.9	21.8	22.9		PASS
802.11n40										
5510	19	44.0	17.2	16.8		100.3	20.0	22.9	0.150	PASS
5550	20	43.3	18.8	18.6		148.0	21.7	22.9		PASS
5670	20	44.5	18.9	18.6		149.9	21.8	22.9		PASS

PSD

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	
802.11a										
5500	17.0	17.4	5.4			3.5	5.4	11.0	11.0	PASS
5580	16.9	17.4	5.2			3.3	5.2	11.0	11.0	PASS
5700	17.0	17.2	5.0			3.1	5.0	11.0	11.0	PASS
802.11n20										
5500	16.9	21.9	6.6	6.8		9.4	9.7	9.9	11.0	PASS
5580	16.9	21.7	6.3	6.8		9.1	9.6	9.9	11.0	PASS
5700	16.9	21.8	6.3	6.8		9.0	9.6	9.9	11.0	PASS
802.11n40										
5510	36.3	20.0	2.1	1.7		3.1	4.9	9.9	11.0	PASS
5550	36.3	21.7	3.9	3.0		4.5	6.5	9.9	11.0	PASS
5670	36.3	21.8	3.7	3.7		4.6	6.7	9.9	11.0	PASS

Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
	Account Manager: Michelle Kim
Contact: Mark Rieger	
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A



Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
	Account Manager: Michelle Kim
Contact: Mark Rieger	
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A

Run #2: Peak Excursion Measurement

802.11a: Device meets the requirement for the peak excursion

Peak Excursion(dB)			Peak Excursion(dB)			Peak Excursion(dB)		
Freq (MHz)	Value	Limit	Freq (MHz)	Value	Limit	Freq (MHz)	Value	Limit
5180	8.3	13.0	5260	8.3	13.0	5500	7.7	13.0
5200	8.2	13.0	5300	8.2	13.0	5580	7.8	13.0
5240	8.8	13.0	5320	8.6	13.0	5700	8.4	13.0

802.11n20 Device meets the requirement for the peak excursion

Peak Excursion(dB)			Peak Excursion(dB)			Peak Excursion(dB)		
Freq (MHz)	Value	Limit	Freq (MHz)	Value	Limit	Freq (MHz)	Value	Limit
5180	8.1	13.0	5260	8.4	13.0	5500	7.2	13.0
5200	9.2	13.0	5300	8.9	13.0	5580	7.5	13.0
5240	8.2	13.0	5320	8.3	13.0	5700	7.8	13.0

802.11n40 Device meets the requirement for the peak excursion

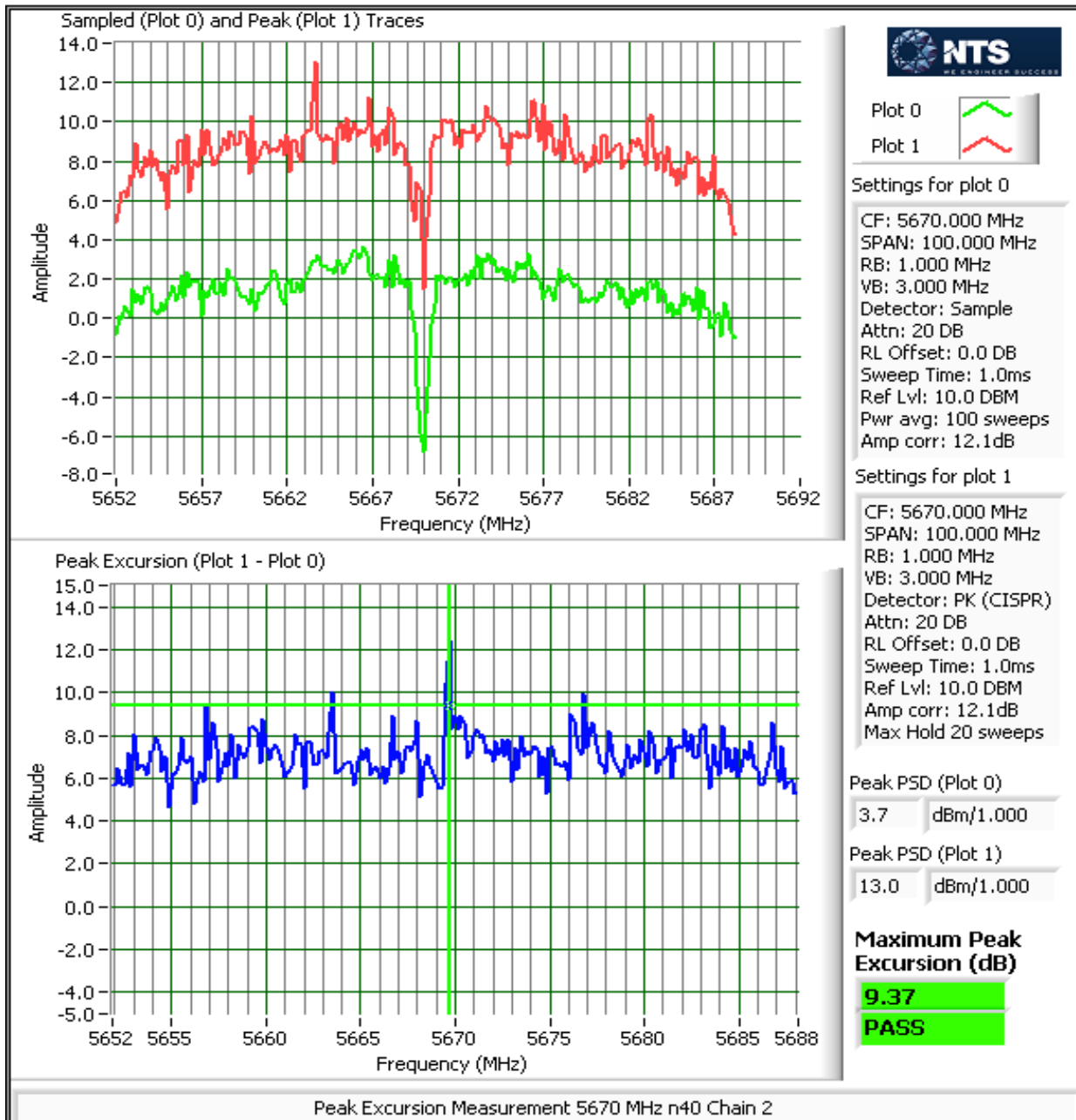
Peak Excursion(dB)			Peak Excursion(dB)			Peak Excursion(dB)		
Freq (MHz)	Value	Limit	Freq (MHz)	Value	Limit	Freq (MHz)	Value	Limit
5190	8.0	13.0	5270	7.8	13.0	5510	7.9	13.0
5230	7.8	13.0	5310	7.9	13.0	5550	9.0	13.0
						5670	9.4	13.0

Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A

Plots Showing Peak Excursion

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

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



Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
	Account Manager: Michelle Kim
Contact: Mark Rieger	
Standard: FCC 15.247, 15E, RSS-210, 15B	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: 4.1 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}: -34.1 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: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A

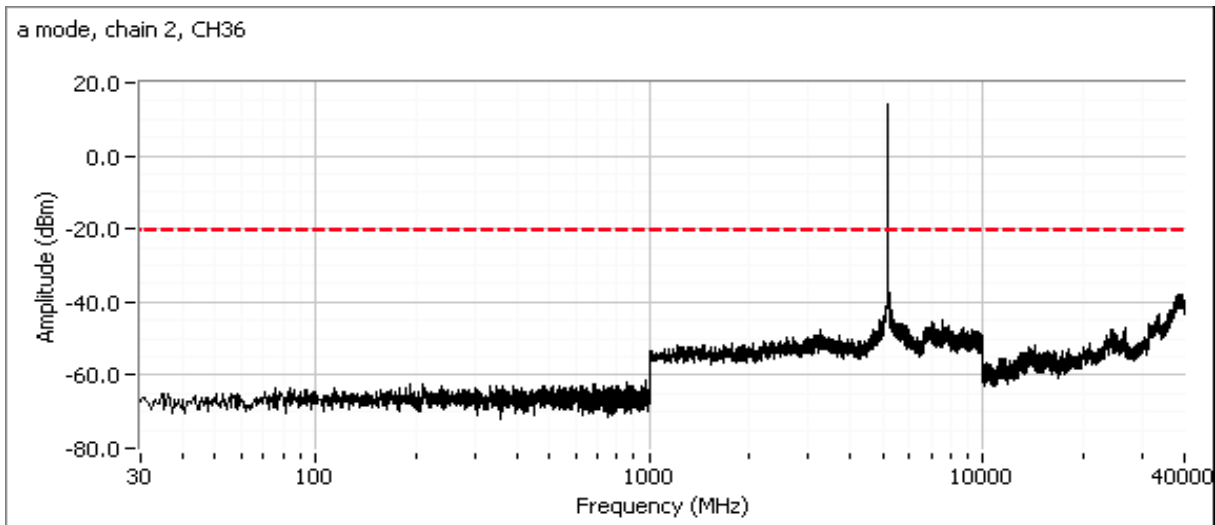
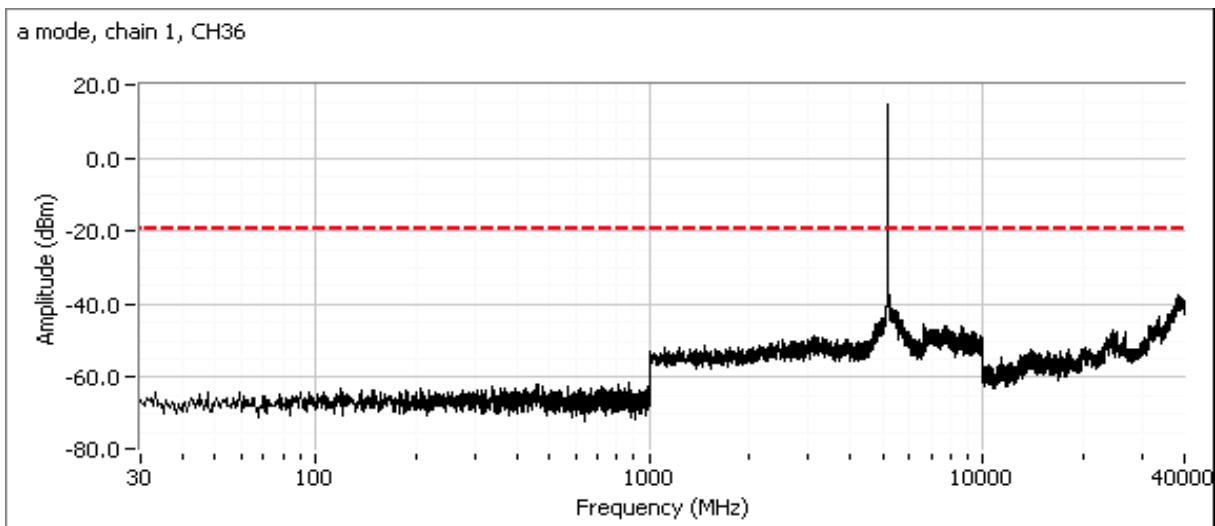
Plots Showing Out-Of-Band Emissions (RBW=VBW=1MHz)

802.11a, pwr setting = Q80.

Low channel, 5150 - 5250 MHz Band.

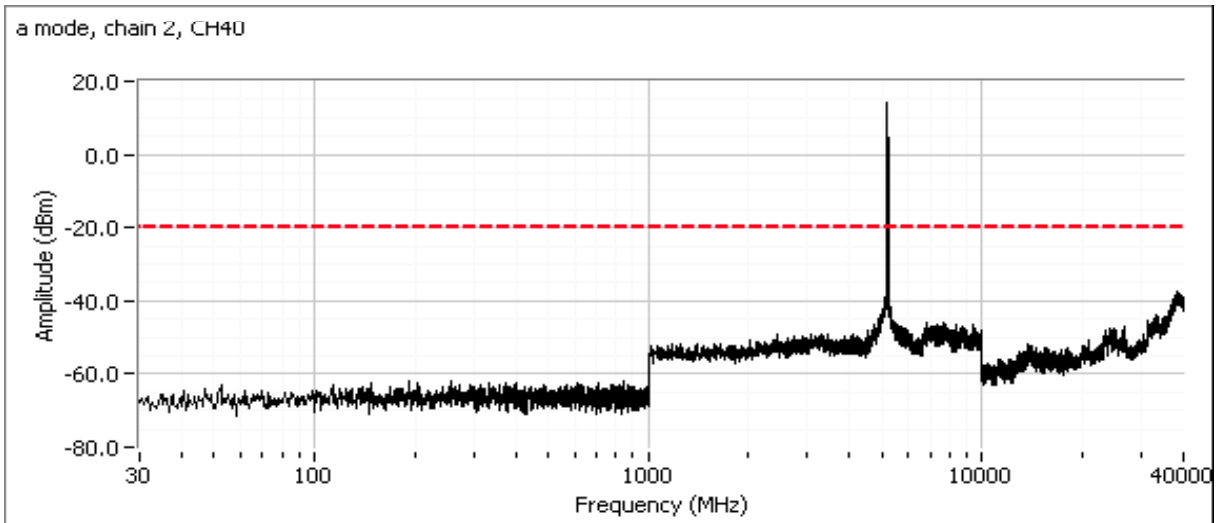
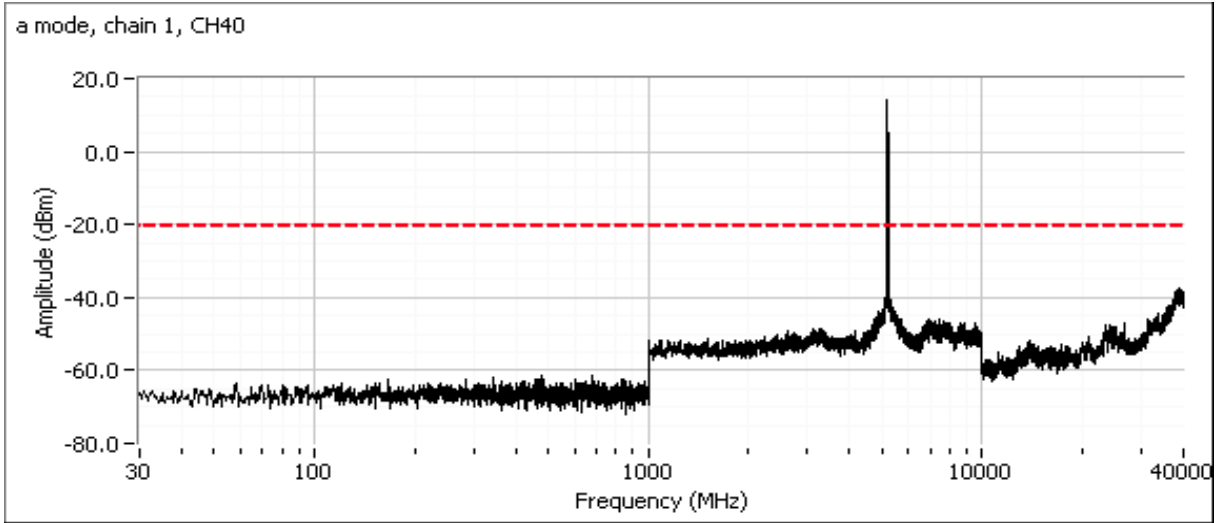
Compliance with the radiated limits for the restricted band immediately below 5150MHz is demonstrated through the radiated emissions tests.

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



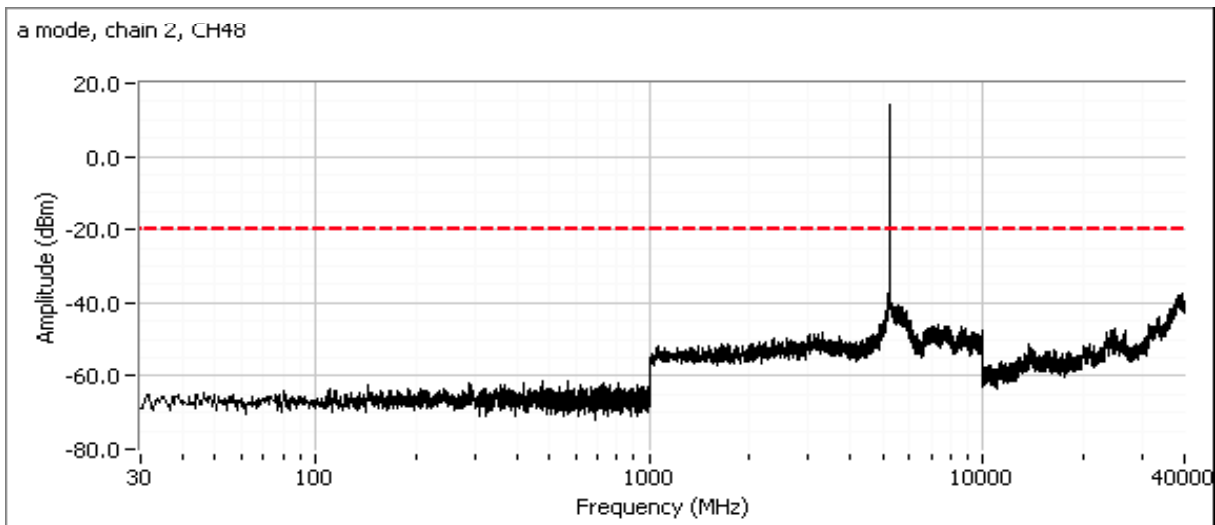
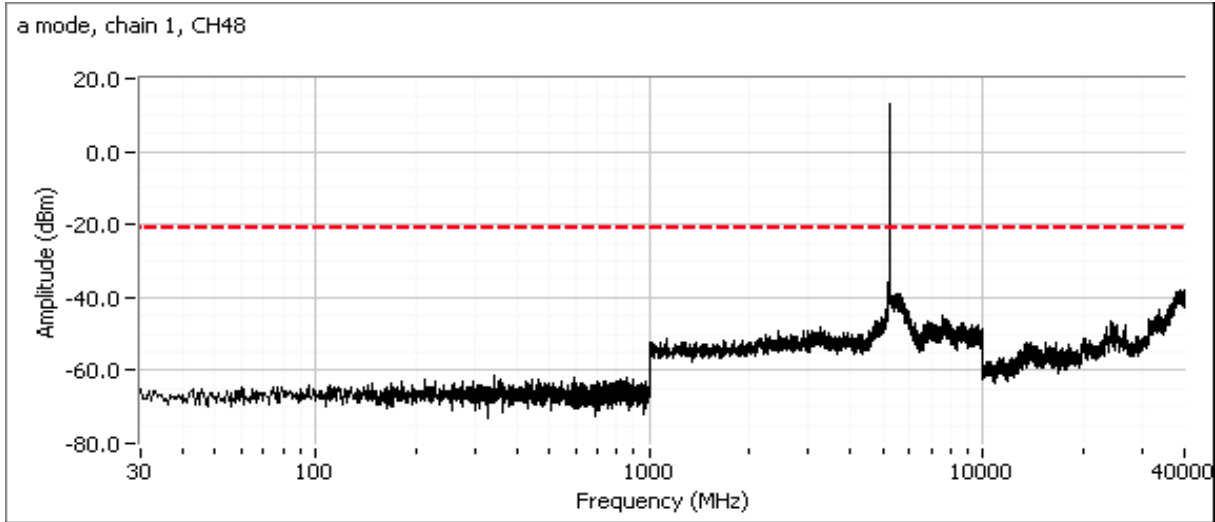
Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A

Center channel, 5150 - 5250 MHz Band
 Wide-band plot, RB=VB=1MHz (Peak measurements versus limit).



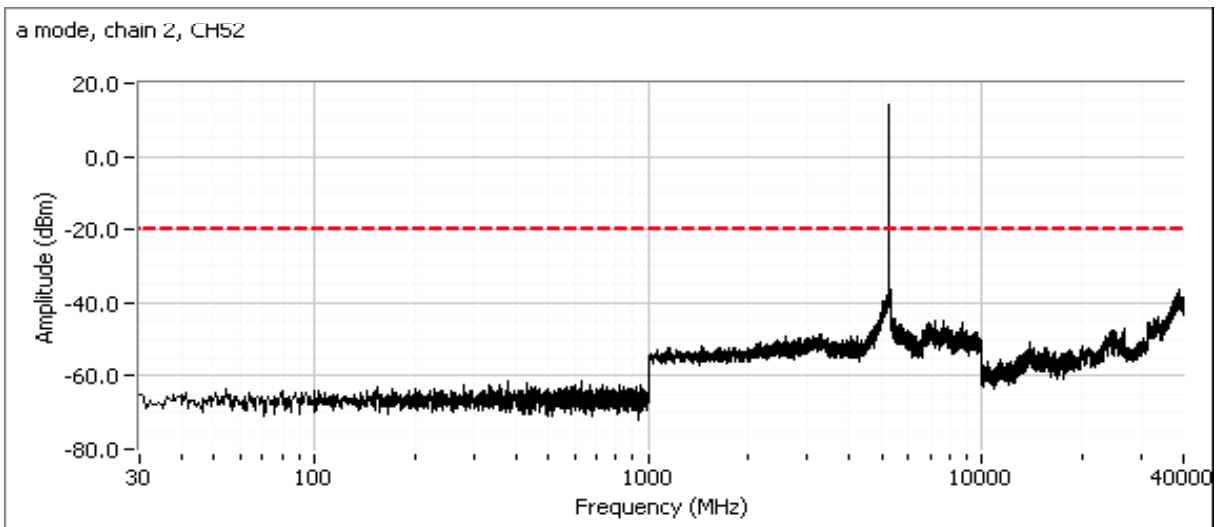
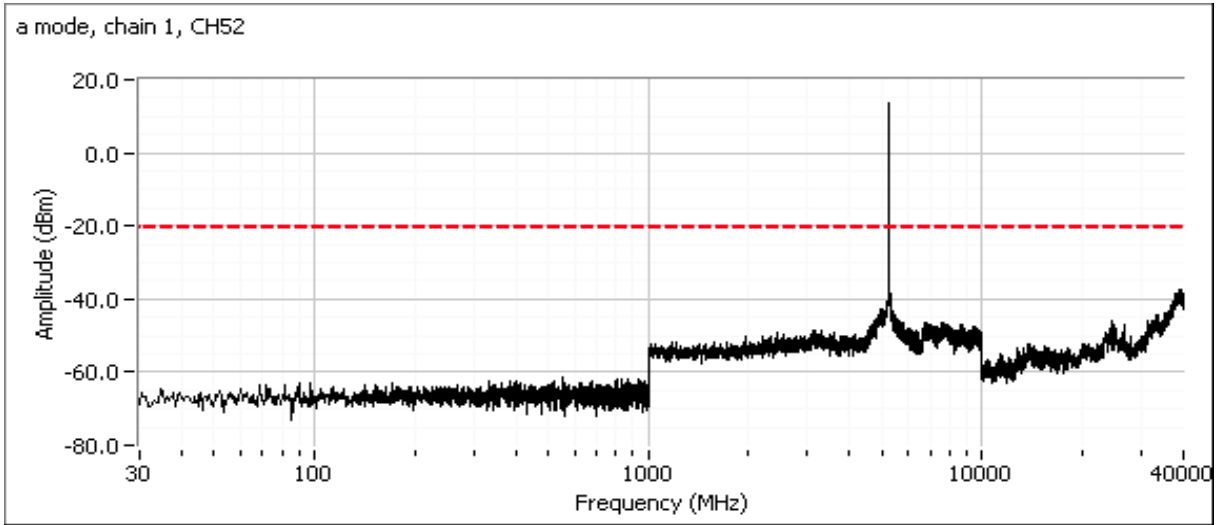
Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A

High channel, 5150 - 5250 MHz Band
 Wide-band plot, RB=VB=1MHz (Peak measurements versus limit).



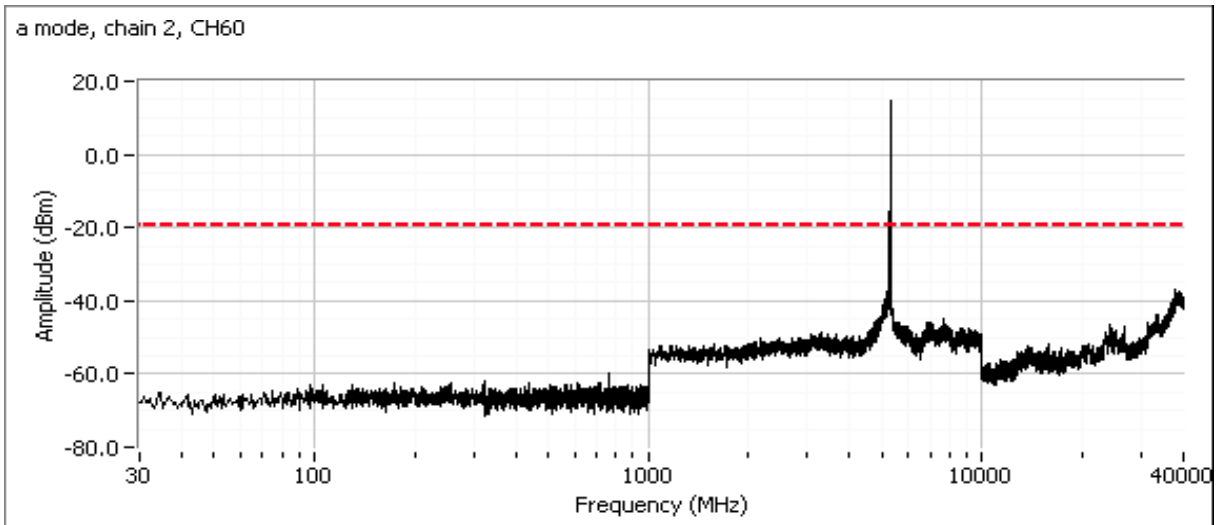
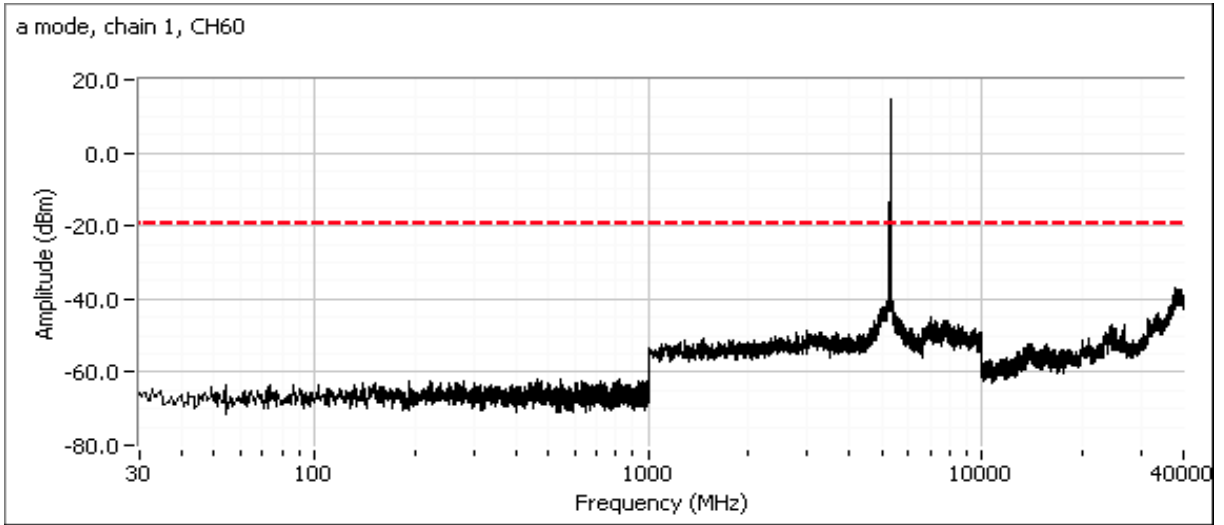
Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A

Low channel, 5250 - 5350 MHz Band
 Wide-band plot, RB=VB=1MHz (Peak measurements versus limit).



Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A

Center channel, 5250 - 5350 MHz Band
 Wide-band plot, RB=VB=1MHz (Peak measurements versus limit).

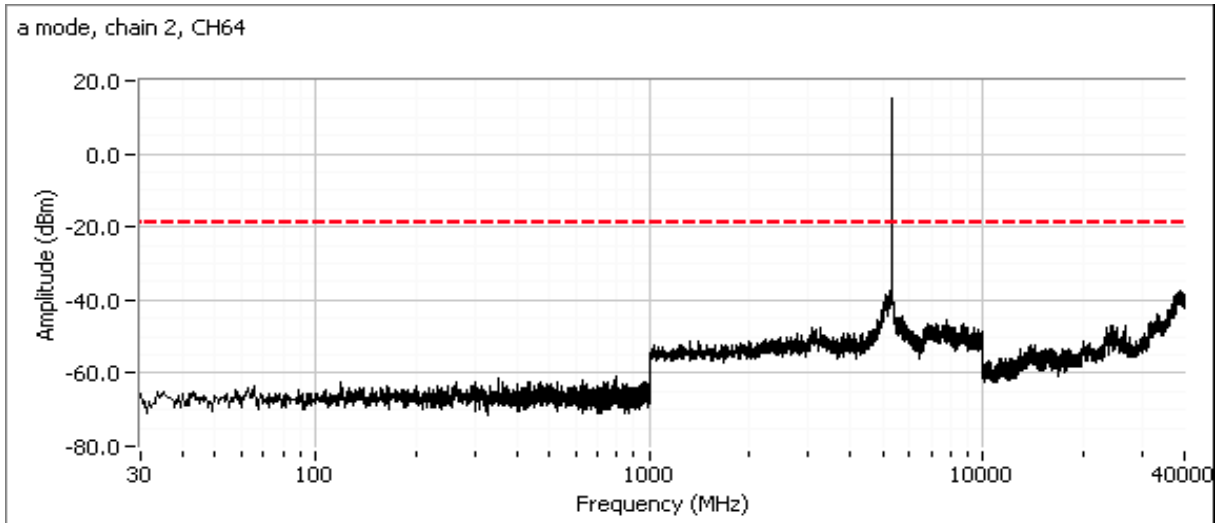
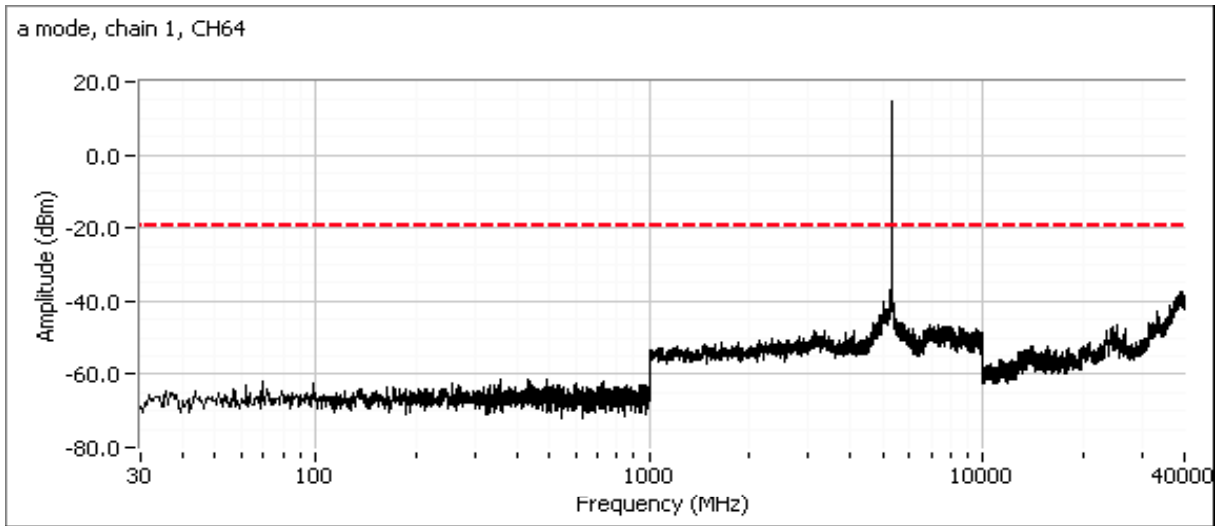


Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A

High channel, 5250 - 5350 MHz Band

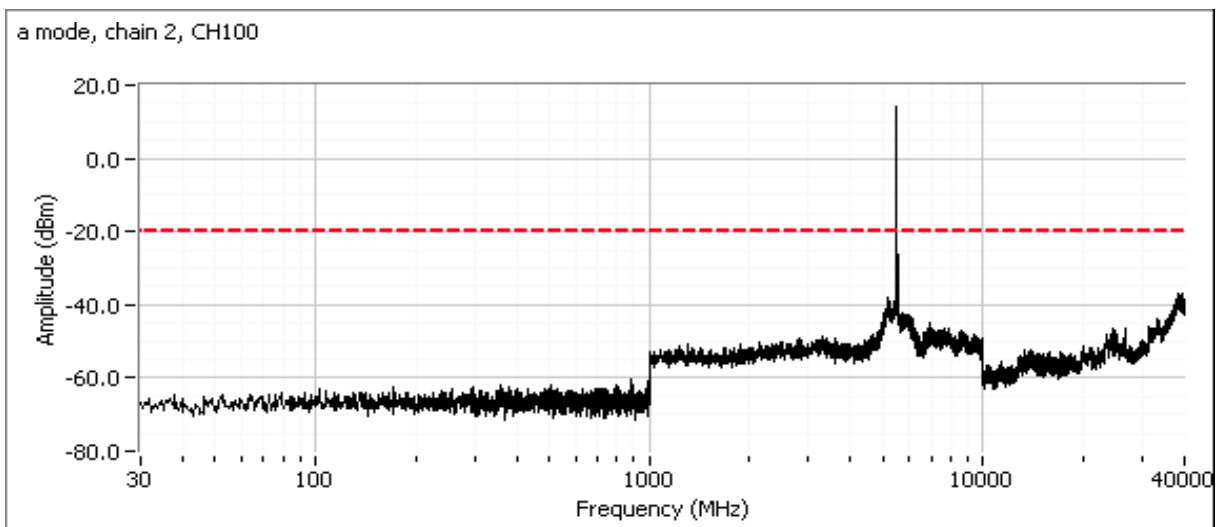
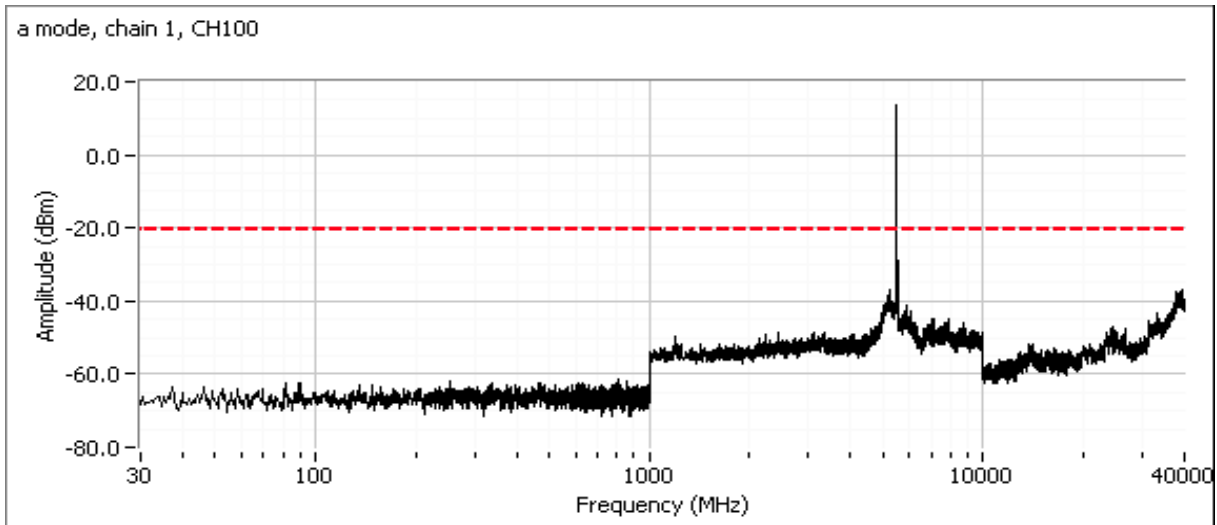
Note - compliance with the radiated limits for the restricted band immediately above 5350MHz is demonstrated through the radiated emissions tests.

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



Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A

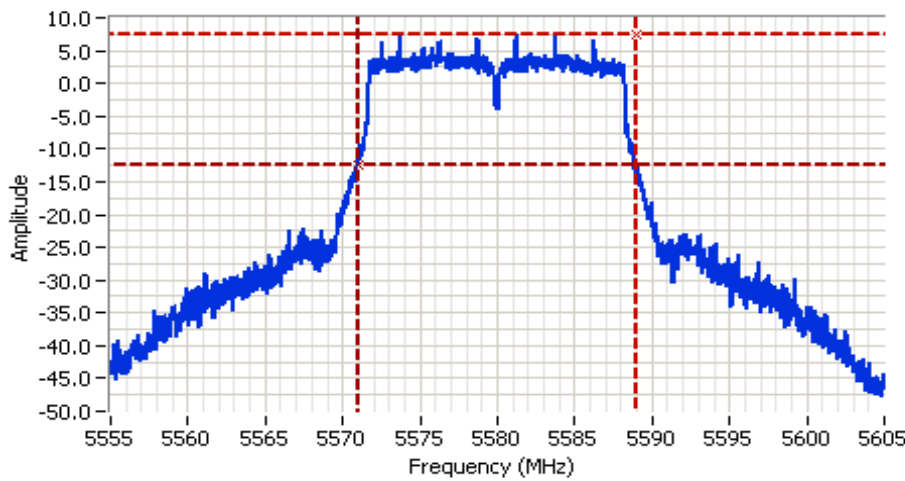
Low channel, 5470 - 5725 MHz Band
 Wide-band plot, RB=VB=1MHz (Peak measurements versus limit).



Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A

Center channel, 5470 - 5725 MHz Band

For master devices - This plot is showing that the 20dB bandwidth of the channel closest to 5600 MHz does not spill into the 5600-5650 MHz band. RB > 1% of span.

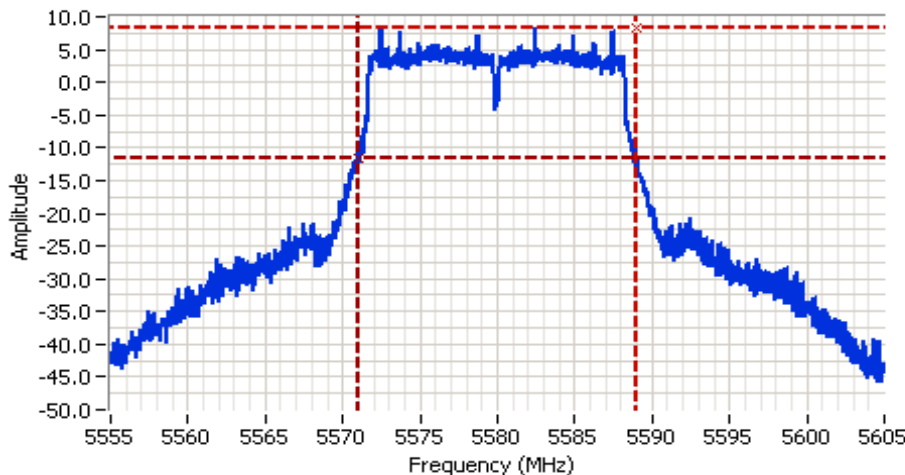


Analyzer Settings
 Agilent Technologies, E4446A
 CF: 5580.000 MHz
 SPAN: 50.000 MHz
 RB: 100 kHz
 VB: 200 kHz
 Detector: POS
 Attn: 20 DB
 RL Offset: 11.5 DB
 Sweep Time: 5.0ms
 Ref Lvl: 20.5 DBM

Comments
 20dB BW: 18.1 MHz
 FH: 5589.045MHz
 chain 1

Cursor 1 5589.0447 7.55
 Cursor 2 5570.9553 -12.45

Delta Freq. 18.089
 Delta Amplitude 20.00



Analyzer Settings
 Agilent Technologies, E4446A
 CF: 5580.000 MHz
 SPAN: 50.000 MHz
 RB: 100 kHz
 VB: 200 kHz
 Detector: POS
 Attn: 20 DB
 RL Offset: 11.5 DB
 Sweep Time: 5.0ms
 Ref Lvl: 20.5 DBM

Comments
 20dB BW: 18.0 MHz
 FH: 5588.995MHz
 chain 2

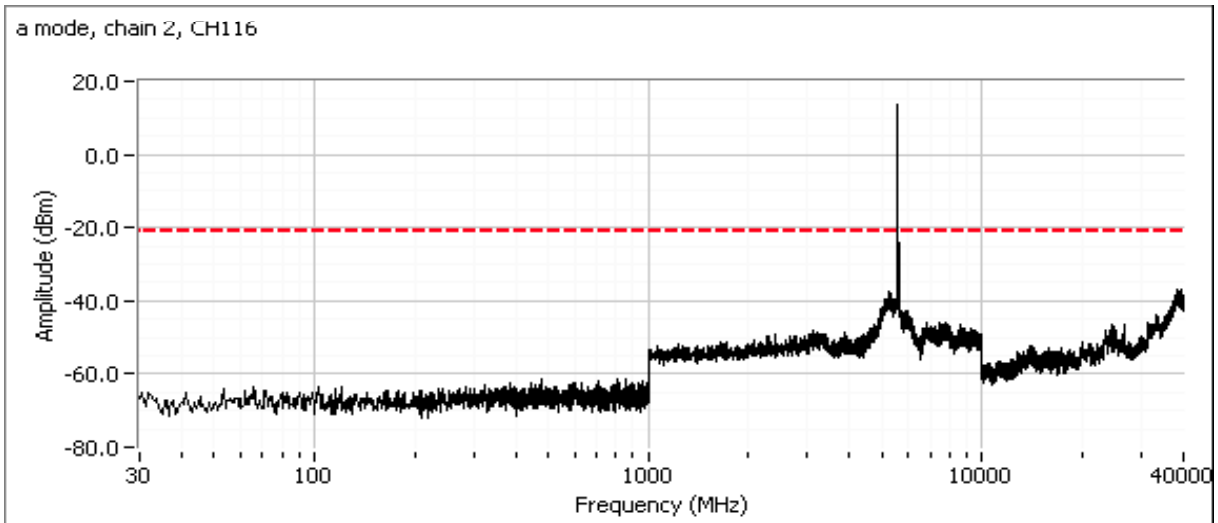
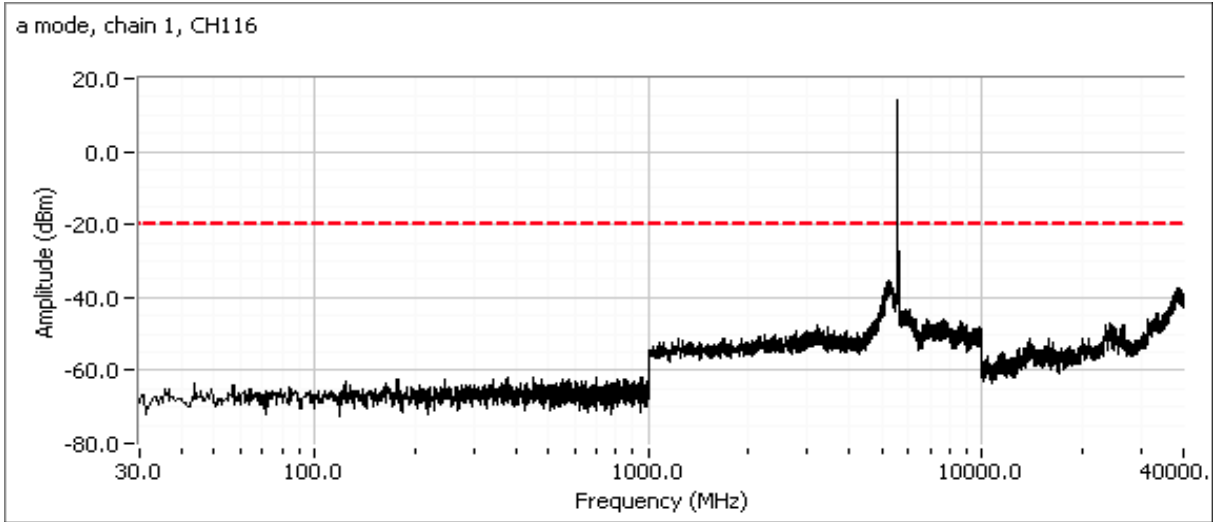
Cursor 1 5588.9947 8.33
 Cursor 2 5570.9887 -11.67

Delta Freq. 18.006
 Delta Amplitude 20.00



Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A

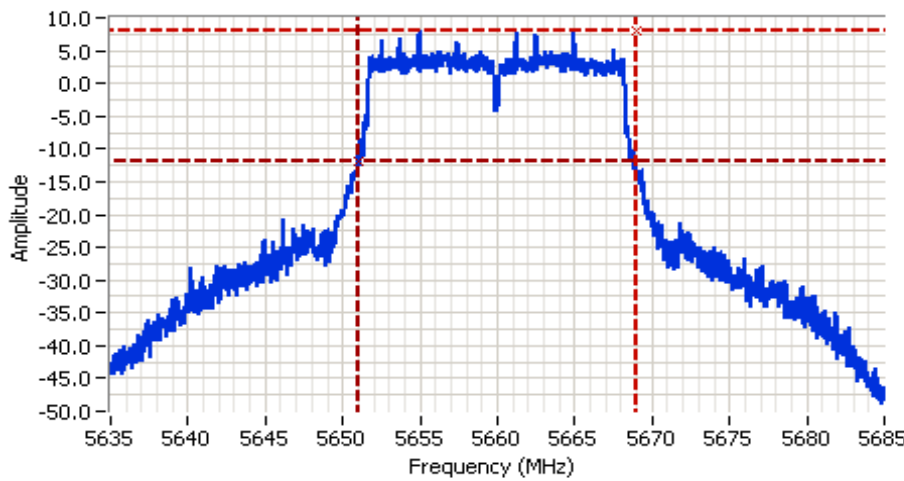
Wide-band plot, RB=VB=1MHz (Peak measurements versus limit).



Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A

Channel adjacent to 5650 MHz (Master Device)

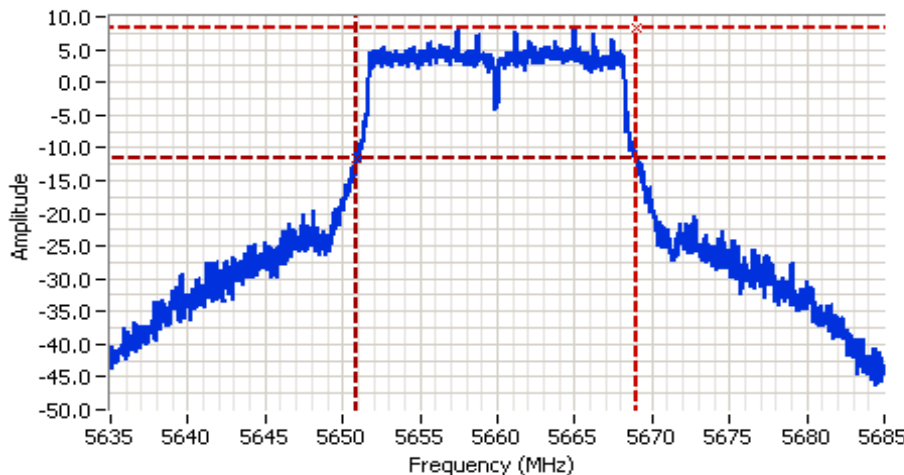
Plots showing that the 20dB bandwidth of the channel closest to 5650 MHz does not spill into the 5600-5650 MHz band. RB > 1% of span.



Analyzer Settings
 Agilent Technologies, E4446A
 CF: 5660.000 MHz
 SPAN: 50.000 MHz
 RB: 100 kHz
 VB: 200 kHz
 Detector: POS
 Attn: 20 DB
 RL Offset: 11.5 DB
 Sweep Time: 5.0ms
 Ref Lvl: 20.5 DBM

Comments
 20dB BW: 18.0 MHz
 FL: 5650.989MHz
 chain 1

Cursor 1: 5668.9947, 8.09
 Cursor 2: 5650.9887, -11.91
 Delta Freq.: 18.006
 Delta Amplitude: 20.00



Analyzer Settings
 Agilent Technologies, E4446A
 CF: 5660.000 MHz
 SPAN: 50.000 MHz
 RB: 100 kHz
 VB: 200 kHz
 Detector: POS
 Attn: 20 DB
 RL Offset: 11.5 DB
 Sweep Time: 5.0ms
 Ref Lvl: 20.5 DBM

Comments
 20dB BW: 18.1 MHz
 FL: 5650.922MHz
 chain 2

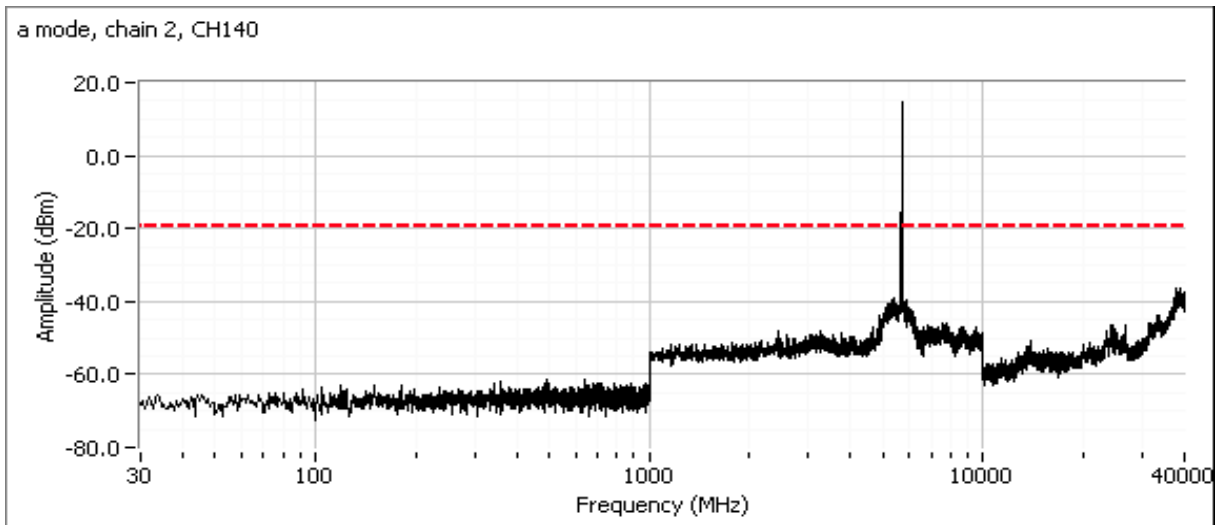
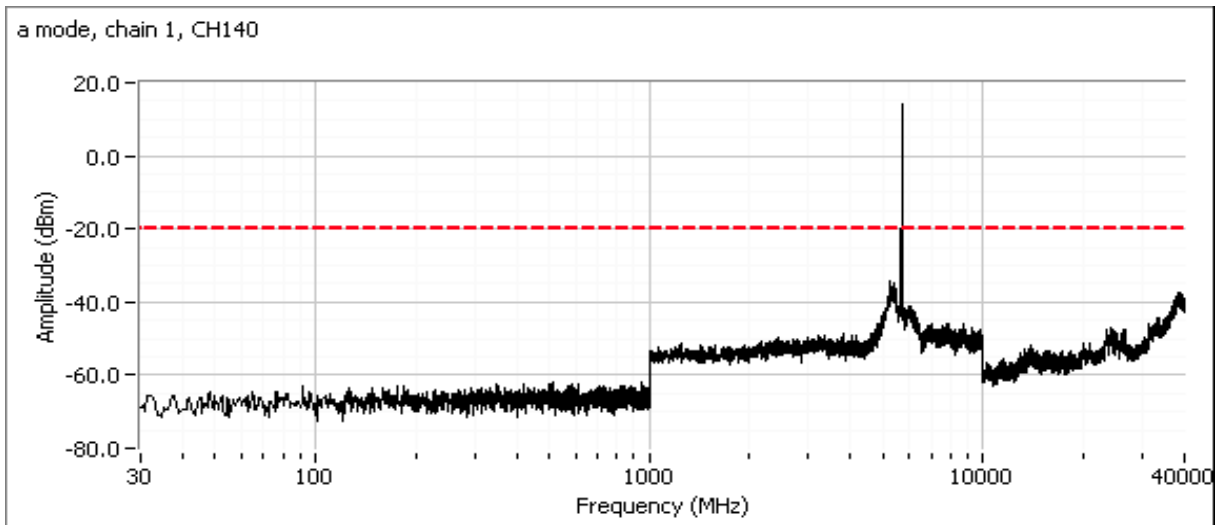
Cursor 1: 5669.0447, 8.27
 Cursor 2: 5650.9220, -11.73
 Delta Freq.: 18.123
 Delta Amplitude: 20.00



Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A

High channel, 5470 - 5725 MHz Band

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



Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A

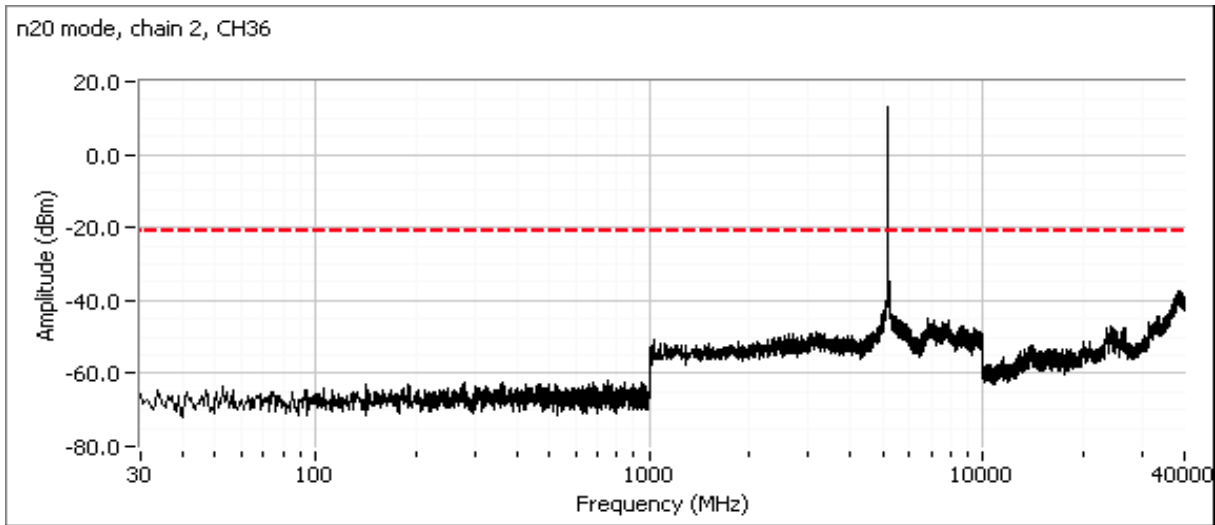
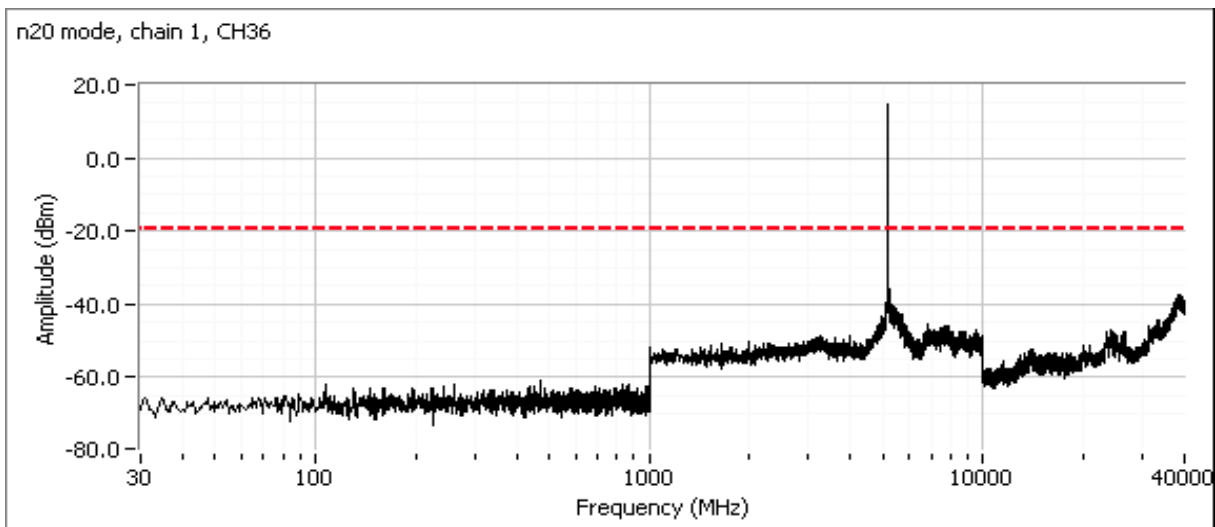
Plots Showing Out-Of-Band Emissions (RBW=VBW=1MHz)

802.11n 20 MHz, pwr setting = Q80.

Low channel, 5150 - 5250 MHz Band.

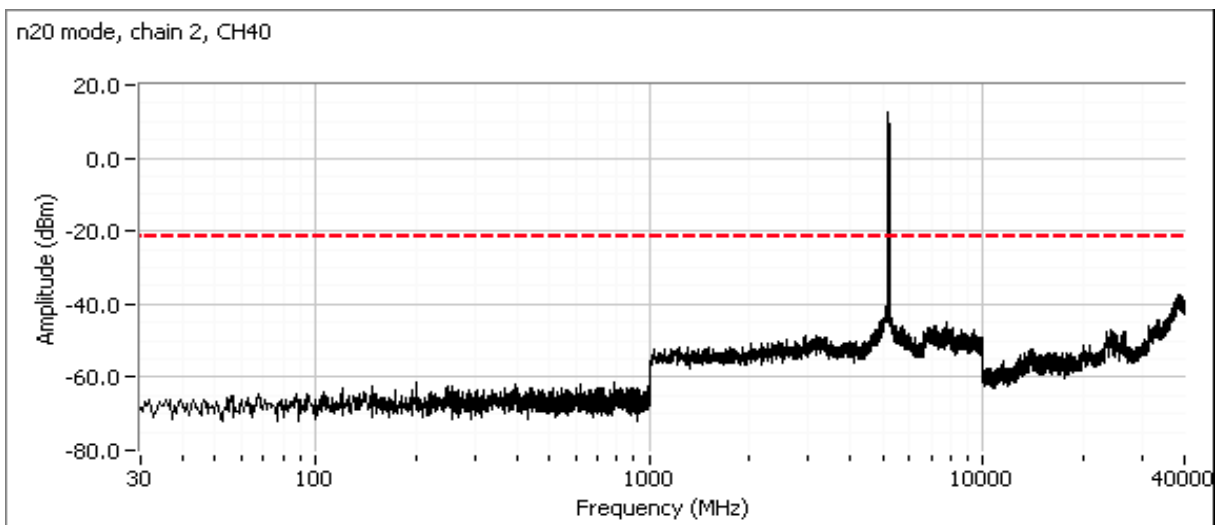
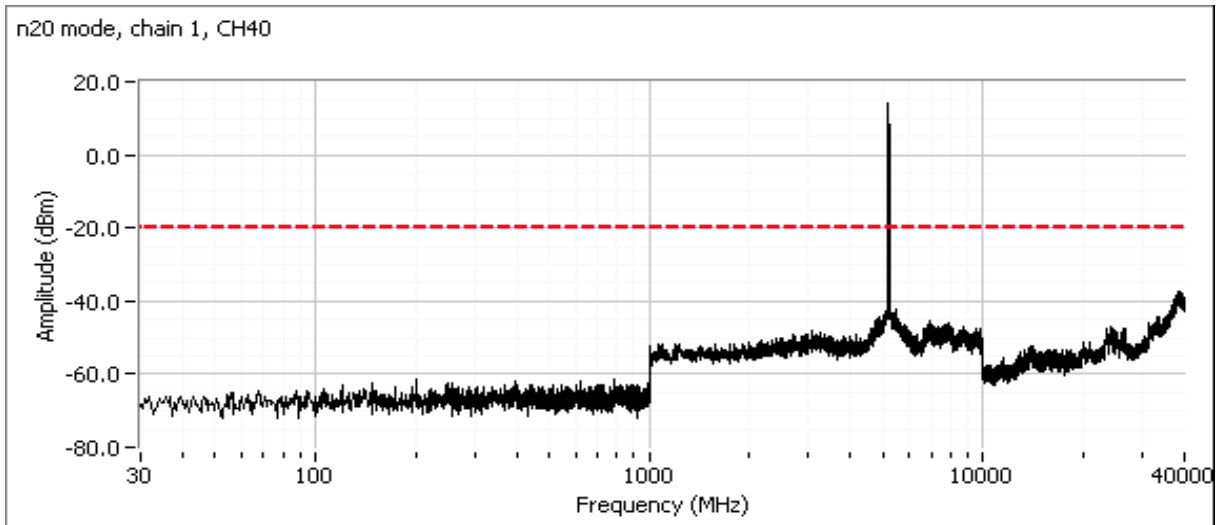
Compliance with the radiated limits for the restricted band immediately below 5150MHz is demonstrated through the radiated emissions tests.

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



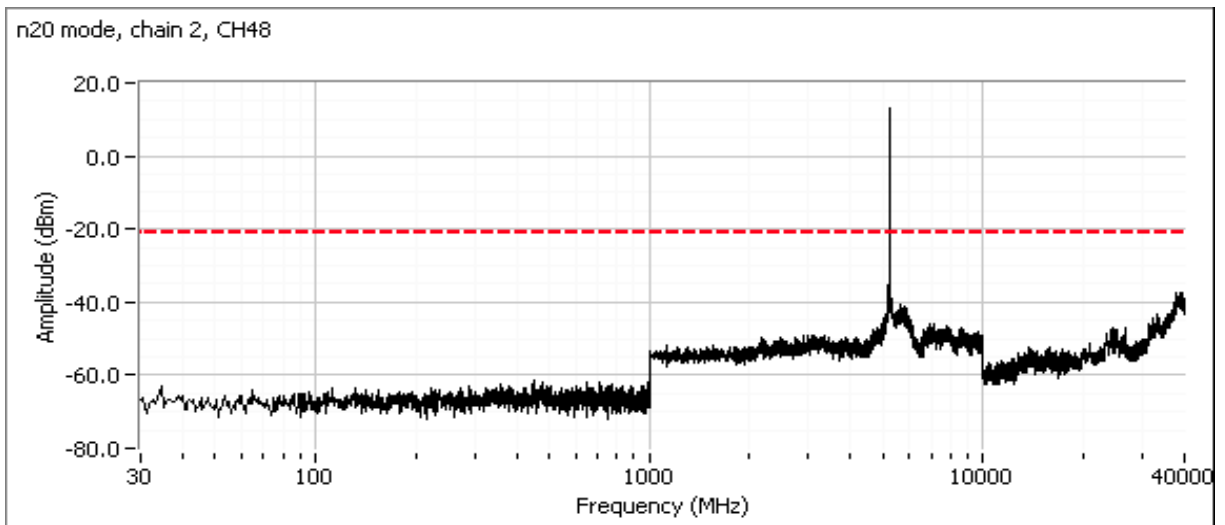
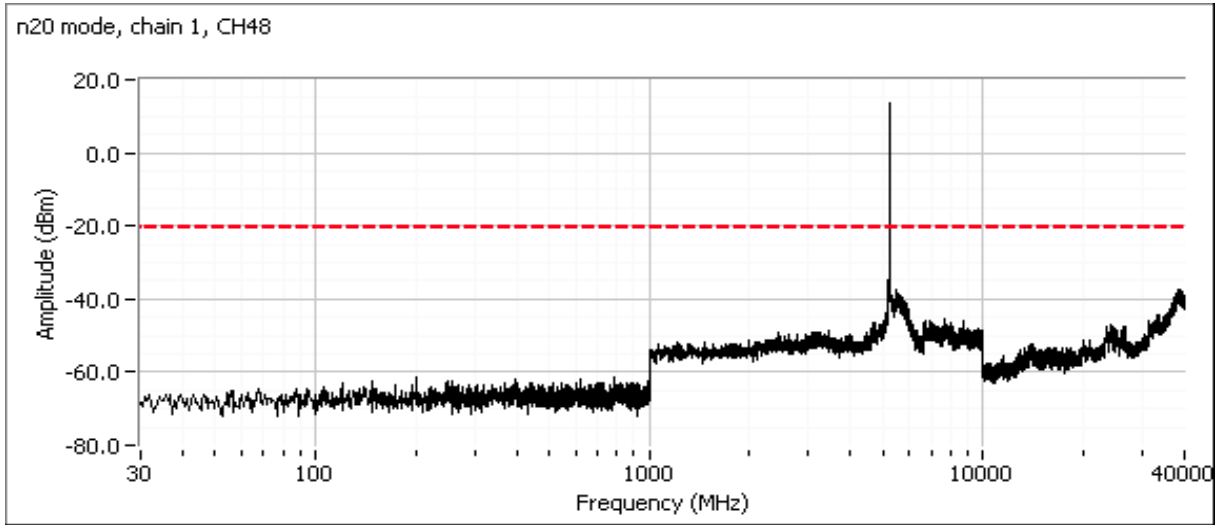
Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A

Center channel, 5150 - 5250 MHz Band
 Wide-band plot, RB=VB=1MHz (Peak measurements versus limit).



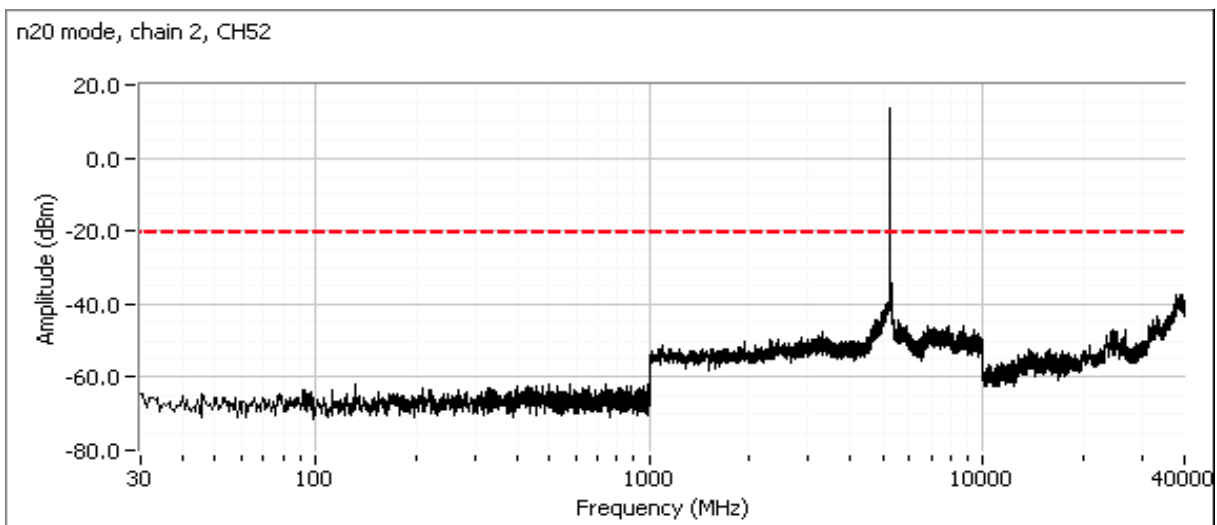
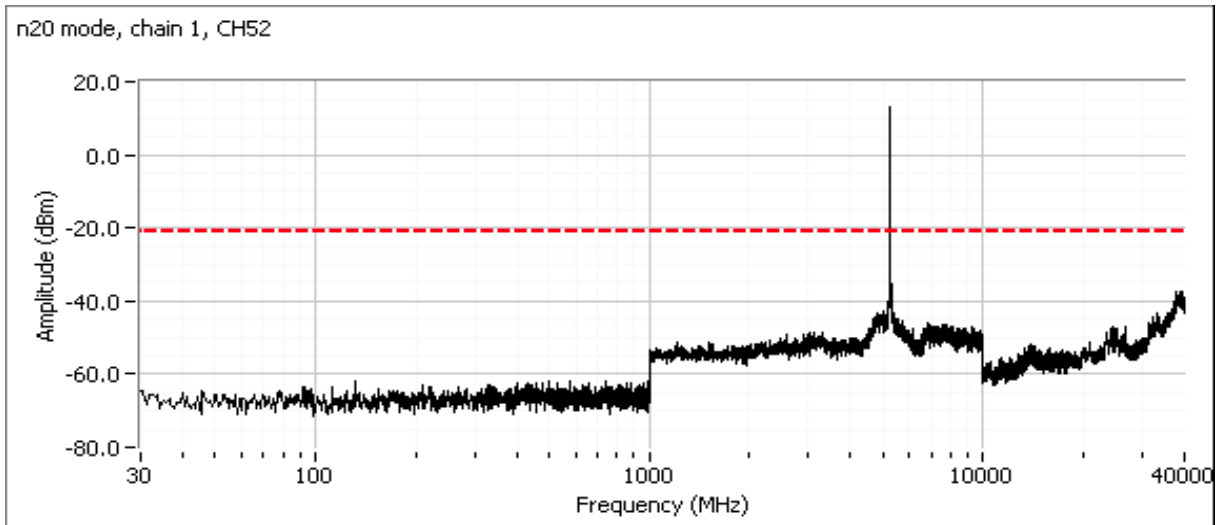
Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A

High channel, 5150 - 5250 MHz Band
 Wide-band plot, RB=VB=1MHz (Peak measurements versus limit).



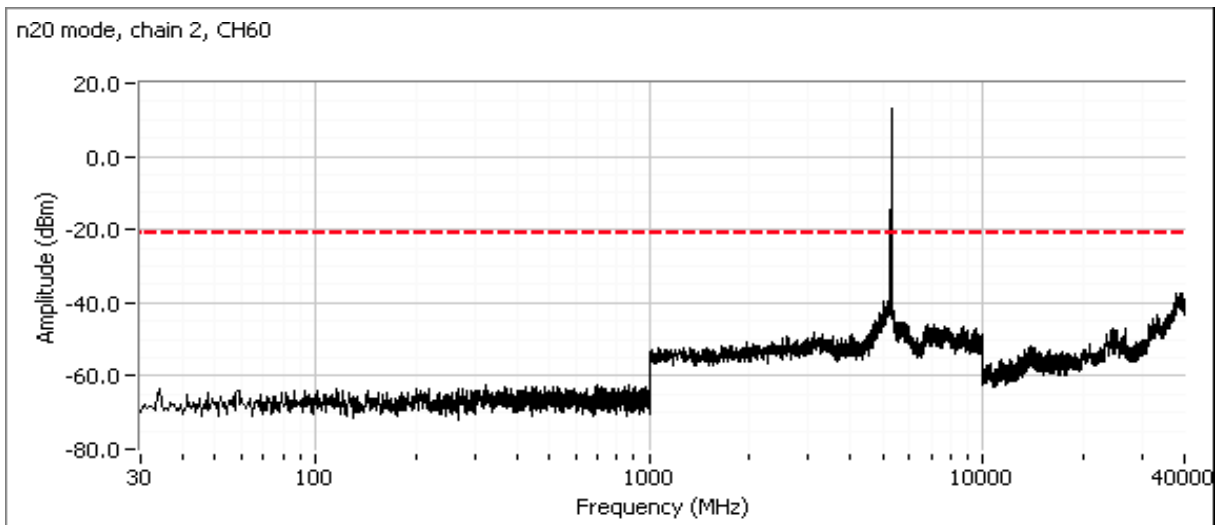
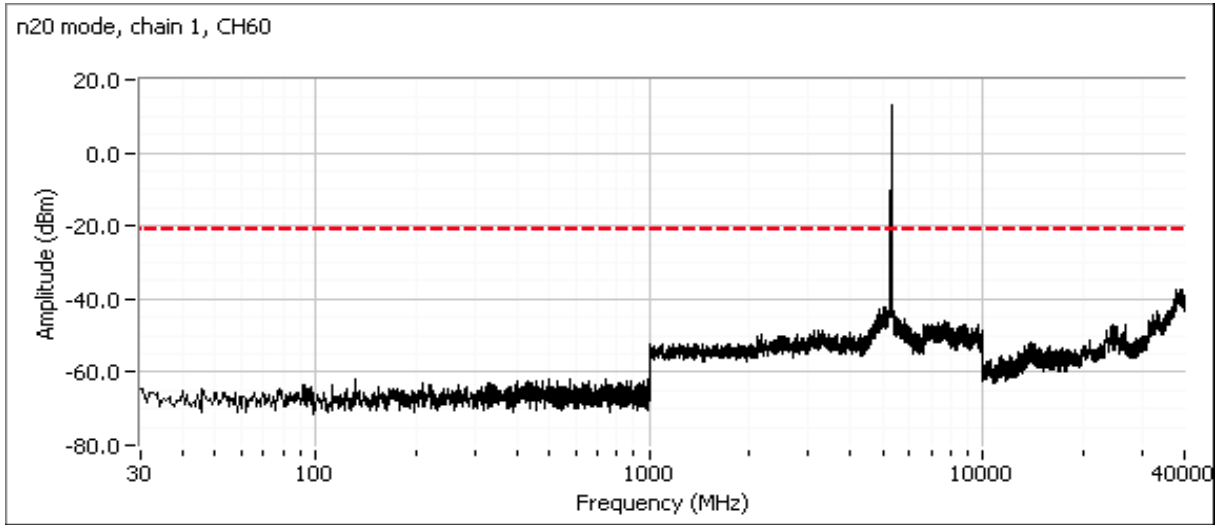
Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A

Low channel, 5250 - 5350 MHz Band
 Wide-band plot, RB=VB=1MHz (Peak measurements versus limit).



Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A

Center channel, 5250 - 5350 MHz Band
 Wide-band plot, RB=VB=1MHz (Peak measurements versus limit).

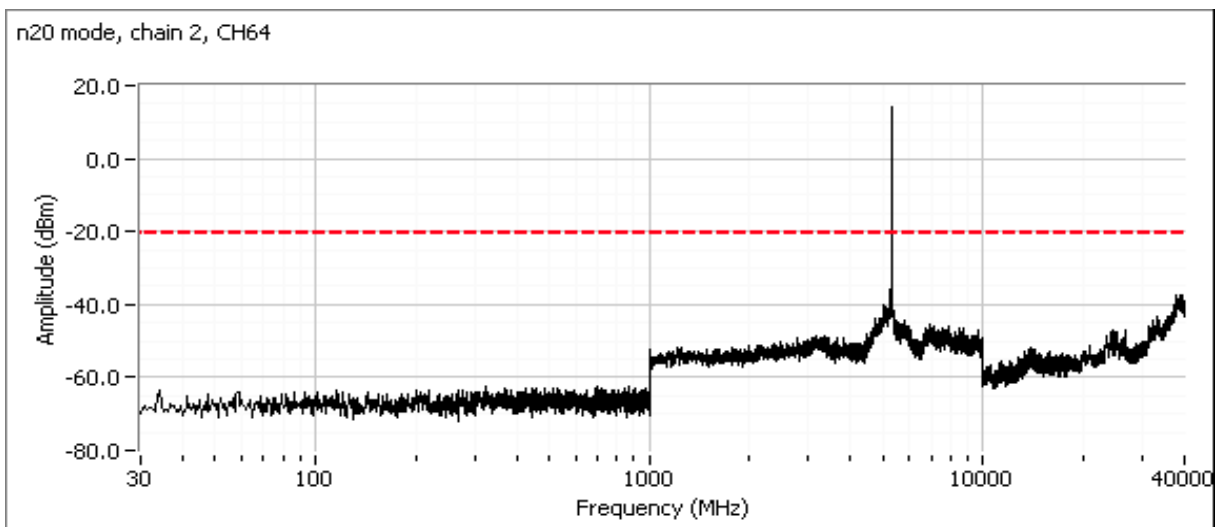
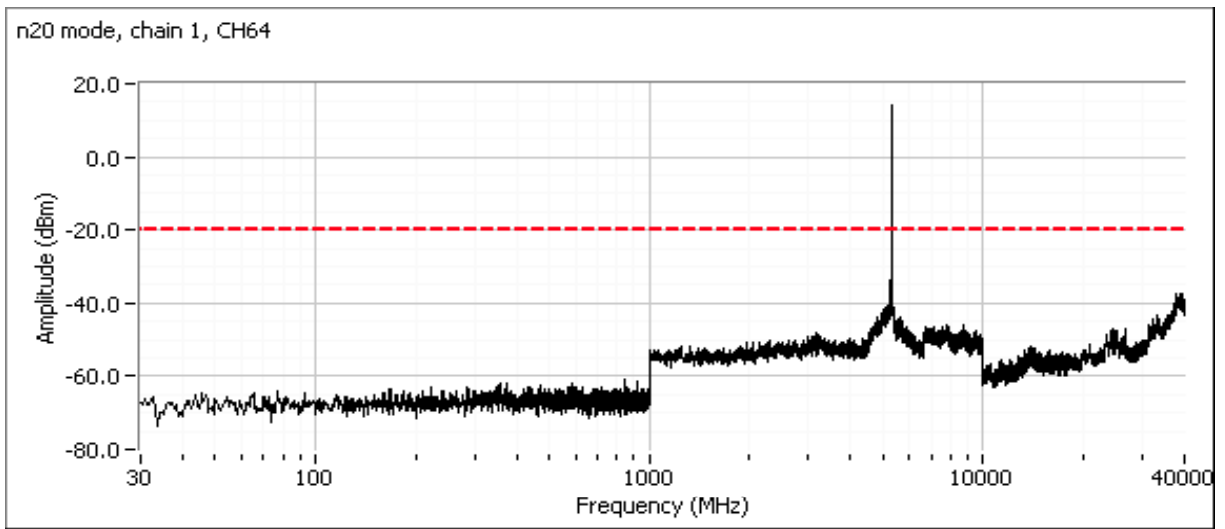


Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A

High channel, 5250 - 5350 MHz Band

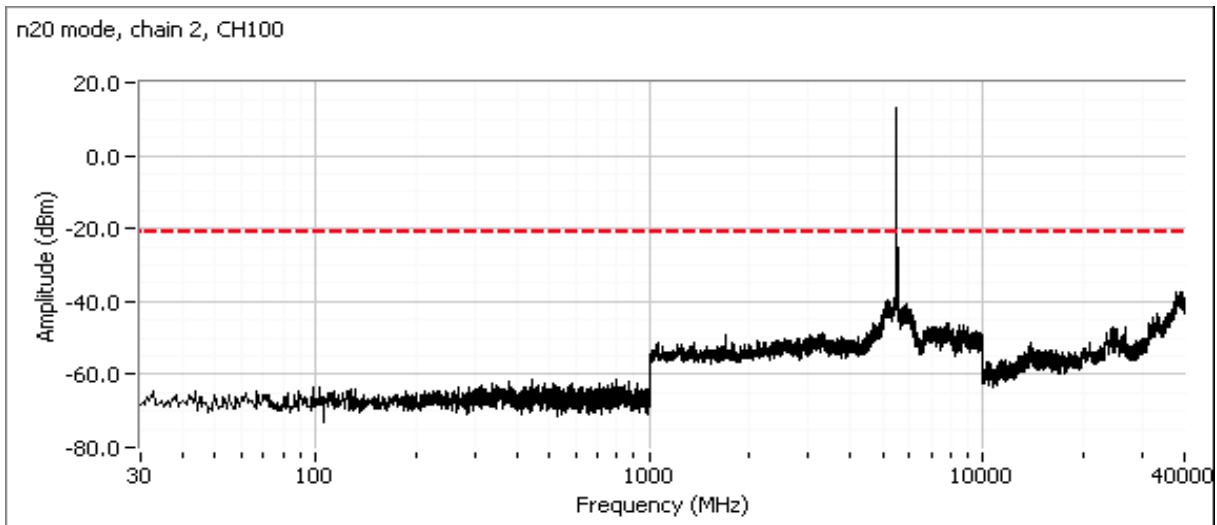
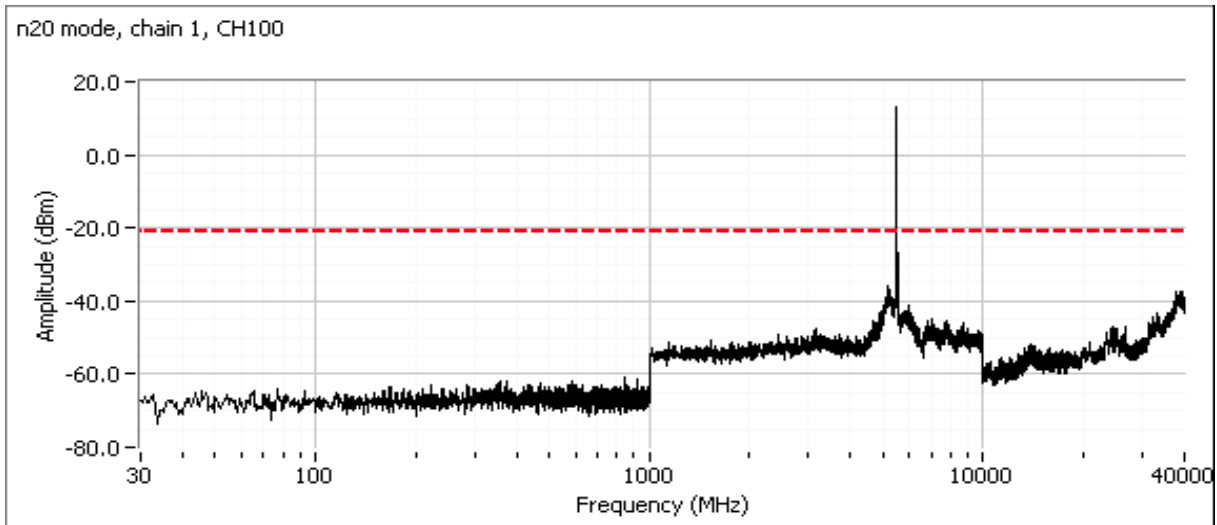
Note - compliance with the radiated limits for the restricted band immediately above 5350MHz is demonstrated through the radiated emissions tests.

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



Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A

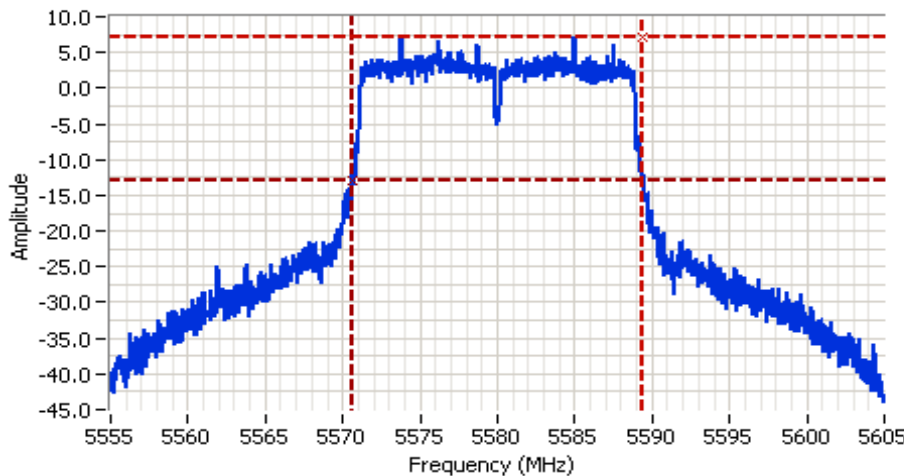
Low channel, 5470 - 5725 MHz Band
 Wide-band plot, RB=VB=1MHz (Peak measurements versus limit).



Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A

Center channel, 5470 - 5725 MHz Band

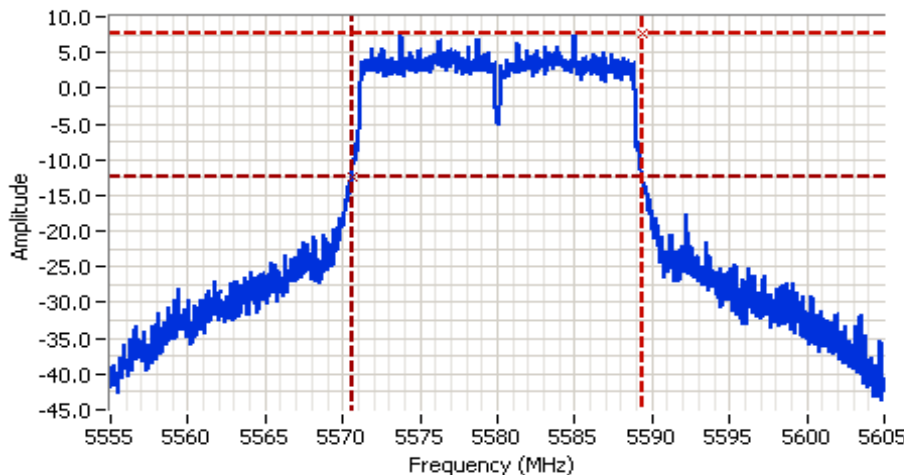
For master devices - This plot is showing that the 20dB bandwidth of the channel closest to 5600 MHz does not spill into the 5600-5650 MHz band. RB > 1% of span.



Analyzer Settings
 Agilent Technologies, E4446A
 CF: 5580.000 MHz
 SPAN: 50.000 MHz
 RB: 100 kHz
 VB: 200 kHz
 Detector: POS
 Attn: 20 DB
 RL Offset: 11.5 DB
 Sweep Time: 5.0ms
 Ref Lvl: 18.5 DBM

Comments
 20dB BW: 18.8 MHz
 FH: 5588.418MHz
 chain 1

Cursor 1	5589.4281	7.18		Delta Freq.	18.790
Cursor 2	5570.6385	-12.82		Delta Amplitude	20.00



Analyzer Settings
 Agilent Technologies, E4446A
 CF: 5580.000 MHz
 SPAN: 50.000 MHz
 RB: 100 kHz
 VB: 200 kHz
 Detector: POS
 Attn: 20 DB
 RL Offset: 11.5 DB
 Sweep Time: 5.0ms
 Ref Lvl: 18.5 DBM

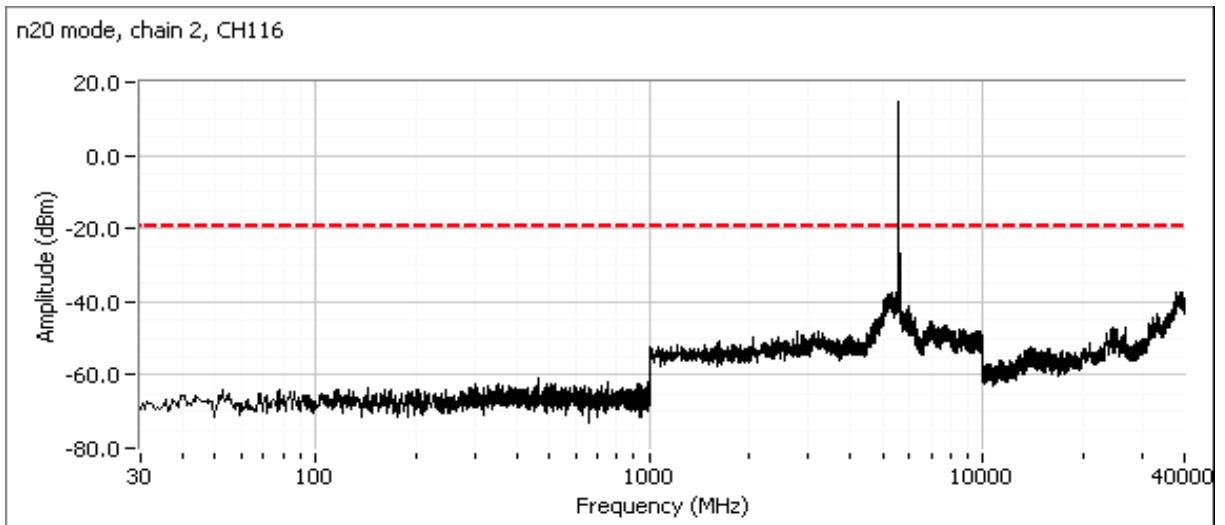
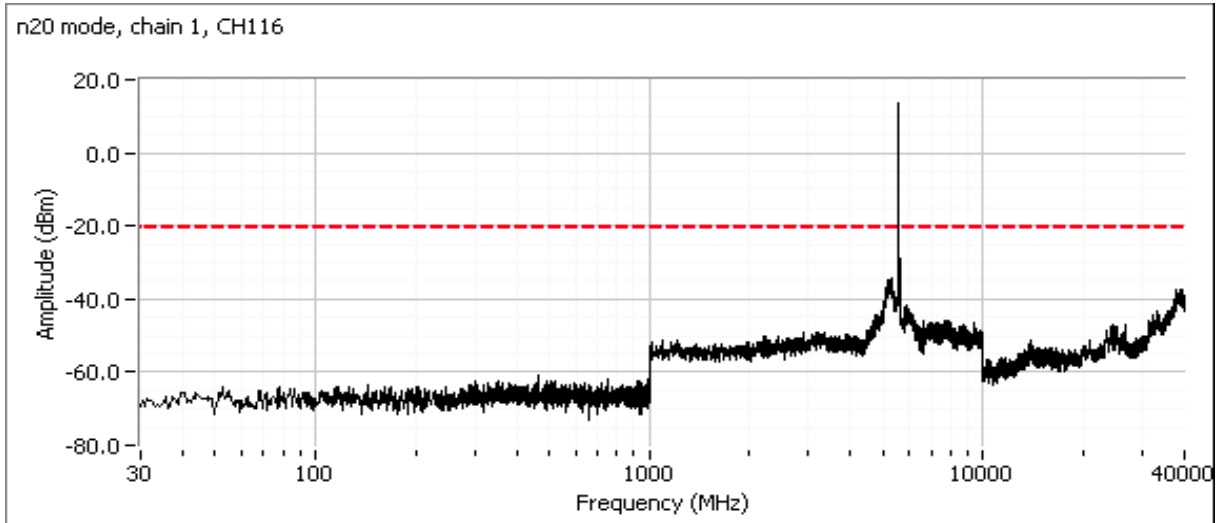
Comments
 20dB BW: 18.7 MHz
 FH: 5588.412MHz
 chain 2

Cursor 1	5589.4115	7.68		Delta Freq.	18.740
Cursor 2	5570.6719	-12.32		Delta Amplitude	20.00



Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
	Account Manager: Michelle Kim
Contact: Mark Rieger	
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A

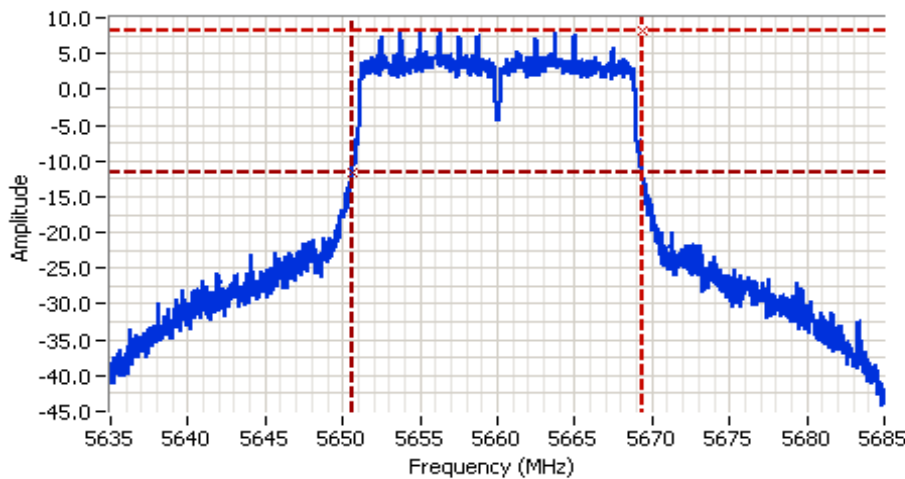
Wide-band plot, RB=VB=1MHz (Peak measurements versus limit).



Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A

Channel adjacent to 5650 MHz (Master Device)

Plots showing that the 20dB bandwidth of the channel closest to 5650 MHz does not spill into the 5600-5650 MHz band. RB > 1% of span.



Analyzer Settings

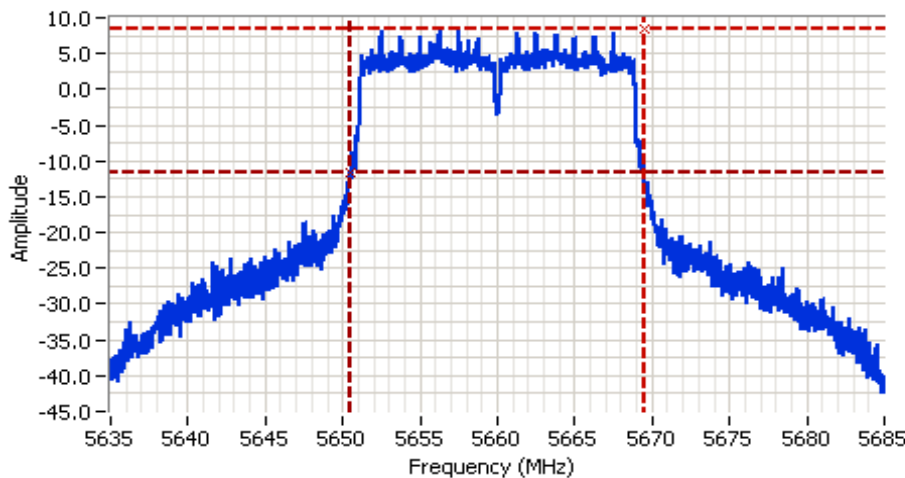
Agilent Technologies, E4446A
 CF: 5660.000 MHz
 SPAN: 50.000 MHz
 RB: 100 kHz
 VB: 200 kHz
 Detector: POS
 Attn: 20 DB
 RL Offset: 11.5 DB
 Sweep Time: 5.0ms
 Ref Lvl: 18.5 DBM

Comments

20dB BW: 18.8 MHz
 FL: 5650.589MHz
 chain 1

Cursor 1	5669.4115	8.24	
Cursor 2	5650.5885	-11.76	

Delta Freq. 18.823
 Delta Amplitude 20.00



Analyzer Settings

Agilent Technologies, E4446A
 CF: 5660.000 MHz
 SPAN: 50.000 MHz
 RB: 100 kHz
 VB: 200 kHz
 Detector: POS
 Attn: 20 DB
 RL Offset: 11.5 DB
 Sweep Time: 5.0ms
 Ref Lvl: 18.5 DBM

Comments

20dB BW: 18.9 MHz
 FL: 5650.555MHz
 chain 2

Cursor 1	5669.4615	8.37	
Cursor 2	5650.5552	-11.63	

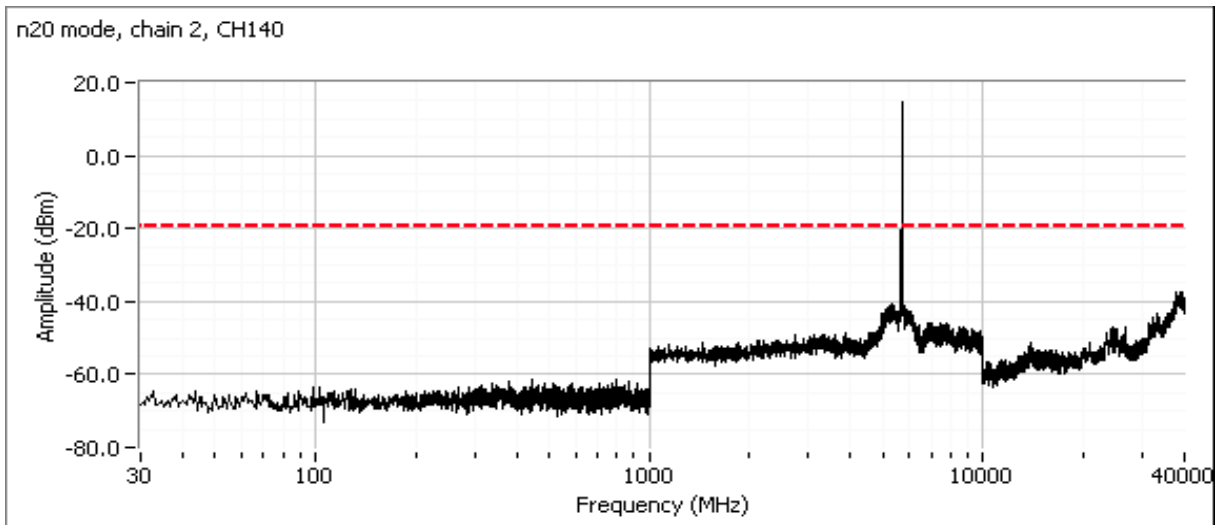
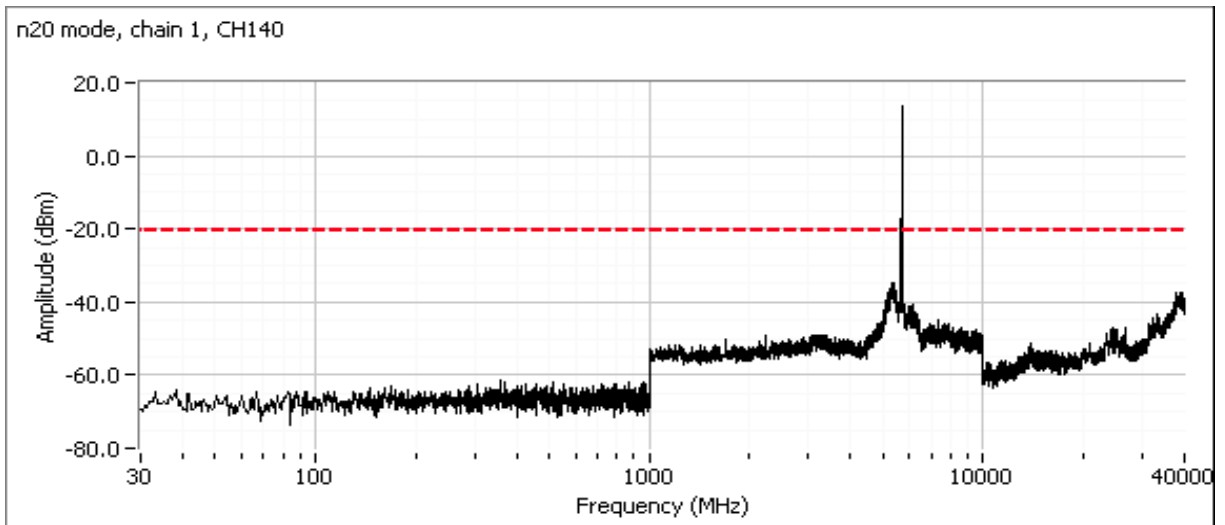
Delta Freq. 18.906
 Delta Amplitude 20.00



Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A

High channel, 5470 - 5725 MHz Band

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



Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A

Date of Test: 9/25/2012
 Test Engineer: D. Demirci
 Test Location: FT Lab#4

Config. Used: Direct connection to antenna ports.
 Config Change: NA
 EUT Voltage: 120V / 60Hz

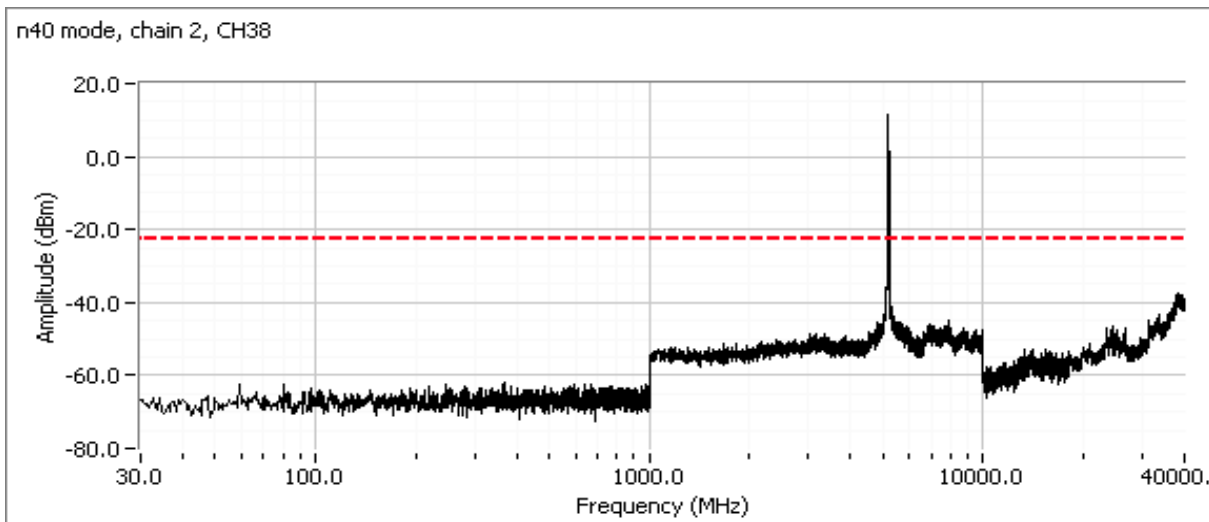
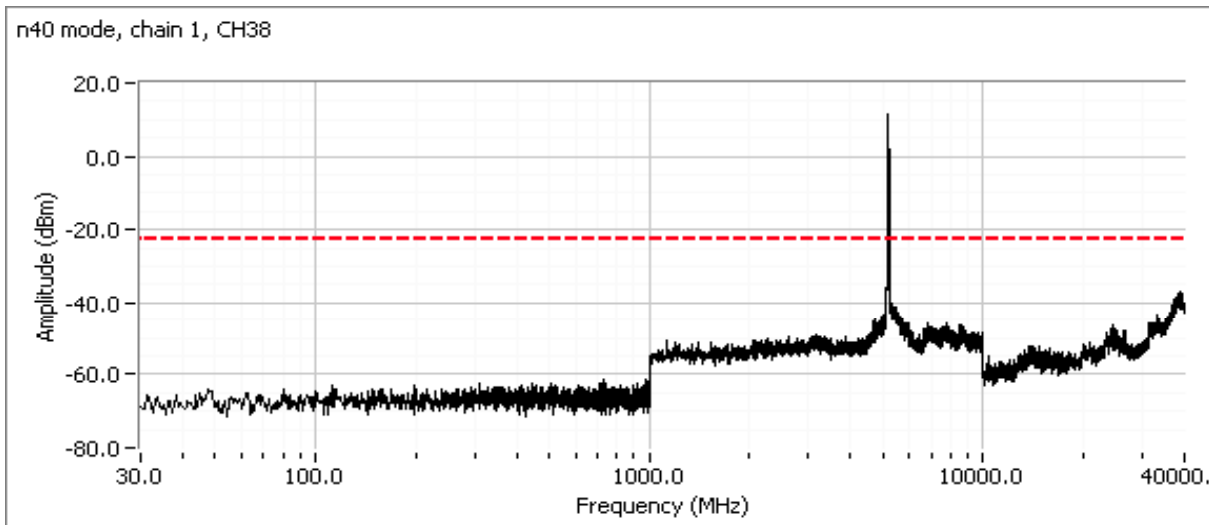
Plots Showing Out-Of-Band Emissions (RBW=VBW=1MHz)

802.11n 40 MHz, pwr setting = Q80.

Low channel, 5150 - 5250 MHz Band.

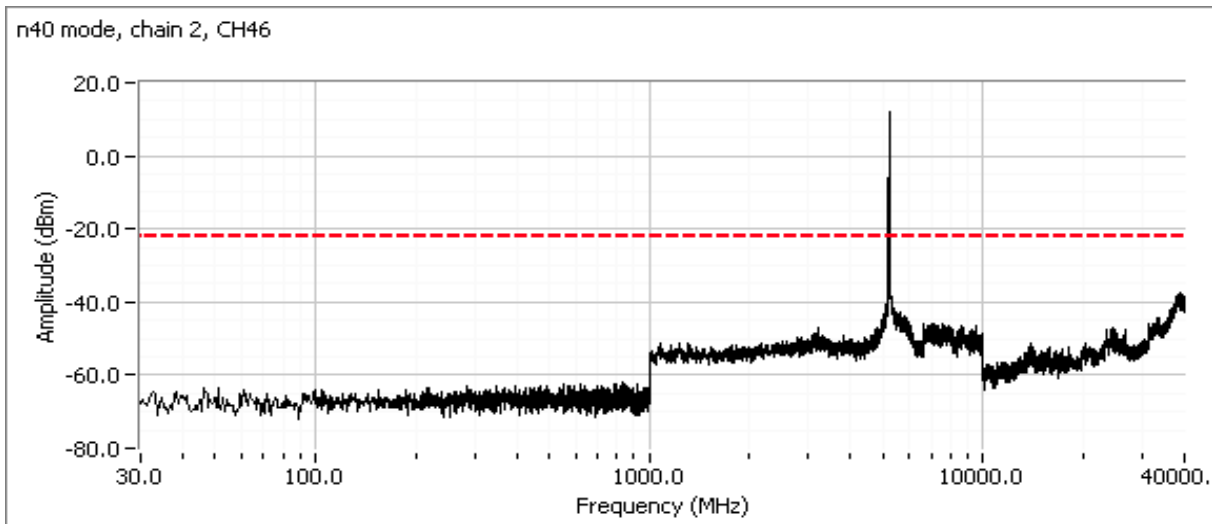
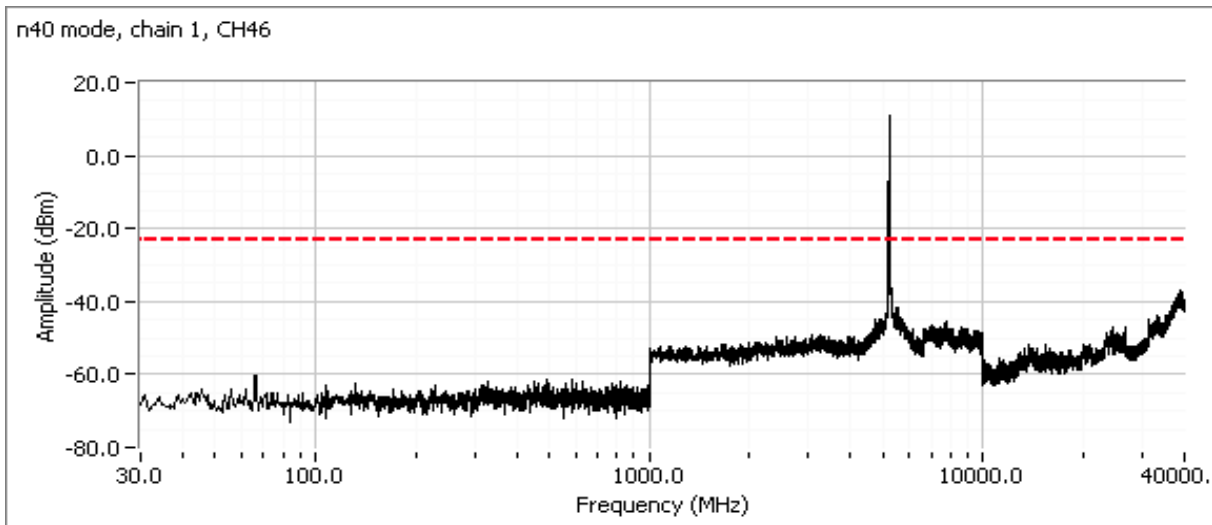
Compliance with the radiated limits for the restricted band immediately below 5150MHz is demonstrated through the radiated emissions tests.

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



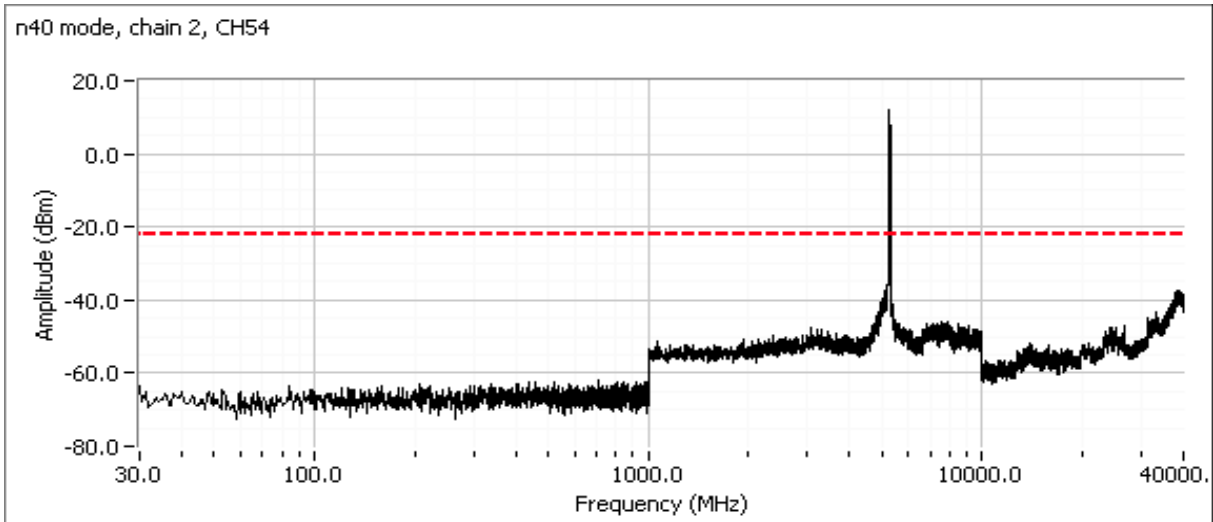
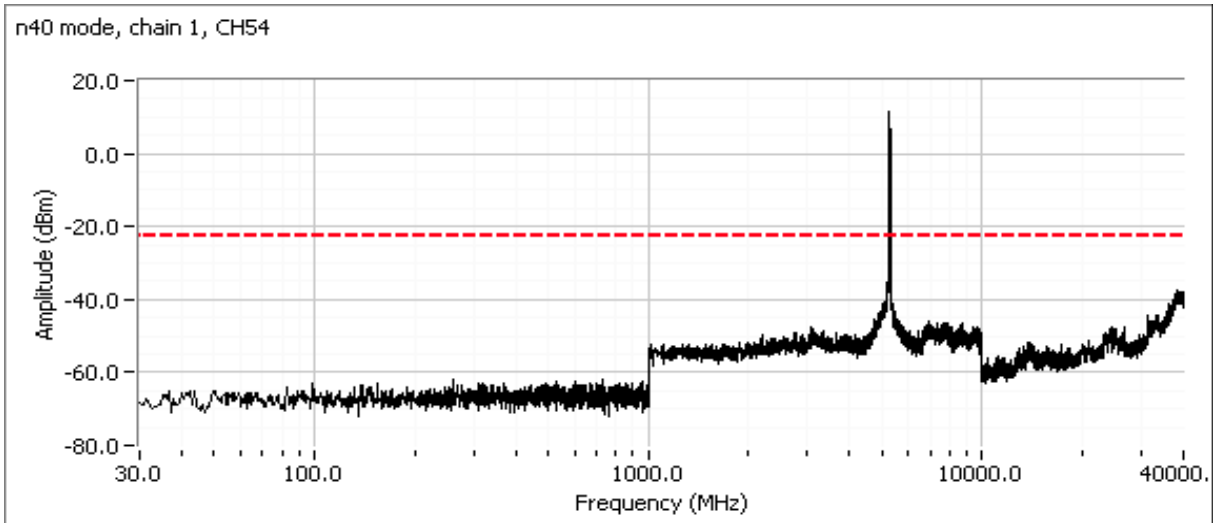
Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A

High channel, 5150 - 5250 MHz Band
 Wide-band plot, RB=VB=1MHz (Peak measurements versus limit).



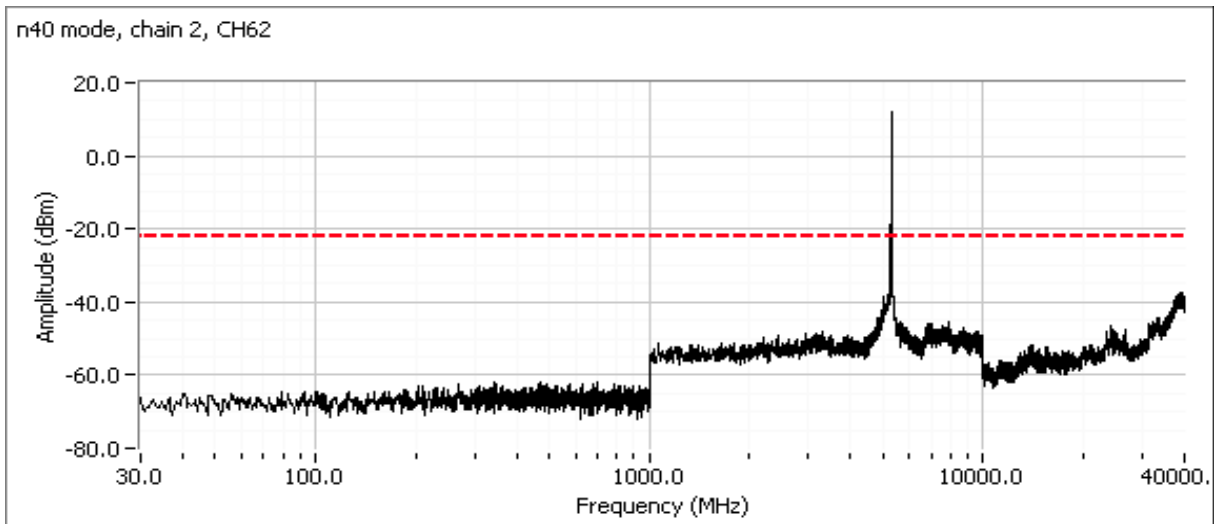
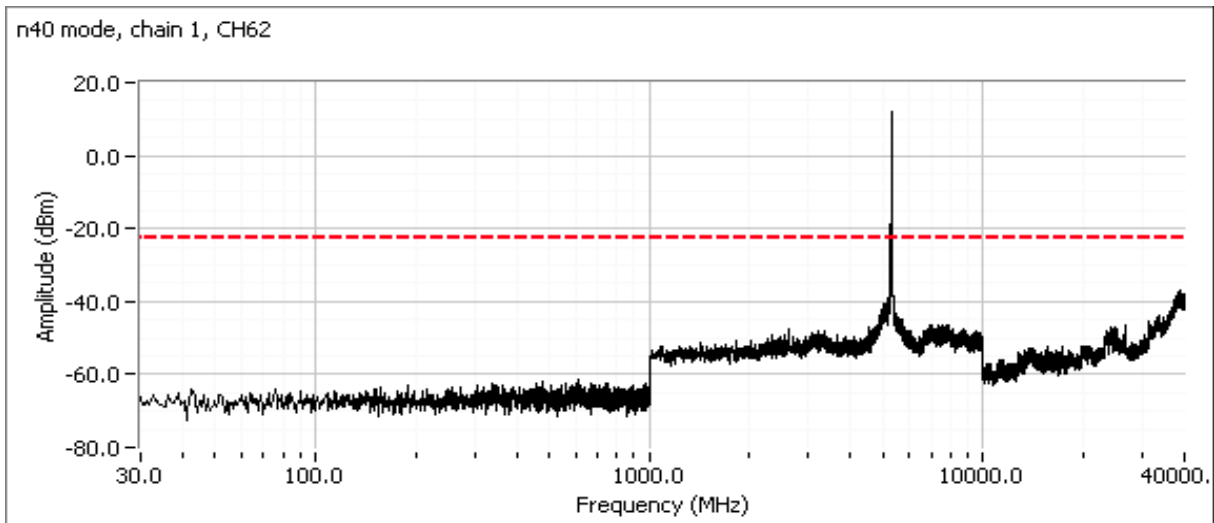
Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A

Low channel, 5250 - 5350 MHz Band
 Wide-band plot, RB=VB=1MHz (Peak measurements versus limit).



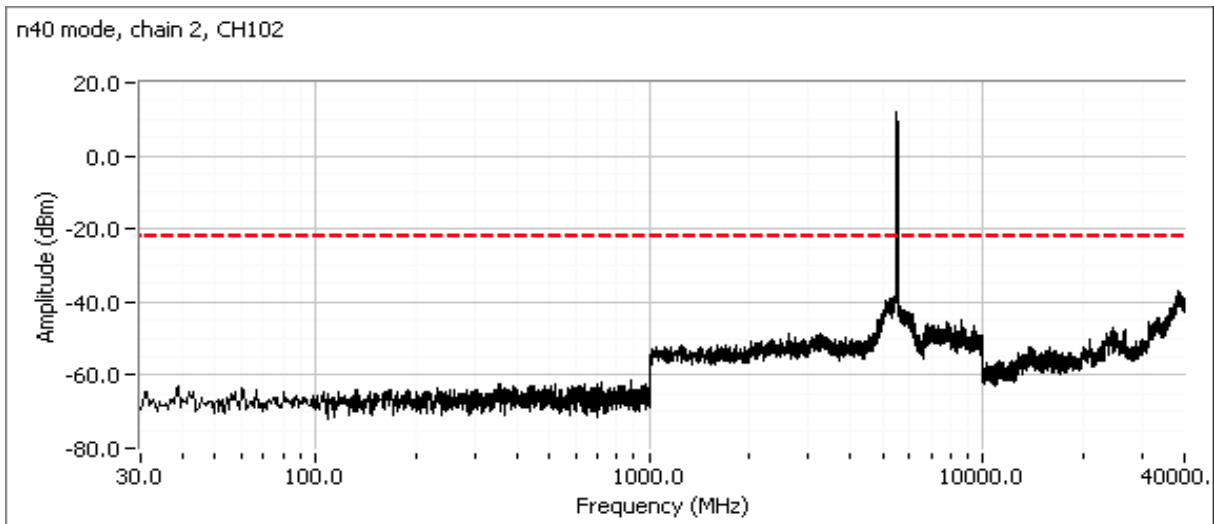
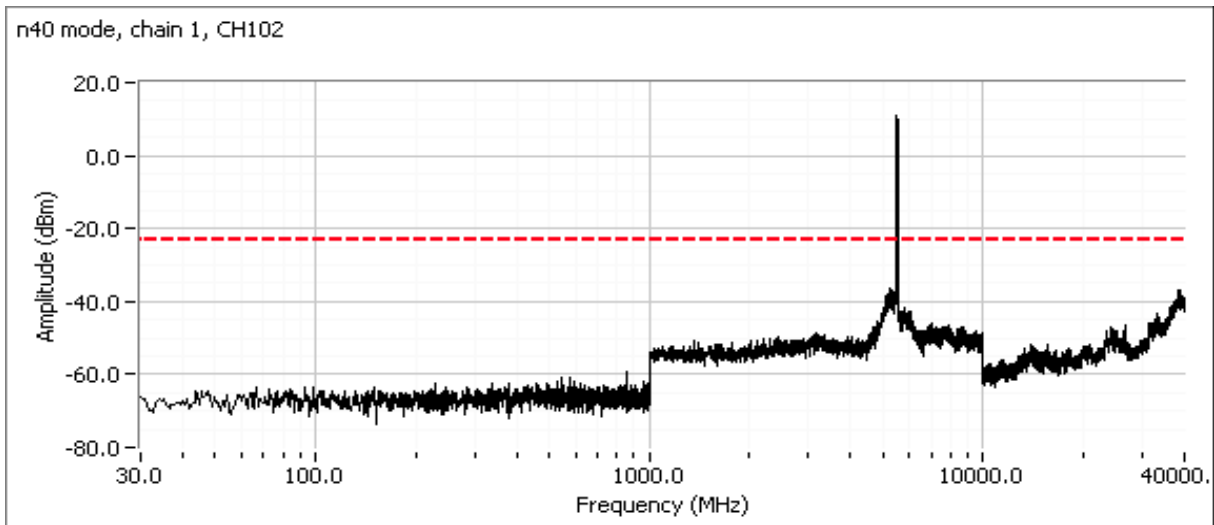
Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A

High channel, 5250 - 5350 MHz Band
 Wide-band plot, RB=VB=1MHz (Peak measurements versus limit).



Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A

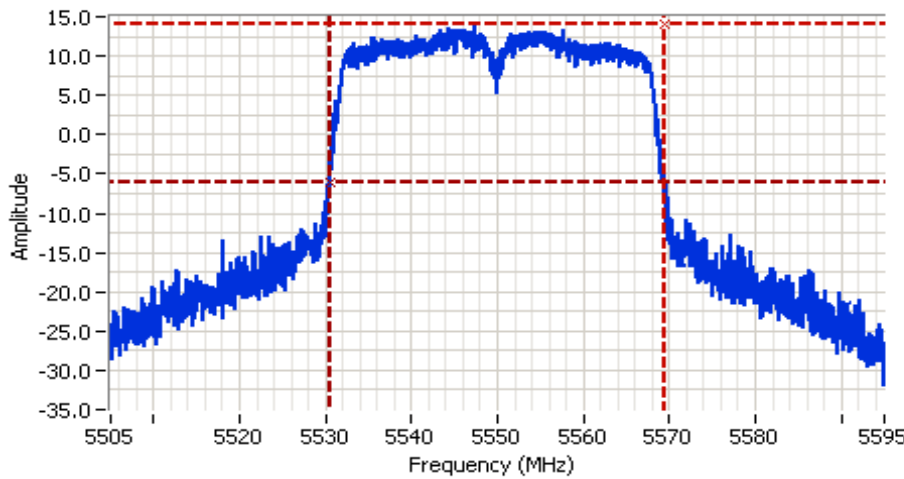
Low channel, 5470 - 5725 MHz Band
 Wide-band plot, RB=VB=1MHz (Peak measurements versus limit).



Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A

Center channel, 5470 - 5725 MHz Band

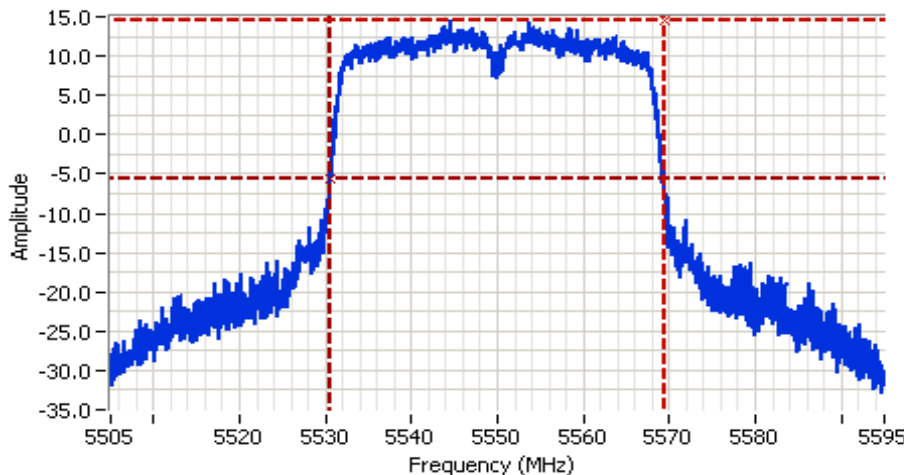
For master devices - This plot is showing that the 20dB bandwidth of the channel closest to 5600 MHz does not spill into the 5600-5650 MHz band. RB > 1% of span.



Analyzer Settings
 Agilent Technologies, E4446A
 CF: 5550.000 MHz
 SPAN: 90.000 MHz
 RB: 1.000 MHz
 VB: 3.000 MHz
 Detector: POS
 Attn: 20 DB
 RL Offset: 11.5 DB
 Sweep Time: 1.0ms
 Ref Lvl: 15.0 DBM

Comments
 20dB BW: 38.953 MHz
 FH: 5569.52 MHz
 chain 1

Cursor 1	5569.5215	13.96	⊕ ⊖	Delta Freq.	38.953
Cursor 2	5530.5685	-6.04	⊕ ⊖	Delta Amplitude	20.00



Analyzer Settings
 Agilent Technologies, E4446A
 CF: 5550.000 MHz
 SPAN: 90.000 MHz
 RB: 1.000 MHz
 VB: 3.000 MHz
 Detector: POS
 Attn: 20 DB
 RL Offset: 11.5 DB
 Sweep Time: 1.0ms
 Ref Lvl: 15.0 DBM

Comments
 20dB BW: 38.893 MHz
 FH: 5569.34 MHz
 chain 2

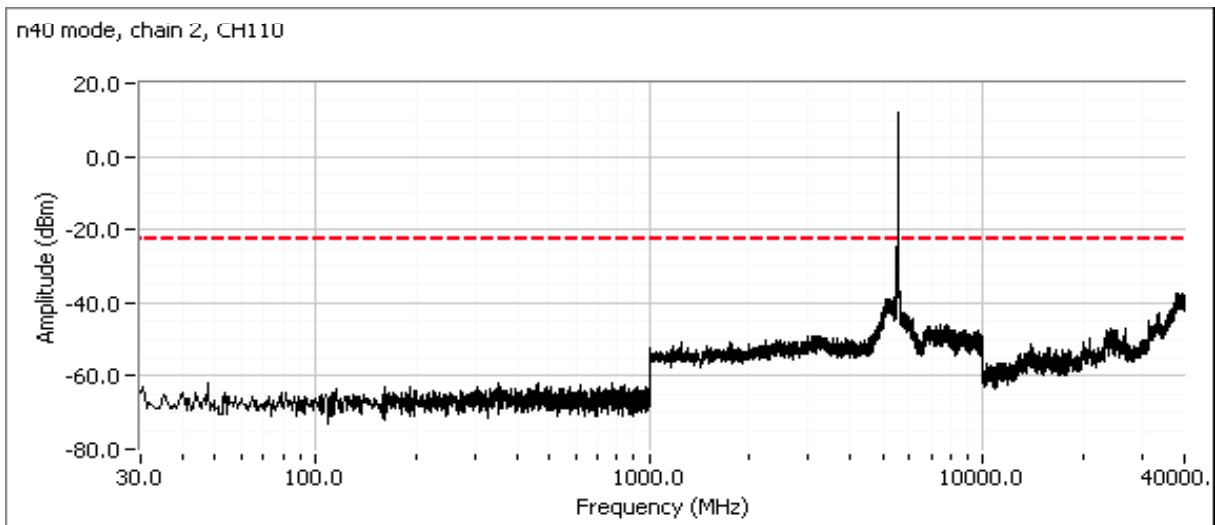
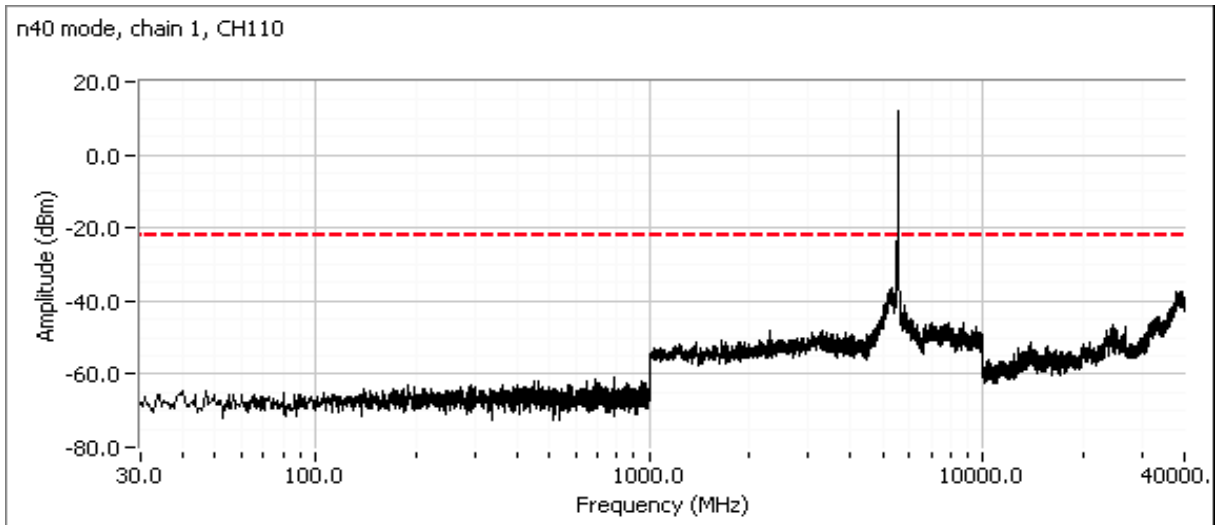
Cursor 1	5569.3414	14.45	⊕ ⊖	Delta Freq.	38.893
Cursor 2	5530.4485	-5.55	⊕ ⊖	Delta Amplitude	20.00



Note: The measurements were performed with wider bandwidth which complies with the requirement

Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A

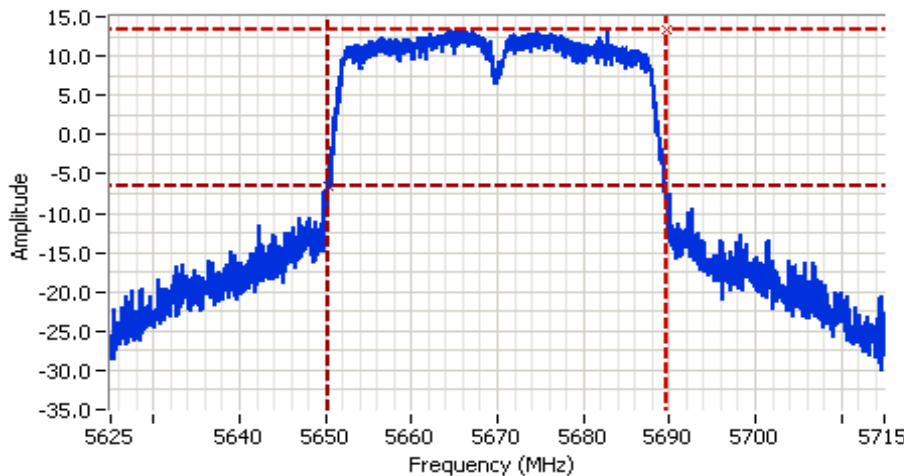
Wide-band plot, RB=VB=1MHz (Peak measurements versus limit).



Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A

Channel adjacent to 5650 MHz (Master Device)

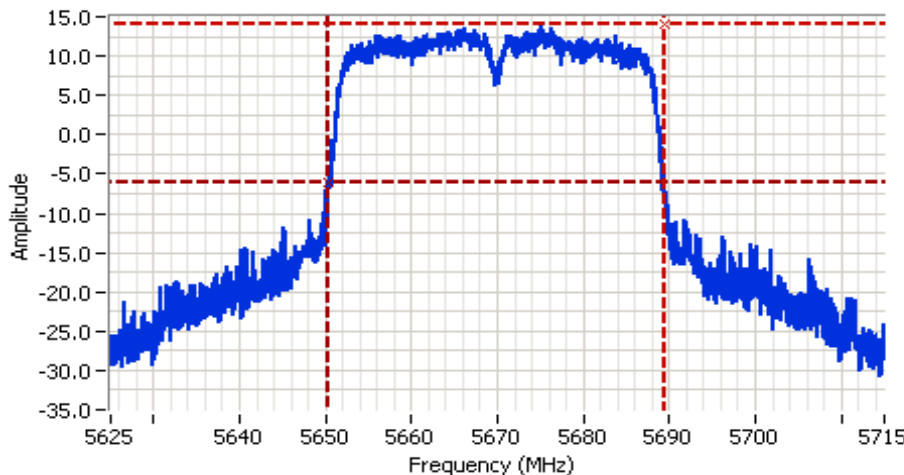
Plots showing that the 20dB bandwidth of the channel closest to 5650 MHz does not spill into the 5600-5650 MHz band. RB > 1% of span.



Analyzer Settings
 Agilent Technologies, E4446A
 CF: 5670.000 MHz
 SPAN: 90.000 MHz
 RB: 1.000 MHz
 VB: 3.000 MHz
 Detector: POS
 Attn: 20 DB
 RL Offset: 11.5 DB
 Sweep Time: 1.0ms
 Ref Lvl: 15.0 DBM

Comments
 20dB BW: 39.193 MHz
 FL: 5650.39 MHz
 chain 1

Cursor 1	5689.5815	13.42	⊕ ⊖ 🔒	Delta Freq.	39.193
Cursor 2	5650.3885	-6.58	⊕ ⊖ 🔒	Delta Amplitude	20.00



Analyzer Settings
 Agilent Technologies, E4446A
 CF: 5670.000 MHz
 SPAN: 90.000 MHz
 RB: 1.000 MHz
 VB: 3.000 MHz
 Detector: POS
 Attn: 20 DB
 RL Offset: 11.5 DB
 Sweep Time: 1.0ms
 Ref Lvl: 15.0 DBM

Comments
 20dB BW: 39.103 MHz
 FL: 5650.42 MHz
 chain 2

Cursor 1	5689.5215	13.98	⊕ ⊖ 🔒	Delta Freq.	39.103
Cursor 2	5650.4185	-6.02	⊕ ⊖ 🔒	Delta Amplitude	20.00

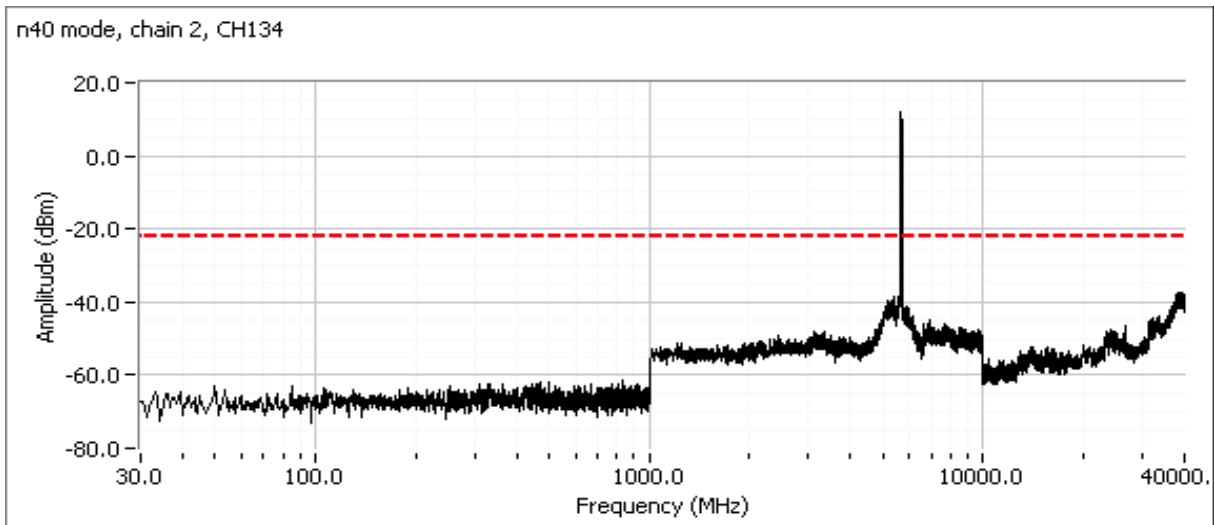
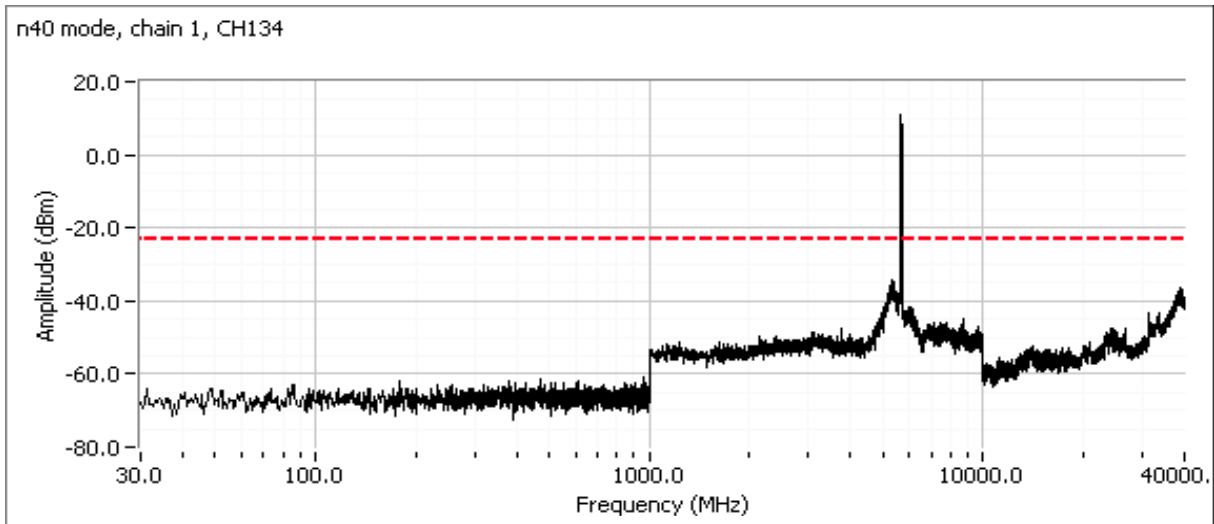


Note: The measurements were performed with wider bandwidth which complies with the requirement

Client: Pace Americas	Job Number: J87430
Model: HR44	T-Log Number: T89059
Contact: Mark Rieger	Account Manager: Michelle Kim
Standard: FCC 15.247, 15E, RSS-210, 15B	Class: N/A

High channel, 5470 - 5725 MHz Band

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



End of Report

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