PCTEST ENGINEERING LABORATORY, INC.
7185 Oakland Mills Road, Columbia, MD 21046 USA
Tel. 410.290.6652 / Fax 410.290.6654
http://www.pctestlab.com

MEASUREMENT REPORT
FCC PART 15.407 / IC RSS-210 802.11a/n (UNII)

Applicant Name:
LG Electronics MobileComm U.S.A
1000 Sylvan Avenue
Englewood Cliffs, NJ 07632
United States

Date of Testing:
July 6-19, 2012
Test Site/Location:
PCTEST Lab, Columbia, MD, USA
Test Report Serial No.:
0Y1207050904.ZNF

FCC ID:	**ZNFE970**
APPLICANT:	**LG Electronics MobileComm U.S.A**

Application Type:	Certification
Model(s):	E970
EUT Type:	Portable Handset
FCC Classification:	Unlicensed National Information Infrastructure (UNII)
FCC Rule Part(s):	Part 15.407
IC Specification(s):	RSS-210 Issue 8
Test Procedure(s):	ANSI C63.4-2003/2009, ANSI C63.10-2009, KDB 789033

Mode	UNII Band	Channel Bandwidth (MHz)	Tx Frequency (MHz)	Conducted Power	
				Max. Power (mW)	Max. Power (dBm)
802.11a	1	20	5180 - 5240	29.4	14.68
	2	20	5260 - 5320	28.4	14.53
	3	20	5500 - 5700	28.3	14.52
802.11n	1	20	5180 - 5240	23.6	13.72
	2	20	5260 - 5320	24.0	13.80
	3	20	5500 - 5700	23.0	13.62
802.11n	1	40	5190 - 5230	17.5	12.44
	2	40	5270 - 5310	18.7	12.71
	3	40	5510 - 5670	17.4	12.40

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.4-2003/2009, ANSI C63.10-2009 and KDB 789033. Test results reported herein relate only to the item(s) tested.

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

PCTEST certifies that no party to this application has been subject to a denial of Federal benefits that includes FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C. 862.

Randy Ortanez
President

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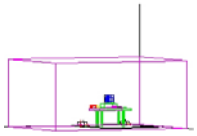
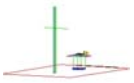


MEASUREMENT REPORT
FCC Part 15.407



§ 2.1033 General Information

APPLICANT:	LG Electronics MobileComm U.S.A
APPLICANT ADDRESS:	1000 Sylvan Avenue
	Englewood Cliffs, NJ 07632, United States
TEST SITE:	PCTEST ENGINEERING LABORATORY, INC.
TEST SITE ADDRESS:	7185 Oakland Mills Road, Columbia, MD 21046 USA
FCC RULE PART(S):	Part 15.407
IC SPECIFICATION(S):	RSS-210 Issue 8
MODEL NAME:	E970
FCC ID:	ZNFE970
Test Device Serial No.:	BT/WIFI ☐ Production ☒ Pre-Production ☐ Engineering
FCC CLASSIFICATION:	Unlicensed National Information Infrastructure (UNII)
DATE(S) OF TEST:	July 6-19, 2012
TEST REPORT S/N:	0Y1207050904.ZNF

Test Facility / Accreditations

Measurements were performed at PCTEST Engineering Lab located in Columbia, MD 21046, U.S.A.

- PCTEST facility is an FCC registered (PCTEST Reg. No. 159966) test facility with the site description report on file and has met all the requirements specified in Section 2.948 of the FCC Rules and Industry Canada (2451B-1).
- PCTEST Lab is accredited to ISO 17025 by U.S. National Institute of Standards and Technology (NIST) under the National Voluntary Laboratory Accreditation Program (NVLAP Lab code: 100431-0) in EMC, FCC and Telecommunications.
- PCTEST Lab is accredited to ISO 17025-2005 by the American Association for Laboratory Accreditation (A2LA) in Specific Absorption Rate (SAR) testing, Hearing Aid Compatibility (HAC) testing, CTIA Test Plans, and wireless testing for FCC and Industry Canada Rules.

- PCTEST Lab is a recognized U.S. Conformity Assessment Body (CAB) in EMC and R&TTE (n.b. 0982) under the U.S.-EU Mutual Recognition Agreement (MRA).
- PCTEST TCB is a Telecommunication Certification Body (TCB) accredited to ISO/IEC Guide 65 by the American National Standards Institute (ANSI) in all scopes of FCC Rules and Industry Canada Standards (RSS).
- PCTEST facility is an IC registered (2451B-1) test laboratory with the site description on file at Industry Canada.
- PCTEST is a CTIA Authorized Test Laboratory (CATL) for AMPS, CDMA, and EvDO wireless devices and for Over-the-Air (OTA) Antenna Performance testing for AMPS, CDMA, GSM, GPRS, EGPRS, UMTS (W-CDMA), CDMA 1xEVDO, and CDMA 1xRTT.

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1.0 INTRODUCTION

1.1 Scope

Measurement and determination of electromagnetic emissions (EMC) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission and the Industry Canada Certification and Engineering Bureau.

1.2 PCTEST Test Location

The map below shows the location of the PCTEST LABORATORY, its proximity to the FCC Laboratory, the Columbia vicinity, the Baltimore-Washington Internt'l (BWI) airport, the city of Baltimore and the Washington, DC area. (*See Figure 1-1*).

These measurement tests were conducted at the PCTEST Engineering Laboratory, Inc. facility located at 7185 Oakland Mills Road, Columbia, MD 21046. The site coordinates are 39° 10'23" N latitude and 76° 49'50" W longitude. The facility is 0.4 miles North of the FCC laboratory, and the ambient signal and ambient signal strength are approximately equal to those of the FCC laboratory. The detailed description of the measurement facility was found to be in compliance with the requirements of § 2.948 according to ANSI C63.4-2003/2009 on February 15, 2012.

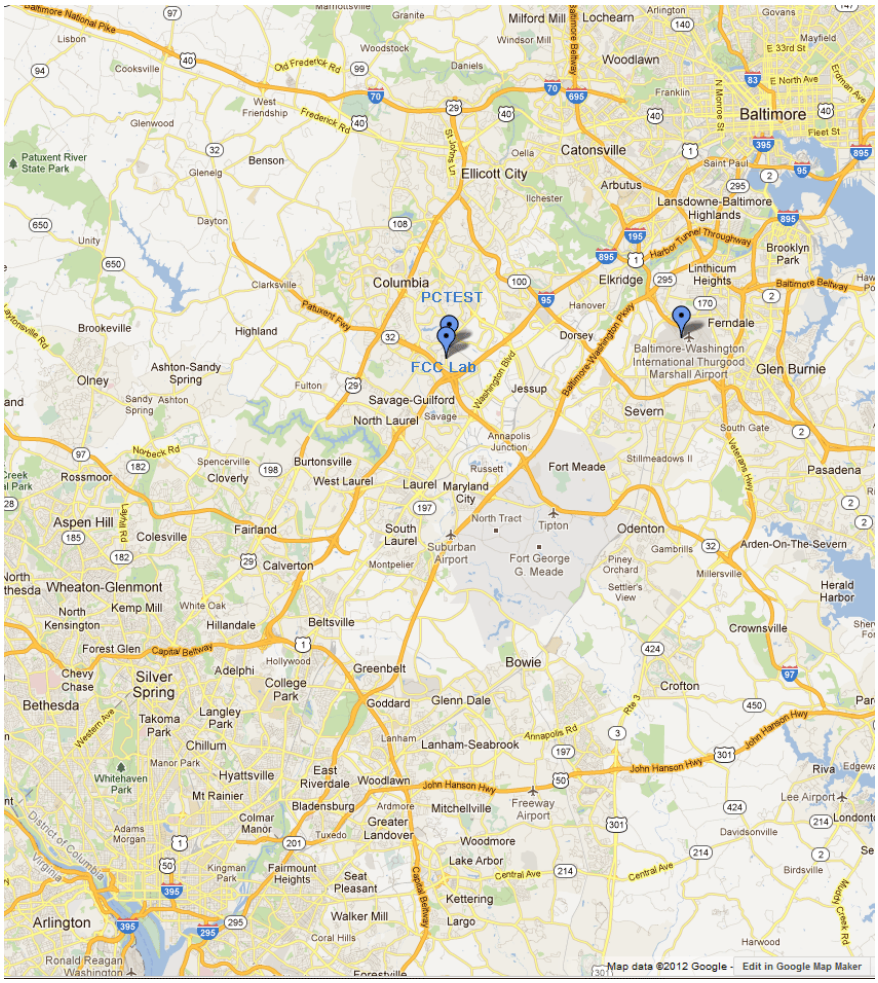

Figure 1-1. Map of the Greater Baltimore and Metropolitan Washington, D.C. area

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2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **LGE Portable Handset FCC ID: ZNFE970**. The test data contained in this report pertains only to the emissions due to the EUT's NII transmitter.

2.2 Device Capabilities

This device contains the following capabilities:

850/1900 CDMA/EvDO Rev 0/A (BC0, BC1, BC10), 802.11b/g/n WLAN, Bluetooth (1x,EDR, LE), NFC

2.3 Test Configuration

The LGE Portable Handset FCC ID: ZNFE970 was tested per the guidance of ANSI C63.10-2009 and KDB 789033. See Sections 3.2, 3.3, and 6.1 of this test report for a description of the AC line conducted emissions, radiated emissions, and antenna port conducted emissions test setups, respectively.

Note: 5GHz 802.11n transmission in this device supports 20MHz and 40MHz channel bandwidths.

2.4 EMI Suppression Device(s)/Modifications

No EMI suppression device(s) were added and/or no modifications were made during testing.

2.5 Labeling Requirements

Per 2.1074 & 15.19; Docket 95-19

The label shall be permanently affixed at a conspicuous location on the device; instruction manual or pamphlet supplied to the user and be readily visible to the purchaser at the time of purchase. However, when the device is so small wherein placement of the label with specified statement is not practical, only the trade name and FCC ID must be displayed on the device per Section 15.19(b)(2).

Please see attachment for FCC ID label and label location.

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3.0 DESCRIPTION OF TEST

3.1 Evaluation Procedure

The measurement procedures described in the American National Standard for Methods of Measurement of Radio-Noise Emission from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40GHz (ANSI C63.4-2003/2009), the American National Standard for Testing Unlicensed Wireless Devices (ANSI C63.10-2009), and the guidance provided in KDB 789033 were used in the measurement of **LGE Portable Handset FCC ID: ZNFE970.**

Deviation from measurement procedure…….....None

3.2 AC Line Conducted Emissions

The line-conducted facility is located inside a 10'x16'x9' shielded enclosure. The shielded enclosure is manufactured by ETS Lindgren RF Enclosures. The shielding effectiveness of the shielded room is in accordance with MIL-Std-285 or NSA 65-5. A 1m x 1.5m wooden table 80cm high is placed 40cm away from the vertical wall and 80cm away from the sidewall of the shielded room. Two 10kHz-30MHz, 50Ω/50μH Line-Impedance Stabilization Networks (LISNs) are bonded to the shielded room floor. Power to the LISNs is filtered by external high-current high-insertion loss power line filters. The external power line filter is an ETS Lindgren Model LPRX-4X30 (100dB Attenuation, 14kHz-18GHz) and the two EMI/RFI filters are ETS Lindgren Model LRW-2030-S1 (100dB Minimum Insertion Loss, 14kHz – 10GHz). These filters attenuate ambient signal noise from entering the measurement lines. These filters are also bonded to the shielded enclosure.

The EUT is powered from one LISN and the support equipment is powered from the second LISN. If the EUT is a DC-powered device, power will be derived from the source power supply it normally will be powered from and this supply line(s) will be connected to the second LISN. All interconnecting cables more than 1 meter were shortened to a 1 meter length by non-inductive bundling (serpentine fashion) and draped over the back edge of the test table. All cables were at least 40cm above the horizontal reference groundplane. Power cables for support equipment were routed down to the second LISN while ensuring that that cables were not draped over the second LISN.

Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the spectrum analyzer and exploratory measurements were made to determine the frequencies producing the maximum emission from the EUT. The spectrum was scanned from 150kHz to 30MHz with a spectrum analyzer. The detector function was set to peak mode for exploratory measurements while the bandwidth of the analyzer was set to 10kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Each emission was also maximized by varying: power lines, the mode of operation or resolution, clock or data exchange speed, scrolling H pattern to the EUT and/or support equipment whichever determined the worst-case emission. Once the worst case emissions have been identified, the one EUT cable configuration/arrangement and mode of operation that produced these emissions is used for final measurements on the same test site. The analyzer is set to CISPR quasi-peak and average detectors with a 9kHz resolution bandwidth for final measurements.

Line conducted emissions test results are shown in Section 6.9. Automated test software was used to perform the AC line conducted emissions testing. Automated measurement software utilized is Rohde & Schwarz EMC32, Version 8.51.0.

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3.3 Radiated Emissions

The radiated test facilities consisted of an indoor 3 meter semi-anechoic chamber used for final measurements and exploratory measurements, when necessary. The measurement area is contained within the semi-anechoic chamber which is shielded from any ambient interference. For measurements above 1GHz absorbers are arranged on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections. For measurements below 1GHz, the absorbers are removed. An ETS Lindgren Model 2188 raised turntable is used for radiated measurement. It is a continuously rotatable, remote-controlled, metallic turntable and 2 meters (6.56 ft.) in diameter. The turn table is flush with the raised floor of the chamber in order to maintain its function as a ground plane. A 78cm high PVC support structure is placed on top of the turntable. A ¾" (~1.9cm) sheet of high density polyethylene is used as the table top and is placed on top of the PVC supports to bring the total height of the table to 80cm.

For all measurements, the spectrum was scanned through all EUT azimuths and from 1 to 4 meter receive antenna height using a broadband antenna from 30MHz up to the upper frequency shown in 15.33(b)(1) depending on the highest frequency generated or used in the device or on which the device operates or tunes. For frequencies above 1GHz, linearly polarized double ridge horn antennas were used. For frequencies below 30MHz, a calibrated loop antenna was used. When exploratory measurements were necessary, they were performed at 1 meter test distance inside the semi-anechoic chamber using broadband antennas, broadband amplifiers, and spectrum analyzers to determine the frequencies and modes producing the maximum emissions. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The test set-up was placed on top of the 0.8 meter high, 1 x 1.5 meter table. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Appropriate precaution was taken to ensure that all emissions from the EUT were maximized and investigated. The system configuration, clock speed, mode of operation or video resolution, if applicable, turntable azimuth, and receive antenna height was noted for each frequency found.

Final measurements were made in the semi-anechoic chamber using calibrated, linearly polarized broadband and horn antennas. The test setup was configured to the setup that produced the worst case emissions. The spectrum analyzer was set to investigate all frequencies required for testing to compare the highest radiated disturbances with respect to the specified limits. The turntable containing the EUT was rotated through 360 degrees and the height of the receive antenna was varied 1 to 4 meters and stopped at the azimuth and height producing the maximum emission. Each emission was maximized by varying: the mode of operation or resolution, clock or data rate, scrolling H pattern to the EUT and/or support equipment, and changing the polarity of the receive antenna, whichever produced the worst-case emissions. To record the final measurements, the analyzer detector function was set to CISPR quasi-peak mode and the bandwidth of the spectrum analyzer was set to 120kHz for frequencies below 1GHz or 1MHz for frequencies above 1GHz.

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4.0 ANTENNA REQUIREMENTS

Excerpt from §15.203 of the FCC Rules/Regulations:
"An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section."

- The antennas of the Portable Handset are **permanently attached.**
- There are no provisions for connection to an external antenna.

Conclusion:

The **LGE Portable Handset FCC ID: ZNFE970** unit complies with the requirement of §15.203.

Band 1		Band 2		Band 3	
Ch.	**Frequency (MHz)**	**Ch.**	**Frequency (MHz)**	**Ch.**	**Frequency (MHz)**
36	5180	52	5260	100	5500
:	:	:	:	:	:
42	5210	56	5280	116	5580
:	:	:	:	:	:
48	5240	64	5320	140	5700

Table 4-1. 802.11a Frequency / Channel Operations

Band 1		Band 2		Band 3	
Ch.	**Frequency (MHz)**	**Ch.**	**Frequency (MHz)**	**Ch.**	**Frequency (MHz)**
36	5180	52	5260	100	5500
:	:	:	:	:	:
42	5210	56	5280	116	5580
:	:	:	:	:	:
48	5240	64	5320	140	5700

Table 4-2. 802.11n (20MHz BW) Frequency / Channel Operations

Band 1		Band 2		Band 3	
Ch.	**Frequency (MHz)**	**Ch.**	**Frequency (MHz)**	**Ch.**	**Frequency (MHz)**
38	5190	54	5270	102	5510
:	:	:	:	:	:
46	5230	62	5310	110	5550
				:	:
				134	5670

Table 4-3. 802.11n (40MHz BW) Frequency / Channel Operations

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5.0 TEST EQUIPMENT CALIBRATION DATA

Test Equipment Calibration is traceable to the National Institute of Standards and Technology (NIST).

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
-	WL25-1	Conducted WLAN Cable Set (25GHz)	2/13/2012	Annual	2/13/2013	N/A
-	RE2	Radiated Emissions Cable Set (VHF/UHF)	2/13/2012	Annual	2/13/2013	N/A
-	40G-1R	40GHz Radiated Cable Set	2/23/2012	Annual	2/23/2013	N/A
-	WL40-1	Conducted WLAN Cable Set (40GHz)	2/24/2012	Annual	2/24/2013	N/A
Agilent	8447D	Broadband Amplifier	5/8/2012	Annual	5/8/2013	2443A01900
Agilent	E4448A	PSA (3Hz-50GHz) Spectrum Analyzer	2/15/2012	Annual	2/15/2013	US42510244
Agilent	N9030A	PXA Signal Analyzer	2/23/2012	Annual	2/23/2013	MY49432391
Anritsu	MA2411B	Power Sensor	3/5/2012	Annual	3/5/2013	846215
Anritsu	ML2495A	Power Meter	10/13/2011	Annual	10/13/2012	1039008
ETS Lindgren	3117	1-18 GHz DRG Horn (Medium)	7/22/2011	Biennial	7/22/2013	125518
ETS Lindgren	3160-09	18-26.5 GHz Standard Gain Horn	5/30/2012	Annual	5/30/2013	135427
ETS Lindgren	3160-10	26.5 - 40 GHz Standard Gain Horn	6/6/2012	Biennial	6/6/2014	130993
Mini-Circuits	VHF-3100+	High Pass Filter	1/15/2012	Annual	1/15/2013	30841
Mini-Circuits	VHF-8400+	3.4GHz - 9.9GHz High Pass Filter	2/28/2012	Annual	2/28/2013	31048
Rohde & Schwarz	RS-PR18	1-18 GHz Pre-Amplifier	6/26/2012	Annual	6/26/2013	100071
Rohde & Schwarz	RS-PR26	18-26.5 GHz Pre-Amplifier	5/30/2012	Annual	5/30/2013	100040
Rohde & Schwarz	RS-PR40	26.5-40GHz Pre-Amplifier	6/6/2012	Annual	6/6/2013	100037
Rohde & Schwarz	ESU26	EMI Test Receiver	12/15/2011	Annual	12/15/2012	100342
Solar Electronics	8012-50-R-24-BNC	LISN	6/23/2011	Biennial	6/23/2013	310233
Sunol	JB5	Bi-Log Antenna (30M - 5GHz)	1/26/2012	Biennial	1/26/2014	A051107

Table 5-1. Annual Test Equipment Calibration Schedule

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6.0 TEST RESULTS

6.1 Summary

Company Name: LG Electronics MobileComm U.S.A
FCC ID: ZNFE970
Method/System: Unlicensed National Information Infrastructure (UNII)
Data Rate(s) Tested: 6, 9, 12, 18, 24, 36, 48, 54Mbps (802.11a)
6.5/7.2, 13/14.4, 19.5/21.7, 26/28.9, 39/43.3, 52/57.8, 58.5/65, 65/72.2 (n – 20MHz)
13.5/15, 27/30, 40.5/45, 54/60, 81/90, 108/120, 121.5/135, 135/150 (n – 40MHz BW)

FCC Part Section(s)	RSS Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
TRANSMITTER MODE (TX)						
N/A	RSS-210 [A9.2]	26dB Bandwidth [FCC] Occupied Bandwidth [IC]	N/A	CONDUCTED	PASS	Section 6.2
15.407 (a)(1)	RSS-210 [A9.2]	Maximum Conducted Output Power	< 4 + 10log$_{10}$(BW) dBm (5150-5250MHz) [FCC] < 10 + 10log$_{10}$(BW) dBm (5150-5250MHz) [IC] < 11 + 10log$_{10}$(B) dBm (5250-5350MHz) < 11 + 10log$_{10}$(B) dBm (5470 – 5725MHz)		PASS	Section 6.3
15.407 (a)(1), (5)	RSS-210 [A9.2]	Peak Power Spectral Density	< 4 dBm/MHz (5150-5250) [FCC] < 10dBm/MHz (5150-5250) [IC] < 11dBm/MHz (5250-5350) < 11dBm/MHz (5470-5725)		PASS	Section 6.4
15.407(a)(6)	N/A	Peak Excursion	< 13 dB/MHz maximum difference		PASS	Section 6.5
15.407(g)	N/A	Frequency Stability	N/A		PASS	Section 6.6
15.407(b)(1), (2),(3)	RSS-210 [A9.2]	Undesirable Emissions	< -27 dBm/MHz EIRP (5150-5350MHz, 5470-5725MHz)	RADIATED	PASS	Section 6.7
15.407(h)	RSS-210 [A9.3]	Dynamic Frequency Selection	See DFS Test Report		PASS	See DFS Test Report
15.205, 15.407(b)(1), (5), (6)	RSS-Gen [7.2.3.2]	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	Emissions in restricted bands must meet the radiated limits detailed in 15.209 (RSS-210 table 3 limits)		PASS	Section 6.8
15.207	RSS-Gen [7.2.2]	AC Conducted Emissions 150kHz – 30MHz	< FCC 15.207 limits or < RSS-Gen table 2 limits	LINE CONDUCTED	PASS	Section 6.9

Table 6-1. Summary of Test Results

Notes:

1) All modes of operation and data rates were investigated. The test results shown in the following sections represent the worst case emissions.
2) The analyzer plots shown in this section were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables and attenuators used as part of the system to connect the EUT to the analyzer at all frequencies of interest.
3) All antenna port conducted emissions testing was performed on a test bench with the antenna port of the EUT connected to the spectrum analyzer through calibrated cables and attenuators.

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6.2 26dB Bandwidth Measurement – 802.11a/n

The bandwidth at 26dB down from the highest in-band spectral density is measured with a spectrum analyzer connected to the antenna terminal while the EUT is operating at its maximum power control level, as defined in KDB 789033, at the appropriate frequencies. The spectrum analyzer's bandwidth measurement function is configured to measure the 26dB bandwidth. ***The 26dB bandwidth is used to determine the conducted power limits.***

	Frequency [MHz]	Channel No.	802.11 Mode	Data Rate [Mbps]	Measured 26dB Bandwidth [MHz]
Band I	5180	36	a	6	23.72
	5200	40	a	6	22.91
	5240	48	a	6	22.64
	5180	36	n (20MHz)	6.5/7.2 (MCS0)	23.10
	5200	40	n (20MHz)	6.5/7.2 (MCS0)	23.05
	5240	48	n (20MHz)	6.5/7.2 (MCS0)	22.97
	5190	38	n (40MHz)	13.5/15 (MCS0)	43.94
	5230	46	n (40MHz)	13.5/15 (MCS0)	44.28
Band II	5260	52	a	6	22.83
	5280	56	a	6	22.60
	5320	64	a	6	22.51
	5260	52	n (20MHz)	6.5/7.2 (MCS0)	23.54
	5280	56	n (20MHz)	6.5/7.2 (MCS0)	22.92
	5320	64	n (20MHz)	6.5/7.2 (MCS0)	22.75
	5270	54	n (40MHz)	13.5/15 (MCS0)	42.99
	5310	62	n (40MHz)	13.5/15 (MCS0)	43.83
Band III	5500	100	a	6	22.08
	5580	116	a	6	22.50
	5700	140	a	6	22.48
	5500	100	n (20MHz)	6.5/7.2 (MCS0)	23.27
	5580	116	n (20MHz)	6.5/7.2 (MCS0)	23.29
	5700	140	n (20MHz)	6.5/7.2 (MCS0)	23.15
	5510	102	n (40MHz)	13.5/15 (MCS0)	43.40
	5550	110	n (40MHz)	13.5/15 (MCS0)	43.82
	5670	134	n (40MHz)	13.5/15 (MCS0)	44.08

Table 6-2. Conducted Bandwidth Measurements

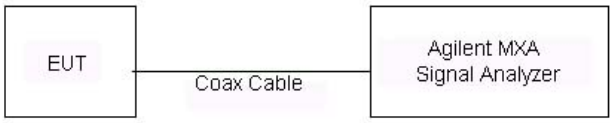

Figure 6-1. Test Instrument & Measurement Setup

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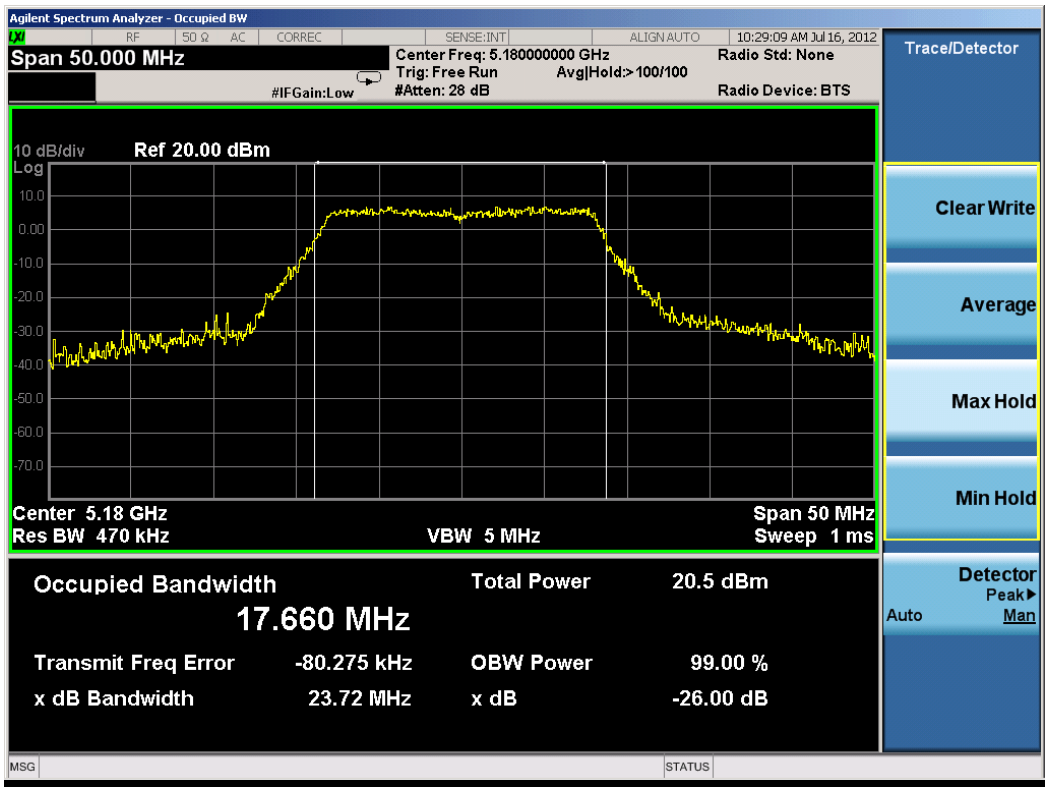
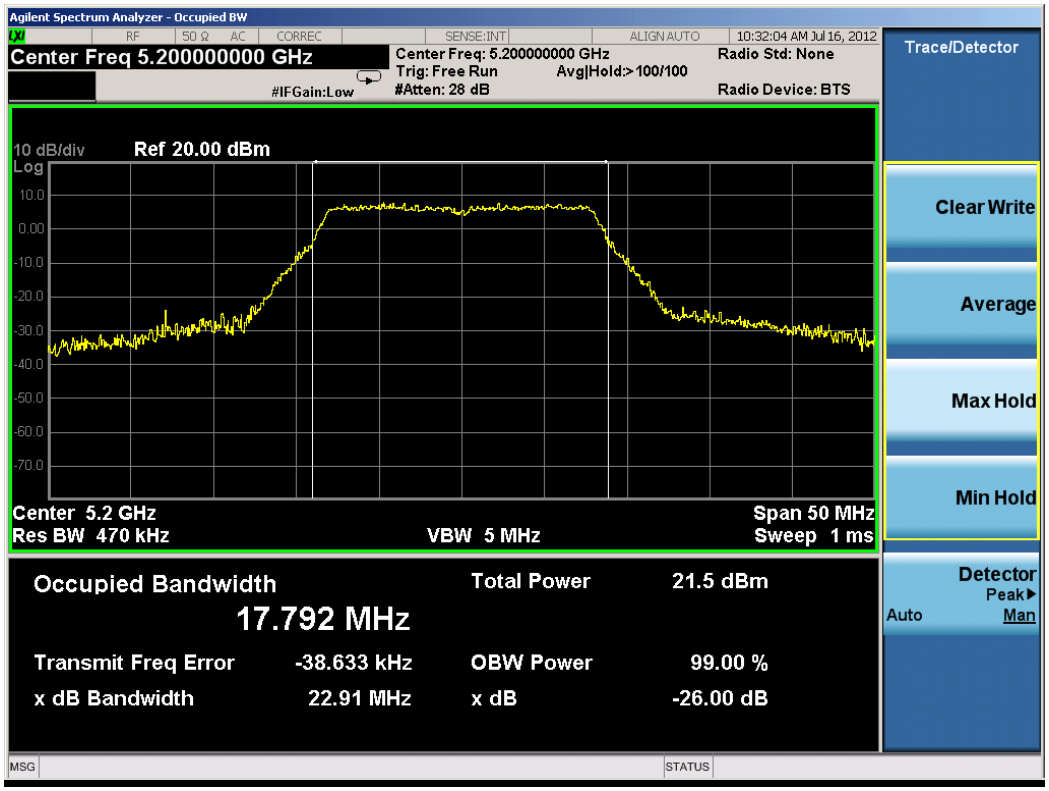


Plot 6-1. 26dB Bandwidth Plot (802.11a (UNII Band 1) – Ch. 36)



Plot 6-2. 26dB Bandwidth Plot (802.11a (UNII Band 1) – Ch. 40)

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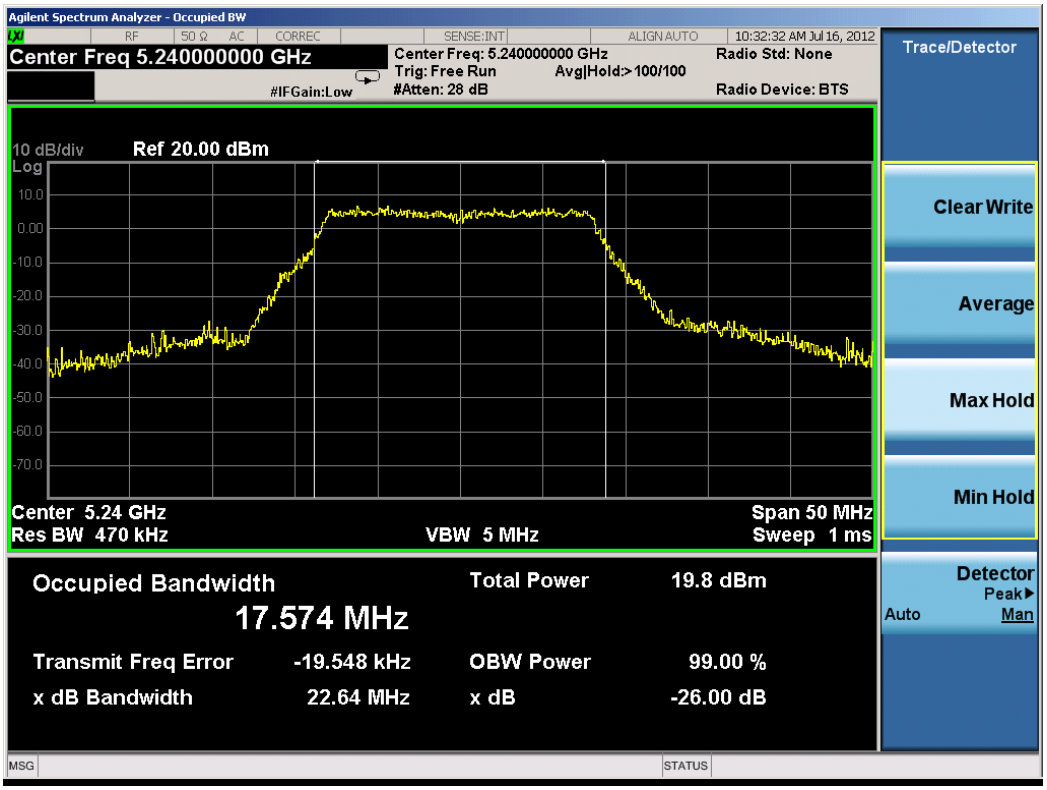
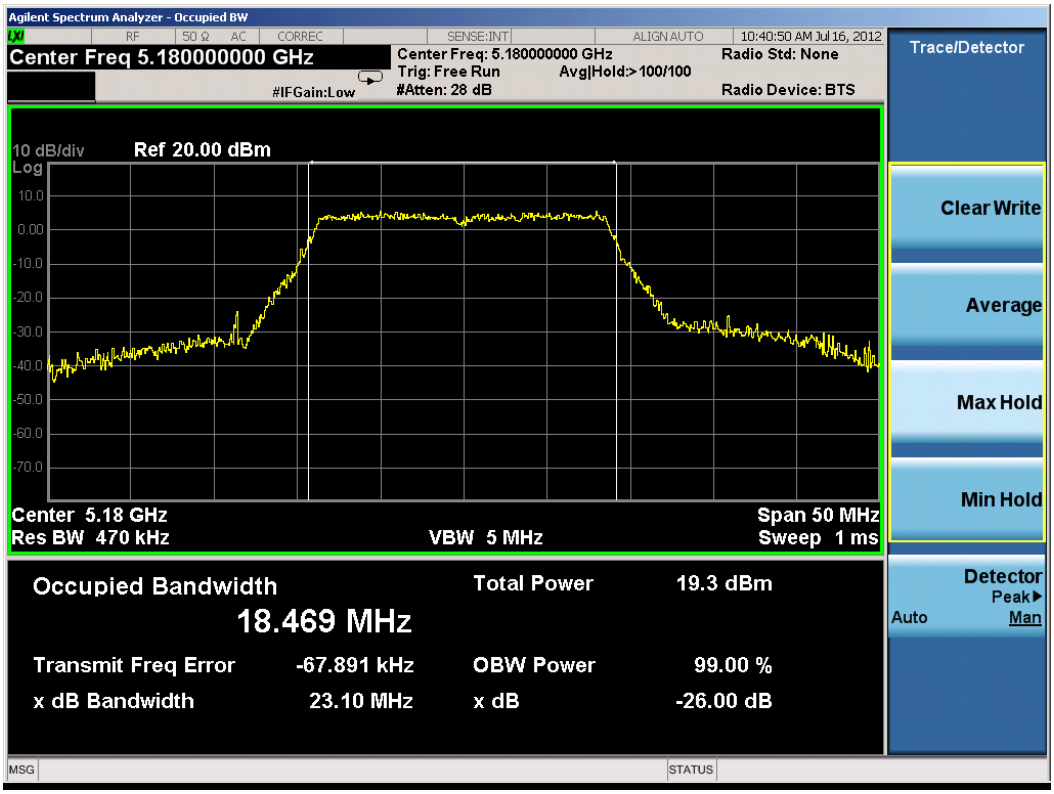


Plot 6-3. 26dB Bandwidth Plot (802.11a (UNII Band 1) – Ch. 48)



Plot 6-4. 26dB Bandwidth Plot (20MHz BW 802.11n (UNII Band 1) – Ch. 36)

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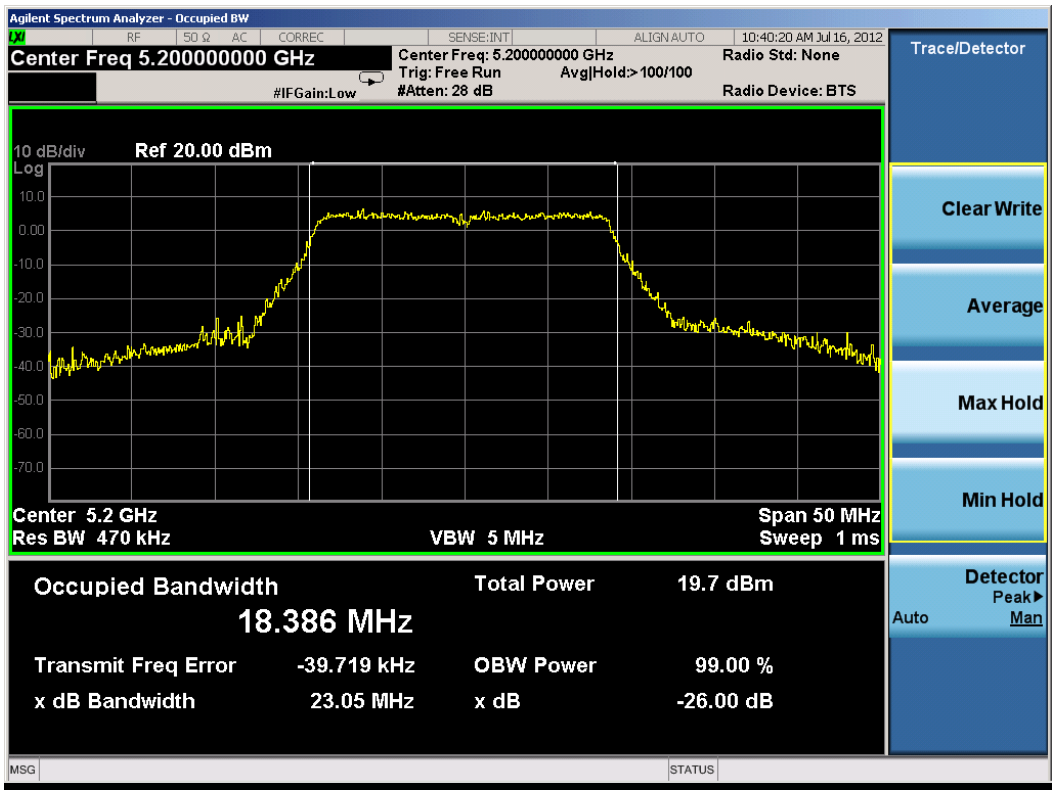
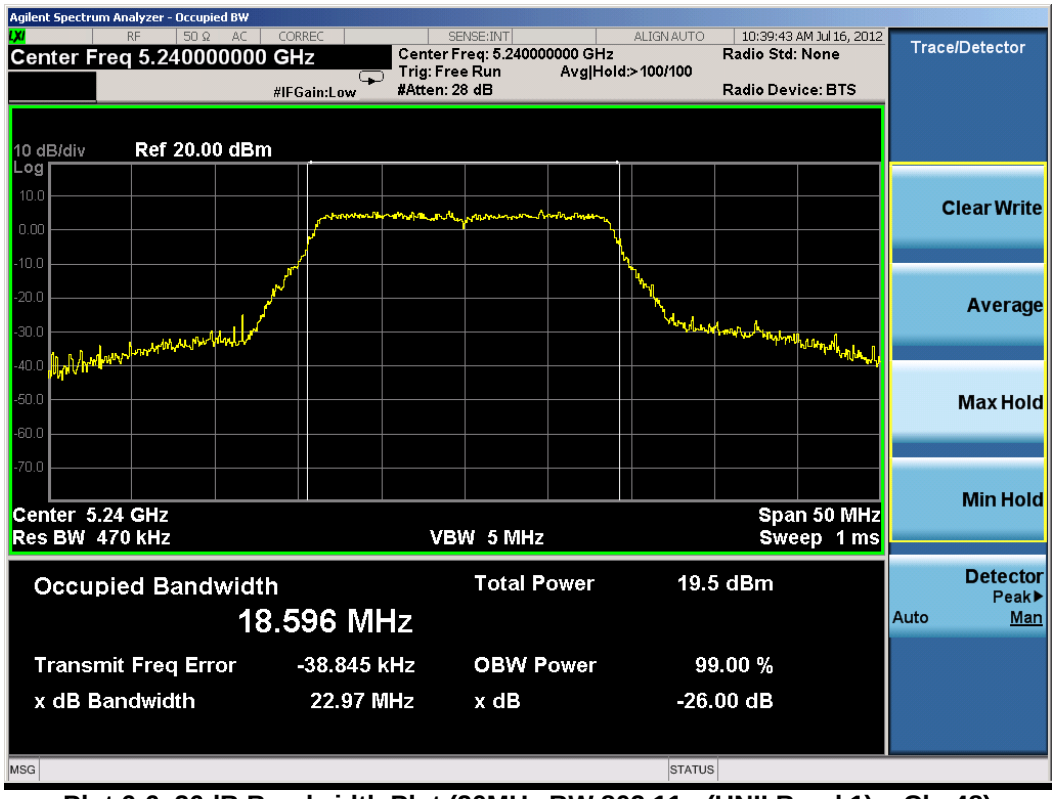


Plot 6-5. 26dB Bandwidth Plot (20MHz BW 802.11n (UNII Band 1) – Ch. 40)



Plot 6-6. 26dB Bandwidth Plot (20MHz BW 802.11n (UNII Band 1) – Ch. 48)

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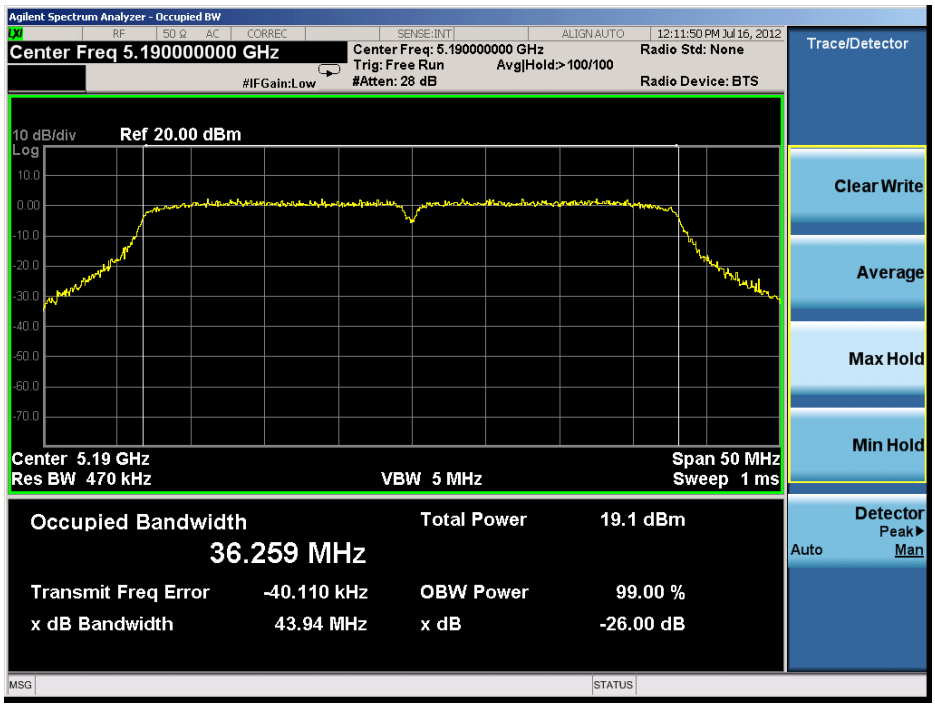
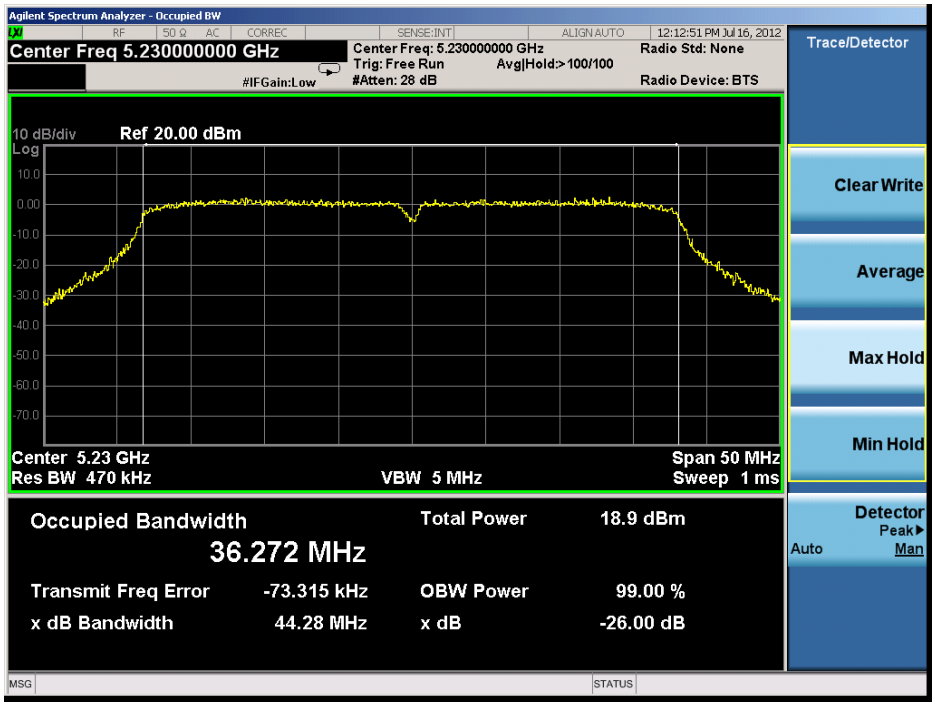


Plot 6-7. 26dB Bandwidth Plot (40MHz BW 802.11n (UNII Band 1) – Ch. 38)



Plot 6-8. 26dB Bandwidth Plot (40MHz BW 802.11n (UNII Band 1) – Ch. 46)

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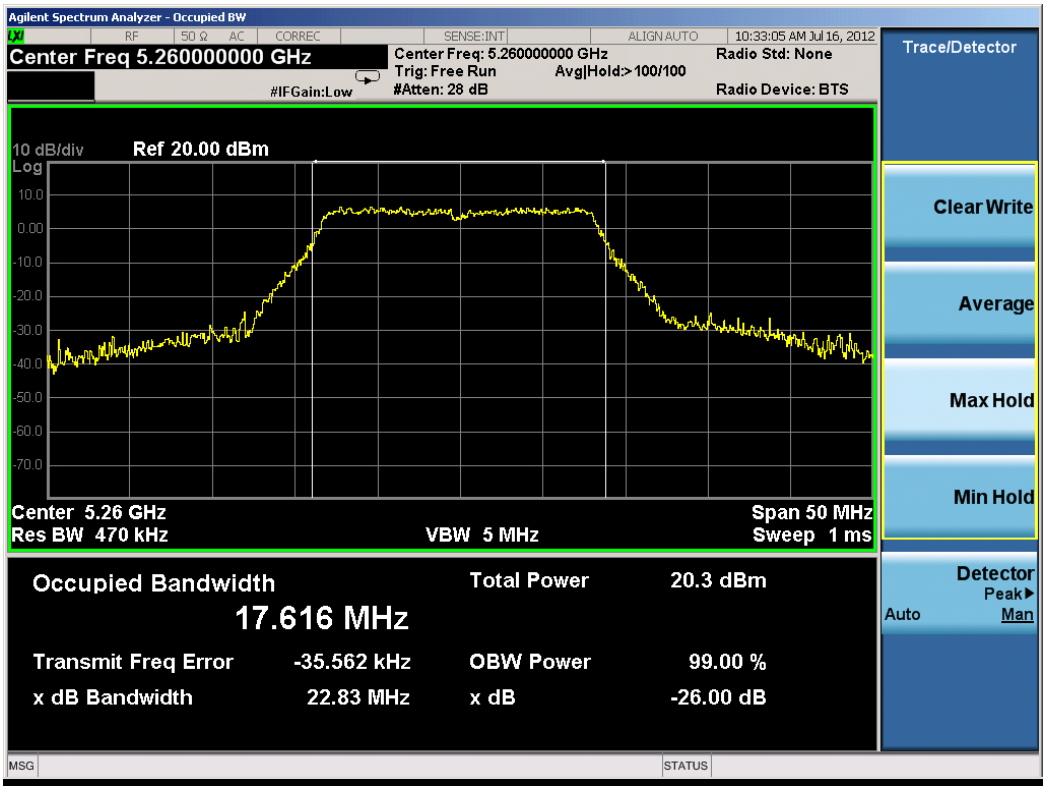
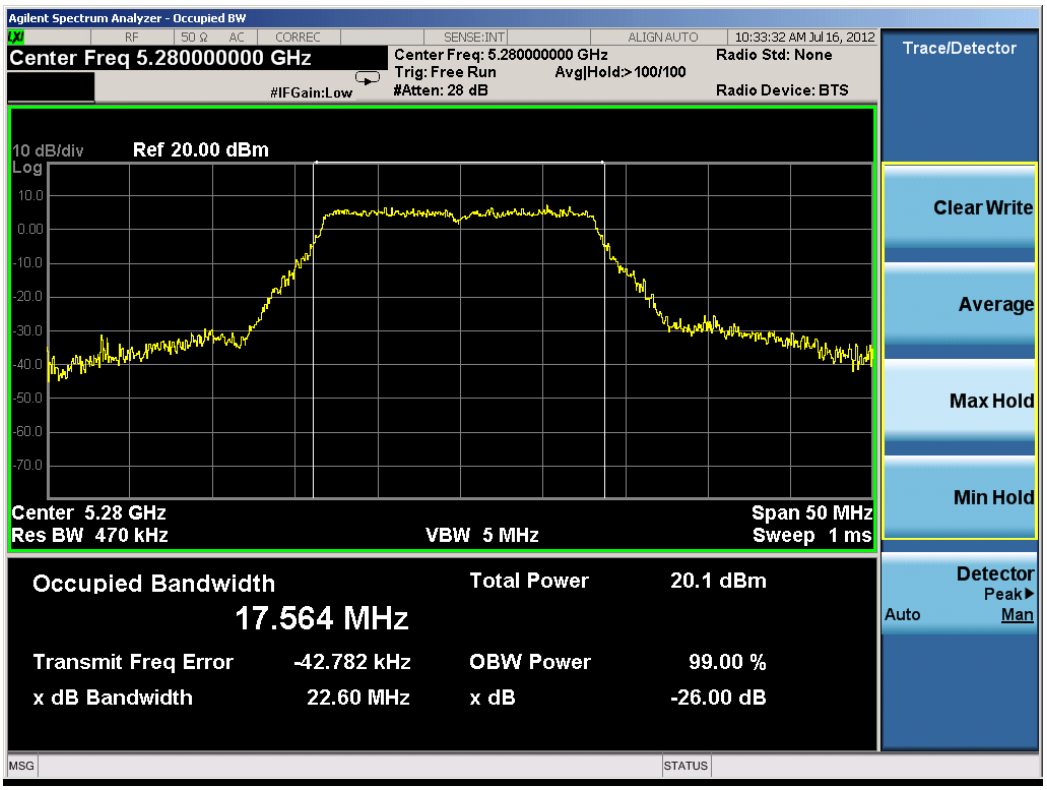


Plot 6-9. 26dB Bandwidth Plot (802.11a (UNII Band 2) – Ch. 52)



Plot 6-10. 26dB Bandwidth Plot (802.11a (UNII Band 2) – Ch. 56)

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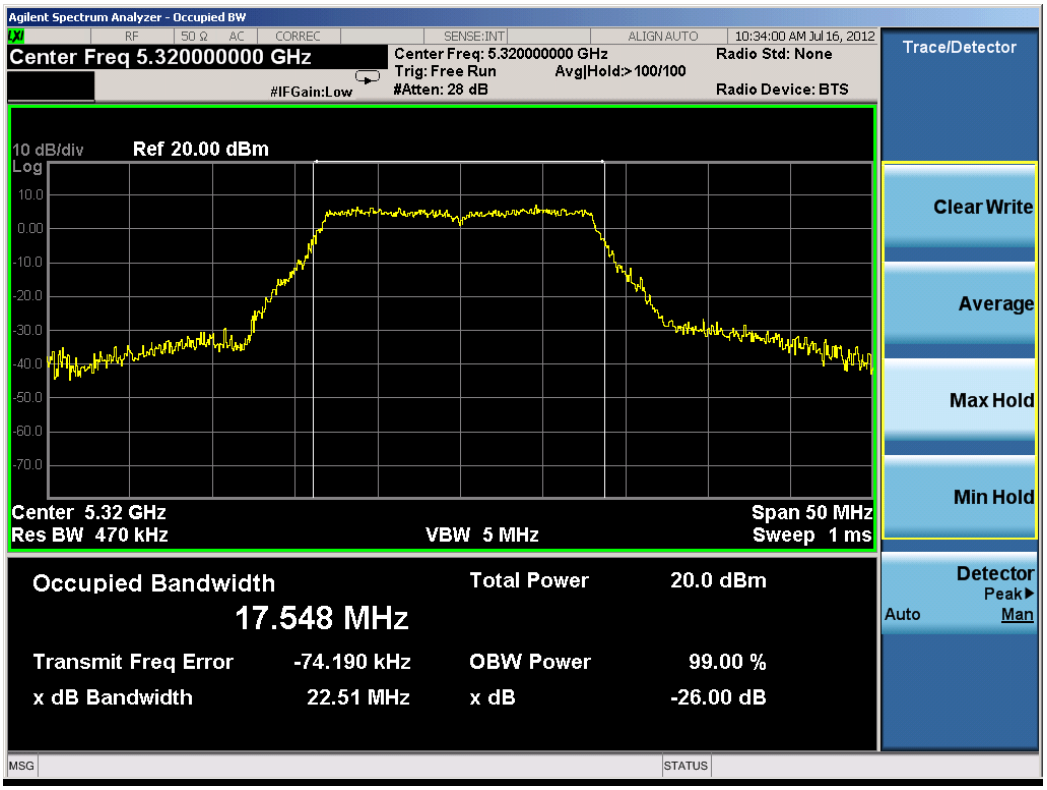
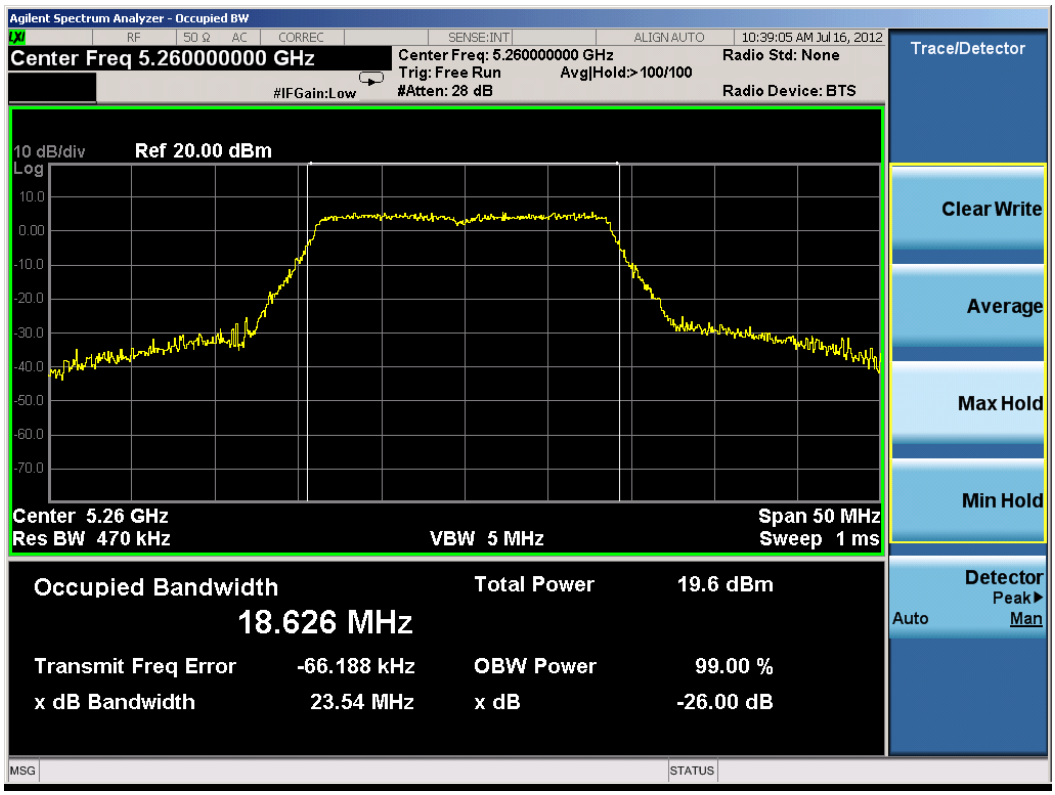


Plot 6-11. 26dB Bandwidth Plot (802.11a (UNII Band 2) – Ch. 64)



Plot 6-12. 26dB Bandwidth Plot (20MHz BW 802.11n (UNII Band 2) – Ch. 52)

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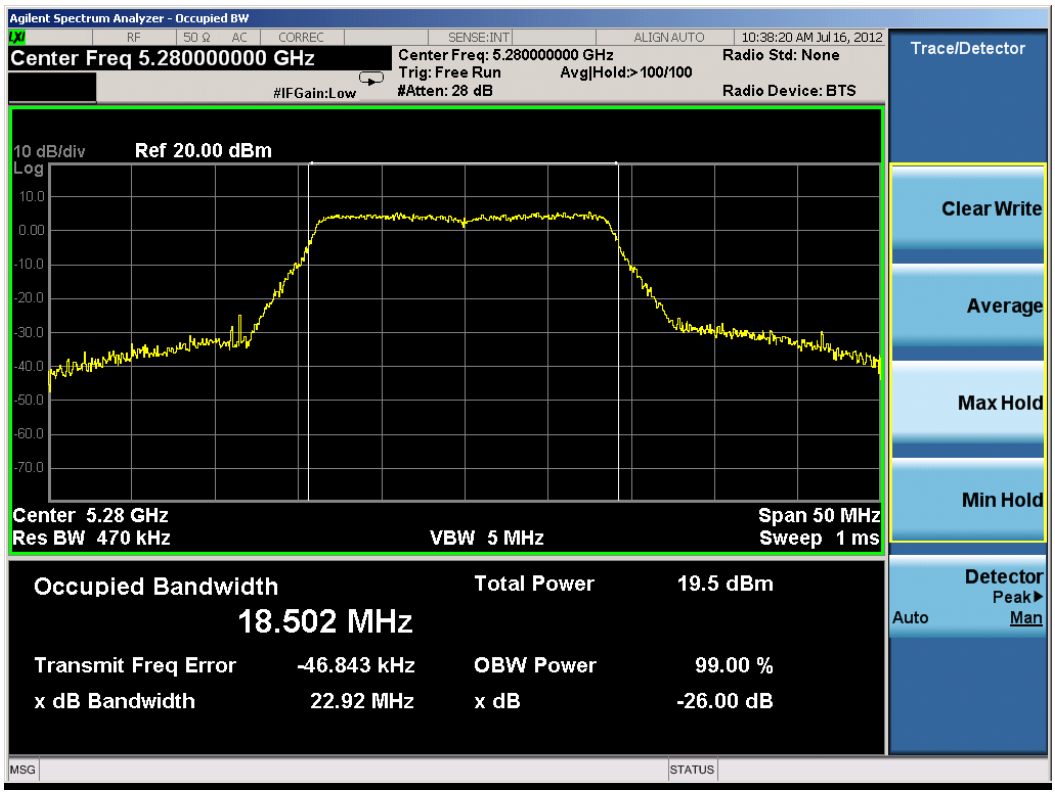
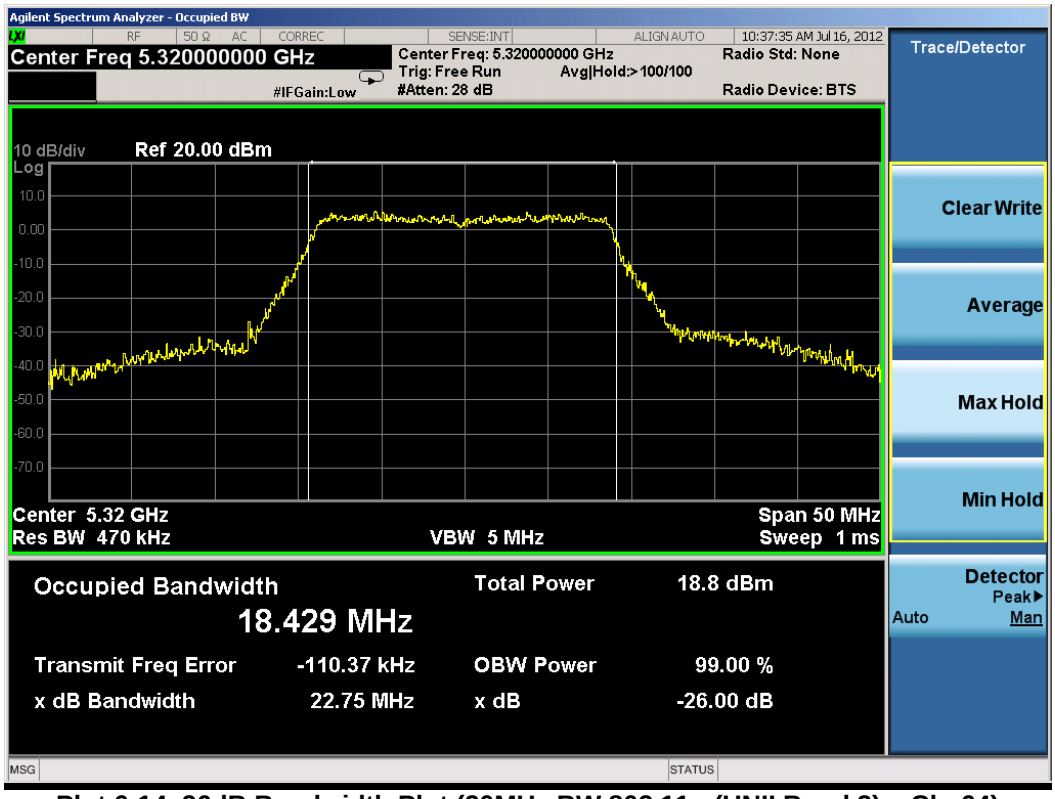


Plot 6-13. 26dB Bandwidth Plot (20MHz BW 802.11n (UNII Band 2) – Ch. 56)



Plot 6-14. 26dB Bandwidth Plot (20MHz BW 802.11n (UNII Band 2) – Ch. 64)

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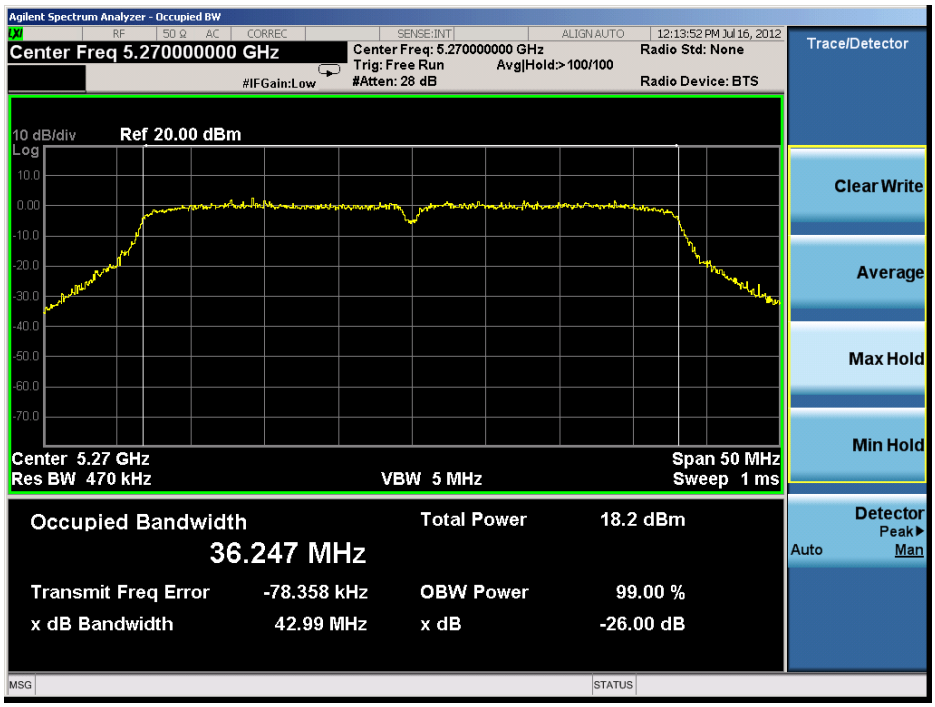
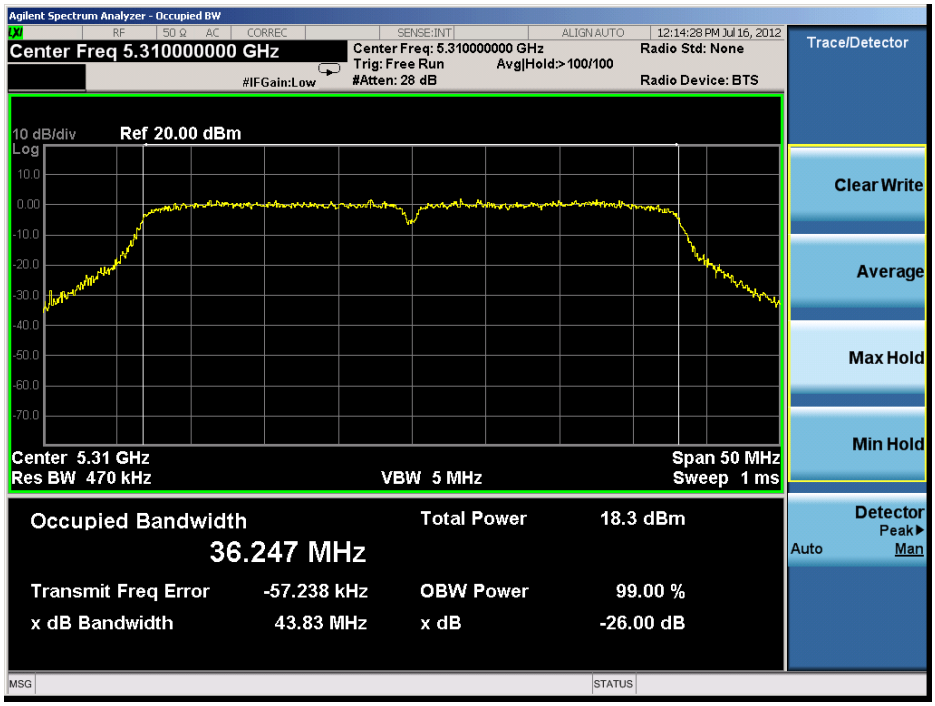


Plot 6-15. 26dB Bandwidth Plot (40MHz BW 802.11n (UNII Band 2) – Ch. 54)



Plot 6-16. 26dB Bandwidth Plot (40MHz BW 802.11n (UNII Band 2) – Ch. 62)

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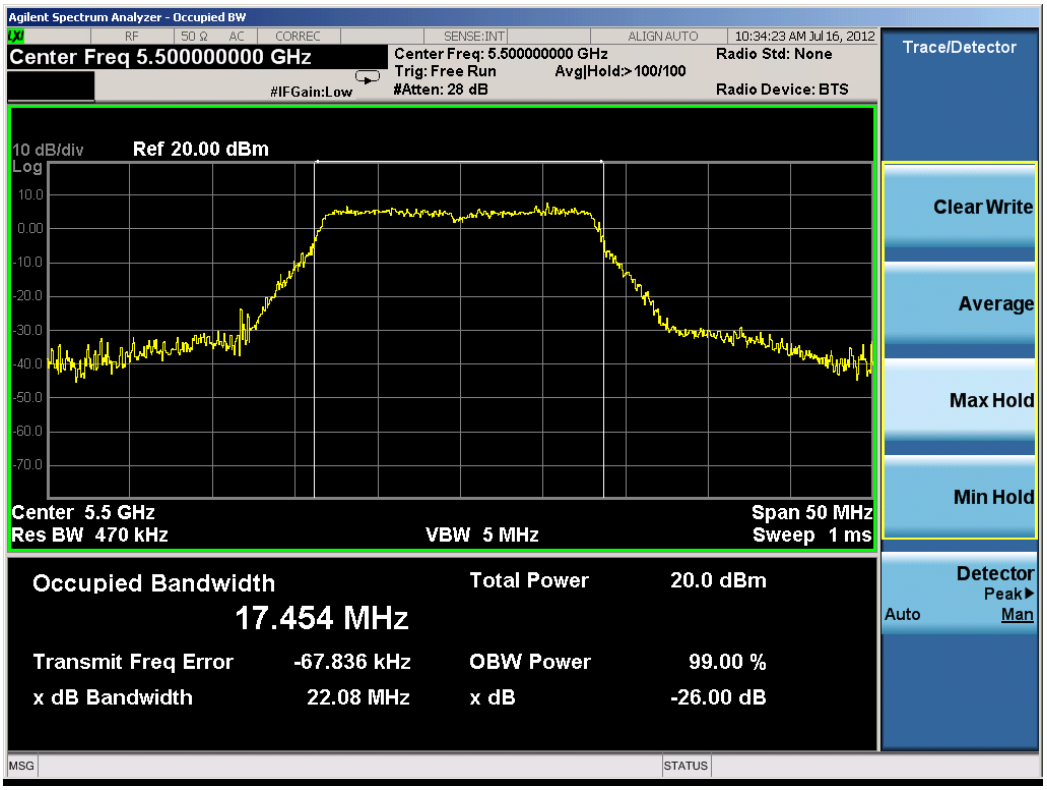
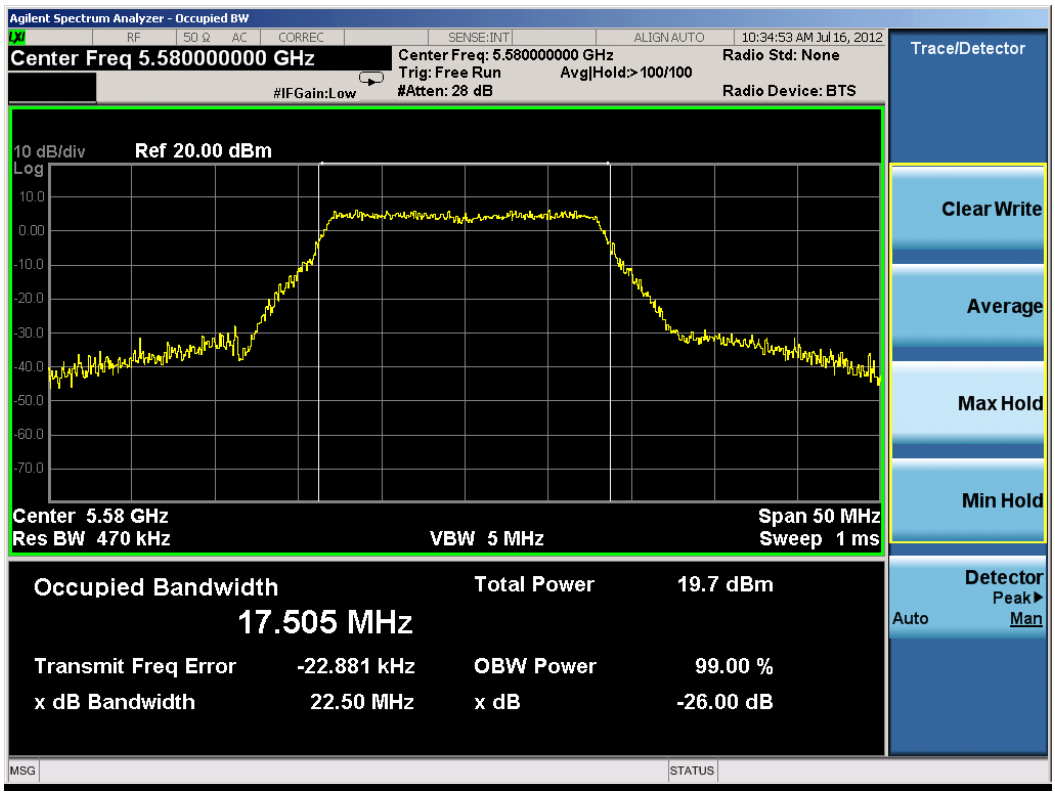


Plot 6-17. 26dB Bandwidth Plot (802.11a (UNII Band 3) – Ch. 100)



Plot 6-18. 26dB Bandwidth Plot (802.11a (UNII Band 3) – Ch. 116)

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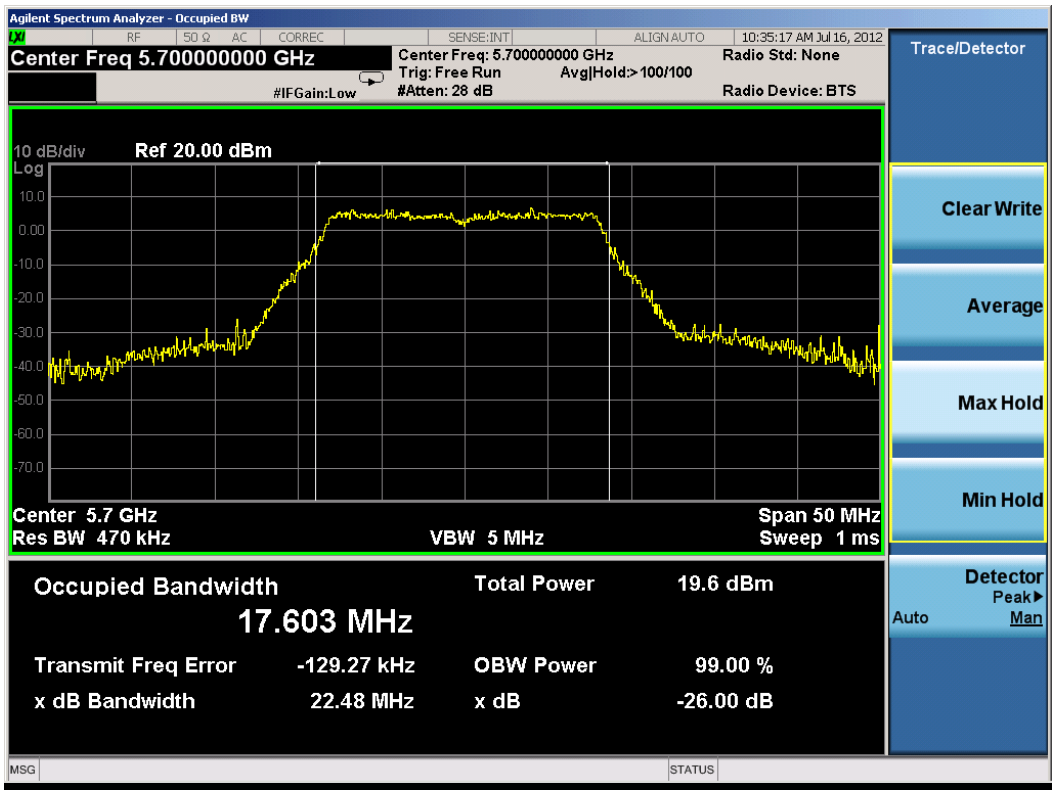
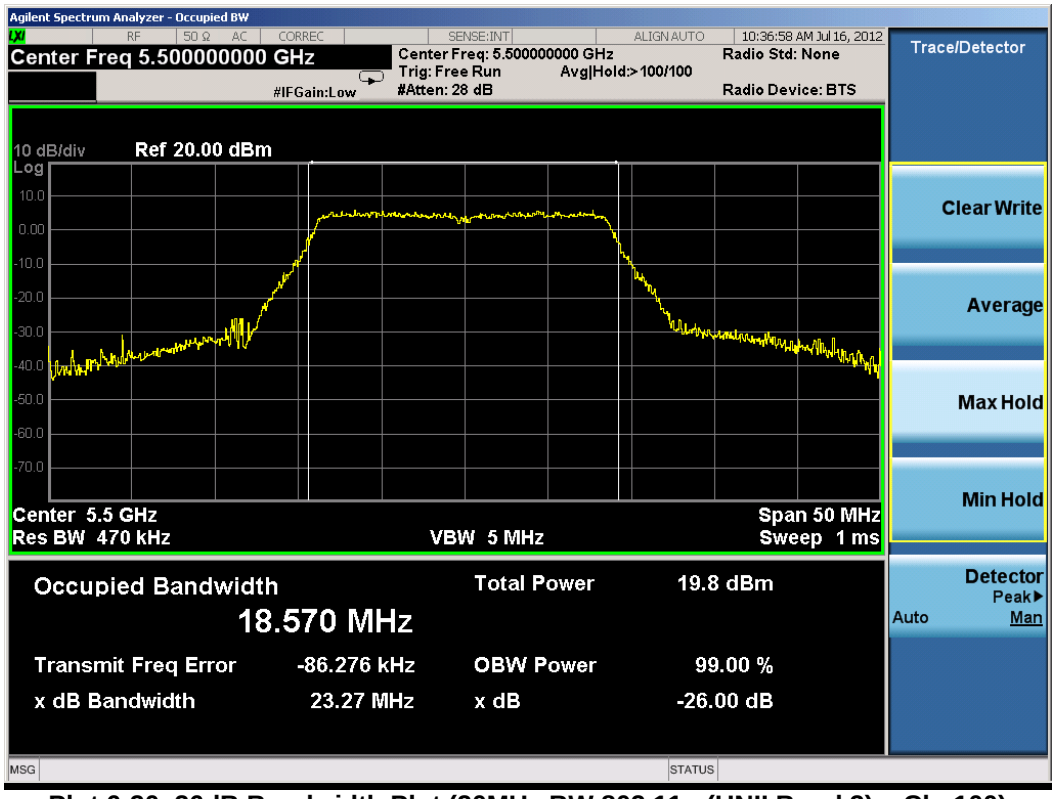


Plot 6-19. 26dB Bandwidth Plot (802.11a (UNII Band 3) – Ch. 140)



Plot 6-20. 26dB Bandwidth Plot (20MHz BW 802.11n (UNII Band 3) – Ch. 100)

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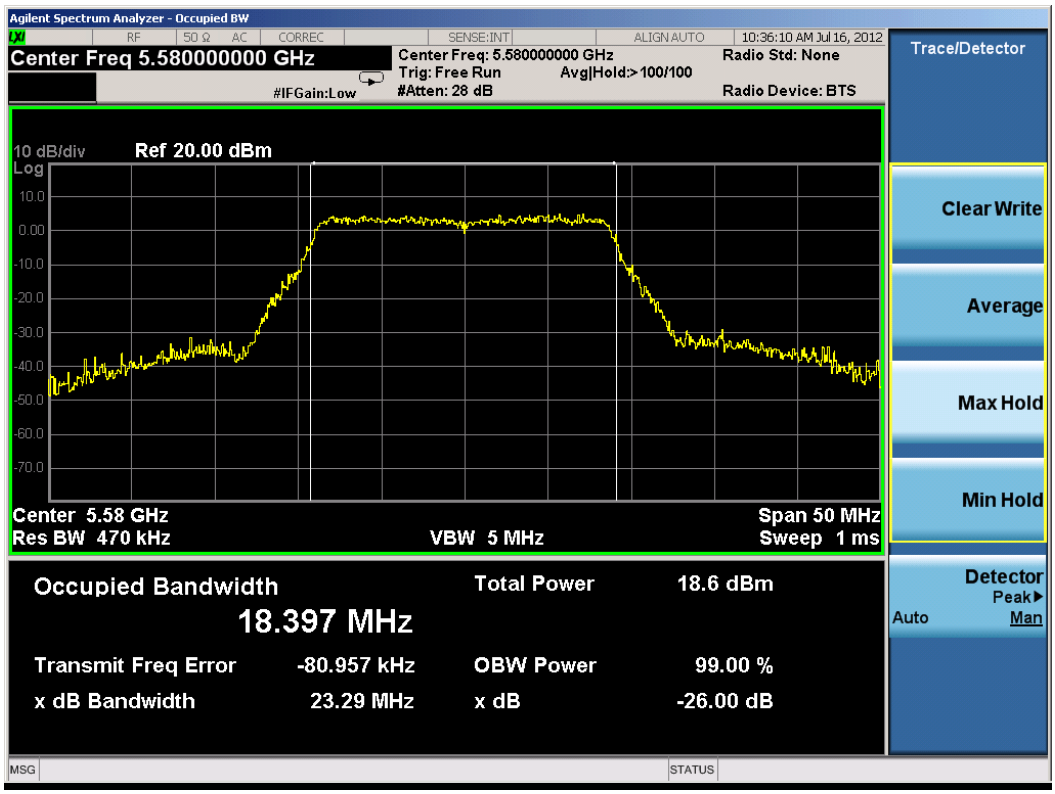
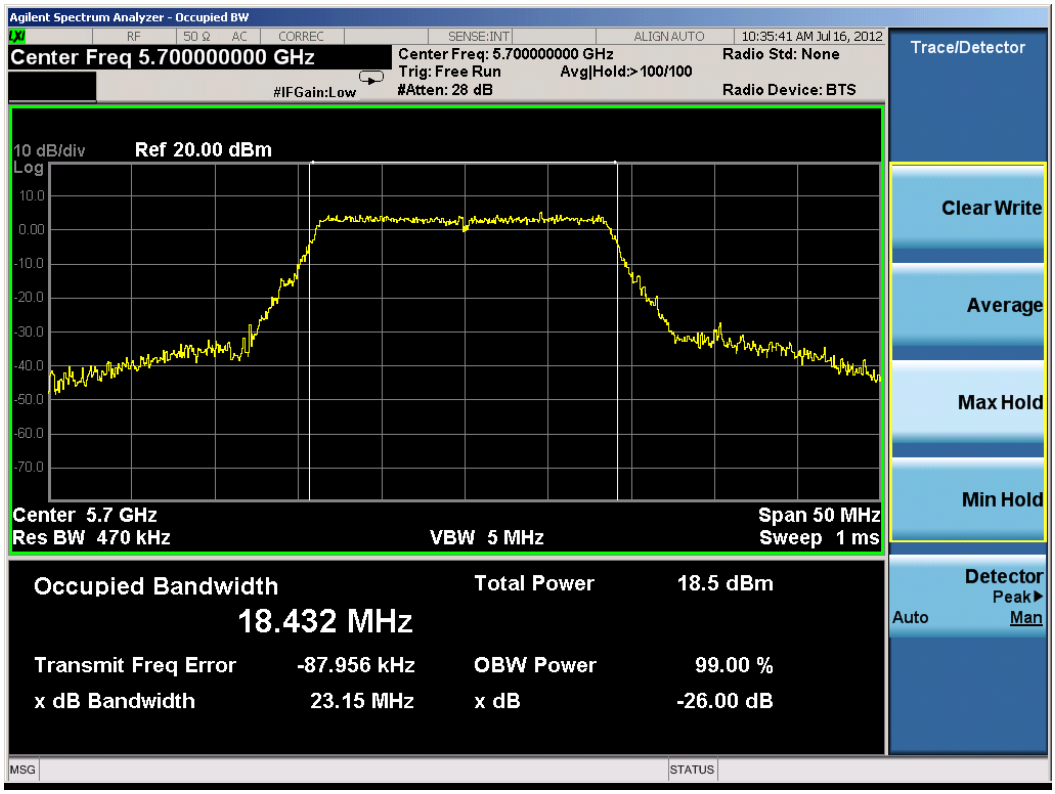


Plot 6-21. 26dB Bandwidth Plot (20MHz BW 802.11n (UNII Band 3) – Ch. 116)



Plot 6-22. 26dB Bandwidth Plot (20MHz BW 802.11n (UNII Band 3) – Ch. 140)

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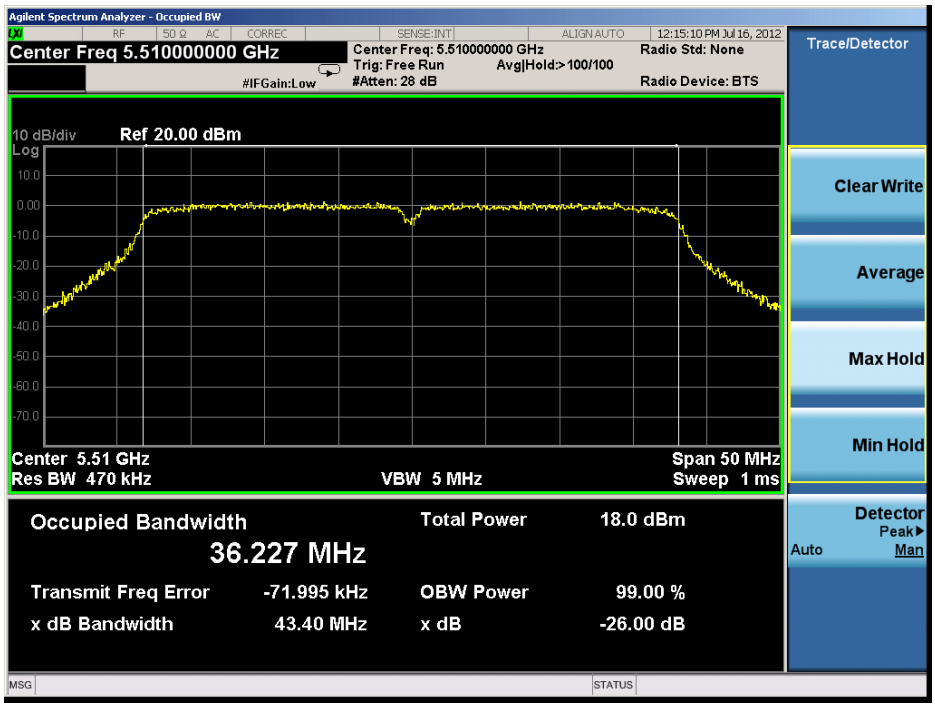
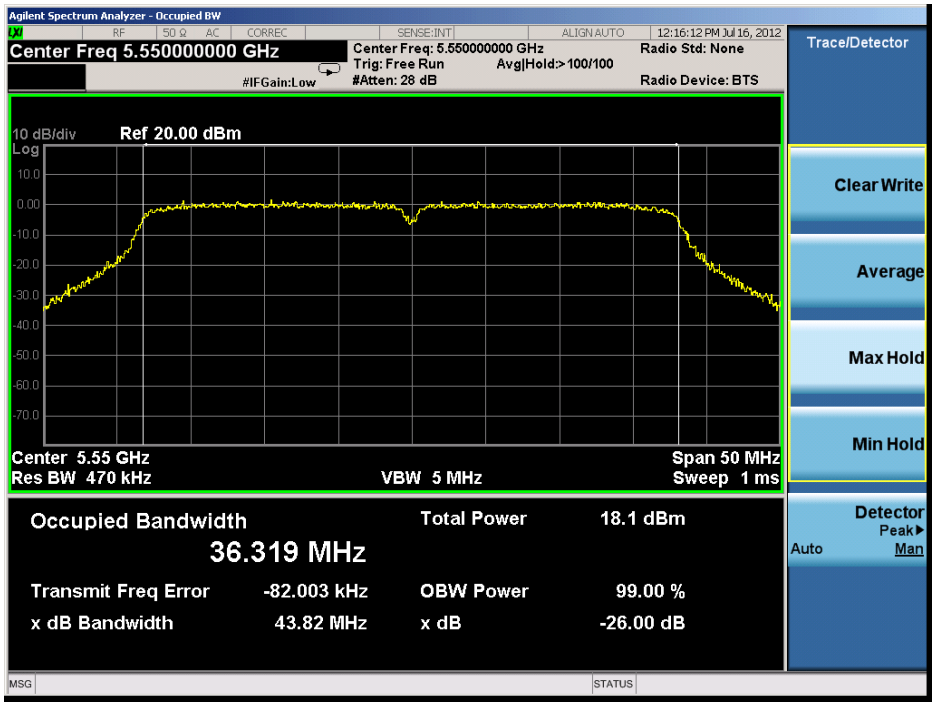


Plot 6-23. 26dB Bandwidth Plot (40MHz BW 802.11n (UNII Band 3) – Ch. 102)



Plot 6-24. 26dB Bandwidth Plot (40MHz BW 802.11n (UNII Band 3) – Ch. 110)

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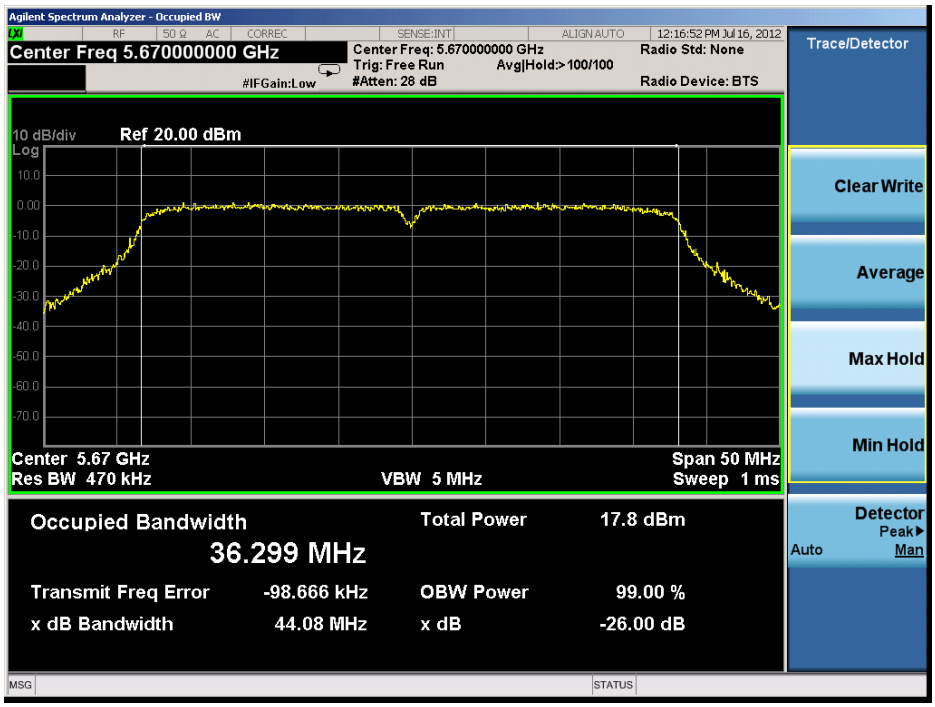

Plot 6-25. 26dB Bandwidth Plot (40MHz BW 802.11n (UNII Band 3) – Ch. 134)

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6.3 UNII Output Power Measurement – 802.11a/n

§15.407 (a)(1); RSS-210 [A9.2]

A transmitter antenna terminal of EUT is connected to the input of a RF power sensor. Measurement is made using a broadband average power meter while the EUT is operating continuously at its maximum power control level, as defined in KDB 789033, at the appropriate frequencies.

In the 5.15 – 5.25GHz band, the maximum permissible conducted output power is the lesser of 50mW (16.99dBm) and 4 dBm + 10log$_{10}$(26dB BW) = 4 dBm + 10log$_{10}$(22.64) = 17.55dBm.

In the 5.25 – 5.35GHz band, the maximum permissible conducted output power is the lesser of 250mW (23.98dBm) and 11 dBm + 10log$_{10}$(26dB BW) = 11 dBm + 10log$_{10}$(22.51) = 24.52dBm.

In the 5.47 – 5.725GHz band, the maximum permissible conducted output power is the lesser of 250mW (23.98dBm) and 11 dBm + 10log$_{10}$(26dB BW) = 11 dBm + 10log$_{10}$(22.08) = 24.44dBm.

Mode	Freq	Channel	Detector	802.11a Conducted Power [dBm]							
				Data Rate [Mbps]							
	[MHz]			6	9	12	18	24	36	48	54
802.11a	5180	36	AVG	14.43	14.41	14.41	14.60	14.61	14.65	14.64	14.68
802.11a	5200	40	AVG	14.57	14.52	14.47	14.61	14.42	14.53	14.48	14.55
802.11a	5220	44	AVG	14.48	14.31	14.37	14.39	14.41	14.35	14.40	14.35
802.11a	5240	48	AVG	14.46	14.37	14.57	14.55	14.45	14.49	14.50	14.51
802.11a	5260	52	AVG	14.53	14.41	14.40	14.43	14.40	14.48	14.51	14.48
802.11a	5280	56	AVG	14.39	14.42	14.35	14.36	14.38	14.38	14.40	14.41
802.11a	5300	60	AVG	14.29	14.34	14.38	14.30	14.33	14.31	14.32	14.35
802.11a	5320	64	AVG	14.40	14.38	14.45	14.27	14.38	14.29	14.43	14.42
802.11a	5500	100	AVG	14.21	14.25	14.28	14.40	14.17	14.17	14.35	14.25
802.11a	5520	104	AVG	14.28	14.47	14.34	14.15	14.42	14.14	14.15	14.13
802.11a	5540	108	AVG	14.47	14.31	14.52	14.33	14.17	14.18	14.20	14.15
802.11a	5560	112	AVG	14.33	14.29	14.30	14.45	14.29	14.43	14.32	14.39
802.11a	5580	116	AVG	14.09	13.99	13.91	14.16	14.02	14.05	14.09	14.13
802.11a	5660	132	AVG	14.23	14.32	14.18	14.11	13.99	13.98	13.96	13.94
802.11a	5680	136	AVG	14.20	14.26	14.04	14.21	14.01	13.98	13.89	13.91
802.11a	5700	140	AVG	14.03	14.23	14.28	14.06	14.18	14.19	14.28	14.22

Table 6-3. 802.11a (UNII) Maximum Conducted Output Power

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Mode	Freq	Channel	Detector	20MHz 802.11n (5GHz) Conducted Power [dBm]							
				Data Rate [Mbps]							
	[MHz]			6.5/7.2	13/14.4	19.5/21.7	26/28.9	39/43.4	52/57.8	58.5/65	65/72.2
802.11n	5180	36	AVG	13.48	13.39	13.62	13.68	13.72	13.56	13.60	13.65
802.11n	5200	40	AVG	13.28	13.29	13.36	13.54	13.49	13.49	13.53	13.28
802.11n	5220	44	AVG	13.14	13.26	13.35	13.34	13.47	13.35	13.40	13.26
802.11n	5240	48	AVG	13.44	13.39	13.34	13.38	13.38	13.54	13.34	13.32
802.11n	5260	52	AVG	13.32	13.33	13.50	13.27	13.35	13.29	13.18	13.25
802.11n	5280	56	AVG	13.62	13.74	13.73	13.76	13.53	13.68	13.67	13.73
802.11n	5300	60	AVG	13.57	13.72	13.62	13.63	13.70	13.73	13.74	13.80
802.11n	5320	64	AVG	13.60	13.74	13.77	13.77	13.75	13.62	13.41	13.66
802.11n	5500	100	AVG	13.33	13.62	13.41	13.32	13.17	13.21	13.17	13.30
802.11n	5520	104	AVG	13.48	13.20	13.19	13.20	13.11	13.19	13.22	13.20
802.11n	5540	108	AVG	13.46	13.47	13.34	13.56	13.00	13.13	13.24	13.45
802.11n	5560	112	AVG	13.40	13.32	13.35	13.34	13.53	13.35	13.40	13.45
802.11n	5580	116	AVG	12.99	13.05	13.06	13.01	13.09	13.03	13.02	13.17
802.11n	5660	132	AVG	13.11	13.28	13.25	13.35	12.79	12.93	12.89	12.89
802.11n	5680	136	AVG	13.33	13.22	13.21	13.21	13.31	13.06	13.13	13.22
802.11n	5700	140	AVG	12.99	13.12	13.13	13.09	12.97	13.18	13.12	13.14

Table 6-4. 20MHz BW 802.11n (UNII) Maximum Conducted Output Power

Mode	Freq	Channel	Detector	40MHz BW 802.11n (5GHz) Conducted Power [dBm]							
				Data Rate [Mbps]							
	[MHz]			13.5/15	27/30	40.5/45	54/60	81/90	108/120	121.5/135	135/150
802.11n	5190	38	AVG	12.00	12.00	12.08	12.12	12.13	12.10	12.08	12.14
802.11n	5230	46	AVG	12.44	12.38	12.38	12.41	12.42	12.30	12.37	12.38
802.11n	5270	54	AVG	12.51	12.71	12.56	12.56	12.54	12.57	12.59	12.60
802.11n	5310	62	AVG	12.31	12.37	12.60	12.46	12.46	12.48	12.50	12.54
802.11n	5510	102	AVG	12.40	12.35	12.33	12.35	12.37	12.35	12.32	12.20
802.11n	5550	110	AVG	11.93	12.05	12.31	12.10	12.01	12.26	11.97	12.09
802.11n	5670	134	AVG	12.01	12.00	11.79	12.02	11.93	12.11	12.01	11.99

Table 6-5. 40MHz BW 802.11n (UNII) Maximum Conducted Output Power

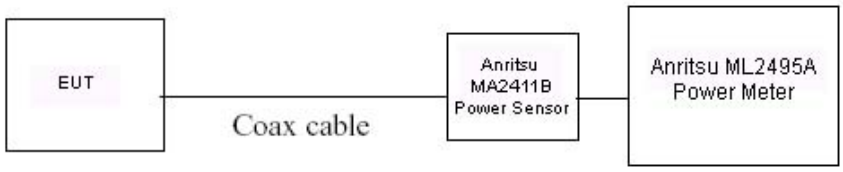

Figure 6-2. Test Instrument & Measurement Setup

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6.4 Peak Power Spectral Density – 802.11a/n

§15.407 (a)(1),(5) / RSS-210 [A9.2]

The spectrum analyzer was connected to the antenna terminal while the EUT was operating in a continuous transmission mode at the appropriate center frequencies. Method SA-1, as defined in KDB 789033, was used to measure the power spectral density.

For 20MHz bandwidth signals, the maximum achievable duty cycle was found to be 93.5%. A video trigger was used to ensure that average measurements were made only at times during which the transmitter was at its maximum power level. The minimum number of sweep points required to ensure that the bin-to-bin spacing is such that narrowband emissions are not lost is equal to 2 x Span / RBW = 2 x 20MHz / 1MHz = 40 sweep points.

For 40MHz bandwidth signals, the maximum achievable duty cycle was found to be 86%. A suitable video trigger level could not be found to satisfy the condition of continuous operation required for use of Method SA-1 per KDB 789033 so the analyzers' gating function was used instead. The spectrum analyzer was set to use an internal "RF Burst" trigger which syncs the analyzer with an incoming pulse from the EUT. Once the analyzer is triggered on a pulse, the gate delay and gate length are set up so as to ensure average measurements are recorded only during times in which the transmitter is operating at its maximum power with no blanking intervals. The minimum number of sweep points required to ensure that the bin-to-bin spacing is such that narrowband emissions are not lost is equal to 2 x Span / RBW = 2 x 40MHz / 1MHz = 80 sweep points.

The maximum permissible peak power spectral density is 4dBm/MHz in the 5.15GHz – 5.25GHz band and 11dBm/MHz in the 5.25GHz – 5.35 GHz and 5.47 – 5.725GHz bands.

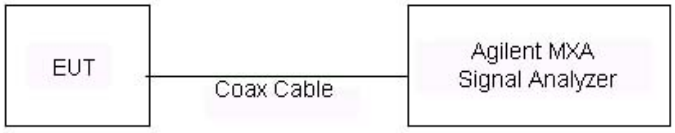

Figure 6-3. Test Instrument & Measurement Setup

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	Frequency [MHz]	Channel No.	802.11 Mode	Data Rate [Mbps]	Measured Power Density [dBm]	Max Permissible Power Density [dBm/MHz]	Margin [dB]
Band I	5180	36	a	6	2.696	4.0	-1.304
	5200	40	a	6	2.931	4.0	-1.069
	5240	48	a	6	2.368	4.0	-1.632
	5180	36	n (20MHz)	6.5/7.2 (MCS0)	1.591	4.0	-2.409
	5200	40	n (20MHz)	6.5/7.2 (MCS0)	1.555	4.0	-2.445
	5240	48	n (20MHz)	6.5/7.2 (MCS0)	1.233	4.0	-2.767
	5190	38	n (40MHz)	13.5/15 (MCS0)	-2.648	4.0	-6.648
	5230	46	n (40MHz)	13.5/15 (MCS0)	-2.379	4.0	-6.379
Band II	5260	52	a	6	2.427	11.0	-8.573
	5280	56	a	6	2.321	11.0	-8.679
	5320	64	a	6	2.395	11.0	-8.605
	5260	52	n (20MHz)	6.5/7.2 (MCS0)	0.770	11.0	-10.230
	5280	56	n (20MHz)	6.5/7.2 (MCS0)	1.051	11.0	-9.949
	5320	64	n (20MHz)	6.5/7.2 (MCS0)	1.285	11.0	-9.715
	5270	54	n (40MHz)	13.5/15 (MCS0)	-2.841	11.0	-13.841
	5310	62	n (40MHz)	13.5/15 (MCS0)	-2.775	11.0	-13.775
Band III	5500	100	a	6	2.531	11.0	-8.469
	5580	116	a	6	2.290	11.0	-8.710
	5700	140	a	6	2.092	11.0	-8.908
	5500	100	n (20MHz)	6.5/7.2 (MCS0)	0.761	11.0	-10.239
	5580	116	n (20MHz)	6.5/7.2 (MCS0)	1.316	11.0	-9.684
	5700	140	n (20MHz)	6.5/7.2 (MCS0)	1.302	11.0	-9.698
	5510	102	n (40MHz)	13.5/15 (MCS0)	-2.854	11.0	-13.854
	5550	110	n (40MHz)	13.5/15 (MCS0)	-3.384	11.0	-14.384
	5670	134	n (40MHz)	13.5/15 (MCS0)	-3.774	11.0	-14.774

Table 6-6. Conducted Power Spectral Density Measurements

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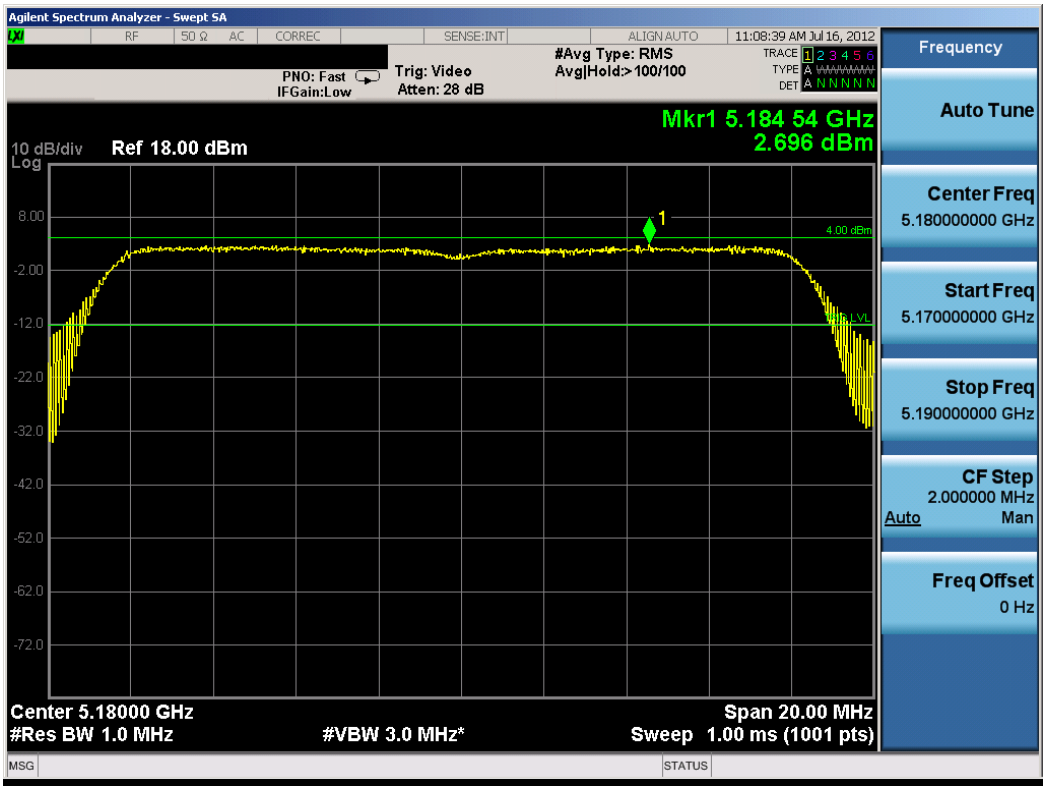

Plot 6-26. Peak Power Spectral Density Plot (802.11a (UNII Band 1) – Ch. 36)

Plot 6-27. Peak Power Spectral Density Plot (802.11a (UNII Band 1) – Ch. 40)

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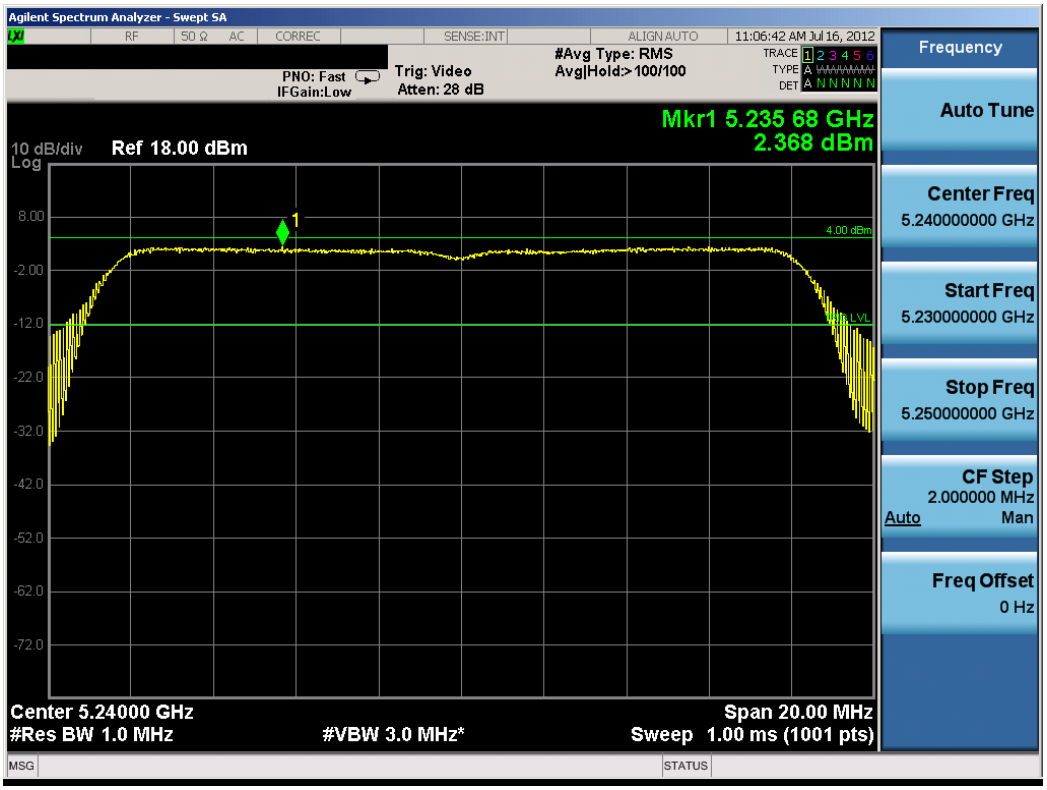
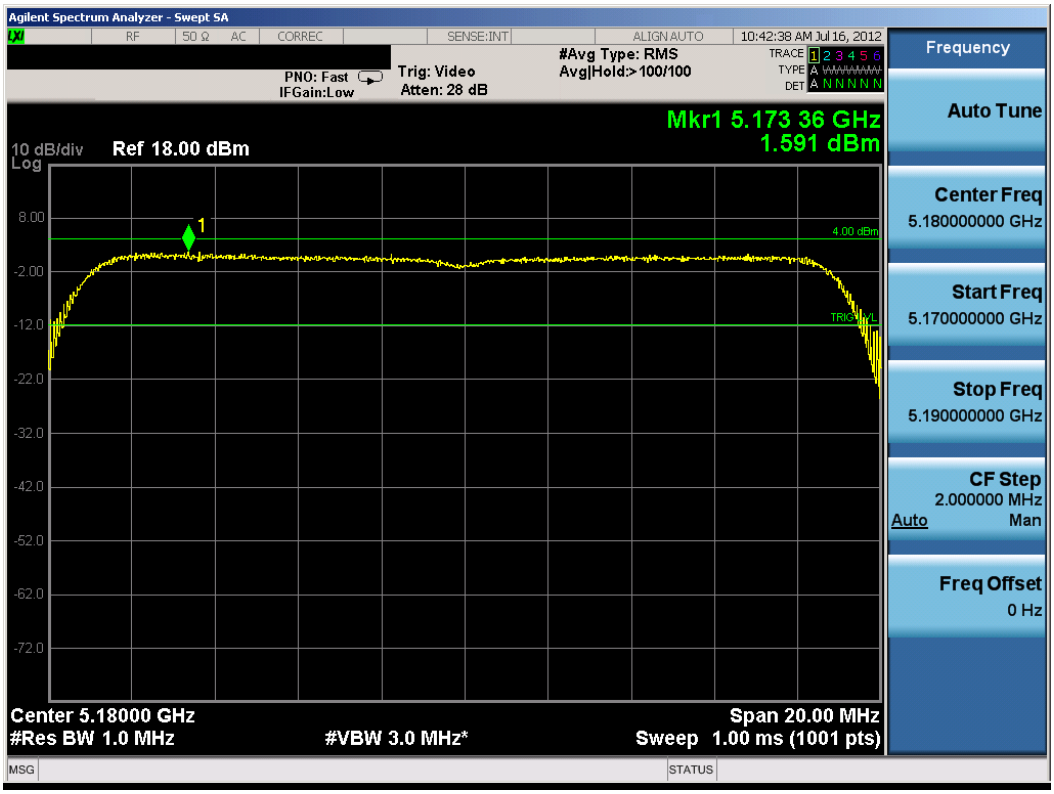


Plot 6-28. Peak Power Spectral Density Plot (802.11a (UNII Band 1) – Ch. 48)



Plot 6-29. Peak Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 1) – Ch. 36)

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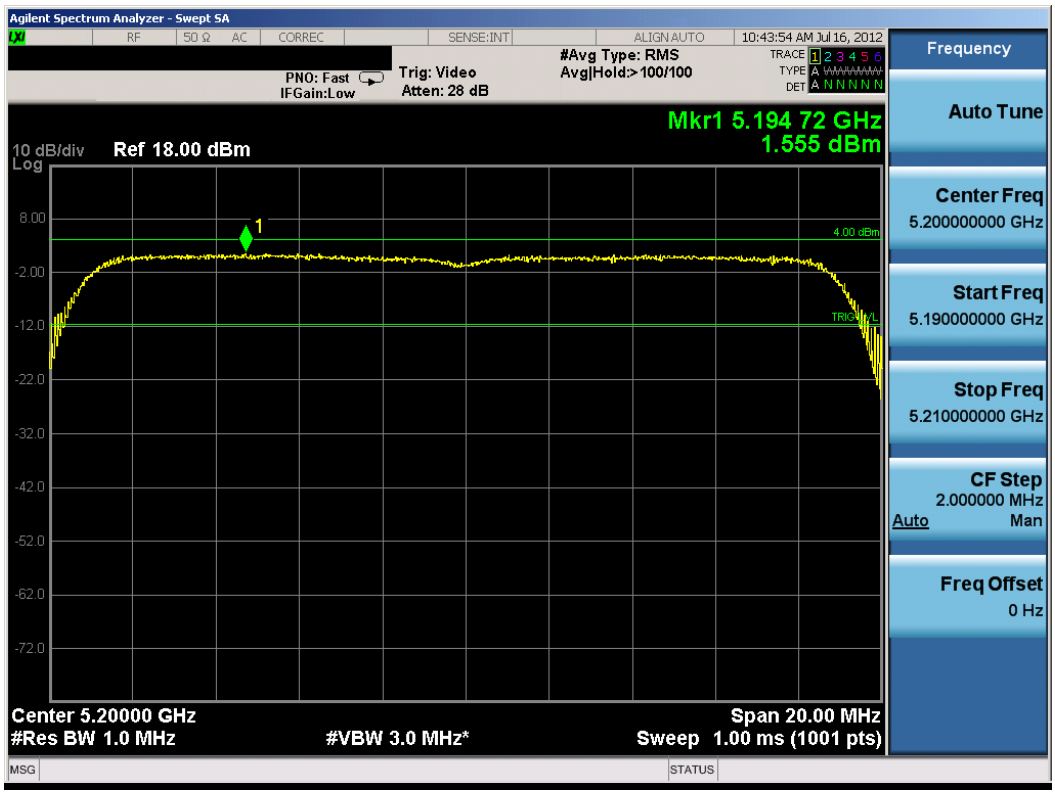
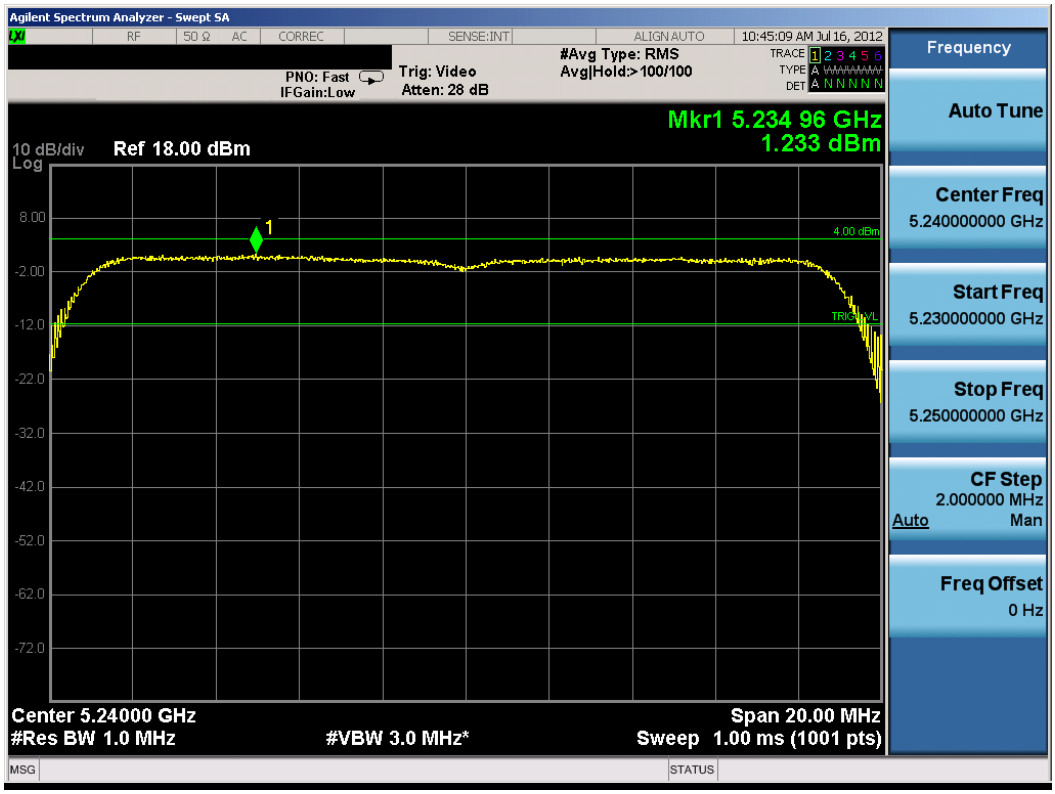


Plot 6-30. Peak Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 1) – Ch. 40)



Plot 6-31. Peak Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 1) – Ch. 48)

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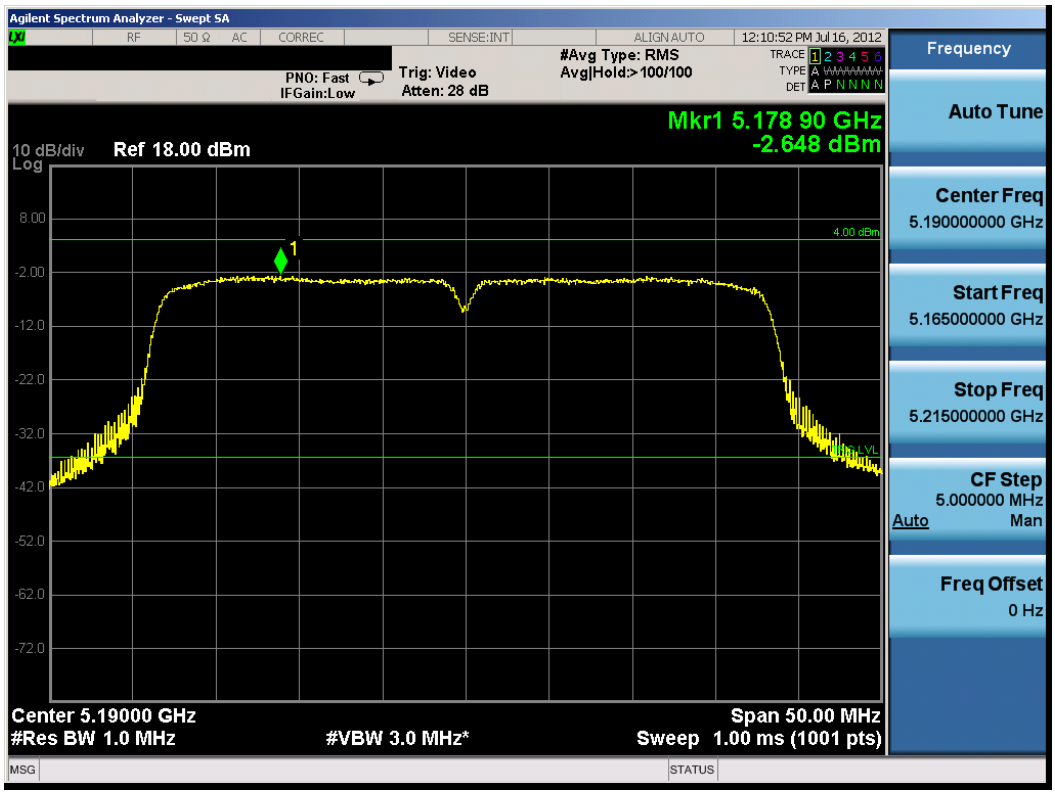
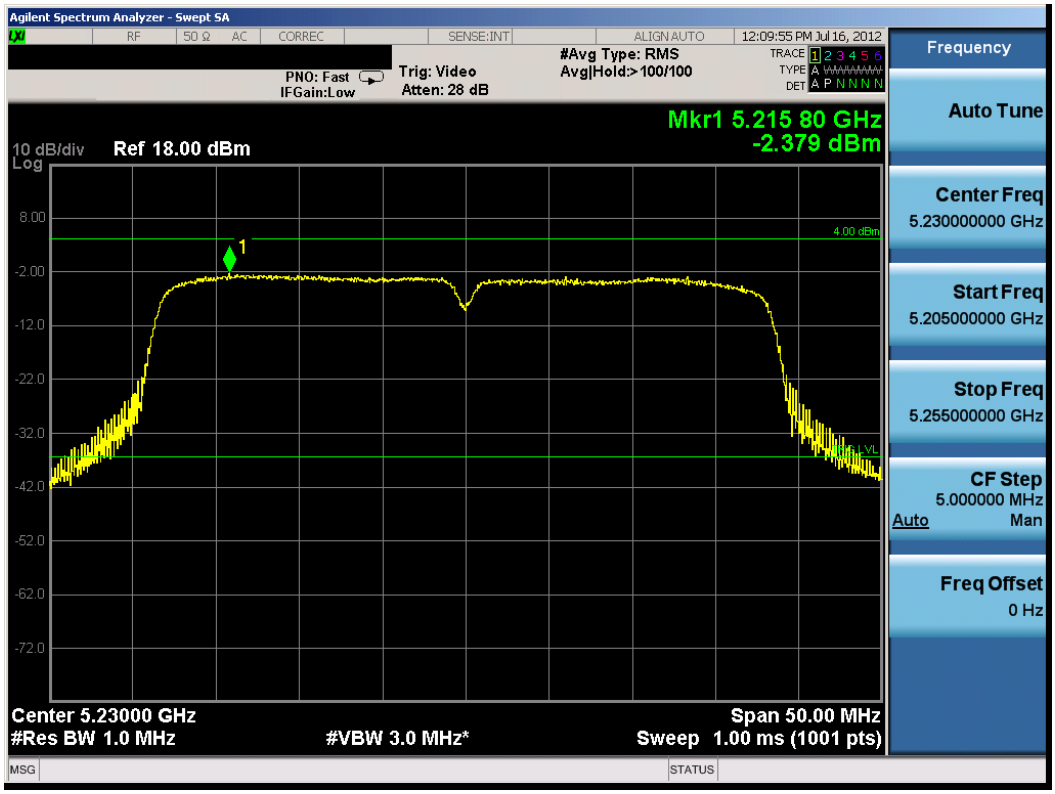


Plot 6-32. Peak Power Spectral Density Plot (40MHz BW 802.11n (UNII Band 1) – Ch. 38)



Plot 6-33. Peak Power Spectral Density Plot (40MHz BW 802.11n (UNII Band 1) – Ch. 46)

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Plot 6-34. Peak Power Spectral Density Plot (802.11a (UNII Band 2) – Ch. 52)

Plot 6-35. Peak Power Spectral Density Plot (802.11a (UNII Band 2) – Ch. 56)

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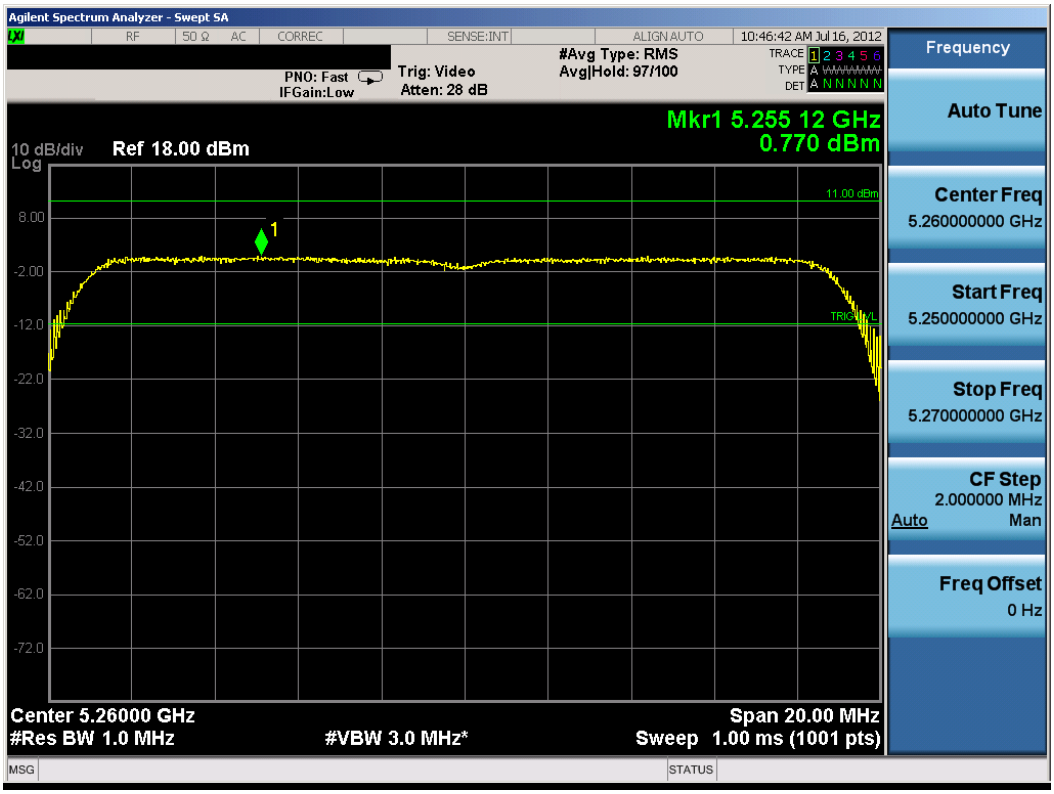
Plot 6-36. Peak Power Spectral Density Plot (802.11a (UNII Band 2) – Ch. 64)



Plot 6-37. Peak Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 2) – Ch. 52)

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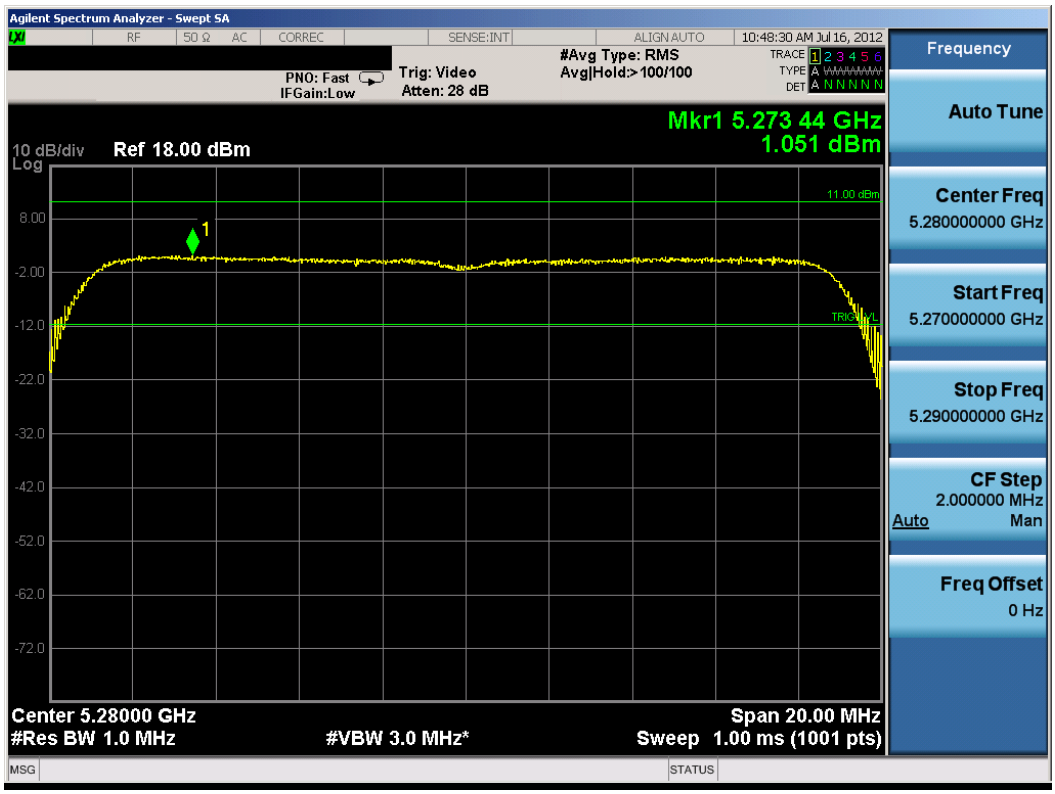

Plot 6-38. Peak Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 2) – Ch. 56)

Plot 6-39. Peak Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 2) – Ch. 64)

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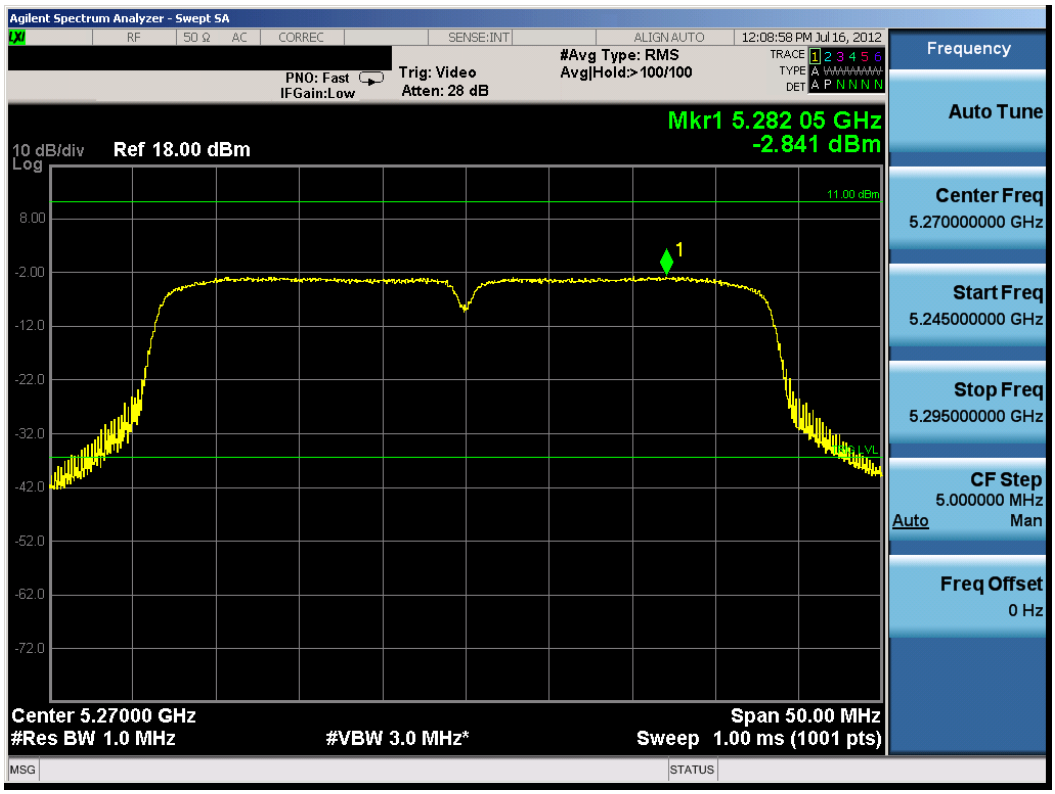
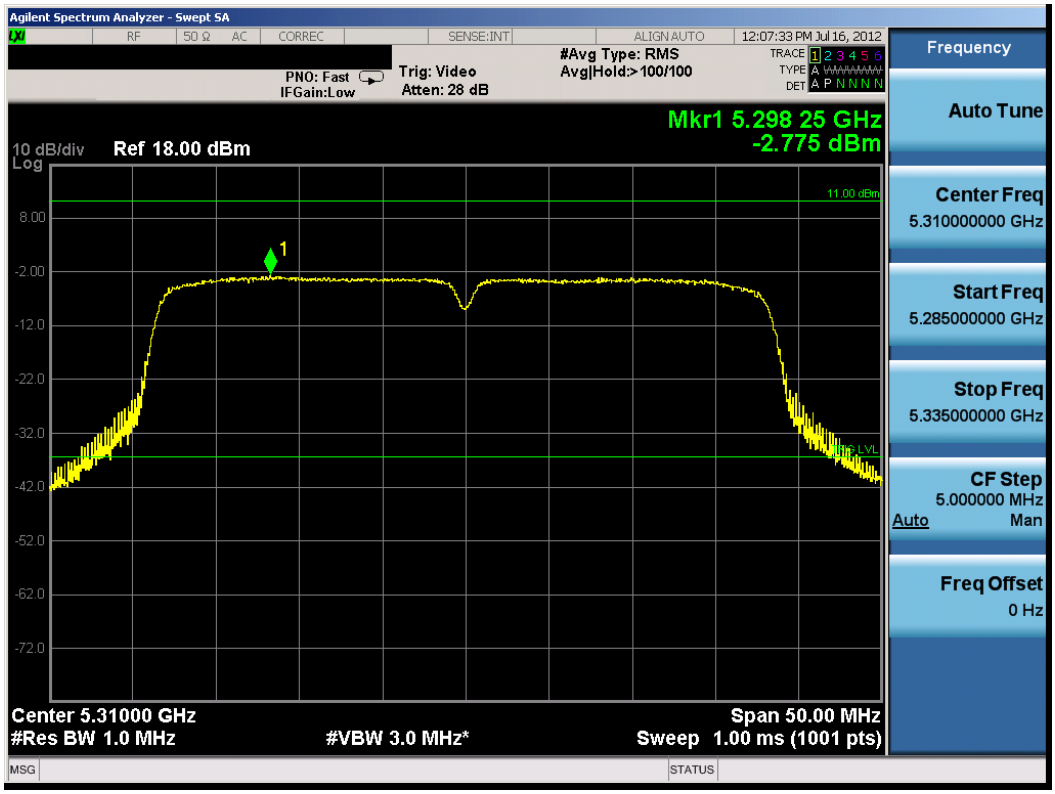


Plot 6-40. Peak Power Spectral Density Plot (40MHz BW 802.11n (UNII Band 2) – Ch. 54)



Plot 6-41. Peak Power Spectral Density Plot (40MHz BW 802.11n (UNII Band 2) – Ch. 62)

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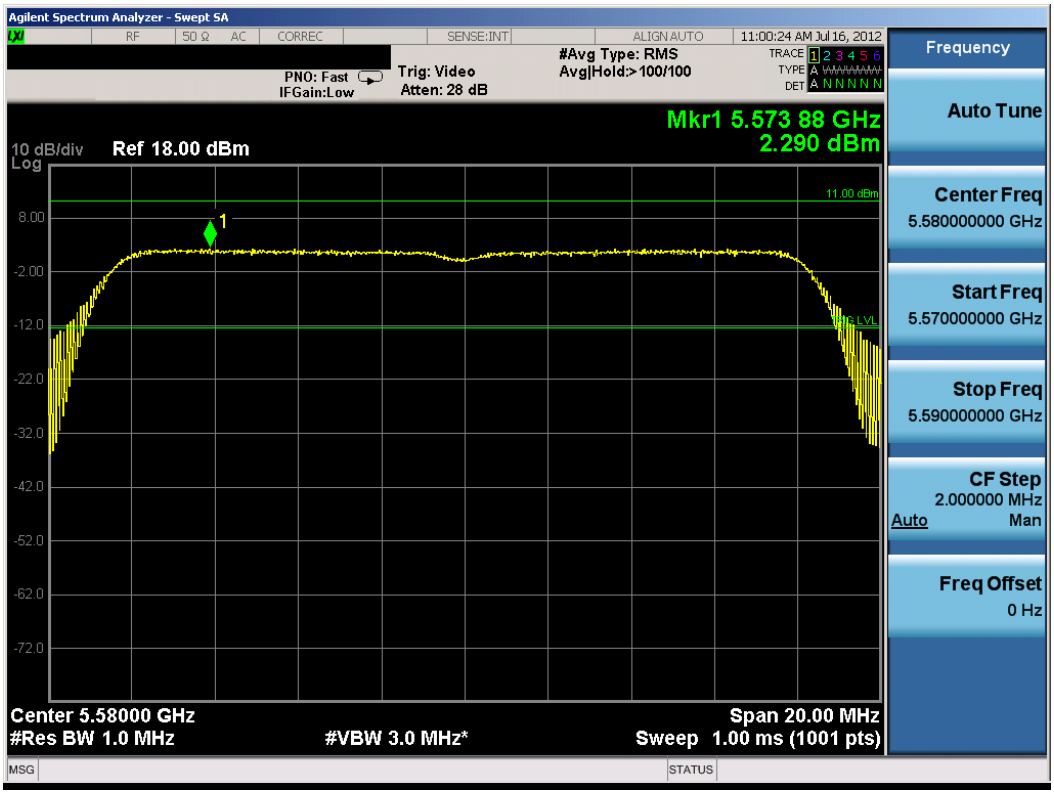
Plot 6-42. Peak Power Spectral Density Plot (802.11a (UNII Band 3) – Ch. 100)



Plot 6-43. Peak Power Spectral Density Plot (802.11a (UNII Band 3) – Ch. 116)

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Plot 6-44. Peak Power Spectral Density Plot (802.11a (UNII Band 3) – Ch. 140)

Plot 6-45. Peak Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 3) – Ch. 100)

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Plot 6-46. Peak Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 3) – Ch. 116)

Plot 6-47. Peak Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 3) – Ch. 140)

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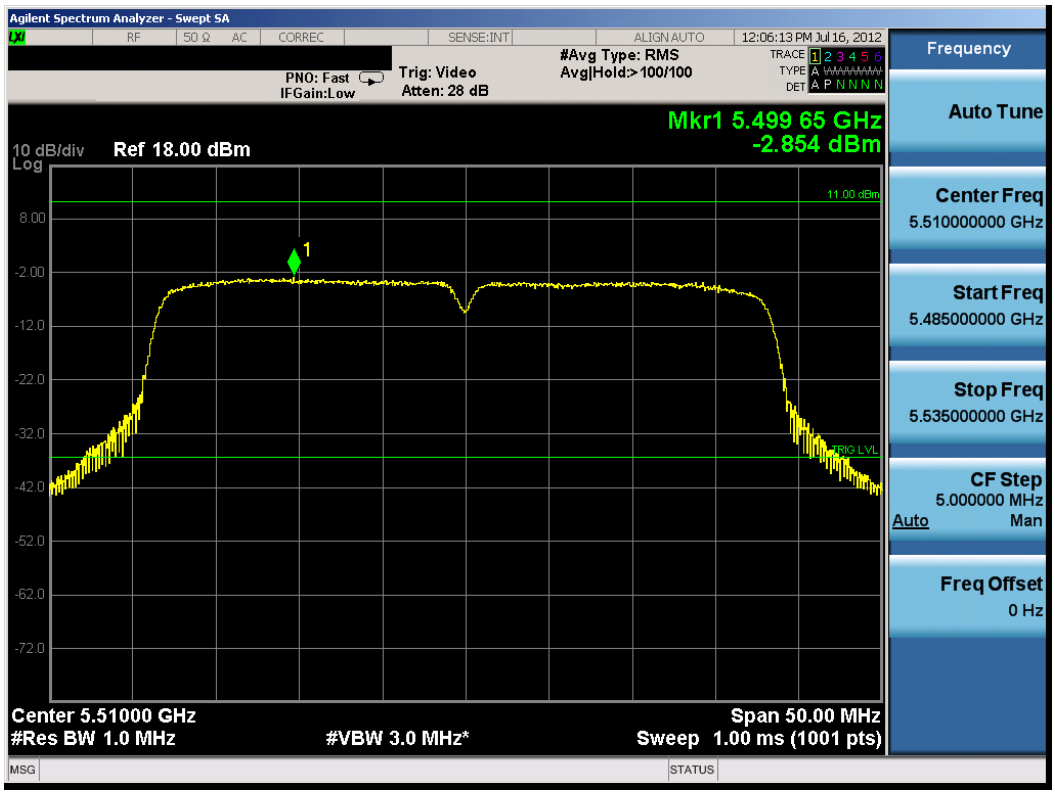
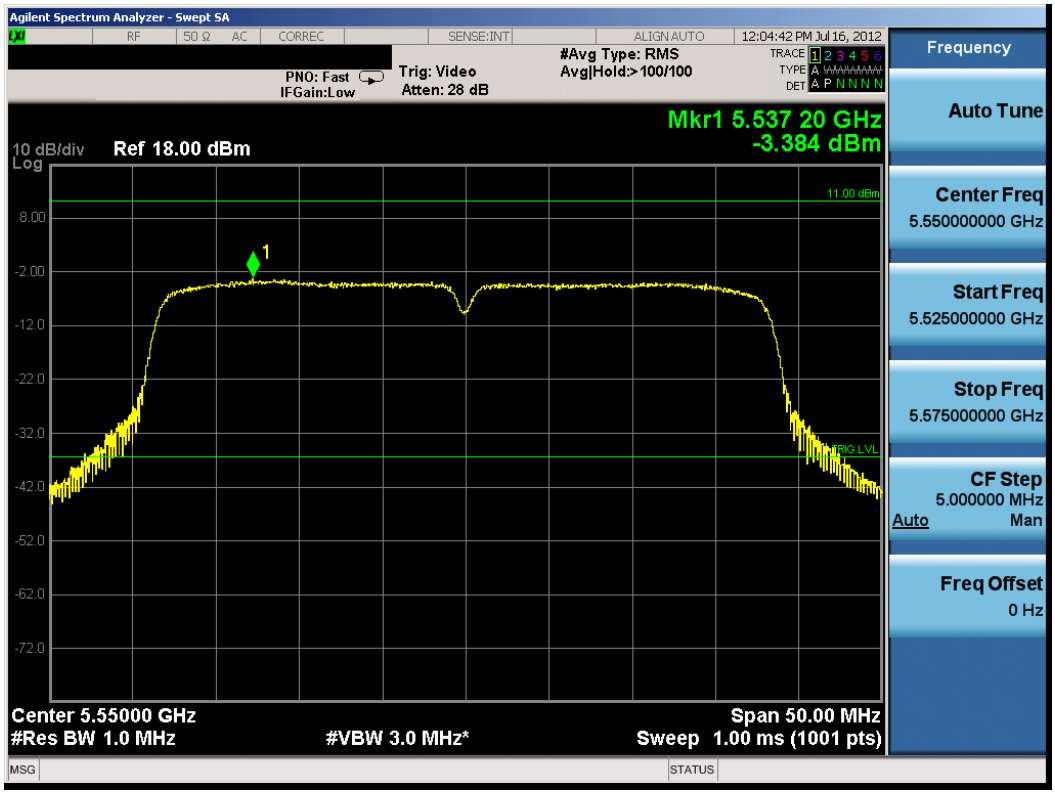


Plot 6-48. Peak Power Spectral Density Plot (40MHz BW 802.11n (UNII Band 3) – Ch. 102)



Plot 6-49. Peak Power Spectral Density Plot (40MHz BW 802.11n (UNII Band 3) – Ch. 110)

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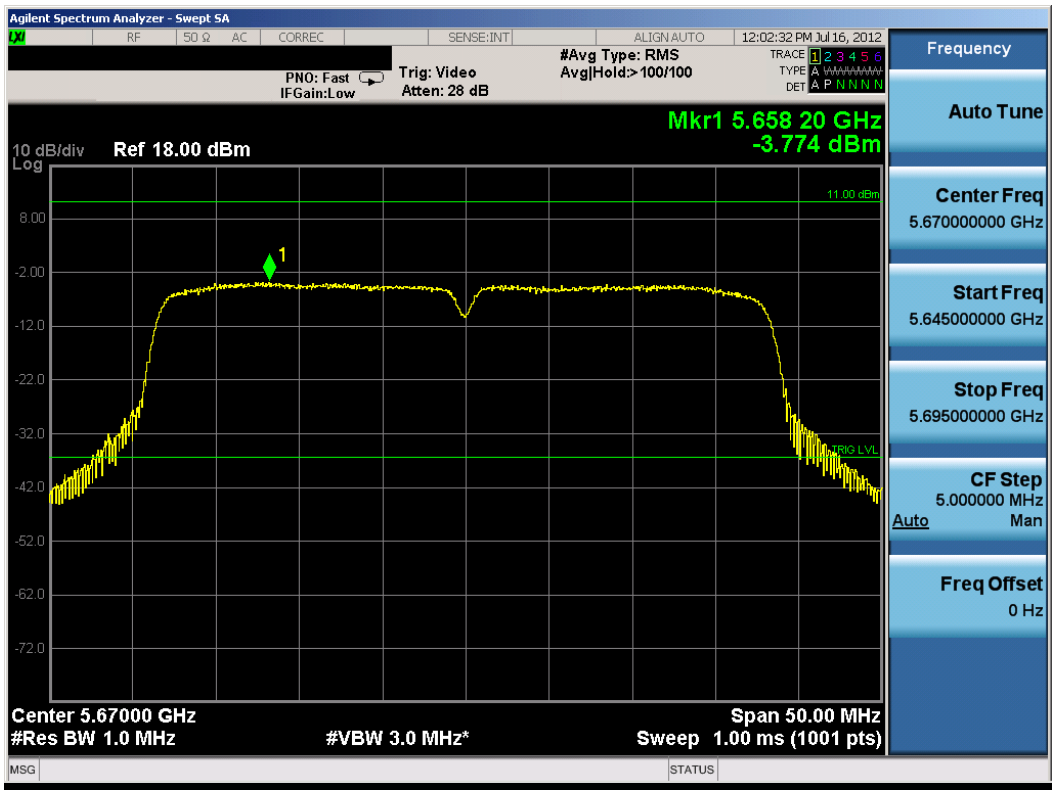

Plot 6-50. Peak Power Spectral Density Plot (40MHz BW 802.11n (UNII Band 3) – Ch. 134)

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6.5 Peak Excursion Ratio – 802.11a/n

§15.407(a)(6)

The spectrum analyzer was connected to the antenna terminal while the EUT was operating in the continuous transmission mode at the appropriate center frequencies.

Method SA-1, as defined in KDB 789033 and with the settings described in Section 6.4 of this test report, was used to generate the average signal trace and the procedure outlined in section F) was used to generate the peak signal trace. A minimum of 100 trace averages were used for the average signal. The peak and average traces are then used to determine the peak excursion.

The largest permissible difference between the modulation envelope (measured using a peak hold function) and the maximum conducted output power is 13 dBm/MHz.

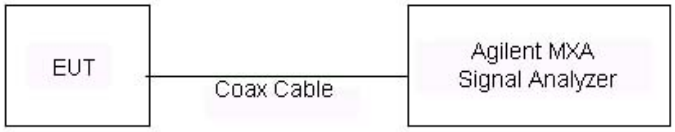

Figure 6-4. Test Instrument & Measurement Setup

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	Frequency [MHz]	Channel No.	802.11 Mode	Data Rate [Mbps]	Measured Peak Excursion Ratio [dBm]	Max Permissible Peak Excursion Ratio [dBm/MHz]	Margin [dB]
Band I	5180	36	a	6	8.784	13.0	-4.216
	5200	40	a	6	8.730	13.0	-4.270
	5240	48	a	6	8.451	13.0	-4.549
	5180	36	n (20MHz)	6.5/7.2 (MCS0)	8.576	13.0	-4.424
	5200	40	n (20MHz)	6.5/7.2 (MCS0)	8.432	13.0	-4.568
	5240	48	n (20MHz)	6.5/7.2 (MCS0)	8.356	13.0	-4.644
	5190	38	n (40MHz)	13.5/15 (MCS0)	9.705	13.0	-3.295
	5230	46	n (40MHz)	13.5/15 (MCS0)	8.951	13.0	-4.049
Band II	5260	52	a	6	9.242	13.0	-3.758
	5280	56	a	6	8.325	13.0	-4.675
	5320	64	a	6	7.749	13.0	-5.251
	5260	52	n (20MHz)	6.5/7.2 (MCS0)	9.053	13.0	-3.947
	5280	56	n (20MHz)	6.5/7.2 (MCS0)	9.584	13.0	-3.416
	5320	64	n (20MHz)	6.5/7.2 (MCS0)	9.335	13.0	-3.665
	5270	54	n (40MHz)	13.5/15 (MCS0)	8.562	13.0	-4.438
	5310	62	n (40MHz)	13.5/15 (MCS0)	8.582	13.0	-4.418
Band III	5500	100	a	6	8.569	13.0	-4.431
	5580	116	a	6	7.728	13.0	-5.272
	5700	140	a	6	8.473	13.0	-4.527
	5500	100	n (20MHz)	6.5/7.2 (MCS0)	8.553	13.0	-4.447
	5580	116	n (20MHz)	6.5/7.2 (MCS0)	8.789	13.0	-4.211
	5700	140	n (20MHz)	6.5/7.2 (MCS0)	9.484	13.0	-3.516
	5510	102	n (40MHz)	13.5/15 (MCS0)	8.114	13.0	-4.886
	5550	110	n (40MHz)	13.5/15 (MCS0)	8.212	13.0	-4.788
	5670	134	n (40MHz)	13.5/15 (MCS0)	8.295	13.0	-4.705

Table 6-7. Conducted Peak Excursion Ratio Measurements

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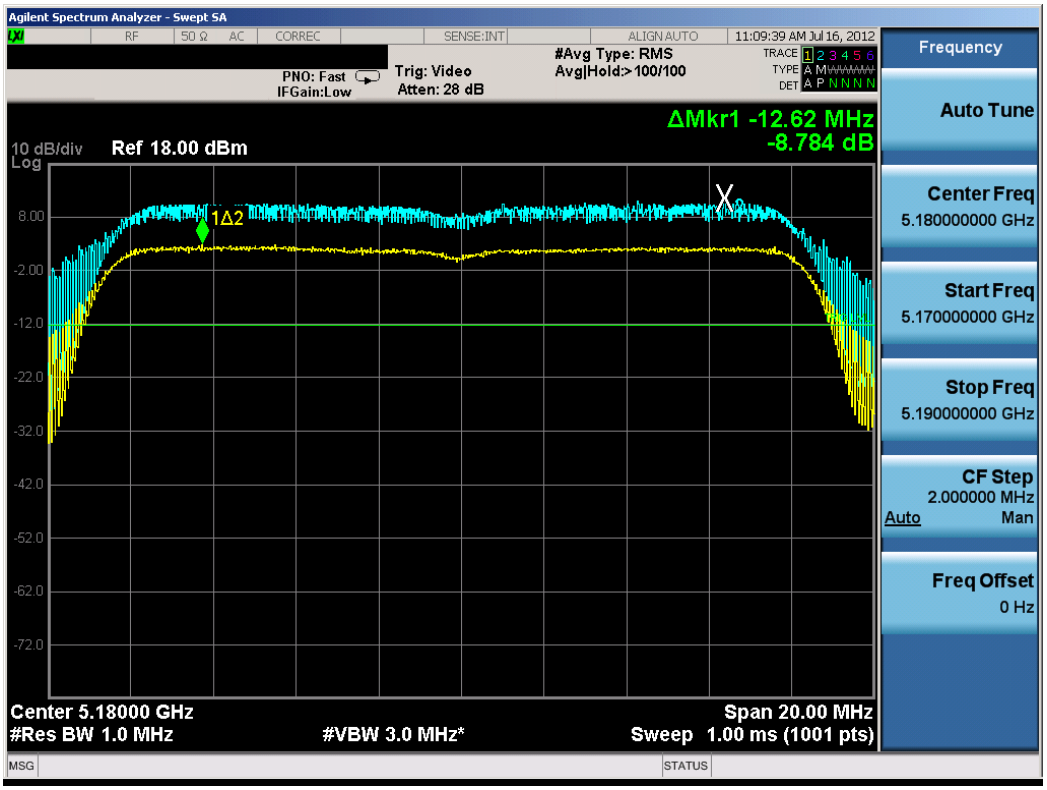
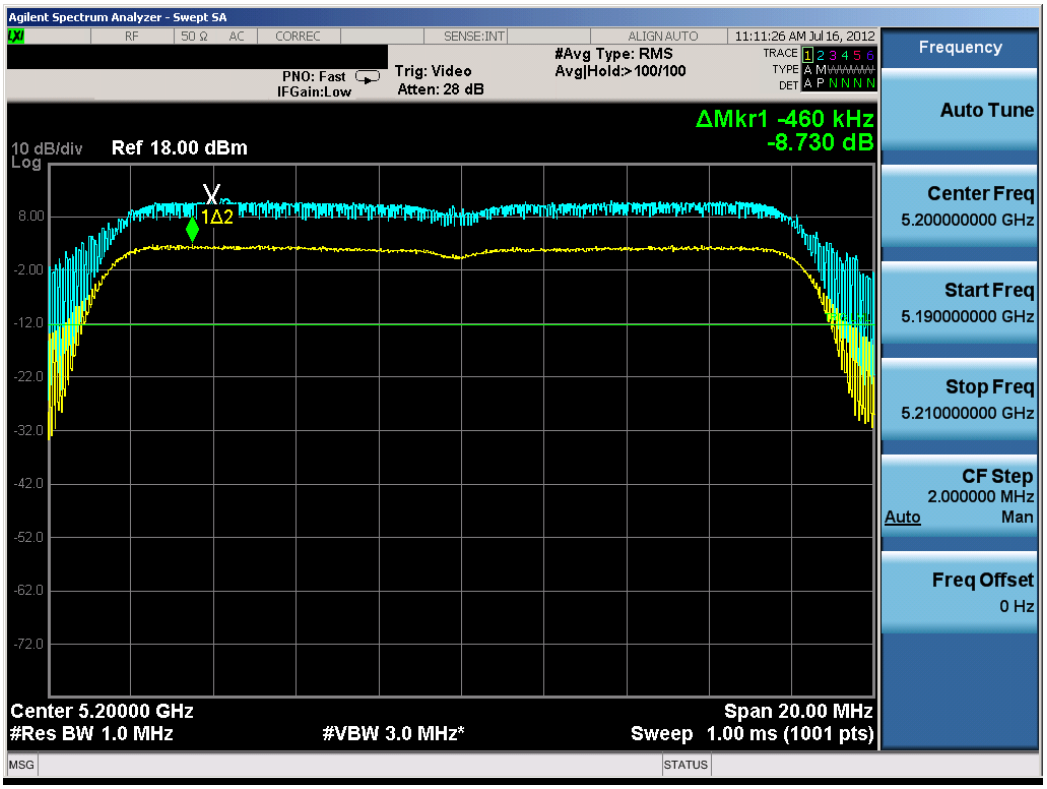


Plot 6-51. Peak Excursion Ratio Plot (802.11a (UNII Band 1) – Ch. 36)



Plot 6-52. Peak Excursion Ratio Plot (802.11a (UNII Band 1) – Ch. 40)

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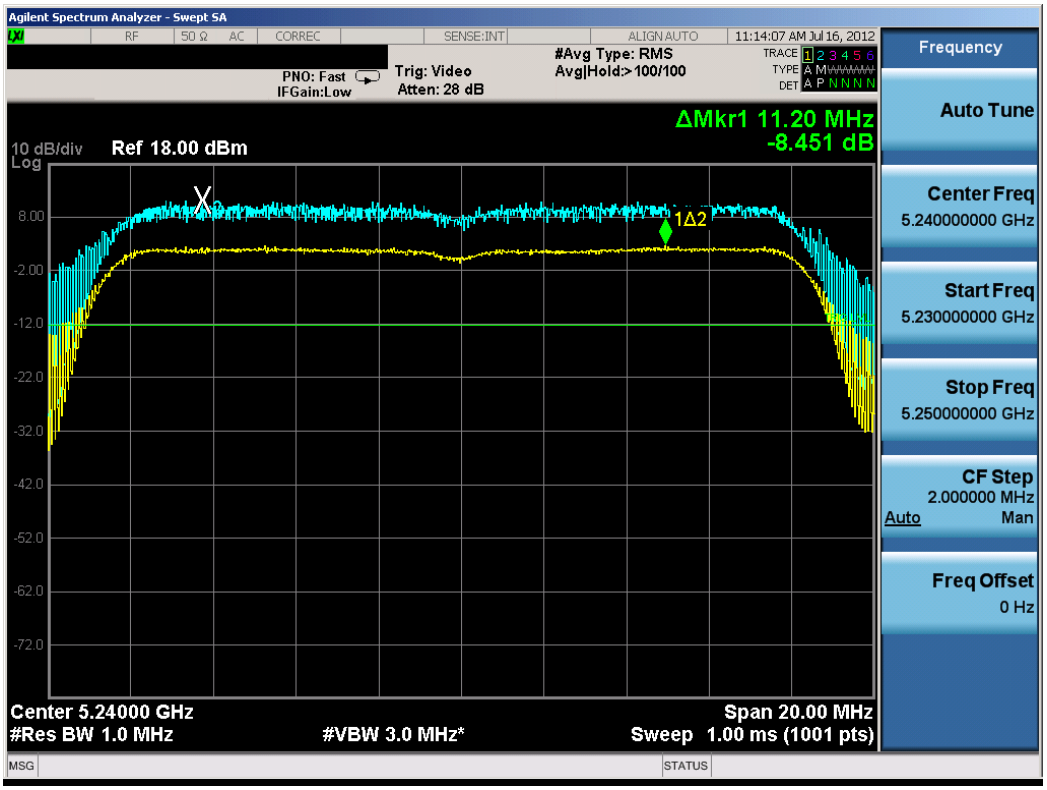
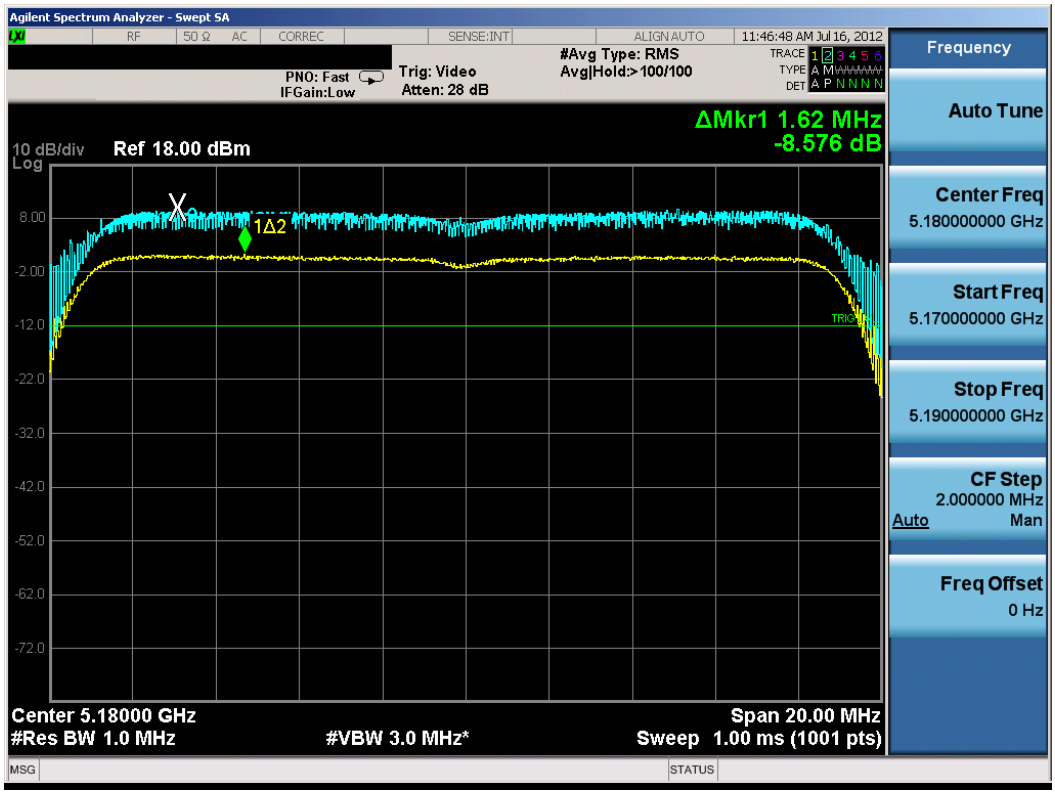


Plot 6-53. Peak Excursion Ratio Plot (802.11a (UNII Band 1) – Ch. 48)



Plot 6-54. Peak Excursion Ratio Plot (20MHz BW 802.11n (UNII Band 1) – Ch. 36)

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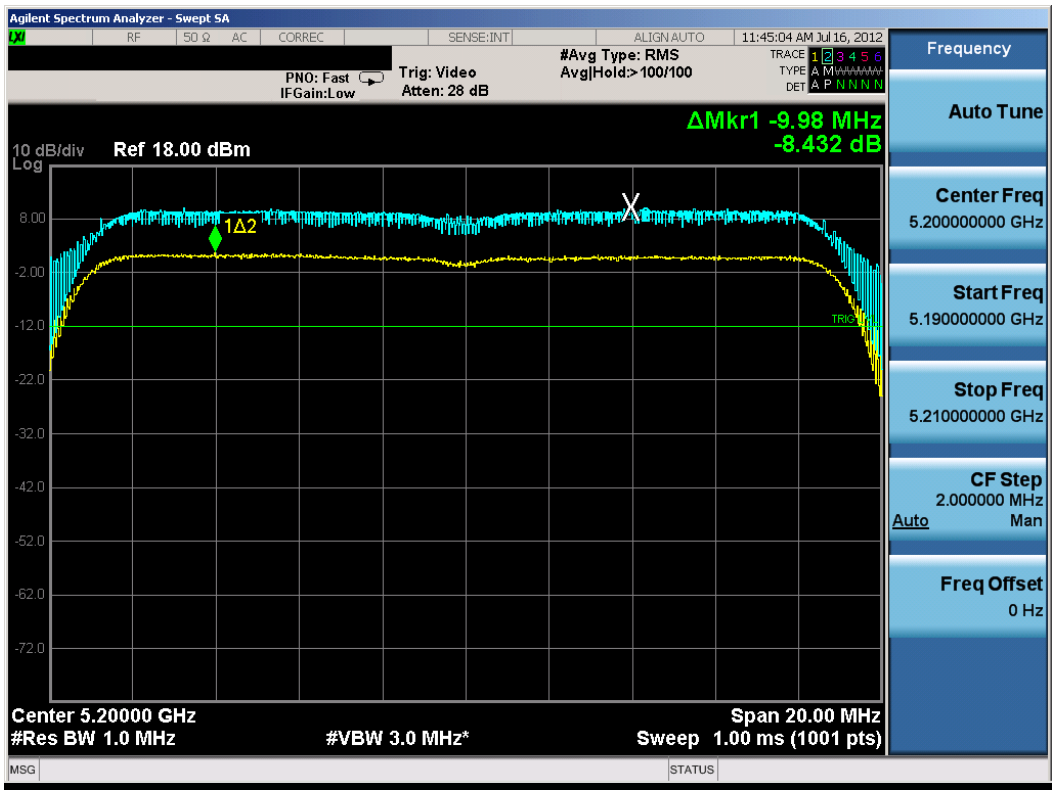
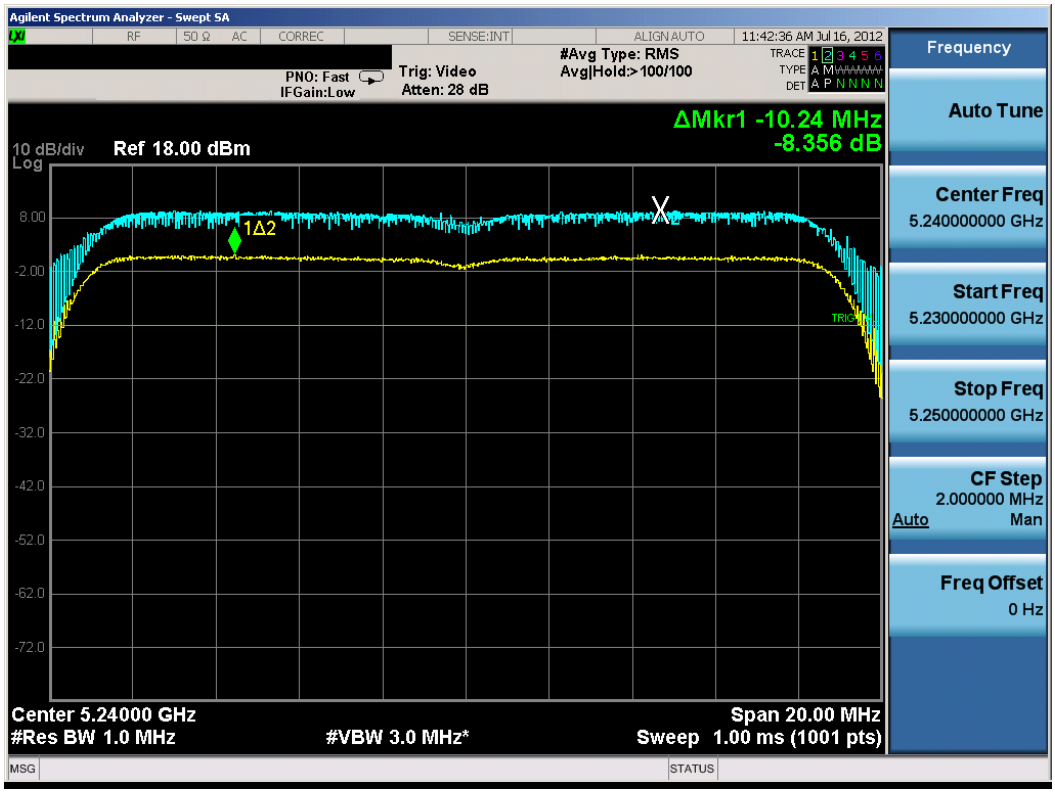


Plot 6-55. Peak Excursion Ratio Plot (20MHz BW 802.11n (UNII Band 1) – Ch. 40)



Plot 6-56. Peak Excursion Ratio Plot (20MHz BW 802.11n (UNII Band 1) – Ch. 48)

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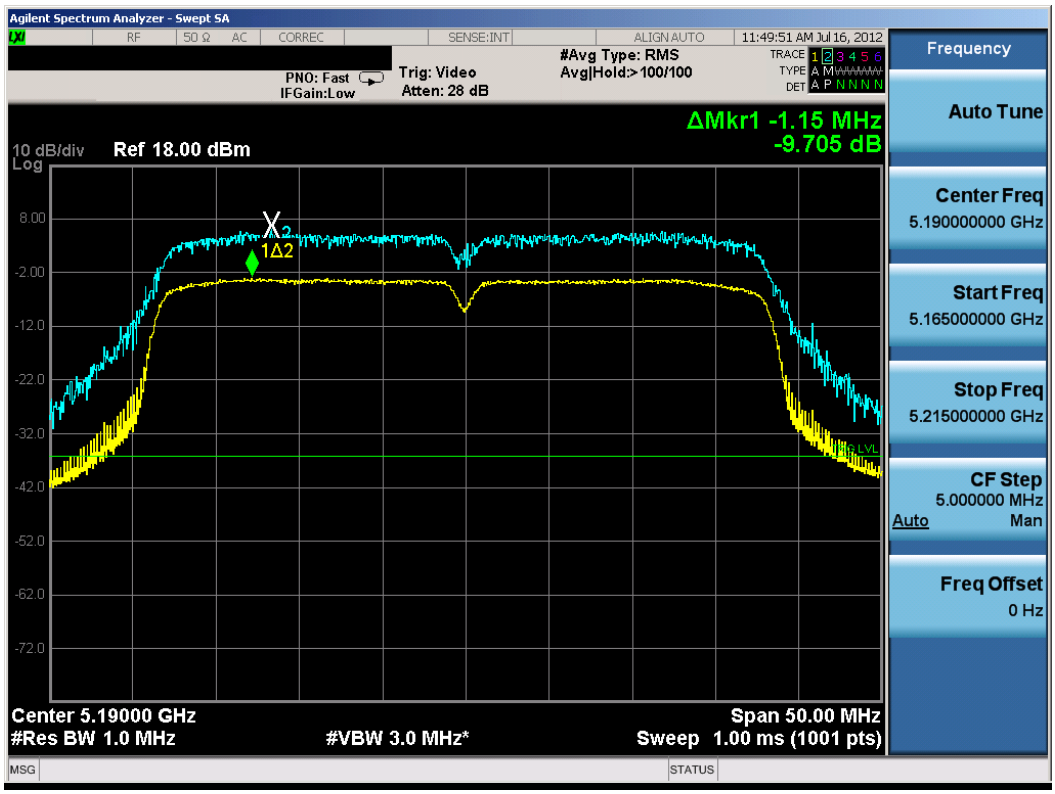
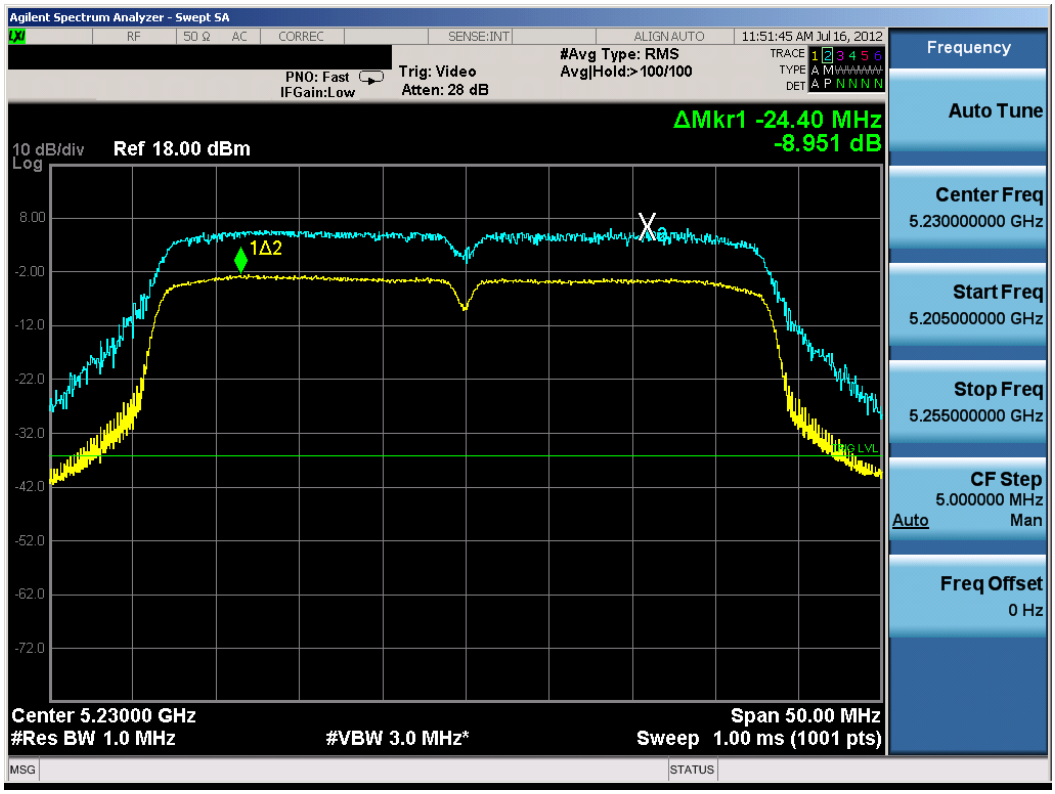


Plot 6-57. Peak Excursion Ratio Plot (40MHz BW 802.11n (UNII Band 1) – Ch. 38)



Plot 6-58. Peak Excursion Ratio Plot (40MHz BW 802.11n (UNII Band 1) – Ch. 46)

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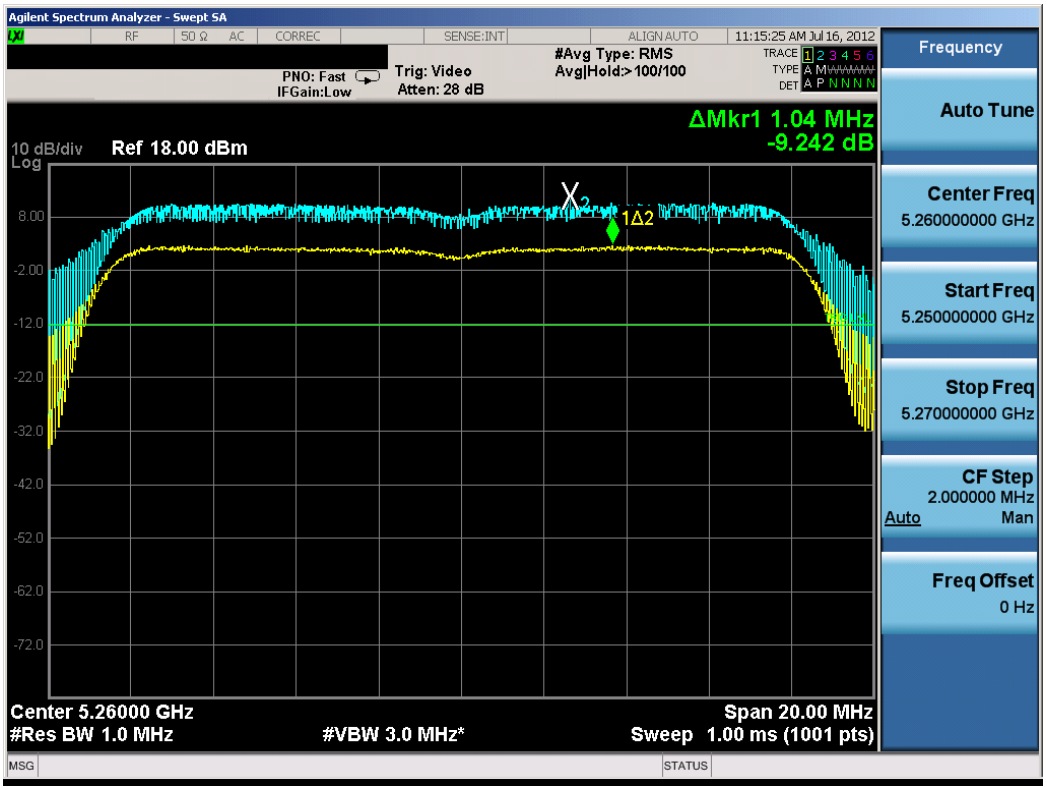
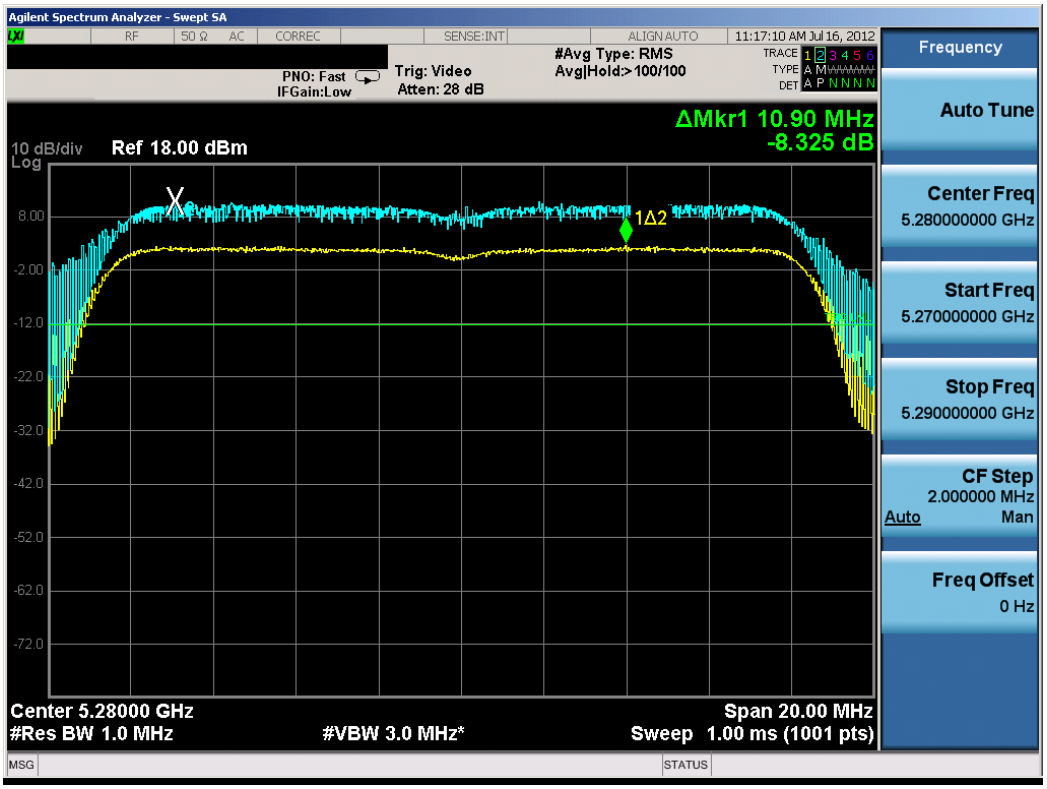


Plot 6-59. Peak Excursion Ratio Plot (802.11a (UNII Band 2) – Ch. 52)



Plot 6-60. Peak Excursion Ratio Plot (802.11a (UNII Band 2) – Ch. 56)

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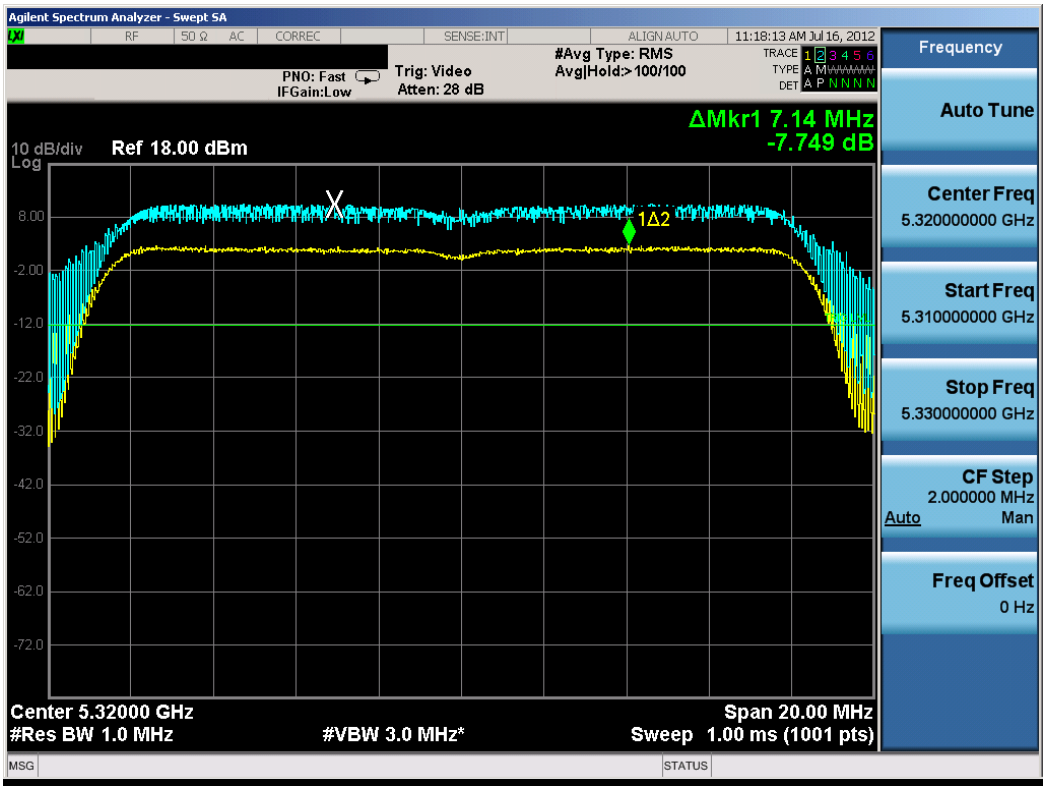
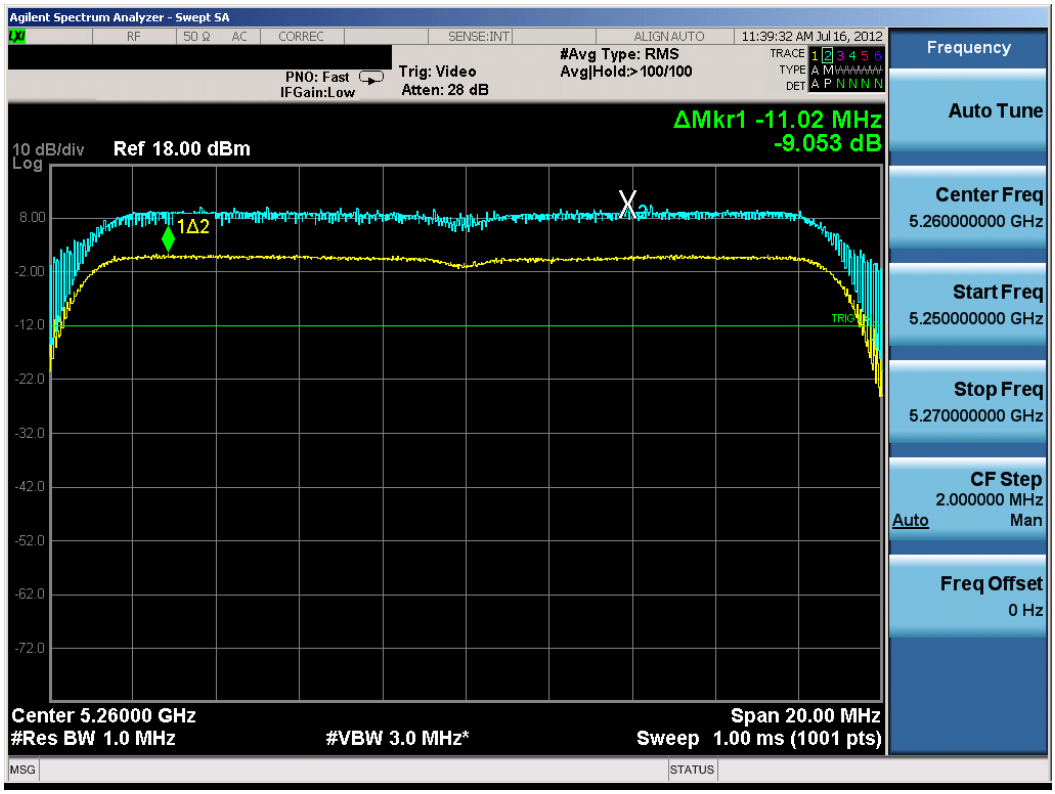


Plot 6-61. Peak Excursion Ratio Plot (802.11a (UNII Band 2) – Ch. 64)



Plot 6-62. Peak Excursion Ratio Plot (20MHz BW 802.11n (UNII Band 2) – Ch. 52)

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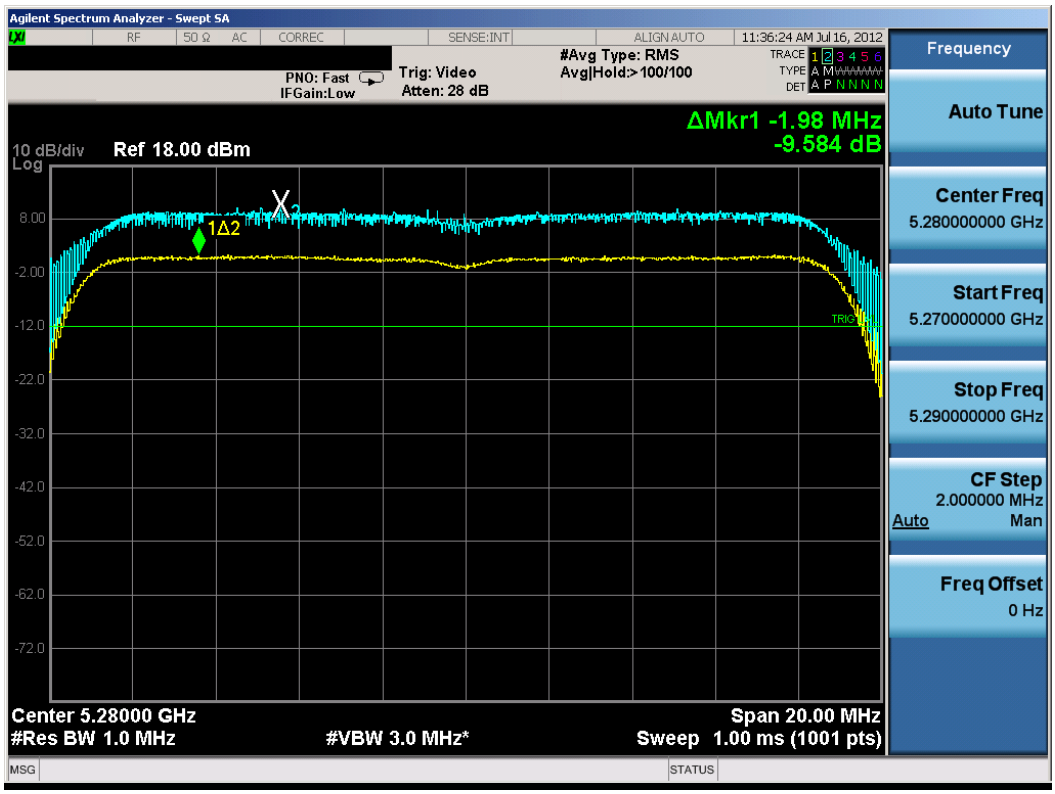
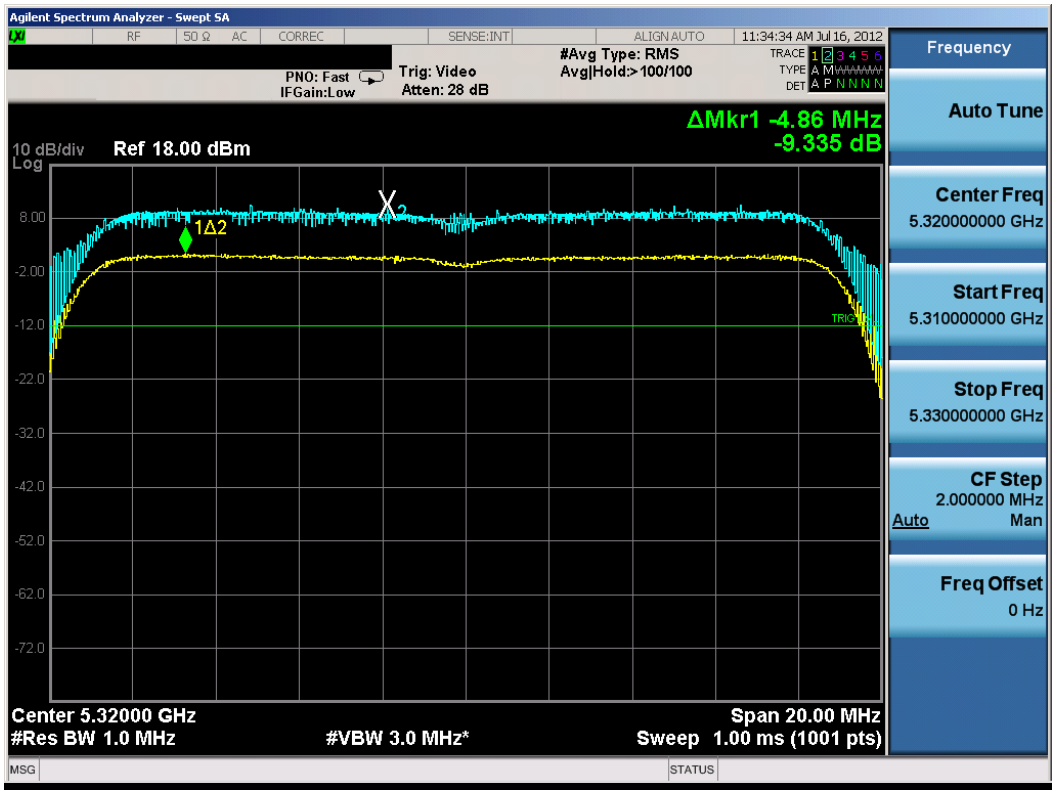


Plot 6-63. Peak Excursion Ratio Plot (20MHz BW 802.11n (UNII Band 2) – Ch. 56)



Plot 6-64. Peak Excursion Ratio Plot (20MHz BW 802.11n (UNII Band 2) – Ch. 64)

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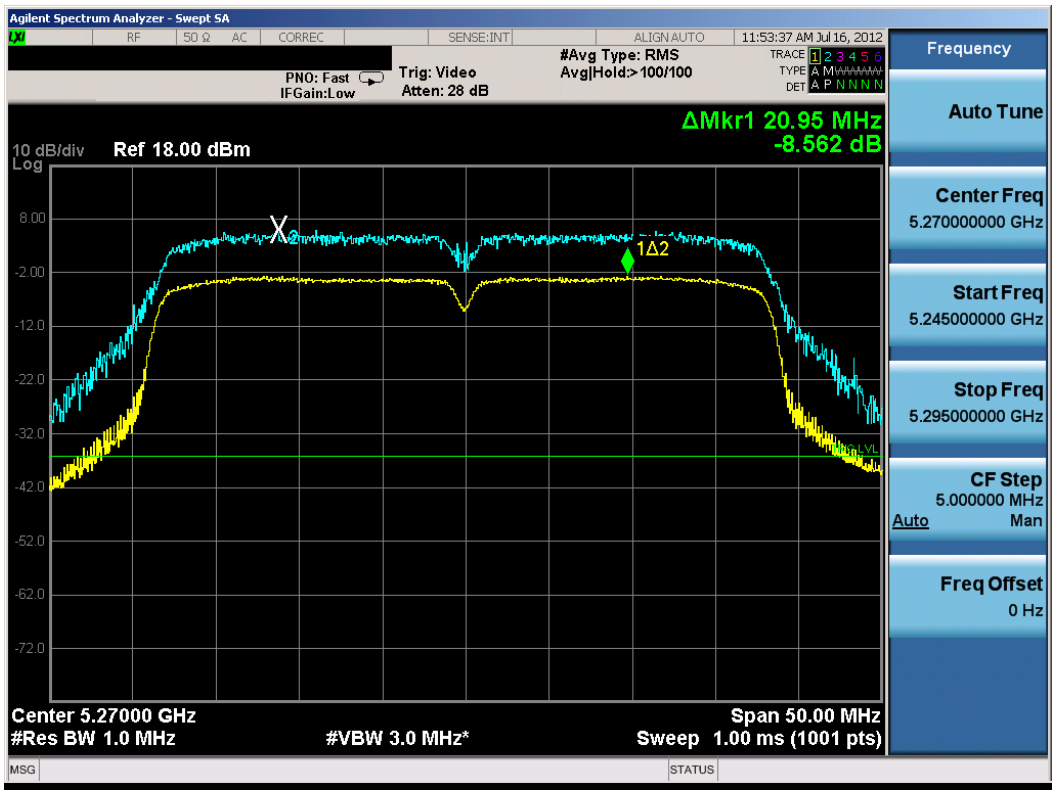
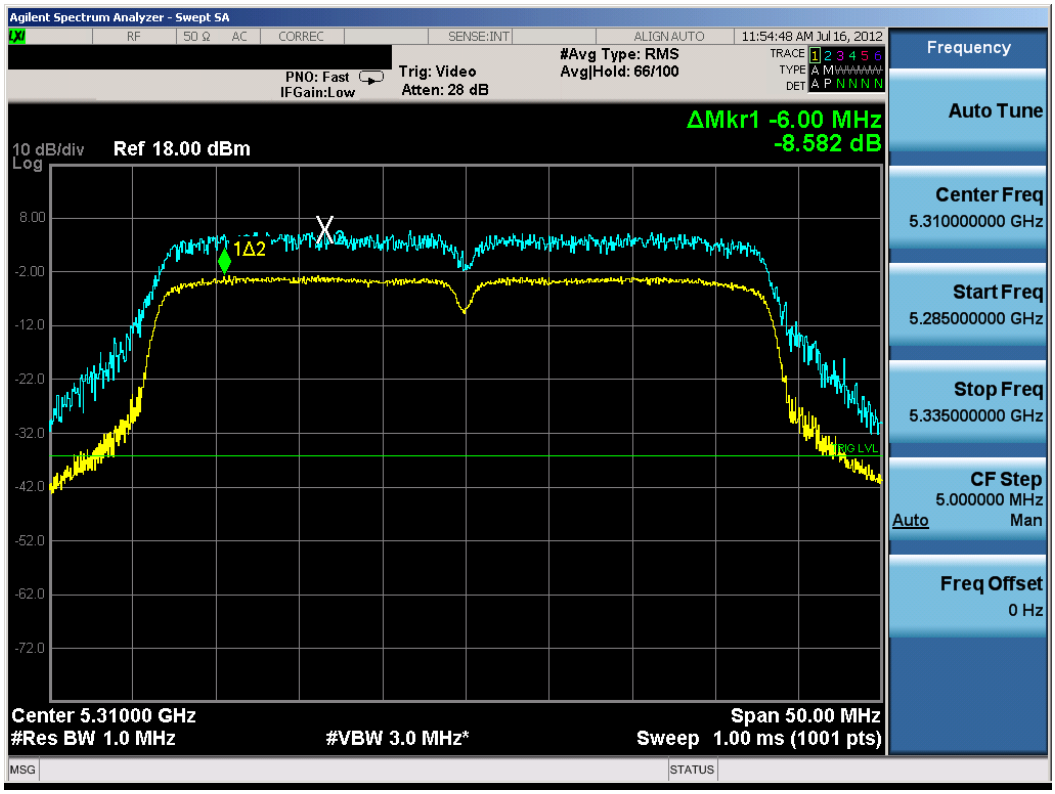


Plot 6-65. Peak Excursion Ratio Plot (40MHz BW 802.11n (UNII Band 2) – Ch. 54)



Plot 6-66. Peak Excursion Ratio Plot (40MHz BW 802.11n (UNII Band 2) – Ch. 62)

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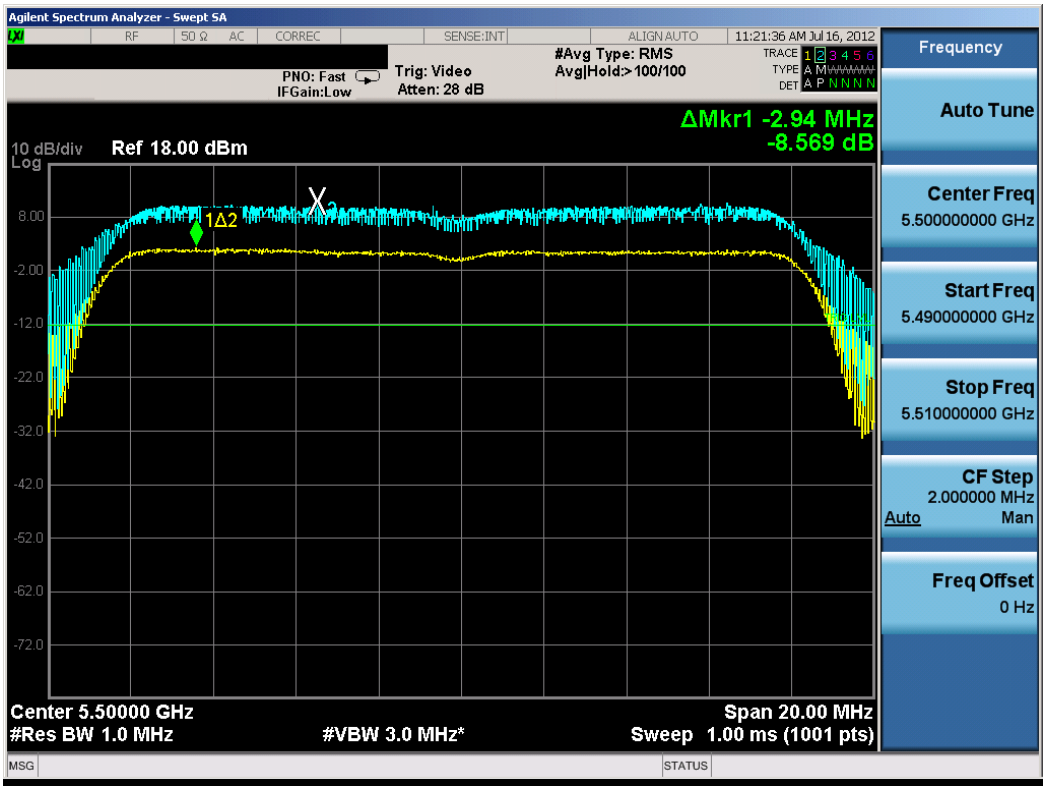
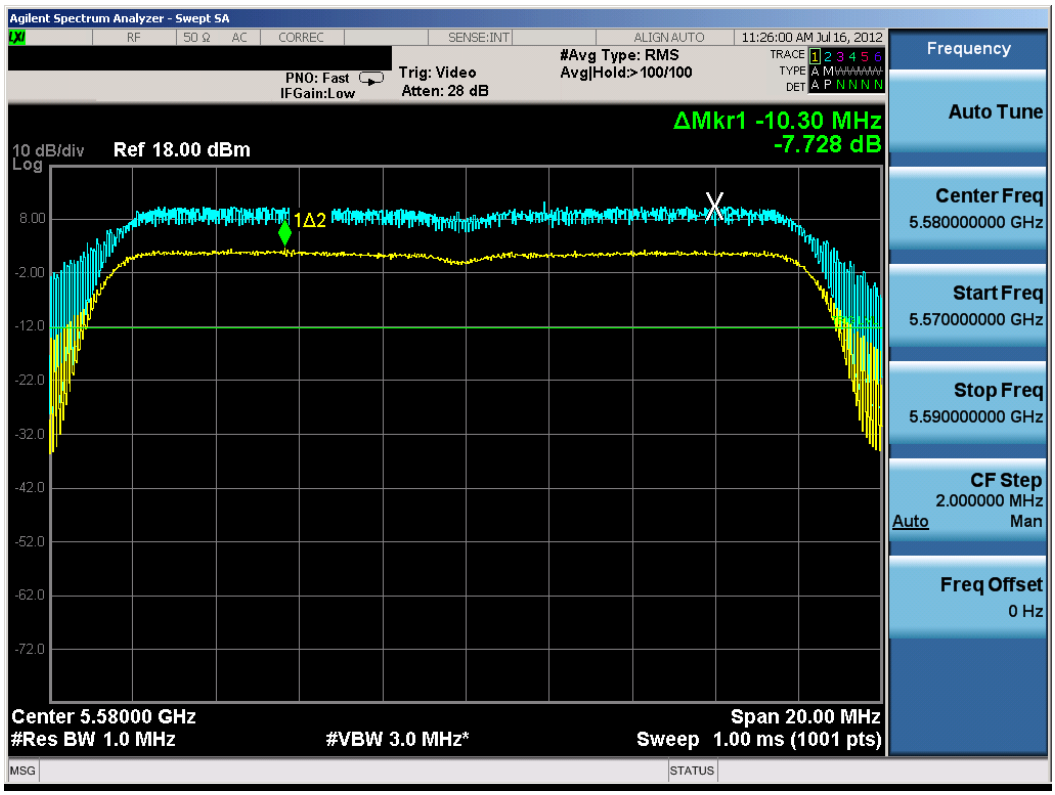


Plot 6-67. Peak Excursion Ratio Plot (802.11a (UNII Band 3) – Ch. 100)



Plot 6-68. Peak Excursion Ratio Plot (802.11a (UNII Band 3) – Ch. 116)

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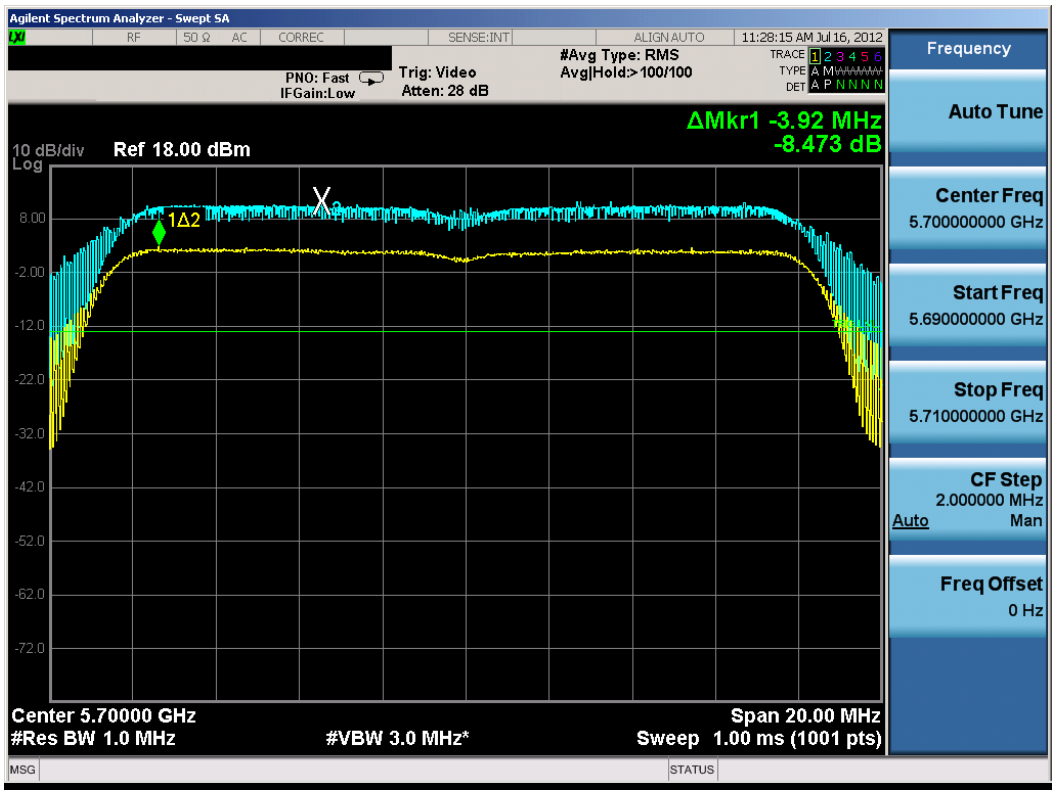
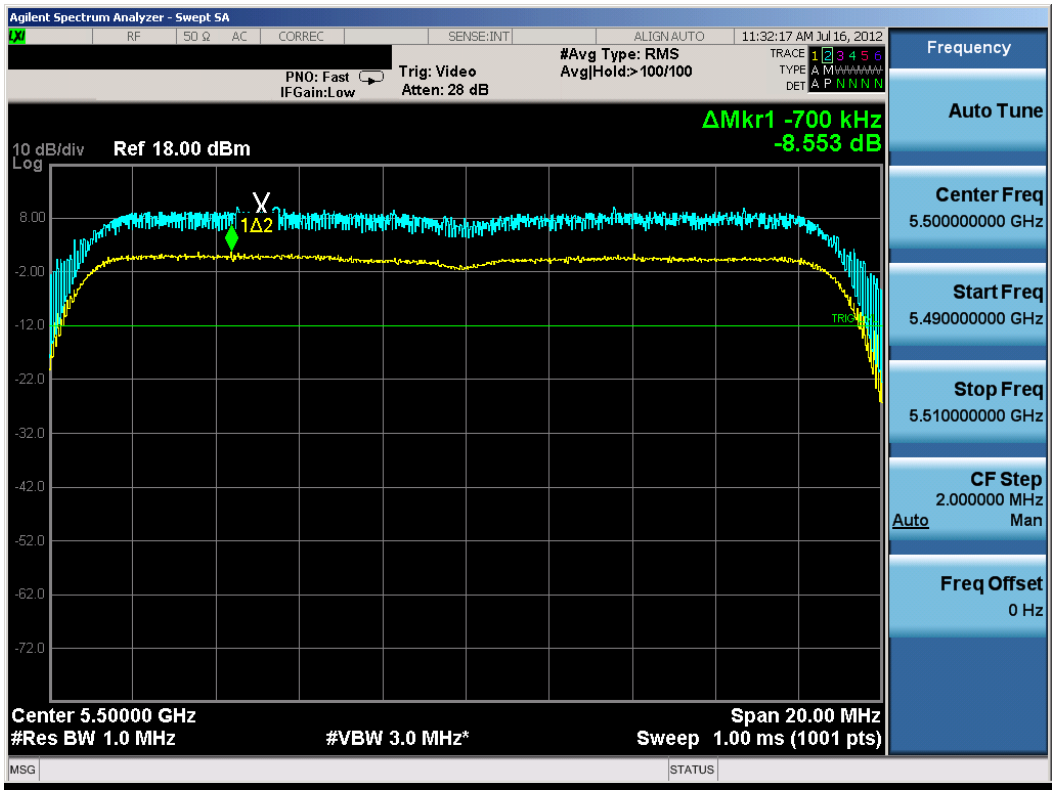


Plot 6-69. Peak Excursion Ratio Plot (802.11a (UNII Band 3) – Ch. 140)



Plot 6-70. Peak Excursion Ratio Plot (20MHz BW 802.11n (UNII Band 3) – Ch. 100)

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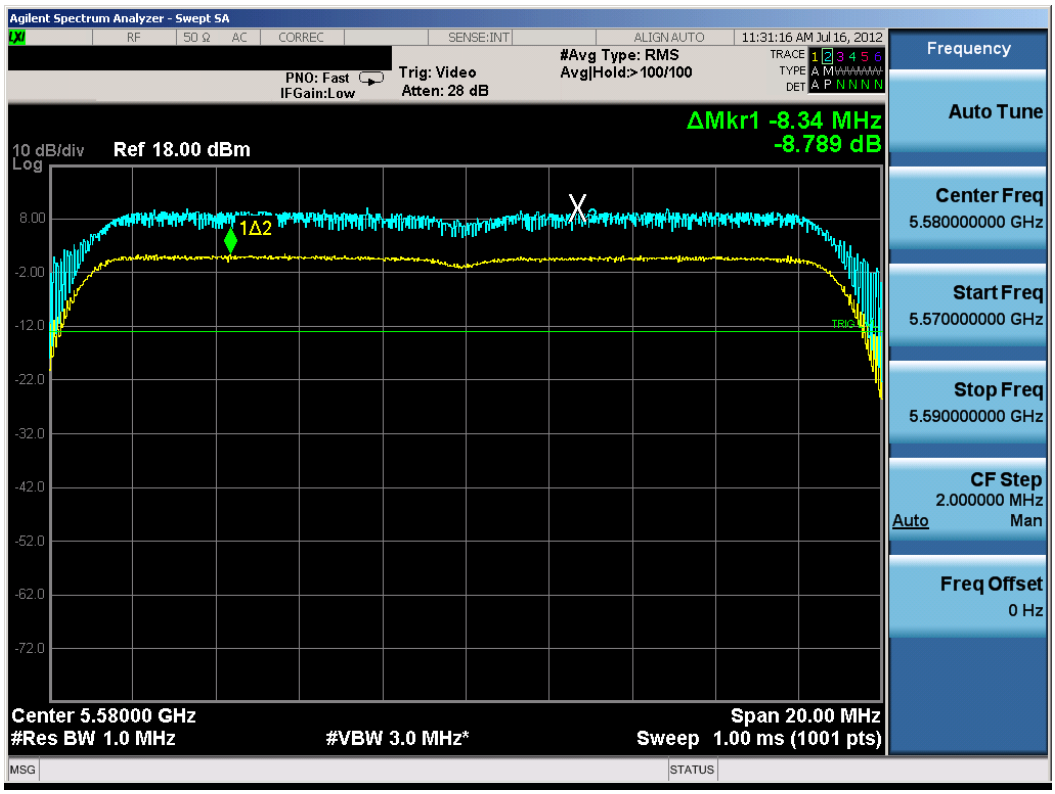
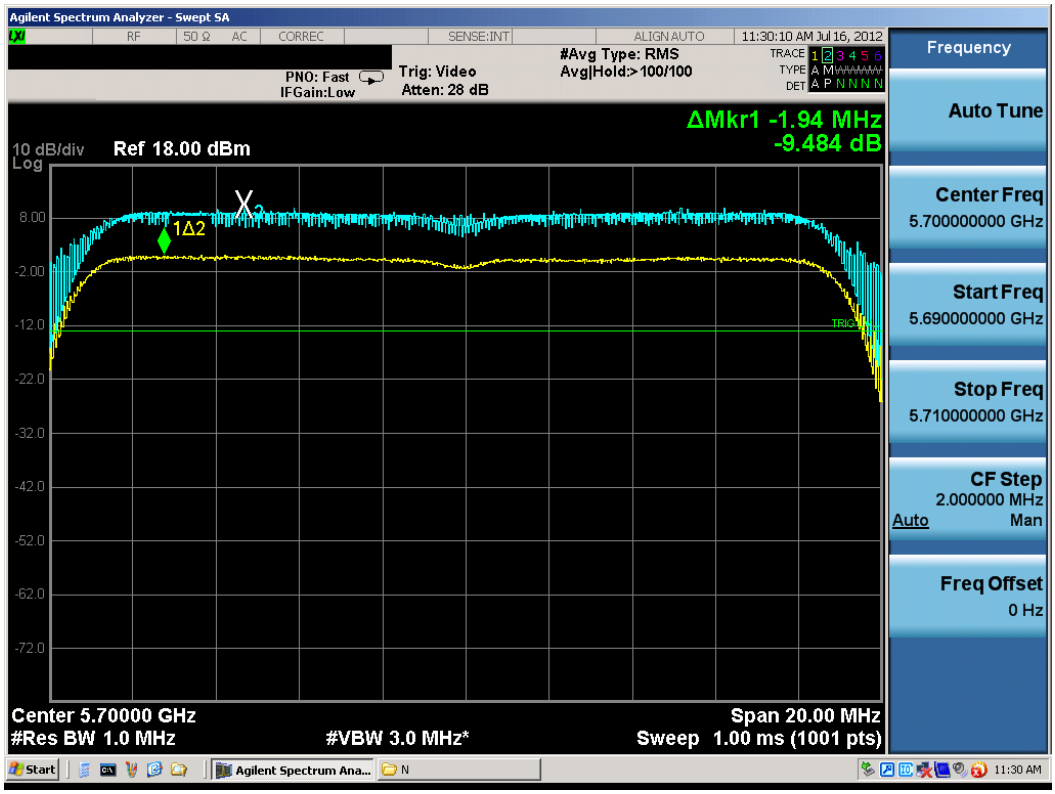


Plot 6-71. Peak Excursion Ratio Plot (20MHz BW 802.11n (UNII Band 3) – Ch. 116)



Plot 6-72. Peak Excursion Ratio Plot (20MHz BW 802.11n (UNII Band 3) – Ch. 140)

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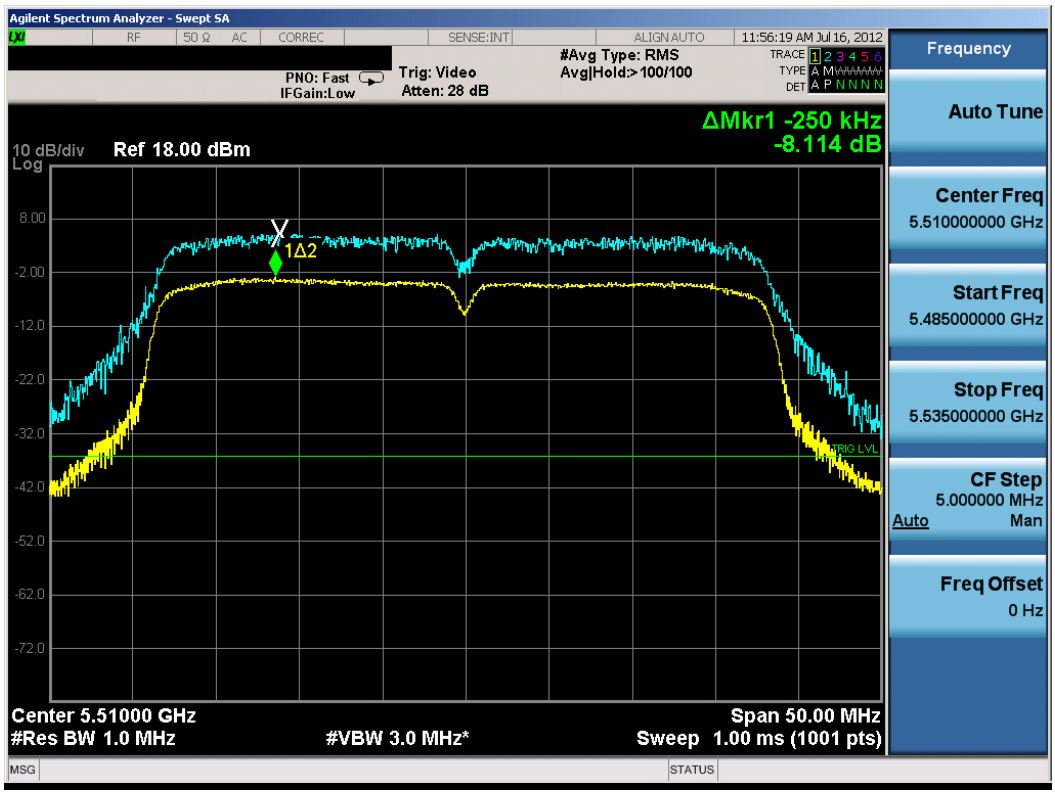
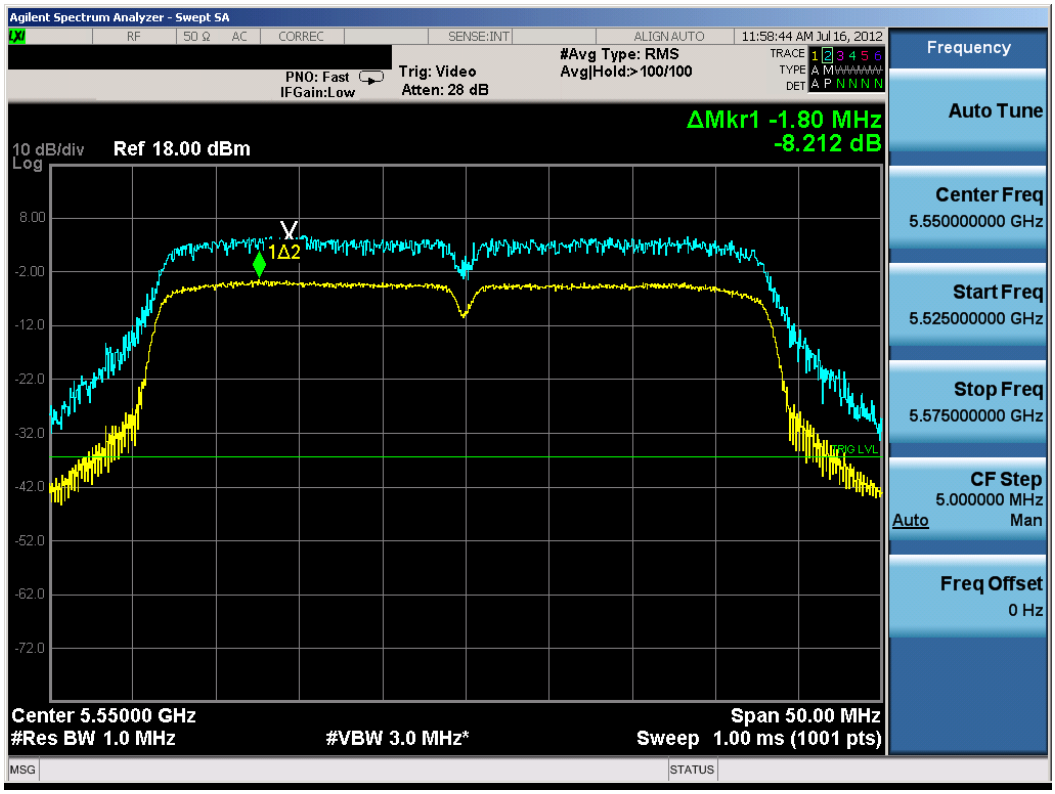


Plot 6-73. Peak Excursion Ratio Plot (40MHz BW 802.11n (UNII Band 3) – Ch. 102)



Plot 6-74. Peak Excursion Ratio Plot (40MHz BW 802.11n (UNII Band 3) – Ch. 110)

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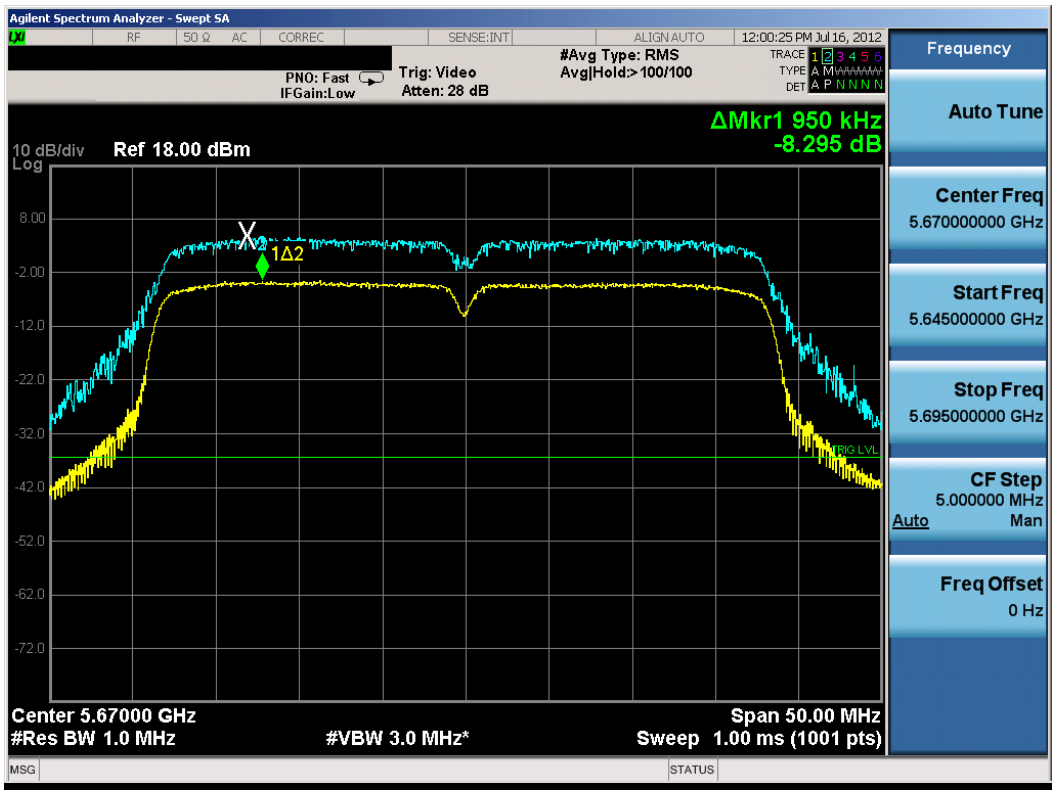

Plot 6-75. Peak Excursion Ratio Plot (40MHz BW 802.11n (UNII Band 3) – Ch. 134)

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6.6 Frequency Stability

§15.407(g)

The EUT was placed inside of an environmental chamber as the temperature in the chamber was varied between -30°C and +50°C. The temperature was incremented by 10° intervals and the unit was allowed to stabilize at each temperature before each measurement. The center frequency of the transmitting channel was evaluated at each temperature and the frequency deviation from the channel's center frequency was recorded. Data for the worst case channel is shown below.

OPERATING FREQUENCY: 5,180,000,000 Hz

CHANNEL: 36

REFERENCE VOLTAGE: 3.8 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.80	+ 20 (Ref)	5,179,999,980	-20	-0.0000004
100 %		- 30	5,180,000,022	22	0.0000004
100 %		- 20	5,180,000,021	21	0.0000004
100 %		- 10	5,179,999,977	-23	-0.0000004
100 %		0	5,180,000,018	18	0.0000003
100 %		+ 10	5,179,999,981	-19	-0.0000004
100 %		+ 20	5,180,000,021	21	0.0000004
100 %		+ 30	5,179,999,980	-20	-0.0000004
100 %		+ 40	5,180,000,019	19	0.0000004
100 %		+ 50	5,179,999,979	-21	-0.0000004
115 %	4.37	+ 20	5,180,000,022	22	0.0000004
BATT. ENDPOINT	3.40	+ 20	5,179,999,977	-23	-0.0000004

Table 6-8. Frequency Stability Measurements for UNII Band 1 (Ch. 36)

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Frequency Stability (Cont'd)
§15.407(g)

The EUT was placed inside of an environmental chamber as the temperature in the chamber was varied between -30°C and +50°C. The temperature was incremented by 10° intervals and the unit was allowed to stabilize at each temperature before each measurement. The center frequency of the transmitting channel was evaluated at each temperature and the frequency deviation from the channel's center frequency was recorded. Data for the worst case channel is shown below.

OPERATING FREQUENCY: 5,260,000,000 Hz

CHANNEL: 52

REFERENCE VOLTAGE: 3.8 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.80	+ 20 (Ref)	5,179,999,980	-20	-0.0000004
100 %		- 30	5,180,000,022	22	0.0000004
100 %		- 20	5,180,000,023	23	0.0000004
100 %		- 10	5,179,999,979	-21	-0.0000004
100 %		0	5,180,000,019	19	0.0000004
100 %		+ 10	5,180,000,018	18	0.0000003
100 %		+ 20	5,179,999,979	-21	-0.0000004
100 %		+ 30	5,180,000,022	22	0.0000004
100 %		+ 40	5,180,000,023	23	0.0000004
100 %		+ 50	5,179,999,979	-21	-0.0000004
115 %	4.37	+ 20	5,180,000,019	19	0.0000004
BATT. ENDPOINT	3.40	+ 20	5,179,999,982	-18	-0.0000003

Table 6-9. Frequency Stability Measurements for UNII Band 2 (Ch. 52)

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Frequency Stability (Cont'd)

§15.407(g)

The EUT was placed inside of an environmental chamber as the temperature in the chamber was varied between -30°C and +50°C. The temperature was incremented by 10° intervals and the unit was allowed to stabilize at each temperature before each measurement. The center frequency of the transmitting channel was evaluated at each temperature and the frequency deviation from the channel's center frequency was recorded. Data for the worst case channel is shown below.

OPERATING FREQUENCY: 5,500,000,000 Hz

CHANNEL: 100

REFERENCE VOLTAGE: 3.8 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.80	+ 20 (Ref)	5,179,999,980	-20	-0.0000004
100 %		- 30	5,180,000,019	19	0.0000004
100 %		- 20	5,180,000,022	22	0.0000004
100 %		- 10	5,179,999,977	-23	-0.0000004
100 %		0	5,180,000,021	21	0.0000004
100 %		+ 10	5,180,000,020	20	0.0000004
100 %		+ 20	5,179,999,982	-18	-0.0000003
100 %		+ 30	5,180,000,019	19	0.0000004
100 %		+ 40	5,179,999,979	-21	-0.0000004
100 %		+ 50	5,179,999,978	-22	-0.0000004
115 %	4.37	+ 20	5,180,000,023	23	0.0000004
BATT. ENDPOINT	3.40	+ 20	5,179,999,979	-21	-0.0000004

Table 6-10. Frequency Stability Measurements for UNII Band 3 (Ch. 100)

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6.7 Radiated Spurious Emission Measurements

§15.407(b)(1), (6), §15.205, §15.209; RSS-210 [A9.2]

The EUT was tested from 9kHz and up to the 10th harmonic of the fundamental frequency of the transmitter using CISPR quasi peak detector below 1GHz. Above 1 GHz, peak measurements were taken using RBW = 1MHz and VBW = 3MHz. Average emissions are measured using RBW = 1MHz, VBW = 3MHz, RMS detector, and 100 trace averages under continuous operation ("Method AD") per KDB 789033 and linearly polarized horn antennas. All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47 CFR must not exceed the limits shown in Table 6-11 per Section 15.209.

All data rates and modes were investigated for radiated spurious emissions. Only the radiated emissions of the configuration that produced the worst case emissions are reported in this section. All measurements shown in this section were obtained using traditional radiated test methods as defined in C63.10-2009. The optional test procedures for antenna port conducted measurements of unwanted emissions per the guidance of KDB 789033 were not used to evaluate this device.

Frequency	Field Strength [μV/m]	Measured Distance [Meters]
0.009 – 0.490 MHz	2400/F (kHz)	300
0.490 – 1.705 MHz	24000/F (kHz)	30
1.705 – 30.00 MHz	30	30
30.00 – 88.00 MHz	100	3
88.00 – 216.0 MHz	150	3
216.0 – 960.0 MHz	200	3
Above 960.0 MHz	500	3

Table 6-11. Radiated Limits

Sample Calculation

- Field Strength Level $_{[dB\mu V/m]}$ = Analyzer Level $_{[dBm]}$ + 107 + AFCL $_{[dB/m]}$
- AFCL $_{[dB/m]}$ = Antenna Factor $_{[dB/m]}$ + Cable Loss $_{[dB]}$
- Margin $_{[dB]}$ = Field Strength Level $_{[dB\mu V/m]}$ – Limit $_{[dB\mu V/m]}$

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Radiated Spurious Emission Measurements (Cont'd)

§15.407(b)(1) and (2), §15.205 & §15.209; RSS-210 [A9.2]

Worst Case Mode: 802.11a

Worst Case Transfer Rate: 6 Mbps

Distance of Measurements: 1&3 Meter

Operating Frequency: 5180MHz

Channel: 36

	Frequency [MHz]	Analyzer Level [dBm]	Detector	Pol. [H/V]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
	10360.00	-100.09	Peak	H	45.89	0.00	52.81	68.20	-15.39
*	15540.00	-135.00	Average	H	58.35	0.00	30.35	53.98	-23.63
*	15540.00	-125.00	Peak	H	58.35	0.00	40.35	73.98	-33.63
*	20720.00	-107.66	Average	H	44.02	-9.54	33.82	53.98	-20.16
*	20720.00	-98.87	Peak	H	44.02	-9.54	42.61	73.98	-31.37
	25900.00	-125.00	Peak	H	44.85	0.00	26.85	68.20	-41.35

Table 6-12. Radiated Measurements @ 1&3 meter

NOTES:

1. All harmonics that do not lie in a restricted band are subject to a peak limit of -27dBm/MHz. At a distance of 3 meters, the field strength limit in dBμV/m can be determined by adding a "conversion" factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions of 68.2dBμV/m.

2. All emissions that lie in the restricted bands (denoted by a * next to the frequency) specified in §15.205 are below the limit shown in Table 6-11.

3. For frequencies above 1GHz, peak emissions are measured using RBW = 1MHz and VBW = 3MHz. Average emissions are measured using RBW = 1MHz, VBW = 3MHz, RMS detector, and 100 trace averages under continuous operation ("Method AD") per KDB 789033.

4. The antenna is manipulated through typical positions, polarity and length during the tests. The EUT is manipulated through three orthogonal planes.

5. The EUT is supplied with nominal AC voltage and/or a new/fully-recharged battery.

6. The spectrum is measured from 9kHz to 40GHz and the worst-case emissions are reported. No significant emissions were found beyond the fifth harmonic for this device.

7. Levels at - 135 dBm represent the analyzer noise floor and signify that no emission was detected.

8. Above 960MHz the limit is 500 μV/m (54dBμ/m) at 3 meters radiated for emissions that lie in restricted bands specified in §15.205.

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Radiated Spurious Emission Measurements (Cont'd)

§15.407(b)(1) and (2), §15.205 & §15.209; RSS-210 [A9.2]

Worst Case Mode: 802.11a

Worst Case Transfer Rate: 6 Mbps

Distance of Measurements: 1&3 Meter

Operating Frequency: 5200MHz

Channel: 40

	Frequency [MHz]	Analyzer Level [dBm]	Detector	Pol. [H/V]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
	10400.00	-99.55	Peak	H	45.98	0.00	53.43	68.20	-14.77
*	15600.00	-135.00	Average	H	58.64	0.00	30.64	53.98	-23.34
*	15600.00	-125.00	Peak	H	58.64	0.00	40.64	73.98	-33.34
*	20800.00	-135.00	Average	H	44.00	0.00	16.00	53.98	-37.98
*	20800.00	-125.00	Peak	H	44.00	0.00	26.00	73.98	-47.98
	26000.00	-125.00	Peak	H	44.88	0.00	26.88	68.20	-41.32

Table 6-13. Radiated Measurements @ 1&3 meter

NOTES:

1. All harmonics that do not lie in a restricted band are subject to a peak limit of -27dBm/MHz (68.2dBμV/m). At a distance of 3 meters, the field strength limit in dBμV/m can be determined by adding a "conversion" factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions of 68.2dBμV/m.

2. All emissions that lie in the restricted bands (denoted by a * next to the frequency) specified in §15.205 are below the limit shown in Table 6-11.

3. For frequencies above 1GHz, peak emissions are measured using RBW = 1MHz and VBW = 3MHz. Average emissions are measured using RBW = 1MHz, VBW = 3MHz, RMS detector, and 100 trace averages under continuous operation ("Method AD") per KDB 789033.

4. The antenna is manipulated through typical positions, polarity and length during the tests. The EUT is manipulated through three orthogonal planes.

5. The EUT is supplied with nominal AC voltage and/or a new/fully-recharged battery.

6. The spectrum is measured from 9kHz to 40GHz and the worst-case emissions are reported. No significant emissions were found beyond the fifth harmonic for this device.

7. Levels at - 135 dBm represent the analyzer noise floor and signify that no emission was detected.

8. Above 960MHz the limit is 500 μV/m (54dBμ/m) at 3 meters radiated for emissions that lie in restricted bands specified in §15.205.

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Radiated Spurious Emission Measurements (Cont'd)

§15.407(b)(1) and (2), §15.205 & §15.209; RSS-210 [A9.2]

Worst Case Mode: 802.11a

Worst Case Transfer Rate: 6 Mbps

Distance of Measurements: 1&3 Meter

Operating Frequency: 5240MHz

Channel: 48

	Frequency [MHz]	Analyzer Level [dBm]	Detector	Pol. [H/V]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
	10480.00	-98.64	Peak	H	46.14	0.00	54.50	68.20	-13.70
*	15720.00	-135.00	Average	H	59.21	0.00	31.21	53.98	-22.77
*	15720.00	-125.00	Peak	H	59.21	0.00	41.21	73.98	-32.77
*	20960.00	-106.74	Average	H	43.99	-9.54	34.71	53.98	-19.27
*	20960.00	-99.13	Peak	H	43.99	-9.54	42.32	73.98	-31.66
	26200.00	-125.00	Peak	H	44.82	0.00	26.82	68.20	-41.38

Table 6-14. Radiated Measurements @1&3 meter

NOTES:

1. All harmonics that do not lie in a restricted band are subject to a peak limit of -27dBm/MHz (68.2dBμV/m). At a distance of 3 meters, the field strength limit in dBμV/m can be determined by adding a "conversion" factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions of 68.2dBμV/m.

2. All emissions that lie in the restricted bands (denoted by a * next to the frequency) specified in §15.205 are below the limit shown in Table 6-11.

3. For frequencies above 1GHz, peak emissions are measured using RBW = 1MHz and VBW = 3MHz. Average emissions are measured using RBW = 1MHz, VBW = 3MHz, RMS detector, and 100 trace averages under continuous operation ("Method AD") per KDB 789033.

4. The antenna is manipulated through typical positions, polarity and length during the tests. The EUT is manipulated through three orthogonal planes.

5. The EUT is supplied with nominal AC voltage and/or a new/fully-recharged battery.

6. The spectrum is measured from 9kHz to 40GHz and the worst-case emissions are reported. No significant emissions were found beyond the fifth harmonic for this device.

7. Levels at - 135 dBm represent the analyzer noise floor and signify that no emission was detected.

8. Above 960MHz the limit is 500 μV/m (54dBμ/m) at 3 meters radiated for emissions that lie in restricted bands specified in §15.205.

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Radiated Spurious Emission Measurements (Cont'd)

§15.407(b)(1) and (2), §15.205 & §15.209; RSS-210 [A9.2]

Worst Case Mode: 802.11a

Worst Case Transfer Rate: 6 Mbps

Distance of Measurements: 1&3 Meter

Operating Frequency: 5260MHz

Channel: 52

	Frequency [MHz]	Analyzer Level [dBm]	Detector	Pol. [H/V]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
	10520.00	-101.44	Peak	H	46.23	0.00	51.78	68.20	-16.42
*	15780.00	-135.00	Average	H	59.53	0.00	31.53	53.98	-22.45
*	15780.00	-125.00	Peak	H	59.53	0.00	41.53	73.98	-32.45
*	21040.00	-109.13	Average	H	44.01	-9.54	32.34	53.98	-21.64
*	21040.00	-100.18	Peak	H	44.01	-9.54	41.29	73.98	-32.69
	26300.00	-125.00	Peak	H	44.87	0.00	26.87	68.20	-41.33

Table 6-15. Radiated Measurements @ 1&3 meter

NOTES:

1. All harmonics that do not lie in a restricted band are subject to a peak limit of -27dBm/MHz (68.2dBμV/m). At a distance of 3 meters, the field strength limit in dBμV/m can be determined by adding a "conversion" factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions of 68.2dBμV/m.

2. All emissions that lie in the restricted bands (denoted by a * next to the frequency) specified in §15.205 are below the limit shown in Table 6-11.

3. For frequencies above 1GHz, peak emissions are measured using RBW = 1MHz and VBW = 3MHz. Average emissions are measured using RBW = 1MHz, VBW = 3MHz, RMS detector, and 100 trace averages under continuous operation ("Method AD") per KDB 789033.

4. The antenna is manipulated through typical positions, polarity and length during the tests. The EUT is manipulated through three orthogonal planes.

5. The EUT is supplied with nominal AC voltage and/or a new/fully-recharged battery.

6. The spectrum is measured from 9kHz to 40GHz and the worst-case emissions are reported. No significant emissions were found beyond the fifth harmonic for this device.

7. Levels at - 135 dBm represent the analyzer noise floor and signify that no emission was detected.

8. Above 960MHz the limit is 500 μV/m (54dBμ/m) at 3 meters radiated for emissions that lie in restricted bands specified in §15.205.

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Radiated Spurious Emission Measurements (Cont'd)

§15.407(b)(1) and (2), §15.205 & §15.209; RSS-210 [A9.2]

Worst Case Mode: 802.11a

Worst Case Transfer Rate: 6 Mbps

Distance of Measurements: 1&3 Meter

Operating Frequency: 5280MHz

Channel: 56

	Frequency [MHz]	Analyzer Level [dBm]	Detector	Pol. [H/V]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
	10560.00	-101.42	Peak	H	46.32	0.00	51.91	68.20	-16.29
*	15840.00	-135.00	Average	H	59.88	0.00	31.88	53.98	-22.09
*	15840.00	-125.00	Peak	H	59.88	0.00	41.88	73.98	-32.09
*	21120.00	-107.82	Average	H	44.00	-9.54	33.64	53.98	-20.34
*	21120.00	-99.99	Peak	H	44.00	-9.54	41.47	73.98	-32.51
	26400.00	-125.00	Peak	H	44.81	0.00	26.81	68.20	-41.39

Table 6-16. Radiated Measurements @ 1&3 meter

NOTES:

1. All harmonics that do not lie in a restricted band are subject to a peak limit of -27dBm/MHz (68.2dBμV/m). At a distance of 3 meters, the field strength limit in dBμV/m can be determined by adding a "conversion" factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions of 68.2dBμV/m.

2. All emissions that lie in the restricted bands (denoted by a * next to the frequency) specified in §15.205 are below the limit shown in Table 6-11.

3. For frequencies above 1GHz, peak emissions are measured using RBW = 1MHz and VBW = 3MHz. Average emissions are measured using RBW = 1MHz, VBW = 3MHz, RMS detector, and 100 trace averages under continuous operation ("Method AD") per KDB 789033.

4. The antenna is manipulated through typical positions, polarity and length during the tests. The EUT is manipulated through three orthogonal planes.

5. The EUT is supplied with nominal AC voltage and/or a new/fully-recharged battery.

6. The spectrum is measured from 9kHz to 40GHz and the worst-case emissions are reported. No significant emissions were found beyond the fifth harmonic for this device.

7. Levels at - 135 dBm represent the analyzer noise floor and signify that no emission was detected.

8. Above 960MHz the limit is 500 μV/m (54dBμ/m) at 3 meters radiated for emissions that lie in restricted bands specified in §15.205.

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Radiated Spurious Emission Measurements (Cont'd)

§15.407(b)(1) and (2), §15.205 & §15.209; RSS-210 [A9.2]

Worst Case Mode: 802.11a

Worst Case Transfer Rate: 6 Mbps

Distance of Measurements: 1&3 Meter

Operating Frequency: 5320MHz

Channel: 64

	Frequency [MHz]	Analyzer Level [dBm]	Detector	Pol. [H/V]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
*	10640.00	-110.23	Average	H	46.52	0.00	43.28	53.98	-10.69
*	10640.00	-101.61	Peak	H	46.52	0.00	51.90	73.98	-22.07
*	15960.00	-135.00	Average	H	62.27	0.00	34.27	53.98	-19.71
*	15960.00	-125.00	Peak	H	62.27	0.00	44.27	73.98	-29.71
*	21280.00	-106.80	Average	H	44.00	-9.54	34.66	53.98	-19.32
*	21280.00	-99.44	Peak	H	44.00	-9.54	42.02	73.98	-31.96
	26600.00	-125.00	Peak	H	44.81	0.00	26.81	68.20	-41.39

Table 6-17. Radiated Measurements @ 1&3 meter

NOTES:

1. All harmonics that do not lie in a restricted band are subject to a peak limit of -27dBm/MHz (68.2dBμV/m). At a distance of 3 meters, the field strength limit in dBμV/m can be determined by adding a "conversion" factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions of 68.2dBμV/m.

2. All emissions that lie in the restricted bands (denoted by a * next to the frequency) specified in §15.205 are below the limit shown in Table 6-11.

3. For frequencies above 1GHz, peak emissions are measured using RBW = 1MHz and VBW = 3MHz. Average emissions are measured using RBW = 1MHz, VBW = 3MHz, RMS detector, and 100 trace averages under continuous operation ("Method AD") per KDB 789033

4. The antenna is manipulated through typical positions, polarity and length during the tests. The EUT is manipulated through three orthogonal planes.

5. The EUT is supplied with nominal AC voltage and/or a new/fully-recharged battery.

6. The spectrum is measured from 9kHz to 40GHz and the worst-case emissions are reported. No significant emissions were found beyond the fifth harmonic for this device.

7. Levels at - 135 dBm represent the analyzer noise floor and signify that no emission was detected.

8. Above 960MHz the limit is 500 μV/m (54dBμ/m) at 3 meters radiated for emissions that lie in restricted bands specified in §15.205.

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Radiated Spurious Emission Measurements (Cont'd)

§15.407(b)(1) and (2), §15.205 & §15.209; RSS-210 [A9.2]

Worst Case Mode: 802.11a

Worst Case Transfer Rate: 6 Mbps

Distance of Measurements: 1&3 Meter

Operating Frequency: 5500MHz

Channel: 100

	Frequency [MHz]	Analyzer Level [dBm]	Detector	Pol. [H/V]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
*	11000.00	-110.78	Average	H	46.98	0.00	43.20	53.98	-10.78
*	11000.00	-101.41	Peak	H	46.98	0.00	52.57	73.98	-21.41
	16500.00	-125.00	Peak	H	60.10	0.00	42.10	68.20	-26.10
	22000.00	-95.25	Peak	H	44.30	-9.54	46.51	68.20	-21.69
	27500.00	-125.00	Peak	H	44.10	0.00	26.10	68.20	-42.10

Table 6-18. Radiated Measurements @ 1&3 meter

NOTES:

1. All harmonics that do not lie in a restricted band are subject to a peak limit of -27dBm/MHz (68.2dBμV/m). At a distance of 3 meters, the field strength limit in dBμV/m can be determined by adding a "conversion" factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions of 68.2dBμV/m.

2. All emissions that lie in the restricted bands (denoted by a * next to the frequency) specified in §15.205 are below the limit shown in Table 6-11.

3. For frequencies above 1GHz, peak emissions are measured using RBW = 1MHz and VBW = 3MHz. Average emissions are measured using RBW = 1MHz, VBW = 3MHz, RMS detector, and 100 trace averages under continuous operation ("Method AD") per KDB 789033.

4. The antenna is manipulated through typical positions, polarity and length during the tests. The EUT is manipulated through three orthogonal planes.

5. The EUT is supplied with nominal AC voltage and/or a new/fully-recharged battery.

6. The spectrum is measured from 9kHz to 40GHz and the worst-case emissions are reported. No significant emissions were found beyond the fifth harmonic for this device.

7. Levels at - 135 dBm represent the analyzer noise floor and signify that no emission was detected.

8. Above 960MHz the limit is 500 μV/m (54dBμ/m) at 3 meters radiated for emissions that lie in restricted bands specified in §15.205.

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Radiated Spurious Emission Measurements (Cont'd)

§15.407(b)(1) and (2), §15.205 & §15.209; RSS-210 [A9.2]

Worst Case Mode: 802.11a

Worst Case Transfer Rate: 6 Mbps

Distance of Measurements: 1&3 Meter

Operating Frequency: 5580MHz

Channel: 116

	Frequency [MHz]	Analyzer Level [dBm]	Detector	Pol. [H/V]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
*	11160.00	-107.99	Average	H	49.42	0.00	48.44	53.98	-5.54
*	11160.00	-99.45	Peak	H	49.42	0.00	56.98	73.98	-17.00
	16740.00	-125.00	Peak	H	58.53	0.00	40.53	68.20	-27.67
*	22320.00	-99.70	Average	H	44.40	-9.54	42.16	53.98	-11.82
*	22320.00	-95.66	Peak	H	44.40	-9.54	46.20	73.98	-27.78
	27900.00	-125.00	Peak	H	43.94	0.00	25.94	68.20	-42.26

Table 6-19. Radiated Measurements @ 1&3 meter

NOTES:

1. All harmonics that do not lie in a restricted band are subject to a peak limit of -27dBm/MHz (68.2dBμV/m). At a distance of 3 meters, the field strength limit in dBμV/m can be determined by adding a "conversion" factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions of 68.2dBμV/m.

2. All emissions that lie in the restricted bands (denoted by a * next to the frequency) specified in §15.205 are below the limit shown in Table 6-11.

3. For frequencies above 1GHz, peak emissions are measured using RBW = 1MHz and VBW = 3MHz. Average emissions are measured using RBW = 1MHz, VBW = 3MHz, RMS detector, and 100 trace averages under continuous operation ("Method AD") per KDB 789033.

4. The antenna is manipulated through typical positions, polarity and length during the tests. The EUT is manipulated through three orthogonal planes.

5. The EUT is supplied with nominal AC voltage and/or a new/fully-recharged battery.

6. The spectrum is measured from 9kHz to 40GHz and the worst-case emissions are reported. No significant emissions were found beyond the fifth harmonic for this device.

7. Levels at - 135 dBm represent the analyzer noise floor and signify that no emission was detected.

8. Above 960MHz the limit is 500 μV/m (54dBμ/m) at 3 meters radiated for emissions that lie in restricted bands specified in §15.205.

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Radiated Spurious Emission Measurements (Cont'd)

§15.407(b)(1) and (2), §15.205 & §15.209; RSS-210 [A9.2]

Worst Case Mode: 802.11a

Worst Case Transfer Rate: 6 Mbps

Distance of Measurements: 1&3 Meter

Operating Frequency: 5700MHz

Channel: 140

	Frequency [MHz]	Analyzer Level [dBm]	Detector	Pol. [H/V]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
*	11400.00	-109.27	Average	H	47.61	0.00	45.34	53.98	-8.64
*	11400.00	-101.56	Peak	H	47.61	0.00	53.05	73.98	-20.93
	17100.00	-125.00	Peak	H	56.08	0.00	38.08	68.20	-30.12
*	22800.00	-102.04	Average	H	44.45	-9.54	39.87	53.98	-14.11
*	22800.00	-96.71	Peak	H	44.45	-9.54	45.20	73.98	-28.78
	28500.00	-125.00	Peak	H	43.63	0.00	25.63	68.20	-42.57

Table 6-20. Radiated Measurements @ 1&3 meter

NOTES:

1. All harmonics that do not lie in a restricted band are subject to a peak limit of -27dBm/MHz (68.2dBμV/m). At a distance of 3 meters, the field strength limit in dBμV/m can be determined by adding a "conversion" factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions of 68.2dBμV/m.

2. All emissions that lie in the restricted bands (denoted by a * next to the frequency) specified in §15.205 are below the limit shown in Table 6-11.

3. For frequencies above 1GHz, peak emissions are measured using RBW = 1MHz and VBW = 3MHz. Average emissions are measured using RBW = 1MHz, VBW = 3MHz, RMS detector, and 100 trace averages under continuous operation ("Method AD") per KDB 789033.

4. The antenna is manipulated through typical positions, polarity and length during the tests. The EUT is manipulated through three orthogonal planes.

5. The EUT is supplied with nominal AC voltage and/or a new/fully-recharged battery.

6. The spectrum is measured from 9kHz to 40GHz and the worst-case emissions are reported. No significant emissions were found beyond the fifth harmonic for this device.

7. Levels at - 135 dBm represent the analyzer noise floor and signify that no emission was detected.

8. Above 960MHz the limit is 500 μV/m (54dBμ/m) at 3 meters radiated for emissions that lie in restricted bands specified in §15.205.

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6.8 Radiated Band Edge Measurements

§15.407(b)(1) and (2), §15.205 & §15.209; RSS-210 [A9.2]

Worst Case Mode: 802.11a

Worst Case Transfer Rate: 6 Mbps

Distance of Measurements: 3 Meter

Operating Frequency: 5180MHz

Channel: 36

Frequency [MHz]	Analyzer Level [dBm]	Detector	Pol. [H/V]	AFCL [dB/m]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
5013.00	-111.86	Average	H	39.05	34.19	53.98	-19.79
5013.00	-100.32	Peak	H	39.05	45.73	73.98	-28.25
5050.00	-110.67	Average	H	39.10	35.43	53.98	-18.55
5050.00	-100.00	Peak	H	39.10	46.10	73.98	-27.88
5127.00	-104.85	Average	H	39.20	41.35	53.98	-12.63
5127.00	-98.38	Peak	H	39.20	47.82	73.98	-26.16

Table 6-21. Radiated Restricted Band Measurements at 3-meter (4.5 – 5.15GHz)

NOTES:

1. For frequencies above 1GHz, peak emissions are measured using RBW = 1MHz and VBW = 3MHz. Average emissions are measured using RBW = 1MHz, VBW = 3MHz, RMS detector, and 100 trace averages under continuous operation ("Method AD") per KDB 789033.

2. The antenna is manipulated through typical positions, polarity and length during the tests. The EUT is manipulated through three orthogonal planes.

3. The EUT is supplied with nominal AC voltage and/or a new/fully-recharged battery.

4. The spectrum is measured from 9kHz to 40GHz and the worst-case emissions are reported. No significant emissions were found beyond the fifth harmonic for this device.

5. Levels at - 135 dBm represent the analyzer noise floor and signify that no emission was detected.

6. Above 960MHz the limit is 500 μV/m (54dBμ/m) at 3 meters radiated for emissions that lie in restricted bands specified in §15.205.

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Radiated Band Edge Measurements (Cont'd)

§15.407(b)(1) and (2), §15.205 & §15.209; RSS-210 [A9.2]

Worst Case Mode: 802.11a

Worst Case Transfer Rate: 6 Mbps

Distance of Measurements: 3 Meter

Operating Frequency: 5320MHz

Channel: 64

Frequency [MHz]	Analyzer Level [dBm]	Detector	Pol. [H/V]	AFCL [dB/m]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
5371.00	-105.62	Average	H	39.53	40.91	53.98	-13.07
5371.00	-94.47	Peak	H	39.53	52.06	73.98	-21.92
5379.00	-106.18	Average	H	39.54	40.36	53.98	-13.62
5379.00	-96.40	Peak	H	39.54	50.14	73.98	-23.84
5387.00	-109.66	Average	H	39.54	36.88	53.98	-17.10
5387.00	-97.31	Peak	H	39.54	49.23	73.98	-24.75

Table 6-22. Radiated Restricted Band Measurements at 3-meter (5.35 – 5.46GHz, 5.46 – 5.47GHz)

NOTES:

1. Emissions within 5.35 – 5.46GHz lie in a restricted band and are subject to the radiated emissions limits specified in §15.209. Emission within 5.46 – 5.47GHz are at the lower band edge of UNII Band 3 transmission and are subject to the -27dBm/MHz (68.2dBμV/m) EIRP limit specified in §15.407.

2. For frequencies above 1GHz, peak emissions are measured using RBW = 1MHz and VBW = 3MHz. Average emissions are measured using RBW = 1MHz, VBW = 3MHz, RMS detector, and 100 trace averages under continuous operation ("Method AD") per KDB 789033.

3. The antenna is manipulated through typical positions, polarity and length during the tests. The EUT is manipulated through three orthogonal planes.

4. The EUT is supplied with nominal AC voltage and/or a new/fully-recharged battery.

5. The spectrum is measured from 9kHz to 40GHz and the worst-case emissions are reported. No significant emissions were found beyond the fifth harmonic for this device.

6. Levels at - 135 dBm represent the analyzer noise floor and signify that no emission was detected.

7. Above 960MHz the limit is 500 μV/m (54dBμ/m) at 3 meters radiated for emissions that lie in restricteds band specified in §15.205.

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Radiated Band Edge Measurements (Cont'd)

§15.407(b)(1) and (2), §15.205 & §15.209; RSS-210 [A9.2]

Worst Case Mode: 802.11a

Worst Case Transfer Rate: 6 Mbps

Distance of Measurements: 3 Meter

Operating Frequency: 5500MHz

Channel: 100

Frequency [MHz]	Analyzer Level [dBm]	Detector	Pol. [H/V]	AFCL [dB/m]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
5440.00	-104.83	Average	H	39.64	41.81	53.98	-12.17
5440.00	-96.67	Peak	H	39.64	49.97	73.98	-24.01
5446.60	-104.54	Average	H	39.65	42.11	53.98	-11.87
5446.60	-93.39	Peak	H	39.65	53.26	73.98	-20.72
5469.00	-94.98	Peak	H	39.69	51.71	68.20	-16.49

Table 6-23. Radiated Restricted Band Measurements at 3-meter (5.35 – 5.46GHz, 5.46 – 5.47GHz)

NOTES:

1. Emissions within 5.35 – 5.46GHz lie in a restricted band and are subject to the radiated emissions limits specified in §15.209. Emission within 5.46 – 5.47GHz are at the lower band edge of UNII Band 3 transmission and are subject to the -27dBm/MHz (68.2dBμV/m) EIRP limit specified in §15.407.

2. For frequencies above 1GHz, peak emissions are measured using RBW = 1MHz and VBW = 3MHz. Average emissions are measured using RBW = 1MHz, VBW = 3MHz, RMS detector, and 100 trace averages under continuous operation ("Method AD") per KDB 789033.

3. The antenna is manipulated through typical positions, polarity and length during the tests. The EUT is manipulated through three orthogonal planes.

4. The EUT is supplied with nominal AC voltage and/or a new/fully-recharged battery.

5. The spectrum is measured from 9kHz to 40GHz and the worst-case emissions are reported. No significant emissions were found beyond the fifth harmonic for this device.

6. Levels at - 135 dBm represent the analyzer noise floor and signify that no emission was detected.

7. Above 960MHz the limit is 500 μV/m (54dBμ/m) at 3 meters radiated for emissions that lie in restricted bands specified in §15.205.

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Radiated Band Edge Measurements (Cont'd)

§15.407(b)(1) and (2), §15.205 & §15.209; RSS-210 [A9.2]

Worst Case Mode: 802.11a

Worst Case Transfer Rate: 6 Mbps

Distance of Measurements: 3 Meter

Operating Frequency: 5700MHz

Channel: 140

Frequency [MHz]	Analyzer Level [dBm]	Detector	Pol. [H/V]	AFCL [dB/m]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
5725.10	-93.24	Peak	H	40.18	53.94	68.20	-14.26
5731.00	-95.87	Peak	H	40.19	51.32	68.20	-16.88
5737.00	-95.77	Peak	H	40.20	51.43	68.20	-16.77

Table 6-24. Radiated Restricted Band Measurements at 3-meter

NOTES:

1. For frequencies above 1GHz, peak emissions are measured using RBW = 1MHz and VBW = 3MHz. Average emissions are measured using RBW = 1MHz, VBW = 3MHz, RMS detector, and 100 trace averages under continuous operation ("Method AD") per KDB 789033.

2. The antenna is manipulated through typical positions, polarity and length during the tests. The EUT is manipulated through three orthogonal planes.

3. The EUT is supplied with nominal AC voltage and/or a new/fully-recharged battery.

4. The spectrum is measured from 9kHz to 40GHz and the worst-case emissions are reported. No significant emissions were found beyond the fifth harmonic for this device.

5. Levels at - 135 dBm represent the analyzer noise floor and signify that no emission was detected.

6. Above 960MHz the limit is 500 μV/m (54dBμ/m) at 3 meters radiated for emissions that lie in restricted bands specified in §15.205.

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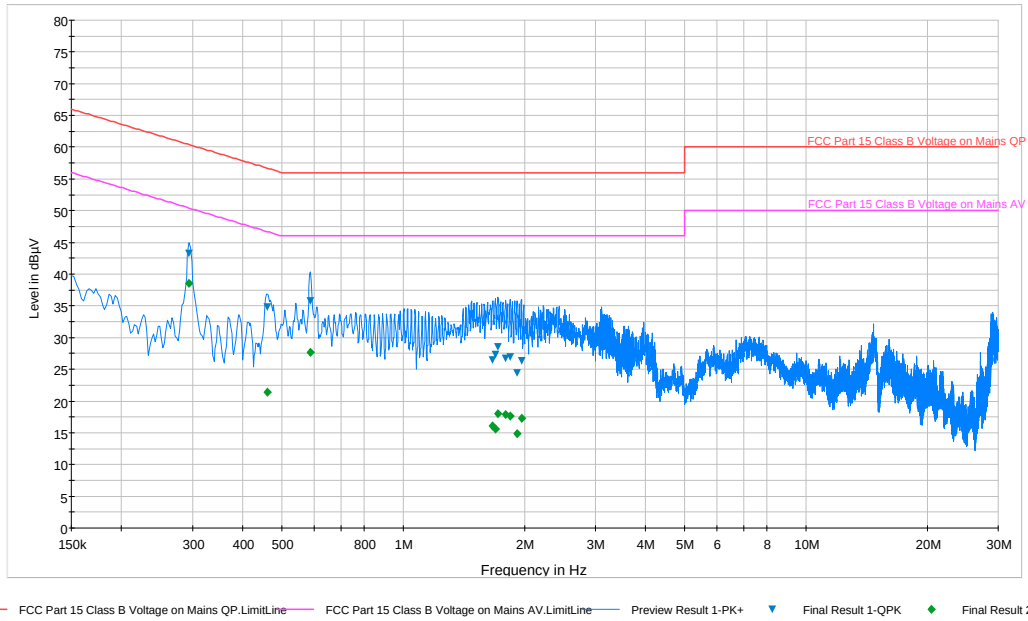
6.9 Line-Conducted Test Data

§15.207; RSS-Gen [7.2.2]



Plot 6-76. Line Conducted Plot with 802.11a UNII Band 1 (L1)

Frequency MHz	Line	Corr. dB	QuasiPeak dBµV	Limit dBµV	Margin dB	Average dBµV	Limit dBµV	Margin dB
0.294	L1	0.1	43.20	60.40	17.20	38.60	50.40	11.80
0.461	L1	0.1	34.80	56.70	21.90	21.30	46.70	25.40
0.589	L1	0.1	35.80	56.00	20.20	27.60	46.00	18.40
1.669	L1	0.2	26.40	56.00	29.60	16.10	46.00	29.90
1.696	L1	0.2	27.30	56.00	28.70	15.60	46.00	30.40
1.721	L1	0.2	28.50	56.00	27.50	18.00	46.00	28.00
1.797	L1	0.2	26.70	56.00	29.30	17.90	46.00	28.10
1.842	L1	0.2	27.00	56.00	29.00	17.60	46.00	28.40
1.916	L1	0.2	24.40	56.00	31.60	14.90	46.00	31.10
1.966	L1	0.2	26.30	56.00	29.70	17.20	46.00	28.80

Table 6-25. Line Conducted Data with 802.11a UNII Band 1 (L1)

Notes:

1. All modes of operation, data rates, and test channels were investigated and the worst-case emissions are reported in 802.11a mode using 6Mbps on Channel 36. The emissions found were not affected by the choice of channel used during testing.
2. The limit for Class B device(s) from 150kHz to 30MHz are specified in Section 15.207 of the Title 47 CFR.
3. L1 = Phase; N = Neutral
4. Corr. (dB) = Cable loss (dB) + LISN insertion factor (dB)
5. QP/AV Level (dBµV) = QP/AV Analyzer/Receiver Level (dBµV) + Corr. (dB)
6. Margin (dB) = QP/AVLimit (dBµV) - QP/AV Level (dBµV)
7. Traces shown in plot are made using a peak detector.
8. Deviations to the Specifications: None.

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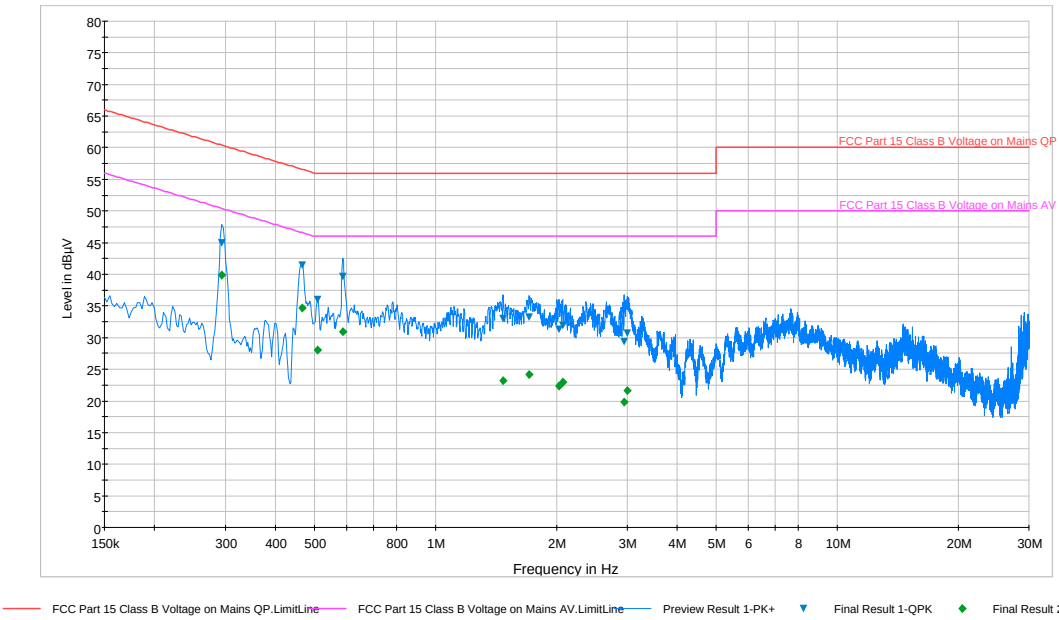
Line-Conducted Test Data (Cont'd)

§15.207; RSS-Gen [7.2.2]



Plot 6-77. Line Conducted Plot with 802.11a UNII Band 1 (N)

Frequency MHz	Line	Corr. dB	QuasiPeak dBµV	Limit dBµV	Margin dB	Average dBµV	Limit dBµV	Margin dB
0.294	N	0.2	45.00	60.40	15.40	39.90	50.40	10.50
0.465	N	0.1	41.50	56.60	15.10	34.70	46.60	11.90
0.508	N	0.1	36.00	56.00	20.00	28.00	46.00	18.00
0.589	N	0.1	39.60	56.00	16.40	30.90	46.00	15.10
1.473	N	0.2	33.00	56.00	23.00	23.20	46.00	22.80
1.712	N	0.2	33.20	56.00	22.80	24.20	46.00	21.80
2.031	N	0.2	31.30	56.00	24.70	22.40	46.00	23.60
2.072	N	0.2	31.90	56.00	24.10	23.00	46.00	23.00
2.949	N	0.2	29.40	56.00	26.60	19.80	46.00	26.20
3.005	N	0.2	30.60	56.00	25.40	21.60	46.00	24.40

Table 6-26. Line Conducted Data with 802.11a UNII Band 1 (N)

Notes:

1. All modes of operation, data rates, and test channels were investigated and the worst-case emissions are reported in 802.11a mode using 6Mbps on Channel 36. The emissions found were not affected by the choice of channel used during testing.
2. The limit for Class B device(s) from 150kHz to 30MHz are specified in Section 15.207 of the Title 47 CFR.
3. L1 = Phase; N = Neutral
4. Corr. (dB) = Cable loss (dB) + LISN insertion factor (dB)
5. QP/AV Level (dBµV) = QP/AV Analyzer/Receiver Level (dBµV) + Corr. (dB)
6. Margin (dB) = QP/AVLimit (dBµV) - QP/AV Level (dBµV)
7. Traces shown in plot are made using a peak detector.
8. Deviations to the Specifications: None.

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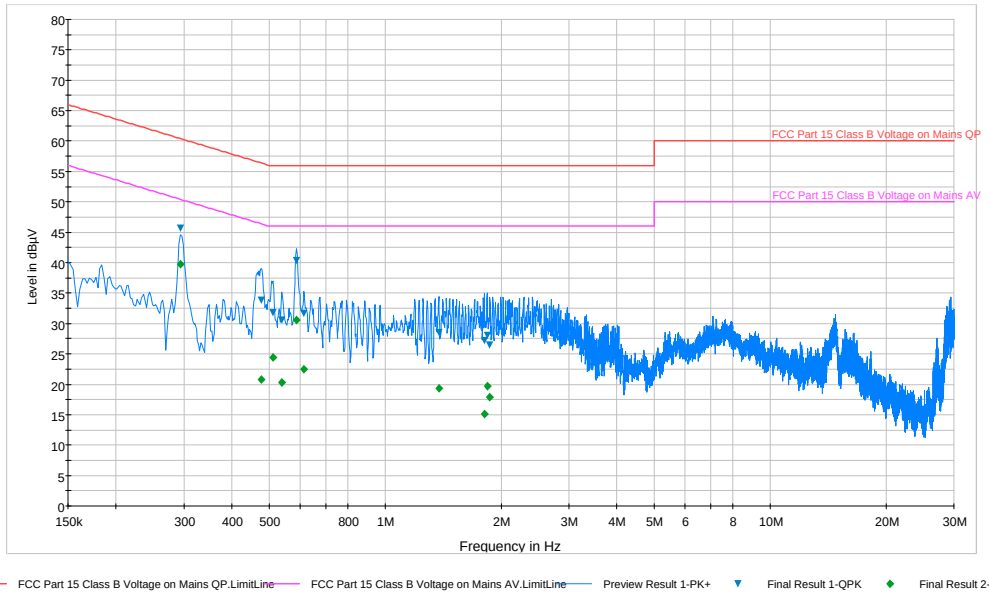
Line-Conducted Test Data (Cont'd)

§15.207; RSS-Gen [7.2.2]



Plot 6-78. Line Conducted Plot with 802.11a UNII Band 2 (L1)

Frequency MHz	Line	Corr. dB	QuasiPeak dBµV	Limit dBµV	Margin dB	Average dBµV	Limit dBµV	Margin dB
0.294	L1	0.1	45.70	60.40	14.70	39.70	50.40	10.70
0.476	L1	0.1	33.80	56.40	22.60	20.80	46.40	25.60
0.510	L1	0.1	31.80	56.00	24.20	24.40	46.00	21.60
0.539	L1	0.1	30.50	56.00	25.50	20.30	46.00	25.70
0.589	L1	0.1	40.40	56.00	15.60	30.60	46.00	15.40
0.616	L1	0.1	31.70	56.00	24.30	22.50	46.00	23.50
1.376	L1	0.2	28.50	56.00	27.50	19.30	46.00	26.70
1.808	L1	0.2	27.20	56.00	28.80	15.10	46.00	30.90
1.840	L1	0.2	28.10	56.00	27.90	19.70	46.00	26.30
1.871	L1	0.2	26.40	56.00	29.60	17.90	46.00	28.10

Table 6-27. Line Conducted Data with 802.11a UNII Band 2 (L1)

Notes:

1. All modes of operation, data rates, and test channels were investigated and the worst-case emissions are reported in 802.11a mode using 6Mbps on Channel 52. The emissions found were not affected by the choice of channel used during testing.
2. The limit for Class B device(s) from 150kHz to 30MHz are specified in Section 15.207 of the Title 47 CFR.
3. L1 = Phase; N = Neutral
4. Corr. (dB) = Cable loss (dB) + LISN insertion factor (dB)
5. QP/AV Level (dBµV) = QP/AV Analyzer/Receiver Level (dBµV) + Corr. (dB)
6. Margin (dB) = QP/AVLimit (dBµV) - QP/AV Level (dBµV)
7. Traces shown in plot are made using a peak detector.
8. Deviations to the Specifications: None.

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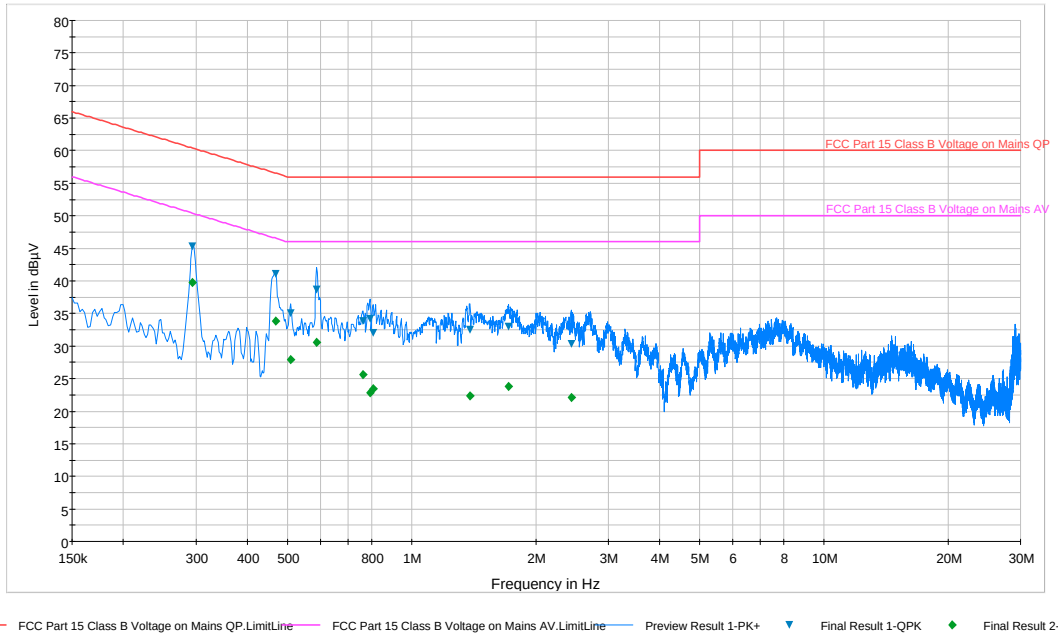
Line-Conducted Test Data (Cont'd)

§15.207; RSS-Gen [7.2.2]



Plot 6-79. Line Conducted Plot with 802.11a UNII Band 2 (N)

Frequency MHz	Line	Corr. dB	QuasiPeak dBµV	Limit dBµV	Margin dB	Average dBµV	Limit dBµV	Margin dB
0.294	N	0.2	45.40	60.40	15.00	39.80	50.40	10.60
0.467	N	0.1	41.10	56.60	15.50	33.90	46.60	12.70
0.508	N	0.1	35.00	56.00	21.00	27.90	46.00	18.10
0.589	N	0.1	38.60	56.00	17.40	30.60	46.00	15.40
0.762	N	0.1	33.80	56.00	22.20	25.70	46.00	20.30
0.791	N	0.1	34.20	56.00	21.80	22.80	46.00	23.20
0.807	N	0.1	32.10	56.00	23.90	23.50	46.00	22.50
1.383	N	0.2	32.50	56.00	23.50	22.40	46.00	23.60
1.718	N	0.2	33.00	56.00	23.00	23.80	46.00	22.20
2.438	N	0.2	30.30	56.00	25.70	22.10	46.00	23.90

Table 6-28. Line Conducted Data with 802.11a UNII Band 2 (N)

Notes:

1. All modes of operation, data rates, and test channels were investigated and the worst-case emissions are reported in 802.11a mode using 6Mbps on Channel 52. The emissions found were not affected by the choice of channel used during testing.
2. The limit for Class B device(s) from 150kHz to 30MHz are specified in Section 15.207 of the Title 47 CFR.
3. L1 = Phase; N = Neutral
4. Corr. (dB) = Cable loss (dB) + LISN insertion factor (dB)
5. QP/AV Level (dBµV) = QP/AV Analyzer/Receiver Level (dBµV) + Corr. (dB)
6. Margin (dB) = QP/AVLimit (dBµV) - QP/AV Level (dBµV)
7. Traces shown in plot are made using a peak detector.
8. Deviations to the Specifications: None.

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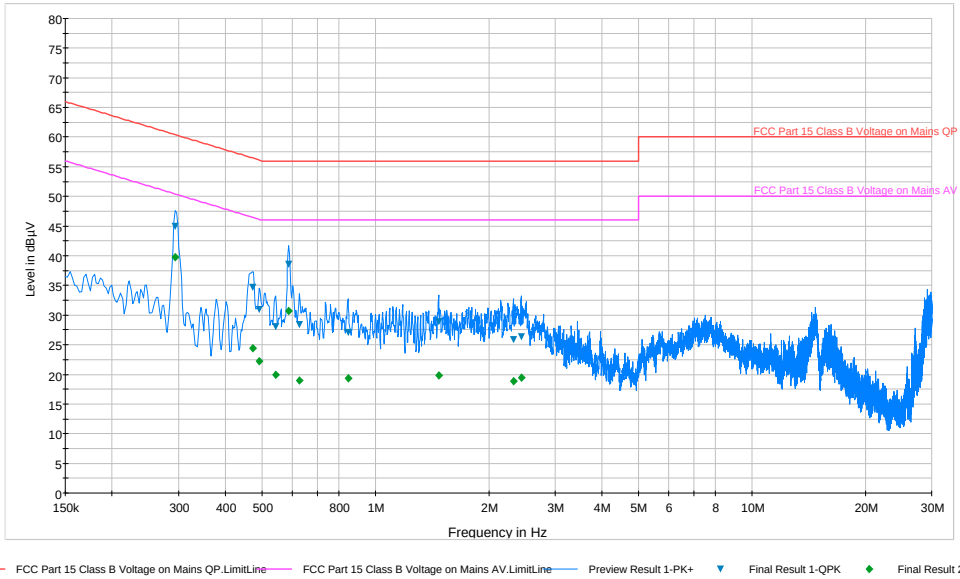
Line-Conducted Test Data (Cont'd)

§15.207; RSS-Gen [7.2.2]



Plot 6-80. Line Conducted Plot with 802.11a UNII Band 3 (L1)

Frequency MHz	Line	Corr. dB	QuasiPeak dBµV	Limit dBµV	Margin dB	Average dBµV	Limit dBµV	Margin dB
0.294	N	0.2	45.00	60.40	15.40	39.80	50.40	10.60
0.465	N	0.1	41.40	56.60	15.20	24.40	46.50	22.10
0.510	N	0.1	34.50	56.00	21.50	22.30	46.10	23.80
0.589	N	0.1	39.20	56.00	16.80	19.90	46.00	26.10
0.780	N	0.1	34.00	56.00	22.00	30.70	46.00	15.30
1.178	N	0.2	31.40	56.00	24.60	19.00	46.00	27.00
1.709	N	0.2	32.80	56.00	23.20	19.30	46.00	26.70
2.461	N	0.2	29.60	56.00	26.40	19.80	46.00	26.20
2.490	N	0.2	28.80	56.00	27.20	18.90	46.00	27.10
2.648	N	0.2	31.00	56.00	25.00	19.40	46.00	26.60

Table 6-29. Line Conducted Plot with 802.11a UNII Band 3 (L1)

Notes:

1. All modes of operation, data rates, and test channels were investigated and the worst-case emissions are reported in 802.11a mode using 6Mbps on Channel 100. The emissions found were not affected by the choice of channel used during testing.
2. The limit for Class B device(s) from 150kHz to 30MHz are specified in Section 15.207 of the Title 47 CFR.
3. L1 = Phase; N = Neutral
4. Corr. (dB) = Cable loss (dB) + LISN insertion factor (dB)
5. QP/AV Level (dBµV) = QP/AV Analyzer/Receiver Level (dBµV) + Corr. (dB)
6. Margin (dB) = QP/AVLimit (dBµV) - QP/AV Level (dBµV)
7. Traces shown in plot are made using a peak detector.
8. Deviations to the Specifications: None.

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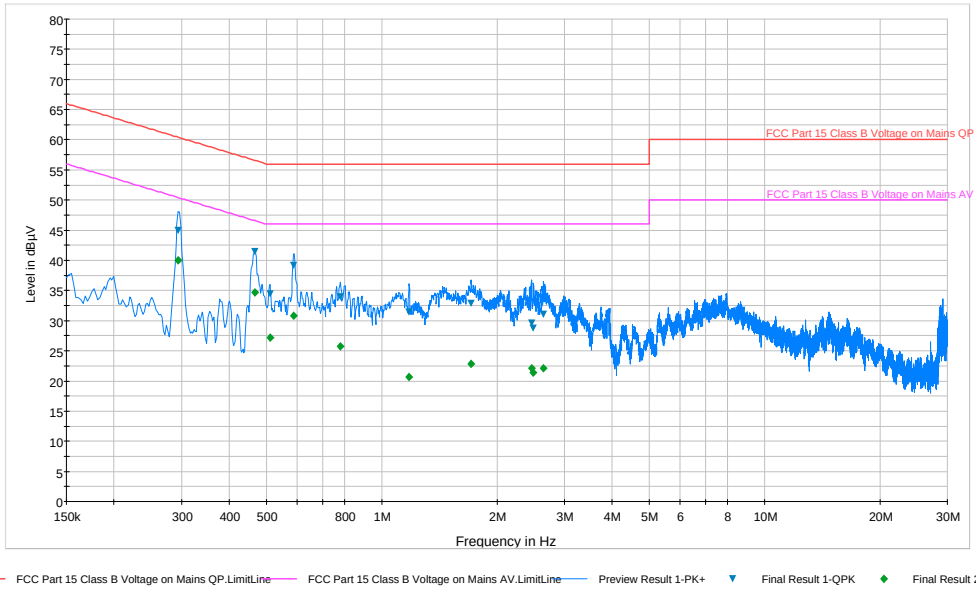
Line-Conducted Test Data (Cont'd)

§15.207; RSS-Gen [7.2.2]



Plot 6-81. Line Conducted Plot with 802.11a UNII Band 3 (N)

Frequency MHz	Line	Corr. dB	QuasiPeak dBµV	Limit dBµV	Margin dB	Average dBµV	Limit dBµV	Margin dB
0.294	N	0.2	45.00	60.40	15.40	39.90	50.40	10.50
0.465	N	0.1	41.40	56.60	15.20	34.70	46.60	11.90
0.510	N	0.1	34.50	56.00	21.50	27.20	46.00	18.80
0.589	N	0.1	39.20	56.00	16.80	30.80	46.00	15.20
0.780	N	0.1	34.00	56.00	22.00	25.70	46.00	20.30
1.178	N	0.2	31.40	56.00	24.60	20.70	46.00	25.30
1.709	N	0.2	32.80	56.00	23.20	22.80	46.00	23.20
2.461	N	0.2	29.60	56.00	26.40	22.20	46.00	23.80
2.490	N	0.2	28.80	56.00	27.20	21.40	46.00	24.60
2.648	N	0.2	31.00	56.00	25.00	22.10	46.00	23.90

Table 6-30. Line Conducted Data with 802.11a UNII Band 3 (N)

Notes:

1. All modes of operation, data rates, and test channels were investigated and the worst-case emissions are reported in 802.11a mode using 6Mbps on Channel 100. The emissions found were not affected by the choice of channel used during testing.
2. The limit for Class B device(s) from 150kHz to 30MHz are specified in Section 15.207 of the Title 47 CFR.
3. L1 = Phase; N = Neutral
4. Corr. (dB) = Cable loss (dB) + LISN insertion factor (dB)
5. QP/AV Level (dBµV) = QP/AV Analyzer/Receiver Level (dBµV) + Corr. (dB)
6. Margin (dB) = QP/AVLimit (dBµV) - QP/AV Level (dBµV)
7. Traces shown in plot are made using a peak detector.
8. Deviations to the Specifications: None.

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7.0 CONCLUSION

The data collected relate only the item(s) tested and show that the **LGE Portable Handset FCC ID: ZNFE970** is in compliance with Part 15E of the FCC Rules and RSS-210 of the Industry Canada Rules.

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