PCTEST ENGINEERING LABORATORY, INC.

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

# MEASUREMENT REPORT FCC Part 15.407 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: 2/6-3/21/2017 Test Site/Location: PCTEST Lab, Columbia, MD, USA Test Report Serial No.: 1M1703010081-05.ZNF

# FCC ID: APPLICANT:

## LG Electronics MobileComm U.S.A

Application Type: Model: Additional Model(s):

FCC Classification:

FCC Rule Part(s):

**Test Procedure(s):** 

EUT Type:

Certification LG-TP450 LGTP450, TP450, LG-MP450, LGMP450, MP450, LG-M470, LGM470, M470, LG-M470F, LGM470F, M470F Portable Handset Unlicensed National Information Infrastructure (UNII) Part 15.407

KDB 789033 D02 v01r03

ZNFTP450

	Channel Bandwidth (MHz)		Conducted Power		
UNII Band		Tx Frequency (MHz)	Max. Power (mW)	Max. Power (dBm)	
1		5180 - 5240	51.404	17.11	
2A	20	5260 - 5320	48.865	16.89	
2C		5500 - 5700	51.523	17.12	
3		5745 - 5825	49.204	16.92	
1		5190 - 5230	20.749	13.17	
2A	40	5270 - 5310	20.606	13.14	
2C	40	5510 - 5670	21.038	13.23	
3		5755 - 5795	20.845	13.19	
1		5210	12.853	11.09	
2A	80	5290	13.092	11.17	
2C		5530 -5610	13.459	11.29	
3		5775	13.521	11.31	

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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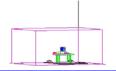
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APPLICANT:	LG Electronics MobileComm U.S.A				
APPLICANT ADDRESS:	1000 Sylvan Avenue				
	Englewood Cliffs, NJ 07632, United States				
TEST SITE:	PCTEST ENGINEERING LABORATORY, INC.				
TEST SITE ADDRESS:	7185 Oakland Mills Road, Columbia, MD 21046 USA				
FCC RULE PART(S):	Part 15.407				
BASE MODEL:	LG-TP450				
FCC ID:	ZNFTP450				
FCC CLASSIFICATION:	Unlicensed National Information Infrastructure (UNII)				
Test Device Serial No.:	38455, 38448,  Production  Pre-Production  Engineering				
DATE(S) OF TEST:	2/6-3/21/2017				
TEST REPORT S/N:	1M1703010081-05.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.

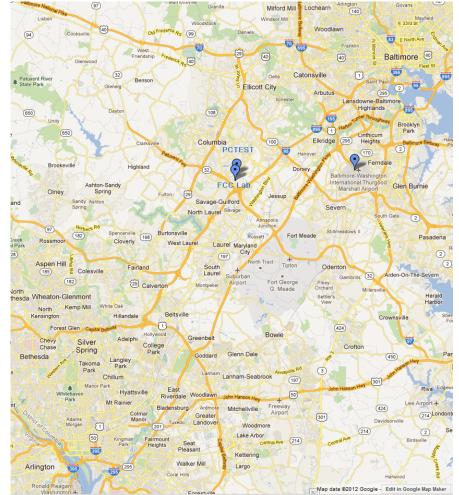


Figure 1-1. Map of the Greater Baltimore and Metropolitan Washington, D.C. area

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#### PRODUCT INFORMATION 2.0

#### 2.1 **Equipment Description**

The Equipment Under Test (EUT) is the LG Portable Handset FCC ID: ZNFTP450. 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

Ban	d	1
Duir	м.	

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 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	802.11 Mode/Band			
802.11 10				
	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. The EMI Receiver mode of the Agilent MXE was used to perform AC line conducted emissions testing.

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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
-	WL25-1	Conducted Cable Set (25GHz)	4/11/2016	Annual	4/11/2017	WL25-1
-	RE1	Radiated Emissions Cable Set (UHF/EHF)	7/11/2016	Annual	7/11/2017	RE1
Agilent	N9030A	PXA Signal Analyzer (26.5GHz)	7/20/2016	Annual	7/20/2017	MY49432391
Agilent	N9038A	MXE EMI Receiver	4/21/2016	Annual	4/21/2017	MY51210133
Anritsu	MA2411B	Pulse Power Sensor	10/14/2015	Biennial	10/14/2017	846215
Anritsu	ML2495A	Power Meter	10/16/2015	Biennial	10/16/2017	941001
Com-Power	AL-130	9kHz - 30MHz Loop Antenna	7/30/2015	Biennial	7/30/2017	121034
Com-Power	PAM-103	Pre-Amplifier (1-1000MHz)	7/6/2016	Annual	7/6/2017	441119
Com-Power	PAM-118A	PREAMPLIFIER 500MHZ TO 18GHZ	8/9/2016	Annual	8/9/2017	551079
Emco	3115	Horn Antenna (1-18GHz)	3/10/2016	Biennial	3/10/2018	9704-5182
EMCO	3160-09	Small Horn (18 - 26.5GHz)	8/23/2016	Biennial	8/23/2018	135427
EMCO	3160-10	Small Horn (26.5 - 40GHz)	8/23/2016	Biennial	8/23/2018	130993
Espec	ESX-2CA	Environmental Chamber	4/4/2016	Annual	4/4/2017	17620
Huber+Suhner	Sucoflex 102A	40GHz Radiated Cable	4/26/2016	Annual	4/26/2017	251425001
Pasternack	NMLC-1	Line Conducted Emissions Cable (NM)	4/28/2015	Biennial	4/28/2017	NMLC-1
PCTEST	-	EMC Switch System	7/6/2016	Annual	7/6/2017	NM2
Rohde & Schwarz	ESU40	EMI Test Receiver (40GHz)	7/15/2016	Annual	7/15/2017	100348
Rohde & Schwarz	FSW67	Signal / Spectrum Analyzer	7/27/2016	Annual	7/27/2017	103200
Rohde & Schwarz	TS-PR18	1-18 GHz Pre-Amplifier	7/11/2016	Annual	7/11/2017	100071
Rohde & Schwarz	TS-PR26	18-26.5 GHz Pre-Amplifier	4/7/2016	Annual	4/7/2017	100040
Rohde & Schwarz	TS-PR40	26.5-40 GHz Pre-Amplifier	4/7/2016	Annual	4/7/2017	100037
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
Sunol Sciences	DRH-118	Horn Antenna	7/1/2015	Biennial	7/1/2017	A060215

Table 6-1. Annual Test Equipment Calibration Schedule

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# 7.0 TEST RESULTS

#### 7.1 Summary

Company Name:	LG Electronics MobileComm U.S.A
FCC ID:	<u>ZNFTP450</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.

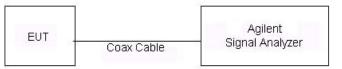


Figure 7-1. Test Instrument & Measurement Setup

#### 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	23.27
	5200	40	а	6	20.81
	5240	48	а	6	20.50
~	5180	36	n (20MHz)	6.5/7.2 (MCS0)	21.25
Band 1	5200	40	n (20MHz)	6.5/7.2 (MCS0)	20.71
ä	5240	48	n (20MHz)	6.5/7.2 (MCS0)	21.11
	5190	38	n (40MHz)	13.5/15 (MCS0)	42.39
	5230	46	n (40MHz)	13.5/15 (MCS0)	42.90
	5210	42	ac (80MHz)	29.3/32.5 (MCS0)	83.15
	5260	52	а	6	20.24
	5280	56	а	6	20.42
	5320	64	а	6	20.34
2A	5260	52	n (20MHz)	6.5/7.2 (MCS0)	20.62
Band 2A	5280	56	n (20MHz)	6.5/7.2 (MCS0)	21.15
Ba	5320	320 64 n (20MHz) 6.5/7.2 (MCS		6.5/7.2 (MCS0)	20.41
	5270	54	n (40MHz)	13.5/15 (MCS0)	42.88
	5310	62	n (40MHz)	13.5/15 (MCS0)	42.92
	5290	58	ac (80MHz)	29.3/32.5 (MCS0)	82.77
	5500	100	а	6	20.35
	5580	116	а	6	21.44
	5700	140	а	6	21.34
o	5500	100	n (20MHz)	6.5/7.2 (MCS0)	21.30
Band 2C	5580	116	n (20MHz)	6.5/7.2 (MCS0)	21.05
and	5700	140	n (20MHz)	6.5/7.2 (MCS0)	21.07
ш	5510	102	n (40MHz)	13.5/15 (MCS0)	43.02
	5550	110	n (40MHz)	13.5/15 (MCS0)	42.83
	5670	134	n (40MHz)	13.5/15 (MCS0)	42.95
	5530	106	ac (80MHz)	29.3/32.5 (MCS0)	82.99

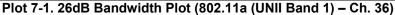
Table 7-2. Conducted Bandwidth Measurements

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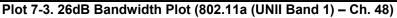


Plot 7-2. 26dB Bandwidth Plot (802.11a (UNII Band 1) - Ch. 40)

FCC ID: ZNFTP450		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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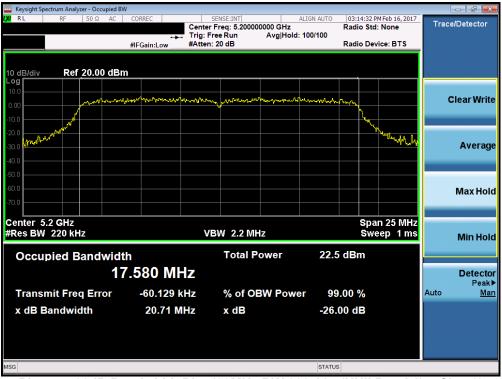




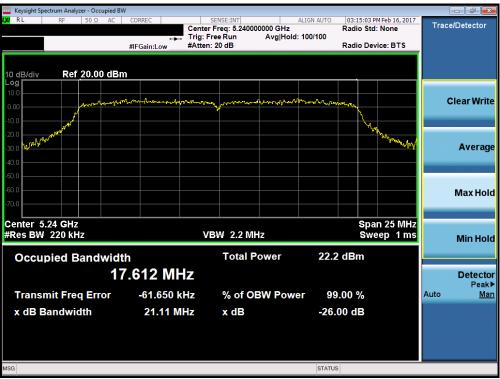
Plot 7-4. 26dB Bandwidth Plot (20MHz BW 802.11n (UNII Band 1) – Ch. 36)

FCC ID: ZNFTP450		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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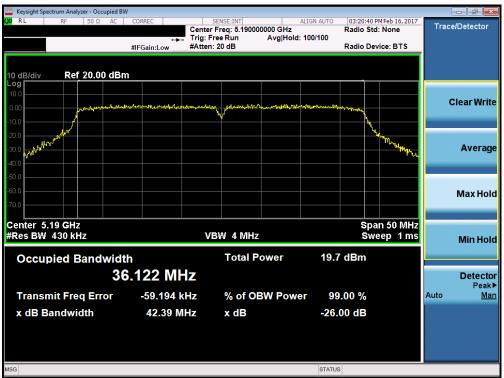
Plot 7-5. 26dB Bandwidth Plot (20MHz BW 802.11n (UNII Band 1) - Ch. 40)



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

FCC ID: ZNFTP450		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: ZNFTP450		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	V				
KL RF 50Ω AC	Trig:	SENSE:INT Freq: 5.210000000 GHz Free Run Avg Hol n: 20 dB	ALIGN AUTO	03:27:03 PM Feb 16, 2017 Radio Std: None Radio Device: BTS	Trace/Detector
10 dB/div Ref 20.00 dBn	n				Clear Write
0.00 -10.0 -20.0			affig falsafigda angeler	Norman Andrews	
-30.0 -40.0 -50.0					Average Max Hold
-70.0 Center 5.21 GHz #Res BW 820 kHz		/BW 8 MHz		Span 100 MH: Sweep 1 ms	
Occupied Bandwidt	h 1.580 MHz	Total Power	18.1	dBm	Detector
Transmit Freq Error	7.425 kHz 83.15 MHz	% of OBW Pov x dB		.00 % 00 dB	Peakl Auto <u>Mar</u>
	65.13 MHz	Xub	-20.0		
ISG			STATUS		

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

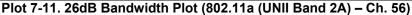


Plot 7-10. 26dB Bandwidth Plot (802.11a (UNII Band 2A) - Ch. 52)

FCC ID: ZNFTP450		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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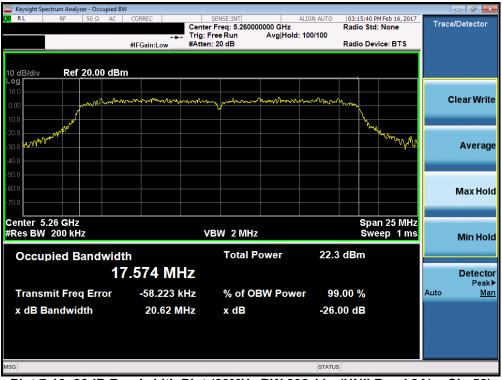




Plot 7-12. 26dB Bandwidth Plot (802.11a (UNII Band 2A) - Ch. 64)

FCC ID: ZNFTP450		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: ZNFTP450		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: ZNFTP450		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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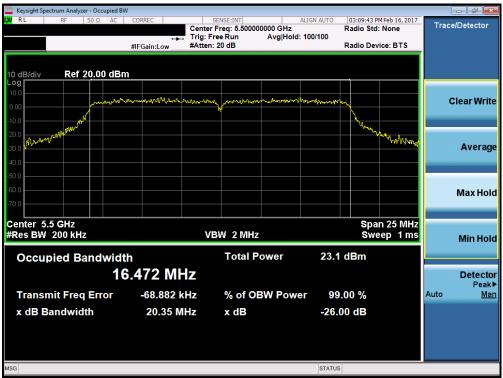
Plot 7-17. 26dB Bandwidth Plot (40MHz BW 802.11n (UNII Band 2A) - Ch. 62)

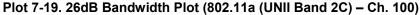


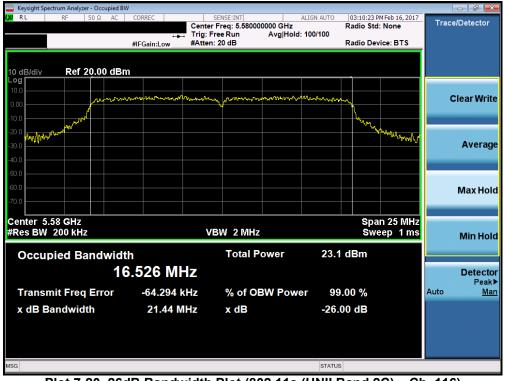
Plot 7-18. 26dB Bandwidth Plot (80MHz BW 802.11ac (UNII Band 2A) - Ch. 58)

FCC ID: ZNFTP450		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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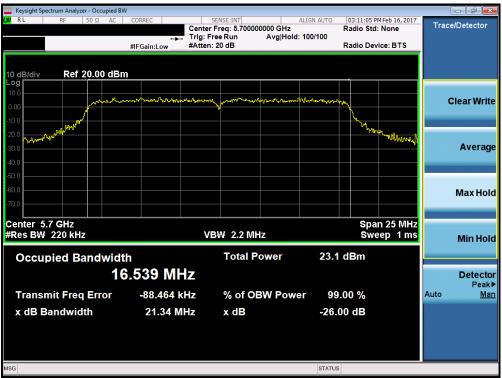


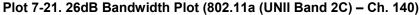


Plot 7-20. 26dB Bandwidth Plot (802.11a (UNII Band 2C) - Ch. 116)

FCC ID: ZNFTP450		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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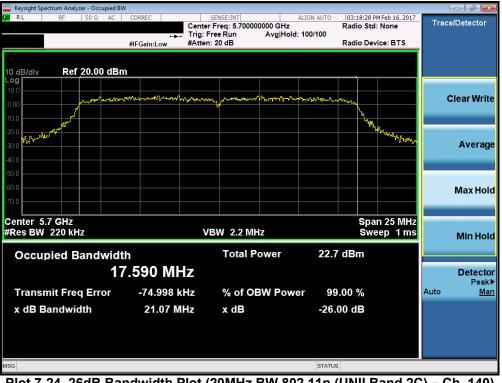
Plot 7-22. 26dB Bandwidth Plot (20MHz BW 802.11n (UNII Band 2C) - Ch. 100)

FCC ID: ZNFTP450		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	💽 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 25 of 112
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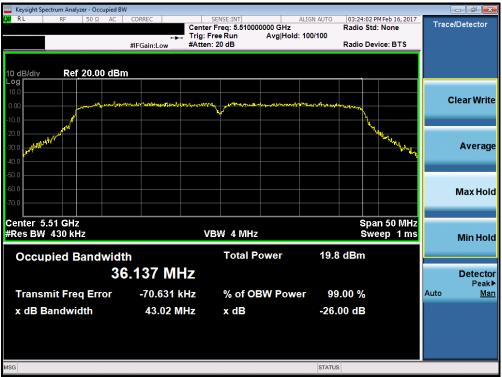
Plot 7-23. 26dB Bandwidth Plot (20MHz BW 802.11n (UNII Band 2C) - Ch. 116)



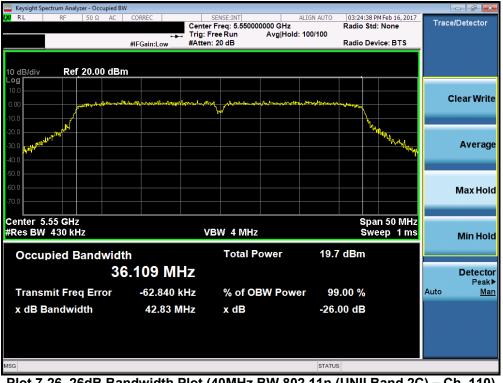
Plot 7-24. 26dB Bandwidth Plot (20MHz BW 802.11n (UNII Band 2C) - Ch. 140)

FCC ID: ZNFTP450		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)



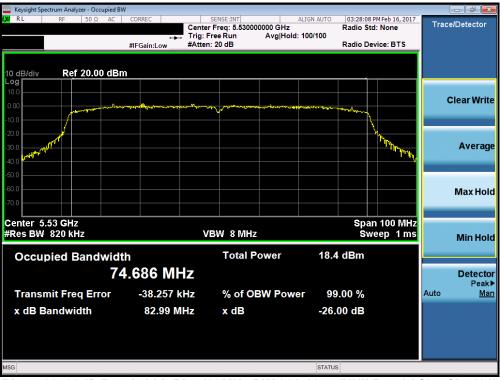
Plot 7-26. 26dB Bandwidth Plot (40MHz BW 802.11n (UNII Band 2C) - Ch. 110)

FCC ID: ZNFTP450		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dego 27 of 112
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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: ZNFTP450		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.

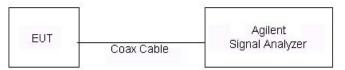


Figure 7-2. Test Instrument & Measurement Setup

#### Test Notes

None.

FCC ID: ZNFTP450		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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## 6 dB Bandwidth Measurements

_	Frequency [MHz]	Channel No.	802.11 Mode	Data Rate [Mbps]	Measured 6dB Bandwidth [MHz]
	5745	149	а	6	15.68
	5785	157	а	6	16.34
	5825	165	а	6	16.32
e	5745	149	n (20MHz)	6.5/7.2 (MCS0)	16.96
Band	5785	157	n (20MHz)	6.5/7.2 (MCS0)	16.46
ä	5825	165	n (20MHz)	6.5/7.2 (MCS0)	16.69
	5755	151	n (40MHz)	13.5/15 (MCS0)	34.82
	5795	159	n (40MHz)	13.5/15 (MCS0)	35.11
	5775	155	ac (80MHz)	29.3/32.5 (MCS0)	75.09

 Table 7-3. Conducted Bandwidth Measurements



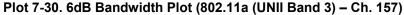
Plot 7-29. 6dB Bandwidth Plot (802.11a (UNII Band 3) - Ch. 149)

FCC ID: ZNFTP450		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dogo 20 of 112
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Plot 7-31. 6dB Bandwidth Plot (802.11a (UNII Band 3) - Ch. 165)

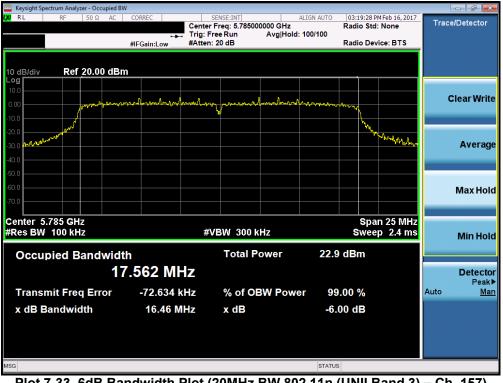
FCC ID: ZNFTP450		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega 21 of 112
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Keysight Spectrum Analyzer - Occupied B		SENSE:INT		02:10:50 0	ME-h 16 2017	-	
KL RF 50Ω AC	Trig:	er Freq: 5.745000000 GI	ALIGN AUTO Hz Hold: 100/100	Radio Std: Radio Dev		Trace/I	Detector
10 dB/div Ref 20.00 dBr	n						
10.0 0.00	m handan para		and the space of the second	~~		Cl	ear Write
-20.0 -20.0 -30.0 av <sup>1</sup> M <sup>34</sup> -40.0					murray		Average
-50.0						ı	Max Hold
Center 5.745 GHz #Res BW 100 kHz		#VBW 300 kHz			n 25 MHz p 2.4 ms		Min Hold
Occupied Bandwid		Total Power	22.8	dBm			
17	7.563 MHz						Detector Peak▶
Transmit Freq Error	-77.778 kHz	% of OBW P	ower 99	.00 %		Auto	Mar
x dB Bandwidth	16.96 MHz	x dB	-6.	00 dB			
MSG			STATUS	3			

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: ZNFTP450		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega 22 of 112
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Keysight Spectrum Analyzer - Occupied BV	V				
KAL RF 50Ω AC	Trig:	sense:INT er Freq: 5.825000000 G Free Run Avg en: 20 dB	ALIGN AUTO Hz Hold: 100/100	03:19:58 PM Feb 16, 2 Radio Std: None Radio Device: BTS	Trace/Detector
10 dB/div Ref 20.00 dBr	n				
0.00	ungangangangangangangangangangangangangan	on pronounder of	amenanana fiyana fiya	hand he a	Clear Write
-20.0					V Average
-50.0					Max Hold
Center 5.825 GHz #Res BW 100 kHz		#VBW 300 kHz Total Power	22.0	Span 25 M Sweep 2.4 r dBm	
Occupied Bandwidt	n 7.551 MHz	rotar Power	22.0	abin	Detector Peak▶
Transmit Freq Error x dB Bandwidth	-81.577 kHz 16.69 MHz	% of OBW P x dB		0.00 % 00 dB	Auto <u>Man</u>
ISG			STATUS	5	

Plot 7-34. 6dB Bandwidth Plot (20MHz BW 802.11n (UNII Band 3) – Ch. 165)



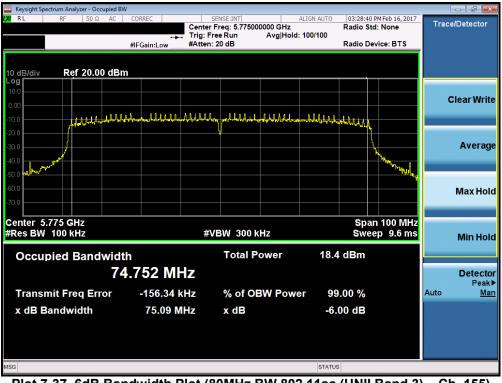
Plot 7-35. 6dB Bandwidth Plot (40MHz BW 802.11n (UNII Band 3) – Ch. 151)

FCC ID: ZNFTP450		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	💽 LG	Approved by: Quality Manager
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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: ZNFTP450		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 +  $10\log_{10}(26dB BW) = 11 dBm + 10\log_{10}(20.24) = 24.06dBm$ .

In the 5.47 – 5.725GHz band, the maximum permissible conducted output power is the lesser of 250mW (23.98dBm) and 11 dBm +  $10log_{10}(26dB BW) = 11 dBm + <math>10log_{10}(20.35) = 24.09dBm$ .

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.

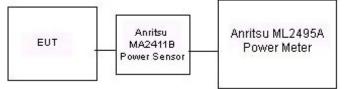


Figure 7-3. Test Instrument & Measurement Setup

#### Test Notes

None

FCC ID: ZNFTP450		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
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			5GHz (20MHz) Conducted Power [dBm] IEEE Transmission Mode			
Freq [MHz]	Channel	Detector				
			802.11a	802.11n	802.11ac	
5180	36	AVG	17.09	16.35	16.24	
5200	40	AVG	17.04	16.31	16.27	
5220	44	AVG	17.11	16.26	16.18	
5240	48	AVG	16.91	16.32	16.16	
5260	52	AVG	16.89	16.20	16.16	
5280	56	AVG	16.87	16.23	16.14	
5300	60	AVG	16.67	16.23	16.09	
5320	64	AVG	16.74	16.31	16.19	
5500	100	AVG	17.11	16.52	16.44	
5580	116	AVG	16.88	16.42	16.39	
5660	132	AVG	17.00	16.48	16.42	
5700	140	AVG	17.12	16.44	16.35	
5745	149	AVG	16.81	16.41	16.32	
5785	157	AVG	16.92	16.56	16.47	
5825	165	AVG	16.91	16.49	16.41	

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

Freq [MHz]	Channel	Detector	5GHz (40MHz) Conducted Power [dBm]			
	Channel	Detector	IEEE Transm	nission Mode		
			802.11n	802.11ac		
5190	38	AVG	13.04	13.01		
5230	46	AVG	13.17	13.02		
5270	54	AVG	13.14	13.01		
5310	62	AVG	13.06	13.02		
5510	102	AVG	13.14	13.03		
5550	110	AVG	13.23	13.04		
5670	134	AVG	13.11	13.02		
5755	151	AVG	13.11	13.01		
5795	159	AVG	13.19	13.02		

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

FCC ID: ZNFTP450		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	💽 LG	Approved by: Quality Manager
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5GHz (80MHz) Conducted Power [dBm]							
Freq [MHz]	Channel	IEEE Transmission Mode					
			802.11ac				
5210	42	AVG	11.09				
5290	58	AVG	11.17				
5530	106	AVG	11.29				
5775	155	AVG	11.31				

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

FCC ID: ZNFTP450		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.

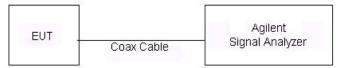


Figure 7-4. Test Instrument & Measurement Setup

#### Test Notes

None

FCC ID: ZNFTP450		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	5.80	11.0	-5.20	Pass
	5200	40	а	6	5.93	11.0	-5.07	Pass
	5240	48	а	6	5.67	11.0	-5.33	Pass
-	5180	36	n (20MHz)	6.5/7.2 (MCS0)	5.32	11.0	-5.68	Pass
Band	5200	40	n (20MHz)	6.5/7.2 (MCS0)	5.18	11.0	-5.82	Pass
B	5240	48	n (20MHz)	6.5/7.2 (MCS0)	5.07	11.0	-5.93	Pass
	5190	38	n (40MHz)	13.5/15 (MCS0)	-0.93	11.0	-11.93	Pass
	5230	46	n (40MHz)	13.5/15 (MCS0)	-0.95	11.0	-11.95	Pass
	5210	42	ac (80MHz)	29.3/32.5 (MCS0)	-6.00	11.0	-17.00	Pass
	5260	52	а	6	5.51	11.0	-5.49	Pass
	5280	56	а	6	5.60	11.0	-5.40	Pass
	5320	64	а	6	5.85	11.0	-5.15	Pass
5A	5260	52	n (20MHz)	6.5/7.2 (MCS0)	4.96	11.0	-6.04	Pass
Band 2A	5280	56	n (20MHz)	6.5/7.2 (MCS0)	5.22	11.0	-5.78	Pass
Ba	5320	64	n (20MHz)	6.5/7.2 (MCS0)	5.33	11.0	-5.67	Pass
	5270	54	n (40MHz)	13.5/15 (MCS0)	-0.96	11.0	-11.96	Pass
	5310	62	n (40MHz)	13.5/15 (MCS0)	-1.01	11.0	-12.01	Pass
	5290	58	ac (80MHz)	29.3/32.5 (MCS0)	-5.57	11.0	-16.57	Pass
	5500	100	а	6	6.32	11.0	-4.68	Pass
	5580	116	а	6	6.11	11.0	-4.89	Pass
	5700	140	а	6	6.25	11.0	-4.75	Pass
0	5500	100	n (20MHz)	6.5/7.2 (MCS0)	5.72	11.0	-5.28	Pass
4 5C	5580	116	n (20MHz)	6.5/7.2 (MCS0)	5.58	11.0	-5.42	Pass
Band 2C	5700	140	n (20MHz)	6.5/7.2 (MCS0)	5.55	11.0	-5.45	Pass
ш	5510	102	n (40MHz)	13.5/15 (MCS0)	-0.82	11.0	-11.82	Pass
	5550	110	n (40MHz)	13.5/15 (MCS0)	-0.94	11.0	-11.94	Pass
	5670	134	n (40MHz)	13.5/15 (MCS0)	-0.80	11.0	-11.80	Pass
	5530	106	ac (80MHz)	29.3/32.5 (MCS0)	-5.59	11.0	-16.59	Pass

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

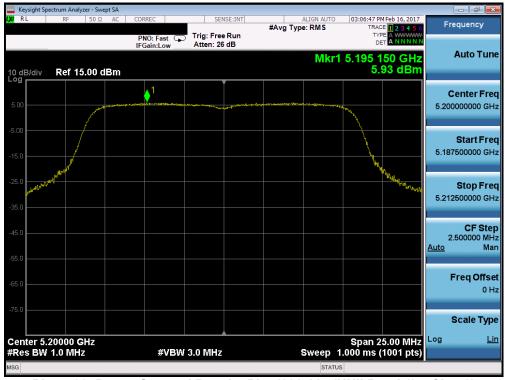
FCC ID: ZNFTP450		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	💽 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dego 20 of 112
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	ectrum Analyzer		A										
LXI RL	RF	50Ω A	AC CO	RREC		SEN	ISE:INT	#Avg Typ	ALIGN AUTO e: RMS		M Feb 16, 2017 CE 1 2 3 4 5 6	F	requency
			P IF	NO: Fast Gain:Low		rig: Free Atten: 26				TY D			Auto Tune
10 dB/div Log	Ref 15.0	)0 dBi	m						Mkr1	5.175 8 5.	800 GHz 80 dBm		Auto Tune
5.00		Jeronana and	generates y official parts of	1		and a special state of the		مەرىمىرىيە بىلىسىيە يەرىسى	and balgeby-th-cluby-splay-	and the second s			<b>Center Freq</b> 80000000 GHz
-5.00	/												Start Freq
-15.0	م مرکز ا											5.16	57500000 GHz
-25.0	yran fu										Marthan to Second Mart	5.19	Stop Freq
-35.0													CF Step
-45.0												<u>Auto</u>	2.500000 MHz Man
-65.0													Freq Offset
-75.0													0 Hz
													Scale Type
Center 5. #Res BW		z		#VE	3W 3.(	) MHz			Sweep 1	Span 2 .000 ms (	5.00 MHz (1001 pts)	Log	Lin
MSG									STATUS	6			

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: ZNFTP450		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					
X/RL RF 50Ω AC	CORREC SEN	SE:INT #Avg Typ		M Feb 16, 2017 DE 1 2 3 4 5 6	Frequency
	PNO: Fast Free IFGain:Low Atten: 26	Run	TY		
10 dB/div Ref 15.00 dBm			Mkr1 5.244 5.	550 GHz 67 dBm	Auto Tune
					Center Freq
5.00	al na an de angle de la constant de	and a sub-product of the second s	and a second		5.240000000 GHz
-5.00					Start Freq 5.227500000 GHz
-25.0			· · ·	Andrahan UNIVINIA WOM	<b>Stop Freq</b> 5.252500000 GHz
45.0					CF Step 2.500000 MH Auto Mar
-65.0					Freq Offset 0 Hz
-75.0					Scale Type
Center 5.24000 GHz #Res BW 1.0 MHz	#VBW 3.0 MHz		Span 2 Sweep 1.000 ms i	.3.00 WILLS	.og <u>Lin</u>
ASG			STATUS		





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

FCC ID: ZNFTP450		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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	ectrum Analyzer - S								- 6 <b>-</b>
L <mark>XI</mark> RL	RF 50	Ω AC	CORREC	SENSE:INT	#Avg Typ	ALIGN AUTO e: RMS	TRAC	HFeb 16, 2017	Frequency
			PNO: Fast G	Trig: Free Run Atten: 26 dB					
10 dB/div Log	Ref 15.00	dBm				Mkr1	5.203 7 5.	'00 GHz 18 dBm	Auto Tun
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-15.0									Start Fre 5.187500000 GH
	La March							MAL .	
-25.0								WWW MAR	<b>Stop Fre</b> 5.212500000 GH
									CF Ste
-45.0									2.500000 MH <u>Auto</u> Ma
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-65.0									. он
-75.0									Scale Type
							<b>0</b> 0	5 00 MILL-	Log Li
Center 5.2 #Res BW	20000 GHz 1.0 MHz		#VBV	/ 3.0 MHz		Sweep 1	span 2 .000 ms (	5.00 MHz 1001 pts)	
MSG						STATUS	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: ZNFTP450		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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Plot 7-45. Power Spectral Density Plot (40MHz BW 802.11n (UNII Band 1) - Ch. 46)

FCC ID: ZNFTP450		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dogo 42 of 112
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	pectrum Analyze	er - Swept SA					
XI RL	RF	50 Ω AC	CORREC PNO: Fast	SENSE:INT	ALIGN AUTO #Avg Type: RMS	03:27:10 PM Feb 16, 2017 TRACE 1 2 3 4 5 6 TYPE A WWWW DET A N N N N N	Frequency
10 dB/div Log		et 0.31 dB 00 dBm	IFGain:Low	Atten: 26 dB	N	DET A NNNNN Akr1 5.202 0 GHz -6.00 dBm	Auto Tun
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-5.00		rer man damana	14440000000000000000000000000000000000		Nergelander (1995) ville verden stander (1995) gewallte en stander og se		<b>Start Fre</b> 5.160000000 GH
-25.0							<b>Stop Fre</b> 5.260000000 GH
-45.0 <b>And</b> -55.0 —	en l'all'					"Minutyny A	CF Ste 10.000000 MH <u>Auto</u> Ma
65.0							Freq Offso 0 ⊦
							Scale Typ
	.21000 GH 1.0 MHz	łz	#VB	W 3.0 MHz	Sweep	Span 100.0 MHz 1.000 ms (1001 pts)	Log <u>Li</u>
//SG					STA	TUS	





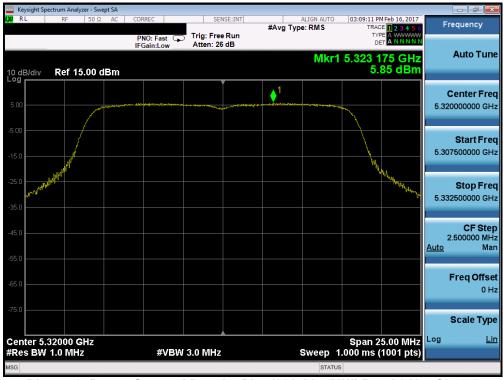
Plot 7-47. Power Spectral Density Plot (802.11a (UNII Band 2A) - Ch. 52)

FCC ID: ZNFTP450		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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— Keysight S	pectrum Analyz	er - Swep	pt SA										
XV RL	RF	50 Ω	AC	CORREC			ENSE:INT	#Avg Typ	ALIGN AUTO e: RMS	TRAC	M Feb 16, 2017	F	requency
				PNO: F IFGain:l	ast ⊊ ∟ow	Trig: Fr Atten: 2				TYF DE			
10 dB/div Log	Ref 15.	.00 dl	Bm					Mkr1 5.284 100 GHz 5.60 dBm				Auto Tune	
							Ĭ						Center Free
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	Jours									NH4	No.		
-25.0	Nur and										- Mingheliudur base	5.29	Stop Free 2500000 GH
-45.0													CF Ste
-55.0												Auto	2.500000 MH Ma
-65.0													Freq Offse
													0 H
-75.0													Scale Typ
	.28000 GI 1.0 MHz			;	#VBW	3.0 MH	z		Sweep 1	Span 2 .000 ms (	5.00 MHz 1001 pts)	Log	Li
//SG									STATUS				

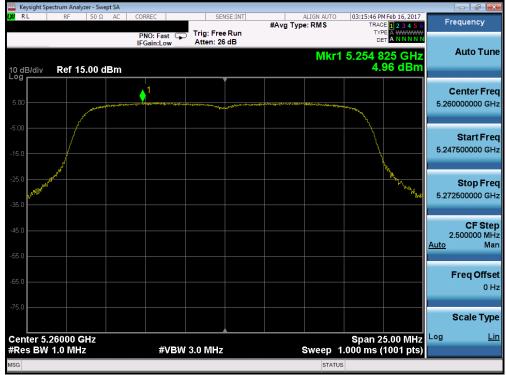
Plot 7-48. Power Spectral Density Plot (802.11a (UNII Band 2A) – Ch. 56)



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

FCC ID: ZNFTP450		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
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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: ZNFTP450		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	💽 LG	Approved by: Quality Manager
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Plot 7-53. Power Spectral Density Plot (40MHz BW 802.11n (UNII Band 2A) - Ch. 54)

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SG		#VD	A CAV IVITIZ	Sweep		
enter 5.3100 Res BW 1.0 N		#\/B)	№ 3.0 MHz	Sween	Span 50.00 MHz 1.000 ms (1001 pts)	Log <u>L</u>
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65.0						o H
55.0						Freq Offs
						Auto Ma
I5.0						CF Ste 5.000000 M
35.0					White the second	3.333000000 8
25.0 <b>با</b>					Why way	Stop Fr 5.335000000 G
					l l	
15.0						5.285000000 G
5.00		and a second				Start Fr
5.00				1		5.310000000 G
						Center Fre
0 dB/div Ref	f 15.00 dBn	n	<b>.</b>		-1.01 dBm	
		IFGain:Low	Atten: 26 dB	Mk	r1 5.321 65 GHz	Auto Tui
		PNO: Fast	Trig: Free Run Atten: 26 dB	#Avg Type: RMS	TRACE 1 2 3 4 5 6 TYPE A WWWWW DET A N N N N N	Trequency
RL RF	50 Ω A	C CORREC	SENSE:INT	ALIGN AUTO	03:23:28 PM Feb 16, 2017	Frequency

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: ZNFTP450		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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	ectrum Analyzer -						
X/RL	RF 5	OΩ AC	CORREC	Trig: Free Run	ALIGN AUTO #Avg Type: RMS	03:09:54 PM Feb 16, TRACE 1 2 3	456 Frequency
			PNO: Fast 🕞 IFGain:Low	Atten: 26 dB			
10 dB/div Log	Ref 15.0	0 dBm			Mkr1	5.494 950 G 6.32 dl	iHz Auto Tune Bm
			<b>1</b>				Center Freq
5.00	/		an a	alassa ang ang ang ang ang ang ang ang ang an	yan a yan Anton San Un tan Anton ya ya ka ya ka		5.50000000 GHz
-5.00							Start Freq 5.487500000 GHz
-15.0	16 Areas and a start and a					W.W. WARDEN	
-25.0							5.512500000 GHz
							CF Step
-45.0							2.500000 MH Auto Mar
-55.0							Freq Offse
-65.0							0 Hz
-75.0							Scale Type
Center 5.	50000 GHz	2				Span 25.00 M	/Hz Log <u>Lir</u>
#Res BW			#VBW	3.0 MHz	Sweep 1	.000 ms (1001	pts)
ISG					STATU	5	





Plot 7-57. Power Spectral Density Plot (802.11a (UNII Band 2C) – Ch. 116)

FCC ID: ZNFTP450		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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	ectrum Analyze		ot SA										
X/RL	RF	50 Ω	AC	CORREC			NSE:INT	#Avg Typ	ALIGN AUTO e: RMS	TRAC	M Feb 16, 2017 E <b>1 2 3 4 5 6</b>	F	requency
				PNO: F	ast ⊊⊃ ∟ow	Trig: Fre Atten: 2							
10 dB/div Log	Ref 15.	00 dl	Bm						Mkr1	5.694 3 6.	75 GHz 25 dBm		Auto Tune
				♦ <sup>1</sup>			Ĭ						Center Freq
5.00	/	/	,			Lotent for the species play of	and the second secon	el <u>an de la serie de la ser</u> ie	Contraction of the state of the	and a second sec		5.70	0000000 GHz
-5.00												5 68	Start Freq
-15.0	- Marth Wel									Jean	Mary Mary		
-25.0	u										Mary Mary Mary	5.71	Stop Freq 2500000 GHz
-35.0													05.04+
-45.0												Auto	CF Step 2.500000 MHz Man
-55.0													
-65.0													Freq Offset 0 Hz
-75.0													Scale Type
Center 5.	70000 CL	17								Snan-2	5.00 MHz	Log	Lin
#Res BW		172		ŧ	#VBW	3.0 MHz			Sweep 1	.000 ms (	1001 pts)		
MSG									STATUS	6			





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

FCC ID: ZNFTP450		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: ZNFTP450		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: ZNFTP450		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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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: ZNFTP450		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	3.14	30.0	-26.86	Pass
	5785	157	а	6	3.36	30.0	-26.64	Pass
	5825	165	а	6	3.46	30.0	-26.54	Pass
e	5745	149	n (20MHz)	6.5/7.2 (MCS0)	2.56	30.0	-27.44	Pass
Band	5785	157	n (20MHz)	6.5/7.2 (MCS0)	2.78	30.0	-27.22	Pass
ä	5825	165	n (20MHz)	6.5/7.2 (MCS0)	2.66	30.0	-27.34	Pass
	5755	151	n (40MHz)	13.5/15 (MCS0)	-3.83	30.0	-33.83	Pass
	5795	159	n (40MHz)	13.5/15 (MCS0)	-3.55	30.0	-33.55	Pass
	5775	155	ac (80MHz)	29.3/32.5 (MCS0)	-5.28	30.0	-35.28	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: ZNFTP450		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	💽 LG	Approved by: Quality Manager
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Plot 7-68. Power Spectral Density Plot (802.11a (UNII Band 3) – Ch. 165)

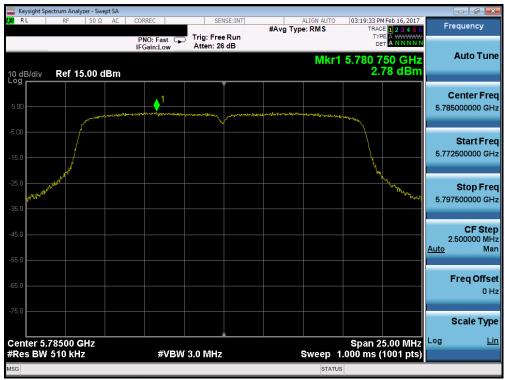
FCC ID: ZNFTP450		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Daga EE of 112
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Plot 7-69. Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 3) – Ch. 149)



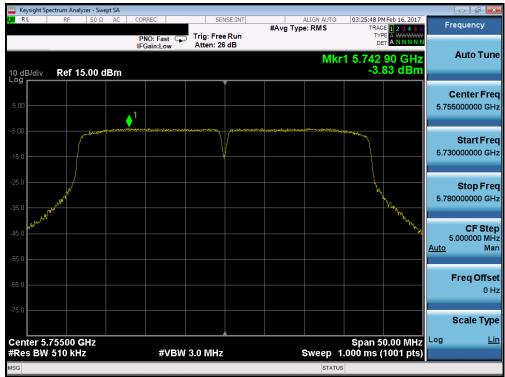
Plot 7-70. Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 3) - Ch. 157)

FCC ID: ZNFTP450		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)

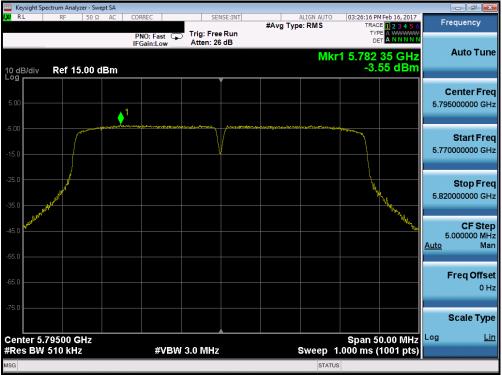


Plot 7-72. Power Spectral Density Plot (40MHz BW 802.11n (UNII Band 3) - Ch. 151)

FCC ID: ZNFTP450		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: ZNFTP450		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)	5,179,999,924	-76	-0.00000147	
100 %		- 30	5,180,000,049	49	0.00000095	
100 %		- 20	5,180,000,124	124	0.00000239	
100 %		- 10	5,180,000,133	133	0.00000257	
100 %		0	5,180,000,268	268	0.00000517	
100 %		+ 10	5,180,000,070	70	0.00000135	
100 %		+ 20	5,179,999,689	-311	-0.00000600	
100 %		+ 30	5,180,000,099	99	0.00000191	
100 %		+ 40	5,179,999,951	-49	-0.00000095	
100 %		+ 50	5,179,999,988	-12	-0.00000023	
BATT. ENDPOINT	3.45	+ 20	5,180,000,184	184	0.00000355	
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)	5,260,000,081	81	0.00000154
100 %		- 30	5,259,999,870	-130	-0.00000247
100 %		- 20	5,260,000,017	17	0.00000032
100 %		- 10	5,260,000,261	261	0.00000496
100 %		0	5,260,000,012	12	0.00000023
100 %		+ 10	5,259,999,964	-36	-0.00000068
100 %		+ 20	5,259,999,894	-106	-0.00000202
100 %		+ 30	5,259,999,979	-21	-0.00000040
100 %		+ 40	5,260,000,267	267	0.00000508
100 %		+ 50	5,260,000,356	356	0.00000677
BATT. ENDPOINT	3.45	+ 20	5,260,000,174	174	0.00000331
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)	5,500,000,218	218	0.00000396
100 %		- 30	5,499,999,976	-24	-0.00000044
100 %		- 20	5,500,000,007	7	0.00000013
100 %		- 10	5,499,999,914	-86	-0.00000156
100 %		0	5,499,999,923	-77	-0.00000140
100 %		+ 10	5,500,000,001	1	0.00000002
100 %		+ 20	5,499,999,838	-162	-0.00000295
100 %		+ 30	5,499,999,781	-219	-0.00000398
100 %		+ 40	5,499,999,987	-13	-0.00000024
100 %		+ 50	5,500,000,387	387	0.00000704
BATT. ENDPOINT	3.45	+ 20	5,499,999,969	-31	-0.00000056
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)	5,745,000,286	286	0.00000498
100 %		- 30	5,744,999,678	-322	-0.00000560
100 %		- 20	5,744,999,856	-144	-0.00000251
100 %		- 10	5,744,999,682	-318	-0.00000554
100 %		0	5,744,999,969	-31	-0.00000054
100 %		+ 10	5,744,999,608	-392	-0.00000682
100 %		+ 20	5,745,000,225	225	0.00000392
100 %		+ 30	5,745,000,195	195	0.00000339
100 %		+ 40	5,744,999,992	-8	-0.00000014
100 %		+ 50	5,745,000,151	151	0.00000263
BATT. ENDPOINT	3.45	+ 20	5,745,000,269	269	0.00000468
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.

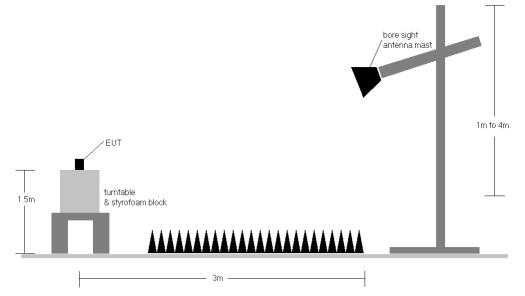


Figure 7-5. Test Instrument & Measurement Setup

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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:

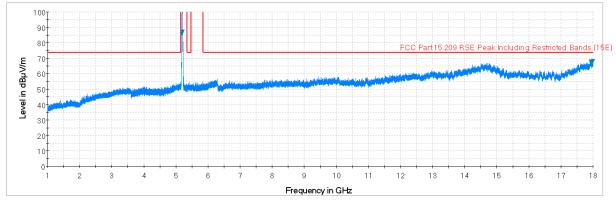
#### Offset (dB) = (Antenna Factor + Cable Loss + Attenuator) – Preamplifier Gain

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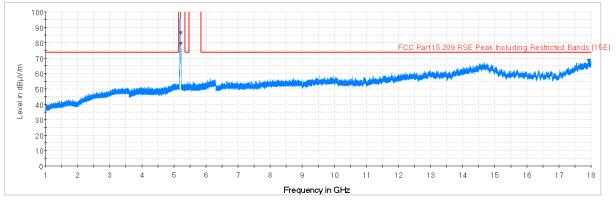
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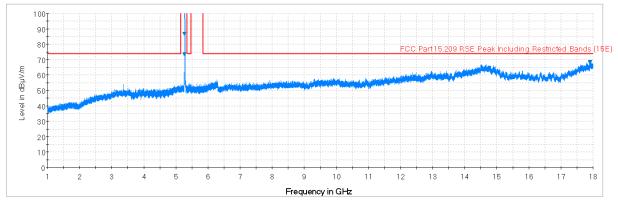
### 7.7.1 Radiated Spurious Emission Measurements



Plot 7-75. Radiated Spurious Plot above 1GHz (802.11a – U1 Ch. 40, Ant. Pol. H)



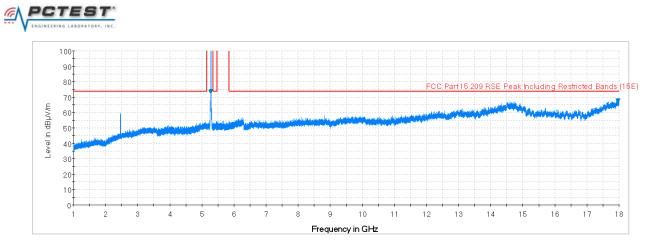
Plot 7-76. Radiated Spurious Plot above 1GHz (802.11a – U1 Ch. 40, Ant. Pol. V)



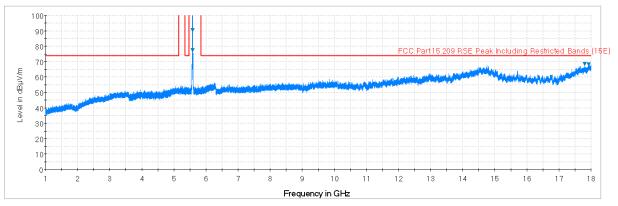
Plot 7-77. Radiated Spurious Plot above 1GHz (802.11a – U2A Ch. 56, Ant. Pol. H)

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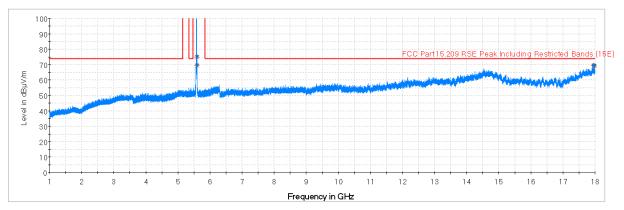
01/09/2016



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

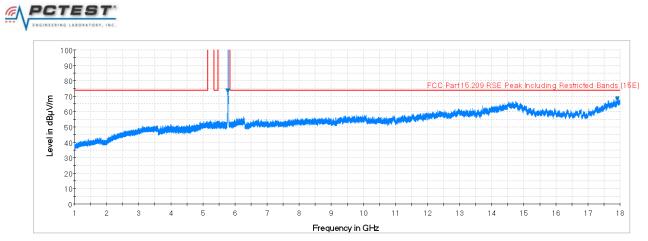


Plot 7-79. Radiated Spurious Plot above 1GHz (802.11a – U2C Ch. 116, Ant. Pol. H)

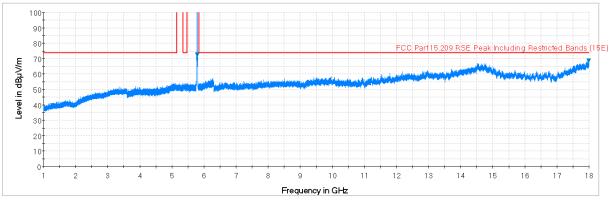


Plot 7-80. Radiated Spurious Plot above 1GHz (802.11a – U2C Ch. 116, Ant. Pol. V)

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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)

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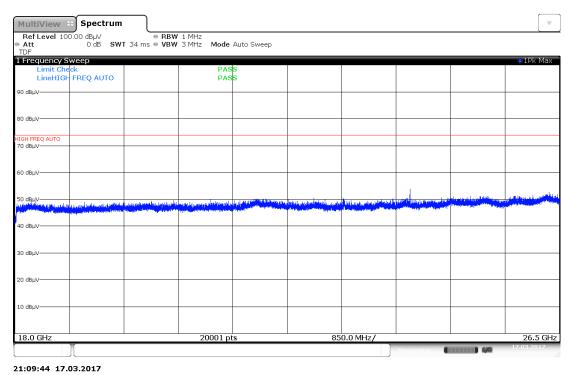


# Radiated Spurious Emissions Measurements (Above 18GHz) §15.209

MultiView	Spectrum								
Ref Level 10 Att TDF	0.00 dBµV 0 dB <b>SWT</b>		1 MHz 3 MHz Mode	Auto Sweep					
1 Frequency S									●1Pk Max
Limit Che			PAS						
LineHIGH	FREQ AUTO		PAS	S					
90 dBµV									
80 dBµV									
HIGH FREQ AUTO 70 dBµV									
, o dop.									
60 dBµV									
FO dD: AL				1				Late contains	واللطائمينان ورزيته والأرز
Join of Burney Links	المتحمين والاطراف والم	and the sector sector sector	data polisi Agoonta bayan Ar		al de auxiliant de arus, de	الألبية الإيداني والمرابع	AND A DESCRIPTION OF THE PARTY		and the property and the state of the state of
and the second	Management design of addition	Annual Statistics of Congress Statistics	and the second		and the second se	the state of the state of the state			
40 dBμV									
30 dBµV									
20 dBuV									
10 dBµV									
18.0 GHz			20001 pt	s	85	0.0 MHz/			26.5 GHz
	T I						Measuring		17.03.2017
						,			

21:01:01 17.03.2017





Plot 7-84. Radiated Spurious Plot above 18GHz - 26.5GHz (802.11a – Ant. Pol. V)

FCC ID: ZNFTP450		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
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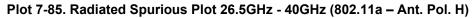
01/09/2016

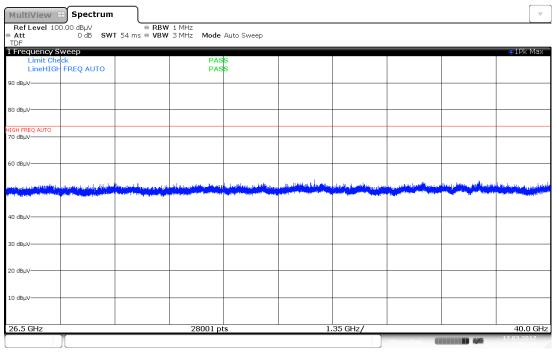


# Radiated Spurious Emissions Measurements (Above 18GHz) §15.209

MultiView 🖽	Spectrum	$\neg$							$\nabla$
Ref Level 100.00 Att TDF	dBµV 0 dB <b>SWT</b>	● RBW 54 ms ● VBW	1 MHz 3 MHz Mode	Auto Sweep					
1 Frequency Swee	:p								●1Pk Max
Limit Check			PAS						
LineHIGH FRE	EQ AUTO		PAS	5					
90 dBµV									
80 dBµV									
HIGH FREQ AUTO 70 dBµV									
, o dopv									
60 dBµV									
لفاليس بيفر وفالغابليين بارين ويتبين		ويروق والروابي وتسامط أطرياتها	والركر أنتسا تسافظ المحترية والطباس	e	والعادا الدويين والمتلفظ أباده والروي	ويمرور الرواط فالأحط والمتلك	يفاقون فيلتج تدامينا ريان	وريدا فيعقب المقصور والمغاف	المقيسين وروريقيلهم أورا فلغة
on the state of th	والالتان ويستروعه والمتكافئة	and the second second second	محمدان كالحسفر سوستسب	and the second states in	and a second statement of the second statements	and and the second standing of the second	the second s	and the state of the	Interconnecting to an a state of the
40 dBµV									
30 dBµV									
20 dBµV									
10 dBµV									
26.5 GHz			28001 pt	s	1.	35 GHz/	-		40.0 GHz
							Measuring	4/4	17.03.2017

21:20:09 17.03.2017





21:16:03 17.03.2017

#### Plot 7-86. Radiated Spurious Plot above 26.5GHz - 40GHz (802.11a – Ant. Pol. V)

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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	135	319	-58.62	12.30	0.00	60.68	68.20	-7.52
*	15540.00	Average	Н	-	-	-73.72	16.93	0.00	50.21	53.98	-3.77
*	15540.00	Peak	Н	-	-	-58.58	16.93	0.00	65.35	73.98	-8.63
*	20720.00	Average	Н	100	10	-69.61	8.13	-9.54	35.98	53.98	-18.00
*	20720.00	Peak	Н	100	10	-59.66	8.13	-9.54	45.93	73.98	-28.05
	25900.00	Peak	Н	-	-	-57.34	8.50	-9.54	48.62	68.20	-19.58

#### 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	101	296	-58.53	12.23	0.00	60.70	68.20	-7.50
*	15600.00	Average	Н	-	-	-73.03	16.96	0.00	50.93	53.98	-3.05
*	15600.00	Peak	Н	-	-	-58.12	16.96	0.00	65.84	73.98	-8.14
*	20800.00	Average	Н	100	87	-71.58	8.16	-9.54	34.03	53.98	-19.95
*	20800.00	Peak	Н	100	87	-58.73	8.16	-9.54	46.88	73.98	-27.10
	26000.00	Peak	Н	-	-	-58.26	8.52	-9.54	47.72	68.20	-20.48
				Tal	ble 7-15 R	A hoteihe	logeurom	onte			

#### Table 7-15. Radiated Measurements

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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	104	293	-58.45	12.31	0.00	60.86	68.20	-7.34
*	15720.00	Average	Н	-	-	-72.54	16.49	0.00	50.95	53.98	-3.03
*	15720.00	Peak	Н	-	-	-57.50	16.49	0.00	65.99	73.98	-7.99
*	20960.00	Average	Н	100	128	-70.34	8.12	-9.54	35.24	53.98	-18.74
*	20960.00	Peak	Н	100	128	-59.24	8.12	-9.54	46.34	73.98	-27.64
	26200.00	Peak	Н	-	-	-56.68	8.62	-9.54	49.40	68.20	-18.80

### 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	105	302	-58.49	12.60	0.00	61.11	68.20	-7.09
*	15780.00	Average	Н	-	-	-73.57	16.17	0.00	49.60	53.98	-4.38
*	15780.00	Peak	Н	-	-	-57.81	16.17	0.00	65.36	73.98	-8.62
*	21040.00	Average	Н	100	122	-71.10	8.10	-9.54	34.46	53.98	-19.52
*	21040.00	Peak	Н	100	122	-59.30	8.10	-9.54	46.26	73.98	-27.72
	26300.00	Peak	Н	-	-	-56.40	8.76	-9.54	49.82	68.20	-18.38

Table 7-17. Radiated Measurements

FCC ID: ZNFTP450		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)		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]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
	10560.00	Peak	н	107	294	-58.36	12.55	0.00	61.19	68.20	-7.01
*	15840.00	Average	н	-	-	-73.43	16.16	0.00	49.73	53.98	-4.25
*	15840.00	Peak	н	-	-	-57.48	16.16	0.00	65.68	73.98	-8.30
*	21120.00	Average	н	100	55	-70.33	8.09	-9.54	35.21	53.98	-18.77
*	21120.00	Peak	н	100	55	-59.11	8.09	-9.54	46.43	73.98	-27.55
	26400.00	Peak	н	-	-	-57.03	8.99	-9.54	49.42	68.20	-18.78

# 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	107	293	-70.28	12.89	0.00	49.61	53.98	-4.37
*	10640.00	Peak	н	107	293	-58.58	12.89	0.00	61.31	73.98	-12.67
*	15960.00	Average	Н	-	-	-73.32	16.27	0.00	49.95	53.98	-4.02
*	15960.00	Peak	Н	-	-	-58.11	16.27	0.00	65.16	73.98	-8.81
*	21280.00	Average	Н	100	59	-69.76	8.07	-9.54	35.77	53.98	-18.21
*	21280.00	Peak	н	100	59	-58.78	8.07	-9.54	46.75	73.98	-27.23
	26600.00	Peak	Н	-	-	-46.77	-8.30	-9.54	42.39	68.20	-25.81

Table 7-19. Radiated Measurements

FCC ID: ZNFTP450		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	100	301	-70.54	12.80	0.00	49.26	53.98	-4.72
*	11000.00	Peak	Н	100	301	-58.68	12.80	0.00	61.12	73.98	-12.86
	16500.00	Peak	Н	-	-	-57.81	15.53	0.00	64.72	68.20	-3.48
	22000.00	Peak	Н	-	-	-58.86	8.35	-9.54	46.94	68.20	-21.26
	27500.00	Peak	Н	-	-	-45.46	-8.93	-9.54	43.07	68.20	-25.13

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	-	-	-70.32	12.97	0.00	49.65	53.98	-4.32
*	11160.00	Peak	Н	-	-	-59.33	12.97	0.00	60.64	73.98	-13.33
	16740.00	Peak	Н	-	-	-59.46	16.15	0.00	63.69	68.20	-4.51
*	22320.00	Average	Н	-	-	-70.16	8.20	-9.54	35.50	53.98	-18.48
*	22320.00	Peak	Н	-	-	-57.88	8.20	-9.54	47.78	73.98	-26.20
	27900.00	Peak	н	-	-	-45.14	-9.24	-9.54	43.08	68.20	-25.12

Table 7-21. Radiated Measurements

FCC ID: ZNFTP450		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	-	-	-70.34	14.14	0.00	50.80	53.98	-3.18
*	11400.00	Peak	Н	-	-	-59.10	14.14	0.00	62.04	73.98	-11.94
	17100.00	Peak	Н	-	-	-62.49	19.31	0.00	63.82	68.20	-4.38
*	22800.00	Average	Н	-	-	-71.70	8.29	-9.54	34.04	53.98	-19.94
*	22800.00	Peak	Н	-	-	-60.22	8.29	-9.54	45.52	73.98	-28.46
	28500.00	Peak	Н	-	-	-45.81	-9.03	-9.54	42.62	68.20	-25.58

# 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	-	-	-70.84	14.05	0.00	50.21	53.98	-3.77
*	11490.00	Peak	Н	-	-	-59.53	14.05	0.00	61.52	73.98	-12.46
	17235.00	Peak	Н	-	-	-62.34	19.32	0.00	63.98	68.20	-4.22
*	22980.00	Average	Н	-	-	-72.67	8.19	-9.54	32.98	53.98	-21.00
*	22980.00	Peak	н	-	-	-61.10	8.19	-9.54	44.55	73.98	-29.43
	28725.00	Peak	Н	-	-	-45.26	-9.45	-9.54	42.75	68.20	-25.45

Table 7-23. Radiated Measurements

FCC ID: ZNFTP450		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]	Distance Correction Factor [dB]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
*	11570.00	Average	Н	-	-	-70.51	13.85	0.00	50.34	53.98	-3.64
*	11570.00	Peak	Н	-	-	-58.89	13.85	0.00	61.96	73.98	-12.02
	17355.00	Peak	Н	-	-	-62.86	20.51	0.00	64.65	68.20	-3.55
	23140.00	Peak	Н	-	-	-59.20	8.47	-9.54	46.72	68.20	-21.48
	28925.00	Peak	Н	-	-	-45.06	-9.71	-9.54	42.69	68.20	-25.51

Table 7-24. Radiated Measurements

Worst Case Mode: Worst Case Transfer Rate: Distance of Measurements: Operating Frequency: Channel: 802.11a 6 Mbps 1 & 3 Meters 5825MHz 165

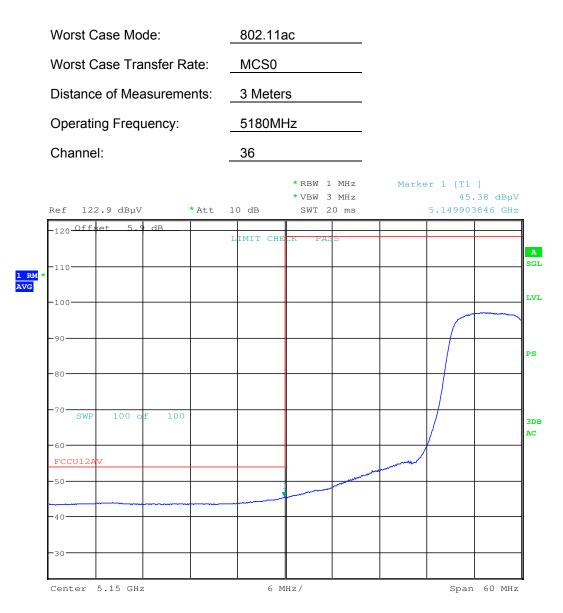
	Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
*	11650.00	Average	н	-	-	-70.53	14.19	0.00	50.66	53.98	-3.32
*	11650.00	Peak	Н	-	-	-58.24	14.19	0.00	62.95	73.98	-11.03
	17475.00	Peak	Н	-	-	-63.69	21.75	0.00	65.06	68.20	-3.14
	23300.00	Peak	Н	100	105	-59.10	8.60	-9.54	46.96	68.20	-21.24
	29125.00	Peak	Н	-	-	-44.56	-9.93	-9.54	42.97	68.20	-25.23

Table 7-25. Radiated Measurements

FCC ID: ZNFTP450		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dega 76 of 112	
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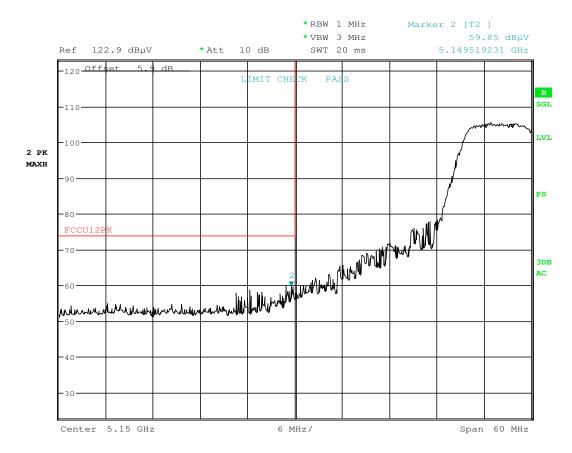
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#### Plot 7-87. Radiated Restricted Lower Band Edge Plot (Average – UNII Band 1)

FCC ID: ZNFTP450		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	💽 LG	Approved by: Quality Manager			
Test Report S/N:	Test Dates:	EUT Type:		Dege 77 of 112			
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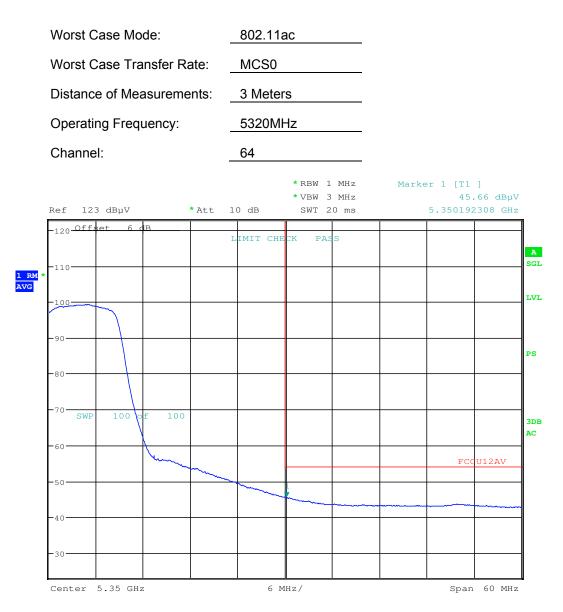
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#### Plot 7-88. Radiated Restricted Lower Band Edge Plot (Peak – UNII Band 1)

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Test Report S/N:	Test Dates:	EUT Type:		Dego 70 of 112		
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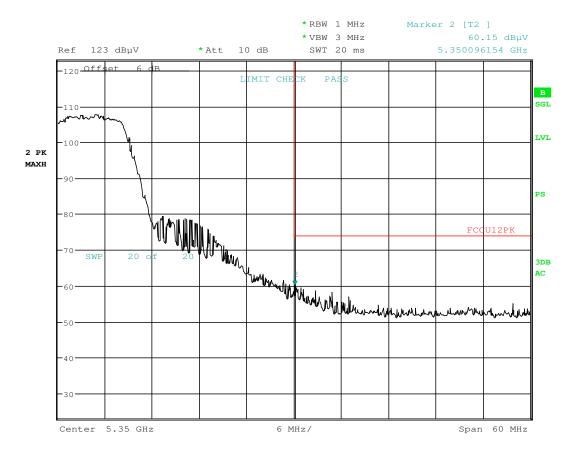
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#### Plot 7-89. Radiated Restricted Upper Band Edge Plot (Average – UNII Band 2A)

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Test Report S/N:	Test Dates:	EUT Type:		Daga 70 of 112			
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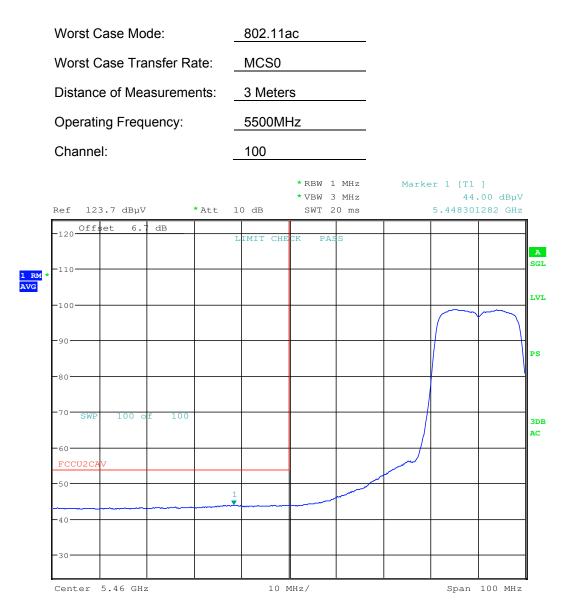
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#### Plot 7-90. Radiated Restricted Upper Band Edge Plot (Peak - UNII Band 2A)

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Test Report S/N:	Test Dates:	EUT Type:		Dogo 90 of 112		
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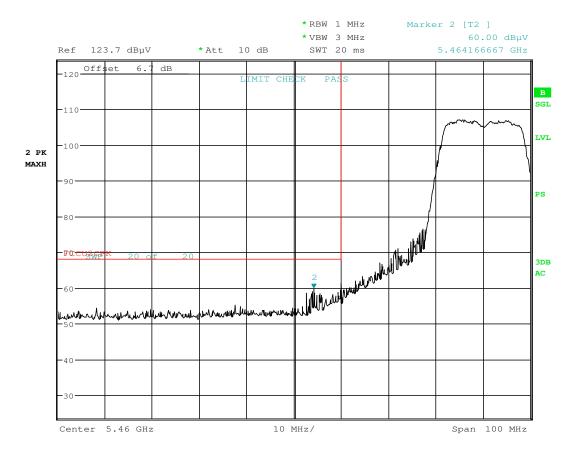
Date: 9.MAR.2017 07:12:09

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

FCC ID: ZNFTP450		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager			
Test Report S/N:	Test Dates:	EUT Type:		Dego 01 of 112			
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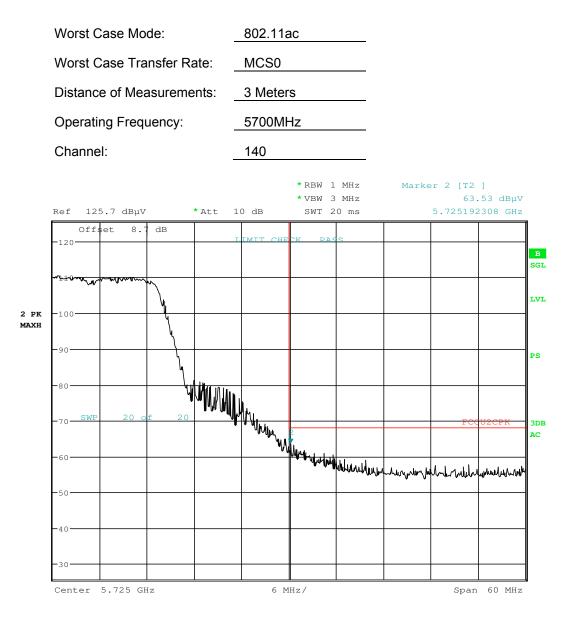
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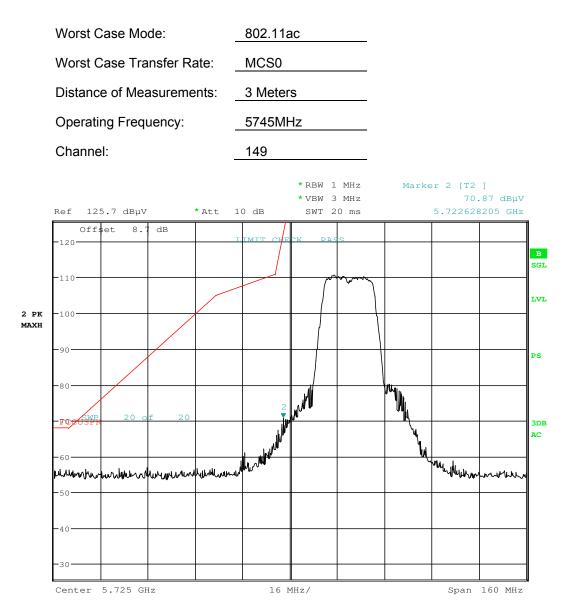
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# Plot 7-93. Radiated Upper Band Edge Plot (Peak – UNII Band 2C)

FCC ID: ZNFTP450		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager			
Test Report S/N:	Test Dates:	EUT Type:		Daga 92 of 112			
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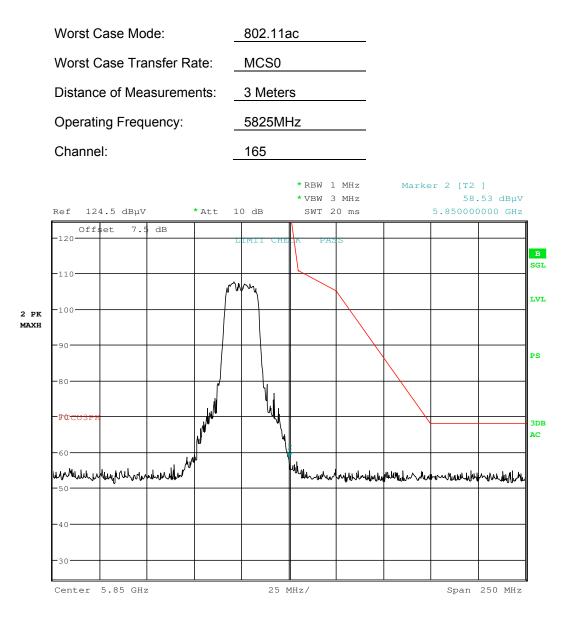
Date: 16.MAR.2017 05:32:28

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

FCC ID: ZNFTP450		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager			
Test Report S/N:	Test Dates:	EUT Type:		Dege 94 of 112			
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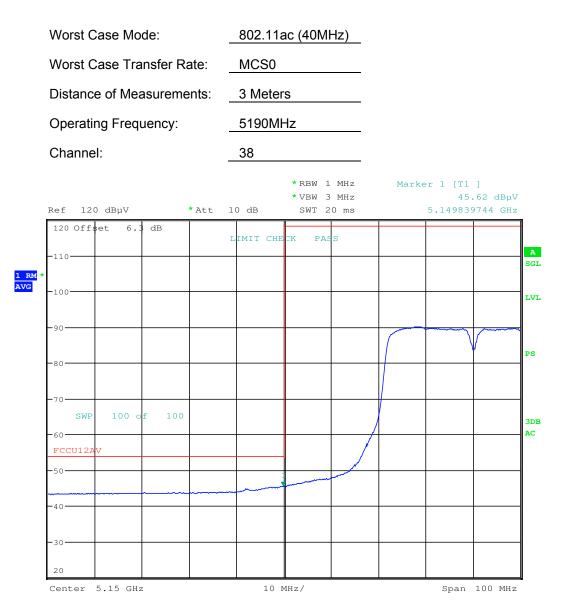
Date: 9.MAR.2017 07:20:15

#### Plot 7-95. Radiated Upper Band Edge Plot (Peak – UNII Band 3)

FCC ID: ZNFTP450		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dege 95 of 112
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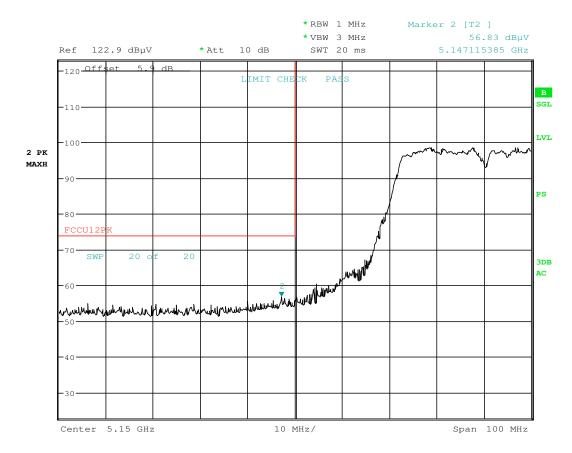
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#### Plot 7-96. Radiated Restricted Lower Band Edge Plot (Average – UNII Band 1)

FCC ID: ZNFTP450		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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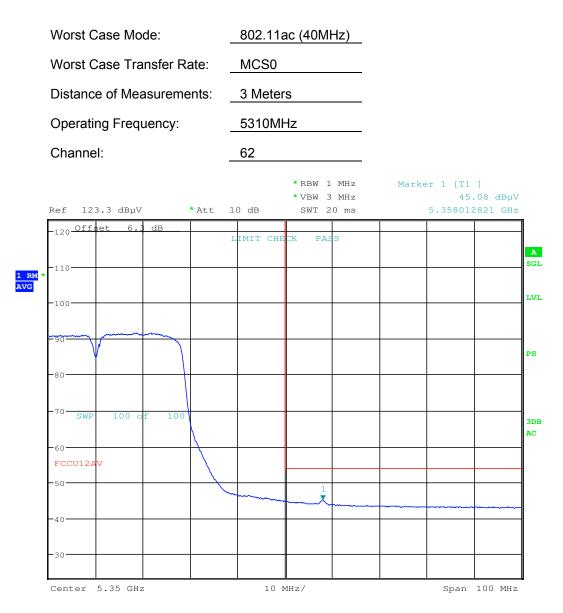
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#### Plot 7-97. Radiated Restricted Lower Band Edge Plot (Peak – UNII Band 1)

FCC ID: ZNFTP450		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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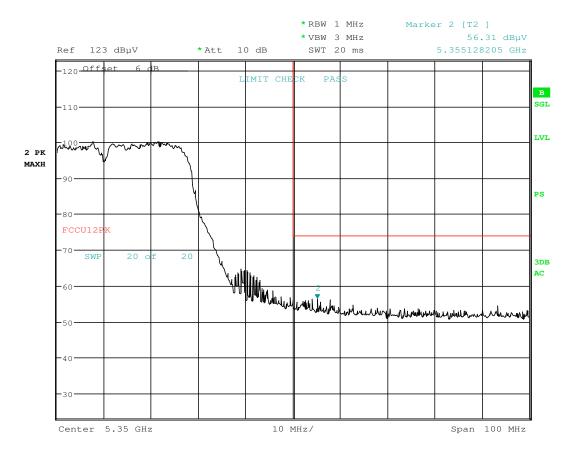
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#### Plot 7-98. Radiated Restricted Upper Band Edge Plot (Average – UNII Band 2A)

FCC ID: ZNFTP450		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 89 of 112
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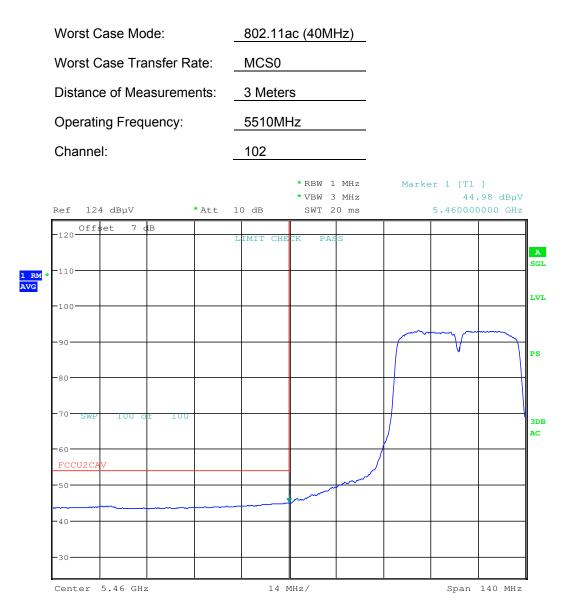
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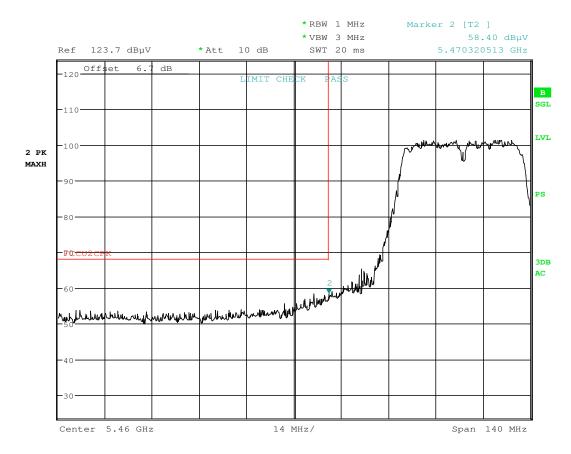
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#### Plot 7-100. Radiated Restricted Lower Band Edge Plot (Average – UNII Band 2C)

FCC ID: ZNFTP450		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Page 90 of 113
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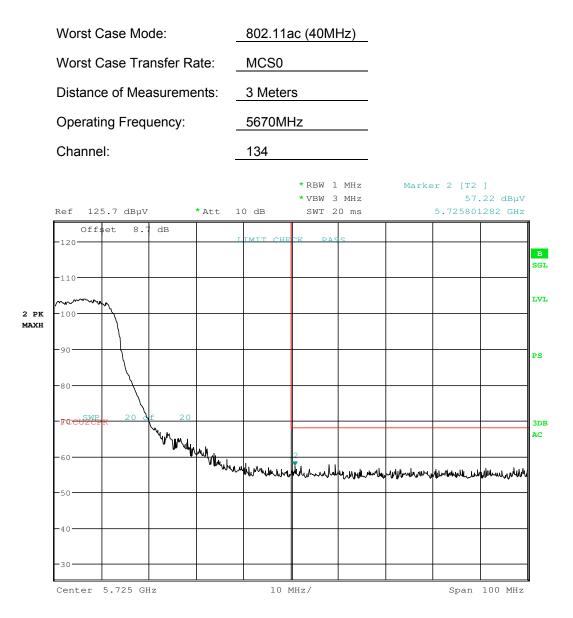
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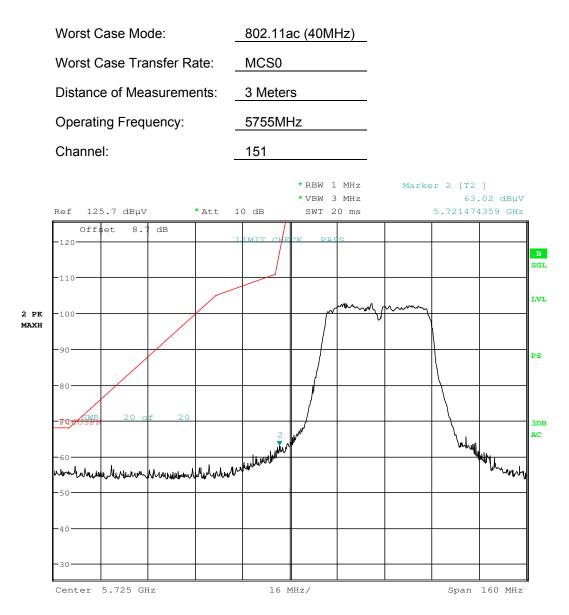
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# Plot 7-102. Radiated Upper Band Edge Plot (Peak – UNII Band 2C)

FCC ID: ZNFTP450		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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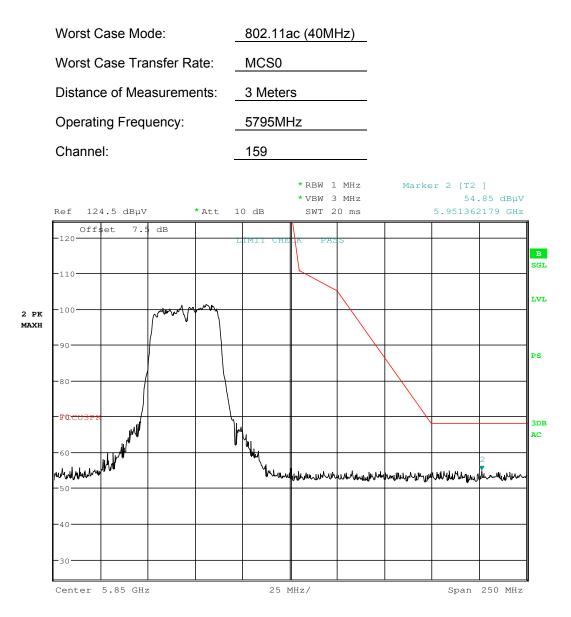
Date: 16.MAR.2017 05:52:45

# Plot 7-103. Radiated Lower Band Edge Plot (Peak – UNII Band 3)

FCC ID: ZNFTP450		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dogo 02 of 112
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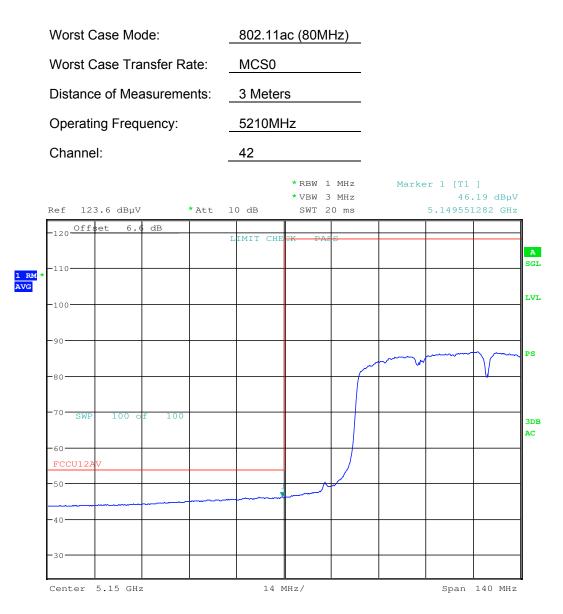
Date: 9.MAR.2017 07:49:57

# Plot 7-104. Radiated Upper Band Edge Plot (Peak – UNII Band 3)

FCC ID: ZNFTP450		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega 04 of 112
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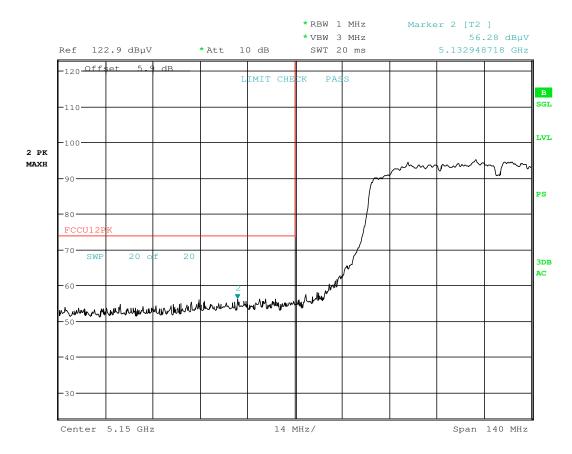
Date: 9.MAR.2017 07:55:05

#### Plot 7-105. Radiated Restricted Lower Band Edge Plot (Average – UNII Band 1)

FCC ID: ZNFTP450		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	💽 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega 05 of 112
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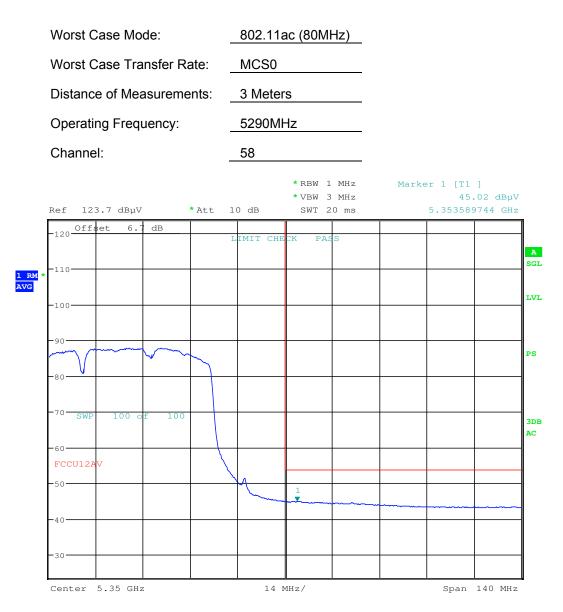
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# Plot 7-106. Radiated Restricted Lower Band Edge Plot (Peak - UNII Band 1)

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Test Report S/N:	Test Dates:	EUT Type:		Dage 06 of 112
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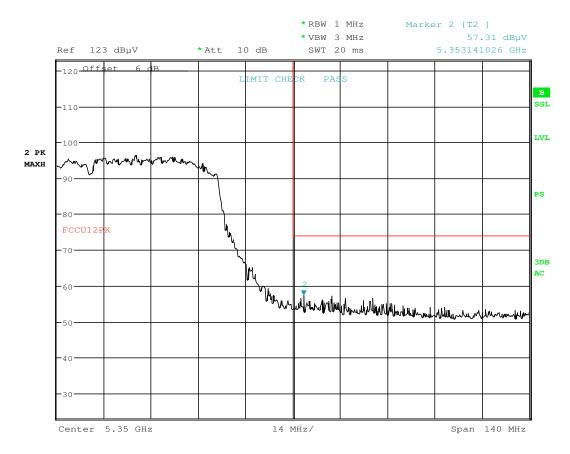
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#### Plot 7-107. Radiated Restricted Upper Band Edge Plot (Average – UNII Band 2A)

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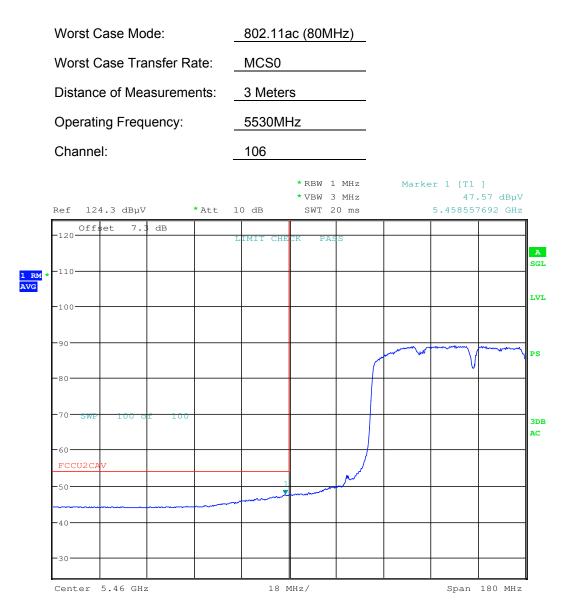
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Test Report S/N:	Test Dates:	EUT Type:		Dego 00 of 112
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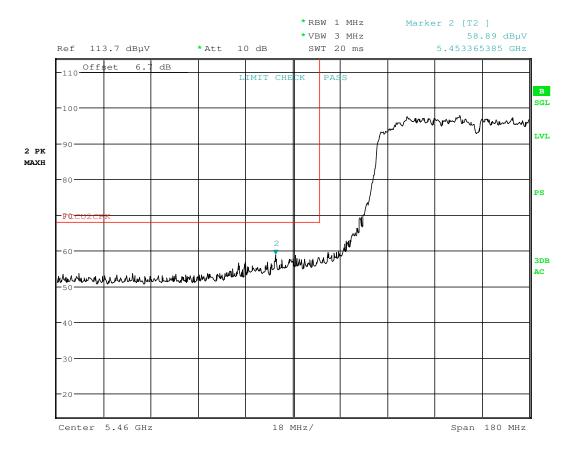
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#### Plot 7-109. Radiated Restricted Lower Band Edge Plot (Average – UNII Band 2C)

FCC ID: ZNFTP450		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	💽 LG	Approved by: Quality Manager
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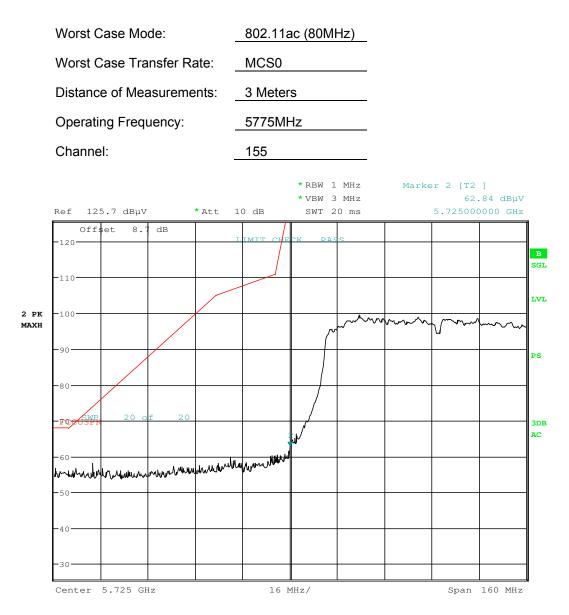
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#### Plot 7-110. Radiated Restricted Lower Band Edge Plot (Peak – UNII Band 2C)

FCC ID: ZNFTP450		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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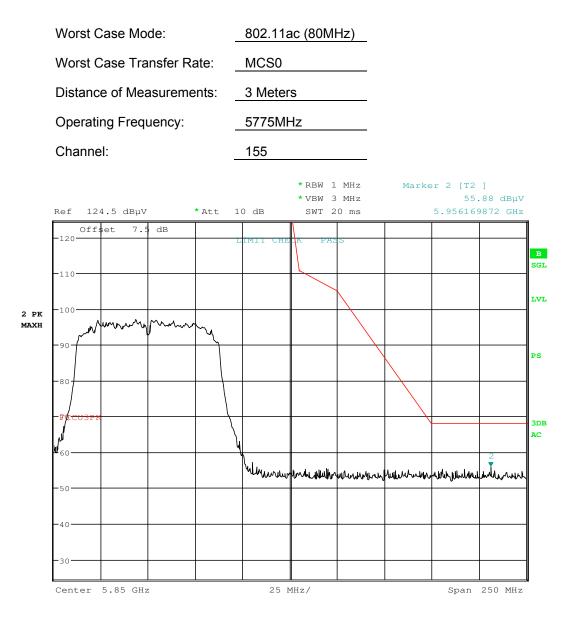
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# Plot 7-111. Radiated Lower Band Edge Plot (Peak – UNII Band 3)

FCC ID: ZNFTP450		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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Date: 9.MAR.2017 08:09:58

# Plot 7-112. Radiated Upper Band Edge Plot (Peak – UNII Band 3)

FCC ID: ZNFTP450		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

FCC ID: ZNFTP450		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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The EUT and measurement equipment were set up as shown in the diagrams below.

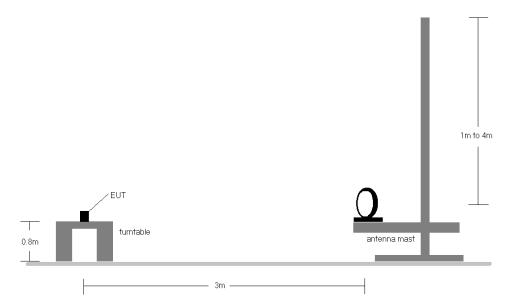
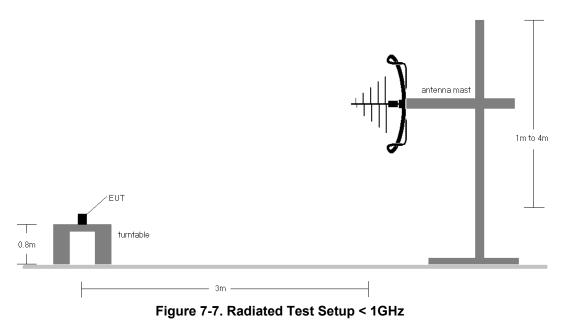


Figure 7-6. Radiated Test Setup < 30MHz



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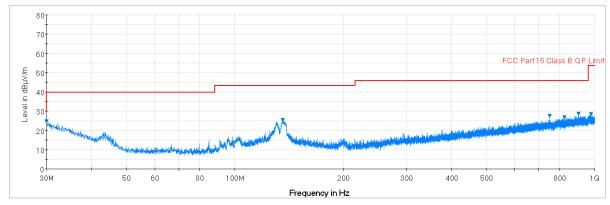
- 1. All emissions lying in restricted bands specified in §15.205 are below the limit shown in Table 7-26.
- 2. The broadband receive antenna is manipulated through vertical and horizontal polarizations during the tests. The EUT is manipulated through three orthogonal planes.
- 3. This unit was tested 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.
- 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.

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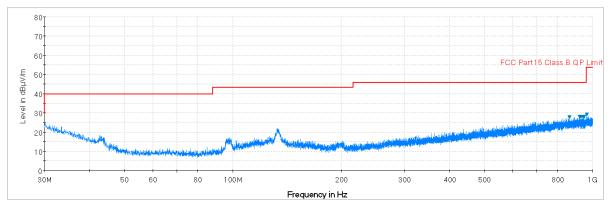
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# Radiated Spurious Emissions Measurements (Below 1GHz) §15.209



Plot 7-113. Radiated Spurious Plot below 1GHz (802.11a - U3 Ch. 157, Ant. Pol. H)



Plot 7-114. Radiated Spurious Plot below 1GHz (802.11a - U3 Ch. 157, Ant. Pol. V)

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#### 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 L	₋imit (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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The EUT and measurement equipment were set up as shown in the diagram below.

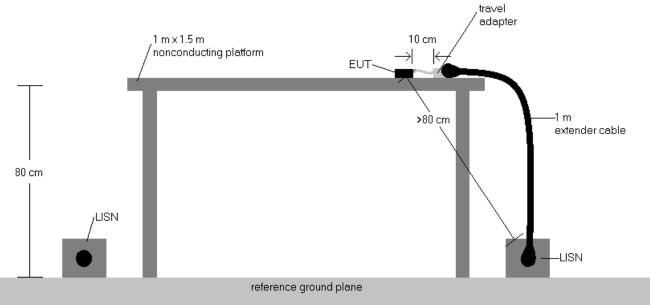


Figure 7-8. Test Instrument & Measurement Setup

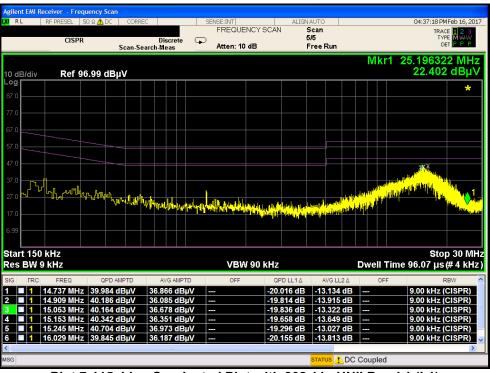
### Test Notes

- 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 $\mu$ V) = QP/AV Analyzer/Receiver Level (dB $\mu$ V) + Corr. (dB)
- 5. Margin (dB) = QP/AV Limit (dB $\mu$ V) QP/AV Level (dB $\mu$ V)
- 6. Traces shown in plot are made using a peak detector.
- 7. Deviations to the Specifications: None.

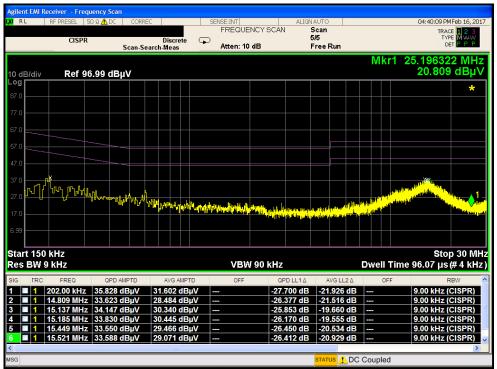
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Plot 7-115. Line Conducted Plot with 802.11a UNII Band 1 (L1)

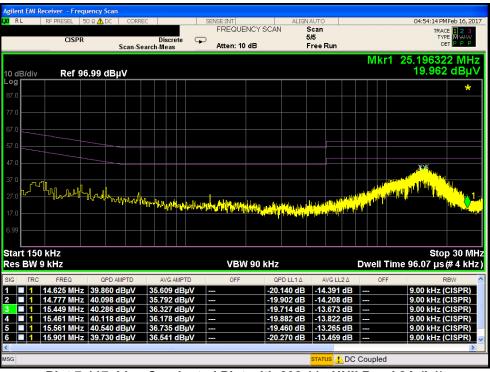


#### Plot 7-116. Line Conducted Plot with 802.11a UNII Band 1 (N)

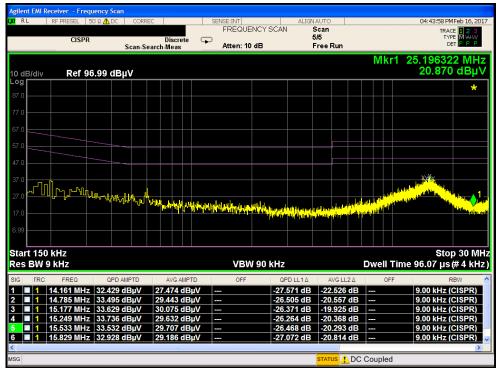
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Plot 7-117. Line Conducted Plot with 802.11a UNII Band 2A (L1)

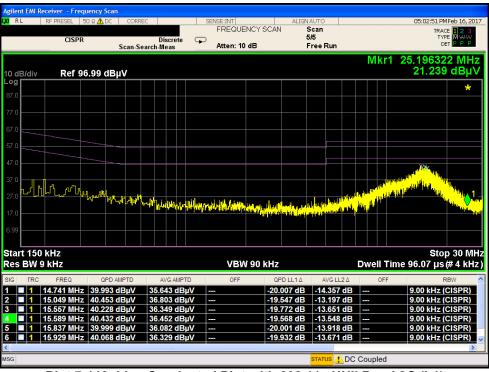


#### Plot 7-118. Line Conducted Plot with 802.11a UNII Band 2A (N)

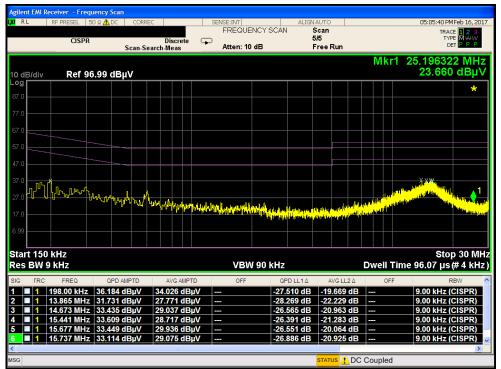
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Plot 7-119. Line Conducted Plot with 802.11a UNII Band 2C (L1)

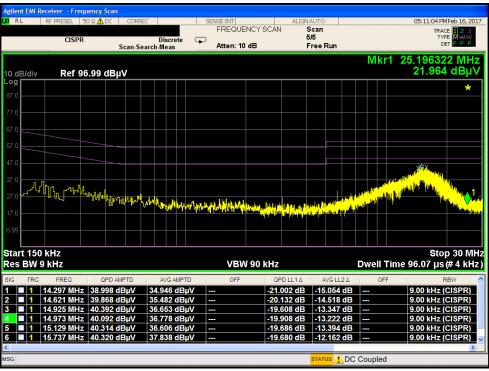


#### Plot 7-120. Line Conducted Plot with 802.11a UNII Band 2C (N)

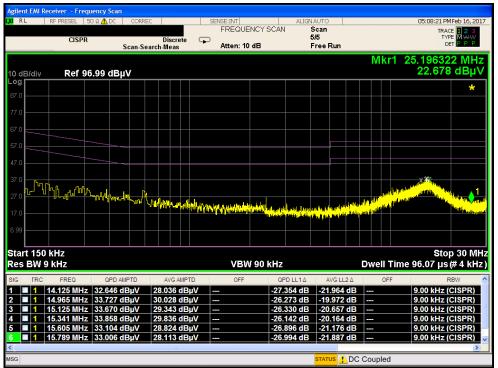
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Plot 7-121. Line Conducted Plot with 802.11a UNII Band 3 (L1)



Plot 7-122. 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 **LG Portable Handset FCC ID: ZNFTP450** is in compliance with Part 15E of the FCC Rules.

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