PCTEST ENGINEERING LABORATORY, INC.

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MEASUREMENT REPORT FCC Part 15.407 UNII 802.11a/n/ac

Applicant Name:

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

Date of Testing: 1/16 - 3/7/2017 Test Site/Location: PCTEST Lab, Columbia, MD, USA Test Report Serial No.: 1M1702280075-05.ZNF

FCC ID:

ZNFM710H

APPLICANT:

LG Electronics MobileComm U.S.A

Application Type:

Certification

Model:

Additional Model(s):

EUT Type:

FCC Classification:

FCC Rule Part(s):

Test Procedure(s):

LG-M710H

LGM710H, M710H

Portable Handset

Unlicensed National Information Infrastructure (UNII)

Part 15.407

KDB 789033 D02 v01r03

	Channel		Conducted Power		
UNII Band	Channel Bandwidth (MHz)	Tx Frequency (MHz)	Max. Power (mW)	Max. Power (dBm)	
1		5180 - 5240	10.375	10.16	
2A		5260 - 5320	10.046	10.02	
2C	20	5500 - 5580	9.840	9.93	
2C		5660 - 5700	9.750	9.89	
3		5745 - 5825	9.886	9.95	
1		5190 - 5230	8.375	9.23	
2A		5270 - 5310	8.375	9.23	
2C	40	5510 - 5550	7.780	8.91	
2C		5670 - 5710	7.870	8.96	
3		5755 - 5795	7.691	8.86	
1		5210	7.798	8.92	
2A	80	5290	8.091	9.08	
2C		5530	7.430	8.71	
3		5775	7.211	8.58	

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 KDB 789033 D02 v01r03. 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.

Randy Ortanez President



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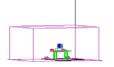
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§ 2.1033 General Information

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			
BASE MODEL:	LG-M710H			
FCC ID:	ZNFM710H			
FCC CLASSIFICATION:	Unlicensed National Information Infrastructure (UNII)			
Test Device Serial No.:	06481, 06358, 06432, ☐ Production ⊠ Pre-Production ☐ Engineering 11382, 06432, 11408			
DATE(S) OF TEST:	1/16 - 3/7/2017			
TEST REPORT S/N:	1M1702280075-05.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'I (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 C63.4-2014 on January 22, 2015.

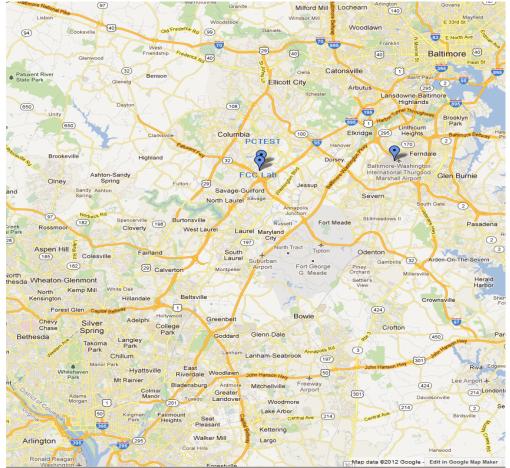


Figure 1-1. Map of the Greater Baltimore and Metropolitan Washington, D.C. area

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PRODUCT INFORMATION 2.0

2.1 **Equipment Description**

The Equipment Under Test (EUT) is the LGE Portable Handset FCC ID: ZNFM710H. The test data contained in this report pertains only to the emissions due to the EUT's UNII transmitter.

2.2 **Device Capabilities**

This device contains the following capabilities:

850/1900 GSM/GPRS/EDGE, 850/1700/1900 WCDMA/HSPA, Multi-band LTE, 802.11b/g/n WLAN, 802.11a/n/ac UNII, Bluetooth (1x, EDR, LE), NFC

	Band 1		Band 2A		Band 2C		Band 3
Ch.	Frequency (MHz)						
36	5180	52	5260	100	5500	149	5745
:	:	:	:	:	:	:	:
42	5210	56	5280	116	5580	157	5785
:	:	:	:	:	:	:	:
48	5240	64	5320	140	5700	165	5825

Table 2-1. 802.11a / 802.11n / 802.11ac (20MHz) Frequency / Channel Operations

Band	1
Dana	

Band 2A

Ch.	Frequency (MHz)
38	5190
:	:
46	5230

Ch.	Frequency (MHz)
54	5270
:	:
62	5310

Band 2C					
Ch.	Frequency (MHz)		Ch.		
102	5510		151		
:	:		:		
110	5550				
:	:				
134	5670]	159		

	Band 3
Ch.	Frequency (MHz)
151	5755
:	•
159	5795

Table 2-2. 802.11n / 802.11ac (40MHz BW) Frequency / Channel Operations

	Band 1			Band 2A			Band 2C			Band 3
Ch.	Frequency (MHz)		Ch.	Frequency (MHz)		Ch.	Frequency (MHz)		Ch.	Frequency (MHz)
42	5210		58	5290		106	5530		155	5775

Table 2-3. 802.11ac (80MHz BW) Frequency / Channel Operations

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5GHz NII operation is possible in 20MHz, and 40MHz, and 80MHz channel bandwidths. The maximum achievable duty cycles for all modes were determined based on measurements performed on a spectrum analyzer in zero-span mode with RBW = 8MHz, VBW = 50MHz, and detector = peak per the guidance of Section B)2)b) of KDB 789033 D02 v01r03. The RBW and VBW were both greater than 50/T, where T is the minimum transmission duration, and the number of sweep points across T was greater than 100. The duty cycles are as follows:

Maximum Achievable Duty Cycles					
802 11 M	Duty Cycle [%]				
802.11 M	ode/Band	ANT1			
	а	99.2			
	n (HT20)	99.2			
	ac (HT20)	98.3			
5GHz	n (HT40)	98.7			
	ac (HT40)	96.4			
	ac (HT80)	93.1			

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) 29.3/32.5, 58.5/65, 87.8/97.5, 117/130, 175.5/195, 234/260, 263.3/292.5, 292.5/325, 351/390, 390/433.3 (ac - 80MHz BW)

2.3 Test Configuration

The EUT was tested per the guidance of KDB 789033 D02 v01r03. ANSI C63.10-2013 was used to reference the appropriate EUT setup for radiated spurious emissions testing and AC line conducted testing. See Sections 3.2 for AC line conducted emissions test setups, 3.3 for radiated emissions test setups, and 7.2, 7.3, 7.4, and 7.5 for antenna port conducted emissions test setups.

2.4 EMI Suppression Device(s)/Modifications

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

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3.0 DESCRIPTION OF TESTS

3.1 Evaluation Procedure

The measurement procedures described in the American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices (ANSI C63.10-2013) and the guidance provided in KDB 789033 D02 v01r03 were used in the measurement of the EUT.

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, $50\Omega/50\mu$ H 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. 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 7.9.

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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. The test site inside the chamber is a 6m x 5.2m elliptical, obstruction-free area in accordance with Figure 5.7 of Clause 5 in ANSI C63.4-2014. A 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. 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 above 1GHz. A 72.4cm high PVC support structure is placed on top of the turntable. A 3" (~7.6cm) sheet of high density polystyrene 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 measurements above 1GHz, a high density expanded polystyrene block is placed on top of the test table to bring the total table height to 1.5m.

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 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, mode of operation, 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 changing the orientation of the EUT through three orthogonal planes and changing the polarity of the receive antenna, whichever produced the worst-case emissions.

3.4 Environmental Conditions

The temperature is controlled within range of 15°C to 35°C. The relative humidity is controlled within range of 10% to 75%. The atmospheric pressure is monitored within the range 86-106kPa (860-1060mbar).

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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 EUT are permanently attached.
- There are no provisions for connection to an external antenna.

Conclusion:

The EUT complies with the requirement of §15.203.

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5.0 MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.10-2013. All measurement uncertainty values are shown with a coverage factor of k = 2 to indicate a 95% level of confidence. The measurement data shown herein meets or exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

Contribution	Expanded Uncertainty (±dB)
Conducted Bench Top Measurements	1.13
Line Conducted Disturbance	3.09
Radiated Disturbance (<1GHz)	4.98
Radiated Disturbance (>1GHz)	5.07
Radiated Disturbance (>18GHz)	5.09

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6.0 TEST EQUIPMENT CALIBRATION DATA

Test Equipment Calibration is traceable to the National Institute of Standards and Technology (NIST). Measurements antennas used during testing were calibrated in accordance to the requirements of ANSI C63.5-2006.

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
-	WL40-1	Conducted Cable Set (40GHz)	4/26/2016	Annual	4/26/2017	WL40-1
-	RE1	Radiated Emissions Cable Set (UHF/EHF)	7/11/2016	Annual	7/11/2017	RE1
Agilent	N9038A	MXE EMI Receiver	4/21/2016	Annual	4/21/2017	MY51210133
Agilent	N9030A	PXA Signal Analyzer (44GHz)	3/1/2016	Annual	3/1/2017	MY52350166
Anritsu	ML2495A	Power Meter	10/16/2015	Biennial	10/16/2017	941001
Anritsu	MA2411B	Pulse Power Sensor	10/14/2015	Biennial	10/14/2017	846215
Com-Power	AL-130	9kHz - 30MHz Loop Antenna	7/30/2015	Biennial	7/30/2017	121034
Com-Power	PAM-103	Pre-Amplifier (1-1000MHz)	2/26/2016	Annual	2/26/2017	441112
Emco	3115	Horn Antenna (1-18GHz)	3/10/2016	Biennial	3/10/2018	9704-5182
Emco	3116	Horn Antenna (18 - 40GHz)	3/27/2015	Triennial	3/27/2018	9203-2178
Espec	ESX-2CA	Environmental Chamber	3/4/2016	Annual	3/4/2017	17620
ETS Lindgren	3160-09	18-26.5 GHz Standard Gain Horn	8/23/2016	Biennial	8/23/2018	135427
ETS Lindgren	3160-10	26.5-40 GHz Standard Gain Horn	8/23/2016	Biennial	8/23/2018	130993
ETS Lindgren	3117	1-18 GHz DRG Horn (Medium)	4/26/2016	Biennial	4/26/2018	125518
Huber+Suhner	Sucoflex 102A	40GHz Radiated Cable	4/26/2016	Annual	4/26/2017	251425001
Narda	EHP-200A	EM Field Probe	3/24/2016	Annual	3/24/2017	170WX50922
Pasternack	NMLC-1	Line Conducted Emissions Cable (NM)	10/14/2016	Annual	10/14/2017	NMLC-1
PCTEST	-	EMC Switch System	7/11/2016	Annual	7/11/2017	NM1
PCTEST	-	EMC Switch System	7/6/2016	Annual	7/6/2017	NM2
Rhode & Schwarz	TS-PR18	Pre-Amplifier	3/7/2016	Annual	3/7/2017	101622
Rohde & Schwarz	TS-PR26	18-26.5 GHz Pre-Amplifier	3/7/2016	Annual	3/7/2017	100040
Rohde & Schwarz	ESU40	EMI Test Receiver (40GHz)	7/15/2016	Annual	7/15/2017	100348
Rohde & Schwarz	TS-PR40	26.5-40 GHz Pre-Amplifier	3/7/2016	Annual	3/7/2017	100037
Rohde & Schwarz	FSW67	Signal / Spectrum Analyzer	7/27/2016	Annual	7/27/2017	103200
Seekonk	NC-100	Torque Wrench 5/16", 8" lbs	3/2/2016	Biennial	3/2/2018	N/A
Solar Electronics	8012-50-R-24-BNC	Line Impedance Stabilization Network	7/30/2015	Biennial	7/30/2017	310233
Sunol	JB5	Bi-Log Antenna (30M - 5GHz)	3/14/2016	Biennial	3/14/2018	A051107

Table 6-1. Annual Test Equipment Calibration Schedule

Notes:

For equipment listed above that has a calibration date or calibration due date that falls within the test date range, care was taken to ensure that this equipment was used after the calibration date and before the calibration due date.

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7.0 TEST RESULTS

7.1 Summary

Company Name:	LG Electronics MobileComm U.S.A
FCC ID:	<u>ZNFM710H</u>
Method/System:	Unlicensed National Information Infrastructure (UNII)

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
N/A	26dB Bandwidth	N/A		PASS	Section 7.2
15.407(e)	6dB Bandwidth	>500kHz(5725-5850MHz)		PASS	Section 7.3
15.407 (a.1.iv), (a.2), (a.3)	Maximum Conducted Output Power	Maximum conducted powers must meet the limits detailed in 15.407 (a)		PASS	Section 7.4
15.407 (a.1.iv), (a.2), (a.3)	Maximum Power Spectral Density	Maximum power spectral density must meet the limits detailed in 15.407 (a)	CONDUCTED	PASS	Section 7.5
15.407(g)	Frequency Stability	N/A		PASS	Section 7.6
15.407(h)	Dynamic Frequency Selection	See DFS Test Report		PASS	See DFS Test Report
15.407(b.1), (2), (3), (4)	Undesirable Emissions	Undesirable emissions must meet the limits detailed in 15.407(b)		PASS	Section 7.7
15.205, 15.407(b.1), (4), (5), (6)	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	Emissions in restricted bands must meet the radiated limits detailed in 15.209	RADIATED	PASS	Section 7.7, 7.8
15.407	AC Conducted Emissions 150kHz – 30MHz	< FCC 15.207 limits	LINE CONDUCTED	PASS	Section 7.9

Table 7-1. Summary of Test Results

Notes:

- 1) All channels, modes, and modulations/data rates were investigated among all UNII bands. 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.
- 4) For conducted spurious emissions, automated test software was used to measure emissions and capture the corresponding plots necessary to show compliance. The measurement software utilized is PCTEST "UNII Automation," Version 4.4.
- 5) For radiated band edge, automated test software was used to measure emissions and capture the corresponding plots necessary to show compliance. The measurement software utilized is PCTEST "Chamber Automation," Version 1.1.5.

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7.2 26dB Bandwidth Measurement – 802.11a/n/ac

Test Overview and Limit

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 duty cycle, at its maximum power control level, as defined in KDB 789033 D02 v01r03, and 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.

Test Procedure Used

KDB 789033 D02 v01r03 - Section C

Test Settings

- The signal analyzers' automatic bandwidth measurement capability was used to perform the 26dB bandwidth measurement. The "X" dB bandwidth parameter was set to X = 26. The automatic bandwidth measurement function also has the capability of simultaneously measuring the 99% occupied bandwidth. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
- 2. RBW = approximately 1% of the emission bandwidth
- 3. VBW <u>></u> 3 x RBW
- 4. Detector = Peak
- 5. Trace mode = max hold

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

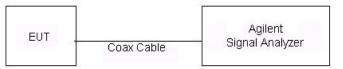


Figure 7-1. Test Instrument & Measurement Setup

Test Notes

None.

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	Frequency [MHz]	Channel No.	802.11 Mode	Data Rate [Mbps]	Measured 26dB Bandwidth [MHz]
	5180	36	а	6	21.87
	5200	40	а	6	21.62
	5240	48	а	6	21.50
Ŧ	5180	36	n (20MHz)	6.5/7.2 (MCS0)	22.28
Band 1	5200	40	n (20MHz)	6.5/7.2 (MCS0)	22.10
B	5240	48	n (20MHz)	6.5/7.2 (MCS0)	22.00
	5190	38	n (40MHz)	13.5/15 (MCS0)	42.14
	5230	46	n (40MHz)	13.5/15 (MCS0)	43.81
	5210	42	ac (80MHz)	29.3/32.5 (MCS0)	83.86
	5260	52	а	6	21.72
	5280	56	а	6	21.90
	5320	64	а	6	21.61
2A	5260	52	n (20MHz)	6.5/7.2 (MCS0)	22.07
Band 2A	5280	56	n (20MHz)	6.5/7.2 (MCS0)	22.49
Ba	5320	64	n (20MHz)	6.5/7.2 (MCS0)	21.98
	5270	54	n (40MHz)	13.5/15 (MCS0)	43.04
	5310	62	n (40MHz)	13.5/15 (MCS0)	43.18
	5290	58	ac (80MHz)	29.3/32.5 (MCS0)	84.29
	5500	100	а	6	21.59
	5580	116	а	6	22.33
	5700	140	а	6	21.77
0	5500	100	n (20MHz)	6.5/7.2 (MCS0)	22.16
Band 2C	5580	116	n (20MHz)	6.5/7.2 (MCS0)	21.92
anc	5700	140	n (20MHz)	6.5/7.2 (MCS0)	22.34
ш	5510	102	n (40MHz)	13.5/15 (MCS0)	42.42
	5550	110	n (40MHz)	13.5/15 (MCS0)	43.39
	5670	134	n (40MHz)	13.5/15 (MCS0)	43.39
	5530	106	ac (80MHz)	29.3/32.5 (MCS0)	83.90

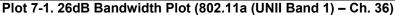
Table 7-2. Conducted Bandwidth Measurements

FCC ID: ZNFM710H		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕑 LG	Approved by: Quality Manager
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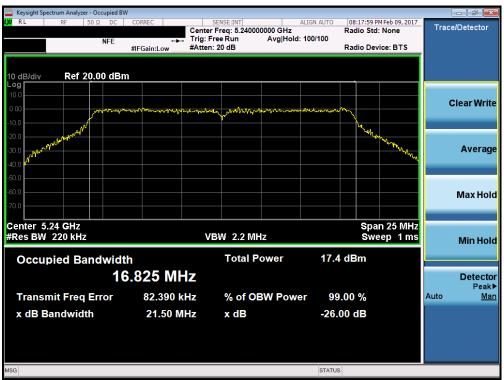


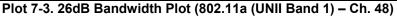


Plot 7-2. 26dB Bandwidth Plot (802.11a (UNII Band 1) - Ch. 40)

FCC ID: ZNFM710H		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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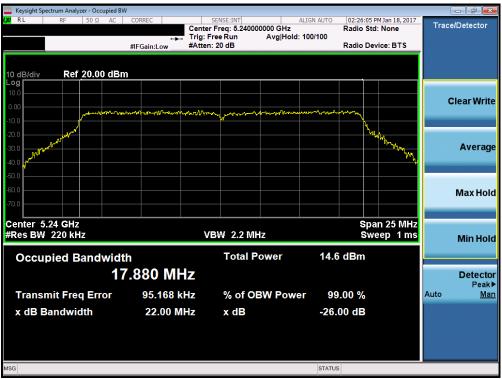
Plot 7-4. 26dB Bandwidth Plot (20MHz BW 802.11n (UNII Band 1) - Ch. 36)

FCC ID: ZNFM710H		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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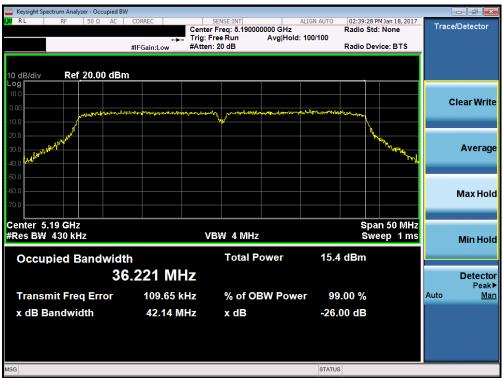
Plot 7-5. 26dB Bandwidth Plot (20MHz BW 802.11n (UNII Band 1) - Ch. 40)



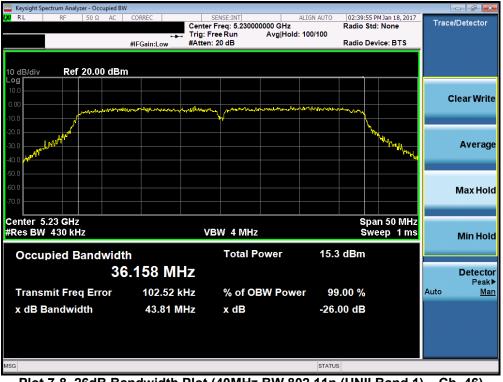
Plot 7-6. 26dB Bandwidth Plot (20MHz BW 802.11n (UNII Band 1) - Ch. 48)

FCC ID: ZNFM710H		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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Plot 7-7. 26dB Bandwidth Plot (40MHz BW 802.11n (UNII Band 1) - Ch. 38)



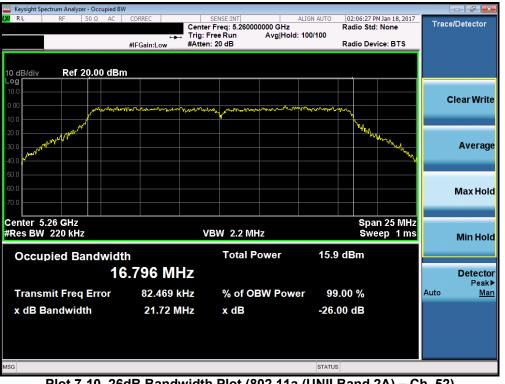
Plot 7-8. 26dB Bandwidth Plot (40MHz BW 802.11n (UNII Band 1) - Ch. 46)

FCC ID: ZNFM710H		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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Keysight Spectrum Analyzer - Occupied BV	1				
UXA RL RF 50Ω AC	+++ Trig:	sense:INT r Freq: 5.210000000 GHz Free Run Avg Hol n: 20 dB	d: 100/100	03:01:12 PMJan 18, 2017 Radio Std: None Radio Device: BTS	Trace/Detector
10 dB/div Ref 20.00 dBn	1				
10.0 0.00 -10.0	neer of Day to make on the other of the other of the other of the other of the other	- Aral Arnoldinal-Arterny arternal all	ale-motenter-lor-lor-	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	Clear Write
-20.0 -30.0 -40.0				- Mirmon	Average
-50.0 -60.0 -70.0					Max Hold
Center 5.21 GHz #Res BW 820 kHz		/BW 8 MHz		Span 100 MHz Sweep 1 ms	Min Hold
Occupied Bandwidt		Total Power	16.3	dBm	
74	.868 MHz				Detector Peak▶
Transmit Freq Error	287.45 kHz	% of OBW Pow	ver 99.	00 %	Auto <u>Man</u>
x dB Bandwidth	83.86 MHz	x dB	-26.0	0 dB	
MSG			STATUS		

Plot 7-9. 26dB Bandwidth Plot (80MHz BW 802.11ac (UNII Band 1) – Ch. 42)

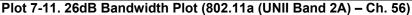


Plot 7-10. 26dB Bandwidth Plot (802.11a (UNII Band 2A) – Ch. 52)

FCC ID: ZNFM710H		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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Plot 7-12. 26dB Bandwidth Plot (802.11a (UNII Band 2A) - Ch. 64)

FCC ID: ZNFM710H		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
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Plot 7-13. 26dB Bandwidth Plot (20MHz BW 802.11n (UNII Band 2A) - Ch. 52)



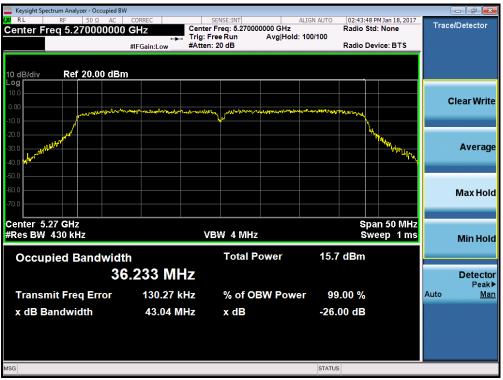
Plot 7-14. 26dB Bandwidth Plot (20MHz BW 802.11n (UNII Band 2A) - Ch. 56)

FCC ID: ZNFM710H		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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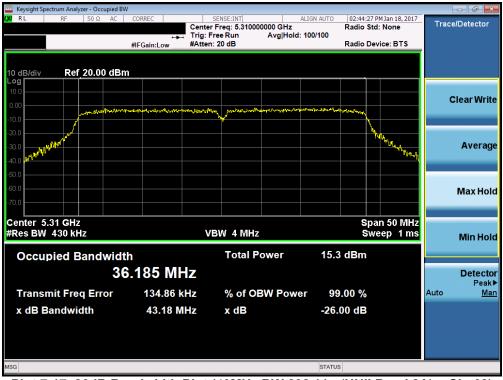
Plot 7-15. 26dB Bandwidth Plot (20MHz BW 802.11n (UNII Band 2A) - Ch. 64)



Plot 7-16. 26dB Bandwidth Plot (40MHz BW 802.11n (UNII Band 2A) - Ch. 54)

FCC ID: ZNFM710H		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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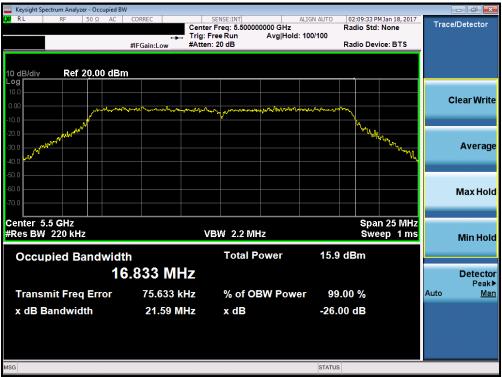
Plot 7-17. 26dB Bandwidth Plot (40MHz BW 802.11n (UNII Band 2A) - Ch. 62)

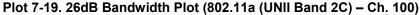


Plot 7-18. 26dB Bandwidth Plot (80MHz BW 802.11ac (UNII Band 2A) - Ch. 58)

FCC ID: ZNFM710H		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕕 LG	Approved by: Quality Manager
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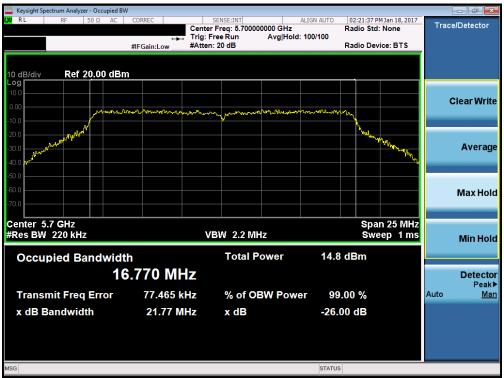


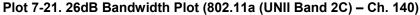


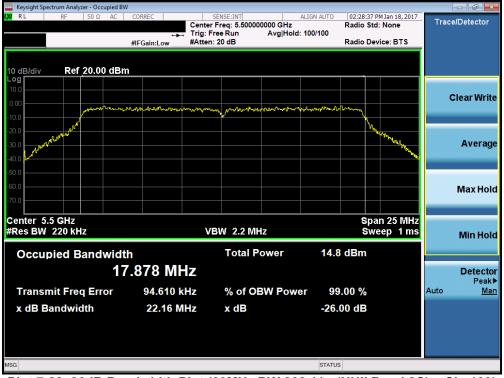
Plot 7-20. 26dB Bandwidth Plot (802.11a (UNII Band 2C) - Ch. 116)

FCC ID: ZNFM710H		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
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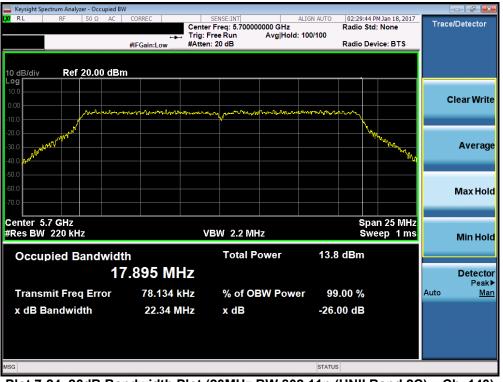
Plot 7-22. 26dB Bandwidth Plot (20MHz BW 802.11n (UNII Band 2C) - Ch. 100)

FCC ID: ZNFM710H		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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Plot 7-23. 26dB Bandwidth Plot (20MHz BW 802.11n (UNII Band 2C) - Ch. 116)



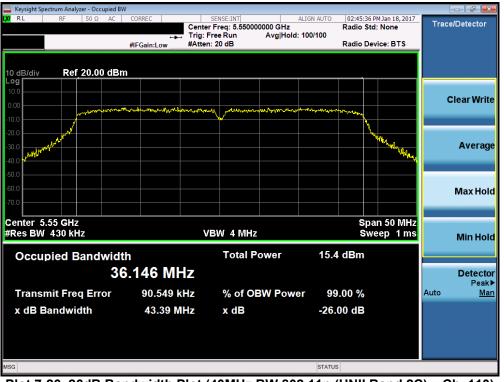
Plot 7-24. 26dB Bandwidth Plot (20MHz BW 802.11n (UNII Band 2C) - Ch. 140)

FCC ID: ZNFM710H		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕕 LG	Approved by: Quality Manager
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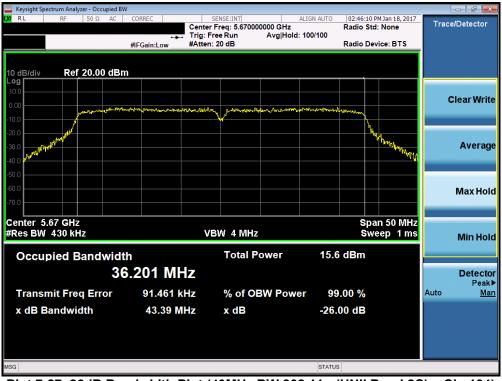
Plot 7-25. 26dB Bandwidth Plot (40MHz BW 802.11n (UNII Band 2C) - Ch. 102)



Plot 7-26. 26dB Bandwidth Plot (40MHz BW 802.11n (UNII Band 2C) - Ch. 110)

FCC ID: ZNFM710H		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕕 LG	Approved by: Quality Manager	
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Plot 7-27. 26dB Bandwidth Plot (40MHz BW 802.11n (UNII Band 2C) - Ch. 134)



Plot 7-28. 26dB Bandwidth Plot (80MHz BW 802.11ac (UNII Band 2C) - Ch. 106)

FCC ID: ZNFM710H		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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7.3 6dB Bandwidth Measurement – 802.11a/n/ac §15.407 (e)

Test Overview and Limit

The bandwidth at 6dB 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 duty cycle, at its maximum power control level, as defined in KDB 789033 D02 v01r03, and at the appropriate frequencies. The spectrum analyzer's bandwidth measurement function is configured to measure the 6dB bandwidth.

In the 5.725 – 5.850GHz band, the 6dB bandwidth must be \geq 500 kHz.

Test Procedure Used

KDB 789033 D02 v01r03 - Section C

Test Settings

- The signal analyzers' automatic bandwidth measurement capability was used to perform the 6dB bandwidth measurement. The "X" dB bandwidth parameter was set to X = 6. The automatic bandwidth measurement function also has the capability of simultaneously measuring the 99% occupied bandwidth. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
- 2. RBW = 100 kHz
- 3. VBW <u>></u> 3 x RBW
- 4. Detector = Peak
- 5. Trace mode = max hold
- 6. Sweep = auto couple

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

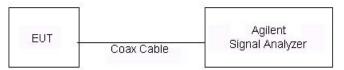


Figure 7-2. Test Instrument & Measurement Setup

Test Notes

None.

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Antenna-1 6 dB Bandwidth Measurements

_	Frequency [MHz]	Channel No.	802.11 Mode	Data Rate [Mbps]	Measured 6dB Bandwidth [MHz]
	5745	149	а	6	16.40
	5785	157	а	6	16.44
	5825	165	а	6	16.38
e	5745	149	n (20MHz)	6.5/7.2 (MCS0)	17.62
Band	5785	157	n (20MHz)	6.5/7.2 (MCS0)	17.60
ä	5825	165	n (20MHz)	6.5/7.2 (MCS0)	17.65
	5755	151	n (40MHz)	13.5/15 (MCS0)	35.54
	5795	159	n (40MHz)	13.5/15 (MCS0)	35.80
	5775	155	ac (80MHz)	29.3/32.5 (MCS0)	75.20

 Table 7-3. Conducted Bandwidth Measurements

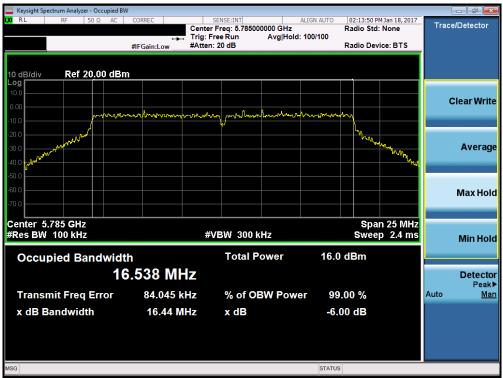


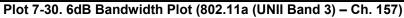
Plot 7-29. 6dB Bandwidth Plot (802.11a (UNII Band 3) - Ch. 149)

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Plot 7-31. 6dB Bandwidth Plot (802.11a (UNII Band 3) - Ch. 165)

FCC ID: ZNFM710H		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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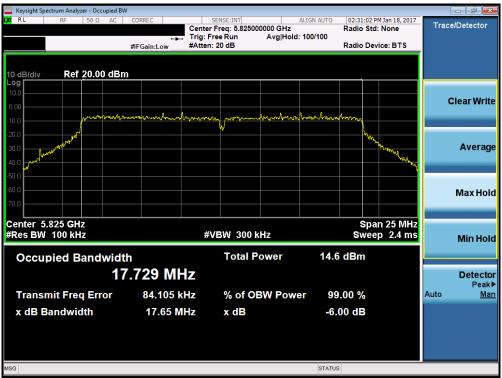
Plot 7-32. 6dB Bandwidth Plot (20MHz BW 802.11n (UNII Band 3) - Ch. 149)



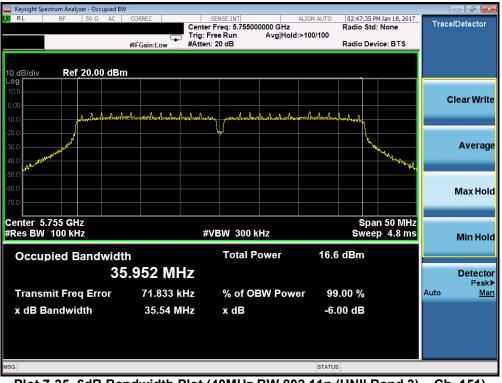
Plot 7-33. 6dB Bandwidth Plot (20MHz BW 802.11n (UNII Band 3) - Ch. 157)

FCC ID: ZNFM710H		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕕 LG	Approved by: Quality Manager
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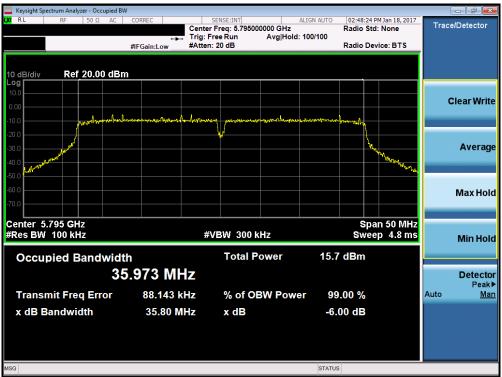
Plot 7-34. 6dB Bandwidth Plot (20MHz BW 802.11n (UNII Band 3) - Ch. 165)



Plot 7-35. 6dB Bandwidth Plot (40MHz BW 802.11n (UNII Band 3) - Ch. 151)

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Plot 7-36. 6dB Bandwidth Plot (40MHz BW 802.11n (UNII Band 3) - Ch. 159)



Plot 7-37. 6dB Bandwidth Plot (80MHz BW 802.11ac (UNII Band 3) - Ch. 155)

FCC ID: ZNFM710H		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕕 LG	Approved by: Quality Manager
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7.4 UNII Output Power Measurement – 802.11a/n/ac §15.407(a.1.iv) §15.407(a.2) §15.407(a.3)

Test Overview and Limits

A transmitter antenna terminal of the EUT is connected to the input of an RF pulse power sensor. Measurement is made using a broadband average power meter while the EUT is operating at its maximum duty cycle, at its maximum power control level, as defined in KDB 789033 D02 v01r03, and at the appropriate frequencies.

In the 5.15 – 5.25GHz band, the maximum permissible conducted output power is 250mW (23.98dBm).

In the 5.25 – 5.35GHz band, the maximum permissible conducted output power is the lesser of 250mW (23.98dBm) and 11 dBm + $10\log_{10}(26dB BW) = 11 dBm + 10\log_{10}(21.61) = 24.35dBm$.

In the 5.47 – 5.725GHz band, the maximum permissible conducted output power is the lesser of 250mW (23.98dBm) and 11 dBm + $10log_{10}(26dB BW) = 11 dBm + <math>10log_{10}(21.59) = 24.34dBm$.

In the 5.725 – 5.850GHz band, the maximum permissible conducted output power is 1W (30dBm).

Test Procedure Used

KDB 789033 D02 v01r03 – Section E)3)b) Method PM-G

Test Settings

Average power measurements were performed only when the EUT was transmitting at its maximum power control level using a broadband power meter with a pulse sensor. The power meter implemented triggering and gating capabilities which were set up such that power measurements were recorded only during the ON time of the transmitter. The trace was averaged over 100 traces to obtain the final measured average power.

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

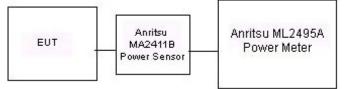


Figure 7-3. Test Instrument & Measurement Setup

Test Notes

None

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			5GHz (20MHz) Conducted Power [dBm]			
Freq [MHz]	Channel	Detector	IEEE Transmission Mode			
			802.11a	802.11n	802.11ac	
5180	36	AVG	10.03	9.05	9.74	
5200	40	AVG	10.16	9.06	9.62	
5220	44	AVG	10.14	9.11	9.61	
5240	48	AVG	9.97	8.92	9.54	
5260	52	AVG	10.02	8.93	9.71	
5280	56	AVG	9.99	9.01	9.52	
5300	60	AVG	9.39	7.98	8.67	
5320	64	AVG	9.02	7.95	8.69	
5500	100	AVG	9.93	9.04	9.26	
5520	104	AVG	9.88	8.72	9.23	
5540	108	AVG	9.92	8.77	9.32	
5560	112	AVG	9.98	8.74	9.34	
5580	116	AVG	9.91	8.77	9.26	
5660	132	AVG	9.89	8.79	9.27	
5680	136	AVG	9.06	8.06	8.33	
5700	140	AVG	9.18	7.91	8.31	
5745	149	AVG	9.77	8.79	9.24	
5765	153	AVG	9.94	8.91	9.25	
5785	157	AVG	9.95	8.87	9.14	
5805	161	AVG	9.89	8.76	9.14	
5825	165	AVG	9.74	8.74	9.17	

Table 7-4. 20MHz BW (UNII) Maximum Conducted Output Power

Channel	Detector	5GHz (40MHz) Conducted Power [dBm] IEEE Transmission Mode		
38	AVG	9.23	9.19	
46	AVG	9.21	9.19	
54	AVG	9.23	8.86	
62	AVG	9.13	8.75	
102	AVG	8.84	8.42	
110	AVG	8.91	8.21	
134	AVG	8.96	8.30	
151	AVG	8.86	8.32	
159	AVG	8.83	8.26	
	38 46 54 62 102 110 134 151	38 AVG 46 AVG 54 AVG 62 AVG 102 AVG 110 AVG 134 AVG 151 AVG	Detector Powe IEEE Trans 38 AVG 9.23 46 AVG 9.23 46 AVG 9.23 54 AVG 9.23 62 AVG 9.13 102 AVG 8.84 110 AVG 8.91 134 AVG 8.96 151 AVG 8.86	

Table 7-5. 40MHz BW (UNII) Maximum Conducted Output Power

FCC ID: ZNFM710H		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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5GHz	(80MHz) Con	ducted Powe	r [dBm]		
Freq [MHz]	Channel	Detector	IEEE Transmission M ode		
			802.11ac		
5210	42	AVG	8.92		
5290	58	AVG	9.08		
5530	106	AVG	8.71		
5775	155	AVG	8.58		

Table 7-6. 80MHz BW (UNII) Maximum Conducted Output Power

FCC ID: ZNFM710H		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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7.5 Maximum Power Spectral Density – 802.11a/n/ac §15.407(a.1.iv) §15.407(a.2) §15.407(a.3)

Test Overview and Limit

The spectrum analyzer was connected to the antenna terminal while the EUT was operating at its maximum duty cycle, at its maximum power control level, as defined in KDB 789033 D02 v01r03, and at the appropriate frequencies. Method SA-1, as defined in KDB 789033 D02 v01r03, was used to measure the power spectral density.

In the 5.15 – 5.25GHz, 5.25 – 5.35GHz, 5.47 – 5.725GHz bands, the maximum permissible power spectral density is 11dBm/MHz.

In the 5.725 – 5.850GHz band, the maximum permissible power spectral density is 30dBm/500kHz.

Test Procedure Used

KDB 789033 D02 v01r03 - Section F

Test Settings

- 1. Analyzer was set to the center frequency of the UNII channel under investigation
- 2. Span was set to encompass the entire emission bandwidth of the signal
- 3. RBW = 1MHz
- 4. VBW = 3MHz
- 5. Number of sweep points $\geq 2 \times (\text{span/RBW})$
- 6. Sweep time = auto
- 7. Detector = power averaging (RMS)
- 8. Trigger was set to free run for all modes
- 9. Trace was averaged over 100 sweeps
- 10. The peak search function of the spectrum analyzer was used to find the peak of the spectrum.

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

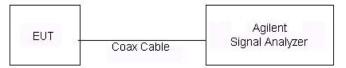


Figure 7-4. Test Instrument & Measurement Setup

Test Notes

None

FCC ID: ZNFM710H		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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	Frequency [MHz]	Channel No.	802.11 Mode	Data Rate [Mbps]		Max Permissible Power Density [dBm/MHz]	Margin [dB]	Pass / Fail
	5180	36	а	6	-0.91	11.0	-11.91	Pass
	5200	40	а	6	-1.33	11.0	-12.33	Pass
	5240	48	а	6	0.57	11.0	-10.43	Pass
-	5180	36	n (20MHz)	6.5/7.2 (MCS0)	-2.22	11.0	-13.22	Pass
Band	5200	40	n (20MHz)	6.5/7.2 (MCS0)	-2.59	11.0	-13.59	Pass
ä	5240	48	n (20MHz)	6.5/7.2 (MCS0)	-2.44	11.0	-13.44	Pass
	5190	38	n (40MHz)	13.5/15 (MCS0)	-4.74	11.0	-15.74	Pass
	5230	46	n (40MHz)	13.5/15 (MCS0)	-4.91	11.0	-15.91	Pass
	5210	42	ac (80MHz)	29.3/32.5 (MCS0)	-7.51	11.0	-18.51	Pass
	5260	52	а	6	-0.91	11.0	-11.91	Pass
	5280	56	а	6	-1.03	11.0	-12.03	Pass
	5320	64	а	6	-2.38	11.0	-13.38	Pass
2A	5260	52	n (20MHz)	6.5/7.2 (MCS0)	-2.33	11.0	-13.33	Pass
Band	5280	56	n (20MHz)	6.5/7.2 (MCS0)	-2.25	11.0	-13.25	Pass
Ba	5320	64	n (20MHz)	6.5/7.2 (MCS0)	-3.64	11.0	-14.64	Pass
	5270	54	n (40MHz)	13.5/15 (MCS0)	-4.66	11.0	-15.66	Pass
	5310	62	n (40MHz)	13.5/15 (MCS0)	-4.82	11.0	-15.82	Pass
	5290	58	ac (80MHz)	29.3/32.5 (MCS0)	-7.49	11.0	-18.49	Pass
	5500	100	а	6	-1.25	11.0	-12.25	Pass
	5580	116	а	6	-1.07	11.0	-12.07	Pass
	5700	140	а	6	-2.43	11.0	-13.43	Pass
0	5500	100	n (20MHz)	6.5/7.2 (MCS0)	-2.53	11.0	-13.53	Pass
d 2C	5580	116	n (20MHz)	6.5/7.2 (MCS0)	-2.21	11.0	-13.21	Pass
Band	5700	140	n (20MHz)	6.5/7.2 (MCS0)	-3.22	11.0	-14.22	Pass
	5510	102	n (40MHz)	13.5/15 (MCS0)	-5.10	11.0	-16.10	Pass
	5550	110	n (40MHz)	13.5/15 (MCS0)	-5.20	11.0	-16.20	Pass
	5670	134	n (40MHz)	13.5/15 (MCS0)	-4.92	11.0	-15.92	Pass
	5530	106	ac (80MHz)	29.3/32.5 (MCS0)	-7.82	11.0	-18.82	Pass

Table 7-7. Bands 1, 2A, 2C Conducted Power Spectral Density Measurements

FCC ID: ZNFM710H		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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	ectrum Analyz	er - Swe	pt SA										
LXI RL	RF	50 Ω	AC	CORREC			SENSE:INT	#Avg Typ	ALIGN AUTO		M Jan 18, 2017 E 1 2 3 4 5 6	F	requency
				PNO: F IFGain:	ast 🖵 Low		Free Run n: 26 dB			TYI Di			Auto Tune
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-15.0	J.									The second secon			
-25.0	www.www.www.									<u> </u>	M. M	5.19	Stop Fre 2500000 GH
-35.0											The second second		
-45.0													CF Ste 2.500000 MH
												Auto	2.500000 MH Ma
-55.0													
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-05.0													он
-75.0													
													Scale Typ
Center 5.										Span 2	5.00 MHz	Log	Li
#Res BW	1.0 MHz				#VBW	3.0 M	HZ				1001 pts)		
MSG									STATUS	5			

Plot 7-38. Power Spectral Density Plot (802.11a (UNII Band 1) - Ch. 36)



Plot 7-39. Power Spectral Density Plot (802.11a (UNII Band 1) - Ch. 40)

FCC ID: ZNFM710H		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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	ectrum Analyz											
RL	RF	50 Ω DC	CORREC		SENSE:I		#Avg Typ	ALIGN AUTO e: RMS	TRAC	M Feb 09, 2017 E 1 2 3 4 5 6 PE A WWWW T A N N N N N	Fi	requency
0 dB/div		et 0.09 dB .00 dBm	IFGain:Lo	ow A	Atten: 26 dB			Mkr1		600 GHz 57 dBm		Auto Tun
.00		and the second s	ووجاويا ورواري والمراجع	non and the state of the state	arrent in a second	4917-129-14-1	¹		-			Center Fre 0000000 GH
5.0									- Vor		5.22	Start Fre 7500000 GF
5.0 5.0	weller W									Whentow half for the state of t	5.25	Stop Fre 2500000 GH
5.0											Auto	CF Ste 2.500000 MI M
5.0												Freq Offs 01
5.0												Scale Typ
	24000 GI 1.0 MHz		#	VBW 3.0) MHz			Sweep 1	Span 2 .000 ms (5.00 MHz 1001 pts)	Log	L
G								STATUS	3			





Plot 7-41. Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 1) - Ch. 36)

FCC ID: ZNFM710H		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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	ectrum Analyze						
KU <mark>RL</mark>	RF	50 Ω AC	CORREC	SENSE:INT	ALIGN AUTO #Avg Type: RMS	02:23:33 PM Jan 18, 2017 TRACE 1 2 3 4 5 6	Frequency
0 dB/div	Ref Offse Ref 15.		PNO: Fast IFGain:Low	☐ Trig: Free Run Atten: 26 dB	• 1	5.206 100 GHz -2.59 dBm	Auto Tur
. og 5.00					↓ 1		Center Fre 5.200000000 Gi
15.0							Start Fre 5.187500000 GH
25.0 35.0	we with the					Vite Market	Stop Fr 5.212500000 G
\$5.0 							CF Ste 2.500000 Mi <u>Auto</u> Mi
65.0							Freq Offs 0
75.0							Scale Typ
	20000 GH 1.0 MHz	lz	#VBV	V 3.0 MHz	Sweep 1	Span 25.00 MHz .000 ms (1001 pts)	Log <u>L</u>
SG					STATU	3	

Plot 7-42. Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 1) - Ch. 40)



Plot 7-43. Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 1) - Ch. 48)

FCC ID: ZNFM710H		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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	ectrum Analyzer -						
U RL	RF 50	Ω AC	CORREC	SENSE:INT	ALIGN AUTO #Avg Type: RMS	02:39:35 PM Jan 18, 2017 TRACE 1 2 3 4 5 6 TYPE A WWWW DET A N N N N	Frequency
10 dB/div	Ref Offset (Ref 15.00	0.09 dB) dBm	IFGain:Low	Atten: 26 dB	Mł	r1 5.202 00 GHz -4.74 dBm	
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35.0	www.					hing have been seen as a second secon	Stop Fre 5.215000000 GH
45.0 45.0							CF Ste 5.000000 M⊢ <u>Auto</u> Ma
65.0							Freq Offs 0 F
75.0							Scale Typ
enter 5. Res BW	19000 GHz 1.0 MHz		#VBW	3.0 MHz	Sweep	Span 50.00 MHz 1.000 ms (1001 pts)	Log <u>Li</u>
ISG					STAT	US	





Plot 7-45. Power Spectral Density Plot (40MHz BW 802.11n (UNII Band 1) - Ch. 46)

FCC ID: ZNFM710H		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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Plot 7-47. Power Spectral Density Plot (802.11a (UNII Band 2A) - Ch. 52)

FCC ID: ZNFM710H		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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	ectrum Analyze											_	
L <mark>XI</mark> RL	RF	50 Ω	AC	CORREC			SENSE:INT	#Avg Typ	ALIGN AUTO e: RMS	TRAC	4 Jan 18, 2017 E 1 2 3 4 5 6	F	requency
				PNO: Fa	ast 🖵 .ow	Trig: Fi Atten:	ree Run 26 dB			TYF De			
10 dB/div Log	Ref Offse Ref 15.							Mkr1 5.287 500 GHz -1.03 dBm				Auto Tune	
5.00			man ann Aulianach			(Perdugutentetrury)				1			Center Freq 0000000 GHz
-5.00												5.26	Start Fred 7500000 GHz
-25.0	Weller and									Ĩ,	North Star	5.29	Stop Fred 2500000 GHz
-45.0												Auto	CF Step 2.500000 MH: Mar
-65.0													Freq Offse 0 H
-75.0													Scale Type
Center 5.2 #Res BW		łz		#	≠VBW	3.0 MH	z		Sweep 1	Span 2 .000 ms (5.00 MHz 1001 pts)	Log	Lir
MSG									STATUS	3			

Plot 7-48. Power Spectral Density Plot (802.11a (UNII Band 2A) – Ch. 56)



Plot 7-49. Power Spectral Density Plot (802.11a (UNII Band 2A) - Ch. 64)

FCC ID: ZNFM710H		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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RF 50 9	Ω AC	CORREC	SENSE:I		ALIGN AUTO		M Jan 18, 2017		
		PNO: Fast	Trig: Free Ru	#Avg	Type: RMS	TRAC	E 1 2 3 4 5 6 E A WWWW A NNNNN	Fre	quency
		IFGain:Low	Atten: 26 dB		Mkr1	5.266 5	50 GHz		Auto Tur
	and the loss state of the				1	•			e nter Fre 000000 GH
									Start Fre
x4							William Marker		Stop Fr 500000 GI
									CF Ste 500000 MI M
								F	req Offs 0
									cale Ty
000 GHz 0 MHz		#VBV	V 3.0 MHz		Sweep 1	Span 2 .000 ms (3.00 191112	Log	Ĺ
	Ref 15.00		Ref 15.00 dBm	Ref 15.00 dBm	Ref 15.00 dBm	Ref 15.00 dBm	Ref 15.00 dBm -2. 1 1 <t< td=""><td>Ref 15.00 dBm -2.33 dBm - - -</td><td>Ref Offset 0.09 dB -2.33 dBm -2.33 dBm -2.33 dBm</td></t<>	Ref 15.00 dBm -2.33 dBm - - -	Ref Offset 0.09 dB -2.33 dBm -2.33 dBm -2.33 dBm

Plot 7-50. Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 2A) - Ch. 52)



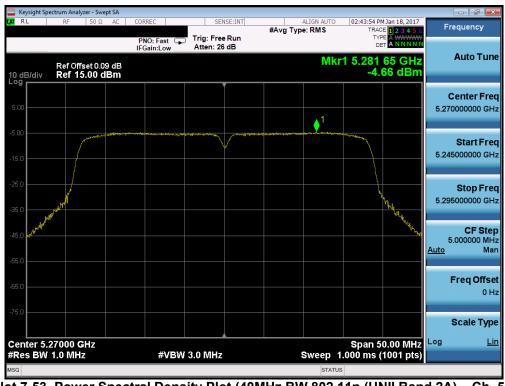
Plot 7-51. Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 2A) - Ch. 56)

FCC ID: ZNFM710H		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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Keysight Spectrum Anal	50 Ω AC	CORREC	SENSE:INT		ALIGN AUTO		M Jan 18, 2017	
		PNO: Fast	Trig: Free Run	#Avg Type	e: RMS	TRAC TYF	E 1 2 3 4 5 6 E A WWWW A NNNN	Frequency
		IFGain:Low	Atten: 26 dB					
	fset 0.09 dB 5.00 dBm				Mkr1	5.324 1	50 GHz 64 dBm	Auto Tu
	5.00 dbm		Y					
								Center Fr
5.00				. 1				5.320000000 G
				↓ ↓				
5.00	/	والمريشينية بمستر المستلة برار مسترك لاتلة	Section and the sector of the			- Marine -		Start Fr
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25.0							<u> </u>	04 E
and a share a s							WYUNN	Stop Fr 5.332500000 G
35.0							W.	
45.0							5	CF St
45.0								2.500000 M Auto M
55.0								<u>Auto</u> M
-65.0								Freq Offs
								0
75.0								
								Scale Ty
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Res BW 1.0 MH		#VBW	/ 3.0 MHz	5	Sweep 1	.000 ms (1001 pts)	
SG					STATUS			

Plot 7-52. Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 2A) - Ch. 64)



Plot 7-53. Power Spectral Density Plot (40MHz BW 802.11n (UNII Band 2A) - Ch. 54)

FCC ID: ZNFM710H		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕕 LG	Approved by: Quality Manager
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X/ RL	RF	50 Ω	AC	CORREC	SE	NSE:INT		ALIGN AUTO	02:44:33 P	M Jan 18, 2017		
				BNO E I C	Trig: Fre	e Run	#Avg Ty	pe: RMS	TRA	CE 1 2 3 4 5 6 PE A WWWW	Fre	quency
				PNO: Fast ⊂ IFGain:Low	Atten: 20				D			
	Ref Offs							Mkr	1 5.321	95 GHz 82 dBm		Auto Tur
10 dB/div	Ref 15	.00 a	вm			•						
											С	enter Fre
5.00											5.310	000000 GH
-5.00								↓ 1				
-5.00	1	Province of the second	ushiryher	******	- and the second second second	1 million	Label	And a second	and the second second			Start Fre
-15.0									\downarrow		5.285	000000 GH
-25.0												Stop Fre
										N _M	5.335	000000 GH
-35.0	المسر									The later		
North March										· · · · · · · · · · · · · · · · · · ·		CF Ste
-45.0 Y										, N	5.	000000 MI
											<u>Auto</u>	Ma
-55.0												
-65.0											F	req Offs
-65.0												0 H
-75.0												
											5	Scale Typ
Center 5.				<i>4</i> 0 (B)					Span 5	0.00 191112	Log	L
≉Res BW	T.U IVIHZ			#VB	N 3.0 MHz			sweep 1	.000 ms	(1001 pts)		

Plot 7-54. Power Spectral Density Plot (40MHz BW 802.11n (UNII Band 2A) - Ch. 62)



Plot 7-55. Power Spectral Density Plot (80MHz BW 802.11ac (UNII Band 2A) - Ch. 58)

FCC ID: ZNFM710H		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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Plot 7-57. Power Spectral Density Plot (802.11a (UNII Band 2C) - Ch. 116)

FCC ID: ZNFM710H		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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Keysight Spectrum Analy	/zer - Swept SA					
RL RF	50 Ω AC	CORREC	SENSE:INT	ALIGN AUTO #Avg Type: RMS	02:21:51 PM Jan 18, 2017 TRACE 1 2 3 4 5 6	Frequency
		PNO: Fast 🕞	Trig: Free Run Atten: 26 dB			Auto Tune
	set 0.09 dB 5.00 dBm			MKM	5.692 750 GHz -2.43 dBm	
			Ĭ			Center Free
5.00	↓1	the adjustic static state of the state of the	and the second s	مىلىر يورى بىلىرىكى ب يىلىرىكى بىلىرىكى بىل		5.70000000 GHz
-5.00						Start Fred
-15.0						5.687500000 GHz
-25.0					WayMun	Stop Free
-35.0					Mr. Mark	5.712500000 GH
and the second					M _{NC}	CF Ster
-45.0						2.500000 MH Auto Mar
-55.0						
-65.0						Freq Offse
-75.0						
						Scale Type
Center 5.70000 (<i>"</i> »			Span 25.00 MHz	Log <u>Lir</u>
#Res BW 1.0 MH	Z	#VBW	(3.0 MHz	Sweep 1	.000 ms (1001 pts)	

Plot 7-58. Power Spectral Density Plot (802.11a (UNII Band 2C) - Ch. 140)



Plot 7-59. Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 2C) - Ch. 100)

FCC ID: ZNFM710H		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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Plot 7-61. Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 2C) - Ch. 140)

FCC ID: ZNFM710H		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕕 LG	Approved by: Quality Manager
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Plot 7-63. Power Spectral Density Plot (40MHz BW 802.11n (UNII Band 2C) - Ch. 110)

FCC ID: ZNFM710H		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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Keysight Spectrum Analyzer - Swept SA						
XIRL RF 50Ω AC	CORREC Tria:	SENSE:INT	#Avg Type:		02:46:20 PM Jan 18, 2017 TRACE 1 2 3 4 5 6 TYPE A WWWW	
Ref Offset 0.09 dB		n: 26 dB		Mkr1	5.656 20 GHz -4.92 dBm	Auto Tun
5.00						Center Fre 5.670000000 GH
-5.0			daa oo oo ahaa ahaa ahaa ahaa ahaa ahaa	er yffersiol Corphy medeum er gyr		Start Fre 5.645000000 GH
-35.0					hy h	Stop Fre 5.695000000 GH
-45.0 prove					"West wat	CF Ste 5.000000 MH <u>Auto</u> Ma
65.0						Freq Offs 0 F
-75.0						Scale Typ
Center 5.67000 GHz #Res BW 1.0 MHz	#VBW 3.0 N	1Hz	S	weep 1.0	Span 50.00 MHz 00 ms (1001 pts)	Log <u>Li</u>
MSG				STATUS		

Plot 7-64. Power Spectral Density Plot (40MHz BW 802.11n (UNII Band 2C) - Ch. 134)



Plot 7-65. Power Spectral Density Plot (80MHz BW 802.11ac (UNII Band 2C) - Ch. 106)

FCC ID: ZNFM710H		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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	Frequency [MHz]	Channel No.	802.11 Mode	Data Rate [Mbps]		Max Permissible Power Density [dBm/500kHz]	Margin [dB]	Pass / Fail
	5745	149	а	6	-4.19	30.0	-34.19	Pass
	5785	157	а	6	-3.81	30.0	-33.81	Pass
	5825	165	а	6	-4.44	30.0	-34.44	Pass
e	5745	149	n (20MHz)	6.5/7.2 (MCS0)	-5.59	30.0	-35.59	Pass
Band	5785	157	n (20MHz)	6.5/7.2 (MCS0)	-5.05	30.0	-35.05	Pass
ä	5825	165	n (20MHz)	6.5/7.2 (MCS0)	-5.64	30.0	-35.64	Pass
	5755	151	n (40MHz)	13.5/15 (MCS0)	-7.83	30.0	-37.83	Pass
	5795	159	n (40MHz)	13.5/15 (MCS0)	-7.73	30.0	-37.73	Pass
	5775	155	ac (80MHz)	29.3/32.5 (MCS0)	-7.66	30.0	-37.66	Pass

Table 7-8. Band 3 Conducted Power Spectral Density Measurements



Plot 7-66. Power Spectral Density Plot (802.11a (UNII Band 3) - Ch. 149)

FCC ID: ZNFM710H		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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Keysight Spectrum Analyzer - Swep	t SA				
RL RF 50 Ω	AC CORREC	SENSE:INT	ALIGN AUTO #Avg Type: RMS	02:13:57 PM Jan 18, 2017 TRACE 1 2 3 4 5 6	Frequency
	PNO: Fast 🕞 IFGain:Low	Trig: Free Run Atten: 26 dB	• 4		
Ref Offset 0.09 0 dB/div Ref 15.00 dE			Mkr1	5.790 125 GHz -3.81 dBm	Auto Tun
		Ĭ			Center Fre
5.00			↓ 1		5.785000000 GH
5.00	***************************************		and and a second se		Start Fre
15.0					5.772500000 GH
25.0				Mary	Stop Fre
35.0				Muluu water	5.797500000 GH
م ^م سر				- Brock we	CF Ste
45.0 ⁴					2.500000 MH Auto Ma
55.0					
65.0					Freq Offs
75.0					
					Scale Typ
enter 5.78500 GHz	<i>4</i>) (D))			Span 25.00 MHz	Log <u>L</u>
Res BW 510 kHz	#VBM	/ 3.0 MHz	Sweep 1	.000 ms (1001 pts)	





Plot 7-68. Power Spectral Density Plot (802.11a (UNII Band 3) - Ch. 165)

FCC ID: ZNFM710H		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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	ectrum Analyzer - Sw									_	
RL	RF 50 Ω	AC	CORREC	SE	NSE:INT	#Avg Typ	ALIGN AUTO e: RMS		M Jan 18, 2017 E 1 2 3 4 5 6	Fi	equency
			PNO: Fast IFGain:Low	Trig: Fre Atten: 2				TYF DE			
I0 dB/div	Ref Offset 0.0 Ref 15.00 (09 dB d Bm					Mkr1	5.751 4 -5.	75 GHz 59 dBm		Auto Tun
5.00							↓ 1				Center Fre 5000000 GH
15.0		A Annanga ang ang ang ang ang ang ang ang a	99394-539 ⁰⁰	n na service and a		and the second	esmanager forces of			5.73	Start Fre 2500000 GH
25.0	Well Work								N. W. Walton	5.75	Stop Fre 7500000 GH
45.0									- A AAA	Auto ²	CF Ste 2.500000 MH Ma
65.0											Freq Offs 0 F
75.0											Scale Typ
enter 5.3 Res BW	74500 GHz 510 kHz		#VE	3W 3.0 MHz			Sweep_1	Span 2 .000 m <u>s (</u>	5.00 MHz 1001 pts)	Log	L
SG							STATUS				





Plot 7-70. Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 3) - Ch. 157)

FCC ID: ZNFM710H		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
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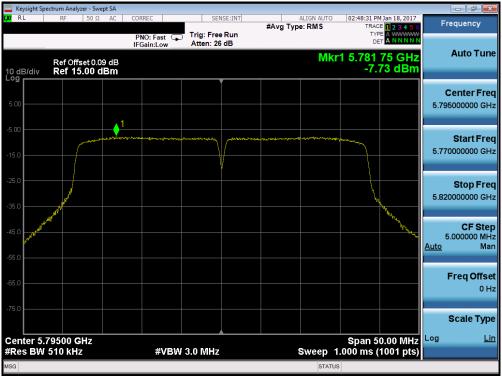
Plot 7-71. Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 3) - Ch. 165)



Plot 7-72. Power Spectral Density Plot (40MHz BW 802.11n (UNII Band 3) - Ch. 151)

FCC ID: ZNFM710H		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕕 LG	Approved by: Quality Manager
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Plot 7-73. Power Spectral Density Plot (40MHz BW 802.11n (UNII Band 3) - Ch. 159)



Plot 7-74. Power Spectral Density Plot (80MHz BW 802.11ac (UNII Band 3) - Ch. 155)

FCC ID: ZNFM710H		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕕 LG	Approved by: Quality Manager
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7.6 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:	3.85	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)				
100 %	3.85	+ 20 (Ref)	5,179,999,994	-6	-0.00000011				
100 %		- 30	5,179,999,831	-169	-0.00000327				
100 %		- 20	5,179,999,989	-11	-0.00000021				
100 %		- 10	5,179,999,952	-48	-0.00000092				
100 %		0	5,179,999,978	-22	-0.00000042				
100 %		+ 10	5,179,999,907	-93	-0.00000179				
100 %		+ 20	5,179,999,824	-176	-0.00000341				
100 %		+ 30	5,179,999,879	-121	-0.00000234				
100 %		+ 40	5,179,999,847	-153	-0.00000296				
100 %		+ 50	5,179,999,850	-150	-0.00000289				
BATT. ENDPOINT	3.45	+ 20	5,179,999,889	-111	-0.00000214				
Table 7-9	Frequency S	Stability Mea	surements for U	NII Band 1 (C	Table 7-9. Frequency Stability Measurements for UNII Band 1 (Ch. 36)				

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency deviation noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

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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:	3.85	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	5,259,999,982	-18	-0.00000034
100 %		- 30	5,259,999,966	-34	-0.00000065
100 %		- 20	5,259,999,982	-18	-0.00000034
100 %		- 10	5,259,999,847	-153	-0.00000290
100 %		0	5,259,999,849	-151	-0.00000288
100 %		+ 10	5,259,999,931	-69	-0.00000130
100 %		+ 20	5,259,999,883	-117	-0.00000222
100 %		+ 30	5,259,999,932	-68	-0.00000129
100 %		+ 40	5,259,999,945	-55	-0.00000105
100 %		+ 50	5,259,999,823	-177	-0.00000337
BATT. ENDPOINT	3.45	+ 20	5,259,999,840	-160	-0.00000303
Table 7-10.	Table 7-10. Frequency Stability Measurements for UNII Band 2A (Ch. 52)				

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency deviation noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

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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:	3.85	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	5,499,999,869	-131	-0.00000238
100 %		- 30	5,499,999,837	-163	-0.00000296
100 %		- 20	5,499,999,961	-39	-0.00000072
100 %		- 10	5,499,999,807	-193	-0.00000351
100 %		0	5,499,999,949	-51	-0.00000093
100 %		+ 10	5,499,999,978	-22	-0.00000039
100 %		+ 20	5,499,999,814	-186	-0.00000338
100 %		+ 30	5,499,999,997	-3	-0.00000006
100 %		+ 40	5,499,999,825	-175	-0.00000318
100 %		+ 50	5,499,999,829	-171	-0.00000311
BATT. ENDPOINT	3.45	+ 20	5,499,999,993	-7	-0.00000012
Table 7-11.	Table 7-11. Frequency Stability Measurements for UNII Band 2C (Ch. 100)				

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency deviation noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

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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:	5,745,000,000	Hz
CHANNEL:	149	-
REFERENCE VOLTAGE:	3.85	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	5,744,999,911	-89	-0.00000156
100 %		- 30	5,744,999,855	-145	-0.00000253
100 %		- 20	5,744,999,890	-110	-0.00000191
100 %		- 10	5,744,999,855	-145	-0.00000253
100 %		0	5,744,999,864	-136	-0.00000237
100 %		+ 10	5,744,999,822	-178	-0.00000310
100 %		+ 20	5,744,999,849	-151	-0.00000263
100 %		+ 30	5,744,999,979	-21	-0.00000037
100 %		+ 40	5,744,999,842	-158	-0.00000275
100 %		+ 50	5,744,999,850	-150	-0.00000262
BATT. ENDPOINT	3.45	+ 20	5,744,999,841	-159	-0.00000277
Table 7-12. Frequency Stability Measurements for UNII Band 3 (Ch. 149)					

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency deviation noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

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7.7 Radiated Spurious Emission Measurements – Above 1GHz §15.407(b) §15.205 §15.209

Test Overview and Limit

All out of band radiated spurious emissions are measured with a spectrum analyzer connected to a receive antenna while the EUT is operating at its maximum duty cycle, at its maximum power control level, as defined in KDB 789033 D02 v01r03, and at the appropriate frequencies. All channels, modes (e.g. 802.11a, 802.11n (20MHz BW), 802.11n (40MHz BW), and 802.11ac (80MHz)), and modulations/data rates were investigated among all UNII bands. Only the radiated emissions of the configuration that produced the worst case emissions are reported in this section.

For transmitters operating in the 5.15-5.25 GHz and 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz.

For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an EIRP of -27 dBm/MHz.

For transmitters operating in the 5.725-5.85 GHz band: All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge.

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 7-13 per Section 15.209.

Frequency	Field Strength [μV/m]	Measured Distance [Meters]
Above 960.0 MHz	500	3

Table 7-13. Radiated Limits

Test Procedures Used

KDB 789033 D02 v01r03 - Section G

Test Settings

Average Measurements above 1GHz (Method AD)

- 1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
- 2. RBW = 1MHz
- 3. VBW = 3MHz
- 4. Detector = power average (RMS)
- 5. Number of measurement points = 1001 (Number of points must be $\geq 2 \times \text{span/RBW}$)
- 6. Averaging type = power (RMS)
- 7. Sweep time = auto couple
- 8. Trace was averaged over 100 sweeps

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Peak Measurements above 1GHz

- 1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
- 2. RBW = 1MHz
- 3. VBW = 3MHz
- 4. Detector = peak
- 5. Sweep time = auto couple
- 6. Trace mode = max hold
- 7. Trace was allowed to stabilize

Peak Measurements below 1GHz

- 1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
- 2. Span was set greater than 1MHz
- 3. RBW = 120kHz
- 4. Detector = CISPR quasi-peak
- 5. Sweep time = auto couple
- 6. Trace was allowed to stabilize

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

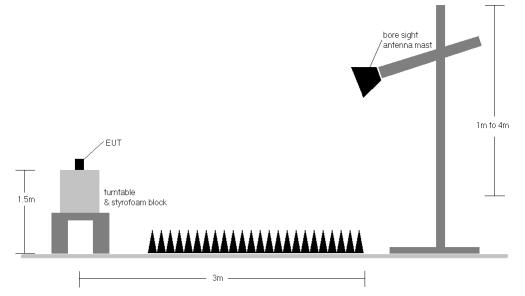


Figure 7-5. Test Instrument & Measurement Setup

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- All radiated spurious emissions levels were measured in a radiated test setup per the guidance of KDB 789033 D02 v01r03 Section G.
- 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 7-13.
- 3. All spurious emissions lying in restricted bands specified in §15.205 are below the limit shown in Table 7-13. All spurious emissions 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.
- 4. The antenna is manipulated through typical positions, polarity and length during the tests. The EUT is manipulated through three orthogonal planes.
- 5. This unit was tested with its standard battery.
- 6. The spectrum is measured from 9kHz to the 10th harmonic of the fundamental frequency of the transmitter using CISPR quasi peak detector below 1GHz. Above 1 GHz, average and peak measurements were taken using linearly polarized horn antennas. The worst-case emissions are reported however emissions whose levels were not within 20dB of the respective limits were not reported.
- 7. Emissions below 18GHz were measured at a 3 meter test distance while emissions above 18GHz were measured at a 1 meter test distance with the application of a distance correction factor.
- 8. The wide spectrum spurious emissions plots shown on the following pages are used only for the purpose of emission identification. Any emissions found to be within 20dB of the limit are fully investigated and the results are shown in this section. Rohde & Schwarz EMC32, Version 9.15.00 automated test software was used to perform the Radiated Spurious Emissions Pre-Scan testing.
- 9. The "-" shown in the following RSE tables are used to denote a noise floor measurement.

Sample Calculations

Determining Spurious Emissions Levels

- Field Strength Level [dBμV/m] = Analyzer Level [dBm] + 107 + AFCL [dB/m]
- AFCL [dB/m] = Antenna Factor [dB/m] + Cable Loss [dB]
- Margin [dB] = Field Strength Level [dBμV/m] Limit [dBμV/m]

Radiated Band Edge Measurement Offset

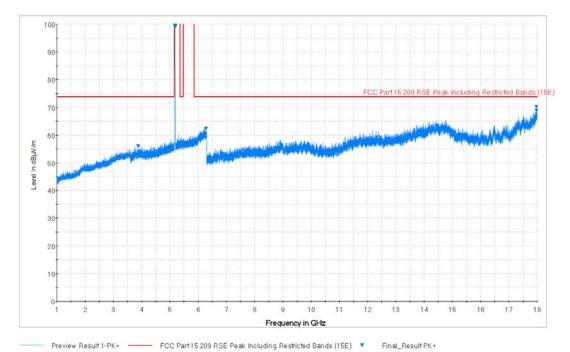
• The amplitude offset shown in the radiated restricted band edge plots in Section 7.7 was calculated using the formula:

Offset (dB) = (Antenna Factor + Cable Loss + Attenuator) – Preamplifier Gain

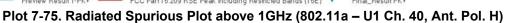
FCC ID: ZNFM710H		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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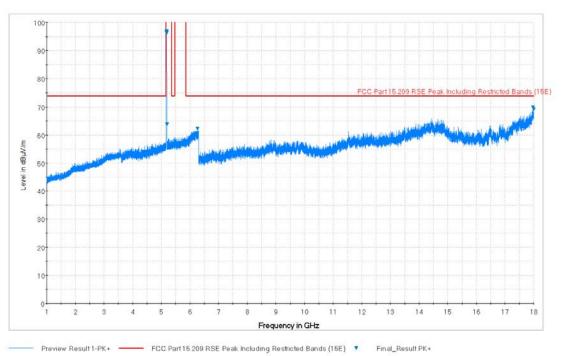
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7.7.1 Radiated Spurious Emission Measurements

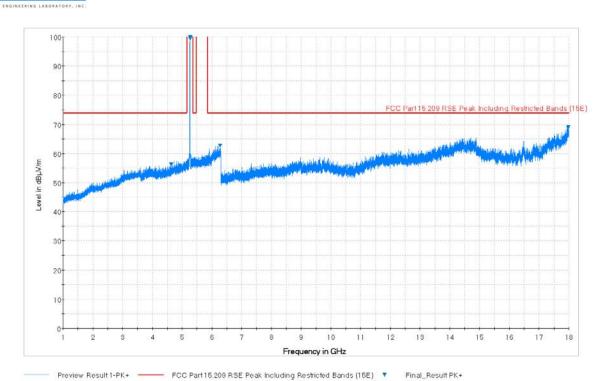




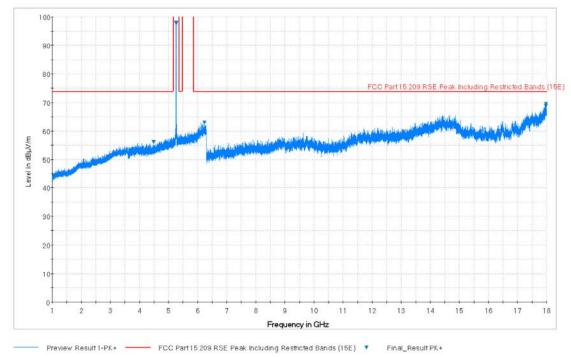
Plot 7-76. Radiated Spurious Plot above 1GHz (802.11a – U1 Ch. 40, Ant. Pol. V)

FCC ID: ZNFM710H		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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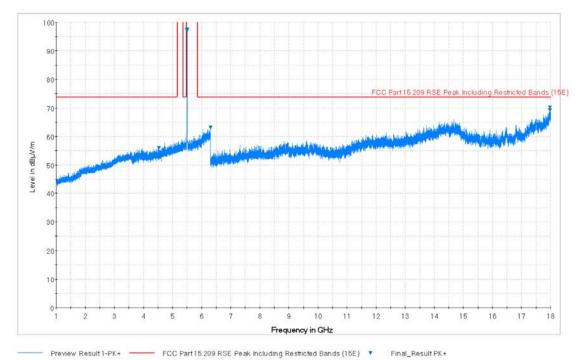
Plot 7-77. Radiated Spurious Plot above 1GHz (802.11a - U2A Ch. 56, Ant. Pol. H)



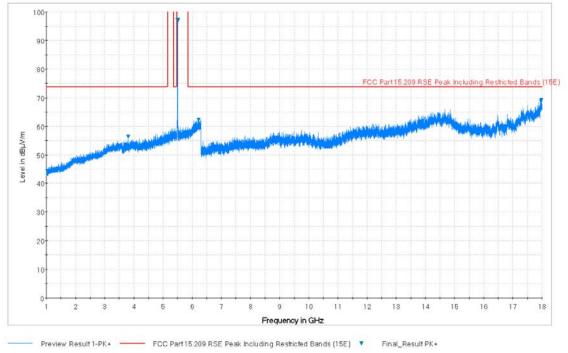
Plot 7-78. Radiated Spurious Plot above 1GHz (802.11a – U2A Ch. 56, Ant. Pol. V)

FCC ID: ZNFM710H		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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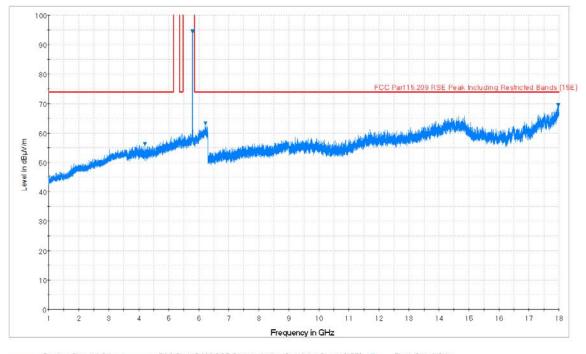
Plot 7-79. Radiated Spurious Plot above 1GHz (802.11a - U2C Ch. 116, Ant. Pol. H)



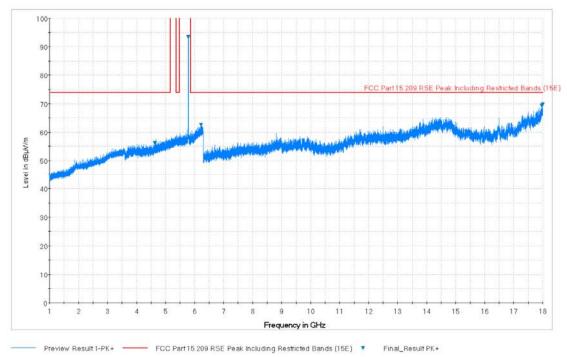
Plot 7-80. Radiated Spurious Plot above 1GHz (802.11a - U2C Ch. 116, Ant. Pol. V)

FCC ID: ZNFM710H		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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Preview Result 1-PK+ FCC Part 15.209 RSE Peak Including Restricted Bands (15E) Final_Result PK+ Plot 7-81. Radiated Spurious Plot above 1GHz (802.11a – U3 Ch. 157, Ant. Pol. H)

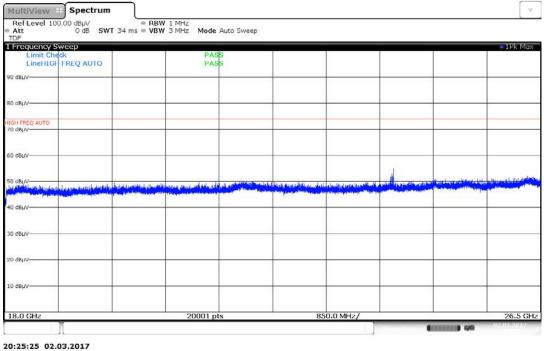


Plot 7-82. Radiated Spurious Plot above 1GHz (802.11a – U3 Ch. 157, Ant. Pol. V)

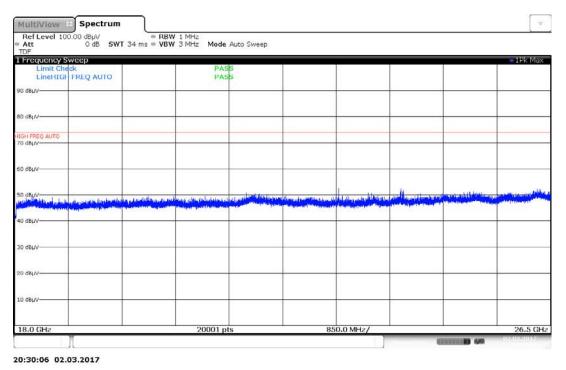
FCC ID: ZNFM710H		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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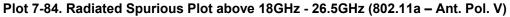


Radiated Spurious Emissions Measurements (Above 18GHz) §15.209









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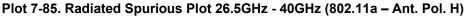
01/09/2016

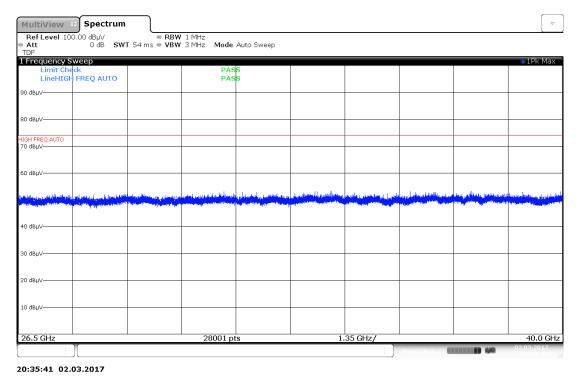


Radiated Spurious Emissions Measurements (Above 18GHz) §15.209

MultiView 🕀 Spectrum	7			v
Ref Level 100.00 dBµV Att 0 dB SWT 54	e RBW 1 MHz ms e VBW 3 MHz Mode Auto:	Sweep		
TDF I Frequency Sweep				1Pk Max
Limit Check LineHIGF FREQ AUTO	PASS PASS			
90 dBµV				
80 dBµV-				
IGH FREQ AUTO 70 dBµV-				
60 dBµV				
	and a second second second second		Him any the second second second	and a shift of the second standards and the
40 dвµv				
30 dBµV				
20 d8µV				
10 dBµV				
26.5 GHz	28001 pts	1.	35 GHz/	40.0 GHz
			l desumina-	0940897017

20:40:43 02.03.2017







FCC ID: ZNFM710H		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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Radiated Spurious Emission Measurements §15.247(d) §15.205 & §15.209

Worst Case Mode:	802.11a
Worst Case Transfer Rate:	6 Mbps
Distance of Measurements:	1 & 3 Meters
Operating Frequency:	5180MHz
Channel:	36

	Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
	10360.00	Peak	Н	-	-	-59.62	11.76	0.00	59.14	68.20	-9.06
*	15540.00	Average	Н	-	-	-73.70	17.60	0.00	50.90	53.98	-3.08
*	15540.00	Peak	Н	-	-	-59.90	17.60	0.00	64.70	73.98	-9.28
*	20720.00	Average	Н	100	296	-76.74	8.13	-9.54	28.85	53.98	-25.13
*	20720.00	Peak	Н	100	296	-64.44	8.13	-9.54	41.15	73.98	-32.83
	25900.00	Peak	Н	-	-	-64.18	8.50	-9.54	41.78	68.20	-26.42

Table 7-14. Radiated Measurements

Worst Case Mode: Worst Case Transfer Rate: Distance of Measurements: Operating Frequency: Channel:

802.11a
6 Mbps
1 & 3 Meters
5200MHz
40

	Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
	10400.00	Peak	н	-	-	-59.29	11.47	0.00	59.18	68.20	-9.02
*	15600.00	Average	Н	-	-	-73.91	17.43	0.00	50.52	53.98	-3.46
*	15600.00	Peak	Н	-	-	-61.09	17.43	0.00	63.34	73.98	-10.64
*	20800.00	Average	Н	100	313	-76.19	8.16	-9.54	29.42	53.98	-24.56
*	20800.00	Peak	Н	100	313	-65.26	8.16	-9.54	40.35	73.98	-33.63
	26000.00	Peak	Н	-	-	-64.31	8.52	-9.54	41.67	68.20	-26.53

Table 7-15. Radiated Measurements

FCC ID: ZNFM710H		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager		
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Worst Case Mode:	802.11a
Worst Case Transfer Rate:	6 Mbps
Distance of Measurements:	1 & 3 Meters
Operating Frequency:	5240MHz
Channel:	48

	Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
	10480.00	Peak	Н	-	-	-59.26	11.81	0.00	59.55	68.20	-8.65
*	15720.00	Average	Н	-	-	-74.20	18.05	0.00	50.85	53.98	-3.13
*	15720.00	Peak	Н	-	-	-60.61	18.05	0.00	64.44	73.98	-9.54
*	20960.00	Average	Н	100	294	-75.57	8.12	-9.54	30.01	53.98	-23.97
*	20960.00	Peak	Н	100	294	-65.76	8.12	-9.54	39.82	73.98	-34.16
	26200.00	Peak	Н	-	-	-63.58	8.62	-9.54	42.50	68.20	-25.70

Table 7-16. Radiated Measurements

Worst Case Mode: Worst Case Transfer Rate: Distance of Measurements: **Operating Frequency:** Channel:

802.11a 6 Mbps 1 & 3 Meters 5260MHz 52

	Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
	10520.00	Peak	Н	-	-	-59.07	11.90	0.00	59.83	68.20	-8.37
*	15780.00	Average	Н	-	-	-73.01	16.92	0.00	50.91	53.98	-3.07
*	15780.00	Peak	Н	-	-	-60.25	16.92	0.00	63.67	73.98	-10.31
*	21040.00	Average	Н	100	307	-75.45	8.10	-9.54	30.11	53.98	-23.87
*	21040.00	Peak	Н	100	307	-64.62	8.10	-9.54	40.94	73.98	-33.04
	26300.00	Peak	Н	-	-	-63.37	8.76	-9.54	42.85	68.20	-25.35

Table 7-17. Radiated Measurements

FCC ID: ZNFM710H		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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Worst Case Mode:	802.11a
Worst Case Transfer Rate:	6 Mbps
Distance of Measurements:	1 & 3 Meters
Operating Frequency:	5280MHz
Channel:	56

	Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Distance Correction Factor [dB]	Strength	Limit [dBµV/m]	Margin [dB]
	10560.00	Peak	Н	-	-	-59.55	11.69	0.00	59.14	68.20	-9.06
*	15840.00	Average	Н	-	-	-73.72	17.04	0.00	50.32	53.98	-3.66
*	15840.00	Peak	Н	-	-	-60.52	17.04	0.00	63.52	73.98	-10.46
*	21120.00	Average	Н	100	314	-74.44	8.09	-9.54	31.10	53.98	-22.88
*	21120.00	Peak	Н	100	314	-65.01	8.09	-9.54	40.53	73.98	-33.45
	26400.00	Peak	Н	-	-	-63.91	8.99	-9.54	42.54	68.20	-25.66

Table 7-18. Radiated Measurements

Worst Case Mode: Worst Case Transfer Rate: Distance of Measurements: Operating Frequency: Channel: 802.11a 6 Mbps 1 & 3 Meters 5320MHz 64

	Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
*	10640.00	Average	н	-	-	-71.36	12.24	0.00	47.88	53.98	-6.10
*	10640.00	Peak	Н	-	-	-59.23	12.24	0.00	60.01	73.98	-13.97
*	15960.00	Average	Н	-	-	-73.90	17.22	0.00	50.32	53.98	-3.65
*	15960.00	Peak	Н	-	-	-60.83	17.22	0.00	63.39	73.98	-10.58
*	21280.00	Average	Н	100	104	-75.56	8.07	-9.54	29.97	53.98	-24.01
*	21280.00	Peak	Н	100	104	-65.10	8.07	-9.54	40.43	73.98	-33.55
	26600.00	Peak	Н	-	-	-46.15	-8.30	-9.54	43.01	68.20	-25.19

Table 7-19. Radiated Measurements

FCC ID: ZNFM710H		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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Worst Case Mode:	802.11a
Worst Case Transfer Rate:	6 Mbps
Distance of Measurements:	1 & 3 Meters
Operating Frequency:	5500MHz
Channel:	100

	Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
*	11000.00	Average	Н	133	82	-71.10	13.01	0.00	48.91	53.98	-5.07
*	11000.00	Peak	Н	133	82	-58.73	13.01	0.00	61.28	73.98	-12.70
	16500.00	Peak	Н	-	-	-62.56	20.25	0.00	64.69	68.20	-3.51
	22000.00	Peak	Н	100	310	-65.40	8.35	-9.54	40.40	68.20	-27.80
	27500.00	Peak	Н	-	-	-46.40	-8.93	-9.54	42.13	68.20	-26.07

Table 7-20. Radiated Measurements

Worst Case Mode: Worst Case Transfer Rate: Distance of Measurements: **Operating Frequency:** Channel:

802.11a 6 Mbps 1 & 3 Meters 5580MHz 116

	Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
*	11160.00	Average	Н	-	-	-71.00	13.64	0.00	49.64	53.98	-4.34
*	11160.00	Peak	Н	-	-	-59.22	13.64	0.00	61.42	73.98	-12.56
	16740.00	Peak	Н	-	-	-60.99	18.21	0.00	64.22	68.20	-3.98
*	22320.00	Average	Н	100	270	-75.93	8.20	-9.54	29.73	53.98	-24.25
*	22320.00	Peak	н	100	270	-65.08	8.20	-9.54	40.58	73.98	-33.40
	27900.00	Peak	Н	-	-	-45.85	-9.24	-9.54	42.37	68.20	-25.83

Table 7-21. Radiated Measurements

FCC ID: ZNFM710H		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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Worst Case Mode:	802.11a
Worst Case Transfer Rate:	6 Mbps
Distance of Measurements:	1 & 3 Meters
Operating Frequency:	5700MHz
Channel:	140

	Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
*	11400.00	Average	н	113	69	-70.66	14.01	0.00	50.35	53.98	-3.63
*	11400.00	Peak	Н	113	69	-58.92	14.01	0.00	62.09	73.98	-11.89
	17100.00	Peak	Н	-	-	-62.46	20.65	0.00	65.19	68.20	-3.01
*	22800.00	Average	Н	100	137	-75.53	8.29	-9.54	30.21	53.98	-23.77
*	22800.00	Peak	Н	100	137	-65.63	8.29	-9.54	40.11	73.98	-33.87
	28500.00	Peak	Н	-	-	-46.25	-9.03	-9.54	42.18	68.20	-26.02

Table 7-22. Radiated Measurements

Worst Case Mode: Worst Case Transfer Rate: Distance of Measurements: Operating Frequency: Channel:

802.11a	
6 Mbps	
1 & 3 Meters	
5745MHz	
149	

	Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
*	11490.00	Average	Н	110	238	-71.03	14.32	0.00	50.29	53.98	-3.69
*	11490.00	Peak	Н	110	238	-59.44	14.32	0.00	61.88	73.98	-12.10
	17235.00	Peak	Н	-	-	-63.68	21.26	0.00	64.58	68.20	-3.62
*	22980.00	Average	Н	100	138	-75.80	8.19	-9.54	29.85	53.98	-24.13
*	22980.00	Peak	Н	100	138	-65.94	8.19	-9.54	39.71	73.98	-34.27
	28725.00	Peak	Н	-	-	-46.17	-9.45	-9.54	41.84	68.20	-26.36

Table 7-23. Radiated Measurements

FCC ID: ZNFM710H		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
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Worst Case Mode:	802.11a
Worst Case Transfer Rate:	6 Mbps
Distance of Measurements:	1 & 3 Meters
Operating Frequency:	5785MHz
Channel:	157

	Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]		Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
*	11570.00	Average	Н	100	86	-71.56	14.61	0.00	50.05	53.98	-3.93
*	11570.00	Peak	Н	100	86	-58.73	14.61	0.00	62.88	73.98	-11.10
	17355.00	Peak	Н	-	-	-64.85	22.75	0.00	64.90	68.20	-3.30
	23140.00	Peak	Н	100	220	-65.50	8.47	-9.54	40.42	68.20	-27.78
	28925.00	Peak	Н	-	-	-46.65	-9.71	-9.54	41.10	68.20	-27.10

Table 7-24. Radiated Measurements

Worst Case Mode: Worst Case Transfer Rate: Distance of Measurements: **Operating Frequency:** Channel:

<u>8</u>02.11a 6 Mbps 1 & 3 Meters 5825MHz 165

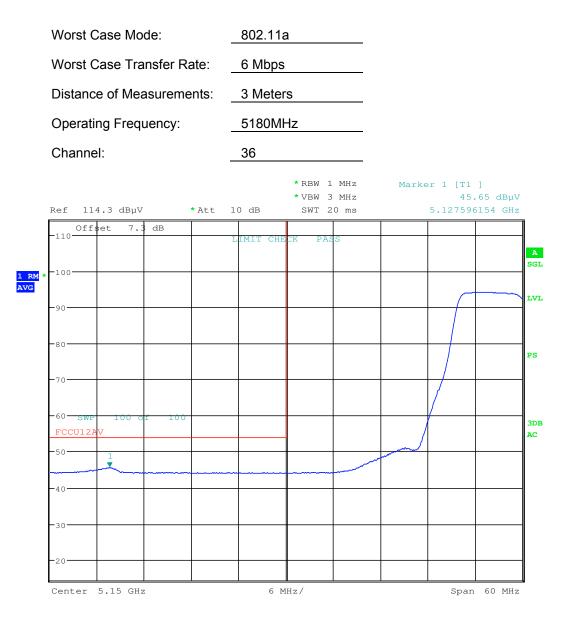
	Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Factor	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
*	11650.00	Average	Н	100	92	-72.00	14.87	0.00	49.87	53.98	-4.11
*	11650.00	Peak	Н	100	92	-58.54	14.87	0.00	63.33	73.98	-10.65
	17475.00	Peak	Н	-	-	-65.00	23.13	0.00	65.13	68.20	-3.07
	23300.00	Peak	Н	-	-	-65.32	8.60	-9.54	40.74	68.20	-27.46
	29125.00	Peak	Н	-	-	-44.75	-9.93	-9.54	42.78	68.20	-25.42

Table 7-25. Radiated Measurements

FCC ID: ZNFM710H		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager		
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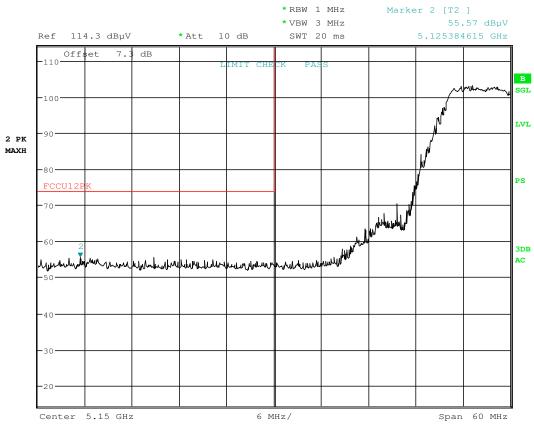
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Plot 7-87. Radiated Restricted Lower Band Edge Plot (Average – UNII Band 1)

FCC ID: ZNFM710H		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager		
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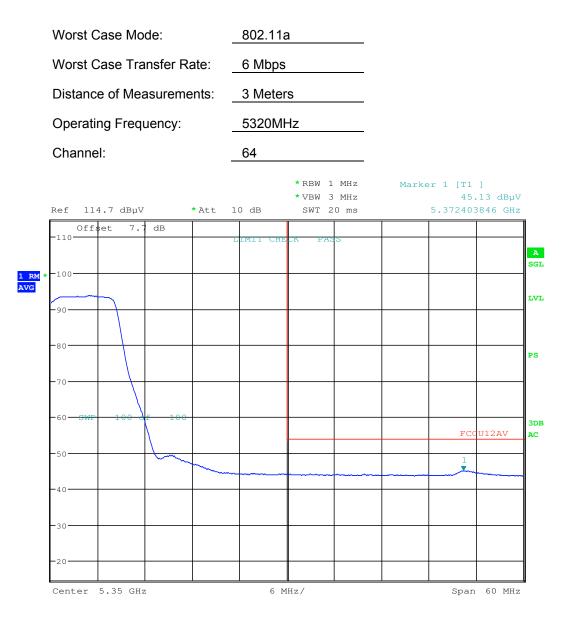
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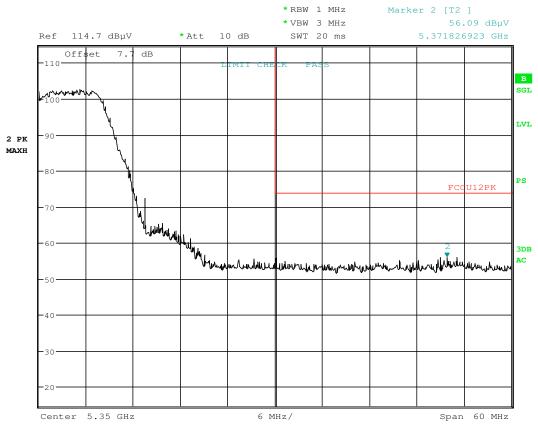
Date: 15.FEB.2017 13:20:23

Plot 7-89. Radiated Restricted Upper Band Edge Plot (Average – UNII Band 2A)

FCC ID: ZNFM710H		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager		
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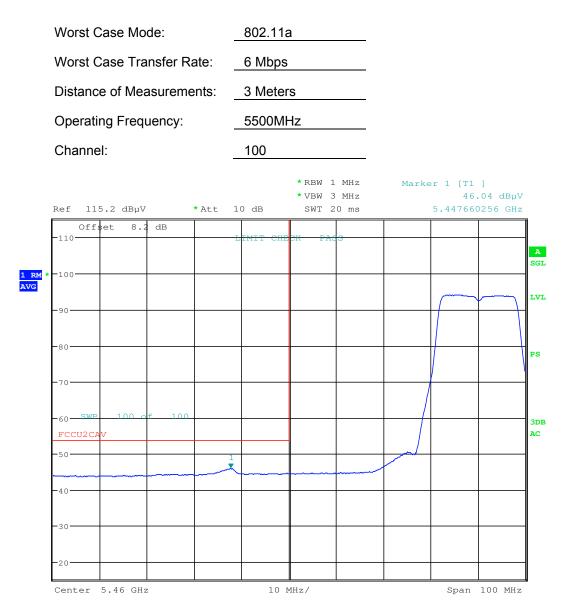
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FCC ID: ZNFM710H		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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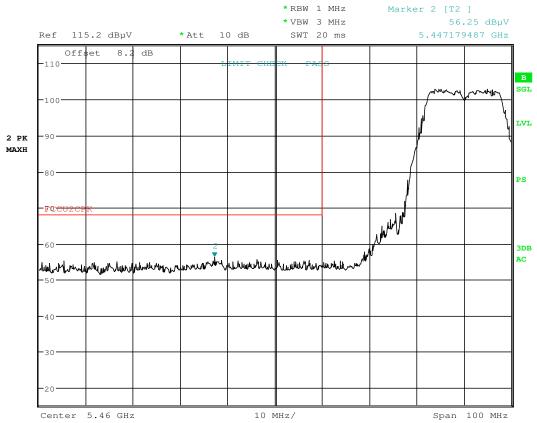
Date: 15.FEB.2017 13:29:24

Plot 7-91. Radiated Restricted Lower Band Edge Plot (Average- UNII Band 2C)

FCC ID: ZNFM710H		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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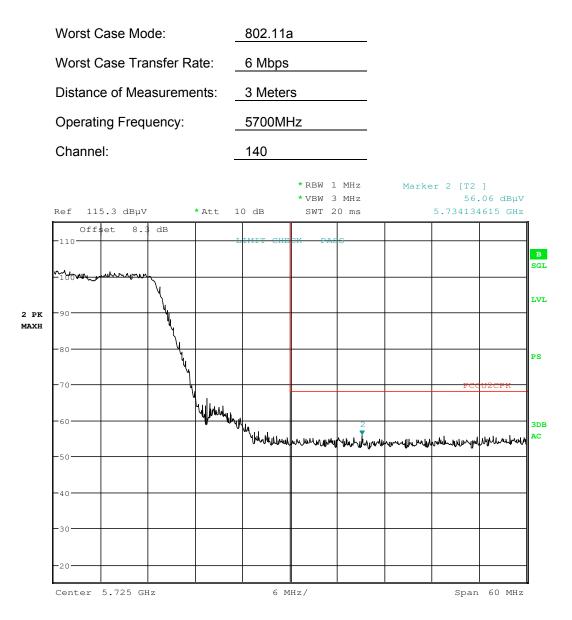
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FCC ID: ZNFM710H		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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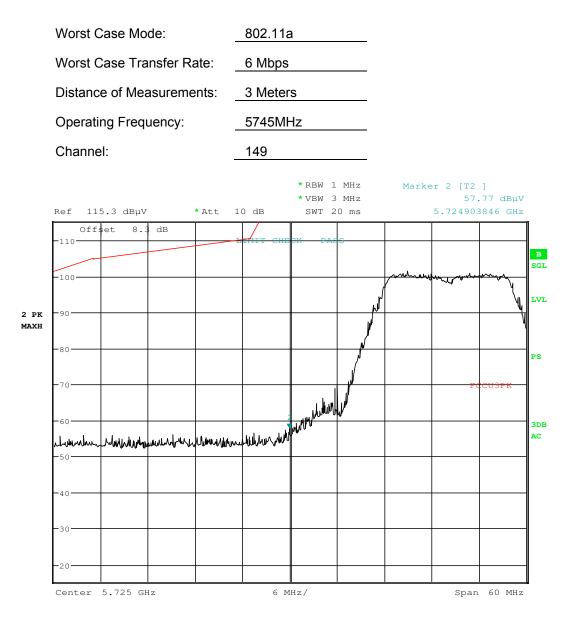
Date: 15.FEB.2017 13:36:18

Plot 7-93. Radiated Upper Band Edge Plot (Peak – UNII Band 2C)

FCC ID: ZNFM710H		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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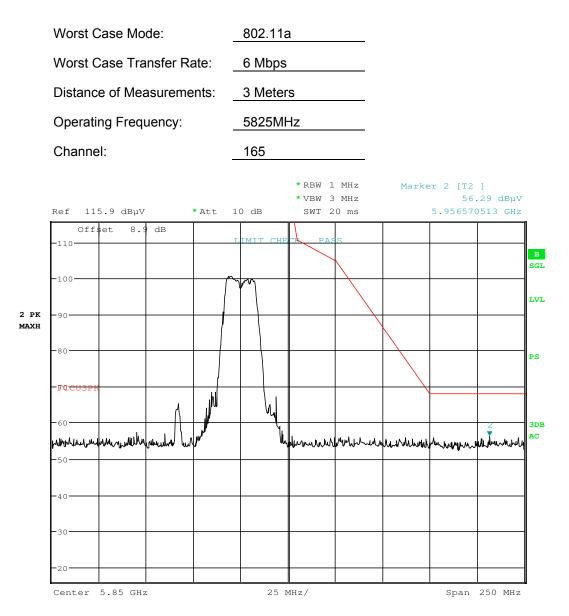
Date: 15.FEB.2017 13:40:56

Plot 7-94. Radiated Lower Band Edge Plot (Peak – UNII Band 3)

FCC ID: ZNFM710H		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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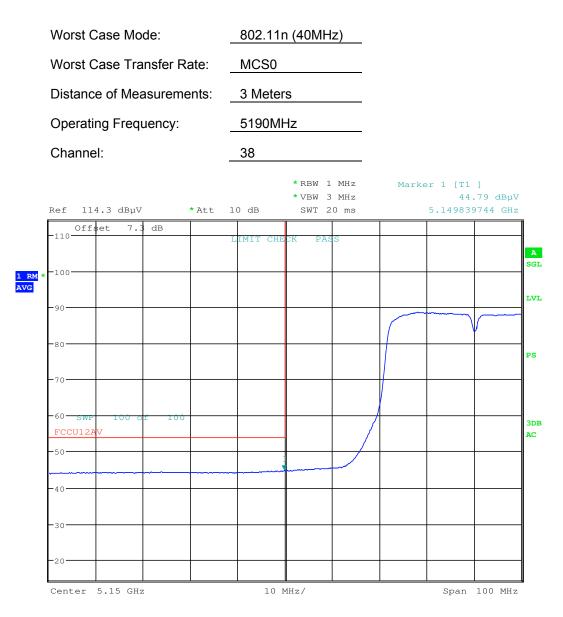
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Plot 7-95. Radiated Upper Band Edge Plot (Peak – UNII Band 3)

FCC ID: ZNFM710H		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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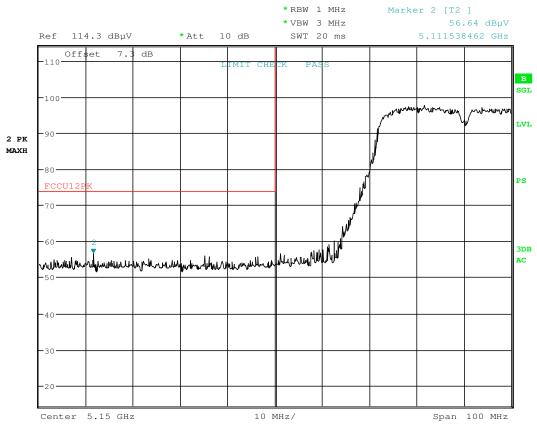
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Plot 7-96. Radiated Restricted Lower Band Edge Plot (Average – UNII Band 1)

FCC ID: ZNFM710H		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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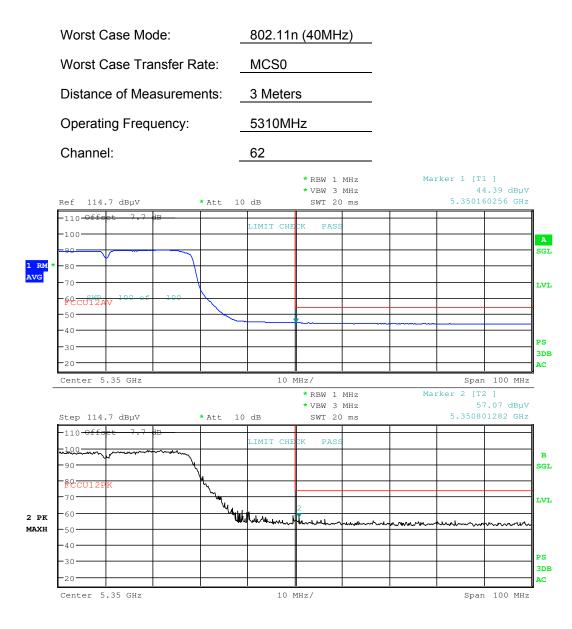
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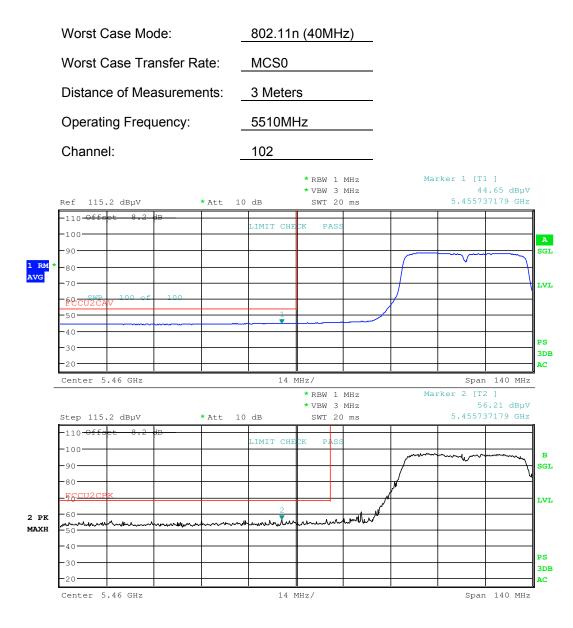
Date: 15.FEB.2017 14:06:08

Plot 7-98. Radiated Restricted Upper Band Edge Plot (Average & Peak – UNII Band 2A)

FCC ID: ZNFM710H		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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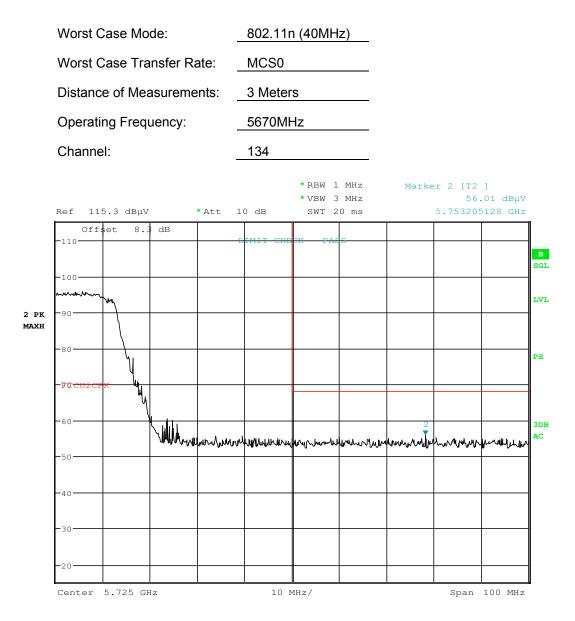
Date: 15.FEB.2017 14:14:35

Plot 7-99. Radiated Restricted Lower Band Edge Plot (Average & Peak – UNII Band 2C)

FCC ID: ZNFM710H		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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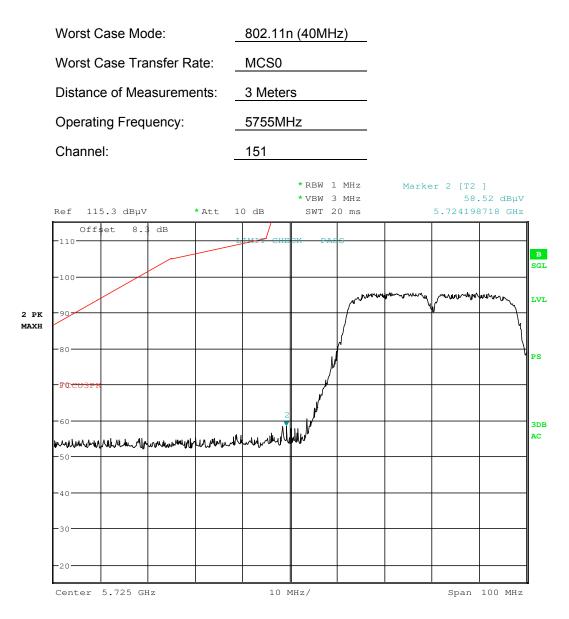
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Plot 7-100. Radiated Upper Band Edge Plot (Peak – UNII Band 2C)

FCC ID: ZNFM710H		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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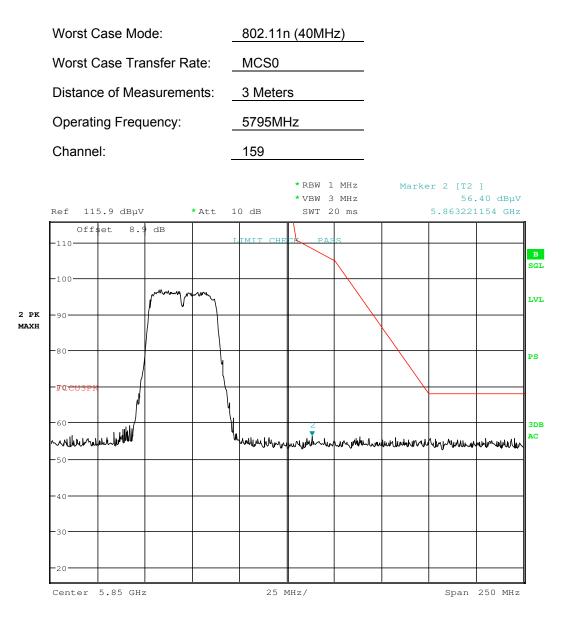
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Plot 7-101. Radiated Lower Band Edge Plot (Peak – UNII Band 3)

FCC ID: ZNFM710H		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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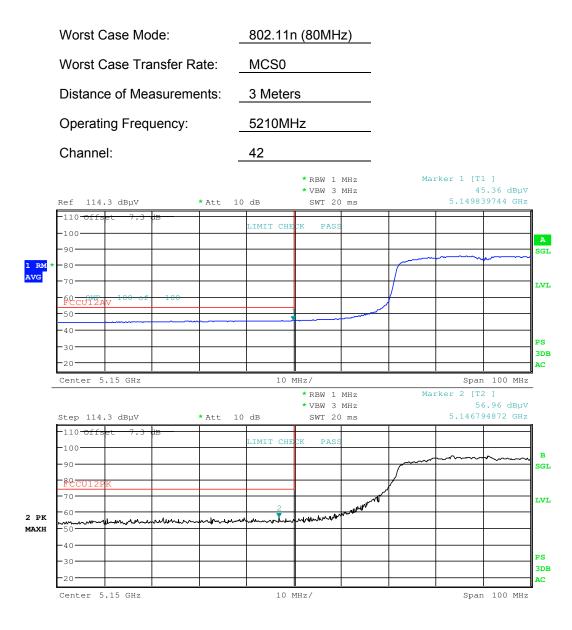
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Plot 7-102. Radiated Upper Band Edge Plot (Peak – UNII Band 3)

FCC ID: ZNFM710H		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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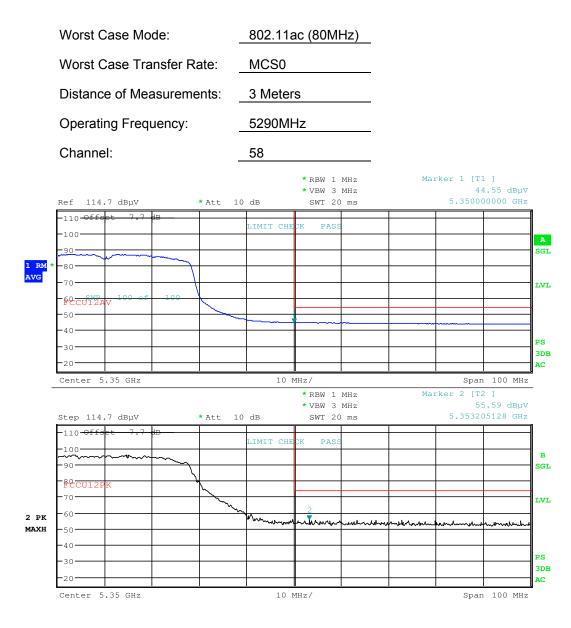
Date: 15.FEB.2017 14:39:59

Plot 7-103. Radiated Restricted Lower Band Edge Plot (Average & Peak – UNII Band 1)

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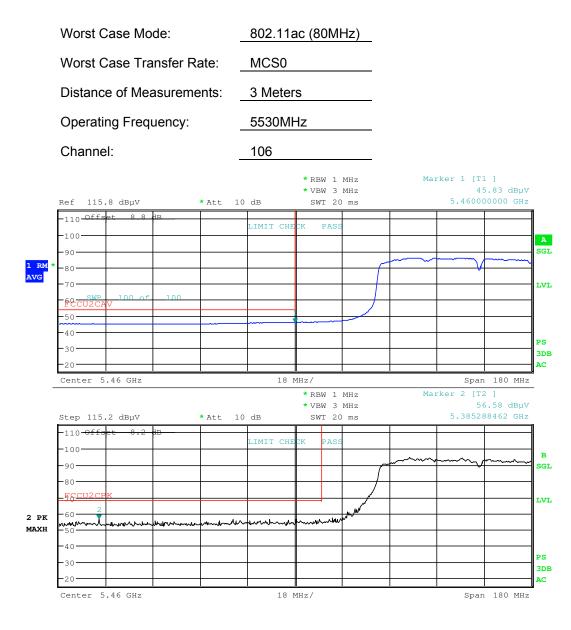
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Plot 7-104. Radiated Restricted Upper Band Edge Plot (Average & Peak – UNII Band 2A)

FCC ID: ZNFM710H		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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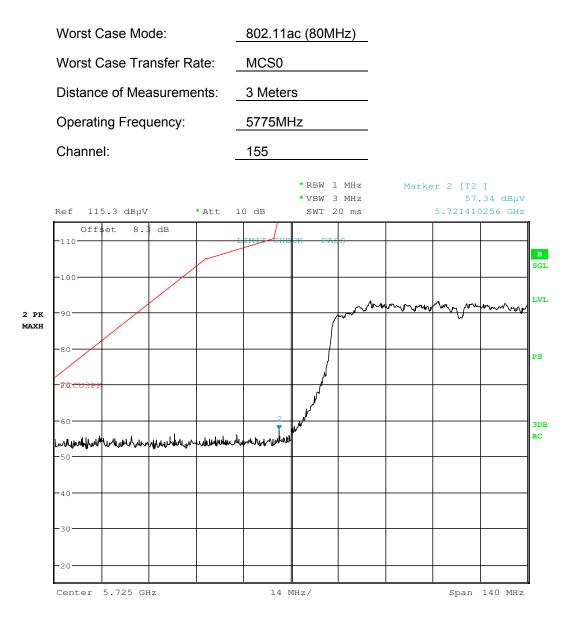
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Plot 7-105. Radiated Restricted Lower Band Edge Plot (Average & Peak – UNII Band 2C)

FCC ID: ZNFM710H		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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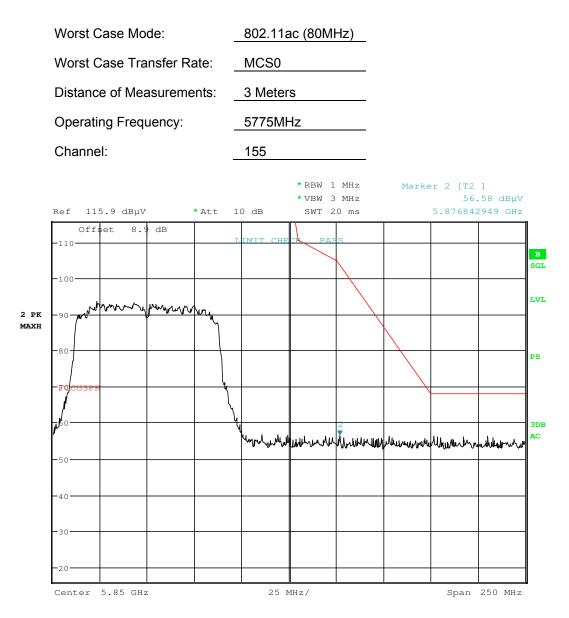
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Plot 7-106. Radiated Lower Band Edge Plot (Peak – UNII Band 3)

FCC ID: ZNFM710H		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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Date: 15.FEB.2017 15:00:13

Plot 7-107. Radiated Upper Band Edge Plot (Peak – UNII Band 3)

FCC ID: ZNFM710H		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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7.8 Radiated Spurious Emissions Measurements – Below 1GHz §15.209

Test Overview and Limit

All out of band radiated spurious emissions are measured with a spectrum analyzer connected to a receive antenna while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. 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 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 7-26 per Section 15.209.

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 7-26. Radiated Limits

Test Procedures Used

ANSI C63.10-2013

Test Settings

Quasi-Peak Field Strength Measurements

- 1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
- 2. RBW = 120kHz (for emissions from 30MHz 1GHz)
- 3. Detector = quasi-peak
- 4. Sweep time = auto couple
- 5. Trace mode = max hold
- 6. Trace was allowed to stabilize

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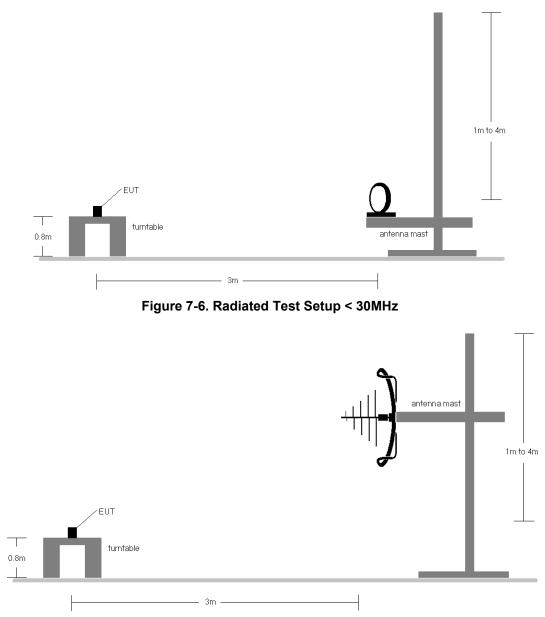
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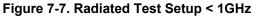
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Test Setup

The EUT and measurement equipment were set up as shown in the diagrams below.





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- 1. All emissions lying in restricted bands specified in §15.205 are below the limit shown in Table 7-26.
- 2. The broadband receive antenna is manipulated through vertical and horizontal polarizations during the tests. The EUT is manipulated through three orthogonal planes.
- 3. This unit was tested with its standard battery.
- 4. The spectrum is investigated using a peak detector and final measurements are recorded using CISPR quasi peak detector. The worst-case emissions are reported however emissions whose levels were not within 20dB of the respective limits were not reported.
- 5. Emissions were measured at a 3 meter test distance.
- 6. Emissions are investigated while operating on the center channel of the mode, band, and modulation that produced the worst case results during the transmitter spurious emissions testing.
- 7. No spurious emissions were detected within 20dB of the limit below 30MHz.
- 8. The results recorded using the broadband antenna is known to correlate with the results obtained by using a tuned dipole with an acceptable degree of accuracy. The VSWR for the measurement antenna was found to be less than 2:1.
- The wide spectrum spurious emissions plots shown on the following pages are used only for the purpose of emission identification. There were no emissions detected in the 30MHz – 1GHz frequency range, as shown in the subsequent plots.

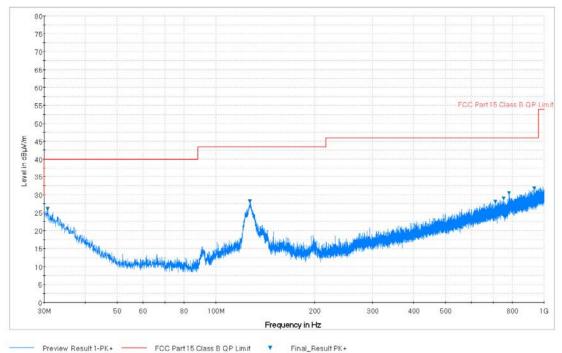
FCC ID: ZNFM710H		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕑 LG	Approved by: Quality Manager
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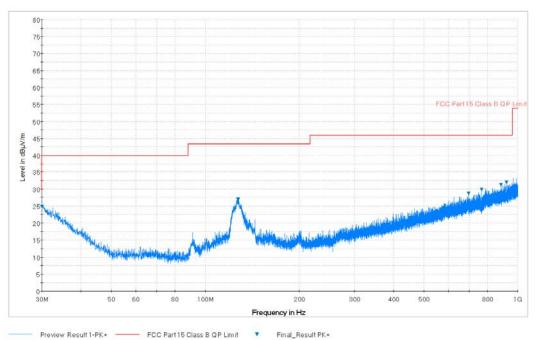
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Radiated Spurious Emissions Measurements (Below 1GHz) §15.209



Plot 7-108. Radiated Spurious Plot below 1GHz (802.11a – U3 Ch. 157, Ant. Pol. H)



Plot 7-109. Radiated Spurious Plot below 1GHz (802.11a - U3 Ch. 157, Ant. Pol. V)

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7.9 Line-Conducted Test Data §15.407

Test Overview and Limit

All AC line conducted spurious emissions are measured with a receiver connected to a grounded LISN while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates and modes were investigated for conducted spurious emissions. Only the conducted emissions of the configuration that produced the worst case emissions are reported in this section.

All conducted emissions must not exceed the limits shown in the table below, per Section 15.207.

Frequency of emission (MHz)	Conducted	Limit (dBµV)
	Quasi-peak	Average
0.15 – 0.5	66 to 56*	56 to 46*
0.5 – 5	56	46
5 – 30	60	50

Table 7-27. Conducted Limits

*Decreases with the logarithm of the frequency.

Test Procedures Used

ANSI C63.10-2013, Section 6.2

Test Settings

Quasi-Peak Field Strength Measurements

- 1. Analyzer center frequency was set to the frequency of the spurious emission of interest
- 2. RBW = 9kHz (for emissions from 150kHz 30MHz)
- 3. Detector = quasi-peak
- 4. Sweep time = auto couple
- 5. Trace mode = max hold
- 6. Trace was allowed to stabilize

Average Field Strength Measurements

- 1. Analyzer center frequency was set to the frequency of the spurious emission of interest
- 2. RBW = 9kHz (for emissions from 150kHz 30MHz)
- 3. Detector = RMS
- 4. Sweep time = auto couple
- 5. Trace mode = max hold
- 6. Trace was allowed to stabilize

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Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

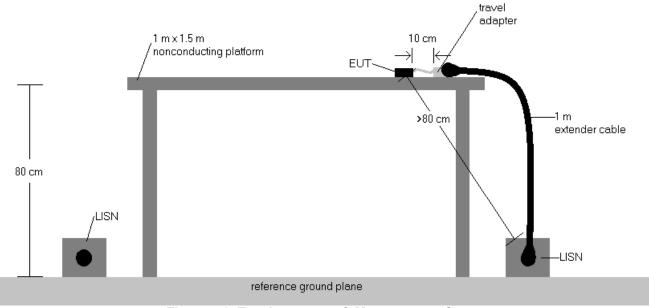


Figure 7-8. Test Instrument & Measurement Setup

Test Notes

- 1. All modes of operation were investigated and the worst-case emissions are reported using mid channel. The emissions found were not affected by the choice of channel used during testing.
- 2. The limit for an intentional radiator from 150kHz to 30MHz are specified in 15.207.
- 3. Corr. (dB) = Cable loss (dB) + LISN insertion factor (dB)
- 4. QP/AV Level (dB μ V) = QP/AV Analyzer/Receiver Level (dB μ V) + Corr. (dB)
- 5. Margin (dB) = QP/AV Limit (dB μ V) QP/AV Level (dB μ V)
- 6. Traces shown in plot are made using a peak detector.
- 7. Deviations to the Specifications: None.

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Line-Conducted Test Data §15.407

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	VBW	90 KHZ		Dwell	rime 96.07 µs (#4 KF
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32.271 dBµV		-24.381 dB	-17.729 dB		9.00 kHz (C	(ISPR)
32.640 dBµV		-23.528 dB	-17.360 dB		9.00 kHz (C	
20.400 uBµV		-29.500 dB	-20.940 dB		9.00 KHZ (C	JSPR)
						1
	32.271 dBµV	AVG AMPTD OFF 32.271 dBµV 32.640 dBµV 32.714 dBµV 32.714 dBµV 28.331 dBµV	32.271 dBµV24.381 dB 32.640 dBµV23.528 dB 33.949 dBµV23.546 dB 32.714 dBµV23.669 dB 28.331 dBµV23.773 dB	AVG AMPTD OFF QPD LL1A AVG LL2A 32.271 dB _J V -24.381 dB -17.729 dB 32.640 dB _J V -23.528 dB -17.360 dB 33.949 dB _J V -23.646 dB -16.051 dB 32.714 dB _J V -23.689 dB -17.286 dB 28.331 dB _J V -23.673 dB -21.669 dB	AVG AMPTD OFF OPD LL1A AVG LL2A OF 32.271 dBµV -24.381 dB -17.729 dB 32.640 dBµV -23.528 dB -17.360 dB 32.949 dBµV -23.546 dB -16.051 dB 32.714 dBµV -23.689 dB -17.286 dB 28.331 dBµV -23.773 dB -21.669 dB	AVG AMPTD OFF QPD LL1A AVG LL2A OFF R 32.271 dBµV -24.381 dB -17.729 dB 9.00 kHz (C 32.640 dBµV -23.528 dB -17.360 dB 9.00 kHz (C 33.949 dBµV -23.546 dB -16.051 dB 9.00 kHz (C 32.714 dBµV -23.640 dB -16.051 dB 9.00 kHz (C 32.714 dBµV -23.773 dB -17.286 dB 9.00 kHz (C 28.331 dBµV -23.773 dB -21.659 dB 9.00 kHz (C

Plot 7-110. Line Conducted Plot with 802.11a UNII Band 1 (L1)

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ilent EMI Receiver - Frequency RL RF PRESEL 50 Ω ΛΛ		SENSE:INT AL	IGNAUTO	04:30:45 PM Jan 24, 201
req (Meters) 28.6320 CISPR)92 MHz	FREQUENCY SCAN	Scan 5/5 Free Run	TRACE 1 2 3 TYPE M WWW DET P P P
) dB/div Ref 96.99			Mkr1	25.196322 MHz 21.578 dBµ\
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art 150 kHz				Stop 30 M
es BW 9 kHz		VBW 90 kHz	Dwell Ti	me 96.07 μs(#4 kH
	AVG AMPTD AVG AMPTD	OFF QPD LL1		RBW
1 14.017 MHz 33.9 1 14.129 MHz 33.7		26.031 c		9.00 kHz (CISPR) 9.00 kHz (CISPR)
	311 dBµV 31.867 dBµV	25.189 0		9.00 kHz (CISPR)
		25.221 c		9.00 kHz (CISPR)
1 14.649 MHz 34.7				
I 14.689 MHz 34.8	333 dBµV 30.910 dBµV	25.167 c		9.00 kHz (CISPR)
	333 dBµV 30.910 dBµV	25.167 c		

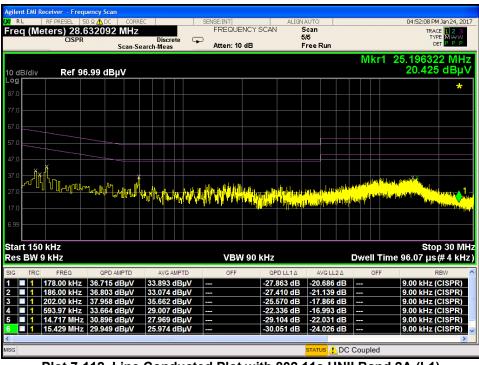
Plot 7-111. Line Conducted Plot with 802.11a UNII Band 1 (N)

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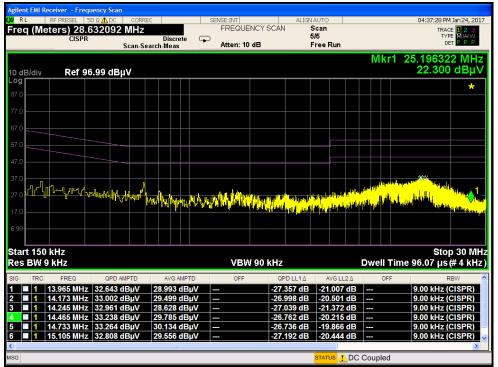
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Line-Conducted Test Data §15.407



Plot 7-112. Line Conducted Plot with 802.11a UNII Band 2A (L1)



Plot 7-113. Line Conducted Plot with 802.11a UNII Band 2A (N)

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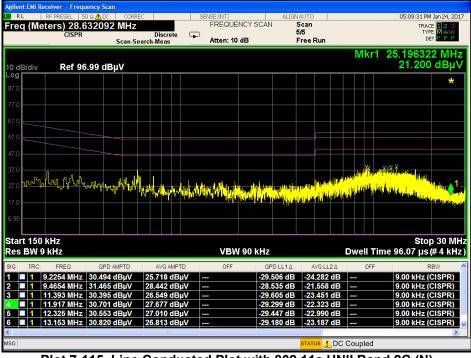
01/09/2016



Line-Conducted Test Data <u>§15.407</u>

RL RF PRESEL 50 Ω		c	SENSE:INT		IAUTO		04:55:41 PM Jan 24, 2
eq (Meters) 28.63	2092 MHz				Scan 5/5		TRACE 1 2 3 TYPE M WWW
CISPR	Scan-Sea	Discrete arch-Meas	Atten: 10		Free Run		DET P P
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art 150 kHz s BW 9 kHz	QPD AMPTD	AVG AMPTD	VBW	90 kHz	AVG LL2 A	Dwell T	ime 96.07 µs (# 4 kl
art 150 kHz s BW 9 kHz ■ 1 182.00 kHz 3	QPD AMPTD 5.788 dBµV	AVG AMPTD 33.588 dBµV	VBW OFF	90 kHz QPD LL1A -28.606 dB	AVG LL2A	Dwell T	ime 96.07 µs (# 4 kl RBW 9.00 kHz (CISPR)
art 150 kHz s BW 9 kHz I 182:00 kHz 3 0 1 182:00 kHz 3 1 182:00 kHz 3 1 203:72 kHz 3	OPD AMPTD 5.788 dBµV 7.793 dBµV	AVG AMPTD 33.588 dBµV 34.950 dBµV	VBW OFF	90 kHz -28.606 dB -25.665 dB	AVG LL2 A -20.806 dB -18.507 dB	Dwell T OFF	ime 96.07 µs (# 4 kl RBW 9.00 kHz (CISPR) 9.00 kHz (CISPR)
art 150 kHz s BW 9 kHz I 182.00 kHz 3 ■ 1 182.00 kHz 3 ■ 1 182.00 kHz 3 ■ 1 182.00 kHz 3 ■ 1 593.97 kHz 3	OPD AMPTD 5.788 dBµV 7.793 dBµV 3.710 dBµV	AVG AMPTD 33.588 dBµV 34.950 dBµV 28.765 dBµV	VBW OFF 	90 kHz QPD LL1A -28.606 dB -25.665 dB -22.290 dB	AVG LL2A -20.806 dB -18.507 dB -17.235 dB	Dwell T OFF	ime 96.07 µs (# 4 kl RBW 9.00 kHz (CISPR) 9.00 kHz (CISPR) 9.00 kHz (CISPR)
art 150 kHz sBW 9 kHz ■ 1 182.00 kHz 3 ■ 1 203.72 kHz 3 ■ 1 593.97 kHz 3 ■ 1 12.709 MHz 2 3 ■ 1 12.709 MHz 3	оро Амето 5.788 dBµV 7.793 dBµV 9.299 dBµV	AVG AMPTD 33.588 dBµV 34.950 dBµV 28.765 dBµV 25.721 dBµV	VBW OFF 	90 kHz QPD LL1A -28.606 dB -25.665 dB -22.290 dB -30.701 dB	AVG LL2A -20.806 dB -18.507 dB -17.235 dB -24.279 dB	Dwell T OFF 	ime 96.07 µs (# 4 kł 9.00 kHz (CISPR) 9.00 kHz (CISPR) 9.00 kHz (CISPR) 9.00 kHz (CISPR) 9.00 kHz (CISPR)
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↓ ↓	оро Амето 5.788 dBµV 7.793 dBµV 3.710 dBµV 9.299 dBµV 0.736 dBµV	AVG AMPTD 33.588 dBµV 34.950 dBµV 28.765 dBµV 25.721 dBµV 26.819 dBµV	VBW OFF 	90 kHz -28.606 dB -22.290 dB -30.701 dB -29.264 dB	AVG LL2A -20.806 dB -18.507 dB -24.279 dB -23.181 dB	Dwell T 	9.00 kHz (CISPR) 9.00 kHz (CISPR) 9.00 kHz (CISPR) 9.00 kHz (CISPR) 9.00 kHz (CISPR)

Plot 7-114. Line Conducted Plot with 802.11a UNII Band 2C (L1)



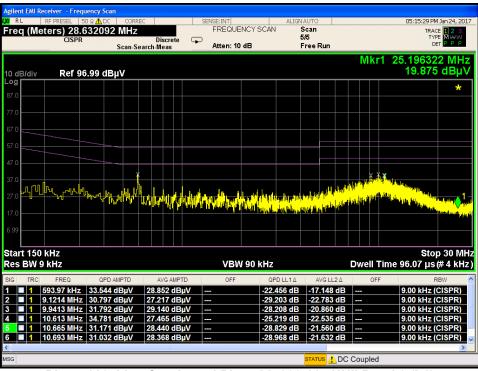
Plot 7-115. Line Conducted Plot with 802.11a UNII Band 2C (N)

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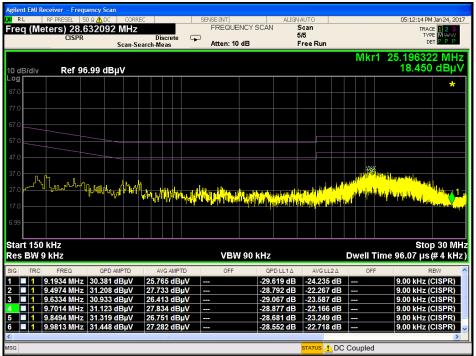
01/09/2016



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Plot 7-116. Line Conducted Plot with 802.11a UNII Band 3 (L1)



Plot 7-117. Line Conducted Plot with 802.11a UNII Band 3 (N)

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8.0 CONCLUSION

The data collected relate only the item(s) tested and show that the LGE Portable Handset FCC ID: ZNFM710H is in compliance with Part 15E of the FCC Rules.

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